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FCC

UHF PORTABLE PART 90

CLASS II PERMISSIVE CHANGE TEST REPORT

APPLICANT	NEPTUNE TECHNOLOGY GROUP INC.
	1600 ALABAMA HIGHWAY 229 TALLASSEE, AL 36078
FCC ID	P2SHR4450I
MODEL NUMBER	12984-000
PRODUCT DESCRIPTION	UHF PORTABLE RADIO
STANDARD APPLIED	CFR 47 Part 22 & 90
DATE SAMPLE RECEIVED	5/27/2015
DATE TESTED	5/27/2015
TESTED BY	Cory Leverett
APPROVED BY	Sid Sanders

Report Number	Version Number	Description	Issue Date
1043AUT15TestReport.docx	Rev.1	Initial Issue	6/4/2015

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

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report
☐ 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: 2005 requirements.

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

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

Authorized Signatory Name:



Cory Leverett
Engineering Project Manager

Date: **6 / 4 / 2015**

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GENERAL INFORMATION

EUT Specification

EUT Description	UHF PORTABLE RADIO
FCC ID	P2SHR4450I
Model Number	12984-000
Operating Frequency	450 -470MHz
Test Frequencies	451.125., 460.875, 468.87MHz
Modulation	FM
EUT Power Source	☐ 110-120Vac/50- 60Hz
	☐ DC Power 12V
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☐ Mobile
	☒ Portable
Test Conditions	The temperature was 25-27°C with a relative humidity of 50-65%.
Revision History to the EUT	None
Test Exercise	See Individual test
Applicable Standards	ANSI C63.4-2009, ANSI/TIA 603-D:2010, FCC CFR 47 Part 90
Test Facility	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.

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SUMMARY OF RESULTS

Rule Part No.	Scope of Work	Status Pass/Fail/NA
Part 2.1033(c)(8), Part 2.1046(a), Part 90	RF Power Output	Pass
2.1053, Part 90	Field Strength Spurious Emissions	Pass

TEST PROCEDURE

RF Power Output: The test procedure used was ANSI/TIA 603-D: 2010, using an Power Meter, attenuator, and a peak power sensor.

Radiation Interference: The test procedure used was ANSI/TIA 603-D: 2010, using an Rohde & Schwarz – EMI test receiver. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

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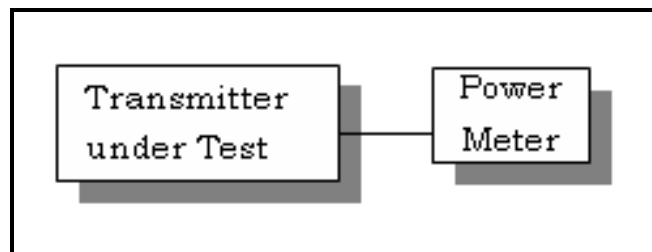
RF POWER OUTPUT

Rule Part No.: Part 2.1046(a), Part 90

Test Requirements: Manufacturer's Specification

Method of Measurement: RF power is measured by using a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage (if battery operated), or a properly adjusted power supply (if not battery operated), and the transmitter properly adjusted the RF output measures:

Test Setup Diagram:



Test Data:

OUTPUT POWER:

Tuned Frequency (MHz)	Power (dBm)
451.125	6.2
460.875	5.9
468.875	5.7

Results Meet Requirements

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FIELD STRENGTH OF SPURIOUS EMISSIONS

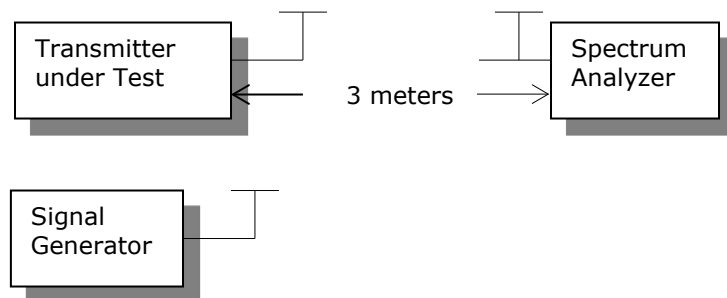
Rule Parts. No.: Part 2.1053

Requirements:

12.5 kHz Channel Spacing = $50 + 10 \log (.0041) = 26.2$ dBc
 12.5 kHz Channel Spacing = $50 + 10 \log (.0038) = 25.9$ dBc
 12.5 kHz Channel Spacing = $50 + 10 \log (.0037) = 25.7$ dBc

METHOD OF MEASUREMENT: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental. This test was conducted per ANSI/TIA 603-D: 2010 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.**

Test Setup Diagram:



Test Data:

HIGH POWER: Low End of the Band

Emission Frequency (MHz)	Power Mode	Power Output (dBm)	Power Output (mW)	FCC Requirement dB	Bandwidth - BW - kHz
451.12	Hi	6.20	4.1	26.20	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
902.25	V	52.12		32.12	
1,353.38	V	53.20		32.66	
1,804.50	V	51.14		30.60	
2,255.63	H	48.15		27.61	
2,706.75	H	66.77		46.23	
3,157.88	H	63.59		43.59	
3,609.00	H	62.05		42.05	
4,060.13	H	44.33		23.79	
4,511.25	H	61.60		41.60	

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Middle of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	Power Output (mW)	FCC Requirement dB	Bandwidth - BW - kHz
460.87	Hi	5.90	3.8	25.90	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
921.75	V	55.38		32.80	
1,382.63	V	55.03		32.45	
1,843.50	V	53.03		30.45	
2,304.38	H	50.96		28.38	
2,765.25	H	66.06		46.06	
3,226.13	H	63.21		43.21	
3,687.00	H	61.43		41.43	
4,147.88	H	46.94		24.36	
4,608.75	H	67.66		47.66	

High End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	Power Output (mW)	FCC Requirement dB	Bandwidth - BW - kHz
468.87	Hi	5.70	3.7	25.70	12.50
Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)		Margin	
937.75	V	56.20		33.17	
1,406.63	H	53.86		30.83	
1,875.50	V	48.25		25.22	
2,344.38	H	51.40		28.37	
2,813.25	H	68.93		45.90	
3,282.13	H	66.10		43.07	
3,751.00	H	63.95		40.92	
4,219.88	H	48.65		25.62	
4,688.75	H	66.97		43.94	

Results Meet Requirements

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EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconnical Chamber	Eaton Chamber	94455-1	1057	06/14/13	06/14/15
Antenna: Log-Periodic Chamber	Eaton	96005	1243	05/31/13	11/31/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Ant: Double-Ridged Horn/ETS Horn 1 Ch	ETS-Lindgren Chamber	3117	00035923	06/13/14	06/13/16
Software: Field Strength Program	Timco	N/A	Version 4.0	NA	NA
Attenuator N 30dB 150W DC-6G	Narda	769-30	10267	05/18/15	05/18/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	03/11/14	03/11/16
Signal Generator HP 8648C	HP	8648C	3623A02898	08/29/13	08/29/15
USB Peak Power Sensor 50 MHz to 18 GHz	Boonton	55318	9224	11/6/14	11/6/16

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

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