



Test Report

Applicant: NADY SYSTEMS, INC.

Address of Applicant: 6701 SHELLMOUND ST. EMERYVILLE, CA 94608, USA

Equipment Under Test (EUT):

EUT Name: Handheld Microphone

Model No.: AMERICAN STARPOWER X2

Trade Mark: NA

Serial No.: Not supplied by client

Standards: FCC PART 74H:2008

Date of Receipt: Oct 26, 2008

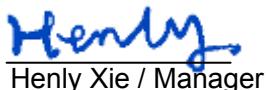
Date of Test: Oct 27 to 31, 2008

Date of Issue: Nov 3, 2008

Test Result : **PASS***

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

Authorized Signature:



Henly Xie / Manager

This report refers to the General Conditions for Inspection and Testing Services, printed overleaf

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. 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.

The test report prepare by:

Guangzhou Huesent Testing Service Co.,Ltd.

Self-ordained 68# courtyard, No.91, Dongguanzhuang Road,Guangzhou,China.

Tel: 86-20-28263298 Fax: 86-20-28263237

<http://www.hst.org.cn> E-mail:hst@hst.org.cn



2 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Carrier Radiated Power	FCC Part 2.1046	74.861 e) 1) 174M-216M--50mW	PASS
Modulation Deviation	FCC Part 2.1047	74.861 e) 3) Within 75kHz	PASS
Frequency Stability	FCC Part 2.1055	74.861 e) 4) <0.005% 50 ppm	PASS
Operating Bandwidth	FCC Part 2.1049 c)	74.861 e) 5) Within 200kHz	PASS
Unwanted Radiation	FCC Part 2.1049 c)	74.861 e) 6) within the mask	PASS
Radiated Spurious Emission	FCC Part 2.1053	74.861 d) 3) < 43+10lgP(W) dB	PASS

Remark:

◆ The EUT has one channel, which is located in the range **76.0MHz to 88.0MHz**.

Only test result of three samples in 76.5 MHz, 81.5 MHz and 87.4 MHz were recorded in this report.



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4 General Information

4.1 Client Information

Applicant: NADY SYSTEMS, INC.
Address of Applicant: 6701 SHELLMOUND ST. EMERYVILLE, CA 94608, USA

4.2 General Description of E.U.T.

EUT Name: Handheld Microphone
Item No.: AMERICAN STARPOWER X2
Serial No.: Not supplied by client

4.3 Details of E.U.T.

Power Supply: 9Vdc, 1 x 6F22 size Battery
Main Function: Wireless microphone system with an associated receiver for transmitting voice.

The final amplifier Collector Voltage and Collector Current are 0.8V & 2.0mA respectively.

Necessary Bandwidth: $2M+2DK = 2 \times 70\text{kHz} + 2 \times 20\text{kHz} \times 1.0 = 180\text{ kHz}$

Frequency Range: 76 MHz to 88 MHz

4.4 Description of Support Units

Connect the EUT to mains power, and then test the EUT with signal generator.

4.5 Standards Applicable for Testing

The standard used was FCC PART 74H, 2008

The EUT belongs to licensed low power auxiliary devices.



4.6 Test Location

GuangZhou Huesent Testing Service Co., Ltd.
No.91, Dongguanzhuang Road, Guangzhou, China.
Tel: 86-20-87221905, Fax: 86-20-87223892
CNAS- Accreditation No.: L2885.
CMA- Authorisation Certificate No.: 2008191614Z

ERP & Spurious Emission tests were subcontracted to the laboratory following-
SGS-CSTC Standards Technical Services Co., Ltd.,
No.1 Workshop,M-10,Middle Section, Science & Technology Park, Shenzhen, China
FCC- Registratrion No.: 556682
IC- Registratrion No.: 6002.
CNAS- Accreditation No.: L2929

4.7 Deviation from Standards

None.

4.8 Abnormalities from Standard Conditions

None.



5 Equipments Used during Test

No:	Test Equipment	Manufactory	Model No.	Serial No.	Cal. Date (dd-mm-yy)	Cal. due Date (dd-mm-yy)
EMC0039	Temperature Chamber	TERCHY	MHG-800R	0118	05-12-2007	05-12-2008
EMC0009	D.C. Power Supply	Instek	PS-3030	9862036	Check when used	
EMC0007	DMM	Fluke	73	70671122	20-12-2007	20-12-2008
EMC0006	DMM	Fluke	73	70681569	20-12-2007	20-12-2008
EMC0525	Compact Semi-Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	N/A	N/A
EMC0530	10m Semi-Anechoic Chamber	ETS	N/A	N/A	10-08-2008	10-08-2009
EMC0502	Biconical Antenna (Rx)	Rohde & Schwarz	HK116	100032	12-08-2008	12-08-2009
EMC0503	Biconical Antenna (Tx)	Rohde & Schwarz	HK116	100033	12-08-2008	12-08-2009
EMC0504	Log-Perd. Dipole Antenna (Rx)	Rohde & Schwarz	HL223	100039	12-08-2008	12-08-2009
EMC0505	Log-Perd. Dipole Antenna (Tx)	Rohde & Schwarz	HL223	100040	12-08-2008	12-08-2009
EMC0517	Horn Antenna (Rx)	Rohde & Schwarz	HF906	100095	12-08-2008	12-08-2009
EMC0519	Bilog Type Antenna	Schaffner Chase	CBL6143	5070	12-08-2008	12-08-2009
EMC0520	0.1-1300 MHz Pre Amplifier	HP	8447D OPT 010	2944A06252	11-03-2008	11-03-2009
EMC0521	1-26.5GHz Pre Amplifier	Agilent	8449B	3008A01649	12-03-2008	12-03-2009
EMC0507	Antenna Mask (Tx)	HD-GmbH	AS620M	620/408	N/A	N/A
EMC0508	Antenna Mask (Rx)	HD-GmbH	MA240	240/619	N/A	N/A
EMC0509	Turntable	HD-GmbH	DT430	N/A	N/A	N/A
EMC0510	Turntable & Antenna Mask Controller	HD-GmbH	HD100	N/A	N/A	N/A
EMC0512	EMI Test Software	Rohde & Schwarz	ES-K1	N/A	N/A	N/A
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	05-12-2007	05-12-2008
EMC0040	Spectrum Analyzer	Rohde & Schwarz	FSP30	100324	05-12-2007	05-12-2008
EMC0516	Signal Generator	Rohde & Schwarz	SMR20	100416	23-07-2008	23-07-2009
EMC0032	Radio Communication Monitor	Rohde & Schwarz	CMS54	100137	18-12-2007	18-12-2008
EMC0904	Power Meter	Rohde & Schwarz	NRVS	825770/074	16-07-2008	16-07-2009
EMC0905	Power Sensor	Rohde & Schwarz	NRV-Z5	825802/013	16-07-2008	16-07-2009
EMC0906	Dual Directional Coupler	Werlatone Inc.	C1795	6634	20-11-2007	20-11-2008
EMC1508	Audio Analyzer	Rohde & Schwarz	UPL	100855	10-09-2008	10-09-2009
EMC1005	Digital Oscilloscope	Tektronix	TDS3012	B015508	16-07-2008	16-07-2009
EMC0523	Active Loop Antenna	EMCO	6502	00042963	09-08-2008	09-08-2010



6 Test Results

6.1 E.U.T. Operation Condition

Operating Environment:

Temperature: 20.0 °C~25 °C

Humidity: 50 ~70% RH

Atmospheric Pressure: 980~1012 mbar

EUT Operation: Test the EUT in transmitting mode.



6.2 Test Procedure & Measurement Data

6.2.1 Carrier Radiated Power & Radiated Spurious Emissions

Test Requirement: FCC CFR 47 Part 74.861 e) 1) & d) 3)

Test Method: EIA/TIA 603-C:2004 section 2.2,
FCC CFR 47 Part 2.1047 & 1053

Test Date: Sep 27, 2008

Measurement Distance: 3m (Semi-Anechoic Chamber)

Test Requirement:

(d) For low power auxiliary stations operating in the bands other than those allocated for TV broadcasting, the following technical requirements are imposed.

(3) The occupied bandwidth shall not be greater than that necessary for satisfactory transmission and, in any event, an emission appearing on any discrete frequency outside the authorized band shall be attenuated, at least, $43+10 \log^{10}$ (mean output power, in watts) dB below the mean output power of the transmitting unit.

(e) For low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

(1) The power of the measured unmodulated carrier power at the output of the transmitter power amplifier (antenna input power) may not exceed the following:

- (i) 54–72, 76–88, and 174–216 MHz bands—50 mW
- (ii) 470–608 and 614–806 MHz bands—250 mW

Test Procedure:

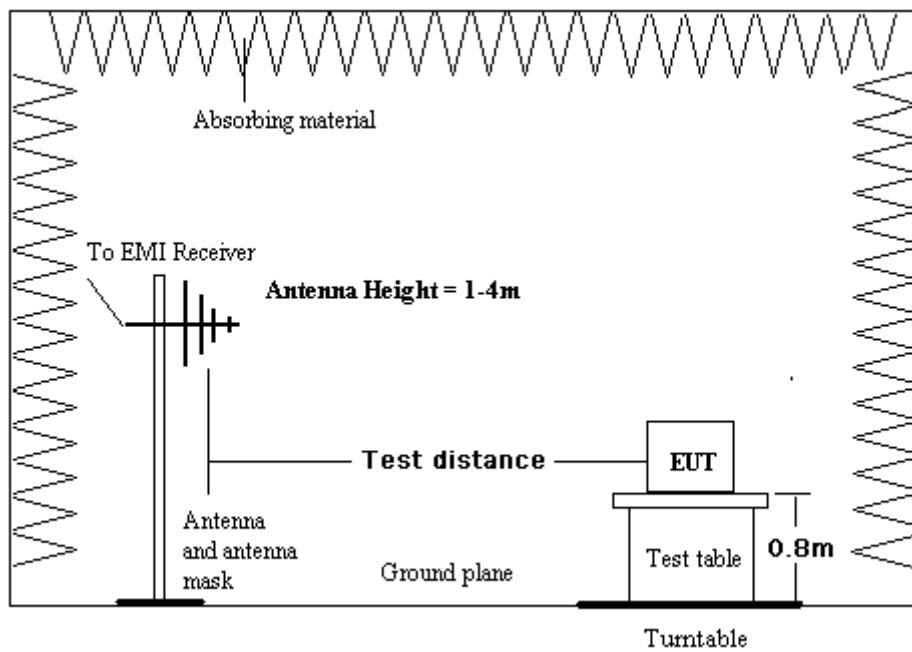
The procedure used was EIA/TIA 603-C:2004. The receive was scanned from 30MHz to 5.0GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal 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 (MHz)	Factual Level dBm (mW)	Limit in 74.861 e) 1)
76.500	-15.1 dBm(i.e. 0.03 mW)	17 dBm (i.e. 50 mW)
81.500	-17.5 dBm(i.e. 0.01 mW)	17 dBm (i.e. 50 mW)
87.600	-17.6 dBm(i.e. 0.02 mW)	17 dBm (i.e. 50 mW)

**Radiated spurious emissions:**

Limit: -17dBm (0.02mW) -[43+10 log ₁₀ (0.02 x 10 ⁻³) dB] = -17- (43-47) = -13 dBm
--

76.500 MHz

Spurious Emission Frequency (MHz)	Factual Level Horizontal (dBm)	Factual Level Vertical (dBm)	Limit (dBm)	Min Margin (dB)
153.0	<-53.0	-44.3	-13.0	31.3
229.5	<-53.0	-42.8	-13.0	29.2
306.0	<-53.0	-51.6	-13.0	38.6
382.5	<-53.0	-50.5	-13.0	37.5

81.500 MHz

163.0	<-53.0	NA, <38.0	-13.0	NA
244.5	<-53.0	NA, <38.0	-13.0	NA
326.0	<-53.0	NA, <38.0	-13.0	NA
407.5	<-53.0	NA, <38.0	-13.0	NA

87.400 MHz

174.8	<-53.0	NA, <38.0	-13.0	NA
262.2	<-53.0	NA, <38.0	-13.0	NA
349.6	<-53.0	NA, <38.0	-13.0	NA
437.0	<-53.0	NA, <38.0	-13.0	NA

The peak emission of other frequency in rang from 30MHz up to 10 times carrier were 25dB lower than the limit, hence no data was recorded in the report.

TEST RESULTS: The unit does meet the FCC requirements.



6.2.2 Occupied Bandwidth

Test Requirement: FCC CFR 47 Part 74.e 5) & 6)

Test Method: FCC CFR 47 Part 2.1049

Test Date: Oct. 29, 2008

Requirements:

(e) For low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

(5) The operating bandwidth shall not exceed 200 kHz.

(6) The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

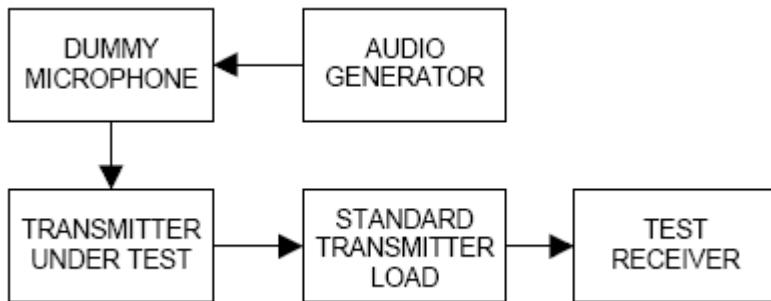
(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25dB;

(ii) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35dB;

(iii) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}$ (mean output power in watts) dB.

Test Procedure

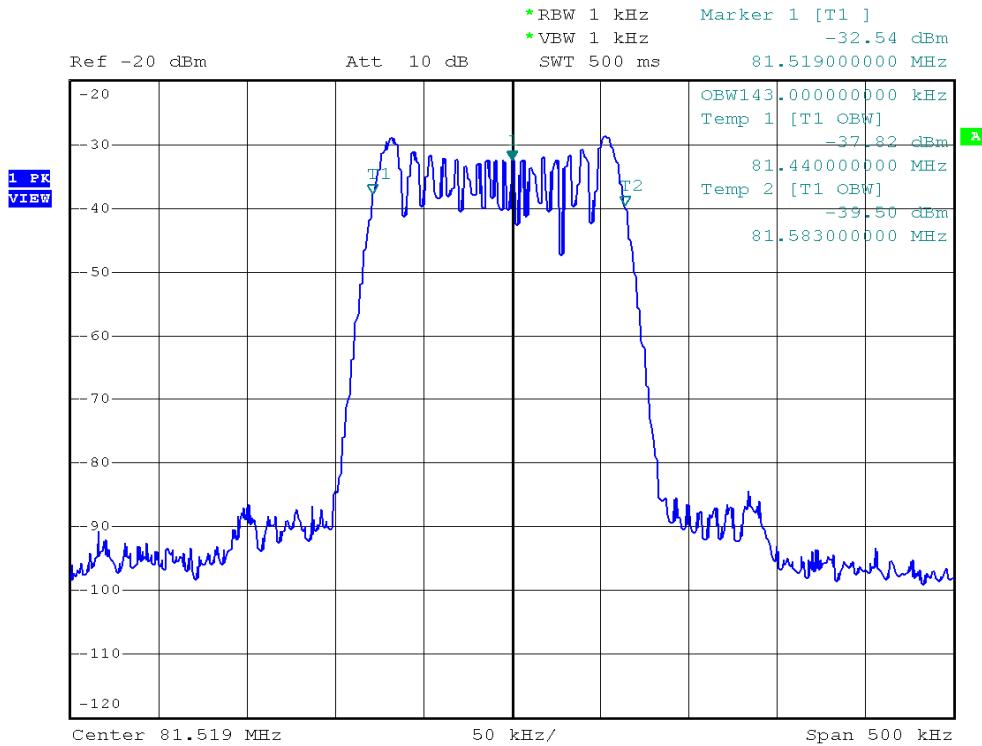
Setup



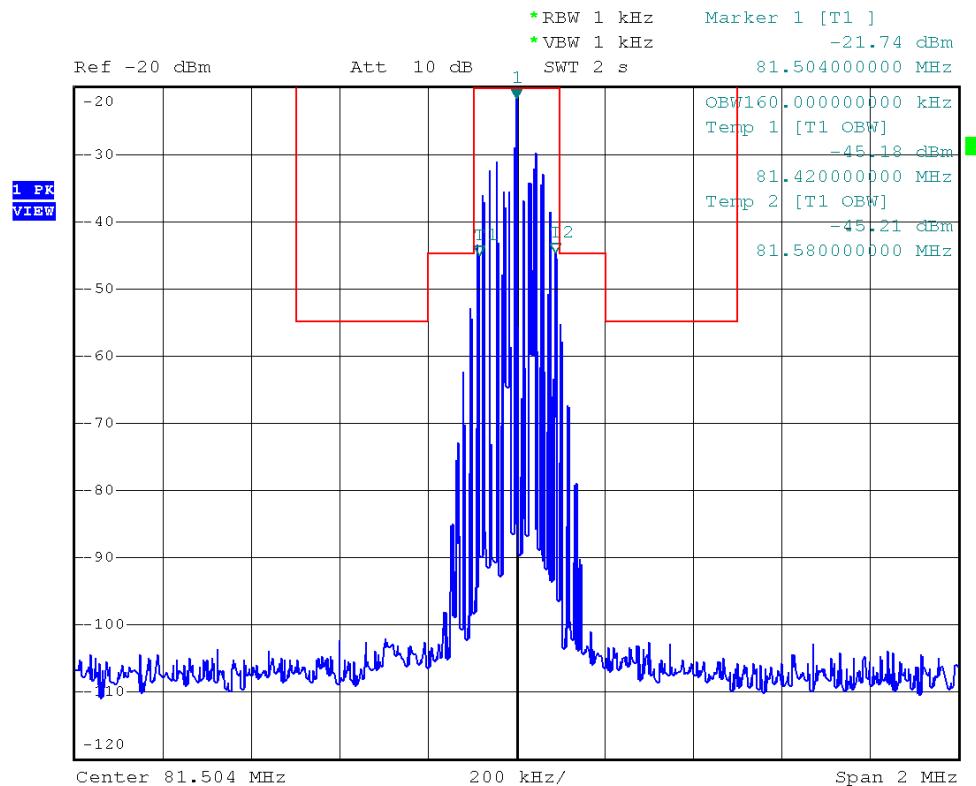
Input 2500Hz signal to the microphone, find the 50% rated deviation, add the level 16dB, test this status the 99% occupied bandwidth and record it.

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

Occupied Bandwidth (99% of total power): 143.0 kHz.



Emission Mask: input with 15 kHz AF, 50% modulation + 16dB.



Test results: The unit does meet the FCC requirements.



6.2.3 Frequency Stability

Test Requirement: FCC CFR 47 Part 74.e 4)

Test Method: FCC CFR 47 Part 2.1055

Test Date: Oct. 30, 2008

Requirements: +/-50 ppm

(e) For low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

(4) The frequency tolerance of the transmitter shall be 0.005 percent.

Test Procedure:

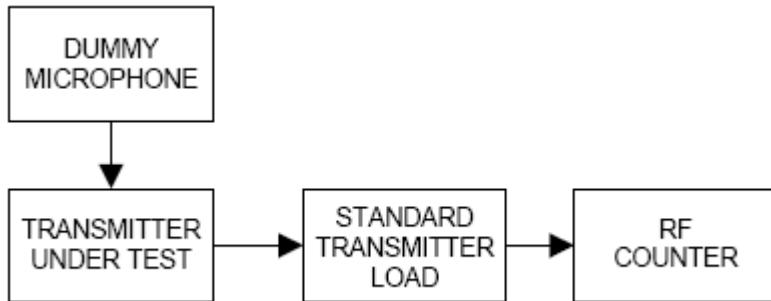
Frequency stability versus Environmental Temperature

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through 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: 81.5500 MHz,		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 4.08 kHz
50	9.0	+2.5
40	9.0	+2.3
30	9.0	+1.8
20	9.0	+1.4
10	9.0	+0.9
0	9.0	+0.5
-10	9.0	-0.6
-20	9.0	-1.1
-30	9.0	-1.2
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 4.08 kHz
25	9.0	+1.5
25	7.6	+0.4
25	7.0	-0.3

Battery end point: 7.0Vdc

The results: The unit does meet the FCC requirements.

6.2.4 Modulation Characteristics

Test Requirement: FCC CFR 47 Part 74.e 3)

Test Method: FCC CFR 47 Part 2.1047

Test Date: Oct. 29, 2008

Requirements:

(e) For low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

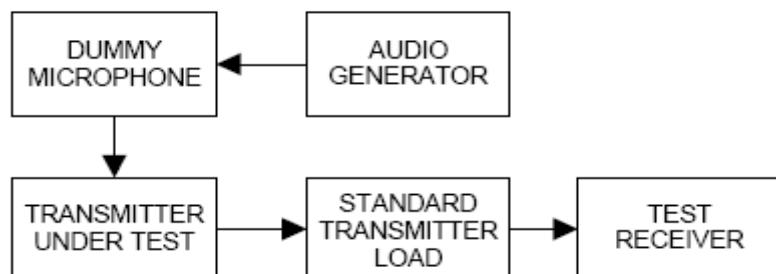
(3) Any form of modulation may be used. A maximum deviation of ± 75 kHz is permitted when frequency modulation is employed.

Test Procedure:

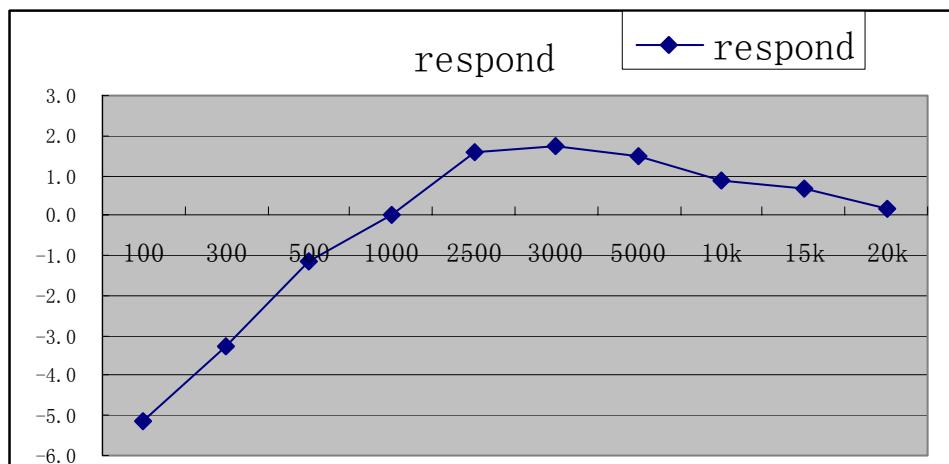
Audio Frequency Response

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 connected 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 to 5000 Hz. The transmitter deviations (DEV_{FREQ}) were measured and the audio frequency response was calculated as $20\log_{10} [DEV_{FREQ} / DEV_{REF}]$



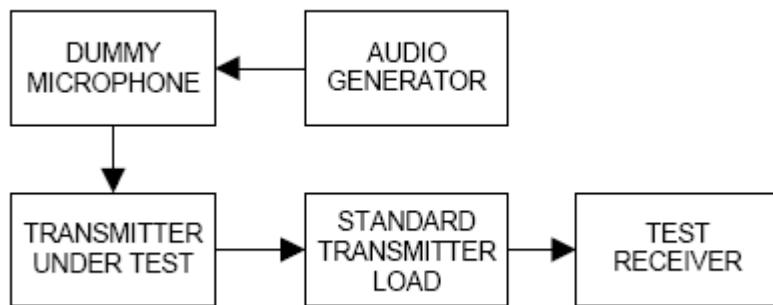
The plot(s) of Audio Frequency Response is presented hereinafter as reference.



0dB=10mV at 1kHz (20% of the maximum rated system deviation).

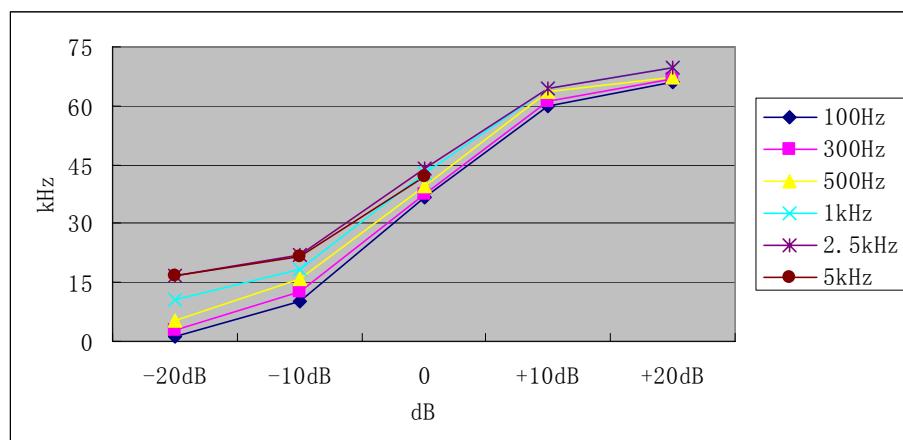
Modulation Limiting

- a) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- b) 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.
- c) 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**.
- d) 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).
- e) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
- f) With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 100 to 5000 Hz and observe the steady-state deviation. Record the maximum deviation.



Test at five different modulating frequencies (100Hz, 300Hz, 500Hz, 1KHz, 2.5kHz, 5kHz), the output level of the audio generator was varied up to 500 mV and the FM deviation level was recorded as below.

Positive peak deviation



6.3 EUT Constructional Details

EUT: AMERICAN STARPOWER X2