

Test Report No. : 33AE0014-HO-02-A-R1

Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 33AE0014-HO-02-A. 33AE0014-HO-02-A is replaced with this report.

Hiroshi Kukita
Engineer of WiSE Japan,
UL Verification Service

Masanori Nishiyama
 Manager of WiSE Japan,
 UL Verification Service



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>

13-EM-F0429

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SECTION 1: Customer information

Company Name : BROTHER INDUSTRIES, LTD.
Address : 1-1-1 Kawagishi, Mizuho-ku, Nagoya-shi, Aichi-ken 467-0852, Japan
Telephone Number : +81-52-824-2345
Facsimile Number : +81-52-824-2734
Contact Person : Yoshiyuki Tsujimoto

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

2.1 Identification of E.U.T.

Type of Equipment : NFC Module
Model No. : BRNF13M001
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC3.0V to DC3.6V
Receipt Date of Sample : November 9, 2012
Country of Mass-production : China, Vietnam
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system : 13.56MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 13.56MHz
Modulation : ASK
- Type A
- Type B
- FeliCa 212kbps/424kbps
- ISO15693
Power Supply (inner) : DC3.3V
Antenna type : Printed Loop Coil Pattern
Antenna Gain : -50dBi
Operating Temperature : 0 deg. C - +60 deg. C

*There are multiple models that have different connectors, but the EMC and Radio performance of these models are deemed to be identical, so the testing was performed with the representative model.

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SECTION 3: Test specification, procedures & results

3.1 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 ----- <IC>RSS-Gen 7.2.2	Section 15.207 ----- <IC>RSS-Gen 7.2.2	[QP]28.0dB, 27.12000MHz, L [AV]19.1dB, 27.12000MHz, L	N/A	*1)
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC> RSS-Gen 4.8, 4.11	Section 15.225(a) ----- <IC>RSS-210 A2.6	59.1dB, 13.56000MHz, QP, 0deg.	Complied	Radiated
Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.9, 4.11	Section 15.225(b)(c) ----- <IC> RSS-210 A2.6	30.7dB, 13.34806MHz, QP, 0deg.	Complied	Radiated
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC> -	Section15.215(c) ----- <IC> -	See data	Complied	Radiated
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.9, 4.11	Section15.209, Section 15.225 (d) ----- <IC>RSS-210 A2.6	5.3dB 40.680MHz, Vertical, QP	Complied	Radiated
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators ----- <IC>RSS-Gen 4.7	Section15.225(e) ----- <IC> RSS-210 A2.6	See data	Complied	Radiated

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

*1) The test was performed on AC Power port of DC Power Supply.

FCC 15.31 (e)

This EUT provides stable voltage (DC2.5V/1.88V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

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

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3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	N/A

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

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

Test room (semi-anechoic chamber)	Conducted emission (+dB)
	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.

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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
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	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	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	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*
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.	

Test Item	Operating mode*
Conducted emission	Tx Type B, without Tag
Electric Field Strength of Fundamental Emission	Tx Type A / Type B / FeliCa 212kbps / FeliCa 424kbps / ISO15693, Mod on, with Tag / without Tag
Spectrum Mask	Tx Type A / Type B / FeliCa 212kbps / FeliCa 424kbps / ISO15693, Mod on, with Tag / without Tag
20dB Bandwidth and 99% Occupied Bandwidth	Tx Type A / Type B / FeliCa 212kbps / FeliCa 424kbps / ISO15693, Mod on, with Tag / without Tag
Electric Field Strength of Spurious Emission (below 30MHz)	Tx Type B, without Tag
Electric Field Strength of Spurious Emission (above 30MHz)	Tx Type B, with Tag
Frequency Tolerance	Tx Mod off

* Maximum Field Strength with Tag and without Tag were compared, the test was performed with the worst case.

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

Frequency Tolerance:

Temperature : 0deg.C to +50deg.C Step 10deg.C

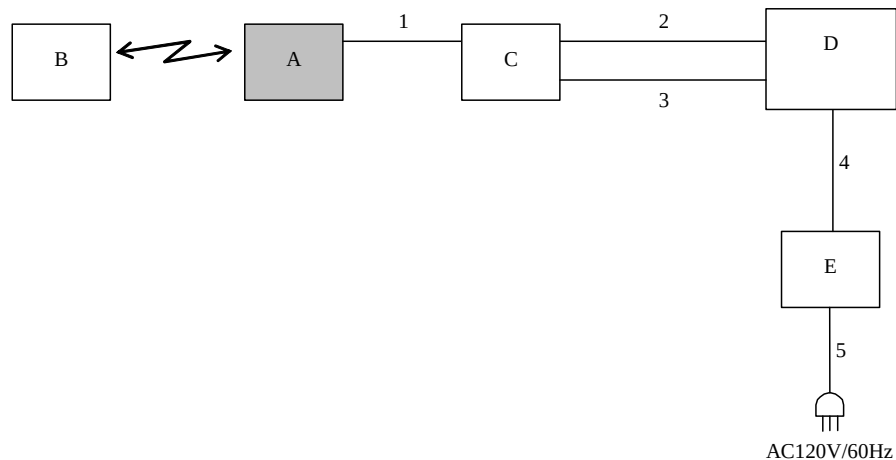
Voltage : Normal Voltage DC 3.3V

Maximum Voltage DC 3.795V, Minimum Voltage DC 2.805V (DC 3.3V ±15%)

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

4.2 Configuration and peripherals

<Conducted emission test>



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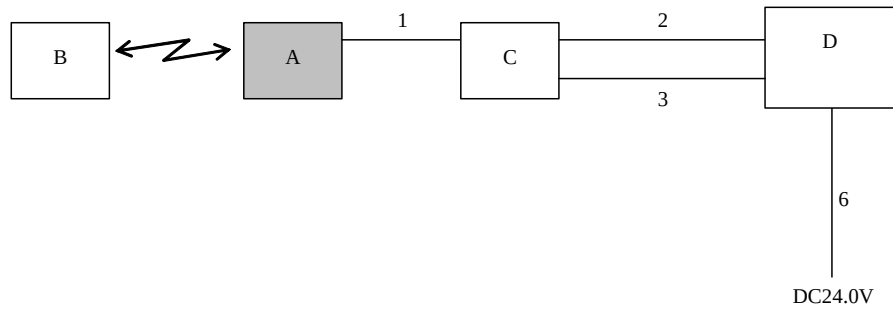
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<Radiated emission test>



* 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 Module	BRNF13M001	1	BROTHER INDUSTRIES, LTD.	EUT
B	Tag	-	-	BROTHER INDUSTRIES, LTD.	-
C	Control Panel (Jig)	-	-	BROTHER INDUSTRIES, LTD.	-
D	Control Board (Jig)	-	-	BROTHER INDUSTRIES, LTD.	-
E	DC Power Supply	PMC35-2A	13090501	KIKUSUI	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	0.1	Unshielded	Unshielded	-
2	Signal Cable	0.65	Unshielded	Unshielded	-
3	Signal Cable	0.75	Shielded	Shielded	-
4	DC Cable	0.2	Unshielded	Unshielded	-
5	AC Cable	2.2	Unshielded	Unshielded	-
6	DC Cable	2.5	Unshielded	Unshielded	-

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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

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

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, 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 had the maximum noise.

- The EUT has two modes, with Tag and without Tag. The test was made at the mode that had the worst case.

* 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

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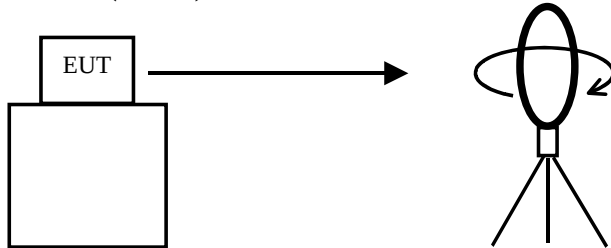
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	5MHz / 10MHz	51kHz/100kHz	160kHz/300kHz	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%.							

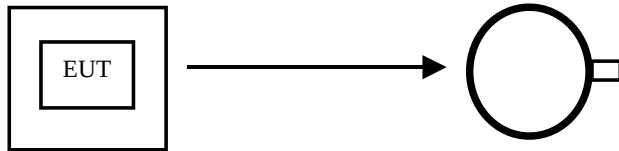
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

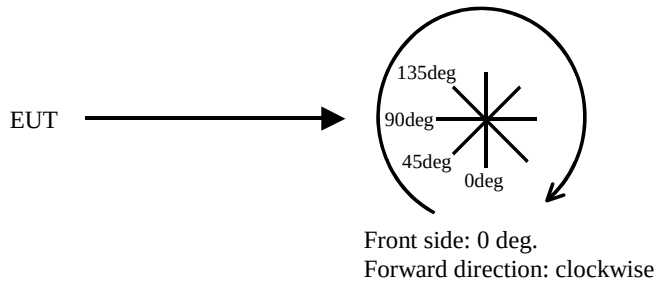


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



APPENDIX 1: Data of EMI test

Conducted emission

DATA OF CONDUCTED EMISSION TEST

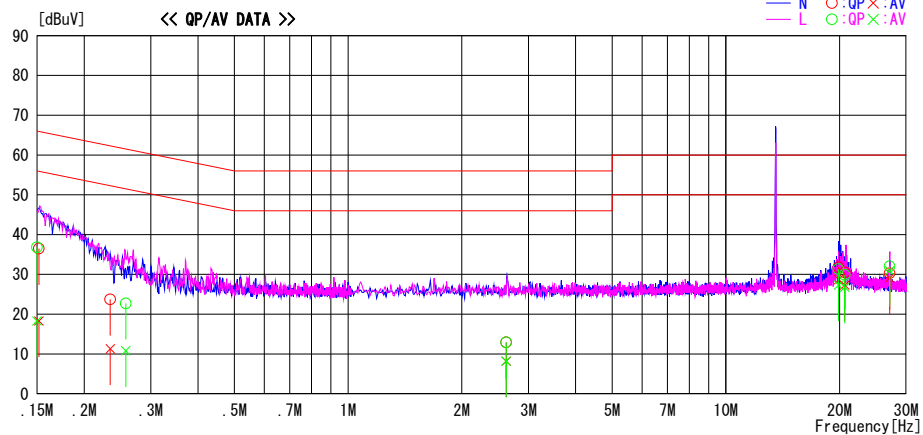
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2012/11/12

Report No. : 33AE0014-HO-02

Temp./Humi. : 21deg. C / 62% RH
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx 13.56MHz, Modulation type B, without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15174	23.2	5.0	13.3	36.5	18.3	65.9	55.9	29.4	37.6	N	
0.23456	10.4	-2.0	13.3	23.7	11.3	62.3	52.3	38.6	41.0	N	
2.62060	-0.6	-5.3	13.5	12.9	8.2	56.0	46.0	43.1	37.8	N	
19.87777	17.0	13.9	14.8	31.8	28.7	60.0	50.0	28.2	21.3	N	
20.62681	15.6	12.4	14.9	30.5	27.3	60.0	50.0	29.5	22.7	N	
27.12000	15.2	14.0	15.1	30.3	29.1	60.0	50.0	29.7	20.9	N	
0.15000	23.5	5.0	13.3	36.8	18.3	66.0	56.0	29.2	37.7	L	
0.25780	9.4	-2.5	13.3	22.7	10.8	61.5	51.5	38.8	40.7	L	
2.62060	-0.6	-5.3	13.5	12.9	8.2	56.0	46.0	43.1	37.8	L	
19.87843	16.5	12.5	14.8	31.3	27.3	60.0	50.0	28.7	22.7	L	
20.62644	15.0	11.9	14.9	29.9	26.8	60.0	50.0	30.1	23.2	L	
27.12000	16.9	15.8	15.1	32.0	30.9	60.0	50.0	28.0	19.1	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.

Conducted emission

DATA OF CONDUCTED EMISSION TEST

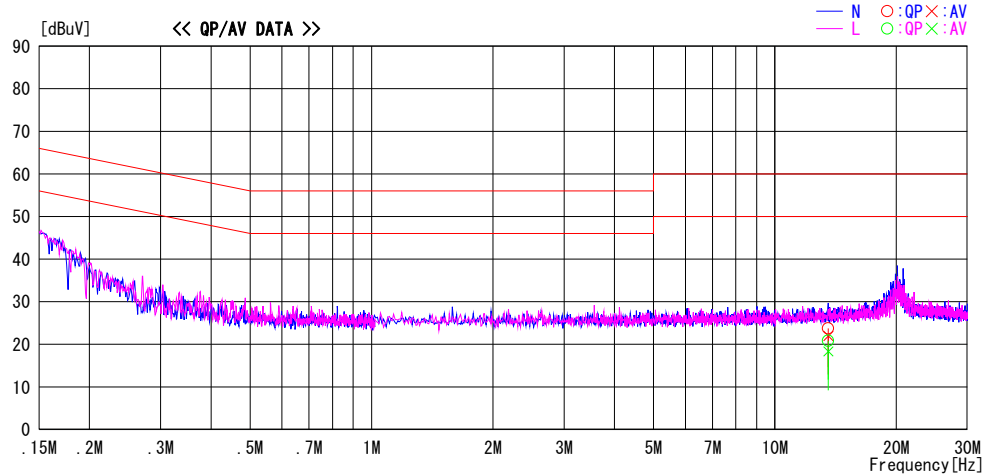
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2012/11/12

Report No. : 33AE0014-HO-02

Temp./Humi. : 21deg. C / 62% RH
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx 13.56MHz, Modulation type B, Antenna terminal: Terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
13.56000	9.2	7.5	14.5	23.7	22.0	60.0	50.0	36.3	28.0	N	Terminated
13.56000	6.3	3.8	14.5	20.8	18.3	60.0	50.0	39.2	31.7	L	Terminated

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.

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Fundamental emission and Spectrum Mask (Precheck)

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp./ Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: Type A, Worst axis:Y axis

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.

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]	
13.56000	58.2	QP	19.3	7.1	32.1	52.5	123.9	71.4	0	202	X
13.56000	69.6	QP	19.3	7.1	32.1	63.9	123.9	60.0	0	178	Y*
13.56000	69.1	QP	19.3	7.1	32.1	63.4	123.9	60.5	0	288	Z
13.56000	53.5	QP	19.3	7.1	32.1	47.8	123.9	76.1	45	178	X
13.56000	67.5	QP	19.3	7.1	32.1	61.8	123.9	62.1	45	171	Y
13.56000	67.5	QP	19.3	7.1	32.1	61.8	123.9	62.1	45	168	Z
13.56000	47.8	QP	19.3	7.1	32.1	42.1	123.9	81.8	90	202	X
13.56000	64.6	QP	19.3	7.1	32.1	58.9	123.9	65.0	90	78	Y
13.56000	65.4	QP	19.3	7.1	32.1	59.7	123.9	64.2	90	221	Z
13.56000	56.5	QP	19.3	7.1	32.1	50.8	123.9	73.1	135	233	X
13.56000	67.6	QP	19.3	7.1	32.1	61.9	123.9	62.0	135	232	Y
13.56000	67.3	QP	19.3	7.1	32.1	61.6	123.9	62.3	135	118	Z
13.56000	58.9	QP	19.3	7.1	32.1	53.2	123.9	70.7	135	240	X, Hori
13.56000	59.6	QP	19.3	7.1	32.1	53.9	123.9	70.0	135	131	Y, Hori
13.56000	60.0	QP	19.3	7.1	32.1	54.3	123.9	69.6	135	283	Z, Hori

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.)

Fundamental emission and Spectrum Mask
without Tag(Type:A)

DATA OF RADIATED EMISSION TEST

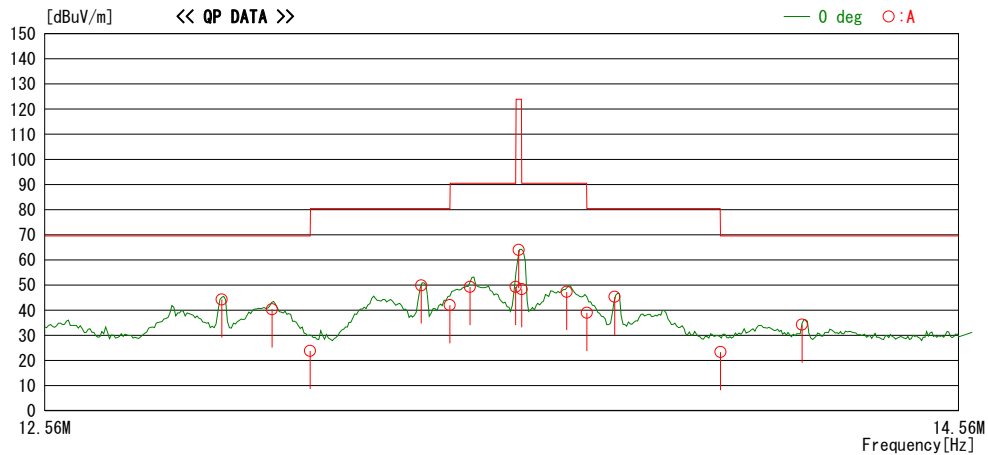
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp./ Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: Type A, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
12.92424	50.0	QP	19.3	7.0	32.1	44.2	69.5	25.3	0	A	178
13.03017	46.1	QP	19.3	7.0	32.1	40.3	69.5	29.2	0	A	178
13.11000	29.6	QP	19.3	7.0	32.1	23.8	69.5	45.7	0	A	178
13.34806	55.6	QP	19.3	7.0	32.1	49.8	80.5	30.7	0	A	178
13.41000	47.8	QP	19.3	7.0	32.1	42.0	80.5	38.5	0	A	178
13.45404	55.1	QP	19.3	7.0	32.1	49.3	90.4	41.1	0	A	178
13.55300	55.0	QP	19.3	7.1	32.1	49.3	90.4	41.1	0	A	178
13.56000	69.6	QP	19.3	7.1	32.1	63.9	123.9	60.0	0	A	178
13.56700	54.1	QP	19.3	7.1	32.1	48.4	90.4	42.0	0	A	178
13.66600	53.0	QP	19.3	7.1	32.1	47.3	90.4	43.1	0	A	178
13.71000	44.6	QP	19.3	7.1	32.1	38.9	80.5	41.6	0	A	178
13.77176	51.0	QP	19.3	7.1	32.1	45.3	80.5	35.2	0	A	178
14.01000	29.0	QP	19.3	7.1	32.1	23.3	69.5	46.2	0	A	178
14.19560	40.0	QP	19.2	7.1	32.1	34.2	69.5	35.3	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.)

Fundamental emission and Spectrum Mask
with Tag(Type:A)

DATA OF RADIATED EMISSION TEST

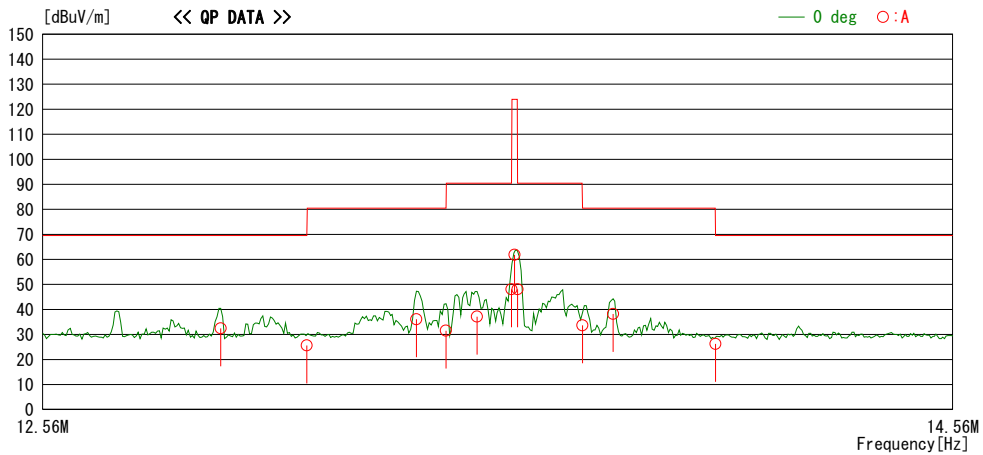
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/20

Report No. : 33AE0014-HO-02

Temp./ Humi. : 22deg. C / 49% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 13.56MHz, Modulation: Type A, Worst axis:Y axis, With Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
12.92876	38.7	QP	19.3	6.6	32.1	32.5	69.5	37.0	0	A	0
13.11000	31.9	QP	19.3	6.6	32.1	25.7	69.5	43.8	0	A	0
13.34563	42.3	QP	19.3	6.6	32.1	36.1	80.5	44.4	0	A	0
13.41000	37.8	QP	19.3	6.6	32.1	31.6	80.5	48.9	0	A	0
13.47790	43.4	QP	19.3	6.6	32.1	37.2	90.4	53.2	0	A	0
13.55300	54.3	QP	19.3	6.6	32.1	48.1	90.4	42.3	0	A	0
13.56000	68.0	QP	19.3	6.7	32.1	61.9	123.9	62.0	0	A	0
13.56700	54.1	QP	19.3	6.7	32.1	48.0	90.4	42.4	0	A	0
13.77852	44.3	QP	19.3	6.7	32.1	38.2	80.5	42.3	0	A	0
13.71000	39.8	QP	19.3	6.7	32.1	33.7	80.5	46.8	0	A	0
14.01000	32.4	QP	19.3	6.7	32.1	26.3	69.5	43.2	0	A	0

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.)

Fundamental emission and Spectrum Mask
without Tag(Type:B)

DATA OF RADIATED EMISSION TEST

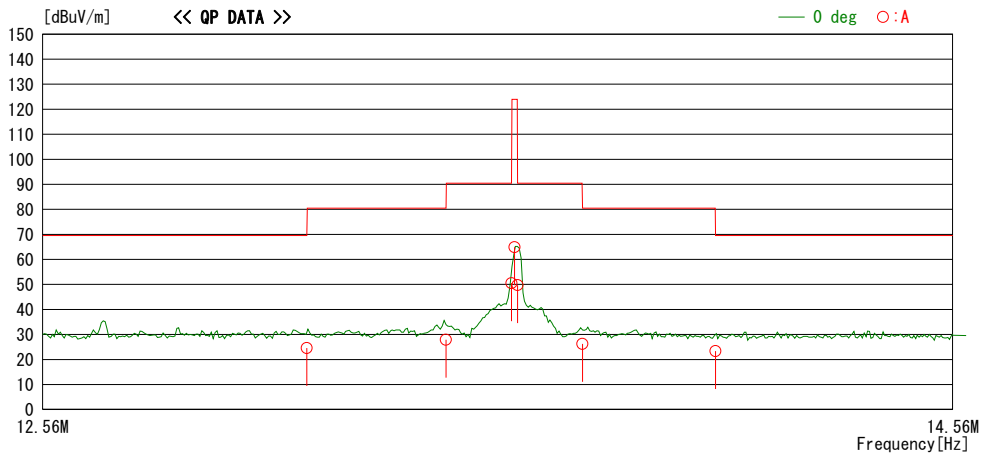
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp./ Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: Type B, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	30.4	QP	19.3	7.0	32.1	24.6	69.5	44.9	0	A	190
13.41000	33.7	QP	19.3	7.0	32.1	27.9	80.5	52.6	0	A	190
13.55300	56.2	QP	19.3	7.1	32.1	50.5	90.4	39.9	0	A	190
13.56000	70.5	QP	19.3	7.1	32.1	64.8	123.9	59.1	0	A	190
13.56700	55.4	QP	19.3	7.1	32.1	49.7	90.4	40.7	0	A	190
13.71000	31.9	QP	19.3	7.1	32.1	26.2	80.5	54.3	0	A	190
14.01000	29.1	QP	19.3	7.1	32.1	23.4	69.5	46.1	0	A	190

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.)

Fundamental emission and Spectrum Mask with Tag(Type:B)

DATA OF RADIATED EMISSION TEST

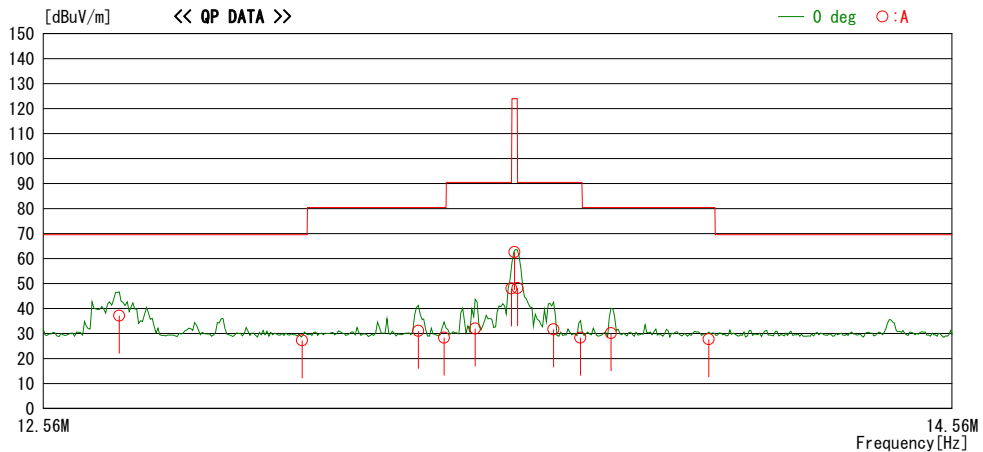
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/20

Report No. : 33AE0014-HO-02

Temp./ Humi. : 22deg. C / 49% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 13.56MHz, Modulation: Type B, Worst axis:Y axis, With Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
12.71632	43.3	QP	19.3	6.6	32.1	37.1	69.5	32.4	0	A	0
13.10000	33.5	QP	19.3	6.6	32.1	27.3	69.5	42.2	0	A	0
13.34963	37.3	QP	19.3	6.6	32.1	31.1	80.5	49.4	0	A	0
13.40575	34.5	QP	19.3	6.6	32.1	28.3	80.5	52.2	0	A	0
13.47389	38.2	QP	19.3	6.6	32.1	32.0	90.4	58.4	0	A	0
13.55300	54.2	QP	19.3	6.6	32.1	48.0	90.4	42.4	0	A	0
13.56000	68.7	QP	19.3	6.7	32.1	62.6	123.9	61.3	0	A	0
13.56700	54.3	QP	19.3	6.7	32.1	48.2	90.4	42.2	0	A	0
13.64625	37.8	QP	19.3	6.7	32.1	31.7	90.4	58.7	0	A	0
13.70637	34.5	QP	19.3	6.7	32.1	28.4	90.4	62.0	0	A	0
13.77451	36.2	QP	19.3	6.7	32.1	30.1	80.5	50.4	0	A	0
13.99497	33.8	QP	19.3	6.7	32.1	27.7	80.5	52.8	0	A	0

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.)

Fundamental emission and Spectrum Mask without Tag(Felica:212kbps)

DATA OF RADIATED EMISSION TEST

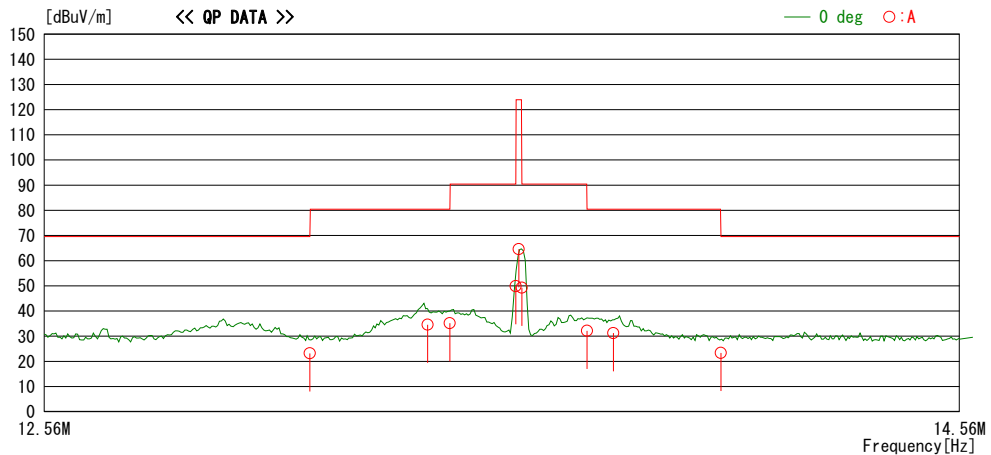
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp./ Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: FeliCa 212kbps, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	19.3	7.0	32.1	23.2	69.5	46.3	0	A	192
13.36240	40.4	QP	19.3	7.0	32.1	34.6	80.5	45.9	0	A	192
13.41000	41.0	QP	19.3	7.0	32.1	35.2	80.5	45.3	0	A	192
13.55300	55.6	QP	19.3	7.1	32.1	49.9	90.4	40.5	0	A	192
13.56000	70.2	QP	19.3	7.1	32.1	64.5	123.9	59.4	0	A	192
13.56700	54.9	QP	19.3	7.1	32.1	49.2	90.4	41.2	0	A	192
13.71000	37.8	QP	19.3	7.1	32.1	32.1	80.5	48.4	0	A	192
13.76860	37.0	QP	19.3	7.1	32.1	31.3	80.5	49.2	0	A	192
14.01000	29.0	QP	19.3	7.1	32.1	23.3	69.5	46.2	0	A	192

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.)

Fundamental emission and Spectrum Mask
with Tag(FeliCa:212kbps)

DATA OF RADIATED EMISSION TEST

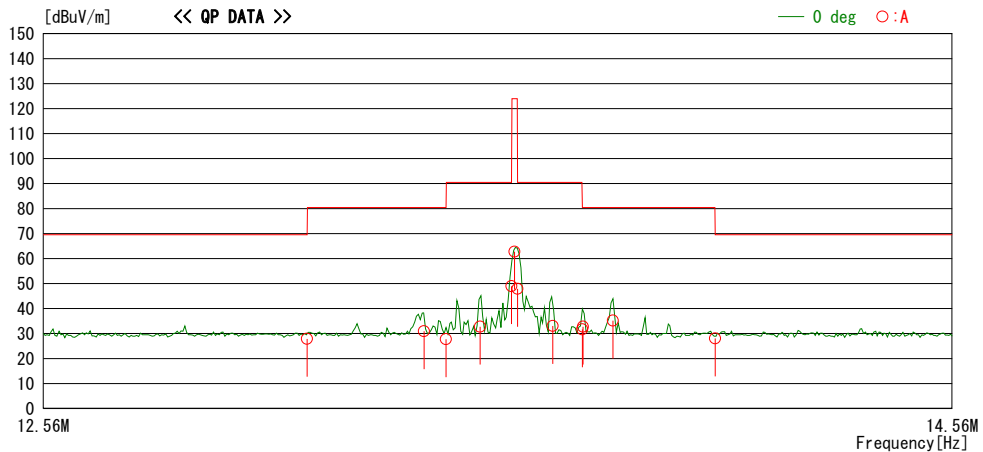
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/20

Report No. : 33AE0014-HO-02

Temp./ Humi. : 22deg. C / 49% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 13.56MHz, Modulation: FeliCa 212kbps, Worst axis:Y axis, With Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	34.1	QP	19.3	6.6	32.1	27.9	69.5	41.6	0	A	0
13.36166	37.2	QP	19.3	6.6	32.1	31.0	80.5	49.5	0	A	0
13.41000	33.9	QP	19.3	6.6	32.1	27.7	80.5	52.8	0	A	0
13.48412	38.9	QP	19.3	6.6	32.1	32.7	90.4	57.7	0	A	0
13.55300	55.1	QP	19.3	6.6	32.1	48.9	90.4	41.5	0	A	0
13.56000	68.9	QP	19.3	6.7	32.1	62.8	123.9	61.1	0	A	0
13.56700	54.1	QP	19.3	6.7	32.1	47.9	90.4	42.5	0	A	0
13.64421	39.2	QP	19.3	6.7	32.1	33.1	90.4	57.3	0	A	0
13.71000	37.8	QP	19.3	6.7	32.1	31.7	80.5	48.8	0	A	0
13.71231	38.9	QP	19.3	6.7	32.1	32.8	80.5	47.7	0	A	0
13.77852	41.2	QP	19.3	6.7	32.1	35.1	80.5	45.4	0	A	0
14.01000	34.2	QP	19.3	6.7	32.1	28.1	69.5	41.4	0	A	0

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.)

Fundamental emission and Spectrum Mask
without Tag(Felica:424kbps)

DATA OF RADIATED EMISSION TEST

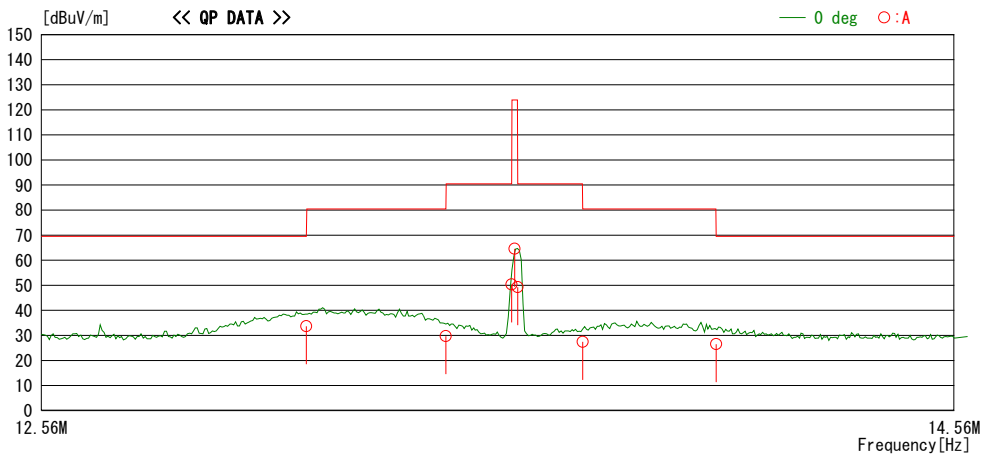
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp./ Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: FeliCa 424kbps, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	39.5	QP	19.3	7.0	32.1	33.7	69.5	35.8	0	A	188
13.41000	35.5	QP	19.3	7.0	32.1	29.7	80.5	50.8	0	A	188
13.55300	56.0	QP	19.3	7.1	32.1	50.3	90.4	40.1	0	A	188
13.56000	70.2	QP	19.3	7.1	32.1	64.5	123.9	59.4	0	A	188
13.56700	54.9	QP	19.3	7.1	32.1	49.2	90.4	41.2	0	A	188
13.71000	33.2	QP	19.3	7.1	32.1	27.5	80.5	53.0	0	A	188
14.01000	32.3	QP	19.3	7.1	32.1	26.6	69.5	42.9	0	A	188

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.)

Fundamental emission and Spectrum Mask

with Tag(FeliCa:424kbps)

DATA OF RADIATED EMISSION TEST

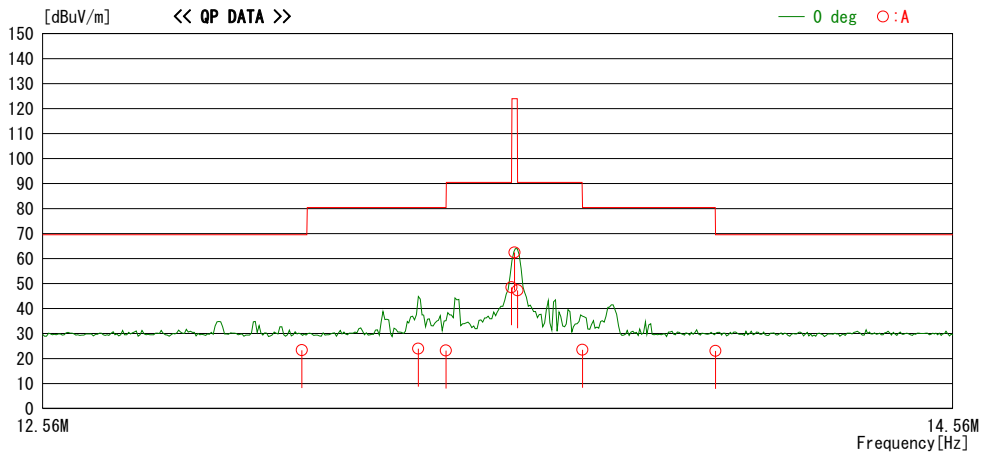
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/20

Report No. : 33AE0014-HO-02

Temp./ Humi. : 22deg. C / 49% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 13.56MHz, Modulation: FeliCa 424kbps, Worst axis:Y axis, With Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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]	
13.10000	29.5	QP	19.3	6.6	32.1	23.3	69.5	46.2	0	A	0
13.41000	29.4	QP	19.3	6.6	32.1	23.2	80.5	57.3	0	A	0
13.34963	30.2	QP	19.3	6.6	32.1	24.0	80.5	56.5	0	A	0
13.55300	54.7	QP	19.3	6.6	32.1	48.5	90.4	41.9	0	A	0
13.56000	68.5	QP	19.3	6.7	32.1	62.4	123.9	61.5	0	A	0
13.56700	53.5	QP	19.3	6.7	32.1	47.4	90.4	43.1	0	A	0
13.71000	29.6	QP	19.3	6.7	32.1	23.4	80.5	57.1	0	A	0
14.01000	29.1	QP	19.3	6.7	32.1	23.0	69.5	46.5	0	A	0

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.)

Fundamental emission and Spectrum Mask
without Tag(ISO15693)

DATA OF RADIATED EMISSION TEST

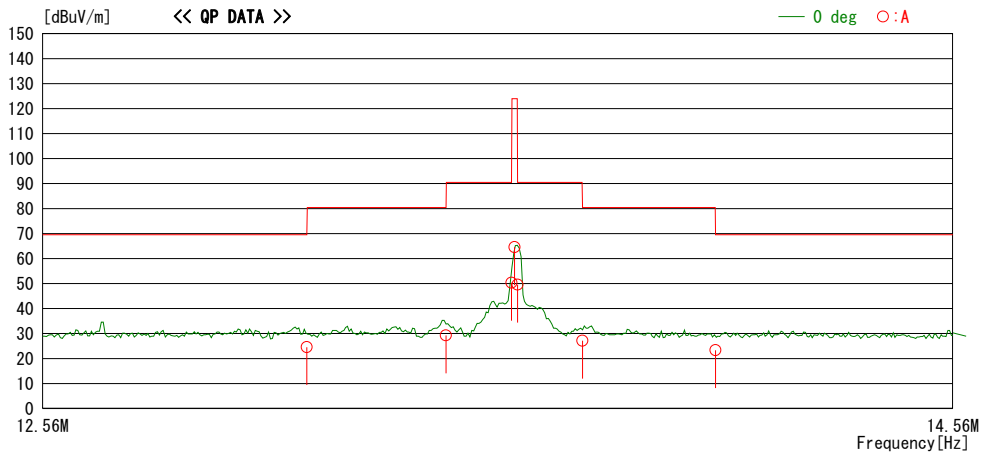
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp./ Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: ISO15693, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	30.3	QP	19.3	7.0	32.1	24.5	69.5	45.0	0	A	183
13.41000	35.0	QP	19.3	7.0	32.1	29.2	80.5	51.3	0	A	183
13.55300	56.0	QP	19.3	7.1	32.1	50.3	90.4	40.1	0	A	183
13.56000	70.3	QP	19.3	7.1	32.1	64.6	123.9	59.3	0	A	183
13.56700	55.2	QP	19.3	7.1	32.1	49.5	90.4	40.9	0	A	183
13.71000	32.8	QP	19.3	7.1	32.1	27.1	80.5	53.4	0	A	183
14.01000	29.1	QP	19.3	7.1	32.1	23.4	69.5	46.1	0	A	183

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.)

Fundamental emission and Spectrum Mask with Tag(ISO15693)

DATA OF RADIATED EMISSION TEST

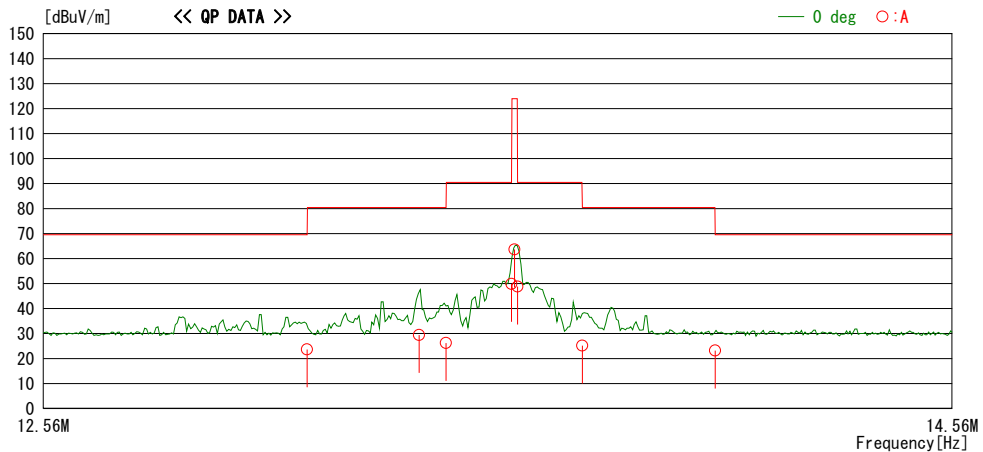
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/20

Report No. : 33AE0014-HO-02

Temp./ Humi. : 22deg. C / 49% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Tx 13.56MHz, Modulation: ISO15693, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	29.8	QP	19.3	6.6	32.1	23.6	69.5	45.9	0	A	0
13.35100	35.6	QP	19.3	6.6	32.1	29.4	80.5	51.1	0	A	0
13.41000	32.4	QP	19.3	6.6	32.1	26.2	80.5	54.3	0	A	0
13.55300	56.1	QP	19.3	6.6	32.1	49.9	90.4	40.5	0	A	0
13.56000	69.8	QP	19.3	6.7	32.1	63.7	123.9	60.2	0	A	0
13.56700	55.0	QP	19.3	6.7	32.1	48.9	90.4	41.5	0	A	0
13.71000	31.2	QP	19.3	6.7	32.1	25.1	80.5	55.4	0	A	0
14.01000	29.3	QP	19.3	6.7	32.1	23.2	69.5	46.3	0	A	0

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

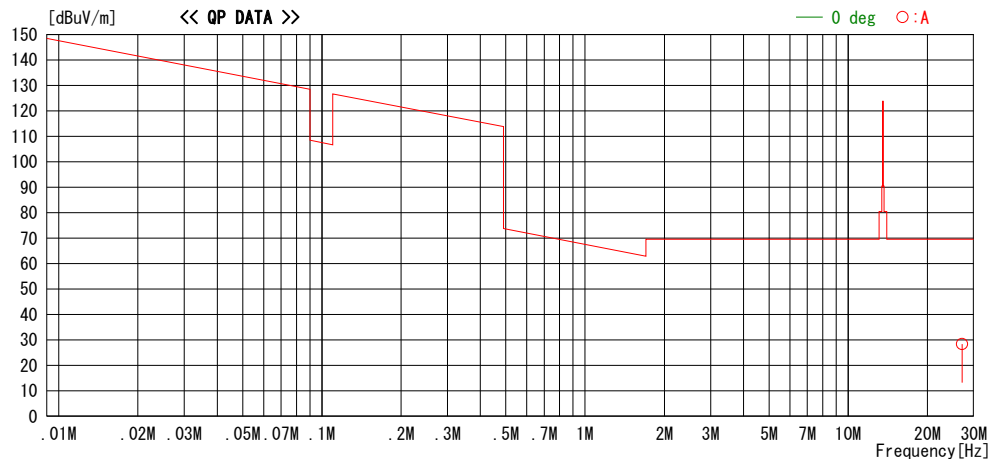
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/11/05

Report No. : 33AE0014-HO-02

Temp. / Humi. : 23deg. C / 52% RH
Engineer : Hiroshi Kukita

Mode / Remarks : Tx 13.56MHz, Modulation: Type B, Worst axis:Y axis, Without Tag

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
All other spurious emissions were less than 20dB for the limit.



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	32.0	QP	20.9	7.5	32.0	28.4	69.5	41.1	0	A	190

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

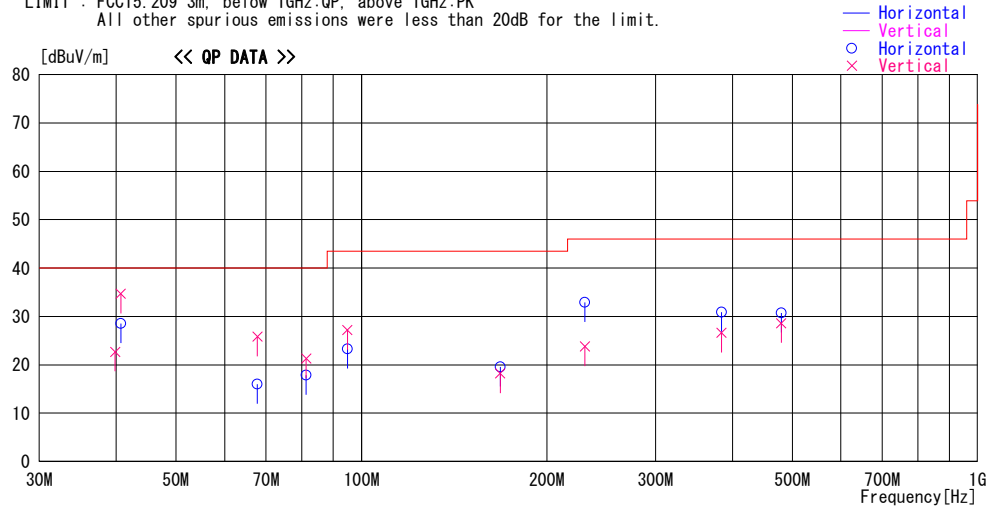
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2012/11/12

Report No. : 33AE0014-HO-02

Temp./Humi. : 21deg. C / 62% RH
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx 13.56MHz, Modulation: Type B, With Tag, Worst axis(Hori: Y, Vert: Y)

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



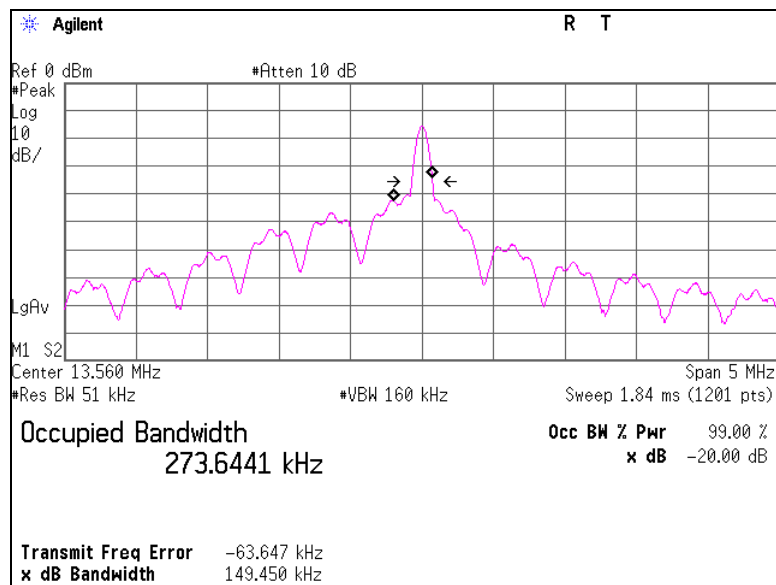
Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
39.840	32.6	QP	14.9	-24.8	22.7	87	100	Vert.	40.0	17.3	
40.680	38.7	QP	14.5	-24.7	28.5	353	297	Hori.	40.0	11.5	
40.680	44.9	QP	14.5	-24.7	34.7	87	100	Vert.	40.0	5.3	
67.800	33.5	QP	6.9	-24.4	16.0	350	304	Hori.	40.0	24.0	
67.800	43.3	QP	6.9	-24.4	25.8	89	100	Vert.	40.0	14.2	
81.360	35.4	QP	6.7	-24.2	17.9	16	227	Hori.	40.0	22.1	
81.360	38.8	QP	6.7	-24.2	21.3	249	150	Vert.	40.0	18.7	
94.920	38.1	QP	9.3	-24.1	23.3	18	225	Hori.	43.5	20.2	
94.920	42.0	QP	9.3	-24.1	27.2	255	100	Vert.	43.5	16.3	
167.990	27.2	QP	15.7	-23.3	19.6	10	202	Hori.	43.5	23.9	
167.990	25.8	QP	15.7	-23.3	18.2	66	100	Vert.	43.5	25.3	
230.520	38.8	QP	17.0	-22.9	32.9	31	143	Hori.	46.0	13.1	
230.520	29.7	QP	17.0	-22.9	23.8	285	230	Vert.	46.0	22.2	
384.006	35.3	QP	17.4	-21.8	30.9	309	100	Hori.	46.0	15.1	
384.006	31.0	QP	17.4	-21.8	26.6	192	187	Vert.	46.0	19.4	
480.008	33.1	QP	18.7	-21.1	30.7	303	100	Hori.	46.0	15.3	
480.008	31.0	QP	18.7	-21.1	28.6	313	145	Vert.	46.0	17.4	

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

20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on without Tag (Type:A)

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	149.45	273.64



UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

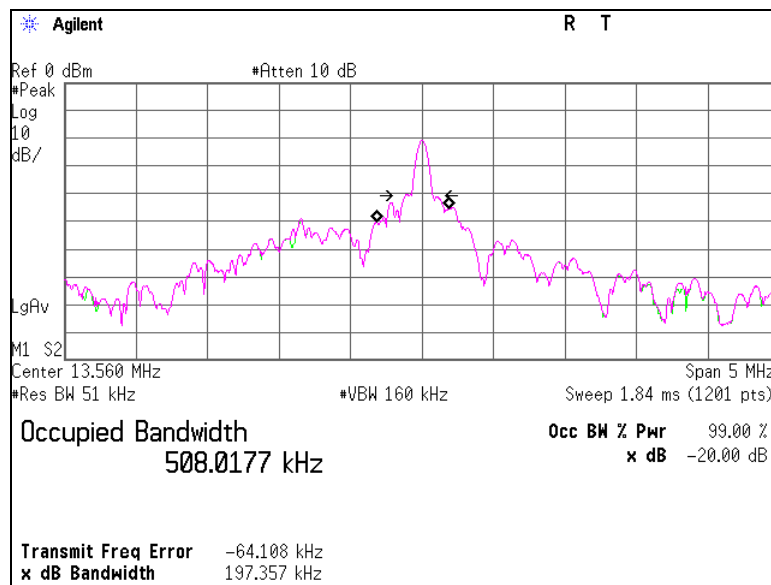
Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on with Tag (Type:A)

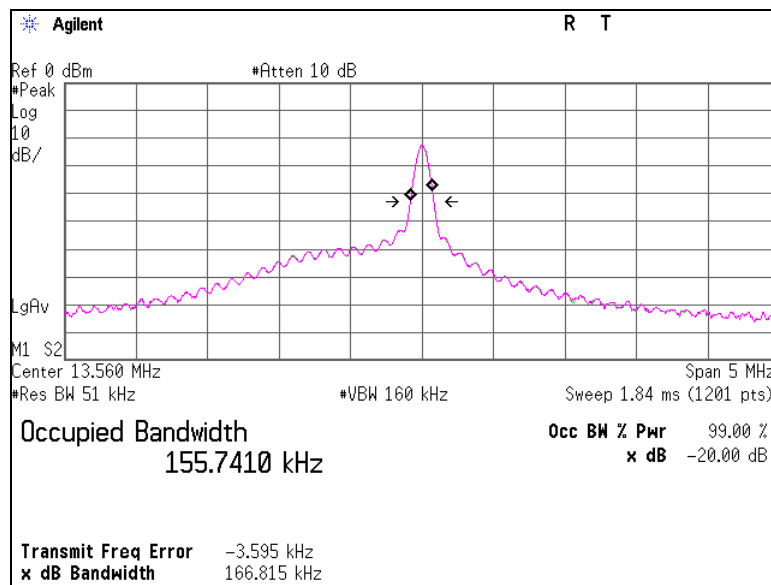
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	197.36	508.02



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on without Tag (Type:B)

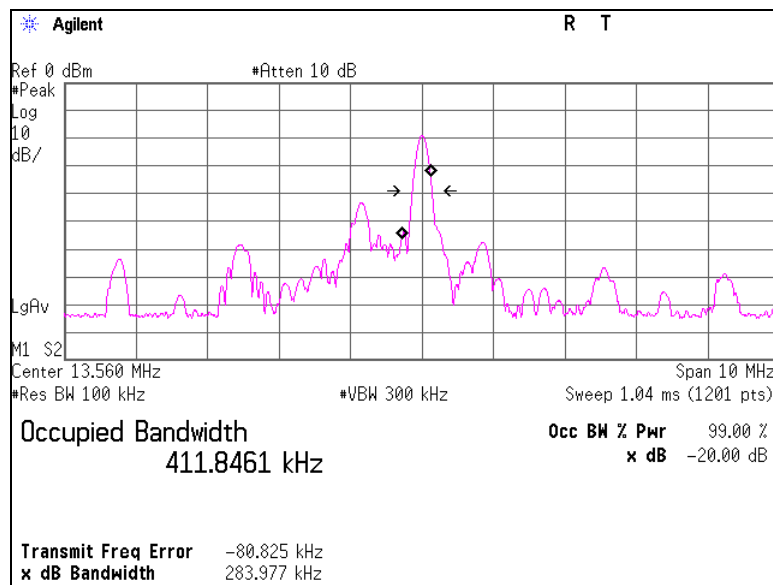
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	166.82	155.74



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on with Tag (Type:B)

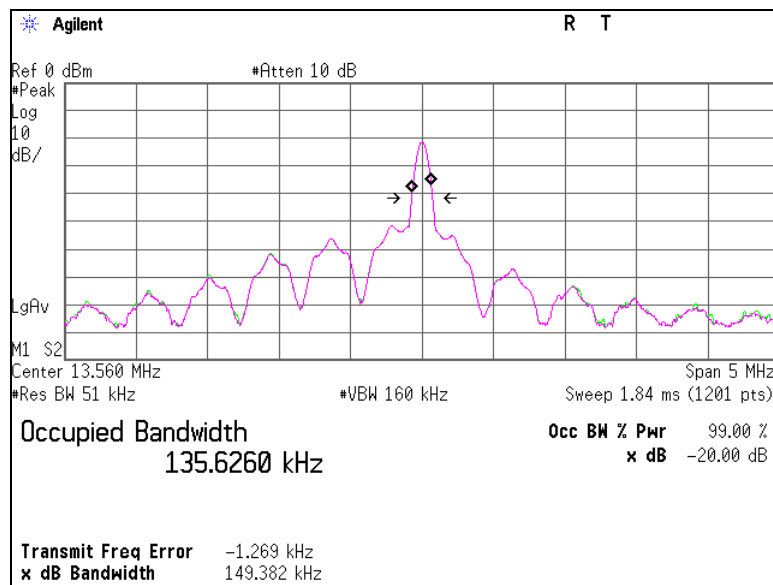
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	283.98	411.85



20dB Bandwidth and 99% Occupied Bandwidth

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 33AE0014-HO-02
Date : 01/27/2013
Temperature/ Humidity : 24 deg. C / 41% RH
Engineer : Tomotaka Sasagawa
Mode : Tx Mod on without Tag (FeliCa:212kbps)

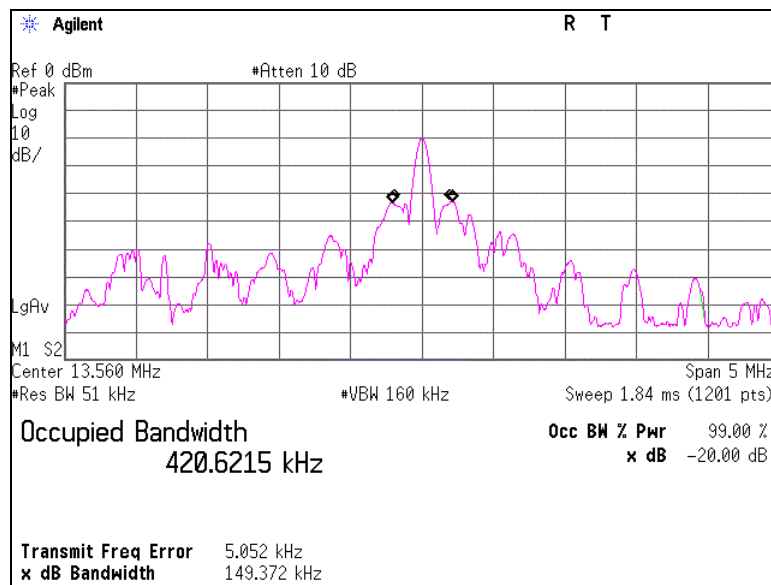
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	149.38	135.63



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on with Tag (FeliCa:212kbps)

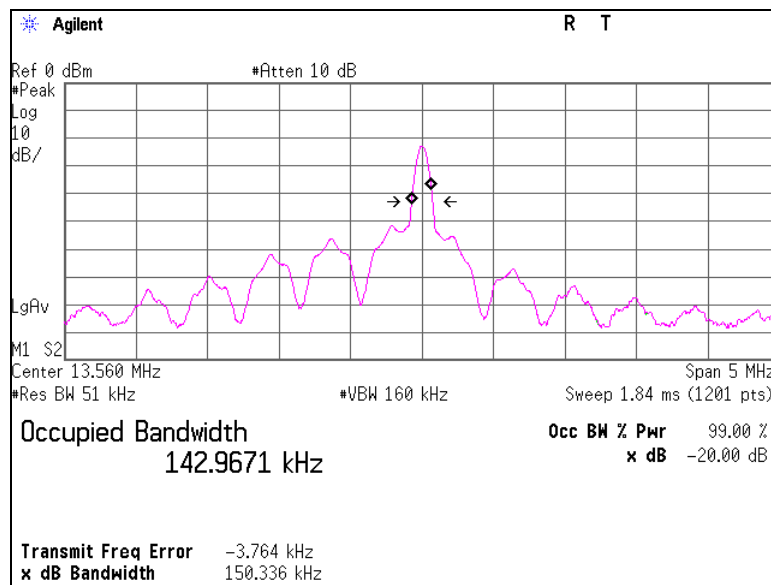
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	149.37	420.62



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on without Tag (FeliCa:424kbps)

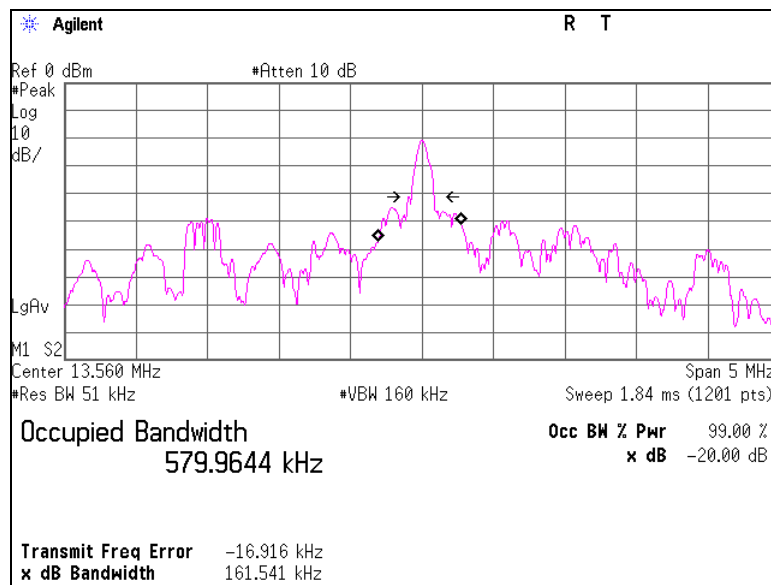
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	150.34	142.97



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on with Tag (FeliCa:424kbps)

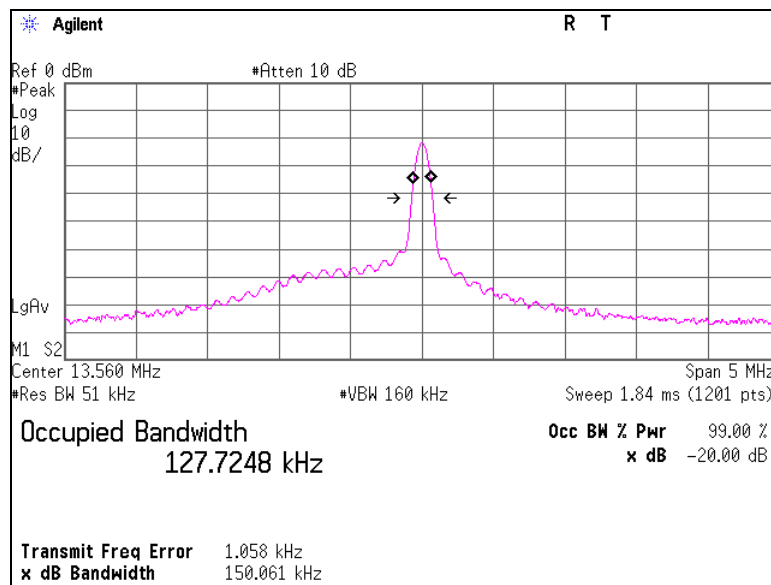
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	161.54	579.96



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on without Tag (ISO15693)

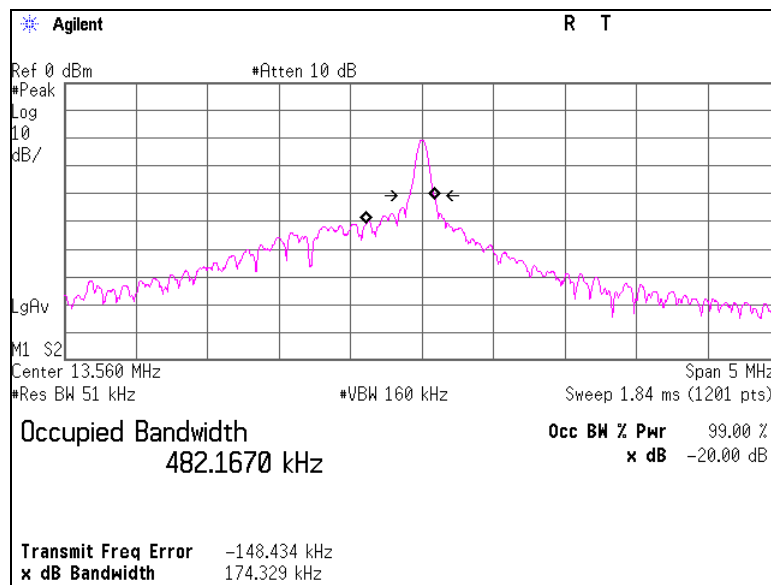
FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	150.06	127.72



20dB Bandwidth and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33AE0014-HO-02
Date	01/27/2013
Temperature/ Humidity	24 deg. C / 41% RH
Engineer	Tomotaka Sasagawa
Mode	Tx Mod on with Tag (ISO15693)

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	174.33	482.17



Frequency Tolerance

Test place : Head Office EMC Lab. No.7 measurement room
Report No. : 33AE0014-HO-02
Date : 11/16/2012
Temperature/ Humidity : 23 deg. C / 45% RH
Engineer : Hiroshi Kukita
Mode : Tx Mod off

Test Condition deg.C Volts		Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
20deg.C	2.805V	Power on	13.55989490	-0.00010510	-7.75	100.00	92.25
		on 2min.	13.55989400	-0.00010600	-7.82	100.00	92.18
		on 5min.	13.55989320	-0.00010680	-7.88	100.00	92.12
		on 10min.	13.55989180	-0.00010820	-7.98	100.00	92.02
	3.3V	Power on	13.55986603	-0.00013397	-9.88	100.00	90.12
		on 2min.	13.55986596	-0.00013404	-9.89	100.00	90.11
		on 5min.	13.55986590	-0.00013410	-9.89	100.00	90.11
		on 10min.	13.55986591	-0.00013409	-9.89	100.00	90.11
	3.795V	Power on	13.55989180	-0.00010820	-7.98	100.00	92.02
		on 2min.	13.55989060	-0.00010940	-8.07	100.00	91.93
		on 5min.	13.55988900	-0.00011100	-8.19	100.00	91.81
		on 10min.	13.55988750	-0.00011250	-8.30	100.00	91.70
50deg.C.	3.3V	Power on	13.55986029	-0.00013971	-10.30	100.00	89.70
		on 2min.	13.55986240	-0.00013760	-10.15	100.00	89.85
		on 5min.	13.55986663	-0.00013338	-9.84	100.00	90.16
		on 10min.	13.55986662	-0.00013338	-9.84	100.00	90.16
40deg.C.		Power on	13.55987417	-0.00012583	-9.28	100.00	90.72
		on 2min.	13.55986032	-0.00013968	-10.30	100.00	89.70
		on 5min.	13.55985948	-0.00014052	-10.36	100.00	89.64
		on 10min.	13.55985932	-0.00014068	-10.37	100.00	89.63
30deg.C.		Power on	13.55989707	-0.00010293	-7.59	100.00	92.41
		on 2min.	13.55988281	-0.00011719	-8.64	100.00	91.36
		on 5min.	13.55988712	-0.00011288	-8.32	100.00	91.68
		on 10min.	13.55988248	-0.00011752	-8.67	100.00	91.33
20deg.C.		Power on	13.55986721	-0.00013279	-9.79	100.00	90.21
		on 2min.	13.55986527	-0.00013473	-9.94	100.00	90.06
		on 5min.	13.55986128	-0.00013872	-10.23	100.00	89.77
		on 10min.	13.55985714	-0.00014286	-10.54	100.00	89.46
10deg.C.		Power on	13.55993310	-0.00006690	-4.93	100.00	95.07
		on 2min.	13.55993208	-0.00006792	-5.01	100.00	94.99
		on 5min.	13.55992956	-0.00007044	-5.19	100.00	94.81
		on 10min.	13.55992606	-0.00007394	-5.45	100.00	94.55
0deg.C.		Power on	13.55993773	-0.00006227	-4.59	100.00	95.41
		on 2min.	13.55993825	-0.00006175	-4.55	100.00	95.45
		on 5min.	13.55993841	-0.00006159	-4.54	100.00	95.46
		on 10min.	13.55993926	-0.00006074	-4.48	100.00	95.52

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

APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2012/06/29 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2012/04/06 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2012/04/03 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE/BW	2012/10/12 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	RE	2012/02/16 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE/BW	2012/07/27 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE/BW	2012/03/05 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2012/11/06 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE/BW	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE/BW	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE/BW	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE/CE/BW	2012/11/21 * 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 *1)
MLA-08	Logperiodic Antenna	Schwarzbeck	UKPL9140-A	N/A	RE	2011/11/16 * 12 *1)
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12 *1)
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2012/02/06 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/suciform141-PE(1m)/RFM-E121(Switcher)	-/04178	RE/CE	2012/07/12 * 12
MCH-06	Temperature and Humidity Chamber	Tabai Spec	PL-1KT	14007630	FT	2012/04/20 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	FT	2012/03/22 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	FT	2012/02/06 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Spec	PL-2KP	14015723	FT	2012/08/01 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE/BW	2012/11/21 * 12

*1)This test equipment was used for the tests before the expiration date of the calibration.

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
BW: 20dB Bandwidth and 99% Occupied Bandwidth

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