



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

RFID MODULE

MODEL NUMBER: RI12C

FCC ID: ACJ9TGRI12C

REPORT NUMBER: 10275679H-A

ISSUE DATE: May 9, 2014

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

Prepared by
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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
--	05/09/2014	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: RI12C

SERIAL NUMBER: DFUP2352ZB1311

DATE TESTED: April 18 to 21, 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:

Tested By:



Takahiro Hatakeda
Leader
Consumer Technology Division



Takumi Shimada
Engineer
Consumer Technology Division

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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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}

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an RFID module that is embedded inside Panasonic laptop model FZ-G1. 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 without tag	23.5
13.56	Normal Mode with Type A tag	18.5
13.56	Normal Mode with Type B tag	9.2

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 HID OMNIKEY Workbench.exe

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was inside the tablet PC.

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

Preliminary test was performed on the EUT with/without Tag.

The Conducted emission and Spurious emission (above 30MHz) tests were performed with Tag which had the worst data.

5.6. MODIFICATIONS

No modifications were made during testing.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Panasonic	FZ-G1	3JTSA37945	--
AC Adapter	Panasonic	CF-AA6413C M1	6413CM113400007G	DoC

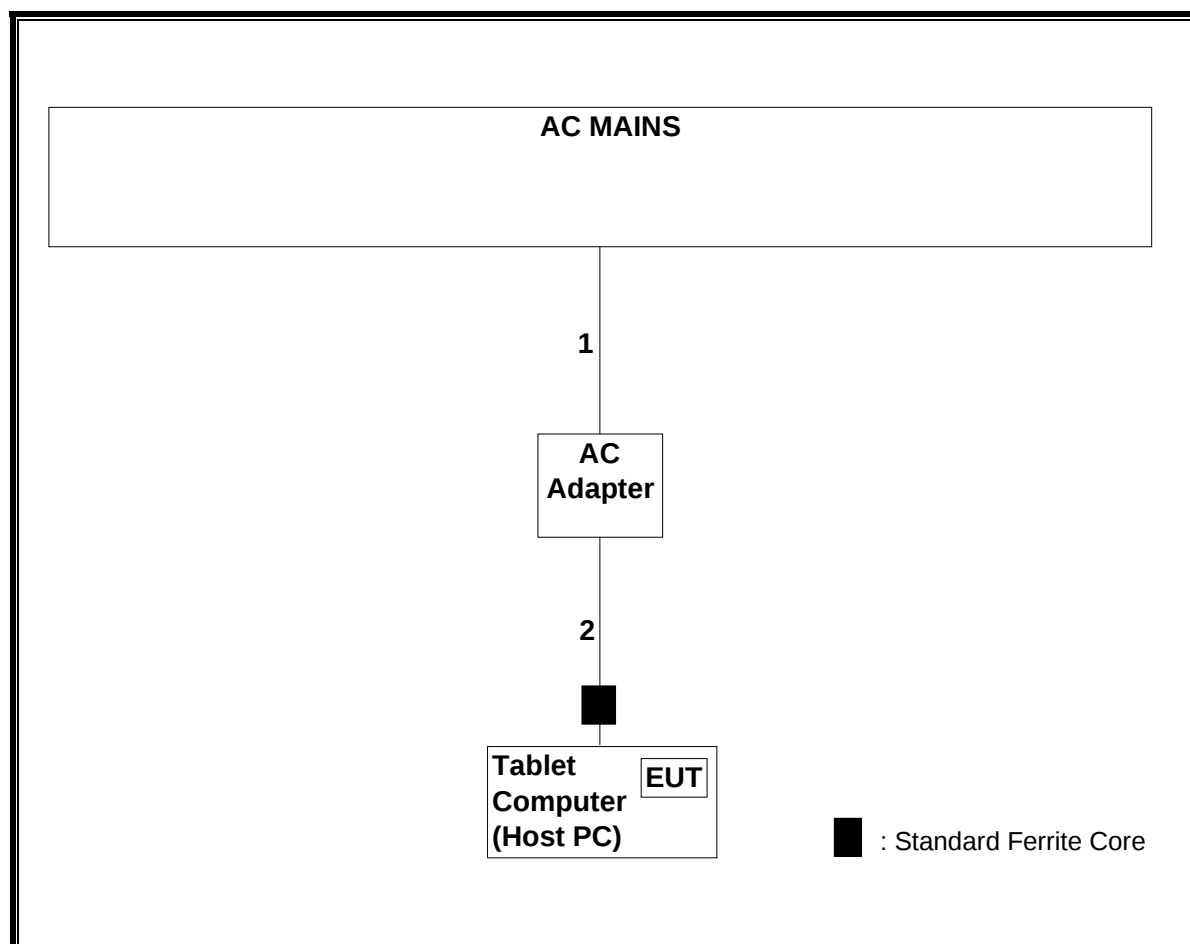
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	AC	Un-Shielded	0.9m	N/A
2	DC	1	DC	Un-Shielded	1.8m	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



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-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE/CE	2014/02/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2014/04/08 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2013/08/20 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2013/10/13 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2013/10/13 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2013/07/23 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2014/04/14 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2014/03/14 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2014/01/27 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	RE/CE	2013/07/23 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2014/01/29 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2013/10/30 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2013/07/22 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2014/02/20 * 12
MLPA-06	Loop Antenna	UL Japan	-	-	FT	Pre Check
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	FT	2013/10/18 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	FT	2014/02/20 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	FT	2013/08/23 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	FT	2013/08/07 * 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

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)

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.

RESULTS

7.2. FUNDAMENTAL EMISSION

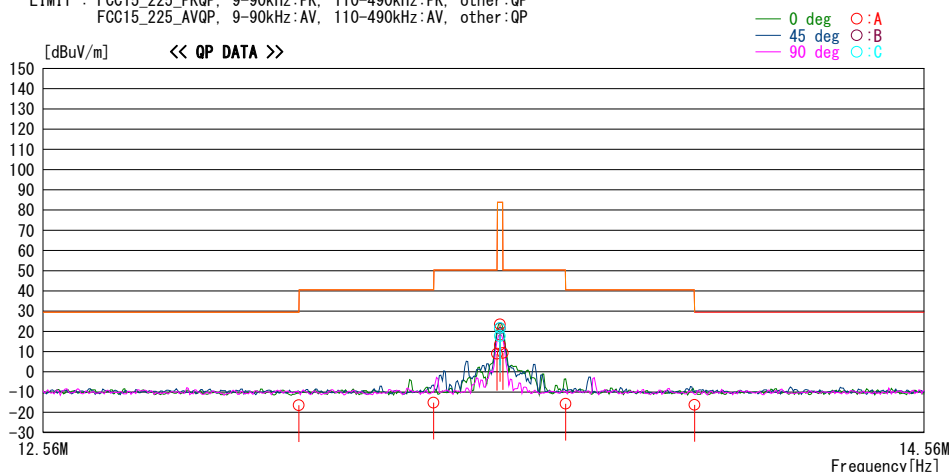
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise HQ EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2014/04/18

Report No. : 10275679H
Power : AC120V / 60Hz
Temp. / Humi. : 24deg. C / 34% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz without tag Worst axis X

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	29.5	QP	19.7	-33.5	32.2	-16.5	29.5	46.0	0	A	177
13.41000	30.6	QP	19.7	-33.4	32.2	-15.3	40.5	55.8	0	A	177
13.55300	54.9	QP	19.7	-33.4	32.2	9.0	50.4	41.4	0	A	177
13.56000	69.4	QP	19.7	-33.4	32.2	23.5	83.9	60.4	0	A	177
13.56000	67.3	QP	19.7	-33.4	32.2	21.4	83.9	62.5	45	B	159
13.56000	63.5	QP	19.7	-33.4	32.2	17.6	83.9	66.3	90	C	281
13.56000	67.5	QP	19.7	-33.4	32.2	21.6	83.9	62.3	135	C	175
13.56000	59.2	QP	19.7	-33.4	32.2	13.3	83.9	70.6	0	A	358
13.56700	55.2	QP	19.7	-33.4	32.2	9.3	50.4	41.1	0	A	177
13.71000	30.1	QP	19.7	-33.4	32.2	-15.8	40.5	56.3	0	A	177
14.01000	29.5	QP	19.7	-33.4	32.2	-16.4	29.5	45.9	0	A	177

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.

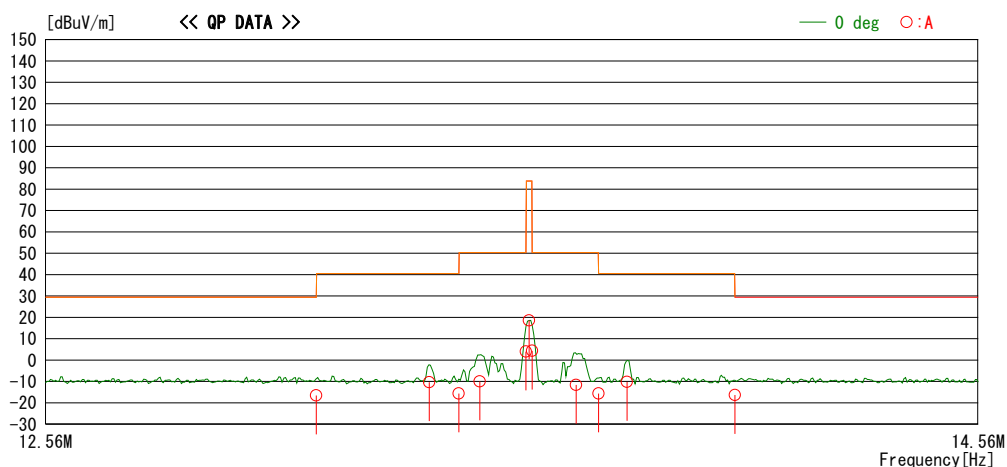
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Report No. : 10275679H
Power : AC120V / 60Hz
Temp. / Humi. : 24deg. C / 34% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Type A tag Worst axis X

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	29.5	QP	19.7	-33.5	32.2	-16.5	29.5	46.0	0	A	25
13.34740	35.7	QP	19.7	-33.5	32.2	-10.3	40.5	50.8	0	A	25
13.41000	30.2	QP	19.7	-33.4	32.2	-15.7	40.5	56.2	0	A	25
13.45480	36.0	QP	19.7	-33.4	32.2	-9.9	50.4	60.3	0	A	25
13.55300	49.9	QP	19.7	-33.4	32.2	4.0	50.4	46.4	0	A	25
13.56000	64.4	QP	19.7	-33.4	32.2	18.5	83.9	65.4	0	A	25
13.56700	50.3	QP	19.7	-33.4	32.2	4.4	50.4	46.0	0	A	25
13.66170	34.2	QP	19.7	-33.4	32.2	-11.7	50.4	62.1	0	A	25
13.71000	30.2	QP	19.7	-33.4	32.2	-15.7	40.5	56.2	0	A	25
13.77170	35.7	QP	19.7	-33.4	32.2	-10.2	40.5	50.7	0	A	25
14.01000	29.6	QP	19.7	-33.4	32.2	-16.3	29.5	45.8	0	A	25

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.

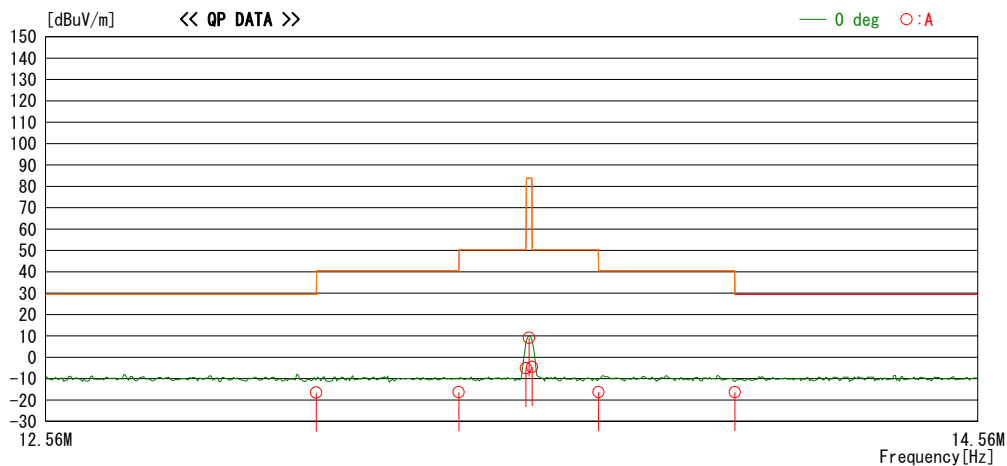
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Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Type B tag Worst axis X

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
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13.11000	29.5	QP	19.7	-33.5	32.2	-16.5	29.5	46.0	0	A	178
13.41000	29.6	QP	19.7	-33.4	32.2	-16.3	40.5	56.8	0	A	178
13.55300	40.9	QP	19.7	-33.4	32.2	-5.0	50.4	55.4	0	A	178
13.56000	55.1	QP	19.7	-33.4	32.2	9.2	83.9	74.7	0	A	178
13.56700	41.3	QP	19.7	-33.4	32.2	-4.6	50.4	55.0	0	A	178
13.71000	29.6	QP	19.7	-33.4	32.2	-16.3	40.5	56.8	0	A	178
14.01000	29.5	QP	19.7	-33.4	32.2	-16.4	29.5	45.9	0	A	178

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 3m without Distance factor

QP

Ant Deg [deg]	Frequency	Detector	Reading	Ant	Loss	Gain	Duty	Result	Limit	Margin	Remark
0	13.56000	QP	69.4	19.7	6.6	32.2	-	63.5	-	-	without tag
0	13.56000	QP	64.4	19.7	6.6	32.2	-	58.5	-	-	with Type A tag
0	13.56000	QP	55.1	19.7	6.6	32.2	-	49.2	-	-	with Type B tag

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

7.3. SPURIOUS EMISSIONS (0.15 – 30 MHz)

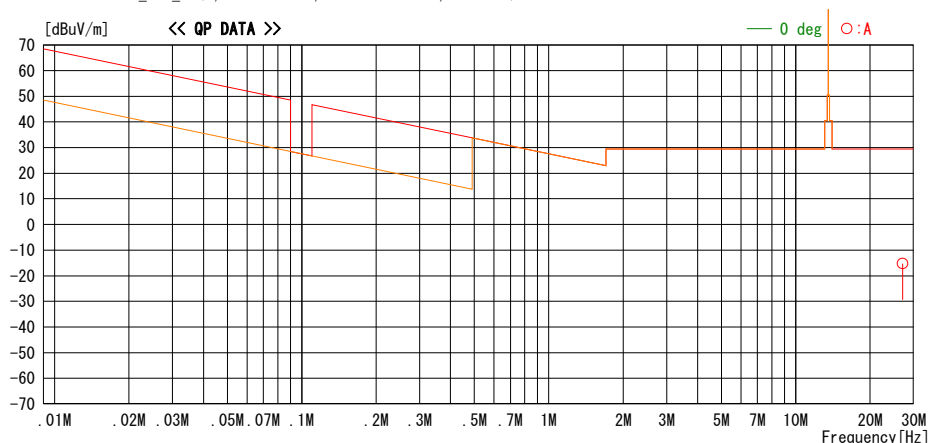
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Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz without tag Worst axis X

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	29.4	QP	20.7	-33.2	32.2	-15.3	29.5	44.8	0	A	177

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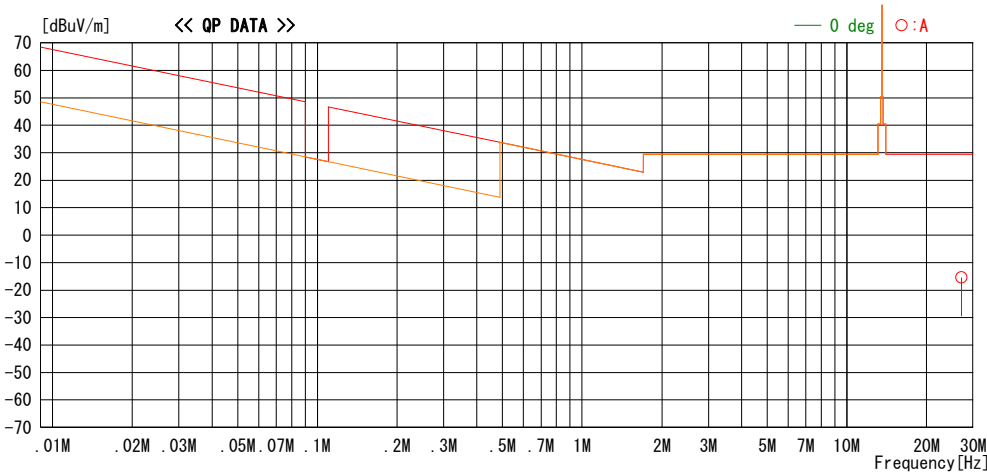
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Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
27.12000	29.3	QP	20.7	-33.2	32.2	-15.4	29.5	44.9	0	A	25

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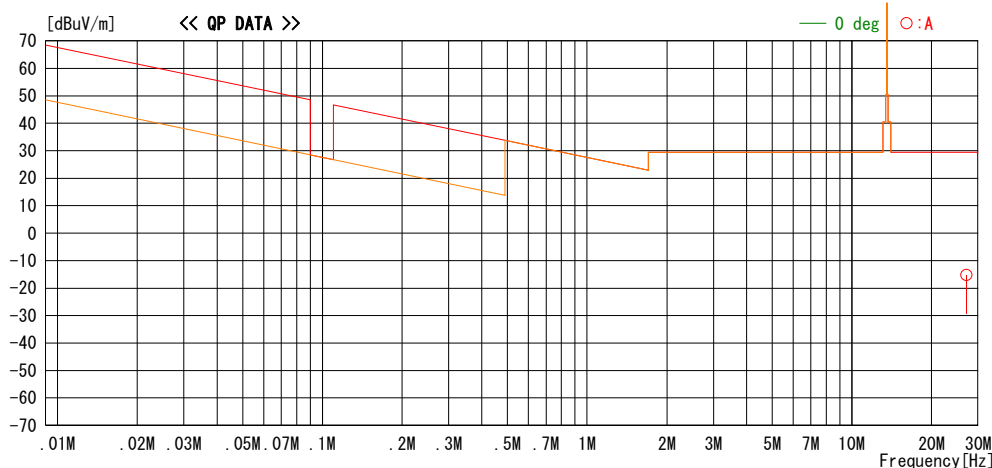
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LIMIT : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15_225_AVQP, 9-90kHz:AV, 110-490kHz:AV, other:QP



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	29.4	QP	20.7	-33.2	32.2	-15.3	29.5	44.8	0	A	178

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.

7.4. SPURIOUS EMISSION 30 TO 1000 MHz

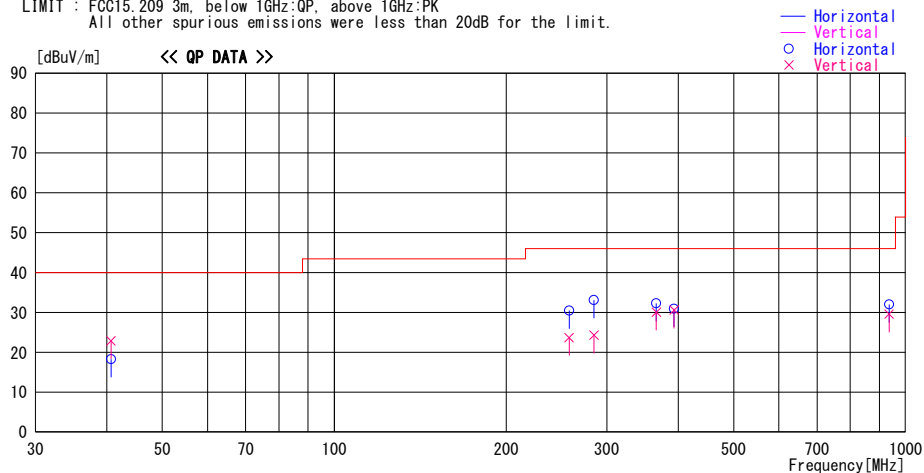
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise HQ EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2014/04/19

Report No. : 10275679H
Power : AC120V / 60Hz
Temp./Humi. : 24deg. C / 34% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Type A tag Worst axis(Hor:X / Ver:X)

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		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	Margin	Comment
			Factor [dB/m]	Gain [dB]					[dBuV/m]	[dB]	
40.680	29.0	QP	14.3	-25.0	18.3	25	371	Hori.	40.0	21.7	
40.680	33.6	QP	14.3	-25.0	22.9	308	100	Vert.	40.0	17.1	
257.640	35.2	QP	17.7	-22.4	30.5	20	124	Hori.	46.0	15.5	
257.640	28.4	QP	17.7	-22.4	23.7	349	100	Vert.	46.0	22.3	
284.760	36.2	QP	19.0	-22.1	33.1	172	120	Hori.	46.0	12.9	
284.760	27.4	QP	19.0	-22.1	24.3	306	100	Vert.	46.0	21.7	
366.120	37.4	QP	16.5	-21.6	32.3	177	100	Hori.	46.0	13.7	
366.120	35.2	QP	16.5	-21.6	30.1	359	177	Vert.	46.0	15.9	
393.240	35.0	QP	17.3	-21.4	30.9	191	100	Hori.	46.0	15.1	
393.240	34.7	QP	17.3	-21.4	30.6	337	161	Vert.	46.0	15.4	
935.640	26.2	QP	23.1	-17.3	32.0	136	100	Hori.	46.0	14.0	
935.640	23.8	QP	23.1	-17.3	29.6	138	115	Vert.	46.0	16.4	

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

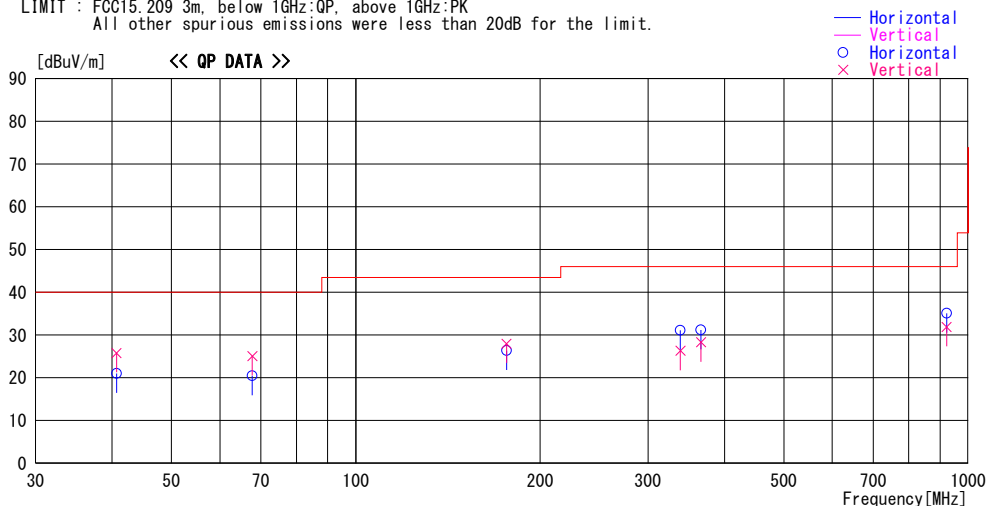
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise HQ EMC Lab. No.3 Semi Anechoic Chamber
Date : 2014/04/19

Report No. : 10275679H
Power : AC120V / 60Hz
Temp./Humi. : 24deg. C / 34% RH
Engineer : Takuni Shimada

Mode / Remarks : Tx 13.56MHz with Type B tag Worst axis(Hor:X / Ver:X)

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



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
40.680	31.7	QP	14.3	-25.0	21.0	238	239	Hori.	40.0	19.0	
40.680	36.5	QP	14.3	-25.0	25.8	150	100	Vert.	40.0	14.2	
67.800	38.2	QP	6.8	-24.5	20.5	230	256	Hori.	40.0	19.5	
67.800	42.8	QP	6.8	-24.5	25.1	340	100	Vert.	40.0	14.9	
176.280	33.6	QP	16.0	-23.2	26.4	66	189	Hori.	43.5	17.1	
176.280	35.2	QP	16.0	-23.2	28.0	136	100	Vert.	43.5	15.5	
339.000	37.2	QP	15.6	-21.7	31.1	173	100	Hori.	46.0	14.9	
339.000	32.4	QP	15.6	-21.7	26.3	215	169	Vert.	46.0	19.7	
366.120	36.3	QP	16.5	-21.6	31.2	172	100	Hori.	46.0	14.8	
366.120	33.4	QP	16.5	-21.6	28.3	200	140	Vert.	46.0	17.7	
922.080	29.7	QP	22.8	-17.4	35.1	146	100	Hori.	46.0	10.9	
922.080	26.5	QP	22.8	-17.4	31.9	162	120	Vert.	46.0	14.1	

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

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 50 μ H/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 (dB μ V)	
	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

RESULTS

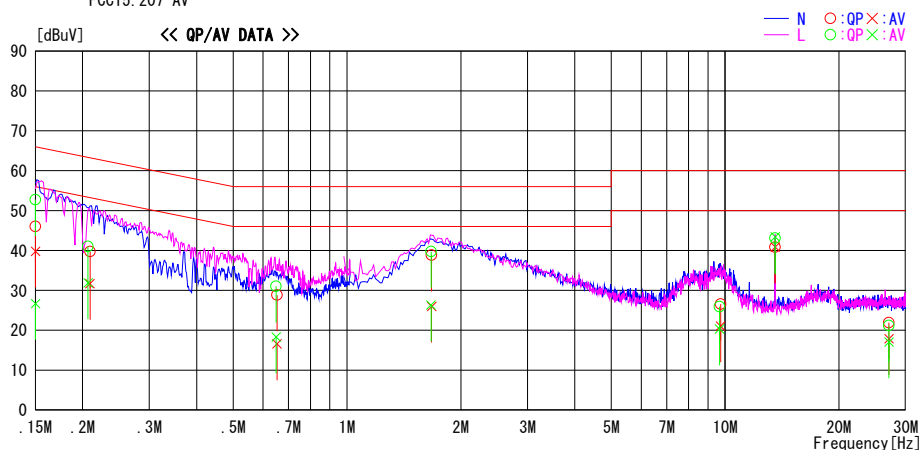
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise HQ EMC Lab. No.3 Semi Anechoic Chamber
Date : 2014/04/19

Report No. : 10275679H
Power : AC120V / 60Hz
Temp./Humi. : 24deg. C / 34% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Type A tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	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]		
0.15000	32.8	26.6	13.2	46.0	39.8	66.0	56.0	20.0	16.2	N	
0.20904	26.4	18.4	13.3	39.7	31.7	63.2	53.2	23.5	21.5	N	
0.65305	15.5	3.3	13.3	28.8	16.6	56.0	46.0	27.2	29.4	N	
1.67429	25.3	12.5	13.5	38.8	26.0	56.0	46.0	17.2	20.0	N	
9.72269	12.6	7.1	14.0	26.6	21.1	60.0	50.0	33.4	28.9	N	
13.56000	26.5	26.6	14.3	40.8	40.9	60.0	50.0	19.2	9.1	N	Carrier
27.12000	7.0	3.0	14.9	21.9	17.9	60.0	50.0	38.1	32.1	N	
0.15000	39.5	13.5	13.2	52.7	26.7	66.0	56.0	13.3	29.3	L	
0.20672	27.7	18.6	13.3	41.0	31.9	63.3	53.3	22.3	21.4	L	
0.64950	17.7	5.0	13.3	31.0	18.3	56.0	46.0	25.0	27.7	L	
1.66745	26.2	12.8	13.5	39.7	26.3	56.0	46.0	16.3	19.7	L	
9.66728	11.9	6.3	14.0	25.9	20.3	60.0	50.0	34.1	29.7	L	
13.56000	28.8	29.1	14.3	43.1	43.4	60.0	50.0	16.9	6.6	L	Carrier
27.12000	6.3	2.2	14.9	21.2	17.1	60.0	50.0	38.8	32.9	L	

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

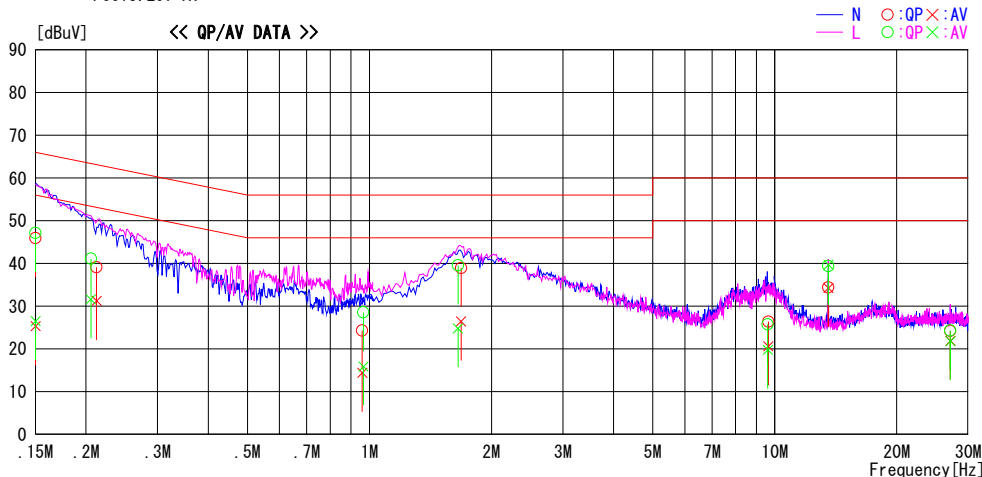
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise HQ EMC Lab. No.3 Semi Anechoic Chamber
Date : 2014/04/19

Report No. : 10275679H
Power : AC120V / 60Hz
Temp./Humi. : 24deg. C / 34% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 13.56MHz with Type B tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	32.7	12.1	13.2	45.9	25.3	66.0	56.0	20.1	30.7	N	Carrier
0.21220	25.8	17.9	13.3	39.1	31.2	63.1	53.1	24.0	21.9	N	
0.96036	11.0	1.1	13.3	24.3	14.4	56.0	46.0	31.7	31.6	N	
1.68266	25.4	12.9	13.5	38.9	26.4	56.0	46.0	17.1	19.6	N	
9.63690	12.4	6.6	14.0	26.4	20.6	60.0	50.0	33.6	29.4	N	
13.56000	20.1	19.9	14.3	34.4	34.2	60.0	50.0	25.6	15.8	N	
27.12000	9.3	7.0	14.9	24.2	21.9	60.0	50.0	35.8	28.1	N	Carrier
0.15000	33.9	13.3	13.2	47.1	26.5	66.0	56.0	18.9	29.5	L	
0.20545	27.8	18.3	13.3	41.1	31.6	63.4	53.4	22.3	21.8	L	
0.96592	15.3	2.6	13.3	28.6	15.9	56.0	46.0	27.4	30.1	L	
1.65360	26.1	11.3	13.5	39.6	24.8	56.0	46.0	16.4	21.2	L	
9.61372	11.7	5.8	14.0	25.7	19.8	60.0	50.0	34.3	30.2	L	
13.56000	25.1	25.4	14.3	39.4	39.7	60.0	50.0	20.6	10.3	L	Carrier
27.12000	9.4	6.9	14.9	24.3	21.8	60.0	50.0	35.7	28.2	L	

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

9. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ 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

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	13.560067	0.000067	4.94	100.00	95.06
		on 2min.	13.560065	0.000065	4.79	100.00	95.21
		on 5min.	13.560065	0.000065	4.79	100.00	95.21
		on 10min.	13.560064	0.000064	4.72	100.00	95.28
	120V	Power on	13.560066	0.000066	4.87	100.00	95.13
		on 2min.	13.560066	0.000066	4.86	100.00	95.14
		on 5min.	13.560065	0.000065	4.79	100.00	95.21
		on 10min.	13.560065	0.000065	4.79	100.00	95.21
	102V	Power on	13.560066	0.000066	4.87	100.00	95.13
		on 2min.	13.560065	0.000065	4.79	100.00	95.21
		on 5min.	13.560064	0.000064	4.72	100.00	95.28
		on 10min.	13.560064	0.000064	4.72	100.00	95.28
50deg.C.		Power on	13.560060	0.000060	4.42	100.00	95.58
		on 2min.	13.560059	0.000059	4.35	100.00	95.65
		on 5min.	13.560066	0.000066	4.87	100.00	95.13
		on 10min.	13.560074	0.000074	5.46	100.00	94.54
	40deg.C.	Power on	13.560064	0.000064	4.72	100.00	95.28
		on 2min.	13.560053	0.000053	3.91	100.00	96.09
		on 5min.	13.560054	0.000054	3.98	100.00	96.02
		on 10min.	13.560056	0.000056	4.13	100.00	95.87
	30deg.C.	Power on	13.560088	0.000088	6.49	100.00	93.51
		on 2min.	13.560067	0.000067	4.94	100.00	95.06
		on 5min.	13.560061	0.000061	4.50	100.00	95.50
		on 10min.	13.560056	0.000056	4.13	100.00	95.87
	20deg.C.	Power on	13.560066	0.000066	4.87	100.00	95.13
		on 2min.	13.560066	0.000066	4.86	100.00	95.14
		on 5min.	13.560065	0.000065	4.79	100.00	95.21
		on 10min.	13.560065	0.000065	4.79	100.00	95.21
10deg.C.		Power on	13.560125	0.000125	9.22	100.00	90.78
		on 2min.	13.560112	0.000112	8.26	100.00	91.74
		on 5min.	13.560105	0.000105	7.74	100.00	92.26
		on 10min.	13.560095	0.000095	7.01	100.00	92.99
	0deg.C.	Power on	13.560121	0.000121	8.92	100.00	91.08
		on 2min.	13.560120	0.000120	8.85	100.00	91.15
		on 5min.	13.560119	0.000119	8.78	100.00	91.22
		on 10min.	13.560118	0.000118	8.70	100.00	91.30
	-10deg.C.	Power on	13.560115	0.000115	8.48	100.00	91.52
		on 2min.	13.560138	0.000138	10.18	100.00	89.82
		on 5min.	13.560136	0.000136	10.03	100.00	89.97
		on 10min.	13.560135	0.000135	9.96	100.00	90.04
	-20deg.C	Power on	13.560107	0.000107	7.89	100.00	92.11
		on 2min.	13.560145	0.000145	10.69	100.00	89.31
		on 5min.	13.560145	0.000145	10.69	100.00	89.31
		on 10min.	13.560145	0.000145	10.69	100.00	89.31
-30deg.C		Power on	13.560099	0.000099	7.30	100.00	92.70
		on 2min.	13.560152	0.000152	11.21	100.00	88.79
		on 5min.	13.560154	0.000154	11.36	100.00	88.64
		on 10min.	13.560153	0.000153	11.28	100.00	88.72

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.