MOTOROLA

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CGISS EME Test Laboratory

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S.A.R. EME Compliance Test Report

Date of Report:	September 10, 2004
Report Revision:	Rev. O
Manufacturer:	Motorola
Product Description:	CPD; Two-Way 1W Portable; 900MHz MOTOTALK; ISM band
FCC ID:	AZ489FT5842
Device Model:	RLN1528A

Test Period: 8/20/04 – 8/24/04

Technician: NA

Responsible Eng: Kim Uong (EME Lead 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 the national and international reference standards and guidelines listed in section 2.0 of this report.

Signature on file   9/15/04

_____   _____
Ken Enger   Date Approved
Senior Resource Manager, Laboratory Director, CGISS EME Lab

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REVISION HISTORY

Date	Revision	Comments
9/10/04	O	Release of Prototype results

1.0   Introduction

This report details the utilization, test setup, test equipment, and test results of the Specific Absorption Rate (S.A.R.) measurements performed at the CGISS EME Test Lab for model number RLN1528A, FCC ID: AZ489FT5842.

The applicable exposure environment is Occupational/Controlled.

2.0   Reference Standards and Guidelines

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

- United States Federal Communications Commission, Code of Federal Regulations; 47CFR part 2 sub-part J
- IEEE 1528, 2003 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Terminal frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999
- Australian Communications Authority Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003
- ANATEL, Brazil Regulatory Authority, Resolution No. 303 of July 2, 2002 "Regulation of the limitation of exposure to electrical, magnetic, and electromagnetic fields in the radio frequency range between 9KHz and 300 GHz." and "Attachment to resolution # 303 from July 2, 2002"

3.0   Description of Test Sample

FCC ID: AZ489FT5842 is a digital two-way portable device that uses a Motorola proprietary digital two-way communication architecture known as MOTOTALK. MOTOTALK operates in the 900MHz industrial, scientific and medical (ISM) band using spread spectrum protocol with 2, 4, and 8 FSK signaling. The maximum transmission duty cycle of the device is 95%.

This device will be marketed for occupational use. This device may be used while held in front of the face in PTT mode, and against the body along with the offered body worn accessories.
FCC ID: AZ489FT5842 is capable of operating in the 902.525-927.475MHz band. The rated power is 0.990 watts. The maximum output is 1.0 watts as defined by the upper limit of the production line final test station.

FCC ID: AZ489FT5842 is offered with the following options and accessories:

Antenna   **Description**

Fixed   ¼ wave Helical antenna; 902-928MHz; 8.2cm; -2.0dBi gain

Batteries

SNN5706B   1050mAh Li Ion battery

Body-worn Accessories

RLN5713A   Holster

A**pplicable Audio accessories**

HMN9039C   Earpiece w/boom mic
HMN9038A   Headset w/swivel boom mic
HMN9025C   Ear bud w/ PTT mic
NTN9159D   Headset (BREEZE) w/ boom mic
HCSN4000B   Earpiece w/ PTT
HCSN4001B   Earpiece w/ boom mic
HMN9026C   Remote speaker microphone

3.1   Test Signal

Test Mode	X	Call Simulator		Simulator	

Test Signal mode:

Transmission Mode:

CW	
Native Transmission	X
TDMA	
Other	

3.2 Test Output Power

A table of the characteristic power slump versus time is provided in Appendix A for the tested battery.

4.0 Description of Test Equipment

4.1 Descriptions of S.A.R. Measurement System

The laboratory utilizes a Dosimetric Assessment System (DASY3™) S.A.R. measurement system manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. The test system consists of a Stäubli RX90L robot with ET3DV6 and EX3DV3 E-Field probes. Please reference the SPEAG user manual and application notes for detailed probe, robot, and S.A.R. computational procedures.

The S.A.R. measurements were conducted with probe model/serial number ET3DV6/SN1393. The system performance check was conducted daily and within 24 hours prior to testing. DASY output files of the system performance test results and the probe/dipole calibration certificates are included in appendices C and D respectively. The table below summarizes the system performance check results normalized to 1W.

Probe Serial #	Tissue Type	Probe Cal Date	Dipole Kit / Serial #	System Perf. 1-g S.A.R. Result when normalized to 1W (mW/g)	Reference 1-g S.A.R @ 1W (mW/g)	Test Date(s)
1393	FCC Body	4/28/04	D900V2/084	11.62 +/- 0.09	11.75 +/- 10%	8/20/04 – 8/23/04 2 test days
1393	IEEE Head	4/28/04	D900V2/084	11.96 +/- 0.00	11.15 +/- 10%	8/24/04

Note: System performance results reflects the median performance +/- ½ of the test date(s) performance ranges

The DASY3™ system is operated per the instructions in the DASY3™ Users Manual. The complete manual is available directly from SPEAG™. All measurement equipment used to assess S.A.R. EME compliance was calibrated according to 17025 A2LA guidelines.

4.2 Description of Phantom

4.2.1 Flat Phantom

Rectangular shaped boxes made of high density polyethylene (HDPE) material were used for assessments at the body and face. The phantoms were mounted on wooden supporting structures that have loss tangents of < 0.05. The center opening dimensions for the of the supporting structures used for positioning the DUT to the phantom's surface during body and face assessments are 68.58 cm x 20.32 cm and

60.96 cm x 15.24 cm respectively. The dimensions of the flat phantoms used for S.A.R. performance assessment at the body and face are L = 80cm, W = 30cm, H = 20cm, Surface Thickness = 0.2cm, and L = 40cm, W = 30cm, H = 20cm, Surface Thickness = 0.2cm respectively.

4.2.2 SAM Phantom

NA

4.3 Simulated Tissue Properties

4.3.1 Type of Simulated Tissue

The simulated tissue used is compliant to that specified in FCC Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01) and IEEE 1528, 2003 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques"

Simulated Tissue	Body Position
FCC Body	Torso
IEEE Head	Head/Face

4.3.2 Simulated Tissue Composition

% of listed ingredients	900MHz		915MHz	
	Head	Body	Head	Body
Sugar	56.50	44.90	56.50	44.90
DGBE (Glycol)	NA	NA	NA	NA
Diacetin	NA	NA	NA	NA
De ionized -Water	40.95	53.06	40.95	53.06
Salt	1.45	0.94	1.45	0.94
HEC	1	1	1	1
Bact.	0.1	0.1	0.1	0.1

Characterization of simulated tissue materials and ambient conditions:
Simulated tissue prepared for S.A.R. measurements is measured daily and within 24 hours prior to actual S.A.R. testing to verify that the tissue is within 5% of target parameters at the center of the transmit band. This measurement is done using the Agilent (HP) probe kit model 85070C and a HP8753D Network Analyzer.

Target tissue parameters

		FCC Body		
Frequency (MHz)	**Di-electric Constant Target**	**Di-electric Constant Meas. (Range)**	**Conductivity Target S/m**	**Conductivity Meas. (Range) S/m**
900	55.0	52.6-53.0	1.05	1.05-1.05
915	55.0	52.5-52.8	1.06	1.07-1.07

		IEEE Head		
Frequency (MHz)	**Di-electric Constant Target**	**Di-electric Constant Meas. (Range)**	**Conductivity Target S/m**	**Conductivity Meas. (Range) S/m**
900	41.5	40.5-40.5	0.97	1.00-1.00
915	41.5	40.3-40.3	0.98	1.01-1.01

4.4   Test conditions

The EME Laboratory ambient environment is well controlled resulting in very stable simulated tissue temperature and therefore stable dielectric properties. Simulated tissue temperature is measured prior to each scan to insure it is within +/- 2°C of the temperature at which the dielectric properties were determined. The liquid depth in the phantom used for measurements was 15cm +/- 0.5cm. Additional precautions are routinely taken to ensure the stability of the simulated tissue such as covering the phantoms when scans are not actively in process in order to minimize evaporation. The lab environment is continuously monitored. The table below presents the range and average environmental conditions during the S.A.R. tests reported herein:

	Target	**Measured**
Ambient Temperature	20 - 25 ˚C	Range: 20.5-22.7˚C Avg. 21.77˚C
Relative Humidity	30 - 70 %	Range: 48.9-58.7% Avg. 52.69%
Tissue Temperature	NA	Range: 19.9-20.7˚C Avg. 20.29˚C

The EME Lab RF environment uses a Spectrum Analyzer to monitor for extraneous large signal RF contaminants that could possibly affect the test results. If such unwanted signals are discovered the S.A.R scans are repeated. However, the lab environment is sufficiently protected such that no S.A.R. impacting interference has been experienced to date.

5.0 Probe Scan Procedures

The E-field probe first scans a coarse grid over a large area inside the phantom in order to locate the interpolated maximum S.A.R. distribution. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The subsequent scan can directly use this position as reference for the cube evaluations. See note in section 5.3 for applicable cube evaluations methodology.

5.1 Shortened scan rationale

APPENDIX A presents relevant shortened S.A.R. cube scan to assess the validity of the calculated results presented herein. The results of the shortened cube scans demonstrate that the scaling methodology used to determine the calculated S.A.R. results presented herein are valid.

5.2 Device test positions

Reference Figure 1 for the device orientation and position which exhibited the highest S.A.R. performance.

5.2.1 Body

The DUT was positioned such that the body worn accessory was centered against the flat phantom with the applicable accessory attachments. The DUT was positioned with its' front, and back separated 2.5cm from the flat phantom.

5.2.2 Head

NA

5.2.3 Face

The DUT was placed with 2.5cm separation from the flat phantom.

5.3 Description of Test Procedure

All options and accessories listed in section 3.0 were considered in order to develop the S.A.R. test plan for this product. S.A.R. measurements were performed using a flat phantom with applicable tissue simulant to assess performance at the body and in front of the face using the applicable transmission mode.
Note that a coarse-to-cube approximation methodology was utilized to determine the worst-case S.A.R. performance configuration for each applicable body location. The test configurations that produced the highest S.A.R. results for each body position using the coarse-to-cube approximation methodology were assessed using the full DASY3™ coarse and 7x7x7 cube scans.

The coarse-to-cube approximation is determined using a Motorola derived and SPEAG accepted software tool to predict a mass average S.A.R. value based on measured coarse scans. Note also that this software tool is part of the latest proposal by Motorola for inclusion into the IEC 62209 part II standard.

Assessments at the body [Page 17-18 of 52; Table 1]

The DUT was assessed at the TX center frequency of the band, using the offered battery and body worn accessory, along with each of the offered audio accessories in the maximum duty cycle mode of 95%.

The DUT was assessed at the band edges using the worst case test configuration from above.

The DUT was assessed with its' back and front housing separated 2.5cm from the phantom using the worst case audio accessory and frequency from above.

Assessments at the face   [Page 18 of 52; Table 2]

The DUT was assessed across the TX band, with its' front housing separated 2.5cm from the phantom using the offered battery.

### Shortened scan assessment at the body [APPENDIX A]

A "shortened" scan was performed using the test configuration that produced the highest S.A.R. results overall at the body.

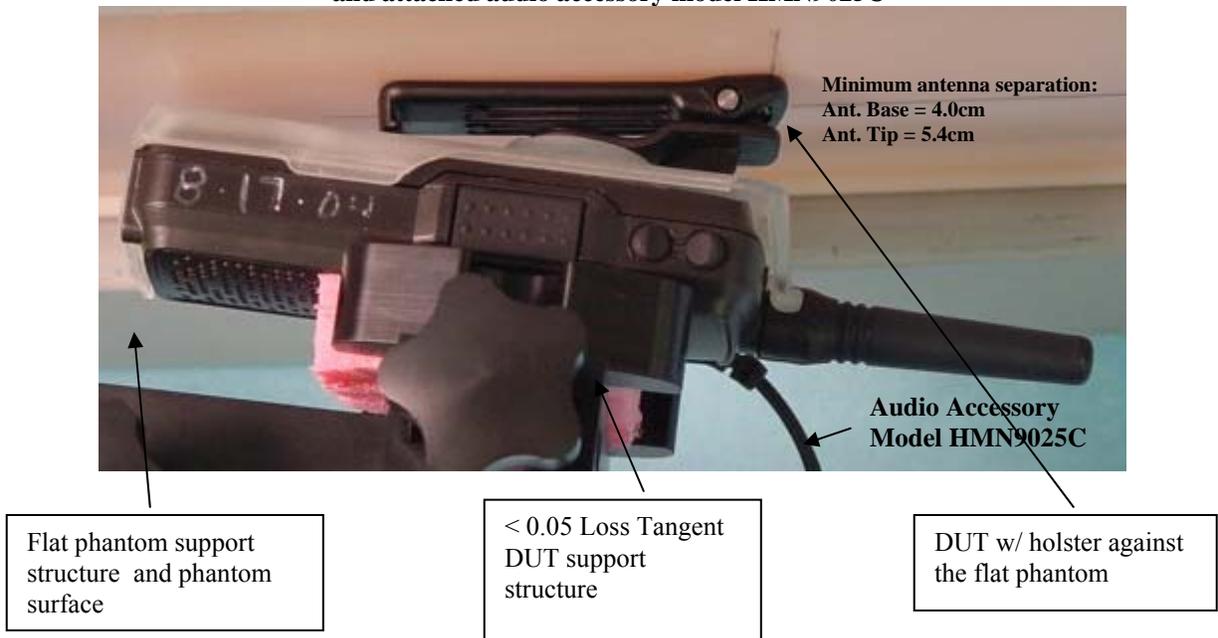### Shortened scan assessment at the face [APPENDIX A]

A "shortened" scan was performed using the test configuration that produced the highest S.A.R. results overall at the face.

5.4   Test Position Photographs

Figure 1. Highest S.A.R. Test Position (@ Face)
DUT with front housing separated 2.5cm from phantom

2.5cm

Minimum antenna separation:
Ant. Base = 2.9cm
Ant. Tip = 2.7cm
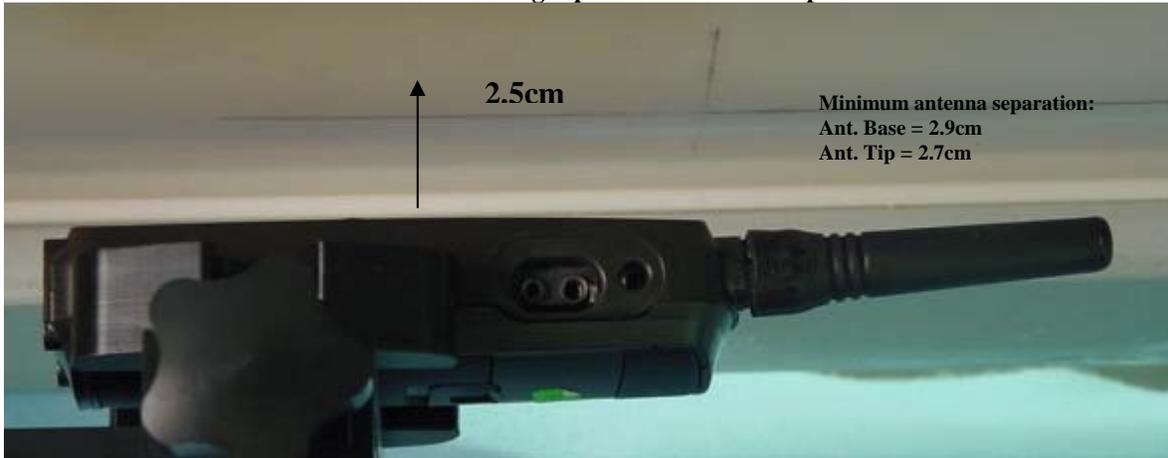
Figure 2: Highest S.A.R. Test Position (@ body)
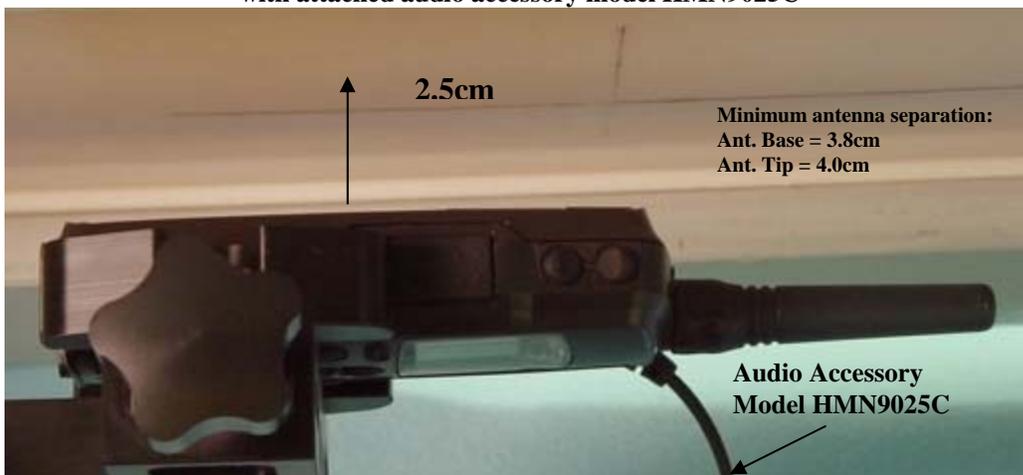**DUT with body worn accessory model RLN5713A against the flat phantom**
and attached audio accessory model HMN9025C

Minimum antenna separation:
Ant. Base = 4.0cm
Ant. Tip = 5.4cm

Audio Accessory
Model HMN9025C

Flat phantom support structure and phantom surface

< 0.05 Loss Tangent DUT support structure

DUT w/ holster against the flat phantom

Figure 3. Assessment @ body
DUT with front separated 2.5cm from phantom
with attached audio accessory model HMN9025C

2.5cm

Minimum antenna separation:
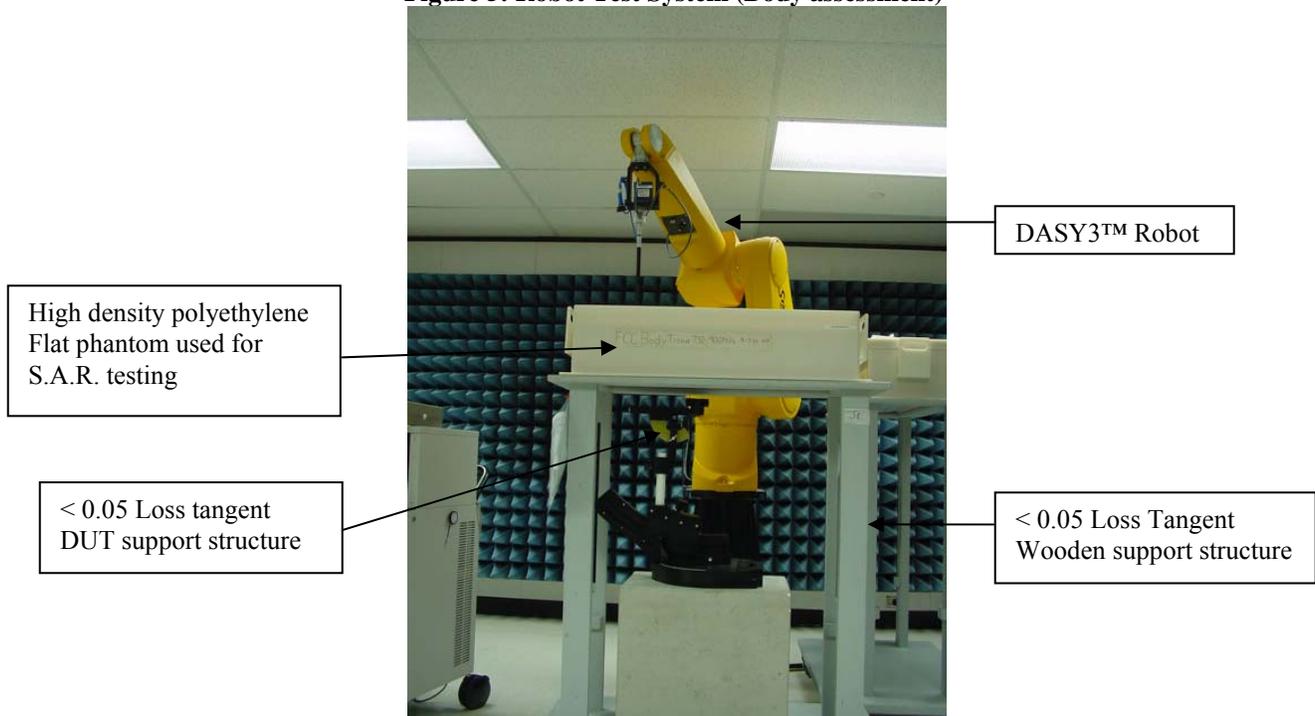Ant. Base = 2.8cm
Ant. Tip = 3.2cm

Audio Accessory
Model HMN9025C
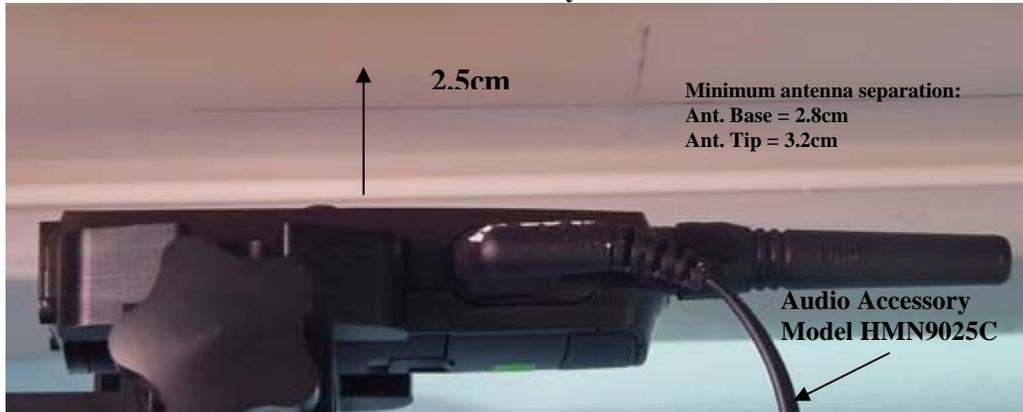
Figure 4. Assessment @ body
DUT with back separated 2.5cm from phantom
with attached audio accessory model HMN9025C

2.5cm

Minimum antenna separation:
Ant. Base = 3.8cm
Ant. Tip = 4.0cm

Audio Accessory
Model HMN9025C

Figure 5: Robot Test System (Body assessment)

DASY3™ Robot

High density polyethylene Flat phantom used for S.A.R. testing

< 0.05 Loss tangent DUT support structure

< 0.05 Loss Tangent Wooden support structure

Figure 6: Robot Test System (Face assessment)

6.0 Measurement Uncertainty

Table 1: Uncertainty Budget for Device Under Test: 75 – 3000 MHz

a	b	c	d	$e = f(d,k)$	f	g	$h = c \times f / e$	$i = c \times g / e$	k
Uncertainty Component	IEEE 1528 section	Tol. (± %)	Prob Dist	Div.	c_i (1 g)	c_i (10 g)	1 g u_i (±%)	10 g u_i (±%)	v_i
Measurement System									
Probe Calibration	E.2.1	4.8	N	1.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	1.3	R	1.73	1	1	0.8	0.8	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	1.0	R	1.73	1	1	0.6	0.6	∞
Probe Positioning w.r.t Phantom	E.6.3	4.0	R	1.73	1	1	2.3	2.3	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.4	N	1.00	1	1	3.4	3.4	29
Device Holder Uncertainty	E.4.1	3.8	N	1.00	1	1	3.8	3.8	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	6.5	N	1.00	0.64	0.43	4.2	2.8	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	4.0	N	1.00	0.6	0.49	2.4	2.0	∞
Combined Standard Uncertainty			RSS				12	11	601
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				23	22	

Table 2: Uncertainty Budget for System Check: 75 – 3000 MHz

a	b	c	d	e = f(d,k)	f	g	h = $c \times f/e$	i = $c \times g/e$	k
		Tol.	Prob.		c_i	c_i	1 g	10 g	
	IEEE 1528	(± %)	Dist.		(1 g)	(10 g)	u_i	u_i	
Uncertainty Component	section			Div.			(±%)	(±%)	v_i
Measurement System									
Probe Calibration	E.2.1	4.8	N	1.00	1	1	4.8	4.8	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	1.0	N	1.00	1	1	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	1.3	R	1.73	1	1	0.8	0.8	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t. Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	6.0	R	1.73	0.64	0.43	2.2	1.5	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	6.0	R	1.73	0.6	0.49	2.1	1.7	∞
Combined Standard Uncertainty			RSS				9	8	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				17	17	

Notes for Tables 1 and 2
a) Column headings *a-k* are given for reference.
b) Tol. - tolerance in influence quantity.
c) Prob. Dist. – Probability distribution
d) N, R - normal, rectangular probability distributions
e) Div. - divisor used to translate tolerance into normally distributed standard uncertainty
f) c_i - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) u_i – SAR uncertainty
h) v_i - degrees of freedom for standard uncertainty and effective degrees of freedom for the expanded uncertainty.

7.0 S.A.R. Test Results

All S.A.R. results obtained by the tests described in Section 5.0 are listed in section 7.1 below. As noted in section 5.3, a coarse-to-cube approximation methodology, which has been accepted by SPEAG, was utilized to ascertain the worst-case test configuration for each body location. The worst case test configurations observed for each body location were then assessed using the full DASY3™ coarse and 7x7x7 cube methodology, and they are presented as bolded results in section 7.1. The associated S.A.R. plots are provided in APPENDIX B.

Appendix A presents shortened S.A.R. cube scans to assess the validity of the calculated results presented herein. Note: The results of the shortened cube scans presented in Appendix A demonstrate that the scaling methodology used to determine the calculated S.A.R. results presented herein are valid.

7.1 S.A.R. results

Table1

DUT assessment at the body; 902.525MHz-927.475 band; 95% duty cycle												
(Run # KU-R2-040823-15 used full coarse and 7x7x7 cube scans)												
Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
Assessment at the body												
KU-R2-040820-05/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HMN9026C	1.00	-0.38	1.311	0.912	0.72	0.50
KU-R2-040823-02/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HMN9039C	1.00	-0.40	1.138	0.794	0.62	0.44
KU-R2-040823-03/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HMN9038A	1.00	-0.39	1.425	0.993	0.78	0.54
*KU-R2-040823-04/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HMN9025C	1.00	-0.32	1.684	1.171	0.91	0.63
KU-R2-040823-05/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	NTN9159D	1.00	-0.40	1.223	0.854	0.67	0.47
KU-R2-040823-06/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HCSN4000B	1.00	-0.28	1.353	0.945	0.72	0.50
KU-R2-040823-07/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HCSN4001B	1.00	-0.34	0.974	0.679	0.53	0.37
KU-R2-040823-09/035TEN62TX	Fixed	902.525	SNN5706B	Against phantom	RLN5713A	HMN9025C	1.00	-0.40	1.634	1.141	0.90	0.63
KU-R2-040823-10/035TEN62TX	Fixed	927.475	SNN5706B	Against phantom	RLN5713A	HMN9025C	1.00	-0.33	1.408	0.981	0.76	0.53
Assessment at 2.5cm separation												
KU-R2-040823-11/035TEN62TX	Fixed	915.025	SNN5706B	DUT Back 2.5cm phantom	None	HMN9025C	1.00	-0.33	0.745	0.527	0.40	0.28
KU-R2-040823-13/035TEN62TX	Fixed	915.025	SNN5706B	DUT Front 2.5cm phantom	None	HMN9025C	1.00	-0.38	1.115	0.789	0.61	0.43

<div style="text-align:center">**Table 1 (continued)**</div>

Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
*Assessment with the worst case test configuration at the body using the full DASY coarse and 7x7x7 cube scan measurements.												
KU-R2-040823-15/035TEN62TX	Fixed	915.025	SNN5706B	Against phantom	RLN5713A	HMN9025C	1.00	-0.65	1.460	1.020	**0.85**	0.59

<div style="text-align:center">**Table 2**</div>

Run Number/ SN	Antenna Position	Freq. (MHz)	Battery	Test position	Carry Case	Additional attachments	Initial Power (W)	S.A.R. Drift (dB)	Meas. 1g-S.A.R. (mW/g)	Meas. 10g-S.A.R. (mW/g)	Max Calc. 1g-S.A.R. (mW/g)	Max Calc. 10g-S.A.R. (mW/g)
DUT assessment at the face; 902.525MHz-927.475 band; 95% duty cycle (Run # KU-R2-040824-06 used full coarse and 7x7x7 cube scans)												
Assessment at the Face												
KU-R2-040824-02/035TEN62TX	Fixed	915.025	SNN5706B	DUT front 2.5cm	None	None	1.00	-0.41	1.686	1.195	0.93	0.66
KU-R2-040824-03/035TEN62TX	Fixed	902.525	SNN5706B	DUT front 2.5cm	None	None	1.00	-0.37	1.535	1.088	0.84	0.59
KU-R2-040824-04/035TEN62TX	Fixed	927.475	SNN5706B	DUT front 2.5cm	None	None	1.00	-0.37	1.679	1.191	0.91	0.65
**KU-R2-040824-05/035TEN62T8	Fixed	915.025	SNN5706B	DUT front 2.5cm	None	None	1.00	-0.45	1.695	1.201	0.94	0.67
**Assessment with the worst case test configuration at the face using the full DASY coarse and 7x7x7 cube scan measurements.												
KU-R2-040824-06/035TEN62T8	Fixed	915.025	SNN5706B	DUT front 2.5cm	None	None	1.00	-0.56	1.530	1.070	0.87	0.61
KU-R2-040824-06/035TEN62T8 (Shortened scan)	Fixed	915.025	SNN5706B	DUT front 2.5cm	None	None	1.00	-0.31	1.760	1.230	**0.95**	0.66

7.2 Peak S.A.R. location

Refer to APPENDIX B for detailed S.A.R. scan distributions.

7.3 Highest S.A.R. results calculation methodology

The calculated maximum 1-gram and 10-gram averaged S.A.R. results reported herein for the full DASY ™ coarse and 7x7x7 cube measurements are determined by scaling the measured S.A.R. to account for power leveling variations and power slump. For this device the Maximum Calculated 1-gram and 10-gram averaged peak S.A.R. is calculated using the following formula:

Max. Calc. 1-g Avg. SAR = $((S.A.R. \text{ meas.} / (10^{(Pdrift/10)}))*(Pmax/Pint))* DC\%$

P_{max} = Maximum Power (W)
P_{int} = Initial Power (W)
Pdrift = DASY drift results (dB)
$SAR_{meas.}$ = Measured 1 gram averaged peak S.A.R. (mW/g)
DC % = Transmission mode duty cycle in % where applicable

Note that the use of the above formula should consider the relationship between the initial power, max power, and drift. Also, a 50% duty cycle is applied for PTT operation.

8.0   Conclusion

The highest Operational Maximum Calculated 1-gram and 10-gram average S.A.R. values found for FCC ID: AZ489FT5842 model RLN1528A.

At the Body: **1-g Avg. = 0.85 mW/g; 10-g Avg. = 0.59 mW/g**
At the Face: **1-g Avg. = 0.95 mW/g; 10-g Avg. = 0.66 mW/g**

These test results clearly demonstrate compliance with FCC Occupational/Controlled RF Exposure limits of **8.0mW/g** per the requirements of 47 CFR 2.1093(d).

APPENDIX A

Power Slump Data/Shortened Scan

DUT Power versus time data

Equipment HP8920B Control # SMHPB030 calibration date Mar 18, 04 Due Mar 18, 06

S/N: 035TEN62TV
Frequency(Low): 902.5250 MHz
1.0 Watt

Time (min)	Power Output(W)
0	0.98
2	0.95
4	0.93
6	0.91
8	0.90
10	0.88
12	0.87
14	0.86
16	0.85
18	0.84
20	0.83
22	0.82
24	0.82
26	0.81
28	0.81
30	0.80
32	0.80
34	0.79
36	0.79
38	0.78
40	0.78

Daytona Slump (902.5250MHz)
S/N 035TEN62TV
Lithium Ion
FCC ID: AZ489FT5842
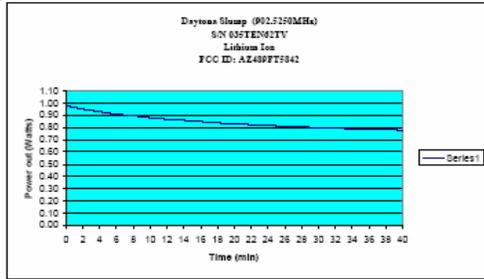
S/N: 035TEN62TV
Channel Frequency(Mid): 915.0250MHz
1.0 Watt

Time (min)	Power Output(W)
0	1.00
2	0.95
4	0.92
6	0.90
8	0.88
10	0.87
12	0.85
14	0.84
16	0.83
18	0.82
20	0.81
22	0.81
24	0.80
26	0.79
28	0.79
30	0.78
32	0.78
34	0.77
36	0.77
38	0.77
40	0.76

Daytona (915.0250MHz)
S/N-035TEN62TV
Lithium Ion
FCC ID:AZ489FT5842
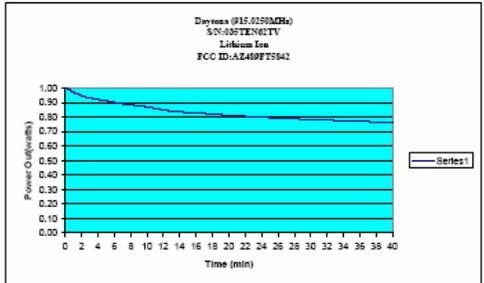
S/N: 035TEN62TV
Channel Frequency(Hi): 927.4750MHz
1.0 Watt

Time (min)	Power Output(W)
0	1.00
2	0.97
4	0.95
6	0.93
8	0.89
10	0.86
12	0.85
14	0.84
16	0.83
18	0.82
20	0.81
22	0.80
24	0.79
26	0.79
28	0.78
30	0.77
32	0.77
34	0.76
36	0.76
38	0.76
40	0.75

Daytona (927.4750MHZ)
S/N: 035TEN62TV
Lithium Ion
FCC ID:AZ489FT5842
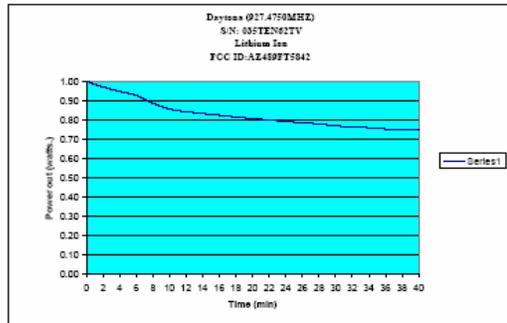
Shortened Scan Results

FCC ID: AZ489FT5842; Test Date: 8/24/04

Motorola CGISS EME Laboratory
Run #: KU-040824-07
Model #: RLN1528A SN#: 035TEN62TX
Tx Freq: 915.025 MHz
Sim tissue temp: 20.6 C
Start power: 1.0 W

Antenna: Fixed
Battery Kit: SNN5706B
Carry Acc: RLN5713A
Audio/Data Acc.: HMN9025C

Shortened scan reflect highest S.A.R. producing configuration; Run time 7minutes.
Representative "normal" scan run time was 26 minutes
"Shortened" scan max calculated S.A.R. using S.A.R. drift: 1-g Avg. = 0.82mW/g; 10-g Avg. = 0.58mW/g
"Normal" scan max calculated S.A.R. using S.A.R. drift: 1-g Avg. = 0.85mW/g; 10-g Avg. = 0.59mW/g
(see section 7.1 run # KU-R2-040823-04)

DUT w/ body worn accessory against phantom
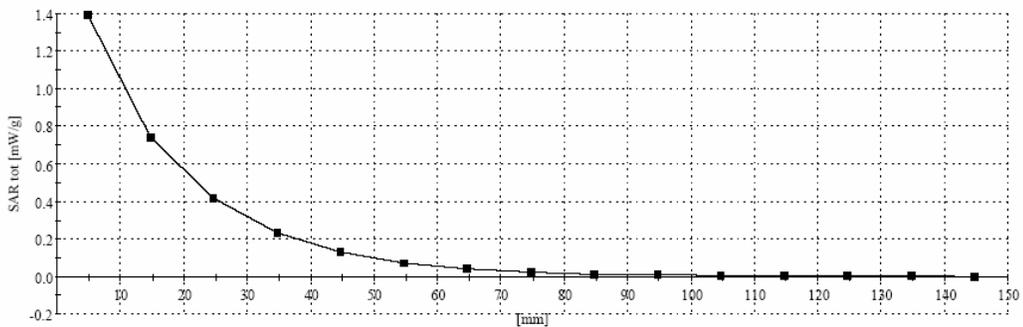Flat Phantom; Device 2 Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.1; FCC
Body 915: σ = 1.06 mho/m εr = 53.1 ρ = 1.00 g/cm3; DAE3V1SN374 Cal Date: 3/23/04
Cube 5x5x7: SAR (1g): 1.58 mW/g, SAR (10g): 1.11 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0; SAR (1g): 1.58 mW/g, SAR (10g): 1.11 mW/g
Power drift: -0.16dB

FCC ID: AZ489FT5842; Test Date: 8/24/04

Motorola CGISS EME Laboratory
Run #: KU-040824-06
Model #: RLN1528A SN#: 035TEN62T8
Tx Freq: 915.025 MHz
Sim tissue temp: 20.0 C
Start power: 1.0 W

Antenna: Fixed
Battery Kit: SNN5706B
Carry Acc: None
Audio/Data Acc.: None

Shortened scan reflect highest S.A.R. producing configuration; Run time 7minutes.
Representative "normal" scan run time was 26 minutes
"Shortened" scan max calculated S.A.R. using S.A.R. drift: 1-g Avg. = 0.95mW/g; 10-g Avg. = 0.66mW/g
"Normal" scan max calculated S.A.R. using S.A.R. drift: 1-g Avg. = 0.94mW/g; 10-g Avg. = 0.67mW/g
(see section 7.1 run # KU-R2-040824-05)

DUT w/ front housing separated 2.5cm from phantom
Flat (2) Phantom; Device 2 Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.73,6.73,6.73); Probe cal date: 28/04/04; Crest factor: 1.1; IEEE
HEAD 915 MHz: σ = 1.01 mho/m εr = 40.3 ρ = 1.00 g/cm3; DAE: DAE3V1SN374 Cal Date: 3/23/04
Cube 5x5x7: SAR (1g): 1.76 mW/g, SAR (10g): 1.23 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0; SAR (1g): 1.76 mW/g, SAR (10g): 1.23 mW/g
Power drift: -0.31dB

APPENDIX B
Data Results

Motorola CGISS EME Laboratory
Run #: KU-040823-15
Model #: RLN1528A SN#: 035TEN62TX
Tx Freq: 915.025 MHz
Sim tissue temp: 20.7 C
Start power: 1.0 W

Antenna: Fixed
Battery Kit: SNN5706B
Carry Acc: RLN5713A
Audio/Data Acc.: HMN9025C

DUT w/ body worn accessory against phantom
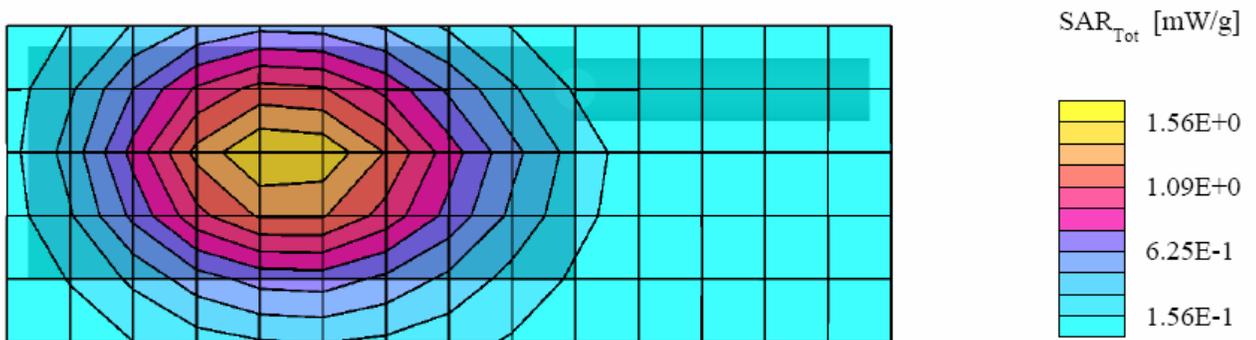Flat (2) Phantom; Device 2 Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.1; FCC
Body 915: σ = 1.07 mho/m εr = 52.5 ρ = 1.00 g/cm3; DAE: DAE3V1SN374 Cal Date: 3/23/04
Cube 7x7x7: SAR (1g): 1.46 mW/g, SAR (10g): 1.02 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 31.5, 66.0, 4.7
Power drift: -0.65dB

Motorola CGISS EME Laboratory
Run #: KU-040824-06
Model #: RLN1528A SN#: 035TEN62T8
Tx Freq: 915.025 MHz
Sim tissue temp: 20.0 C
Start power: 1.0 W

Antenna: Fixed
Battery Kit: SNN5706B
Carry Acc: None
Audio/Data Acc.: None

DUT w/ front housing separated 2.5cm from phantom
Flat (2) Phantom; Device 2 Section; Position: (90°,90°);
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.73,6.73,6.73); Probe cal date: 28/04/04; Crest factor: 1.1; IEEE
HEAD 915 MHz: σ = 1.01 mho/m ϵr = 40.3 ρ = 1.00 g/cm3; DAE: DAE3V1SN374 Cal Date: 3/23/04
Cube 7x7x7: SAR (1g): 1.53 mW/g, SAR (10g): 1.07 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0; Max at 36.0, 61.5, 4.7
Power drift: -0.56dB
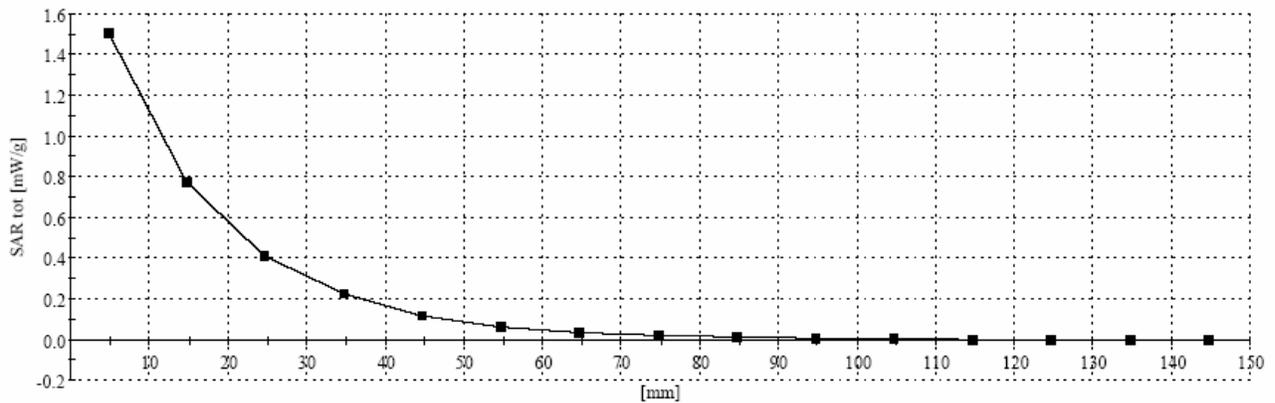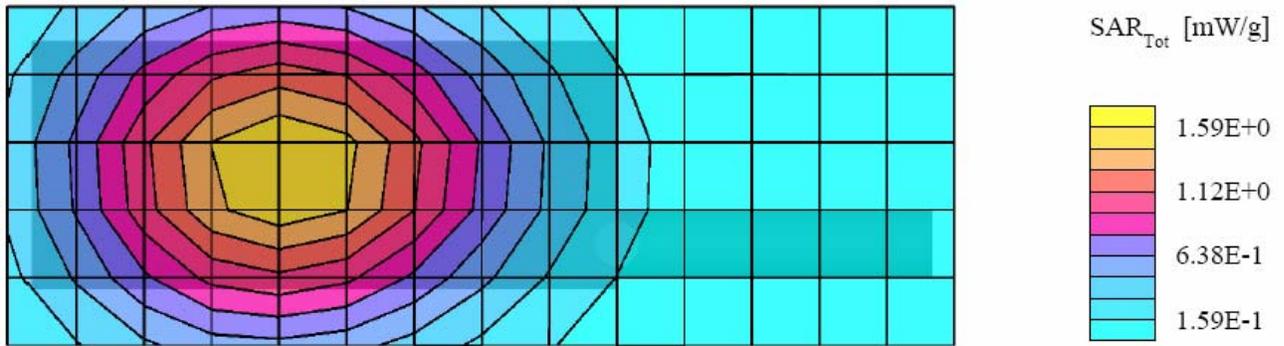
APPENDIX C

Dipole System Performance Check Results

Dipole validation scans at the head from SPEAG are provided in APPENDIX D. The CGISS EME lab validated the dipole to the applicable IEEE system performance targets. Within the same day system validation was performed using FCC body tissue parameters to generate the system performance target values for body at the applicable frequency. The results of the CGISS EME system performance validation are provided in this appendix.
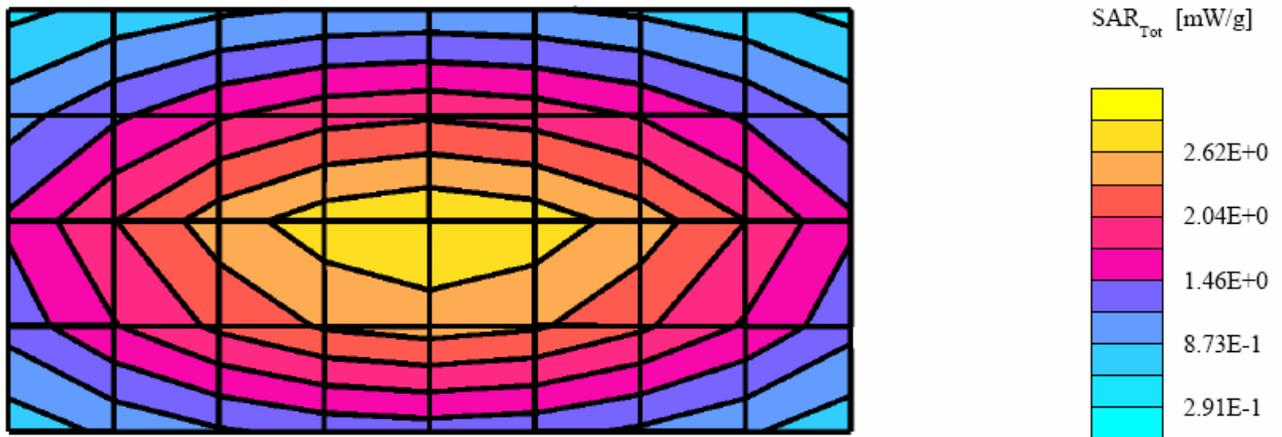
SPEAG 900 MHz Dipole; Model D900V2, SN 084; Test Date: 8/20/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-040820-01
TX Freq: 900 MHz
Sim Tissue Temp: 20.9C
Start Power: 250mW

Target:
11.75 mW/g for 1g SAR, 7.47 mW/g for 10g SAR +/- 10% from system performance target
SAR calculated 1g is 11.53 mW/g percent from target (including drift) is -1.85 %
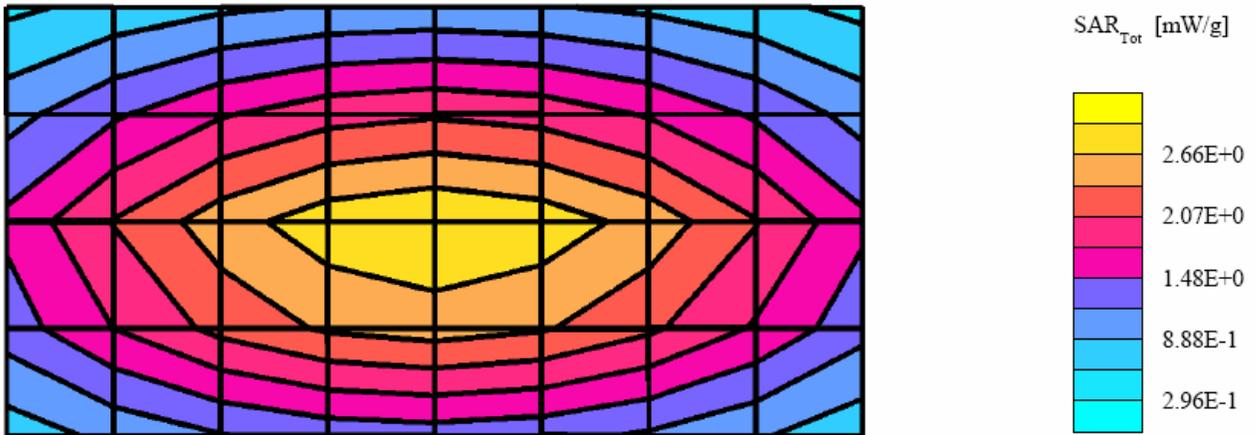SAR Calculated 10g is 7.35 mW/g Percent from target (including drift) is -1.56 %

Flat (2);Probe: ET3DV6 - SN1393 (Cal Date 28/04/04);Probe Cal Date: 28/04/04ConvF(6.35,6.35,6.35); Crest factor: 1.0;
FCC Body 900: σ = 1.05 mho/mε_r = 53.0 ρ = 1.00 g/cm$_3$; DAE: DAE3V1SN374 Cal Date: 3/23/04
Cubes (2): Peak: 4.44 mW/g ± 0.03 dB, SAR (1g): 2.87 mW/g ± 0.02 dB, SAR (10g): 1.83 mW/g ± 0.01 dB, (Worst-case extrapolation) Penetration depth: 12.3 (11.4, 13.4) [mm]
Power drift: -0.02 dB

SPEAG 900 MHz Dipole; Model D900V2, SN 084; Test Date: 8/23/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-040823-01
TX Freq: 900 MHz
Sim Tissue Temp: 20.9C
Start Power: 250mW

Target:
11.75 mW/g for 1g SAR, 7.47 mW/g for 10g SAR +/- 10% from system performance target
SAR calculated 1g is 11.71 mW/g percent from target (including drift) is -0.37 %
SAR Calculated 10g is 7.50 mW/g Percent from target (including drift) is 0.36 %

Flat (2); Probe: ET3DV6 - SN1393 (Cal Date 28/04/04);Probe Cal Date: 28/04/04ConvF(6.35,6.35,6.35); Crest factor: 1.0;
FCC Body 900: σ = 1.05 mho/m ε_r = 52.6 ρ = 1.00 g/cm$_3$; DAE: DAE3V1SN374 Cal Date: 3/23/04
Cubes (2): Peak: 4.52 mW/g ± 0.04 dB, SAR (1g): 2.92 mW/g ± 0.02 dB, SAR (10g): 1.87 mW/g ± 0.01 dB, (Worst-case
extrapolation) Penetration depth: 12.2 (11.3, 13.3) [mm]
Power drift: -0.01 dB

SPEAG 900 MHz Dipole; Model D900V2, SN 084; Test Date: 8/24/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-040824-01
TX Freq: 900 MHz
Sim Tissue Temp: 21.1C
Start Power: 250mW

Target:
11.15 mW/g for 1g SAR, 6.98 mW/g for 10g SAR +/- 10% from system performance target
SAR calculated 1g is 11.96 mW/g percent from target (including drift) is 7.26 %
SAR Calculated 10g is 7.52 mW/g Percent from target (including drift) is 7.74 %

Flat (2); Probe: ET3DV6 - SN1393 (Cal Date 28/04/04);Probe Cal Date: 28/04/04ConvF(6.73,6.73,6.73); Crest factor: 1.0;
IEEE HEAD 900 MHz: σ = 1.00 mho/m εr = 40.5 ρ = 1.00 g/cm3; DAE: DAE3V1SN374 Cal Date: 3/23/04
Cubes (2): Peak: 4.76 mW/g ± 0.02 dB, SAR (1g): 2.99 mW/g ± 0.03 dB, SAR (10g): 1.88 mW/g ± 0.04 dB, (Worst-case
extrapolation) Penetration depth: 11.3 (10.6, 12.4) [mm]
Power drift: 0.00 dB
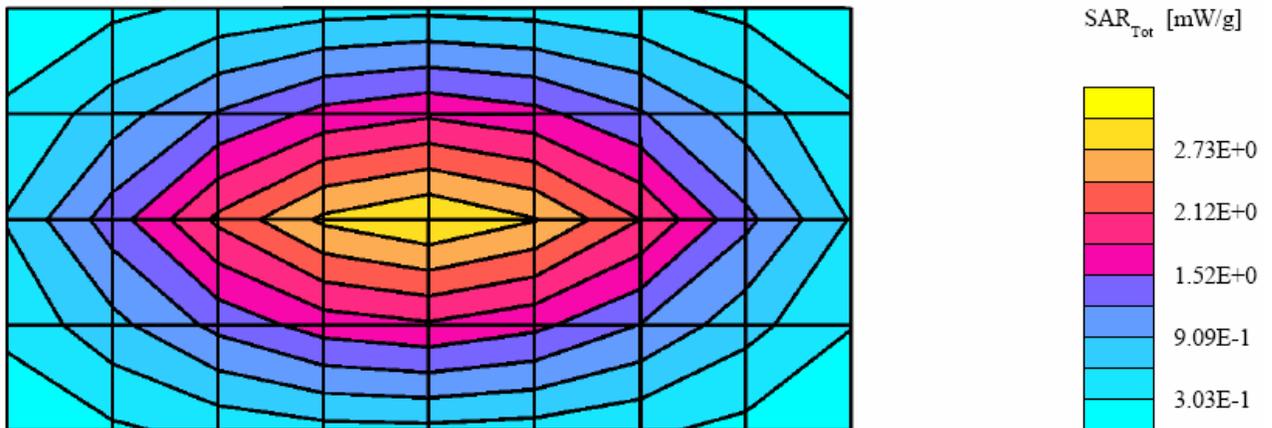
SYSTEM VALIDATION

Date: _____ 4/14/2004 _____ Frequency (MHz): _____ 900 _____

Lab Location: _____ CGISS _____ Mixture Type: _____ IEEE-Head _____

Robot System: _____ 3 _____ Ambient Temp.(^{o}C): _____ 23 _____

Probe Serial #: _____ 1383 _____ Tissue Temp.(^{o}C): _____ 21 _____

DAE Serial #: _____ 406 _____

Tissue Characteristics

Permitivity: _____ 41.2 _____ Phantom Type/SN: _____ SAMTP1022 _____

Conductivity: _____ 1.00 _____ Distance (mm): _____ 15 (tissue/dipole cnt) _____

Reference Source: _____ D900V2 _____ (Dipole)

Reference SN: _____ 84 _____

Power to Dipole: _____ 250 _____ mW

Power Output (radio): _____ n/a _____ mW

Target SAR Value: _____ 10.8 _____ mW/g, _____ 6.9 _____ mW/g (10g avg.)
(normalized to 1.0 W)

Measured SAR Value: _____ 2.78 _____ mW/g, _____ 1.74 _____ mW/g (10g avg.)

Power Drift: _____ -0.01 _____ dB

Measured SAR Value: _____ 11.15 _____ mW/g, _____ 6.98 _____ mW/g (10g avg.)
(normalized to 1.0 W, including drift)

Percent Difference From Target (MUST be within System Uncertainty): _____ 3.20 % (1g ave)

_____ 1.10 % (10g ave)

Test performed by: _____ C. Miller _____ Initial: _____

SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	4/14/2004	Frequency (MHz):	900
Lab Location:	CGISS	Mixture Type:	IEEE - Head
Robot System:	3	Ambient Temp.(°C):	23
Probe Serial #:	1383	Tissue Temp.(°C):	21
DAE Serial #:	401		

Tissue Characteristics

Permitivity:	41.2	Phantom Type/SN:	SAMTP1022
Conductivity:	1.00	Distance (mm):	15 (tissue/dipole cnt)

Reference Source: D900V2   (Dipole)
Reference SN: 84

Power to Dipole: 250   mW

Measured SAR Value: 2.78   mW/g,   1.74   mW/g (10g avg.)
Power Drift: -0.01   dB

New Target/Measured
SAR Value: 11.15 mW/g,   6.98 mW/g (10g avg.)
(normalized to 1.0 W, including drift)

Test performed by: C. Miller   Initial:

SPEAG DIPOLE D900V2; Test date:04/14/04

Run #: Sys Perf-040414-08

Model #: D900 V2

Robot: CGISS-3

TX Freq: 900 MHz

Start Power; 250 mW

DAE3: 401

- Comments-

Phantom #: SAMTP1022

SN: 084

Tester: C. Miller

900 MHz Sim Tissue Temp: 21.0   (Celsius)

DAE Cal Date: 08/21/2003

SAR calculated at 1W is 11.15 mW/g (1g avg).

SAR calculated at 1W is 6.98 mW/g (10g avg).

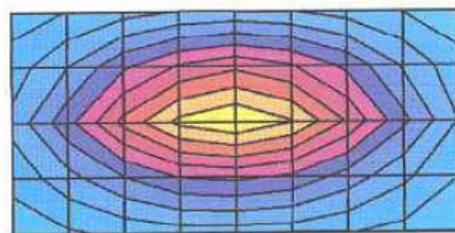SAM; Probe: ET3DV6 - SN1383(Cal Date 25 Feb 2004); ConvF(6.30,6.30,6.30); Crest factor: 1.0; IEEE

Head 900: $\sigma = 1.00$ mho/m $\varepsilon_r = 41.2$ $\rho = 1.00$ g/cm³

Cubes (2): Peak: 4.44   mW/g $\pm$ 0.01 dB, SAR (1g): 2.78   mW/g $\pm$ 0.02 dB, SAR (10g): 1.74   mW/g $\pm$ 0.03 dB, (Worst-case extrapolation)

Penetration depth: 11.2 (10.4, 12.4) [mm]

Powerdrift: -0.01 dB

SAR_{Tot} [mW/g]

2.49E+0

1.39E+0

2.77E-1

SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	4/14/2004	Frequency (MHz):	900
Lab Location:	CGISS	Mixture Type:	FCC Body
Robot System:	3	Ambient Temp.(°C):	23
Probe Serial #:	1545	Tissue Temp.(°C):	20.5
DAE Serial #:	406		

Tissue Characteristics

Permitivity:	53.3	Phantom Type/SN:	80302002A/S8
Conductivity:	1.05	Distance (mm):	15 (tissue/dipole cnt)

Reference Source: D900V2   (Dipole)

Reference SN: 84

Power to Dipole: 250   mW

Measured SAR Value: 2.91   mW/g,   1.85   mW/g (10g avg.)

Power Drift: -0.04   dB

New Target/Measured
SAR Value: 11.75 mW/g,   7.47 mW/g (10g avg.)
(normalized to 1.0 W, including drift)

Test performed by: C. Miller   Initial:

SPEAG DIPOLE D900V2; Test date:04/14/04

Run #: Sys Perf-040414-09
Model #: D900 V2
Robot: CGISS-3
TX Freq: 900 MHz
Start Power; 250 mW
DAE3: 401
- Comments-

Phantom #: 80302002A/S8
SN: 084
Tester: C. Miller
900 MHz Sim Tissue Temp: 20.5 (Celsius)

DAE Cal Date: 08/21/2003

SAR calculated at 1W is 11.75 mW/g (1g avg).
SAR calculated at 1W is 7.47 mW/g (10g avg).
Flat; Probe: ET3DV6 - SN1383(Cal Date 25 Feb 2004); ConvF(5.82,5.82,5.82); Crest factor: 1.0; FCC Body
900MHz: $\sigma = 1.05$ mho/m $\varepsilon_r = 53.3$ $\rho = 1.00$ g/cm³
Cubes (2): Peak: 4.56 mW/g ± 0.03 dB, SAR (1g): 2.91 mW/g ± 0.03 dB, SAR (10g): 1.85 mW/g ± 0.03
dB, (Worst-case extrapolation)
Penetration depth: 12.0 (11.1, 13.3) [mm]
Powerdrift: -0.04 dB

SAR_{Tot} [mW/g]

1.73E+0

2.89E-1
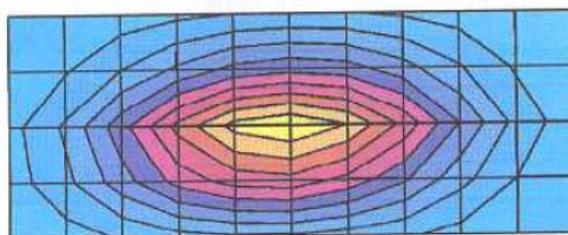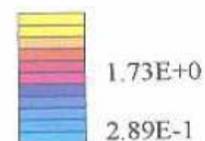
APPENDIX D

Probe/Dipole Calibration Certificates

Calibration Laboratory of
Schmid & Partner
  Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

Client   **Motorola CGISS**

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN:1393
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	April 28, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	US37292783	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Fluke Process Calibrator Type 702	SN: 6295803	8-Sep-03 (Sintrel SCS No. E-030020)	Sep-04
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8684C	US3642U01700	4-Aug-99 (SPEAG, in house check Aug-02)	In house check: Aug-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: April 28, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

DASY - Parameters of Probe: ET3DV6 SN:1393

Sensitivity in Free Space

NormX	1.87 $\mu V/(V/m)^2$	DCP X	94	mV
NormY	1.55 $\mu V/(V/m)^2$	DCP Y	94	mV
NormZ	1.86 $\mu V/(V/m)^2$	DCP Z	94	mV

Diode Compression[A]

(see table above)

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Plese see Page 7.

Boundary Effect

Head		900 MHz	Typical SAR gradient: 5 % per mm		
	Sensor Center to Phantom Surface Distance			3.7 mm	4.7 mm
	SAR_{be} [%]	Without Correction Algorithm		8.8	4.8
	SAR_{be} [%]	With Correction Algorithm		0.1	0.2

Head		1800 MHz	Typical SAR gradient: 10 % per mm		
	Sensor Center to Phantom Surface Distance			3.7 mm	4.7 mm
	SAR_{be} [%]	Without Correction Algorithm		12.5	8.6
	SAR_{be} [%]	With Correction Algorithm		0.2	0.1

Sensor Offset

|		
Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**low but repeatable**	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] numerical linearization parameter: uncertainty not required

Frequency Response of E-Field

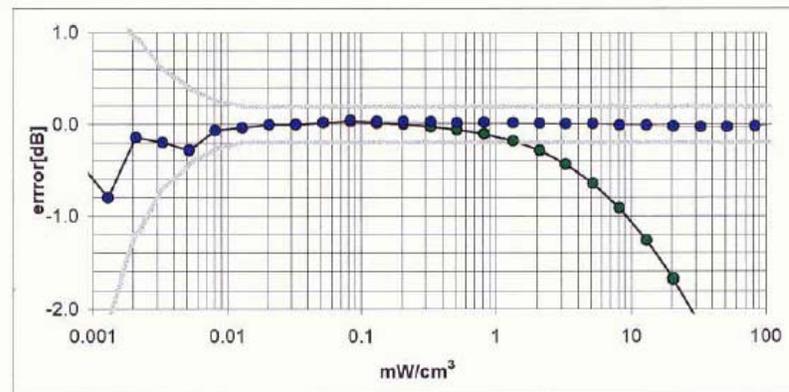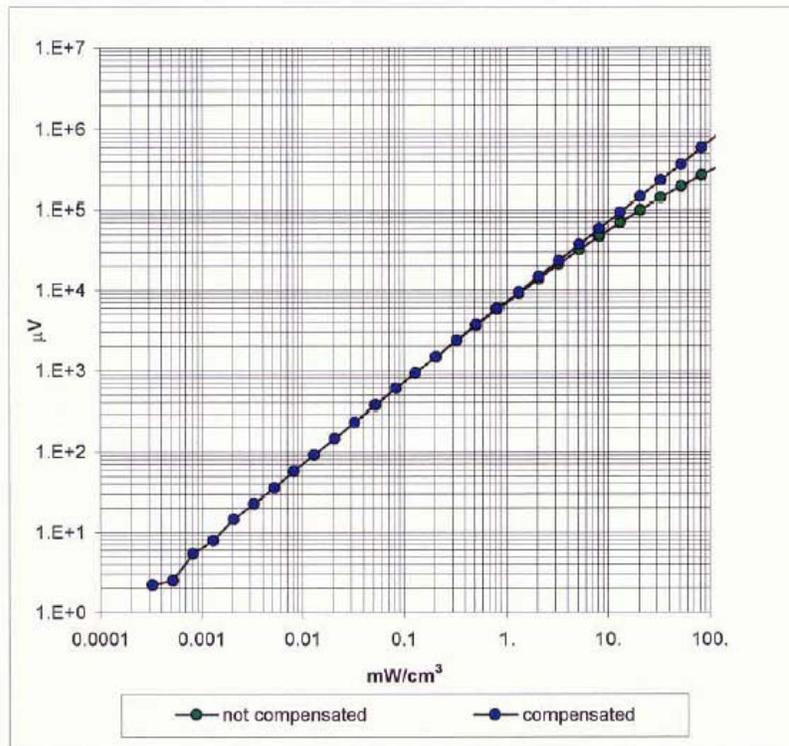## (TEM-Cell:ifi110, Waveguide R22)
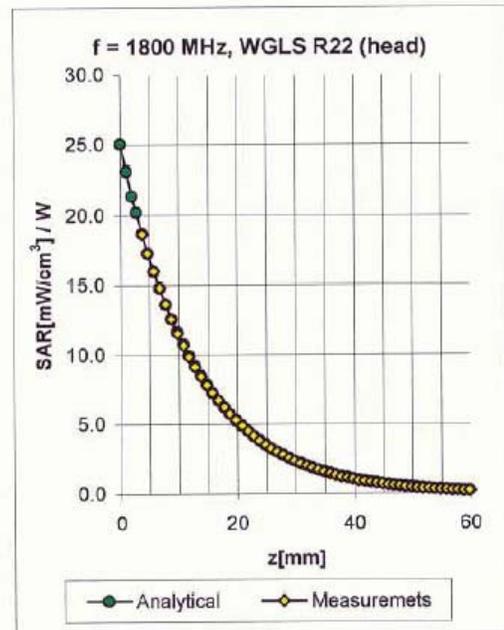
Receiving Pattern (ϕ) , $\theta = 0°$

f = 900 MHz, TEM cell ifi110

f = 1800 MHz, WG R22
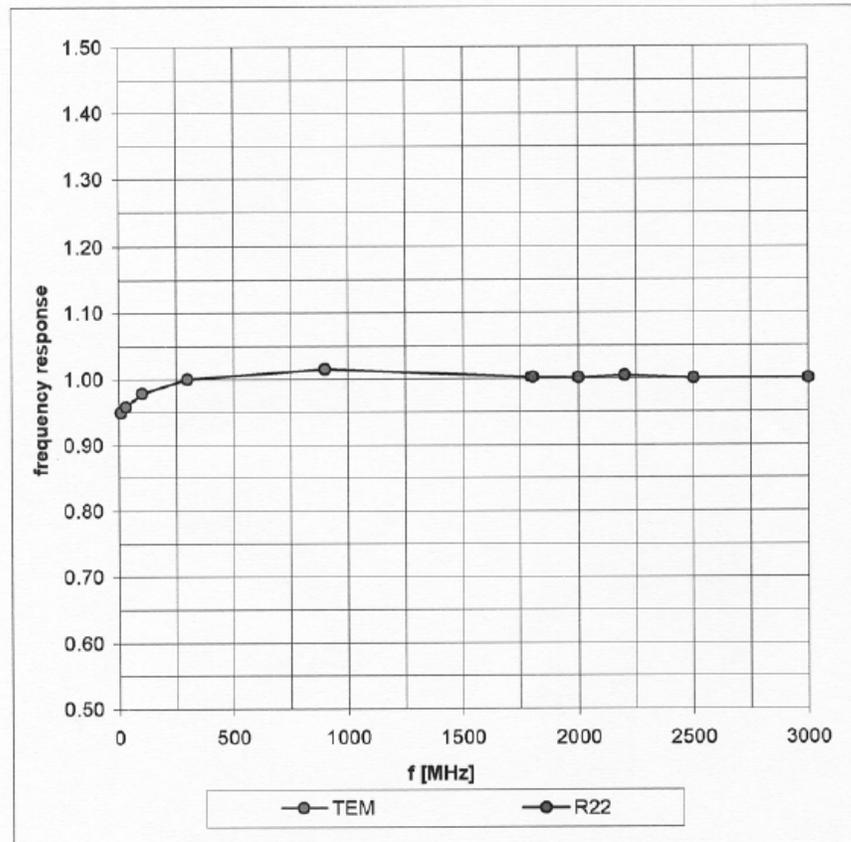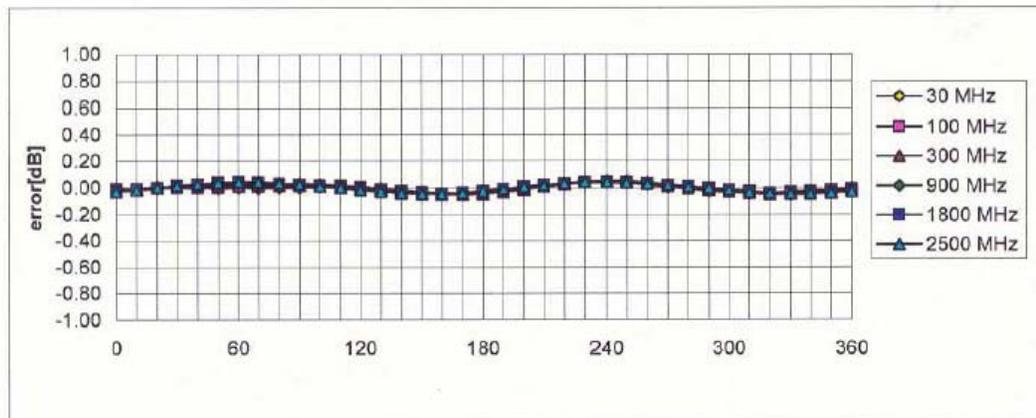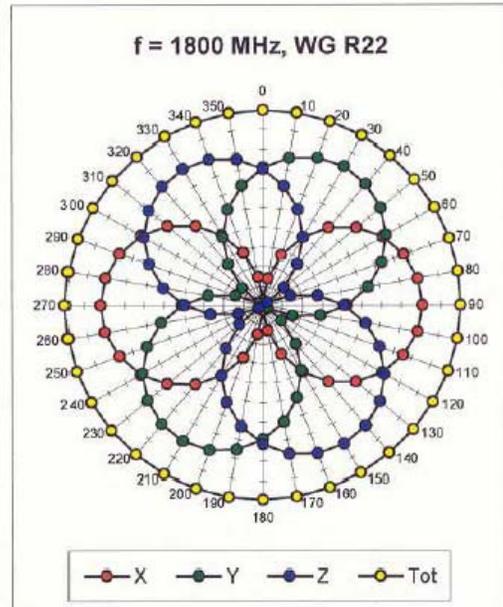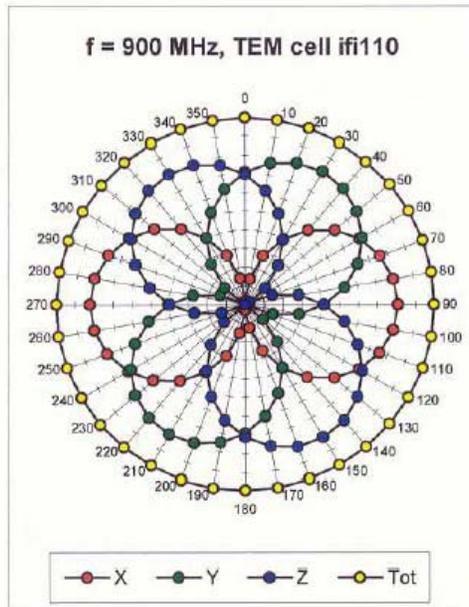
Axial Isotropy Error < ± 0.2 dB

Dynamic Range f(SAR$_{head}$)

(Waveguide R22)

Probe Linearity < ± 0.2 dB

Conversion Factor Assessment

f = 900 MHz, WGLS R9 (head)

f = 1800 MHz, WGLS R22 (head)
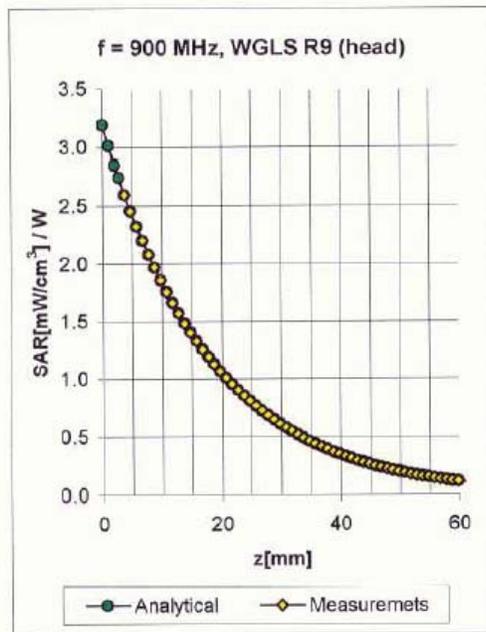
f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	800-1000	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.95	6.73	± 9.5% (k=2)
1450	1400-1500	Head	40.5 ± 5%	1.20 ± 5%	0.41	2.78	5.85	± 9.5% (k=2)
1800	1710-1910	Head	40.0 ± 5%	1.40 ± 5%	0.42	2.79	5.29	± 9.5% (k=2)
2450	2400-2500	Head	39.2 ± 5%	1.80 ± 5%	0.88	1.95	4.51	± 9.5% (k=2)
900	800-1000	Body	55.0 ± 5%	1.05 ± 5%	0.45	2.27	6.35	± 9.5% (k=2)
1450	1400-1500	Body	54.0 ± 5%	1.30 ± 5%	0.43	2.79	5.56	± 9.5% (k=2)
1800	1710-1910	Body	53.3 ± 5%	1.52 ± 5%	0.51	2.82	4.83	± 9.5% (k=2)
2450	2400-2500	Body	52.7 ± 5%	1.95 ± 5%	1.01	1.61	4.41	± 9.5% (k=2)

[B] The stated uncertainty of calibration in according to P1528.

Deviation from Isotropy in HSL
Error (θ,φ), f = 900 MHz
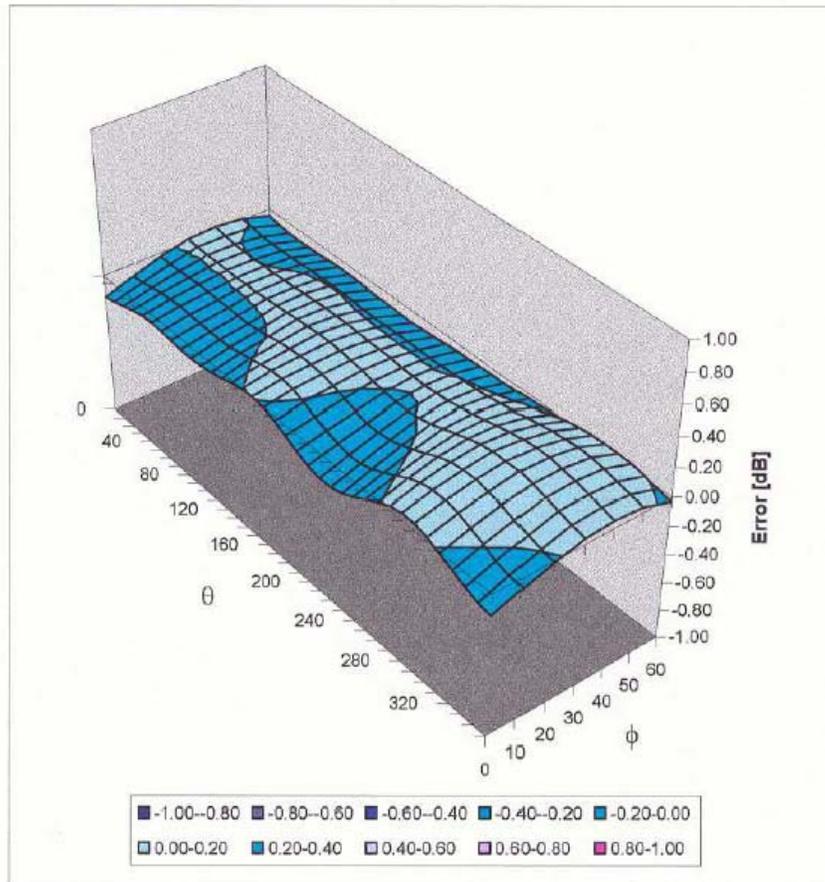
Spherical Isotropy Error < ± 0.4 dB

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IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

Diethylene Gycol Monobuthy Ether (the basis for liquids above 1 GHz), as many other organic solvents, is a very effective softener for synthetic materials. These solvents can cause irreparable damage to certain SPEAG products, except those which are explicitly declared as compliant with organic solvents.

Compatible Probes:
- ET3DV6
- ET3DV6R
- ES3DV2
- ER3DV6
- H3DV6

Important Note for ET3DV6 Probes:
The ET3DV6 probes shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

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IMPORTANT NOTICE

UNCERTAINTY OF THE PROBE CONVERSION FACTOR

Important Note:

The Swiss accreditation body (METAS) has requested an additional uncertainty for narrow bandwidth probe calibration compared to the uncertainty table of IEEE/IEC defined for a single frequency. SPEAG and the IT'IS foundation are currently investigating the most appropriate method for narrow and broadband uncertainty assessment.

A preliminary uncertainty value for the indicated frequency bandwidth is included in the attached probe calibration document.

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Calibration Laboratory of
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Client   Motorola CGISS

CALIBRATION CERTIFICATE

Object(s)	D900V2 - SN:084
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits
Calibration date:	March 22, 2004
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM E442	GB37480704	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	US37292783	6-Nov-03 (METAS, No. 252-0254)	Nov-04
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-03)	In house check: Oct 05

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: March 23, 2004

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **head simulating solution** of the following electrical parameters at 900 MHz:

Relative Dielectricity	**41.4**	± 5%
Conductivity	**0.95 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.18 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.
The dipole input power (forward power) was 250 mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm^3 (1 g) of tissue:	**10.9 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**7.04 mW/g** ± 16.2 % (k=2)[1]

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.388 ns**	(one direction)
Transmission factor:	**0.989**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	$Re\{Z\} = $ **52.6 Ω**
	$Im\{Z\} = $ **-3.4 Ω**
Return Loss at 900 MHz	**-27.7 dB**

4. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

5. Design

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

6. Power Test

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN084

Communication System: CW-900; Frequency: 900 MHz;Duty Cycle: 1:1
Medium: HSL 900 MHz;
Medium parameters used: f = 900 MHz; σ = 0.95 mho/m; ε_r = 41.4; ρ = 1000 kg/m³

Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.18, 6.18, 6.18); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn411; Calibrated: 11/6/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASY4, V4.2 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 112

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 57 V/m; Power Drift = 0.0 dB
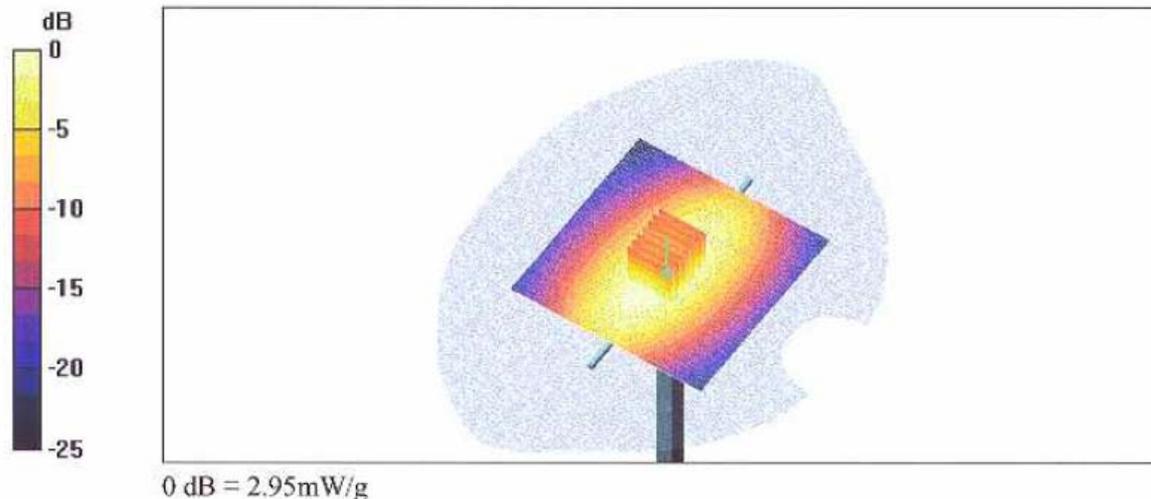Maximum value of SAR (interpolated) = 2.92 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,
dy=5mm, dz=5mm
Reference Value = 57 V/m; Power Drift = 0.0 dB
Maximum value of SAR (measured) = 2.95 mW/g
Peak SAR (extrapolated) = 4.11 W/kg
SAR(1 g) = 2.73 mW/g; SAR(10 g) = 1.76 mW/g

0 dB = 2.95mW/g

APPENDIX E

Illustration of Body-Worn Accessories

The purpose of this appendix is to illustrate the body-worn carry accessories offered for FCC ID: AZ489FT5842. The sample that was used in the following photos represents the product used to obtain the results presented herein.

Photo 1.
Model RLN5713A
Back View

Photo 2.
Model RLN5713A
Side View

Appendix F
Accessories and options test status and separation distances

Carry Case Models	Tested ?	Min. Separation distances between DUT antenna and phantom surface. (mm)	Comments
RLN5713A	Yes	40-54	NA

Audio Acc. Models	Tested ?	Separation distances between DUT antenna and phantom surface. (mm)	Comments
HMN9026C	Yes	NA	NA
HMN9039C	Yes	NA	NA
HMN9038A	Yes	NA	NA
HMN9025C	Yes	NA	NA
NTN9159D	Yes	NA	NA
HCSN4000B	Yes	NA	NA
HCSN4001B	Yes	NA	NA