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FEDERAL COMMUNICATIONS COMMISSION

Registration number: 282399

Report No.: GLEMR070601904RFT

Page: 1 of 14

FCC ID: U6WSMM112AB

TEST REPORT

Application No. : GLEMR070601904RF
Applicant: SMC (Comercial Offshore De Macau) Limitada.
FCC ID: U6W-SMM112AB
Assigned Frequency: 171.905MHz; 171.105MHz♣
♣ refer to the section 2 for the details
Equipment Under Test (EUT):
Name: Uni-Directional Dynamic VHF Wireless Headset Microphone
Model No.: SMM112
Standards: FCC PART 90: 2006 (Section 90.265)
FCC PART 2 : 2006 (Section 2.1047)
Date of Receipt: July 11 2007
Date of Test: July 11 2007 to July 30 2007
Date of Issue: July 31 2007

Test Result :	PASS *
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



2007 - July

Stephen Guo
Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

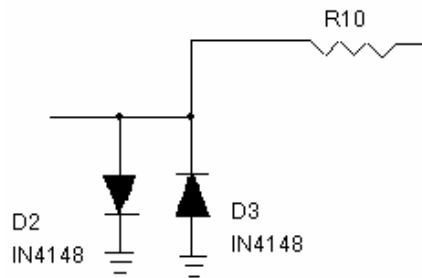
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2 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Carrier Radiated Power	FCC PART 90	Section 90.265(b)	PASS
Radiated Spurious Emission	FCC PART 90	Section 90.210(b)	PASS
Occupied Bandwidth	FCC PART 90	Section 90.265(b)	PASS*
Frequency Stability	FCC PART 90	Section 90.265(b)	PASS
Modulation Characteristics	FCC PART 2	Section 2.1047	PASS

Remark:

- ♣ The EUT have a pair set with a model is 171.905MHz and other one is 171.105MHz. Only the crystal is different, any other PCB and configuration are the same. So only test the 171.905MHz model for the test report and the certification.
- *. The EUT passed Occupied Bandwidth test after modification carried out as below:



Replace the resistor R10 with a new one which is 470 Ω .



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4 General Information

4.1 Client Information

Applicant: SMC (Comercial Offshore De Macau) Limitada.
Address of Applicant: Avenida da Praia Grande No. 371, Edificio Comercial Keng Ou, 11 andar C, Macau, China
Manufacturer: Sea Tune Communication Co., Ltd.
Address of Manufacturer: Zhong Xin Cun Lu, Longhu Industrial Area, Shui Kou Town, Hui Zhou, Guangdong, China.

4.2 Details of E.U.T.

Name: Uni-Directional Dynamic VHF Wireless Headset Microphone
Model No.: SMM112
Power Supply: 9V DC (1×'6F22' Side Battery)
Power Cord: N/A
Main Function: Wireless microphone system with an associated receiver for transmitting voice.

4.3 Description of Support Units

The EUT was tested as an independent 171.905MHz radio transmitter.

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory, No.198 Kezhu Road, Science Town Economic & Technology Development District Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Other Information Requested by the Customer

None.



4.6 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: 200611-0.

- **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's accreditation, SGS-CSTC is an authorized test laboratory for the DoC process.



5 Test Results

5.1 Test Instruments

RE in Chamber/OATS						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	06-03-2007	06-03-2008
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	05-12-2006	05-12-2007
N/A	EMI Test Software	Audix	E3	N/A	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	04-12-2006	04-12-2007
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	12-08-2007	12-08-2008
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	12-08-2007	12-08-2008
EMC0517	Horn Antenna	Rohde & Schwarz	HF906	100095	12-08-2007	12-08-2008
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	05-12-2006	05-12-2007
EMC0520	0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	28-03-2007	28-03-2008
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	28-03-2007	28-03-2008
EMC0523	Active Loop Antenna	EMCO	6502	00042963	09-08-2006	09-08-2008
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	22-08-2006	22-08-2007

General used equipment						
No:	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
EMC0050-EMC0053	Temperature, & Humidity	ZHENGZHOU BO YANG	WSB	N/A	05-12-2006	05-12-2007
EMC0054	Temperature, & Humidity	Shenzhen Tai Kong	THG-1	N/A	04-01-2007	04-01-2008
EMC0006	DMM	Fluke	73	70681569	27-09-2006	27-09-2007
EMC0007	DMM	Fluke	73	70671122	27-09-2006	27-09-2007



5.2 E.U.T. Operation

Operating Environment:

Temperature: 25.0 °C~30 °C

Humidity: 56 ~68% RH

Atmospheric Pressure: 980~1012 mbar

EUT Operation: Test the EUT in transmitting mode.

5.3 Test Procedure & Measurement Data

5.3.1 Carrier Radiated Power & Radiated Spurious Emissions

Test Requirement: FCC Part 90.265(b) & 90.210(b)

Test Method: EIA/TIA 603-C:2004 section 2.2

Test Date: July 18 2007

Measurement Distance: 3m (Semi-Anechoic Chamber)

Test Requirement:

(e) Transmitters used for wireless microphone operations and operating on frequencies allocated for Federal use must comply with the requirements of §90.265(b).

90.210(b) (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB below the unmodulated carrier power (P).(i.e.-13dBm)

Test Procedure: The procedure used was EIA/TIA 603-C:2004. The receiver was scanned from 30MHz to 5.0GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes.

The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Peramplifier Factor

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bilog antenna with 2 orthogonal polarities

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the Carrier Radiated Power and spurious emissions were measured by the substitution.

Test Result:

Carrier Frequency	Factual Level	Limit in 90.265(b)
171.898 MHz	3.1 dBm(i.e. 2.0mW)	17 dBm (i.e. 50 mW)

Calculate the Factual Level:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)
171.898	109.53	11.96	0.92	24.82	97.59

Substitution antenna mode:

Signal generator read level:-0.9dBm ;Substitution Antenna Gain:4.2dBd; Cable loss:0.2dB

Factual Level=-0.9-0.2+4.2=3.1dBm.



Radiated Spurious emissions

(a) Antenna polarization: Horizontal

Spurious Emission Frequency (MHz)	Factual Level (dBm)	Limits (dBm)	Margin (dB)
114.596	-53.6	-13.0	40.6
229.194	-49.5	-13.0	36.5
286.493	-48.4	-13.0	35.4
343.796	-45.1	-13.0	32.1
514.030	-58.5	-13.0	45.5
572.994	-59.1	-13.0	46.1

(b) Antenna polarization: Vertical

Spurious Emission Frequency (MHz)	Factual Level (dBm)	Limits (dBm)	Margin (dB)
114.596	-47.8	-13.0	34.8
229.194	-49.9	-13.0	36.9
286.493	-42.5	-13.0	29.5
343.796	-41.3	-13.0	28.3
515.675	-51.7	-13.0	38.7
572.230	-54.4	-13.0	41.4

TEST RESULTS: The unit does meet the FCC requirements.

5.3.2 Occupied Bandwidth

Test Requirement: FCC Part 90.265(b) & 90.210 (b)

Test Method: FCC Part 2.1049

Test Date: July 24 2007(initial test); July 27 2007(Final test)

Requirements: 90.265(b)(1) The emission bandwidth shall not exceed 54 kHz.

Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable.

90.210(C) *Emission Mask C*. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least $83 \log(f_d/5)$ dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least $29 \log(f_d^2/11)$ dB or 50 dB, whichever is the lesser attenuation;

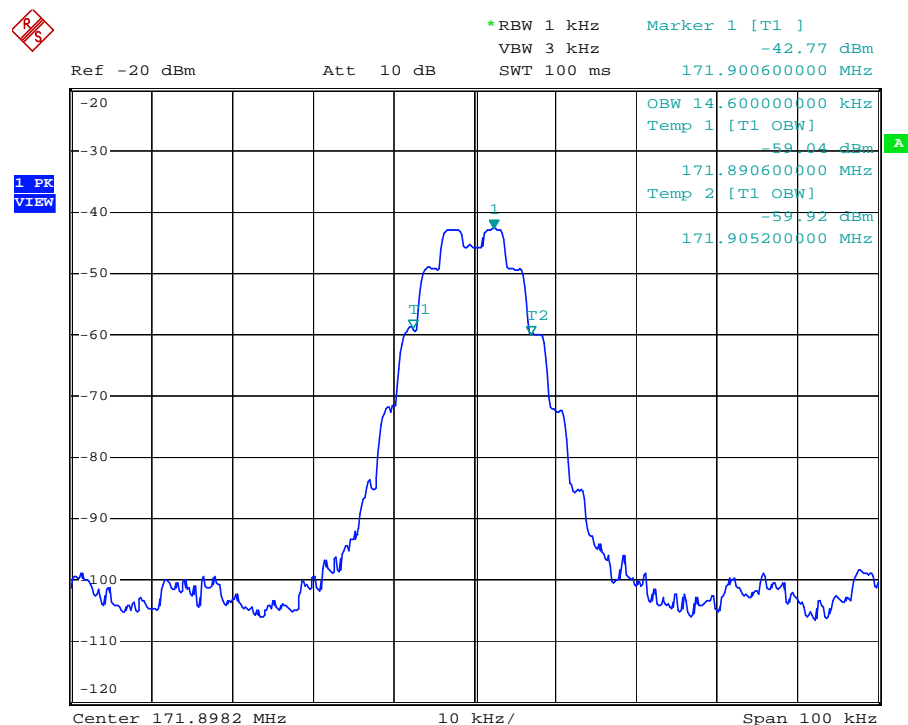
(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log(P)$ dB.

Method of measurement: Input 2500Hz signal to the microphone, find the 50% rated deviation, add the level 16dB, test this status the 99% occupied bandwidth and record it. And then input 15KHz signal to the microphone for additional test.

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

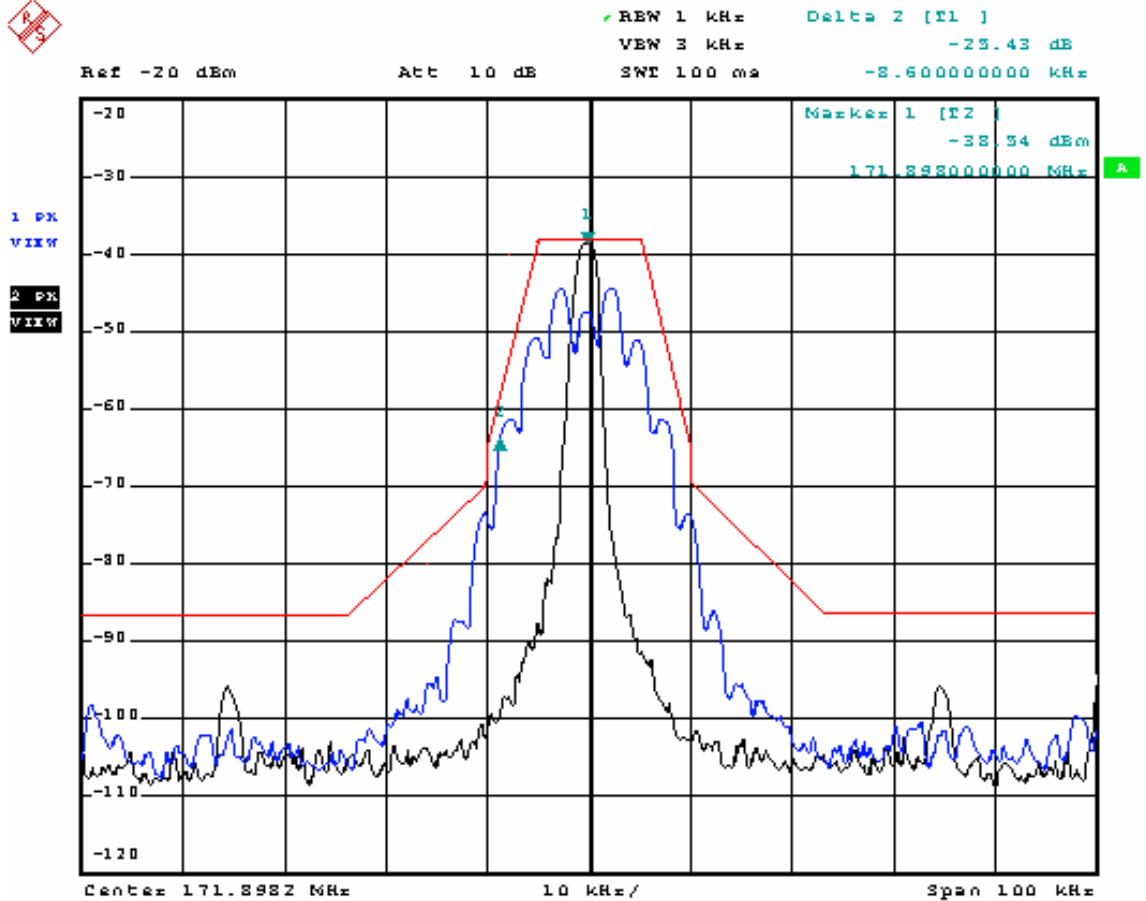
Input 2500Hz signal:

Occupied Bandwidth(99% of total power): 14.6KHz.





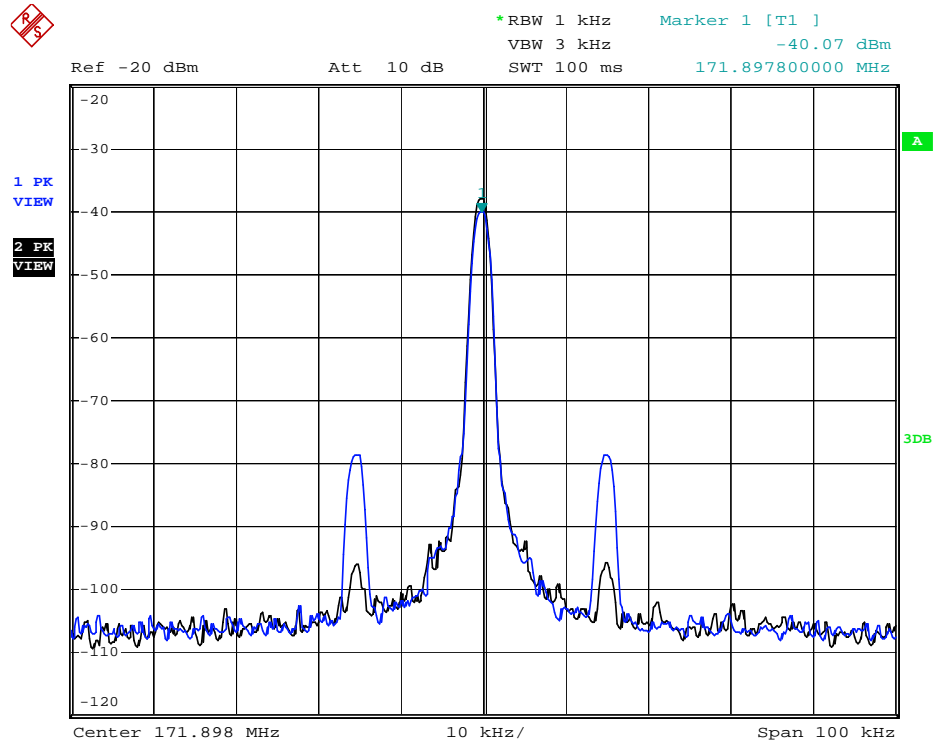
Emission Mask:



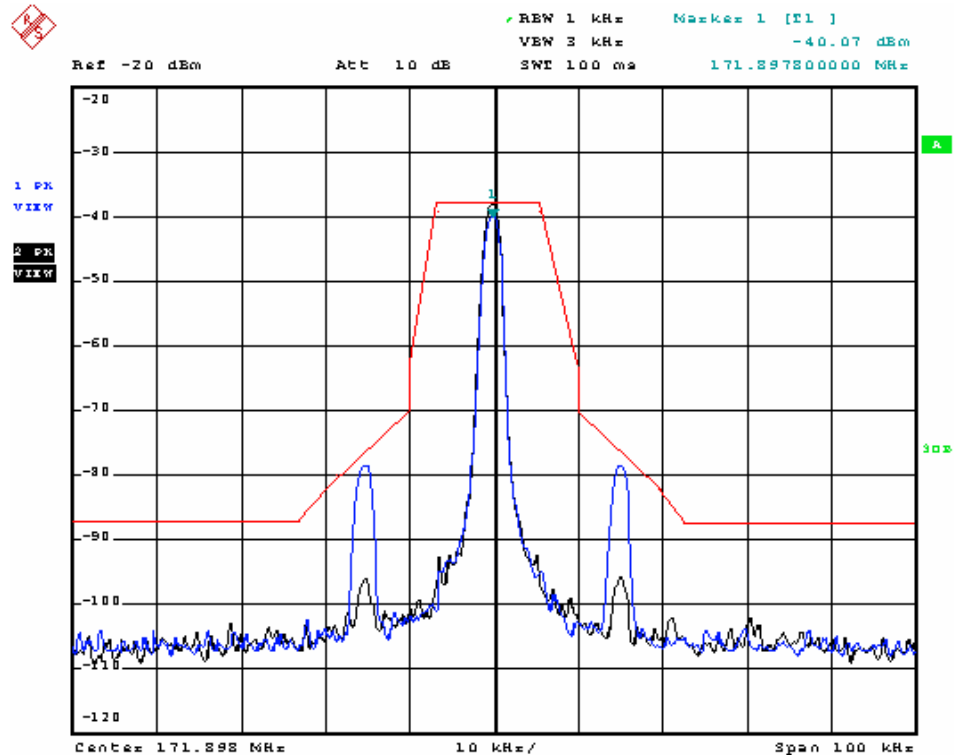


Input 15KHz signal:

Occupied Bandwidth(99% of total power): 10.0KHz.



Emission Mask:



Test results: The unit does meet the FCC requirements.

**Frequency Stability**

Test Requirement:	FCC 90.265(b)
Test Method:	EIA/TIA 603-C:2004
Test Date:	July 30 2007
Requirements:	90.265(b)(3) The frequency stability of wireless microphones shall limit the total emission to within ± 32.5 kHz of the assigned frequency.

Test Procedure:**Frequency stability versus environmental temperature**

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feedthrough attenuators. The EUT was placed inside the temperature chamber. After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

Frequency Stability versus Input Voltage

At room temperature ($25 \pm 5^\circ\text{C}$), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage. For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

Test Result

Assigned Frequency: 171.905 MHz, Limit: total emission within +/- 32.5KHz of the assigned frequency.		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within KHz
50	9.0	-7.0
40	9.0	-7.1
30	9.0	-7.2
20	9.0	-7.2
10	9.0	-7.4
0	9.0	-7.6
-10	9.0	-7.1
-20	9.0	-7.7
-30	9.0	-8.5

Assigned Frequency: 171.905 MHz, Limit: total emission within +/- 32.5KHz of the assigned frequency		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max KHz
25	9.0	-7.1
25	7.55	-6.9
25	5.6	-7.4

Battery end point: 5.6Vdc

The results: The unit does meet the FCC requirements.

5.3.3 Modulation Characteristics

Test Requirement: FCC2.1047
Test Method: FCC2.1047
Test Date: July 30 2007

5.3.4.1 Audio Frequency Response

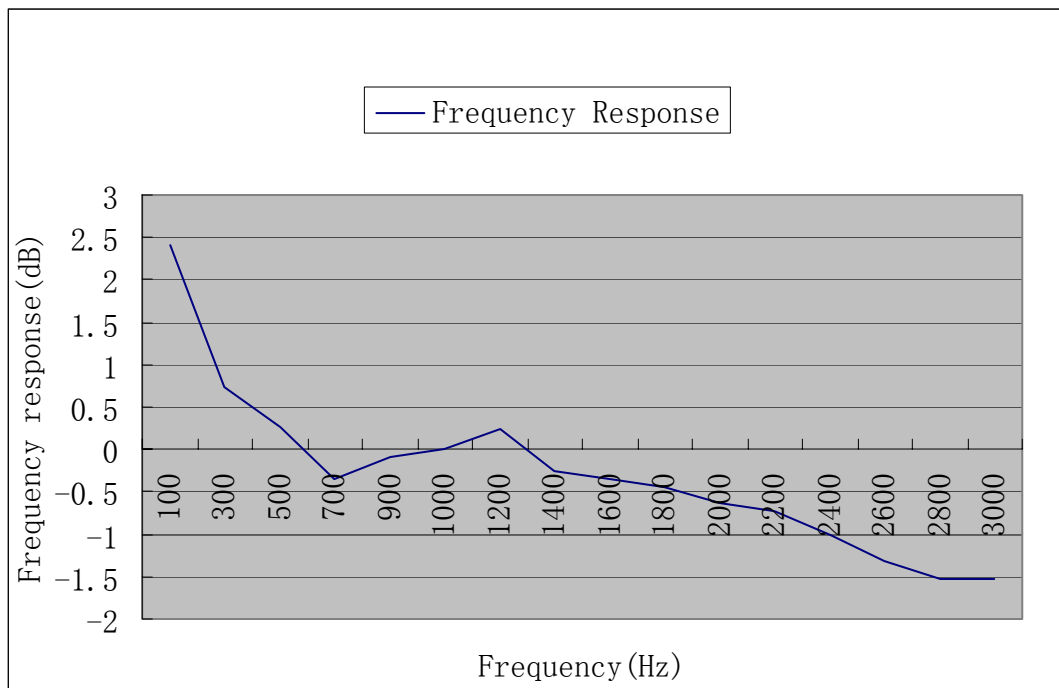
Test Procedure:

The RF output of the transceiver was connected to the input of FSP 30 with FM deviation module through sufficient attenuation so as not to overload the meter or distort the reading. An audio signal generator was connect to the audio input of microphone.

The audio signal input level was adjusted to obtain 20% of the maximum rated system deviation at 1 kHz, and recorded as DEV_{REF} . With the audio signal generator level unchanged, set the generator frequency between 100 Hz to 3000 Hz. The transmitter deviations (DEV_{FREQ}) were measured and the audio frequency response was calculated as $20\log_{10} [DEV_{FREQ} / DEV_{REF}]$

Test result:

The plot(s) of Aduio Frequency Response is presented hereinafter as reference.



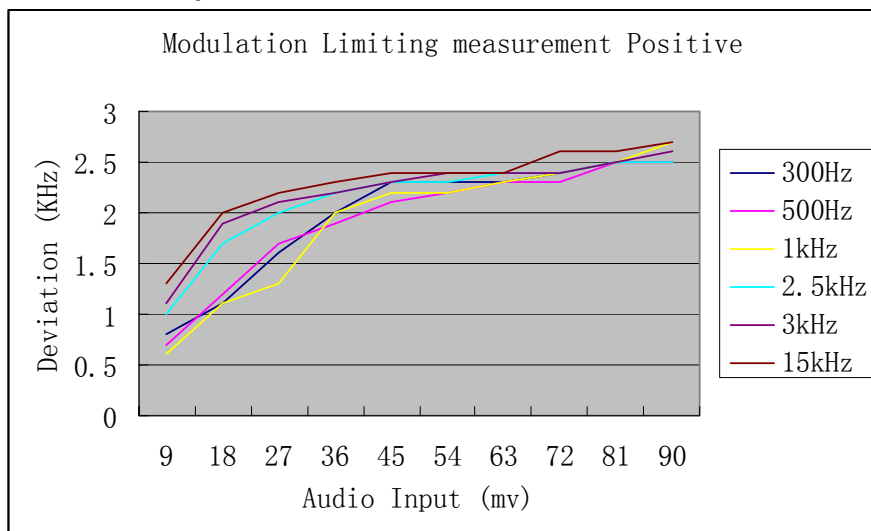
0dB=9mV at 1KHz. Aduio Frequency of Maximum Response is 100 Hz .

5.3.4.2 Modulation Limiting

Test Procedure:

- Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤ 0.25 Hz to $\geq 15,000$ Hz. Turn the de-emphasis function off.
- Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation.
- Increase the level from the audio frequency generator by 20 dB in one step (rise time between the 10% and 90% points shall be 0.1 second maximum).
- Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
- With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation.
- Set the test receiver to measure peak negative deviation and repeat steps c) through f).

Test at five different modulating frequencies (300Hz ,500Hz, 1kHz , 2.5kHz, 3kHz,15KHz), the output level of the audio generator was varied and the FM deviation level was recorded.(one of which was the frequency of maximum response, here is 15 KHz)

Test result:
1 • Positive peak deviation

2 • Negative peak deviation
