



Williams Sound, LLC

FM T55C

FCC 15.237:2022

FM Transmitter Radio

Report: WILM0087.1 Rev. 1, Issue Date: August 25, 2022



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CERTIFICATE OF TEST



Last Date of Test: July 18, 2022
Williams Sound, LLC
EUT: FM T55C

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2022	ANSI C63.10:2013
FCC 15.237:2022	ANSI C63.10:2013

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Duty Cycle	N/A	15.207	7.5	Not required assuming the devices uses 100% duty cycle
Field strength of Harmonics and Spurious Radiated Emissions	Pass	15.237(c)	6.5, 6.6	
Field Strength of Fundamental	Pass	15.237(c)	6.6	
Occupied Bandwidth (20 dB)	Pass	15.237(b)	6.9	
Powerline Conducted Emissions	Pass	15.207	6.2	

Deviations From Test Standards

A reduced Resolution Bandwidth was used for measurements at the edge of the allowed band based on ~1% of the measured emissions bandwidth. Using the prescribed CISPR RBW (30 kHz) to measure this narrow signal near the edge of the allowed band, you see the shoulders of the filter (essentially the filter response) and not the actual signal to be measured. This path was confirmed via FCC enquiry.

Approved By:

Kyle McMullan, Department 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. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Type of modulation used for testing added. Their device has a limiter in line that limits the possible modulation, this is added to product desc.	2022-08-25	10, 16, 22, 38-38

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 - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

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

Korea

MSIT / 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:

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FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 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 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



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 QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. 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	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 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)	3.2 dB	-3.2 dB

TEST SETUP BLOCK DIAGRAMS

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

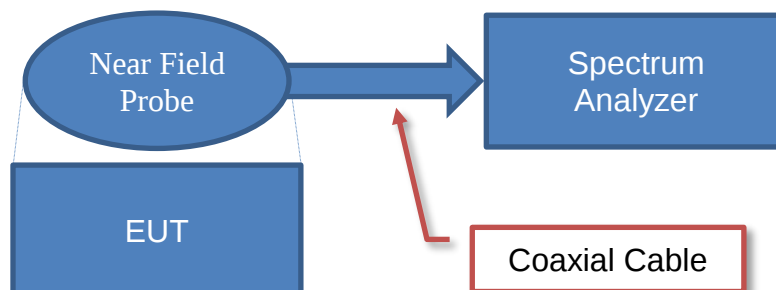
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

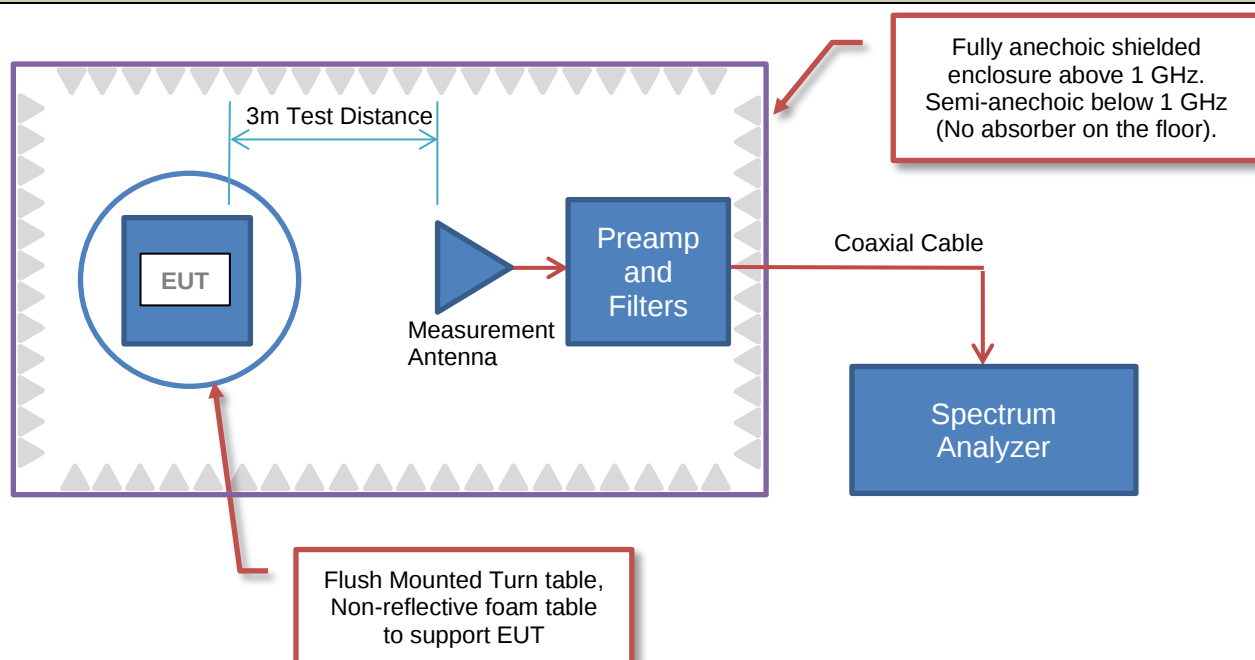


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)	Factor			Distance Adjustment Factor	External Attenuation	Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain			
42.6	28.6	3.1	40.8	0.0	0.0	33.5

Conducted Emissions:

Measured Level (Amplitude)	Factor		External Attenuation	Adjusted Level
	Transducer Factor	Cable Factor		
26.7	0.3	0.1	20.0	47.1

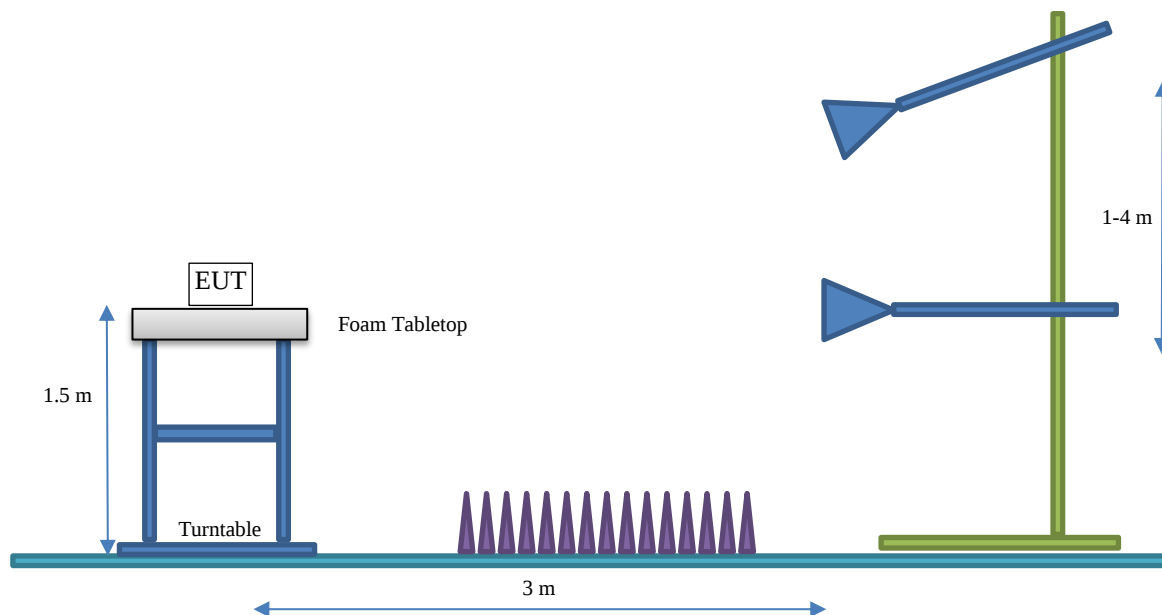
Radiated Power (ERP/EIRP):

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



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:	Jacob Lewis
EUT:	FM T55C
First Date of Test:	June 2, 2022
Last Date of Test:	July 18, 2022
Receipt Date of Samples:	June 2, 2022
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The FM T55C is an FM transmitter operating at 72-76 MHz (Assistive Listening Band) with wired networking capabilities (an Ethernet jack). It takes audio from either an analog or digital input (Dante audio over Ethernet). The modulation is limited to prevent deviation outside of +/- 75 kHz. Target markets: US, CA.

Testing Objective:

Seeking to demonstrate compliance under FCC 15.237 for operation in the 72.0-73.0, 74.6-74.8, 75.2-76.0 MHz bands.

CONFIGURATIONS



Configuration WILM0087- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
72-76 MHz FM Transmitter	Williams Sound, LLC	FM T55C	00001

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
22 ft coaxial antenna	Williams AV	ANT 005	N/A

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Surge Protector	Triplite	AGIB6946	IB7950
Cisco Router	Cisco	RV130	CCQ223006GC
POE Injector	Intellinet	560566	P302017056C00142
Audio DSP	Symetrix	Prism 4x4	80-0114ANA1716218
MP3 Player	Generic	AGPTEK	N/A
AC Adapter (Router)	DVE	DSA-24PFM-12 FUS	LU1622003288
AC Adapter (EUT)	GlobTek	GT-46240-2424-T3	N/A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable (72-76 MHz FM Transmitter)	No	1.5 m	No	AC Adapter (72-76 MHz FM Transmitter)	AC Mains
DC Cable (72-76 MHz FM Transmitter)	No	1.5 m	Yes	AC Adapter (72-76 MHz FM Transmitter)	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	Cisco Router	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	Audio DSP	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	POE Injector	Audio DSP
AC Cable (Router)	No	2 m	No	Cisco Router	Surge Protector
AC Cable (Surge Protector)	No	2 m	No	Surge Protector	AC Mains
AC Cable	No	1.5 m	No	POE Injector	Surge Protector
Audio 3.5 mm Cable	No	0.4 m	No	MP3 Player	Audio DSP
USB Cable	No	0.1 m	No	MP3 Player	Cisco Router
Analog Audio Cable	No	1.5 m	No	72-76 MHz FM Transmitter	Audio DSP

CONFIGURATIONS



Configuration WILM0087- 4

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
72-76 MHz FM Transmitter	Williams Sound, LLC	FM T55C	00001

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
39 inch Collapsible Whip	Williams AV	ANT 025	N/A

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Surge Protector	Triplite	AGIB6946	IB7950
Cisco Router	Cisco	RV130	CCQ223006GC
POE Injector	Intellinet	560566	P302017056C00142
Audio DSP	Symetrix	Prism 4x4	80-0114ANA1716218
MP3 Player	Generic	AGPTEK	N/A
AC Adapter (Router)	DVE	DSA-24PFM-12 FUS	LU1622003288
AC Adapter (EUT)	GlobTek	GT-46240-2424-T3	N/A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable (72-76 MHz FM Transmitter)	No	1.5 m	No	AC Adapter (72-76 MHz FM Transmitter)	AC Mains
DC Cable (72-76 MHz FM Transmitter)	No	1.5 m	Yes	AC Adapter (72-76 MHz FM Transmitter)	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	Cisco Router	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	Audio DSP	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	POE Injector	Audio DSP
AC Cable (Router)	No	2 m	No	Cisco Router	Surge Protector
AC Cable (Surge Protector)	No	2 m	No	Surge Protector	AC Mains
AC Cable	No	1.5 m	No	POE Injector	Surge Protector
Audio 3.5 mm Cable	No	0.4 m	No	MP3 Player	Audio DSP
USB Cable	No	0.1 m	No	MP3 Player	Cisco Router
Analog Audio Cable	No	1.5 m	No	72-76 MHz FM Transmitter	Audio DSP

CONFIGURATIONS



Configuration WILM0087- 5

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
72-76 MHz FM Transmitter	Williams Sound, LLC	FM T55C	00001

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
75/50 Ohm Balun	Mini-Circuits	15542	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Surge Protector	Triplite	AGIB6946	IB7950
Cisco Router	Cisco	RV130	CCQ223006GC
POE Injector	Intellinet	560566	P302017056C00142
Audio DSP	Symetrix	Prism 4x4	80-0114ANA1716218
MP3 Player	Generic	AGPTEK	N/A
AC Adapter (Router)	DVE	DSA-24PFM-12 FUS	LU1622003288
AC Adapter (EUT)	GlobTek	GT-46240-2424-T3	N/A

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable (72-76 MHz FM Transmitter)	No	1.5 m	No	AC Adapter (72-76 MHz FM Transmitter)	AC Mains
DC Cable (72-76 MHz FM Transmitter)	No	1.5 m	Yes	AC Adapter (72-76 MHz FM Transmitter)	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	Cisco Router	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	Audio DSP	72-76 MHz FM Transmitter
Ethernet Cable	No	2 m	No	POE Injector	Audio DSP
AC Cable (Router)	No	2 m	No	Cisco Router	Surge Protector
AC Cable (Surge Protector)	No	2 m	No	Surge Protector	AC Mains
AC Cable	No	1.5 m	No	POE Injector	Surge Protector
Audio 3.5 mm Cable	No	0.4 m	No	MP3 Player	Audio DSP
USB Cable	No	0.1 m	No	MP3 Player	Cisco Router
Analog Audio Cable	No	1.5 m	No	72-76 MHz FM Transmitter	Audio DSP

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-06-08	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-07-05	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2022-07-18	Field Strength of Harmonics and Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2022-08-23	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Dipole	Williams Sound, LLC	70-80	2.4
Collapsible Whip	Williams Sound, LLC	70-80	2.4

The EUT was tested using the power settings provided by the manufacturer which were based upon:

- ☒ Test software settings Test software/firmware installed on EUT: Drop 0.0.10
- ☐ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Band (MHz)	Position (if multiple channels)	Power Setting
Single Data Rate / Modulation	72-73	Low Channel	Full Power
		Mid Channel	Full Power
		High Channel	Full Power
Single Data Rate / Modulation	74.6-74.8	Low Channel	Full Power
		Mid Channel	Full Power
		High Channel	Full Power
Single Data Rate / Modulation	75.2-76	Low Channel	Full Power
		Mid Channel	Full Power
		High Channel	Full Power

POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Gauss Instruments	TDEMI 30M	ARS	2022-04-20	2023-04-20
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2022-04-04	2023-04-04
Filter - High Pass	TTE	H97-100K-50-720B	HGN	NCR	NCR
LISN	Solar Electronics	9252-50-R-24-BNC	LIO	2021-09-26	2022-09-26
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2022-03-07	2023-03-07

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

WILM0087-4

MODES INVESTIGATED

Normal Mode, wavecast on, FM transmitting on, high band mid channel 15 (75.6 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

Normal Mode, wavecast on, FM transmitting on, low band mid channel 9 (72.5 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

Normal Mode, wavecast on, FM transmitting on, mid band mid channel 5 (74.7 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

POWERLINE CONDUCTED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-08-23
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Jacob Lewis	Relative Humidity:	57.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification: Equipment Class B	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	34	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

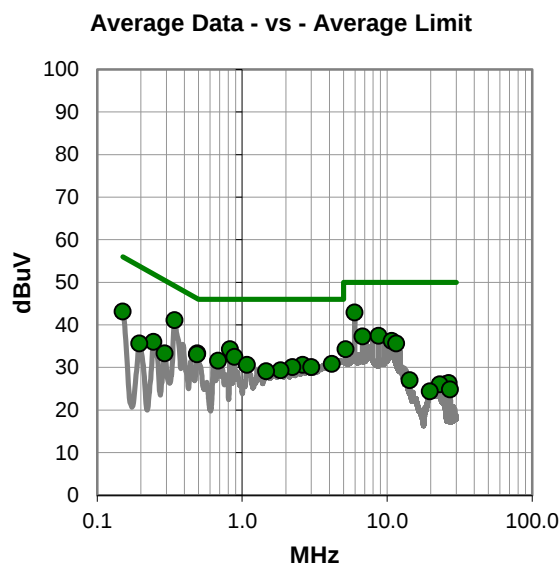
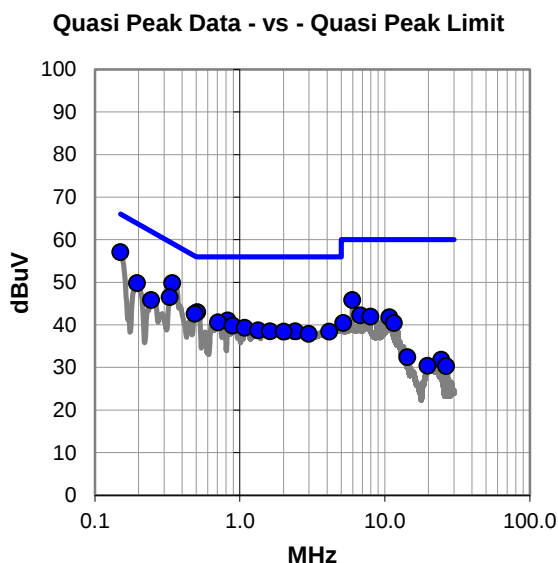
Dante audio through router

EUT OPERATING MODES

Normal Mode, wavecast on, FM transmitting on, mid band mid channel 5 (74.7 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #34

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	36.4	20.7	57.1	66.0	-8.9
0.342	29.5	20.3	49.8	59.1	-9.3
0.329	26.2	20.3	46.5	59.5	-13.0
0.507	22.7	20.3	43.0	56.0	-13.0
0.489	22.3	20.3	42.6	56.2	-13.6
0.196	29.3	20.5	49.8	63.8	-14.0
5.969	25.2	20.6	45.8	60.0	-14.2
0.824	20.8	20.2	41.0	56.0	-15.0
0.708	20.3	20.3	40.6	56.0	-15.4
0.245	25.4	20.4	45.8	61.9	-16.1
0.888	19.6	20.2	39.8	56.0	-16.2
1.079	19.1	20.2	39.3	56.0	-16.7
1.334	18.5	20.2	38.7	56.0	-17.3
1.616	18.2	20.3	38.5	56.0	-17.5
2.416	18.1	20.4	38.5	56.0	-17.5
2.008	18.1	20.3	38.4	56.0	-17.6
4.138	17.9	20.5	38.4	56.0	-17.6
6.766	21.5	20.7	42.2	60.0	-17.8
2.985	17.5	20.4	37.9	56.0	-18.1
7.958	21.0	20.9	41.9	60.0	-18.1
10.744	20.5	21.3	41.8	60.0	-18.2
5.174	19.8	20.6	40.4	60.0	-19.6
11.540	19.0	21.4	40.4	60.0	-19.6
14.326	10.9	21.5	32.4	60.0	-27.6
24.587	9.8	22.0	31.8	60.0	-28.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
5.969	22.3	20.6	42.9	50.0	-7.1
0.342	20.8	20.3	41.1	49.1	-8.0
0.824	14.1	20.2	34.3	46.0	-11.7
8.754	16.4	21.0	37.4	50.0	-12.6
6.764	16.6	20.7	37.3	50.0	-12.7
0.150	22.4	20.7	43.1	56.0	-12.9
0.490	13.0	20.3	33.3	46.2	-12.9
0.489	12.8	20.3	33.1	46.2	-13.1
0.887	12.3	20.2	32.5	46.0	-13.5
10.744	14.9	21.3	36.2	50.0	-13.8
0.683	11.3	20.3	31.6	46.0	-14.4
11.540	14.2	21.4	35.6	50.0	-14.4
4.154	10.3	20.5	30.8	46.0	-15.2
1.078	10.4	20.2	30.6	46.0	-15.4
2.611	10.2	20.4	30.6	46.0	-15.4
5.173	13.7	20.6	34.3	50.0	-15.7
0.245	15.6	20.4	36.0	51.9	-15.9
2.221	9.8	20.3	30.1	46.0	-15.9
3.000	9.7	20.4	30.1	46.0	-15.9
1.838	9.0	20.3	29.3	46.0	-16.7
1.467	8.8	20.3	29.1	46.0	-16.9
0.292	13.0	20.3	33.3	50.5	-17.2
0.196	15.1	20.5	35.6	53.8	-18.2
14.325	5.5	21.5	27.0	50.0	-23.0
26.609	4.1	22.2	26.3	50.0	-23.7

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-08-23
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Jacob Lewis	Relative Humidity:	57.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification: Equipment Class B	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	35	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

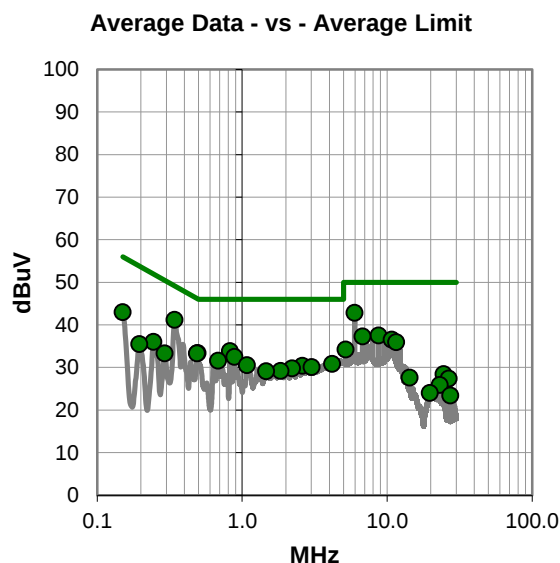
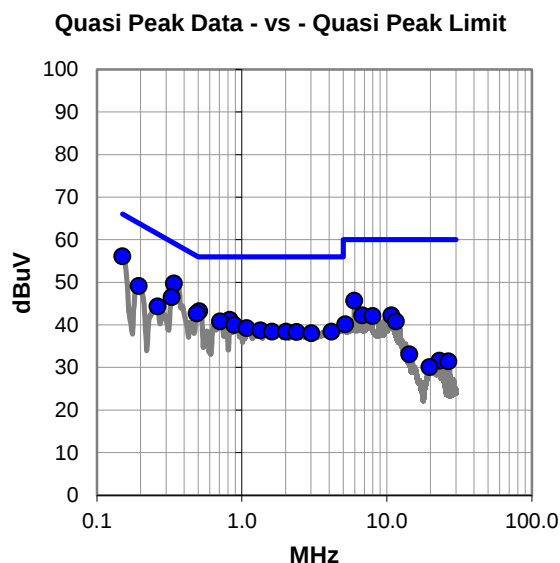
Dante audio through router

EUT OPERATING MODES

Normal Mode, wavecast on, FM transmitting on, mid band mid channel 5 (74.7 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #35

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.341	29.4	20.3	49.7	59.2	-9.5
0.150	35.4	20.7	56.1	66.0	-9.9
0.509	22.9	20.3	43.2	56.0	-12.8
0.329	26.2	20.3	46.5	59.5	-13.0
0.489	22.4	20.3	42.7	56.2	-13.5
5.969	25.1	20.6	45.7	60.0	-14.3
0.194	28.6	20.5	49.1	63.9	-14.8
0.824	21.0	20.2	41.2	56.0	-14.8
0.708	20.5	20.3	40.8	56.0	-15.2
0.887	19.8	20.2	40.0	56.0	-16.0
1.078	19.0	20.2	39.2	56.0	-16.8
0.263	24.0	20.3	44.3	61.3	-17.0
1.343	18.5	20.2	38.7	56.0	-17.3
1.616	18.1	20.3	38.4	56.0	-17.6
2.018	18.1	20.3	38.4	56.0	-17.6
4.163	17.9	20.5	38.4	56.0	-17.6
2.387	17.9	20.4	38.3	56.0	-17.7
6.764	21.5	20.7	42.2	60.0	-17.8
10.744	20.9	21.3	42.2	60.0	-17.8
7.959	21.2	20.9	42.1	60.0	-17.9
3.020	17.6	20.4	38.0	56.0	-18.0
11.540	19.4	21.4	40.8	60.0	-19.2
5.171	19.5	20.6	40.1	60.0	-19.9
14.326	11.6	21.5	33.1	60.0	-26.9
23.127	9.7	21.9	31.6	60.0	-28.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
5.969	22.2	20.6	42.8	50.0	-7.2
0.342	20.9	20.3	41.2	49.1	-7.9
0.824	13.6	20.2	33.8	46.0	-12.2
8.754	16.5	21.0	37.5	50.0	-12.5
6.764	16.6	20.7	37.3	50.0	-12.7
0.492	13.1	20.3	33.4	46.1	-12.7
0.489	13.0	20.3	33.3	46.2	-12.9
0.150	22.3	20.7	43.0	56.0	-13.0
0.887	12.3	20.2	32.5	46.0	-13.5
10.744	15.2	21.3	36.5	50.0	-13.5
11.540	14.5	21.4	35.9	50.0	-14.1
0.684	11.3	20.3	31.6	46.0	-14.4
4.172	10.3	20.5	30.8	46.0	-15.2
1.078	10.3	20.2	30.5	46.0	-15.5
2.602	10.0	20.4	30.4	46.0	-15.6
5.173	13.6	20.6	34.2	50.0	-15.8
0.245	15.6	20.4	36.0	51.9	-15.9
3.009	9.7	20.4	30.1	46.0	-15.9
2.208	9.5	20.3	29.8	46.0	-16.2
1.838	8.9	20.3	29.2	46.0	-16.8
1.467	8.8	20.3	29.1	46.0	-16.9
0.292	13.0	20.3	33.3	50.5	-17.2
0.196	15.0	20.5	35.5	53.8	-18.3
24.587	6.4	22.0	28.4	50.0	-21.6
14.325	6.1	21.5	27.6	50.0	-22.4

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-08-23
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Jacob Lewis	Relative Humidity:	57.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification: Equipment Class B	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	40	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

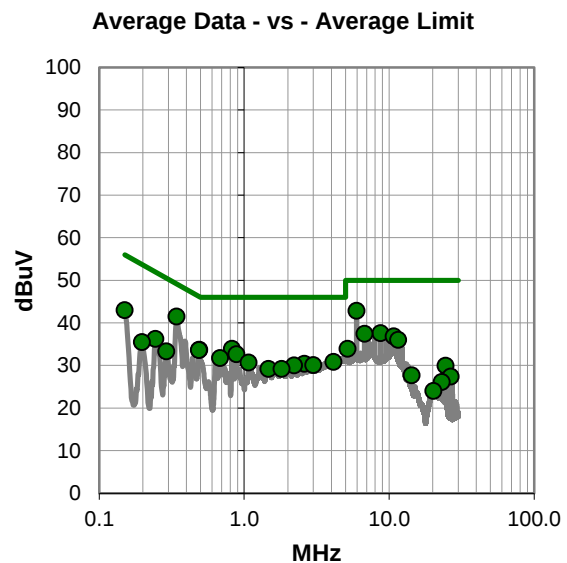
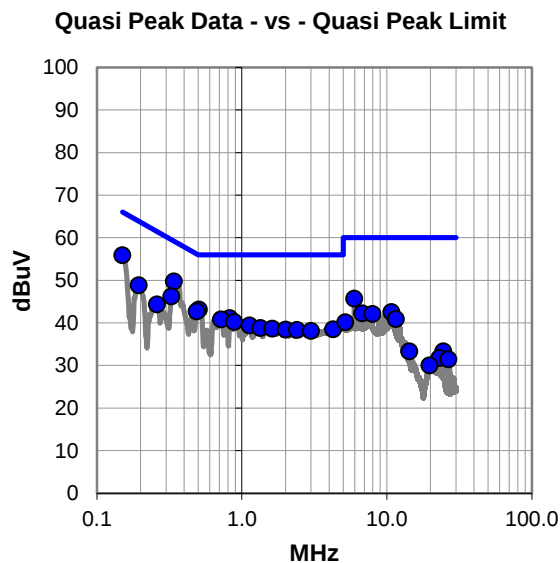
Dante audio through router

EUT OPERATING MODES

Normal Mode, wavecast on, FM transmitting on, low band mid channel 9 (72.5 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #40

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.341	29.4	20.3	49.7	59.2	-9.5
0.150	35.2	20.7	55.9	66.0	-10.1
0.506	22.8	20.3	43.1	56.0	-12.9
0.327	25.9	20.3	46.2	59.5	-13.3
0.489	22.4	20.3	42.7	56.2	-13.5
5.966	25.1	20.6	45.7	60.0	-14.3
0.826	20.9	20.2	41.1	56.0	-14.9
0.194	28.3	20.5	48.8	63.9	-15.1
0.718	20.5	20.3	40.8	56.0	-15.2
0.885	20.0	20.2	40.2	56.0	-15.8
1.133	19.2	20.2	39.4	56.0	-16.6
0.260	24.0	20.3	44.3	61.4	-17.1
1.340	18.6	20.2	38.8	56.0	-17.2
1.619	18.3	20.3	38.6	56.0	-17.4
4.265	18.0	20.5	38.5	56.0	-17.5
10.741	21.2	21.3	42.5	60.0	-17.5
2.011	18.1	20.3	38.4	56.0	-17.6
2.405	17.9	20.4	38.3	56.0	-17.7
6.763	21.5	20.7	42.2	60.0	-17.8
3.000	17.7	20.4	38.1	56.0	-17.9
7.956	21.2	20.9	42.1	60.0	-17.9
11.537	19.5	21.4	40.9	60.0	-19.1
5.171	19.5	20.6	40.1	60.0	-19.9
24.589	11.3	22.0	33.3	60.0	-26.7
14.322	11.8	21.5	33.3	60.0	-26.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
5.968	22.2	20.6	42.8	50.0	-7.2
0.342	21.2	20.3	41.5	49.1	-7.6
0.823	13.7	20.2	33.9	46.0	-12.1
8.752	16.6	21.0	37.6	50.0	-12.4
0.490	13.4	20.3	33.7	46.2	-12.5
6.763	16.7	20.7	37.4	50.0	-12.6
0.489	13.3	20.3	33.6	46.2	-12.6
0.150	22.3	20.7	43.0	56.0	-13.0
10.741	15.5	21.3	36.8	50.0	-13.2
0.885	12.4	20.2	32.6	46.0	-13.4
11.537	14.6	21.4	36.0	50.0	-14.0
0.683	11.4	20.3	31.7	46.0	-14.3
4.143	10.3	20.5	30.8	46.0	-15.2
1.076	10.5	20.2	30.7	46.0	-15.3
2.600	10.0	20.4	30.4	46.0	-15.6
0.245	15.8	20.4	36.2	51.9	-15.7
2.999	9.7	20.4	30.1	46.0	-15.9
2.211	9.7	20.3	30.0	46.0	-16.0
5.171	13.3	20.6	33.9	50.0	-16.1
1.470	8.9	20.3	29.2	46.0	-16.8
1.818	8.9	20.3	29.2	46.0	-16.8
0.290	13.0	20.3	33.3	50.5	-17.2
0.197	15.0	20.5	35.5	53.7	-18.2
24.587	7.9	22.0	29.9	50.0	-20.1
14.322	6.2	21.5	27.7	50.0	-22.3

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-08-23
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Jacob Lewis	Relative Humidity:	57.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification: Equipment Class B	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	41	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

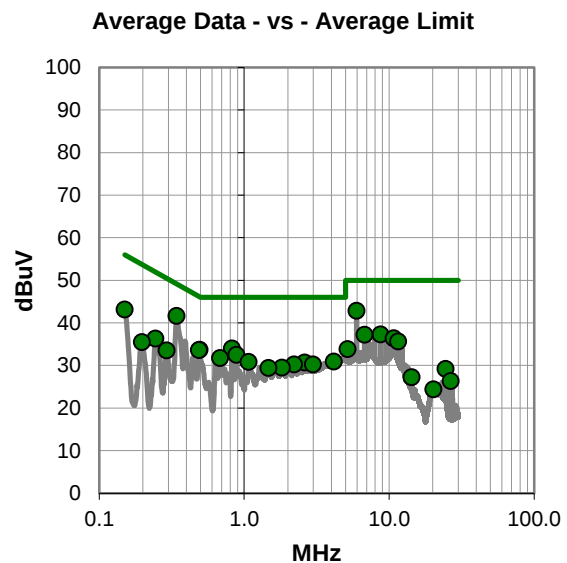
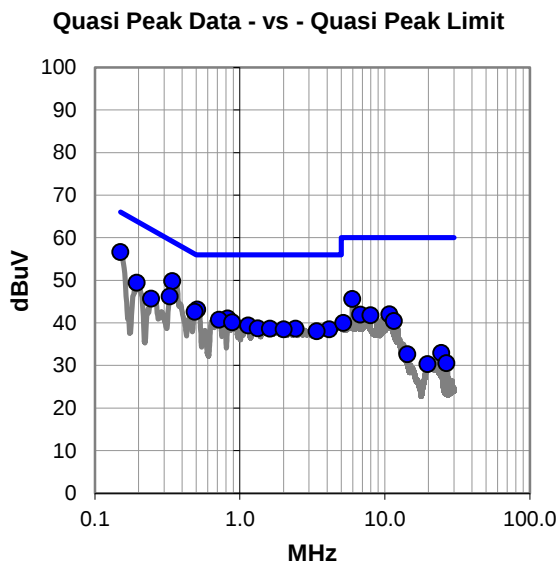
Dante audio through router

EUT OPERATING MODES

Normal Mode, wavecast on, FM transmitting on, low band mid channel 9 (72.5 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #41

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.342	29.5	20.3	49.8	59.1	-9.3
0.150	35.9	20.7	56.6	66.0	-9.4
0.507	22.8	20.3	43.1	56.0	-12.9
0.329	25.9	20.3	46.2	59.5	-13.3
0.489	22.3	20.3	42.6	56.2	-13.6
5.966	25.0	20.6	45.6	60.0	-14.4
0.194	28.9	20.5	49.4	63.9	-14.5
0.823	20.8	20.2	41.0	56.0	-15.0
0.718	20.4	20.3	40.7	56.0	-15.3
0.887	19.9	20.2	40.1	56.0	-15.9
0.245	25.3	20.4	45.7	61.9	-16.2
1.139	19.2	20.2	39.4	56.0	-16.6
1.331	18.5	20.2	38.7	56.0	-17.3
1.616	18.3	20.3	38.6	56.0	-17.4
2.420	18.2	20.4	38.6	56.0	-17.4
2.013	18.2	20.3	38.5	56.0	-17.5
4.146	18.0	20.5	38.5	56.0	-17.5
3.394	17.5	20.5	38.0	56.0	-18.0
10.741	20.7	21.3	42.0	60.0	-18.0
6.763	21.2	20.7	41.9	60.0	-18.1
7.956	20.9	20.9	41.8	60.0	-18.2
11.537	19.0	21.4	40.4	60.0	-19.6
5.170	19.4	20.6	40.0	60.0	-20.0
24.587	10.9	22.0	32.9	60.0	-27.1
14.320	11.1	21.5	32.6	60.0	-27.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
5.966	22.2	20.6	42.8	50.0	-7.2
0.342	21.3	20.3	41.6	49.1	-7.5
0.823	13.8	20.2	34.0	46.0	-12.0
0.492	13.4	20.3	33.7	46.1	-12.4
0.489	13.3	20.3	33.6	46.2	-12.6
8.751	16.3	21.0	37.3	50.0	-12.7
6.763	16.5	20.7	37.2	50.0	-12.8
0.150	22.4	20.7	43.1	56.0	-12.9
0.885	12.3	20.2	32.5	46.0	-13.5
10.741	15.1	21.3	36.4	50.0	-13.6
0.683	11.4	20.3	31.7	46.0	-14.3
11.536	14.2	21.4	35.6	50.0	-14.4
4.149	10.4	20.5	30.9	46.0	-15.1
1.076	10.6	20.2	30.8	46.0	-15.2
2.614	10.3	20.4	30.7	46.0	-15.3
0.245	15.9	20.4	36.3	51.9	-15.6
2.216	9.9	20.3	30.2	46.0	-15.8
2.993	9.8	20.4	30.2	46.0	-15.8
5.171	13.2	20.6	33.8	50.0	-16.2
1.827	9.2	20.3	29.5	46.0	-16.5
1.470	9.1	20.3	29.4	46.0	-16.6
0.292	13.2	20.3	33.5	50.5	-17.0
0.197	15.0	20.5	35.5	53.7	-18.2
24.587	7.2	22.0	29.2	50.0	-20.8
14.320	5.7	21.5	27.2	50.0	-22.8

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-08-23
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Jacob Lewis	Relative Humidity:	57.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification: Equipment Class B	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	42	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

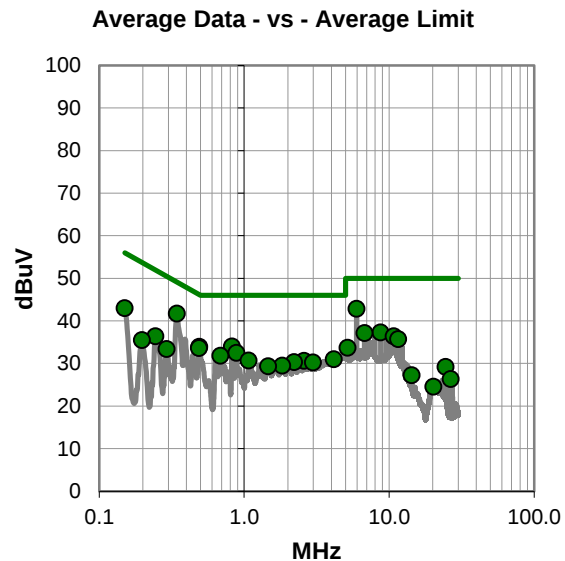
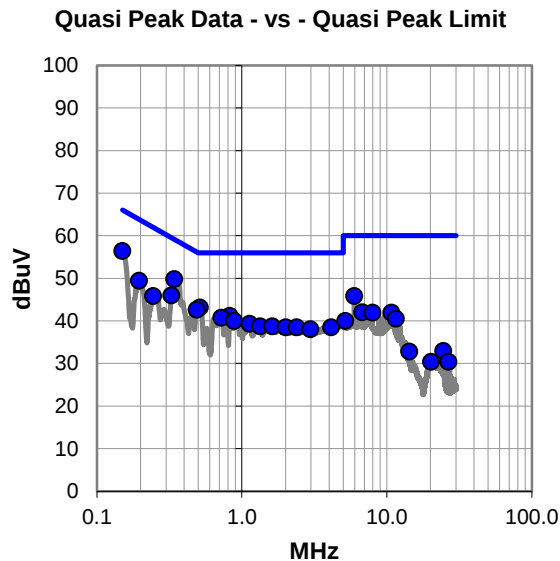
Dante audio through router

EUT OPERATING MODES

Normal Mode, wavecass on, FM transmitting on, high band mid channel 15 (75.6 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #42

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.342	29.5	20.3	49.8	59.1	-9.3
0.150	35.7	20.7	56.4	66.0	-9.6
0.515	22.8	20.3	43.1	56.0	-12.9
0.327	25.7	20.3	46.0	59.5	-13.5
0.489	22.3	20.3	42.6	56.2	-13.6
5.966	25.2	20.6	45.8	60.0	-14.2
0.196	28.9	20.5	49.4	63.8	-14.4
0.824	21.0	20.2	41.2	56.0	-14.8
0.721	20.4	20.3	40.7	56.0	-15.3
0.885	19.8	20.2	40.0	56.0	-16.0
0.245	25.4	20.4	45.8	61.9	-16.1
1.133	19.1	20.2	39.3	56.0	-16.7
1.334	18.5	20.2	38.7	56.0	-17.3
1.618	18.4	20.3	38.7	56.0	-17.3
2.008	18.2	20.3	38.5	56.0	-17.5
2.393	18.1	20.4	38.5	56.0	-17.5
4.131	18.0	20.5	38.5	56.0	-17.5
2.974	17.6	20.4	38.0	56.0	-18.0
6.761	21.3	20.7	42.0	60.0	-18.0
7.956	21.0	20.9	41.9	60.0	-18.1
10.739	20.6	21.3	41.9	60.0	-18.1
11.534	19.1	21.4	40.5	60.0	-19.5
5.171	19.4	20.6	40.0	60.0	-20.0
24.587	10.9	22.0	32.9	60.0	-27.1
14.320	11.3	21.5	32.8	60.0	-27.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
5.966	22.2	20.6	42.8	50.0	-7.2
0.344	21.4	20.3	41.7	49.1	-7.4
0.823	13.8	20.2	34.0	46.0	-12.0
0.490	13.6	20.3	33.9	46.2	-12.3
0.489	13.3	20.3	33.6	46.2	-12.6
8.751	16.3	21.0	37.3	50.0	-12.7
6.761	16.4	20.7	37.1	50.0	-12.9
0.150	22.3	20.7	43.0	56.0	-13.0
0.885	12.3	20.2	32.5	46.0	-13.5
10.739	15.1	21.3	36.4	50.0	-13.6
0.687	11.5	20.3	31.8	46.0	-14.2
11.536	14.3	21.4	35.7	50.0	-14.3
4.163	10.5	20.5	31.0	46.0	-15.0
1.076	10.5	20.2	30.7	46.0	-15.3
2.596	10.2	20.4	30.6	46.0	-15.4
0.245	16.0	20.4	36.4	51.9	-15.5
2.211	10.0	20.3	30.3	46.0	-15.7
2.990	9.8	20.4	30.2	46.0	-15.8
5.171	13.1	20.6	33.7	50.0	-16.3
1.828	9.2	20.3	29.5	46.0	-16.5
1.468	9.0	20.3	29.3	46.0	-16.7
0.292	13.1	20.3	33.4	50.5	-17.1
0.197	15.0	20.5	35.5	53.7	-18.2
24.587	7.2	22.0	29.2	50.0	-20.8
14.320	5.7	21.5	27.2	50.0	-22.8

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-08-23
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Jacob Lewis	Relative Humidity:	57.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification: Equipment Class B	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	43	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

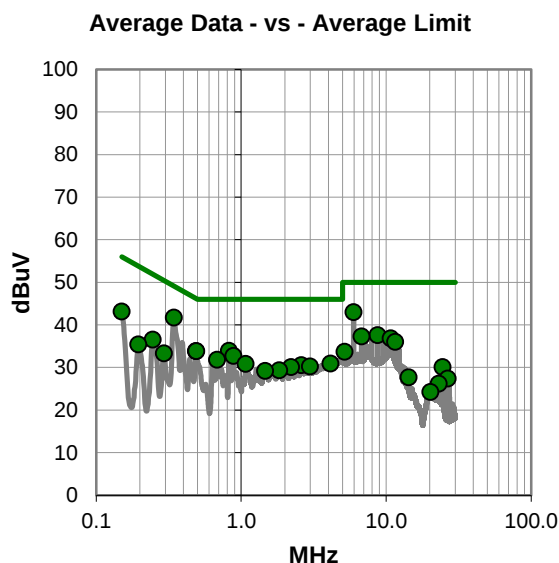
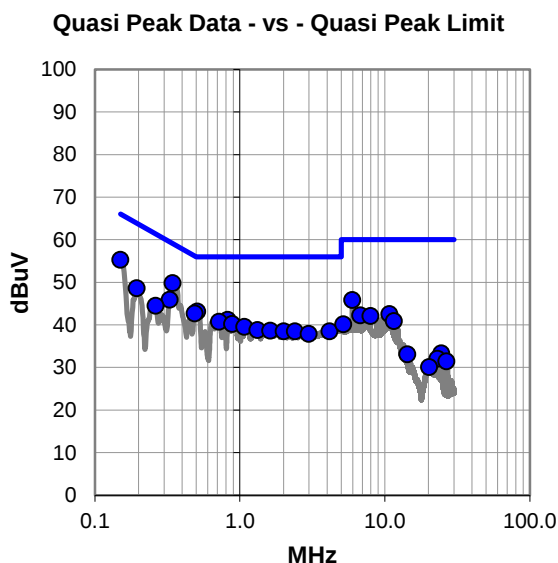
Dante audio through router

EUT OPERATING MODES

Normal Mode, wavecast on, FM transmitting on, high band mid channel 15 (75.6 MHz) mod max power. MP3 player indirectly connected via audio DSP. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #43

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.344	29.5	20.3	49.8	59.1	-9.3
0.150	34.6	20.7	55.3	66.0	-10.7
0.509	22.8	20.3	43.1	56.0	-12.9
0.489	22.4	20.3	42.7	56.2	-13.5
0.329	25.6	20.3	45.9	59.5	-13.6
5.966	25.2	20.6	45.8	60.0	-14.2
0.824	21.0	20.2	41.2	56.0	-14.8
0.194	28.1	20.5	48.6	63.9	-15.3
0.719	20.4	20.3	40.7	56.0	-15.3
0.887	20.0	20.2	40.2	56.0	-15.8
1.076	19.3	20.2	39.5	56.0	-16.5
0.263	24.2	20.3	44.5	61.3	-16.8
1.323	18.6	20.2	38.8	56.0	-17.2
1.622	18.3	20.3	38.6	56.0	-17.4
2.010	18.2	20.3	38.5	56.0	-17.5
2.399	18.1	20.4	38.5	56.0	-17.5
4.149	18.0	20.5	38.5	56.0	-17.5
10.739	21.2	21.3	42.5	60.0	-17.5
6.761	21.5	20.7	42.2	60.0	-17.8
7.954	21.2	20.9	42.1	60.0	-17.9
2.980	17.5	20.4	37.9	56.0	-18.1
11.534	19.5	21.4	40.9	60.0	-19.1
5.171	19.5	20.6	40.1	60.0	-19.9
24.587	11.3	22.0	33.3	60.0	-26.7
14.320	11.6	21.5	33.1	60.0	-26.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
5.966	22.4	20.6	43.0	50.0	-7.0
0.344	21.4	20.3	41.7	49.1	-7.4
0.823	13.7	20.2	33.9	46.0	-12.1
8.751	16.6	21.0	37.6	50.0	-12.4
0.489	13.5	20.3	33.8	46.2	-12.4
0.490	13.5	20.3	33.8	46.2	-12.4
6.761	16.6	20.7	37.3	50.0	-12.7
0.150	22.4	20.7	43.1	56.0	-12.9
10.739	15.5	21.3	36.8	50.0	-13.2
0.885	12.5	20.2	32.7	46.0	-13.3
11.536	14.6	21.4	36.0	50.0	-14.0
0.683	11.5	20.3	31.8	46.0	-14.2
4.143	10.4	20.5	30.9	46.0	-15.1
1.076	10.6	20.2	30.8	46.0	-15.2
0.246	16.1	20.4	36.5	51.9	-15.4
2.600	10.1	20.4	30.5	46.0	-15.5
2.983	9.8	20.4	30.2	46.0	-15.8
2.214	9.8	20.3	30.1	46.0	-15.9
5.171	13.1	20.6	33.7	50.0	-16.3
1.828	9.0	20.3	29.3	46.0	-16.7
1.465	8.9	20.3	29.2	46.0	-16.8
0.293	13.0	20.3	33.3	50.4	-17.1
0.196	14.9	20.5	35.4	53.8	-18.4
24.587	8.1	22.0	30.1	50.0	-19.9
14.320	6.2	21.5	27.7	50.0	-22.3

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS



TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level was detected. This required the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search was utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT. Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance was 3 meters or 10 meters (from antenna to boundary of EUT). At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna was increased so that the lowest point of the bottom of the antenna cleared the ground surface by at least 25 cm.

The EUT arrangement is configured as equivalent to that occurring in normal use. Tabletop equipment is placed on a 0.8 meter high non-conductive table & for Floor-standing equipment, it is placed on, but insulated from a ground reference plane by the use of its own rollers or stand-off supports. If measurements above 1 GHz were required, the test setup was modified to meet the regulatory requirements for higher frequency measurements. If required, RF absorber was placed on the floor between the measurement antenna and EUT. If required, per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables.

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.

The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2022-01-24	2023-01-24
Cable	Element	Biconilog Cable	MNX	2022-01-24	2023-01-24
Antenna - Biconilog	Ametek	CBL 6141B	AYS	2021-03-09	2023-03-09
Filter - High Pass	Mini Circuits	BHP-150+	HIA	2021-10-21	2022-10-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2022-05-18	2023-05-18
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079 and SA18E-10	AOO	2022-01-24	2023-01-24
Cable	Element	Biconilog Cable	MNX	2022-01-24	2023-01-24
Antenna - Biconilog	Ametek	CBL 6141B	AYS	2021-03-09	2023-03-09
Filter - High Pass	Mini Circuits	BHP-150+	HIA	2021-10-21	2022-10-21
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	2022-05-18	2023-05-18

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	4.7 dB	-4.7 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 1000 MHz

POWER INVESTIGATED

120VAC/60Hz

CONFIGURATIONS INVESTIGATED

WILM0087-3
WILM0087-4

MODES INVESTIGATED

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/-75 kHz.

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS



EUT:	FM T55C	Work Order:	WILM0089
Serial Number:	1	Date:	2022-07-18
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Butch Harrington, Jacob Lewis, Keith Carlson	Relative Humidity:	62%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Chris Patterson	Job Site:	MN09
Power:	120VAC/60Hz	Configuration:	WILM0087-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.209:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	7	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

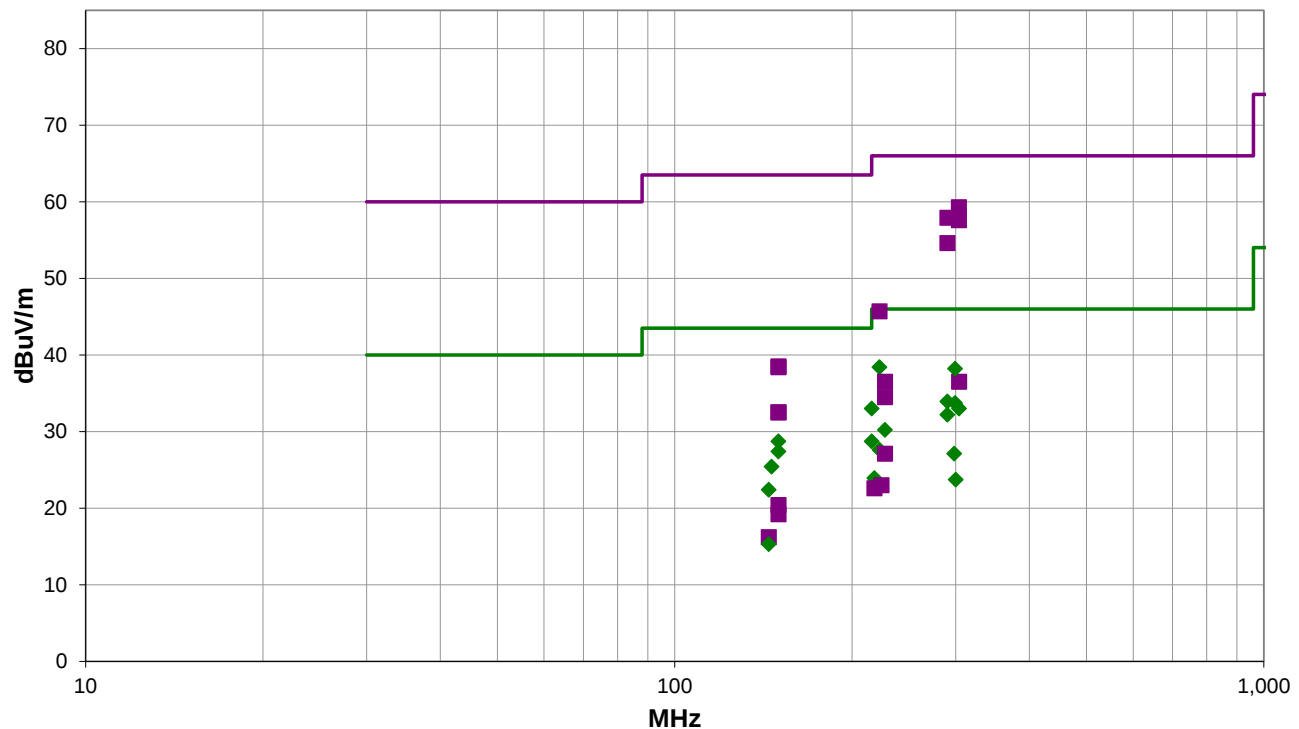
None

EUT OPERATING MODES

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



Run #: 7

■ PK ◆ AV ● QP

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

RESULTS - Run #7

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
149.985	43.5	-5.0	1.12	139.0	3.0	0.0	Vert	PK	0.0	38.5	43.5	-5.0	Mid Band Mid Ch
149.980	43.4	-5.0	1.04	121.0	3.0	0.0	Vert	PK	0.0	38.4	43.5	-5.1	High Band Mid Ch
303.715	61.6	-2.3	1.0	326.0	3.0	0.0	Horz	PK	0.0	59.3	66.0	-6.7	High Band Mid Ch
290.250	61.5	-3.6	1.55	335.0	3.0	0.0	Horz	PK	0.0	57.9	66.0	-8.1	Low Band Mid Ch
303.770	59.9	-2.3	1.66	340.0	3.0	0.0	Vert	PK	0.0	57.6	66.0	-8.4	High Band Mid Ch
303.820	38.8	-2.3	1.0	326.0	3.0	0.0	Horz	AV	0.0	36.5	46.0	-9.5	High Band Mid Ch
150.000	37.5	-5.0	1.12	139.0	3.0	0.0	Vert	AV	0.0	32.5	43.5	-11.0	Mid Band Mid Ch
150.000	37.5	-5.0	1.04	121.0	3.0	0.0	Vert	AV	0.0	32.5	43.5	-11.0	High Band Mid Ch
290.255	58.2	-3.6	2.2	90.0	3.0	0.0	Vert	PK	0.0	54.6	66.0	-11.4	Low Band Mid Ch
227.440	38.5	-4.0	1.0	12.0	3.0	0.0	Vert	AV	0.0	34.5	46.0	-11.5	High Band Mid Ch
290.220	37.5	-3.6	2.2	90.0	3.0	0.0	Vert	AV	0.0	33.9	46.0	-12.1	Low Band Mid Ch
303.815	35.3	-2.3	1.66	340.0	3.0	0.0	Vert	AV	0.0	33.0	46.0	-13.0	High Band Mid Ch
290.215	35.8	-3.6	1.55	335.0	3.0	0.0	Horz	AV	0.0	32.2	46.0	-13.8	Low Band Mid Ch
222.765	31.5	-3.9	1.0	25.0	3.0	0.0	Vert	AV	0.0	27.6	46.0	-18.4	Mid Band Mid Ch
298.130	30.2	-3.1	1.0	174.0	3.0	0.0	Horz	AV	0.0	27.1	46.0	-18.9	Mid Band Mid Ch
227.445	31.1	-4.0	1.45	2.0	3.0	0.0	Horz	AV	0.0	27.1	46.0	-18.9	High Band Mid Ch
222.715	49.6	-3.9	1.0	25.0	3.0	0.0	Vert	PK	0.0	45.7	66.0	-20.3	Mid Band Mid Ch
218.220	28.5	-4.6	1.0	20.0	3.0	0.0	Vert	AV	0.0	23.9	46.0	-22.1	Low Band Mid Ch
299.995	26.5	-2.8	1.0	285.0	3.0	0.0	Vert	AV	0.0	23.7	46.0	-22.3	Mid Band Mid Ch
224.365	26.9	-3.9	1.0	26.0	3.0	0.0	Horz	AV	0.0	23.0	46.0	-23.0	Mid Band Mid Ch
150.000	25.4	-5.0	1.98	196.0	3.0	0.0	Horz	AV	0.0	20.4	43.5	-23.1	High Band Mid Ch
218.220	27.2	-4.6	1.0	217.0	3.0	0.0	Horz	AV	0.0	22.6	46.0	-23.4	Low Band Mid Ch
150.000	24.2	-5.0	1.0	209.0	3.0	0.0	Horz	AV	0.0	19.2	43.5	-24.3	Mid Band Mid Ch
144.455	21.0	-4.8	2.26	179.0	3.0	0.0	Horz	AV	0.0	16.2	43.5	-27.3	Low Band Mid Ch
222.710	42.3	-3.9	1.0	26.0	3.0	0.0	Horz	PK	0.0	38.4	66.0	-27.6	Mid Band Mid Ch
299.245	41.1	-2.9	1.0	174.0	3.0	0.0	Horz	PK	0.0	38.2	66.0	-27.8	Mid Band Mid Ch
144.455	20.1	-4.8	1.0	188.0	3.0	0.0	Vert	AV	0.0	15.3	43.5	-28.2	Low Band Mid Ch
227.450	40.5	-4.0	1.0	12.0	3.0	0.0	Vert	PK	0.0	36.5	66.0	-29.5	High Band Mid Ch
299.165	36.6	-2.9	1.0	285.0	3.0	0.0	Vert	PK	0.0	33.7	66.0	-32.3	Mid Band Mid Ch
216.025	37.9	-4.9	1.0	20.0	3.0	0.0	Vert	PK	0.0	33.0	66.0	-33.0	Low Band Mid Ch
149.990	33.7	-5.0	1.98	196.0	3.0	0.0	Horz	PK	0.0	28.7	63.5	-34.8	High Band Mid Ch
227.420	34.2	-4.0	1.45	2.0	3.0	0.0	Horz	PK	0.0	30.2	66.0	-35.8	High Band Mid Ch
149.970	32.4	-5.0	1.0	209.0	3.0	0.0	Horz	PK	0.0	27.4	63.5	-36.1	Mid Band Mid Ch
216.020	33.6	-4.9	1.0	217.0	3.0	0.0	Horz	PK	0.0	28.7	66.0	-37.3	Low Band Mid Ch
146.100	30.2	-4.8	1.0	188.0	3.0	0.0	Vert	PK	0.0	25.4	63.5	-38.1	Low Band Mid Ch
144.430	27.2	-4.8	2.26	179.0	3.0	0.0	Horz	PK	0.0	22.4	63.5	-41.1	Low Band Mid Ch

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0089
Serial Number:	1	Date:	2022-07-18
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Butch Harrington, Jacob Lewis, Keith Carlson	Relative Humidity:	62%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Chris Patterson	Job Site:	MN09
Power:	120VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.209:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	12	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

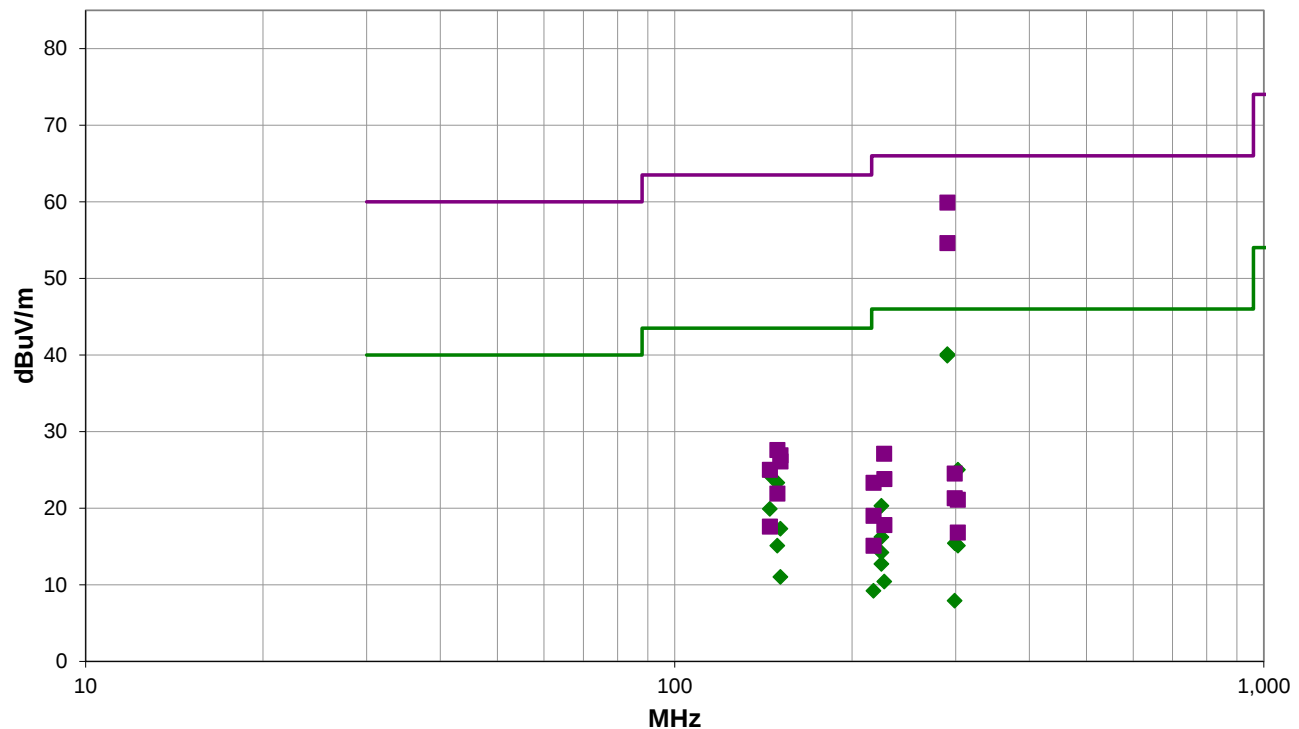
None

EUT OPERATING MODES

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/- 75 kHz.

DEVIATIONS FROM TEST STANDARD

None



Run #: 12

■ PK ◆ AV ● QP

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

RESULTS - Run #12

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
290.250	43.7	-3.6	1.0	358.0	3.0	0.0	Horz	AV	0.0	40.1	46.0	-5.9	Low Band Mid Ch
290.238	63.5	-3.6	1.0	358.0	3.0	0.0	Horz	PK	0.0	59.9	66.0	-6.1	Low Band Mid Ch
290.242	43.5	-3.6	1.0	174.0	3.0	0.0	Vert	AV	0.0	39.9	46.0	-6.1	Low Band Mid Ch
290.243	58.2	-3.6	1.0	174.0	3.0	0.0	Vert	PK	0.0	54.6	66.0	-11.4	Low Band Mid Ch
145.009	29.1	-4.8	1.0	56.0	3.0	0.0	Vert	AV	0.0	24.3	43.5	-19.2	Low Band Mid Ch
302.649	28.9	-3.9	1.49	176.0	3.0	0.0	Horz	AV	0.0	25.0	46.0	-21.0	Mid Band Mid Ch
149.402	27.2	-3.9	1.0	1.0	3.0	0.0	Vert	AV	0.0	23.3	46.0	-22.7	Mid Band Mid Ch
224.350	25.1	-4.8	1.0	61.0	3.0	0.0	Vert	AV	0.0	20.3	43.5	-23.2	Mid Band Mid Ch
145.005	24.9	-5.0	1.0	71.0	3.0	0.0	Vert	AV	0.0	19.9	43.5	-23.6	High Band Mid Ch
151.207	21.2	-3.9	1.0	335.0	3.0	0.0	Vert	AV	0.0	17.3	46.0	-28.7	High Band Mid Ch
224.343	19.2	-5.0	1.92	8.0	3.0	0.0	Horz	AV	0.0	14.2	43.5	-29.3	High Band Mid Ch
224.350	19.2	-3.0	2.6	258.0	3.0	0.0	Vert	AV	0.0	16.2	46.0	-29.8	Mid Band Mid Ch
299.050	20.1	-4.7	1.0	267.0	3.0	0.0	Vert	AV	0.0	15.4	46.0	-30.6	Low Band Mid Ch
224.350	17.5	-4.8	1.94	85.0	3.0	0.0	Horz	AV	0.0	12.7	43.5	-30.8	Mid Band Mid Ch
302.621	18.1	-3.0	1.16	347.0	3.0	0.0	Horz	AV	0.0	15.1	46.0	-30.9	Mid Band Mid Ch
149.406	17.6	-2.5	1.06	348.0	3.0	0.0	Horz	AV	0.0	15.1	46.0	-30.9	High Band Mid Ch
151.203	15.8	-4.8	2.09	279.0	3.0	0.0	Horz	AV	0.0	11.0	43.5	-32.5	Low Band Mid Ch
226.806	12.9	-2.5	1.0	52.0	3.0	0.0	Vert	AV	0.0	10.4	46.0	-35.6	High Band Mid Ch
151.178	31.7	-4.8	1.0	56.0	3.0	0.0	Vert	PK	0.0	26.9	63.5	-36.6	Low Band Mid Ch
217.492	13.1	-3.9	1.0	148.0	3.0	0.0	Horz	AV	0.0	9.2	46.0	-36.8	High Band Mid Ch
298.806	12.6	-4.7	1.0	6.0	3.0	0.0	Horz	AV	0.0	7.9	46.0	-38.1	Low Band Mid Ch
149.379	30.1	-2.5	1.06	348.0	3.0	0.0	Horz	PK	0.0	27.6	66.0	-38.4	High Band Mid Ch
145.003	29.8	-4.8	1.0	61.0	3.0	0.0	Vert	PK	0.0	25.0	63.5	-38.5	Mid Band Mid Ch
226.790	31.0	-3.9	1.49	176.0	3.0	0.0	Horz	PK	0.0	27.1	66.0	-38.9	Mid Band Mid Ch
226.806	28.8	-5.0	1.0	71.0	3.0	0.0	Vert	PK	0.0	23.8	63.5	-39.7	High Band Mid Ch
151.200	30.0	-3.9	1.0	1.0	3.0	0.0	Vert	PK	0.0	26.1	66.0	-39.9	Mid Band Mid Ch
298.806	27.5	-3.0	1.16	347.0	3.0	0.0	Horz	PK	0.0	24.5	66.0	-41.5	Mid Band Mid Ch
217.511	25.8	-2.5	1.0	52.0	3.0	0.0	Vert	PK	0.0	23.3	66.0	-42.7	High Band Mid Ch
149.400	25.8	-3.9	1.0	335.0	3.0	0.0	Vert	PK	0.0	21.9	66.0	-44.1	High Band Mid Ch
217.441	24.0	-5.0	1.92	8.0	3.0	0.0	Horz	PK	0.0	19.0	63.5	-44.5	High Band Mid Ch
298.791	26.0	-4.7	1.0	267.0	3.0	0.0	Vert	PK	0.0	21.3	66.0	-44.7	Low Band Mid Ch
302.433	24.1	-3.0	2.6	258.0	3.0	0.0	Vert	PK	0.0	21.1	66.0	-44.9	Mid Band Mid Ch
145.004	22.4	-4.8	1.94	85.0	3.0	0.0	Horz	PK	0.0	17.6	63.5	-45.9	Mid Band Mid Ch
302.435	21.6	-4.8	2.09	279.0	3.0	0.0	Horz	PK	0.0	16.8	63.5	-46.7	Low Band Mid Ch
226.813	21.7	-3.9	1.0	148.0	3.0	0.0	Horz	PK	0.0	17.8	66.0	-48.2	High Band Mid Ch
217.430	19.8	-4.7	1.0	6.0	3.0	0.0	Horz	PK	0.0	15.1	66.0	-50.9	Low Band Mid Ch

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0089
Serial Number:	1	Date:	2022-07-18
Customer:	Williams Sound, LLC	Temperature:	21°C
Attendees:	Butch Harrington, Jacob Lewis, Keith Carlson	Relative Humidity:	62%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Chris Patterson	Job Site:	MN09
Power:	120VAC/60Hz	Configuration:	WILM0087-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.209:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	10	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

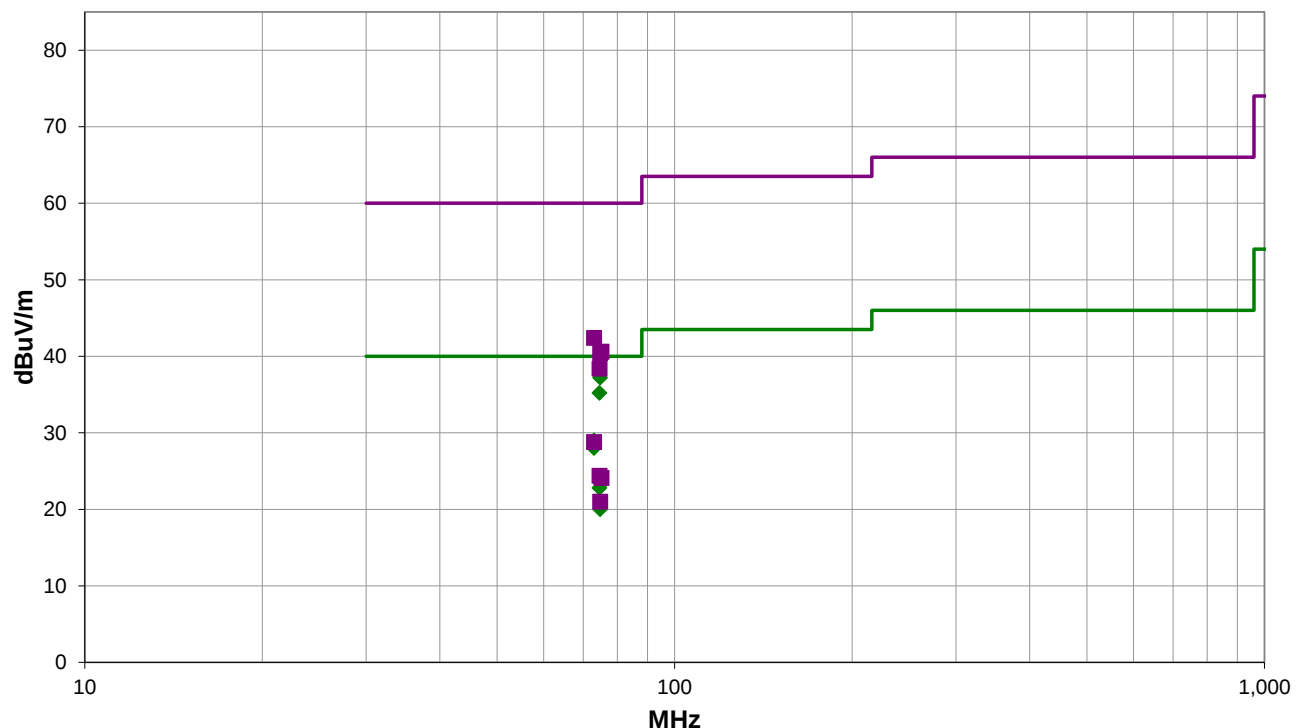
None

EUT OPERATING MODES

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

A reduced Resolution Bandwidth was used for measurements at the edge of the allowed band based on ~1% of the measured emissions bandwidth. Using the prescribed CISPR RBW (30 kHz) to measure this narrow signal near the edge of the allowed band, you see the shoulders of the filter (essentially the filter response) and not the actual signal to be measured. This path was confirmed via FCC inquiry.



FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

RESULTS - Run #10

Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB/m)	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)	Marker Delta Comments
75.200	18.2	11.5	1.05	204.0	3.0	10.0	Vert	AV	0.0	39.7	40.0	-0.3	High Band Low Channel 75.2 MHz: Fund 71.4dBuV - 53.2dBc = 18.2dBuV (calc. amp.)
74.800	15.7	11.5	1.0	117.0	3.0	10.0	Vert	AV	0.0	37.2	40.0	-2.8	Mid Band Mid Channel 74.7 MHz: Fund 69.8dBuV - 54.1dBc = 15.7dBuV (calc. amp.)
74.600	13.7	11.5	1.0	117.0	3.0	10.0	Vert	AV	0.0	35.2	40.0	-4.8	Mid Band Mid Channel 74.7 MHz: Fund 69.9dBuV - 56.2dBc = 13.7dBuV (calc. amp.)
73.000	7.5	11.5	1.0	230.0	3.0	10.0	Vert	AV	0.0	29.0	40.0	-11.0	Low Band High Channel 72.9 MHz: Fund 60.5dBuV - 53.0dBc = 7.5dBuV (calc. amp.)
73.000	6.5	11.5	1.75	226.0	3.0	10.0	Horz	AV	0.0	28.0	40.0	-12.0	Low Band High Channel 72.9 MHz: Fund 58.2dBuV - 51.7dBc = 6.5dBuV (calc. amp.)
75.200	1.9	11.5	1.35	277.0	3.0	10.0	Horz	AV	0.0	23.4	40.0	-16.6	High Band Low Channel 75.3 MHz: Fund 53.6dBuV - 51.7dBc = 1.9dBuV (calc. amp.)
74.600	1.3	11.5	3.31	235.0	3.0	10.0	Horz	AV	0.0	22.8	40.0	-17.2	Mid Band Mid Channel 74.7 MHz: Fund 50.3dBuV - 49.0dBc = 1.3dBuV (calc. amp.)
73.000	20.9	11.5	1.0	230.0	3.0	10.0	Vert	PK	0.0	42.4	60.0	-17.6	Low Band High Channel 72.9 MHz: Fund 73.9dBuV - 53.0dBc = 20.9dBuV (calc. amp.)
75.200	19.1	11.5	1.05	204.0	3.0	10.0	Vert	PK	0.0	40.6	60.0	-19.4	High Band Low Channel 75.2 MHz: Fund 72.3dBuV - 53.2dBc = 19.1dBuV (calc. amp.)
74.812	18.9	11.5	1.0	117.0	3.0	10.0	Vert	PK	0.0	40.4	60.0	-19.6	Mid Band Mid Channel 74.7 MHz: Fund 73.0dBuV - 54.1dBc = 18.9dBuV (calc. amp.)
74.800	-1.5	11.5	3.31	235.0	3.0	10.0	Horz	AV	0.0	20.0	40.0	-20.0	Mid Channel Mid Band 74.7 MHz: Fund 53.7dBuV - 55.2dBc = -1.5dBuV (calc. amp.)
74.600	16.9	11.5	1.0	117.0	3.0	10.0	Vert	PK	0.0	38.4	60.0	-21.6	Mid Band Mid Channel 74.7 MHz: Fund 73.1dBuV - 56.2dBc = 16.9dBuV (calc. amp.)
73.000	7.3	11.5	1.75	226.0	3.0	10.0	Horz	PK	0.0	28.8	60.0	-31.2	Low Band High Channel 72.9 MHz: Fund 59.0dBuV - 51.7dBc = 7.3dBuV (calc. amp.)
74.600	2.9	11.5	3.31	235.0	3.0	10.0	Horz	PK	0.0	24.4	60.0	-35.6	Mid Band Mid Channel 74.7 MHz: Fund 51.9dBuV - 49.0dBc = 2.9dBuV (calc. amp.)
75.200	2.6	11.5	1.35	277.0	3.0	10.0	Horz	PK	0.0	24.1	60.0	-35.9	High Band Low Channel 75.3 MHz: Fund 54.3dBuV - 51.7dBc = 2.6dBuV (calc. amp.)
74.800	-0.5	11.5	3.31	235.0	3.0	10.0	Horz	PK	0.0	21.0	60.0	-39.0	Mid Channel Mid Band 74.7 MHz: Fund 54.7dBuV - 55.2dBc = -0.5dBuV (calc. amp.)

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

EUT:	FM T55C	Work Order:	WILM0087
Serial Number:	00001	Date:	2022-06-06
Customer:	Williams Sound, LLC	Temperature:	20.7°C
Attendees:	Keith Carlson, Jacob Lewis	Relative Humidity:	49.3%
Customer Project:	None	Bar. Pressure (PMSL):	1011 mb
Tested By:	Chris Patterson	Job Site:	MN05
Power:	110VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.237:2022	ANSI C63.10:2020

TEST PARAMETERS

Run #:	18	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

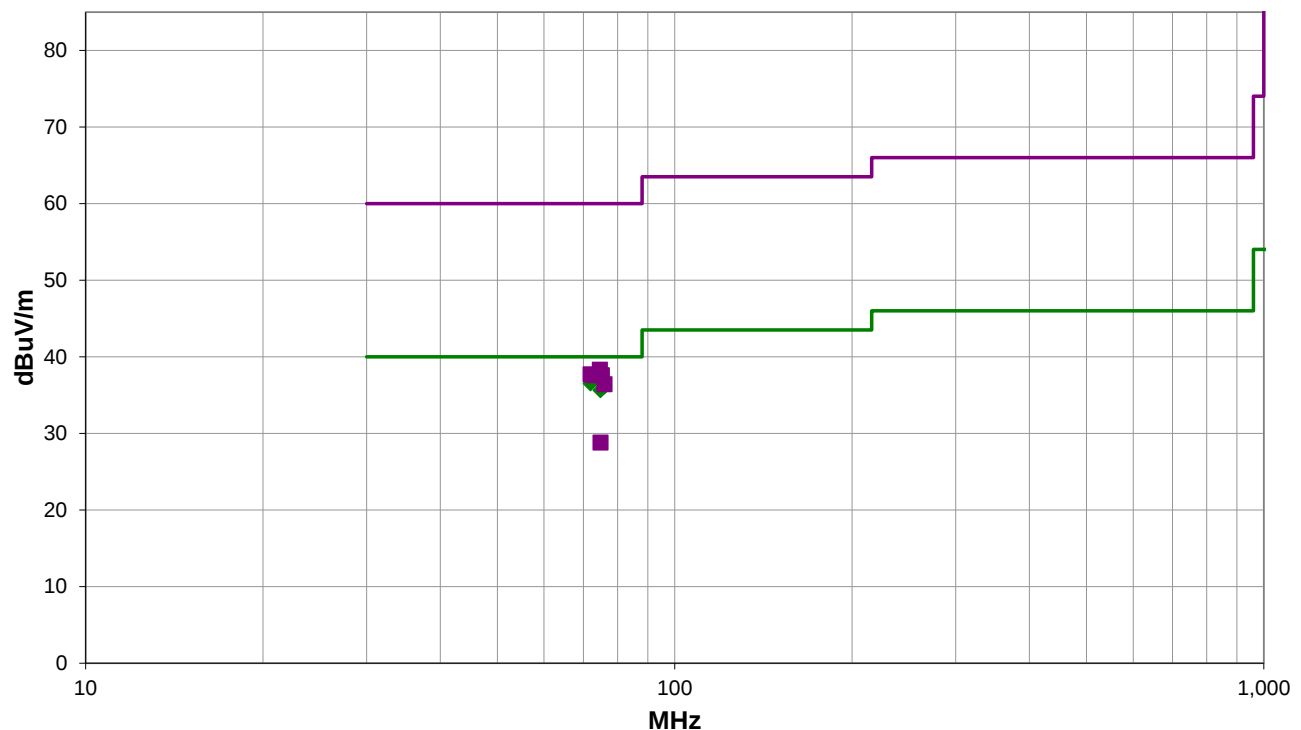
None

EUT OPERATING MODES

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/- 75 kHz.

DEVIATIONS FROM TEST STANDARD

A reduced Resolution Bandwidth was used for measurements at the edge of the allowed band based on ~1% of the measured emissions bandwidth. Using the prescribed CISPR RBW (30 kHz) to measure this narrow signal near the edge of the allowed band, you see the shoulders of the filter (essentially the filter response) and not the actual signal to be measured. This path was confirmed via FCC inquiry.



Run #: 18

■ PK ◆ AV ● QP

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

RESULTS - Run #18

Freq (MHz)	Calculated Amplitude (dBuV)	Factor (dB/m)	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)	Marker Delta Comments
74.600	16.4	11.0	1.0	144.0	3.0	10.0	Vert	AV	0.0	37.4	40.0	-2.6	Config 4, Ch 5, 74.7 MHz: Fund 70.9dBuV -54.5dBc = 16.4dBuV (calc. amp.)
75.200	16.3	11.0	1.0	113.0	3.0	10.0	Vert	AV	0.0	37.3	40.0	-2.7	Config 4, Ch 14, 75.3 MHz: Fund 72.2dBuV -55.9dBc = 16.3dBuV (calc. amp.)
73.000	15.9	11.2	1.0	95.9	3.0	10.0	Vert	AV	0.0	37.1	40.0	-2.9	Config 4, Ch 13, 72.9 MHz: Fund 71.2dBuV -55.3dBc = 15.9dBuV (calc. amp.)
72.000	15.2	11.3	1.0	92.9	3.0	10.0	Vert	AV	0.0	36.5	40.0	-3.5	Config 4, Ch 1, 72.1 MHz: Fund 70.0dBuV -54.8dBc = 15.2dBuV (calc. amp.)
76.000	15.1	11.0	1.0	49.9	3.0	10.0	Vert	AV	0.0	36.1	40.0	-3.9	Config 4, Ch 8, 75.9 MHz: Fund 68.4dBuV -53.3dBc = 15.1dBuV (calc. amp.)
74.800	14.6	11.0	1.0	144.0	3.0	10.0	Vert	AV	0.0	35.6	40.0	-4.4	Config 4, Ch 5, 74.7 MHz: Fund 71.2dBuV -56.6dBc = 14.6dBuV (calc. amp.)
74.600	17.3	11.0	1.0	144.0	3.0	10.0	Vert	PK	0.0	38.3	60.0	-21.7	Config 4, Ch 5, 74.7 MHz: Fund 71.8dBuV -54.5dBc = 17.3dBuV (calc. amp.)
72.000	16.4	11.3	1.0	92.9	3.0	10.0	Vert	PK	0.0	37.7	60.0	-22.3	Config 4, Ch 1, 72.1 MHz: Fund 71.2dBuV -54.8dBc = 16.4dBuV (calc. amp.)
75.200	16.6	11.0	1.0	113.0	3.0	10.0	Vert	PK	0.0	37.6	60.0	-22.4	Config 4, Ch 14, 75.3 MHz: Fund 72.5dBuV -55.9dBc = 16.6dBuV (calc. amp.)
73.000	16.4	11.2	1.0	95.9	3.0	10.0	Vert	PK	0.0	37.6	60.0	-22.4	Config 4, Ch 13, 72.9 MHz: Fund 71.7dBuV -55.3dBc = 16.4dBuV (calc. amp.)
76.000	15.4	11.0	1.0	49.9	3.0	10.0	Vert	PK	0.0	36.4	60.0	-23.6	Config 4, Ch 8, 75.9 MHz: Fund 68.7dBuV -53.5dBc = 15.4dBuV (calc. amp.)
74.800	7.8	11.0	1.0	144.0	3.0	10.0	Vert	PK	0.0	28.8	60.0	-31.2	Config 4, Ch 5, 74.7 MHz: Fund 64.4dBuV -56.6dBc = 7.8dBuV (calc. amp.)

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF FUNDAMENTAL

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level was detected. This required the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search was utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT. Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance was 3 meters or 10 meters (from antenna to boundary of EUT). At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna was increased so that the lowest point of the bottom of the antenna cleared the ground surface by at least 25 cm.

The EUT arrangement is configured as equivalent to that occurring in normal use. Tabletop equipment is placed on a 0.8 meter high non-conductive table & for Floor-standing equipment, it is placed on, but insulated from a ground reference plane by the use of its own rollers or stand-off supports. If measurements above 1 GHz were required, the test setup was modified to meet the regulatory requirements for higher frequency measurements. If required, RF absorber was placed on the floor between the measurement antenna and EUT. If required, per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables.

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.

The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Attenuator	Fairview Microwave	SA18E-20	TWZ	2021-09-09	2022-09-09
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2021-09-14	2023-09-14
Cable	ESM Cable Corp.	Bilog Cables	MNH	2021-10-13	2022-10-13
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2021-10-13	2022-10-13

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	4.6 dB	-4.6 dB

FREQUENCY RANGE INVESTIGATED

70 MHz TO 80 MHz

POWER INVESTIGATED

120VAC/60Hz

CONFIGURATIONS INVESTIGATED

WILM0087-4

WILM0087-3

MODES INVESTIGATED

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/-75 kHz.

FIELD STRENGTH OF FUNDAMENTAL

EUT:	FM T55C	Work Order:	WILM0089
Serial Number:	1	Date:	2022-07-05
Customer:	Williams Sound, LLC	Temperature:	22.4°C
Attendees:	Butch Harrington, Jacob Lewis, Keith Carlson	Relative Humidity:	56.8%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Christopher Heintzelman	Job Site:	MN05
Power:	120VAC/60Hz	Configuration:	WILM0087-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	0	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

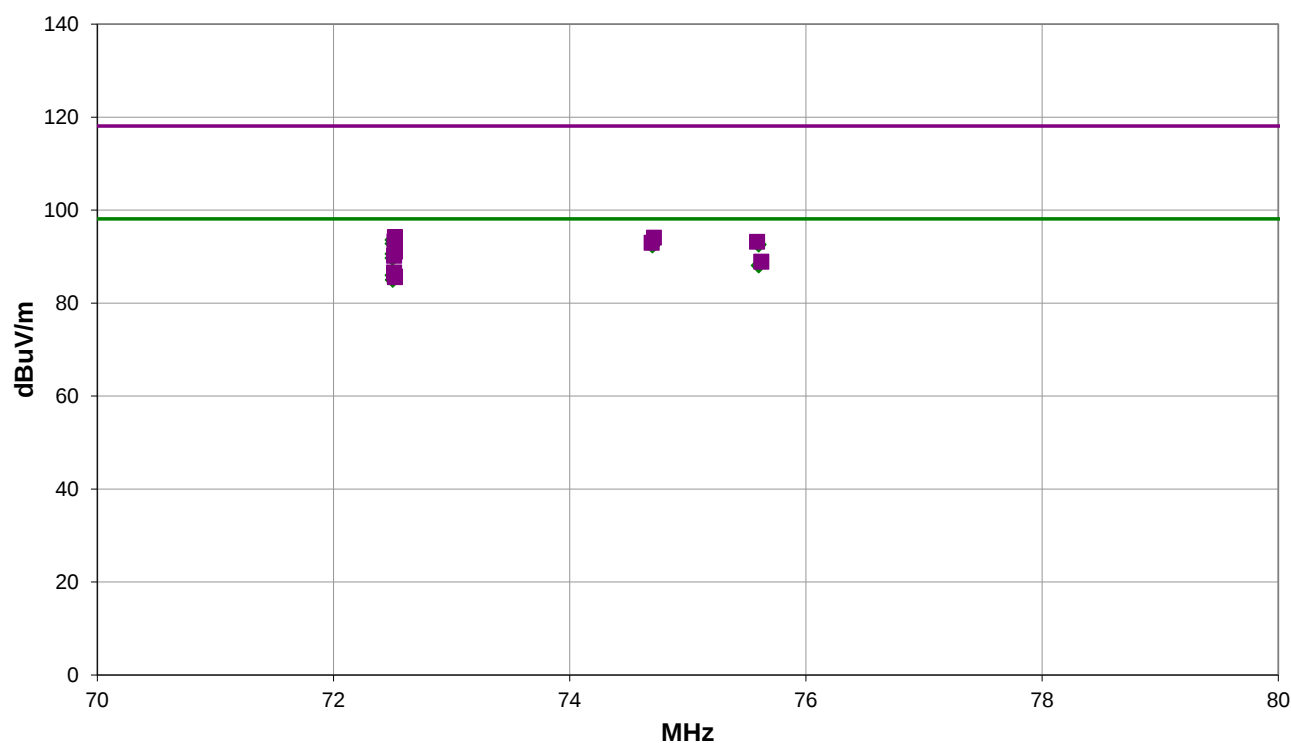
Collapsible antenna. Audio source 400 Hz test tone.

EUT OPERATING MODES

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/- 75 kHz.

DEVIATIONS FROM TEST STANDARD

None



Run #: 0

PK AV QP

FIELD STRENGTH OF FUNDAMENTAL

RESULTS - Run #0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
72.500	83.8	-10.2	4.0	66.0	3.0	20.0	Horz	AV	0.0	93.6	98.1	-4.5	EUT On Side, Low Band
74.700	83.9	-10.5	3.9	76.0	3.0	20.0	Horz	AV	0.0	93.4	98.1	-4.7	EUT On Side, Mid Band
72.500	83.0	-10.2	1.0	314.0	3.0	20.0	Vert	AV	0.0	92.8	98.1	-5.3	EUT Vert, Low Band
75.600	83.1	-10.5	1.0	318.9	3.0	20.0	Vert	AV	0.0	92.6	98.1	-5.5	EUT Vert, High Band
74.700	82.9	-10.5	1.0	318.9	3.0	20.0	Vert	AV	0.0	92.4	98.1	-5.7	EUT Vert, Mid Band
72.500	80.8	-10.2	2.67	162.0	3.0	20.0	Vert	AV	0.0	90.6	98.1	-7.5	EUT On Side, Low Band
72.500	79.9	-10.2	4.0	335.0	3.0	20.0	Horz	AV	0.0	89.7	98.1	-8.4	EUT Horz, Low Band
75.600	78.6	-10.5	3.97	294.9	3.0	20.0	Horz	AV	0.0	88.1	98.1	-10.0	EUT On Side, High Band
72.500	76.2	-10.2	1.0	270.0	3.0	20.0	Vert	AV	0.0	86.0	98.1	-12.1	EUT Horz, Low Band
72.502	75.3	-10.3	3.9	278.0	3.0	20.0	Horz	AV	0.0	85.0	98.1	-13.1	EUT Vert, Low Band
72.520	84.5	-10.3	4.0	66.0	3.0	20.0	Horz	PK	0.0	94.2	118.1	-23.9	EUT On Side, Low Band
74.713	84.6	-10.5	3.9	76.0	3.0	20.0	Horz	PK	0.0	94.1	118.1	-24.0	EUT On Side, Mid Band
72.517	83.6	-10.3	1.0	314.0	3.0	20.0	Vert	PK	0.0	93.3	118.1	-24.8	EUT Vert, Low Band
75.587	83.7	-10.5	1.0	318.9	3.0	20.0	Vert	PK	0.0	93.2	118.1	-24.9	EUT Vert, High Band
74.693	83.5	-10.5	1.0	318.9	3.0	20.0	Vert	PK	0.0	93.0	118.1	-25.1	EUT Vert, Mid Band
72.522	81.4	-10.3	2.67	162.0	3.0	20.0	Vert	PK	0.0	91.1	118.1	-27.0	EUT On Side, Low Band
72.513	80.5	-10.3	4.0	335.0	3.0	20.0	Horz	PK	0.0	90.2	118.1	-27.9	EUT Horz, Low Band
75.622	79.4	-10.5	3.97	294.9	3.0	20.0	Horz	PK	0.0	88.9	118.1	-29.2	EUT On Side, High Band
72.513	76.9	-10.3	1.0	270.0	3.0	20.0	Vert	PK	0.0	86.6	118.1	-31.5	EUT Horz, Low Band
72.520	76.0	-10.3	3.87	272.9	3.0	20.0	Horz	PK	0.0	85.7	118.1	-32.4	EUT Vert, Low Band
72.520	75.9	-10.3	3.9	278.0	3.0	20.0	Horz	PK	0.0	85.6	118.1	-32.5	EUT Vert, Low Band

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF FUNDAMENTAL

EUT:	FM T55C	Work Order:	WILM0089
Serial Number:	1	Date:	2022-07-05
Customer:	Williams Sound, LLC	Temperature:	22.4°C
Attendees:	Butch Harrington, Jacob Lewis, Keith Carlson	Relative Humidity:	56.8%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Christopher Heintzelman	Job Site:	MN05
Power:	120VAC/60Hz	Configuration:	WILM0087-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.237:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	1	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

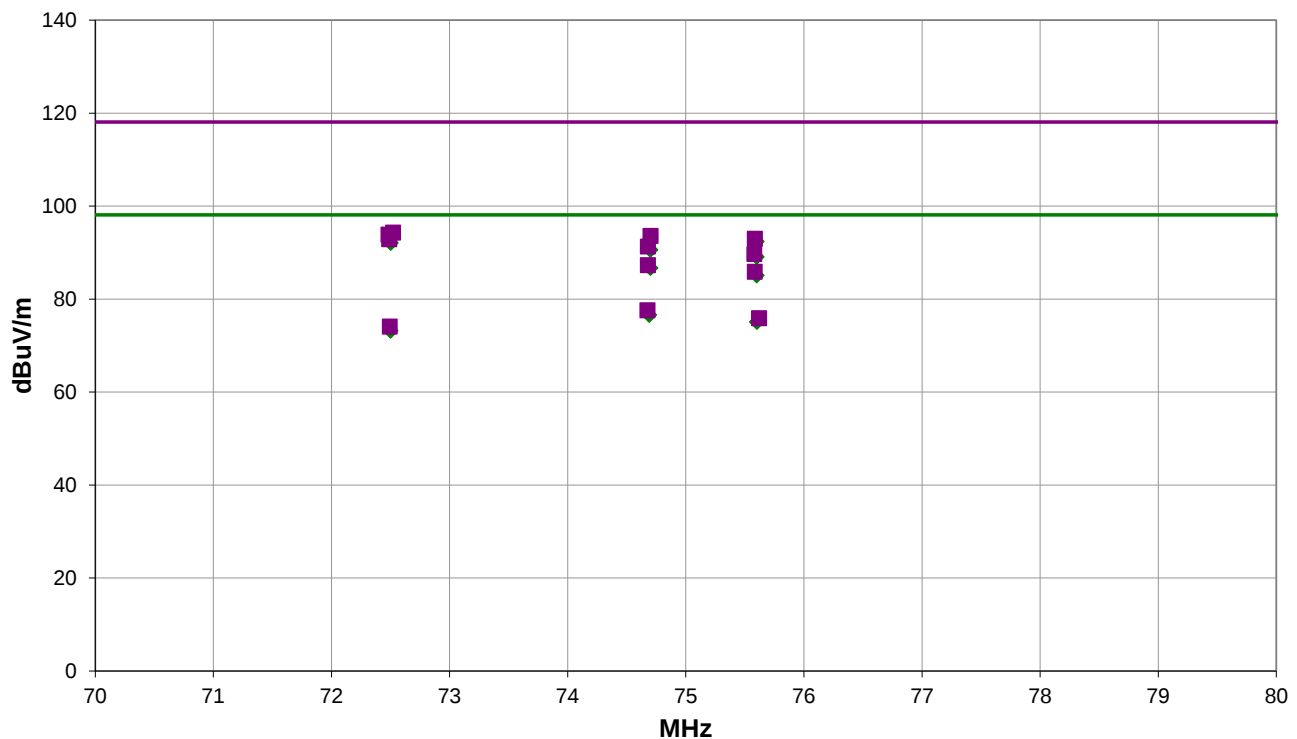
Large Dipole antenna. Audio source 400 Hz test tone.

EUT OPERATING MODES

Transmitting Low Band Mid Ch 72.5 MHz, Mid Band Mid Ch 74.7 MHz, and High Band Mid Ch 75.6 MHz, Modulated. Full power. Maximum FM deviation of +/-75 kHz.

DEVIATIONS FROM TEST STANDARD

None



Run #: 1

■ PK ◆ AV ● QP

FIELD STRENGTH OF FUNDAMENTAL

RESULTS - Run #1

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
72.498	84.0	-10.2	1.0	192.9	3.0	20.0	Vert	AV	0.0	93.8	98.1	-4.3	EUT Vert, Low Band, 80 cm table
72.500	83.5	-10.2	1.0	303.0	3.0	20.0	Vert	AV	0.0	93.3	98.1	-4.8	EUT Vert, Low Band
74.700	83.5	-10.5	1.0	232.0	3.0	20.0	Vert	AV	0.0	93.0	98.1	-5.1	EUT Vert, Mid Band, 80 cm table
75.600	82.9	-10.5	1.0	113.9	3.0	20.0	Vert	AV	0.0	92.4	98.1	-5.7	EUT Vert, High Ch, 80 cm table
72.502	82.4	-10.3	4.0	245.0	3.0	20.0	Horz	AV	0.0	92.1	98.1	-6.0	EUT Vert, Low Band, 80 cm table
74.700	81.1	-10.5	1.0	310.0	3.0	20.0	Vert	AV	0.0	90.6	98.1	-7.5	EUT Vert, Mid Band
75.600	79.6	-10.5	1.0	296.0	3.0	20.0	Vert	AV	0.0	89.1	98.1	-9.0	EUT Vert, High Band
74.700	77.2	-10.5	1.65	315.0	3.0	20.0	Horz	AV	0.0	86.7	98.1	-11.4	EUT Vert, Mid Band, 80 cm table
75.600	75.6	-10.5	1.71	315.9	3.0	20.0	Horz	AV	0.0	85.1	98.1	-13.0	EUT Vert, High Ch, 80 cm table
74.690	67.1	-10.5	4.0	348.9	3.0	20.0	Horz	AV	0.0	76.6	98.1	-21.5	EUT Vert, Mid Band
75.602	65.6	-10.5	4.0	360.0	3.0	20.0	Horz	AV	0.0	75.1	98.1	-23.0	EUT Vert, High Band
72.522	84.6	-10.3	1.0	192.9	3.0	20.0	Vert	PK	0.0	94.3	118.1	-23.8	EUT Vert, Low Band, 80 cm table
72.483	84.1	-10.2	1.0	303.0	3.0	20.0	Vert	PK	0.0	93.9	118.1	-24.2	EUT Vert, Low Band
74.702	84.1	-10.5	1.0	232.0	3.0	20.0	Vert	PK	0.0	93.6	118.1	-24.5	EUT Vert, Mid Band, 80 cm table
72.500	63.4	-10.2	3.75	1.9	3.0	20.0	Horz	AV	0.0	73.2	98.1	-24.9	EUT Vert, Low Band
75.585	83.5	-10.5	1.0	113.9	3.0	20.0	Vert	PK	0.0	93.0	118.1	-25.1	EUT Vert, High Ch, 80 cm table
72.488	83.1	-10.2	4.0	245.0	3.0	20.0	Horz	PK	0.0	92.9	118.1	-25.2	EUT Vert, Low Band, 80 cm table
74.678	81.8	-10.5	1.0	310.0	3.0	20.0	Vert	PK	0.0	91.3	118.1	-26.8	EUT Vert, Mid Band
75.580	80.2	-10.5	1.0	296.0	3.0	20.0	Vert	PK	0.0	89.7	118.1	-28.4	EUT Vert, High Band
74.678	77.8	-10.5	1.65	315.0	3.0	20.0	Horz	PK	0.0	87.3	118.1	-30.8	EUT Vert, Mid Band, 80 cm table
75.583	76.4	-10.5	1.71	315.9	3.0	20.0	Horz	PK	0.0	85.9	118.1	-32.2	EUT Vert, High Ch, 80 cm table
74.675	68.1	-10.5	4.0	348.9	3.0	20.0	Horz	PK	0.0	77.6	118.1	-40.5	EUT Vert, Mid Band
75.620	66.4	-10.5	4.0	360.0	3.0	20.0	Horz	PK	0.0	75.9	118.1	-42.2	EUT Vert, High Band
72.493	64.3	-10.2	3.75	1.9	3.0	20.0	Horz	PK	0.0	74.1	118.1	-44.0	EUT Vert, Low Band

CONCLUSION

Pass



Tested By

OCCUPIED BANDWIDTH



XMH 2022.02.07.0

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.	Cal. Due
Cable	Micro-Coax	D150A-1-0720-200	MNL	2021-09-12	2022-09-12
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24
Attenuator	S.M. Electronics	SA26B-20	RFW	2022-02-08	2023-02-08
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25

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

OCCUPIED BANDWIDTH



TbTb 2022.05.02.0 XMR 2022.02.07.0

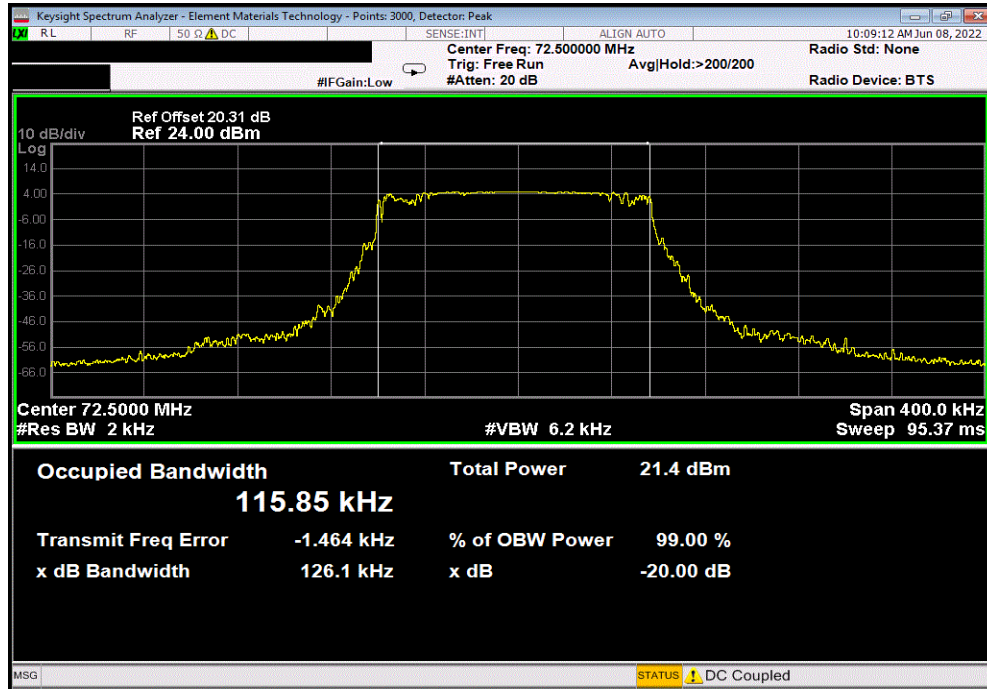
EUT: FM T55C		Work Order: WILM0087	
Serial Number: 00001		Date: 8-Jun-22	
Customer: Williams Sound, LLC		Temperature: 20.7 °C	
Attendees: Keith Carlson		Humidity: 45.9% RH	
Project: None		Barometric Pres.: 1015 mbar	
Tested by: Christopher Heintzelman	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.237:2022		ANSI C63.10:2013	
COMMENTS			
50/75 Ohm balun in line.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	5	Signature <i>Christopher Heintzelman</i>	
		Value	Limit (<) Result
Mid Ch 72.5 MHz, Wideband FM Modulated		126.1	200 kHz Pass
Mid Ch 74.7 MHz, Wideband FM Modulated		129.1	200 kHz Pass
Mid Ch 75.6 MHz, Wideband FM Modulated		132.0	200 kHz Pass

OCCUPIED BANDWIDTH

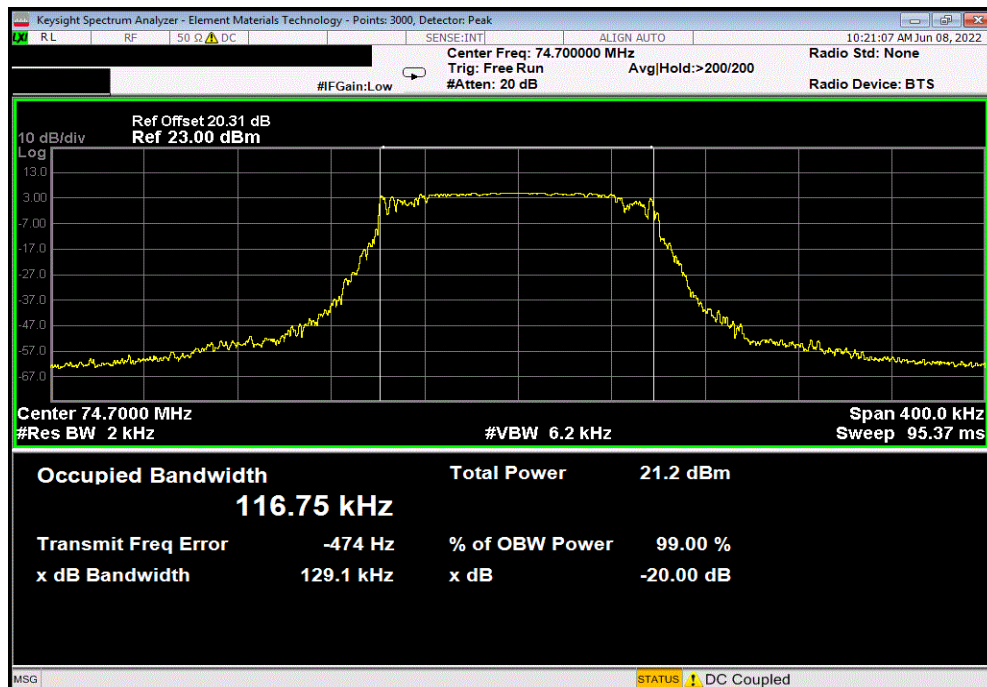


TbTx 2022.05.02.0 XMt 2022.02.07.0

Mid Ch 72.5 MHz, Wideband FM Modulated						
				Value	Limit (<)	Result
				126.1	200 kHz	Pass



Mid Ch 74.7 MHz, Wideband FM Modulated						
				Value	Limit (<)	Result
				129.1	200 kHz	Pass

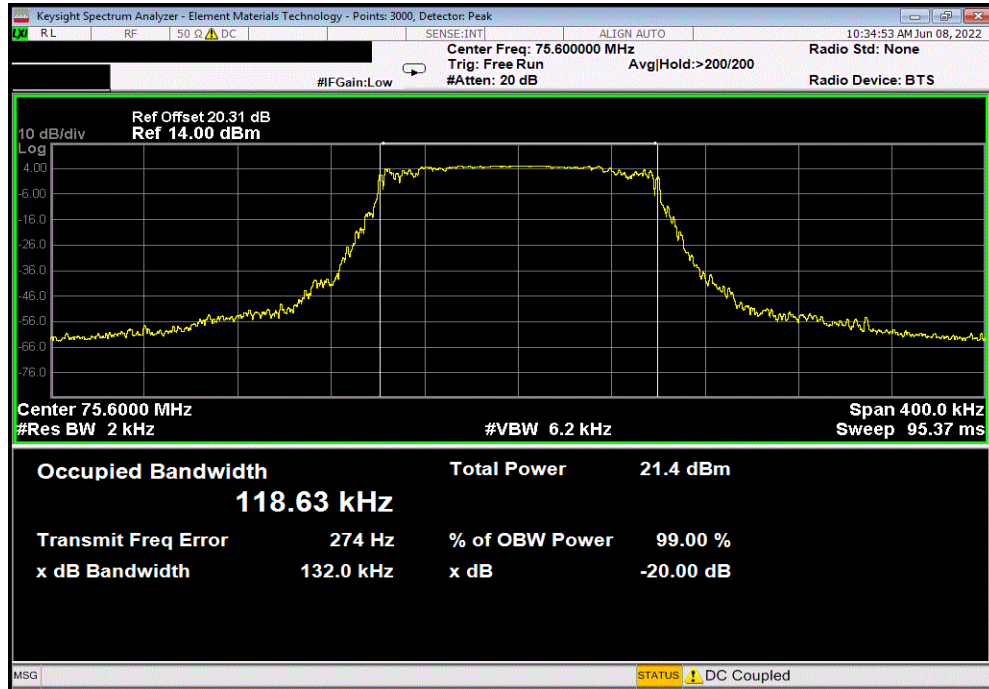


OCCUPIED BANDWIDTH



TbTx 2022.05.02.0 XMt 2022.02.07.0

Mid Ch 75.6 MHz, Wideband FM Modulated						
Value				Limit	Result	
				(<)		
132.0				200 kHz	Pass	



End of Test Report