




# RADIO TEST REPORT


**Test Report No.:** 32FE0185-SH-01-A

**Applicant** : PIONEER CORPORATION  
**Type of Equipment** : Receiver Ass'y  
**Model No.** : DEH-8328  
**FCC ID** : AJDK052  
**Test regulation** : FCC Part15 Subpart C: 2012  
**Test result** : Complied

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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

**Date of test:** February 16 to 20, 2012

**Tested by:**   
Akiyo 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



**Contents**

	<b><u>Page</u></b>
<b>SECTION 1: Customer information .....</b>	<b>4</b>
<b>SECTION 2: Equipment under test (E.U.T.) .....</b>	<b>4</b>
<b>SECTION 3: Test specification, procedures &amp; results .....</b>	<b>6</b>
<b>SECTION 4: Operation of E.U.T. during testing.....</b>	<b>9</b>
<b>SECTION 5: Carrier frequency separation.....</b>	<b>12</b>
<b>SECTION 6: 20dB bandwidth &amp; Occupied bandwidth (99%) .....</b>	<b>12</b>
<b>SECTION 7: Number of hopping frequency .....</b>	<b>12</b>
<b>SECTION 8: Dwell time .....</b>	<b>12</b>
<b>SECTION 9: Maximum peak output power .....</b>	<b>12</b>
<b>SECTION 10: Spurious emissions (Antenna port conducted).....</b>	<b>12</b>
<b>SECTION 11: Radiated emission.....</b>	<b>13</b>
<b>Contents of APPENDIXES.....</b>	<b>15</b>
<b>APPENDIX 1: Data of radio tests .....</b>	<b>16</b>
<b>APPENDIX 2: Test instruments .....</b>	<b>54</b>
<b>APPENDIX 3: Photographs of test setup .....</b>	<b>55</b>

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## **SECTION 1: Customer information**

Company Name : PIONEER CORPORATION  
Brand name : Pioneer  
Address : 25-1 Aza-Nishi-machi, Yamada, Kawagoe-shi, Saitama, 350-8555, JAPAN  
Telephone Number : +81-49-228-6415  
Facsimile Number : +81-49-228-6493  
Contact Person : Makoto Kaieda

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

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

Type of Equipment : Receiver Ass'y  
Model No. : DEH-8328  
Serial No. : See Section 4  
Rating : DC 12.0V  
Country of Mass-production : Thailand / Japan  
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 : February 10, 2012

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## 2.2 Product description

Model: DEH-8328 (referred to as the EUT in this report) is a Receiver Ass'y.

### Clock Frequency:

	Part No.	usage	block	Frequency	note
AUDIO	TEF6638	DSP Tuner IC (HERO)	Oscillator	62.4MHz	
			Audio DP	225MHz	
			Tuner DCO	5.3-6.2GHz	It depends on FM,AM tuning frequency
	R5S726B	System Micro Computer (SH726B)	Oscillator	12MHz	
			CPU	216MHz	
			BUS	72MHz	
			I/O	36MHz	
	BD9781HFP	DCDC Converter(5.15V)	Switching frequency	450kHz or 500kHz	It depends on AM tuning frequency
	CWW2850	Bluetooth Module	Oscillator	26MHz	
			Oscillator	25.8048MHz	
RF			2402-2480MHz		
CXK5847	CD Mechanical Module	Oscillator	16.93MHz		
KEYBOARD	UPD70F3340GC	Panel Micro Computer	Oscillator	4MHz	
	MXS4043	OLED Module	Oscillator	2.86MHz	
	XC9105D091MR	DCDC Converter(15.5V)	Switching frequency	100kHz	

Equipment type : Transceiver  
Frequency of operation : 2402-2480MHz  
Bandwidth & channel spacing : 1MHz  
Type of modulation : GFSK,  $\pi/4$ DQPSK, 8DPSK  
Antenna type : Pattern antenna  
Antenna gain with cable loss : +2.5dBi (max)  
Antenna connector type : None  
Operation temperature range : -30 to +85 deg.C.

### FCC 15.31 (e)

The equipment provides the Bluetooth transmitter with stable power supply (DC1.5V and DC3.3V). Therefore, the equipment complies with the requirement.

### FCC 15.203

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: 2012, final revised on February 1, 2012  
 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. The test is performed by the customer.

### **3.2 Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results	
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	-	N/A	
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A	*See data.	Complied	
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A		-	
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(1)	Conducted	N/A		Complied	
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (d) 15.209	Conducted/ Radiated	N/A		2.1dB Freq.: 75.947MHz Polarization: Horizontal Detection: Quasi-Peak Mode: Tx 2441MHz, 3DH5	Complied
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422 *1) The test is not applicable since the EUT has no AC mains.							

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### 3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	-

Note: UL Japan's 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	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	5.0 dB
	300MHz-1GHz	5.0 dB	5.2 dB	5.0 dB
	1GHz-15GHz	4.8 dB	4.8 dB	4.9 dB
<b>Radiated emission</b> (Measurement distance: 1m)	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.8 dB	4.3 dB	4.4 dB

\*1: SAC=Semi-Anechoic Chamber

\*2: SR= Shielded Room is applied besides radiated emission

#### Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

#### Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB

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 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**

<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 affect the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

\*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: HCI Tester (Version: 2.0.99)

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

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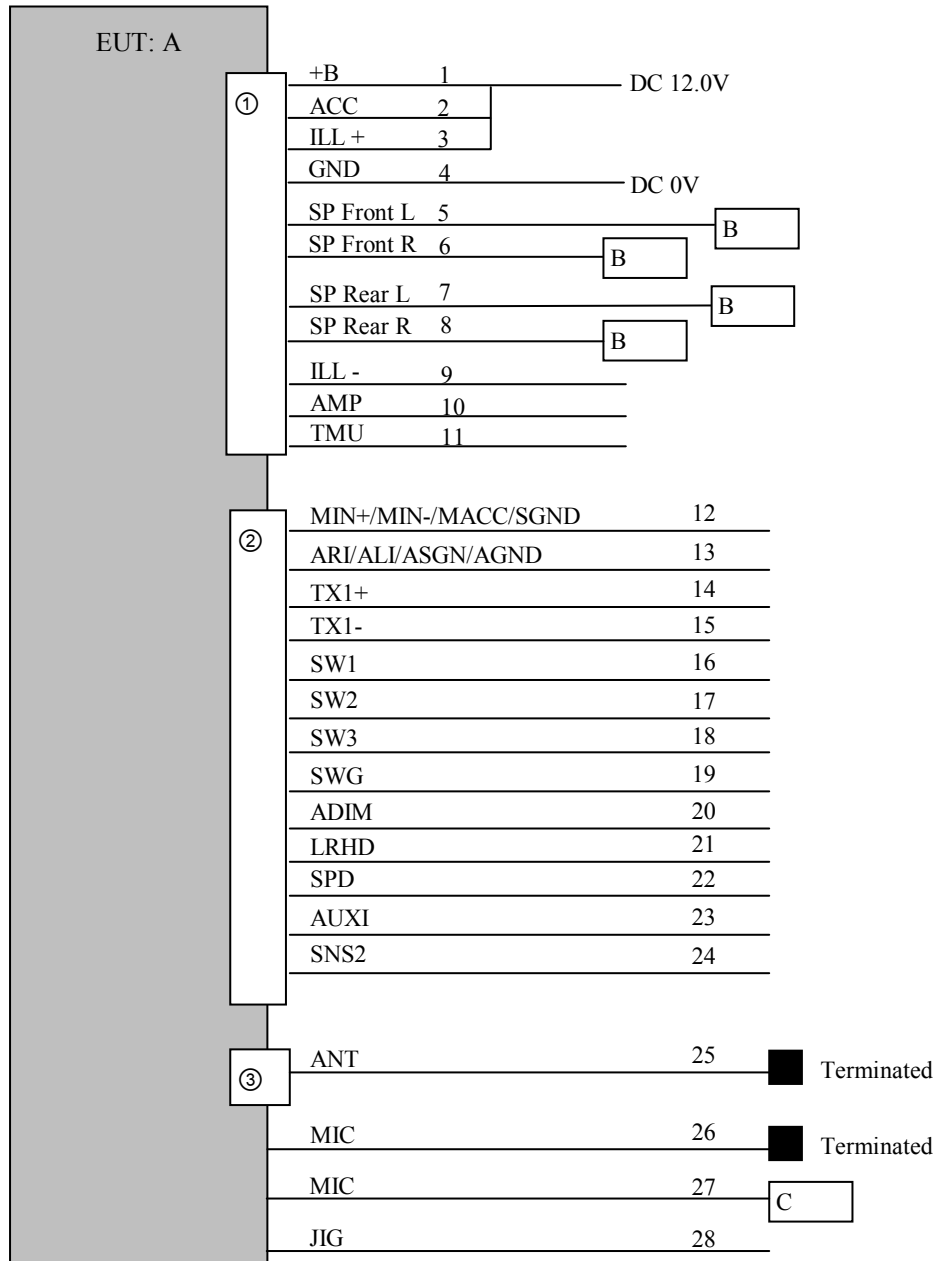
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## 4.2 Configuration of tested system



\* Test data was taken under worse case conditions.

**Description of EUT and support equipment**

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Receiver Ass'y	DEH-8328	AABB999996ES*1) AABB999995ES *2)	Pioneer	EUT
B	Speaker	LV-002	-	Listening & Visual	-
C	USB Memory	-	-	Mecel	-

\*1) Used for Antenna terminal conducted tests

\*2) Used for Radiated emission tests

**List of cables used**

No.	Cable name	Length (m)	Shield		Remark
			Cable	Connector	
1	+B	3.0 + 1.5	Unshielded	Unshielded	-
2	ACC	3.0	Unshielded	Unshielded	-
3	ILL+	3.0	Unshielded	Unshielded	-
4	GND	3.0 + 1.5	Unshielded	Unshielded	-
5	Speaker (Front-Left side)	3.0 + 3.0	Unshielded	Unshielded	-
6	Speaker (Front-Right side)	3.0 + 3.0	Unshielded	Unshielded	-
7	Speaker (Rear-Left side)	3.0 + 3.0	Unshielded	Unshielded	-
8	Speaker (Rear-Right side)	3.0 + 3.0	Unshielded	Unshielded	-
9	ILL -	3.0	Unshielded	Unshielded	-
10	AMP	3.0	Unshielded	Unshielded	-
11	TMU	3.0	Unshielded	Unshielded	-
12	MIN+/MIN-/MACC/SGND	3.0	Unshielded	Unshielded	-
13	ARI/ALI/ASGN/AGND	3.0	Unshielded	Unshielded	-
14	TX1+	3.0	Unshielded	Unshielded	-
15	TX1-	3.0	Unshielded	Unshielded	-
16	SW1	3.0	Unshielded	Unshielded	-
17	SW2	3.0	Unshielded	Unshielded	-
18	SW3	3.0	Unshielded	Unshielded	-
19	SWG	3.0	Unshielded	Unshielded	-
20	ADIM	3.0	Unshielded	Unshielded	-
21	LRHD	3.0	Unshielded	Unshielded	-
22	SPD	3.0	Unshielded	Unshielded	-
23	AUXI	3.0	Unshielded	Unshielded	-
24	SNS2	3.0	Unshielded	Unshielded	-
25	ANT	0.15	Shielded	Shielded	-
26	MIC	1.8	Shielded	Shielded	-
27	USB	3.0	Shielded	Shielded	-
28	JIG	0.9	Unshielded	Unshielded	For Bluetooth setting

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

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## **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

## **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

## **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

## **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

## **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

## **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

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## **SECTION 11: Radiated emission**

### **11.1 Operating environment**

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

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

### **11.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m 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.

### **11.3 Test conditions**

Frequency range : 30MHz to 25GHz  
Test distance : 3m (below 15GHz) / 1m (above 15GHz)  
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 15GHz) / 1m (above 15GHz) (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	30 - 1000MHz	1 - 25GHz	
Detection Type	Quasi-Peak	Peak	* Average
IF Bandwidth	120kHz	RBW:1MHz/VBW:3MHz	RBW:1MHz/VBW:10Hz

\* When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold. Although 00-705 accepts VBW=10Hz for AV measurements, confirmed that superfluous smoothing was not performed.

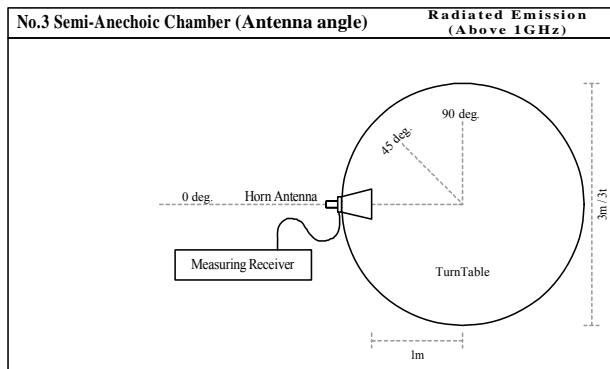
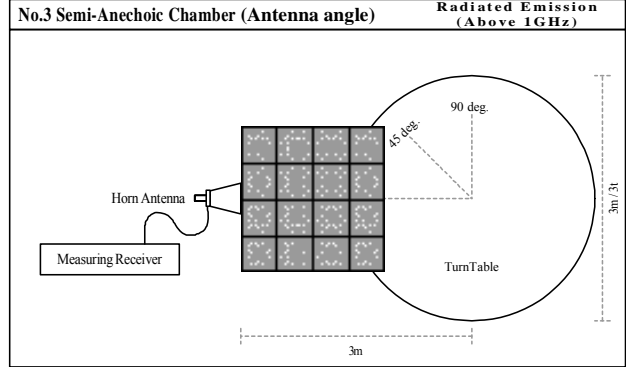
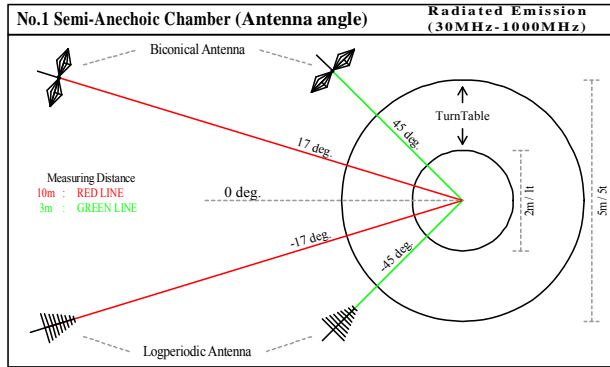
The carrier level and noise levels were fixed at angle of 30 deg. based on the product specification.

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**Figure 1. Antenna angle**



**11.5 Band edge**

Band edge level is below the limits of FCC 15.209. Refer to the data.

**11.6 Results**

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

## **Contents of APPENDIXES**

### **APPENDIX 1: Data of Radio tests**

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

### **APPENDIX 2: Test instruments**

Test instruments

### **APPENDIX 3: Photographs of test setup**

Radiated emission

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