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RF Exposure Evaluation Report

APPLICANT	ALPHATRON MARINE USA, INC.
	1205 BUTLER ROAD LEAGUE CITY TX 77573 USA
FCC ID	2ADJKJMA-610
MODEL NUMBER	JMA-610
PRODUCT DESCRIPTION	MARINE RADAR
STANDARD APPLIED	CFR 47 Part 2.1091
PREPARED BY	Christian Pawlak

We, TIMCO ENGINEERING, INC. would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and meets the requirements.

The attached report shall not be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

GENERAL REMARKS

Attestations

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

I attest that the necessary evaluations were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669



Authorized Signatory Name:

Christian Pawlak

Engineering Project Manager

Date: 5/31/2015

Applicant: ALPHATRON MARINE USA, INC.
FCC ID: 2ADJKJMA-610
Report: V:\A\ALPHATRON\45AUT15\45AUT15RF EXP MPE RPT.DOCX

RF Exposure Requirements

General information

Device type: MARINE RADAR

Devices that operate under Part 90 of this chapter are subject to RF exposure evaluation prior to equipment authorization or use.

Antenna

The manufacturer does not specify an antenna, but a typical antenna has a gain of 0 dBi.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Fixed mounted	Any	omni	0

Operating configuration and exposure conditions:

The conducted output power is shown in the table below. Typical use qualifies for a maximum duty cycle factor of 100%.

Operation: A typical installation consists of an antenna system with a 10 meter coaxial cable of the type RG 213/ U type which has a loss as follows;

Nom. Attenuation for RG 213/U:

Frequency MHz	Attenuation per 100ft. dB
1	.27
10	.55
50	1.3
100	1.9
200	2.7
400	4.1
700	6.5
900	7.6
1000	8.0
4000	21.5

MPE Calculation:

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for general uncontrolled exposure environment is shown in FCC rule Part 1.11310, Table 1.

**Minimum Separation Distance for Mobile or Fixed Devices
General Population/Uncontrolled Exposure**

Insert values in yellow highlighted boxes to determine Minimum Separation Distance

Max Power	4900 W	<i>equals</i>	Max Power	4900000 mW
Duty Cycle	0.06 %	<i>equals</i>	Duty Factor	0.0006 numeric
Antenna Gain	30.2 dBi	<i>equals</i>	Gain numeric	1047.129 numeric
Coax Loss	0 dB		Gain - Coax Loss	1047.129 numeric
Power Density	1 mW/cm ²			
Frequency	9500 MHz			

Enter power Density from the chart to the right

Rule Part 1.1310, Table 1

Frequency range	Power der	Enter this value
MHz	mW/cm ²	mW/cm ²
0.3-1.34	100	100
1.34-30	180/f ²	0.0
30-300	0.2	0.2
300-1,500	f/1500	6.3
1,500-100,000	1	1

f = frequency in MHz

Minimum Separation Distance	495 cm	4.95 m
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Minimum Separation in Inches 194.7166 Inches