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## FCC PART 15.247 TEST REPORT

### DIGITAL SPREAD SPECTRUM

Applicant	AUDIOVOX CORP.
Address	150 MARCUS BLVD. HAUPPAUGE NY 11787 USA
FCC ID	BGA-WHT24TX
Model Number	WHT24TX
Product Description	WIRELESS SPEAKER SYSTEM
Date Sample Received	1/21/2008
Date Tested	1/21/2008
Tested By	MARIO DE ARANZETA
Approved By	MARIO DE ARANZETA
Report Number	170BUT8TestReport.doc
Test Results	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL  
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Testing Certificate # 0955-01

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**GENERAL REMARKS**

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

The test results relate only to the items tested.

**Summary**

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

**Attestations**

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.  
849 NW State Road 45  
Newberry, Fl 32669



**Authorized Signatory Name:**

Mario de Aranzeta C.E.T.  
Compliance Engineer/ Lab. Supervisor

**Date:** 2/4/2008

APPLICANT: AUDIOVOX CORP.  
FCC ID: BGA-WHT24TX  
REPORT: X:\A\AUDIOBGA\170BUT8\170BUT8TestReport.doc

**GENERAL INFORMATION**

**DUT Specification**

Applicable Standard	Part 15.247		
DUT Description	WIRELESS SPEAKER SYSTEM		
FCC ID	BGA-WHT24RX		
Operating Frequency	TX: 2412-2462 MHz		
Number of channels	4		
DUT Power Source	<input checked="" type="checkbox"/> 110-120Vac/50- 60Hz		
	<input type="checkbox"/> DC Power		
	<input type="checkbox"/> Battery Operated Exclusively		
Test Item	<input type="checkbox"/> Prototype	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Production
Type of Equipment	<input checked="" type="checkbox"/> Fixed	<input type="checkbox"/> Mobile	<input type="checkbox"/> Portable
Antenna Connector	none		
Antenna	Printed F (part of PC Board) type -2 dBi		
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Test Conditions	Temperature: 26°C Relative humidity: 50%		
Test Exercise	The DUT was placed in continuous transmit mode of operation.		

**Test Supporting Equipment**

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
N/A			

**EMC EQUIPMENT LIST**

<b>Device</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>Cal/Char Date</b>	<b>Due Date</b>
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/20/07	3/19/10
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/11/07	5/10/10
Analyzer: Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	Listed 11/30/07	11/30/09
Analyzer: Tan Tower Quasi-Peak Adapter	HP	85685A	3221A01400	Listed 11/30/07	11/30/09
Analyzer: Tan Tower Preamplifier	HP	8449B-H02	3008A00372	Listed 11/30/07	11/30/09
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 7/18/07	7/18/09
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	CAL 7/18/07	7/18/09
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/5/06	10/5/08
LISN	Electro-Metrics	EM-7820	2682	CAL 7/23/07	7/23/09
Antenna: Log-Periodic	Eaton	96005	1243	CAL 12/13/07	12/13/09
Spectrum Receiver	Rohde & Schwarz	ESIB40		Feb 08	Feb 10

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**TEST PROCEDURES**

**Radiation Interference:** ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

**Formula Of Conversion Factors:** The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:  
 Freq (MHz)      Meter Reading      + ACF      + CL = FS  
 33                    20 dBuV            + 10.36 dB      + 0.5 = 30.86 dBuV/m @ 3m

**Power Line Conducted Interference:** The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

**Occupied Bandwidth:** A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

**Bandwidth 6.0dB:** The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1 MHz and the video bandwidth (VBW) =3 MHz and the span set as shown on plot.

**Power Output:** The RF power output was measured at the antenna feed point using a peak power meter.

**Antenna Conducted Emissions:** The RBW=100 kHz, VBW=300 kHz and the span set to 10 MHz and the spectrum was scanned from 30 MHz to the 10<sup>th</sup> Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

**ANSI C63.4-2003 10.1 Measurement Procedures:** The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

## RADIATION INTERFERENCE

Rules Part No.: 15.247, 15.209

### Requirements:

Frequency	Limits
Part 15.209	
9 to 490 kHz	2400/F (kHz) $\mu\text{V}/\text{m}$ @ 300 meters
490 to 1705 kHz	24000/F (kHz) $\mu\text{V}/\text{m}$ @ 30 meters
1705 kHz to 30 MHz	29.54 dB $\mu\text{V}/\text{m}$ @ 30 meters
30 – 88	40.0 dB $\mu\text{V}/\text{m}$ @ 3 meters
80 – 216	43.5 dB $\mu\text{V}/\text{m}$ @ 3 meters
216 – 960	46.0 dB $\mu\text{V}/\text{m}$ @ 3 meters
Above 960	54.0 dB $\mu\text{V}/\text{m}$ @ 3 meters
Part 15.247	
Fundamental 902 – 928 MHz	127.37 dB $\mu\text{V}/\text{m}$ @ 3 meters
Fundamental 2.4 – 2.4835 MHz	127.37 dB $\mu\text{V}/\text{m}$ @ 3 meters
Harmonics	54.0 dB $\mu\text{V}/\text{m}$ @ 3 meters

Any emissions that fall in the restricted bands (15.205) must be less than or equal to to 54 dB $\mu\text{V}/\text{m}$ . Spurious emissions not in a restricted band must be 20 dBc. Harmonics were checked through the 10<sup>th</sup> harmonic.

**Test Data:** All values are peak unless noted.

Items mark with an \* designate a frequency in a restricted band.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dB $\mu\text{V}$	Ant. Pol V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dB $\mu\text{V}/\text{m}$	Margin dB
2,412.0	2,412.00	71.0	V	3.19	32.27	106.46	20.92
2,412.0	2,412.00	75.4	H	3.19	32.27	110.86	16.52
2,412.0	6,431.00	9.9	H	5.43	35.74	51.07	39.79
2,412.0	6,431.00	11.9	V	5.43	35.74	53.07	37.79
2,412.0	6,431.50	9.5	V	5.43	35.75	50.68	40.18
2,412.0	9,648.00	12.0	V	6.79	36.75	55.54	35.32
2,412.0	12,863.00	5.0	V	8.40	39.10	52.50	38.36
2,437.0	2,437.00	71.0	H	3.21	32.34	106.55	20.83
2,437.0	3,251.0Pk	18.6	H	3.83	32.70	55.13	31.42
2,437.0	3,251.0Av	10.0	H	3.83	32.70	46.53	40.02
2,437.0	4,876.0*Pk	20.2	H	4.94	34.10	59.24	14.76
2,437.0	4,876.0*Av	13.1	H	4.94	34.10	52.14	1.86
2,437.0	7,313.0*	8.3	H	5.79	36.06	50.15	3.85
2,437.0	9,752.0Pk	12.0	H	6.83	36.85	55.68	30.87
2,437.0	9,752.0Av	4.3	H	6.83	36.85	47.98	38.57
2,462.0	2,462.00	72.7	H	3.22	32.40	108.32	19.06
2,462.0	3,285.00	11.7	H	3.86	32.71	48.27	40.05
2,462.0	4,928.00*Av	13.6	H	4.96	34.10	52.66	1.34
2,462.0	4,928.00*Pk	17.3	H	4.96	34.10	56.36	17.64

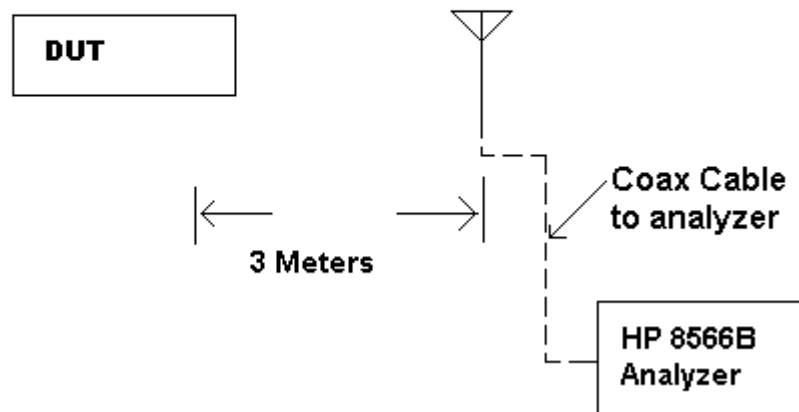
APPLICANT: AUDIOVOX CORP.

FCC ID: BGA-WHT24TX

REPORT: X:\A\AUDIOBGA\170BUT8\170BUT8TestReport.doc

## Method of Measuring Radiated Spurious Emissions

Antenna is Calibrated  
and appropriate one.  
Raised from 1 to 4 M.



**METHOD OF MEASUREMENT:** The procedure used was ANSI STANDARD C63.4-2003 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems – DA 00-705, March 30, 2000.

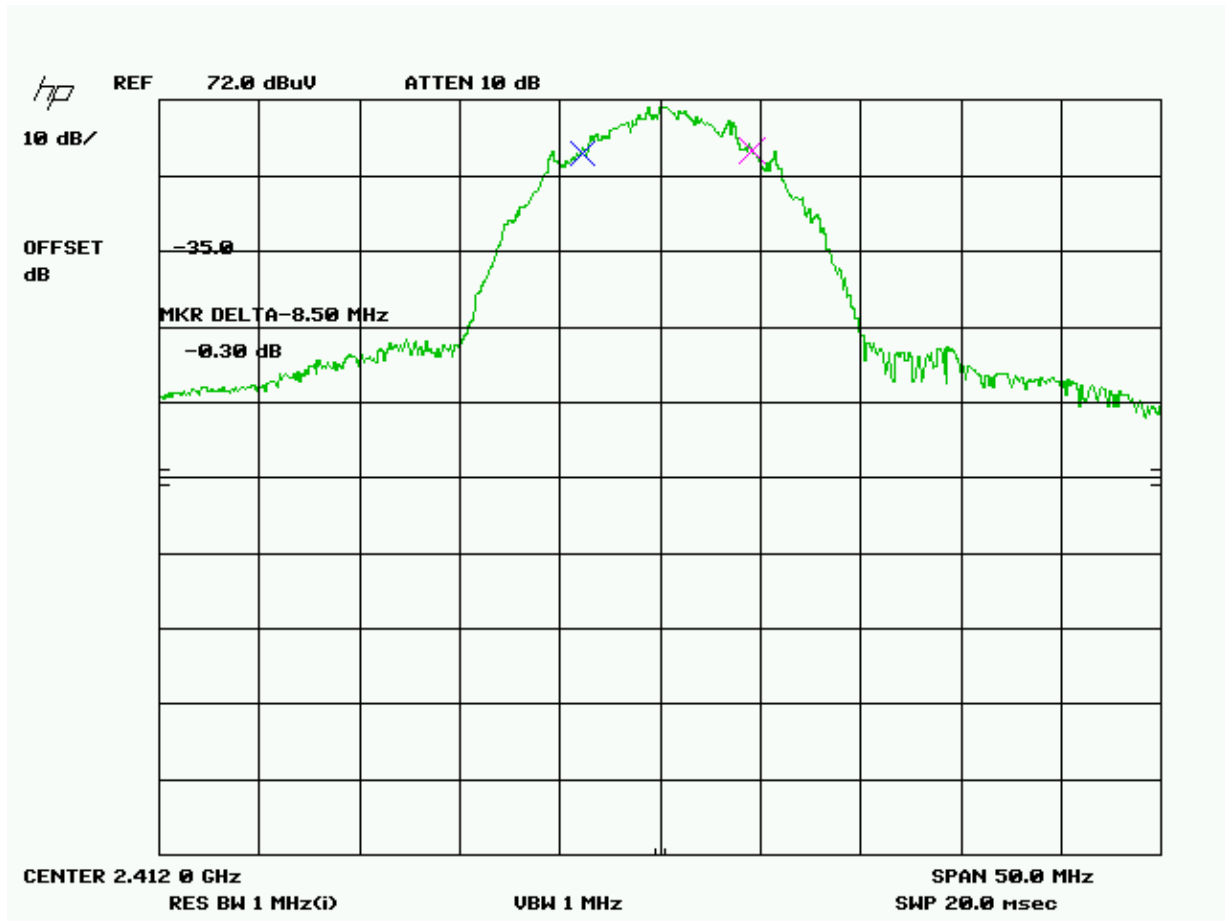


### OCCUPIED BANDWIDTH

**Rules Part No.:** 15.247(a)(2)

**Requirements:** The 6 dB bandwidth must be greater than 500 kHz.

**Test Data:**



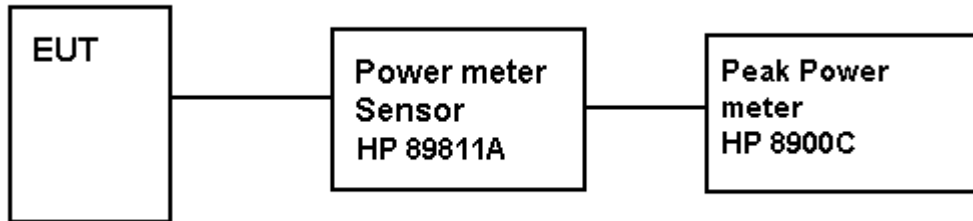
Three places in the band were measured and the worst case reported.

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**POWER OUTPUT**

**Rules Part #:** 15.247(b) 1 Watt conducted, 4W ERP

TEST SET UP:



\*Harmonics were checked through the 10<sup>th</sup> harmonic\*

**Test Results:**

Frequency MHz	Po dBm	Po Watts
2412	+17	0.050
2437	+16	0.050
2462	+16	0.047

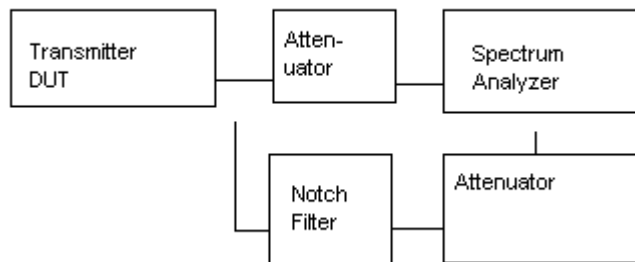
## SPURIOUS EMISSIONS AT ANTENNA TERMINALS

**Requirements:** Emissions must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

**Test Data:**

**N/A, Device has permanently attached antenna and no antenna connector.**

15.247(c) Method of Measuring RF Conducted Spurious Emissions



APPLICANT: AUDIOVOX CORP.

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## POWER LINE CONDUCTED INTERFERENCE

**Rules Part No.:** 15.207

**Requirements:**

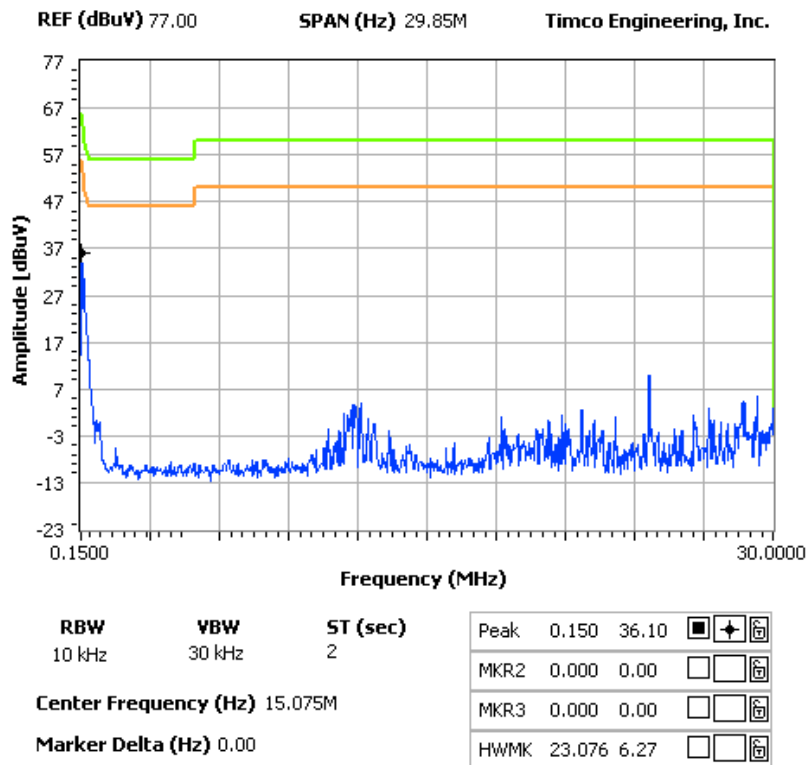
Frequency (MHz)	Quasi Peak Limits (dBuV)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

**Test Data:** The attached graphs represent the emissions read for power line conducted for this device. Both lines were observed.

**NOTES:**

AUDIOVOX CORPORATION - FCC ID: BGA-WHT24TX  
POWER LINE CONDUCTED PLOT - LINE 1

**FCC 15.107 Mask Class B**



APPLICANT: AUDIOVOX CORP.

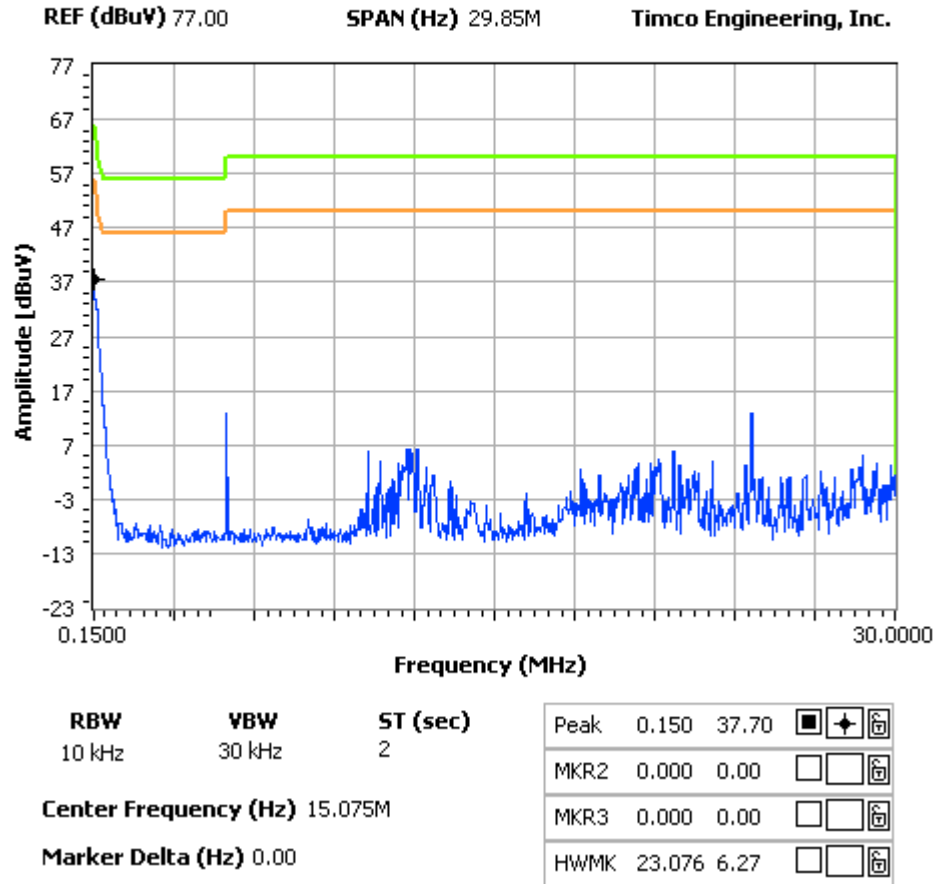
FCC ID: BGA-WHT24TX

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**NOTES:**

AUDIOVOX CORPORATION -FCC ID: BGA-WHT24TX  
 POWER LINE CONDUCTED PLOT - LINE 2

**FCC 15.107 Mask Class B**

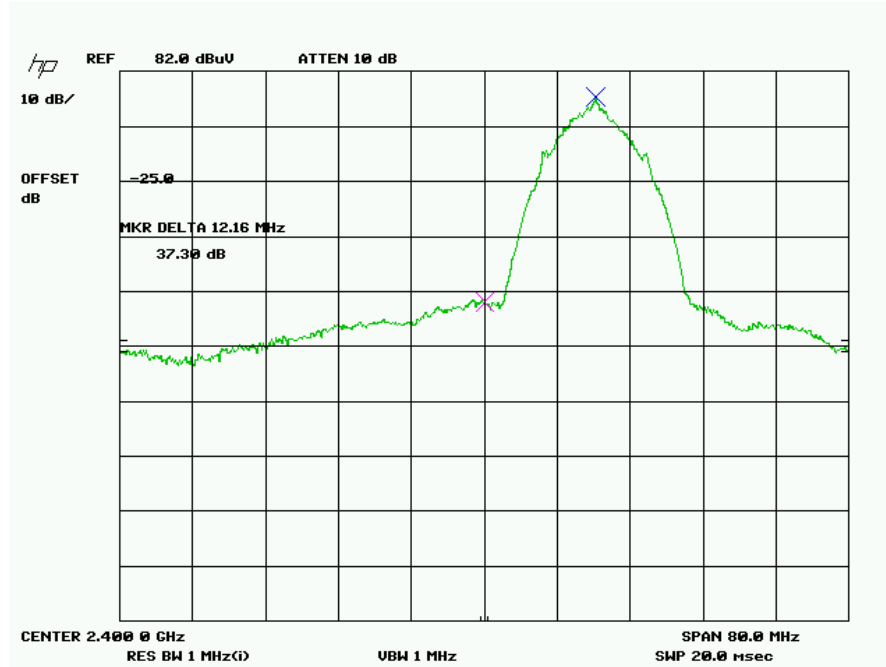


APPLICANT: AUDIOVOX CORP.  
 FCC ID: BGA-WHT24TX  
 REPORT: X:\A\AUDIOBGA\170BUT8\170BUT8TestReport.doc

## RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

**Requirements:** Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54 dBuV/m).

**Test Procedure:** An in band field strength measurement of the fundamental Emission using the RBW and detector function required by C63.4-2000 and FCC Rules. The procedure was repeated with an average detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.



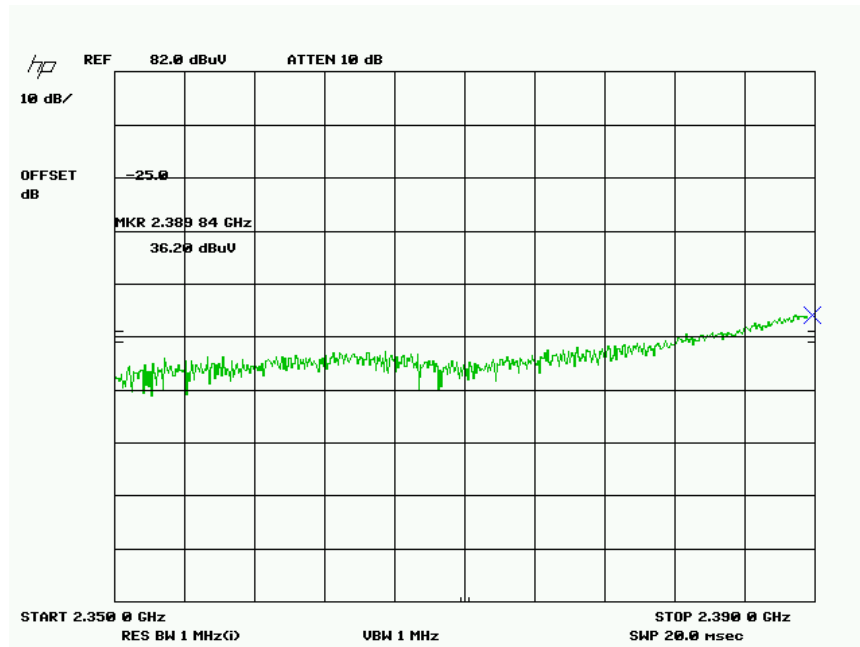
Lower adjacent restricted band – ch 2412 Average Horiz.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,412.0	2,388.0Pk	36.2	H	3.17	32.21	71.58	2.42
2,412.0	2,388.0Av	15.3	H	3.17	32.21	50.68	3.32

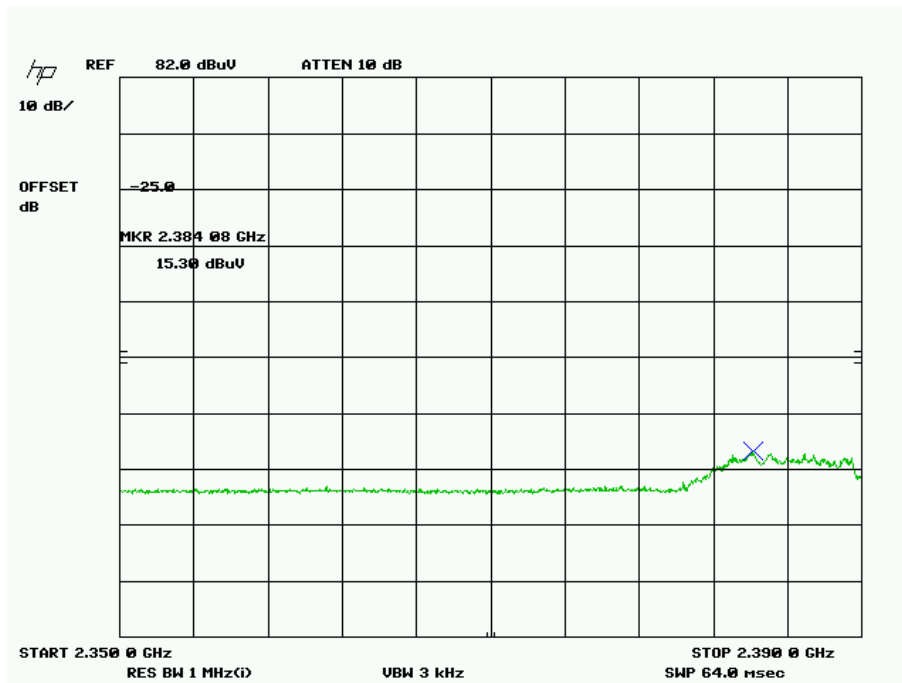
APPLICANT: AUDIOVOX CORP.

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REPORT: X:\A\AUDIOBGA\170BUT8\170BUT8TestReport.doc

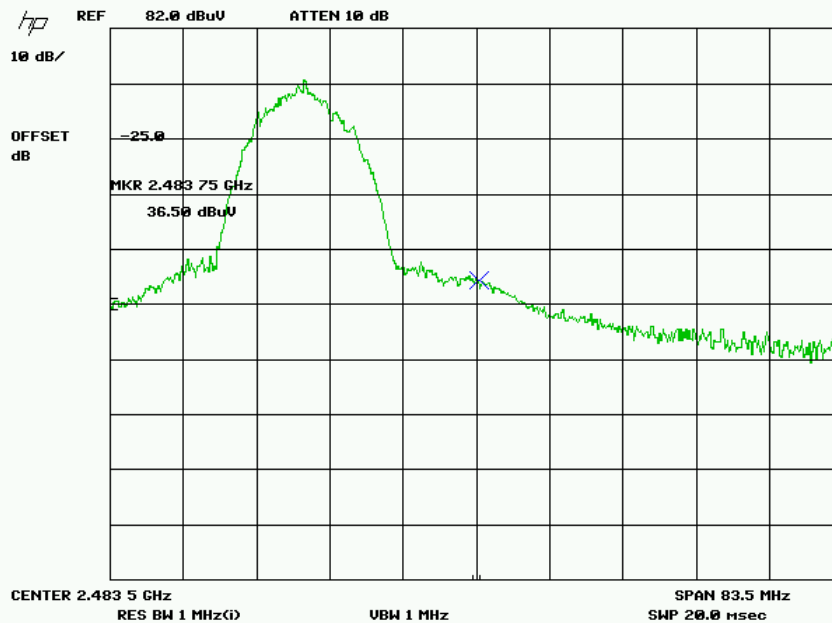


ch 2412-Lower restricted band peak

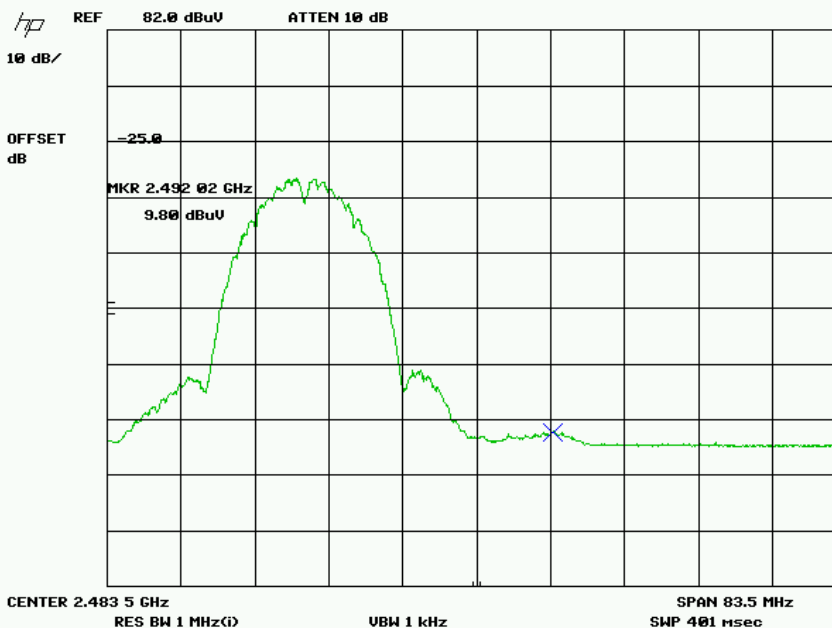


ch 2412-Lower restricted band Average

APPLICANT: AUDIOVOX CORP.  
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Upper bandedge ch 2462 Peak Horiz.



Upper bandedge 2462 average - Horiz.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
2,462.0	2,483.50*Pk	36.5	H	3.24	32.46	72.20	1.8
2,462.0	2,492.00*Av	9.8	H	3.24	32.48	45.52	8.48

APPLICANT: AUDIOVOX CORP.

FCC ID: BGA-WHT24TX

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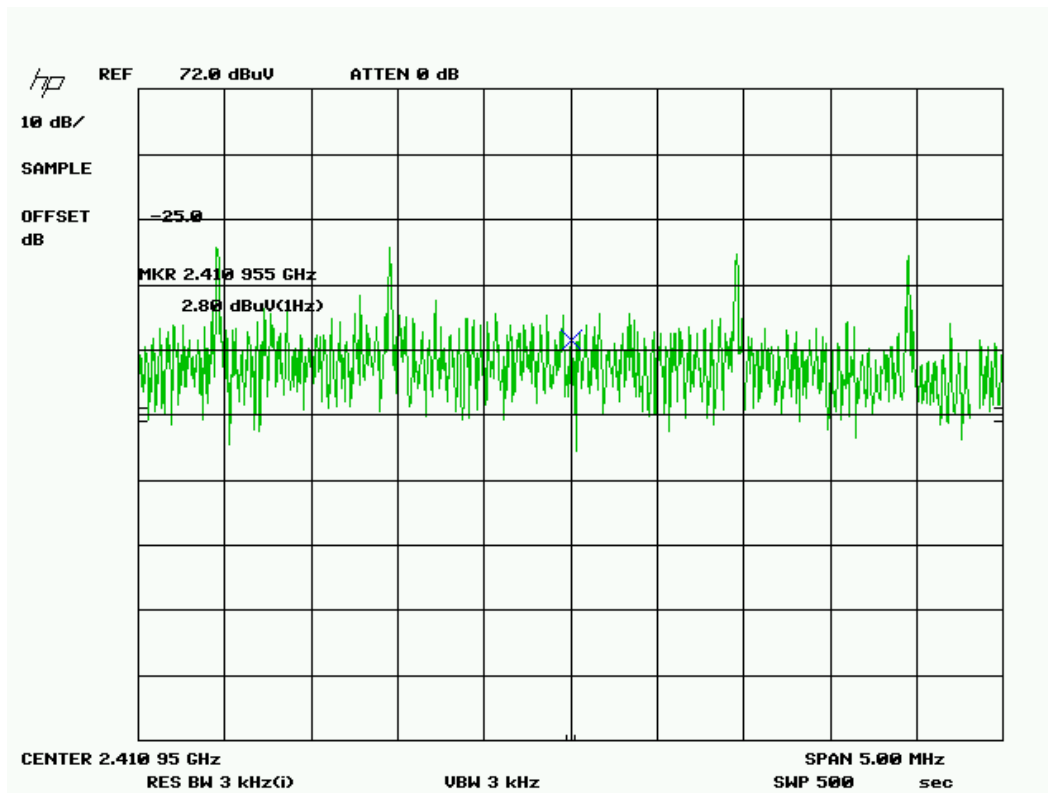
**POWER SPECTRAL DENSITY**

**Rules Part No.:** 15.247(d)

**Requirements:** The peak level measured must be less than +8.0 dBm.

**Test Data:** SEE THE FOLLOWING PLOTS

802.11b



Three places in the band were measured and the worst case reported.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m
2,412.0	2,412.00	2.80	H	3.19	32.27	38.26

38.26 dBuV/m  
+35 dB CF for 1 Hz to 3 kHz RBW  
 73.26 dBuV/m  
 -22 dBm converted to a ERP value then to dBm

APPLICANT: AUDIOVOX CORP.  
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