



# RADIO TEST REPORT

**Test Report No.: 31IE0008-SH-01-A-R1**

**Applicant** : Sony Corporation  
**Type of Equipment** : FM/AM Digital Media Player  
**Model No.** : DSX-S310BTX  
**FCC ID** : AK8DSXS310BT  
**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 test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This report is a revised version of 31IE0008-SH-01-A. 31IE0008-SH-01-A is replaced with this report.

**Date of test:** April 7 to 10, 2011

**Tested by:**   
\_\_\_\_\_  
Kenichi Adachi  
Engineer of WiSE Japan, UL Verification  
Service

**Approved by :**   
\_\_\_\_\_  
Ichiro Isozaki  
Leader of WiSE Japan, UL  
Verification Service

- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
 There is no testing item of "Non-accreditation".



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13-EM-F0429

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**SECTION 1: Customer information**

Company Name : Sony Corporation  
 Brand Name : SONY  
 Address : 1-7-1 Konan, Minato-ku, Tokyo, 108-0075, Japan  
 Telephone Number : +81-03-5769-5650  
 Facsimile Number : +81-03-5769-5085  
 Contact Person : Kazunaga Kinjo

**SECTION 2: Equipment under test (E.U.T.)****2.1 Identification of E.U.T.**

Type of Equipment : FM/AM Digital Media Player  
 Model Number : DSX-S310BTX  
 Serial Number : 62  
 Rating : DC 12V (Car Battery)  
 Country of Manufacture : Thailand  
 Condition of EUT : Engineering prototype  
 (Not for Sale: This sample is equivalent to mass-produced items.)  
 Receipt Date of Sample : April 4, 2011  
 Modification of EUT : The test lab did not make the modification to the EUT supplied from the customer to have it pass the tests.

**2.2 Product description**

Model: DSX-S310BTX (referred to as the EUT in this report) is a FM/AM Digital Media Player.  
 The clock frequencies used in EUT: 24MHz (for Radio part), 32.768kHz, 4MHz, 7.92MHz, 12MHz, 16.934MHz.

## &lt;Radio part&gt;

Equipment type : Transceiver  
 Frequency of operation : 2402MHz to 2480MHz  
 Radio part clock frequency : 24MHz  
 Bandwidth & channel spacing : 79MHz & 1MHz  
 Type of modulation : FHSS (BDR: GFSK, EDR(2Mbps): pi/4DQPSK, EDR(3Mbps):8DPSK )  
 Antenna type : Monopole antenna  
 Antenna connector type : U.FL connector  
 Antenna gain : -2.90dBi (Peak), -7.33dBi (Average)  
 ITU code : F1D (BDR) / G1D (EDR)  
 Operating Voltage (Radio part) : DC 3.3V  
 Operation temperature range : -20deg.C. to +60deg.C.  
 RF Output Power : 2.5mW or less (at antenna terminal port)  
 RF Output Power Limit : 125 mW (at antenna terminal port) (Refer to Section 3.2)

## FCC 15.31 (e)

The equipment provides the Bluetooth transmitter with stable power supply (DC 3.3 V), therefore, the equipment complies power supply regulation.

## FCC Part15.203

The equipment and its antenna comply with this requirement since this antenna is built in the equipment and it cannot be replaced by end users.

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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 Part 15 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

#### 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 Section 15.207	-	N/A	-	N/A *1)	
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (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 Section 15.247 (a)(1)	Conducted	N/A		Complied	
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.247 (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 Section 15.247 (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 Section 15.247 (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 Section 15.247 (d) Section 15.209	Conducted/ Radiated	N/A		3.9dB (33.824MHz, QP, Vertical, (BDR, Tx 2402MHz) )	Complied

Note: UL Japan's EMI Work Procedures No.13-EM-W420 and 13-EM-W422.

These tests were also referred to "FCC Public Notice DA00-705".

\*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line (used battery).

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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	-	N/A *2)
Note: UL Japan's EMI Work Procedures No.13-EM-W420 and 13-EM-W422. *2) This test is no limit.					

\* 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)	30MHz-300MHz	4.7 dB	4.5 dB	4.7 dB
	300MHz-1GHz	4.5 dB	4.6 dB	4.6 dB
	1GHz-18GHz	3.9 dB	3.9 dB	4.0 dB
	18GHz-26.5GHz	4.4 dB	4.4 dB	4.4 dB
<b>Radiated emission</b> (Measurement distance: 1m)	1GHz-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 meets the limits unless the uncertainty is taken into consideration.

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

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

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

Conducted emissions, Power Density 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

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**

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

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

\*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 payload. (except Dwell time test)

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

Device driver: CSR BlueCore Bluetooth (for USB) (include "CSR Blue Suite Casira v1.24")

Test Software: CSR BlueSuite BlueTest (include "CSR Blue Suite Casira v1.24")

CSR BlueSuite BtCliCtrl (include "CSR Blue Suite Casira v1.24") (Inquiry mode only)

Power settings: BDR: Ext.=0, Int.=44

EDR: Ext.=0, Int.=48

\*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.

\*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.

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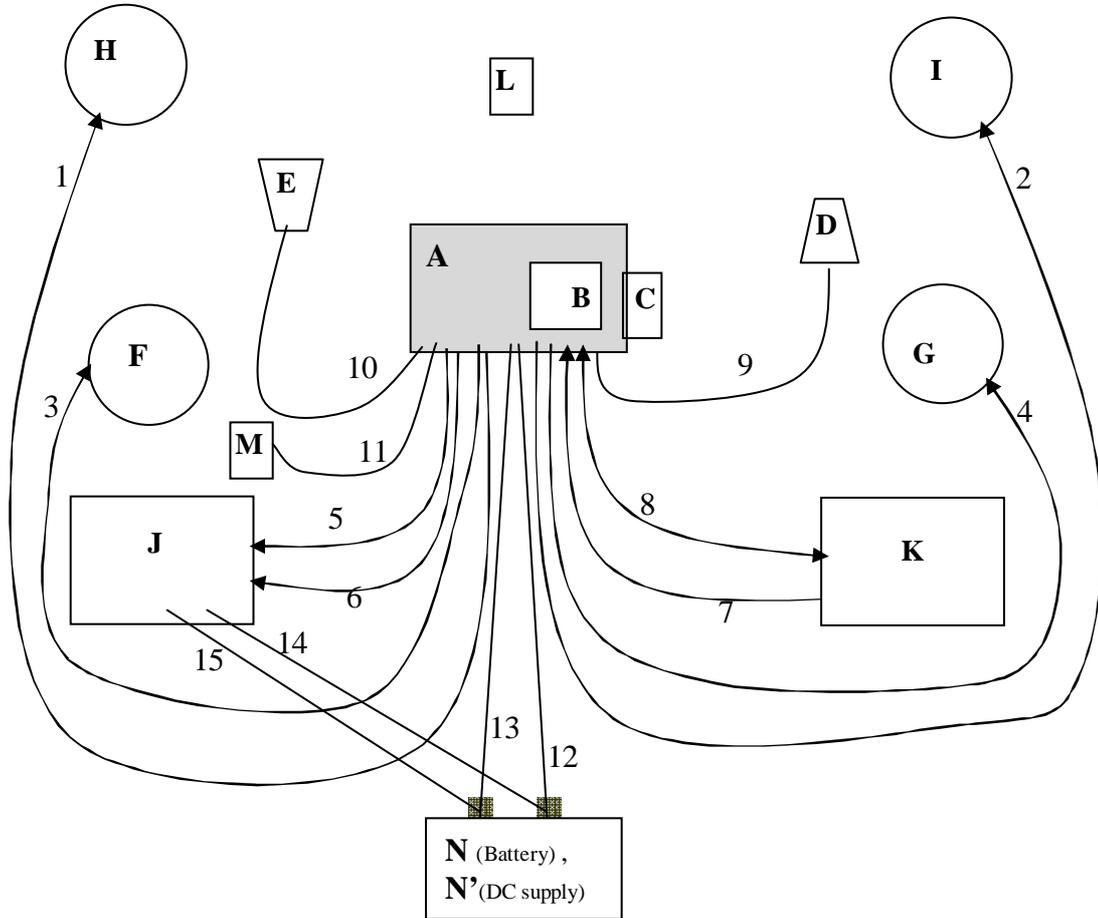
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4.2 Configuration of tested system



Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks	FCC ID
A	FM/AM Digital Media Player	DSX-S310BTX	62	SONY	EUT	AK8DSXS310BT
B	iPod nano	A1320	YM005VWJ71Y	Apple	-	-
C	USB memory	USM64D	B05019AB	SONY	-	-
D	Wired remote controller	RM-X4S	-	SONY	-	-
E	External microphone	XC-MA10	-	SONY	-	-
F	Speaker	XS-F1611	-	SONY	-	-
G	Speaker	XS-F1611	-	SONY	-	-
H	Speaker	1-544-814-31	-	AIWA	-	-
I	Speaker	1-544-814-31	-	AIWA	-	-
J	Stereo Power Amplifier	XM-423SL	0020316	SONY	-	-
K	CD changer	CDX-T67	22634	SONY	-	-
L	Remote controller	RMX306	No.7	SONY	-	-
M	Terminator (75ohm)	-	-	-	-	-
N	Car Battery	38B19L	-	GS YUASA	-	-
N'	DC power supply	PAN35-10A	ML002085	Kikusui	-	-

\*1) DC power supply (Model No.: PAN35-10A) was used for DC 12.0V input.

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**List of cables used**

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Speaker	2.0	Unshielded	Unshielded	-
2	Speaker	2.0	Unshielded	Unshielded	-
3	Speaker	2.0	Unshielded	Unshielded	-
4	Speaker	2.0	Unshielded	Unshielded	-
5	Audio	5.2	Shielded	Unshielded	-
6	Audio	5.2	Shielded	Unshielded	-
7	Audio	5.5	Shielded	Unshielded	-
8	Bus	5.0	Shielded	Shielded	-
9	Wired remote controller	2.0	Unshielded	Unshielded	-
10	External microphone	0.26	Shielded	Unshielded	-
11	FM/AM antenna	3.0	Shielded	Shielded	-
12	DC (+)	3.0	Unshielded	Unshielded	-
13	DC (-)	3.0	Unshielded	Unshielded	-
14	DC (+)	2.0	Unshielded	Unshielded	-
15	DC (-)	2.0	Unshielded	Unshielded	-

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## **SECTION 5: Radiated emission**

### **5.1 Operating environment**

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

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 to prevent the reflection influence. The configuration was set in accordance with ANSI C63.4: 2003.

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.

### **5.3 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

### **5.4 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	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer *1)
Detector IF bandwidth	QP: BW 120kHz	PK: RBW: 1MHz VBW: 3MHz, AV RBW: 1MHz VBW: *2) (Pulse noise) 10Hz (No pulse noise)

\*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

\*2) Used for the band edge of the harmonics that can be measured. The VBW is based on the inverse of the duty cycle (Refer to the data).

The EUT was tested in the direction normally used.

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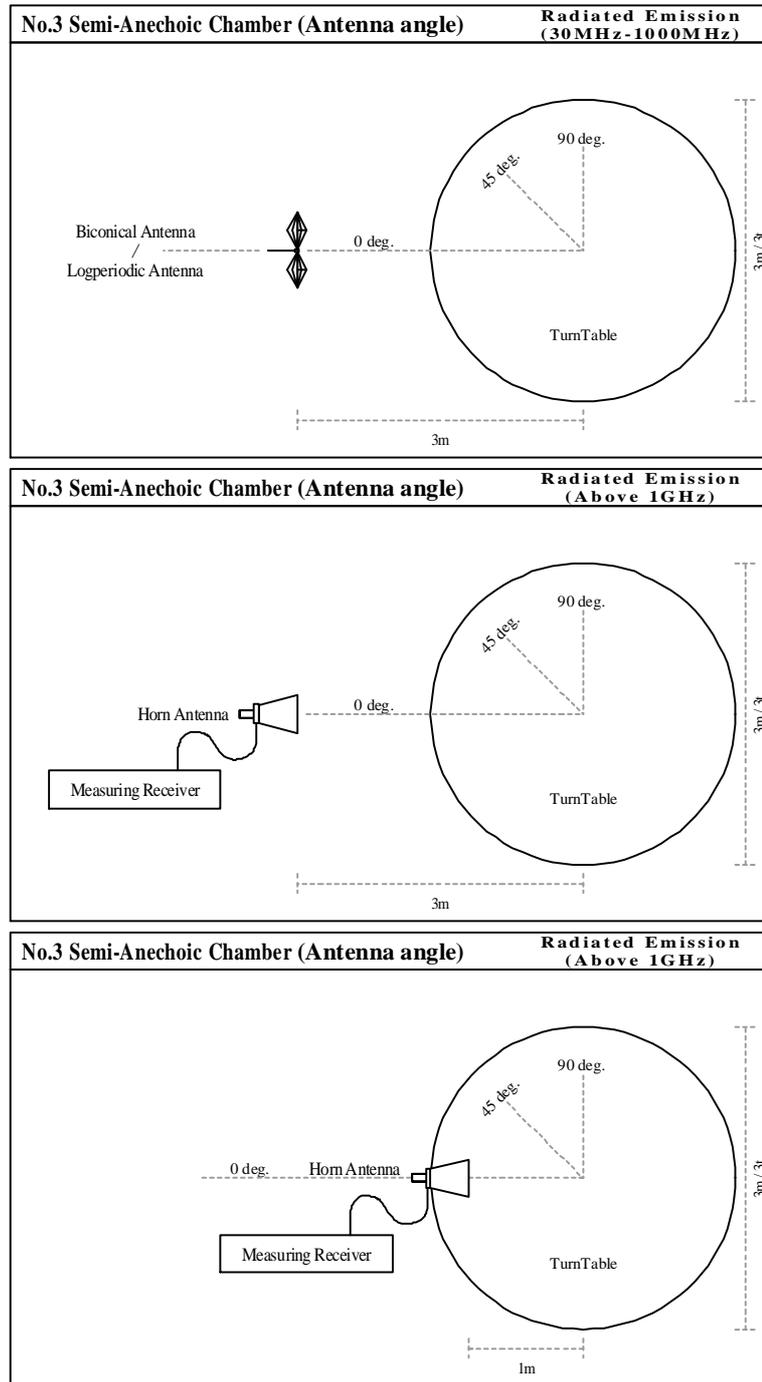
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Figure 1. Antenna angle



### 5.5 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 (Radiated and 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.

### 5.6 Results

summary of the test results : Pass \*No noise was detected above the 5<sup>th</sup> order harmonics.  
Refer to APPENDIX 2

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## **SECTION 6: 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.

\*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

## **SECTION 7: 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 8: 20dB bandwidth & Occupied bandwidth (99%)**

### **Test procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port. The channel separation in Hopping mode and Inquiry mode was separated by 25kHz and 2/3 of the 20dB bandwidth.

Summary of the test results: Pass  
Refer to APPENDIX 2

## **SECTION 9: 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 10: 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 11: 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

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