

APPLICATION CERTIFICATION
On Behalf of
SEATUNE ELECTRONICS CO., LTD

Wireless Microphone
Model No.: SMM-107A

FCC ID: TZ9SMM-107A

Prepared for : SEATUNE ELECTRONICS CO., LTD
Address : NO.27, SHUIKOU AVENUE, SHUIKOU TOWN,
HUIZHOU CITY, GUANGDONG, CHINA

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Date of Test : May 14-29, 2012
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Test Report Certification

Applicant : SEATUNE ELECTRONICS CO., LTD
Manufacturer : SEATUNE ELECTRONICS CO., LTD
EUT Description : Wireless Microphone
(A) MODEL NO.: SMM-107A
(B) SERIAL NO.: N/A
(C) POWER SUPPLY: DC 9V ("6F22 battery" 1×)

Measurement Procedure Used:

FCC PART 90.217 & 2.1047
ANSI 63.4: 2003

The device described above is tested by ACCURATE TECHNOLOGY CO., LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC PART 90.217 & 2.1047. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO., LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO., LTD.

Date of Test : May 14-29, 2012

Prepared by :

APPLE

(Engineer)

Approved & Authorized Signer :

Heungh

(Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Wireless Microphone
Model Number	:	SMM-107A
Power Supply	:	DC 9V (“6F22 battery” 1×)
Operation Frequency	:	171.905MHz
Applicant	:	SEATUNE ELECTRONICS CO., LTD
Address	:	NO.27, SHUIKOU AVENUE, SHUIKOU TOWN, HUIZHOU CITY, GUANGDONG, CHINA
Manufacturer	:	SEATUNE ELECTRONICS CO., LTD
Address	:	NO.27, SHUIKOU AVENUE, SHUIKOU TOWN, HUIZHOU CITY, GUANGDONG, CHINA
Date of sample received	:	May 14, 2012
Date of Test	:	May 14-29, 2012

1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC
The Registration Number is 752051

Listed by Industry Canada
The Registration Number is 5077A-2

Accredited by China National Accreditation Committee
for Laboratories
The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO., LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.3. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated date	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 8, 2012	Jan. 7, 2013
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 8, 2012	Jan. 7, 2013
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 8, 2012	Jan. 7, 2013
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 8, 2012	Jan. 7, 2013
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 8, 2012	Jan. 7, 2013
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 8, 2012	Jan. 7, 2013
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 8, 2012	Jan. 7, 2013
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 8, 2012	Jan. 7, 2013
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 8, 2012	Jan. 7, 2013
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 8, 2012	Jan. 7, 2013
Spectrum Analyzer	R&S	FSL6	100611	May 20, 2012	May 19, 2013
RF Communication Test Set	HP	HP8920A	3438A05187	April 28, 2012	April 27, 2013
Audio analyzer	R&S	UPL	100026	December 21, 2011	December 20, 2012

3. SUMMARY OF TEST RESULTS

Test	Test Requirement	Standard Paragraph	Result
Output Power	FCC PART 90	Section 90.265(b)	PASS
Radiated Spurious Emission	FCC PART 90	Section 90.217	PASS
Occupied Bandwidth	FCC PART 90	Section 90.265(b)	PASS
Frequency Satiability	FCC PART 90	Section 90.265(b)	PASS
Modulation Characteristics	FCC PART 2	Section 2.1047	PASS

The Customer Requested EMC Tests for a Wireless Microphone.

4. CARRIER RADIATED POWER & RADIATED SPURIOUS EMISSIONS

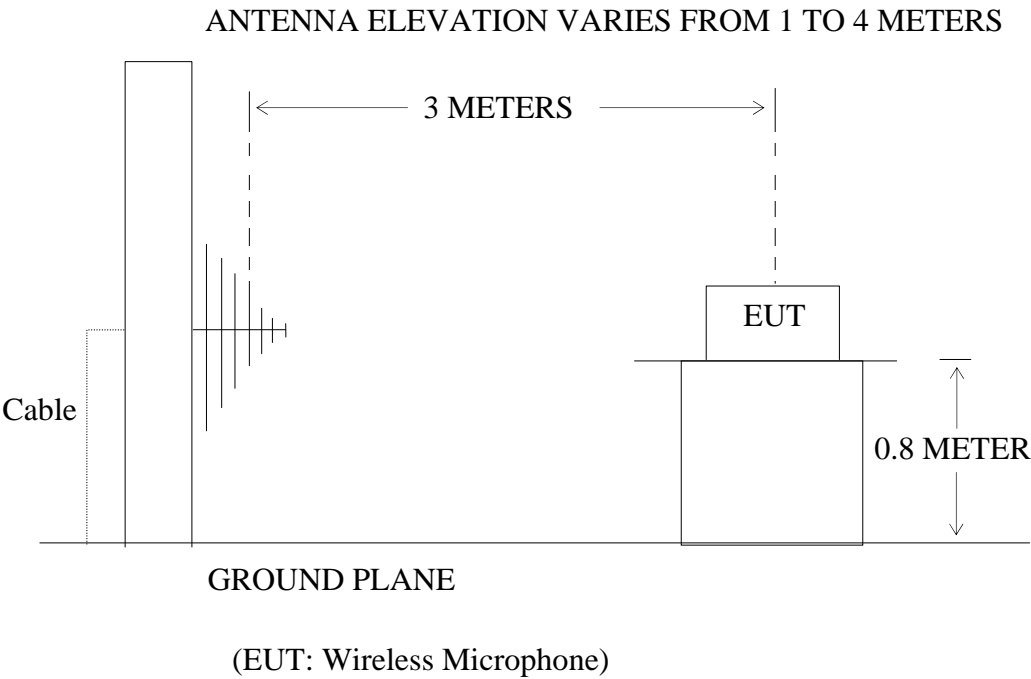
4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Microphone)

4.1.2. Semi-Anechoic Chamber Test Setup Diagram



4.2. Test Requirement

Test Requirement: FCC Part 90.217(a) & (e)

Test Method: ANSI C63.4

Test Date: May 28, 2012

Test Requirement:

90.217 (a) For equipment designed to operate with 25 KHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40KHz or more removed from the assigned frequency is attenuated at least 30dB below the unmodulated carrier

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

4.3. Configuration of EUT on Measurement

4.3.1. Wireless Microphone (EUT)

Model Number : SMM-107A

Serial Number : N/A

Manufacturer : SEATUNE ELECTRONICS CO., LTD

4.4. Operating Condition of EUT

4.4.1. Setup the EUT and simulator as shown as Section 4.1.

4.4.2. Turn on the power of all equipment.

4.4.3. Let the EUT work in TX mode measure it.

4.5. Test Procedure

The procedure used was ANSI Standard C63.4-2003. The receiver was scanned from 30MHz to 2.0GHz. 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, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

An initial pre-scan was performed in the 3m chamber using the spectrum analyzer 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.

4.6. Test Result:

The unit does meet the FCC requirements.

Carrier Frequency	Test Level (dBm)	Output power (mW)	Limit (mW)
171.905MHz	-8.23	0.15	50

Spurious Emission Frequency (MHz)	Factual Level (dBm)		Limits (dBm)	Margin (dBm)	
	Vertical	Horizontal		Vertical	Horizontal
286.100	-58.03	-59.01	-57	-1.03	-2.01
381.560	-63.05	-63.11	-57	-6.05	-6.11

Note:

Emissions attenuated more than 20 dB below the permissible value are not reported.

5. OCCUPIED BANDWIDTH

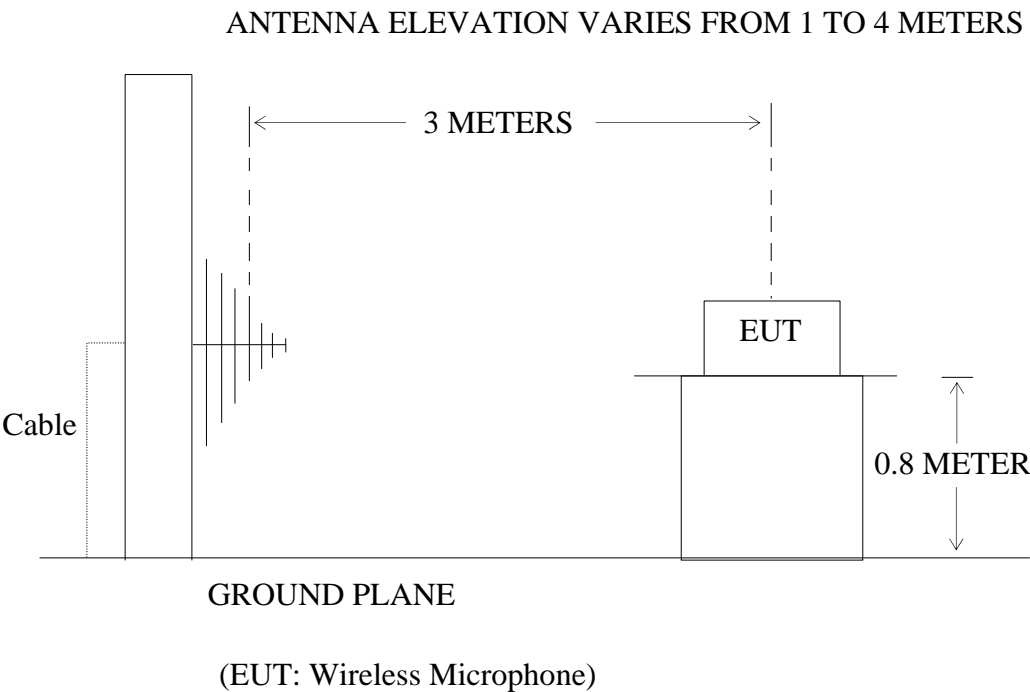
5.1. Block Diagram of Test Setup

5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Wireless Microphone)

5.1.2. Semi-Anechoic Chamber Test Setup Diagram



5.2. Test Requirement

Test Requirement FCC Part 90.265(b) & 90.210(c)
 Test Method: ANSI C62.3 & FCC Part 2.1049
 Test Date: May 28, 2012

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(b) Emission Mask B. For transmitters that are equipped with an audio lowpass filter the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
 (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
 (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
 (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.

5.3. EUT Configuration on Measurement

The following equipment are installed on the bandwidth of emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.3.1. Wireless Microphone (EUT)

Model Number : SMM-107A
 Serial Number : N/A
 Manufacturer : SEATUNE ELECTRONICS CO., LTD

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX mode measure it.

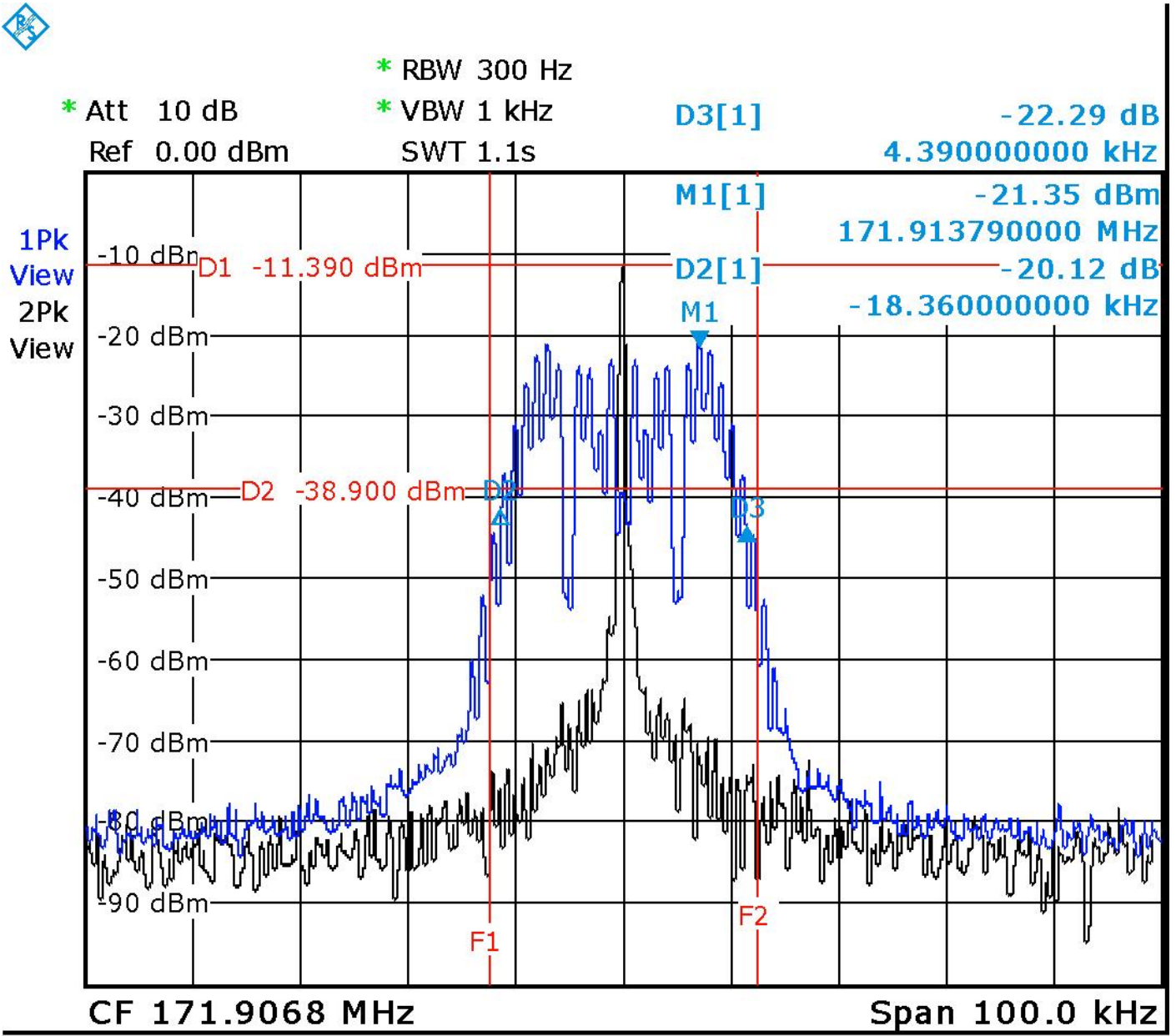
5.5. Test procedure:

Input 1000Hz signal to the microphone, find the 50% rated deviation, keep the level, tune the signal to 2500Hz, add the level 16dB, test this status the 20dB occupied bandwidth and record it.

5.6.Measurement Result

The unit does meet the FCC requirements.

Please refer the following curve and plots.



6. FREQUENCY STABILITY

6.1. Test Requirement

Test Requirement: FCC 90.265(b)
 Test Method : ANSI C63.4 & FCC Part 2.1055
 Test Date: May 28, 2012
 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.

6.2. EUT Configuration on Measurement

The following equipment are installed on Release Time Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.2.1. Wireless Microphone (EUT)

Model Number : SMM-107A
 Serial Number : N/A
 Manufacturer : SEATUNE ELECTRONICS CO., LTD

6.3. Operating Condition of EUT

6.3.1. Turn on the power of all equipment.

6.3.2. Let the EUT work in TX mode measure it.

6.4. 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.

6.5.Measurement Result

Assigned Frequency: 171.905		
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	-4.1
40	9.0	-3.9
30	9.0	-2.9
20	9.0	-1.7
10	9.0	-0.8
0	9.0	-0.1
-10	9.0	+0.5
-20	9.0	+0.9
-30	9.0	+1.2

Assigned Frequency: 171.905		
Limit: total emission within +/-32.5KHz of the assigned Frequency		
Environment Temperature °C	Power Supplied (Vdc)	Frequency measure with time elapsed total emission Max KHz
20	9.0	-1.7
20	7.55	-2.1
20	7.2	-2.0
20	6.8	-2.5
20	5.4	-2.8

Battery end point: DC 5.4V

The unit does meet the FCC requirements.

7. MODULATION CHARACTERISTICS

7.1. Test requirement

Test requirement: FCC2.1047
Test method: FCC2.1047
Test Date: May 29, 2012

7.2. EUT Configuration on Measurement

The following equipment are installed on average factor Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.2.1. Wireless Microphone (EUT)

Model Number : SMM-107A
Serial Number : N/A
Manufacturer : SEATUNE ELECTRONICS CO., LTD

7.3. Operating Condition of EUT

7.3.1. Turn on the power of all equipment.

7.3.2. Let the EUT work in TX mode measure it.

7.4.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 1500 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:

0dB=12mV

Audio Frequency Response

Frequency(Hz)	Audio Response(dB)
100	-1.15983894
300	-0.755771218
500	-0.560574472
1000	0
2000	2.633442385
5000	7.88611448
10000	-0.369668114
150000	-15.56302501

7.5.Audio Low-Pass Filter Response

An audio signal generator and FSP 30 with FM deviation module were connected to the input and output of the post limiter low pass filter respectively. The audio signal generator frequency was set between 1000 Hz and 15000Hz. The level corresponding to 1000Hz was recorded as LEV_{REF} . The audio frequency response (LEV_{FREQ}) at test frequency was calculated as: $LEV_{FREQ} - LEV_{REF}$

Test result:

Audio Low-pass

Frequency(Hz)	Audio Low-pass(dB)
1000	0
2000	-0.195196746
5000	-8.25326531
10000	-7.489178256
15000	-27.95880017

7.6. Modulation Limiting

Test Procedure:

With the same setup as above, at four different modulating frequencies (300Hz, 1KHz, 3 KHz, 15KHz) (one of which was the frequency of maximum response, here is 15KHz), the output level of the audio generator was varied and the FM deviation level was recorded.

Test result:

Positive peak							
			Peak Frequency Deviation (kHz)				
Modulation Limiting(dB)	A-ref(mV)		300	1000	2000	3000	15000
-20			1.6	1.4	2.8	2.1	0.3
-10			4.1	4.3	5.3	6.1	0.9
-6			6.1	6.8	9	13.2	1.2
-3			6.5	10.3	33.5	17.5	2
0	6.40		12.6	14.9	15.4	14	8.2
3			17.2	22.4	21.5	35.7	2.2
6			22.6	27.8	18.2	39.9	0.4
10			34.2	32.4	0.8	29.3	1.4
20			61	35.9	10.7	7.6	2.1
Negative peak							
			Peak Frequency Deviation (kHz)				
Modulation Limiting(dB)	A-ref(mV)		300	1000	2000	3000	15000
-20			1.3	1.6	1.3	1.4	0.3
-10			3.8	4.4	3.7	4.3	0.5
-6			5.8	6.4	5.7	6.7	0.8
-3			8.2	8.8	7.5	9.4	1.1
0	6.40		12.3	19	10.4	34.5	1.9
3			23.7	30.2	10.3	10.4	5.5
6			29.7	30	25.2	36.1	2.6
10			46.2	34	17.2	16	0.2
20			81	66.3	12.1	15.3	5.7