

NORTHWEST EMC

Williams Sound, LLC

T27

FCC 15.207:2015

FCC 15.237:2016

Report # WILM0007



NVLAP Lab Code: 200881-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety

CERTIFICATE OF TEST

Last Date of Test: July 22, 2015
Williams Sound, LLC
Model: T27

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2015	ANSI C63.10:2013
FCC 15.237:2016	ANSI C63.10:2013

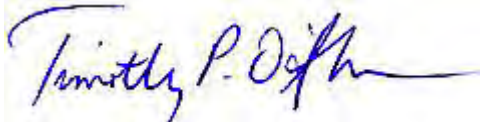
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Occupied Bandwidth	Yes	Pass	
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
6.6	Field Strength of Fundamental	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Tim O'Shea, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

Revision Number		Description	Date	Page Number
00		None		

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>
<http://gsi.nist.gov/global/docs/cabs/designations.html>

MEASUREMENT UNCERTAINTY

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

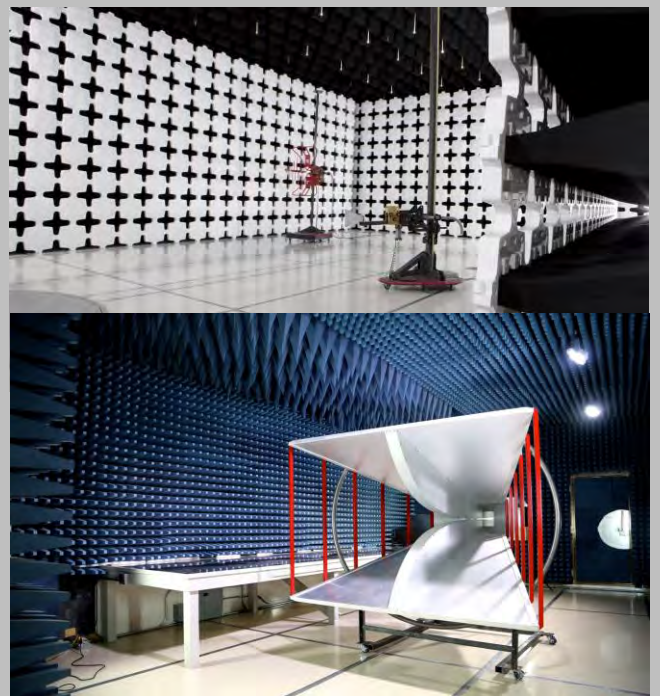
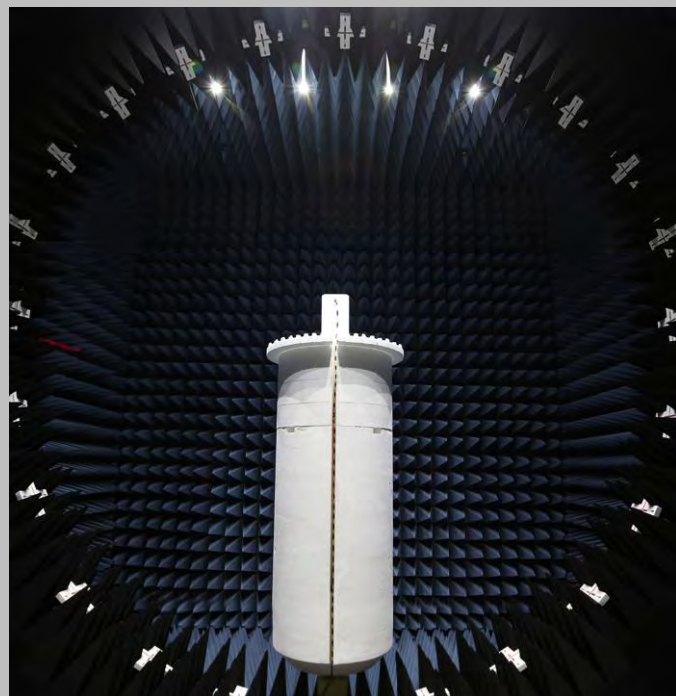
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

FACILITIES



California Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 9801 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Williams Sound, LLC
Address:	10300 Valley View Road
City, State, Zip:	Eden Prairie, MN 55344
Test Requested By:	Lawrence J. Herrington
Model:	T27
First Date of Test:	July 20, 2015
Last Date of Test:	July 22, 2015
Receipt Date of Samples:	July 20, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

This is a hearing assistance receiver operating in the 72.1 to 75.9MHz range. The equipment is a hearing assistance transmitter. The PPA T27 transmitter broadcasts a speaker's voice, music program or audio service wirelessly up to 1000 feet to a listening audience. Audience participants can use the optional R37, R358 or any FM receiver operating on the 72-76 MHz frequency to pick up the broadcast. The speaker simply connects a microphone with a 3.5mm plug into the unit to broadcast their voice. Unit also can connect to a sound system through a line level (RCA) jack to broadcast music or other audio service. Meets Americans with Disabilities Act (ADA) accessibility requirements.

Testing Objective:

Seeking to demonstrate compliance under FCC 15.237 for operation in the 72.1 - 75.9 MHz Band.

CONFIGURATIONS

Configuration WILM0007- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2
Whip Antenna	Williams Sound, LLC	ANT 025	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
BNC Cable	Yes	> 3m	Yes	Audio Cable	Function Generator
Audio Cable (unmodulated)	No	1.0m	No	Hearing Assistance Receiver	Unterminated
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)

Configuration WILM0007- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2
Rubber Duck Antenna	Williams Sound, LLC	ANT 021	None
Coaxial Dipole Antenna	Williams Sound, LLC	ANT 005	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
BNC Cable	Yes	> 3m	Yes	Audio Cable	Function Generator
Audio Cable (unmodulated)	No	1.0m	No	Hearing Assistance Receiver	Unterminated
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)

CONFIGURATIONS

Configuration WILM0007- 3

EUT					
Description	Manufacturer	Model/Part Number	Serial Number		
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2		
Whip Antenna	Williams Sound, LLC	ANT 025	None		
Remote Equipment Outside of Test Setup Boundary					
Description	Manufacturer	Model/Part Number	Serial Number		
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None		
Function Generator	Hewlett-Packard	33120A	TEA		
Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
BNC Cable	Yes	> 3m	Yes	Audio Cable	Function Generator
Audio Cable (modulated)	No	1.0m	No	Hearing Assistance Receiver	BNC Cable
AC Cable (function generator)	No	1.8m	No	Function Generator	AC Mains
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)

Configuration WILM0007- 4

EUT						
Description		Manufacturer	Model/Part Number	Serial Number		
Hearing Assistance Receiver		Williams Sound, LLC	T27	D2		
Rubber Duck Antenna		Williams Sound, LLC	ANT 021	None		
Remote Equipment Outside of Test Setup Boundary						
Description		Manufacturer	Model/Part Number	Serial Number		
AC Adapter		Williams Sound, LLC	41A-12-800 CT	None		
Function Generator		Hewlett-Packard	33120A	TEA		
Cables						
Cable Type		Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable		No	1.80m	No	AC Adapter	Hearing Assistance Receiver
BNC Cable		Yes	> 3m	Yes	Audio Cable	Function Generator
Audio Cable (modulated)		No	1.0m	No	Hearing Assistance Receiver	BNC Cable
AC Cable (function generator)		No	1.8m	No	Function Generator	AC Mains
Microphone Simulator Cable		No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)

CONFIGURATIONS

Configuration WILM0007- 5

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2
Dipole Antenna	Williams Sound, LLC	ANT 024	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
Audio Cable (unmodulated)	No	1.0m	No	Hearing Assistance Receiver	Unterminated
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)
Dipole Coaxial Cable	Yes	6.05m	No	Hearing Assistance Receiver	Dipole Antenna

Configuration WILM0007- 6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2
Dipole Antenna	Williams Sound, LLC	ANT 024	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None
Function Generator	Hewlett-Packard	33120A	TEA

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
BNC Cable	Yes	> 3m	Yes	Audio Cable	Function Generator
Audio Cable (modulated)	No	1.0m	No	Hearing Assistance Receiver	BNC Cable
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)
Dipole Coaxial Cable	Yes	6.05m	No	Hearing Assistance Receiver	Dipole Antenna

CONFIGURATIONS

Configuration WILM0007- 7

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2
Coaxial Dipole Antenna	Williams Sound, LLC	ANT 005	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
Audio Cable (unmodulated)	No	1.0m	No	Hearing Assistance Receiver	Unterminated
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)

Configuration WILM0007- 8

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None
Function Generator	Hewlett-Packard	33120A	TEA

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
BNC Cable	Yes	> 3m	Yes	Audio Cable	Function Generator
Audio Cable (modulated)	No	1.0m	No	Hearing Assistance Receiver	BNC Cable
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)

CONFIGURATIONS

Configuration WILM0007- 9

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Hearing Assistance Receiver	Williams Sound, LLC	T27	D2

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Williams Sound, LLC	41A-12-800 CT	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	1.80m	No	AC Adapter	Hearing Assistance Receiver
Audio Cable (unmodulated)	No	1.0m	No	Hearing Assistance Receiver	Unterminated
Microphone Simulator Cable	No	1.0m	No	Hearing Assistance Receiver	Terminated (Attenuator)
Coax	Yes	0.9m	No	Hearing Assistance Receiver	Termination
AC Power	No	1.8m	No	AC Adapter	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/20/2015	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	7/21/2015	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	7/22/2015	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	7/22/2015	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mos)
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/30/2015	12
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12

TEST DESCRIPTION

The 20dB occupied bandwidth was measured using a Peak detector. The resolution bandwidth was set to 1-3% of the measured emissions bandwidth.

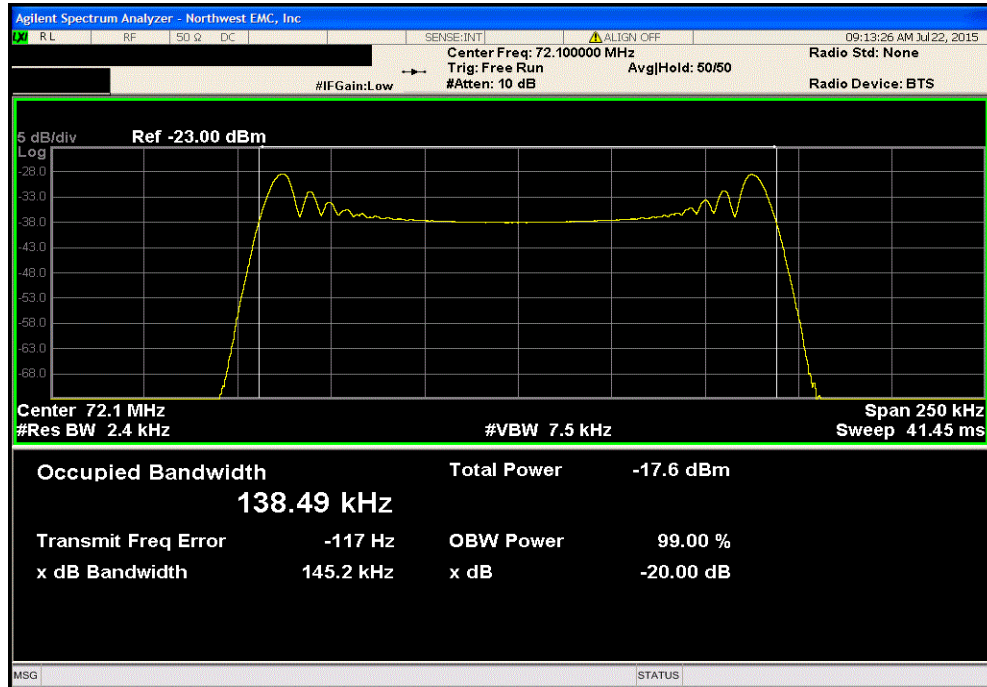
The EUT was set to low, medium and high transmit frequencies. The measurement was made in a radiated configuration in a semi-anechoic chamber with the fundamental of the carrier full maximized for its highest radiated power. The EUT was transmitting at the data rate(s) listed in the datasheet.

OCCUPIED BANDWIDTH

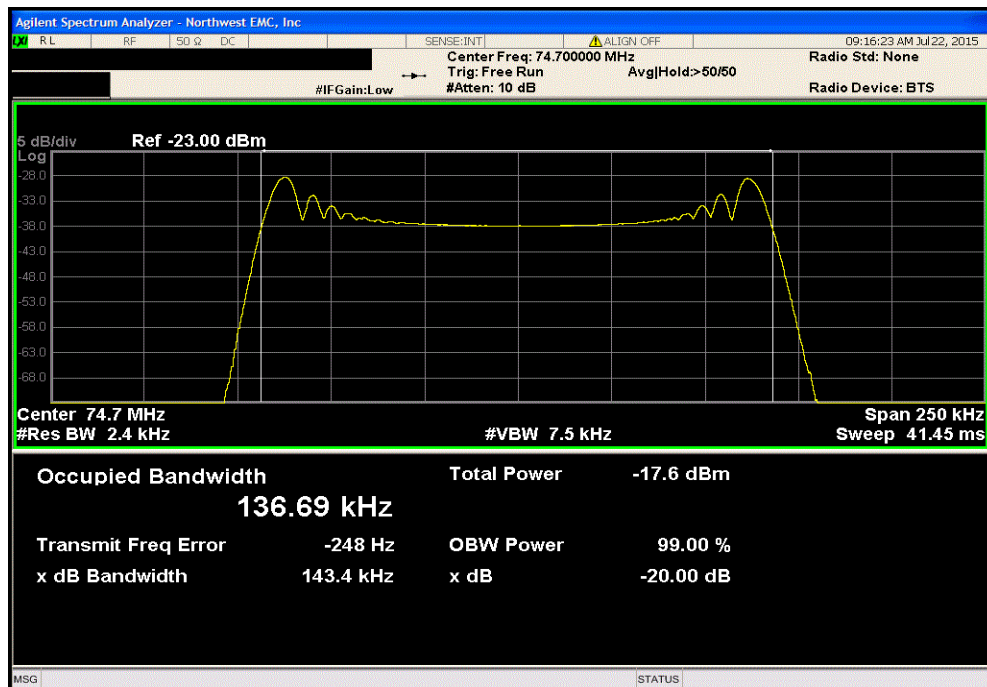
EUT: T27		Work Order: WILM0007	
Serial Number: D2		Date: 07/22/15	
Customer: Williams Sound, LLC		Temperature: 23.4°C	
Attendees: None		Humidity: 51%	
Project: None		Barometric Pres.: 984.9	
Tested by: Trevor Buls	Power: 110VAC/60Hz	Job Site: MN05	
TEST SPECIFICATIONS		Test Method	
FCC 15.237:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature <i>Trevor Buls</i>	
		Value	Limit (<) Result
Low Channel, 72.1 MHz		145.213 kHz	200 kHz Pass
Mid Channel, 74.7 MHz		143.43 kHz	200 kHz Pass
High Channel, 75.9 MHz		156.263 kHz	200 kHz Pass

OCCUPIED BANDWIDTH

Low Channel, 72.1 MHz						
				Value	Limit ($\leq$)	Result
				145.213 kHz	200 kHz	Pass

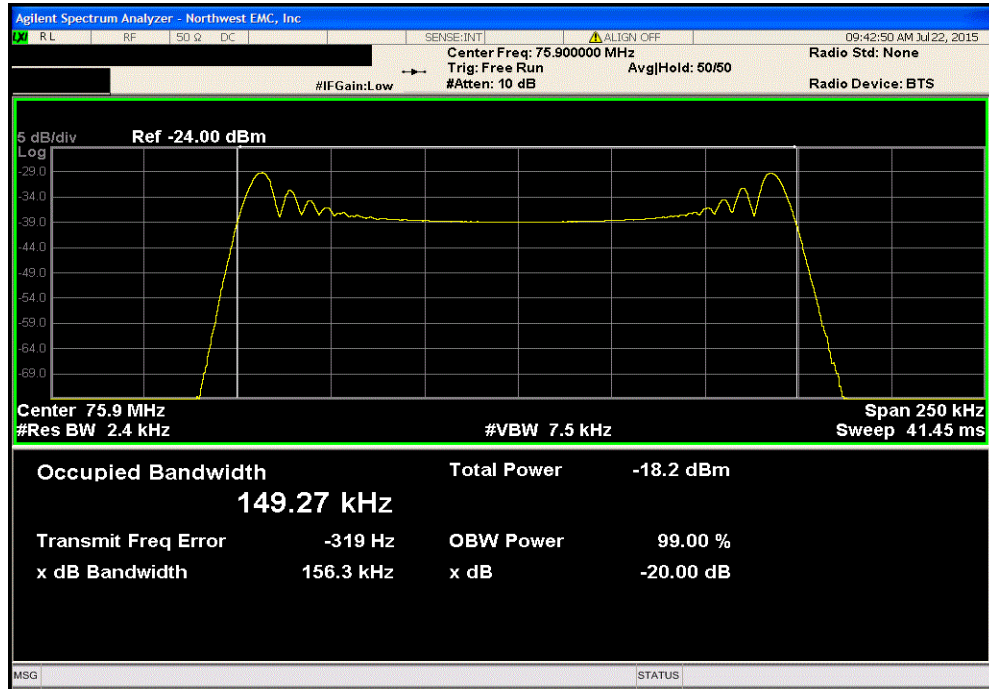


Mid Channel, 74.7 MHz						
				Value	Limit ($\leq$)	Result
				143.43 kHz	200 kHz	Pass



OCCUPIED BANDWIDTH

High Channel, 75.9 MHz						
				Value	Limit (≤)	Result
				156.263 kHz	200 kHz	Pass



POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
High Pass Filter	TTE	H97-100K-50-720B	HGN	5/11/2015	05/11/2016
Attenuator 20dB, BNC	Fairview Microwave	SA01B-20	AQP	7/6/2015	07/06/2016
Cable	ESM Cable Corp.	Conducted Cables	MNC	5/13/2015	05/13/2016
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/23/2015	03/23/2016
Receiver	Rohde & Schwarz	ESR7	ARI	5/21/2015	05/21/2016

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

WILM0007-9

MODES INVESTIGATED

Transmitting High Channel 75.9 MHz, CW.
Transmitting Low Channel 72.1 MHz, CW.
Transmitting Mid Channel 74.7 MHz, CW.

POWERLINE CONDUCTED EMISSIONS

EUT:	T27	Work Order:	WILM0007
Serial Number:	D2	Date:	07/22/2015
Customer:	Williams Sound, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	51.9%
Customer Project:	None	Bar. Pressure:	984.7 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0007-9

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

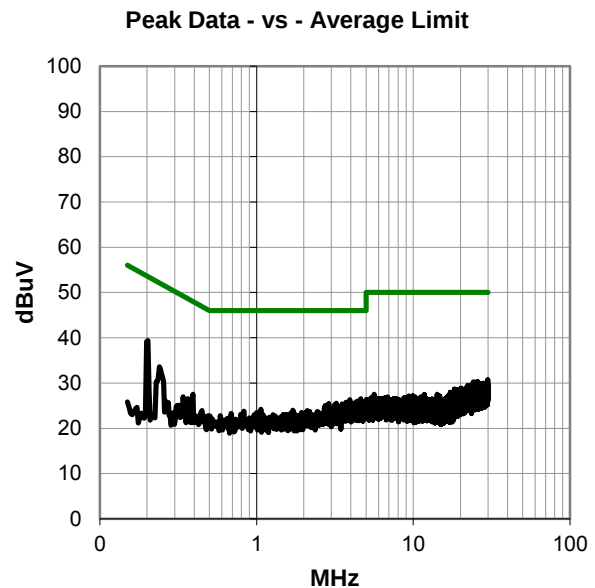
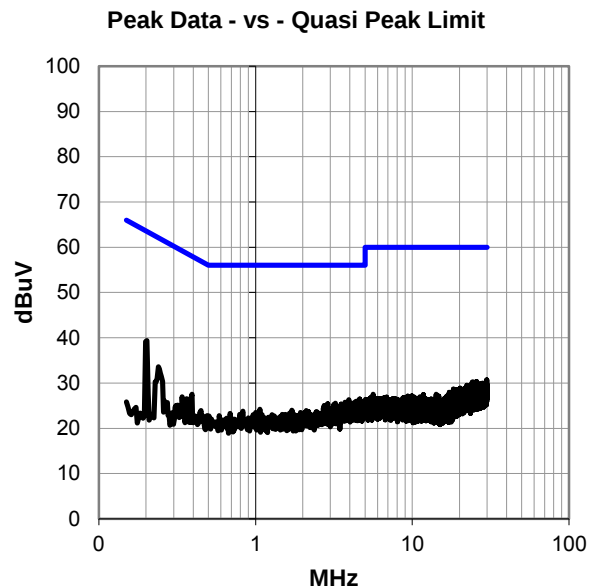
Antenna terminated.

EUT OPERATING MODES

Transmitting High Channel 75.9 MHz, CW.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #3

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.202	19.1	20.3	39.4	63.5	-24.1
0.240	13.3	20.3	33.6	62.1	-28.5
29.843	8.2	22.5	30.7	60.0	-29.3
4.623	6.0	20.5	26.5	56.0	-29.5
3.929	5.9	20.4	26.3	56.0	-29.7
25.773	8.2	22.1	30.3	60.0	-29.7
24.258	8.3	22.0	30.3	60.0	-29.7
24.090	8.1	21.9	30.0	60.0	-30.0
4.403	5.5	20.5	26.0	56.0	-30.0
28.060	7.6	22.4	30.0	60.0	-30.0
4.952	5.4	20.5	25.9	56.0	-30.1
27.683	7.5	22.3	29.8	60.0	-30.2
4.866	5.3	20.5	25.8	56.0	-30.2
4.739	5.3	20.5	25.8	56.0	-30.2
4.578	5.3	20.5	25.8	56.0	-30.2
3.728	5.4	20.4	25.8	56.0	-30.2
4.295	5.3	20.5	25.8	56.0	-30.2
26.993	7.5	22.3	29.8	60.0	-30.2
28.754	7.3	22.4	29.7	60.0	-30.3
29.534	7.2	22.5	29.7	60.0	-30.3
29.470	7.2	22.5	29.7	60.0	-30.3
29.978	7.1	22.5	29.6	60.0	-30.4
29.713	7.1	22.5	29.6	60.0	-30.4
29.358	7.1	22.5	29.6	60.0	-30.4
3.228	5.2	20.3	25.5	56.0	-30.5
0.393	7.3	20.2	27.5	58.0	-30.5

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.202	19.1	20.3	39.4	53.5	-14.1
0.240	13.3	20.3	33.6	52.1	-18.5
29.843	8.2	22.5	30.7	50.0	-19.3
4.623	6.0	20.5	26.5	46.0	-19.5
3.929	5.9	20.4	26.3	46.0	-19.7
25.773	8.2	22.1	30.3	50.0	-19.7
24.258	8.3	22.0	30.3	50.0	-19.7
24.090	8.1	21.9	30.0	50.0	-20.0
4.403	5.5	20.5	26.0	46.0	-20.0
28.060	7.6	22.4	30.0	50.0	-20.0
4.952	5.4	20.5	25.9	46.0	-20.1
27.683	7.5	22.3	29.8	50.0	-20.2
4.866	5.3	20.5	25.8	46.0	-20.2
4.739	5.3	20.5	25.8	46.0	-20.2
4.578	5.3	20.5	25.8	46.0	-20.2
3.728	5.4	20.4	25.8	46.0	-20.2
4.295	5.3	20.5	25.8	46.0	-20.2
26.993	7.5	22.3	29.8	50.0	-20.2
28.754	7.3	22.4	29.7	50.0	-20.3
29.534	7.2	22.5	29.7	50.0	-20.3
29.470	7.2	22.5	29.7	50.0	-20.3
29.978	7.1	22.5	29.6	50.0	-20.4
29.713	7.1	22.5	29.6	50.0	-20.4
29.358	7.1	22.5	29.6	50.0	-20.4
3.228	5.2	20.3	25.5	46.0	-20.5
0.393	7.3	20.2	27.5	48.0	-20.5

CONCLUSION

Pass

Trevor Buls
Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	T27	Work Order:	WILM0007
Serial Number:	D2	Date:	07/22/2015
Customer:	Williams Sound, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	51.9%
Customer Project:	None	Bar. Pressure:	984.7 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0007-9

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

Run #:	4	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

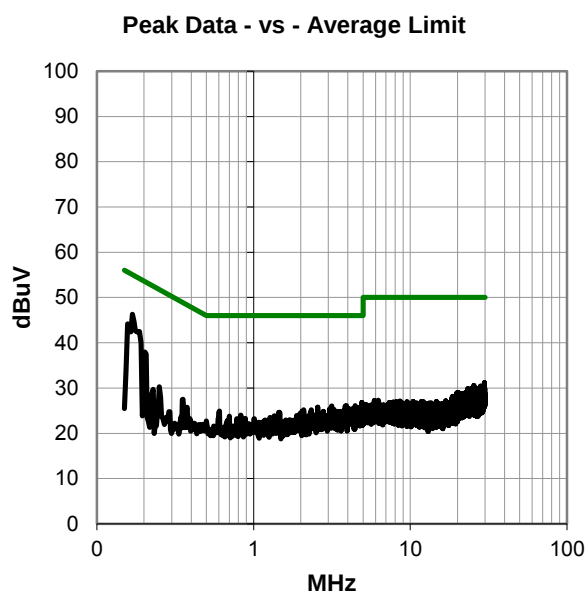
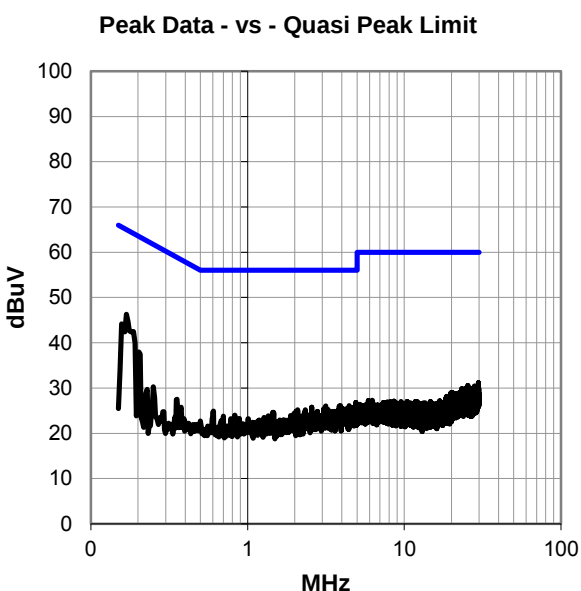
Antenna terminated.

EUT OPERATING MODES

Transmitting High Channel 75.9 MHz, CW.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.169	25.9	20.4	46.3	65.0	-18.7
0.202	17.7	20.3	38.0	63.5	-25.5
29.810	8.7	22.5	31.2	60.0	-28.8
4.914	6.3	20.5	26.8	56.0	-29.2
25.445	8.5	22.1	30.6	60.0	-29.4
29.713	8.0	22.5	30.5	60.0	-29.5
4.933	5.9	20.5	26.4	56.0	-29.6
28.172	8.0	22.4	30.4	60.0	-29.6
29.399	7.8	22.5	30.3	60.0	-29.7
3.926	5.7	20.4	26.1	56.0	-29.9
4.459	5.6	20.5	26.1	56.0	-29.9
3.153	5.7	20.3	26.0	56.0	-30.0
3.855	5.6	20.4	26.0	56.0	-30.0
26.922	7.7	22.2	29.9	60.0	-30.1
28.500	7.5	22.4	29.9	60.0	-30.1
29.892	7.4	22.5	29.9	60.0	-30.1
23.352	8.0	21.9	29.9	60.0	-30.1
29.467	7.4	22.5	29.9	60.0	-30.1
24.396	7.9	22.0	29.9	60.0	-30.1
3.881	5.4	20.4	25.8	56.0	-30.2
26.687	7.6	22.2	29.8	60.0	-30.2
29.086	7.3	22.4	29.7	60.0	-30.3
29.056	7.3	22.4	29.7	60.0	-30.3
2.568	5.4	20.3	25.7	56.0	-30.3
4.952	5.2	20.5	25.7	56.0	-30.3
4.724	5.2	20.5	25.7	56.0	-30.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.169	25.9	20.4	46.3	55.0	-8.7
0.202	17.7	20.3	38.0	53.5	-15.5
29.810	8.7	22.5	31.2	50.0	-18.8
4.914	6.3	20.5	26.8	46.0	-19.2
25.445	8.5	22.1	30.6	50.0	-19.4
29.713	8.0	22.5	30.5	50.0	-19.5
4.933	5.9	20.5	26.4	46.0	-19.6
28.172	8.0	22.4	30.4	50.0	-19.6
29.399	7.8	22.5	30.3	50.0	-19.7
3.926	5.7	20.4	26.1	46.0	-19.9
4.459	5.6	20.5	26.1	46.0	-19.9
3.153	5.7	20.3	26.0	46.0	-20.0
3.855	5.6	20.4	26.0	46.0	-20.0
26.922	7.7	22.2	29.9	50.0	-20.1
28.500	7.5	22.4	29.9	50.0	-20.1
29.892	7.4	22.5	29.9	50.0	-20.1
23.352	8.0	21.9	29.9	50.0	-20.1
29.467	7.4	22.5	29.9	50.0	-20.1
24.396	7.9	22.0	29.9	50.0	-20.1
3.881	5.4	20.4	25.8	46.0	-20.2
26.687	7.6	22.2	29.8	50.0	-20.2
29.086	7.3	22.4	29.7	50.0	-20.3
29.056	7.3	22.4	29.7	50.0	-20.3
2.568	5.4	20.3	25.7	46.0	-20.3
4.952	5.2	20.5	25.7	46.0	-20.3
4.724	5.2	20.5	25.7	46.0	-20.3

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	T27	Work Order:	WILM0007
Serial Number:	D2	Date:	07/22/2015
Customer:	Williams Sound, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	51.9%
Customer Project:	None	Bar. Pressure:	984.7 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0007-9

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

Run #:	5	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

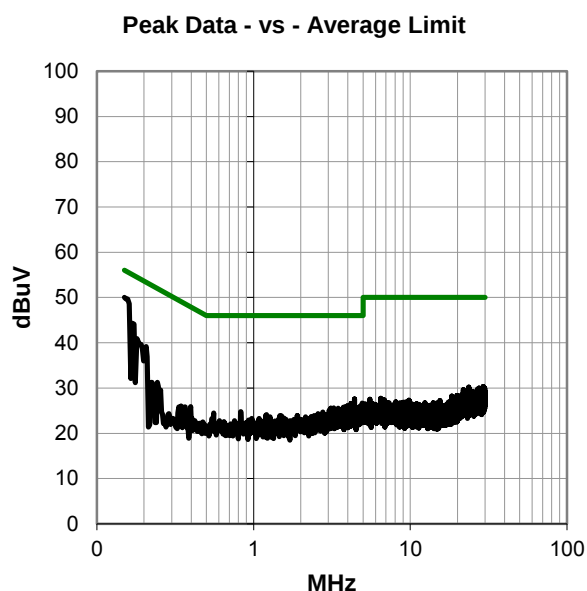
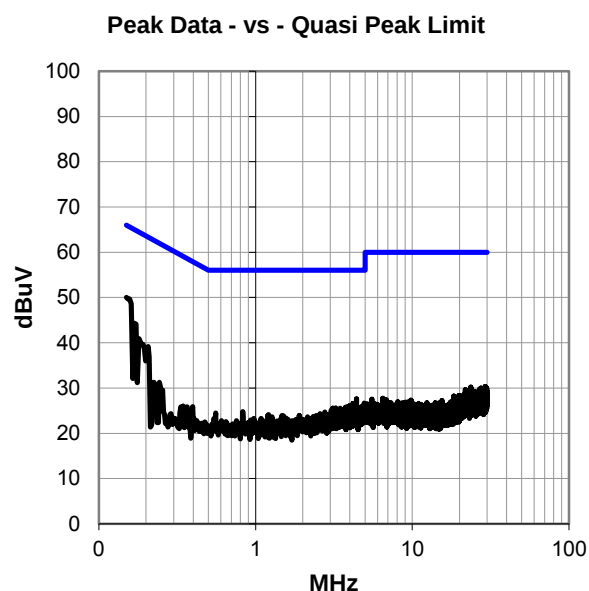
Antenna terminated.

EUT OPERATING MODES

Transmitting Mid Channel 74.7 MHz, CW.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #5

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.6	20.4	50.0	66.0	-16.0
0.169	23.9	20.4	44.3	65.0	-20.7
0.180	20.5	20.4	40.9	64.5	-23.6
0.206	18.9	20.3	39.2	63.4	-24.2
4.407	7.1	20.5	27.6	56.0	-28.4
4.933	6.2	20.5	26.7	56.0	-29.3
4.183	6.1	20.5	26.6	56.0	-29.4
29.217	7.9	22.4	30.3	60.0	-29.7
29.366	7.8	22.5	30.3	60.0	-29.7
23.654	8.3	21.9	30.2	60.0	-29.8
29.675	7.6	22.5	30.1	60.0	-29.9
3.955	5.6	20.4	26.0	56.0	-30.0
28.892	7.6	22.4	30.0	60.0	-30.0
27.441	7.7	22.3	30.0	60.0	-30.0
23.549	8.1	21.9	30.0	60.0	-30.0
29.948	7.4	22.5	29.9	60.0	-30.1
23.863	7.9	21.9	29.8	60.0	-30.2
3.870	5.4	20.4	25.8	56.0	-30.2
4.728	5.3	20.5	25.8	56.0	-30.2
3.758	5.4	20.4	25.8	56.0	-30.2
27.012	7.5	22.3	29.8	60.0	-30.2
3.243	5.3	20.3	25.6	56.0	-30.4
21.774	7.9	21.7	29.6	60.0	-30.4
28.761	7.2	22.4	29.6	60.0	-30.4
29.758	7.1	22.5	29.6	60.0	-30.4
4.105	5.1	20.5	25.6	56.0	-30.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.6	20.4	50.0	56.0	-6.0
0.169	23.9	20.4	44.3	55.0	-10.7
0.180	20.5	20.4	40.9	54.5	-13.6
0.206	18.9	20.3	39.2	53.4	-14.2
4.407	7.1	20.5	27.6	46.0	-18.4
4.933	6.2	20.5	26.7	46.0	-19.3
4.183	6.1	20.5	26.6	46.0	-19.4
29.217	7.9	22.4	30.3	50.0	-19.7
29.366	7.8	22.5	30.3	50.0	-19.7
23.654	8.3	21.9	30.2	50.0	-19.8
29.675	7.6	22.5	30.1	50.0	-19.9
3.955	5.6	20.4	26.0	46.0	-20.0
28.892	7.6	22.4	30.0	50.0	-20.0
27.441	7.7	22.3	30.0	50.0	-20.0
23.549	8.1	21.9	30.0	50.0	-20.0
29.948	7.4	22.5	29.9	50.0	-20.1
23.863	7.9	21.9	29.8	50.0	-20.2
3.870	5.4	20.4	25.8	46.0	-20.2
4.728	5.3	20.5	25.8	46.0	-20.2
3.758	5.4	20.4	25.8	46.0	-20.2
27.012	7.5	22.3	29.8	50.0	-20.2
3.243	5.3	20.3	25.6	46.0	-20.4
21.774	7.9	21.7	29.6	50.0	-20.4
28.761	7.2	22.4	29.6	50.0	-20.4
29.758	7.1	22.5	29.6	50.0	-20.4
4.105	5.1	20.5	25.6	46.0	-20.4

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	T27	Work Order:	WILM0007
Serial Number:	D2	Date:	07/22/2015
Customer:	Williams Sound, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	51.9%
Customer Project:	None	Bar. Pressure:	984.7 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0007-9

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

Run #:	6	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

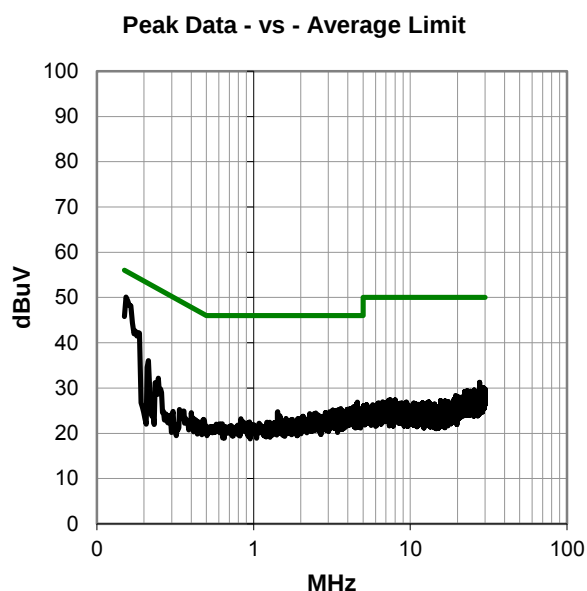
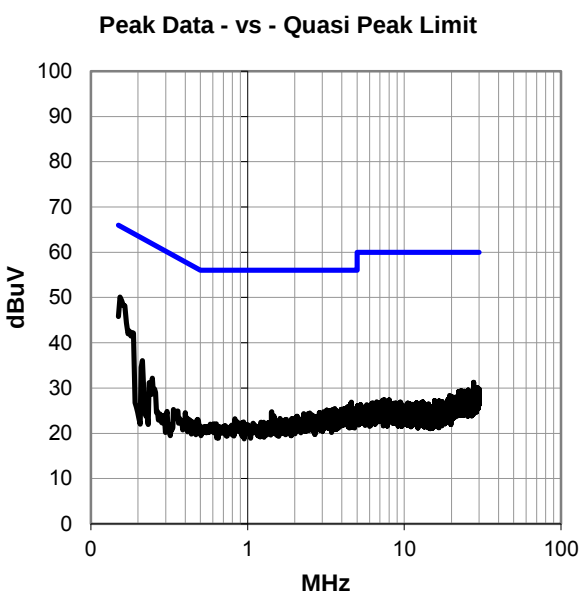
Antenna terminated.

EUT OPERATING MODES

Transmitting Mid Channel 74.7 MHz, CW.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.154	29.7	20.4	50.1	65.8	-15.7
0.213	15.8	20.3	36.1	63.1	-27.0
27.687	8.9	22.3	31.2	60.0	-28.8
4.590	6.4	20.5	26.9	56.0	-29.1
4.575	6.2	20.5	26.7	56.0	-29.3
0.247	11.9	20.3	32.2	61.9	-29.7
29.347	7.6	22.5	30.1	60.0	-29.9
4.511	5.4	20.5	25.9	56.0	-30.1
4.377	5.4	20.5	25.9	56.0	-30.1
29.985	7.3	22.5	29.8	60.0	-30.2
29.713	7.3	22.5	29.8	60.0	-30.2
4.317	5.3	20.5	25.8	56.0	-30.2
28.004	7.3	22.4	29.7	60.0	-30.3
25.598	7.5	22.1	29.6	60.0	-30.4
27.504	7.2	22.3	29.5	60.0	-30.5
28.355	7.1	22.4	29.5	60.0	-30.5
29.653	7.0	22.5	29.5	60.0	-30.5
4.198	5.0	20.5	25.5	56.0	-30.5
3.608	5.1	20.4	25.5	56.0	-30.5
23.079	7.6	21.8	29.4	60.0	-30.6
4.735	4.9	20.5	25.4	56.0	-30.6
4.657	4.9	20.5	25.4	56.0	-30.6
27.221	7.1	22.3	29.4	60.0	-30.6
4.142	4.9	20.5	25.4	56.0	-30.6
4.000	4.9	20.4	25.3	56.0	-30.7
28.750	6.9	22.4	29.3	60.0	-30.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.154	29.7	20.4	50.1	55.8	-5.7
0.213	15.8	20.3	36.1	53.1	-17.0
27.687	8.9	22.3	31.2	50.0	-18.8
4.590	6.4	20.5	26.9	46.0	-19.1
4.575	6.2	20.5	26.7	46.0	-19.3
0.247	11.9	20.3	32.2	51.9	-19.7
29.347	7.6	22.5	30.1	50.0	-19.9
4.511	5.4	20.5	25.9	46.0	-20.1
4.377	5.4	20.5	25.9	46.0	-20.1
29.985	7.3	22.5	29.8	50.0	-20.2
29.713	7.3	22.5	29.8	50.0	-20.2
4.317	5.3	20.5	25.8	46.0	-20.2
28.004	7.3	22.4	29.7	50.0	-20.3
25.598	7.5	22.1	29.6	50.0	-20.4
27.504	7.2	22.3	29.5	50.0	-20.5
28.355	7.1	22.4	29.5	50.0	-20.5
29.653	7.0	22.5	29.5	50.0	-20.5
4.198	5.0	20.5	25.5	46.0	-20.5
3.608	5.1	20.4	25.5	46.0	-20.5
23.079	7.6	21.8	29.4	50.0	-20.6
4.735	4.9	20.5	25.4	46.0	-20.6
4.657	4.9	20.5	25.4	46.0	-20.6
27.221	7.1	22.3	29.4	50.0	-20.6
4.142	4.9	20.5	25.4	46.0	-20.6
4.000	4.9	20.4	25.3	46.0	-20.7
28.750	6.9	22.4	29.3	50.0	-20.7

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	T27	Work Order:	WILM0007
Serial Number:	D2	Date:	07/22/2015
Customer:	Williams Sound, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	51.9%
Customer Project:	None	Bar. Pressure:	984.7 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0007-9

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

Run #:	7	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

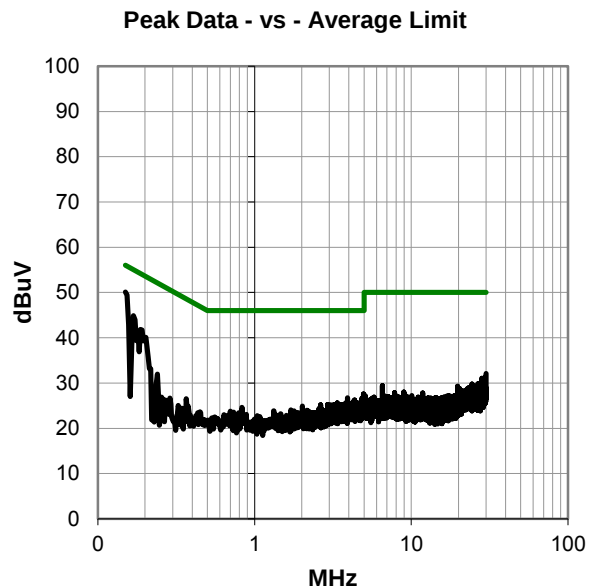
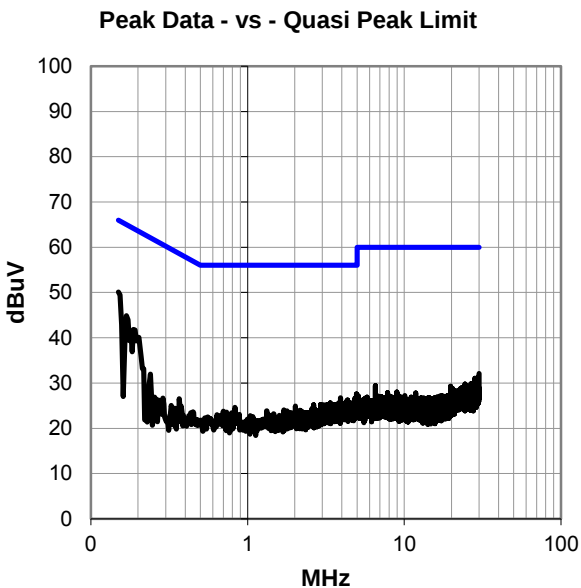
Antenna terminated.

EUT OPERATING MODES

Transmitting Low Channel 72.1 MHz, CW.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #7

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.7	20.4	50.1	66.0	-15.9
0.169	24.5	20.4	44.9	65.0	-20.1
0.187	21.5	20.4	41.9	64.2	-22.3
29.996	9.6	22.5	32.1	60.0	-27.9
4.963	7.1	20.5	27.6	56.0	-28.4
29.806	8.9	22.5	31.4	60.0	-28.6
28.247	8.7	22.4	31.1	60.0	-28.9
4.985	6.3	20.5	26.8	56.0	-29.2
3.926	6.3	20.4	26.7	56.0	-29.3
4.847	6.1	20.5	26.6	56.0	-29.4
4.347	5.8	20.5	26.3	56.0	-29.7
29.336	7.5	22.5	30.0	60.0	-30.0
4.261	5.4	20.5	25.9	56.0	-30.1
28.142	7.5	22.4	29.9	60.0	-30.1
27.101	7.6	22.3	29.9	60.0	-30.1
0.240	11.7	20.3	32.0	62.1	-30.1
26.642	7.6	22.2	29.8	60.0	-30.2
29.746	7.3	22.5	29.8	60.0	-30.2
24.430	7.8	22.0	29.8	60.0	-30.2
29.384	7.3	22.5	29.8	60.0	-30.2
29.280	7.3	22.5	29.8	60.0	-30.2
27.508	7.4	22.3	29.7	60.0	-30.3
28.690	7.3	22.4	29.7	60.0	-30.3
4.500	5.2	20.5	25.7	56.0	-30.3
3.373	5.3	20.3	25.6	56.0	-30.4
3.817	5.2	20.4	25.6	56.0	-30.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.7	20.4	50.1	56.0	-5.9
0.169	24.5	20.4	44.9	55.0	-10.1
0.187	21.5	20.4	41.9	54.2	-12.3
29.996	9.6	22.5	32.1	50.0	-17.9
4.963	7.1	20.5	27.6	46.0	-18.4
29.806	8.9	22.5	31.4	50.0	-18.6
28.247	8.7	22.4	31.1	50.0	-18.9
4.985	6.3	20.5	26.8	46.0	-19.2
3.926	6.3	20.4	26.7	46.0	-19.3
4.847	6.1	20.5	26.6	46.0	-19.4
4.347	5.8	20.5	26.3	46.0	-19.7
29.336	7.5	22.5	30.0	50.0	-20.0
4.261	5.4	20.5	25.9	46.0	-20.1
28.142	7.5	22.4	29.9	50.0	-20.1
27.101	7.6	22.3	29.9	50.0	-20.1
0.240	11.7	20.3	32.0	52.1	-20.1
26.642	7.6	22.2	29.8	50.0	-20.2
29.746	7.3	22.5	29.8	50.0	-20.2
24.430	7.8	22.0	29.8	50.0	-20.2
29.384	7.3	22.5	29.8	50.0	-20.2
29.280	7.3	22.5	29.8	50.0	-20.2
27.508	7.4	22.3	29.7	50.0	-20.3
28.690	7.3	22.4	29.7	50.0	-20.3
4.500	5.2	20.5	25.7	46.0	-20.3
3.373	5.3	20.3	25.6	46.0	-20.4
3.817	5.2	20.4	25.6	46.0	-20.4

CONCLUSION

Pass

Trevor Buls

Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	T27	Work Order:	WILM0007
Serial Number:	D2	Date:	07/22/2015
Customer:	Williams Sound, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	51.9%
Customer Project:	None	Bar. Pressure:	984.7 mb
Tested By:	Trevor Buls	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0007-9

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

Run #:	8	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

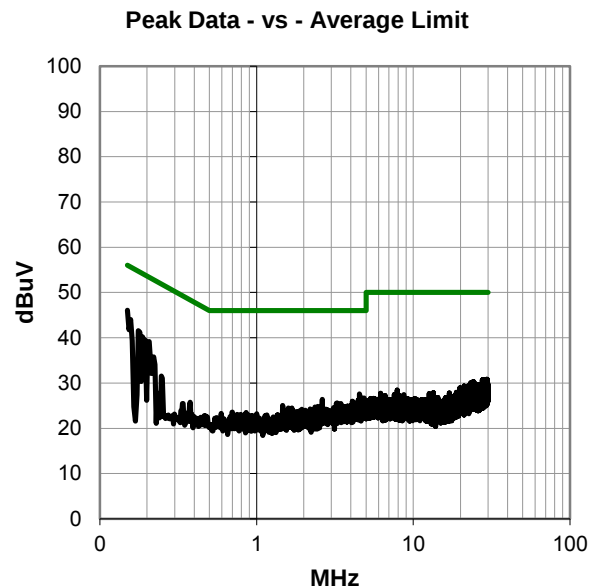
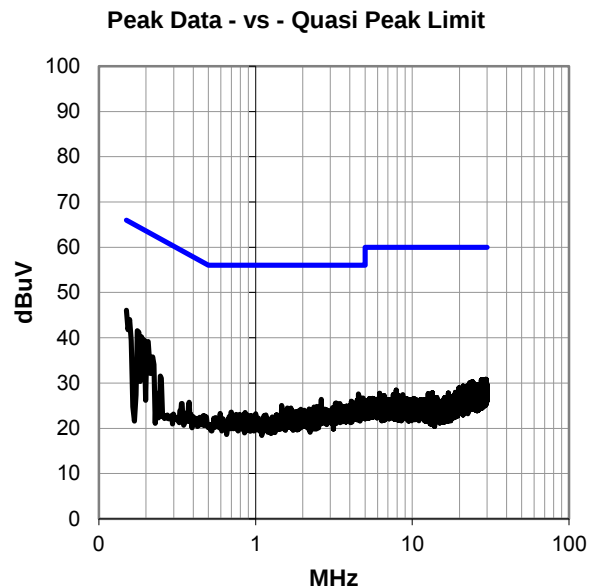
Antenna terminated.

EUT OPERATING MODES

Transmitting Low Channel 72.1 MHz, CW.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	25.7	20.4	46.1	66.0	-19.9
0.176	21.2	20.4	41.6	64.7	-23.1
0.187	19.9	20.4	40.3	64.2	-23.9
0.206	18.9	20.3	39.2	63.4	-24.2
0.221	15.5	20.3	35.8	62.8	-27.0
4.545	7.1	20.5	27.6	56.0	-28.4
29.467	8.4	22.5	30.9	60.0	-29.1
29.728	8.3	22.5	30.8	60.0	-29.2
29.593	8.3	22.5	30.8	60.0	-29.2
28.049	8.4	22.4	30.8	60.0	-29.2
27.549	8.4	22.3	30.7	60.0	-29.3
4.858	6.2	20.5	26.7	56.0	-29.3
4.739	6.2	20.5	26.7	56.0	-29.3
4.683	6.0	20.5	26.5	56.0	-29.5
2.624	6.1	20.3	26.4	56.0	-29.6
24.247	8.4	22.0	30.4	60.0	-29.6
4.810	5.8	20.5	26.3	56.0	-29.7
4.448	5.7	20.5	26.2	56.0	-29.8
24.519	8.1	22.0	30.1	60.0	-29.9
23.292	8.2	21.9	30.1	60.0	-29.9
28.978	7.6	22.4	30.0	60.0	-30.0
4.093	5.5	20.5	26.0	56.0	-30.0
27.631	7.6	22.3	29.9	60.0	-30.1
29.884	7.4	22.5	29.9	60.0	-30.1
4.586	5.3	20.5	25.8	56.0	-30.2
0.247	11.3	20.3	31.6	61.9	-30.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	25.7	20.4	46.1	56.0	-9.9
0.176	21.2	20.4	41.6	54.7	-13.1
0.187	19.9	20.4	40.3	54.2	-13.9
0.206	18.9	20.3	39.2	53.4	-14.2
0.221	15.5	20.3	35.8	52.8	-17.0
4.545	7.1	20.5	27.6	46.0	-18.4
29.467	8.4	22.5	30.9	50.0	-19.1
29.728	8.3	22.5	30.8	50.0	-19.2
29.593	8.3	22.5	30.8	50.0	-19.2
28.049	8.4	22.4	30.8	50.0	-19.2
27.549	8.4	22.3	30.7	50.0	-19.3
4.858	6.2	20.5	26.7	46.0	-19.3
4.739	6.2	20.5	26.7	46.0	-19.3
4.683	6.0	20.5	26.5	46.0	-19.5
2.624	6.1	20.3	26.4	46.0	-19.6
24.247	8.4	22.0	30.4	50.0	-19.6
4.810	5.8	20.5	26.3	46.0	-19.7
4.448	5.7	20.5	26.2	46.0	-19.8
24.519	8.1	22.0	30.1	50.0	-19.9
23.292	8.2	21.9	30.1	50.0	-19.9
28.978	7.6	22.4	30.0	50.0	-20.0
4.093	5.5	20.5	26.0	46.0	-20.0
27.631	7.6	22.3	29.9	50.0	-20.1
29.884	7.4	22.5	29.9	50.0	-20.1
4.586	5.3	20.5	25.8	46.0	-20.2
0.247	11.3	20.3	31.6	51.9	-20.3

CONCLUSION

Pass

Trevor Buls

Tested By

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel); modulated with 1 kHz, 200 mVRMS sine wave.

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

WILM0007 - 3

WILM0007 - 4

WILM0007 - 6

WILM0007 - 8

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
High Pass Filter	Mini Circuits	BHP-150+	HIA	12/8/2014	12 mo
Attenuator, 20 dB, 'SMA'	S.M. Electronics	SA6-20	REO	3/2/2015	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	3/2/2015	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/30/2015	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12 mo

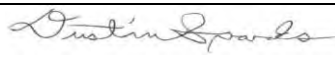
MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

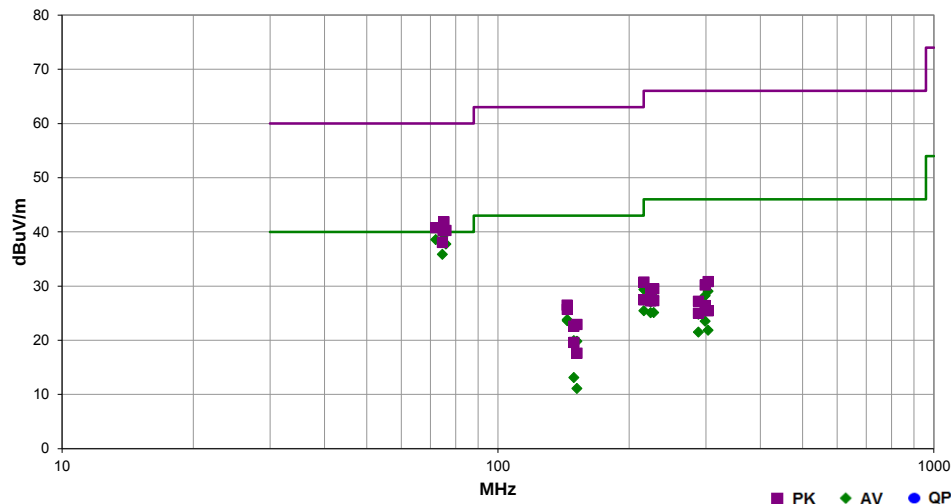
The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Measurements at the band edge were taken according to the method called out in Public Notice DA 00-705-2000 for Marker-Delta Method. The fundamental was measured using standard bandwidths and measurement detectors. A screen capture using a resolution bandwidth greater than the 1 percent emissions bandwidth was taken using a marker delta measurement of the highest value outside of the band compared to the highest value in the band. This offset was added to the reading of the fundamental to calculate the band edge reading.

Work Order:	WILM0007	Date:	07/20/15	
Project:	None	Temperature:	22.9 °C	
Job Site:	MN05	Humidity:	52.8% RH	
Serial Number:	D2	Barometric Pres.:	977.4 mbar	
EUT:	T27			
Configuration:	3			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel); modulated with 1 kHz, 200 mVRMS sine wave.			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used. Whip antenna.			

Test Specifications	Test Method
FCC 15.237:2015	ANSI C63.10:2013

Run #	3	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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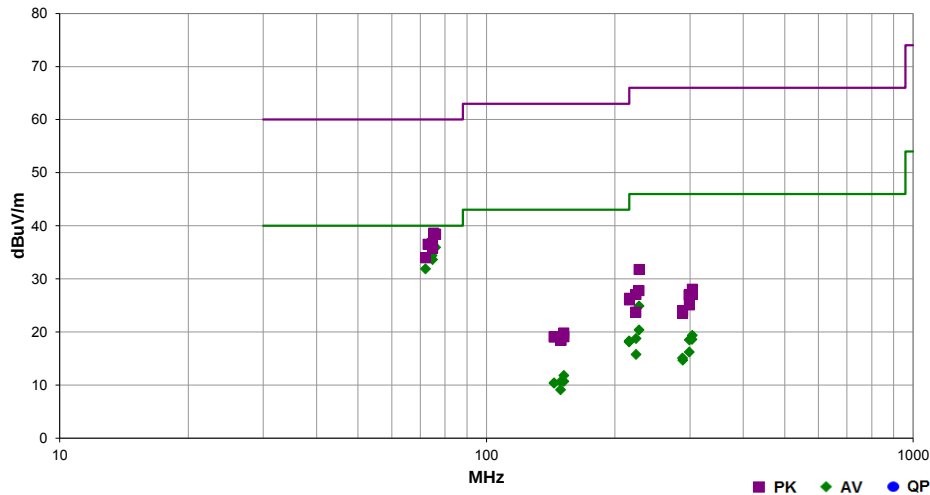


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
75.200	82.1	-9.7	1.1	141.1	3.0	20.0	Vert	AV	0.0	39.4	40.0	-0.6	75.3 MHz, marker delta
72.000	83.9	-9.5	1.2	165.0	3.0	20.0	Vert	AV	0.0	38.6	40.0	-1.4	72.1 MHz, marker delta
74.800	82.5	-9.7	1.0	148.1	3.0	20.0	Vert	AV	0.0	38.0	40.0	-2.0	74.7 MHz, marker delta
76.000	82.1	-9.7	1.0	140.0	3.0	20.0	Vert	AV	0.0	37.7	40.0	-2.3	75.9 MHz, marker delta
74.600	82.5	-9.7	1.0	148.1	3.0	20.0	Vert	AV	0.0	35.8	40.0	-4.2	74.7 MHz, marker delta
216.298	33.7	-4.4	1.0	110.0	3.0	0.0	Horz	AV	0.0	29.3	40.0	-10.7	Low channel
303.605	31.2	-2.2	1.0	102.1	3.0	0.0	Horz	AV	0.0	29.0	40.0	-11.0	High channel
298.797	31.0	-2.8	1.0	106.1	3.0	0.0	Horz	AV	0.0	28.2	40.0	-11.8	Mid channel
227.705	31.8	-3.8	1.0	252.0	3.0	0.0	Horz	AV	0.0	28.0	40.0	-12.0	High channel
224.107	30.6	-3.5	1.1	240.9	3.0	0.0	Horz	AV	0.0	27.1	40.0	-12.9	Mid channel
216.298	29.8	-4.4	1.0	70.1	3.0	0.0	Vert	AV	0.0	25.4	40.0	-14.6	Low channel
227.700	28.9	-3.8	1.0	67.0	3.0	0.0	Vert	AV	0.0	25.1	40.0	-14.9	High channel
224.103	28.6	-3.5	1.0	63.0	3.0	0.0	Vert	AV	0.0	25.1	40.0	-14.9	Mid channel
288.403	28.0	-3.2	1.0	103.0	3.0	0.0	Horz	AV	0.0	24.8	40.0	-15.2	Low channel
144.190	28.4	-4.6	1.9	61.0	3.0	0.0	Horz	AV	0.0	23.8	40.0	-16.2	Low channel
144.193	28.2	-4.6	1.0	145.1	3.0	0.0	Vert	AV	0.0	23.6	40.0	-16.4	Low channel
298.797	26.3	-2.8	1.0	72.0	3.0	0.0	Vert	AV	0.0	23.5	40.0	-16.5	Mid channel
75.200	84.5	-9.7	1.1	141.1	3.0	20.0	Vert	PK	0.0	41.8	60.0	-18.2	75.3 MHz, marker delta
303.600	24.0	-2.2	1.0	289.9	3.0	0.0	Vert	AV	0.0	21.8	40.0	-18.2	High channel
288.398	24.7	-3.2	1.2	82.0	3.0	0.0	Vert	AV	0.0	21.5	40.0	-18.5	Low channel
72.000	86.1	-9.5	1.2	165.0	3.0	20.0	Vert	PK	0.0	40.8	60.0	-19.2	72.1 MHz, marker delta
76.000	84.6	-9.7	1.0	140.0	3.0	20.0	Vert	PK	0.0	40.2	60.0	-19.8	75.9 MHz, marker delta
74.800	84.7	-9.7	1.0	148.1	3.0	20.0	Vert	PK	0.0	40.2	60.0	-19.8	74.7 MHz, marker delta
149.395	24.6	-4.7	1.0	297.0	3.0	0.0	Vert	AV	0.0	19.9	40.0	-20.1	Mid channel
151.800	24.6	-4.8	1.0	289.0	3.0	0.0	Vert	AV	0.0	19.8	40.0	-20.2	High channel
74.600	84.7	-9.7	1.0	148.1	3.0	20.0	Vert	PK	0.0	38.0	60.0	-22.0	74.7 MHz, marker delta
149.400	17.8	-4.7	1.6	58.1	3.0	0.0	Horz	AV	0.0	13.1	40.0	-26.9	Mid channel
151.795	15.9	-4.8	1.0	315.0	3.0	0.0	Horz	AV	0.0	11.1	40.0	-28.9	High channel
303.600	33.0	-2.2	1.0	102.1	3.0	0.0	Horz	PK	0.0	30.8	60.0	-29.2	High channel
216.308	35.1	-4.4	1.0	110.0	3.0	0.0	Horz	PK	0.0	30.7	60.0	-29.3	Low channel
298.797	33.0	-2.8	1.0	106.1	3.0	0.0	Horz	PK	0.0	30.2	60.0	-29.8	Mid channel
227.700	33.3	-3.8	1.0	252.0	3.0	0.0	Horz	PK	0.0	29.5	60.0	-30.5	High channel
224.100	32.2	-3.5	1.1	240.9	3.0	0.0	Horz	PK	0.0	28.7	60.0	-31.3	Mid channel
216.295	31.8	-4.4	1.0	70.1	3.0	0.0	Vert	PK	0.0	27.4	60.0	-32.6	Low channel
227.705	31.1	-3.8	1.0	67.0	3.0	0.0	Vert	PK	0.0	27.3	60.0	-32.7	High channel
224.115	30.8	-3.5	1.0	63.0	3.0	0.0	Vert	PK	0.0	27.3	60.0	-32.7	Mid channel
288.398	30.4	-3.2	1.0	103.0	3.0	0.0	Horz	PK	0.0	27.2	60.0	-32.8	Low channel
144.182	31.1	-4.6	1.9	61.0	3.0	0.0	Horz	PK	0.0	26.5	60.0	-33.5	Low channel
298.788	29.2	-2.8	1.0	72.0	3.0	0.0	Vert	PK	0.0	26.4	60.0	-33.6	Mid channel
144.220	30.3	-4.6	1.0	145.1	3.0	0.0	Vert	PK	0.0	25.7	60.0	-34.3	Low channel
303.610	27.6	-2.2	1.0	289.9	3.0	0.0	Vert	PK	0.0	25.4	60.0	-34.6	High channel
288.390	28.2	-3.2	1.2	82.0	3.0	0.0	Vert	PK	0.0	25.0	60.0	-35.0	Low channel
151.815	27.7	-4.8	1.0	289.0	3.0	0.0	Vert	PK	0.0	22.9	60.0	-37.1	High channel
149.390	27.3	-4.7	1.0	297.0	3.0	0.0	Vert	PK	0.0	22.6	60.0	-37.4	Mid channel
149.388	24.3	-4.7	1.6	58.1	3.0	0.0	Horz	PK	0.0	19.6	60.0	-40.4	Mid channel
151.850	22.4	-4.8	1.0	315.0	3.0	0.0	Horz	PK	0.0	17.6	60.0	-42.4	High channel

Work Order:	WILM0007	Date:	07/20/15	<i>Dustin Sparks</i>
Project:	None	Temperature:	22.9 °C	
Job Site:	MN05	Humidity:	52.8% RH	
Serial Number:	D2	Barometric Pres.:	977.4 mbar	
EUT:	T27	Tested by:	Dustin Sparks	
Configuration:	4			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel); modulated with 1 kHz, 200 mVRMS sine wave.			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used. Rubber duck antenna.			

Test Specifications	Test Method
FCC 15.237:2015	ANSI C63.10:2013

Run #	12	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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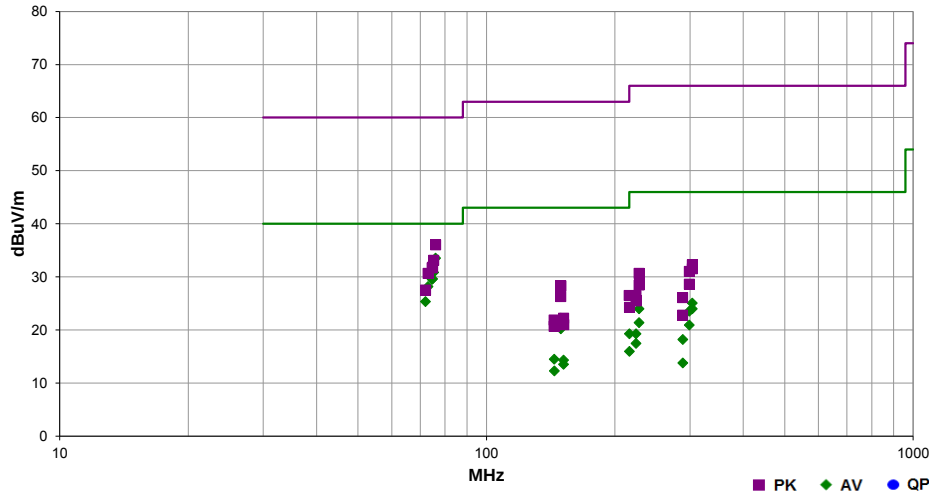


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
75.200	80.4	-9.7	1.0	143.0	3.0	20.0	Vert	AV	0.0	36.2	40.0	-3.8	75.3 MHz, marker delta
76.000	80.8	-9.7	1.1	138.1	3.0	20.0	Vert	AV	0.0	35.9	40.0	-4.1	75.9 MHz, marker delta
74.600	79.8	-9.7	1.0	139.0	3.0	20.0	Vert	AV	0.0	34.4	40.0	-5.6	74.7 MHz, marker delta
73.000	76.6	-9.5	1.0	141.1	3.0	20.0	Vert	AV	0.0	34.0	40.0	-6.0	72.9 MHz, marker delta
74.800	79.8	-9.7	1.0	139.0	3.0	20.0	Vert	AV	0.0	33.6	40.0	-6.4	74.7 MHz, marker delta
72.000	76.6	-9.5	1.2	146.0	3.0	20.0	Vert	AV	0.0	31.9	40.0	-8.1	72.1 MHz, marker delta
227.880	28.7	-3.8	1.3	260.0	3.0	0.0	Horz	AV	0.0	24.9	40.0	-15.1	High channel
227.890	24.2	-3.8	1.1	139.0	3.0	0.0	Vert	AV	0.0	20.4	40.0	-19.6	High channel
303.865	21.5	-2.1	1.0	247.9	3.0	0.0	Horz	AV	0.0	19.4	40.0	-20.6	High channel
224.260	22.3	-3.5	1.0	134.1	3.0	0.0	Vert	AV	0.0	18.8	40.0	-21.2	Mid channel
75.200	82.8	-9.7	1.0	143.0	3.0	20.0	Vert	PK	0.0	38.6	60.0	-21.4	75.3 MHz, marker delta
303.340	20.8	-2.2	1.0	73.1	3.0	0.0	Vert	AV	0.0	18.6	40.0	-21.4	High channel
299.015	21.3	-2.8	1.0	89.0	3.0	0.0	Vert	AV	0.0	18.5	40.0	-21.5	Mid channel
76.000	83.3	-9.7	1.1	138.1	3.0	20.0	Vert	PK	0.0	38.4	60.0	-21.6	75.9 MHz, marker delta
216.145	22.7	-4.4	1.0	260.0	3.0	0.0	Horz	AV	0.0	18.3	40.0	-21.7	Low channel
216.125	22.5	-4.4	1.0	204.0	3.0	0.0	Vert	AV	0.0	18.1	40.0	-21.9	Low channel
74.600	82.0	-9.7	1.0	139.0	3.0	20.0	Vert	PK	0.0	36.6	60.0	-23.4	74.7 MHz, marker delta
73.000	79.1	-9.5	1.0	141.1	3.0	20.0	Vert	PK	0.0	36.5	60.0	-23.5	72.9 MHz, marker delta
299.030	19.0	-2.8	1.0	246.9	3.0	0.0	Horz	AV	0.0	16.2	40.0	-23.8	Mid channel
74.800	82.0	-9.7	1.0	139.0	3.0	20.0	Vert	PK	0.0	35.8	60.0	-24.2	74.7 MHz, marker delta
224.270	19.3	-3.5	1.0	90.0	3.0	0.0	Horz	AV	0.0	15.8	40.0	-24.2	Mid channel
288.160	18.3	-3.2	1.2	249.0	3.0	0.0	Horz	AV	0.0	15.1	40.0	-24.9	Low channel
288.650	17.9	-3.2	1.1	89.0	3.0	0.0	Vert	AV	0.0	14.7	40.0	-25.3	Low channel
72.000	78.7	-9.5	1.2	146.0	3.0	20.0	Vert	PK	0.0	34.0	60.0	-26.0	72.1 MHz, marker delta
151.890	16.6	-4.8	2.0	65.1	3.0	0.0	Horz	AV	0.0	11.8	40.0	-28.2	High channel
227.900	35.6	-3.8	1.3	260.0	3.0	0.0	Horz	PK	0.0	31.8	60.0	-28.2	High channel
151.920	15.5	-4.8	1.0	179.0	3.0	0.0	Vert	AV	0.0	10.7	40.0	-29.3	High channel
149.290	15.3	-4.7	1.0	282.9	3.0	0.0	Vert	AV	0.0	10.6	40.0	-29.4	Mid channel
144.100	15.0	-4.6	1.3	246.9	3.0	0.0	Horz	AV	0.0	10.4	40.0	-29.6	Low channel
144.105	15.0	-4.6	1.0	159.1	3.0	0.0	Vert	AV	0.0	10.4	40.0	-29.6	Low channel
149.290	13.8	-4.7	2.7	10.0	3.0	0.0	Horz	AV	0.0	9.1	40.0	-30.9	Mid channel
303.880	30.2	-2.1	1.0	247.9	3.0	0.0	Horz	PK	0.0	28.1	60.0	-31.9	High channel
227.760	31.6	-3.8	1.1	139.0	3.0	0.0	Vert	PK	0.0	27.8	60.0	-32.2	High channel
303.405	29.3	-2.2	1.0	73.1	3.0	0.0	Vert	PK	0.0	27.1	60.0	-32.9	High channel
224.195	30.6	-3.5	1.0	134.1	3.0	0.0	Vert	PK	0.0	27.1	60.0	-32.9	Mid channel
298.535	29.8	-2.8	1.0	89.0	3.0	0.0	Vert	PK	0.0	27.0	60.0	-33.0	Mid channel
216.445	30.7	-4.3	1.0	204.0	3.0	0.0	Vert	PK	0.0	26.4	60.0	-33.6	Low channel
216.340	30.4	-4.4	1.0	260.0	3.0	0.0	Horz	PK	0.0	26.0	60.0	-34.0	Low channel
298.925	27.9	-2.8	1.0	246.9	3.0	0.0	Horz	PK	0.0	25.1	60.0	-34.9	Mid channel
288.205	27.2	-3.2	1.1	89.0	3.0	0.0	Vert	PK	0.0	24.0	60.0	-36.0	Low channel
223.970	27.3	-3.5	1.0	90.0	3.0	0.0	Horz	PK	0.0	23.8	60.0	-36.2	Mid channel
288.150	26.7	-3.2	1.2	249.0	3.0	0.0	Horz	PK	0.0	23.5	60.0	-36.5	Low channel
151.795	24.6	-4.8	2.0	65.1	3.0	0.0	Horz	PK	0.0	19.8	60.0	-40.2	High channel
151.870	23.9	-4.8	1.0	179.0	3.0	0.0	Vert	PK	0.0	19.1	60.0	-40.9	High channel
144.145	23.7	-4.6	1.0	159.1	3.0	0.0	Vert	PK	0.0	19.1	60.0	-40.9	Low channel
144.315	23.7	-4.6	1.3	246.9	3.0	0.0	Horz	PK	0.0	19.1	60.0	-40.9	Low channel
149.460	23.2	-4.7	1.0	282.9	3.0	0.0	Vert	PK	0.0	18.5	60.0	-41.5	Mid channel
149.450	23.1	-4.7	2.7	10.0	3.0	0.0	Horz	PK	0.0	18.4	60.0	-41.6	Mid channel

Work Order:	WILM0007	Date:	07/21/15	<i>Justin Sparks</i>
Project:	None	Temperature:	23.1 °C	
Job Site:	MN05	Humidity:	50.3% RH	
Serial Number:	D2	Barometric Pres.:	985 mbar	
EUT:	T27	Tested by:	Dustin Sparks	
Configuration:	6			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel); modulated with 1 kHz, 200 mVRMS sine wave.			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used. Dipole antenna.			

Test Specifications	Test Method
FCC 15.237:2015	ANSI C63.10:2013

Run #	25	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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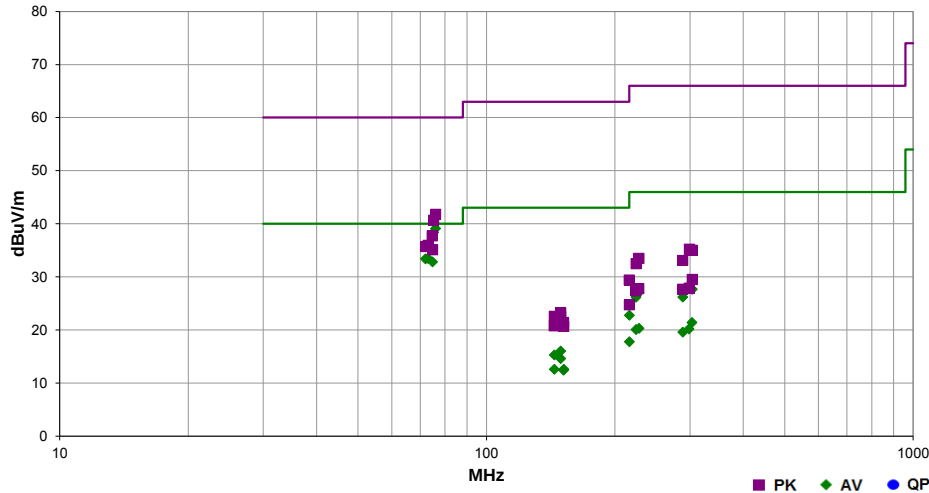


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
76.000	76.9	-9.7	1.0	0.0	3.0	20.0	Vert	AV	0.0	33.5	40.0	-6.5	75.9 MHz, marker delta
75.200	76.6	-9.7	1.0	14.0	3.0	20.0	Vert	AV	0.0	30.8	40.0	-9.2	75.3 MHz, marker delta
74.800	75.9	-9.7	1.0	24.0	3.0	20.0	Vert	AV	0.0	29.6	40.0	-10.4	74.7 MHz, marker delta
74.600	75.9	-9.7	1.0	24.0	3.0	20.0	Vert	AV	0.0	29.5	40.0	-10.5	74.7 MHz, marker delta
73.000	70.8	-9.5	1.8	358.9	3.0	20.0	Vert	AV	0.0	28.2	40.0	-11.8	72.9 MHz, marker delta
72.000	70.1	-9.5	2.3	355.9	3.0	20.0	Vert	AV	0.0	25.3	40.0	-14.7	72.1 MHz, marker delta
303.845	27.2	-2.1	1.0	257.0	3.0	0.0	Horz	AV	0.0	25.1	40.0	-14.9	High channel
227.875	27.8	-3.8	1.1	193.0	3.0	0.0	Horz	AV	0.0	24.0	40.0	-16.0	High channel
303.845	26.1	-2.1	1.0	289.9	3.0	0.0	Vert	AV	0.0	24.0	40.0	-16.0	High channel
299.020	26.3	-2.8	1.0	264.9	3.0	0.0	Horz	AV	0.0	23.5	40.0	-16.5	Mid channel
149.495	26.9	-4.7	2.1	317.0	3.0	0.0	Horz	AV	0.0	22.2	40.0	-17.8	Mid channel
227.875	25.2	-3.8	1.5	215.0	3.0	0.0	Vert	AV	0.0	21.4	40.0	-18.6	High channel
299.025	23.7	-2.8	1.0	289.9	3.0	0.0	Vert	AV	0.0	20.9	40.0	-19.1	Mid channel
149.495	24.9	-4.7	2.5	297.0	3.0	0.0	Vert	AV	0.0	20.2	40.0	-19.8	Mid channel
216.460	23.6	-4.3	1.4	232.9	3.0	0.0	Vert	AV	0.0	19.3	40.0	-20.7	Low channel
224.250	22.8	-3.5	1.8	8.1	3.0	0.0	Horz	AV	0.0	19.3	40.0	-20.7	Mid channel
288.620	21.4	-3.2	1.2	256.0	3.0	0.0	Horz	AV	0.0	18.2	40.0	-21.8	Low channel
224.255	21.0	-3.5	1.0	204.0	3.0	0.0	Vert	AV	0.0	17.5	40.0	-22.5	Mid channel
76.000	79.4	-9.7	1.0	0.0	3.0	20.0	Vert	PK	0.0	36.0	60.0	-24.0	75.9 MHz, marker delta
216.480	20.3	-4.3	1.6	197.0	3.0	0.0	Horz	AV	0.0	16.0	40.0	-24.0	Low channel
144.290	19.1	-4.6	1.0	326.9	3.0	0.0	Vert	AV	0.0	14.5	40.0	-25.5	Low channel
151.690	19.1	-4.8	2.0	9.0	3.0	0.0	Vert	AV	0.0	14.3	40.0	-25.7	High channel
288.630	17.0	-3.2	1.0	289.9	3.0	0.0	Vert	AV	0.0	13.8	40.0	-26.2	Low channel
151.690	18.3	-4.8	1.0	21.0	3.0	0.0	Horz	AV	0.0	13.5	40.0	-26.5	High channel
75.200	78.9	-9.7	1.0	14.0	3.0	20.0	Vert	PK	0.0	33.1	60.0	-26.9	75.3 MHz, marker delta
144.295	16.9	-4.6	1.8	304.9	3.0	0.0	Horz	AV	0.0	12.3	40.0	-27.7	Low channel
303.870	34.4	-2.1	1.0	257.0	3.0	0.0	Horz	PK	0.0	32.3	60.0	-27.7	High channel
74.800	78.1	-9.7	1.0	24.0	3.0	20.0	Vert	PK	0.0	31.8	60.0	-28.2	74.7 MHz, marker delta
74.600	78.1	-9.7	1.0	24.0	3.0	20.0	Vert	PK	0.0	31.7	60.0	-28.3	74.7 MHz, marker delta
303.745	33.7	-2.2	1.0	289.9	3.0	0.0	Vert	PK	0.0	31.5	60.0	-28.5	High channel
299.055	33.8	-2.8	1.0	264.9	3.0	0.0	Horz	PK	0.0	31.0	60.0	-29.0	Mid channel
227.910	34.5	-3.8	1.1	193.0	3.0	0.0	Horz	PK	0.0	30.7	60.0	-29.3	High channel
73.000	73.3	-9.5	1.8	358.9	3.0	20.0	Vert	PK	0.0	30.7	60.0	-29.3	72.9 MHz, marker delta
299.055	31.4	-2.8	1.0	289.9	3.0	0.0	Vert	PK	0.0	28.6	60.0	-31.4	Mid channel
227.900	32.3	-3.8	1.5	215.0	3.0	0.0	Vert	PK	0.0	28.5	60.0	-31.5	High channel
149.465	33.0	-4.7	2.1	317.0	3.0	0.0	Horz	PK	0.0	28.3	60.0	-31.7	Mid channel
72.000	72.3	-9.5	2.3	355.9	3.0	20.0	Vert	PK	0.0	27.5	60.0	-32.5	72.1 MHz, marker delta
216.090	30.9	-4.4	1.4	232.9	3.0	0.0	Vert	PK	0.0	26.5	60.0	-33.5	Low channel
224.095	30.0	-3.5	1.8	8.1	3.0	0.0	Horz	PK	0.0	26.5	60.0	-33.5	Mid channel
149.410	31.0	-4.7	2.5	297.0	3.0	0.0	Vert	PK	0.0	26.3	60.0	-33.7	Mid channel
288.310	29.3	-3.2	1.2	256.0	3.0	0.0	Horz	PK	0.0	26.1	60.0	-33.9	Low channel
224.280	29.0	-3.5	1.0	204.0	3.0	0.0	Vert	PK	0.0	25.5	60.0	-34.5	Mid channel
216.475	28.6	-4.3	1.6	197.0	3.0	0.0	Horz	PK	0.0	24.3	60.0	-35.7	Low channel
288.170	26.0	-3.2	1.0	289.9	3.0	0.0	Vert	PK	0.0	22.8	60.0	-37.2	Low channel
151.650	27.0	-4.8	2.0	9.0	3.0	0.0	Vert	PK	0.0	22.2	60.0	-37.8	High channel
144.070	26.5	-4.6	1.0	326.9	3.0	0.0	Vert	PK	0.0	21.9	60.0	-38.1	Low channel
151.800	25.8	-4.8	1.0	21.0	3.0	0.0	Horz	PK	0.0	21.0	60.0	-39.0	High channel
144.090	25.3	-4.6	1.8	304.9	3.0	0.0	Horz	PK	0.0	20.7	60.0	-39.3	Low channel

Work Order:	WILM0007	Date:	07/21/15	<i>Justin Sparks</i>
Project:	None	Temperature:	23.1 °C	
Job Site:	MN05	Humidity:	50.3% RH	
Serial Number:	D2	Barometric Pres.:	985 mbar	
EUT:	T27	Tested by:	Dustin Sparks	
Configuration:	8			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel); modulated with 1 kHz, 200 mVRMS sine wave.			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used. Coaxial dipole antenna.			

Test Specifications	Test Method
FCC 15.237:2015	ANSI C63.10:2013

Run #	34	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
76.000	82.0	-9.7	1.0	360.0	3.0	20.0	Vert	AV	0.0	39.1	40.0	-0.9	75.9 MHz, marker delta
75.200	81.3	-9.7	1.1	0.0	3.0	20.0	Vert	AV	0.0	38.4	40.0	-1.6	75.3 MHz, marker delta
74.600	80.5	-9.7	1.0	17.0	3.0	20.0	Vert	AV	0.0	35.4	40.0	-4.6	74.7 MHz, marker delta
73.000	77.3	-9.5	1.4	347.9	3.0	20.0	Vert	AV	0.0	33.5	40.0	-6.5	72.9 MHz, marker delta
72.000	78.5	-9.5	1.1	174.1	3.0	20.0	Vert	AV	0.0	33.4	40.0	-6.6	72.1 MHz, marker delta
74.800	80.5	-9.7	1.0	17.0	3.0	20.0	Vert	AV	0.0	32.8	40.0	-7.2	74.7 MHz, marker delta
299.015	31.1	-2.8	1.0	278.0	3.0	0.0	Horz	AV	0.0	28.3	40.0	-11.7	Mid channel
303.840	29.8	-2.1	1.0	261.9	3.0	0.0	Horz	AV	0.0	27.7	40.0	-12.3	High channel
227.870	30.9	-3.8	1.0	268.9	3.0	0.0	Horz	AV	0.0	27.1	40.0	-12.9	High channel
288.635	29.4	-3.2	1.0	279.0	3.0	0.0	Horz	AV	0.0	26.2	40.0	-13.8	Low channel
224.250	29.7	-3.5	1.5	53.0	3.0	0.0	Horz	AV	0.0	26.2	40.0	-13.8	Mid channel
216.460	27.1	-4.3	1.0	271.9	3.0	0.0	Horz	AV	0.0	22.8	40.0	-17.2	Low channel
76.000	84.7	-9.7	1.0	360.0	3.0	20.0	Vert	PK	0.0	41.8	60.0	-18.2	75.9 MHz, marker delta
303.350	23.6	-2.2	1.1	245.0	3.0	0.0	Vert	AV	0.0	21.4	40.0	-18.6	High channel
75.200	83.6	-9.7	1.1	0.0	3.0	20.0	Vert	PK	0.0	40.7	60.0	-19.3	75.3 MHz, marker delta
227.880	24.1	-3.8	1.0	12.1	3.0	0.0	Vert	AV	0.0	20.3	40.0	-19.7	High channel
298.580	23.0	-2.8	1.0	229.0	3.0	0.0	Vert	AV	0.0	20.2	40.0	-19.8	Mid channel
224.255	23.6	-3.5	1.0	16.1	3.0	0.0	Vert	AV	0.0	20.1	40.0	-19.9	Mid channel
288.625	22.8	-3.2	1.0	0.0	3.0	0.0	Vert	AV	0.0	19.6	40.0	-20.4	Low channel
216.460	22.1	-4.3	1.5	351.0	3.0	0.0	Vert	AV	0.0	17.8	40.0	-22.2	Low channel
74.600	82.8	-9.7	1.0	17.0	3.0	20.0	Vert	PK	0.0	37.7	60.0	-22.3	74.7 MHz, marker delta
149.315	20.7	-4.7	2.0	103.0	3.0	0.0	Horz	AV	0.0	16.0	40.0	-24.0	Mid channel
73.000	79.8	-9.5	1.4	347.9	3.0	20.0	Vert	PK	0.0	36.0	60.0	-24.0	72.9 MHz, marker delta
72.000	80.8	-9.5	1.1	174.1	3.0	20.0	Vert	PK	0.0	35.7	60.0	-24.3	72.1 MHz, marker delta
144.310	19.9	-4.6	1.5	179.0	3.0	0.0	Vert	AV	0.0	15.3	40.0	-24.7	Low channel
299.045	38.0	-2.8	1.0	278.0	3.0	0.0	Horz	PK	0.0	35.2	60.0	-24.8	Mid channel
74.800	82.8	-9.7	1.0	17.0	3.0	20.0	Vert	PK	0.0	35.1	60.0	-24.9	74.7 MHz, marker delta
303.635	37.2	-2.2	1.0	261.9	3.0	0.0	Horz	PK	0.0	35.0	60.0	-25.0	High channel
149.325	19.3	-4.7	1.8	268.9	3.0	0.0	Vert	AV	0.0	14.6	40.0	-25.4	Mid channel
227.775	37.3	-3.8	1.0	268.9	3.0	0.0	Horz	PK	0.0	33.5	60.0	-26.5	High channel
288.560	36.3	-3.2	1.0	279.0	3.0	0.0	Horz	PK	0.0	33.1	60.0	-26.9	Low channel
151.895	17.4	-4.8	1.5	315.9	3.0	0.0	Vert	AV	0.0	12.6	40.0	-27.4	High channel
144.300	17.2	-4.6	2.6	74.0	3.0	0.0	Horz	AV	0.0	12.6	40.0	-27.4	Low channel
224.280	36.0	-3.5	1.5	53.0	3.0	0.0	Horz	PK	0.0	32.5	60.0	-27.5	Mid channel
151.675	17.2	-4.8	1.8	112.1	3.0	0.0	Horz	AV	0.0	12.4	40.0	-27.6	High channel
303.685	31.7	-2.2	1.1	245.0	3.0	0.0	Vert	PK	0.0	29.5	60.0	-30.5	High channel
216.130	33.8	-4.4	1.0	271.9	3.0	0.0	Horz	PK	0.0	29.4	60.0	-30.6	Low channel
298.770	30.7	-2.8	1.0	229.0	3.0	0.0	Vert	PK	0.0	27.9	60.0	-32.1	Mid channel
227.570	31.6	-3.8	1.0	12.1	3.0	0.0	Vert	PK	0.0	27.8	60.0	-32.2	High channel
288.525	30.9	-3.2	1.0	0.0	3.0	0.0	Vert	PK	0.0	27.7	60.0	-32.3	Low channel
224.165	30.9	-3.5	1.0	16.1	3.0	0.0	Vert	PK	0.0	27.4	60.0	-32.6	Mid channel
216.310	29.1	-4.4	1.5	351.0	3.0	0.0	Vert	PK	0.0	24.7	60.0	-35.3	Low channel
149.365	27.9	-4.7	2.0	103.0	3.0	0.0	Horz	PK	0.0	23.2	60.0	-36.8	Mid channel
144.265	27.2	-4.6	1.5	179.0	3.0	0.0	Vert	PK	0.0	22.6	60.0	-37.4	Low channel
149.305	27.2	-4.7	1.8	268.9	3.0	0.0	Vert	PK	0.0	22.5	60.0	-37.5	Mid channel
151.665	26.2	-4.8	1.8	112.1	3.0	0.0	Horz	PK	0.0	21.4	60.0	-38.6	High channel
144.100	25.4	-4.6	2.6	74.0	3.0	0.0	Horz	PK	0.0	20.8	60.0	-39.2	Low channel
151.855	25.5	-4.8	1.5	315.9	3.0	0.0	Vert	PK	0.0	20.7	60.0	-39.3	High channel

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel) unmodulated

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

WILM0007 - 1

WILM0007 - 2

WILM0007 - 5

WILM0007 - 7

FREQUENCY RANGE INVESTIGATED

Start Frequency	70 MHz	Stop Frequency	80 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator, 20 dB, 'SMA'	S.M. Electronics	SA6-20	REO	3/2/2015	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	3/2/2015	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/30/2015	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2015	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

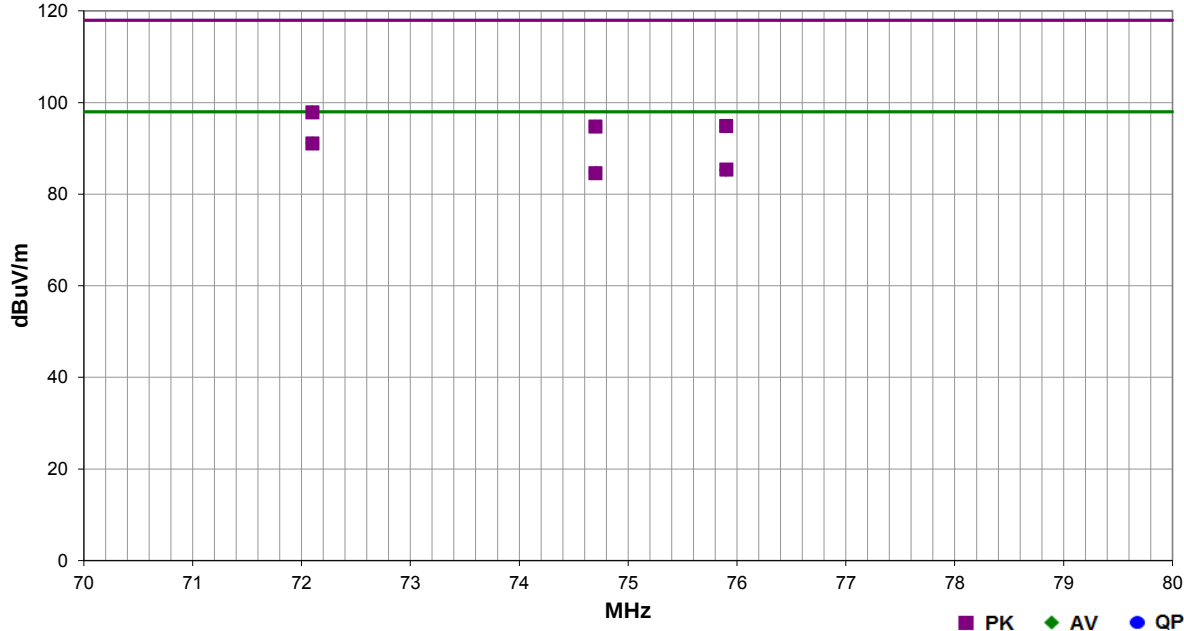
TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting and while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT and EUT antenna in 3 orthogonal planes.

Work Order:	WILM0007	Date:	07/20/15	
Project:	None	Temperature:	22.9 °C	
Job Site:	MN05	Humidity:	52.8% RH	
Serial Number:	D2	Barometric Pres.:	977.4 mbar	
EUT:	T27			
Configuration:	1			
Customer:	Williams Sound, LLC			
Attendees:				
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel) unmodulated			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.			

Test Specifications	Test Method
FCC 15.237:2016	ANSI C63.10:2013

Run #	1	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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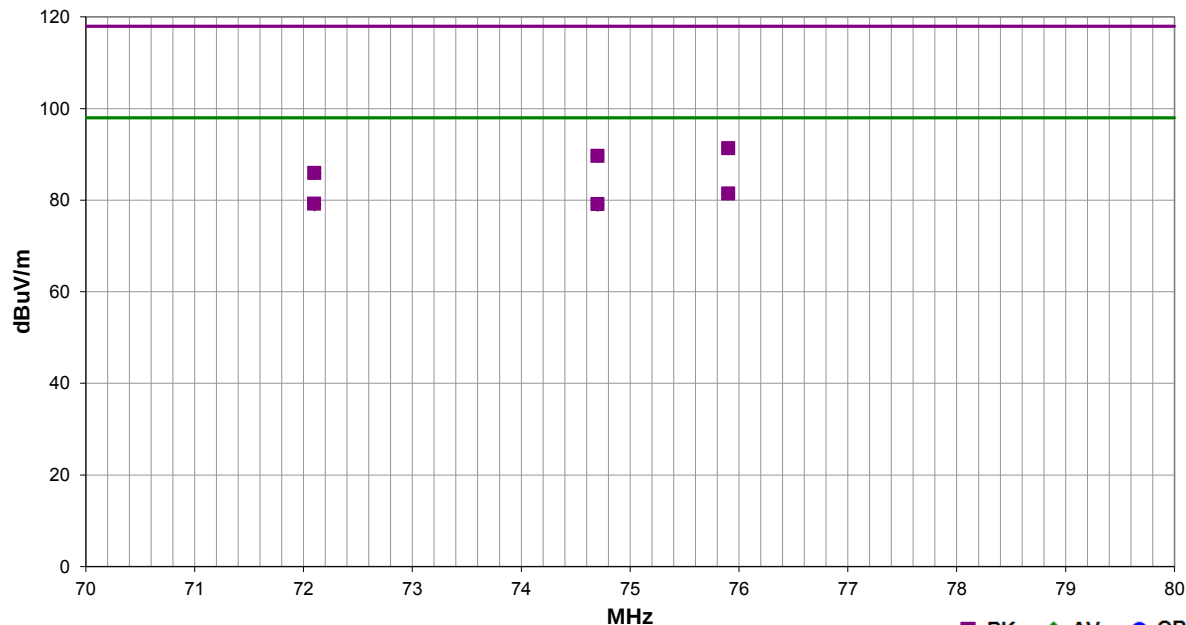


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
72.100	65.7	12.2	1.1	167.1	3.0	20.0	Vert	AV	0.0	97.9	98.0	-0.1	Low channel
75.900	62.8	12.0	1.0	175.0	3.0	20.0	Vert	AV	0.0	94.8	98.0	-3.2	High channel
74.700	62.8	12.0	1.0	174.1	3.0	20.0	Vert	AV	0.0	94.8	98.0	-3.2	Mid channel
72.100	58.9	12.2	3.8	57.0	3.0	20.0	Horz	AV	0.0	91.1	98.0	-6.9	Low channel
75.898	53.3	12.0	3.9	360.0	3.0	20.0	Horz	AV	0.0	85.3	98.0	-12.7	High channel
74.700	52.7	12.0	4.0	360.0	3.0	20.0	Horz	AV	0.0	84.7	98.0	-13.3	Mid channel
72.100	65.7	12.2	1.1	167.1	3.0	20.0	Vert	PK	0.0	97.9	118.0	-20.1	Low channel
75.900	62.9	12.0	1.0	175.0	3.0	20.0	Vert	PK	0.0	94.9	118.0	-23.1	High channel
74.700	62.8	12.0	1.0	174.1	3.0	20.0	Vert	PK	0.0	94.8	118.0	-23.2	Mid channel
72.100	58.9	12.2	3.8	57.0	3.0	20.0	Horz	PK	0.0	91.1	118.0	-26.9	Low channel
75.902	53.4	12.0	3.9	360.0	3.0	20.0	Horz	PK	0.0	85.4	118.0	-32.6	High channel
74.700	52.6	12.0	4.0	360.0	3.0	20.0	Horz	PK	0.0	84.6	118.0	-33.4	Mid channel

Work Order:	WILM0007	Date:	07/20/15	
Project:	None	Temperature:	22.9 °C	
Job Site:	MN05	Humidity:	52.8% RH	
Serial Number:	D2	Barometric Pres.:	977.4 mbar	
EUT:	T27			
Configuration:	2			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel) unmodulated			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.			

Test Specifications	Test Method
FCC 15.237:2016	ANSI C63.10:2013

Run #	11	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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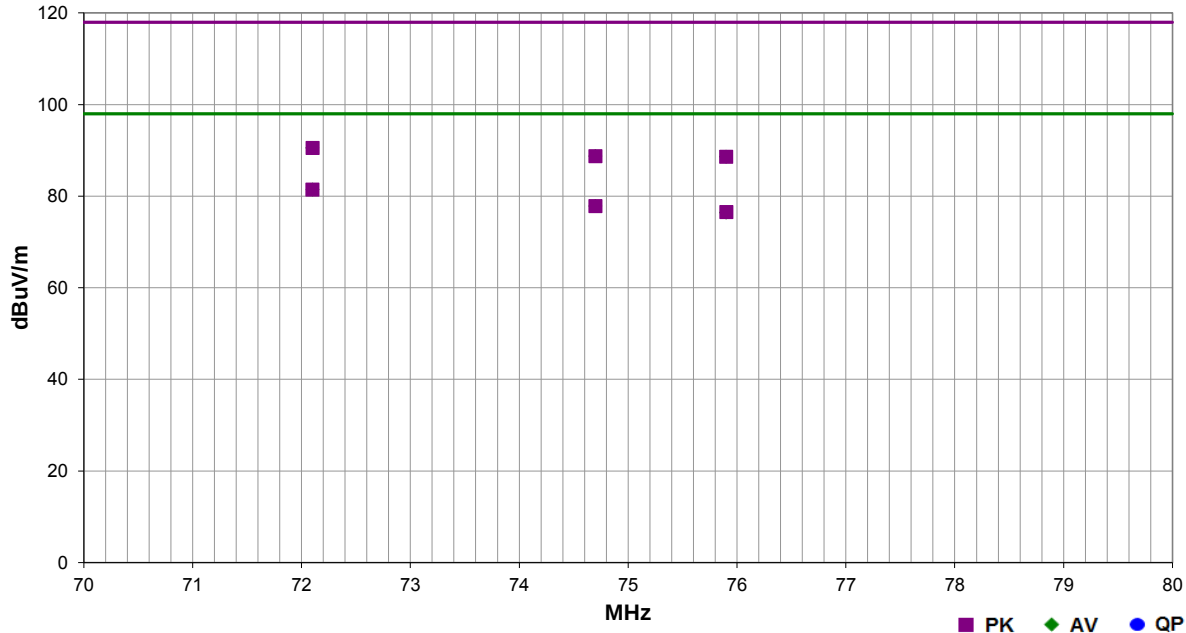


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
75.902	59.3	12.0	1.0	135.0	3.0	20.0	Vert	AV	0.0	91.3	98.0	-6.7	High channel
74.700	57.6	12.0	1.0	130.1	3.0	20.0	Vert	AV	0.0	89.6	98.0	-8.4	Mid channel
72.102	53.7	12.2	1.1	134.1	3.0	20.0	Vert	AV	0.0	85.9	98.0	-12.1	Low channel
75.898	49.4	12.0	3.9	79.0	3.0	20.0	Horz	AV	0.0	81.4	98.0	-16.6	High channel
72.102	46.9	12.2	3.8	91.1	3.0	20.0	Horz	AV	0.0	79.1	98.0	-18.9	Low channel
74.702	47.0	12.0	1.0	96.0	3.0	20.0	Horz	AV	0.0	79.0	98.0	-19.0	Mid channel
75.900	59.4	12.0	1.0	135.0	3.0	20.0	Vert	PK	0.0	91.4	118.0	-26.6	High channel
74.700	57.7	12.0	1.0	130.1	3.0	20.0	Vert	PK	0.0	89.7	118.0	-28.3	Mid channel
72.098	53.8	12.2	1.1	134.1	3.0	20.0	Vert	PK	0.0	86.0	118.0	-32.0	Low channel
75.900	49.5	12.0	3.9	79.0	3.0	20.0	Horz	PK	0.0	81.5	118.0	-36.5	High channel
72.097	47.1	12.2	3.8	91.1	3.0	20.0	Horz	PK	0.0	79.3	118.0	-38.7	Low channel
74.700	47.2	12.0	1.0	96.0	3.0	20.0	Horz	PK	0.0	79.2	118.0	-38.8	Mid channel

Work Order:	WILM0007	Date:	07/21/15	
Project:	None	Temperature:	23.1 °C	
Job Site:	MN05	Humidity:	50.3% RH	
Serial Number:	D2	Barometric Pres.:	985 mbar	
EUT:	T27			
Configuration:	5			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel) unmodulated			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.			

Test Specifications	Test Method
FCC 15.237:2016	ANSI C63.10:2013

Run #	19	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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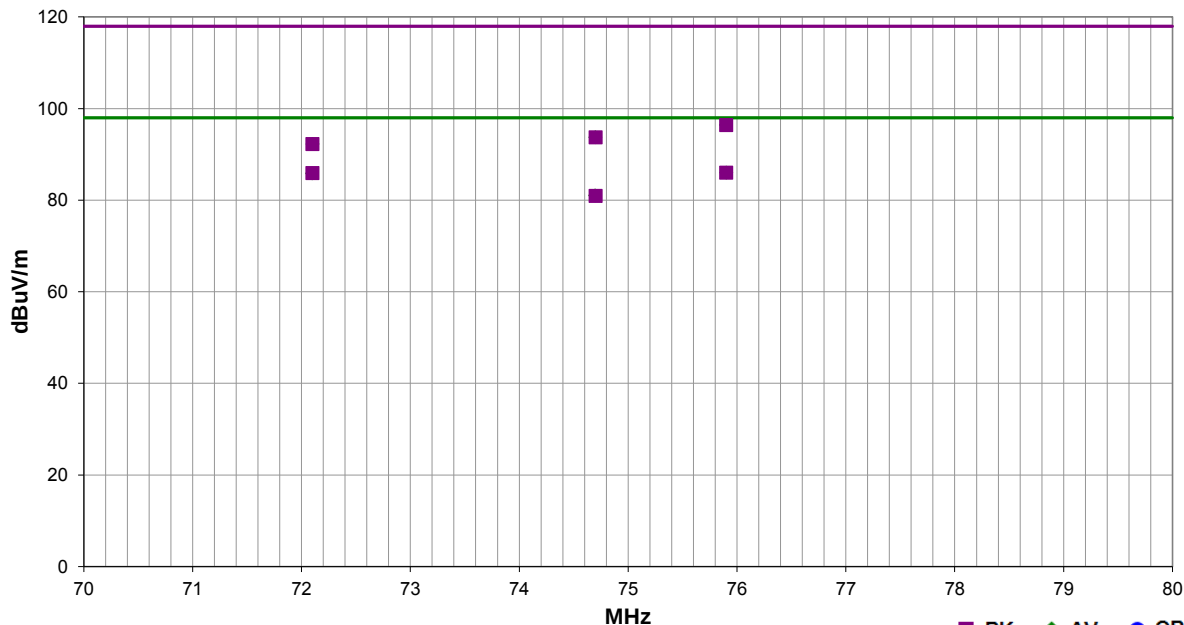


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
72.100	80.0	-9.5	1.1	0.0	3.0	20.0	Vert	AV	0.0	90.5	98.0	-7.5	Low channel
74.700	78.4	-9.7	1.0	0.0	3.0	20.0	Vert	AV	0.0	88.7	98.0	-9.3	Mid channel
75.900	78.3	-9.7	1.0	360.0	3.0	20.0	Vert	AV	0.0	88.6	98.0	-9.4	High channel
72.102	70.9	-9.5	3.8	153.0	3.0	20.0	Horz	AV	0.0	81.4	98.0	-16.6	Low channel
74.700	67.5	-9.7	2.0	178.1	3.0	20.0	Horz	AV	0.0	77.8	98.0	-20.2	Mid channel
75.900	66.1	-9.7	2.1	191.1	3.0	20.0	Horz	AV	0.0	76.4	98.0	-21.6	High channel
72.102	80.0	-9.5	1.1	0.0	3.0	20.0	Vert	PK	0.0	90.5	118.0	-27.5	Low channel
74.700	78.4	-9.7	1.0	0.0	3.0	20.0	Vert	PK	0.0	88.7	118.0	-29.3	Mid channel
75.900	78.3	-9.7	1.0	360.0	3.0	20.0	Vert	PK	0.0	88.6	118.0	-29.4	High channel
72.100	70.9	-9.5	3.8	153.0	3.0	20.0	Horz	PK	0.0	81.4	118.0	-36.6	Low channel
74.700	67.5	-9.7	2.0	178.1	3.0	20.0	Horz	PK	0.0	77.8	118.0	-40.2	Mid channel
75.902	66.2	-9.7	2.1	191.1	3.0	20.0	Horz	PK	0.0	76.5	118.0	-41.5	High channel

Work Order:	WILM0007	Date:	07/21/15	
Project:	None	Temperature:	23.1 °C	
Job Site:	MN05	Humidity:	50.3% RH	
Serial Number:	D2	Barometric Pres.:	985 mbar	
EUT:	T27			
Configuration:	7			
Customer:	Williams Sound, LLC			
Attendees:	Butch Herrington			
EUT Power:	110VAC/60Hz			
Operating Mode:	Transmitting 72.1 MHz (low channel), 74.7 MHz (mid channel), and 75.9 MHz (high channel) unmodulated			
Deviations:	None			
Comments:	Per manufacturer, EUT antenna will always be mounted in vertical position. Coax port is only populated when external antenna is used.			

Test Specifications	Test Method
FCC 15.237:2016	ANSI C63.10:2013

Run #	27	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
75.900	86.1	-9.7	1.0	360.0	3.0	20.0	Vert	AV	0.0	96.4	98.0	-1.6	High channel
74.700	83.4	-9.7	1.0	360.0	3.0	20.0	Vert	AV	0.0	93.7	98.0	-4.3	Mid channel
72.102	81.7	-9.5	1.4	360.0	3.0	20.0	Vert	AV	0.0	92.2	98.0	-5.8	Low channel
75.902	75.7	-9.7	4.0	282.9	3.0	20.0	Horz	AV	0.0	86.0	98.0	-12.0	High channel
72.098	75.3	-9.5	3.7	329.9	3.0	20.0	Horz	AV	0.0	85.8	98.0	-12.2	Low channel
74.698	70.7	-9.7	4.0	279.9	3.0	20.0	Horz	AV	0.0	81.0	98.0	-17.0	Mid channel
75.900	86.1	-9.7	1.0	360.0	3.0	20.0	Vert	PK	0.0	96.4	118.0	-21.6	High channel
74.702	83.4	-9.7	1.0	360.0	3.0	20.0	Vert	PK	0.0	93.7	118.0	-24.3	Mid channel
72.100	81.7	-9.5	1.4	360.0	3.0	20.0	Vert	PK	0.0	92.2	118.0	-25.8	Low channel
75.900	75.7	-9.7	4.0	282.9	3.0	20.0	Horz	PK	0.0	86.0	118.0	-32.0	High channel
72.100	75.4	-9.5	3.7	329.9	3.0	20.0	Horz	PK	0.0	85.9	118.0	-32.1	Low channel
74.702	70.6	-9.7	4.0	279.9	3.0	20.0	Horz	PK	0.0	80.9	118.0	-37.1	Mid channel