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FCC
UHF PORTABLE PART 90
TEST REPORT

APPLICANT	MOTOROLA SOLUTIONS, INC.
	8000 WEST SUNRISE BLVD FT. LAUDERDALE FL 33322-9947 USA
FCC ID	AZ489FT4923
MODEL NUMBER	RDU4100+
PRODUCT DESCRIPTION	4 WATT UHF PORTABLE RADIO
STANDARD APPLIED	CFR 47 Part 90
DATE SAMPLE RECEIVED	12/5/2014
DATE TESTED	12/6/2014
REPORT ISSUE DATE	12/7/2014
TESTED BY	Sid Sanders
APPROVED BY	Cory Leverett
TIMCO REPORT NO.	2234UT14TestReport.docx
TEST RESULTS	☒ PASS ☐ FAIL

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:



Engineering Project Manager

Date: 12/7/2014

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GENERAL INFORMATION

EUT Specification

EUT Description	4 WATT UHF PORTABLE RADIO
FCC ID	AZ489FT4923
Model Number	RDU4100+
Operating Frequency	
Test Frequencies	438MHz
Type of Emission	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 24-26°C 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-C:2004, 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
Part 2.1033(c)(8), Part 2.1046(a), Part 90	RF Power Output	PASS
2.1051(a)	Antenna Conducted Emissions	PASS
2.1053, Part 90	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.

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

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

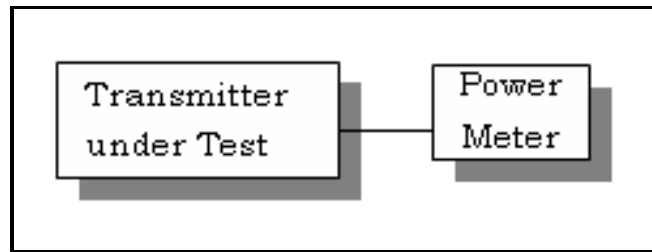
Rule Part No.: Part 2.1046(a), Part 90

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:

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: RF power of the EUT can be set at 5W to 25W.

OUTPUT POWER:

Tuned Frequency (MHz)	RF POWER (W)	
	dBm	W
	36.1	4.0

Part 2.1033 (C)(8) DC Input into the final amplifier

FOR HIGH POWER SETTING INPUT POWER: $(7.2V)(0.09A) = 6.48\text{Watts}$

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SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Requirements:

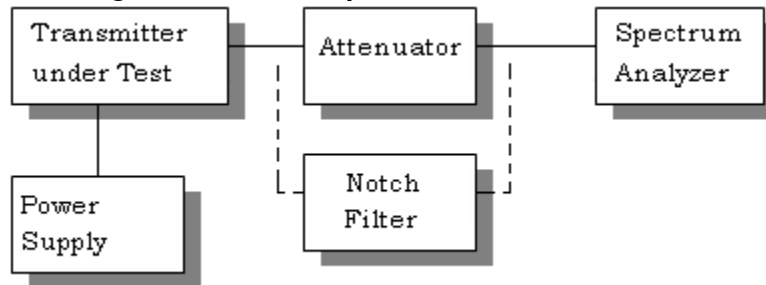
6.25kHz Channel Spacing = On any frequency removed from the center of the authorized bandwidth by more than 4.6kHz: At least $55 + 10\log(P)$ dB or 65 dB, whichever is the lesser attenuation.

12.5 kHz Channel Spacing = $50 + 10 \log (25.0) = 64.0$ dBc (high power)

12.5 kHz Channel Spacing = $50 + 10 \log (5.0) = 57.0$ dBc (low power)

Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from the lowest frequency generated to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard ANSI/TIA 603-D: 2010.

Method of Measuring Conducted Spurious Emissions



Test Data: High Power 438.0MHz

	dBm	Watts
Power Output	36.1	4.1
	Frequency	dBc
	438	0
	876	69.4
	1314	72.8
	1752	72.2
	2190	65.6
	2628	65
	3066	62.9
	3504	65.7
	3942	64.8
	4380	64.7

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FIELD STRENGTH OF SPURIOUS EMISSIONS

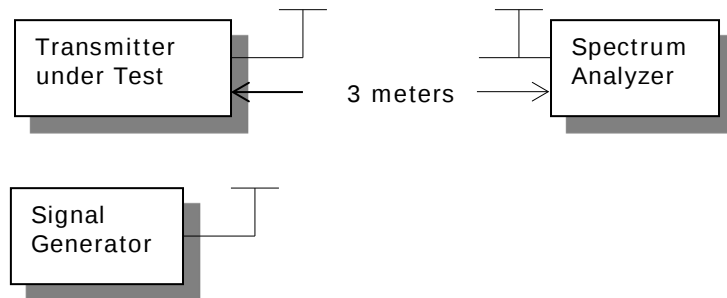
Rule Parts. No.: Part 2.1053

Requirements:

$$12.5\text{kHz Channel Spacing} = 50 + 10\log(4.0) = 56.0\text{dBc}$$

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 438.00MHz

Emission Frequency (MHz)	Power Mode	ERP Power Output (dBm)	ERP Power Output (Watts)	FCC Requirement dB	Bandwidth - BW - kHz
438.00	Hi	36.10	4.07	56.10	12.50

Emission Frequency (MHz)	Ant. Polarity	Below Carrier (dBc)	Margin
876.00	H	96.84	40.74
1,314.00	H	87.28	31.18
1,752.00	V	84.05	27.95
2,190.00	H	85.49	29.39
2,628.00	H	84.48	28.38
3,066.00	H	81.39	25.29
3,504.00	H	82.43	26.33
3,942.00	H	76.74	20.64
4,380.00	H	80.45	24.35

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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	05/31/15
DC Power Supply	HP	6264B	2032A04119	05/06/13	05/06/15
AC Voltmeter	HP	400FL	2213A14728	06/26/13	06/26/15
Digital Multimeter	Fluke	77	35053830	08/22/13	08/22/15
Frequency Counter Large Chamber	HP	5352B	2632A00165	06/26/13	06/26/15
Frequency Counter Small Chamber	HP	5385A	3242A07460	06/16/13	06/16/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/15
EMI Test Receiver R & S ESIB 40 Screen Room	Rohde & Schwarz	ESIB 40	100274	08/12/14	08/12/15
Software: Field Strength Program	Timco	N/A	Version 4.0	10/12/13	10/12/15
LISN (Secondary/Auxiliary)	Electro-Metrics	EM-7821	101	06/05/13	06/05/15
30 dB Attenuator	Narda	769-30	10267	03/15/13	03/15/15
Signal Generator HP 8648C	HP	8648C	3623A02898	08/29/13	08/29/15
Attenuator 30dB 500W	Bird	8325	1761	02/25/13	02/25/15
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	01/15/14	01/15/16
Analyzer Tan Tower RF Preselector		85685A	3221A01400	01/15/14	01/15/16
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	01/15/14	01/15/16
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	01/15/14	01/15/16

*EMI RECEIVER SOFTWARE VERSION

*EMI Test Receiver Firmware Version: 4.73 Service Pack 1

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