SAR TEST REPORT

HCT CO., LTD

EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
FCC ID:	ZNFP700
Model:	LG-P700
Additional Model:	P700, LGP700
Date of Issue:	Mar. 06, 2012
Test report No.:	HCTA1203FS03
Test Laboratory:	**HCT CO., LTD.** 105-1, Jangam-ri, Majang-myeon, Icheon-si, Gyeonggi-do, Korea 467-811 TEL: +82 31 645 6485 FAX: +82 31 645 6401
Applicant :	**LG Electronics, MobileComm U.S.A., Inc.** 10101 Old Grove Road, San Diego, CA 92131
Testing has been carried out in accordance with:	RSS-102 Issue 4; Health Canada Safety Code 6 47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 1992 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 : Young-Soo Jang Test Engineer of SAR Part Approved by : Jae-Sang So Manager of SAR Part

Table of Contents

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
2 of 125

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

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

Figure 2. SAR Mathematical Equation

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

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

where:

σ	=	conductivity of the tissue-simulant material (S/m)
ρ	=	mass density of the tissue-simulant material (kg/m^3)
E	=	Total RMS electric field strength (V/m)

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

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
3 of 125

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).

2.1 General Information

EUT Type	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC			
FCC ID:	ZNFP700			
Model:	LG-P700			
Additional Model:	P700, LGP700			
Trade Name	LG		Serial Number(s)	#1
Application Type	Certification			
Mode(s)of Operation	GSM850/GSM1900/802.11b/g/n			
Tx Frequency	824.20 - 848.80 MHz (GSM850)/1 850.20 – 1 909.80 MHz (GSM1900) 2 412- 2 462 MHz (WLAN)			
Rx Frequency	869.20 - 893.80 MHz (GSM850)/1 930.20 – 1 989.80 MHz (GSM1900) 2 412- 2 462 MHz (WLAN)			
FCC Classification	Licensed Portable Transmitter Held to Ear (PCE)			
Production Unit	Prototype			
Max SAR	Band	1g SAR (W/kg)		
		Head	Body-worn	Hotspot
	GSM850	0.336	0.565	0.565
	GSM1900	0.439	0.407	0.407
	802.11b	0.203	0.071	0.071
Date(s) of Tests	Mar. 3, 2012 ~ Mar. 4, 2012			
Antenna Type	Integral Antenna			
GPRS	Multislot Class: 12, Mode Class: B			
Key Features	This device support Mobile Hotspot and GPRS VoIP capability.			

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   4 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

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.
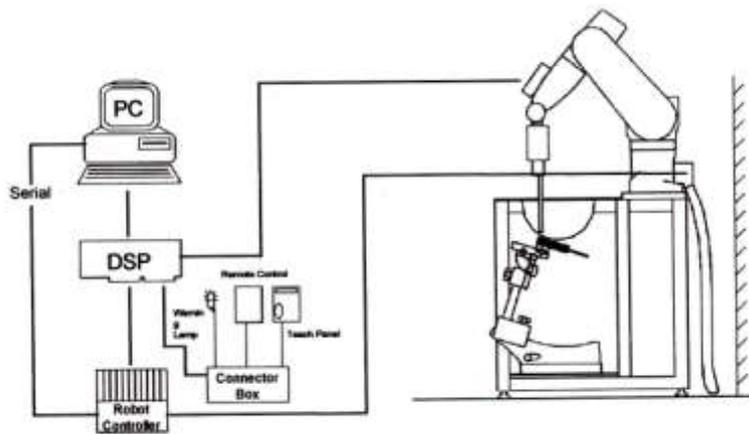
Figure 3.1 HCT SAR Lab. Test Measurement Set-up

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.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   5 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

3.2 DASY4 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: $\pm$ 0.2 dB
(30 MHz to 3 GHz)

Directivity $\pm$ 0.2 dB in brain tissue (rotation around probe axis)
$\pm$ 0.4 dB in brain tissue (rotation normal probe axis)

Dynamic   5 μW/g to > 100 mW/g;

Range Linearity: $\pm$ 0.2 dB

Surface $\pm$ 0.2 mm repeatability in air and clear liquids
Detection   over diffuse reflecting surfaces.

Dimensions   Overall length: 330 mm
Tip length: 16 mm
Body diameter: 12 mm
Tip diameter: 6.8 mm
Distance from probe tip to dipole centers: 2.7 mm

Application   General 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 3.2 EX3DV4 E-field Probe

The SAR measurements were conducted with the dosimetric probe EX3DV4, 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.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   6 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

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/cm³ for brain tissue)
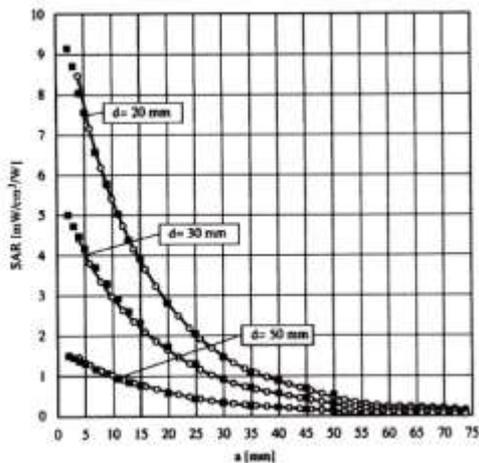

Figure 3.4 E-Field and Temperature
measurements at 900 MHz
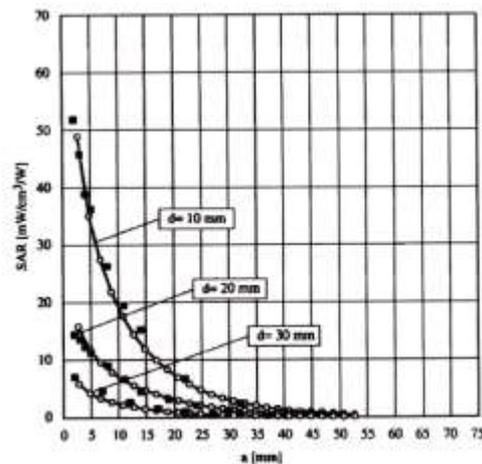

Figure 3.5 E-Field and temperature
measurements at 1.8 GHz

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   7 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

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/cm³

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/cm²
E_{tot} = total electric field strength in V/m

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   8 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

3.4 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm (6 ± 0.2 mm at ear point)
Filling Volume	about 25 L
Dimensions	1 000 mm x 500 mm (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

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

9 of 125

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	Frequency (MHz)									
(% by weight)	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

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
10 of 125

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	DAE4	869	Sep 22, 2011	Annual	Sep 22, 2012
SPEAG	E-Field Probe EX3DV4	3797	July 25, 2011	Annual	July 25, 2012
SPEAG	Validation Dipole D835V2	441	May 16, 2011	Annual	May 16, 2012
SPEAG	Validation Dipole D1900V2	5d032	July 22, 2011	Annual	July 22, 2012
SPEAG	Validation Dipole D2450V2	743	Aug. 29, 2011	Annual	Aug. 29, 2012
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 04, 2011	Annual	Nov. 04, 2012
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 04, 2011	Annual	Nov. 04, 2012
HP	Dielectric Probe Kit	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 04, 2011	Annual	Nov. 04, 2012
R&S	Base Station CMU200	110740	July 26, 2011	Annual	July 26, 2012
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2012	Annual	Feb. 10, 2013
HP	Signal Generator E4438C	MY42082646	Nov. 11, 2011	Annual	Nov. 11, 2012
HP	Network Analyzer 8753ES	JP39240221	Mar. 30, 2011	Annual	Mar. 30, 2012

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.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
11 of 125

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 30 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.
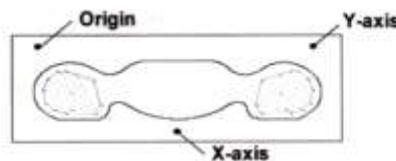

Figure 4.1 SAR Measurement Point in Area Scan

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   12 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

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 15^0 or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

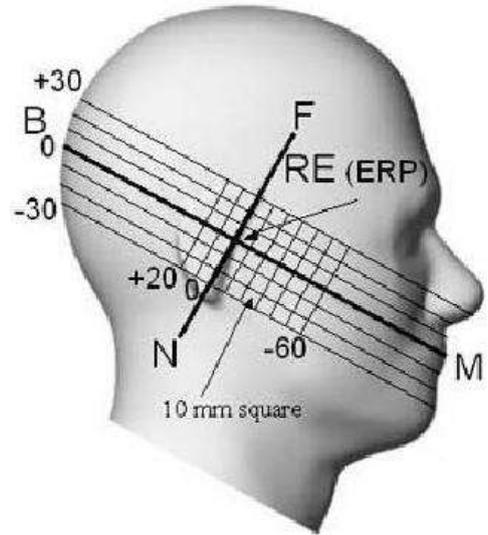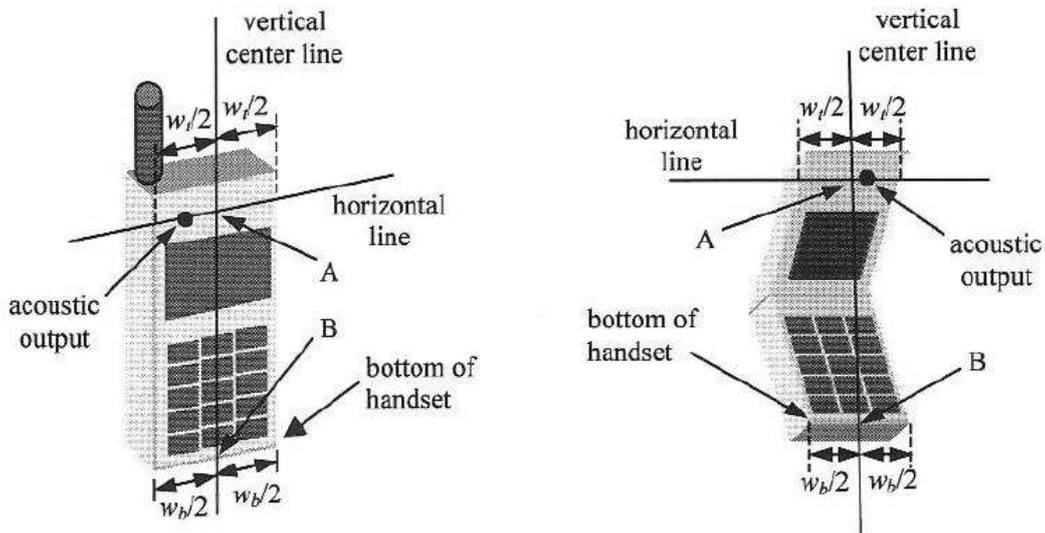Figure 5.1 Side view of the phantom

Figure 5.2 Handset vertical and horizontal reference lines

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
13 of 125

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 1.0 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.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   14 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

6. MEASUREMENT UNCERTAINTY

Error Description (± %)	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	v_{eff}
1. Measurement System						
Probe Calibration	6.00	N	1	1	6.00	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Conditions	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
2.Test Sample Related						
Device Positioning	2.90	N	1.00	1	2.90	145
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
3.Phantom and Setup						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞
Liquid Conductivity(meas.)	2.07	N	1	0.64	1.32	9
Liquid Permitivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permitivity(meas.)	5.02	N	1	0.6	3.01	9
Combind Standard Uncertainty					11.13	
Coverage Factor for 95 %					$k=2$	
Expanded STD Uncertainty					22.25	

Table 6.1 Uncertainty (800 MHz- 2450 MHz)

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   15 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

7. ANSI/ IEEE C95.1 - 1992 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).

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   16 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

8. SYSTEM VERIFICATION

8.1 Tissue Verification

Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Mar. 3, 2012	Head	21.0	ε r	41.5	43	+ 3.61	± 5
				σ	0.90	0.901	+ 0.11	± 5
835		Body		ε r	55.2	54.4	- 1.45	± 5
				σ	0.97	0.995	+ 2.58	± 5
1 900	Mar. 4, 2012	Head	21.2	ε r	40.0	41.5	+ 3.75	± 5
				σ	1.40	1.4	0.00	± 5
1 900		Body		ε r	53.3	55.2	+ 3.56	± 5
				σ	1.52	1.47	- 3.29	± 5
2 450	Mar. 4, 2012	Head	21.2	ε r	39.2	38.7	- 1.28	± 5
				σ	1.80	1.85	+ 2.78	± 5
2 450		Body		ε r	52.7	52.1	- 1.14	± 5
				σ	1.95	1.88	- 3.59	± 5

The dielectronic parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070C

Dielectronic Probe Kit and Agilent Network Analyzer.

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)

Freq. [MHz]	Date	Probe (SN)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{1g} (SPEAG) (mW/g)	Measured SAR_{1g} (mW/g)	1 W Normalized SAR_{1g} (mW/g)	Deviation [%]	Limit [%]
835	Mar. 3.2012	3797	Head	21.2	21.0	9.34	0.942	9.42	+ 0.86	± 10
835	Mar. 3.2012	3797	Body	21.2	21.0	9.45	0.944	9.44	- 0.11	± 10
1 900	Mar. 4, 2012	3797	Head	21.4	21.2	39.9	3.88	38.8	- 2.76	± 10
1 900	Mar. 4, 2012	3797	Body	21.4	21.2	40.9	4.07	40.7	- 0.49	± 10
2 450	Mar. 4, 2012	3797	Head	21.4	21.2	53.8	5.4	54	+ 0.37	± 10
2 450	Mar. 4, 2012	3797	Body	21.4	21.2	51.7	5.19	51.9	+ 0.39	± 10

8.3 System Validation Procedure

SAR measurement was prior to assessment, the system is verified to the ± 10 % of the specifications at each frequency band by using the system validation kit. (Graphic Plots Attached)
- Cabling the system, using the validation kit equipments.
- Generate about 100 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

Note;
SAR Verification was performed according to the FCC KDB 450824.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
17 of 125

9. RF CONDUCTED POWER

Power measurements were performed using a base station simulator under digital average power.

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 evaluation SAR

SAR measurements were taken with a fully charged battery. In order to verify that the device was tested

and maintained at full power, this was configured with the base station simulator. The SAR measurement

Software calculates a reference point at the start and end of the test to check for power drifts. If conducted

Power deviations of more then 5 % occurred, the tests were repeated.

9.1 GSM

Conducted output power measurements were performed using a base station simulator under digital average power.
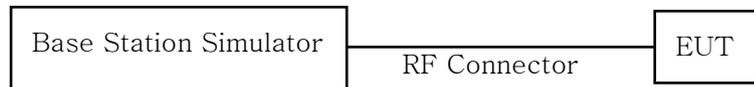
SAR Test for WWAN were performed with a base station simulator Agilent E5515C. Communication between the device and the emulator was established by air link. Set base station emulator to allow DUT to radiate maximum output power during all tests. Please refer to the below worst case SAR operation setup.

- GSM voice: Head SAR

- GPRS Multi-slots : GPRS850/1900 Body SAR with GPRS Multi-slot Class12 with 4Tx with CS 1 (GMSK)

Band	Channel	GSM Voice (dBm)	GPRS(GMSK) Data – CS1			
			GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 850	128	32.38	32.32	29.84	27.99	26.89
	190	32.32	32.27	29.79	27.95	26.84
	251	32.27	32.22	29.78	27.9	26.81
GSM 1900	512	28.45	28.41	26.03	24.15	23.04
	661	28.43	28.38	25.99	24.12	23.01
	810	28.3	28.26	25.86	24	22.89

Table 9.1 GSM Inactive Conducted output powers (Burst-Average)

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr   18 of 125

Band	Channel	GSM	GPRS(GMSK) Data – CS1			
		Voice (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 850	128	23.35	23.29	23.82	23.73	23.88
	190	23.29	23.24	23.77	23.69	23.83
	251	23.24	23.19	23.76	23.64	23.8
GSM 1900	512	19.42	19.38	20.01	19.89	20.03
	661	19.4	19.35	19.97	19.86	20
	810	19.27	19.23	19.84	19.74	19.88

Table 9.2 GSM Inactive Conducted output powers (Frame-Average)

Note:

Time slot average factor is as follows:

1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB

2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB

3 Tx slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB

4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   19 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

9.2 WiFi

9.2.1 SAR Testing for 802.11a/b/g/n modes

General Device Setup

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.

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.

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	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				√
UNII	5.500	100				*
	5.520	104				√
	5.540	108				*
	5.560	112				*
	5.580	116	Unknown			√
	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	152 (5.76 GHz)	√		√
	5.765	153			*	*
	5.785	157	160 (5.80 GHz)	√		*
	5.805	161			*	√
§15.247	5.825	165		√		

802.11 Test Channels per FCC Requirements

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
20 of 125

Band	Channel	Mbps (dBm)			
		1	**2**	**5.5**	**11**
IEEE 802.11b	1	14.10	14.00	14.34	14.09
	6	13.68	13.53	13.70	13.63
	11	14.17	14.01	14.35	14.10

Table 9.3 Average IEEE 802.11b Conducted output power

Band	Channel	Mbps (dBm)							
		6	**9**	**12**	**18**	**24**	**36**	**48**	**54**
IEEE 802.11g	1	13.15	13.05	12.90	12.72	12.59	12.32	12.00	11.82
	6	12.68	12.65	12.55	12.35	12.24	11.85	11.63	11.41
	11	12.66	12.60	12.39	12.31	12.20	11.73	11.54	11.30

Table 9.4 Average IEEE 802.11g Conducted output power

Band	Channel	Mbps (dBm)							
		6.5	**13**	**20**	**26**	**39**	**52**	**58**	**65**
IEEE 802.11n (HT-20)	1	12.09	11.96	11.75	11.65	11.18	11.17	10.81	11.80
	6	11.61	11.50	11.36	11.15	10.83	10.45	10.36	10.19
	11	11.59	11.46	11.30	11.13	10.79	10.37	10.28	10.23

Table 9.5 Average IEEE 802.11n Conducted output power

Note;
SAR testing was performed according to the FCC KDB 248227.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

21 of 125

10. SAR Test configuration & Antenna Information

10.1 SAR Test configurations

Mode	Back	Front	Top	Bottom	Right	Left
850 GPRS	Yes	Yes	No	Yes	Yes	Yes
1900 GPRS	Yes	Yes	No	Yes	Yes	Yes
WLAN	Yes	Yes	Yes	No	No	Yes

10.2 Antenna and Device Information

Note;

Per FCC KDB Publication 941225 D06, we performed the SAR testing at 1 cm from the top & bottom surfaces and also from side edges with a transmitting antenna $\leq$ 2.5 cm from an edge.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
22 of 125

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: ZNFP700 / BT Max. RF output power: 9.19 dBm (8.30 mW)

Antenna separation distance between Main and BT/ WLAN: 94.1 mm

WLAN Max. RF output power: Wi-Fi 802.11b (14.35 dBm)

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   23 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

11.2 SAR Summation Scenario

Simultaneous Transmission Summation for Held to Ear

Simultaneous TX	configuration	850 GSM SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)	Simultaneous TX	configuration	1900 GSM SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)
Head SAR	Left Cheek	0.267	0.11	0.377	Head SAR	Left Cheek	0.439	0.11	0.549
	Left Tilt	0.151	0.094	0.245		Left Tilt	0.226	0.094	0.320
	Right Cheek	0.336	0.203	0.539		Right Cheek	0.36	0.203	0.563
	Right Tilt	0.167	0.092	0.259		Right Tilt	0.218	0.092	0.310

Simultaneous TX	configuration	850 GPRS SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)	Simultaneous TX	configuration	1900 GPRS SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)
Head SAR	Left Cheek	0.262	0.11	0.372	Head SAR	Left Cheek	0.402	0.11	0.512
	Left Tilt	0.146	0.094	0.240		Left Tilt	0.217	0.094	0.311
	Right Cheek	0.325	0.203	0.528		Right Cheek	0.345	0.203	0.548
	Right Tilt	0.171	0.092	0.263		Right Tilt	0.208	0.092	0.300

The above tables represent a held to ear voice call with 2.4 GHz WLAN.

Simultaneous Transmission Summation for Body-Worn (1cm)

Simultaneous TX	configuration	850 GPRS SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)	Simultaneous TX	configuration	1900 GPRS SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)
Body SAR	Back	0.565	0.071	0.636	Body SAR	Back	0.407	0.071	0.478

The above tables represent a body-worn call with 2.4 GHz WLAN

Simultaneous Transmission Summation for Hotspot (1cm)

Simultaneous TX	configuration	850 GPRS SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)	Simultaneous TX	configuration	1900 GPRS SAR(W/kg)	WIFI SAR (W/kg)	∑SAR (W/kg)
Body SAR	Back	0.565	0.071	0.636	Body SAR	Back	0.407	0.071	0.478
	Front	0.384	0.04	0.424		Front	0.384	0.04	0.424
	Left	0.306	0.026	0.332		Left	0.162	0.026	0.188
	Right	0.398	-	0.398		Right	0.125	-	0.125
	Bottom	0.051	-	0.051		Bottom	0.342	-	0.342
	Top	-	0.04	0.040		Top	-	0.04	0.040

The above tables represent a portable hotspot condition.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   24 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Note;

Body-Worn SAR : The Rear side hotspot SAR test configurations can be considered for body-worn accessory SAR. Although body-worn accessory conditions are typically for voice configurations, the GPRS slot frame averaged output power was more conservative and was included for the body-worn accessory SAR assessment.

11.3 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation is required per FCC KDB Publication 648474.

The above tables represent the worst-case simultaneous transmission scenarios possibility with this device.

The conducted output power level of the BT transmitter is less than P_{ref}, the BT antenna is more than 2.5 cm from the other antenna, therefore, a stand-alone BT SAR evaluation is not required.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
25 of 125

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (GSM/GPRS850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
836.6	190 (Mid)	GSM850	32.32	-0.01	Standard	Left Ear	0.267
836.6	190 (Mid)	GSM850	32.32	0.014	Standard	Left Tilt 15°	0.151
836.6	190 (Mid)	GSM850	32.32	-0.08	Standard	Right Ear	0.336
836.6	190 (Mid)	GSM850	32.32	-0.049	Standard	Right Tilt 15°	0.167
836.6	190 (Mid)	GPRS 4Tx	26.84	-0.065	Standard	Left Ear	0.262
836.6	190 (Mid)	GPRS 4Tx	26.84	-0.012	Standard	Left Tilt 15°	0.146
836.6	190 (Mid)	GPRS 4Tx	26.84	-0.038	Standard	Right Ear	0.325
836.6	190 (Mid)	GPRS 4Tx	26.84	0.007	Standard	Right Tilt 15°	0.171

ANSI/ IEEE C95.1 - 1992– 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).

8　For body SAR testing, the EUT was set in GPRS multi-slot class12 with 4uplink slots for GSM850 due to maximum source-based time-averaged output power.
　　According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
26 of 125

12.2 Measurement Results (GSM/GPRS1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
1 880.0	661 (Mid)	GSM1900	28.43	0.038	Standard	Left Ear	0.439
1 880.0	661 (Mid)	GSM1900	28.43	-0.022	Standard	Left Tilt 15°	0.226
1 880.0	661 (Mid)	GSM1900	28.43	0.009	Standard	Right Ear	0.36
1 880.0	661 (Mid)	GSM1900	28.43	0.022	Standard	Right Tilt 15°	0.218
1 880.0	661 (Mid)	GPRS 4Tx	23.01	-0.066	Standard	Left Ear	0.402
1 880.0	661 (Mid)	GPRS 4Tx	23.01	-0.147	Standard	Left Tilt 15°	0.217
1 880.0	661 (Mid)	GPRS 4Tx	23.01	-0.014	Standard	Right Ear	0.345
1 880.0	661 (Mid)	GPRS 4Tx	23.01	-0.059	Standard	Right Tilt 15°	0.208

ANSI/ IEEE C95.1 - 1992– 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).
8   For body SAR testing, the EUT was set in GPRS multi-slot class12 with 4uplink slots for GSM1900 due to maximum source-based time-averaged output power.
     According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
27 of 125

12.3 Measurement Results (802.11b/g/n Head)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Data Rate (Mbps)	SAR(mW/g)
MHz	Channel							
2 462	11 (High)	802.11b	14.17	0.080	Standard	Left Ear	1	0.11
2 462	11 (High)	802.11b	14.17	0.184	Standard	Left Tilt 15°	1	0.094
2 462	11 (High)	802.11b	14.17	0.095	Standard	Right Ear	1	0.203
2 462	11 (High)	802.11b	14.17	0.194	Standard	Right Tilt 15°	1	0.092

ANSI/ IEEE C95.1 - 1992– 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   IEEE 802.11g(including 802.11n) 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.
8   For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
28 of 125

12.4 Measurement Results (GSM850 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
836.6	190 (Mid)	GPRS 4Tx	26.84	0.035	Rear	1.0 cm	0.565
836.6	190 (Mid)	GPRS 4Tx	26.84	0.045	Front	1.0 cm	0.384
836.6	190 (Mid)	GPRS 4Tx	26.84	-0.036	Left	1.0 cm	0.306
836.6	190 (Mid)	GPRS 4Tx	26.84	-0.057	Right	1.0 cm	0.398
836.6	190 (Mid)	GPRS 4Tx	26.84	-0.119	Bottom	1.0 cm	0.051

ANSI/ IEEE C95.1 - 1992– 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 Test Configuration   ☐ With Holster   ☒ Without Holster

8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

9 For body SAR testing, the EUT was set in GPRS multi-slot class12 with 4uplink slots for GSM850 due to maximum source-based time-averaged output power.
   According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
29 of 125

12.5 Measurement Results (GSM1900 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
1 880.0	661 (Mid)	GPRS 4Tx	23.01	-0.165	Rear	1.0 cm	0.407
1 880.0	661 (Mid)	GPRS 4Tx	23.01	0.002	Front	1.0 cm	0.384
1 880.0	661 (Mid)	GPRS 4Tx	23.01	0.029	Left	1.0 cm	0.162
1 880.0	661 (Mid)	GPRS 4Tx	23.01	0.061	Right	1.0 cm	0.125
1 880.0	661 (Mid)	GPRS 4Tx	23.01	-0.102	Bottom	1.0 cm	0.342

ANSI/ IEEE C95.1 - 1992– 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 Test Configuration   ☐ With Holster   ☒ Without Holster
8 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
9 For body SAR testing, the EUT was set in GPRS multi-slot class12 with 4uplink slots for GSM1900 due to maximum source-based time-averaged output power.
     According to the KDB 941225 D03 SAR test reduction GSM/GPRS/EDGE, the maximum output power configuration were chosen for Body SAR testing.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
30 of 125

12.6 Measurement Results (802.11b/g/n Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Data Rate (Mbps)	SAR(mW/g)
MHz	Channel							
2 462	11 (High)	802.11b	14.17	0.048	Rear	1.0 cm	1	0.071
2 462	11 (High)	802.11b	14.17	0.018	Front	1.0 cm	1	0.04
2 462	11 (High)	802.11b	14.17	0.147	Left	1.0 cm	1	0.026
2 462	11 (High)	802.11b	14.17	0.174	Top	1.0 cm	1	0.04
ANSI/ IEEE C95.1 - 1992– 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 code   ☐ Base Station Simulator
7 IEEE 802.11g(including 802.11n) 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.
8 For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   31 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

13. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 1992.

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.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   32 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

14. REFERENCES

[1] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields, July 2001.

[2] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, IEE Recommended Practice or Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body from Wireless Communications Devices.

[3] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio frequency Radiation, Aug. 1996.

[4] ANSI/IEEE C95.1 - 1991, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 kHz to 100 GHz, New York: IEEE, Aug. 1992

[5] ANSI/IEEE C95.3 - 1991, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, 1992.

[6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.

[9]K. Pokoviº, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300 MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[13] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectro magnetics, Canada: 1987, pp. 29-36.

[14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[15] W. Gander, Computer mathematick, Birkhaeuser, Basel, 1992.

[16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recepies in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[17] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[18] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[19] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10 kHz-300 GHz, Jan. 1995.

[20] Prof. Dr. Niels Kuster, ETH, EidgenØssische Technische Hoschschule Zòrich, Dosimetric Evaluation of the Cellular Phone.
[21] SAR Evaluation of Handsets with Multiple Transmitters and Antennas #648474.

[22] SAR Measurement Procedure for 802.11 a/b/g Transmitters #KDB 248227.

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   33 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Attachment 1. – SAR Test Plots

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

34 of 125

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.285 mW/g

Left touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
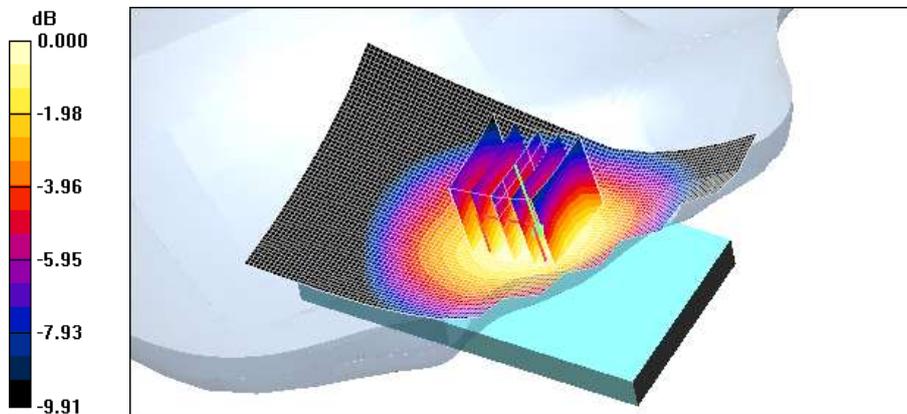Reference Value = 3.64 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.335 W/kg
SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.200 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.283 mW/g

0 dB = 0.283mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   35 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.0 ℃
Ambient Temperature:	21.2 ℃
Test Date:	Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

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

Left tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.55 V/m; Power Drift = 0.014 dB
Peak SAR (extrapolated) = 0.183 W/kg
SAR(1 g) = 0.151 mW/g; SAR(10 g) = 0.116 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.159 mW/g

0 dB = 0.159mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   36 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.354 mW/g

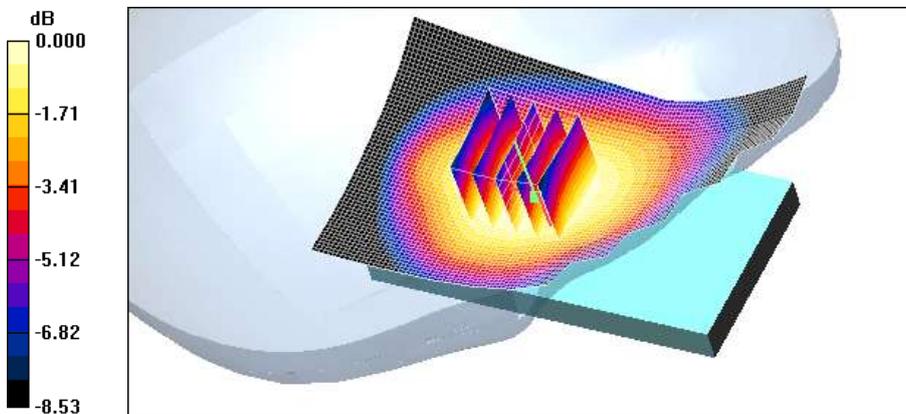**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.67 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.427 W/kg
SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.249 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.353 mW/g

0 dB = 0.353mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   37 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.180 mW/g

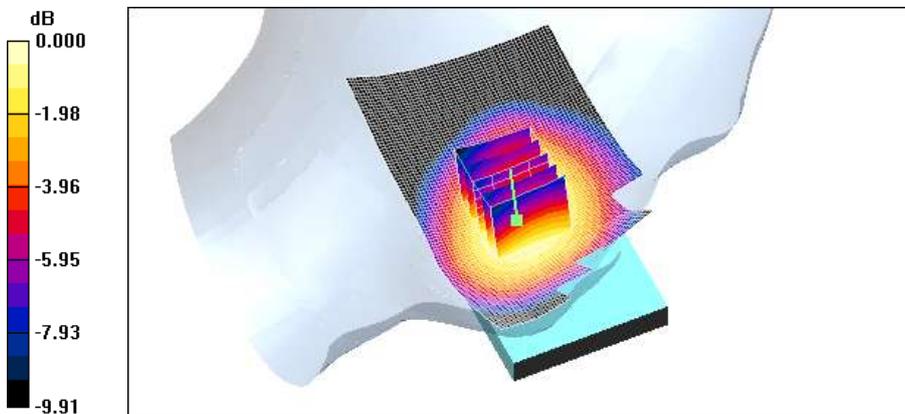**Right tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.58 V/m; Power Drift = -0.049 dB
Peak SAR (extrapolated) = 0.205 W/kg
SAR(1 g) = 0.167 mW/g; SAR(10 g) = 0.130 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.173 mW/g

0 dB = 0.173mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   38 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Left touch 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.280 mW/g

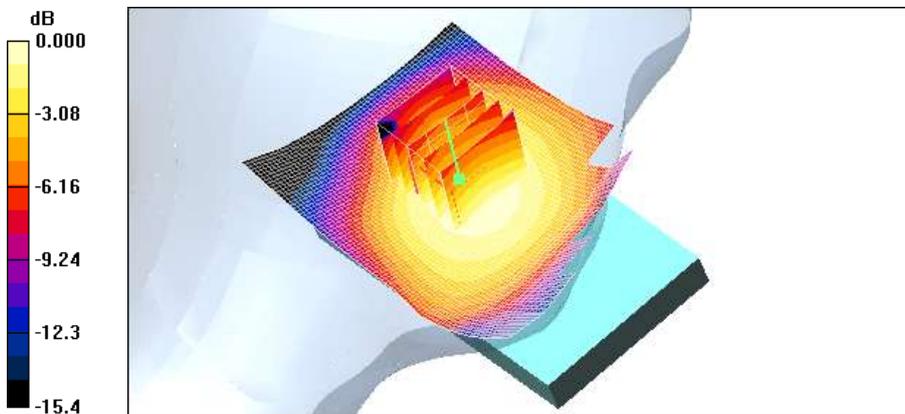**Left touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.20 V/m; Power Drift = -0.065 dB
Peak SAR (extrapolated) = 0.332 W/kg
SAR(1 g) = 0.262 mW/g; SAR(10 g) = 0.196 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.275 mW/g

0 dB = 0.275mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   39 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Left tilt 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.144 mW/g

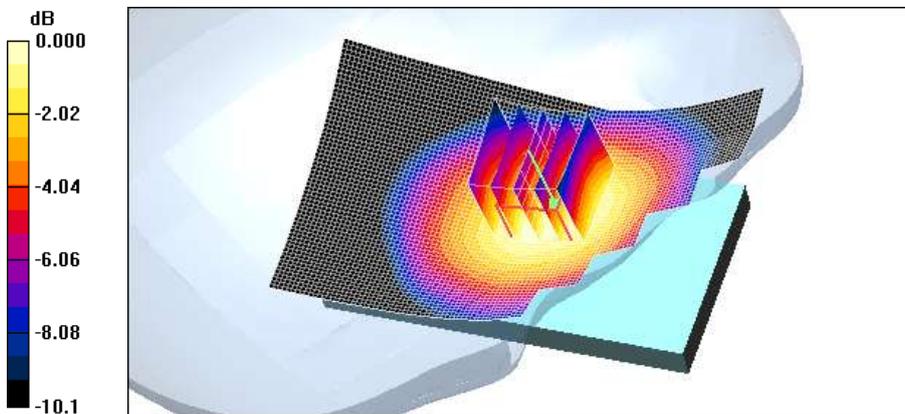**Left tilt 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.60 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 0.177 W/kg
SAR(1 g) = 0.146 mW/g; SAR(10 g) = 0.108 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.156 mW/g

0 dB = 0.156mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   40 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
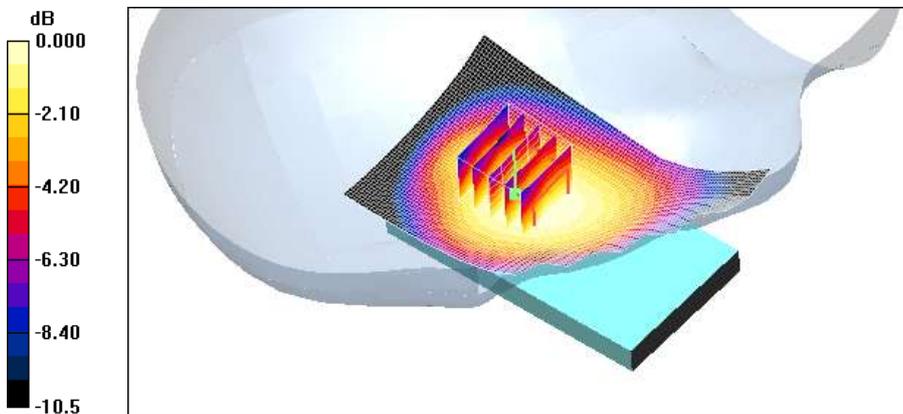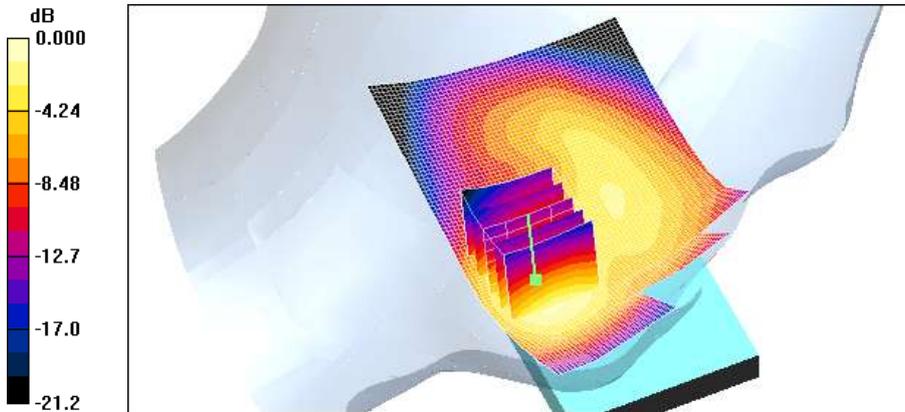Maximum value of SAR (interpolated) = 0.348 mW/g

Right touch 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.32 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 0.410 W/kg
SAR(1 g) = 0.325 mW/g; SAR(10 g) = 0.243 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.342 mW/g

0 dB = 0.342mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   41 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.0 ℃
Ambient Temperature:	21.2 ℃
Test Date:	Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Right tilt 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.185 mW/g

Right tilt 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.54 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.208 W/kg
SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.131 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
aximum value of SAR (measured) = 0.177 mW/g

0 dB = 0.177mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
42 of 125

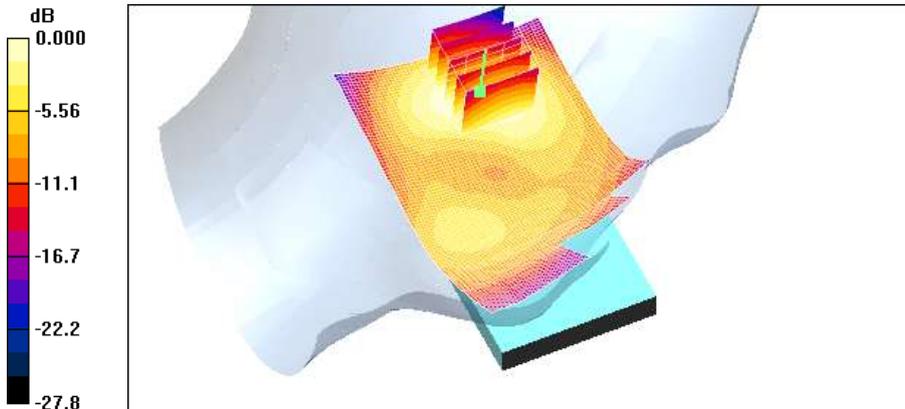|	
Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.465 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.25 V/m; Power Drift = 0.038 dB
Peak SAR (extrapolated) = 0.754 W/kg
SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.251 mW/g
Maximum value of SAR (measured) = 0.485 mW/g

0 dB = 0.485mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811　　43 of 125
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

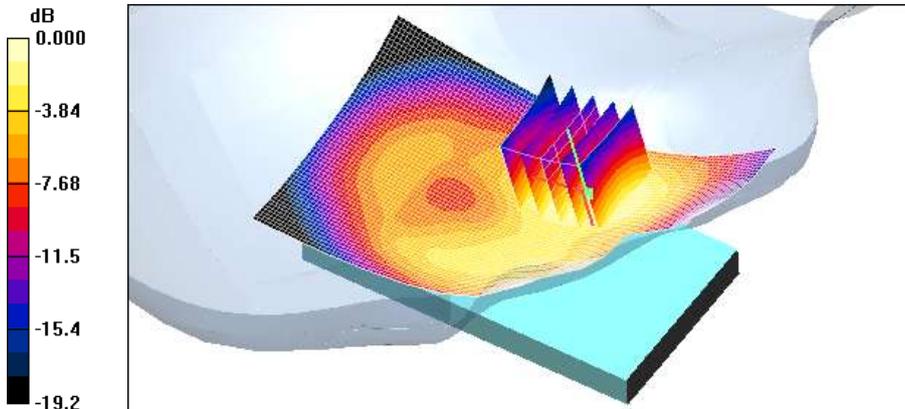Test Date: Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Left tilt 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.278 mW/g

Left tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 0.380 W/kg
SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.130 mW/g
Maximum value of SAR (measured) = 0.244 mW/g

0 dB = 0.244mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811 44 of 125
TEL: +82 31 645 64851 FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.372 mW/g

Right touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.93 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 0.609 W/kg
SAR(1 g) = 0.360 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 0.397 mW/g

0 dB = 0.397mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
45 of 125

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

Test Date: Mar.04, 2012
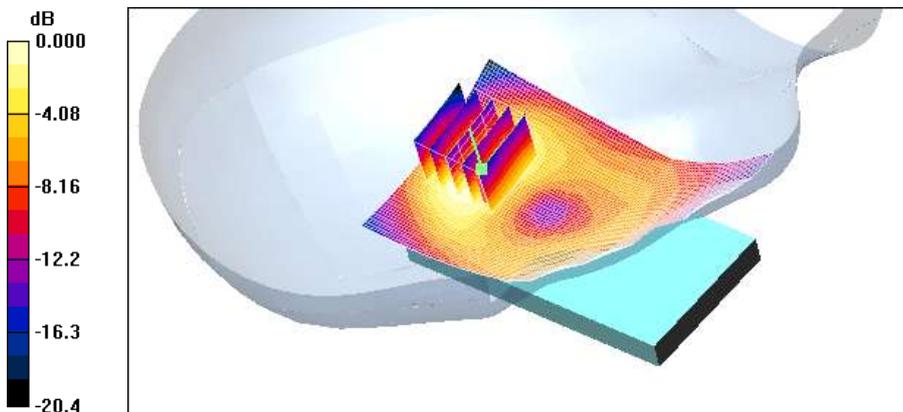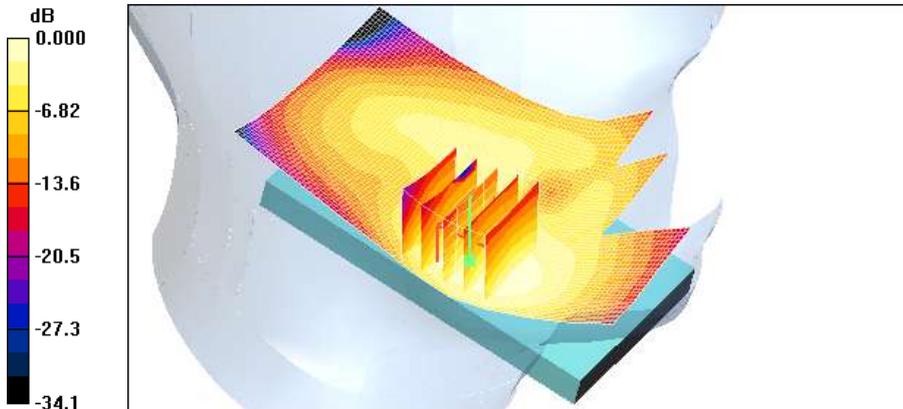
DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Right tilt 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.247 mW/g

Right tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.378 W/kg
SAR(1 g) = 0.218 mW/g; SAR(10 g) = 0.122 mW/g
Maximum value of SAR (measured) = 0.238 mW/g

0 dB = 0.238mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   46 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.445 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.37 V/m; Power Drift = -0.066 dB
Peak SAR (extrapolated) = 0.702 W/kg
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.230 mW/g
Maximum value of SAR (measured) = 0.440 mW/g

0 dB = 0.440mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
47 of 125

Test Laboratory:　　　　HCT CO., LTD

EUT Type:　　　　　　Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature:　　21.2 ℃

Ambient Temperature:　21.4 ℃

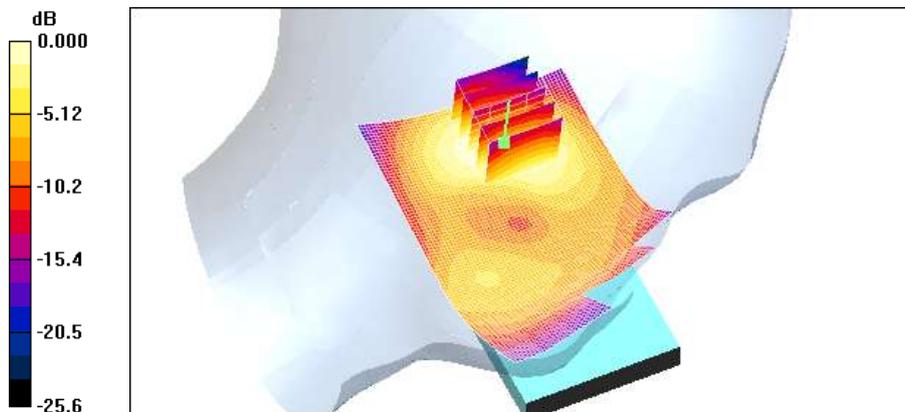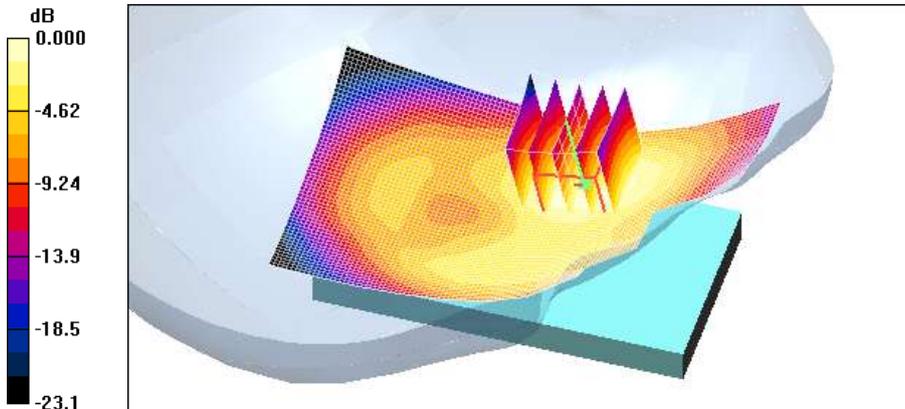Test Date:　　　　　　Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Left tilt 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.271 mW/g

Left tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.0 V/m; Power Drift = -0.147 dB
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.217 mW/g; SAR(10 g) = 0.125 mW/g
Maximum value of SAR (measured) = 0.235 mW/g

0 dB = 0.235mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811　　　48 of 125
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8
Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Right touch 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.357 mW/g

Right touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.91 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 0.584 W/kg
SAR(1 g) = 0.345 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.381 mW/g

0 dB = 0.381mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   49 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Mar.04, 2012
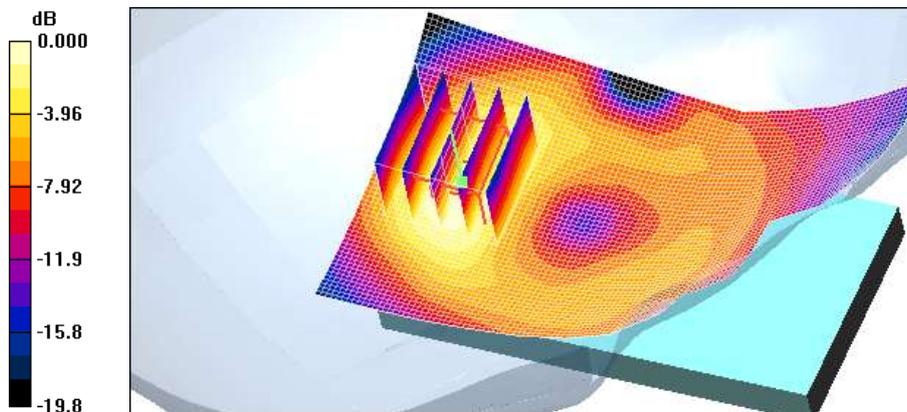
DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Right tilt 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.226 mW/g

Right tilt 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.7 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 0.364 W/kg
SAR(1 g) = 0.208 mW/g; SAR(10 g) = 0.115 mW/g
Maximum value of SAR (measured) = 0.230 mW/g

0 dB = 0.230mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   50 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.86 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left touch 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.127 mW/g

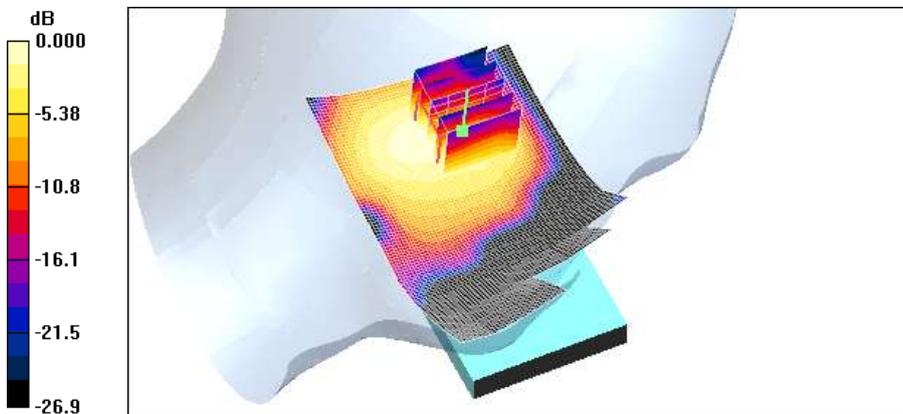**Left touch 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.86 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 0.210 W/kg
SAR(1 g) = 0.110 mW/g; SAR(10 g) = 0.058 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.118 mW/g

0 dB = 0.118mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   51 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:　　　　　HCT CO., LTD

EUT Type:　　　　　　　Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature:　　　21.2 ℃

Ambient Temperature:　　21.4 ℃

Test Date:　　　　　　　Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.86 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

Left tilt 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.102 mW/g

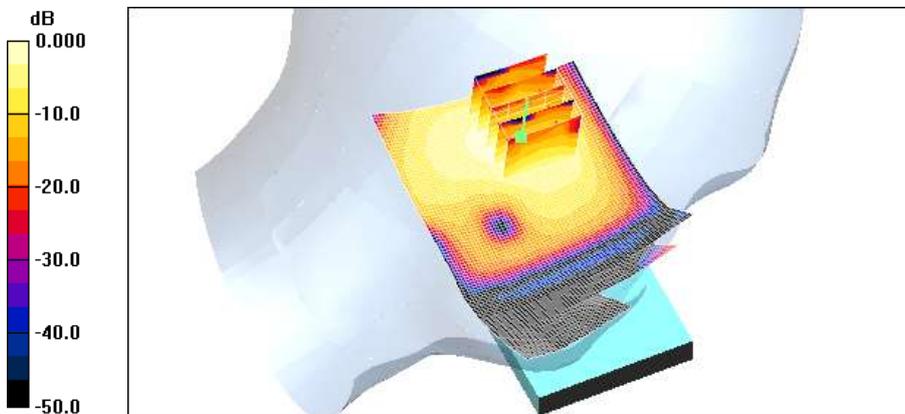**Left tilt 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.80 V/m; Power Drift = 0.184 dB
Peak SAR (extrapolated) = 0.184 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.047 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.105 mW/g

0 dB = 0.105mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
52 of 125

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

Test Date: Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.86 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.233 mW/g

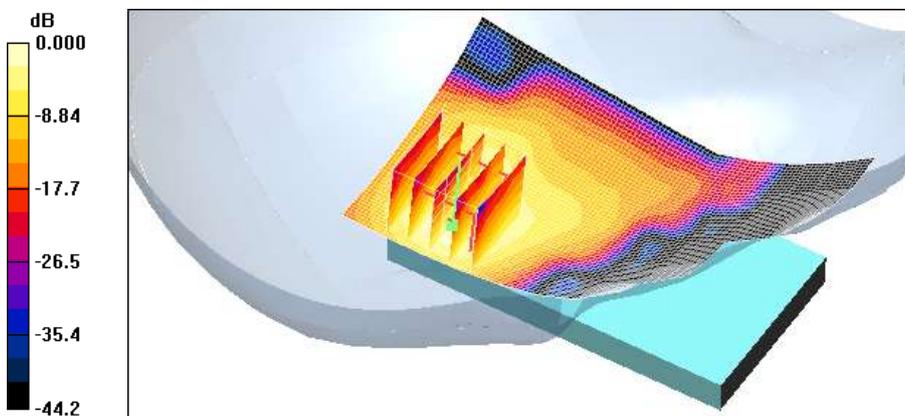**Right touch 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.06 V/m; Power Drift = 0.095 dB
Peak SAR (extrapolated) = 0.439 W/kg
SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.092 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.241 mW/g

0 dB = 0.241mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   53 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.86 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right tilt 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.100 mW/g

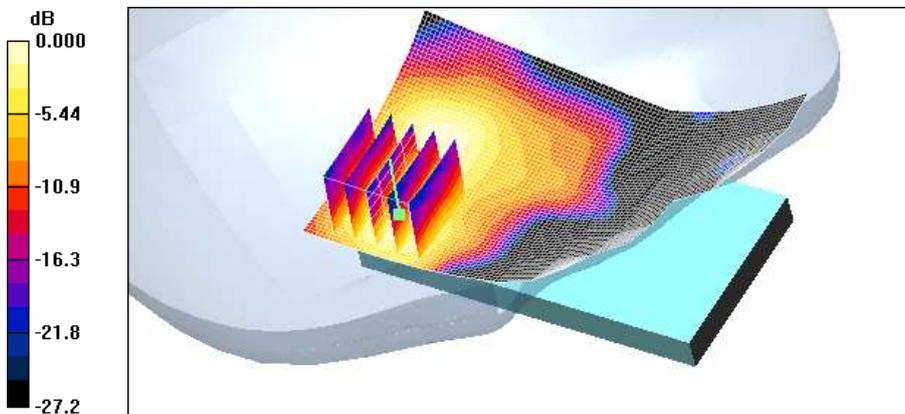**Right tilt 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.88 V/m; Power Drift = 0.194 dB
Peak SAR (extrapolated) = 0.186 W/kg
SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.045 mW/g

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

0 dB = 0.101mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   54 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.0 ℃
Ambient Temperature:	21.2 ℃
Test Date:	Mar.03, 2012
Separation	1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.997 mho/m; $ε_r$ = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body rear 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.602 mW/g

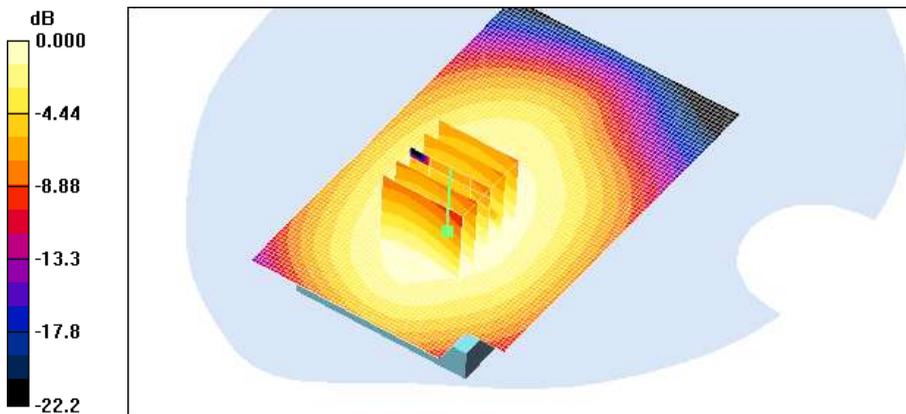**Body rear 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.3 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 0.710 W/kg
SAR(1 g) = 0.565 mW/g; SAR(10 g) = 0.416 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.592 mW/g

0 dB = 0.592mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
55 of 125

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Mar.03, 2012
Separation   1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.997 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body front 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.403 mW/g

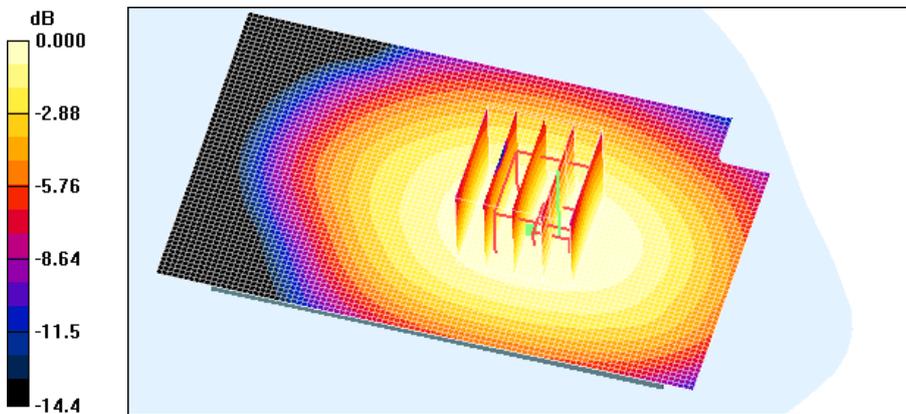**Body front 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.5 V/m; Power Drift = 0.045 dB
Peak SAR (extrapolated) = 0.479 W/kg
SAR(1 g) = 0.384 mW/g; SAR(10 g) = 0.294 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.401 mW/g

0 dB = 0.401mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   56 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

Separation   1 cm

DUT: LG-P700(side); Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.997 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body left 190/Area Scan (31x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.331 mW/g

Body left 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
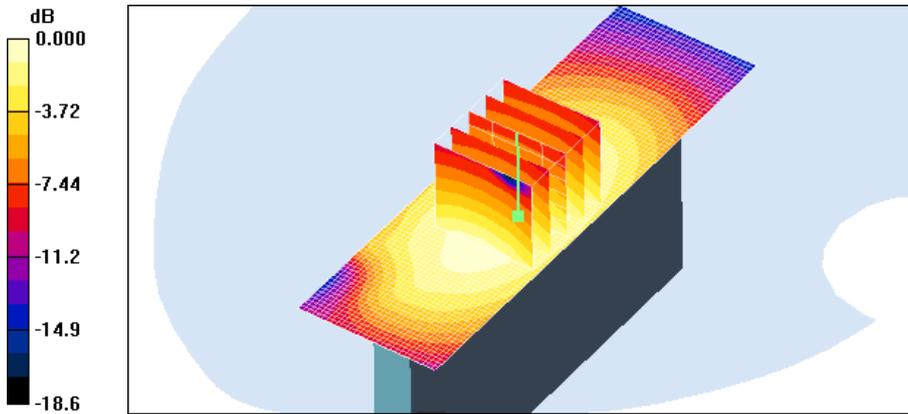Reference Value = 11.1 V/m; Power Drift = -0.036 dB
Peak SAR (extrapolated) = 0.431 W/kg
SAR(1 g) = 0.306 mW/g; SAR(10 g) = 0.213 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.324 mW/g

0 dB = 0.324mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
57 of 125

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.0 ℃
Ambient Temperature:	21.2 ℃
Test Date:	Mar.03, 2012
Separation	1 cm

DUT: LG-P700(side); Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.997 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body right 190/Area Scan (31x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.406 mW/g

Body right 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 0.651 W/kg
SAR(1 g) = 0.398 mW/g; SAR(10 g) = 0.270 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.422 mW/g

0 dB = 0.422mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   58 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Mar.03, 2012
Separation   1 cm

DUT: LG-P700(bottom); Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.997 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body bottom 190/Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.052 mW/g

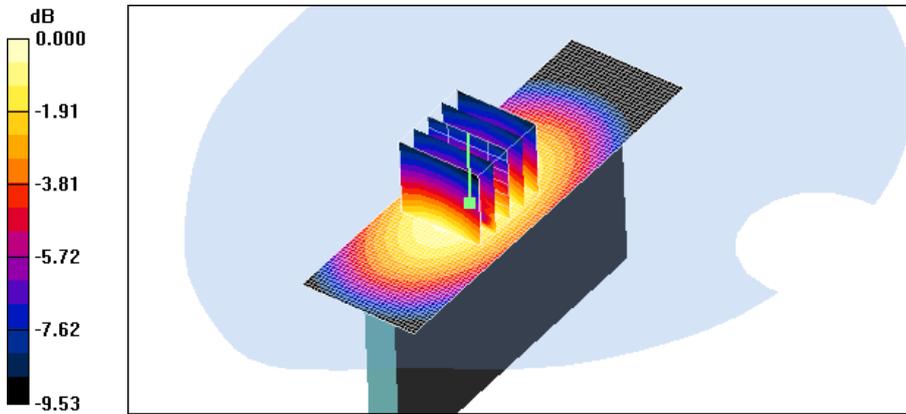**Body bottom 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.72 V/m; Power Drift = -0.119 dB
Peak SAR (extrapolated) = 0.087 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.031 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.056 mW/g

0 dB = 0.056mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   59 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012
Separation	1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Body rear 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.488 mW/g

Body rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
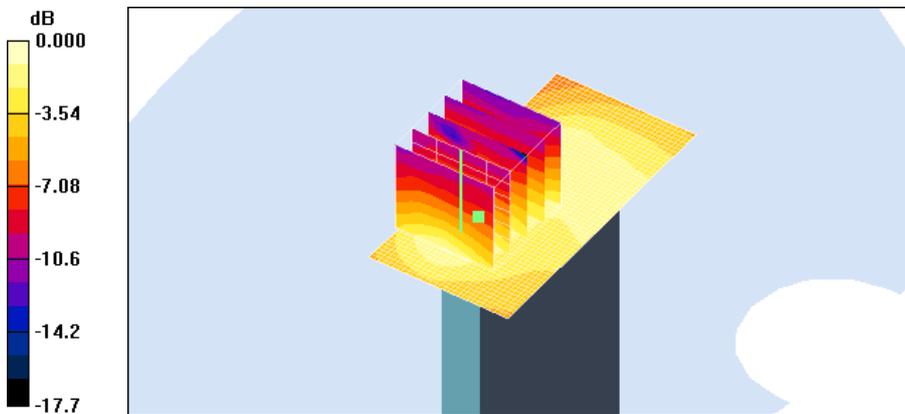Reference Value = 10.8 V/m; Power Drift = -0.165 dB
Peak SAR (extrapolated) = 0.697 W/kg
SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.259 mW/g

Maximum value of SAR (measured) = 0.433 mW/g

0 dB = 0.433mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   60 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

Test Date: Mar.04, 2012

Separation   1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8
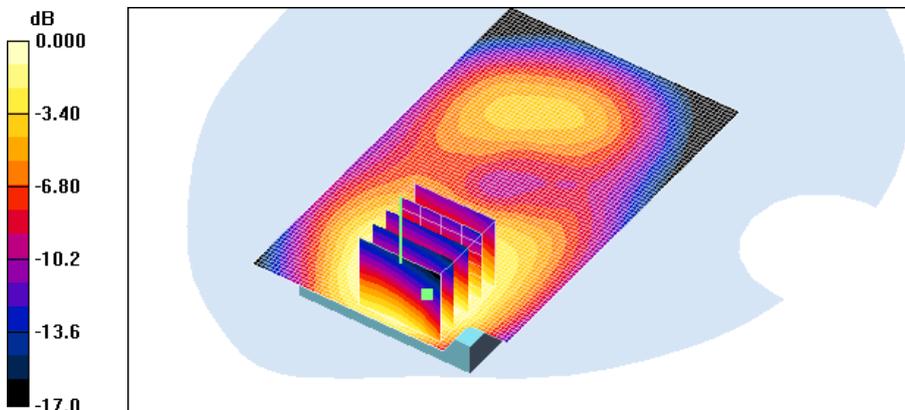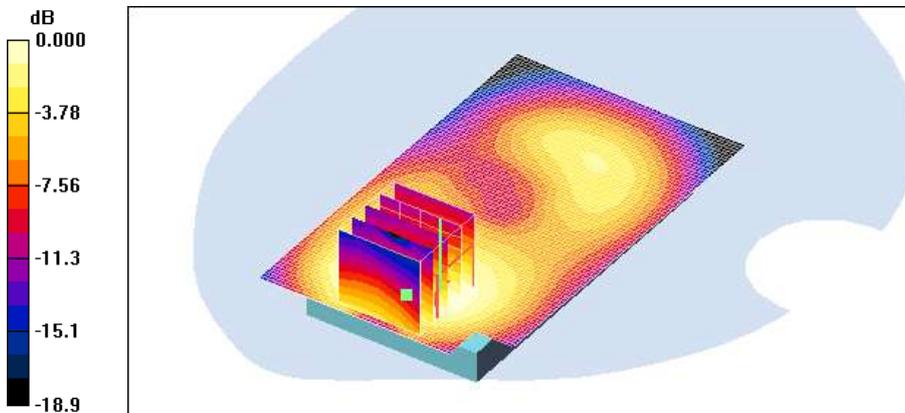Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Body front 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.442 mW/g

Body front 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.0 V/m; Power Drift = 0.002 dB
Peak SAR (extrapolated) = 0.590 W/kg
SAR(1 g) = 0.384 mW/g; SAR(10 g) = 0.244 mW/g
aximum value of SAR (measured) = 0.410 mW/g

0 dB = 0.410mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   61 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012
Separation	1 cm

DUT: LG-P700(side); Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Body left 661/Area Scan (31x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.181 mW/g

Body left 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.70 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 0.258 W/kg
SAR(1 g) = 0.162 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.176 mW/g

0 dB = 0.176mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
62 of 125

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Mar.04, 2012
Separation   1 cm
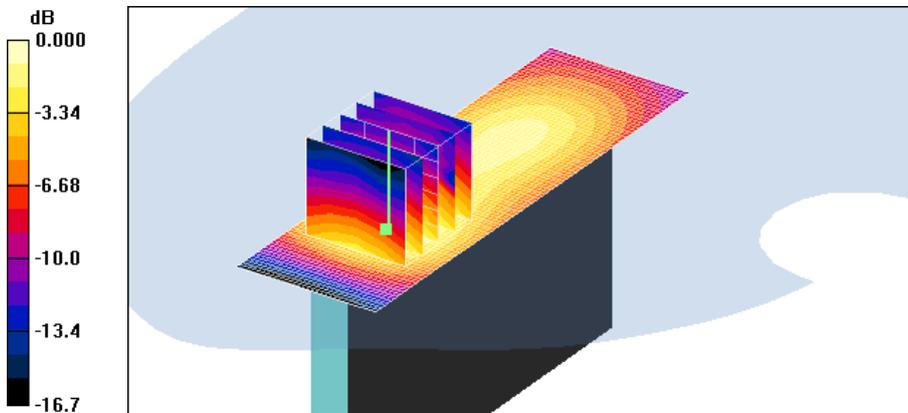
DUT: LG-P700(side); Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Body right 661/Area Scan (31x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.135 mW/g

Body right 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.78 V/m; Power Drift = 0.061 dB
Peak SAR (extrapolated) = 0.201 W/kg
SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.139 mW/g

0 dB = 0.139mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr   63 of 125

Test Laboratory: HCT CO., LTD
EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Mar.04, 2012
Separation   1 cm

DUT: LG-P700(bottom); Type: bar; Serial: #1

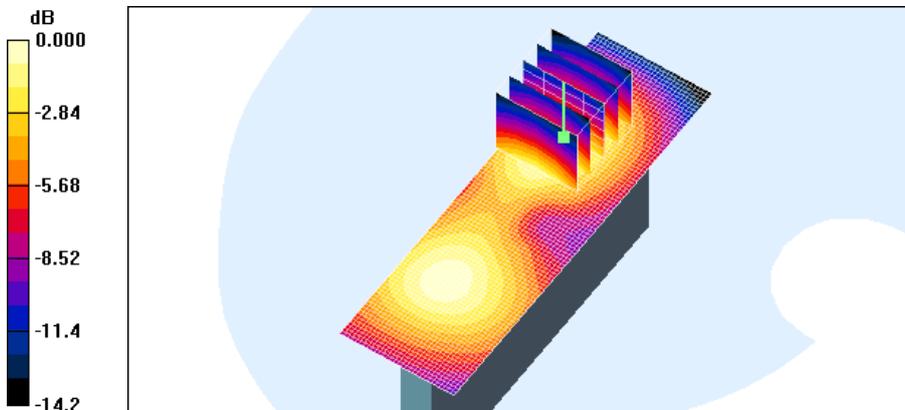Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8
Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Body bottom 661/Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.385 mW/g

Body bottom 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.102 dB
Peak SAR (extrapolated) = 0.582 W/kg
SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.188 mW/g
Maximum value of SAR (measured) = 0.384 mW/g

0 dB = 0.384mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   64 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:　　　　HCT CO., LTD

EUT Type:　　　　Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature:　　21.2 ℃

Ambient Temperature:　21.4 ℃

Test Date:　　　　　Mar.04, 2012

Separation　　　　　1 cm

DUT: LG-P700; Type: bar; Serial: #1
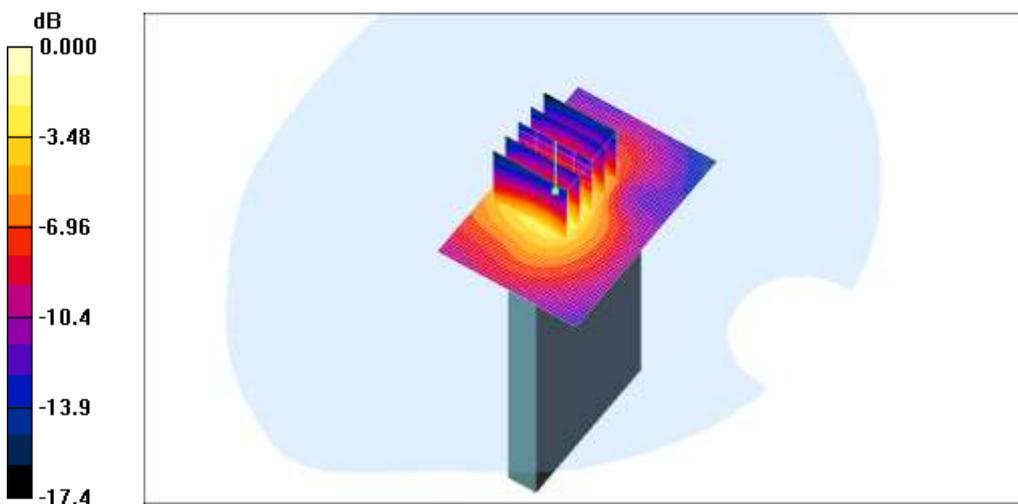
Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body rear 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.079 mW/g

Body rear11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.84 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.130 W/kg
SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.038 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.077 mW/g

0 dB = 0.077mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
65 of 125

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

Test Date: Mar.04, 2012

Separation   1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body front 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.046 mW/g

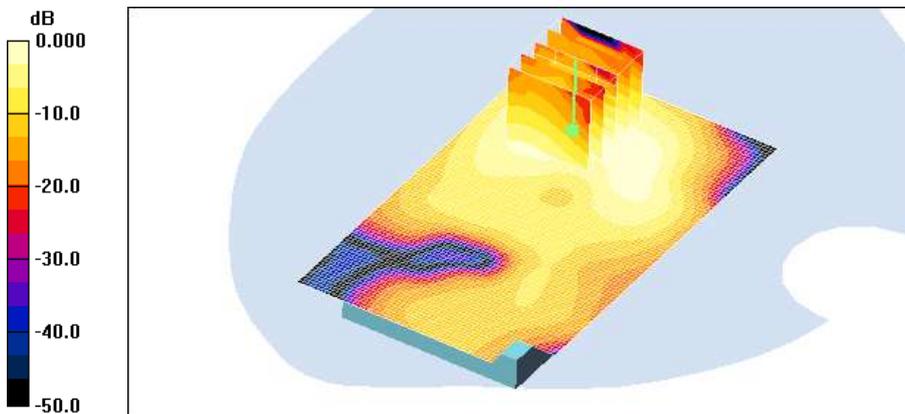**Body front 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.55 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 0.069 W/kg
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.022 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.044 mW/g

0 dB = 0.044mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   66 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012
Separation	1 cm

DUT: LG-P700(side); Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body left 11ch 1Mbps /Area Scan (31x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.035 mW/g

Body left 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
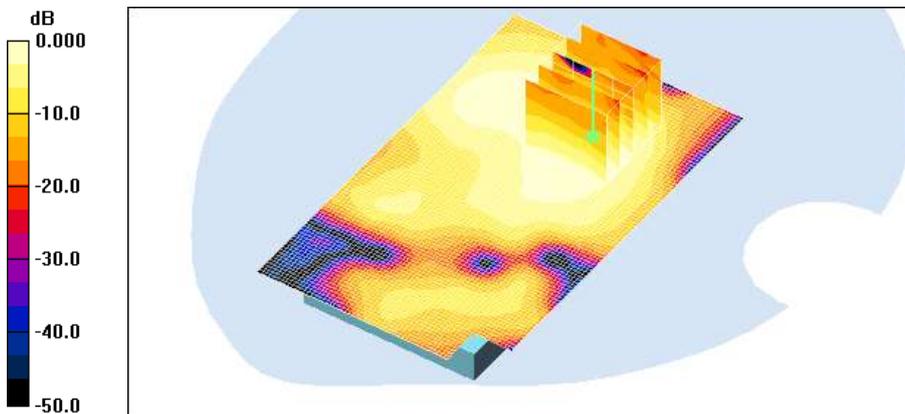Reference Value = 3.37 V/m; Power Drift = 0.147 dB
Peak SAR (extrapolated) = 0.066 W/kg
SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.012 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.028 mW/g

0 dB = 0.028mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
67 of 125

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012
Separation	1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body top 11ch 1Mbps /Area Scan (31x61x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.042 mW/g

Body top 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.56 V/m; Power Drift = 0.174 dB
Peak SAR (extrapolated) = 0.075 W/kg
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.021 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.045 mW/g

0 dB = 0.045mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   68 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.0 ℃

Ambient Temperature: 21.2 ℃

Test Date: Mar.03, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.903 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.354 mW/g

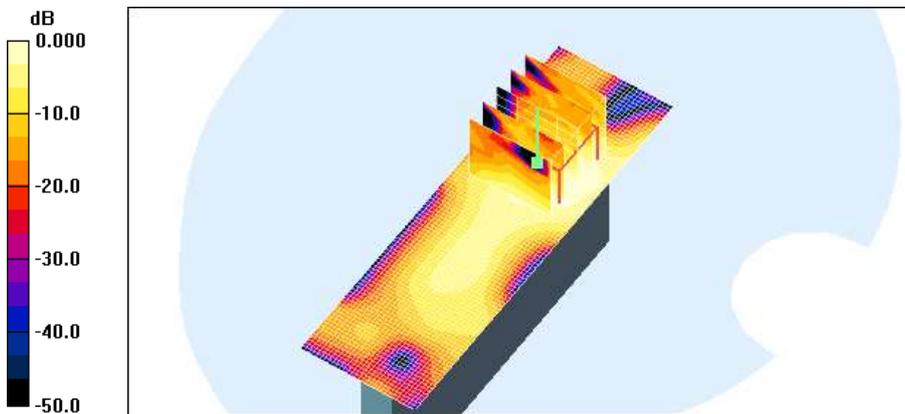**Right touch 190/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
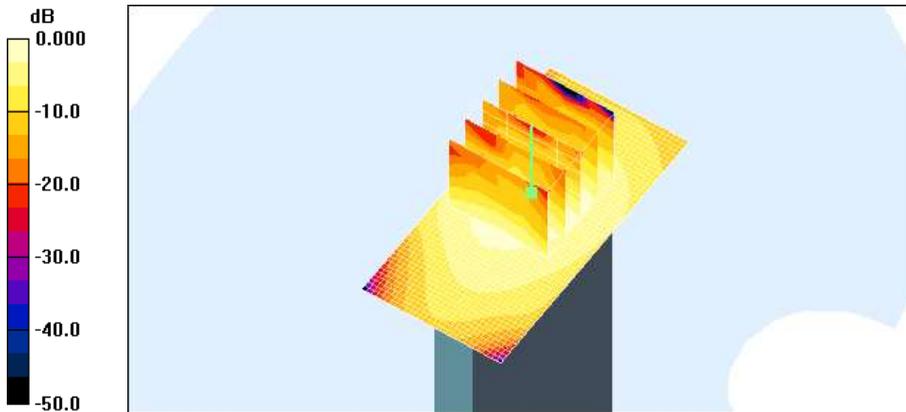Reference Value = 4.67 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.427 W/kg
SAR(1 g) = 0.336 mW/g; SAR(10 g) = 0.249 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.353 mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
69 of 125

Test Laboratory:	HCT CO., LTD	
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC	
Liquid Temperature:	21.0 ℃	
Ambient Temperature:	21.2 ℃	
Test Date:	Mar.03, 2012	
Separation	1 cm	

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.997 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body rear 190/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.602 mW/g

Body rear 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.3 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 0.710 W/kg
SAR(1 g) = 0.565 mW/g; SAR(10 g) = 0.416 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.592 mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   70 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

Test Date: Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 835/900 MHz; Type: SAM

Left touch 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.465 mW/g

Left touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
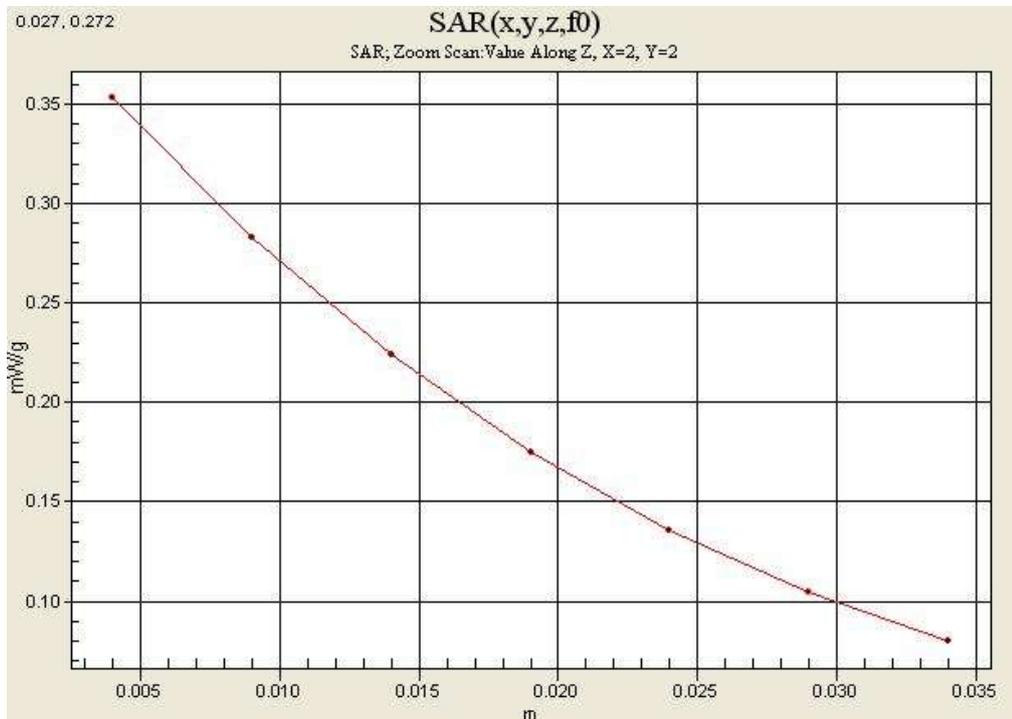Reference Value = 7.25 V/m; Power Drift = 0.038 dB
Peak SAR (extrapolated) = 0.754 W/kg
SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.251 mW/g
Maximum value of SAR (measured) = 0.485 mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   71 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012
Separation	1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Body rear 661/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.488 mW/g

Body rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
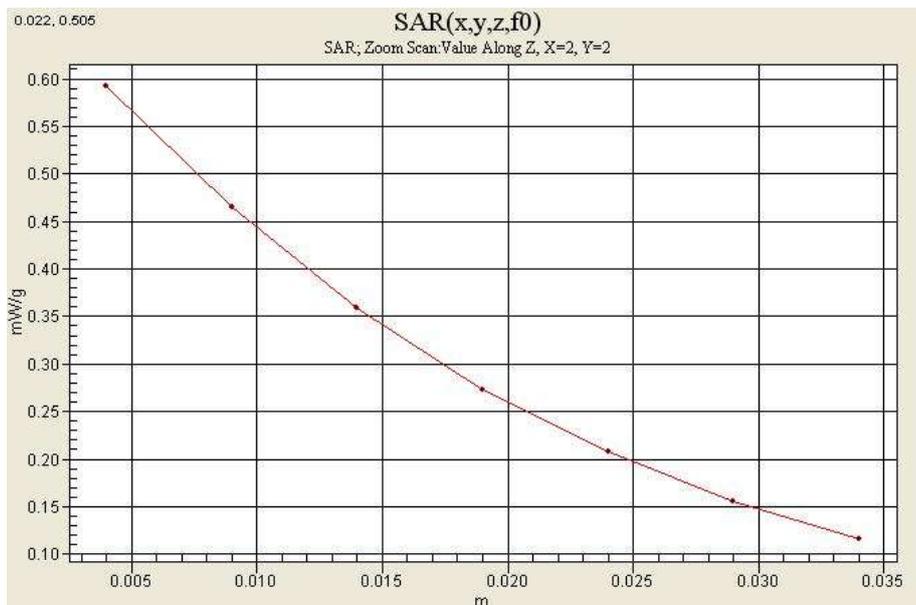Reference Value = 10.8 V/m; Power Drift = -0.165 dB
Peak SAR (extrapolated) = 0.697 W/kg
SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.259 mW/g

Maximum value of SAR (measured) = 0.433 mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   72 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory: HCT CO., LTD

EUT Type: Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC

Liquid Temperature: 21.2 ℃

Ambient Temperature: 21.4 ℃

Test Date: Mar.04, 2012

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.86 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: SAM 1800/1900 MHz; Type: SAM

Right touch 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.233 mW/g

Right touch 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.06 V/m; Power Drift = 0.095 dB
Peak SAR (extrapolated) = 0.439 W/kg
SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.092 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.241 mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   73 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Test Laboratory:	HCT CO., LTD
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Rx only Phone with Bluetooth, WLAN and NFC
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Mar.04, 2012
Separation	1 cm

DUT: LG-P700; Type: bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

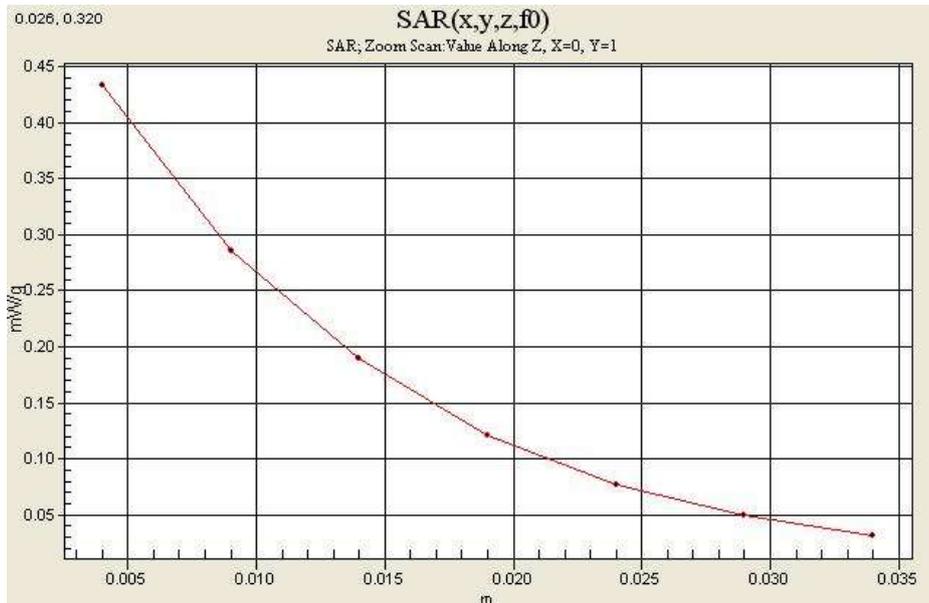DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Body rear 11ch 1Mbps /Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.079 mW/g

Body rear 11ch 1Mbps /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.84 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.130 W/kg
SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.038 mW/g

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.077 mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
74 of 125

Attachment 2. – Dipole Validation Plots

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

75 of 125

■ Validation Data (835 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power   100 mW (20 dBm)

Liquid Temp: 21.0 ℃

Test Date: Mar.03, 2012

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 = 0.901 mho/m; ε_r = 43; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 − SN3797; ConvF(8.93, 8.93, 8.93); Calibrated: 2011−07−25
- Sensor−Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011−09−22
- Phantom: 1800/1900 Phantom; Type: SAM

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

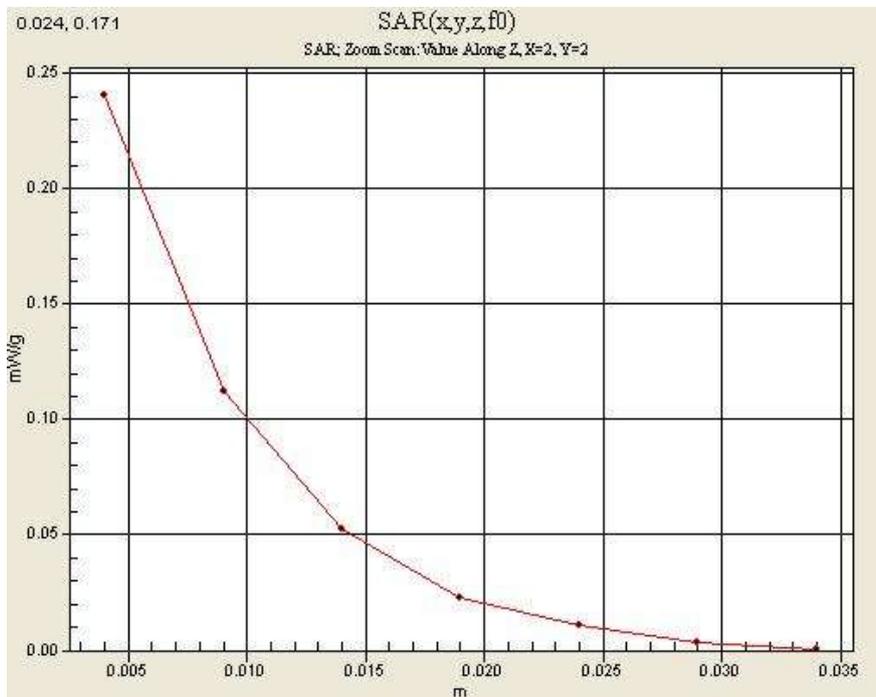**Validation 835MHz/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.9 V/m; Power Drift = 0.003 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.942 mW/g; SAR(10 g) = 0.576 mW/g
Maximum value of SAR (measured) = 1.04 mW/g

0 dB = 1.04mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
76 of 125

■ **Validation Data (835 MHz Body)**

Test Laboratory: HCT CO., LTD

Input Power   100 mW (20 dBm)

Liquid Temp: 21.0 ℃

Test Date: Mar.03, 2012

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 = 0.995 mho/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 − SN3797; ConvF(9.14, 9.14, 9.14); Calibrated: 2011−07−25
- Sensor−Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011−09−22
- Phantom: 800/900 Phantom; Type: SAM

Validation 835 MHz/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.02 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
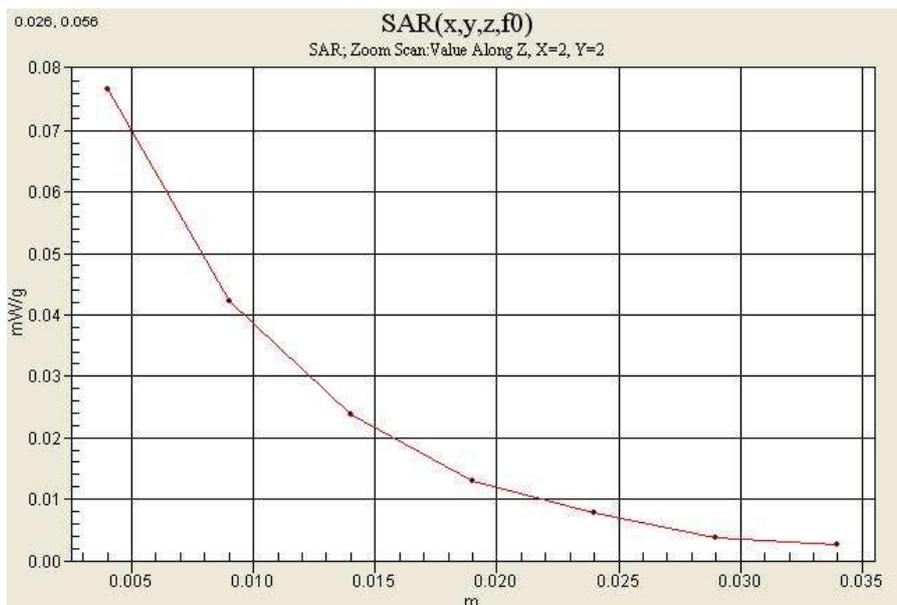Reference Value = 31.5 V/m; Power Drift = −0.006 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.944 mW/g; SAR(10 g) = 0.619 mW/g
Maximum value of SAR (measured) = 1.02 mW/g

dB
0.000
-2.10
-4.20
-6.30
-8.40
-10.5

0 dB = 1.02mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
77 of 125

■ Validation Data (1900 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power   100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: Mar.04, 2012

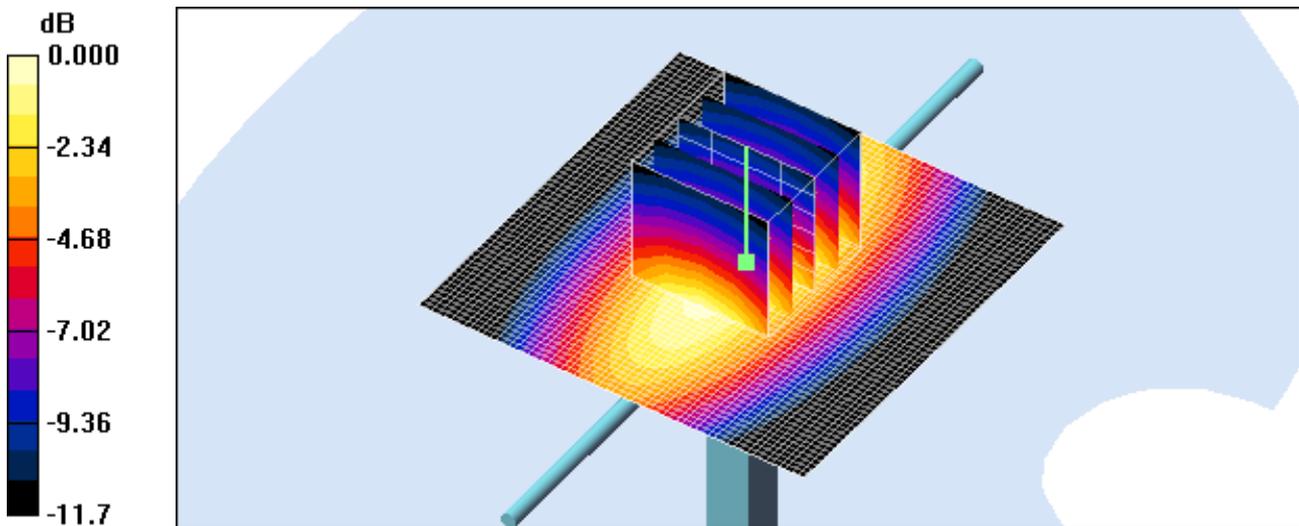**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5d032**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 41.5; ρ = 1000 kg/m³
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8
Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(7.6, 7.6, 7.6); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.58 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 7.51 W/kg
SAR(1 g) = 3.88 mW/g; SAR(10 g) = 1.98 mW/g
Maximum value of SAR (measured) = 4.26 mW/g

0 dB = 4.26mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
78 of 125

■ Validation Data (1900 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power   100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: Mar.04, 2012

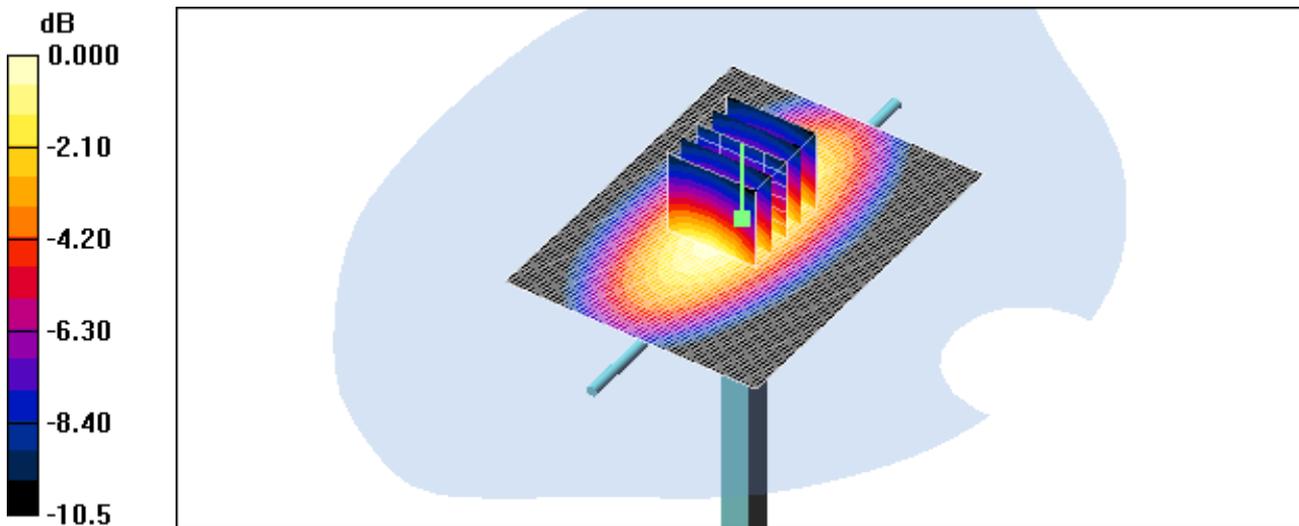**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 – SN:5d032**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8
Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(7.26, 7.26, 7.26); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 1800/1900 Phantom; Type: SAM

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.79 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 7.87 W/kg
SAR(1 g) = 4.07 mW/g; SAR(10 g) = 2.08 mW/g
Maximum value of SAR (measured) = 4.44 mW/g

0 dB = 4.44mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
79 of 125

■ Validation Data (2450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power   100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: Mar.04, 2012

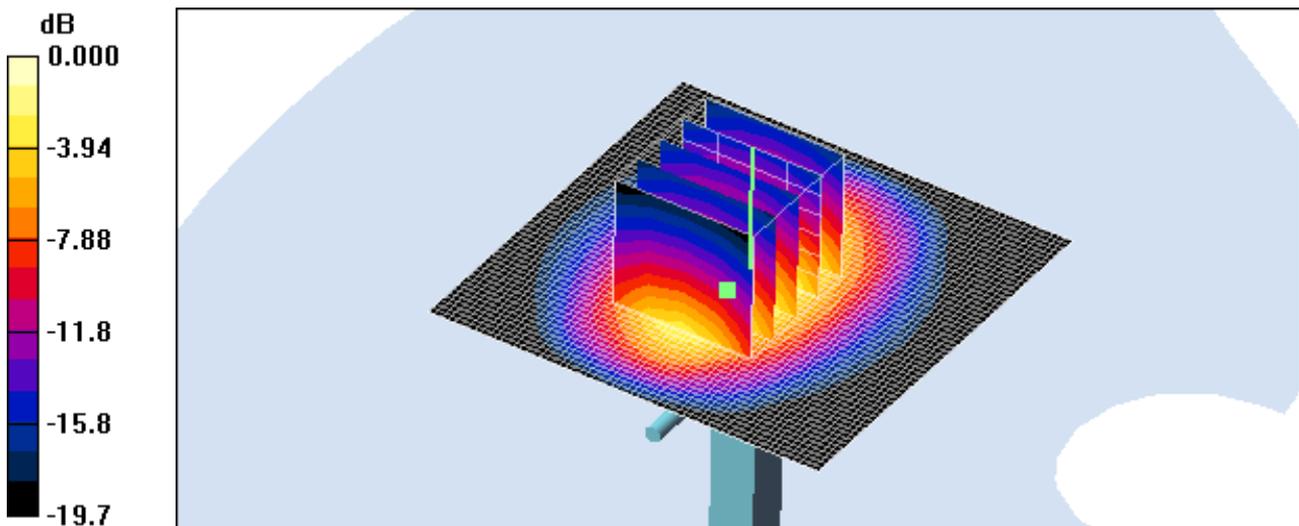**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:743**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 - SN3797; ConvF(6.94, 6.94, 6.94); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2011-03-01
- Phantom: 800/900 Phantom; Type: SAM

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.52 mW/g

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.1 V/m; Power Drift = 0.031 dB
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.4 mW/g; SAR(10 g) = 2.53 mW/g

Maximum value of SAR (measured) = 6.02 mW/g

0 dB = 6.02mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   80 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
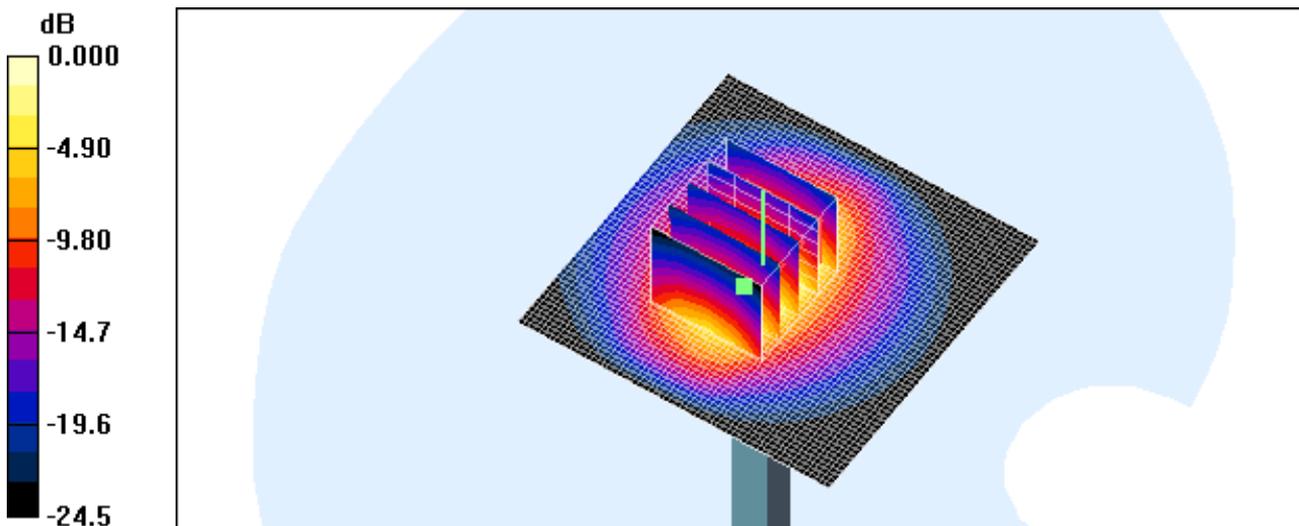
■ Validation Data (2450 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power   100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: Mar.04, 2012

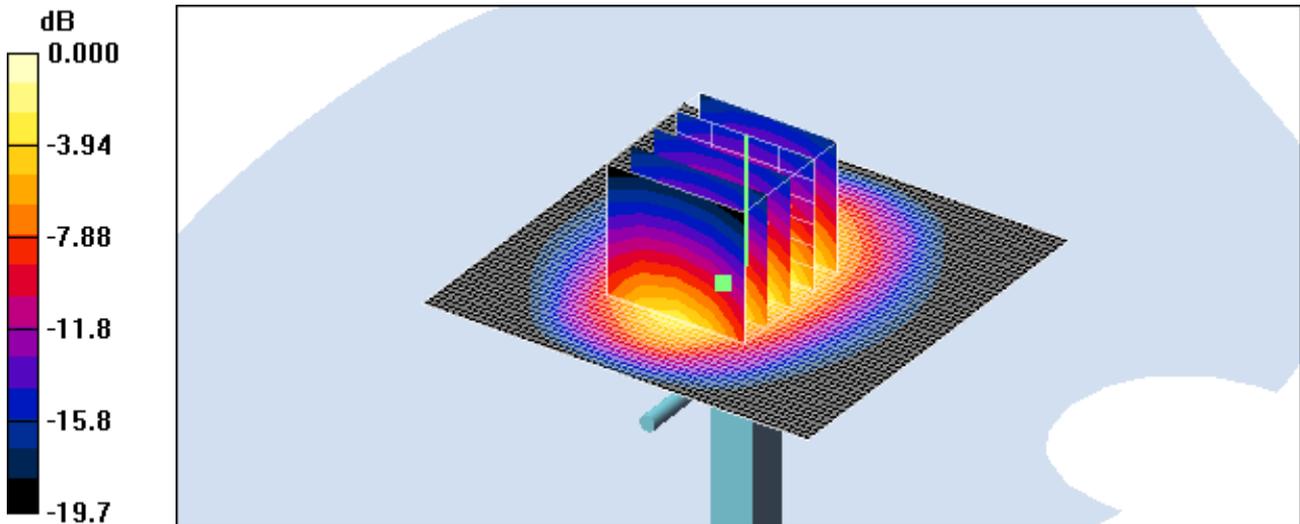**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 – SN:743**

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section ; Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

DASY4 Configuration:
- Probe: EX3DV4 – SN3797; ConvF(6.96, 6.96, 6.96); Calibrated: 2011-07-25
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2011-09-22
- Phantom: 800/900 Phantom; Type: SAM

Validation 2450MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = 0.103 dB
Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 5.19 mW/g; SAR(10 g) = 2.43 mW/g
Maximum value of SAR (measured) = 5.74 mW/g

Validation 2450MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 6.18 mW/g

0 dB = 6.18mW/g

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   81 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
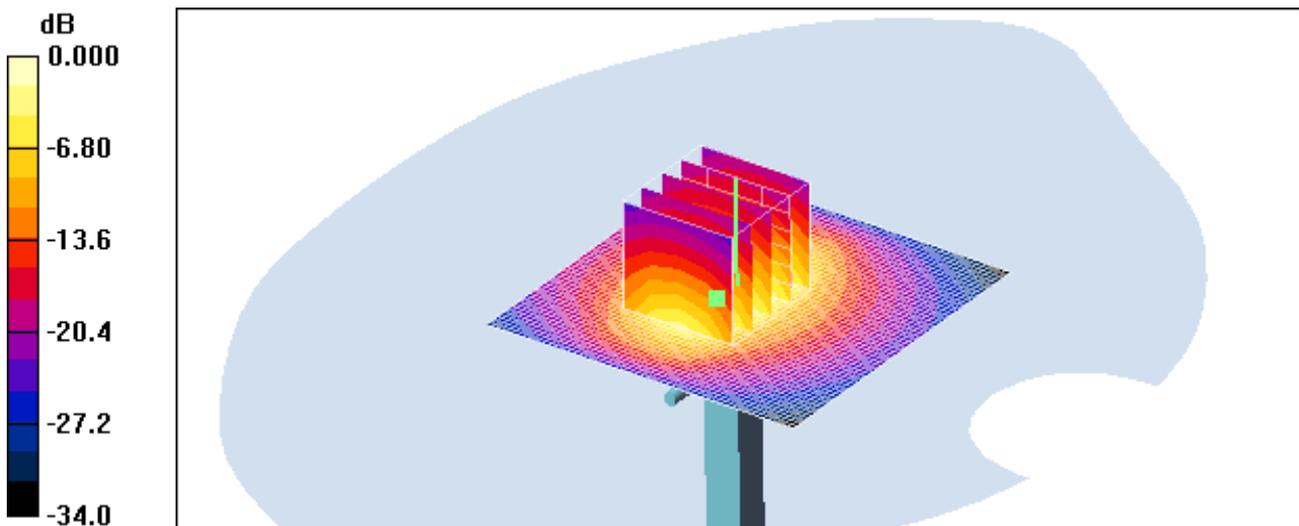
■ <u>Dielectric Parameter (835 MHz Head)</u>

Title   LG-P700
SubTitle   GSM850(Head)
Test Date   Mar.03, 2012

Frequency	e'	e''
800000000.0000	43.4853	19.5172
805000000.0000	43.4271	19.5314
810000000.0000	43.3630	19.4823
815000000.0000	43.2706	19.4634
820000000.0000	43.2448	19.4474
825000000.0000	43.1892	19.4188
830000000.0000	43.1052	19.3988
835000000.0000	42.9989	19.4068
840000000.0000	42.9881	19.3769
845000000.0000	42.9110	19.3508
850000000.0000	42.8228	19.3545
855000000.0000	42.7440	19.3505
860000000.0000	42.6865	19.3096
865000000.0000	42.6335	19.2987
870000000.0000	42.5668	19.3074
875000000.0000	42.5385	19.3047
880000000.0000	42.4904	19.2675
885000000.0000	42.4053	19.2722
890000000.0000	42.4005	19.2728
895000000.0000	42.3508	19.2071
900000000.0000	42.2795	19.1984

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   82 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

■ Dielectric Parameter (835 MHz Body)

Title　　　　　　　LG-P700
SubTitle　　　　　GSM850(Body)
Test Date　　　　Mar.03, 2012

Frequency	e'	e''
800000000.0000	54.9461	21.3432
805000000.0000	54.8745	21.3628
810000000.0000	54.8281	21.3848
815000000.0000	54.7158	21.4078
820000000.0000	54.6283	21.4166
825000000.0000	54.5360	21.4384
830000000.0000	54.4778	21.4424
835000000.0000	54.3809	21.4275
840000000.0000	54.2915	21.3993
845000000.0000	54.2325	21.3605
850000000.0000	54.2158	21.3009
855000000.0000	54.1359	21.2599
860000000.0000	54.1183	21.2231
865000000.0000	54.1152	21.1379
870000000.0000	54.1081	21.0976
875000000.0000	54.0799	21.0708
880000000.0000	54.0915	21.0075
885000000.0000	54.0773	20.9863
890000000.0000	54.0637	20.9648
895000000.0000	54.0471	20.9340
900000000.0000	54.0040	20.9138

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
83 of 125

■ Dielectric Parameter (1900 MHz Head)

Title   LG-P700
SubTitle   GSM1900(Head)
Test Date   Mar.04, 2012

Frequency	e'	e''
1800000000.0000	41.9535	12.9386
1810000000.0000	41.9151	12.9515
1820000000.0000	41.9130	13.0274
1830000000.0000	41.8848	13.0799
1840000000.0000	41.8749	13.1017
1850000000.0000	41.8061	13.1257
1860000000.0000	41.7462	13.1470
1870000000.0000	41.7331	13.1403
1880000000.0000	41.6121	13.1942
1890000000.0000	41.6019	13.2378
1900000000.0000	41.5171	13.2681
1910000000.0000	41.4897	13.2870
1920000000.0000	41.4349	13.3126
1930000000.0000	41.4230	13.3635
1940000000.0000	41.4327	13.3781
1950000000.0000	41.4038	13.3922
1960000000.0000	41.4110	13.3960
1970000000.0000	41.3886	13.4418
1980000000.0000	41.3343	13.4408
1990000000.0000	41.3065	13.4754
2000000000.0000	41.2436	13.4843

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

84 of 125

■ Dielectric Parameter (1900 MHz Body)

Title	LG-P700
SubTitle	GSM1900(Body)
Test Date	Mar.04, 2012

Frequency	e'	e''
1850000000.0000	55.2944	13.8113
1855000000.0000	55.2656	13.8279
1860000000.0000	55.2495	13.8248
1865000000.0000	55.2381	13.8405
1870000000.0000	55.2188	13.8346
1875000000.0000	55.1986	13.8655
1880000000.0000	55.1908	13.8767
1885000000.0000	55.1951	13.8948
1890000000.0000	55.1824	13.9235
1895000000.0000	55.1833	13.9304
1900000000.0000	55.1740	13.9413
1905000000.0000	55.1787	13.9603
1910000000.0000	55.1732	13.9833
1915000000.0000	55.1678	13.9844
1920000000.0000	55.1643	13.9916
1925000000.0000	55.1670	13.9888
1930000000.0000	55.1513	13.9904
1935000000.0000	55.1516	14.0011
1940000000.0000	55.1388	13.9985
1945000000.0000	55.1248	13.9894
1950000000.0000	55.1010	13.9795

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
85 of 125

■ Dielectric Parameter (2 450 MHz Head)

Title   LG-P700
SubTitle   2450MHz (Head)
Test Date   Mar.04, 2012

Frequency	e'	e''
2400000000.0000	38.8867	13.4670
2405000000.0000	38.8607	13.4751
2410000000.0000	38.8499	13.4845
2415000000.0000	38.8259	13.4910
2420000000.0000	38.8042	13.5068
2425000000.0000	38.7797	13.5223
2430000000.0000	38.7643	13.5385
2435000000.0000	38.7467	13.5483
2440000000.0000	38.7413	13.5592
2445000000.0000	38.7169	13.5637
2450000000.0000	38.6984	13.5717
2455000000.0000	38.6725	13.5805
2460000000.0000	38.6484	13.6045
2465000000.0000	38.6435	13.6179
2470000000.0000	38.6272	13.6243
2475000000.0000	38.6134	13.6398
2480000000.0000	38.5797	13.6446
2485000000.0000	38.5511	13.6617
2490000000.0000	38.5446	13.6656
2495000000.0000	38.5300	13.6987
2500000000.0000	38.5038	13.6919

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   86 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

■ Dielectric Parameter (2 450 MHz Body)

Title   LG-P700
SubTitle   2450MHz (Body)
Test Date   Mar.04, 2012

Frequency	e'	e''
2400000000.0000	52.2083	13.6562
2405000000.0000	52.1962	13.6624
2410000000.0000	52.1798	13.6707
2415000000.0000	52.1598	13.6759
2420000000.0000	52.1407	13.6992
2425000000.0000	52.1134	13.7217
2430000000.0000	52.1006	13.7522
2435000000.0000	52.0919	13.7739
2440000000.0000	52.0893	13.8030
2445000000.0000	52.0780	13.8132
2450000000.0000	52.0569	13.8213
2455000000.0000	52.0505	13.8405
2460000000.0000	52.0376	13.8836
2465000000.0000	52.0393	13.8851
2470000000.0000	52.0126	13.8936
2475000000.0000	52.0258	13.8801
2480000000.0000	52.0032	13.8912
2485000000.0000	51.9927	13.8939
2490000000.0000	51.9825	13.8966
2495000000.0000	51.9816	13.8945
2500000000.0000	51.9552	13.8960

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
87 of 125

Attachment 3. – Probe Calibration Data

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

88 of 125

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

USAGE OF ORGANIC SOLVENTS WITH SPEAG PRODUCTS

INTRODUCTION

SPEAG offers a wide range of simulating liquids. These liquids are based on various ingredients depending on their frequency range. The below compatibility table shows compatibility of SPEAG products used in conjunction with tissue simulating liquids. Proper treatment and maintenance of all SPEAG products is essential regardless of its compliance status.

COMPATIBILITY TABLE

Y= 　fully compatible with the tissue simulating liquid. Long time exposure is not critical.

P= 　partially compatible. It is essential to keep the exposure time to a minimum and to rinse and clean the item after exposure to the respective tissue simulating liquid. Continuous exposure will reduce the item life-time drastically and will therefore void any warranty. 100 hours per 7 days maximum exposure.

R= 　restricted compatibility with the respective tissue simulating liquid. Short time exposure of less then 4 hours is possible given that the item is thoroughly rinsed and dried after each exposure.

N= 　not compatible with the respective tissue simulating liquid. Short time exposure will cause irreparable damage to the item exposed.

SPEAG MSDS Probes & Phantoms / Liquid Type	772-SLAA46yy SL 900	HSL 175 to HSL 900	MSL 450 to MSL 900	772-SLAAx1yy HSL 1430 to HSL 2450	MSL 1450 to MSL 2450	772-SLAAx2yy HSL 3500 - 5800 Broadband	MSL 3500 - 5800 Broadband	772-SLAAx6yy HSL 3500 - 5800 Broadband	MSL 3500 - 5800 Broadband	772-SLAAx3yy HSL 5800 Broadband	MSL 5800 Broadband	772-SLAAx6yy HSL BB 1.5 to HSL BB 1.9	MSL BB 1.5 to MSL BB 1.9	3rd Party Liquids Triton Based Liquids	Acids	Solvents
Twin SAM Phantom V4.0	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
ELI Oval Phantom V4.0	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Flat Phantom V4.x / V5.x	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Whole Body Mannequin	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
SAM HEAD V4.5	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
SAM HEAD V4.5 CTIA	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
SAM HEAD V4.5 BS																
SAM HEAD V6.0 / 6.1	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe ER3DV6 / ET3DV6R	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe ES3DVx / EX3DVx	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe H3DV6 and higher	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe EU2DVx / HU2DVx	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe ET3DVx	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probe T1V3 / T1V3 Lab	Y	Y	Y	R	R	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
PEX 150 / 300 Probe Extension	Y	Y	Y	P	P	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Probes in PMMA enclosures	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
ASTM Phantom	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
ELIT 1.5 / 3.0T Phantom	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N

IMPORTANT NOTE FOR PROBES: The probe shall not be exposed to solvents longer than necessary for the measurements and shall be cleaned daily after use with warm water and stored dry.

IMPORTANT NOTE FOR PHANTOMS: Phantoms shall not be exposed to solvents longer than necessary for the measurement. After use, they shall be washed in the inside with clean water and stored dry. Any damaging of the inner surface must be avoided. Once a week, also the outside of the phantom shell shall be washed with clean water and dried.

Schmid & Partner Engineering AG

771-TN-BR-100621-7A　　　　　　　　　BR　　　　　　　　　June 2010

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
89 of 125

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
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: **EX3-3797_Jul11**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3797
Calibration procedure(s)	QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	July 25, 2011

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 $(22 \pm 3)°C$ and humidity < 70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12

Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: July 25, 2011

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

Certificate No: EX3-3797_Jul11   Page 1 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr   90 of 125

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

ilac-MRA   SWISS CALIBRATION

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

Accredited by the Swiss Accreditation Service (SAS)   Accreditation No.: **SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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., $\vartheta = 0$ 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 $\vartheta = 0$ (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 affect 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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.

- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics

- Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.

- 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.

Certificate No: EX3-3797_Jul11   Page 2 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   91 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4 – SN:3797   July 25, 2011

Probe EX3DV4

SN:3797

Manufactured:	April 5, 2011
Calibrated:	July 25, 2011

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3797_Jul11   Page 3 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
92 of 125

EX3DV4~ SN:3797　　　　　　　　　　　　　　　　　　　　July 25, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)^A	0.63	0.59	0.57	± 10.1 %
DCP (mV)^B	94.6	95.3	96.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc^F (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	96.0	±2.5 %
			Y	0.00	0.00	1.00	126.8	
			Z	0.00	0.00	1.00	126.7	

> 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 Pages 5 and 6).
^{B} Numerical linearization parameter: uncertainty not required.
^{F} Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Certificate No: EX3-3797_Jul11　　　　　　　Page 4 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811　　93 of 125
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4– SN:3797   July 25, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)^C	Relative Permittivity^r	Conductivity (S/m)^r	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.29	9.29	9.29	0.80	0.68	± 12.0 %
835	41.5	0.90	8.93	8.93	8.93	0.80	0.67	± 12.0 %
900	41.5	0.97	8.83	8.83	8.83	0.80	0.66	± 12.0 %
1450	40.5	1.20	8.30	8.30	8.30	0.59	0.78	± 12.0 %
1750	40.1	1.37	7.88	7.88	7.88	0.77	0.62	± 12.0 %
1900	40.0	1.40	7.60	7.60	7.60	0.80	0.60	± 12.0 %
1950	40.0	1.40	7.44	7.44	7.44	0.78	0.81	± 12.0 %
2300	39.5	1.67	7.30	7.30	7.30	0.75	0.62	± 12.0 %
2450	39.2	1.80	6.94	6.94	6.94	0.74	0.62	± 12.0 %
2600	39.0	1.96	7.16	7.16	7.16	0.59	0.72	± 12.0 %
5200	36.0	4.66	4.73	4.73	4.73	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.44	4.44	4.44	0.42	1.80	± 13.1 %
5500	35.6	4.96	4.48	4.48	4.48	0.42	1.80	± 13.1 %
5600	35.5	5.07	4.16	4.16	4.16	0.42	1.80	± 13.1 %
5800	35.3	5.27	4.26	4.26	4.26	0.45	1.80	± 13.1 %

^{C} Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
^{r} At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if squid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Certificate No: EX3-3797_Jul11   Page 5 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   94 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4– SN:3797　　　　　　　　　　　　　　　　　　　　July 25, 2011

DASY/EASY - Parameters of Probe: EX3DV4- SN:3797

Calibration Parameter Determined in Body Tissue Simulating Media

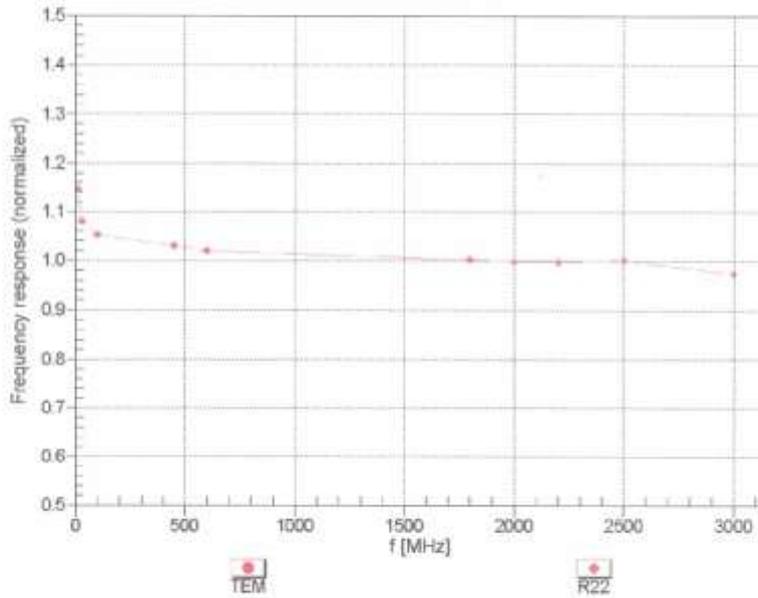| f (MHz) [G]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.22	9.22	9.22	0.80	0.70	± 12.0 %
835	55.2	0.97	9.14	9.14	9.14	0.80	0.69	± 12.0 %
1750	53.4	1.49	7.69	7.69	7.69	0.80	0.66	± 12.0 %
1900	53.3	1.52	7.26	7.26	7.26	0.80	0.64	± 12.0 %
2300	52.9	1.81	7.18	7.18	7.18	0.80	0.62	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.90	6.90	6.90	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.10	4.10	4.10	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.83	3.83	3.83	0.55	1.90	± 13.1 %
5500	48.6	5.65	3.72	3.72	3.72	0.55	1.90	± 13.1 %
5600	48.5	5.77	3.60	3.60	3.60	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.75	3.75	3.75	0.60	1.90	± 13.1 %

[G] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Certificate No: EX3-3797_Jul11　　　　　　Page 6 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
95 of 125

EX3DV4– SN:3797   July 25, 2011

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

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

Certificate No: EX3-3797_Jul11   Page 7 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   96 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4– SN:3797   July 25, 2011

Receiving Pattern (φ), ϑ = 0°

f=600 MHz,TEM   f=1800 MHz,R22

Tot   X   Y   Z   Tot   X   Y   Z
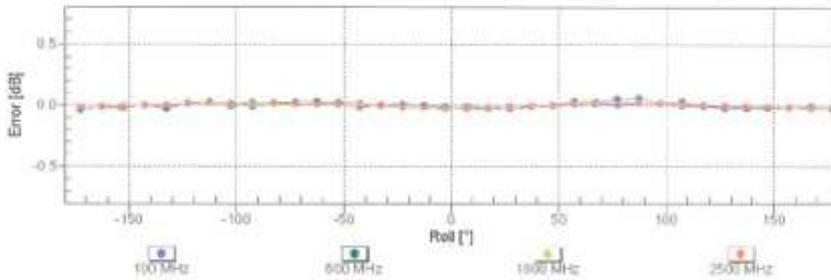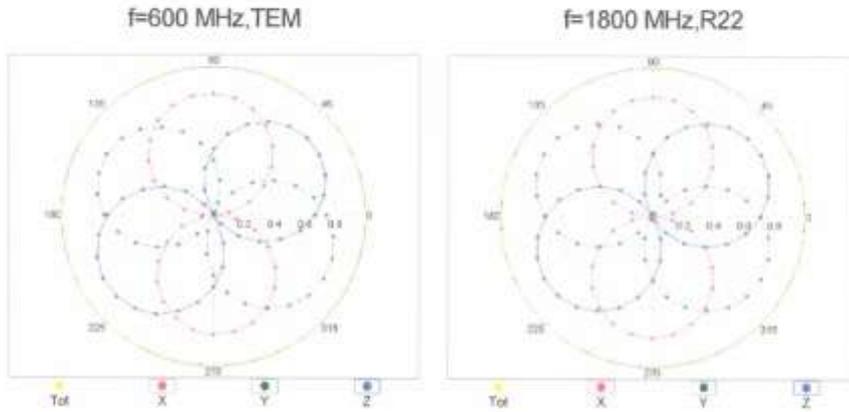
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Certificate No: EX3-3797_Jul11   Page 8 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   97 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4– SN:3797

July 25, 2011

Dynamic Range f(SAR_head)
(TEM cell , f = 900 MHz)
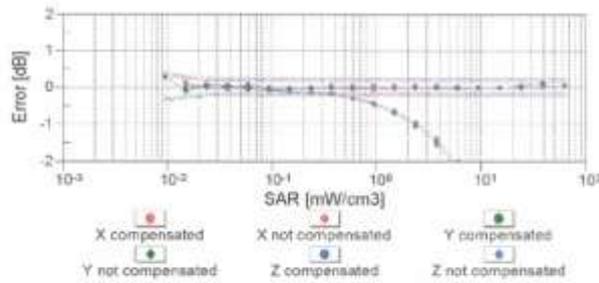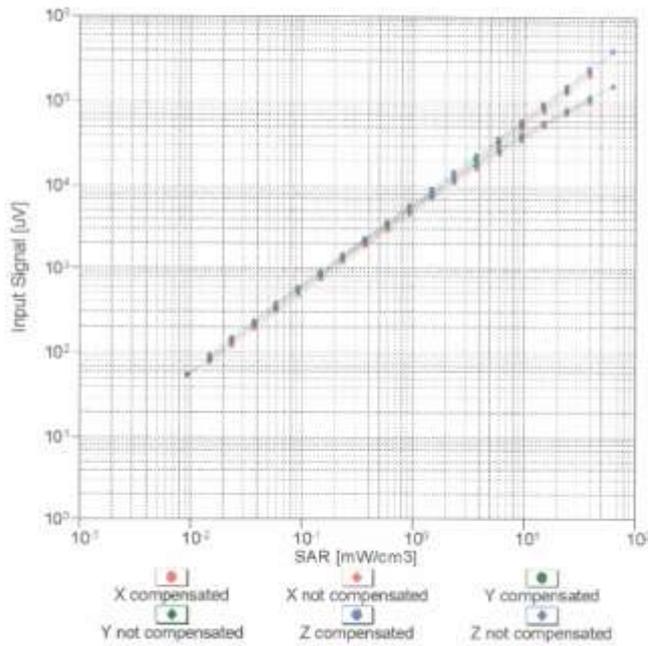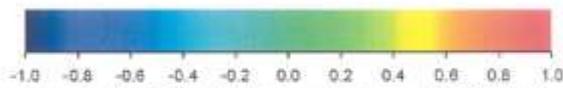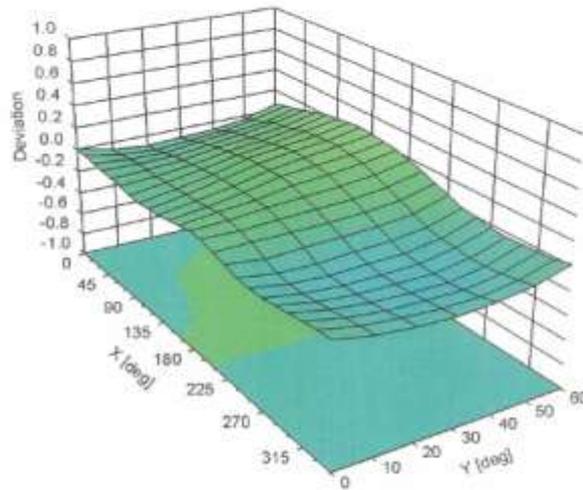

Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: EX3-3797_Jul11   Page 9 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   98 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4– SN:3797   July 25, 2011

Conversion Factor Assessment

f = 750 MHz, WGLS R9 (H_convF)   f = 2600 MHz, WGLS R22 (H_convF)
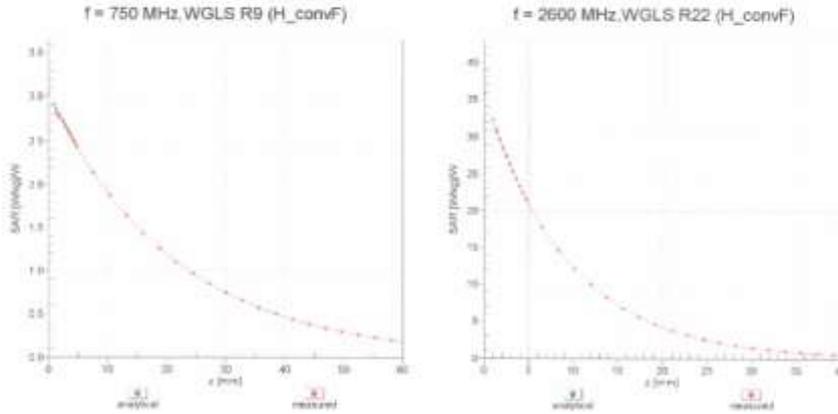
Deviation from Isotropy in Liquid
Error (φ, θ), f = 900 MHz

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

Certificate No: EX3-3797_Jul11   Page 10 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   99 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

EX3DV4– SN:3797　　　　　　　　　　　　　　　　　　　July 25, 2011

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3797

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Certificate No: EX3-3797_Jul11　　　　　　　Page 11 of 11

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
100 of 125

Attachment 4. – Dipole Calibration Data

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
101 of 125

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

ilac-MRA

SWISS CALIBRATION

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: **D835V2-441_May11**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 441
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 16, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 16, 2011

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

Certificate No: D835V2-441_May11   Page 1 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
102 of 125

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

ilac-MRA

SWISS CALIBRATION

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

Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: SCS 108

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

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.

Certificate No: D835V2-441_May11   Page 2 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   103 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	40.4 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-----	-----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.34 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.51 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.09 mW /g ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.9 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	-----	-----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.45 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.27 mW / g ± 16.5 % (k=2)

Certificate No: D835V2-441_May11　　　　　　　　Page 3 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811　　　　104 of 125
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.2 Ω - 9.8 jΩ
Return Loss	- 20.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 10.3 jΩ
Return Loss	- 18.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1,374 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

Certificate No: D835V2-441_May11   Page 4 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   105 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

DASY5 Validation Report for Head TSL

Date: 16.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 10.06.2010

- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

- Measurement SW: DASY52, V52.6.2 Build (424)

- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

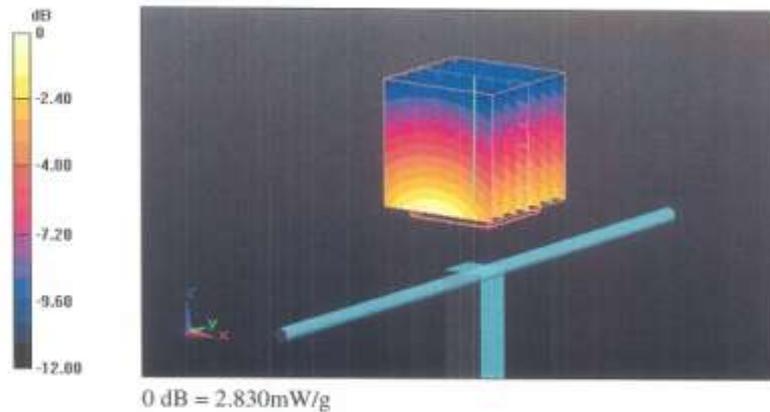**Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.041 V/m; Power Drift = 0.03 dB
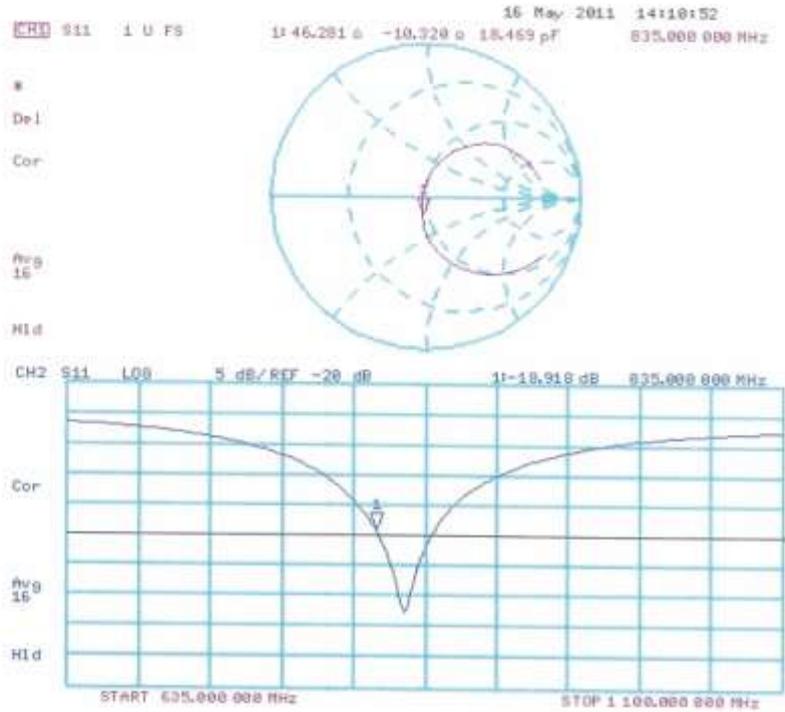Peak SAR (extrapolated) = 3.442 W/kg
SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.51 mW/g
Maximum value of SAR (measured) = 2.703 mW/g

0 dB = 2.700mW/g

Certificate No: D835V2-441_May11   Page 5 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   106 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Impedance Measurement Plot for Head TSL

Certificate No: D835V2-441_May11   Page 6 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

107 of 125
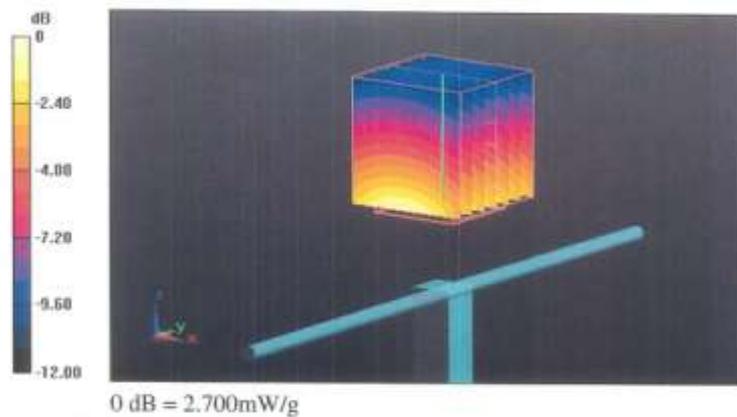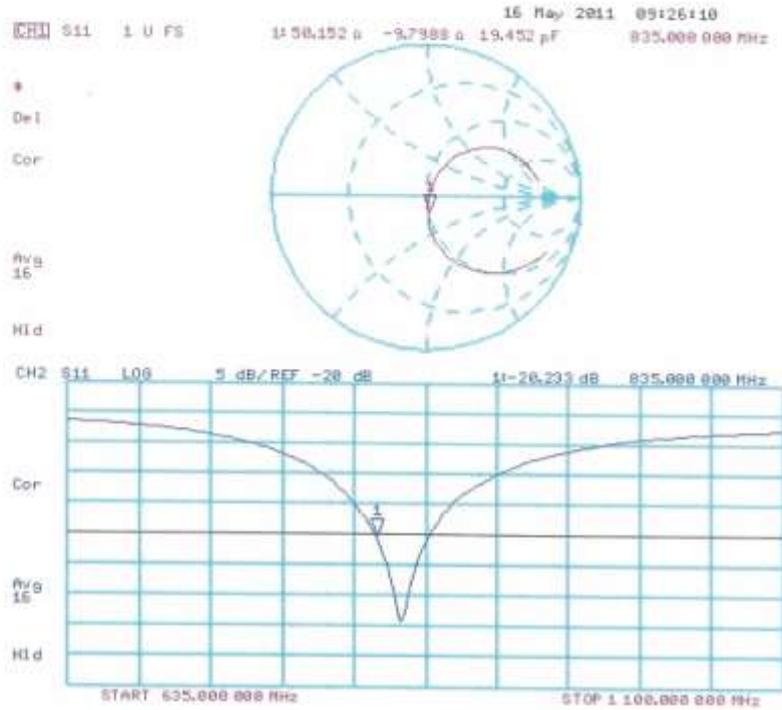
DASY5 Validation Report for Body TSL

Date: 16.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 53.9; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 10.06.2010

- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

- Measurement SW: DASY52, V52.6.2 Build (424)

- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.302 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.553 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.833 mW/g

0 dB = 2.830mW/g

Certificate No: D835V2-441_May11   Page 7 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   108 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Impedance Measurement Plot for Body TSL

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
109 of 125

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

ilac-MRA

SWISS CALIBRATION

S　Schweizerischer Kalibrierdienst
C　Service suisse d'étalonnage
S　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: **D1900V2-5d032_Jul11**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d032
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 22, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 2, 2011

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

Certificate No: D1900V2-5d032_Jul11　　　　　Page 1 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr
110 of 125

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

ilac-MRA

SWISS CALIBRATION

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

Accreditation No.: **SCS 108**

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

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.

Certificate No: D1900V2-5d032_Jul11　　　　　　　Page 2 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811　　　111 of 125
TEL: +82 31 645 64851　　FAX: +82 31 645 6401 www.hct.co.kr

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	39.1 ± 6 %	1.42 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-----	-----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.9 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.29 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.0 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	1.53 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	-----	-----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.9 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.39 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 mW / g ± 16.5 % (k=2)**

Certificate No: D1900V2-5d032_Jul11   Page 3 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   112 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.6 Ω + 6.5 jΩ
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 6.0 jΩ
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.190 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

Certificate No: D1900V2-5d032_Jul11   Page 4 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   113 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

DASY5 Validation Report for Head TSL

Date: 20.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.42 mho/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 04.07.2011

- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.253 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 18.469 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.29 mW/g
Maximum value of SAR (measured) = 12.721 mW/g

0 dB = 12.720mW/g

Certificate No: D1900V2-5d032_Jul11   Page 5 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
114 of 125

Impedance Measurement Plot for Head TSL

Certificate No: D1900V2-5d032_Jul11   Page 6 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   115 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

DASY5 Validation Report for Body TSL

Date: 22.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 04.07.2011

- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

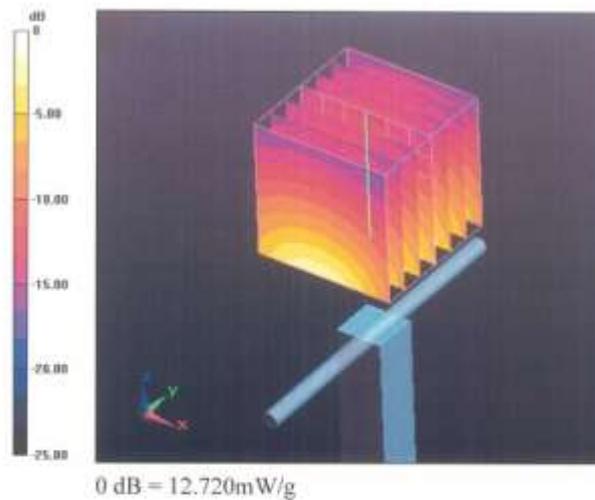### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
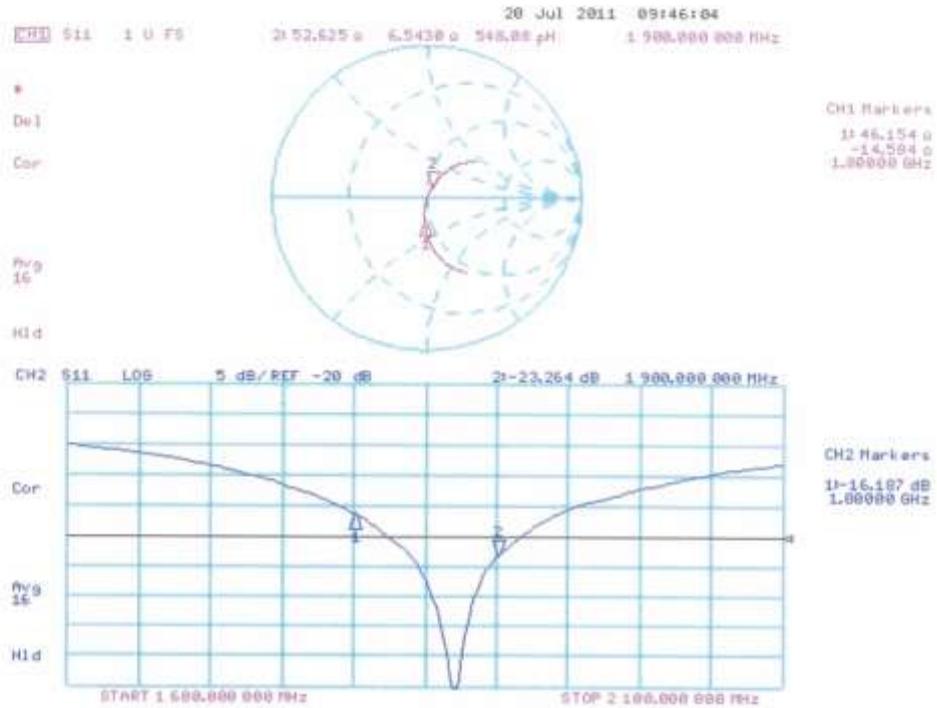Reference Value = 95.827 V/m; Power Drift = 0.0078 dB
Peak SAR (extrapolated) = 18.111 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.39 mW/g
Maximum value of SAR (measured) = 12.898 mW/g
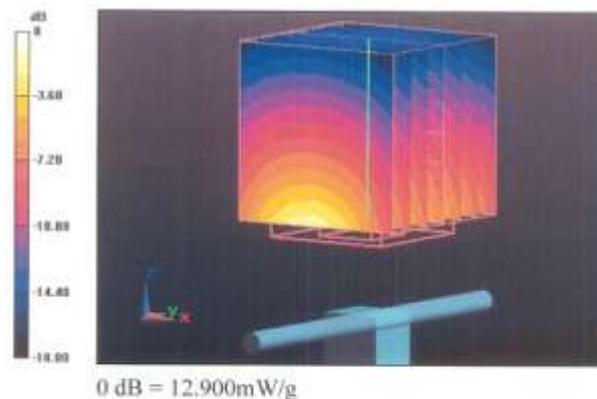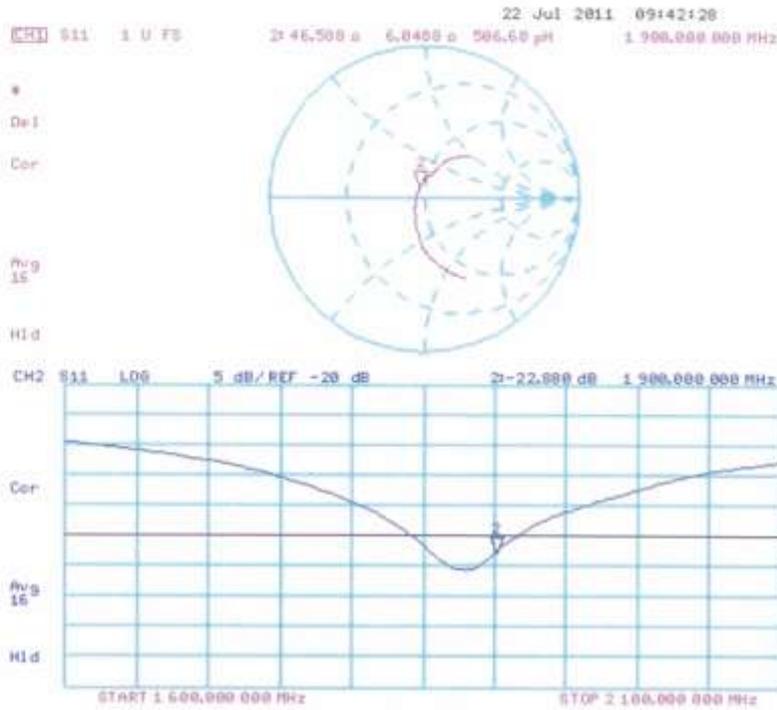
0 dB = 12.900mW/g

Certificate No: D1900V2-5d032_Jul11　　　　Page 7 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851　　FAX: +82 31 645 6401　www.hct.co.kr
116 of 125

Impedance Measurement Plot for Body TSL

Certificate No: D1900V2-5d032_Jul11   Page 8 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
117 of 125

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

ilac-MRA

SWISS CALIBRATION

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S 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: **D2450V2-743_Aug11**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 743
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 29, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	in house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	in house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	in house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 29, 2011

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

Certificate No: D2450V2-743_Aug11 Page 1 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851 FAX: +82 31 645 6401 www.hct.co.kr
118 of 125

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

ilac-MRA

SWISS CALIBRATION

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

Accreditation No.: **SCS 108**

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

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.

Certificate No: D2450V2-743_Aug11   Page 2 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   119 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	38.4 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.8 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.40 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.4 mW /g ± 16.5 % (k=2)

Body TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	2.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	51.7 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.11 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.2 mW / g ± 16.5 % (k=2)

Certificate No: D2450V2-743_Aug11   Page 3 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
120 of 125

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.0 Ω + 4.8 jΩ
Return Loss	- 23.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.3 Ω + 5.8 jΩ
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 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

Certificate No: D2450V2-743_Aug11   Page 4 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   121 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

DASY5 Validation Report for Head TSL

Date: 29.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.4; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 04.07.2011

- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
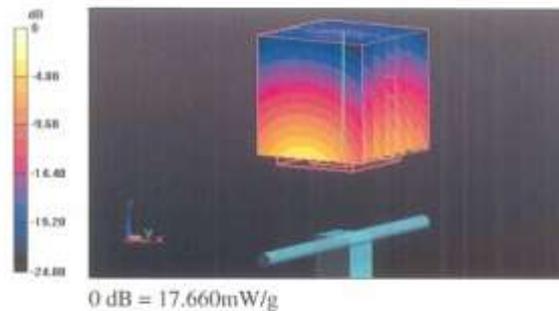Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.2 V/m; Power Drift = 0.03 dB
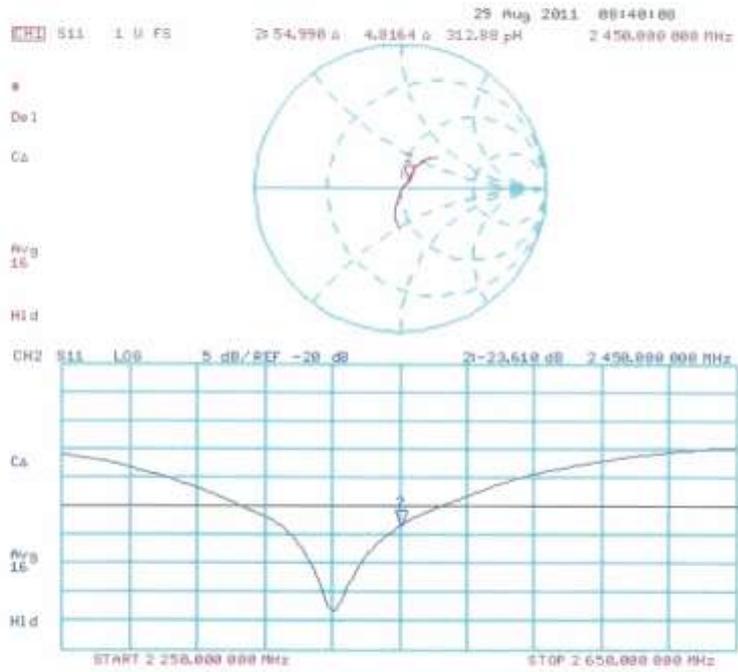Peak SAR (extrapolated) = 28.291 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.4 mW/g
Maximum value of SAR (measured) = 17.657 mW/g

0 dB = 17.660mW/g

Certificate No: D2450V2-743_Aug11   Page 5 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
122 of 125

Impedance Measurement Plot for Head TSL

Certificate No: D2450V2-743_Aug11   Page 6 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr

123 of 125

DASY5 Validation Report for Body TSL

Date: 29.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 mho/m; ε_r = 51.8; ρ = 1000 kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011

- Sensor-Surface: 3mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn601; Calibrated: 04.07.2011

- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002

- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.903 V/m; Power Drift = -0.0051 dB
Peak SAR (extrapolated) = 27.107 W/kg
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.11 mW/g
Maximum value of SAR (measured) = 17.329 mW/g

0 dB = 17.330mW/g

Certificate No: D2450V2-743_Aug11   Page 7 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr
124 of 125

Impedance Measurement Plot for Body TSL

Certificate No: D2450V2-743_Aug11   Page 8 of 8

HCT CO., LTD.
105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811   125 of 125
TEL: +82 31 645 64851   FAX: +82 31 645 6401 www.hct.co.kr