



RADIO TEST REPORT

Test Report No. : 32BE0197-HO-01-B-R1

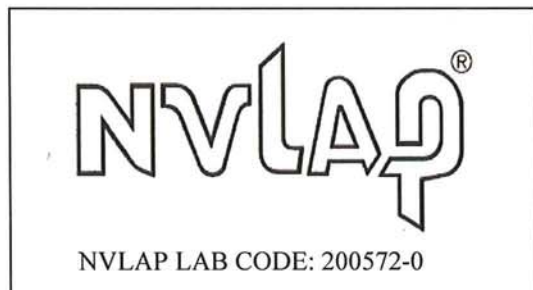
Applicant : DENSO WAVE INCORPORATED
Type of Equipment : High Frequency 13.56 MHz Transceiver
Model No. : AN10R-01
Test regulation : FCC Part 15 Subpart C: 2012
FCC ID : PZWAN10R01
Test Result : Complied

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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 32BE0197-HO-01-B. 32BE0197-HO-01-B is replaced with this report.

Date of test: October 26, 2011 to April 1, 2012

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Leader 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>

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SECTION 1: Customer information

Company Name : DENSO WAVE INCORPORATED
Address : 1 Yoshiike, Kusagi, Agui-cho, Chita-gun, Aichi 470-2297 Japan
Telephone Number : +81-569-49-5284
Facsimile Number : +81-569-49-5488
Contact Person : TOSHIHARU SHIMIZU

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

2.1 Identification of E.U.T.

Type of Equipment : High Frequency 13.56 MHz Transceiver
Model No. : AN10R-01
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 8.5V
Receipt Date of Sample : October 18, 2011
Country of Mass-production : Japan
Condition of EUT : Engineering 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
Power Supply (inner) : Transmitter: DC 7V, Receiver: DC 5V
Antenna type : Loop Coil
Operating Temperature : -10 deg. C to +60 deg. C

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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 February 1, 2012
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 February 1, 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] 6.2dB 4.14268MHz, N (RS-422 Communication)	Complied	*1)
	<IC>RSS-Gen 7.2.2	<IC>RSS-Gen 7.2.2	[AV] 6.0dB 4.50621MHz, N (RS-232C Communication)		
Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	55.3dB 13.56000MHz, QP 90deg.	Complied	Radiated
	<IC> RSS-Gen 4.8, 4.11	<IC>RSS-210 A2.6	(RS-422 Communication)		
Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	28.1dB 13.08421MHz, QP 90deg.	Complied	Radiated
	<IC>RSS-Gen 4.9, 4.11	<IC> RSS-210 A2.6	(RS-422 Communication)		
20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.215(c)	See data	Complied	Radiated
	<IC> -	<IC> -			
Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	1.3dB 40.680MHz, Vertical, QP	Complied	Radiated
	<IC>RSS-Gen 4.9, 4.11	<IC>RSS-210 A2.6	(RS-232C Communication)		
Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	See data	Complied	Radiated
	<IC>RSS-Gen 4.7	<IC> RSS-210 A2.6			

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(Transmitter: DC 7V, Receiver: DC 5V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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3.3 Addition to standard

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 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	4.2dB	5.0dB	5.1dB	5.6dB	5.9dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	5.7dB	5.8dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	5.7dB	5.8dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	5.7dB	5.8dB	5.1dB	4.2dB

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

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 report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

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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 (Tx and Rx) mode - RS-232C Communication - RS-422 Communication	With Tag*
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. * This EUT has two modes, with tag or without tag. The worst case was confirmed with and without tag, as a result, the test with tag was the worst case. Therefore the test with tag was only performed.	

Test Item	Operating mode*
Conducted emission	Tx and Rx Mod on
Electric Field Strength of Fundamental Emission	Tx and Rx Mod on
Spectrum Mask	Tx and Rx Mod on
20dB Bandwidth and 99% Occupied Bandwidth	Tx and Rx Mod on
Electric Field Strength of Spurious Emission	Tx and Rx Mod on
Frequency Tolerance	Tx and Rx Mod off

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

Frequency Tolerance:

Temperature : -30deg.C to +50deg.C Step 10deg.C

Voltage : Normal Voltage DC 24V

Maximum Voltage DC 27.6V, Minimum Voltage DC 20.4V (DC 24V ±15%)

* This EUT is generally used along with Interface Box, and power supply of EUT is generally provided from Interface Box. Therefore the test was performed with external input voltage of Interface Box.

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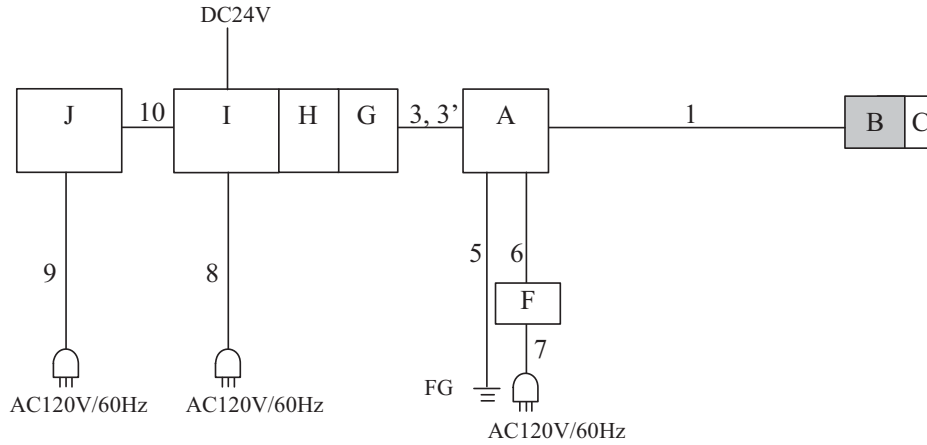
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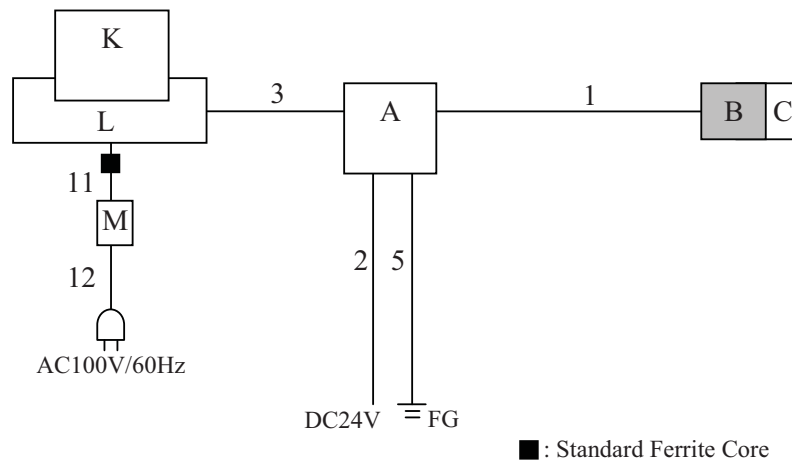
Facsimile : +81 596 24 8124

4.2 Configuration and peripherals

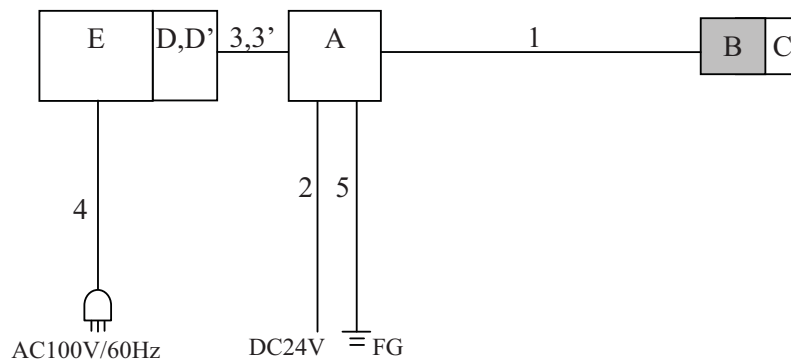
<For Conducted emission and Frequency Tolerance tests>



<For Radiated emission (Above 30MHz) (RS-232C Communication) tests>



<For other tests except for Conducted emission, Frequency Tolerance and Radiated emission (Above 30MHz) (RS-232C Communication) tests>



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

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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Interface Box	IFAN10R-RS-02	466200-4011	DENSO WAVE INCORPORATED	-
B	High Frequency 13.56 MHz Transceiver	AN10R-01	995750-0710	DENSO WAVE INCORPORATED	EUT
C	Square RFID Tag	TG10R-01	466000-4010	DENSO WAVE INCORPORATED	-
D	Serial Communication Unit	CJ1W-SCU21-V1	100828M 0167-Q0	OMRON	*1)
D'	Serial Communication Unit	CJ1W-SCU31-V1	101019M 0092	OMRON	*2)
E	Power Supply Unit	CJ1W-PA205R	101019YK 0197	OMRON	-
F	Power Supply	PMC35-2A	13090501	KIKUSUI	-
G	RS-232C Unit	QJ71C24N-R2	130510131460050-B	MITSUBISHI	-
H	RS-422 Unit	QJ71C24N-R4	120916122685035-B	MITSUBISHI	-
I	Power Supply Unit	Q61P	121005122760204-A	MITSUBISHI	-
J	Power Supply	S8VS-09024S	-	OMRON	-
K	Laptop PC	FMV8MCHWL6	R1302172	FUJITSU	-
L	Port Replicator	CP082850	-	FUJITSU	-
M	AC Adapter	FMV-AC308	G103	FUJITSU	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Antenna Cable	1.9	Shielded	Shielded	-
2	DC Cable	1.1	Unshielded	Unshielded	-
3	RS-232C Cable	2.1	Shielded	Shielded	*1)
3'	RS-422 Cable	9.8	Shielded	Shielded	*2)
4	AC Cable	3.2	Unshielded	Unshielded	-
5	FG Cable	1.2	Unshielded	Unshielded	-
6	DC Cable	1.1	Unshielded	Unshielded	-
7	AC Cable	2.0	Unshielded	Unshielded	-
8	AC Cable	2.2	Unshielded	Unshielded	-
9	AC Cable	1.9	Unshielded	Unshielded	-
10	DC Cable	0.5	Unshielded	Unshielded	-
11	DC Cable	1.8	Unshielded	Unshielded	-
12	AC Cable	2.0	Unshielded	Unshielded	-

*1) Used for Transmitting and Receiving mode (RS-232C Communication) only

*2) Used for Transmitting and Receiving mode (RS-422 Communication) only

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SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.3 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
Antenna Type	Loop	Biconical	Logperiodic

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
Instrument used	Test Receiver				
Detector	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

- 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)

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

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

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

SECTION 7: Other test

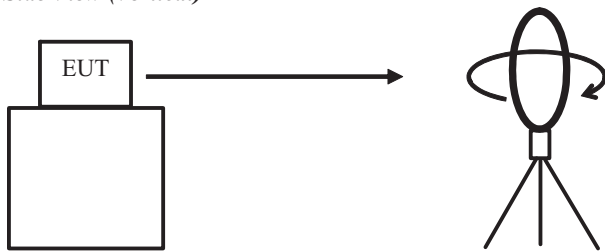
Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth	100kHz	3kHz	10kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	3% of Span	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency 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)

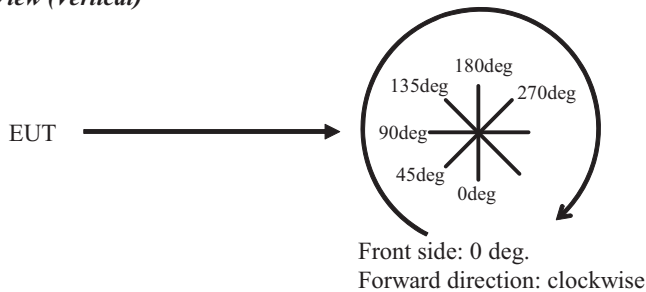


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



APPENDIX 1: Data of EMI test

Conducted emission
(RS-232C Communication)

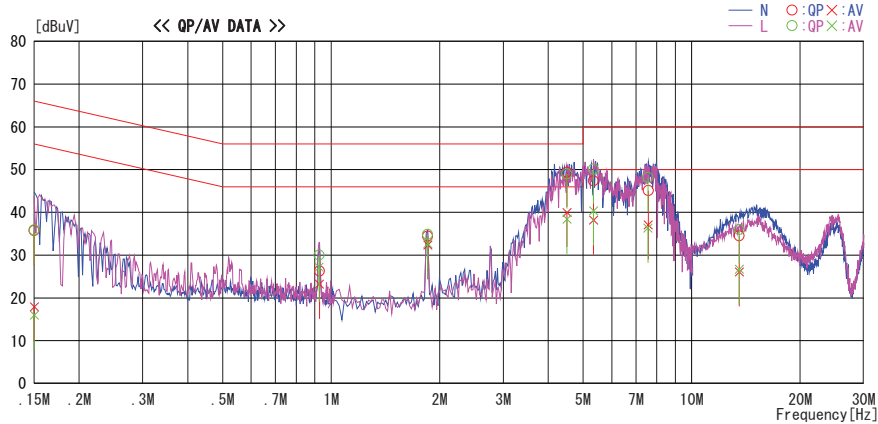
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2011/11/07

Report No. : 32BE0197-H0-01
 Temp./Humi. : 23deg. C / 55%RH
 Engineer : Tsubasa Takayama

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-232C Communication

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]		
0.15000	22.5	4.7	13.2	35.7	17.9	66.0	56.0	30.3	38.1	N	
0.92760	13.1	10.0	13.2	26.3	23.2	56.0	46.0	29.7	22.8	N	
1.85246	21.1	19.1	13.3	34.4	32.4	56.0	46.0	21.6	13.6	N	
4.50621	36.0	26.6	13.4	49.4	40.0	56.0	46.0	6.6	6.0	N	
5.34233	34.0	24.8	13.4	47.4	38.2	60.0	50.0	12.6	11.8	N	
7.57805	31.6	23.6	13.5	45.1	37.1	60.0	50.0	14.9	12.9	N	
0.15000	22.7	2.8	13.2	35.9	16.0	66.0	56.0	30.1	40.0	L	
0.92586	16.8	14.0	13.2	30.0	27.2	56.0	46.0	26.0	18.8	L	
1.85246	21.5	19.4	13.3	34.8	32.7	56.0	46.0	21.2	13.3	L	
4.50621	35.6	25.0	13.4	49.0	38.4	56.0	46.0	7.0	7.6	L	
5.34233	36.7	27.0	13.4	50.1	40.4	60.0	50.0	9.9	9.6	L	
7.55987	34.7	22.8	13.5	48.2	36.3	60.0	50.0	11.8	13.7	L	
13.56000	20.8	12.4	13.7	34.5	26.1	60.0	50.0	25.5	23.9	N	
13.56000	22.3	13.0	13.7	36.0	26.7	60.0	50.0	24.0	23.3	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
(RS-422 Communication)

DATA OF CONDUCTED EMISSION TEST

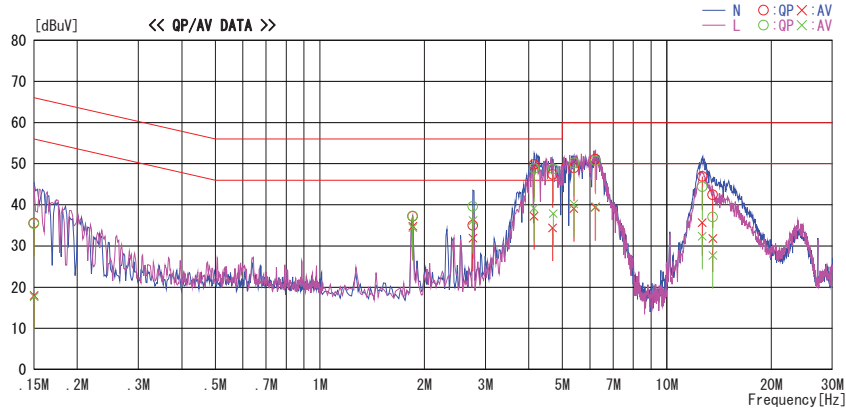
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2011/11/07

Report No. : 32BE0197-H0-01

Temp./Humi. : 23deg. C / 55%RH
Engineer : Tsubasa Takayama

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-422 Communication

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	22.4	4.8	13.2	35.6	18.0	66.0	56.0	30.4	38.0	N	
1.85246	23.9	21.5	13.3	37.2	34.8	56.0	46.0	18.8	11.2	N	
2.76128	21.7	18.6	13.3	35.0	31.9	56.0	46.0	21.0	14.1	N	
4.14268	36.4	23.8	13.4	49.8	37.2	56.0	46.0	6.2	8.8	N	
4.68798	34.0	21.0	13.4	47.4	34.4	56.0	46.0	8.6	11.6	N	
5.39686	35.6	25.7	13.4	49.0	39.1	60.0	50.0	11.0	10.9	N	
6.21481	37.6	25.9	13.5	51.1	39.4	60.0	50.0	8.9	10.6	N	
12.64207	33.3	22.1	13.6	46.9	35.7	60.0	50.0	13.1	14.3	N	
13.56000	28.7	18.1	13.7	42.4	31.8	60.0	50.0	17.6	18.2	N	
0.15000	22.2	4.5	13.2	35.4	17.7	66.0	56.0	30.6	38.3	L	
1.85246	24.0	21.2	13.3	37.3	34.5	56.0	46.0	18.7	11.5	L	
2.76128	26.3	22.9	13.3	39.6	36.2	56.0	46.0	16.4	9.8	L	
4.14268	35.4	25.8	13.4	48.8	39.2	56.0	46.0	7.2	6.8	L	
4.70615	35.3	24.5	13.4	48.7	37.9	56.0	46.0	7.3	8.1	L	
5.39686	36.8	26.8	13.4	50.2	40.2	60.0	50.0	9.8	9.8	L	
6.23299	37.2	26.1	13.5	50.7	39.6	60.0	50.0	9.3	10.4	L	
12.64207	30.8	18.8	13.6	44.4	32.4	60.0	50.0	15.6	17.6	L	
13.56000	23.3	14.0	13.7	37.0	27.7	60.0	50.0	23.0	22.3	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 (RS-232C Communication)

DATA OF RADIATED EMISSION TEST

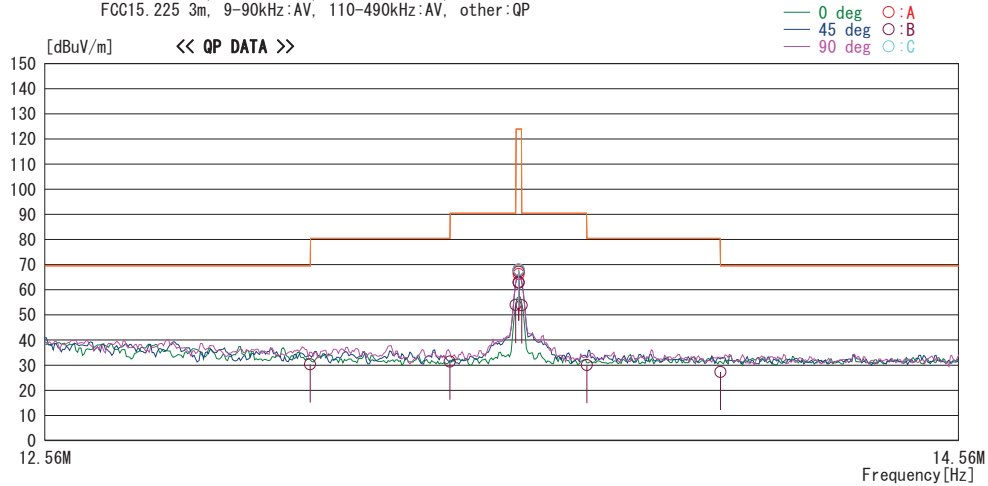
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Date : 2011/10/26

Report No. : 32BE0197-H0-01

Temp. / Humi. : 25deg. C / 50% RH
 Engineer : Keisuke Kawamura

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz. With Tag, Axis-Check, RS-232C Communication, Worst-Axis: Z

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
 FCC15.225 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
[MHz]	[dBuV]		[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.11000	32.5	QP	23.1	6.9	32.2	30.3	69.5	39.2	45	B	132
13.41000	33.5	QP	23.2	6.9	32.2	31.4	80.5	49.1	45	B	132
13.55300	56.0	QP	23.3	6.9	32.2	54.0	90.4	36.4	45	B	132
13.56000	68.3	QP	23.3	6.9	32.2	66.3	123.9	57.6	0	A	167
13.56000	69.8	QP	23.3	6.9	32.2	67.8	123.9	56.1	135	A	25
13.56000	64.8	QP	23.3	6.9	32.2	62.8	123.9	61.1	45	B	135 without-TAG
13.56000	69.1	QP	23.3	6.9	32.2	67.1	123.9	56.8	225	B	169
13.56000	70.0	QP	23.3	6.9	32.2	68.0	123.9	55.9	90	C	89
13.56000	70.1	QP	23.3	6.9	32.2	68.1	123.9	55.8	45	B	132 Worst
13.56000	65.1	QP	23.3	6.9	32.2	63.1	123.9	60.8	45	B	219 Hori
13.56700	55.8	QP	23.3	6.9	32.2	53.8	90.4	36.6	45	B	132
13.71000	31.9	QP	23.3	7.0	32.2	30.0	80.5	50.5	45	B	132
14.01000	29.0	QP	23.5	7.0	32.2	27.3	69.5	42.2	45	B	132

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
(RS-422 Communication)

DATA OF RADIATED EMISSION TEST

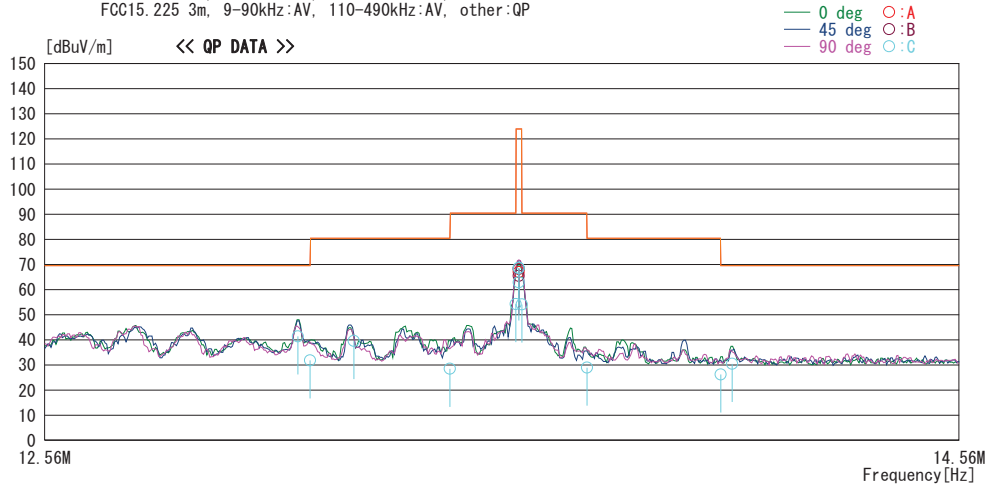
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2011/10/27

Report No. : 32BE0197-H0-01

Temp. / Humi. : 25deg. C / 50% RH
Engineer : Keisuke Kawamura

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, Axis-Check, RS-422 Communication, Worst-Axis: Z

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 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	Comment
										[deg]	
13.08421	43.6	QP	23.1	6.9	32.2	41.4	69.5	28.1	90	C	93
13.11000	34.1	QP	23.1	6.9	32.2	31.9	69.5	37.6	90	C	93
13.20340	41.7	QP	23.1	6.9	32.2	39.5	80.5	41.0	90	C	93
13.41000	30.6	QP	23.2	6.9	32.2	28.5	80.5	52.0	90	C	93
13.55300	56.2	QP	23.3	6.9	32.2	54.2	90.4	36.2	90	C	93
13.56000	70.3	QP	23.3	6.9	32.2	68.3	123.9	55.6	45	B	161
13.56000	70.6	QP	23.3	6.9	32.2	68.6	123.9	55.3	90	C	93 Worst
13.56000	70.2	QP	23.3	6.9	32.2	68.2	123.9	55.7	135	A	52
13.56000	67.4	QP	23.3	6.9	32.2	65.4	123.9	58.5	0	B	205 Hori
13.56000	70.5	QP	23.3	6.9	32.2	68.5	123.9	55.4	270	C	93
13.56000	64.9	QP	23.3	6.9	32.2	62.9	123.9	61.0	90	C	116 Without-TAG
13.56000	69.0	QP	23.3	6.9	32.2	67.0	123.9	56.9	0	A	359
13.56700	56.1	QP	23.3	6.9	32.2	54.1	90.4	36.3	90	C	93
13.71000	30.8	QP	23.3	7.0	32.2	28.9	80.5	51.6	90	C	93
14.01000	27.9	QP	23.5	7.0	32.2	26.2	69.5	43.3	90	C	93
14.03560	32.1	QP	23.5	7.0	32.2	30.4	69.5	39.1	90	C	93

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
(RS-232C Communication)

DATA OF RADIATED EMISSION TEST

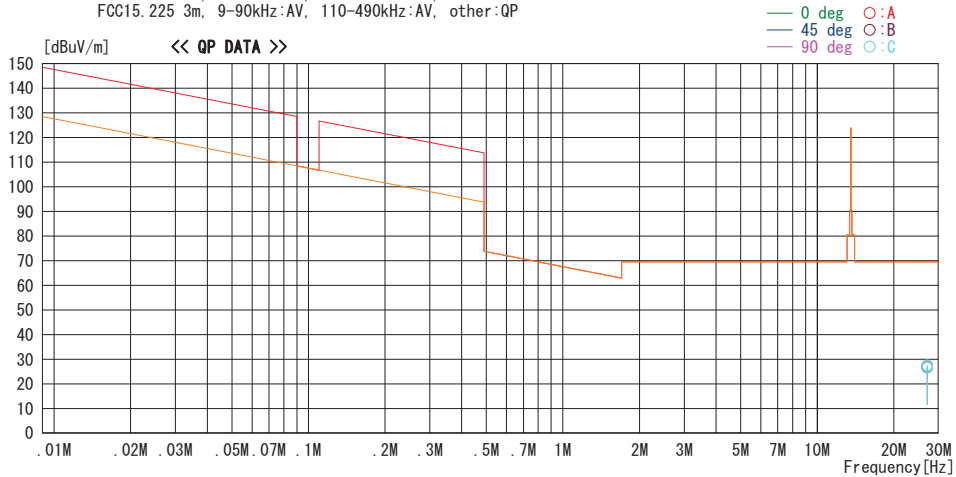
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2011/10/27

Report No. : 32BE0197-HO-01

Temp./ Humi. : 23deg. C / 55% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-232C Communication, Worst-Axis: Z

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.225 3m, 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	26.5	QP	25.3	7.4	32.2	27.0	69.5	42.5	0	A	63
27.12000	26.2	QP	25.3	7.4	32.2	26.7	69.5	42.8	45	B	234
27.12000	26.9	QP	25.3	7.4	32.2	27.4	69.5	42.1	90	C	190
27.12000	26.5	QP	25.3	7.4	32.2	27.0	69.5	42.5	135	C	179
27.12000	26.2	QP	25.3	7.4	32.2	26.7	69.5	42.8	180	C	243
27.12000	26.5	QP	25.3	7.4	32.2	27.0	69.5	42.5	0	C	0 Loop:Horizontal

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
 (RS-232C Communication)

DATA OF RADIATED EMISSION TEST

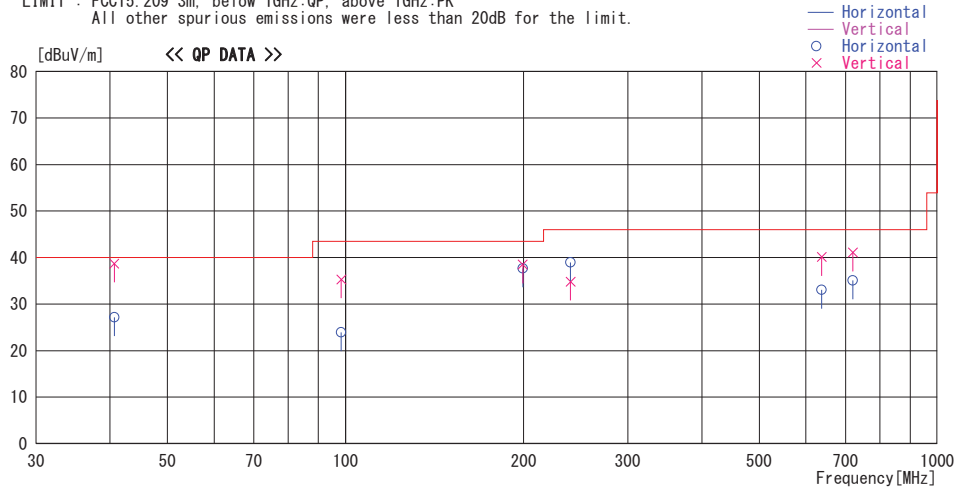
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2012/04/01

Report No. : 32BE0197-HO-01

Temp./Humi. : 23deg. C / 34% RH
 Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-232C Communication, 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	Loss&	Level	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
			[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
40.680	37.5	QP	14.6	-24.9	27.2	15	332	Hori.	40.0	12.8	
40.680	49.0	QP	14.6	-24.9	38.7	322	100	Vert.	40.0	1.3	
98.304	38.3	QP	9.8	-24.2	23.9	284	281	Hori.	43.5	19.6	
98.400	49.7	QP	9.8	-24.2	35.3	300	100	Vert.	43.5	8.2	
199.347	43.8	QP	16.9	-23.0	37.7	327	163	Hori.	43.5	5.8	
199.348	44.6	QP	16.9	-23.0	38.5	125	100	Vert.	43.5	5.0	
240.029	44.3	QP	17.3	-22.6	39.0	104	146	Hori.	46.0	7.0	
240.031	40.1	QP	17.3	-22.6	34.8	325	100	Vert.	46.0	11.2	
637.900	40.2	QP	19.8	-19.9	40.1	183	100	Vert.	46.0	5.9	
637.904	33.2	QP	19.8	-19.9	33.1	304	130	Hori.	46.0	12.9	
719.963	39.5	QP	20.9	-19.3	41.1	0	100	Vert.	46.0	4.9	
719.967	33.5	QP	20.9	-19.3	35.1	334	298	Hori.	46.0	10.9	

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)

Spurious emission
 (RS-422 Communication)

DATA OF RADIATED EMISSION TEST

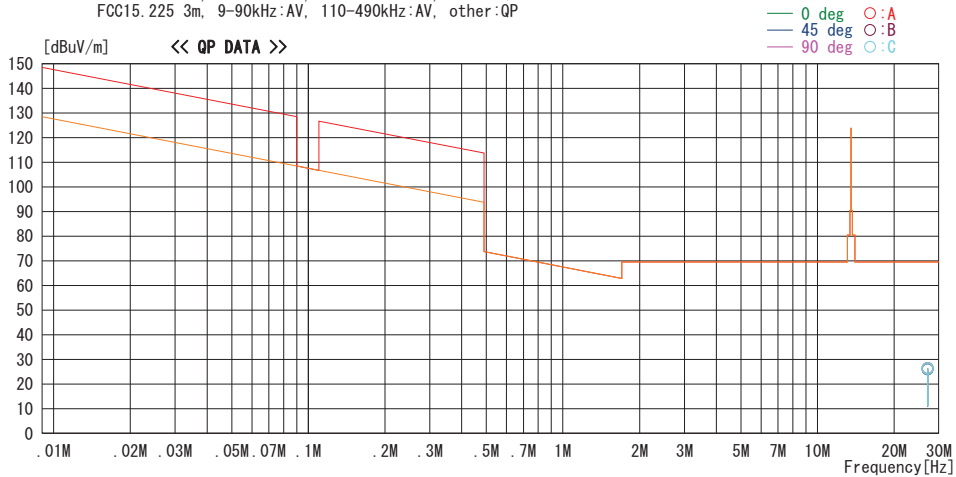
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Date : 2011/10/27

Report No. : 32BE0197-HO-01

Temp./ Humi. : 23deg. C / 55% RH
 Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-422 Communication, Worst-Axis:Z

LIMIT : FCC15.225 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
 FCC15.225 3m, 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	26.0	QP	25.3	7.4	32.2	26.5	69.5	43.0	0	A	134
27.12000	25.5	QP	25.3	7.4	32.2	26.0	69.5	43.5	45	B	17
27.12000	25.9	QP	25.3	7.4	32.2	26.4	69.5	43.1	90	C	283
27.12000	25.8	QP	25.3	7.4	32.2	26.3	69.5	43.2	135	C	175
27.12000	25.6	QP	25.3	7.4	32.2	26.1	69.5	43.4	180	C	233
27.12000	25.9	QP	25.3	7.4	32.2	26.4	69.5	43.1	0	C	94 Loop:Horizontal

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
(RS-422 Communication)

DATA OF RADIATED EMISSION TEST

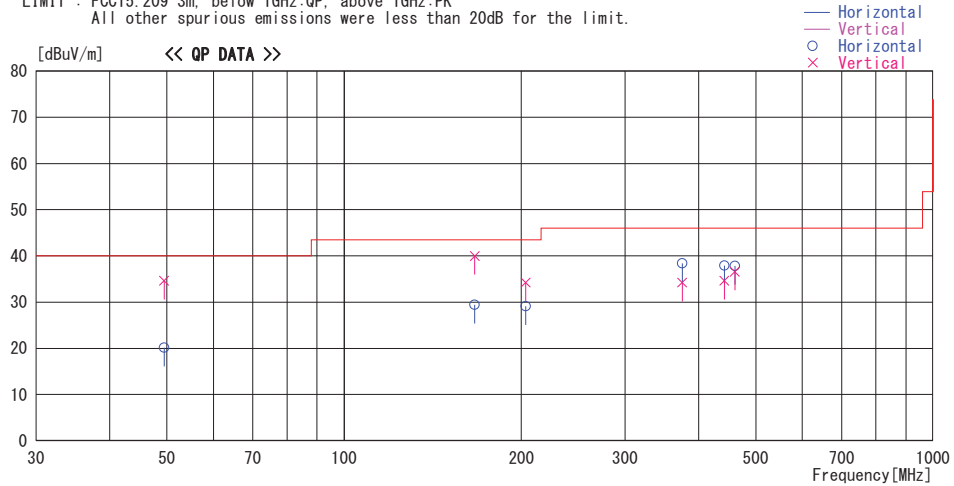
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2011/10/27

Report No. : 32BE0197-HO-01

Temp./Humi. : 23deg. C / 55% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-422 Communication, Worst-Axis(Ant/Con H:X V:Z)

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 [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss& Gain [dB]							
49.464	44.9	QP	11.3	-21.6	34.6	251	100	Vert.	40.0	5.4	
49.472	30.4	QP	11.3	-21.6	20.1	251	269	Hori.	40.0	19.9	
166.646	44.5	QP	15.6	-20.1	40.0	354	100	Vert.	43.5	3.5	
166.651	33.9	QP	15.6	-20.1	29.4	356	194	Hori.	43.5	14.1	
203.401	37.6	QP	16.4	-19.8	34.2	342	100	Vert.	43.5	9.3	
203.402	32.5	QP	16.4	-19.8	29.1	126	162	Hori.	43.5	14.4	
374.996	40.6	QP	16.7	-18.9	38.4	15	100	Hori.	46.0	7.6	
375.001	36.4	QP	16.7	-18.9	34.2	232	128	Vert.	46.0	11.8	
442.361	39.1	QP	17.8	-19.0	37.9	341	100	Hori.	46.0	8.1	
442.369	35.8	QP	17.8	-19.0	34.6	90	116	Vert.	46.0	11.4	
461.042	37.6	QP	18.0	-19.0	36.6	292	100	Vert.	46.0	9.4	
461.044	38.8	QP	18.0	-19.0	37.8	155	100	Hori.	46.0	8.2	

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)

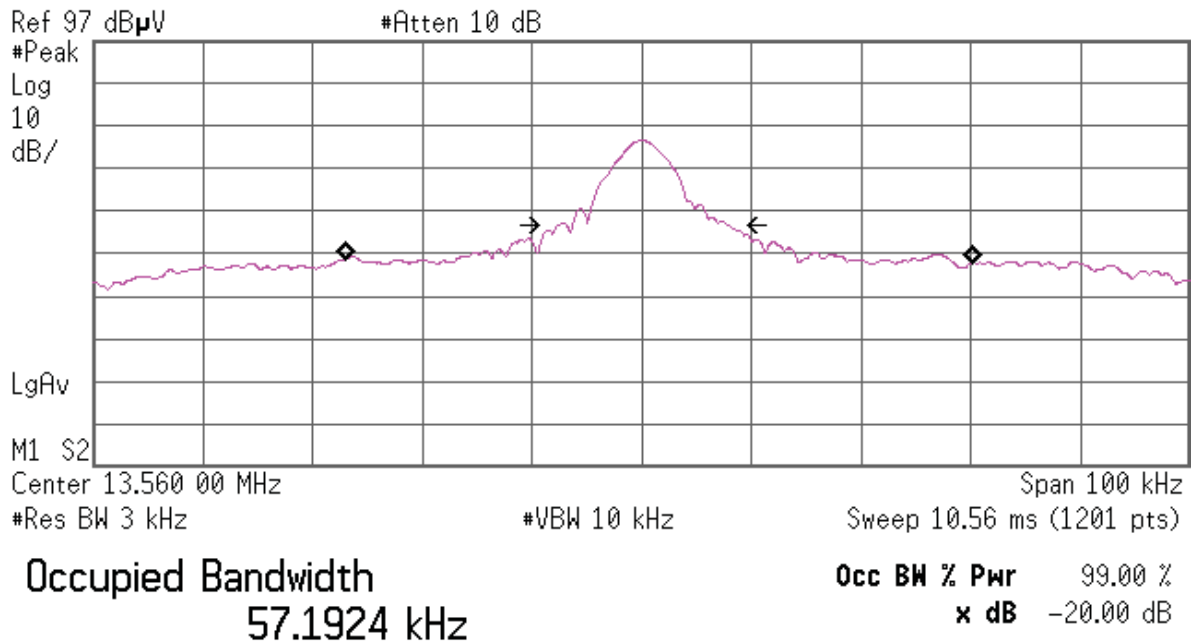
20dB Bandwidth and 99% Occupied Bandwidth
(RS-232C Communication)

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 32BE0197-HO-01
Date : 10/26/2011
Temperature/ Humidity : 25 deg.C / 50% RH
Engineer : Keisuke Kawamura
Mode : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-232C Communication, Mod on

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	15.63	57.19

Agilent

R T



Transmit Freq Error : 1.589 kHz
x dB Bandwidth : 15.628 kHz

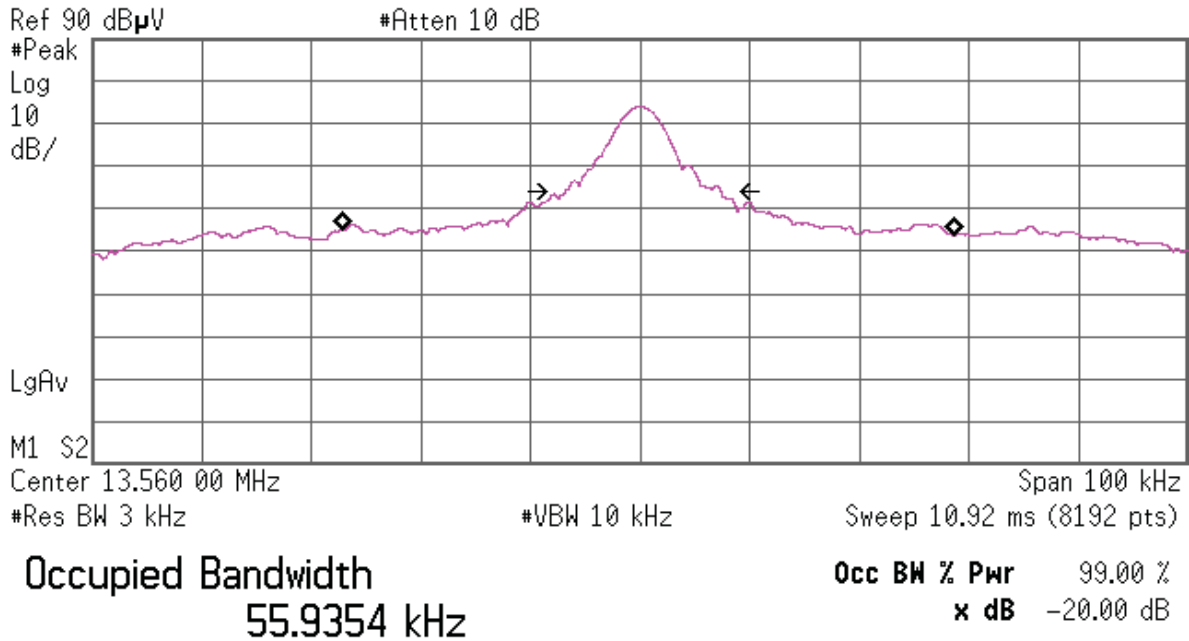
20dB Bandwidth and 99% Occupied Bandwidth
(RS-422 Communication)

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 32BE0197-HO-01
Date : 10/26/2011
Temperature/ Humidity : 25 deg.C / 50% RH
Engineer : Keisuke Kawamura
Mode : Transmitting (Tx and Rx) mode 13.56MHz, With Tag, RS-422 Communication, Mod on

FREQ [MHz]	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	14.28	55.94

Agilent

R T



Transmit Freq Error : 769.597 Hz
x dB Bandwidth : 14.279 kHz

Frequency Tolerance (RS-232C Communication)

Test place Head Office EMC Lab. No.7 measurement room
Report No. 32BE0197-HO-01
Date 11/11/2011
Temperature/ Humidity 24 deg.C/ 51% RH
Engineer Hisayoshi Sato
Mode Transmitting (Tx and Rx) mode 13.56MHz, With Tag,
RS-232C Communication, Mod off

Test Condition deg.C	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]	
20deg.C	20.4V	Power on	13.55995027	-0.00004973	-3.67	100.00	96.33
		on 2min.	13.55995127	-0.00004873	-3.59	100.00	96.41
		on 5min.	13.55995144	-0.00004856	-3.58	100.00	96.42
	24V	on 10min.	13.55995163	-0.00004837	-3.57	100.00	96.43
		Power on	13.55995624	-0.00004376	-3.23	100.00	96.77
		on 2min.	13.55995622	-0.00004378	-3.23	100.00	96.77
		on 5min.	13.55995631	-0.00004369	-3.22	100.00	96.78
		on 10min.	13.55995642	-0.00004358	-3.21	100.00	96.79
		27.6V	Power on	13.55995321	-0.00004679	-3.45	100.00
	on 2min.		13.55995270	-0.00004730	-3.49	100.00	96.51
	on 5min.		13.55995245	-0.00004755	-3.51	100.00	96.49
	50deg.C.	on 10min.	13.55995223	-0.00004777	-3.52	100.00	96.48
Power on		13.55996080	-0.00003920	-2.89	100.00	97.11	
on 2min.		13.56010422	0.00010422	7.69	100.00	92.31	
on 5min.		13.56010457	0.00010457	7.71	100.00	92.29	
40deg.C.	on 10min.	13.56010440	0.00010440	7.70	100.00	92.30	
	Power on	13.55995026	-0.00004974	-3.67	100.00	96.33	
	on 2min.	13.55995009	-0.00004991	-3.68	100.00	96.32	
	on 5min.	13.55995013	-0.00004987	-3.68	100.00	96.32	
30deg.C.	on 10min.	13.55995027	-0.00004973	-3.67	100.00	96.33	
	Power on	13.55995341	-0.00004659	-3.44	100.00	96.56	
	on 2min.	13.55995438	-0.00004562	-3.36	100.00	96.64	
	on 5min.	13.55995452	-0.00004548	-3.35	100.00	96.65	
20deg.C.	on 10min.	13.55995460	-0.00004540	-3.35	100.00	96.65	
	Power on	13.55995624	-0.00004376	-3.23	100.00	96.77	
	on 2min.	13.55995622	-0.00004378	-3.23	100.00	96.77	
	on 5min.	13.55995631	-0.00004369	-3.22	100.00	96.78	
10deg.C.	on 10min.	13.55995642	-0.00004358	-3.21	100.00	96.79	
	Power on	13.55997320	-0.00002680	-1.98	100.00	98.02	
	on 2min.	13.55997123	-0.00002877	-2.12	100.00	97.88	
	on 5min.	13.55996742	-0.00003258	-2.40	100.00	97.60	
0deg.C.	on 10min.	13.55996823	-0.00003177	-2.34	100.00	97.66	
	Power on	13.55996740	-0.00003260	-2.40	100.00	97.60	
	on 2min.	13.55996574	-0.00003426	-2.53	100.00	97.47	
	on 5min.	13.55996430	-0.00003570	-2.63	100.00	97.37	
-10deg.C.	on 10min.	13.55996344	-0.00003656	-2.70	100.00	97.30	
	Power on	13.55996532	-0.00003468	-2.56	100.00	97.44	
	on 2min.	13.55996455	-0.00003545	-2.61	100.00	97.39	
	on 5min.	13.55996532	-0.00003468	-2.56	100.00	97.44	
-20deg.C	on 10min.	13.55996534	-0.00003466	-2.56	100.00	97.44	
	Power on	13.55996421	-0.00003579	-2.64	100.00	97.36	
	on 2min.	13.55996345	-0.00003655	-2.70	100.00	97.30	
	on 5min.	13.55996530	-0.00003470	-2.56	100.00	97.44	
-30deg.C	on 10min.	13.55996621	-0.00003379	-2.49	100.00	97.51	
	Power on	13.55996433	-0.00003567	-2.63	100.00	97.37	
	on 2min.	13.55996322	-0.00003678	-2.71	100.00	97.29	
	on 5min.	13.55996253	-0.00003747	-2.76	100.00	97.24	
	on 10min.	13.55997234	-0.00002766	-2.04	100.00	97.96	

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

Frequency Tolerance (RS-422 Communication)

Test place : Head Office EMC Lab. No.7 measurement room
Report No. : 32BE0197-HO-01
Date : 11/11/2011
Temperature/ Humidity : 24 deg.C/ 51% RH
Engineer : Hisayoshi Sato
Mode : Transmitting (Tx and Rx) mode 13.56MHz, With Tag,
RS-422 Communication, 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	20.4V	Power on	13.55995333	-0.00004667	-3.44	100.00	96.56
		on 2min.	13.55995135	-0.00004865	-3.59	100.00	96.41
		on 5min.	13.55995233	-0.00004767	-3.52	100.00	96.48
		on 10min.	13.55995363	-0.00004637	-3.42	100.00	96.58
	24V	Power on	13.55995234	-0.00004766	-3.51	100.00	96.49
		on 2min.	13.55995455	-0.00004545	-3.35	100.00	96.65
		on 5min.	13.55995453	-0.00004547	-3.35	100.00	96.65
		on 10min.	13.55995343	-0.00004657	-3.43	100.00	96.57
	27.6V	Power on	13.55995344	-0.00004656	-3.43	100.00	96.57
		on 2min.	13.55994547	-0.00005453	-4.02	100.00	95.98
		on 5min.	13.55995434	-0.00004567	-3.37	100.00	96.63
		on 10min.	13.55995533	-0.00004467	-3.29	100.00	96.71
50deg.C.	24V	Power on	13.55999566	-0.00000434	-0.32	100.00	99.68
		on 2min.	13.56000534	0.00000534	0.39	100.00	99.61
		on 5min.	13.56001052	0.00001052	0.78	100.00	99.22
		on 10min.	13.56001234	0.00001234	0.91	100.00	99.09
40deg.C.	24V	Power on	13.55995233	-0.00004767	-3.52	100.00	96.48
		on 2min.	13.55995233	-0.00004767	-3.52	100.00	96.48
		on 5min.	13.55995434	-0.00004566	-3.37	100.00	96.63
		on 10min.	13.55994345	-0.00005655	-4.17	100.00	95.83
30deg.C.	24V	Power on	13.55995351	-0.00004649	-3.43	100.00	96.57
		on 2min.	13.55994344	-0.00005656	-4.17	100.00	95.83
		on 5min.	13.55993352	-0.00006648	-4.90	100.00	95.10
		on 10min.	13.55994354	-0.00005646	-4.16	100.00	95.84
20deg.C.	24V	Power on	13.55995234	-0.00004766	-3.51	100.00	96.49
		on 2min.	13.55995455	-0.00004545	-3.35	100.00	96.65
		on 5min.	13.55995453	-0.00004547	-3.35	100.00	96.65
		on 10min.	13.55995343	-0.00004657	-3.43	100.00	96.57
10deg.C.	24V	Power on	13.55996432	-0.00003568	-2.63	100.00	97.37
		on 2min.	13.55994230	-0.00005770	-4.26	100.00	95.74
		on 5min.	13.55996544	-0.00003456	-2.55	100.00	97.45
		on 10min.	13.55995443	-0.00004557	-3.36	100.00	96.64
0deg.C.	24V	Power on	13.55995474	-0.00004526	-3.34	100.00	96.66
		on 2min.	13.55995566	-0.00004434	-3.27	100.00	96.73
		on 5min.	13.55995656	-0.00004344	-3.20	100.00	96.80
		on 10min.	13.55995332	-0.00004668	-3.44	100.00	96.56
-10deg.C.	24V	Power on	13.55995573	-0.00004427	-3.26	100.00	96.74
		on 2min.	13.55995446	-0.00004555	-3.36	100.00	96.64
		on 5min.	13.55996454	-0.00003546	-2.61	100.00	97.39
		on 10min.	13.55996455	-0.00003545	-2.61	100.00	97.39
-20deg.C.	24V	Power on	13.55996645	-0.00003355	-2.47	100.00	97.53
		on 2min.	13.55995435	-0.00004566	-3.37	100.00	96.63
		on 5min.	13.55995465	-0.00004535	-3.34	100.00	96.66
		on 10min.	13.55996645	-0.00003355	-2.47	100.00	97.53
-30deg.C.	24V	Power on	13.55996544	-0.00003456	-2.55	100.00	97.45
		on 2min.	13.55996322	-0.00003678	-2.71	100.00	97.29
		on 5min.	13.55996343	-0.00003657	-2.70	100.00	97.30
		on 10min.	13.55997334	-0.00002666	-1.97	100.00	98.03

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

APPENDIX 2: Test instruments

EMI test equipment

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	2011/06/21 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2011/04/08 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2011/04/15 * 12
LP-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	829425/014	RE	2010/12/08 * 12 *1)
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	RE	2012/02/16 * 12
MCC-30	Coaxial cable	UL Japan	-	-	RE	2011/07/28 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE/RE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	CE/RE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	CE/RE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2010/11/18 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	CE/RE	2011/08/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(AE)	2011/02/20 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2011/02/22 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2011/01/05 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/suoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2011/07/15 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/22 * 12
KCH-01	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	14007630	RE	2011/04/27 * 12
EST-09	Universal Counter	Agilent	53131A	KR01204716	RE	2011/05/11 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	RE	2011/02/23 * 12 *1)
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 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

UL Japan, Inc.

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