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Class II Permissive Change Test Report

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MODEL: P5300/P5400 800 MHZ Portable Radio

FCC ID: OWDTR-0043-E
IC: 3636B-0043

September 17, 2008

Standards Referenced for this Report	
Part 2: 2007	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2007	Private Land Portable Radio Services
ANSI TIA-603-C-2004	Land Portable FM or PM Communications Equipment - Measurement and Performance Standards
RSS-119 Issue 9 2007	Land Portable and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Frequency Range (MHz)	Rated Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Emission Designator
806-824	3.0/0.5	0.48	16K0F3E (Analog Voice; WB)
806-824	3.0/0.5	0.48	14K0F3E (Analog Voice; NPSPAC)
806-824	3.0/0.5	0.48	14K2F1D/E (2-level FSK; EDACS)
806-824	3.0/0.5	0.48	11K9F1D/E (2-level FSK; EDACS)
806-824	3.0/0.5	0.48	8K40F1D/E (4-level C4FM; P25)
806-824	3.0/0.5	0.48	17K1F1D/E (4-level FSK; OTP)
851-869	3.0/0.5	0.48	16K0F3E (Analog Voice; WB)
851-869	3.0/0.5	0.48	14K0F3E (Analog Voice; NPSPAC)
851-869	3.0/0.5	0.48	14K2F1D/E (2-level FSK; EDACS)
851-869	3.0/0.5	0.48	11K9F1D/E (2-level FSK; EDACS)
851-869	3.0/0.5	0.48	8K40F1D/E (4-level C4FM; P25)
851-869	3.0/0.5	0.48	17K1F1D/E (4-level FSK; OTP)

Report Prepared By: Daniel Baltzell, Test Engineer

Document Number: 2008140

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The results reported relate only to the item(s) tested.*

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1 General Information

The following Class II Permissive Change Report is prepared on behalf of **M/A-COM, Inc.** in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **P5400 800 MHZ Portable Radio, FCC ID: OWDTR-0043-E, IC: 3636B-0043.**

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations and Industry Canada RSS-119. 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 April 3, 2008.

1.3 Description of Change

Please refer to "Change - Technical Description" in Appendix A.

2 Tested System Details

The test sample was received on August 28, 2008. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this testing, as applicable.

Note that the testing covers both the System and Scan versions of the P5400. The Scan version is a limited version of the radio with fewer front panel buttons. The radios are electrically identical except for the fewer buttons on the Scan version.

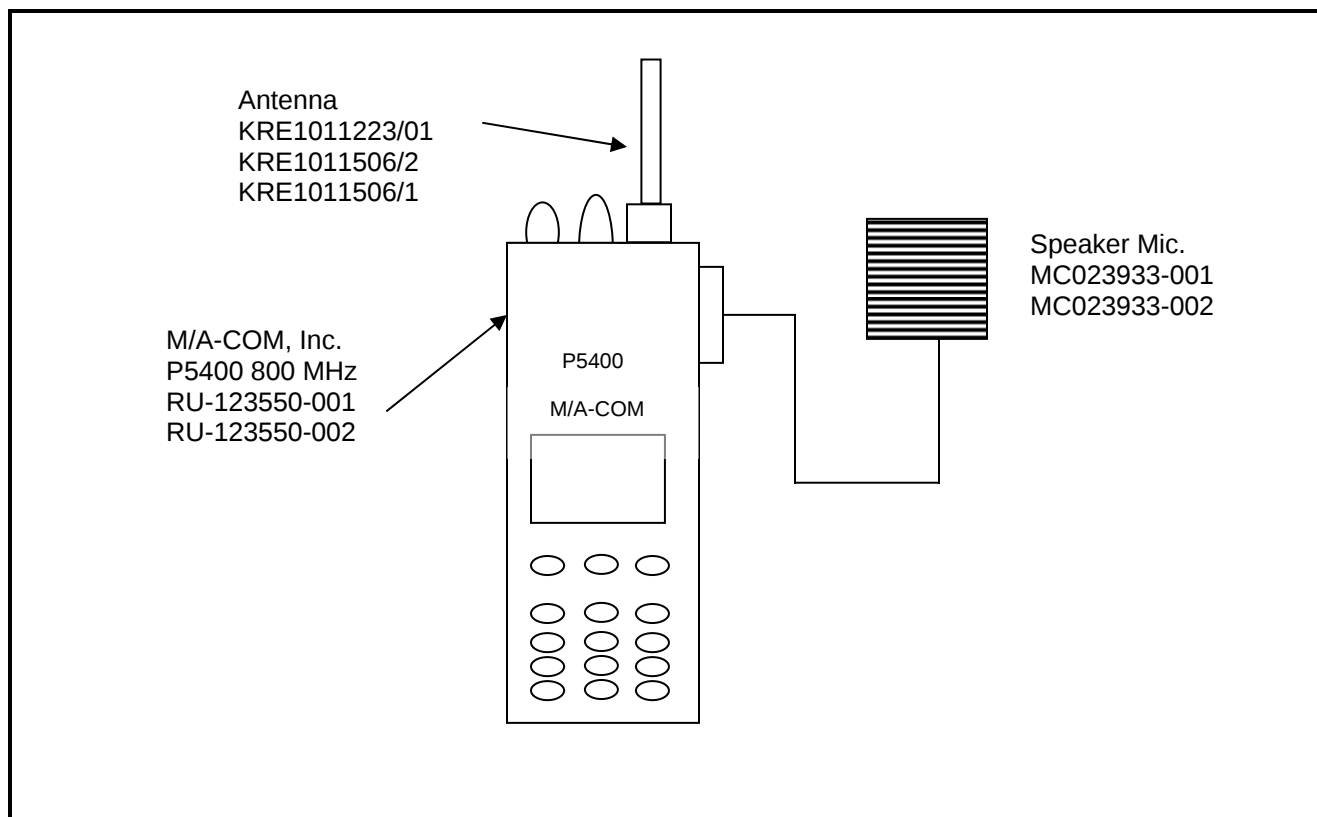
Table 2-1: Equipment under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Portable Radio	M/A-COM, Inc.	MAEX-C81XX	RU-123550-001 (Scan version)	OWDTR-0043-E	18394
Portable Radio (adds DTMF keypad)	M/A-COM, Inc.	MAEX-D81XX	RU-123550-002 (System version)	OWDTR-0043-E	18395
Battery	M/A-COM, Inc.	NiMH	BT-023406-003	N/A	17931
Battery	M/A-COM, Inc.	NiCd	BT-023406-001	N/A	17933
Battery	M/A-COM, Inc.	Li-Ion	BT-023406-005	N/A	17932
Microphone	M/A-COM, Inc.	Speaker Mic (w/ antenna)	MC023933-001	N/A	18157
Antenna	M/A-COM, Inc.	High Gain	KRE 101 1506/1	N/A	N/A
Antenna	M/A-COM, Inc.	Wideband Whip	KRE 101 1506/2	N/A	N/A
Antenna	M/A-COM, Inc.	Whip	KRE 101 1223/01	N/A	18277
Battery Charger	M/A-COM, Inc.	8263	00033	N/A	17865

Table 2-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Audio Test Box	M/A-COM, Inc.	MATQ-03424	N/A	N/A	17870
Audio Test Cable	M/A-COM, Inc.	CA-023407-002	N/A	N/A	17869

Figure 2-1: Configuration of Tested System



3 FCC Rules and Regulations Part 2 §2.1033(c)(8) Voltages and Currents Through The Final Amplifying Stage

Nominal DC Voltage:

NiCd: 6.0 to 9.0 V (7.5 V nominal)
NiMH: 6.0 to 9.0 V (7.5 V nominal)
Li-Ion: 6.0 to 9.0 V (7.5 V nominal)

Current: 2.5 A

4 FCC Rules and Regulations Part 2 §2.1046(a); RSS-119 5.4: RF Power Output: Conducted

4.1 Test Procedure

ANSI/TIA/EIA-603-2002, Section 2.2.1.

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

4.2 Test Data

Table 4-1: RF Power Output: Unmodulated Carrier Output Power

Frequency (MHz)	RF Power Measured (dBm)	RF Power Measured (W)
815.5	35.1	3.2

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

Table 4-2: RF Power Output (Rated Power)

Frequency (MHz)	High Power Rated (W)	Low Power Rated (W)*
806-869	3.0	0.5

Table 4-3: Test Equipment for Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184/901356	Agilent Technologies	E4416A/E9323A	Power Meter/ Sensor	GB41050573/ 31764-261	10/24/08
900957	Weinschel Corp	68-20-43	100W Attenuator 20 dB	LT394	1/13/09

Test Personnel:

Daniel Baltzell		August 29, 2008
Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 2 §2.1051; RSS-119 5.8: Spurious Emissions at Antenna Terminals

5.1 Test Procedure

ANSI/TIA/EIA-603-2002, Section 2.2.13.

The transmitter is terminated with a 50 Ω load and interfaced with a cable, notch filter, and spectrum analyzer. The level shown (dBc) has been corrected with the notch insertion loss and cable loss added.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

5.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc.

Limits: Mask D (dBm): $P(\text{dBm}) - (43 + 10 \times \text{LOG } P(\text{W}))$

The following channels (in MHz) were investigated: 815.5 and 860.5 MHz. The worst case (unwanted emissions) channels are shown. Per 2.1051, the magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

All conducted spurious emissions were greater than 20 dB below the limit.

Table 5-1: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08
901128	Par Electronics	806-902 (25W)	Notch Filter	N/A	2/1/09

Test Personnel:

Daniel Baltzell		August 29, 2008
Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part §2.1049(c)(1); §90.210; RSS-119 5.8: Occupied Bandwidth

6.1 Test Procedure

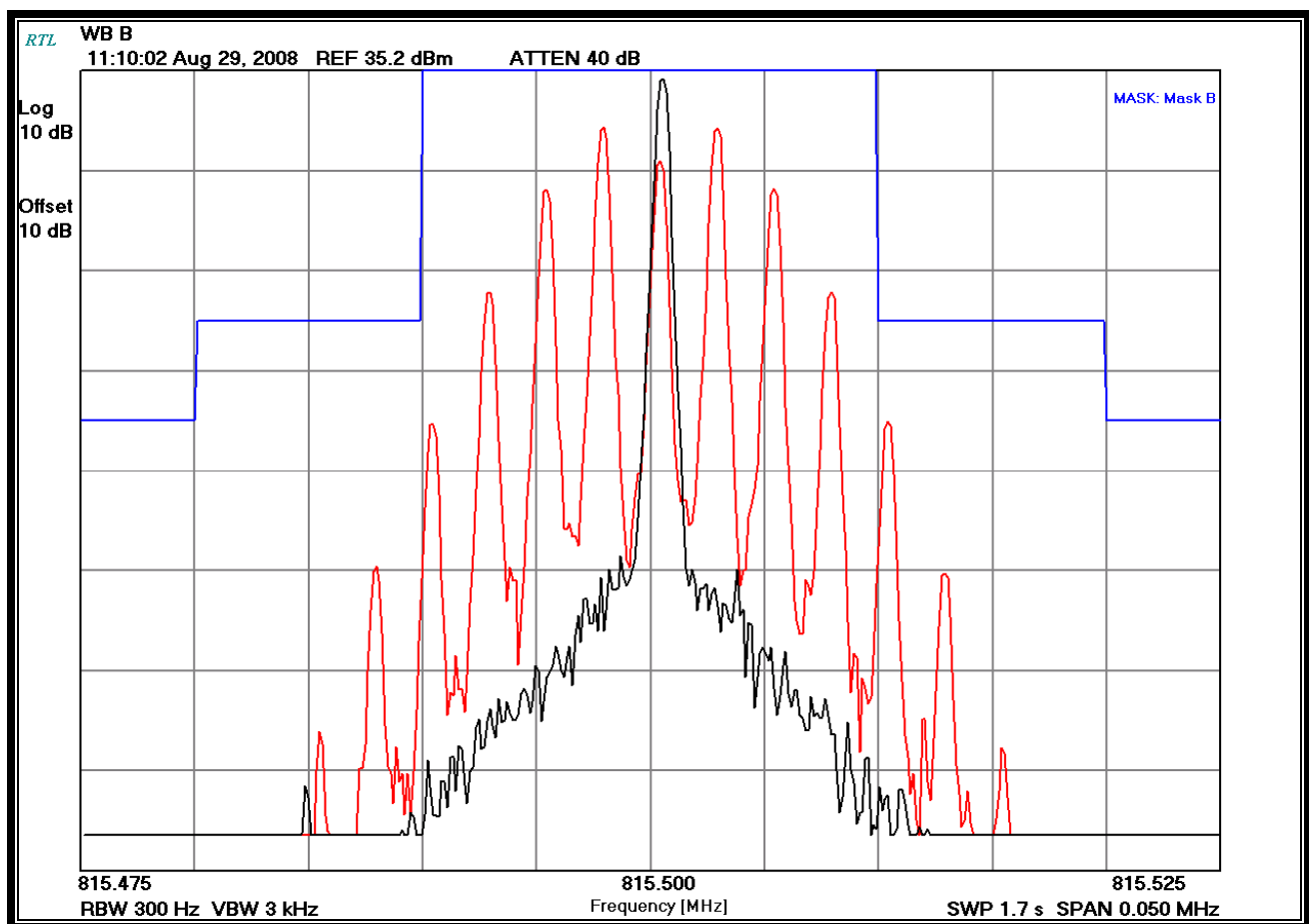
Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

Device with analog modulation: Modulated at 16 dB greater than that equal to 50% deviation at 1 kHz, then switched to 2.5 kHz

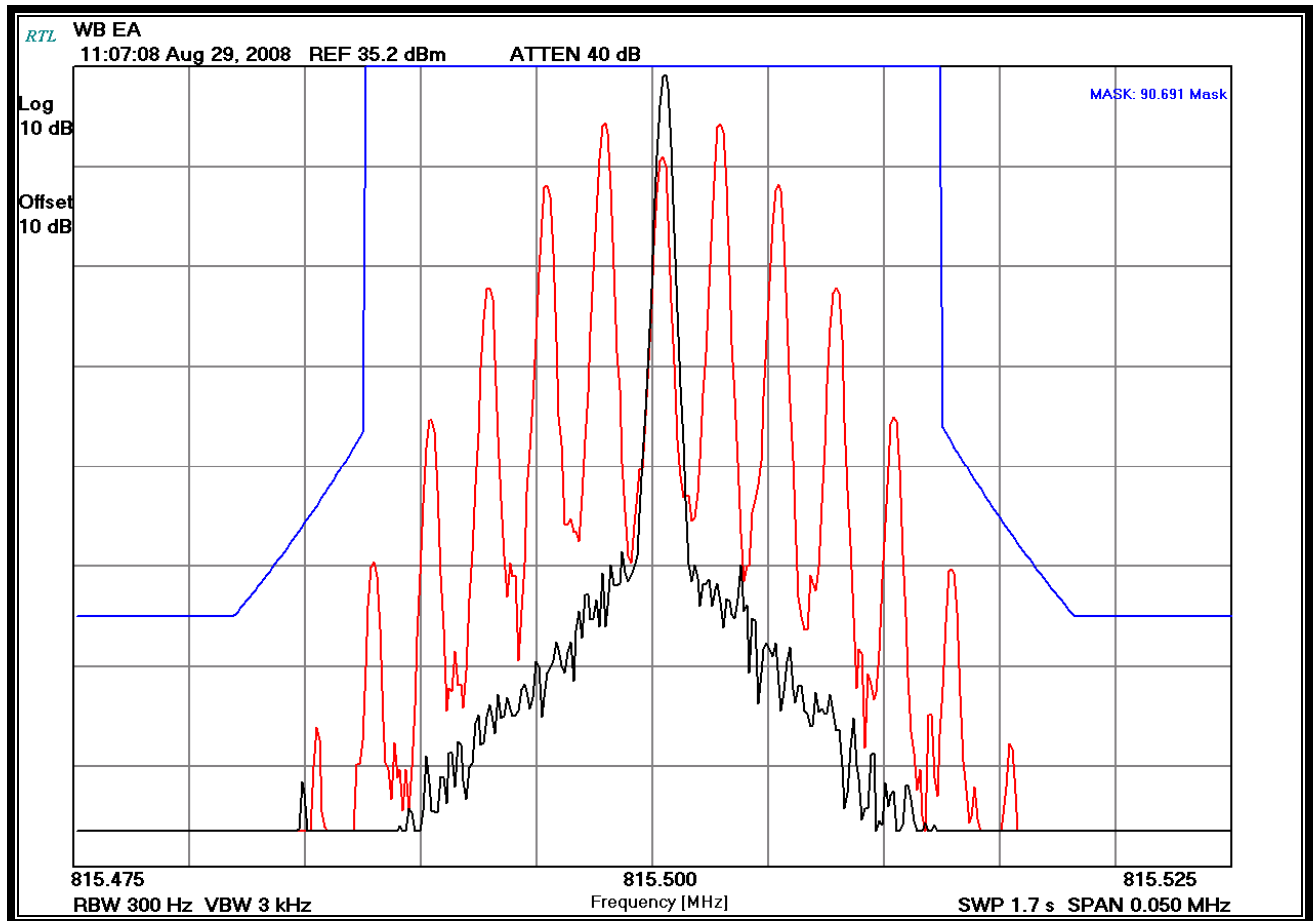
ANSI/TIA/EIA-603-2002, Section 2.2.11.

6.2 Test Data

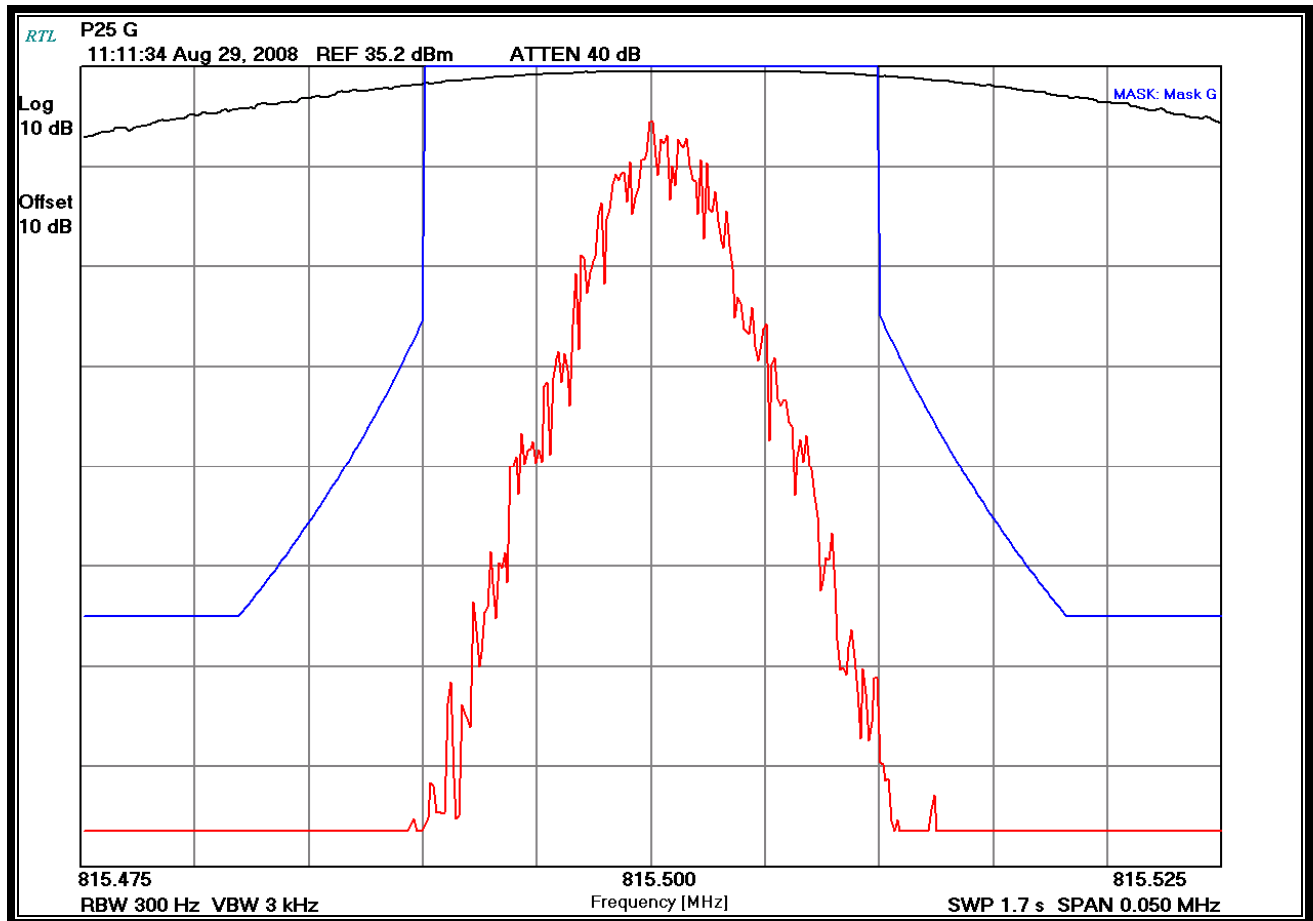
Plot 6-1: Occupied Bandwidth - 815.5 MHz; Mask EA; Wide Band Analog; High Power



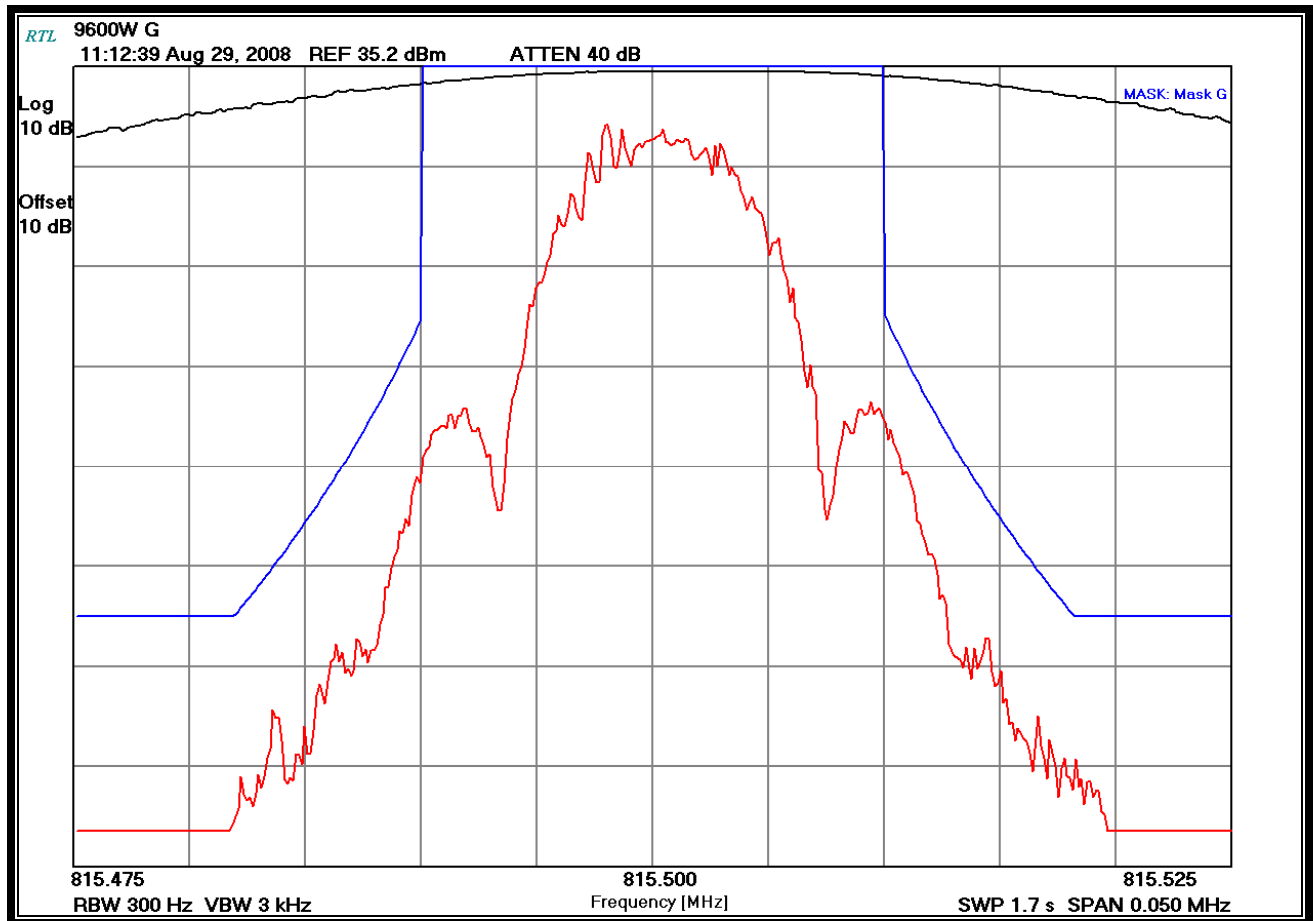
Plot 6-2: Occupied Bandwidth - 815.5 MHz; Mask EA; Wide Band Analog; High Power



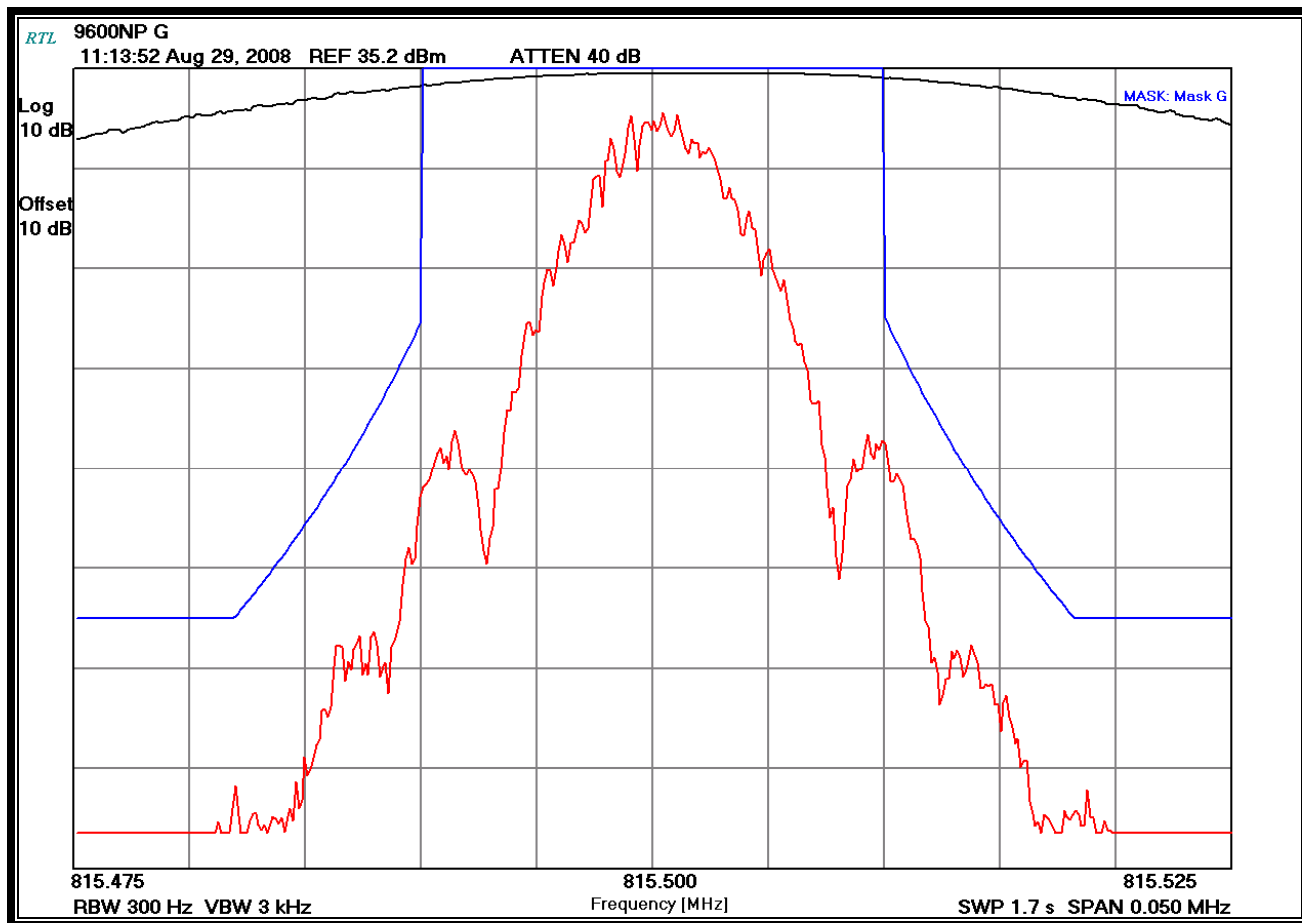
Plot 6-3: Occupied Bandwidth - 815.5 MHz; Mask G; Wide Band; C4FM; 4-Level FSK; 9600BPS



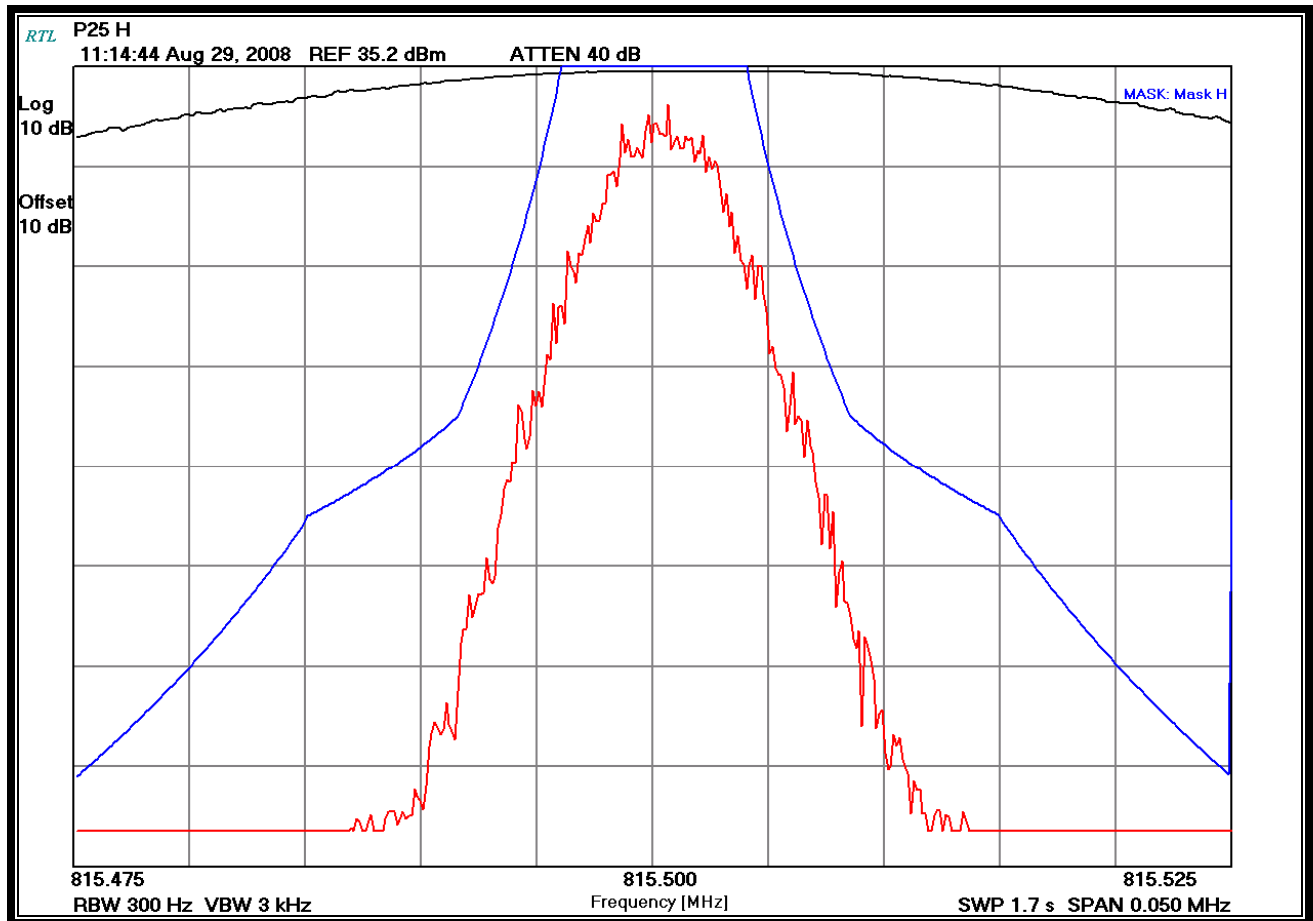
Plot 6-4: Occupied Bandwidth - 815.5 MHz; Mask G; Wide Band; 2-Level FSK; 9600BPS



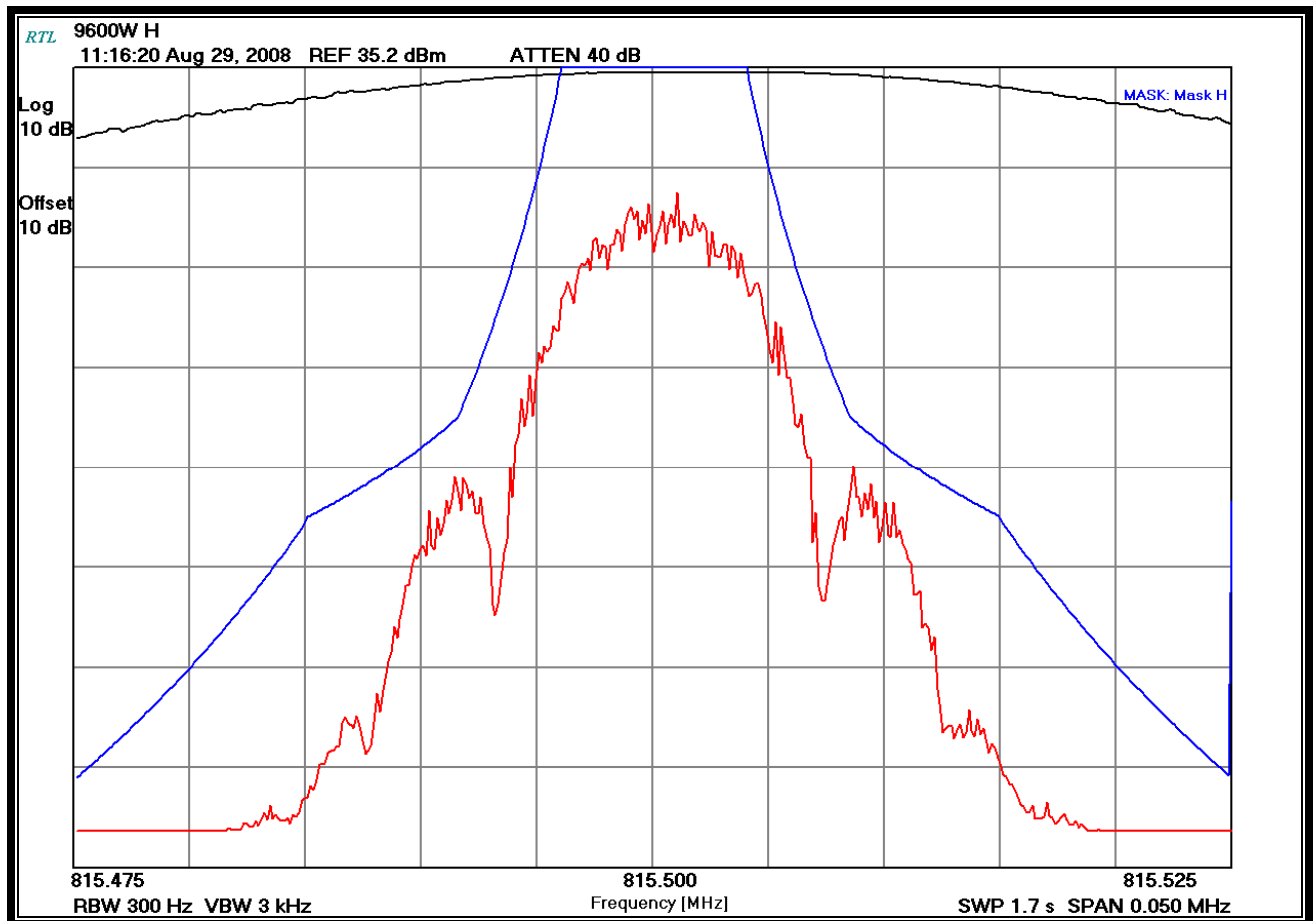
Plot 6-5: Occupied Bandwidth - 815.5 MHz; Mask G; NPSPAC; 2-Level FSK; 9600BPS



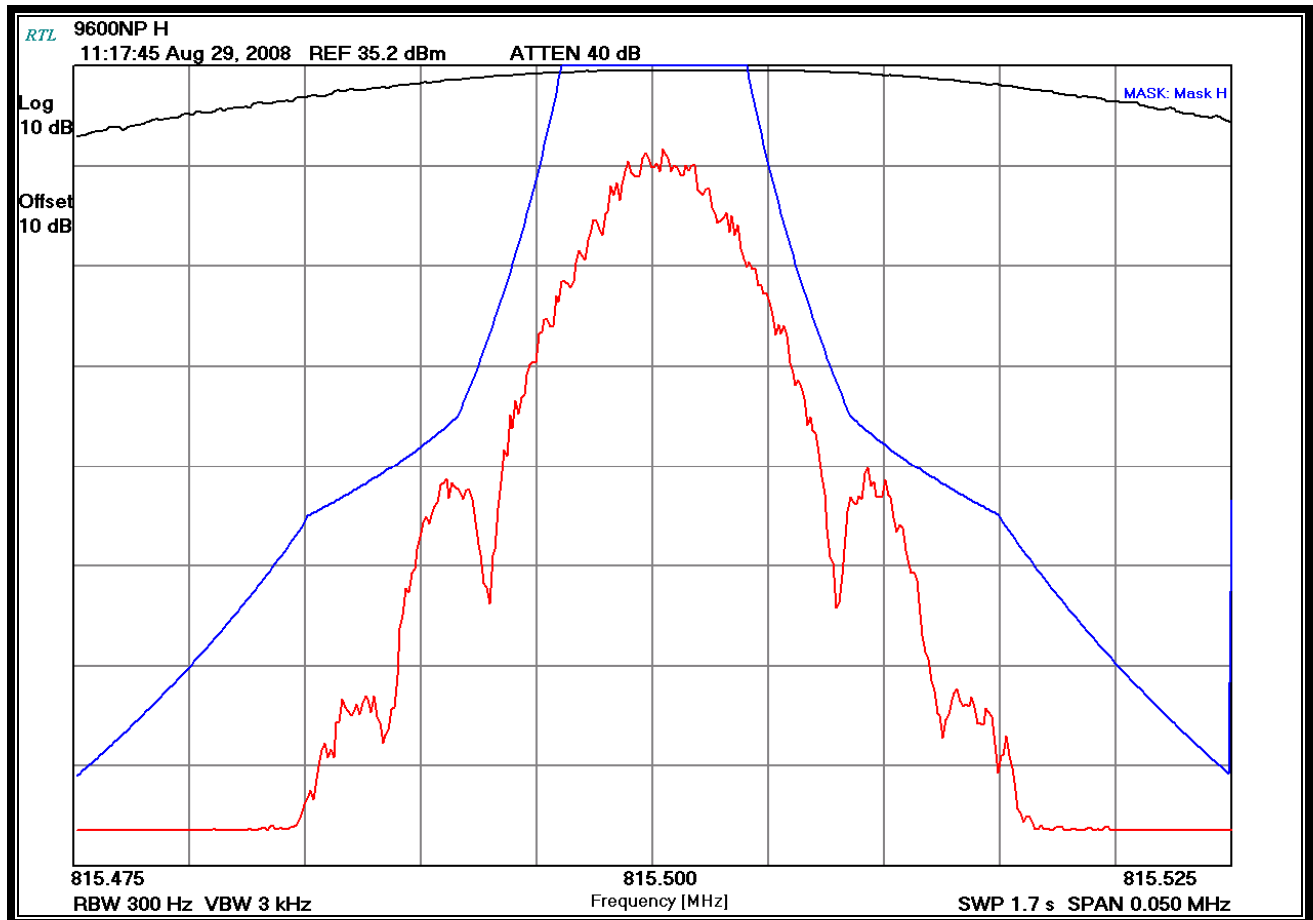
Plot 6-6: Occupied Bandwidth - 815.5 MHz; Mask H; Wide Band; C4FM; 4-Level FSK; 9600BPS



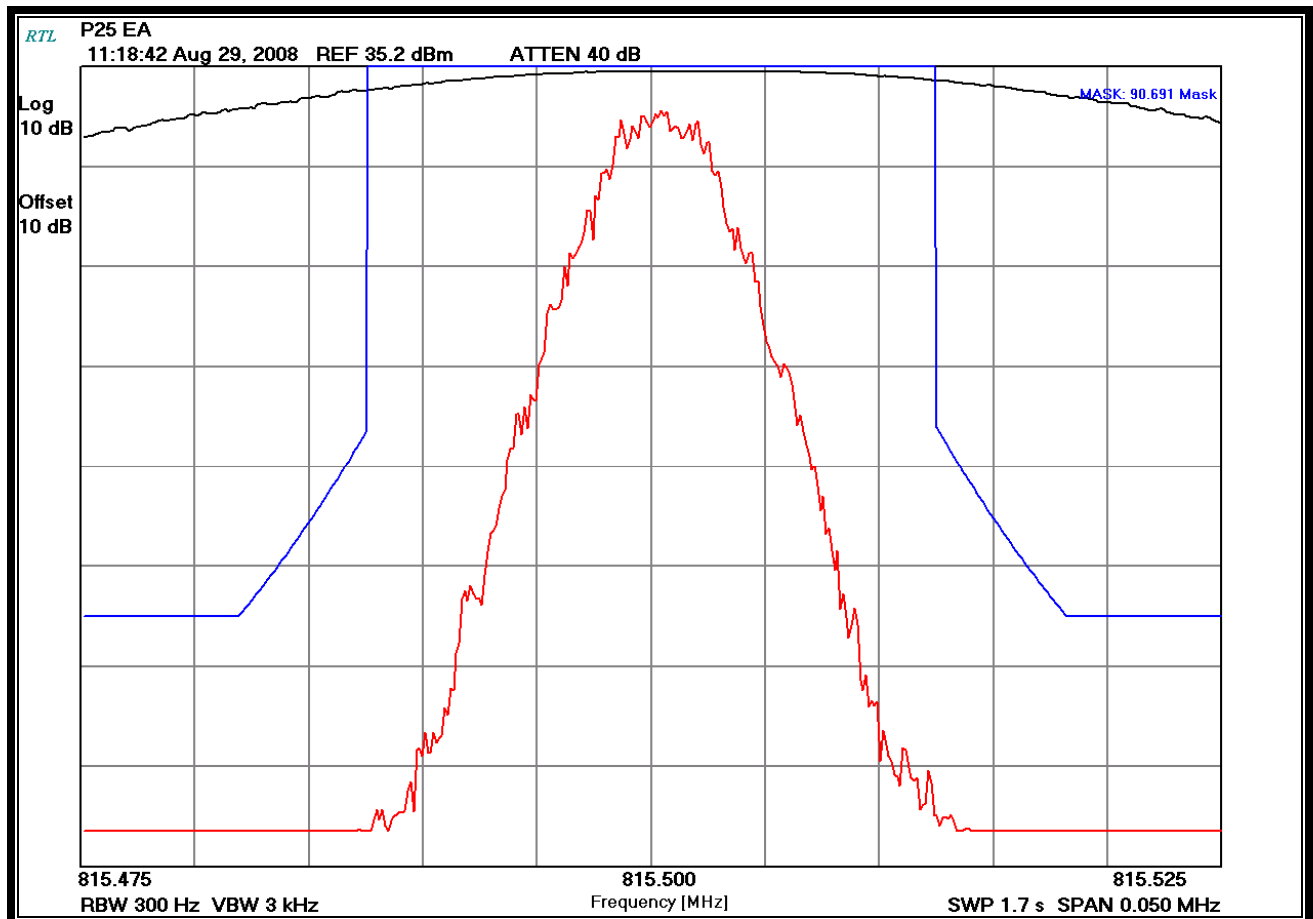
Plot 6-7: Occupied Bandwidth - 815.5 MHz; Mask H; Wide Band; 2-Level FSK; 9600BPS



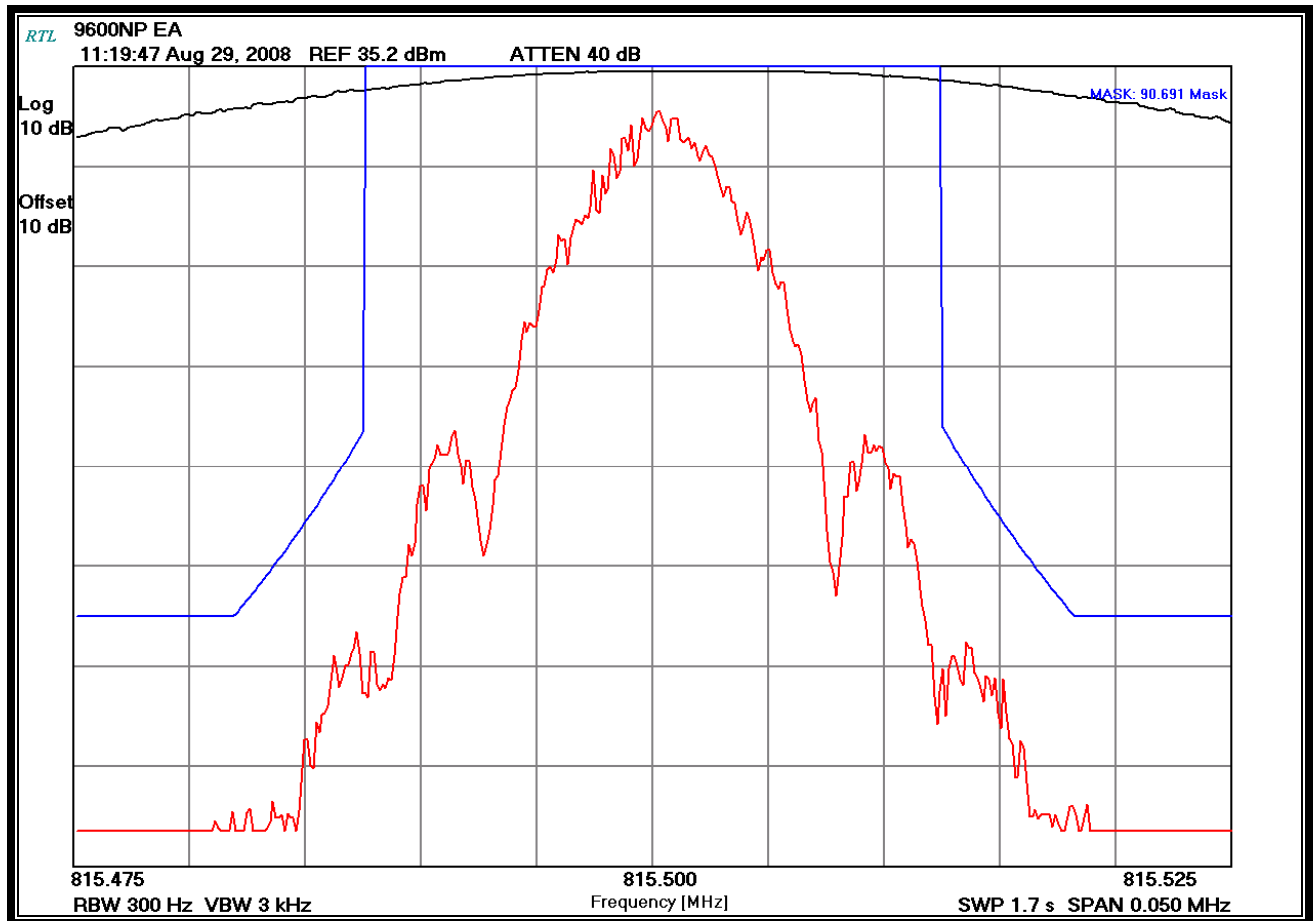
Plot 6-8: Occupied Bandwidth - 815.5 MHz; Mask H; NPSPAC; 2-Level FSK; 9600BPS



Plot 6-9: Occupied Bandwidth - 815.5 MHz; Mask EA; Wide Band; C4FM; 4-Level FSK; 9600BPS



Plot 6-10: Occupied Bandwidth - 815.5 MHz; Mask EA; NPSPAC; 2-Level FSK; 9600BPS



Plot 6-11: Occupied Bandwidth - 815.5 MHz; Mask EA; Wide Band; 2-Level FSK; 9600BPS

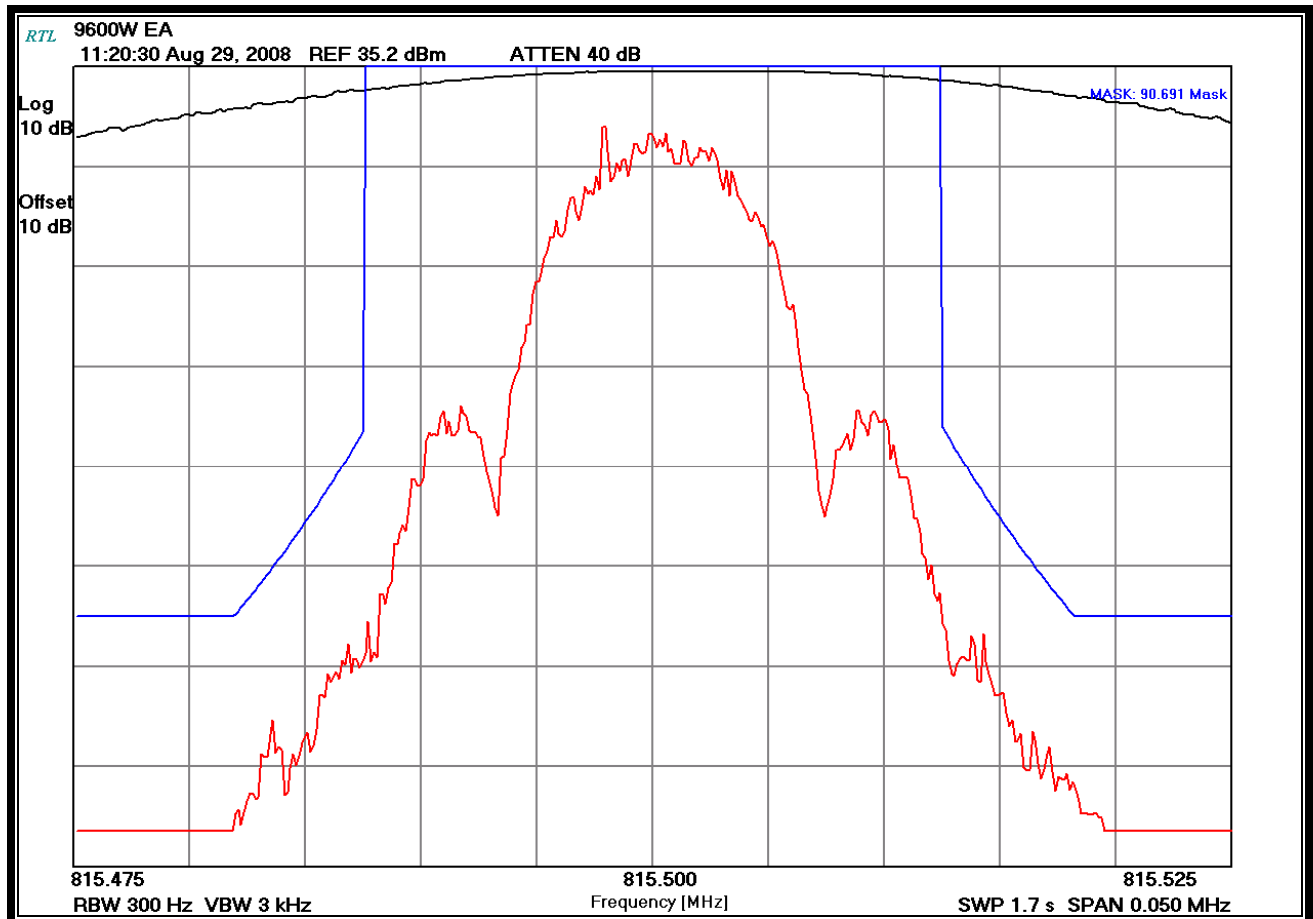


Table 6-1: Test Equipment for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08
900819	Weinschel Corporation	BF0830	Attenuator 10db	N/A	12/2/08

Test Personnel:

Daniel Baltzell		August 29, 2008
Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 90 §90.543(c) & Part 2 §2.1053(a); RSS-119 5.8: Field Strength of Spurious Radiation

7.1 Test Procedure

ANSI/TIA/EIA-603-2002, Section 2.2.12.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

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.

7.2 Test Data

7.2.1 CFR 47 Part 90.210 Requirements

Limit = $43 + 10 \log P$

All emissions were greater than 20 dB below the limit. Per FCC 2.1057(c), no data is being reported.

Table 7-1: Test Equipment for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz–2 GHz)	2648	12/20/08
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridge Guide Antenna (1-18 GHz)	2310	3/30/09
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	10/8/08
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz-12.8 GHz)	3826A00144	10/17/08
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01-20 GHz)	3610A00866	12/7/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/08
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/5/08
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	10/5/08
900772	EMCO	3161-02	Horn Antenna (2-4 GHz)	9804-1044	6/14/10
900321	EMCO	3161-03	Horn Antenna (4.0-8.2 GHz)	9508-1020	6/14/10
900323	EMCO	3160-07	Horn Antenna (8.2-12.4 GHz)	9605-1054	6/14/10

Test Personnel:

Daniel Baltzell		August 29, 2008
Engineer	Signature	Date Of Test

8 FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Bandwidth

Type of Emission: F1D, F1E (the addition of this emission is the purpose of this Class 2 report).

Digital Data – 4 level FSK; 9600 bps; Wide Band; 25 kHz Channel Spacing

Calculation:

Data rate in bps (R) = 19200

Peak deviation of carrier (D) = +/-3.75 kHz

Number of states in each symbol (S) = 2

$B_n = [19200 / \log_2(4) + 2(3750)(1)] = 17.100 \text{ kHz}$

Emission designator: 17K1F1D, 17K1F1E

9 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc. Model P5300/P5400 800 MHz Portable Radio; FCC ID: OWDTR-0043-E, IC: 3636B-0043**, complies with the applicable requirements of Parts 90 and 2 of the FCC Rules and Regulations, and IC RSS-119, and meets the requirements of a Class II Permissive Change.