



Engineering Solutions & Electromagnetic Compatibility Services

Class II Permissive Change Test Report

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Model: P5400 VHF Portable Radio

FCC ID: OWDTR-0099-E

June 22, 2012

Standards Referenced for this Report	
Part 2: 2011	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 22: 2011	Public Mobile Services
TIA-EIA-603-C 2004	Land Portable FM or PM Communications Equipment - Measurement and Performance Standards

Frequency Range* (MHz)	Rated Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Emission Designator
157 – 159	5.0/0.5	0.55	11K0F3E (Analog Voice; NB)
157 – 159	5.0/0.5	0.55	10K8F1D (Digital 2-FSK; 9600 Data; NB)
157 – 159	5.0/0.5	0.55	10K8F1E (Digital 2-FSK; 9600 Data Voice; NB)
157 – 159	5.0/0.5	0.55	7K80F1D (Digital 2-FSK; 4800 Data; NB)
157 – 159	5.0/0.5	0.55	7K80F1E (Digital 2-FSK; 4800 Data Voice; NB)
157 – 159	5.0/0.5	0.55	8K40F1D (Digital C4FM; 9600 Data; NB)
157 – 159	5.0/0.5	0.55	8K40F1E (Digital C4FM; 9600 Data Voice; NB)

* frequency range for Part 22 line items

Report Prepared by Test Engineer: Dan Baltzell

Document Number: 2012222

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These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

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1 General Information

This Class II Permissive Change Report is prepared on behalf of **Harris Corporation** in accordance with the Federal Communications Commission Rules and Regulations. The Equipment Under Test (EUT) was the **P5400 VHF Portable; FCC ID: OWDTR-0099-E**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 Part 22. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

1.2 Related Submittal(s)/Grant(s)

The original grant was issued on March 2, 2008, with a Class II permissive change granted on July 29, 2010.

This is a Class 2 Permissive Change to add Part 22 operation under FCC Public Notice DA 01-850 in the 157 – 159 MHz frequency band. There have been no hardware changes.

This application includes a change in FCC ID per 2.933; please refer to the supporting documents included with this application.

1.3 Grant Notes

Conducted power shown is rated power. Actual measured conducted power is shown in the test report.

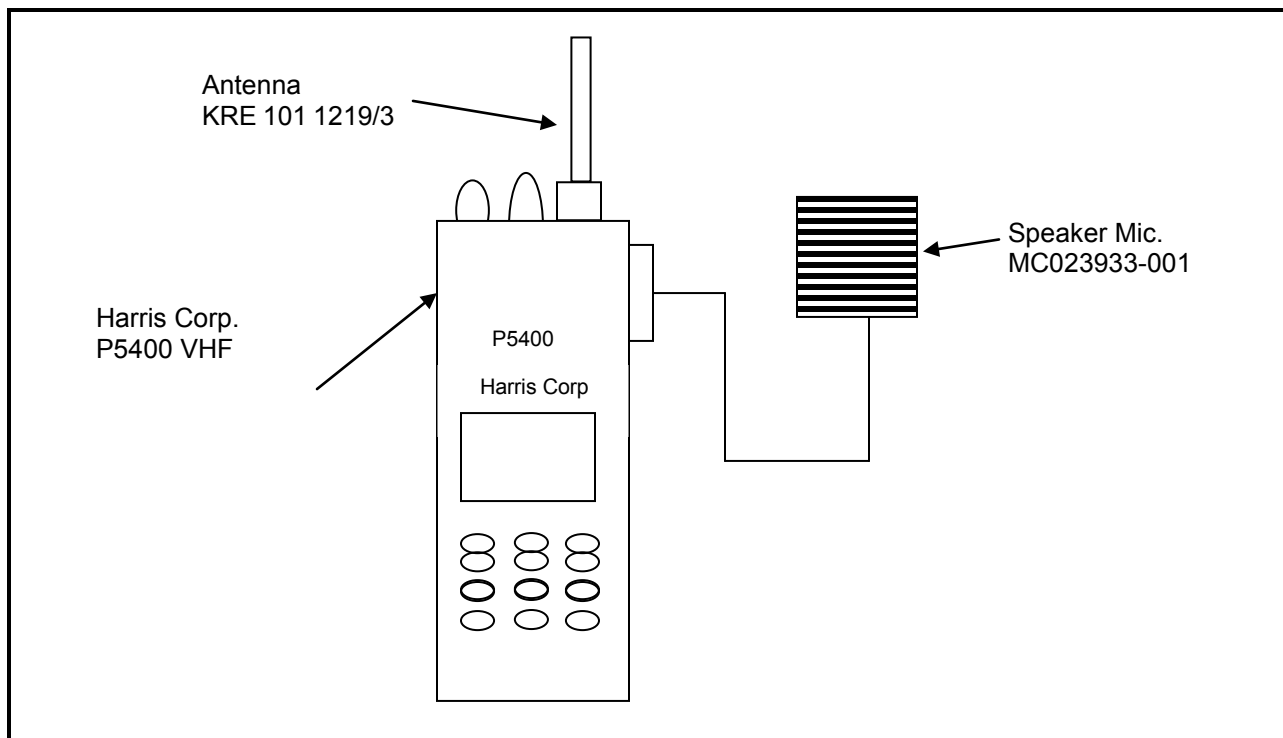
2 Tested System Details

The test sample was received on April 27, 2012. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this testing, as applicable.

Table 2-1: Equipment under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
VHF Portable Radio	Harris Corp.	P5400	A40113000628	OWDTR-0099-E	N/A	20664
VHF Portable Radio	Harris Corp.	P5400	A4011300062A	OWDTR-0099-E	N/A	20665
Antenna	Harris Corp.	KRE 101 1219/3	N/A	N/A	N/A	20650
7.5V NiCd Battery	Harris Corp.	BT-023406-001 Rev D	N/A	N/A	N/A	20659
7.5V NiMH Battery	Harris Corp.	BT023406-004 Rev D	BRFM	N/A	N/A	20660
Microphone	Harris Corp.	MC023933-001	N/A	N/A	0.7m unshielded I/O	18157

Figure 2-1: Configuration of Tested System



3 FCC Rules and Regulations Part §2.1046(a): RF Power Output: Conducted

3.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.1

The EUT was connected with an appropriate 50 ohm attenuator. Attenuator loss was accounted for.

3.2 Test Data

Table 3-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)

Frequency (MHz)	RF Power Measured (W)*
157.77	5.5
157.80	5.5
157.83	5.5
157.86	5.5
157.89	5.5
157.92	5.5
157.95	5.5
157.98	5.5
158.01	5.5
158.04	5.5
158.07	5.5
158.49	5.5
158.52	5.5
158.55	5.5
158.58	5.5
158.61	5.5
158.64	5.5
158.67	5.5

* Measurement accuracy: +/- .02 dB (logarithmic mode)

Table 3-2: RF Power Output (Rated Power)

Rated Power (W)
5

Table 3-3: Test Equipment for Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	10/14/12
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	3/13/13

Test Personnel:

Daniel Baltzell		May 7, 2012
Test Engineer	Signature	Date of Test

4 FCC Rules and Regulations Part §2.1051: Spurious Emissions at Antenna Terminals; Part §22.359: Emissions Limitations

4.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.13.

The transmitter was interfaced with a spectrum analyzer through an appropriate 50 ohm attenuator. The transmitter was operated at maximum power. Attenuator losses were accounted for.

Analog Modulation: The transmitter is terminated with a $50\ \Omega$ load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

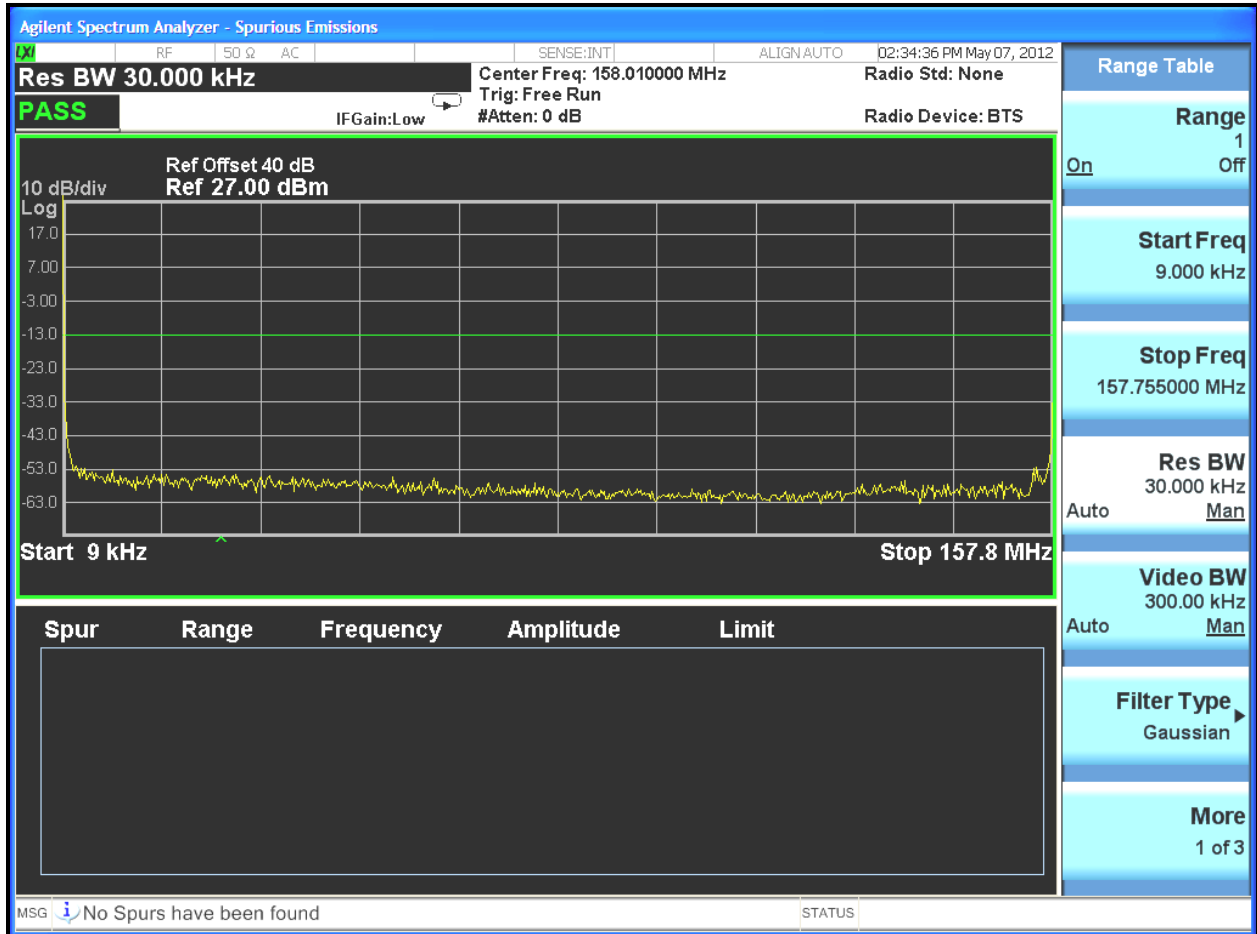
4.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to $10 \times F_c$.

Limit = $43 + 10 \log(P)$ dB or 70 dB, whichever is greater.

The worst case (unwanted emissions) channels are shown.

Plot 4-1: Spurious Emissions at Antenna Terminals - 158.01 MHz; 9 kHz-157.8 MHz



Plot 4-2: Spurious Emissions at Antenna Terminals - 158.01 MHz; 158.7 MHz–1.6 GHz

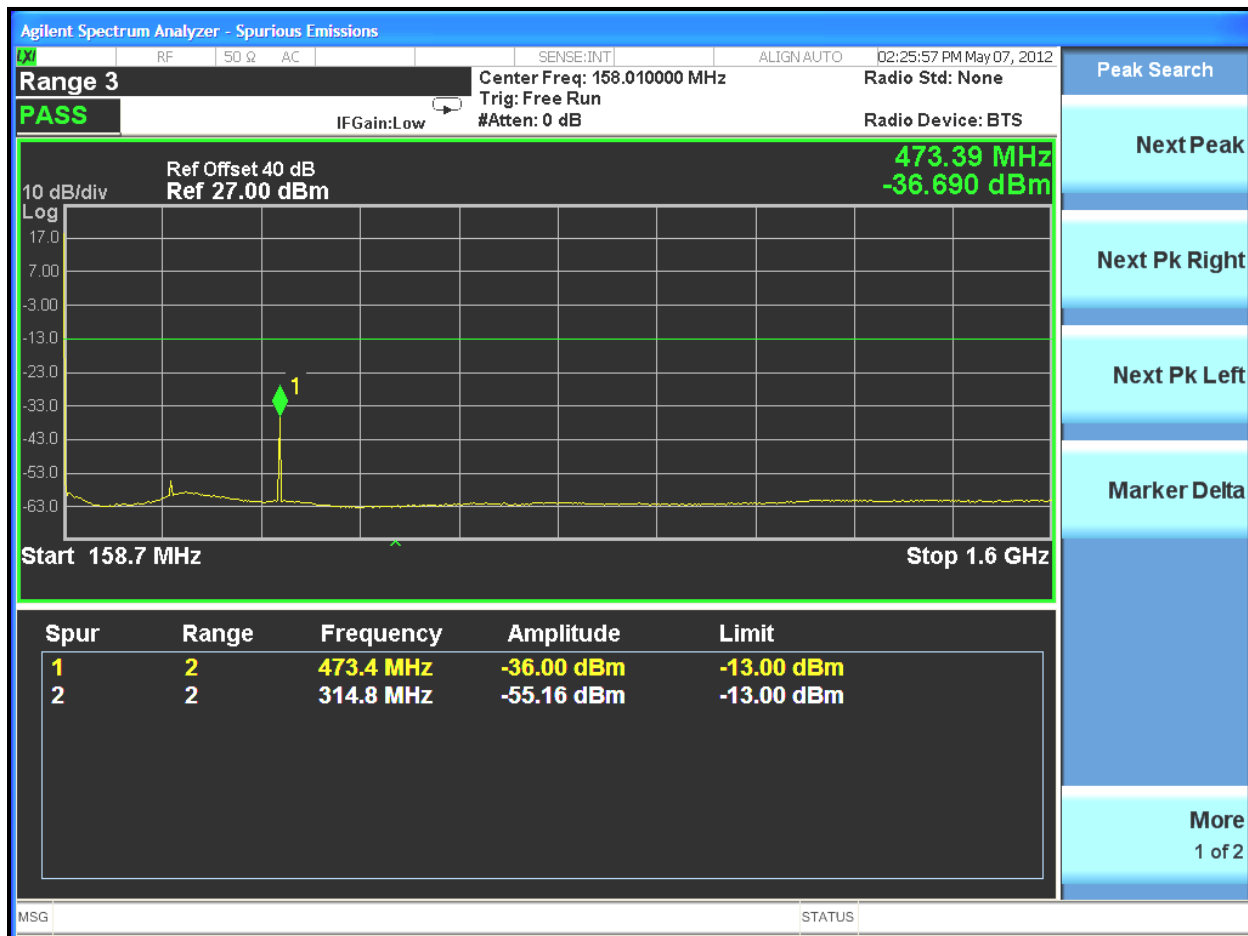


Table 4-1: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	10/14/12
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	3/13/13

Test Personnel:

Daniel Baltzell		May 7, 2012
Test Engineer	Signature	Date of Test

5 FCC Rules and Regulations Part §2.1053(a): Field Strength of Spurious Radiation

5.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole.

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

where: P_d is the dipole equivalent power; P_g is the generator output power into the substitution antenna

5.2 Test Data

5.2.1 CFR 47 Part §22.359: Emissions Limitations

Limit = 43 + 10 Log (P) dB or 70 dB, whichever is greater. The worst case emissions test data are shown

The EUT transmitting at high power was determined to be the worst case emissions level and is reported in the following tables.

Table 5-1: Field Strength of Spurious Radiation – 158.01 MHz; Narrow Band; High Power

50.4 dBc = Limit

Frequency (MHz)	Measured Level (dBuv)	Signal Gen. Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Level (dBc)	Margin (dB)
316.020	75.6	-40.5	0.4	1.5	76.8	-26.4
474.030	79.5	-27.9	0.4	1.6	64.1	-13.7
632.040	51.2	-58.3	0.5	1.3	94.9	-44.5
790.050	58.6	-45.1	0.5	0.7	82.3	-31.9
948.060	43.7	-56.2	0.6	1.2	93.0	-42.6
1106.070	52.8	-47.6	0.6	6.4	79.2	-28.8
1264.080	36.7	-60.9	0.6	7.2	91.7	-41.3
1422.090	44.3	-48.3	0.7	8.1	78.3	-27.9
1580.100	34.2	-58.0	0.7	8.8	87.3	-36.9

**This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.*

Table 5-2: Test Equipment for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	1/31/13
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz – 6.5 GHz)	3325A00159	8/17/12
900914	Hewlett Packard	85460A	RF Filter Section, (100 kHz - 6.5 GHz)	3330A00107	8/17/12
900905	Rhein Tech Laboratories	PR-1040	OATS 1 Preamplifier 40dB (30 MHz – 2 GHz)	1006	7/14/12
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole 25 - 1000 MHz Antennas	00401	3/6/14
900906	Weinschel Corporation	18	6 dB- 5 W Attenuator	AL740	3/5/13
901235	IW Microwave Products	KPS-1503-360-KPS	High Frequency RF Cables	36"	7/8/12
900817	Weinschel Corporation	BG1219	Attenuator, 3db	N/A	3/5/13
901288	Signa Wave	4LC-NANA-0360	Cables, 10 and 3 meters OATS 1	NA	4/13/13
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	2/29/13
901262	ETS	3160-9	Double ridged Guide Antenna (1 - 18 GHz)	6748	5/11/14
900917	Hewlett Packard	8648C	Synthesized. Signal Generator (9 kHz - 3200 MHz)	3537A01741	10/20/12
901517	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	10/14/12

Test Personnel:

Daniel Baltzell		May 7, 2012
Test Engineer	Signature	Date of Test

6 FCC Rules and Regulations Part §2.1049: Occupied Bandwidth; Part §22.359(b): Emission Limitations

6.1 Test Procedure

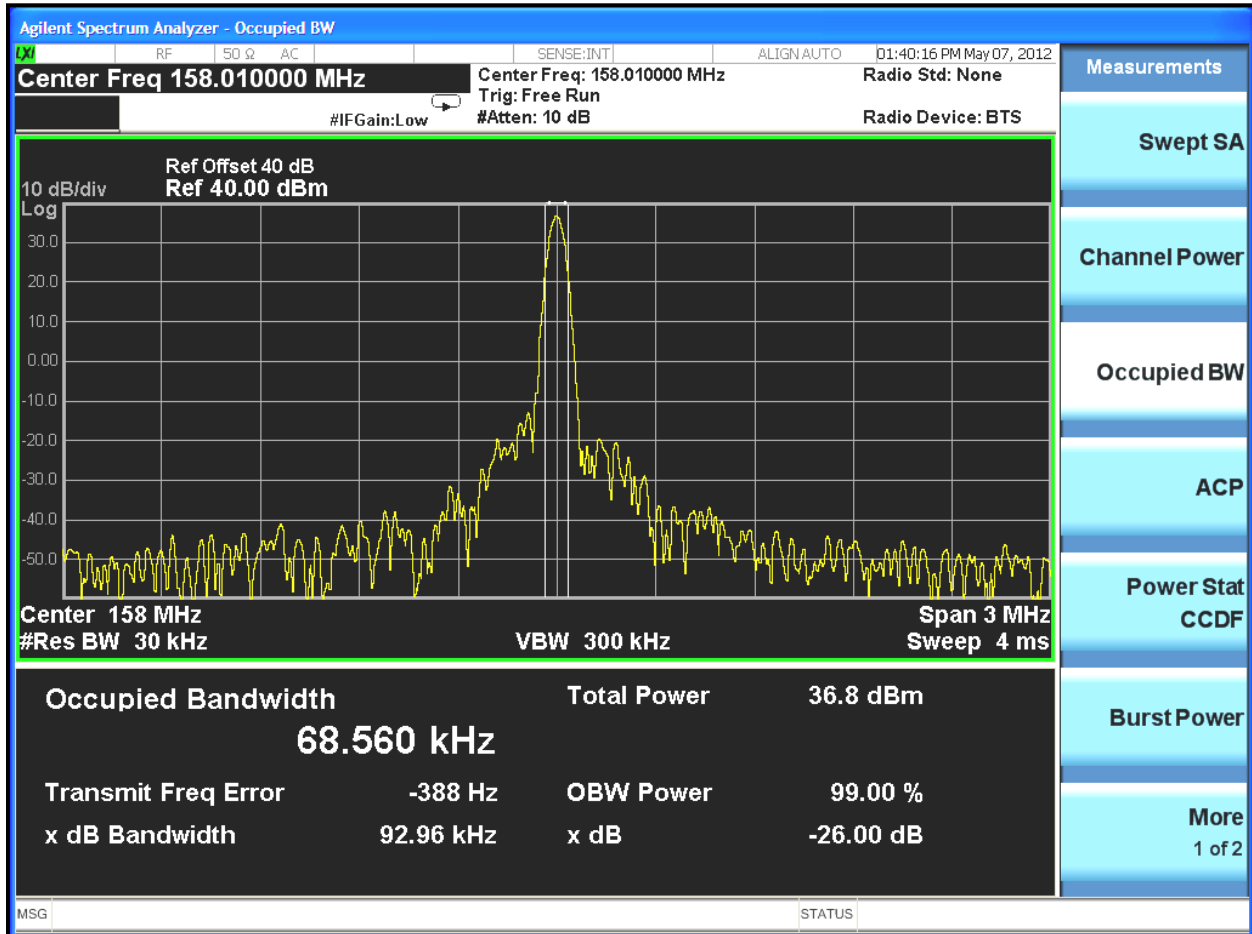
ANSI TIA-603-C-2004, Section 2.2.11.

The transmitter was interfaced with a spectrum analyzer through an appropriate 50 ohm attenuator and a notch filter. The transmitter was operated at maximum power. Attenuator losses were accounted for.

§22.359 (b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 30 kHz or more. In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.2 Test Data

Plot 6-1: Occupied Bandwidth – 158.01 MHz; Analog



Plot 6-2: Occupied Bandwidth – 158.01 MHz; Analog; Mask

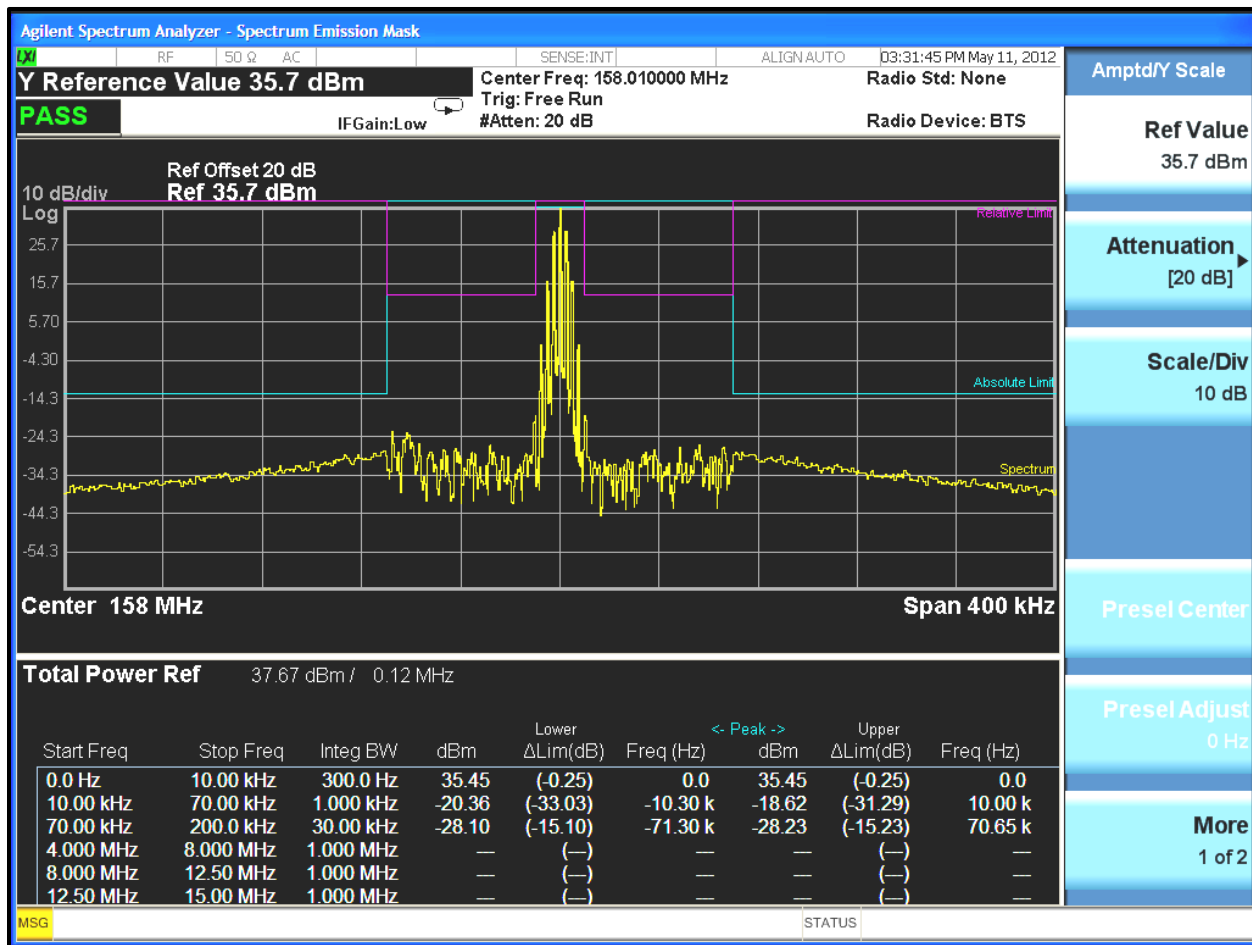


Table 6-1: Test Equipment for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	10/14/12
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz-26.5 GHz)	MY51250846	3/13/13

Test Personnel:

Daniel Baltzell		May 7 and 11, 2012
Test Engineer	Signature	Dates of Test

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: Harris Corporation
Model: P5400 VHF
FCC ID: OWDTR-0099-E
Standard: Part 22
Report #: 2012222

7 Conclusion

The data in this measurement report shows that the **Harris Corporation**. Model **P5400 VHF Portable**, **FCC ID: OWDTR-0099-E**, complies with all the applicable requirements of Parts 2 and 22 of the FCC Rules and qualifies for a Class II permissive change.