



RADIO TEST REPORT

Test Report No.: 32EE0045-SH-01

Applicant : PIONEER CORPORATION
Type of Equipment : Receiver Ass'y
Model No. : DEH-8128
FCC ID : AJDK050
Test regulation : FCC Part15 Subpart C: 2011
Test result : Complied

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Date of test: January 26 and 27, 2012

Tested by: *H. Shirasawa*
Hikaru Shirasawa
Engineer of WiSE Japan,
UL Verification Service

Approved by : *G. Ishiwata*
Go Ishiwata
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UL Verification Service

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13-EM-F0429

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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-8128
Serial No. : See Section 4
Rating : DC 12.0V
Country of Mass-production : 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 : December 26, 2011

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2.2 Product description

Model: DEH-8128 (referred to as the EUT in this report) is a Receiver Ass'y.

Clock Frequency:

【Main Unit】 4.6875MHz, 18.85MHz, 16.9344MHz, 64MHz, 32MHz, 74.1MHz, 37.05MHz, 48MHz, 128MHz

【Bluetooth】 26MHz, 25.8048MHz

【CD DRIVE】 16.93MHz, 176.4kHz

【Panel】 5MHz, 10MHz, 384kHz, 311.5kHz, 350kHz

| | |
|------------------------------|------------------------------|
| Equipment type | : Transceiver |
| Frequency of operation | : 2402-2480.0MHz |
| Bandwidth & channel spacing | : 1MHz |
| Type of modulation | : GFSK, $\pi/4$ DQPSK, 8DPSK |
| Antenna type | : Inverted F type |
| Antenna gain with cable loss | : -0.28dBi (max) |
| Antenna connector type | : U.FL |
| 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 Part 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.

SECTION 3: Test specification, procedures & results**3.1 Test specification**

Test specification : FCC Part 15 Subpart C: 2011,
final revised on November 21, 2011 and effective December 21, 2011

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 Section 15.207 | - | N/A *1) | - | N/A *1) |
| Carrier frequency separation | FCC Public Notice DA 00-705 & ANSI C63.4:2009 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 C63.4:2009 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 C63.4:2009 13. Measurement of intentional radiators | FCC Section15.247 (a)(1)(iii) | Conducted | N/A | | Complied |
| Dwell time | FCC Public Notice DA 00-705 & ANSI C63.4:2009 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 C63.4:2009 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 C63.4:2009 13. Measurement of intentional radiators | FCC Section15.247 (d) Section15.209 | Conducted/ Radiated | N/A | | 6.1dB (2399.4MHz, Horizontal, Average, Tx 2402MHz, 3-DH5) |

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 | - | N/A |
| 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 ^{*1} /SR ^{*2} (±) | No.2 SAC/SR (±) | No.3 SAC/SR (±) |
|---|-----------------|--|-----------------|-----------------|
| Radiated emission (Measurement distance: 3m) | 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 |
| Radiated emission (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

*3: Value of Antenna Terminal Voltage measurement is also applies to the No.5 and No.6 Shielded Room.

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: (±) 1.9dB

Conducted emissions, Power Density Measurement (below 1GHz) uncertainty for this test was: (±) 1.8dB

Conducted emissions, Power Density Measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Conducted emissions, Power Density Measurement (3G-18GHz) uncertainty for this test was: (±) 3.6dB

Conducted emissions Measurement (18G-26.5GHz) uncertainty for this test was: (±) 4.0dB

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 checked="" 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

| 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), 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 influence on 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;

*Software for testing: HCI Tester (Version: 2.0.99)

Power settings: Fixed (The setting is not controlled by the software and it is equivalent to that of mass-produced items.)

Above setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting.

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

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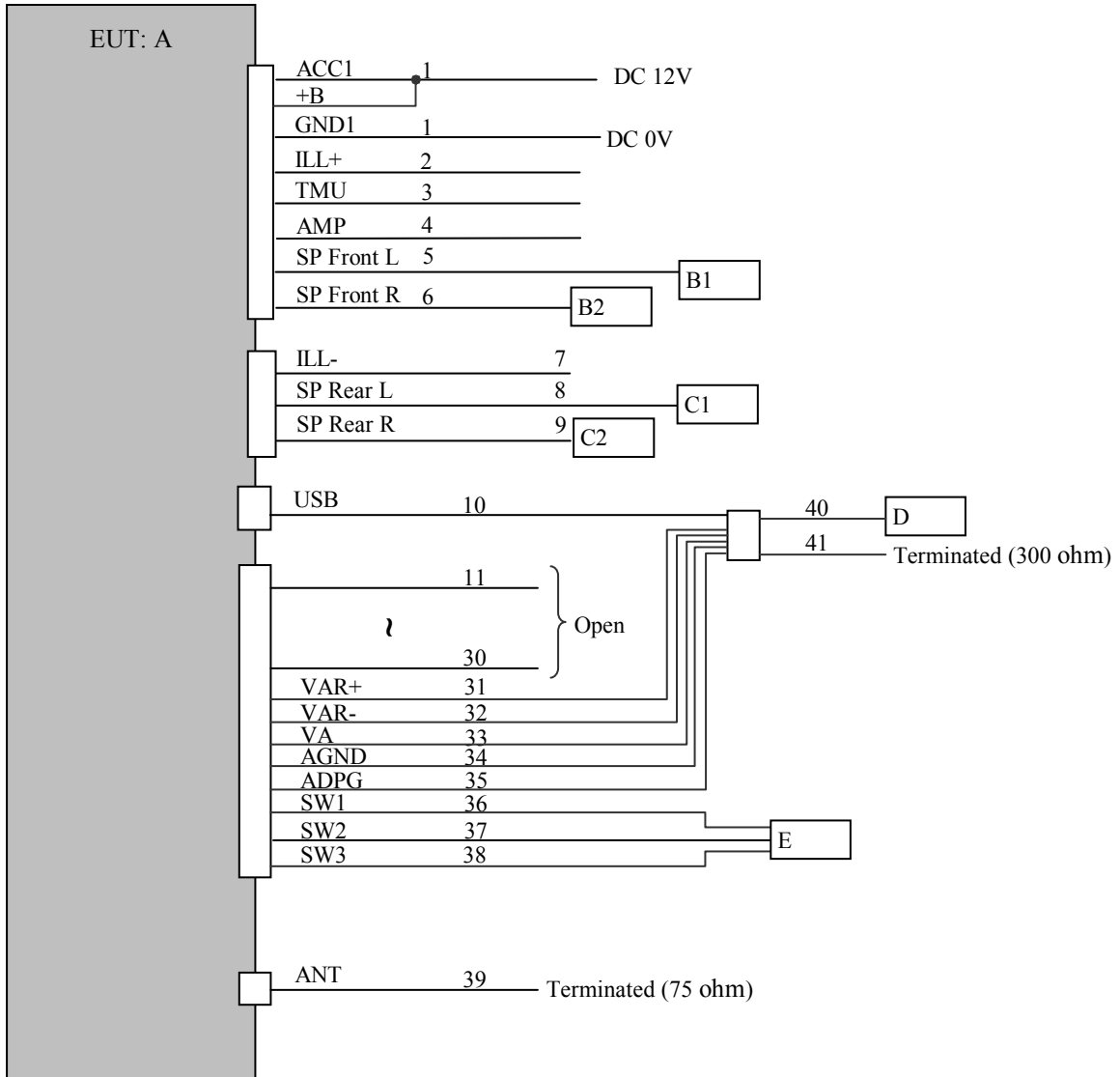
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4.2 Configuration of tested system



* Test data was taken under worst case conditions.

Description of EUT and support equipment

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|------------------|---------------|------------------------------------|--------------|---------|
| A | Receiver Ass'y | DEH-8128 | AABB000001CS *1 AABB000002CS *2 | PIONEER | EUT |
| B1 | Speaker | TS-X180 | D56JEK1 | PIONEER | - |
| B2 | Speaker | TS-X180 | D56JEK1 | PIONEER | - |
| C1 | Speaker | R-S07731-1B | 20LS | PIONEER | - |
| C2 | Speaker | R-S07731-1B | 20LS | PIONEER | - |
| D | USB Memory (4GB) | SDK-USM4GL(B) | 10503MEDB | SONY | - |
| E | Steering SW jig | OSS2 | - | - | - |

*1) Used for Radiated Emission tests.

*2) Used for Antenna Terminal conducted tests.

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List of cables used

| No. | Cable name | Length (m) | Shield | | Remark |
|-----|------------|------------|------------|------------|--------|
| | | | Cable | Connector | |
| 1 | DC | 2.4 | Unshielded | Unshielded | - |
| 2 | ILL+ | 2.0 | Unshielded | Unshielded | - |
| 3 | TMU | 2.0 | Unshielded | Unshielded | - |
| 4 | AMP | 2.0 | Unshielded | Unshielded | - |
| 5 | SP Front L | 2.4 | Unshielded | Unshielded | - |
| 6 | SP Front R | 2.4 | Unshielded | Unshielded | - |
| 7 | ILL- | 2.0 | Unshielded | Unshielded | - |
| 8 | SP Rear L | 2.4 | Unshielded | Unshielded | - |
| 9 | SP Rear R | 2.4 | Unshielded | Unshielded | - |
| 10 | USB | 2.2 | Unshielded | Unshielded | - |
| 11 | VV- | 2.0 | Unshielded | Unshielded | - |
| 12 | VV+ | 2.0 | Unshielded | Unshielded | - |
| 13 | VSG | 2.0 | Unshielded | Unshielded | - |
| 14 | IVI+ | 2.0 | Unshielded | Unshielded | - |
| 15 | IVI- | 2.0 | Unshielded | Unshielded | - |
| 16 | IVI SLD | 2.0 | Unshielded | Unshielded | - |
| 17 | MACC | 2.0 | Unshielded | Unshielded | - |
| 18 | MIN- | 2.0 | Unshielded | Unshielded | - |
| 19 | MIN+ | 2.0 | Unshielded | Unshielded | - |
| 20 | SGND | 2.0 | Unshielded | Unshielded | - |
| 21 | SNS2 | 2.0 | Unshielded | Unshielded | - |
| 22 | ADIM | 2.0 | Unshielded | Unshielded | - |
| 23 | IG | 2.0 | Unshielded | Unshielded | - |
| 24 | SW3 | 2.0 | Unshielded | Unshielded | - |
| 25 | LRHD | 2.0 | Unshielded | Unshielded | - |
| 26 | REV | 2.0 | Unshielded | Unshielded | - |
| 27 | TX1- | 2.0 | Unshielded | Unshielded | - |
| 28 | TX1+ | 2.0 | Unshielded | Unshielded | - |
| 29 | CANL | 2.0 | Unshielded | Unshielded | - |
| 30 | CANH | 2.0 | Unshielded | Unshielded | - |
| 31 | SW1 | 2.0 | Unshielded | Unshielded | - |
| 32 | SW2 | 2.0 | Unshielded | Unshielded | - |
| 33 | SWG | 2.0 | Unshielded | Unshielded | - |
| 34 | VAR+ | 2.0 | Unshielded | Unshielded | - |
| 35 | VAR- | 2.0 | Unshielded | Unshielded | - |
| 36 | VA- | 2.0 | Unshielded | Unshielded | - |
| 37 | AGND | 2.0 | Unshielded | Unshielded | - |
| 38 | ADPG | 2.0 | Unshielded | Unshielded | - |
| 39 | ANT | 3.15 | Shielded | Shielded | - |
| 40 | USB | 1.0 | Shielded | Shielded | - |
| 41 | Audio In | 1.5 | Shielded | Shielded | - |

*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. 2 and 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 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.

11.3 Test conditions

Frequency range : 30MHz to 25GHz
Test distance : 3m(below 15GHz) / 1m(above15GHz)
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 | : | 30-1,000MHz | 1 - 25GHz | |
| Detection Type | : | Quasi-Peak | Peak | * Average |
| IF Bandwidth | : | 120kHz | RBW:1MHz/VBW:3MHz | RBW:1MHz/VBW * |

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

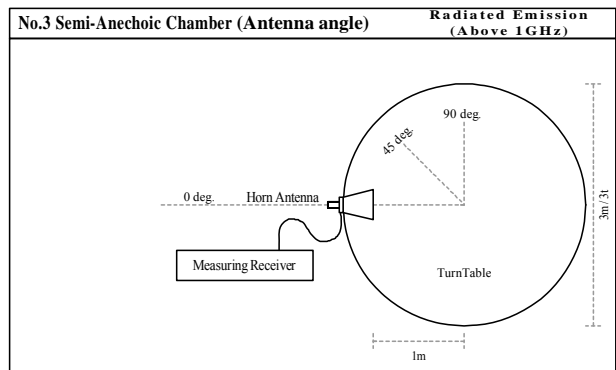
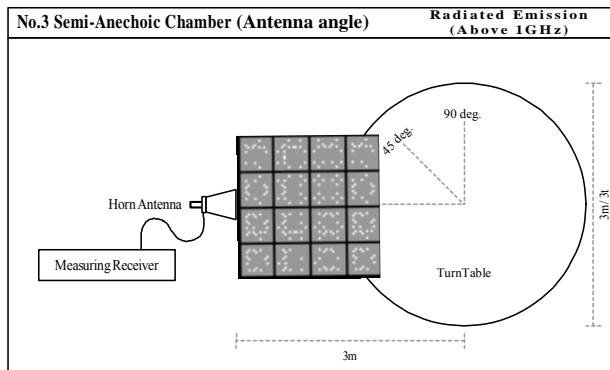
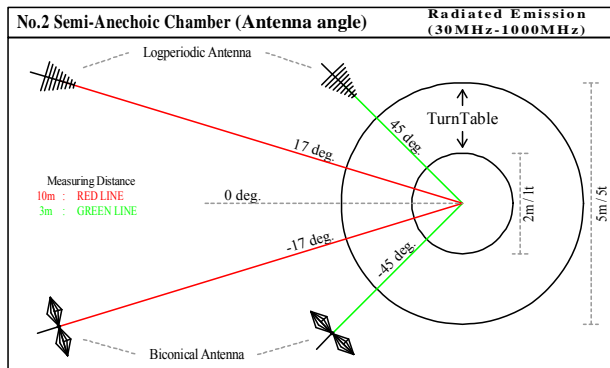
* Though 00-705 accepts VBW=10Hz for AV measurements, confirmed that superfluous smoothing was not performed.

The EUT was set at 0 degree as normal position according to the EUT's 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 of Radiated emission.

11.6 Results

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

Contents of APPENDIXES

APPENDIX 1: Data of EMI test

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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