



FCC CFR 47 Part 80 & ISSED RSS-182 Test Report

APPLICANT	ALPHATRON MARINE USA, INC.
ADDRESS	1205 BUTLER ROAD
FCC ID	2ADJKJHS-800S
IC	12477A-JHS800S
MODEL NUMBER	JHS-800S
PRODUCT DESCRIPTION	MARINE VHF RADIOTELEPHONE
DATE SAMPLE RECEIVED	10/30/2019
FINAL TEST DATE	10/30/2019
TESTED BY	Tim Royer
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Report Version	Description	Issue Date
2920AUT19TestReport_	Rev1	Initial Issue	7/23/2020
	Rev2	Revised pages 3,26, 28,29	

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

TABLE OF CONTENTS

GENERAL REMARKS	2
TESTING INFORMATION	3
RESULTS SUMMARY	4
TECHNICAL DATA	5
RF POWER OUTPUT	6
TEST DATA: MEASUREMENT TABLE	6
MODULATION CHARACTERISTICS	7
TEST DATA: 16K0F3E BANDWIDTH CALCULATION	7
AUDIO FREQUENCY RESPONSE.....	8
TEST DATA: 0.1 – 5 KHz AUDIO INPUT PLOT	8
AUDIO LOW PASS FILTER.....	9
TEST DATA: 1 – 30 KHz AUDIO INPUT PLOT	9
AUDIO INPUT VERSUS MODULATION	10
TEST DATA: MODULATION LIMITING PLOT	10
OCCUPIED BANDWIDTH	11
TEST DATA: VOICE.....	12
TEST DATA: DSC-ATIS	13
TEST DATA: 156.025MHz LOW POWER	14
TEST DATA: 156.025MHz HIGH POWER	15
TEST DATA: 156.525MHz LOW POWER	16
TEST DATA: 156.525MHz HIGH POWER	17
TEST DATA: 156.8MHz LOW POWER	18
TEST DATA: 156.8MHz HIGH POWER.....	19
TEST DATA: 157.425MHz LOW POWER	20
TEST DATA: 157.425MHz HIGH POWER	21
SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)	22
TEST DATA: HIGH POWER LOW END OF BAND	23
TEST DATA: LOW POWER LOW END OF BAND	23
TEST DATA: HIGH POWER HIGH END OF BAND	24
TEST DATA: LOW POWER HIGH END OF BAND	24
FIELD STRENGTH OF SPURIOUS EMISSIONS.....	25
TEST DATA: HIGH POWER LOW END OF BAND	26
TEST DATA: HIGH POWER MIDDLE OF BAND	26
TEST DATA: HIGH POWER HIGH END OF BAND	26
FREQUENCY STABILITY	27
TEST DATA: MEASUREMENT TABLE	28
TEST DATA: MEASUREMENT PLOT	29
STATEMENT OF MEASUREMENT UNCERTAINTY.....	30
EMC EQUIPMENT LIST	31

GENERAL REMARKS

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- ☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
Designation #: US1070

Tested by:



Name and Title	Tim Royer, Project Manager / EMC Testing Engineer
Date	07/23/2020

Reviewed and Approved by:



Name and Title	Franklin Rose, Project Manager / EMC Specialist
Date	07/23/2020

Applicant: ALPHATRON MARINE USA, INC.
FCC ID: 2ADJKJHS-800S
IC: 12477A-JHS800S
Report: 2920AUT19TestReport _Rev2

GENERAL INFORMATION

Testing Information

EUT Description	MARINE VHF RADIOTELEPHONE WITH DSC		
FCC ID	2ADJKJHS-800S		
IC	12477A-JHS800S		
Model Number	JHS-800S		
Operating Band(s)	156.025-157.425 MHz		
Test Frequencies	156.025, 156.05, 156.30, 156.525, 156.80, 157.425 MHz		
Type of Emission	16K0F3E, 12K0G2B		
Measurement Method	99% Occupied Bandwidth		
Modulation	FM		
EUT Power Source	☐ 110-120 VAC	☒ DC Power (24 V)	☐ Battery Operated
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☒ Mobile	☐ Portable
Antenna Connector	Type N		
Modification to the EUT	None		
Test Exercise	The EUT was operated using control software provided by the manufacturer in accordance with the user manual.		
Applicable Standards	FCC CFR 47 Part 2 and Part 80 using ANSI C63.26-2015, TIA-603-E 2015, RSS-182 i5		
Test Conditions	Laboratory temperature: 26°C, Relative humidity: 50%		
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070, IC: US0111, 2056A		

RESULTS SUMMARY

Rule Part No.	Test Item	Results
2.1046(a), 80.215(e)(1), RSS-182, §7.5	RF Power Output	Pass
2.1033(c) (4), 80.205(a), 80.207, RSS-182 §7.8	Modulation Characteristics	Pass
2.1047(a) (b), RSS-182 §7.8	Audio Frequency Response and Low Filter	Pass
2.1047(b) & 80.213 (a)(2) & (b), RSS-182 §7.8	Audio Input Vs Modulation	Pass
2.1049(c), 80.211 (f)(1)(2), RSS-182	Occupied Bandwidth	Pass
2.1051(a), 80.211(f)(3), RSS-182 §7.9	Spurious Emissions at Antenna Terminals	Pass
2.1053, 80.211(f)(3), RSS-182 §7.9	Field Strength of Spurious Emissions	Pass
2.1055, Part 80.209(a), RSS-182 §7.4	Frequency Stability	Pass

TECHNICAL DATA

§80.203 Authorization of transmitters for licensing.

(b) The external controls, of maritime station transmitters capable of operation in the 156-162 MHz band and manufactured in or imported into the United States after August 1, 1990, or sold or installed after August 1, 1991, must provide for selection of only maritime channels for which the maritime station is authorized. Such transmitters must not be capable of being programmed by station operators using external controls to transmit on channels other than those programmed by the manufacturer, service or maintenance personnel.

(c) All VHF ship station transmitters that are either manufactured in or imported into the United States, on or after August 1, 1993, or are initially installed on or after August 1, 1994, must be equipped with an automatic timing device that deactivates the transmitter and reverts the transmitter to the receive mode after an uninterrupted transmission period of five minutes, plus or minus 10 per cent. Additionally, such transmitters must have a device that indicates when the automatic timer has deactivated the transmitter. VHF ship station transmitters initially installed before August 1, 1994, are authorized for use indefinitely at the same maritime station. VHF hand-held, portable transmitters are not required to comply with the requirements in paragraph (c) of this section except when used as described in §80.141.

(n) Applications for certification of all marine radio transmitters operating in the 2-27.5 MHz band or the 156-162 MHz band received on or after June 17, 1999, must have a DSC capability in accordance with §80.225. This requirement does not apply to transmitters used with AMTS or hand-held portable transmitters.

§80.873 VHF radiotelephone transmitter.

(a) The transmitter must be capable of transmission of G3E emission on 156.300 MHz and 156.800 MHz, and on frequencies which have been specified for use in a system established to promote safety of navigation. Vessels in waters of other Administrations are required to communicate on any channel designated by that Administration for navigational safety in the bands specified in §80.871(d).

(c) The transmitter must deliver a carrier power between 8 and 25 watts into a 50 ohm effective resistance. Provision must be made for reducing the carrier power to a value between 0.1 and 1.0 watts.

§80.911 VHF transmitter.

(a) The transmitter must be capable of transmission of G3E emission on 156.800 MHz, 156.300 MHz, and on the ship-to-shore working frequencies necessary to communicate with public coast stations serving the area in which the vessel is navigated.

(c) The transmitter must be certificated to transmit between 20 watts and 25 watts, on each of the frequencies 156.300 MHz, 156.800 MHz and on ship-to-shore public correspondence channels, into 50 ohms effective resistance when operated with a primary supply voltage of 13.6 volts DC.

RF POWER OUTPUT

§80.215 Transmitter power.

(a) Transmitter power shown on the radio station authorization is the maximum power the licensee is authorized to use. Power is expressed in the following terms:

- (1) For single sideband emission: Peak envelope power;
- (2) For G3E emission: Carrier power;

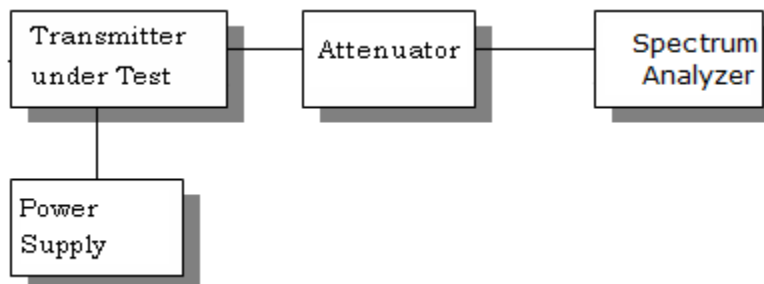
(e) *Ship stations frequencies above 27500 kHz.* The maximum power must not exceed the values listed below.

- (1) Ship stations 156-162 MHz—25W⁶

⁶Reducible to 1 watt or less, except for transmitters limited to public correspondence channels and used in an automated system.

Method of Measurement: ANSI/TIA-603

Test Setup Diagram:



Test Data: **Measurement Table**

Peak Output Power					
Tuned Freq. MHz	Channel	dBm		Watts	
		High	Low	High	Low
156.0250	60	43.44	28.85	22.08	0.77
156.8000	16	42.59	27.98	18.16	0.63
157.4250	88	42.69	28.03	18.58	0.64

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
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 Report: 2920AUT19TestReport _Rev2

Part 2.1033 (C) (8) DC Input into the final amplifier

POWER SETTING INPUT POWER: (24V) (15A) = 180 Watts

MODULATION CHARACTERISTICS

Rule Part No.: Part 2.1033(c) (4), 80.205(a), 80.207

Test Data: 16K0F3E Bandwidth Calculation

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 5 \text{ kHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(3000) + 2(5k) (1) = 16.0K$$

80.205(a) ALLOWED AUTHORIZED BANDWIDTH – 20.00 kHz

The 99 % bandwidth for the DSC is 12.06 kHz. 12K0G2B

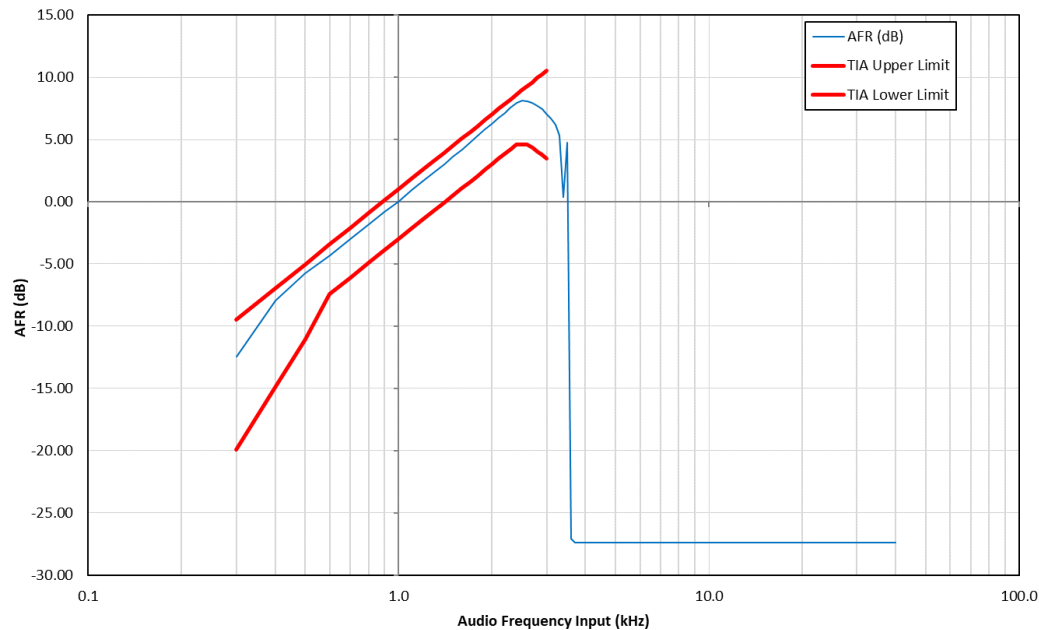
AUDIO FREQUENCY RESPONSE

Rule Part No.: FCC Part 2.1047(a) (b)

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

Method of Measurement: ANSI/TIA-603

Test Data: 0.1 – 5 KHz Audio Input Plot



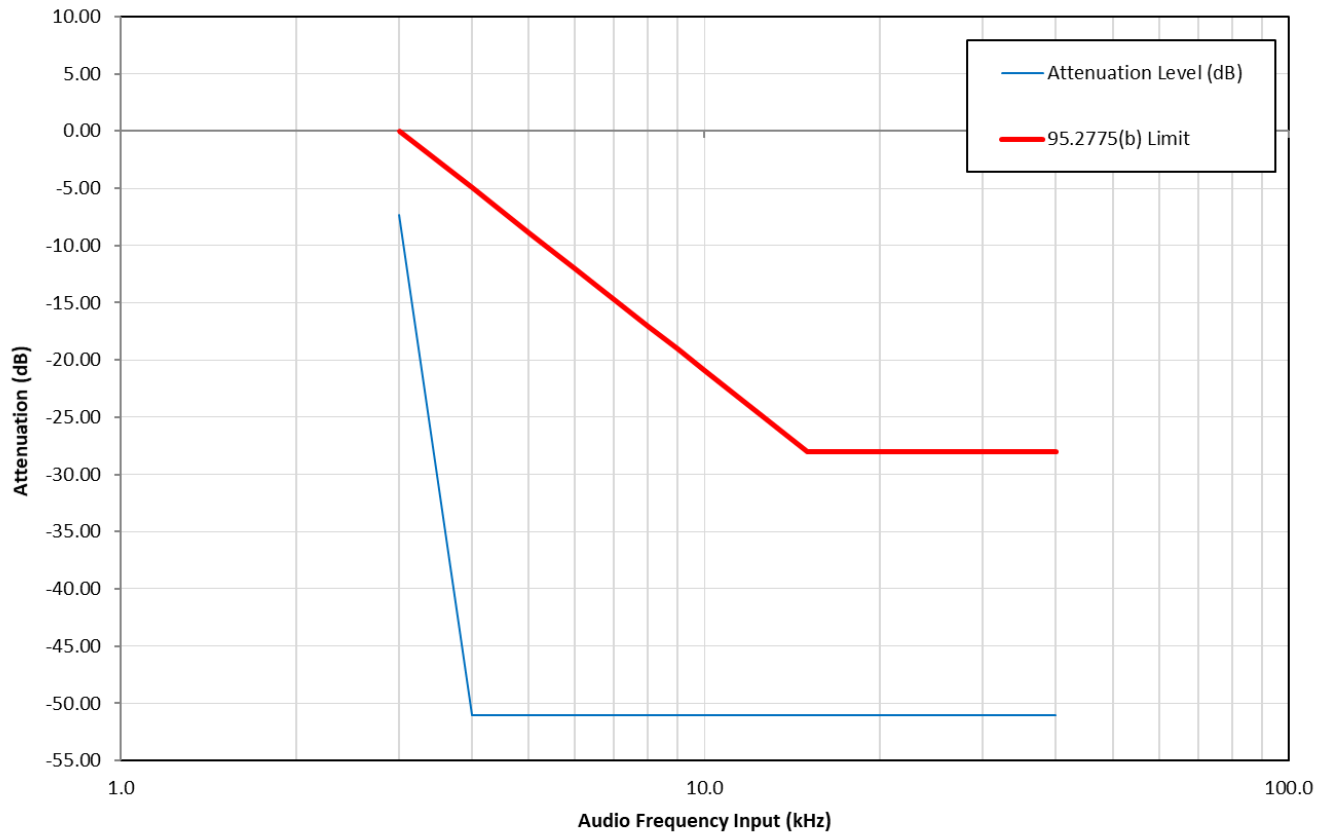
AUDIO LOW PASS FILTER

Rule Part No.: 2.1047(a)

Test Requirements: For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Method of Measurement: ANSI/TIA-603

Test Data: 1 – 30 KHz Audio Input Plot



AUDIO INPUT VERSUS MODULATION

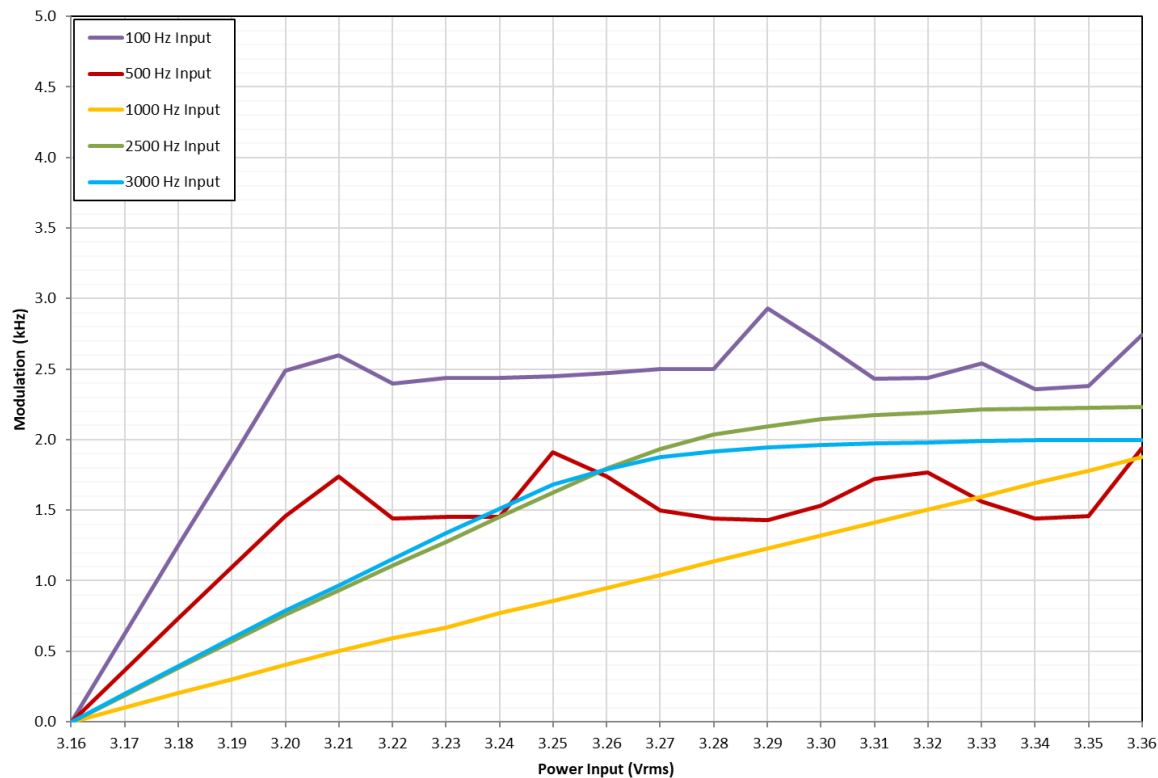
Rule Part No.: FCC Part 2.1047(b) & 80.213 (a)(2) & (b)

Test Requirements: The peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ± 5 kHz is defined as 100 percent peak modulation.

Radiotelephone transmitters using A3E, F3E and G3E emission must have a modulation limiter to prevent any modulation over 100 percent.

Method of Measurement: ANSI/TIA-603

Test data: **Modulation Limiting Plot**



OCCUPIED BANDWIDTH

§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;

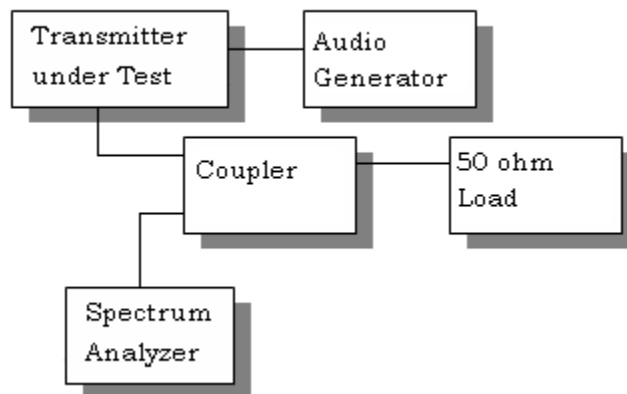
(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

Method of Measurement: ANSI/TIA-603

Test Setup Diagram:

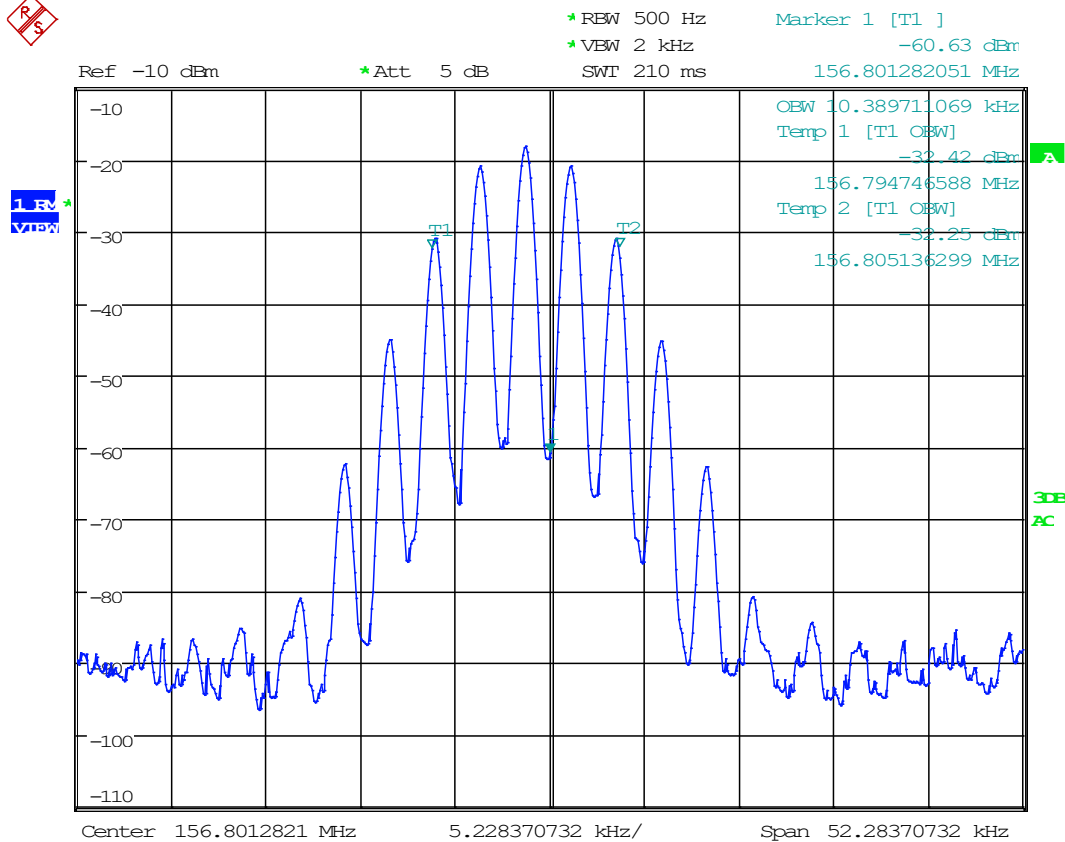
OCCUPIED BANDWIDTH MEASUREMENT



Test Data: See the plot below

OCCUPIED BANDWIDTH 99%

Test Data: Voice



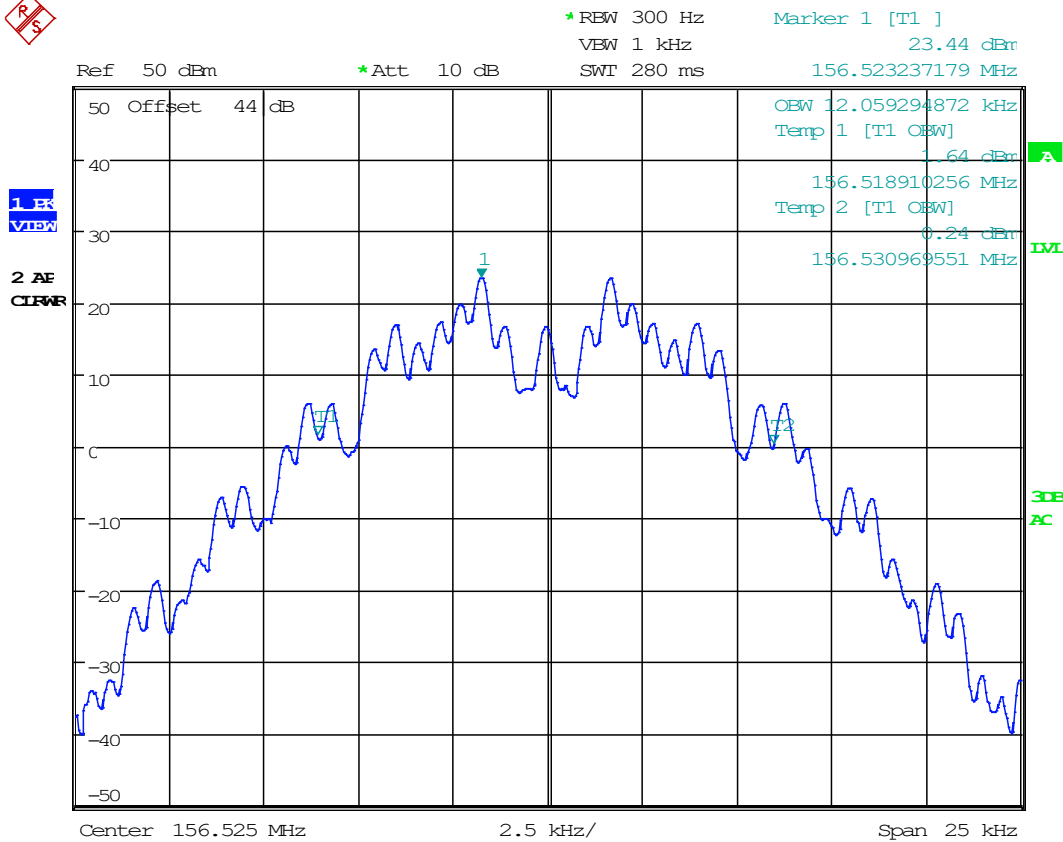
Date: 5.NOV.2019 16:15:14

Results: 10.39kHz

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 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH 99%

Test Data: DSC-ATIS



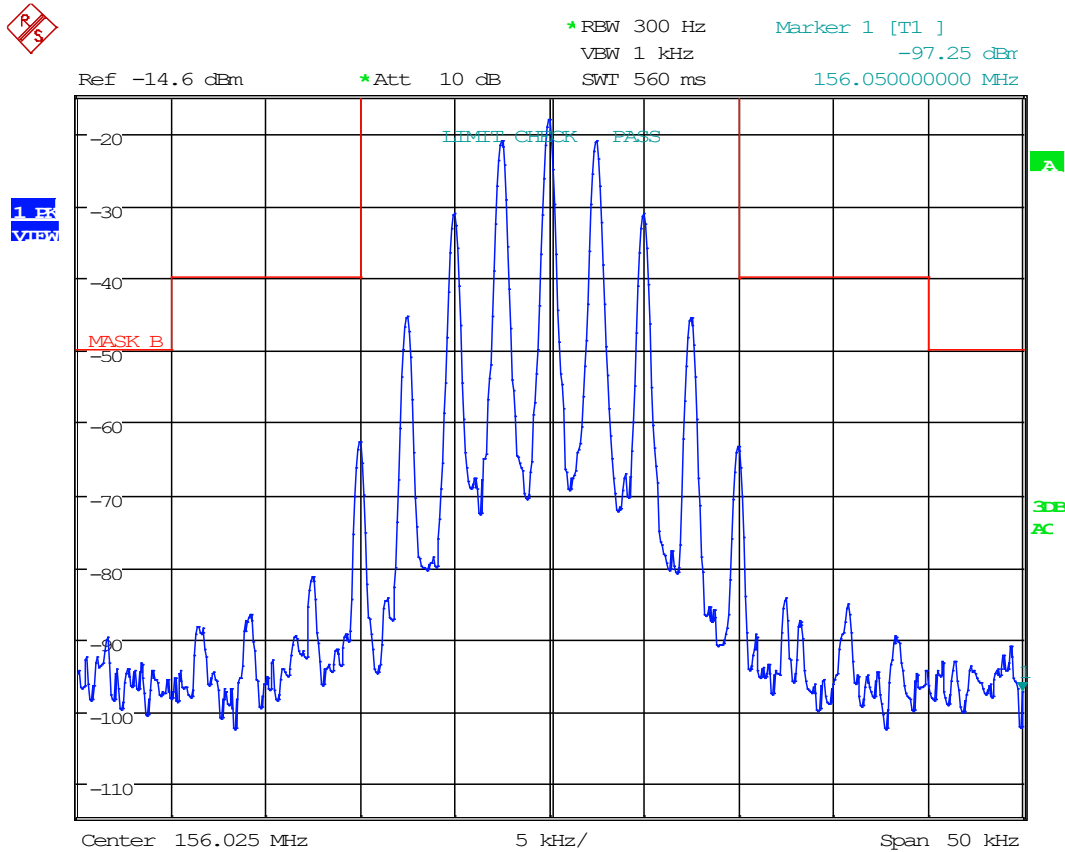
Date: 4.NOV.2019 12:51:40

Results 12.06kHz

Applicant: ALPHATRON MARINE USA, INC.
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OCCUPIED BANDWIDTH

Test Data: 156.025MHz Low Power



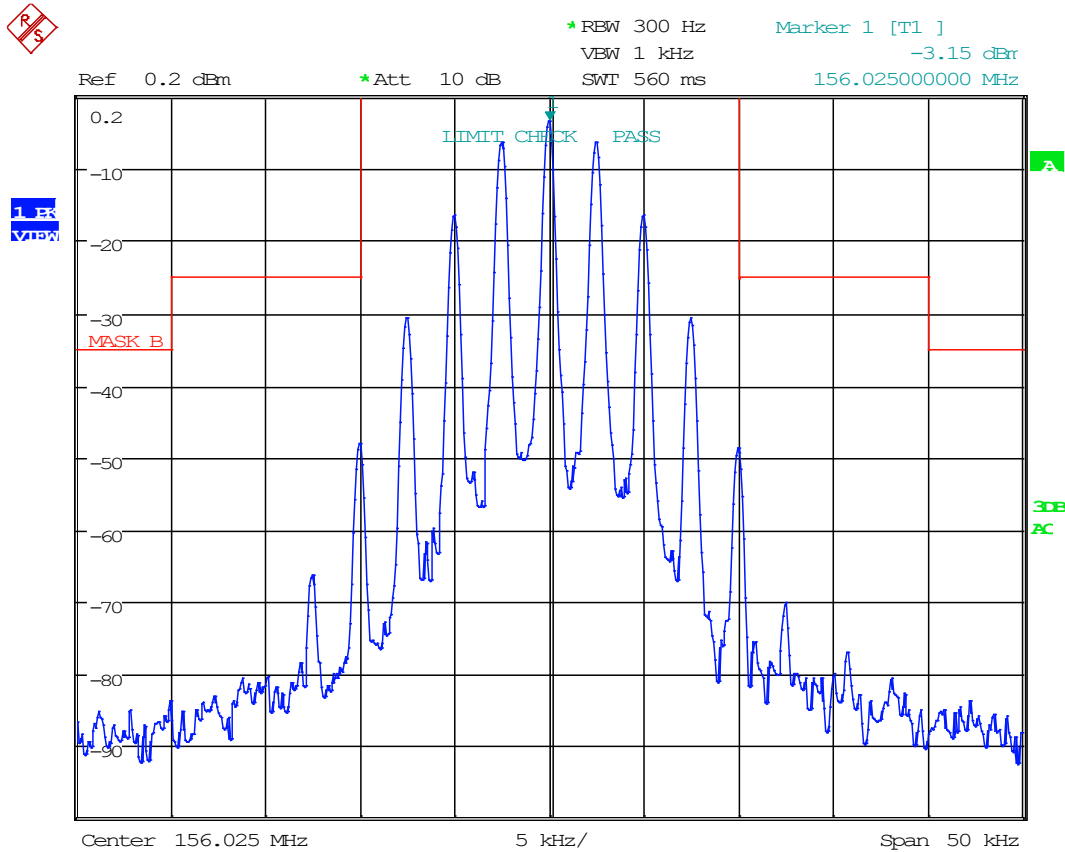
Date: 5.NOV.2019 16:44:50

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
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 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 156.025MHz High Power



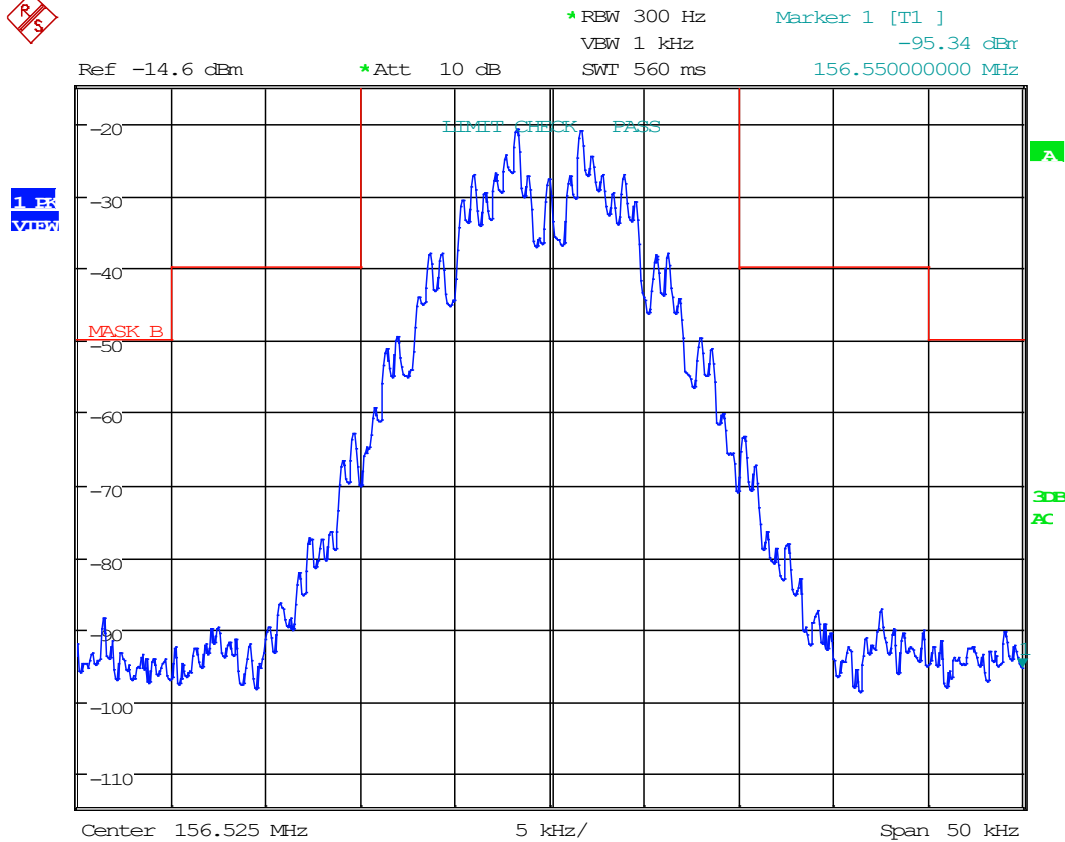
Date: 5.NOV.2019 16:32:08

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 156.525MHz Low Power



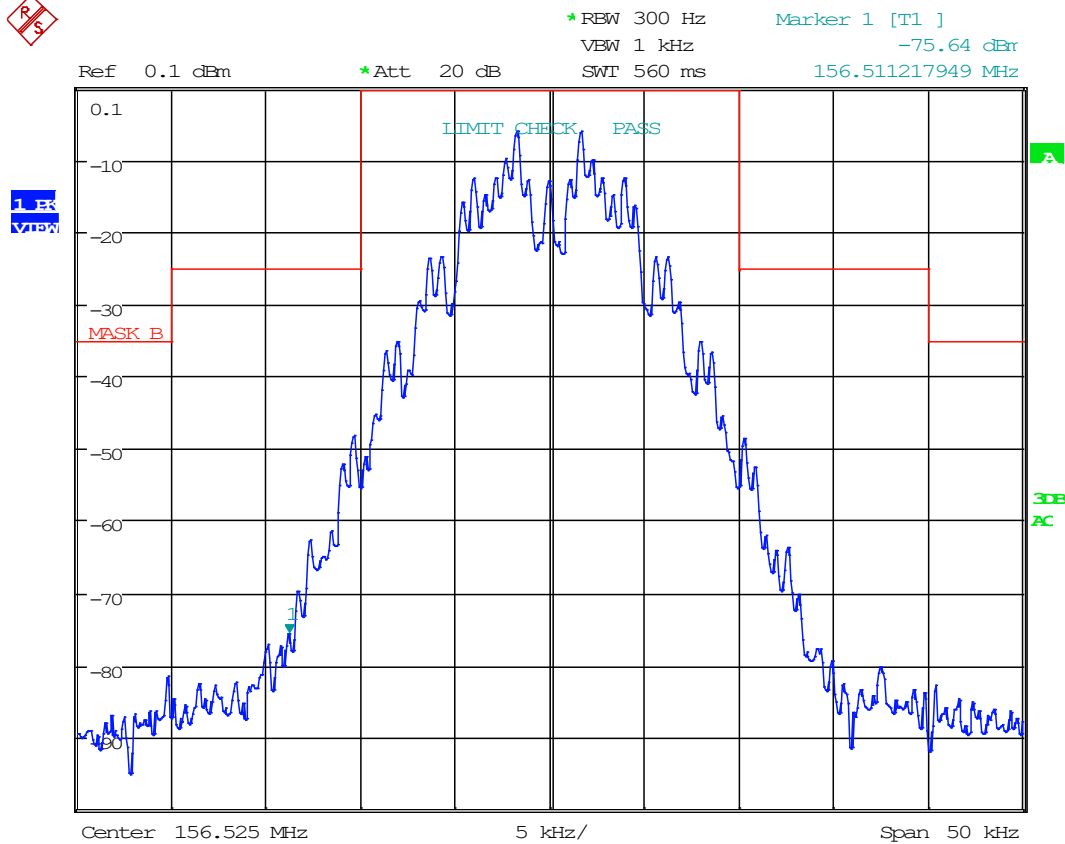
Date: 5.NOV.2019 16:51:48

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 156.525MHz High Power



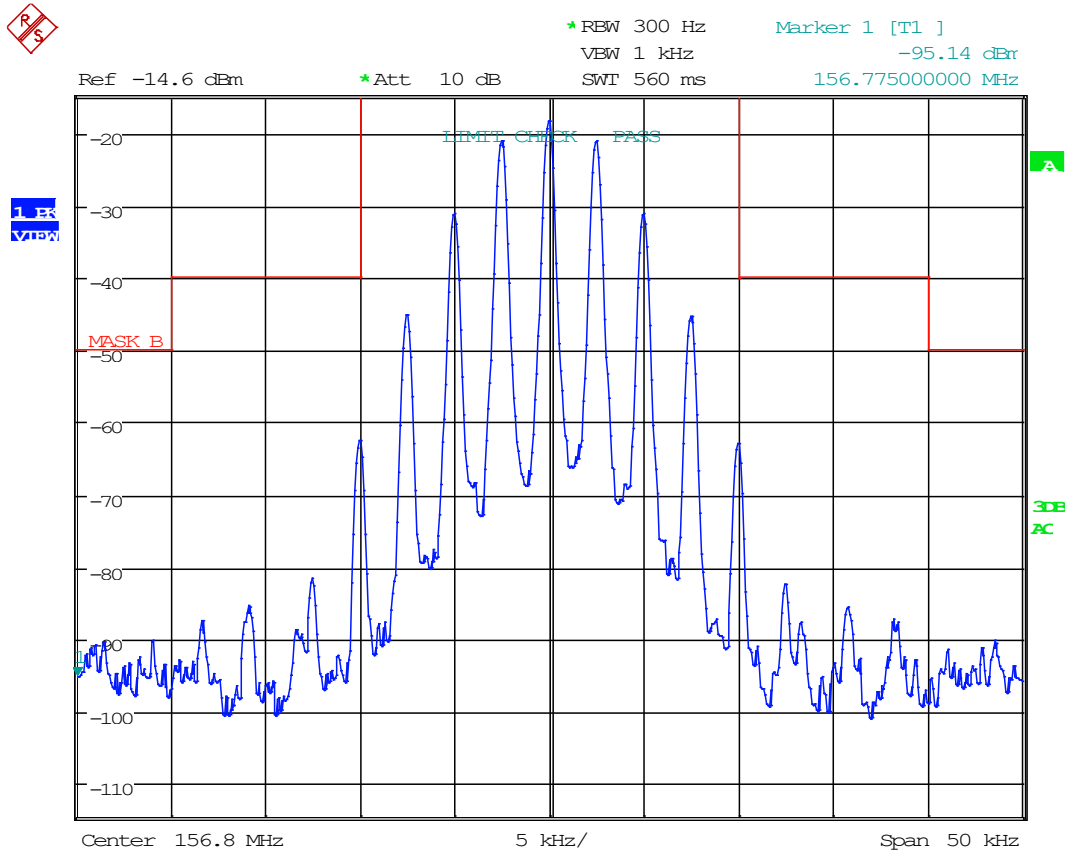
Date: 5.NOV.2019 16:52:52

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 156.8MHz Low Power



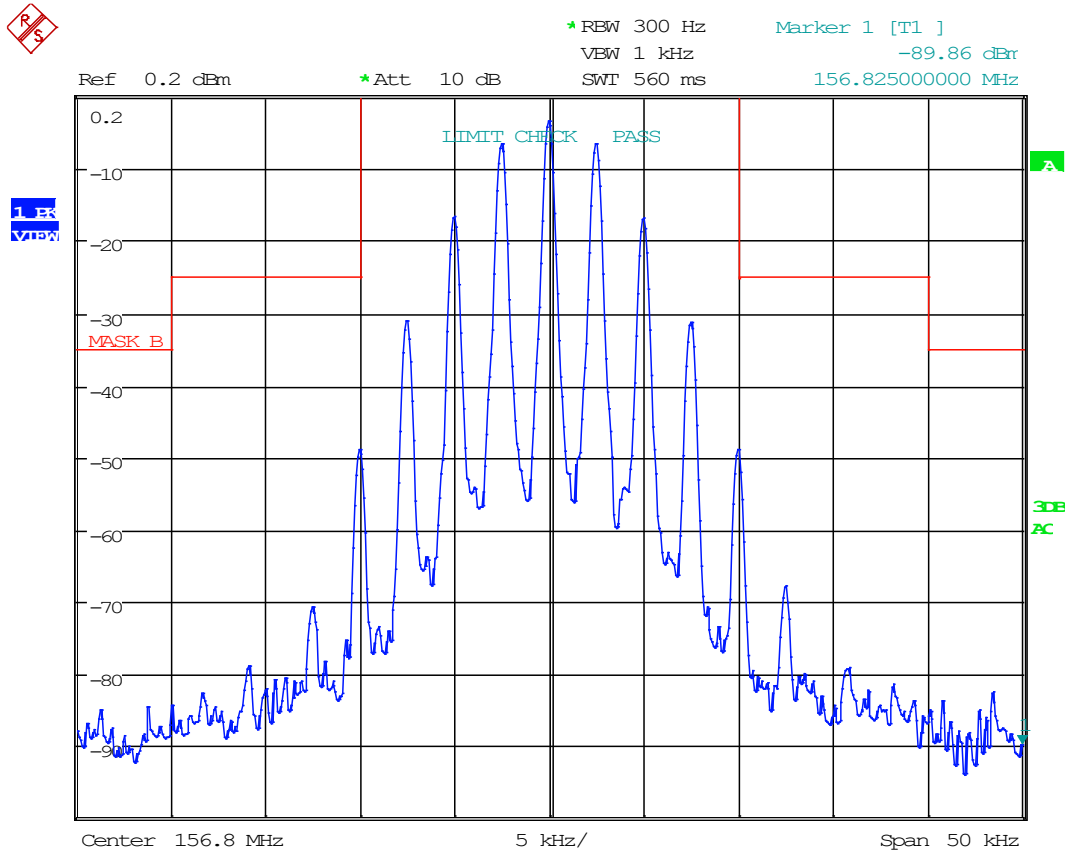
Date: 5.NOV.2019 16:45:43

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 156.8MHz High Power



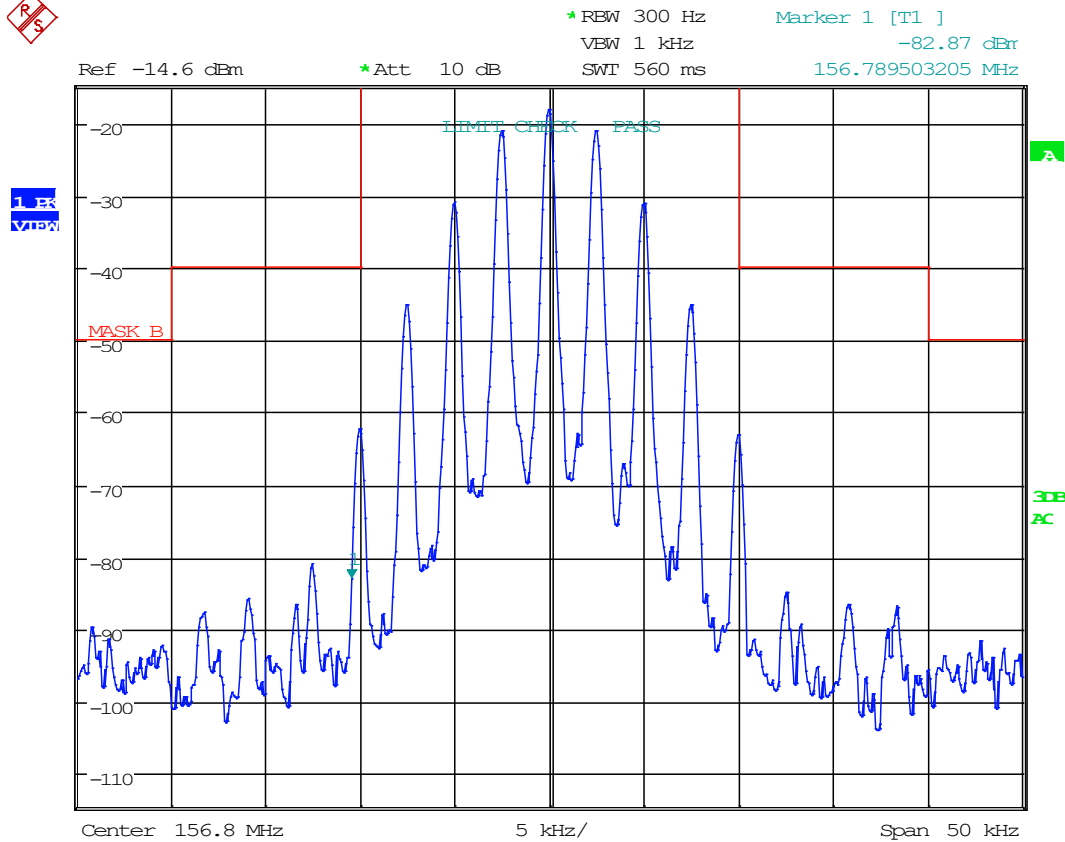
Date: 5.NOV.2019 16:43:35

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 157.425MHz Low Power



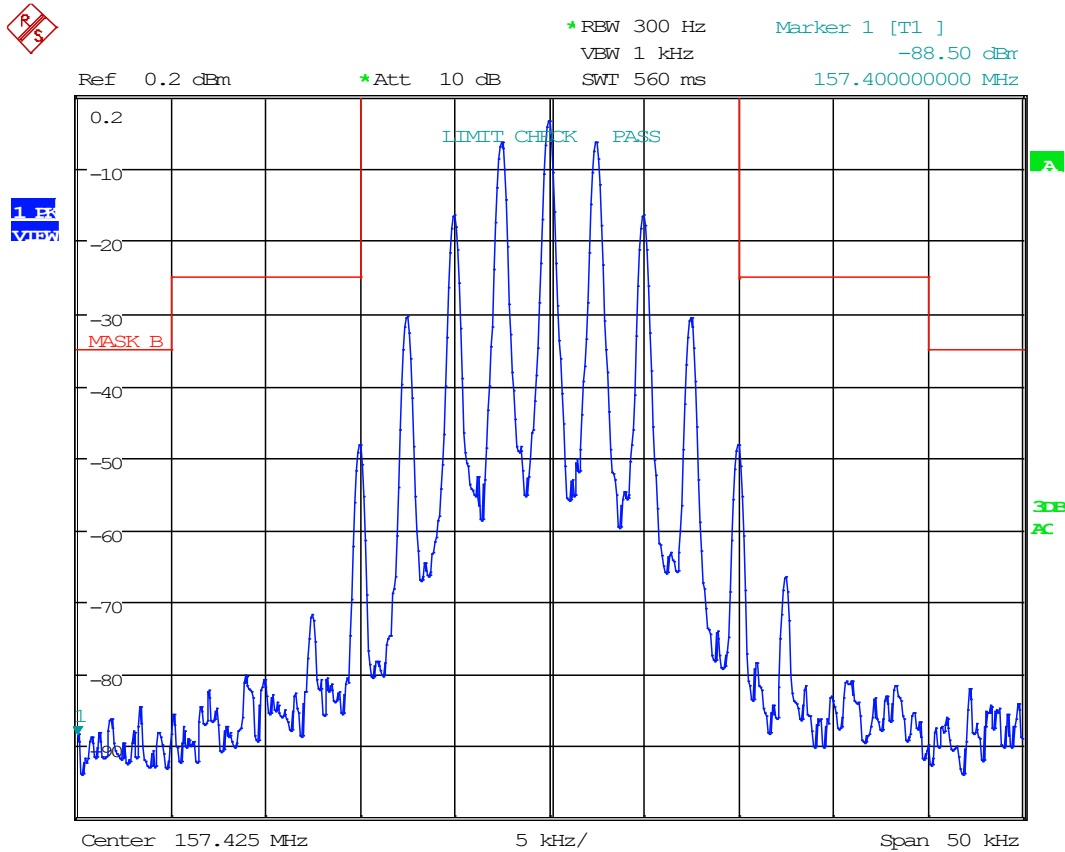
Date: 5.NOV.2019 16:44:14

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

Test Data: 157.425MHz High Power



Date: 5.NOV.2019 16:33:38

Results Meet Requirements

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

OCCUPIED BANDWIDTH

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

§80.211 Emission limitations.

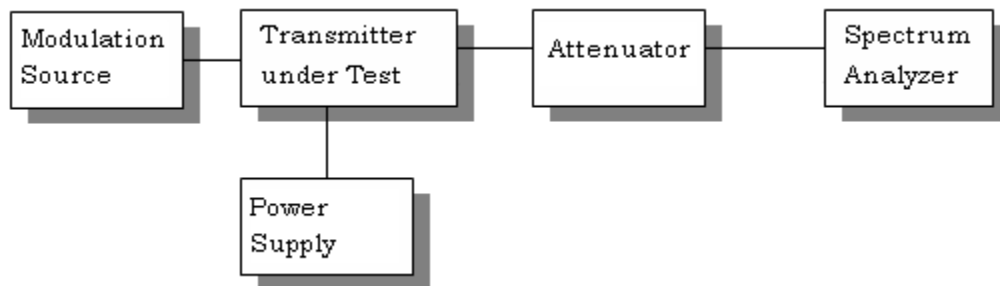
The emissions must be attenuated according to the following schedule.

(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

Method of Measurement: ANSI/TIA-603

Setup Diagram:



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: High Power Low End of Band

Power Mode	Emission Frequency (MHz)	Power Output (dBm)	Antenna Gain (dB)	Antenna Loss (dB)	ERP (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
High	156.03	48.95	0.00	0.59	48.36	n/a	n/a	n/a
High	312.05	-43.48	0.00	52.86	-96.34	61.95	-13.00	83.34
High	468.08	-47.88	0.00	42.39	-90.27	61.95	-13.00	77.27
High	624.10	-48.53	0.00	45.76	-94.29	61.95	-13.00	81.29
High	780.13	-49.16	0.00	53.16	-102.32	61.95	-13.00	89.32
High	936.15	-51.34	0.00	41.69	-93.03	61.95	-13.00	80.03
High	1092.18	-51.53	0.00	43.35	-94.88	61.95	-13.00	81.88
High	1248.20	-51.12	0.00	30.66	-81.78	61.95	-13.00	68.78
High	1404.23	-50.94	0.00	31.23	-82.17	61.95	-13.00	69.17
High	1560.25	-50.64	0.00	17.91	-68.55	61.95	-13.00	55.55

Test Data: Low Power Low End of Band

Power Mode	Emission Frequency (MHz)	Power Output (dBm)	Antenna Gain (dB)	Antenna Loss (dB)	ERP (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
Low	156.03	37.00	0.00	0.59	36.41	n/a	n/a	n/a
Low	312.05	-52.12	0.00	52.86	-104.98	50.00	-13.00	91.98
Low	468.08	-51.93	0.00	42.39	-94.32	50.00	-13.00	81.32
Low	624.10	-51.72	0.00	45.76	-97.48	50.00	-13.00	84.48
Low	780.13	-51.56	0.00	53.16	-104.72	50.00	-13.00	91.72
Low	936.15	-51.26	0.00	41.69	-92.95	50.00	-13.00	79.95
Low	1092.18	-51.45	0.00	43.35	-94.80	50.00	-13.00	81.80
Low	1248.20	-51.04	0.00	30.66	-81.70	50.00	-13.00	68.70
Low	1404.23	-50.86	0.00	31.23	-82.09	50.00	-13.00	69.09
Low	1560.25	-50.56	0.00	17.91	-68.47	50.00	-13.00	55.47

Results Meet Requirements

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: High Power High End of Band

Power Mode	Emission Frequency (MHz)	Power Output (dBm)	Antenna Gain (dB)	Antenna Loss (dB)	ERP (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
High	157.43	48.95	0.00	0.59	48.36	n/a	n/a	n/a
High	314.85	-41.99	0.00	52.86	-94.85	61.95	-13.00	81.85
High	472.28	-46.59	0.00	42.39	-88.98	61.95	-13.00	75.98
High	629.70	-46.43	0.00	45.76	-92.19	61.95	-13.00	79.19
High	787.13	-46.16	0.00	53.16	-99.32	61.95	-13.00	86.32
High	944.55	-45.92	0.00	41.69	-87.61	61.95	-13.00	74.61
High	1101.98	-45.98	0.00	43.35	-89.33	61.95	-13.00	76.33
High	1259.40	-45.68	0.00	30.66	-76.34	61.95	-13.00	63.34
High	1416.83	-45.58	0.00	31.23	-76.81	61.95	-13.00	63.81
High	1574.25	-45.05	0.00	17.91	-62.96	61.95	-13.00	49.96

Test Data: Low Power High End of Band

Power Mode	Emission Frequency (MHz)	Power Output (dBm)	Antenna Gain (dB)	Antenna Loss (dB)	ERP (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
Low	157.43	37.49	0.63	0.00	38.12	n/a	n/a	n/a
Low	314.85	-48.65	0.00	54.42	-103.07	50.49	-13.00	90.07
Low	472.28	-48.40	0.00	44.10	-92.50	50.49	-13.00	79.50
Low	629.70	-48.24	0.00	41.76	-90.00	50.49	-13.00	77.00
Low	787.13	-47.97	0.00	49.47	-97.44	50.49	-13.00	84.44
Low	944.55	-47.73	0.00	32.08	-79.81	50.49	-13.00	66.81
Low	1101.98	-47.79	0.00	35.62	-83.41	50.49	-13.00	70.41
Low	1259.40	-47.49	0.00	29.73	-77.22	50.49	-13.00	64.22
Low	1416.83	-47.39	0.00	18.39	-65.78	50.49	-13.00	52.78
Low	1574.25	-46.86	0.00	14.80	-61.66	50.49	-13.00	48.66

Results Meet Requirements

FIELD STRENGTH OF SPURIOUS EMISSIONS

§80.211 Emission limitations.

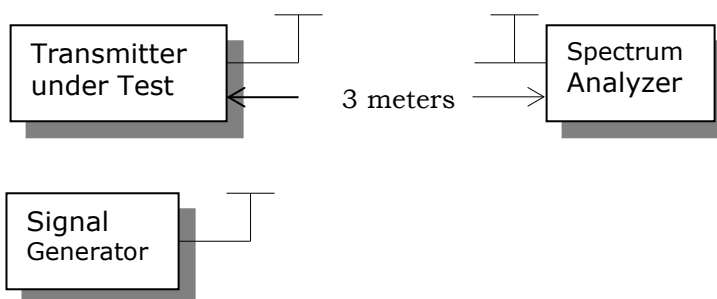
The emissions must be attenuated according to the following schedule.

(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

Method of Measurement: ANSI/TIA-603

Test Setup Diagram:



Note:

The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 9 KHz MHz to at least the tenth harmonic of the fundamental. This test was conducted in accordance with the standard listed above using the substitution method. Measurements were made at the test site of **TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669.**

The measurements below represent the worst case of all the frequencies tested.

Test Data: High Power Low End of Band

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Margin (dB)
156.025	312.10	18.78	H	2.08	14.77	35.63	3.00	35.63	-61.75	48.75
156.025	312.10	19.78	H	2.08	14.77	36.63	3.00	36.63	-60.75	47.75
156.025	468.10	22.25	H	2.52	16.53	41.30	3.00	41.30	-56.07	43.07
156.025	468.10	26.07	V	2.52	16.53	45.12	3.00	45.12	-52.25	39.25
156.025	624.10	24.07	V	2.91	18.80	45.78	3.00	45.78	-51.60	38.60
156.025	624.10	20.59	H	2.91	18.80	42.30	3.00	42.30	-55.08	42.08
156.025	780.10	24.04	H	3.30	21.99	49.33	3.00	49.33	-48.05	35.05
156.025	780.10	22.65	V	3.30	21.99	47.94	3.00	47.94	-49.44	36.44
156.025	936.20	26.97	V	3.59	22.60	53.16	3.00	53.16	-44.22	31.22
156.025	936.20	25.86	H	3.59	22.60	52.05	3.00	52.05	-45.33	32.33
156.025	1092.20	14.18	H	3.83	27.96	45.97	3.00	45.97	-51.41	38.41
156.025	1092.20	11.58	V	3.83	27.96	43.37	3.00	43.37	-54.01	41.01
156.025	1248.20	12.57	V	4.00	29.16	45.73	3.00	45.73	-51.65	38.65
156.025	1248.20	10.37	H	4.00	29.16	43.53	3.00	43.53	-53.85	40.85
156.025	1404.20	10.31	H	4.34	28.84	43.49	3.00	43.49	-53.88	40.88
156.025	1404.20	11.33	V	4.34	28.84	44.51	3.00	44.51	-52.86	39.86
156.025	1560.30	12.18	V	4.59	28.10	44.87	3.00	44.87	-52.51	39.51
156.025	1560.30	10.80	H	4.59	28.10	43.49	3.00	43.49	-53.89	40.89

Test Data: High Power Middle of Band

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Margin (dB)
156.800	313.60	22.68	H	2.08	14.68	39.44	3.00	39.44	-57.93	44.93
156.800	313.60	19.26	V	2.08	14.68	36.02	3.00	36.02	-61.35	48.35
156.800	470.40	21.73	V	2.53	16.82	41.08	3.00	41.08	-56.29	43.29
156.800	470.40	18.46	H	2.53	16.82	37.81	3.00	37.81	-59.56	46.56
156.800	627.20	26.15	H	2.91	18.84	47.90	3.00	47.90	-49.47	36.47
156.800	627.20	21.73	V	2.91	18.84	43.48	3.00	43.48	-53.89	40.89
156.800	784.00	21.71	V	3.30	21.68	46.69	3.00	46.69	-50.68	37.68
156.800	784.00	17.56	H	3.30	21.68	42.54	3.00	42.54	-54.83	41.83
156.800	940.80	27.36	H	3.59	22.60	53.55	3.00	53.55	-43.83	30.83
156.800	940.80	25.68	V	3.59	22.60	51.87	3.00	51.87	-45.51	32.51
156.800	1097.60	15.80	V	3.83	28.07	47.70	3.00	47.70	-49.67	36.67
156.800	1097.60	14.94	V	3.83	28.07	46.84	3.00	46.84	-50.53	37.53
156.800	1254.40	13.08	V	4.01	29.19	46.28	3.00	46.28	-51.10	38.10
156.800	1254.40	12.31	H	4.01	29.19	45.51	3.00	45.51	-51.87	38.87
156.800	1411.20	10.98	H	4.36	28.80	44.14	3.00	44.14	-53.24	40.24
156.800	1411.20	11.47	V	4.36	28.80	44.63	3.00	44.63	-52.75	39.75
156.800	1568.00	12.31	V	4.60	28.12	45.03	3.00	45.03	-52.34	39.34
156.800	1568.00	10.84	H	4.60	28.12	43.56	3.00	43.56	-53.81	40.81

Test Data: High Power High End of Band

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Margin (dB)
157.430	314.90	16.09	V	2.08	14.61	32.78	3.00	32.78	-64.59	51.59
157.430	314.90	19.16	H	2.08	14.61	35.85	3.00	35.85	-61.52	48.52
157.430	472.30	22.76	H	2.54	16.89	42.19	3.00	42.19	-55.18	42.18
157.430	472.30	23.07	V	2.54	16.89	42.50	3.00	42.50	-54.87	41.87
157.430	629.70	24.96	V	2.92	18.89	46.77	3.00	46.77	-50.61	37.61
157.430	629.70	25.51	H	2.92	18.89	47.32	3.00	47.32	-50.06	37.06
157.430	787.10	20.63	H	3.31	21.26	45.20	3.00	45.20	-52.18	39.18
157.430	787.10	22.59	V	3.31	21.26	47.16	3.00	47.16	-50.22	37.22
157.430	944.60	18.44	V	3.60	22.60	44.64	3.00	44.64	-52.74	39.74
157.430	944.60	27.99	H	3.60	22.60	54.19	3.00	54.19	-43.19	30.19
157.430	1102.00	13.07	H	3.84	28.14	45.05	3.00	45.05	-52.33	39.33
157.430	1102.00	13.41	V	3.84	28.14	45.39	3.00	45.39	-51.99	38.99
157.430	1259.40	13.50	V	4.02	29.23	46.75	3.00	46.75	-50.62	37.62
157.430	1259.40	10.33	H	4.02	29.23	43.58	3.00	43.58	-53.79	40.79
157.430	1416.80	11.47	H	4.36	28.77	44.60	3.00	44.60	-52.77	39.77
157.430	1416.80	10.24	V	4.36	28.77	43.37	3.00	43.37	-54.00	41.00
157.430	1574.30	11.37	V	4.61	28.13	44.11	3.00	44.11	-53.26	40.26
157.430	1574.30	10.33	H	4.61	28.13	43.07	3.00	43.07	-54.30	41.30

Applicant: ALPHATRON MARINE USA, INC.
 FCC ID: 2ADJKJHS-800S
 IC: 12477A-JHS800S
 Report: 2920AUT19TestReport _Rev2

FREQUENCY STABILITY

§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 unless shown in Hz.

Frequency bands and categories of stations	Tolerances ¹
(5) Band 156-162 MHz:	
(ii) Ship stations	10. ⁴

⁴For transmitters in the radiolocation and associated telecommand service operating on 154.584 MHz, 159.480 MHz, 160.725 MHz and 160.785 MHz the frequency tolerance is 15 parts in 10^6 .

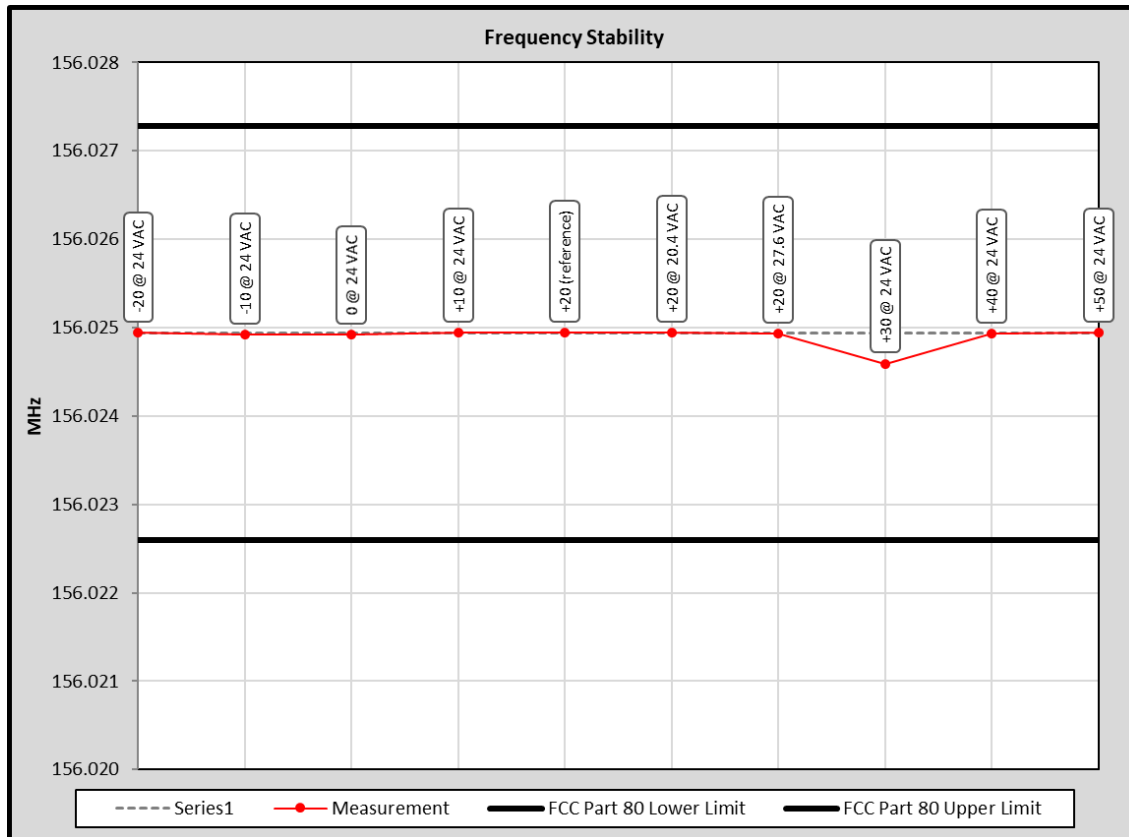
Method of Measurements: ANSI/TIA 603

The transmitter was placed in the temperature chamber at 25°C and allowed to stabilize for one hour. The transmitter was keyed ON for one minute during which four frequency readings were recorded at 15 second intervals. The worst-case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -20°C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute and was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute and again frequency readings were noted at 15 sec intervals. The worst-case number was recorded for temperature plotting. This procedure was repeated in 10-degree increments up to +50°C.

Test Data: Measurement Table

FCC Part 80 Limit	15.0	ppm	
FCC Part 80 Limit	2340.374	Hz	
FCC Part 80 Lower Limit	156.022600	MHz	
FCC Part 80 Upper Limit	156.027280	MHz	
Rated Supply Voltage	24.0	☒ AC ☐ DC	
Temperature / Voltage Variation			
Temperature (°C)	Supplied Voltage (V)	Frequency (MHz)	Deviation (kHz)
-20	24.0	156.02494	0.000
-10	24.0	156.02492	0.020
0	24.0	156.02492	0.020
+10	24.0	156.02494	0.000
+20 (reference)	24.0	156.02494	0.000
+20	20.4	156.02494	0.000
+20	27.6	156.02493	0.010
+30	24.0	156.02459	0.347
+40	24.0	156.02493	0.010
+50	24.0	156.02494	0.000

Test Data: Measurement Plot



STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16-4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Frequency Accuracy	± 49.5 Hz	(1)
RF Conducted Power	± 0.93 dB	(1)
Conducted spurious emission of transmitter to 40GHz	± 1.86 dB	
Occupied Bandwidth	± 2.65 %	
Radiated RF Power	± 1.4 dB	
Rad Emissions of transmitter up to 26.5GHz	± 2.14 dB	
Rad Emissions of transmitter to 40GHz	± 2.36 dB	
Temperature	± 1.0 °C	(1)
Humidity	± 5.0 %	

Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

EMC EQUIPMENT LIST

Device	Manufacturer	Model	SN	Calibration Date	Cal Due Date
Function Generator	Standford	DS340	25200	02/21/18	02/21/21
Modulation Analyzer	HP	8901A	3050A05856	04/13/17	04/13/20
Audio Analyzer	HP	8903B	3011A13084	02/20/18	02/20/21
EMI Test Receiver R & S ESIB 40 firmware v 4.34.3 BIOS v3.3	Rohde & Schwarz	ESIB 40	100274	07/22/19	07/22/21
EMI Test Receiver R & S ESU 40 firmware v 4.43 SP 3 BIOS v5.1-24-3	Rohde & Schwarz	ESU 40	100320	08/28/18	08/28/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 KMKM-0670-01 KFKF-0197-00	02/27/19	02/27/21
CHAMBER	Panashield	3M	N/A	03/15/19	03/15/21
Antenna: Active Loop	ETS-Lindgren	6502	00062529	12/11/17	12/11/20
Antenna: Biconical 1096	Eaton	94455-1	1096	08/01/17	08/01/20
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/26/17	07/26/20
Ant: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	02/25/20	02/25/23
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	N/A	N/A
Type K J Thermometer	Martel	303	080504494	11/06/17	11/06/20
Oscilloscope	LeCroy	LT364	00414	03/28/19	03/28/21

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF REPORT

Applicant: ALPHATRON MARINE USA, INC.
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Document Name	Description of Change	Revision Date	Approved By
PT 80 Rpt	Initial Issue		SS Sanders
	Added Document History to Template		G Greene
	Added Uc Table	170508	Cory Leverett

TEST SETUP PHOTOGRAPHS

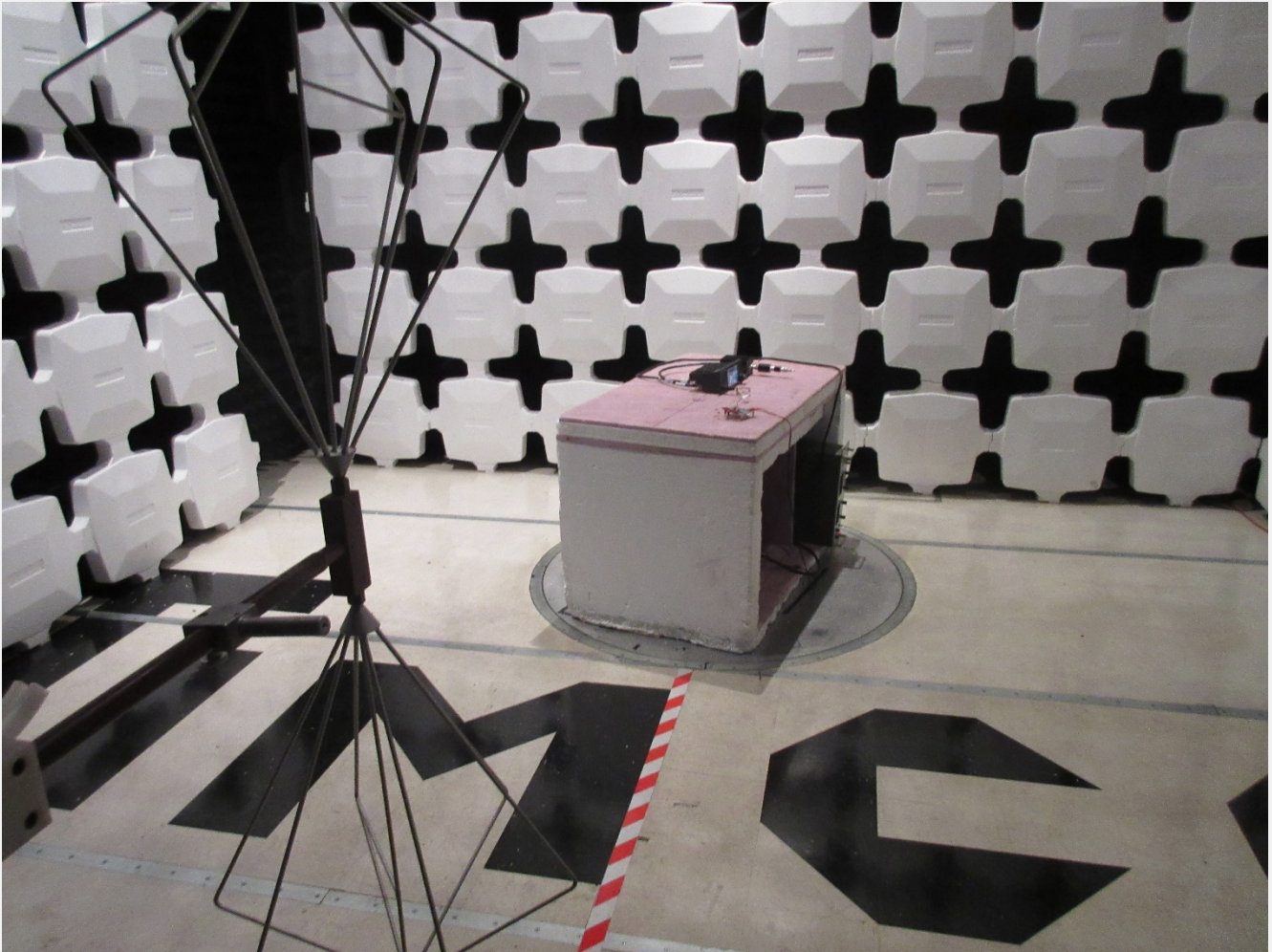
Applicant: Alphatron Marine USA, Inc.
FCC ID: 2ADJKJHS-800S
IC: 12477A-JHS800S

Conducted Measurements: Table Setup



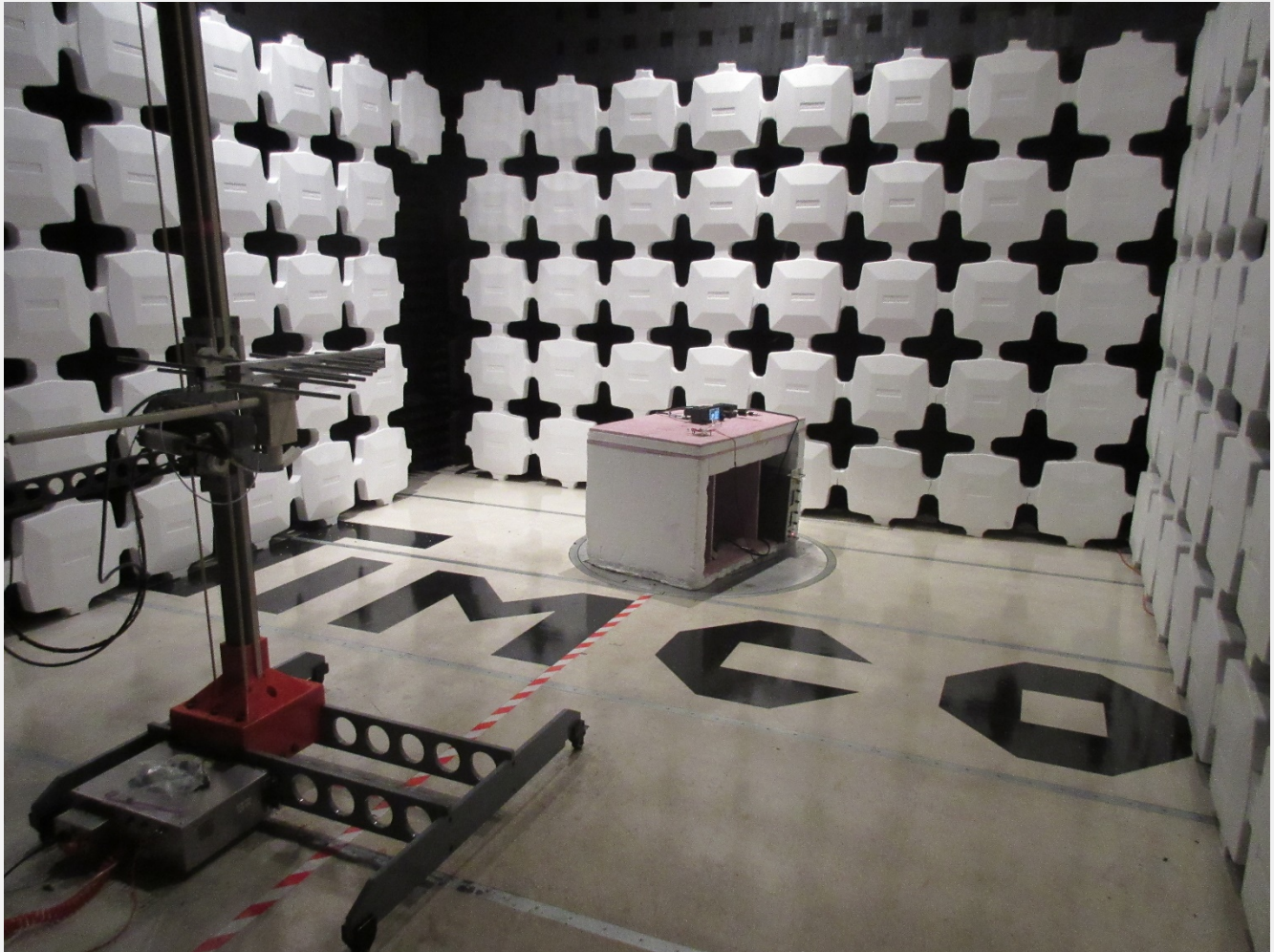
TEST SETUP PHOTOGRAPHS

**Field Strength of Spurious Emissions
30 MHz to 200 MHz (Biconical Antenna)**



TEST SETUP PHOTOGRAPHS

**Field Strength of Spurious Emissions
200 MHz to 1 GHz (Log Periodic Antenna)**



TEST SETUP PHOTOGRAPHS

Field Strength of Spurious Emissions 1 – 18 GHz (Dual Ridge Waveguide Antenna)

