SAR TEST REPORT

HCT CO., LTD

EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
FCC ID:	ZNFE410I
Model:	LG-E410i
Additional Model:	LGE410i, E410i
Date of Issue:	Jul. 10, 2013
Test report No.:	HCTA1307FS05
Test Laboratory:	**HCT CO., LTD.** 74, Seoicheon-ro 578 beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea TEL: +82 31 645 6300 FAX: +82 31 645 6401
Applicant :	**LG Electronics, MobileComm U.S.A., Inc.** 1000 Sylvan Avenue, Englewood Cliffs NJ 07632
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

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Version

Rev	DATE	DESCRIPTION
	Jul. 10, 2013	First Approval Report

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 C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

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

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

Figure 2. SAR Mathematical Equation

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

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

where:

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

ρ = mass density of the tissue-simulant material (kg/m^3)

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

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

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C 01-01, IEEE Standard 1528-2003 & IEEE 1528a-2005 and the following published KDB procedures.

- FCC KDB Publication 941225 D01 SAR test for 3G devices v02
- FCC KDB Publication 941225 D02 HSPA and 1x Advanced v02r02
- FCC KDB Publication 941225 D03 SAR Test Reduction GSM GPRS EDGE v01
- FCC KDB Publication 941225 D04 SAR for GSM E GPRS Dual Xfer Mode v01
- FCC KDB Publication 941225 D06 Hot Spot SAR v01r01
- FCC KDB Publication 248227 D01v01r02(SAR Consideration for 802.11 Devices)
- FCC KDB Publication 447498 D01 General RF Exposure v05r01
- FCC KDB Publication 648474 D04 Handset SAR v01r01
- FCC KDB Publication 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r01
- FCC KDB Publication 865664 D02 RF Exposure Reporting v01r01

3. DESCRIPTION OF DEVICE

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

EUT Type	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n					
FCC ID:	ZNFE410I					
Model:	LG-E410i					
Additional Model	LGE410i, E410i					
Trade Name	LG Electronics, MobileComm U.S.A., Inc.					
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 (802.11b/g/n)					
Production Unit or Identical Prototype	Prototype					
Max SAR	Band	Tx Frequency (MHz)	Equipment Class	Reported 1 g SAR (W/kg)		
				Head	Body-worn	Hotspot
	GSM850	824.2 - 848.8	PCE	0.68	0.85	0.85
	GSM1900	1 850.2 -1 909.8	PCE	0.69	0.71	0.71
	Bluetooth	2 402 - 2 480	DSS	-		
	802.11b	2 412- 2 462	DTS	0.33	0.21	0.21
Simultaneous SAR per KDB 690783 D01				1.01	1.06	1.06
Date(s) of Tests	Jun. 29, 2013 – Jul. 4, 2013					
Antenna Type	Integral Antenna					
GPRS	Multislot Class: 12 ; Mode class B					
Key Feature(s)	This device supports Mobile Hotspot.					

4. DESCRIPTION OF TEST EQUIPMENT

4.1 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.4.1).

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.

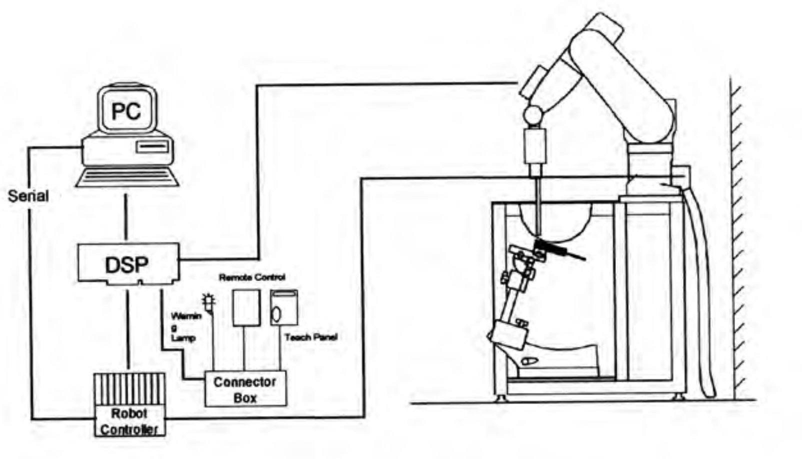


Figure 4.1 HCT SAR Lab. Test Measurement Set-up

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.

4.2 DASY4 E-FIELD PROBE SYSTEM

4.1 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 > 3 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal probe axis)
Dynamic	5 ㎼/g to > 100 mW/g;
Range Linearity:	± 0.2 dB
Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces.
Dimensions	Overall length: 330 mm Tip length: 16 mm Body diameter: 12 mm Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application	General dissymmetry up to 3 GHz Compliance tests of WCDMA/LTE Phones Fast automatic scanning in arbitrary phantoms

Figure 4.1 Photograph of the probe and the Phantom

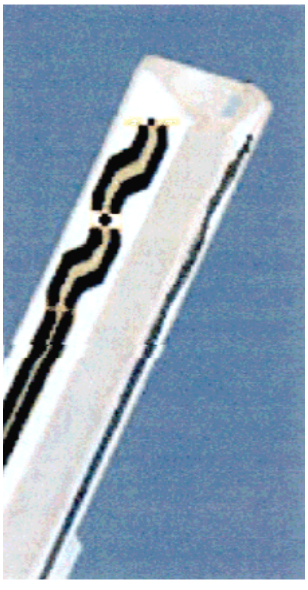


Figure 3.3 ET3DV6 E-field Probe

The SAR measurements were conducted with the dosimetric probe ET3DV6, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

4.3 PROBE CALIBRATION PROCESS

4.3.1 E-Probe Calibration

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

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

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

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

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

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

where:

σ = simulated tissue conductivity,

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

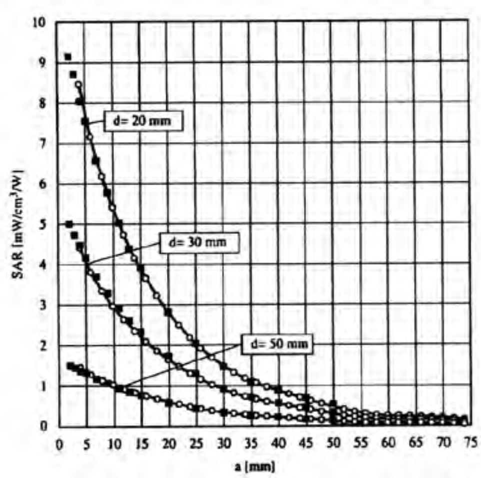


Figure 4.4 E-Field and Temperature measurements at 900 MHz

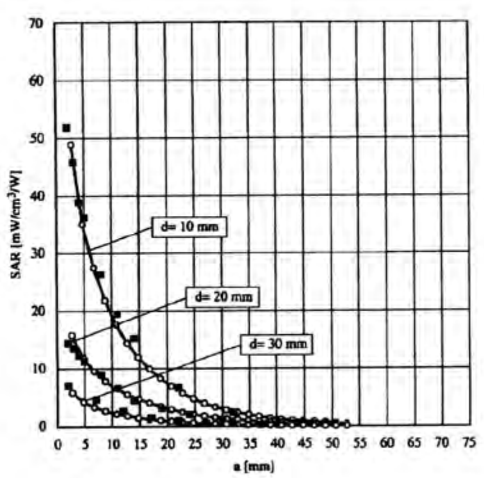


Figure 4.5 E-Field and temperature measurements at 1.8 GHz

4.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

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

with V_i = compensated signal of channel i (i=x,y,z)
U_i = input signal of channel i (i=x,y,z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

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

with V_i = compensated signal of channel i (i = x,y,z)
$Norm_i$ = sensor sensitivity of channel i (i = x,y,z) $\mu V/(V/m)^2$ for E-field probes
ConvF = sensitivity of enhancement in solution
E_i = electric field strength of channel i in V/m

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

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

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

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

with SAR = local specific absorption rate in W/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

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

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

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

4.4 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.

Shell Thickness	2.0 mm ± 0.2 mm (6 ± 0.2 mm at ear point)
Filling Volume	about 25 L
Dimensions	810 mm x 1 000 mm x 500 mm (H x L x W)

Figure 4.6 SAM Phantom

Triple Modular Phantom consists of tree identical modules which can be installed and removed separately without emptying the liquid. It includes three reference points for phantom installation. Covers prevent evaporation of the liquid. Phantom material is resistant to DGBE based tissue simulating liquids. The MFP V5.1 will be delivered including wooden support only (**non**-standard SPEAG support).
Applicable for system performance check from 700 MHz to 6 GHz (MFP V5.1C) or 800 MHz - 6 GHz (MFP V5.1A) as well as dosimetric evaluations for body-worn operation.

Shell Thickness	2.0 mm ± 0.2 mm
Filling Volume	approx. 9.2 L
Dimensions	830 mm x 500 mm (L x W)

Figure 4.7 Triple Modular Phantom

4.5 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 4.8 Device Holder

4.6 Brain & Muscle Simulating Mixture Characterization

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

Ingredients (% by weight)	Frequency (MHz)							
	835		1 900		2 450 - 2700		5200-5800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
Water	40.45	53.06	54.9	70.17	71.88	73.2	65.52	78.66
Salt (NaCl)	1.45	0.94	0.18	0.39	0.16	0.1	0.0	0.0
Sugar	57.0	44.9	0.0	0	0.0	0.0	0.0	0.0
HEC	1.0	1.0	0.0	0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.1	0.0	0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	19.97	0.0	17.24	10.67
DGBE	0.0	0.0	44.92	29.44	7.99	26.7	0.0	0.0
Diethylene glycol hexyl ether	-	-	-	-	-	-	17.24	10.67

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 4.1 Composition of the Tissue Equivalent Matter

4.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE3	466	Feb. 21, 2013	Annual	Feb. 21, 2014
SPEAG	E-Field Probe ET3DV6	1798	Apr. 29, 2013	Annual	Apr. 29, 2014
SPEAG	Dipole D835V2	441	Apr. 25, 2013	Annual	Apr. 25, 2014
SPEAG	Dipole D1900V2	5d032	July 20, 2012	Annual	July 20, 2013
SPEAG	Dipole D2450V2	743	Aug. 23, 2012	Annual	Aug. 23, 2013
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 02, 2012	Annual	Nov. 02, 2013
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 02, 2012	Annual	Nov. 02, 2013
HP	Dielectric Probe Kit 85070C	00721521	CBT		
HP	Dual Directional Coupler	16072	Nov. 02, 2012	Annual	Nov. 02, 2013
R&S	Base Station CMW500	1201.0002K50_116858	Jan. 17, 2013	Annual	Jan. 17, 2014
HP	Base Station E5515C	GB44400269	Feb. 14, 2013	Annual	Feb. 14, 2014
HP	Signal Generator 8664A	3744A02069	Nov. 02, 2012	Annual	Nov. 02, 2013
Hewlett Packard	11636B/Power Divider	11377	Nov. 11. 2012	Annual	Nov. 11. 2013
Agilent	N9020A/ SIGNAL	MY51110020	Jul. 31.2012	Annual	Jul. 31.2013
TESCOM	TC-3000C / BLUETOOTH	3000C000276	Jul. 11, 2012	Annual	Jul. 11, 2013
HP	Network Analyzer 8753ES	JP39240221	Mar. 26, 2013	Annual	Mar. 26, 2014

NOTE:

1. The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body 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/body-equivalent material.

2. CBT(Calibrating Before Testing). Prior to testing, the dielectric probe kit was calibrated via the network analyzer, with the specified procedure(calibrated in pure water) and calibration kit(standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent

5. 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 15 mm x 15 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.

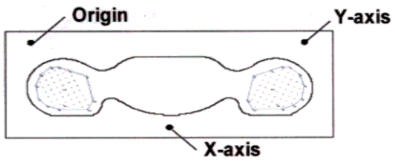


Figure 5.1 SAR Measurement Point in Area Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extend, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the hightest E-field value to determine the averaged SASR-distribution over 10g.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01 quoted below

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

6. DESCRIPTION OF TEST POSITION

6.1 HEAD POSITION

The device was placed in a normal operating position with the Point A on the device, as illustrated in following drawing, aligned with the location of the RE(ERP) on the phantom. With the ear-piece pressed against the head, the vertical center line of the body of the handset was aligned with an imaginary plane consisting of the RE, LE and M. While maintaining these alignments, the body of the handset was gradually moved towards the cheek until any point on the mouth-piece or keypad contacted the cheek. This is a cheek/touch position. For ear/tilt position, while maintain the device aligned with the BM and FN lines, the device was pivot against ERP back for 15º or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

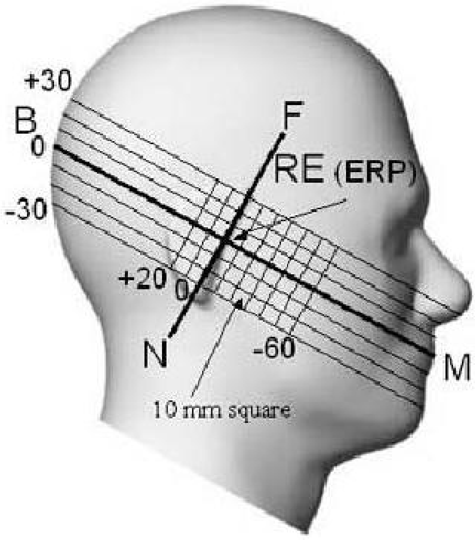


Figure 6.1 Side view of the phantom

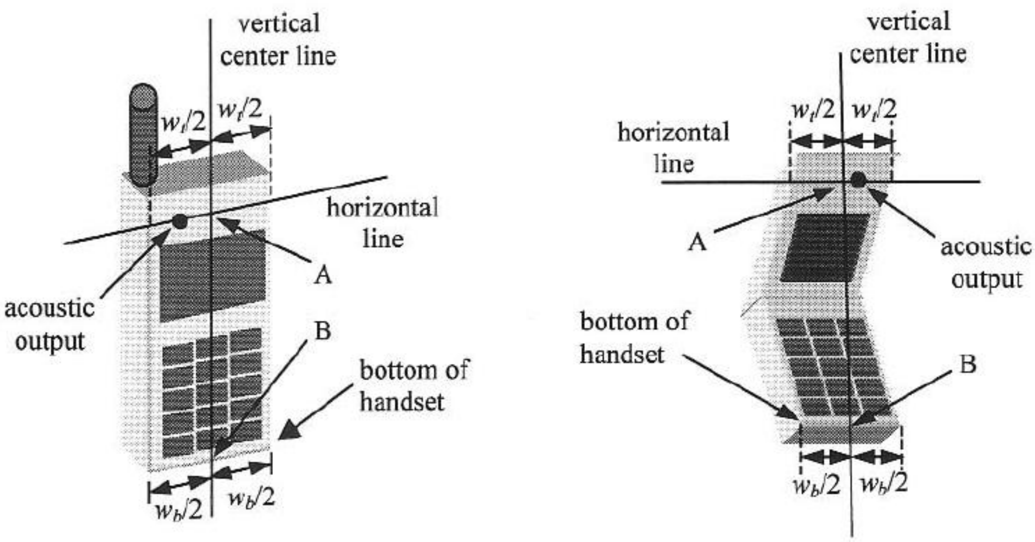


Figure 6.2 Handset vertical and horizontal reference lines

6.2 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.

7. 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 7.1 Uncertainty (800 MHz- 2450 MHz)

8. 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 8.1 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).

9. SAR SYSTEM VALIDATION

Per FCC KCB 865664 D02v01, SAR system validation status should be document to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2003 and FCC KDB 865664 D01 v01. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

SAR System #	Probe	probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isortopy	MOD. Type	Duty Factor	PAR
6	1798	ET3DV6	Head	835	441	May.06,2013	42.01	0.92	PASS	PASS	PASS	GMSK	PASS	N/A
6	1798	ET3DV6	Head	1900	5d032	May.07,2013	39.12	1.41	PASS	PASS	PASS	GMSK	PASS	N/A
6	1798	ET3DV6	Head	2450	743	May.08,2013	40.23	1.81	PASS	PASS	PASS	OFDM	N/A	PASS
6	1798	ET3DV6	Body	835	441	May.06,2013	55.88	0.99	PASS	PASS	PASS	GMSK	PASS	N/A
6	1798	ET3DV6	Body	1900	5d032	May.07,2013	54.67	1.54	PASS	PASS	PASS	GMSK	PASS	N/A
6	1798	ET3DV6	Body	2450	743	May.08,2013	52.77	1.97	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary

Note : All measurement were performed using probes calibrated for CW signal only. Modulations in the table bove represent test configurations for which the measurement system has been validated per FCC KDB Publication 865884 D01v01. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664.

10. SYSTEM VERIFICATION

10.1 Tissue Verification

Freq. [MHz]	Date	Probe	Dipole	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
835	Jul. 1, 2013	1798	441	Head	21.2	ε_r	41.5	40.4	- 2.65	± 5
						σ	0.90	0.92	+ 2.22	± 5
835	Jul. 2, 2013			Body	21.0	ε_r	55.2	56.8	+ 2.90	± 5
						σ	0.97	0.981	+ 1.13	± 5
1 900	Jul. 3 2013		5d032	Head	21.1	ε_r	40.0	39.8	- 0.50	± 5
						σ	1.40	1.41	+ 0.71	± 5
1 900	Jul. 4 2013			Body	21.2	ε_r	53.3	52.2	- 2.06	± 5
						σ	1.52	1.56	+ 2.63	± 5
2 450	Jun. 29 2013		743	Head	21.6	ε_r	39.2	37.9	- 3.32	± 5
						σ	1.80	1.84	+ 2.22	± 5
2 450	Jun. 29 2013			Body	21.6	ε_r	52.7	53.4	+ 1.33	± 5
						σ	1.95	1.99	+ 2.05	± 5

The Tissue dielectronic parameters were measured prior to the SAR evaluation using an Agilent 85070C Dielectronic Probe Kit and Agilent Network Analyzer.

10.2 System Verification

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 Verification kit. (Graphic Plots Attached)

Freq. [MHz]	Date	Probe (SN)	Dipole (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	Jul. 1 2013	1798	441	Head	21.4	21.2	9.68	1.00	10	+ 3.31	± 10
835	Jul. 2 2013			Body	21.2	21.0	9.69	0.955	9.55	- 1.44	± 10
1 900	Jul. 3 2013		5d032	Head	21.3	21.1	39.0	3.72	37.2	- 4.62	± 10
1 900	Jul. 4 2013			Body	21.4	21.2	39.9	3.99	39.9	+ 0.00	± 10
2 450	Jun.29 2013		743	Head	21.8	21.6	52.7	5.30	53	+ 0.57	± 10
2 450	Jun. 29 2013			Body	21.8	21.6	51.2	5.05	50.5	- 1.37	± 10

10.3 System Verification 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 Verification kit. (Graphic Plots Attached)

- Cabling the system, using the Verification 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.

11. RF CONDUCTED POWER MEASUREMENT

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.

11.1 Output Power Specifications.

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v05.

GSM

GSM850	GSM1900
Target Power : 33 dBm	Target Power : 29.7 dBm
GPRS850	PCS1900
GPRS 1tx : 33 dBm	GPRS 1tx : 29.7 dBm
GPRS 2tx : 30.2 dBm	GPRS 2tx : 27.2 dBm
GPRS 3tx : 28.7 dBm	GPRS 3tx : 25.7 dBm
GPRS 4tx : 27.2 dBm	GPRS 4tx : 24.2 dBm
Tune-up Tolerance : -1.5dB/ +0.5dB	Tune-up Tolerance : -1.5dB/ +0.5dB

Wifi

Mode / Band	IEEE 802.11 (in dBm)			
	a	b	g	N
2.4 GHz WIFI		15.5	12.0	11.5

Tune-up Tolerance : +0.5dB

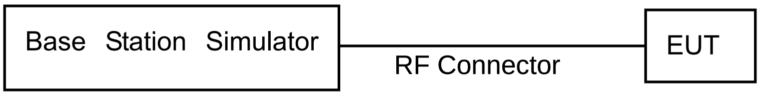
BT

Model	Channel	Frequency (MHz)	Output Power (dBm)		
			GFSK	8DPSK	π/4DQPSK
LG-E410f	0	2402	6.0	6.0	6.0
	39	2440	6.0	6.0	6.0
	78	2480	6.0	6.0	6.0

Tolerance : + 0.5 dB

11.2 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 : Body SAR with GPRS Multi-slot Class12 with CS 1 (GMSK)

Note;

CS1/MCS7 coding scheme was used in GPRS/EDGE output power measurements and SAR Testing, as a condition where GMSK/8PSK modulation was ensured. Investigation has shown that CS1 - CS4/ MCS5 – MCS9 settings do not have any impact on the output levels in the GPRS/EDGE modes.

Band	Channel	Voice	GPRS(GMSK) Data – CS1			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 850	128	33.30	33.29	30.52	29.07	27.59
	190	33.28	33.28	30.45	28.99	27.51
	251	33.27	33.27	30.35	28.89	27.40
GSM 1900	512	29.71	29.72	27.10	25.60	24.05
	661	29.86	29.87	27.27	25.77	24.24
	810	30.02	30.04	27.45	25.99	24.45

GSM Conducted output powers (Burst-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)
GSM 850	128	24.27	24.26	24.5	24.81	24.58
	190	24.25	24.25	24.43	24.73	24.5
	251	24.24	24.24	24.33	24.63	24.39
GSM 1900	512	20.68	20.69	21.08	21.34	21.04
	661	20.83	20.84	21.25	21.51	21.23
	810	20.99	21.01	21.43	21.73	21.44

GSM 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

11.3 WiFi

11.3.1 SAR Testing for 802.11b/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

802.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channels 1, 6 and 11.802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11,15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels.

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

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

802.11 Test Channels per FCC Requirements

▣ TEST RESULTS-Average

Conducted Output Power Measurements (802.11b Mode)

802.11b Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	15.26	15.26	30
		15.29	15.29	30
		15.42	15.42	30
		15.34	15.34	30
2437	6	14.89	14.89	30
		14.78	14.78	30
		14.96	14.96	30
		14.83	14.83	30
2462	11	15.79	15.79	30
		15.74	15.74	30
		15.80	15.80	30
		15.83	15.83	30

Conducted Output Power Measurements (802.11g Mode)

802.11g Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6 Mbps	11.46	30
		9 Mbps	11.36	30
		12 Mbps	11.39	30
		18 Mbps	11.73	30
		24 Mbps	11.86	30
		36 Mbps	11.62	30
		48 Mbps	11.49	30
		54 Mbps	11.44	30
2437	6	6 Mbps	11.41	30
		9 Mbps	11.54	30
		12 Mbps	11.64	30
		18 Mbps	11.54	30
		24 Mbps	11.54	30
		36 Mbps	11.60	30
		48 Mbps	11.58	30
		54 Mbps	11.21	30
2462	11	6 Mbps	11.63	30
		9 Mbps	11.98	30
		12 Mbps	12.04	30
		18 Mbps	11.86	30
		24 Mbps	11.95	30
		36 Mbps	12.13	30
		48 Mbps	11.83	30
		54 Mbps	11.67	30

Conducted Output Power Measurements (802.11n Mode)

802.11n Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6.5 Mbps	11.51	30
		13 Mbps	11.35	30
		19.5 Mbps	11.60	30
		26 Mbps	11.51	30
		39 Mbps	11.54	30
		52 Mbps	11.41	30
		58.5 Mbps	11.43	30
		65 Mbps	11.62	30
2437	6	6.5 Mbps	11.45	30
		13 Mbps	11.63	30
		19.5 Mbps	11.47	30
		26 Mbps	11.48	30
		39 Mbps	11.67	30
		52 Mbps	11.36	30
		58.5 Mbps	11.52	30
		65 Mbps	11.43	30
2462	11	6.5 Mbps	11.85	30
		13 Mbps	11.78	30
		19.5 Mbps	11.64	30
		26 Mbps	11.57	30
		39 Mbps	11.89	30
		52 Mbps	11.76	30
		58.5 Mbps	11.69	30
		65 Mbps	11.82	30

11.5 SAR Test Exclusions Applied

11.5.1 Wi-Fi/BT

Per FCC KDB 447498 D01, The SAR exclusion threshold for distance < 50mm is defined by the following equation:

$$\frac{Max\ Power\ of\ Channel(mW)}{Test\ \ Separation\ Distance\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

. Mode	Frequency	Maximum Allowed Power	Separatuin Distance	≤ 3.0
	[MHz]	[mW]	[mm]	
Bluetooth	2440	4	10	0.70

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(4/10)*√2.440] = 0.70 < 3.0.

his device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6W/kg. When standalone SAR is not required to be measured per FCC KDB 447498 D01v 4.3.22, the following equation must be used to estimate the standalone 1-g SAR for simultaneous transmission assessment involving that transmitter

$$Estimated\ SAR = \frac{\sqrt{f(GHZ)}}{7.5} * \frac{(Max\ \ Power\ \ of\ \ channel\ \ mW)}{Min\ Seperation\ \ Distance}.$$

. Mode	Frequency	Maximum Allowed Power	Separatuin Distance (Body)	Estimated SAR (Body)
	[MHz]	[mW]	[mm]	[W/kg]
Bluetooth	2440	4	10	0.09

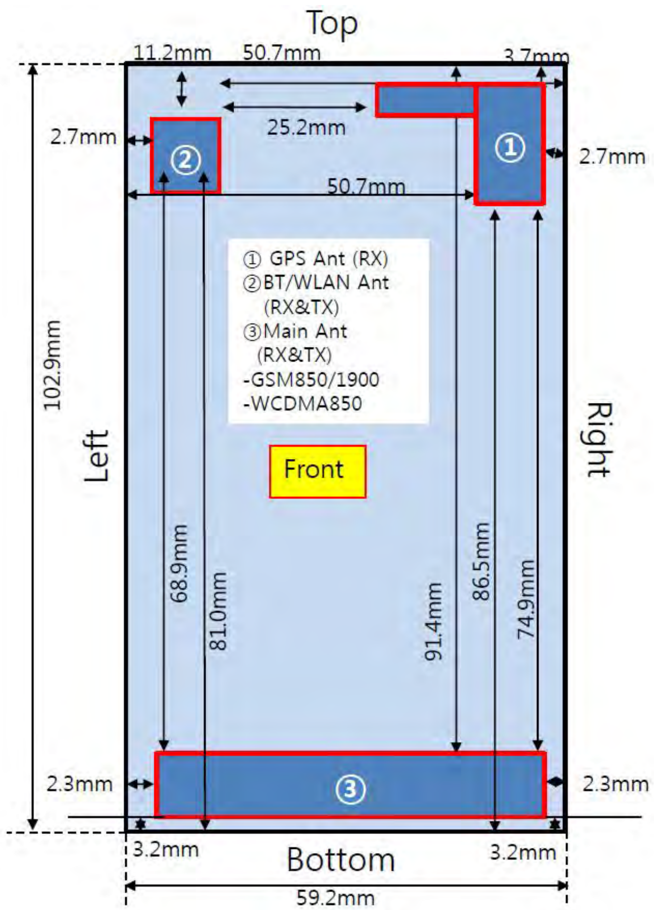
Note : Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. The Estimated SAR results were determined according to FCC KDB447498 D01

12. SAR Test configuration & Antenna Information

12.1 SAR Test configurations

Mode	Rear	Front	Left	Right	Bottom	Top
GSM 850	Yes	Yes	Yes	Yes	Yes	No
GSM 1 900	Yes	Yes	Yes	Yes	Yes	No
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes

12.2 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 ≤ 2.5 cm from an edge.

※Please see LG-E410i_Ant_distance file for futher information.

13. SAR TEST DATA SUMMARY

13.1 Measurement Results (GSM850 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g)	Plot No.
MHz	Channel									
836.6	190	GSM850	33.28	0.089	Standard	Left Ear	0.341	1.052	0.359	-
836.6	190		33.28	-0.023	Standard	Left Tilt	0.188	1.052	0.198	-
836.6	190		33.28	0.047	Standard	Right Ear	0.409	1.052	0.430	-
836.6	190		33.28	-0.068	Standard	Right Tilt	0.218	1.052	0.229	-
836.6	190	GPRS 3Tx	28.99	-0.104	Standard	Left Ear	0.610	1.050	0.640	-
836.6	190		28.99	-0.059	Standard	Left Tilt	0.316	1.050	0.332	-
836.6	190		28.99	-0.13	Standard	Right Ear	0.651	1.050	**0.683**	1
836.6	190		28.99	- 0.101	Standard	Right Tilt	0.361	1.050	0.379	-
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 According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
8 For Head SAR testing, the EUT was set in GPRS multi-slot class12 with 3plink 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 SAR testing.
9 GSM GPRS VoIP is 3rd Party applications possibly installed and used by the end-user

13.2 Measurement Results (GSM1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Measured SAR(mW/g)	Scaling Facor	Scaled SAR(mW/g)	Plot No.
MHz	Channel									
1 880.0	661	GSM 1900	29.86	0.059	Standard	Left Ear	0.633	1.081	**0.685**	2
			29.86	0.008	Standard	Left Tilt	0.278	1.081	0.301	-
			29.86	-0.049	Standard	Right Ear	0.479	1.081	0.518	-
			29.86	-0.013	Standard	Right Tilt	0.202	1.081	0.218	-
		GPRS 3Tx	25.77	0.061	Standard	Left Ear	0.592	1.104	0.654	-
			25.77	-0.068	Standard	Left Tilt	0.268	1.104	0.296	-
			25.77	-0.131	Standard	Right Ear	0.507	1.104	0.560	-
			25.77	-0.181	Standard	Right Tilt	0.214	1.104	0.236	-
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 According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
8 For Head SAR testing, the EUT was set in GPRS multi-slot class12 with 3uplink 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 SAR testing.
9 GSM GPRS VoIP is 3rd Party applications possibly installed and used by the end-user

13.3 Measurement Results (802.11b/g/n Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	Data Rate	Measured SAR(mW/g)	Scaling Facor	Scaled SAR(mW/g)	Plot No.
MHz	Chan										
2 462	11	802.11b	15.79	-0.186	Standard	Left Ear	1Mbps	0.237	1.050	0.249	-
			15.79	-0.031	Standard	Left Tilt	1Mbps	0.228	1.050	0.239	-
			15.79	0.110	Standard	Right Ear	1Mbps	0.312	1.050	**0.327**	3
			15.79	0.033	Standard	Right Tilt	1Mbps	0.211	1.050	0.221	-
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.

13.4 Measurement Results (GSM850 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR(mW/g)	Scaling Facor	Scaled SAR(mW/g)	Plot No.
MHz	Channel									
824.2	128	GPRS 3Tx	29.07	-0.064	Rear	1.0 cm	0.828	1.030	**0.853**	4
836.6	190		28.99	-0.157	Rear	1.0 cm	0.806	1.050	0.846	-
848.8	251		28.89	-0.037	Rear	1.0 cm	0.620	1.074	0.666	-
836.6	190		28.99	0.027	Front	1.0 cm	0.432	1.050	0.453	-
836.6	190		28.99	-0.125	Left	1.0 cm	0.227	1.050	0.238	-
836.6	190		28.99	0.028	Right	1.0 cm	0.413	1.050	0.433	-
836.6	190		28.99	0.018	Bottom	1.0 cm	0.136	1.050	0.143	-
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-body 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 According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
9 For body SAR testing, the EUT was set in GPRS multi-slot class12 with 3plink 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.

13.5 Measurement Results (GSM1900 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g)	Plot No.
MHz	Chan									
1 880	661	GPRS 3Tx	25.77	-0.072	Rear	1.0 cm	0.643	1.104	**0.710**	5
1 880	661	GPRS 3Tx	25.77	0.002	Front	1.0 cm	0.361	1.104	0.399	-
1 880	661	GPRS 3Tx	25.77	-0.183	Left	1.0 cm	0.151	1.104	0.167	-
1 880	661	GPRS 3Tx	25.77	-0.002	Right	1.0 cm	0.130	1.104	0.144	-
1 880	661	GPRS 3Tx	25.77	-0.046	Bottom	1.0 cm	0.322	1.104	0.356	-
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-body 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 According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
9 For body SAR testing, the EUT was set in GPRS multi-slot class12 with 3plink 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.

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

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Data Rate	Separation Distance	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g	Plot No.
MHz	Channel										
2 462	11	802.11b	15.79	0.043	Rear	1Mbps	1.0 cm	0.197	1.050	**0.207**	6
			15.79	-0.048	Front	1Mbps	1.0 cm	0.146	1.050	0.153	-
			15.79	-0.136	Left	1Mbps	1.0 cm	0.150	1.050	0.157	-
			15.79	-0.019	Top	1Mbps	1.0 cm	0.109	1.050	0.114	-
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-body 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.

13.7 Measurement Results (Body-worn SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Measured SAR(mW/g)	Scaling Facor	Scaled SAR(mW/g)	Plot No.
MHz	Channel									
836.6	190	GSM850	33.28	-0.146	Rear	1.0 cm	0.525	1.052	**0.552**	7
836.6	190	GSM850	33.28	-0.012	Front	1.0 cm	0.255	1.052	0.268	-
824.2	128	GPRS 3Tx	28.99	-0.064	Rear	1.0 cm	0.828	1.030	**0.853**	4
836.6	190	GPRS 3Tx	28.99	-0.157	Rear	1.0 cm	0.806	1.050	0.846	-
848.8	251	GPRS 3Tx	28.99	-0.037	Rear	1.0 cm	0.620	1.074	0.666	-
836.6	190	GPRS 3Tx	28.99	0.027	Front	1.0 cm	0.432	1.050	0.453	-
1 880.0	661	GSM1900	29.86	-0.155	Rear	1.0 cm	0.589	1.081	**0.637**	8
1 880.0	661	GSM1900	29.86	0.053	Front	1.0 cm	0.337	1.081	0.364	
1 880.0	661	GPRS 3Tx	25.77	-0.072	Rear	1.0 cm	0.643	1.104	**0.710**	5
1 880.0	661	GPRS 3Tx	25.77	0.002	Front	1.0 cm	0.361	1.104	0.399	-
2 462	11	802.11b (1Mbps)	15.79	0.043	Rear	1.0 cm	0.197	1.050	**0.207**	6
2 462	11	802.11b (1Mbps)	15.79	-0.048	Front	1.0 cm	0.146	1.050	0.153	-
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-body 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 According to KDB 447498, Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz.
6 Body-Worn accessory testing is typically associated with voice operation. Therefore, GSM voice was evaluated for body-worn SAR.

14. SAR Measurement Variability and Uncertainty

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Frequency		Modulation	Battery	Configuration	Original SAR(mW/g)	Repeated SAR(mW/g)	Largest to Smallest SAR Ratio	Plot No.
MHz	Channel							
824.2	128	GPRS 3Tx	Standard	Rear	0.828	0.808	1.025	9

Note(s):

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg.

15. SAR Summation Scenario

	Position	Applicable Combination	Note
Simultaneous Transmission	Head	GSM 850 Voice + 2.4 GHz WiFi	WiFi-Direct
		GSM 1900 Voice + 2.4 GHz WiFi	
		GPRS 850 Data + 2.4 GHz WiFi	
		GPRS 1900 Data + 2.4 GHz WiFi	
	Hotspot	GPRS 850 Data + 2.4 GHz WiFi	
		GPRS 1900 Data + 2.4 GHz WiFi	
	Body-worn	GSM 850 Voice + 2.4 GHz WiFi	WiFi-Direct
		GSM 1900 Voice + 2.4 GHz WiFi	
		GSM 850 Voice + 2.4 GHz Bluetooth	
		GSM 1900 Voice + 2.4 GHz Bluetooth	
		GPRS 850 Data + 2.4 GHz WiFi	WiFi-Direct
		GPRS 1900 Data + 2.4 GHz WiFi	
* BT and WLAN are not simultaneous transmission.			

15.1 Simultaneous Transmission Summation for Head

Simultaneous Transmission Summation with Wifi

Band	configuration	Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM850	Left Cheek	0.359	0.249	0.608
	Left Tilt	0.198	0.239	0.437
	Right Cheek	0.430	0.327	0.757
	Right Tilt	0.229	0.221	0.450
GSM 1 900	Left Cheek	0.685	0.249	0.934
	Left Tilt	0.301	0.239	0.540
	Right Cheek	0.518	0.327	0.845
	Right Tilt	0.218	0.221	0.439
GPRS 850	Left Cheek	0.640	0.249	0.889
	Left Tilt	0.332	0.239	0.571
	Right Cheek	0.683	0.327	**1.010**
	Right Tilt	0.379	0.221	0.600
GPRS 1 900	Left Cheek	0.654	0.249	0.903
	Left Tilt	0.296	0.239	0.535
	Right Cheek	0.560	0.327	0.887
	Right Tilt	0.236	0.221	0.457

15.2 Simultaneous Transmission Summation for Body-Worn

Simultaneous Transmission Summation with Wifi (1 cm)

Band	configuration	Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM 850	Rear	0.552	0.207	0.759
GSM 1900	Rear	0.637	0.207	0.844
GPRS 850	Rear	0.853	0.207	**1.060**
GPRS 1900	Rear	0.710	0.207	0.917

Simultaneous Transmission Summation with Bluetooth (1 cm)

Band	configuration	Scaled SAR(W/kg)	BT SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM 850	Rear	0.552	0.09	0.642
GSM 1900	Rear	0.637	0.09	0.727
GPRS 850	Rear	0.853	0.09	0.943
GPRS 1900	Rear	0.710	0.09	0.800

Note;

- Body-Worn 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.

15.3 Simultaneous Transmission Summation for Hotspot

Band	configuration	Scaled SAR(W/kg)	2.4 GHz WIFI Scaled SAR	∑ 1-g SAR
			(W/kg)	(W/kg)
GSM850	Rear	0.853	0.207	**1.060**
	Front	0.453	0.153	0.606
	Left	0.238	0.157	0.395
	Right	0.443		0.557
	Bottom	0.143		0.143
	Top		0.114	0.114
GSM 1 900	Rear	0.710	0.207	0.917
	Front	0.399	0.153	0.552
	Left	0.167	0.157	0.324
	Right	0.144		0.144
	Bottom	0.356		0.356
	Top		0.114	0.114

16. 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.

17. 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.

Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Jul. 1, 2013
Plot No. 1

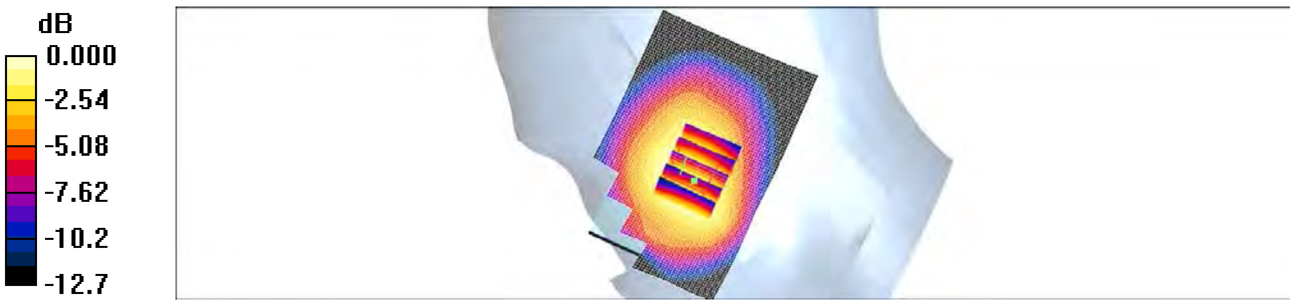
DUT: LG-E410i; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.77
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.921 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.64, 6.64, 6.64); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 190 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.697 mW/g

Right touch 190 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.14 V/m; Power Drift = -0.130 dB
Peak SAR (extrapolated) = 0.857 W/kg
SAR(1 g) = 0.651 mW/g; SAR(10 g) = 0.458 mW/g
Maximum value of SAR (measured) = 0.683 mW/g



0 dB = 0.683mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature:	21.1 ℃
Ambient Temperature:	21.3 ℃
Test Date:	Jul. 3, 2013
Plot No.	2

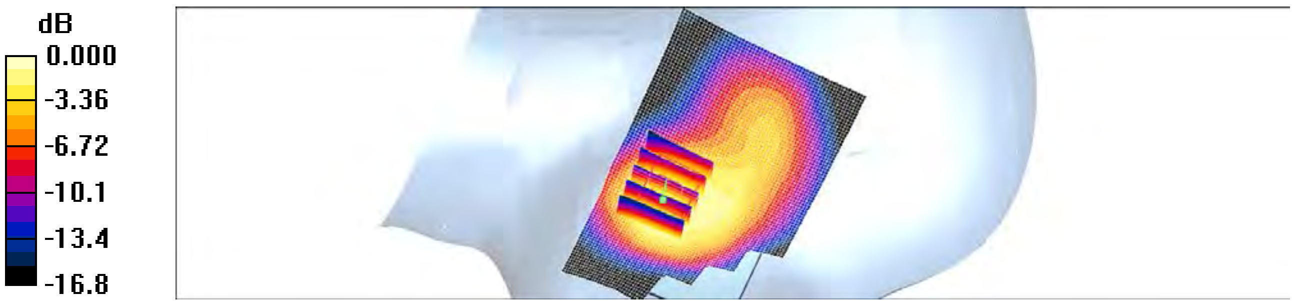
DUT: LG-E440i; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.29, 5.29, 5.29); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 800/900 Phantom; Type: SAM

Left Touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.674 mW/g

Left Touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 0.862 W/kg
SAR(1 g) = 0.633 mW/g; SAR(10 g) = 0.392 mW/g
Maximum value of SAR (measured) = 0.701 mW/g



0 dB = 0.701mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Jun. 29, 2013
Plot No.	3

DUT: LG-E410i; Type: bar; Serial: #1

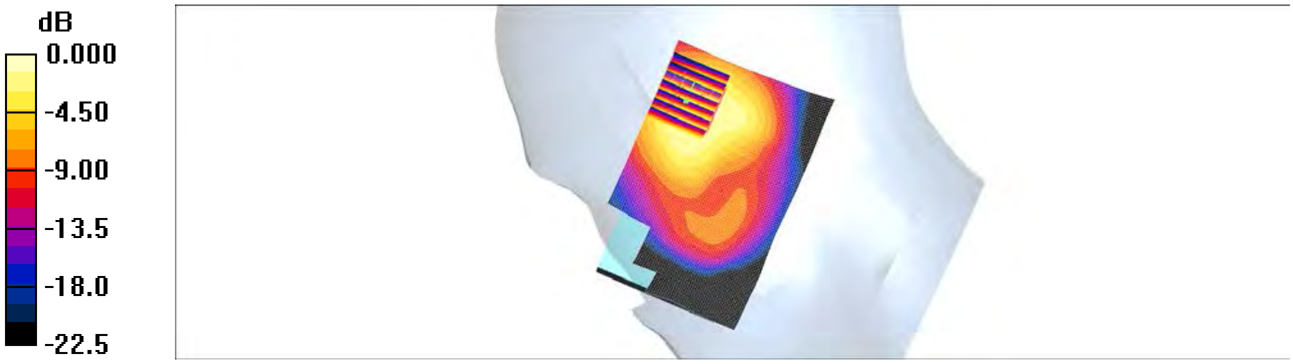
Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.85 mho/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 835/900 Phamtom ; Type: SAM; Serial:
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b Right Touch 1Mbps 11/Area Scan (71x111x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.339 mW/g

802.11b Right Touch 1Mbps 11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.86 V/m; Power Drift = 0.110 dB
Peak SAR (extrapolated) = 0.761 W/kg
SAR(1 g) = 0.312 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.340 mW/g



0 dB = 0.340mW/g

Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Jul. 2, 2013
Plot No. 4

DUT: LG-E410i; Type: bar; Serial: #1

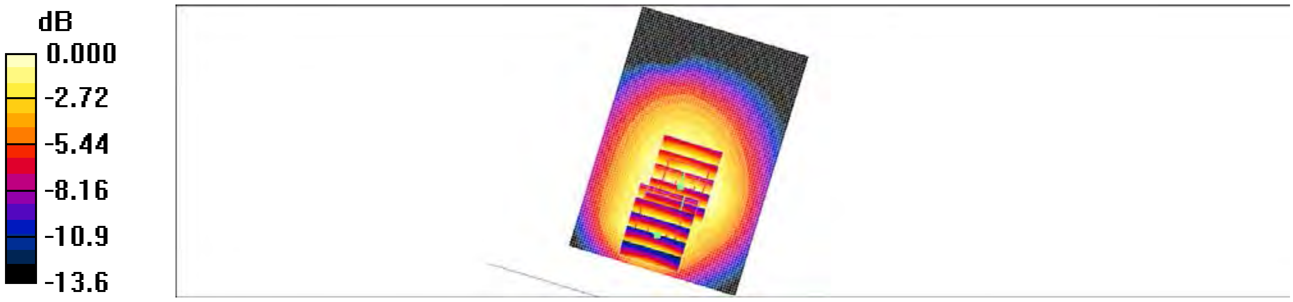
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2.77
Medium parameters used: f = 825 MHz; σ = 0.97 mho/m; ε_r = 56.9; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

Body rear 128 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.878 mW/g

Body rear 128 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.30 V/m; Power Drift = -0.064 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.828 mW/g; SAR(10 g) = 0.559 mW/g
Maximum value of SAR (measured) = 0.885 mW/g

Body rear 128 3Tx/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.30 V/m; Power Drift = -0.064 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.455 mW/g
Maximum value of SAR (measured) = 0.778 mW/g



0 dB = 0.778mW/g

Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.2 ℃
Ambient Temperature: 21.4 ℃
Test Date: Jul. 4, 2013
Plot No. 5

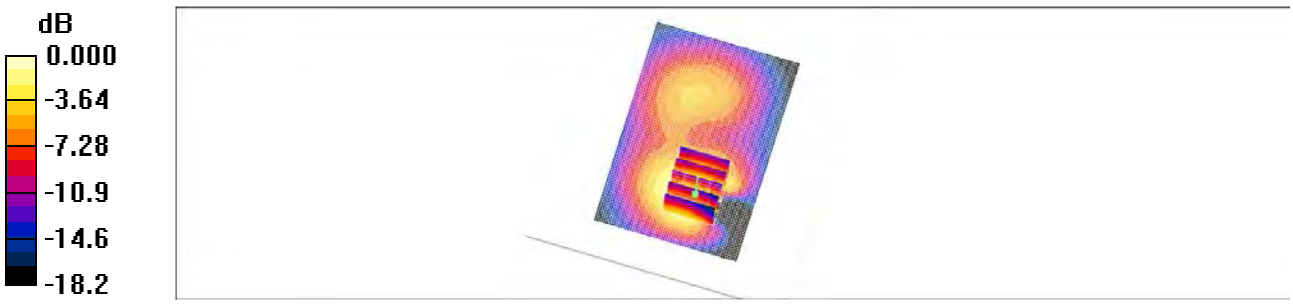
DUT: LG-E410i; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.77
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.7, 4.7, 4.7); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

Body rear 661 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.947 mW/g

Body rear 661 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.24 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 0.983 W/kg
SAR(1 g) = 0.643 mW/g; SAR(10 g) = 0.383 mW/g
Maximum value of SAR (measured) = 0.704 mW/g



0 dB = 0.704mW/g

Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.6 ℃
Ambient Temperature: 21.8 ℃
Test Date: Jun. 29, 2013
Plot No. 6

DUT: LG-E410i; Type: bar; Serial: #1

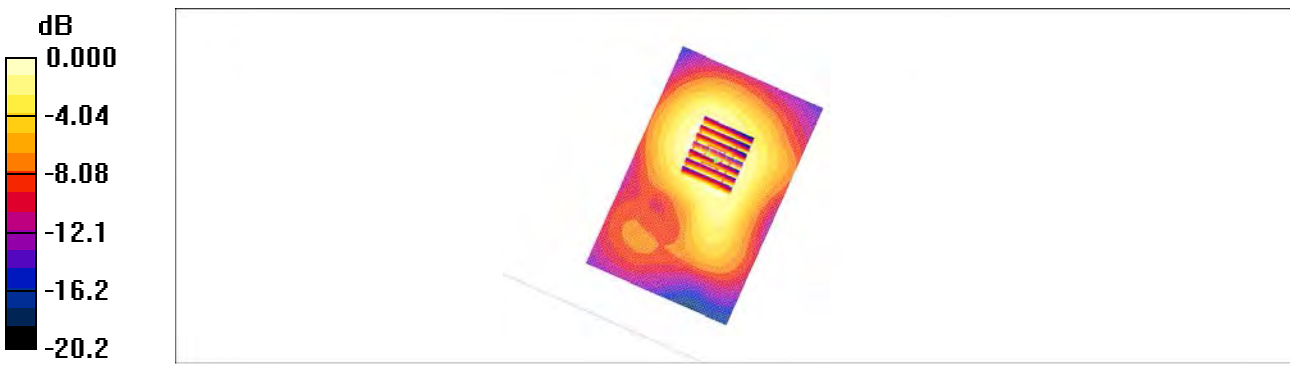
Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.16, 4.16, 4.16); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b Body rear 1Mbps 11/Area Scan (71x111x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.203 mW/g

802.11b Body rear 1Mbps 11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.23 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 0.418 W/kg
SAR(1 g) = 0.197 mW/g; SAR(10 g) = 0.116 mW/g
Maximum value of SAR (measured) = 0.205 mW/g



0 dB = 0.205mW/g

Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Jul. 02, 2013
Plot No. 7

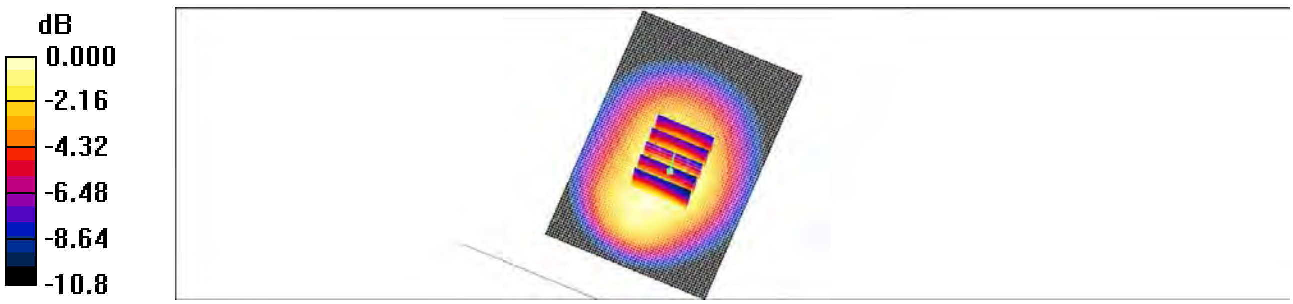
DUT: LG-E410i; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.982 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA

Body rear 190/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.550 mW/g

Body rear 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.95 V/m; Power Drift = -0.146 dB
Peak SAR (extrapolated) = 0.713 W/kg
SAR(1 g) = 0.525 mW/g; SAR(10 g) = 0.373 mW/g
Maximum value of SAR (measured) = 0.554 mW/g



0 dB = 0.554mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Jul. 4, 2013
Plot No.	8

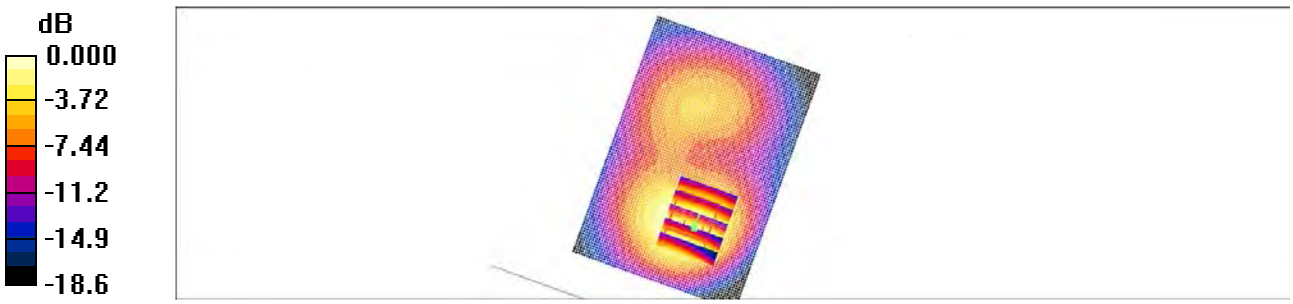
DUT: LG-E410i; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.7, 4.7, 4.7); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

Body rear 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.692 mW/g

Body rear 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.75 V/m; Power Drift = -0.155 dB
Peak SAR (extrapolated) = 0.901 W/kg
SAR(1 g) = 0.589 mW/g; SAR(10 g) = 0.352 mW/g
Maximum value of SAR (measured) = 0.646 mW/g



0 dB = 0.646mW/g

Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Jul. 2, 2013
Plot No. 9

DUT: LG-E410i; Type: bar; Serial: #1

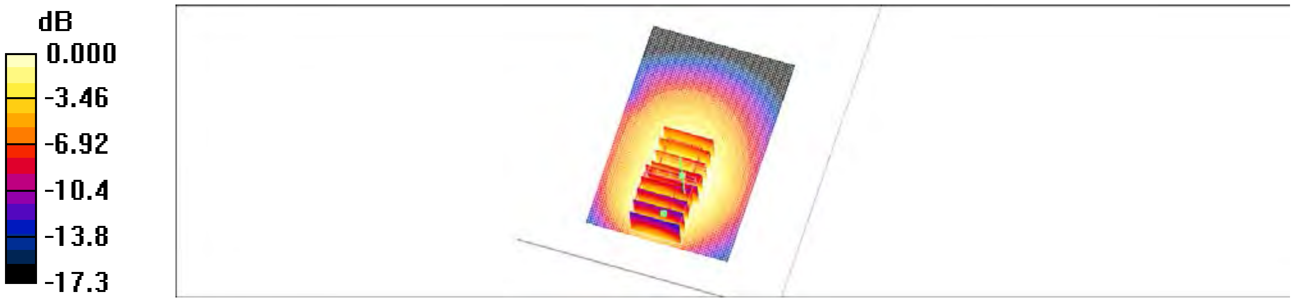
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2.77
Medium parameters used: f = 825 MHz; σ = 0.97 mho/m; ε_r = 56.9; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

Body rear 128 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.868 mW/g

Body rear 128 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.27 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.808 mW/g; SAR(10 g) = 0.563 mW/g
Maximum value of SAR (measured) = 0.867 mW/g

Body rear 128 3Tx/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.27 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.626 mW/g; SAR(10 g) = 0.381 mW/g
Maximum value of SAR (measured) = 0.746 mW/g



0 dB = 0.746mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Jul. 1, 2013
Plot No.	1

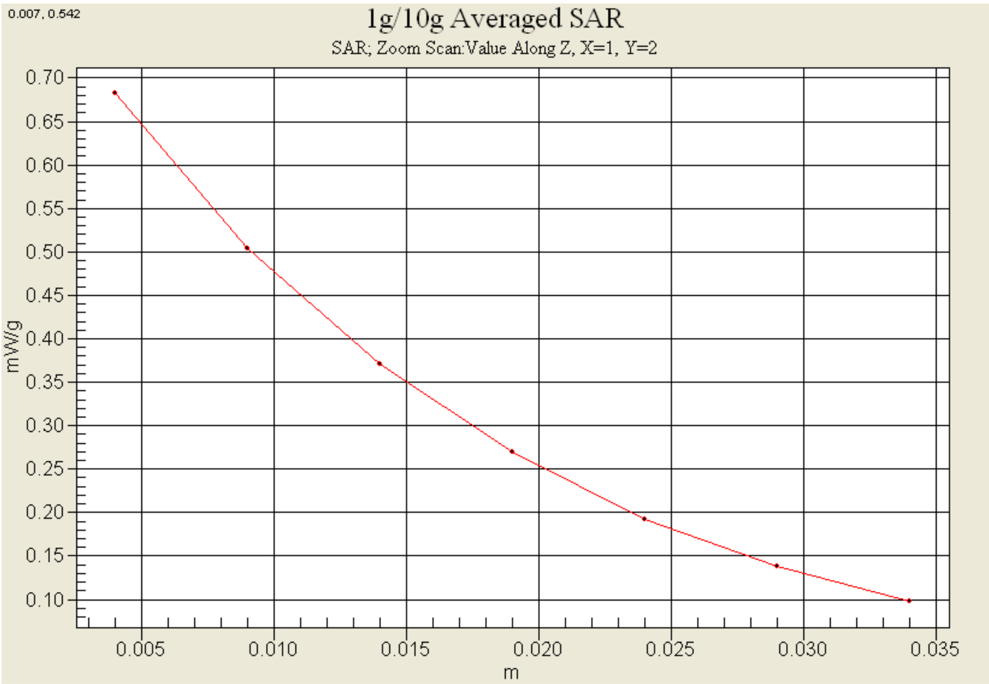
DUT: LG-E410i; Type: bar; Serial: #1

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.77
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.921 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.64, 6.64, 6.64); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 1800/1900 Phantom; Type: SAM

Right touch 190 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.697 mW/g

Right touch 190 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.14 V/m; Power Drift = -0.130 dB
Peak SAR (extrapolated) = 0.857 W/kg
SAR(1 g) = 0.651 mW/g; SAR(10 g) = 0.458 mW/g
Maximum value of SAR (measured) = 0.683 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.1 ℃
Ambient Temperature: 21.3 ℃
Test Date: Jul. 3, 2013
Plot No. 2

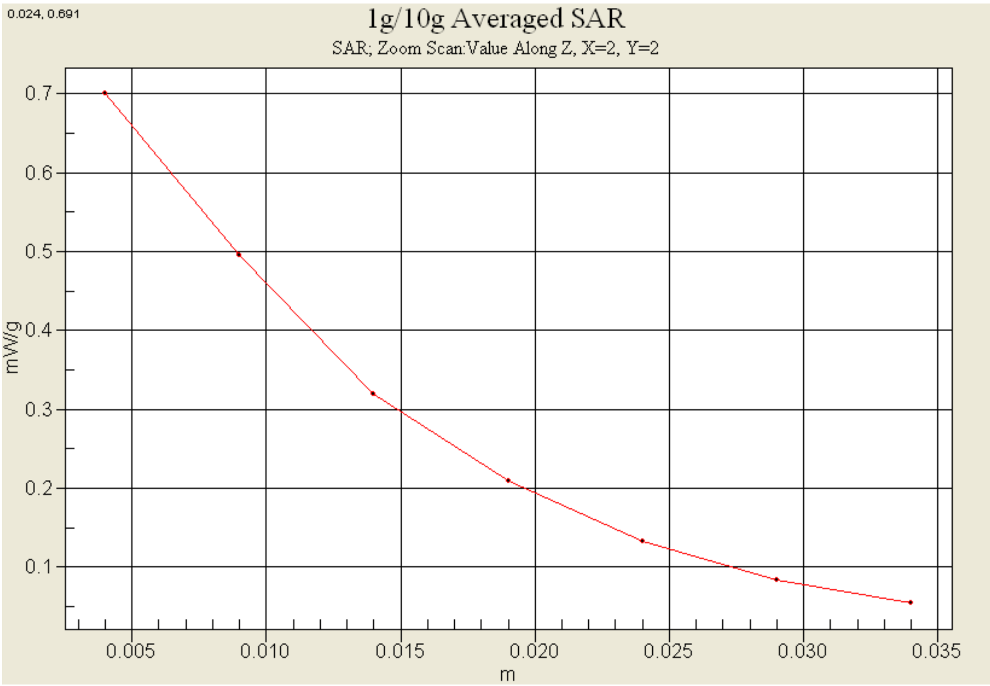
DUT: LG-E440i; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(5.29, 5.29, 5.29); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 800/900 Phantom; Type: SAM

Left Touch 661/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.674 mW/g

Left Touch 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 0.862 W/kg
SAR(1 g) = 0.633 mW/g; SAR(10 g) = 0.392 mW/g
Maximum value of SAR (measured) = 0.701 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.6 ℃
Ambient Temperature: 21.8 ℃
Test Date: Jun. 29, 2013
Plot No. 3

DUT: LG-E410i; Type: bar; Serial: #1

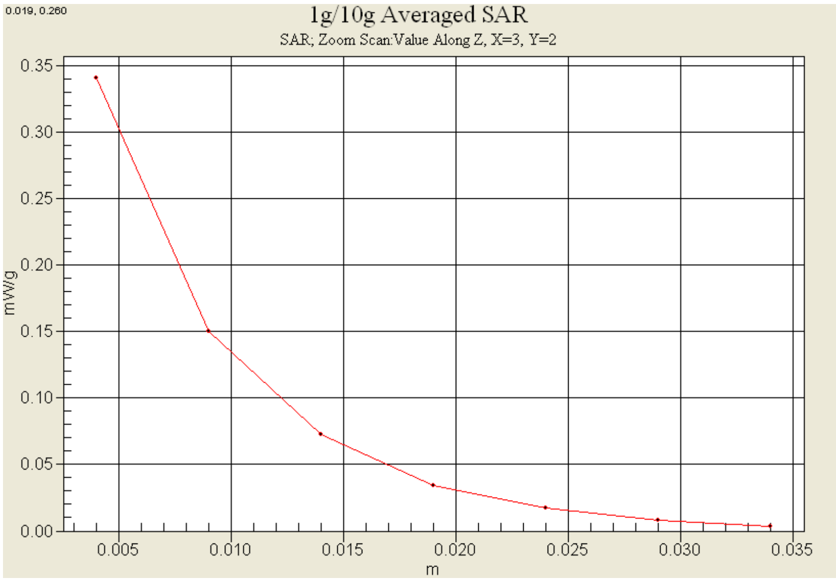
Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.85 mho/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 835/900 Phamtom ; Type: SAM; Serial:
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b Right Touch 1Mbps 11/Area Scan (71x111x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.339 mW/g

802.11b Right Touch 1Mbps 11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.86 V/m; Power Drift = 0.110 dB
Peak SAR (extrapolated) = 0.761 W/kg
SAR(1 g) = 0.312 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.340 mW/g



Test Laboratory: HCT CO., LTD
EUT Type: GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: Jul. 2, 2013
Plot No. 4

DUT: LG-E410i; Type: bar; Serial: #1

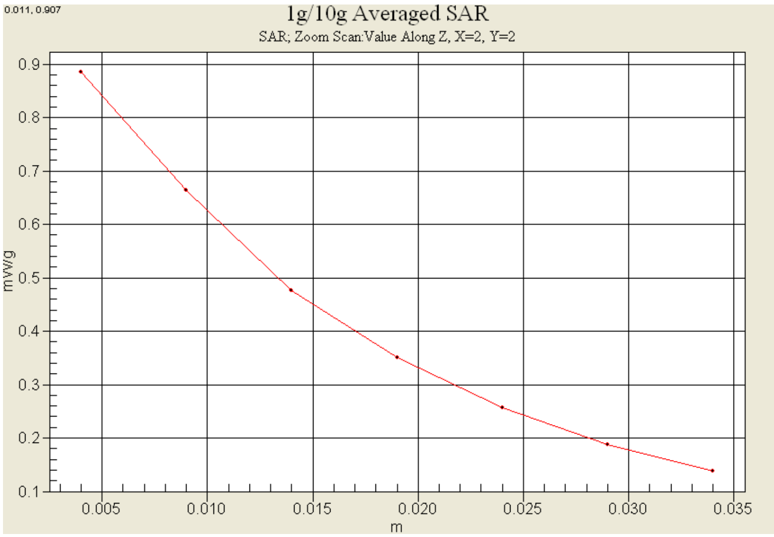
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:2.77
Medium parameters used: f = 825 MHz; σ = 0.97 mho/m; ε_r = 56.9; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

Body rear 128 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.878 mW/g

Body rear 128 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.30 V/m; Power Drift = -0.064 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.828 mW/g; SAR(10 g) = 0.559 mW/g
Maximum value of SAR (measured) = 0.885 mW/g

Body rear 128 3Tx/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.30 V/m; Power Drift = -0.064 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.455 mW/g
Maximum value of SAR (measured) = 0.778 mW/g



Test Laboratory:	HCT CO., LTD
EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.4 ℃
Test Date:	Jul. 4, 2013
Plot No.	5

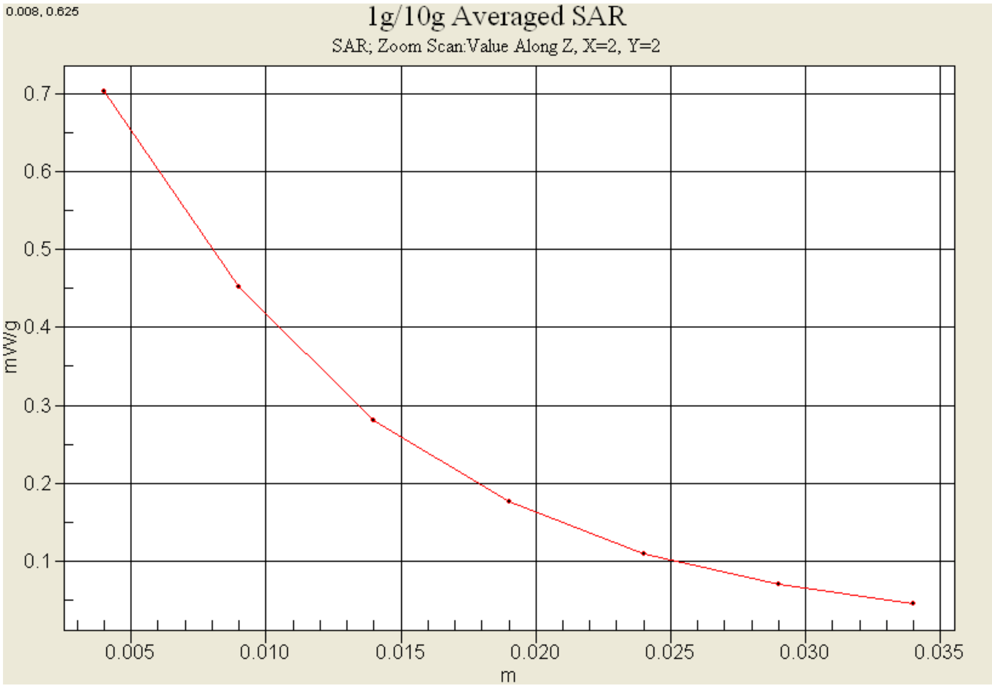
DUT: LG-E410i; Type: bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.77
Medium parameters used: f = 1880 MHz; σ = 1.55 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Center Section ; Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

DASY4 Configuration:
- Probe: ET3DV6 - SN1798; ConvF(4.7, 4.7, 4.7); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA

Body rear 661 3Tx/Area Scan (61x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.947 mW/g

Body rear 661 3Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.24 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 0.983 W/kg
SAR(1 g) = 0.643 mW/g; SAR(10 g) = 0.383 mW/g
Maximum value of SAR (measured) = 0.704 mW/g



Test Laboratory:	HCT CO., LTD
EUT Type:	GSM Phone with Bluetooth 3.0, WIFI802.11 b/g/n
Liquid Temperature:	21.6 ℃
Ambient Temperature:	21.8 ℃
Test Date:	Jun. 29, 2013
Plot No.	6

DUT: LG-E410i; Type: bar; Serial: #1

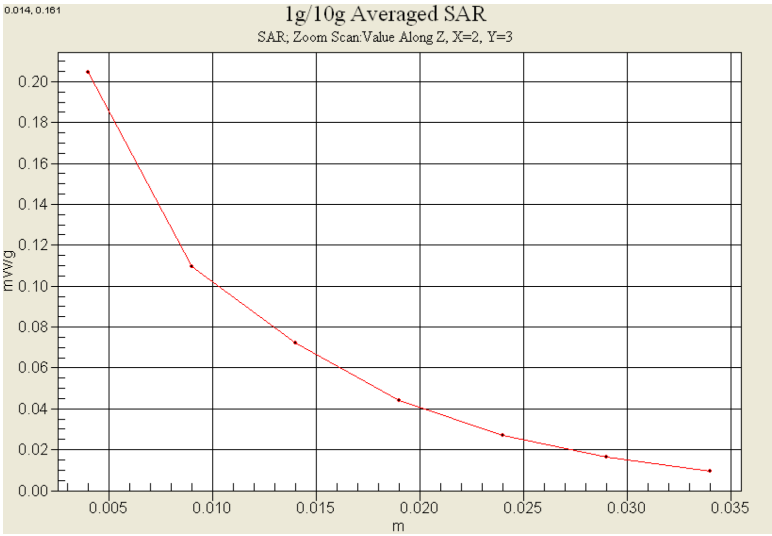
Communication System: 2450MHz FCC; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 2 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.16, 4.16, 4.16); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b Body rear 1Mbps 11/Area Scan (71x111x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.203 mW/g

802.11b Body rear 1Mbps 11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.23 V/m; Power Drift = 0.043 dB
Peak SAR (extrapolated) = 0.418 W/kg
SAR(1 g) = 0.197 mW/g; SAR(10 g) = 0.116 mW/g
Maximum value of SAR (measured) = 0.205 mW/g



Attachment 2. – Dipole Verification Plots

■ Verification Data (835 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	21.2 ℃
Test Date:	Jul. 01, 2013

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

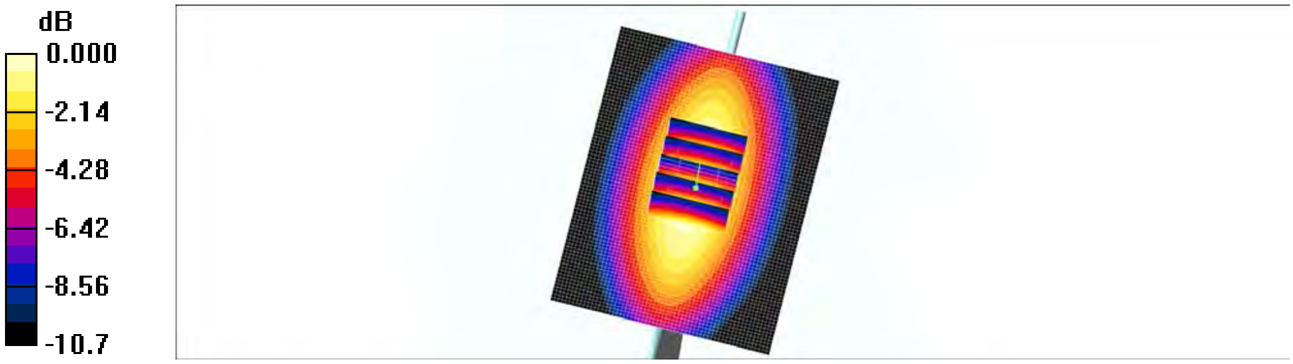
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.64, 6.64, 6.64); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: SAM 835/900 MHz; Type: SAM; Serial: TP-1141
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 835 MHz/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 36.1 V/m; Power Drift = -0.060 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 1 mW/g; SAR(10 g) = 0.655 mW/g
Maximum value of SAR (measured) = 1.08 mW/g



0 dB = 1.08mW/g

■ Verification Data (835 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 21.0 ℃
Test Date: Jul. 02, 2013

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

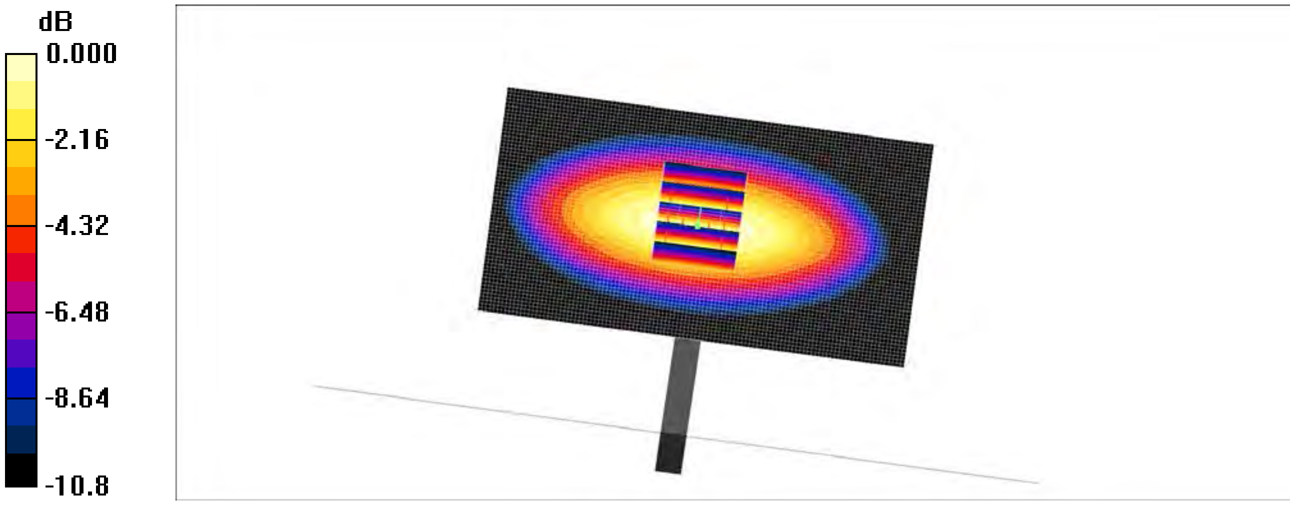
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.981 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 835 MHz/Area Scan (111x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.04 mW/g

Validation 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.7 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.955 mW/g; SAR(10 g) = 0.619 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

■ Verification Data (1 900 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.1 ℃

Test Date: Jul. 03, 2013

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

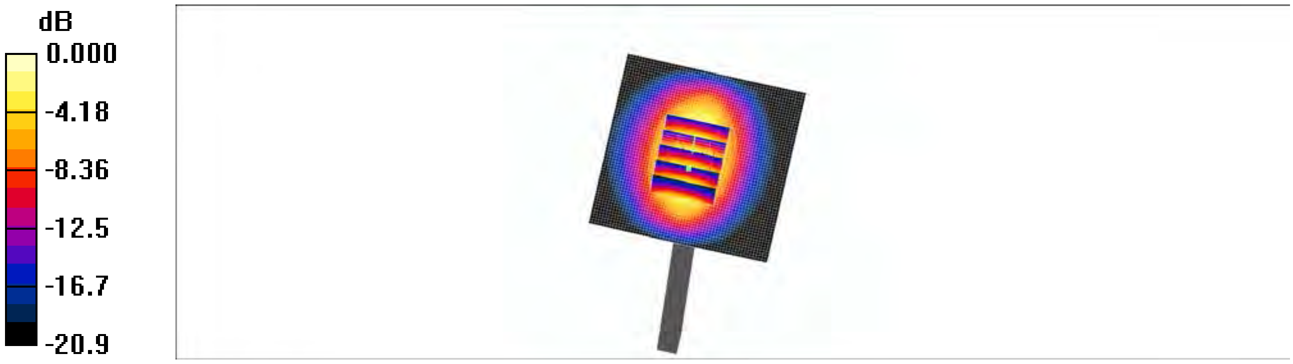
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(5.29, 5.29, 5.29); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: SAM 1800/1900 MHz; Type: SAM; Serial: TP-1173
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Dipole 1900MHz Validation/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.35 mW/g

Dipole 1900MHz Validation/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.1 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 6.53 W/kg
SAR(1 g) = 3.72 mW/g; SAR(10 g) = 1.91 mW/g
Maximum value of SAR (measured) = 4.21 mW/g



0 dB = 4.21mW/g

■ Verification Data (1 900 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.2 ℃

Test Date: Jul. 04, 2013

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

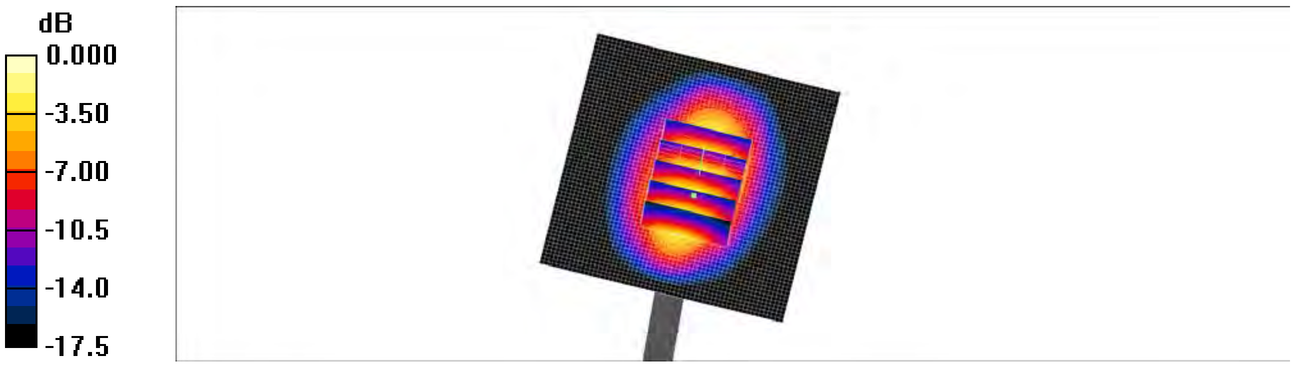
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.7, 4.7, 4.7); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA; Serial: xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.73 mW/g

Validation1900 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.7 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 6.53 W/kg
SAR(1 g) = 3.99 mW/g; SAR(10 g) = 2.17 mW/g
Maximum value of SAR (measured) = 4.47 mW/g



0 dB = 4.47mW/g

Verification Data (2 450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.6 ℃

Test Date: Jun. 29, 2013

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

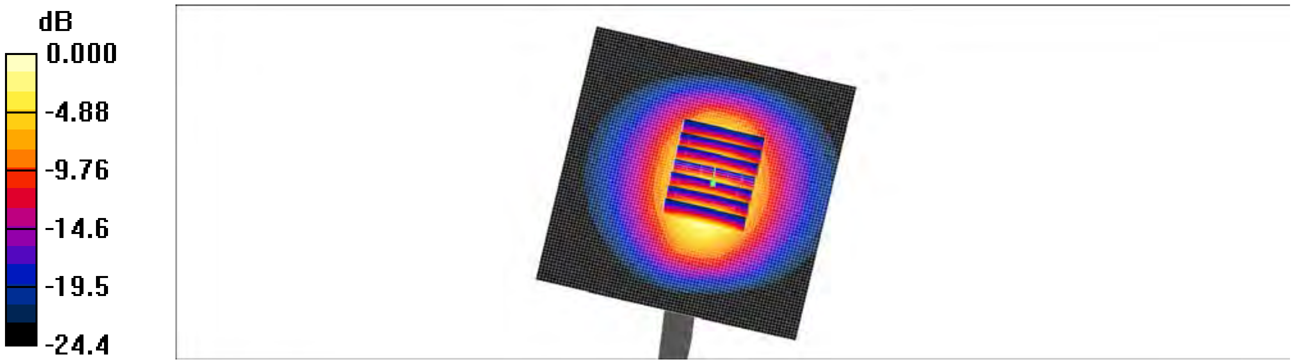
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.84 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.63, 4.63, 4.63); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 835/900 Phamtom ; Type: SAM; Serial:
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 2450MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 6.01 mW/g

Validation 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.4 V/m; Power Drift = -0.091 dB
Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 5.3 mW/g; SAR(10 g) = 2.36 mW/g
Maximum value of SAR (measured) = 5.89 mW/g



0 dB = 5.89mW/g

■ Verification Data (2 450 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.6 ℃

Test Date: Jun. 29, 2013

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

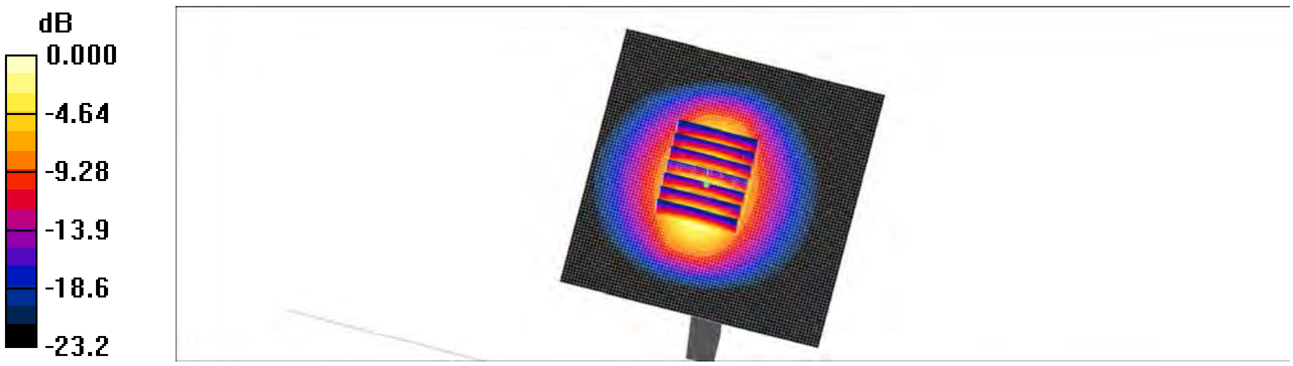
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(4.16, 4.16, 4.16); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Validation 2450MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 5.66 mW/g

Validation 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.4 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 13.5 W/kg
SAR(1 g) = 5.05 mW/g; SAR(10 g) = 2.24 mW/g
Maximum value of SAR (measured) = 5.46 mW/g



0 dB = 5.46mW/g