849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA

PHONE: 352.472.5500
EMAIL: INFO@TIMCOENGR.COM
WEB: HTTP://WWW.TIMCOENGR.COM

TIMCO ENGINEERING, Inc.

An IIA Company

RF Exposure Evaluation Report

APPLICANT	NAVICO INC.
ADDRESS	4500 S. 129TH EAST AVENUE SUITE 200 TULSA OK 74134-5885 USA
FCC ID	RAYHALO24
IC	978B-HALO24
MODEL NUMBER	Halo24
PRODUCT DESCRIPTION	BROADBAND RADAR
DATE SAMPLE RECEIVED	07/05/2018
FINAL TEST DATE	08/10/2018
PREPARED BY	Franklin Rose
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Report Version	Description	Issue Date
988AUT18 MPE_TestReport_	Rev1	Initial Issue	08/10/2018
988AUT18 MPE_TestReport_	Rev2	Corrected MPE Calculation	08/24/2018

TABLE OF CONTENTS

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

Prepared by:

Name and Title	Franklin Rose, Project Manager / EMC Testing Technician
Date	08/10/2018

GENERAL INFORMATION

EUT Description	BROADBAND RADAR
Model Number	Halo24
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power (12.0 V)
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Antenna Connector	Precision N-Connector
Test Conditions	The temperature was 26ºC Relative humidity of 50%.
Modification to the EUT	The EUT was tested without the rotational antenna, using an N-type connector for conducted power output measurement
Applicable Standards	FCC CFR 47 Part 2.1091; RSS-102 Issue 5
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070

ANTENNA INFORMATION

The following antenna information was provided by the Manufacturer:

Antenna Type	Patch Array
Length	560 mm
Antenna Gain	23 dBi
Beamwidth	3.9 degrees
Sidelobe Supression	Better than -18dB inside +/-10deg Better than -24dB outside +/-10deg
Backlobe Supression	≥ -24dB

Manufacturer Provides Antenna	Type	Max Gain (dBi)
Yes	Patch Array	**23.0**

MPE CALCULATION

The minimum separation distance is calculated as follows:

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

1. **FCC: General Population / Uncontrolled Exposure Environment**: The limit for General Uncontrolled Exposure Environment is calculated as shown in Part 1.1310, Table 1 (B):

Variable	Value
Max Power (Rated)	25 W
Max Duty Cycle (Rated)	10.0%
Max Antenna Gain	23.00 dBi
Coax Loss	0 (unspecified)
Power Density	1 mW/cm^2
Minimum Separation Distance	199.23 cm

1. **Industry Canada: General Uncontrolled Exposure Environment**: The limit for General Uncontrolled Exposure Environment is calculated as shown in RSS-102 i5, Table 4:

Variable	Value
Max Power (Rated)	25 W
Max Duty Cycle (Rated)	10.0%
Max Antenna Gain	23.00 dBi
Coax Loss	0 (unspecified)
Power Density	10 W/m^2
Minimum Separation Distance	199.23 cm