



RADIO TEST REPORT

Test Report No.: 30IE0014-YK-01-B-R2

Applicant : Sony EMCS Corporation Kisarazu TEC
Type of Equipment : Network Audio System/Server
Model No. : NAS-SV20i
FCC ID : AK8NASSV20I
Test regulation : FCC Part15 Subpart C: 2010
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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This report is a revised version of 30IE0014-YK-01-B-R1. 30IE0014-YK-01-B-R1 is replaced with this report.

Date of test: April 15, 16, 21, 22 and July 12, 2010

Representative test engineer:

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MF060b (06.08.09)

Table of Contents	Page
1 Applicant information	3
2 Equipment under test (E.U.T.)	3
3 Test specification, procedures and results	4
4 System test configuration	7
5 Conducted emission	8
6 6dB bandwidth & Occupied bandwidth (99%)	8
7 Maximum peak output power	8
8 Out of band emissions (Antenna port conducted)	8
9 Out of band emissions (Radiated)	9
10 Peak power density	9
<u>Contents of Appendixes</u>	10
APPENDIX 1: Photographs of test setup	11
APPENDIX 2: Test data	13
APPENDIX 3: Test instruments	55

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1 Applicant information

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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 Audio System/Server
Model No. : NAS-SV20i
Serial No. : Refer to 4.2 in this report.
Rating : DC19.5V (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: NAS-SV20i (referred to as the EUT in this report) is a Network Audio System/Server.

Clock frequency : Real time clock: 32.768kHz, Audio clock: 11.2896MHz,
LAN control: 25MHz & 100MHz, Wireless Module: 38.4MHz,
USB Controller: 26MHz & 60MHz & 480MHz, Main CPU: 500MHz,
DD converter: 2.25MHz & 400kHz & 700kHz & 300kHz,
Oscillator circuit: 11.2896MHz, AD converter: 11.2896MHz, Mi-com: 4.194MHz,
DA converter: 11.2896MHz, Digital Amp: 24.576MHz, Touch SW: 1.6MHz & 20kHz

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.

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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 30IE0014-YK-01-A-R1.

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	19.4dB (0.1500MHz, QP, L1, Tx 2437MHz, IEEE802.11b)	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	-	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	3.3dB (2483.5MHz, AV, Horizontal, IEEE802.11g, Tx 2462MHz)	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	-	Complied

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

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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

* 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.

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3.5 Test location

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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

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4 System test configuration

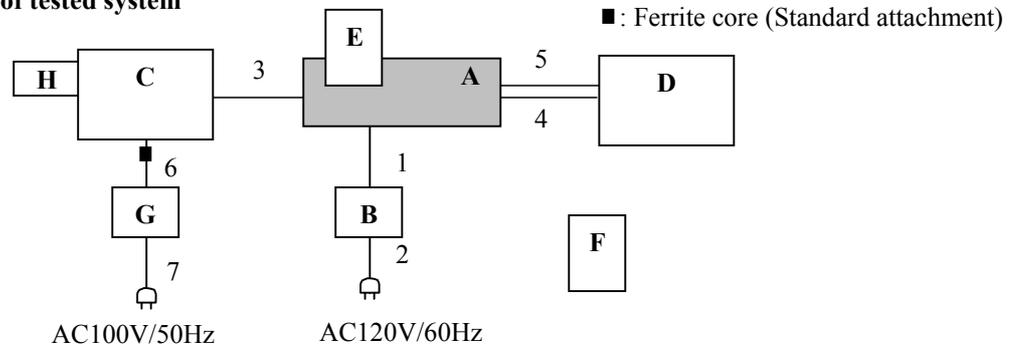
4.1 Justification

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

Test item	Operating mode	Tested frequency
Conducted emission	Transmitting (IEEE802.11b), 11Mbps	2412MHz, 2437MHz,
Out of band emission	Transmitting (IEEE802.11g), 36Mbps	2462MHz
6dB bandwidth	Transmitting (IEEE802.11b), 11Mbps	2412MHz, 2437MHz,
Maximum peak output power	Transmitting (IEEE802.11g), 36Mbps	2462MHz
Power density		
99% occupied bandwidth		
Restricted band edge	Transmitting (IEEE802.11b), 11Mbps	2412MHz, 2462MHz
	Transmitting (IEEE802.11g), 36Mbps	

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

4.2 Configuration of tested system



* Test data was taken under worst case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer *1)	Remarks
A	Network Audio System/Server	NAS-SV20i	*2)	SONY	EUT
B	AC Adaptor	AC-E1920L	-	SONY	-
C	Personal Computer	NT757PA	AR09900137	HP	-
D	AV Selector	JX-S8	19	Victor	-
E	iPod	A1285	YM845G633QX	Apple	-
F	Remote Controller	RM-ANU093	-	SONY	-
G	AC Adaptor	NSW23579	-	HP	-
H	USB Memory	MF-AU201GSV/RS	E8052900126	ELECOM	-

*1) "SONY" means Sony Corporation or Sony EMCS Corporation.

*2) 15 (Radiated emission above 1GHz and Antenna port conducted test), 81 (other test)

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC cable	1.8	Unshielded	Unshielded	-
2	AC cable	0.7	Unshielded	Unshielded	-
3	LAN cable	3.0	Unshielded	Unshielded	-
4	Audio cable	1.5	Unshielded	Unshielded	-
5	Audio cable	1.5	Unshielded	Unshielded	-
6	DC cable	1.4	Unshielded	Unshielded	-
7	AC cable	1.7	Unshielded	Unshielded	-

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5 Conducted emissions

5.1 Operating environment

The test was carried out in No.1 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 and its peripherals were 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

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9 Out of band emissions (Radiated)

9.1 Operating environment

The test was carried out in No.1 semi-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 EUT was tested in the direction normally used.

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

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APPENDIX 1: Photographs of test setup

Page 11 : Conducted emission
Page 12 : Radiated emission

APPENDIX 2: Test data

Page 13 - 22 : Conducted emission
Page 23 - 24 : 6dB bandwidth
Page 25 - 26 : Maximum peak output power
Page 27 - 33 : Out of band emissions (Antenna port conducted)
Page 34 - 51 : Out of band emissions (Radiated)
Page 52 - 53 : Peak power density
Page 54 : Occupied bandwidth

APPENDIX 3: Test instruments

Page 55 : Test instruments

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