MOTOROLA

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CGISS EME Test Laboratory
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S.A.R. EME Compliance Test Report

Date of Report:	November 10, 2004
Report Revision:	Rev. A
Manufacturer:	Motorola
Product Description:	iDEN iM240**;** TDMA: 236:310 WiDEN (76.1%), 81:120 Packet Data (67.5%); 1:6, 2:6 TDMA Circuit Data/FAX; 64 QAM, 16 QAM, and QPSK Modulations; 0.6 W Pulse Avg.
FCC ID:	AZ489FT5834
Device Model:	H70UAA9RR1AN

Test Period:	11/4/04-11/9/04
Responsible Eng:	K. Uong (EME Lead Eng.)
Author:	K. Uong (EME Lead Eng.)

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 – Ken Enger — 11/10/04

Ken Enger
Senior Resource Manager, Laboratory Director, CGISS EME Lab

Date Approved

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REVISION HISTORY

Date	Revision	Comments
9/8/04	O	Release of Prototype results
11/10/04	A	Disclose the Prototype results for the latest design of the iM240.

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 H70UAA9RR1AN, FCC ID: AZ489FT5834.

The DUT for this vintage has a different antenna, the antenna is longer, and there are tuning value changes to adapt the card to the new antenna.

The applicable exposure environment is General Population/Uncontrolled.

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: AZ489FT5834 is device that employs circuit data transmissions using quad 16-QAM modulation. Packet Data transmission is also supported with a maximum duty cycle of 67.5% using quad QPSK modulation, quad 16-QAM or quad 64-QAM modulations. The WiDEN mode, which features a wider bandwidth capability (up to 100KHz), uses QPSK, M16-QAM, or M64-QAM modulation modes in 1 to 4 standard 25KHz iDEN channels and has a maximum duty cycle of 76.1%. WiDEN 25KHz mode (WiDEN25) provides the highest duty cycle and uses one standard iDEN channel. WiDEN50, WIDEN75, and WiDEN100 use two, three, and four contiguous channels respectively.

This device will be marketed to and used by the general population. This device may be used as a PCMCIA modem within a PC laptop or a PDA while in the above mentioned data modes.

FCC ID: AZ489FT5834 is capable of operating in the 806-825 MHz band. The rated power is 0.60 watts pulse average. The maximum output is 0.64 watts pulse average as defined by the upper limit of the production line final test station.

FCC ID: AZ489FT5834 is offered with the following options and accessories:

Antenna	**Description**
NNTN6033A	Removable 806-870 MHz 1/4 wave 8.5 cm -2.5 dBi
NNTN5861A	External mobile antenna 806-870MHz ½ wave antenna; 21.1cm, 3.0dBi

3.1 Test Signal

Test Mode	X	Call Simulator		Simulator	

Test Signal mode:

Transmission Mode:

CW	
Native Transmission	**X**
TDMA	**X**
Other	

3.2 Test Output Power

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

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	D835V2/426	10.33 +/- 0.14	10.56 +/- 10%	11/04/04-11/09/04 4 test days

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

A rectangular shaped box made of high density polyethylene (HDPE) material. The phantom is mounted on a wooden supporting structure that has a loss tangent of < 0.05. The structure has a 68.58 cm x 25.40 cm opening at its center to allow positioning the DUT to the phantom's surface. The flat phantom dimensions are L = 80cm, W = 60cm, H = 20cm, Surface Thickness = 0.2cm. This phantom is only used to confirm the peak area located on the laptop host with the PCMCIA card inserted.

4.2.2 SAM Phantom

A flat section of the SAM TP1209 phantom supplied by SPEAG was used to assess S.A.R. performance at the body.

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)

Simulated Tissue	Body Position
FCC Body	Torso

4.3.2 Simulated Tissue Composition

% of listed ingredients	900MHz		835MHz	
	Head	Body	Head	Body
Sugar	NA	NA	NA	44.90
DGBE (Glycol)	NA	NA	NA	NA
Diacetin	NA	NA	NA	NA
De ionized -Water	NA	NA	NA	53.06
Salt	NA	NA	NA	0.94
HEC	NA	NA	NA	1
Bact.	NA	NA	NA	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
835	55.2	53.1-53.5	0.97	0.96-0.97
813	55.3	53.3-53.8	0.97	0.94-0.95

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^{o}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: 21.4-23.4˚C Avg. 22.78˚C
Relative Humidity	30 - 70 %	Range: 43.2-52.0% Avg. 48.0%
Tissue Temperature	NA	Range: 20.1-21.1˚C Avg. 20.6˚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.

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 inserted into the host devices that placed against the flat section of the SAM phantom with the DUT centered to the flat section of the SAM phantom.

5.2.2 Head

NA

5.2.3 Face

NA

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 section of the SAM phantom with applicable tissue simulant to assess performance at the body and hand. Note that the device being assessed herein serves as a PCMCIA card and works in conjunction with a PC laptop or PDA host device. The DUT was assessed using the following three popular consumer PC laptops and one iPAQ Pocket PC: Compaq – Evo N610c, IBM - ThinkPad type 2658, Toshiba - A10-S177, and HP iPaq - model h5550 w/ PCMCIA adaptor p/n 249704-B22. Note that for this assessment the closest to the body of the two available PCMCIA slots on the Compaq and IBM laptops were used. The Toshiba laptop and the HP iPAQ PDA only have one slot. Due to the size of the laptop host and the resulting length of time required to complete a scan, all SAR measurements were performed with the coarse scan capturing only the area around the PCMCIA card and the attached antennas. Also for each antenna, with the lap top host that indicated highest SAR results, a rough coarse scan was done to cover the entire area of the lap top host with the PCMCIA card inserted to confirm the peak area. Assessments with the iPAQ Pocket PC host were done with the coarse scan capturing the DUT and the entire host device. The DUT receives its supply power from the host devices.

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 (800MHz band) [Table 3]

The DUT was assessed with the antenna NNTN6033A at the TX center frequency of the band, with the bottom of each of the three PC laptops against the phantom in the 236:310 transmission mode.

The DUT was assessed with the antenna NNTN6033A at the TX band edges, with the bottom of the lap top that exhibited the worst case performance from above against the phantom, in 236:310 transmission mode.

The DUT was assessed with the antenna NNTN5861A at across the TX frequency of the band, with the bottom of the lap top that exhibited the worst case performance from above against the phantom, in 236:310 transmission mode.

The DUT was assessed at the TX center frequency of the band, with the bottom of the iPAQ Pocket PC against the phantom in the 236:310 transmission mode. Note that this assessment is for both body and handheld exposure.

The DUT was assessed at the TX band edges, with the bottom of the iPAQ Pocket PC against the phantom in 236:310 transmission mode. Note that this assessment is for both body and handheld exposure.

Shortened scan assessment at the body [APPENDIX A]

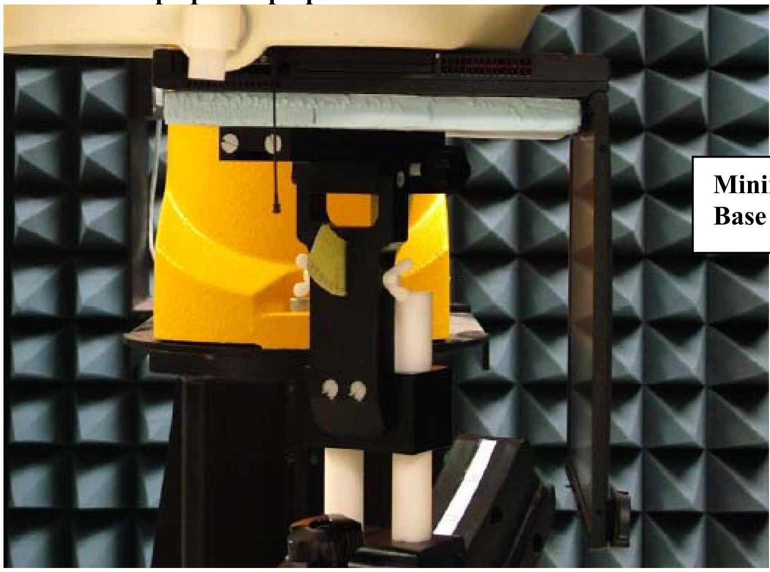
A "shortened" scan was performed using the worst case test configuration from the assessment above.

Rough Coarse scan [APPENDIX B]

For each antenna, with the lap top host that indicated highest SAR results, a rough coarse scan was done to cover the entire area of the lap top host with the PCMCIA card inserted to confirm the peak area.

5.4 Test Position Photographs

Figure 1: Highest S.A.R. Test Position (@ body)
DUT in Compaq PC laptop host device with NNTN6033A antenna



Minimum antenna separation:
Base = 5mm

Note that the assessed Toshiba and IBM hosts produce an antenna separation distance of 8mm and 12mm respectively from the phantom.

Figure 2: S.A.R. Test Position (@ body)
DUT in Compaq PC laptop host device with NNTN5861A antenna

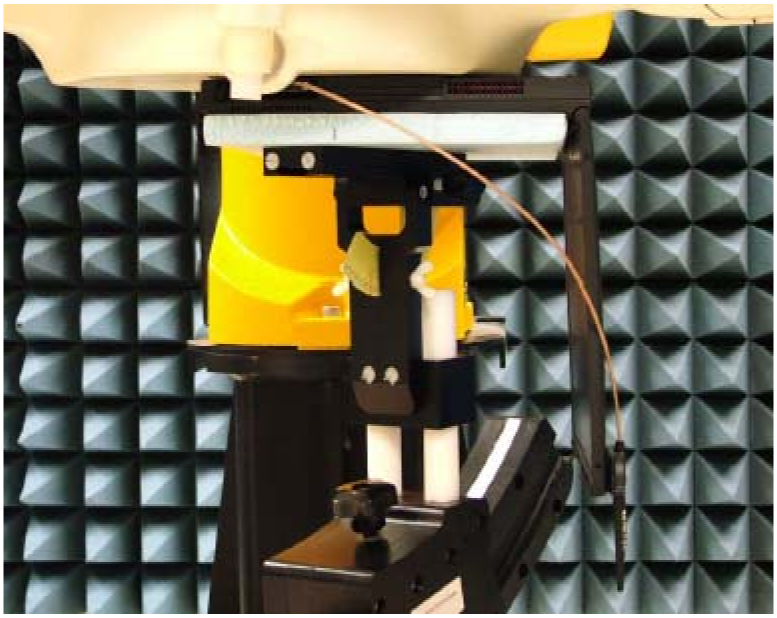
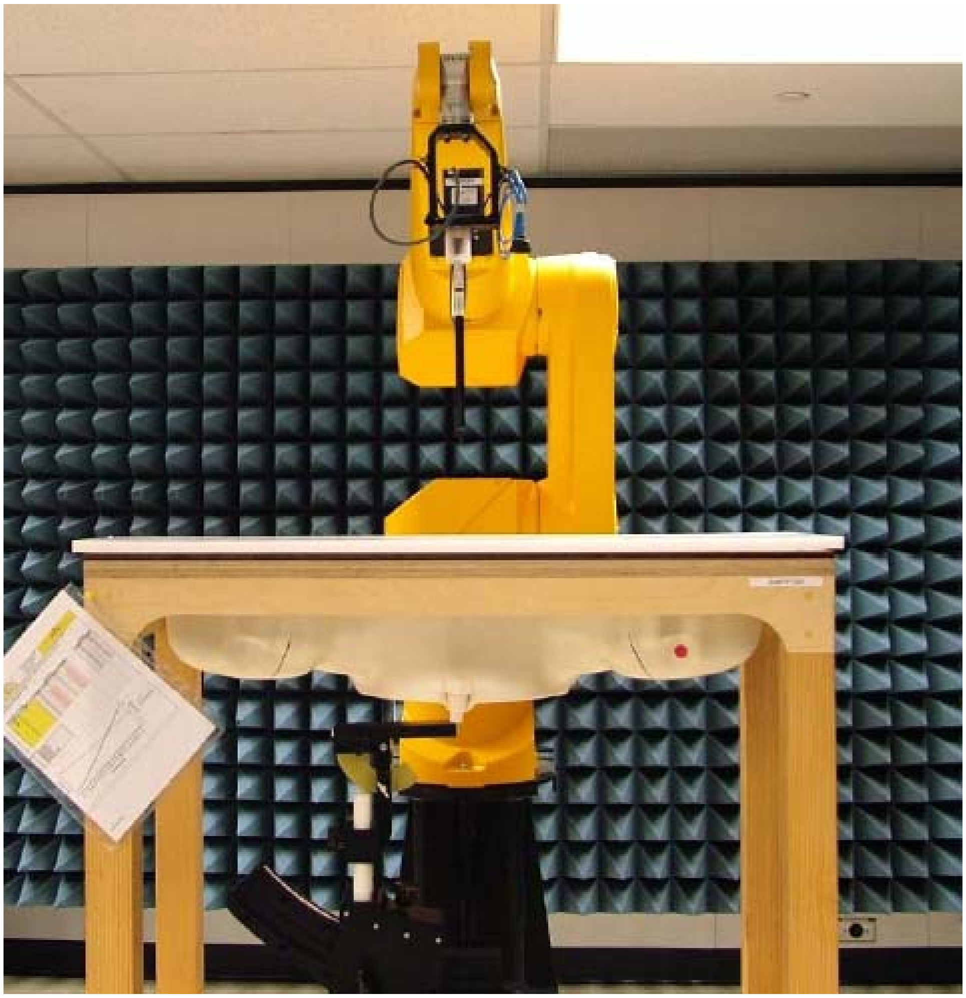


Figure 3. Assessment @ body and hand
DUT in iPAQ Pocket PC host device with antenna vertical

Figure 3: Robot Test System (SAM Phantom)



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 x f / e	i = c x 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 x f / e	i = c x 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	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) *ci* - sensitivity coefficient that should be applied to convert the variability of the uncertainty component into a variability of SAR.
g) *ui* – SAR uncertainty
h) *vi* - 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

Note: (Run #s KU-R2-041105-02 and **KU-041105-05, used full coarse and 7x7x7 cube scans)**

Table 3

DUT assessment at the body; 236:310 mode (76.1% max duty cycle) 806-825MHz band												
Run Number/ SN	**Antenna**	**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 for antenna NNTN6033A, at TX band center frequency using the PC laptop hosts against the phantom;												
KU-R2-041104-04/365AEU12VG	NNTN6033A	813.5125	Host device battery supply	Bottom against phantom	NA	COMPAQ Lap top host device	0.656	-0.08	1.001	0.651	1.020	0.663
KU-R2-041105-03/365AEU12VG	NNTN6033A	813.5125	Host device battery supply	Bottom against phantom	NA	IBM Lap top host device	0.649	-0.38	0.455	0.311	0.497	0.339
KU-R2-041105-04/365AEU12VG	NNTN6033A	813.5125	Host device battery supply	Bottom against phantom	NA	TOSHIBA Lap top host device	0.643	-0.01	0.713	0.476	0.715	0.477
Band edges assessment for antenna NNTN6033A with worst case host laptop **(*Assessment with the worst case test configuration with the Lap top using the full DASY coarse and 7x7x7 cube scan measurements.)**												
*KU-R2-041105-02/365AEU12VG	NNTN6033A	806.0125	Host device battery supply	Bottom against phantom	NA	COMPAQ Lap top host device	0.644	-0.05	1.180	0.631	**1.194**	0.638
KU-R2-041104-10/365AEU12VG	NNTN6033A	824.9875	Host device battery supply	Bottom against phantom	NA	COMPAQ Lap top host device	0.634	-0.26	0.854	0.556	0.915	0.596
DUT assessment for antenna NNTN5861A, at across the TX frequencies of the band with worst case laptop												
KU-R2-041109-02/365AEU12VG	NNTN5861A	806.0125	Host device battery supply	Bottom against phantom	NA	COMPAQ Lap top host device	0.642	0.00	0.840	0.578	0.840	0.578
KU-R2-041108-02/365AEU12VG	NNTN5861A	813.5125	Host device battery supply	Bottom against phantom	NA	COMPAQ Lap top host device	0.652	0.03	0.846	0.571	0.846	0.571
KU-R2-041109-04/365AEU12VG	NNTN5861A	824.9875	Host device battery supply	Bottom against phantom	NA	COMPAQ Lap top host device	0.639	-0.06	0.801	0.550	0.813	0.559
DUT assessment using the iPAQ Pocket PC host against the phantom **(*Assessment with the worst case test configuration with the iPAQ using the full DASY coarse and 7x7x7 cube scan measurements.)**												
*KU-R2-041105-05/365AEU12VG	NNTN6033A	813.5125	Host device battery supply PE2031B	Bottom against phantom	NA	iPAQ Pocket PC host device	0.648	0.03	0.863	0.621	**0.863**	0.621
KU-R2-041105-06/365AEU12VG	NNTN6033A	813.5125	Host device battery supply PE2031A	Bottom against phantom	NA	iPAQ Pocket PC host device	0.647	0.07	0.664	0.472	0.664	0.472
KU-R2-041105-07/365AEU12VG	NNTN6033A	806.0125	Host device battery supply PE2031B	Bottom against phantom	NA	iPAQ Pocket PC host device	0.645	0.03	0.821	0.579	0.821	0.579
KU-R2-041105-08/365AEU12VG	NNTN6033A	824.9875	Host device battery supply PE2031B	Bottom against phantom	NA	iPAQ Pocket PC host device	0.643	-0.22	0.757	0.538	0.796	0.566

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 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. 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: AZ489FT5834 model H70UAA9RR1AN.

At the Body: 1-g Avg. = 1.194 mW/g; 10-g Avg. = 0.638 mW/g

These test results clearly demonstrate compliance with FCC General Population/Uncontrolled RF Exposure limits of **1.6 mW/g** per the requirements of 47 CFR 2.1093(d).

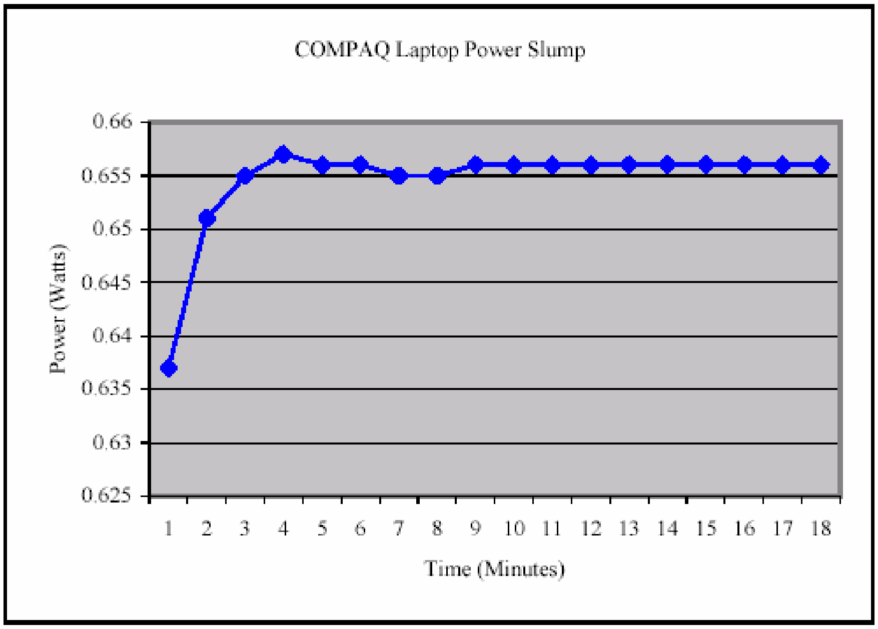
APPENDIX A

Power Slump Data/Shortened Scan

DUT Power versus time data

Power slump for COMPAQ laptop computer with iM240 DUT
DUT SN: 364AEU12VG
Test frequency: 813.5125MHz; 241:310 mode
COMPAQ laptop battery series: PP2041F

Time (minutes)	Power (W)
0	0.637
2	0.651
4	0.655
6	0.657
8	0.656
10	0.656
12	0.655
14	0.655
16	0.656
18	0.656
20	0.656
22	0.656
24	0.656
26	0.656
28	0.656
30	0.656
32	0.656
34	0.656



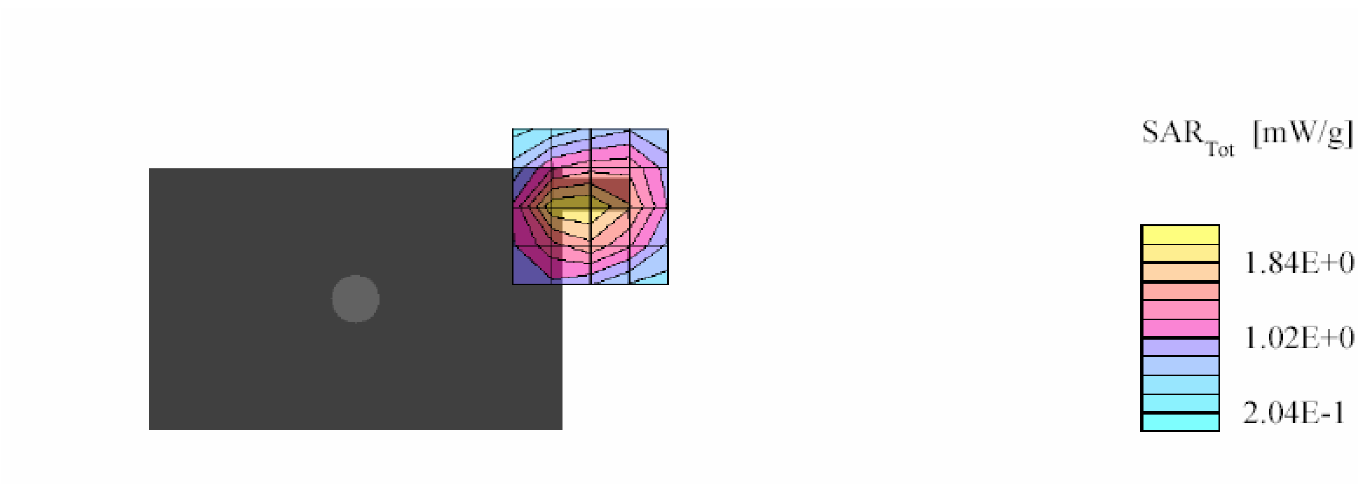
Shortened Scan Results

FCC ID: AZ489FT5834; Test Date: 11/05/04
Motorola CGISS EME Laboratory
Run #: KU-R2-041105-02
Model #: H70UAA9RR1AN SN: 364AEU12VG
TX Freq: 806.0125 MHz
Sim Tissue Temp: 20.6 (Celsius)
Start Power: 0.661 W

Antenna: NNTN6033A
Battery Kit: COMPAQ Laptop powered
Carry Acc: NA
Audio/Data Acc.: NA

Shortened scan reflect highest S.A.R. producing configuration; Run time 8 minutes.
Representative "normal" scan run time was 24 minutes
"Shortened" scan max calculated S.A.R. using S.A.R. drift: 1-g Avg. = 1.16 mW/g; 10-g Avg. = 0.637mW/g
"Normal" scan max calculated S.A.R. using S.A.R. drift: 1-g Avg. = 1.194mW/g; 10-g Avg. = 0.638mW/g
(see section 7.1 run # KU-R2-041105-02)

DUT w/ COMPAQ Laptop Computer against the phantom
SAM Phantom; Flat Section;
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.3; FCC Body 813: σ = 0.95 mho/m εr = 53.7 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cube 5x5x7: SAR (1g): 1.16 mW/g, SAR (10g): 0.637 mW/g, (Worst-case extrapolation)
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0; SAR (1g): 1.16 mW/g, SAR (10g): 0.637 mW/g
Powerdrift: 0.03 dB



APPENDIX B

Data Results

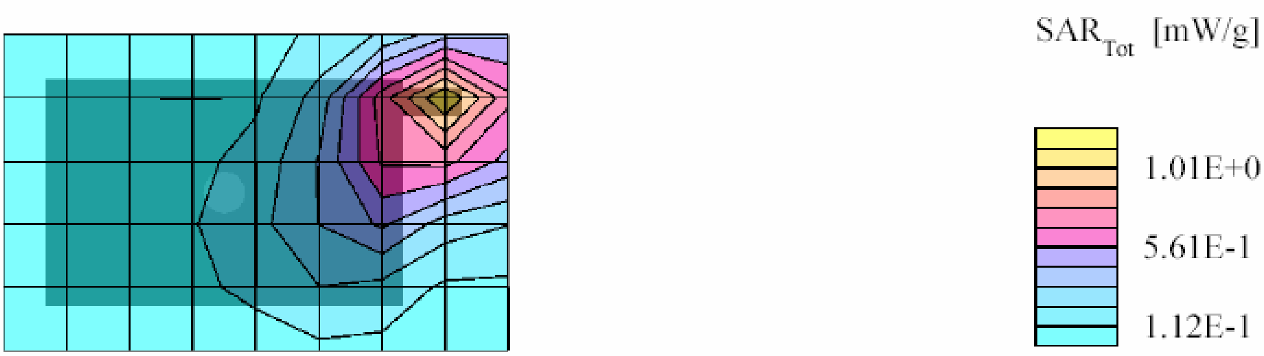
FCC ID: AZ489FT5834; Test Date: 11/05/04

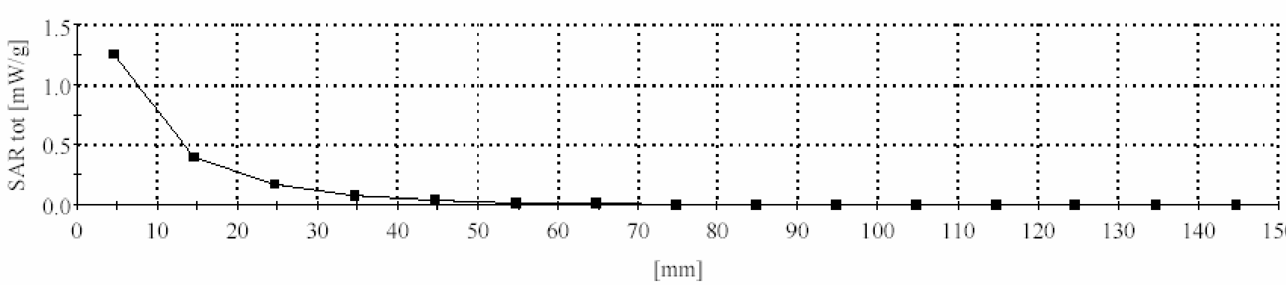
Motorola CGISS EME Laboratory

Run #: KU-R2-041105-02
Model #: H70UAA9RR1AN SN: 364AEU12VG
TX Freq: 806.0125 MHz
Sim Tissue Temp: 20.6 (Celsius)
Start Power: 0.644 W

Antenna: NNTN6033A
Battery Kit: COMPAQ Laptop powered
Carry Acc: NA
Audio/Data Acc.: NA

DUT w/ COMPAQ Laptop Computer against the phantom
SAM Phantom; Flat Section;
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.3; FCC Body 813: σ = 0.95 mho/m εr = 53.7 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cube 7x7x7: SAR (1g): 1.18 mW/g, SAR (10g): 0.631 mW/g * Max outside, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 1.0; Max at 106.5, 61.5, 4.7
Powerdrift: -0.05 dB
Note: “Max outside” has been identified by SPEAG as an unresolved intermittent occurrence with the DASY 3 application even when the entire peak area is captured.





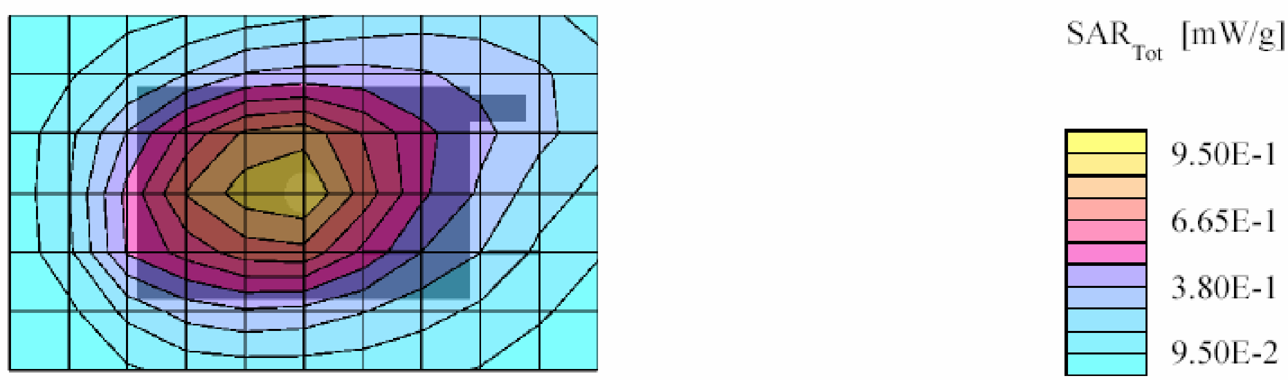
FCC ID: AZ489FT5834; Test Date: 11/05/04

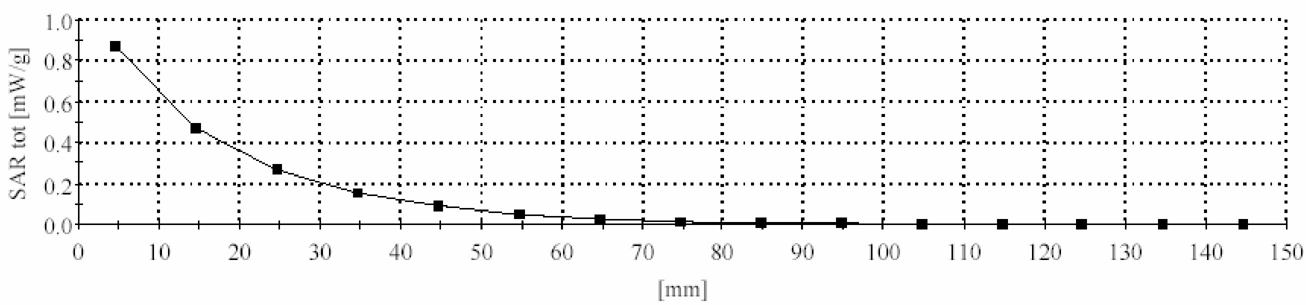
Motorola CGISS EME Laboratory

Run #: KU-R2-041105-05
Model #: H70UAA9RR1AN SN: 364AEU12VG
TX Freq: 813.5125 MHz
Sim Tissue Temp: 20.1 (Celsius)
Start Power: 0.648 W

Antenna: NNTN6033A
Battery Kit: iPAQ Pocket PC model PE2031B
Carry Acc: NA
Audio/Data Acc.: NA

DUT w/ iPAQ host device against the phantom
SAM Phantom; Flat Section;
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.3; FCC Body 813: σ = 0.95 mho/m εr = 53.7 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cube 7x7x7: SAR (1g): 0.863 mW/g, SAR (10g): 0.621 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 1.0; Max at 43.5, 70.5, 4.7
Powerdrift: 0.03 dB





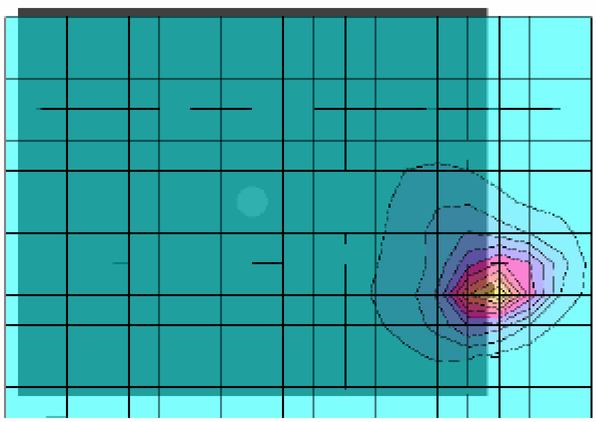
FCC ID: AZ489FT5834; Test Date: 11/09/04

Motorola CGISS EME Laboratory

Run #: CM-R2-041109-07
Model #: H70UAA9RR1AN SN: 364AEU12VG
TX Freq: 813.5125 MHz
Sim Tissue Temp: 20.7 (Celsius)

Coarse scan to confirm the peak area on the lap top w/ PCMCIA card and antenna NNTN5861A.

Flat (2) Phantom; Device 2 Section;
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.3; FCC
Body 813: $\sigma = 0.93$ mho/m $\varepsilon r = 53.3$ $\rho = 1.00$ g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Coarse: Dx = 20.0, Dy = 20.0, Dz = 20.0; Max at 178.0, 316.0, 4.7



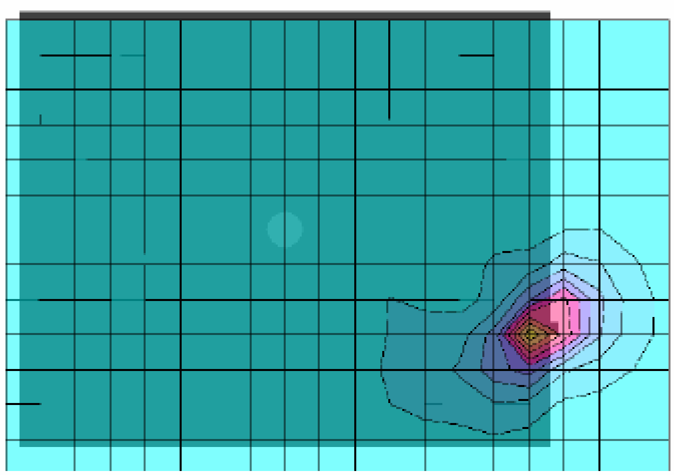
FCC ID: AZ489FT5834; Test Date: 11/09/04

Motorola CGISS EME Laboratory

Run #: CM-R2-041109-08
Model #: H70UAA9RR1AN SN: 364AEU12VG
TX Freq: 813.5125 MHz
Sim Tissue Temp: 21.0 (Celsius)

Coarse scan to confirm the peak area on the lap top w/ PCMCIA card and antenna NNTN6033A.

Flat (2) Phantom; Device 2 Section;
Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Probe cal date: 28/04/04; Crest factor: 1.3; FCC Body 813: σ = 0.93 mho/m εr = 53.3 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Coarse: Dx = 20.0, Dy = 20.0, Dz = 20.0; Max at 180.0, 302.0, 4.7



APPENDIX C

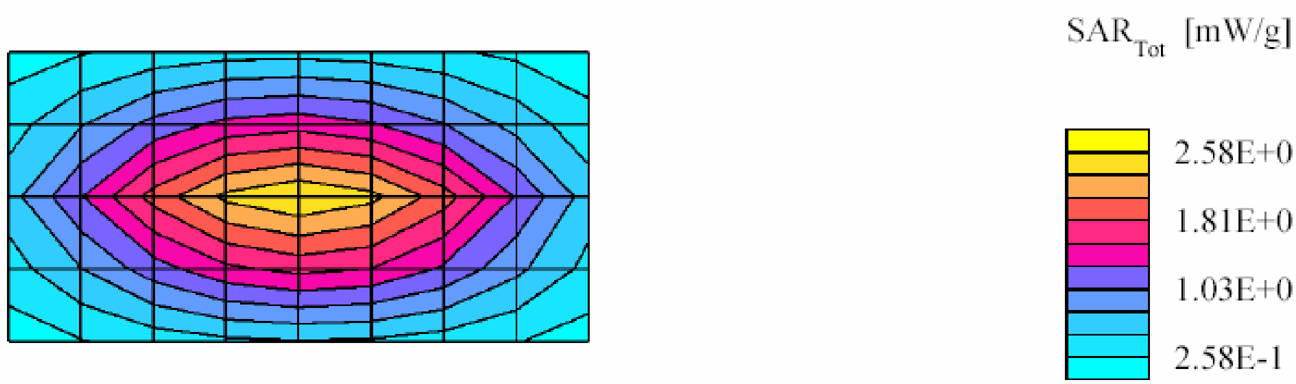
Dipole System Performance Check Results

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 835 MHz Dipole; Model D835V2, SN 426; Test Date: 11/04/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-041104-01
TX Freq: 835 MHz
Sim Tissue Temp: 21.0 (Celsius)
Start Power: 250mW

SAR target at 1W is 10.56 mW/g (1g avg, including drift)
SAR target at 1W is 6.80 mW/g (10g avg, including drift)
SAR calculated 1g is 10.22mW/g percent from target (including drift) is -3.19 %
SAR Calculated 10g is 6.66mW/g Percent from target (including drift) is -2.13%

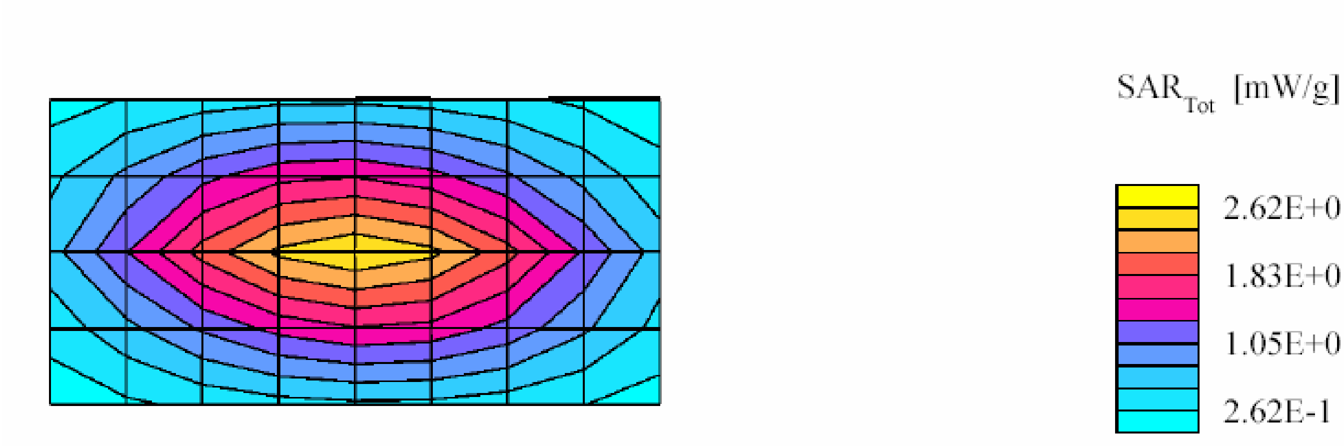
SAM; Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Crest factor: 1.0; FCC Body 835: σ = 0.97 mho/m εr = 53.5 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cubes (2): Peak: 3.91 mW/g ± 0.01 dB, SAR (1g): 2.55 mW/g ± 0.01 dB, SAR (10g): 1.66 mW/g ± 0.02 dB, (Worstcase extrapolation) Penetration depth: 12.7 (11.7, 14.0) [mm]
Powerdrift: -0.01 dB



SPEAG 835 MHz Dipole; Model D835V2, SN 426; Test Date: 11/05/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-041105-01
TX Freq: 835 MHz
Sim Tissue Temp: 20.7 (Celsius)
Start Power: 250mW

SAR target at 1W is 10.56 mW/g (1g avg, including drift)
SAR target at 1W is 6.80 mW/g (10g avg, including drift)
SAR calculated 1g is 10.28 mW/g percent from target (including drift) is -2.65%
SAR Calculated 10g is 6.68 mW/g Percent from target (including drift) is -1.76%

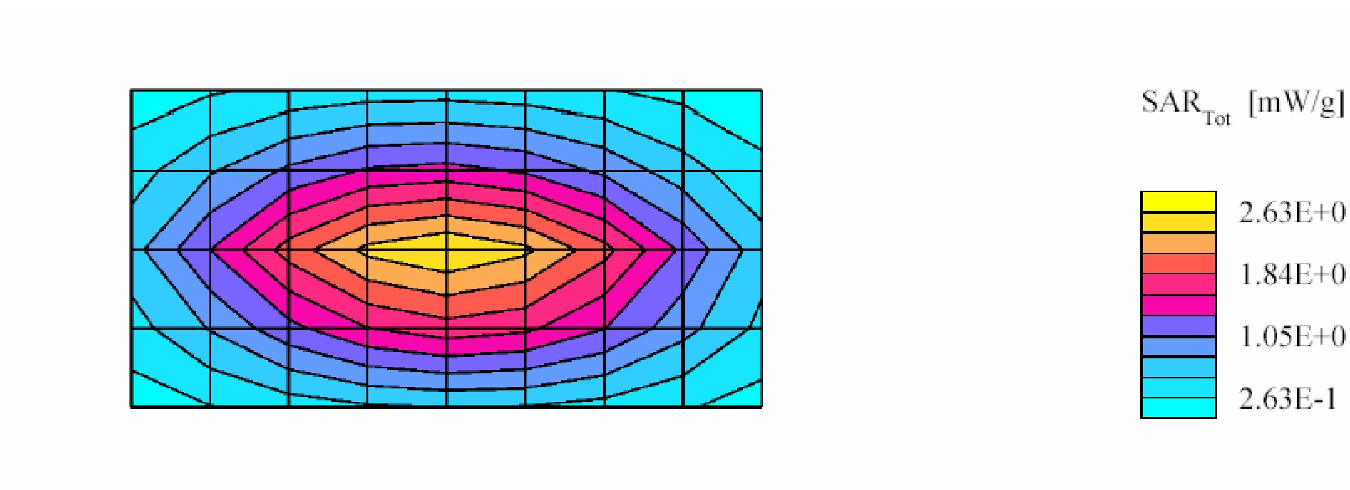
SAM; Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Crest factor: 1.0; FCC Body 835: σ = 0.97 mho/m εr = 53.4 ρ = 1.00 g/cm; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cubes (2): Peak: 3.93 mW/g ± 0.01 dB, SAR (1g): 2.57 mW/g ± 0.01 dB, SAR (10g): 1.67 mW/g ± 0.01 dB, (Worstcase extrapolation) Penetration depth: 12.7 (11.8, 14.0) [mm]
Powerdrift: 0.00 dB



SPEAG 835 MHz Dipole; Model D835V2, SN 426; Test Date: 11/08/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-041108-01
TX Freq: 835 MHz
Sim Tissue Temp: 20.6 (Celsius)
Start Power: 250mW

SAR target at 1W is 10.56 mW/g (1g avg, including drift)
SAR target at 1W is 6.80 mW/g (10g avg, including drift)
SAR calculated 1g is 10.47 mW/g percent from target (including drift) is -0.83%
SAR Calculated 10g is 6.81 mW/g Percent from target (including drift) is 0.1%

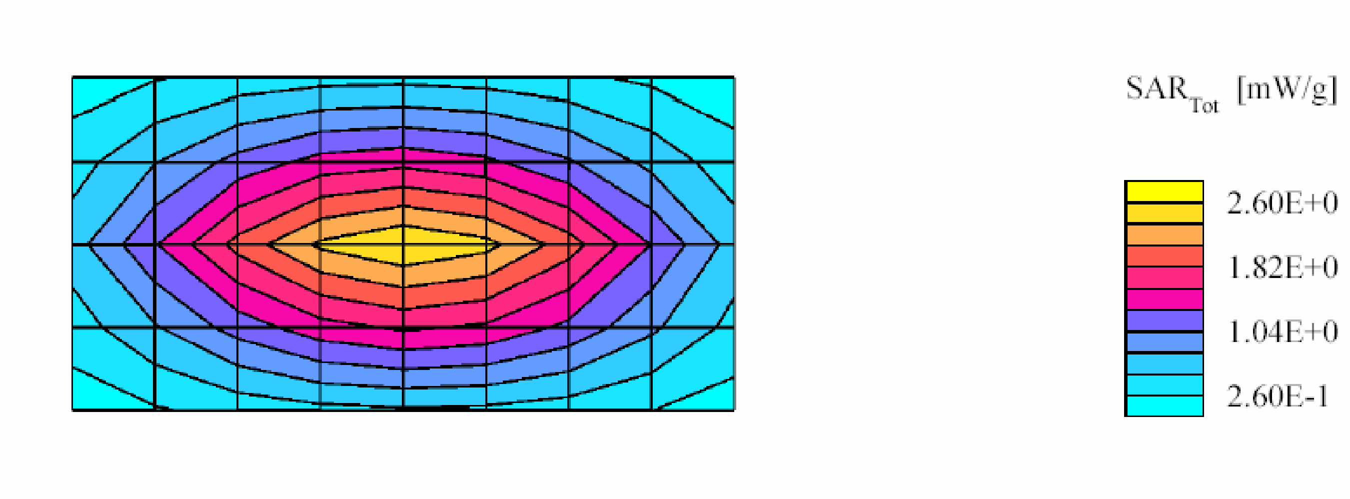
SAM; Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Crest factor: 1.0; FCC Body 835: σ = 0.97 mho/m εr = 53.1 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cubes (2): Peak: 3.99 mW/g ± 0.00 dB, SAR (1g): 2.60 mW/g ± 0.01 dB, SAR (10g): 1.69 mW/g ± 0.02 dB, (Worstcase extrapolation) Penetration depth: 12.7 (11.7, 13.9) [mm]
Powerdrift: -0.03 dB



SPEAG 835 MHz Dipole; Model D835V2, SN 426; Test Date: 11/09/04
Motorola CGISS EME Lab
Run #: Sys Perf-R2-041109-01
TX Freq: 835 MHz
Sim Tissue Temp: 20.9 (Celsius)
Start Power: 250mW

SAR target at 1W is 10.56 mW/g (1g avg, including drift)
SAR target at 1W is 6.80 mW/g (10g avg, including drift)
SAR calculated 1g is 10.19mW/g percent from target (including drift) is -3.48%
SAR Calculated 10g is 6.65 mW/g Percent from target (including drift) is -2.22 %

SAM; Probe: ET3DV6 - SN1393 (Cal Date 28/04/04); ConvF(6.35,6.35,6.35); Crest factor: 1.0; FCC Body 835: σ = 0.96 mho/m εr = 53.1 ρ = 1.00 g/cm3; DAE3: 374V1 DAE Cal Date: 3/23/2004
Cubes (2): Peak: 3.94 mW/g ± 0.01 dB, SAR (1g): 2.56 mW/g ± 0.01 dB, SAR (10g): 1.67 mW/g ± 0.02 dB, (Worstcase extrapolation) Penetration depth: 12.6 (11.6, 13.9) [mm]
Powerdrift: 0.02 dB



SYSTEM VALIDATION

Date:	4/14/2004	Frequency (MHz):	835
Lab Location:	CGISS	Mixture Type:	IEEE-Head
Robot System:	3	Ambient Temp.(°C):	23
Probe Serial #:	1383	Tissue Temp.(°C):	20.9
DAE Serial #:	406		

Tissue Characteristics

Permitivity:	42	Phantom Type/SN:	SAMTP1022
Conductivity:	0.94	Distance (mm):	15 (tissue/dipole cnt)

Reference Source: D835V2 (Dipole)
Reference SN: 426

Power to Dipole: 250 mW
Power Output (radio): n/a mW

Target SAR Value: 9.5 mW/g, 6.2 mW/g (10g avg.)
(normalized to 1.0 W)

Measured SAR Value: 2.47 mW/g, 1.57 mW/g (10g avg.)
Power Drift: -0.02 dB

Measured SAR Value: 9.93 mW/g, 6.31 mW/g (10g avg.)
(normalized to 1.0 W, including drift)

Percent Difference From Target (MUST be within System Uncertainty): 4.48 % (1g ave)
1.76 % (10g ave)

Test performed by: C. Miller Initial: CM

Motorola Internal Use Only Sys. Valid. Form: 021024

SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	4/14/2004	Frequency (MHz):	835
Lab Location:	CGISS	Mixture Type:	IEEE - Head
Robot System:	3	Ambient Temp.(°C):	23
Probe Serial #:	1383	Tissue Temp.(°C):	20.9
DAE Serial #:	401		

Tissue Characteristics

Permitivity:	42	Phantom Type/SN:	SAMTP1022
Conductivity:	0.94	Distance (mm):	15 (tissue/dipole cnt)

Reference Source: D835V2 (Dipole)
Reference SN: 426

Power to Dipole: 250 mW

Measured SAR Value: 2.47 mW/g, 1.57 mW/g (10g avg.)
Power Drift: -0.02 dB

New Target/Measured
SAR Value: 9.93 mW/g, 6.31 mW/g (10g avg.)
(normalized to 1.0 W, including drift)

Test performed by: C. Miller Initial: CM

Sys. Per. Chk. Form: 021024

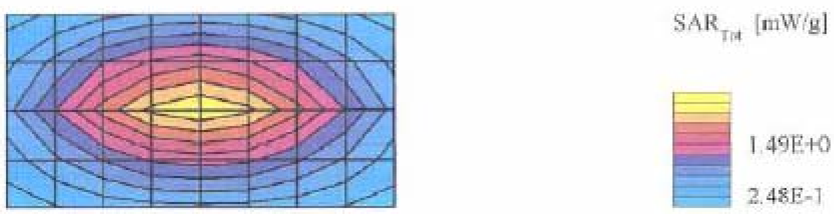
SPEAG DIPOLE D835V2; Test date:04/14/04

Run #: Sys Perf-040414-07
Model #: D835 V2
Robot: CGISS-3
TX Freq: 835 MHz
Start Power: 250 mW
DAE3: 401
- Comments-

Phantom #: SAMTP1022
SN: 426
Tester: C. Miller
835 MHz Sim Tissue Temp: 20.9 (Celsius)

DAE Cal Date: 08/21/2003

SAR calculated at 1W is 9.93 mW/g (1g avg).
SAR calculated at 1W is 6.31 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 835 MHz: $\sigma = 0.94$ mho/m $\varepsilon_r = 42.0$ $\rho = 1.00$ g/cm^3
Cubes (2): Peak: 3.93 mW/g ± 0.02 dB, SAR (1g): 2.47 mW/g ± 0.02 dB, SAR (10g): 1.57 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 11.6 (10.6, 13.0) [mm]
Powerdrift: -0.02 dB



SYSTEM PERFORMANCE CHECK TARGET SAR

Date:	4/14/2004	Frequency (MHz):	835
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:	54	Phantom Type/SN:	80302002A/S8
Conductivity:	0.98	Distance (mm):	15 (tissue/dipole cnt)

Reference Source:	D835V2	(Dipole)
Reference SN:	426	

Power to Dipole: 250 mW

Measured SAR Value:	2.64	mW/g,	1.7	mW/g (10g avg.)
Power Drift:	0	dB		

New Target/Measured SAR Value: (normalized to 1.0 W, including drift)	10.56	mW/g,	6.80	mW/g (10g avg.)

Test performed by: C. Miller Initial: CM

Sys. Per. Chk. Form: 021024

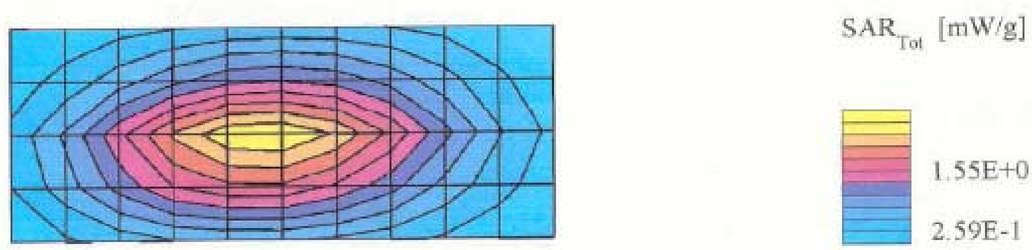
SPEAG DIPOLE D835V2; Test date:04/14/04

Run #: Sys Perf-040414-10
Model #: D835 V2
Robot: CGISS-3
TX Freq: 835 MHz
Start Power; 250 mW
DAE3: 401
- Comments-

Phantom #: 80302002A/S8
SN: 426
Tester: C. Miller
835 MHz Sim Tissue Temp: 20.5 (Celsius)

DAE Cal Date: 08/21/2003

SAR calculated at 1W is 10.56 mW/g (1g avg).
SAR calculated at 1W is 6.80 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
835 MHz: $\sigma = 0.98$ mho/m $\varepsilon_r = 54.0$ $\rho = 1.00$ g/cm^3
Cubes (2): Peak: 4.08 mW/g ± 0.05 dB, SAR (1g): 2.64 mW/g ± 0.04 dB, SAR (10g): 1.70 mW/g ± 0.04 dB, (Worst-case extrapolation)
Penetration depth: 12.6 (11.6, 14.0) [mm]
Powerdrift: -0.00 dB



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	F. Bomholt
Approved by:	Katja Pokovic	Laboratory Director	[signature]

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** $\mu V/(V/m)^2$	
NormY	**1.55** $\mu V/(V/m)^2$	
NormZ	**1.86** $\mu V/(V/m)^2$	

Diode Compression[A]

DCP X	**94**	mV
DCP Y	**94**	mV
DCP Z	**94**	mV

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

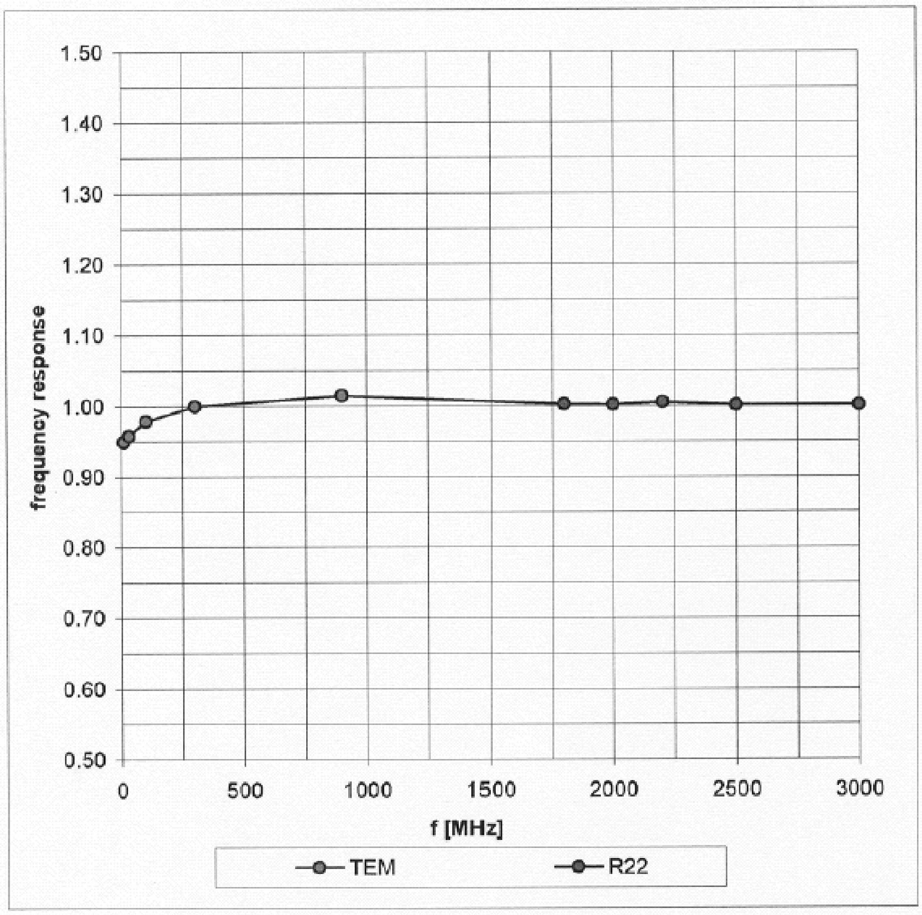
Probe Tip to Sensor Center	**2.7** mm
Optical Surface Detection	**low but repeatable**

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%.

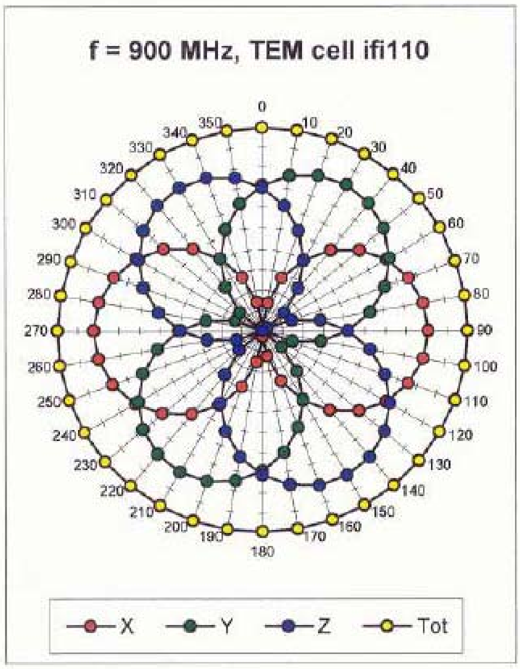
[A] numerical linearization parameter: uncertainty not required

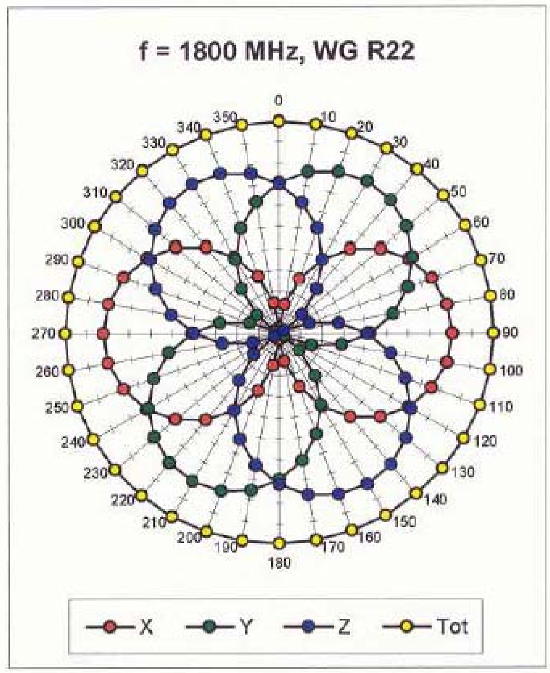
Frequency Response of E-Field

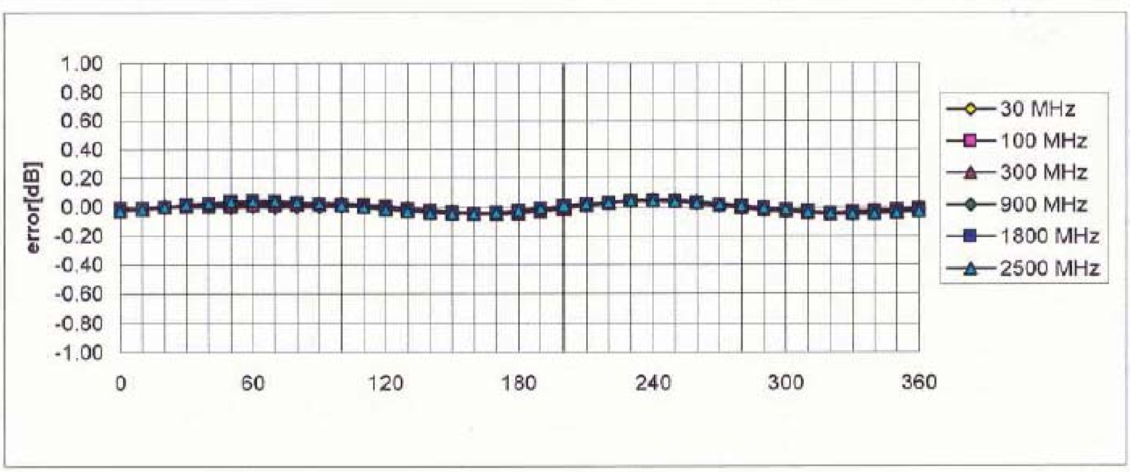
(TEM-Cell:ifi110, Waveguide R22)



Receiving Pattern (ϕ) , θ = 0°



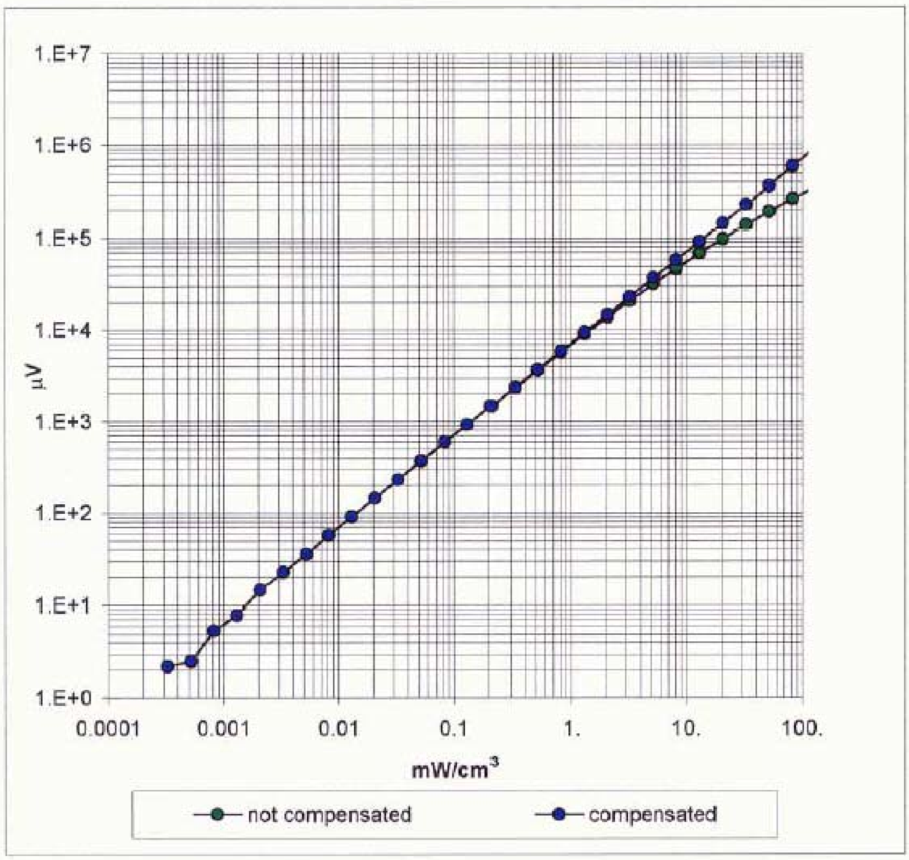


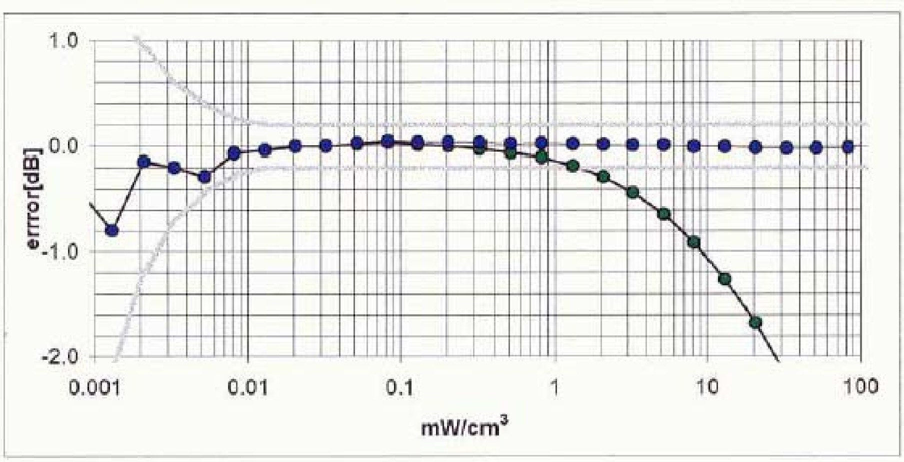


Axial Isotropy Error < ± 0.2 dB

Dynamic Range f(SAR_{head})

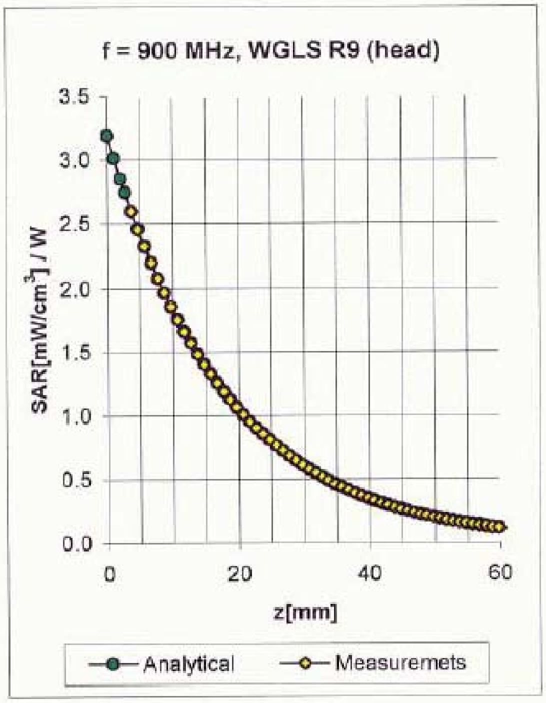
(Waveguide R22)

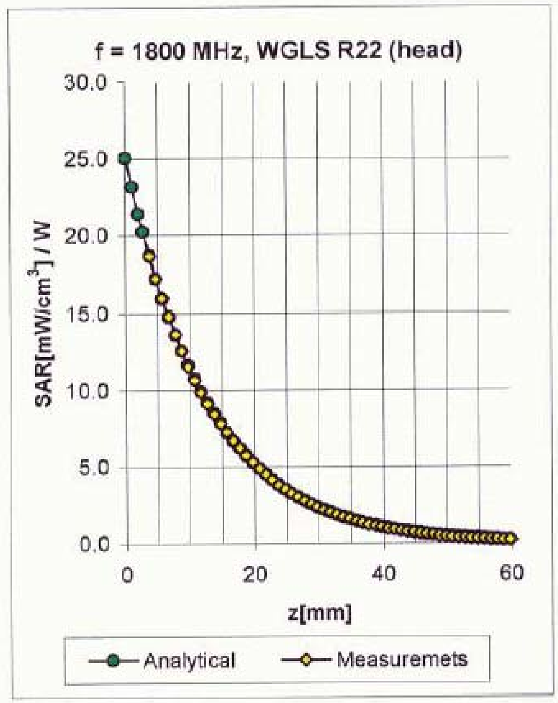




Probe Linearity < ± 0.2 dB

Conversion Factor Assessment



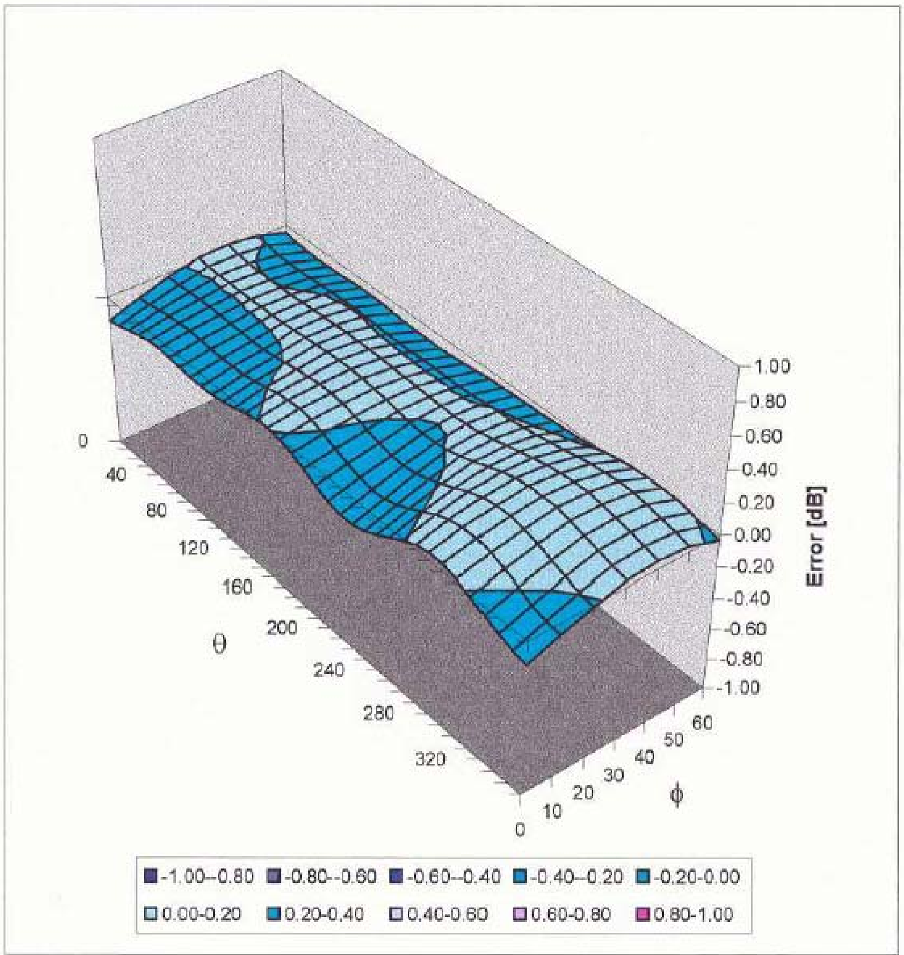


f [MHz]	Validity [MHz][B]	Tissue	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	800-1000	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.95	6.73	± 9.5% (k=2)
1450	1400-1500	Head	40.5 ± 5%	1.20 ± 5%	0.41	2.78	5.85	± 9.5% (k=2)
1800	1710-1910	Head	40.0 ± 5%	1.40 ± 5%	0.42	2.79	5.29	± 9.5% (k=2)
2450	2400-2500	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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Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1393**
Place of Assessment:	**Zurich**
Date of Assessment:	**May 3, 2004**
Probe Calibration Date:	**April 28, 2004**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

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Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

150 MHz	ConvF	**8.4 ± 8%**	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
236 MHz	ConvF	**8.2 ± 8%**	ε_r = 59.8 σ = 0.87 mho/m (body tissue)
300 MHz	ConvF	**8.1 ± 8%**	ε_r = 58.2 σ = 0.92 mho/m (body tissue)
350 MHz	ConvF	**8.0 ± 8%**	ε_r = 57.7 σ = 0.93 mho/m (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	ε_r = 56.7 σ = 0.94 mho/m (body tissue)
784 MHz	ConvF	**6.7 ± 8%**	ε_r = 55.4 σ = 0.97 mho/m (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

Schmid & Partner Engineering AG

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Dosimetric E-Field Probe ET3DV6 SN:1393

Conversion factor (± standard deviation)

Frequency		ConvF	Tissue parameters
150 MHz	ConvF	9.3 ± 8%	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
236 MHz	ConvF	8.5 ± 8%	ε_r = 48.3 σ = 0.82 mho/m (head tissue)
300 MHz	ConvF	8.1 ± 8%	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
350 MHz	ConvF	8.0 ± 8%	ε_r = 44.7 σ = 0.87 mho/m (head tissue)
400 MHz	ConvF	7.8 ± 8%	ε_r = 44.4 σ = 0.87 mho/m (head tissue - CENELEC)
450 MHz	ConvF	7.7 ± 8%	ε_r = 43.5 σ = 0.87 mho/m (head tissue)
784 MHz	ConvF	7.0 ± 8%	ε_r = 41.8 σ = 0.90 mho/m (head tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

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

Client Motorola CGISS

CALIBRATION CERTIFICATE

Object(s)	D835V2 - SN:426
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 835 MHz:

Relative Dielectricity	**42.1**	± 5%
Conductivity	**0.89 mho/m**	± 5%

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.3 at 835 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:	**10.0 mW/g** ± 16.8 % (k=2)[1]
averaged over 10 cm^3 (10 g) of tissue:	**6.52 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:	**1.377 ns**	(one direction)
Transmission factor:	**0.986**	(voltage transmission, one direction)

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

Feedpoint impedance at 835 MHz:	Re{Z} = **51.9 Ω**
	Im {Z} = **0.7 Ω**
Return Loss at 835 MHz	**-34.2 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 835 MHz; Type: D835V2; Serial: D835V2 - SN426

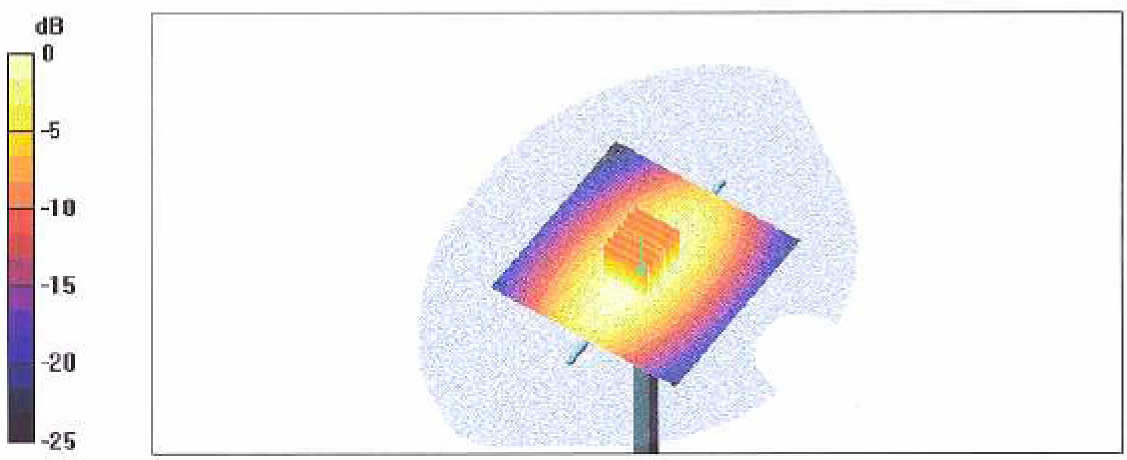
Communication System: CW-835; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL 835 MHz;
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.3, 6.3, 6.3); 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 = -0.009 dB
Maximum value of SAR (interpolated) = 2.68 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 = -0.009 dB
Maximum value of SAR (measured) = 2.69 mW/g
Peak SAR (extrapolated) = 3.73 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.63 mW/g



0 dB = 2.69mW/g

APPENDIX E

Illustration of host devices used

The purpose of this appendix is to illustrate the host devices used for assessments of FCC ID: AZ489FT5834. The sample that was used in the following photos represents the product used to obtain the results presented herein.

Photo 1
iPAQ Pocket PC host with im240 DUT inserted

Photo 2
PC Laptop host with im240 DUT/antenna NNTN6033A inserted

Photo 3
PC Laptop host with im240 DUT/antenna NNTN5861A inserted