



# **FCC 47 CFR PART 74 SUBPART H**

## **TEST REPORT**

*For*

**Applicant : Nady Systems, Inc.**

**Address : 6701 Shellmound Street Emeryville, CA 94608, USA**

**Product Name : Wireless Microphone**

**Model Name : HT-1KU/DR-T40**

**Brand Name : Nady/Digital Reference**

**FCC ID : BEK9E3W1KUH**

**Report No. : SZSTS090204F1**

**Date of Issue : February 18, 2009**

**Issued by : Shenzhen Super Test Service Technology Co., Ltd.**

**Address : No.813 Unit A, Huameiju Business Center, Xinhua Road, Bao'an District, Shenzhen, China**

**Tel : 86-755-2795 8522**

**Fax : 86-755-2795 8022**

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## 1. TEST RESULT CERTIFICATION

<b>Applicant Name:</b>	Nady Systems, Inc.
<b>Address:</b>	6701 Shellmound Street Emeryville, CA 94608, USA
<b>Manufacturer Name:</b>	Enping VOTEX Electronic Technology Co., LTD
<b>Address:</b>	NO. 7-8 Wu Li Ying, Jin jiang Road, Enping City, GuangDong, China
<b>Brand Name:</b>	Nady/Didital Reference
<b>Equipment Under Test:</b>	Wireless Microphone
<b>Model Number:</b>	HT-1KU/DR-T40
<b>FCC ID:</b>	BEK9E3W1KUH
<b>Test Standard</b>	FCC 47 CFR Part 74 Subpart H
<b>File Number:</b>	SZSTS090204F1
<b>Date of Test:</b>	February 11, 2009 - February 18, 2009

***We (STS) hereby certify that:***

The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 74 H.

The test results of this report relate only to the tested sample identified in this report.

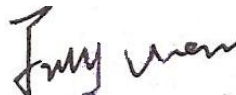
**Tested By:**



Glyn He / Test Engineer

February 18, 2009

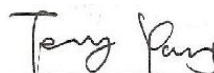
**Checked By:**



July Wen / Quality Engineer

February 18, 2009

**Authorized By:**



Terry Yang / General Manager

February 18, 2009

## 2. Technical Information

Note: the following data is based on the information by the applicant.

### 2.1 EUT Description

Product	Wireless Microphone
Brand Name	Nady/Didital Reference
Model Number	HT-1KU/DR-T40
Series Model Name:	N/A
Series Model Difference description:	N/A
Power Supply	DC 3 V (Battery AA*2)
Frequency Range	672.000 MHz-696.975 MHz
Modulation Technique	FM
Channel Number	1000
Antenna Gain	3 dBi
Temperature Range	-10°C-40°C

**Note:**

1. This submittal(s) (test report) is intended for FCC ID: BEK9E3W1KUH filing to comply with the FCC Part 74, Subpart H Rules.
2. Please refer to Appendix B for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

## 2.2 Objective

The tests documented in this report were performed in accordance with ANSI C63.4 (2003) and FCC CFR 47 Rules Part 74 Subpart H.

## 2.3 Test Standards and Results

The EUT has been tested according to FCC CFR 47:

- Part 2: Frequency Allocations and Radio Treaty Matters: General Rules and Regulations (10-1-05 Edition)
- Part 74: Experimental Radio, Auxiliary, Special Broadcast and other program distributional services

**Test items and the results are as bellow:**

No	Test Type	Para. Number	Limit	Result
1	RF Output Power (Radiated)	2.1046(a); 74.861 e(1)	250 mW	PASS
2	Modulation Deviation	2.1047(b); 74.861 e(2)	Refer to 74.861e(2)	PASS
3	Audio Frequency Response	2.1047(a)	Refer to 2.1047(a)	PASS
4	Occupied Bandwidth	2.1049(c)(1); 74.861 e(5)	< 200 KHz	PASS
5	Radiated Spurious Emission	2.1053; 74.861 e(6)	Refer to 74.861e(6)	PASS
6	Frequency Stability vs. Temperature	2.1055(b); 74.861 e(4)	Refer to 74.861e(4)	PASS
7	Frequency Stability vs. Voltage	2.1055(a)(1); 74.861 e(4)	Refer to 74.861e(4)	PASS

### 3. Details of Test

#### 3.1 Identification of the Responsible Testing Laboratory

Company:	Shenzhen Super Test Service Technology Co., Ltd.
Address:	No.813 Unit A, Huameiju Business Center,Xinhu Road, Bao'an District, Shenzhen, China

#### 3.2 Identification of the Responsible Testing Location

Test Site:	Shenzhen Most Technology Service Co., Ltd
Address:	Add: No.5, Nangshan 2nd Rd., North Hi-Tech Industrial park ,Nanshan, Shenzhen, Guangdong ,China
Description:	<p>There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 16 requirements.</p> <p>The <b>FCC</b> Registration Number is <b>490827</b>.</p> <p>The <b>CNAS</b> Registration Number is <b>CNAS L3573</b>.</p>

### 3.3 List of Test Equipments

No.	Equipment	Manufacturer	Model No.	S/N	Calibrator due date
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2009/03/15
2	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2009/03/15
3	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2009/03/15
4	Terminator	Hubersuhner	50Ω	No.1	2009/03/15
5	RF Cable	SchwarzBeck	N/A	No.1	2009/03/15
6	Bilog Antenna	Sunol	JB3	A121206	2009/03/15
7	Cable	Resenberger	N/A	NO.1	2009/03/15
8	DC Power Filter	DuoJi	DL2×30B	N/A	2009/03/15
9	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2009/03/15
10	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2009/03/15
11	Absorbing Clamp	Luthi	MDS21	3635	2009/03/15
12	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2009/03/15
13	AC Power Source	Kikusui	AC40MA	LM003232	2009/03/15
14	Test Analyzer	Kikusui	KHA1000	LM003720	2009/03/15
15	Line Impedence Network	Kikusui	LIN40MA-PCR-L	LM002352	2009/03/15
16	ESD Tester	Kikusui	KES4021	LM003537	2009/03/15
17	EMC PRO System	EM Test	UCS-500-M4	V0648102026	2009/03/15
18	Signal Generator	IFR	2032	203002/100	2009/03/15
19	Amplifier	A&R	150W1000	301584	2009/03/15
20	CDN	FCC	FCC-801-M3-25	107	2009/03/15
21	EM Injection Clamp	FCC	F-203I-23mm	403	2009/03/15
22	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2009/03/15

**NOTE:** Equipments listed above have been calibrated and are in the period of validation.

### **3.4 Environmental Conditions**

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60%
- Atmospheric pressure: 86-106 k Pa



## 4. Test Methodology

### 4.1 General Test Procedures

#### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirement in Section 13.1.4.1 of ANSI C63.4:2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

**Not Applicable (Since the EUT is powered by battery)**

#### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4:2003.

### 4.2 Description of Test Modes

The EUT has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

### 4.3 FCC Part 15.205 Restricted Bands of Operations

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

## 5. FCC Part 74 Requirements

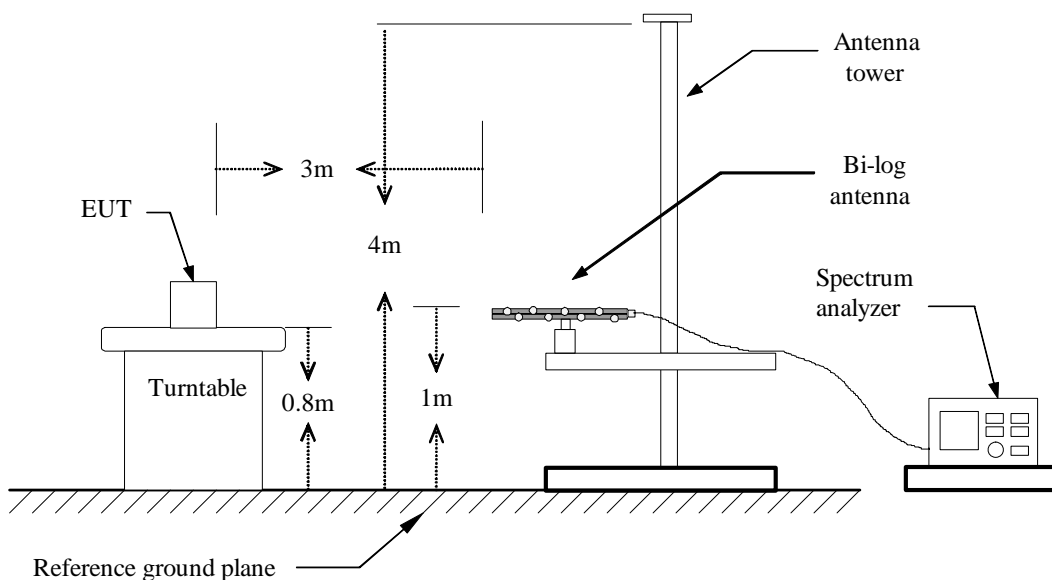
### 5.1 RF Output Power (Radiated)

#### LIMIT

According to CFR 47 section 74.861 e (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:

- (1) 54-72, 76-88, and 174-216 MHz bands: 50 mW;
- (2) 470-608 and 614-806 MHz bands: 250 mW

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
2. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
3. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how

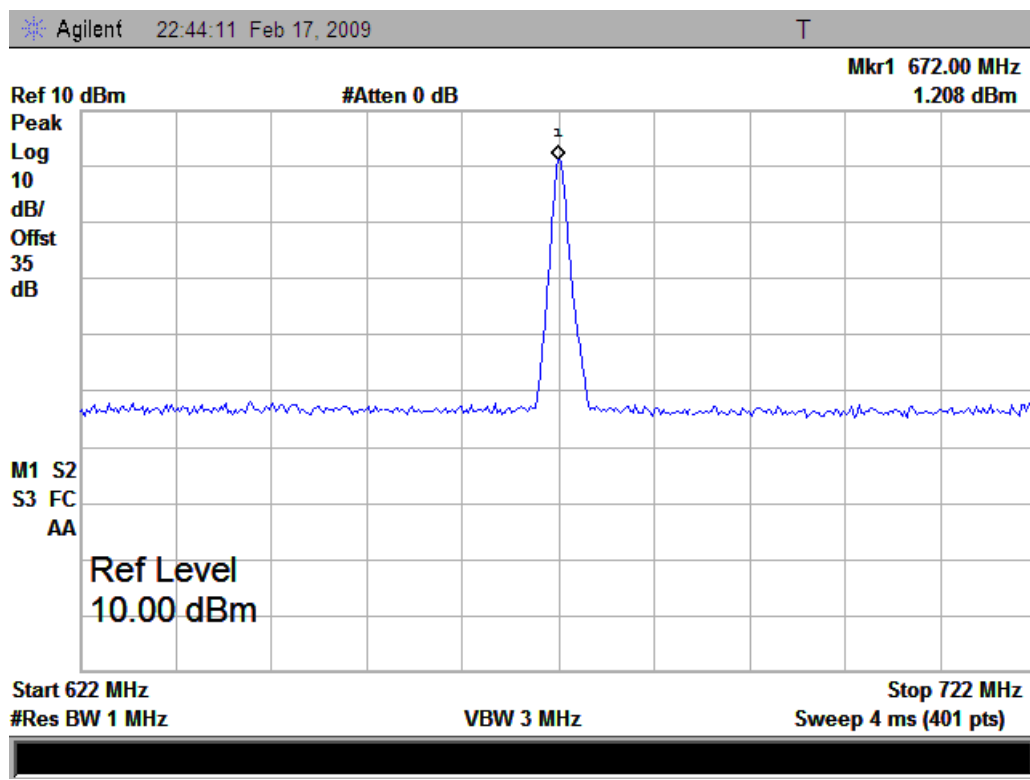
close the emission level was approaching the limit.

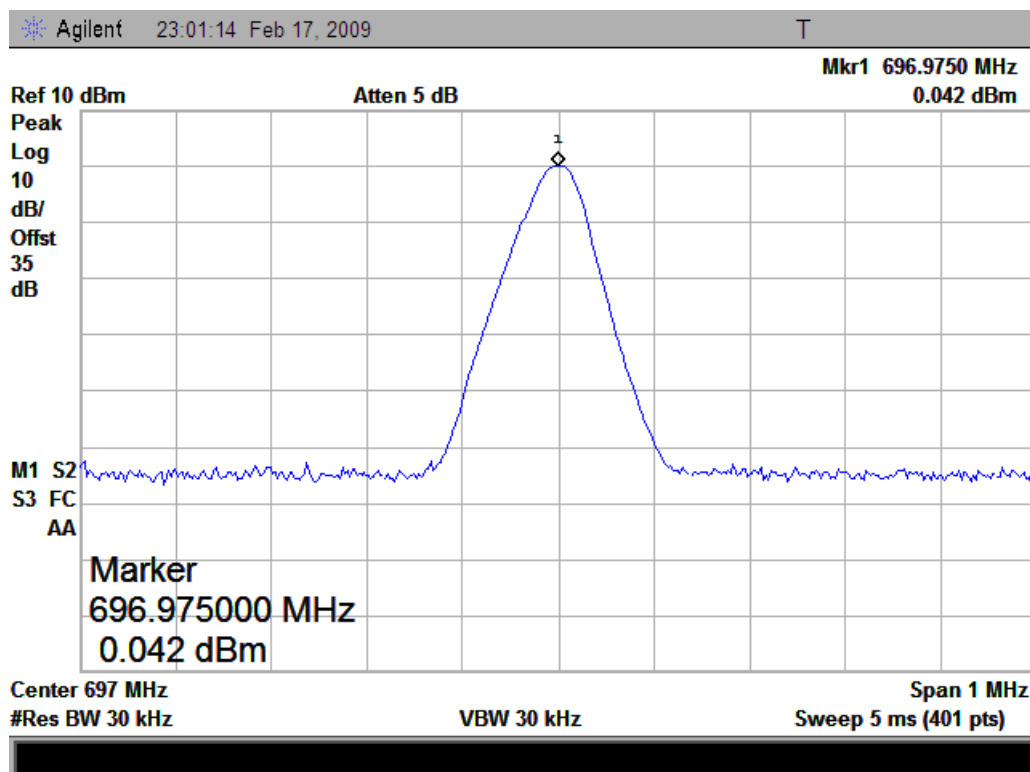
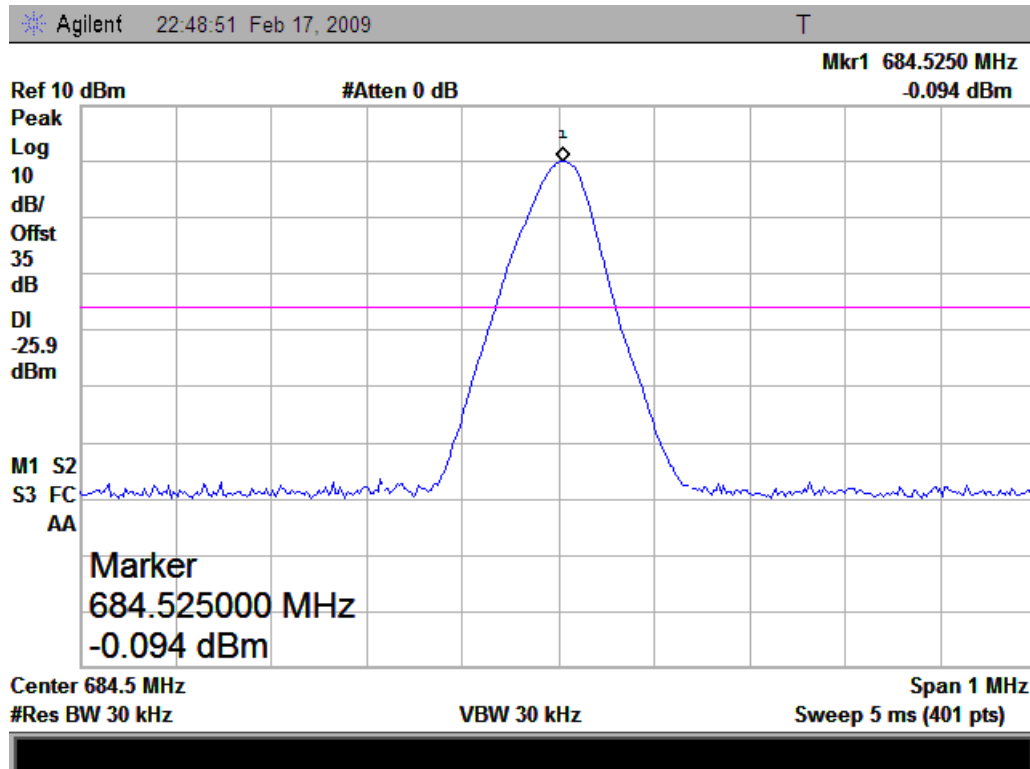
4. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
6. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The measurement shall be repeated with the test antenna set to horizontal polarization.
10. Replace the antenna with a proper Antenna (substitution antenna).
11. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
12. The substitution antenna shall be connected to a calibrated signal generator.
13. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
14. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
15. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
16. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
17. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

## TEST RESULTS

Channel List	Frequency Channel (MHz)	Peak Output Power (dBm)	Transmitter Power (mW)	Limits (mW)
Low	672.000	1.208	1.321	250
Middle	684.525	-0.094	0.979	250
High	696.975	0.042	1.009	250

## Test Plot





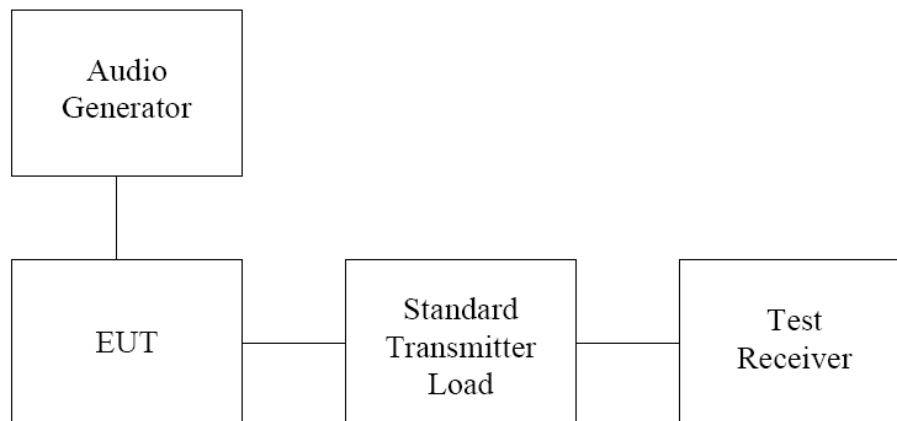
## 5.2 Modulation Deviation

### LIMIT

According to CFR 47 section 2.1047 a, for Voice modulation communication equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 74.861 e (1), any form of modulation may be used. A maximum deviation of  $\pm 75$  KHz is permitted when frequency modulation is employed.

### TEST CONFIGURATION



### TEST PROCEDURE

Modulation limits is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of rated system deviation.

The audio signal generator is connected to the audio input of the EUT with its full rating.

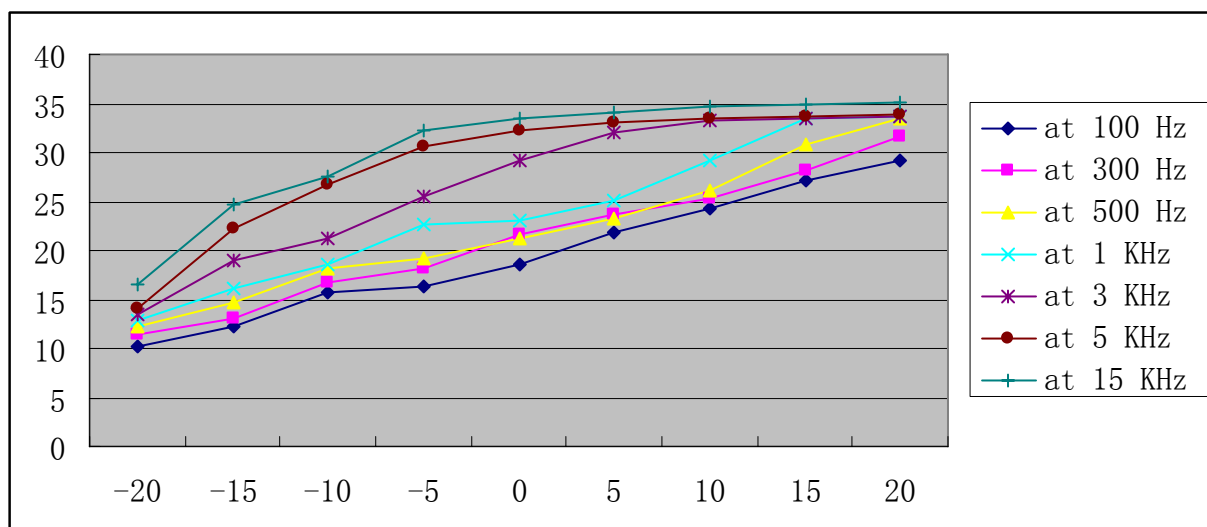
The modulation response is measured at certain modulation frequencies, related to 1000 Hz reference signal.

Tests are performed for positive and negative modulation.

## TEST RESULTS

The Low Channel (672.000 MHz)

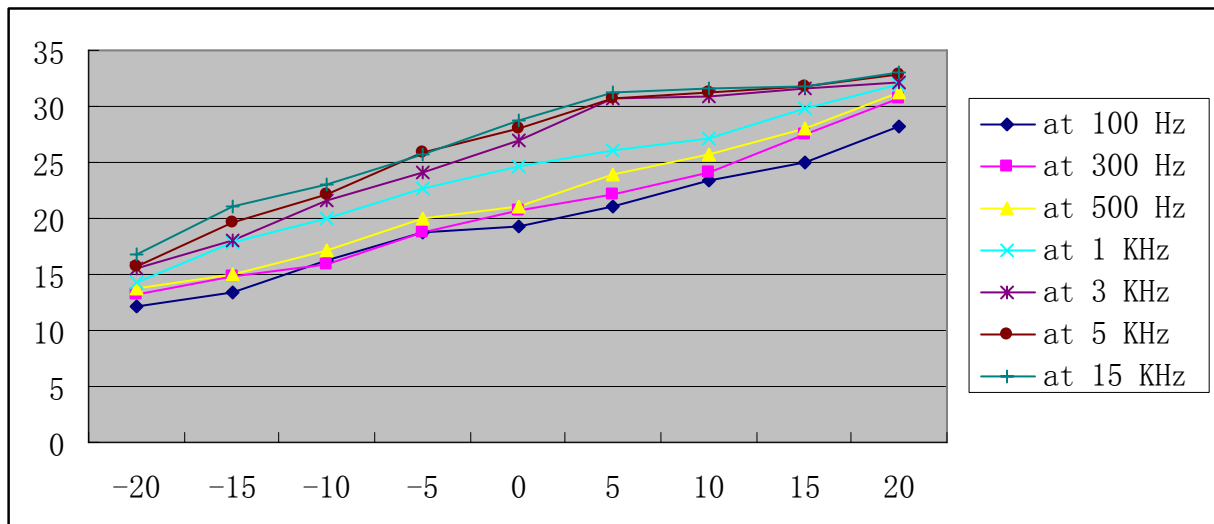
Modulation Level (dB)	Peak Frequency Deviation						
	at 100 Hz (KHz)	at 300 Hz (KHz)	at 500 Hz (KHz)	at 1 KHz (KHz)	at 3 KHz (KHz)	at 5 KHz (KHz)	at 15 KHz (KHz)
-20	10.26	11.39	12.16	12.85	13.52	14.14	16.45
-15	12.15	13.11	14.65	16.18	18.90	22.16	24.68
-10	15.67	16.64	18.17	18.63	21.28	26.74	27.53
-5	16.31	18.12	19.13	22.57	25.59	30.61	32.19
0	18.56	21.64	21.32	23.03	29.23	32.15	33.46
+5	21.89	23.65	23.18	25.18	32.11	33.09	34.10
+10	24.23	25.26	26.10	29.20	33.26	33.57	34.62
+15	27.13	28.19	30.81	33.39	33.48	33.71	34.85
+20	29.24	31.56	33.57	33.61	33.69	33.86	35.09





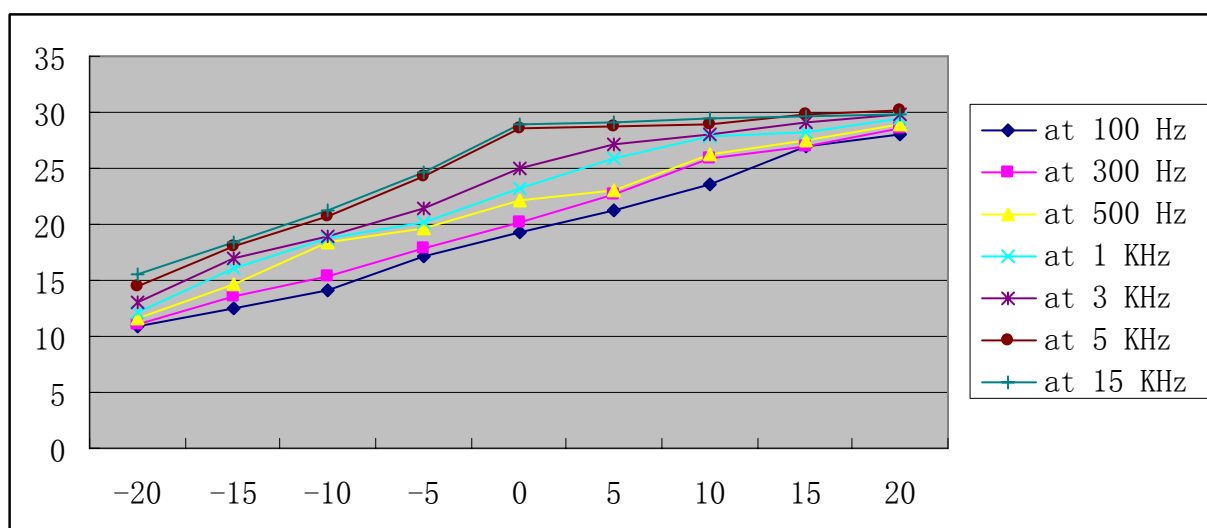
The Middle Channel (684.525 MHz)

Modulation Level (dB)	Peak Frequency Deviation						
	at 100 Hz (KHz)	at 300 Hz (KHz)	at 500 Hz (KHz)	at 1 KHz (KHz)	at 3 KHz (KHz)	at 5 KHz (KHz)	at 15 KHz (KHz)
-20	12.08	13.13	13.68	14.31	15.52	15.78	16.85
-15	13.35	14.75	15.05	17.88	18.11	19.56	21.09
-10	16.18	15.83	17.09	20.05	21.52	22.16	23.12
-5	18.75	18.75	19.96	22.61	24.18	25.89	25.67
0	19.20	20.64	21.16	24.56	27.01	28.09	28.73
+5	21.16	22.18	23.85	26.09	30.65	30.72	31.25
+10	23.39	24.19	25.67	27.11	30.93	31.17	31.58
+15	25.06	27.56	28.11	29.91	31.58	31.79	31.87
+20	28.17	30.66	31.27	31.95	32.08	32.88	33.01



The High Channel (696.975 MHz)

Modulation Level (dB)	Peak Frequency Deviation						
	at 100 Hz (KHz)	at 300 Hz (KHz)	at 500 Hz (KHz)	at 1 KHz (KHz)	at 3 KHz (KHz)	at 5 KHz (KHz)	at 15 KHz (KHz)
-20	10.85	11.15	11.58	12.11	13.09	14.51	15.59
-15	12.56	13.59	14.65	16.08	16.95	18.11	18.46
-10	14.19	15.31	18.43	18.69	18.98	20.78	21.18
-5	17.09	17.89	19.69	20.14	21.35	24.26	24.69
0	19.35	20.11	22.11	23.26	25.06	28.57	28.91
+5	21.28	22.75	23.06	25.85	27.15	28.79	29.13
+10	23.66	25.91	26.32	27.83	28.06	29.01	29.52
+15	26.90	27.01	27.51	28.19	29.08	29.76	29.65
+20	28.12	28.52	28.97	29.53	29.89	30.16	29.80



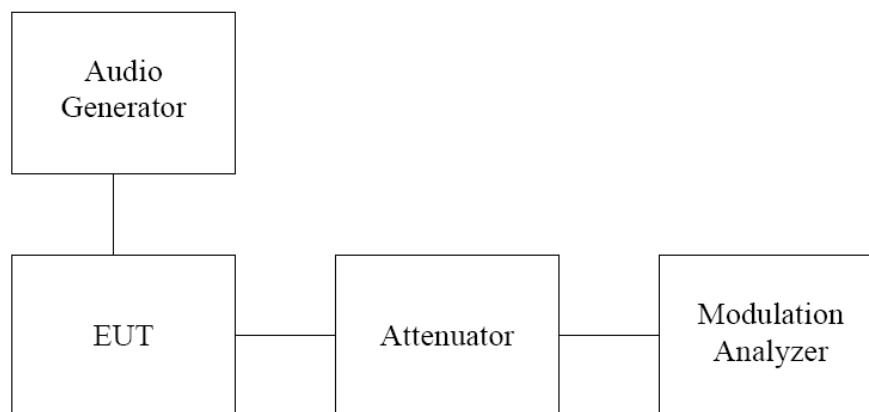
### 5.3 Audio Frequency Response

#### LIMIT

According to CFR 47 section 2.1047 a, for Voice modulation communication equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 74.861 e (1), any form of modulation may be used. A maximum deviation of  $\pm 75$  KHz is permitted when frequency modulation is employed.

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. The audio frequency response is the degree of the closeness to which the frequency deviation of the transmitter follows prescribed characteristics.
2. The frequency response of the audio modulation part is measured over a frequency range of 100Hz to 5000 Hz.
3. For 1000 Hz tone reference signal the audio generator level is adjusted to get 20% of the rated system deviation.
4. The deviations obtained over the frequency range from 100 HZ to 5000 Hz are recorded and compared with the reference deviation as follows:

$$\text{Audio Frequency Response} = 20 \log (\text{DEV freq/ Dev ref})$$

**TEST RESULTS**

Low Channel (672.000 MHz)

Frequency ( Hz)	Deviation ( KHz)
100	10.13
200	10.56
300	10.98
400	11.25
500	12.17
600	12.63
700	12.95
800	13.06
900	13.15
1000	13.57
1200	13.86
1400	14.42
1600	15.68
1800	16.14
2000	17.28
2400	18.59
2800	18.81
3200	19.23
3600	18.75
4000	17.39
4500	15.62
5000	13.49

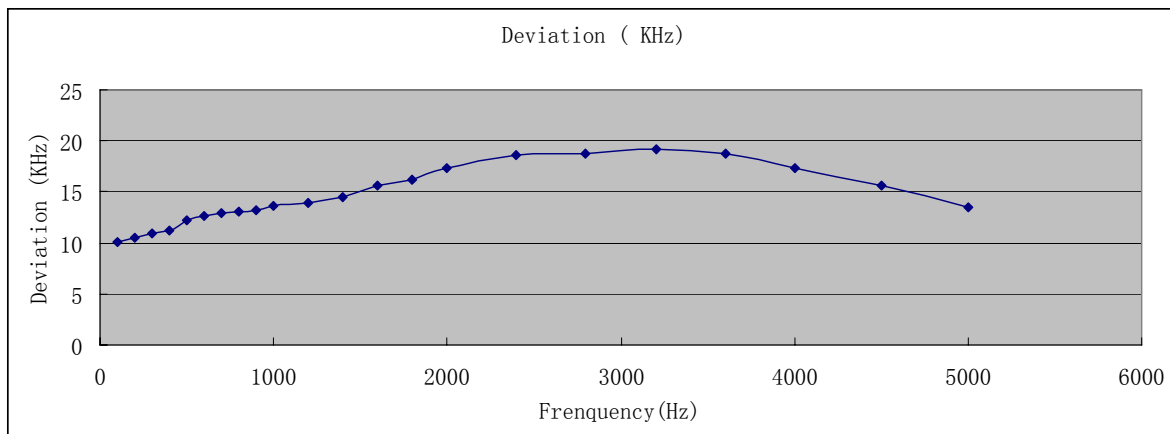
## The Middle Channel (684.525 MHz)

Frequency ( Hz)	Deviation ( KHz)
100	11.52
200	11.76
300	11.95
400	12.31
500	12.68
600	12.90
700	13.15
800	13.56
900	13.89
1000	14.12
1200	14.95
1400	15.52
1600	16.19
1800	16.93
2000	17.46
2400	18.11
2800	19.75
3200	20.18
3600	17.65
4000	15.26
4500	13.61
5000	11.10

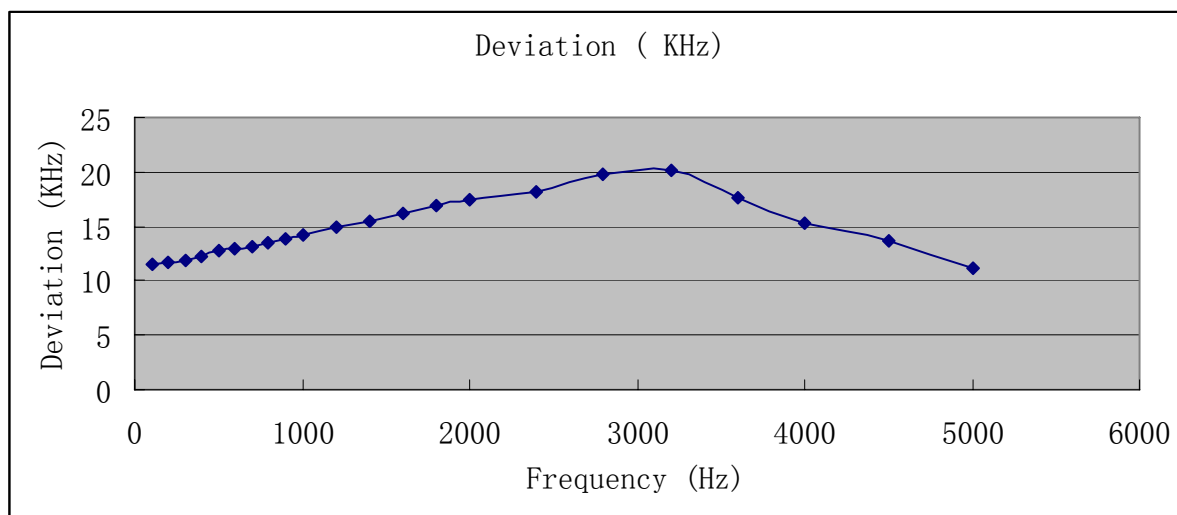
## The High Channel (696.975 MHz)

Frequency ( Hz)	Deviation ( KHz)
100	11.31
200	11.42
300	11.79
400	12.12
500	12.51
600	12.89
700	13.26
800	13.64
900	13.95
1000	14.47
1200	14.83
1400	15.36
1600	16.40
1800	17.18
2000	18.21
2400	19.35
2800	20.56
3200	21.48
3600	18.19
4000	15.09
4500	13.11
5000	10.87

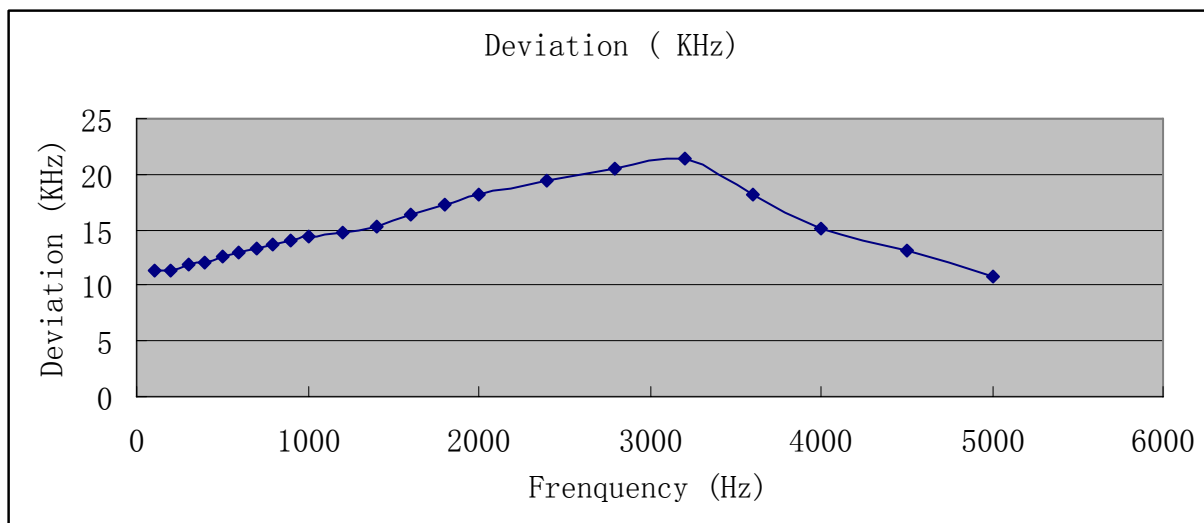
The Low Channel (672.000 MHz)



The Middle Channel (684.525 MHz)



The High Channel (696.975 MHz)



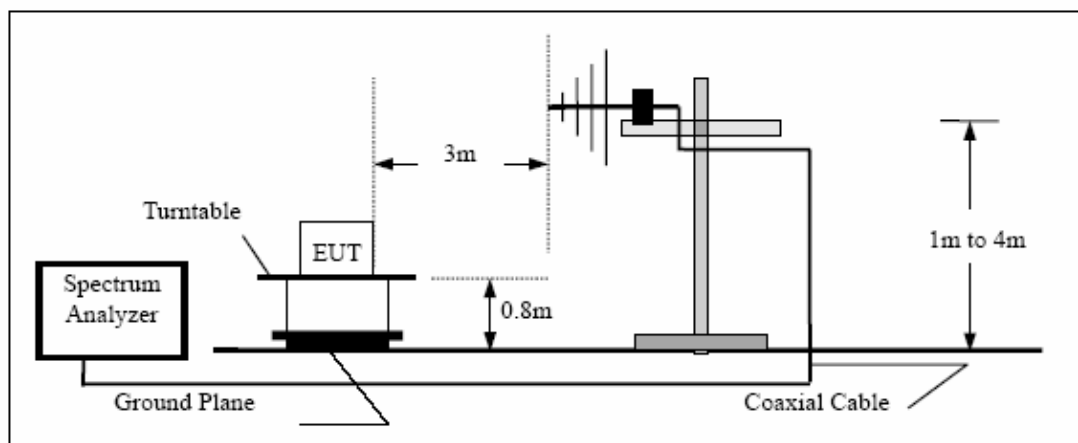
## 5.4 Occupied Bandwidth

### LIMIT

According to CFR 47 section 74.861 e (5), the operating bandwidth shall no exceed 200 KHz.

Near the carrier an emission mask is defined by the standard.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. Set EUT as normal operation.
3. Set SPA center frequency=fundamental frequency, RBW, VBW=1 KHz, Span=50 KHz.
4. Set SPA max. Hold. Mark peak, -26dB.



## TEST RESULTS

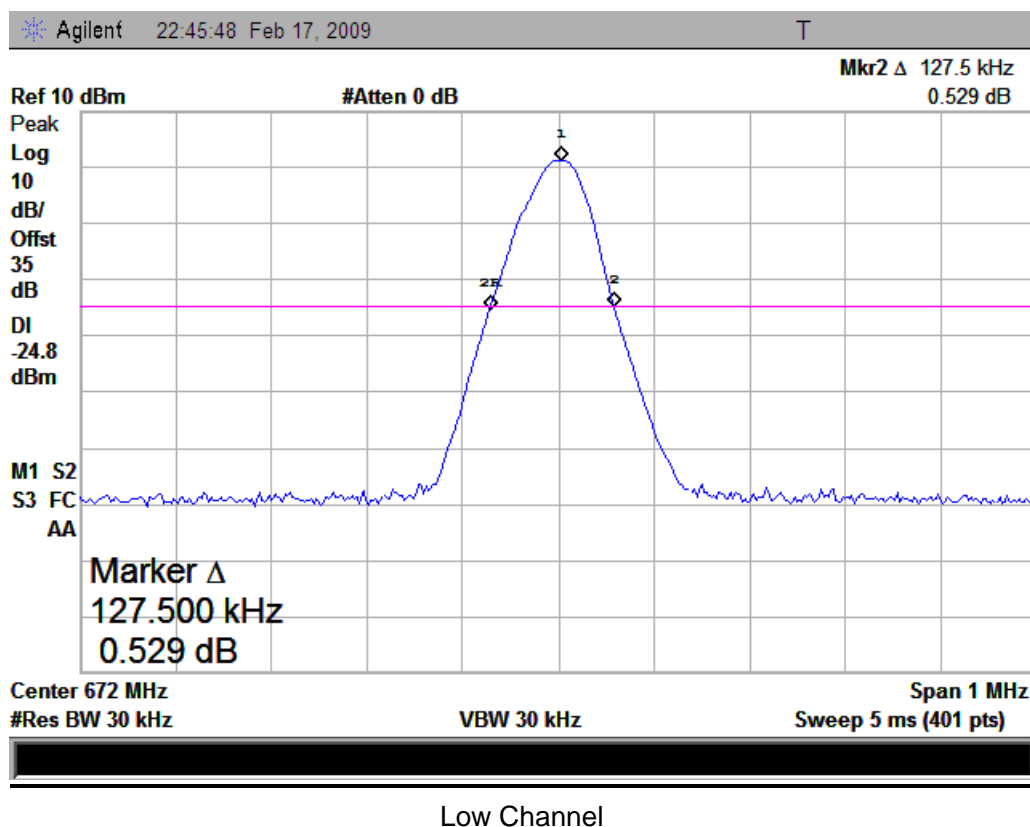
### 1000 Hz Modulation

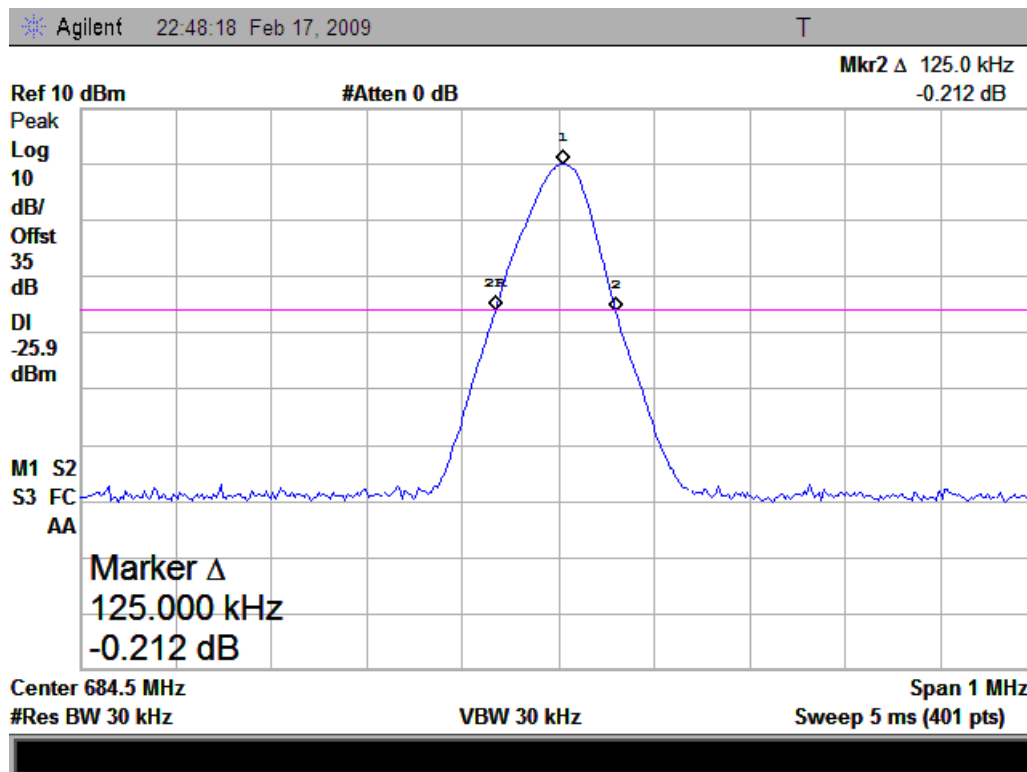
Frequency	Occupied Bandwidth	Limit
672.000 MHz	127.5 KHz	200 KHz
684.525 MHz	125.0 KHz	200 KHz
696.975 MHz	125.0 KHz	200 KHz

### 2500 Hz Modulation

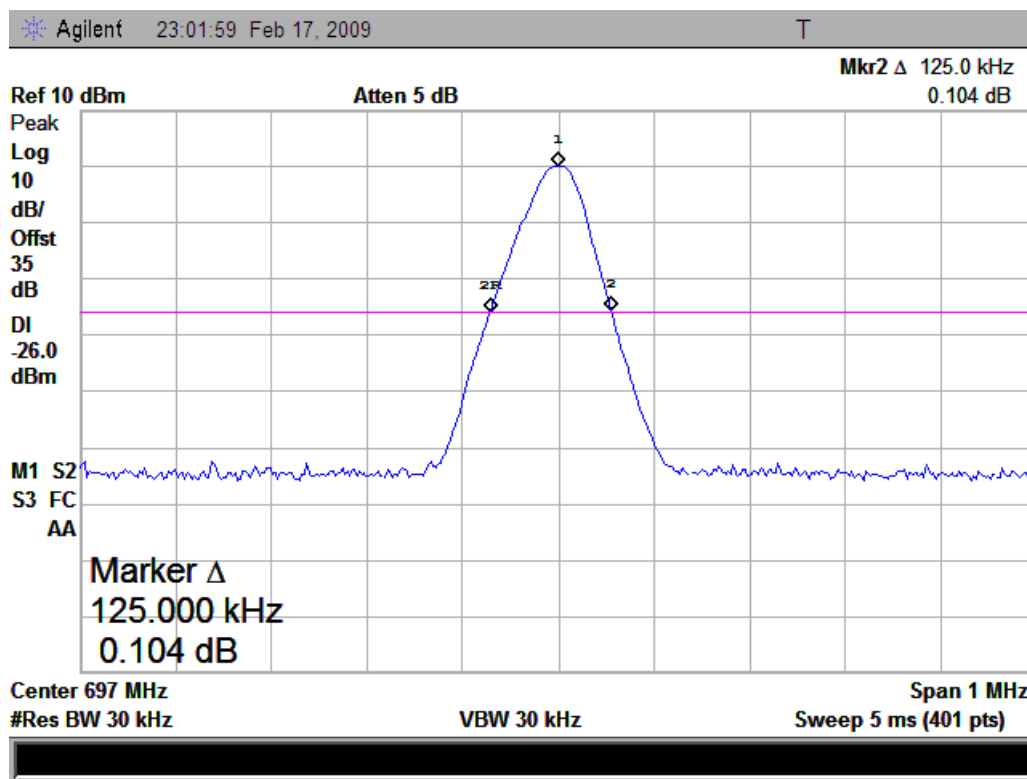
Frequency	Occupied Bandwidth	Limit
672.000 MHz	125.8 KHz	200 KHz
684.525 MHz	123.2 KHz	200 KHz
696.975 MHz	123.2 KHz	200 KHz

## Test Plot





Middle Channel



High Channel

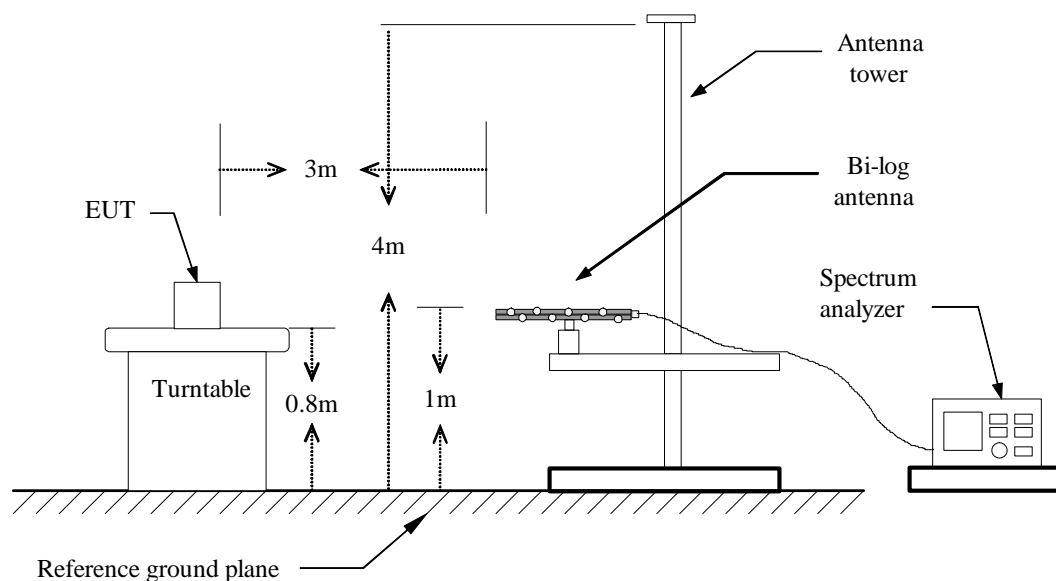
## 5.5 Radiated Spurious Emission

### LIMIT

According to CFR 47 section 74.861 e (6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

- (1) 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 25 dB;
- (2) 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 35 dB;
- (3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least  $43 + 10 \log_{10} \text{ (mean output power in watts) dB}$ ;

### TEST CONFIGURATION



## **TEST PROCEDURE**

1. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
2. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
3. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
6. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The measurement shall be repeated with the test antenna set to horizontal polarization.
10. Replace the antenna with a proper Antenna (substitution antenna).
11. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
12. The substitution antenna shall be connected to a calibrated signal generator.
13. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
14. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
15. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
16. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
17. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

**RESULTS**

The Low Channel (672.000 MHz)

Frequency (MHz)	Reading level (dBuv)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
288.10	10.47	V	-72.55	2.2	1.75	-73.00	-13	-60.00
1340.76	23.06	V	-44.64	10.8	8.67	-46.77	-13	-33.77
2010.15	25.87	V	-39.79	14.6	15.15	-39.24	-13	-26.24
2443.45	25.93	V	-39.30	14.7	15.89	-38.11	-13	-25.11
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--								
288.10	10.56	H	-72.48	2.2	1.75	-72.93	-13	-59.93
1340.76	18.15	H	-58.69	10.8	8.67	-60.82	-13	-47.82
2443.45	19.68	H	-46.86	14.7	15.89	-45.67	-13	-32.67
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--								

**Notes:**

(1) "--" in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

(2) Emission Level=S.G output power(dBm)-Cable loss(db)+Antenna Gain(dBi)

## The Middle Channel (684.525 MHz)

Frequency (MHz)	Reading level (dBuv)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
288.10	10.44	V	-72.53	2.2	1.75	-72.98	-13	-59.98
1370.15	23.85	V	-47.41	10.9	8.69	-49.62	-13	-36.62
2050.15	24.12	V	-43.95	14.7	15.18	-43.47	-13	-30.47
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--							
288.10	10.31	H	-72.62	2.2	1.75	-73.07	-13	-60.07
1370.15	20.05	H	-62.10	10.9	8.69	-64.31	-13	-51.31
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--							

## Notes:

(1) "--" in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

(2) Emission Level=S.G output power(dBm)-Cable loss(db)+Antenna Gain(dBi)

## The High Channel (696.975 MHz)

Frequency (MHz)	Reading level (dBuv)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
288.10	10.40	V	-72.79	2.2	1.75	-73.24	-13	-60.24
1390.05	23.81	V	-47.26	10.9	8.69	-49.47	-13	-36.47
2090.11	24.36	V	-42.68	14.8	15.20	-42.28	-13	-29.28
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--	V	--	--	--	--	-13	> 30 dB
--	--							
288.10	10.26	H	-72.99	2.2	1.75	-73.44	-13	-60.44
1390.05	20.13	H	-61.60	10.9	8.69	-63.81	-13	-50.81
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--	H	--	--	--	--	-13	> 30 dB
--	--							

## Notes:

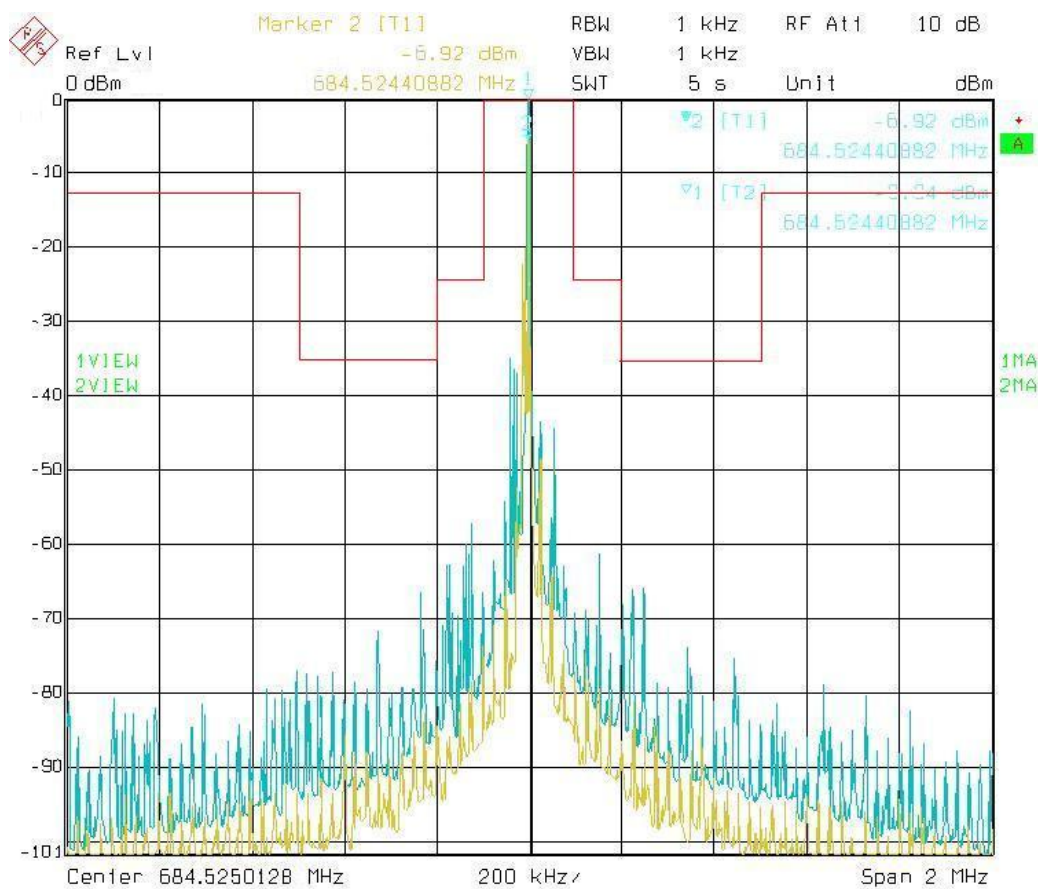
(1) "--" in the table above means that the emissions are too small to be measured and are at least 10 dB below the limit.

(2) Emission Level=S.G ourput power(dBm)-Cable loss(db)+Antenna Gain(dBi)

Maximum Transmitter Power (P)	1.208 dBm
Require attenuation	$43+10\log_{10} (0.001321)= 14.21 \text{ dB}$
Emission Limits	$P-[43+10\log_{10} (1.321 )]= -13 \text{ dBm}$

Emission Mask:

## The Middle Channel (684.525 MHz)





## 5.6 Frequency Stability vs. Temperature

### LIMIT

According to CFR 47 section 74.861 e (4), the frequency tolerance of the transmitter shall be 0.005 percent.

### TEST PROCEDURE

The EUT 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. The DC leads and the RF output cable, exited the chamber through an opening made for that purpose.

After the temperature stabilized the frequency output was recorded from the counter.

### RESULTS

The Low Channel (672.000 MHz)

Temperature (°C)	Frequency Error ( K Hz)	Frequency Error ( %)	Limit ( %)
-30	-4.042	-0.000601	±0.005
-20	-1.285	-0.000191	±0.005
-10	0.785	0.000117	±0.005
0	1.162	0.000173	±0.005
10	1.036	0.000154	±0.005
20	0.224	0.000033	±0.005
30	-0.725	-0.000108	±0.005
40	-2.006	-0.000299	±0.005
50	-2.608	-0.000388	±0.005

The Middle Channel (684.525 MHz)

Temperature (°C)	Frequency Error ( Hz)	Frequency Error ( %)	Limit ( %)
-30	-4.101	-0.000599	$\pm 0.005$
-20	-1.346	-0.000197	$\pm 0.005$
-10	0.845	0.000123	$\pm 0.005$
0	1.221	0.000178	$\pm 0.005$
10	1.095	0.000159	$\pm 0.005$
20	0.281	0.000041	$\pm 0.005$
30	-0.782	-0.000114	$\pm 0.005$
40	-2.035	-0.000297	$\pm 0.005$
50	-2.661	-0.000389	$\pm 0.005$

The High Channel (696.975 MHz)

Temperature (°C)	Frequency Error ( Hz)	Frequency Error ( %)	Limit ( %)
-30	-4.105	-0.000589	$\pm 0.005$
-20	-1.348	-0.000193	$\pm 0.005$
-10	0.846	0.000121	$\pm 0.005$
0	1.224	0.000176	$\pm 0.005$
10	1.097	0.000157	$\pm 0.005$
20	0.284	0.000041	$\pm 0.005$
30	-0.780	-0.000112	$\pm 0.005$
40	-2.031	-0.000291	$\pm 0.005$
50	-2.658	-0.000381	$\pm 0.005$

## 5.7 Frequency Stability vs. Voltage

### LIMIT

According to CFR 47 section 74.861 e (4), the frequency tolerance of the transmitter shall be 0.005 percent.

### TEST PROCEDURE

An external variable DC power supply was connected to the battery terminals of the equipment under test.

For hand carried, battery powered equipment primary supply voltage was reduced to the battery operating end point as specified by the manufacturer. The output frequency was recorded for each battery voltage.

### RESULTS

The Low Channel (672.000 MHz)

Voltage (V)	Frequency Error ( Hz)	Frequency Error ( %)	Limit ( %)
3.0	1560	0.000232	±0.005
2.5	940	0.000140	±0.005
2.0	2190	0.000326	±0.005
1.8	2810	0.000418	±0.005

The Middle Channel (684.525 MHz)

Voltage (V)	Frequency Error ( Hz)	Frequency Error ( %)	Limit ( %)
3.0	530	0.000077	±0.005
2.5	1180	0.000172	±0.005
2.0	2670	0.000390	±0.005
1.8	3340	0.000488	±0.005

The High Channel (696.975 MHz)

Voltage (V)	Frequency Error ( Hz)	Frequency Error ( %)	Limit ( %)
3.0	1150	0.000165	$\pm 0.005$
2.5	890	0.000127	$\pm 0.005$
2.0	2160	0.000309	$\pm 0.005$
1.8	2850	0.000409	$\pm 0.005$