RADIO TEST REPORT

Test Report No. : 32LE0002-HO-01-R1

Applicant	:	**Tokyo Communication Equipment MFG Co., ltd.**
Type of Equipment	:	**NFC Reader/Writer Module**
Model No.	:	**PC-1080501**
Test regulation	:	**FCC Part 15 Subpart C: 2012**
FCC ID	:	**VZQPC1080501**
Test Result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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 report is a revised version of 32LE0002-HO-01. 32LE0002-HO-01 is replaced with this report.

Date of test: August 26 and September 3, 2012

Representative test engineer:
H. Kukita
Hiroshi Kukita
Engineer of WiSE Japan,
UL Verification Service

Approved by:
Masanori Nishiyama
Manager of WiSE Japan,
UL Verification Service

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

UL Japan, Inc.
Head Office EMC Lab.
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REVISION HISTORY

Original Test Report No.: 32LE0002-HO-01

Revision	Test report No.	Date	Page revised	Contents
- (Original)	32LE0002-HO-01	January 28, 2013	-	-
1	32LE0002-HO-01-R1	June 7, 2013	P. 4	Correction of Clock frequency(ies) in the system.

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SECTION 1: Customer information

Company Name	:	Tokyo Communication Equipment MFG Co., ltd.
Address	:	3-8-13 takanawa minato-ku,tokyo, 108-0074 Japan
Telephone Number	:	+81-3-3447-2421
Facsimile Number	:	+81-3-3447-0426
Contact Person	:	Masaya Mikami

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

2.1 Identification of E.U.T.

Type of Equipment	:	NFC Reader/Writer Module
Model No.	:	PC-1080501
Serial No.	:	Refer to Section 4, Clause 4.2
Receipt Date of Sample	:	August 28, 2012
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

General Specification

Clock frequency(ies) in the system	:	27.12MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	13.56MHz
Modulation	:	ASK
Power Supply (inner)	:	DC5V
Antenna type	:	Coil antenna
Antenna Gain	:	-63.9dBi
Operating Temperature	:	-20 deg. C. - +55 deg. C

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	Test specification: FCC Part 15 Subpart C: 2012, final revised on December 27, 2012 and effective January 28, 2013
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

* The revision on December 27, 2012 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	[QP]17.8dB 27.12000MHz, L [AV]7.8dB 27.12000MHz, L	Complied	-
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	51.7dB 13.56000MHz, QP, 0deg.	Complied	Radiated
Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	33.1dB 13.56700MHz, QP, 0deg.	Complied	Radiated
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.215(c)	See data	Complied	Radiated
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	5.7dB 54.241MHz, Vertical, QP	Complied	Radiated
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	See data	Complied	Radiated
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422					

FCC 15.31 (e)
The stable voltage(DC5.0V) is constantly provided to the EUT from host device. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.5dB
No.2	3.6dB
No.3	3.6dB
No.4	3.6dB

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	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

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

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

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

Radiated emission test (3m)
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	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	313583	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	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	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	134570	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	4.75 x 5.4 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	-	-	8.8 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* 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, Data of EMI, and Test instruments

Refer to APPENDIX.

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

4.1 Operating Modes

The mode is used :

Mode	Remarks*
13.56MHz Transmitting mode (Tx)	The EUT Transmits and Receives at the same time and there is no receiving mode.
The EUT was operated in a manner similar to typical use during the tests. The EUT Transmits and Receives at the same time and there is no receiving mode.	

Test Item	Operating mode*
Conducted emission	Tx Mod on, with Tag / Antenna terminated
Electric Field Strength of Fundamental Emission	Tx Mod on, without Tag
Spectrum Mask	Tx Mod on, without Tag
20dB Bandwidth	Tx Mod on, without Tag
Electric Field Strength of Spurious Emission	Tx Mod on, without/with Tag
Frequency Tolerance	Tx Mod on, without Tag

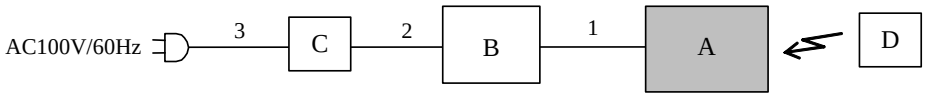
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

Frequency Tolerance:

Temperature : -20deg.C to +50deg.C Step 10deg.C
Voltage : Normal Voltage DC 5V
Maximum Voltage DC 5.75V, Minimum Voltage DC 4.25V (DC 5V ±15%)
*This EUT provides stable voltage(DC5V) constantly to RF Part regardless of input voltage

4.2 Configuration and peripherals

<For Conducted emission test>



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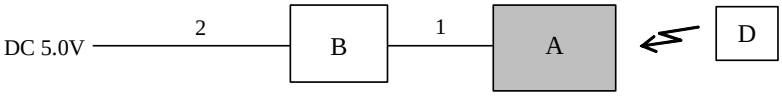


* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	NFC Reader/Writer Module	PC-1080501	001	Tokyo Communication Equipment MFG Co., ltd.	EUT
B	Jig	SEK-A	PWB114925620000	Konami Digital Entertainment Co., Ltd.	-
C	DC Power Supply	PMC35-2A	13090501	Kikusui	-
D	Card	001	3EEP-9RWI-UBMH-VX5Y-ZCCL	TECHNIKA	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	0.25	Unshielded	Unshielded	-
2	DC Cable	2.0	Unshielded	Unshielded	-
3	AC Cable	2.0	Unshielded	Unshielded	-

SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.4 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/ an AMN to the input power source. All unused 50ohm connectors of the LISN/ AMN were resistively terminated in 50ohm when not connected to the measuring equipment.
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a horizontal conducting plane 4.0 x 4.0m and a vertical conducting plane 2.0 x 2.0m in a semi Anechoic Chamber.
Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range : 0.15MHz-30MHz
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in the semi Anechoic Chamber.
The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains Network (AMN).
An overview sweep with peak detection has been performed.
The measurements had been performed with a quasi-peak detector and if required, with an average detector.
The conducted emission measurements were made with the following detector function of the test receiver.
Detector Type : QP and AV
IF Bandwidth : 9kHz

5.5 Test result

Summary of the test results : Pass

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

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical (angle of loop antenna: 0deg., 45deg., 90deg., and 135 deg.) and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
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 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz	Above 1GHz	
Instrument used	Test Receiver					Spectrum Analyzer	
Detector	PK/AV	QP	PK/AV	QP	QP	PK	AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz

- 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.

* FCC Part 15 Section 15.31 (f)(2) / IC RSS-Gen 4.11 (9kHz-30MHz)

$$9\text{kHz} - 490\text{kHz}\,[\text{Limit at 3m}] = [\text{Limit at 300m}] - 40\log\left(\frac{3}{300}\right)$$

$$490\text{kHz} - 30\text{MHz}[\text{Limit at 3m}] = [\text{Limit at 30m}] - 40\log\left(\frac{3}{30}\right)$$

Measurement range : **0.009M-1GHz**
Test data : **APPENDIX**
Test result : **Pass**

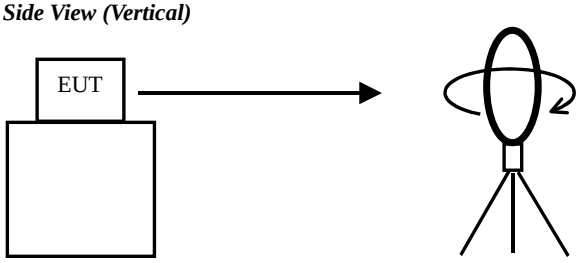
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	100kHz	1kHz	3kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter
*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100%.							

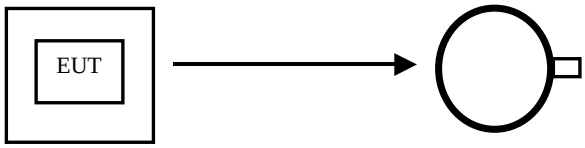
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

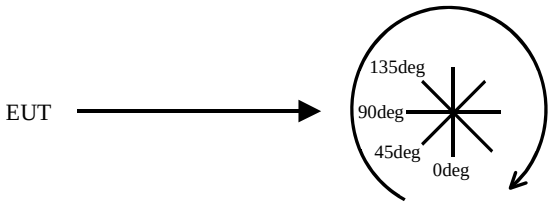


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

APPENDIX 1: Data of EMI test

Conducted emission

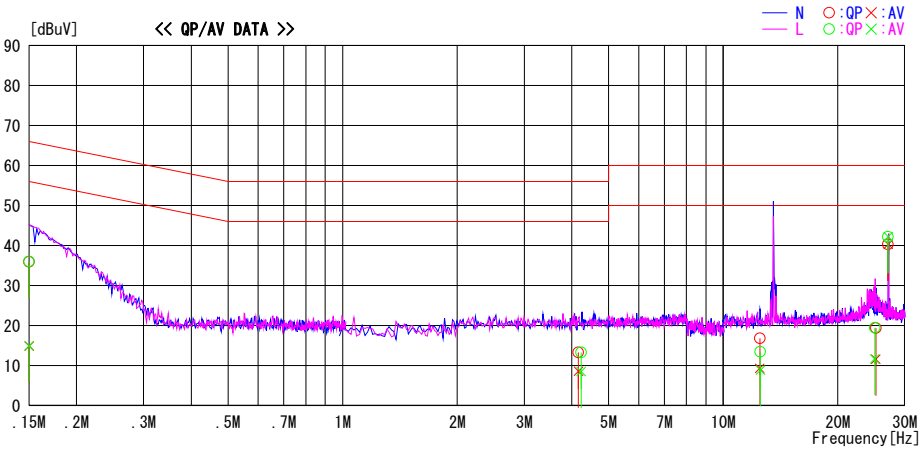
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/08/26

Report No. : 32LE0002-HO-01
Power : DC 5V
Temp./Humi. : 24deg. C / 65% RH
Engineer : Hiroshi Kukita

Mode / Remarks : 13.56MHz Tx, with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	22.6	1.6	13.3	35.9	14.9	66.0	56.0	30.1	41.1	N	
0.15000	22.7	1.7	13.3	36.0	15.0	66.0	56.0	30.0	41.0	L	
4.16460	-0.4	-5.1	13.7	13.3	8.6	56.0	46.0	42.7	37.4	N	
4.23230	-0.4	-5.2	13.7	13.3	8.5	56.0	46.0	42.7	37.5	L	
12.48135	2.4	-5.1	14.4	16.8	9.3	60.0	50.0	43.2	40.7	N	
12.52080	-0.9	-5.5	14.4	13.5	8.9	60.0	50.0	46.5	41.1	L	
25.01120	4.5	-3.3	15.0	19.5	11.7	60.0	50.0	40.5	38.3	L	
25.16840	4.4	-3.4	15.0	19.4	11.6	60.0	50.0	40.6	38.4	N	
27.12000	25.2	25.2	15.1	40.3	40.3	60.0	50.0	19.7	9.7	N	
27.12000	27.1	27.1	15.1	42.2	42.2	60.0	50.0	17.8	7.8	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.

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

Conducted emission

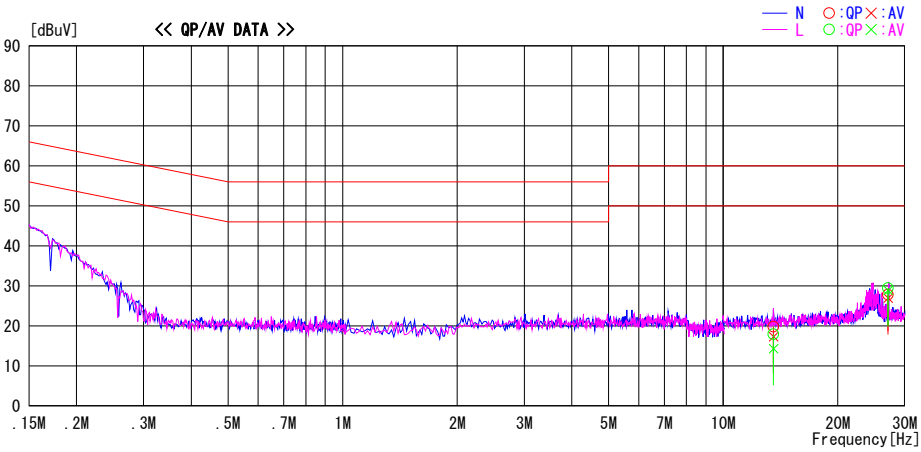
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/08/26

Report No. : 32LE0002-HO-01
Power : DC 5V
Temp./Humi. : 24deg. C / 65% RH
Engineer : Hiroshi Kukita

Mode / Remarks : 13.56MHz Tx, Antenna terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	5.3	2.8	14.5	19.8	17.3	60.0	50.0	40.2	32.7	N	
27.12000	12.7	11.9	15.1	27.8	27.0	60.0	50.0	32.2	23.0	N	
13.56000	3.4	-0.2	14.5	17.9	14.3	60.0	50.0	42.1	35.7	L	
27.12000	14.4	13.8	15.1	29.5	28.9	60.0	50.0	30.5	21.1	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.

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

Fundamental emission and Spectrum Mask

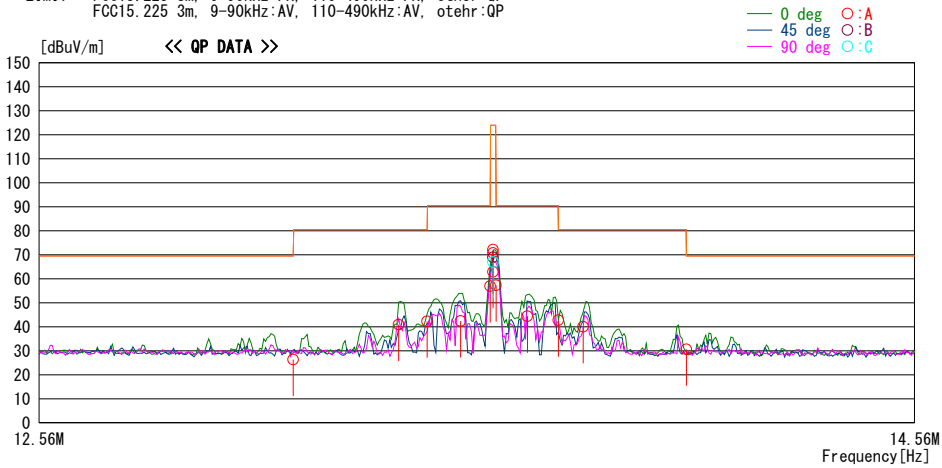
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/08/26

Report No. : 32LE0002-HO-01
Power : AC 120V / 60Hz
Temp./ Humi. : 24deg. C / 65% RH
Engineer : Hiroshi Kukita

Mode / Remarks : 13.56MHz Tx, without Tag, Worst-axis:Z axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, otehr: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	32.7	QP	19.1	6.7	32.1	26.4	69.5	43.1	0	A	0	
13.34560	47.4	QP	19.0	6.7	32.1	41.0	80.5	39.5	0	A	359	
13.41000	48.7	QP	19.0	6.7	32.1	42.3	80.5	38.2	0	A	359	
13.48620	48.9	QP	19.0	6.7	32.1	42.5	90.4	47.9	0	A	359	
13.55300	63.5	QP	18.9	6.7	32.1	57.0	90.4	33.4	0	A	359	
13.56000	78.7	QP	18.9	6.7	32.1	72.2	123.9	51.7	0	A	359	
13.56000	75.5	QP	18.9	6.7	32.1	69.0	123.9	54.9	45	B	136	
13.56000	73.5	QP	18.9	6.7	32.1	67.0	123.9	56.9	90	C	264	
13.56000	77.3	QP	18.9	6.7	32.1	70.8	123.9	53.1	135	A	233	
13.56000	69.4	QP	18.9	6.7	32.1	62.9	123.9	61.0	135	A	359	Hori
13.56700	63.8	QP	18.9	6.7	32.1	57.3	90.4	33.1	0	A	359	
13.63880	50.9	QP	18.9	6.7	32.1	44.4	90.4	46.0	0	A	359	
13.71000	49.3	QP	18.9	6.7	32.1	42.8	80.5	37.7	0	A	359	
13.76740	46.5	QP	18.9	6.7	32.1	40.0	80.5	40.5	0	A	359	
14.01000	37.3	QP	18.8	6.7	32.1	30.7	69.5	38.8	0	A	359	

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

Spurious emission

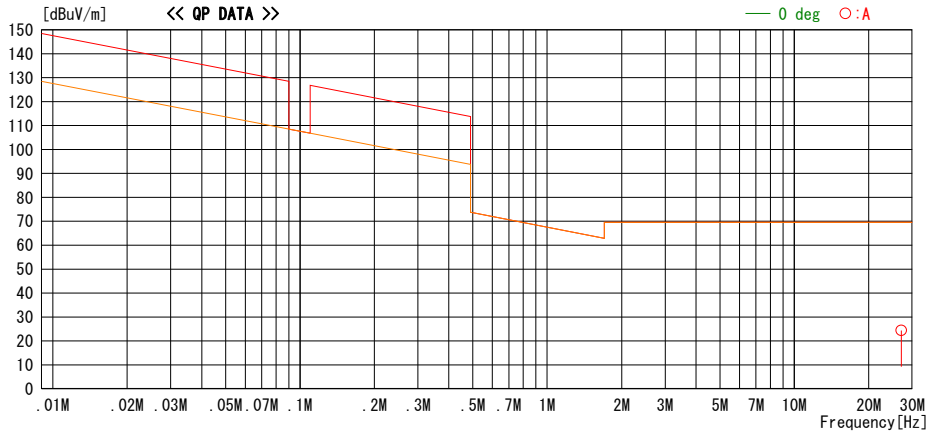
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/08/26

Report No. : 32LE0002-HO-01
Power : AC 120V / 60Hz
Temp./ Humi. : 24deg. C / 65% RH
Engineer : Hiroshi Kukita

Mode / Remarks : 13.56MHz Tx, without Tag, Worst-axis:Z axis

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]		Table [deg]	Comment
27.12000	30.5	QP	18.9	7.0	32.0	24.4	69.5	45.1	0	A	359	

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

Spurious emission

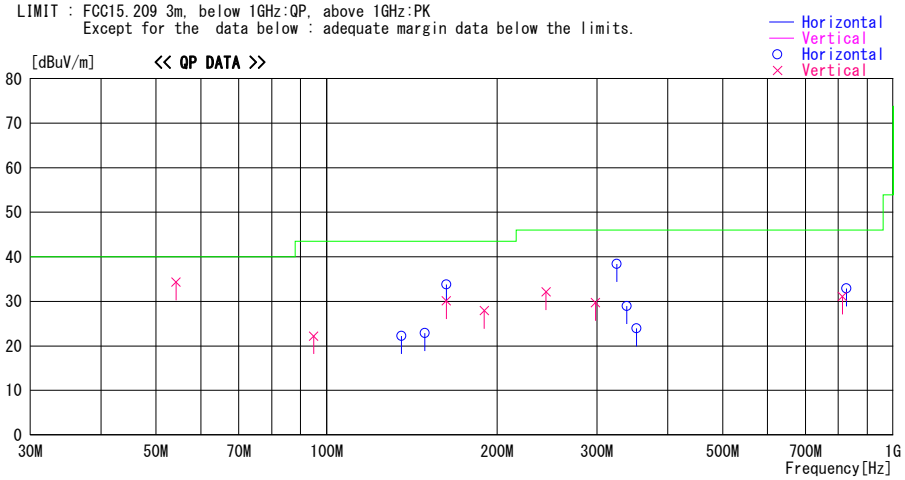
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/08/26

Report No. : 32LE0002-HO-01
Power : DC 5V
Temp./Humi. : 24deg. C / 65% RH
Engineer : Hiroshi Kukita

Mode / Remarks : 13.56MHz Tx, with Tag, Worst-axis Hori:Z axis, Ver:X axis

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



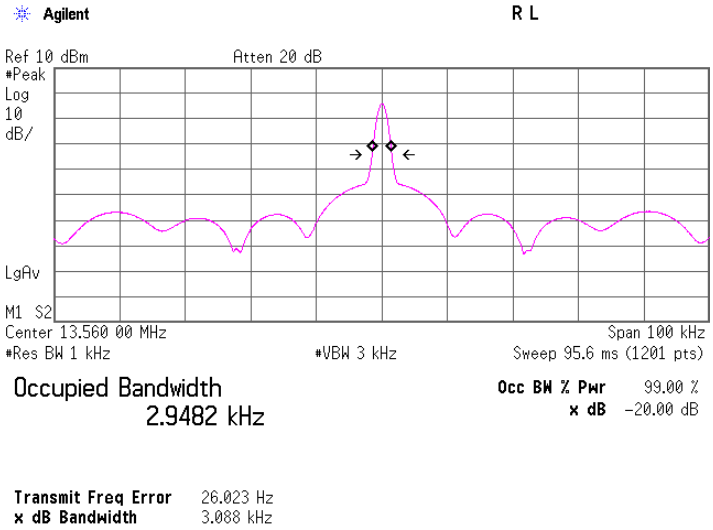
Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
54.241	49.2	QP	9.7	-24.6	34.3	5	100	Vert.	40.0	5.7	
94.920	37.0	QP	9.3	-24.1	22.2	356	100	Vert.	43.5	21.3	
135.600	31.4	QP	14.3	-23.5	22.2	174	249	Hori.	43.5	21.3	
149.160	31.4	QP	15.0	-23.5	22.9	172	234	Hori.	43.5	20.6	
162.721	41.7	QP	15.5	-23.4	33.8	357	190	Hori.	43.5	9.7	
162.720	38.0	QP	15.5	-23.4	30.1	201	100	Vert.	43.5	13.4	
189.840	34.5	QP	16.4	-23.0	27.9	220	100	Vert.	43.5	15.6	
244.080	37.8	QP	17.1	-22.8	32.1	206	100	Vert.	46.0	13.9	
298.320	32.0	QP	20.1	-22.4	29.7	243	100	Vert.	46.0	16.3	
325.440	44.1	QP	16.5	-22.2	38.4	19	100	Hori.	46.0	7.6	
339.000	34.3	QP	16.7	-22.1	28.9	29	100	Hori.	46.0	17.1	
352.560	29.0	QP	16.9	-22.0	23.9	353	103	Hori.	46.0	22.1	
813.599	26.5	QP	23.7	-19.1	31.1	165	100	Vert.	46.0	14.9	
827.159	28.2	QP	23.8	-19.1	32.9	30	195	Hori.	46.0	13.1	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-200MHz:BICONICAL, 200MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

20dB Bandwidth

Test place	Head Office EMC Lab. No.6 measurement room
Report No.	32LE0002-HO-01
Date	09/03/2012
Temperature/ Humidity	24 deg.C/ 56% RH
Engineer	Hiroshi Kukita
Mode	Tx Mod

FREQ [MHz]	20dB Bandwidth [kHz]
13.56	3.09



Frequency Tolerance

Test place	Head Office EMC Lab. No.6 measurement room
Report No.	32LE0002-HO-01
Date	09/03/2012
Temperature/ Humidity	24 deg.C/ 56% RH
Engineer	Hiroshi Kukita
Mode	Tx Mod on, without Tag

Test Condition deg.C	Volts	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
20deg.C	4.25V	Power on	13.55999242	-0.00000759	-0.56	100.00	99.44
		on 2min.	13.55998733	-0.00001267	-0.93	100.00	99.07
		on 5min.	13.55998623	-0.00001377	-1.02	100.00	98.98
		on 10min.	13.55998711	-0.00001289	-0.95	100.00	99.05
	5V	Power on	13.56003694	0.00003694	2.72	100.00	97.28
		on 2min.	13.56001611	0.00001611	1.19	100.00	98.81
		on 5min.	13.56001658	0.00001658	1.22	100.00	98.78
		on 10min.	13.55999190	-0.00000810	-0.60	100.00	99.40
	5.75V	Power on	13.55999810	-0.00000190	-0.14	100.00	99.86
		on 2min.	13.55998790	-0.00001210	-0.89	100.00	99.11
		on 5min.	13.55997621	-0.00002379	-1.75	100.00	98.25
		on 10min.	13.55997610	-0.00002390	-1.76	100.00	98.24
50deg.C.	5V	Power on	13.55994100	-0.00005900	-4.35	100.00	95.65
		on 2min.	13.55999655	-0.00000345	-0.25	100.00	99.75
		on 5min.	13.55999165	-0.00000835	-0.62	100.00	99.38
		on 10min.	13.55998221	-0.00001779	-1.31	100.00	98.69
40deg.C.		Power on	13.55999232	-0.00000768	-0.57	100.00	99.43
		on 2min.	13.55999123	-0.00000877	-0.65	100.00	99.35
		on 5min.	13.55998823	-0.00001177	-0.87	100.00	99.13
		on 10min.	13.55998576	-0.00001424	-1.05	100.00	98.95
30deg.C.		Power on	13.55999562	-0.00000438	-0.32	100.00	99.68
		on 2min.	13.55998745	-0.00001255	-0.93	100.00	99.07
		on 5min.	13.55998021	-0.00001979	-1.46	100.00	98.54
		on 10min.	13.55999452	-0.00000548	-0.40	100.00	99.60
20deg.C.		Power on	13.56003192	0.00003192	2.35	100.00	97.65
		on 2min.	13.56001982	0.00001982	1.46	100.00	98.54
		on 5min.	13.55997430	-0.00002570	-1.90	100.00	98.10
		on 10min.	13.55998183	-0.00001817	-1.34	100.00	98.66
10deg.C.		Power on	13.55999055	-0.00000945	-0.70	100.00	99.30
		on 2min.	13.55998463	-0.00001537	-1.13	100.00	98.87
		on 5min.	13.55998628	-0.00001372	-1.01	100.00	98.99
		on 10min.	13.55999650	-0.00000350	-0.26	100.00	99.74
0deg.C.		Power on	13.56000202	0.00000202	0.15	100.00	99.85
		on 2min.	13.55999950	-0.00000050	-0.04	100.00	99.96
		on 5min.	13.55999879	-0.00000121	-0.09	100.00	99.91
		on 10min.	13.55999262	-0.00000738	-0.54	100.00	99.46
-10deg.C.		Power on	13.55999892	-0.00000108	-0.08	100.00	99.92
		on 2min.	13.55998727	-0.00001273	-0.94	100.00	99.06
		on 5min.	13.55998834	-0.00001166	-0.86	100.00	99.14
		on 10min.	13.55999814	-0.00000186	-0.14	100.00	99.86
-20deg.C		Power on	13.55999775	-0.00000226	-0.17	100.00	99.83
		on 2min.	13.55999174	-0.00000826	-0.61	100.00	99.39
		on 5min.	13.55998867	-0.00001133	-0.84	100.00	99.16
		on 10min.	13.55998934	-0.00001066	-0.79	100.00	99.21
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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APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE/CE/FT	2012/04/06 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2012/04/05 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/11/16 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/11/16 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2012/03/05 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	RE/CE	2012/07/12 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2012/07/27 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2012/02/06 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	FT	2012/02/06 * 12
MBM-10	Barometer	Sunoh	SBR121	832	FT	2010/12/13 * 36
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	FT	2012/08/01 * 12

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