RADIO TEST REPORT

Test Report No.: 30IE0007-YK-01-B

Applicant	**:**	**Sony EMCS Corporation Kisarazu TEC**
Type of Equipment	**:**	**Network Remote Controller**
Model No.	**:**	**RMN-U1**
FCC ID	**:**	**AK8RMNU1**
Test regulation	**:**	**FCC Part15 Subpart C: 2010**
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 8, 9, 12 and 14, 2010

Representative test engineer:

A. Sato

Akira Sato
Engineer of EMC Service

Approved by: T. Imamura

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Manager of EMC Service

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1 Applicant information

Company Name	:	SONY EMCS Corporation Kisarazu TEC
Address	:	Shinagawa INTERCITY C Tower, 2-15-3 Konan, Minato-ku, Tokyo, 108-6201 Japan
Telephone Number	:	+81-3-5769-5640
Facsimile Number	:	+81-3-5769-5915
Contact Person	:	Shigeru Higai

Sony EMCS Corporation Kisarazu TEC is on behalf of the applicant: Sony corporation.

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

2.1 Identification of E.U.T.

Type of Equipment	:	Network Remote Controller
Model No.	:	RMN-U1
Serial No.	:	5
Rating	:	DC3.7V (Internal battery), DC5.2V (AC adaptor: AC120V/60Hz)
Country of Mass-production	:	China
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.
Receipt Date of Sample	:	April 8, 2010

2.2 Product description

Model: RMN-U1 (referred to as the EUT in this report) is a Network Remote Controller.

Clock frequency	:	Real Time Clock: 32.768kHz, Audio Clock: 11.2896MHz, IR μCOM: 8MHz, Wireless Module: 38.4MHz, CODEC: 11.2896MHz, Charge PUMP: 1MHz, Main CPU: 500MHz, DD converter: 2.25MHz & 400kHz & 700kHz & 1MHz & 2MHz

Equipment type	:	Transceiver
Frequency of operation	:	2412-2462MHz
Bandwidth & channel spacing	:	20MHz & 5MHz
Type of modulation	:	IEEE802.11b: DSSS (DBPSK, DQPSK, CCK) IEEE802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna type	:	Chip
Antenna connector type	:	None
Antenna gain	:	2.51dBi
ITU code	:	D1D, G1D
Operation temperature range	:	0 ~ +40 deg.C.

FCC 15.31 (e)
This EUT provides stable voltage (DC1.8V and DC3.3V) constantly to RF transmitter regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203
The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement.

3 Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2010, final revised on January 22, 2010 and effective March 1, 2010

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 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

The EUT complies with FCC Part 15 Subpart B: 2010. Refer to the test report 30IE0007-YK-01-A.

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	11.5dB (0.2076MHz, QP, Tx 2437MHz, IEEE802.11g)	Complied
6dB bandwidth	"Guidance on Measurement for Digital Transmission Systems Section 15.247" & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (a)(2)	Conducted	N/A	* See data.	Complied
Maximum peak Output power	"Guidance on Measurement for Digital Transmission Systems Section 15.247" & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (b)(3)	Conducted	N/A		Complied
Out of band emission & Restricted band edges	"Guidance on Measurement for Digital Transmission Systems Section 15.247" & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	3.1dB (2483.5MHz, AV, Horizontal, Tx 2462MHz, IEEE802.11g, without charging cradle)	Complied
Power density	"Guidance on Measurement for Digital Transmission Systems Section 15.247" & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (e)	Conducted	N/A	* See data.	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	Conducted	-	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 semi-anechoic chamber (±)
Conducted emission (AC mains)			
150kHz-30MHz	3.5 dB	3.5 dB	3.5 dB
Radiated emission (3m)			
9kHz-30MHz	3.3 dB	3.2 dB	3.0 dB
30-300MHz	4.4 dB	4.5 dB	4.6 dB
300-1000MHz	4.6 dB	4.7 dB	4.7 dB
1-18GHz	3.8 dB	4.2 dB	4.5 dB
18-26.5GHz	4.4 dB	4.5 dB	4.5 dB

Antenna port conducted test	(±)
Below 1GHz	0.4 dB
1GHz and above	0.7 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 report meets the limits unless the uncertainty is taken into consideration.

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

4 System test configuration

4.1 Justification

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

Test item	Operating mode	Tested frequency
Conducted emission Spurious emission	Transmitting (IEEE802.11b), 2Mbps Transmitting (IEEE802.11g), 6Mbps	2412MHz, 2437MHz, 2462MHz
6dB bandwidth Maximum peak output power Power density 99% occupied bandwidth	Transmitting (IEEE802.11b), 2Mbps Transmitting (IEEE802.11g), 6Mbps	2412MHz, 2437MHz, 2462MHz
Restricted band edge	Transmitting (IEEE802.11b), 2Mbps Transmitting (IEEE802.11g), 6Mbps	2412MHz, 2462MHz

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum rated power.

Software & Setting

Software: Tera Tern Ver. 4.64

Setting: Power: 15dBm

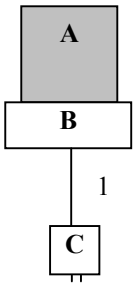
Channel:

1	2412MHz	Low	**6**	2437MHz	Middle	**11**	2462MHz	High
2	2417MHz	-	**7**	2442MHz	-			
3	2422MHz	-	**8**	2447MHz	-			
4	2427MHz	-	**9**	2452MHz	-			
5	2432MHz	-	**10**	2457MHz	-			

*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.

4.2 Configuration of tested system

EUT with Charging cradle



AC120V/60Hz

Stand alone

* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer *1)	Remarks
A	Network Remote Controller	RMN-U1	5	SONY	EUT
B	Remote Control Charger (Charging cradle)	BCA-U1	6	SONY	-
C	AC Adaptor	AC-E5212	11	SONY	-

*1) “SONY” means Sony Corporation or Sony EMCS Corporation.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC 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 peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN) and excess AC cable was bundled in center. 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 6dB bandwidth & Occupied bandwidth (99%)

Test procedure
The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass

7 Maximum peak output power

Test procedure
The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass

8 Out of band emissions (Antenna port conducted)

Test procedure
The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.
In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

Summary of the test results: Pass

9 Out of band emissions (Radiated)

9.1 Operating environment

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

9.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.9m 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 set up are shown in Appendix 1.

9.3 Test conditions

Frequency range : 30MHz - 26GHz
Test distance : 3m

9.4 Test procedure

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

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector IF Bandwidth	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 3MHz, AV*1): RBW: 1MHz/VBW: See data
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

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.

Combinations of the worst case (EUT without charging cradle)

Frequency	Worst position	
	Horizontal	Vertical
Below 1GHz	Y	X
Above 1GHz	Y	X

9.5 Band edge

Band edge level at 2400MHz is less than 20dB of peak point of the carrier. Refer to the data of Out of Band Emissions (Antenna Port Conducted). Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209. Refer to the data of Radiated emission.

9.6 Results

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

10 Peak power density

Test procedure
The peak power density was measured with a spectrum analyzer connected to the antenna port.

Instrument used : Spectrum Analyzer *1)
RBW / VBW : 30kHz / 100kHz *2)

*1) PSD Option 1 of "Measurement of Digital Transmission Systems Operating under Section 15.247".
*2) The test was not performed at RBW: 3kHz that was stated in the Regulation. However, the measurement value with RBW: 3kHz is less than the value of RBW: 30kHz and the test data met the limit with RBW: 30kHz.

Summary of the test results: Pass

APPENDIX 1: Photographs of test setup

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Page 13 - 14 : Radiated emission

Page 15 : Pre-check of the worst position

APPENDIX 2: Test data

Page 16 - 25 : Conducted emission

Page 26 - 27 : 6dB bandwidth

Page 28 - 31 : Maximum peak output power

Page 32 - 38 : Out of band emissions (Antenna port conducted)

Page 39 - 74 : Out of band emissions (Radiated)

Page 75 - 76 : Peak power density

Page 77 : Occupied bandwidth

APPENDIX 3: Test instruments

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