



RADIO TEST REPORT

Test Report No.: 10401259S-C

Applicant : Sony Corporation
Type of Equipment : Contactless IC Card Reader/Writer
Model No. : RC-S650/IA
FCC ID : AK8RCS650IA
Test regulation : FCC Part15 Subpart C: 2014
Test result : Complied

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Date of test: July 28 to August 4, 2014

Tested by: 
Makoto Hosaka
Engineer
Consumer Technology Division

Approved by : 
Toyokazu Imamura
Leader
Consumer Technology Division



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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10401259S-C

[illegible]

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SECTION 1: Customer information

Company Name : Sony EMCS Corporation
Brand Name : SONY
Address : Inazawa Site, 30 Ibarajima, Ohya-cho, Inazawa-shi, Aichi, 492-8545 Japan
Telephone Number : +81-050-3369-5593
Facsimile Number : +81-0587-36-8570
Contact Person : Hideo Nomura

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-S650/IA
Serial Number : Refer to clause 4.2
Rating : DC 3.3V
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 : July 25 and August 1, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: RC-S650/IA (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 : FPC
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 (DC1.8V and DC3.1V) via regulator.
Therefore, this EUT complies with the requirement.

FCC 15.203

This module has a unique antenna coupler, FPC connector. This modular transmitter will always be used in the configuration in which it was authorized. Therefore, this EUT 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: 2014, final revised on May 1, 2014 and effective June 2, 2014
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: 10401259S-E.

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	15.7dB Freq.: 27.16000MHz 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	53.9dB 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	34.6dB Freq.: 13.567MHz 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	3.3dB Freq.: 149.146MHz 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	*1)	-	Complied

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

*1) The voltage variation for testing was set to 2.805 to 3.6V, according to the EUT's specification. The EUT does not operate outside the range. (The test lab has confirmed that operation.)

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	4.8 dB	5.0 dB	4.8 dB
	300MHz-1GHz	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 site margin.

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐ No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☒ No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☒ No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ 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 • Modulation ASK100% • Bit coding Modified Miller • Data transfer rate 106kbps ISO/IEC 14443-3 Type B Request • Modulation ASK8-14% • Bit coding NRZ • Data transfer rate 106kbps FeliCa 212kbps Request • 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: NFC 100Poll.exe version 1.0.1.0

- Parameter file (Type A Modulated): Type A.bat
- Parameter file (Type B Modulated): Type B.bat
- Parameter file (Type F Modulated): Type F.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.

Combinations of the worst case

Test item	Conducted emission	Radiated emission (Carrier)	Radiated emission (Below 30MHz)	Radiated emission (Above 30MHz)
Antenna polarization				
Horizontal	-	X	X	X
Vertical	-	Z	Z	X
Card type	Type A: Except for 13.56MHz Type F (FeliCa): 13.56MHz	Type F (FeliCa)	Type F (FeliCa)	Type B

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

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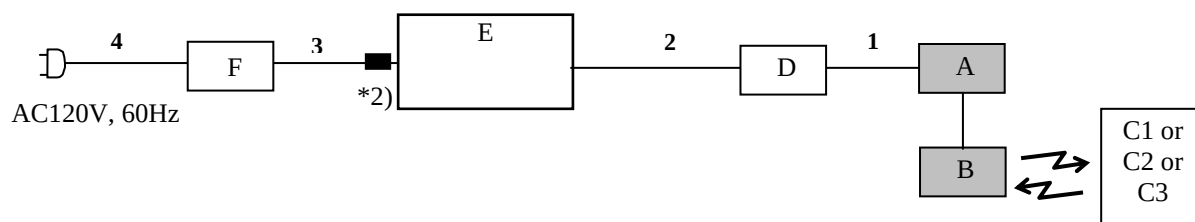
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4.2 Configuration and peripherals

■ : 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-S650/IA	9999001, 9999003	Sony	EUT
B	Antenna				
C1	IC Card	-	-	-	Type A
C2	IC Card	-	-	-	Type B
C3	IC Card	-	-	-	FeliCa
D	Jig	-	-	Sony	-
E	Laptop PC	PCG-5D1N	28248610 0795514	Sony	-
F	AC Adapter	VGP-AC16V8	147774951 0795514	Sony	*1)

List of cables used

No.	Item	Length(m)	Shield		Remarks
			Cable	Connector	
1	Flat	0.1	Shielded	Shielded	-
2	USB	1.1	Shielded	Shielded	-
3	DC	1.8	Unshielded	Unshielded	*1)
4	AC	0.7	Unshielded	Unshielded	*1)

*1) The item was used for Conducted emission test only.

*2) The core is a standard ferrite core attached to DC cable and not used to reduce the noise from the EUT. Therefore, that does not affect the emission level of the EUT.

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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 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 polystyrene platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. 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

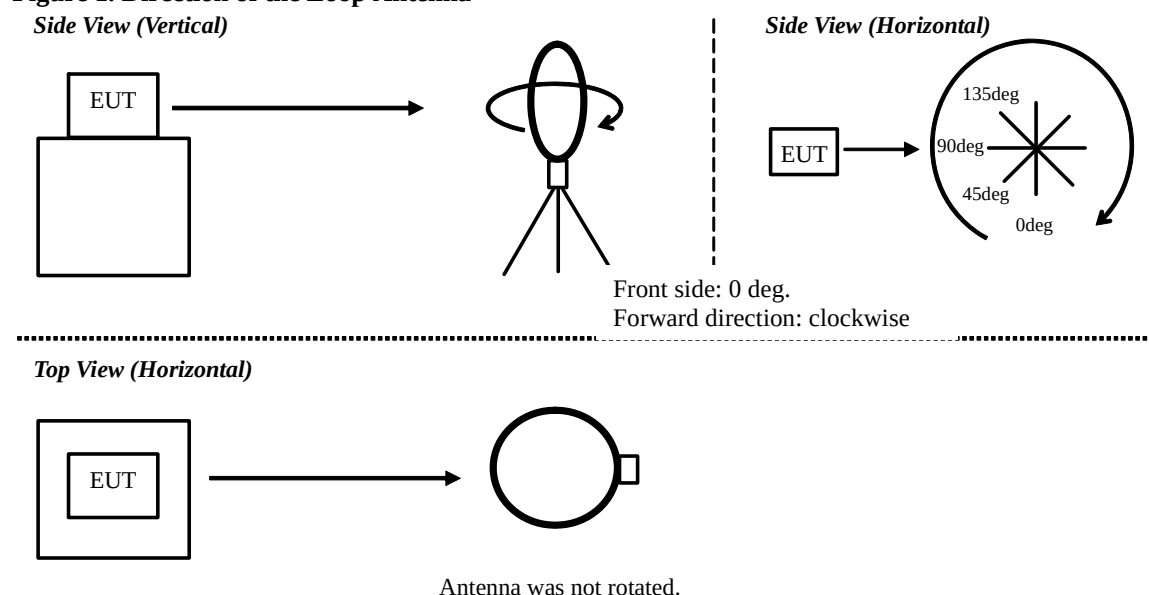
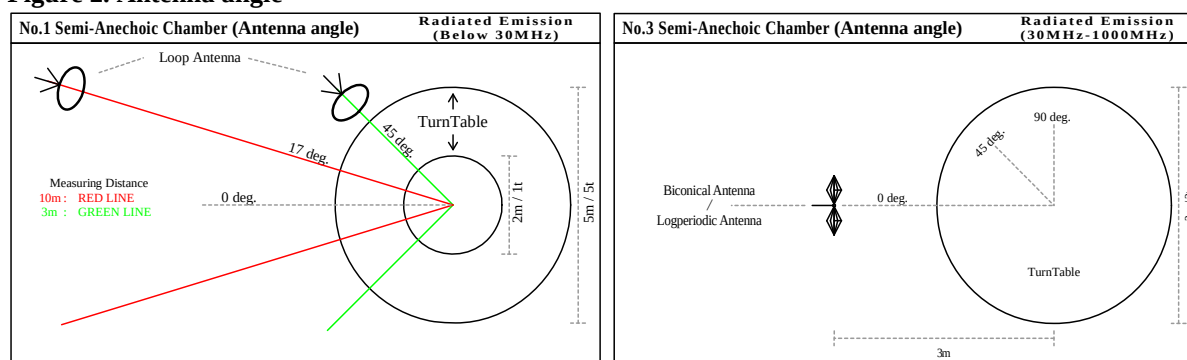


Figure 2. Antenna angle



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 60 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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Conducted emission
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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

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DATA OF CONDUCTED EMISSION TEST

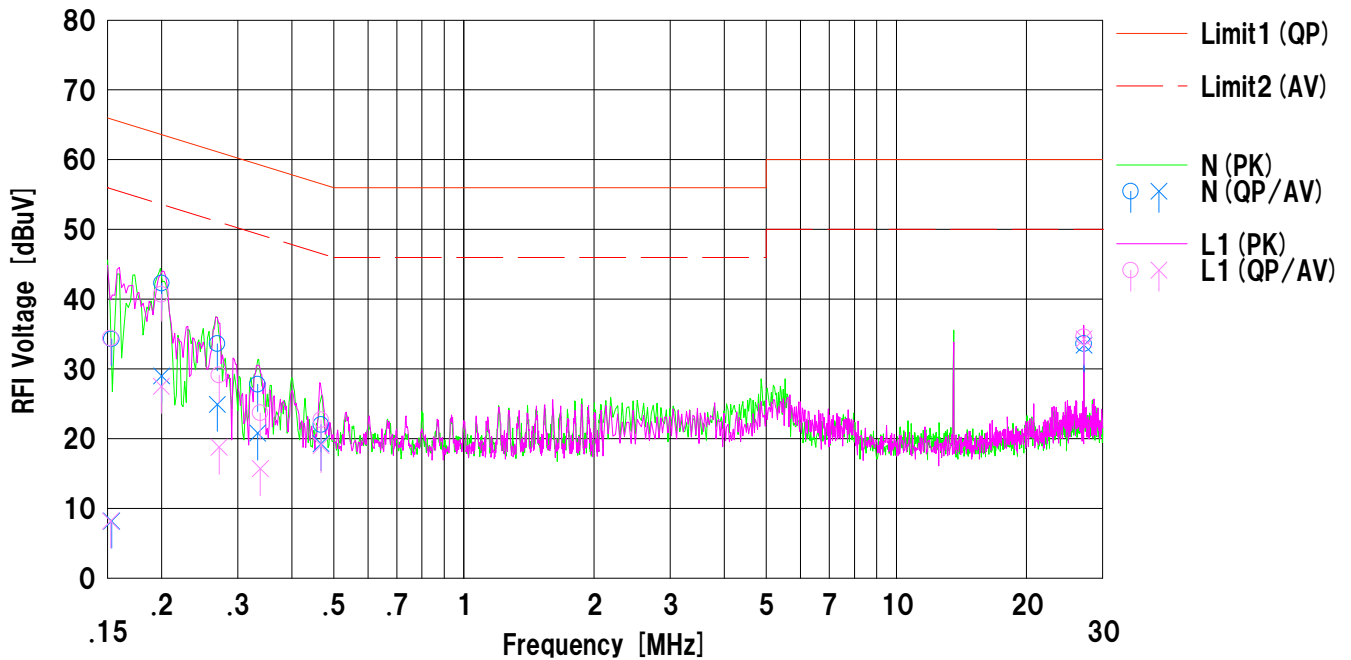
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2014/07/31

Company : Sony Corporation
 Kind of EUT : Contactless IC Card Reader/Writer
 Model No. : RC-S650/IA
 Serial No. : 9999003
 Remarks : Card Type A (with Card)

Mode : Transmitting (13.56MHz)
 Order No. : 10401259S
 Power : DC3.3V (USB) ,AC120V/60Hz (PC)
 Temp./Humi. : 26deg.C / 53%RH

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

Engineer : Akio Hayashi



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	0.15322	21.6	-4.5	12.7	34.3	8.2	65.8	55.8	31.5	47.6	N	
2	0.19996	29.6	16.3	12.7	42.3	29.0	63.6	53.6	21.3	24.6	N	
3	0.26887	20.9	12.2	12.7	33.6	24.9	61.1	51.1	27.5	26.2	N	
4	0.33350	15.1	8.1	12.7	27.8	20.8	59.3	49.3	31.5	28.5	N	
5	0.46746	9.3	6.6	12.7	22.0	19.3	56.5	46.5	34.5	27.2	N	
6	27.16000	19.8	19.6	13.8	33.6	33.4	60.0	50.0	26.4	16.6	N	
7	0.15243	21.7	-4.5	12.7	34.4	8.2	65.8	55.8	31.4	47.6	L1	
8	0.19972	28.0	14.8	12.7	40.7	27.5	63.6	53.6	22.9	26.1	L1	
9	0.27163	16.4	6.1	12.7	29.1	18.8	61.0	51.0	31.9	32.2	L1	
10	0.33820	11.0	3.0	12.7	23.7	15.7	59.2	49.2	35.5	33.5	L1	
11	0.46719	10.0	6.3	12.7	22.7	19.0	56.5	46.5	33.8	27.5	L1	
12	27.16000	20.8	20.5	13.8	34.6	34.3	60.0	50.0	25.4	15.7	L1	

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2014/08/01

Company : Sony Corporation
Kind of EUT : Contactless IC Card Reader/Writer
Model No. : RC-S650/IA
Serial No. : 9999001
Remarks : Card: Type F with Card (Antenna Terminated)

Mode : Transmitting (13.56MHz)
Order No. : 10401259S
Power : DC3.3V (USB) ,AC120V/60Hz (PC)
Temp./Humi. : 24deg.C / 50%RH

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

Engineer : Makoto Hosaka

<< QP/AV DATA >>

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	30.3	16.0	13.4	43.7	29.4	60.0	50.0	16.3	20.6	N	
2	13.56000	30.5	16.3	13.4	43.9	29.7	60.0	50.0	16.1	20.3	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.2 Semi Anechoic Chamber

Company: Sony EMCS Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S650/IA
Sample No.: 9999003
Power: DC3.3V
Mode: Transmitting 13.56MHz

Regulation: FCC Part15 Subpart C 15.225
Test Distance: 3m
Date: August 4, 2014
Temperature: 24 deg.C
Humidity: 55 %RH
ENGINEER: Makoto Hosaka

Remarks: : NFC type F, with Tag, (Axis:Hor_X / Ver_Z) , 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	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	64.3	75.7	19.8	6.4	31.9	-40.0	18.6	30.0	83.9	65.3	53.9

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

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

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	13.110	30.5	30.3	19.8	6.4	31.9	-40.0	-15.2	-15.4	29.5	44.7	44.9
2	13.410	30.6	30.6	19.8	6.4	31.9	-40.0	-15.1	-15.1	40.5	55.6	55.6
3	13.553	49.6	60.7	19.8	6.4	31.9	-40.0	3.9	15.0	50.4	46.5	35.4
4	13.567	50.1	61.5	19.8	6.4	31.9	-40.0	4.4	15.8	50.4	46.0	34.6
5	13.710	30.5	30.6	19.8	6.4	31.9	-40.0	-15.2	-15.1	40.5	55.7	55.6
6	14.010	30.6	30.5	19.8	6.5	31.9	-40.0	-15.0	-15.1	29.5	44.5	44.6

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)

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Radiated Emission

UL Japan, Inc.
Shonan EMC Lab. No.2 and 3 Semi Anechoic Chamber

Company: Sony EMCS Corporation	Regulation: FCC Part15 Subpart C 15.225
Equipment: Contactless IC Card Reader/Writer	Test Distance: 3m
Model: RC-S650/1A	Date: July 31, 2014 August 4, 2014
Sample No.: 9999003	Temperature: 26 deg.C 24 deg.C
Power: DC3.3V	Humidity: 53 %RH 55 %RH
Mode: Transmitting 13.56MHz	ENGINEER: Akio Hayashi Makoto Hosaka
EUT axis: Below 30MHz(Horizontal X-axis, Vertical Z-axis), NFC type F, with Tag	
Above 30MHz(Horizontal: X-axis, Vertical: X-axis), NFC type B, with Tag	

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	31.2	20.3	6.7	31.9	-40.0	-13.7	29.5	75.4	-	359	* Limit: 30m
Hori.	67.800	QP	53.1	6.7	6.5	32.2	0.0	34.1	40.0	5.9	283	194	
Hori.	149.160	QP	48.9	14.6	7.7	32.1	0.0	39.1	43.5	4.4	221	42	
Hori.	162.720	QP	47.4	15.0	7.7	32.1	0.0	38.0	43.5	5.5	206	31	
Hori.	176.280	QP	46.1	15.8	7.7	32.1	0.0	37.5	43.5	6.0	183	187	
Hori.	189.840	QP	46.8	16.2	7.7	32.1	0.0	38.6	43.5	4.9	179	186	
Hori.	203.400	QP	45.7	16.5	7.9	32.1	0.0	38.0	43.5	5.5	167	180	
Hori.	325.440	QP	37.3	14.4	8.5	32.0	0.0	28.2	46.0	17.8	100	202	
Vert.	27.12	QP	31.2	20.3	6.7	31.9	-40.0	-13.7	29.5	75.4	-	220	* Limit: 30m
Vert.	67.800	QP	52.1	6.7	6.5	32.2	0.0	33.1	40.0	6.9	100	274	
Vert.	122.040	QP	42.9	13.2	7.2	32.1	0.0	31.2	43.5	12.3	100	71	
Vert.	149.146	QP	50.0	14.6	7.7	32.1	0.0	40.2	43.5	3.3	100	120	
Vert.	162.720	QP	49.3	15.0	7.7	32.1	0.0	39.9	43.5	3.6	100	147	

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amplifier) + 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= 58.6dBuV/m, Ver= 70 dBuV/m

Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company Sony EMCS Corporation

Equipment Contactless IC Card Reader/Writer

Model RC-S650/IA

Serial No. 9999003

Power DC 3.3V

Mode Transmitting 13.56 MHz

Regulation FCC Part15 Subpart C 15.225 (e)

Date July 28, 2014

Temperature 25 deg.C

Humidity 50 %RH

ENGINEER Hiroshi Kukita

Temperature Variation: -30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560043	0.000043	0.00032	0.010
after 2minutes	13.56	13.560066	0.000066	0.00049	0.010
after 5minutes	13.56	13.560067	0.000066	0.00049	0.010
after 10minutes	13.56	13.560067	0.000067	0.00049	0.010

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560103	0.000103	0.00076	0.010
after 2minutes	13.56	13.560122	0.000122	0.00090	0.010
after 5minutes	13.56	13.560121	0.000121	0.00089	0.010
after 10minutes	13.56	13.560121	0.000121	0.00089	0.010

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560136	0.000136	0.00100	0.010
after 2minutes	13.56	13.560143	0.000143	0.00105	0.010
after 5minutes	13.56	13.560144	0.000144	0.00106	0.010
after 10minutes	13.56	13.560144	0.000144	0.00106	0.010

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560143	0.000143	0.00106	0.010
after 2minutes	13.56	13.560140	0.000140	0.00103	0.010
after 5minutes	13.56	13.560139	0.000139	0.00103	0.010
after 10minutes	13.56	13.560148	0.000148	0.00109	0.010

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560127	0.000127	0.00094	0.010
after 2minutes	13.56	13.560116	0.000116	0.00086	0.010
after 5minutes	13.56	13.560116	0.000116	0.00086	0.010
after 10minutes	13.56	13.560116	0.000116	0.00086	0.010

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Data of Frequency Tolerance

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560059	0.000059	0.00044	0.010
after 2minutes	13.56	13.560057	0.000057	0.00042	0.010
after 5minutes	13.56	13.560056	0.000056	0.00041	0.010
after 10minutes	13.56	13.560057	0.000057	0.00042	0.010

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560067	0.000067	0.00049	0.010
after 2minutes	13.56	13.560053	0.000053	0.00039	0.010
after 5minutes	13.56	13.560052	0.000052	0.00039	0.010
after 10minutes	13.56	13.560052	0.000052	0.00038	0.010

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560034	0.000034	0.00025	0.010
after 2minutes	13.56	13.560028	0.000028	0.00021	0.010
after 5minutes	13.56	13.560028	0.000028	0.00021	0.010
after 10minutes	13.56	13.560028	0.000028	0.00021	0.010

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560021	0.000021	0.00015	0.010
after 2minutes	13.56	13.560018	0.000018	0.00013	0.010
after 5minutes	13.56	13.560017	0.000017	0.00013	0.010
after 10minutes	13.56	13.560017	0.000017	0.00013	0.010

Temperature Variation: 60deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560019	0.000019	0.00014	0.010
after 2minutes	13.56	13.560020	0.000020	0.00015	0.010
after 5minutes	13.56	13.560022	0.000022	0.00016	0.010
after 10minutes	13.56	13.560023	0.000023	0.00017	0.010

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Data of Frequency Tolerance

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded room

Company	Sony EMCS Corporation	Regulation	FCC Part15 Subpart C 15.225 (e)
Equipment	Contactless IC Card Reader/Writer	Date	July 28, 2014
Model	RC-S650/IA	Temperature	25 deg.C
Serial No.	9999003	Humidity	50 %RH
Power	DC 3.3V	ENGINEER	Hiroshi Kukita
Mode	Transmitting 13.56 MHz		

Voltage Variation: DC 2.805 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560121	0.000121	0.00089	0.010
after 2minutes	13.56	13.560092	0.000092	0.00068	0.010
after 5minutes	13.56	13.560096	0.000096	0.00071	0.010
after 10minutes	13.56	13.560088	0.000088	0.00065	0.010

Voltage Variation: DC 3.6 V**Temperature Variation: 20deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560108	0.000108	0.00080	0.010
after 2minutes	13.56	13.560088	0.000088	0.00065	0.010
after 5minutes	13.56	13.560083	0.000083	0.00061	0.010
after 10minutes	13.56	13.560088	0.000088	0.00065	0.010

UL Japan, Inc.

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

UL Japan, Inc.

Shonan EMC Lab. No.5 Shielded Room

Company: Sony EMCS Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S650/IA
Sample No.: 9999003
Power: DC3.3V
Mode: Transmitting 13.56MHz
: NFC type F, with Tag

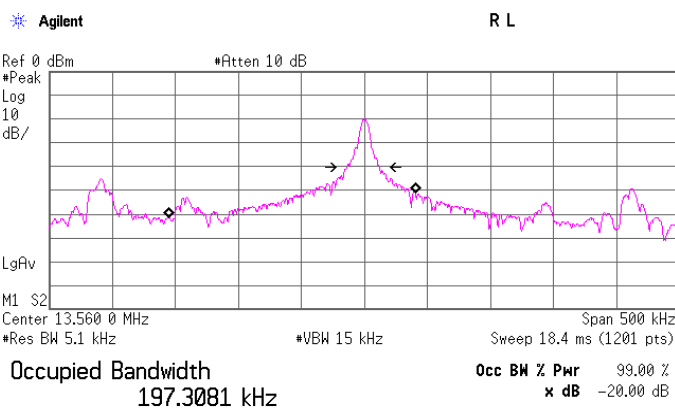
Regulation: FCC Part15 Subpart C 15.215

Date: July 28, 2014

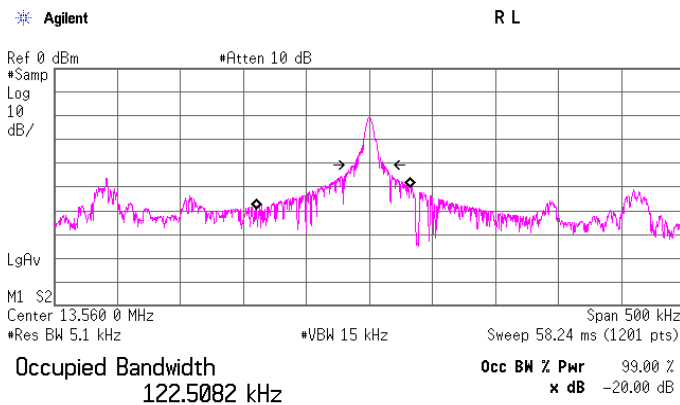
Temperature: 25 deg.C

Humidity: 50 %RH

ENGINEER: Hiroshi Kukita

20dB Bandwidth: 26.002 kHz

Transmit Freq Error -57.814 kHz
x dB Bandwidth 26.002 kHz

99% Occupied Bandwidth: 122.508 kHz

Transmit Freq Error -28.792 kHz
x dB Bandwidth 23.124 kHz*

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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)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	FT/BW	2014/02/03 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	FT/BW	Pre Check
SFC-01	Microwave Counter	Agilent	53151A	US40511493	FT	2014/04/01 * 12
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	FT	2014/04/15 * 12
SBM-09	Barometer	Sunoh	SBR121	001074	FT/BW	2012/02/23 * 36
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	FT/BW	2014/03/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2013/10/26 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2014/04/25 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2013/10/26 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/02/21 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE,CE	2014/03/04 * 12
SJM-15	Measure	ASKUL	-	-	RE,CE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2014/07/14 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,LF)	-	RE,CE	-
SCC-C6/C7/C8/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Fujikura/Suhner/Suhner/TOYO	141PE/12DSFA/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	CE	2014/04/25 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2014/02/26 * 12
SAT3-05	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2014/03/07 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2014/02/17 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
LP-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	829425/014	RE	2014/02/25 * 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	2014/04/25 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/02/21 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE	2013/09/24 * 12
SJM-14	Measure	ASKUL	-	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2014/07/08 * 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,

BW: Bandwidth

FT: Frequency Tolerance