



## EMI TEST REPORT

Test Report No.: 28LE0070-YK-01-R1

Applicant : AOR USA, Inc.  
Type of Equipment : Receiver  
Model No. : AR-mini  
FCC ID : NVJAR-MINI  
Test regulation : FCC Part15 Subpart B: 2008  
Test result : Complied

1. This test report shall not be reproduced except in full or partial, without the written approval of UL Japan, Inc.
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. Original test report number of this report is 28LE0070-YK-01.

Date of test: August 1, 4, 5 and 26, 2008

Tested by:

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## **SECTION 1: Customer information**

Company Name : AOR USA, Inc.  
Brand Name : AOR  
Address : 20655 South Western Ave., Ste Torrance, CA 90501  
Telephone Number : 310-787-8615  
Facsimile Number : 310-787-8619  
Contact Person : Shigeru Takano

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

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

Type of Equipment : Receiver  
Model No. : AR-mini  
Serial No. : Sample-1  
Rating : DC3.0V (External DC6.0V)  
Country of Mass-production : Japan  
Receipt Date of Sample : July 18, 2008  
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.

### **2.2 Product description**

Model: AR-mini (referred to as the EUT in this report) is a Receiver.

Equipment type : Receiver  
(FM/AM: Triple conversion super heterodyne  
WFM: Double conversion super heterodyne)  
Frequency of operation : 0.1MHz - 1299.995MHz  
Clock frequency : CPU: 4.194304MHz, TCXO: 21.25000MHz  
Intermediate frequency : FM/AM: 1<sup>st</sup> IF 243.95MHz, 2<sup>nd</sup> IF: 21.7MHz, 3<sup>rd</sup> IF: 450kHz  
WFM: 1<sup>st</sup> IF: 243.95MHz, 2<sup>nd</sup> IF: 10.7MHz  
IF filter bandwidth : 243.95MHz: 260kHz, 21.7MHz: 15kHz,  
10.7MHz: 220kHz, 450kHz: 15kHz  
Antenna type : 1/4 wave whip  
Antenna connector type : SMA  
Operation temperature range : -10 to +50 deg.C.

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

#### **3.1 Test specification**

Test Specification : FCC Part 15 Subpart B: 2008, final revised on May 19, 2008  
Title : FCC 47CFR Part 15 Radio Frequency Device  
Subpart B Unintentional Radiators

#### **3.2 Procedures & Results**

Item	Test procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	FCC 15.107 (a) CISPR 22: 1997 Class B	N/A	4.8dB (0.5640MHz, N, AV, FM Reception (139MHz))	Complied
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	FCC 15.109 (a) CISPR 22: 1997 Class B	N/A	4.5dB (2124.675MHz, Horizontal, AV, WFM Reception 851MHz)	Complied
Antenna power conduction for receivers	ANSI C63.4: 2003 12.1.5 Antenna-conducted power measurements	FCC 15.111 (a)	N/A	7.8dB (2359.600MHz, FM Reception 51MHz)	Complied
38dB rejection	-	FCC 15.121 (b)	N/A	See data	Complied

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

#### **3.3 Additions to standards**

No addition, deviation or exclusion has been made from standards.

#### **3.4 Confirmation**

**UL Japan, Inc. hereby confirms the E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B: 2008.**

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### 3.5 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	No.1 open site (±)	No.2 open site (±)	No.1 anechoic chamber (±)
<b>Conducted emission</b>			
150kHz-30MHz	2.8 dB	2.8 dB	2.8 dB
<b>Radiated emission (3m)</b>			
<30MHz	2.3 dB	2.3 dB	2.2 dB
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB
1GHz<	5.7 dB	5.7 dB	5.7 dB
<b>Antenna voltage</b>			
30-1000MHz	1.5 dB	1.5 dB	1.5 dB
1000-2150MHz	1.5 dB	1.4 dB	1.5 dB

#### Conducted Emission Test

The data listed in this test report has enough margin, more than site margin.

#### Radiated Emission Test

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

#### Antenna terminal disturbance voltage

The data listed in this test report has enough margin, more than site margin.

### 3.6 Test Location

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NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on July 23, 2008 (Registration No.: 95486).

IC Registration No. : 2973B-1

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5	Semi-anechoic chamber	
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

### 3.7 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

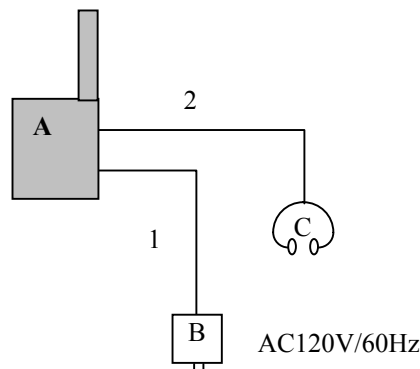
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test sequence is used:

Band 0	FM Reception (0.1MHz, 51MHz, 107.995MHz)
Band 1	FM Reception (108MHz, 139MHz, 169.995MHz)
Band 2	FM Reception (170MHz, 246MHz, 321.995MHz)
Band 3	AM Reception (322MHz, 396MHz, 469.995MHz)
Band 4	WFM Reception (470MHz, 660MHz, 821.9575MHz)
Band 5	WFM Reception (851MHz, 1075MHz, 1299.995MHz)

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

### 4.2 Configuration and peripherals



\*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

#### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Receiver	AR-mini	Sample-1	AOR	EUT
B	AC adaptor	AA-mini	Sample A	Shenzhen Huoniu Technology	-
C	Headphone	-	-	-	-

#### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC cable	1.4	Unshielded	Unshielded	-
2	Headphone cable	1.3	Shielded	Shielded	-

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## **SECTION 5: Conducted emission**

### **5.1 Operating environment**

The test was carried out in No.1 shielded room.

Temperature : See test data  
Humidity : See test data

### **5.2 Test configuration**

EUT was placed on a wooden platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN and excess AC cable was bundled in center. 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. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50Ω connectors of the LISN were resistively terminated in 50Ω when not connected to the measuring equipment.

Photographs of the setup are shown in Appendix 1.

### **5.3 Test conditions**

Frequency range : 0.15 - 30MHz  
EUT position : Table top  
EUT operation mode : Reception (FM, AM, WFM)

### **5.4 Test procedure**

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a screened room. The EUT was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver.

Detector type : Quasi-Peak/ Average  
IF Bandwidth : 9kHz

### **5.5 Results**

Summary of the test results : Pass

Date : August 4, 2008      Test engineer : Minoru Nakatake

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## **SECTION 5: Radiated emission**

### **5.1 Operating environment**

The test was carried out in No.1 anechoic chamber.

Temperature : See test data  
Humidity : See test data

### **5.2 Test configuration**

EUT was placed on a platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. The setup was not the one for a system which is specified in ANSI C63.4: 2003. The cables did not have much effect on spurious emission. Photographs of the setup are shown in Appendix 1.

### **5.3 Test conditions**

Frequency range : 9kHz - 8GHz  
Test distance : 3m  
EUT position : Table top  
EUT operation mode : Reception (FM, AM, WFM)

### **5.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on an anechoic chamber with a ground plane and at a distance of 3m. 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. When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Frequency	Below 30MHz	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Test Receiver	Spectrum Analyzer
Detector type IF Bandwidth	QP: BW 9kHz	QP: BW 120kHz	PK: RBW: 1MHz/VBW: 1MHz AV RBW: 1MHz/VBW: 10Hz
Measuring antenna	Loop	Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz)	Horn

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 13. With the position, the noise levels of all the frequencies were measured.

	Below 1GHz	Above 1GHz
Horizontal	Y	X
Vertical	X	Y

### **5.5 Results**

Summary of the test results : Pass

Date : August 1 and 4, 2008  
Test engineer : Makoto Hosaka, Takahiro Suzuki and Minoru Nakatake

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## **SECTION 6: Antenna power conduction for receivers**

### **6.1 Operating environment**

The test was carried out in No.4 shielded room.

Temperature : See test data  
Humidity : See test data

### **6.2 Test configuration**

EUT was placed on a platform of nominal size, 1.0m by 1.8m, raised 80cm above the conducting ground plane. Photograph of the setup is shown in Appendix 1.

### **6.3 Test conditions**

Frequency range : 30 - 1000MHz  
EUT position : Table top  
EUT operation mode : Reception (FM, AM, WFM)

### **6.4 Test procedure**

The antenna power conduction for receivers was made with the following detector function of the test receiver.

Frequency	30-1000MHz	1-11GHz
Detector type	QP	PK
IF Bandwidth	120kHz	RBW: 1MHz/VBW: 1MHz

### **6.5 Results**

Summary of the test results : Pass

Date : August 5, 2008 Test engineer : Takahiro Suzuki

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## **SECTION 7: 38dB rejection**

### **7.1 Operating environment**

The test was carried out in No.4 shielded room.

Temperature : See test data  
Humidity : See test data

### **7.2 Test configuration**

EUT was placed on a platform of nominal size, 1.0m by 1.8m, raised 80cm above the conducting ground plane. Photograph of the setup is shown in Appendix 1.

### **7.3 Test conditions**

Frequency range : 100kHz - 1299.995MHz  
EUT position : Table top  
EUT operation mode : Reception (WFM)

### **7.4 Test procedure**

A signal generator was connected to the antenna port of the EUT and an audio analyzer was connected to the audio output port of the EUT. A standard signal was applied to the EUT from the signal generator. The EUT was put into scanning mode and detected frequency was recorded. (Where no signal is detected, the EUT complies with the requirement of FCC 15. 121 (b).) The squelch threshold level was set to detect +20dB above the reference sensitivity. The EUT was then set to the recorded frequency and the squelch was closed. The signal generator level was adjusted so that the audio analyzer level was 12dB SINAD and the level was recorded. The signal generator level was set to output the tuned frequency and the audio analyzer level was 12dB SINAD. The level was noted. The procedure was repeated for each frequency of the mobile and base cellular frequency band. The difference between the 12dB SINAD levels at the injected frequency and the detected frequency, must be at least 38dB.

#### **Applied standard signal**

Frequency (FCC Part 22 Subpart H - Cellular Radiotelephone Service)	
Mobile	824.040MHz, 836.505MHz, 848.970MHz
Base	869.040MHz, 881.505MHz, 893.970MHz
Audio signal	1kHz
Deviation	8kHz
Output level	66dBuV

### **7.5 Results**

Summary of the test results : Pass

Date : August 26, 2008 Test engineer : Tatsuya Arai

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## **APPENDIX 1: Photographs of test setup**

Page 12	:	Conducted emission
Page 13	:	Radiated emission
Page 14	:	Pre-check of the worst position
Page 15	:	Antenna power conduction for receivers and 38dB rejection

## **APPENDIX 2: Data of EMI test**

Page 16 - 45	:	Conducted emission
Page 46 - 75	:	Radiated emission
46 - 51	:	Local frequency & Harmonics
52 - 75	:	Other
Page 76 - 93	:	Antenna power conduction for receivers
Page 94 - 95	:	38dB rejection

## **APPENDIX 3: Test instruments**

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