MOTOROLA

ACCREDITED

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

MPE Compliance Test Report

Date of Report:	October 20, 2004
Report Revision(s):	Rev. A
Device Manufacturer:	Motorola
Device Description:	40W nominal UHF (R1) 403-440 MHz; 32 channel Marlin + mini-UHF Display
Classification:	Occupational/Controlled Exposure
FCC ID:	ABZ99FT4064
Device Model:	PMUE2158A

Test Period:	3/2/04 & 3/4/04
Responsible Engineer:	Jim Fortier (Elect. Principle Staff Engineer)
Test Engineer:	Stephen Whalen (Sr. 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 — 10/26/04

Ken Enger
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Date Approved

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REVISION HISTORY

Date	Revision	Comments
3/30/04	O	Release of Pilot Results
10/20/04	A	In response to FCC correspondences 27328 and 27329 the following revisions were made: Language in section 6.0 was updated, a test results summary table was added to section 11.0, Language in section 12.0 was updated, and Appendix D was revised.

1.0 Product Description

FCC ID: ABZ99FT4064, model PMUE2158A 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 403-440 MHz. The nominal power of the device is 40 watts with a maximum conducted power output of 44 watts.

2.0 Offered Options and Accessories

Antenna

HAE4002A	403-430 MHz ¼ wave 2.15dBi antenna; 17.5cm
HAE4010A	406-420 MHz 5.65dBi gain antenna; 84.5cm (Untrimmed)
RAE4151A	403-430 MHz ¼ wave 2.15dBi antenna; 17.5cm
TAE6053A	430-450 MHz ¼ wave 2.15dBi antenna; 16.5cm

3.0 Measurement Standards

Measurements were performed according to FCC Limits Per 47 CFR 2.1091 (d) for General Population/Uncontrolled RF Exposure as well as with the recommended guidelines in IEEE/ANSI C95.1-1999.

For frequencies ranging from 403-440 MHz the MPE (Maximum Permissible Exposure) limit to electromagnetic energy in equivalent plane wave free-space power density ranges from 0.27 – 0.29 mW/cm^2.

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.

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)

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

MPE measurements for by-stander conditions are determined by taking the average of (10) measurements in a 2m vertical line directly behind the vehicle with 20cm increments at the standard test distance of 90cm from each applicable antenna. The measurement probe sensor is rotated 180º at each of the ten incremental measurements to ensure the highest result is captured. These measurements are representative of persons other than the operator standing next to the vehicle.
Using the highest MPE configuration from above, repeat two additional MPE tests at the vehicle/trunk corner (45 degree radial) and on the side of the vehicle adjacent to the trunk (90 degree radial, directly opposite center trunk mounted antenna) while maintaining twenty (20) centimeter separation between the probe sensor and vehicle body.
For the current test vehicle, the antenna to probe sensor separation distance is 99.5 cm (45 degree radial) and 104 cm (90 degree radial)
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 (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, scans were performed inside of the vehicle, both front and back seating areas, using each of the antennas tested herein at the trunk, to ascertain the highest level in each location. After the highest level is found, scans were performed 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, indicated below, that are 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)

MPE measurements for by-stander conditions are determined by taking the average of (10) measurements in a 2m vertical line directly beside the vehicle with 20cm increments at the standard test distance of 90cm from each of the applicable antennas. The measurement probe sensor is rotated 180º at each of the ten incremental measurements to ensure the highest result is captured. These measurements are representative of persons other than the operator standing next to the vehicle.

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, scans were performed inside of the vehicle, both at the front and back seating areas, using each of the antennas tested herein at the roof, to ascertain the highest level in each location. After the highest level is found, scans were performed 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 are 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); Cal. date: 4/14/03

c) E-Field (Electric Field) Probe - NARDA Model 8722B (13001); Cal. date: 5/6/03

d) Antennas - (1/4 wave 2.15dBi, and 5.65dBi gain antennas)

9.0 Test Unit Description

Power density measurements were performed on a representative sample of model number PMUE2158A. The serial number of the tested radio was 019TAA1233. The frequency band of the DUT is 403-440 MHz; the tested frequencies were 403.025, 406.025, 413.000, 421.500, and 435.000 MHz. The ¼ wave 2.15dBi and 5.65dBi gain mobile antennas listed in section 2.0 were used to assess compliance to the applicable MPE limits.

10.0 Test Set-Up Description

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

a) The ¼ wave 2.15dBi antenna models HAE4002A, and TAE6053A, as well as 5.65dBi gain antenna model HAE4010A were mounted at the center of the roof and trunk of the test vehicle. Assessments were made internal and external to the test vehicle at the specified distances stated in sections 6.0, 11.0, and the APPENDIX A. Note that the offered antenna models RAE4151A was not tested due to its' similarity in frequency band and antenna length to model HAE4002A.

11.0 Test Results Summary

Table A

Tables	Antenna Model	Antenna Location	Test Frequency (MHz)	E/H Field	Int./Ext.	Max Calc Pwr Density	% of Uncontrolled limit
Table 1	HAE4002A	Trunk	421.5	E	Ext	0.145	51.79
*Table 2	HAE4002A	Trunk	421.5	E	Int	0.289	103.21
Table 3	HAE4002A	Trunk	403	E	Ext	0.121	44.81
Table 4	HAE4002A	Trunk	403	E	Int	0.230	85.19
Table 5	HAE4002A	Roof	403	E	Ext	0.103	38.15
Table 6	HAE4002A	Roof	403	E	Int	0.055	20.37
Table 7	HAE4002A	Roof	421.5	E	Ext	0.088	31.43
Table 8	HAE4002A	Roof	421.5	E	Int	0.075	26.79
Table 9	TAE6053A	Trunk	435	E	Ext	0.078	26.90
Table 10	TAE6053A	Trunk	435	E	Int	0.195	67.24
Table 11	TAE6053A	Roof	435	E	Ext	0.054	18.62
Table 12	TAE6053A	Roof	435	E	Int	0.057	19.66
Table 13	HAE4010A	Trunk	413	E	Ext	0.087	31.07
Table 14	HAE4010A	Trunk	413	E	Int	0.064	22.86
Table 15	HAE4010A	Trunk	406	E	Ext	0.085	31.48
Table 16	HAE4010A	Trunk	406	E	Int	0.058	21.48
Table 17	HAE4010A	Roof	406	E	Ext	0.044	16.30
Table 18	HAE4010A	Roof	406	E	Int	0.005	1.85
Table 19	HAE4010A	Roof	413	E	Ext	0.044	15.71
Table 20	HAE4010A	Roof	413	E	Int	0.007	2.50
By-stander assessment at 90º radial from the trunk mount antenna							
Table 21	HAE4010A	Trunk	413	E	Ext	0.069	24.64
Table 22	HAE4002A	Trunk	421.5	E	Ext	0.137	48.93
By-stander assessment at 45º radial from the trunk mount antenna							
Table 23	HAE4002A	Trunk	421.5	E	Ext	0.163	58.21
Table 24	HAE4010A	Trunk	413	E	Ext	0.061	21.79

Note: * Results exceeding applicable limits

11.1 Test Results

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):
403.025 MHz (Po=45.4), 406.025 MHz (Po=45.3), 413.000 MHz (Po=46.2), 421.500 MHz (Po=46.1), 435.000 MHz (Po=43.7)
Meter reads in % of controlled limit; controlled limit = f/300 mW/cm^2 for 300-1500 MHz
(Cal factors presented herein are automatically accounted for in the meter used for assessments)
General Population MPE limits = f/300 mW/cm^2
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
Pwr Density Max Calc.= (RF Po Max/Initial Power)*Pwr Density Calc. (initial power > max power)
Note: The average over the body test methodology is consistent with IEEE/ANSI C95.1-1999 guidelines

Table 1

External Vehicle MPE Assessment @ 421.5 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)	HAE4002 A	2.15	90	E	0.96	0.289	46.1	0.145	0.145

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	5.2%	6	120	33.7%	1.41	0.3
2	40	7.5%	7	140	26.9%		
3	60	9.1%	8	160	24.7%		
4	80	23.7%	9	180	19.6%		**RF Po (*Max)**
5	100	34.5%	10	200	21.1%		44.0

Table 2

Internal Vehicle MPE Assessment @ 421.5 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)	HAE4002 A	2.15	Highest Reading	E	0.96	0.578	0.361	46.1	0.289	0.289

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.41
Back Seat	54.1%	47.3%	22.0%	IEEE Uncontrolled Limit:	0.28
Front Seat	44.3%	19.8%	12.9%	**RF Po (*Max):**	44.0

Table 3

External Vehicle MPE Assessment @ 403.025 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)	HAE4002 A	2.15	90	E	0.97	0.241	45.4	0.121	0.121

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	8.1%	6	120	27.8%	1.34	0.3
2	40	6.4%	7	140	21.6%		
3	60	16.3%	8	160	18.3%		
4	80	18.1%	9	180	19.5%		**RF Po (*Max)**
5	100	25.4%	10	200	18.1%		44.0

Table 4

Internal Vehicle MPE Assessment @ 403.025 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)	HAE4002 A	2.15	Highest Reading	E	0.97	0.460	0.165	45.4	0.230	0.230

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.34
Back Seat	47.5%	36.7%	18.6%	IEEE Uncontrolled Limit:	0.27
Front Seat	15.4%	10.3%	11.1%	**RF Po (*Max):**	44.0

Table 5

External Vehicle MPE Assessment @ 403.025 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)	HAE4002A	2.15	110	E	0.97	0.206	45.4	0.103	0.103
Measurement Grid									
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**			IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.5%	6	120	12.4%			1.34	0.3
2	40	1.5%	7	140	17.5%				
3	60	4.5%	8	160	27.6%				
4	80	7.2%	9	180	35.8%				**RF Po (*Max)**
5	100	9.3%	10	200	36.1%				44.0

Table 6

Internal Vehicle MPE Assessment @ 403.025 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)	HAE4002A	2.15	Highest Reading	E	0.97	0.109	0.085	45.4	0.055	0.055
Measurement Grid										
Test Position		**% of Control Limit Head**		**% of Control Limit Chest**		**% of Control Limit Lower Trunk**		IEEE Controlled Limit:		1.34
Back Seat		12.4%		4.2%		7.8%		IEEE Uncontrolled Limit:		0.27
Front Seat		8.8%		3.1%		7.0%			**RF Po (*Max):**	44.0

Table 7

External Vehicle MPE Assessment @ 421.5 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)	HAE4002A	2.15	110	E	0.96	0.177	46.1	0.088	0.088

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	13.4%	1.41	0.3
2	40	1.0%	7	140	15.1%		
3	60	1.3%	8	160	23.6%		
4	80	5.4%	9	180	27.7%		**RF Po (*Max)**
5	100	8.9%	10	200	28.9%		44.0

Table 8

Internal Vehicle MPE Assessment @ 421.5 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)	HAE4002A	2.15	Highest Reading	E	0.96	0.150	0.065	46.1	0.075	0.075

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.41
Back Seat	11.2%	13.4%	7.5%	IEEE Uncontrolled Limit:	0.28
Front Seat	2.2%	4.8%	6.9%	**RF Po (*Max):**	44.0

Table 9

External Vehicle MPE Assessment @ 435 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)	TAE6053A	2.15	90	E	0.95	0.154	43.7	0.077	0.078
Measurement Grid									
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**			IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	3.4%	6	120	15.6%			1.45	0.3
2	40	3.9%	7	140	12.0%				
3	60	6.8%	8	160	11.7%				
4	80	12.6%	9	180	12.4%				**RF Po (*Max)**
5	100	17.8%	10	200	10.3%				44.0

Table 10

Internal Vehicle MPE Assessment @ 435 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)	TAE6053A	2.15	Highest Reading	E	0.95	0.388	0.191	43.7	0.194	0.195
Measurement Grid										
Test Position		**% of Control Limit Head**		**% of Control Limit Chest**		**% of Control Limit Lower Trunk**		IEEE Controlled Limit:		1.45
Back Seat		45.0%		19.9%		15.4%		IEEE Uncontrolled Limit:		0.29
Front Seat		16.7%		13.8%		9.0%			**RF Po (*Max):**	44.0

Table 11

External Vehicle MPE Assessment @ 435 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)	TAE6053A	2.15	110	E	0.95	0.107	43.7	0.053	0.054

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	0.1%	6	120	5.8%	1.45	0.3
2	40	0.9%	7	140	8.9%		
3	60	2.7%	8	160	14.7%		
4	80	4.3%	9	180	15.5%		**RF Po (*Max)**
5	100	6.3%	10	200	14.3%		44.0

Table 12

Internal Vehicle MPE Assessment @ 435 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)	TAE6053A	2.15	Highest Reading	E	0.95	0.113	0.037	43.7	0.057	0.057

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.45
Back Seat	6.3%	12.9%	4.2%	IEEE Uncontrolled Limit:	0.29
Front Seat	2.0%	2.7%	2.9%	**RF Po (*Max):**	44.0

Table 13

External Vehicle MPE Assessment @ 413 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)	HAE4010A	5.65	90	E	0.96	0.174	46.2	0.087	0.087

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.8%	6	120	28.5%	1.38	0.3
2	40	1.7%	7	140	33.4%		
3	60	3.4%	8	160	18.7%		
4	80	6.2%	9	180	6.9%		**RF Po (*Max)**
5	100	14.7%	10	200	11.1%		44.0

Table 14

Internal Vehicle MPE Assessment @ 413 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)	HAE4010A	5.65	Highest Reading	E	0.96	0.128	0.046	46.2	0.064	0.064

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.38
Back Seat	16.3%	7.5%	4.2%	IEEE Uncontrolled Limit:	0.28
Front Seat	4.2%	2.7%	3.1%	**RF Po (*Max):**	44.0

Table 15

External Vehicle MPE Assessment @ 406.025 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)	HAE4010A	5.65	90	E	0.97	0.170	45.3	0.085	0.085

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	2.1%	6	120	26.0%	1.35	0.3
2	40	1.8%	7	140	32.4%		
3	60	3.8%	8	160	21.3%		
4	80	5.1%	9	180	9.8%		**RF Po (*Max)**
5	100	13.1%	10	200	10.4%		44.0

Table 16

Internal Vehicle MPE Assessment @ 406.025 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)	HAE4010A	5.65	Highest Reading	E	0.97	0.117	0.041	45.3	0.058	0.058

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.35
Back Seat	15.1%	4.6%	6.2%	IEEE Uncontrolled Limit:	0.27
Front Seat	4.7%	2.4%	1.9%	**RF Po (*Max):**	44.0

Table 17

External Vehicle MPE Assessment @ 406.025 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)	HAE4010A	5.65	110	E	0.97	0.088	45.3	0.044	0.044

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	0.0%	6	120	1.7%	1.35	0.3
2	40	0.0%	7	140	6.4%		
3	60	0.6%	8	160	13.3%		
4	80	1.0%	9	180	22.1%		**RF Po (*Max)**
5	100	0.9%	10	200	18.9%		44.0

Table 18

Internal Vehicle MPE Assessment @ 406.025 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)	HAE4010A	5.65	Highest Reading	E	0.97	0.010	0.009	45.3	0.005	0.005

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.35
Back Seat	1.0%	0.6%	0.7%	IEEE Uncontrolled Limit:	0.27
Front Seat	0.8%	0.6%	0.7%	**RF Po (*Max):**	44.0

Table 19

External Vehicle MPE Assessment @ 413 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)	HAE4010A	5.65	110	E	0.96	0.087	46.2	0.044	0.044

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	0.0%	6	120	1.6%	1.38	0.3
2	40	0.0%	7	140	5.2%		
3	60	0.0%	8	160	13.6%		
4	80	0.5%	9	180	22.9%		**RF Po (*Max)**
5	100	0.7%	10	200	18.8%		44.0

Table 20

Internal Vehicle MPE Assessment @ 413 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)	HAE4010A	5.65	Highest Reading	E	0.96	0.015	0.006	46.2	0.007	0.007

Measurement Grid					
Test Position	**% of Control Limit Head**	**% of Control Limit Chest**	**% of Control Limit Lower Trunk**	IEEE Controlled Limit:	1.38
Back Seat	1.5%	1.0%	0.7%	IEEE Uncontrolled Limit:	0.28
Front Seat	0.7%	0.2%	0.5%	**RF Po (*Max):**	44.0

Table 21

External Vehicle MPE Assessment @ 413 MHz (90º 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)	HAE4010A	5.65	104	E	0.96	0.138	46.2	0.069	0.069

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.4%	6	120	15.4%	1.38	0.3
2	40	1.1%	7	140	26.3%		
3	60	2.9%	8	160	23.5%		
4	80	4.7%	9	180	11.1%		**RF Po (*Max)**
5	100	9.1%	10	200	5.1%		44.0

Table 22

External Vehicle MPE Assessment @ 421.5 MHz (90º 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)	HAE4002A	2.15	104	E	0.96	0.286	46.1	0.143	0.137

Measurement Grid							
Test Position	**Height (cm)**	**% of Control Limit**	**Test Position**	**Height (cm)**	**% of Control Limit**	IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	6.8%	6	120	32.8%	1.41	0.3
2	40	7.5%	7	140	31.7%		
3	60	17.3%	8	160	26.5%		
4	80	23.6%	9	180	17.8%		**RF Po (*Max)**
5	100	26.1%	10	200	13.6%		44.0

Table 23

External Vehicle MPE Assessment @						421.5 MHz		(45º 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)	HAE4002A	2.15	99.5	E	0.96	0.327	46.1	0.163	0.163
Measurement Grid									
Test Position	**Height (cm)**	**% of Control Limit**		**Test Position**	**Height (cm)**	**% of Control Limit**		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	6.2%		6	120	42.6%		1.41	0.3
2	40	5.3%		7	140	34.7%			
3	60	19.4%		8	160	24.9%			
4	80	32.6%		9	180	14.4%			**RF Po (*Max)**
5	100	42.0%		10	200	10.5%			44.0

Table 24

External Vehicle MPE Assessment @						413 MHz		(45º 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)	HAE4010A	5.65	99.5	E	0.96	0.129	46.2	0.064	0.061
Measurement Grid									
Test Position	**Height (cm)**	**% of Control Limit**		**Test Position**	**Height (cm)**	**% of Control Limit**		IEEE Controlled Limit	IEEE Uncontrolled Limit
1	20	1.5%		6	120	19.3%		1.38	0.3
2	40	1.0%		7	140	23.3%			
3	60	3.3%		8	160	17.8%			
4	80	5.2%		9	180	9.2%			**RF Po (*Max)**
5	100	8.4%		10	200	4.5%			44.0

12.0 Conclusion

Depending on the test frequency, compliance assessments were performed with an output power range of 43.7W to 46.2W. The maximum RF power allowable will be equal to the upper limit of the final test factory transmit power specification of 44.0W. The highest power density result scaled to the maximum allowable power output is 0.29mW/cm^2.

The MPE results presented herein demonstrate compliance to the applicable Occupational/Controlled exposure limit of f/300 mW/cm^2 for the frequency range of 300-1500MHz.

Compliance to the General population/Uncontrolled limits is demonstrated by S.A.R. computational assessments of specific MPE non-compliant passenger test conditions* (see section 11.0). APPENDIX D presents computational S.A.R. results demonstrating compliance to the applicable General Population/Uncontrolled S.A.R. exposure limit of 1.6mW/g and therefore also demonstrates compliance to the MPE General Population/Uncontrolled limits.

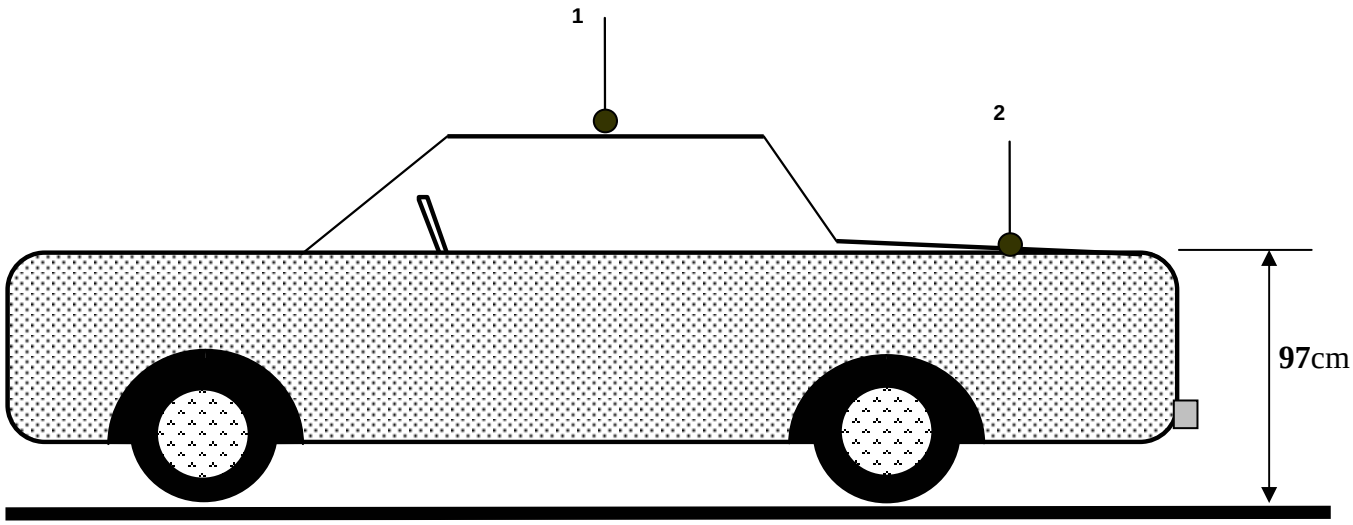
The computational results show that this device, when used with the offered antennas in accordance with the user manual instructions, exhibits a maximum peak 1-g average S.A.R. of 0.22mW/g for passengers internal to the vehicle.

Notes:
1) Table 2 reflects the worst-case passenger test configuration conditions that exceed the applicable MPE power density specification limits. The test condition was analyzed computationally to assess performance to the applicable S.A.R. exposure specification limits. APPENDIX D of this report presents computational EME compliance assessment results for FCC ID: ABZ99FT4064 performed by the Motorola Corporate Research Lab located in Plantation Florida using a commercial code based on FDTD (Finite Difference Time Domain) methodology. The computational results are provided herein in order to demonstrate the EME compliance of this device with respect to the IEEE Std C95.1-1999 specific absorption rate (S.A.R.) exposure limits.

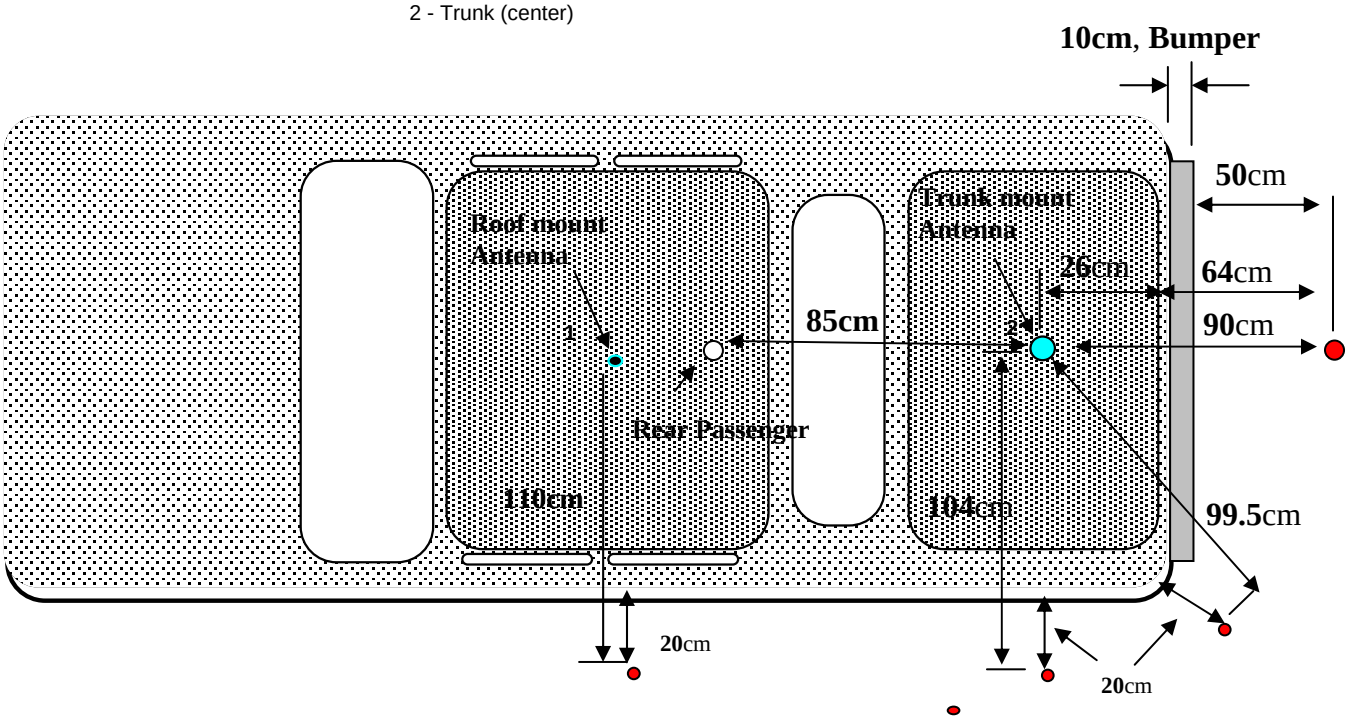
2) As presented in tables 21-24 in section 11.0 above MPE testing was performed at the trunk corners (45^O radial) and on the side of vehicle adjacent to trunk (90^O radial) in order to confirm that the worst case MPE test configuration is behind the vehicle.

APPENDIX A

Antenna Location Drawing with Test Locations Identified



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



Note: Test Locations

APPENDIX B

Calibration Certificates for E-Field probes

E-FIELD PROBE CALIBRATION CERTIFICATE

L-3 communications
Narda Microwave-East

Certificate of Calibration

L-3 Communications, Narda Microwave-East, hereby certifies that the referenced RF Radiation Hazard monitoring equipment has been calibrated in accordance with MIL-STD-45662A, ANSI Z540, ISO 10012 and ISO 9001.

The measured values were determined by comparision with our standards, which are traceable to the National Institute of Standards and Technology to the extent allowed by NIST's calibration facilities.

Certificate #: 35740 1

Customer: MOTOROLA
SCHAUMBURG, IL 60168-0429

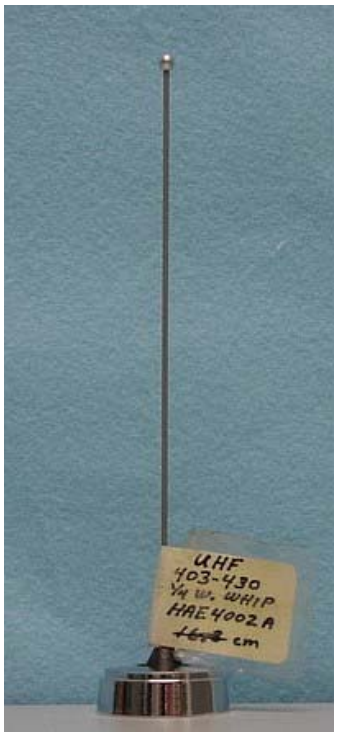
Model #: 8722B
Description: RAD MONITOR 8722B
Date Calibrated: 05/06/2003

Serial #: 13001
PO #: NP776106
R.O. #: 35740

Vince Donovan
Manager of Instruments Assembly and Test

John C. Stine
Director of Quality Assurance

APPENDIX C
Photos of Assessed Antennas



HAE4002A

TAE6053A

HAE4010

APPENDIX D
Computational EME SAR Compliance Assessment