

FCC TEST REPORT

Under
FCC Part 74 Subpart H,

Prepared For:

Dexun Electronic Technology Co., Ltd.

North Banlieue Aote Industry Building Enping Guangdong, China.

FCC ID: RFP-DX87

EUT: Wireless Microphone

Model: DX-87

August 12, 2004

Report Type: Original Report

Test Engineer: Peter Lin

Test Date: July 12, 2004


Review By: Apollo Liu / Manager

TABLE OF CONTENTS

1. General Information.....	3
1. 1 Notes.....	3
1. 2 Testing Laboratory.....	3
1. 3 Details of Applicant.....	3
1. 4 Application Details.....	3
1. 5 Test Item.....	3
1. 6 Test Standards.....	4
2. Technical Test.....	5
2. 1 Summary of Test Results.....	5
3. EUT Modifications.....	6
4. Conducted Power Line Test.....	7
4. 1 Test Equipment.....	7
4. 2 Test Procedure.....	7
4. 3 Test Setup.....	7
4. 4 Configuration of The EUT.....	8
4. 5 EUT Operating Condition.....	9
4. 6 Conducted Power Line Emission Limits.....	9
4. 7 Conducted Power Line Test Result.....	10
5. Output Power Measurement.....	11
5. 1 Test Equipment.....	11
5. 2 Test Procedure.....	11
5. 3 Test Setup.....	11
5. 4 Configuration of The EUT.....	12
5. 5 EUT Operating Condition.....	12
5. 6 Rules and Specification Limits.....	12
5. 7 Output Power Test Result.....	12
5. 8 Result Calculation.....	13
6. Modulation Characteristics.....	14
6. 1 Test Equipment.....	14
6. 2 Test Procedure.....	14
6. 3 Test Setup.....	14
6. 4 Rules and Specification Limits.....	14
6. 5 Test Result.....	15
7. Occupied Bandwidth of Emission.....	16
7. 1 Test Equipment.....	16
7. 2 Test Procedure.....	16
7. 3 Test Setup.....	16
7. 4 Rules and Specification Limits.....	16
7. 5 Occupied Bandwidth Test Result.....	17
8. Field Strength of Emission.....	19
8. 1 Test Equipment.....	19
8. 2 Test Procedure.....	19
8. 3 Rules and Specification Limits.....	19
8. 4 Test Result.....	20
9. Frequency Stability Measurement.....	22
9. 1 Test Equipment.....	22
9. 2 Test Procedure.....	22
9. 3 Test Setup.....	22
9. 4 Rules and Specification Limits.....	22
9. 5 Test Result.....	23
10. Photos of Testing.....	24
10. 1 EUT Test Photographs.....	24
10. 2 EUT Detailed Photographs.....	25
11. FCC ID Label.....	30
12. Test Equipment.....	31

1. General Information

1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1.2 Testing Laboratory

Ke Mei Ou Laboratory Co., Ltd.

7A, Jiexiangge, JiahuiXincheng, No.3027, Shennan Rd., Futian, Shenzhen, Guangdong, P.R.China.

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Email: kmo@kmlab.com

Internet: www.kmlab.com

Site on File with the Federal Communications Commission – United States

Registration Number: 125782

For 3 & 10 meter OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC4986

For 3 & 10 meter OATS

1.3 Details of Applicant

Name : Dexun Electronic Technology Co., Ltd.
Address : North Banlieue Aote Industry Building Enping Guangdong, China.
Contact : FENG ZHEN JIONG / General Manager
Tel : + 86 750 7117790
Fax : + 86 750 7116341

1.4 Application Details

Date of Receipt of Application : June 18, 2004
Date of Receipt of Test Item : June 18, 2004
Date of Test : July 12~August 6, 2004

1.5 Test Item

Manufacturer : See Applicant
Brand Name : Dexun Nady API AC Hisonic MAX KAM Audio-technica BST SKPro audio
TSI Audio2000s TURBO JBSsystems Vitek WECONIC Gemini.
Model No. : DX-87, DX-89, DX-88, DX-86, DX-84, DX-83, DX-82, DX-81, DX-80,
401×QUAD, DH-901, DH-902, DH-903, KWM-5, KWM-10, MIC-88,
DR-2388, DR-3000, DP-602, DP-600, VT-3834.
Description : Wireless Microphone

Additional Information

Frequency : 174.0MHz~216.0MHz
Modulation Mode : FM
Nominal Deviation : 15KHz, max 30KHz
Audio Frequency Response : 50Hz~16KHz
S/N Ratio : >100dB
T.H.D : <1%
Power : Handle Microphone Transmitter: DC3V
Operating environment Temp. : -10℃~40℃

1. 6 Test Standards

FCC Part 74 Subpart H

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2. Technical Test

2.1 Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.207	Conducted Test	N/A	Owing to the DC operation of EUT, this test item is not performed.
FCC Part 74, Paragraph 74.861(e)(1)(i)	Output Power Measurement	PASS	Complies.
FCC Part 2, Paragraph 2.1047(a)	Modulation Characteristics	PASS	Complies
FCC Part 2, Paragraph 2.1049 (c)(1)	Occupied Bandwidth of Emission	PASS	Complies.
FCC Part 2, Paragraph 2.1053 & FCC Part 74, Paragraph 74.861(e)(6)	Field Strength of Emission	PASS	Complies.
FCC Part 2, Paragraph 2.1055 (a)(1)(d)(2) & FCC Part 74, Paragraph 74.861(e)(4).	Measured Bandwidth	PASS	Complies.

3. EUT Modifications

No modification by Ke Mei Ou Laboratory Co., Ltd.

4. Conducted Power Line Test

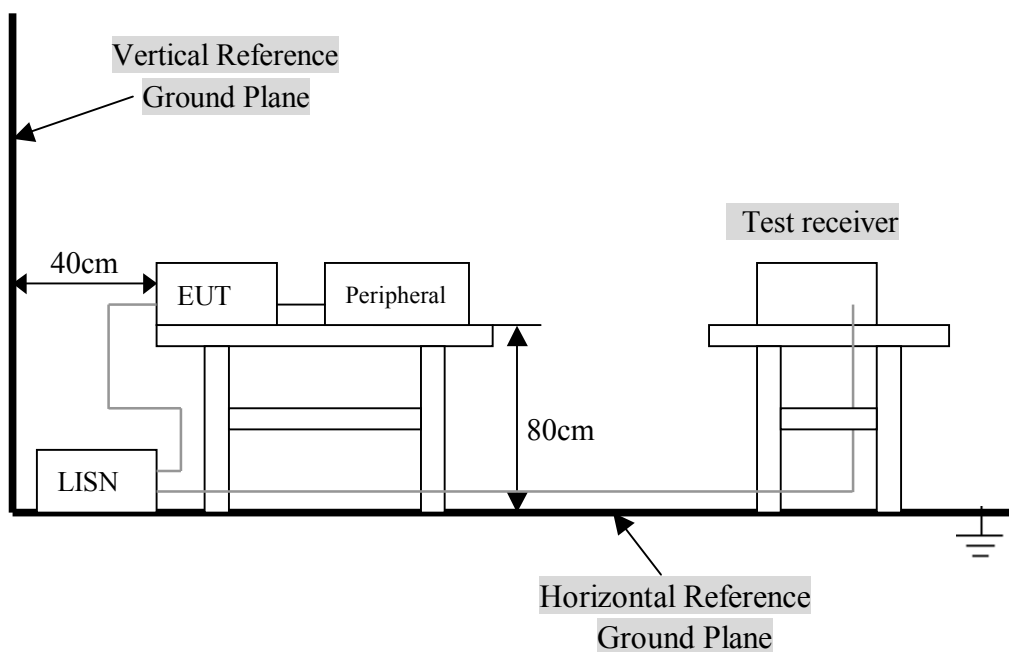
4.1 Test Equipment

Please refer to Section 12 this report.

4.2 Test Procedure

The EUT was tested according to ANSI C63.4 - 2001. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u-Henry as specified by section 5.1 OF ANSI C63.4 - 2001. cables and peripherals were moved to find the maximum emission levels for each frequency.

4.3 Test Setup



For the actual test configuration, Please refer to the related items – Photos of Testing.

4.4 Configuration of The EUT

3 frequencies are provided by EUT. The 3 frequencies of 174.1MHz, 179.3MHz, 215.2MHz were for test.

Note:

- 1) Below 1GHz, the frequency 174.1MHz, 179.3MHz, 215.2MHz were pre-tested in chamber. The frequency 215.2MHz, worst case one, was chosen for radiated emission test.
- 2) Above 1GHz, the frequency 174.1MHz, 179.3MHz, 215.2Mhz were tested individually.

A. EUT

Device	Manufacturer	Model #	FCC ID
Wireless Microphone	Dexun Electronic Technology Co., Ltd.	DX-87	RFP-DX87

B. Internal Devices

Device	Manufacturer	Model #	FCCID / DoC
N/A			

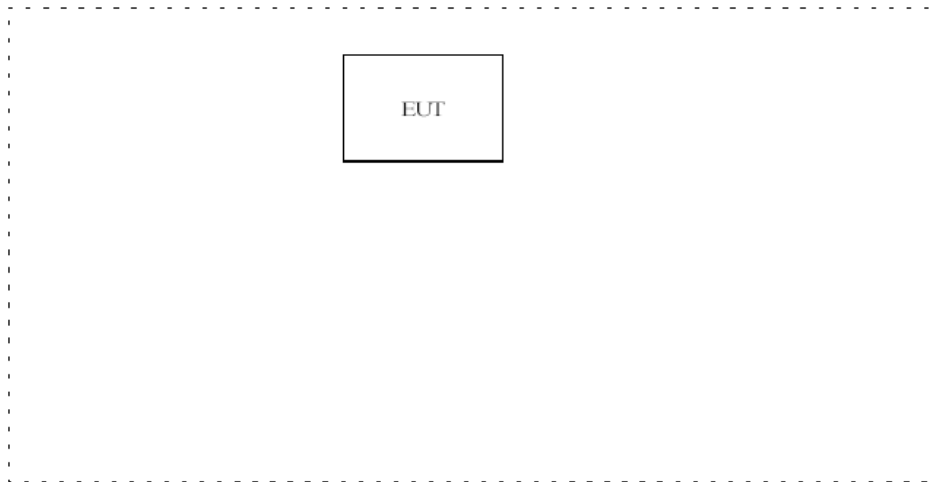
C. Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
N/A				

4. 5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 1992.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



4. 6 Conducted Power Line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency Range (MHz)	Class A QP/AV	Class B QP/AV
0.15 – 0.5	79/66	66-56/56-46
0.5 – 5.0	73/60	56/46
5.0 - 30	73/60	60/50

NOTE : In the above table, the tighter limit applies at the band edges.

4. 7 Conducted Power Line Test Result

Owing to the DC operation of EUT, this test item is not performed.

5. Output Power Measurement

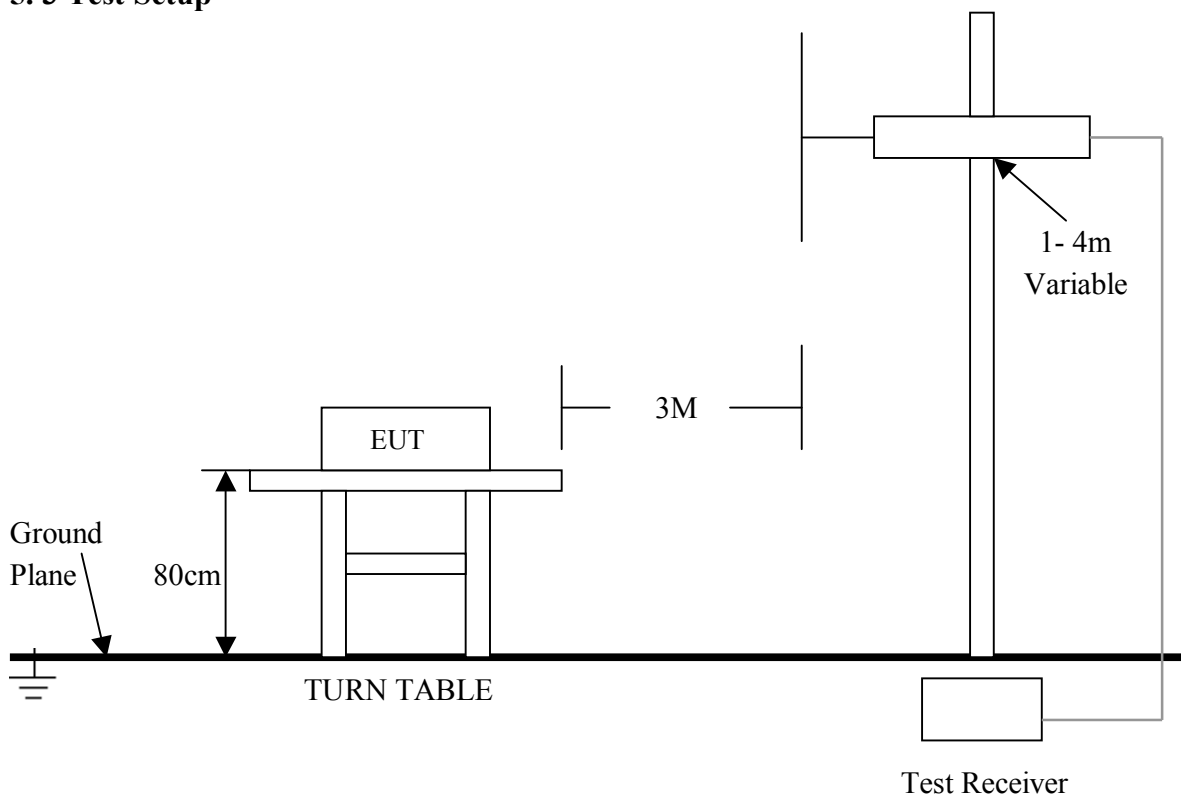
5.1 Test Equipment

Please refer to Section 12 this report.

5.2 Test Procedure

1. Setup the configuration as section 5.3 this report test setup for frequencies measured below and above 1GHz respectively. adjusting the input voltage to produce the maximum power as measured.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on test receiver, then change the orientation of EUT on test table over a range from 0 degree to 360 degree, and record the highest value indicated on test receiver as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on test receiver, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on test receiver. Record this value for result calculated.
7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

5.3 Test Setup



For the actual test configuration, please refer to the related items – Photos of Testing.

5. 4 Configuration of The EUT

Same as section 4 . 4 of this report

5. 5 EUT Operating Condition

Same as section 4 . 5 of this report.

5. 6 Rules and Specification Limits

According to § 74.861(e)(1)(i), the output power shall not exceed 50 milliwatts.

5. 7 Output Power Test Result

A. 174.1MHz (ERP)

Product	: Wireless Microphone	Test Mode	: 174.1MHz
Test Item	: Output Power Measurement	Temperature	: 25 °C
Test Voltage	: DC 3V	Humidity	: 56%RH
Test Result	: PASS		

Frequency. (MHz)	Result (dBm)	Output Power (mW)	Limit (mW)
174.1	-2.20	0.60	50.0

B. 179.3MHz (ERP)

Product	: Wireless Microphone	Test Mode	: 179.3MHz
Test Item	: Output Power Measurement	Temperature	: 25 °C
Test Voltage	: DC 3V	Humidity	: 56%RH
Test Result	: PASS		

Frequency. (MHz)	Result (dBm)	Output Power (mW)	Limit (mW)
179.3	-0.50	0.89	50.0

C. 215.2MHz (ERP)

Product	: Wireless Microphone	Test Mode	: 215.2MHz
Test Item	: Output Power Measurement	Temperature	: 25 °C
Test Voltage	: DC 3V	Humidity	: 56%RH
Test Result	: PASS		

Frequency. (MHz)	Result (dBm)	Output Power (mW)	Limit (mW)
215.2	0.13	1.03	50.0

Note: For measured frequency below 1GHz, a tuned dipole antenna is used.

5. 8 Result Calculation

Result calculation is as following:

Result = SG Reading + Cable Loss + Antenna Gain Corrected

Antenna Gain Corrected: is used for antenna other than dipole to convert radiated power to ERP.

$$\text{mW} = \log^{-1} \left[\frac{\text{Result(dBm)}}{10} \right]$$

6. Modulation Characteristics

6.1 Test Equipment

Please refer to Section 12 this report.

6.2 Test Procedure

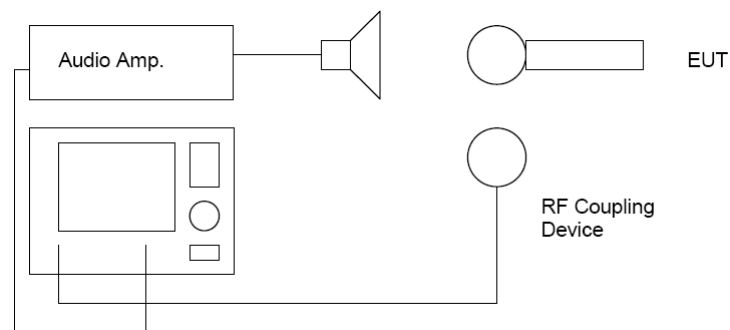
A. Audio Frequency Response

- 1) The audio signal was coupled to the microphone via a calibrated loudspeaker.
- 2) The audio signal was adjusted for 20% nominal modulation at 1 kHz. This was taken as 0 dB reference.
- 3) With input level held constant, the audio signal was varied from 100Hz to 30kHz.
- 4) The response was measured and recorded with a CMS54 Radiocommunication Tester.

B. Modulation Limit

- 1) The audio signal was coupled to the microphone via a calibrated loudspeaker.
- 2) The modulation response was measured for 100Hz to 15kHz including the frequency with maximum response found during "Audio Frequency Response Test".
- 3) The input level was varied from 30% modulation to 20 dB higher than the saturation point. The resulting deviation was measured with a CMS54 Radiocommunication Tester.
- 4) Measurements were performed for positive and negative deviation.

6.3 Test Setup

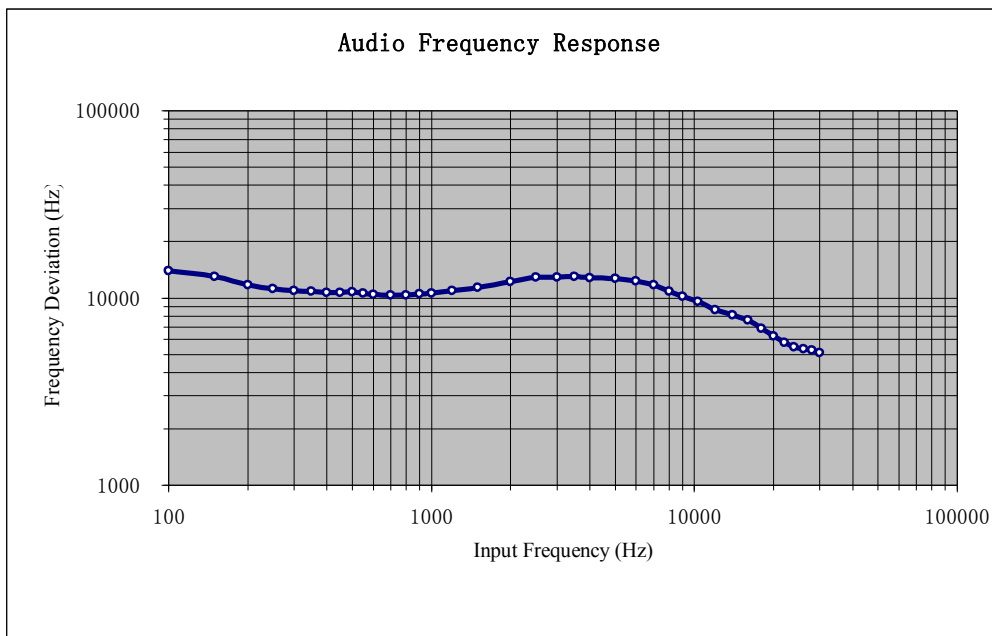


6.4 Rules and Specification Limits

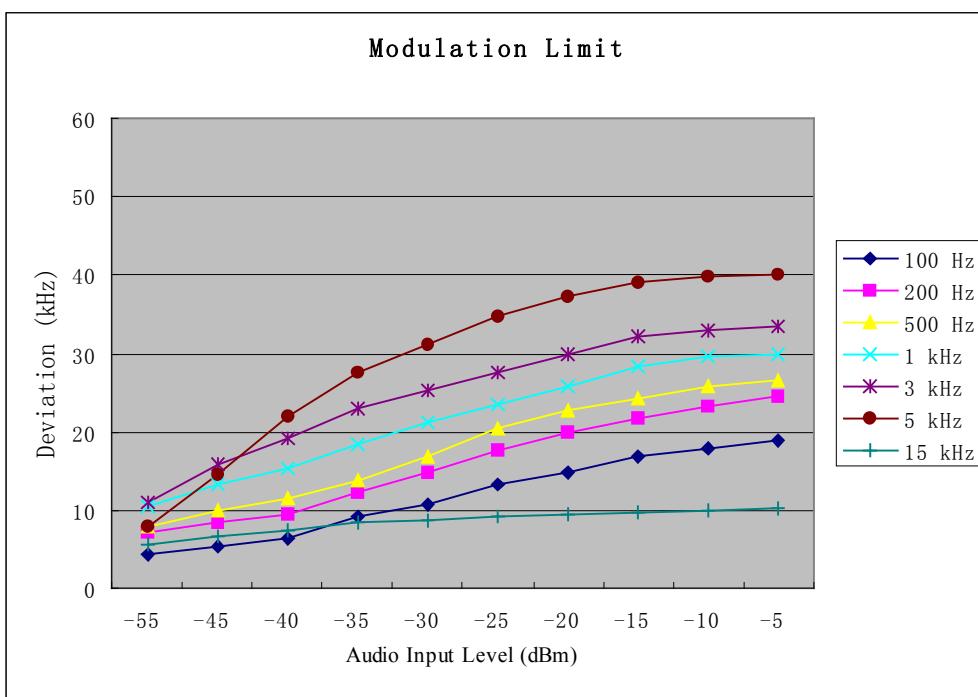
According to § 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be measured.

6.5 Test Result

A. Audio Frequency Response



B. Modulation Limit



7. Occupied Bandwidth of Emission

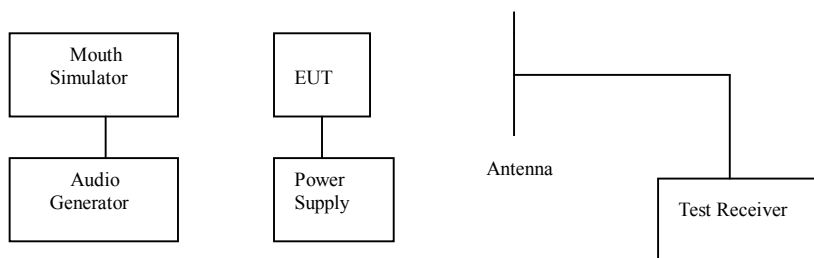
7.1 Test Equipment

Please refer to Section 12 this report.

7.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Set the output of the signal generator to 15KHz. Increase the amplitude of the signal, while monitoring the modulation meter. Until modulation is maximum measure the bandwidth under 26dB compared to the unmodulated fundamental carrier peak level of the modulated signal displayed on the test receiver

7.3 Test Setup



7.4 Rules and Specification Limits

According to § 2.1049 (c)(1): ANSI / TIA / EIA-603-1992, Paragraph 2.2.11

According to § 74.861 (e)(3), Any form of modulation may be used. A maximum deviation of ± 75 KHz is permitted when frequency modulation is employed.

According to § The operation bandwidth shall not exceed 200KHz.

7.5 Occupied Bandwidth Test Result

The occupied bandwidth's plot is presented on following pager, which illustrates compliance with the rules.

Calculation of Necessary Bandwidth (Bn)

$$B_n = 2M + 2DK$$

M = Max. Modulation Frequency = 15.0 KHz

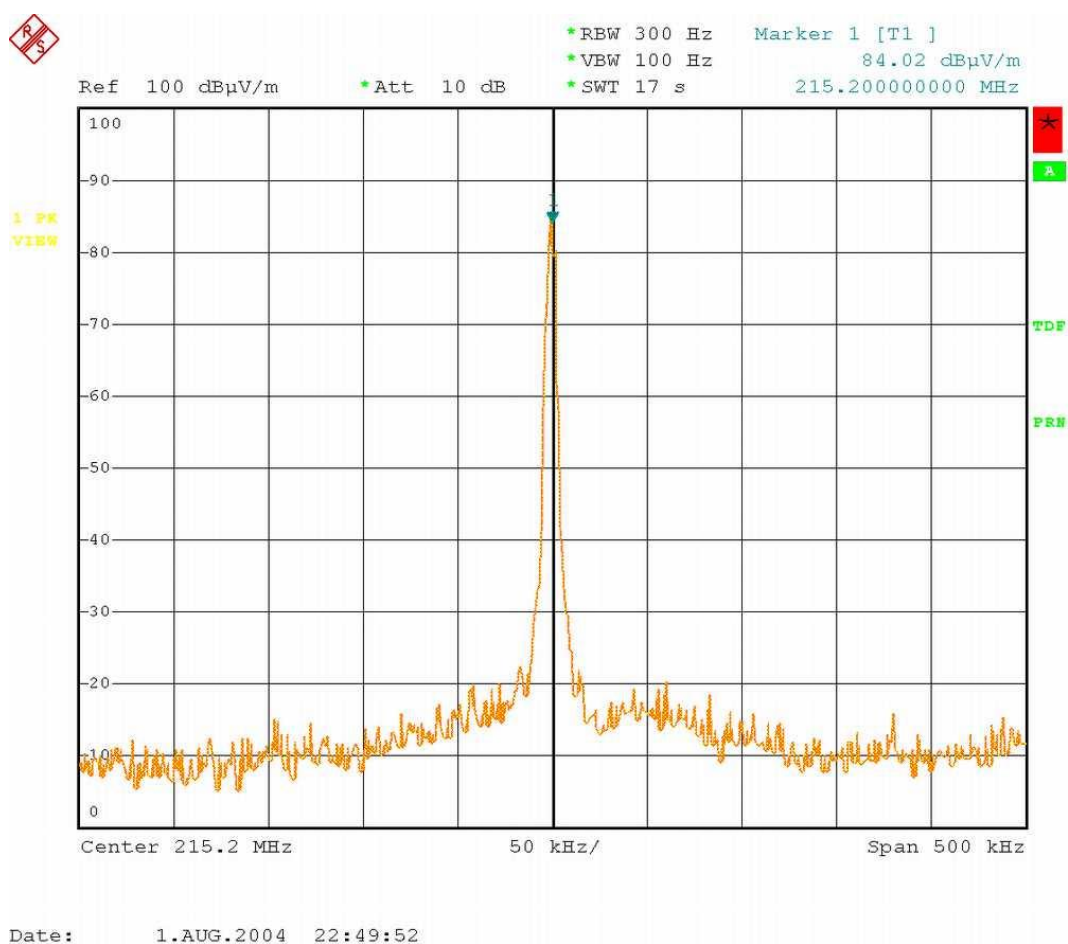
D = Peak Frequency Deviation = 40KHz

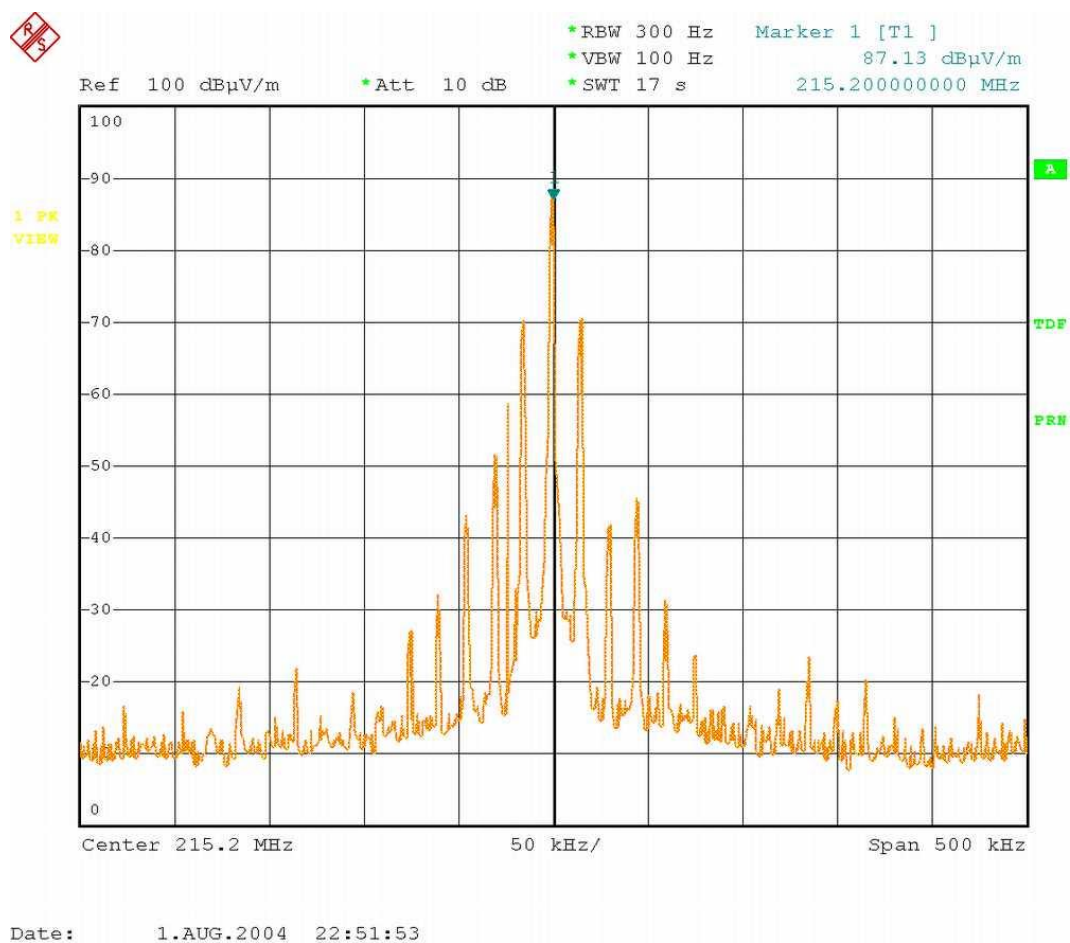
K = 1

$$B_n = 110\text{KHz}$$

Product	: Wireless Microphone	Test Mode	: 215.2MHz
Test Item	: Occupied Bandwidth Measurement	Temperature	: 25 °C
Test Voltage	: DC 3V	Humidity	: 56%RH
Test Result	: PASS		

Unmodulation



15KHz modulation

8. Field Strength of Emission

8.1 Test Equipment

Please refer to Section 12 this report.

8.2 Test Procedure

1. Setup the configuration in Section 5.3 this report for frequencies measured below and above 1GHz respectively, adjusting the input voltage to produce the maximum power as measured in Section 5 this report.
2. Adjust the test receiver for each frequency measured on a 1MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on test receiver. Then change the orientation of EUT on test table over a range from 0 degree to 360 degree, and record the highest value indicated on test receiver as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on test receiver, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on test receiver. Record this value for result calculated.
7. Repeat step 6 until all frequency need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1GHz) and search antenna in vertical polarized orientations.

8.3 Rules and Specification Limits

According to § 2.1053(a): ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.12,

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, Power leads, or intermediate circuit elements under normal conditions of installation and operation.

According to § 74.861 (e)(6)(iii):

Spurious and harmonics must be at least $43 + 10\log(\text{Output Power})$ below the carrier peak.

According to § 2.1057:

In all measurements set forth, the test receiver should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency.

8. 4 Test Result

A. 174.1MHz

Product : Wireless Microphone Test Mode : 174.1MHz
 Test Item : Field Strength of Emission Temperature : 25 °C
 Test Voltage : DC 3V Humidity : 56%RH
 Test Result : **PASS**

Unmodulated carrier output power is -2.20 dBm, or 0.6 mW(ERP). The limit of spurious or harmonics is calculated as following:

$$-2.20 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency. (MHz)	Result (dBm) Hori. / Vert.	Limit (dBm)	Margin (dB) Hori. / Vert.
348.200	-68.2 / -63.2	-13.0	-55.2 / -50.2
522.320	-66.5 / -59.1	-13.0	-53.5 / -46.1
696.400	-64.4 / -62.5	-13.0	-51.4 / -49.5
870.520	-60.1 / -54.9	-13.0	-47.1 / -41.9
1044.600	-59.6 / -58.8	-13.0	-46.6 / -45.8
1741.000	-65.4 / -63.1	-13.0	-52.4 / -50.1

- Note:**
- (1) For measured frequency below 1GHz, a tuned dipole antenna is used.
 - (2) Result calculation is as following:
 Result = SG Reading + Cable Loss + Antenna Gain Corrected.
 Antenna Gain Corrected: is used for antenna other than dipole to convert radiated power to ERP.
 - (3) Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60dB from limit value.

B. 179.3MHz

Product : Wireless Microphone Test Mode : 179.3MHz
 Test Item : Field Strength of Emission Temperature : 25 °C
 Test Voltage : DC 3V Humidity : 56%RH
 Test Result : **PASS**

Unmodulated carrier output power is -0.50 dBm, or 0.89 mW(ERP). The limit of spurious or harmonics is calculated as following:

$$-0.50 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency. (MHz)	Result (dBm) Hori. / Vert.	Limit (dBm)	Margin (dB) Hori. / Vert.
358.600	-73.4 / -70.2	-13.0	-60.4 / -57.2
537.900	-69.2 / -66.6	-13.0	-56.2 / -53.6
717.200	-69.5 / -67.8	-13.0	-56.5 / -54.8
896.500	-69.0 / -62.6	-13.0	-56.0 / -49.6
1075.800	-63.1 / -59.3	-13.0	-50.1 / -46.3
1793.000	-61.5 / -60.4	-13.0	-48.5 / -47.4

- Note:**
- (1) For measured frequency below 1GHz, a tuned dipole antenna is used.
 - (2) Result calculation is as following:
 Result = SG Reading + Cable Loss + Antenna Gain Corrected.
 Antenna Gain Corrected: is used for antenna other than dipole to convert radiated power to ERP.
 - (3) Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60dB from limit value.

C. 215.2MHz

Product	: Wireless Microphone	Test Mode	: 215.2MHz
Test Item	: Field Strength of Emission	Temperature	: 25 °C
Test Voltage	: DC 3V	Humidity	: 56%RH
Test Result	: PASS		

Unmodulated carrier output power is 0.13 dBm, or 1.03mW(ERP). The limit of spurious or harmonics is calculated as following:

$$0.13 - [43 + 10\log(\text{carrier output power in W})], \text{ or } -13\text{dBm}$$

Frequency. (MHz)	Result (dBm) Hori. / Vert.	Limit (dBm)	Margin (dB) Hori. / Vert.
430.400	-58.2 / -58.9	-13.0	-45.2 / -45.9
645.600	-58.7 / -62.6	-13.0	-45.7 / -49.6
860.800	-65.3 / -61.0	-13.0	-52.3 / -48.0
1076.000	-72.1 / -69.4	-13.0	-59.1 / -56.4
1291.200	-76.0 / -74.1	-13.0	-63.0 / -61.1
2015.200	-70.6 / -68.1	-13.0	-57.6 / -55.1

- Note:**
- (1) For measured frequency below 1GHz, a tuned dipole antenna is used.
 - (2) Result calculation is as following:
Result = SG Reading + Cable Loss + Antenna Gain Corrected.
Antenna Gain Corrected: is used for antenna other than dipole to convert radiated power to ERP.
 - (3) Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60dB from limit value.

9. Frequency Stability Measurement

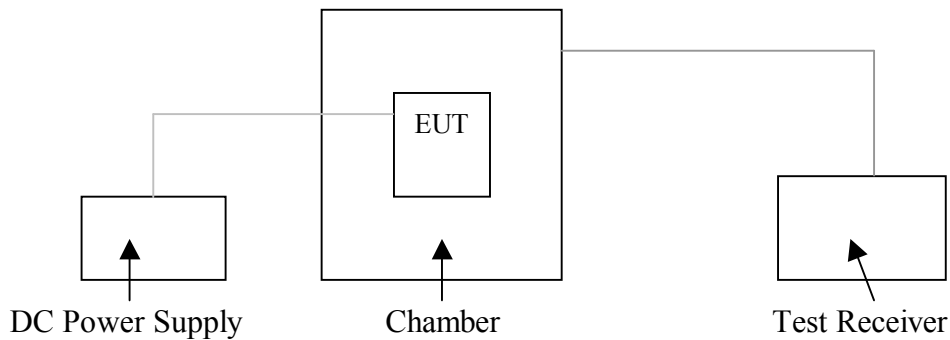
9.1 Test Equipment

Please refer to Section 12 this report.

9.2 Test Procedure

1. Place the EUT in the chamber, powered in its normal operation.
2. Set the temperature of the chamber -30 degree Centigrade. Allow the equipment to stabilize at that temperature.
3. Measurement the carrier frequency using preamplifier and frequency counter.
4. Repeated procedures 1 to 3 from -20 to 50 degree Centigrade at intervals of 10 degree.

9.3 Test Setup



9.4 Rules and Specification Limits

According to § 2.1055 (a)(1), The frequency stability shall be measured with variation of ambient temperature from -30°C to $+50^{\circ}\text{C}$ centigrade, and according to § 2.1055 (d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to § 74.861: The frequency tolerance of the transmitter shall be 0.005 percent.

9.5 Test Result

Frequency stability versus environment temperature

Handle Microphone Transmitter: DC3V

Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measured (MHz)	Frequency Tolerance (ppm)	Nominal Frequency	Limit (ppm)
50	New Batt.	179.2935	-36.25	179.3000	50
40	New Batt.	179.2931	-38.48	179.3000	50
30	New Batt.	179.2965	-19.52	179.3000	50
20	New Batt.	179.2995	-2.78	179.3000	50
10	New Batt.	179.2986	-7.80	179.3000	50
0	New Batt.	179.3069	38.48	179.3000	50
-10	New Batt.	179.3073	40.71	179.3000	50
-20	New Batt.	179.3081	45.17	179.3000	50

Frequency stability versus end-point supplied voltage (2Vdc)

Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measured (MHz)	Frequency Tolerance (ppm)	Nominal Frequency	Limit (ppm)
25	End-Point	179.2990	-5.77	179.3000	50

10. Photos of Testing

10. 1 EUT Test Photographs

Radiated emission test view



10. 2 EUT Detailed Photographs

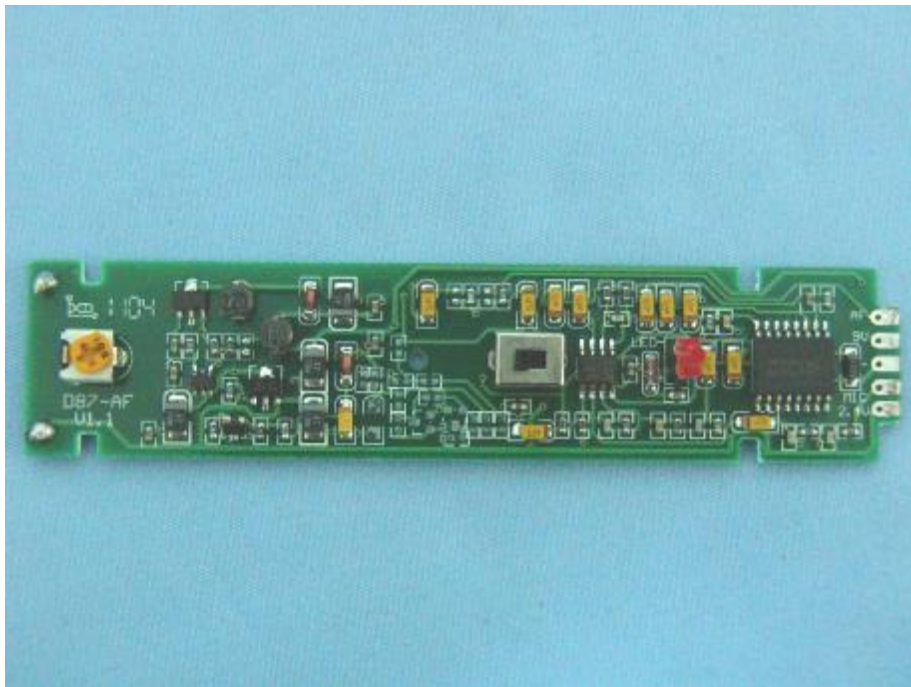
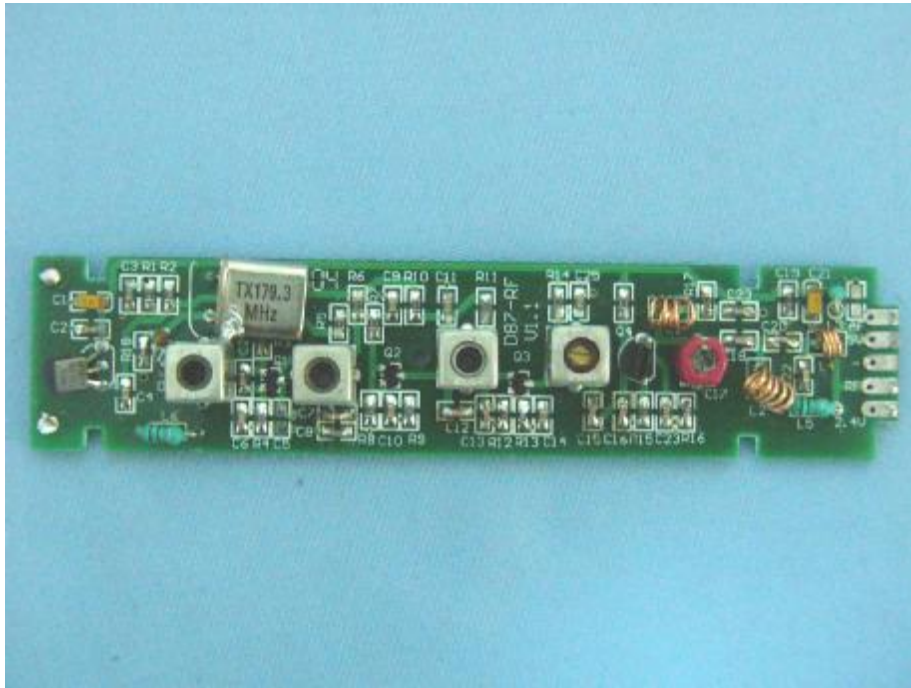
EUT view



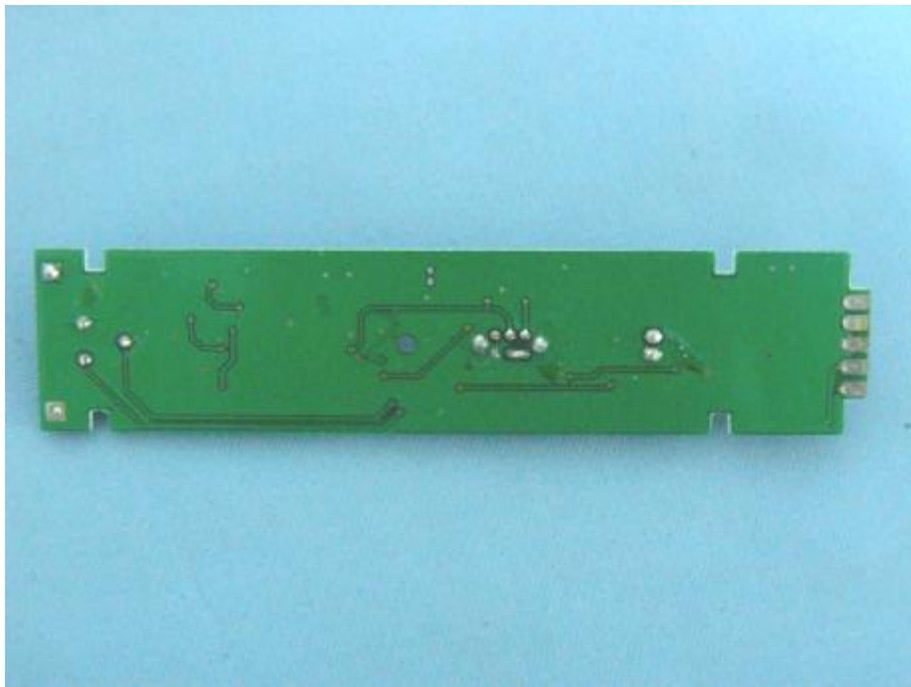
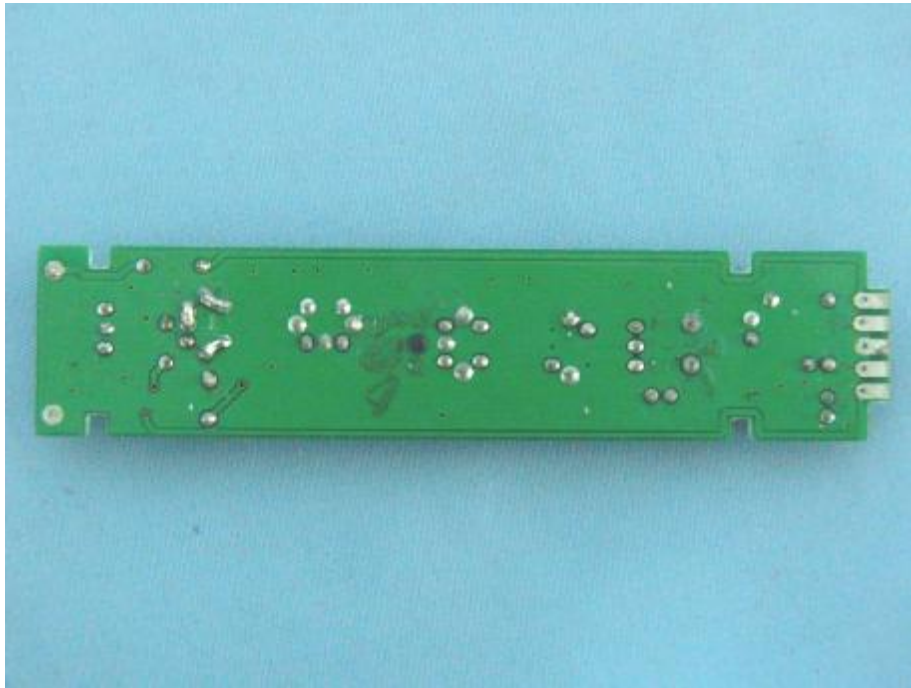
EUT inside whole view

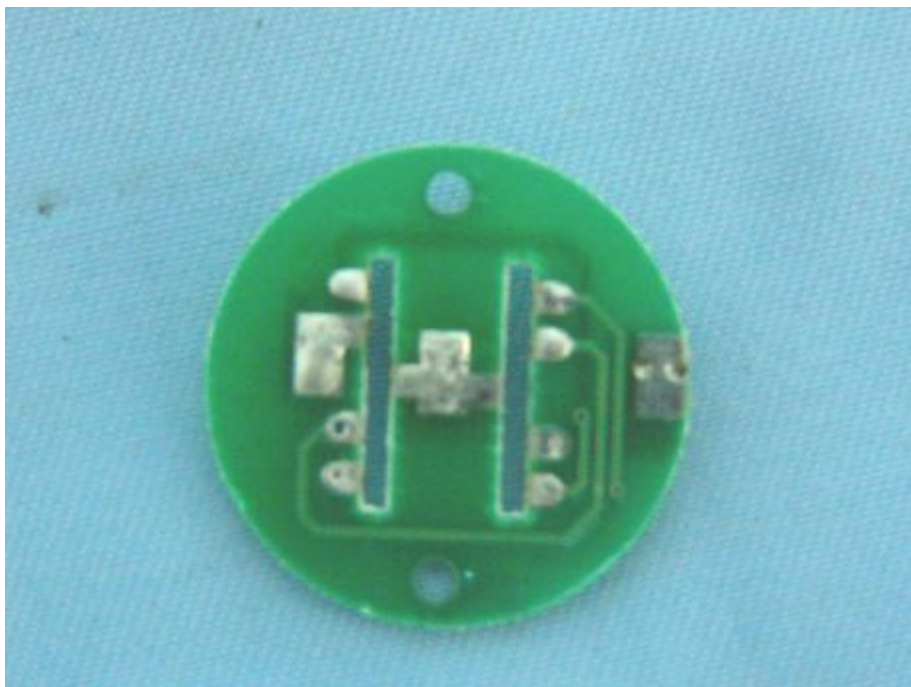
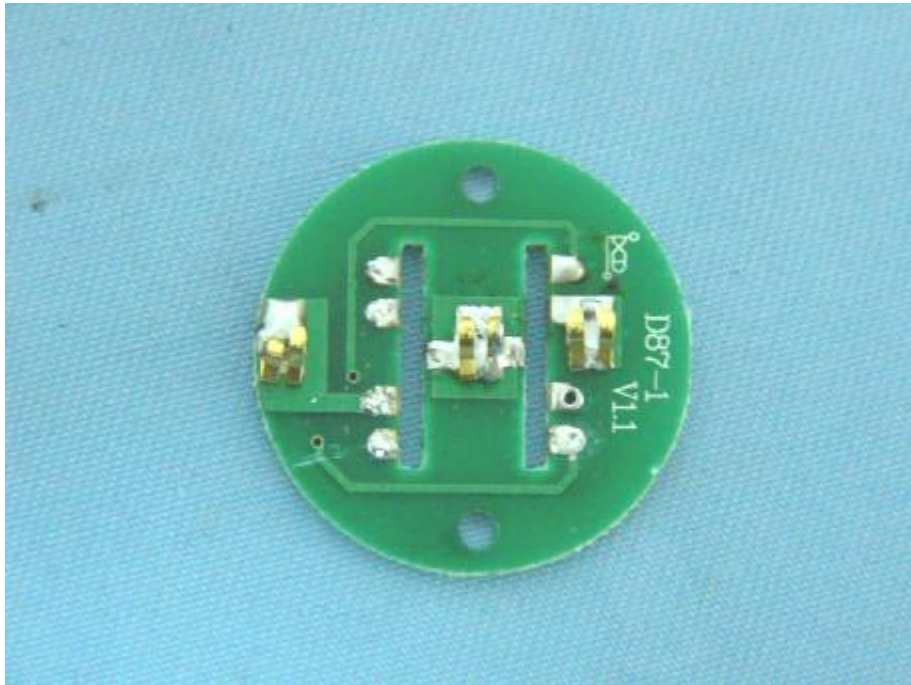


EUT Main board component side



EUT Main board solder side





11. FCC ID Label

FCC ID: RFP-DX87

This device complies with Part 74 of the FCC Rules.

The Label must not be a stick-on paper label. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT

EUT Bottom View/Proposed FCC ID Location



12. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Date of Cal.	Due Date
Turntable	KMO	KSZ001T	200306	NCR	NCR
Antenna Tower	KMO	KSZ002AT	200307	NCR	NCR
OATS	KMO	KSZSITE001	N/A	July 06, 2003	July 06, 2004
EMI Test Receiver	Rohde & Schwarz	ESPI3	100180	Oct.18, 2003	Oct.18, 2004
Signal Generator	Rohde & Schwarz	SMT03	100059	Feb.01, 2004	Feb.01, 2005
Bilog Antenna	Chase	CBL6111C	2576	Feb.01, 2004	Feb.01, 2005
Ultra Broadband Antenna	Rohde & Schwarz	HL 562	100110	June.05, 2003	June.05, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct. 23,2003	Oct. 23, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct. 23,2003	Oct. 23, 2004
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
KMO Shielded Room	KMO	KMO-001	N/A	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb. 27, 2003	Feb.27, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100002	Feb. 01, 2004	Feb.01, 2005
LISN	Kyoritsu	KNW-407	8-1441-8	Feb. 23, 2003	Feb.23, 2004
EMI Test Receiver	Rohde & Schwarz	ESI26	838786/013	Feb. 01, 2004	Feb.01, 2005
Bilog Antenna	Chase	CBL6112B	2591	Feb. 01, 2004	Feb.01, 2005
Horn Antenna	Rohde & Schwarz	HF906	100014	Feb. 01, 2004	Feb.01, 2005
Power Meter	Rohde & Schwarz	NRVD	100041	Feb. 01, 2004	Feb.01, 2005
Radio Communication Test Set	IFR	2955B	100015	Feb 01, 2004	Feb 01, 2005
Multifunction Synthesizer	Hewlett-Packard	8904A	100016	Feb 01, 2004	Feb 01, 2005
Temperature Chamber	TABAI	PSL-4GTW	N/A	Feb 06,2004	Feb 06, 2005
3m Semi-Anechoic Chamber	Albatross Projects	9mX6mX6m	N/A	Feb. 01, 2004	Feb.01, 2005