SAR EVALUATION REPORT

For

BK Radio Inc.

7100 Technology Drive
West Melbourne, FL 32904

FCC ID: K95DPH51

November 27, 2002

This Report Concerns: ☒ Original Report	**Equipment Type:** VHF Portable Two-way Radio
Test Engineer:	Jeff Lee
Report No.:	R0210171S
Test Date:	November 8, 2002
Reviewed By:	Benjamin Jing
Prepared By:	Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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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:

Ambient Temperature (ºC): 24.0
Relative Humidity (%): 49.3

Worst case SAR reading

EUT position	Frequency (MHz)	Conducted Power (W)	Test Type	Antenna Type	Liquid	Phantom	Notes / Accessories	Measured		Limit
								100% duty cycle	50% duty cycle	
back in touch with phantom	148	6.01	Body worn	Built-in	body	flat	none	0.884	0.442	8
back in touch with phantom	162	6.02	Body worn	Built-in	body	flat	none	1.08	0.54	8
back in touch with phantom	174	5.90	Body worn	Built-in	body	flat	none	1.22	0.61	8
w/belt clip in touch with phantom	148	6.01	Body worn	Built-in	body	flat	Leather case w/belt clip, microphone	0.551	0.2755	8
w/belt clip in touch with phantom	162	6.02	Body worn	Built-in	body	flat	Leather case w/belt clip, microphone	0.632	0.316	8
w/belt clip in touch with phantom	174	5.90	Body worn	Built-in	body	flat	Leather case w/belt clip, microphone	0.742	0.371	8
front to face at 2.5 cm	148	6.01	Face-held	Built-in	head	flat	none	0.497	0.2485	8
front to face at 2.5 cm	162	6.02	Face-held	Built-in	head	flat	none	0.614	0.307	8
front to face at 2.5 cm	174	5.90	Face-held	Built-in	head	flat	none	0.911	0.4555	8
front to face at 2.5 cm	148	6.01	Face-held	Built-in	head	flat	earphone	0.104	0.052	8
front to face at 2.5 cm	162	6.02	Face-held	Built-in	head	flat	earphone	0.322	0.161	8
front to face at 2.5 cm	174	5.90	Face-held	Built-in	head	flat	earphone	0.186	0.093	8

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

2.1 Equipment List & Calibration Info

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	6/02	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	11/6/01	BCL-049
SPEAG Validation Dipole D900V2	9/3/02	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	6/20/02	3009A00791
Microwave Amp. 8349B	N/A	2644A02662
Power Meter HP436A	4/2/02	2709A29209
Power Sensor HP8482A	4/2/02	2349A08568
Signal Generator RS SMIQ O3	2/10/02	1084800403
Network Analyzer HP-8753ES	7/30/02	820079
Dielectric Probe Kit HP85070A	N/A	N/A
Apprel Validation Dipole D-2450-S-1	10/1/02	BCL-141
Dipole Antenna AD-100 (450MHz)	5/7/02	02220

2.2 Equipment Calibration Certificate

Please see the attached file.

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

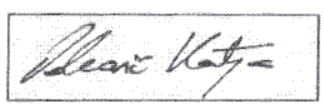
Additional Conversion Factors

for Dosimetric E-Field Probe

Type	ET3DV6
Serial Number:	1604
Place of Assessment	Zurich
Date of Assessment:	October 4, 2002
Probe Calibration Date:	August 26, 2002

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



Conversion Factor (± standard deviation)

150 MHz	ConvF	**9.2 ± 8%**	ε_r = 52.3 σ = 0.76 mho/m (head tissue)
300 MHz	ConvF	**8.0 ± 8%**	ε_r = 45.3 σ = 0.87 mho/m (head tissue)
450 MHz	ConvF	**7.3 ± 8%**	ε_r = 43.5 σ = 0.87 mho/m (head tissue)
2450 MHz	ConvF	**4.7 ± 8%**	ε_r = 39.2 σ = 1.80 mho/m (head tissue)
150 MHz	ConvF	**8.8 ± 8%**	ε_r = 61.9 σ = 0.80 mho/m (body tissue)
450 MHz	ConvF	**7.7 ± 8%**	ε_r = 56.7 σ = 0.94 mho/m (body tissue)
2450 MHz	ConvF	**4.3 ± 8%**	ε_r = 52.7 σ = 1.95 mho/m (body tissue)

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1604**
Place of Calibration:	**Zurich**
Date of Calibration:	**August 26, 2002**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	N. Vetter
Approved by:	[signature]

DASY3 - Parameters of Probe: ET3DV6 SN:1604

Sensitivity in Free Space

NormX	**1.73**	$\mu V/(V/m)^2$
NormY	**1.68**	$\mu V/(V/m)^2$
NormZ	**1.72**	$\mu V/(V/m)^2$

Diode Compression

DCP X	**93**	mV
DCP Y	**93**	mV
DCP Z	**93**	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz ε_r **= 41.5 ± 5%** σ **= 0.97 ± 5% mho/m**
Head 835 MHz ε_r **= 41.5 ± 5%** σ **= 0.90 ± 5% mho/m**

ConvF X	**6.5** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**6.5** ± 9.5% (k=2)		Alpha	**0.36**
ConvF Z	**6.5** ± 9.5% (k=2)		Depth	**2.82**

Head 1800 MHz ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**
Head 1900 MHz ε_r **= 40.0 ± 5%** σ **= 1.40 ± 5% mho/m**

ConvF X	**5.5** ± 9.5% (k=2)		Boundary effect:	
ConvF Y	**5.5** ± 9.5% (k=2)		Alpha	**0.50**
ConvF Z	**5.5** ± 9.5% (k=2)		Depth	**2.46**

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	11.1	6.6
SAR_{be} [%]	With Correction Algorithm	0.4	0.6

Head 1800 MHz Typical SAR gradient: 10 % per mm

Probe Tip to Boundary		**1 mm**	**2 mm**
SAR_{be} [%]	Without Correction Algorithm	12.3	8.1
SAR_{be} [%]	With Correction Algorithm	0.1	0.1

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm
Optical Surface Detection	**1.3 ± 0.2**	mm

Body 450MHz validation-

frequency	e'	e''
400000000.0000	59.4499	38.0810
402000000.0000	59.4678	38.0074
404000000.0000	59.4079	38.0280
406000000.0000	59.2998	38.0670
408000000.0000	59.3132	37.9350
410000000.0000	59.2299	37.9087
412000000.0000	59.3406	37.8085
414000000.0000	59.2311	37.8265
416000000.0000	59.2289	37.7233
418000000.0000	59.1630	37.6652
420000000.0000	59.0797	37.6561
422000000.0000	58.9398	37.5576
424000000.0000	58.9554	37.4313
426000000.0000	58.8959	37.3892
428000000.0000	58.7836	37.2439
430000000.0000	58.6710	37.2157
432000000.0000	58.5414	37.2641
434000000.0000	58.4097	37.0549
436000000.0000	58.2332	36.8942
438000000.0000	58.1219	36.8832
440000000.0000	57.9215	36.7310
442000000.0000	57.8920	36.6104
444000000.0000	57.6841	36.5054
446000000.0000	57.5786	36.3842
448000000.0000	57.4289	36.3654
450000000.0000	57.4134	36.2941
452000000.0000	57.2340	36.2007
454000000.0000	57.2107	36.0365
456000000.0000	57.0831	36.0358
458000000.0000	56.9420	35.8614
460000000.0000	56.8416	35.7400
462000000.0000	56.6591	35.6668
464000000.0000	56.5652	35.6203
466000000.0000	56.4390	35.5755
468000000.0000	56.4336	35.5285
470000000.0000	56.2594	35.3902
472000000.0000	56.2019	35.3440
474000000.0000	56.2028	35.2378
476000000.0000	56.0472	35.1380
478000000.0000	56.0471	35.1320
480000000.0000	55.9365	35.0751
482000000.0000	55.8392	34.9635
484000000.0000	55.7960	34.0665
486000000.0000	55.7534	34.9618
488000000.0000	55.7235	34.9579
490000000.0000	55.6851	34.0719
492000000.0000	55.6801	34.0103
494000000.0000	55.5552	33.9284
496000000.0000	55.6288	33.8733
498000000.0000	55.5978	33.8577
500000000.0000	55.5795	33.8895

$s = w e_o e'' = 2 p f e_o e''=0.91$

where $f = 450$

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

$e'' = 36.2941$

Head 450MHz validation-

frequency	e'	e''
400000000.0000	48.0388	36.4420
402000000.0000	48.2680	36.3643
404000000.0000	48.1803	36.3523
406000000.0000	47.8727	36.1470
408000000.0000	47.7139	36.0468
410000000.0000	47.1565	36.2088
412000000.0000	47.3864	36.1835
414000000.0000	47.1591	36.2062
416000000.0000	47.0867	36.0198
418000000.0000	46.8172	35.8824
420000000.0000	46.8045	35.7522
422000000.0000	46.6711	35.6745
424000000.0000	46.4832	35.6108
426000000.0000	46.3111	35.5445
428000000.0000	46.2478	35.4382
430000000.0000	46.0841	35.3064
432000000.0000	45.9498	35.3502
434000000.0000	45.9215	35.2600
436000000.0000	45.7491	34.9613
438000000.0000	45.5148	34.8740
440000000.0000	45.4302	34.7799
442000000.0000	45.3046	34.7181
444000000.0000	45.0676	34.5432
446000000.0000	44.9781	34.4467
448000000.0000	44.7376	34.3604
450000000.0000	44.6487	34.2868
452000000.0000	44.4645	34.1335
454000000.0000	44.3323	33.9897
456000000.0000	44.1947	33.8764
458000000.0000	44.1341	33.7933
460000000.0000	43.9118	33.6896
462000000.0000	43.7346	33.5965
464000000.0000	43.6338	33.5601
466000000.0000	43.4531	33.4160
468000000.0000	43.3624	33.3048
470000000.0000	43.2632	33.2102
472000000.0000	43.1741	33.1007
474000000.0000	43.1627	33.1655
476000000.0000	42.9674	32.9715
478000000.0000	42.9667	33.0734
480000000.0000	42.8929	32.9367
482000000.0000	42.8663	32.8809
484000000.0000	42.6918	32.9873
486000000.0000	42.6373	32.8936
488000000.0000	42.6994	32.8488
490000000.0000	42.6860	32.9139
492000000.0000	42.7229	32.7722
494000000.0000	42.6352	32.8950
496000000.0000	42.7316	32.9822
498000000.0000	42.7873	32.9130
500000000.0000	42.7792	33.0393

$s = w e_o e'' = 2 p f e_o e'' = 0.86$

where $f = 450$

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

$e'' = 34.2868$

Body 150MHz validation-1

frequency	e'	e''
100000000.0000	74.4381	101.4369
102000000.0000	73.3542	101.0842
104000000.0000	73.1092	101.1595
106000000.0000	72.1925	101.3005
108000000.0000	71.3264	101.5860
110000000.0000	70.9579	101.0973
112000000.0000	70.3363	101.5511
114000000.0000	69.7623	101.5333
116000000.0000	68.4974	101.4507
118000000.0000	68.3076	101.0760
120000000.0000	68.0843	101.1719
122000000.0000	67.0440	101.0857
124000000.0000	66.3476	101.0128
126000000.0000	66.3280	100.9564
128000000.0000	65.6674	100.2730
130000000.0000	65.3614	100.1627
132000000.0000	64.8968	100.0328
134000000.0000	64.3114	100.7991
136000000.0000	64.0114	100.7836
138000000.0000	63.9231	100.7843
140000000.0000	63.2145	100.5039
142000000.0000	62.7905	100.9775
144000000.0000	62.3471	100.8476
146000000.0000	62.0360	100.6117
148000000.0000	62.1555	100.4605
150000000.0000	61.4019	100.4389
152000000.0000	61.0910	100.5846
154000000.0000	60.8737	100.5356
156000000.0000	60.6542	100.4173
158000000.0000	60.1078	100.4499
160000000.0000	59.7653	100.1963
162000000.0000	59.4670	100.2193
164000000.0000	59.0933	100.2527
166000000.0000	58.6894	100.4927
168000000.0000	58.2542	100.0337
170000000.0000	58.0731	100.1781
172000000.0000	57.8470	100.0653
174000000.0000	57.3253	100.1085
176000000.0000	56.8438	100.0036
178000000.0000	56.6849	99.9848
180000000.0000	56.3027	99.5602
182000000.0000	55.8532	99.6032
184000000.0000	55.2171	99.5505
186000000.0000	55.0670	99.1910
188000000.0000	54.4999	99.0475
190000000.0000	54.0817	99.0364
192000000.0000	53.6072	98.7702
194000000.0000	53.3850	98.6790
196000000.0000	53.0507	98.5773
198000000.0000	52.7656	98.4717
200000000.0000	52.3280	98.2493

$s = w e_o e'' = 2 p f e_o e''=0.84$

where $f = 150$

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

$e'' = 100.4389$

Head 150MHz validation-

frequency	e'	e''
100000000.0000	53.6619	92.2715
102000000.0000	53.4016	92.4484
104000000.0000	53.3884	92.4943
106000000.0000	53.6076	92.4154
108000000.0000	53.5249	92.2699
110000000.0000	53.3806	92.4157
112000000.0000	53.5063	92.4343
114000000.0000	53.6424	92.5837
116000000.0000	53.7504	92.5046
118000000.0000	53.5081	92.4637
120000000.0000	53.4586	92.5312
122000000.0000	53.6995	92.5188
124000000.0000	53.6674	92.5553
126000000.0000	53.5613	92.4740
128000000.0000	53.5550	92.5234
130000000.0000	53.6915	92.5916
132000000.0000	53.5680	92.6475
134000000.0000	53.5817	92.5284
136000000.0000	53.6843	91.5135
138000000.0000	53.6456	91.5899
140000000.0000	53.6717	91.5795
142000000.0000	53.6925	91.5313
144000000.0000	53.6465	91.5274
146000000.0000	53.6368	91.5170
148000000.0000	53.6420	91.6083
150000000.0000	53.6478	91.4523
152000000.0000	53.6100	91.4759
154000000.0000	53.5402	91.5019
156000000.0000	53.5618	91.6795
158000000.0000	53.6230	91.4490
160000000.0000	53.4159	91.6206
162000000.0000	53.4569	91.6858
164000000.0000	53.5618	90.5465
166000000.0000	53.4844	90.4679
168000000.0000	53.5379	90.6180
170000000.0000	53.5874	90.5480
172000000.0000	53.4483	90.4474
174000000.0000	53.5165	90.4947
176000000.0000	53.5787	90.5101
178000000.0000	53.4585	90.4948
180000000.0000	53.5533	90.5300
182000000.0000	53.4178	90.5729
184000000.0000	53.4286	90.6175
186000000.0000	53.5127	90.6749
188000000.0000	53.5357	90.6281
190000000.0000	53.3888	90.6387
192000000.0000	53.4883	90.6314
194000000.0000	53.4538	90.7143
196000000.0000	53.4704	90.5568
198000000.0000	53.5086	90.6626
200000000.0000	53.4383	90.6797

$s = w e_o e'' = 2 p f e_o e'' = 0.76$
where $f = 150$
$e_o = 8.854 \times 10^{-12}$
$e'' = 91.4523$

3 - EUT DESCRIPTION

Applicant:	BK Radio Inc.
Product Description:	VHF Portable Two-way Radio (prototype)
Product Name:	DPH51
FCC ID:	K95DPH51
Serial Number:	None
Transmitter Frequency:	148~174MHz
Maximum Output Power:	Measured: 6.02W; Typical: 5W
Dimension:	2.5" L x 1.5"W x 13"H approximately
RF Exposure environment:	Occupational
Power Supply:	BK Radio Battery Charger, M/N: LAA0342
Applicable Standard	FCC CFR 47, Part 22, 74, 80 & 90
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 was good for test sample only. It may have deviation for other test samples.

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. The EUT was tested by pushing the PTT bottom during the testing.

4.3 Special Accessories

All interface cables used for compliance testing are shielded as normally supplied by INMAC, Monster Cable and their respective support equipment manufacturer. The EUT is featured shielded metal connectors.

4.4 Equipment Modifications

No modification(s) were made to ensure that the EUT complies with the applicable limits.

5 - CONDUCTED OUTPUT POWER MEASUREMENT

5.1 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.

5.2 Test Results

Channel	Output Power in W	Voltage V	Current A
148.05	6.01	10.0	1.63
161.5	6.02	10.0	1.61
173.95	5.90	10.0	1.62

Note: The power output may depend on the intended use of the EUT. For all tests, the EUT was set to maximum conditions.

6 - DOSIMETRIC ASSESSMENT SETUP

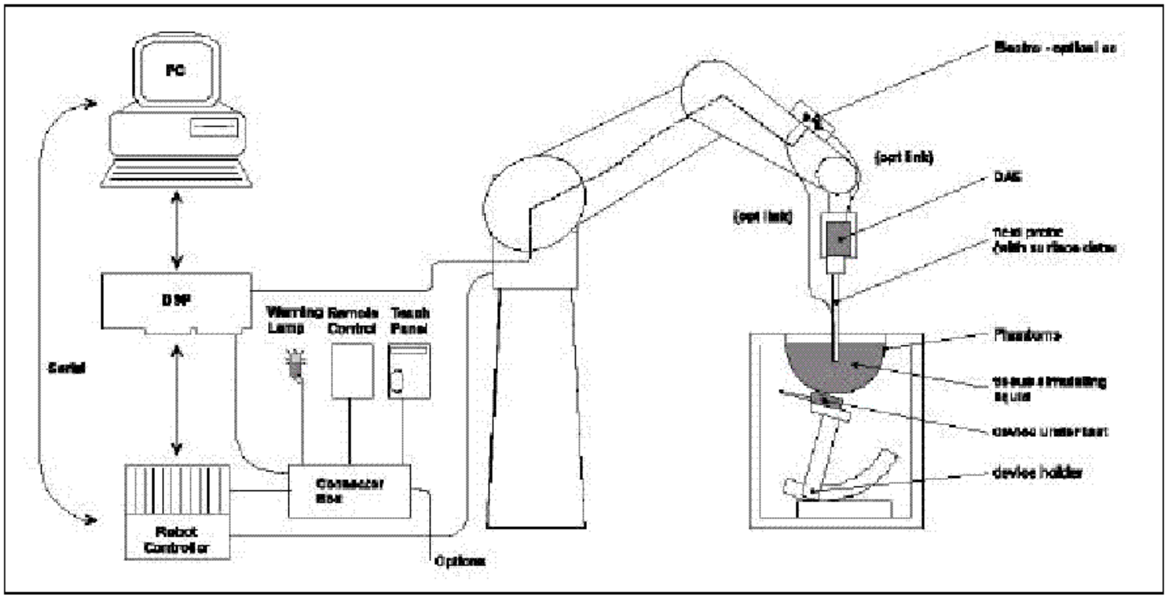
These measurements were performed with the automated near-field scanning system DASY3 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ±0.02mm. Special 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	42.54	55.2	42.0	55.9	39.9	53.3	39.8	53.6
Conductivity (s/m)	0.85	0.83	0.91	0.97	1.0	0.98	1.42	1.52	1.88	1.81

6.1 Measurement System Diagram

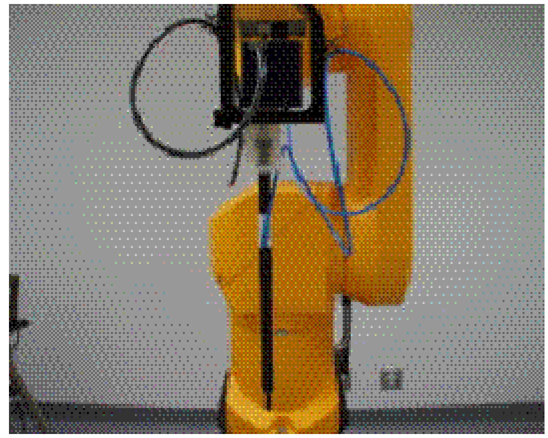


The DASY3 system for performing compliance tests consist of the following items:

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.

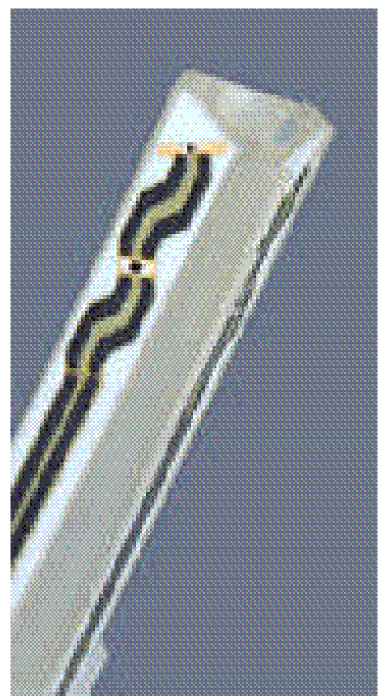
6.2 System Components

ET3DV6 Probe Specification



Photograph of the probe

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



Inside view of ET3DV6 E-field 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.

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	ó
	-Density	ñ

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)
ìV/ $(V/m)^2$ 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.

$$SAR = (E_{tot})^2 \quad ó/(ñ \quad 1000)$$

With SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
ó = conductivity in [mho/m] or [Siemens/m]
ñ = 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.

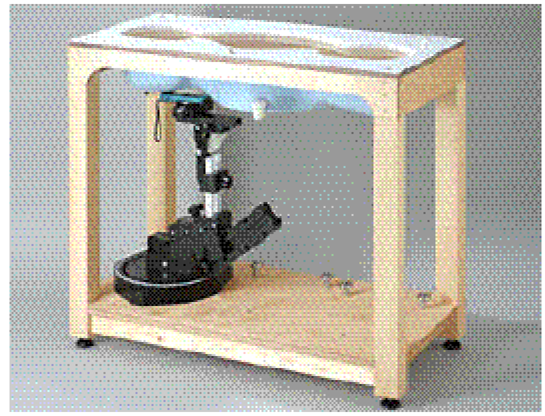
The power flow density is calculated assuming the excitation field as a free space field.

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

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)

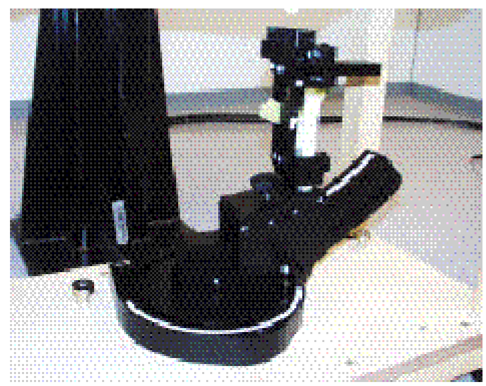


Generic Twin Phantom

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.

Uncertainty Description	Error	Distrib.	Weight	Std. Dev.	Offset
Probe Uncertainty					
Axial isotropy	± 0.2 dB	U-shape	0.5	±2.4 %	/
Spherical isotropy	±0.4 dB	U-shape	0.5	±4.8 %	/
Isotropy from gradient	±0.5 dB	U-shape	0	/	/
Spatial resolution	±0.5 %	Normal	1	±0.5 %	/
Linearity error	±0.2 dB	Rectangle	1	±2.7 %	/
Calibration error	±3.3 %	Normal	1	± 3.3 %	/
SAR Evaluation Uncertainty					
Data acquisition error	±1%	Rectangle	1	±0.6 %	/
ELF and RF disturbances	±0.25 %	Normal	1	±0.25 %	/
Conductivity assessment	±10 %	Rectangle	1	± 5.8 %	/
Spatial Peak SAR Evaluation Uncertainty					
Extrapol boundary effect	±3%	Normal	1	±3%	± 5%
Probe positioning error	±0.1 mm	Normal	1	± 1%	/
Integrat. and cube orient	±3%	Normal	1	±3%	/
Cube shape inaccuracies	±2%	Rectangle	1	±1.2 %	/
Device positioning	±6%	Normal	1	± 6%	/
Combined Uncertainties	/	/	1	±11.7 %	± 5%
Extended uncertainty (K = 2)	/	/	/	± 23.5 %.	/

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 (450 MHz)

Validation Measurement	SAR @ 9.225mW Input averaged over 1g	SAR @ 1W Input averaged over 1g	SAR @ 9.225mW Input averaged over 10g	SAR @ 1W Input averaged over 10g
Test 1	0.0451	0.89	0.0315	3.4
Test 2	0.0447	4.85	0.0312	3.38
Test 3	0.0448	4.86	0.0313	3.39
Test 4	0.0450	4.88	0.0313	3.39
Test 5	0.0451	4.89	0.0313	3.39
Test 6	0.0450	4.88	0.0315	3.4
Test 7	0.0451	4.89	0.0314	3.4
Test 8	0.0449	4.87	0.0312	3.38
Test 9	0.0449	4.87	0.0312	3.38
Test 10	0.0448	4.86	0.0311	3.37
Average	0.0449	4.874	0.0313	3.388

System validation result

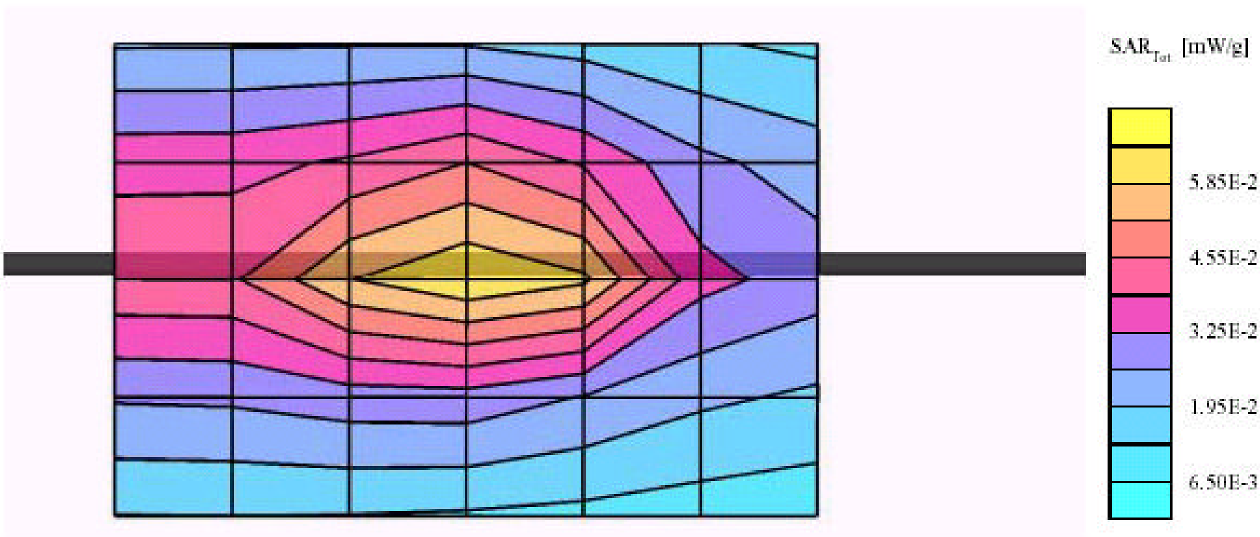
11/8/02:

Ambient Temperature (ºC): 24.0
Relative Humidity (%): 49.3

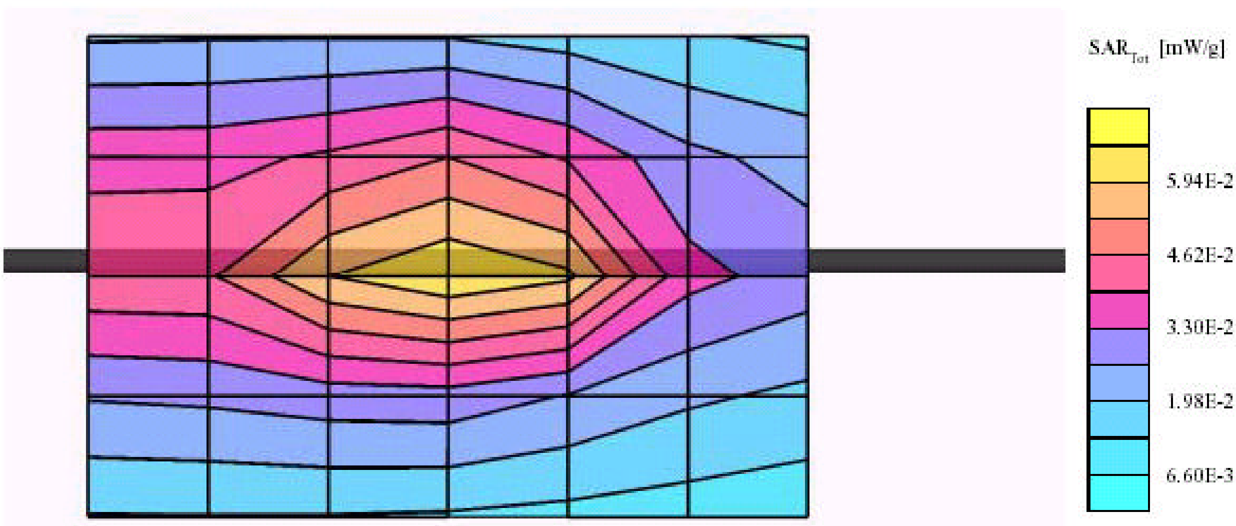
Simulant	Freq [MHz]	Parameters	Liquid Temp [ºC]	Target Value	Measured Value	Deviation [%]	Limits [%]
Body	450	ε	23	56.7	57.4	1.23	±5
		σ	23	0.94	0.91	-3.19	±5
		1g SAR	23	4.874	4.856	-0.37	±10
Head	450	ε	23	43.5	44.5	2.30	±5
		σ	23	0.87	0.86	-1.15	±5
		1g SAR	23	4.9	4.91	0.20	±10

ε = relative permittivity, σ = conductivity and ρ=1000kg/m^3
Note: Forward power = 9.226mW

450 MHz System Validation (23 Deg. C, 11/8/02) Forward power = 9.65 dBm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 450 MHz
Probe: ET3DV6 - SN1604; ConvF(7.70,7.70,7.70); Crest factor: 1.0; Body (Flat) 450 MHz: σ = 0.91 mho/m ε_r = 57.4 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.0448 mW/g, SAR (10g): 0.0311 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.02 dB



450 MHz System validation Validation (22 Deg. C, 11/8/02) Forward power = 9.65 dBm
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 450 MHz
Probe: ET3DV6 - SN1604; ConvF(7.30,7.30,7.30); Crest factor: 1.0; Head (Flat) 450 MHz: σ = 0.86 mho/m ε_r = 44.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.0453 mW/g, SAR (10g): 0.0315 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.10 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 dosimetric 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 **6.02W**.

8.1 SAR Test Data

Ambient Temperature (ºC): 24.0
Relative Humidity (%): 49.3

Worst case SAR reading

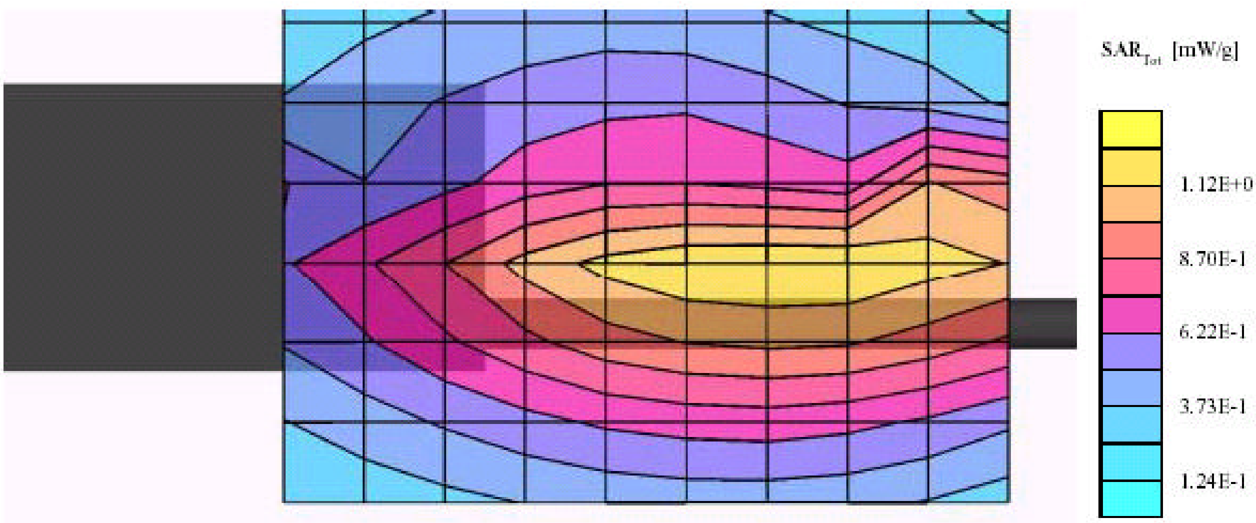
EUT position	Frequency (MHz)	Conducted Power (W)	Test Type	Antenna Type	Liquid	Phantom	Notes / Accessories	Measured		Limit	Plot #
								100% duty cycle	50% duty cycle		
back in touch with phantom	148	6.01	Body worn	Built-in	body	flat	none	0.884	0.442	8	1
back in touch with phantom	162	6.02	Body worn	Built-in	body	flat	none	1.08	0.54	8	2
back in touch with phantom	174	5.90	Body worn	Built-in	body	flat	none	1.22	0.61	8	3
w/belt clip in touch with phantom	148	6.01	Body worn	Built-in	body	flat	Leather case w/belt clip, microphone	0.551	0.2755	8	4
w/belt clip in touch with phantom	162	6.02	Body worn	Built-in	body	flat	Leather case w/belt clip, microphone	0.632	0.316	8	5
w/belt clip in touch with phantom	174	5.90	Body worn	Built-in	body	flat	Leather case w/belt clip, microphone	0.742	0.371	8	6
front to face at 2.5 cm	148	6.01	Face-held	Built-in	head	flat	none	0.497	0.2485	8	7
front to face at 2.5 cm	162	6.02	Face-held	Built-in	head	flat	none	0.614	0.307	8	8
front to face at 2.5 cm	174	5.90	Face-held	Built-in	head	flat	none	0.911	0.4555	8	9
front to face at 2.5 cm	148	6.01	Face-held	Built-in	head	flat	earphone	0.104	0.052	8	10
front to face at 2.5 cm	162	6.02	Face-held	Built-in	head	flat	earphone	0.322	0.161	8	11
front to face at 2.5 cm	174	5.90	Face-held	Built-in	head	flat	earphone	0.186	0.093	8	12

8.2 Plots of Test Result

The plots of test result were attached as reference.

BK Radio Inc. DPH51 (without belt clip 23 Deg C, 11/8/02)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 148 MHz
Probe: ET3DV6 - SN1604; ConvF(8.80,8.80,8.80); Crest factor: 1.0; Flat (body) 150 MHz: σ = 0.84 mho/m ε_r = 61.4 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 0.884 mW/g ± 0.22 dB, SAR (10g): 0.619 mW/g ± 0.03 dB, (Worst-case extrapolation)
Coarse: Dx = 17.0, Dy = 17.0, Dz = 14.0
Powerdrift: -0.01 dB



Plot #1

BK Radio Inc. DPH51 (without belt clip 23 Deg C, 11/8/02)

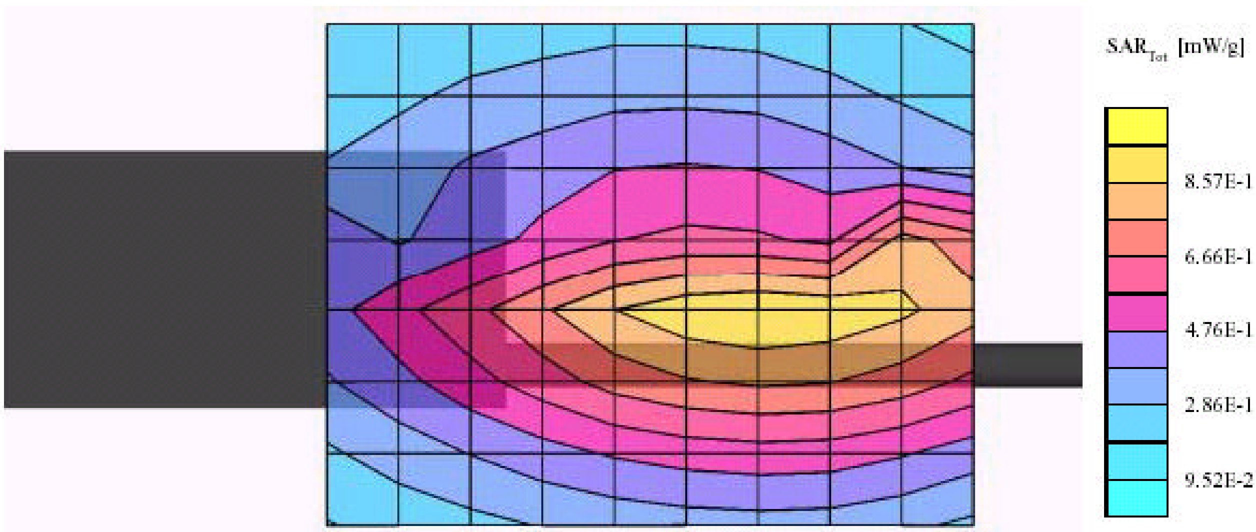
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 162 MHz

Probe: ET3DV6 - SN1604; ConvF(8.80,8.80,8.80); Crest factor: 1.0; Flat (body) 150 MHz: σ = 0.84 mho/m ε_r = 61.4 ρ = 1.00 g/cm³

Cubes (2): SAR (1g): 1.08 mW/g ± 0.02 dB, SAR (10g): 0.806 mW/g ± 0.02 dB, (Worst-case extrapolation)

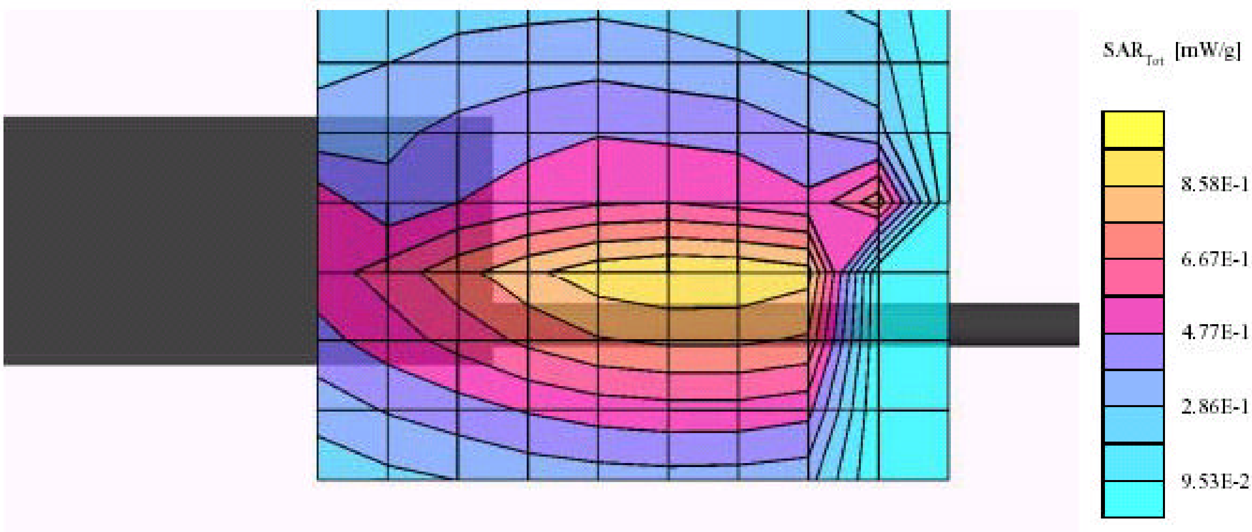
Coarse: Dx = 17.0, Dy = 17.0, Dz = 14.0

Powerdrift: -0.04 dB



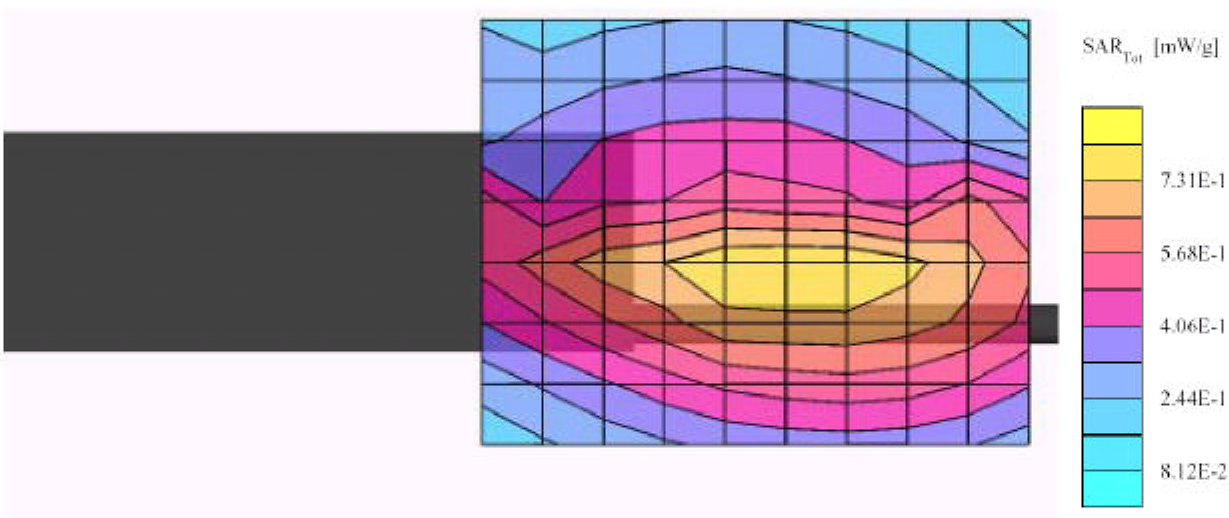
Plot #2

BK Radio Inc. DPH51 (without belt clip 23 Deg C, 11/8/02)
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 174 MHz
Probe: ET3DV6 - SN1604; ConvF(8.80,8.80,8.80); Crest factor: 1.0; Flat (body) 150 MHz: σ = 0.84 mho/m ε_r = 61.4 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.22 mW/g, SAR (10g): 0.572 mW/g, (Worst-case extrapolation)
Coarse: Dx = 17.0, Dy = 17.0, Dz = 14.0
Powerdrift: -0.02 dB



Plot #3

BK Radio Inc. DPH51 (with belt clip, 23 Deg C, 11/8/02)
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 148 MHz
Probe: ET3DV6 - SN1604; ConvF(8.80,8.80,8.80); Crest factor: 1.0; Flat (body) 150 MHz: σ = 0.84 mho/m ε_r = 61.4 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.551 mW/g, SAR (10g): 0.373 mW/g, (Worst-case extrapolation)
Coarse: Dx = 17.0, Dy = 17.0, Dz = 14.0
Powerdrift: -0.21 dB



Plot #4

BK Radio Inc. DPH51 (with belt clip, 23 Deg C, 11/8/02)

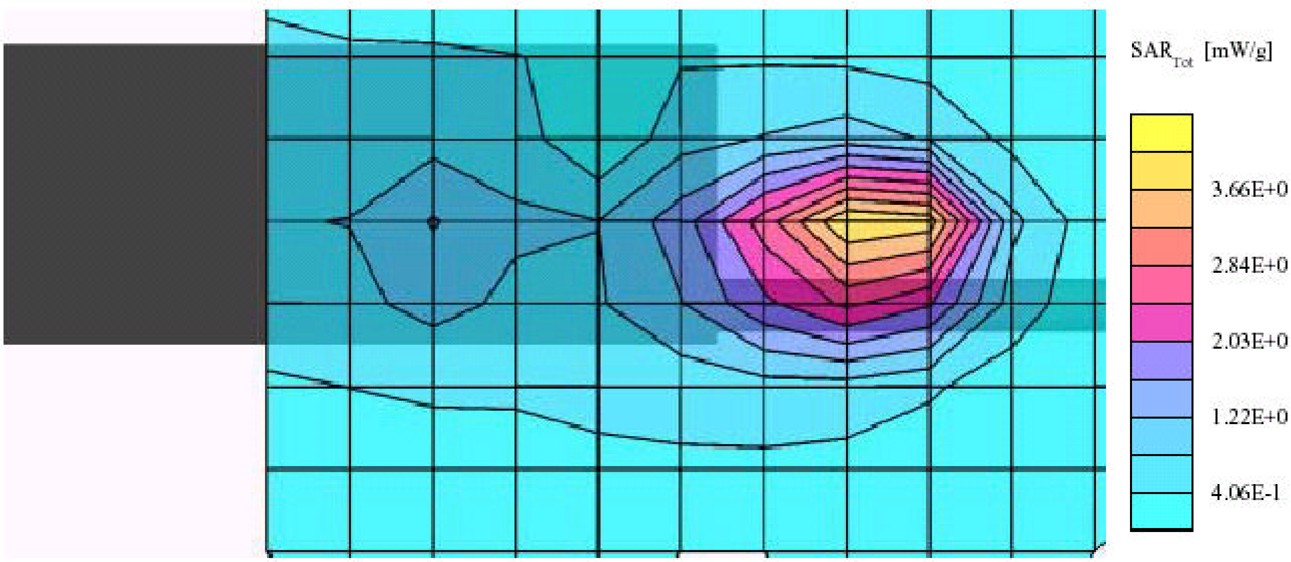
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 162 MHz

Probe: ET3DV6 - SN1604; ConvF(8.80,8.80,8.80); Crest factor: 1.0; Flat (body) 150 MHz: σ = 0.84 mho/m ε_r = 61.4 ρ = 1.00 g/cm³

Cube 5x5x7: SAR (1g): 0.632 mW/g, SAR (10g): 0.417 mW/g, (Worst-case extrapolation)

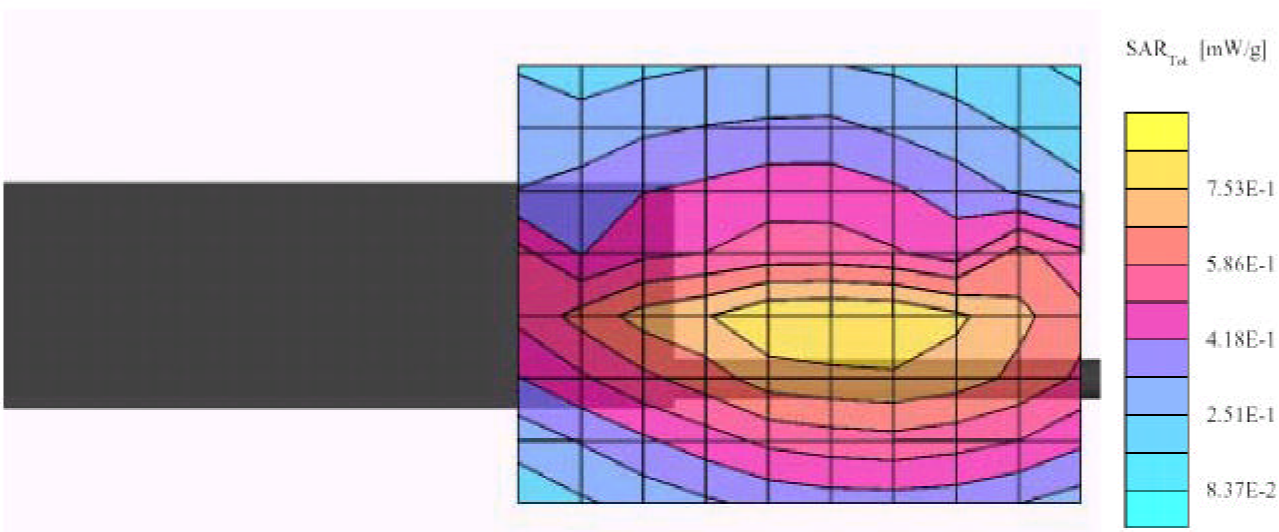
Coarse: Dx = 17.0, Dy = 17.0, Dz = 14.0

Powerdrift: -0.01 dB



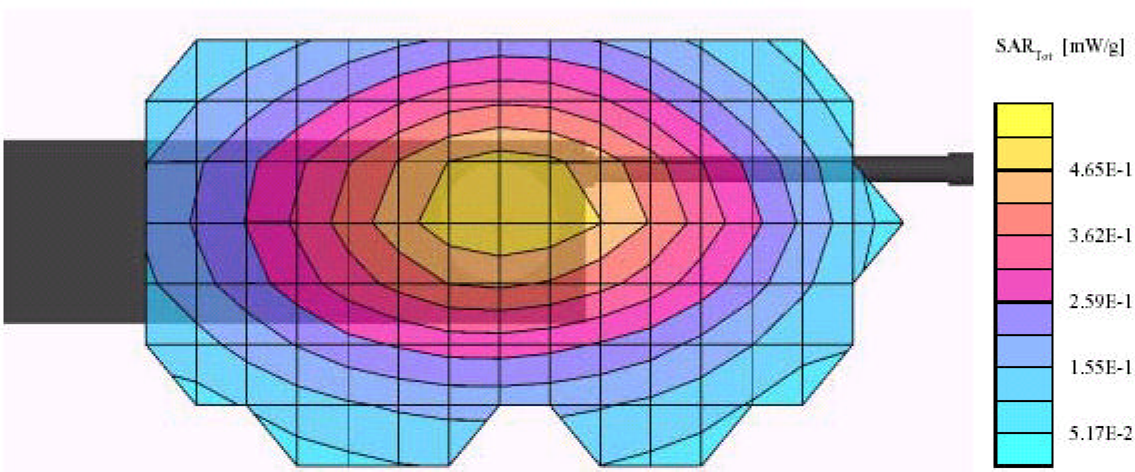
Plot #5

BK Radio Inc. DPH51 (with belt clip, 23 Deg C, 11/8/02)
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 174 MHz
Probe: ET3DV6 - SN1604; ConvF(8.80,8.80,8.80); Crest factor: 1.0; Flat (Body) 150 MHz: σ = 0.84 mho/m ε_r = 61.4 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 0.742 mW/g ± 0.05 dB, SAR (10g): 0.562 mW/g ± 0.02 dB, (Worst-case extrapolation)
Coarse: Dx = 17.0, Dy = 17.0, Dz = 14.0
Powerdrift: -0.17 dB



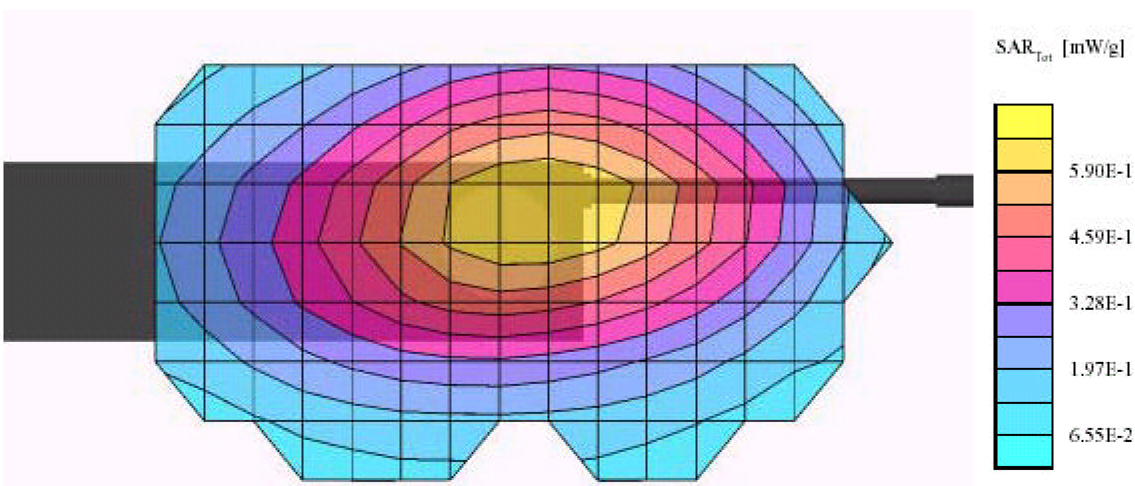
Plot #6

BK Radio Inc, DPH51 (2.5 cm seperation with phantom, 23 Deg C, 3/4/2003)
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 148 MHz
Probe: ET3DV6 - SN1604; ConvF(9.20,9.20,9.20); Crest factor: 1.0; 150: $\sigma = 0.76$ mho/m $\varepsilon_r = 52.3$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.497 mW/g, SAR (10g): 0.361 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.5, Dy = 17.0, Dz = 10.0
Powerdrift: -0.05 dB



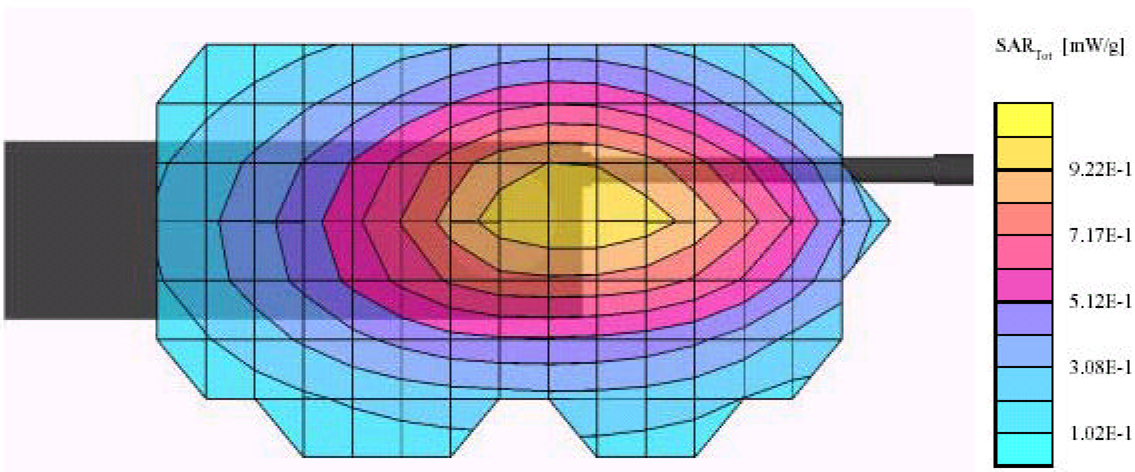
Plot #7

BK Radio Inc, DPH51 (2.5 cm seperation with phantom, 23 Deg C, 3/4/2003)
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 162 MHz
Probe: ET3DV6 - SN1604; ConvF(9.20,9.20,9.20); Crest factor: 1.0; 150: $\sigma = 0.76$ mho/m $\varepsilon_r = 52.3$ $\rho = 1.00$ g/cm³
Cube 5x5x7: SAR (1g): 0.614 mW/g, SAR (10g): 0.444 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.5, Dy = 17.0, Dz = 10.0
Powerdrift: -0.98 dB



Plot #8

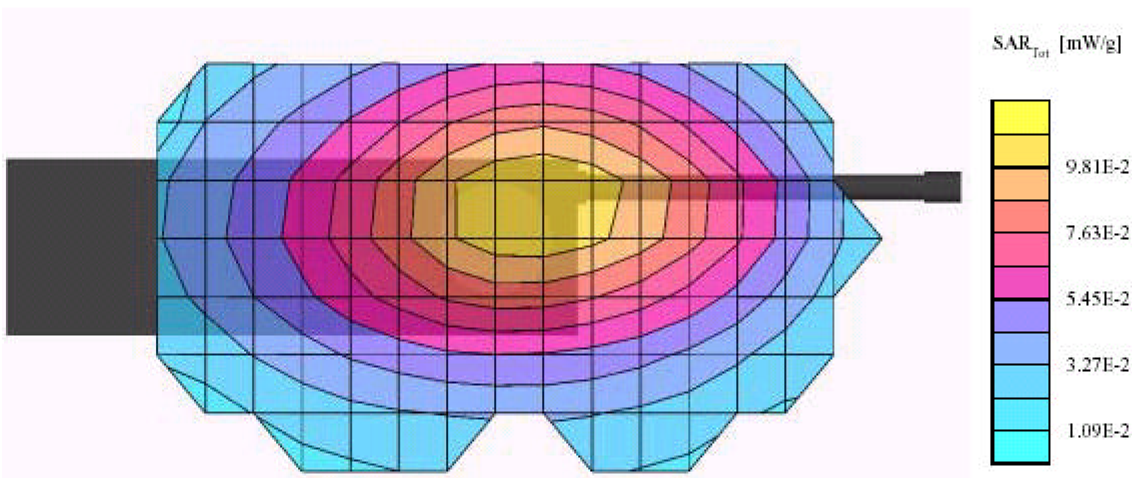
BK Radio Inc, DPH51 (2.5 cm seperation with the phantom, 23 Deg C, 3/4/2003)
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 174 MHz
Probe: ET3DV6 - SN1604; ConvF(9.20,9.20,9.20); Crest factor: 1.0; 150: σ = 0.76 mho/m ε_r = 52.3 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 0.911 mW/g ± 0.67 dB, SAR (10g): 0.650 mW/g ± 0.68 dB, (Worst-case extrapolation)
Coarse: Dx = 20.5, Dy = 17.0, Dz = 10.0
Powerdrift: 0.72 dB



Plot #9

BK Radio Inc, DPH51 (without belt clip 2.5 cm seperation and with ear phone, 23 Deg C, 3/4/2003)

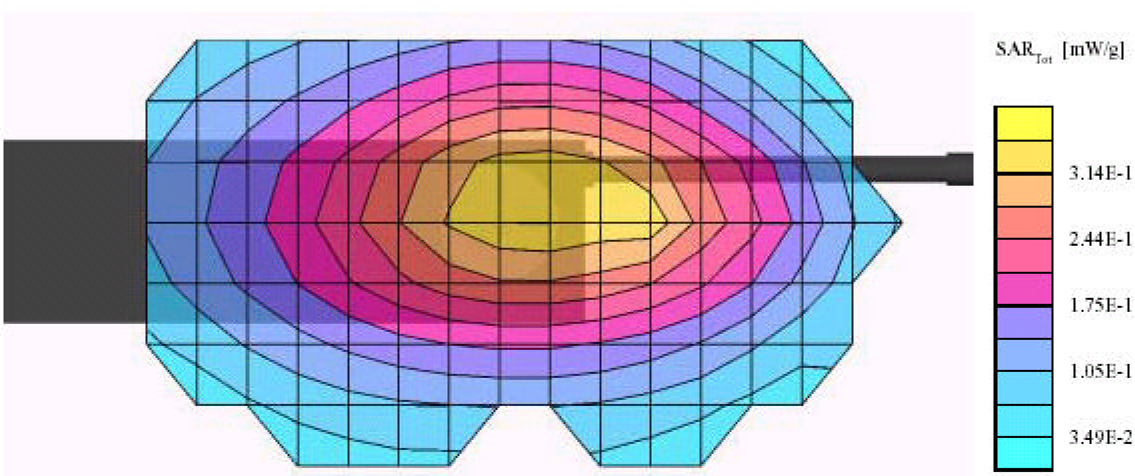
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 148 MHz
Probe: ET3DV6 - SN1604; ConvF(9.20,9.20,9.20); Crest factor: 1.0; 150: σ = 0.76 mho/m ε_r = 52.3 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.104 mW/g, SAR (10g): 0.0759 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.5, Dy = 17.0, Dz = 10.0
Powerdrift: -0.13 dB



Plot #10

BK Radio Inc, DPH51 (without belt clip 2.5 cm seperation and with ear phone, 23 Deg C, 3/4/2003)

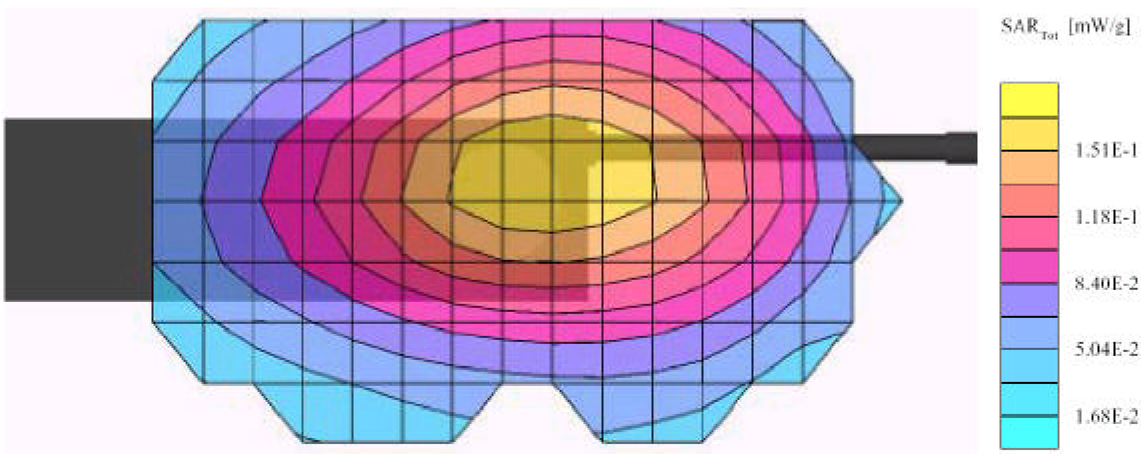
SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 162 MHz
Probe: ET3DV6 - SN1604; ConvF(9.20,9.20,9.20); Crest factor: 1.0; 150: σ = 0.76 mho/m ε_r = 52.3 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.322 mW/g, SAR (10g): 0.235 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.5, Dy = 17.0, Dz = 10.0
Powerdrift: -0.45 dB



Plot #11

BK Radio Inc, DPH51 (without belt clip 2.5 cm seperation and with ear phone, 23 Deg C, 3/4/2003)

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 174 MHz
Probe: ET3DV6 - SN1604; ConvF(9.20,9.20,9.20); Crest factor: 1.0; 150: σ = 0.76 mho/m ε_r = 52.3 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 0.186 mW/g ± 0.23 dB, SAR (10g): 0.135 mW/g ± 0.24 dB, (Worst-case extrapolation)
Coarse: Dx = 20.5, Dy = 17.0, Dz = 10.0
Powerdrift: 0.68 dB



Plot #12