FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

RFID MODULE

MODEL NUMBER: RI14C

FCC ID: ACJ9TGRI14C

REPORT NUMBER: 10552553H-A

ISSUE DATE: November 17, 2014

Prepared for
PANASONIC CORPORATION OF NORTH AMERICA
ONE PANASONIC WAY, 4B-8
SECAUCUS, NEW JERSEY, 07094, USA

Prepared by
UL Japan, Inc.
Ise EMC Lab.
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Mie-ken 516-0021 JAPAN
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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

Rev.	Issue Date	Revisions	Revised By
--	11/17/2014	Initial Issue	T. Hatakeda

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PANASONIC CORPORATION OF NORTH AMERICA
ONE PANASONIC WAY, 4B-8
SECAUCUS, NEW JERSEY, 07094, USA

EUT DESCRIPTION: RFID MODULE

MODEL: RI14C

SERIAL NUMBER: 4JTSA0282

DATE TESTED: November 5 to 12, 2014

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL Japan, Inc. By:

T. Hatakeda

Takahiro Hatakeda
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0
The full scope of accreditation can be viewed at
http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT 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)**
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.6dB
No.4	3.5dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz - 300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

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

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an RFID module that is embedded inside Panasonic laptop model CF-54. The radio module is manufactured by NXP.

5.2. MAXIMUM TRANSMITTER FIELD STRENGTH

The field strength of the transmitter is as follows:

Frequency Range (MHz)	Mode	Output Power (dBuV/m @ 30m)
13.56	Normal Mode Type A	22.1
13.56	Normal Mode Type B	22.3

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Loop antenna.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Regulation test EMVco_loopback.exe

5.5. WORST-CASE CONFIGURATION AND MODE

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

5.6. MODIFICATIONS

No modifications were made during testing.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Panasonic	CF-54	4JTSA00282	--
AC Adapter	Panasoinc	CF-AA5713AM3	ES554	D of C

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	AC	Un-Sheilded	1.80 m	N/A
2	DC	1	DC	Un-Sheilded	1.40 m	N/A

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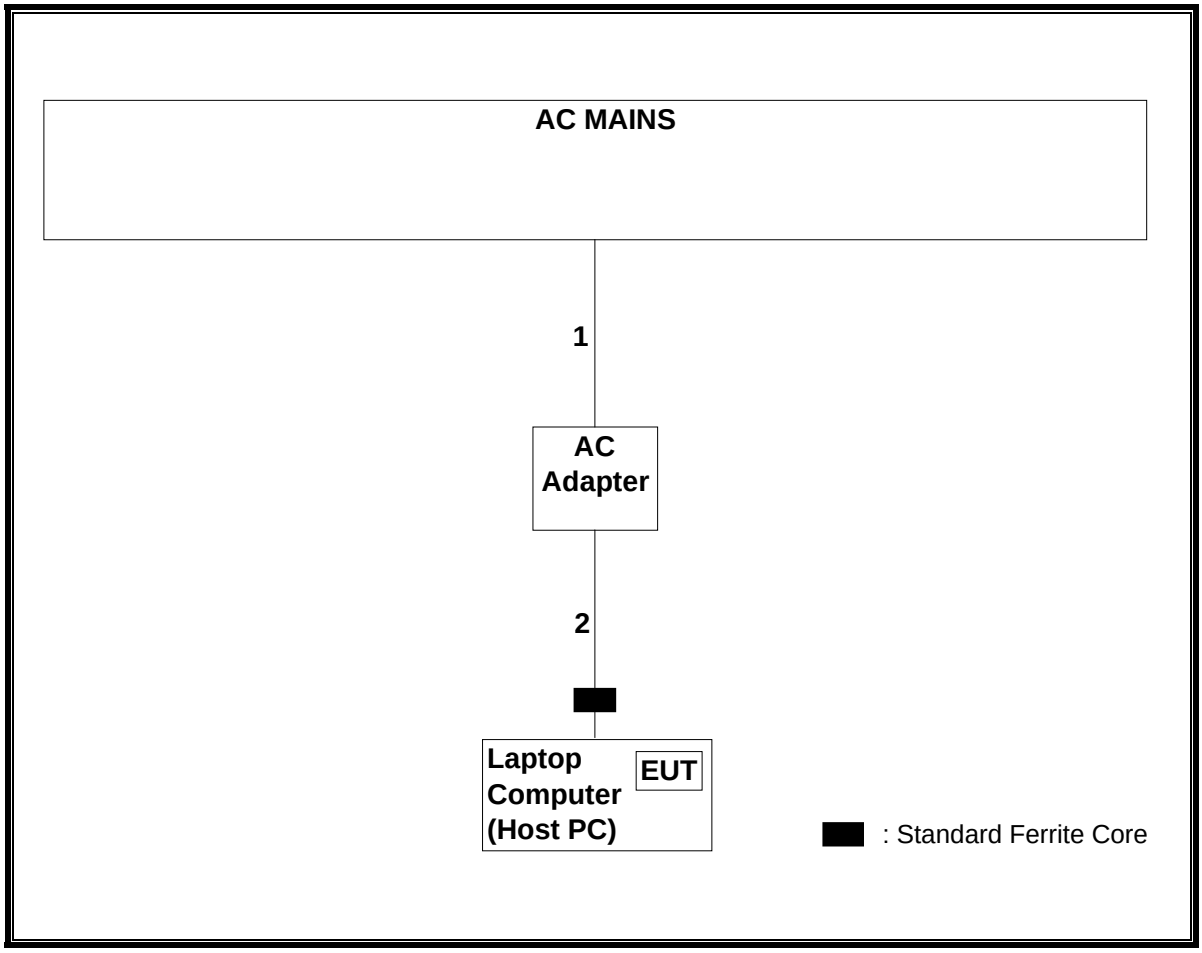
TEST SETUP

The EUT is installed in a host laptop computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2014/09/01 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2014/02/20 * 12
MJM-21	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	RE	2014/06/06 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2013/11/24 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	361	RE	2013/11/24 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2013/11/26 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	-	RE	2014/09/12 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2014/02/17 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2014/10/04 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2014/07/28 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	-/01068(Switcher)	RE	2014/09/12 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2014/03/14 * 12
MRENT-114						
MCH-05	Temperature and Humidity Chamber	Tabai Espec	PL-1KP	14019569	FT	2014/05/19 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	FT	2013/12/17 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2014/02/28 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	CE	2014/02/20 * 12
MJM-22	Measure	ASKUL	-	-	CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	CE	-
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	CE	2014/11/10 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2014/07/10 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2014/01/29 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform 141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2014/07/15 * 12

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

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

Test Item:
CE: Conducted emission
RE: Radiated emission
FT: Frequency Tolerance

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7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMIT

§15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:
§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

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In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.4

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 30 MHz to 1000 MHz.

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.

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RESULTS

7.2. FUNDAMENTAL EMISSION

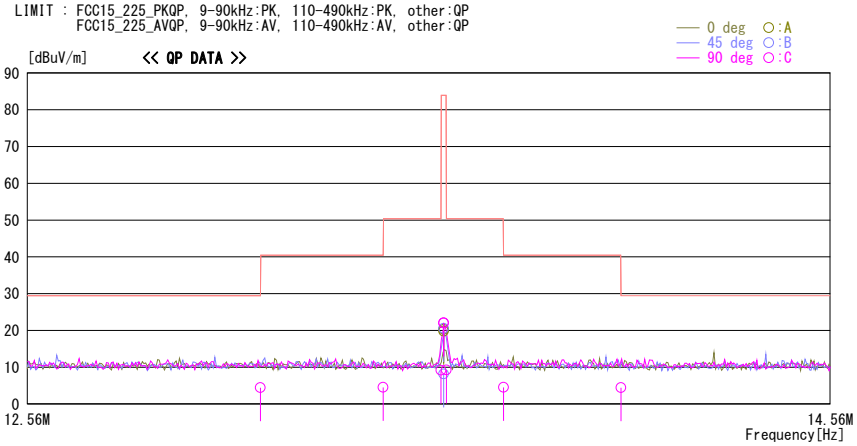
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp. / Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz without Type-A 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.	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	29.0	QP	19.5	-11.8	32.2	4.5	29.5	25.0	90	C	277	
13.41000	29.1	QP	19.4	-11.7	32.2	4.6	40.5	35.9	90	C	277	
13.55300	33.7	QP	19.4	-11.7	32.2	9.2	50.4	41.2	90	C	277	
13.56000	44.3	QP	19.4	-11.7	32.2	19.8	83.9	64.1	0	A	193	
13.56000	46.5	QP	19.4	-11.7	32.2	22.0	83.9	61.9	270	C	285	
13.56000	32.7	QP	19.4	-11.7	32.2	8.2	83.9	75.7	45	B	184	Loop:Hori
13.56000	45.1	QP	19.4	-11.7	32.2	20.6	83.9	63.3	45	B	303	
13.56000	46.6	QP	19.4	-11.7	32.2	22.1	83.9	61.8	90	C	277	*
13.56000	44.8	QP	19.4	-11.7	32.2	20.3	83.9	63.6	135	A	229	
13.56700	33.8	QP	19.4	-11.7	32.2	9.3	50.4	41.1	90	C	277	
13.71000	29.1	QP	19.4	-11.7	32.2	4.6	40.5	35.9	90	C	277	
14.01000	29.1	QP	19.3	-11.7	32.2	4.5	29.5	25.0	90	C	277	

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

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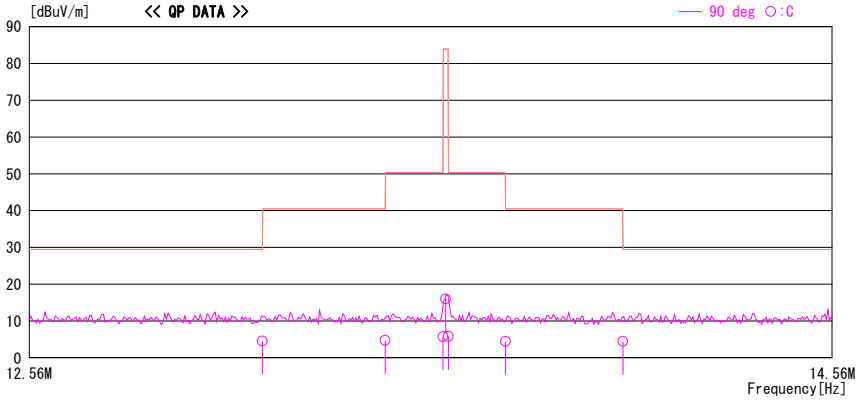
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./ Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz with Type-A 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.	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	29.1	QP	19.5	-11.8	32.2	4.6	29.5	24.9	90	C	290	
13.41000	29.2	QP	19.4	-11.7	32.2	4.7	40.5	35.8	90	C	290	
13.55300	30.2	QP	19.4	-11.7	32.2	5.7	50.4	44.7	90	C	290	
13.56000	40.5	QP	19.4	-11.7	32.2	16.0	83.9	67.9	90	C	290	
13.56700	30.3	QP	19.4	-11.7	32.2	5.8	50.4	44.6	90	C	290	
13.71000	29.0	QP	19.4	-11.7	32.2	4.5	40.5	36.0	90	C	290	
14.01000	29.1	QP	19.3	-11.7	32.2	4.5	29.5	25.0	90	C	290	

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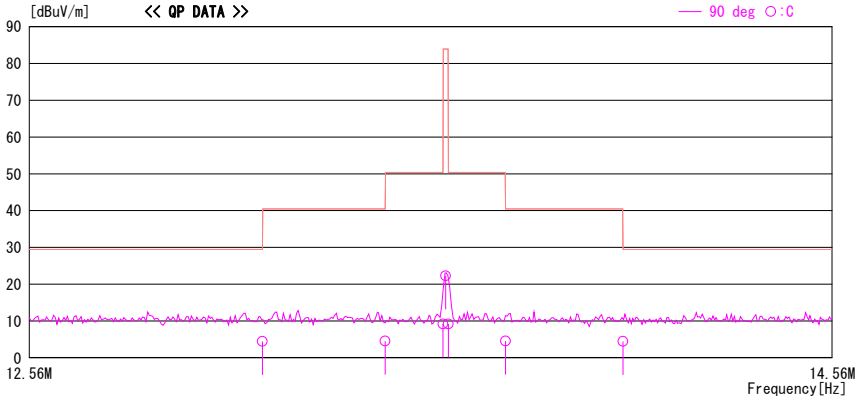
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz without Type-B 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



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13.56000	46.8	QP	19.4	-11.7	32.2	22.3	83.9	61.6	90	C	293	
13.56700	33.7	QP	19.4	-11.7	32.2	9.2	50.4	41.2	90	C	293	
13.71000	29.1	QP	19.4	-11.7	32.2	4.6	40.5	35.9	90	C	293	
14.01000	29.1	QP	19.3	-11.7	32.2	4.5	29.5	25.0	90	C	293	

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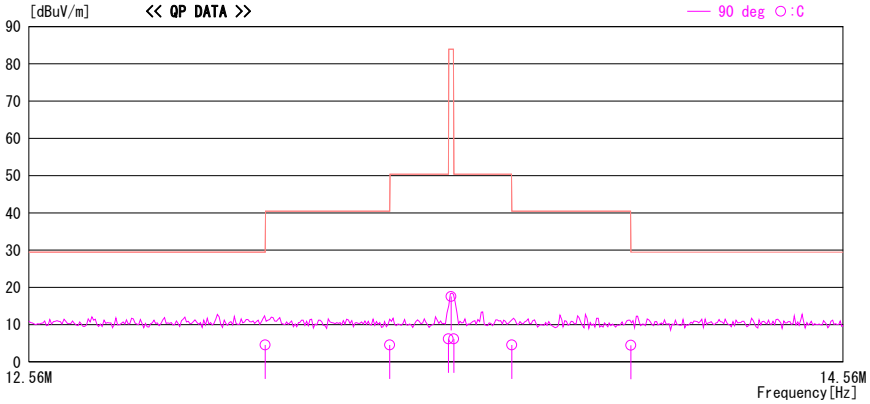

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13.11000	29.1	QP	19.5	-11.8	32.2	4.6	29.5	24.9	90	C	288	
13.41000	29.1	QP	19.4	-11.7	32.2	4.6	40.5	35.9	90	C	288	
13.55300	30.7	QP	19.4	-11.7	32.2	6.2	50.4	44.2	90	C	288	
13.56000	42.1	QP	19.4	-11.7	32.2	17.6	83.9	66.3	90	C	288	
13.56700	30.7	QP	19.4	-11.7	32.2	6.2	50.4	44.2	90	C	288	
13.71000	29.1	QP	19.4	-11.7	32.2	4.6	40.5	35.9	90	C	288	
14.01000	29.1	QP	19.3	-11.7	32.2	4.5	29.5	25.0	90	C	288	

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CALCULATION : RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN. + D.Factor) - GAIN(AMP.)

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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
90	13.56000	QP	46.6	19.4	28.2	32.2	-	62.0	-	-	without Type A tag
90	13.56000	QP	40.5	19.4	28.2	32.2	-	55.9	-	-	with Type A tag
90	13.56000	QP	46.8	19.4	28.2	32.2	-	62.2	-	-	without Type B tag
90	13.56000	QP	42.1	19.4	28.2	32.2	-	57.5	-	-	with Type B tag

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

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7.3. SPURIOUS EMISSIONS (0.15 – 30 MHz)

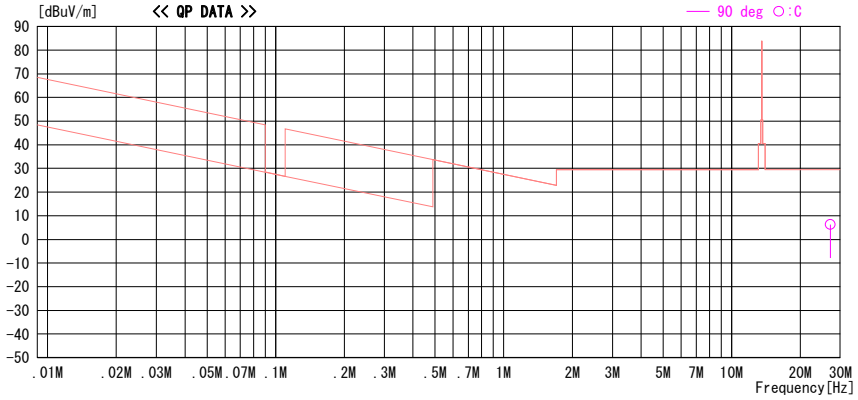
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./ Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz without Type-A 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	30.0	QP	19.7	-11.2	32.2	6.3	29.5	23.2	90	C	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. + D.Factor) - GAIN(AMP.)

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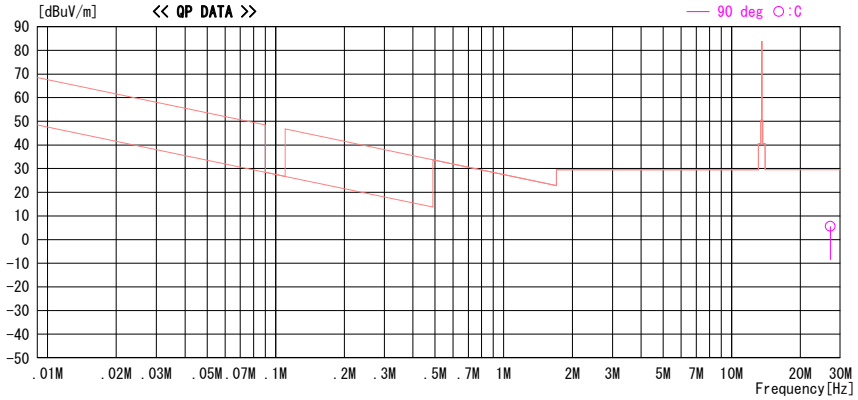
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./ Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz with Type-A 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.	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	19.7	-11.2	32.2	5.6	29.5	23.9	90	C	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. + D.Factor) - GAIN(AMP.)

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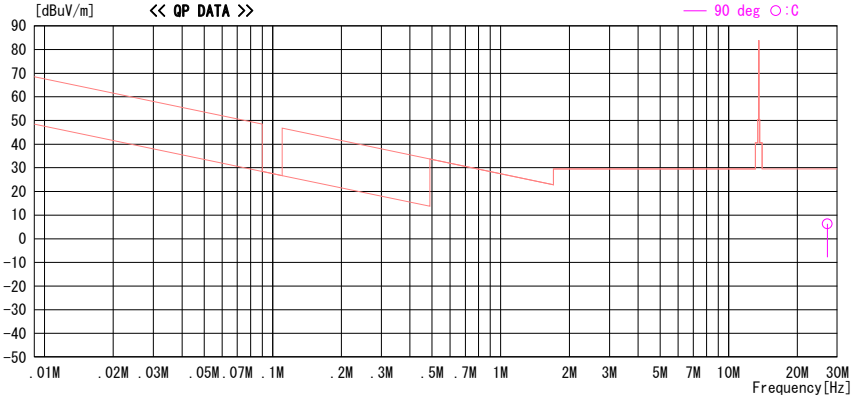
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp. / Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz without Type-B 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.	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	30.0	QP	19.7	-11.2	32.2	6.3	29.5	23.2	90	C	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. + D.Factor) - GAIN(AMP.)

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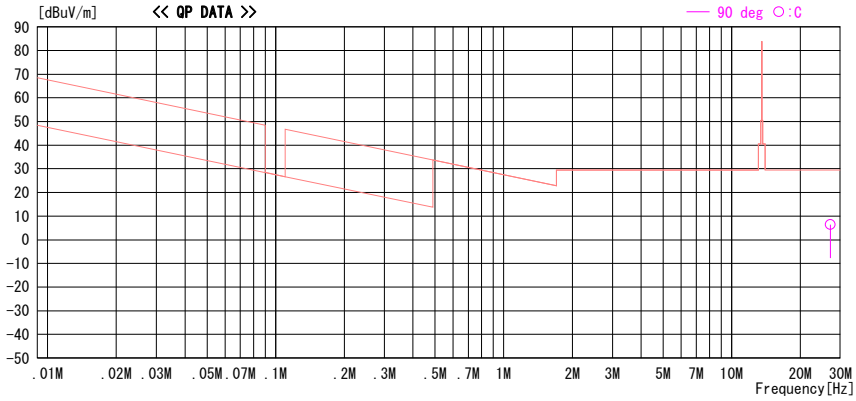
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./ Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz with Type-B 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.	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	30.1	QP	19.7	-11.2	32.2	6.4	29.5	23.1	90	C	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. + D.Factor) - GAIN(AMP.)

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7.4. SPURIOUS EMISSION 30 TO 1000 MHz

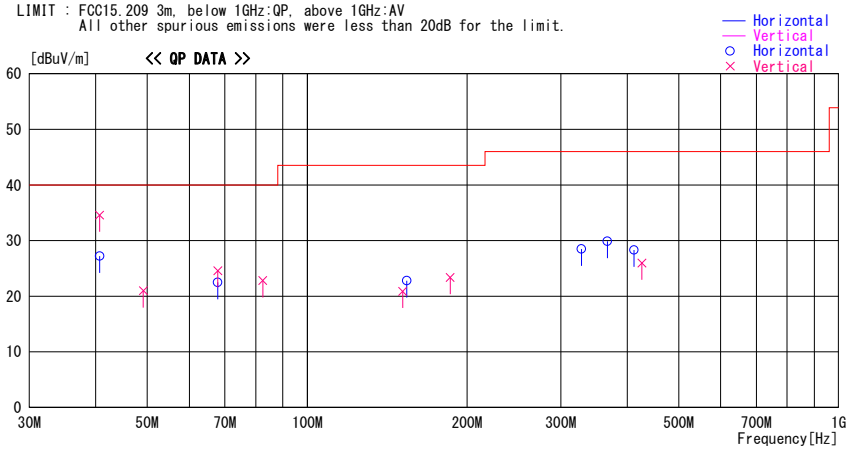
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz with Type-A TAG Worst-axis(Hori:Y / Vert:X)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:AV
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]	
40.680	44.4	QP	14.0	-31.2	27.2	21	198	Hori.	40.0	12.8	
40.681	51.8	QP	14.0	-31.2	34.6	312	100	Vert.	40.0	5.4	
49.170	41.0	QP	11.0	-31.0	21.0	311	100	Vert.	40.0	19.0	
67.817	46.4	QP	6.9	-30.8	22.5	57	222	Hori.	40.0	17.5	
67.876	48.5	QP	6.9	-30.8	24.6	187	100	Vert.	40.0	15.4	
82.485	46.5	QP	6.9	-30.6	22.8	96	100	Vert.	40.0	17.2	
151.202	35.7	QP	15.0	-29.8	20.9	94	100	Vert.	43.5	22.6	
153.908	37.5	QP	15.1	-29.8	22.8	88	211	Hori.	43.5	20.7	
185.831	36.9	QP	16.2	-29.7	23.4	214	100	Vert.	43.5	20.1	
328.056	41.2	QP	15.2	-27.9	28.5	182	102	Hori.	46.0	17.5	
367.335	41.1	QP	16.3	-27.5	29.9	192	110	Hori.	46.0	16.1	
412.224	37.9	QP	17.3	-26.9	28.3	191	107	Hori.	46.0	17.7	
426.252	35.4	QP	17.4	-26.8	26.0	6	141	Vert.	46.0	20.0	

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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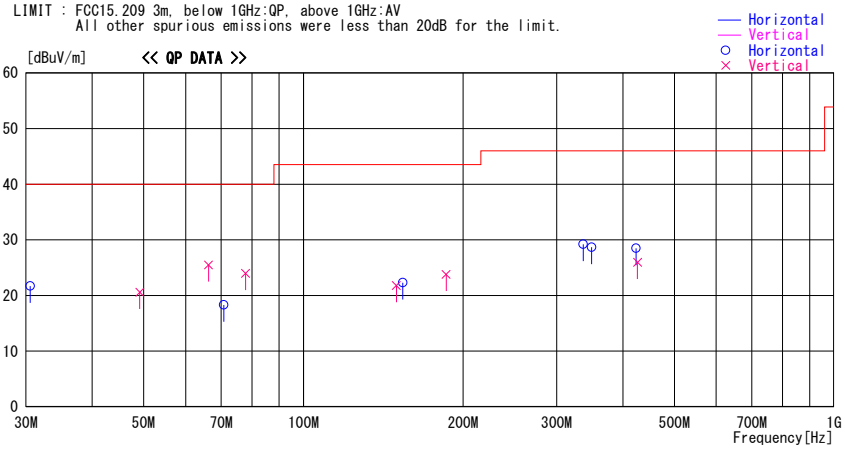
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz without Type-A TAG Worst-axis(Hori:Y / Vert:X)

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



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
30.577	35.6	QP	17.5	-31.4	21.7	221	214	Hori.	40.0	18.3	
49.170	40.6	QP	11.0	-31.0	20.6	321	100	Vert.	40.0	19.4	
66.264	49.3	QP	7.1	-30.9	25.5	182	100	Vert.	40.0	14.5	
70.830	42.5	QP	6.6	-30.8	18.3	67	211	Hori.	40.0	21.7	
77.813	48.2	QP	6.5	-30.7	24.0	109	100	Vert.	40.0	16.0	
149.682	36.8	QP	14.9	-29.9	21.8	98	100	Vert.	43.5	21.7	
153.892	37.0	QP	15.1	-29.8	22.3	89	211	Hori.	43.5	21.2	
185.822	37.3	QP	16.2	-29.7	23.8	211	100	Vert.	43.5	19.7	
336.776	41.5	QP	15.5	-27.8	29.2	188	100	Hori.	46.0	16.8	
349.592	40.5	QP	15.8	-27.6	28.7	190	109	Hori.	46.0	17.3	
423.323	37.9	QP	17.4	-26.8	28.5	187	106	Hori.	46.0	17.5	
426.252	35.4	QP	17.4	-26.8	26.0	6	141	Vert.	46.0	20.0	

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))

UL Japan, Inc. Ise EMC Lab.
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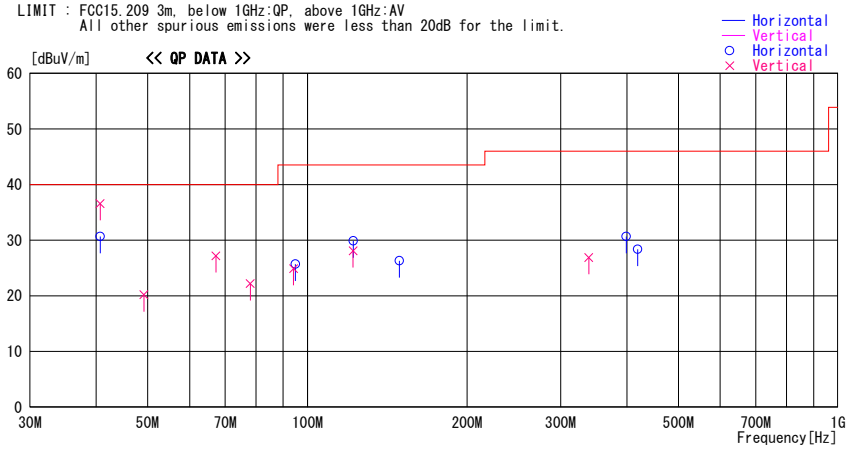
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz with Type-B TAG Worst-axis(Hori:Y / Vert:X)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:AV
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]	
40.680	47.9	QP	14.0	-31.2	30.7	12	198	Hori.	40.0	9.3	
40.672	53.8	QP	14.0	-31.2	36.6	331	100	Vert.	40.0	3.4	
49.210	40.2	QP	11.0	-31.0	20.2	302	100	Vert.	40.0	19.8	
67.226	51.2	QP	6.9	-30.9	27.2	188	100	Vert.	40.0	12.8	
78.029	46.4	QP	6.5	-30.7	22.2	98	100	Vert.	40.0	17.8	
94.921	46.9	QP	9.2	-30.4	25.7	189	266	Hori.	43.5	17.8	
122.039	47.0	QP	13.1	-30.2	29.9	169	316	Hori.	43.5	13.6	
149.155	41.3	QP	14.9	-29.9	26.3	102	297	Hori.	43.5	17.2	
94.128	46.3	QP	9.0	-30.4	24.9	81	100	Vert.	43.5	18.6	
121.953	45.3	QP	13.0	-30.2	28.1	221	102	Vert.	43.5	15.4	
398.707	40.6	QP	17.1	-27.0	30.7	198	119	Hori.	46.0	15.3	
419.243	37.9	QP	17.4	-26.9	28.4	188	102	Hori.	46.0	17.6	
339.278	39.2	QP	15.5	-27.8	26.9	209	102	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 + ATTEN. - GAIN(AMP))

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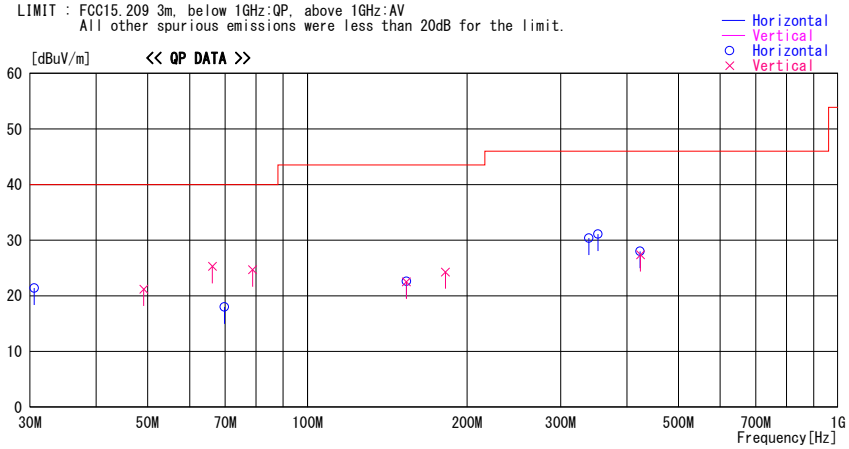
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/05

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./Humi. : 21deg.C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 13.56MHz without Type-B TAG Worst-axis(Hori:Y / Vert:X)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:AV
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]	
30.579	35.3	QP	17.5	-31.4	21.4	224	216	Hori.	40.0	18.6	
49.172	41.2	QP	11.0	-31.0	21.2	331	100	Vert.	40.0	18.8	
66.211	49.1	QP	7.1	-30.9	25.3	189	100	Vert.	40.0	14.7	
69.789	42.2	QP	6.6	-30.8	18.0	69	222	Hori.	40.0	22.0	
78.841	48.9	QP	6.5	-30.7	24.7	112	100	Vert.	40.0	15.3	
153.718	37.2	QP	15.1	-29.8	22.5	102	100	Vert.	43.5	21.0	
153.818	37.3	QP	15.1	-29.8	22.6	91	209	Hori.	43.5	20.9	
182.020	37.8	QP	16.2	-29.7	24.3	213	100	Vert.	43.5	19.2	
339.527	42.7	QP	15.5	-27.8	30.4	182	100	Hori.	46.0	15.6	
352.723	42.8	QP	15.9	-27.6	31.1	198	102	Hori.	46.0	14.9	
423.635	37.4	QP	17.4	-26.8	28.0	182	106	Hori.	46.0	18.0	
424.477	36.8	QP	17.4	-26.8	27.4	9	138	Vert.	46.0	18.6	

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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8. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

ANSI C63.4

UL Japan, Inc. Ise EMC Lab.
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RESULTS

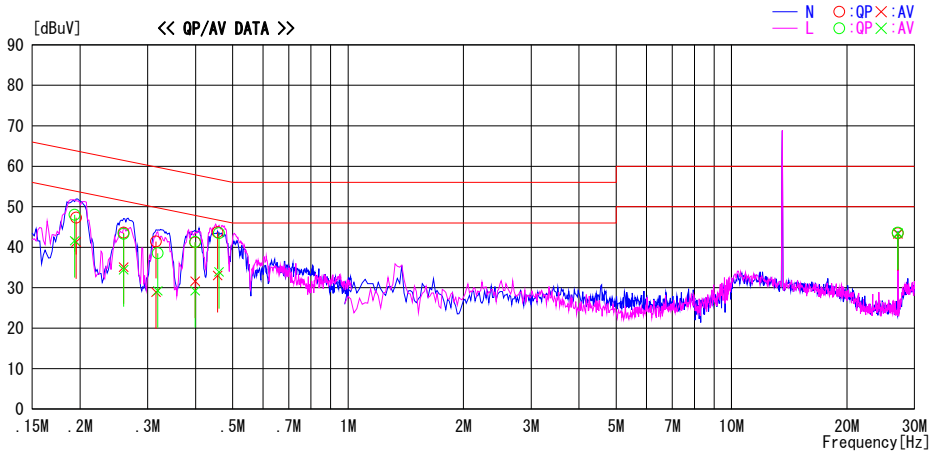
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/06

Report No. : 10552553H
Power : AC120V/60Hz
Temp./Humi. : 21deg. C / 61% RH
Engineer : Tsubasa Takayama

Mode / Remarks : Tx 13.56MHz Type A without Tag

LIMIT : FCC15.207 QP
FCC18 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]		
0.19359	34.8	28.4	13.2	48.0	41.6	63.9	53.9	15.9	12.3	L	
0.19533	34.1	28.1	13.2	47.3	41.3	63.8	53.8	16.5	12.5	N	
0.25984	30.3	21.8	13.3	43.6	35.1	61.4	51.4	17.8	16.3	N	
0.25984	30.0	21.1	13.3	43.3	34.4	61.4	51.4	18.1	17.0	L	
0.31563	28.1	15.6	13.3	41.4	28.9	59.8	49.8	18.4	20.9	N	
0.31912	25.2	15.9	13.3	38.5	29.2	59.7	49.7	21.2	20.5	L	
0.39932	27.9	18.3	13.3	41.2	31.6	57.9	47.9	16.7	16.3	N	
0.39932	28.0	15.9	13.3	41.3	29.2	57.9	47.9	16.6	18.7	L	
0.45685	30.4	19.7	13.3	43.7	33.0	56.7	46.7	13.0	13.7	N	
0.46034	30.2	20.6	13.3	43.5	33.9	56.7	46.7	13.2	12.8	L	
27.12000	27.8	27.7	15.6	43.4	43.3	60.0	50.0	16.6	6.7	N	
27.12000	28.0	27.9	15.6	43.6	43.5	60.0	50.0	16.4	6.5	L	

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

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN TEL: +81 596 24 8116 FAX: +81 596 24 8124

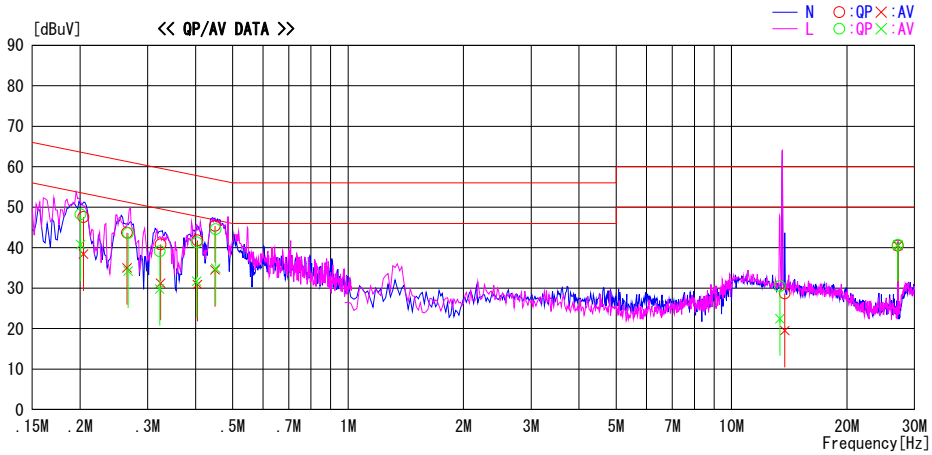
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/06

Report No. : 10552553H
Power : AC120V/60Hz
Temp./Humi. : 21deg. C / 61% RH
Engineer : Tsubasa Takayama

Mode / Remarks : Tx 13.56MHz Type A with Tag

LIMIT : FCC15.207 QP
FCC18 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]		
0.20056	34.9	27.5	13.3	48.2	40.8	63.6	53.6	15.4	12.8	L	
0.20405	34.3	25.1	13.3	47.6	38.4	63.4	53.4	15.8	15.0	N	
0.26507	30.4	21.7	13.3	43.7	35.0	61.3	51.3	17.6	16.3	N	
0.26681	30.3	20.9	13.3	43.6	34.2	61.2	51.2	17.6	17.0	L	
0.32261	25.8	16.5	13.3	39.1	29.8	59.6	49.6	20.5	19.8	L	
0.32435	27.5	17.9	13.3	40.8	31.2	59.6	49.6	18.8	18.4	N	
0.40281	28.0	18.4	13.3	41.3	31.7	57.8	47.8	16.5	16.1	L	
0.40455	28.5	17.6	13.3	41.8	30.9	57.8	47.8	16.0	16.9	N	
0.44988	32.1	21.2	13.3	45.4	34.5	56.9	46.9	11.5	12.4	N	
0.45162	31.3	21.6	13.3	44.6	34.9	56.8	46.8	12.2	11.9	L	
13.35600	15.8	7.7	14.7	30.5	22.4	60.0	50.0	29.5	27.6	L	
13.76712	14.0	4.8	14.7	28.7	19.5	60.0	50.0	31.3	30.5	N	
27.12000	24.9	24.9	15.6	40.5	40.5	60.0	50.0	19.5	9.5	N	
27.12000	25.1	25.1	15.6	40.7	40.7	60.0	50.0	19.3	9.3	L	

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

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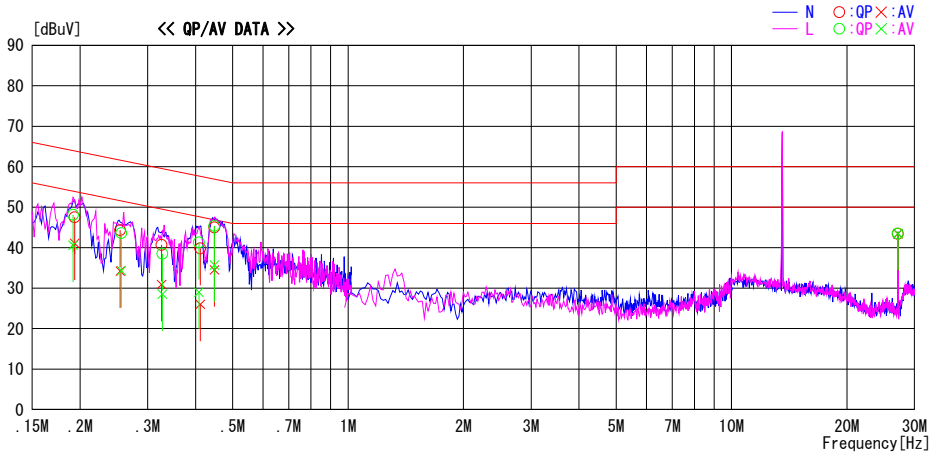
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/06

Report No. : 10552553H
Power : AC120V/60Hz
Temp./Humi. : 21deg. C / 61% RH
Engineer : Tsubasa takayama

Mode / Remarks : Tx 13.56MHz Type B without Tag

LIMIT : FCC15.207 QP
FCC18 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]		
0.19184	34.9	27.4	13.2	48.1	40.6	64.0	54.0	15.9	13.4	L	
0.19359	34.3	27.9	13.2	47.5	41.1	63.9	53.9	16.4	12.8	N	
0.25461	31.0	20.9	13.3	44.3	34.2	61.6	51.6	17.3	17.4	N	
0.25635	30.3	21.0	13.3	43.6	34.3	61.5	51.5	17.9	17.2	L	
0.32609	27.4	17.6	13.3	40.7	30.9	59.6	49.6	18.9	18.7	N	
0.32784	25.2	15.2	13.3	38.5	28.5	59.5	49.5	21.0	21.0	L	
0.40804	28.0	15.7	13.3	41.3	29.0	57.7	47.7	16.4	18.7	L	
0.41152	26.5	12.7	13.3	39.8	26.0	57.6	47.6	17.8	21.6	N	
0.44814	31.7	21.2	13.3	45.0	34.5	56.9	46.9	11.9	12.4	N	
0.44814	32.1	22.4	13.3	45.4	35.7	56.9	46.9	11.5	11.2	L	
27.12000	27.8	27.8	15.6	43.4	43.4	60.0	50.0	16.6	6.6	N	
27.12000	27.9	27.9	15.6	43.5	43.5	60.0	50.0	16.5	6.5	L	

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

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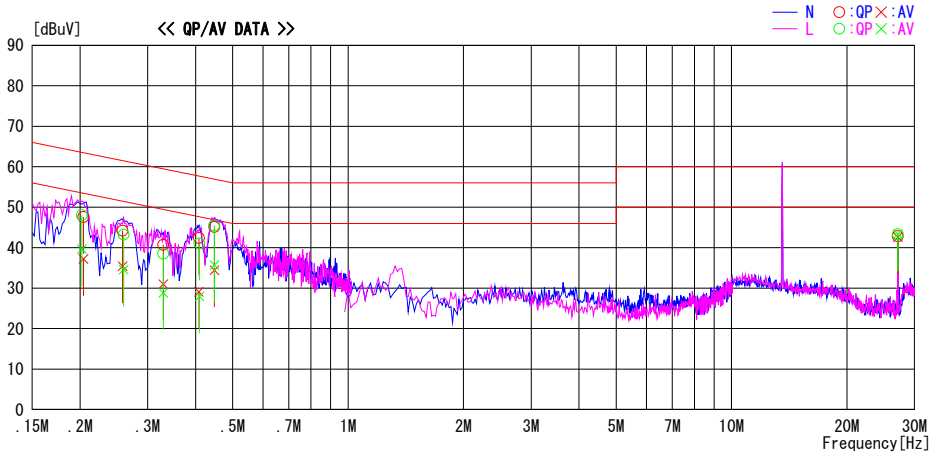
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2014/11/06

Report No. : 10552553H
Power : AC120V/60Hz
Temp./Humi. : 21deg. C / 61% RH
Engineer : Tsubasa Takayama

Mode / Remarks : Tx 13.56MHz Type B with Tag

LIMIT : FCC15.207 QP
FCC18 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]		
0.20230	34.7	26.3	13.3	48.0	39.6	63.5	53.5	15.5	13.9	L	
0.20405	34.3	23.9	13.3	47.6	37.2	63.4	53.4	15.8	16.2	N	
0.25810	30.9	22.1	13.3	44.2	35.4	61.5	51.5	17.3	16.1	N	
0.25984	29.9	21.3	13.3	43.2	34.6	61.4	51.4	18.2	16.8	L	
0.32958	27.4	17.7	13.3	40.7	31.0	59.5	49.5	18.8	18.5	N	
0.32958	25.2	15.5	13.3	38.5	28.8	59.5	49.5	21.0	20.7	L	
0.40804	29.1	15.8	13.3	42.4	29.1	57.7	47.7	15.3	18.6	N	
0.40978	27.7	14.7	13.3	41.0	28.0	57.7	47.7	16.7	19.7	L	
0.44814	31.8	21.1	13.3	45.1	34.4	56.9	46.9	11.8	12.5	N	
0.44814	32.2	22.4	13.3	45.5	35.7	56.9	46.9	11.4	11.2	L	
27.12000	27.2	27.0	15.6	42.8	42.6	60.0	50.0	17.2	7.4	N	
27.12000	27.7	27.7	15.6	43.3	43.3	60.0	50.0	16.7	6.7	L	

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

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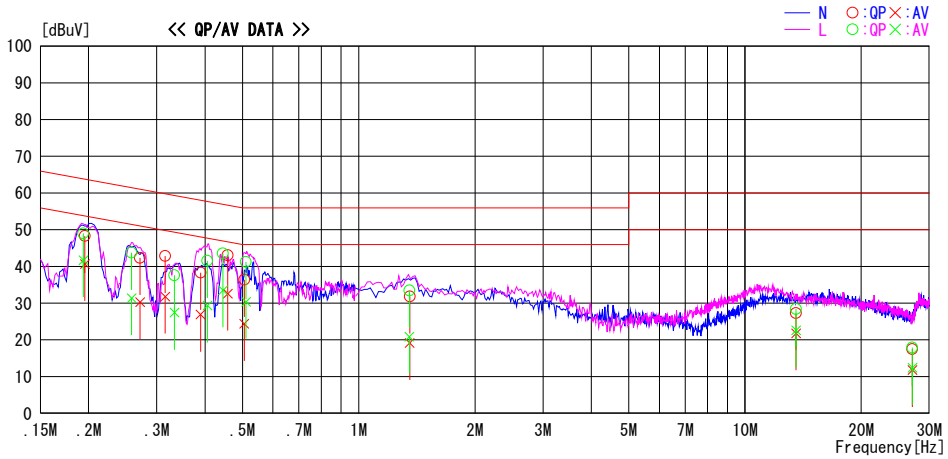
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2014/11/12

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 54% RH
Engineer : Tsubasa Takayama

Mode / Remarks : Tx 13.56MHz without Type A Tag (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]		
0.19376	35.7	28.4	13.3	49.0	41.7	63.9	53.9	14.9	12.2	L	
0.19549	35.0	27.4	13.3	48.3	40.7	63.8	53.8	15.5	13.1	N	
0.25812	30.4	18.1	13.3	43.7	31.4	61.5	51.5	17.8	20.1	L	
0.27167	29.0	17.0	13.3	42.3	30.3	61.1	51.1	18.8	20.8	N	
0.31571	29.5	18.5	13.3	42.8	31.8	59.8	49.8	17.0	18.0	N	
0.33372	24.3	14.1	13.3	37.6	27.4	59.4	49.4	21.8	22.0	L	
0.38948	25.0	13.6	13.3	38.3	26.9	58.1	48.1	19.8	21.2	N	
0.40601	28.2	16.1	13.3	41.5	29.4	57.7	47.7	16.2	18.3	L	
0.44552	30.2	20.2	13.3	43.5	33.5	57.0	47.0	13.5	13.5	L	
0.45820	29.7	19.3	13.3	43.0	32.6	56.7	46.7	13.7	14.1	N	
0.50582	23.0	11.0	13.4	36.4	24.4	56.0	46.0	19.6	21.6	N	
0.51078	27.8	17.0	13.4	41.2	30.4	56.0	46.0	14.8	15.6	L	
1.35553	18.4	5.8	13.4	31.8	19.2	56.0	46.0	24.2	26.8	N	
1.35281	20.0	7.5	13.4	33.4	20.9	56.0	46.0	22.6	25.1	L	
13.56000	13.1	7.6	14.2	27.3	21.8	60.0	50.0	32.7	28.2	N	
13.56000	14.2	8.4	14.2	28.4	22.6	60.0	50.0	31.6	27.4	L	
27.12000	2.7	-3.0	14.8	17.5	11.8	60.0	50.0	42.5	38.2	N	
27.12000	3.1	-2.4	14.8	17.9	12.4	60.0	50.0	42.1	37.6	L	

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

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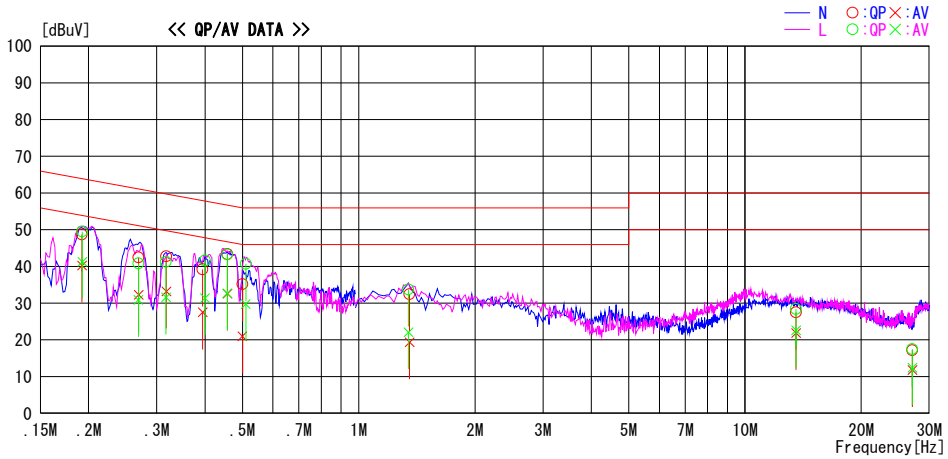
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2014/11/12

Report No. : 10552553H
Power : AC 120V / 60Hz
Temp./Humi. : 22deg. C / 54% RH
Engineer : Tsubasa Takayama

Mode / Remarks : Tx 13.56MHz without Type B Tag (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]		
0.19220	35.4	27.0	13.3	48.7	40.3	63.9	53.9	15.2	13.6	N	
0.19262	36.2	28.0	13.3	49.5	41.3	63.9	53.9	14.4	12.6	L	
0.26892	27.5	17.6	13.3	40.8	30.9	61.2	51.2	20.4	20.3	L	
0.26937	29.1	19.0	13.3	42.4	32.3	61.1	51.1	18.7	18.8	N	
0.31709	27.9	18.3	13.3	41.2	31.6	59.8	49.8	18.6	18.2	L	
0.31756	29.4	19.9	13.3	42.7	33.2	59.8	49.8	17.1	16.6	N	
0.40022	28.3	18.1	13.3	41.6	31.4	57.8	47.8	16.2	16.4	L	
0.39456	25.9	14.2	13.3	39.2	27.5	58.0	48.0	18.8	20.5	N	
0.45703	30.0	19.3	13.3	43.3	32.6	56.7	46.7	13.4	14.1	N	
0.45682	29.9	19.4	13.3	43.2	32.7	56.8	46.8	13.6	14.1	L	
0.50003	21.8	7.6	13.4	35.2	21.0	56.0	46.0	20.8	25.0	N	
0.50988	27.3	16.4	13.4	40.7	29.8	56.0	46.0	15.3	16.2	L	
1.35381	19.0	6.0	13.4	32.4	19.4	56.0	46.0	23.6	26.6	N	
1.34486	20.4	8.7	13.4	33.8	22.1	56.0	46.0	22.2	23.9	L	
13.56000	13.3	7.7	14.2	27.5	21.9	60.0	50.0	32.5	28.1	N	
13.56000	14.2	8.4	14.2	28.4	22.6	60.0	50.0	31.6	27.4	L	
27.12000	2.4	-3.0	14.8	17.2	11.8	60.0	50.0	42.8	38.2	N	
27.12000	2.7	-2.4	14.8	17.5	12.4	60.0	50.0	42.5	37.6	L	

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

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9. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI C63.4

UL Japan, Inc. Ise EMC Lab.
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RESULTS

Test Condition deg.C	Volts	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
20deg.C	138V	Power on	13.560082	0.000082	6.07	100.00	93.93
		on 2min.	13.560080	0.000080	5.86	100.00	94.14
		on 5min.	13.560079	0.000079	5.79	100.00	94.21
		on 10min.	13.560080	0.000080	5.86	100.00	94.14
	120V	Power on	13.560108	0.000108	7.93	100.00	92.07
		on 2min.	13.560092	0.000092	6.78	100.00	93.22
		on 5min.	13.560080	0.000080	5.93	100.00	94.07
		on 10min.	13.560078	0.000078	5.75	100.00	94.25
	102V	Power on	13.560104	0.000104	7.68	100.00	92.32
		on 2min.	13.560082	0.000082	6.01	100.00	93.99
		on 5min.	13.560079	0.000079	5.79	100.00	94.21
		on 10min.	13.560079	0.000079	5.83	100.00	94.17
50deg.C.	120V	Power on	13.560055	0.000055	4.07	100.00	95.93
		on 2min.	13.560059	0.000059	4.38	100.00	95.62
		on 5min.	13.560068	0.000068	5.01	100.00	94.99
		on 10min.	13.560071	0.000071	5.23	100.00	94.77
40deg.C.		Power on	13.560076	0.000076	5.62	100.00	94.38
		on 2min.	13.560068	0.000068	5.05	100.00	94.95
		on 5min.	13.560061	0.000061	4.52	100.00	95.48
		on 10min.	13.560054	0.000054	3.95	100.00	96.05
30deg.C.		Power on	13.560092	0.000092	6.79	100.00	93.21
		on 2min.	13.560064	0.000064	4.72	100.00	95.28
		on 5min.	13.560058	0.000058	4.28	100.00	95.72
		on 10min.	13.560058	0.000058	4.31	100.00	95.69
20deg.C.		Power on	13.560138	0.000138	10.14	100.00	89.86
		on 2min.	13.560092	0.000092	6.78	100.00	93.22
		on 5min.	13.560080	0.000080	5.93	100.00	94.07
		on 10min.	13.560078	0.000078	5.75	100.00	94.25
10deg.C.		Power on	13.560176	0.000176	12.96	100.00	87.04
		on 2min.	13.560120	0.000120	8.85	100.00	91.15
		on 5min.	13.560114	0.000114	8.39	100.00	91.61
		on 10min.	13.560112	0.000112	8.26	100.00	91.74
0deg.C.		Power on	13.560204	0.000204	15.06	100.00	84.94
		on 2min.	13.560155	0.000155	11.43	100.00	88.57
		on 5min.	13.560148	0.000148	10.91	100.00	89.09
		on 10min.	13.560149	0.000149	11.00	100.00	89.00
-10deg.C.		Power on	13.560176	0.000176	13.01	100.00	86.99
		on 2min.	13.560175	0.000175	12.90	100.00	87.10
		on 5min.	13.560176	0.000176	12.95	100.00	87.05
		on 10min.	13.560176	0.000176	13.01	100.00	86.99
-20deg.C		Power on	13.560243	0.000243	17.94	100.00	82.06
		on 2min.	13.560214	0.000214	15.76	100.00	84.24
		on 5min.	13.560202	0.000202	14.87	100.00	85.13
		on 10min.	13.560199	0.000199	14.71	100.00	85.29
-30deg.C		Power on	13.560244	0.000244	17.98	100.00	82.02
		on 2min.	13.560226	0.000226	16.65	100.00	83.35
		on 5min.	13.560218	0.000218	16.11	100.00	83.89
		on 10min.	13.560217	0.000217	16.03	100.00	83.97
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.

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