

RADIO TEST REPORT

Test Report No.: 31EE0037-SH-01-A

Applicant : PIONEER CORPORATION
Type of Equipment : FLASH MEMORY MULTIMEDIA AV
NAVIGATION RECEIVER
Model No. : AVIC-Z130BT
FCC ID : AJDK037
Test regulation : FCC Part15 Subpart C: 2010
Test result : Complied

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Date of test: December 13 to 15, 2010

**Representative
test engineer:**



Akio Hayashi

Engineer of WiSE Japan, UL
Verification Service

Approved by :



Go Ishiwata

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SECTION 1: Customer information

Company Name : PIONEER CORPORATION
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Contact Person : Ayumu Kojima, Tetsuya Higuchi

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

2.1 Identification of E.U.T.

Type of Equipment : FLASH MEMORY MULTIMEDIA AV NAVIGATION RECEIVER
Model Number : AVIC-Z130BT
Serial Number : Refer to 4.2.
Rating : DC 14.4V
Country of Mass-production : Thailand
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : December 13, 2010
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: AVIC-Z130BT (referred to as the EUT in this report) is a FLASH MEMORY MULTIMEDIA AV NAVIGATION RECEIVER.

Clock frequency(ies) in the system : (1) System microcomputer: 15MHz
(2) CD mechanism: 27MHz
(3) FM/AM Tuner: 36.48MHz, 22.5792MHz, 59.535MHz
(4) Bluetooth: 26MHz
(5) CPU: 12MHz, 32.768kHz (42MHz, 24.576MHz, 33.23MHz, 33.3MHz)
(6) GPS: 16.367677MHz
(7) DC-DC converter: 3MHz, 1.93MHz, 750kHz, 625kHz, 500kHz, 428.571kHz, 2.31MHz, 384.6154kHz, 405.4054kHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth / Channel spacing : 79MHz & 1MHz
Type of modulation : FHSS
Antenna type : $\lambda/4$ type
Antenna connector type : I-PEX Micro coaxial
Antenna gain : 1.6dBi
ITU code : F1D, G1D
Operation temperature range : -10 to +60 deg.C.

FCC Part15.31 (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 Antenna requirement

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 October 13, 2010
 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

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 *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		Complied
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	5.6dB Freq.: 300.003MHz Detector: Quasi-Peak Polarization: Horizontal Mode: Tx 2480MHz, 3DH5	Complied

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

*1) The test is not applied 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 C63.4:2003 13. Measurement of intentional radiators, RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	Complied

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

* 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 ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.4 dB	2.7 dB	3.4 dB
	30MHz-300MHz	4.6 dB	4.5 dB	4.9 dB
	300MHz-1GHz	4.5 dB	4.6 dB	5.1 dB
	1GHz-13GHz	3.9 dB	3.9 dB	4.0 dB
Radiated emission (Measurement distance: 1m)	13GHz-18GHz	4.8 dB	4.8 dB	4.8 dB
	18GHz-40GHz	4.2 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: (±) 0.8dB

Conducted emissions Measurement (below 1GHz) uncertainty for this test was: (±) 1.1dB

Conducted emissions Measurement (1G-3GHz) uncertainty for this test was: (±) 1.2dB

Conducted emissions Measurement (3G-18GHz) uncertainty for this test was: (±) 2.9dB

Conducted emissions Measurement (18G-26.5GHz) uncertainty for this test was: (±) 3.4dB

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 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.

Operation: TEST MODE

Test item	Operating mode	Tested frequency
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) -DH1, -DH3, -DH5 -3DH1, -3DH3, -3DH5 -Inquiry	-
Maximum peak output power	Transmitting Hopping OFF, Payload: PRBS9 -DH5, -2DH5, -3DH5	2402MHz, 2441MHz, 2480MHz
Spurious emission & Band edge compliance (Conducted)	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	Spurious emission: 2402MHz, 2441MHz, 2480MHz
(Radiated)	Transmitting (DH5/3DH5), Payload: PRBS9	Band edge compliance: 2402MHz, 2480MHz
99% occupied bandwidth	Transmitting, -Hopping ON (DH5/3DH5) -Hopping OFF(DH5/3DH5) -Inquiry Payload: PRBS9	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 125mW of AFH mode was used for the test.

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

Software : CWW3197

Power Settings : 4

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

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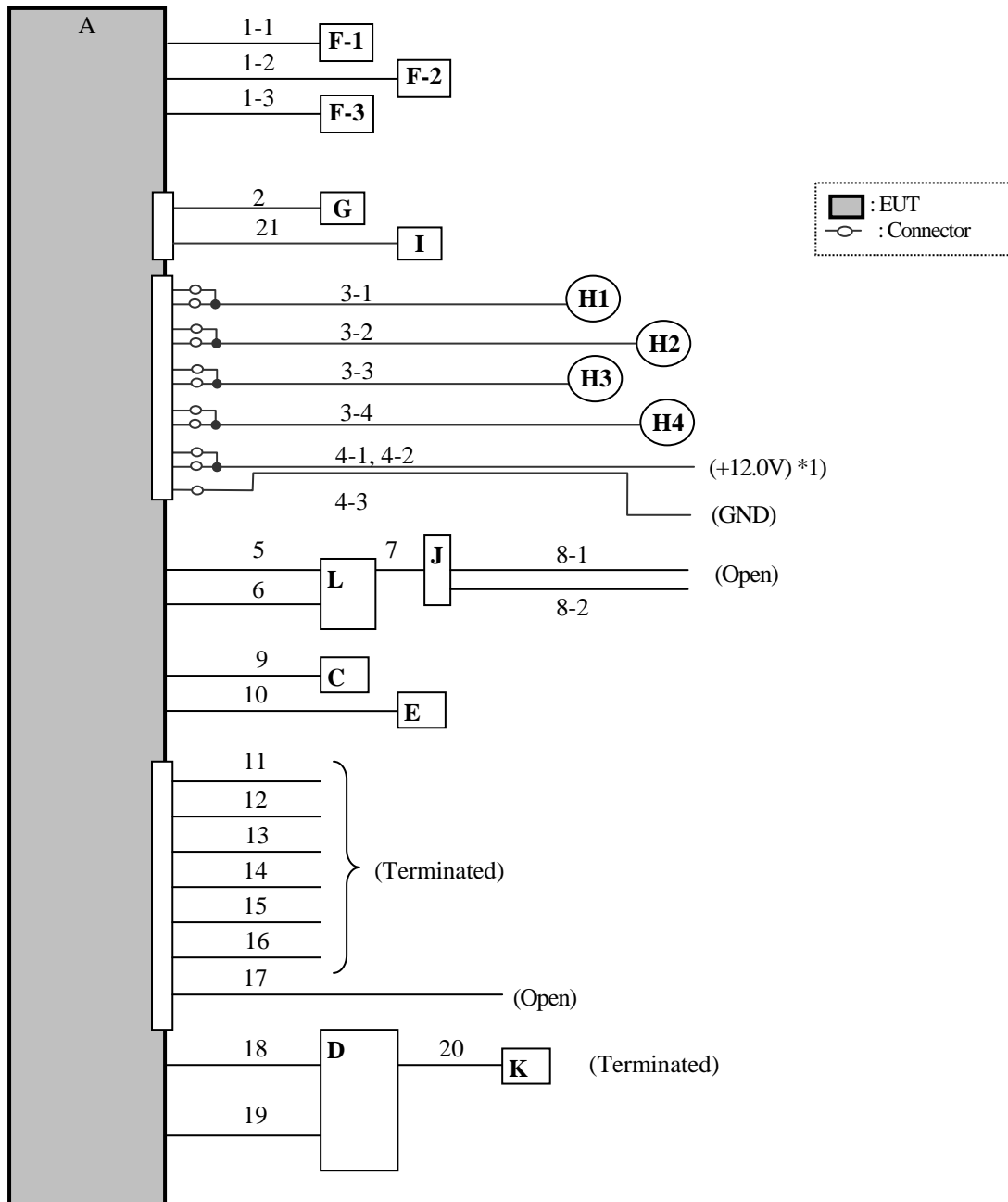
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4.2 Configuration of tested system



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	FLASH MEMORY MULTIMEDIA AV NAVIGATION RECEIVER	AVIC-Z130BT	NX071/UC No.38 *2) NX071/UC No.22 *3)	PIONEER	EUT
C	GPS Antenna	CZX5496	-	PIONEER	-
D	RDS-TMC TUNER	CXE2176	B140AS02705	PIONEER	-
E	MIC for Hands-free	CPM1083	-	PIONEER	-
F	Dummy load(for RCA)	-	-	-	-
G	USB Memory	SOK-USM4GL(B)	-	SONY	-
H	Dummy load for Speaker(4ohm)	-	-	-	-
I	AUX termination load	-	-	-	-
J	Wired Remote Controller	CD-MR80D	-	PIONEER	-
K	Dummy load for RF(75ohm)	-	-	-	-
L	Wired Remote Controller	CD-MR80D	-	PIONEER	-

*1) DC power supply (Model No.: PAN35-10A) was used for DC 12V input.

*2) Used for Spurious emissions tests (Radiated).

*3) Used for Antenna Terminal Conducted tests.

List of cables used *4)

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Preout	1.0	Shielded	Shielded	1-1: Rear Monitor Video Output Terminated (75ohm) 1-2: Subwoofer Output(L) Terminated (15kohm) 1-3: Subwoofer Output(R) Terminated (15kohm)
2	USB extension	2.0	Shielded	Shielded	-
3	Speaker	1.7	Unshielded	Unshielded	Terminated (4ohm)
4	DC (Battery, Accessory & GND)	1.7	Unshielded	Unshielded	4-1: Battery 4-2: Accessory 4-3: GND
5	Remote Controller	1.4	Shielded	Shielded	-
6	Remote Controller	1.5	Unshielded	Unshielded	-
7	Remote Controller	0.2	Shielded	Shielded	-
8	DC (Battery & GND)	1.4	Unshielded	Unshielded	Open 8-1: Battery 8-2: GND
9	GPS Antenna	3.5	Shielded	Shielded	-
10	MIC	4.0	Unshielded	Unshielded	-
11	Audio Input	0.3	Unshielded	Unshielded	Terminated (1kohm)
12	Video Input	0.3	Unshielded	Unshielded	Terminated (75ohm)
13	Rear View Camera Input	0.3	Unshielded	Unshielded	Terminated (75ohm)
14	Rear Audio Output	1.2	Unshielded	Unshielded	Terminated (15kohm)
15	Front Audio Output	1.2	Unshielded	Unshielded	Terminated (15kohm)
16	REAR MONITOR Audio Output	1.2	Unshielded	Unshielded	Terminated (15ohm)
17	MUTE	0.3	Shielded	Shielded	-
18	Antenna	0.3	Shielded	Shielded	-
19	Communication (for TMC)	1.0	Unshielded	Unshielded	-
20	Antenna	0.8	Shielded	Shielded	Terminated (75ohm)
21	AUX	0.15	Unshielded	Unshielded	Open

*4) 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 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: 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.

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.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 1.5m, 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 26GHz
Test distance : 3m (below 13GHz) / 1m (above 13GHz)
EUT position : Table top
EUT operation mode : Refer to 4.1.

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	1000-26000MHz	
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 EUT was tested in the direction normally used.

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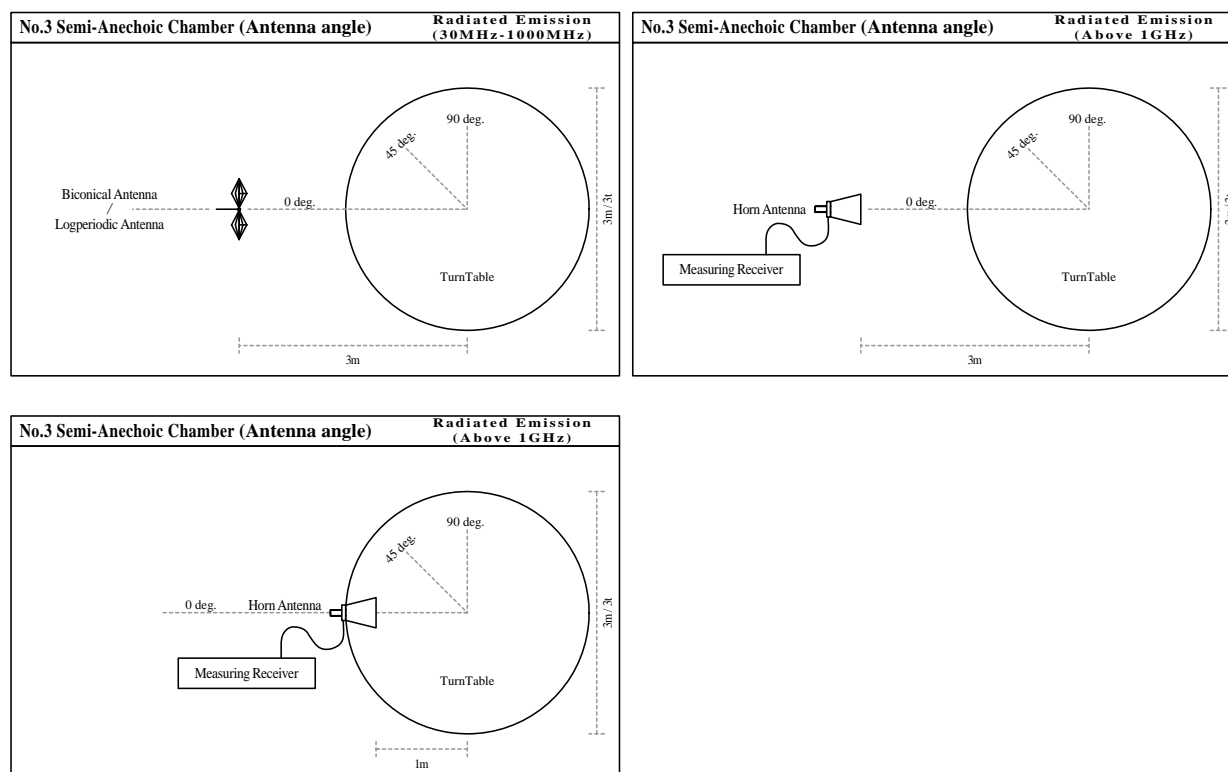
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Figure 1. Antenna angle

No.3 Semi-Anechoic Chamber



11.5 Band edge

Band edge level at 2390MHz, 2400MHz and 2483.5MHz 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 5th order harmonics.
Refer to APPENDIX 2

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Contents of appendixes

APPENDIX 1: Photographs of test setup

Radiated emission

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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