



# RADIO TEST REPORT

Test Report No. : 27LE0018-HO-A

Applicant : Sony Corporation  
Type of Equipment : Bluetooth Audio System  
Model No. : MEX-BT2600  
FCC ID : AK8MEXBT2600  
Test standard : FCC Part 15 Subpart C 2007  
Section 15.207, Section 15.247  
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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:

August 21 and 22, 2007

Tested by:

Hidekazu Tanaka  
EMC Services

Tomotaka Sasagawa  
EMC Services

Approved by :

Hironobu Shinoji  
Assistant Manager of  
EMC Services



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.  
\*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://uljapan.co.jp/emc/nvlap.htm>

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b (18.06.07)

<b>CONTENTS</b>	<b>PAGE</b>
<b>SECTION 1: Client information</b> .....	<b>3</b>
<b>SECTION 2: Equipment under test (E.U.T.)</b> .....	<b>3</b>
<b>SECTION 3: Test specification, procedures &amp; results</b> .....	<b>4</b>
<b>SECTION 4: Operation of E.U.T. during testing</b> .....	<b>8</b>
<b>SECTION 6: Spurious Emission</b> .....	<b>11</b>
<b>SECTION 7: Bandwidth</b> .....	<b>12</b>
<b>SECTION 8: Maximum Peak Output Power</b> .....	<b>12</b>
<b>SECTION 9: Carrier Frequency Separation</b> .....	<b>12</b>
<b>SECTION 10: Number of Hopping Frequency</b> .....	<b>12</b>
<b>SECTION 11: Dwell time</b> .....	<b>12</b>
<b>APPENDIX 1: Photographs of test setup</b> .....	<b>13</b>
<b>Spurious Emission (Radiated)</b> .....	<b>13</b>
<b>APPENDIX 2: Data of EMI test</b> .....	<b>14</b>
<b>Carrier Frequency Separation</b> .....	<b>14</b>
<b>20dB Bandwidth</b> .....	<b>16</b>
<b>Number of Hopping Frequency</b> .....	<b>18</b>
<b>Dwell time</b> .....	<b>20</b>
<b>Maximum Peak Output Power</b> .....	<b>23</b>
<b>Radiated Spurious Emission (below 1GHz)</b> .....	<b>24</b>
<b>Radiated Spurious Emission (above 1GHz)</b> .....	<b>28</b>
<b>Conducted Spurious Emission</b> .....	<b>32</b>
<b>99% Occupied Bandwidth</b> .....	<b>37</b>
<b>APPENDIX 3: Test instruments</b> .....	<b>38</b>

## **SECTION 1: Client information**

Company Name : Sony Corporation  
Address : 1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan  
Telephone Number : +81-3-5769-5650  
Facsimile Number : +81-3-5769-5085  
Contact Person : Kengo Nakamura

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

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

Type of Equipment : Bluetooth Audio System  
Model No. : MEX-BT2600  
Serial No. : 11  
Rating : DC12V  
Country of Manufacture : Thailand  
Receipt Date of Sample : July 31, 2007  
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: MEX-2600 (referred to as the EUT in this report) is the Bluetooth Audio System.

Clock frequency(ies) in the system : 32.768MHz, 18.432MHz, 20.5MHz, 12MHz, 16.9344MHz

#### [Bluetooth Specification]

Equipment Type : Transceiver  
Frequency of Operation : 2402-2480MHz  
Bandwidth & Channel Spacing : 1MHz & 1MHz  
Modulation : FHSS  
Power Supply (inner) : DC 3.3V  
Antenna Type : Mono-pole antenna (PWB pattern antenna)  
Antenna Connector Type : MHF(I-PEX)  
Antenna Gain : -0.98dBi

---

## **UL Japan, Inc.**

### **Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### **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)**

This EUT provides stable voltage(DC3.3V) constantly to RF Module regardless of input voltage. 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.

---

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### 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: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(a)(1)	Conducted	N/A	See data.	Complied						
		IC: -	IC: RSS-210 A8.1 (b)										
3	20dB Bandwidth	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(a)(1)	Conducted	N/A			See data.	Complied				
		IC: -	IC: RSS-210 A8.1 (a)										
4	Number of Hopping Frequency	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(a)(1)(iii)	Conducted	N/A					See data.	Complied		
		IC: -	IC: RSS-210 A8.1 (d)										
5	Dwell time	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(a)(1)(iii)	Conducted	N/A							See data.	Complied
		IC: -	IC: RSS-210 A8.1 (d)										
6	Maximum Peak Output Power	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(b)(1)	Conducted	N/A	See data.	Complied						
		IC: RSS-Gen 4.8	IC: RSS-210 A8.4 (2)										
7	Band Edge Compliance	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(d)	Conducted	N/A			See data.	Complied				
		IC: -	IC: RSS-210 A8.5										
8	Spurious Emission	FCC: ANSI C63.4:2003 13. Measurement of intentional radiators	FCC: Section15.247(d)	Conducted/ Radiated	N/A					See data.	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 EUT is a DC drive device installed on vehicles and is not connected with AC power line.

\*These tests were also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

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

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### 3.3 Addition to standards

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

### 3.4 Uncertainty

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

#### Spurious Emission (Radiated)

The measurement uncertainty for this test using Biconical antenna is  $\pm 4.59\text{dB}(3\text{m})$ .

The measurement uncertainty for this test using Logperiodic antenna is  $\pm 4.62\text{dB}(3\text{m})$ .

The measurement uncertainty for this test using Horn antenna is  $\pm 5.27\text{dB}$ .

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  $\pm 3.0\text{dB}$ .

---

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### 3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. \*NVLAP Lab. code: 200572-0

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	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	-

\* 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.

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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

### **4.1 Operating Modes**

The mode used for test :

<b>Test</b>	<b>Mode</b>	<b>Tested frequency</b>
Carrier Frequency Separation	Transmitting (Tx)(Hopping ON)/Inquiry	2402MHz 2441MHz 2480MHz
20dB Bandwidth Maximum Peak Output Power	Transmitting (Tx)(Hopping Off)/Inquiry	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Transmitting (Tx)(Hopping ON)/Inquiry	-
Dwell time	Transmitting (Tx)(Hopping ON)/Inquiry -DH1 -DH3 -DH5	-
Suprious Emission (Conducted/Radiated)	Transmitting (Tx), DH5	2402MHz 2441MHz 2480MHz
	Receiving (Rx), DH5	2441MHz
Band Edge Compliance (Conducted)	Transmitting (Tx), DH5 -Hopping ON -Hopping OFF	2402MHz 2480MHz
	(Radiated)	2402MHz 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.

**UL Japan, Inc.**

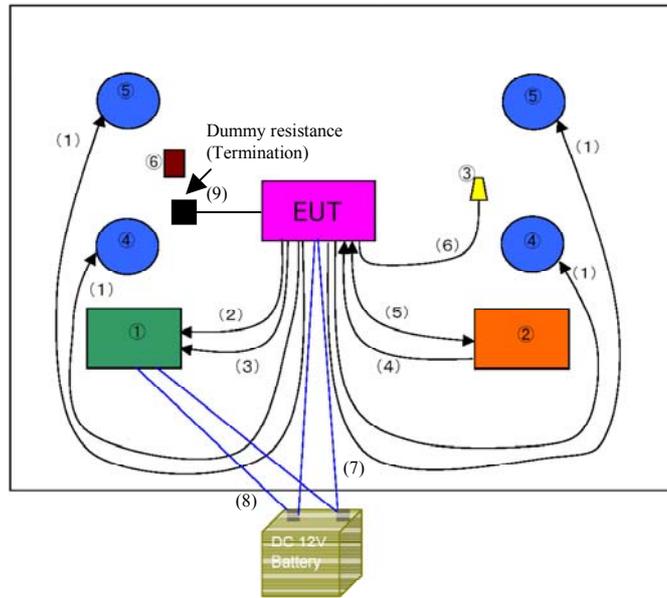
**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals



\* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

**Description of EUT**

No.	Item	Model number	Serial number	Manufacturer
EUT	Bluetooth Audio System	MEX-BT2600	11	SONY

**Support equipment**

No.	Item	Model number	Serial number	Manufacturer	Remark
①	Stereo Power Amplifier	XM-423SL	0020316	SONY	-
②	CD Changer	CDX-T67	22634	SONY	-
③	Wired Remote controller	RM-X4S	-	SONY	-
④	Speaker 1	XS-F1611	-	SONY	-
⑤	Speaker 2	1-544-814-31	-	AIWA	-
⑥	Remote Controller with Infrared rays	RM-X304	-	SONY	-

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**List of cables used**

No.	Name	Length (m)	Shield (Cable)	Shield (Connector)
(1)	Speaker Cable	2.0	Unshielded	Unshielded
(2)	Audio Cable	5.2	Unshielded	Unshielded
(3)	Audio Cable	5.2	Unshielded	Unshielded
(4)	Audio Cable	5.5	Unshielded	Unshielded
(5)	Bus Cable	5.0	Shielded	Shielded
(6)	Cable for Wired remote controller	2.0	Unshielded	Unshielded
(7)	DC Cable	2.0	Unshielded	Unshielded
(8)	DC Cable	2.4	Unshielded	Unshielded
(9)	Aux Cable	1.8	Unshielded	Unshielded

---

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

**SECTION 6: Spurious Emission**

**[Conducted]**

**Test Procedure**

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

**Test data : APPENDIX 2**

**Test result : Pass**

**[Radiated]**

**Test Procedure**

EUT was placed on a urethane platform of nominal size, 1.5m by 1.0m, 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 test was made on EUT at the normal use position.

As for the setup, it was also confirmed that the EUT was centered laterally and its rear was flushed with the rear of the table.

**Test data : APPENDIX 2**

**Test result : Pass**

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

## **SECTION 7: Bandwidth**

### **Test Procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

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.

Test data : APPENDIX 2  
Test result : Pass

## **SECTION 9: Carrier Frequency Separation**

### **Test Procedure**

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

Test data : APPENDIX 2  
Test result : Pass

## **SECTION 10: Number of Hopping Frequency**

### **Test Procedure**

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

Test data : APPENDIX 2  
Test result : Pass

## **SECTION 11: Dwell time**

### **Test Procedure**

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2  
Test result : Pass