RADIO TEST REPORT

Test Report No.: 29GE0132-YK-01-A

Applicant	:	**Sony Corporation**
Type of Equipment	:	**Contactless IC Card Reader/Writer**
Model No.	:	**RC-S620/U**
FCC ID	:	**AK8RCS620U**
Test regulation	:	**FCC Part15 Subpart C: 2009**
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.

Date of test: April 3 and 8, 2009

Tested by: Akira Sato

Approved by: Toyokazu Imamura
Assistant Manager of Yamakita EMC Lab.

Table of Contents Page

1 Applicant information

Company Name	:	Sony Corporation
Address	:	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 JAPAN
Telephone Number	:	+81-3-5435-3608
Facsimile Number	:	+81-3-5435-3575
Contact Person	:	Satoshi Setoyama

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

2.1 Identification of E.U.T.

Type of Equipment	:	Contactless IC Card Reader/Writer
Model No.	:	RC-S620/U
Serial No.	:	D100113
Rating	:	DC3.3V
Country of Mass-production	:	Japan
Receipt Date of Sample	:	April 3, 2009
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.

2.2 Product description

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

Equipment type	:	Transceiver
Frequency of operation	:	13.56MHz
Clock frequency	:	13.56MHz
Type of modulation	:	ASK
Antenna type	:	Loop antenna
Antenna connector type	:	None
ITU code	:	A1D
Operation temperature range	:	0 ~ +50 deg.C.

FCC Part15.31 (e)
Host device provides the RFID transmitter with stable power supply, and the power is not changed when voltage of the device is varied. Therefore, the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted on the board integrally. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3 Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2009, final revised on February 27, 2009
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 bands 13.110-14.010MHz.

The EUT complies with FCC Part 15 Subpart B: 2009, final revised on February 27, 2009. Refer to the test report 29GE0132-YK-01-C.

3.2 Procedures & results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	16.8dB (0.1863MHz, QP, N)	Complied
Electric field strength of fundamental emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (a)	Radiated	N/A	65.3dB (Vertical)	Complied
Electric field strength of outside the allocated bands	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (b)(c)	Radiated	N/A	44.3dB (13.110MHz, Horizontal)	Complied
Electric field strength of spurious emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.209 FCC 15.225 (d)	Radiated	N/A	6.7dB (40.68MHz, Vertical)	Complied
20dB bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.215 (c)	Radiated	N/A	-	Complied
Frequency tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.225 (e)	Radiated	N/A	-	Complied
Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15.						

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	-	Complied

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

3.4 Uncertainty

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

	No.1 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
Conducted emission			
150kHz-30MHz	2.7 dB	2.7 dB	2.8 dB
Radiated emission (3m)			
<30MHz	2.4 dB	2.4 dB	2.7 dB
30-300MHz	4.3 dB	4.3 dB	4.6 dB
300-1000MHz	4.3 dB	4.3 dB	4.5 dB

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	(±)
	0.000014dB

3.5 Test location

UL Japan, Inc. Yamakita EMC Lab.
907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN
Telephone number : +81 465 77 1011
Facsimile number : +81 465 77 2112
JAB Accreditation No. : RTL02610

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on July 23, 2008 (Registration No.: 95486).
IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on February 27, 2008 (Registration No.: 466226).
IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on October 22, 2008 (Registration No.: 95967).
IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

3.8 Test Configuration Photographs, Data of EMI test and Test instruments

Refer to APPENDIX 1 to 3, in this report.

4 System test configuration

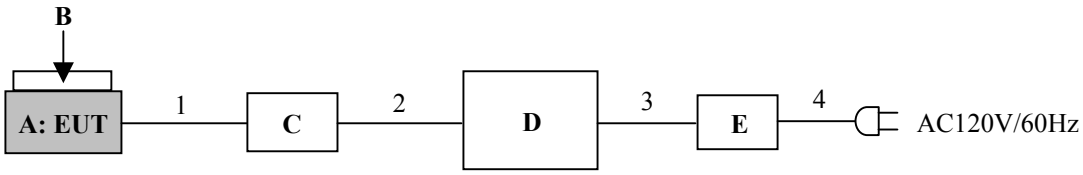
4.1 Operating mode

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 tolerance	Transmitting (ASK), 212kbps * A card which has the worst-case emission was selected for the test. The card can communicate at 212kbps max.	13.56MHz
Frequency tolerance	Transmitting, Unmodulated	13.56MHz

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

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Contactless IC Card Reader/Writer	RC-S620/U	D100113	Sony	EUT
B	IC Card	-	No.28	Sony	-
C	Jig	-	-	Sony	-
D	Note PC	HP Mini 1007TV	CNU8505G0D	HP	-
E	AC Adaptor	PPP018H	F1-081079499A	HP	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Flat cable	0.1	Shielded	Shielded	-
2	USB cable	0.1	Shielded	Shielded	-
3	DC cable	1.5	Unshielded	Unshielded	-
4	AC cable	1.8	Unshielded	Unshielded	-

5 Conducted emissions

5.1 Operating environment

The test was carried out in No.2 shielded room.

5.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm 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 80cm from any other grounded conducting surface. EUT was located 80cm 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 30cm to 40cm long and were hanged at a 40cm height to the ground plane.
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN 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 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz

5.4 Test procedure

The EUT was connected to a LISN (AMN). An overview sweep with peak detection has been performed. The Conducted emission measurements were made with the following detector function of the test receiver.
Detector: QP/AV
IF bandwidth: 9kHz

5.5 Results

Summary of the test results : Pass

6 Radiated emissions (Fundamental, Spurious and Outside the Allocated bands)

6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m by 1.8m, raised 80cm above the conducting ground plane to prevent the reflection influence. The configuration was set in accordance with ANSI C63.4: 2003. Photographs of the setup are shown in Appendix 1.

6.3 Test conditions

Frequency range : 9kHz - 1GHz
Test distance : 3m

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
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	10kHz	9kHz	120kHz
Measuring antenna	Loop antenna				Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)

Part 15 Section 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])

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.

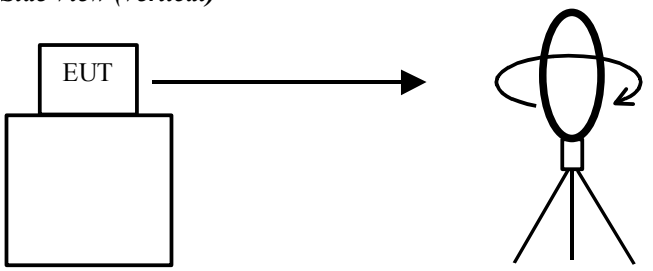
Frequency	Worst position	
9kHz - 30MHz	Horizontal: Y	Vertical: Y
30 - 1000MHz	Horizontal: Y	Vertical: Y

6.6 Results

Summary of the test results : Pass *No noise was detected above the 5th order harmonics.

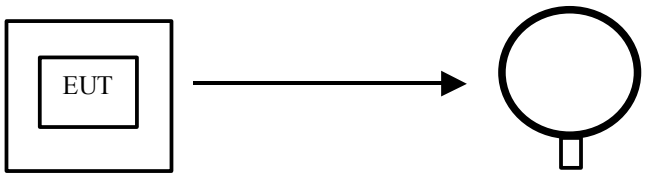
Figure 1: Direction of the Loop Antenna

Side View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

Top View (Horizontal)



Antenna was not rotated.

7 20dB bandwidth & Occupied bandwidth (99%)

7.1 Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

7.2 Results

Summary of the test results: Pass

8 Frequency tolerances

8.1 Test procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.
The temperature test was started after the temperature stabilization time of 30 minutes.

8.2 Results

Summary of the test results: Pass

APPENDIX 1: Photographs of test setup

APPENDIX 2: Test data

APPENDIX 3: Test instruments