Timco Test Report # TR_1573-21_FCC_MPE_2
Revision: 2
Issue Date: April 30, 2021
Final Test Date: April 15, 2021

TIMCO ENGINEERING, Inc.
*An IIA Company*

# Test Report - FCC PART 1.1310 / MPE
# Prepared For: Alphatron Marine USA, Inc.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager
Date of Signature (YYYY-MM-DD): 2021-04-30

Table of Contents

## 1. Customer Information

Applicant: Alphatron Marine USA, Inc.
Address: 1205 Butler Road
League City, TX 77573

## 2. Location of Testing

### 2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA"). Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

2.2 Testing was performed, reviewed by

Dates of Testing: April 15 - 29, 2021

Signature:  Sr. EMC Engineer EMC-003838-NE

Name & Title: Tim Royer, EMC Engineer

Date of Signature
(YYYY-MM-DD): 2021-04-30

## 3. Test Sample(s) (EUT/DUT)

The test sample was received: April 22, 2021

### 3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

| Identification | |
|---|---|
| FCC ID: | 2ADJKNKE387 |
| Brief Description | River Radar |
| Type of Modular | n/a |
| Model(s) # | NKE-387 |
| Trade name | n/a |
| Firmware version | n/a |
| Software version | n/a |
| Serial Number | n/a |

| Technical Characteristics | |
|---|---|
| Technology | Radar |
| Frequency Range | 9200 - 9500 MHz |
| RF O/P Power (Max.) | 5.5 kW |
| Modulation | Pulse w/ no modulated information |
| Bandwidth & Emission Class | 66M3PON |
| Number of Channels | n/a |
| Duty Cycle | 0.12% |
| Antenna Connector | Proprietary (fitted with WR-90 adapter for testing) |
| Voltage Rating (AC or Batt.) | DC 24 V |

| Antenna Characteristics | | |
|---|---|---|
| Antenna Name | Frequency Range | Dimensions |
| Swing Circle 1880 mm | 9.0 – 9.5 GHz | 6’ |
| Swing Circle 2240 mm | 9.0 – 9.5 GHz | 7’ |
| Swing Circle 2810 mm | 9.0 – 9.5 GHz | 9’ |

# 4. Test methods & Applicable Regulatory Limits

## 4.1 Test methods/Standards/Guidance:

The following guidance FCC KDB 447498 D01 General RF Exposure Guidance v06 was used for RF exposure evaluation as per FCC Part 1.1310 and FCC Part 2.1091 and part 2.1093. Full test results are available in this report.

### 4.1.1 FCC Limits for Maximum Permissible Exposure (MPE)

| Frequency Range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density ($mW/cm^2$) | Averaging Time (minutes) |
|---|---|---|---|---|
| A Limits for Occupational/Controlled Exposure | | | | |
| 0.3-3.0 | 614 | 1.63 | *(100) | ≤6 |
| 3.0-30 | 1842/f | 4.89/f | *($900/f^2$) | <6 |
| 30-300 | 61.4 | 0.163 | 1.0 | <6 |
| 300-1,500 | | | f/300 | <6 |
| 1,500-100,000 | | | 5 | <6 |
| B Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | *(100) | <30 |
| 1.34-30 | 824/f | 2.19/f | *($180/f^2$) | <30 |
| 30-300 | 27.5 | 0.073 | 0.2 | <30 |
| 300-1,500 | | | f/1500 | <30 |
| 1,500-100,000 | | | 1.0 | <30 |

## 4.2 Equations

POWER DENSITY

E(V/m) = SQRT ( 30 * P * G ) / d

Pd(W/m^2) = E^2 / 377

S = EIRP / ( 4 * Pi * D^2v )

*Where:*

S = Power density, in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power, in mW
D = Separation distance in cm

Power density is converted from units of mW/cm^2 to units of W/m^2 by multiplying by 10.

DISTANCE

D = SQRT ( EIRP / ( 4 * Pi * S ))

*Where:*

D = Separation distance in cm
EIRP = Equivalent Isotropic Radiated Power, in mW
S = Power density in mW/cm^2

SOURCE-BASED DUTY CYCLE (When applicable (for example, multi-slot mobile phone applications) A duty cycle factor may be applied.)

Source-based time-average EIRP = ( DC / 100 ) * EIRP

*Where:*

DC = Duty Cycle in % as applicable.
EIRP = Equivalent Isotropic radiated Power, in mW

## 5. RF Exposure Results

| Type | Horizontal Beam Width(deg.) | Vertical Beam Width(deg.) | Antenna Gain (dBi) | Maximum dimension of antenna D(m) | ①$R_{nf}$ Near-field (m) | ②$R_{ff}$ Far-field Beginning Distance (m) | Aperture Efficiency η | ③$S_{nf}$ Power density of Near-field ($mW/cm^2$) | ④$R_t$ The distance of till $S_{LMT}$ by using Near-field (cm) | ⑤$R_f$ The distance of till $S_{LMT}$ by using Far-field (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| NAX-16R-6 | 1.2 | 28.9 | 29.1 | 1.7760 | 24.730 | 59.352 | 0.6 | 0.427 | 211.3 | 308.4 |
| NAX-16R-7 | 1.0 | 28.7 | 29.5 | 2.1296 | 35.558 | 85.339 | 0.6 | 0.297 | 211.3 | 322.9 |
| NAX-16R-9 | 0.81 | 28.3 | 30.9 | 2.7060 | 57.411 | 137.786 | 0.6 | 0.184 | 211.3 | 379.4 |

| Type | Length | FCC Limit (cm) |
|---|---|---|
| NAX-16R-6 | 6ft | 308.4 |
| NAX-16R-7 | 7ft | 322.9 |
| NAX-16R-9 | 9ft | 379.4 |

## 6. History of Test Report Changes

| Test Report # | Revision # | Description | Date of Issue |
|---|---|---|---|
| TR_1573-21_FCC_MPE_1 | 1 | Initial release | April 30, 2021 |
| | 2 | Page 8 Updated | July 6, 2021 |
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END OF TEST REPORT