



# RADIO TEST REPORT

Test Report No. : 28DE0276-HO-02-A

Applicant : Sony Corporation  
Type of Equipment : Digital Media Player  
Model No. : NWZ-A826  
FCC ID : AK8NWZA820  
Test standard : FCC Part 15 Subpart C 2007  
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.

Date of test: December 16, 2007 to January 7, 2008

Tested by:

  
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NVLAP LAB CODE: 200572-0

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MF060b (18.06.07)

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## **SECTION 1: Customer information**

Company Name : Sony Corporation  
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108-6201 Japan  
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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 Media Player  
Model No. : NWZ-A826  
Serial No. : 1) 0000371 (Used for Antenna Terminal Conducted test)  
2) 0000370 (Used for Spurious emissions (Radiated) test)  
Country of Manufacture : Malaysia  
Rating : DC3.7V  
Receipt Date of Sample : December 5, 2007  
Condition of EUT : Engineering Prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No modification by this test lab

### **2.2 Product Description**

Model No: NWZ-A826, referred as the EUT in this report, is the Digital Media Player.  
The EUT has variant models, NWZ-A826(4GB), NWZ-A828(8GB), NWZ-A829(16GB). The differences in 3 models are a memory capacity and supplied accessory only.

Clock Frequencies are USB IC:12MHz, Micom Clock:11.2896MHz, Clock IC:32.768kHz, Bluetooth IC:26MHz.

#### **Bluetooth (Ver. 2.0 + EDR)**

Equipment Type : Transceiver  
Frequency of Operation : 2400-2483.5MHz  
Type of Modulation : FHSS  
Bandwidth & Channel spacing : 1MHz & 1MHz  
ITU code : 1M00FXD(DH5) / 1M00GXD(3DH5)  
Power Supply (inner) : DC1.8V  
Antenna Type : Chip Helical Antenna  
Antenna Gain : 2.0dBi  
Method of Frequency Generation : Synthesizer  
Mode of operation : Half Duplex  
Operating Temperature : 5 deg. C. to 35 deg. C.

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### **SECTION 3: Test specification, procedures & results**

#### **3.1 Test Specification**

Test Specification : FCC Part15 Subpart C: 2007  
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

#### **FCC 15.31 (e)**

The EUT is constantly provided with voltage (DC1.8V) from the built-in Battery, so the testing was performed with DC3.7V only. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203 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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### 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	FCC: Section 15.207	-	N/A	N/A	N/A *1)
		IC: RSS-Gen 7.2.2	IC: RSS-Gen 7.2.2				
2	Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(a)(1)	Conducted	N/A	See data.	Complied
		IC: -	IC: RSS-210 A8.1 (b)				
3	20dB Bandwidth	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(a)(1)	Conducted	N/A		Complied
		IC: -	IC: RSS-210 A8.1 (a)				
4	Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(a)(1)(iii)	Conducted	N/A		Complied
		IC: -	IC: RSS-210 A8.1 (d)				
5	Dwell time	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(a)(1)(iii)	Conducted	N/A		Complied
		IC: -	IC: RSS-210 A8.1 (d)				
6	Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(b)(1)	Conducted	N/A	Complied	
		IC: RSS-Gen 4.8	IC: RSS-210 A8.4 (2)				
7	Band Edge Compliance	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(d)	Conducted	N/A	Complied	
		IC: -	IC: RSS-210 A8.5				
8	Spurious Emission	FCC: FCC Public Notice DA 00-705	FCC: Section 15.247(d)	Conducted/ Radiated	N/A	Complied	
		IC: RSS-Gen 4.9 RSS-Gen 4.10	IC: RSS-210 A8.5 RSS-Gen 7.2.1 and 7.2.3				

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

\*1) The test is not applicable since the EUT cannot be in the Bluetooth transmitting mode by its specification, when the EUT is connected with the power line. As for the Conducted Emission test at the power line (USB line) connection mode, please see UL Japan Test Report No. 28DE0276-HO-02-C.

\*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	±4.4dB	±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

#### 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)**

The mode used for test :

<b>Test</b>	<b>Operating mode</b>	<b>Tested frequency</b>
Carrier Frequency Separation	Bluetooth Transmitting (Tx) (Hopping on)	2402MHz
	-DH5	2441MHz
	-3DH5	2480MHz
	- Inquiry	2441MHz
20dB Bandwidth	Bluetooth Transmitting (Tx) (Hopping off)	2402MHz
	-DH5	2441MHz
	-3DH5	2480MHz
	- Inquiry	2441MHz
Number of Hopping Frequency	Bluetooth Transmitting (Tx) (Hopping on)	-
	-DH5	
	-3DH5	
	-Inquiry	
Dwell time	Bluetooth Transmitting (Tx) (Hopping on)	-
	-DH1	
	-DH3	
	-DH5	
	-Inquiry	
	-3DH1	
Maximum Peak Output Power	Bluetooth Transmitting (Tx) (Hopping off)	2402MHz
	-DH5	2441MHz
	-2DH5	2480MHz
	-3DH5	
	- Inquiry	2441MHz
Spurious emission (Radiated/ Conducted)	Bluetooth Transmitting (Tx), (Hopping off)	2402MHz
	-DH5	2441MHz
	-3DH5	2480MHz
	Bluetooth Receiving (Rx)	2441MHz
Band Edge compliance (Conducted)	Bluetooth Transmitting (Tx) (Hopping off)	2402MHz
	-DH5	2480MHz
	-3DH5	
	Bluetooth Transmitting (Tx) (Hopping on)	-
(Radiated)	-DH5	
	-3DH5	
	Bluetooth Transmitting (Tx) (Hopping off)	2402MHz
99% Occupied Bandwidth	-DH5	2480MHz
	-3DH5	
	Bluetooth Transmitting (Tx) (Hopping on)	-
	-DH5	
	-3DH5	
	Bluetooth Transmitting (Tx) (Hopping off)	2402MHz
-DH5	2441MHz	
-3DH5	2480MHz	

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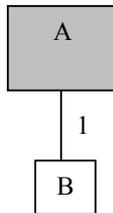
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As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test)

**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 125mW of AFH mode was used due to the overlap of the bandwidth.

#### 4.2 Configuration and peripherals



\* Cabling and setup 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	Remark
A	Digital Media Player	NWZ-A826	1) 0000371 2) 0000370	SONY	EUT
B	Earphone	MDR-EX082	-	SONY	-

- 1) Used for Antenna Terminal Conducted test  
2) Used for Spurious emissions (Radiated) test

#### List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Earphone Cable	1.5	Unshielded	Unshielded

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**SECTION 5: Spurious Emission**

**[Conducted]**

**Test Procedure**

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.  
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**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, 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
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

- 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.

**Test data** : APPENDIX 2  
**Test result** : Pass

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## **SECTION 6: 20dB Bandwidth**

### **Test Procedure**

The 20dB bandwidth was measured with a spectrum analyzer connected to the antenna port.  
The following spectrum analyzer setting was used:

- Span: 3MHz
- RBW: 30kHz
- VBW: 30kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data** : APPENDIX 2  
**Test result** : Pass

## **SECTION 7: 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.

**Test data** : APPENDIX 2  
**Test result** : Pass

## **SECTION 8: Carrier Frequency Separation**

### **Test Procedure**

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

- Span: 3MHz
- RBW: 100kHz
- VBW: 300kHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data** : APPENDIX 2  
**Test result** : Pass

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## **SECTION 9: Number of Hopping Frequency**

### **Test Procedure**

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

- Span: 30MHz
- RBW: 300kHz
- VBW: 1MHz
- Sweep: Auto
- Detector: Peak
- Trace: Max Hold

**Test data** : APPENDIX 2  
**Test result** : Pass

## **SECTION 10: Dwell time**

### **Test Procedure**

The Dwell time was measured with a spectrum analyzer connected to the antenna port.  
The following spectrum analyzer setting was used:

- Span: Zero Span
- RBW: 1MHz
- VBW: 1MHz
- Sweep: as necessary to capture the entire dwell time per hopping channel
- Detector: function peak
- Trace: Max Hold

**Test data** : APPENDIX 2  
**Test result** : Pass