



A Test Lab Techno. Corp. RF Testing Lab

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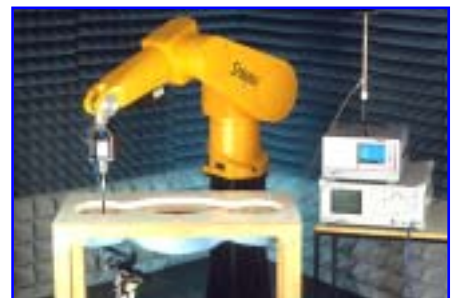


SAR EVALUATION REPORT

Test Report No. :	04-0517-S-00-02-02
Applicant :	Quanta Computer Inc. (廣達電腦股份有限公司)
Trade Name :	Philips
Model Name :	Philips 568
EUT Type :	GSM Mobile Phone With GPRS
Dates of Test :	Sep. 3,6~7, 2004 Oct. 19-20, 2004
Test Environment :	Ambient Temperature : 22 ± 2 Relative Humidity : < 60%
Test Specification :	ANSI/IEEE Std. C95.1-1992 IEEE Std. P1528-200X
Max. SAR :	0.527 W/kg PCS 1900 Head SAR 0.236 W/kg PCS 1900 Body SAR 0.569 W/kg GPRS PCS 1900 Body SAR

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1. Description of Equipment Under Test (EUT)

Applicant :**Quanta Computer Inc.**

No. 188, Wen Hwa 2nd Rd., Kuei Shan Hsiang, Tao Yuan Shien, Taiwan, R.O.C

EUT Type : GSM Mobile Phone With GPRS
Trade Name : Philips
Model Name : Philips 568
FCC ID : HFS-CT5688
Test Device : Production Unit
Tx Frequency : 1850 – 1909.8 MHz (PCS)
Rx Frequency : 1930 – 1989.8 MHz (PCS)
Max. RF Output Power : 0.832 W PCS 1900 (29.2 dBm - Conducted)
0.79 W PCS 1900 (29.0 dBm - Conducted)
0.79 W GPRS PCS 1900 (29.0 dBm - Conducted)
Max. SAR Measurement : 0.527 W/kg PCS 1900 Head SAR
0.236 W/kg PCS 1900 Body SAR
0.569 W/kg GPRS PCS 1900 Body SAR
Antenna Type : Internal Type
Device Category : Identical Prototype
RF Exposure Environment : General Population / Uncontrolled
Mobile Phone IMEI No. : 354054000000488
GPRS Class : B
GPRS Multislot Class : 10
Battery Option : Standard
Application Type : Certification

This wireless portable device 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 and had been tested in accordance with the measurement procedures specified in IEEE Std. P1528-200X.

**Figure 1. EUT Photo**

2. Introduction

The ATL Techno. Corp. RF Testing Laboratory has performed measurements of the maximum potential exposure to the user of **Quanta Computer Inc. Trade Name : Philips Model(s) : Philips 568**. The test procedures, as described in American National Standards, Institute C95.1 – 1992 [1] , FCC OET 65 Supplemental C - June 2001 were employed and they specify the maximum exposure limit of 1.6mW/g as averaged over any 1 gram of tissue for portable devices being used within 20cm of the used in the uncontrolled environment. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the equipment used are included within this test report.

3. SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dw) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Figure 2).

$$\text{SAR} = \frac{d}{dt} \left(\frac{dw}{dm} \right) = \frac{d}{dt} \left(\frac{dw}{\rho dv} \right)$$

Figure 2. SAR Mathematical Equation

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

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

Where :

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m³)

E = 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 [2]

4. SAR Measurement Setup

These measurements were performed with the automated near-field scanning system DASY4 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 $\pm 0.025\text{mm}$. 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 (length = 300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Measurement Server is based on a PC/104 CPU board with a 166MHz low-power Pentium, 32MB chipdisk and 64MB RAM. The necessary circuits for communication with either the DAE3 electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board. The PC consists of the Intel Pentium 4 2.4GHz computer with Windows2000 system and SAR Measurement Software DASY4, Post Processor SEMCAD, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection...etc. is connected to the Electro-optical converter (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the Measurement Server.

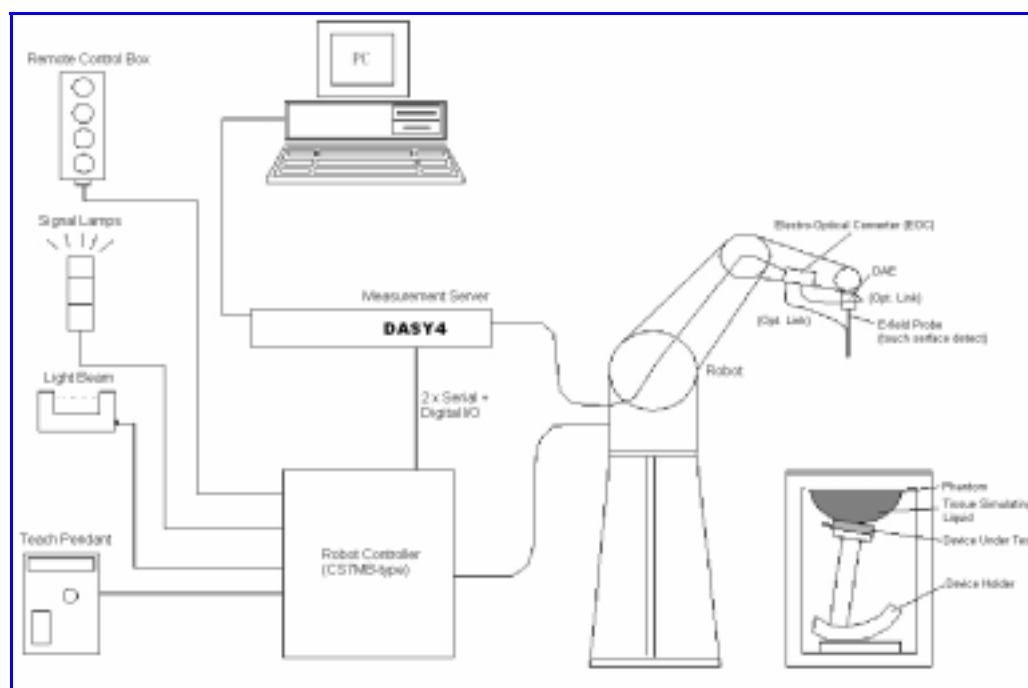


Figure 3. SAR Lab Test Measurement Setup

The DAE3 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [3] .

5. System Components

5.1 DASY4 E-Field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration [3] 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 DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped when reaching the maximum.

5.1.1 ET3DV6 E-Field Probe Specification

Construction	Symmetrical design with triangular core
	Built-in optical fiber for surface detection
	System (ET3DV6 only)
	Built-in shielding against static charges
	PEEK enclosure material (resistant to organic solvents, e.q., glycol)
Calibration	In air from 10 MHz to 2.5 GHz
	In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz, 1.8GHz and 2.45GHz (accuracy $\pm 8\%$)
	Calibration for other liquids and frequencies upon request
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 Range	5 μ W/g to > 100mW/g; Linearity: ± 0.2 dB
Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surface(ET3DV6 only)
Dimensions	Overall length: 330mm
	Tip length: 16mm
	Body diameter: 12mm
	Tip diameter: 6.8mm
	Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 3GHz
	Compliance tests of mobile phones
	Fast automatic scanning in arbitrary phantoms



**Figure 4.
ET3DV6 E-field Probe**



**Figure 5.
Probe setup on robot**

5.1.2 ET3DV6 E-Field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure described in [4] with accuracy better than $\pm 10\%$. The spherical isotropy was evaluated with the procedure described in [5] and found to be better than $\pm 0.25\text{dB}$. The sensitivity parameters (NormX, NormY, and 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 below 1GHz, and in a wave guide above 1GHz 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 a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$\text{SAR} = C \frac{\Delta T}{\Delta t}$$

Where :

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

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

Where :

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m³).

5.2 Data Acquisition Electronic (DAE) System

Cell Controller

Processor : Intel Pentium 4
Clock Speed : 2.4GHz
Operating System : Windows 2000 Professional

Data Converter

Features : Signal Amplifier, multiplexer, A/D converter, and control logic
Software : DASY4 v4.3 (Build 22) & SEMCAD v1.8 (Build 127)
Connecting Lines : Optical downlink for data and status info
Optical uplink for commands and clock

5.3 Robot

Positioner : Stäubli Unimation Corp. Robot Model: RX90L

Repeatability : ± 0.025 mm

No. of Axis : 6

5.4 Measurement Server

Processor : PC/104 with a 166MHz low-power Pentium

I/O-board : Link to DAE3

16-bit A/D converter for surface detection system

Digital I/O interface

Serial link to robot

Direct emergency stop output for robot

5.5 Device Holder for Transmitters

In combination with the SAM Twin Phantom V4.0, the Mounting Device (POM) 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 repeat ably positioned according to the IEEE SCC34-SC2 and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, and 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 [6] . To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Larger DUT cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values. Therefore those devices are normally only tested at the flat part of the SAM.



Figure 6. Device Holder

5.6 Phantom - SAM v4.0

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. 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 evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.



Figure 7. SAM Twin Phantom

Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	810×1000×500 mm (H×L×W)

Table 1. Specification of SAM v4.0

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY4 software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension .DA4. The postprocessing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

5.7.2 Data Evaluation

The DASY4 postprocessing software (SEMCAD) 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 parameters :	- Sensitivity	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	dcp _i
Device parameters :	- Frequency	f
	- Crest factor	cf
Media parameters :	- Conductivity	
	- Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter 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 :

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with V_i = compensated signal of channel i ($i = x, y, z$)
 U_i = 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 :

$$H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

with V_i = compensated signal of channel i ($i = x, y, z$)

$Norm_i$ = sensor sensitivity of channel i ($i = x, y, z$)

$\mu V/(V/m)^2$ for E-field Probes

$ConvF$ = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

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

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in g/cm³

*** Note :** that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

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

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

6. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Filed Probe	ET3DV6	1530	Sep. 1, 2004	Sep. 1, 2005
SPEAG	900MHz System Validation Kit	D900V2	172	Jan. 13, 2004	Jan. 13, 2005
SPEAG	1800MHz System Validation Kit	D1800V2	2d057	Feb. 9, 2004	Feb. 9, 2005
SPEAG	Data Acquisition Electronics	DAE3	393	Jan. 8, 2004	Jan. 8, 2005
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	Phantom	SAM V4.0	1009	NCR	NCR
SPEAG	Robot	Staubli RX90L	F00/589B1/A/01	NCR	NCR
SPEAG	Software	DASY4 V4.2 Build 12	N/A	NCR	NCR
SPEAG	Software	SEMCAD V1.8 Build 93	N/A	NCR	NCR
SPEAG	Measurement Server	SE UMS 001 BA	1021	NCR	NCR
Agilent	Wireless Communication Test Set	8960(E5515C)	GB41450409	Nov. 6, 2002	Nov. 6, 2004
Agilent	Dielectric Probe Kit	85070C	US99360094	NCR	NCR
Agilent	Power Meter	E4418C	GB40206143	May 18, 2004	May 17, 2005
Agilent	Power Sensor	8481H	3318A0779	July 3, 2004	July 3, 2005
Agilent	Signal Generator	8648C	3847A05201	July 13, 2004	July 13, 2005
Agilent	Dual Directional Coupler	778D	50334	NCR	NCR
Mini-Circuits	Power Amplifier	ZHL-42W-SMA	D111103#5	NCR	NCR

Table 2. Test Equipment List

7. Tissue Simulating Liquids

The Head and Muscle mixtures consist of a viscous gel using hydroxethylcellulouse (HEC) gelling agent and saline solution. Preservation with a bacteriacide is added and visual inspection is made to ensure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8720ES Network Analyzer.

INGREDIENT	FREQUENCY			
	HSL900 – Head (800-1000MHz)	MSL900 - Muscle (800-1000MHz)	HSL1800 - Head (1700-2000MHz)	MSL1800-Muscle (1700-2000MHz)
Water	51.07 %	65.45 %	54.88 %	69.91 %
HEC	0.23 %	0.00 %	0 %	0 %
Sugar	47.31 %	34.31 %	0 %	0 %
Preventol	0.24 %	0.10 %	0 %	0 %
Salt	1.15 %	0.62 %	0.21 %	0.13 %
Glycol monobutyl	0 %	0 %	44.91 %	29.96 %
Dielectric Parameters at 22°	f = 900 MHz $\epsilon_r = 41.0, \sigma = 0.96 \text{ S/m}$	f = 900 MHz $\epsilon_r = 56.5, \sigma = 0.99 \text{ S/m}$	f = 1800 MHz $\epsilon_r = 40.5, \sigma = 1.35 \text{ S/m}$	f = 1800 MHz $\epsilon_r = 54.6, \sigma = 1.39 \text{ S/m}$
	f = 835 MHz $\epsilon_r = 42.0, \sigma = 0.89 \text{ S/m}$	f = 835 MHz $\epsilon_r = 56.6, \sigma = 0.93 \text{ S/m}$	f = 1900 MHz $\epsilon_r = 39.8, \sigma = 1.42 \text{ S/m}$	f = 1900 MHz $\epsilon_r = 54.2, \sigma = 1.50 \text{ S/m}$

Table 3. Recipes for Head & Muscle Tissue Simulating Liquids

IEEE SCC-34/SC-2 in P1528 recommended Tissue Dielectric Parameters

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equation and extrapolated according to the head parameter specified in P1528.

Target Frequency	Head		Body	
(MHz)	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 - 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00
(ϵ_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m ³)				

Table 4. Tissue dielectric parameters for head and body phantoms

7.1 Liquid Confirmation

7.1.1 Parameters

Liquid Verify								
Ambient Temperature : 22±2 ; Relative Humidity : < 60 %								
Liquid Tyep	Frequency	Temp ()	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)	Measured Date
1900 MHz Head	1800	21.6	r	40	39.13	2.17%	±5 %	Sep. 2, 2004
				1.4	1.35	3.57%	±5 %	
	1851	21.6	r	40	38.878	2.81%	±5 %	
				1.4	1.4	0.00%	±5 %	
	1880	21.6	r	40	38.8	3.00%	±5 %	
				1.4	1.43	2.14%	±5 %	
1900 MHz Body	1800	21.7	r	53.3	53.29	0.02%	±5 %	Oct.19, 2004
				1.52	1.45	4.75%	±5 %	
	1851	21.7	r	53.3	53.14	0.29%	±5 %	
				1.52	1.50	1.36%	±5 %	
	1880	21.7	r	53.3	53.03	0.51%	±5 %	
				1.52	1.52	0.17%	±5 %	
	1910	21.7	r	53.3	53.07	0.43%	±5 %	
				1.52	1.56	2.62%	±5 %	

Table 5. Measured Tissue dielectric parameters for head and body phantoms

7.1.2 Liquid Depth

The liquid level was during measurement 15cm \pm 0.5cm.

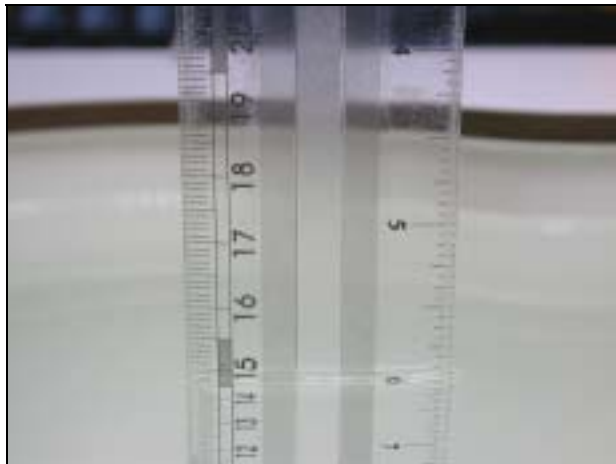


Figure 8. Head-Tissue-Simulating-Liquid 1900MHz



Figure 9. Body-Muscle-Tissue-Simulating-Liquid 1900MHz

8. Measurement Process

8.1 Device and Test Conditions

The Test Device was provided by **Quanta Computer Inc.** for this evaluation. The spatial peak SAR values were assessed for the lowest, middle and highest channels defined by **GSM1900 (PCS)** (Ch512=1850.2MHz, Ch661=1880.00MHz, Ch810=1909.8MHz) systems. The device was put in operation using the **Agilent 8960 wireless Communication Test Set**. The antenna(s), battery and accessories shall be those specified by the manufacturer. The battery shall be fully charged before each measurement and there shall be no external connections.

8.2 System Performance Check

8.2.1 Symmetric Dipoles for System Validation

Construction	Symmetrical dipole with 1/4 balun enables measurement of feed point impedance with NWA matched for use near flat phantoms filled with brain simulating solutions Includes distance holder and tripod adaptor Calibration Calibrated SAR value for specified position and input power at the flat phantom in brain simulating solutions.
Frequency	900, 1800, 2450MHz
Return Loss	> 20 dB at specified validation position
Power Capability	> 100 W (f < 1GHz); > 40 W (f > 1GHz)
Options	Dipoles for other frequencies or solutions and other calibration conditions are available upon request
Dimensions	D900V2 : dipole length 149 mm; overall height 330 mm D1800V2 : dipole length 72 mm; overall height 300 mm D2450V2 : dipole length 51.5 mm; overall height 300 mm



Figure 10. Validation Kit

8.2.2 Validation

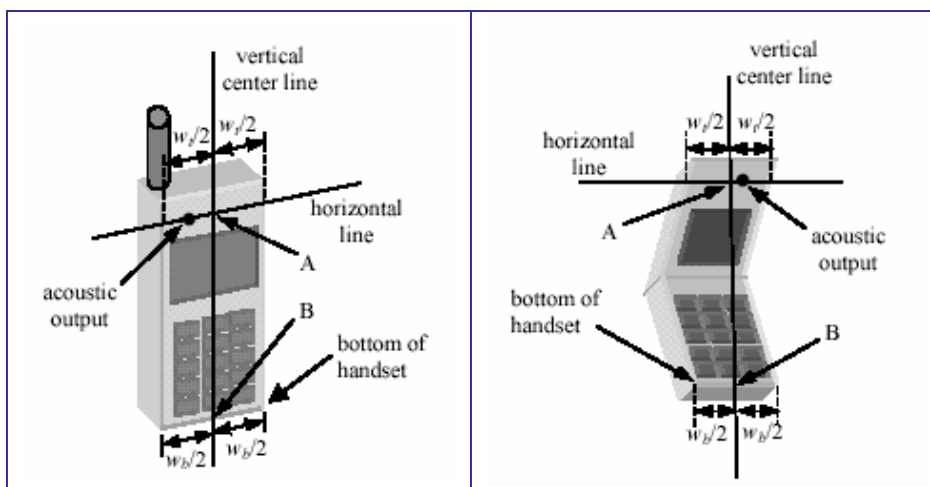
Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of $\pm 10\%$. The validation was performed at 900MHz and 1800MHz.

Validation kit		Mixture Type		SAR _{1g} [mW/g]	SAR _{10g} [mW/g]	Date of Calibration	
D1800V2-SN2d057		Head		39.6	21.08	Feb. 09, 2004	
D1800V2-SN2d057		Body		39.8	21.56	Feb. 09, 2004	
Frequency (MHz)	Power (dBm)	SAR _{1g} (mW/g)	SAR _{10g} (mW/g)	Drift (dB)	Difference percentage		Date
					1g	10g	
1800 (Head)	250mW	9.3	4.94	0.0	-6.1%	-6.3%	Sep. 3, 6~7, 2004
	Normalize to 1 Watt	37.2	19.76				
1800 (Body)	250mW	9.71	5.18	0.0	-2.4%	-3.9%	Oct. 19-20, 2004
	Normalize to 1 Watt	38.84	20.72				

8.3 Dosimetric Assessment Setup

8.3.1 Handset Test Position - Head Position

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR :



**Figure 11. Handset vertical and horizontal Reference Lines
- Fixed Case & Clam Shell**

- 1) "Cheek/Touch Position" — the device is brought toward the mouth of the head phantom by pivoting against the "ear reference point" or along the "N-F" line for the SCC-34/SC-2 head phantom.

This test position is established:

i) When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

ii) (Or) when any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms — when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touch the cheek of the phantom or breaks its last contact from the ear spacer.

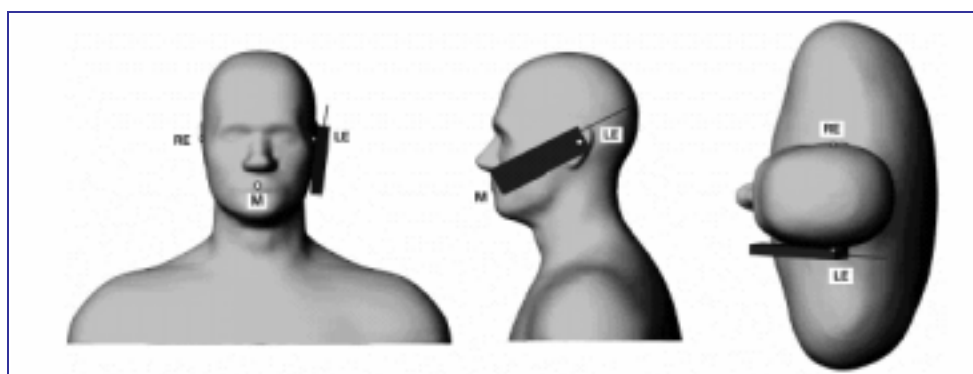


Figure 12. Phone Position 1, Cheek or Touch Position

- 2) "Ear/Tilt Position" — With the handset aligned in the "Cheek/Touch Position":

i) If the earpiece of the handset is not in full contact with the phantom's ear spacer (in the "Cheek/Touch position") and the peak SAR location for the "Cheek/Touch" position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the "initial ear position" by rotation it away from the mouth until the earpiece is in full contact with the ear spacer.

ii) (Otherwise) the handset should be moved (translated) away from the cheek perpendicular to the line passes through both "ear reference points" (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3cm. While it is in this position, the handset is tilted away from the mouth with respect to the "test device reference point" by 15°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both "ear reference points" until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

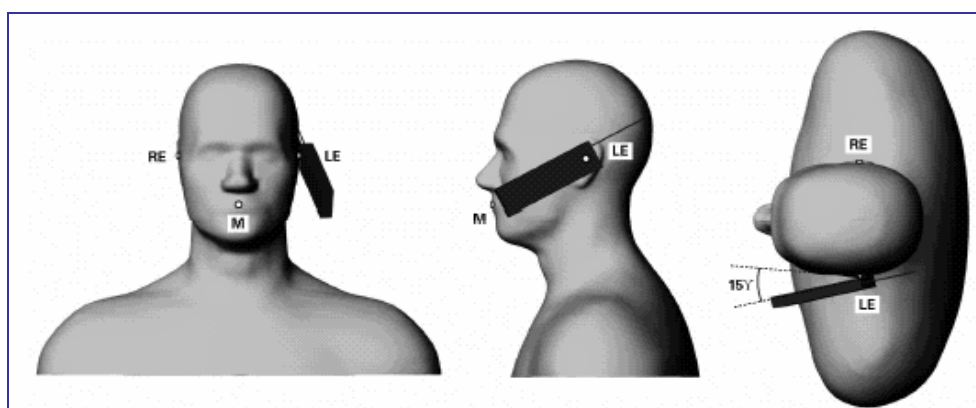


Figure 13. Phone Position 2, Tilted Position

8.3.2 Handset Test Position – Body-Worn

Body-Worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances.

For this test :

The EUT is placed into the holster/belt clip and the holster is positioned against the surface of the phantom in a normal operating position.

Since this EUT doesn't supply any body-worn accessory to the end user, a distance of 1.5 cm was tested to confirm the necessary "minimum SAR separation distance".

(* **Note** : this distance includes the 2 mm phantom shell thickness.)

8.3.3 Measurement Procedures

The evaluation was performed with the following procedures :

Surface Check : A surface check job gathers data used with optical surface detection. It determines the distance from the phantom surface where the reflection from the optical detector has its peak. Any following measurement jobs using optical surface detection will then rely on this value. The surface check performs its search a specified number of times, so that the repeatability can be verified.

Reference : The reference job measures the field at a specified reference position, at 4 mm from the selected section's grid reference point.

Area Scan : The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines can find the maximum locations even in relatively coarse grids. When an area scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. Any following zoom scan within the same procedure will then perform fine scans around these maxima. The area covered the entire dimension of the EUT and the horizontal grid spacing was 15 mm × 15 mm.

Zoom Scan : Zoom scans are used to assess the highest averaged SAR for cubic averaging volumes with 1 g and 10 g of simulated tissue. The zoom scan measures 5 x 5 x 7 points in a 32 x 32 x 30 mm cube whose base faces are centered around the maxima returned from a preceding area scan within the same procedure.

Drift : The drift job measures the field at the same location as the most recent reference job within the same procedure, with the same settings. The drift measurement gives the field difference in dB from the last reference measurement. Several drift measurements are possible for each reference measurement. This allows monitoring of the power drift of the device in the batch process. If the value changed by more than 5%, the evaluation was repeated.

8.4 Spatial Peak SAR Evaluation

The DASY4 software includes all numerical procedures necessary to evaluate the spatial peak SAR values. Based on the Draft: SCC-34, SC-2, WG-2 - Computational Dosimetry, IEEE P1529/D0.0 (Draft Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) Associated with the Use of Wireless Handsets - Computational Techniques), a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a "cube" measurement in a volume of (32x32x30)mm³ (5x5x7 points). The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan. If the 10g cube or both cubes are not entirely inside the measured volumes, the system issues a warning regarding the evaluated spatial peak values within the Postprocessing engine (SEMCAD). This means that if the measured volume is shifted, higher values might be possible. To get the correct values you can use a finer measurement grid for the area scan. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location.

The entire evaluation of the spatial peak values is performed within the Postprocessing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into three stages:

Interpolation and Extrapolation

The probe is calibrated at the center of the dipole sensors which is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated.

In DASY4, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and SAR extrapolation routines. The interpolation, Maxima Search and extrapolation routines are all based on the modified Quadratic Shepard's method [7].

9. Measurement Uncertainty

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than $\pm 27\%$ [8] .

According to ANSI/IEEE C95.3 [9] , the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of ± 1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ± 2 dB can be expected.

According to CENELEC [10] , typical worst-case uncertainty of field measurements is ± 5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ± 3 dB.

Uncertainty Component	Uncertainty Value	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	Standard Uncertainty $\pm 1\%$ (1-g)	Standard Uncertainty $\pm 1\%$ (10-g)	v_i or V_{eff}
Measurement System								
Probe Calibration ($k=1$)	4.8	Normal	1	1	1	4.8	4.8	∞
Axial Isotropy	4.7	Rectangular	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	1.9	1.9	∞
Hemispherical Isotropy	9.6	Rectangular	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	3.9	3.9	∞
Boundary Effect	0.8	Rectangular	$\sqrt{3}$	1	1	0.5	0.5	∞
Linearity	4.7	Rectangular	$\sqrt{3}$	1	1	2.7	2.7	∞
System Detection Limit	1.0	Rectangular	$\sqrt{3}$	1	1	0.6	0.6	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	∞
Response Time	1.0	Rectangular	$\sqrt{3}$	1	1	0.6	0.6	∞
Integration Time	1.9	Rectangular	$\sqrt{3}$	1	1	1.1	1.1	∞
RF Ambient Conditions	3.0	Rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	1.4	Rectangular	$\sqrt{3}$	1	1	0.8	0.8	∞
Probe Positioning with respect to Phantom Shell	2.9	Rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	4.5	Rectangular	$\sqrt{3}$	1	1	2.6	2.6	∞
Test sample Related								
Test sample Positioning	2.9	Normal	1	1	1	2.9	2.9	145
Device Holder Uncertainty	3.6	Normal	1	1	1	3.6	3.6	5
Output Power Variation – SAR drift measurement	5.0	Rectangular	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4.0	Rectangular	$\sqrt{3}$	1	1	2.3	2.3	∞
Liquid Conductivity – deviation from target values	5.0	Rectangular	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
Liquid Conductivity – measurement uncertainty	5.0	Normal	1	0.64	0.43	3.2	2.2	∞
Liquid Permittivity - deviation from target values	5.0	Rectangular	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	5.0	Normal	1	0.6	0.49	3.0	2.5	∞
Combined standard uncertainty		RSS				11.2	10.7	388
Expanded uncertainty (95% CONFIDENCE LEVEL)		$k=2$				22.4	21.5	

Table 6. Uncertainty Budget of DASY

10. SAR Test Results Summary

10.1 PCS 1900 MHz SAR Test Results – Head

Ambient :

Temperature () :

22 ± 2

Relative HUMIDITY (%) :

< 60

Liquid :

Mixture Type :

HSL1900

Liquid Temperature () :

23.1

Dielectric Constant :

38.8

Depth of liquid (cm) :

15

Conductivity :

1.43

Measurement :

Crest Factor :

8.3

Probe S/N :

1531

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	SAR _{1g} [mW/g]	Power Drift	Remark
MHz	Ch.							
1850.2	512	PCS	28.8	Right-Cheek	Internal	0.464	0	-
1880.0	661	PCS	29	Right-Cheek	Internal	0.527	-0.001	-
1909.8	810	PCS	28.8	Right-Cheek	Internal	0.44	0	-
1850.2	512	PCS	28.7	Right-Tilted	Internal	0.4	0	-
1880.0	661	PCS	29.2	Right-Tilted	Internal	0.405	0	-
1909.8	810	PCS	28.8	Right-Tilted	Internal	0.346	-0.1	-
1850.2	512	PCS	28.6	Left-Cheek	Internal	0.292	0	-
1880.0	661	PCS	29.1	Left-Cheek	Internal	0.301	0	-
1909.8	810	PCS	28.8	Left-Cheek	Internal	0.262	-0.1	-
1850.2	512	PCS	28.9	Left-Tilted	Internal	0.293	-0.004	-
1880.0	661	PCS	29	Left-Tilted	Internal	0.304	0	-
1909.8	810	PCS	28.9	Left-Tilted	Internal	0.243	-0.1	-
ANSI / IEEE C95.1 1992 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population						Brain 1.6 W/kg (mW/g) Averaged over 1 gram		



Figure 12. Left Head SAR Test Setup (Cheek)



Figure 13. Left Head SAR Test Setup (Tilted)



Figure 14. Right Head SAR Test Setup (Cheek)



Figure 15. Right Head SAR Test Setup (Tilted)

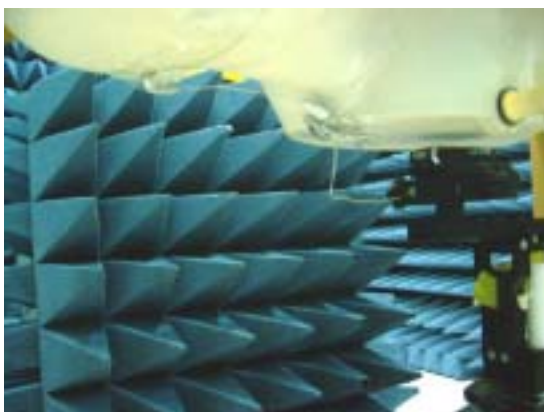


Figure 16. Body SAR Test Setup (Flat Section)

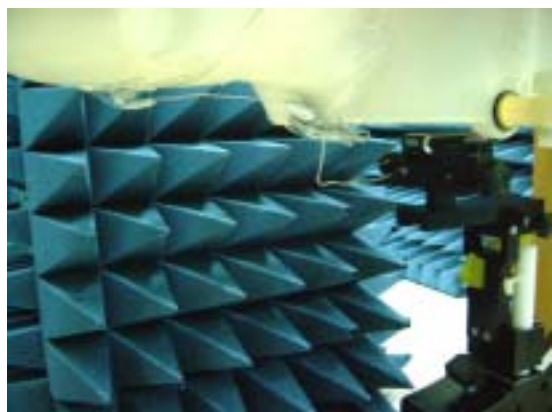


Figure 17. Body SAR Test Setup (Flat Section)

10.2 GPRS (PCS 1900) SAR Test Results – Body

Ambient :

Temperature () :

22 ± 2

Relative HUMIDITY (%) :

< 60

Liquid :

Mixture Type :

(MSL 1900)

Liquid Temperature () :

22.3

Dielectric Constant :

53.1

Depth of liquid (cm) :

15

Conductivity :

1.5

Measurement :

Crest Factor :

8.3/4.2

Probe S/N :

1530

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	SAR _{1g} [mW/g]	Power Drift	Remark
MHz	Ch.							
1850.2	512	PCS	28.8	Flat	Internal	0.236	0	Earphone
1880.0	661	PCS	29	Flat	Internal	0.22	0	Earphone
1909.8	810	PCS	28.9	Flat	Internal	0.201	0	Earphone
1850.2	512	PCS	28.8	Flat	Internal	0.569	-0.1	Earphone With GPRS
1880.0	661	PCS	29	Flat	Internal	0.509	-0.1	Earphone With GPRS
1909.8	810	PCS	28.9	Flat	Internal	0.444	0	Earphone With GPRS
ANSI / IEEE C95.1 1992 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population						Brain 1.6 W/kg (mW/g) Averaged over 1 gram		

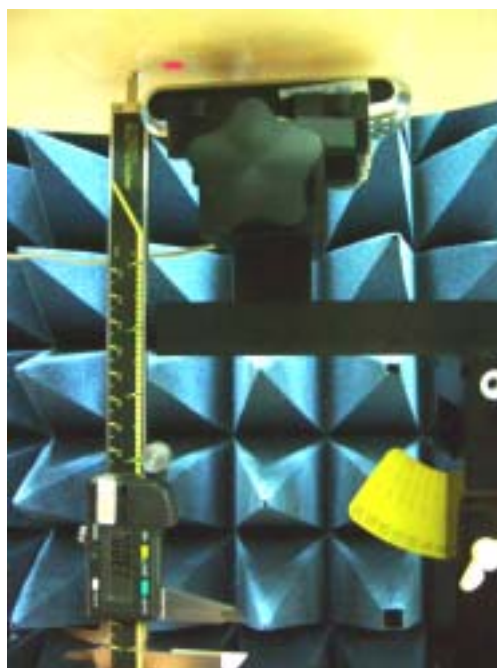


Figure 18. Body SAR Test Setup (Flat Section)

10.3 ANSI/IEEE C95.1 – 1992 RF Exposure Limit

Human Exposure	Population	Occupational
	Uncontrolled Exposure (W/kg) or (mW/g)	Controlled Exposure (W/kg) or (mW/g)
Spatial Peak SAR* (Brain)	1.60	8.00
Spatial Peak SAR** (Whole Body)	0.08	0.40
Spatial Peak SAR*** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7. Safety Limits for Partial Body Exposure

Notes :

- * The Spatial Peak value of the SAR averaged over any 1 gram of tissue.
(defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
- ** The Spatial Average value of the SAR averaged over the whole – body.
- *** The Spatial Peak value of the SAR averaged over any 10 grams of tissue.
(defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Population / Uncontrolled Environments : are defined as locations where there is the exposure of individuals 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 persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

11. Conclusion

The SAR test values found for the portable mobile phone **Quanta Computer Inc. Trade Name : Philips Model(s) : Philips 568** are below the maximum recommended level of 1.6 W/kg (mW/g).

12. References

- [1] ANSI/IEEE C95.1-1991, "American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300KHz to 100GHz", New York: IEEE, Aug. 1992.
- [2] NCRP, National Council on Radiation Protection and Measurements, "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields", NCRP report NO. 86, 1986.
- [3] T. Schmid, O. Egger, and N. Kuster, "Automatic E-field scanning system for dosimetric assessments", IEEE Transactions on Microwave Theory and Techniques, vol. 44, pp, 105-113, Jan. 1996.
- [4] K. Poković, T. Schmid, and N. Kuster, "Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequency", in ICECOM'97, Dubrovnik, October 15-17, 1997, pp.120-124.
- [5] K. Poković, T. Schmid, and N. Kuster, "E-field probe with improved isotropy in brain simulating liquids", in Proceedings of the ELMAR, Zadar, Croatia, 23-25 June, 1996, pp.172-175.
- [6] N. Kuster, and Q. Balzano, "Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz", IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [7] Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988 , pp. 139-148.
- [8] N. Kuster, R. Kastle, T. Schmid, "Dosimetric evaluation of mobile communications equipment with known precision", IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [9] ANSI/IEEE C95.3-1991, "IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave", New York: IEEE, Aug. 1992.
- [10] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), *Human Exposure to Electromagnetic Fields High-frequency: 10KHz-300GHz*, Jan. 1995.

Appendix A – System Performance Check

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 09:54:08

System Performance Check at 1900MHz

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d057

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Head 1900MHz Medium parameters used: $f = 1900$ MHz; $s = 1.45$ mho/m; $\epsilon_r = 38.7$;

Conductivity=1000 kg/m³ ;Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5, 5, 5); Calibrated: 9/19/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 1/8/2004
- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009
- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

System Performance Check at 1900MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 90.9 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 10.6 mW/g

System Performance Check at 1900MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

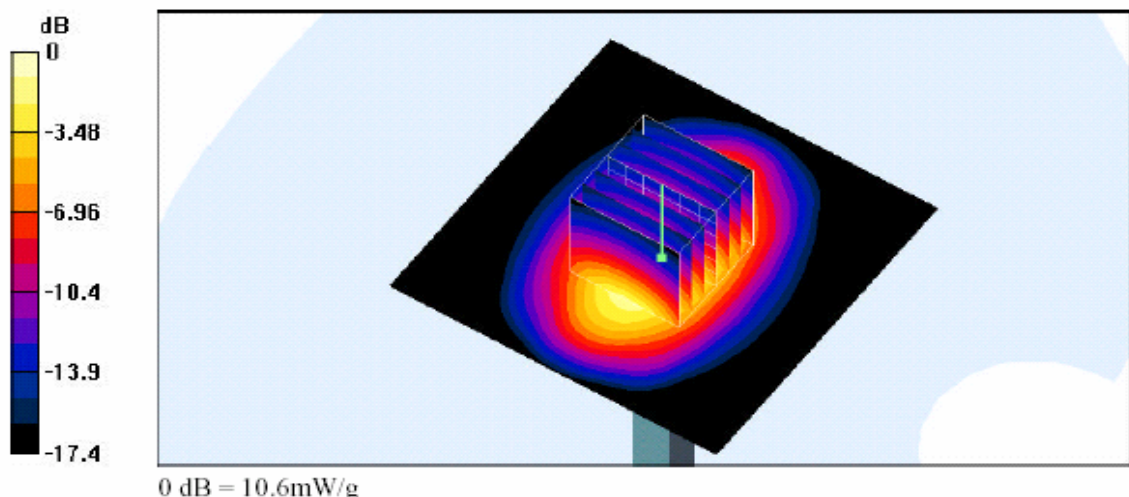
Peak SAR (extrapolated) = 15.9 W/kg

SAR(1 g) = 9.3 mW/g; SAR(10 g) = 4.94 mW/g

Reference Value = 90.9 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 10.6 mW/g



Head-Tissue-Simulating-Liquid 1800MHz

Date/Time: 10/19/04 20:00:43

Test Laboratory: A Test Lab Techno Corp.

System Performance Check at 1900MHz_Flat_20041019**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d057**

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Body 1900MHz Medium parameters used: $f = 1900$ MHz; $s = 1.55$ mho/m; $\epsilon_r = 53$;Conductivity=1000kg/m³; Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1530; ConvF(4.43, 4.43, 4.43); Calibrated: 9/1/2004

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.3 Build 22; Postprocessing SW: SEMCAD, V1.8 Build 127

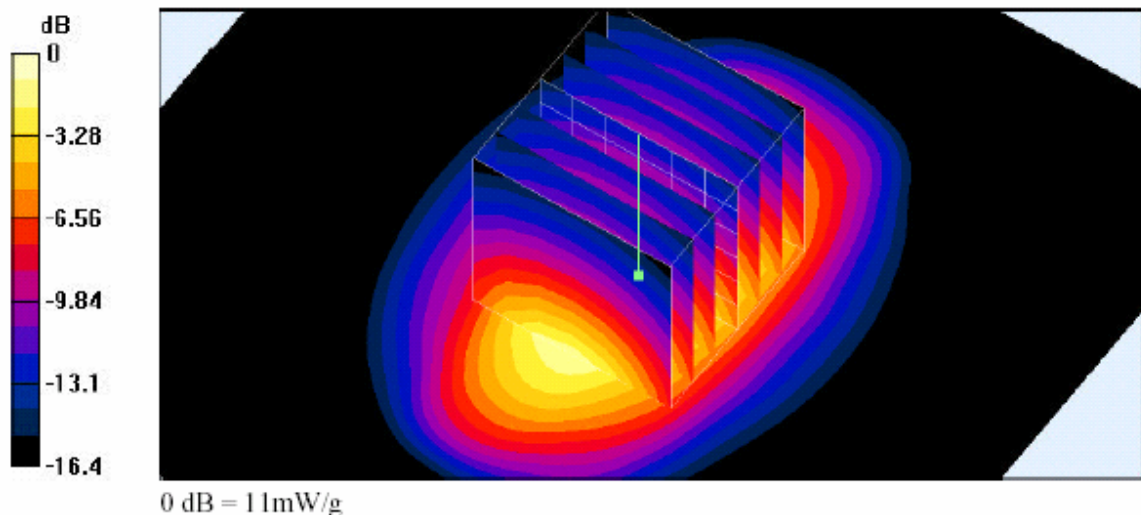
System Performance Check at 1900MHz/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (interpolated) = 11.2 mW/g**System Performance Check at 1900MHz/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 177.5 V/m; Power Drift = -0.0 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.71 mW/g; SAR(10 g) = 5.18 mW/g

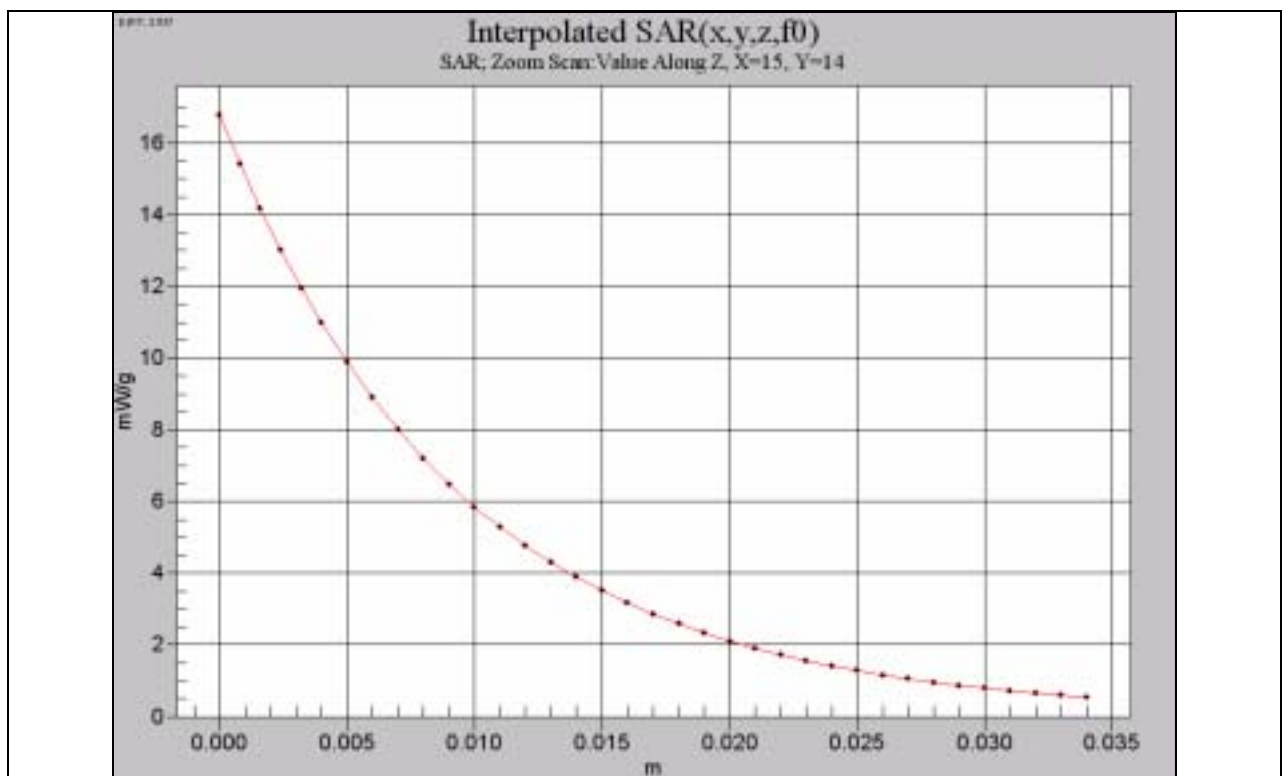
Maximum value of SAR (measured) = 11 mW/g

**Body-Tissue-Simulating-Liquid 1900MHz**

Z-axis Plot of System Performance Check



Head-Tissue-Simulating-Liquid 1900MHz



Body-Tissue-Simulating-Liquid 1900MHz

Appendix B – SAR Measurement Data

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 11:09:45

04-0517-S_Philips 568_Right Cheek_PCS CH512_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1850.2$ MHz; $s = 1.4$ mho/m; $\epsilon_r = 38.9$;

Conductivity=1000 kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Right Cheek/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 12.4 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 0.496 mW/g

Right Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

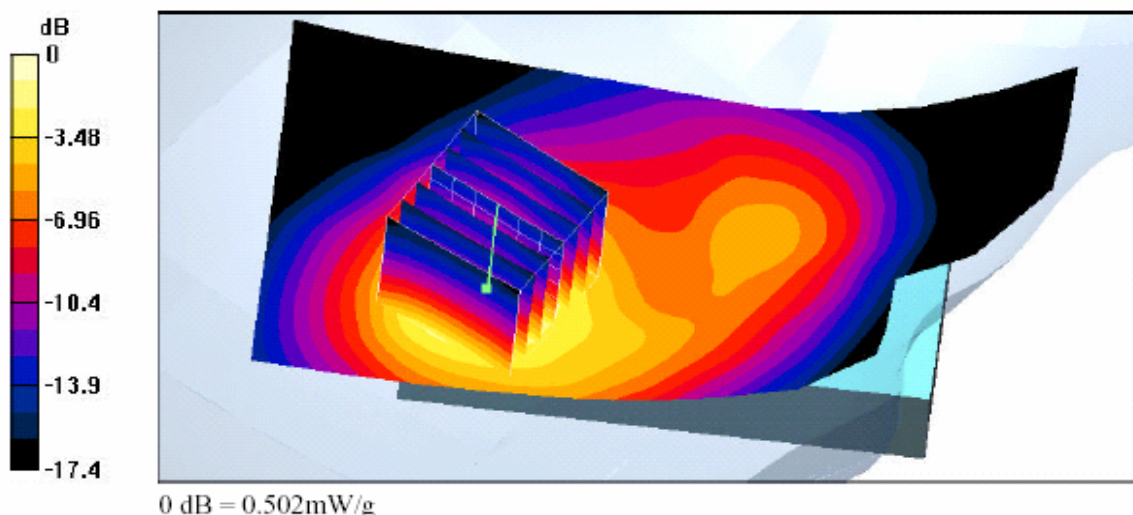
Peak SAR (extrapolated) = 0.967 W/kg

SAR(1 g) = 0.464 mW/g; SAR(10 g) = 0.243 mW/g

Reference Value = 12.4 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 0.502 mW/g



Head-SAR Test Result for Right Cheek Position – Channel 512

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 11:50:52

04-0517-S_Philips 568_Right Cheek_PCS CH661_20040903_

DUT:Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1880 MHz;Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used: $f = 1880$ MHz; $s = 1.43$ mho/m; $\epsilon_r = 38.8$;

Conductivity=1000 kg/m3;Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Right Cheek/Area Scan (51x101x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Reference Value = 13.6 V/m

Power Drift = -0.001 dB

Maximum value of SAR = 0.552 mW/g

Right Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

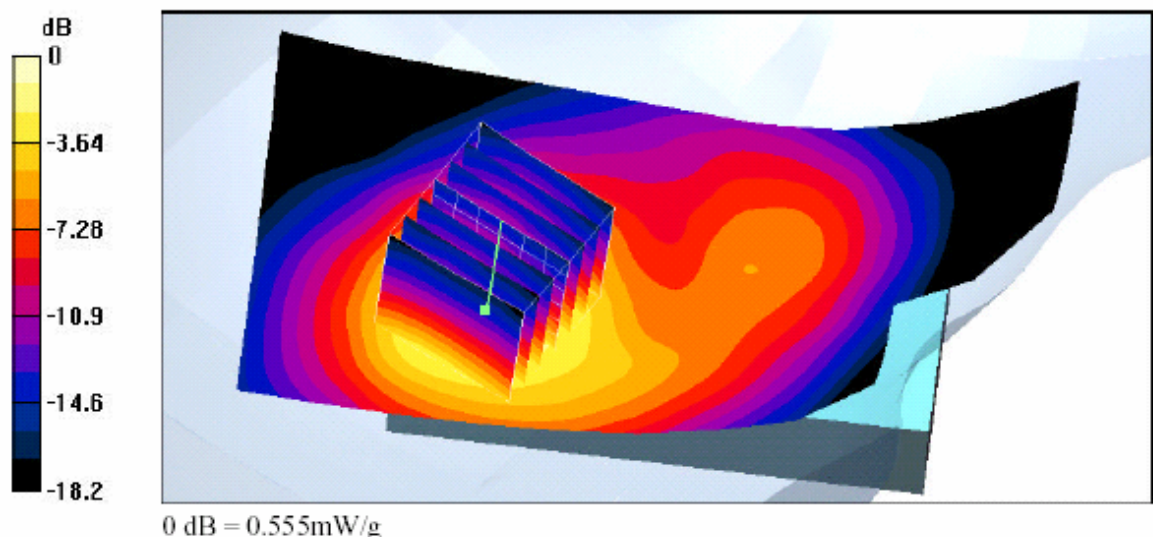
Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.527 mW/g; SAR(10 g) = 0.268 mW/g

Reference Value = 13.6 V/m

Power Drift = -0.001 dB

Maximum value of SAR = 0.555 mW/g



Head-SAR Test Result for Right Cheek Position – Channel 661

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 12:15:18

04-0517-S_Philips 568_Right Cheek_PCS CH810_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1909.8 \text{ MHz}$; $s = 1.46 \text{ mho/m}$; $\epsilon_r = 38.7$;

Conductivity=1000 kg/m^3

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5, 5, 5); Calibrated: 9/19/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 1/8/2004
- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009
- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Right Cheek/Area Scan (51x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 12.4 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.491 mW/g

Right Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

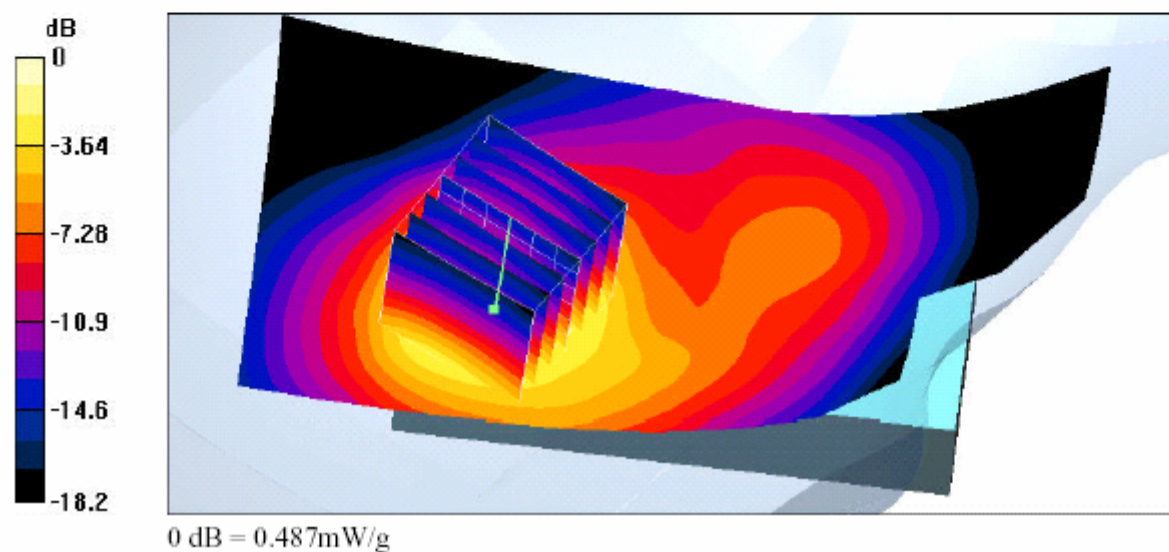
Peak SAR (extrapolated) = 0.804 W/kg

SAR(1 g) = 0.440 mW/g; SAR(10 g) = 0.234 mW/g

Reference Value = 12.4 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.487 mW/g



Head-SAR Test Result for Right Cheek Position – Channel 810

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 12:43:41

04-0517-S_Philips 568_Right Tilted_PCS CH512_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1850.2$ MHz; $s = 1.4$ mho/m; $\epsilon_r = 38.9$;

Conductivity=1000 kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Right Tilted/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 13.9 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 0.428 mW/g

Right Tilted/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

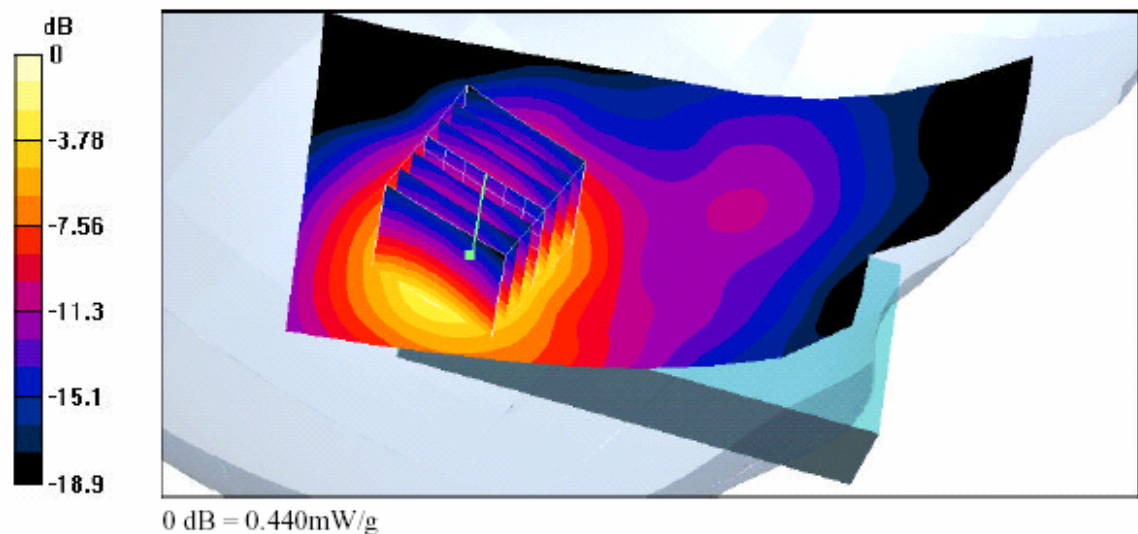
Peak SAR (extrapolated) = 0.841 W/kg

SAR(1 g) = 0.400 mW/g; SAR(10 g) = 0.205 mW/g

Reference Value = 13.9 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 0.440 mW/g



Head-SAR Test Result for Right Tilted Position – Channel 512

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 13:31:47

04-0517-S_Philips 568_Right Tilted_PCS CH661_20040903_**DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488**

Communication System: PCS Band; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used: $f = 1880$ MHz; $s = 1.43$ mho/m; $\epsilon_r = 38.8$;Conductivity=1000 kg/m³; Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Right Tilted/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 13.9 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.435 mW/g

Right Tilted/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

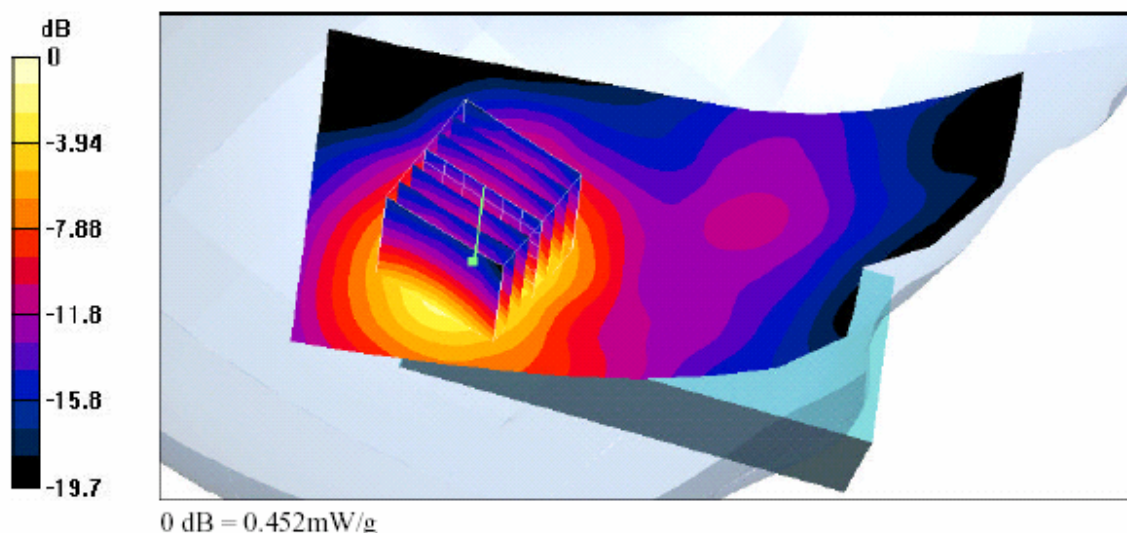
Peak SAR (extrapolated) = 0.865 W/kg

SAR(1 g) = 0.405 mW/g; SAR(10 g) = 0.205 mW/g

Reference Value = 13.9 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.452 mW/g

**Head-SAR Test Result for Right Tilted Position – Channel 661**

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 14:02:09

04-0517-S_Philips 568_Right Tilted_PCS CH810_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1909.8 \text{ MHz}$; $s = 1.46 \text{ mho/m}$; $\epsilon_r = 38.7$;

Conductivity=1000 kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5, 5, 5); Calibrated: 9/19/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 1/8/2004
- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009
- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Right Tilted/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 13.9 V/m

Power Drift = -0.1 dB

Maximum value of SAR = 0.383 mW/g

Right Tilted/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

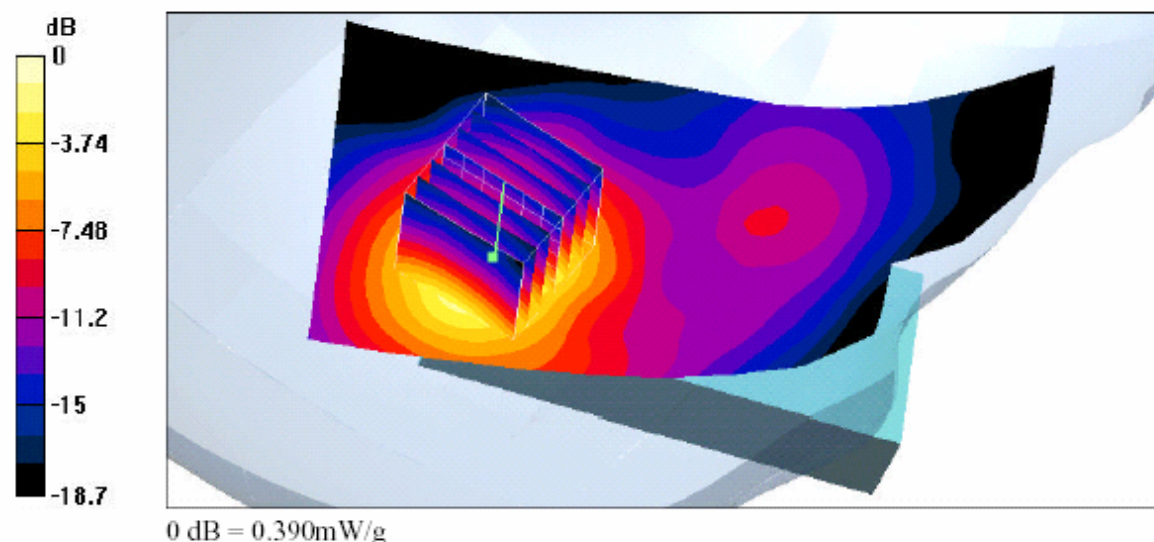
Peak SAR (extrapolated) = 0.613 W/kg

SAR(1 g) = 0.346 mW/g; SAR(10 g) = 0.182 mW/g

Reference Value = 13.9 V/m

Power Drift = -0.1 dB

Maximum value of SAR = 0.390 mW/g



Head-SAR Test Result for Right Tilted Position – Channel 810

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 14:58:49

04-0517-S_Philips 568_Left Cheek_PCS CH512_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1850.2$ MHz; $s = 1.4$ mho/m; $\epsilon_r = 38.9$;

Conductivity= 1000kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Left Cheek/Area Scan (51x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 12 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.310 mW/g

Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

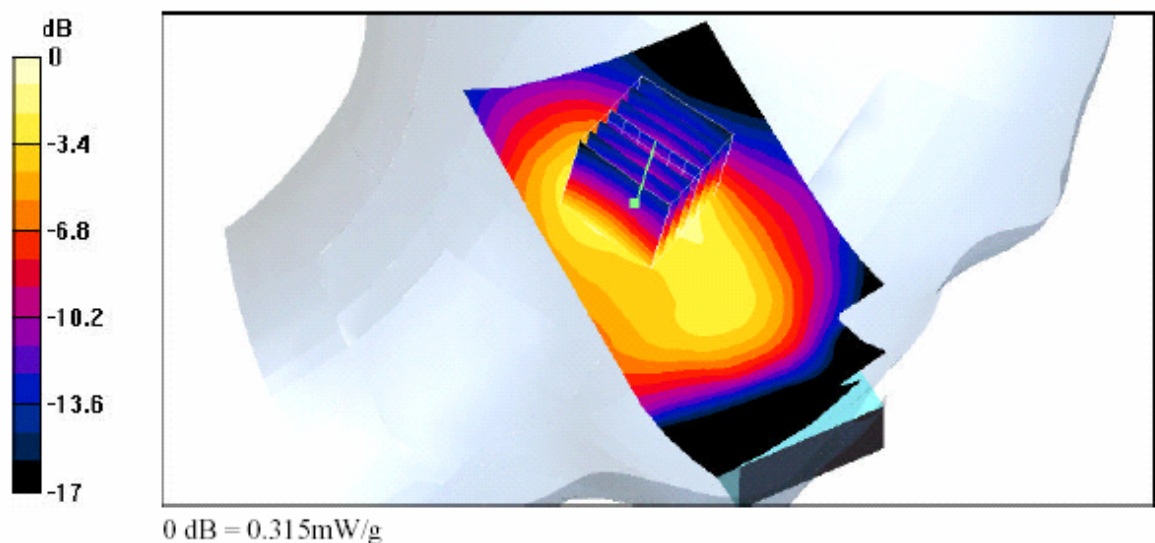
Peak SAR (extrapolated) = 0.578 W/kg

SAR(1 g) = 0.292 mW/g; SAR(10 g) = 0.161 mW/g

Reference Value = 12 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.315 mW/g



Head-SAR Test Result for Left Cheek Position – Channel 512

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 15:03:44

04-0517-S_Philips 568_Left Cheek_PCS CH661_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1850.2$ MHz; $s = 1.4$ mho/m; $\epsilon_r = 38.9$;

Conductivity= 1000kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Left Cheek/Area Scan (51x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 12.6 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.315 mW/g

Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

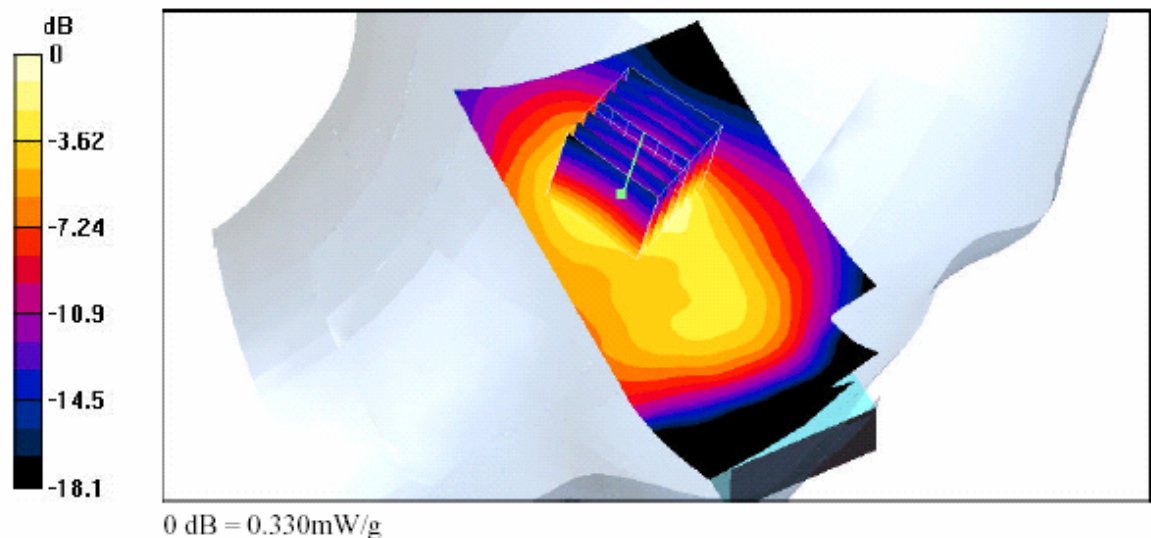
Peak SAR (extrapolated) = 0.610 W/kg

SAR(1 g) = 0.301 mW/g; SAR(10 g) = 0.163 mW/g

Reference Value = 12.6 V/m

Power Drift = 0.0 dB

Maximum value of SAR = 0.330 mW/g



Head-SAR Test Result for Left Cheek Position – Channel 661

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 15:26:59

04-0517-S_Philips 568_Left Cheek_PCS CH810_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1909.8 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1909.8 \text{ MHz}$; $s = 1.46 \text{ mho/m}$; $\epsilon_r = 38.7$;

Conductivity= 1000 kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5, 5, 5); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Left Cheek/Area Scan (51x101x1): Measurement grid: $dx=15 \text{ mm}$, $dy=15 \text{ mm}$

Reference Value = 12.3 V/m

Power Drift = -0.1 dB

Maximum value of SAR = 0.283 mW/g

Left Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5 \text{ mm}$, $dy=5 \text{ mm}$, $dz=5 \text{ mm}$

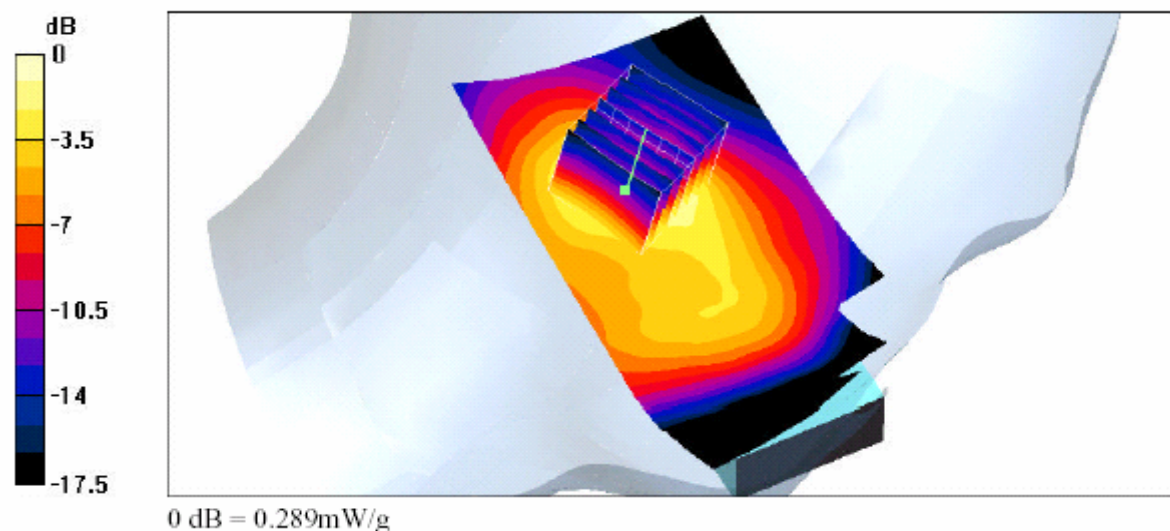
Peak SAR (extrapolated) = 0.434 W/kg

SAR(1 g) = 0.262 mW/g ; SAR(10 g) = 0.147 mW/g

Reference Value = 12.3 V/m

Power Drift = -0.1 dB

Maximum value of SAR = 0.289 mW/g



Head-SAR Test Result for Left Cheek Position – Channel 810

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 15:55:46

04-0517-S_Philips 568_Left Tilted_PCS CH512_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1850.2$ MHz; $s = 1.4$ mho/m; $\epsilon_r = 38.9$;

Conductivity= 1000kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Left Tilted/Area Scan (51x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 13.1 V/m

Power Drift = -0.004 dB

Maximum value of SAR = 0.316 mW/g

Left Tilted/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

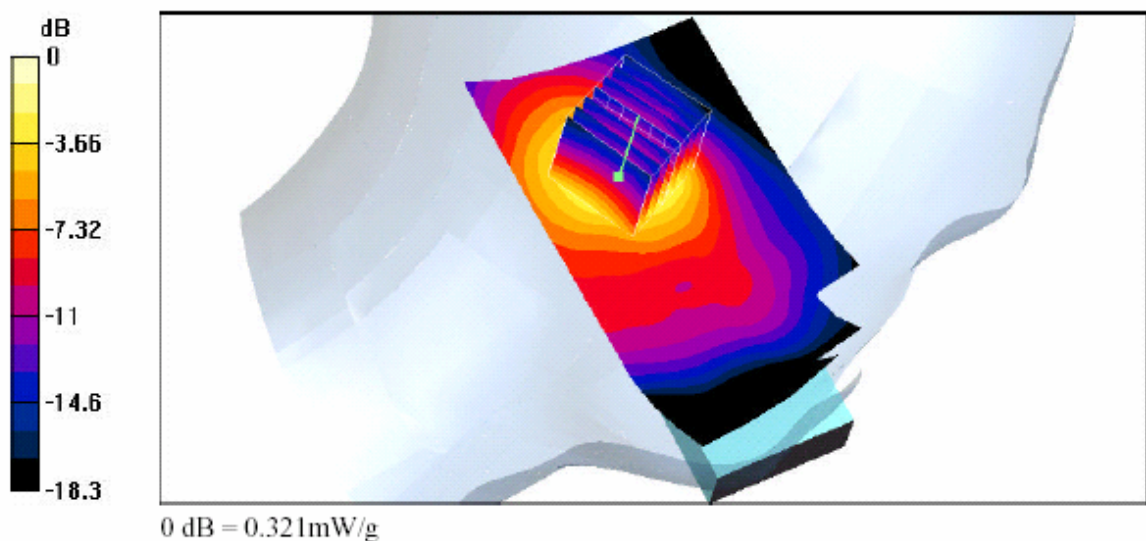
Peak SAR (extrapolated) = 0.577 W/kg

SAR(1 g) = 0.293 mW/g; SAR(10 g) = 0.156 mW/g

Reference Value = 13.1 V/m

Power Drift = -0.004 dB

Maximum value of SAR = 0.321 mW/g



Head-SAR Test Result for Left Tilted Position – Channel 512

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 16:24:52

04-0517-S_Philips 568_Left Tilted_PCS CH661_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System: PCS Band; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used: $f = 1880$ MHz; $s = 1.43$ mho/m; $\epsilon_r = 38.8$;

Conductivity=1000 kg/m³; Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5.3, 5.3, 5.3); Calibrated: 9/19/2003

- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

- Electronics: DAE3 Sn393; Calibrated: 1/8/2004

- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009

- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Left Tilted/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Reference Value = 13.3 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 0.328 mW/g

Left Tilted/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

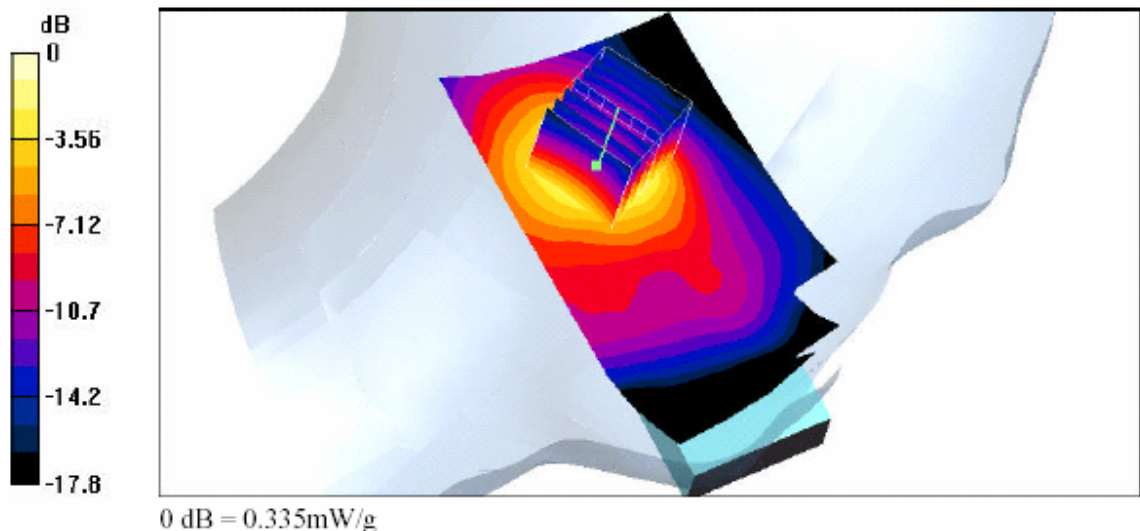
Peak SAR (extrapolated) = 0.601 W/kg

SAR(1 g) = 0.304 mW/g; SAR(10 g) = 0.162 mW/g

Reference Value = 13.3 V/m

Power Drift = -0.0 dB

Maximum value of SAR = 0.335 mW/g



Head-SAR Test Result for Left Tilted Position – Channel 661

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 09/03/04 17:17:49

04-0517-S_Philips 568_Left Tilted_PCS CH810_20040903_

DUT: Philips 568; Type: GSM Three Band Mobile Phone; Serial: 354054000000488

Communication System:PCS Band; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3

Medium: Head 1900MHz Medium parameters used (interpolated): $f = 1909.8 \text{ MHz}$; $s = 1.46 \text{ mho/m}$; $\epsilon_r = 38.7$;

Conductivity= 1000 kg/m^3

Phantom section: Left Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1531; ConvF(5, 5, 5); Calibrated: 9/19/2003
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 1/8/2004
- Phantom: SAM 12; Type: SAM v4.0; Serial: TP:1009
- Measurement SW: DASY4, V4.2 Build 12; Postprocessing SW: SEMCAD, V1.8 Build 93

Left Tilted/Area Scan (51x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Reference Value = 12.6 V/m

Power Drift = -0.1 dB

Maximum value of SAR = 0.272 mW/g

Left Tilted/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

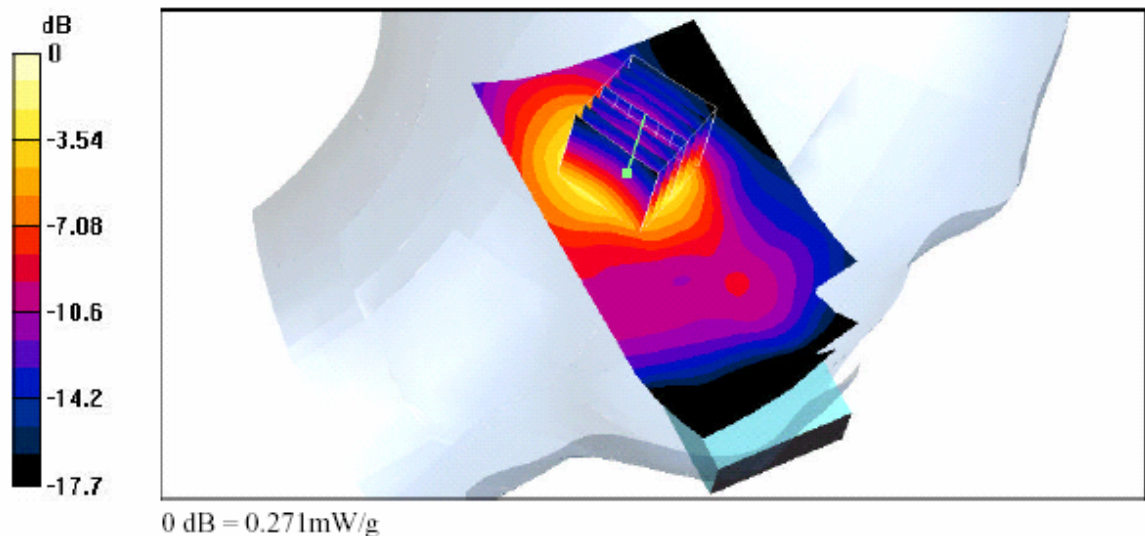
Peak SAR (extrapolated) = 0.391 W/kg

SAR(1 g) = 0.243 mW/g ; SAR(10 g) = 0.133 mW/g

Reference Value = 12.6 V/m

Power Drift = -0.1 dB

Maximum value of SAR = 0.271 mW/g



Head-SAR Test Result for Left Tilted Position – Channel 810