



Engineering and Testing for EMC and Safety Compliance



Accredited under A2LA Testing Certificate # 2653.01

Class II Permissive Change Test Report

M/A-COM, Inc.
221 Jefferson Ridge Parkway
Lynchburg, VA 24501
Phone: (434) 455-9527
Contact: Daryl Popowitch

MODEL: J725M Mobile Radio

FCC ID: OWDTR-0012-E
IC: 3636B-12058

March 24, 2008

Standards Referenced for this Report	
Part 2: 2007	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2007	Private Land Mobile Radio Services
RSS-119 Issue 9	Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41-960 MHz
ANSI/TIA/EIA 603-2002	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods

Frequency Range (MHz)	Maximum Measured Output Power (W) Conducted**	Frequency Tolerance (ppm)	Emission Designator
806.0125-823.9875 MHz	37.1	1.5	16K0F3E
806.0125-823.9875 MHz	37.1	1.5	15K6F1D
806.0125-823.9875 MHz	37.1	1.5	15K6F1E
851.0125-868.9875 MHz	37.1	1.5	16K0F3E
851.0125-868.9875 MHz	37.1	1.5	15K6F1D
851.0125-868.9875 MHz	37.1	1.5	15K6F1E

**Mode of operation for all of the above is OpenSky protocol. **All powers as shown on original grant.*

Report prepared by: Daniel Baltzell, Test Engineer

Document Number: 2008047

No part of this report may be reproduced without the full written approval of Rhein Tech Laboratories, Inc. and M/A-COM, Inc.

360 Herndon Parkway
Suite 1400
Herndon, VA 20170
Tel: 703-689-0368 Fax: 703-689-2056

Table of Contents

1	General Information	4
1.1	Test Facility	4
1.2	Related Submittal(s)/Grant(s).....	4
1.3	Description of Change in Device	4
2	Tested System Details.....	5
3	FCC Rules and Regulations Part 2 §2.1033(c)(8) Voltages and Currents Through the Final Amplifying Stage	6
4	FCC Rules and Regulations Part 2 §2.1046(a); RSS-119 5.4: RF Power Output: Conducted	7
4.1	Test Procedure	7
4.2	Test Data	7
5	FCC Rules and Regulations Part 2 §2.1051; RSS-119 5.8: Spurious Emissions at Antenna Terminals	8
5.1	Test Procedure	8
5.2	Test Data	8
6	FCC Rules and Regulations Part 2 §2.1049(c)(1); RSS-119 5.8: Occupied Bandwidth	9
6.1	Test Procedure	9
6.2	Test Data	9
7	FCC Rules and Regulations Part 90 §90.543(c) & Part 2 §2.1053(a); RSS-119 5.8: Field Strength of Spurious Radiation	20
7.1	Test Procedure	20
7.2	Test Data	20
7.2.1	CFR 47 Part 90.210 Requirements.....	20
8	Conclusion.....	21

Table of Tables

Table 2-1:	Equipment Under Test (EUT).....	5
Table 2-2:	Support Equipment.....	5
Table 4-1:	RF Power Output (High Power): Carrier Output Power (Unmodulated)	7
Table 4-2:	RF Power Output (Rated Power).....	7
Table 4-3:	Test Equipment for Testing RF Power Output - Conducted	7
Table 5-1:	Test Equipment for Testing Conducted Spurious Emissions.....	8
Table 6-1:	Test Equipment for Testing Occupied Bandwidth.....	19
Table 7-1:	Field Strength of Spurious Radiation Channel 3 – 823.9875 MHz; Wideband; High Power	20
Table 7-2:	Test Equipment for Testing Field Strength of Spurious Radiation.....	21

Table of Plots

Plot 6-1:	Occupied Bandwidth – Wideband Analog; Mask B	9
Plot 6-2:	Occupied Bandwidth – Wideband Analog; Mask EA.....	10
Plot 6-3:	Occupied Bandwidth – P25; Mask G.....	11
Plot 6-4:	Occupied Bandwidth – 9600W; Mask G.....	12
Plot 6-5:	Occupied Bandwidth – 9600NP; Mask G	13
Plot 6-6:	Occupied Bandwidth – P25; Mask H.....	14
Plot 6-7:	Occupied Bandwidth – 9600W; Mask H	15
Plot 6-8:	Occupied Bandwidth – 9600NP; Mask H	16
Plot 6-9:	Occupied Bandwidth - P25; Mask EA.....	17
Plot 6-10:	Occupied Bandwidth – 9600NP; Mask EA	18
Plot 6-11:	Occupied Bandwidth - 9600W; Mask EA.....	19

Table of Figures

Figure 2-1:	Configuration of Tested System	6
-------------	--------------------------------------	---

Table of Appendixes

Appendix A:	Agency Authorization	22
Appendix B:	FCC Confidentiality Request Letter	23
Appendix C:	IC Letters.....	24
Appendix D:	IC Confidentiality Request Letter.....	25
Appendix E:	Change Description.....	26
Appendix F:	Schematics.....	27
Appendix G:	Parts List	28
Appendix H:	Test Configuration Photographs.....	29
Appendix I:	Internal Photographs	31

Table of Photographs

Photograph 1:	Radiated Emissions – Front View	29
Photograph 2:	Radiated Emissions – Rear View.....	30
Photograph 3:	TX Board – Top View	31
Photograph 4:	TX Board – Bottom View	32

1 General Information

This Class II Permissive Change Report is prepared on behalf of **M/A-COM, Inc.** in accordance with the Federal Communications Commission's and Industry Canada's applicable Rules and Regulations. The Equipment Under Test (EUT) was the **J725M Mobile Radio; FCC ID: OWDTR-0012-E, IC: 3636B-12058**. 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 the applicable FCC Rules and Regulations in CFR 47. 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)

This is a Class II permissive change report for FCC ID: OWDTR-0012-E, originally granted on March 11, 2002, with a Class II permissive change granted on October 24, 2002, and IC: 3636B-12058, originally certified June 5, 2002, with a reassessment granted on December 18, 2002.

1.3 Description of Change in Device

This Class II permissive change request is a result of a power amplifier replacement.

2 Tested System Details

The test sample was received on March 19, 2008. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

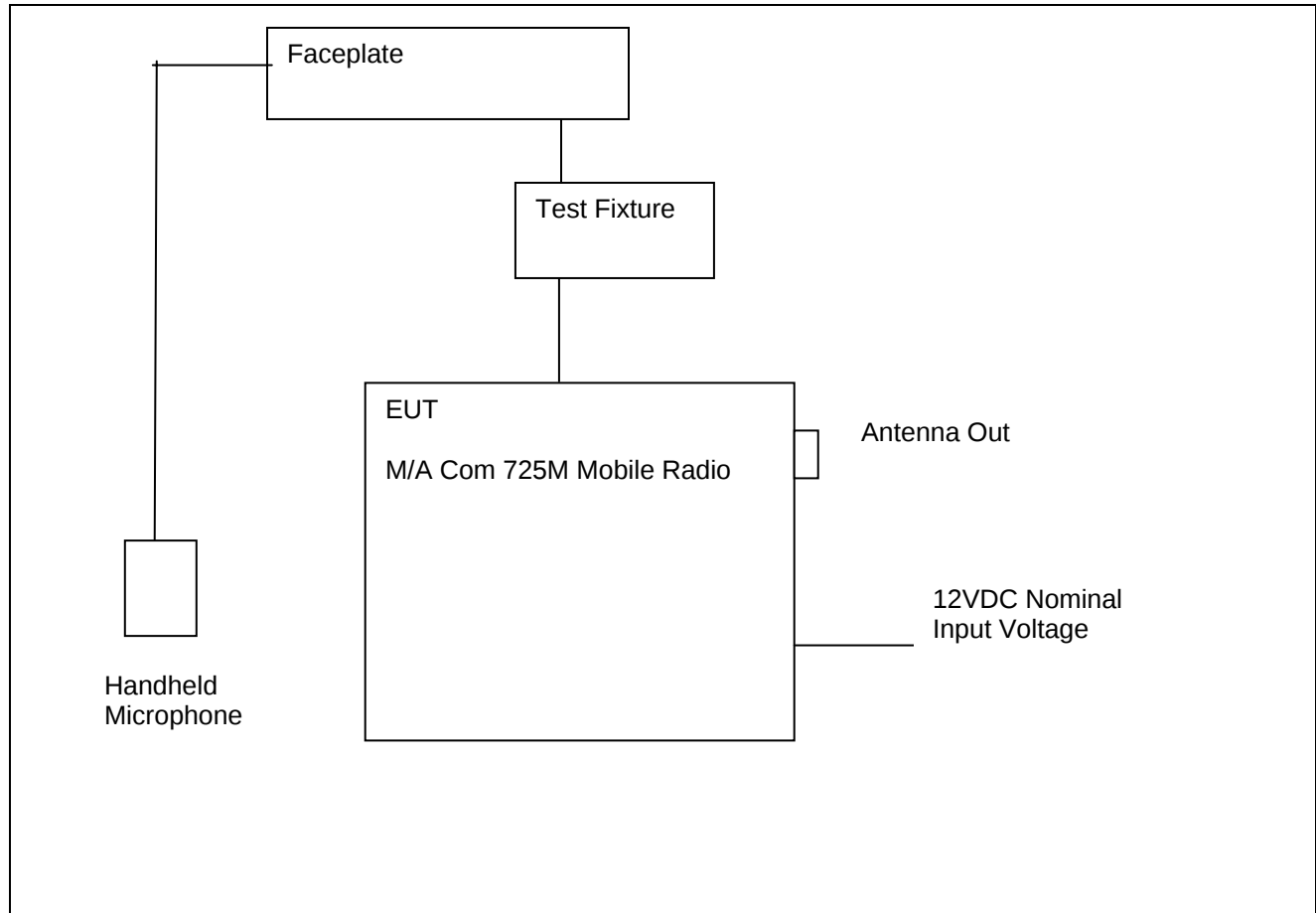
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
J725M Mobile Radio	M/A-COM, Inc.	RU101188U31	9802119	OWDTR-0012-E	18332
Test Fixture	M/A-COM, Inc.	N/A	N/A	N/A	18334
Faceplate	M/A-COM, Inc.	KRY1011632/14	Rev.:R3B	N/A	N/A

Table 2-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Power Supply	Alinco	DM-330MV	0001638	N/A	901124

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: 13.8 VDC
Current: 10.18 AMPS

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 (High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	806.0125	35.2
2	815.0000	36.1
3	823.9875	36.5
4	851.0125	35.0
5	860.5000	33.6
6	868.9875	32.5

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

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

Rated Power (W)
35

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

Test Personnel:

Daniel Baltzell		March 20, 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 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
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/08/08
901396	Aeroflex/Weinschel	48-40-34	Attenuator, 40 dB, (1-18 GHz)	BN9803	1/13/09

Test Personnel:

Daniel Baltzell		March 20, 2008
Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1049(c)(1); RSS-119 5.8: Occupied Bandwidth

Occupied Bandwidth: provided that the ACCP requirements are met, the applicants may request any authorized bandwidth that does not exceed the channel size.

6.1 Test Procedure

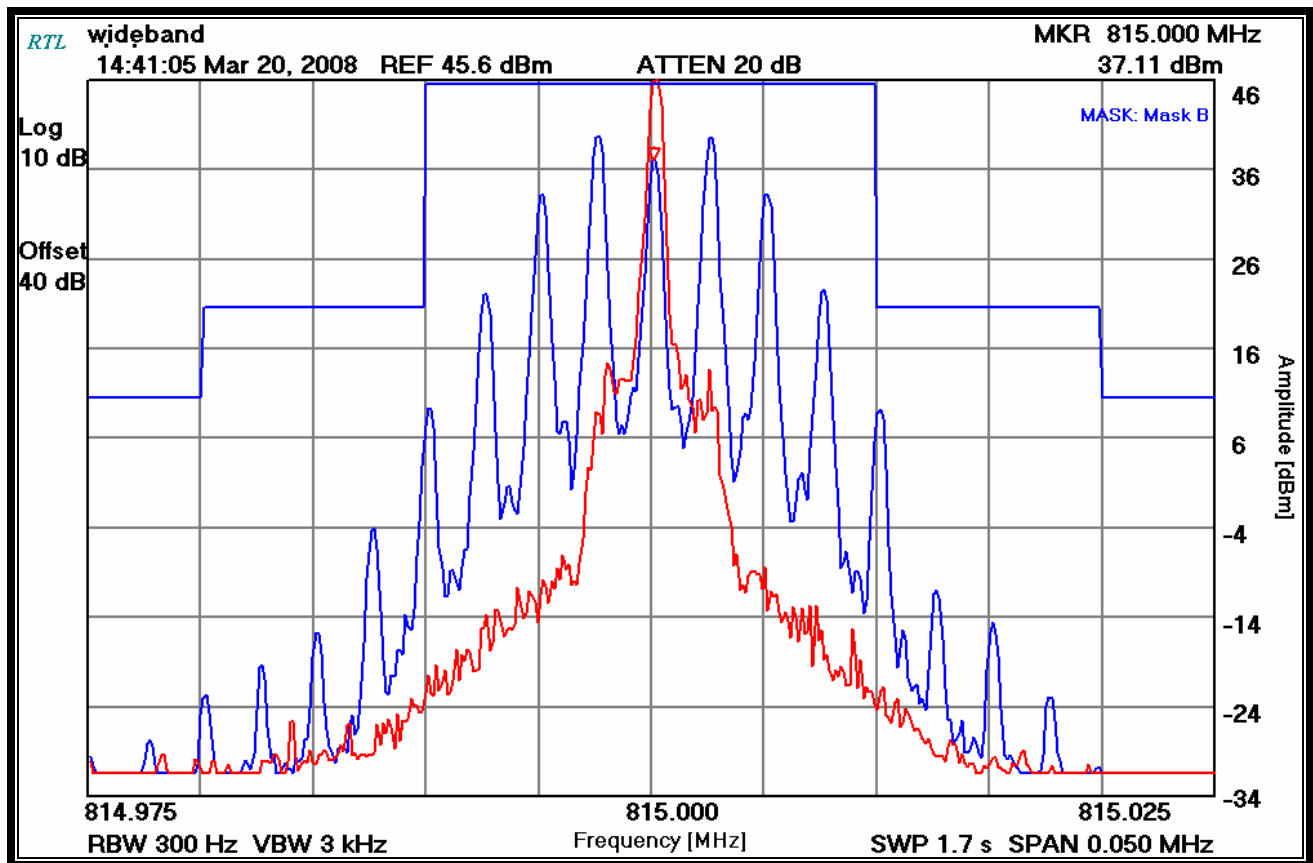
Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps.

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

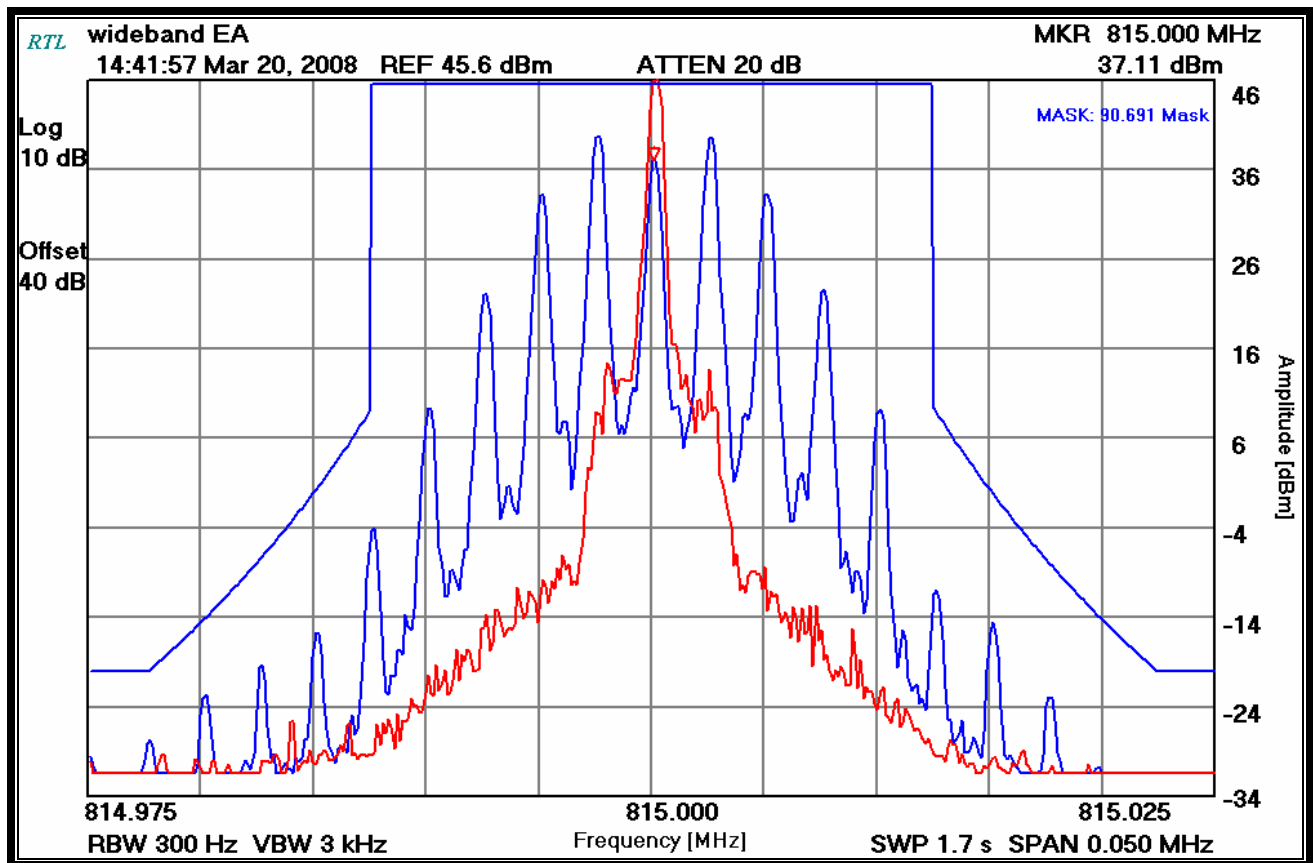
ANSI/TIA/EIA-603-2002, Section 2.2.11.

6.2 Test Data

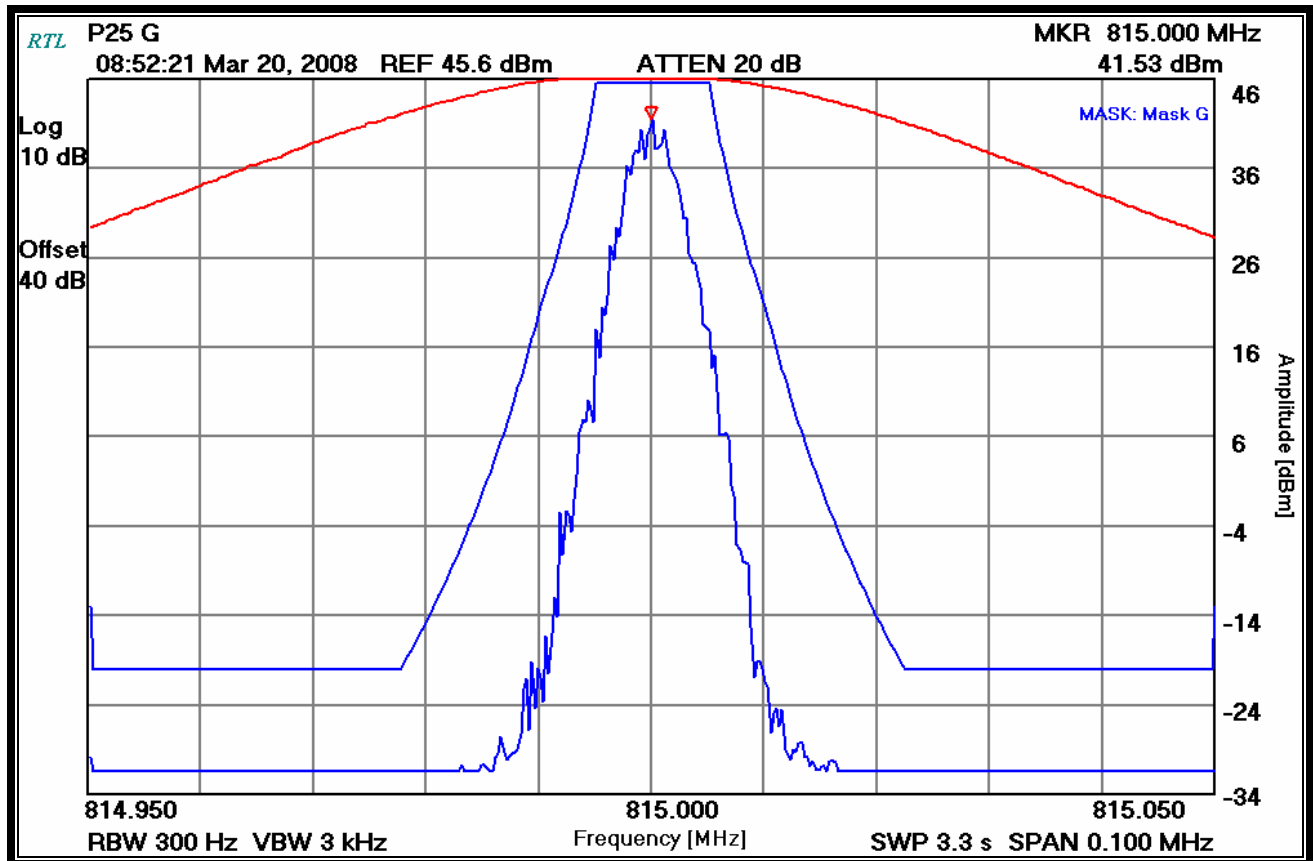
Plot 6-1: Occupied Bandwidth – Wideband Analog; Mask B



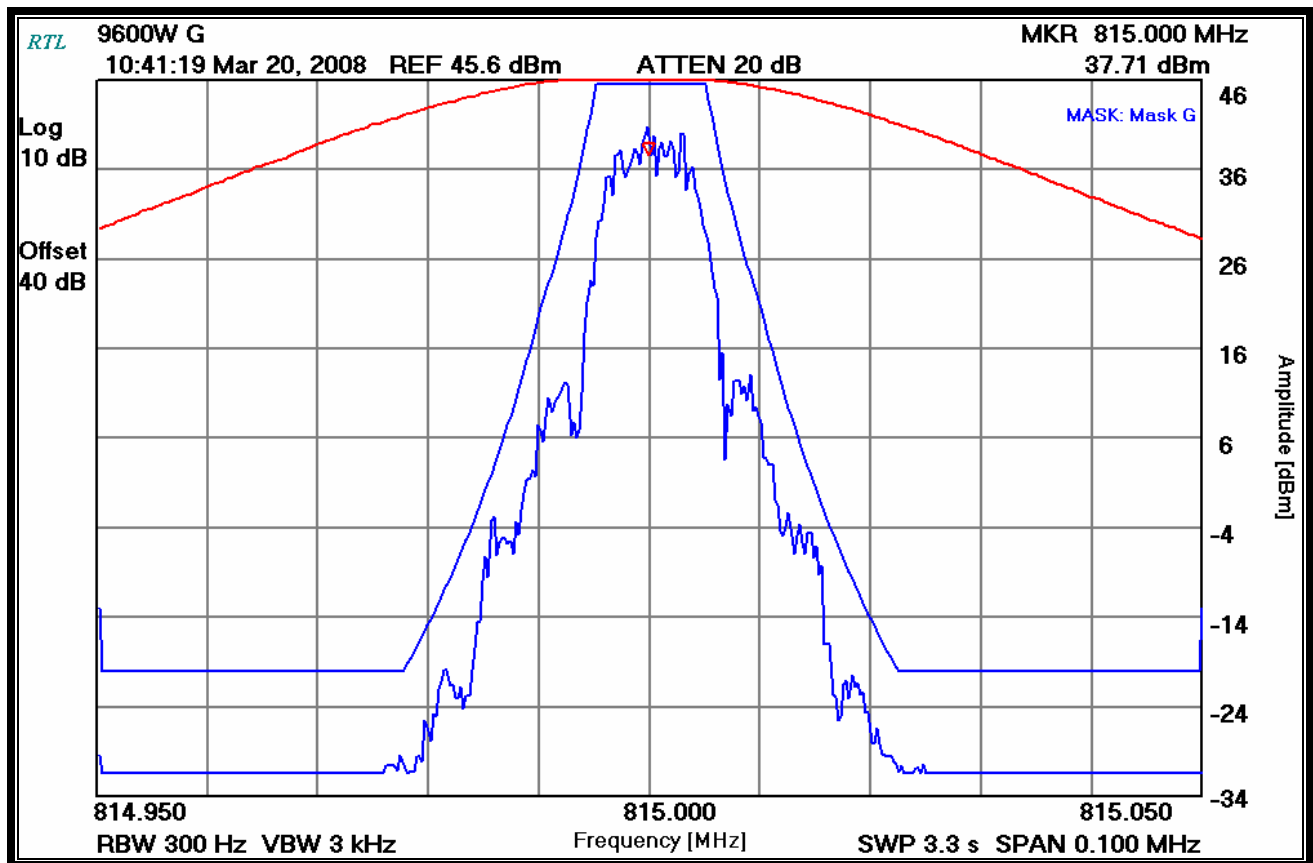
Plot 6-2: Occupied Bandwidth – Wideband Analog; Mask EA



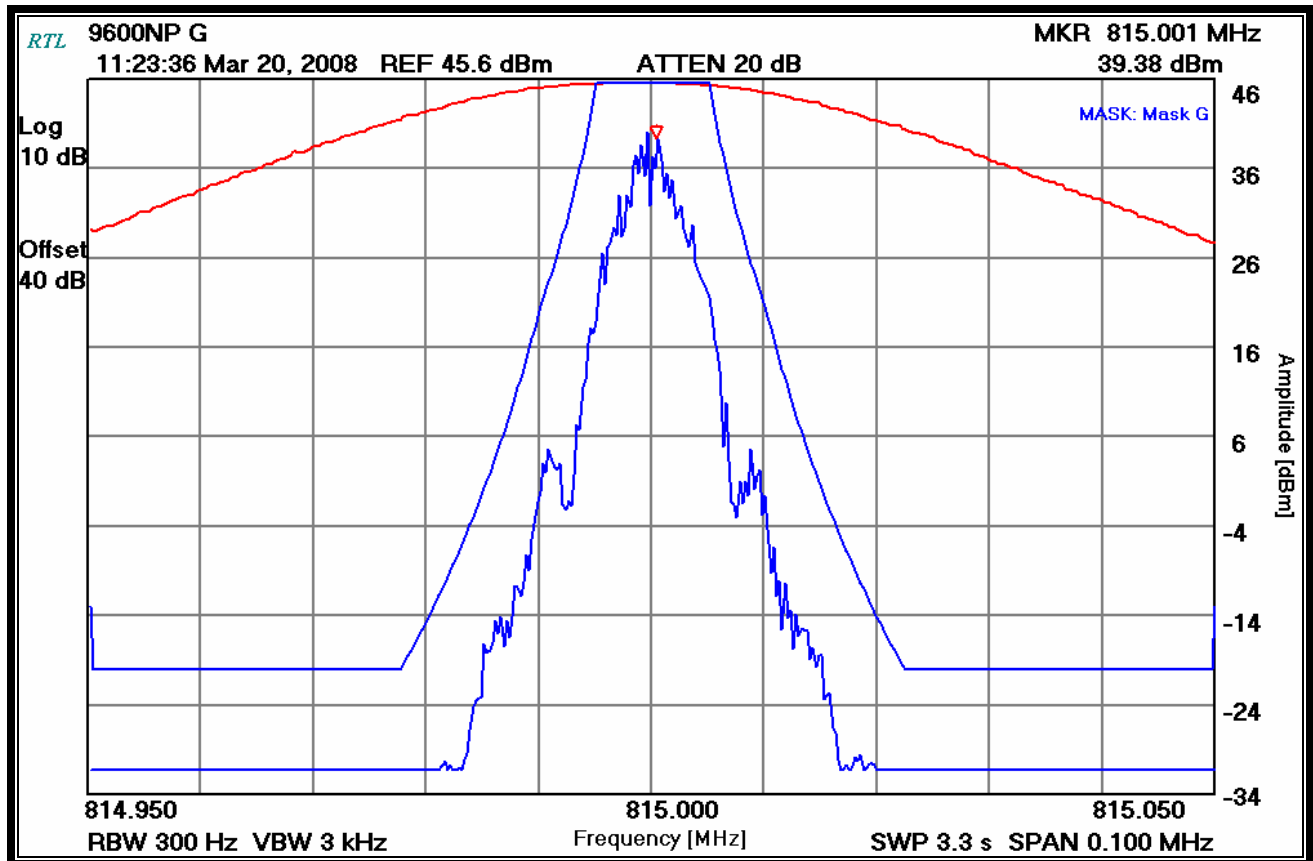
Plot 6-3: Occupied Bandwidth – P25; Mask G



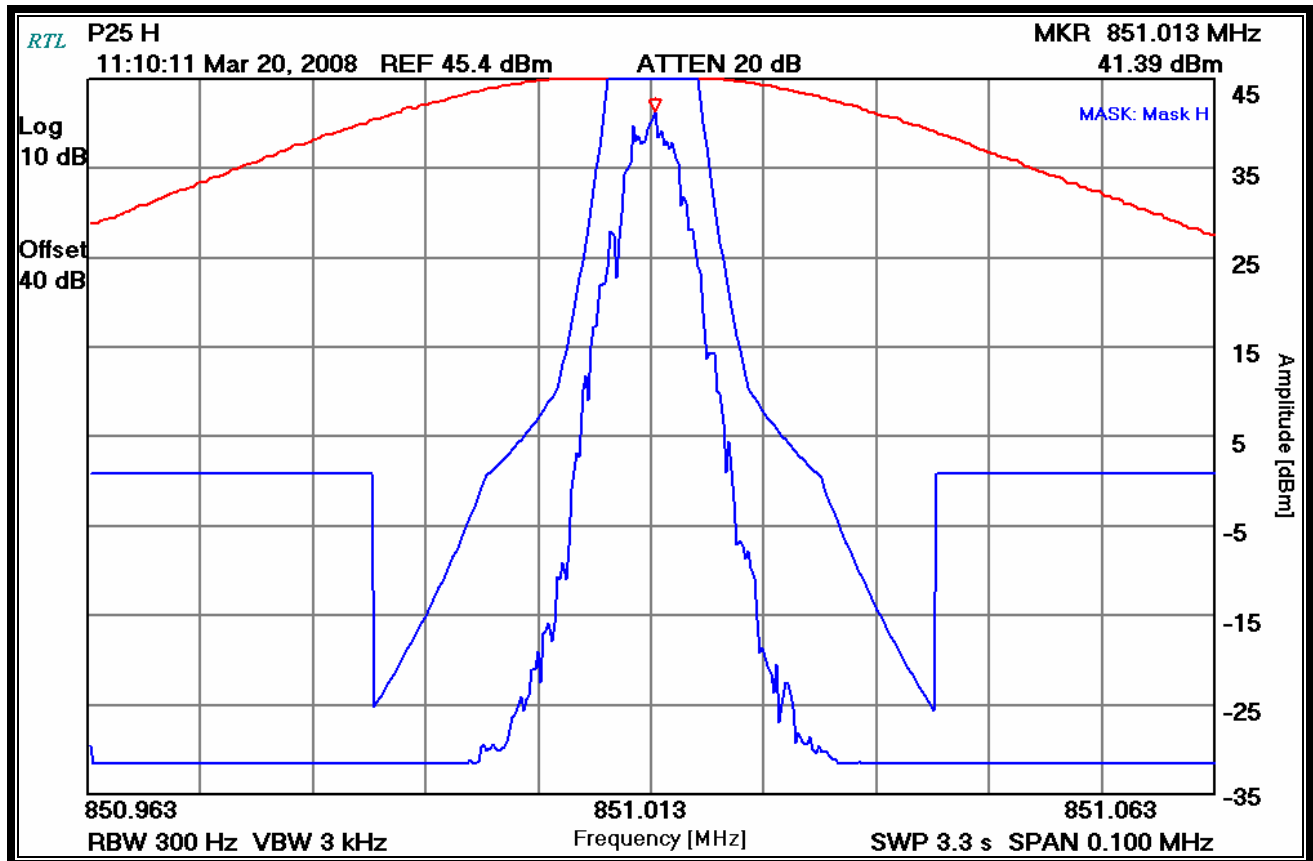
Plot 6-4: Occupied Bandwidth – 9600W; Mask G



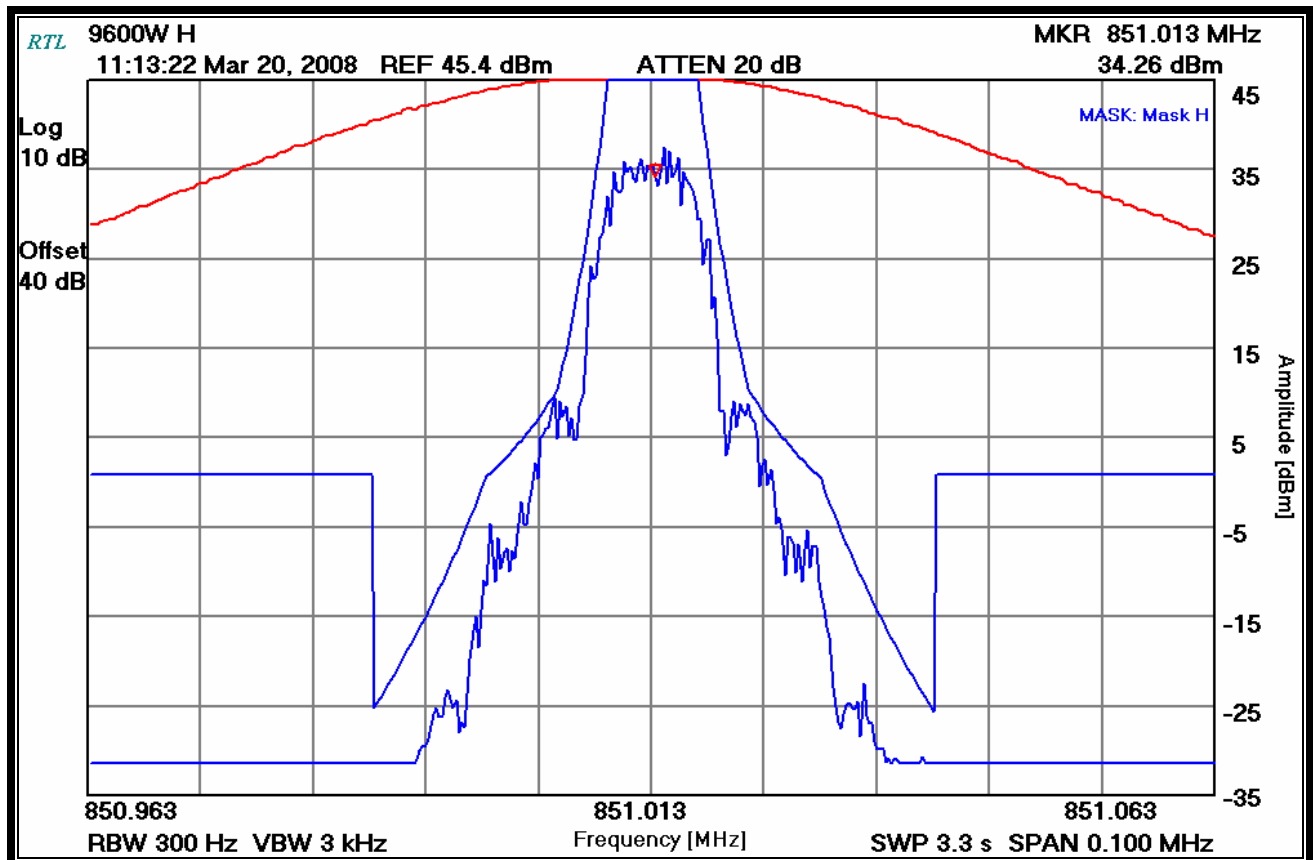
Plot 6-5: Occupied Bandwidth – 9600NP; Mask G



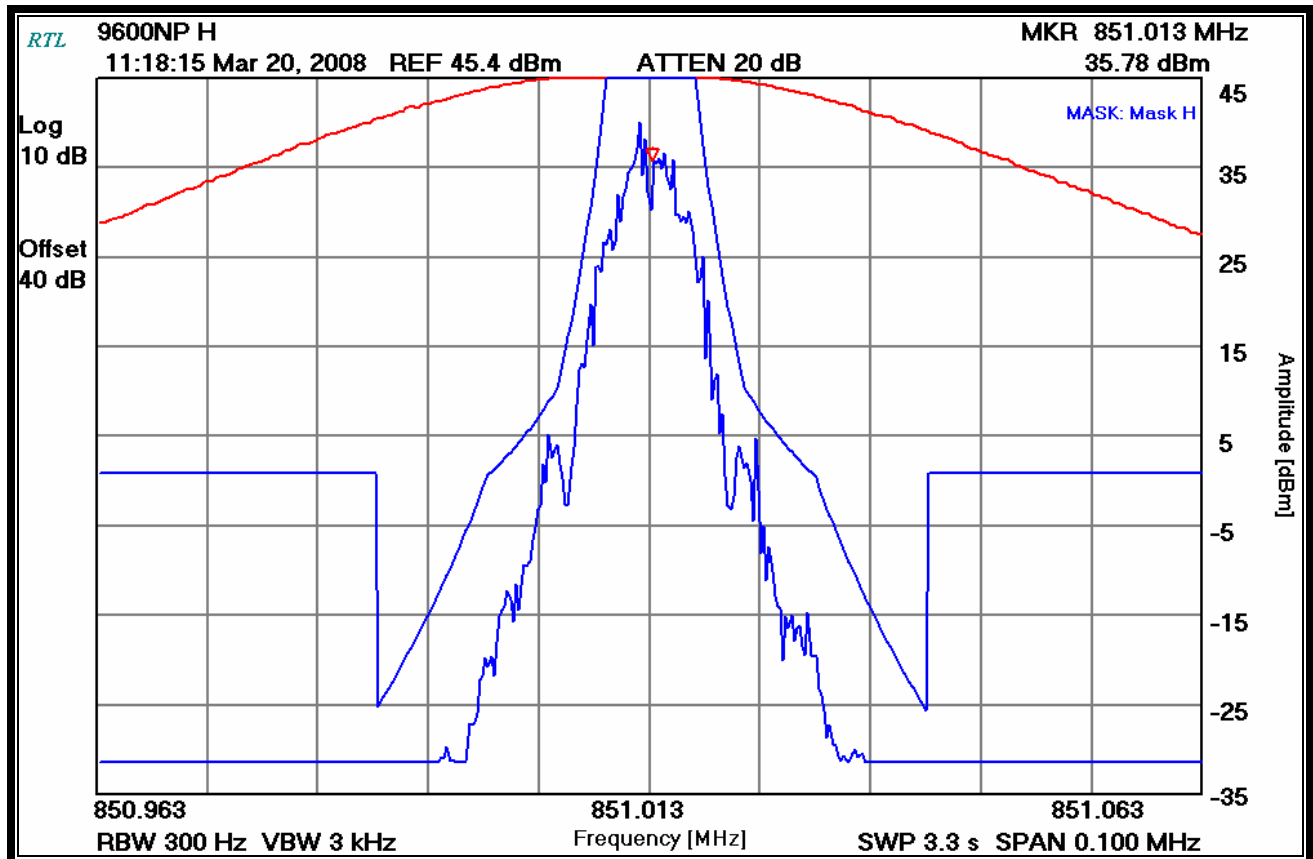
Plot 6-6: Occupied Bandwidth – P25; Mask H



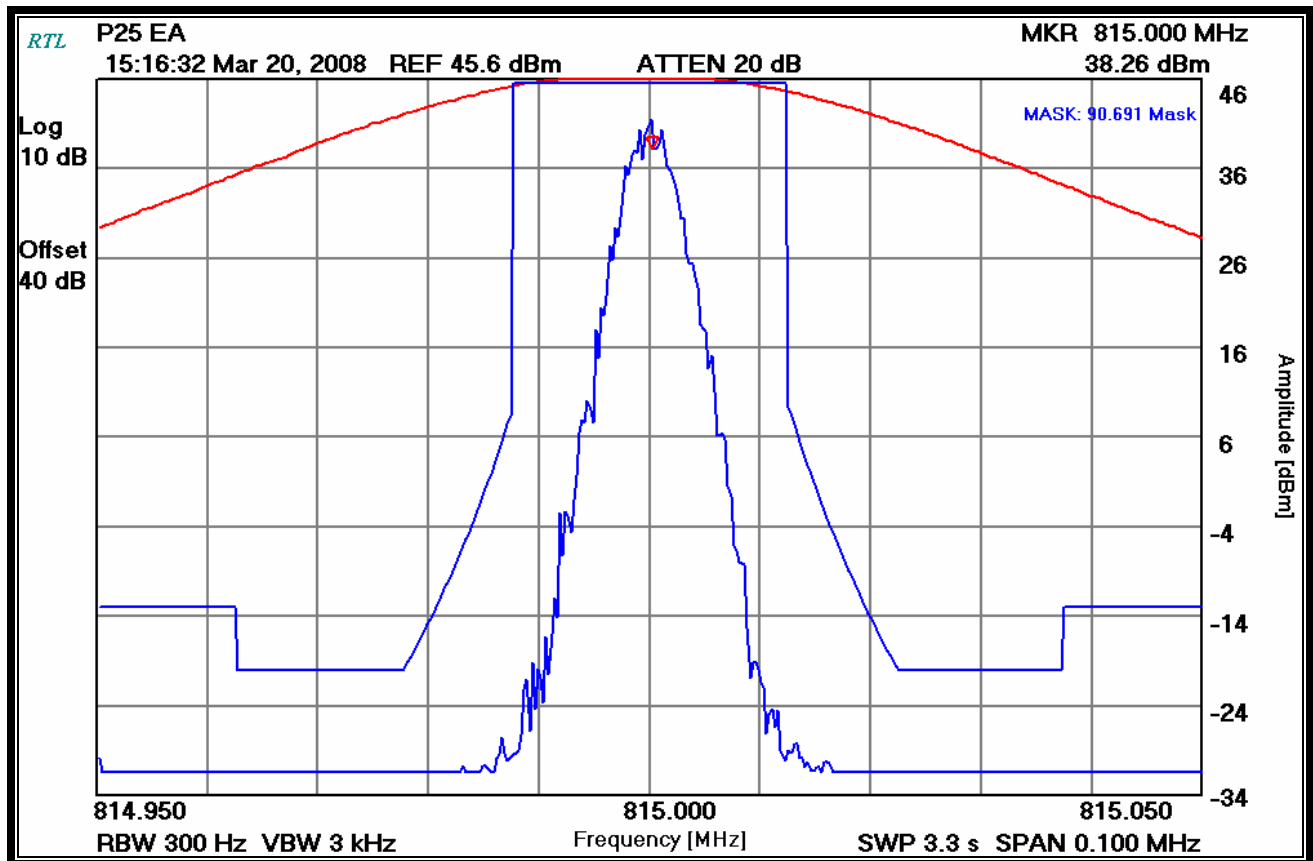
Plot 6-7: Occupied Bandwidth – 9600W; Mask H



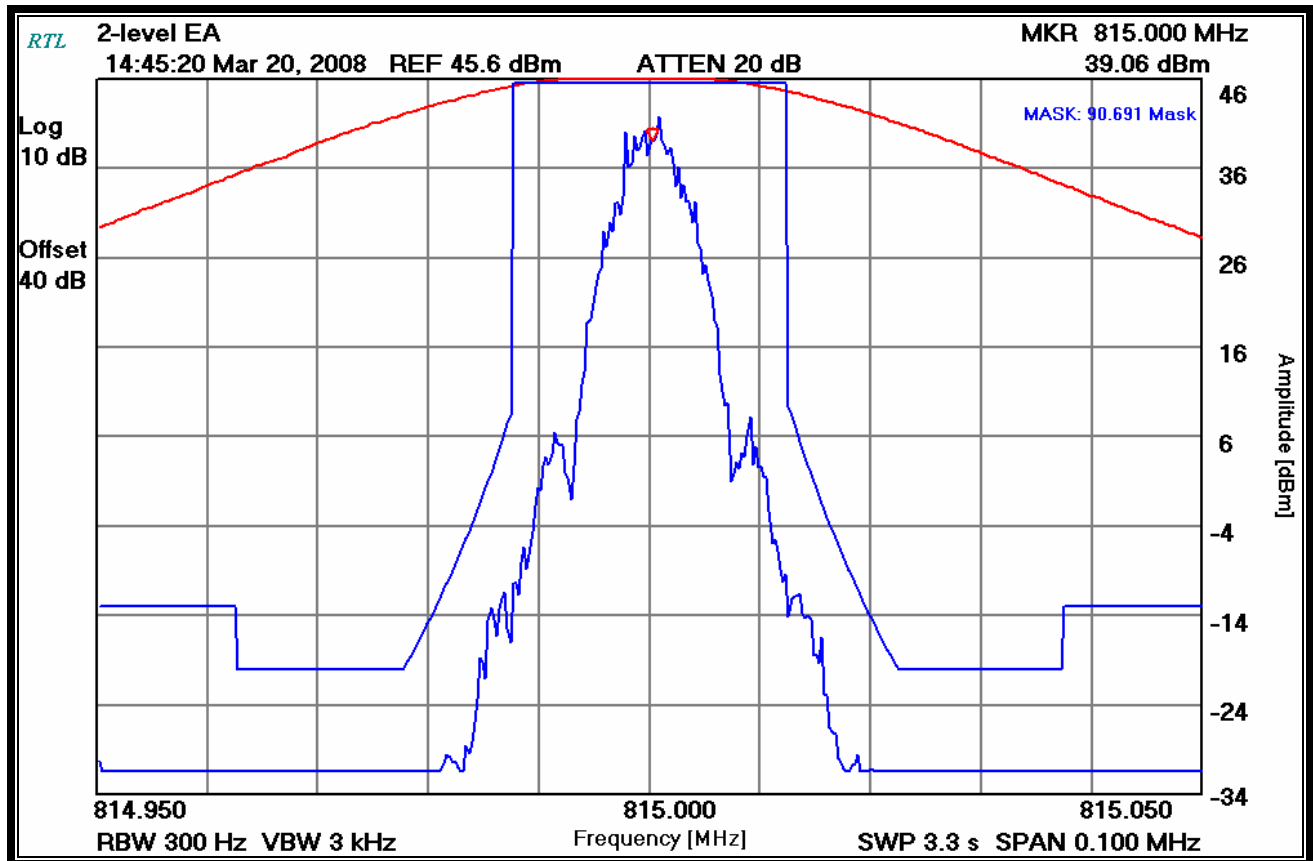
Plot 6-8: Occupied Bandwidth – 9600NP; Mask H



Plot 6-9: Occupied Bandwidth - P25; Mask EA



Plot 6-10: Occupied Bandwidth – 9600NP; Mask EA



Plot 6-11: Occupied Bandwidth - 9600W; Mask EA

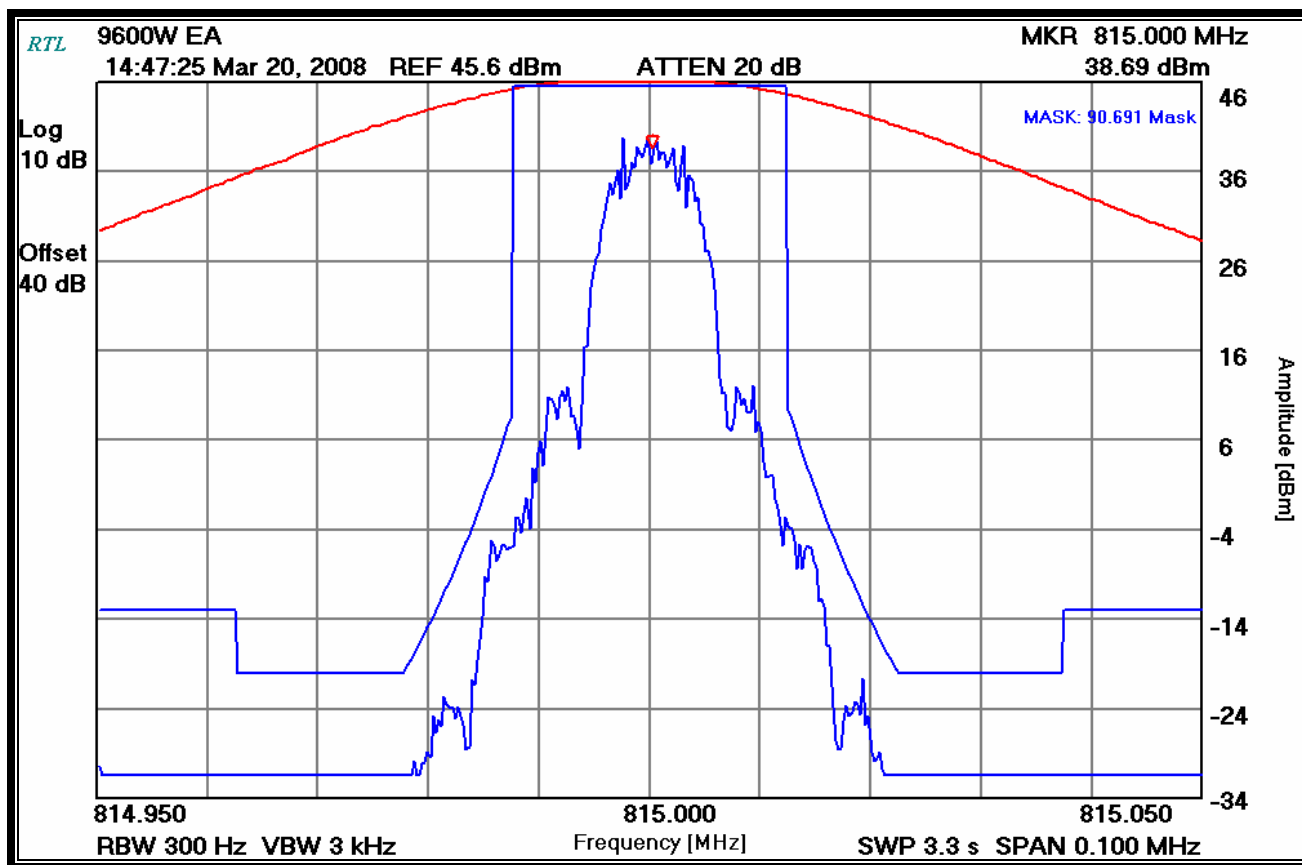


Table 6-1: Test Equipment for Testing Occupied Bandwidth

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
901396	Aeroflex/Weinschel	48-40-34	Attenuator, 40 dB, (1-18 GHz)	BN9803	1/13/09

Test Personnel:

Daniel Baltzell		March 20, 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

The worst-case emissions test data are shown.

Table 7-1: Field Strength of Spurious Radiation Channel 3 – 823.9875 MHz; Wideband; High Power

Limit = $43 + 10 \log P = 58.62 \text{ dBc}$; Conducted Power = $45.62 \text{ dBm} = 36.5 \text{ W}$

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1647.9750	53.9	-48.5	7.7	5.3	96.5	-37.9
2471.9625	58.1	-32.8	9.6	7.1	80.9	-22.3
3295.9500	38.2	-51.9	10.9	7.5	100.9	-42.3
4119.9375	45.6	-37.2	12.2	7.6	87.4	-28.8
4943.9250	45.3	-39.5	13.2	8.4	89.9	-31.3
5767.9125	45.9	-35.2	14.2	8.6	86.4	-27.8
6591.9000	41.0	-42.0	14.7	9.3	93.0	-34.4
7415.8875	47.8	-31.2	15.5	8.8	83.5	-24.9
8239.8750	32.4	-39.3	15.7	9.0	91.6	-33.0

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the $\frac{1}{2}$ wave dipole antenna.

Table 7-2: 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		March 21, 2008
Engineer	Signature	Date Of Test

8 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc. Model J725M Mobile Radio; FCC ID: OWDTR-0012-E, IC: 3636B-12058**, complies with applicable requirements of Parts 90 and 2 of the FCC Rules and Regulations, and IC RSS-119.