



Engineering and Testing for EMC and Safety Compliance



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Class II Permissive Change Report

Model: M803VTAC OpenSky Mobile Radio

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FCC ID: BV8M803VTAC
IC: 3670A-M803

October 31, 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
ANSI TIA-603-C-2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods
Industry Canada RSS-119 Issue 9 June 2007	Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41- 960 MHz

Frequency Range (MHz)	Output Power (W) Conducted Max Measured	Frequency Tolerance Limit (ppm)	Emission Designator
806-824	18.0	1.5	15K8F7D
851-869	17.0	1.5	15K8F7D
806-824	18.0	1.5	15K8F7E
851-869	17.0	1.5	15K8F7E
806-824	18.0	1.5	12K8F9W

Report Prepared by Test Engineer: Daniel Baltzell

Document Number: 2008182

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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 **M803VTAC OpenSky Mobile Radio; FCC ID: BV8M803VTAC, IC: 3670A-M803**. 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 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 purpose of this Class II Permissive Change is to document and demonstrate continued compliance of the M803VTAC 800 MHz radio following the addition of emission designator 12K8F9W. No hardware has been changed nor added. Radio deviation has been enhanced in firmware on an existing mode of operation for the new emission designator.

The original FCC grant and IC certificates were issued October 1, 2002. FCC permissive change grants were issued June 3, 2003 and October 6, 2004.

2 Tested System Details

The test sample was received on October 17, 2008. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. The device was programmed for multiple modes of operation and modulation types.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model/Part Number	Serial Number	FCC ID	Cable	RTL Bar Code
Vehicle Repeater Base	M/A-COM, Inc.	MAMROS0007	A400801B7BEE	BV8M803VTAC	2 40cm shielded RF I/O; 90cm unshielded I/O (CAN); 76cm unshielded power	18655
Vehicle Repeater Mobile	M/A-COM, Inc.	MAMROS0006	A400711B7E85	BV8M803M	2 40cm shielded RF I/O; 40cm unshielded I/O; 76cm unshielded power	18654
RF Combiner 800 MHz	M/A-COM, Inc.	MAMROS0016	A400901C5041	N/A	76cm unshielded power	18656
Control Head	M/A-COM, Inc.	CH-103	A4000A170424	N/A	76cm unshielded power; 1.7m unshielded serial	18657
Microphone	M/A-COM, Inc	1000005928-0001	N/A	N/A	0.7m coiled unshielded I/O	18646
Speaker	M/A-COM, Inc	LS102824V10R1A	N/A	N/A	1.4m unshielded I/O	18659
Power Supply	Samlex America inc.	SEC 1212	03051-7F03-00873	N/A	1.7m unshielded	18662

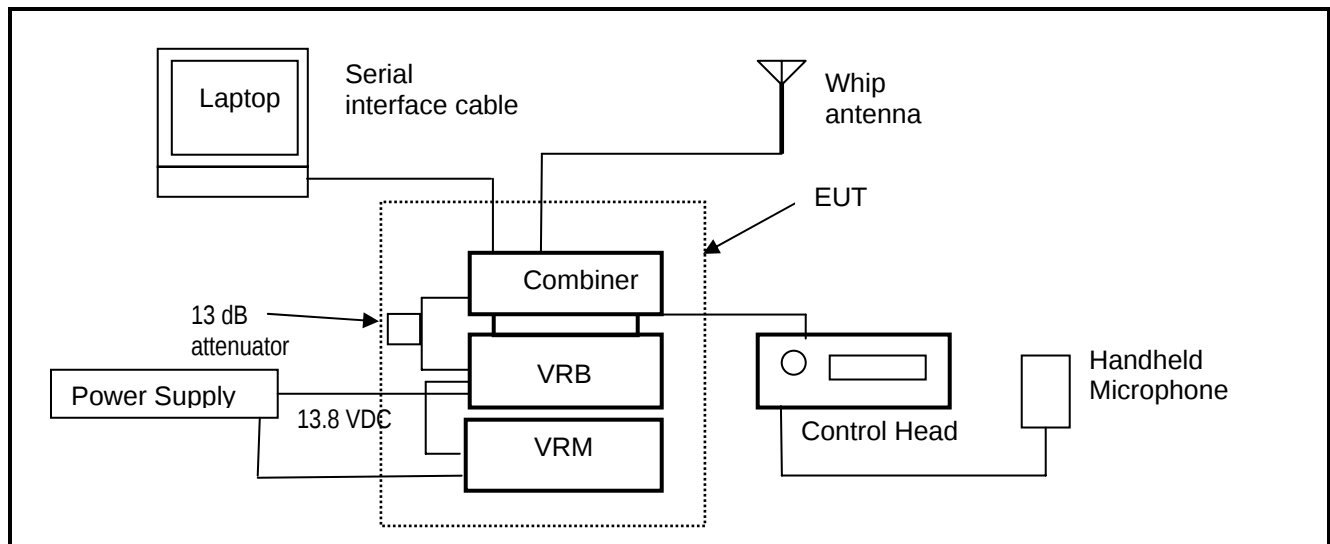


Figure 2-1: Configuration of Tested System

3 FCC Rules and Regulations Part 2 §2.1046(a): RF Power Output: Conducted; Part §90.541(c): Transmitting Power Limits; RSS-119 §5.4

3.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.1

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

3.2 Test Data

Table 3-1: RF Power Output: Carrier Output Power

Frequency (MHz)	High Power (dBm)	High Power (W)
806.0125	41.52	14.19
813.4875	41.30	13.49
816.3625	41.83	15.24
820.9875	41.02	12.65
821.0125	41.00	12.59
822.5125	40.50	11.22
823.9875	40.46	11.12

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

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

Rated Power High Power (W)
15

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

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	10/24/08
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	10/24/08
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	1/13/09

Test Personnel:

Daniel Baltzell		October 24, 2008
Test Engineer	Signature	Date Of Test

4 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals; Part §90.543(b): Out of Band Emissions Limit; RSS-119 §5.8

4.1 Test Procedure

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

The transmitter is terminated with a 50 ohm 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 for OTP and 9,600 bps for P25 and EDACS modes. The following data shows no frequencies found within 20 dB of the limit, all are below 20 dBc.

4.2 Test Data

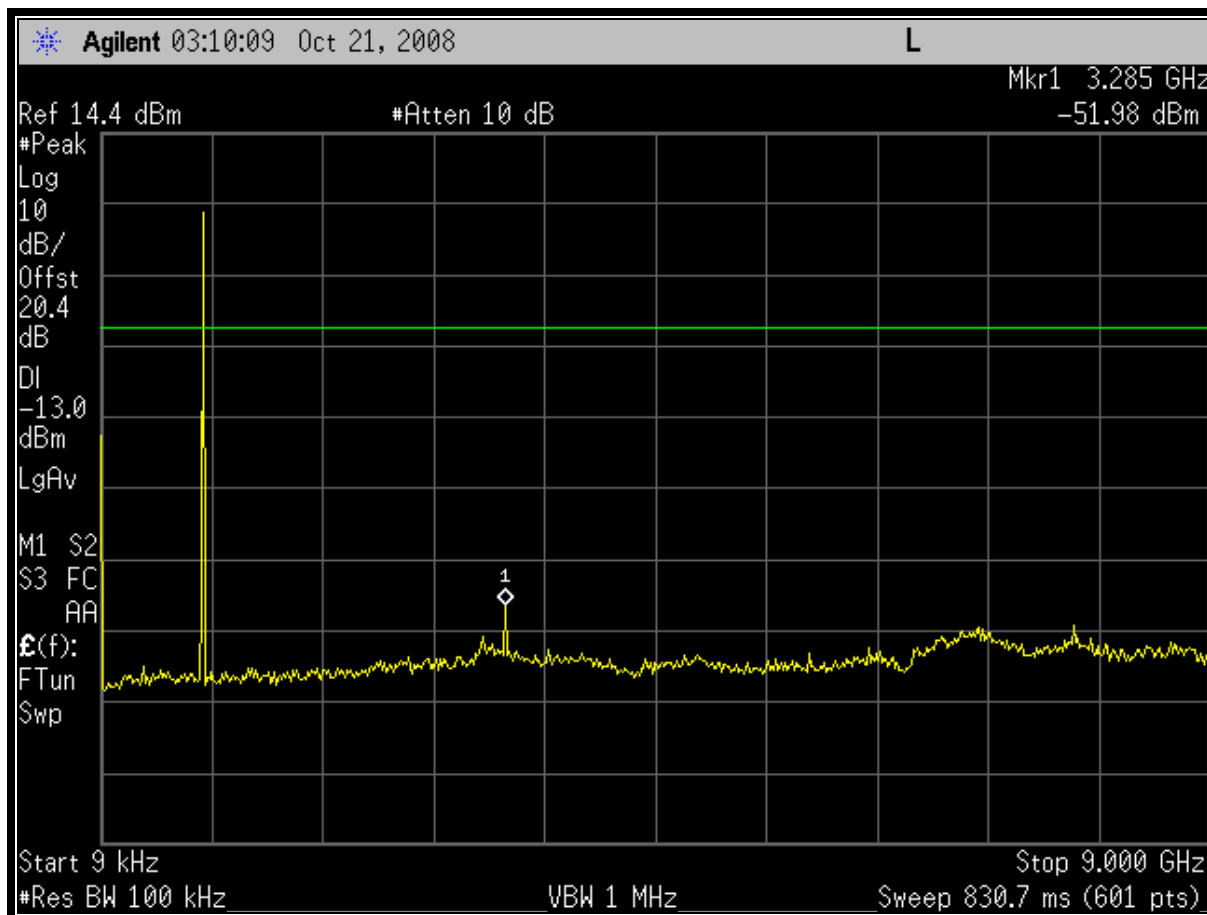


Table 4-1: Test Equipment Used For Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900957	MCE Weinschel	68-20-43	Attenuator 20 dB	LT394	1/13/09
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/09
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	2/1/09

Test Personnel:

Daniel Baltzell		October 21, 2008
Test Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 2 §2.1053(a): Field Strength of Spurious Radiation; Part §90.543(b): Out of Band Emissions Limit; RSS-119 §5.8

5.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 ohm 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.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

The spurious emissions levels were measured, and the device under test was replaced by a substitution antenna connected to a signal generator. The 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.

5.2 Test Data

The worst case emissions test data are shown. All other emissions were attenuated more than 20 dB below the FCC limit and per FCC 2.1057(c), are not reported.

Table 5-1: Field Strength of Spurious Radiation; OTP Wideband; 820.9875 MHz; High Power; Horizontal Polarity

Conducted Power = 41.02 dBm = 12.65 W; Limit = $43 + 10 \log P = 54.02$

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1641.9750	50.1	-18.0	7.7	5.3	61.5	-7.5

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

Table 5-2: Field Strength of Spurious Radiation; OTP Wideband; 820.9875 MHz; High Power; Vertical Polarity

Conducted Power = 41.02 dBm = 12.65 W; Limit = $43 + 10 \log P = 54.02$

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1641.9750	84.4	-15.3	7.7	5.3	58.8	-4.8

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

Table 5-3: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz–2 GHz)	2648	12/20/08
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
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	10/8/09
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/5/09
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/5/09
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	10/5/09
900928	Hewlett Packard	83752A	Synthesized Sweeper, 0.01 to 20 GHz	3610A00866	12/7/08
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole 25-1000 MHz Antennas	00401	2/4/09

Test Personnel:

Daniel Baltzell		October 28, 2008
Test Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1049(c)(1): Occupied Bandwidth; Part §90.543(d): Authorized Bandwidth; RSS-119 §5.8

Occupied Bandwidth - Compliance with the emission masks

6.1 Test Procedure

ANSI/TIA/EIA-603, section 2.2.11 and TIA/EIA-102.CAAA section 2.2.5

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 19,200 bps for OTP mode, and 9600 bps for P25 and EDACS modes.

6.2 Test Data

Plot 6-1: Occupied Bandwidth; 820.9875 MHz; OTP WB; High Power; Mask G

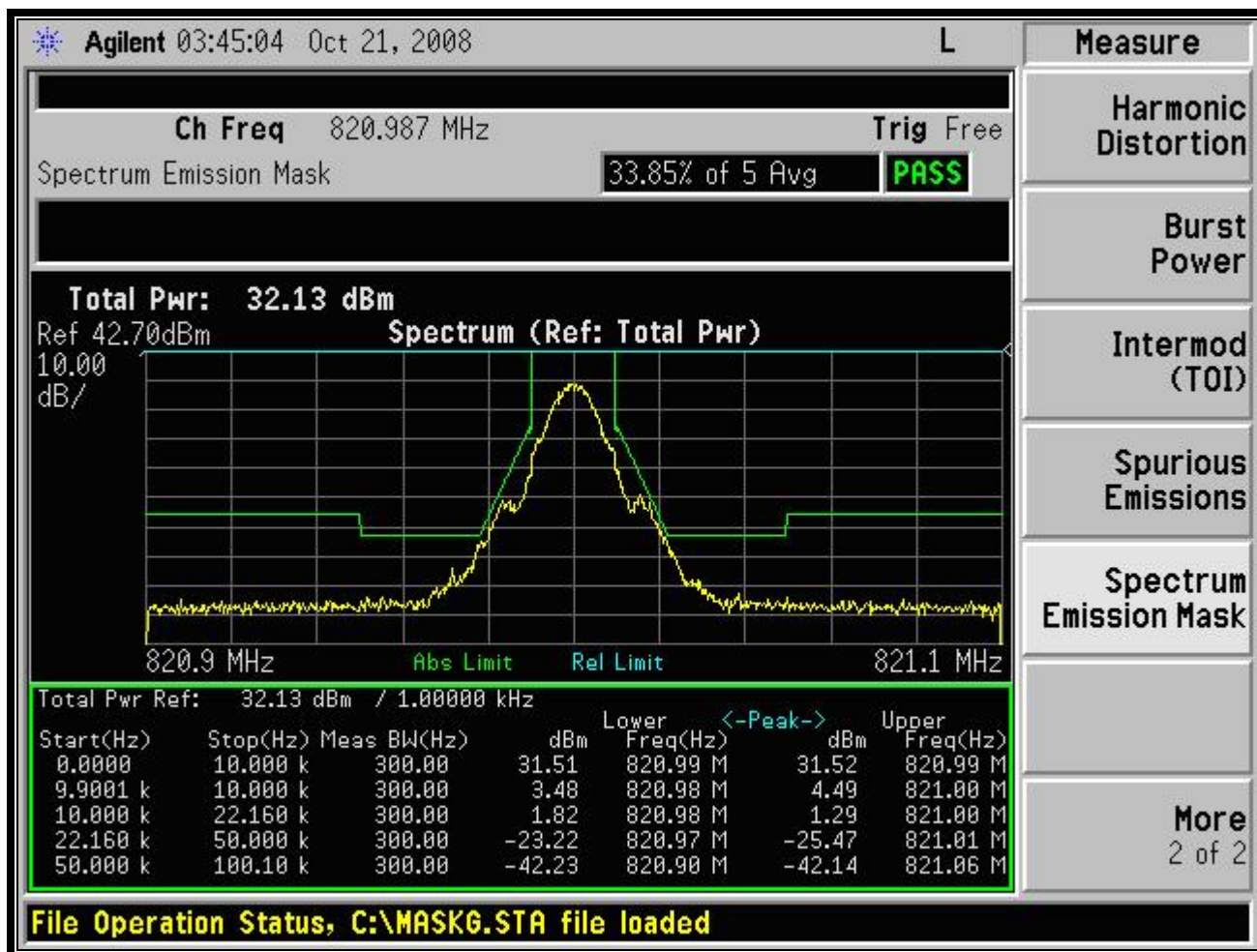


Table 6-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900957	MCE Weinschel	68-20-43	Attenuator 20 dB	LT394	1/13/09

Test Personnel:

Daniel Baltzell		October 21, 2008
Test Engineer	Signature	Date Of Test

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

806-809, 809-821, 821-824 MHz SMR Trunked

Calculation:

Data rate in bps (R) = 19,200

Deviation of carrier (D) = 3900 Hz

Number of state in each symbol (S) = 4

K = 0.415

$B_n = [R/\log_2(4) + 2(D)(K)] = 12.8 \text{ kHz}$

Emission designator: 12K8F9W

8 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc. Model M803VTAC OpenSky Radio; FCC ID: BV8M803VTAC, IC: 3670A-M803**, complies with all the applicable requirements of Parts 90 and 2 of the FCC Rules, and Industry Canada RSS-119, and meets the requirements of a Class II Permissive Change and IC reassessment.