TEST REPORT

Report No. :	**HST201603-1228-FCC**
Product description:	**Wireless Microphone**
Model/Type :	**NAM-984, NAM-982, M-308, M-309, M-336, MC-0306, MC-0308, MC-0138, M1, M2, EL 5537, EL-1131, LI-WM306, LI-198, MIC ASSTD, WM-306, MC-1326, MC-839, MA 58A, TCM-122, TDM-340CR, TDM-340TI, TDM-304, TDM-304BS, TDM-308, AS-WM109, MC-1, MC-2, MC-306, MC-308**
Applicant's name:	**ENPING CITY SHUANGYI ELECTRONICS INDUSTRIAL CO.,LTD**

TEST REPORT

FCC Part 74.861: 2014

FCC ID: 2AHWHM-308

Report Reference No. .....:	HST201603-1228-FCC	
Tested by (+ signature).....:	Lemon Fu	Lemon Fu
Review by (+ signature) .....:	Sandy Yu	Sandy Yu
Approved by (+ signature)		Robin Peng
Date of issue .....:	Apr. 2, 2016	
Total number of pages .....:	23 Pages	
Testing Laboratory……..:	Guangdong Environment Radiation Monitoring Center (Accredited by CNAS, Accredited Number: L5539) FCC- Registration No: 667318 Renewal on Sep. 12, 2012	
Address .....:	No. 860, South Guangzhou Avenue, Guangzhou, 510300 China	
Applicant's name .....:	ENPING CITY SHUANGYI ELECTRONICS INDUSTRIAL CO.,LTD	
Address .....:	B1 Foreign And Private Capital Industry,Enping , Guangdong,China	
Manufacturer's name .....:	ENPING CITY SHUANGYI ELECTRONICS INDUSTRIAL CO.,LTD	
Address .....:	B1 Foreign And Private Capital Industry,Enping , Guangdong,China	
Test specification……:	Entrusted testing	
Standard.....:	FCC Part 74.861: 2014	
Non-standard test method……...:	N/A	
Date of Sample Receive ..... …...:	Mar. 15, 2016	
Date of Test.....:	Mar. 15, 2016 to Apr. 1, 2016	
Test item description.....:	Wireless Microphone	
Trade Mark.....:	N/A	
Model/Type reference .....:	M-308	
Ratings .....:	DC1.5V by one AA battery	

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1 TEST SUMMARY

Test	Test Requirement	Test Method	Class / Severity	Result
Carrier Radiated Power	FCC Part 2.1046	74.861 e) 1) 54–72, 76–88 & 174–216 MHz bands, 50 mW 470–608 and 614–806 MHz bands, 250 mW	PASS	Carrier Radiated Power
Modulation Deviation	FCC Part 2.1047	74.861 e) 3) Within 75kHz	PASS	Modulation Deviation
Frequency Stability	FCC Part 2.1055	74.861 e) 4) <0.005% 50 ppm	PASS	Frequency Stability
Operating Bandwidth	FCC Part 2.1049 c)	74.861 e) 5) Within 200kHz	PASS	Operating Bandwidth
Unwanted Radiation	FCC Part 2.1049 c)	74.861 e) 6) within the mask	PASS	Unwanted Radiation
Radiated Spurious Emission	FCC Part 2.1053	74.861 d) 3) < 43+10lgP(W) dB	PASS	Radiated Spurious Emission

Remark:

Model: **NAM-984, NAM-982, M-308, M-309, M-336, MC-0306, MC-0308, MC-0138, M1, M2, EL 5537, EL-1131, LI-WM306, LI-198, MIC ASSTD, WM-306, MC-1326, MC-839, MA 58A, TCM-122, TDM-340CR, TDM-340TI, TDM-304, TDM-304BS, TDM-308, AS-WM109, MC-1, MC-2, MC-306, MC-308**

Only tested **M-308**, since the other models listed above are electric identical with only difference being the model name and appearance.

♣

Channel	Frequency/ MHz
Lowest	76.2
Middle	86.7
Highest	87.8

2 GENERAL INFORMATION

2.1 Client Information

Applicant:	ENPING CITY SHUANGYI ELECTRONICS INDUSTRIAL CO.,LTD
Address of Applicant:	B1 Foreign And Private Capital Industry,Enping , Guangdong,China

2.2 General Description of E.U.T.

EUT Name:	Wireless Microphone
Item No.:	NAM-984
Serial No.:	Not supplied by client

2.3 Details of E.U.T.

Power Supply:	DC1.5V by one AA battery
Main Function:	Wireless transmitter system with an associated receiver for transmitting voice.

The final amplifier Collector Voltage and Collector Current are 0.3V & 3.5mA respectively.

Necessary Bandwidth: 2M+2DK= 2 x 80kHz + 2 x 20kHz x 1.0 = 200 kHz

2.4 Description of Support Units

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

2.5 Standards Applicable for Testing

The standard used was 47 CFR Part 74.861: 2014

The EUT belongs to licensed low power auxiliary devices.

2.6 Test Location

Guangdong Huesent Testing & Inspection Technology Co., Ltd
No.91, Dongguanzhuang Road, Guangzhou, China.

Tel: 86-20-87221905, Fax: 86-20-87223892
CNAS- Accreditation No.: L2885.

Guangdong Environment Radiation Monitoring Center
Address: No. 860, South Guangzhou Avenue, Guangzhou, 510300 China
Accredited by CNAS, Accredited Number: L5539
FCC- Registration No: 667318 Renewal on Sep. 12, 2012

2.7 Deviation from Standards

None.

2.8 Abnormalities from Standard Conditions

None.

3 TEST RESULTS

3.1 **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.
	Performed Carrier Radiated Power & Radiated Spurious Emissions testing in highest/ middle / lowest frequency spots within the range, and performed Occupied Bandwidth, Frequency Stability & Modulation Characteristics in middle frequency spot.

3.2 Test Procedure & Measurement Data

3.2.1 Carrier Radiated Power & Radiated Spurious Emissions

Test Requirement:	FCC CFR 47 Part 74.861 e) 1) & d) 3)
Test Method:	EIA/TIA 603-D:2010 section 2.2, FCC CFR 47 Part 2.1047 & 1053
Test Date:	Mar. 22, 2016
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:

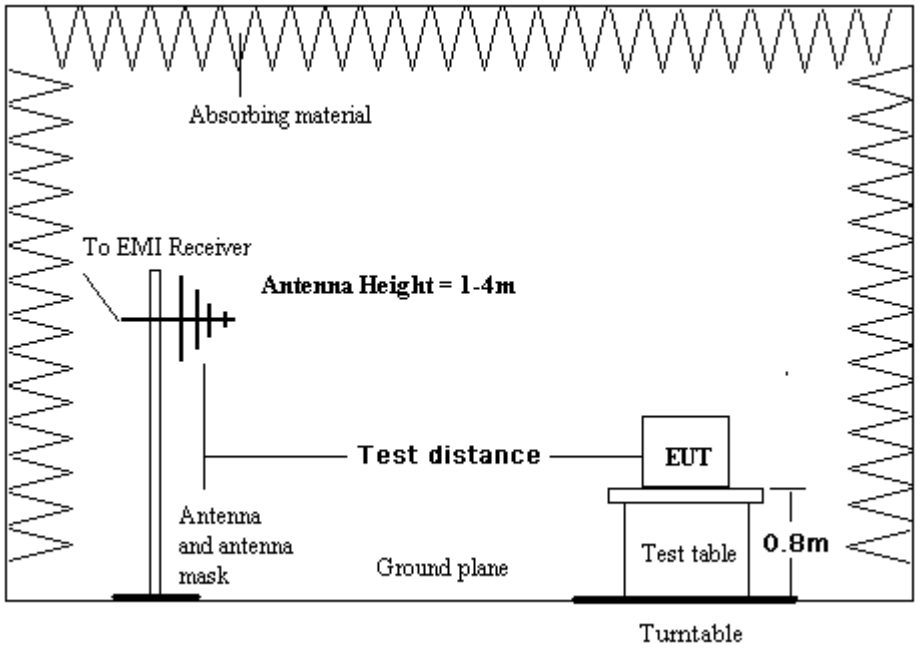
The procedure used was EIA/TIA 603-C:2004. The receiver was scanned from 30MHz to 5.0GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal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

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

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

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.



Test Result:

Carrier Frequency (MHz)	**Factual Level dBm (mW) with ERP value**
76.200	-9.0 dBm(i.e. 0.13 mW)
86.700	-10.0 dBm(i.e. 0.10 mW)
87.800	-9.6 dBm(i.e. 0.11 mW)

Carrier Frequency (MHz)	**Factual Level dBm (mW) ***	**conducted output power dBm (mW)**	**Limit in** 74.861 e) 1) *
76.200	-6.85 dBm(i.e. 0.21 mW)	-6.95 dBm(i.e.0.20 mW)	17 dBm (i.e. 50 mW)
86.700	-7.85 dBm(i.e. 0.16 mW)	-7.95 dBm(i.e.0.16 mW)	17 dBm (i.e. 50 mW)
87.800	-7.45 dBm(i.e. 0.18 mW)	-7.55 dBm(i.e 0.18 mW)	17 dBm (i.e. 50 mW)

Note: * the factual level & the limit is EIRP value.

Radiated spurious emissions:

76.200 MHz				
Spurious Emission Frequency (MHz)	Factual Level Horizontal (dBm)	Factual Level Vertical (dBm)	Limit (dBm)	Min Margin (dB)
152.4	<-33	<-33	-13.0	>20
228.6	<-33	<-33	-13.0	>20
304.8	<-33	<-33	-13.0	>20
381.0	<-33	<-33	-13.0	>20
86.700 MHz				
173.4	<-33	<-33	-13.0	>20
260.1	<-33	<-33	-13.0	>20
346.8	<-33	<-33	-13.0	>20
433.5	<-33	<-33	-13.0	>20
87.800 MHz				
175.6	<-33	<-33	-13.0	>20
263.4	<-33	<-33	-13.0	>20
351.2	<-33	<-33	-13.0	>20
439.0	<-33	<-33	-13.0	>20

The Factual Level is ERP value.

The peak emission of other frequency in rang from 30MHz up to 10 times carrier were 20dB lower than the limit, hence no data was recorded in the report.

NA: Not applicable, since the level is over 20dB lower than the limit.

TEST RESULTS: The unit does meet the FCC requirements.

3.2.2 Occupied Bandwidth

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

Test Method: FCC CFR 47 Part 2.1049

Test Date: Mar. 22, 2016

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:

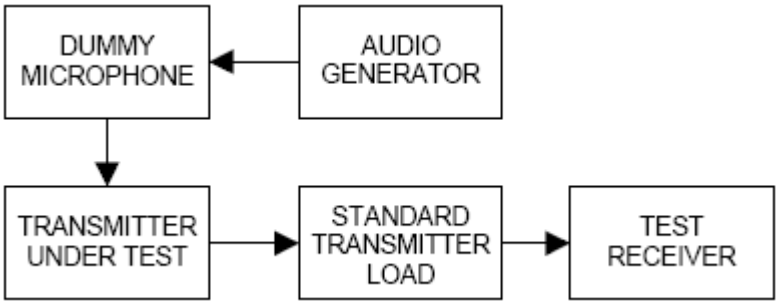
(i) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25dB;

(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

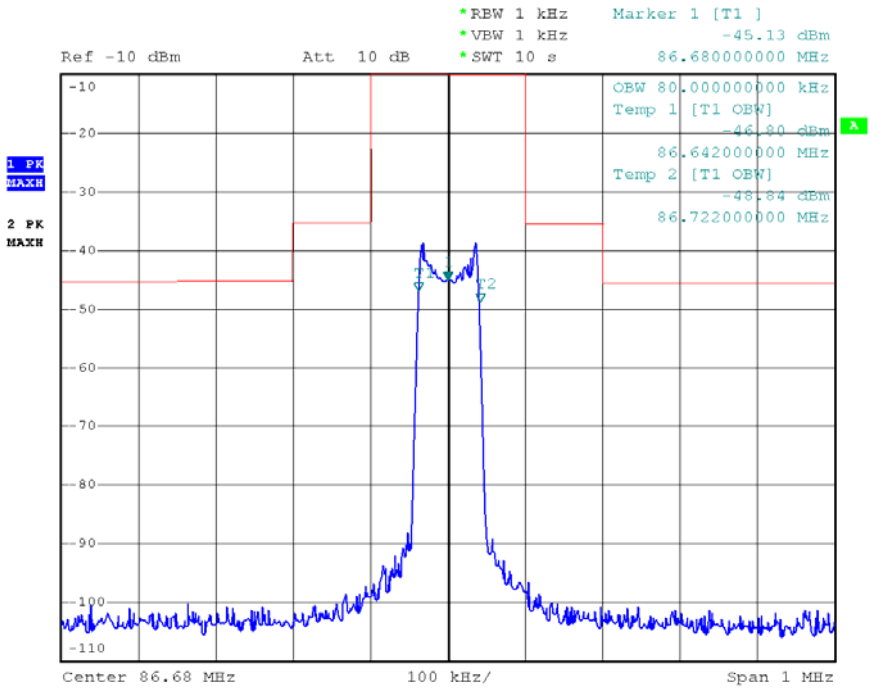
Setup



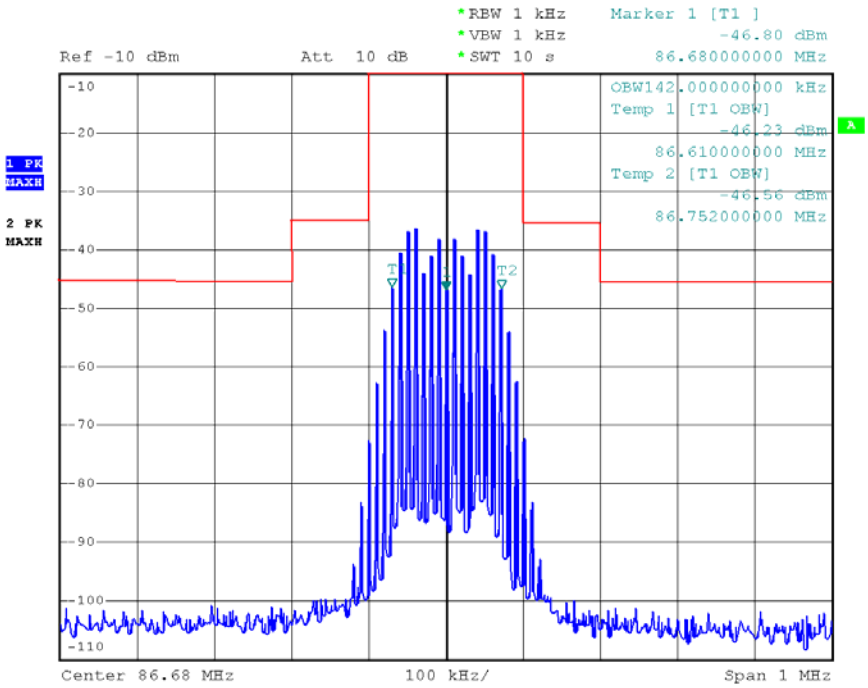
Input 2500Hz signal to the microphone, find the 50% rated deviation, add the level 16dB, test this status the 99% occupied bandwidth and record it.

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

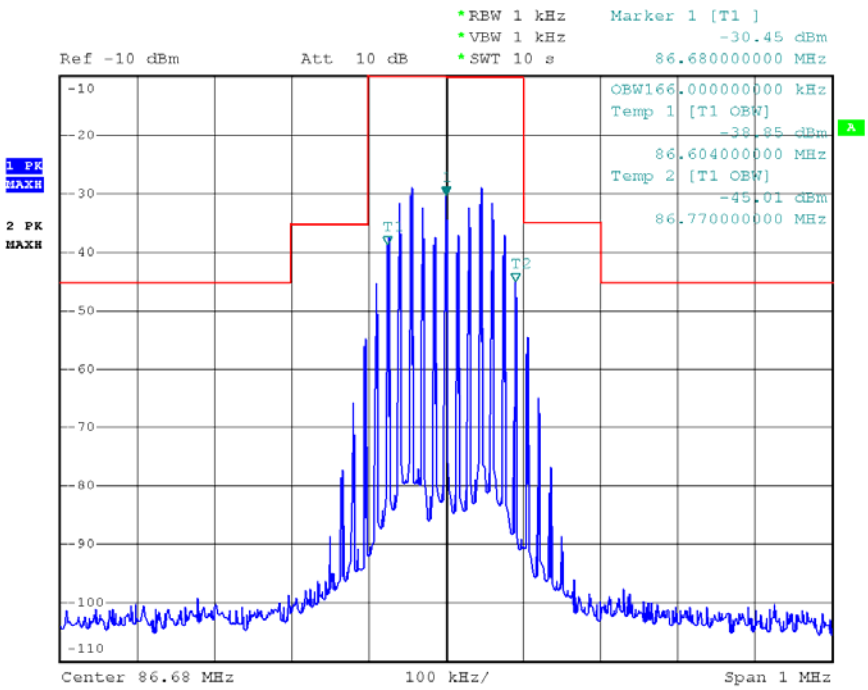
Occupied Bandwidth (99% of total power): 80.0 kHz.



Emission Mask: input with 10 kHz AF, 50% modulation + 16dB.



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



Test results: The unit does meet the FCC requirements.

3.2.3 Frequency Stability

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

Test Method: FCC CFR 47 Part 2.1055

Test Date: Mar. 22, 2016

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.

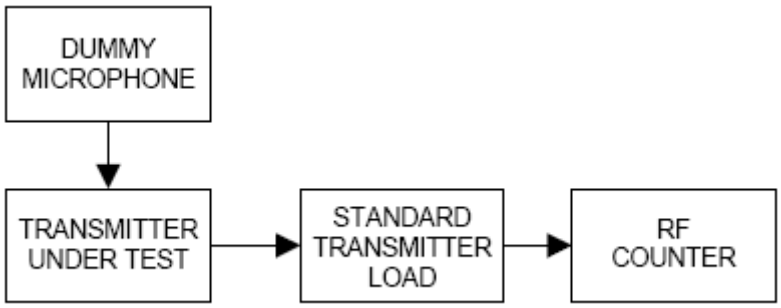
Test Procedure:

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 ± 5°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: 87.600 MHz, ...		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 4.38 kHz
50	1.5	+2.8
40	1.5	+2.6
30	1.5	+1.9
20	1.5	+1.7
10	1.5	+1.1
0	1.5	+0.7
-10	1.5	-0.6
-20	1.5	-1.2
-30	1.5	-1.4
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 4.08 kHz
25	1.5	+1.8
25	1.4	+0.7
25	1.3	-0.2
25	1.2	-0.5

Battery end point: 1.2Vdc

The results: The unit does meet the FCC requirements.

3.2.4 Modulation Characteristics

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

Test Method: FCC CFR 47 Part 2.1047

Test Date: Mar. 22, 2016

Requirements:

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

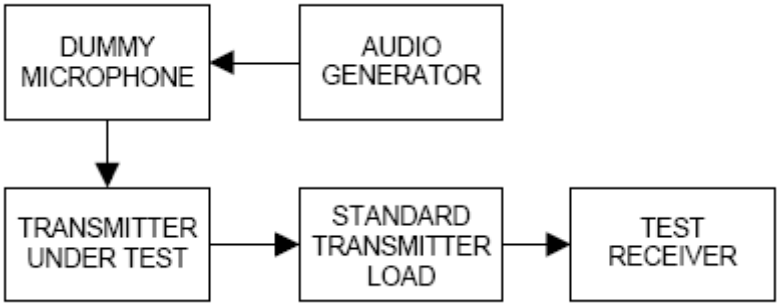
(3) Any form of modulation may be used. A maximum deviation of ±75 kHz is permitted when frequency modulation is employed.

Test Procedure:

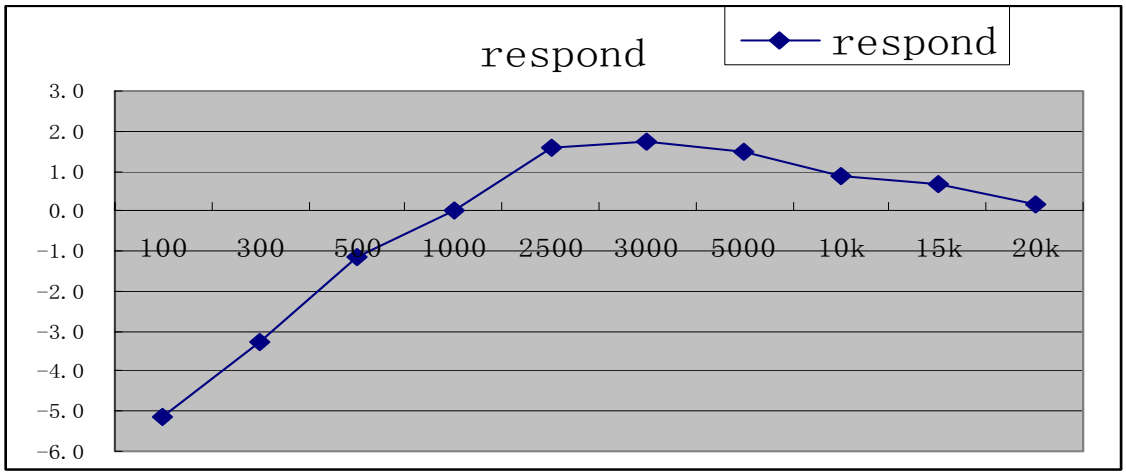
Audio Frequency Response

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 20log10 [DEV_{FREQ} / DEV_{REF}]



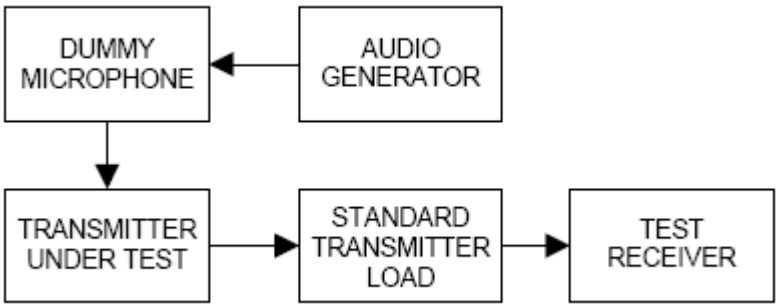
The plot(s) of Audio Frequency Response is presented hereinafter as reference.



0dB=10mV at 1kHz (20% of the maximum rated system deviation).
The maximum deviation of Audio Frequency Response plots is at 3kHz generating frequency.

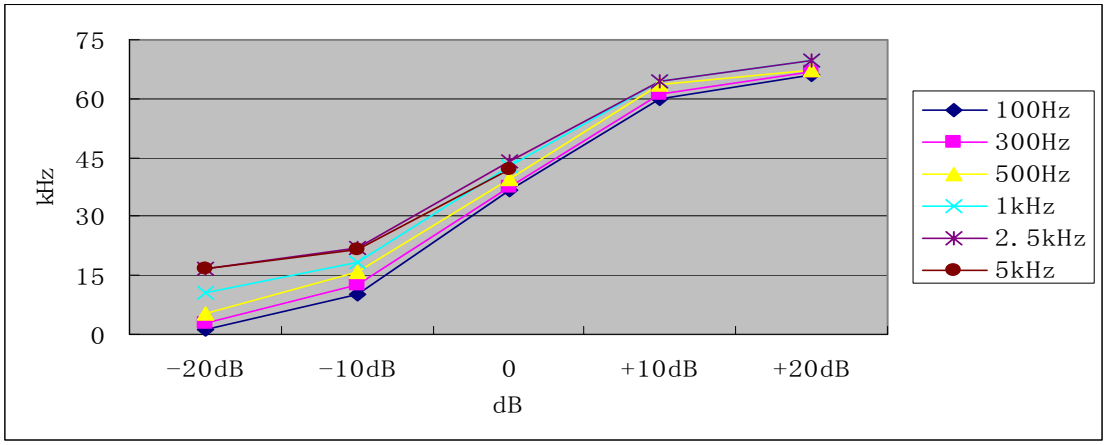
Modulation Limiting

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 ≥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 1V and the FM deviation level was recorded.

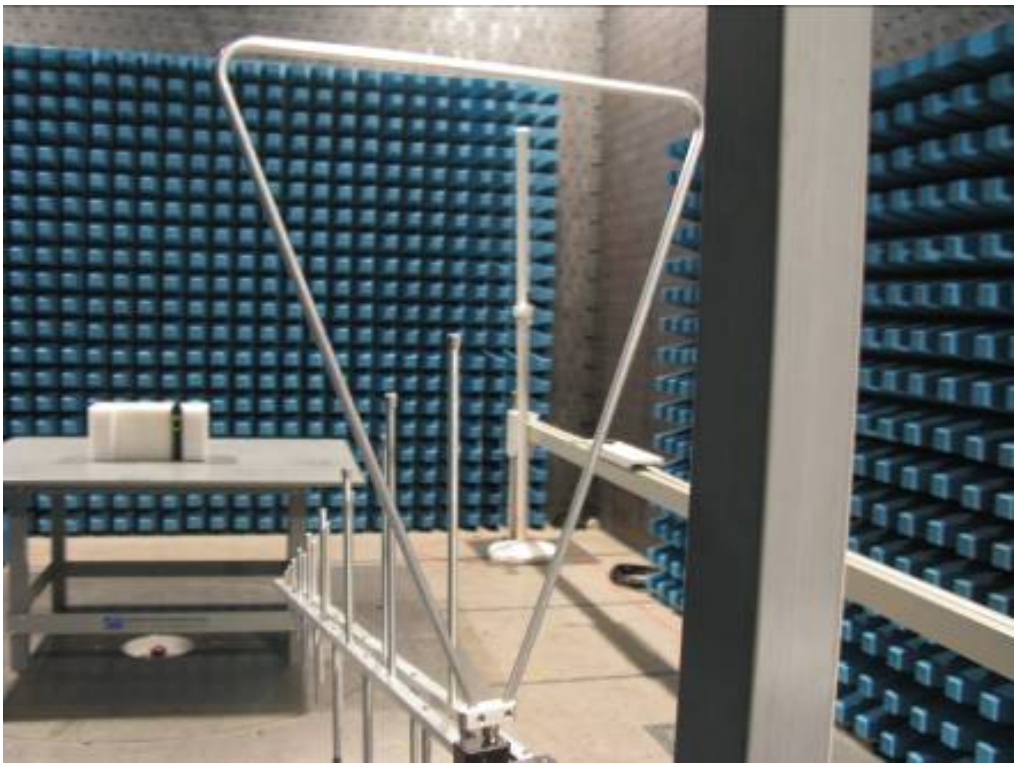
Positive peak deviation



The maximum deviation of the Positive peak deviation plot is at 5kHz modulating frequency.

4 PHOTOGRAPHS

4.1 **Radiated Emission Test Setup**

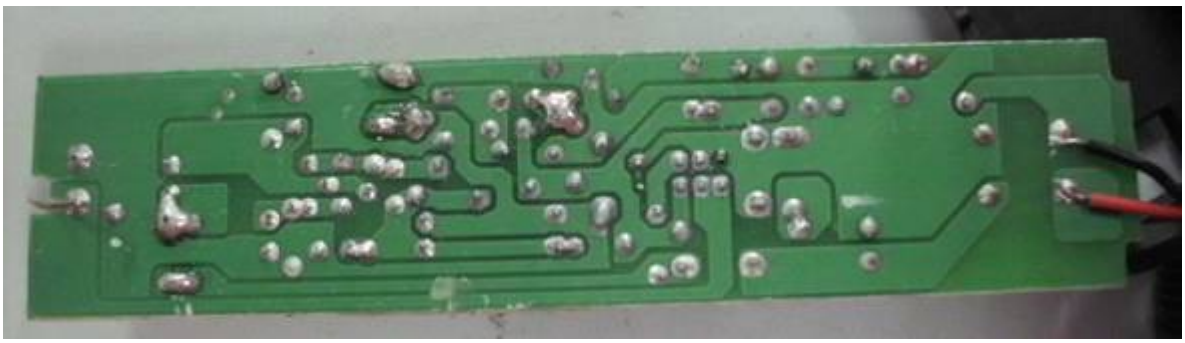


30MHz – 1GHz

4.2 **EUT Constructional Details**

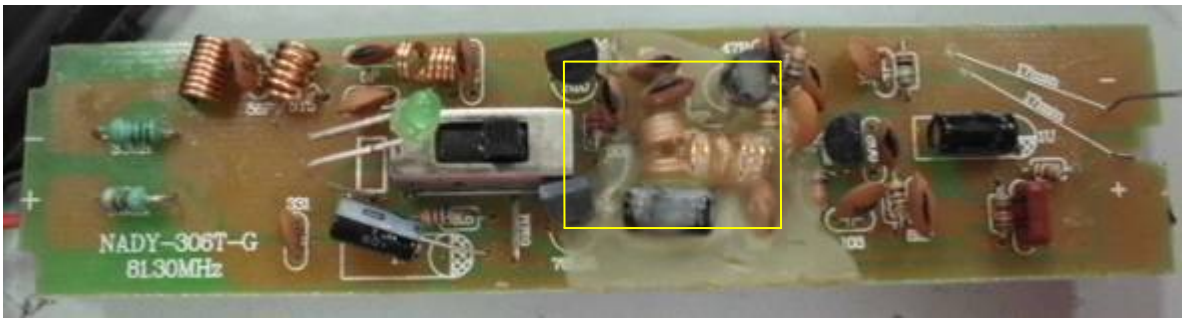
M-308

NADY-306T-G
8130MHz



4.3 **Antenna Photo**

Antenna



5 EQUIPMENTS USED DURING TEST

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
1	RF Generator	Rohde & Schwarz	SMT06	61-318	2015-6-8	2016-6-8
2	Spectrum Analyzer	R&S	CMU 200	/	2015-6-8	2016-6-8
3	EMI Test Receiver	Rohde & Schwarz	ESU	/	2015-6-8	2016-6-8
4	Power Meter	Rohde & Schwarz	URV35	EMC1506	2015-6-8	2016-6-8
5	Audio Analyzer	Rohde & Schwarz	UPL	EMC1508	2015-6-8	2016-6-8
6	Antenna Positioner	ETS-LINDGREN	/	/	2015-6-8	2016-6-8
7	Turn table	ETS-LINDGREN	/	/	2015-6-8	2016-6-8
8	Multi-Device Controller	ETS-LINDGREN	/	/	2015-6-8	2016-6-8
9	EMI Test Software	Ceprei	/	/	2015-6-8	2016-6-8
10	Coaxial cable	Ceprei	/	/	2015-6-8	2016-6-8
11	Coaxial cable	Ceprei	/	/	2015-6-8	2016-6-8
12	Power Sensor	Rohde & Schwarz	URV5-Z7	EMC1507	2015-6-8	2016-6-8
13	Temperature Chamber	Gongwen	GDS-250	1150	2015-6-8	2016-6-8
14	D.C. Power Supply	WELLSTAR	PS-205A	SEL0045	2015-6-8	2016-6-8
15	Humidity/ Temperature Meter	Shanghai	ZJ1-2B	SEL0101 to SEL0103	2015-6-8	2016-6-8
16	Barometer	ChangChun	DYM3	SEL0088	2015-6-8	2016-6-8
17	Multimeter	Victor	VC9805A+	3000125	2015-6-8	2016-6-8
18	DC Power Supply	DG HuaYang	PS-3030	9862036	2015-6-8	2016-6-8
19	Low loss coaxial cable	HST	2 m	EMC1008	2015-6-8	2016-6-8
20	Monopole Antenna	HST	N/A	N/A	2015-6-8	2016-6-8
21	Noise Generaror	Ningbo Zhongce	DF1681	EMC0009	2015-6-8	2016-6-8
22	Antenna	R & S	HF906	/	2014-5-10	2017-5-10
23	3m Semi-anechoic Chamber	ABLATROSS	SAC-3	/	2014-5-10	2017-5-10
24	EMI Receiver	R & S	ESCI-3	/	2015-5-10	2016-5-10
25	Spectrum Analyzer	R & S	FSP30	/	2015-5-10	2016-5-10
26	BiConiLog Antenna	SCHWARZBECK	SWB-VULB 9163	/	2014-5-10	2017-5-10
27	Pre-amplifier	B & Z TECHNOLOGIES	SCA-SCU18	/	2015-5-10	2016-5-10

End of report