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FCC PART 15.237

Auditory Assistance Device

Low Power Unlicensed Intentional Radiator

TEST REPORT

Applicant	Williams Sound Corporation
Address	10399 WEST 70th Street Eden Prairie MN 55344 USA
FCC ID	CNMT36
Model Number	T36
Product Description	Auditory Assitance Device
Date Sample Received	5/26/2008
Date Tested	June 11, 2008
Tested By	Nam Nguyen
Approved By	Mario de Aranzeta
Report Number	1086AUT8TestReport.pdf
Test Results	☒ PASS ☐ FAIL

A2LA ACCREDITED
Certificate # 0955-01

TABLE OF CONTENT

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.

ACCREDITED

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: June 17, 2008

REPORT SUMMARY

Purpose of Report	To demonstrate the DUT in compliance with FCC CFR 47 Part 15.237 requirements for auditory assistance device.
Disclaimer	The test results relate only to the items tested.
Applicable Standards	FCC CFR 47, Pt 15.237, ANSI C63.4-2003
Related Report	Digital portion is in compliance with Pt15.109, Pt 15.107 requirements in

TEST ENVIRONMENT

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

TEST SYSTEM SETUP

Certified System	The DUT is a stand alone unit.
Modification to DUT	No modification was made to ensure the DUT in compliance with regulatory requirements
Test Exercise	The DUT was placed in continuous transmit mode of operation
Cable	N/A
Supporting Equipment	The device is a stand-alone device operated by installed manufacturer software specified in operation manual.

DUT DESCRIPTION

DUT	AUDITORY ASSITANCE DEVICE		
FCC ID	CNMT36		
Model Number	T36		
Serial Number	N/A		
Trade Name	Williams		
Operating Frequency	72.1-72.9 MHz; 74.7-74.7 MHz; 75.3-75.9 MHz		
Max. Output Power	N/A		
Modulation	F3E		
DUT Power Source	Battery Operated		
Test Item	☐ Prototype		
Type of Equipment	☐ Fixed	☒ Pre-Production	☐ Production
Antenna Specification	Unique Type. Professional installation declared in the users' manual	☐ Mobile	☒ Portable

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/20/07	3/19/10
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/07	12/7/09
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/07	12/7/09
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/07	12/8/09
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/07	12/8/09
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	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 Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 5/17/07	5/17/09
Analyzer Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/30/06	10/30/08
Analyzer Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 3/6/07	3/6/09
Analyzer Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/30/06	10/30/08
Analyzer Open-Frame Tower Preamplifier	HP	8449B	3008A01075	CAL 6/20/07	6/20/09

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 7/18/07	7/18/09
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/07	12/12/09
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	CAL 12/1/06	12/1/08

TEST PROCEDURES

Power Line Conducted Interference
The procedure used was ANSI STANDARD 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 STANDARD C63.4-2003 using an Agilent spectrum analyzer with a pre-selector. 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 TIA/EIA Specification 603.

Occupied Bandwidth
The test procedure used was ANSI STANDARD 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 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.

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 Pre-selector 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.

RADIATION INTERFERENCE

Rules Part No.: Pt 15.237 (c), Pt 15.35

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. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
72.1	72.12	71.2	V	0.57	7.63	79.4	18.66
72.1	72.12	75.1	H	0.57	7.46	83.13	14.93
72.1	144.24	5.7	V	0.69	13.51	19.9	43.62
72.1	144.24	9	H	0.69	13.42	23.11	40.41
72.1	216.36	11.9	V	0.93	11.38	24.21	39.31
72.1	216.36	16.7	H	0.93	11.65	29.28	34.24
72.1	288.48	10.3	V	1.08	13.85	25.23	38.29
72.1	288.48	17.4	H	1.08	13.97	32.45	31.07
72.1	360.6	5.3	V	1.16	14.82	21.28	42.24
72.1	360.6	6.1	H	1.16	15.01	22.27	41.25
72.1	432.72	12.1	H	1.23	16.58	29.91	33.61
72.1	432.72	15.5	V	1.23	16.15	32.88	30.64
72.1	504.84	15.3	H	1.31	18.34	34.95	28.57
72.1	504.84	17	V	1.31	18.19	36.5	27.02
72.1	576.96	3.7	H	1.53	18.84	24.07	39.45
72.1	576.96	6.6	V	1.53	18.41	26.54	36.98
72.1	649.08	4.7	H	1.65	20.17	26.52	37
72.1	649.08	8.3	V	1.65	19.87	29.82	33.7
72.1	721.2	6.1	H	1.74	21.3	29.14	34.38
72.1	721.2	8.7	V	1.74	20.61	31.05	32.47
75.9	75.92	69.3	V	0.59	7.42	77.31	20.75
75.9	75.92	74.5	H	0.59	6.54	81.63	16.43
75.9	151.84	6.2	V	0.71	14.37	21.28	42.24
75.9	151.84	9.7	H	0.71	13.79	24.2	39.32

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
75.9	227.76	18.5	V	0.96	11.2	30.66	32.86
75.9	227.76	24	H	0.96	11.5	36.46	27.06
75.9	303.68	14.2	V	1.1	14.66	29.96	33.56
75.9	303.68	16.7	H	1.1	14.69	32.49	31.03
75.9	379.6	8.9	V	1.18	15.29	25.37	38.15
75.9	379.6	10	H	1.18	15.39	26.57	36.95
75.9	455.52	15	H	1.26	16.84	33.1	30.42
75.9	455.52	18.6	V	1.26	16.77	36.63	26.89
75.9	531.44	15.1	H	1.39	18.47	34.96	28.56
75.9	531.44	18.6	V	1.39	17.76	37.75	25.77
75.9	607.36	5	H	1.61	19.39	26	37.52
75.9	607.36	7.6	V	1.61	18.89	28.1	35.42
75.9	683.28	4.6	H	1.68	21	27.28	36.24
75.9	683.28	5.5	V	1.68	20.5	27.68	35.84
75.9	759.2	8.9	H	1.82	21.6	32.32	31.2
75.9	759.2	13.1	V	1.82	20.69	35.61	27.91

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

MODULATION CHARACTERISTICS

Rule Parts No.: Pt 2.1047 (a) & (b)

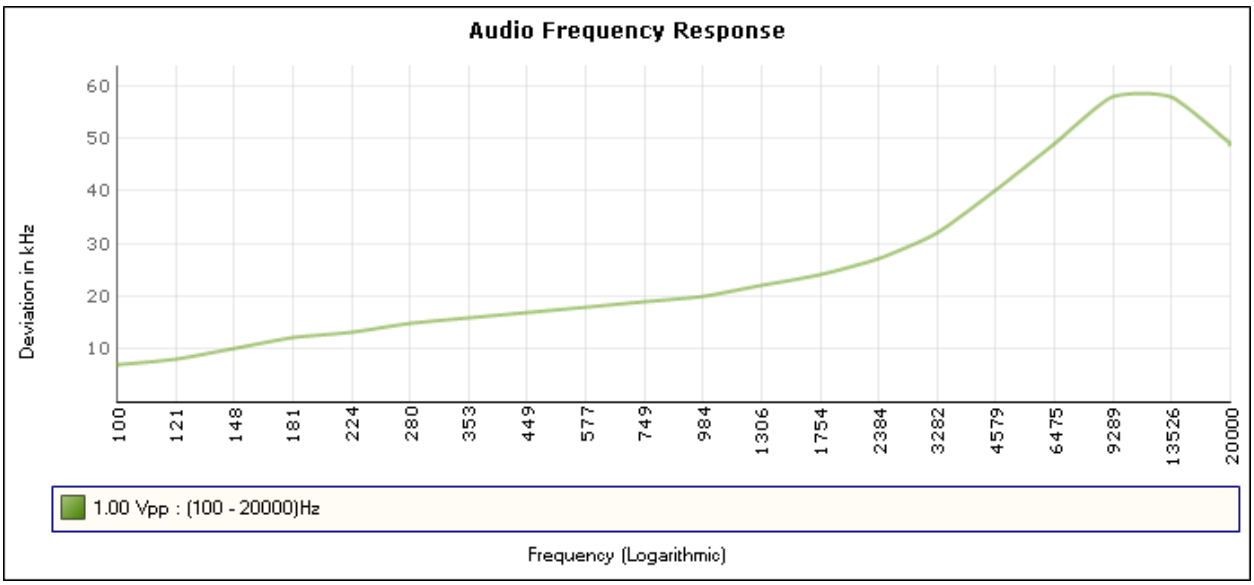
Requirements: A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted.

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

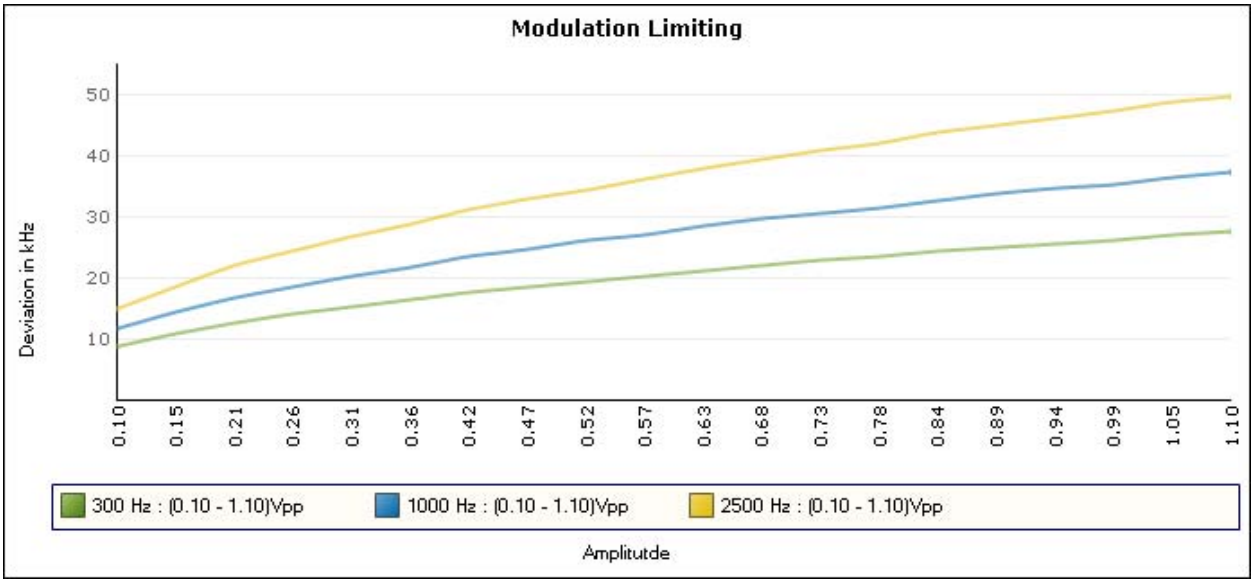
Audio input versus modulation cannot exceed 100%.

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

Plot - Audio Frequency Response



Plot – Audio input vs. Modulation



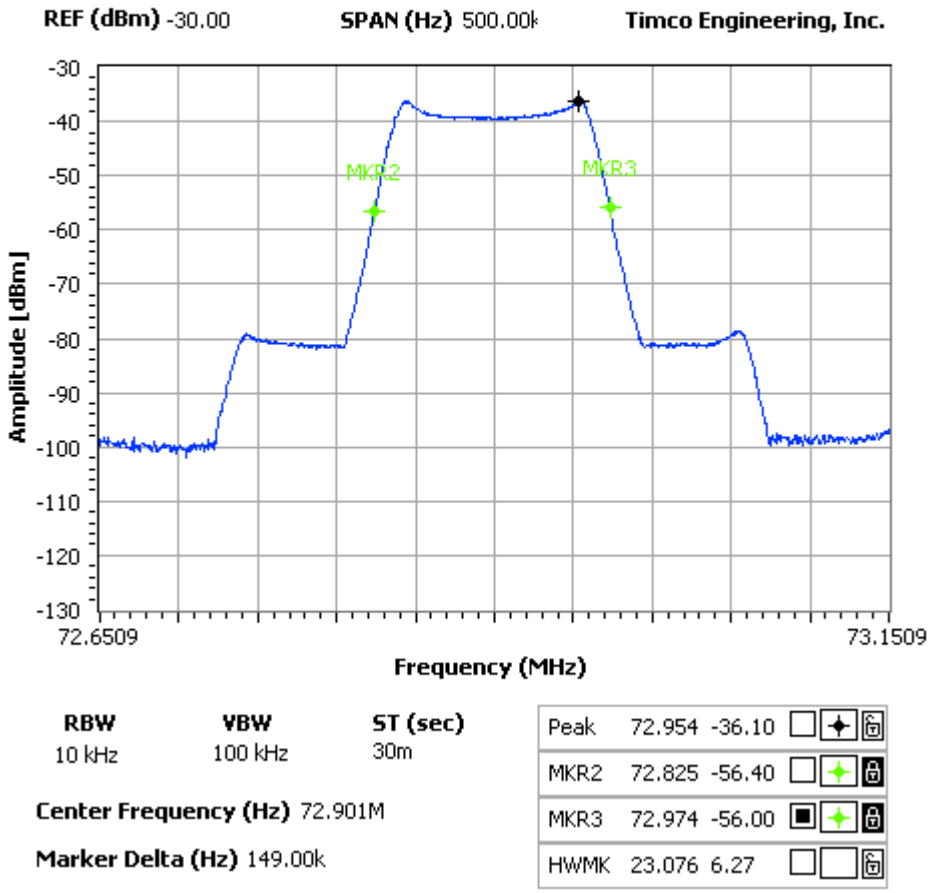
OCCUPIED BANDWIDTH

Rules Part No.: FCC Part 15.237 (b)

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:

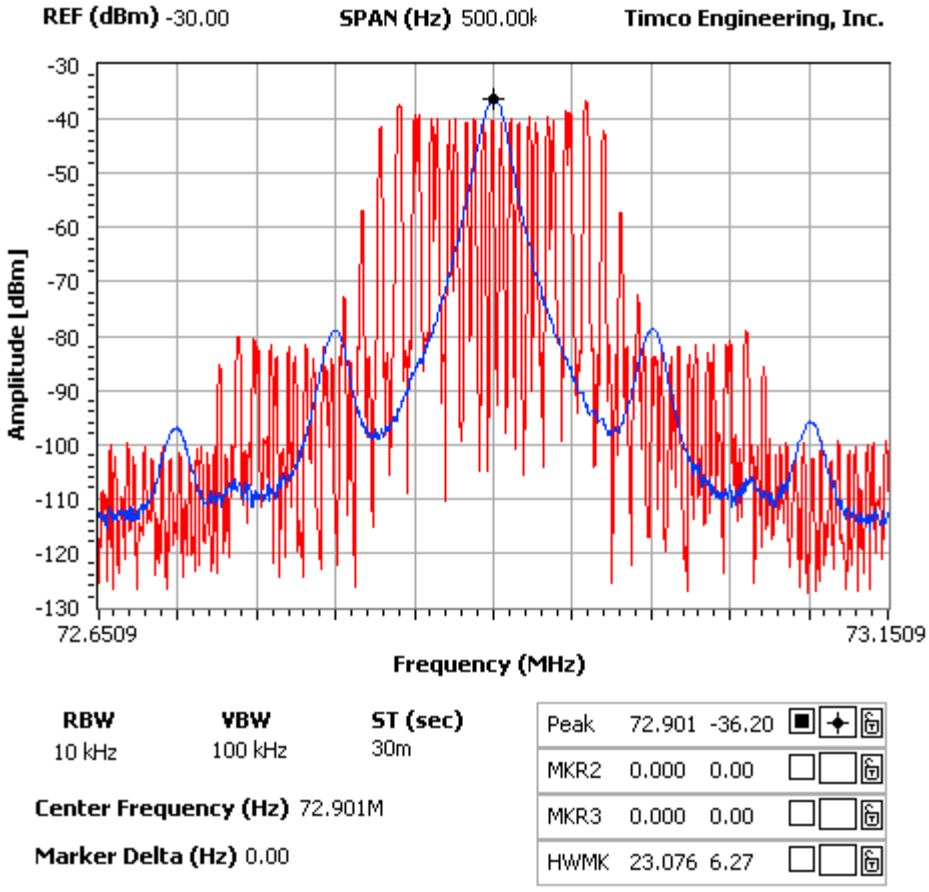
NOTES:
WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
OCCUPIED BANDWIDTH PLOT



Note: the 20 dB bandwidth was found to be 149 kHz.

NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
OCCUPIED BANDWIDTH PLOT



RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

Rule Parts No.: Pt 15.237 (b) and (c)

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 must be below the outside restricted band of 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.

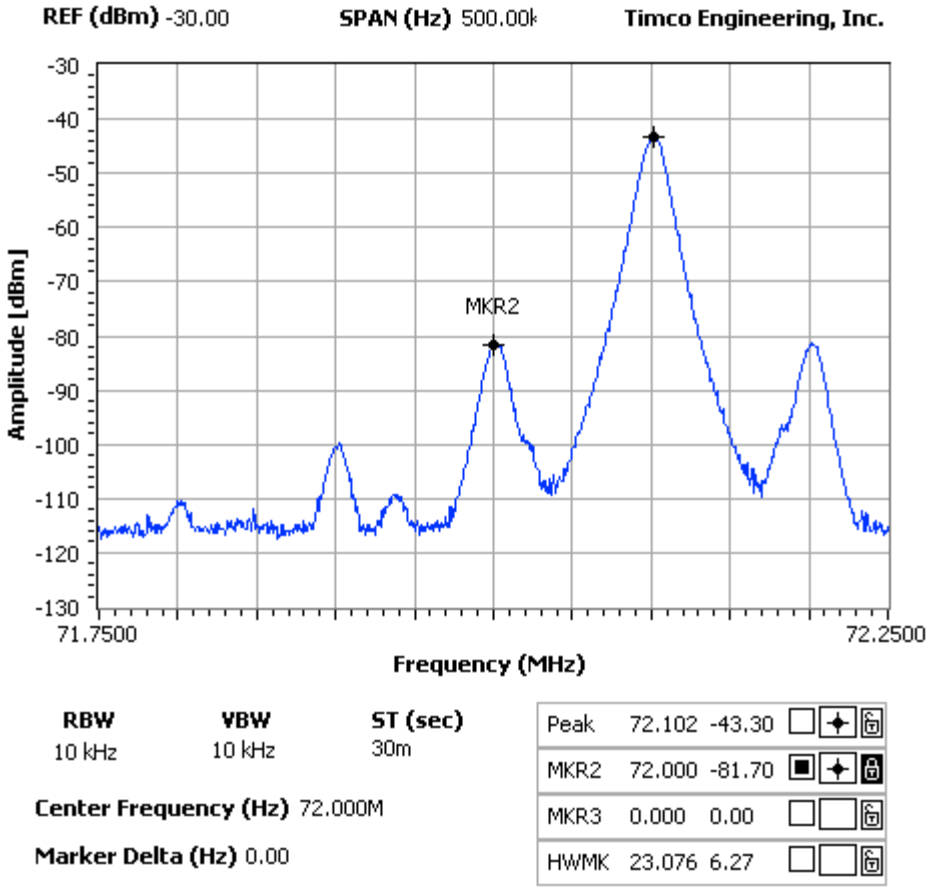
The marker(s) on each plot indicate a band-edge frequency. Frequency scale: 4 divisions correspond to a 200 kHz bandwidth.

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)
72.12	83.13	72.00	38.4	44.73	63.5	18.77
72.92	81.01	73.00	42.8	38.21	40	1.79
74.72	80.77	74.60	53.3	27.47	40	12.53
74.72	80.77	74.80	52.2	28.57	40	11.43
75.32	81.56	75.20	46.7	34.86	40	5.14
75.93	81.63	76.00	45.4	36.23	63.5	27.27

* 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

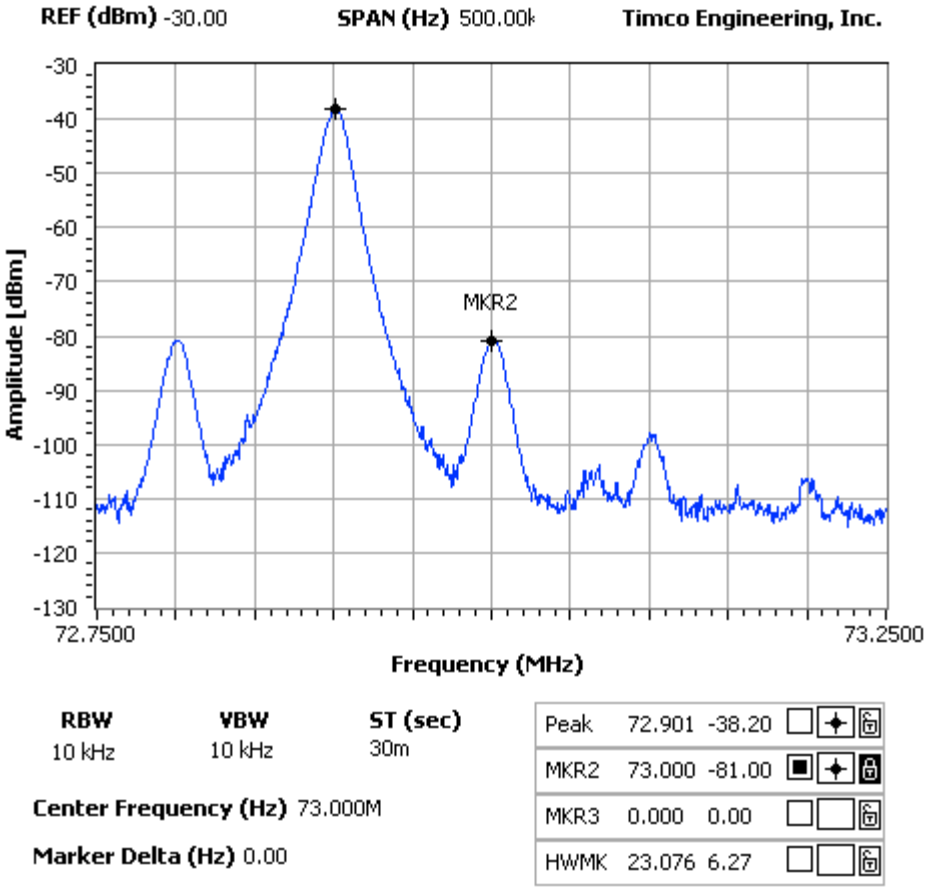
NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 72.118 MHz



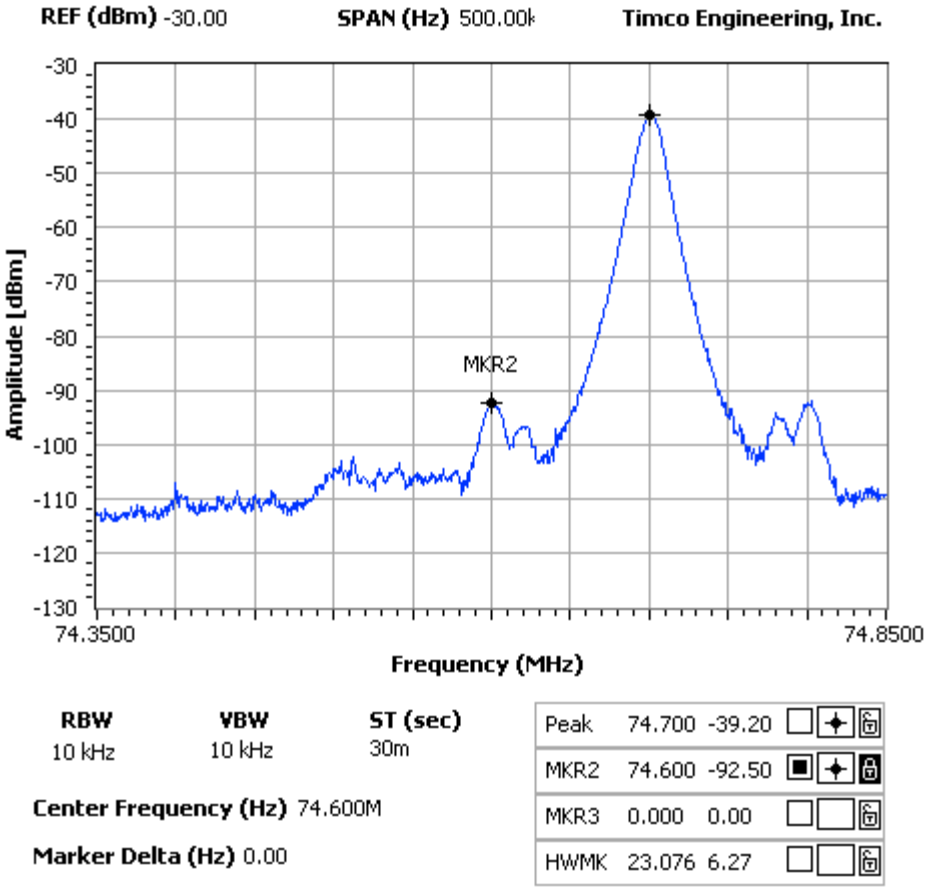
NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 72.919 MHz



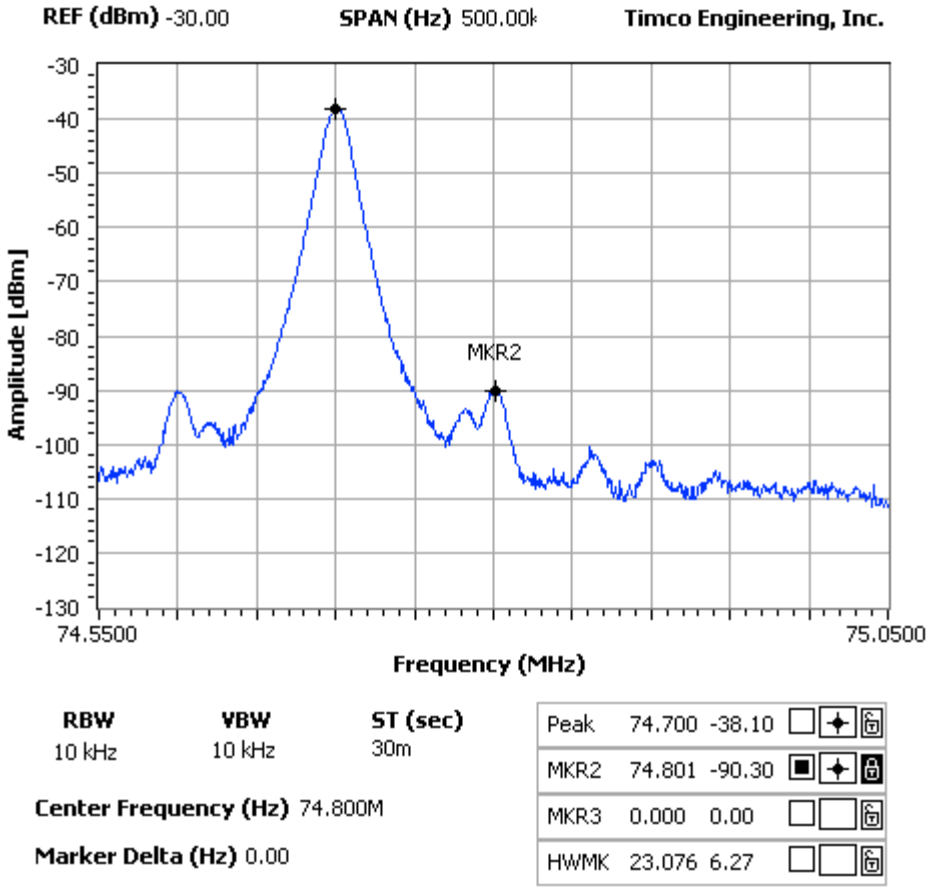
NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 74.723 MHz



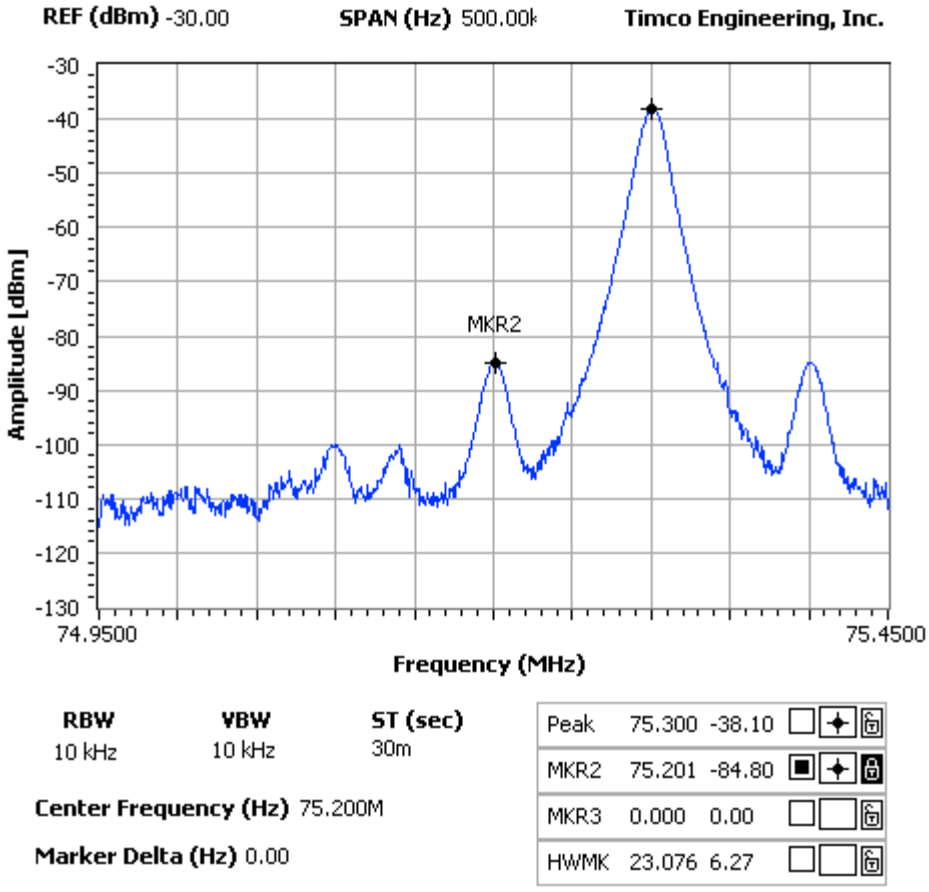
NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 74.723 MHz



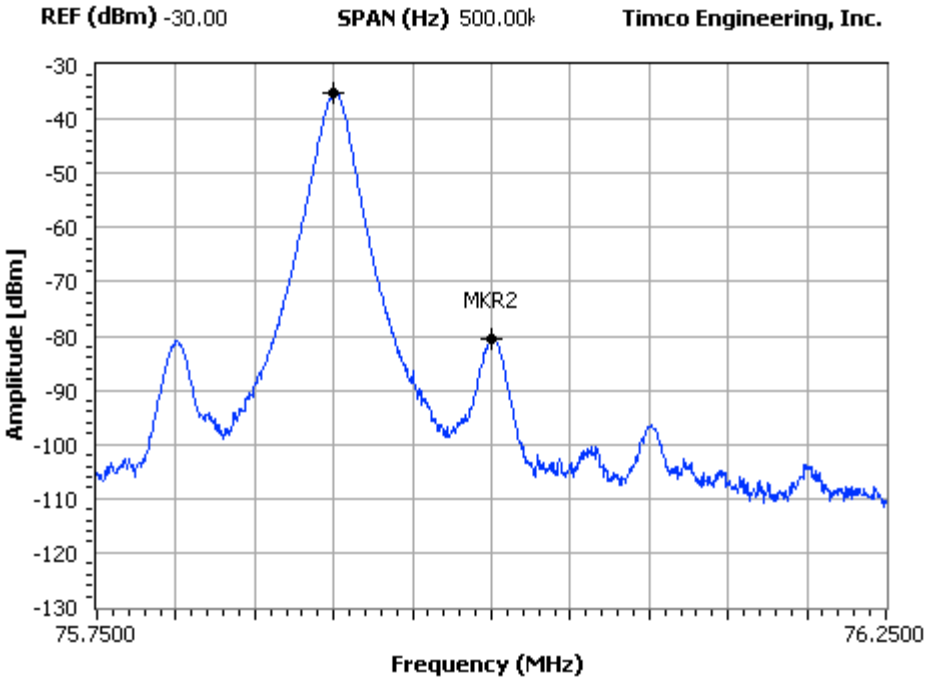
NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 75.324 MHz



NOTES:

WILLIAMS SOUND CORPORATION - FCC ID: CNMT36
ADJACENT RESTRICTED BAND PLOT - TUNED FREQUENCY 75.925 MHz



POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: Part 15.207 Class B

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: N/A