MOTOROLA

ACCREDITED
TESTING CERT # 2518.01

FCC ID: AZ492FT4887
DECLARATION OF COMPLIANCE MPE ASSESSMENT Part 2 of 2

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

Date of Report: October 22, 2009
Report Revision: Rev. B
Report ID: FCC SAR rpt_SR6835_PMUE3257A RPX Repeater _Rev. B_091022

Responsible Engineer:	Kim Uong (Principal Staff EME Eng.)
Date/s Tested:	5/1/09; 10/2/09
Manufacturer/Location:	Motorola, China
Date submitted for test:	10/20/08
DUT Description:	RPU4160 RPX Repeater, UHF 450-470, Removable Antenna, 4.0Watts AC/DC Power supply,(2.0 Watts AA Li-Ion) Color Black
Test TX mode(s):	CW
Max. Power output:	4.20 W, 100% Duty Cycle
TX Frequency Bands:	450.000MHz - 455.000MHz
Signaling type:	FM
Model(s) Tested:	PMUE3257A
Model(s) Certified:	PMUE3257A
Serial Number(s):	186TKC0019
Classification:	Occupational/Controlled Environment
Rule Part(s):	90

DUT Photo
(Refer to Exhibit 7B)

Approved Accessories:
Antenna(s):
HKAE4000A Dipole, 450MHz-470MHz, 1.4dBi gain
HKKN4022A 1/2 wave Whip (monopole), 438MHz-470MHz, 2.4dBi gain, Mag Mount & 12' RF CBL Kit

Batteries:
AA Alkaline battery; 6080384X65 (RLN6351A) 1100MAh Standard Li-Ion battery; 6080384X63 (RLN6305A) 2200MAh High capacity battery; 6080384Y10 (RLN6308A) Ultra High Capacity battery.

Others:
HKHN4003A (NNTN7569A) Alkaline Battery frame; HKHN4004A (NNTN7571A) Li-Ion Battery frame; HKNN4010A Ultra high capacity Li-Ion Battery kit; HKNN4011A High capacity Li-Ion Battery kit.

Final RF Exposure Results:

	Vehicle	Desk Top/Wall mount
Passengers/Operator	0.08 mW/cm^2	0.16 mW/cm^2
Bystander	0.06 mW/cm^2	

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 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 – Deanna Zakharia
Deanna Zakharia
EMS EME Lab Senior Resource Manager,
Laboratory Director,

Approval Date: 10/22/09

Certification Date: 10/22/09

Certification No.: L1091025

TABLE OF CONTENTS

Part 1 of 2: Vehicle mount Antenna
Part 2 of 2: Desktop and wall mount Antennas

Part 2 of 2: Desktop and wall mount Antennas

REVISION HISTORY

Date	Revision	Comments
08/03/09	O	Original release
8/25/09	A	To add the suffix for the battery 6080384Y10 (RLN6308A) and modify the 2nd paragraph of section 1.0.
10/22/09	B	To change the report's name from RF exposure to MPE assessment; include the actual MPE measurement for desktop, wall mount and vehicle mount applications; add section 2.0 Abbreviations / Definitions.

1.0 Product and System Description

FCC ID: AZ492FT4887, RPX Series™ Repeater model PMUE3257A is ideal as a range extender that can help reach other users in areas that are normally not covered by a 2-way radio's range. This repeater is very useful to help resolve the common problem of "dead spots" that are created when there are terrain obstructions. The RPX Series™ operates in the 450-470 MHz band (transmit only at 450-455MHz), with a rated conducted power of 4W (with power supply) and 2W (with AA Li-Ion battery). The maximum conducted output power is 4.2 Watts. The RPX Series™ is designed to be completely compatible with the RDX UHF 2-Way Radio Series.

This device will be marketed to and used by employees solely for work-related operations. 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.

(Note that "By-standers" as used herein mean people other than operator)

2.0 Abbreviations / Definitions

CNR: Calibration Not Required
CW: Continues Wave
DUT: Device Under Test
FM: Frequency Modulation
NA: Not Applicable
MPE: Maximum Permissible Exposure
EME: Electromagnetic Energy

3.0 Additional Options and Accessories

FCC ID: AZ492FT4887 is offered with the options and accessories listed on the coversheet.

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 450-455MHz the MPE (Maximum Permissible Exposure) limit to electromagnetic energy in equivalent plane wave free-space power density is 0.30 – 0.30 mW/cm^2 and calculated using the formula f/1500.

5.0 Measurement System Uncertainty Levels

Uncertainty Budget for E-field and H-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 MPE assessments for desktop device with antenna HKAE4000A

(Refer to APPENDIX A figure 1 for antenna location and test distances)

MPE measurements are determined by taking the average of (10) measurements in a 2m vertical line for the test locations indicated in appendix A with 20cm increments at the test distance of 20cm from the antenna under test. These measurements are representative of persons standing next to the device.

6.2 MPE assessments for device with wall mount antenna HKKN4022A

(Refer to APPENDIX A figure 2 for antenna location and test distances)

MPE measurements are determined by taking the average of (10) measurements in a 2m vertical line for the test locations indicated in appendix B with 20cm increments at the test distance of 20cm from the antenna under test. These measurements are representative of persons standing next to the device.

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
Survey Meter / Probe – E-Field (Electric Field)	ETS Model HI-2200 / ETS Model E100	86887 / 83370	12/04/08

9.0 DUT output power:

Power density measurements were performed on device model PMUE3257A with serial number 186TKC0019. Both of the antennas listed in the cover page of this report were used to assess MPE compliance.

The tested frequency and associated power outputs are presented below.

Test frequencies and measured Po (W):

Frequency (MHz)	Po (W)
452.5	4.19

10.0 Test Set-Up Description

The following are the antenna test configurations used for this product (refer to APPENDIX A for the antenna location and test distances).

Desktop:
The DUT, with the antenna HKAE4000A attached, was placed on the wooden table with the antenna is closest to the edge of the table as indicated in the APPENDIX A figure 1 –Test setup for the Desktop device.

Wall Mount:
The DUT, with the antenna HKKN4022A attached, was placed on the Metal cabinet with the antenna's base is located on the edge of the table as indicated in the APPENDIX A figure 2 –Test setup for the device with wall mount antenna.

11.0 Test Results Summary

The tables below summarized the MPE measurement results for each test configuration: antenna (model and description), antenna gain, TX frequency, maximum output power, initial power, E/H field measurements, probe frequency cal factor, applicable test positions for desktop and wall mount antennas, 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 device are based on 100% duty cycle which is in accordance with the User Manual instructions.

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

Operator/Bystander -10 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/cm^2) and therefore the cal factors were squared as indicated in the formula above.

Ant. Model/ Desc.	Ant. Gain (dBi)	Tx Freq (MHz)	Max Pwr (W)	Initial Pwr (W)	E/H Field	Probe Freq. Cal. Factor	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
HKAE4000A (Dipole 450-470MMz)	1.4	452.5	4.2	3.97	E	1.02	Desk top	0.151	0.15	0.16	54	0.30
HKKN4022A (Whip 438-470MHz)	2.4	452.5	4.2	3.97	E	1.02	Wall mount	0.116	0.12	0.13	41	0.30

12.0 Conclusion

The MPE assessments for this device were performed with an output power range as indicated in section 9. The maximum allowable output power is equal to the upper limit of the final test factory transmit power specification of 4.2W. The highest power density results scale to the maximum allowable power output is 0.16mW/cm^2. The MPE results presented herein demonstrate compliance to the applicable FCC General Population/ Uncontrolled RF Exposure limit.

APPENDIX A
Illustration of Antenna Locations and Test Distances

Figure 1: Test setup for desktop device with antenna HKAE4000A

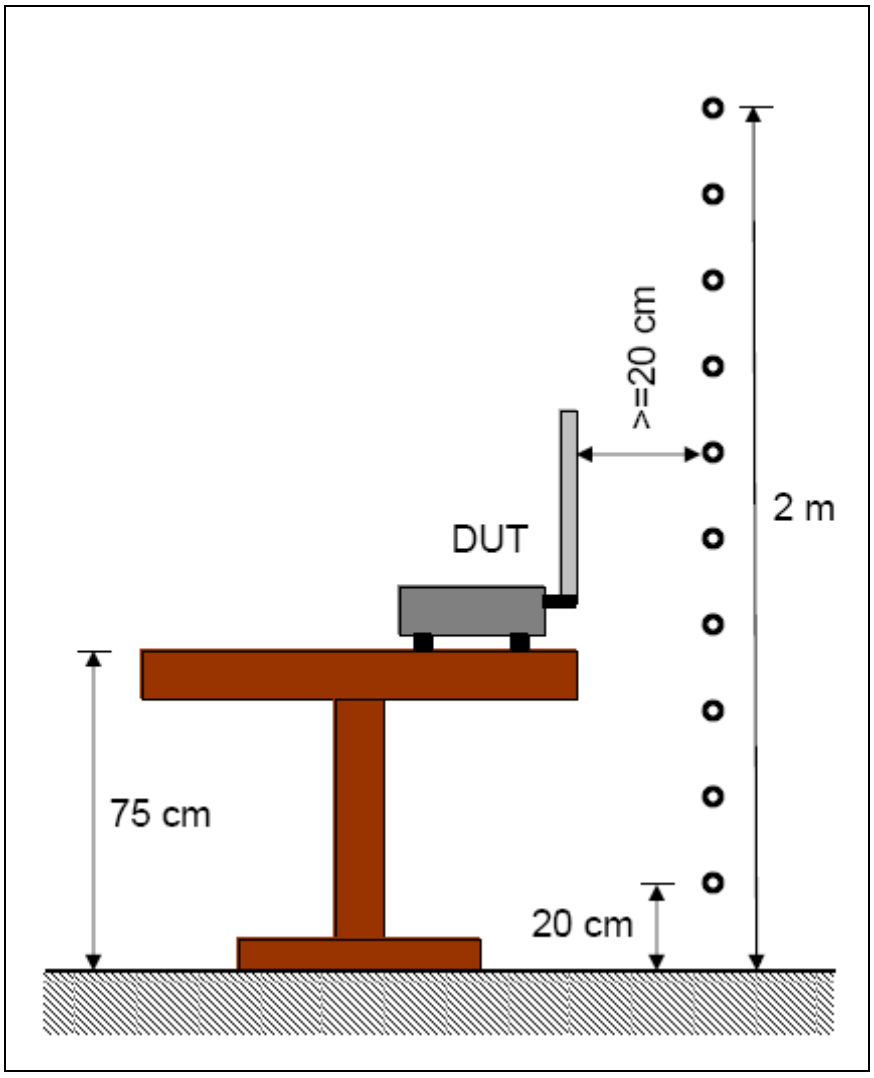
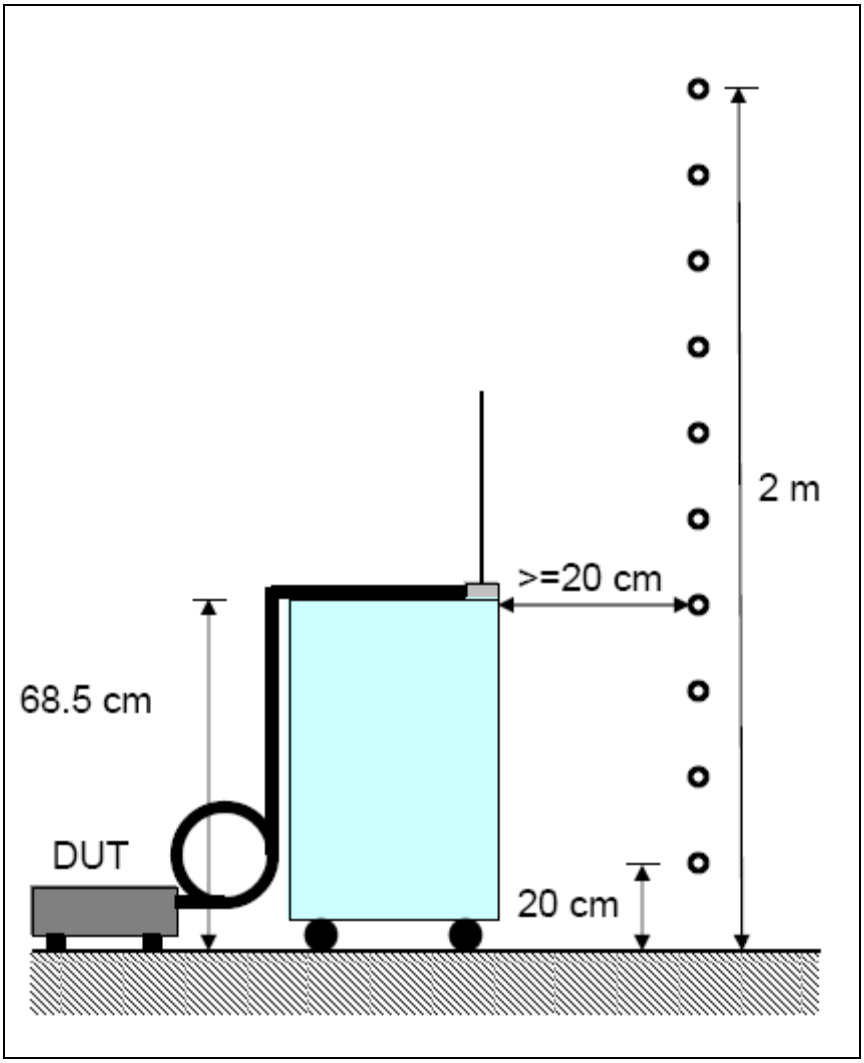


Figure 2: Test setup for device with wall mount antenna HKKN4022A



APPENDIX B
Meter/Probe Calibration Certificates

ACCREDITED

Cert I.D.: 70578
Lab Code 115844/1207.01

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

ETS·LINDGREN
An ESCO Technologies Company
Track# S000015131 Ltd Cal ☐
By AS Date 04-Dec-08
Next Cal Due _____
www.ets-lindgren.com

Certificate of Calibration Conformance

Page 1 of 4

The instrument identifed 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:	*00083370*	**Date Code:**	
Tracking Number:	**S000015131**	**Alternate ID:**	
Date Completed:	04-Dec-08	**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: Provided special data points per customer request.

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

Boonton	9200B	RF Voltmeter	280601AE	29-Sep-09
Hewlett Packard	437B	HP Power Meter	3125U12370	21-May-09
Fluke	6060B	RF Signal Generator	5690204	20-May-09
Marconi	2022	Signal Generator	119019/077	02-Oct-09
Rohde & Schwarz	857.8008.0	Power Meter NRVD	828110/019	27-Dec-08
Hewlett Packard	83620B	Signal Generator	3722A00541	19-Sep-09

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-Dec-08
Justin Tarr, Calibration Supervisor

ETS·LINDGREN™

Frequency Response Calibration Factors
Model E100 Serial Number 00083370
Date of Calibration 4 Dec 2008

Frequency	Applied	Probe Reading			Correction Factor			
(MHz)	V/m	X	Y	Z	X	Y	Z	Avg
1.00	7.97	6.74	6.71	6.60	1.18	1.19	1.21	1.19
1.00	20.01	17.05	16.99	16.75	1.17	1.18	1.19	1.18
1.00	69.93	59.37	59.09	58.36	1.18	1.18	1.20	1.19
1.00	124.30	105.11	104.67	103.34	1.18	1.19	1.20	1.19
15.00	8.02	7.86	7.79	7.76	1.02	1.03	1.03	1.03
15.00	19.96	19.62	19.45	19.42	1.02	1.03	1.03	1.02
15.00	70.28	68.97	68.30	68.14	1.02	1.03	1.03	1.03
15.00	125.20	122.31	121.06	120.78	1.02	1.03	1.04	1.03
30.00	8.02	8.00	7.92	7.89	1.00	1.01	1.02	1.01
30.00	20.11	20.09	19.88	19.85	1.00	1.01	1.01	1.01
30.00	69.83	69.30	68.56	68.31	1.01	1.02	1.02	1.02
30.00	124.31	122.47	121.21	120.74	1.01	1.03	1.03	1.02
75.00	8.03	8.24	8.23	8.12	0.97	0.98	0.99	0.98
75.00	20.11	20.71	20.64	20.46	0.97	0.97	0.98	0.98
75.00	70.04	72.11	71.83	71.03	0.97	0.98	0.99	0.98
75.00	124.66	128.20	127.66	126.29	0.97	0.98	0.99	0.98
100.00	8.02	8.17	8.13	8.04	0.98	0.99	1.00	0.99
100.00	20.04	20.45	20.33	20.21	0.98	0.99	0.99	0.99
100.00	70.33	71.31	70.79	70.25	0.99	0.99	1.00	0.99
100.00	124.43	125.68	124.79	123.57	0.99	1.00	1.01	1.00
150.00	8.03	8.14	8.14	8.02	0.99	0.99	1.00	0.99
150.00	19.96	20.33	20.31	20.09	0.98	0.98	0.99	0.99
150.00	70.14	71.64	71.55	70.58	0.98	0.98	0.99	0.98
150.00	125.58	128.56	128.42	126.52	0.98	0.98	0.99	0.98
200.00	8.00	8.43	8.53	8.28	0.95	0.94	0.97	0.95
200.00	19.97	21.08	21.37	20.85	0.95	0.93	0.96	0.95
200.00	69.86	74.08	74.82	72.92	0.94	0.93	0.96	0.94
200.00	124.95	132.17	134.06	130.32	0.95	0.93	0.96	0.95
250.00	7.97	8.11	7.88	7.96	0.98	1.01	1.00	1.00
250.00	19.99	20.55	19.75	20.20	0.97	1.01	0.99	0.99
250.00	70.06	72.32	70.37	70.59	0.97	1.00	0.99	0.99
250.00	125.12	128.64	124.26	125.28	0.97	1.01	1.00	0.99
300.00	8.00	8.08	7.94	7.97	0.99	1.01	1.00	1.00
300.00	20.03	20.57	20.25	20.34	0.97	0.99	0.98	0.98
300.00	69.79	72.57	71.30	71.56	0.96	0.98	0.98	0.97
300.00	125.28	130.82	128.42	128.85	0.96	0.98	0.97	0.97
400.00	8.00	8.10	7.97	7.97	0.99	1.00	1.00	1.00
400.00	19.89	20.15	19.87	19.89	0.99	1.00	1.00	1.00
400.00	69.67	70.49	69.32	69.33	0.99	1.01	1.00	1.00
400.00	125.09	126.27	124.24	124.10	0.99	1.01	1.01	1.00
500.00	8.01	7.89	7.95	7.68	1.02	1.01	1.03	1.02
500.00	19.94	19.59	19.74	19.37	1.02	1.01	1.03	1.02
500.00	70.28	69.65	70.06	68.64	1.01	1.00	1.02	1.01
500.00	124.58	123.19	123.63	121.24	1.01	1.01	1.03	1.02
600.00	8.01	7.65	7.63	7.61	1.04	1.05	1.06	1.05
600.00	20.01	19.34	19.09	19.06	1.04	1.05	1.05	1.04
600.00	69.90	67.55	67.54	66.46	1.03	1.04	1.05	1.04
600.00	125.28	120.21	120.01	119.47	1.03	1.05	1.05	1.04

ETS·LINDGREN™

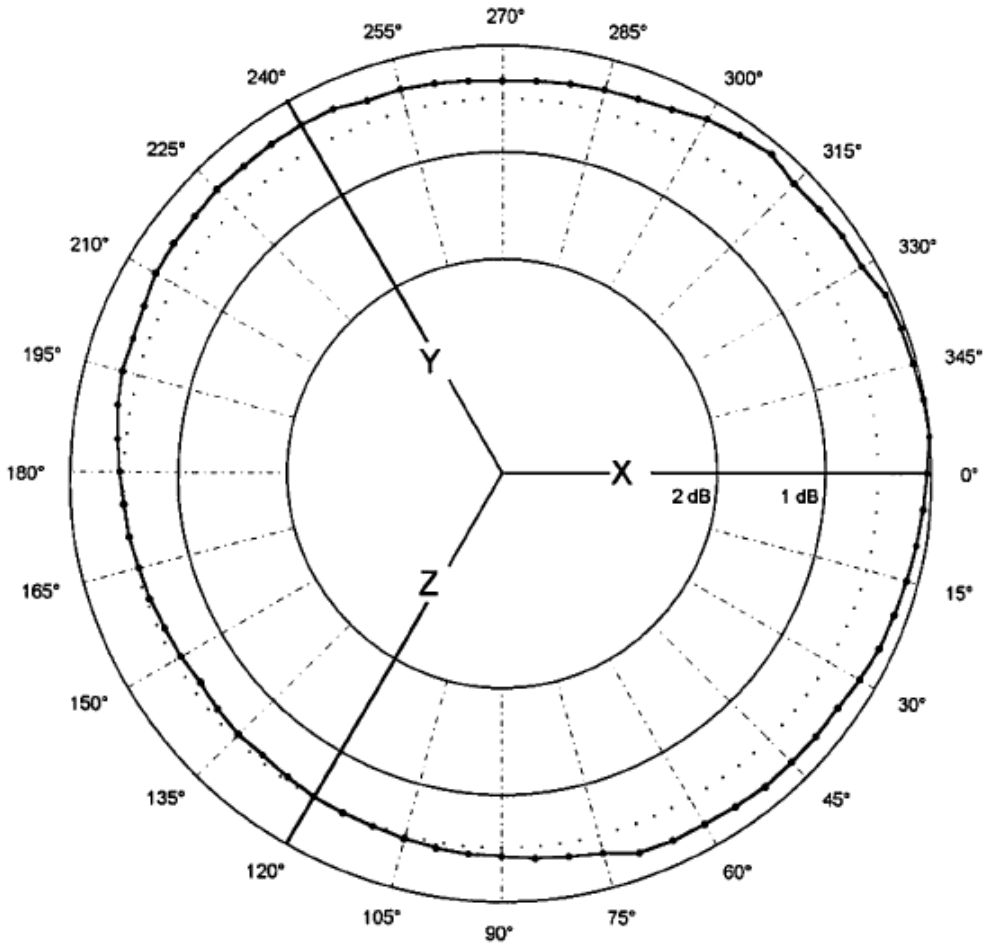
Frequency Response Calibration Factors
Model E100 Serial Number 00083370
Date of Calibration 4 Dec 2008

Frequency	Applied	Probe Reading			Correction Factor			
(MHz)	V/m	X	Y	Z	X	Y	Z	Avg
700.00	7.96	7.56	7.35	7.42	1.05	1.08	1.07	1.07
700.00	20.10	19.21	18.63	18.87	1.05	1.08	1.06	1.06
700.00	70.26	67.25	65.16	65.96	1.05	1.08	1.07	1.06
700.00	125.09	119.09	115.24	116.69	1.05	1.09	1.07	1.07
800.00	8.04	7.34	7.28	7.22	1.10	1.10	1.11	1.10
800.00	20.02	18.38	18.27	18.07	1.09	1.09	1.11	1.10
800.00	69.85	64.15	63.68	63.03	1.09	1.10	1.11	1.10
800.00	124.82	113.69	112.90	111.64	1.10	1.10	1.12	1.11
900.00	7.97	7.70	7.78	7.56	1.03	1.02	1.05	1.04
900.00	20.03	19.42	19.58	19.07	1.03	1.02	1.05	1.03
900.00	70.21	67.77	68.79	66.47	1.04	1.02	1.06	1.04
900.00	124.81	119.63	120.40	117.19	1.04	1.04	1.06	1.05
1000.00	7.99	8.09	7.90	7.89	0.99	1.01	1.01	1.00
1000.00	19.92	20.17	19.63	19.74	0.99	1.01	1.01	1.00
1000.00	69.78	70.08	68.11	68.35	1.00	1.02	1.02	1.01
1000.00	124.80	124.87	120.11	120.41	1.01	1.04	1.03	1.02
2000.00	19.92	19.09	18.99	20.04	1.04	1.05	0.99	1.03
2450.00	20.38	19.27	18.50	17.75	1.06	1.10	1.15	1.10
3000.00	20.36	19.27	18.66	19.77	1.06	1.09	1.03	1.06
3500.00	20.02	21.99	21.67	19.57	0.91	0.92	1.02	0.95
4000.00	19.99	19.75	18.25	19.57	1.01	1.10	1.02	1.04
5000.00	19.97	14.40	13.92	15.38	1.39	1.43	1.30	1.37

ETS·LINDGREN™
An EMCO Technologies Company

PROBE ROTATIONAL RESPONSE

Model	E100
S/N	00083370
Date	04-Dec-2008
Time	20:40:05
Variation	0.59 dB



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

Page 4 of 4

APPENDIX C
Photos of Assessed Antennas

(Refer to Exhibit 7B)