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FCC PART 15.237  
INDUSTRY CANADA RSS-210  
TEST REPORT  
AUDITORY ASSISTANCE DEVICE

Applicant	SAGRAD, INC.
Address	4325 WOODLAND PARK DRIVE SUITE 102-A WEST MELBOURNE, FL 32904
FCC ID	VRA-SG9011023
IC CERT	7420A-SG9011023
Model Number	SG901-1023
Product Description	ASSISTIVE LISTENING TRANSMITTER
Date Sample Received	10/10/2007
Date Tested	10/17/2007
Tested By	NAM NGUYEN
Approved By	NAM NGUYEN
Report Number	3323UT7TestReport.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.**



Certificate # 0955-01

## TABLE OF CONTENT

GENERAL REMARKS.....	3
REPORT SUMMARY.....	4
DUT DESCRIPTION .....	5
EMC EQUIPMENT LIST .....	6
TEST PROCEDURES .....	7
RADIATION INTERFERENCE .....	9
MODULATION CHARACTERISTICS.....	11
OCCUPIED BANDWIDTH .....	13
RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND.....	15
POWER LINE CONDUCTED INTERFERENCE.....	22

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
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Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## GENERAL REMARKS

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

## 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.



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*

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

**Date:** 11/1/2007

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
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Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## REPORT SUMMARY

Disclaimer	The test results relate only to the items tested.
Applicable Standards	FCC CFR 47, Pt 15.237, ANSI C63.4-2003 RSS-210, RSS-GEN
Related Report	None

## TEST ENVIRONMENT

Test Facility	Timco Engineering Inc 849 NW State Road 45 Newberry, FL 32669 USA
Laboratory Condition	Temperature: 26°C, Humidity: 50%

## TEST SYSTEM SETUP

Modification to DUT	None
Test Exercise	The DUT was placed in continuous transmit mode of operation
Cable	N/A
Supporting Equipment	The device is a stand-alone device

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## DUT DESCRIPTION

DUT	ASSISTIVE LISTENING TRANSMITTER		
FCC ID	VRA-SG9011023		
IC CERT	7420A-SG9011023		
Model Number	SG901-1023		
Trade Name	SAGRAD		
Operating Frequency	72-73 MHz, 74.6-74.8 MHz, 75.2-76 MHz		
No. of Channels	8		
DUT Power Source	9V DC ADAPTER		
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

Applicant: SAGRAD, INC.  
 FCC ID: VRA-SG9011023  
 IC Cert: 7420A-SG9011023  
 Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
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
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/05	12/12/07
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
Analyzer Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 5/17/07	5/17/09
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 5/17/07	5/17/09
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 5/17/07	5/17/09
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 12/14/05	12/14/07

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 FCC ID: VRA-SG9011023  
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 Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## **TEST PROCEDURES**

### **Power Line Conducted Interference**

The procedure used was ANSI C63.4-2003 using a 50uH LISN. The spectrum was scanned from .15 to 30 MHz. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

### **Radiation Interference**

The test procedure used was ANSI C63.4-2003 using a spectrum analyzer with a preselector. In the frequency range 10 kHz to 30 MHz the RBW was 10 kHz and from 30-1000 MHz the RBW of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz.

### **Modulation Characteristics**

Audio Frequency Response - The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

#### Audio input versus modulation

The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA 603-C:2004.

### **Occupied Bandwidth**

The test procedure used was ANSI C63.4-2003.

### **Radiated Spurious Emissions Into Adjacent Restricted Band**

An in band field strength measurement of the fundamental Emission using the RBW and detector function required by ANSI C63.4-2003 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.

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**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. 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/m	+0.40 dB	=30.76 dBuV/m @ 3m

**ANSI C63.4-2003 Section 8.2.1 Measurement Procedures:** The DUT was placed on a non-conducting table 80 cm above the ground plane with the DUT located in the center of the table. With the antenna vertical a preliminary scan was done at 1 meters distance, the DUT was moved to a 3.0-meter distance and the antenna height varied and also placed in a horizontal position. The frequency was scanned from 9.0 kHz to 1.0 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The DUT was measured in three (3) orthogonal planes as necessary.

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 FCC ID: VRA-SG9011023  
 IC Cert: 7420A-SG9011023  
 Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc



## RADIATION INTERFERENCE

**Rules Part No.:** Pt 15.237 (c), Pt 15.35, RSS-210

**Requirements:** Carrier frequency shall not exceeds 98.0 dBuV/m at 3m. Out-of-band emissions, other than emissions in the restricted band shall not exceed 63.5 dBuV/m at 3m.

### Test Data:

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Pol	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
72.5	72.50	82.3	V	0.58	7.15	90.03	8.03
72.5	72.50	86.5	H	0.58	7.75	94.83	3.23
72.5	145.00	7.7	V	0.70	13.10	21.50	42.02
72.5	145.00	16.0	H	0.70	13.50	30.20	33.32
72.5	217.50	4.4	H	0.94	11.60	16.94	46.58
72.5	362.50	5.7	H	1.16	15.05	21.91	41.61
72.5	435.00	5.3	H	1.24	16.65	23.19	40.33
72.5	435.00	5.8	V	1.24	16.20	23.24	40.28
72.5	580.00	4.7	V	1.54	18.50	24.74	38.78
72.5	580.00	4.9	H	1.54	18.90	25.34	38.18
72.5	652.50	8.2	H	1.65	20.23	30.08	33.44
72.5	652.50	13.9	V	1.65	19.98	35.53	27.99
72.5	725.00	5.3	V	1.75	20.65	27.70	35.82
74.7	74.70	82.7	V	0.58	6.84	90.12	7.94
74.7	74.70	85.6	H	0.58	7.09	93.27	4.79
74.7	149.00	9.3	V	0.70	13.98	23.98	39.54
74.7	149.00	22.7	H	0.70	14.22	37.62	25.9
74.7	224.10	6.5	H	0.95	11.50	18.95	44.57
74.7	298.80	4.7	V	1.10	14.34	20.14	43.38
74.7	373.50	7.4	V	1.17	15.17	23.74	39.78
74.7	373.50	9.8	H	1.17	15.27	26.24	37.28
74.7	448.20	7.2	H	1.25	16.88	25.33	38.19
74.7	448.20	7.7	V	1.25	16.55	25.50	38.02
74.7	522.90	6.5	H	1.37	18.78	26.65	36.87
74.7	597.60	6.8	V	1.59	18.60	26.99	36.53
74.7	597.60	9.2	H	1.59	19.10	29.89	33.63
74.7	672.30	6.6	H	1.67	20.77	29.04	34.48
74.7	672.30	9.4	V	1.67	20.50	31.57	31.95
74.7	747.00	4.8	V	1.79	20.66	27.25	36.27

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**Test Data Contd:**

<b>Tuned Frequency MHz</b>	<b>Emission Frequency MHz</b>	<b>Meter Reading dBuV</b>	<b>Ant. Pol</b>	<b>Coax Loss dB</b>	<b>Correction Factor dB/m</b>	<b>Field Strength dBuV/m</b>	<b>Margin dB</b>
75.5	75.50	81.3	V	0.59	6.79	88.68	9.38
75.5	75.50	86.6	H	0.59	6.96	94.15	3.91
75.5	151.00	9.1	V	0.70	14.26	24.06	39.46
75.5	151.00	16.8	H	0.70	14.30	31.80	31.72
75.5	226.50	5.3	V	0.95	11.20	17.45	46.07
75.5	226.50	7.3	H	0.95	11.50	19.75	43.77
75.5	302.00	4.7	V	1.10	14.54	20.34	43.18
75.5	302.00	7.3	H	1.10	14.56	22.96	40.56
75.5	377.50	7.4	V	1.18	15.25	23.83	39.69
75.5	377.50	9.5	H	1.18	15.35	26.03	37.49
75.5	453.00	7.2	H	1.25	16.87	25.32	38.2
75.5	453.00	8.9	V	1.25	16.69	26.84	36.68
75.5	528.50	4.6	V	1.39	17.79	23.78	39.74
75.5	528.50	7.1	H	1.39	18.56	27.05	36.47
75.5	604.00	5.4	V	1.60	18.76	25.76	37.76
75.5	604.00	7.3	H	1.60	19.26	28.16	35.36
75.5	679.50	6.0	H	1.68	20.99	28.67	34.85
75.5	679.50	8.4	V	1.68	20.50	30.58	32.94
75.5	755.00	5.6	V	1.81	20.65	28.06	35.46

Sample Calculation:  $FSdBuV/m = MR(dBuV) + ACFdB$

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## MODULATION CHARACTERISTICS

**Rule Parts No.:** Pt 2.1047 (a) & (b), RSS-210

**Requirements:** A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted.

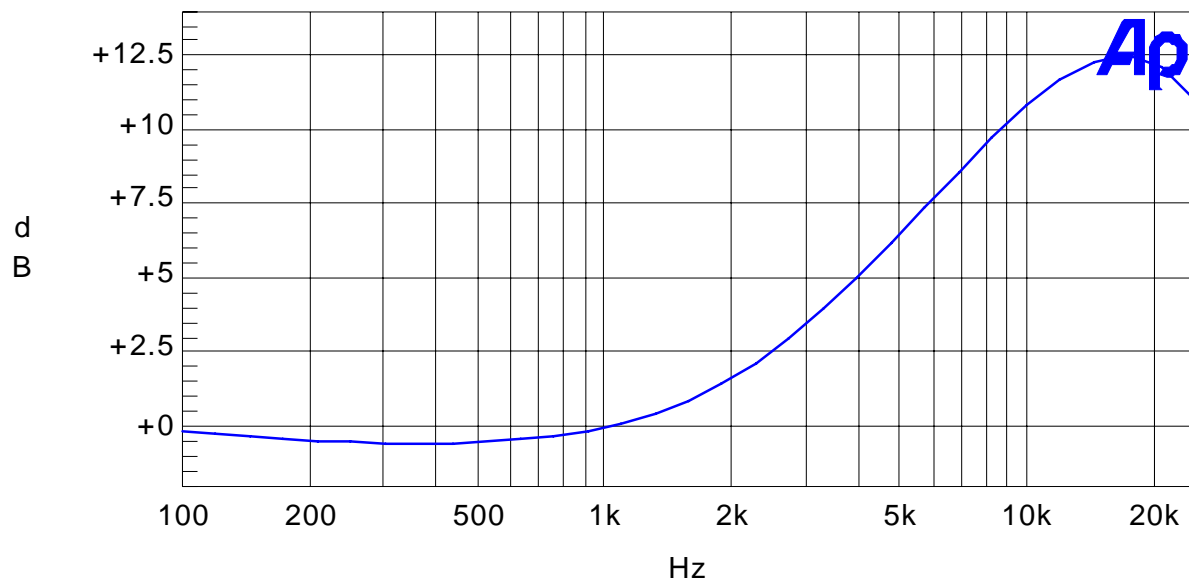
For voice modulated communication equipment, a curve or equivalent data showing audio low pass filter shall be submitted.

Audio input versus modulation cannot exceed 100%.

**Test Data:** The curve(s) is/are shown below.

Plot - Audio Frequency Response

### Audio Frequency Response Plot



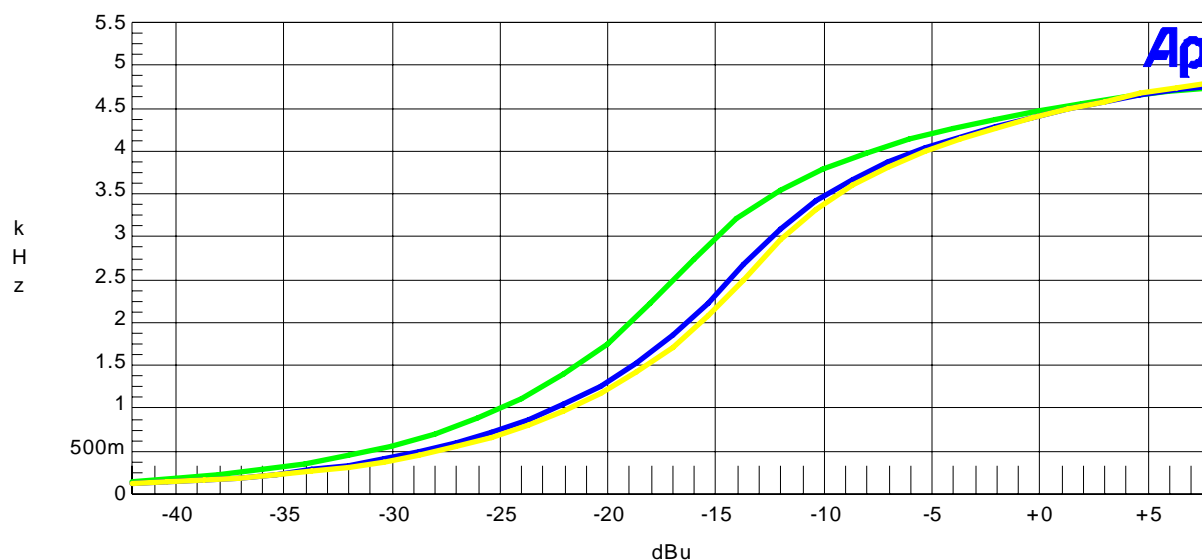
Color	Line Style	Thick	Data	Axis
Blue	Solid	1	Anlr.Level A!Normalize	Left

MaxFreq.at1

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IC Cert: 7420A-SG9011023  
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## Plot – Audio input vs. Modulation

Modulation Limiting Plots: 2.5 KHz (Green), 1.0 KHz (Blue), and 300 Hz (Yellow)



Color	Line Style	Thick	Data	Axis
Green	Solid	3	Anlr.Level A	Left
Blue	Solid	3	Anlr.Level A	Left
Yellow	Solid	3	Anlr.Level A	Left

modulation limiting.at1

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## OCCUPIED BANDWIDTH

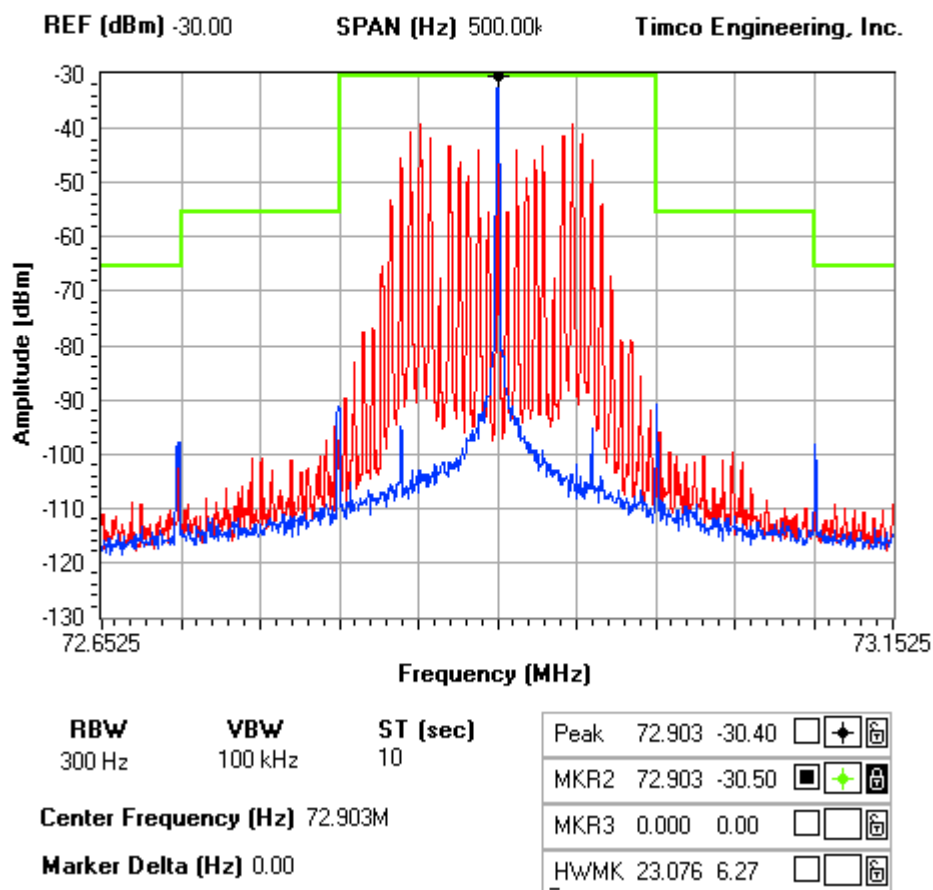
**Rules Part No.:** FCC Part 15.237 (b), RSS-210

**Requirements:** Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the above specified frequency ranges.

### Test Data:

#### NOTES:

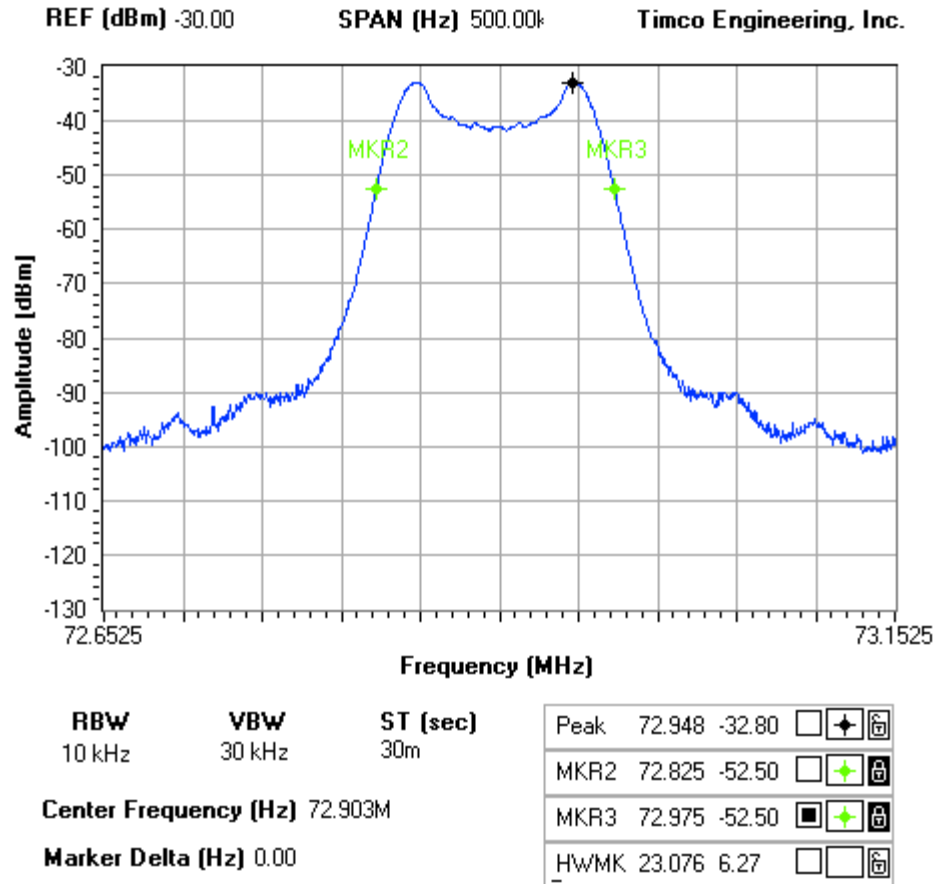
SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
OCCUPIED BANDWIDTH PLOT



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IC Cert: 7420A-SG9011023  
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**NOTES:**

SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
20 dB OCCUPIED BANDWIDTH PLOT - MARKER DELTA = 150 KHz



Note: the 20 dB bandwidth was found to be 150 kHz.

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

**Rule Parts No.:** Pt 15.237 (b) and (c), RSS-210

**Requirements:** Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 100 uV/m (40 dBuV/m). Part 15.35(b) applies in the restricted bands. Emissions not in the restricted band must be below 63.5dBuV/m.

**Test Data:** The plot is presented below. Data was collected in the following table. The EUT was feed by the 11.5 kHz signal (audio frequency response) at the microphone input.

The following plots show that the 200 kHz bandwidth for each fundamental frequency lie wholly within the allowed frequency ranges of operation.

The marker(s) on each plot indicate a bandedge frequency.

Fundamental Frequency (MHz)	Field Strength Level of Fund. (dBuV/m)	Freq of Max. Band-edges Emission (MHz)	Delta Marker (dB) *	Cal. Max. Out of Band Emission Level (dBuV/m) **	Limit (dBuV/m)	Margin (dB)
72.1	94.83	72.001	49	45.83	63.5	17.67
72.9	94.05	73.003	55.2	38.85	40	1.15
74.7	93.27	74.600	54.2	39.07	40	0.93
74.7	93.27	74.800	56.2	37.07	40	2.93
75.3	94.08	75.200	54.9	39.18	40	0.82
75.9	94.15	76.000	35.8	58.35	63.5	5.15

\* According to step 2 of Marker-Delta Method DA 00-705 (following plots included).

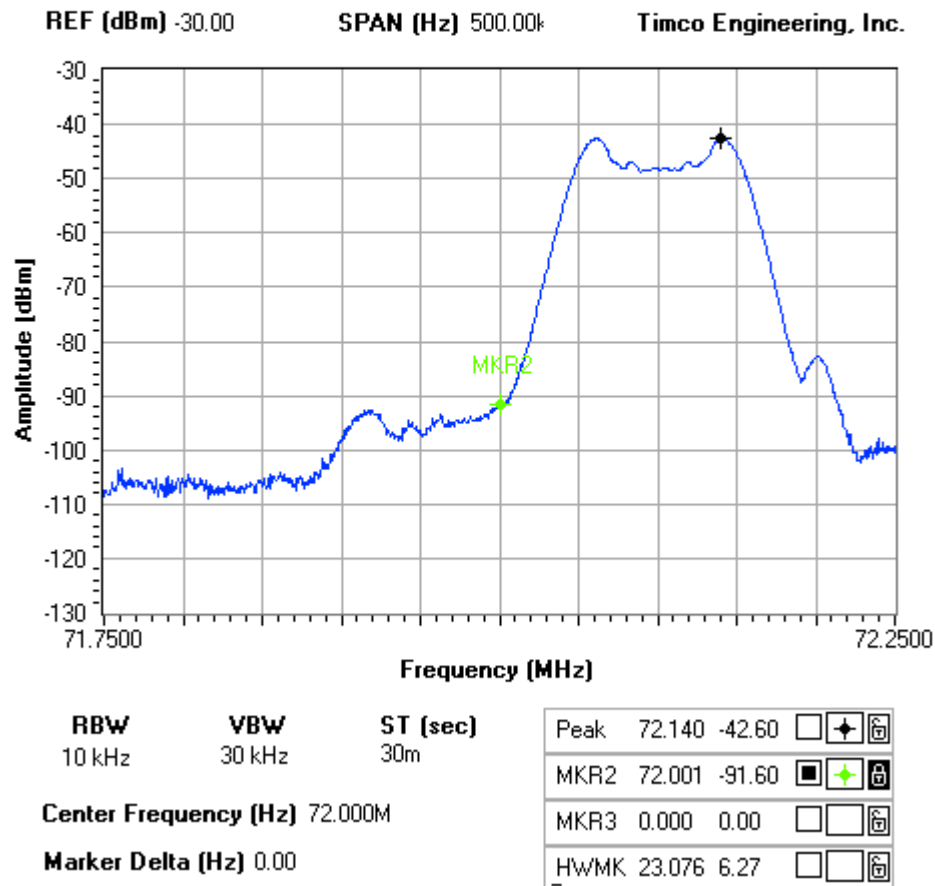
\*\* According to step 3 of Marker-Delta Method:

Calculated Emission Level = Field Strength Level - Delta Marker Level

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**NOTES:**

SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 72.1 MHz

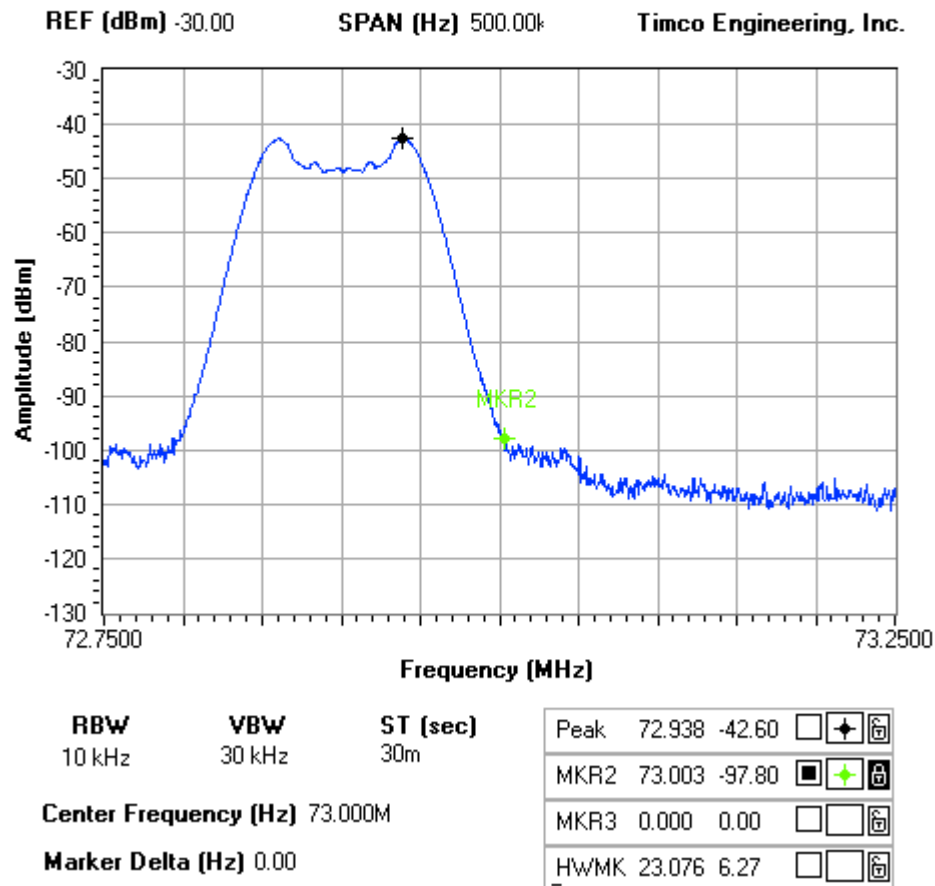


Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc



**NOTES:**

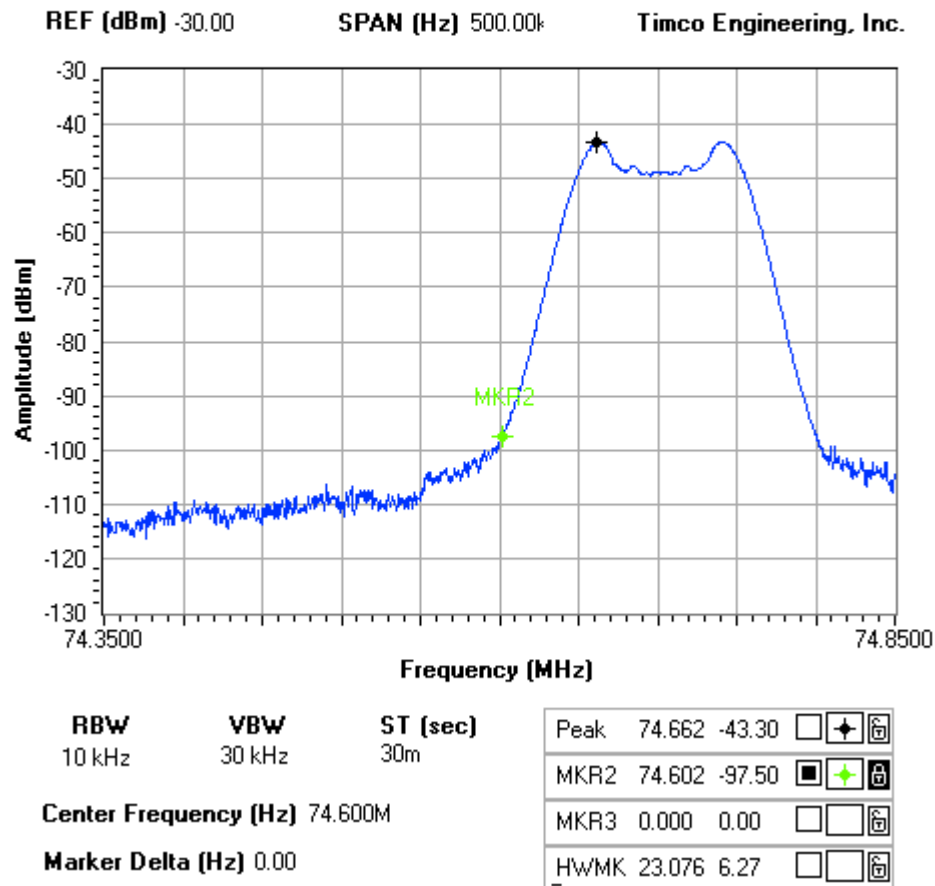
SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 72.9 MHz



Applicant: SAGRAD, INC.  
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Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**NOTES:**

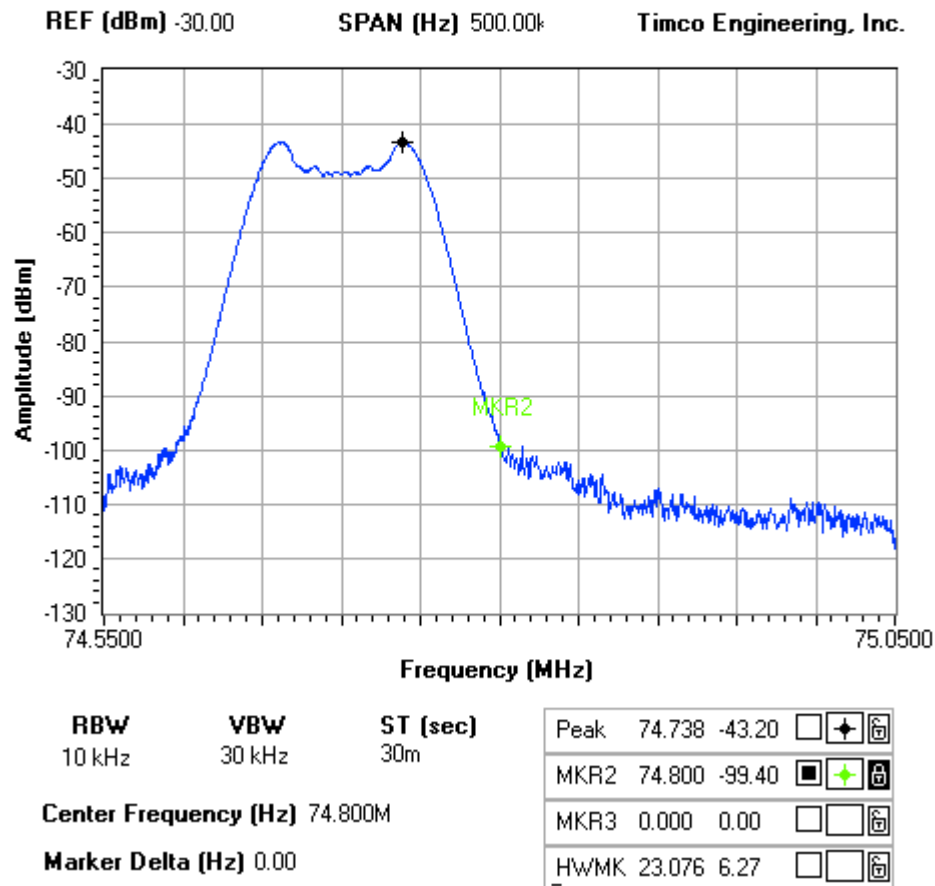
SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
 ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 74.7 MHz



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 FCC ID: VRA-SG9011023  
 IC Cert: 7420A-SG9011023  
 Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**NOTES:**

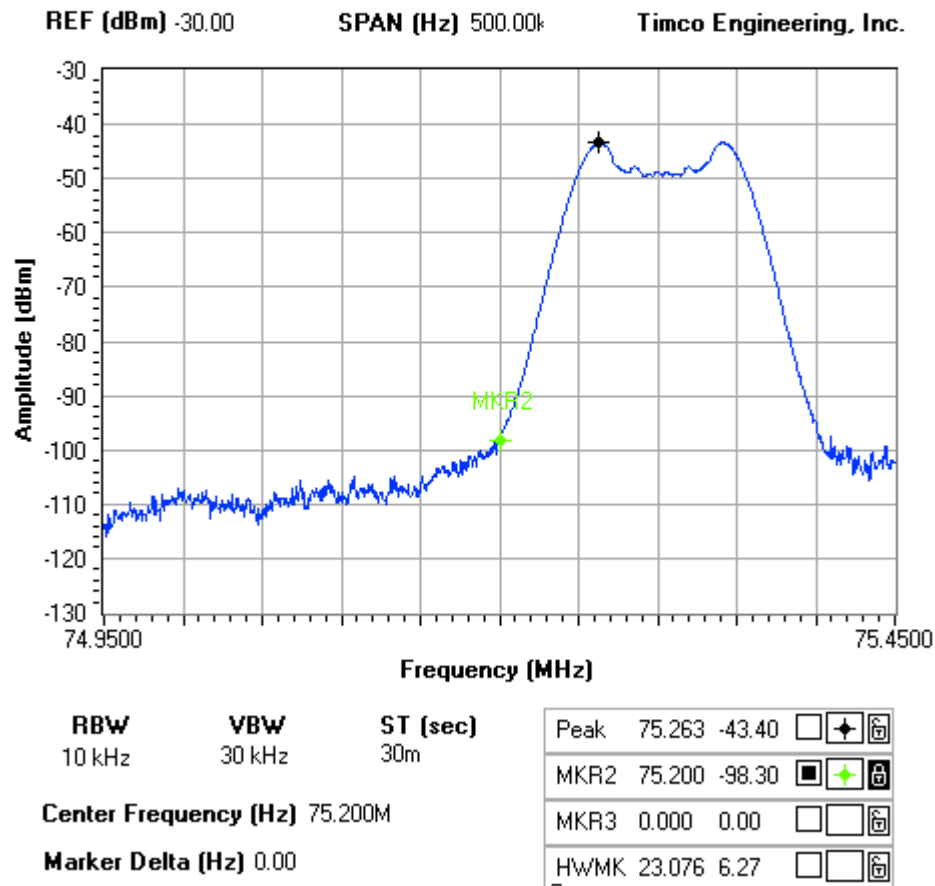
SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
 ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 74.7 MHz



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 FCC ID: VRA-SG9011023  
 IC Cert: 7420A-SG9011023  
 Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**NOTES:**

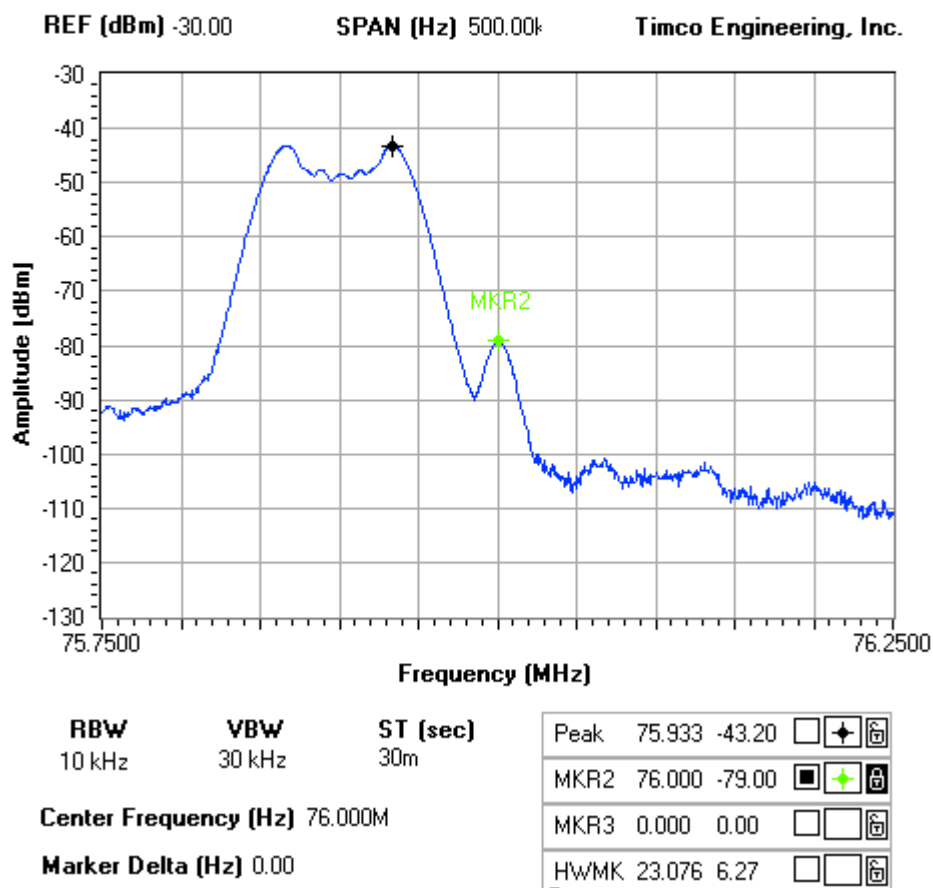
SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
 ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 75.3 MHz



Applicant: SAGRAD, INC.  
 FCC ID: VRA-SG9011023  
 IC Cert: 7420A-SG9011023  
 Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**NOTES:**

SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 75.9 MHz



Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

## POWER LINE CONDUCTED INTERFERENCE

**Rules Part No.:** Part 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

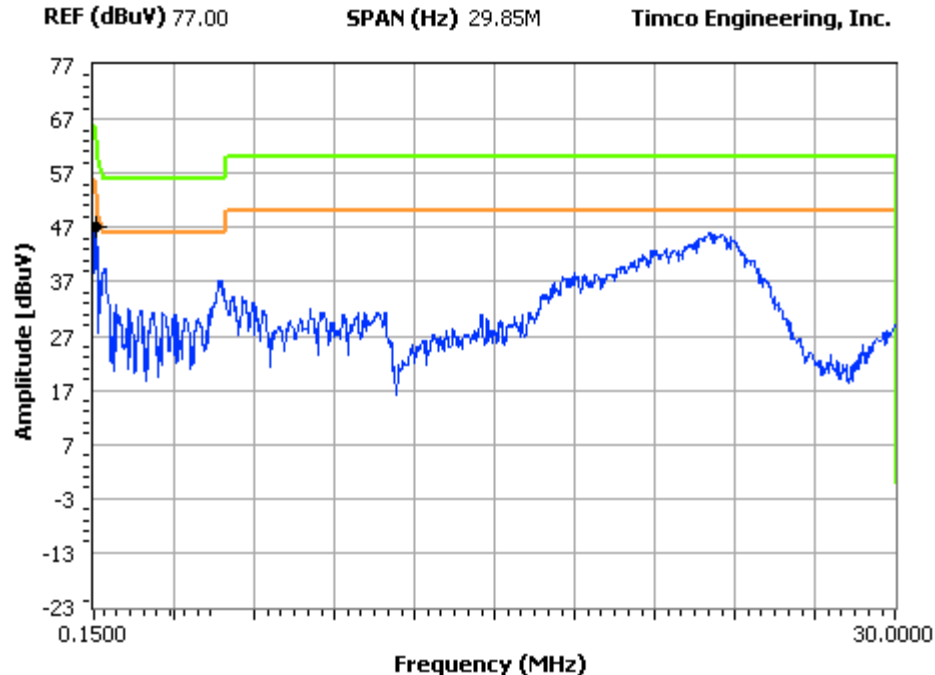
**Test Data:** See the following plots.

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc

**NOTES:**

SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
POWER LINE CONDUCTED PLOT - LINE 1

**FCC 15.107 Mask Class B**



**RBW** 10 kHz      **VBW** 30 kHz      **ST (sec)** 2

**Center Frequency (Hz)** 15.075M

**Marker Delta (Hz)** 0.00

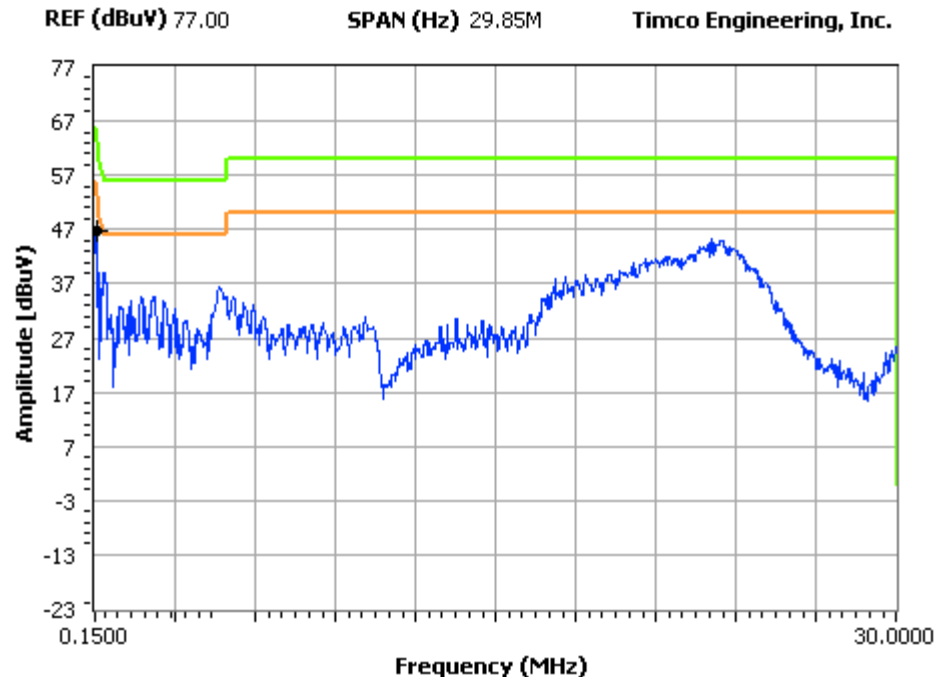
Peak	0.210	47.10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
MKR2	0.000	0.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MKR3	0.000	0.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HWMK	23.076	6.27	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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**NOTES:**

SAGRAD, INC. - SIDEWINDER ASSISTIVE LISTENING TRANSMITTER  
POWER LINE CONDUCTED PLOT - LINE 2

**FCC 15.107 Mask Class B**



**RBW**      **VBW**      **ST (sec)**  
10 kHz      30 kHz      2

**Center Frequency (Hz)** 15.075M

**Marker Delta (Hz)** 0.00

Peak	0.210	46.60	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
MKR2	0.000	0.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MKR3	0.000	0.00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HWMK	23.076	6.27	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Applicant: SAGRAD, INC.  
FCC ID: VRA-SG9011023  
IC Cert: 7420A-SG9011023  
Report: W:\S\SAGRAD\3323UT7\3323UT7TestReport.doc