



MOTOROLA

COMMERCIAL, GOVERNMENT, AND INDUSTRIAL
SOLUTION SECTOR (CGISS)

ELECTROMAGNETIC EXPOSURE (EME)
TESTING LABORATORY

8000 West Sunrise Blvd.
Fort Lauderdale, Florida

M.P.E. TEST REPORT

VRS750 VHF Vehicular Repeater, FCC ID: AZ492FT3802

Date: October 16, 2001 (Rev. A)

Tested By:

Stephen Whalen
Senior EME Engineer

Tested/Prepared By:

Jim Fortier
Lead EME Engineer

Reviewed/Approved By:

Ken Enger
Senior Resource Manager
Product Safety and EME Director

Environmental Evaluation for General Population/Uncontrolled RF Exposure Limits - Pursuant 47 CFR 2.1091 (b)

REVISION HISTORY

Date	Revision	Comments
10/8/01	O	Original release.
10/16/01	A	Corrected frequency description error in paragraph 1.0

1.0 FCC Limits Per 47 CFR 2.1091 (b) for General Population/Uncontrolled RF Exposure

MPE (Maximum Permissible Exposure) in Uncontrolled Environments. For human exposure in uncontrolled environments to electromagnetic energy at radio frequencies from 136 - 174 MHz, the MPE, in terms of rms electric/magnetic (E/H) field strengths, the equivalent plane wave free-space power density that can be associated with exposure to such fields is 0.2 mW/cm^2 .

1.1 GENERAL INFORMATION

FCC ID: AZ492FT3802

Device category: Mobile radio

RF exposure environment: Uncontrolled

Test method: Power Density Measurement

1.2 ANTENNA DESCRIPTION

Antenna Kit #	Antenna Desc.	Antenna Gain	Antenna Length (cm)
RAD4010	Trunk Mt. (136-174)	3 dB	120.5
HAD4006	Roof/Trunk Mt. (136-144)	0 dB	51
HAD4007	Roof/Trunk Mt. (144-152)	0 dB	48.1
HAD4008	Roof/Trunk Mt. (150-162)	0 dB	44.6
HAD4009	Roof/Trunk Mt. (162-174)	0 dB	41.8

2.0 Data Collection Consideration

Power density testing was performed with unit installed in a 1991 Ford Taurus (4-door). Measurement data was taken with vehicle running at idle and vehicle battery measuring 14.0 volts.

3.0 Test Results

Measurements were taken with the antenna located in two areas: the roof center, and center trunk. A summary of results (highest level in each area) is in the following table.

<u>Antenna Location</u>	<u>Antenna</u>	<u>External/Internal</u>	<u>Highest Result</u>
Roof Center	HAD4008	External	0.013 mW/cm ²
Center Trunk	RAD4010	External	0.095 mW/cm ²
Roof Center	HAD4008	Internal	<= 0.047 mW/g (Equivalent SAR)
Center Trunk	HAE4004	Internal	<= 0.047 mW/g (Equivalent SAR)

Although the measured RF power of this radio was 5.37 watts, under any condition of permissible tuning, frequency, voltage, and temperature, the maximum RF power delivered to the antenna connector of this radio can be as high as 5.5 watts. As a result, the calculated power density (mW/cm²) for the maximum power condition using the highest power density in the above table could be 0.097 mW/cm².

4.0 Measurement System Uncertainty Levels

Table 1.4 below lists an estimate of the possible errors that are associated with the measurement system.

<u>Description</u>	<u>Error</u>
NARDA Survey Meter	± 3%
Repeatability Accuracy	± 5%

5.0 Method of Measurement

5.1 EME MEASUREMENTS MADE ON CENTER ROOF MOUNTED ANTENNAS

(for reference, see Antenna Location Layout drawings in Appendix)

5.1.1 EXTERNAL VEHICLE EME MEASUREMENT

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 20 cm from the side of the vehicle, in a vertical line and then average the results. These measurements are taken and recorded at every twenty (20) centimeters over a range starting at twenty (20) centimeters above ground and ending at 2.0 meters; this would be representative of a person standing next to a vehicle during a mobile radio transmission.

5.1.2 INTERNAL VEHICLE EME MEASUREMENT

While rotating survey meter probe through 180 degrees to ensure that the highest level is found, scan the inside of the vehicle, both front and back seating areas, for the highest level in each location. After the highest level is found, scan vertically making two (2) additional measurements within an area approximately 40 cm wide (representing the width of a person) so as to have a total of three (3) measured points as indicated below that will be averaged.

- a) Head area
- b) Chest area
- c) Lower Trunk area

5.2 EME MEASUREMENTS MADE ON TRUNK MOUNTED ANTENNAS

(for reference, see Antenna Location Layout drawings in Appendix)

5.2.1 EXTERNAL VEHICLE EME MEASUREMENT

(Antenna mounted in trunk center)

With the survey meter and probe take ten (10) measurements, at the standard test distance of 30 cm to antenna, from the back of the vehicle in a vertical line and then average the results. These measurements are taken and recorded at every twenty (20) centimeters over a range starting at twenty (20) centimeters above ground and ending at 2.0 meters; this would be representative of a person standing behind a vehicle during a mobile radio transmission.

5.2.2 INTERNAL VEHICLE EME MEASUREMENT

(Antenna mounted in trunk center)

While rotating survey meter probe through 180 degrees to ensure that the highest level is found, scan the inside of the vehicle, both front and back seating areas, for the highest level in each location. After the highest level is found, scan vertically making two (2) additional measurements within an area approximately 40 cm wide (representing the width of a person) so as to have a total of three (3) measured points as indicated below that will be averaged.

- a) Head area
- b) Chest area
- c) Lower Trunk area

6.0 Test Site

The test site is the Motorola Commercial, Government, Industrial Solution Sector (CGISS) world wide electromagnetic exposure (EME) open area test site located at 8000 W. Sunrise Blvd., Plantation, Fl. 33322.

7.0 Measurement System/Equipment

The minimum equipment required will mainly consist of a test vehicle, radio frequency radiation test set consisting of a Electromagnetic Radiation Survey Meter, E-Field Test Probe, and typical antenna configurations.

Below is the specific equipment currently in use by CGISS:

- a) Automobile: 1991 Ford Taurus, 4-Door
- b) Survey Meter - NARDA Model 8718
- c) E-Field (Electric Field) Probe - NARDA Model 8722B (300 kHz - 40 Ghz)
- d) H-Field (Magnetic Field) Probe – NARDA Model 8731 (10 MHz – 300 MHz)
- e) H-Field (Magnetic Field) Probe – NARDA Model 8732 (300 kHz – 200 MHz)
- f) Antennas - (Quarter wave and 3 dB Gain)

8.0 Test Unit Description

Power density measurements were performed on a VRS750 vehicular repeater; model number P2080A and serial number 287ABL0009. The frequency band of the mobile was 136-174 MHz; the test frequency was 155.875 MHz. The mobile antennas used were a ¼ wave 0dB gain and a 3 dB gain.

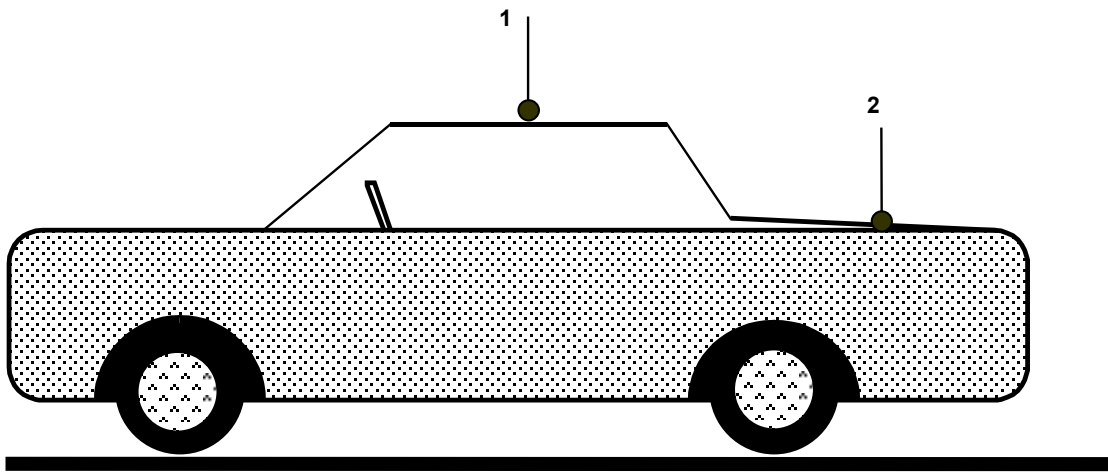
9.0 Test Set-Up Description

Following are the standard mobile antenna test configurations used for this product. (for reference, see Antenna Location Layout drawings in Appendix)

- a) $\frac{1}{4}$ wave antenna, HAD4008, mounted in the center of the roof.
- b) $\frac{1}{4}$ wave antenna, HAD4008, mounted in the center of the trunk.
- c) 3 dB gain antenna, RAD4010, mounted in the center of the trunk.

APPENDIX

ANTENNA LOCATION DRAWING



- 1 - Roof (center)
- 2 - Trunk (center)

