



**MOTOROLA**



**CGISS EME Test Laboratory**  
8000 West Sunrise Blvd  
Fort Lauderdale, FL. 33322

## **EME Compliance Test Report**

**Attention:** Federal Communication Commission  
**Date of Report:** September 30, 2002  
**Report Revision(s):** Rev. O  
**Device Manufacturer:** Motorola  
**Device Description:** Mobile VHF analog radio 1-25 Watts; 4/8 Ch.  
Mini UHF  
**Classification:** Occupational/Controlled Exposure  
**FCC ID:** AZ492FT3805  
**Device Model:** FUD1182A

**Test Period:** 9/6/02

**Test Engineer:** Jim Fortier  
Sr. Staff Engineer

**Author:** Michael Sailsman  
EME Regulatory Affairs Liaison

**Note: Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with all applicable national and international reference standards and guidelines.**

/s/ Ken Enger

Senior Resource Manager, Laboratory Director, CGISS EME Lab  
Phone: 954-723-6299 Fax: 954-723-3803

10/10/02

Date Approved

**Note: This report shall not be reproduced in part without written approval from an authorized representative of the Motorola CGISS EME Laboratory.**

## **TABLE OF CONTENTS**

|             |                                                       |
|-------------|-------------------------------------------------------|
| 1.0         | Product Description                                   |
| 2.0         | Offered Options and Accessories                       |
| 3.0         | Measurement Standards                                 |
| 4.0         | Data Collection Consideration                         |
| 5.0         | Measurement System Uncertainty Levels                 |
| 6.0         | Method of Measurement                                 |
| 6.1         | EME measurements made on trunk mounted antennas       |
| 6.1.1       | External vehicle EME measurement                      |
| 6.1.2       | Internal vehicle EME measurement                      |
| 6.2         | EME Measurements made on center roof mounted antennas |
| 6.2.1       | External vehicle EME measurements                     |
| 6.2.2       | Internal vehicle EME measurement                      |
| 7.0         | Test Site                                             |
| 8.0         | Measurement System/Equipment                          |
| 9.0         | Test Unit Description                                 |
| 10.0        | Test Set-Up Description                               |
| 11.0        | Test Results                                          |
| 12.0        | Conclusion                                            |
| Appendix A. | Antenna Location Drawing                              |

### REVISION HISTORY

| Date    | Revision | Comments                          |
|---------|----------|-----------------------------------|
| 9/30/02 | O        | Initial release Prototype results |

## 1.0 Product Description



FCC ID: AZ492FT3805, model FUD1182A is a mobile transceiver that utilizes frequency modulation (FM) half duplex transmission technology. The intended use of the radio is Push-To-Talk (PTT) while the device is properly installed in a vehicle with an external antenna mounted at the center of the roof or trunk.

This device is marketed to Commercial, Government, and Industrial Users and therefore is classified as Occupational/Controlled Exposure. The intended users of this device are informed and aware professionals operating this device in accordance with the User Manual instructions including maintaining a maximum operational transmit duty cycle of 50%. In accordance with FCC requirements, the passengers inside the vehicle and the bystanders external to the vehicle are evaluated to the General Population/Uncontrolled Exposure Limits. The transmit frequency band is 146-174 MHz. The rated power of the device is 1 to 25 watts with a maximum conducted power output of 28 watts.

## 2.0 Offered Options and Accessories

### Antenna

|           |                                    |
|-----------|------------------------------------|
| HAD4007A  | 144-150.8 MHz ¼ wave 0dBi; 48.1cm  |
| HAD4008A  | 150.8 -162 MHz ¼ wave 0dBi; 44.6cm |
| HAD4009A  | 162-174 MHz ¼ wave 0dBi; 41.8cm    |
| HAD4014AR | 140-174 MHz 3dBi gain ; 1.2m       |

## 3.0 Measurement Standards

Measurements were performed according to FCC Limits Per 47 CFR 2.1091 (b) for General Population/Uncontrolled RF Exposure.

For frequencies ranging from 146-174 MHz the MPE (Maximum Permissible Exposure) limit to electromagnetic energy in equivalent plane wave free-space power density is 0.20 mW/cm<sup>2</sup>.

## 4.0 Data Collection Consideration

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

## 5.0 Measurement System Uncertainty Levels

The information below presents an estimate of the possible errors that are associated with the measurement system.

| <u>Description</u>     | <u>Error</u> |
|------------------------|--------------|
| NARDA Survey Meter     | $\pm 3\%$    |
| Repeatability Accuracy | $\pm 7\%$    |

## 6.0 Method of Measurement

### 6.1 EME measurements made on trunk mounted antennas (for reference, see Antenna Location Layout drawings in Appendix)

#### 6.1.1 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 60 cm to the 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.

#### 6.1.2 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

### 6.2 EME measurements made on center roof mounted antennas (for reference, see Antenna Location Layout drawings in Appendix)

#### 6.2.1 External vehicle EME measurement

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 60 cm from the vehicle-mounted antenna, 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.

**Note: Actual test distance was 110cm; this is the closest distance that can be achieved to an antenna mounted to the center of the vehicle used for MPE compliance assessment.**

### **6.2.2 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

## **7.0 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.

## **8.0 Measurement System/Equipment**

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

Below are the test equipment used to assess compliance:

- a) Automobile: 1991 Ford Taurus, 4-Door
- b) E-Field Survey Meter - NARDA Model 8718; Calibration date: 4/23/02
- c) E-Field (Electric Field) Probe - NARDA Model 8722B (300 kHz - 40 Ghz);  
Calibration date: 3/28/02
- d) H-Field Survey Meter – NARDA Model 8718; Calibration date: 4/23/02
- e) H-Field (Magnetic field) Probe – NARDA Model 8732; Calibration date: 4/1/02
- f) Antennas - (1/4 wave 0dBi and 3dBi gain)

## 9.0 Test Unit Description

Power density measurements were performed on a 1-25 watt mobile radio; model number FUD1182A serial number 17. The frequency band of the mobile was 146-174 MHz; the test frequencies were 146.625, 161.425, and 173.9925 MHz. The ¼ wave 0dBi and 3dBi gain mobile antennas listed in section 2.0 were used to assess MPE compliance.

## 10.0 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) ¼ wave antenna model HAD4007A, HAD4008A, HAD4009AR mounted on the center of the trunk.
- b) 3 dBi gain antenna model HAD4014AR antenna mounted on the center of the trunk.
- c) ¼ wave antenna, model HAD4007A mounted on the center of the roof. This antenna was selected because it exhibited the highest MPE results during the 60 cm trunk testing.

## 11.0 Test Results

Measurements were taken with the antenna located in two areas: the roof center, and trunk center. Below is the raw MPE data for all measured grid points. Results are based on a 50% duty cycle with the radio operating in accordance with the User Manual instructions.

**Raw MPE Data; Test Frequencies and Po = 146.625 (Po =24.0W), 161.425 (Po =25.8W), 173.9925 MHz (Po =28.0W)**

**Meter reads in % of controlled limit; controlled limit = 1.0 for 30-300MHz**

**(Cal factors presented herein are automatically accounted for in the meter used for assessments)**

**Vehicle spec. limits = 0.20 mW/cm<sup>2</sup>**

**External Vehicle Power Density (Pwr. Den. (cal.)) = average over body/2**

**Internal Vehicle Power Density (Pwr. Den. (cal.)) = average over (head/chest/leg)/2**

**Note: The average over the body test methodology is consistent with IEEE/ANSI C95.1-1999 guidelines**

| External Vehicle MPE Assessment @ 146.625 MHz |               |                     |               |                    |                                         |                                    |
|-----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                              | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Trunk                                         | HAD4007A/0dB  | 60                  | E             | 0.89               | 0.31                                    | 0.155                              |
| Measurement grid                              |               |                     |               |                    |                                         |                                    |
| Test position                                 | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                             | 20            | 9                   | 6             | 120                | 59                                      |                                    |
| 2                                             | 40            | 14                  | 7             | 140                | 56                                      |                                    |
| 3                                             | 60            | 20                  | 8             | 160                | 41                                      |                                    |
| 4                                             | 80            | 29                  | 9             | 180                | 25                                      |                                    |
| 5                                             | 100           | 42                  | 10            | 200                | 15                                      |                                    |

| External Vehicle MPE Assessment @146.625 MHz |               |                     |               |                    |                             |                        |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------|------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm^2) | Pwr. Density (mW/cm^2) |
| Trunk                                        | HAD4007A/0dB  | 60                  | H             | 0.88               | 0.154                       | 0.077                  |
| Measurement grid                             |               |                     |               |                    |                             |                        |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit          |                        |
| 1                                            | 20            | 9                   | 6             | 120                | 31                          |                        |
| 2                                            | 40            | 7                   | 7             | 140                | 18                          |                        |
| 3                                            | 60            | 11                  | 8             | 160                | 8                           |                        |
| 4                                            | 80            | 26                  | 9             | 180                | 3.50                        |                        |
| 5                                            | 100           | 38                  | 10            | 200                | 2.50                        |                        |

| External Vehicle MPE Assessment @161.425 MHz |               |                     |               |                    |                             |                        |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------|------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm^2) | Pwr. Density (mW/cm^2) |
| Trunk                                        | HAD4008A/0dB  | 60                  | E             | 0.92               | 0.256                       | 0.128                  |
| Measurement grid                             |               |                     |               |                    |                             |                        |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit          |                        |
| 1                                            | 20            | 5                   | 6             | 120                | 59                          |                        |
| 2                                            | 40            | 8                   | 7             | 140                | 45                          |                        |
| 3                                            | 60            | 10                  | 8             | 160                | 28                          |                        |
| 4                                            | 80            | 21                  | 9             | 180                | 17                          |                        |
| 5                                            | 100           | 54                  | 10            | 200                | 8.5                         |                        |

| External Vehicle MPE Assessment @161.425 MHz |               |                     |               |                    |                             |                        |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------|------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm^2) | Pwr. Density (mW/cm^2) |
| Trunk                                        | HAD4008A/0dB  | 60                  | H             | 0.94               | 0.156                       | 0.078                  |
| Measurement grid                             |               |                     |               |                    |                             |                        |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit          |                        |
| 1                                            | 20            | 8                   | 6             | 120                | 26                          |                        |
| 2                                            | 40            | 7                   | 7             | 140                | 16                          |                        |
| 3                                            | 60            | 15                  | 8             | 160                | 10                          |                        |
| 4                                            | 80            | 32                  | 9             | 180                | 5                           |                        |
| 5                                            | 100           | 32                  | 10            | 200                | 4                           |                        |

| External Vehicle MPE Assessment @173.9925 MHz |               |                     |               |                    |                                         |                                    |
|-----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                              | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Trunk                                         | HAD4009AR/0dB | 60                  | E             | 0.95               | 0.24                                    | 0.12                               |
| Measurement grid                              |               |                     |               |                    |                                         |                                    |
| Test position                                 | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                             | 20            | 1.50                | 6             | 120                | 55                                      |                                    |
| 2                                             | 40            | 4                   | 7             | 140                | 45                                      |                                    |
| 3                                             | 60            | 5                   | 8             | 160                | 26                                      |                                    |
| 4                                             | 80            | 26                  | 9             | 180                | 13                                      |                                    |
| 5                                             | 100           | 56                  | 10            | 200                | 8                                       |                                    |

| External Vehicle MPE Assessment @173.9925 MHz |               |                     |               |                    |                                         |                                    |
|-----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                              | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Trunk                                         | HAD4009AR/0dB | 60                  | H             | 0.98               | 0.13                                    | 0.066                              |
| Measurement grid                              |               |                     |               |                    |                                         |                                    |
| Test position                                 | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                             | 20            | 2.50                | 6             | 120                | 33                                      |                                    |
| 2                                             | 40            | 2.50                | 7             | 140                | 23                                      |                                    |
| 3                                             | 60            | 6                   | 8             | 160                | 13                                      |                                    |
| 4                                             | 80            | 15                  | 9             | 180                | 5                                       |                                    |
| 5                                             | 100           | 28                  | 10            | 200                | 3                                       |                                    |

| External Vehicle MPE Assessment @161.425 MHz |               |                     |               |                    |                                         |                                    |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Trunk                                        | HAD4014AR/3dB | 60                  | E             | 0.92               | 0.24                                    | 0.12                               |
| Measurement grid                             |               |                     |               |                    |                                         |                                    |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                            | 20            | 0.50                | 6             | 120                | 36                                      |                                    |
| 2                                            | 40            | 1.50                | 7             | 140                | 47                                      |                                    |
| 3                                            | 60            | 5                   | 8             | 160                | 49                                      |                                    |
| 4                                            | 80            | 12                  | 9             | 180                | 39                                      |                                    |
| 5                                            | 100           | 20                  | 10            | 200                | 32                                      |                                    |

| External Vehicle MPE Assessment @161.425 MHz |               |                     |               |                    |                                         |                                    |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Trunk                                        | HAD4014AR/3dB | 60                  | H             | 0.94               | 0.199                                   | 0.099                              |
| Measurement grid                             |               |                     |               |                    |                                         |                                    |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                            | 20            | 1                   | 6             | 120                | 4.3                                     |                                    |
| 2                                            | 40            | 1.30                | 7             | 140                | 23                                      |                                    |
| 3                                            | 60            | 3                   | 8             | 160                | 50                                      |                                    |
| 4                                            | 80            | 6                   | 9             | 180                | 60                                      |                                    |
| 5                                            | 100           | 2                   | 10            | 200                | 48                                      |                                    |

| External Vehicle MPE Assessment @146.625 MHz |               |                     |               |                    |                                         |                                    |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Roof                                         | HAD4007A/0dB  | 110                 | E             | 0.89               | 0.068                                   | 0.034                              |
| Measurement grid                             |               |                     |               |                    |                                         |                                    |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                            | 20            | 2                   | 6             | 120                | 7                                       |                                    |
| 2                                            | 40            | 5.80                | 7             | 140                | 11                                      |                                    |
| 3                                            | 60            | 3                   | 8             | 160                | 13                                      |                                    |
| 4                                            | 80            | 1.50                | 9             | 180                | 11                                      |                                    |
| 5                                            | 100           | 3                   | 10            | 200                | 10                                      |                                    |

| External Vehicle MPE Assessment @146.625 MHz |               |                     |               |                    |                                         |                                    |
|----------------------------------------------|---------------|---------------------|---------------|--------------------|-----------------------------------------|------------------------------------|
| Antenna Location                             | Antenna /gain | Meas. Distance (cm) | E/H Field     | Calibration Factor | Average over Body (mW/cm <sup>2</sup> ) | Pwr. Density (mW/cm <sup>2</sup> ) |
| Roof                                         | HAD4007A/0dB  | 110                 | H             | 0.88               | 0.056                                   | 0.028                              |
| Measurement grid                             |               |                     |               |                    |                                         |                                    |
| Test position                                | Height (cm)   | % of control limit  | Test position | Height (cm)        | % of control limit                      |                                    |
| 1                                            | 20            | 1                   | 6             | 120                | 4.30                                    |                                    |
| 2                                            | 40            | 1                   | 7             | 140                | 6.50                                    |                                    |
| 3                                            | 60            | 2                   | 8             | 160                | 10.50                                   |                                    |
| 4                                            | 80            | 4                   | 9             | 180                | 11.50                                   |                                    |
| 5                                            | 100           | 4.3                 | 10            | 200                | 10.50                                   |                                    |

| Internal Vehicle MPE Assessment @146.625 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                        | HAD4007A/0dB            | Highest reading     | E                        | 0.89               | 0.53/0.04                                                            | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 125                     |                     | 28                       |                    | 6                                                                    |                                           |
| Front seat                                   | 7                       |                     | 3                        |                    | 2                                                                    |                                           |

| Internal Vehicle MPE Assessment @146.625 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                        | HAD4007A/0dB            | Highest reading     | H                        | 0.88               | 0.21/0.048                                                           | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 37                      |                     | 13                       |                    | 14                                                                   |                                           |
| Front seat                                   | 8                       |                     | 3.50                     |                    | 3                                                                    |                                           |

| Internal Vehicle MPE Assessment @161.425 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                        | HAD4008A/0dB            | Highest reading     | E                        | 0.92               | 0.397/0.077                                                          | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 90                      |                     | 24                       |                    | 5                                                                    |                                           |
| Front seat                                   | 14                      |                     | 5                        |                    | 4                                                                    |                                           |

| Internal Vehicle MPE Assessment @161.425 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                        | HAD4008A/0dB            | Highest reading     | H                        | 0.94               | 0.197/0.05                                                           | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 36                      |                     | 13                       |                    | 10                                                                   |                                           |
| Front seat                                   | 6                       |                     | 5                        |                    | 4                                                                    |                                           |

| Internal Vehicle MPE Assessment @173.9925 MHz |                         |                     |                          |                    |                                                                      |                                           |
|-----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                              | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                         | HAD4009AR/0dB           | Highest reading     | E                        | 0.95               | 0.40/0.087                                                           | <= 0.25                                   |
| Measurement grid                              |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                 | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                     | 85                      |                     | 30                       |                    | 5                                                                    |                                           |
| Front seat                                    | 17                      |                     | 5                        |                    | 4                                                                    |                                           |

| Internal Vehicle MPE Assessment @173.9925 MHz |                         |                     |                          |                    |                                                                      |                                           |
|-----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                              | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                         | HAD4009AR/0dB           | Highest reading     | H                        | 0.98               | 0.19/0.011                                                           | <= 0.25                                   |
| Measurement grid                              |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                 | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                     | 45                      |                     | 6                        |                    | 7                                                                    |                                           |
| Front seat                                    | 1                       |                     | 0.80                     |                    | 1.50                                                                 |                                           |

| Internal Vehicle MPE Assessment @161.425 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                        | HAD4014AR/3dB           | Highest reading     | E                        | 0.92               | 0.07/0.042                                                           | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 14                      |                     | 4                        |                    | 3                                                                    |                                           |
| Front seat                                   | 7.50                    |                     | 2                        |                    | 3                                                                    |                                           |

| Internal Vehicle MPE Assessment @161.425 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Trunk                                        | HAD4014AR/3dB           | Highest reading     | H                        | 0.94               | 0.035/0.017                                                          | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 5                       |                     | 3                        |                    | 2.50                                                                 |                                           |
| Front seat                                   | 2.70                    |                     | 2                        |                    | 0.50                                                                 |                                           |

| Internal Vehicle MPE Assessment @146.625 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Roof                                         | HAD4007A/0dB            | Highest reading     | E                        | 0.89               | 0.197/0.037                                                          | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 48                      |                     | 8                        |                    | 3                                                                    |                                           |
| Front seat                                   | 4                       |                     | 4                        |                    | 3                                                                    |                                           |

| Internal Vehicle MPE Assessment @146.625 MHz |                         |                     |                          |                    |                                                                      |                                           |
|----------------------------------------------|-------------------------|---------------------|--------------------------|--------------------|----------------------------------------------------------------------|-------------------------------------------|
| Antenna Location                             | Antenna /gain           | Meas. Distance (cm) | E/H Field                | Calibration Factor | Average over Head, Chest, Leg Back/Front seats (mW/cm <sup>2</sup> ) | S.A.R. calculated Back/Front seats (mW/g) |
| Roof                                         | HAD4007A/0dB            | Highest reading     | H                        | 0.88               | 0.037/0.015                                                          | <= 0.25                                   |
| Measurement grid                             |                         |                     |                          |                    |                                                                      |                                           |
| Test position                                | % of control limit Head |                     | % of control limit Chest |                    | % of control limit Leg                                               |                                           |
| Back seat                                    | 7.70                    |                     | 2                        |                    | 1.50                                                                 |                                           |
| Front seat                                   | 2.30                    |                     | 1.30                     |                    | 1                                                                    |                                           |

## 12.0 Conclusion

Although the rated power of this product is 25 watts, the actual measured RF power ranged from 24.0 – 28.0 watts depending upon the tested frequency. As a result, the highest power density results of 0.155 mW/cm<sup>2</sup> presented above will be 0.180 mW/cm<sup>2</sup> when the measured power of 24 watts at 146.625 MHz is scaled to the maximum reported power of 28 watts. The maximum RF power delivered to the antenna connector of this radio will not exceed 28 watts. The maximum RF power is equal to the upper limit of the final test factory transmit power specification.

Note: EQUIVALENT SAR FOR FREQUENCIES OF 100-300 MHz

The final SAR (Specific Absorption Rate) values are evaluated through the following calculation based on measurements completed by MFRL (Motorola Florida Research Lab) on both VHF and UHF high power mobile radios feeding a quarter-wave length monopole antenna, trunk mounted, on a phantom located on the back seat of test vehicle: Reference: “Field Strengths and Specific Absorption Rates in Automotive Environments”, by D. McCoy, D. Zakharia, and Q. Balzano, IEEE Trans. Vehicular Tech. Vol. 48 (4): pp. 1287-1303, July, 1999

### PTT (PUSH-TO-TALK) OPERATION

$$\text{SAR (mW/g)} = ((\text{measured RF power out}/130) * 2.292) / 2 \text{ [50\% duty cycle]}$$

Formula definitions:

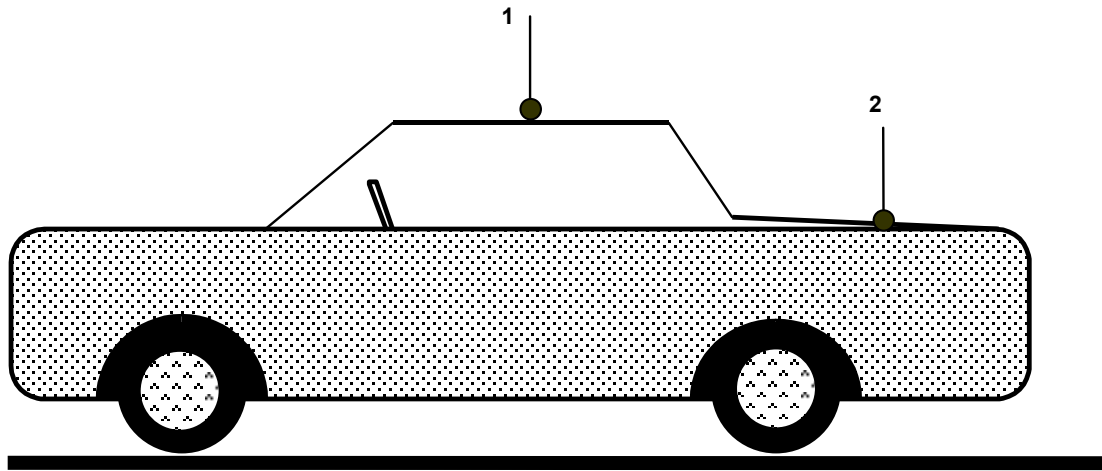
“130” = RF mobile power (W) feeding a quarter-wave length antenna in original research document.

“2.292” = the SAR resulting from that 130 Watt mobile feeding a quarter-wave length antenna in original research document.

**The measurement results clearly demonstrate compliance with the FCC Limits Per 47 CFR 2.1091 (b) for General Population/Uncontrolled RF Exposure.**

## APPENDIX

### ANTENNA LOCATION DRAWING



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

