SAR EVALUATION REPORT

For

Hisense Communication Co., Ltd.

Hisense Infor. Industrial Park, Economic Technology Dev. District,
Qingdao, China, 266510

FCC ID: SARHISENSEC389

This Report Concerns: ☒ Original Report	**Equipment Type:** CDMA 2000 Mobile Phone
Test Engineer:	Daniel Deng /
Report No.:	R0405263S
Report Date:	2004-06-23
Reviewed By:	Ling Zhang /
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

SUMMARY

The US Federal Communications Commission has released the report and order “Guidelines for Evaluating the Environmental Effects of RF Radiation", ET Docket No. 93-62 in August 1996 [1].

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

The investigation was limited to the worst-case scenario from the device usage point of view. For the clarity of data analysis, and clarity of presentation, only one tissue simulation was used for the head and body simulation. This means that if SAR was found at the headset position, the magnitude of SAR would be overestimated comparing to SAR to a headset placed in the ear region.

There was no SAR of any concern measured on the device for any of the investigated configurations, please see following table for testing result summary:

1 - REFERENCE

[1] Federal Communications Commission, \Report and order: Guidelines for evaluating the environmental effects of radiofrequency radiation", Tech. Rep. FCC 96-326, FCC, Washington, D.C. 20554, 1996.

[2] David L. Means Kwok Chan, Robert F. Cleveland, \Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields", Tech. Rep., Federal Communication Commission, O_ce of Engineering & Technology, Washington, DC, 1997.

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, \Automated E-field scanning system for dosimetric assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp. 105{113, Jan. 1996.

[4] Niels Kuster, Ralph K.astle, and Thomas Schmid, \Dosimetric evaluation of mobile communications equipment with known precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp. 645{652, May 1997.

[5] CENELEC, \Considerations for evaluating of human exposure to electromagnetic fields (EMFs) from mobile telecommunication equipment (MTE) in the frequency range 30MHz - 6GHz", Tech. Rep., CENELEC, European Committee for Electrotechnical Standardization, Brussels, 1997.

[6] ANSI, ANSI/IEEE C95.1-1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz, The Institute of Electrical and Electronics Engineers, Inc., New York, NY 10017, 1992.

[7] Katja Pokovic, Thomas Schmid, and Niels Kuster, \Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies", in ICECOM _ 97, Dubrovnik, October 15{17, 1997, pp. 120-24.

[8] Katja Pokovic, Thomas Schmid, and Niels Kuster, \E-_eld probe with improved isotropy in brain simulating liquids", in Proceedings of the ELMAR, Zadar, Croatia, 23{25 June, 1996, pp. 172-175.

[9] Volker Hombach, Klaus Meier, Michael Burkhardt, Eberhard K. uhn, and Niels Kuster, \The depen-dence of EM energy absorption upon human head modeling at 900 MHz", IEEE Transactions on Microwave Theory and Techniques, vol. 44, no. 10, pp. 1865-1873, Oct. 1996.

[10] Klaus Meier, Ralf Kastle, Volker Hombach, Roger Tay, and Niels Kuster, \The dependence of EM energy absorption upon human head modeling at 1800 MHz", IEEE Transactions on Microwave Theory and Techniques, Oct. 1997, in press.

[11] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.

[12] W. H. Press, S. A. Teukolsky,W. T. Vetterling, and B. P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second Edition, Cambridge University Press, 1992.Dosimetric Evaluation of Sample device, month 1998 9

[13] NIS81 NAMAS, \The treatment of uncertainity in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddington, Middlesex, England, 1994.

[14] Barry N. Taylor and Christ E. Kuyatt, \Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994. Dosimetric Evaluation of Sample device, month 1998 10

2 - TESTING EQUIPMENT

Type / Model	Cal. Date	S/N:
DASY3 Professional Dosimetric System	N/A	N/A
Robot RX60L	N/A	F00/5H31A1/A/01
Robot Controller	N/A	F01/5J72A1/A/01
Dell Computer Optiplex GX110	N/A	N/A
Pentium III, Windows NT	N/A	N/A
SPEAG EDC3	N/A	N/A
SPEAG DAE3	6/04	456
SPEAG E-Field Probe ET3DV6	9/7/02	1604
SPEAG Dummy Probe	N/A	N/A
SPEAG Generic Twin Phantom	N/A	N/A
SPEAG Light Alignment Sensor	N/A	278
Apprel Validation Dipole D-1800-S-2	11/6/04	BCL-049
SPEAG Validation Dipole D900V2	9/3/04	122
Brain Equivalent Matter (800MHz)	Daily	N/A
Brain Equivalent Matter (1900MHz)	Daily	N/A
Brain Equivalent Matter (2450MHz)	Daily	N/A
Muscle Equivalent Matter (800MHz)	Daily	N/A
Muscle Equivalent Matter (1900MHz)	Daily	N/A
Muscle Equivalent Matter (2450MHz)	Daily	N/A
Robot Table	N/A	N/A
Phone Holder	N/A	N/A
Phantom Cover	N/A	N/A
HP Spectrum Analyzer HP8593GM	6/20/04	3009A00791
Microwave Amp. 8349B	N/A	2644A02662
Power Meter HP436A	4/2/04	2709A29209
Power Sensor HP8482A	4/2/04	2349A08568
Signal Generator RS SMIQ O3	2/10/04	1084800403
Network Analyzer HP-8753ES	7/30/04	820079
Dielectric Probe Kit HP85070A	N/A	N/A
Apprel Validation Dipole D-2450-S-1	10/1/04	BCL-141
Dipole Antenna AD-100 (450MHz)	5/7/04	02220

2.2 Equipment Calibration Certificate

Please see the attached file.

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

Client Bay Area Comp. Lab (BACL)

CALIBRATION CERTIFICATE

Object(s)	ES3DV2 - SN:3019
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	October 9, 2003
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 E4419B	GB41293874	2-Apr-03 (METAS, No 252-0250)	Apr-04
Power sensor E4412A	MY41495277	2-Apr-03 (METAS, No 252-0250)	Apr-04
Reference 20 dB Attenuator	SN: 5086 (20b)	3-Apr-03 (METAS No. 251-0340	Apr-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 (Agilent, No. 20020918)	In house check: Oct 03
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 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	[redacted]		
Approved by:	[redacted]		

Date issued: October 9, 2003

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.

880-KP0301061-A Page 1 (1)

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info@speag.com, http://www.speag.com

Probe ES3DV2

SN:3019

Additional Conversion Factors

Manufactured: December 5, 2002
Last calibration: July 12, 2003
Add. calibration: October 9, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

Page 1 of 6

DASY - Parameters of Probe: ES3DV2 SN:3019

Sensitivity in Free Space

NormX	**1.05** $\mu V/(V/m)^2$
NormY	**1.14** $\mu V/(V/m)^2$
NormZ	**0.98** $\mu V/(V/m)^2$

Diode Compression

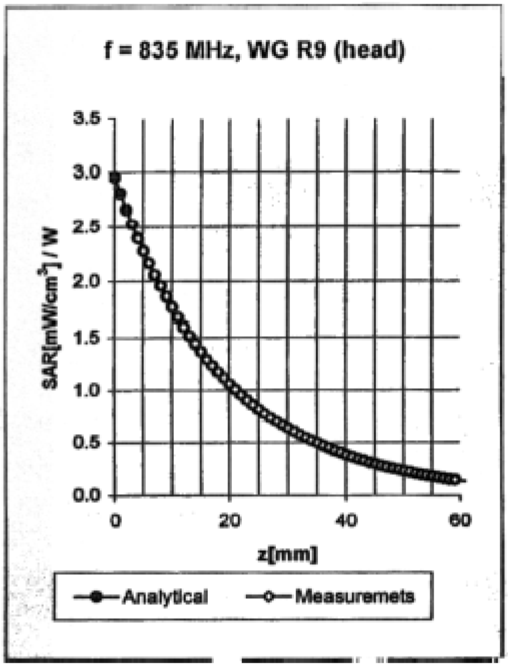
DCP X	**99**
DCP Y	**99**
DCP Z	**99**

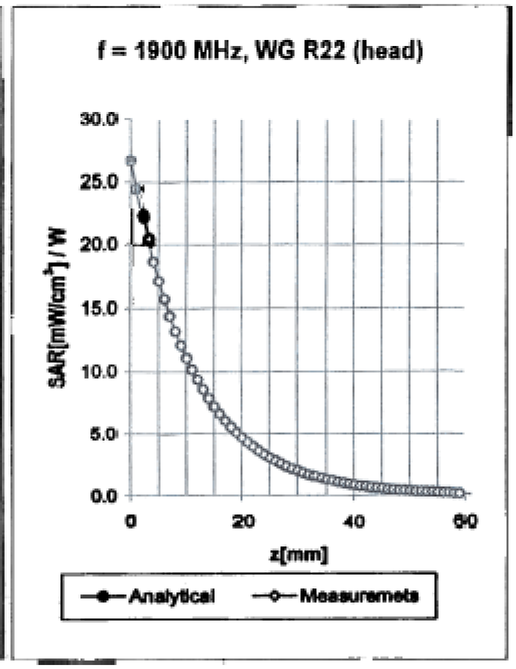
Sensor Offset

Probe Tip to Sensor Center	**2.1**	mm

Page 2 of 6

Conversion Factor Assessment





Head **835 MHz** ε_r **= 41.5 ± 5%** **σ = 0.90 ± 5% mho/m**

Valid for f=793-877 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**6.5** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.5** ± 9.5% (k=2)	Alpha	**0.35**
ConvF Z	**6.5** ± 9.5% (k=2)	Depth	**1.46**

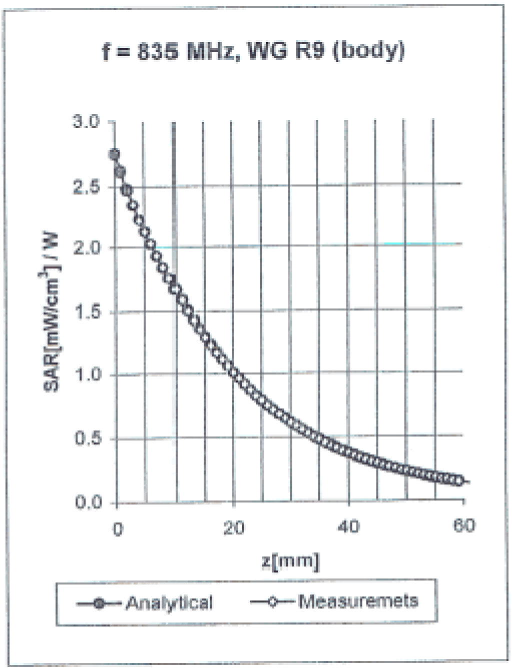
Head **1900 MHz** ε_r **= 40.0 ± 5%** **σ = 1.40 ± 5% mho/m**

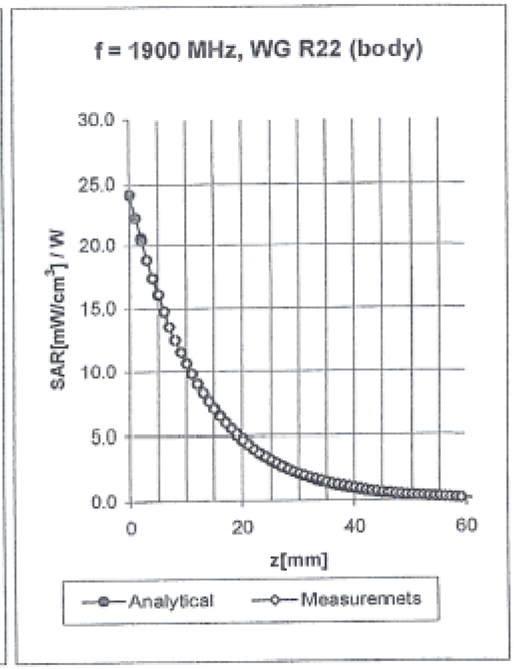
Valid for f=1805-1995 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**4.7** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.7** ± 9.5% (k=2)	Alpha	**0.22**
ConvF Z	**4.7** ± 9.5% (k=2)	Depth	**3.48**

Page 3 of 6

Convers ion Factor Assessment





Body **835 MHz** **ε_r = 55.2 ± 5%** **σ = 0.97 ± 5% mho/m**

Valid for f=793-877 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**6.1** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**6.1** ± 9.5% (k=2)		Alpha	**0.24**
ConvF Z	**6.1** ± 9.5% (k=2)		Depth	**2.00**

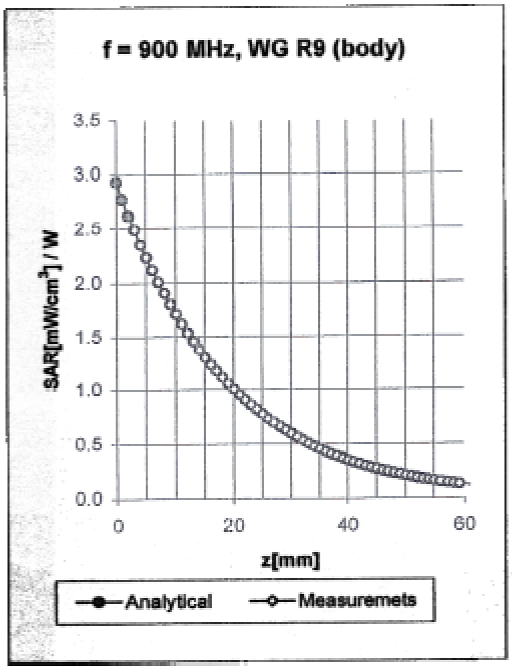
Body **1900 MHz** **ε_r = 53.3 ± 5%** **σ = 1.52 ± 5% mho/m**

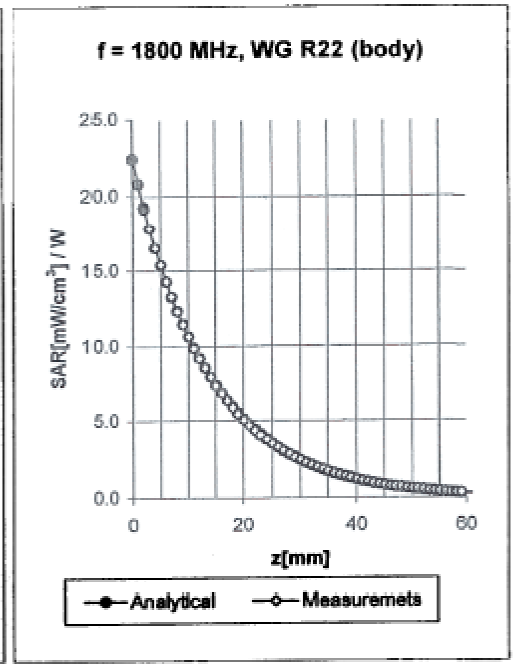
Valid for f=1805-1995 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.6** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**4.6** ± 9.5% (k=2)		Alpha	**0.24**
ConvF Z	**4.6** ± 9.5% (k=2)		Depth	**2.64**

Page 4 of 6

Conversion Factor Assessment





Body 900 MHz ε_r = 55.0 ± 5% σ = 1.05 ± 5% mho/m

Valid for f=855-945 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**6.1** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**6.1** ± 9.5% (k=2)		Alpha	**0.27**
ConvF Z	**6.1** ± 9.5% (k=2)		Depth	**1.82**

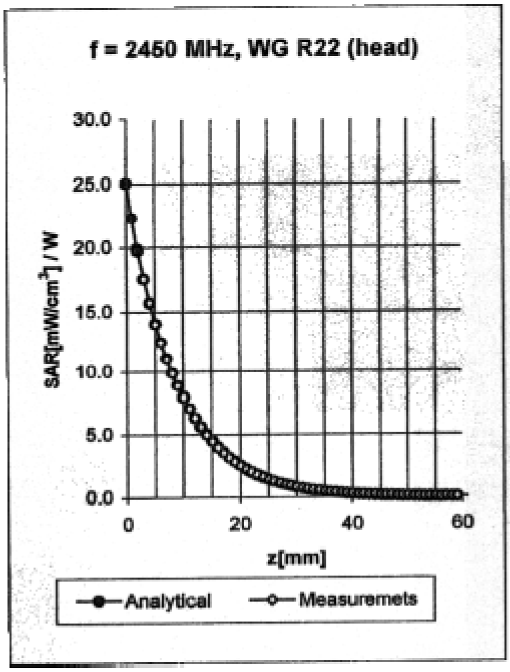
Body 1800 MHz ε_r = 53.3 ± 5% σ = 1.52 ± 5% mho/m

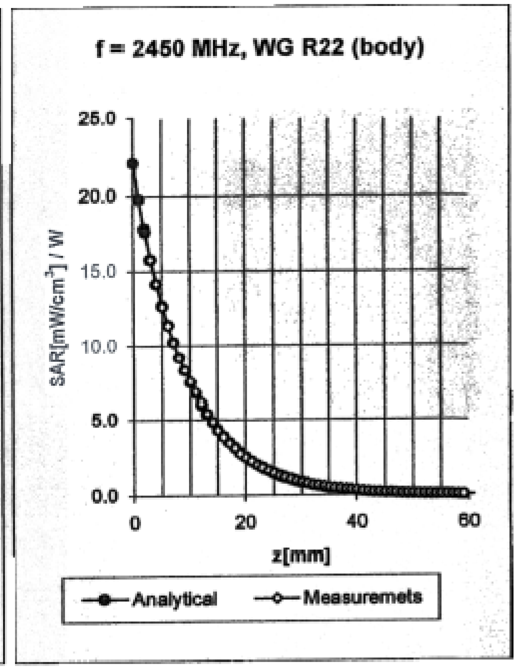
Valid for f=1710-1890 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.7** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**4.7** ± 9.5% (k=2)		Alpha	**0.23**
ConvF Z	**4.7** ± 9.5% (k=2)		Depth	**2.99**

Page 5 of 6

Conversion Factor Assessment





Head **2450 MHz** ε_r **= 39.2 ± 5%** **σ = 1.80 ± 5% mho/m**

Valid for f=2400-2500 MHz with Head Tissue Simulating Liquid according to EN 50361, P1528-200X

ConvF X	**4.5** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**4.5** ± 9.5% (k=2)		Alpha	**0.40**
ConvF Z	**4.5** ± 9.5% (k=2)		Depth	**1.62**

Body **2450 MHz** ε_r **= 52.7 ± 5%** **σ = 1.95 ± 5% mho/m**

Valid for f=2400-2500 MHz with Body Tissue Simulating Liquid according to OET 65 Suppl. C

ConvF X	**4.2** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**4.2** ± 9.5% (k=2)		Alpha	**0.32**
ConvF Z	**4.2** ± 9.5% (k=2)		Depth	**1.98**

Page 6 of 6

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Additional Conversion Factors

for Dosimetric E-Field Probe

'ype:	ES3DV2
Serial Number:	3019
Place of Assessment:	Zurich
Date of Assessment:	October 13, 2003
Probe Calibration Date:	October 9, 2003

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:

ES3DV2-SN:3019 October 13, 2003

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Dosimetric E-Field Probe ES3DV2 SN:3019

Conversion factor (± standard deviation)

150 MHz	ConvF	8.7 ± 8%	ε_r = 52.3 ± 5% σ = 0.76 ± 5% mho/m (head tissue)
150 MHz	ConvF	8.3 ± 8%	ε_r = 61.9 ± 5% σ = 0.80 ± 5% mho/m (body tissue)
450 MHz	ConvF	7.4 ± 8%	ε_r = 43.5 ± 5% σ = 0.87 ± 5% mho/m (head tissue)
450 MHz	ConvF	7.3 ± 8%	ε_r = 56.7 ± 5% σ = 0.94 ± 5% mho/m (body tissue)

ES3DV2-SN:3019 October 13, 2003

835 MHz Body Liquid Validation

835MHz Body Liquid validation
Ambient Temp=23 Deg C , Liquid Temp=22 Deg C , 6/11/2004

frequency	e'	e''
815000000.0000	53.8436	21.6487
815800000.0000	53.8270	21.6106
816600000.0000	53.8738	21.5509
817400000.0000	53.8161	21.5609
818200000.0000	53.8532	21.5382
819000000.0000	53.7440	21.5274
819800000.0000	53.8197	21.5457
820600000.0000	53.8072	21.4599
821400000.0000	53.8993	21.5114
822200000.0000	53.8421	21.4938
823000000.0000	53.7553	21.5184
823800000.0000	53.7870	21.4661
824600000.0000	53.7889	21.4838
825400000.0000	53.8093	21.4647
826200000.0000	53.8058	21.4345
827000000.0000	53.7859	21.3896
827800000.0000	53.7181	21.4052
828600000.0000	53.7808	21.3880
829400000.0000	53.7517	21.3708
830200000.0000	53.6678	21.3259
831000000.0000	53.7450	21.3289
831800000.0000	53.7306	21.3319
832600000.0000	53.7200	21.3329
833400000.0000	53.7240	21.3084
834200000.0000	53.7134	21.3277
835000000.0000	53.7185	21.3141
835800000.0000	53.7134	21.3115
836600000.0000	53.7073	21.2544
837400000.0000	53.7222	21.2154
838200000.0000	53.6973	21.2237
839000000.0000	53.6904	21.1958
839800000.0000	53.6365	21.1643
840600000.0000	53.6514	21.1254
841400000.0000	53.6410	21.0904
842200000.0000	53.6779	21.1311
843000000.0000	53.6875	21.1267
843800000.0000	53.6411	21.1099
844600000.0000	53.6923	21.1161
845400000.0000	53.6151	21.0743
846200000.0000	53.5523	20.9801
847000000.0000	53.5457	20.9524
847800000.0000	53.6113	20.9783
848600000.0000	53.5992	20.9400
849400000.0000	53.5644	20.9898
850200000.0000	53.4880	20.9842
851000000.0000	53.5332	20.9168
851800000.0000	53.5664	20.9320
852600000.0000	53.5566	20.9331
853400000.0000	53.5162	20.9184
854200000.0000	53.5080	20.9052
855000000.0000	53.5031	20.8456

$\sigma = \omega \varepsilon_o \varepsilon'' = 2 \pi f \varepsilon_o \varepsilon''=0.9901$
where $f = 835 \times 10^6$
$\varepsilon_o = 8.854 \times 10^{-12}$
$\varepsilon'' = 21.3141$

835 MHz Head Liquid Validation

835MHz Head Liquid validation
Ambient Temp=23 Deg C , Liquid Temp=22 Deg C , 6/11/2004

frequency	e'	e''
815000000.0000	40.1791	19.8695
815800000.0000	40.2007	19.8039
816600000.0000	40.2421	19.8498
817400000.0000	40.1874	19.8164
818200000.0000	40.1809	19.8227
819000000.0000	40.2430	19.8108
819800000.0000	40.1280	19.8087
820600000.0000	40.1899	19.8087
821400000.0000	40.1597	19.8264
822200000.0000	40.1951	19.7684
823000000.0000	40.1646	19.8214
823800000.0000	40.2085	19.8387
824600000.0000	40.1898	19.7825
825400000.0000	40.1705	19.7850
826200000.0000	40.1699	19.7971
827000000.0000	40.1954	19.7696
827800000.0000	40.1880	19.7606
828600000.0000	40.1353	19.7196
829400000.0000	40.1652	19.7179
830200000.0000	40.1029	19.7190
831000000.0000	40.0964	19.7485
831800000.0000	40.1008	19.7396
832600000.0000	40.0669	19.7083
833400000.0000	40.0850	19.7298
834200000.0000	40.1054	19.7582
835000000.0000	40.1076	19.7307
835800000.0000	40.0885	19.7565
836600000.0000	40.1367	19.7989
837400000.0000	40.1482	19.7529
838200000.0000	40.1109	19.7461
839000000.0000	40.1453	19.7466
839800000.0000	40.1151	19.7144
840600000.0000	40.1471	19.7310
841400000.0000	40.1099	19.7243
842200000.0000	40.1601	19.7963
843000000.0000	40.0955	19.7525
843800000.0000	40.0860	19.7596
844600000.0000	40.1124	19.7358
845400000.0000	40.1352	19.7362
846200000.0000	40.1028	19.7433
847000000.0000	40.0384	19.7227
847800000.0000	40.1128	19.7404
848600000.0000	40.0851	19.7383
849400000.0000	40.0553	19.6835
850200000.0000	40.0896	19.6495
851000000.0000	40.1271	19.6945
851800000.0000	40.1475	19.6879
852600000.0000	40.1189	19.6825
853400000.0000	40.1461	19.7306
854200000.0000	40.1517	19.7138
855000000.0000	40.0877	19.7162

$\sigma = \omega \varepsilon_o \varepsilon'' = 2 \pi f \varepsilon_o \varepsilon''=0.9165$

where $f = 835 \times 10^6$

$\varepsilon_o = 8.854 \times 10^{-12}$

$\varepsilon'' = 19.7307$

3 - EUT DESCRIPTION

Applicant:	Hisense Communication Co., Ltd.
Product Description:	CDMA 2000 Mobile Phone
FCC ID:	SARHISENSEC389
Serial Number:	C389-001
Transmitter Frequency:	824.73~848.19MHz
Maximum Output Power:	0.447 W (ERP)
Dimension:	11.8'L x 4.3'W x1.6'H
RF Exposure environment:	General Population/Uncontrolled
Applicable Standard	FCC CFR 47, Part 22
Application Type:	Certification

[1] Specific Absorption Rate (SAR) is a measure of the rate of energy absorption due to exposure to an RF transmitting source (wireless portable device).
[2] IEEE/ANSI Std. C95.1-1992 limits are used to determine compliance with FCC ET Docket 93-62.

Note: The test data gathered are from production sample, serial number: C389-001, provided by the manufacturer.

4 - SYSTEM TEST CONFIGURATION

4.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

4.2 EUT Exercise Procedure

The EUT exercising program used during SAR testing was designed to exercise the various system components in a manner similar to a typical use.

4.3 Equipment Modifications

No modification(s) were made to the EUT.

5 – CONDUCTED OUTPUT POWER

5.1 Provision Applicable

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

5.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

5.3 Test equipment

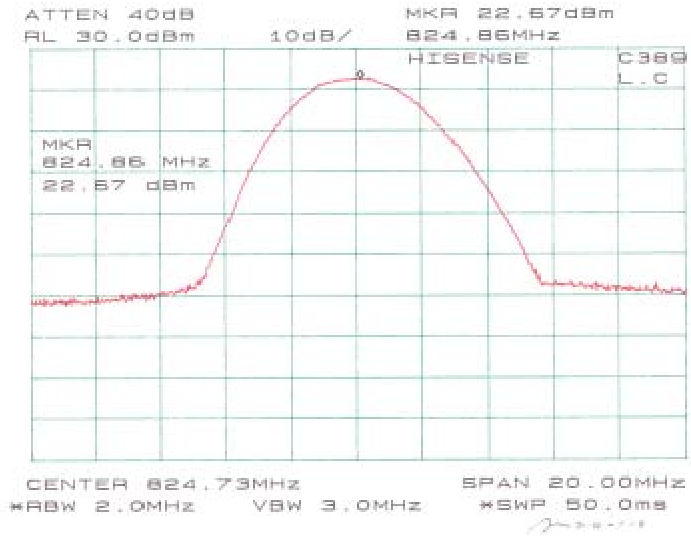
Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Analyzer, Spectrum	8565EC	3946A00131	2003-06-30

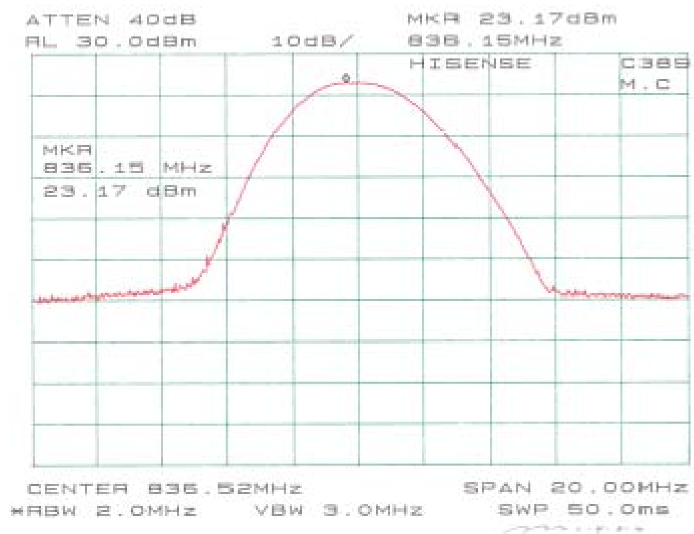
*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

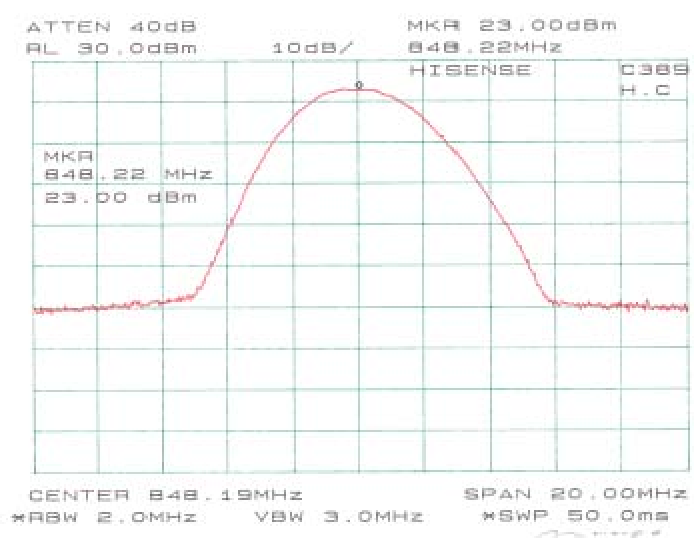
5.4 Test Results

Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
LOW	824.73	22.67	0.185	7
MIDDLE	836.53	23.17	0.207	7
HIGH	848.19	23.00	0.200	7

Please refer to the following plots.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 22.67dBm
824.86MHz
HISENSE
C389
L.C
MKR
824.86 MHz
22.67 dBm
CENTER 824.73MHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 23.17dBm
836.15MHz
HISENSE
C389
M.C
MKR
836.15 MHz
23.17 dBm
CENTER 836.52MHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 23.00dBm
848.22MHz
HISENSE
C389
H.C
MKR
848.22 MHz
23.00 dBm
CENTER 848.19MHz
SPAN 20.00MHz
*RBW 2.0MHz
VBW 3.0MHz
*SWP 50.0ms

6 - DOSIMETRIC ASSESSMENT SETUP

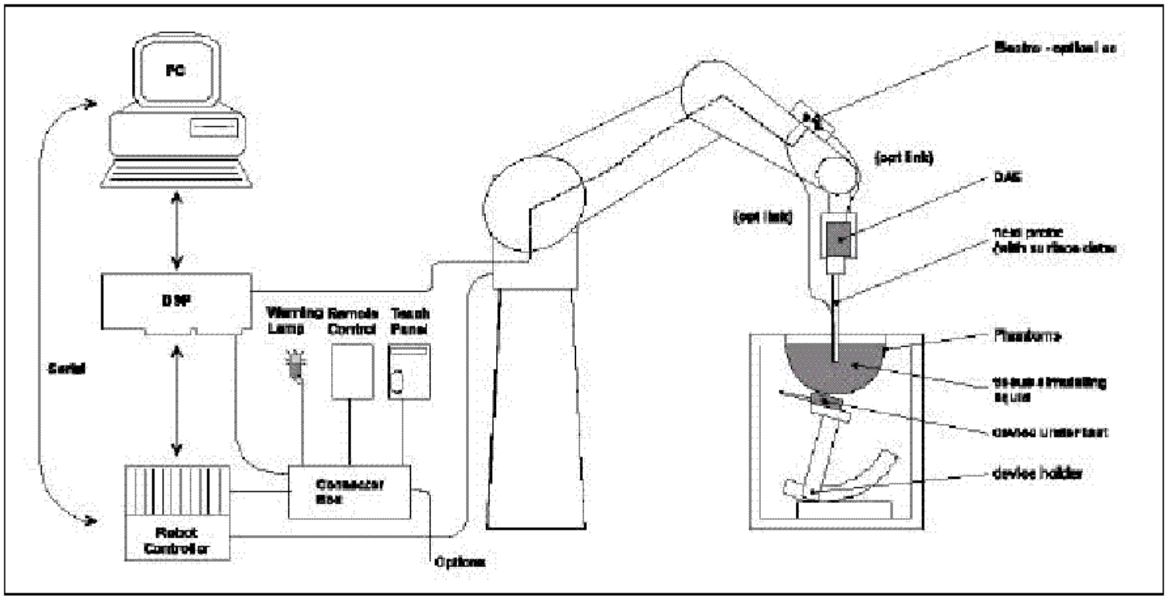
These measurements were performed with the automated near-field scanning system DASY3 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ±0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The system is described in detail in [3].

The SAR measurements were conducted with the dosimetric probe ET3DV6 SN: 1604 (manufactured by SPEAG), designed in the classical triangular configuration [3] and optimized for dosimetric evaluation. The probe has been calibrated according to the procedure described in [7] with accuracy of better than ±10%. The spherical isotropy was evaluated with the procedure described in [8] and found to be better than ±0.25dB.

The phantom used was the \Generic Twin Phantom” described in [4]. The ear was simulated as a spacer of 4 mm thickness between the earpiece of the phone and the tissue simulating liquid. The Tissue simulation liquid used for each test is in according with the FCC OET65 supplement C as listed below.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	41.5	55.2	42.0	55.9	39.9	53.3	39.8	53.6
Conductivity (s/m)	0.85	0.83	0.9	0.97	1.0	0.98	1.42	1.52	1.88	1.81

6.1 Measurement System Diagram

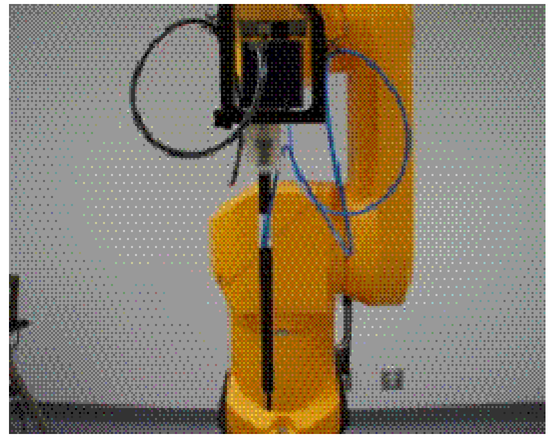


The DASY3 system for performing compliance tests consist of the following items:

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software.
2. An arm extension for accommodating the data acquisition electronics (DAE).
3. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
4. A data acquisition electronic (DAE), which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
5. A unit to operate the optical surface detector, which is connected to the EOC. The Electro-optical coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the PC plug-in card. The functions of the PC plug-in card based on a DSP is to perform the time critical task such as signal filtering, surveillance of the robot operation fast movement interrupts.
6. A computer operating Windows 95 or larger
7. DASY3 software
8. Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling testing left-hand and right-hand usage.
10. The device holder for handheld EUT.
11. Tissue simulating liquid mixed according to the given recipes (see Application Note).
12. System validation dipoles to validate the proper functioning of the system.

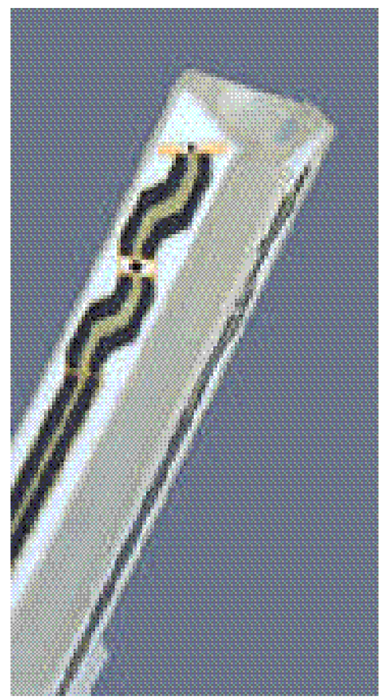
6.2 System Components

ET3DV6 Probe Specification
Construction Symmetrical design with triangular core
Built-in optical fiber for surface detection System
Built-in shielding against static charges
Calibration In air from 10 MHz to 2.5 GHz
In brain and muscle simulating tissue at
Frequencies of 450 MHz, 900 MHz and
1.8 GHz (accuracy ± 8%)
Frequency 10 MHz to > 6 GHz; Linearity: ± 0.2 dB
(30 MHz to 3 GHz)
Directivity ± 0.2 dB in brain tissue (rotation around
probe axis)
± 0.4 dB in brain tissue (rotation normal probe axis)
Dynamic 5 mW/g to > 100 mW/g;
Range Linearity: ± 0.2 dB
Surface ± 0.2 mm repeatability in air and clear liquids
Detection over diffuse reflecting surfaces.
Dimensions Overall length: 330 mm
Tip length: 16 mm
Body diameter: 12 mm
Tip diameter: 6.8 mm
Distance from probe tip to dipole centers: 2.7 mm
Application General dosimetric up to 3 GHz
Compliance tests of mobile phones
Fast automatic scanning in arbitrary phantoms



Photograph of the probe

The SAR measurements were conducted with the dosimetric probe ET3DV6 designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY3 software reads the reflection during a software approach and looks for the maximum using a 2 nd order fitting. The approach is stopped when reaching the maximum.



Inside view of ET3DV6 E-field Probe

E-Field Probe Calibration Process

Each probe is calibrated according to a dosimetric assessment procedure described in [6] with accuracy better than +/- 10%. The spherical isotropy was evaluated with the procedure described in [7] and found to be better than +/-0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a waveguide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

Data Evaluation

The DASY3 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe Parameter:	-Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	-Conversion Factor	ConvFi
	-Diode compression point	Dcp_i
Device parameter:	-Frequency	f
	-Crest Factor	cf
Media parameter:	-Conductivity	σ
	-Density	ρ

These parameters must be set correctly in the software. They can either be found in the component documents or be imported into the software from the configuration files issued for the DASY3 components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$Vi = Ui + (Ui)^2 \, cf / dcp_i$$

With Vi = compensated signal of channel i (i =x, y, z)
Ui = input signal of channel i (i =x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

H-field probes: $$H_i = \sqrt{Vi} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$$

With Vi = compensated signal of channel i (i =x, y, z)
$Norm_i$ = sensor sensitivity of channel i (i =x, y, z)
μV/ $(V/m)^2$ for E-field probes
ConF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strenggy of channel i in V/m
H_i = diode compression point (DASY parameter)

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \text{Square Root } [(E_x)^2 + (E_y)^2 + (E_z)^2]$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

With SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

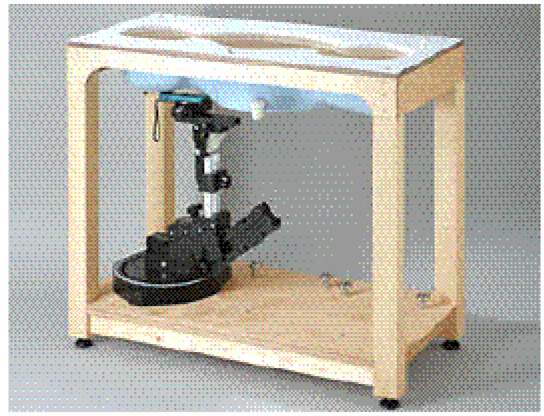
The power flow density is calculated assuming the excitation field as a free space field.

$$P_{pwe} = (E_{tot})^2 / 3770 \text{ or } P_{pwe} = (H_{tot})2 \cdot 37.7$$

With P_{pwe} = equivalent power density of a plane wave in mW/cm3
E_{tot} = total electric filed strength in V/m
H_{tot} = total magnetic filed strength in V/m

Generic Twin Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users [9][10]. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allows the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.
Shell Thickness 2 ± 0.1 mm
Filling Volume Approx. 20 liters
Dimensions 810 x 1000 x 500 mm (H x L x W)

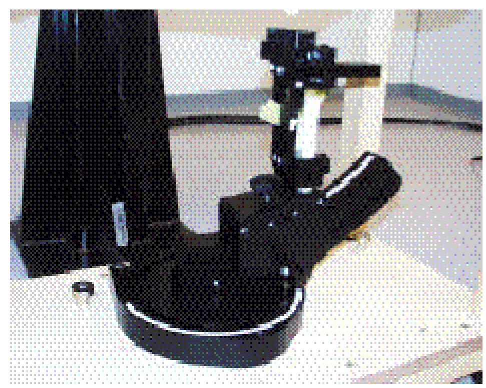


Generic Twin Phantom

Device Holder

In combination with the Generic Twin Phantom V3.0, the Mounting Device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatedly positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

* Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations [10]. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.



Device Holder

6.3 Measurement Uncertainty

The uncertainty budget has been determined for the DASY3 measurement system according to the NIS81 [13] and the NIST1297 [14] documents and is given in the following Table.

Measurement Uncertainty Analysis per IEEE P1528-2002								
Description	Section	Reported Variance (%)	Probability Distribution type	Divisor	Ci (1g)	Ui (1g)	Vi	welc/satt series term
Probe Calibration	E.2.1	4.80	N	1	1	4.80	1.00E+09	5.30842E-07
Axial isotropy	E.2.2	4.70	R	1.732	0.707107	1.92	1.00E+09	1.35563E-08
Hemispherical isotropy	E.2.2	9.60	R	1.732	0.707107	3.92	1.00E+09	2.35957E-07
Boundary effects	E.2.3	8.30	R	1.732	1	4.79	1.00E+09	5.27377E-07
Linearity	E.2.4	4.70	R	1.732	1	2.71	1.00E+09	5.4225E-08
System Detection Limit	E.2.5	1.00	R	1.732	1	0.58	1.00E+09	1.11124E-10
Readout Electronics	E.2.6	0.00	N	1	1	0.00	1.00E+09	0
Response time	E.2.7	0.00	R	1.732	1	0.00	1.00E+09	0
Integration time	E.2.8	0.00	R	1.732	1	0.00	1.00E+09	0
RF Ambient conditions	E.6.1	3.00	R	1.732	1	1.73	1.00E+09	9.00106E-09
Probe positioning mechanical tolerance	E.6.2	0.40	R	1.732	1	0.23	1.00E+09	2.84478E-12
Probe positioning wrt phantom shell	E.6.3	2.90	R	1.732	1	1.67	1.00E+09	7.8596E-09
Extra/inter-polation & integration algorithmsfor max SAR evaluation	E.5.2	3.90	R	1.732	1	2.25	1.00E+09	2.57079E-08
Test sample positioning	8, E.4.2	6.00	R	1.732	1	3.46	1.00E+09	1.44017E-07
Device holder distance tolerance	E.4.1	5.00	N	1	1	5.00	1.00E+09	0.000000625
Output power and SAR drift measurement	8, E.6.6.2	5.00	R	1.732	1	2.89	1.00E+09	6.94526E-08
Phantom uncertainty, shell thickness tolerance	E.3.1	4.00	R	1.732	1	2.31	1.00E+09	2.84478E-08
Liquid conductivity, deviation from target values	E.3.2	5.00	R	1.732	0.64	1.85	1.00E+09	1.16522E-08
Liquid conductivity, measurement uncertainty	E.3.3	5.00	N	1	0.64	3.20	5	20.97152
Liquid permitivity, deviation from target values	E.3.2	5.00	R	1.732	0.6	1.73	1.00E+09	9.00106E-09
Liquid permitivity, measurement uncertainty	E.3.3	5.00	N	1	0.6	3.00	5	16.2
								689
Probe isotropy sensitivity coefficient	**0.5**							
Combined Standard Uncertainty						**12.65**	**%**	
Expanded Uncertainty, 95% confidence		**k=**	**2.004**			**25.34**	**%**	

7 - SYSTEM EVALUATION

7.1 Simulated Tissue Liquid Parameter Confirmation

The dielectric parameters were checked prior to assessment using the HP85070A dielectric probe kit. The dielectric parameters measured are reported in each correspondent section:

7.2 Evaluation Procedures

Maximum Search

The maximum search is automatically performed after each coarse scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacings. After the coarse scan measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations.

Extrapolation

The extrapolation can be used in z-axis scans with automatic surface detection. The SAR values can be extrapolated to the inner phantom surface. The extrapolation distance is the sum of the probe sensor offset, the surface detection distance and the grid offset. The extrapolation is based on fourth order polynomal functions. The extrapolation is only available for SAR values.

Boundary Corrections

The correction of the probe boundary effect in the vicinity of the phantom surface can be done in two different ways. In the standard (worse case) evaluation, the boundary effect is reduced by different weights for the lowest measured points in the extrapolation routine. The result is a slight overestimation of the extrapolated SAR values (2% to 8%) depending on the SAR distribution and gradient. The advanced evaluation makes a full compensation of the boundary effect before doing the extrapolation. This is only possible of probes with specifications on the boundary effect.

Peak Search for 1g and 10g cube averaged SAR

The 1g and 10g peak evaluations are only available for the predefined cube 4x4x7 and cube 5x5x7 scans. The routine are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 32x32x35mm contains about 35g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation get all points within the measured volume in a 1mm grid (35000 points). In the last step, a 1g cube is place numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. This last procedure is repeated for a 10g cube. If the highest SAR is found at the edge of the measured volume, the system will issue a warning,: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

7.3 System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

IEEE P1528 recommended reference value

Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (above feed point)	Local SAR at surface (v=2cm offset from feed point)
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	14.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	39.7	20.5	72.1	6.6
2000	41.1	21.1	74.6	6.5
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

Validation Dipole SAR Reference Test Result for Body

Validation Measurement	SAR @ 0.025W Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 0.025W Input averaged over 10g	SAR @ 1W Input averaged over 10g
Test 1	0.222	8.88	0.112	4.48
Test 2	0.221	8.84	0.111	4.44
Test 3	0.222	8.88	0.112	4.48
Test 4	0.220	8.80	0.111	4.44
Test 5	0.223	8.92	0.113	4.52
Test 6	0.222	8.88	0.115	4.60
Test 7	0.221	8.84	0.114	4.56
Test 8	0.222	8.88	0.114	4.56
Test 9	0.223	8.92	0.113	4.52
Test 10	0.222	8.88	0.112	4.48
Average	0.2218	8.872	0.1127	4.51

System Validation Result

Ambient Temperature (ºC): 23

2004-06-11

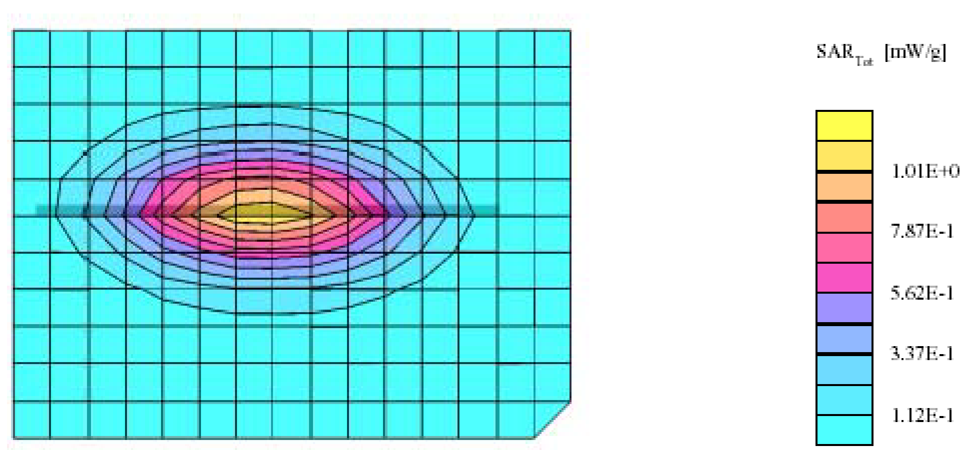
Simulant	Freq MHz]	Parameters	Liquid Temp [ºC]	Target Value	Measured Value	Deviation	Limits [%]
Body	835	ε_r	22	55.2	53.7	-2.72	±5
		σ	22	0.97	0.99	2.06	±5
		1g SAR	22	8.872	9.36	5.50	±10
Head	835	ε_r	22	41.5	40.1	-3.37	±5
		σ	22	0.90	0.92	2.22	±5
		1g SAR	22	9.5	10.03	5.58	±10

ε_r = relative permittivity, σ = conductivity and ρ=1000kg/m^3

Forward Power for body = 20.5 dBm = 112.20mW
Forward Power for head = 20.4 dBm =109.65 mW

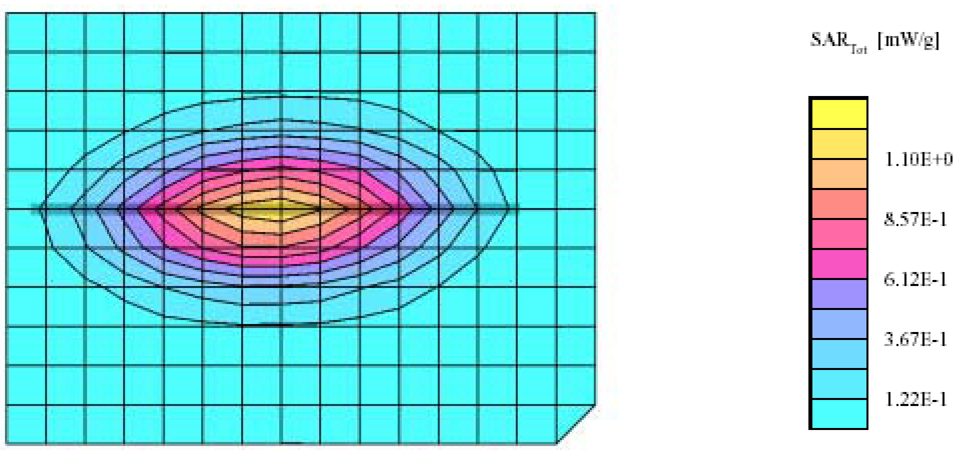
System Validation 835 MHz Body liquid (Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C,Forward Power =20.5 dBm , 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; 835 Body MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.05 mW/g, SAR (10g): 0.638 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 0.00 dB



System Validation 835 MHz Head liquid (Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C,Forward Power =20.4 dBm , 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ES3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; 835 (Head) MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.10 mW/g, SAR (10g): 0.673 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 0.00 dB



7.4 SAR Evaluation Procedure

a. The evaluation was performed in the applicable area of the phantom depending on the type of device being tested. For device held to the dear during normal operation, both the left and right ear positions were evaluated in accordance with FCC OET Bulletin 65, Supplement C (Edition 01-01) using the SAM phantom. For body-worn and face-held devices a planar phantom was used. The EUT in the test setup for body-worn and face-held devices was placed in three different positions (relative to the phantom): with belt clip, without belt clip and 2.5cm facing left head side and 2.5cm facing right head side.
b. The SAR was determined by a pre-defined procedure within the DASY3 software. Upon completion of a reference and optical surface check, the exposed region of the phantom was scanned near the inner surface with a grid spacing of 20mm x 20mm.
c. A 5x5x7 matrix was performed around the greatest special SAR distribution found during the area scan of the applicable exposed region. SAR values were then calculated using a 3-D spline interpolation algorithm and averaged over spatial volumes of 1 and 10 grams.
d. The depth of the simulating tissue in the planar used for the SAR evaluation and system validation was no less than 15.0cm.
e. For this particular evaluation, a stack of low-density, low-loss dielectric foamed polystyrene was used in place of the device holder.
f. Re-measurement of the SAR value at the same location as in a. If the value changed by more than 5%, the evaluation was repeated.

7.5 Exposure Limits

Table 1: Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands. Wrists. Feet and Ankles
0.4	8.0	20.0

Table 2: Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands. Wrists. Feet and Ankles
0.08	1.6	4.0

Note: Whole-body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube SAR for hands, writs, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

Population/uncontrolled environments Partial-body limit 1.6W/kg applied to the EUT.

8 - TEST RESULTS

This page summarizes the results of the performed dosimeter evaluation. The plots with the corresponding SAR distributions, which reveal information about the location of the maximum SAR with respect to the device could be found in the following pages.

According to the data in section 8.1, the EUT complied with the FCC 2.1093 RF Exposure standards, with worst case of 1.50 mW/g.

8.1 SAR Test Data

Ambient Temperature (ºC): 23.0
Relative Humidity (%): 49.3

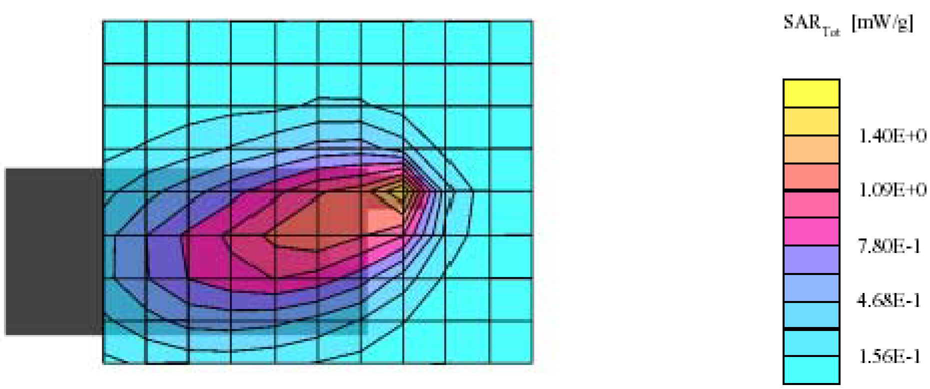
Position	Frequency (MHz)	Output Power (dBm)	Test Type	Accessories	Liquid	Phantom	Measured (mW/g)	Limit (mW/g)	Plot #
Back Side Touching	825	22.67	Body Worn	headset	Body	Flat	1.50	1.6	1
Back Side Touching	836	23.17		headset			1.49		2
Back Side Touching	848	23.00		headset			1.46		3
Face Touching	825	22.67		headset			1.06		4
Face Touching	836	23.17		headset			0.993		5
Face Touching	848	23.00		headset			0.976		6
Left Head Cheek Touching	825	22.67	Head	None	Head	Head	1.08		7
Left Head Cheek Touching	836	23.17		None			1.16		8
Left Head Cheek Touching	848	23.00		None			1.16		9
Left Head Tilted Touching	825	22.67		None			0.826		10
Left Head Tilted Touching	836	23.17		None			0.815		11
Left Head Tilted Touching	848	23.00		None			0.747		12
Right Head Cheek Touching	825	22.67		None			1.28		13
Right Head Cheek Touching	836	23.17		None			1.32		14
Right Head Cheek Touching	848	23.00		None			1.10		15
Right Head Tilted Touching	825	22.67		None			0.778		16
Right Head Tilted Touching	836	23.17		None			0.781		17
Right Head Tilted Touching	848	23.00		None			0.781		18

8.2 Plots of Test Result

The plots of test result were attached as reference.

HisenceCommunication Co., Model: C389 (Body Worn, Back touching flat phantom with accessory (headset), Low Channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 825 MHz
Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.50 mW/g, SAR (10g): 0.747 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.04 dB



HisenceCommunication Co., Model: C389 (Body Worn, Back touching flat phantom with accessory (headset), Mid channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

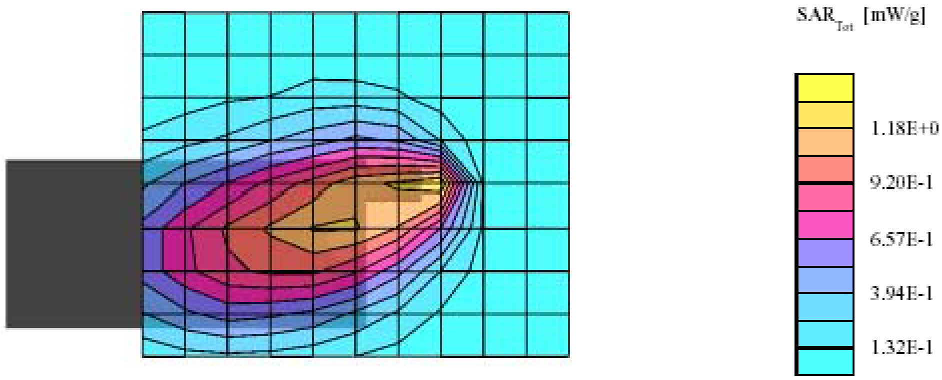
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 836 MHz

Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³

Cube 5x5x7: SAR (1g): 1.49 mW/g, SAR (10g): 0.732 mW/g, (Worst-case extrapolation)

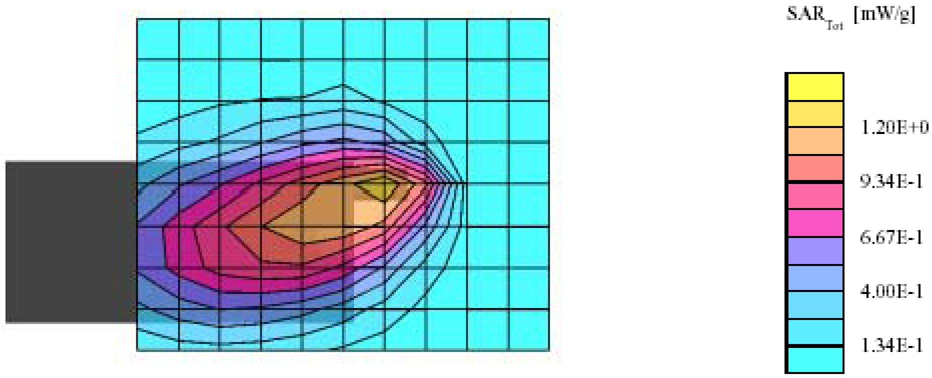
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0

Powerdrift: -0.03 dB



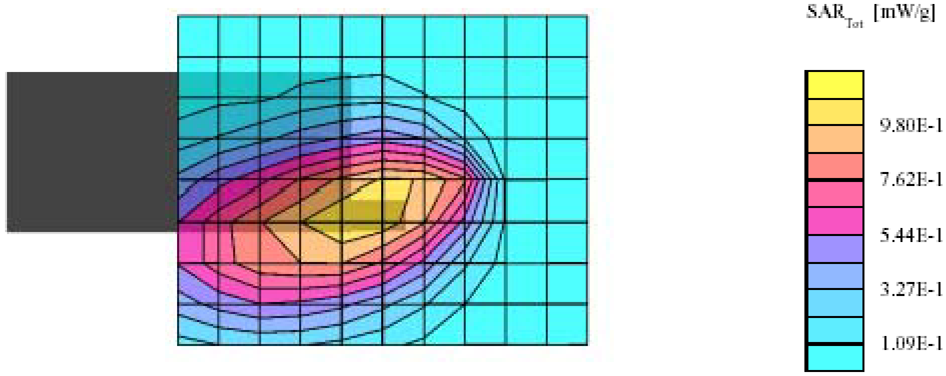
HisenceCommunication Co., Model: C389 (Body Worn, Back touching flat phantom with accessory (headset), High channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 848 MHz
Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.46 mW/g, SAR (10g): 0.761 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.04 dB



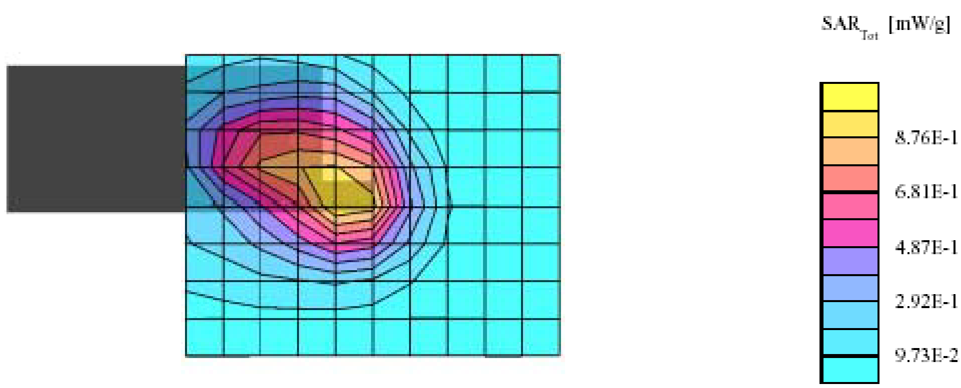
HisenceCommunication Co., Model: C389 (Body Worn, Face touching flat phantom with accessory (headset), Low Channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 825 MHz
Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.06 mW/g, SAR (10g): 0.715 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.03 dB



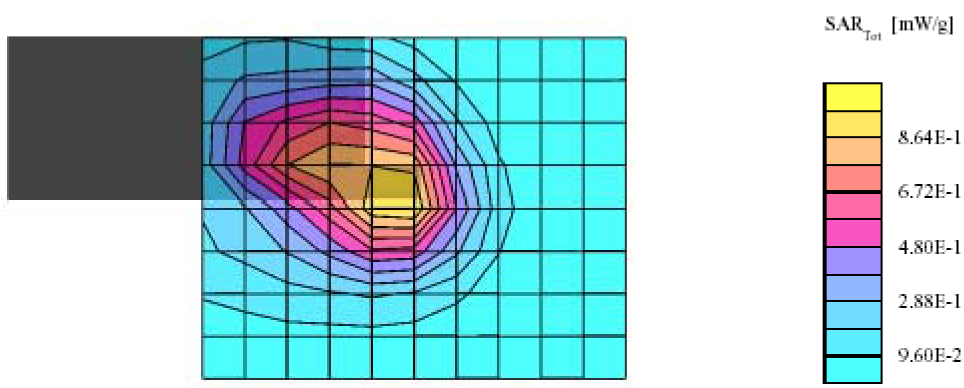
HisenceCommunication Co., Model: C389 (Body Worn, Face touching flat phantom with accessory (headset), Mid Channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 836 MHz
Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.993 mW/g, SAR (10g): 0.609 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.01 dB



HisenceCommunication Co., Model: C389 (Body Worn, Face touching flat phantom with accessory (headset), High channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 848 MHz
Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.976 mW/g, SAR (10g): 0.604 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.01 dB

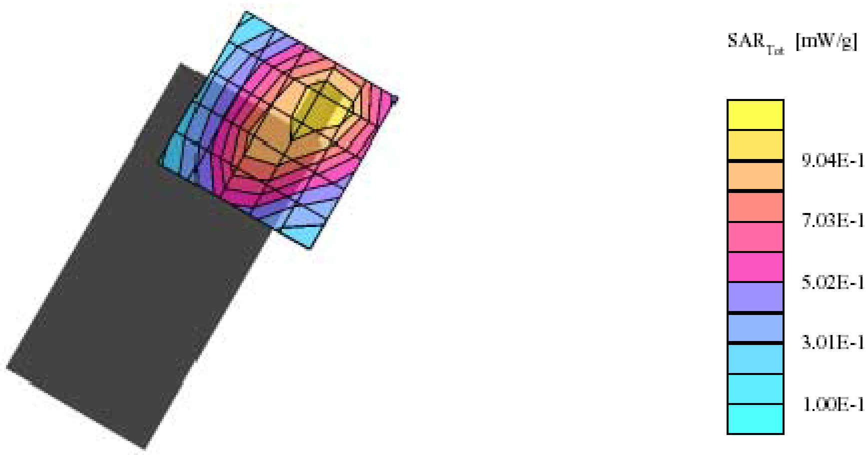


Hisence Comunication Co., Model: C389 (Left Head, Cheek, Low Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Left Hand Section; Position: (90°,60°); Frequency: 825 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.08 mW/g, SAR (10g): 0.604 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.01 dB

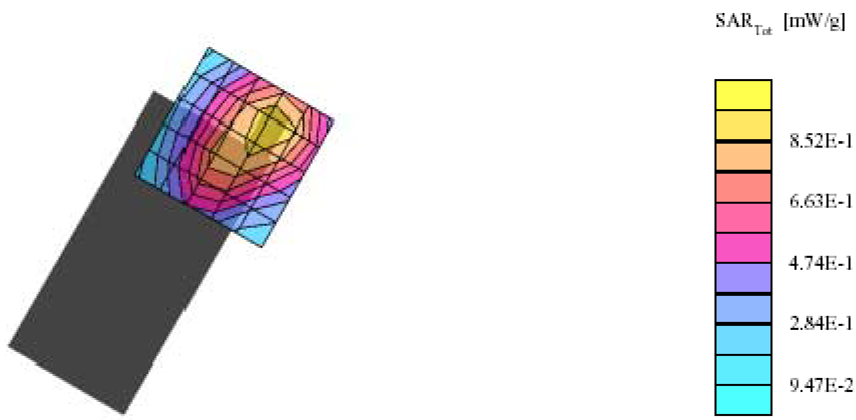
Hisence Comunication Co., Model: C389 (Left Head, Cheek, Mid Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Left Hand Section; Position: (90°,60°); Frequency: 836 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.16 mW/g, SAR (10g): 0.736 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: 0.04 dB



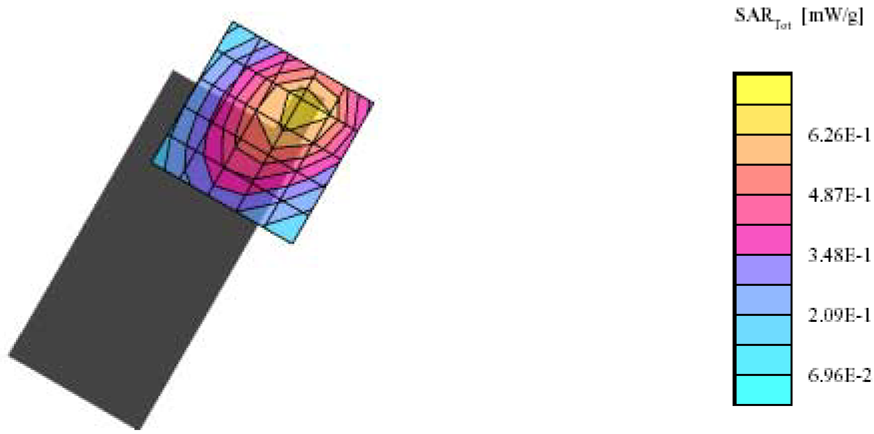
Hisence Comunication Co., Model: C389 (Left Head, Cheek, High Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Left Hand Section; Position: (90°,60°); Frequency: 848 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: $\sigma = 0.92$ mho/m $\varepsilon_r = 40.1$ $\rho = 1.00$ g/cm³
Cubes (2): SAR (1g): 1.16 mW/g ± 0.00 dB, SAR (10g): 0.731 mW/g ± 0.01 dB, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.03 dB



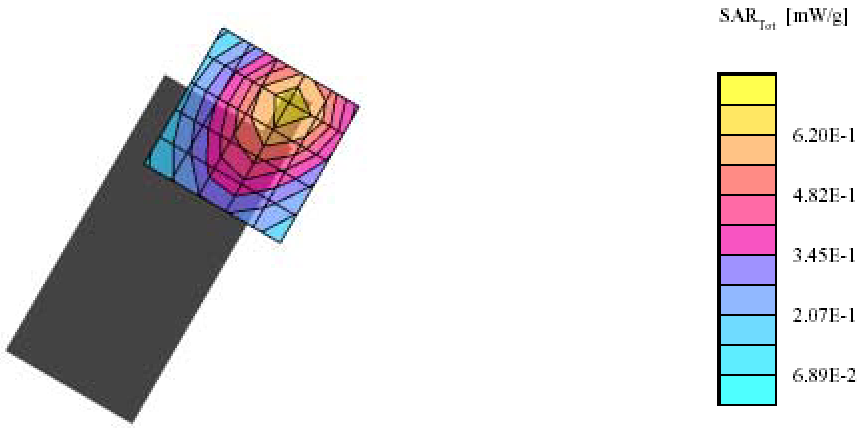
Hisence Comunication Co., Model: C389 (Left Head, Tilt, Low Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Left Hand Section; Position: (90°,60°); Frequency: 825 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.826 mW/g, SAR (10g): 0.519 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.02 dB



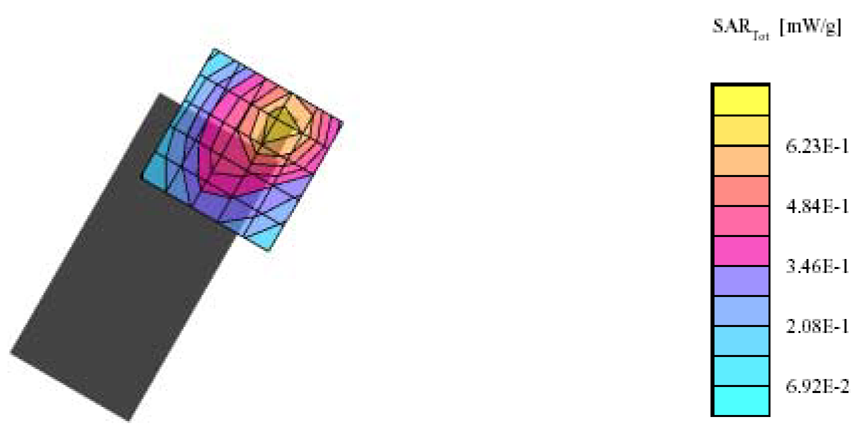
Hisence Comunication Co., Model: C389 (Left Head, Tilt, Mid Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Left Hand Section; Position: (90°,60°); Frequency: 836 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.815 mW/g, SAR (10g): 0.500 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.01 dB



Hisence Comunication Co., Model: C389 (Left Head, Tilt, High Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Left Hand Section; Position: (90°,60°); Frequency: 848 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.747 mW/g, SAR (10g): 0.483 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: 0.02 dB

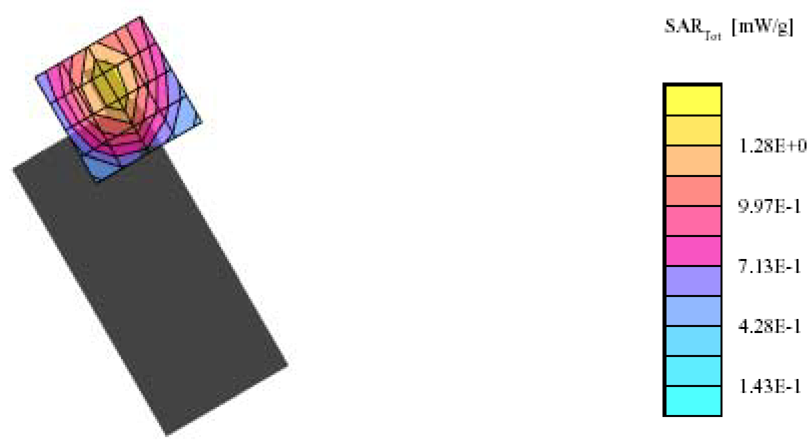


Hisence Communication Co., Model: C389 (Right Head, Cheek, Low Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Righ Hand Section; Position: (90°,300°); Frequency: 825 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.28 mW/g, SAR (10g): 0.833 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: 0.02 dB

Hisence Communication Co., Model: C389 (Right Head, Cheek, Mid Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Righ Hand Section; Position: (90°,300°); Frequency: 836 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.32 mW/g, SAR (10g): 0.879 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.04 dB



Hisence Communication Co., Model: C389 (Right Head, Cheek, High Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Righ Hand Section; Position: (90°,300°); Frequency: 848 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.10 mW/g, SAR (10g): 0.735 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.01 dB

Hisence Communication Co., Model: C389 (Right Head, Tilt, Low Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Righ Hand Section; Position: (90°,300°); Frequency: 825 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.778 mW/g, SAR (10g): 0.512 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.01 dB

Hisence Communication Co., Model: C389 (Right Head, Tilt, Mid Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Righ Hand Section; Position: (90°,300°); Frequency: 836 MHz

Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: $\sigma = 0.92$ mho/m $\varepsilon_r = 40.1$ $\rho = 1.00$ g/cm³

Cube 5x5x7: SAR (1g): 0.781 mW/g, SAR (10g): 0.511 mW/g, (Worst-case extrapolation)

Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0

Powerdrift: -0.01 dB

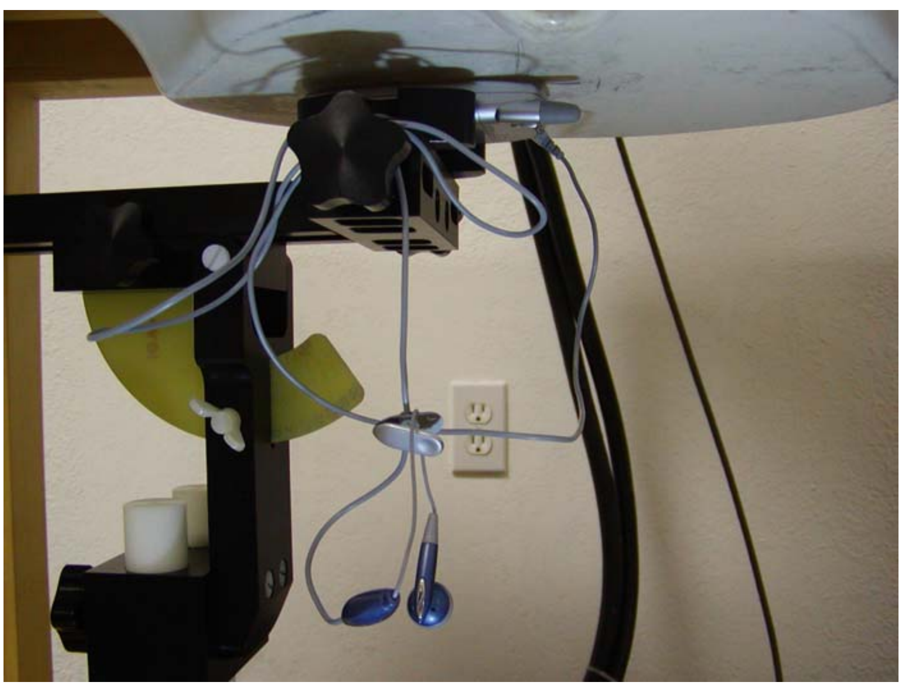
Hisence Communication Co., Model: C389 (Right Head, Tilt, High Channel, Ambient Temp = 23 Deg C, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Righ Hand Section; Position: (90°,300°); Frequency: 848 MHz
Probe: ET3DV2 - SN3019; ConvF(6.50,6.50,6.50); Crest factor: 1.0; Head Liquid 835 MHz: σ = 0.92 mho/m ε_r = 40.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.781 mW/g, SAR (10g): 0.516 mW/g, (Worst-case extrapolation)
Coarse: Dx = 10.0, Dy = 10.0, Dz = 10.0
Powerdrift: -0.01 dB

EXHIBIT A - SAR SETUP PHOTOGRAPHS

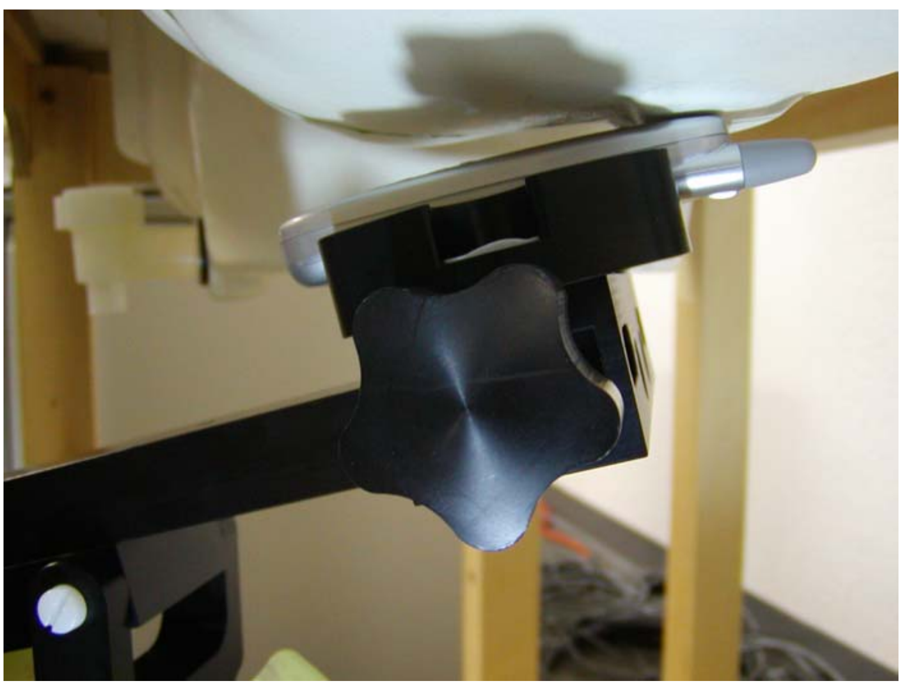
Back Side Touching Phantom

Face Touching Phantom

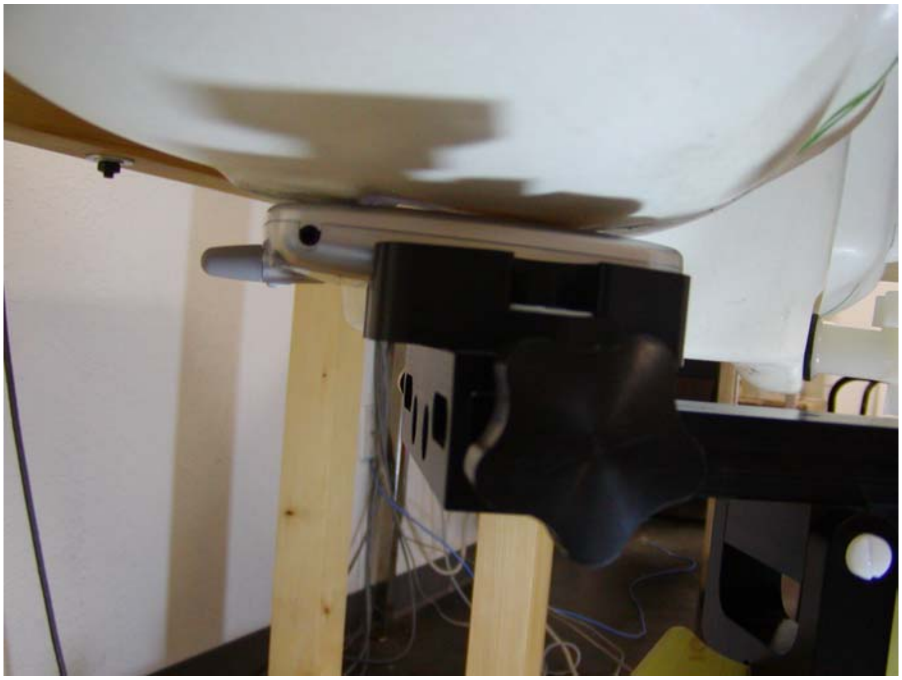


Left Cheek Touching Phantom

Left Cheek Tilted Touching Phantom



Right Cheek Touching Phantom



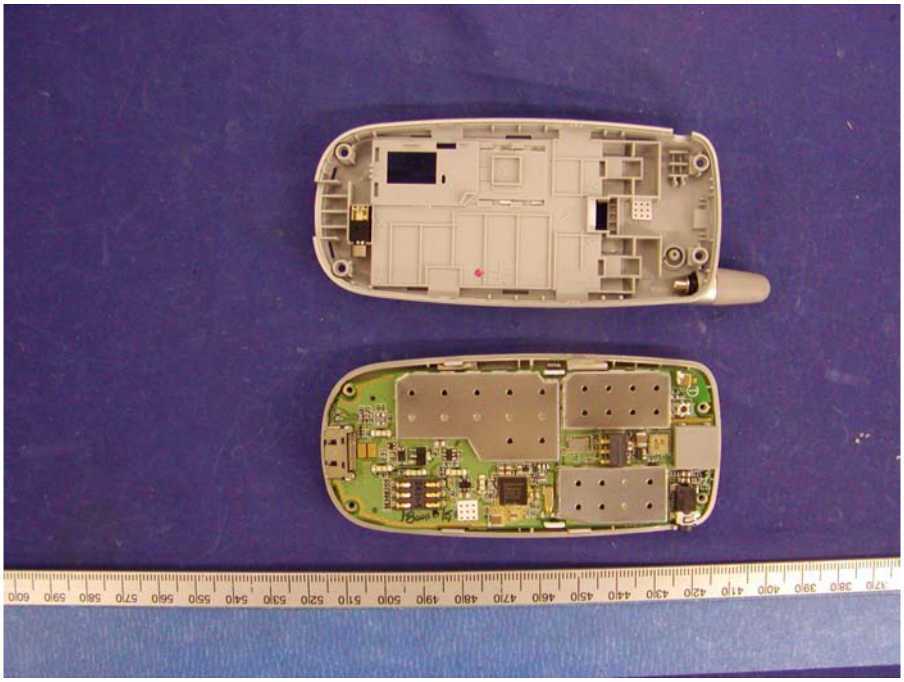
Right Cheek Tilted Touching Phantom

EXHIBIT B - EUT PHOTOGRAPHS

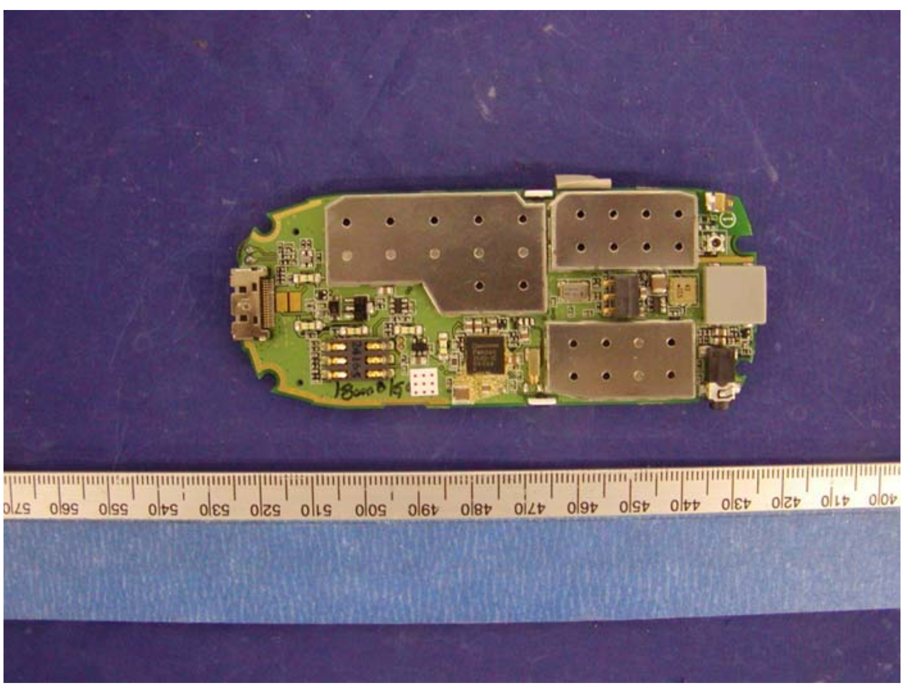
Chassis - Front View

Chassis – Rear View

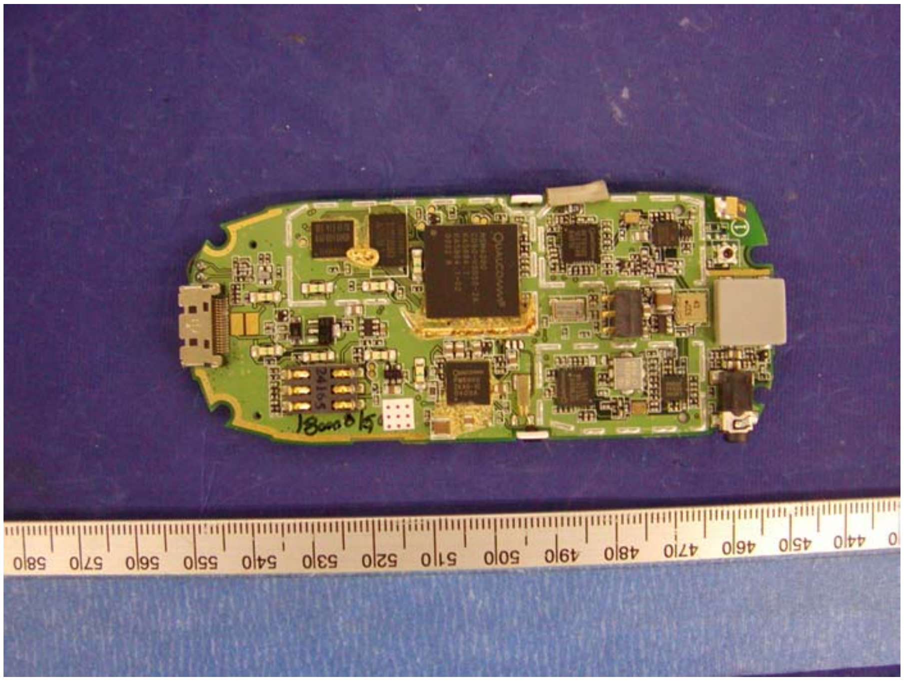
EUT – Cover off View



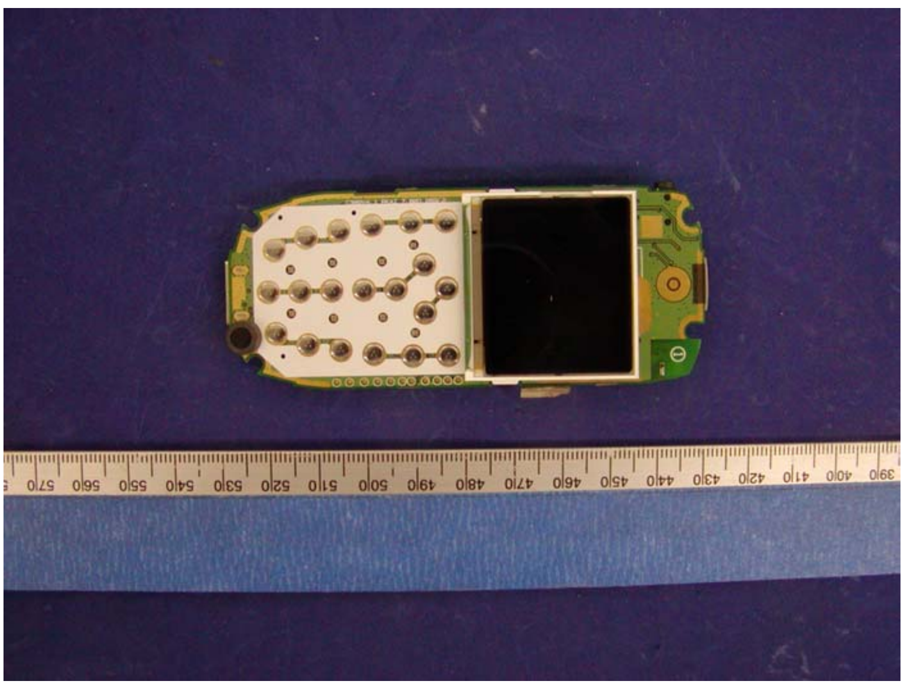
EUT – Component View



EUT – Shield Removed View



EUT – Solder View



AC Power Adapter

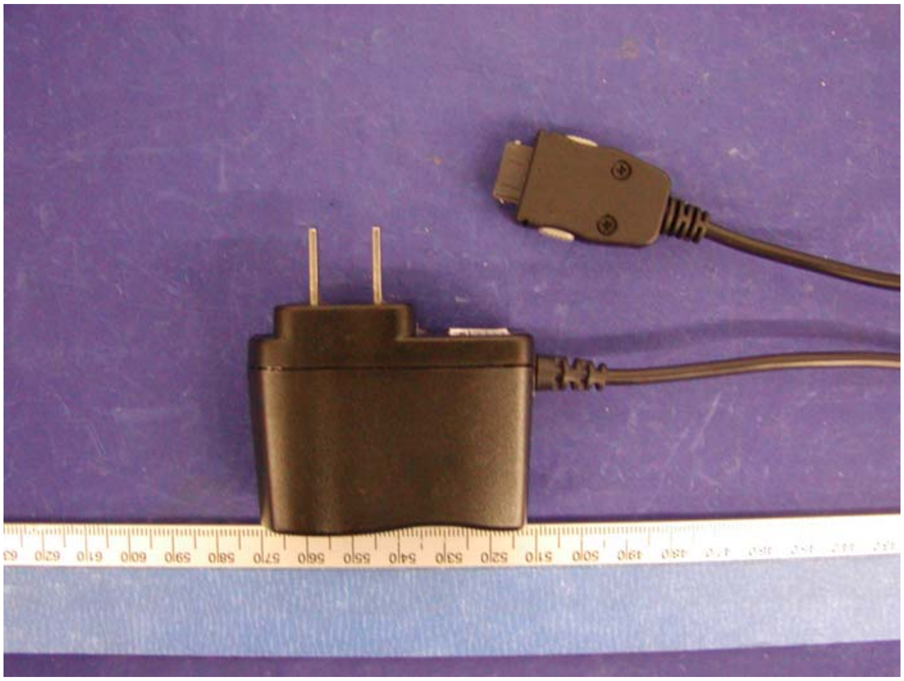


EXHIBIT C – Z-Axis

HisenceCommunication Co., Model: C389 (Body Worn, Back touching flat phantom with accessory (headset), Low Channel, Ambient Temp = 23 DegC, Liquid Temp = 22 Deg C, 6/11/2004)

SAM Phantom; Section; Position: ; Frequency: 825 MHz

Probe: ES3DV2 - SN3019; ConvF(6.10,6.10,6.10); Crest factor: 1.0; (Body) 835 MHz: σ = 0.99 mho/m ε_r = 53.7 ρ = 1.31 g/cm³

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Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 2.0