



RADIO TEST REPORT

Test Report No.: 31HE0102-SH-04-A

Applicant : KONICA MINOLTA MEDICAL & GRAPHIC, INC.
Type of Equipment : AeroDR SYSTEM
Model No. : AeroDR P-21
FCC ID : YR7AERODRP2
Test regulation : FCC Part15 Subpart E: 2011
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.

Date of test:

August 22 – November 17, 2011

**Representative
test engineer:**

Tatsuya Arai
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Go Ishiwata
Manager of WiSE Japan,
UL Verification Service

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

13-EM-F0429

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1 Applicant information

Company Name : KONICA MINOLTA MEDICAL & GRAPHIC, INC.
Address : 1 Sakura-Machi, Hino-Shi, Tokyo, 191-8511 Japan
Telephone Number : +81-42-589-8429
Facsimile Number : +81-42-589-8053
Contact Person : Masayoshi Inoue

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

2.1 Identification of E.U.T.

Type of Equipment : AeroDR SYSTEM
Model No. : AeroDR P-21
Serial No. : 19
Rating : DC15V
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 : August 4, 2011

2.2 Product description

Model: AeroDR P-21 (referred to as the EUT in this report) is a AeroDR SYSTEM.

Equipment type : Transceiver
Frequency of operation : 5180-5320MHz
5500-5700MHz
5745-5825MHz *1
Clock frequency : 32.768kHz, 26MHz
Bandwidth & channel spacing : Bandwidth : 18MHz
Channel spacing : 20MHz
Type of modulation : 11a : OFDM
Antenna type : Planar Inverted F Antenna
Antenna gain with cable loss : +3.78dBi
Antenna connector type : U.FL
ITU code : D1D, G1D
Operation temperature range : +10 to +30 deg.C.

*1) Refer to 31HE0102-SH-04-B, FCC part 15C (FCC15.247) report..

FCC Part15.31 (e)

This EUT provides stable voltage (DC3.3V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part15.203 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. Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile: +81 463 50 6401

3 Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part 15 Subpart E: 2011, final revised on July 8, 2011 and effective August 8, 2011
Title : FCC 47CFR Part15 Radio Frequency Device
: Subpart E Unlicensed National Information Infrastructure Devices
: Section 15.407 General technical requirements

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	15.407 (b)(6) and 15.207	-	N/A *1)	N/A	N/A
26dB Emission Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407(a)(1)(2)	Conducted	N/A	See data	Complied
Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407 (a)(1)(2)	Conducted	N/A		Complied
Peak Power Spectral Density	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407 (a)(1)(2)	Conducted	N/A		Complied
Peak Excursion Ratio	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.407 (a)(6)	Conducted	N/A		Complied
Out of Band Emission & Restricted Band Edges	ANSI C63.4:2003 13. Measurement of intentional radiators	15.407 (b)(1)(2)(4)(6) (7), 15.205 and 15.209	Conducted	N/A		Complied
Out of Band Emission & Restricted Band Edges	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.109, 15.407 (b)(1)(2)(5)(6) (7), 15.205 and 15.209	Radiated	N/A		0.5dB (10600.00MHz, Vertical, AV, 11a Tx 5300MHz)
Dynamic Frequency Selection	FCC 06-96 APPENDIX	FCC 15.407 (h)(2)	Conducted	*2)	N/A	N/A

Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422
These tests were also referred to FCC Public Notice DA02-2138 "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands".

*1) This equipment cannot operate WLAN card when it is connected to the control box at the interface cable. In that case, it can only use wire communication mode. This mode is tested by customer based on IEC 60601-1-2 for the compliance of Part 15 subpart B.

*2) Refer to 31HE0102-SH-04-C, FCC part 15E (FCC15.407) DFS report.

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

* 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	3.3 dB	2.7 dB	3.4 dB
	30MHz-300MHz	4.7 dB	4.5 dB	4.7 dB
	300MHz-1GHz	4.5 dB	4.6 dB	4.6 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	4.4 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 report meets the limits unless the uncertainty is taken into consideration.

Antenna port conducted test

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

Spurious emission (Conducted), Power density Measurement (below 1GHz) uncertainty for this test was: (±) 1.9dB

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

Spurious emission (Conducted), Power density Measurement (3G-18GHz) uncertainty for this test was: (±) 3.8dB

Spurious emission (Conducted), Power density Measurement (18G-26.5GHz) uncertainty for this test was: (±) 4.1dB

Bandwidth Measurement uncertainty for this test was: (±) 5.4%

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.

1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN

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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 anechoic chamber)

2973D-2 (No2 anechoic chamber)

2973D-3 (No3 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 Full-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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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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4 System test configuration

4.1 Justification

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

Mode	Remarks*
IEEE 802.11a	24Mbps (W52, W53) / 9Mbps (W56), PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Low Channel)	

Test Item	Operating Mode	Tested frequency
26dB Bandwidth Occupied Bandwidth (99%) Maximum Peak Output Power Peak Power Spectral Density Peak Excursion Ratio Out of Band Emissions	11a Tx	[W52 Band] 5180MHz 5220MHz 5240MHz [W53 Band] 5260MHz 5300MHz 5320MHz [W56 Band] 5500MHz 5580MHz*1) 5700MHz

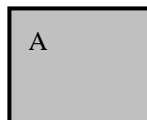
*1) The test was carried out in 5580MHz, since there was not a difference in 5580MHz and 5600MHz.

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

Power settings: 14

Software: KM-TB7-R-052-00 Version 00

4.2 Configuration and peripherals



Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remark)
A	AeroDR SYSTEM	AeroDR P-21	19	KONICA MINOLTA MEDICAL & GRAPHIC, INC.	YR7AERODRP2 (EUT)

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone: +81 463 50 6400

Facsimile: +81 463 50 6401

5 26dB 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

Date : August 25 and November 17, 2011

Test engineer : Tatsuya Arai

6 Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a spectrum analyzer connected to the antenna port.

The test was made with the spectrum analyzer that has a function of channel-power measurement.

We followed the method 1 specified in DA-02-2138A1.

Summary of the test results: Pass

Date : August 19 and November 2, 2011

Test engineer : Shinichi Takano and Tatsuya Arai

7 Peak Power Spectral Density

Test Procedure

The peak power spectral density was measured with a spectrum analyzer connected to the antenna port.

We followed the method 2 specified in DA-02-2138A1.

Summary of the test results: Pass

Date : August 25 and November 17, 2011

Test engineer : Tatsuya Arai

8 Peak Excursion Ratio

Test Procedure

The Peak Excursion Ratio was measured with a spectrum analyzer connected to the antenna port.

The second sweep was measured based on method 1 specified in DA-02-2138A1

Summary of the test results: Pass

Date : August 25 and November 17, 2011

Test engineer : Tatsuya Arai

9 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 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

Date : August 19 and November 3, 2011

Test engineer : Shinichi Takano and Tatsuya Arai

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile: +81 463 50 6401

10 Out of band emissions (Radiated)

10.1 Operating environment

The test was carried out in No.3 Semi-anechoic chamber.

10.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 1.5m, raised 80cm above the conducting ground plane. Photographs of the set up are shown in Appendix 1.

10.3 Test conditions

Frequency range : 30MHz - 40GHz

10.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m(below 13GHz) and 1m(above13GHz).

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.

Measurements were performed with QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function 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: 10Hz
Measuring antenna	Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn
Test distance	3m	3m(below 13GHz) 1m(above 13GHz)

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

Substitution Method (above 1GHz Outside of the restricted band)

- 1) EUT was placed on a platform of nominal size, 0.5m by 1.5m, raised 0.8m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength has been measured in semi anechoic chamber at a distance of 3m (below 13GHz) and 1m(above13GHz)..
The measuring antenna height was varied between 1 to 4m and the turn table was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization.
Measurements were performed with PK detector.
- 2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 0.8m as the EUT. The frequency above 1GHz of the Substitution Antenna was used Horn Antenna.
The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 to 4m to obtain maximum receiving level.
Its Output power of Signal Generator was recorded.

- 3) EIRP was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
The EIRP was calculated by compensating the finite difference in the Antenna gain of Substitution Antenna.

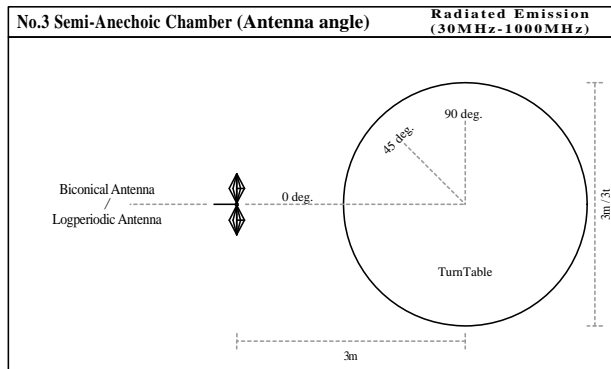
The equipment was previously checked at each position of three axis X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement.

Combinations of the worst case

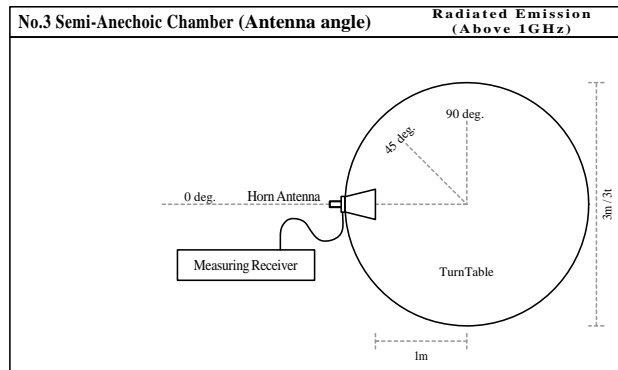
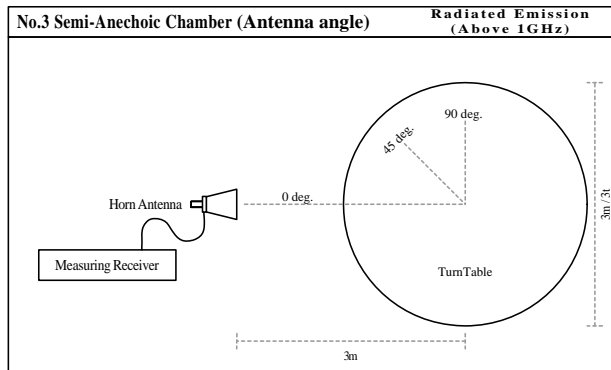
Band	Worst position	
	Below 1GHz	Above 1GHz
W52, W53	Horizontal: X, Vertical: X	Carrier: Horizontal: X, Vertical: Z Spurious: Horizontal: Y, Vertical: Z
W56	Horizontal: X, Vertical: X	Carrier: Horizontal: X, Vertical: Z Spurious: Horizontal: X, Vertical: Z

Figure 1. Antenna angle

Below 1GHz



Above 1GHz



10.5 Band edge

Band edge level at 5470MHz 5725 are below -27dBm/MHz (EIRP). Band edge level at 5150MHz, 5350MHz and 5460MHz are below the limits of FCC 15.209. Refer to the data of Radiated emission.

10.6 Results

Summary of the test results : Pass *No noise was detected above the 5th order harmonics.
Date : August 22 – November 4, 2011 Test engineer : Shinichi Tatsuya Arai

APPENDIX 1: Test data

Page 12 - 14	:	26dB bandwidth
Page 15 - 17	:	99% Occupied Bandwidth
Page 18 - 31	:	Peak Output Power
Page 32 - 49	:	Out of band emissions (Radiated)
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Page 69 - 71	:	Peak power density
Page 72 - 74	:	Peak Excursion Ratio

APPENDIX 2: Test instruments

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APPENDIX 3: Photographs of test setup

Page 77	:	Radiated emission
Page 78	:	Pre-check of the worst position