Certificate Number: 1449-02

MOTOROLA

ACCREDITED

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

MPE Compliance Test Report

Date of Report:	September 2,2003
Report Revision(s):	Rev. O
Manufacturer:	Motorola
Product Description:	10-40W Mobile Transceiver 380-470MHz
Classification:	Occupational/Controlled Exposure
FCC ID:	AZ492FT4862
Device Model:	M20QSS9PW1AN

Test Period:	8/1/03 & 8/20/03-8/22/03
EME Engineer:	Stephen C. Whalen (Sr. EME Engineer)
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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.

Signature on File — 9/02/03

Ken Enger
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Date Approved

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REVISION HISTORY

Date	Revision	Comments
09/02/03	O	Initial release Prototype results

1.0 Product Description

FCC ID AZ492FT4862, model M20QSS9PW1AN is a mobile transceiver that utilizes continuous carrier frequency modulation (FM). The modulation could be conventional analog voice, trunked analog voice or C4FM digital modulation. Control channel data rates are 3600 and 9600 baud on the C4FM constant envelope carrier. 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 will be marketed to and used by employees solely for work-related operations, such as public safety agencies, e.g. police, fire and emergency medical. User training is the responsibility of these agencies, who can be expected to employ the usage instructions, safety information and operational cautions set forth in the user's manual, instructional sessions or other means. Motorola also makes available to its customers training classes on the proper use of two-way radios and wireless data devices. This device is classified as Occupational/Controlled Exposure. However, 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 380-470MHz. The rated power of the device is 10-40 watts with a maximum conducted power output of 48 watts.

2.0 Offered Options and Accessories (see Appendix B for photos of antennas)

Antenna	Description
HAE6012A	380-433MHz, ¼ Wave, 16cm, 2.15 dBi
HAE4003A	450-470MHz, ¼ Wave, 14cm, 2.15 dBi
HAE6010A	380-433MHz, ½ Wave, 62cm, 5.65 dBi
HAE6013A	380-470MHz, ½ Wave, 15.5cm, 4.15 dBi
HAE4011A	450-470MHz, ½ Wave, 71.8cm, 5.65 dBi
HAE6011A	380-433MHz, 5/8 Wave, 97cm, 7.15 dBi
RAE4014A	450-470MHz, 5/8 Wave, 92cm, 7.15 dBi

Note: All ¼ wave antennas listed above are restricted to mounting on the roof only.

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 380-470 MHz the MPE (Maximum Permissible

Exposure) limit to electromagnetic energy in equivalent plane wave free-space power density is 0.25-0.31 mW/cm^2.

4.0 Data Collection Consideration

Power density testing was performed with DUT (Device Under Test) 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.

Description	Error
NARDA Survey Meter	**± 3%**
Repeatability Accuracy	**± 7%**

6.0 Method of Measurement

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

6.1.1 External vehicle EME measurement
(Antenna mounted at trunk center)

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 90 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.
Note: The distance from the trunk mounted antenna to the edge of the vehicle is 26cm and the distance from the edge of the vehicle's trunk to the MPE vertical line assessment is 64cm.
The actual distances for measurements at 90° and 45° angles from the side and corner of the trunk were 104cm and 99.5cm respectively.

6.1.2 Internal vehicle EME measurement
(Antenna mounted at 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 A)

6.2.1 External vehicle EME measurement

(Antenna mounted at roof center)

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 90 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 (60cm from antenna to roof edge; 30cm from roof edge to edge of car door; 20cm vertical test line to car door); 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

(Antenna mounted at roof 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

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 and typical antenna configurations.
Below are the test equipment used to assess compliance:

a) Automobile: 1991 Ford Taurus, 4-Door

b) Survey Meter – NARDA Model 8718 (S/N 01108); Calibration date: 04/14/03

c) E-Field (Electric Field) Probe – NARDA Model 8722B (SN13001) (300 kHz – 40 Ghz); Calibration date: 05/06/03

9.0 Test Unit Description

Power density measurements were performed on a 10-40 watt mobile radio; model number M20QSS9PW1AN serial number X17890085. The frequency band of the mobile was 380-470 MHz; the test frequencies were 380.0125, 406.0125, 425.0125, 460.0125 and 469.9875MHz. The HAE6012A, HAE4003A, HAE4011A, RAE4014A, HAE6011A, HAE6010A, HAE6013A 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)

a) ½ and 5/8 wave antenna models HAE4011A, RAE4014A, HAE6011A, HAE6010A, and HAE6013A were mounted on the center of the trunk and roof.
b) ¼ wave antenna models HAE6012A, HAE4003A were mounted on the roof only.

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. The bolded power density result represents the highest MPE results observed.

Raw MPE Data; Test Frequencies and measured Po:
380.0125 MHz (Po=47.3W), 406.0125 MHz (Po=47.0W), 425.0125 MHz (Po=47.1W), 460.0125 MHz (Po=47.2W) and 469.9875 MHz (Po= 47.5W).
Meter reads in % of controlled limit; controlled limit = 1.27-1.57mW/cm^2 for 380-470 MHz
(Cal factors presented herein are automatically accounted for in the meter used for assessments)
General Population MPE limits = 0.25 – 0.31mW/cm^2
External Vehicle Power Density (Pwr. Den. (cal.)) = average over body/2
Max cal External Vehicle Power Density (Pwr. Den. (cal.)) = (Pmax/Pintial)*average over body/2
Internal Vehicle Power Density (Pwr. Den. (cal.)) = average over (head/chest/lower trunk)/2
Max cal Internal Vehicle Power Density (Pwr. Den. (cal.)) = (Pmax/Pintial)*average over (head/chest/lower trunk)/2

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

Table 1

External Vehicle MPE Assessment @ 460.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE4011 A	5.65	90	E	0.94	0.189	47.2	0.09	0.10
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**		**Test Position**	**Height (cm)**	**% of Control Limit**			
1	20	1.0		6	120	32.4			
2	40	0.9		7	140	29.9			
3	60	4.5		8	160	11.8			
4	80	8.7		9	180	7.6			
5	100	18.7		10	200	7.8			

Table 2

Internal Vehicle MPE Assessment @ 460.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	HAE4011 A	5.65	Highest Reading	E	0.94	0.258	0.136	47.2	0.13	0.13
Measured grid										
Test Position		**% of control limit Head**		**% of control limit Chest**		**% of control limit Lower Trunk**				
Back Seat		24.4		16.7		9.3				
Front Seat		8.3		8.0		10.4				

Table 3

External Vehicle MPE Assessment @ 460.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	RAE4014A	7.15	90	E	0.94	0.109	47.2	0.05	0.06

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	0.0	6	120	7.9
2	40	0.0	7	140	17.8
3	60	0.3	8	160	22.5
4	80	0.9	9	180	14.7
5	100	1.5	10	200	5.4

Table 4

Internal Vehicle MPE Assessment @ 460.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	RAE4014A	7.15	Highest Reading	E	0.94	0.022	0.014	47.2	0.01	0.01

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	2.9	0.8	0.7
Front Seat	0.7	1.2	0.9

Table 5

External Vehicle MPE Assessment @ 406.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6011 A	7.15	90	E	0.97	0.223	47.0	0.11	0.11

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	2.2	6	120	35.6
2	40	2.8	7	140	42.7
3	60	4.7	8	160	26.5
4	80	9.9	9	180	11.9
5	100	20.1	10	200	8.5

Table 6

Internal Vehicle MPE Assessment @ 406.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	HAE6011 A	7.15	Highest Reading	E	0.97	0.217	0.069	47.0	0.11	0.11

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	26.1	7.9	14.2
Front Seat	8.4	3.5	3.3

Table 7

External Vehicle MPE Assessment @ 425.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6013 A	4.15	90	E	0.96	0.227	47.1	0.11	0.12

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	4.2	6	120	29.8
2	40	5.8	7	140	23.4
3	60	14.7	8	160	14.6
4	80	21.3	9	180	10.7
5	100	27.5	10	200	7.9

Table 8

Internal Vehicle MPE Assessment @ 425.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	HAE6013 A	4.15	Highest Readin g	E	0.96	0.495	0.268	47.1	0.25	0.25

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	57.0	33.1	14.8
Front Seat	33.4	5.9	17.4

Table 9

External Vehicle MPE Assessment @ 380.025MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6013 A	4.15	90	E	0.98	0.297	47.3	0.15	0.15

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	8.2	6	120	35.6
2	40	7.8	7	140	31.3
3	60	13.8	8	160	30.5
4	80	19.5	9	180	29.3
5	100	28.6	10	200	29.9

Table 10

Internal Vehicle MPE Assessment @ 380.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	HAE6013 A	4.15	Highest Readin g	E	0.98	0.263	0.102	47.3	0.13	0.13

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	33.4	8.9	20.1
Front Seat	15.7	5.1	3.4

Table 11

External Vehicle MPE Assessment @ 469.9875MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6013 A	4.15	90	E	0.94	0.238	47.5	0.12	0.12

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	2.5	6	120	32.4
2	40	4.4	7	140	25.8
3	60	12.4	8	160	15.9
4	80	17.7	9	180	6.4
5	100	28.7	10	200	5.8

Table 12

Internal Vehicle MPE Assessment @ 469.9875MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	HAE6013 A	4.15	Highest Readin g	E	0.94	0.581	0.312	47.5	0.29	**0.29**

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	51.6	42.3	17.4
Front Seat	23.1	17.5	19.2

Table 13

External Vehicle MPE Assessment @ 406.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6010 A	5.65	90	E	0.97	0.232	47.0	0.12	0.12

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	9.6	6	120	6.2
2	40	10.2	7	140	6.0
3	60	15.7	8	160	19.8
4	80	18.3	9	180	34.7
5	100	14.7	10	200	36.1

Table 14

Internal Vehicle MPE Assessment @ 406.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Trunk (cnt)	HAE6010 A	5.65	Highest Reading	E	0.97	0.444	0.166	47.0	0.22	0.23

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	42.1	25.3	31.1
Front Seat	22.3	5.4	9.1

Table 15

External Vehicle MPE Assessment @ 406.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE6012 A	2.15	60 (110 Actual)	E	0.97	0.175	47.0	0.09	0.09

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	1.2	6	120	12.5
2	40	1.5	7	140	17.8
3	60	4.0	8	160	26.3
4	80	3.2	9	180	27.1
5	100	8.9	10	200	26.6

Table 16

Internal Vehicle MPE Assessment @ 406.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE6012 A	2.15	Highest Reading	E	0.97	0.075	0.083	47.0	0.04	0.04

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	8.3	3.9	4.3
Front Seat	4.2	5.7	8.4

Table 17

External Vehicle MPE Assessment @ 460.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE4003 A	2.15	90 (110 Actual)	E	0.94	0.167	47.2	0.08	0.09

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	0.7	6	120	5.9
2	40	1.2	7	140	15.4
3	60	3.6	8	160	23.7
4	80	5.1	9	180	25.5
5	100	5.4	10	200	22.6

Table 18

Internal Vehicle MPE Assessment @ 460.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE4003 A	2.15	Highest Reading	E	0.94	0.052	0.062	47.2	0.03	0.03

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	3.1	5.5	1.6
Front Seat	1.9	5.6	4.7

Table 19

External Vehicle MPE Assessment @ 460.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE4011 A	5.65	90 (110 Actual)	E	0.94	0.123	47.2	0.06	0.06
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**		**Test Position**	**Height (cm)**	**% of Control Limit**			
1	20	0.5		6	120	2.4			
2	40	0.5		7	140	7.8			
3	60	0.9		8	160	19.0			
4	80	1.1		9	180	27.5			
5	100	1.3		10	200	19.4			

Table 20

Internal Vehicle MPE Assessment @ 460.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE4011 A	5.65	Highest Readin g	E	0.94	0.011	0.001	47.2	0.01	0.01
Measured grid										
Test Position		**% of control limit Head**		**% of control limit Chest**		**% of control limit Lower Trunk**				
Back Seat		1.2		0.8		0.2				
Front Seat		0.1		0.0		0.1				

Table 21

External Vehicle MPE Assessment @ 460.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	RAE4014A	7.15	90 (110 Actual)	E	0.94	0.047	47.2	0.02	0.02

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	0.0	6	120	0.4
2	40	0.0	7	140	1.1
3	60	0.0	8	160	5.1
4	80	0.0	9	180	10.8
5	100	0.0	10	200	13.4

Table 22

Internal Vehicle MPE Assessment @ 460.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	RAE4014A	7.15	Highest Readin g	E	0.94	0.000	0.000	47.2	0.00	0.00

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	0.0	0.0	0.0
Front Seat	0.0	0.0	0.0

Table 23

External Vehicle MPE Assessment @ 406.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE6011 A	7.15	90 (110 Actual)	E	0.97	0.112	47.0	0.06	0.06

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	0.1	6	120	2.5
2	40	0.1	7	140	7.5
3	60	0.6	8	160	17.3
4	80	0.8	9	180	26.4
5	100	1.8	10	200	25.7

Table 24

Internal Vehicle MPE Assessment @ 406.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE6011 A	7.15	Highest Readin g	E	0.97	0.008	0.014	47.0	0.01	0.01

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	0.8	0.4	0.5
Front Seat	0.6	1.3	1.1

Table 25

External Vehicle MPE Assessment @ 425.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE6013 A	4.15	90 (110 Actual)	E	0.96	0.166	47.1	0.08	0.08
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**		**Test Position**	**Height (cm)**	**% of Control Limit**			
1	20	1.8		6	120	10.1			
2	40	1.4		7	140	17.4			
3	60	3.5		8	160	25.7			
4	80	4.8		9	180	24.3			
5	100	7.6		10	200	20.7			

Table 26

Internal Vehicle MPE Assessment @ 425.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE6013 A	4.15	Highest Readin g	E	0.96	0.063	0.060	47.1	0.03	0.03
Measured grid										
Test Position		**% of control limit Head**		**% of control limit Chest**		**% of control limit Lower Trunk**				
Back Seat		5.5		4.7		3.2				
Front Seat		5.8		3.1		3.7				

Table 27

External Vehicle MPE Assessment @ 380.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE6013 A	4.15	90 (110 Actual)	E	0.98	0.157	47.3	0.08	0.08

Measurement grid					
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**
1	20	1.9	6	120	12.6
2	40	1.4	7	140	16.3
3	60	4.5	8	160	21.8
4	80	4.2	9	180	26.5
5	100	8.7	10	200	25.7

Table 28

Internal Vehicle MPE Assessment @ 380.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE6013 A	4.15	Highest Readin g	E	0.98	0.098	0.078	47.3	0.05	0.05

Measured grid			
Test Position	**% of control limit Head**	**% of control limit Chest**	**% of control limit Lower Trunk**
Back Seat	9.3	5.7	8.3
Front Seat	6.7	5.3	6.4

Table 29

External Vehicle MPE Assessment @ 469.9875MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE6013 A	4.15	90 (110 Actual)	E	0.94	0.174	47.5	0.09	0.09
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**		**Test Position**	**Height (cm)**	**% of Control Limit**			
1	20	1.1		6	120	6.7			
2	40	1.2		7	140	18.4			
3	60	2.6		8	160	27.7			
4	80	2.4		9	180	26.5			
5	100	3.9		10	200	20.7			

Table 30

Internal Vehicle MPE Assessment @ 469.9875MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE6013 A	4.15	Highest Reading	E	0.94	0.096	0.061	47.5	0.05	0.05
Measured grid										
Test Position		**% of control limit Head**		**% of control limit Chest**		**% of control limit Lower Trunk**				
Back Seat		7.7		7.5		3.2				
Front Seat		1.9		4.6		5.2				

Table 31

External Vehicle MPE Assessment @ 406.0125MHz									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Roof (cnt)	HAE6010 A	5.65	90 (110 Actual)	E	0.97	0.114	47.0	0.06	0.06
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**				
1	20	2.2	6	120	12.8				
2	40	1.8	7	140	13.3				
3	60	4.6	8	160	12.1				
4	80	4.2	9	180	8.9				
5	100	9.3	10	200	15.3				

Table 32

Internal Vehicle MPE Assessment @ 406.0125MHz										
Antenna Location	**Antenna**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Head, Chest, Lower trunk Back/Front seats (mW/cm^2)**		**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
						Back	**Front**			
Roof (cnt)	HAE6010 A	5.65	Highest Reading	E	0.97	0.097	0.119	47.0	0.06	0.06
Measured grid										
Test Position		**% of control limit Head**		**% of control limit Chest**		**% of control limit Lower Trunk**				
Back Seat		8.4		5.7		7.3				
Front Seat		6.5		9.8		10.1				

Table 33

External Vehicle MPE Assessment @ 380.0125MHz (90° from passenger side of trunk)									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6013 A	4.15	90 (104 Actual)	E	0.98	0.333	47.3	0.17	0.17
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**				
1	20	7.4	6	120	35.4				
2	40	6.9	7	140	54.6				
3	60	19.0	8	160	43.7				
4	80	19.5	9	180	27.6				
5	100	30.1	10	200	18.5				

Table 34

External Vehicle MPE Assessment @ 380.0125MHz (45° diagonal from passenger side of trunk)									
Antenna Location	**Antenna Model**	**Gain (dBi)**	**Meas. Distance (cm)**	**E/H Field**	**Calibration Factor**	**Average over Body (mW/cm^2)**	**Intial Power (W)**	**Pwr. Density cal (mW/cm^2)**	**Pwr. Density max cal (mW/cm^2)**
Trunk (cnt)	HAE6013 A	4.15	90 (99.5 Actual)	E	0.98	0.213	47.3	0.11	0.11
Measurement grid									
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**				
1	20	4.8	6	120	26.1				
2	40	6.0	7	140	29.5				
3	60	9.7	8	160	23.6				
4	80	24.3	9	180	14.5				
5	100	21.0	10	200	8.5				

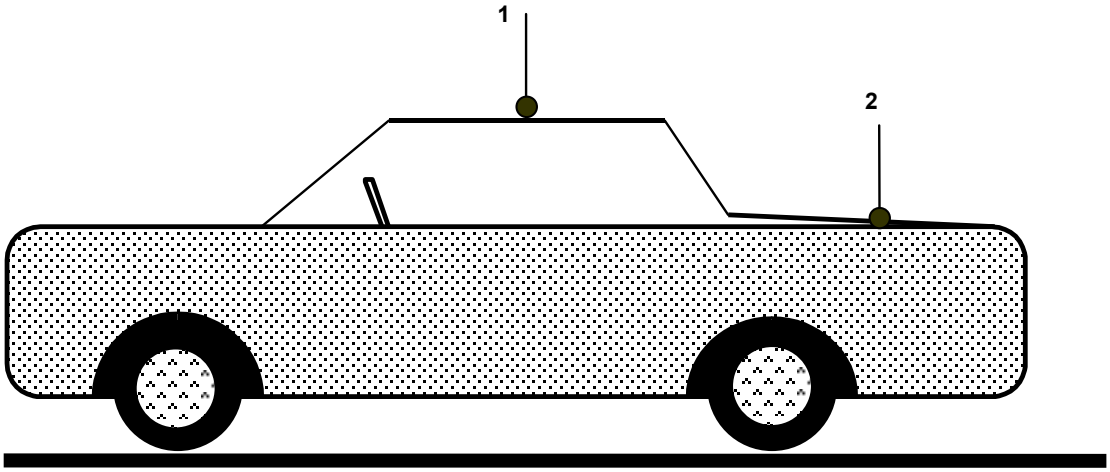
12.0 Conclusion

Depending on the test frequency, compliance assessments were performed with an output power range of 46.7-47.5W. The maximum RF power allowable will be equal to the upper limit of the final test factory transmit power specification of 48W. The highest power density result scaled to the maximum allowable power output is 0.29 mW/cm^2.

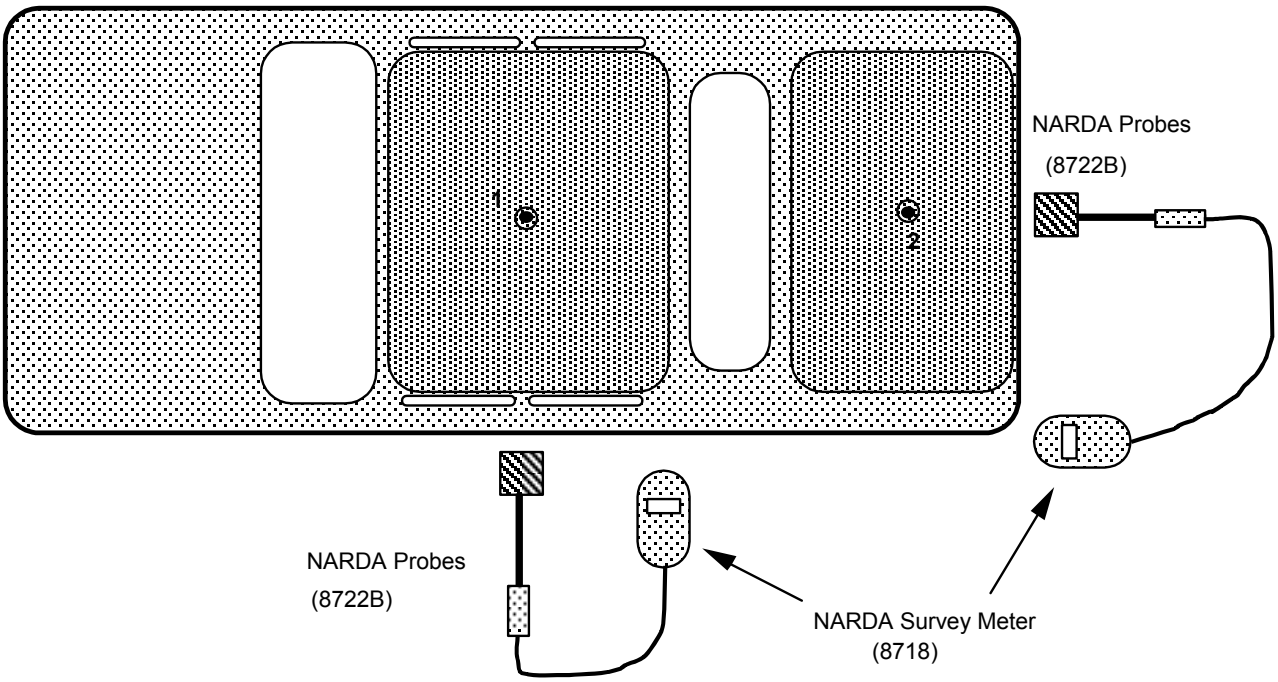
The measurement results clearly demonstrate compliance with the FCC Limits for the frequency band of 380-470MHz Per 47 CFR 2.1091 (d) for General Population/Uncontrolled(0.25-0.31 mW/cm^2) RF Exposure.

APPENDIX A

ANTENNA LOCATION DRAWING

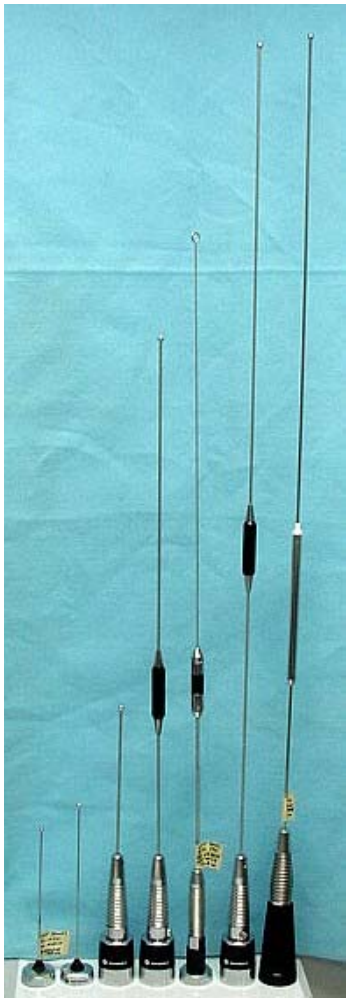


1 - Roof (center)
2 - Trunk (center)



APPENDIX B

Antenna photos



Antenna kit numbers, from left to right; HAE4003A, HAE6012A, HAE6013A, HAE6010A, HAE4011A, HAE6011A and RAE4014A