



RADIO TEST REPORT

Test Report No.: 31DE0280-SH-01-A

Applicant : Sony Corporation
Type of Equipment : Digital Surround Processor
Model No. : DP-RF6500
FCC ID : AK8DPRF6500
Test regulation : FCC Part15 Subpart C: 2010
Test result : Complied

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Date of test: January 23 – 27, 2011

Tested by:

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Verification Service

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Verification Service

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SECTION 1: Customer information

Company Name : Sony Corporation
Brand Name : Sony
Address : Shinagawa INTERCITY C Tower, 2-15-3 Konan, Minato-ku, Tokyo
108-6201, Japan
Telephone Number : +81-3-5769-5640
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Contact Person : Shigeru Higai

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

2.1 Identification of E.U.T.

Type of Equipment : Digital Surround Processor
Model No. : DP-RF6500
Serial No. : Refer to the Section 4.2
Rating : DC6V (AC Adaptor: AC100-240V, 50/60Hz)
Country of Mass-production : Malaysia
Receipt Date of Sample : January 6, 2011
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

2.2 Product description

Model No: DP-RF6500, referred to as the EUT in this report, is the Digital Surround Processor.
Model No: MDR-DS6500 is the Wireless Stereo Headphone System.
MDR-DS6500 consists of DP-RF6500 (Digital Surround Processor) and MDR-RF6500 (Wireless Stereo Headphones).

General Specification

Clock frequency(ies) in the system : DSP 24.576MHz&258MHz, Micom clock 8MHz, DD converter 380kHz,
DIR 12.288MHz, Crystal 22.576649MHz, Master clock 11.2896MHz

Radio Specification

Equipment type	: Transceiver
Frequency of operation	: 2408MHz-2473MHz
Bandwidth & channel spacing	: 3MHz & 5MHz
Type of modulation	: MSK
Transmit power	: 10mW
Power control	: None
Method of frequency generation	: Synthesizer
Operating voltage	: DC 2.8V, 3.2V
Antenna type	: Pattern Antenna
Antenna Gain	: -7.21dBi
Antenna connector type	: Integral
Operation temperature range	: 5 ~ +35 deg.C.
Regulator	: Yes

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FCC 15.31 (e)

The RF Module has its own regulator.

The RF Module is constantly provided voltage (DC2.8V, 3.2V) through its own regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2010, final revised on December 6, 2010 and effective January 5, 2011.
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 31DE0280-SH-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	(Tx) 11.9dB (4.58390MHz, AV, L1, Tx 2483MHz)	Complied
6dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (a)(2) & 15.209	Conducted	N/A	* See data	Complied
Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (b)(3) & 15.209	Conducted	N/A		Complied
Out of Band Emission & Restricted Band Edges	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	(Tx) 8.8dB (2248.096MHz, AV, Vertical, Tx 2473MHz)	Complied
Power Density	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (e) & 15.209	Conducted	N/A	* See data	Complied
Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15. These tests were also referred to "Guidance on Measurement for Digital Transmission Systems Section15.247".						

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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

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

* 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.

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Conducted emission (AC Mains) LISN	150kHz-30MHz	3.0 dB	2.7 dB	3.1 dB
Radiated emission (Measurement distance: 3m)	30MHz-300MHz	4.7 dB	4.5 dB	4.7 dB
	300MHz-1GHz	4.5 dB	4.6 dB	4.6 dB
	1GHz-13GHz	3.9 dB	3.9 dB	4.0 dB
Radiated emission (Measurement distance: 1m)	13GHz-18GHz	4.8 dB	4.8 dB	4.8 dB
	18GHz-40GHz	4.4 dB	4.2 dB	4.2 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 the site margin.

Radiated emission test

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

Antenna Terminal Voltage

Power Measurement uncertainty above 1GHz for this test was: (±) 0.8dB

Conducted emissions, Power Density Measurement (below 1GHz) uncertainty for this test was: (±) 1.1dB

Conducted emissions, Power Density Measurement (1G-3GHz) uncertainty for this test was: (±) 1.2dB

Conducted emissions, Power Density Measurement (3G-18GHz) uncertainty for this test was: (±) 2.9dB

Conducted emissions Measurement (18G-26.5GHz) uncertainty for this test was: (±) 3.4dB

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

Channel power Measurement uncertainty for this test was: (±) 1.4dB

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3.5 Test location

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JAB Accreditation No. : RTL02610

No.1/ No.2/ No.3 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on April 17, 2009 (Registration No.: 697847).

IC Registration No. : 2973D-1 (No1 Semi-Anechoic Chamber)

2973D-2 (No2 Semi-Anechoic Chamber)

2973D-3 (No3 Semi-Anechoic Chamber)

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-Anechoic Chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-Anechoic Chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-Anechoic Chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5m	No.3 Shielded room	6.3 x 4.7 x 2.7
No.4 Semi-Anechoic Chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7

3.6 Test setup, Data of EMI & 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

Test sequence is used : Transmitting (Tx) 2408MHz (with normal modulation, Continuous Transmitting)
 Transmitting (Tx) 2438MHz (with normal modulation, Continuous Transmitting)
 Transmitting (Tx) 2473MHz (with normal modulation, Continuous Transmitting)

Test item	Operating mode	Tested frequency
Conducted emission Spurious emission	Tx	2408MHz, 2438MHz, 2473MHz
6dB bandwidth Maximum peak output power Power density 99% occupied bandwidth	Tx	2408MHz, 2438MHz, 2473MHz
Restricted band edge	Tx	2408MHz, 2473MHz

*Transmitting duty was refer to APPENDIX 2.

*The worst condition was determined based on the test result of RF output power.

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

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

Test software : DX2516_SRC EMC_26-Oct.rfs

Version: KLR2010-2.4

Test commands: SRC_MSK_TX0-14_L1.cmd

Power settings: -1dBm

*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.

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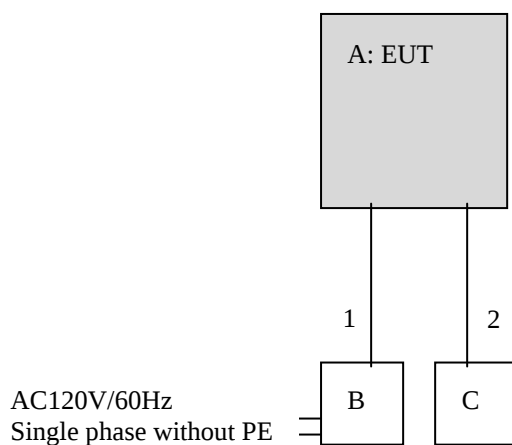
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4.2 Configuration of tested system



* Test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Surround Processor	DP-RF6500	21 (*1) 2 (*2)	Sony Corporation	EUT
B	AC Adaptor	AC-ES608K3	-	Sony Corporation	-
C	Portable CD Player	D-NE509	5115173	Sony Corporation	-

*1). Used for Conducted emissions and Spurious emissions test.

*2). Except for Conducted emissions and Spurious emissions test.

List of cables used

No.	Name (Cable)	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	2.1	Unshielded	Unshielded	-
2	Audio Input	1.0	Shielded	Shielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

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

Temperature : See test data (APPENDIX 2)

Humidity : See test data (APPENDIX 2)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 2.0m, raised 80cm 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, 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.

Photographs of the set up are shown in APPENDIX 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz

EUT position : Table top

EUT operation mode : Refer to SECTION 4.1

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a Shielded room or Semi-Anechoic Chamber. 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, an average detector.

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

Detection Type : Quasi-Peak/ 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

6.1 Operating environment

The test was carried out in No.2 and No.3 Semi-Anechoic Chamber.

Temperature : See test data (APPENDIX 2)

Humidity : See test data (APPENDIX 2)

6.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m or 2.0m, raised 80cm above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. 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.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in APPENDIX 1.

6.3 Test conditions

Frequency range : 30MHz to 26GHz

Test distance : 3m(below 13GHz) / 1m(above13GHz)

EUT position : Table top

EUT operation mode : Refer to SECTION 4.1

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m(below 13GHz) / 1m(above 13GHz) (Refer to Figure 1). Measurements were performed with quasi-peak, peak and average detector. 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.

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

Frequency	:	30-1000MHz	1000-26000MHz
Detection Type	:	Quasi-Peak	Peak * Average
IF Bandwidth	:	120kHz	RBW:1MHz/VBW:3MHz RBW:1MHz/VBW:10Hz

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

The EUT was tested in the direction normally used.

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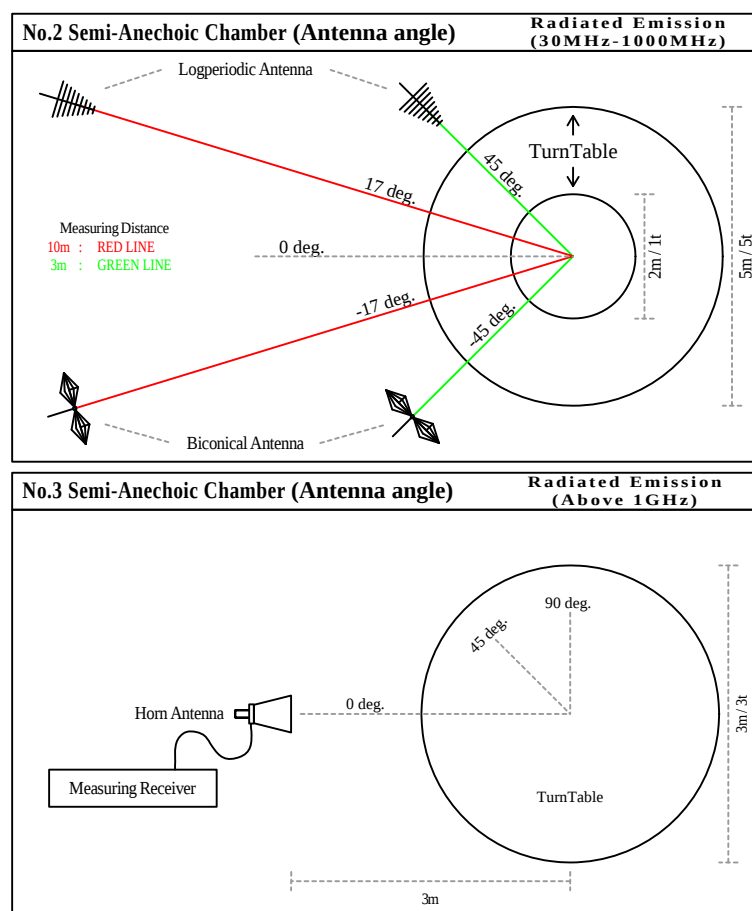
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Figure 1. Antenna angle



6.5 Band edge

Band edge level at 2390MHz, 2400MHz and 2483.5MHz is below the limits of FCC 15.209. Refer to the data of Radiated emission.

6.6 Results

Summary of the test results : Pass *No noise was detected above the 5th order harmonics.
Refer to APPENDIX 2

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SECTION 7: 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
Refer to APPENDIX 2

SECTION 8: 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
Refer to APPENDIX 2

SECTION 9: 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
Refer to APPENDIX 2

SECTION 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 : 10kHz / 30kHz *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: 10kHz and the test data met the limit with RBW: 10kHz.

Summary of the test results: Pass
Refer to APPENDIX 2

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Conducted emission
Radiated emission

APPENDIX 2: Test data

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Spurious emission (Antenna port conducted)
Peak power density
Occupied Bandwidth

APPENDIX 3: Test instruments

Test instruments

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