



RADIO TEST REPORT

Test Report No.: 10875471S-A

Applicant : Roland DG Corporation
Type of Equipment : HF RFID Reader/Writer
Model No. : LXRFZZHAAA-022
FCC ID : 2AFW5LXRFZZHAAA
Test regulation : FCC Part15 Subpart C: 2015
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 the limits of the above regulation.
4. The test results in this test 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 any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

Date of test: August 4 to 7, 2015

Representative test engineer: K. Adachi
Kenichi Adachi
Engineer
Consumer Technology Division

Approved by : T. Imamura
Toyokazu Imamura
Leader
Consumer Technology Division



- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
 There is no testing item of "Non-accreditation".

UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

13-EM-F0429

Contents

	<u>Page</u>
SECTION 1: Customer information	4
SECTION 2: Equipment under test (E.U.T.)	4
SECTION 3: Test specification, procedures & results	5
SECTION 4: Operation of E.U.T. during testing.....	7
SECTION 5: Conducted emission	8
SECTION 6: Radiated emission	9
SECTION 7: 20dB bandwidth & Occupied bandwidth (99%).....	11
SECTION 8: Frequency tolerances	11
Contents of APPENDIXES	12
APPENDIX 1: Data of Radio tests.....	13
APPENDIX 2: Test instruments	22
APPENDIX 3: Photographs of test setup.....	23

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 1: Customer information

Company Name : Roland DG Corporation
Address : 1-6-4 Shinmiyakoda, Kita-ku, Hamamatsu-shi, Shizuoka-ken, 431-2103 Japan
Telephone Number : +81-53-484-1210
Facsimile Number : +81-53-484-1221
Contact Person : Yasuo Hirai

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

2.1 Identification of E.U.T.

Type of Equipment : HF RFID Reader/Writer
Model Number : LXRFFZZHAAA-022
Serial Number : Refer to Section 4.2
Rating : DC 5 V
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : August 3, 2015
Modification of EUT : The test lab did not make the modification to the EUT supplied from the customer to have it pass the tests.

2.2 Product description

Model: LXRFFZZHAAA-022 (referred to as the EUT in this report) is a HF RFID Reader/Writer.

Clock frequency(ies) in the system : 27.12 MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Type of modulation : ASK 100%
Antenna type : Loop
Antenna connector type : None
ITU code : A1D

FCC 15.31 (e)

The stable voltage (DC 5 V) is provided to the EUT from the host device. Therefore, this EUT complies with the requirement.

FCC 15.203 / 212

The antenna is not removable from the EUT. Therefore the EUT complies with the requirement.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2015, final revised on September 8, 2015
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.215 Additional provisions to the general radiated emission limitations
Section 15.225 Operation within the band 13.110-14.010MHz

* The revision on September 8, 2015 does not affect the test specification applied to the EUT.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	7.1 dB (0.15607 MHz, QP, N, With TAG)	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (a) *2)	Radiated	N/A	59.6 dB (Vertical)	Complied
Electric Field Strength of Outside the Allocated bands	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (b)(c) *2)	Radiated	N/A	40.4 dB (13.553 MHz, Vertical)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.209 FCC 15.225 (d) *2)	Radiated	N/A	8.4 dB (33.008 MHz, Horizontal)	Complied
20 dB Bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.215 (c)	Radiated	N/A	-	Complied
Frequency Tolerance	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (e)	Radiated	N/A	-	Complied

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

*2) These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane. However test results were confirmed to pass against standard limit.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99 %)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 6.6	RSS-Gen 4.6.1	Conducted	-	-

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

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

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

3.4 Uncertainty

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

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	3.6 dB	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.7 dB	3.5 dB	3.5 dB
	30 MHz-300 MHz	4.9 dB	4.9 dB	4.7 dB
	300 MHz-1 GHz	5.0 dB	5.0 dB	4.8 dB

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

Conducted emission test

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

Radiated emission test

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

Frequency (Normal condition) Measurement uncertainty for this test was: $(\pm) 7.9 \times 10^{-8}$.

Frequency (Extreme condition) Measurement uncertainty for this test was: $(\pm) 7.9 \times 10^{-8}$.

Bandwidth Measurement uncertainty for this test was: $(\pm) 0.66\%$

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.

1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN

Telephone number : +81 463 50 6400

Facsimile number : +81 463 50 6401

JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
<input checked="" type="checkbox"/> No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
<input type="checkbox"/> No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
<input type="checkbox"/> No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input checked="" type="checkbox"/> No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input checked="" type="checkbox"/> No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
<input type="checkbox"/> No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test setup, Data of EMI & Test instruments

Refer to APPENDIX 1 to 3.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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

4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
All items	Transmitting	13.56MHz

Software for testing: Murata_HF-RFID_ReaderWriterDemo_v1.1.3

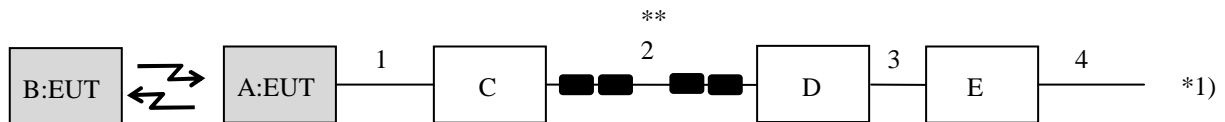
The carrier level and noise levels were confirmed with and without Tag, and the test was made with the condition that has the maximum noise. (The worst case was with tag in all measurement frequency range.)

*Used tag was NFC tag type 2 (for NFC type A modulation)

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

4.2 Configuration of tested system

■ : Ferrite core (refer to table)



* Test data was taken under worse case conditions.

** The ferrite cores attached to USB cable (except CE Test) are not used to reduce the noise from the EUT. Therefore, that does not affect the emission level of the EUT.

*1) Conducted emission : AC120 V / 60 Hz, other tests : AC100V/50Hz

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	RFID Module	LXRFZZHAAA-022	*2)	Murata Manufacturing Co., Ltd.	EUT
B	Tag	LXMSAPHA17-176	-	Murata Manufacturing Co., Ltd.	EUT
C	Jig	-	-	Murata Manufacturing Co., Ltd.	-
D	Notebook PC	E1Q57PA#ABJ	5CB3310KHW	Hewlett Packard	-
E	AC Adapter	PPP009L-E	3453442403	Hewlett-Packard	-

*2) 002: Conducted emission (Antenna terminated), 001: Other tests.

List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC/Signal	0.05	Unshielded	Unshielded	-
2	USB	0.5	Shielded	Shielded	With 4 ferrite cores: NFT-6 (Takeuchi Industry Co., Ltd.)
3	DC	1.7	Unshielded	Unshielded	-
4	AC	1.7	Unshielded	Unshielded	-

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 5: Conducted emission

5.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from LISN 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 for the forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment. Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

Frequency range : 0.15 MHz - 30 MHz
EUT position : Table top
EUT operation mode : Refer to SECTION 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via host equipment within a Shielded room. The EUT via host equipment was connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, an average detector. The conducted emission measurements were made with the following detection of the test receiver.

Detection Type : Quasi-Peak/ Average
IF Bandwidth : 9 kHz

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

SECTION 6: Radiated emission

6.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

6.2 Test configuration

EUT was placed on a polystyrene platform of nominal size, 0.5 m by 0.5 m, raised 0.8 m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

6.3 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane at a distance of 3m.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606. These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane. However test results were confirmed to pass against standard limit.

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3 m.

Frequency: From 9 kHz to 30 MHz at distance 3 m (Refer to Figure 2)

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0 deg., 45 deg., 90 deg. and 135 deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

Frequency: From 30 MHz to 1 GHz at distance 3 m (Refer to Figure 2).

The measuring antenna height was varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function of the test receiver.

	9 kHz to 90 kHz & 110 kHz to 150 kHz	90 kHz to 110 kHz	150 kHz to 490 kHz	490 kHz to 30 MHz	30 MHz to 1 GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200 Hz	200 Hz	10 kHz	9 kHz	120 kHz
Distance factor *1)	-80 dB	-80 dB	-80 dB	-40 dB	-
Measuring antenna	Loop antenna				Biconical (30 MHz - 299.99 MHz) Logperiodic (300 MHz - 1 GHz)

*1) FCC 15.31 (f)(2) (9kHz-30MHz)

Distance Factor: $40 \times \log(3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

Distance Factor: $40 \times \log(3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

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.

UL Japan, Inc.

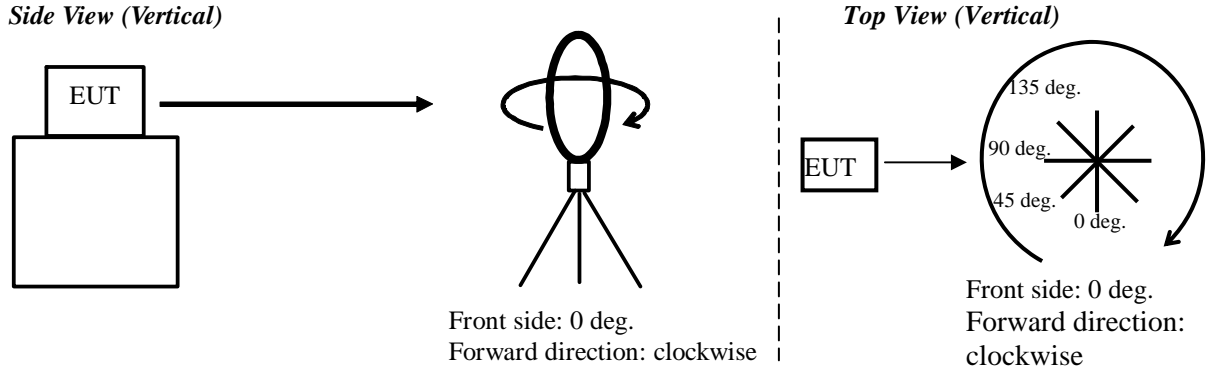
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

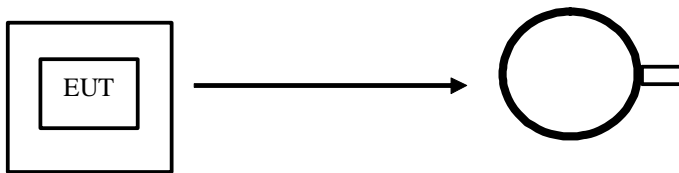
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Figure 1: Direction of the Loop Antenna



Top View (Horizontal)



Antenna was not rotated.

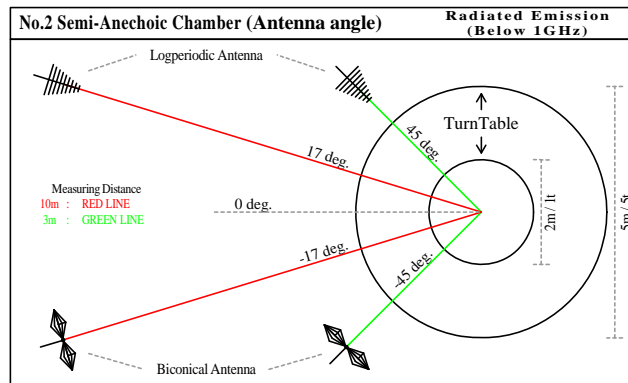


Figure 2. Antenna angle

6.4 Results

Summary of the test results : Pass *No noise was detected above the 3rd order harmonics.
 Refer to APPENDIX 1

SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

The test was measured with a spectrum analyzer using a test fixture.

Results

Summary of the test results: Pass
Refer to APPENDIX 1.

SECTION 8: Frequency tolerances

Test procedure

The test was measured with a spectrum analyzer using a test fixture.
The temperature test was started after the temperature stabilization time of 30 minutes.
The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

Results

Summary of the test results: Pass
Refer to APPENDIX 1.

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Conducted emission
Radiated emission
Frequency tolerance
Bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission
Pre-check of the worst case
NFC Tags used as representatives

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

DATA OF CONDUCTED EMISSION TEST

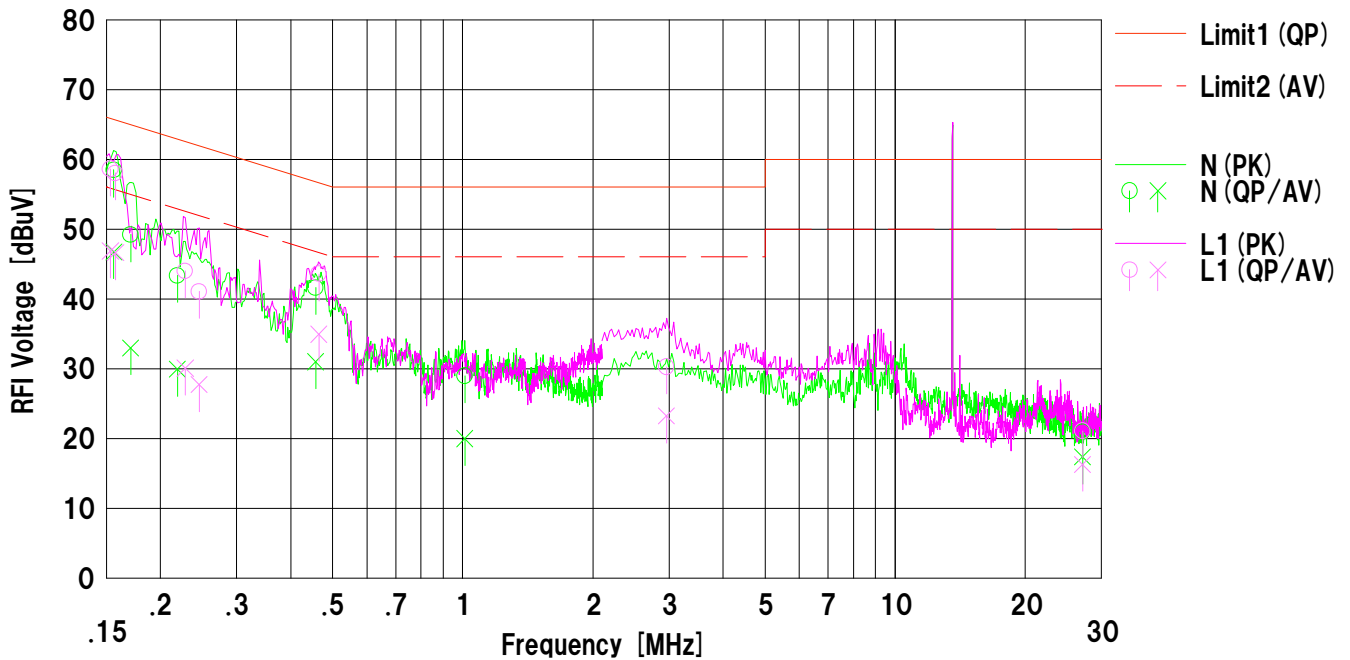
UL Japan,Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2015/08/06

Company : Roland DG Corporation
Kind of EUT : HF RFID Reader/Writer
Model No. : LXRFFZZHAAA-022
Serial No. : 001
Remarks : With TAG

Mode : Transmitting 13.56MHz
Order No. : 10875471S
Power : AC 120V / 60Hz
Temp./Humi. : 24deg.C. / 58%RH

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15607	45.96	34.24	12.52	58.48	46.76	65.67	55.67	7.1	8.9	N	
2	0.17075	36.70	20.46	12.51	49.21	32.97	64.92	54.92	15.7	21.9	N	
3	0.21891	30.82	17.38	12.52	43.34	29.90	62.86	52.86	19.5	22.9	N	
4	0.45670	29.04	18.41	12.57	41.61	30.98	56.75	46.75	15.1	15.7	N	
5	1.01142	16.37	7.34	12.61	28.98	19.95	56.00	46.00	27.0	26.0	N	
6	27.12000	7.14	3.54	13.79	20.93	17.33	60.00	50.00	39.0	32.6	N	
7	0.15322	46.10	34.34	12.52	58.62	46.86	65.82	55.82	7.2	8.9	L1	
8	0.15735	45.52	34.11	12.52	58.04	46.63	65.60	55.60	7.5	8.9	L1	
9	0.22829	31.47	17.52	12.53	44.00	30.05	62.51	52.51	18.5	22.4	L1	
10	0.24573	28.51	15.17	12.53	41.04	27.70	61.90	51.90	20.8	24.2	L1	
11	0.46463	31.02	22.36	12.57	43.59	34.93	56.61	46.61	13.0	11.6	L1	
12	2.96142	17.52	10.48	12.74	30.26	23.22	56.00	46.00	25.7	22.7	L1	
13	27.12000	7.26	2.48	13.79	21.05	16.27	60.00	50.00	38.9	33.7	L1	

Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
LISN : SLS-04

DATA OF CONDUCTED EMISSION TEST

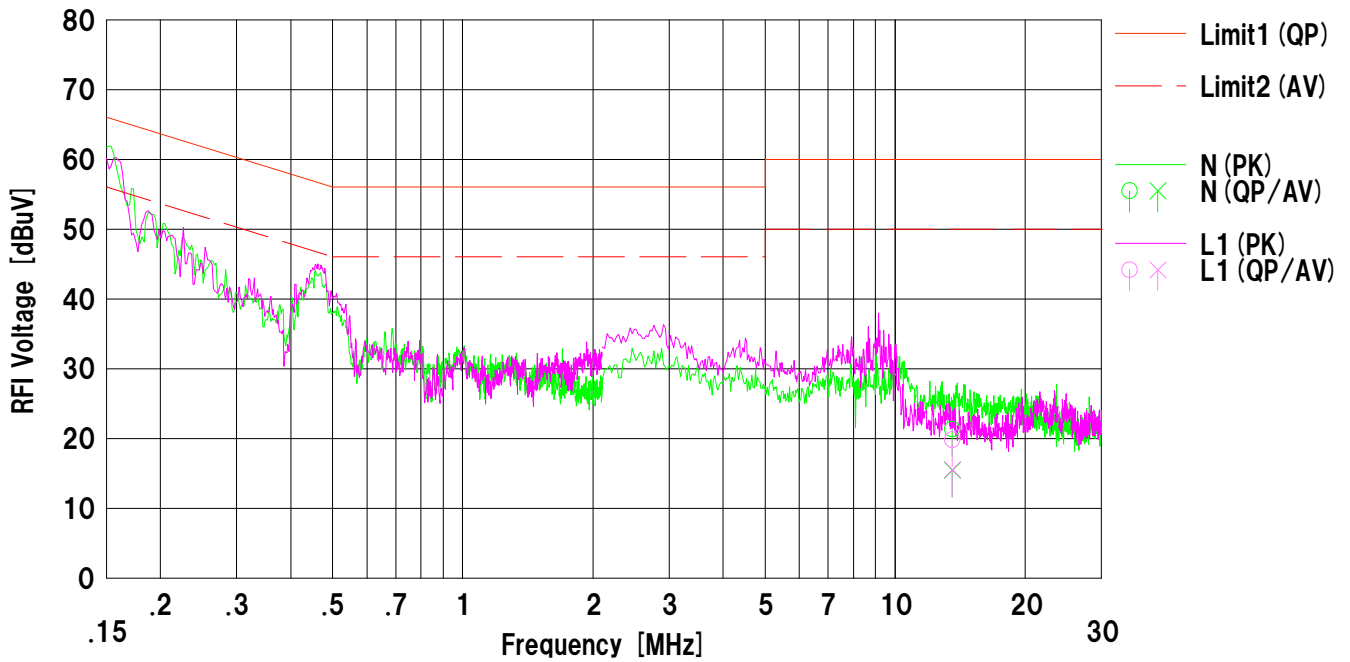
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2015/08/06

Company : Roland DG Corporation
 Kind of EUT : HF RFID Reader/Writer
 Model No. : LXRFFZZHAAA-022
 Serial No. : 002
 Remarks : Antenna terminated

Mode : Transmitting 13.56MHz
 Order No. : 10875471S
 Power : AC 120V / 60Hz
 Temp./Humi. : 24deg.C. / 58%RH

Limit1 : FCC 15C (15.207) QP
 Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	13.56000	8.06	2.18	13.26	21.32	15.44	60.00	50.00	38.6	34.5	N	
2	13.56000	6.54	2.23	13.26	19.80	15.49	60.00	50.00	40.2	34.5	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN : SLS-04

Data of Electric field strength of Fundamental emission and Spurious emission within the band: FCC15.225(a)(b)(c)

UL Japan, Inc.
Shonan EMC Lab., No.2 Semi Anechoic Chamber

Company: Roland DG Corporation	Regulation: FCC Part15 Subpart C 15.225
Equipment: HF RFID Reader/Writer	Test Distance: 3m
Model: LXRFZZHAAA-022	Date: August 4, 2015
Sample No.: 001	Temperature: 24 deg.C
Power: DC 5 V	Humidity: 65 %RH
Mode: Transmitting 13.56 MHz	ENGINEER: Hiroyuki Morikawa

Remarks: : NFC type A (Axis:Hor_Y / Ver_Y) , Vertical polarization (antenna angle) of the worst case: 90deg
(tag: type 2)

Fundamental emission

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor [dB/m]	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	63.6	71.2	18.6	6.5	31.9	-40.0	16.7	24.3	83.9	67.2	59.6

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Distance factor: 40 x log (3m/30m) = -40 dB

Limits (30m)

•13.553MHz to 13.567MHz : 83.9dBuV/m (FCC 15.225(a))

Spurious emission within the band

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor [dB/m]	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	12.937	-	34.0	18.6	6.4	31.9	-40.0	-	-12.9	29.5	-	42.4
2	13.110	30.0	28.4	18.6	6.4	31.9	-40.0	-16.9	-18.5	29.5	46.4	48.0
3	13.274	-	32.7	18.6	6.4	31.9	-40.0	-	-14.2	40.5	-	54.7
4	13.410	33.1	38.0	18.6	6.5	31.9	-40.0	-13.8	-8.9	40.5	54.3	49.4
5	13.553	49.7	56.9	18.6	6.5	31.9	-40.0	2.8	10.0	50.4	47.6	40.4
6	13.567	49.1	56.2	18.6	6.5	31.9	-40.0	2.2	9.3	50.4	48.2	41.1
7	13.710	33.0	38.2	18.6	6.5	31.9	-40.0	-13.9	-8.67	40.5	54.4	49.2
8	13.768	40.7	-	18.5	6.5	31.9	-40.0	-6.2	-	40.5	46.7	-
9	14.010	30.1	28.5	18.5	6.5	31.9	-40.0	-16.8	-18.43	29.5	46.3	47.9

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Outside filed strength frequencies

- Fc±7kHz:13.553MHz to 13.567MHz
- Fc±150kHz:13.410MHz to 13.710MHz
- Fc±450kHz:13.110MHz to 14.010MHz

Fc = 13.56MHz

Limits (30m)

- 13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : 50.4dBuV/m (FCC 15.225(b))
- 13.110MHz to 13.410MHz and 13.710MHz to 14.010MHz : 40.5dBuV/m (FCC 15.225(c))
- Below 13.110MHz and Above 14.010MHz : 29.5dBuV/m (FCC 15.225(d)and FCC 15.209)

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa, Japan 259-1220

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

UL Japan, Inc.
Shonan EMC Lab. No.2 Semi Anechoic Chamber

Company: Roland DG Corporation
Equipment: HF RFID Reader/Writer
Model: LXRFZZHAAA-022
Sample No.: 001
Power: DC 5 V
Mode: Transmitting 13.56 MHz
EUT axis: Below 30MHz(Horizontal Y-axis, Vertical Y-axis), NFC type A, with Tag
Above 30MHz(Horizontal: Y-axis, Vertical: Y-axis), NFC type A, with Tag

Regulation: FCC Part15 Subpart C 15.225
Test Distance: 3m
Date: August 4, 2015
Temperature: 24 deg.C
Humidity: 65 %RH
ENGINEER: Hiroyuki Morikawa

Remarks:

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	29.6	19.4	6.8	31.9	-40.0	-16.2	29.5	45.7	-	258	* Limit: 30m
Hori.	56.939	QP	30.0	8.6	7.3	31.9	0.0	14.1	40.0	25.9	341	231	
Hori.	166.022	QP	30.1	15.5	8.6	31.8	0.0	22.4	43.5	21.1	227	217	
Hori.	284.756	QP	34.6	18.7	9.6	31.7	0.0	31.2	46.0	14.8	117	31	
Hori.	509.962	QP	27.8	17.6	7.8	31.6	0.0	21.7	46.0	24.4	100	136	
Vert.	27.12	QP	29.0	19.4	6.8	31.9	-40.0	-16.7	29.5	46.2	-	159	* Limit: 30m
Vert.	33.008	QP	40.1	16.4	7.0	31.9	0.0	31.6	40.0	8.4	100	92	
Vert.	33.207	QP	33.0	16.4	7.0	31.9	0.0	24.4	40.0	15.6	100	287	
Vert.	166.548	QP	37.1	15.5	8.6	31.8	0.0	29.4	43.5	14.1	100	57	
Vert.	232.566	QP	31.3	16.8	9.2	31.7	0.0	25.5	46.0	20.5	100	234	

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amprifier) + Distance factor(below 30MHz)

* Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

* Carrier level (Result at 3m): Hor= 56.7dBuV/m, Ver= 64.3 dBuV/m

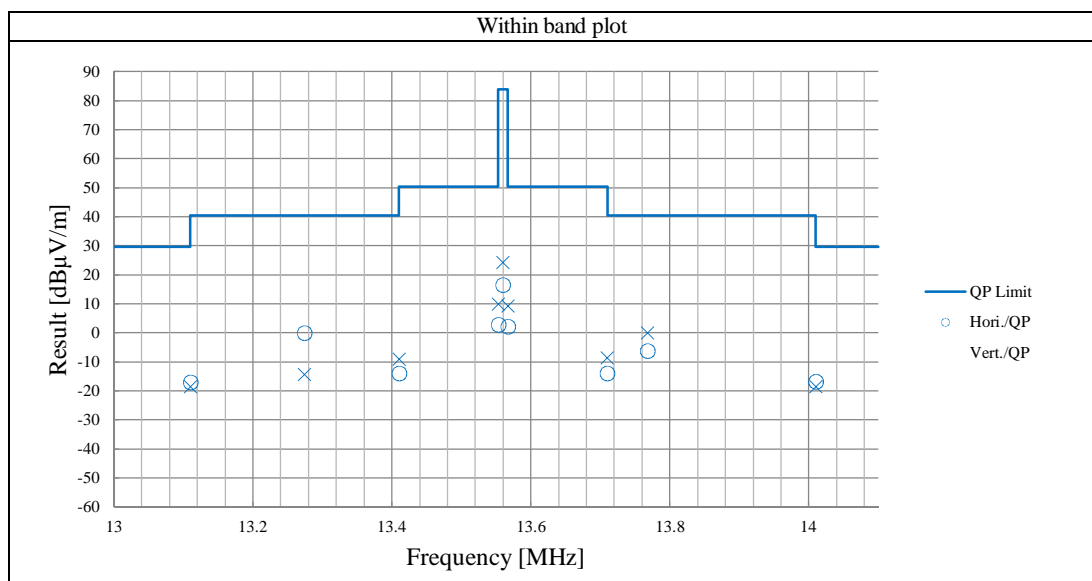
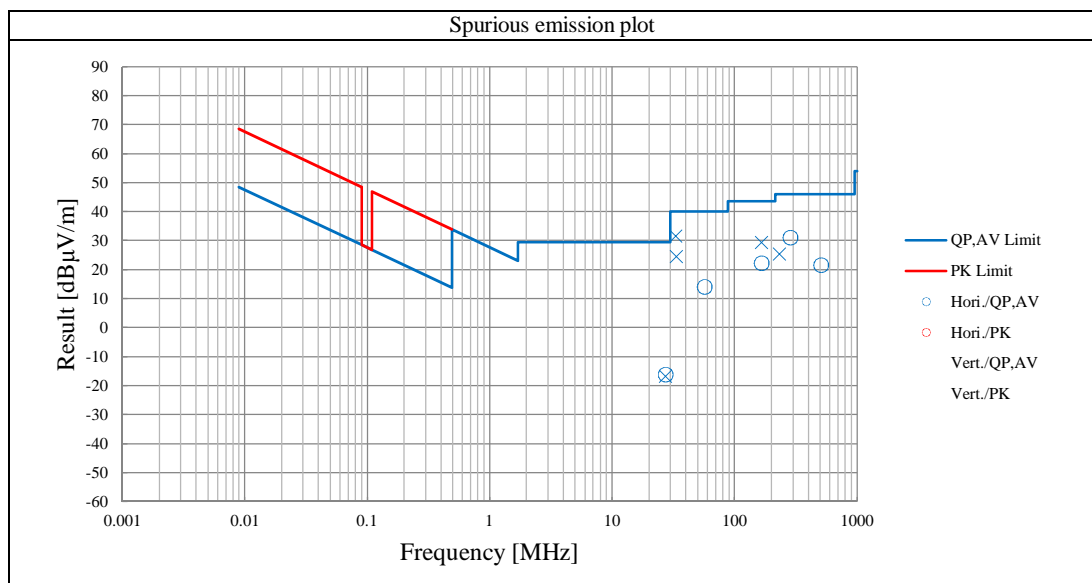
UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa, Japan 259-1220
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission (Worst mode plot)

UL Japan, Inc.
Shonan EMC Lab. No.2 Semi Anechoic Chamber

Company: Roland DG Corporation
 Equipment: HF RFID Reader/Writer
 Model: LXRFZZHAAA-022
 Sample No.: 001
 Power: DC 5 V
 Mode: Transmitting 13.56 MHz
 EUT axis: Below 30MHz(Horizontal Y-axis, Vertical Y-axis), NFC type A, with Tag
 Above 30MHz(Horizontal: Y-axis, Vertical: Y-axis), NFC type A, with Tag
 Remarks: These plots data contains sufficient number to show the trend of characteristic features for EUT.

Regulation: FCC Part15 Subpart C 15.225
 Test Distance: 3m
 Date: August 4, 2015
 Temperature: 24 deg.C
 Humidity: 65 %RH
 ENGINEER: Hiroyuki Morikawa



Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company Roland DG Corporation
 Equipment HF RFID Reader/Writer
 Model LXRFZZHAAA-022
 Serial No. 001
 Power DC 5 V
 Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)
 Date August 7, 2015
 Temperature 25 deg.C
 Humidity 49 %RH
 ENGINEER Kenichi Adachi

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560007	0.000007	0.00005	0.010
after 2minutes	13.56	13.560015	0.000015	0.00011	0.010
after 5minutes	13.56	13.560015	0.000015	0.00011	0.010
after 10minutes	13.56	13.560014	0.000014	0.00010	0.010

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560035	0.000035	0.00026	0.010
after 2minutes	13.56	13.560038	0.000038	0.00028	0.010
after 5minutes	13.56	13.560042	0.000042	0.00031	0.010
after 10minutes	13.56	13.560043	0.000043	0.00032	0.010

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560036	0.000036	0.00027	0.010
after 2minutes	13.56	13.560034	0.000034	0.00025	0.010
after 5minutes	13.56	13.560033	0.000033	0.00024	0.010
after 10minutes	13.56	13.560033	0.000033	0.00024	0.010

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560008	0.000008	0.00006	0.010
after 2minutes	13.56	13.560004	0.000004	0.00003	0.010
after 5minutes	13.56	13.560002	0.000002	0.00001	0.010
after 10minutes	13.56	13.560002	0.000002	0.00001	0.010

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559922	-0.000078	-0.00058	0.010
after 2minutes	13.56	13.559955	-0.000045	-0.00033	0.010
after 5minutes	13.56	13.559949	-0.000051	-0.00038	0.010
after 10minutes	13.56	13.559948	-0.000052	-0.00038	0.010

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Data of Frequency Tolerance

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559910	-0.000090	-0.00066	0.010
after 2minutes	13.56	13.559905	-0.000095	-0.00070	0.010
after 5minutes	13.56	13.559904	-0.000096	-0.00071	0.010
after 10minutes	13.56	13.559905	-0.000095	-0.00070	0.010

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559871	-0.000129	-0.00095	0.010
after 2minutes	13.56	13.559865	-0.000135	-0.00100	0.010
after 5minutes	13.56	13.559864	-0.000136	-0.00100	0.010
after 10minutes	13.56	13.559865	-0.000135	-0.00100	0.010

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559844	-0.000156	-0.00115	0.010
after 2minutes	13.56	13.559841	-0.000159	-0.00117	0.010
after 5minutes	13.56	13.559842	-0.000158	-0.00117	0.010
after 10minutes	13.56	13.559841	-0.000159	-0.00117	0.010

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company Roland DG Corporation
 Equipment HF RFID Reader/Writer
 Model LXRFZZHAAA-022
 Serial No. 001
 Power DC 5 V
 Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)
 Date August 7, 2015
 Temperature 25 deg.C
 Humidity 49 %RH
 ENGINEER Kenichi Adachi

Voltage Variation: DC 4.25 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559923	-0.000077	-0.00057	0.010
after 2minutes	13.56	13.559963	-0.000037	-0.00027	0.010
after 5minutes	13.56	13.559948	-0.000052	-0.00038	0.010
after 10minutes	13.56	13.559949	-0.000051	-0.00038	0.010

Voltage Variation: DC 5.75 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559971	-0.000029	-0.00021	0.010
after 2minutes	13.56	13.559949	-0.000051	-0.00038	0.010
after 5minutes	13.56	13.559948	-0.000052	-0.00038	0.010
after 10minutes	13.56	13.559946	-0.000054	-0.00040	0.010

UL Japan, Inc.**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

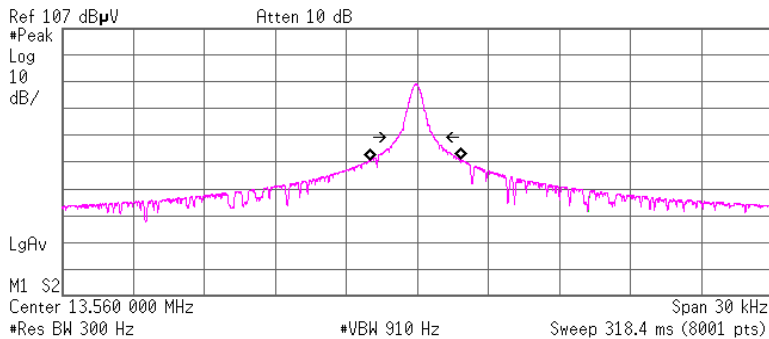
UL Japan, Inc.
Shonan EMC Lab. No.5 Shielded Room

Company: Roland DG Corporation
 Equipment: HF RFID Reader/Writer
 Model: LXRFFZHAAA-022
 Sample No.: 001
 Power: DC 5 V
 Mode: Transmitting 13.56 MHz
 NFC type A
 (tag type 2)

Regulation: FCC Part15 Subpart C 15.215
 Date: August 6, 2015
 Temperature: 23 deg.C
 Humidity: 47 %RH
 ENGINEER: Kenichi Adachi

20dB Bandwidth: 1.535 kHz

✧ Agilent L



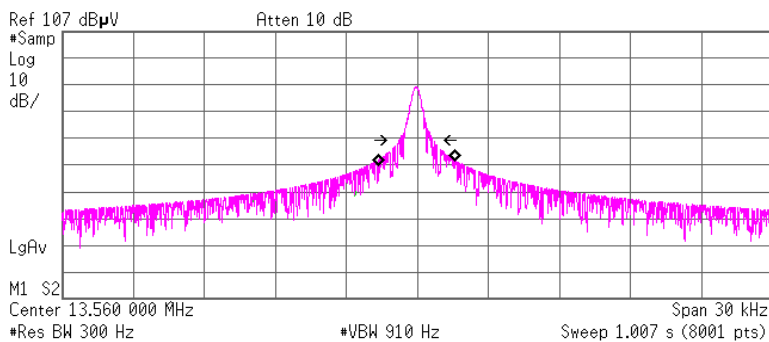
Occupied Bandwidth
3.8077 kHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -84.202 Hz
x dB Bandwidth 1.535 kHz

99% Occupied Bandwidth: 3.246 kHz

✧ Agilent L



Occupied Bandwidth
3.2457 kHz

Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -16.783 Hz
x dB Bandwidth 1.412 kHz*

UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa, Japan 259-1220
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Test Report No :

APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-ALL	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	RE	2014/12/26 * 24
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2015/02/18 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2014/11/22 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2015/04/17 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2015/04/17 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A0893	RE	2014/11/22 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/10/30 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE, CE	2014/09/03 * 12
SJM-14	Measure	ASKUL	-	-	RE, CE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2015/07/15 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE, CE	-
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2014/11/30 * 12
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
SCC-B12/B13/SRSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(RF Selector)	CE	2015/04/17 * 12
SLS-04	LISN	Rohde & Schwarz	ENV216	100514	CE	2015/02/25 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2015/02/18 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2014/12/24 * 12
STS-02	Digital Hitester	Hioki	3805-50	080997819	CE	2015/03/10 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	TF	2015/03/23 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	TF	Pre Check
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	TF	2014/12/24 * 12
SFC-01	Microwave Counter	Agilent	53151A	US40511493	TF	2015/04/24 * 12
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	TF	2015/04/22 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	TF	2014/11/11 * 12

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

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

Test Item :

CE: Conducted emission ,
RE: Radiated emission ,
FT: Test Fixture test