

**MOTOROLA SOLUTIONS**

TESTING CERT # 2518.01

DECLARATION OF COMPLIANCE: MPE ASSESSMENT Part 1 of 2**EME Test Laboratory**8000 West Sunrise Blvd
Fort Lauderdale, FL. 33322**Date of Report:** January 13, 2012**Report Revision:** O**Report ID:** SR9340 MPE MC rpt APX7500 UHF R1 & UHF
R2 Rev O 01132012

Responsible Engineer: Stephen C. Whalen (Principal Staff EME Test Engineer) *SCW 1/13/12*
Report author: Stephen C. Whalen (Principal Staff EME Test Engineer)
Date(s) Tested: UHFR1 - 6/24/2010, 8/2/2011
Manufacturer/Location: Motorola Solutions, Schaumburg, IL
Date submitted for test: 05/31/2011
DUT Description: APX7500 Dual Band UHF R1 15W (380 - 470MHz) & UHF R2
15W (450-520MHz) Motorcycle Mount Option
Test TX mode(s): CW
Max. Power output: 18W
TX Frequency Bands: 380-470MHz & 450-520MHz
Signaling type: Analog, APCO 25, and TDMA 1:2 (F2)
Model(s) Tested M30QSS9PW1AN (FCC ID AZ492FT4894) with G67 motorcycle
option
Model(s) Certified: M30TSS9PW1AN (MHUE1002A) with G67 motorcycle option
Serial Number(s): 123ABC4567
Classification: Occupational/Controlled Environment
FCC ID: AZ492FT4904
Part 22 & 90 UHF R1 (406.1-470MHz) & UHF R2 (450-512MHz)
Results outside FCC bands are not applicable for FCC compliance
demonstration.

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 3.0 of this report. This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions 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.

Kim A. Zakharia
FOR Deanna Zakharia
EME Lab Senior Resource Manager and
Laboratory Director

Approval Date:

1/18/2012

Certification Date:

Certification No.:

MW 1/18/12
Ku 1/18/12

Document Revision History

Date	Revision	Comments
1/13/2012	O	Initial release

Part 1 of 2: MPE Assessment for 380-470MHz**Part 2 of 2: MPE Assessment for 450-520MHz****Part 1 of 2****Table of Contents**

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1.0 Introduction

This report details the test setup, test equipment and test results of Maximum Permissible Exposure (MPE) performed at Motorola Solutions' outside test site for product model M30TSS9PW1AN (MHUE1002A) with G67 motorcycle option.

2.0 Abbreviations / Definitions

APCO: Association of Public-Safety Communications Officials

BS: Bystander

C4FM: Compatible 4-Level Frequency Modulation

CNR: Calibration Not Required

CQPSK: Compatible Quadrature Phase Shift Keying

CW: Continuous Wave

DUT: Device Under Test

EME: Electromagnetic Energy

F2: 2 slot Time Division Multiple Access

FM: Frequency Modulation

MPE: Maximum Permissible Exposure

NA: Not Applicable

OP: Operator

PTT: Push to Talk

TDMA: Time Division Multiple Access

3.0 Referenced Standards and Guidelines

This product is designed to comply with the following applicable national and international standards and guidelines.

- United States Federal Communications Commission, Code of Federal Regulations; Rule Part 47CFR § 1.1310, § 2.1091 (d) and § 2.1093 for RF Exposure, where applicable.
- Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", OET Bulletin 65, Supplement C (Edition 01-01), FCC, Washington, D.C.: June 2001.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1999
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1992. Specific to FCC rules and regulations.
- Institute of Electrical and Electronics Engineers (IEEE) C95.1-2005
- Institute of Electrical and Electronics Engineers (IEEE) C95.3-2002
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998

4.0 Power Density Limits

Table 1 – Occupational / Controlled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65 Supplement C	ICNIRP	IEEE C95.1 1992/1999	IEEE C95.1 2005
	mW/cm ²	W/m ²	mW/cm ²	W/m ²
30 - 300	1.0			
10 - 400		10.0		
100 - 300			1.0	10.0
300 - 1,500	f/300			
300 - 3,000			f/300	f/30
400 - 2,000		f/40		
1,500 - 15,000				
1,500 - 100,000	5.0			
2,000 – 300,000		50.0		
3,000 - 300,000			10.0	100.0

Table 2 – General Population / Uncontrolled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65 Supplement C	ICNIRP	IEEE C95.1 1992/1999	IEEE C95.1 2005
	mW/cm ²	W/m ²	mW/cm ²	W/m ²
30 – 300	0.2			
10 – 400		2.0		
100 – 300			0.2	
100 – 400				2.0
300 – 1,500	f/1,500			
400 – 2,000		f/200		f/200
300 – 15,000			f/1,500	
1,500 – 15,000				
1,500 – 100,000	1.0			
2,000 – 100,000				10.0
2,000 – 300,000		10.0		

5.0 N_c Test Channels

The number of test channels are determined by using Equation 1 below. This equation is available in FCC's KDB 447498. The test channels are appropriately spaced across the antenna's frequency range.

Equation 1 – Number of test channels

$$N_c = \text{Round} \{ [100(f_{\text{high}} - f_{\text{low}})/f_c]^{0.5} \times (f_c / 100)^{0.2} \}$$

where N_c is the number of test channels, f_{high} and f_{low} are the highest and lowest frequencies within the transmission band, f_c is the mid-band frequency, and frequencies are in MHz.

6.0 Measurement Equipment

Table 3 - Equipment

Equipment Type	Model #	SN	Calibration Date	Calibration Due Date
Motorcycle	2005 Kawasaki KZ1000	NA	NA	NA
*Survey Meter	ETS Model HI-2200	00086316	10/22/2010	10/22/2011
*Probe – E-Field	ETS Model E100	00109011		
**Survey Meter	ETS Model HI-2200	00086316	01/04/2011	01/04/2012
**Probe – E-Field	ETS Model E100	00109011		

E-field measurements are in mW/cm².

* Equipment used for 6/24/2010 data

** Equipment used for 8/2/2011 data

7.0 Measurement System Uncertainty Levels

Table 4 - 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	

8.0 Product and System Description

Model M30TSS9PW1AN (MHUE1002A) with G67 motorcycle option 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 on a motorcycle.

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 bystanders are evaluated to the General Population/ Uncontrolled Exposure Limits, and the operator is evaluated to the Occupational/Controlled Exposure Limits.

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

9.0 Additional Options and Accessories

Refer to Table 5 for complete list of tested antennas.

10.0 Test Set-Up Description

Assessments were performed with mobile radio installed on the test vehicle while engine was at idle, at the specified distances and test locations indicated in section 11.0 and Appendix A.

All antennas described in Table 5 were considered in order to develop the test plan for this product. Antennas were installed and tested per their defined test channels.

11.0 Method of Measurement for motorcycle mounted antenna(s)

11.1 Bystander vehicle MPE measurements

Antenna is located at the rear of the test vehicle. Refer to Appendix A for antenna location with respect to the bystander.

MPE measurements for bystander (BS) conditions are determined by taking the average of (10) measurements in a 2m vertical line for the bystander test location indicated in Appendix A with 20cm height increments, with antenna to probe sensor separation distance of 60cm directly behind the vehicle. The separation distance used for testing is defined from the antenna where as the RF safety booklet defines the same distance from the vehicle body to ensure that the assessment is applicable to other vehicles. 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.

11.2 Operator vehicle MPE measurements

Antenna is located at the rear of the test vehicle. Refer to Appendix A for antenna location with respect to the operator.

MPE measurements for operator (OP) conditions are determined by taking the average of the (3) measurements (Head, Chest and Lower Trunk) at the standard test distance of 30cm from the operators' seat area.

The measurement probe is oriented parallel (horizontal) to the ground and positioned above the motorcycle operator's seat. The probe head is pointed towards the back of the vehicle and aimed directly at the antenna's axis while maintaining a twenty (20) centimeter separation distance between the probe sensor and reradiating structures. These (3) measurements are representative of the operator.

Note; Motorola Solution's weather proof enclosures provide 30cm separation distance from the antenna to the enclosure's edge. Refer to the installation manual for universal mounting options.

12.0 MPE Calculations

The final MPE results for this mobile radio are presented in section 14.0 Tables 6 & 7. These results are based on 50% duty cycle for PTT.

Below is an explanation of how the MPE results are calculated. Refer to Appendix D for MPE measurement results and calculations.

Bystander -10 measurements are averaged over the body (*Avg_over_body*).

Operator - 3 measurements are averaged over the body (*Avg_over_body*).

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

Therefore;

Equation 2 – Power Density Calculation (*Calc._P.D.*)

$$\text{Calc._P.D.} = (\text{Avg_over_body}) * (\text{probe_frequency_cal_factor}) * (\text{duty_cycle})$$

Note 1: The highest “average” cal factors from the calibration certificates were selected for the applicable frequency range. Linear interpretation was used to determine “probe_frequency_cal_factor” for the specific test frequencies.

Note 2: The E-field probe calibration certificate’s frequency cal factors were determined by measuring V/m. The survey meter’s results were measured in power density (mW/cm²) and therefore the “probe_frequency_cal_factor” was squared in equation 2 to account for these results.

Note 3: The H-field probe calibration certificate’s frequency cal factors were determined by measuring A/m. The survey meter’s results were measured in A/m and therefore the “Avg_over_body” A/m results were converted to power density (mW/cm²) using the equation 3. H-field measurements are only applicable to frequencies below 300MHz.

Equation 3 – Converting A/m to mW/cm²

$$\text{mW / cm}^2 = (\text{A / m})^2 * 37.699$$

Equation 4 – Power Density Maximum Calculation

$$\text{Max_Calc._P.D.} = \text{P.D._calc} * \frac{\text{max_output_power}}{\text{initial_output_power}}$$

Note 4: For initial output power > max_output_power; max_output_power / initial output power = 1

13.0 Antenna Summary

Table 5 below summarizes the tested antennas and their descriptions, overlap of FCC bands, number of test channels per FCC KDB 447498 (FCC N_c) and actual number of tested channels (Actual N_c). This information was used to determine the test configurations presented in this report.

Table 5

#	Antenna Model	Frequency Range (MHz)	Physical Length (cm)	Gain (dBi)	Remarks	Overlap FCC Bands	FCC N_c	Actual N_c
1	HAE6014A	380-433	18.5	2.15	1/4 wave, wire	406.1-433	3	5
2	HAE6032A	425-470	15.2	2.15	1/4 wave, wire	425-470	4	4

14.0 Test Results Summary

The following tables below summarize the MPE results for each test configuration: test positions (BS-Bystander, OP-Operator), E/H field measurements, antenna model & freq. range, maximum output power, initial power, TX frequency, max calculated power density results, applicable FCC/IEEE/ICNIRP specification limits and % of the applicable specification limits.

Table 6 - Bystander MPE assessment to General Population / Uncontrolled Exposure Limits

Test Position	E/H field	Antenna Model	Max Pwr (W)	Initial Pwr (W)	Tx Freq (MHz)	Max Calc. P.D. (mW/cm ²)	FCC Limit	% To FCC Spec Limit	ICNIRP Limit	% To ICNIRP Spec Limit
BS	E	HAE6014A, (380-433MHz)	18	17.2	380.0125	0.07	0.25	29	0.20	37
				17.8	393.0125	0.10	0.26	39	0.20	52
				17.3	406.5000	0.08	0.27	29	0.20	39
				17.3	419.5000	0.09	0.28	31	0.21	41
				17.3	433.0000	0.07	0.29	24	0.22	32
		HAE6032A, (425-470MHz)	18	17.4	425.0125	0.06	0.28	22	0.21	29
				17.7	440.0125	0.10	0.29	35	0.22	46
				17.8	455.0125	0.10	0.30	34	0.23	46
				17.2	469.9875	0.07	0.31	24	0.23	32

Note – Data highlighted was used for FCC ID AZ492FT4894 in July 2010. Remaining data was taken in 2011 with the same radio model from FCC ID AZ492FT4894.

Table 7 - Operator MPE assessment to Occupational / Controlled Exposure Limits

Test Position	E/H field	Antenna Model	Max Pwr (W)	Initial Pwr (W)	Tx Freq (MHz)	Max Calc. P.D. (mW/cm ²)	FCC Limit	% To FCC Spec Limit	ICNIRP Limit	% To ICNIRP Spec Limit
OP	E	HAE6014A, (380-433MHz)	18	17.2	380.0125	0.46	1.27	36	1.00	46
				17.8	393.0125	0.48	1.31	37	1.00	48
				17.3	406.5000	0.45	1.36	33	1.02	44
				17.3	419.5000	0.37	1.40	26	1.05	35
				17.3	433.0000	0.32	1.44	22	1.08	30
		HAE6032A, (425-470MHz)	18	17.4	425.0125	0.33	1.42	23	1.06	31
				17.7	440.0125	0.36	1.47	25	1.10	33
				17.8	455.0125	0.39	1.52	26	1.14	35
				17.2	469.9875	0.38	1.57	24	1.17	32

15.0 Conclusion

The assessments for this device were performed with an output power range as indicated in section 14.0 Tables 6 & 7. The maximum allowable output power is equal to the upper limit of the final test factory transmit power specification of 18W. The highest power density results for the mobile device scaled to the maximum allowable power output are indicated in Table 8 for operator and bystander to the vehicle.

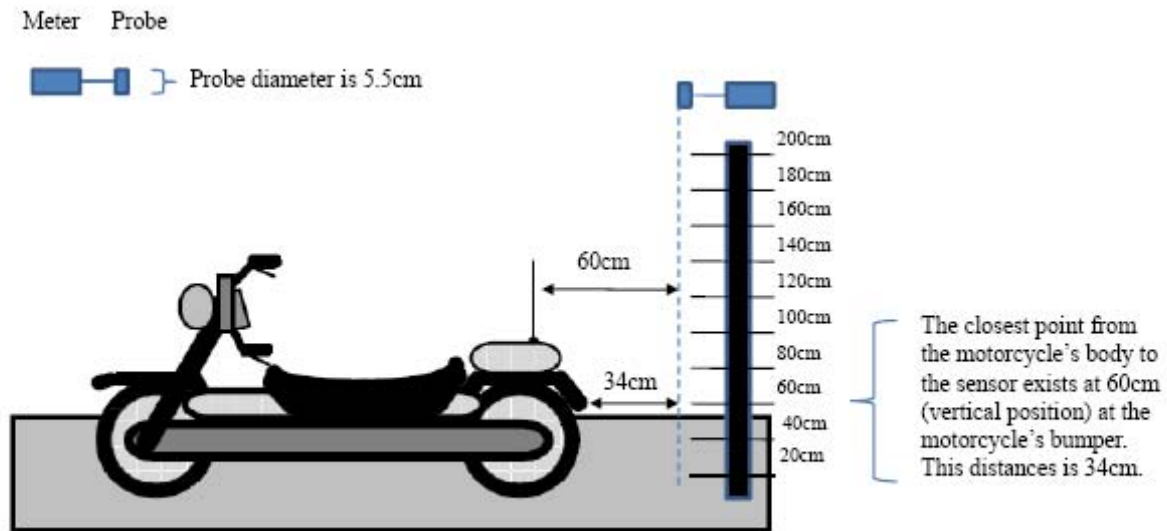
Table 8: Maximum MPE RF Exposure Summary

Designator	Frequency (MHz)	Operator (mW/cm²)	Bystander (mW/cm²)
Overall	380-470	0.48	0.10
FCC	406.1-470	0.45	0.10

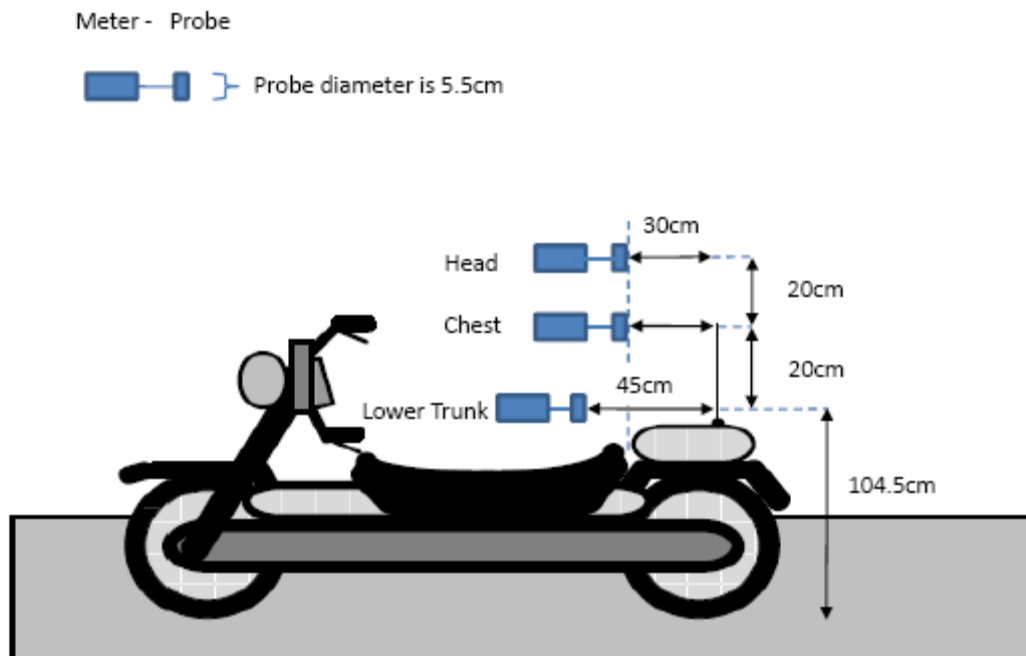
These MPE results herein demonstrate compliance to the FCC/IEEE/ICNIRP Occupational/Controlled Exposure limit. FCC rules require compliance for Bystanders to the FCC General Population/Uncontrolled limits.

Appendix A - Illustration of Antenna Location and Test Distances

Bystander Illustration



Operator Illustration



Note that the Lower Trunk measurement distance (45cm) from the antenna is to achieve 20cm distance from reradiating objects.

Appendix B - Probe Calibration Certificates

Service Test Report

QAF 1126, 06/07

Report ID: 75744



An ESCO Technologies Company

1301 Arrow Point Drive
Cedar Park, Texas 78613
(512) 531-6498



An ESCO Technologies Company

Tracking # S000017735

Equipment Check

Attested by JT Date: 22-Oct-09

www.ets-lindgren.com

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

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,

A handwritten signature in blue ink, appearing to read "Justin Tarr".

Justin Tarr

Calibration Supervisor

Date Attested: 22-Oct-09



Cert I.D.: 75742

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
Hewlett Packard	437B	HP Power Meter	
Fluke	6060B	RF Signal Generator	
Marconi	2022	Signal Generator	
Rohde & Schwarz	857.8008.0	Power Meter	NRVD
Hewlett Packard	83620B	Signal Generator	

828110/019	10-Feb-10
3110A03972	09-Jan-10
5690204	11-Jun-10
119019/077	25-Sep-10
100451	18-Nov-09
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



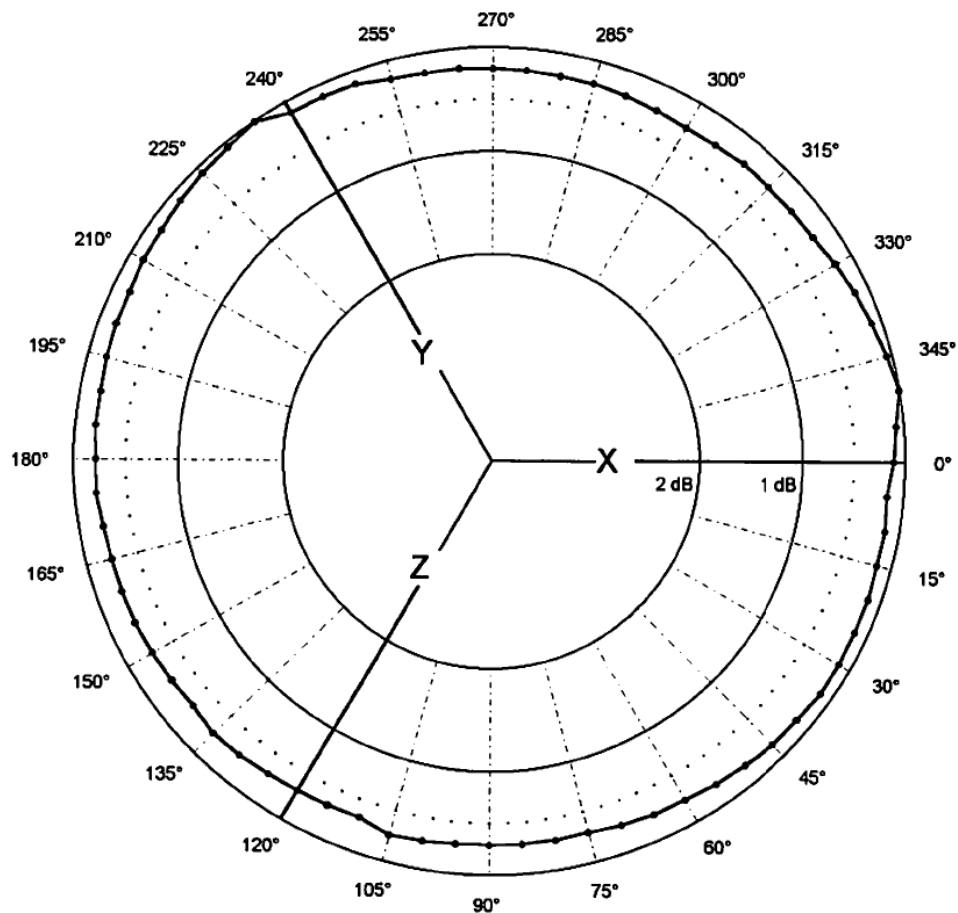
Frequency Response Calibration Factors
Model E100 Serial Number 00109011
Date of Calibration 21 Oct 2009

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: 82515



Certificate of Test Conformance

Page 1 of 1

Reference: S 000021039

Customer: AGILENT/MOTOROLA (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>	In Tolerance
<u>Instrument Type</u>	RF Survey Meter	<u>Date Completed</u>	04-Jan-11
<u>Model</u>	HI-2200	<u>Status Out</u>	Compliant with Internal Quality Standards
<u>Serial Number/ID</u>	00086316		

Remarks

Performed functional test with customer probes.

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,

Richard Goodlow

Calibration Supervisor

Date Attested: 04-Jan-11



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



Cert I.D.: 82513

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:	S000021039	Alternate ID:	
Date Completed:	04-Jan-11	Customer:	AGILENT/MOTOROLA (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: Provided specific frequencies per customer request.

Calibration Traceability: All Measuring and Test Equipment (MTE) 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

Hewlett Packard	437B	HP Power Meter	3125U12370	15-Jun-11
Fluke	6060B	RF Signal Generator	5690204	15-Jun-11
Marconi	2022	Signal Generator	119019/077	23-Sep-11
Agilent	E4419B	Power Meter	MY45104171	23-Sep-11
Rohde & Schwarz	857.8008.02	Power Meter NRVD	100451	11-Mar-11
Hewlett Packard	83650L	Synthesized Sweep Gen	3844A00422	29-Jan-11

Condition of Instrument

Upon Receipt:

In Tolerance to Internal Quality Standards

On Release:

In Tolerance to Internal Quality Standards

Calibration Completed By
Alan Schifferdecker, Calibration Technician

Attested and Issued on 04-Jan-11
Richard Goodlow, 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 4 Jan 2011

Frequency (MHz)	Applied V/m	Probe Reading			Correction Factor			
		X	Y	Z	X	Y	Z	Avg
1.00	8.01	6.72	6.81	6.79	1.19	1.18	1.19	1.18
1.00	19.91	16.99	17.06	16.81	1.18	1.16	1.18	1.17
1.00	69.94	57.57	58.72	57.39	1.21	1.19	1.22	1.21
1.00	124.57	101.46	104.06	102.37	1.23	1.20	1.22	1.21
15.00	7.96	7.86	7.90	7.83	1.01	1.01	1.02	1.01
15.00	20.05	19.63	19.82	19.48	1.02	1.01	1.03	1.02
15.00	70.00	69.10	69.69	68.73	1.01	1.00	1.02	1.01
15.00	124.88	122.58	123.22	122.40	1.02	1.01	1.02	1.02
30.00	7.98	8.01	8.05	7.96	1.00	0.99	1.00	1.00
30.00	19.92	19.97	19.95	19.75	1.00	1.00	1.01	1.00
30.00	70.27	70.84	71.25	70.61	0.99	0.99	1.00	0.99
30.00	125.59	125.86	126.38	125.94	1.00	0.99	1.00	1.00
75.00	7.98	8.06	8.10	8.14	0.99	0.98	0.98	0.98
75.00	19.98	20.08	20.34	20.37	0.99	0.98	0.98	0.99
75.00	69.66	71.26	71.78	71.67	0.98	0.97	0.97	0.97
75.00	124.36	126.52	127.22	126.98	0.98	0.98	0.98	0.98
100.00	8.00	8.31	8.35	8.32	0.97	0.96	0.95	0.96
100.00	19.94	20.43	20.62	20.69	0.98	0.97	0.96	0.97
100.00	69.60	71.97	72.44	72.45	0.97	0.96	0.96	0.96
100.00	124.78	129.20	129.68	129.76	0.97	0.96	0.96	0.96
150.00	8.03	8.22	8.28	8.36	0.98	0.97	0.96	0.97
150.00	20.04	20.29	20.56	20.74	0.99	0.97	0.97	0.98
150.00	69.71	71.24	71.85	72.06	0.98	0.97	0.97	0.97
150.00	124.96	127.79	128.59	128.81	0.98	0.97	0.97	0.97
200.00	7.96	8.42	8.54	8.67	0.95	0.93	0.92	0.93
200.00	19.94	20.85	21.26	21.50	0.96	0.94	0.93	0.94
200.00	69.91	73.96	75.03	75.43	0.94	0.93	0.93	0.93
200.00	125.22	132.74	134.34	135.14	0.94	0.93	0.93	0.93
250.00	8.01	8.24	8.23	8.39	0.97	0.97	0.96	0.97
250.00	19.97	20.34	20.44	20.74	0.98	0.98	0.96	0.97
250.00	69.73	72.74	71.86	72.46	0.97	0.97	0.96	0.96
250.00	124.77	129.17	128.53	129.40	0.97	0.97	0.97	0.97
300.00	7.99	8.19	8.22	8.40	0.97	0.97	0.95	0.97
300.00	19.98	20.29	20.42	20.78	0.99	0.98	0.96	0.98
300.00	69.98	72.15	72.24	72.93	0.97	0.97	0.96	0.97
300.00	125.38	130.27	130.16	131.02	0.96	0.96	0.96	0.96
400.00	7.98	8.15	8.17	8.34	0.98	0.98	0.95	0.97
400.00	19.89	20.07	20.26	20.67	0.99	0.98	0.96	0.98
400.00	69.66	71.58	71.93	72.74	0.97	0.97	0.96	0.97
400.00	124.82	128.40	128.45	129.35	0.97	0.97	0.96	0.97
500.00	8.01	7.90	8.00	8.20	1.01	1.00	0.98	1.00
500.00	20.01	19.58	19.94	20.36	1.02	1.00	0.98	1.00
500.00	70.01	69.21	70.57	70.91	1.01	1.00	0.98	1.00
500.00	124.92	123.45	124.93	125.25	1.01	1.00	0.99	1.00
600.00	8.00	7.74	7.78	7.97	1.03	1.03	1.00	1.02
600.00	19.99	19.16	19.35	19.81	1.04	1.03	1.01	1.03
600.00	69.71	67.99	68.18	68.96	1.03	1.02	1.01	1.02
600.00	125.01	121.68	121.62	123.11	1.03	1.03	1.02	1.02



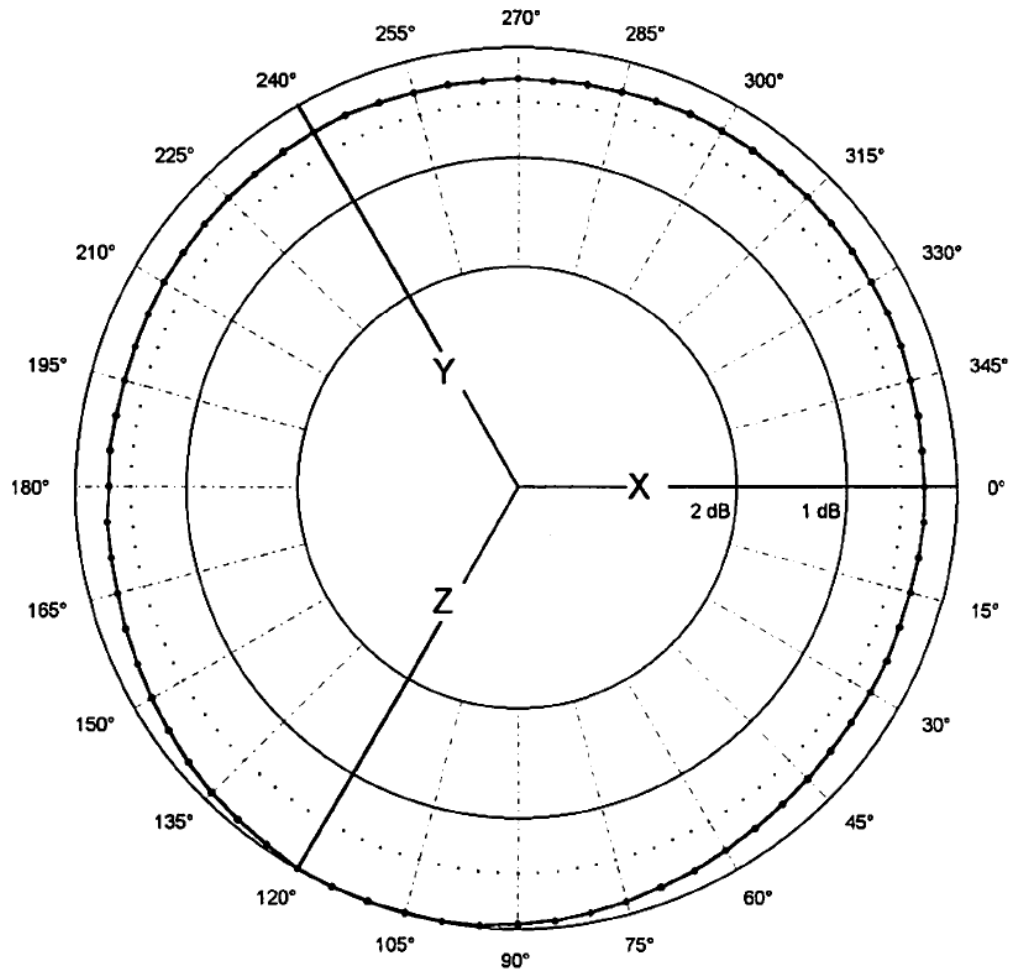
Frequency Response Calibration Factors
Model E100 Serial Number 00109011
Date of Calibration 4 Jan 2011

Frequency (MHz)	Applied V/m	Probe Reading			Correction Factor			
		X	Y	Z	X	Y	Z	Avg
700.00	7.98	7.54	7.55	7.75	1.06	1.06	1.03	1.05
700.00	19.95	18.65	18.77	19.21	1.07	1.06	1.04	1.06
700.00	70.29	66.67	66.74	67.70	1.05	1.05	1.04	1.05
700.00	125.03	118.33	118.33	119.37	1.05	1.06	1.05	1.05
800.00	8.02	7.36	7.46	7.65	1.09	1.08	1.05	1.07
800.00	20.01	18.20	18.51	18.79	1.10	1.09	1.06	1.08
800.00	70.11	64.66	65.16	66.08	1.09	1.08	1.06	1.07
800.00	124.54	114.33	115.44	115.49	1.09	1.08	1.08	1.08
900.00	8.01	7.73	7.90	8.11	1.04	1.01	0.99	1.01
900.00	20.03	19.06	19.57	20.19	1.05	1.02	1.00	1.02
900.00	70.05	67.21	68.79	69.68	1.04	1.02	1.01	1.02
900.00	125.46	120.34	121.90	123.03	1.05	1.03	1.02	1.03
1000.00	8.01	8.03	8.09	8.31	1.00	0.99	0.96	0.98
1000.00	19.92	19.81	19.86	20.44	1.01	1.00	0.98	0.99
1000.00	69.72	69.27	70.09	71.56	1.00	1.00	0.97	0.99
1000.00	125.71	124.36	124.64	125.68	1.01	1.01	1.00	1.01
2000.00	20.37	20.04	19.84	20.46	1.02	1.03	1.00	1.01
2450.00	20.04	18.11	19.40	19.62	1.11	1.03	1.02	1.05
3000.00	19.97	19.95	19.47	19.27	1.00	1.03	1.04	1.02
3500.00	19.93	20.40	22.00	20.96	0.98	0.91	0.95	0.94
4000.00	20.05	20.37	19.96	20.00	0.98	1.00	1.00	1.00
5000.00	19.80	14.46	15.77	14.64	1.37	1.26	1.35	1.33
5500.00	19.98	15.05	15.28	15.18	1.33	1.31	1.32	1.32
6000.00	20.07	13.45	15.63	15.58	1.49	1.28	1.29	1.35



PROBE ROTATIONAL RESPONSE

Model E100
S/N 00109011
Date 04-Jan-2011
Time 14:33:16
Variation 0.31 dB



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

Appendix C - Photos of Assessed Antennas

(Refer to Exhibit 7B)

Appendix D – MPE Measurement Results

MPE measurement data for Bystander

D.U.T. Info.							Probe Info.		Test Pos.	Bystander (BS) Positions										DUT Max. TX Factor	Avg. over Body (mW/cm ²)	Calc. P.D. (mW/cm ²)	Max Calc. P.D. (mW/cm ²)
Ant Loc.	Ant. Model/ Desc.	Ant. Gain (dBi)	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	Test Mode	E/H Field	Probe Cal. Factor		20 cm	40 cm	60 cm	80 cm	100 cm	120 cm	140 cm	160 cm	180 cm	200 cm				
MC	HAE6014A, (380-433MHz)	2.15	380.0125	18	17.2	CW	E	0.94	BS	0.14	0.11	0.16	0.15	0.22	0.22	0.19	0.14	0.1	0.06	0.5	0.149	0.070	0.07
MC	HAE6014A, (380-433MHz)	2.15	393.0125	18	17.8	CW	E	0.96	BS	0.17	0.16	0.22	0.21	0.29	0.33	0.3	0.21	0.14	0.09	0.5	0.212	0.102	0.10
MC	HAE6014A, (380-433MHz)	2.15	406.5000	18	17.3	CW	E	0.94	BS	0.1	0.07	0.11	0.1	0.25	0.3	0.28	0.21	0.13	0.08	0.5	0.163	0.077	0.08
MC	HAE6014A, (380-433MHz)	2.15	419.5000	18	17.3	CW	E	0.97	BS	0.13	0.12	0.13	0.12	0.23	0.3	0.28	0.19	0.12	0.07	0.5	0.169	0.082	0.09
MC	HAE6014A, (380-433MHz)	2.15	433.0000	18	17.3	CW	E	0.95	BS	0.08	0.05	0.08	0.07	0.23	0.29	0.27	0.18	0.11	0.06	0.5	0.142	0.067	0.07
MC	HAE6032A, (425-470MHz)	2.15	425.0125	18	17.4	CW	E	0.95	BS	0.08	0.05	0.08	0.06	0.22	0.25	0.23	0.16	0.09	0.05	0.5	0.127	0.060	0.06
MC	HAE6032A, (425-470MHz)	2.15	440.0125	18	17.7	CW	E	0.98	BS	0.09	0.09	0.12	0.15	0.34	0.41	0.38	0.23	0.14	0.08	0.5	0.203	0.099	0.10
MC	HAE6032A, (425-470MHz)	2.15	455.0125	18	17.8	CW	E	0.98	BS	0.09	0.1	0.12	0.17	0.36	0.46	0.37	0.22	0.13	0.07	0.5	0.209	0.102	0.10
MC	HAE6032A, (425-470MHz)	2.15	469.9875	18	17.2	CW	E	0.97	BS	0.09	0.05	0.05	0.09	0.28	0.34	0.27	0.15	0.09	0.05	0.5	0.146	0.071	0.07

MPE calculations are defined in section 12.0.

MPE measurement data for Operator

D.U.T. Info.							Probe Info.		Test Pos.	Operator (MC) Positions			DUT Max. TX Factor	Avg. over Body (mW/cm2)	Calc. P.D. (mW/cm2)	Max Calc. P.D. (mW/cm2)
Ant Loc.	Ant. Model/ Desc.	Ant. Gain (dBi)	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	Test Mode	E/H Field	Probe Cal. Factor								
										Head	Chest	Lower Trunk				
MC	HAE6014A, (380-433MHz)	2.15	380.0125	18	17.8	CW	E	0.96	OP	0.6	1.37	0.86	0.5	0.943	0.453	0.46
MC	HAE6014A, (380-433MHz)	2.15	393.0125	18	17.8	CW	E	0.96	OP	0.66	1.46	0.86	0.5	0.993	0.477	0.48
MC	HAE6014A, (380-433MHz)	2.15	406.5000	18	17.6	CW	E	0.96	OP	0.6	1.42	0.7	0.5	0.907	0.435	0.45
MC	HAE6014A, (380-433MHz)	2.15	419.5000	18	17.3	CW	E	0.97	OP	0.42	1.12	0.63	0.5	0.723	0.351	0.37
MC	HAE6014A, (380-433MHz)	2.15	433.0000	18	17.8	CW	E	0.97	OP	0.38	1.04	0.54	0.5	0.653	0.317	0.32
MC	HAE6032A, (425-470MHz)	2.15	425.0125	18	17.8	CW	E	0.97	OP	0.39	1.04	0.56	0.5	0.663	0.322	0.33
MC	HAE6032A, (425-470MHz)	2.15	440.0125	18	17.7	CW	E	0.98	OP	0.4	1.13	0.63	0.5	0.720	0.353	0.36
MC	HAE6032A, (425-470MHz)	2.15	455.0125	18	17.8	CW	E	0.98	OP	0.46	1.18	0.75	0.5	0.797	0.395	0.40
MC	HAE6032A, (425-470MHz)	2.15	469.9875	18	17.8	CW	E	0.99	OP	0.52	1.41	0.35	0.5	0.760	0.376	0.38

MPE calculations are defined in section 12.0.