SAR TEST REPORT

FCC Class II Permissive Change

HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)		
FCC ID:	PP4PN-310		
Model:	PN-310	Trade Name	PANTECH&CURITEL
Date of Issue:	Mar. 30, 2007		
Test report No.:	HCT-SAR07-0312		
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Testing has been carried out in accordance with:	47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 2005 IEEE 1528-2003		
Test result:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		
Signature	Ki Soo Kim Report prepared by: Ki-Soo Kim Manager of Product Compliance Team		

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1. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

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 C95.1-2005 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.[2] The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave[3] is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 (c) NCRP, 1986, Bethesda, MD 20814.[4] SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

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

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

Figure 2. SAR Mathematical Equation

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

$$SAR = \sigma E^2 / \rho$$

where:

σ	=	conductivity of the tissue-simulant material (S/m)
ρ	=	mass density of the tissue-simulant material (kg/m^3)
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.[4]

2. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

EUT Type	Dual-Band CDMA Phone(CDMA/PCS CDMA)
FCC ID	HCT-SAR07-0312
Model(s)	PN-310
Trade Name	PANTECH&CURITEL
Serial Number(s)	PP4 PN31020070301
Application Type	Permissive Change Class II
Change of Contents	Antenna/ Hardware have been changed
Modulation(s)	CDMA835/PCS1900
Tx Frequency	824.70 - 848.31 MHz (CDMA) 1851.25 - 1908.75 MHz (PCS CDMA)
Rx Frequency	869.70 - 893.31 MHz (CDMA) 1931.25 - 1988.75 MHz (PCS CDMA)
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
Production Unit or Identical Prototype	Prototype
Max SAR	1.27 W/kg CDMA835 Head SAR / 0.558 W/kg CDMA835 Body SAR 1.12 W/kg PCS1900 Head SAR / 0.27 W/kg PCS1900 Body SAR
Date(s) of Tests	Mar. 27, 2007 ~ Mar. 28, 2007
Antenna Type:	Retractable
This device does not transmit with flip cover closed.	

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig.3.1).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium 4 3.0 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, 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 coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

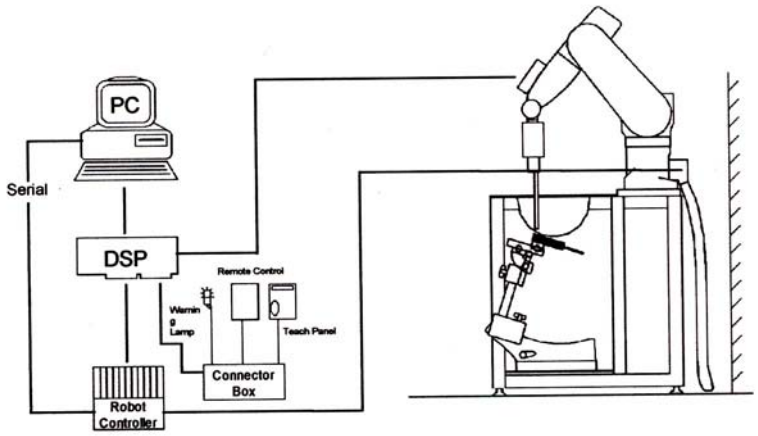

Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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 [5].

3.2 DASY E-FIELD PROBE SYSTEM

3.2.1 ET3DV6 Probe Specification

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

Figure 3.2 Photograph of the probe and the Phantom

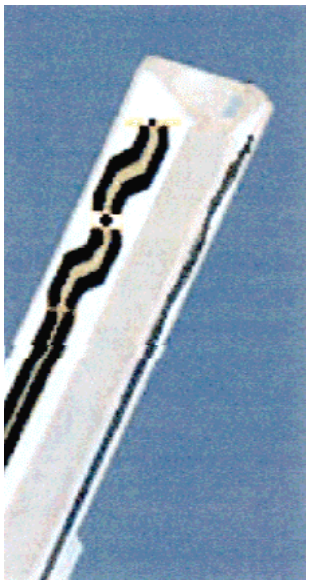

Figure 3.3 ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration [5] 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 mortifier 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 a 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 at reaching the maximum.

3.3 PROBE CALIBRATION PROCESS

3.3.1 E-Probe Calibration

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

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

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

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm^3 for brain tissue)

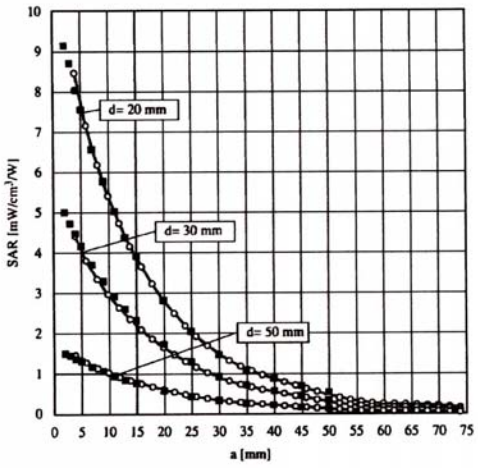

Figure 3.4 E-Field and Temperature measurements at 900MHz[5]

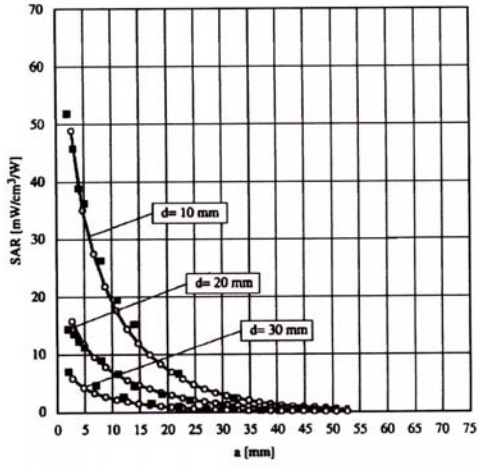

Figure 3.5 E-Field and temperature measurements at 1.8GHz [5]

3.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. 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 [8]:

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

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:

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

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

The RSS value of the field components gives the total field strength (Hermetian 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 W/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

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

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with P_{pwe} = equivalent power density of a plane wave in W/cm^2
E_{tot} = total electric field strength in V/m

3.4 SAM Phantom

The SAM Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90 % of all users [9][10]. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

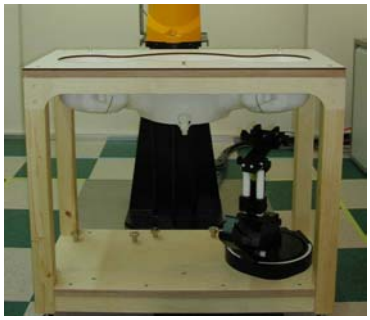

Figure 3.6 SAM Phantom

Shell Thickness	**2.0 mm**
Filling Volume	Volume Approx. 30 liters
Dimensions	810 x 1000 x 500 mm (H x L x W)

3.5 Device Holder for Transmitters

In combination with the SAM 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 repeatable positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

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

Fig. 3.7 Device Holder

3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove [11].

Ingredients (%by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7

Salt:	99%Pure Sodium Chloride	Sugar:	98%Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99% Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy)ethanol]		
Triton X-100(ultra pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Table 3.1 Composition of the Tissue Equivalent Matter

3.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib. Interval	Calib. Due
Staubli	Robot RX90L	F01/ 5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
HP	Pavilion t000 puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	DAE4V1	446	11/15/06	Annual	11/15/07
SPEAG	DAE3V1	447	11/17/06	Annual	11/17/07
SPEAG	DAE4V1	614	08/22/06	Annual	08/22/07
SPEAG	E-Field Probe ET3DV6	1609	03/23/07	Annual	03/23/08
SPEAG	E-Field Probe ET3DV6	1798	08/25/06	Annual	08/25/07
SPEAG	SAM Phantom	-	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
SPEAG	Validation Dipole D835V2	441	08/14/06	Annual	08/14/07
SPEAG	Validation Dipole D900V2	121	02/19/07	Annual	02/19/08
SPEAG	Validation Dipole D1800V2	2d007	08/16/06	Annual	08/16/07
SPEAG	Validation Dipole D1900V2	5d032	02/20/07	Annual	02/20/08
SPEAG	Validation Dipole D2450V2	743	01/17/07	Annual	01/17/08
Agilent	Power Meter(F) E4419B	MY40330223	11/08/06	Annual	11/08/07
Agilent	Power Sensor(G) 8481	MY41090870	11/21/06	Annual	11/21/07
HP	Signal Generator 8664A	3744A02069	04/11/06	Annual	04/11/07
EM POWER	Power Amp BBS3Q7ELU	1013-D/C-0127	04/05/06	Annual	04/05/07
HP	Network Analyzer 8753ES	JP39240221	04/06/06	Annual	04/06/07
HP	Dielectric Probe Kit 85070C	00721521	-		-
HP	Dual Directional Coupler 778D	16072	11/09/06	Annual	11/09/07
R&S	Base Station CMU200	838207/050	11/14/06	Annual	11/14/07
Agilent	Base Station E5515C	US41070189	05/03/06	Annual	05/03/07
Tescom	Bluetooth TC-3000	3000A490112	01/22/07	Annual	01/22/08

NOTE:

The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Validation measurement is performed by HCT Lab. before each test. The brain simulating material is calibrated by HCT using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material.

4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.

2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

3. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm [13]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x,y, and z directions) [13][14]. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

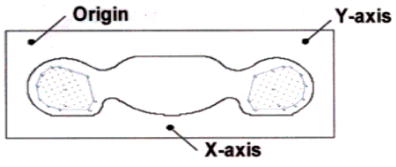

Fig. 4.1 SAR Measurement Point in Area Scan

5. DESCRIPTION OF TEST POSITION

5.1 HEAD POSITION

The device was placed in a normal operating position with the Point A on the device, as illustrated in following drawing, aligned with the location of the RE(ERP) on the phantom. With the ear-piece pressed against the head, the vertical center line of the body of the handset was aligned with an imaginary plane consisting of the RE, LE and M. While maintaining these alignments, the body of the handset was gradually moved towards the cheek until any point on the mouth-piece or keypad contacted the cheek. This is a cheek/touch position. For ear/tilt position, while maintain the device aligned with the BM and FN lines, the device was pivot against ERP back for 15º or until the device antenna touch the phantom. Please refer to IEEE SC-2 P1528 illustration below.

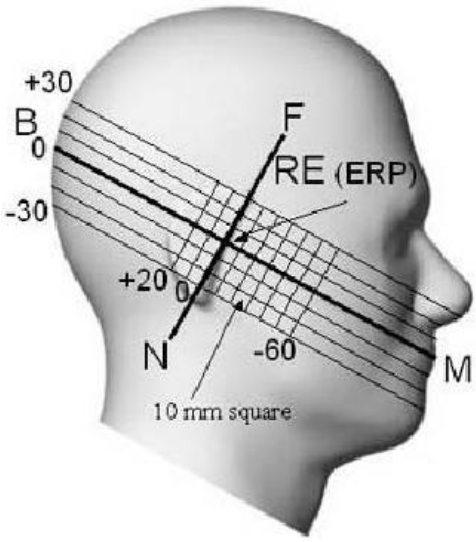

Figure 5.1 Side view of the phantom

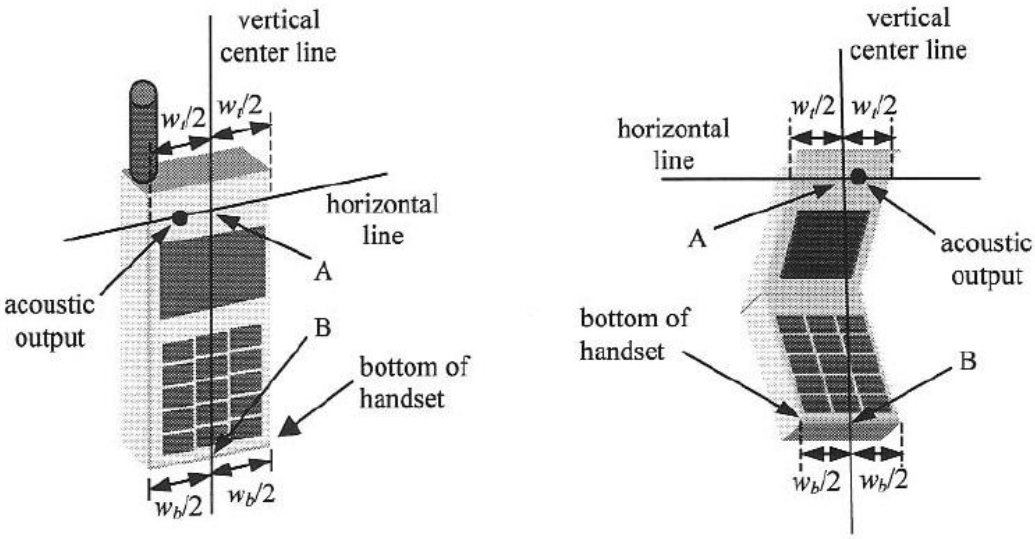

Figure 5.2 Handset vertical and horizontal reference lines

5.2 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with each accessory. If multiple accessory share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

For this test the EUT is placed into the Body worn accessory and the accessory is positioned against the surface of the phantom in a normal operating position. (2 mm separation phantom thickness)

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), Including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst case positioning is then documented and used to perform Body SAR testing.

6. 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 15-25 % [16].

According to ANSI/IEEE C95.3, 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 ± 2dB can be expected.[3]

According to CENELEC [17], typical worst-case uncertainty of field measurements is 5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ± 3 dB.

Error Description	Uncertainty value [%]	Probability Distribution	Divisor	ci	ci^2	Standard Uncertainty [%]	Stand Uncert^2	(Stand Uncert^2) X (ci^2)	Vi & Veff
1. Measurement System									
Probe Calibration	5.5	Normal	1.00	1	1	5.50	30.25	30.25	∞
Axial Isotropy	4.7	Rectangular	1.73	0.7	0.49	2.71	7.36	3.61	∞
Hemispherical Isotropy	9.6	Rectangular	1.73	0.7	0.49	5.54	30.72	15.05	∞
Linearity	4.7	Rectangular	1.73	1	1	2.71	7.36	7.36	∞
System Detection limits	1.0	Rectangular	1.73	1	1	0.58	0.33	0.33	∞
Boundary effect	1.0	Rectangular	1.73	1	1	0.58	0.33	0.33	∞
Response time	0.8	Rectangular	1.73	1	1	0.46	0.21	0.21	∞
RF Ambient conditions	3.0	Rectangular	1.73	1	1	1.73	3.00	3.00	∞
Readout Electronics	0.3	Normal	1.00	1	1	0.30	0.09	0.09	∞
Integration time	2.6	Rectangular	1.73	1	1	1.50	2.25	2.25	∞
Probe positioner	0.4	Rectangular	1.73	1	1	0.23	0.05	0.05	∞
Probe positionering	2.9	Rectangular	1.73	1	1	1.67	2.80	2.80	∞
Maximum SAR evaluation	1.0	Rectangular	1.73	1	1	0.58	0.33	0.33	∞
2.Test Sample Related						Sub Total		65.69	
Device Positioning	1.8	Normal	1.00	1	1	1.77	3.13	3.13	9
Device Holder	3.6	Normal	1.00	1	1	3.60	12.96	12.96	∞
Power Drift	5.0	Rectangular	1.73	1	1	2.89	8.33	8.33	∞
3. Phantom and Setup						Sub Total		24.43	
Phantom Uncertainty	4.0	Rectangular	1.73	1	1	2.31	5.33	5.33	∞
Liquid conductivity (target)	5.0	Rectangular	1.73	0.5	0.25	2.89	8.33	2.08	∞
Liquid conductivity (measurement error)	2.5	Normal	1.00	0.5	0.25	2.50	6.25	1.56	∞
Liquid permittivity (target)	5.0	Rectangular	1.73	0.5	0.25	2.89	8.33	2.08	∞
Liquid permittivity (measurement error)	2.5	Normal	1.00	0.5	0.25	2.50	6.25	1.56	∞
						Sub Total		12.63	
Combined standard uncertainty [%]						**10.14**		102.74	-
Expanded uncertainty [k = 2, confidence 95 %]						**± 20.3 %**			

Table 6.1 Breakdown of Errors

7. ANSI/ IEEE C95.1 - 2005 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7.1 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.

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

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).

8. SYSTEM VERIFICATION

8.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Mar.27, 2007	Head	21.6	ε r	41.5	41	- 1.20	± 5
				σ	0.90	0.875	- 2.78	± 5
835	Mar.27, 2007	Body	21.6	ε r	55.2	53.4	- 3.26	± 5
				σ	0.97	0.99	+ 2.06	± 5
1900	Mar.28, 2007	Head	21.5	ε r	40.0	39.2	- 2.00	± 5
				σ	1.40	1.44	+ 2.86	± 5
1900	Mar.28, 2007	Body	21.5	ε r	53.3	52.1	- 2.25	± 5
				σ	1.52	1.56	+ 2.63	± 5

8.2 System Validation

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1900 MHz by using the system validation kit. (Graphic Plots Attached)

Freq. [MHz]	Date	Liquid	Liquid Temp [°C]	SAR Average	Target Value (IEEE 1528) (mW/g)	Measured Value (mW/g)	Deviation [%]	Limit [%]
835 MHz	Mar.27, 2007	Head	21.6	1 g	9.5	9.22	- 2.95	± 10
1900 MHz	Mar.28, 2007	Head	21.5	1 g	39.7	41.3	+ 4.03	± 10

* Input Power: 1 W

9. 3G MEASUREMENT PROCEDURES

9.1 Procedures Used To Establish Test Signal

The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more then 5% occurred, the tests were repeated.

9.2 SAR Measurement Conditions for CDMA2000 1x

These procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices", May 2006.

9.2.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices", May 2006. Maximum output power is verified on the High, Middle and Low channels according to procedures defined in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in “All Up” condition.

1. If the mobile station supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC = 1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1 (Table 4) parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3, 4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2(Table 5) was applied.
5. FCHs were configured at full rate for maximum SAR with “All Up” power control bits.

Parameters for Max. Power for RC1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table. 9.1

Parameters for Max. Power for RC3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table. 9.2

9.2.2 Head SAR Measurement

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

9.2.3 Body SAR Measurement

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts.

Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

9.2.4 Handsets with EV-DO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for Ev-Do is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots should be configured in the downlink for both Rev. 0 and Rev. A.

Average Output Power Measurement for FCC ID: PP4PN-310

Band	Channel	SO2	SO2	SO55	SO55	TDSO	1xEvDO	1xEvDO
		RC1/1	RC3/3	RC1/1	RC3/3	RC3/3	(FTAP)	(RTAP)
CDMA	1013	25.03	25.03	25.04	25.04	24.98	-	-
	384	25.02	25.02	25.00	25.04	25.00	-	-
	777	25.00	25.01	25.03	25.08	25.03	-	-
PCS	25	25.03	25.10	25.08	25.12	25.11	-	-
	600	25.02	25.03	25.05	25.07	25.04	-	-
	1175	25.05	25.04	25.08	25.10	25.11	-	-

10. SAR TEST DATA SUMMARY

10.1 Measurement Results (CDMA835 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Ant. Position	SAR(mW/g)
MHz	Channel.		Begin	End				
824.70	1013 (Low)	CDMA835	25.04	25.00	Standard	Left Ear	In	0.937
824.70	1013 (Low)	CDMA835	25.04	25.12	Standard	Left Ear	Out	0.753
836.52	384 (Mid)	CDMA835	25.04	25.06	Standard	Left Ear	In	1.01
836.52	384 (Mid)	CDMA835	25.04	25.16	Standard	Left Ear	Out	0.573
848.31	777 (High)	CDMA835	25.08	25.02	Standard	Left Ear	In	0.908
848.31	777 (High)	CDMA835	25.08	24.96	Standard	Left Ear	Out	0.434
824.70	1013 (Low)	CDMA835	25.04	24.96	Standard	Right Ear	In	1.11
824.70	1013 (Low)	CDMA835	25.04	24.89	Standard	Right Ear	Out	1.27
836.52	384 (Mid)	CDMA835	25.04	25.03	Standard	Right Ear	In	1.21
836.52	384 (Mid)	CDMA835	25.04	25.06	Standard	Right Ear	Out	0.726
848.31	777 (High)	CDMA835	25.08	25.03	Standard	Right Ear	In	1.07
848.31	777 (High)	CDMA835	25.08	24.90	Standard	Right Ear	Out	0.523
824.70	1013 (Low)	CDMA835	25.04	24.89	Extended	Right Ear	Out	*1.26
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g) Averaged over 1 gram**		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☒ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Head SAR was tested under RC3/SO55.
8 Highest SAR value measurement in this band repeated with *Extended battery.

10.2 Measurement Results (CDMA835 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Ant. Position	SAR(mW/g)
MHz	Channel.		Begin	End				
836.52	384 (Mid)	CDMA835	25.04	24.85	Standard	Left Tilt 15°	In	0.285
836.52	384 (Mid)	CDMA835	25.04	24.95	Standard	Left Tilt 15°	Out	0.152
836.52	384 (Mid)	CDMA835	25.04	24.97	Standard	Right Tilt 15°	In	0.287
836.52	384 (Mid)	CDMA835	25.04	24.91	Standard	Right Tilt 15°	Out	0.154
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g) **Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Head SAR was tested under RC3/SO55.
8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.3 Measurement Results (PCS1900 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Ant. Position	SAR(mW/g)
MHz	Channel.		Begin	End				
1851.25	25 (Low)	PCS1900	-	-	Standard	Left Ear	In	-
1851.25	25 (Low)	PCS1900	-	-	Standard	Left Ear	Out	-
1880.00	600 (Mid)	PCS1900	25.07	25.22	Standard	Left Ear	In	0.675
1880.00	600 (Mid)	PCS1900	25.07	25.21	Standard	Left Ear	Out	0.0533
1908.75	1175 (High)	PCS1900	-	-	Standard	Left Ear	In	-
1908.75	1175 (High)	PCS1900	-	-	Standard	Left Ear	Out	-
1851.25	25 (Low)	PCS1900	25.12	25.12	Standard	Right Ear	In	1.12
1851.25	25 (Low)	PCS1900	-	-	Standard	Right Ear	Out	-
1880.00	600 (Mid)	PCS1900	25.07	24.98	Standard	Right Ear	In	0.855
1880.00	600 (Mid)	PCS1900	25.07	24.93	Standard	Right Ear	Out	0.0825
1908.75	1175 (High)	PCS1900	25.10	24.95	Standard	Right Ear	In	0.912
1908.75	1175 (High)	PCS1900	-	-	Standard	Right Ear	Out	-
1851.25	25 (Low)	PCS1900	25.12	24.97	Extended	Right Ear	In	*1.07
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g) Averaged over 1 gram**		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☒ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Head SAR was tested under RC3/SO55.
8 Highest SAR value measurement in this band repeated with *Extended battery.
9 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.4 Measurement Results (PCS1900 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Ant. Position	SAR(mW/g)
MHz	Channel.		Begin	End				
1880.00	600 (Mid)	PCS1900	25.07	25.01	Standard	Left Tilt 15°	In	0.137
1880.00	600 (Mid)	PCS1900	25.07	25.04	Standard	Left Tilt 15°	Out	0.017
1880.00	600 (Mid)	PCS1900	25.07	24.99	Standard	Right Tilt 15°	In	0.108
1880.00	600 (Mid)	PCS1900	25.07	25.26	Standard	Right Tilt 15°	Out	0.013
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g) **Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Head SAR was tested under RC3/SO55.
8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

10.5 Measurement Results (CDMA835 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Ant. Position	SAR(mW/g)
MHz	Channel.		Begin	End				
836.52	384 (Mid)	CDMA835	25.00	24.80	Standard	with Holster	In	0.558
836.52	384 (Mid)	CDMA835	25.00	24.81	Standard	with Holster	Out	0.358
836.52	384 (Mid)	CDMA835	25.00	24.85	Extended	with Holster	In	*0.544
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g) **Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☒ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Both side of the phone were tested and the worst-case side is reported.
8 HEADSET was connected.
9 Test Configuration ☒ With Holster ☐ Without Holster
10 Body SAR was tested under RC3/SO32.
11 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
12 Highest SAR value measurement in this band repeated with *Extended battery.

10.6 Measurement Results (PCS1900 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Ant. Position	SAR(mW/g)
MHz	Channel.		Begin	End				
1880.00	600 (Mid)	PCS1900	25.04	25.12	Standard	with Holster	In	0.270
1880.00	600 (Mid)	PCS1900	25.04	24.86	Standard	with Holster	Out	0.104
1880.00	600 (Mid)	PCS1900	25.04	25.14	Extended	with Holster	In	*0.263
ANSI/ IEEE C95.1 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g) **Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☒ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Both side of the phone were tested and the worst-case side is reported.
8 HEADSET was connected.
9 Test Configuration ☒ With Holster ☐ Without Holster
10 Body SAR was tested under RC3/SO32.
11 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2002), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tile/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
12 Highest SAR value measurement in this band repeated with *Extended battery.

11. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 2005.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

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Attachment 1. – SAR Test Plots

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

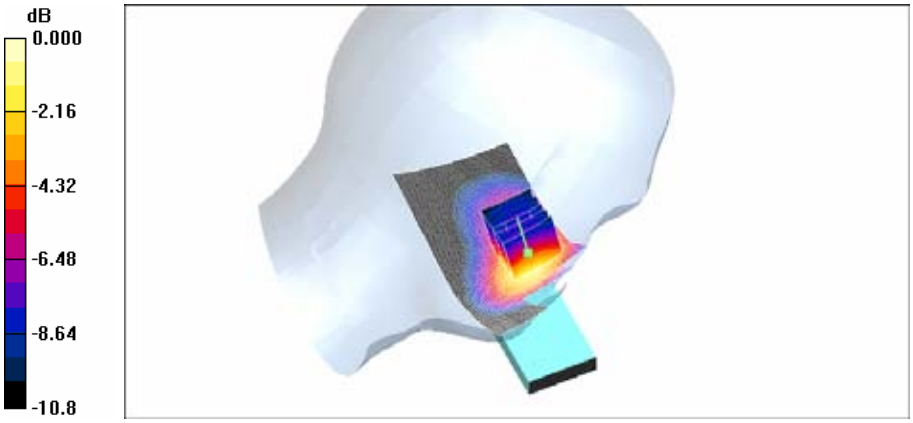
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.865 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 1013/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.988 mW/g

Left touch 1013/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.7 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.937 mW/g; SAR(10 g) = 0.602 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

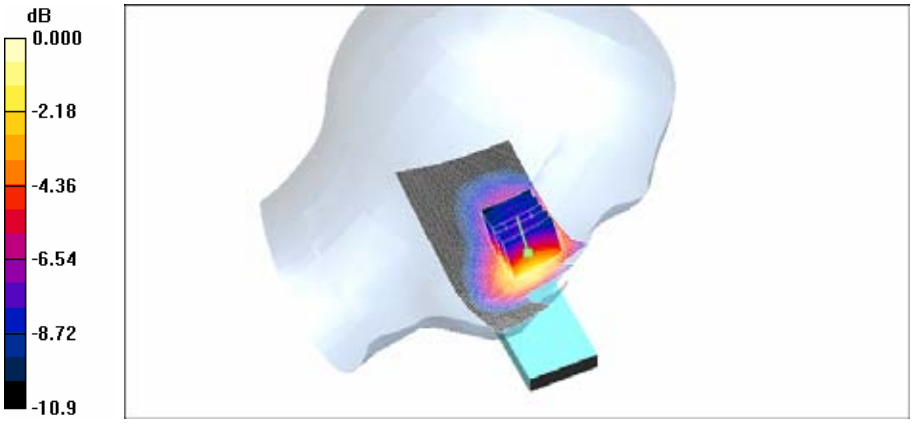
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.865 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 1013/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.793 mW/g

Left touch 1013/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.3 V/m; Power Drift = 0.080 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.753 mW/g; SAR(10 g) = 0.484 mW/g
Maximum value of SAR (measured) = 0.817 mW/g



0 dB = 0.817mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

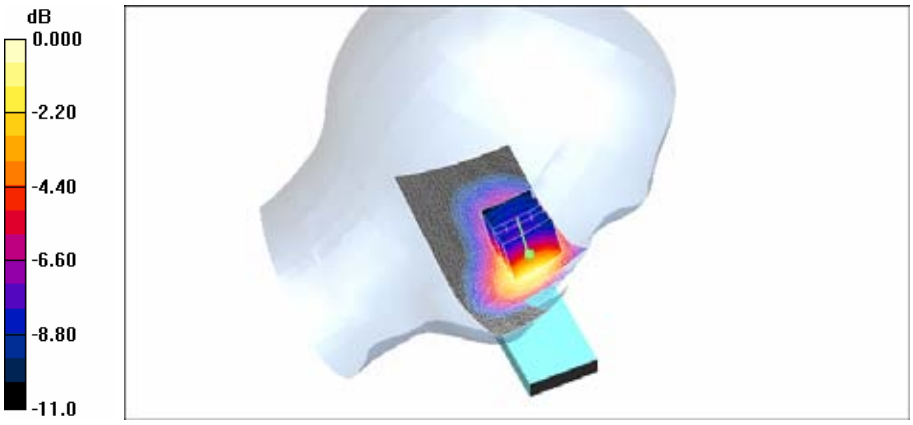
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.11 mW/g

Left touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.9 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 1.55 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.651 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.11 mW/g



0 dB = 1.11mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

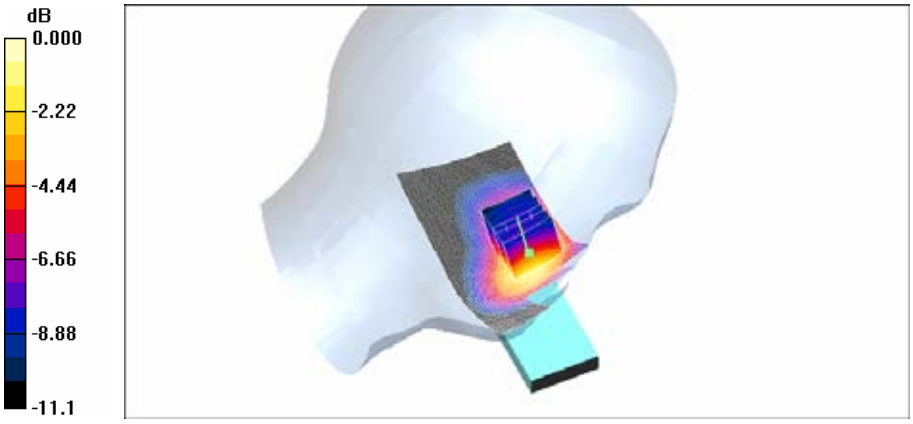
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.632 mW/g

Left touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = 0.119 dB
Peak SAR (extrapolated) = 0.881 W/kg
SAR(1 g) = 0.573 mW/g; SAR(10 g) = 0.364 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.627 mW/g



0 dB = 0.627mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

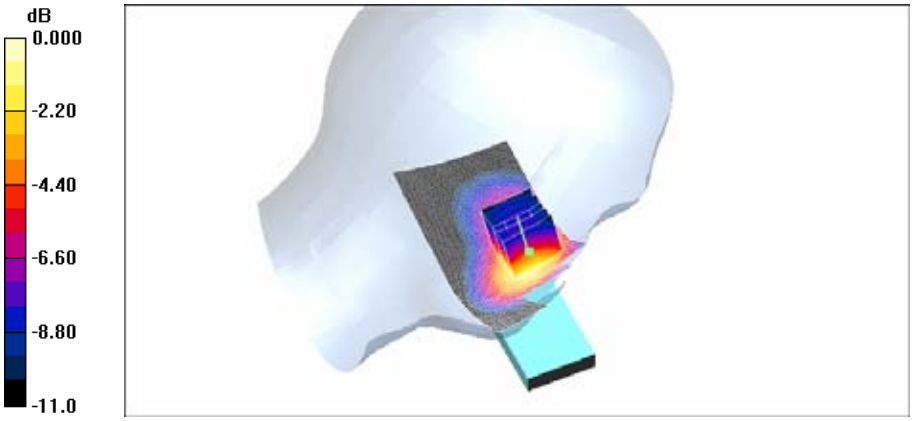
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 777/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.966 mW/g

Left touch 777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.8 V/m; Power Drift = -0.063 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.908 mW/g; SAR(10 g) = 0.583 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.986 mW/g



0 dB = 0.986mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

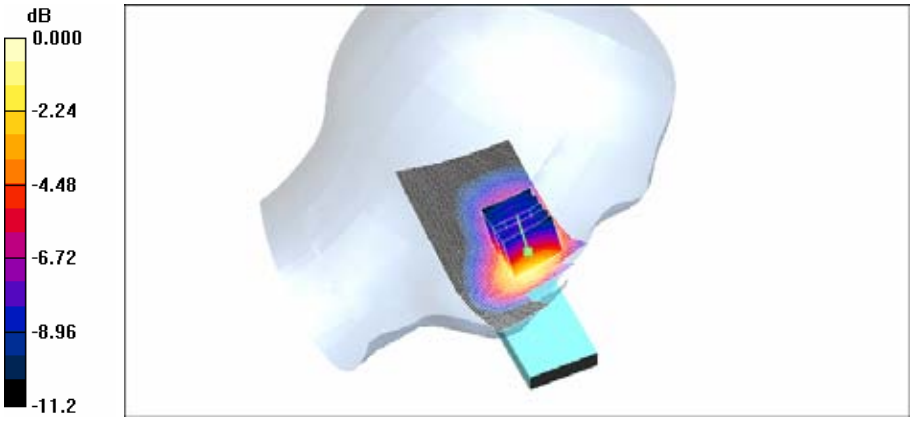
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 777/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.468 mW/g

Left touch 777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.2 V/m; Power Drift = -0.124 dB
Peak SAR (extrapolated) = 0.681 W/kg
SAR(1 g) = 0.434 mW/g; SAR(10 g) = 0.272 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.477 mW/g



0 dB = 0.477mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

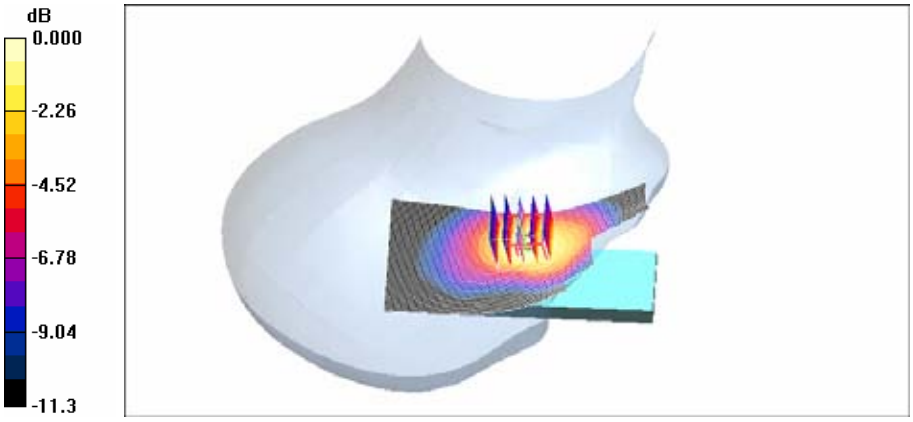
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.865 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 1013/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.22 mW/g

Right touch 1013/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.9 V/m; Power Drift = -0.084 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.693 mW/g
Maximum value of SAR (measured) = 1.20 mW/g



0 dB = 1.20mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

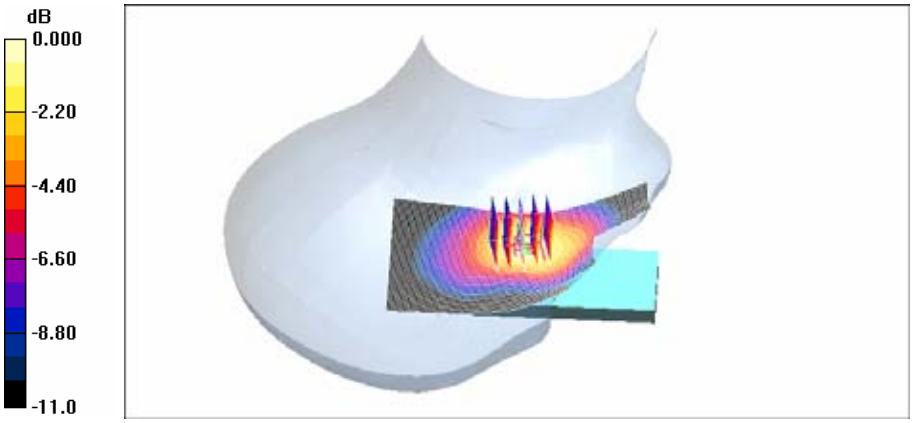
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.865 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 1013/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.42 mW/g

Right touch 1013/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.2 V/m; Power Drift = -0.152 dB
Peak SAR (extrapolated) = 2.03 W/kg
SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.794 mW/g
Maximum value of SAR (measured) = 1.39 mW/g



0 dB = 1.39mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

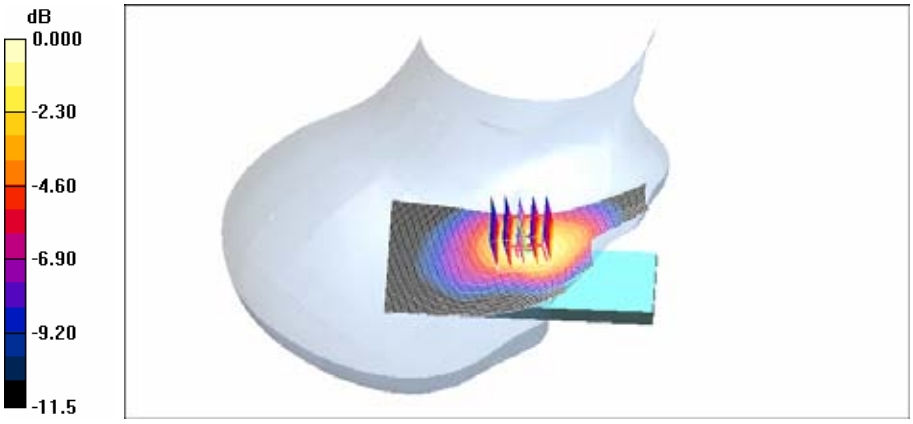
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.33 mW/g

Right touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.0 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.754 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

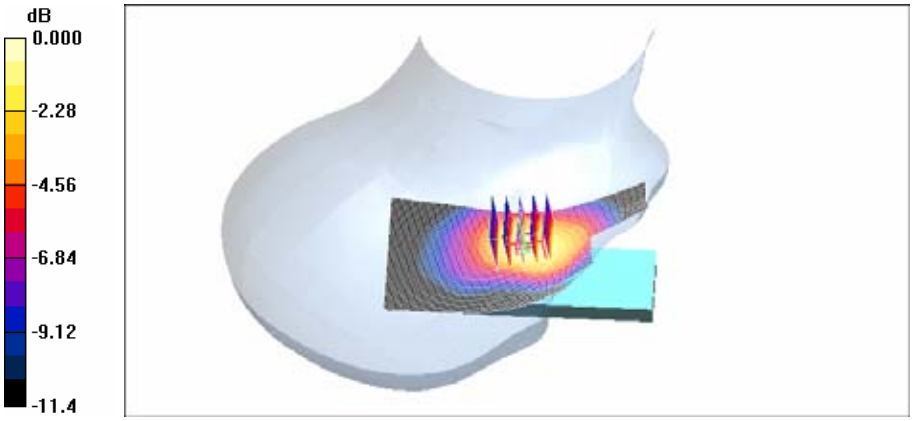
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.797 mW/g

Right touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.9 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.726 mW/g; SAR(10 g) = 0.452 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.788 mW/g



0 dB = 0.788mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

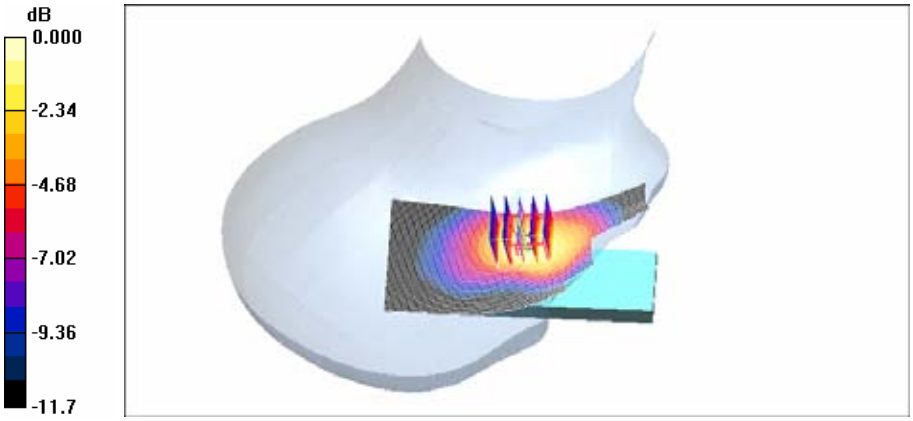
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 777/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.18 mW/g

Right touch 777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.6 V/m; Power Drift = -0.048 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.665 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.18 mW/g



0 dB = 1.18mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

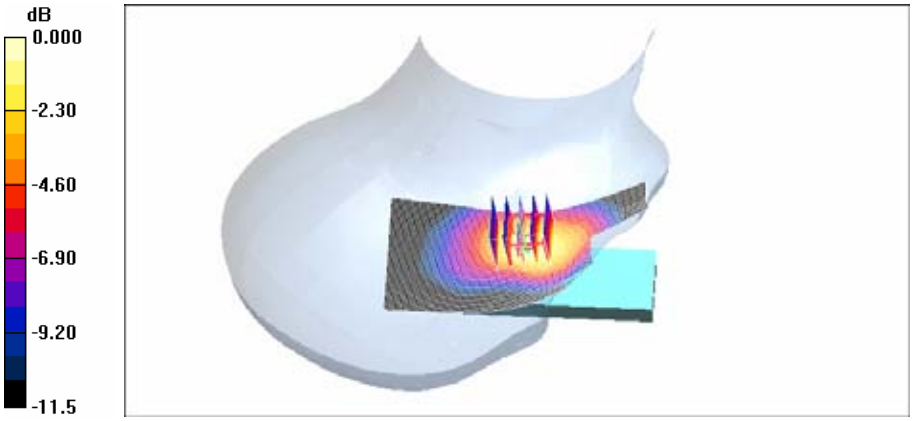
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 777/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.569 mW/g

Right touch 777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.5 V/m; Power Drift = -0.183 dB
Peak SAR (extrapolated) = 0.837 W/kg
SAR(1 g) = 0.523 mW/g; SAR(10 g) = 0.321 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.569 mW/g



0 dB = 0.569mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007
Option	Extended battery

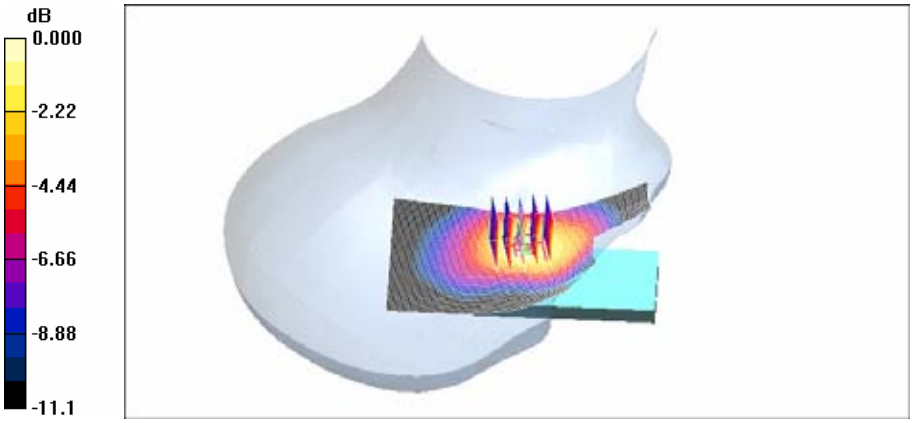
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.865 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 1013/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.39 mW/g

Right touch 1013/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.1 V/m; Power Drift = -0.149 dB
Peak SAR (extrapolated) = 2.00 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.785 mW/g
Maximum value of SAR (measured) = 1.39 mW/g



0 dB = 1.39mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

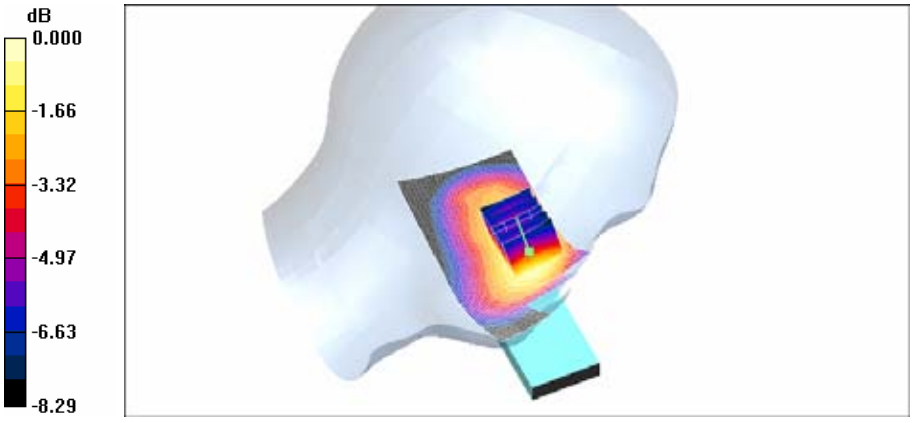
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left tilt 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.305 mW/g

Left tilt 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.0 V/m; Power Drift = -0.193 dB
Peak SAR (extrapolated) = 0.374 W/kg
SAR(1 g) = 0.285 mW/g; SAR(10 g) = 0.207 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.302 mW/g



0 dB = 0.302mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.6 Build 23

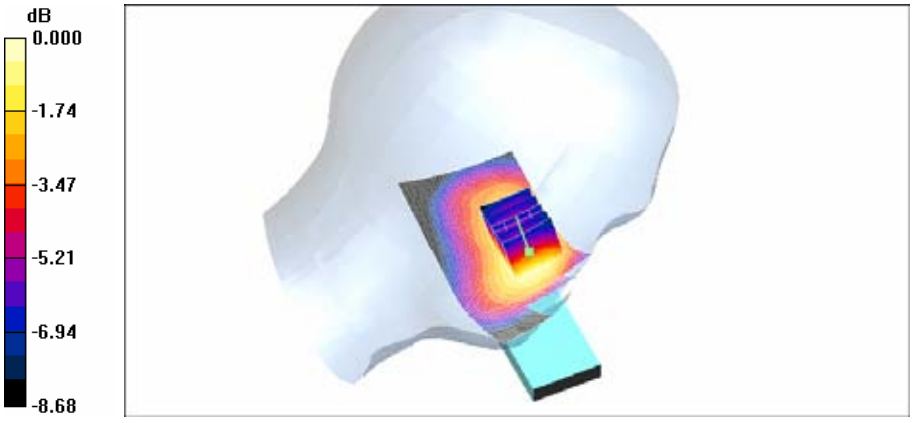
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Left tilt 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.162 mW/g

Left tilt 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.7 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 0.200 W/kg
SAR(1 g) = 0.152 mW/g; SAR(10 g) = 0.110 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.160 mW/g



0 dB = 0.160mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

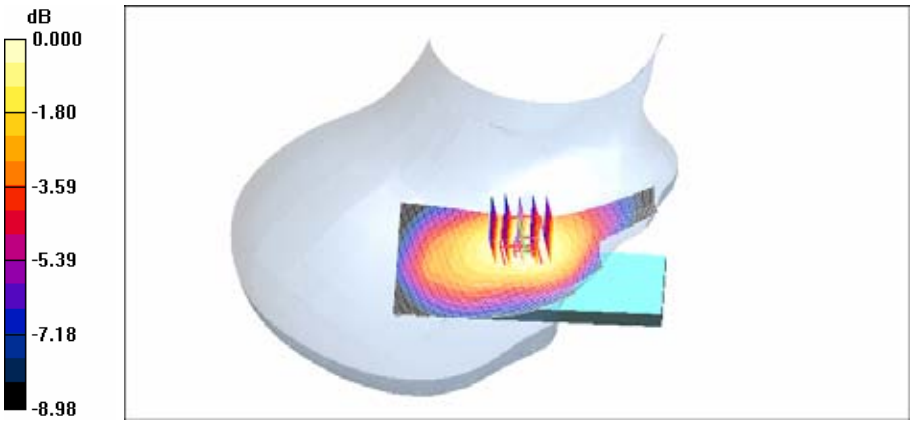
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right tilt 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.305 mW/g

Right tilt 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.8 V/m; Power Drift = -0.073 dB
Peak SAR (extrapolated) = 0.370 W/kg
SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.211 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.303 mW/g



0 dB = 0.303mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.877 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

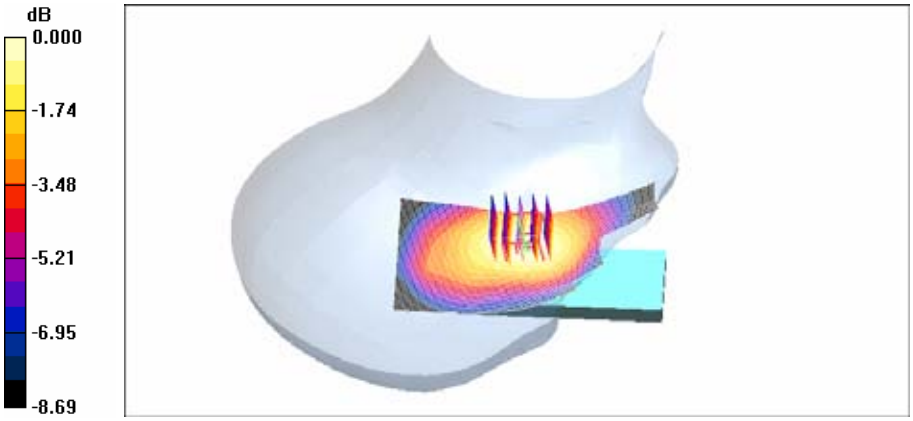
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right tilt 384/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.165 mW/g

Right tilt 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.7 V/m; Power Drift = -0.130 dB
Peak SAR (extrapolated) = 0.199 W/kg
SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.113 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.164 mW/g



0 dB = 0.164mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

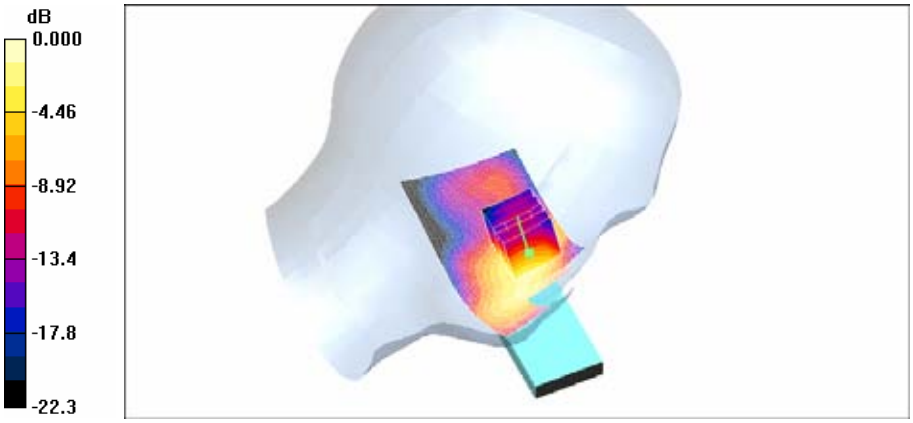
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.765 mW/g

Left touch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.6 V/m; Power Drift = 0.146 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.675 mW/g; SAR(10 g) = 0.370 mW/g
Maximum value of SAR (measured) = 0.752 mW/g



0 dB = 0.752mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

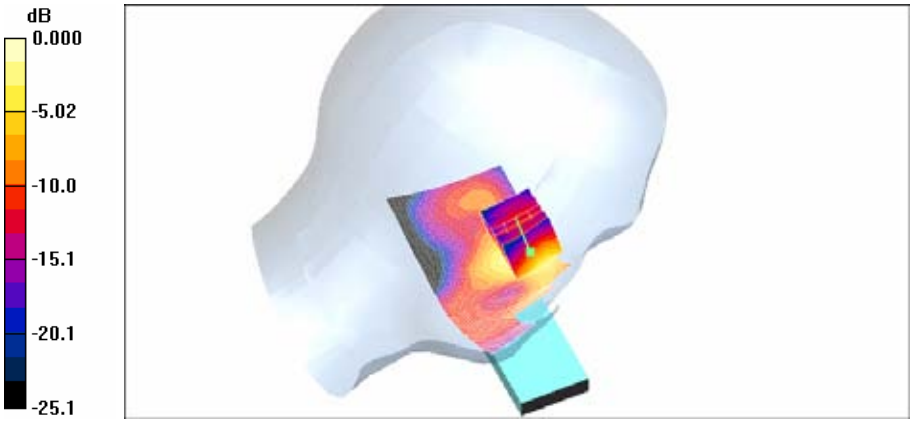
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.062 mW/g

Left touch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.83 V/m; Power Drift = 0.143 dB
Peak SAR (extrapolated) = 0.085 W/kg
SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.030 mW/g
Maximum value of SAR (measured) = 0.059 mW/g



0 dB = 0.059mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1851.25 MHz; σ = 1.41 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

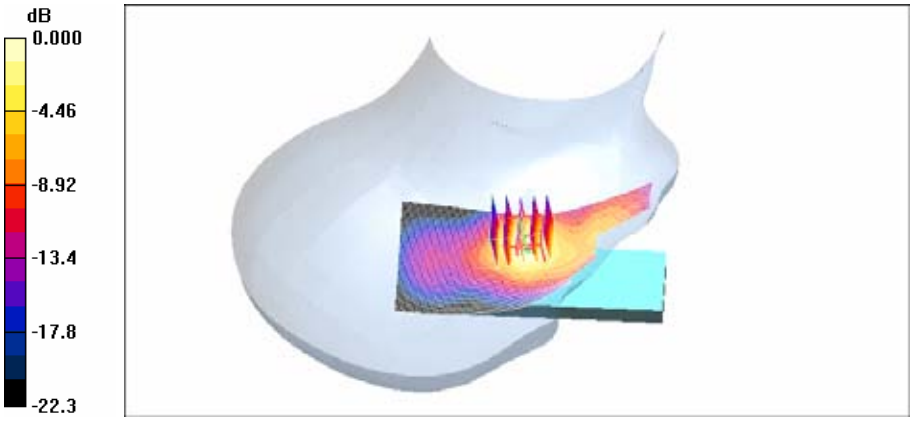
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 25/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.28 mW/g

Right touch 25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.4 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 1.90 W/kg
SAR(1 g) = 1.12 mW/g; SAR(10 g) = 0.570 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.30 mW/g



0 dB = 1.30mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

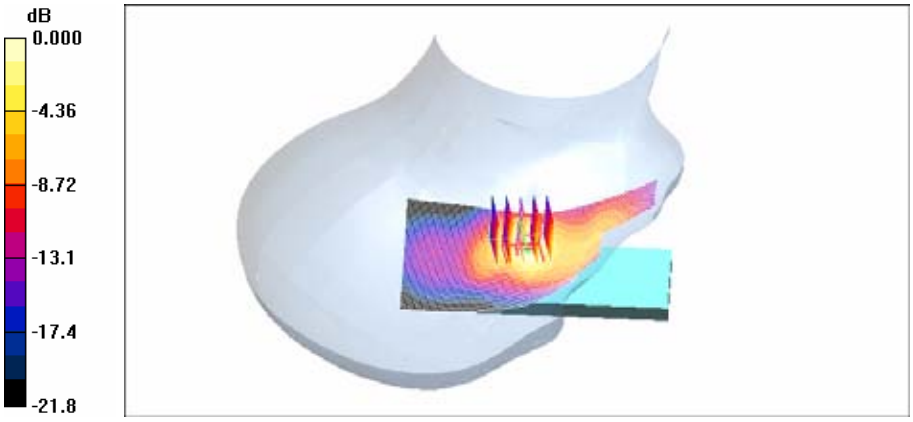
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.958 mW/g

Right touch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.6 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.855 mW/g; SAR(10 g) = 0.438 mW/g
Maximum value of SAR (measured) = 0.984 mW/g



0 dB = 0.984mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

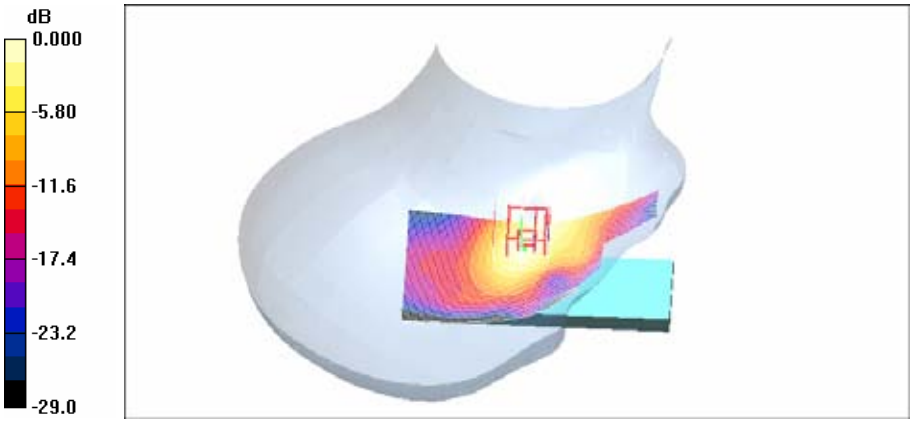
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.084 mW/g

Right touch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.48 V/m; Power Drift = -0.136 dB
Peak SAR (extrapolated) = 0.161 W/kg
SAR(1 g) = 0.082 mW/g; SAR(10 g) = 0.041 mW/g
Maximum value of SAR (measured) = 0.091 mW/g



0 dB = 0.091mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1908.75 MHz; σ = 1.45 mho/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

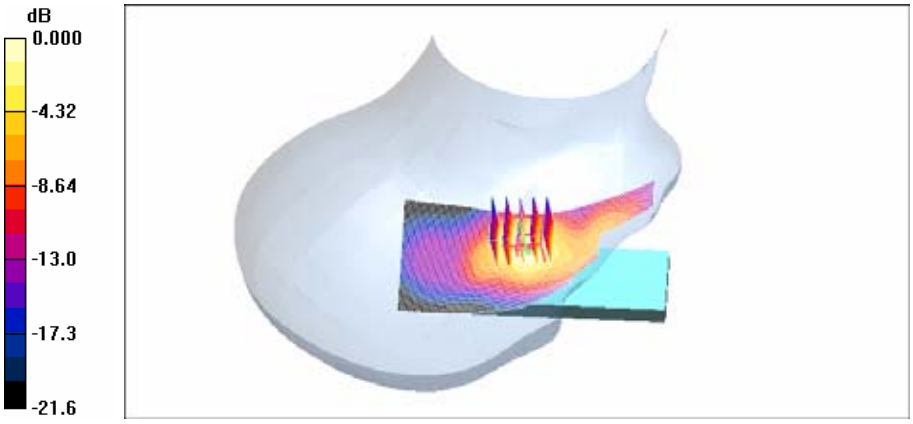
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 1175/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.06 mW/g

Right touch 1175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.8 V/m; Power Drift = -0.154 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.912 mW/g; SAR(10 g) = 0.475 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007
Option	Extended battery

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1851.25 MHz; σ = 1.41 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

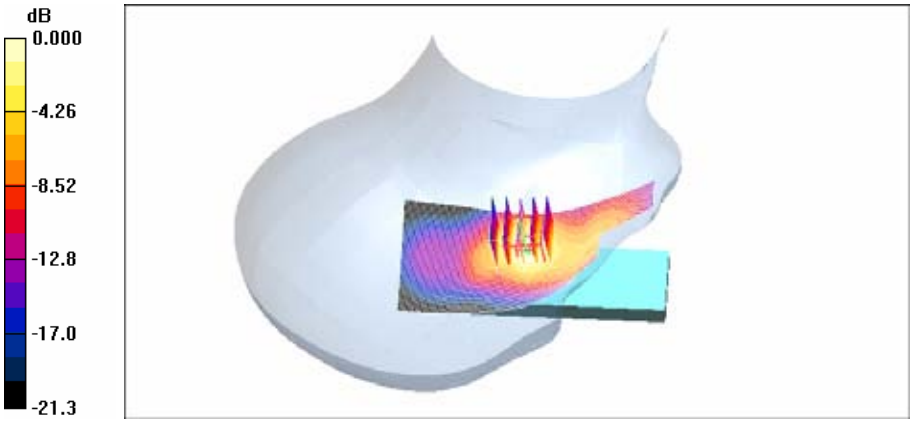
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 25/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.22 mW/g

Right touch 25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.0 V/m; Power Drift = -0.147 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.557 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.23 mW/g



0 dB = 1.23mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

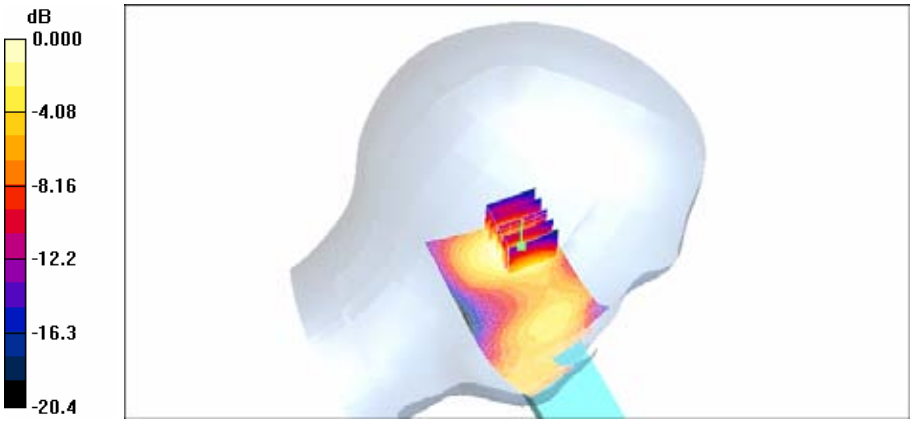
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left tilt 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.164 mW/g

Left tilt 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.14 V/m; Power Drift = -0.058 dB
Peak SAR (extrapolated) = 0.208 W/kg
SAR(1 g) = 0.137 mW/g; SAR(10 g) = 0.081 mW/g
Maximum value of SAR (measured) = 0.149 mW/g



0 dB = 0.149mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

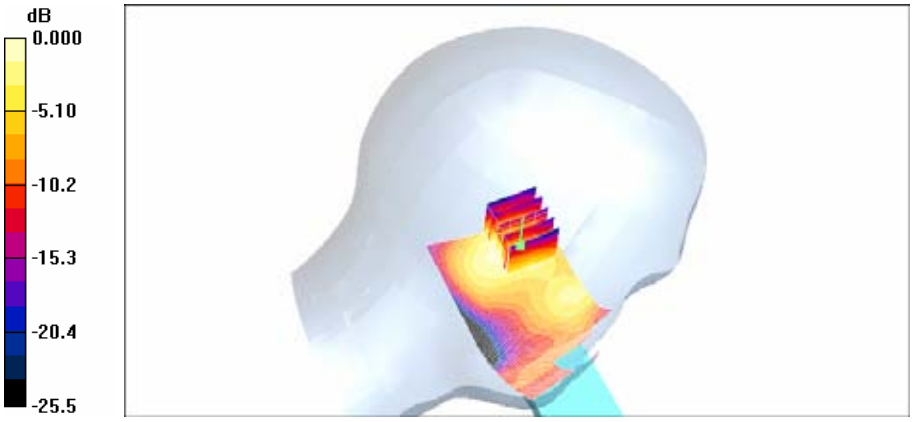
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left tilt 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.019 mW/g

Left tilt 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.38 V/m; Power Drift = -0.029 dB
Peak SAR (extrapolated) = 0.027 W/kg
SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.00974 mW/g
Maximum value of SAR (measured) = 0.019 mW/g



0 dB = 0.019mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

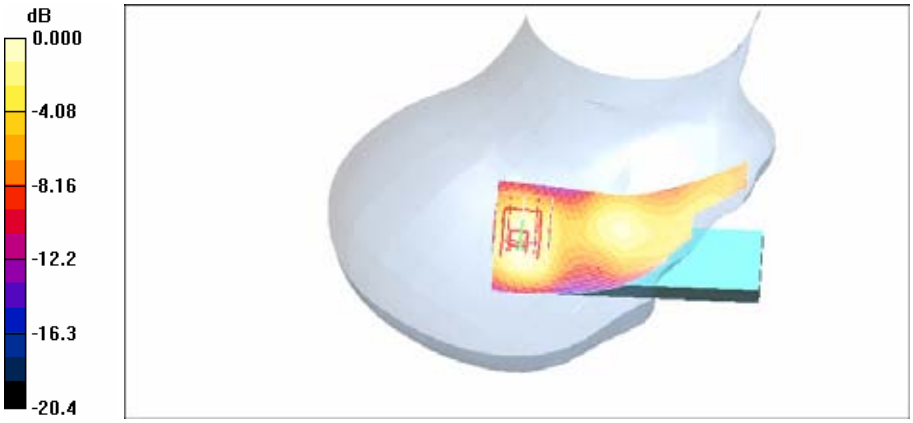
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right tilt 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.122 mW/g

Right tilt 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.56 V/m; Power Drift = -0.076 dB
Peak SAR (extrapolated) = 0.153 W/kg
SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.066 mW/g
Maximum value of SAR (measured) = 0.118 mW/g



0 dB = 0.118mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

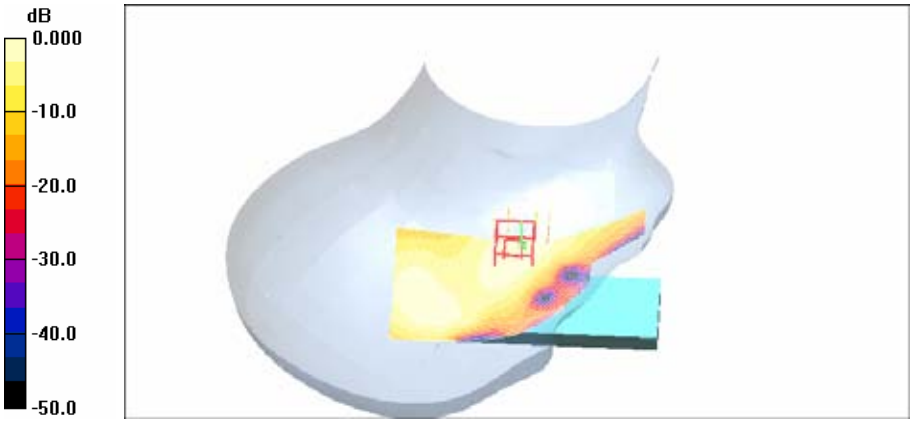
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right tilt 600/Area Scan (51x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.014 mW/g

Right tilt 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.22 V/m; Power Drift = 0.190 dB
Peak SAR (extrapolated) = 0.020 W/kg
SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00693 mW/g
Maximum value of SAR (measured) = 0.014 mW/g



0 dB = 0.014mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.989 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.6 Build 23

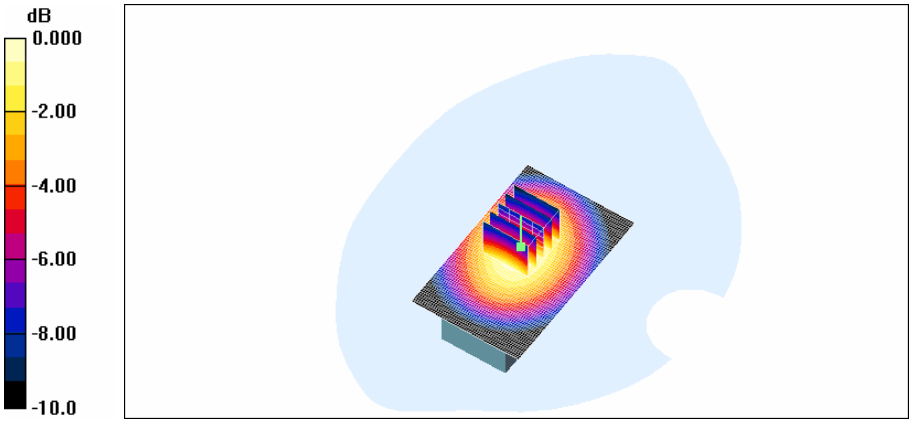
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.71, 6.71, 6.71); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA Body 384/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.603 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.5 V/m; Power Drift = -0.201 dB
Peak SAR (extrapolated) = 0.753 W/kg
SAR(1 g) = 0.558 mW/g; SAR(10 g) = 0.392 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.593 mW/g



0 dB = 0.593mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.989 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.6 Build 23

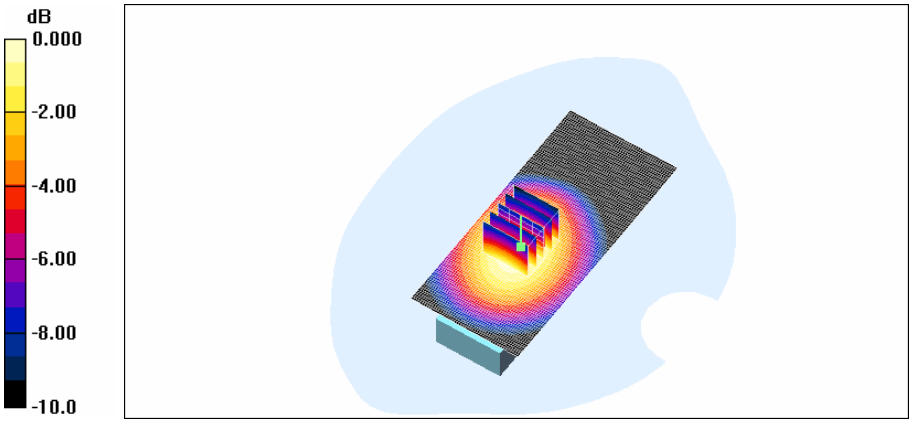
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.71, 6.71, 6.71); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA Body 384/Area Scan (51x111x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.393 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.2 V/m; Power Drift = -0.194 dB
Peak SAR (extrapolated) = 0.483 W/kg
SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.252 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.382 mW/g



0 dB = 0.382mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007
Option	Extended battery

DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.989 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.6 Build 23

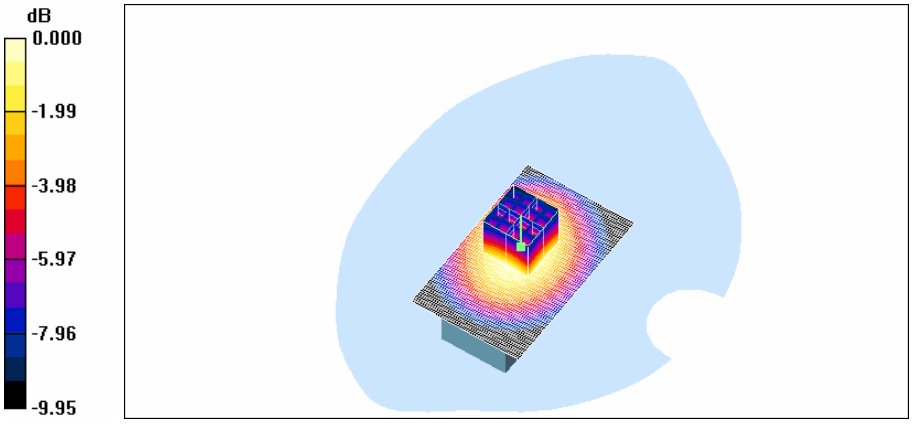
DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.71, 6.71, 6.71); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA Body 384/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.594 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.2 V/m; Power Drift = -0.147 dB
Peak SAR (extrapolated) = 0.728 W/kg
SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.384 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.578 mW/g



0 dB = 0.578mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

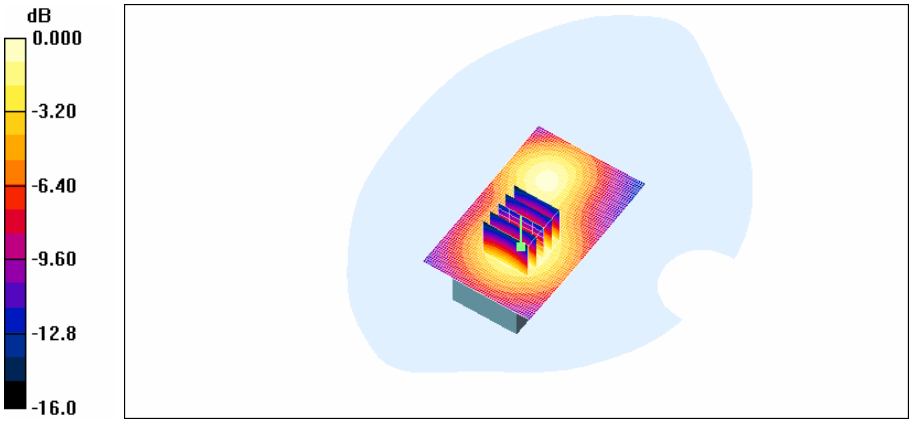
DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.8, 4.8, 4.8); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

PCS Body 600/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.289 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.5 V/m; Power Drift = 0.085 dB
Peak SAR (extrapolated) = 0.384 W/kg
SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.164 mW/g
Maximum value of SAR (measured) = 0.297 mW/g



0 dB = 0.297mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

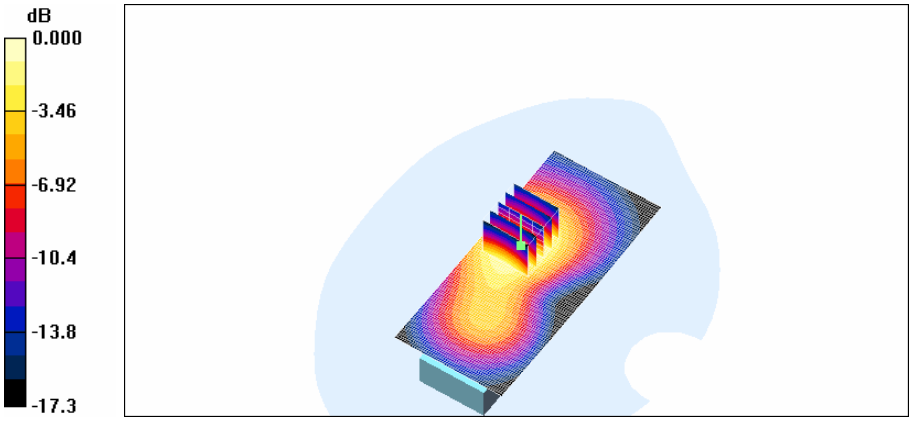
DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.8, 4.8, 4.8); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

PCS Body 600/Area Scan (51x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.118 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.00 V/m; Power Drift = -0.180 dB
Peak SAR (extrapolated) = 0.153 W/kg
SAR(1 g) = 0.104 mW/g; SAR(10 g) = 0.063 mW/g
Maximum value of SAR (measured) = 0.114 mW/g



0 dB = 0.114mW/g

Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007
Option	Extended battery

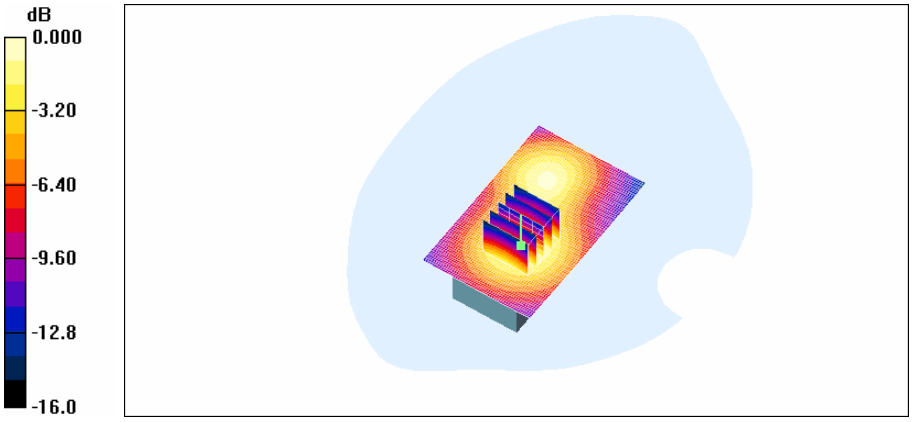
DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.8, 4.8, 4.8); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

PCS Body 600/Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.277 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = 0.102 dB
Peak SAR (extrapolated) = 0.369 W/kg
SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.161 mW/g
Maximum value of SAR (measured) = 0.289 mW/g



0 dB = 0.289mW/g

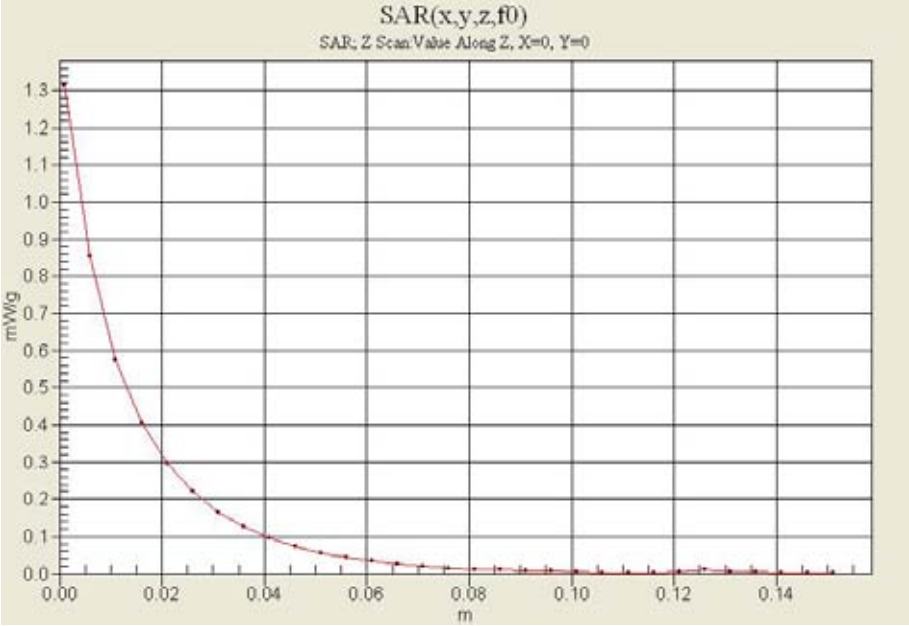
Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	Out
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: CDMA 835MHz FCC; Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium parameters used: f = 825 MHz; σ = 0.865 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 1013/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.32 mW/g



Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Mar.27, 2007

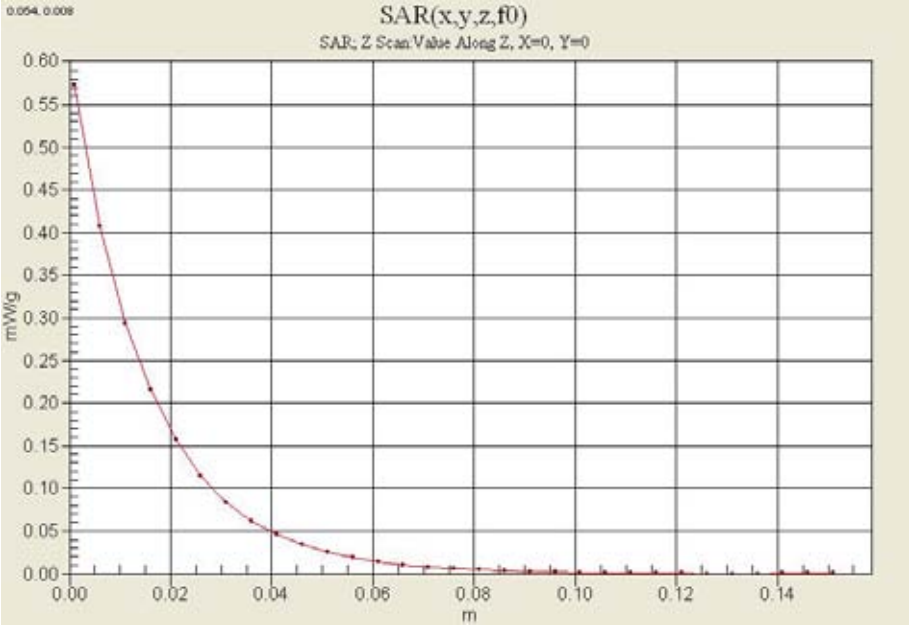
DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.989 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.6 Build 23

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.71, 6.71, 6.71); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn446; Calibrated: 2006-03-17
- Phantom: SAM 835/900 MHz; Type: SAM

CDMA Body 384/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.574 mW/g



Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

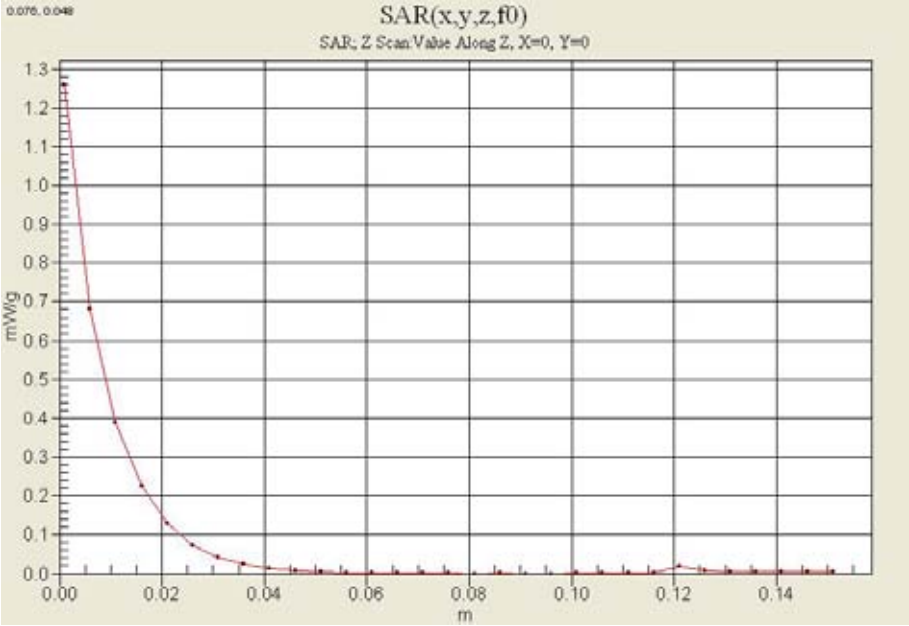
DUT: PN-310; Type: Folder; Serial: #1
Program Name: PN-310-ClassII

Communication System: PCS 1900MHz FCC; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1851.25 MHz; σ = 1.41 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 25/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.26 mW/g



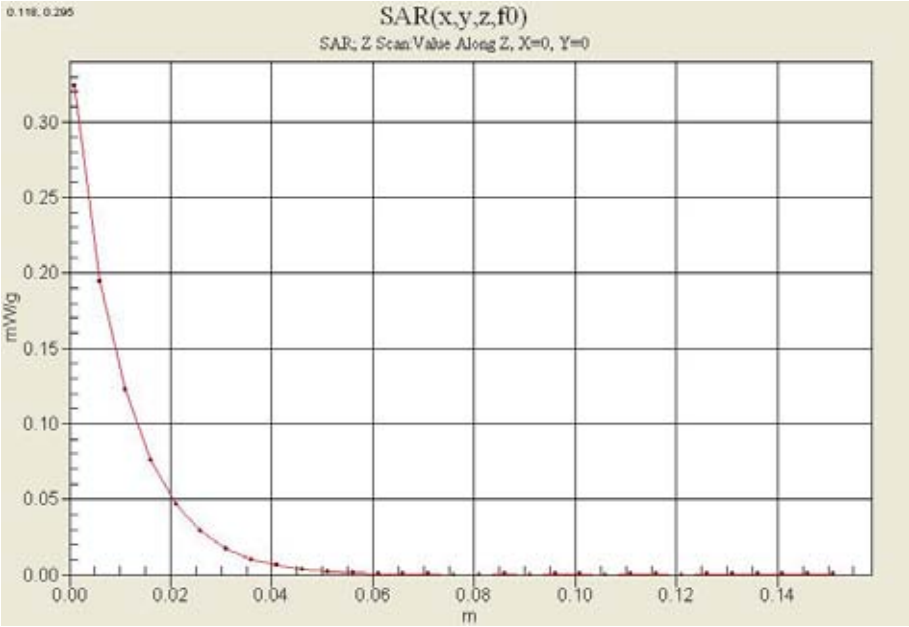
Test Laboratory:	HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD
EUT Type:	Dual-Band CDMA Phone(CDMA/PCS CDMA)
Antenna Position	In
Liquid Temperature:	21.5 ℃
Ambient Temperature:	21.7 ℃
Test Date:	Mar.28, 2007

DUT: PN-310 (Body); Type: Folder; Serial: #1
Program Name: PN-310-Class II

Communication System: PCS 1900MHz FCC; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.8, 4.8, 4.8); Calibrated: 2006-08-25
- Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

PCS Body 600/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.324 mW/g



Attachment 2. – Dipole Validation Plots

■ Validation Data (835 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 21.6

Test Date: Mar.27, 2007

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441

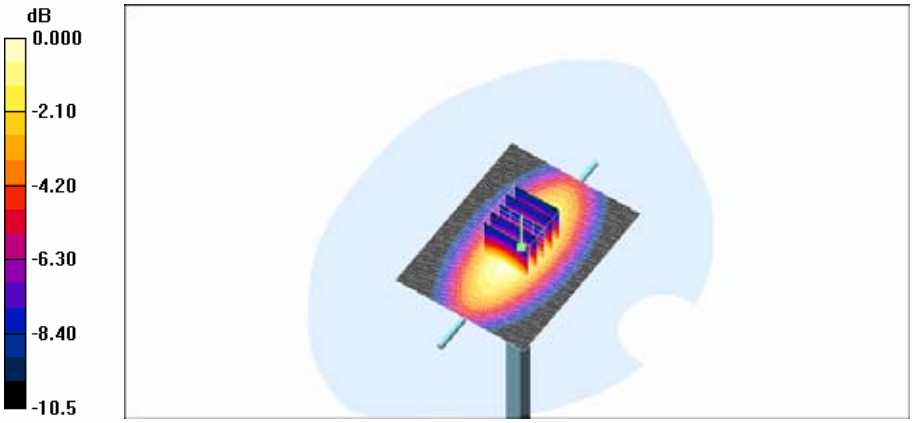
Program Name: Validation

Medium parameters used: f = 835 MHz; σ = 0.875 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.73, 6.73, 6.73); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835 MHz/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 10.1 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 110.8 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 13.6 W/kg
SAR(1 g) = 9.22 mW/g; SAR(10 g) = 6.05 mW/g
Maximum value of SAR (measured) = 9.93 mW/g



0 dB = 9.93mW/g

■ Validation Data (1900 MHz Head)

Test Laboratory: HYUNDAI CALIBRATION & CERTIFICATION TECHNOLOGIES CO., LTD

Input Power 1W (30dBm)

Liquid Temp: 21.5

Test Date: Mar.28, 2007

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032

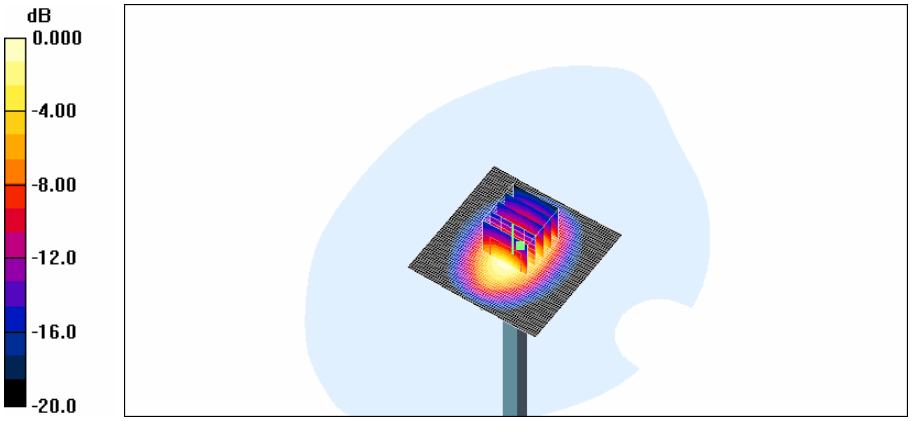
Program Name: Validation

Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ;Measurement SW: DASY4, V4.7 Build 53

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.6, 5.6, 5.6); Calibrated: 2006-08-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2006-11-15
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 49.3 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 192.3 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 73.0 W/kg
SAR(1 g) = 41.3 mW/g; SAR(10 g) = 21.4 mW/g
Maximum value of SAR (measured) = 46.3 mW/g



0 dB = 46.3mW/g

■ Dielectric Parameter (835 MHz Head)

Title	PN-310
SubTitle	CDMA835(Head)
Test Date	Mar.27, 2007

Frequency	e'	e''
800000000	41.4697	18.8394
805000000	41.3956	18.8449
810000000	41.3393	18.7921
815000000	41.2675	18.7975
820000000	41.2176	18.7812
825000000	41.1494	18.8495
830000000	41.0840	18.8271
835000000	41.0485	18.8335
840000000	41.0246	18.8783
845000000	40.9991	18.8401
850000000	40.9780	18.8526
855000000	40.9004	18.8809
860000000	40.9390	18.8455
865000000	40.8888	18.8559
870000000	40.8394	18.8660
875000000	40.7976	18.8638
880000000	40.7590	18.8357
885000000	40.6649	18.7690
890000000	40.5870	18.8229
895000000	40.5325	18.7658
900000000	40.4632	18.7235

■ Dielectric Parameter (835 MHz Body)

Title	PN-310
SubTitle	CDMA835(Body)
Test Date	Mar.27, 2007

Frequency	e'	e''
800000000	53.5931	21.3521
805000000	53.5481	21.3329
810000000	53.5253	21.3738
815000000	53.5216	21.3064
820000000	53.4248	21.3060
825000000	53.3671	21.2864
830000000	53.3590	21.2936
835000000	53.3588	21.2591
840000000	53.2612	21.2271
845000000	53.2598	21.2152
850000000	53.2336	21.2232
855000000	53.2243	21.1274
860000000	53.1867	21.1289
865000000	53.1664	21.1455
870000000	53.1152	21.0771
875000000	53.1181	21.1221
880000000	53.0720	21.0631
885000000	53.0401	21.0257
890000000	53.0071	20.9837
895000000	52.9857	21.0109
900000000	52.9511	21.0012

■ Dielectric Parameter (1900 MHz Head)

Title	PN-310
SubTitle	PCS1900(Head)
Test Date	Mar.28, 2007

Frequency	e'	e''
1800000000	39.4796	13.4736
1810000000	39.4063	13.5451
1820000000	39.4190	13.6159
1830000000	39.4818	13.6375
1840000000	39.5720	13.7169
1850000000	39.6622	13.7406
1860000000	39.6750	13.7212
1870000000	39.6559	13.7217
1880000000	39.5588	13.6545
1890000000	39.4187	13.6545
1900000000	39.2420	13.6460
1910000000	39.0922	13.6957
1920000000	38.9519	13.7343
1930000000	38.9200	13.8107
1940000000	38.9058	13.8846
1950000000	38.9482	13.9484
1960000000	39.0706	14.0155
1970000000	39.1590	14.0063
1980000000	39.2010	14.0150
1990000000	39.1890	13.9944
2000000000	39.1033	13.9675

■ Dielectric Parameter (1900 MHz Body)

Title	PN-310
SubTitle	PCS1900(Body)
Test Date	Mar.28, 2007

Frequency	e'	e''
1800000000	52.3803	14.4219
181000000090	52.2939	14.4888
182000000090	52.2370	14.5707
183000000089	52.1887	14.6385
184000000089	52.1878	14.7125
185000000089	52.2529	14.7725
186000000089	52.2667	14.7755
187000000088	52.2435	14.8001
188000000088	52.2452	14.8100
189000000088	52.1880	14.7966
190000000088	52.0816	14.8028
191000000087	51.9771	14.8370
192000000087	51.8744	14.8671
193000000087	51.7699	14.8890
194000000086	51.7340	14.9605
195000000086	51.7435	15.0089
196000000086	51.7199	15.0697
197000000086	51.7403	15.1331
198000000086	51.7722	15.1641
199000000086	51.7657	15.1447
200000000085	51.7875	85.4942

Attachment 3. – Probe Calibration Data

Calibration Laboratory of
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Engineering AG
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Accreditation No.: SCS 108

Client H-CT (Dymstec)

Certificate No: ET3-1798_Aug06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1798
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	August 25, 2006
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: August 26, 2006

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1798

Manufactured:	August 14, 2003
Last calibrated:	April 14, 2005
Recalibrated:	August 25, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1798 August 25, 2006

DASY - Parameters of Probe: ET3DV6 SN:1798

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**1.97** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**98** mV
NormY	**1.79** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**92** mV
NormZ	**2.05** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	7.5	3.9
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	11.6	6.6
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

Sensor Offset

Probe Tip to Sensor Center	**2.7** mm

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

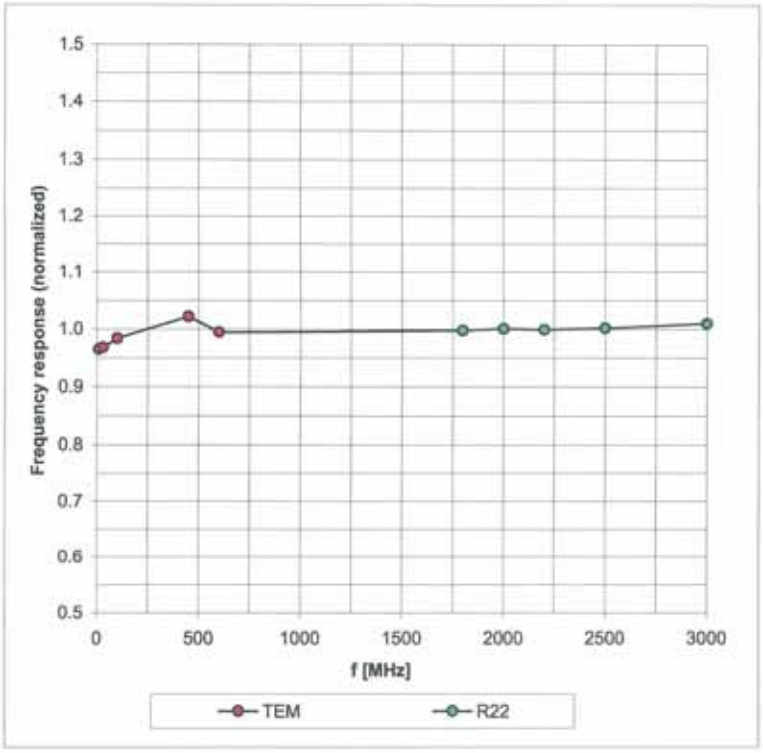
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1798 August 25, 2006

Frequency Response of E-Field

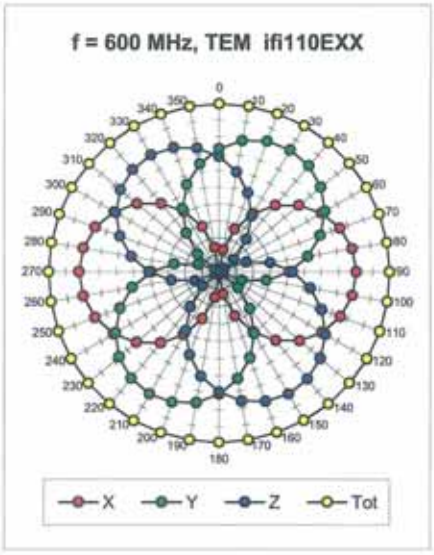
(TEM-Cell:ifi110 EXX, Waveguide: R22)

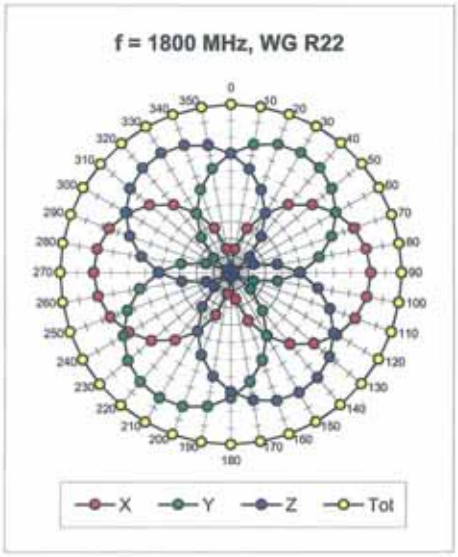


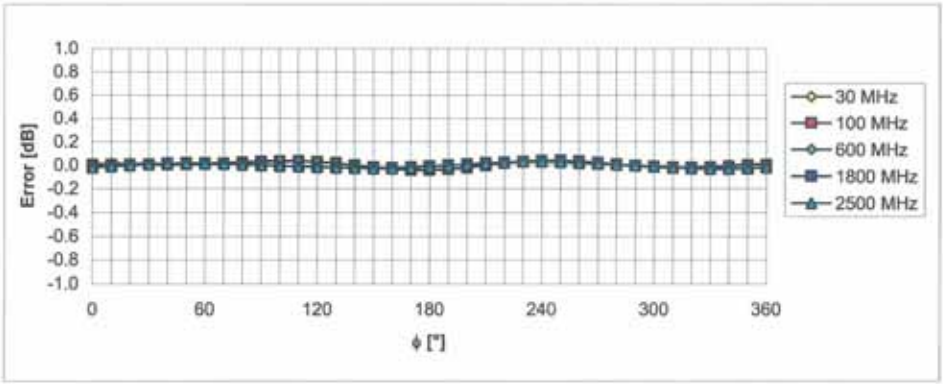
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ET3DV6 SN:1798 August 25, 2006

Receiving Pattern (ϕ), ϑ = 0°





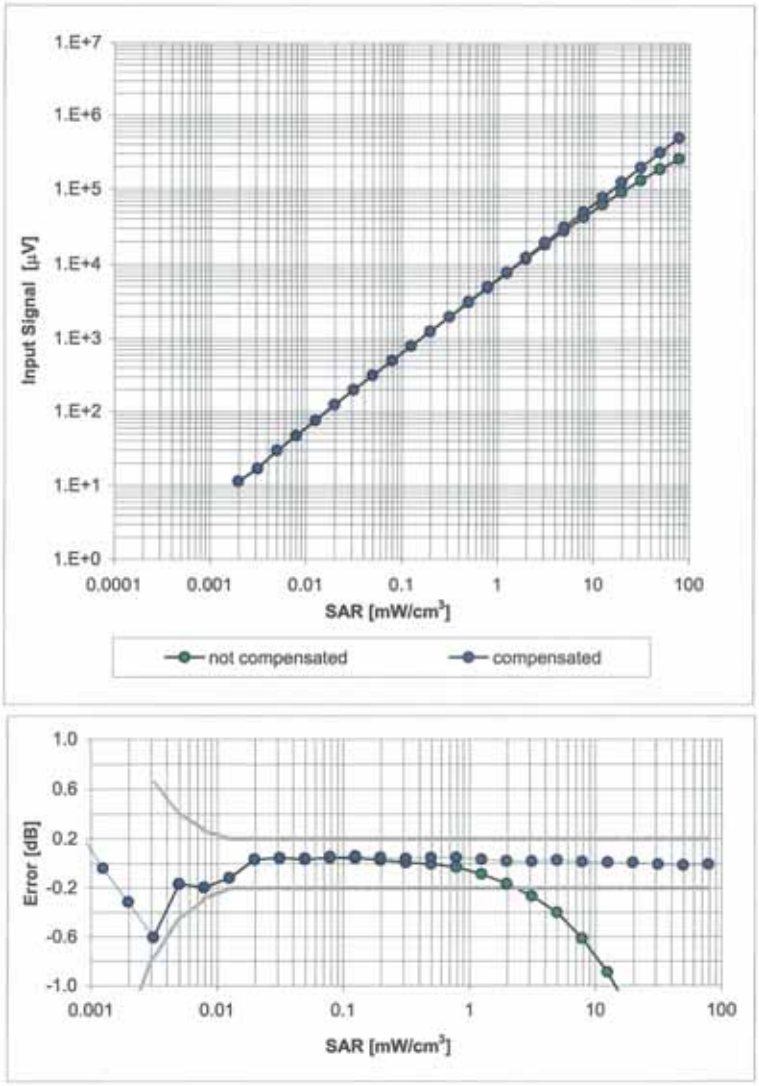


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1798 August 25, 2006

Dynamic Range f(SAR_{head})

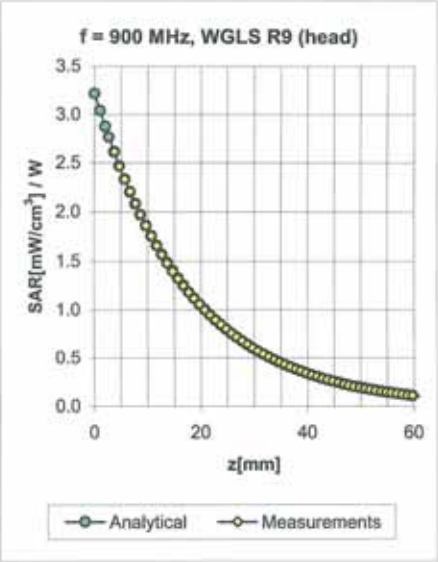
(Waveguide R22, f = 1800 MHz)

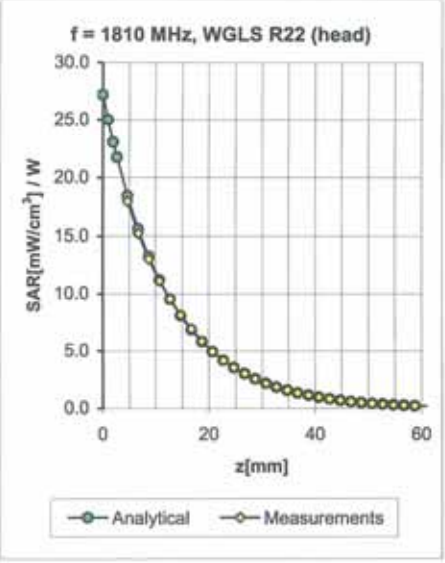


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1798 August 25, 2006

Conversion Factor Assessment





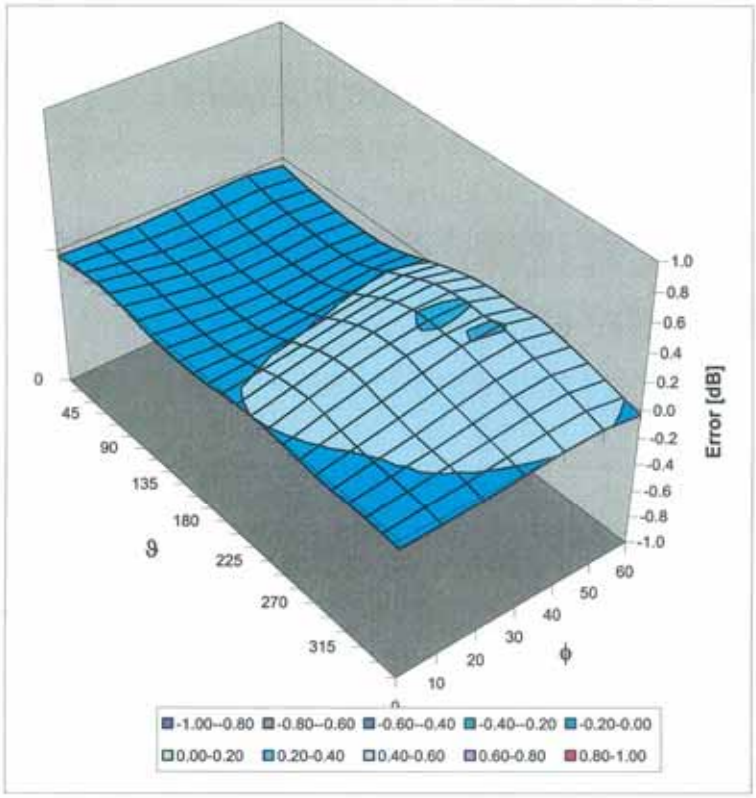
f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.35	1.82	7.59 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.54	1.80	6.73 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.78	5.60 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.77	5.25 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.55	2.23	4.73 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.24	1.85	7.86 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.46	2.02	6.71 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.64	2.69	4.80 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.45	1.82	4.37 ± 11.8% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1798 August 25, 2006

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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IMPORTANT NOTICE

USAGE OF PROBES IN ORGANIC SOLVENTS

Diethylene Gycol Monobuthy Ether (the basis for liquids above 1 GHz), as many other organic solvents, is a very effective softener for synthetic materials. These solvents can cause irreparable damage to certain SPEAG products, except those which are explicitly declared as compliant with organic solvents.

Compatible Probes:
- ET3DV6
- ET3DV6R
- ES3DVx
- EX3DVx
- ER3DV6
- H3DV6

Important Note for ET3DV6 Probes:
The ET3DV6 probes shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

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Schmid & Partner Engineering AG

Technical Note 01.06.15-1A October 2003

Attachment 4. – Dipole Calibration Data

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

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Accreditation No.: SCS 108

Client H-CT (Dymstec)

Certificate No: D835V2-441_Aug06

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 441
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	August 14, 2006
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 17, 2006

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

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 6.7 jΩ
Return Loss	- 23.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.376 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 09, 2001

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 6.7 jΩ
Return Loss	- 23.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.376 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 09, 2001

DASY4 Validation Report for Head TSL

Date/Time: 14.08.2006 13:00:04

Test Laboratory: SPEAG, Zurich, Switzerland

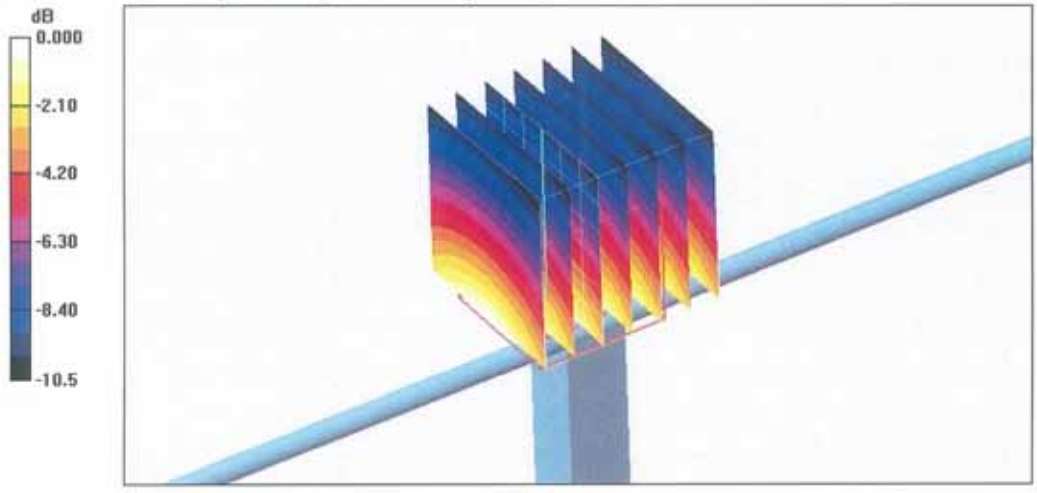
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 441

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL900;
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

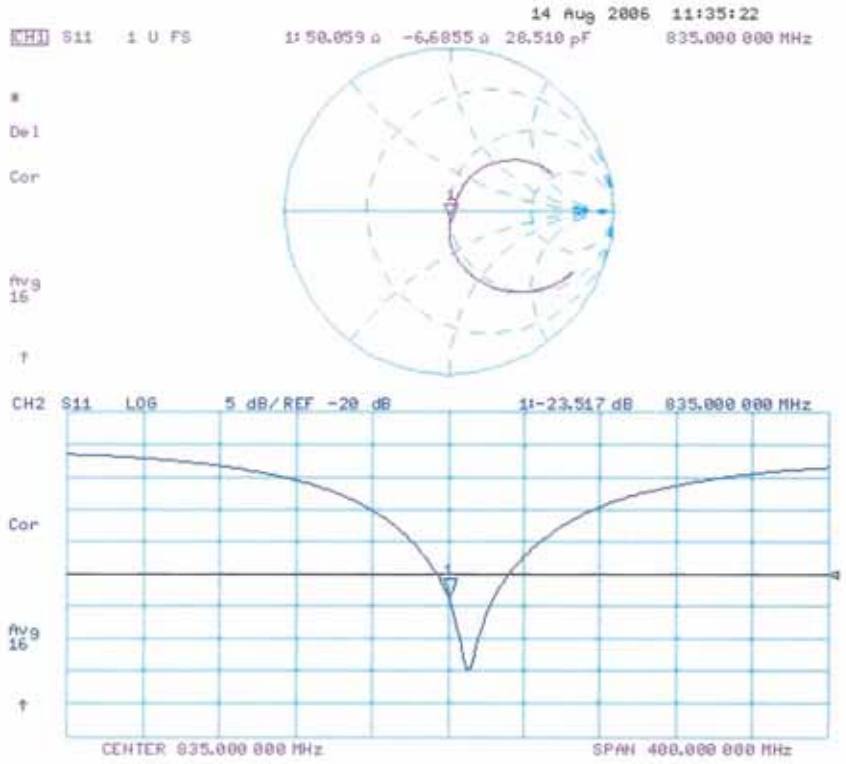
- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.067 dB
Peak SAR (extrapolated) = 3.50 W/kg
SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (measured) = 2.53 mW/g



0 dB = 2.53mW/g

Impedance Measurement Plot for Head TSL



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

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Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **H-CT (Dymstec)**

Certificate No: **D1900V2-5d032_Feb07**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d032
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	February 20, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DV6	SN: 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 21, 2007

Calibration Laboratory of
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.8 ± 6 %	1.43 mho/m ± 6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.55 mW / g
SAR normalized	normalized to 1W	38.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**37.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.03 mW / g
SAR normalized	normalized to 1W	20.1mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**19.8 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω + 3.3 jΩ
Return Loss	- 26.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 17, 2003

DASY4 Validation Report for Head TSL

Date/Time: 20.02.2007 14:35:32

Test Laboratory: SPEAG, Zurich, Switzerland

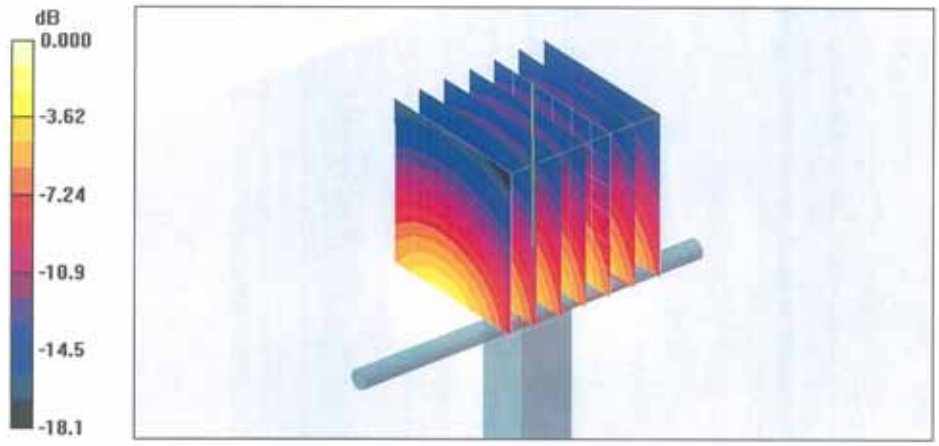
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.97, 4.97, 4.97); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.3 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.55 mW/g; SAR(10 g) = 5.03 mW/g
Maximum value of SAR (measured) = 10.5 mW/g



0 dB = 10.5mW/g

Impedance Measurement Plot for Head TSL