Test Report Serial Number:	**45461696 R1.0**
Test Report Date:	**11 December 2021**
Project Number:	**1565**

EMC Test Report - New Application

Applicant:

Uniden America Corporation
6225 N. State Highway 161
Suite 300
Irving, Tx, 75038, USA

FCC ID:	IC Registration Number
AMWUT664	**513C-UT664**
Product Model Number / HVIN	Product Name / PMN
UT664	**MHS75**

In Accordance With:

CFR Title 47, Part 80 Subpart E, Part 15 Subpart B
Stations in the Maritime Services

RSS-Gen, RSS-182 Issue 6
Maritime Radio Transmitters and Receivers in the Band 156-162.5 MHz

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01

IC Registration 3874A

FCC Registration: CA3874

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1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:	Art Voss, P.Eng.	**Date(s) of Evaluation:**		25 Nov - 8 Dec, 2021
Report Prepared By:	Art Voss, P.Eng.	**Report Reviewed By:**		Ben Hewson
Report Revision	**Description of Revision**	**Revised Section**	**Revised By**	**Revision Date**
0.1	Draft	n/a	Art Voss	9 December 2021
1.0	Initial Release	n/a	Art Voss	11 December 2021

2.0 CLIENT AND DUT INFORMATION

Client Information		
Applicant Name	**Uniden America Corporation**	
Applicant Address	6225 N. State Highway 161, Suite 300	
	Irving, TX, 75038	
	USA	
DUT Information		
Device Identifier(s):	**FCC ID:**	**AMWUT664**
	ISED ID:	**513C-UT664**
Device Type:	Portable FM VHF PTT Transceiver	
Type of Equipment:	Analog FM Transceiver	
Device Model(s) / HVIN:	UT664	
Device Marketing Name / PMN:	MHS75	
Firmware Version ID Number / FVIN:	-	
Host Marketing Name / HMN:	-	
Test Sample Serial No.:	T/A Sample - Identical Prototype	
Transmit Frequency Range:	Tx: 156.05 - 157.425MHz, Rx: 156.05 - 162.55MHz	
Number of Channels:	60 Channel Programmable	
Manuf. Max. Rated Output Power:	30dBm (1W), 34dBm, (2.5W), 37 dBm +/- .5dB, (5W)	
Manuf. Max. Rated BW/Data Rate:	n/a	
Antenna Make and Model:	1/4 Wavelength Stub	
Antenna Type and Gain:	-2 dBi	
Modulation:	FM	
Mode:	Simplex/Duplex	
DUT Power Source:	7.4V Li-Ion Rechargeable	
DUT Dimensions [LxWxH] (mm)	110 (230w/Antenna) x 70 x 45	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

3.0 SCOPE

This Certification Report was prepared on behalf of:

Uniden America Corporation

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

As per FCC CFR 47 Part §2.1091 and §2.1093 and Health Canada Safety Code 6, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in a separate exhibit from this report.

This *Equipment* is subject to FCC Declaration of Conformity (DoC). DoC evaluations were performed on this *Equipment* and the results of the DoC evaluation appear in a separate exhibit from this report.

Application: New Certification

4.0 TEST RESULT SUMMARY

TEST SUMMARY

Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Applicable Rule Part(s) ISED	Test Date	Result
7.0	Modulation Characteristics Modulation Limiting	ANSI/TIA/EIA-603-E-2016	§2.1047(a) §80.213(a)(2)	RSS-182 [5.8]	2 Dec 2021	Complies
8.0	Modulation Characteristics Audio Low Pass Filter Response	ANSI/TIA/EIA-603-E-2016	§2.1047(a) §80.213(e)	RSS-182 [5.8]	2 Dec 2021	Complies
9.0	Conducted Power (Fundamental)	ANSI/TIA/EIA-603-E-2016	§2.1046 §80.215(c)(2)	RSS-Gen RSS-182 [5.6]	25 Nov 2021 6 Dec 2021	Complies
10.0	Occupied Bandwidth Emission Mask	ANSI/TIA/EIA-603-E-2016	§2.1049 §80.205(a)	RSS-Gen RSS-182 [5.9.1]	6 Dec 2021	Complies
11.0	Conducted TX Spurious Emissions	ANSI/TIA/EIA-603-E-2016	§2.1051 §80.211	RSS-Gen RSS-182 [5.9.1]	6-7 Dec 2021	Complies
12.0	Radiated RX Spurious Emissions	ANSI/TIA/EIA-603-E-2016 ANSI C63.4-2014	§15.109	ICES-003[6.2]	29 Nov 2021	Complies
13.0	Frequency Stability	ANSI/TIA/EIA-603-E-2016	§2.1055 §80.209	RSS-182 [5.5]	8 Dec 2021	Complies

Test Station Day Log

Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
25 Nov 2021	20.6	18	102.0	**EMC**	**9.0**
29 Feb 2021	10.0	90	102.2	**OATS**	**12.0**
2 Dec 2021	20.8	17	102.1	**EMC**	**7.0, 8.0**
6 Dec 2021	20.5	17	102.1	**EMC**	**9.0, 10.0, 11.0**
7 Dec 2021	21.2	19	101.7	**EMC**	**11.0**
8 Dec 2021	17.9	18	103.5	**TC**	**13.0**

EMC - EMC Test Bench
OATS - Open Area Test Site
LISN - LISN Test Area
IMM - Immunity Test Area
SAC - Semi-Anechoic Chamber
TC - Temperature Chamber
ESD - ESD Test Bench
RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

9 December 2021
Date

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA A. F. VOSS # 31327

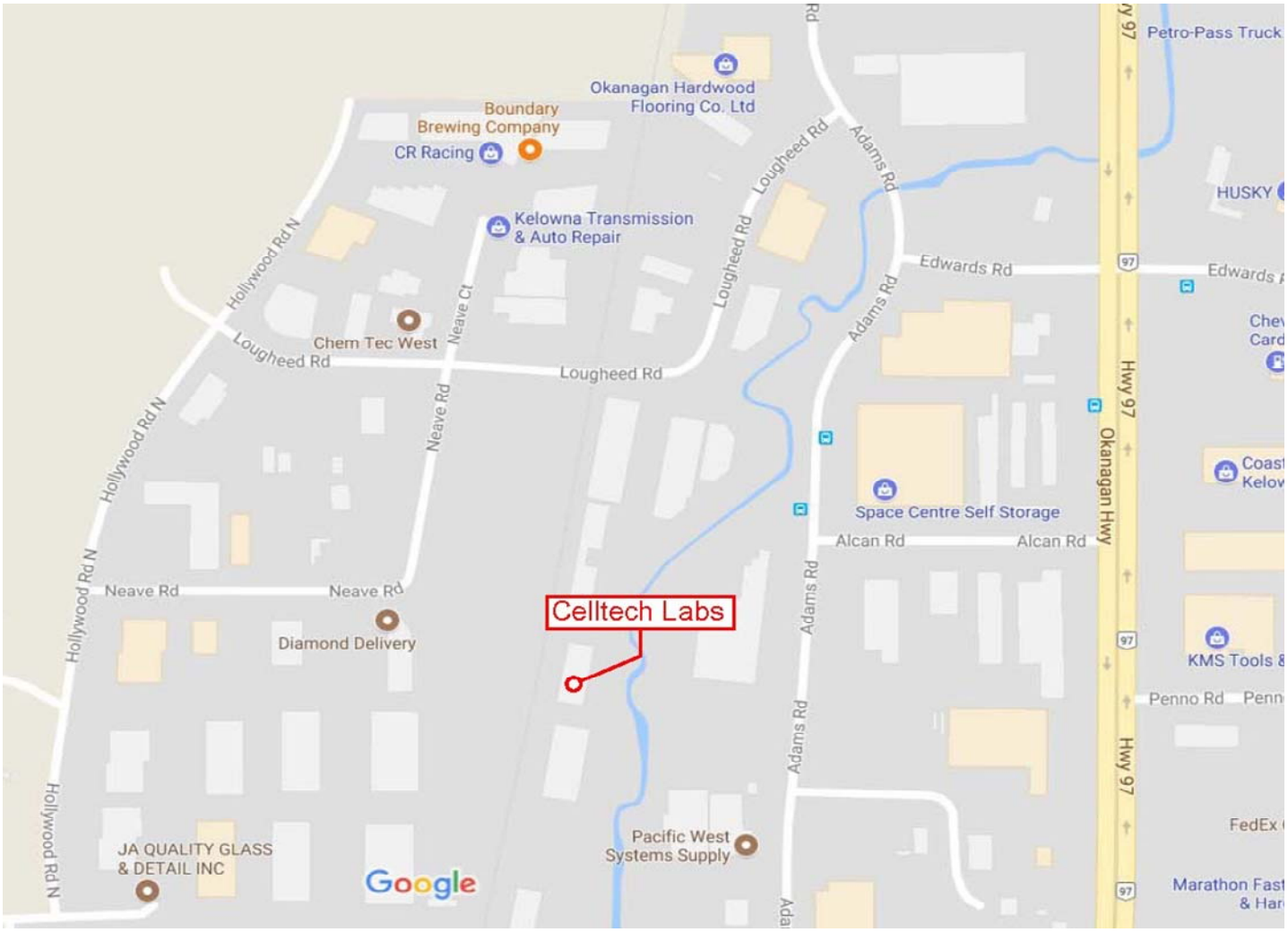
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.4-2014	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz
ANSI C63.26-2015	American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (Revision of TIA-603-D)
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 15: Subpart B:	Code of Federal Regulations Telecommunication Radio Frequency Devices Unintentional Radiators
CFR Title 47: Part 80: Sub Part E:	Code of Federal Regulations Telecommunication Stations In The Maritimes Services General Technical Standards
ISED RSS-Gen Issue 5A1: March 2019	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment
ISED ICES-003 Issue 6: Jan 2016	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement
ISED RSS-182 Issue 6: June, 2021	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Maritime Radio Equipment Operating in the 156-162.5MHz Band

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874A and Industry Canada under Test Site File Number IC 3874A. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 MODULATION RESPONSE - LIMITING

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1047, §80.213, RSS-182**

Limits	
47 CFR §2.1047	a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.
47 CFR §80	**§80.213 Modulation requirements.** (a) Transmitters must meet the following modulation requirements: (2) When phase or frequency modulation is used in the 156-162 MHz band the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ±5 kHz is defined as 100 percent peak modulation; (b) Radiotelephone transmitters using A3E, F3E and G3E emission must have a modulation limiter to prevent any modulation over 100 percent. This requirement does not apply to survival craft transmitters, to transmitters that do not require a license or to transmitters whose output power does not exceed 3 watts.
RSS-182	**5.4 Types of Modulation and Equipment Characteristics** VHF radiocommunication shall employ G3E or F3E modulation for voice communication. (iii) the frequency deviation corresponding to 100% modulation shall approach 5 kHz as nearly as practicable and in no event shall the frequency deviation exceed +/- 5 kHz;

Measurement Procedure

TIA 603-E 2.2.6.2.1 Transmitter Audio Frequency Response - Constant Deviation

a) Connect the equipment as illustrated.
b) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤50 Hz to ≥15,000 Hz. Turn the de-emphasis function off.
c) Set the DMM to measure rms voltage.
d) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
e) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
f) Set the test receiver to measure rms deviation and record the deviation reading.
g) Record the DMM reading as VREF .
h) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz.
i) Vary the audio frequency generator output level until the deviation reading that was recorded in step f) is obtained.
j) Record the DMM reading as VFREQ .
k) Calculate the audio frequency response at the present frequency as: $AFR = 20\log(Vfreq/Vref)$

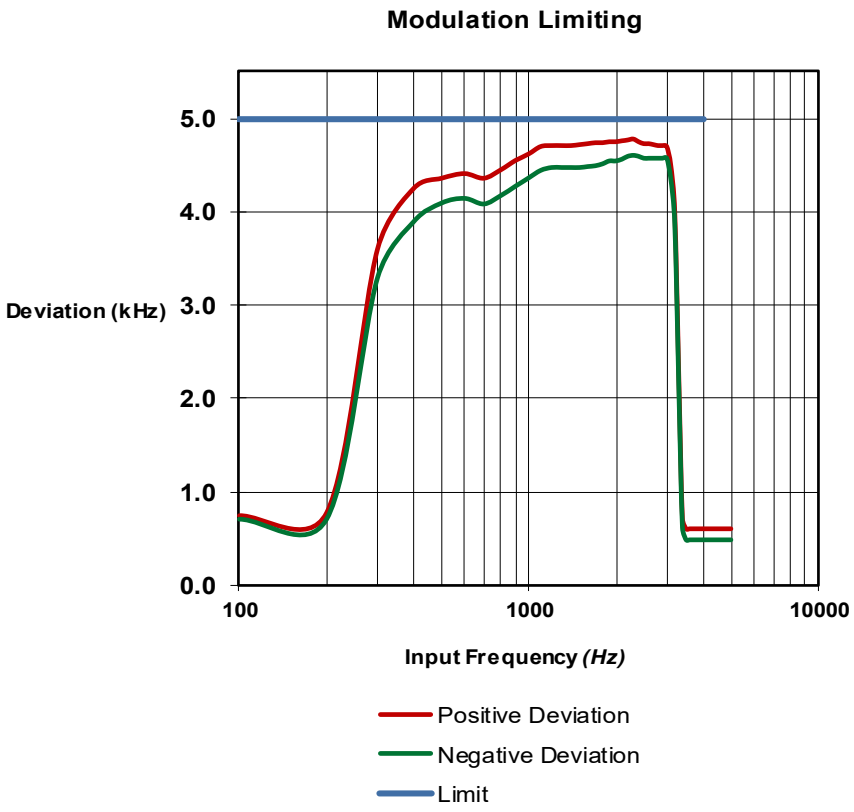
Graph the audio level in dB relative to the 0 dB reference level as a function of the modulating frequency. Record any audio frequency where it is impossible to perform the measurement.

Test Setup	Appendix A Figure A.2

Plot 7.1 – Modulation Limiting

Modulation Limiting

Measured Audio Response		
Freq (Hz)	Audio Response (Deviation) (@ 85mv Audio Level)	
	Pos (kHz)	*Neg (kHz)*
100	0.75	0.72
200	0.78	0.72
300	3.60	3.30
400	4.25	3.90
500	4.36	4.10
600	4.41	4.15
700	4.36	4.09
800	4.45	4.18
900	4.55	4.28
1000	4.62	4.37
1100	4.70	4.45
1200	4.71	4.48
1300	4.71	4.48
1400	4.71	4.48
1500	4.72	4.48
1600	4.73	4.49
1700	4.74	4.50
1800	4.74	4.52
1900	4.75	4.55
2000	4.75	4.55
2100	4.76	4.57
2200	4.77	4.60
2300	4.78	4.61
2400	4.75	4.60
2500	4.73	4.58
2600	4.73	4.58
2700	4.72	4.58
2800	4.71	4.58
2900	4.71	4.58
3000	4.70	4.58
3100	4.50	4.36
3200	4.00	3.88
3300	2.33	2.22
3400	0.72	0.63
3500	0.61	0.50
3600	0.61	0.50
3700	0.61	0.50
3800	0.61	0.50
3900	0.61	0.50
4000	0.61	0.50
5000	0.61	0.50



Audio Level = 20dB greater than audio level at audio frequency = 1kHz

Maximum Deviation:	**4.78kHz**
Result:	**Complies**

8.0 MODULATION RESPONSE – AUDIO LOW PASS FILTER RESPONSE

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1047, §80.213, RSS-182**

Limits	
47 CFR §2.1047	a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.
47 CFR §80	**§80.213 Modulation requirements.** (a) Transmitters must meet the following modulation requirements: (e) Coast station transmitters operated in the 156-162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20 kHz it must have an attenuation greater than at 1 kHz by at least 60log10(f/3) dB where "f" is the audio frequency in kilohertz. At frequencies above 20 kHz the attenuation must be at least 50 dB greater than at 1 kHz.
RSS-182	**5.4 Types of Modulation and Equipment Characteristics** VHF radiocommunication shall employ G3E or F3E modulation for voice communication and G2B for DSC signals. (d) the audio-frequency band shall be 3000 Hz;

Measurement Procedure

TIA 603-E 2.2.6.2.2 Transmitter Audio Frequency Response - Constant Input

a) Connect the equipment as illustrated.
b) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤50 Hz to ≥15,000 Hz. Turn the de-emphasis function off.
c) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
d) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation.
e) Set the test receiver to measure rms deviation and record the deviation reading as DEVREF .
f) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz.
g) Record the test receiver deviation reading as DEVFREQ .
h) Calculate the audio frequency response at the present frequency as: AFR = 20Log(Dfreq/Dref)

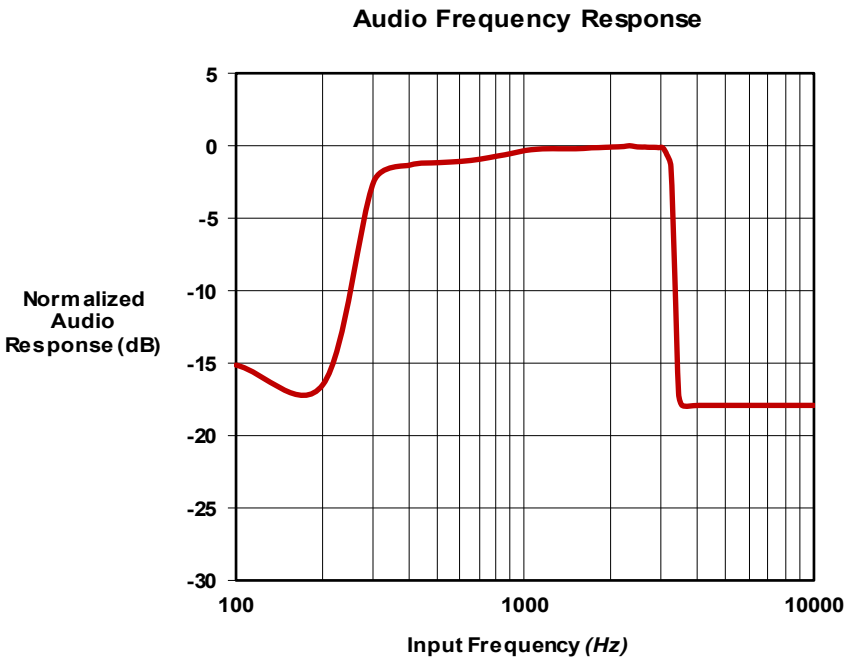
Graph the audio level in dB relative to the 0 dB reference level as a function of the modulating frequency. Record any audio frequency where it is impossible to perform the measurement.

Test Setup	**Appendix A Figure A.2**

Plot 8.1 – Audio Frequency Response

Audio Frequency Response

Measured Audio Response		
Freq (Hz)	Audio Response (Deviation) (@ 10mv Audio Level) (kHz)	(dB)*
100	0.84	-15.103
200	0.72	-16.442
300	3.60	-2.463
400	4.10	-1.333
500	4.18	-1.165
600	4.22	-1.082
700	4.30	-0.919
800	4.40	-0.720
900	4.50	-0.524
1000	4.60	-0.333
1100	4.65	-0.239
1200	4.67	-0.202
1300	4.67	-0.202
1400	4.67	-0.202
1500	4.67	-0.202
1600	4.68	-0.184
1700	4.70	-0.147
1800	4.71	-0.128
1900	4.72	-0.110
2000	4.73	-0.091
2100	4.74	-0.073
2200	4.75	-0.055
2300	4.78	0.000
2400	4.75	-0.055
2500	4.73	-0.091
2600	4.73	-0.091
2700	4.72	-0.110
2800	4.72	-0.110
2900	4.71	-0.128
3000	4.70	-0.147
3100	4.45	-0.621
3200	4.05	-1.439
3300	1.73	-8.828
3400	0.67	-17.067
3500	0.61	-17.882
4000	0.61	-17.882
5000	0.61	-17.882
10000	0.61	-17.882
* Normalize to 2300Hz		



Note: Modulation could not be achieved above 3300Hz.

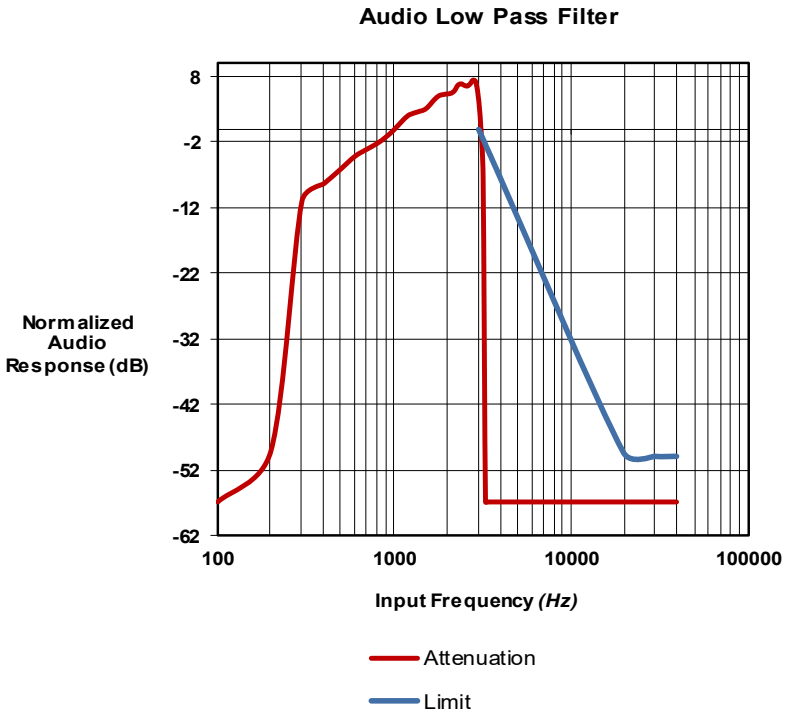
Audio Frequency at -6dB Attenuation:	< 3300Hz
Result:	Complies

Plot 8.2 – Audio Low Pass Filter Response

Audio Low Pass Filter Response

Measured Audio Response			
Freq	Audio Response (Attenuation) (@ 3kHz Deviation)		
(Hz)	*(mv)*	*(dB)**	
100	6000.00	-56.773	
200	2450.00	-48.993	
300	30.50	-10.896	
400	22.50	-8.253	
500	17.30	-5.971	
600	13.90	-4.070	
700	12.30	-3.008	
800	11.10	-2.116	
900	9.90	-1.122	
1000	8.70	0.000	
1100	7.60	1.174	
1200	6.80	2.140	
1300	6.50	2.532	
1400	6.30	2.804	
1500	6.10	3.084	
1600	5.60	3.827	
1700	5.10	4.639	
1800	4.80	5.166	
1900	4.70	5.348	
2000	4.65	5.441	
2100	4.60	5.535	
2200	4.40	5.921	
2300	4.00	6.749	
2400	3.90	6.969	
2500	4.00	6.749	
2600	4.05	6.641	
2700	3.90	6.969	
2800	3.65	7.545	
2900	3.75	7.310	**Limit**
3000	4.80	5.166	0.00
3100	8.10	0.621	-0.85
3200	20.10	-7.274	-1.68
3300	6000.00	-56.773	-2.48
3400	6000.00	-56.773	-3.26
3450	6000.00	-56.773	-3.64
3475	6000.00	-56.773	-3.83
3490	6000.00	-56.773	-3.94
3500	6000.00	-56.773	-4.02
3600	6000.00	-56.773	-4.75
3700	6000.00	-56.773	-5.46
3800	6000.00	-56.773	-6.16
3900	6000.00	-56.773	-6.84
4000	6000.00	-56.773	-7.50
20000	6000.00	-56.773	-49.43
30000	6000.00	-56.773	-50.00
40000	6000.00	-56.773	-50.00

*** Normalize to 1000Hz**



Note: 3 khz deviation could not be achieved above 3300Hz.

Audio Frequency at -6dB Attenuation:	**< 3200Hz**
Result:	**Complies**

9.0 CONDUCTED POWER

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §2.1033(c)(8), §80.215, RSS-182 EIA/TIA-603-E

Limits	
47 CFR §80	**§80.215 Transmitter power.** (c) Coast station frequencies above 27500 kHz. The maximum power must not exceed the alues listed below. (2) Marine utility stations: 156-162MHz - 10W
RSS-182	**5.6 Transmitter Output Powers** The transmitter output power for equipment certified under this standard shall not exceed the limits specified in table 3. Shipborne hand-held protable transmitter: 6W

General Procedure	
TIA-603-E	**2.2.1 TRANSMITTER CARRIER POWER OUTPUT** Transmitter Carrier Power Output for this service is the power (rms) available at the output terminals of the transmitter when the output terminals are connected to a standard output load. This measurement shall be performed without modulation, at standard test. conditions.

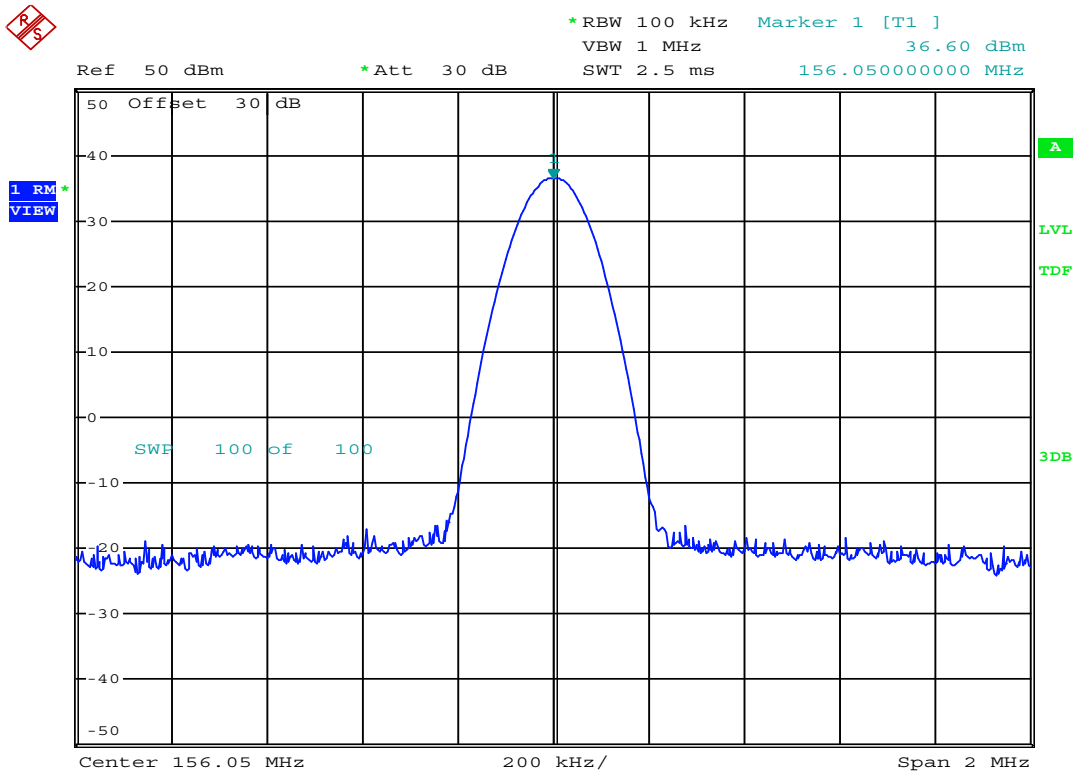
Test Setup	Appendix A - Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer via a 30dB attenuator connected to the DUT's antenna port. The SA was set to measure RMS power. The output power of the DUT was set to the manufacturer's lowest, mid and highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit unmodulated. The SA was set to Max Hold and the output power was measured using Marker Peak.

Plot 9.1 – Conducted Power – 5W – Ch 1

Conducted Power:

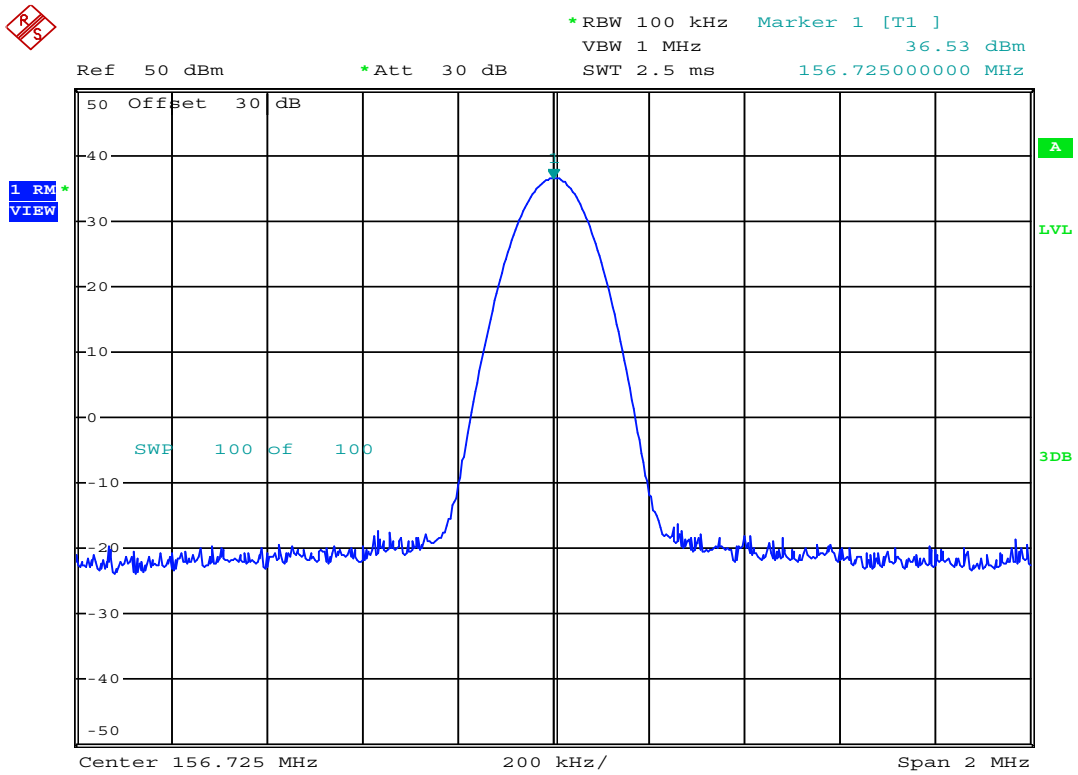


Date: 25.NOV.2021 12:50:31

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
1	156.05	5W	CW	36.60

Plot 9.2 – Conducted Power – 5W – Ch 74

Conducted Power:

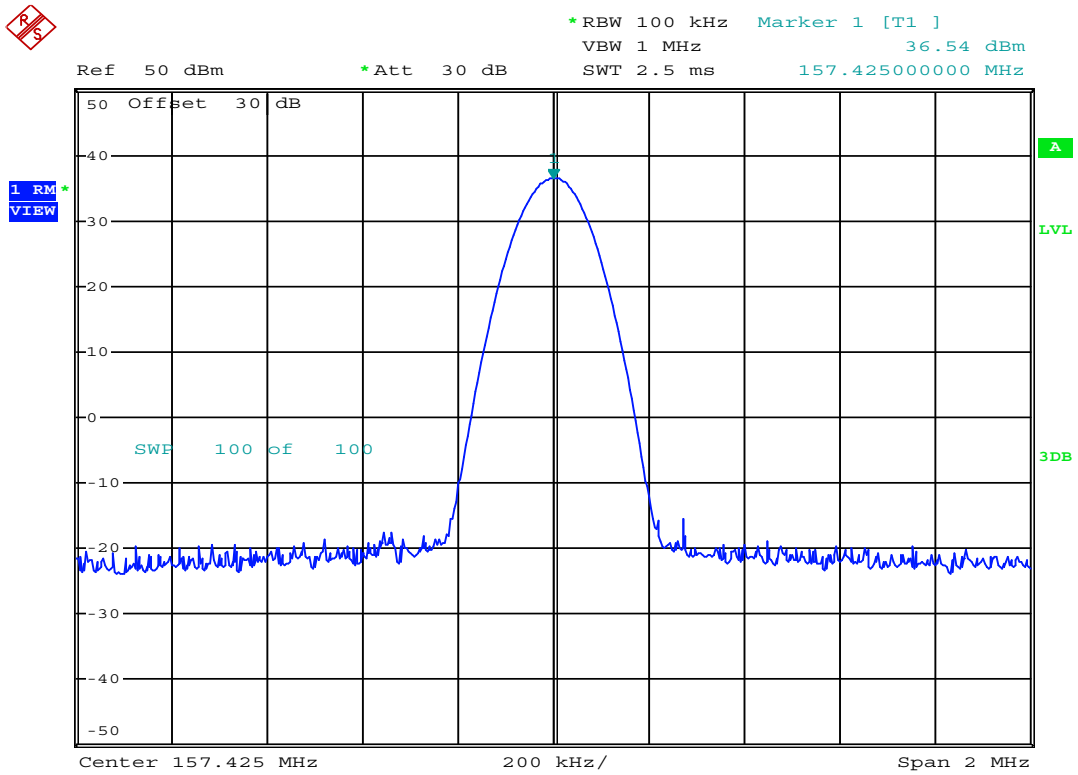


Date: 6.DEC.2021 14:12:07

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
74	156.725	5W	CW	36.53

Plot 9.3 – Conducted Power – 5W – Ch 88

Conducted Power:

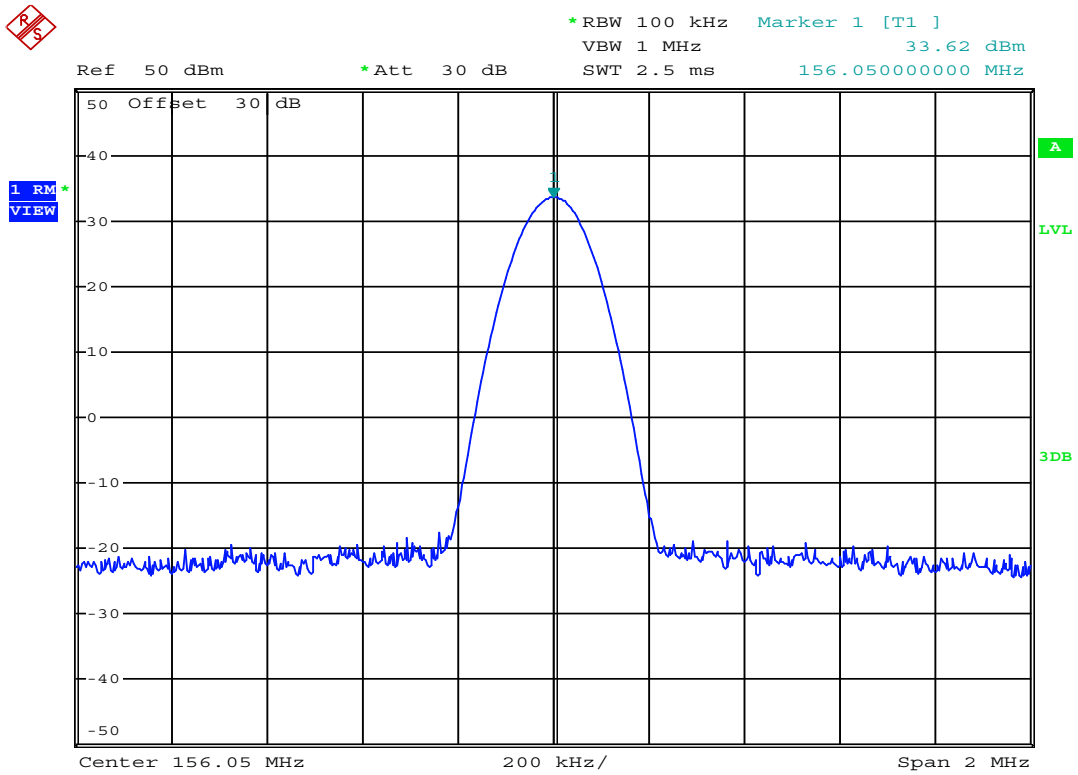


Date: 6.DEC.2021 14:09:17

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
88	157.425	5W	CW	36.54

Plot 9.4 – Conducted Power – 2.5W – Ch 1

Conducted Power:

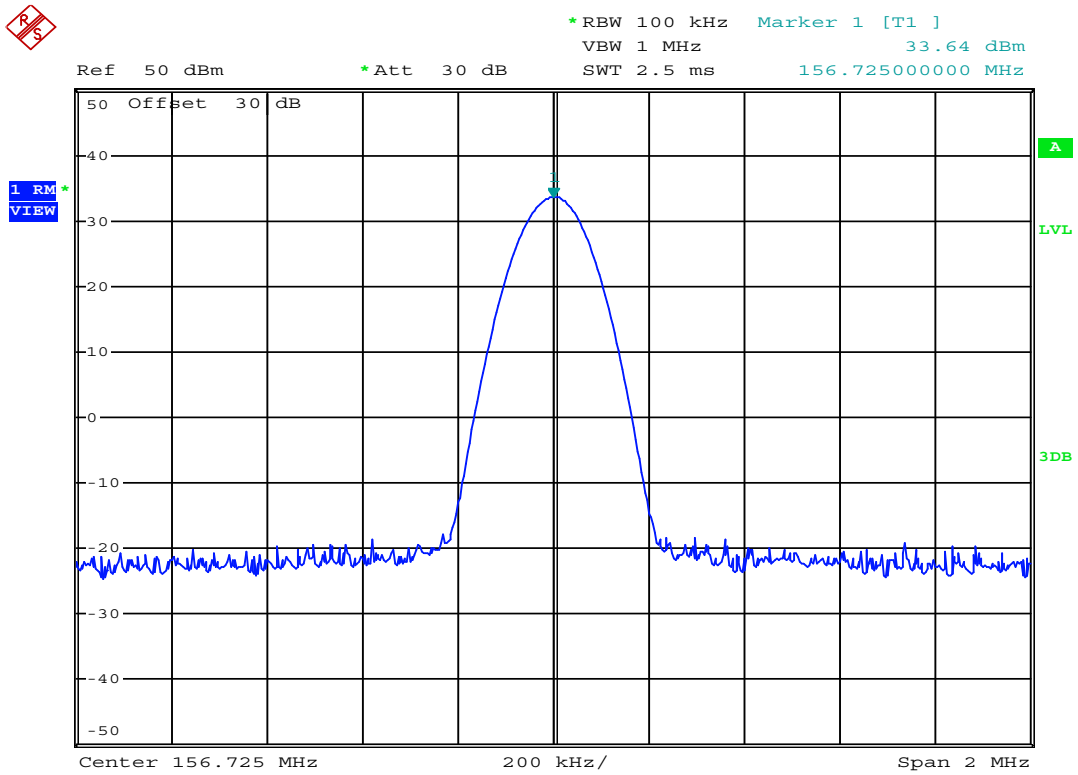


Date: 6.DEC.2021 15:24:22

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
1	156.05	2.5W	CW	33.62

Plot 9.5 – Conducted Power – 2.5W – Ch 74

Conducted Power:

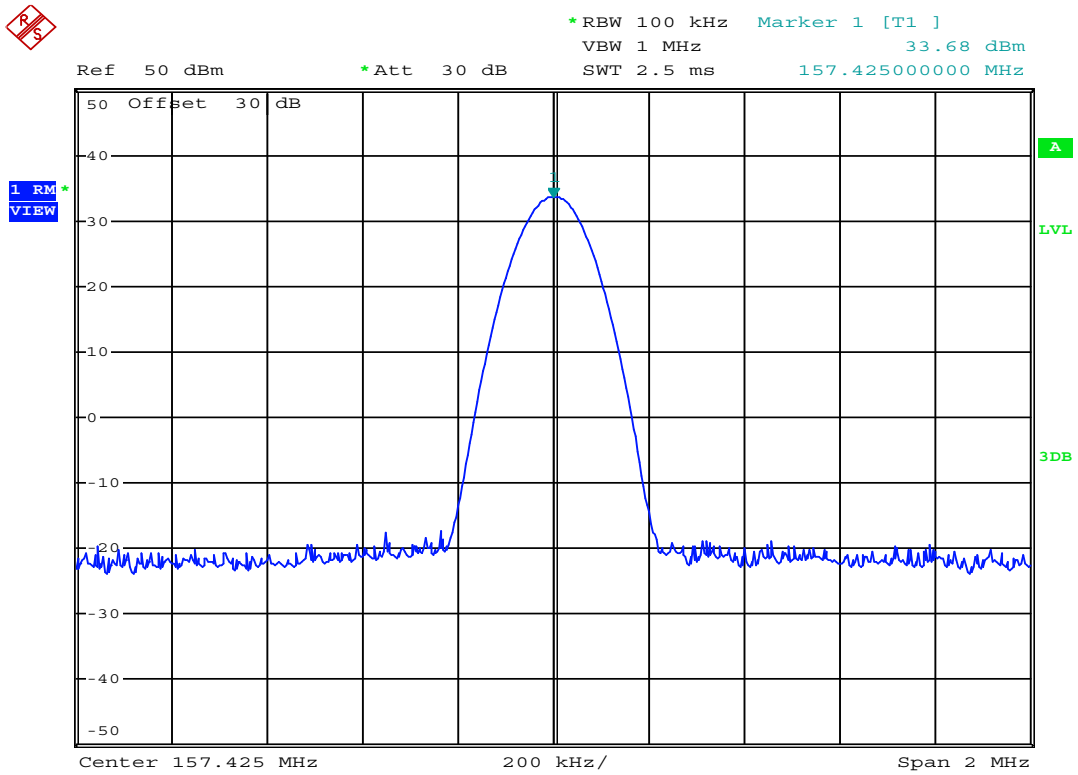


Date: 6.DEC.2021 15:25:15

Channel Number	Channel Frequency (MHz)	Power Setting	Modulation	Conducted Power (dBm)
74	156.725	2.5W	CW	33.64

Plot 9.6 – Conducted Power – 2.5W – Ch 88

Conducted Power:

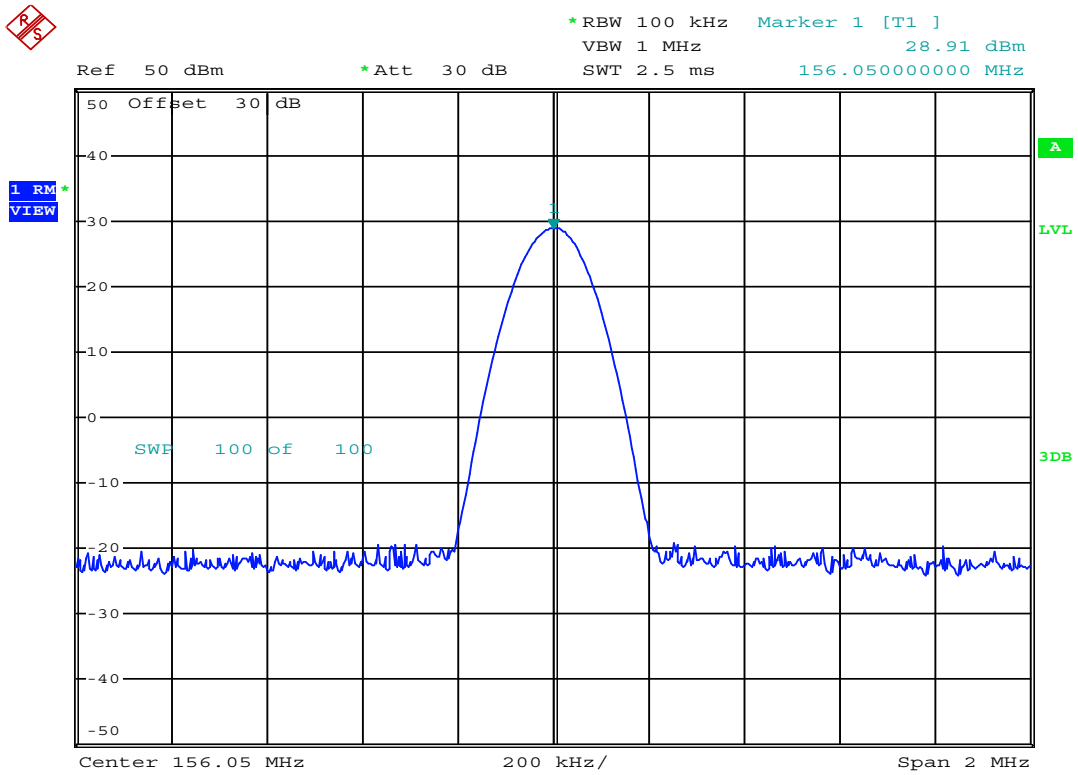


Date: 6.DEC.2021 15:23:25

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
88	157.425	2.5W	CW	33.68

Plot 9.7 – Conducted Power – 1W – Ch 1

Conducted Power:

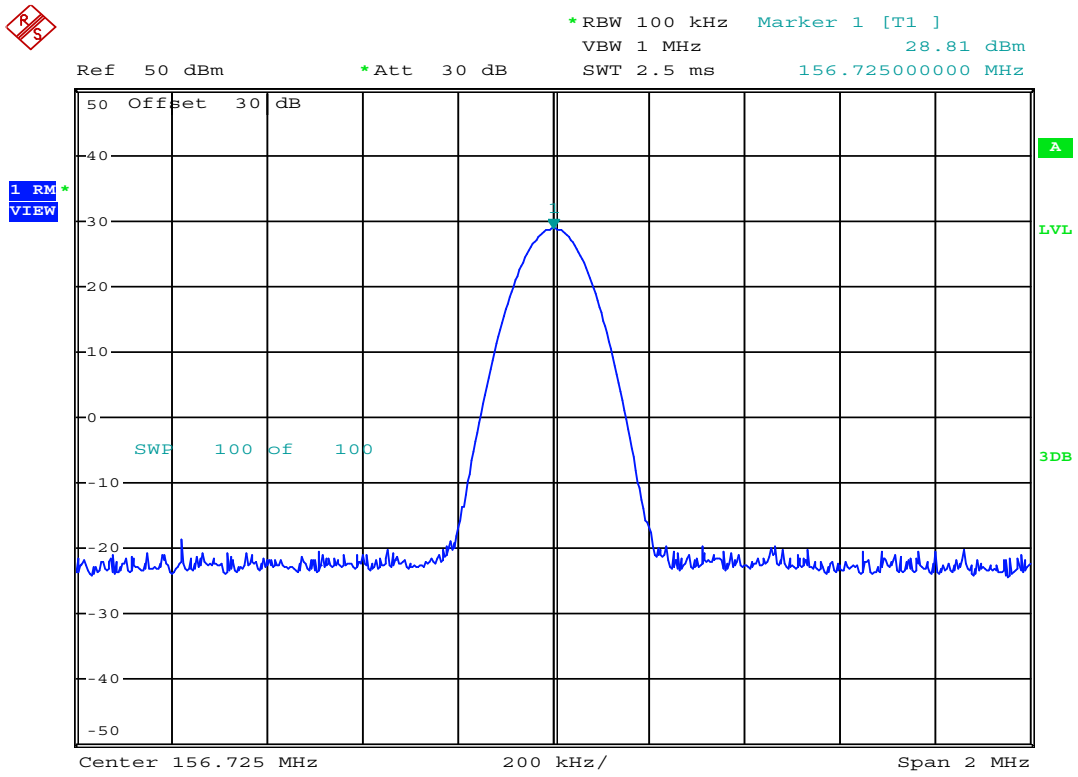


Date: 6.DEC.2021 14:07:44

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
1	156.05	1W	CW	28.91

Plot 9.8 – Conducted Power – 1W – Ch 74

Conducted Power:

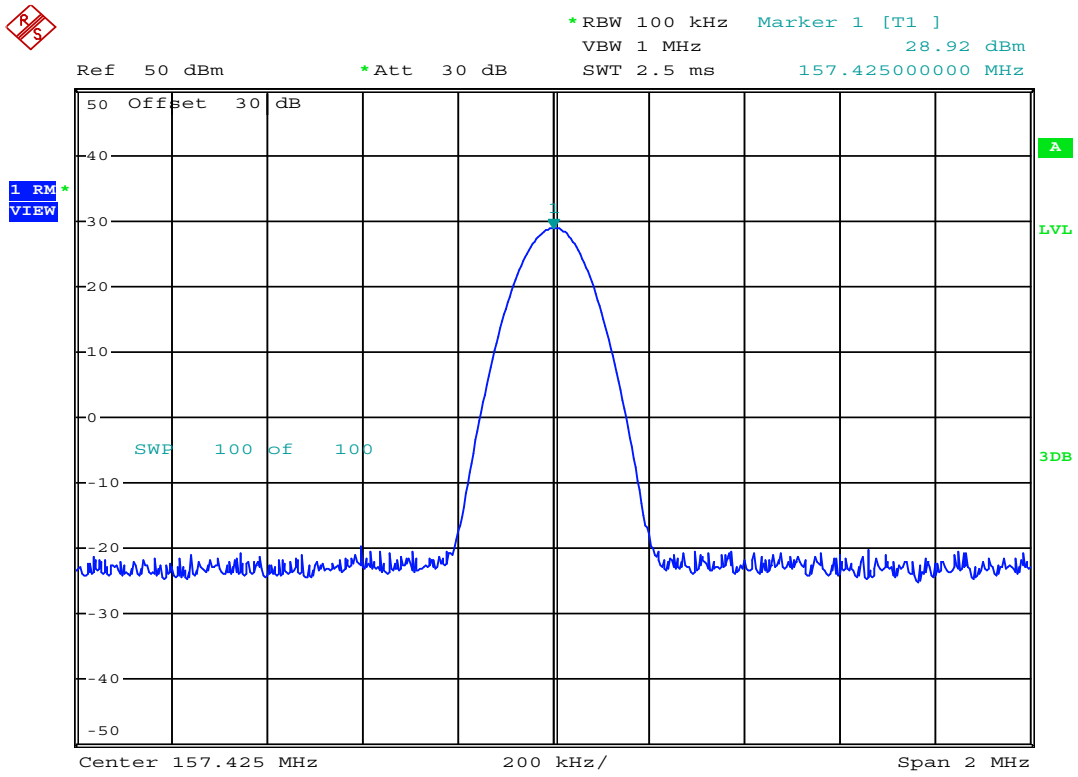


Date: 6.DEC.2021 14:11:32

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
74	156.725	1W	CW	28.81

Plot 9.9 – Conducted Power – 1W – Ch 88

Conducted Power:



Date: 6.DEC.2021 14:10:16

Channel Number	Channel Frequency *(MHz)*	Power Setting	Modulation	Conducted Power *(dBm)*
88	157.425	1W	CW	28.92

Table 9.1 - Summary of Conduct Power Measurements

Conducted Power Measurement Results:								
Power Setting	Channel Number	Frequency (MHz)	Modulation	Measured Power [P_{Meas}] (dBm)	Measured Power [P_{Meas}] (W)	Limit [P_{Lim}] (dBm)	Limit [P_{Lim}] (W)	Margin (dB)
5W	1	156.05	CW	36.60	4.57	37.8	6.0	1.2
	74	156.73		36.53	4.50			1.3
	88	157.43		36.54	4.51			1.3
2.5W	1	156.05		33.62	2.30			4.2
	74	156.73		33.64	2.31			4.2
	88	157.43		33.68	2.33			4.1
1W	1	156.05		28.91	0.78			8.9
	74	156.73		28.81	0.76			9.0
	88	157.43		28.92	0.78			8.9
							Result:	Complies

Conducted Margin = P_{Limit} - P_{Meas}

Table 9.2 – Compliance to §2.1033(c)(8)

FCC CFR 47 §2.1033(c)(8): Power to Transmitter:	
6W Setting	
Measured Receiver Current:	IRx = 0.10A
Measured Total Current:	ITx =1.35A
Transmitter Current (ITx - IRx):	IXmitter = 1.25A
Power to Transmitter:	(7.4VDC)(1.25) = 9.25W
Result:	Complies
2.5W Setting	
Measured Receiver Current:	IRx = 0.10A
Measured Total Current:	ITx =1.05A
Transmitter Current (ITx - IRx):	IXmitter = 0.95A
Power to Transmitter:	(7.4VDC)(0.95) = 7.03W
Result:	Complies
1W Setting	
Measured Receiver Current:	IRx = 0.10A
Measured Total Current:	ITx =0.65A
Transmitter Current (ITx - IRx):	IXmitter = 0.55A
Power to Transmitter:	(7.4VDC)(0.55) = 4.07W
Result:	Complies

10.0 OCCUPIED BANDWIDTH AND EMISSION MASKS

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, §80.205, §80.211, RSS-182**

Limits	
47 CFR §80	**§80.205 Bandwidths.** (a) An emission designator shows the necessary bandwidth for each class of emission of a station except that in ship earth stations it shows the occupied or necessary bandwidth, whichever is greater. The following table gives the class of emission and corresponding emission designator and authorized bandwidth: F3E: 16K0F3E, Authorized BW: 20kHz
RSS-182	**5.4 Types of Modulation and Equipment Characteristics** (v) the authorized channel bandwidth for voice shall be 16 kHz; and
47 CFR §80	**§80.211 Emission limitations.** The emissions must be attenuated according to the following schedule. (f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section: (1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB; (2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus 10log10 (mean power in watts) dB.
RSS-182	**5.9.1 Emission Mask B for Equipment with 25 kHz Channel Spacing** This mask is for FM or PM modulation equipment with 25 kHz channel spacing, an authorized bandwidth of 16 kHz for voice or 20 kHz for data, and equipped with or without an audio low-pass filter. The power of any emission shall be attenuated below the transmitter output power (P, in dBW) as follows: (a) on any frequency removed from the carrier frequency by more than 50%, but not more than 100% of the authorized bandwidth: at least 25 dB, measured with a bandwidth of 300 Hz; (b) on any frequency removed from the carrier frequency by more than 100%, but not more than 250% of the authorized bandwidth: at least 35 dB, measured with a bandwidth of 300 Hz; and (c) on any frequency removed from the carrier frequency by more than 250% of the authorized bandwidth: at least 43 + 10 log10 p(watts) dB, measured with a bandwidth of 30 kHz.

Measurement Procedure

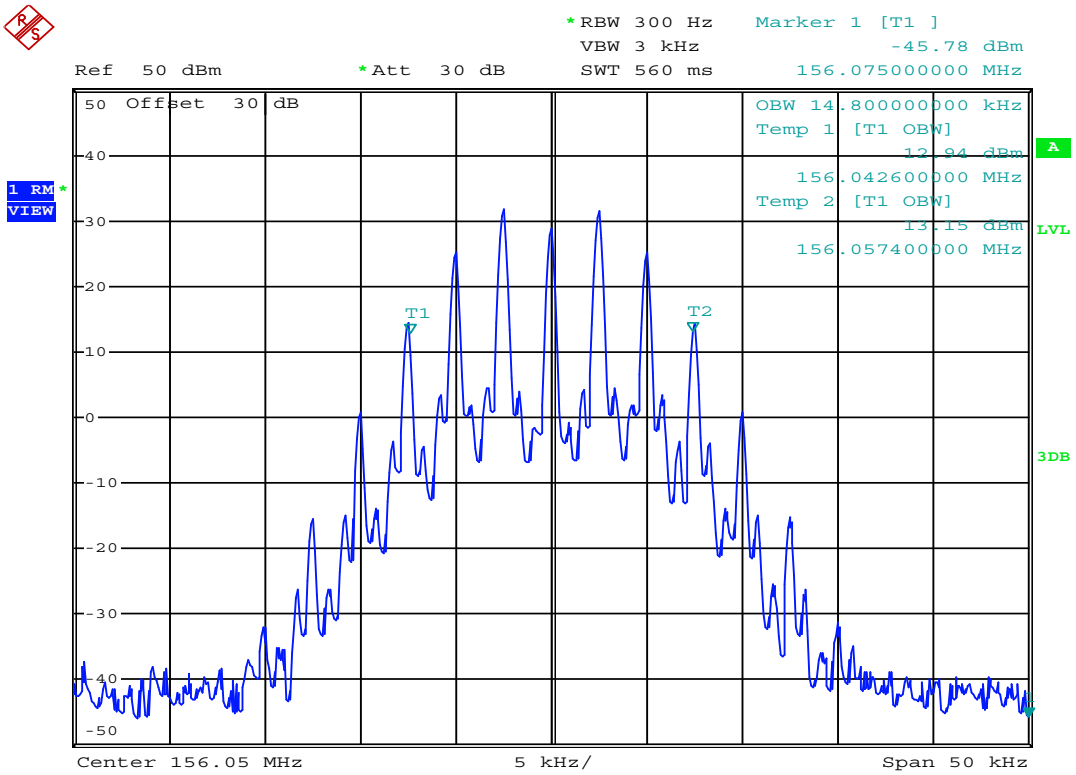
TIA 382 23.2 Transmitter Modulation Occupied Bandwidth

The transmitter is modulated by a sinusoidal audio signal applied to the microphone input jack. First, the frequency is adjusted to deliver 50% modulation at the highest audio response level (minimum applied audio level). Then the audio signal level is increased 16 dB and the audio frequency is readjusted to 2500 Hz The analyzer is adjusted to display each of the discrete modulation sidebands and their respective harmonic products within +/- 50 kHz of the carrier frequency.

Test Setup	Appendix A Figure A.1

Plot 10.1 – Occupied Bandwidth – 5W – Ch 1

Occupied Bandwidth:

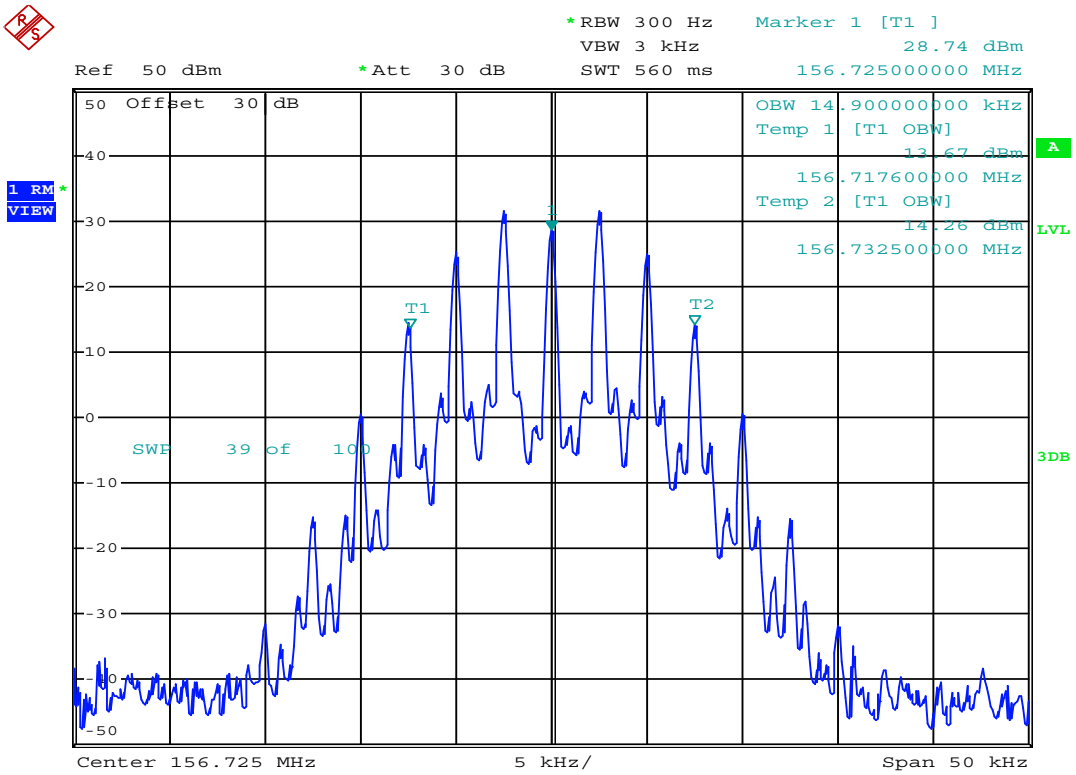


Date: 6.DEC.2021 14:30:07

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
5W	1	156.05	FM	14.8

Plot 10.2 – Occupied Bandwidth – 5W – Ch 74

Occupied Bandwidth:

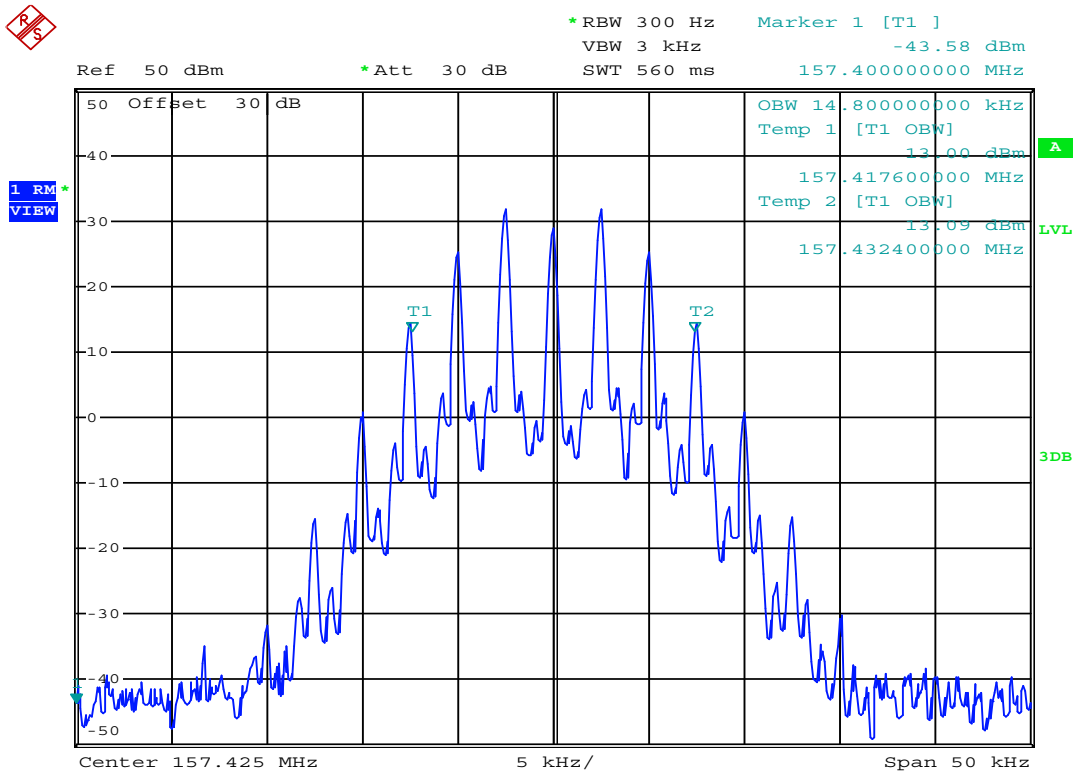


Date: 6.DEC.2021 14:26:07

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
5W	74	156.725	FM	**14.9**

Plot 10.3 – Occupied Bandwidth – 5W – Ch 88

Occupied Bandwidth:

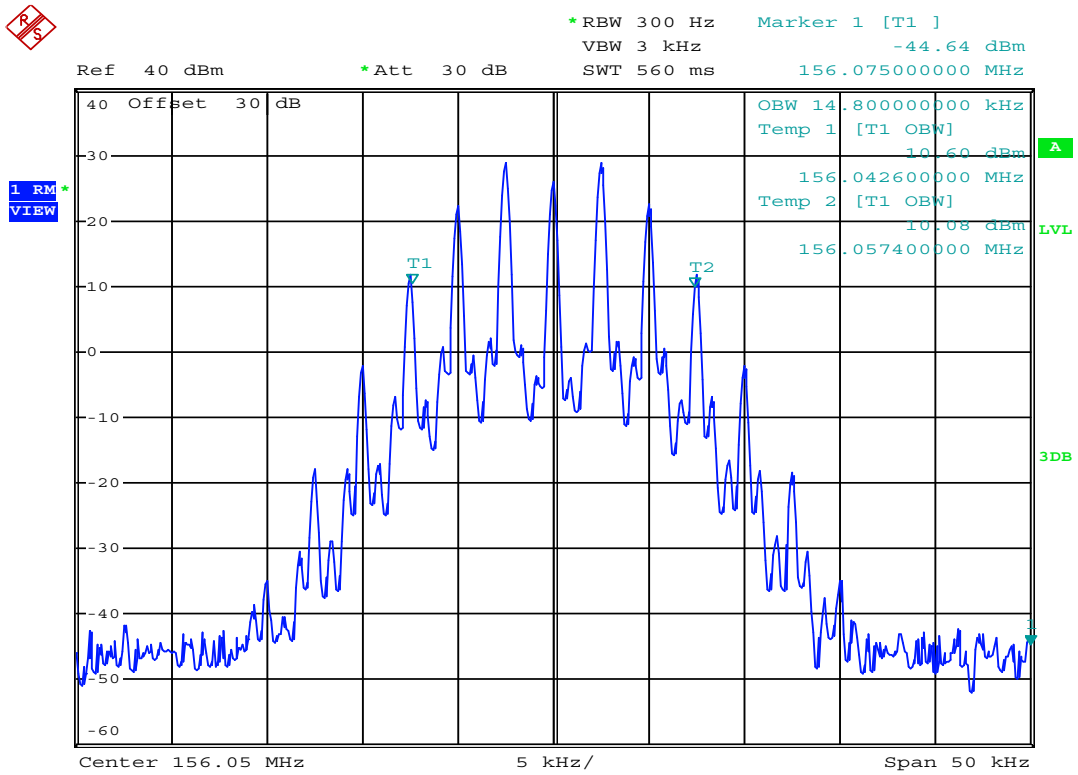


Date: 6.DEC.2021 14:28:59

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
5W	88	157.425	FM	14.8

Plot 10.4 – Occupied Bandwidth – 2.5W – Ch 1

Occupied Bandwidth:

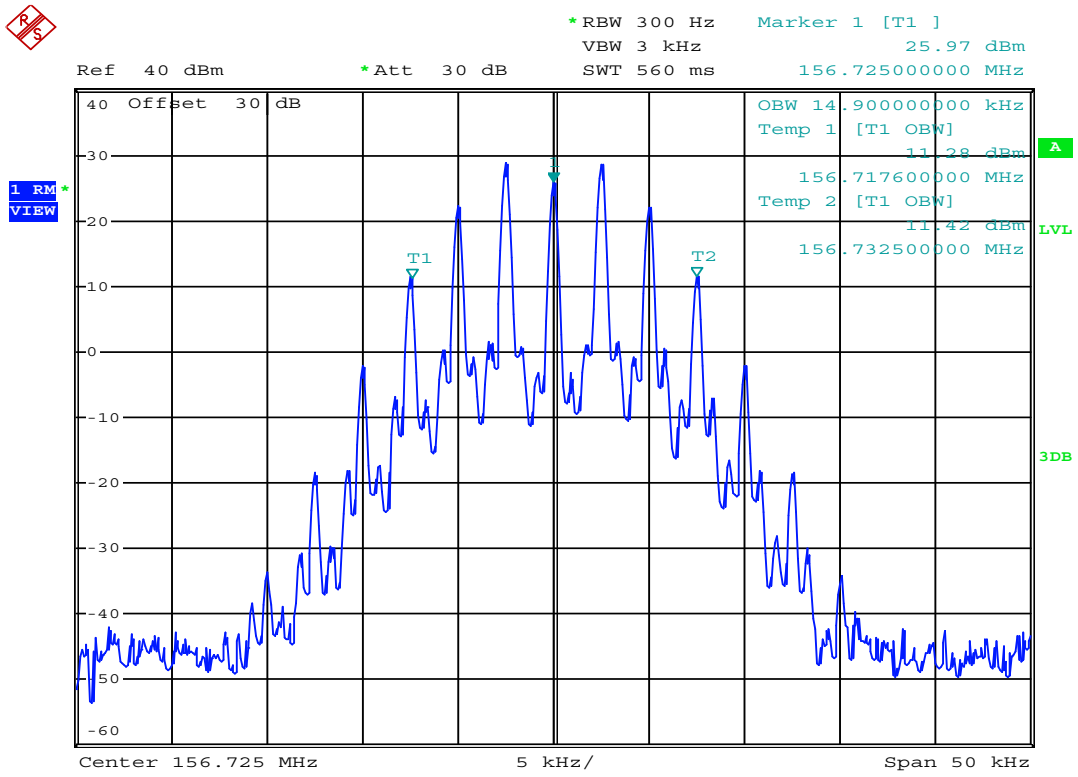


Date: 6.DEC.2021 15:27:54

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
2.5W	1	156.05	FM	14.8

Plot 10.5 – Occupied Bandwidth – 2.5W – Ch 74

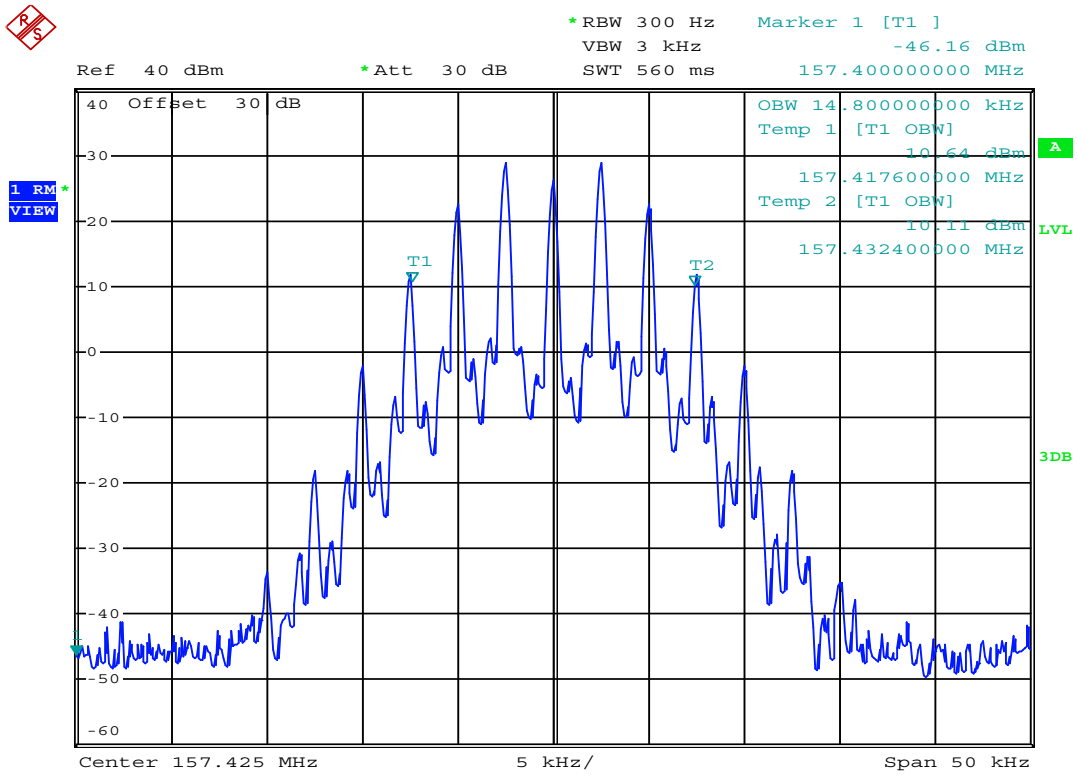
Occupied Bandwidth:



Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
2.5W	74	156.725	FM	14.9

Plot 10.6 – Occupied Bandwidth – 2.5W – Ch 88

Occupied Bandwidth:

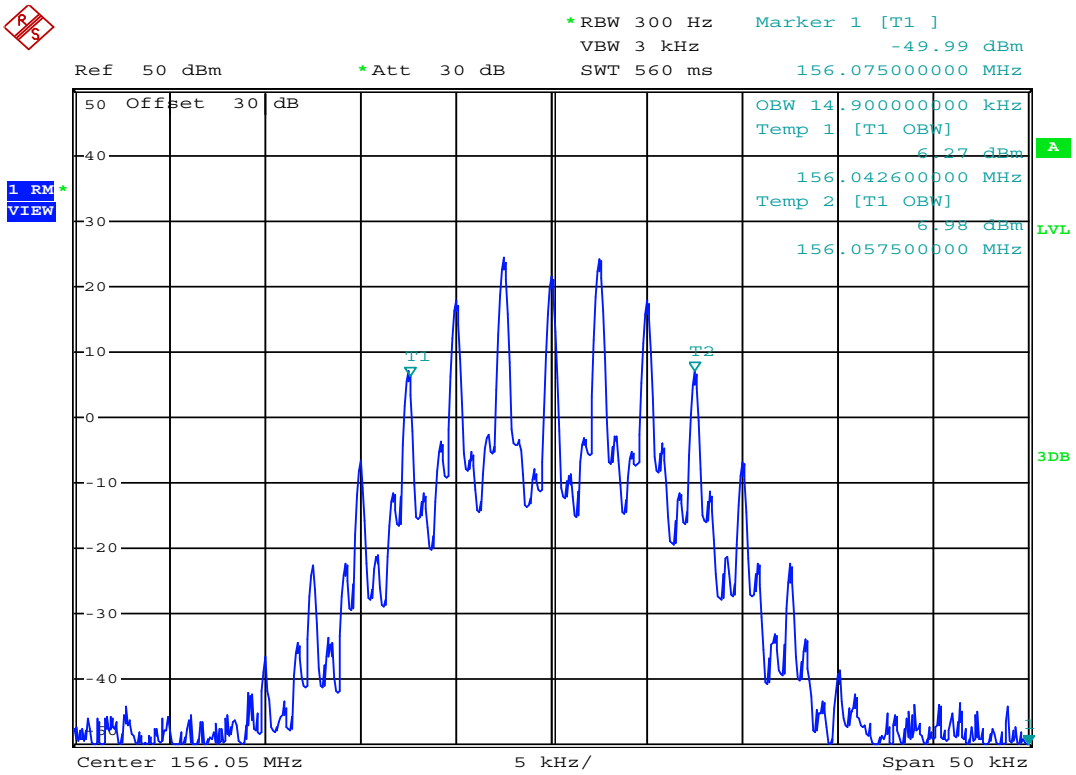


Date: 6.DEC.2021 15:27:18

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
2.5W	88	157.425	FM	14.8

Plot 10.7 – Occupied Bandwidth – 1W – Ch 1

Occupied Bandwidth:

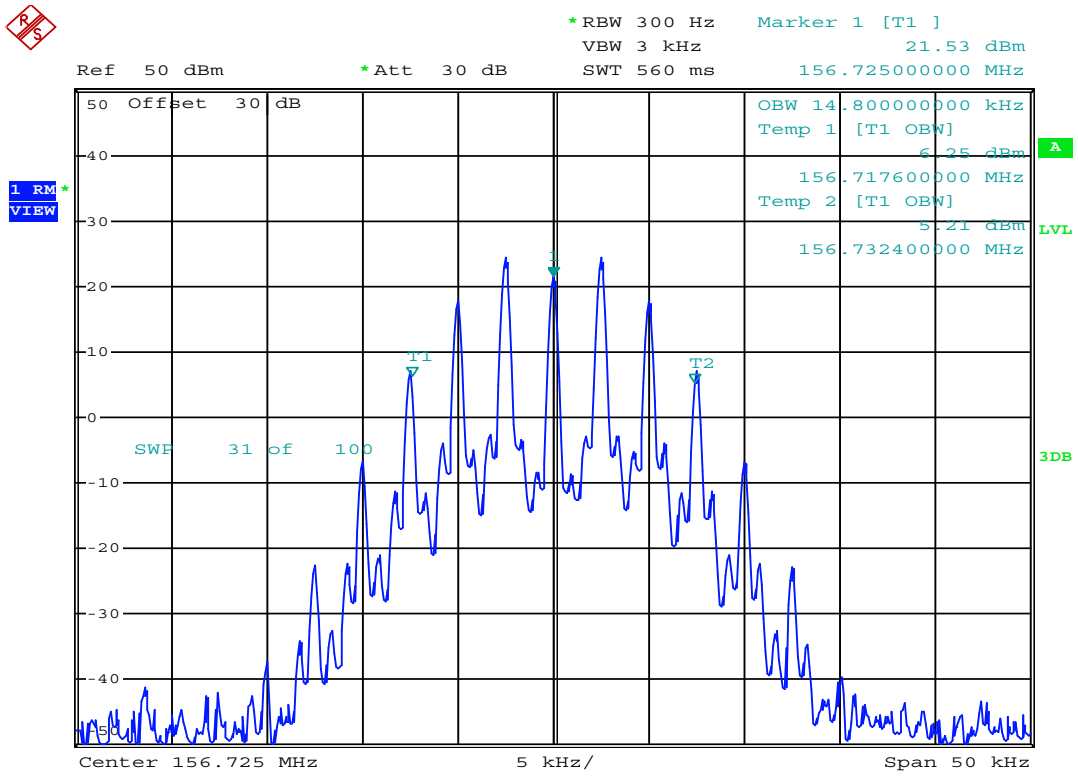


Date: 6.DEC.2021 14:30:41

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
1W	1	156.05	FM	**14.9**

Plot 10.8 – Occupied Bandwidth – 1W – Ch 74

Occupied Bandwidth:

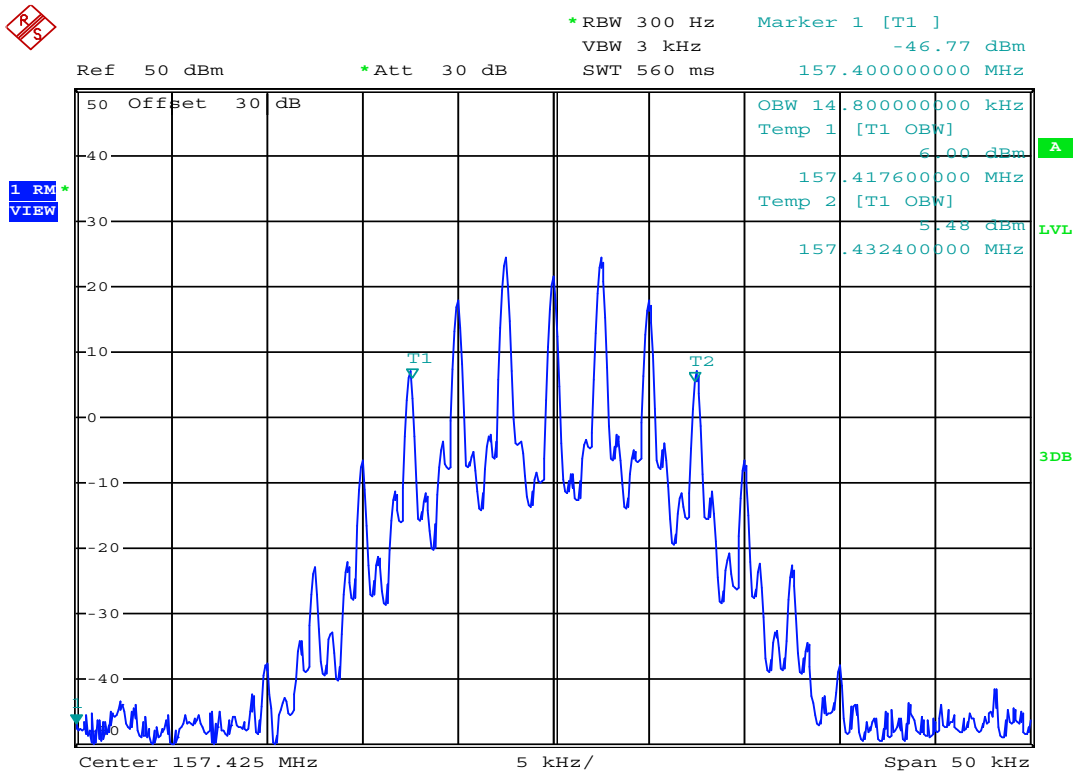


Date: 6.DEC.2021 14:26:40

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
1W	74	156.725	FM	14.8

Plot 10.9 – Occupied Bandwidth – 1W – Ch 88

Occupied Bandwidth:



Date: 6.DEC.2021 14:28:06

Power Setting	Channel Number	Channel Frequency *(MHz)*	DUT Modulation	Occupied Bandwidth *(kHz)*
1W	88	157.425	FM	14.8

Table 10 - Summary of Occupied Bandwidth and Emission Mask Results

Occupied Bandwidth Results:								
Power Setting	Channel Number	Channel Frequency (MHz)	Modulation	Measured Occupied Bandwidth (kHz)	FCC Limit (kHz)	ISED Limit (kHz)	Emission Designator	Emissions Mask
5W	1.0	156.050	FM	14.8	20	16	14K8F3E	PASS
	74.0	156.725		14.9			14K9F3E	PASS
	88.0	157.425		14.8			14K8F3E	PASS
2.5W	1.0	156.050		14.8			14K8F3E	PASS
	74.0	156.725		14.9			14K9F3E	PASS
	88.0	157.425		14.8			14K8F3E	PASS
1W	1.0	156.050		14.9			14K9F3E	PASS
	74.0	156.725		14.8			14K8F3E	PASS
	88.0	157.425		14.8			14K8F3E	PASS
						Result:	Complies	

11.0 CONDUCTED OUT OF BAND SPURIOUS EMISSIONS

Test Conditions	
Normative Reference	FCC 47 CFR §2.1049, §80.205, §80.211, RSS-182

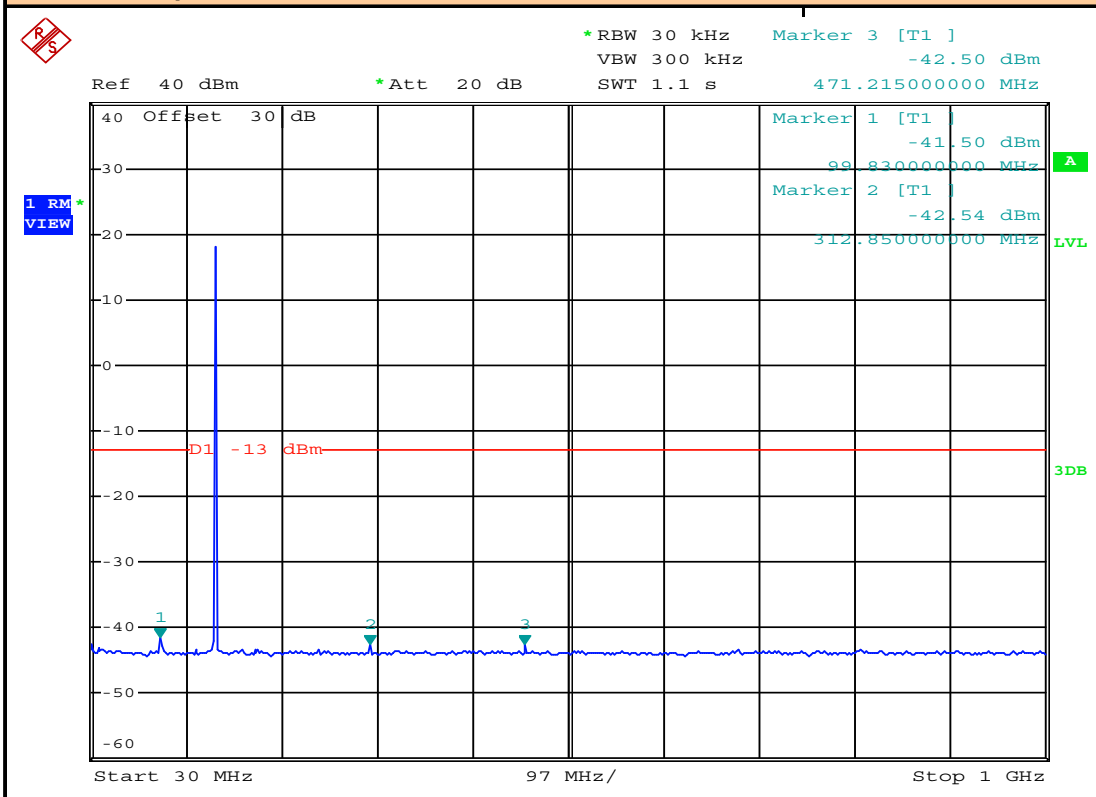
Limits	
47 CFR §80	**§80.211 Emission limitations.** The emissions must be attenuated according to the following schedule. (f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section: (1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB; (2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus 10log10 (mean power in watts) dB.
RSS-182	**5.9.1 Emission Mask B for Equipment with 25 kHz Channel Spacing** This mask is for FM or PM modulation equipment with 25 kHz channel spacing, an authorized bandwidth of 16 kHz for voice or 20 kHz for data, and equipped with or without an audio low-pass filter. The power of any emission shall be attenuated below the transmitter output power (P, in dBW) as follows: (a) on any frequency removed from the carrier frequency by more than 50%, but not more than 100% of the authorized bandwidth: at least 25 dB, measured with a bandwidth of 300 Hz; (b) on any frequency removed from the carrier frequency by more than 100%, but not more than 250% of the authorized bandwidth: at least 35 dB, measured with a bandwidth of 300 Hz; and (c) on any frequency removed from the carrier frequency by more than 250% of the authorized bandwidth: at least 43 + 10 log10 p(watts) dB, measured with a bandwidth of 30 kHz.

Measurement Procedure
The transmitter was set to the highest output power unmodulated. The emissions were evaluated to the 10th harmonic.

Test Setup	Appendix A Figure A.1

Plot 11.1 – Conducted Out of Band Emissions, 5.5W, 30MHz – 1000MHz, Channel 1

Conducted Spurious Emissions:

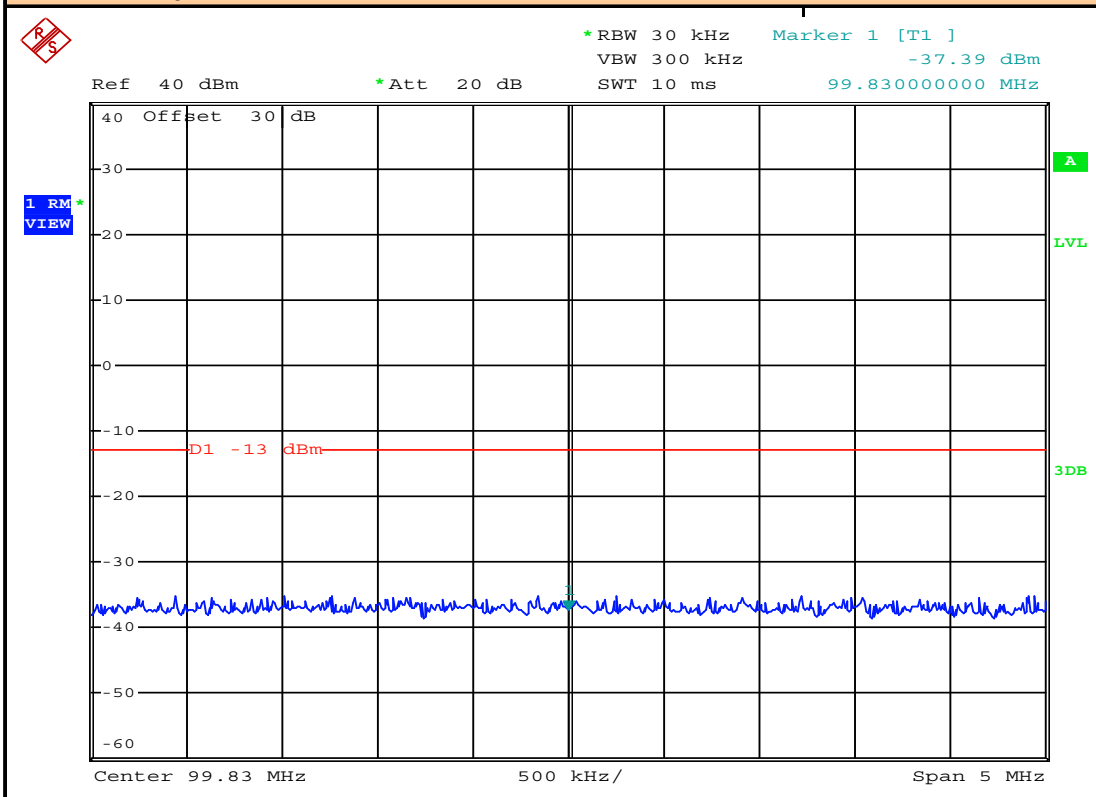


Date: 6.DEC.2021 15:46:30

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	74	156.725	CW	36.6	-	-

Plot 11.2 – Conducted Out of Band Emissions, 5.5W, 99.83MHz, Channel 1

Conducted Spurious Emissions:

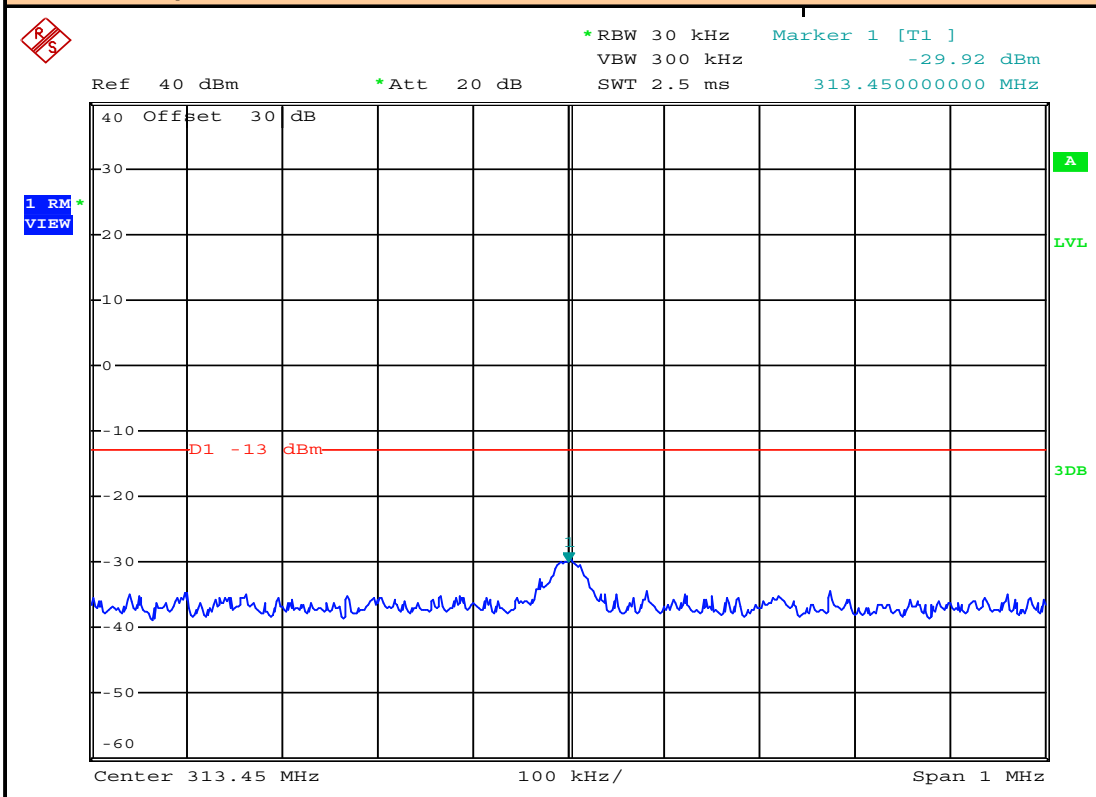


Date: 6.DEC.2021 15:47:58

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	74	156.725	CW	36.6	99.83	-37.39

Plot 11.3 – Conducted Out of Band Emissions, 5.5W, 313.45MHz, Channel 1

Conducted Spurious Emissions:

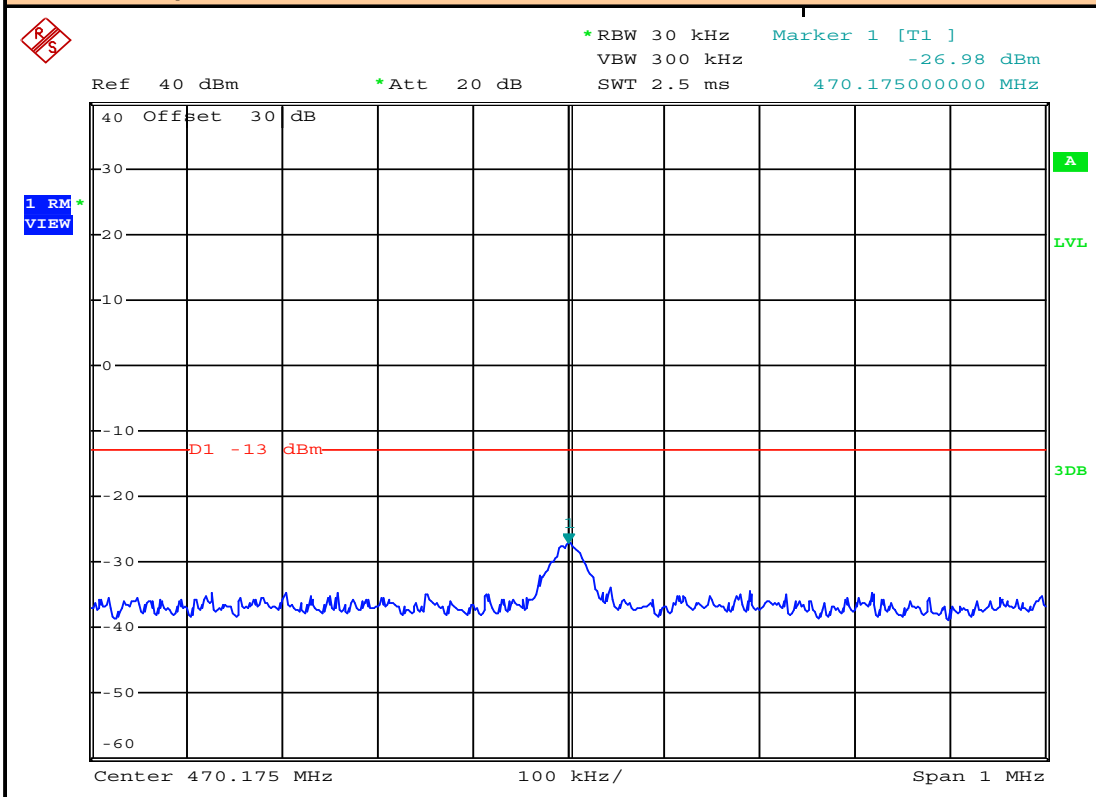


Date: 6.DEC.2021 15:48:46

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	74	156.725	CW	36.6	313.45	-29.92

Plot 11.4 – Conducted Out of Band Emissions, 5.5W, 470.18MHz, Channel 1

Conducted Spurious Emissions:

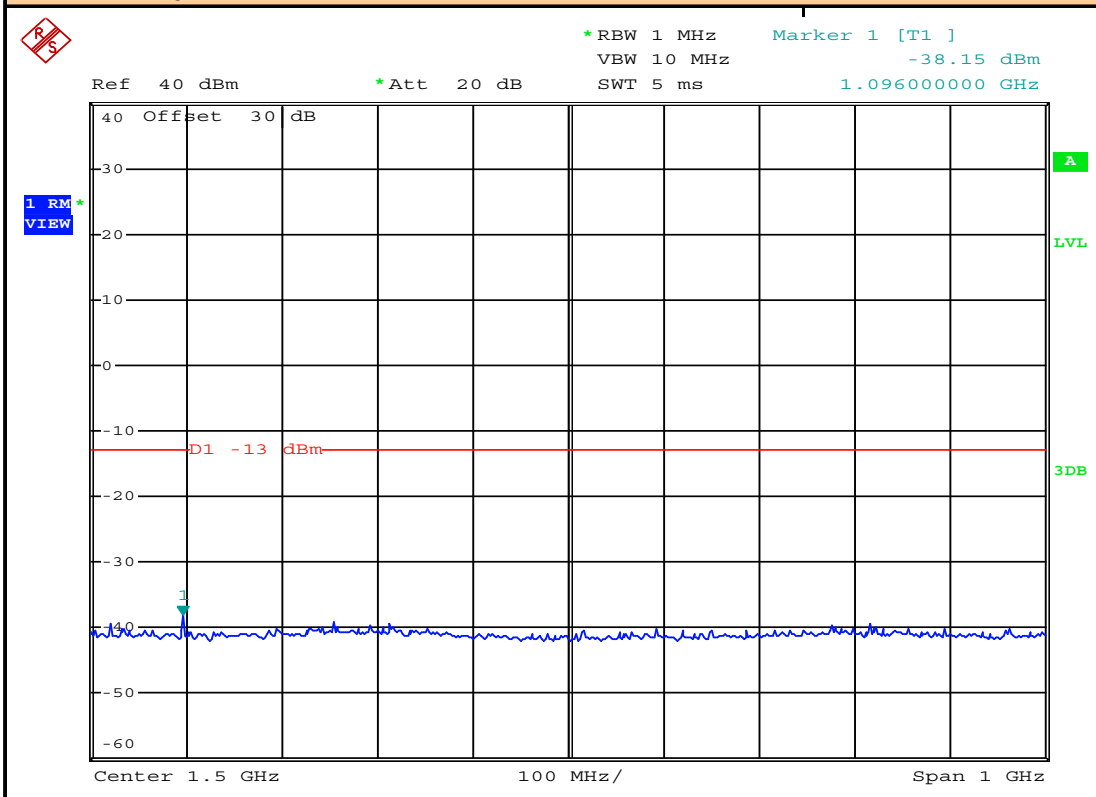


Date: 6.DEC.2021 15:49:31

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	74	156.725	CW	36.6	470.18	-26.98

Plot 11.5 – Conducted Out of Band Emissions, 5.5W, 1000 - 3000MHz, Channel 1

Conducted Spurious Emissions:

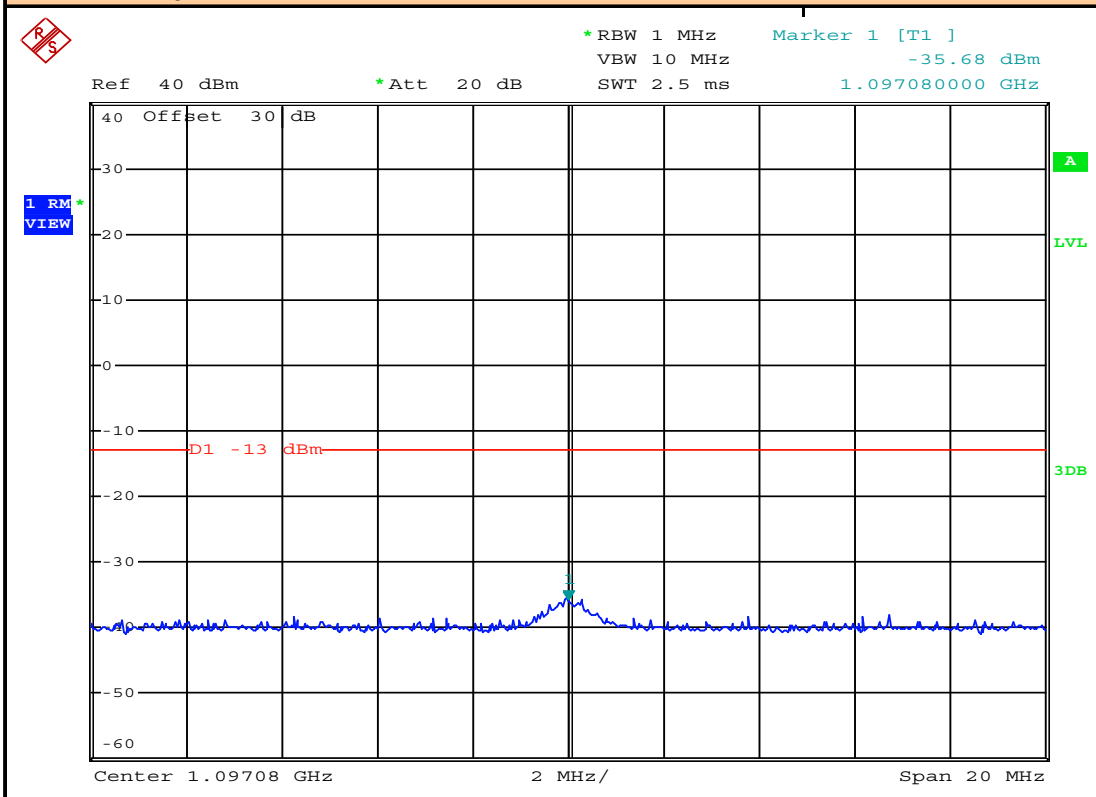


Date: 7.DEC.2021 08:46:36

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	74	156.725	CW	36.6	-	-

Plot 11.6 – Conducted Out of Band Emissions, 5.5W, 1097MHz, Channel 1

Conducted Spurious Emissions:



Date: 7.DEC.2021 08:47:13

Power Setting	Channel Number	Channel Frequency (MHz)	Modulation	Fund. Power (dBm)	Emission Frequency (MHz)	Measured Emission (dBm)
5W	74	156.725	CW	36.6	1097.00	-35.68

Table 11.1 – Summary of Conducted Out of Band Emissions

Conducted Spurious Emissons Measurement Results:									
Power Setting	Channel Number	Frequency (MHz)	Modulation	Fundamental Power [P_{Fund}] (dBm)	Emission Frequency (MHz)	Measured Emission [P_{Meas}] (dBm)	Attenuation [Att] (dBm)	Limit (dB)	Margin (dB)
5W	74	156.7	CW	36.60	99.8	-37.37	73.97	43.0	31.0
				36.60	313.5	-29.90	66.50		23.5
				36.60	470.2	-36.52	73.12		30.1
				36.60	1097.0	-35.68	72.28		29.3
								Result:	Complies

Attenuation [Att] = Fundamental Power [Pf_{und}] - Measured Emission [P_{meas}]

Margin = [Att] - Limit

11.0 CONDUCTED OUT OF BAND SPURIOUS EMISSIONS – §80.211(F),

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1046, §80.211(c)**

Limits	
47 CFR §80.211(c)	**§ 80.211 Emission limitations** (c) In any 4 kHz band the peak power of spurious emissions and noise at the input to the transmit antenna must be attenuated below the peak output power of the station as follows: (1) 125 dB at 1525.0 MHz, increasing linearly to 90 dB at 1612.5 MHz; (3) 90 dB from 1624.0 MHz to 1650.0 MHz, except at frequencies near the transmitted carrier where the requirements of paragraphs (b)(1) through (3) of this section, apply; (4) 60 dB at 1650.0 MHz decreasing linearly to 90 dB at 1662.5 MHz; (5) 90 dB at 1662.5 MHz decreasing linearly to 125 dB at 1752.5 MHz; and (6) 125 dB outside above range, except for harmonics which must comply with (b)(3) of this section.

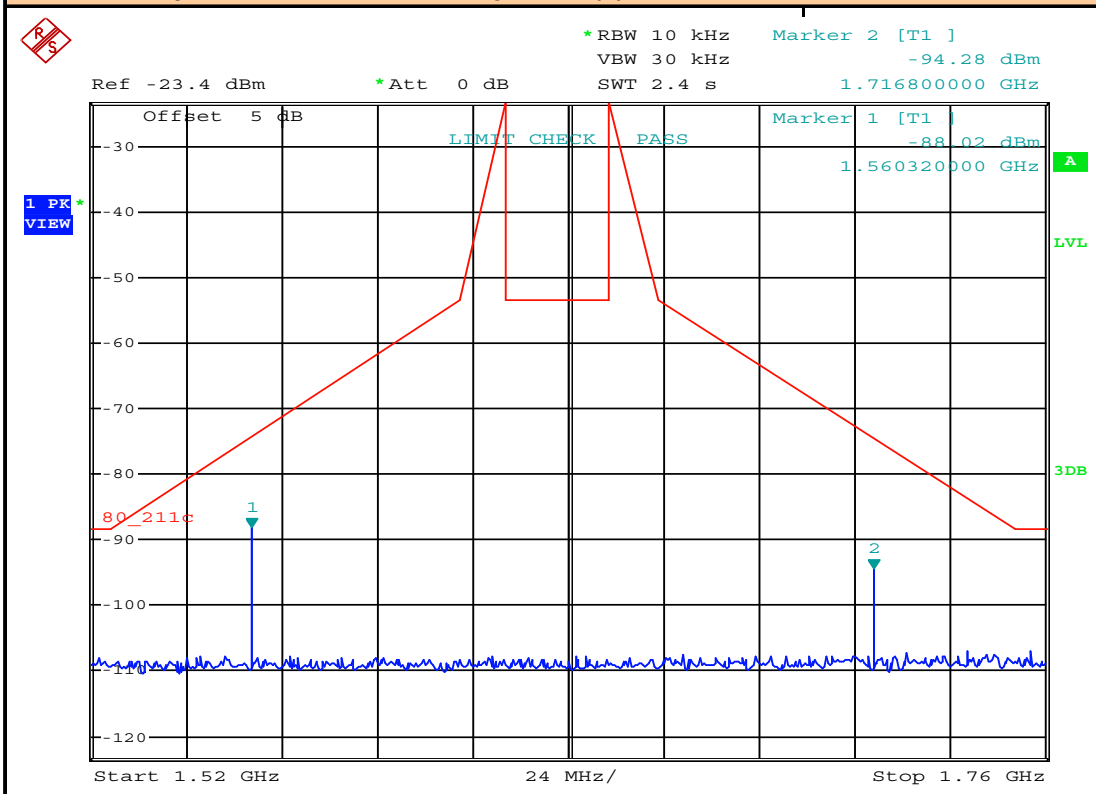
Test Setup	**Appendix A Figure A.2**

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via the DUT's antenna port using a high-pass filter to filter out the carrier. The SA Detector was set toRMS. The output power of the DUT was set to the manufacturer's highest rated setting.To determine compliance an emission mask was created in accordance with the above requirements referenced to the carrier, or dBc. The DUT frequency was set a frequency which would produce a harmonic at the frequency of the worst case attenuation criteria from above. The emission was measured with minimum *attenuation* referenced to the carrier, dBc.

Plot 11.7 – Conducted Out of Band Emissions, §80.211(f), Channel 1

Conducted Spurious Emissions: FCC §80.211 (c)

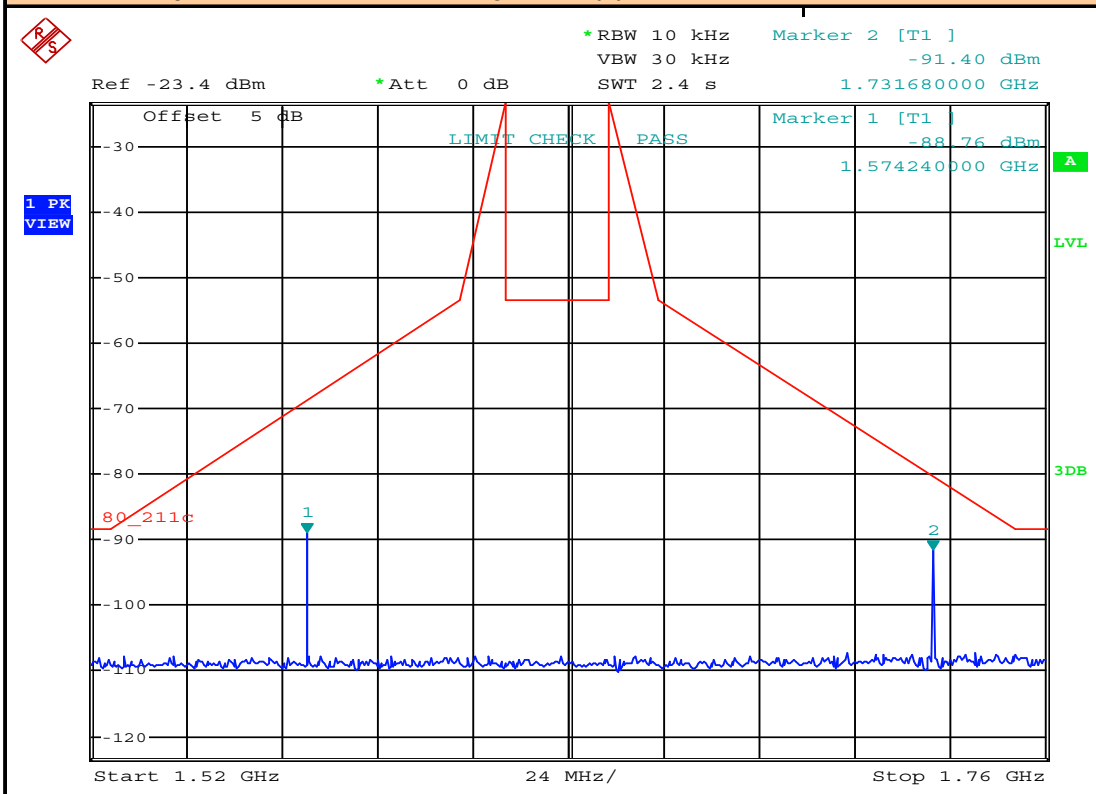


Date: 7.DEC.2021 10:07:59

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	1	156.05	CW	36.6	1560.32	-88.02

Plot 11.8 – Conducted Out of Band Emissions, §80.211(f), Channel 88

Conducted Spurious Emissions: FCC §80.211 (c)



Date: 7.DEC.2021 10:09:56

Power Setting	Channel Number	Channel Frequency *(MHz)*	Modulation	Fund. Power *(dBm)*	Emission Frequency *(MHz)*	Measured Emission *(dBm)*
5W	88	157.425	CW	36.6	1574.24	-88.76

Table 11.2 – Summary of Conducted Out of Band Emissions, §80.211(f)

§80.211 (c) Out of Band Emission in 1525 - 1752.5MHz Band									
Channel Freq (MHz)	Modulation	Fundamental Power [E_{Meas}] (dBm)	Emission Frequency [$F_{Emission}$] (MHz)	Measured Emission [E_{EM}] (dBm)	Attenuation [A] (dBc)	Filter Loss* [L_F] (dB)	Corrected Attenuation [A_C] (dBc)	Limit [Limit] (dB)	Margin (dB)
156.05000	CW	36.60	1560.32	-88.02	124.62	0.50	124.12	110.9	**13.2**
156.05000			1716.80	-94.28	130.88	0.50	130.38	111.1	**19.3**
157.42500			1574.24	-88.76	125.36	0.50	124.86	105.3	**19.6**
157.42500			1731.68	-91.40	128.00	0.50	127.50	116.9	**10.6**
							Results:	**Complies**	

* Insertion Loss of Hi-Pass Filter at Measured Frequency

Attenuation [A] = E_{Meas} - E_{EM}

Corrected Attenuation = [A] - L_F

Slope of Limit of §80.211 (c)(1) = 0.4dB/MHz, F_{Start} = 1525MHz, $Limit_{Start}$ = 125dB

Slope of Limit of §80.211 (c)(5) = -0.389dB/MHz, F_{Start} = 1752.5MHz, $Limit_{Start}$ = 125dB

Limit = $Limit_{Start}$ + ((F_{Start} - $F_{Emission}$) x Slope)

Margin = A_C - Limit

12.0 RECEIVER RADIATED EMISSIONS - DOC

Test Procedure	
Normative Reference	**FCC 47 CFR §15.109, ICES-003(6.2)** **ANSI C63.4:2014**

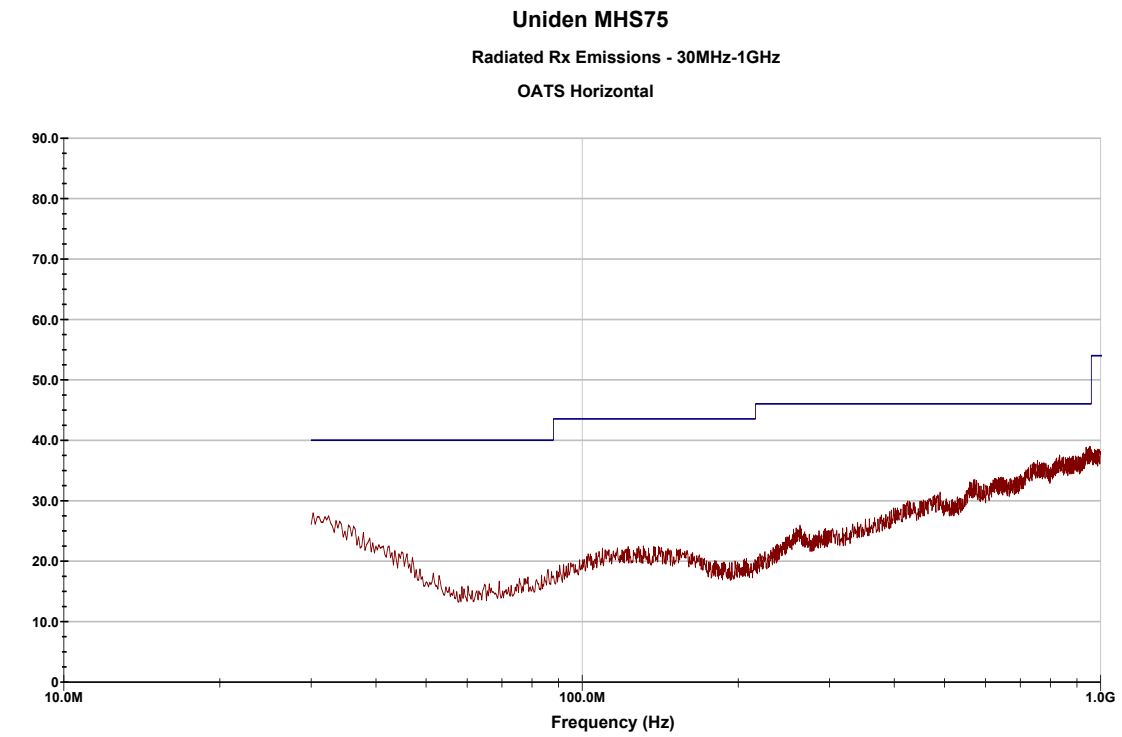
Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 216-960MHz: > 960MHz: 54dBuV/m
ICES-003(6.2.1)	6.2.1 - Radiated Emissions Limits Below 1 GHz Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 5 determined at a distance of 3 metres. 30-88MHz: 40dBuV/m 88-216MHz: 216-960MHz: > 960MHz: 54dBuV/m

Test Setup	Appendix A Figure A.2

Measurement Procedure
The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

Plot 12.1 – Radiated Rx Emissions, 30MHz – 1000MHz, Horizontal

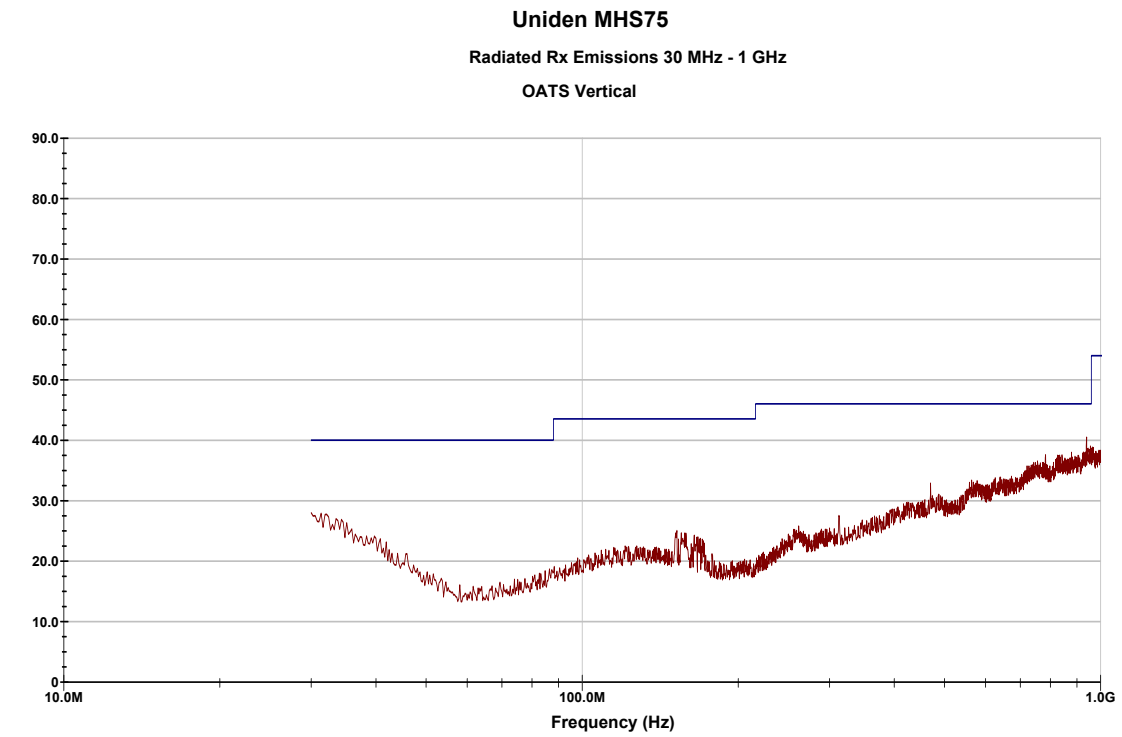
Radiated Rx Emissions



Antenna Polarization	Emission Frequency *(MHz)*	Measured Emission *(dBuV)*
Horizontal	ND	ND

Plot 12.2 – Radiated Rx Emissions, 30MHz – 1000MHz, Vertical

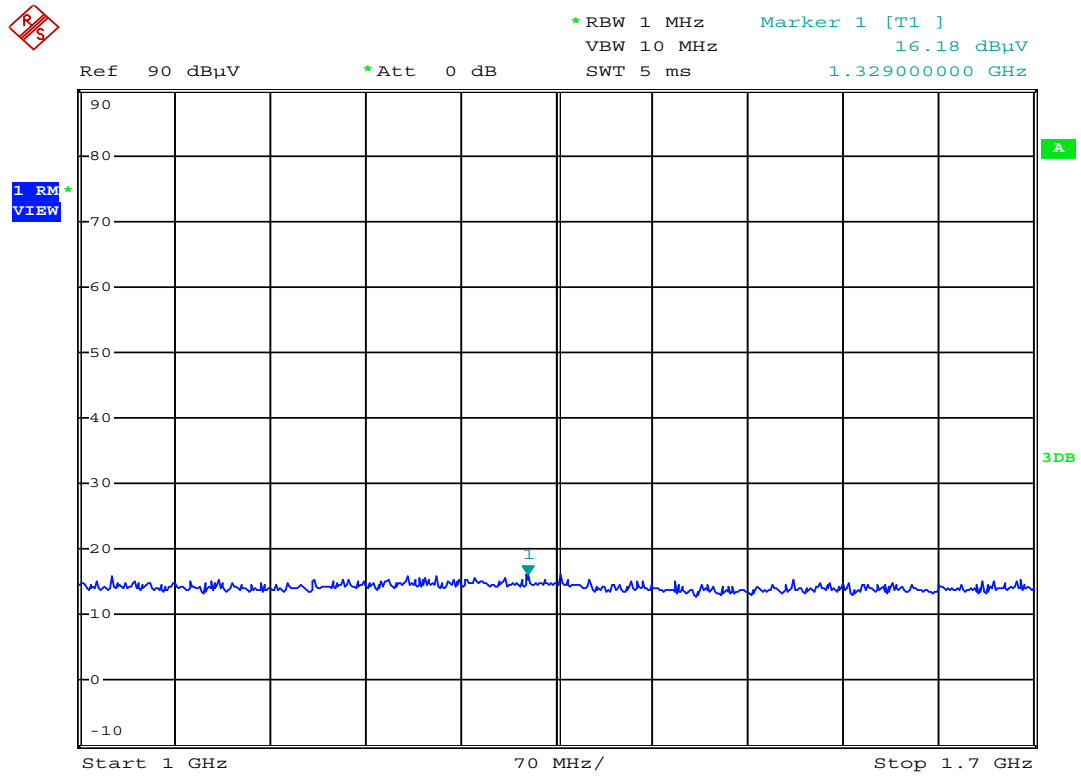
Radiated Rx Emissions



Antenna Polarization	Emission Frequency *(MHz)*	Measured Emission *(dBuV)*
Vertical	ND	ND

Plot 12.3 – Radiated Rx Emissions, 1000 - 1700MHz, Horizontal

Radiated Rx Emissions

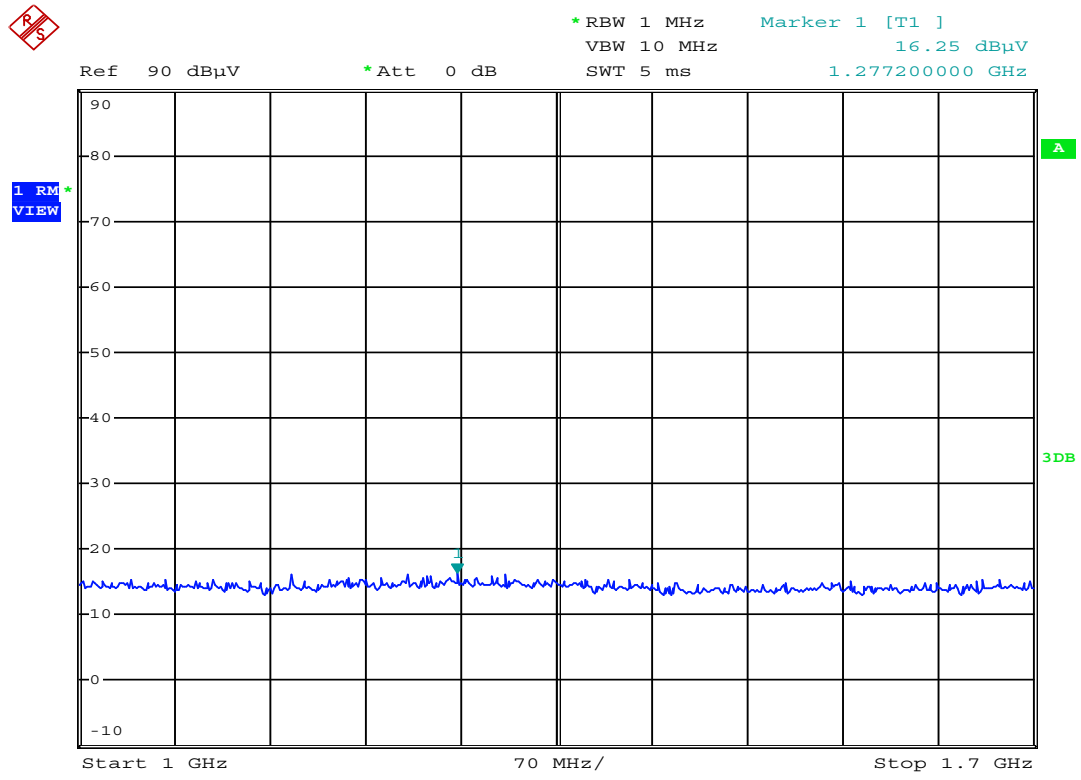


Date: 29.NOV.2021 14:42:32

Trace 1	Trace 2	Antenna Polarization	Emission Frequency *(MHz)*	Measured Emission *(dBuV)*
Ambient	DUT	Horizontal	ND	ND

Plot 12.4 – Radiated Rx Emissions, 1000 - 1700MHz, Vertical

Radiated Rx Emissions



Date: 29.NOV.2021 14:45:27

Trace 1	Trace 2	Antenna Polarization	Emission Frequency *(MHz)*	Measured Emission *(dBuV)*
Ambient	DUT	Vertical	ND	ND

Table 12.1 – Summary of Radiated Rx Spurious Emissions

Measurement Results				
Frequency Range	**Antenna Polarization**	**Measured Emission [E_{Meas}] (dBm)**	**Limit e.r.p./e.r.i.p. [A_L] (dBuV/m)**	**Margin (dB)**
30-1000MHz	Horizontal	ND	49.5	**n/a**
1 - 1.7GHz		ND	60.0	**n/a**
30-1000MHz	Vertical	ND	49.5	**n/a**
1 - 1.7GHz		ND	60.0	**n/a**
		Results:	**Complies**	

ND: No emissions detected above ambient or within 20dB of the limit

13.0 FREQUENCY STABILITY

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1055, §80.209, RSS-182**

Limits	
47 CFR §80	**§80.209 Transmitter frequency tolerances.** (a) The frequency tolerance requirements applicable to transmitters in the maritime services are shown in the following table. Tolerances are given as parts in $10^{6:}$ Below 3W: 10ppm, 3 to 100W, 5ppm
RSS-182	**5.5 Frequency Stability** With the exception of DSC emissions, the RF carrier frequency shall not depart from the reference frequency in excess of the limits listed in Table 2. +/-10.0 ppm for transmitter power less than 3 watts +/-5.0 ppm for transmitter power between 3 and 100 watts

Measurement Procedure

47 CFR §2.1055 Frequency Stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +55° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

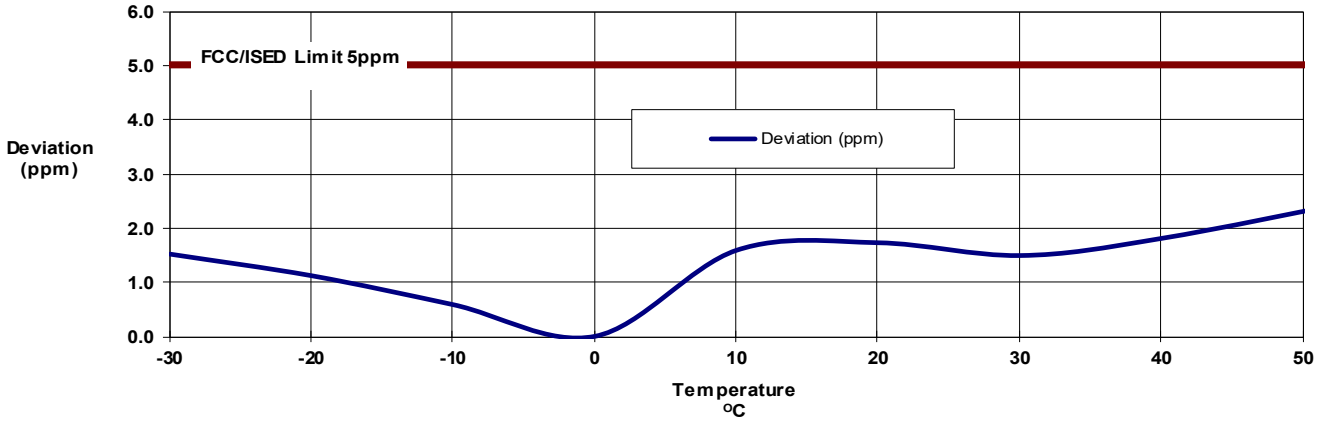
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

Test Setup	**Appendix A Figure A.4**

Table 13.1 – Summary of Frequency Stability Results, 5.5W

Frequency Stability - 6W Power Setting

Nominal Frequency (MHz):	156.725
Nominal Channel BW (KHz):	CW
Nominal Voltage (VDC):	7.4
Nominal Temperature (°C):	20



Frequency Stability Measurements (Temperature)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
-30	156.725000	156.724763	-237	1.51
-20		156.724825	-175	1.12
-10		156.724908	-92	0.59
0		156.724999	-1	0.01
10		156.725248	248	1.58
20		156.725270	270	1.72
30		156.725233	233	1.49
40		156.725282	282	1.80
55		156.725400	400	2.55
			Maximum Deviation:	2.55
			Maximum Limit (ppm):	5.00
			Result:	Complies

Frequency Stability Measurements (Voltage)

Voltage* (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
8 (100%)	156.725000	156.725270	270	1.72
7.4 (100%)		156.725270	270	1.72
6.4 (80%)*		156.725238	238	1.52
		Maximum Deviation:		1.72
		Maximum Limit (ppm):		5.00
		Result:		Complies

Battery Operated Device at 8VDC.
*The suppy voltage was lowered to a level prior to device shutdown

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00241	R&S	FSU40	Spectrum Analyzer

Figure A.1 – Test Setup Conducted Measurements

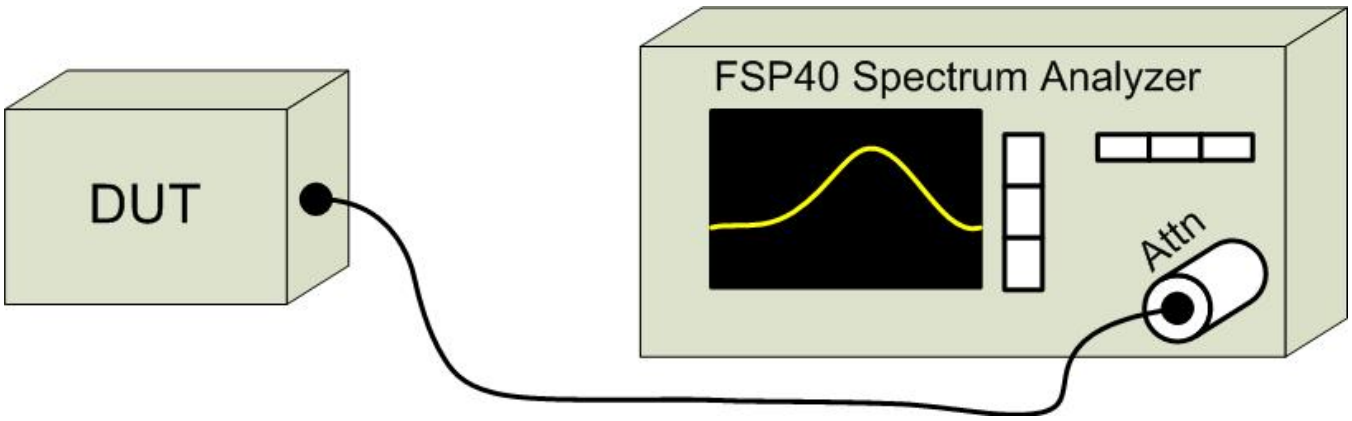


Table A.2 – Setup - Audio Modulation Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00028	HP	8901A	Modulation Analyzer
00027	HP	8903B	Audio Analyzer/Generator

Figure A.2 – Test Setup Audio Modulation Response Measurements

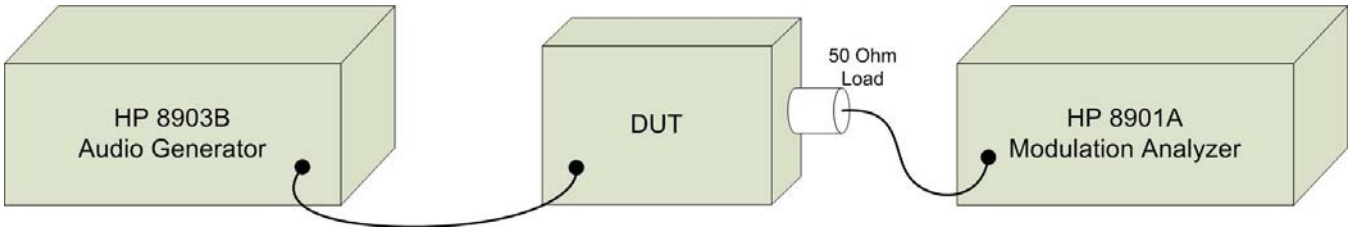


Table A.3 – Setup - Radiated Emissions Equipment

Equipment List				
Asset Number	**Manufacturer**	**Model Number**	**Serial Number**	**Description**
00050	Chase	CBL-6111A	1607	Bilog Antenna
00034	ETS	3115	6267	Double Ridged Guide Horn
00035	ETS	3115	6276	Double Ridged Guide Horn
00333	HP	85685A	3010A01095	RF Preselector
00049	HP	85650A	2043A00162	Quasi-peak Adapter
00051	HP	8566B	2747A05510	Spectrum Analyzer
00241	R&S	FSU40	100500	Spectrum Analyzer
00071	EMCO	2090	9912-1484	Multi-Device Controller
00072	EMCO	2075	0001-2277	Mini-mast
00073	EMCO	2080	0002-1002	Turn Table
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable
00275	TMS	LMR400	n/a	25m Cable
00278	TILE	34G3	n/a	TILE Test Software

Figure A.3 – Test Setup Radiated Emissions Measurements 30 – 1000MHz

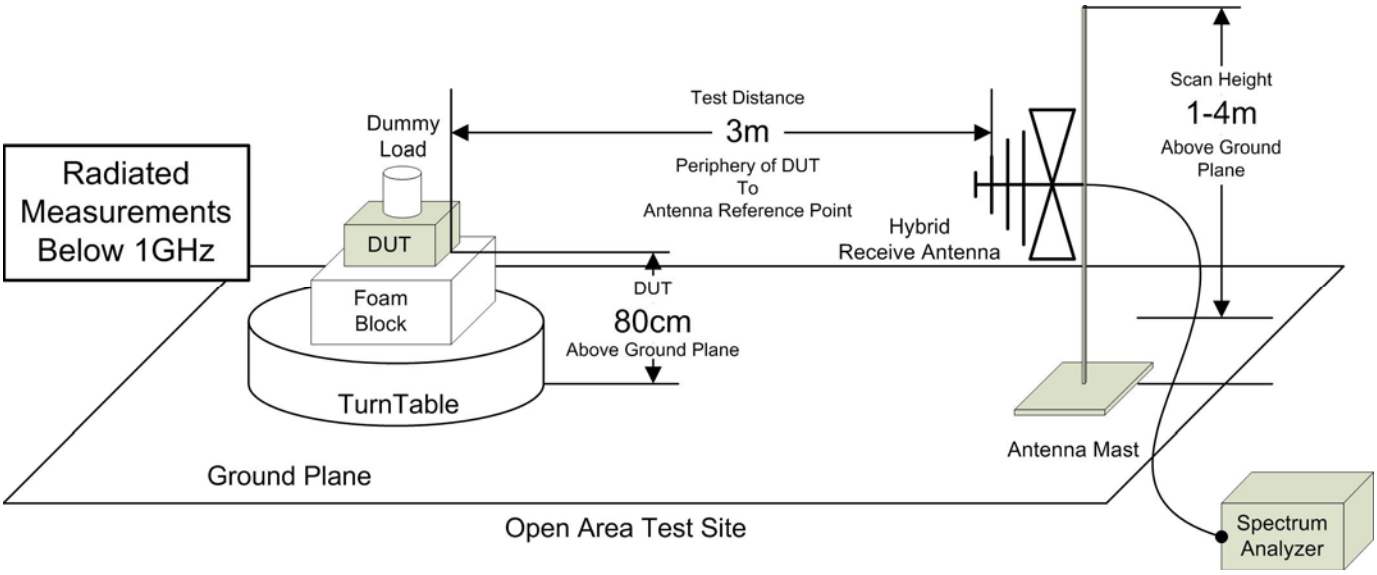


Figure A.4 – Test Setup Radiated Emissions Measurements, 30 – 1000MHz, Signal Substitution

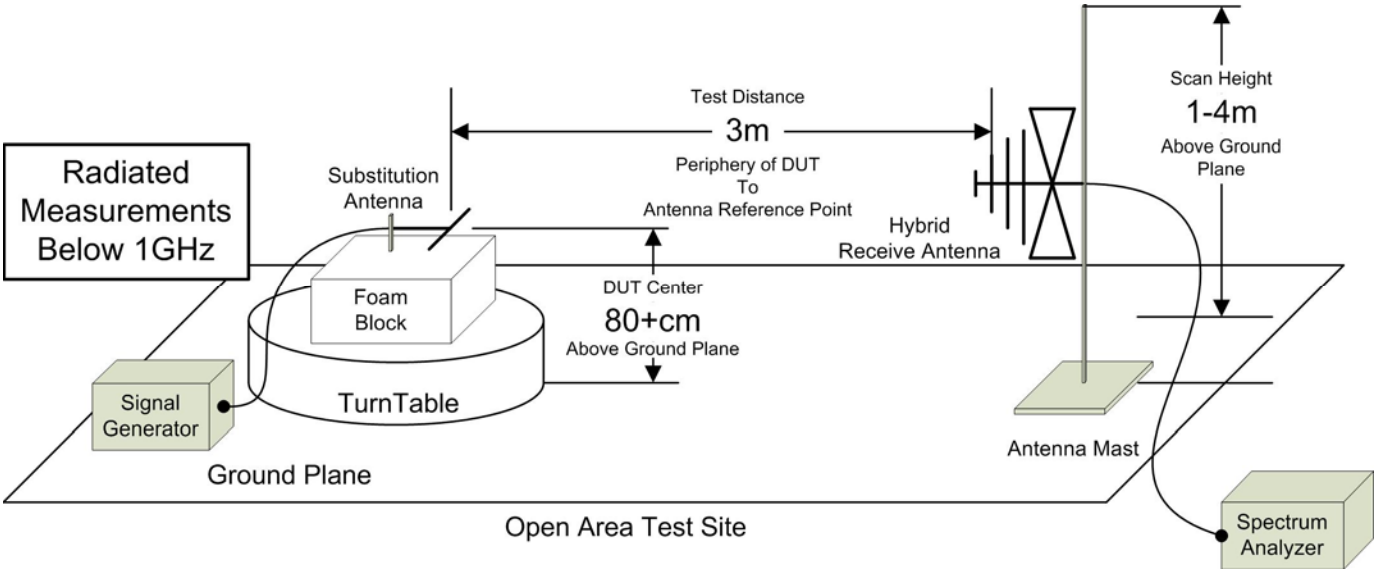


Figure A.5 – Test Setup Radiated Emissions Measurements, 1 – 18GHz

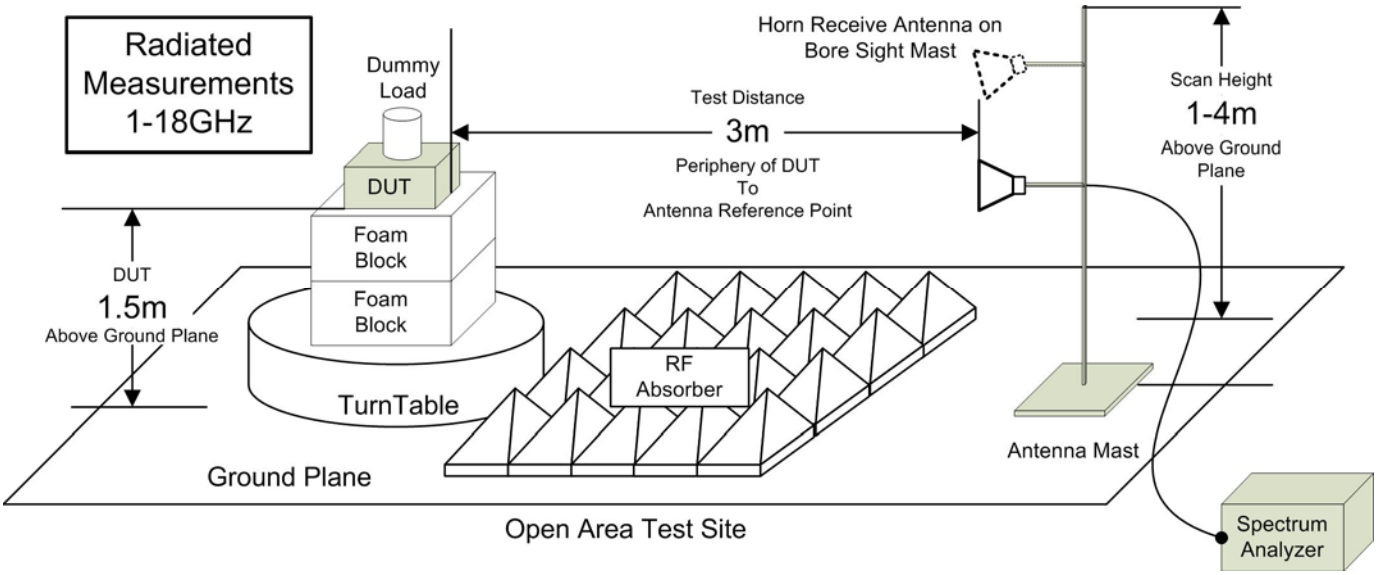
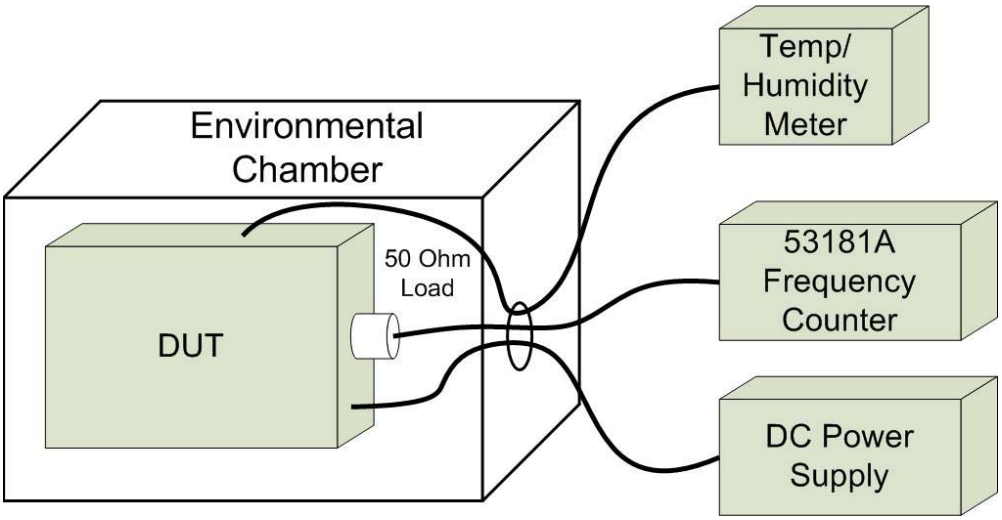


Table A.4 – Setup - Frequency Stability Measurement Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
n/a	ESPEC	ECT-2	Environmental Chamber
00003	HP	53181A	Frequency Counter
n/a	HP	E3611A	Power Supply
00234	VWR	61161-378	Temp/Humidity Meter

Figure A.6 – Test Setup Frequency Stability Measurements



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	3 Jan 2019	Triennial	3 Jan 2022
00035	ETS	3115	6276	Double Ridged Guide Horn	22 Mar 2019	Triennial	21 Mar 2022
00085	EMCO	6502	9203-2724	Loop Antenna	11 Jun 2019	Triennial	11 Jun 2022
00333	HP	85685A	3010A01095	RF Preselector	23 Jun 2020	Triennial	30 Jun 2023
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2020	Triennial	23 Jun 2023
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2020	Triennial	23 Jun 2023
00223	HP	8901A	3749A07154	Modulation Analyzer	27 Dec 2017	Triennial	27 Dec 2020
00224	HP	8903B	3729A18691	Audio Analyzer	28 Dec 2017	Triennial	28 Dec 2020
00241	R&S	FSU40	100500	Spectrum Analyzer	10 Aug 2021	Triennial	10 Aug 2024
00005	HP	8648D	3847A00611	Signal Generator	23 Jun 2020	Triennial	23 Jun 2023
00003	HP	53181A	3736A05175	Frequency Counter	23 Jun 2020	Triennial	23 Jun 2023
00250	Circuit Test	DMR-1800	TE182	Digital Multi-Meter - DVM	23 Jun 2020	Triennial	23 Jun 2023
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber	NCR	n/a	CNR
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a	COU
00264	Koaxis	KP10-7.00M-TD	264	7m Armoured Cable	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})	
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2	
Radiated Emissions 30MHz - 200MHz	
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB	
Radiated Emissions 200MHz - 1000MHz	
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB	
Radiated Emissions 1GHz - 6GHz	
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB	
Radiated Emissions 6GHz - 18GHz	
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB	
Power Line Conducted Emissions 9kHz to 150kHz	
U_{LAB} = 2.96dB U_{CISPR} = 3.8dB	
Power Line Conducted Emissions 150kHz to 30MHz	
U_{LAB} = 3.12dB U_{CISPR} = 3.4dB	
If the calculated uncertainty **U_{lab}** is **less** than **U_{CISPR}** then:	
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
If the calculated uncertainty **U_{lab}** is **greater** than **U_{CISPR}** then:	
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), **EXCEEDS** the disturbance limit

Other Measurement Uncertainties (U_{LAB})
RF Conducted Emissions 9kHz - 40GHz
U_{LAB} = 1.0dB U_{CISPR} = n/a
Frequency/Bandwidth 9kHz - 40GHz
U_{LAB} = 0.1ppm U_{CISPR} = n/a
Temperature
U_{LAB} = 1^{O}C U_{CISPR} = n/a

END OF REPORT