

TEST REPORT

Application No.: SZEM2103002197CR
Applicant: Navico Inc.
Address of Applicant: 4500 S. 129th East Avenue, Ste. 200, Tulsa, Oklahoma, 74134 United States
Manufacturer: Navico Auckland Ltd.
Address of Manufacturer: 44 Arrenway Drive, Rosedale, Auckland 0632, New Zealand
Factory: Shenzhen Fastrain Technology Co., Ltd.
Address of Factory: No.3 Baolong 4th Rd., Baolong Industrial Area, Longgang District, Shenzhen, China

Equipment Under Test (EUT):

EUT Name: MARINE BLACK BOX DSC/AIS VHF RADIO SYSTEM
Model No.: NRS-2
Trade Mark: NAVICO
Standard(s) : 47 CFR Part 15, Subpart B
Date of Receipt: 2021-03-01
Date of Test: 2021-03-03 to 2021-04-13
Date of Issue: 2021-04-14

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-04-14		Original

Authorized for issue by:			
		<i>Edison Li</i>	
		Edison Li/Project Engineer	
		<i>Eric Fu</i>	
		Eric Fu/Reviewer	



2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (above 1GHz)		ANSI C63.4:2014	Class B	Pass



3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 DETAILS OF E.U.T.	5
4.2 DESCRIPTION OF SUPPORT UNITS	5
4.3 MEASUREMENT UNCERTAINTY	5
4.4 TEST LOCATION.....	6
4.5 TEST FACILITY.....	6
4.6 DEVIATION FROM STANDARDS	6
4.7 ABNORMALITIES FROM STANDARD CONDITIONS	6
5 EQUIPMENT LIST	7
6 EMISSION TEST RESULTS	8
6.1 RADIATED EMISSIONS (30MHZ-1GHZ).....	8
6.1.1 <i>E.U.T. Operation</i>	8
6.1.2 <i>Test Mode Description</i>	8
6.1.3 <i>Test Setup Diagram</i>	8
6.1.4 <i>Measurement Procedure and Data</i>	9
6.2 RADIATED EMISSIONS (ABOVE 1GHZ).....	12
6.2.1 <i>E.U.T. Operation</i>	12
6.2.2 <i>Test Mode Description</i>	12
6.2.3 <i>Test Setup Diagram</i>	12
6.2.4 <i>Measurement Procedure and Data</i>	12
7 PHOTOGRAPHS.....	15
7.1 SETUP PHOTOS.	15
7.2 EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS).....	15



4 General Information

4.1 Details of E.U.T.

Power Supply:	12 VDC battery system
Cable:	DC cable: longer than 300cm unshielded
Sample Type:	Mobile device
Internal Source:	More than 108MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
DC power	ZHAOXIN	RXN-305D	REF. No.SEA2700
Coaxial Attenuator	Provided by client	TS4	HYT168793
Cell Site Test Set	HP	8921A	3633A04615
Audio Analyzer	Rohde & Schwarz	UPV	SEM008-03
Wired Handset	SIMRAD	HS100	/
Wired Speaker	/	SP100	/
Wired Handset	B&G	H100	/
Wired Speaker	/	SP100	/

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emissions (30MHz-1GHz)	± 4.5dB
Radiated Emissions (above 1GHz)	± 4.8dB

Remark:

The U_{lab} (lab Uncertainty) is less than U_{CISPR} (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



5 Equipment List

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2020-11-02	2021-11-01
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-02	2019-05-24	2022-05-23
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2020-03-24	2021-03-23
				2021-03-24	2022-03-23
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09

Radiated Emissions (above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-31	2021-03-30
				2021-03-30	2024-03-29
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
				2021-04-11	2024-04-10
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2020-09-15	2021-09-14
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2020-09-15	2021-09-14
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06



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6 Emission Test Results

6.1 Radiated Emissions (30MHz-1GHz)

Test Requirement: 47 CFR Part 15, Subpart B

Test Method: ANSI C63.4:2014

Measurement Distance: 3m

Limit:

FREQUENCY (MHz)	dB μ V/m (At 10m)		dB μ V/m (At 3m)	
	Class B		Class B	
30MHz -88MHz	29.5		40.0	
88MHz-216MHz	33.1		43.5	
216MHz-960MHz	35.6		46.0	
960MHz-1000MHz	43.5		54.0	

Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.4 °C

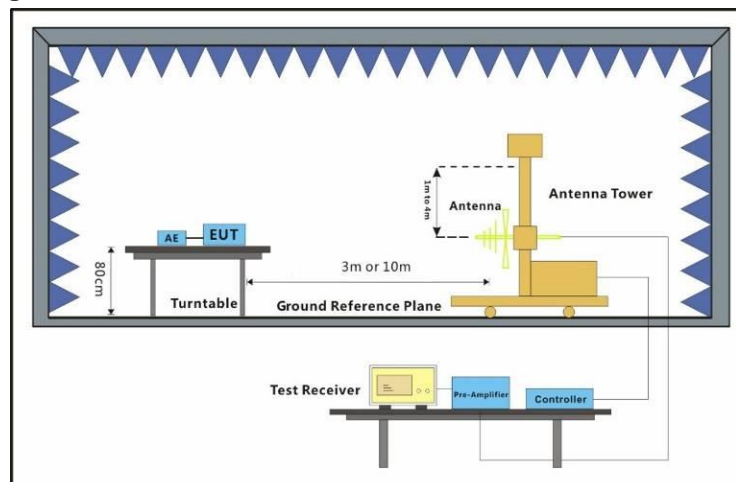
Humidity: 51.3 % RH

Atmospheric Pressure: 1010 mbar

6.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal working

6.1.3 Test Setup Diagram

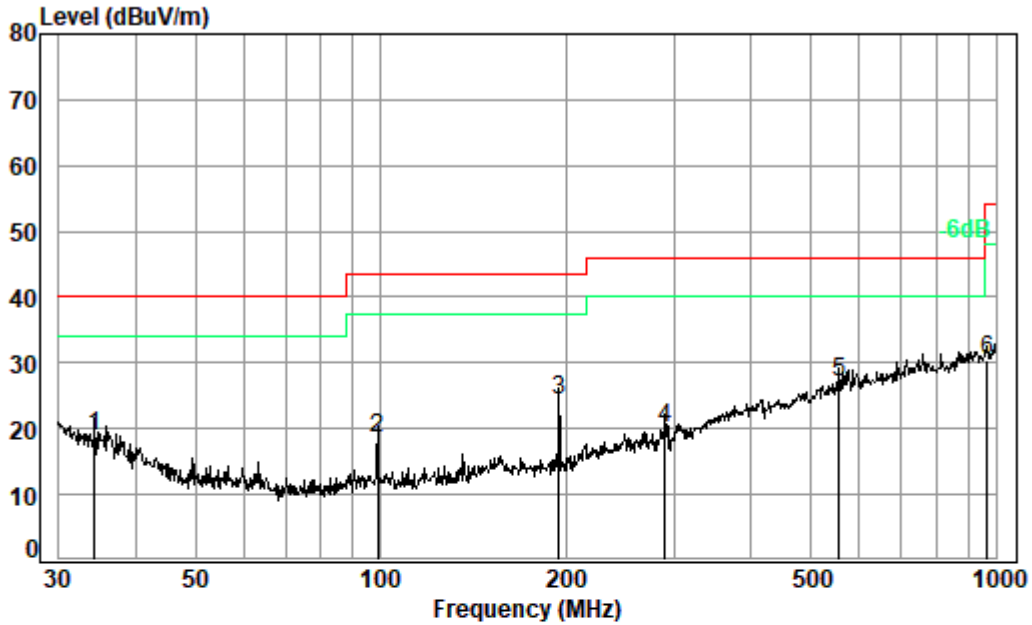


6.1.4 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.



Test Mode: 00; Polarity: Horizontal

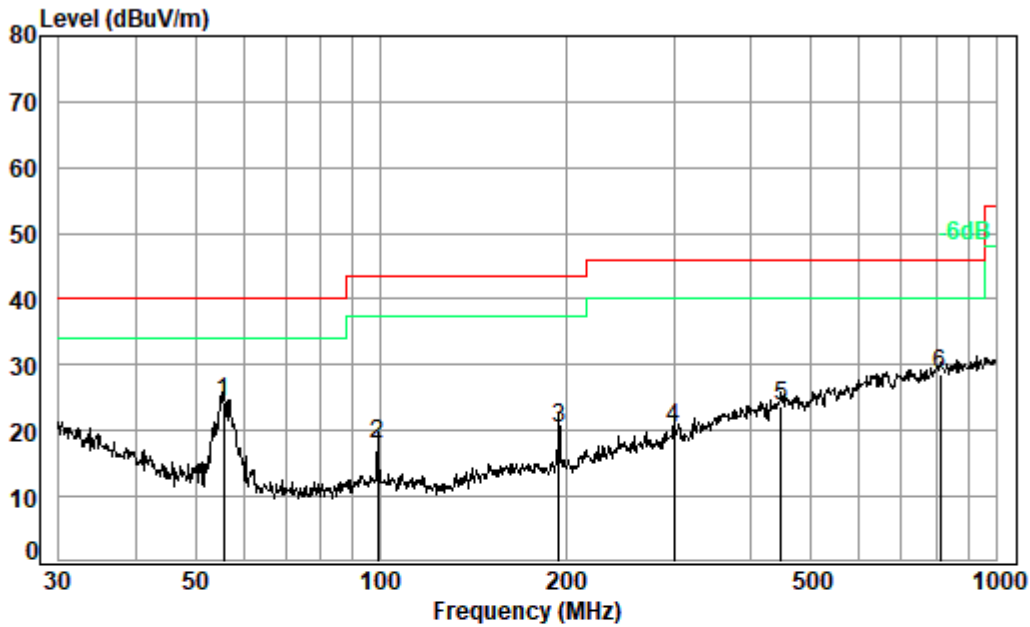


Condition: 3m HORIZONTAL
Job No. : 02197CR
Test Mode: 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	34.28	0.65	20.73	27.72	25.08	18.74	40.00	-21.26	QP
2	98.83	1.12	13.88	27.61	31.14	18.53	43.50	-24.97	QP
3	195.14	1.20	15.66	27.16	34.51	24.21	43.50	-19.29	QP
4	290.02	1.93	18.30	26.89	26.85	20.19	46.00	-25.81	QP
5 pp	556.77	2.62	25.03	27.99	27.40	27.06	46.00	-18.94	QP
6	968.93	3.57	29.50	26.81	24.15	30.41	54.00	-23.59	QP



Test Mode: 00; Polarity: Vertical



Condition: 3m VERTICAL

Job No. : 02197CR

Test Mode: 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	pp	55.61	0.76	13.02	27.67	38.32	24.43	40.00	-15.57 QP
2		98.83	1.12	13.88	27.61	30.44	17.83	43.50	-25.67 QP
3		195.14	1.20	15.66	27.16	30.72	20.42	43.50	-23.08 QP
4		299.32	2.00	19.05	26.87	26.24	20.42	46.00	-25.58 QP
5		447.98	2.40	22.70	27.60	26.37	23.87	46.00	-22.13 QP
6		810.27	3.32	27.85	27.67	25.07	28.57	46.00	-17.43 QP



6.2 Radiated Emissions (above 1GHz)

Test Requirement: 47 CFR Part 15, Subpart B
 Test Method: ANSI C63.4:2014
 Measurement Distance: 3m
 Limit:
 Above 1GHz 74(dBμV/m) peak, 54(dBμV/m) average
 Detector: Peak for pre-scan (1000kHz resolution bandwidth) 100M to18000MHz

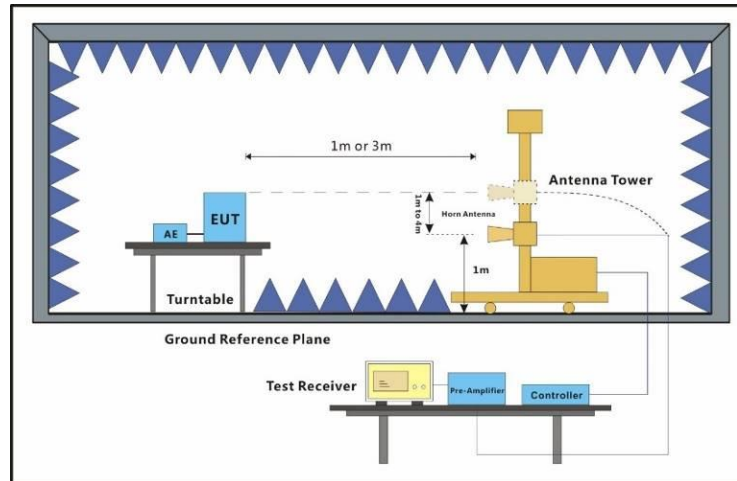
6.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.6 °C Humidity: 52.1 % RH Atmospheric Pressure: 1010 mbar

6.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Normal working

6.2.3 Test Setup Diagram



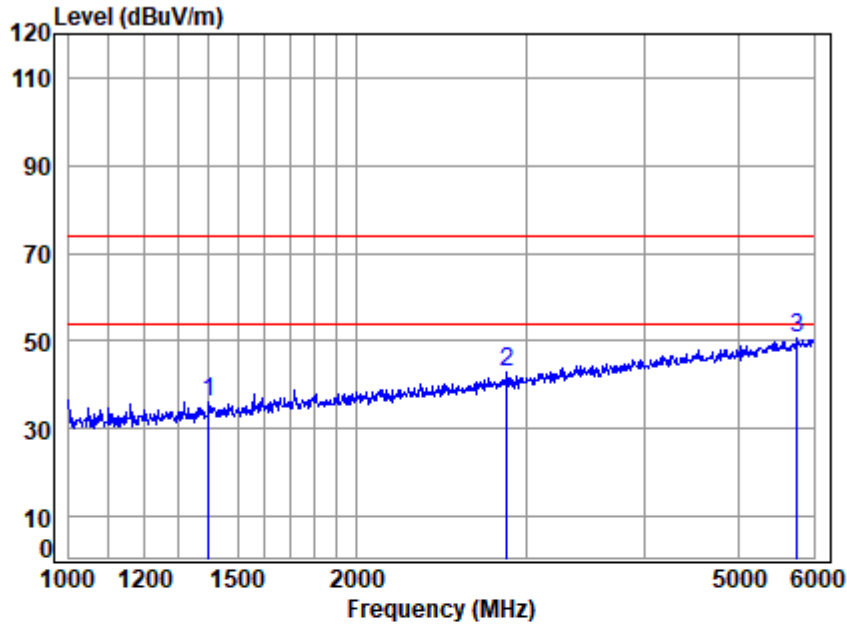
6.2.4 Measurement Procedure and Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.



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Test Mode: 00; Polarity: Horizontal



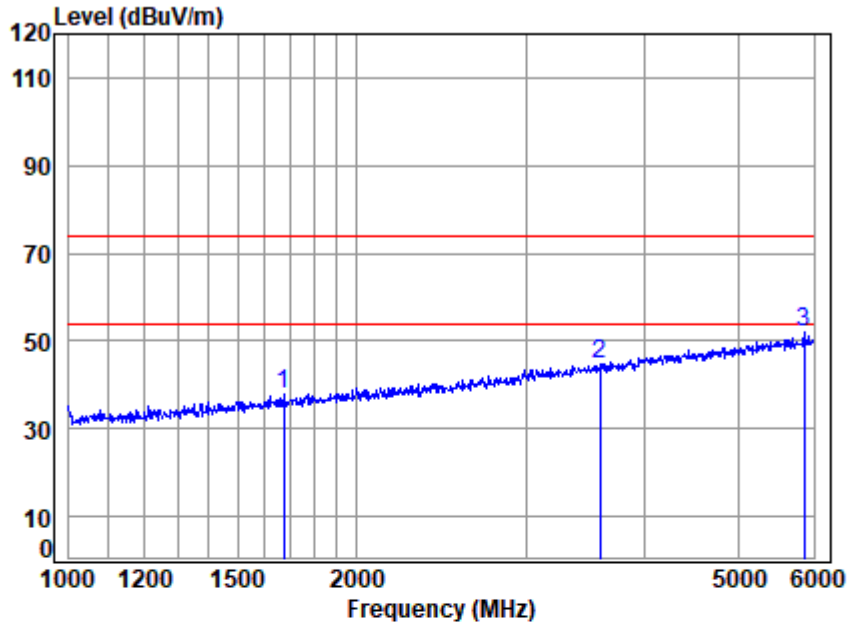
Site : chamber
 Condition: 3m HORIZONTAL
 Job No : 02197CR/02198CR
 Mode : 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	1400.530	3.11	25.43	39.89	47.36	36.01	74.00	-37.99 Peak
2	2867.827	4.78	30.36	40.64	48.51	43.01	74.00	-30.99 Peak
3	5768.088	8.22	34.87	42.38	50.01	50.72	74.00	-23.28 Peak



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Test Mode: 00; Polarity: Vertical



Site : chamber
 Condition: 3m VERTICAL
 Job No : 02197CR/02198CR
 Mode : 00

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	1678.362	3.41	26.58	40.05	47.94	37.88	74.00	-36.12 Peak
2	3587.747	5.66	31.89	41.14	48.21	44.62	74.00	-29.38 Peak
3	5861.858	8.24	34.97	42.39	50.98	51.80	74.00	-22.20 Peak



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7 Photographs

7.1 Setup photos.

Please refer to setup photos.

7.2 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

- End of the Report -

