


MOTOROLA


TESTING CERT # 2518.01

DECLARATION OF COMPLIANCE: MPE ASSESSMENT Part 1 of 3

Enterprise Mobility Solutions
EME Test Laboratory
 8000 West Sunrise Blvd
 Fort Lauderdale, FL. 33322

Date of Report: October 25, 2010
Report Revision: O
Report ID: SR8722_MPE rpt_APX7500_UHFR1_ and 7/800 Mobile_Rev O_101025

Responsible Engineer: Stephen C. Whalen (Principal Staff EME Test Engineer)
Date/s Tested: 5/27/2010, 6/2/2010, 6/3/2010, 6/22/2010, 6/25/2010 & 7/1/2010
 4/4/08 - 4/11/08, 4/21/08
Manufacturer/Location: Motorola Penang
Date submitted for test: 9/2/2010
DUT Description: APX7500 Dual Band Mobile UHFR1 (40W) & 700/800MHz (35W)
Test TX mode(s): CW
Max. Power output: UHF 48W; 764-806MHz 36W; 806-870MHz 42W
TX Frequency Bands: UHF 380-470MHz
 700MHz bands: 764-776MHz (talk around); 794-806MHz (Trunked);
 800MHz bands: 806-824MHz (Trunked); 851-870MHz (talk around)
Signaling type: Analog, APCO 25, and TDMA 1:2 (F2)
Model(s) Tested: M30QSS9PW1AN (UHF), M30URS9PW1AN (7/800MHz)
Model(s) Certified: M30TSS9PW1AN (MHUS1008A)
Serial Number(s): 123ABC4567 (M30QSS9PW1AN)
 174 (M30URS9PW1AN)
Classification: Occupational/Controlled Environment

DUT Photo
 (Refer to Exhibit 7B)

Regulatory Identifications:

FCC ID AZ492FT7043 – Part 22 & 90 (406.1-470 MHz & 763-775MHz; 793-805MHz; 806-824MHz; 851-869MHz), MPE results outside of Part 90 are not applicable for FCC compliance

IC 109U-92FT7043 – RSS-102

Approved Accessories:
Antenna(s):

Antennas for UHFR1 band	Antennas for 700/800MHz bands
Report part 1 of 3 HAE6012A (Vehicular Roof Mount, 380-433 MHz, 1/4 Wave, 2.15dBi) HAE6011A (Vehicular Mount, 380-433 MHz, 5/8 Wave, 7.15dBi) HAE4003A (Vehicular Roof Mount, 450-470 MHz, 1/4 Wave, 2.15dBi) HAE4011A (Vehicular Mount, 450-470 MHz, 1/2 Wave, 5.65dBi) RAE4014ARB (Vehicular Mount, 445-470 MHz, 5/8 Wave, 7.15dBi) Report part 2 of 3 HAE6010A (Vehicular Mount, 380-433 MHz, 1/2 Wave, 5.65dBi) HAE6013A (Vehicular Mount, 380-470 MHz, 1/2 Wave, 4.15dBi) HAE6031A (Vehicular Mount, 380-520 MHz, 1/2 Wave, 4.15dBi)	Report part 3 of 3 HAF4016A (Thru-hole Mount 764-870MHz, 1/4 wave, 2.15dBi) HAF4014A (Thru-hole Mount 764-870 MHz, 1/4 wave, 5.15dBi) HAF4013A (Thru-hole Mount 764-870 MHz, 1/4 wave, 5.15dBi) HAF4017A (Thru-hole Mount 764-870 MHz, 1/4 wave, 5.15dBi) RRA4914B (Thru-hole Mount 806 - 900 MHz, 1/4 wave, 5.15dBi) HAF4002A (Thru-hole Mount 806 - 900 MHz, 1/4 wave, 2.15dBi)

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 the national and international reference standards and guidelines listed in section 4.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola EME Laboratory.

I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements.

This reporting format is consistent with the suggested guidelines of the TIA TSB-159 April 2006

The results and statements contained in this report pertain only to the device(s) evaluated herein.

Signature on file –Kim Uong for Deanna Zakharia
Deanna Zakharia EMS EME Lab Senior Resource Manager,
Laboratory Director,

Approval Date: 10/26/2010

Certification Date:

Certification No.:

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Part 1 of 3

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REVISION HISTORY

Date	Revision	Comments
10/25/2010	O	Initial release

1.0 Product and System Description

Model M30TSS9PW1AN (MHUS1008A) is a mobile transceiver that utilizes analog, APCO 25 & F2 digital two-way radio communications. The analog modulation scheme uses Frequency Modulation (FM). APCO 25 & F2 digital modes use C4FM of CQPSK family of modulation (Compatible 4-Level Frequency Modulation of Compatible Quadrature Phase Shift Keying). F2 is a TDMA 1:2 protocol that allocates portions of the RF signal by dividing time into two slots (2 slots TDMA). Transmission from a unit or base station is accommodated in time-slot lengths of 30 milliseconds and frame lengths of 60 milliseconds. This product supports voice in analog mode, and both voice and data modes in digital mode.

The maximum duty cycle for TDMA is 1:2 (50%) and is controlled by software. The FM signal is continuous. However because of hand shaking or Push-To-Talk (PTT) between users and/or base stations a conservative 50% duty cycle is applied. The TDMA mode was not tested because its duty cycle is inherently 50% and would include an additional 50% duty cycle for PTT.

The intended use of the radio is 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 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.

Accordingly this product 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.

(Note that "Bystanders" as used herein mean people other than operator)

2.0 Abbreviations / Definitions

APCO: Association of Public-Safety Communications Officials

C4FM: Compatible 4-Level Frequency Modulation

CNR: Calibration Not Required

CQPSK: Compatible Quadrature Phase Shift Keying

CW: Continues Wave

DUT: Device Under Test

F2: 2 slot Time Division Multiple Access

FM: Frequency Modulation

NA: Not Applicable

PTT: Push to Talk

TDMA: Time Division Multiple Access

MPE: Maximum Permissible Exposure

EME: Electromagnetic Energy

3.0 Additional Options and Accessories

NA

4.0 Measurement and Limit Standards

Measurements were performed according to the recommended guidelines in IEEE/ANSI C95.3-2002 and compared to FCC Limits Per 47 CFR 2.1091 (d) for General Population/ Uncontrolled RF Exposure.

For test frequencies ranging from 380 - 470 MHz the MPE (Maximum Permissible Exposure) limits to electromagnetic energy in equivalent plane wave free-space power density are 0.25 – 0.31mW/cm² (FCC) for General Population and 1.27 – 1.57mW/cm² (FCC) for Occupational.

5.0 Measurement System Uncertainty Levels

Uncertainty Budget for Near Field Probe Measurements

	Tol. (± %)	Prob · Dist.	Divisor	u_i (± %)	v_i
Measurement System					
Probe Calibration	6.0	N	1.00	6.0	∞
Survey Meter Calibration	3.0	N	1.00	3.0	∞
Hemispherical Isotropy	8.0	R	1.73	4.6	∞
Linearity	5.0	R	1.73	2.9	∞
Pulse Response	1.0	R	1.73	0.6	∞
RF Ambient Noise	3.0	R	1.73	1.7	∞
RF Reflections	8.0	R	1.73	4.6	∞
Probe Positioning	10.0	R	1.73	5.8	∞
Test sample Related					
Antenna Positioning	3.0	N	1.00	3.0	∞
Power drift	5.0	R	1.73	2.9	∞
Combined Standard Uncertainty		RSS		12.2	∞
Expanded Uncertainty (95% CONFIDENCE LEVEL)		$k=2$		24	

6.0 Method of Measurement

6.1 EME measurements made with trunk mounted antenna(s) (Refer to APPENDIX A for antenna location and test distances)

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

MPE measurements for bystander conditions are determined by taking the average of (10) measurements in a 2 m vertical line for each of the (3) bystander test locations indicated in Appendix A with 20 cm height increments, with antenna to probe sensor separation distances of 90 cm (directly behind vehicle), 104 cm (45 degree radial) and 110.5 cm (90 degree radial). The measurement probe is positioned orthogonal to antenna (typically parallel to ground with a vertically mounted antenna) and aimed directly at the antenna's axis. These measurements are representative of persons other than the operator standing next to the vehicle.

Each of the offered antennas mounted at the center of the trunk were assessed at the rear of the vehicle while maintaining a minimum of twenty (20) centimeter separation distance between the probe sensor and vehicle body. The worst case antenna was then tested at a 45° radial at the corner of the trunk, and 90° radial at the side of the trunk.

Note: The distance from the centered trunk-mounted antenna to the rear edge of the vehicle is 42cm and the distance from the rear edge of the vehicle to the survey probe sensor is 48cm.

6.1.2 Internal/Passenger vehicle EME measurement (Antenna mounted at trunk center)

MPE measurements for passenger conditions are determined by taking the average of the (3) measurements (Head, Chest, and Lower Trunk) inside the vehicle for both the front and back seats. The measurement probe is positioned orthogonal to antenna (typically parallel to ground with a vertically mounted antenna), and aimed directly at the antenna's axis while the antenna is at 85cm from the back of the backseat passenger's head. These measurements are representative of operator and passengers sitting in the front and back seat of the vehicle.

6.2 EME measurements made with roof mounted antenna(s) (Refer to APPENDIX A for antenna location and test distances)

6.2.1 External/Bystander vehicle EME measurement (Antenna mounted at roof center)

MPE measurements for bystander conditions are determined by taking the average of (10) measurements in a 2m vertical line for the test location indicated in APPENDIX A with 20cm increments at the test distance of 117cm from the antenna under test. The measurement probe is positioned orthogonal to antenna (typically parallel to ground with a vertically mounted antenna) and aimed directly at the antenna's axis. These measurements are representative of persons other than the operator standing next to the vehicle.

Note: Actual test distance was approximately 117cm from centered roof-mounted antenna to the probe element (97cm from antenna to edge of car door and 20cm from the edge of the car door to the survey probe sensor); this is the closest distance that can be achieved to a centered roof-mounted antenna used for MPE compliance assessment herein.

6.2.2 Internal/Passenger vehicle EME measurement (Antenna mounted at roof center)

MPE measurements for passenger conditions are determined by taking the average of the (3) measurements (Head, Chest, and Lower Trunk) inside the vehicle for both the front and back seats. The measurement probe is positioned orthogonal to antenna (typically parallel to ground with a vertically mounted antenna) and aimed directly at the antenna's axis. These measurements are representative of operator and passengers sitting in the front and back seat of the vehicle.

7.0 Test Site

The test site is the Motorola open area test site located at 8000 W. Sunrise Blvd., Plantation, FL. 33322.

8.0 Measurement System/Equipment

Equipment Type	Model #	SN	Calibration Date
Automobile	2003 Ford Crown Victoria, 4-Door	NA	NA
Survey Meter / Probe – E-Field (Electric Field)	ETS Model HI-2200 / ETS Model E100	00086316 / 00109011	10/22/09

ETS equipments measured for E-field is in mW/cm² for E-field.

9.0 DUT Output Power and Test Frequencies

Power density measurements were performed with the test frequencies and associated power levels presented in the table below.

Test frequencies were chosen to include (approximately) the low, middle and high channels of the DUT band and applicable antenna bands.

Note that the test frequencies that are outside the relevant FCC frequency allocations are presented in blue font.

Test Frequencies (MHz)	Measured Initial Power (W)
380.0125	47.5
406.5	47.8
432.9875	47.0
445.0125	47.3
450.0125	46.6
457.5	47.0
460.0125	47.1
469.9875	46.6

10.0 Test Set-Up Description

All antennas listed on the cover page of this report were considered in order to develop the test plan for this product.

a) The ¼ wave 2.15dBi gain antennas (HAE6012A & HAE4003A), ½ wave 5.65dBi gain antenna (HAE4011A) and 5/8 wave 7.15dBi gain antennas (HAE6011A & RAE4014ARB) were assessed while mounted at the center of the roof of the test vehicle.

b) The ½ wave 5.65dBi gain antenna (HAE4011A) and 5/8 wave 7.15dBi gain antennas (HAE6011A & RAE4014ARB) were assessed while mounted at the center of the trunk of the test vehicle.

Assessments were performed with DUT (Device Under Test) installed on a test vehicle, while engine was at idle, at the specified distances and test locations indicated in section 6.0 and APPENDIX A.

11.0 Test Results Summary

The tables below summarized the MPE measurement results for each test configuration: antenna (model and description), TX frequency, maximum output power, initial power, E/H field measurements, probe frequency cal factor, test positions (BS-Bystander, PB-Passenger Back, PF-Passenger Front), average over body results, calculated power density results, max calculated power density results, % of the applicable specification limit, and applicable FCC specification limits.

MPE results for this mobile radio are based on 50% duty cycle which is in accordance with the User Manual instructions.

Below is an explanation of how the MPE results are calculated.

External to vehicle (Bystander) -10 measurements are averaged over the body (*body_avg*).

Internal to vehicle (Passengers) - 3 measurements are averaged over the body (*body_avg*).

The Average over Body test methodology is consistent with IEEE/ANSI C95.3-2002 guidelines.

Therefore;

$$Pwr_density_calc = body_avg * (probe_frequency_cal_factor)^2 * duty_cycle$$

$$Pwr_density_max_calc = pwr_density_calc * \frac{max_output_power}{initial_output_power}$$

Note1; For initial output power > max_output_power; max_output_power / initial output power = 1

Note2: The probe frequency cal factors used for MPE evaluation of this product are based on the worse case.

Note 3: The calibration certificate's frequency cal factors were determined by measuring V/m for E-field probe and A/m for H-field probe. The results presented herein are power density (mW/cm²) and therefore the cal factors were squared as indicated in the formula above.

Note that the test frequencies that are outside the relevant FCC frequency allocations are presented in blue font.

Table 1: E-field - MPE assessment data with antennas mounted on the Roof

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna HAE6012A											
HAE6012A , 1/4 wave (380-433MHz)	380.0125	48	47.5	E	0.94	BS	0.101	0.047	0.05	20	0.25
HAE6012A , 1/4 wave (380-433MHz)	380.0125	48	47.5	E	0.94	PB	0.097	0.045	0.05	20	0.25
HAE6012A , 1/4 wave (380-433MHz)	380.0125	48	47.5	E	0.94	PF	0.060	0.028	0.03	12	0.25
HAE6012A , 1/4 wave (380-433MHz)	406.5	48	47.8	E	0.94	BS	0.109	0.051	0.05	19	0.27
HAE6012A , 1/4 wave (380-433MHz)	406.5	48	47.8	E	0.94	PB	0.247	0.116	0.12	44	0.27
HAE6012A , 1/4 wave (380-433MHz)	406.5	48	47.8	E	0.94	PF	0.067	0.031	0.03	11	0.27
HAE6012A , 1/4 wave (380-433MHz)	432.9875	48	47	E	0.95	BS	0.095	0.045	0.05	17	0.29
HAE6012A , 1/4 wave (380-433MHz)	432.9875	48	47	E	0.95	PB	0.047	0.022	0.02	7	0.29
HAE6012A , 1/4 wave (380-433MHz)	432.9875	48	47	E	0.95	PF	0.020	0.010	0.01	3	0.29

Table 1 (cont): E field - MPE assessment data with antenna mounted on the roof

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna HAE4003A											
HAE4003 A, 1/4 wave (450-470MHz)	450.0125	48	46.6	E	0.96	BS	0.126	0.060	0.06	20	0.30
HAE4003 A, 1/4 wave (450-470MHz)	450.0125	48	46.6	E	0.96	PB	0.083	0.040	0.04	13	0.30
HAE4003 A, 1/4 wave (450-470MHz)	450.0125	48	46.6	E	0.96	PF	0.050	0.024	0.02	7	0.30
HAE4003 A, 1/4 wave (450-470MHz)	460.0125	48	47.8	E	0.96	BS	0.122	0.059	0.06	19	0.31
HAE4003 A, 1/4 wave (450-470MHz)	460.0125	48	47.8	E	0.96	PB	0.047	0.022	0.02	6	0.31
HAE4003 A, 1/4 wave (450-470MHz)	460.0125	48	47.8	E	0.96	PF	0.063	0.030	0.03	10	0.31
HAE4003 A, 1/4 wave (450-470MHz)	469.9875	48	46.6	E	0.97	BS	0.112	0.054	0.06	19	0.31
HAE4003 A, 1/4 wave (450-470MHz)	469.9875	48	46.6	E	0.97	PB	0.043	0.021	0.02	6	0.31
HAE4003 A, 1/4 wave (450-470MHz)	469.9875	48	46.6	E	0.97	PF	0.043	0.021	0.02	6	0.31

Table 1 (cont): E field - MPE assessment data with antenna mounted on the roof

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna HAE6011A											
HAE6011A , 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	BS	0.073	0.034	0.03	12	0.25
HAE6011A , 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	PB	0.003	0.002	0.00	0	0.25
HAE6011A , 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	PF	0.007	0.003	0.00	0	0.25
HAE6011A , 5/8 wave (380-433MHz)	406.5	48	47.8	E	0.94	BS	0.069	0.032	0.03	11	0.27
HAE6011A , 5/8 wave (380-433MHz)	406.5	48	47.8	E	0.94	PB	0.033	0.016	0.02	7	0.27
HAE6011A , 5/8 wave (380-433MHz)	406.5	48	47.8	E	0.94	PF	0.000	0.000	0.00	0	0.27
HAE6011A , 5/8 wave (380-433MHz)	432.9875	48	47	E	0.95	BS	0.020	0.010	0.01	3	0.29
HAE6011A , 5/8 wave (380-433MHz)	432.9875	48	47	E	0.95	PB	0.000	0.000	0.00	0	0.29
HAE6011A , 5/8 wave (380-433MHz)	432.9875	48	47	E	0.95	PF	0.000	0.000	0.00	0	0.29

Table 1 (cont): E field - MPE assessment data with antenna mounted on the roof

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna HAE4011A											
HAE4011A, 1/2 wave (450-470MHz)	450.0125	48	46.6	E	0.96	BS	0.107	0.051	0.05	17	0.30
HAE4011A, 1/2 wave (450-470MHz)	450.0125	48	46.6	E	0.96	PB	0.010	0.005	0.00	0	0.30
HAE4011A, 1/2 wave (450-470MHz)	450.0125	48	46.6	E	0.96	PF	0.010	0.005	0.00	0	0.30
HAE4011A, 1/2 wave (450-470MHz)	460.0125	48	47.1	E	0.96	BS	0.086	0.041	0.04	13	0.31
HAE4011A, 1/2 wave (450-470MHz)	460.0125	48	47.1	E	0.96	PB	0.003	0.002	0.00	0	0.31
HAE4011A, 1/2 wave (450-470MHz)	460.0125	48	47.1	E	0.96	PF	0.010	0.005	0.00	0	0.31
HAE4011A, 1/2 wave (450-470MHz)	469.9875	48	46.6	E	0.97	BS	0.059	0.029	0.03	10	0.31
HAE4011A, 1/2 wave (450-470MHz)	469.9875	48	46.6	E	0.97	PB	0.003	0.002	0.00	0	0.31
HAE4011A, 1/2 wave (450-470MHz)	469.9875	48	46.6	E	0.97	PF	0.000	0.000	0.00	0	0.31

Table 1 (cont): E field - MPE assessment data with antenna mounted on the roof

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna RAE4014ARB											
RAE4014A RB, 5/8 wave (445-470MHz)	445.0125	48	47.3	E	0.96	BS	0.057	0.027	0.03	10	0.30
RAE4014A RB, 5/8 wave (445-470MHz)	445.0125	48	47.3	E	0.96	PB	0.003	0.002	0.00	0	0.30
RAE4014A RB, 5/8 wave (445-470MHz)	445.0125	48	47.3	E	0.96	PF	0.000	0.000	0.00	0	0.30
RAE4014A RB, 5/8 wave (445-470MHz)	457.5	48	47	E	0.96	BS	0.034	0.016	0.02	6	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	457.5	48	47	E	0.96	PB	0.000	0.000	0.00	0	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	457.5	48	47	E	0.96	PF	0.000	0.000	0.00	0	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	469.9875	48	46.6	E	0.97	BS	0.006	0.003	0.00	0	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	469.9875	48	46.6	E	0.97	PB	0.000	0.000	0.00	0	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	469.9875	48	46.6	E	0.97	PF	0.000	0.000	0.00	0	0.31

Table 2: E field - MPE assessment data with antenna mounted on the trunk

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna HAE6011A											
HAE6011A, 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	BS	0.169	0.079	0.08	32	0.25
HAE6011A, 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	PB	0.303	0.143	0.14	56	0.25
HAE6011A, 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	PF	0.063	0.030	0.03	12	0.25
HAE6011A, 5/8 wave (380-433MHz)	406.5	48	47.8	E	0.94	BS	0.137	0.064	0.06	22	0.27
HAE6011A, 5/8 wave (380-433MHz)	406.5	48	47.8	E	0.94	PB	0.360	0.169	0.17	63	0.27
HAE6011A, 5/8 wave (380-433MHz)	406.5	48	47.8	E	0.94	PF	0.057	0.027	0.03	11	0.27
HAE6011A, 5/8 wave (380-433MHz)	432.9875	48	47	E	0.95	BS	0.050	0.024	0.02	7	0.29
HAE6011A, 5/8 wave (380-433MHz)	432.9875	48	47	E	0.95	PB	0.030	0.014	0.01	3	0.29
HAE6011A, 5/8 wave (380-433MHz)	432.9875	48	47	E	0.95	PF	0.007	0.003	0.00	0	0.29

Table 2 (cont): E field - MPE assessment data with antenna mounted on the trunk

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
Antenna HAE4011A											
HAE4011A, 1/2 wave (450-470MHz)	450.0125	48	46.6	E	0.96	BS	0.161	0.077	0.08	27	0.30
HAE4011A, 1/2 wave (450-470MHz)	450.0125	48	46.6	E	0.96	PB	0.383	0.184	0.19	63	0.30
HAE4011A, 1/2 wave (450-470MHz)	450.0125	48	46.6	E	0.96	PF	0.090	0.043	0.04	13	0.30
HAE4011A, 1/2 wave (450-470MHz)	460.0125	48	47.1	E	0.96	BS	0.162	0.078	0.08	26	0.31
HAE4011A, 1/2 wave (450-470MHz)	460.0125	48	47.1	E	0.96	PB	0.327	0.157	0.16	52	0.31
HAE4011A, 1/2 wave (450-470MHz)	460.0125	48	47.1	E	0.96	PF	0.087	0.042	0.04	13	0.31
HAE4011A, 1/2 wave (450-470MHz)	469.9875	48	46.6	E	0.97	BS	0.105	0.051	0.05	16	0.31
HAE4011A, 1/2 wave (450-470MHz)	469.9875	48	46.6	E	0.97	PB	0.163	0.079	0.08	26	0.31
HAE4011A, 1/2 wave (450-470MHz)	469.9875	48	46.6	E	0.97	PF	0.053	0.026	0.03	10	0.31

Table 2 (cont): E field - MPE assessment data with antenna mounted on the trunk

Ant. Model/ Desc.	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Cal. Factor (P.D.)	Test Pos.	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)	% of FCC Spec Limit	FCC Spec Limit (mW/cm ²)
RAE4014ARB											
RAE4014A RB, 5/8 wave (445-470MHz)	445.0125	48	47.3	E	0.96	BS	0.112	0.054	0.05	17	0.30
RAE4014A RB, 5/8 wave (445-470MHz)	445.0125	48	47.3	E	0.96	PB	0.117	0.056	0.06	20	0.30
RAE4014A RB, 5/8 wave (445-470MHz)	445.0125	48	47.3	E	0.96	PF	0.020	0.010	0.01	3	0.30
RAE4014A RB, 5/8 wave (445-470MHz)	457.5	48	47	E	0.96	BS	0.093	0.045	0.05	16	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	457.5	48	47	E	0.96	PB	0.033	0.016	0.02	6	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	457.5	48	47	E	0.96	PF	0.010	0.005	0.00	0	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	469.9875	48	46.6	E	0.97	BS	0.041	0.020	0.02	6	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	469.9875	48	46.6	E	0.97	PB	0.000	0.000	0.00	0	0.31
RAE4014A RB, 5/8 wave (445-470MHz)	469.9875	48	46.6	E	0.97	PF	0.000	0.000	0.00	0	0.31
----- 45 Degree -----											
HAE6011A , 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	BS	0.168	0.079	0.08	32	0.25
----- 90 Degree -----											
HAE6011A , 5/8 wave (380-433MHz)	380.0125	48	47.5	E	0.94	BS	0.141	0.066	0.07	28	0.25

12.0 Conclusion

The assessments for this device were performed with an output power range as indicated in section 9.0. The maximum allowable output power is equal to the upper limit of the final test factory transmit power specification of 48W for frequency range of 380 - 470MHz. The highest power density results for the mobile device scaled to the maximum allowable power output is 0.19mW/cm² for internal/passenger to the vehicle, and 0.08mW/cm² for external/bystander to the vehicle.

These MPE results demonstrate compliance to the IEEE/FCC Occupational/Controlled Exposure limit.

These MPE results also demonstrate compliance to the FCC General Population/Uncontrolled limits as required by FCC rules for passengers and bystanders.

RF Exposure Results (380-470MHz)

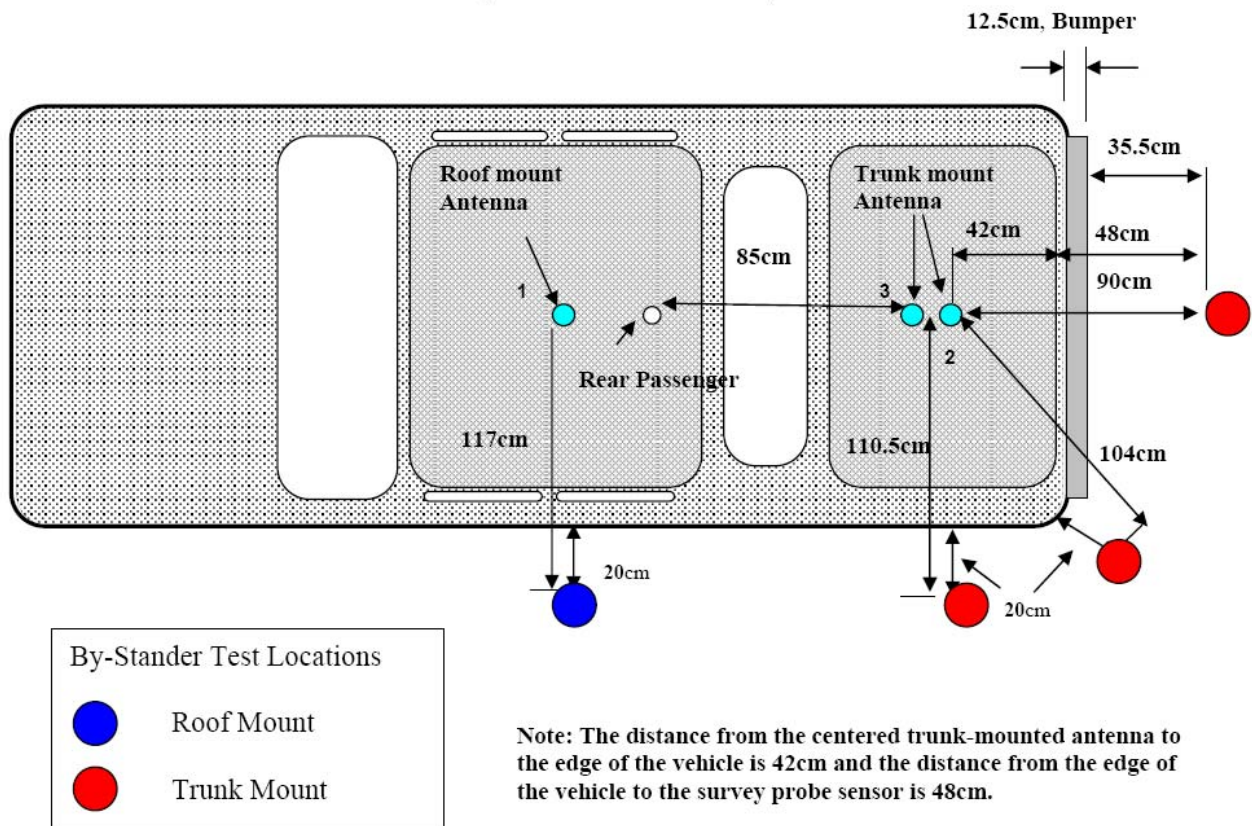
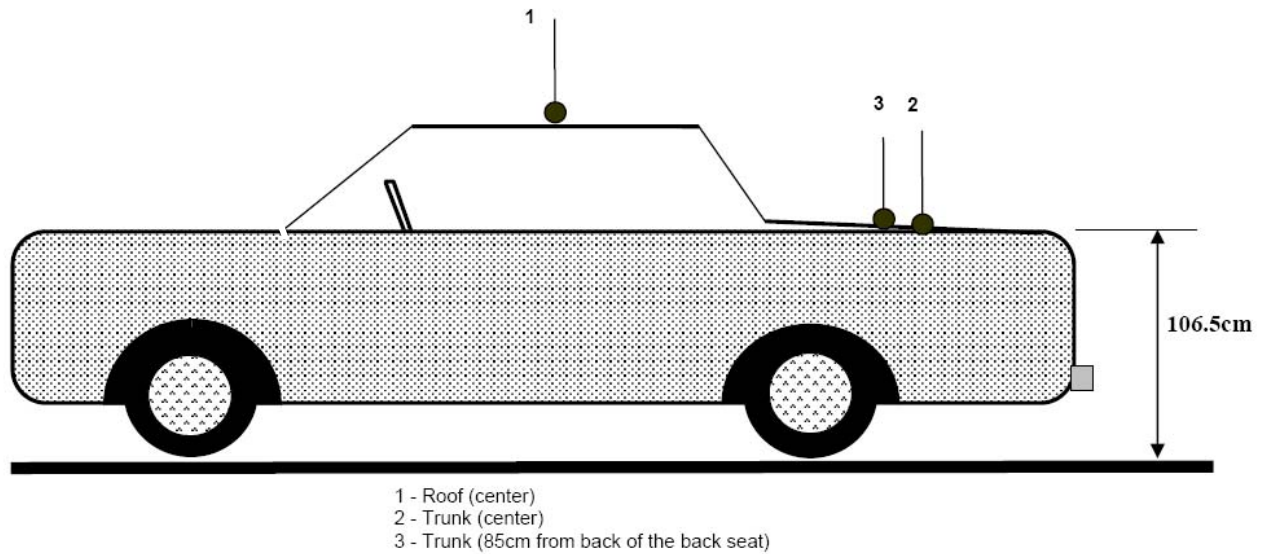
	UHFR1 Band
Passenger - Max Calculated Power Density	0.19 mW/cm ²
Bystander - Max Calculated Power Density	0.08 mW/cm ²

RF Exposure Results for FCC Part 90 (406.1-470 MHz)

	UHFR1 Band
Passenger - Max Calculated Power Density	0.19 mW/cm ²
Bystander - Max Calculated Power Density	0.08 mW/cm ²

APPENDIX A

Illustration of Antenna Locations and Test Distances



APPENDIX B
Meter/Probe Calibration Certificates



Cert I.D.: 75742

ETS-LINDGREN
An ESCO Technologies Company
1301 Arrow Point Drive
Cedar Park, Texas 78613
(512) 531-6498

ETS-LINDGREN
An ESCO Technologies Company
Track# S000017735 Ltd Cal ☐
By MR Date 22-Oct-09
Next Cal Due
www.ets-lindgren.com

Certificate of Calibration Conformance

Page 1 of 4

The instrument identified below has been individually calibrated in compliance with the following standard(s):

IEEE 1309 - 2005, Institute of Electrical and Electronics Engineers, Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas from 9 kHz to 40 GHz

Environment: Laboratory MTE is maintained in a temperature controlled environment with ambient conditions from 18 to 28 C, relative humidity less than 90%. The instrument under test has been calibrated in a suitable environment using an EMCO TEM Cell 5101C, GTEM! 5305 and an RF Shielded EMC Chamber which is conducive to maintaining accurate and reliable measurement quality.

Manufacturer:	ETS-Lindgren	Operating Range:	100kHz - 5GHz
Model Number:	E100	Instrument Type:	Isotropic Probe > 1 GHz
Serial Number/ ID:	00109011	Date Code:	
Tracking Number:	S000017735	Alternate ID:	
Date Completed:	22-Oct-09	Customer:	MOTOROLA INC. (FL)
Test Type:	Standard Field, Field Strength		
Calibration Uncertainty:	Std Field Method	10kHz - 18000 MHz, +/-0.7 dB, 26.5GHz - 40GHz, +/- 0.95 dB	
k=2, (95% Confidence Level)			

Test Remarks: Special calibration - Additional field levels added.

Calibration Traceability: All Measuring and Test Equipment (M/TE) identified below are traceable to the National Institute for Standards and Technology (NIST). Calibration Laboratory and Quality System controls are compliant with ISO/IEC 17025-2005.

Standards and Equipment Used:

Make / Model / Name / S/N / Recall Date

Rohde & Schwarz	857.8008.0	Power Meter	NRVD	828110/019	10-Feb-10
Hewlett Packard	437B	HP Power Meter		3110A03972	09-Jan-10
Fluke	6060B	RF Signal Generator		5690204	11-Jun-10
Marconi	2022	Signal Generator		119019/077	25-Sep-10
Rohde & Schwarz	857.8008.0	Power Meter	NRVD	100451	18-Nov-09
Hewlett Packard	83620B	Signal Generator		3722A00541	25-Sep-10

Condition of Instrument Upon Receipt:

In Tolerance to Internal Quality Standards

On Release:

In Tolerance to Internal Quality Standards


Calibration Completed By
Maynard Reich, Calibration Technician


Attested and Issued on 22-Oct-09
Justin Terr, Calibration Supervisor

This document provides traceability of measurements to recognized national standards using controlled processes at the ETS-Lindgren Calibration Laboratory. Uncertainties listed are derived from the methods described by NIST Tech Note 1297. This certificate and report may not be reproduced, except in full, without the written approval of ETS-Lindgren Calibration Laboratory in accordance with ISO/IEC 17025-2005. QAF 1127 (06/07)



Frequency Response Calibration Factors
Model E100 Serial Number 00109011
Date of Calibration 21 Oct 2009

Frequency (MHz)	Applied V/m	Probe Reading			Correction Factor			
		X	Y	Z	X	Y	Z	Avg
1.00	7.64	7.02	7.79	6.94	1.14	1.04	0.98	1.05
1.00	19.82	16.71	17.11	16.74	1.18	1.16	1.18	1.18
1.00	71.15	57.93	59.53	58.16	1.23	1.19	1.22	1.22
1.00	125.11	100.56	104.03	102.13	1.24	1.20	1.23	1.22
15.00	7.95	8.17	8.28	8.18	0.98	0.96	0.97	0.97
15.00	19.94	19.63	19.98	19.65	1.02	1.00	1.01	1.01
15.00	70.00	67.78	68.81	67.94	1.03	1.02	1.03	1.03
15.00	124.61	120.61	122.69	121.30	1.03	1.02	1.03	1.03
30.00	7.95	8.49	8.59	8.45	0.93	0.93	0.94	0.93
30.00	19.81	19.99	20.29	20.08	1.00	0.97	0.98	0.98
30.00	69.87	69.71	70.67	70.11	1.00	0.99	1.00	1.00
30.00	124.31	124.11	125.93	125.11	1.00	0.99	0.99	0.99
75.00	8.06	8.62	8.75	8.77	0.94	0.93	0.91	0.92
75.00	19.92	20.32	20.71	20.76	0.97	0.96	0.96	0.97
75.00	69.19	71.16	72.25	72.19	0.97	0.96	0.96	0.96
75.00	123.17	126.65	128.70	128.37	0.97	0.96	0.96	0.96
100.00	7.99	8.30	8.54	8.58	0.96	0.95	0.92	0.94
100.00	19.72	20.02	20.31	20.50	0.98	0.97	0.96	0.97
100.00	70.01	70.85	71.90	72.15	0.99	0.97	0.97	0.98
100.00	126.58	128.59	130.29	130.10	0.98	0.97	0.97	0.98
150.00	8.05	8.13	8.26	8.36	0.99	0.98	0.95	0.98
150.00	19.93	20.03	20.39	20.66	0.99	0.98	0.96	0.98
150.00	69.87	70.30	71.46	71.94	0.99	0.98	0.97	0.98
150.00	124.91	126.00	127.53	128.17	0.99	0.98	0.97	0.98
200.00	8.07	8.50	8.67	8.69	0.95	0.94	0.92	0.94
200.00	19.86	20.80	21.21	21.58	0.96	0.94	0.92	0.94
200.00	69.73	73.51	74.90	75.46	0.95	0.93	0.92	0.93
200.00	125.11	132.11	134.58	134.95	0.95	0.93	0.93	0.93
250.00	8.00	8.33	8.42	8.60	0.96	0.95	0.93	0.95
250.00	20.02	20.72	21.00	21.43	0.97	0.95	0.93	0.95
250.00	70.08	72.35	73.13	74.05	0.97	0.96	0.95	0.96
250.00	123.93	128.09	129.47	130.20	0.97	0.96	0.95	0.96
300.00	8.02	8.27	8.40	8.57	0.97	0.95	0.94	0.95
300.00	19.96	20.48	20.79	21.31	0.98	0.96	0.94	0.96
300.00	69.80	71.54	72.40	73.40	0.98	0.96	0.95	0.96
300.00	125.31	129.68	131.16	131.92	0.97	0.96	0.95	0.96
400.00	7.97	8.30	8.34	8.56	0.97	0.95	0.93	0.95
400.00	20.00	20.54	20.92	21.48	0.97	0.96	0.93	0.95
400.00	70.16	71.90	72.88	73.99	0.98	0.96	0.95	0.96
400.00	126.35	129.28	131.06	132.12	0.98	0.96	0.96	0.97
500.00	7.99	8.01	8.18	8.39	1.00	0.98	0.95	0.97
500.00	20.01	20.00	20.41	20.98	1.00	0.98	0.95	0.98
500.00	69.97	69.80	71.05	72.15	1.00	0.98	0.97	0.99
500.00	124.82	125.16	127.11	128.22	1.00	0.98	0.97	0.98
600.00	8.05	8.00	8.13	8.36	1.01	0.99	0.96	0.99
600.00	19.91	19.62	19.99	20.62	1.01	1.00	0.97	0.99
600.00	70.04	68.89	69.92	71.17	1.02	1.00	0.98	1.00
600.00	126.51	124.61	126.45	127.20	1.02	1.00	0.99	1.00



Frequency Response Calibration Factors

Model E100 Serial Number 00109011

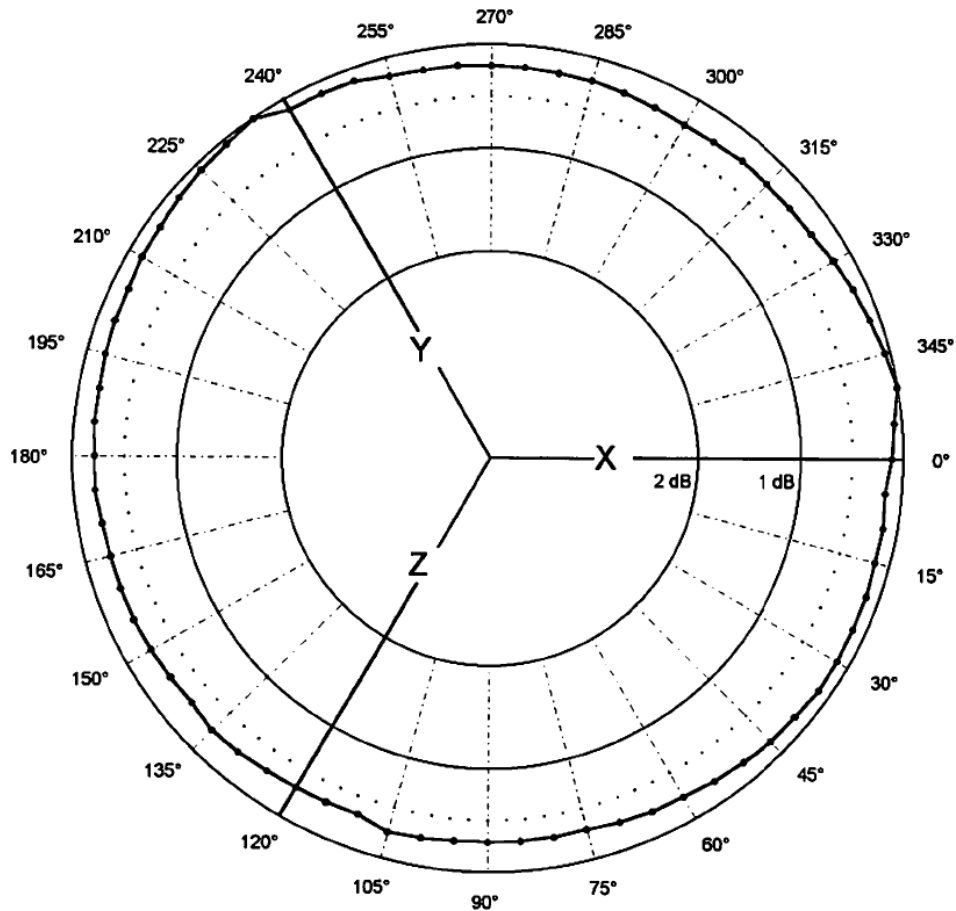
Date of Calibration 21 Oct 2009

Frequency (MHz)	Applied V/m	Probe Reading			Correction Factor			
		X	Y	Z	X	Y	Z	Avg
700.00	8.00	7.97	8.10	8.33	1.00	0.99	0.96	0.98
700.00	19.96	19.73	20.08	20.70	1.01	0.99	0.96	0.99
700.00	70.92	70.15	71.10	72.40	1.01	1.00	0.98	1.00
700.00	126.17	124.81	126.29	127.81	1.01	1.00	0.99	1.00
800.00	8.03	7.80	7.94	8.18	1.03	1.01	0.98	1.01
800.00	20.00	19.25	19.67	20.30	1.04	1.02	0.99	1.01
800.00	70.11	67.44	68.66	69.87	1.04	1.02	1.01	1.02
800.00	124.80	120.51	122.51	123.68	1.04	1.02	1.01	1.02
900.00	8.00	7.62	7.82	8.04	1.05	1.02	1.00	1.02
900.00	20.12	19.05	19.57	20.18	1.06	1.03	1.00	1.03
900.00	69.94	66.19	67.78	68.96	1.06	1.03	1.01	1.03
900.00	124.54	118.24	120.95	121.59	1.05	1.03	1.02	1.04
1000.00	7.99	8.48	8.65	9.01	0.94	0.92	0.89	0.92
1000.00	19.88	21.08	21.49	22.22	0.94	0.92	0.89	0.92
1000.00	70.09	74.27	75.51	76.80	0.94	0.93	0.91	0.93
1000.00	126.71	134.43	136.66	137.97	0.94	0.93	0.92	0.93
2000.00	20.27	19.59	20.78	20.88	1.03	0.98	0.97	0.99
2450.00	19.89	18.55	19.38	19.12	1.07	1.03	1.04	1.05
3000.00	20.20	19.52	20.35	21.43	1.03	0.99	0.94	0.99
3500.00	19.95	20.73	22.23	21.00	0.96	0.90	0.95	0.94
4000.00	20.49	21.32	21.67	21.70	0.96	0.95	0.94	0.95
5000.00	20.26	16.24	17.62	17.17	1.25	1.15	1.18	1.19
5500.00	19.77	15.77	16.06	14.83	1.25	1.23	1.33	1.27
6000.00	19.99	14.67	16.77	16.40	1.36	1.19	1.22	1.26



PROBE ROTATIONAL RESPONSE

Model E100
S/N 00109011
Date 22-Oct-2009
Time 07:40:55
Variation 0.39 dB



• Isotropic response measured in a 20 V/m field at 400 MHz

Service Test Report
QAF 1126, 06/07
Report ID: 75744



Certificate of Test Conformance

Page 1 of 1

Reference: S 000017735

Customer: MOTOROLA INC. (FL)

The instrument listed below has been tested and verified to Internal Quality Standards. Test data is Not Applicable. Equipment used during instrument testing is controlled by laboratory compliance with ISO/IEC 17025-2005 using ETS-Lindgren Quality Management System internal procedures.

<u>Manufacturer</u>	ETS-Lindgren	<u>Status In</u>	Other
<u>Instrument Type</u>	RF Survey Meter	<u>Date Completed</u>	22-Oct-09
<u>Model</u>	HI-2200	<u>Status Out</u>	Compliant with Internal Quality Standards
<u>Serial Number/ID</u>	00086316		

Remarks

Secured mounting screw on LCD to remove lines - Functional Test Performed.

I would like to take this opportunity to express our appreciation for using ETS-Lindgren for your EMI test equipment services and I am looking forward to continued business with your organization. Please feel free to contact our offices at (512) 531-6400, if you have any questions regarding this report.

Sincerely,

Justin Tarr

Calibration Supervisor

Date Attested: 22-Oct-09

APPENDIX C
DUT Photos
(Refer to Exhibit 7B)