



# RADIO TEST REPORT

**Test Report No.: 31IE0081-SH-04-A**

**Applicant** : Sony Corporation  
**Type of Equipment** : Digital Media Player  
**Model No.** : NWZ-S764  
**FCC ID** : AK8NWZS760  
**Test regulation** : FCC Part15 Subpart C: 2010  
**Test result** : Complied

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3. This sample tested is in compliance with the limits of the above regulation.
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**Date of test:** April 12 to 26, 2011

**Representative test engineer:**

Akio Hayashi  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

Ichiro Isozaki  
Leader of WiSE Japan,  
UL Verification Service

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13-EM-F0429

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## **SECTION 1: Customer information**

Company Name : Sony Corporation  
Address : Shinagawa INTERCITY C Tower 2-15-3, Konan Minato-ku, Tokyo, Japan  
Telephone Number : +81-3-5769-5222  
Facsimile Number : +81-3-5769-5901  
Contact Person : Shinichi Maru

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Digital Media Player  
Model Number : NWZ-S764  
Serial Number : Refer to clause 4.2  
Rating : DC3.7V  
Country of Mass-production : Malaysia  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Receipt Date of Sample : April 12, 2011  
Modification of EUT : No modification by the test lab.

### **2.2 Product description**

Model: NWZ-S764 (referred to as the EUT in this report) is a Digital Media Player.

The EUT has some derived models:

	NWZ-S764	NWZ-S765
NAND memory	8GB	16GB

Clock frequency(ies) in the system : CPU: 11MHz  
Bluetooth IC:26MHz, Power IC: 26MHz, 32.768kHz

<Radio part>

Equipment type : Transceiver  
Frequency of operation : 2402-2480MHz  
Bandwidth / Channel spacing : 79MHz & 1MHz  
Type of modulation : FHSS (GFSK,  $\pi/4$ -DQPSK, 8DPSK)  
Antenna type : Chip Antenna  
Antenna connector type : None  
Antenna gain : 0.9dBi  
ITU code : F1D, G1D  
Operation temperature range : 5 to 35 deg.C.

FCC Part15.31 (e)

The EUT is a battery-operated device and test was performed with the full-charged battery. Therefore, this EUT complies with the requirement.

FCC Part15.203 Antenna requirement

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: 31IE0081-SH-04-B.

### **3.2 Procedures & Results**

<b>Item</b>	<b>Test Procedure</b>	<b>Specification</b>	<b>Remarks</b>	<b>Deviation</b>	<b>Worst Margin</b>	<b>Results</b>
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC Section 15.207	-	N/A *1)	N/A	N/A
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A	*See data.	Complied
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)	Conducted	N/A		-
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (a)(1)(iii)	Conducted	N/A		Complied
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (b)(1)	Conducted	N/A		Complied
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (d) Section15.209	Conducted/ Radiated	N/A		6.6dB Freq.: 2483.500MHz Detector: Average Polarization: Vertical Mode: Tx 2480MHz, 3DH5

Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422

\*1) The EUT operates with a battery and is connected to PC to recharge. AC Line can be connected to the EUT via the PC, however, the EUT stops transmission during recharging. Therefore, the test is not applicable to the EUT.

### 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	-	-

Note: UL Japan's EMI Work Procedures No.13-EM-W0420 and 13-EM-W0422.

\* 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 <sup>*1</sup> /SR <sup>*2</sup> (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
<b>Radiated emission</b> (Measurement distance: 3m)	9kHz-30MHz	3.3 dB	2.7 dB	3.4 dB
	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
<b>Radiated emission</b> (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

#### Radiated emission test

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

#### Antenna port conducted test

Power Measurement uncertainty above 1GHz for this test was: (±) 1.3dB

Conducted emissions Measurement (below 1GHz) uncertainty for this test was: (±) 1.9dB

Conducted emissions Measurement (1G-3GHz) uncertainty for this test was: (±) 2.5dB

Conducted emissions Measurement (3G-18GHz) uncertainty for this test was: (±) 3.8dB

Conducted emissions Measurement (18G-26.5GHz) uncertainty for this test was: (±) 4.1dB

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

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### 3.5 Test location

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input checked="" type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Full-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input checked="" type="checkbox"/> No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

### 3.6 Test setup, Data of test & 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**

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

<b>Test item</b>	<b>Operating mode</b>	<b>Tested frequency</b>
Carrier frequency separation	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting Hopping OFF (DH5/3DH5)/Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Hopping ON), Payload: PRBS9 -DH1, -DH3, -DH5 -3DH1, -3DH3, -3DH5 ----- -Inquiry	-
Maximum peak output power	Transmitting (Hopping OFF), Payload: PRBS9 -DH5, -2DH5, -3DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Conducted)	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
(Radiated)	Transmitting (DH5/3DH5), Payload: PRBS9	Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	2402MHz, 2441MHz, 2480MHz

\*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test).

\*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.  
However, the limit level 125mWof AFH mode was used for the test.

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

Power settings: Fixed (The setting is not controlled by the software and it is equivalent to that of mass-produced items.)

Software: BT Test Mode FW\_S Version 1.00

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

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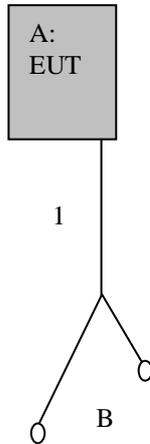
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## 4.2 Configuration of tested system



\* Test data was taken under worse case conditions.

### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Media Player	NWZ-S764	*1) 002 *2) 001	Sony	EUT
B	Headphone	MDR-EX083LP	0001	Sony	-

\*1) Used for Spurious emissions tests (Radiated)

\*2) Used for Antenna Terminal Conducted tests

### List of cables used \*3)

No.	Item	Length(m)	Shield		Remarks
			Cable	Connector	
1	Headphone	1.1	Unshielded	Unshielded	-

\*3) All cables used for the measurement are exclusive use or marketed.

\* WM-PORT Jack: USB conversion cable was not connected during the test. When the cable is connected, Bluetooth function is not able to be used.

## **SECTION 5: Carrier frequency separation**

### **Test procedure**

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 2

## **SECTION 6: 20dB 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 7: Number of hopping frequency**

### **Test procedure**

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 2

## **SECTION 8: Dwell time**

### **Test procedure**

The Dwell time 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: Spurious 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.

In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

Summary of the test results: Pass  
Refer to APPENDIX 2

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## **SECTION 11: Radiated emission**

### **11.1 Operating environment**

The test was carried out in No.1 and 3 Semi-Anechoic Chamber.

Temperature : See test data (APPENDIX 2)  
Humidity : See test data (APPENDIX 2)

### **11.2 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 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.

### **11.3 Test conditions**

Frequency range : 30MHz to 25GHz  
Test distance : 3m (below 13GHz) / 1m (above 13GHz)  
EUT position : Table top

### **11.4 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). 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 and Spectrum Analyzer.

Frequency	:	30-1000MHz	1000-25000MHz	
Detection Type	:	Quasi-Peak	Peak	* Average
IF Bandwidth	:	120kHz	RBW:1MHz/VBW:3MHz	RBW:1MHz/VBW:See data

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

\* The VBW was based on the inverse of the duty cycle (Refer to Appendix 2).

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.

Worst position:

	Horizontal	Vertical
Below 1GHz	X	X
Above 1GHz	X	Z

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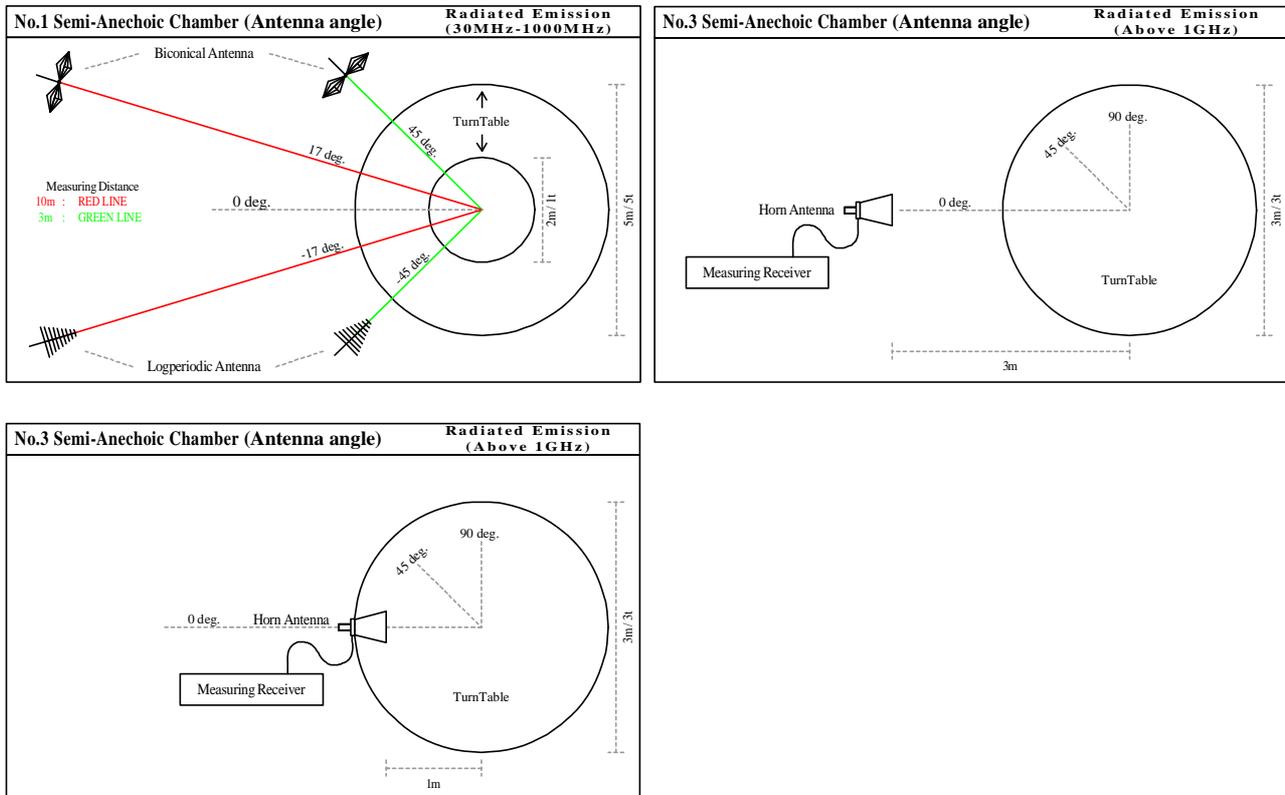
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Figure 1. Antenna angle



## 11.5 Band edge

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

## 11.6 Results

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

## **Contents of appendixes**

### **APPENDIX 1: Photographs of test setup**

Radiated emission  
Pre-check of the worst position

### **APPENDIX 2: Test data**

20dB bandwidth and Carrier frequency separation  
Number of hopping frequency  
Dwell time  
Maximum peak output power  
Spurious emission (Antenna port conducted)  
Radiated emission  
99% Occupied bandwidth

### **APPENDIX 3: Test instruments**

Test instruments

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