



Engineering and Testing for EMC and Safety Compliance

CLASS II PERMISSIVE CHANGE TEST REPORT

M/A-COM, Inc.
221 Jefferson Ridge Parkway
Lynchburg, VA 24051
Phone: (434) 455-9527
Daryl Popowitch
E-Mail: Popowitda@tycoelectronics.com

**MODEL: SkyMastr 800 MHz
Base Station**

FCC ID: BV8MBS800A075

May 19, 2006

Standards Referenced for this Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	§15.109: Radiated Emissions Limits
Part 90: 2003	Private Land Mobile Radio Services
ANSI C63.4-2003	Standard Format Measurement/Technical Report Personal Computer and Peripherals
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
854-869	40	0.1	13K1F9W
866-869	75	1.0	12K1F9W
851-866	75	1.0	12K1F9W
866-869	75	1.0	11K0F9W
851-869	75	1.0	11K3F1D

REPORT PREPARED BY TEST ENGINEER: DANIEL BIGGS

Document Number: 2006049/QRTL06-220

No part of this report may be reproduced without the full written approval of Rhein Tech Laboratories, Inc.

360 Herndon Parkway
Suite 1400
Herndon, VA 20170
Phone: 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
1.4	Product Description	4
2	Conformance Statement.....	5
3	Tested System Details.....	6
4	FCC Rules and Regulations Part 2 §2.1033(C)(8) Voltages and Currents Through The Final Amplifying Stage	7
5	FCC Rules and Regulations Part 2 §2.1046 (a): RF Power Output: Conducted.....	7
5.1	Test Procedure	7
5.2	Test Data	7
6	FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals	8
6.1	Test Procedure	8
6.2	Test Data	8
7	FCC Rules and Regulations Part 2 §2.1049(c)(1): Occupied Bandwidth	11
7.1	Test Procedure	11
7.2	Test Data	11
8	FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Bandwidth	15
9	Conclusion.....	15

Table of Tables

Table 3-1: Equipment Under Test (EUT).....	6
Table 3-2: Support Equipment	6
Table 5-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)	7
Table 5-2: RF Power Output (Rated Power)	7
Table 5-3: Test Equipment Used For Testing RF Power Output - Conducted	7
Table 6-1: Conducted Spurious Emissions – 851.0125 MHz – High Power	8
Table 6-2: Conducted Spurious Emissions – 854.0125 MHz – High Power	9
Table 6-3: Conducted Spurious Emissions – 861.5000 MHz – High Power.....	9
Table 6-4: Conducted Spurious Emissions – 868.9875 MHz – High Power.....	9
Table 6-3: Test Equipment Used For Testing Conducted Spurious Emissions	10
Table 7-1: Test Equipment Used For Testing Occupied Bandwidth.....	14

Table of Plots

Plot 7-1: Occupied Bandwidth; Wide band; 851.0125 MHz.....	11
Plot 7-2: Occupied Bandwidth; Wide band; 854.0125 MHz.....	12
Plot 7-3: Occupied Bandwidth; Wideband; 861.5000 MHz.....	13
Plot 7-4: Occupied Bandwidth; Wideband; 868.9875 MHz.....	14

Table of Figures

Figure 3-1: Configuration of Tested System	6
--	---

Table of Appendices

Appendix A: Agency Authorization	16
Appendix B: Change Description	17

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. The Equipment Under Test (EUT) was the **SkyMastr 800 MHz Base Station; FCC ID: BV8MBS800A075**. 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, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2003. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. 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 dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.2 Related Submittal(s)/Grant(s)

This is a Class II permissive change report for FCC ID: BV8MBS800A075, originally certified August 18, 1999, with Class II permissive changes granted on January 16, 2005 and July 15, 2005.

1.3 Description of Change in Device

A new emissions designator is requested to be added to this radio product to support a new modulation format. Changes were made to the base-band DSP filtering to alter the bandwidth of the pulse shaping filter and a change was made to the value of FM deviation. These changes altered the overall modulation bandwidth of the transmitted signal and thus a new FCC emissions designator is warranted. No changes were made to any portion of the hardware with the inclusion of this new designator. The radio product is intended support existing legacy systems already deployed in the market place and as such must continue to maintain the former emissions designators in the FCC grant.

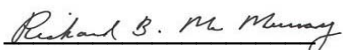
1.4 Product Description

The EUT is a base station radio that operates in the 854-869 MHz band. Conducted power is variable from 5 W to 40 W. The EUT is digitally modulated using a 4-level Gaussian Minimum Shift Keying (GMSK) with a symbol rate of 9600 Hz (19.2 kbps).

2 Conformance Statement

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the above standards for Certification methodology.

Signature: 

Date: May 19, 2006

Typed/Printed Name: Rick McMurray

Position: Vice President of Operations

Signature: 

Date: May 19, 2006

Typed/Printed Name: Daniel W. Biggs

Position: Test Engineer

3 Tested System Details

The test sample was received 4/17/2006. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

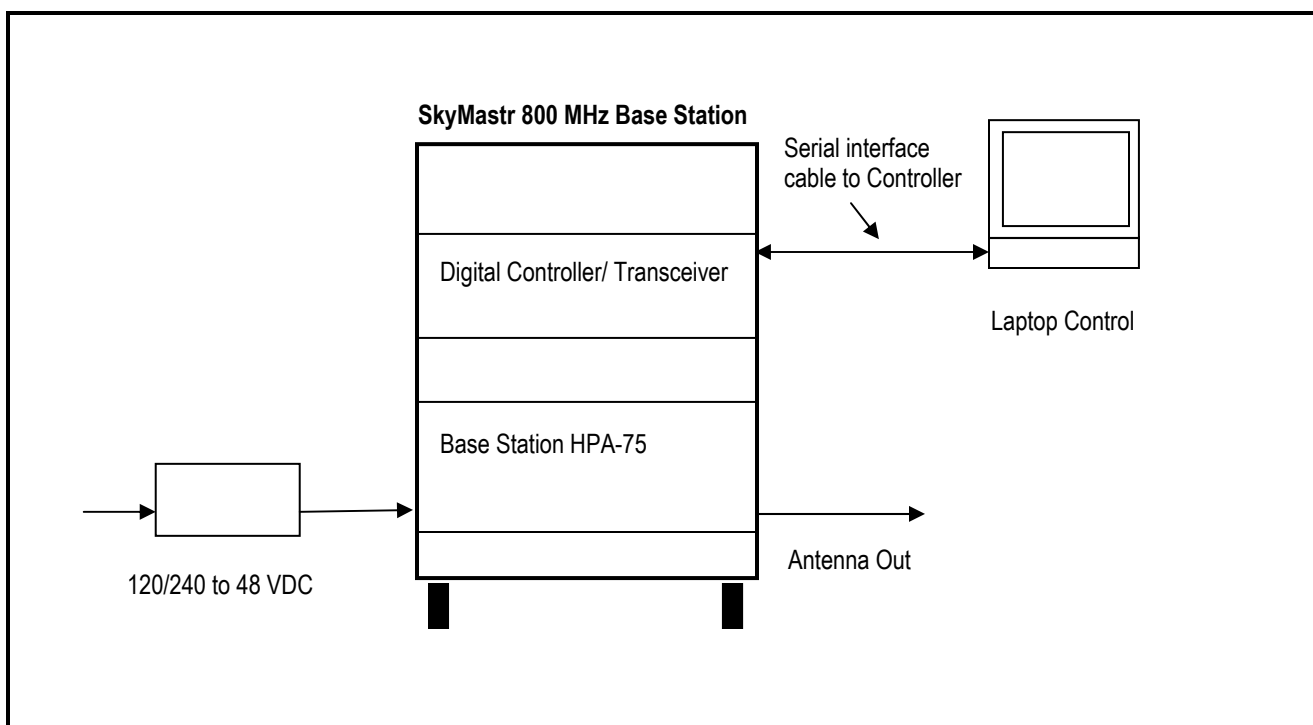
Table 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
SkyMastr 800 MHz Base Station HPA-75	M/A-Com, Inc.	BSH 1010	AM42-0053	BV8MBS800A075	17211
Digital Controller/Transceiver	M/A-Com, Inc.	N/A	BS90-0001-000	N/A	17211
Power Supply	MW	SE-600-48		N/A	N/A

Table 3-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook computer	Compaq	Armada	N/A	N/A	17212
Serial interface cable		DB-9	N/A	N/A	N/A

Figure 3-1: Configuration of Tested System



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

Nominal DC Voltage: 28.0 VDC

Current: 10.0 AMPS

5 FCC Rules and Regulations Part 2 §2.1046 (a): RF Power Output: Conducted

5.1 Test Procedure

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

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

5.2 Test Data

The following channels (in MHz) were tested: 851.0125, 854.0125, 861.5000, and 868.9875.

Table 5-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	851.0125	40
2	854.0125	40
3	861.5000	40
4	868.9875	40

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

Table 5-2: RF Power Output (Rated Power)

Rated Power (W)
40

Table 5-3: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184/901186	Agilent	E4416A/E9323A	Power Meter/ Sensor	GB41050573/US420.52510380	09/21/06

TEST PERSONNEL:

Daniel Biggs		May 5, 2006
Test Technician/Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals

6.1 Test Procedure

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

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

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

6.2 Test Data

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

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

The following channels (in MHz) were investigated: 851.0125, 854.0125, 861.5000 and 868.9875. The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Table 6-1: Conducted Spurious Emissions – 851.0125 MHz – High Power

25 kHz channel spacing; Conducted power = 40.0 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1702.025	98.10	59.02	-39.08
2553.038	92.20	59.02	-33.18
3404.05	106.90	59.02	-47.88
4255.063	103.50	59.02	-44.48
5106.075	101.50	59.02	-42.48
5957.088	96.70	59.02	-37.68
6808.1	90.60	59.02	-31.58
7659.113	100.50	59.02	-41.48
8510.125	96.70	59.02	-37.68

Table 6-2: Conducted Spurious Emissions – 854.0125 MHz – High Power

25 kHz channel spacing; Conducted power = 40.0 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1708.025	98.17	59.02	-39.15
2562.038	85.30	59.02	-26.28
3416.05	102.00	59.02	-42.98
4270.063	100.60	59.02	-41.58
5124.075	103.60	59.02	-44.58
5978.088	100.20	59.02	-41.18
6832.1	94.30	59.02	-35.28
7686.113	99.50	59.02	-40.48
8540.125	97.10	59.02	-38.08

Table 6-3: Conducted Spurious Emissions – 861.5000 MHz – High Power

25 kHz channel spacing; Conducted power = 40.0 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1723	98.17	59.02	-39.15
2584.5	85.30	59.02	-26.28
3446	102.00	59.02	-42.98
4307.5	100.60	59.02	-41.58
5169	103.60	59.02	-44.58
6030.5	100.20	59.02	-41.18
6892	94.30	59.02	-35.28
7753.5	99.50	59.02	-40.48
8615	97.10	59.02	-38.08

Table 6-4: Conducted Spurious Emissions – 868.9875 MHz – High Power

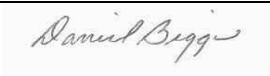
25 kHz channel spacing; Conducted power = 40.0 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1737.975	98.00	59.02	-38.98
2606.963	86.00	59.02	-26.98
3475.95	102.40	59.02	-43.38
4344.938	99.90	59.02	-40.88
5213.925	101.60	59.02	-42.58
6082.913	100.40	59.02	-41.38
6951.9	95.40	59.02	-36.38
7820.888	101.20	59.02	-42.18
8689.875	95.40	59.02	-36.38

Table 6-5: Test Equipment Used 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	09/22/06
901132	Par Electronics	UHF	UHF Notch Filter	N/A	02/1/09

TEST PERSONNEL:

Daniel Biggs		May 4 2006
Test Technician/Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 2 §2.1049(c)(1): 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.

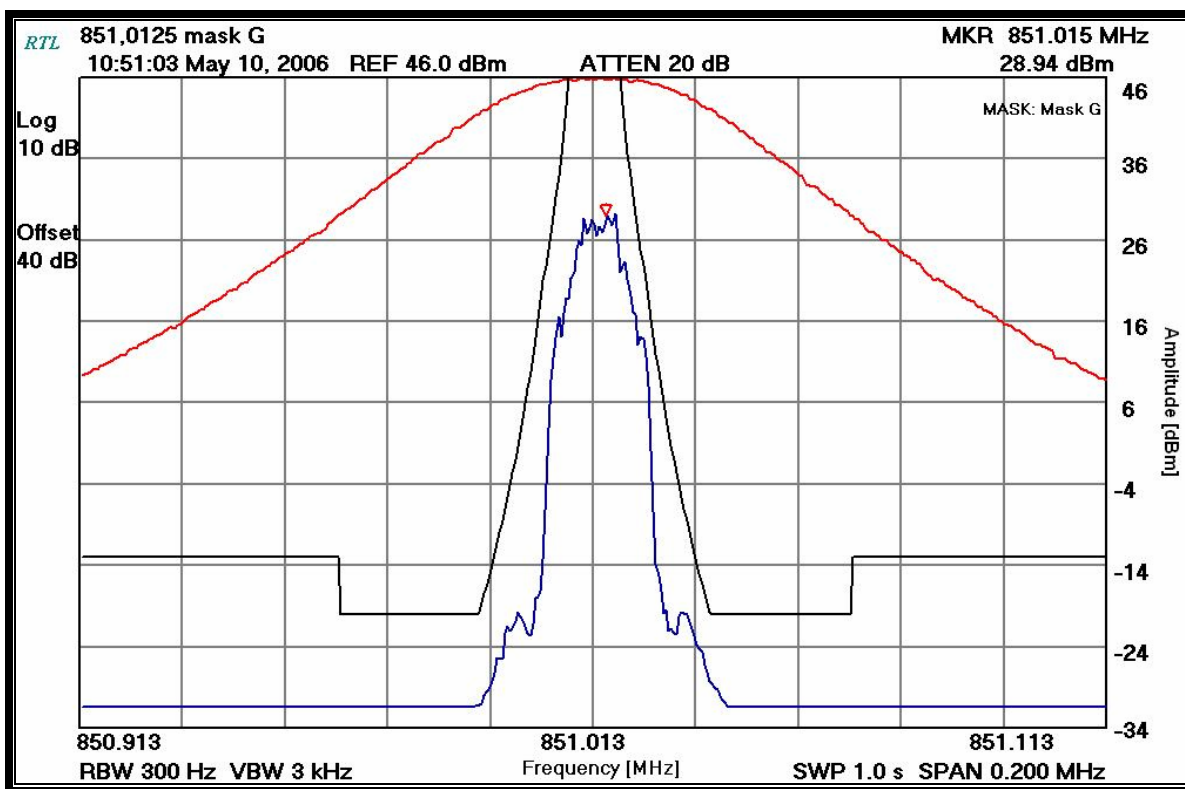
7.1 Test Procedure

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

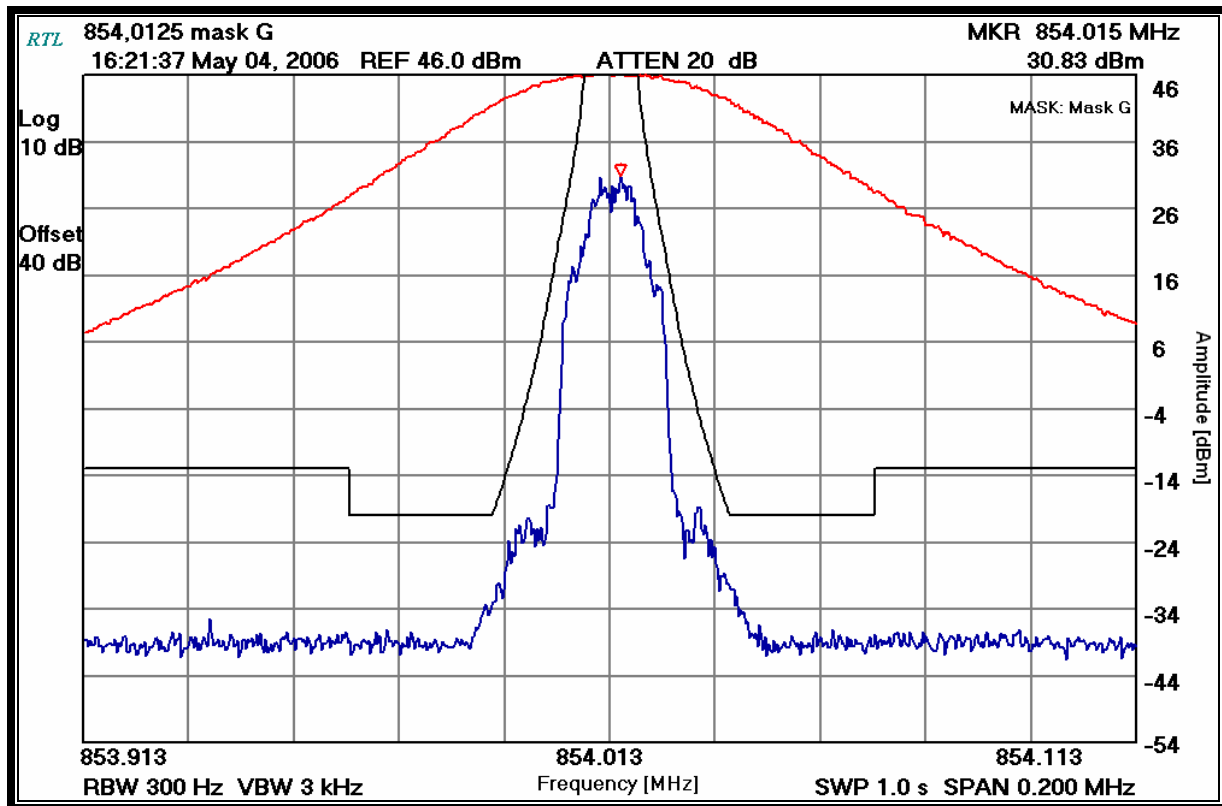
ANSI/TIA/EIA-603-2002, Section 2.2.11.

7.2 Test Data

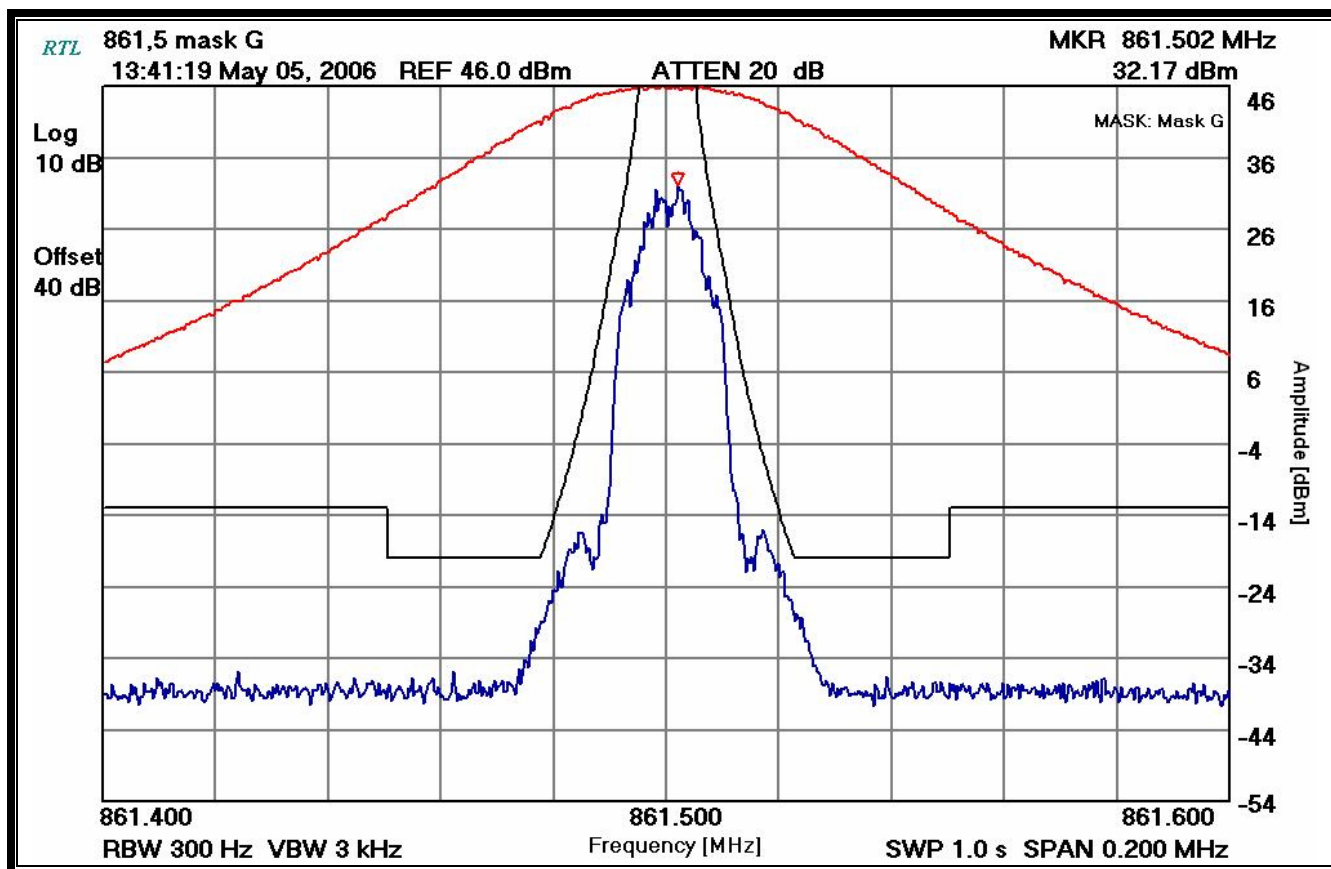
Plot 7-1: Occupied Bandwidth; Wide band; 851.0125 MHz



Plot 7-2: Occupied Bandwidth; Wide band; 854.0125 MHz



Plot 7-3: Occupied Bandwidth; Wideband; 861.5000 MHz



Plot 7-4: Occupied Bandwidth; Wideband; 868.9875 MHz

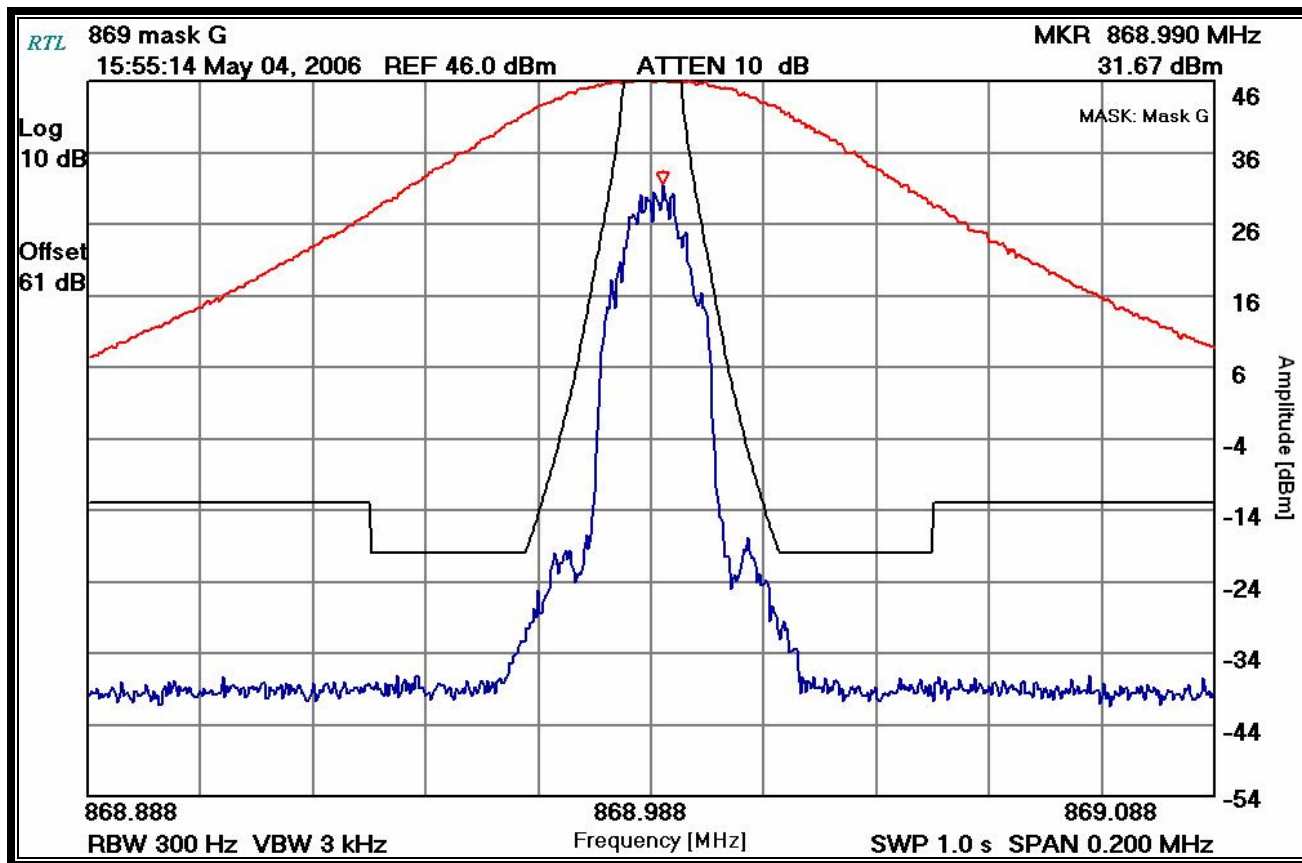


Table 7-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	9/14/06

Test Personnel:

Daniel Biggs		May 4, 5 & 10, 2006
Test Technician/Engineer	Signature	Dates Of Test

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

Type of Emission: F9W

FCC Mask 90.210(g):

Type of Emission: F9W

Digital Voice and Data: 19,200 BPS

Calculation:

$B(n) = (R/\text{Log}\{2\}S + 2KD)$, where $\text{Log}\{2\}$ is Log base 2

where

R = 19.2 kilobits per second [raw data rate]

S = 4 [4-level FSK]

D = 4.2 KHz [FM Deviation]

K = 0.415, [K is best quadratic fit to occupied BW measurements; $K = (-0.256*d*d + 1.066*d - 0.576)$, where d = normalized deviation factor of 1.4

$B(n) = 13,100$ or 13K1

FCC Emission Designator: 13K1F9W

9 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc. Model SkyMastr 800 MHz Base Station Radio; FCC ID: BV8MBS800A075**, complies with applicable requirements of Parts 90, 15 and 2 of the FCC Rules.