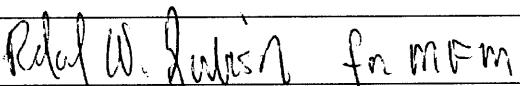


FCC Part 90 Test Report
for
M/A-Com, Inc.
on the
RF Exposure Testing
of the
OpenSky M-803 Mobile Radio System
Model: MAMROS0004

FCC ID: BV8M803M

Test Report #: 3035133
Date of Report: November 21, 2002
Revision 1 Date: May 8, 2003

Project #: 3035133
Dates of Test: November 19-20, 2002

	Nicholas Abbondante, Test Engineer
	Michael F. Murphy, Staff Engineer, EMC

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Revision #	Date	Editor	Explanation
Revision 1	5/8/2003	Nicholas Abbondante	Client requested all references to 0 and 3 dBi gain antennae be changed to 0 and 3 dBd (2 and 5 dBi) gain, to accurately represent the antenna characteristics. This made the Minimum Safe Distance calculations obsolete, and since they were not required initially, they were simply removed.

M/A-Com, Model No. MAMROS0004
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1.0 Summary of Tests

FCC ID: BV8M803M
Model No.: MAMROS0004

FCC RULE	DESCRIPTION OF TEST	RESULTS	REPORT PAGE
2.1091, 2.1093	RF Exposure	Passed	6

Test Engineer:


Nicholas Abbondante Date: 5/8/03

Staff Engineer, EMC:
Chief Engineer,
EMC / Telecom.


Michael F. Murphy Date: 5-8-2003

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2.0 General Description

2.1 Product Description

The OpenSky M-803 Mobile Radio is a versatile voice and data radio designed for the mobile environment. The M-803 Mobile Radio operates in the 800 MHz SMR and NPSPAC frequency bands. A production version of the M-803 Unit was received on November 19, 2002 in good condition. Only the OpenSky digital modulation (OTP/ORP which employs a GFSK modulation) software was provided and tested.

The EUT has been tested at the request of

Company: M/A-Com
1011 Pawtucket Blvd.
Lowell, MA, 01853-2395
Name of contact: Andy Moysenko
Telephone: (978) 442-4762
Fax: (978) 442-5442

Overview of M-803 Mobile Radio Unit

Applicant	M/A-Com
Trade Name	OpenSky M-803 Mobile Radio
FCC Identifier	BV8M803M
Use of Product	Voice and Data Communication
Type of Modulation	GFSK and FM
Bit Rate	19200 bps
Max. Allowed Deviation	10 kHz
RF Output	32 Watts Maximum
The dc voltage applied to and current into the several elements of the final RF amplifying device	Voltage: 12VDC Current: 9A
Frequency Range	806 – 824 MHz and 851 – 869 MHz
Max. Number of Channels	830
Antenna(e) & Gain	0 dBd (2 dBi) and 3 dBd (5 dBi)
Detachable Antenna?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Receiver L.O. Frequency	921 – 939 MHz
External Input	<input checked="" type="checkbox"/> Audio <input checked="" type="checkbox"/> Digital Data

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2.2 Related Submittal(s) Grants

None.

2.3 Test Facility

Site 1C (Top Site) is a 3m and 10m sheltered emissions measurement range located in a light commercial environment in Boxborough, Massachusetts. It meets the technical requirements of ANSI C63.4-1992 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

3.0 RF Exposure

FCC §2.1091, §2.1093

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3.1 Test Procedure

Description	Manufacturer	Model Number	Serial Number	Cal Due Date
Spectrum Analyzer	Agilent	E7405A	US40240205	11/11/03
BNC Cable	ITS	BNC-30	CBLBNC1	4/29/03
Antenna	Compliance Design, Inc.	B300	1651	9/16/03

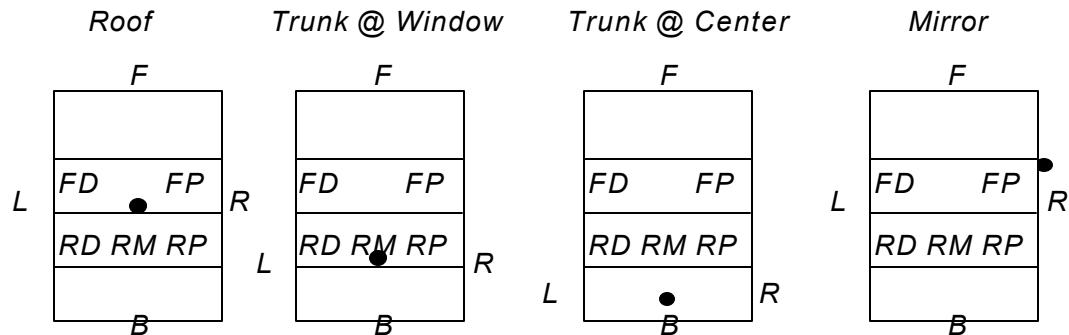
Support Equipment				
Description	Manufacturer	Model Number	Serial Number	
Laptop	Compaq	Armada 7800	7919CB630126	
DC Power Supply	Hewlett Packard	6652A	910510	
Test Vehicle	Jeep	Wrangler Sahara	1J4FA59S7YP760903	
Test Vehicle	Oldsmobile	1994 Cutlass Supreme	1G3WH55M2RD302262	
Fan	Electrix	N619	N/L	
Equipment Under Test				
OpenSky Mobile Radio	M/A-Com, Inc.	M-803	A4006016E4D3	
3 dBd Gain Whip	Antenna Specialists	APR852.3	N/L	
3 dBd Gain Whip	Antenna Specialists	ASPA913	N/L	
3 dBd Gain Puck Antenna	Antenna Plus	AP3000/GPS-B-9	N/L	
0 dBd Gain Transit Antenna	Antenna Specialists	ASP930	N/L	

The EUT was activated at full power, and connected to each of the antennas listed in this report. Each antenna was placed at a typical mounting point. A measurement antenna was connected to a spectrum analyzer, and peak readings of the field strength were taken at various test points outside and inside of the vehicle. Measurement antenna height and polarization were varied at each point to produce the worst-case value. Below are diagrams showing the transmit antenna mounting point and the corresponding test point locations and designations.

The readings at the spectrum analyzer are in dBuV/m. The limits are expressed in mW/cm². An equation that relates these two values is

$$E = 20 \text{ LOG} (1 \times 10^6 (377 * 10 * P)^{1/2})$$

where E is the measured voltage in dBuV/m, and P is the power density in mW/cm². The factor 377 is the impedance of free space, a constant. The obtained power density can then be compared to the limits. The power density limit for uncontrolled exposure is f/1500, where f is the transmit frequency. The worst case limits are at the lowest transmit frequency, and the measured RF output power of the EUT at the antenna port was maximum at the lowest transmit frequency. Therefore the lowest transmit frequency of 806.0125 MHz was selected as the worst case frequency and the limit for Maximum Permissible Exposure (MPE) was determined to be 0.537 mW/cm².



F = Front

L = Left

R = Right

B = Back

FD = Front Driver Side

FP = Front Passenger Side

RD = Rear Driver Side

RM = Rear Middle

RP = Rear Passenger Side

● = Transmit Antenna



Roof Mounting on Test Vehicle, Transit Antenna



Roof Mounting on Test Vehicle, Puck Antenna

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Trunk @ Window Mounting on Test Vehicle



Mirror Mounting on Test Vehicle

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Trunk @ Center Mounting, Puck Antenna



Trunk @ Center Mounting, Transit Antenna

M/A-Com, Model No. MAMROS0004
 FCC ID: BV8M803M

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3.2 Test Results

Antenna Specialists APR852.3 3dBd Gain Window Mount (M/A-Com P/N: MAMROS0089) on Oldsmobile

Test Point	Field Strength Reading (dBuV/m)	Field Strength Reading (mW/cm ²)	MPE Limit (mW/cm ²)	Test Point Distance (cm)
Front	137.50	0.015	0.537	364.0
Back	150.20	0.278	0.537	118.0
Left	145.20	0.088	0.537	136.0
Right	146.00	0.106	0.537	136.0
Front Driver	147.70	0.156	0.537	112.0
Front Passenger	145.90	0.103	0.537	112.0
Rear Driver	149.40	0.231	0.537	53.0
Rear Middle	149.00	0.211	0.537	20.0
Rear Passenger	145.70	0.099	0.537	53.0

Antenna Specialists ASPA913 3dBd Gain Mirror Mount (M/A-Com P/N: MAMROS0073) on Jeep

Test Point	Field Strength Reading (dBuV/m)	Field Strength Reading (mW/cm ²)	MPE Limit (mW/cm ²)	Test Point Distance (cm)
Front	143.80	0.064	0.537	185.0
Back	137.50	0.015	0.537	247.0
Left	143.00	0.053	0.537	191.0
Right	146.10	0.108	0.537	98.0
Front Driver	139.90	0.026	0.537	146.0
Front Passenger	143.60	0.061	0.537	97.0
Rear Driver	140.30	0.028	0.537	200.0
Rear Middle	142.30	0.045	0.537	185.0
Rear Passenger	142.60	0.048	0.537	175.0

Antenna Specialists Transit Antenna ASP930 0dBd Gain Roof Mount (M/A-Com P/N: MAMROS0096) on Oldsmobile

Test Point	Field Strength Reading (dBuV/m)	Field Strength Reading (mW/cm ²)	MPE Limit (mW/cm ²)	Test Point Distance (cm)
Front	139.00	0.021	0.537	294.0
Back	141.40	0.037	0.537	203.0
Left	147.00	0.133	0.537	97.0
Right	146.20	0.111	0.537	110.0
Front Driver	138.40	0.018	0.537	55.0
Front Passenger	139.00	0.021	0.537	54.0
Rear Driver	143.00	0.053	0.537	55.0
Rear Middle	144.00	0.067	0.537	48.0
Rear Passenger	140.90	0.033	0.537	60.0

Antenna Specialists Transit Antenna ASP930 (M/A-Com P/N: MAMROS0096) 0dBd Gain Trunk@Center Mount on Oldsmobile

Test Point	Field Strength Reading (dBuV/m)	Field Strength Reading (mW/cm ²)	MPE Limit (mW/cm ²)	Test Point Distance (cm)
Front	131.90	0.004	0.537	454.0
Back	152.20	0.440	0.537	47.0
Left	142.40	0.046	0.537	100.0
Right	140.60	0.030	0.537	100.0
Front Driver	141.20	0.035	0.537	185.0
Front Passenger	141.30	0.036	0.537	185.0
Rear Driver	144.60	0.076	0.537	105.0
Rear Middle	145.40	0.092	0.537	100.0
Rear Passenger	143.30	0.057	0.537	105.0

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Antenna Plus Puck Antenna AP8000/GPS-B-9 (M/A-Com P/N: MAMROS0097) 3dBd Gain Roof Mount on Oldsmobile

Test Point	Field Strength Reading (dBuV/m)	Field Strength Reading (mW/cm ²)	MPE Limit (mW/cm ²)	Test Point Distance (cm)
Front	137.80	0.016	0.537	294.0
Back	140.20	0.028	0.537	203.0
Left	146.70	0.124	0.537	97.0
Right	144.60	0.076	0.537	110.0
Front Driver	132.10	0.004	0.537	55.0
Front Passenger	133.80	0.006	0.537	54.0
Rear Driver	136.00	0.011	0.537	55.0
Rear Middle	137.90	0.016	0.537	48.0
Rear Passenger	138.20	0.018	0.537	60.0

Antenna Plus Puck Antenna AP8000/GPS-B-9 (M/A-Com P/N: MAMROS0097) 3dBd Gain Trunk@Center Mount on Oldsmobile

Test Point	Field Strength Reading (dBuV/m)	Field Strength Reading (mW/cm ²)	MPE Limit (mW/cm ²)	Test Point Distance (cm)
Front	136.50	0.012	0.537	454.0
Back	149.30	0.226	0.537	47.0
Left	141.00	0.033	0.537	100.0
Right	139.30	0.023	0.537	100.0
Front Driver	142.10	0.043	0.537	185.0
Front Passenger	133.20	0.006	0.537	185.0
Rear Driver	147.90	0.164	0.537	105.0
Rear Middle	149.00	0.211	0.537	100.0
Rear Passenger	148.00	0.167	0.537	105.0

This radio has been tested and complies with the FCC RF exposure limits for Uncontrolled Exposure and Occupational exposure. The difference is in the minimum safe distance that people must be away from the antenna when transmitting RF energy. To assure optimal radio performance and that human exposure to RF electromagnetic energy is within the guidelines, transmit only when people are at least the minimum distance away from a properly installed antenna.

Results: Passed
