



RADIO TEST REPORT

Test Report No. : 27LE0344-HO-A-R1

Applicant : Sony Corporation
Type of Equipment : WLAN MODULE
Model No. : CMN-727AS
FCC ID : AK8CMN727AS
Test regulation : FCC Part 15 Subpart C 2008
Section 15.207, Section 15.247
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. Original test report number of this report is 27LE0344-HO-A.

Date of test: February 18 to March 28, 2008

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NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

Company Name : Sony Corporation
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Contact Person : Ikuji Abe

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

2.1 Identification of E.U.T.

Type of Equipment : WLAN MODULE
Model No. : CMN-727AS
Serial No. : 54: Used for Radiated Spurious Emission and Conducted Spurious Emission tests
55: Used for Antenna Terminal test
Rating : DC3.3V
Country of Mass-production : Japan
Receipt Date of Sample : February 5, 2008
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 No: CMN-727AS (referred to as the EUT in this report) is the WLAN MODULE which is installed in the DATA PROJECTOR (Host device) manufactured by Sony Corporation.

Clock frequency(ies) in the system : WLAN chip: 40MHz

Other Clock Frequency : 33MHz (PCI)

Equipment Type	Transceiver	
Frequency of Operation	11b/11g	2412MHz - 2462MHz
	11a	5180MHz, 5200MHz, 5220MHz, 5240MHz
Type of Modulation	11b	DSSS
	11a/11g	OFDM
Bandwidth & Channel Spacing	11b/11g	18MHz & 5MHz
	11a	18MHz & 20MHz
Power Supply	DC3.3V	
Antenna Type	Chip Antenna	
Antenna Connector Type	U.FL	
Antenna Gain	2.0dBi	

*Two types of Power Supply Unit are chosen as the circuit of power supply for representative host device.

-Power Supply Unit 1 (Model Number: PS200)

-Power Supply Unit 2 (Model Number: PS100)

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C: 2008, final revised on May 19, 2008

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

*The revision on May 19, 2008 does not influence the test specification applied to the EUT.

FCC 15.31 (e)

This EUT is provided stable voltage(DC3.3V) constantly from the host device. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The EUT has an external antenna connector, but it is installed in the specific host device of EUT by the professionals. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

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3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements ----- IC: RSS-Gen 7.2.2	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.2	Conducted	N/A	[QP] 8.0dB 29.46045MHz, N [AV] 7.6dB 29.46045MHz, N	Complied
2	6dB Bandwidth	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a)	Conducted	N/A	See data.	Complied
3	Maximum Peak Output Power	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)	Conducted	N/A		Complied
4	Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: -	FCC: Section 15.247 (d) ----- IC: RSS-210 A8.5	Conducted/ Radiated	N/A		Complied
5	Power Density	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: -	FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b)	Conducted	N/A		Complied
6	Spurious Emission	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9 RSS-Gen 4.10	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3	Conducted/ Radiated	N/A		[Tx] 4.6 dB 176.349 MHz, Horizontal, QP [Rx] 7.2 dB 4885.00MHz, Horizontal, AV

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

*These tests were performed without any deviations from test procedure except for additions or exclusions.

*In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

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3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	Conducted	N/A	N/A	N/A

3.4 Uncertainty

EMI

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

Test room	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)	
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-40GHz
No.1 semi-anechoic Chamber (±)	3.7dB	3.1dB	4.7dB	4.4dB	3.2dB	3.7dB	3.9dB	5.9dB	6.1dB
No.2 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.3dB	3.9dB	5.9dB	6.1dB
No.3 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.2dB	4.4dB	5.9dB	6.1dB
No.4 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.2dB	4.4dB	5.9dB	6.1dB

*10m/3m = Measurement distance

Conducted emission test

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

Radiated emission test(3m)

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

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty for this test is 3.0dB.

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3.5 Test Location

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

4.1 Operating Mode(s)

Test Item	Operating Mode	Tested frequency
Conducted emission Spurious Emission	IEEE802.11b Transmitting (Tx), 11Mbps (Payload: PN9)	2412MHz(L)
	IEEE802.11g Transmitting (Tx), 54Mbps (Payload: PN9)	2437MHz(M) 2462MHz(H)
	----- IEEE802.11b/g Receiving (Rx)	2437MHz(M)
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	IEEE802.11b Transmitting (Tx), 11Mbps (Payload: PN9)	2412MHz(L)
	IEEE802.11g Transmitting (Tx), 54Mbps (Payload: PN9)	2437MHz(M) 2462MHz(H)
Conducted emission Band Edge compliance	IEEE802.11b Transmitting (Tx), 11Mbps (Payload: PN9)	2412MHz(L)
	IEEE802.11g Transmitting (Tx), 54Mbps (Payload: PN9)	2462MHz(H)
Transmitting duty was 100% on all tests. (See Page 57)		

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

All tests were performed on the antenna port A other than the antenna port B since the antenna port A had the maximum power on conducted peak power.

Although there are three antenna cables (length of 3cm, 25cm, and 50cm), the cable of 50cm was used for the Radiated Spurious emission test, and the cable of 25cm was used for Conducted Spurious emission test. The data of test with other cables were attached as reference data. The difference of cables is only its length.

Since the host device has two types of power supply unit, Conducted Emission test was carried out with Power Supply Unit 1 (Model: PS200) and also Radiated Spurious Emission with Power Supply Unit 2 (Model: PS100), which showed the worse level of spurious emission than another power unit. The difference of power units did not affect the result of Antenna Terminal test.

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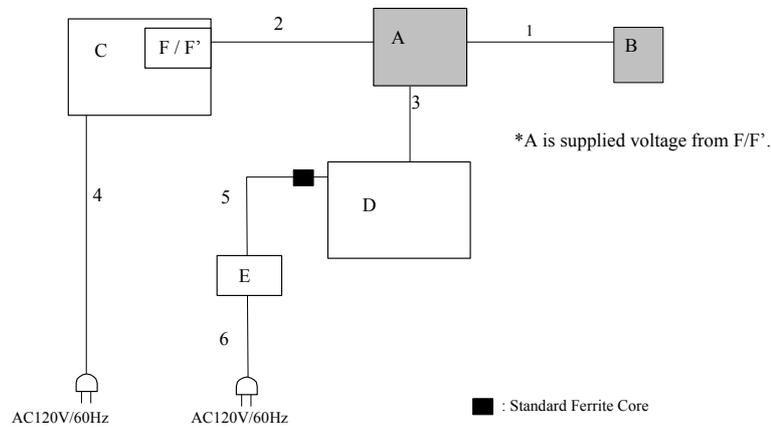
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4.2 Configuration and peripherals



* Cabling and setup(s) 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	WLAN MODULE	CMN-727AS	54 *1) 55 *2)	Japan Radio Co., Ltd	EUT
B	ANTENNA BOARD	AH-104N2450D1	26	SONY	EUT
C	DATA PROJECTOR	VPL-CX125	2000467	SONY	Host device
D	Note PC	PP17L	48643-569-5752	DELL	-
E	AC ADAPTER	AA22850	16293-55G-00JF	DELL	-
F	Power Supply Unit 1	PS200	1	SONY	Part of Host device
F'	Power Supply Unit 2	PS100	1	SONY	Part of Host device

*1) Used for Radiated Spurious Emission and Conducted Spurious Emission tests

*2) Used for Antenna Terminal test

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Antenna Cable	0.03 0.25 0.50	Shielded	Shielded
2	DC Cable	0.9	Unshielded	Unshielded
3	mini- PCI Extension Cable	0.2	Shielded	Shielded
4	AC Cable	1.9	Unshielded	Unshielded
5	DC Cable	2.0	Unshielded	Unshielded
6	AC Cable	0.9	Unshielded	Unshielded

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a wooden table of nominal size, 1.0m by 1.5m, 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 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)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cable and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Detector : quasi-peak and average detector (IF BW 9 kHz)
Measurement range : 0.15-30MHz
Test data : APPENDIX 2
Test result : Pass

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SECTION 6: Spurious Emission

[Conducted]

Test Procedure

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port. It was measured based on "1. RF antenna conducted test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

The following spectrum analyzer setting was used:

- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

Test data : APPENDIX 2
Test result : Pass

[Radiated]

Test Procedure

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247".

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 80cm above the conducting ground plane.

The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m(Below 10GHz) and 1m(Upper 10GHz).

The height of the measuring 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 with the Test Receiver, or the Spectrum Analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

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

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.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 2 of RSS-210 2.7 (IC) and outside the restricted band of FCC15.205 / Table 1 of RSS-210 2.7 (IC).

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer *1)
Detector	QP: BW 120kHz(T/R)	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth	20dBc : RBW: 100kHz VBW: 300kHz (S/A)	AV: RBW:1MHz/VBW:10Hz 20dBc : RBW:100kHz/VBW:300kHz

*1) The Spectrum Analyzer was used in 3dB resolution bandwidth.

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of Module and Antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Test data : APPENDIX 2
Test result : Pass

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SECTION 7: Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".
The following spectrum analyzer setting was used:

- Span: 50MHz
- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

Test data : APPENDIX 2
Test result : Pass

SECTION 8: Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a power meter (tested bandwidth: 50MHz) connected to the antenna port.
It was measured based on "Power Output Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".

Test data : APPENDIX 2
Test result : Pass

SECTION 9: Peak Power Density

[Conducted]

Test Procedure

The Peak Power Density was measured with a spectrum analyzer connected to the antenna port.
It was measured based on "PSD Option 1" of "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247 ".

Test data : APPENDIX 2
Test result : Pass

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