SGS-CSTC Standards Technical Services Ltd.

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FEDERAL COMMUNICATIONS COMMISSION
Registration number: 282399

FCC TEST REPORT

Application No. : 04.05.1056EF

Applicant : International SMC(HK) Ltd

FCC ID : QNISMM-112-T

Fundamental Frequency : 171.905MHz

Equipment under Test (EUT):

Name : Uni-direction Dynamic VHF Wireless Headset Microphone

Model : SMM-112

Standards : FCC PART 90: 1997 (Section 90.265)

Date of Receipt : 12 May 2004

Date of Test : 20 May to 25 June 2004

Date of Issue : 05 July 2004

Test Result :	**PASS ***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Kent Hsu
Laboratory Manager
SGS-CSTC Co.,Ltd.

2 Contents

3 General Information

3.1 Client Information

Applicant:	International SMC(HK) Ltd
Address of Applicant:	Suite 1210, Ocean Centre, 5 Canton Road, TST, Kowloon, HongKong.

3.2 Details of E.U.T.

Product Name:	Uni-direction Dynamic VHF Wireless Headset Microphone (Transmitter Part)
Model:	SMM-112
Power Supply:	9Vdc (1 x 6F22 Manganin-Zincic alkaline battery) for Transmitter

3.3 Description of Support Units

The EUT was tested as a 171.905MHz wireless microphone.

3.4 Test Location

All tests were performed at:-

SGS-CSTC Standards Technical Services Ltd., Guangzhou Safety & EMC Laboratory, 1/F, Building No. 1, Agriculture Machinery Materials Company Warehouse Ltd., Wushan Road Shipai, Tianhe District, Guangzhou, China. P.C. 510630.

Tel: +86 20 3848 1001

Fax: +86 20 3848 1006

3.5 Other Information Requested by the Customer

None.

3.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP – Lab Code: 200611-0**
  SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 2000611-0. Effective through December 31, 2004.
- **ACA**
  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.
- **VCCI**
  The 3m Semi-anechoic chamber and Shielded Room (11.5m x 4m x 4m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-1599 and C-1706 respectively.
  Date of Registration: February 28, 2003. Valid until May 30, 2005
- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FINKO**
  Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.
- **CNAL – LAB Code: L0141**
  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of Testing Laboratories.
- **FCC – Registration No.: 282399**
  SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002. With the above and NVLAP, SGS-CSTC is an authorized test laboratory for the DoC process.
- **Industry Canada (IC)**
  The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5169

4 Test Results

4.1 Test Instruments

Test Equipment	Manufacturer	Model	Asset No.	Cal. Due Date
Temperature, Humidity & Barometer	Oregon Scientific	BA-888	EMC0003	24-07-2004
3m Semi- Anechoic Chamber	Frankonia	N/A	EMC0501	04-12-2004
EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	EMC0506	04-11-2004
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 30	EMC0521	01-04-2005
Bilog Type Antenna	Schaffner Chase	CBL6143	EMC0519	01-12-2005
Horn Antenna	ROHDE & SCHWARZ	HF906	EMC0517	01-04-2005
Peramplifier	Agilent	8449B	EMC0520	30-06-2005
Coaxial cable	SGS	N/A	EMC0514	30-06-2005
1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	25-01-2005
Signal Generator	Philips	PM5134	EMC0902	05-06-2005

4.2 E.U.T. Operation

Operating Environment:
Temperature: 24.0 °C
Humidity: 50 % RH
Atmospheric Pressure: 1006 mbar

4.3 Test Procedure & Measurement Data

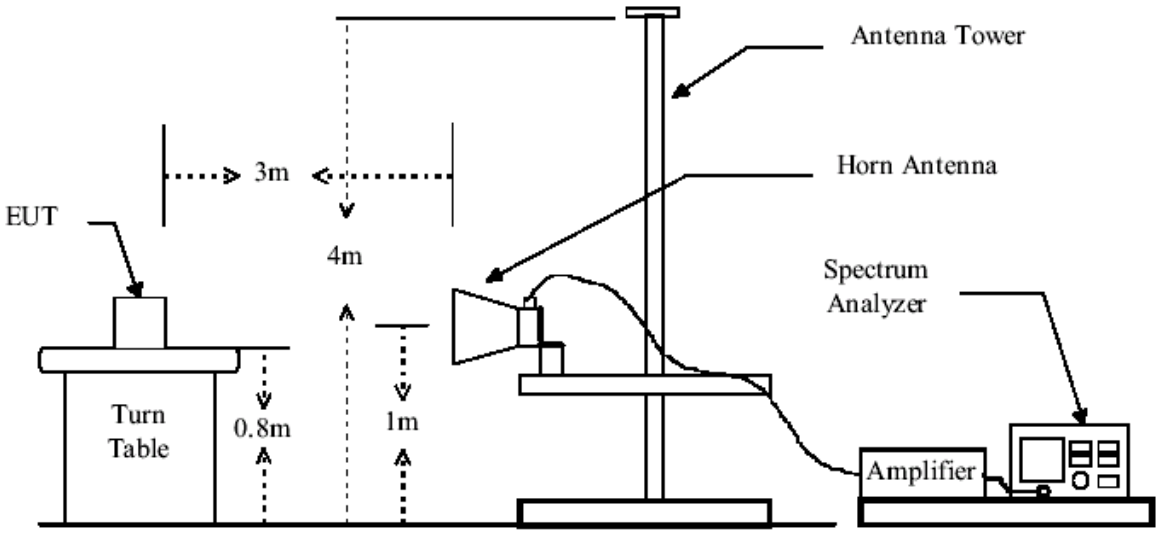
4.3.1 Power Output

Test Requirement: FCC Part 90
Test Method: ANSI 63.4, Section 2.1046
Test Date: 10 June 2004
Measurement Distance: 3m (Semi-Anechoic Chamber)
Frequency range 30 MHz – 2.0GHz for transmitting mode.
Test instrumentation resolution bandwidth 120 kHz (30 MHz - 1000 MHz)
1 MHz (1000 MHz – 2.0GHz)

Receive antenna scan height 1 m - 4 m, polarization Vertical/Horizontal

Requirements: The output power shall not exceed 50 milliwatts.

Test Configuration:



Test Procedure:

The technique used to find the output power of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP emission levels of the EUT.
The following test procedure as below:

1. The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length.

2. The fundamental frequency (171.905MHz) of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3. Steps 1 and 2 were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4. The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5. A signal at the fundamental frequency (171.905MHz) was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2 is obtained for this set of conditions.

6. The output power into the substitution antenna was then measured.

7. Steps 5 and 6 were repeated with both antennas polarized.

Test Result:

Test Frequency (MHz)	Test Level (dBm)	Output Power (mW)	Limit (mW)
171.905	-12.2	0.14	50.0

TEST RESULTS: The unit does meet the FCC requirements.

4.3.2 Filed Strength of Spurious Radiation

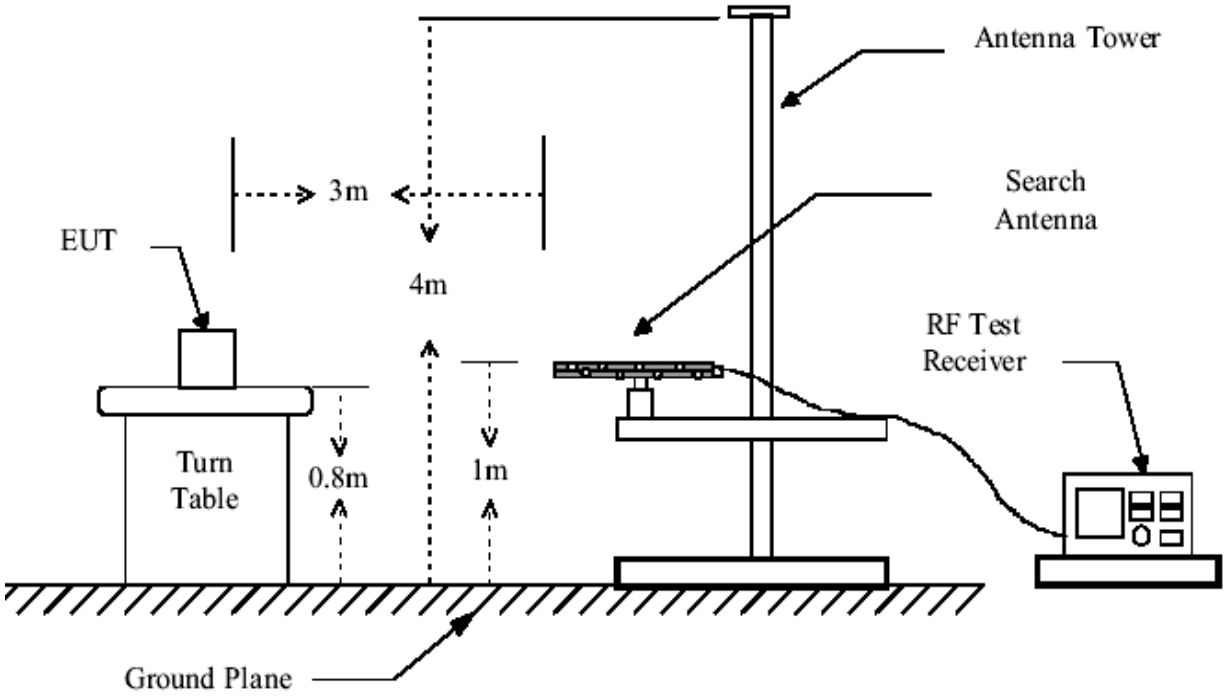
Test Requirement: FCC Part 90
Test Method: ANSI 63.4, Section 2.1053
Test Date: 10 June 2004
Measurement Distance: 3m (Semi-Anechoic Chamber)
Frequency range 30 MHz – 2.0GHz for transmitting mode.
Test instrumentation resolution bandwidth 120 kHz (30 MHz - 1000 MHz)
1 MHz (1000 MHz – 2.0GHz)

Receive antenna scan height 1 m - 4 m, polarization Vertical/Horizontal

Requirements:

The power of each unwanted emission should be less than the transmitter power (P) by at least 43+10Log(P) on any frequency removed from the center of the authorized bandwidth by more than 250%. Or –13.0dBm.

Test Configuration:



Test Procedure:

The technique used to find the output power of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP emission levels of the EUT.

The following test procedure as below:

1. The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length.

2. The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3. Steps 1 and 2 were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4. The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5. A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2 is obtained for this set of conditions.

6. The output power into the substitution antenna was then measured.

7. Steps 5 and 6 were repeated with both antennas polarized.

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Test Result:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier .
The basic equation with a sample calculation is as follows:
The transmitter complied with the radiated spurious requirement and the following table contains the 10highest spurious emissions.

Harmonics & Spurious Emissions

Test Frequency (MHz)	Signal Generator Reading (dBm)		Limits (dBm)	Margin (dB)	
	Vertical	Horizontal		Vertical	Horizontal
57.300	-48.2	-55.2	-13.0	35.2	42.2
114.600	-39.5	-45.8	-13.0	26.5	32.8
229.200	-46.7	-70.0	-13.0	33.7	57.0
286.500	-58.8	-42.7	-13.0	45.8	29.7
343.800	-32.6	-70.0	-13.0	19.6	57.0
401.100	-31.8	-70.0	-13.0	18.8	57.0
458.400	-32.7	-70.0	-13.0	19.7	57.0
515.700	-48.9	-70.0	-13.0	35.9	57.0
573.000	-46.8	-70.0	-13.0	33.8	57.0
630.300	-45.2	-70.0	-13.0	32.2	57.0
687.600	-46.7	-70.0	-13.0	33.7	57.0
744.900	-43.7	-70.0	-13.0	30.7	57.0
802.200	-42.0	-70.0	-13.0	29.0	57.0
859.500	-52.6	-70.0	-13.0	39.6	57.0
1031.400	-50.8	-70.0	-13.0	37.8	57.0
1203.300	-47.2	-70.0	-13.0	34.2	57.0
1375.200	-49.6	-70.0	-13.0	36.6	57.0
1547.100	-63.6	-70.0	-13.0	50.6	57.0
1719.000	-65.8	-70.0	-13.0	52.8	57.0

Remark:

–70dBm is the minimum level can be detected by measuring Reciver.

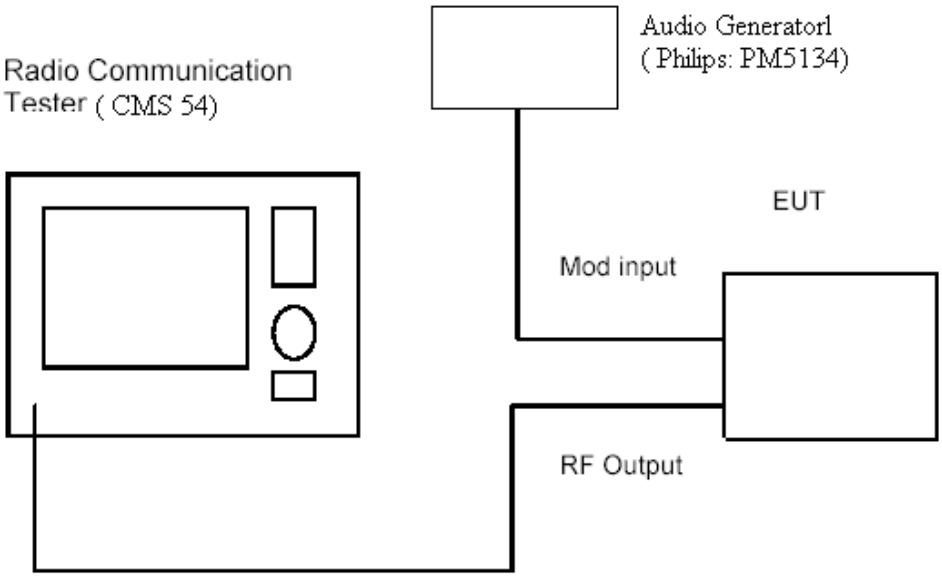
TEST RESULTS: The unit does meet the FCC requirements.

4.3.3 OCCUPIED BANDWIDTH

Test Requirement: FCC Part 90
Test Method: TIA/EIA-603-AParagraph 2.2.1; Section 2.1049
Test Date: 21 June 2004 (Final Test)

Requirements: The emission bandwidth shall not exceed 54 kHz.

Test Configuration:



Method of measurement:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Other than single side band or independent sideband transmitters when modulated by a 2500Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

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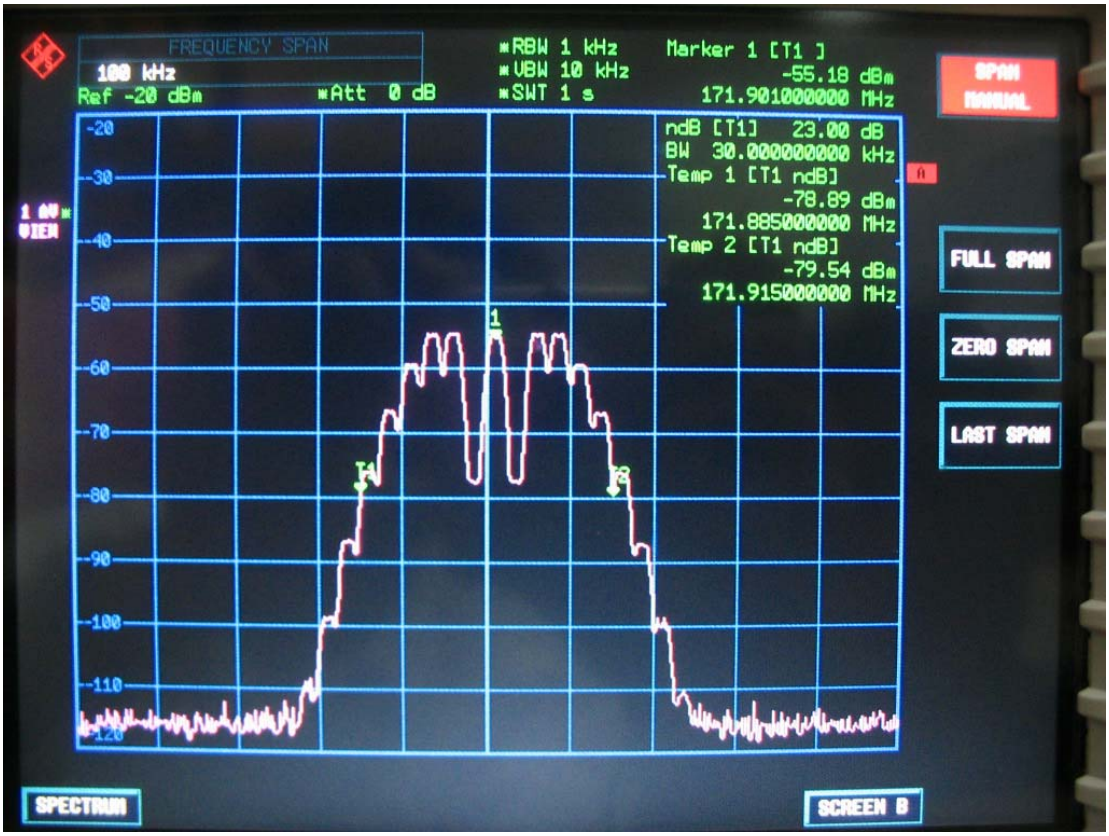
The graph as below, represents the emissions take for this device.



The emission bandwidth is 32 KHz , it's less than 54 kHz

The results: The unit does meet the FCC requirements.

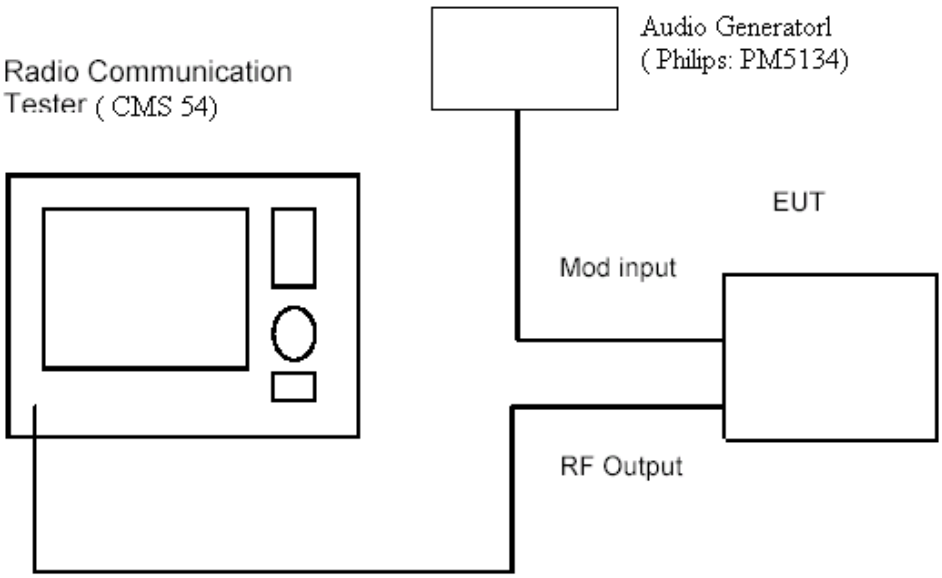
4.3.4 Modulation Characteristics:

Test Requirement:	FCC Part 90
Test Method:	ANSI/TIA/EIA-603,Paragraph 2.2.6.2.2, Paragraph 2.2.3; Section2.1047
Test Date:	21 June 2004

Requirements:

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Test Configuration:



4.3.4.1 Audio Frequency Response

Method of measurement:

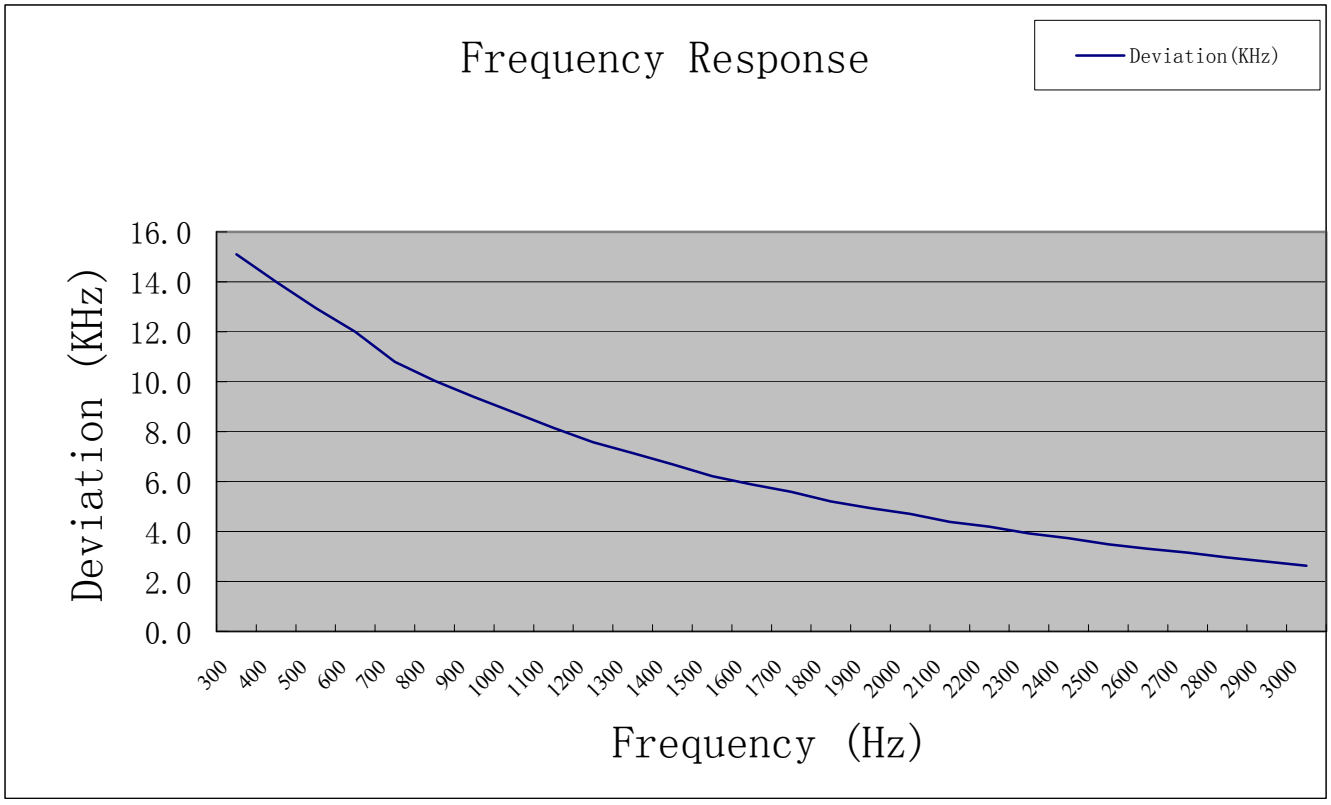
TIA/EIA-603 Paragraph 2.2.6.2.2 procedure was used for modulation characteristics. The constant input test method was used to measure the frequency response from 300 to 3000 Hz. The deviation was measure with a CMS 54.

The following steps were done:

1. Adjusted the transmitter per the manufacture's procedure for full rated system deviation.
2. Apply a 1000 Hz tone and adjusted the audio frequency generator to produce 20% of the rated system deviation.
3. Set the test receiver to measure rms deviation and record the deviation reading as DEVref.
4. Set the audio frequency generator to the desired test frequency between 300 and 3000 Hz.
5. Recorded the test receiver deviation reading as DEVfreq.
6. Calculated the audio frequency response at the present frequency as:

   Audio Frequency response = 20 * log10 (DEVfreq / DEVref)

7. Repeated steps 4 through 6 for all other test frequencies.



4.3.4.2 Modulation Limiting

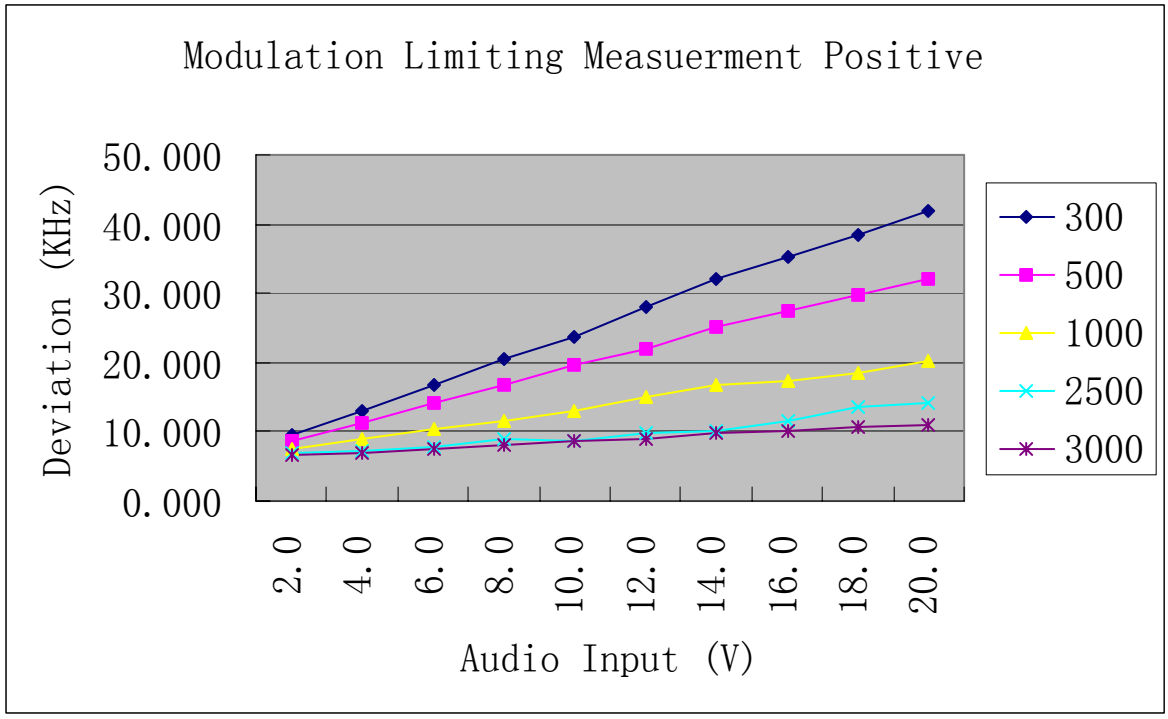
Method of measurement:

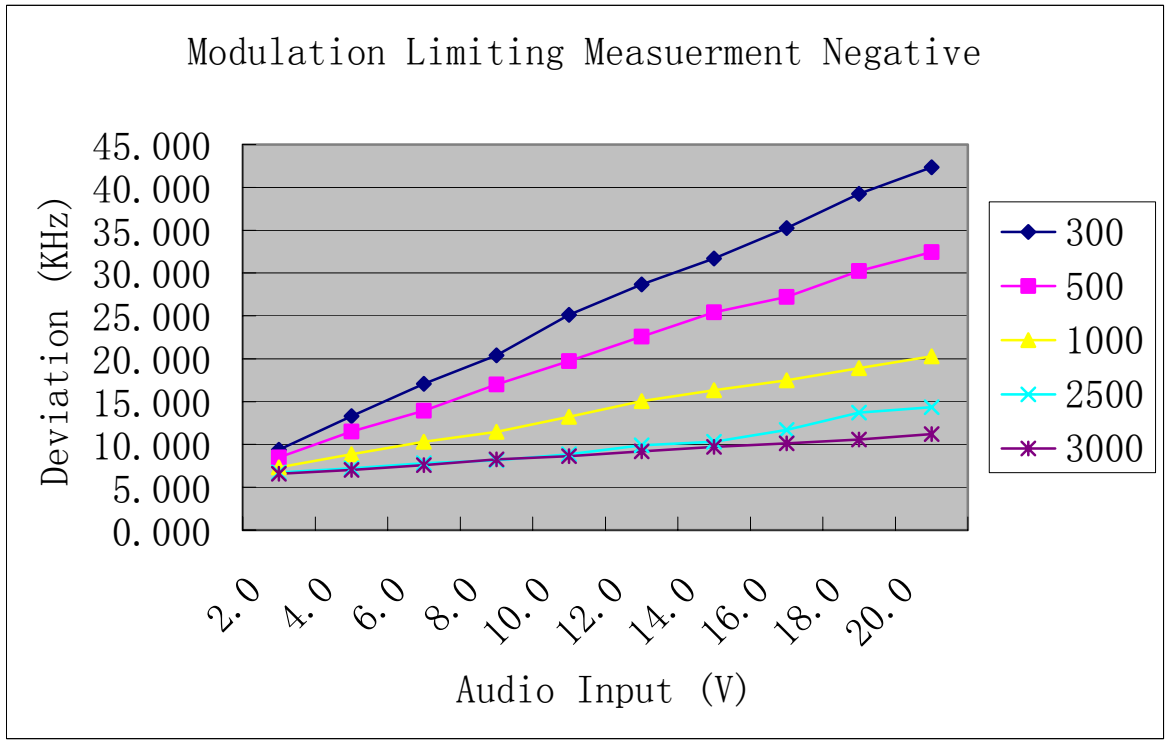
ANSI/TIA/EIA-603-A 2001, Paragraph 2.2.3 procedure was used for modulation limiting. Modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of a rated system deviation.

The following steps were done:

1. Adjusted the transmitter per the manufacture's procedure for full rated system deviation.
2. Set the test receiver to measure peak positive deviation. Set the audio bandwidth for <= 0.25Hz to >= 15,000 Hz. The the de-emphaisi function off.
3. Apply a 1000Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation.
4. Increase the level from the audio frequency generator by 20dB in one step (rise time betweem the 10% and 90% points shall be 0.1 second maximum).
5. With the level from the audio frequency generator held constant at the level obstained in step 4, slowly vary the audio frequency from 300Hz to 3000Hz and observe the steady-state deviation . Record the maximum deviation.
6. Repeated steps 3 to 5 through 6 measure peak negative deviation.

Test Result:


Modulation Limiting Measuerment Positive
Deviation (KHz)
50.000
40.000
30.000
20.000
10.000
0.000
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Audio Input (V)
300
500
1000
2500
3000


Modulation Limiting Measuerment Negative
Deviation (KHz)
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0.000
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
Audio Input (V)
300
500
1000
2500
3000

4.3.5 Frequency Stability

Test Requirement: FCC Part 90

Test Method: Part 2.1055

Test Date: 21 June 2004

Requirements:
Section 90.265(b)(3): The frequency stability of wireless microphones shall limit the total emission to within ±32.5 kHz of the assigned frequency.
Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the assigned carrier frequency.

Test Method:
Frequency measurements were made as follows:
(a) at 10 degree intervals of temperatures between -30ºC and +50ºC at the manufacturer's rated supply voltage, and
(b) at +20ºC temperature and ±15% supply voltage variations.
Note, for handheld equipment that is only capable of operating from internal batteries, reduce the primary supply voltage to the battery operating end point. The manufacturer should specify the battery operating endpoint voltage of the equipment.

Test Results:
The transmitter complied with the frequency stability requirements.
The tables below show the test results.

Frequency Stability vs. Temperature

Assigned Frequency(MHz)	Temperature (°C)	Measured Frequency(MHz)	Frequency Deviation (KHz)	Limit (KHz)
171.9050	-30	171.9031	1.9	32.5
	-20	171.9033	1.7	32.5
	-10	171.9051	0.1	32.5
	0	171.9056	0.6	32.5
	+10	171.9058	0.8	32.5
	+20	171.9052	0.2	32.5
	+30	171.9063	1.3	32.5
	+40	171.9040	1.0	32.5
	+50	171.9043	0.7	32.5

Frequency Stability vs. End Point Supply Voltage

Nominal Voltage: 9.0VDC Temperature: 20°C

Assigned Frequency (MHz)	End Point Voltage (V)	Measured Frequency (MHz)	Frequency Deviation (KHz)	Limit (KHz)
171.9050	4.2	171.9012	3.8	32.5