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FCC

VHF PORTABLE PART 90 and PART 80

CLASS II PERMISSIVE CHANGE

RADIATED EMISSIONS TEST REPORT

APPLICANT	**YAESU MUSEN CO., LTD.**
	TENNOZU PARKSIDE BUILDING 2-5-8 HIGASHI-SHINAGAWA, SHINAGAWA-KU, TOKYO 140-0002 JAPAN
FCC ID	**K6630393X20**
MODEL NUMBER	**HX400, HX380**
PRODUCT DESCRIPTION	HANDHELD VHF MARINE LAND MOBILE RADIO
STANDARD APPLIED	CFR 47 Part 90
DATE SAMPLE RECEIVED	10/6/2015
DATE TESTED	10/23/2015
TESTED BY	Tim Royer
APPROVED BY	Cory Leverett
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Version Number	Description	Issue Date
2072AUT15TestReport	Rev1	Initial Issue	10/26/2015

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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:

Tim Royer
Engineering Project Manager

Date: 10/26/2015

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GENERAL INFORMATION

EUT Specification

EUT Description	HANDHELD VHF MARINE LAND MOBILE RADIO
FCC ID	K6630393X20
Model Number	HX400, HX380
Operating Frequency Range	134 – 174 MHz
Test Frequencies	151, 156.5, 157.1, 165.9, 173MHz,
Type of Emission	16K0F3E, 16K0G3E, 11K0F3E
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 24-26ºC with a relative humidity of 50-65%.
Revision History to the EUT	None
Test Exercise	The EUT was placed in continuous transmit mode.
Applicable Standards	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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TEST REPORT SUMMARY

Rule Part No.	Scope of Work	Status Pass/Fail/NA
2.1053, Part 90.210	Field Strength Spurious Emissions	Pass
2.1053, Part 80.211	Field Strength Spurious Emissions	Pass

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TEST PROCEDURE

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Radiation Interference: The test procedure used was ANSI/TIA 603-D: 2010, using a 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

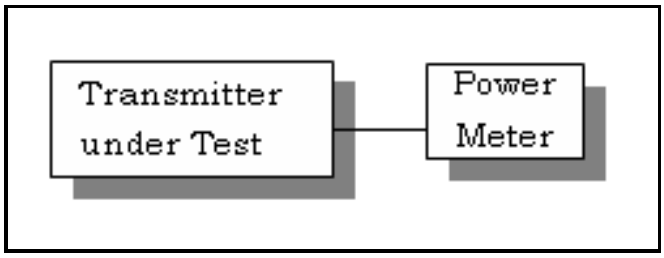
Rule Part No.: Part 2.1046(a), Part 90.205, 80.215

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:

For the device with a fixed or integral antenna, the RF power is measured as ERP. The substitution method was used. The RF output measures:

Test Setup Diagram:



Test Data:
OUTPUT POWER:

	RF POWER (W)	
Tuned Frequency (MHz)	HI	LOW
151	4.78	0.953
156.5	---	1.069
157.125	---	1.052
165.9	5.88	1.268
173	1.129	1.099

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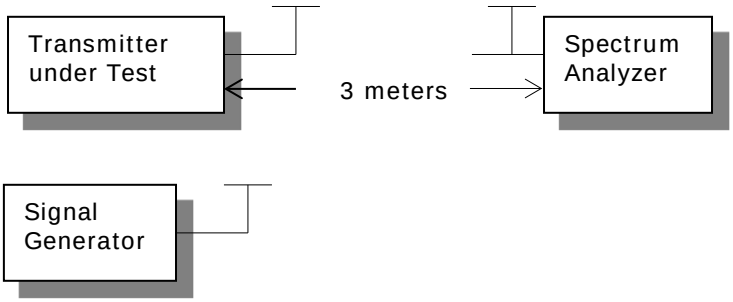
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053, 90.210, 80.211

12.5 kHz Channel Spacing = 50+10log (OP) = dBc
25 KHz Channel Spacing = 43+10log (OP) = 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:
LOW POWER: Low End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
151.00	Low	30.21	1.05	50.21	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
302.00	H	108.41	58.20
453.00	V	93.91	43.70
604.00	H	98.71	48.50
755.00	H	96.19	45.98
906.00	V	86.25	36.04
1,057.00	V	77.46	27.25
1,208.00	H	75.12	24.91
1,359.00	H	78.05	27.84
1,510.00	H	79.03	28.82

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Test Data:
HIGH POWER: Low End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
151.00	Hi	36.80	4.79	56.80	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
302.00	H	99.41	42.61
453.00	V	84.26	27.46
604.00	V	94.49	37.69
755.00	H	94.31	37.51
906.00	H	85.92	29.12
1,057.00	V	75.97	19.17
1,208.00	V	73.74	16.94
1,359.00	H	73.65	16.85
1,510.00	V	79.32	22.52

HIGH POWER: Middle of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
156.50	Lo	30.29	1.07	43.29	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
313.00	H	74.91	54.91
469.50	V	58.02	38.02
626.00	V	66.79	46.79
782.50	V	62.85	42.85
939.00	H	56.34	36.34
1,095.50	V	47.19	27.19
1,252.00	V	46.72	26.72
1,408.50	H	47.75	27.75
1,565.00	V	46.28	26.28

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LOW POWER: Middle of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
157.12	Low	30.22	1.05	43.22	25.00

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
314.25	V	103.16	52.94
471.38	V	94.26	44.04
628.50	H	99.40	49.18
785.63	H	95.90	45.68
942.75	H	86.44	36.22
1,099.88	H	77.29	27.07
1,257.00	V	77.30	27.08
1,414.13	H	76.61	26.39
1,571.25	V	77.02	26.80

LOW POWER: High End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
165.90	Low	31.03	1.27	51.03	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
331.80	V	105.11	54.08
497.70	H	100.82	49.79
663.60	H	99.63	48.60
829.50	V	90.41	39.38
995.40	H	89.38	38.35
1,161.30	H	77.33	26.30
1,327.20	H	78.65	27.62
1,493.10	H	79.42	28.39
1,659.00	V	76.84	25.81

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HIGH POWER: High End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
165.90	Hi	37.70	5.89	57.70	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
331.80	H	100.10	42.40
497.70	H	89.72	32.02
663.60	H	96.66	38.96
829.50	V	89.56	31.86
995.40	V	85.83	28.13
1,161.30	V	74.05	16.35
1,327.20	H	73.24	15.54
1,493.10	V	74.38	16.68
1,659.00	V	71.85	14.15

LOW POWER: High End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
173.40	Low	30.41	1.10	50.41	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
346.80	H	103.00	52.59
520.20	V	93.79	43.38
693.60	V	94.76	44.35
867.00	H	90.64	40.23
1,040.40	V	78.44	28.03
1,213.80	V	77.27	26.86
1,387.20	V	78.30	27.89
1,560.60	H	75.81	25.40
1,734.00	H	74.65	24.24

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HIGH POWER: High End of the Band

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
173.00	Hi	37.10	5.13	57.10	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
346.00	H	95.68	38.58
519.00	V	95.79	38.69
692.00	H	94.90	37.80
865.00	V	87.68	30.58
1,038.00	H	75.79	18.69
1,211.00	H	73.71	16.61
1,384.00	V	74.64	17.54
1,557.00	H	75.25	18.15
1,730.00	H	69.70	12.60

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EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	07/09/15	07/09/17
Antenna: Biconnical Chamber	Eaton Chamber	94455-1	1057	06/14/13	12/14/15
Antenna: Log-Periodic Chamber	Eaton	96005	1243	05/31/13	11/30/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren Chamber	3117	00035923	06/13/14	06/13/16
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/12/14	08/12/16
Software: Field Strength Program	Timco	N/A	Version 4.0	N/A	N/A

***EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

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