



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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January 7, 2003

Benefon Oyj
PO Box 84
Salo, FINLAND FIN-2-4101

Reference: GSM/GPS PCS Phone - TGP77AU
FCC ID: QFPTGP77AU

Dear Mr. Petri Aarnio:

Enclosed is the EMC SAR Evaluation Report for the Benefon Oyj GSM/GPS PCS Phone - TGP77AU. The Benefon Oyj GSM/GPS PCS Phone - TGP77AU was tested in accordance with the measurement procedures specified in FCC OET 65 Supplement C:01-01 and shown to be capable to be in compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992.

Thank you for using the testing services of MET Laboratories. If you have any questions regarding these results or if MET can be of further assistance to you, please feel free to contact me. We appreciate your business and look forward to working with you again soon.

Kindest Regards,
MET LABORATORIES, INC.

Marianne T. Bosley
EMC Administrator

Enclosures: (\Benefon Oyj\EMC12379A-SAR.rpt)

DOCTEM-23 Jan 02

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Dosimetric Assessment

Test Report

for the

GSM/GPS PCS Phone - TGP77AU

**Tested And Evaluated
In Accordance With
FCC OET 65 Supplement C:01-01**

MET REPORT: EMC12379A-SAR

January 7, 2003

PREPARED FOR:

Benefon Oyj
PO Box 84
Salo, FINLAND FIN-2-4101

PREPARED BY:

MET Laboratories, Inc.
914 West Patapsco Avenue
Baltimore, Maryland 21230-3432



**MET REPORT: EMC12379A-SAR**

**DOSIMETRIC ASSESSMENT
TEST REPORT**
for the
GSM/GPS PCS Phone - TGP77AU

**Tested And Evaluated
In Accordance With
FCC OET Supplement C:01-01**

Prepared for

Benefon Oyj
PO Box 84
Salo, FINLAND FIN-2-4101

Report Prepared By  Marianne T. Bosley EMC ADMINISTRATOR	Report Reviewed By  Liming Xu TEST ENGINEER
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Final Review By



Christopher R. Harvey
EMC LAB DIRECTOR

Engineering Statement: The measurements shown in this report were made in accordance with the procedures specified in Supplement C to OET Bulletin 65 of the Federal Communications Commission (FCC) Guidelines [FCC 2001] for uncontrolled exposure. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment evaluated is capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1-1992.



Christopher R. Harvey
EMC LAB DIRECTOR



SAR EVALUATION CERTIFICATE OF COMPLIANCE

FCC ID: QFPTGP77AU
APPLICANT: Benefon Oyj

APPLICANT NAME AND ADDRESS:	DATE OF TEST:	June 14, 2002
Benefon Oyj	TEST LOCATION:	MET LABORATORIES INC.
PO Box 84		914 West Patapsco Avenue
Salo, FINLAND FIN-2-4101		Baltimore, Maryland 21230

EUT:	GSM/GPS PCS Phone - TGP77AU		
Date of Receipt:	June 11, 2002		
Device Category:	Part 24 Licensed Portable Transmitter Held to Ear		
RF exposure environment:	Uncontrolled		
RF exposure category:	Portable		
Power supply:	Battery Operated		
Antenna:	Fixed PCS and Folding GPS (Receive) Antenna		
Production/prototype:	Identical Prototype		
Measured Standards:	PCS 1900		
Modulation:	GMSK		
Crest Factor:	GSM = 8		
TX Range:	GSM PCS 1900	1850.2 MHz - 1909.8 MHz	
RX Range:	GSM PCS 1900	1930.2 MHz - 1989.8 MHz	
Used TX Channels:	Low: ch.512	Centre: ch. 660	High: ch. 810
Maximum RF Power Output:	0.8 W EIRP	GSM PCS1900 (29.0 dBm)	
Maximum SAR Measurement (Averaged over 1g):	0.778 W/kg PCS GSM Head; 0.263 W/kg PCS GSM Body		

This wireless portable device has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001) and IEEE Std. 1528-200X (July 2001), and has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE Std. C95.1 - 1992.

I attest to the accuracy of this data. All reported measurements were performed by me, or were made under my supervision, and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

I also certify that no party to this application has been denied the FCC benefits pursuant to Section 5.301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Chris Harvey
Director, EMC Laboratory





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OBJECTIVE

The TGP77AU is a new GSM/GPS PCS Handset Phone from Benefon Oyj that operates in the 1850.2-1909.8 TX frequency range utilizing a fixed antenna. The system uses the GSM PCS 1900 standard.

The objective of the procedure was to perform a dosimetric assessment of one of the TGP77AU in the GSM PCS 1900 standard. The measurements have been carried out with the dosimetric assessment system "SARA2", and were made according to the Supplement C to OET Bulletin 65 of the Federal Communications Commission (FCC) Guidelines [FCC 2001] for evaluating compliance of mobile and portable devices with FCC limits for human exposure in the general population to radio frequency emissions.

INTRODUCTION

In the United States, the most recent FCC RF exposure criteria is documented in the publication OET 65 Supplement C Edition 01-01 [FCC 2001], which sets limits for human exposure to radio frequency electromagnetic fields in the frequency range 3kHz to 300GHz.

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. (c) 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT).

SAR DEFINITION

Specific absorption rate (SAR) is the biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest. It is a measure of the power absorbed per unit mass and may be spatially averaged over the total mass of an exposed body or its parts.

In mathematical terms Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy absorbed by (dissipated in) an incremental mass contained in a volume element of a given density. It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body as given below. The SAR is calculated from the r.m.s. electric field strength E inside the human body, the conductivity σ and the mass density $\tilde{\rho}$ of the biological tissue:

$$SAR = \frac{|E|^2 \sigma}{\tilde{\rho}}$$

SAR is expressed in units of Watts per Kilogram (W/kg)

σ = Conductivity of the tissue-simulant material (S/m)

$\tilde{\rho}$ = Mass density of the tissue-simulant material (kg/m³)

E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.



SUMMARY FOR SAR TEST REPORT

EUT	TGP77AU
FCC ID	QFPTGP77AU
Date of receipt	June 11, 2002
Date of Test	June 14, 2002-October 6, 2002
RF Exposure Category	Uncontrolled
Measured Standard	PCS 1900
Measurement done by	Liming Xu

Maximum Results Found during SAR Evaluation

The equipment is deemed to fulfil the requirements if the measured values are less than or equal to the limit.

Head Configuration

Phantom Configuration	Test Position	Power (dBm)	Channel (MID)	Frequency (GHz)	Max. 1g SAR (W/kg)
Right Side of Head/900 mAH Battery /GPS Antenna In	Tilted (0°)	29.9	660	1.879	0.778

Table 1: The Max SAR value for Head Testing Handset model TGP77AU

Body Worn Configuration

Test Configurations	Power (dBm)	Channel (MID)	Frequency (GHz)	Max. 1g SAR (W/kg)
Black Carrying Case/External GPS	29.9	660	1.879	0.263

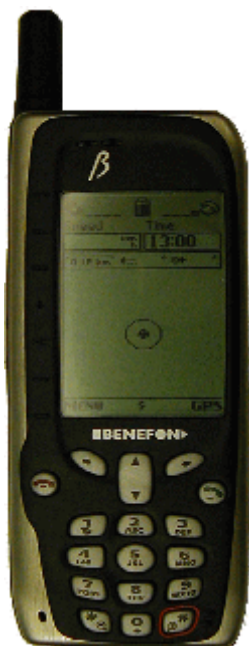
Table 2: The Max SAR value for Body Testing Handset model TGP77AU



DESCRIPTION OF TESTED DEVICE

FCC ID	QFPTGP77AU
Modes of Operation	PCS 1900
Modulation Mode(s)	GSM(GMSK)
Duty Cycle(s) (=1/ Crest Factor)	Crest Factor=8
Transmitter Frequency Range	1850.2-1909.8 MHz

Picture of Phone



Description of the Antenna

Fixed PCS Antenna and a Folding GPS Antenna.

Battery Options

There were two battery options one with 900 mAH and other one with 1200 mAH. SAR data is provided for both the batteries.

EUT PICTURES



Fig 1.Front of EUT



Fig 2.Back Of EUT



Fig 3.Bottom of EUT



Fig 4.Left View of EUT



Fig 5.Right view of EUT



Fig 6.Front with GPS Antenna out

Body Worn Accessories



Fig 7. Both 1200 and 900 mAH Batteries



Fig 8. Headset



Fig 9. Data Cable



Fig 10. External GPS Antenna



Fig 11. Black Carrying Case



Fig 12. Gray Carrying Case



TEST CONDITIONS

Environment

Test Environment	Dedicated test area
Ambient temperature	24°C ± 1 °C
Tissue simulating liquid temperature	24.2°C ± 0.5 °C
Shielded Chamber	Anechoic material strategically positioned to minimize room reflections
Ambient Noise	very low

Table 3: Summary of Test Environment conditions

Test Signal, Frequencies and Output Power

1. The measurements are first performed at the middle channel of the operating band of the EUT. If the SAR value of the middle channel for each test configuration (Left, Right, Cheek, Tilt, Extended, Retracted) is at least 3 dB below the SAR limit, testing at the high and low channels is optional for such test configurations.
2. The phone was set to maximum power level during all the tests and at the beginning of the each test the battery was fully charged. Power output was measured before and after each test.
3. The phone was equipped with a special firmware, which allowed controlling the transmitter from its keypad.

T During SAR testing, the EUT (PCS phone) was operated and controlled by a Rhode & Schwartz CMU 200 Base Station Simulator.

During SAR testing, the EUT (PCS phone) was operated and controlled by an Agilent Base station HP 8924 E (with HP 83236B PCS Interface).

Other





TEST DETAILS

Tissue Recipes

The following recipes are provided in percentage by weight.

1900 MHz, Head: 54.90% De-Ionized Water
 0.18% Salt
 00% Sugar
 44.92% DGBE

1900 MHz, Body: 41% De-Ionized Water
 0.2% Salt
 58.8% Sugar

Material Parameters

Simulant	Freq [MHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Body	1900	24.3	24.7	\dot{Y}_r	54.0	55.3	2.4	+/- 5%
				σ	1.45	1.47	1.37	+/- 5%
Head	1900	24.3	24.7	\dot{Y}_r	39.9	41.2	3.26	+/- 5%
				σ	1.42	1.44	1.41	+/- 5%

Table 4: Parameters of the tissue simulating liquid, 1900MHz Head/Body



TEST DETAILS

Tissue Recipes (After December 27, 2002)

The following recipes are provided in percentage by weight.

1900 MHz, Head: 54.00% De-Ionized Water
 0.37% Salt
 45.63% DGBE

1900 MHz, Body: 70% De-Ionized Water
 0.3% Salt
 29.7% DGBE

Material Parameters

Simulant	Freq [MHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Body	1900	24.3	24.7	\bar{Y}_r	53.3	53.0	-0.6	+/- 5%
				σ	1.52	1.54	1.30	+/- 5%
Head	1900	24.3	24.7	\bar{Y}_r	40.0	40.9	2.25	+/- 5%
				σ	1.40	1.42	1.43	+/- 5%

Table 4A: Parameters of the tissue simulating liquid, 1900MHz Head/Body

NOTES:

- 1 Parameters were measured before and after testing. These values reflect both measurements.

System Validation

Following equipment is used for the system validation:

Signal Generator (Agilent E4432B)
 RF Amplifier (Mini circuits ZHL-42)
 Dual Directional Coupler (HP 778D)
 The HP 8564E Spectrum Analyzer (used for RF power measurement)
 Cables, Attenuate and Adapters

The recommended (IEEE Std 1528) set-up was used:

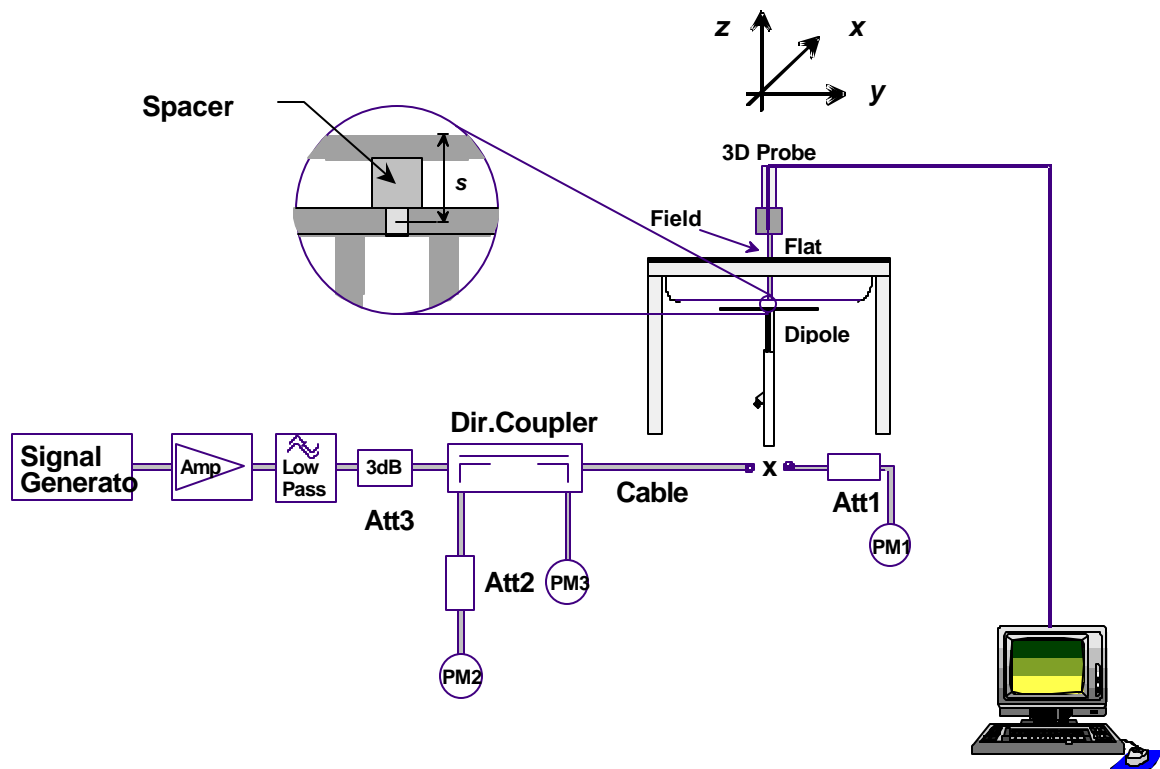


Figure 13. Performance Check Setup Diagram



Performance Checking

Test Position:

Test Date:

Antenna Position:

Probe:

Med. Parameters:

Pre Test Room Temperature:

Post Test Room Temperature:

Pre Test Simulant Liquid

Post Test Simulant Liquid

CH

SAR Drift

SAR (1g):

Flat Phantom

June 14, 2002

Balanced Dipole

IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002

Head: $\bar{Y}_r = 41.2$; $\bar{o} = 1.44$

24.3 C

24.4 C

24.7 C

24.9 C

NA

<5%

35.539

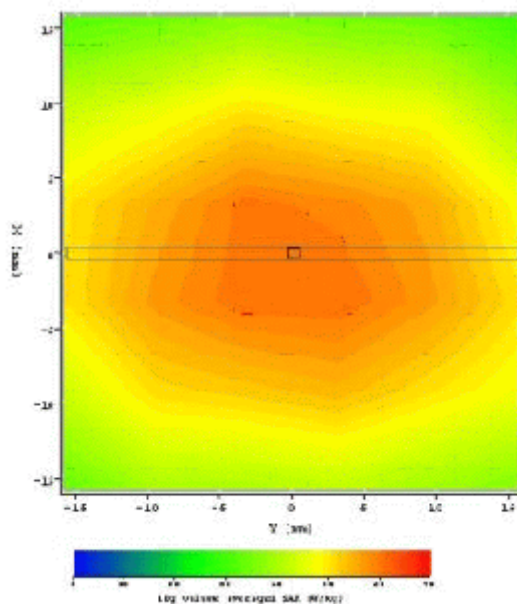


Figure 14. Day 1 Validation Measurement - 1800 MHz in head tissue

Simulant	Freq [MHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Head	1800	24.3	24.7	\bar{Y}_r	40.0	41.2	3.26	+/- 5
				\bar{o}	1.40	1.44	1.41	+/- 5
				1g SAR	38.1	35.539	6.72	+/- 10

Table 5. System Validation Results - Day 1(June 14, 2002)

NOTE:

RF Forward power = 0.117W

Validation was done within 100MHz of test frequency



Test Position:

Flat Phantom

Test Date:

July 3, 2002

Antenna Position:

Balanced Dipole

Probe:

IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002

Med. Parameters:

Head: $\bar{Y}_r = 41.2$; $\bar{o} = 1.44$

Pre Test Room Temperature:

24.4 C

Post Test Room Temperature:

24.7 C

Pre Test Simulant Liquid

24.6 C

Post Test Simulant Liquid

25 C

CH

NA

SAR Drift

< 5%

SAR (1g):

35.554

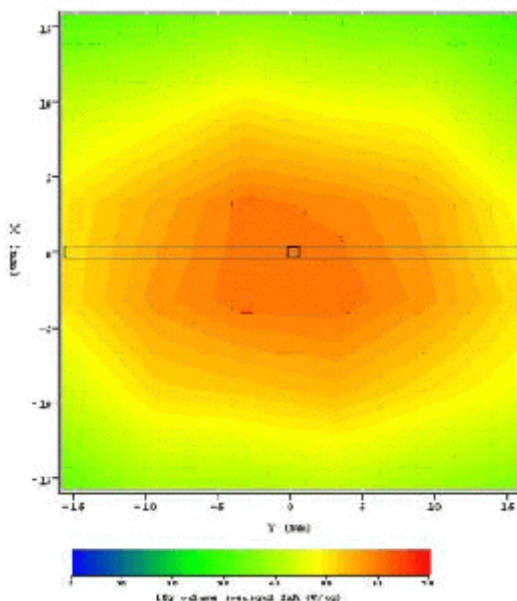


Figure 15. Day 2 Validation Measurement - 1800 MHz in head tissue

Simulant	Freq [MHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Head	1800	24.4	24.6	\bar{Y}_r	40.0	41.2	3.26	+/- 5
				\bar{o}	1.40	1.44	1.41	+/- 5
				1g SAR	38.1	35.554	6.682	+/- 10

Table 6. System Validation Results - Day 2(July 3, 2002)

NOTE:

RF Forward power = 0.117W

Validation was done within 100MHz of test frequency



Test Position:

Flat Phantom

Test Date:

October 6, 2002

Antenna Position:

Balanced Dipole

Probe:

IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002

Med. Parameters:

Head: $\bar{Y}_r = 41.2$; $\bar{o} = 1.44$

Pre Test Room Temperature:

24.4 C

Post Test Room Temperature:

24.5 C

Pre Test Simulant Liquid

24.6 C

Post Test Simulant Liquid

24.8 C

CH

NA

SAR Drift

< 5%

SAR (1g):

35.832

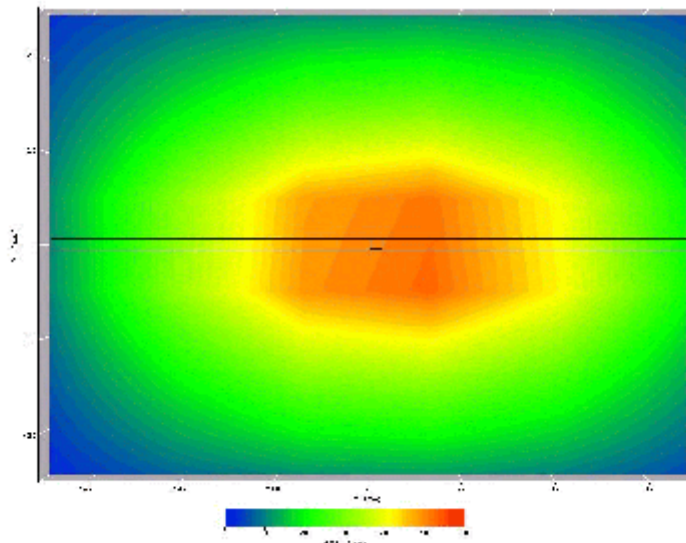


Figure 16. Day 3 Validation Measurement - 1800 MHz in head tissue

Simulant	Freq [MHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Head	1800	24.4	24.6	\bar{Y}_r	40.0	41.2	3.26	+/- 5
				\bar{o}	1.40	1.44	1.41	+/- 5
				1g SAR	38.1	35.832	5.952	+/- 10

Table 7. System Validation Results - Day 3(October 6, 2002)

NOTE:

RF Forward power = 0.148W

Validation done within 100MHz of test frequency





Test Position: Flat Phantom
Test Date: Dec. 27, 2002
Antenna Position: Balanced Dipole
Probe: IXP-050/SN 0122 – SARf(0.673, 0.673, 0.673) Probe Cal Date 10/2002
Med. Parameters: Head: $\bar{Y}_r = 40.9$; $\bar{o} = 1.42$
Pre Test Room Temperature: 24.4 C
Post Test Room Temperature: 24.5 C
Pre Test Simulant Liquid 24.6 C
Post Test Simulant Liquid 24.8 C
CH NA
SAR Drift < 5%
SAR (1g): 37.32

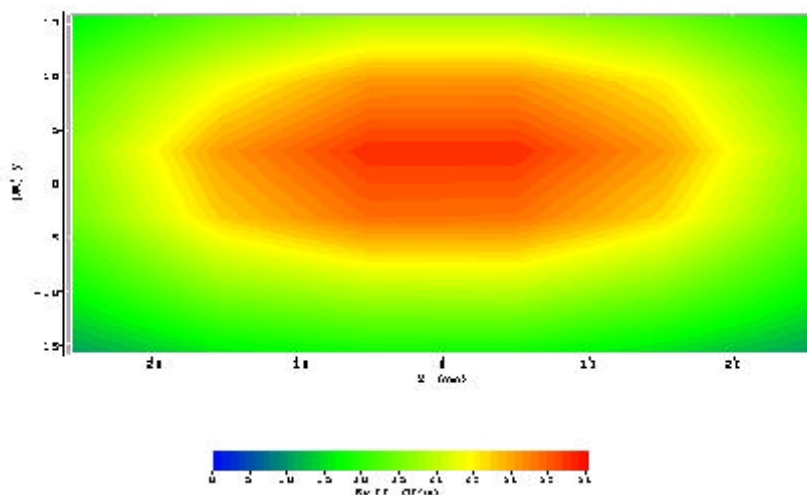


Figure 16. Day 3 Validation Measurement - 1800 MHz in head tissue

Simulant	Freq [MHz]	Room Temp [C]	Liquid Temp [C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
Head	1800	24.4	24.6	\bar{Y}_r	40.0	40.9	2.25	+/- 5
				\bar{o}	1.40	1.42	1.43	+/- 5
				1g SAR	38.1	37.32	2.00	+/- 10

Table 7. System Validation Results - Dec. 27, 2002

NOTE:

RF Forward power = 0.12W

Validation done within 100MHz of test frequency



SAR Results Summary



MEASUREMENT RESULTS (Head SAR)

Phantom Configuration	Test Position	Power dBm	Channel (MID)	Frequency (GHz)	Max. 1g SAR (W/kg)	2 nd spot (W/kg)
Left Side of Head/ 1200 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.304	0.034
	Tilted (15 °)	29.9	660	1.879	0.387	NA
Right Side of Head/ 1200 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.548	NA
	Tilted (15 °)	29.9	660	1.879	0.523	NA
Left Side of Head/ 900 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.274	NA
	Tilted (15 °)	29.9	660	1.879	0.354	NA
Right Side of Head/ 900 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.57 0.664 (retest)	NA
	Tilted (15 °)	29.9	660	1.879	0.561 0.778(retest)	NA

Table 8. Measured head-phantom results for Benefon Oyj GSM/GPS PCS Handset for the model TGP77AU - GPS Antenna In

NOTES:

- The measurements are first performed at the middle channel of the operating band of the EUT. If the SAR value of the middle channel for each test configuration (Left, Right, Cheek, Tilt, Extended, Retracted) is at least 2 dB below the SAR limit, testing at the high and low channels is optional for such test configurations.
- The test data reported are the worst-case SAR values with the antenna-head position set in a typical configuration.
- All modes of operation are investigated and worst case are reported.
- Multiple Hot Spots None T SAR was less than 2 dB of the highest peak T Reported
- Battery Type Standard Extended T Both
- Power Measured T Conducted EIRP ERP
- SAR Measurement System SARA2
- SAR Configuration T Head Body
- Before the measurements, the test site ambient conditions were checked performing SAR measurements with the phone powered off.



MEASUREMENT RESULTS (Head SAR, continued)

Phantom Configuration	Test Position	Power dBm	Channel (MID)	Frequency (GHz)	Max. 1g SAR (W/kg)	2 nd spot (W/kg)
Left Side of Head/ 1200 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.164	0.020
	Tilted (15 °)	29.9	660	1.879	0.448	NA
Right Side of Head/ 1200 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.32	0.041
	Tilted (15 °)	29.9	660	1.879	0.306	NA
Left Side of Head/ 900 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.23	0.010
	Tilted (15 °)	29.9	660	1.879	0.391	NA
Right Side of Head/ 900 mAH Battery	Cheek (0 °)	29.9	660	1.879	0.329	0.036
	Tilted (15 °)	29.9	660	1.879	0.34	NA

Table 9. Measured head-phantom results for Benfon Oyj GSM/GPS PCS Handset for the model TGP77AU - GPS Antenna Out

NOTES:

- The measurements are first performed at the middle channel of the operating band of the EUT. If the SAR value of the middle channel for each test configuration (Left, Right, Cheek, Tilt, Extended, Retracted) is at least 2 dB below the SAR limit, testing at the high and low channels is optional for such test configurations.
- The test data reported are the worst-case SAR values with the antenna-head position set in a typical configuration.
- All modes of operation are investigated and worst case are reported.
- Multiple Hot Spots None T SAR was less than 2 dB of the highest peak T Reported
- Battery Type Standard Extended T Both
- Power Measured T Conducted EIRP ERP
- SAR Measurement System SARA2
- SAR Configuration T Head Body
- Before the measurements, the test site ambient conditions were checked performing SAR measurements with the phone powered off.



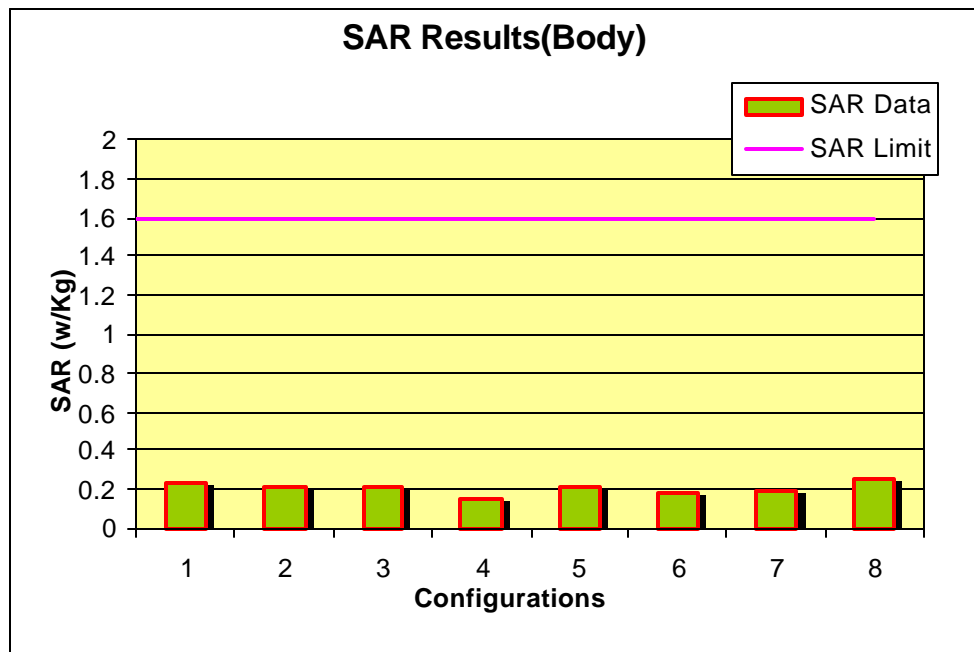
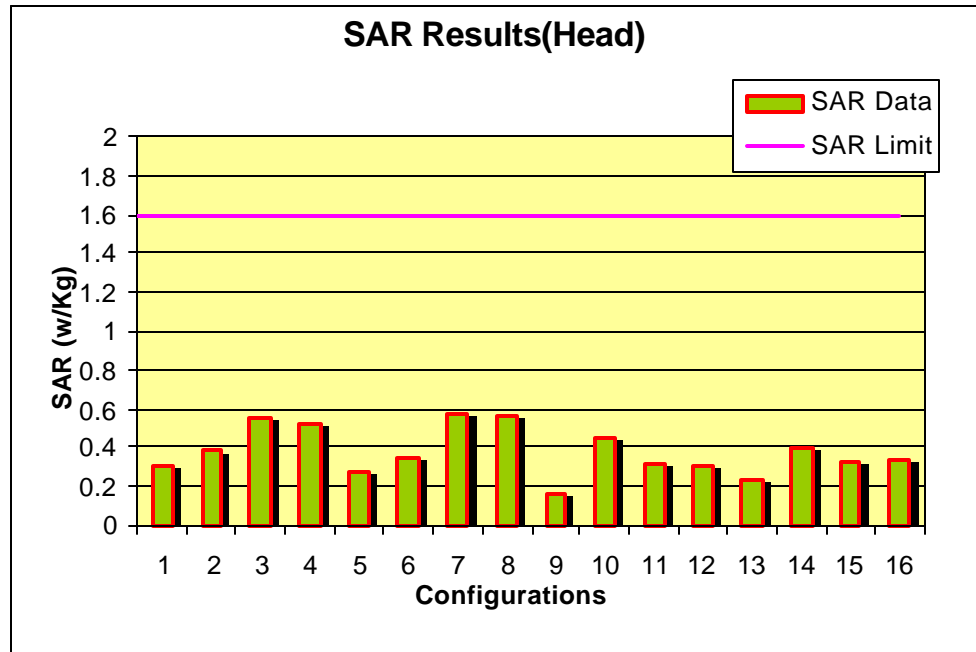
MEASUREMENT RESULTS (Body)

Config	Description	Battery Option	Power dBm	Channel (MID)	Frequency (GHz)	Max. 1g SAR (W/kg)	2 nd spot (W/kg)
1	Black Carrying Case	900 mAh	29.9	660	1.879	0.238 0.263(retest)	0.121 0.128
2	Black Carrying Case/Headset		29.9	660	1.879	0.209	NA
3	Black Carrying Case/Data Cable		29.9	660	1.879	0.208	NA
4	Black Carrying Case/External GPS		29.9	660	1.879	0.144	NA
5	Black Carrying Case	1200 mAh	29.9	660	1.879	0.216	NA
6	Black Carrying Case/Headset		29.9	660	1.879	0.178	NA
7	Black Carrying Case/Data Cable		29.9	660	1.879	0.189	0.023
8	Black Carrying Case/External GPS		29.9	660	1.879	0.258 0.212(retest)	0.201 0.111

Table 10. Measured Body SAR results for the Handset model TGP77AU

NOTES:

- Identical metallic component on both of the carrying harnesses. Therefore data is provided only for one of them, i.e. black carrying harness.
- The measurements are first performed at the middle channel of the operating band of the EUT. If the SAR value of the middle channel for each test configuration (Left, Right, Cheek, Tilt, Extended, Retracted) is at least 2 dB below the SAR limit, testing at the high and low channels is optional for such test configurations.
- The test data reported are the worst-case SAR values with the antenna-head position set in a typical configuration.
- All modes of operation are investigated and worst case are reported.
- Multiple Hot Spots None T SAR was less than 2 dB of the highest peak T Reported
- Battery Type Standard Extended T Both
- Power Measured T Conducted EIRP ERP
- SAR Measurement System SARA2
- SAR Configuration Head T Body
- Before the measurements, the test site ambient conditions were checked performing SAR measurements with the phone powered off.

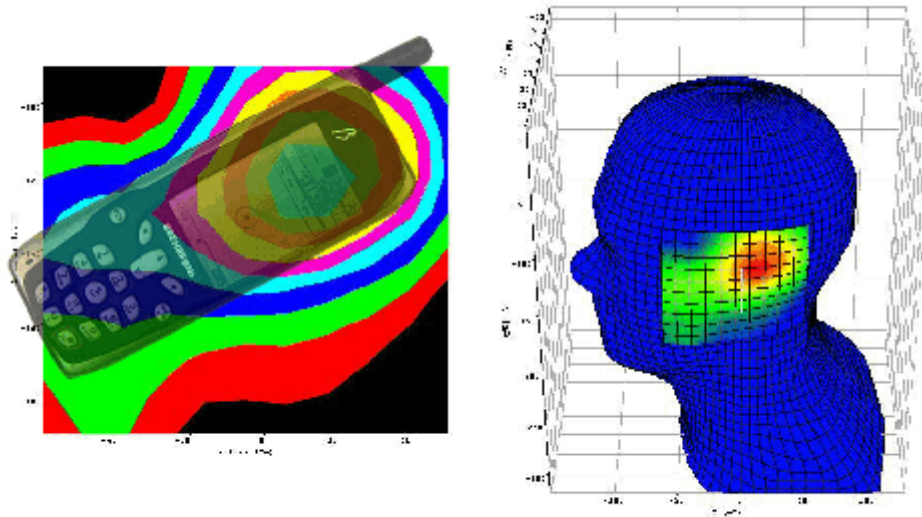
**SAR Results (Continued)**



SAR DISTRIBUTIONS (AREA SCANS)



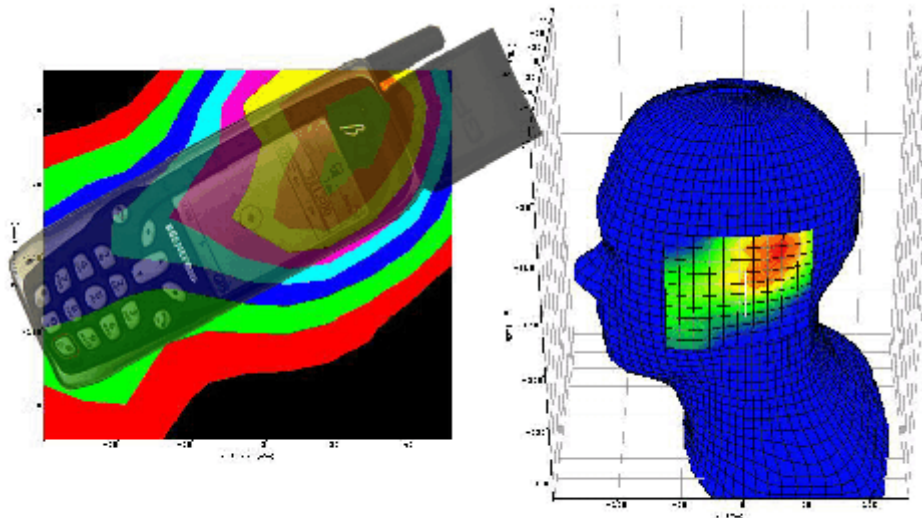
Test Position: Upright Phantom; Right Hand Section; Tilted Position; 1200 mAH Battery
Test Date: June 14, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$
Pre Test Room Temperature: 24.3 C
Post Test Room Temperature: 24.4 C
Pre Test Simulant Liquid: 24.7 C
Post Test Simulant Liquid: 24.9 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 5%
SAR (1g): 0.523 W/Kg



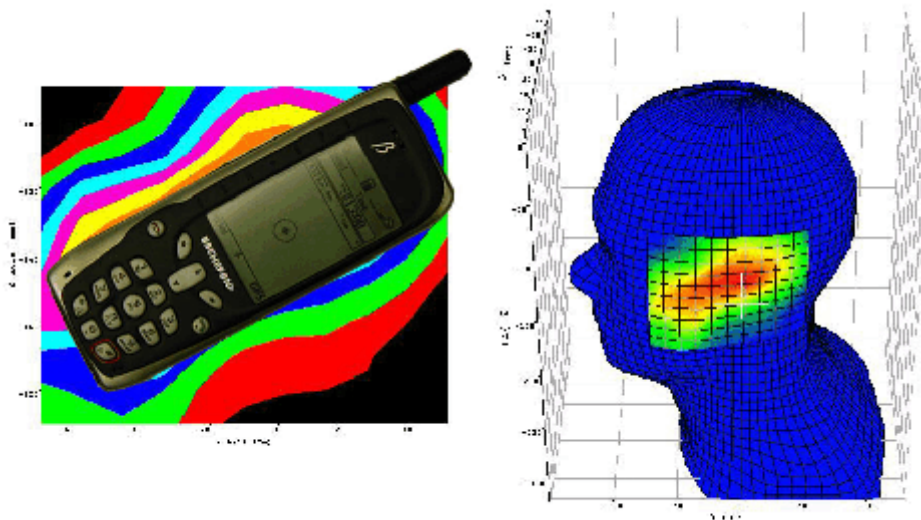
1g Volume averaged SAR= 0.523



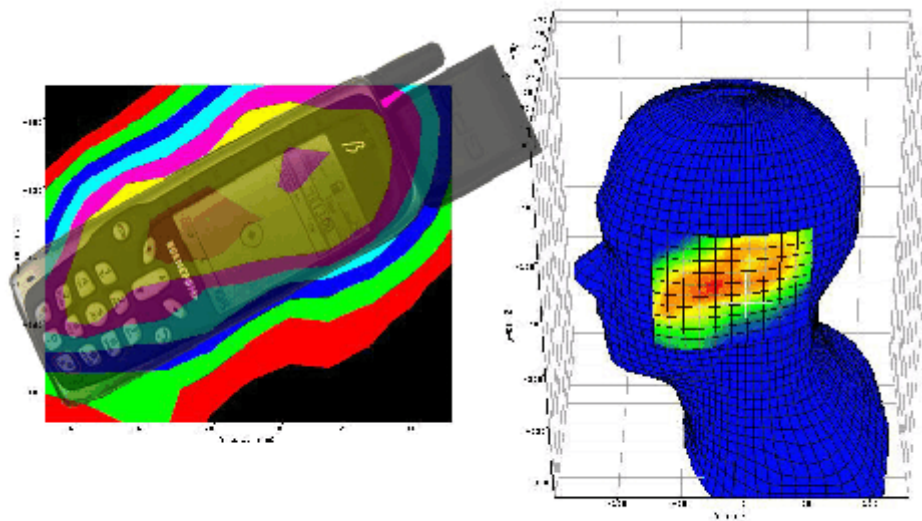
Test Position: Upright Phantom; Right Hand Section; Tilted Position; 1200 mAH Battery
Test Date: June 14, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna OUT
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$
Pre Test Room Temperature: 24.3 C
Post Test Room Temperature: 24.4 C
Pre Test Simulant Liquid 24.7 C
Post Test Simulant Liquid 24.9 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 2%
SAR (1g): 0.306 W/Kg



1g Volume averaged SAR= 0.306

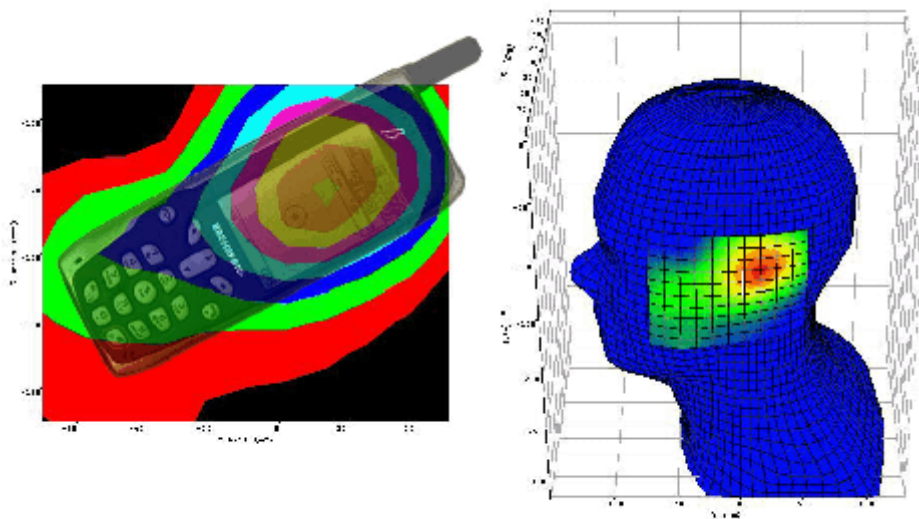
**Test Position:****Upright Phantom; Right Hand Section; Cheek Position; 1200 mAH Battery****Test Date:****June 14, 2002****Antenna Position:****Fixed PCS Antenna and GPS Antenna IN****Probe:****IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002****Med. Parameters:****1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$** **Pre Test Room Temperature:****24.3 C****Post Test Room Temperature:****24.4 C****Pre Test Simulant Liquid****24.7 C****Post Test Simulant Liquid****24.9 C****CH 660;****Crest Factor = 8(GSM)****SAR Drift****< 2%****SAR (1g):****0.548 W/Kg**

1g Volume averaged SAR= 0.548

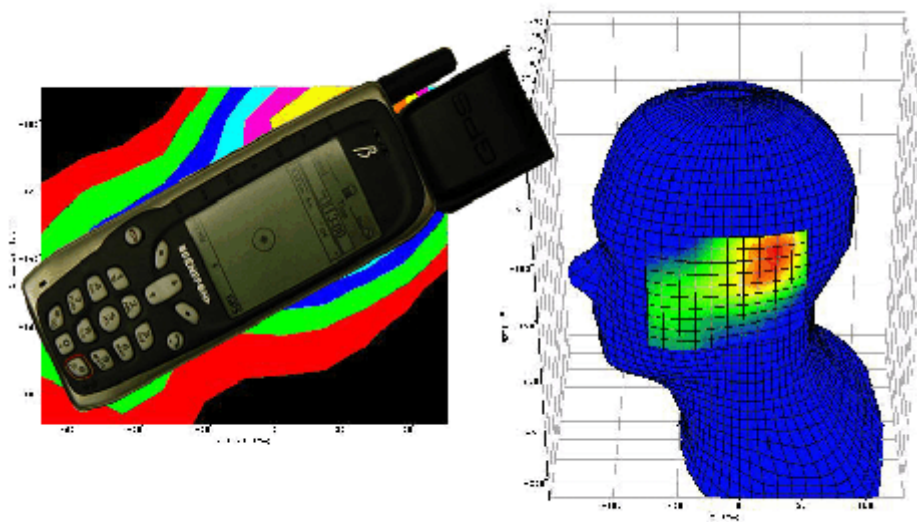
**Test Position:****Upright Phantom; Right Hand Section; Cheek Position; 1200 mAH Battery****Test Date:****June 14, 2002****Antenna Position:****Fixed PCS Antenna and GPS Antenna OUT****Probe:****IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002****Med. Parameters:****1900 MHz Head: $\hat{Y}_t = 41.2$; $\phi = 1.44$** **Pre Test Room Temperature:****24.3 C****Post Test Room Temperature:****24.4 C****Pre Test Simulant Liquid****24.7 C****Post Test Simulant Liquid****24.9 C****CH 660;****Crest Factor = 8(GSM)****SAR Drift****< 2%****SAR (1g):****0.320 W/Kg****1g Volume averaged SAR= 0.320**



Test Position: Upright Phantom; Right Hand Section; Tilted Position; 900 mAH Battery
Test Date: June 14, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\hat{Y}_t = 41.2$; $\hat{o} = 1.44$
Pre Test Room Temperature: 24.3 C
Post Test Room Temperature: 24.4 C
Pre Test Simulant Liquid 24.7 C
Post Test Simulant Liquid 24.9 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 2%
SAR (1g): 0.561 W/Kg



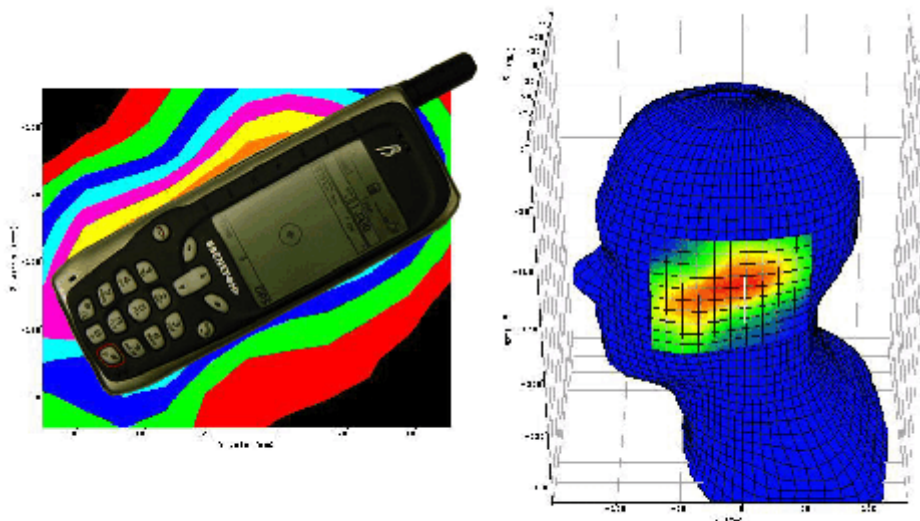
1g Volume averaged SAR= 0.561

**Test Position:****Upright Phantom; Right Hand Section; Tilted Position; 900 mAH Battery****Test Date:****June 14, 2002****Antenna Position:****Fixed PCS Antenna and GPS Antenna OUT****Probe:****IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002****Med. Parameters:****1900 MHz Head: $\hat{\gamma}_t = 41.2$; $\phi = 1.44$** **Pre Test Room Temperature:****24.3 C****Post Test Room Temperature:****24.4 C****Pre Test Simulant Liquid****24.7 C****Post Test Simulant Liquid****24.9 C****CH 660;****Crest Factor = 8(GSM)****SAR Drift****< 2%****SAR (1g):****0.340 W/Kg**

1g volume averaged SAR= 0.34



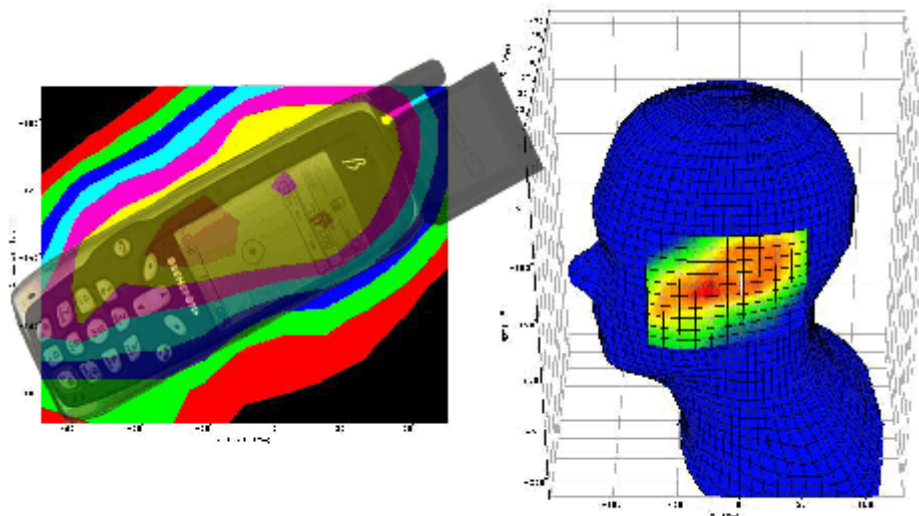
Test Position: Upright Phantom; Right Hand Section; Cheek Position; 900 mAH Battery
Test Date: June 14, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$
Pre Test Room Temperature: 24.3 C
Post Test Room Temperature: 24.4 C
Pre Test Simulant Liquid: 24.7 C
Post Test Simulant Liquid: 24.9 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 2%
SAR (1g): 0.57 W/Kg



1g volume averaged SAR= 0.57



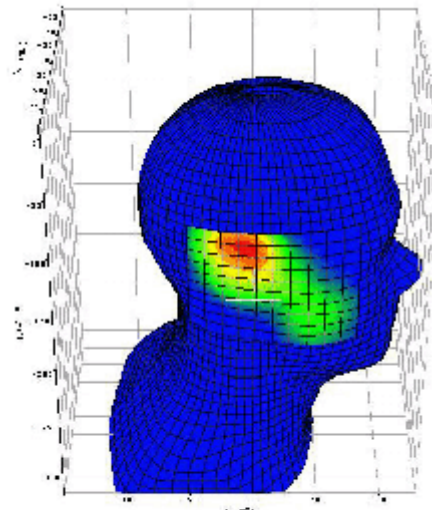
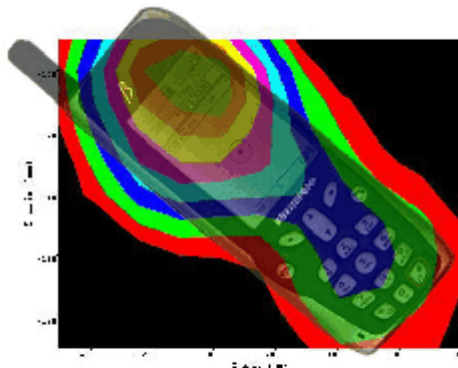
Test Position: Upright Phantom; Right Hand Section; Cheek Position; 900 mAH Battery
Test Date: June 14, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna OUT
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\hat{Y}_t = 41.2$; $\hat{o} = 1.44$
Pre Test Room Temperature: 24.3 C
Post Test Room Temperature: 24.4 C
Pre Test Simulant Liquid 24.7 C
Post Test Simulant Liquid 24.9 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 2%
SAR (1g): 0.329 W/Kg



1g volume averaged SAR= 0.329



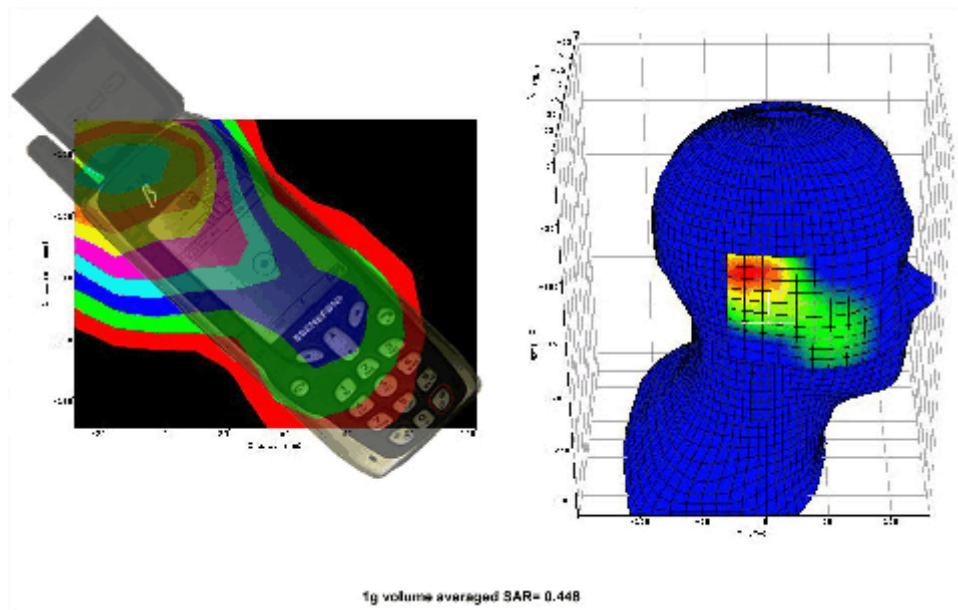
Test Position: Upright Phantom; Left Hand Section; Tilted Position; 1200 mAH Battery
Test Date: June 14, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$
Pre Test Room Temperature: 24.3 C
Post Test Room Temperature: 24.4 C
Pre Test Simulant Liquid 24.7 C
Post Test Simulant Liquid 24.9 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 2%
SAR (1g): 0.387 W/Kg



1g volume averaged SAR= 0.387

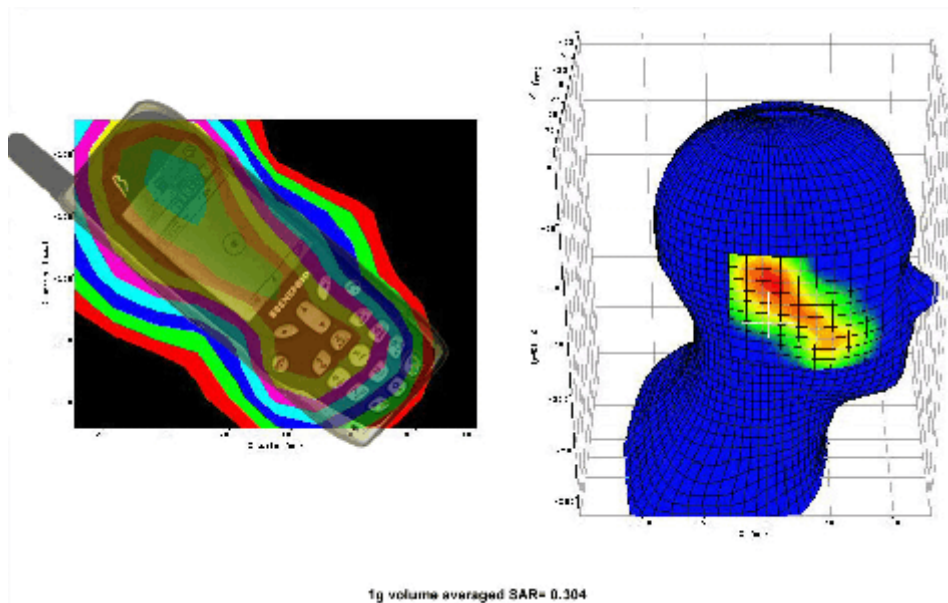


Test Position:	Upright Phantom; Left Hand Section; Tilted Position; 1200 mAH Battery
Test Date:	July 3, 2002
Antenna Position:	Fixed PCS Antenna and GPS Antenna OUT
Probe:	IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters:	1900 MHz Head: $\hat{Y}_t = 41.2$; $\phi = 1.44$
Pre Test Room Temperature:	24.4 C
Post Test Room Temperature:	24.7 C
Pre Test Simulant Liquid	24.6 C
Post Test Simulant Liquid	25 C
CH 660;	Crest Factor = 8(GSM)
SAR Drift	< 5%
SAR (1g):	0.448 W/Kg



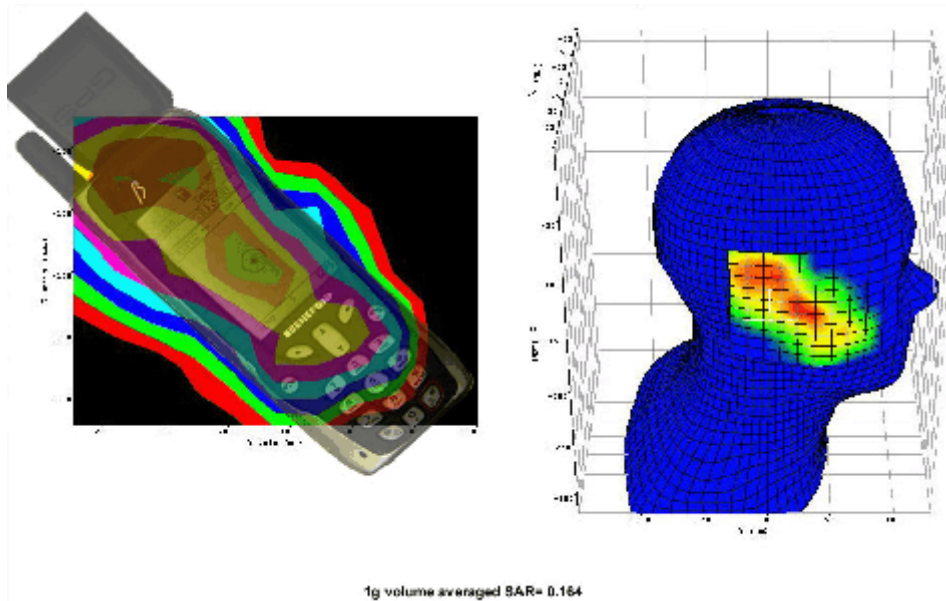


Test Position: Upright Phantom; Left Hand Section; Cheek Position; 1200 mAH Battery
Test Date: July 3, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$
Pre Test Room Temperature: 24.4 C
Post Test Room Temperature: 24.7 C
Pre Test Simulant Liquid 24.6 C
Post Test Simulant Liquid 25 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 5%
SAR (1g): 0.304 W/Kg



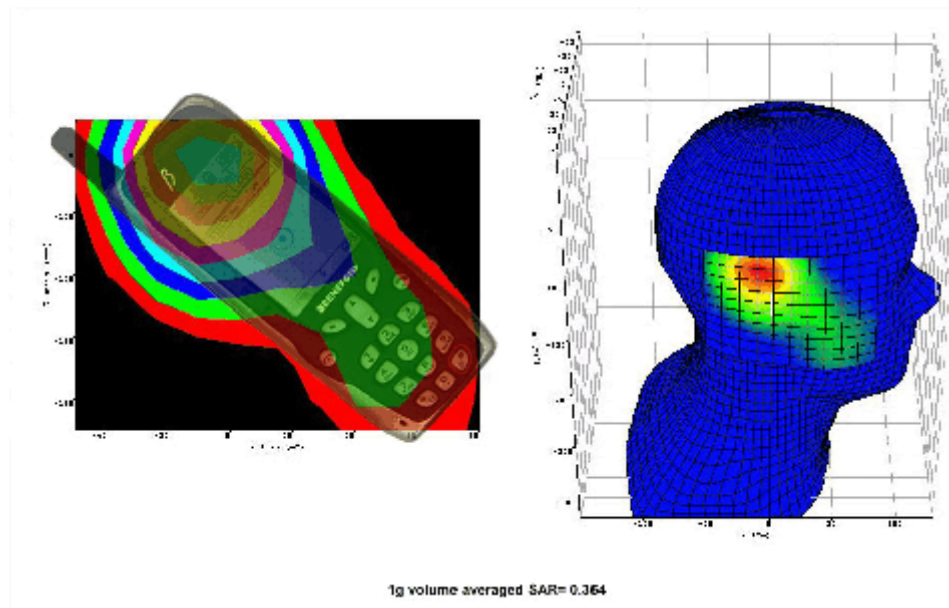


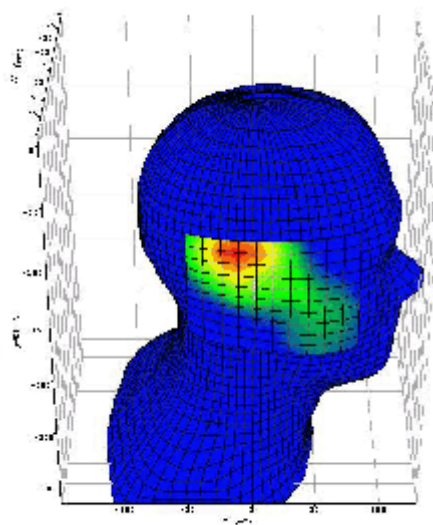
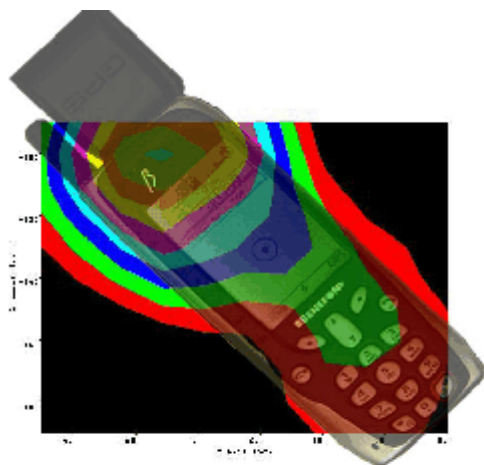
Test Position: Upright Phantom; Left Hand Section; Cheek Position; 1200 mAH Battery
Test Date: July 3, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna OUT
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\hat{Y}_t = 41.2$; $\phi = 1.44$
Pre Test Room Temperature: 24.4 C
Post Test Room Temperature: 24.7 C
Pre Test Simulant Liquid 24.6 C
Post Test Simulant Liquid 25 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 5%
SAR (1g): 0.164 W/Kg





Test Position: Upright Phantom; Left Hand Section; Tilted Position; 900 mAH Battery
Test Date: July 3, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\phi = 1.44$
Pre Test Room Temperature: 24.4 C
Post Test Room Temperature: 24.7 C
Pre Test Simulant Liquid 24.6 C
Post Test Simulant Liquid 25 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 5%
SAR (1g): 0.354 W/Kg

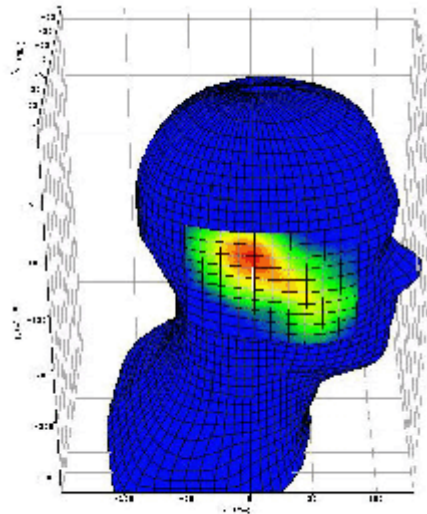
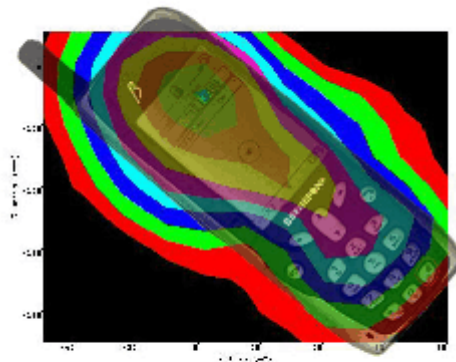


**Test Position:****Upright Phantom; Left Hand Section; Tilted Position; 900 mAH Battery****Test Date:****July 3, 2002****Antenna Position:****Fixed PCS Antenna and GPS Antenna OUT****Probe:****IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002****Med. Parameters:****1900 MHz Head: $\hat{Y}_t = 41.2$; $\phi = 1.44$** **Pre Test Room Temperature:****24.4 C****Post Test Room Temperature:****24.7 C****Pre Test Simulant Liquid****24.6 C****Post Test Simulant Liquid****25 C****CH 660;****Crest Factor = 8(GSM)****SAR Drift****< 5%****SAR (1g):****0.391 W/Kg**

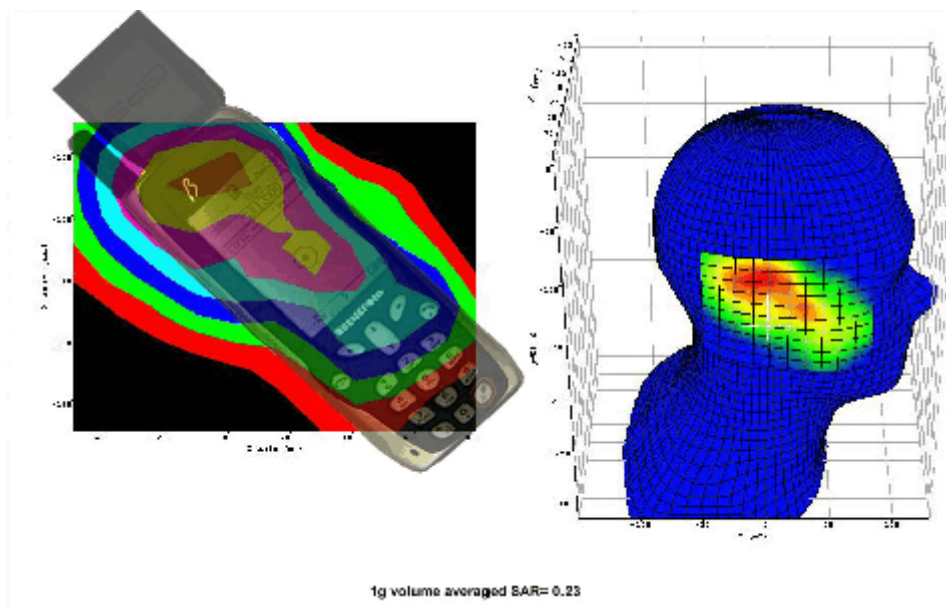
1g volume averaged SAR= 0.391



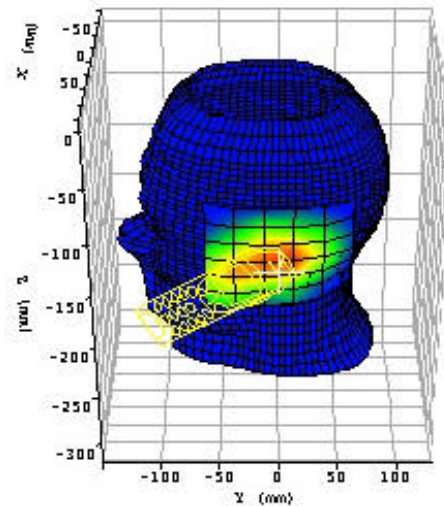
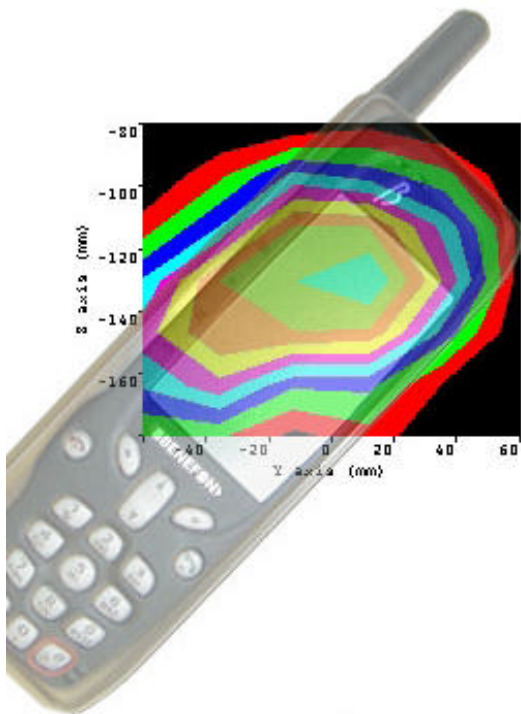
Test Position: Upright Phantom; Left Hand Section; Cheek Position; 900 mAH Battery
Test Date: July 3, 2002
Antenna Position: Fixed PCS Antenna and GPS Antenna IN
Probe: IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002
Med. Parameters: 1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$
Pre Test Room Temperature: 24.4 C
Post Test Room Temperature: 24.7 C
Pre Test Simulant Liquid: 24.6 C
Post Test Simulant Liquid: 25 C
CH 660; Crest Factor = 8(GSM)
SAR Drift < 5%
SAR (1g): 0.274 W/Kg



1g volume averaged SAR= 0.274

**Test Position:****Test Date:****Antenna Position:****Probe:****Med. Parameters:****Pre Test Room Temperature:****Post Test Room Temperature:****Pre Test Simulant Liquid****Post Test Simulant Liquid****CH 660;****SAR Drift****SAR (1g):****Upright Phantom; Left Hand Section; Cheek Position; 900 mAH Battery****July 3, 2002****Fixed PCS Antenna and GPS Antenna OUT****IXP-050/SN 0082 – SARf(0.51, 0.53, 0.53) Probe Cal Date 03/2002****1900 MHz Head: $\bar{Y}_t = 41.2$; $\sigma = 1.44$** **24.4 C****24.7 C****24.6 C****25 C****Crest Factor = 8(GSM)****< 5%****0.230 W/Kg**



**Test Position:****Upright Phantom; Right Hand Section; Cheek Position; 900 mAH Battery****Test Date:****Dec. 27, 2002****Antenna Position:****Fixed PCS Antenna and GPS Antenna IN****Probe:****IXP-050/SN 0122 – SARf(0.673, 0.673, 0.673) Probe Cal Date 10/2002****Med. Parameters:****1900 MHz Head: $\hat{\gamma}_t = 40.9$; $\hat{\sigma} = 1.42$** **Pre Test Room Temperature:****24.3 C****Post Test Room Temperature:****24.4 C****Pre Test Simulant Liquid****24.7 C****Post Test Simulant Liquid****24.9 C****CH 660;****Crest Factor = 8(GSM)****SAR Drift****< 5%****SAR (1g):****0.664 W/Kg**

**Test Position:****Test Date:****Antenna Position:****Probe:****Med. Parameters:****Pre Test Room Temperature:****Post Test Room Temperature:****Pre Test Simulant Liquid****Post Test Simulant Liquid****CH 660;****SAR Drift****SAR (1g):****Upright Phantom; Right Hand Section; Tilted Position; 900 mAH Battery****Dec. 27, 2002****Fixed PCS Antenna and GPS Antenna IN****IXP-050/SN 0122 – SARf(0.673, 0.673, 0.673) Probe Cal Date 10/2002****1900 MHz Head: $\hat{Y}_r = 40.9$; $\phi = 1.42$** **24.3 C****24.4 C****24.7 C****24.9 C****Crest Factor = 8(GSM)****< 2%****0.778 W/Kg**