



MOTOROLA



CGISS EME Test Laboratory

8000 West Sunrise Blvd
Fort Lauderdale, FL. 33322

MPE Compliance Test Report

Date of Report: January 16, 2004
Report Revision(s): Rev. O
Device Manufacturer: Motorola
Device Description: 25W 4 channel Mobile Radio 465-495 MHz
Classification: Occupational/Controlled Exposure
FCC ID: ABZ99FT4063
Device Model: PMUE2148A

Test Period: 1/14/04

Test Engineer: Jim Fortier (Elect. Principle Staff Engineer)
Kim Uong (Lead EME Engineer)

Author: Michael Sailsman (Global 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.

Signature on File

1/20/04

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

Date Approved

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REVISION HISTORY

Date	Revision	Comments
1/16/04	O	Release of Pilot Results

1.0 Product Description



FCC ID: ABZ99FT4063, model PMUE2148A 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 the offered external antennas 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 which 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 465-495 MHz. The rated power of the device is 25 watts with a maximum conducted power output of 28 watts.

2.0 Offered Options and Accessories

Antenna

HAE4003A	450-470 MHz ¼ wave 0dB antenna; 14.9cm
HAE4004A	470-512 MHz ¼ wave 0dB antenna; 13.8cm
HAE4011A	450-470 MHz 3.5dB gain antenna; 71.8cm
HAE4012A	470-494 MHz 3.5dB gain antenna; 67.5cm

3.0 Measurement Standards

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

For frequencies ranging from 465-495 MHz the MPE (Maximum Permissible Exposure) limit to electromagnetic energy in equivalent plane wave free-space power density is from 0.31-0.33 mW/cm².

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 at 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.

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 34cm (trunk to edge of bumper is 10cm). The radial distance measured at 45° from corner of trunk to vertical test line is 99.5cm. The radial distance measured at 90° from the side of the trunk is 104cm.

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)

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 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 (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 Probes, 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 (01108); Calibration date: 4/14/03
- c) E-Field (Electric Field) Probe - NARDA Model 8722B (13001);
Calibration date: 6/1/03
- d) Antennas - (1/4 wave 0dB and 3.5dB gain antennas)

9.0 Test Unit Description

Power density measurements were performed on a 25 watts mobile radio; model number PMUE2148A serial number 019TAA0006. The frequency band of the mobile was 465-495 MHz; the test frequencies were 465.0125, 470.0125, and 480.0125, and 494.9875 MHz. The 1/4 wave 0dB and 3.5dB 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 the Appendix)

- a) 1/4 wave 0dB antenna models HAE4003A and HAE4004A, as well as 3.5dB gain antenna models HAE4011A and HAE4012A mounted at the center of the roof and trunk with measurements taken at the specified distances stated in section 11.0 and the Appendix.

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 results represent the highest MPE results observed.

Raw MPE Data; Test Frequencies and measured Po (W):

465.0125MHz (Po=28.5), 470.0125 MHz (Po=28.9), 480.0125 MHz (Po=29.0), 494.9875 MHz (Po=27.0)

Meter reads in % of controlled limit; controlled limit = 1.55-1.65 mW/cm² for f/300

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

General Population MPE limits = 0.31-0.33mW/cm² / 1.6mW/g (Bystanders & Passengers)

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

Internal Vehicle Power Density (Pwr. Den. (cal.)) = 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 @ 465.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4003A	2.15	60	E	0.94	0.286	28.5	0.143	0.143
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	4.2%		6	120	44.3%		1.55	0.31
2	40	5.7%		7	140	27.3%			
3	60	15.0%		8	160	12.7%			
4	80	25.3%		9	180	8.5%			
5	100	34.7%		10	200	6.8%			
								RF Po (*Max)	28

Table 2

Internal Vehicle MPE Assessment @ 465.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm ²)	Pwr. Density Max Calc. (mW/cm ²)
						Back	Front			
Trunk (cnt)	HAE4003A	2.15	Highest Reading	E	0.94	0.482	0.553	28.5	0.276	0.276
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.55
Back Seat		42.0%		43.0%		8.3%		IEEE Uncontrolled Limit:		0.31
Front Seat		34.0%		31.0%		42.0%		RF Po (*Max):		28

Table 3

External Vehicle MPE Assessment @						465.0125 MHz			
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4011A	5.65	60	E	0.94	0.245	28.5	0.122	0.122
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	2.5%		6	120	35.0%		1.55	0.31
2	40	2.5%		7	140	41.0%			RF Po (*Max)
3	60	5.0%		8	160	21.0%			
4	80	6.0%		9	180	14.0%			
5	100	13.0%		10	200	18.0%			

Table 4

Internal Vehicle MPE Assessment @ 465.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm ²)	Pwr. Density Max Calc. (mW/cm ²)
						Back	Front			
Trunk (cnt)	HAE4011A	5.65	Highest Reading	E	0.94	0.233	0.238	28.5	0.119	0.119
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.55
Back Seat		19.0%		20.0%		6.0%		IEEE Uncontrolled Limit:		0.31
Front Seat		13.0%		14.0%		19.0%		RF Po (*Max):		28

Table 5

External Vehicle MPE Assessment @ 470.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4004A	2.15	60	E	0.94	0.284	28.9	0.142	0.142
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	6.0%		6	120	43.0%		1.57	0.31
2	40	4.0%		7	140	30.0%			
3	60	14.0%		8	160	15.0%			
4	80	21.0%		9	180	7.0%			
5	100	36.0%		10	200	5.0%			
RF Po (*Max)									
28									

Table 6

Internal Vehicle MPE Assessment @ 470.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Trunk (cnt)	HAE4004A	2.15	Highest Reading	E	0.94	0.480	0.496	28.9	0.248	0.248
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.57
Back Seat		45.0%		30.0%		17.0%		IEEE Uncontrolled Limit:		0.31
Front Seat		28.0%		30.0%		37.0%			RF Po (*Max):	28

Table 7

External Vehicle MPE Assessment @ 470.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4012A	5.65	60	E	0.94	0.282	28.9	0.141	0.141
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	2.0%		6	120	48.0%		1.57	0.31
2	40	1.0%		7	140	47.0%			RF Po (*Max)
3	60	3.0%		8	160	26.0%			
4	80	7.0%		9	180	14.0%			
5	100	17.0%		10	200	15.0%			
									28

Table 8

Internal Vehicle MPE Assessment @ 470.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Trunk (cnt)	HAE4012A	5.65	Highest Reading	E	0.94	0.355	0.183	28.9	0.178	0.178
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.57
Back Seat		32.0%		17.0%		19.0%		IEEE Uncontrolled Limit:		0.31
Front Seat		12.0%		9.0%		14.0%			RF Po (*Max):	28

Table 9

External Vehicle MPE Assessment @ 480.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4004A	2.15	60	E	0.93	0.352	29.0	0.176	0.176
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	5.0%		6	120	63.0%		1.60	0.32
2	40	5.0%		7	140	41.0%			RF Po (*Max)
3	60	12.0%		8	160	15.0%			
4	80	19.0%		9	180	5.0%			
5	100	53.0%		10	200	2.0%			

Table 10

Internal Vehicle MPE Assessment @ 480.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Trunk (cnt)	HAE4004A	2.15	Highest Reading	E	0.93	0.587	0.267	29.0	0.293	0.293
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.60
Back Seat		48.0%		34.0%		28.0%		IEEE Uncontrolled Limit:		0.32
Front Seat		18.0%		19.0%		13.0%			RF Po (*Max):	28

Table 11

External Vehicle MPE Assessment @ 480.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4012A	5.65	60	E	0.93	0.320	29.0	0.160	0.160
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	2.0%		6	120	58.0%		1.60	0.32
2	40	3.0%		7	140	64.0%		RF Po (*Max)	
3	60	3.0%		8	160	22.0%			
4	80	4.0%		9	180	10.0%			
5	100	24.0%		10	200	10.0%			

Table 12

Internal Vehicle MPE Assessment @ 480.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Trunk (cnt)	HAE4012A	5.65	Highest Reading	E	0.93	0.405	0.171	29.0	0.203	0.203
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.60
Back Seat		30.0%		24.0%		22.0%		IEEE Uncontrolled Limit:		0.32
Front Seat		9.0%		13.0%		10.0%			RF Po (*Max):	28

Table 13

External Vehicle MPE Assessment @ 494.9875 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4004A	2.15	60	E	0.92	0.285	27.0	0.142	0.148
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	4.0%		6	120	43.0%		1.65	0.33
2	40	3.0%		7	140	32.0%			
3	60	10.0%		8	160	15.0%			
4	80	20.0%		9	180	5.5%			RF Po (*Max)
5	100	38.0%		10	200	2.0%			28

Table 14

Internal Vehicle MPE Assessment @ 494.9875 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Trunk (cnt)	HAE4004A	2.15	Highest Reading	E	0.92	0.528	0.258	27.0	0.264	0.274
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.65
Back Seat		53.0%		23.0%		20.0%		IEEE Uncontrolled Limit:		0.33
Front Seat		16.0%		20.0%		11.0%			RF Po (*Max):	28

Table 15

External Vehicle MPE Assessment @ 494.9875 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4012A	5.65	60	E	0.92	0.144	27.0	0.072	0.074
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.0%		6	120	23.0%		1.65	0.33
2	40	1.0%		7	140	23.0%			RF Po (*Max)
3	60	3.0%		8	160	9.0%			
4	80	4.0%		9	180	4.0%			
5	100	14.0%		10	200	5.0%			
									28

Table 16

Internal Vehicle MPE Assessment @ 494.9875 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Trunk (cnt)	HAE4012A	5.65	Highest Reading	E	0.92	0.242	0.126	27.0	0.121	0.125
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.65
Back Seat		28.0%		11.0%		5.0%		IEEE Uncontrolled Limit:		0.33
Front Seat		8.0%		11.0%		4.0%			RF Po (*Max):	28

Table 17

External Vehicle MPE Assessment @ 480.0125 MHz 45° Radial									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4004A	2.15	99.5	E	0.93	0.158	29.0	0.079	0.079
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	2.0%		6	120	13.0%		1.60	0.32
2	40	2.0%		7	140	14.0%			RF Po (*Max)
3	60	6.0%		8	160	17.0%			
4	80	9.0%		9	180	12.0%			
5	100	15.0%		10	200	9.0%			
28									

Table 18

External Vehicle MPE Assessment @ 480.0125 MHz 90° Radial									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Trunk (cnt)	HAE4004A	2.15	104	E	0.93	0.165	29.0	0.082	0.082
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	4.0%		6	120	16.0%		1.60	0.32
2	40	3.0%		7	140	19.0%			
3	60	6.0%		8	160	16.0%			
4	80	8.0%		9	180	12.0%			
5	100	10.0%		10	200	9.0%			
									RF Po (*Max)
									28

Table 19

External Vehicle MPE Assessment @ 465.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Roof (cnt)	HAE4003A	2.15	110	E	0.94	0.112	28.5	0.056	0.056
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.0%		6	120	4.0%		1.55	0.31
2	40	1.0%		7	140	8.0%		RF Po (*Max)	
3	60	2.0%		8	160	16.0%			
4	80	3.0%		9	180	18.0%			
5	100	5.0%		10	200	14.0%			

Table 20

Internal Vehicle MPE Assessment @ 465.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Roof (cnt)	HAE4003A	2.15	Highest Reading	E	0.94	0.057	0.083	28.5	0.041	0.041
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.55
Back Seat		5.0%		3.0%		3.0%		IEEE Uncontrolled Limit:		0.31
Front Seat		4.0%		7.0%		5.0%			RF Po (*Max):	28

Table 21

External Vehicle MPE Assessment @ 465.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Roof (cnt)	HAE4011A	5.65	110	E	0.94	0.081	28.5	0.041	0.041
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	0.4%		6	120	2.0%		1.55	0.31
2	40	0.6%		7	140	4.0%			RF Po (*Max)
3	60	1.0%		8	160	12.0%			
4	80	1.0%		9	180	16.0%			
5	100	1.4%		10	200	14.0%			
								28	

Table 22

Internal Vehicle MPE Assessment @ 465.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Roof (cnt)	HAE4011A	5.65	Highest Reading	E	0.94	0.013	0.021	28.5	0.010	0.010
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.55
Back Seat		1.0%		1.0%		0.5%		IEEE Uncontrolled Limit:		0.31
Front Seat		1.0%		2.0%		1.0%			RF Po (*Max):	28

Table 23

External Vehicle MPE Assessment @ 480.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Roof (cnt)	HAE4004A	2.15	110	E	0.93	0.123	29.0	0.062	0.062
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.0%		6	120	5.0%		1.60	0.32
2	40	1.0%		7	140	13.0%			
3	60	1.0%		8	160	20.0%			
4	80	2.0%		9	180	19.0%			
5	100	2.0%		10	200	13.0%			
								RF Po (*Max)	28

Table 24

Internal Vehicle MPE Assessment @ 480.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Roof (cnt)	HAE4004A	2.15	Highest Reading	E	0.93	0.091	0.053	29.0	0.045	0.045
Measurement Grid										
Test Position		% of Control Limit Head		% of Control Limit Chest		% of Control Limit Lower Trunk		IEEE Controlled Limit:		1.60
Back Seat		6.0%		6.0%		5.0%		IEEE Uncontrolled Limit:		0.32
Front Seat		3.0%		3.0%		4.0%			RF Po (*Max):	28

Table 25

External Vehicle MPE Assessment @ 480.0125 MHz									
Antenna Location	Antenna Model	Gain (dBi)	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Body (mW/cm^2)	Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
Roof (cnt)	HAE4012A	5.65	60	E	0.93	0.101	29.0	0.051	0.051
Measurement Grid									
Test Position	Height (cm)	% of Control Limit		Test Position	Height (cm)	% of Control Limit		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	0.5%		6	120	3.0%		1.60	0.32
2	40	0.5%		7	140	9.0%			
3	60	0.6%		8	160	17.0%			
4	80	1.0%		9	180	19.0%			
5	100	0.6%		10	200	12.0%			
								RF Po (*Max)	
								28	

Table 26

Internal Vehicle MPE Assessment @ 480.0125 MHz										
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)		Initial Power (W)	Pwr. Density Calc. (mW/cm^2)	Pwr. Density Max Calc. (mW/cm^2)
						Back	Front			
Roof (cnt)	HAE4012A	5.65	Highest Reading	E	0.93	0.027	0.016	29.0	0.013	0.013
Measurement Grid										
Test Position		% of Control Limit Head	% of Control Limit Chest	% of Control Limit Lower Trunk		IEEE Controlled Limit:			1.60	
Back Seat		2.0%	2.0%	1.0%		IEEE Uncontrolled Limit:			0.32	
Front Seat		1.0%	1.0%	1.0%			RF Po (*Max):	28		

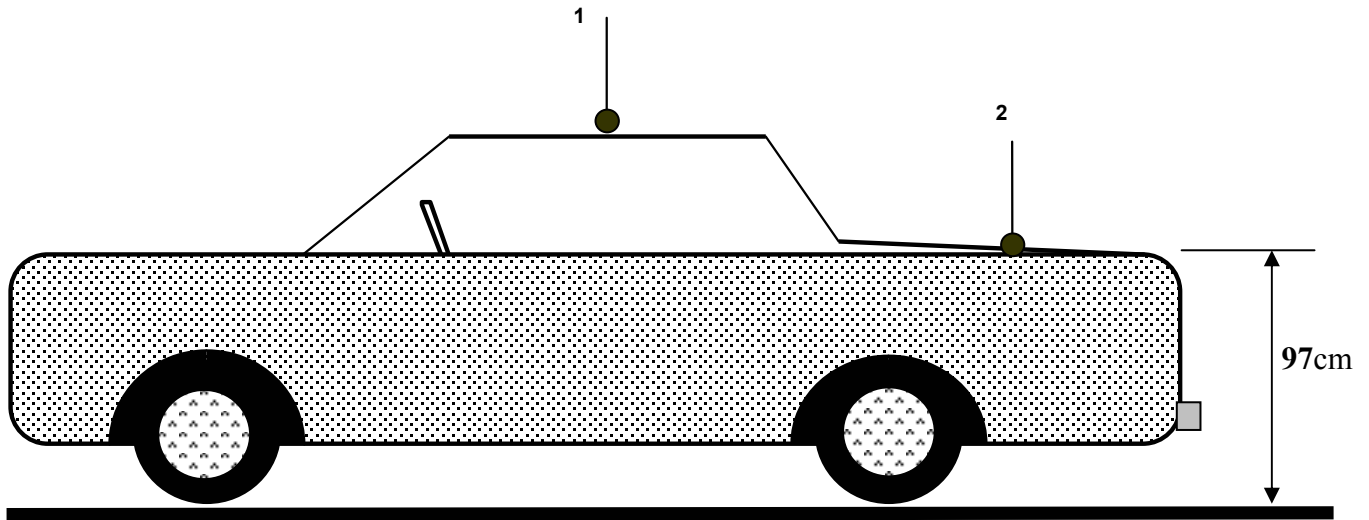
12.0 Conclusion

Depending on the test frequency, compliance assessments were performed with an output power range of 27.0W to 29.0W. The maximum RF power allowable will be equal to the upper limit of the final test factory transmit power specification of 28W. The highest power density result scaled to the maximum allowable power output is 0.29mW/cm².

The measurement results clearly demonstrate compliance with the FCC limits (frequency/1500 = 0.31-0.33 mW/cm² for the frequency band of 465-495 MHz) Per 47 CFR 2.1091(d) for General Population/Uncontrolled RF Exposure

APPENDIX A

Antenna Location Drawing with Test Locations Identified



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

