



RADIO TEST REPORT

Test Report No.: 10182167S-A

Applicant : Sony Corporation
Type of Equipment : Contactless IC Card Reader/Writer
Model No. : RC-S620/S
FCC ID : AK8RCS620S
Test regulation : FCC Part15 Subpart C: 2013
Test result : Complied

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Date of test: February 7 to 18, 2014

Tested by: S. Takano
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Engineer of WiSE Japan,
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UL Verification Service



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13-EM-F0429

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SECTION 1: Customer information

Company Name : Sony EMCS Corporation Kisarazu Site
Brand Name : SONY
Address : 8-4 Shiomi Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number : +81-438-37-3982
Facsimile Number : +81-438-37-4705
Contact Person : Yuuki Fujiwara

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

2.1 Identification of E.U.T.

Type of Equipment : Contactless IC Card Reader / Writer
Model Number : RC-S620/S
Serial Number : Refer to clause 4.2
Rating : DC 3.3V or DC 5.0V
Country of Mass-production : Japan
Condition of EUT : Production model
Receipt Date of Sample : February 7, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: RC-S620/S (referred to as the EUT in this report) is a Contactless IC Card Reader/Writer.

Clock frequency(ies) in the system : 27.12MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 13.56MHz
Type of modulation : ASK
Antenna type : Loop
Antenna connector type : None
ITU code : A1D
Operation temperature range : -10 to +40 deg.C./20 to 90%RH
+40 to +60 deg.C./50%RH or lower

FCC 15.31 (e)

The RFID transmitter is provided the stable voltage (DC2.8V) via regulator.
Therefore, this EUT complies with the requirement.

FCC 15.203

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

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2013,
final revised on September 30, 2013 and effective October 30, 2013
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 EUT complies with FCC Part 15 Subpart B. Refer to the test report: 10182167S-C.

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	8.4dB Freq.: 13.56000MHz Detector: Average Phase: L1	Complied
Electric field strength of Fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	64.2dB Polarization: Vertical (angle: 0deg.)	Complied
Electric field strength of Spurious emission (within the 13.110-14.010MHz band)	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (b)(c)	Radiated	N/A	33.9dB Freq.: 12.713MHz Polarization: Vertical (angle 0deg.)	Complied
Electric field strength of Spurious emission (outside of the 13.110-14.010MHz band)	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.209 FCC 15.225 (d)	Radiated	N/A	11.4dB Freq.: 42.25MHz Polarization: Vertical	Complied
20dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.215 (c)	Radiated	N/A	-	-
Frequency tolerance	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.225 (e)	Radiated	N/A	-	Complied

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

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 4.6.1	RSS-Gen 4.6.1	Radiated	-	-

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

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

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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) AMN/LISN	150kHz-30MHz	3.6 dB	3.6 dB	3.5 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 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 site margin.

Radiated emission test

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

Frequency tolerance

Frequency (Normal condition) Measurement uncertainty for this test was: (±) 7.9×10^{-8} .

Frequency (Extreme condition) Measurement uncertainty for this test was: (±) 7.9×10^{-8} .

Other tests

Bandwidth Measurement uncertainty for this test was: (±) 5.4%

3.5 Test location

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input checked="" type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<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.1 Measurement room	-	-	2.55 x 4.1 x 2.5	-	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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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 except for Frequency tolerances	Transmitting ISO/IEC 14443-3 Type A Request <ul style="list-style-type: none"> • Modulation ASK100% • Bit coding Modified Miller • Data transfer rate 106kbps ISO/IEC 14443-3 Type B Request <ul style="list-style-type: none"> • Modulation ASK8-14% • Bit coding NRZ • Data transfer rate 106kbps FeliCa 212kbps Request <ul style="list-style-type: none"> • Modulation ASK8-12% • Bit coding Manchester • Data transfer rate 212kbps 	13.56MHz
Frequency tolerances	Transmitting (Unmodulated)	13.56MHz

The EUT has the power settings by the software as follows;

Power settings: Setting is controlled by the firmware and cannot be changed.

Software: RC-S956poll.exe version 1.0.2.0

- Parameter file (Type A Modulated): APolling_RCS620S.bat
- Parameter file (Type B Modulated): BPolling_RCS620S.bat
- Parameter file (Type F Modulated): FPolling_RCS620S.bat
- Parameter file (Unmodulated): Carrier_RCS620S.bat

The Contactless IC Card Reader / Writer and antenna were fixed each position by the customer's specification. 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.

The carrier level and noise levels were confirmed with and without IC card (type A, B or F), and the test was made with IC card that was worse condition.

The carrier and spurious level was no difference between DC 5V and DC 3.3V.

Combinations of the worst case

Test item	Conducted emission	Radiated emission (Carrier)	Radiated emission (Sideband spurious)	Radiated emission (Below 30MHz)	Radiated emission (Above 30MHz)	Frequency tolerance
Antenna polarization						
Horizontal	-	Y	Y	Y	X	-
Vertical	-	Y	Y	Y	Z	-
Card type	Type B	Type A	Type B	Type A	FeliCa	-
Voltage	DC 5V	DC 5V	DC 5V	DC 5V	DC 5V	DC 5V and DC 3.3V

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

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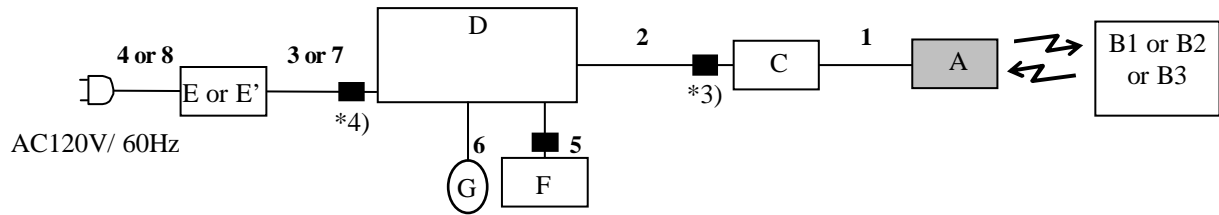
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4.2 Configuration and peripherals

■ : Standard ferrite core



* 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	Contactless IC Card Reader / Writer	RC-S620/S	0218762	Sony	EUT
B1	IC Card	-	A-1	-	Type A
B2	IC Card	-	B-1	-	Type B
B3	IC Card	-	F-1	-	FeliCa
C	Jig (Interface Box)	-	-	Sony	-
D	Laptop PC	VGN-G1	28248610 1000006	Sony	-
E	AC Adapter	PCGA-AC16V6	147774951 248745	Sony	*2)
E'	AC Adapter	ERA-201P1	1031504	Sony	*1)
F	CD-ROM drive	PCGA-CD51	A8002997A 1148524	Sony	-
G	Mouse	MO56UC	G0C00DUD	DELL	-

List of cables used

No.	Item	Length(m)	Shield		Remarks
			Cable	Connector	
1	Flat Cable	0.1	Shielded	Unshielded	-
2	USB	0.1	Shielded	Shielded	*3)
3	DC	1.8	Unshielded	Unshielded	*2), *4)
4	AC	0.7	Unshielded	Unshielded	*2)
5	PC Card	0.3	Shielded	Unshielded	-
6	USB	1.8	Shielded	Shielded	-
7	DC	1.8	Unshielded	Unshielded	*1), *4)
8	AC	1.8	Unshielded	Unshielded	*1)

*1) Used for conducted emission test only

*2) Used for except conducted emission tests

*3) The ferrite core was attached during spurious emission measurement to remove the effect of spurious emission from Jig.

*4) The ferrite core was not attached to reduce the noise from the EUT but was used to reduce the noise from Laptop PC. Therefore, that does not affect the emission level of the EUT. Since it was difficult to prepare a cable for Laptop PC to which a ferrite core was not attached, the measurement was performed with the cable with the ferrite core.

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SECTION 5: Conducted emission

5.1 Operating environment

The test was carried out in a shielded room.

Temperature : Refer to APPENDIX 2.
Humidity : Refer to APPENDIX 2.

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m 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 40cm to the vertical conducting plane. The rear of EUT was aligned and was 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. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

Each EUT current-carrying power lead was individually connected through a LISN to the input power source. Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via host device within a Shielded room. The EUT 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, a CISPR average detector.

The conducted emission measurements were made with the following detection of the test receiver.

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

5.5 Results

Summary of the test results : Pass

Refer to APPENDIX 2.

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SECTION 6: Radiated emission (Fundamental and Spurious emission)

6.1 Operating environment

The test was carried out in a semi-anechoic chamber.

Temperature : Refer to APPENDIX 2.

Humidity : Refer to APPENDIX 2.

6.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane.

The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 9kHz - 1GHz

Test distance : 3m

EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m
Frequency: From 9kHz to 30MHz at distance 3m

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: 0deg.to 360deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

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

The measuring antenna height was varied between 1 and 4m 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.

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

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

9kHz – 490kHz [Limit at 3m]= [Limit at 300m]-40log (3[m]/300[m])

490kHz – 30MHz [Limit at 3m]= [Limit at 30m]-40log (3[m]/30[m])

6.5 Results

Summary of the test results : Pass

Refer to APPENDIX 2.

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Figure 1. Direction of the Loop Antenna

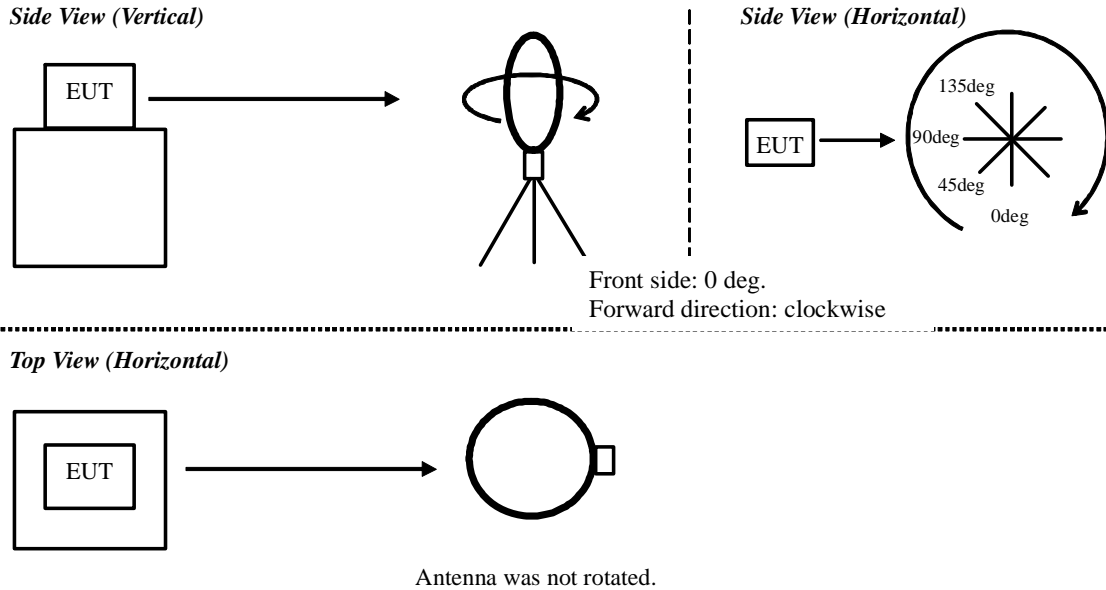
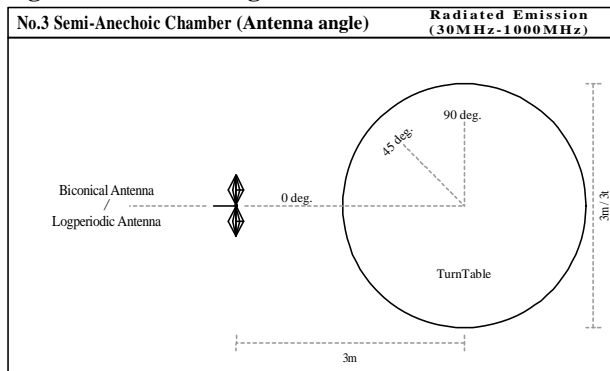


Figure 2. Antenna angle



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

Test procedure

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

Summary of the test results: Pass
Refer to APPENDIX 2.

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.

Summary of the test results: Pass
Refer to APPENDIX 2.

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Contents of APPENDIXES

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Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
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Pre-check of the worst case

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DATA OF CONDUCTED EMISSION TEST

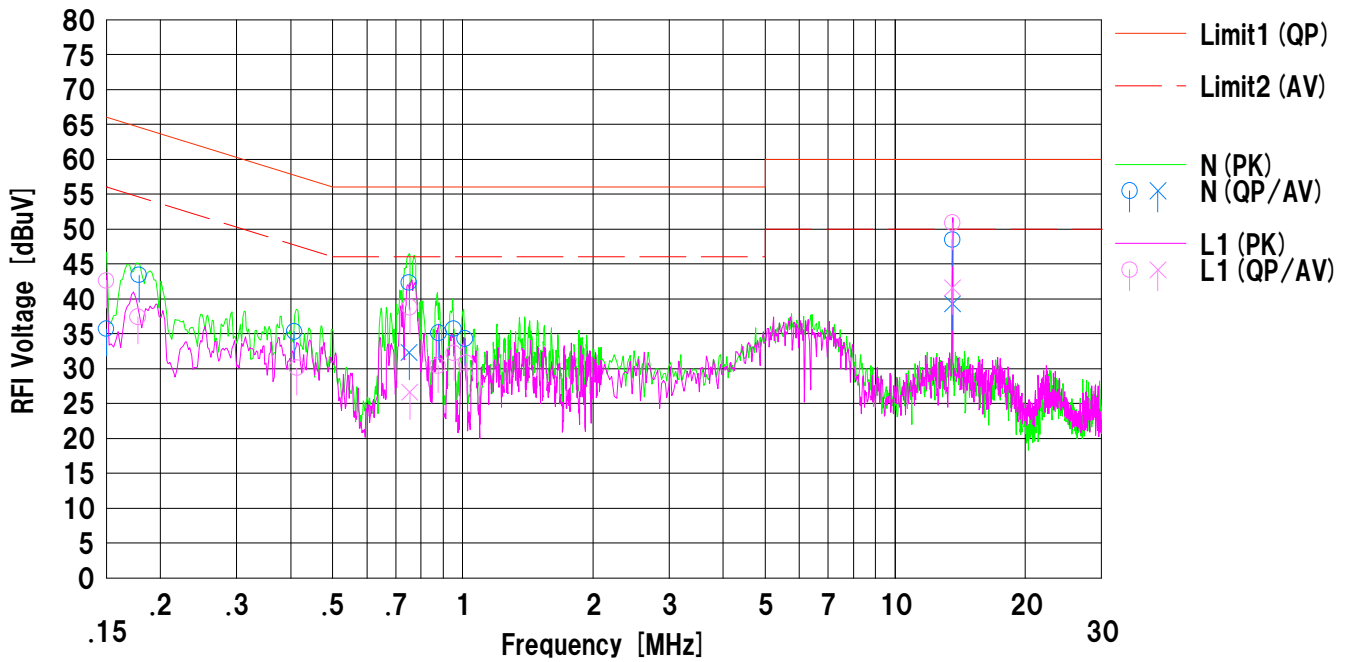
UL Japan,Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2014/02/16

Company : Sony Corporation
 Kind of EUT : Contactless IC Card Reader/Writer
 Model No. : RC-S620/S
 Serial No. : 0218762
 Remarks : Card: type B
 AC Adapter : ERA-201P1

Mode : Communication (13.56MHz) type B
 Order No. : 10182167S
 Power : DC5.0V (USB) ,AC120V/60Hz (LaptopPC)
 Temp./Humi. : 20deg.C. / 30%RH

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

Engineer : Hikaru Shirasawa



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	0.15000	23.1	---	12.6	35.7	---	66.0	56.0	30.3	---	N	
2	0.17832	30.8	---	12.6	43.4	---	64.5	54.5	21.1	---	N	
3	0.40743	22.7	---	12.6	35.3	---	57.7	47.7	22.4	---	N	
4	0.75116	29.7	19.7	12.6	42.3	32.3	56.0	46.0	13.7	13.7	N	
5	0.88050	22.5	---	12.6	35.1	---	56.0	46.0	20.9	---	N	
6	0.95242	23.1	---	12.6	35.7	---	56.0	46.0	20.3	---	N	
7	1.01201	21.6	---	12.7	34.3	---	56.0	46.0	21.7	---	N	
8	13.56000	35.1	25.9	13.4	48.5	39.3	60.0	50.0	11.5	10.7	N	
9	0.15000	30.0	---	12.6	42.6	---	66.0	56.0	23.4	---	L1	
10	0.17742	24.8	---	12.6	37.4	---	64.6	54.6	27.2	---	L1	
11	0.41362	17.5	---	12.6	30.1	---	57.5	47.5	27.4	---	L1	
12	0.75466	26.2	14.0	12.6	38.8	26.6	56.0	46.0	17.2	19.4	L1	
13	0.87614	17.8	---	12.6	30.4	---	56.0	46.0	25.6	---	L1	
14	0.95416	19.6	---	12.6	32.2	---	56.0	46.0	23.8	---	L1	
15	1.01907	18.1	---	12.7	30.8	---	56.0	46.0	25.2	---	L1	
16	13.56000	37.5	28.2	13.4	50.9	41.6	60.0	50.0	9.1	8.4	L1	

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.1 Semi-Anechoic Chamber

Company: Sony Corporation	Regulation: FCC Part15 SupartC 15.225
Equipment: Contactless IC Card Reader/Writer	Test Distance: 3m
Model: RC-S620/S	Date: Feburary 11, 2014
Sample No.: 0218762	Temperature: 22deg.C
Power: DC5V	Humidity: 21%RH
Mode: Transmitting 13.56MHz	ENGINEER: Kenichi Adachi
Remarks: Carrier: Type A (106kbps) (worst axis: Y), Vertical polarization (antenna angle) of the worst case: 0deg	
Sideband spurious: Type B (106kbps) (worst axis: Y), Vertical polarization (antenna angle) of the worst case: 0deg	

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		Table angle [deg.]
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]	
1	13.560	58.6	66.0	19.0	6.5	31.8	-40.0	12.3	19.7	83.9	71.6	64.2	109

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)

((reference) worst carrier @3m)

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

59.7 dBuV/m

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		Table angle [deg.]
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]	
1	12.660	30.7	30.5	19.0	6.4	31.8	-40.0	-15.7	-15.9	29.5	45.2	45.4	116
2	12.713	35.3	42.0	19.0	6.4	31.8	-40.0	-11.1	-4.4	29.5	40.6	33.9	116
3	13.110	30.5	30.5	19.0	6.5	31.8	-40.0	-15.8	-15.8	40.5	56.3	56.3	116
4	13.410	30.6	30.5	19.0	6.5	31.8	-40.0	-15.7	-15.8	40.5	56.2	56.3	116
5	13.553	45.0	51.4	19.0	6.5	31.8	-40.0	-1.3	5.1	50.4	51.7	45.3	116
6	13.567	45.5	51.8	19.0	6.5	31.8	-40.0	-0.8	5.5	50.4	51.2	44.9	116
7	13.710	30.7	30.5	19.0	6.5	31.8	-40.0	-15.6	-15.8	40.5	56.1	56.3	116
8	14.010	30.7	30.5	19.0	6.5	31.8	-40.0	-15.6	-15.8	40.5	56.1	56.3	116
9	14.405	34.0	39.6	19.0	6.5	31.8	-40.0	-12.3	-6.7	29.5	41.8	36.2	116
10	14.460	30.6	30.5	19.0	6.5	31.8	-40.0	-15.7	-15.8	29.5	45.2	45.3	116

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

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Radiated Emission

UL Japan, Inc.
Shonan EMC Lab. No.1 and No.3 Semi Anechoic Chamber

Company: Sony Corporation	Regulation: FCC Part15 SupartC 15.225
Equipment: Contactless IC Card Reader/Writer	Test Distance: 3m 3m
Model: RC-S620/S	Date: Feburary 11, 2014 Feburary 7, 2014
Sample No.: 0218762	Temperature: 22deg.C 21deg.C
Power: DC5V	Humidity: 21%RH 20%RH
Mode: Transmitting 13.56MHz	ENGINEER: Kenichi Adachi Kenichi Adachi
EUT axis: Below 30MHz (Y-axis), at 30m (measured 3m), Card Type A	(No.1 AC) (No.3 AC)
Above 30MHz (Horizontal: X-axis, Vertical: Z-axis) at 3m, Card Type F	

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	35.1	19.8	6.8	31.8	-40.0	-10.1	29.5	39.6	-	119	at 30m
Hori.	40.68	QP	28.2	14.2	6.7	32.2		16.9	40.0	23.1	309	211	at 3m
Hori.	54.24	QP	28.5	9.6	6.8	32.2		12.7	40.0	27.3	371	71	at 3m
Hori.	67.80	QP	43.1	6.7	6.9	32.1		24.6	40.0	15.4	268	9	at 3m
Hori.	81.36	QP	39.9	6.5	7.1	32.1		21.4	40.0	18.6	221	12	at 3m
Hori.	90.24	QP	42.7	8.2	7.1	32.1		25.9	43.5	17.6	197	176	at 3m
Hori.	94.92	QP	47.8	9.1	7.2	32.1		32.0	43.5	11.5	207	163	at 3m
Hori.	108.48	QP	33.5	11.3	7.3	32.1		20.0	43.5	23.5	154	71	at 3m
Hori.	122.04	QP	34.5	13.2	7.4	32.1		23.0	43.5	20.5	147	5	at 3m
Hori.	135.60	QP	34.7	14.1	7.5	32.1		24.2	43.5	19.3	218	338	at 3m
Hori.	168.07	QP	38.4	15.3	7.7	32.1		29.3	43.5	14.2	200	323	at 3m
Hori.	233.22	QP	39.2	16.8	8.1	32.0		32.1	46.0	13.9	142	40	at 3m
Hori.	432.01	QP	35.4	16.6	9.2	31.9		29.3	46.0	16.7	100	213	at 3m
Hori.	797.46	QP	29.0	20.6	10.6	31.6		28.6	46.0	17.4	142	312	at 3m
Vert.	27.12	QP	40.9	19.8	6.8	31.8	-40.0	-4.3	29.5	33.8	-	123	at 30m
Vert.	40.68	QP	35.3	14.2	6.7	32.2		24.0	40.0	16.0	100	129	at 3m
Vert.	42.25	QP	40.4	13.7	6.7	32.2		28.6	40.0	11.4	100	186	at 3m
Vert.	54.24	QP	26.2	9.6	6.8	32.2		10.4	40.0	29.6	100	228	at 3m
Vert.	67.80	QP	42.6	6.7	6.9	32.1		24.1	40.0	15.9	100	109	at 3m
Vert.	81.36	QP	37.9	6.5	7.1	32.1		19.4	40.0	20.6	100	113	at 3m
Vert.	90.24	QP	37.5	8.2	7.1	32.1		20.7	43.5	22.8	100	102	at 3m
Vert.	94.92	QP	42.7	9.1	7.2	32.1		26.9	43.5	16.6	100	108	at 3m
Vert.	108.48	QP	28.9	11.3	7.3	32.1		15.4	43.5	28.1	100	104	at 3m
Vert.	122.04	QP	30.0	13.2	7.4	32.1		18.5	43.5	25.0	100	93	at 3m
Vert.	135.60	QP	28.0	14.1	7.5	32.1		17.5	43.5	26.0	100	121	at 3m
Vert.	155.91	QP	35.6	14.7	7.7	32.1		25.9	43.5	17.6	100	93	at 3m
Vert.	168.07	QP	35.2	15.3	7.7	32.1		26.1	43.5	17.4	100	91	at 3m
Vert.	233.22	QP	30.4	16.8	8.1	32.0		23.3	46.0	22.7	100	184	at 3m
Vert.	551.26	QP	30.9	17.9	9.7	32.0		26.5	46.0	19.5	100	192	at 3m

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

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

Data of Frequency Tolerance: FCC 15.225(e)

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

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S620/S
Sample No.: 0218762
Power: DC5V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: February 13, 2014
Temperature: 24 deg.C
Humidity: 42 %RH
ENGINEER: Tatsuya Arai

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560108	0.000108	0.00080	0.01
after 2minutes	13.56	13.560112	0.000112	0.00083	0.01
after 5minutes	13.56	13.560111	0.000111	0.00082	0.01
after 10minutes	13.56	13.560110	0.000110	0.00081	0.01

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560104	0.000104	0.00077	0.01
after 2minutes	13.56	13.560110	0.000110	0.00081	0.01
after 5minutes	13.56	13.560105	0.000105	0.00077	0.01
after 10minutes	13.56	13.560106	0.000106	0.00078	0.01

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560104	0.000104	0.00077	0.01
after 2minutes	13.56	13.560108	0.000108	0.00080	0.01
after 5minutes	13.56	13.560110	0.000110	0.00081	0.01
after 10minutes	13.56	13.560106	0.000106	0.00078	0.01

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560108	0.000108	0.00080	0.01
after 2minutes	13.56	13.560113	0.000113	0.00083	0.01
after 5minutes	13.56	13.560114	0.000114	0.00084	0.01
after 10minutes	13.56	13.560111	0.000111	0.00082	0.01

Data of Frequency Tolerance: FCC 15.225(e)

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

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S620/S
Sample No.: 0218762
Power: DC5V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: February 13, 2014
Temperature: 24 deg.C
Humidity: 42 %RH
ENGINEER: Tatsuya Arai

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560110	0.000110	0.00081	0.01
after 2minutes	13.56	13.560112	0.000112	0.00083	0.01
after 5minutes	13.56	13.560111	0.000111	0.00082	0.01
after 10minutes	13.56	13.560109	0.000109	0.00080	0.01

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560096	0.000096	0.00071	0.01
after 2minutes	13.56	13.560096	0.000096	0.00071	0.01
after 5minutes	13.56	13.560096	0.000096	0.00071	0.01
after 10minutes	13.56	13.560098	0.000098	0.00072	0.01

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560057	0.000057	0.00042	0.01
after 2minutes	13.56	13.560059	0.000059	0.00044	0.01
after 5minutes	13.56	13.560065	0.000065	0.00048	0.01
after 10minutes	13.56	13.560067	0.000067	0.00049	0.01

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559994	-0.000006	-0.00004	0.01
after 2minutes	13.56	13.560005	0.000005	0.00004	0.01
after 5minutes	13.56	13.560003	0.000003	0.00002	0.01
after 10minutes	13.56	13.560004	0.000004	0.00003	0.01

Temperature Variation: -30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559883	-0.000117	-0.00086	0.01
after 2minutes	13.56	13.559903	-0.000097	-0.00072	0.01
after 5minutes	13.56	13.559903	-0.000097	-0.00072	0.01
after 10minutes	13.56	13.559904	-0.000096	-0.00071	0.01

Data of Frequency Tolerance: FCC 15.225(e)

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

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S620/S
Sample No.: 0218762
Power: DC5V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: 2014/2/18
Temperature: 24 deg.C
Humidity: 35 %RH
ENGINEER: Shinichi Takano

Input Voltage:DC4.25V (85%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560096	0.000096	0.00071	0.01
after 2minutes	13.56	13.560098	0.000098	0.00072	0.01
after 5minutes	13.56	13.560098	0.000098	0.00072	0.01
after 10minutes	13.56	13.560100	0.000100	0.00074	0.01

Input Voltage:DC5.75V (115%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560096	0.000096	0.00071	0.01
after 2minutes	13.56	13.560098	0.000098	0.00072	0.01
after 5minutes	13.56	13.560098	0.000098	0.00072	0.01
after 10minutes	13.56	13.560096	0.000096	0.00071	0.01

Data of Frequency Tolerance: FCC 15.225(e)

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

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S620/S
Sample No.: 0218762
Power: DC3.3V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: February 16, 2014
Temperature: 22 deg.C
Humidity: 31 %RH
ENGINEER: Hikaru Shirasawa

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560096	0.000096	0.00071	0.01
after 2minutes	13.56	13.560093	0.000093	0.00069	0.01
after 5minutes	13.56	13.560097	0.000097	0.00072	0.01
after 10minutes	13.56	13.560096	0.000096	0.00071	0.01

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560087	0.000087	0.00064	0.01
after 2minutes	13.56	13.560085	0.000085	0.00063	0.01
after 5minutes	13.56	13.560081	0.000081	0.00060	0.01
after 10minutes	13.56	13.560084	0.000084	0.00062	0.01

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560090	0.000090	0.00066	0.01
after 2minutes	13.56	13.560086	0.000086	0.00063	0.01
after 5minutes	13.56	13.560084	0.000084	0.00062	0.01
after 10minutes	13.56	13.560086	0.000086	0.00063	0.01

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560097	0.000097	0.00072	0.01
after 2minutes	13.56	13.560093	0.000093	0.00069	0.01
after 5minutes	13.56	13.560089	0.000089	0.00066	0.01
after 10minutes	13.56	13.560091	0.000091	0.00067	0.01

Data of Frequency Tolerance: FCC 15.225(e)

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

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S620/S
Sample No.: 0218762
Power: DC3.3V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
Date: February 16, 2014
Temperature: 22 deg.C
Humidity: 31 %RH
ENGINEER: Hikaru Shirasawa

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560093	0.000093	0.00069	0.01
after 2minutes	13.56	13.560097	0.000097	0.00072	0.01
after 5minutes	13.56	13.560095	0.000095	0.00070	0.01
after 10minutes	13.56	13.560094	0.000094	0.00069	0.01

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560074	0.000074	0.00055	0.01
after 2minutes	13.56	13.560080	0.000080	0.00059	0.01
after 5minutes	13.56	13.560082	0.000082	0.00060	0.01
after 10minutes	13.56	13.560081	0.000081	0.00060	0.01

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560043	0.000043	0.00032	0.01
after 2minutes	13.56	13.560045	0.000045	0.00033	0.01
after 5minutes	13.56	13.560049	0.000049	0.00036	0.01
after 10minutes	13.56	13.560045	0.000045	0.00033	0.01

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559978	-0.000022	-0.00016	0.01
after 2minutes	13.56	13.559988	-0.000012	-0.00009	0.01
after 5minutes	13.56	13.559986	-0.000014	-0.00010	0.01
after 10minutes	13.56	13.559994	-0.000006	-0.00004	0.01

Temperature Variation: -30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559879	-0.000121	-0.00089	0.01
after 2minutes	13.56	13.559893	-0.000107	-0.00079	0.01
after 5minutes	13.56	13.559884	-0.000116	-0.00086	0.01
after 10minutes	13.56	13.559883	-0.000117	-0.00086	0.01

Data of Frequency Tolerance: FCC 15.225(e)

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

Company: Sony Corporation
 Equipment: Contactless IC Card Reader/Writer
 Model: RC-S620/S
 Sample No.: 0218762
 Power: DC3.3V
 Mode: Transmitting 13.56MHz

Regulation: FCC Part15 SupartC 15.225
 Date: 2014/2/18
 Temperature: 24 deg.C
 Humidity: 35 %RH
 ENGINEER: Shinichi Takano

Input Voltage:DC2.805V (85%)
Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560094	0.000094	0.00069	0.01
after 2minutes	13.56	13.560092	0.000092	0.00068	0.01
after 5minutes	13.56	13.560096	0.000096	0.00071	0.01
after 10minutes	13.56	13.560100	0.000100	0.00074	0.01

Input Voltage:DC3.795V (115%)
Temperature Variation: 20deg.C

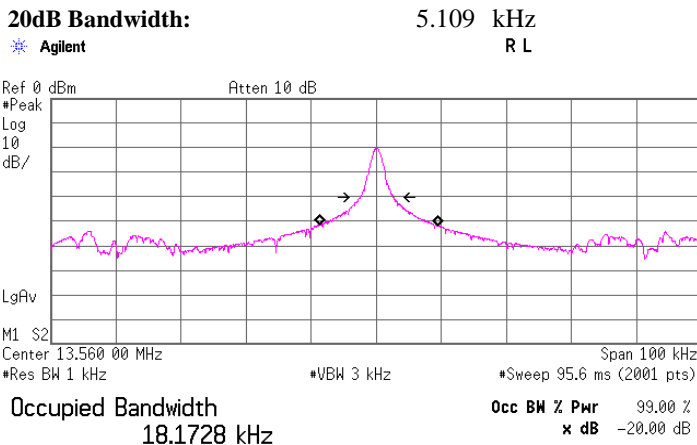
Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.560102	0.000102	0.00075	0.01
after 2minutes	13.56	13.560098	0.000098	0.00072	0.01
after 5minutes	13.56	13.560096	0.000096	0.00071	0.01
after 10minutes	13.56	13.560098	0.000098	0.00072	0.01

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

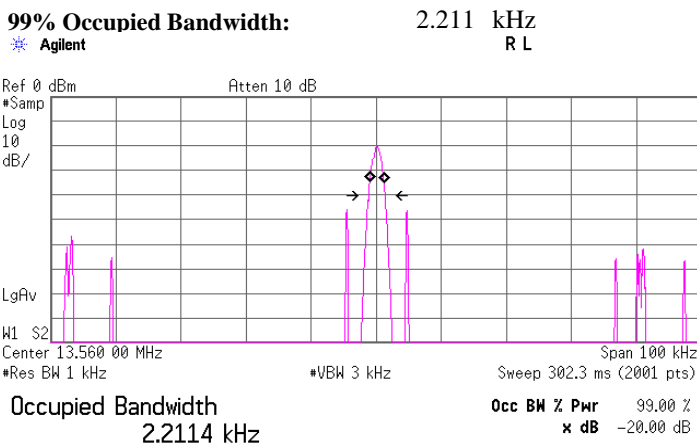
UL Japan, Inc.
Shonan EMC Lab. No.5 Shielded Room

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S620/S
Sample No.: 0218762
Power: DC5V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.215
Date: February 13, 2014
Temperature: 24 deg.C
Humidity: 42 %RH
ENGINEER: Tatsuya Arai



Transmit Freq Error 449.416 Hz
Occupied Bandwidth 5.109 kHz



Transmit Freq Error 102.728 Hz
Occupied Bandwidth 2.503 kHz*

UL Japan, Inc.
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APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2013/10/26 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2013/10/26 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2013/04/03 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2013/02/12 * 12
STR-03	Test Receiver	Rohde & Schwarz	ES140	100054/040	RE	2013/07/09 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2013/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE,CE	-
SJM-11	Measure	PROMART	SEN1935	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2013/02/27 * 12
SCC-B12/B13/SRSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(RF Selector)	CE	2013/04/03 * 12
SLS-03	LISN	Rohde & Schwarz	ENV216	100513	CE	2013/02/22 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2013/02/12 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2013/03/07 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	CE	2013/09/24 * 12
SJM-02	Measure	KOMELON	KMC-36	-	CE	-
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2013/11/08 * 12
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2013/04/04 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2013/02/12 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2013/11/20 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2013/02/27 * 12
SJM-08	Measure	PROMART	SEN1935	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2013/07/03 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	TF	2014/02/03 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	TF	2013/03/04 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	TF	Pre Check
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	TF	2013/04/17 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	TF	2013/03/07 * 12

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

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

Test Item :

CE: Conducted emission,
RE: Radiated emission,
TF: Test Fixture tests,