SAR TEST REPORT

HCT CO., LTD

EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN		
FCC ID:	APYNAR0066		
Model:	PB20ZU	Trade Name	SHARP CORPORATION
Date of Issue:	Feb.19, 2010		
Test report No.:	HCTA1002FS04		
Test Laboratory:	HCT CO., LTD. SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA TEL: +82 31 639 8565 FAX: +82 31 639 8525		
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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	Report prepared by : Sun-Hee Kim Test Engineer of SAR Part	Approved by : Jae-Sang So Manager of SAR Part	

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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.

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. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). 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 NCRP, 1986, Bethesda, MD 20814. 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 of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) 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.

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	Slide Dual-band CDMA Phone with Bluetooth/WLAN
FCC ID	APYNAR0066
Model(s)	PB20ZU
Trade Name	SHARP CORPORATION
Serial Number(s)	#1
Application Type	Certification
Modulation(s)	CDMA835/PCS1900/WLAN
Tx Frequency	824.70 - 848.31 MHz (CDMA) 1 851.25 - 1908.75 MHz (PCS CDMA) 2 412- 2 462 MHz (DSSS/ OFDM)
Rx Frequency	869.70 - 893.31 MHz (CDMA) 1 931.25 - 1 988.75 MHz (PCS CDMA) 2 412- 2 462 MHz (DSSS/ OFDM)
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)
Production Unit or Identical Prototype	Production Unit
Max SAR	0.781 W/kg CDMA835 Head SAR / 0.755 W/kg CDMA835 Body SAR 1.29 W/kg PCS1900 Head SAR / 0.402 W/kg PCS1900 Body SAR 0.246 W/kg Wi-Fi 802.11b
Date(s) of Tests	Feb. 17, 2010 ~ Feb. 18, 2010
Antenna Type	Intenna

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 Figure.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 IV 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.

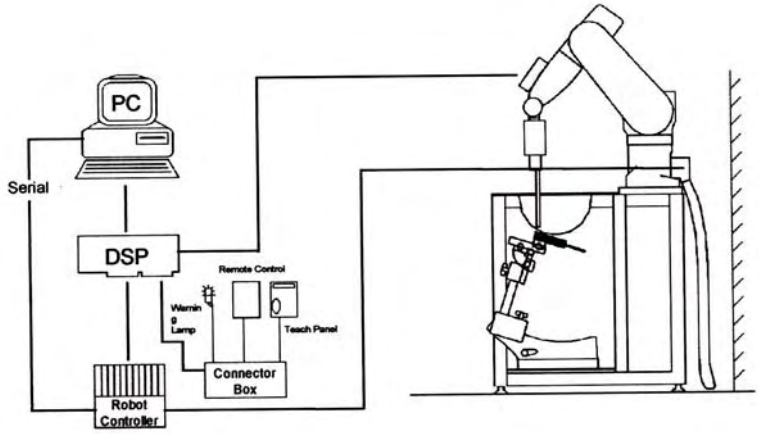

Figure 3.1 HCT SAR Lab. Test Measurement Set-up

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

3.2 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 μW/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

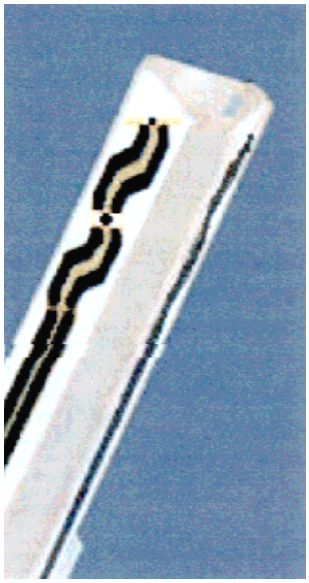

Figure 3.3 ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration 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 multifiber 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 with an accuracy better than ± 10 %. The spherical isotropy was evaluated with the proper procedure 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)

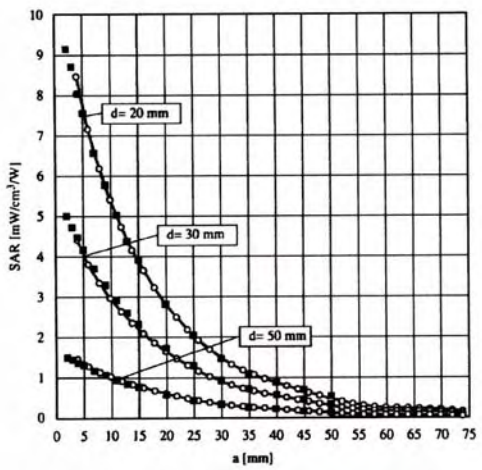

Figure 3.4 E-Field and Temperature measurements at 900 MHz

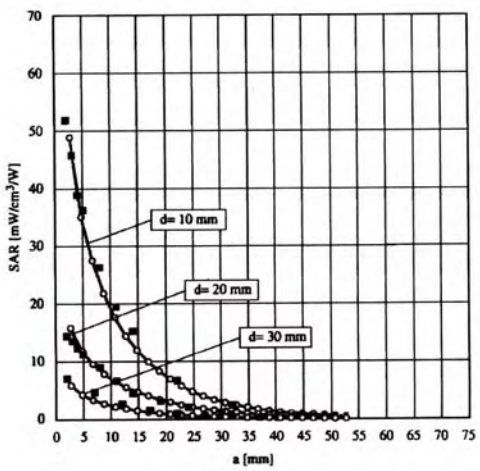

Figure 3.5 E-Field and temperature measurements at 1.8 GHz

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 like below;

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

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. 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.

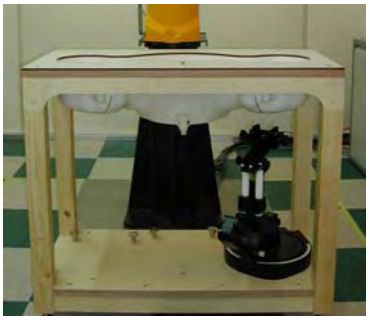

Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm
Filling Volume	about 30 L
Dimensions	810 mm x 1 000 mm x 500 mm (H x L x W)

3.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, 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. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 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.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1 900		2 450	
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
SPEAG	SAM Phantom	-	N/A	N/A	N/A
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
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE3	446	May 22, 2009	Annual	May 22, 2010
SPEAG	DAE4	869	Sep 18, 2009	Annual	Sep 18, 2010
SPEAG	DAE3	466	July 21, 2009	Annual	July 21, 2010
SPEAG	E-Field Probe ET3DV6	1631	Jun. 24, 2009	Annual	Jun. 24, 2010
SPEAG	E-Field Probe ET3DV6	1609	Mar. 17, 2009	Annual	Mar. 17, 2010
SPEAG	E-Field Probe ES3DV3	3161	July 22, 2009	Annual	July 22, 2010
SPEAG	Validation Dipole D450V2	1007	July 15, 2008	Biennial	July 15, 2010
SPEAG	Validation Dipole D835V2	441	May 25, 2009	Annual	May 25, 2010
SPEAG	Validation Dipole D900V2	130	Aug. 24, 2009	Annual	Aug. 24, 2010
SPEAG	Validation Dipole D1800V2	2d007	May 20, 2008	Biennial	May 20, 2010
SPEAG	Validation Dipole D1900V2	5d032	July 20, 2009	Annual	July 20, 2010
SPEAG	Validation Dipole D2450V2	743	Aug. 27, 2008	Biennial	Aug. 27, 2010
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 05, 2009	Annual	Nov. 05, 2010
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 05, 2009	Annual	Nov. 05, 2010
HP	Dielectric Probe Kit 85070C	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 05, 2009	Annual	Nov. 05, 2010
R&S	Base Station CMU200	110740	July 26, 2009	Annual	July 26, 2010
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2010	Annual	Feb. 10, 2011
HP	Signal Generator E4438C	MY42082646	Dec. 24, 2009	Annual	Dec. 24, 2010
HP	Network Analyzer 8753C	3310J01394	Dec. 04, 2009	Annual	Dec. 04, 2010
Tescom	TC-3000/ Bluetooth	3000A490112	Jan. 11, 2010	Annual	Jan. 11, 2011

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. 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 (1 g 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. 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.

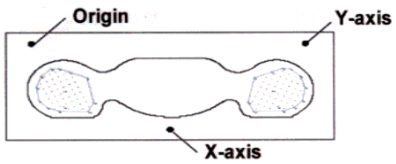

Figure 4.1 SAR Measurement Point in Area Scan

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 1528-2003 illustration below.

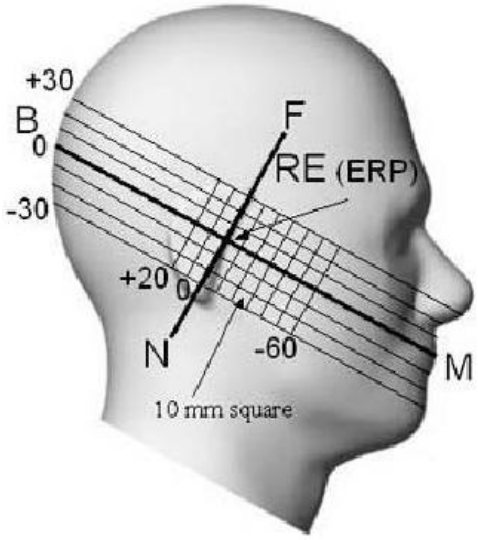

Figure 5.1 Side view of the phantom

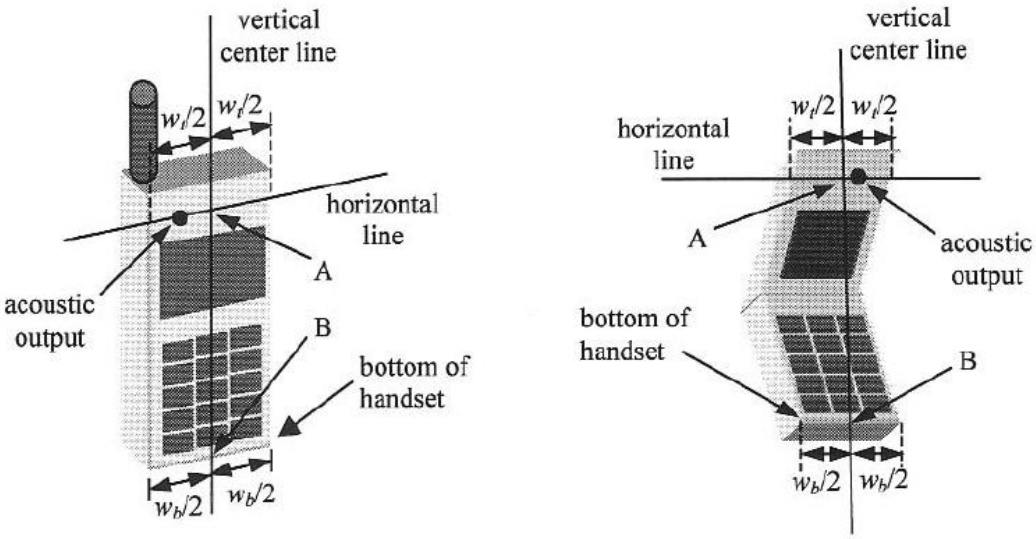

Figure 5.2 Handset vertical and horizontal reference lines

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.

Since this EUT does not supply any body worn accessory to the end user a distance of 2.0 cm from the EUT back surface to the liquid interface is configured for the generic test.

"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. Worstcase 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 %.

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 dB to ± 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ± 2 dB can be expected.

According to CENELEC, 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	1.81	3.28	3.28	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		24.57	
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**		102.88	-
Expanded uncertainty [*k*=2, approximately confidence level 95 %]						**± 20.28 %**			

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 g 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 g 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	Feb.17, 2010	Head	21.4	ε r	41.5	42.1	+ 1.45	± 5
				σ	0.90	0.888	- 1.33	± 5
835	Feb.17, 2010	Body	21.4	ε r	55.2	54.4	- 1.45	± 5
				σ	0.97	0.97	0.00	± 5
1 900	Feb.18, 2010	Head	21.3	ε r	40.0	39.5	- 1.25	± 5
				σ	1.40	1.42	+ 1.43	± 5
1 900	Feb.18, 2010	Body	21.3	ε r	53.3	53.5	+ 0.38	± 5
				σ	1.52	1.49	- 1.97	± 5
2 450	Feb.18, 2010	Head	21.3	ε r	39.2	38.2	- 2.55	± 5
				σ	1.80	1.88	+ 4.44	± 5
2 450	Feb.18, 2010	Body	21.3	ε r	52.7	51.68	- 1.94	± 5
				σ	1.95	1.96	+ 0.51	± 5

8.2 System Validation

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1 900 MHz / 2 450 MHz by using the system validation kit. (Graphic Plots Attached)

* Input Power: 100 mW

Freq. [MHz]	Date	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	Measured Value (mW/g)	Deviation [%]	Limit [%]
835	Feb.17, 2010	Head	21.4	1 g	9.56	0.958	+ 0.21	± 10
1 900	Feb.18, 2010	Head	21.3	1 g	40.5	4.15	+ 2.47	± 10
2 450	Feb.18, 2010	Head	21.3	1 g	52.4	5.36	+ 2.29	± 10

9. TEST CONFIGURATIONS

SAR Testing with IEEE 802.11 a/b/g Transmitters

Normal Network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

9.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.2 Frequency Channel Configurations

80.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 80.211 b/g modes are tested on channels 1, 6 and 11.802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11,15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels.

These are referred to as the “default test channels”. 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

Mode		GHz	Channel	Turbo Channel	“Default Test Channels”			
					§15.247		UNII	
					802.11b	802.11g		
802.11 b/g		2.412	1		√	∇		
		2.437	6	6	√	∇		
		2.462	11		√	∇		
802.11a	UNII	5.18	36				√	
		5.20	40	42 (5.21 GHz)				*
		5.22	44					*
		5.24	48	50 (5.25 GHz)			√	
		5.26	52				√	
		5.28	56	58 (5.29 GHz)				*
		5.30	60					*
		5.32	64				√	
		5.500	100	Unknown				*
		5.520	104				√	
		5.540	108					*
		5.560	112					*
		5.580	116				√	
		5.600	120					*
		5.620	124				√	
		5.640	128					*
		5.660	132					*
		5.680	136				√	
		5.700	140					*
	UNII or §15.247	5.745	149		√		√	
		5.765	153	152 (5.76 GHz)		*		*
		5.785	157		√			*
		5.805	161	160 (5.80 GHz)		*	√	
	§15.247	5.825	165		√			

802.11 Test Channels per FCC Requirements

10. 3G MEASUREMENT PROCEDURES

10.1 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.

10.2 SAR Measurement Conditions for CDMA2000 1x

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

10.2.1 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 9 600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1 (Table 9.1) 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 9 600 bps Fundamental Channel and 9 600 bps SCH0 data rate Channel and 9 600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2(Table 9.2) 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. 10.1

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. 10.2

10.2.2 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.

10.2.3 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 9 600 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.

10.2.4 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 4 096 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: APYNAR0066

Band	Channel	SO2	SO2	SO55	SO55	TDSO SO32	1xEvD Rev.0	1xEvD Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)	(FTAP)	(RTAP)	(FETAP)	(RETAP)
CDMA	1013	24.57	24.62	24.53	24.65	24.55	24.61	24.72	24.55	24.55
	384	24.60	24.45	24.51	24.47	24.45	24.64	24.77	24.52	24.76
	777	24.57	24.47	24.49	24.55	24.51	24.69	24.74	24.61	24.69
PCS	25	24.23	24.41	24.28	24.17	24.2	24.22	24.23	24.18	24.15
	600	24.07	23.97	24.22	23.94	24.07	24.26	24.27	24.16	24.14
	1175	24.09	24.13	24.21	24.11	24.02	24.32	24.32	24.24	24.28

Table 10.3 Conducted output power

Band	Channel	Mbps			
		1	2	5.5	11
IEEE 802.11b	1	19.05	19.45	21.40	22.40
	6	19.35	19.97	21.92	22.85
	11	19.10	19.71	21.38	22.47

Table 10.4 IEEE 802.11b Conducted output power

Band	Channel	Mbps							
		6	9	12	18	24	36	48	54
IEEE 802.11g	1	15.93	14.68	15.93	15.79	15.72	16.68	15.32	16.87
	6	16.95	15.09	15.29	16.75	16.10	17.12	15.76	17.21
	11	16.43	15.48	16.81	16.76	17.13	17.05	16.67	17.16

Table 10.5 IEEE 802.11g Conducted output power

11. SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas

11.1 SAR Evaluation Considerations

These procedures were followed according to FCC "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas", May 2008. The procedures are applicable to phones with built-in unlicensed transmitters, such as 802.11 a/b/g and Bluetooth devices.

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P_{Ref}	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this				

Table. 11.1 Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	Routine evaluation required	SAR not required: Unlicensed only ○ when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas Licensed & Unlicensed ○ when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas ○ when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 SAR required: Licensed & Unlicensed antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
Unlicensed Transmitters	When there is no simultaneous transmission – ○ output ≤ 60/f: SAR not required ○ output > 60/f: stand-alone SAR required When there is simultaneous transmission – Stand-alone SAR not required when ○ output ≤ 2·P_{Ref} and antenna is ≥ 5.0 cm from other antennas ○ output ≤ P_{Ref} and antenna is ≥ 2.5 cm from other antennas ○ output ≤ P_{Ref} and antenna is < 2.5 cm from other antennas, each with either output power ≤ P_{Ref} or 1-g SAR < 1.2 W/kg Otherwise stand-alone SAR is required When stand-alone SAR is required ○ test SAR on highest output channel for each wireless mode and exposure condition ○ if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures	
Jaw, Mouth and Nose	Flat phantom SAR required ○ when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues ○ position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations	When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.

Table. 11.2 SAR Evaluation Requirements for Cellphones with Multiple Transmitters

FCC ID: APYNAR0066

BT Max. RF output power: 4.84 dBm(3.05 mW)

Antenna separation distance between Main and BT/ WLAN: 0.77 cm

WLAN Max. RF output power: Wi-Fi 802.11b(22.85 dBm) / Wi-Fi 802.11g (17.21 dBm)

The conducted output power level of the BT transmitter is less than P_{ref}, the BT antenna is less than 2.5 cm from the Main antenna, and licensed Transmitter SAR is 0.755 W/kg for body, which are less than 1.2 W/kg, therefore, a stand-alone BT SAR evaluation is not required.
Based on the output power and antenna separation distance, a stand-slone WLAN SAR test is required. The summation of Main and WLAN is (0.755 + 0.158) = 0.913 < 1.6 mW/g. Therefore a simultaneous SAR evaluation is not required.

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (CDMA835 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.52	384 (Mid)	CDMA835	24.47	24.54	Standard	Left Ear	Intenna	0.781
836.52	384 (Mid)	CDMA835	24.47	24.41	Standard	Right Ear	Intenna	0.746
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 cm ± 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 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).

12.2 Measurement Results (CDMA835 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.52	384 (Mid)	CDMA835	24.47	24.47	Standard	Left Tilt 15°	Intenna	0.561
836.52	384 (Mid)	CDMA835	24.47	24.45	Standard	Right Tilt 15°	Intenna	0.610
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 cm ± 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 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).

12.3 Measurement Results (PCS 1900 Head SAR Touch)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 851.25	25 (Low)	PCS1900	24.17	24.03	Standard	Left Ear	Intenna	0.80
1 880.00	600 (Mid)	PCS1900	23.94	23.80	Standard	Left Ear	Intenna	0.914
1 908.75	1175 (High)	PCS1900	24.11	24.11	Standard	Left Ear	Intenna	0.984
1 851.25	25 (Low)	PCS1900	24.17	24.01	Standard	Right Ear	Intenna	0.571
1 880.00	600 (Mid)	PCS1900	23.94	23.97	Standard	Right Ear	Intenna	0.945
1 908.75	1175 (High)	PCS1900	24.11	24.05	Standard	Right Ear	Intenna	1.29
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 cm ± 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 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).

12.4 Measurement Results (PCS 1900 Head SAR Tilt)

Frequency		Modulation	Conducted Power (dBm)		Battery	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.00	600 (Mid)	PCS1900	23.94	23.97	Standard	Left Tilt 15°	Intenna	0.666
1 880.00	600 (Mid)	PCS1900	23.94	23.86	Standard	Right Tilt 15°	Intenna	0.766
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 cm ± 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 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).

12.5 Measurement Results (CDMA835 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
836.52	384 (Mid)	CDMA835	24.45	24.42	Rear	2.0 cm without Holster	Intenna	0.755
836.52	384 (Mid)	CDMA835	24.45	24.55	Front	2.0 cm without Holster	Intenna	0.472
836.52	384 (Mid)	EVDO	24.64	24.84	Rear	2.0 cm without Holster	Intenna	0.737
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 cm ± 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 CDMA Body SAR was tested under RC3/SO32.
11 EVDO Body SAR was tested under EVDO Rev.0 RTAP.
12 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).

12.6 Measurement Results (PCS 1900 Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Phantom Position	Antenna Type	SAR(mW/g)
MHz	Channel		Begin	End				
1 880.00	600 (Mid)	PCS1900	23.94	24.02	Rear	2.0 cm without Holster	Intenna	0.402
1 880.00	600 (Mid)	PCS1900	23.94	23.79	Front	2.0 cm without Holster	Intenna	0.267
1 880.00	600 (Mid)	EVDO	24.26	24.16	Rear	2.0 cm without Holster	Intenna	0.336
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 cm ± 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 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).
11 PCS Body SAR was tested under RC3/SO32.
12 EVDO Body SAR was tested under EVDO Rev.0 RTAP.

12.7 Measurement Results (802.11b/g Module Body SAR)

Frequency		Modulation	Conducted Power (dBm)		Configuration	Separation Distance	Data Rate	SAR(mW/g)
MHz	Channel		Begin	End				
2 412	1 (Mid)	802.11b	19.05	19.08	Rear	2.0 cm	1 Mbps	0.156
2 412	1 (Mid)	802.11b	19.45	19.59	Rear	2.0 cm	2 Mbps	0.151
2 412	1 (Mid)	802.11b	21.40	21.25	Rear	2.0 cm	5.5 Mbps	0.102
2 412	1 (Mid)	802.11b	22.40	22.44	Rear	2.0 cm	11 Mbps	0.088
2437	6(Low)	802.11b	19.35	19.48	Rear	2.0 cm	1 Mbps	0.138
2437	6(Low)	802.11b	19.97	20.05	Rear	2.0 cm	2 Mbps	0.133
2437	6(Low)	802.11b	21.92	22.09	Rear	2.0 cm	5.5 Mbps	0.078
2437	6(Low)	802.11b	22.85	22.89	Rear	2.0 cm	11 Mbps	0.092
2462	11(High)	802.11b	19.10	19.06	Rear	2.0 cm	1 Mbps	0.143
2462	11(High)	802.11b	19.71	19.79	Rear	2.0 cm	2 Mbps	0.246
2462	11(High)	802.11b	21.38	21.35	Rear	2.0 cm	5.5 Mbps	0.117
2462	11(High)	802.11b	22.47	22.35	Rear	2.0 cm	11 Mbps	0.137
2462	11(High)	802.11b	19.71	19.70	Front	2.0 cm	2 Mbps	0.015
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 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard with Charger ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☒ Manual Test code ☐ Base Station Simulator
7 IEEE 802.11g SAR testing is required when the conducted powers are equal to or greater than 0.25 dB Than the conducted powers in IEEE 802.11b.

13. 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:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.889 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

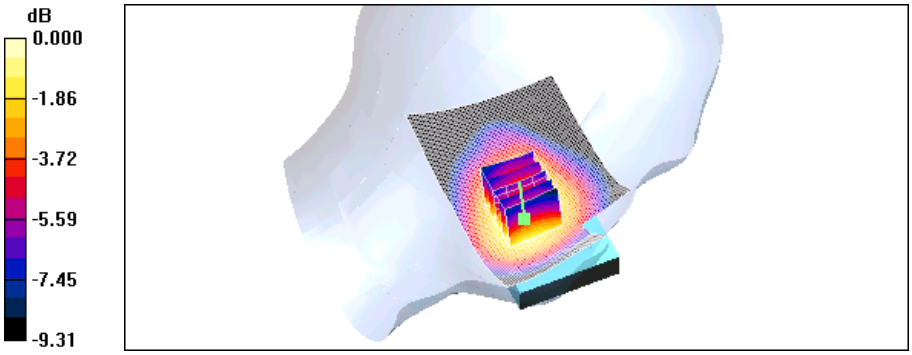
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.25, 6.25, 6.25); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

Left touch 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

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

Left touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.6 V/m; Power Drift = 0.067 dB
Peak SAR (extrapolated) = 0.983 W/kg
SAR(1 g) = 0.781 mW/g; SAR(10 g) = 0.584 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.826 mW/g



0 dB = 0.826mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.889 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

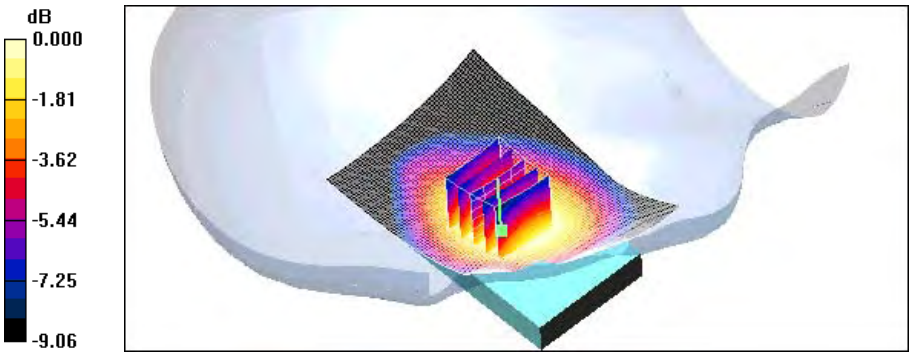
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.25, 6.25, 6.25); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

Right touch 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.782 mW/g

Right touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.6 V/m; Power Drift = -0.056 dB
Peak SAR (extrapolated) = 0.914 W/kg
SAR(1 g) = 0.746 mW/g; SAR(10 g) = 0.569 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.778 mW/g



0 dB = 0.778mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.889 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

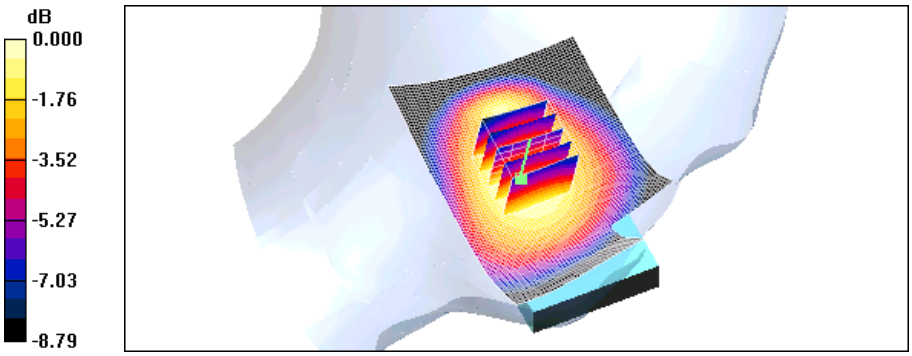
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.25, 6.25, 6.25); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

Left tilt 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

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

Left tilt 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 0.699 W/kg
SAR(1 g) = 0.561 mW/g; SAR(10 g) = 0.420 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.582 mW/g



0 dB = 0.582mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.889 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.25, 6.25, 6.25); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

Right tilt 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

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

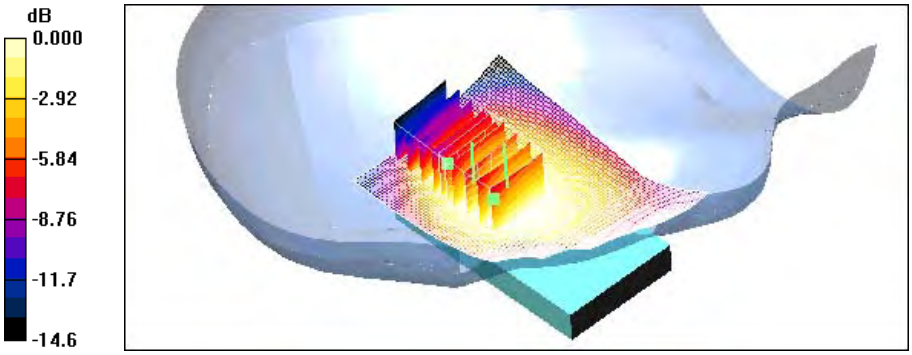
Right tilt 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = 0.022dB
Peak SAR (extrapolated) = 0.764 W/kg
SAR(1 g) = 0.610 mW/g; SAR(10 g) = 0.458 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.640 mW/g

Right tilt 384/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.3 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.866 W/kg
SAR(1 g) = 0.499 mW/g; SAR(10 g) = 0.339 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.576 mW/g



0 dB = 0.576mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1851.25 MHz; σ = 1.36 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

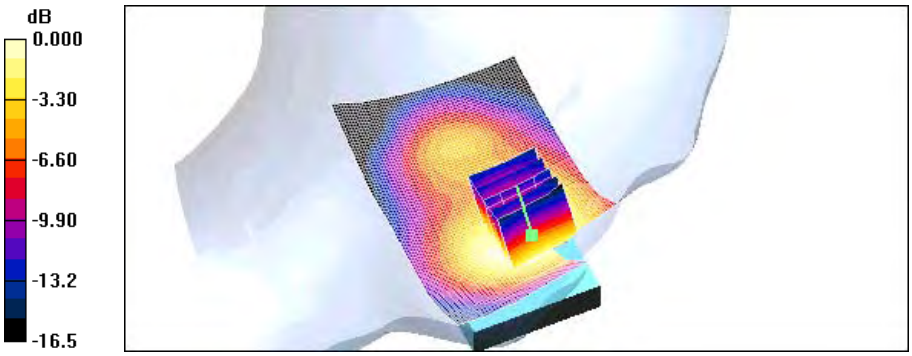
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 25/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.880 mW/g

Left touch 25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.2 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.800 mW/g; SAR(10 g) = 0.501 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.873 mW/g



0 dB = 0.873mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

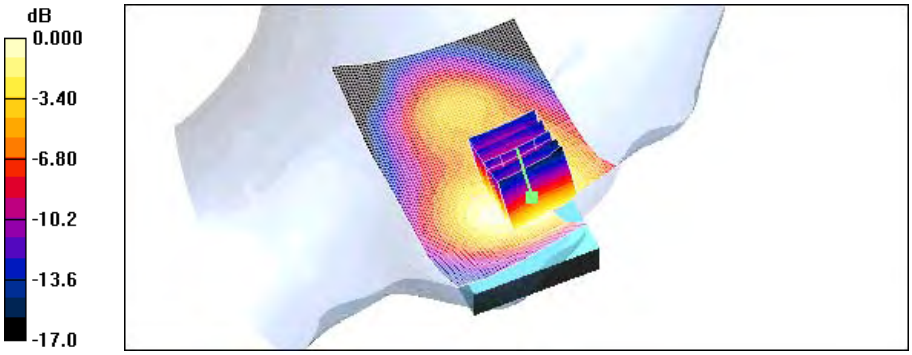
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.00 mW/g

Left touch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.8 V/m; Power Drift = -0.142 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.914 mW/g; SAR(10 g) = 0.569 mW/g
Maximum value of SAR (measured) = 1.00 mW/g



0 dB = 1.00mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1908.75 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

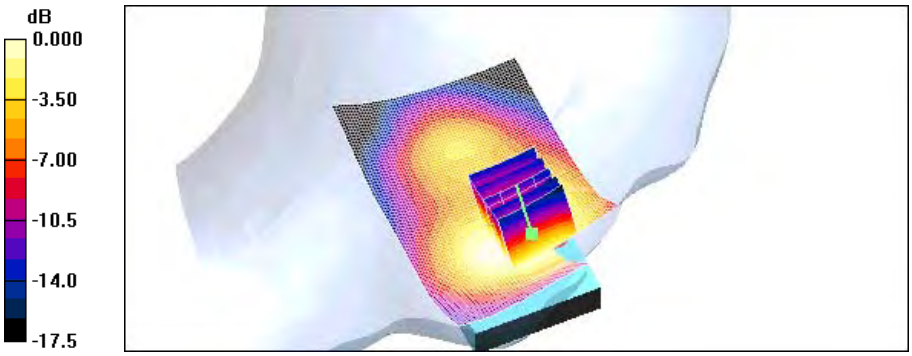
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 1175/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.08 mW/g

Left touch 1175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.4 V/m; Power Drift = 0.002 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.984 mW/g; SAR(10 g) = 0.609 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1851.25 MHz; σ = 1.36 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

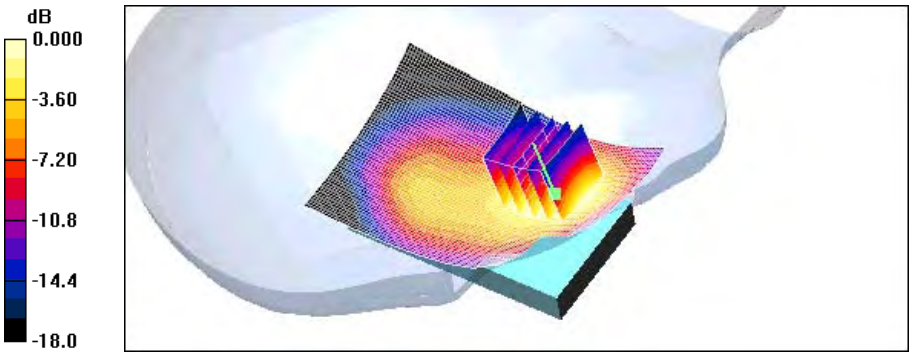
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 25/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.655 mW/g

Right touch 25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.8 V/m; Power Drift = -0.159 dB
Peak SAR (extrapolated) = 0.861 W/kg
SAR(1 g) = 0.571 mW/g; SAR(10 g) = 0.339 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.614 mW/g



0 dB = 0.614mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

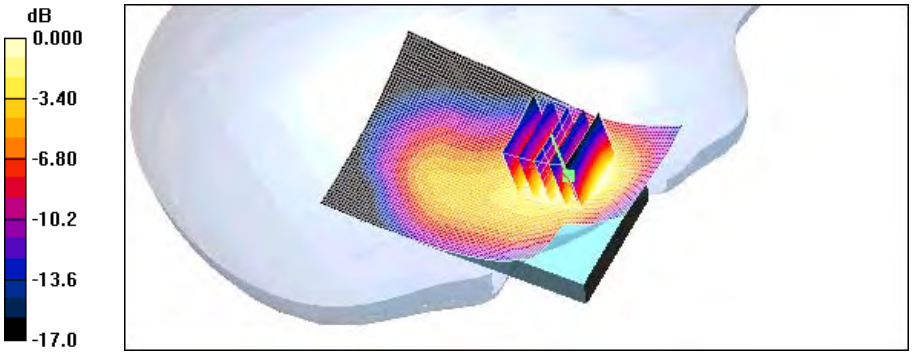
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.07 mW/g

Right touch 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.2 V/m; Power Drift = 0.034 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.945 mW/g; SAR(10 g) = 0.554 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1908.75 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

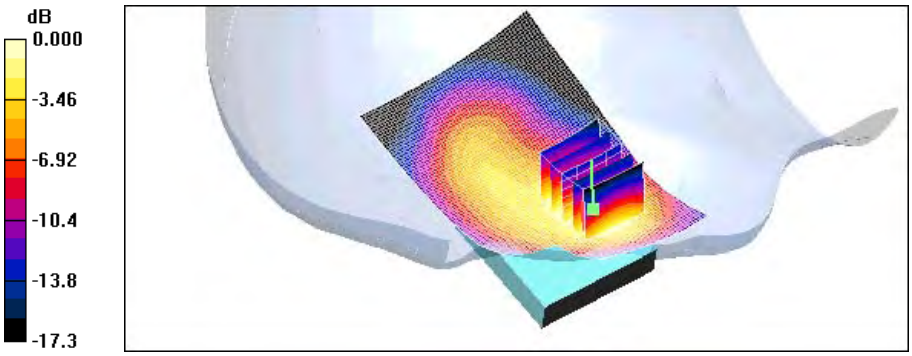
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 1175/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.49 mW/g

Right touch 1175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.7 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.757 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.42 mW/g



0 dB = 1.42mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

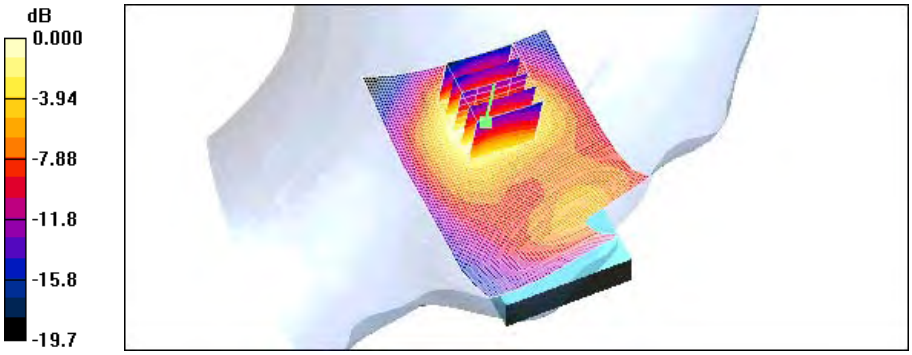
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.743 mW/g

Left tilt 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.76 V/m; Power Drift = 0.0281 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.666 mW/g; SAR(10 g) = 0.389 mW/g
Maximum value of SAR (measured) = 0.726 mW/g



0 dB = 0.726mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

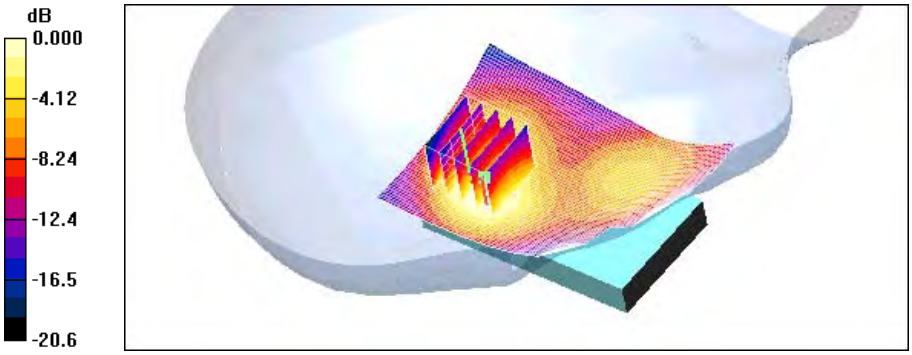
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.895 mW/g

Right tilt 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.2 V/m; Power Drift = -0.076 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.766 mW/g; SAR(10 g) = 0.451 mW/g
Maximum value of SAR (measured) = 0.807 mW/g



0 dB = 0.807mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.976 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

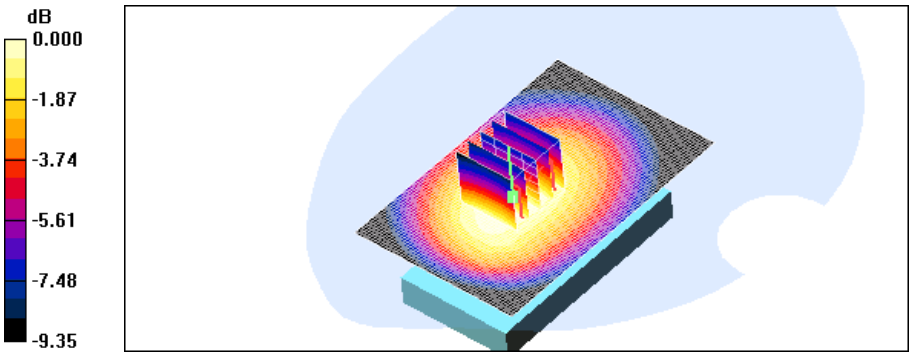
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.08, 6.08, 6.08); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

CDMA Body 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.817 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.3 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 0.987 W/kg
SAR(1 g) = 0.755 mW/g; SAR(10 g) = 0.550 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.798 mW/g



0 dB = 0.798mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.976 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

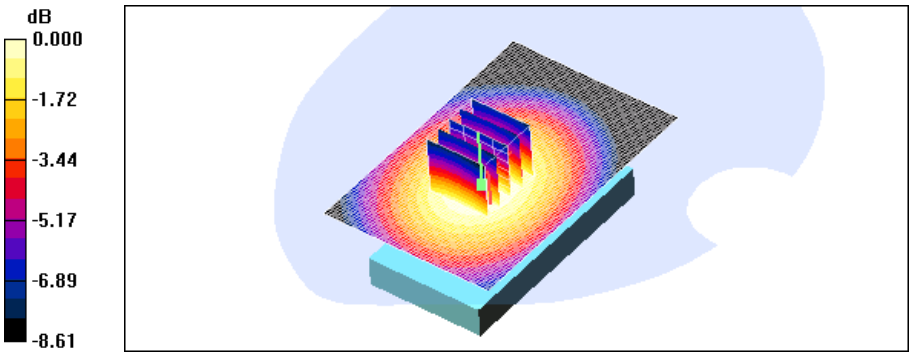
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.08, 6.08, 6.08); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

CDMA Body 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.508 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.0 V/m; Power Drift = 0.096 dB
Peak SAR (extrapolated) = 0.606 W/kg
SAR(1 g) = 0.472 mW/g; SAR(10 g) = 0.351 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.496 mW/g



0 dB = 0.496mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.976 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

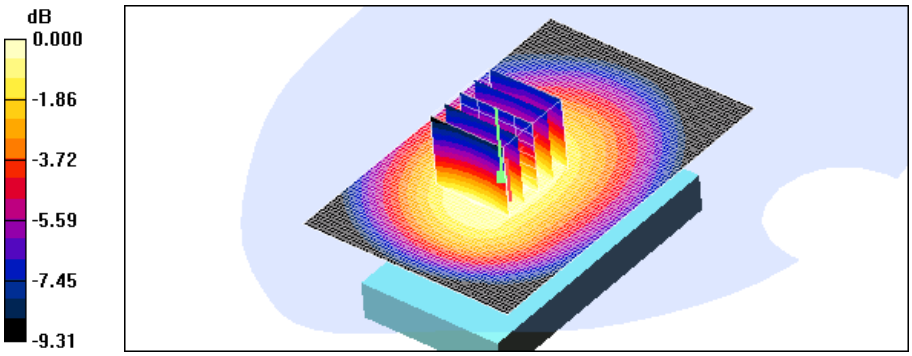
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.08, 6.08, 6.08); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

CDMA Body 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.750 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.3 V/m; Power Drift = 0.190 dB
Peak SAR (extrapolated) = 0.963 W/kg
SAR(1 g) = 0.737 mW/g; SAR(10 g) = 0.536 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.778 mW/g



0 dB = 0.778mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

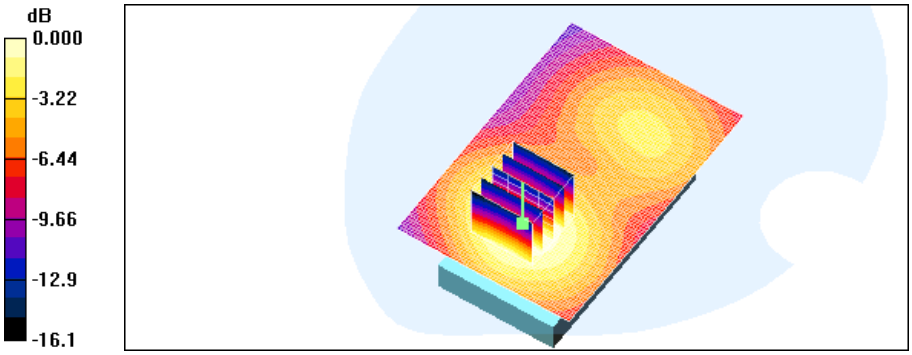
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.47 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.61, 4.61, 4.61); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

PCS Body 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.457 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.1 V/m; Power Drift = 0.084 dB
Peak SAR (extrapolated) = 0.523 W/kg
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.249 mW/g
Maximum value of SAR (measured) = 0.440 mW/g



0 dB = 0.440mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

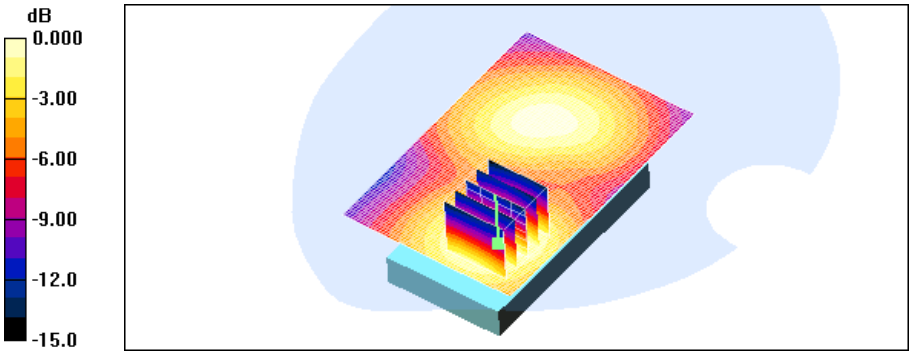
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.47 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.61, 4.61, 4.61); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

PCS Body 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.291 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.8 V/m; Power Drift = -0.147 dB
Peak SAR (extrapolated) = 0.329 W/kg
SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.170 mW/g
Maximum value of SAR (measured) = 0.293 mW/g



0 dB = 0.293mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

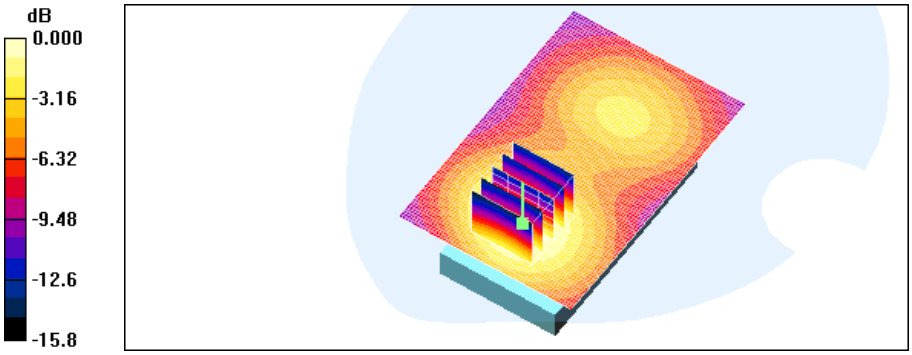
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.47 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.61, 4.61, 4.61); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

PCS Body 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.364 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = -0.104 dB
Peak SAR (extrapolated) = 0.425 W/kg
SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.209 mW/g
Maximum value of SAR (measured) = 0.369 mW/g



0 dB = 0.369mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.9 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

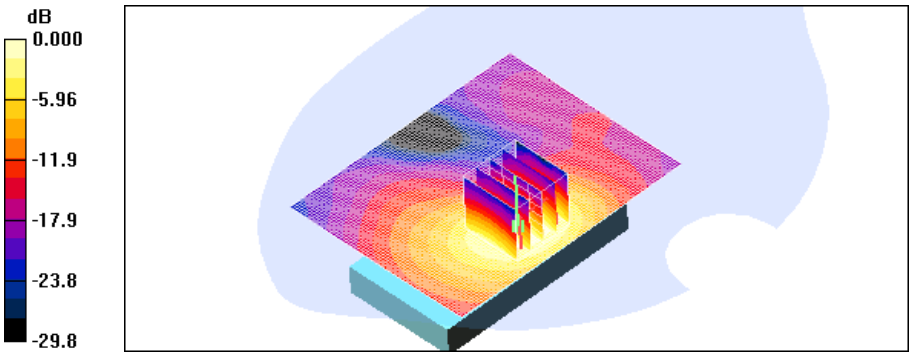
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 1ch 1Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.171 mW/g

802.11b 1ch 1Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.50 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.328 W/kg
SAR(1 g) = 0.156 mW/g; SAR(10 g) = 0.077 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.169 mW/g



0 dB = 0.169mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.9 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

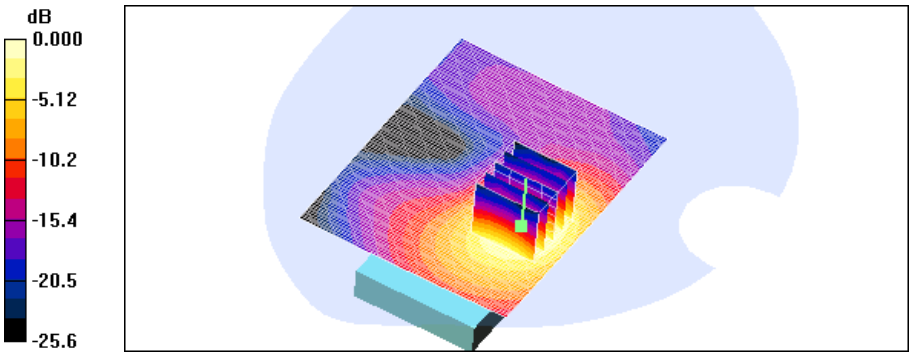
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 1ch 2Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.172 mW/g

802.11b 1ch 2Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.59 V/m; Power Drift = 0.137 dB
Peak SAR (extrapolated) = 0.314 W/kg
SAR(1 g) = 0.151 mW/g; SAR(10 g) = 0.075 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.163 mW/g



0 dB = 0.163mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.9 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

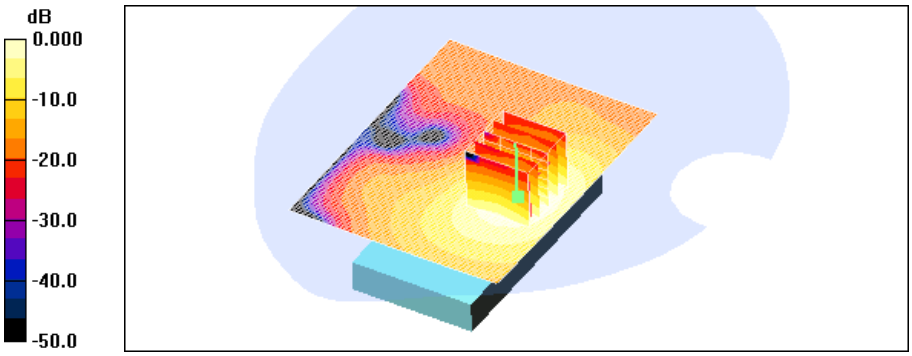
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 1ch 5.5Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.112 mW/g

802.11b 1ch 5.5Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.40 V/m; Power Drift = -0.154 dB
Peak SAR (extrapolated) = 0.216 W/kg
SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.051 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.110 mW/g



0 dB = 0.110mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.9 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

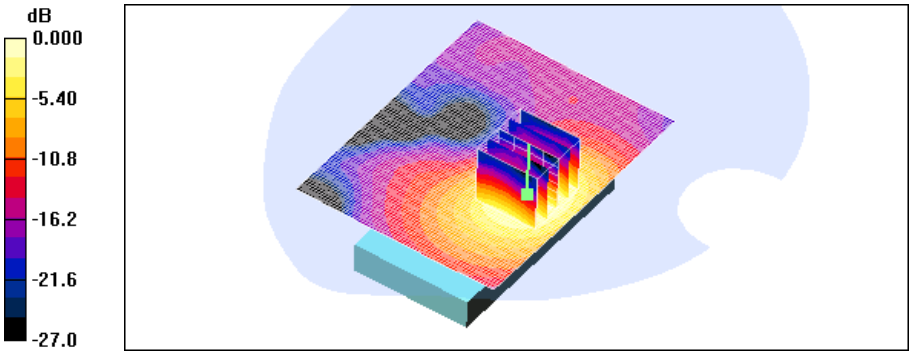
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 1ch 11Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.096 mW/g

802.11b 1ch 11Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.22 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.088 mW/g; SAR(10 g) = 0.043 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.094 mW/g



0 dB = 0.094mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

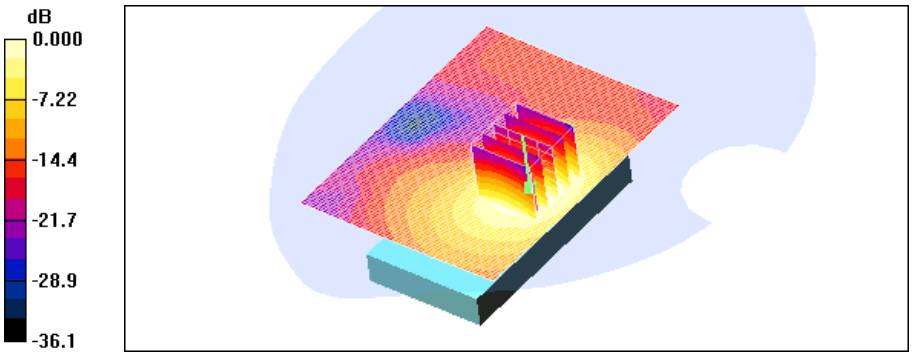
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 6ch 1Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.152 mW/g

802.11b 6ch 1Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.62 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.068 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.150 mW/g



0 dB = 0.150mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

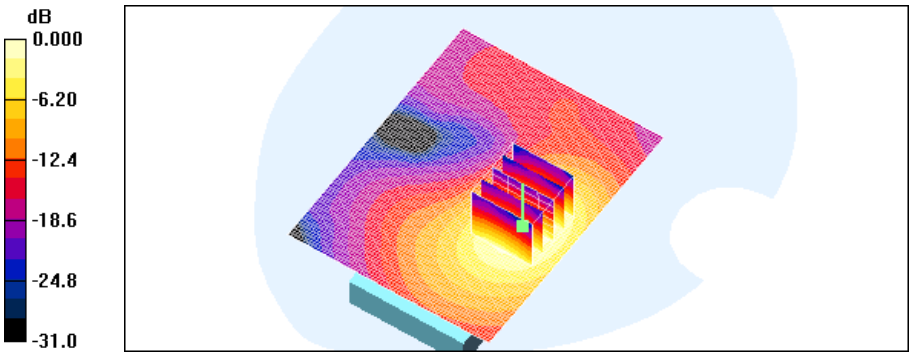
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 6ch 2Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.146 mW/g

802.11b 6ch 2Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.56 V/m; Power Drift = 0.077 dB
Peak SAR (extrapolated) = 0.283 W/kg
SAR(1 g) = 0.133 mW/g; SAR(10 g) = 0.066 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.145 mW/g



0 dB = 0.145mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

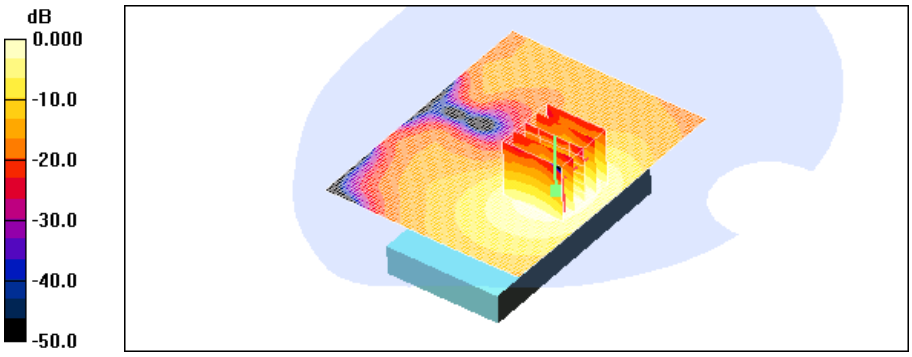
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 6ch 5.5Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.085 mW/g

802.11b 6ch 5.5Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.20 V/m; Power Drift = 0.169 dB
Peak SAR (extrapolated) = 0.164 W/kg
SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.039 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.084 mW/g



0 dB = 0.084mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

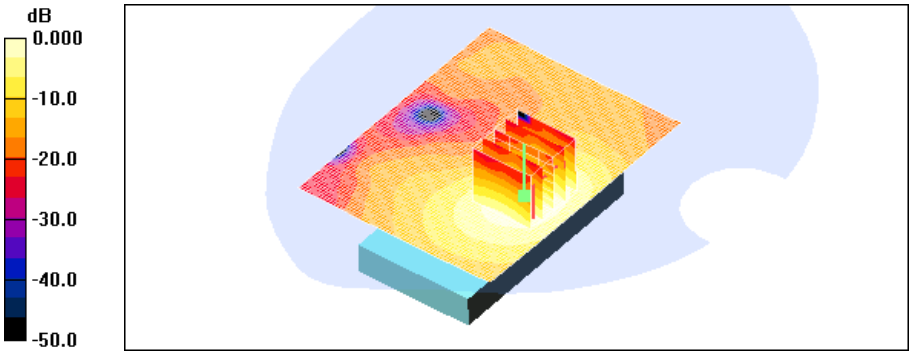
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 6ch 11Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.101 mW/g

802.11b 6ch 11Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.30 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 0.194 W/kg
SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.045 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.099 mW/g



0 dB = 0.099mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.98 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

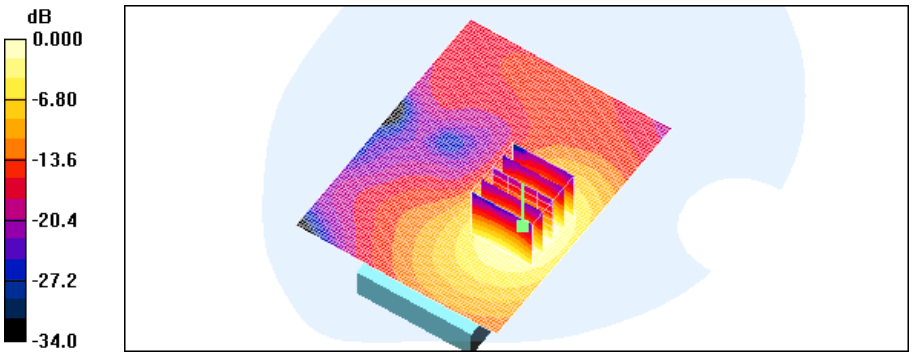
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 11ch 1Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.152 mW/g

802.11b 11ch 1Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.56 V/m; Power Drift = -0.037 dB
Peak SAR (extrapolated) = 0.302 W/kg
SAR(1 g) = 0.143 mW/g; SAR(10 g) = 0.071 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.154 mW/g



0 dB = 0.154mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.98 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

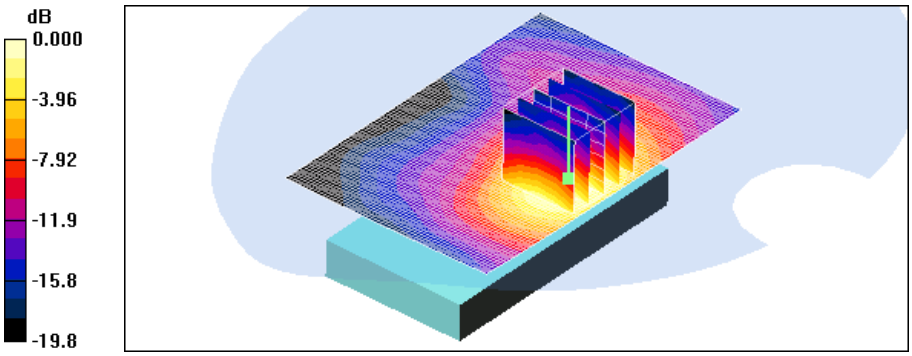
DASY4 Configuration:
- Probe: ET3DV6 - SN1631; ConvF(4.21, 4.21, 4.21); Calibrated: 2009-06-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2009-05-22
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 11ch/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.262 mW/g

802.11b 11ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.56 V/m; Power Drift = 0.083 dB
Peak SAR (extrapolated) = 0.512 W/kg
SAR(1 g) = 0.246 mW/g; SAR(10 g) = 0.131 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.261 mW/g



0 dB = 0.261mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.98 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

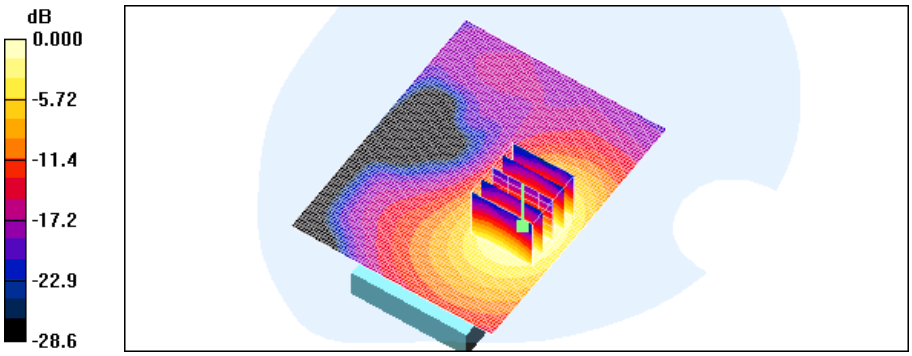
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 11ch 5.5Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.130 mW/g

802.11b 11ch 5.5Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.36 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.117 mW/g; SAR(10 g) = 0.059 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.125 mW/g



0 dB = 0.125mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.98 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

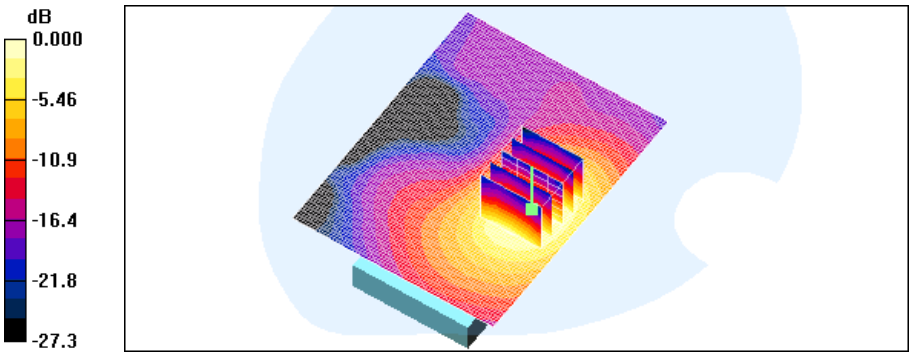
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 11ch11Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.151 mW/g

802.11b 11ch11Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.44 V/m; Power Drift = -0.120 dB
Peak SAR (extrapolated) = 0.287 W/kg
SAR(1 g) = 0.137 mW/g; SAR(10 g) = 0.069 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.147 mW/g



0 dB = 0.147mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.98 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

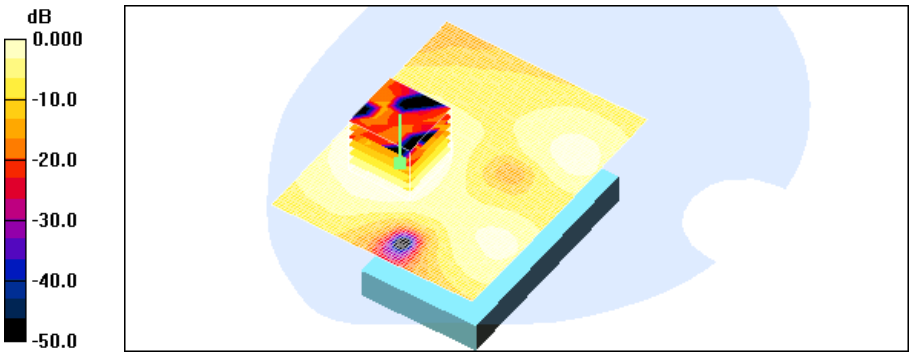
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4, 4, 4); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

802.11b 11ch 2Mbit/Area Scan (71x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.017 mW/g

802.11b 11ch 2Mbit/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.82 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 0.031 W/kg
SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00804 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.016 mW/g



0 dB = 0.016mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.889 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

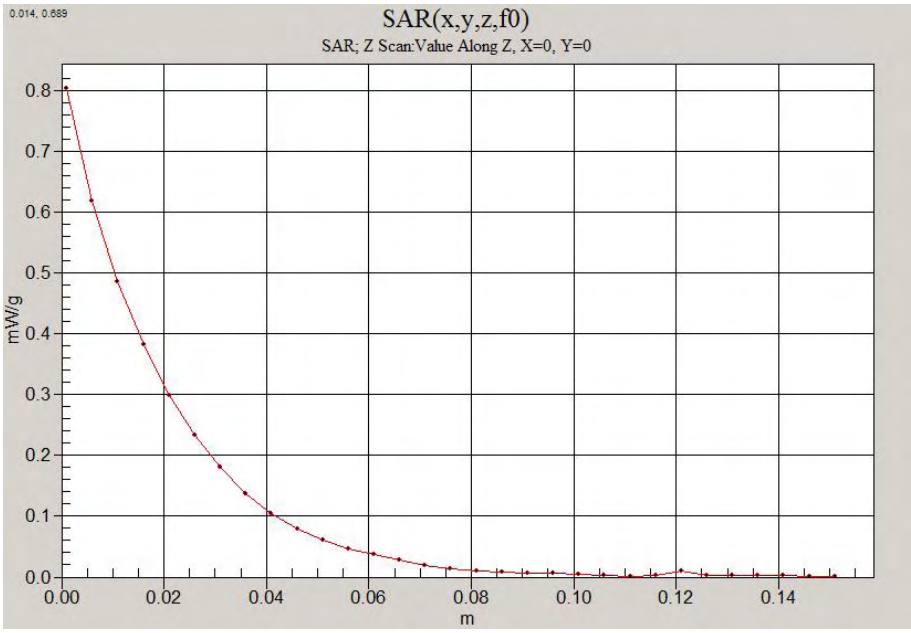
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.25, 6.25, 6.25); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

Left touch 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

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

Left touch 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.6 V/m; Power Drift = 0.067 dB
Peak SAR (extrapolated) = 0.983 W/kg
SAR(1 g) = 0.781 mW/g; SAR(10 g) = 0.584 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.826 mW/g



Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.4 ℃
Ambient Temperature:	21.6 ℃
Test Date:	Feb.17, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: CDMA 835MHz FCC; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.52 MHz; σ = 0.976 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

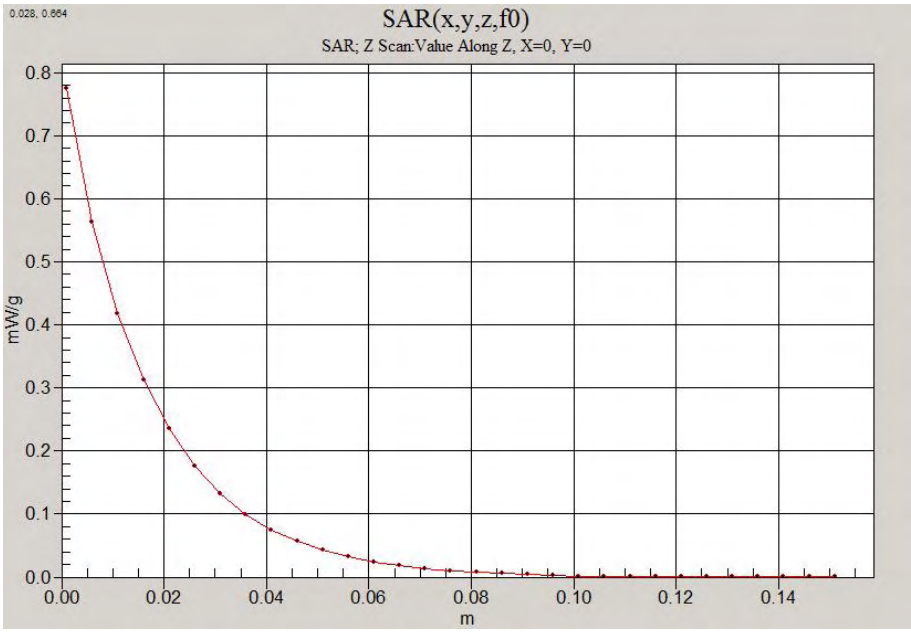
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.08, 6.08, 6.08); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 835/900 Phamtom ; Type: SAM

CDMA Body 384/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.817 mW/g

CDMA Body 384/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.3 V/m; Power Drift = -0.031 dB
Peak SAR (extrapolated) = 0.987 W/kg
SAR(1 g) = 0.755 mW/g; SAR(10 g) = 0.550 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.798 mW/g



Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1908.75 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

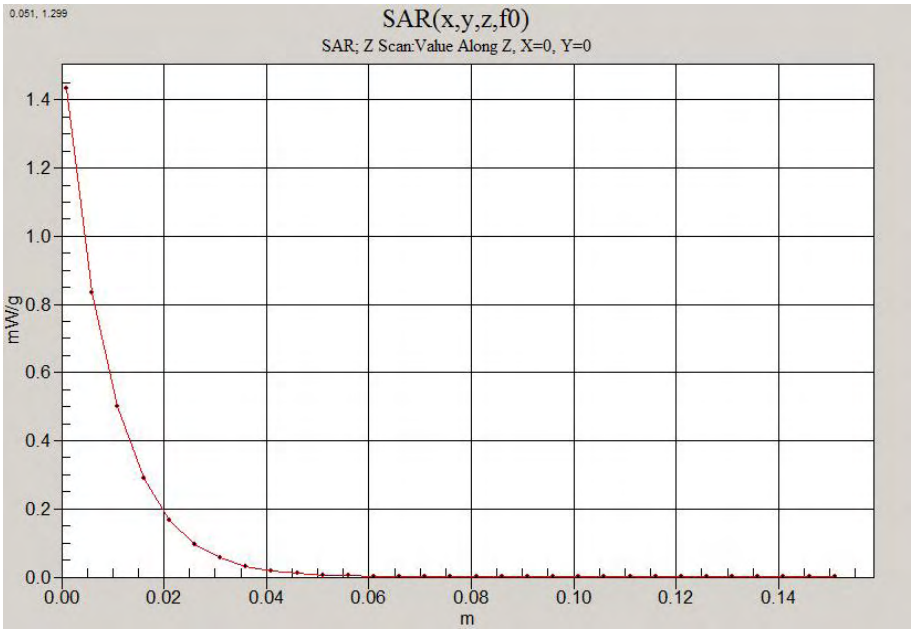
DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 1175/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.49 mW/g

Right touch 1175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.7 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.757 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.42 mW/g



Test Laboratory:	HCT CO., LTD
EUT Type:	Slide Dual-band CDMA Phone with Bluetooth/WLAN
Liquid Temperature:	21.3 ℃
Ambient Temperature:	21.5 ℃
Test Date:	Feb.18, 2010

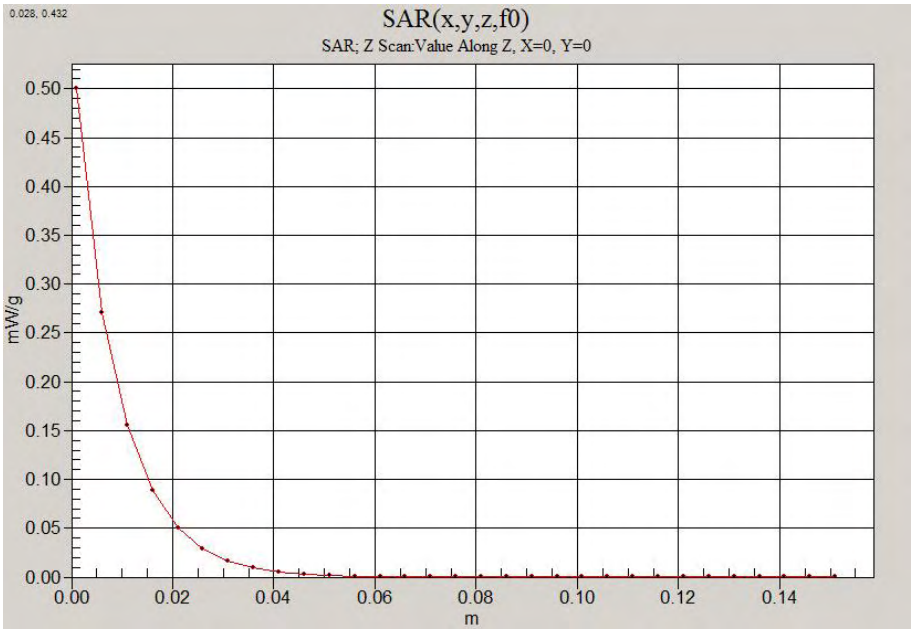
DUT: PB20ZU; Type: Bar; Serial: #1

Communication System: PCS 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.47 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.61, 4.61, 4.61); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: 1800/1900 Phantom; Type: SAM

PCS Body 600/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.457 mW/g

PCS Body 600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.1 V/m; Power Drift = 0.084 dB
Peak SAR (extrapolated) = 0.523 W/kg
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.249 mW/g
Maximum value of SAR (measured) = 0.440 mW/g



Attachment 2. – Dipole Validation Plots

■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20dBm)

Liquid Temp: 21.4 ℃

Test Date: Feb.17, 2010

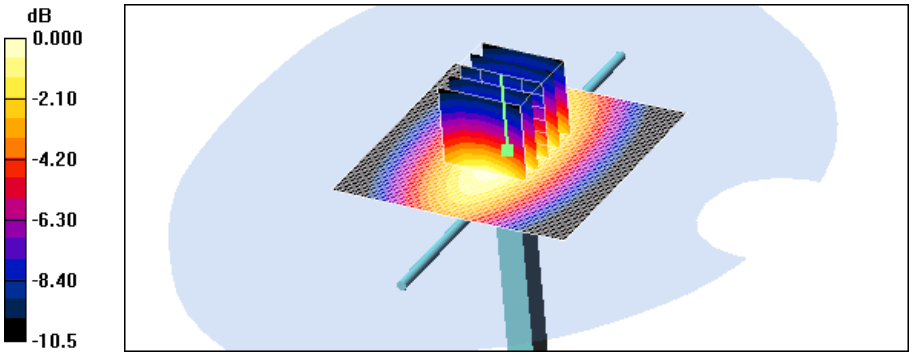
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.888 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(6.25, 6.25, 6.25); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 835/900 MHz; Type: SAM

Validation 835MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.03 mW/g

Validation 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.2 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.958 mW/g; SAR(10 g) = 0.627 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20dBm)

Liquid Temp: 21.3 ℃

Test Date: Feb.18, 2010

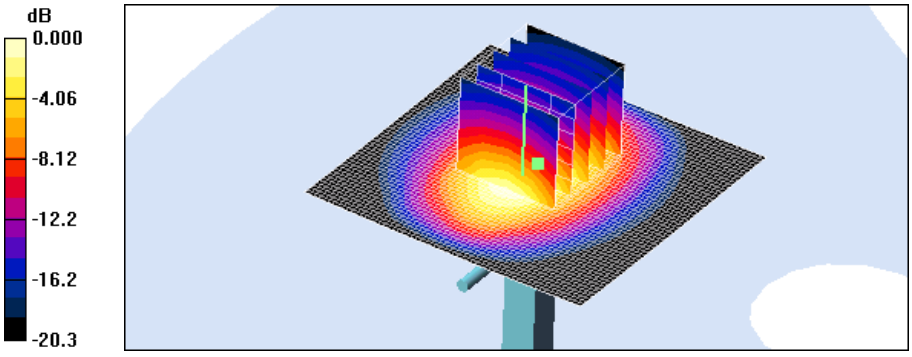
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.42 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(5.12, 5.12, 5.12); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 5.00 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.6 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 7.43 W/kg
SAR(1 g) = 4.15 mW/g; SAR(10 g) = 2.12 mW/g
Maximum value of SAR (measured) = 4.62 mW/g



0 dB = 4.62mW/g

■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Feb.18, 2010

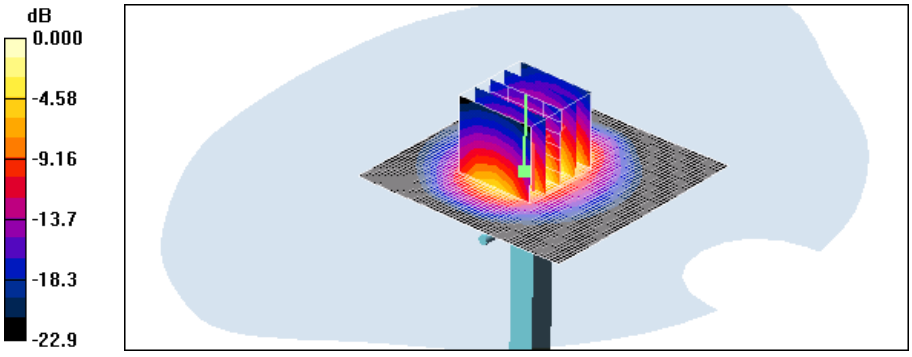
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.54, 4.54, 4.54); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.50 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.2 V/m; Power Drift = -0.124 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 5.36 mW/g; SAR(10 g) = 2.46 mW/g
Maximum value of SAR (measured) = 5.87 mW/g



0 dB = 5.87mW/g

■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: Feb.18, 2010

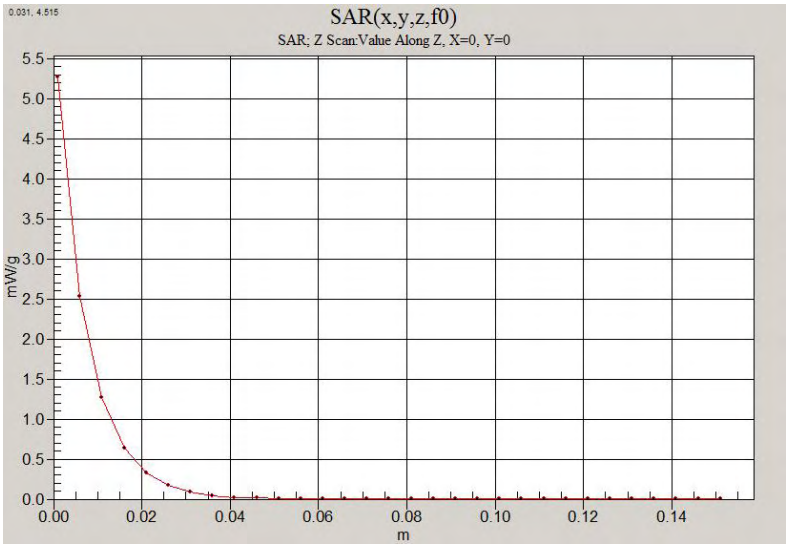
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 176

DASY4 Configuration:
- Probe: ET3DV6 - SN1609; ConvF(4.54, 4.54, 4.54); Calibrated: 2009-03-17
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2009-07-21
- Phantom: SAM 1800/1900 MHz; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.50 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.2 V/m; Power Drift = -0.124 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 5.36 mW/g; SAR(10 g) = 2.46 mW/g
Maximum value of SAR (measured) = 5.87 mW/g



■ Dielectric Parameter (835 MHz Head)

Title	PB20ZU
SubTitle	CDMA835(Head)
Test Date	Feb.17, 2010

Frequency	e'	e''
800000000	42.4613	19.2500
805000000	42.4177	19.2425
810000000	42.3720	19.1656
815000000	42.3156	19.1838
820000000	42.2859	19.1784
825000000	42.2175	19.1839
830000000	42.1607	19.1705
835000000	42.1356	19.1167
840000000	42.0757	19.1048
845000000	42.0064	19.1114
850000000	41.9431	19.1165
855000000	41.9202	19.1152
860000000	41.8369	19.0800
865000000	41.7770	19.0693
870000000	41.7438	19.0765
875000000	41.6695	19.0451
880000000	41.5873	19.0518
885000000	41.5626	19.0116
890000000	41.5036	19.0219
895000000	41.4326	19.0060
900000000	41.3382	19.0075

■ Dielectric Parameter (835 MHz Body)

Title PB20ZU
SubTitle CDMA835(Body)
Test Date Feb.17, 2010

Frequency	e'	e''
800000000	54.8854	21.2069
805000000	54.8233	21.1494
810000000	54.7594	21.1299
815000000	54.6659	21.0856
820000000	54.5920	21.0500
825000000	54.4813	21.0614
830000000	54.4689	21.0263
835000000	54.3815	20.9909
840000000	54.3079	20.9535
845000000	54.2487	20.9489
850000000	54.2177	20.9694
855000000	54.1582	20.9832
860000000	54.1916	20.9469
865000000	54.2077	20.9899
870000000	54.2220	20.9634
875000000	54.1880	20.9896
880000000	54.1901	20.9610
885000000	54.1713	20.9398
890000000	54.1634	20.9515
895000000	54.1602	20.9389
900000000	54.0624	20.9242

■ Dielectric Parameter (1900 MHz Head)

Title	PB20ZU
SubTitle	PCS1900(Head)
Test Date	Feb.18, 2010

Frequency	e'	e''
1800000000	40.0135	13.1198
1810000000	39.9823	13.1552
1820000000	39.9148	13.1493
1830000000	39.8705	13.1446
1840000000	39.7996	13.1538
1850000000	39.7217	13.1737
1860000000	39.6325	13.1353
1870000000	39.5818	13.1989
1880000000	39.5514	13.2498
1890000000	39.5303	13.2946
1900000000	39.5137	13.4138
1910000000	39.4706	13.4337
1920000000	39.4854	13.4906
1930000000	39.4371	13.5170
1940000000	39.4177	13.5041
1950000000	39.3204	13.4747
1960000000	39.2785	13.4831
1970000000	39.2021	13.4911
1980000000	39.1443	13.4989
1990000000	39.0692	13.5536
2000000000	39.0564	13.5816

■ Dielectric Parameter (1900 MHz Body)

Title PB20ZU
SubTitle PCS1900(Body)
Test Date Feb.18, 2010

Frequency	e'	e''
1850000000	53.7329	13.9351
1855000000	53.7159	13.9388
1860000000	53.7322	13.9751
1865000000	53.6862	13.9778
1870000000	53.6963	13.9952
1875000000	53.6721	14.0277
1880000000	53.6225	14.0538
1885000000	53.6116	14.0587
1890000000	53.5447	14.0753
1895000000	53.5122	14.0975
1900000000	53.5188	14.1017
1905000000	53.4737	14.1447
1910000000	53.4382	14.1396
1915000000	53.4084	14.1806
1920000000	53.3944	14.2100
1925000000	53.3858	14.2315
1930000000	53.3394	14.2499
1935000000	53.3690	14.2708
1940000000	53.3614	14.2836
1945000000	53.3435	14.3214
1950000000	53.3576	14.3256

■ Dielectric Parameter (2450 MHz Head)

Title	PB20ZU
SubTitle	2450 MHz(Head)
Test Date	Feb.18, 2010

Frequency	e'	e''
2400000000.0000	38.5101	13.5648
2405000000.0000	38.4683	13.5868
2410000000.0000	38.4279	13.6188
2415000000.0000	38.3145	13.5953
2420000000.0000	38.2697	13.6713
2425000000.0000	38.2633	13.6813
2430000000.0000	38.1993	13.6777
2435000000.0000	38.1865	13.7255
2440000000.0000	38.1679	13.7344
2445000000.0000	38.1791	13.7549
2450000000.0000	38.1667	13.7796
2455000000.0000	38.1934	13.7775
2460000000.0000	38.2392	13.8331
2465000000.0000	38.2503	13.8366
2470000000.0000	38.2615	13.8489
2475000000.0000	38.2857	13.8619
2480000000.0000	38.3075	13.8547
2485000000.0000	38.3169	13.8874
2490000000.0000	38.3318	13.9128
2495000000.0000	38.3203	13.8931
2500000000.0000	38.3117	13.8845

■ Dielectric Parameter (2450 MHz Body)

Title PB20ZU
SubTitle 2450 MHz (Body)
Test Date Feb.18, 2010

Frequency	e'	e''
2400000000.0000	51.9900	14.1189
2405000000.0000	51.9667	14.1063
2410000000.0000	51.9226	14.1575
2415000000.0000	51.8786	14.1487
2420000000.0000	51.8577	14.1937
2425000000.0000	51.8092	14.2285
2430000000.0000	51.7466	14.2665
2435000000.0000	51.7381	14.3115
2440000000.0000	51.7085	14.3721
2445000000.0000	51.6735	14.3835
2450000000.0000	51.6757	14.4269
2455000000.0000	51.6523	14.4617
2460000000.0000	51.6233	14.4887
2465000000.0000	51.6373	14.4989
2470000000.0000	51.6179	14.5593
2475000000.0000	51.5945	14.5573
2480000000.0000	51.6025	14.6207
2485000000.0000	51.5738	14.6258
2490000000.0000	51.5970	14.6473
2495000000.0000	51.5710	14.6305
2500000000.0000	51.5605	14.6428

Attachment 3. – Probe Calibration Data

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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 **HCT (Dymstec)**

Certificate No: ET3-1609_Mar09

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1609
Calibration procedure(s)	QA CAL-01.v6, QA CAL-12.v5 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	March 17, 2009
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 (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 17, 2009

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: ET3-1609_Mar09 Page 1 of 9

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
ConvF	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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

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:1609

Manufactured:	July 21, 2001
Last calibrated:	August 30, 2007
Recalibrated:	March 17, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1609 March 17, 2009

DASY - Parameters of Probe: ET3DV6 SN:1609

Sensitivity in Free Space[A]

NormX	1.97 ± 10.1%	$\mu V/(V/m)^2$	DCP X	93 mV
NormY	1.87 ± 10.1%	$\mu V/(V/m)^2$	DCP Y	90 mV
NormZ	1.82 ± 10.1%	$\mu V/(V/m)^2$	DCP Z	93 mV

Diode Compression[B]

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	11.4	7.0
SAR_{be} [%]	With Correction Algorithm	0.9	0.5

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		3.7 mm	4.7 mm
SAR_{be} [%]	Without Correction Algorithm	13.8	9.5
SAR_{be} [%]	With Correction Algorithm	0.9	0.6

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 6).

[B] Numerical linearization parameter: uncertainty not required.

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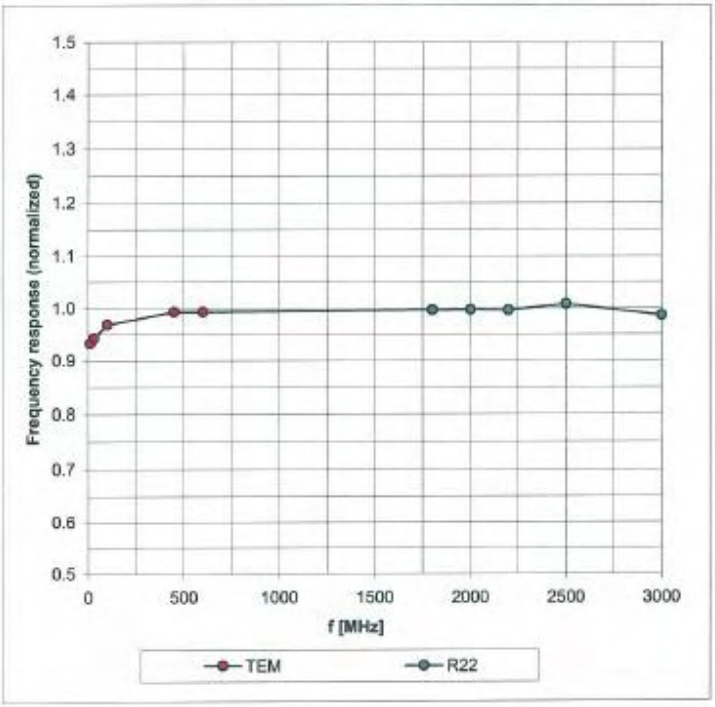
ET3DV6 SN:1609 March 17, 2009

Frequency Response of E-Field

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



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

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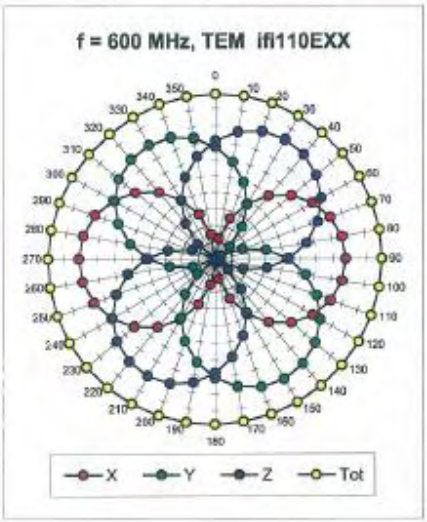
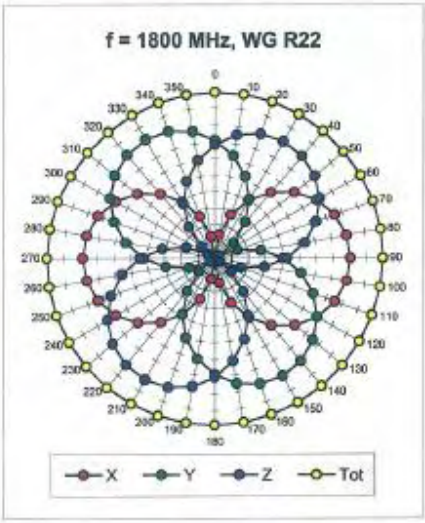
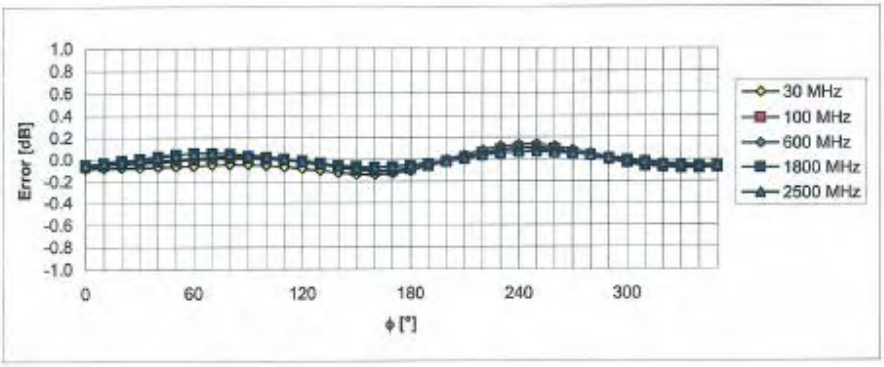
ET3DV6 SN:1609 March 17, 2009

Receiving Pattern (ϕ), ϑ = 0°







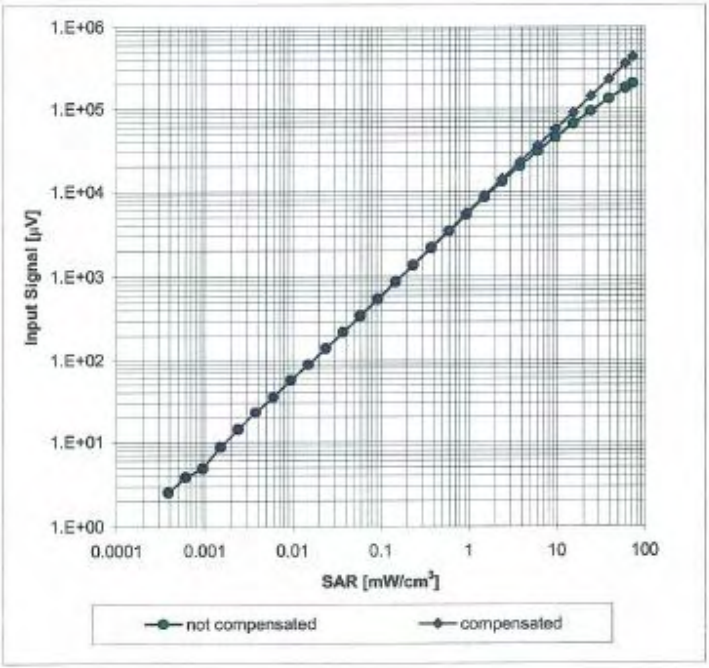
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

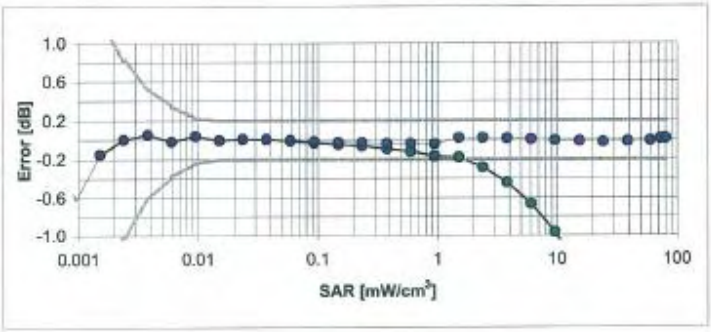
Certificate No: ET3-1609_Mar09 Page 6 of 9

ET3DV6 SN:1609 March 17, 2009

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



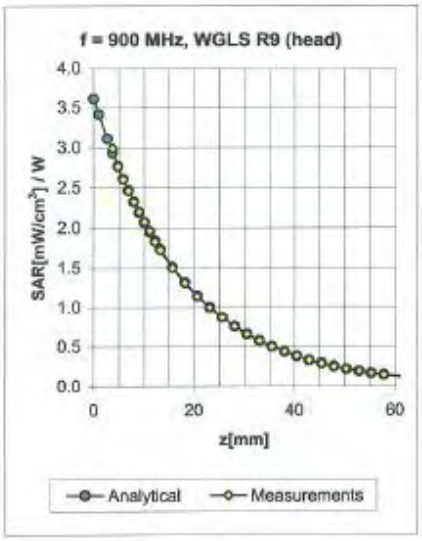


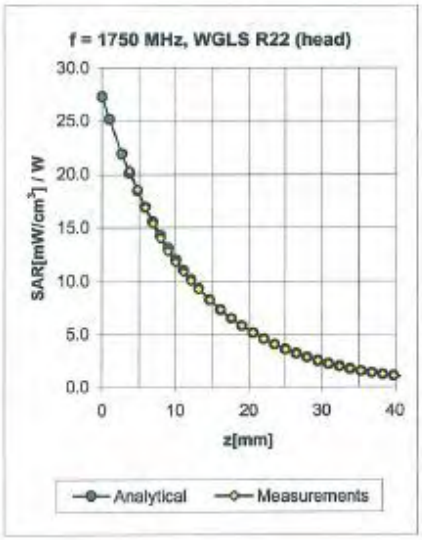
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1609_Mar09 Page 7 of 9

ET3DV6 SN:1609 **March 17, 2009**

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%	0.38	1.91	6.91 ± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.25	2.80	6.25 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.25	2.80	6.11 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.39	3.57	5.39 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.50	2.75	5.12 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.55	2.52	5.01 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.99	1.76	4.54 ± 11.0% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.30	1.92	7.48 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.25	2.85	6.08 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.77	3.05	4.89 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.99	2.60	4.61 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.99	1.78	4.00 ± 11.0% (k=2)

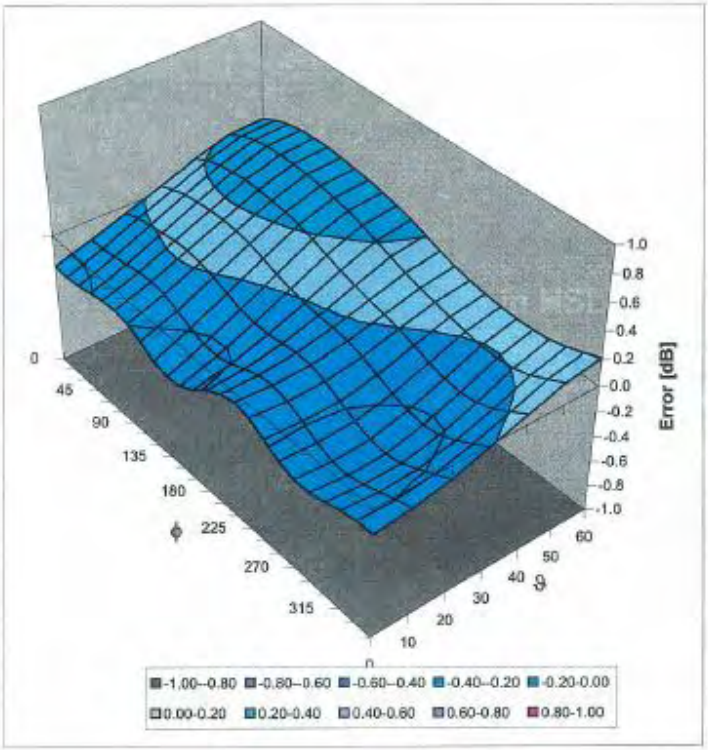
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Certificate No: ET3-1609_Mar09 Page 8 of 9

ET3DV6 SN:1609 March 17, 2009

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1609_Mar09 Page 9 of 9

Attachment 4. – Dipole Calibration Data

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Accreditation No.: **SCS 108**

Client **HTC (Dymstec)**

Certificate No: **D835V2-441_May09**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 441
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	May 25, 2009
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 (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 25, 2009

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Certificate No: D835V2-441_May09 Page 1 of 6

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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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
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) DASY4/5 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	DASY5	V5.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(21.6 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 mW / g
SAR normalized	normalized to 1W	9.52 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.56 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.26 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	50.3 Ω - 7.4 jΩ
Return Loss	- 22.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 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

DASY5 Validation Report for Head TSL

Date/Time: 25.05.2009 09:55:22

Test Laboratory: SPEAG, Zurich, Switzerland

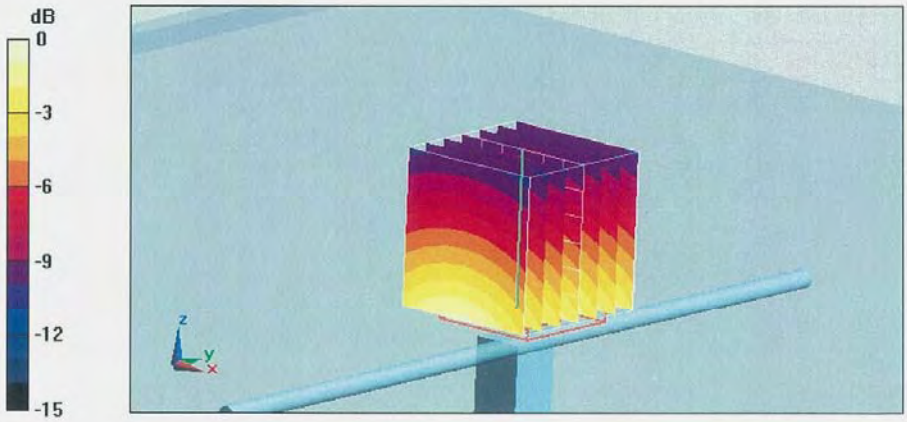
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:441

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

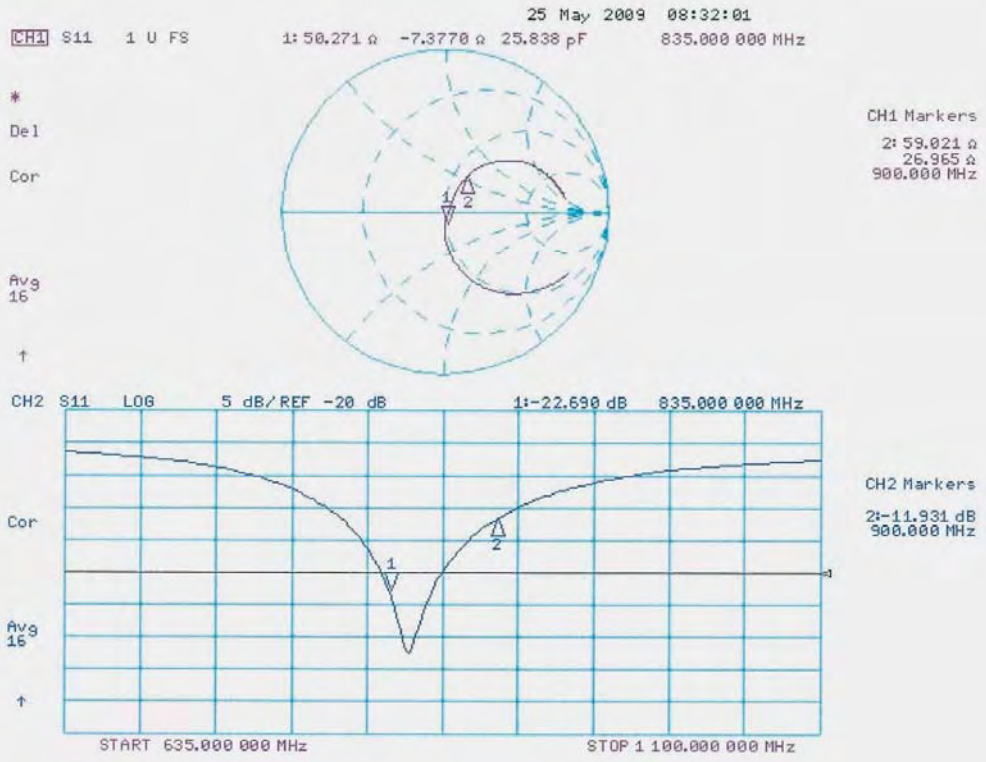
Pin=250mW; dip=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.1 V/m; Power Drift = 0.0073 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.77 mW/g



0 dB = 2.77mW/g

Certificate No: D835V2-441_May09 Page 5 of 6

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-441_May09 Page 6 of 6

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Accreditation No.: **SCS 108**

Client **HCT (Dymstec)**

Certificate No: **D1900V2-5d032_Jul09**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d032
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	July 20, 2009
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	08-Oct-08 (No. 217-00898)	Oct-09
Power sensor HP 8481A	US37292783	08-Oct-08 (No. 217-00898)	Oct-09
Reference 20 dB Attenuator	SN: 5086 (20g)	31-Mar-09 (No. 217-01025)	Mar-10
Type-N mismatch combination	SN: 5047.2 / 06327	31-Mar-09 (No. 217-01029)	Mar-10
Reference Probe ES3DV2	SN: 3025	30-Apr-09 (No. ES3-3025_Apr09)	Apr-10
DAE4	SN: 601	07-Mar-09 (No. DAE4-601_Mar09)	Mar-10

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: July 22, 2009

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Certificate No: D1900V2-5d032_Jul09 Page 1 of 6

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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) DASY4/5 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	DASY5	V5.0
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	40.9 ± 6 %	1.43 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

.

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**40.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.36 mW / g
SAR normalized	normalized to 1W	21.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**21.4 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	51.2 Ω + 4.4 jΩ
Return Loss	- 27.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 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

DASY5 Validation Report for Head TSL

Date/Time: 20.07.2009 14:41:47

Test Laboratory: SPEAG, Zurich, Switzerland

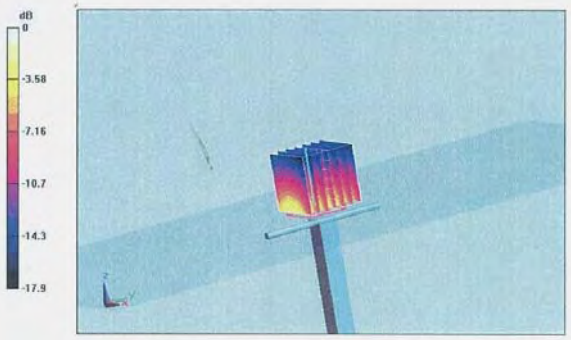
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d032

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U11 BB
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.88, 4.88, 4.88); Calibrated: 30.04.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.4 Build 45

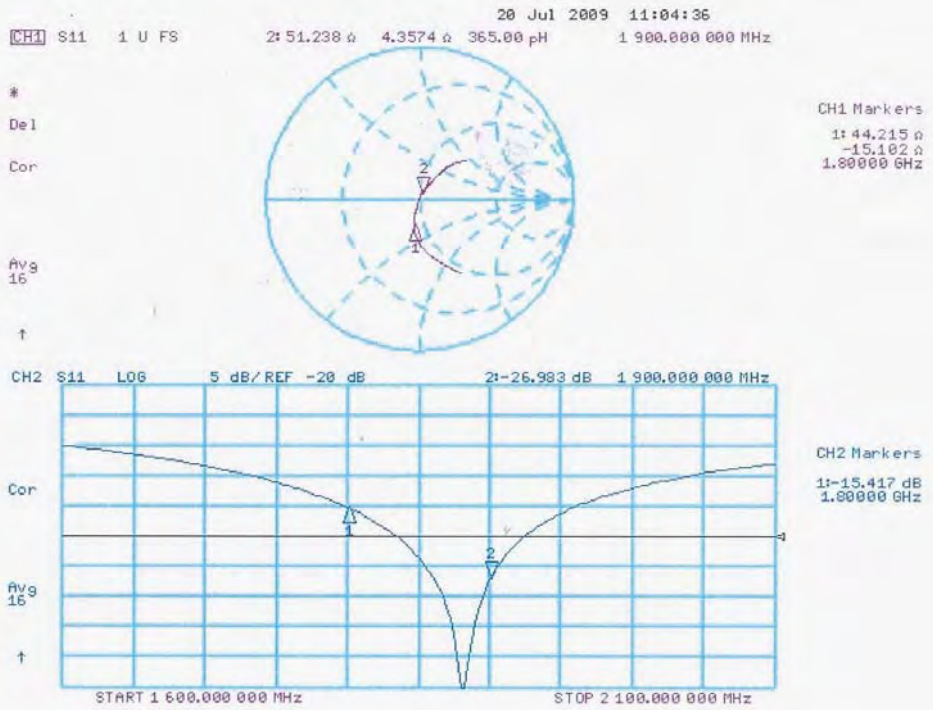
Pin = 250 mW; dip = 10 mm, scan at 3.0 mm/Zoom Scan (dist=3.0 mm, probe 0deg)
(7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.5 V/m; Power Drift = 0.063 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.36 mW/g
Maximum value of SAR (measured) = 12.8 mW/g



0 dB = 12.8mW/g

Certificate No: D1900V2-5d032_Jul09 Page 5 of 6

Impedance Measurement Plot for Head TSL



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Accreditation No.: SCS 108

Client H-CT (Dymstec)

Certificate No: D2450V2-743_Aug08

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 743
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	August 27, 2008
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 (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: S5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 27, 2008

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Certificate No: D2450V2-743_Aug08 Page 1 of 6

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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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
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) DASY4/5 System Handbook

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- *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	DASY5	V5.0
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	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.1 ± 6 %	1.80 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 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	13.3 mW / g
SAR normalized	normalized to 1W	53.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**52.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.17 mW / g
SAR normalized	normalized to 1W	24.7 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**24.4 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	53.8 Ω + 3.8 jΩ
Return Loss	- 25.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 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	December 01, 2003

DASY5 Validation Report for Head TSL

Date/Time: 27.08.2008 11:29:32

Test Laboratory: SPEAG, Zurich, Switzerland

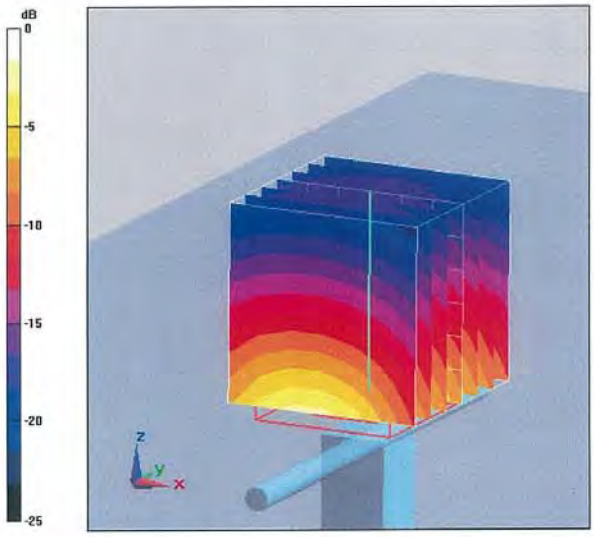
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN743

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB
Medium parameters used: f = 2450 MHz; σ = 1.8 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

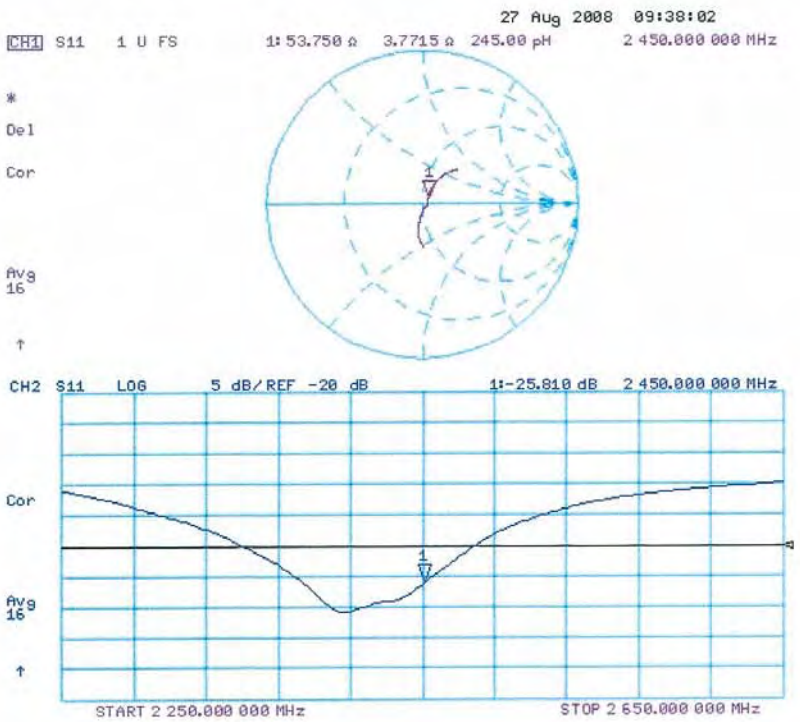
- Probe: ES3DV2 - SN3025; ConvF(4.4, 4.4, 4.4); Calibrated: 28.04.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 14.03.2008
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.0 Build 119; SEMCAD X Version 13.2 Build 87

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.6 V/m; Power Drift = 0.054 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.17 mW/g
Maximum value of SAR (measured) = 16 mW/g



0 dB = 16mW/g

Impedance Measurement Plot for Head TSL



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