SAR TEST REPORT

HCT CO., LTD

EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
FCC ID:	ZNFD821
Model:	LGD821
Date of Issue:	Sep. 10, 2013
Test report No.:	HCTA1308FS04
Test Laboratory:	**HCT CO., LTD.** 74, Seoicheon-ro 578beon-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 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 : Yun-Jeang Heo Test Engineer of SAR Part Approved by : Jae-Sang So Manager of SAR Part

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Revision History

Rev.	Issue DATE	DESCRIPTION
-	Sep. 05, 2013	Initial Issue
1	Sep. 10, 2013	Page 6 was reviesd.

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 KDB Procedure, 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 D05 SAR for LTE Devices v02
- FCC KDB Publication 941225 D06 Hot Spot SAR v01
- FCC KDB Publication 248227 D01v01r(SAR Considerationa for 802.11 Devices)
- FCC KDB Publication 447498 D01v05 (General SAR Guidance)
- FCC KDB Publication 648474 D04 Handset SAR v01
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01
- FCC KDB Publication 865664 D02 SAR Reporting v01

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/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
FCC ID:	ZNFD821
Model:	LGD821
Trade Name	LG Electronics, MobileComm U.S.A., Inc.
Application Type	Certification
Mode(s) of Operation	GSM850/GSM1900 /WCDMA850/WCDMA 1700/WCDMA1900/LTE5/LTE7/802.11b/g/n/ac
Tx Frequency	824.20 - 848.80 MHz (GSM850) /1 850.20 – 1 909.80 MHz (GSM1900) 826.4 - 846.6 MHz (WCDMA850)/ 1712.4 – 1752.6 MHz (WCDMA 1700) / 1 852.4 – 1 907.6 MHz (WCDMA1900)/ 2 412- 2 462 MHz (802.11b/g/n) / 824.7 – 848.3 MHz (LTE 5)/ 2 502.5 – 2 567.5 (LTE 7)
Production Unit or Identical Prototype	Prototype

Max SAR

Band	Tx Frequency (MHz)	Equipment Class	Reported 1g SAR (W/kg)		
			Head	Body-worn	Hotspot
GSM850	824.2 - 848.8	PCE	0.55	0.57	0.58
GSM1900	1 850.2 -1 909.8	PCE	0.68	0.68	0.70
WCDMA 850	826.4 - 846.6	PCE	0.40	0.32	0.42
WCDMA 1700	1712.4 - 1752.6	PCE	0.69	0.94	1.09
WCDMA 1900	1 852.4 - 1 907.6	PCE	0.92	1.01	1.23
LTE 5	824.7 - 848.3	PCE	0.34	0.27	0.29
LTE 7	2 502.5 - 2 567.5	PCE	0.91	0.89	0.89
802.11b	2 412.0 - 2 462.0	DTS	0.54	0.10	0.11
802.11a	5 745 - 5 825	DTS	0.09	0.02	0.07
802.11a	5 180 - 5 240	UNII	0.19	0.01	
802.11a	5 260 - 5 320	UNII	0.21	0.01	
802.11a	5 500 - 5 700	UNII	0.09	0.05	
Bluetooth	2402 – 2480	DSS/DTS	-	-	-
Simultaneous SAR per KDB 690783 D01			1.46	1.11	1.30

Date(s) of Tests	Aug.20, 2013 ~ Sep.03, 2013
Antenna Type	Integral Antenna
GPRS	Multislot Class: 12 Mode Class : B
Key Feature(s)	This device supports Mobile Hotspot.

3.1 KDB 941225 LTE information

<table>
<tr><td>Frequency Range:</td><td>Band 5: 824.7 – 848.3 MHz
Band 7: 2 502.5 – 2 567.5 MHz</td></tr>
<tr><td>Channel Bandwidth:</td><td>Band 5: 1.4MHz, 3 MHz, 5 MHz, 10 MHz
Band 7: 5 MHz, 10 MHz, 15 MHZ, 20 MHz</td></tr>
<tr><td>Channel Number & Frequency:</td><td>
<table>
<tr><th colspan="8">Band 5</th></tr>
<tr><th colspan="2">1.4 MHz</th><th colspan="2">3 MHz</th><th colspan="2">5 MHz</th><th colspan="2">10 MHz</th></tr>
<tr><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th></tr>
<tr><td>20407</td><td>824.7</td><td>20415</td><td>825.5</td><td>20425</td><td>826.5</td><td>20450</td><td>829.0</td></tr>
<tr><td>20525</td><td>836.5</td><td>20525</td><td>836.5</td><td>20525</td><td>836.5</td><td>20525</td><td>836.5</td></tr>
<tr><td>20643</td><td>848.3</td><td>20635</td><td>847.5</td><td>20625</td><td>846.5</td><td>20600</td><td>844.0</td></tr>
</table>
<table>
<tr><th colspan="8">Band 7</th></tr>
<tr><th colspan="2">5 MHz</th><th colspan="2">10 MHz</th><th colspan="2">15 MHz</th><th colspan="2">20 MHz</th></tr>
<tr><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th><th>Ch.</th><th>Freq. (MHz)</th></tr>
<tr><td>20775</td><td>2502.5</td><td>20800</td><td>2505.0</td><td>20825</td><td>2507.5</td><td>20850</td><td>2510.0</td></tr>
<tr><td>21100</td><td>2535.0</td><td>21100</td><td>2535.0</td><td>21100</td><td>2535.0</td><td>21100</td><td>2535.0</td></tr>
<tr><td>21425</td><td>2567.5</td><td>21400</td><td>2565.0</td><td>21375</td><td>2562.5</td><td>21350</td><td>2560.0</td></tr>
</table>
</td></tr>
<tr><td>UE Category & Uplink</td><td>UE Category 3 QPSK, 16QAM</td></tr>
<tr><td>Description of the LTE Transmitter & antenna</td><td>This model have three Tx antennas.
-, Antenna 1 is for GSM850, WCDMA850 and LTE 5. It can not transmit simultaneously.
-, Antenna 2 is for GSM1900, WCDMA1700, WCDMA1900 and LTE 7 It can not transmit simultaneously
- Antenna 3 is for BT & WLAN. It can not transmit simultaneously.
Please find the section 12.</td></tr>
<tr><td>LTE voice/data requirements</td><td>Data Only,
LTE voice is available via VoIP. Considering the users may install 3rd party software to enable VoIP, LTE Head SAR is also evaluated.</td></tr>
<tr><td>Identify if MPR is optional or mendatory</td><td>The EUT incorporates MPR as per 3GPP TS36.101.
The MPR is permanently built-in by design as a mandatory.
A-MPR is not implemented.
During SAR testing, A-MPR was disabled by setting NS=01 on the R&S CMW500.</td></tr>
<tr><td>Maximum average (dBm)</td><td>See section 10.7 RF output power measurements in the SAR report.</td></tr>
<tr><td>Identify all other U.S. wireless operating modes, device</td><td>-. GSM850/GSM1900 /WCDMA850/WCDMA1700/WCDMA1900/LTE5/LTE7
: Head & Body SAR are required.
- Bluetooth 2.4 GHz: BT SAR is not required as maximum output power < 12 mW.
- WiFi 2.4 GHz & 5.8 GHz: Head/Body worn and Hotspot SAR is required.
- WiFi UNII 1,2,3: Head/Body worn.</td></tr>
<tr><td>Maximum average conducted output power for other wireless mode and frequency</td><td>See section 11 RF output power measurements in the SAR report.</td></tr>
<tr><td>Simultaneous</td><td>This device supports simultaneous transmission. Please find the section 15.</td></tr>
<tr><td>Power reduction</td><td>This device doesn't implements power reduction.</td></tr>
<tr><td>Description of the test</td><td>LTE SAR Testing was performed using a CMW500.</td></tr>
</table>

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.

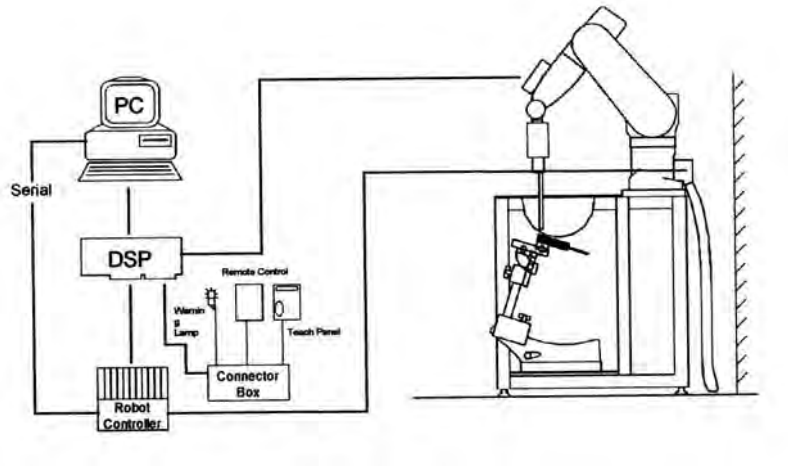


Figure 4.1 HCT SAR Lab. Test Measurement Set-up

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

Figure 4.1 Photograph of the probe and the Phantom

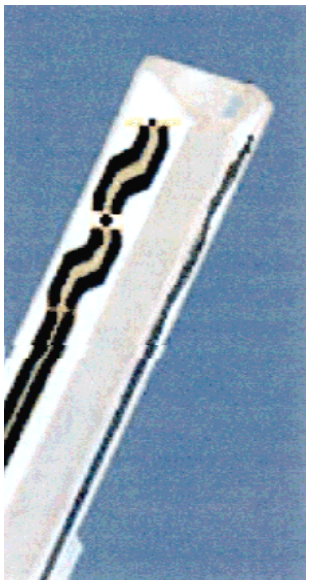


Figure 4.2 ET3DV6 E-field Probe

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.

4.2.1 EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors
	Built-in shielding against static charges
	PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air
	Conversion Factors (CF) for HSL 900 and HSL 1810
	Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis)
	± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm)
	Tip diameter: 3.9 mm (Body: 12 mm)
	Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz
	Dosimetry in strong gradient fields
	Compliance tests of mobile phones

Figure 4.3 Photograph of the probe and the Phantom

Figure 4.4 EX3DV4 E-field Probe

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

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)

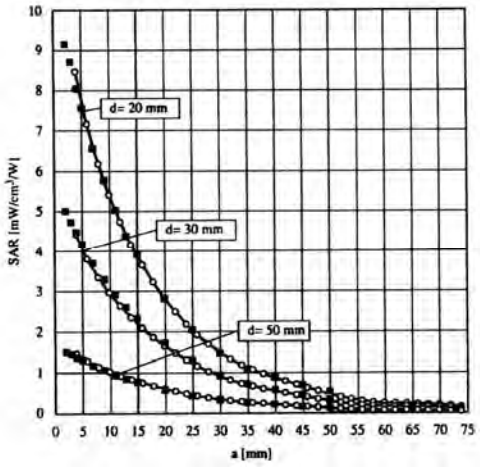


Figure 4.4 E-Field and Temperature measurements at 900 MHz

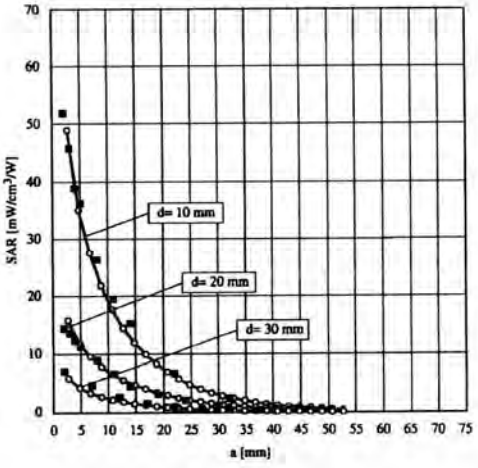


Figure 4.5 E-Field and temperature measurements at 1.8 GHz

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 Tissue Simulating Mixture Characterization

The mixture is characterized to obtain proper dielectric constant (permittivity) and conductivity of the tissue of interest. The tissue dielectric parameters recommended in IEEE 1528 and IEC 62209 have been used as targets for the compositions, and are to mach within 5%, per the FCC recommendations .

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	446	Jan. 16, 2013	Annual	Jan. 16, 2014
SPEAG	DAE3	466	Feb. 21, 2013	Annual	Feb. 21, 2014
SPEAG	DAE4	648	Apr. 24, 2013	Annual	Apr. 24, 2014
SPEAG	DAE4	652	Mar. 21, 2013	Annual	Mar. 21, 2014
SPEAG	DAE4	869	Sep. 18, 2012	Annual	Sep. 18, 2013
SPEAG	E-Field Probe ET3DV6	1630	Jan. 24, 2013	Annual	Jan. 24, 2014
SPEAG	E-Field Probe ET3DV6	1798	Apr. 29, 2013	Annual	Apr. 29, 2014
SPEAG	E-Field Probe EX3DV4	3797	Nov. 22, 2012	Annual	Nov. 22, 2013
SPEAG	E-Field Probe EX3DV4	3863	July. 29, 2013	Annual	July. 29, 2014
SPEAG	E-Field Probe EX3DV4	3903	Mar. 18, 2013	Annual	Mar. 18, 2014
SPEAG	Dipole D835V2	441	Apr. 25, 2013	Annual	Apr. 25, 2014
SPEAG	Dipole D1800V2	2d007	Mar. 19, 2013	Annual	Mar. 19, 2014
SPEAG	Dipole D1900V2	5d038	May. 29, 2013	Annual	May. 29, 2014
SPEAG	Dipole D2450V2	743	Aug. 23, 2012	Annual	Aug. 23, 2013
SPEAG	Dipole D2600V2	1015	May. 02, 2013	Annual	May. 02, 2014
SPEAG	Dipole D5GHzV2	1107	Feb. 21, 2013	Annual	Feb. 21, 2014
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 778D	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 ANALYZER	MY51110020	Apr. 25, 2013	Annual	Apr. 25, 2014
TESCOM	TC-3000C / BLUETOOTH TESTER	3000C000276	Apr. 24, 2013	Annual	Apr. 24, 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.

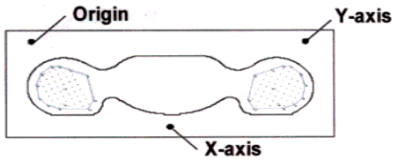


Figure 5.1 SAR Measurement Point in Area Scan

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.

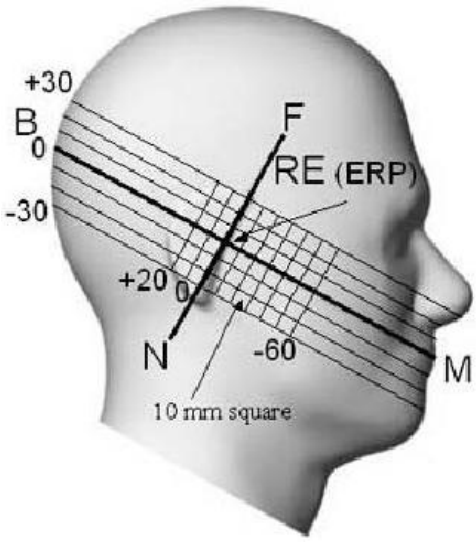


Figure 6.1 Side view of the phantom

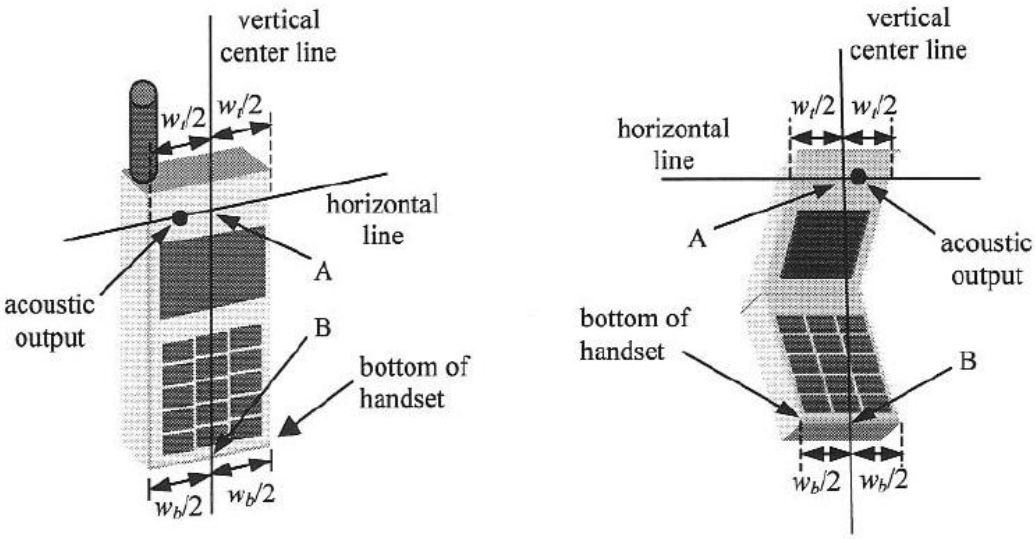


Figure 6.2 Handset vertical and horizontal reference lines

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- 2700 MHz)

Error Description	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	v_{eff}
1. Measurement System						
Probe Calibration	6.55	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					11.43	
Coverage Factor for 95 %					*k*=2	
Expanded STD Uncertainty					22.86	

Table 7.2 Uncertainty (5000-5900 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
7	1630	ET3DV6	Head	835	441	May.06,2013	42.01	0.92	PASS	PASS	PASS	GMSK	PASS	N/A
6	1798	ET3DV6	Head	835	441	May.06,2013	42.01	0.92	PASS	PASS	PASS	GMSK	PASS	N/A
5	3903	EX3DV4	Head	1800	2d007	Apr.1,2013	41.2	1.41	PASS	PASS	PASS	N/A	N/A	N/A
5	3903	EX3DV4	Head	1900	5d032	Aug.07,2013	39.8	1.4	PASS	PASS	PASS	GMSK	PASS	N/A
5	3903	EX3DV4	Body	5200	1107	Apr.5,2013	50.14	5.44	PASS	PASS	PASS	OFDM	N/A	PASS
5	3903	EX3DV4	Body	5300	1107	Apr.5,2013	49.52	5.51	PASS	PASS	PASS	OFDM	N/A	PASS
5	3903	EX3DV4	Body	5500	1107	Apr.5,2013	49.15	5.65	PASS	PASS	PASS	OFDM	N/A	PASS
5	3903	EX3DV4	Body	5600	1107	Apr.5,2013	48.84	5.93	PASS	PASS	PASS	OFDM	N/A	PASS
5	3903	EX3DV4	Body	5800	1107	Apr.5,2013	48.26	6.21	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Head	1800	2d007	Apr.1,2013	41.2	1.41	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Body	1900	5d032	Aug.08,2013	51.8	1.54	PASS	PASS	PASS	GMSK	PASS	N/A
3	3797	EX3DV4	Body	2450	743	Dec.21,2012	52.9	1.96	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Head	2600	1015	May.13,2013	38.3	1.97	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Body	2600	1015	May.13,2013	53.4	2.11	PASS	PASS	PASS	N/A	N/A	N/A
1	3863	EX3DV4	Head	2450	743	Aug.07,2013	38.4	1.81	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5200	1107	Aug.09,2013	36.7	4.69	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5300	1107	Aug.09,2013	36.48	4.78	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5500	1107	Aug.09,2013	35.9	5.12	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5600	1107	Aug.09,2013	35.55	5.11	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5800	1107	Aug.09,2013	35.2	5.28	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 865664 D01v01r01. 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	Aug. 20, 2013	1630	441	Head	20.6	εr	41.5	40.4	- 2.65	± 5
						σ	0.90	0.919	+ 2.11	± 5
835	Aug. 21, 2013	1798		Body	20.4	εr	55.2	56.8	+ 2.90	± 5
						σ	0.97	0.983	+ 1.34	± 5
1 800	Aug. 22, 2013	3903	2d007	Head	20.5	εr	40.0	41.9	+ 4.75	± 5
						σ	1.40	1.40	+ 0.00	± 5
1 800	Aug. 23, 2013	3797		Body	20.2	εr	53.3	52.9	- 0.75	± 5
						σ	1.52	1.56	+ 2.63	± 5
1 900	Aug. 27, 2013	3903	5d032	Head	20.2	εr	40.0	39.7	- 0.75	± 5
						σ	1.40	1.41	+ 0.71	± 5
1 900	Aug. 28, 2013	3797		Body	20.3	εr	53.3	55.3	+ 3.75	± 5
						σ	1.52	1.48	- 2.63	± 5
2 450	Sep. 03, 2013	3863	743	Head	20.4	εr	39.2	39.4	+ 0.51	± 5
						σ	1.80	1.81	+ 0.56	± 5
2 450	Sep. 02, 2013	3797		Body	20.4	εr	52.7	51.7	- 1.90	± 5
						σ	1.95	1.96	+ 0.51	± 5
2 600	Aug. 30, 2013	3797	1015	Head	20.5	εr	39.0	40.1	+ 2.82	± 5
						σ	1.96	2.0	+ 2.04	± 5
2 600	Aug. 31, 2013	3797		Body	20.0	εr	52.51	51.3	- 2.30	± 5
						σ	2.16	2.17	+ 0.46	± 5
5 200	Sep. 03, 2013	3863	1107	Head	20.1	ε_r	36	36.1	+ 0.28	± 5
						σ	4.66	4.53	- 2.79	± 5
5 300	Sep. 03, 2013	3863		Head	20.1	ε_r	35.9	35.8	- 0.28	± 5
						σ	4.76	4.67	- 1.89	± 5
5 600	Sep. 03, 2013	3863		Head	20.1	ε_r	35.5	35.1	- 1.13	± 5
						σ	5.07	4.99	- 1.58	± 5
5 800	Sep. 03, 2013	3863		Head	20.1	ε_r	35.3	34.5	- 2.27	± 5
						σ	5.27	5.26	- 0.19	± 5
5 200	Sep. 03, 2013	3903		Body	20.1	ε_r	49.01	47.8	- 2.47	± 5
						σ	5.3	5.22	- 1.51	± 5
5 300	Sep. 03, 2013	3903		Body	20.1	ε_r	48.85	47.4	- 2.97	± 5
						σ	5.42	5.39	- 0.55	± 5
5 600	Sep. 03, 2013	3903		Body	20.1	ε_r	48.44	47.0	- 2.97	± 5
						σ	5.77	5.71	- 1.04	± 5
5 800	Sep. 03, 2013	3903		Body	20.1	ε_r	48.2	46.6	- 3.32	± 5
						σ	6.00	6.10	+ 1.67	± 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 750 MHz/835 MHz /1 700 MHz/1 900 MHz/ 2 450MHz / 2 600 MHz/ 5 200 MHz/ 5 300 MHz/ 5 600 MHz/ 5 800 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	Aug. 20, 2013	1630	441	Head	20.8	20.6	9.68	0.967	9.67	- 0.10	± 10
835	Aug. 21, 2013	1798		Body	20.6	20.4	9.69	0.960	9.6	- 0.93	± 10
1 800	Aug. 22, 2013	3903	2d007	Head	20.7	20.5	38.9	3.57	35.7	- 8.23	± 10
1 800	Aug. 23, 2013	3797		Body	20.4	20.2	38.4	3.94	39.4	+ 2.60	± 10
1 900	Aug. 27, 2013	3903	5d032	Head	20.4	20.2	40.1	4.25	42.5	+ 5.99	± 10
1 900	Aug. 28, 2013	3797		Body	20.5	20.3	40.5	4.20	42	+ 3.70	± 10
2 450	Sep. 03, 2013	3863	743	Head	20.6	20.4	52.7	5.51	55.1	+ 4.55	± 10
2 450	Sep. 02, 2013	3797		Body	20.6	20.4	51.2	5.20	52	+ 1.56	± 10
2 600	Aug. 30, 2013	3797	1015	Head	20.7	20.5	57.8	5.74	57.4	- 0.69	± 10
2 600	Aug. 31, 2013	3797		Body	20.2	20.0	57.1	5.75	57.5	+ 0.70	± 10
5 200	Sep. 03, 2013	3863	1107	Head	20.3	20.1	80.1	8.12	81.2	+ 1.37	± 10
5 300	Sep. 03, 2013	3863		Head	20.3	20.1	81.0	8.29	82.9	+ 2.35	± 10
5 600	Sep. 03, 2013	3863		Head	20.3	20.1	84.4	8.28	82.8	- 1.90	± 10
5 800	Sep. 03, 2013	3863		Head	20.3	20.1	78.3	7.95	79.5	+ 1.53	± 10
5 200	Sep. 03, 2013	3903		Body	20.3	20.1	74.3	7.32	73.2	- 1.48	± 10
5 300	Sep. 03, 2013	3903		Body	20.3	20.1	76.0	7.56	75.6	- 0.53	± 10
5 600	Sep. 03, 2013	3903		Body	20.3	20.1	81.0	8.03	80.3	- 0.86	± 10
5 800	Sep. 03, 2013	3903		Body	20.3	20.1	74.3	7.67	76.7	+ 3.23	± 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 : 32.7 dBm	Target Power : 30.2 dBm
GPRS850	PCS1900
GPRS 1tx : 32.7 dBm/ EGPRS 1tx : 27.2 dBm	GPRS 1tx : 30.2 dBm/ EGPRS 1tx : 25.7 dBm
GPRS 2tx : 31.7 dBm/ EGPRS 2tx : 26.2 dBm	GPRS 2tx : 29.2 dBm/ EGPRS 2tx : 24.7 dBm
GPRS 3tx : 29.7 dBm/ EGPRS 3tx : 25.2 dBm	GPRS 3tx : 27.2 dBm/ EGPRS 3tx : 23.7 dBm
GPRS 4tx : 27.7 dBm/ EGPRS 4tx : 24.2 dBm	GPRS 4tx : 25.2 dBm/ EGPRS 4tx : 22.7 dBm
Tune-up Tolerance : -1.5 dB/ +0.5 dB	

WCDMA

WCDMA850	WCDMA1900
Target Power : 23.7 dBm	Target Power : 24.2 dBm
WCDMA1700	
Target Power : 24.2 dBm	
Tune-up Tolerance : -1.5 dB/ +0.5 dB / MPR Tolerance : -1 dB/ + 1 dB	

LTE

LTE Band 5	LTE Band 7
Target Power : 23.2 dBm	Target Power : 22.2 dBm
Tune-up Tolerance : -1.5 dB/ +0.5 dB	

Wifi

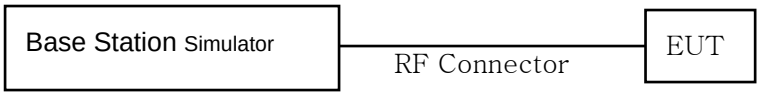
	Mode / Band		Average Power
WIFI	802.11b (2.4GHz)	Maximum	16.5 dBm
		Nominal	15.5 dBm
	802.11g (2.4GHz)	Maximum	10.5 dBm
		Nominal	9.5 dBm
	802.11n (2.4GHz)	Maximum	9.5 dBm
		Nominal	8.5 dBm
	802.11ac (2.4GHz)	Maximum	10.5 dBm
		Nominal	9.5 dBm
	802.11a (5GHz)	Maximum	12.0 dBm
		Nominal	11.0 dBm
	802.11n (5GHz 20MHz)	Maximum	10.5 dBm
		Nominal	9.5 dBm
	802.11n (5GHz 40MHz)	Maximum	10.0 dBm
		Nominal	9.0 dBm
	802.11ac (5GHz 20MHz)	Maximum	10.5 dBm
		Nominal	9.5 dBm
	802.11ac (5GHz 40MHz)	Maximum	10.0 dBm
		Nominal	9.0 dBm
	802.11ac (5GHz 80MHz)	Maximum	10.0 dBm
		Nominal	9.0 dBm

BT.

	Mode/ Band		Average Power
Bluetooth	1 Mbps (GFSK)	Maximum	10 dBm
		Nominal	9 dBm
	2 Mbps (DPSK)	Maximum	7 dBm
		Nominal	6 dBm
	3 Mbps (8DPSK)	Maximum	7 dBm
		Nominal	6 dBm
	LE	Maximum	7 dBm
		Nominal	6 dBm

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.

GSM Conducted output powers (Burst-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
GSM 850	128	32.60	32.63	31.87	29.41	27.42	26.41	26.26	25.17	24.06
	190	32.65	32.7	31.51	29.4	27.29	26.07	25.96	24.86	23.85
	251	32.63	32.67	31.56	29.3	27.3	26.13	26.03	24.98	23.88
GSM 1900	512	29.9	30.01	29.04	27.2	25.13	25.24	25.0	23.9	22.84
	661	29.93	29.92	29.0	27.2	25.1	25.0	24.7	23.7	22.7
	810	30.03	30.06	29.1	27.2	25.05	25.1	24.85	23.83	22.79

GSM Conducted output powers (Frame-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
GSM 850	128	23.57	23.6	25.85	25.15	24.41	17.38	20.24	20.91	21.05
	190	23.62	23.67	25.49	25.14	24.28	17.04	19.94	20.6	20.84
	251	23.6	23.64	25.54	25.04	24.29	17.1	20.01	20.72	20.87
GSM 1900	512	20.87	20.98	23.02	22.94	22.12	16.21	18.98	19.64	19.83
	661	20.9	20.89	22.98	22.94	22.09	15.97	18.68	19.44	19.69
	810	21.0	21.03	23.08	22.94	22.04	16.07	18.83	19.57	19.78

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

11.2 WCDMA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

11.2.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3 GPP TS 34.121, using the appropriate RMC or AMR with TPC(transmit power control) set to all “1s”.

11.2.2 Head SAR Measurements

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all “1s”. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than ¼ dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer using the exposure configuration that results in the highest SAR for that RF channel in 12.2 RMC.

11.2.3 Body SAR Measurement

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”.

11.2.4 Handsets with Release 5 HSDPA

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

Sub-Test 1 Setup for Release 5 HSDPA

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM (dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

11.2.5 Handsets with Release 6 HSPA (HSDPA/HSUPA)

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.1 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurement should be used to test for head exposure.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

WCDMA 850

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm] UL 4132 (826.4) DL 4357	Power reduction (dB)	UL 4183 (836.6) DL 4408	Power reduction (dB)	UL 4233 (846.6) DL 4458	Power reduction (dB)	MPR
99	WCDMA	12.2 kbps RMC	23.85		23.99		24.4		
99	WCDMA	12.2 kbps AMR	23.83		23.96		24.02		
5	HSDPA	Subtest 1	23.78	0.08	23.89	0.19	23.95	0.25	0
5		Subtest 2	23.76	0.06	23.87	0.17	23.94	0.24	0
5		Subtest 3	23.3	-0.4	23.35	-0.35	23.51	-0.19	-0.5
5		Subtest 4	23.26	-0.44	23.37	-0.33	23.5	-0.2	-0.5
6	HSUPA	Subtest 1	23.27	-0.43	23.06	-0.64	23.81	0.11	0
6		Subtest 2	22.17	-1.53	22.05	-1.65	21.89	-1.81	-2
6		Subtest 3	22.25	-1.45	22.4	-1.3	22.78	-0.92	-1
6		Subtest 4	22.19	-1.51	22.18	-1.52	22.20	-1.50	-2
6		Subtest 5	23.59	-0.11	23.5	-0.2	23.7	0	0
8	DC-HSDPA	Subtest 1	23.56	-0.14	23.72	0.02	23.93	0.23	0
8		Subtest 2	23.55	-0.15	23.67	-0.03	23.82	0.12	0
8		Subtest 3	23.29	-0.41	23.42	-0.28	23.61	-0.09	-0.5
8		Subtest 4	23.27	-0.43	23.35	-0.35	23.52	-0.18	-0.5

WCDMA 1700

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm] UL 1312 (1712.4) DL 1537	Power reduction (dB	UL 1412 (1732.4) DL 1637	Power reduction (dB)	UL 1512 (1752.6) DL 1737	Power reduction (dB)	MPR
99	WCDMA	12.2 kbps RMC	24.48		24.38		24.36		-
99	WCDMA	12.2 kbps AMR	24.47		24.35		24.33		
5	HSDPA	Subtest 1	24.39	0.19	24.3	0.1	24.25	0.05	0
5		Subtest 2	24.37	0.17	24.32	0.12	24.24	0.04	0
5		Subtest 3	23.93	-0.27	23.84	-0.36	23.74	-0.46	-0.5
5		Subtest 4	23.91	-0.29	23.8	-0.4	23.76	-0.44	-0.5
6	HSUPA	Subtest 1	23.86	-0.34	23.8	-0.4	23.78	-0.42	0
6		Subtest 2	22.24	-1.96	22.43	-1.77	22.15	-2.05	-2
6		Subtest 3	23.36	-0.84	22.86	-1.34	22.9	-1.3	-1
6		Subtest 4	22.67	-1.53	22.6	-1.6	22.59	-1.61	-2
6		Subtest 5	23.93	-0.27	24.08	-0.12	23.74	-0.46	0
8	DC-HSDPA	Subtest 1	24.20	0	24.11	-0.09	24.05	-0.15	0
8		Subtest 2	24.15	-0.05	24.06	-0.14	24.02	-0.18	0
8		Subtest 3	23.84	-0.36	23.74	-0.46	23.66	-0.54	-0.5
8		Subtest 4	23.78	-0.42	23.69	-0.51	23.58	-0.62	-0.5

WCDMA 1900

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm] UL 9262 (1852.4) DL 9662	Power reduction (dB	UL 9400 (1880.0) DL 9800	Power reduction (dB)	UL 9538 (1907.6) DL 9938	Power reduction (dB)	MPR
99	WCDMA	12.2 kbps RMC	24.23		24.15		24.37		-
99	WCDMA	12.2 kbps AMR	24.22		24.15		24.36		
5	HSDPA	Subtest 1	24.33	0.13	24.31	0.11	24.39	0.19	24.33
5		Subtest 2	24.34	0.14	24.35	0.15	24.37	0.17	24.34
5		Subtest 3	23.83	-0.37	23.74	-0.46	23.91	-0.29	23.83
5		Subtest 4	23.76	-0.44	23.79	-0.41	23.93	-0.27	23.76
6	HSUPA	Subtest 1	23.74	-0.46	23.88	-0.32	23.77	-0.43	23.74
6		Subtest 2	22.61	-1.59	22.28	-1.92	22.76	-1.44	22.61
6		Subtest 3	22.75	-1.45	22.95	-1.25	22.85	-1.35	22.75
6		Subtest 4	22.69	-1.51	22.57	-1.63	22.68	-1.52	22.69
6		Subtest 5	23.72	-0.48	23.84	-0.36	23.79	-0.41	23.72
8	DC-HSDPA	Subtest 1	23.96	-0.24	23.81	-0.39	24.05	-0.15	0
8		Subtest 2	23.92	-0.28	23.76	-0.44	24.02	-0.18	0
8		Subtest 3	23.79	-0.41	23.67	-0.53	23.81	-0.39	-0.5
8		Subtest 4	23.72	-0.48	23.63	-0.57	23.74	-0.46	-0.5

WCDMA Average Conducted output powers

11.3 LTE

SAR testing was performed according to the FCC KDB 941225 D05v02 publication.
This DUT is developed base on MPR. The MPR is mandatory.
The device will not operate with any other MPR setting than that stated in the table as indicated.
SAR Testing was performed using a CMW500. UE transmits with Maximum output power during SAR testing.
A-MPR has been disabled for all SAR tests by setting NS=01 on the R&S CMW500.

Note;

The EUT enables maximum power reduction in accordance with 3GPP 36.101. The MPR settings are configured during the manufacture process and are not configurable by the network, carrier, or end user.

LTE Band 5

LTE Band 5 Conducted Power – 1.4 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
1.4MHz	20407	824.7	QPSK	1	0	23.66	0
				1	3	23.51	0
				1	5	23.48	0
				3	0	23.54	0
				3	1	23.46	0
				3	3	23.52	0
				6	0	22.48	1
			16QAM	1	0	22.48	1
				1	3	22.41	1
				1	5	22.44	1
				3	0	22.38	2
				3	1	22.37	2
				3	3	22.35	2
				6	0	21.42	2
1.4MHz	20525	836.5	QPSK	1	0	23.56	0
				1	3	23.58	0
				1	5	23.59	0
				3	0	23.60	0
				3	1	23.59	0
				3	3	23.58	0
				6	0	22.6	1
			16QAM	1	0	22.44	1
				1	3	22.44	1
				1	5	22.50	1
				3	0	22.46	2
				3	1	22.43	2
				3	3	22.39	2
				6	0	21.55	2
1.4MHz	20643	848.3	QPSK	1	0	23.46	0
				1	3	23.44	0
				1	5	23.46	0
				3	0	23.42	0
				3	1	23.43	0
				3	3	23.42	0
				6	0	22.45	1
			16QAM	1	0	22.34	1
				1	3	22.32	1
				1	5	22.38	2
				3	0	22.37	2
				3	1	22.33	2
				3	3	22.32	2
				6	0	21.43	2

LTE Band 5 Conducted Power – 3 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
3MHz	20415	825.5	QPSK	1	0	23.58	0
				1	7	23.41	0
				1	14	23.5	0
				8	0	22.41	1
				8	3	22.33	1
				8	7	22.33	1
				15	0	22.29	1
			16QAM	1	0	22.62	1
				1	7	22.33	1
				1	14	22.43	1
				8	0	21.40	2
				8	3	21.33	2
				8	7	21.31	2
				15	0	21.36	2
3MHz	20525	836.5	QPSK	1	0	23.44	0
				1	7	23.59	0
				1	14	23.58	0
				8	0	22.44	1
				8	3	22.49	1
				8	7	22.52	1
				15	0	22.39	1
			16QAM	1	0	22.43	1
				1	7	22.49	1
				1	14	22.55	1
				8	0	21.41	2
				8	3	21.55	2
				8	7	21.50	2
				15	0	21.41	2
3MHz	20635	847.5	QPSK	1	0	23.50	0
				1	7	23.46	0
				1	14	23.43	0
				8	0	22.41	1
				8	3	22.37	1
				8	7	22.44	1
				15	0	22.28	1
			16QAM	1	0	22.46	1
				1	7	22.37	1
				1	14	22.40	1
				8	0	21.41	2
				8	3	21.42	2
				8	7	21.46	2
				15	0	21.44	2

LTE Band 5 Conducted Power – 5 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
5 MHz	20425	826.5	QPSK	1	0	23.60	0
				1	12	23.54	0
				1	24	23.57	0
				12	0	22.25	1
				12	6	22.40	1
				12	11	22.40	1
				25	0	22.25	1
			16QAM	1	0	22.42	1
				1	12	22.39	1
				1	24	22.41	1
				12	0	21.49	2
				12	6	21.54	2
				12	11	21.56	2
				25	0	21.31	2
5 MHz	20525	836.5	QPSK	1	0	23.53	0
				1	12	23.55	0
				1	24	23.58	0
				12	0	22.38	1
				12	6	22.42	1
				12	11	22.49	1
				25	0	22.24	1
			16QAM	1	0	22.39	1
				1	12	22.42	1
				1	24	22.47	1
				12	0	21.50	2
				12	6	21.50	2
				12	11	21.62	2
				25	0	21.24	2
5 MHz	20625	846.5	QPSK	1	0	23.51	0
				1	12	23.54	0
				1	24	23.46	0
				12	0	22.47	1
				12	6	22.43	1
				12	11	22.40	1
				25	0	22.25	1
			16QAM	1	0	22.35	1
				1	12	22.36	1
				1	24	22.32	1
				12	0	21.63	2
				12	6	21.51	2
				12	11	21.54	2
				25	0	21.26	2

LTE Band 5 Conducted Power – 10 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
10MHz	20450	829	QPSK	1	0	23.52	0
				1	24	23.54	0
				1	49	23.52	0
				25	0	22.23	1
				25	12	22.26	1
				12	24	22.21	1
				50	0	22.02	1
			16QAM	1	0	22.41	1
				1	24	22.35	1
				1	49	22.44	1
				25	0	21.34	2
				25	12	21.34	2
				25	24	21.31	2
				50	0	21.05	2
10MHz	20525	836.5	QPSK	1	0	23.47	0
				1	24	23.60	0
				1	49	23.47	0
				25	0	22.20	1
				25	12	22.26	1
				25	24	22.26	1
				50	0	22.08	1
			16QAM	1	0	22.36	1
				1	24	22.39	1
				1	49	22.35	1
				25	0	21.24	2
				25	12	21.34	2
				25	24	21.35	2
				50	0	21.08	2
10MHz	20600	844	QPSK	1	0	23.42	0
				1	24	23.51	0
				1	49	23.49	0
				25	0	22.25	1
				25	12	22.29	1
				25	24	22.25	1
				50	0	22.14	1
			16QAM	1	0	22.30	1
				1	24	22.39	1
				1	49	22.39	1
				25	0	21.37	2
				25	12	21.39	2
				25	24	21.36	2
				50	0	21.19	2

LTE Band 7

LTE Band 7 Conducted Power – 5 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
5 MHz	20775	2502.5	QPSK	1	0	22.6	0
				1	12	22.5	0
				1	24	22.6	0
				12	0	21	1
				12	6	21.1	1
				12	11	21	1
				25	0	21	1
			16QAM	1	0	21.5	1
				1	12	21.4	1
				1	24	21.6	1
				12	0	20.2	2
				12	6	20.1	2
				12	11	20.2	2
				25	0	20.3	2
5 MHz	21100	2535	QPSK	1	0	22.6	0
				1	12	22.7	0
				1	24	22.7	0
				12	0	21.2	1
				12	6	21.4	1
				12	11	21.3	1
				25	0	21.3	1
			16QAM	1	0	21.6	1
				1	12	21.7	1
				1	24	21.7	1
				12	0	20.3	2
				12	6	20.4	2
				12	11	20.4	2
				25	0	20.3	2
5 MHz	21425	2567.5	QPSK	1	0	22.7	0
				1	12	22.7	0
				1	24	22.7	0
				12	0	21.4	1
				12	6	21.4	1
				12	11	21.3	1
				25	0	21.4	1
			16QAM	1	0	21.7	1
				1	12	21.7	1
				1	24	21.7	1
				12	0	20.6	2
				12	6	20.5	2
				12	11	20.5	2
				25	0	20.4	2

LTE Band 7 Conducted Power – 10 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
10MHz	20800	2505	QPSK	1	0	22.6	0
				1	24	22.7	0
				1	49	22.7	0
				25	0	21.2	1
				25	12	21.1	1
				25	24	21.3	1
				50	0	21.2	1
			16QAM	1	0	21.5	1
				1	24	21.6	1
				1	49	21.7	1
				25	0	20.2	2
				25	12	20.3	2
				25	24	20.4	2
				50	0	20.2	2
10MHz	21100	2535	QPSK	1	0	22.7	0
				1	12	22.7	0
				1	24	22.7	0
				25	0	21.3	1
				25	12	21.3	1
				25	24	21.3	1
				50	0	21.2	1
			16QAM	1	0	21.7	1
				1	24	21.7	1
				1	49	21.6	1
				25	0	20.3	2
				25	12	20.4	2
				25	24	20.4	2
				50	0	20.2	2
10MHz	21400	2565	QPSK	1	0	22.6	0
				1	24	22.7	0
				1	49	22.7	0
				25	0	21.2	1
				25	12	21.4	1
				25	24	21.4	1
				50	0	21.3	1
			16QAM	1	0	21.7	1
				1	24	21.7	1
				1	49	21.7	1
				25	0	20.5	2
				25	12	20.4	2
				25	24	20.5	2
				50	0	20.3	2

LTE Band 7 Conducted Power – 15 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
15MHz	20825	2507.5	QPSK	1	0	22.5	0
				1	37	22.7	0
				1	74	22.7	0
				36	0	21.1	1
				36	18	21.2	1
				36	38	21.2	1
				75	0	21.1	1
			16QAM	1	0	21.5	1
				1	37	21.7	1
				1	74	21.7	1
				36	0	20.1	2
				36	18	20.2	2
				36	38	20.2	2
				75	0	20.1	2
15MHz	21100	2535	QPSK	1	0	22.7	0
				1	37	22.7	0
				1	74	22.7	0
				36	0	21.2	1
				36	18	21.1	1
				36	38	21.2	1
				75	0	21.1	1
			16QAM	1	0	21.7	1
				1	37	21.7	1
				1	74	21.7	1
				36	0	20.1	2
				36	18	20.1	2
				36	38	20.1	2
				75	0	20.1	2
15MHz	21375	2562.5	QPSK	1	0	22.7	0
				1	37	22.7	0
				1	74	22.7	0
				36	0	21.2	1
				36	18	21.2	1
				36	38	21.2	1
				75	0	21.2	1
			16QAM	1	0	21.7	1
				1	37	21.7	1
				1	74	21.7	1
				36	0	20.2	2
				36	18	20.1	2
				36	38	20.3	2
				75	0	20.1	2

LTE Band 7 Conducted Power – 20 MHZ Bandwidth

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)
20MHz	20850	2510	QPSK	1	0	22.4	0
				1	49	22.7	0
				1	99	22.6	0
				50	0	21.3	1
				50	25	21.2	1
				50	49	21.1	1
				100	0	21.1	1
			16QAM	1	0	21.5	1
				1	49	21.7	1
				1	99	21.6	1
				50	0	20.1	2
				50	25	20.2	2
				50	49	20.3	2
				100	0	20.2	2
20MHz	21100	2535	QPSK	1	0	22.6	0
				1	49	22.7	0
				1	99	22.6	0
				50	0	21.1	1
				50	25	21.1	1
				50	49	21.1	1
				100	0	21.1	1
			16QAM	1	0	21.6	1
				1	49	21.6	1
				1	99	21.7	1
				50	0	20.1	2
				50	25	20.0	2
				50	49	20.1	2
				100	0	20.2	2
20MHz	21350	2560	QPSK	1	0	22.6	0
				1	49	22.6	0
				1	99	22.7	0
				50	0	21.1	1
				50	25	21.2	1
				50	49	21.1	1
				100	0	21.2	1
			16QAM	1	0	21.6	1
				1	49	21.4	1
				1	99	21.7	1
				50	0	20.2	2
				50	25	20.0	2
				50	49	20.2	2
				100	0	20.2	2

11.4 WiFi

11.4.1 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	1 Mbps	15.21	30
		2 Mbps	15.22	30
		5.5 Mbps	15.23	30
		11 Mbps	15.35	30
2437	6	1 Mbps	16.05	30
		2 Mbps	16.26	30
		5.5 Mbps	16.13	30
		11 Mbps	16.15	30
2462	11	1 Mbps	15.84	30
		2 Mbps	15.99	30
		5.5 Mbps	15.84	30
		11 Mbps	15.90	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	8.80	30
		9 Mbps	9.00	30
		12 Mbps	9.09	30
		18 Mbps	8.92	30
		24 Mbps	9.15	30
		36 Mbps	8.88	30
		48 Mbps	9.08	30
		54 Mbps	8.80	30
2437	6	6 Mbps	9.59	30
		9 Mbps	9.68	30
		12 Mbps	9.69	30
		18 Mbps	9.80	30
		24 Mbps	9.68	30
		36 Mbps	9.74	30
		48 Mbps	9.65	30
		54 Mbps	9.52	30
2462	11	6 Mbps	9.31	30
		9 Mbps	9.35	30
		12 Mbps	9.44	30
		18 Mbps	9.46	30
		24 Mbps	9.36	30
		36 Mbps	9.41	30
		48 Mbps	9.51	30
		54 Mbps	9.48	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	7.74	30
		13 Mbps	7.82	30
		19.5 Mbps	7.84	30
		26 Mbps	7.68	30
		39 Mbps	7.73	30
		52 Mbps	7.78	30
		58.5 Mbps	7.84	30
		65 Mbps	7.79	30
2437	6	6.5 Mbps	8.45	30
		13 Mbps	8.53	30
		19.5 Mbps	8.48	30
		26 Mbps	8.29	30
		39 Mbps	8.34	30
		52 Mbps	8.40	30
		58.5 Mbps	8.45	30
		65 Mbps	8.47	30
2462	11	6.5 Mbps	8.13	30
		13 Mbps	8.19	30
		19.5 Mbps	8.20	30
		26 Mbps	8.18	30
		39 Mbps	8.31	30
		52 Mbps	8.13	30
		58.5 Mbps	8.14	30
		65 Mbps	8.21	30

Note;
SAR testing was performed according to the FCC KDB 248227D01

Conducted Output Power Measurements (802.11ac Mode)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
2412	1	6.5 Mbps	8.67	30
		13 Mbps	8.97	30
		19.5 Mbps	8.99	30
		26 Mbps	9.07	30
		39 Mbps	9.03	30
		52 Mbps	8.76	30
		58.5 Mbps	8.88	30
		65 Mbps	8.82	30
		78 Mbps	8.94	30
2437	6	6.5 Mbps	9.53	30
		13 Mbps	9.45	30
		19.5 Mbps	9.50	30
		26 Mbps	9.62	30
		39 Mbps	9.63	30
		52 Mbps	9.66	30
		58.5 Mbps	9.46	30
		65 Mbps	9.77	30
		78 Mbps	9.74	30
2462	11	6.5 Mbps	9.34	30
		13 Mbps	9.38	30
		19.5 Mbps	9.40	30
		26 Mbps	9.23	30
		39 Mbps	9.33	30
		52 Mbps	9.41	30
		58.5 Mbps	9.46	30
		65 Mbps	9.54	30
		78 Mbps	9.51	30

Conducted Output Power Measurements (802.11a Mode: 5180~5240)

802.11a Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5180	36	6 Mbps	10.31	16.86
		9 Mbps	10.38	16.86
		12 Mbps	10.47	16.86
		18 Mbps	10.41	16.86
		24 Mbps	10.39	16.86
		36 Mbps	10.22	16.86
		48 Mbps	10.35	16.86
		54 Mbps	10.23	16.86
5200	40	6 Mbps	10.47	16.86
		9 Mbps	10.41	16.86
		12 Mbps	10.45	16.86
		18 Mbps	10.45	16.86
		24 Mbps	10.42	16.86
		36 Mbps	10.46	16.86
		48 Mbps	10.65	16.86
		54 Mbps	10.53	16.86
5220	44	6 Mbps	10.20	16.86
		9 Mbps	10.25	16.86
		12 Mbps	10.17	16.86
		18 Mbps	10.21	16.86
		24 Mbps	10.23	16.86
		36 Mbps	10.17	16.86
		48 Mbps	10.32	16.86
		54 Mbps	10.16	16.86
5240	48	6 Mbps	10.56	16.86
		9 Mbps	10.70	16.86
		12 Mbps	10.60	16.86
		18 Mbps	10.61	16.86
		24 Mbps	10.59	16.86
		36 Mbps	10.59	16.86
		48 Mbps	10.68	16.86
		54 Mbps	10.59	16.86

Conducted Output Power Measurements (802.11a Mode: 5260~5320)

802.11a Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5260	52	6 Mbps	9.83	23.84
		9 Mbps	9.81	23.84
		12 Mbps	9.84	23.84
		18 Mbps	9.83	23.84
		24 Mbps	9.71	23.84
		36 Mbps	9.71	23.84
		48 Mbps	9.85	23.84
		54 Mbps	9.76	23.84
5280	56	6 Mbps	9.52	23.84
		9 Mbps	9.62	23.84
		12 Mbps	9.50	23.84
		18 Mbps	9.51	23.84
		24 Mbps	9.40	23.84
		36 Mbps	9.37	23.84
		48 Mbps	9.57	23.84
		54 Mbps	9.47	23.84
5300	60	6 Mbps	9.65	23.84
		9 Mbps	9.63	23.84
		12 Mbps	9.76	23.84
		18 Mbps	9.73	23.84
		24 Mbps	9.74	23.84
		36 Mbps	9.61	23.84
		48 Mbps	9.77	23.84
		54 Mbps	9.66	23.84
5320	64	6 Mbps	9.68	23.84
		9 Mbps	9.68	23.84
		12 Mbps	9.70	23.84
		18 Mbps	9.69	23.84
		24 Mbps	9.69	23.84
		36 Mbps	9.65	23.84
		48 Mbps	9.69	23.84
		54 Mbps	9.71	23.84

Conducted Output Power Measurements (802.11a Mode: 5500~5720)

802.11a Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5500	100	6 Mbps	10.26	23.84
		9 Mbps	10.21	23.84
		12 Mbps	10.36	23.84
		18 Mbps	10.31	23.84
		24 Mbps	10.16	23.84
		36 Mbps	10.19	23.84
		48 Mbps	10.33	23.84
		54 Mbps	10.23	23.84
5520	104	6 Mbps	10.02	23.84
		9 Mbps	10.02	23.84
		12 Mbps	10.00	23.84
		18 Mbps	10.11	23.84
		24 Mbps	10.05	23.84
		36 Mbps	9.84	23.84
		48 Mbps	10.01	23.84
		54 Mbps	9.89	23.84
5540	108	6 Mbps	10.09	23.84
		9 Mbps	10.07	23.84
		12 Mbps	10.10	23.84
		18 Mbps	10.15	23.84
		24 Mbps	10.08	23.84
		36 Mbps	9.88	23.84
		48 Mbps	10.03	23.84
		54 Mbps	9.98	23.84
5560	112	6 Mbps	10.16	23.84
		9 Mbps	10.13	23.84
		12 Mbps	10.20	23.84
		18 Mbps	10.18	23.84
		24 Mbps	10.10	23.84
		36 Mbps	9.91	23.84
		48 Mbps	10.06	23.84
		54 Mbps	10.08	23.84
5580	116	6 Mbps	10.06	23.84
		9 Mbps	10.05	23.84
		12 Mbps	9.99	23.84
		18 Mbps	10.04	23.84
		24 Mbps	9.97	23.84
		36 Mbps	9.96	23.84
		48 Mbps	10.08	23.84
		54 Mbps	10.00	23.84

5660	132	6 Mbps	10.24	23.84
		9 Mbps	10.19	23.84
		12 Mbps	10.31	23.84
		18 Mbps	10.22	23.84
		24 Mbps	10.13	23.84
		36 Mbps	9.94	23.84
		48 Mbps	10.09	23.84
		54 Mbps	10.18	23.84
5680	136	6 Mbps	10.06	23.84
		9 Mbps	10.00	23.84
		12 Mbps	10.02	23.84
		18 Mbps	10.19	23.84
		24 Mbps	10.11	23.84
		36 Mbps	9.81	23.84
		48 Mbps	9.99	23.84
		54 Mbps	10.06	23.84
5700	140	6 Mbps	10.24	23.84
		9 Mbps	10.19	23.84
		12 Mbps	10.23	23.84
		18 Mbps	10.11	23.84
		24 Mbps	10.17	23.84
		36 Mbps	10.08	23.84
		48 Mbps	10.31	23.84
		54 Mbps	10.20	23.84

Conducted Output Power Measurements (802.11a Mode: 5745~5825)

802.11a Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5745	149	6 Mbps	9.85	30
		9 Mbps	10.01	30
		12 Mbps	9.78	30
		18 Mbps	9.88	30
		24 Mbps	10.04	30
		36 Mbps	10.04	30
		48 Mbps	9.94	30
		54 Mbps	9.87	30
5765	153	6 Mbps	9.81	30
		9 Mbps	9.81	30
		12 Mbps	9.82	30
		18 Mbps	9.88	30
		24 Mbps	9.84	30
		36 Mbps	9.85	30
		48 Mbps	9.94	30
		54 Mbps	9.81	30
5785	157	6 Mbps	9.85	30
		9 Mbps	10.09	30
		12 Mbps	9.88	30
		18 Mbps	9.87	30
		24 Mbps	9.92	30
		36 Mbps	9.93	30
		48 Mbps	10.05	30
		54 Mbps	9.99	30
5805	161	6 Mbps	9.63	30
		9 Mbps	9.72	30
		12 Mbps	9.69	30
		18 Mbps	9.74	30
		24 Mbps	9.75	30
		36 Mbps	9.68	30
		48 Mbps	9.68	30
		54 Mbps	9.62	30
5825	165	6 Mbps	10.06	30
		9 Mbps	10.03	30
		12 Mbps	10.17	30
		18 Mbps	10.04	30
		24 Mbps	10.14	30
		36 Mbps	9.90	30
		48 Mbps	10.01	30
		54 Mbps	10.03	30

20 MHz BW

Conducted Output Power Measurements (802.11n 20MHz Mode: 5180~5240)

802.11n Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5180	36	6.5 Mbps	9.79	16.92
		13 Mbps	9.84	16.92
		19.5 Mbps	9.79	16.92
		26 Mbps	9.89	16.92
		39 Mbps	9.84	16.92
		52 Mbps	9.85	16.92
		58.5 Mbps	9.92	16.92
		65 Mbps	9.92	16.92
5200	40	6.5 Mbps	9.75	16.92
		13 Mbps	9.83	16.92
		19.5 Mbps	9.89	16.92
		26 Mbps	9.91	16.92
		39 Mbps	9.86	16.92
		52 Mbps	9.81	16.92
		58.5 Mbps	9.98	16.92
		65 Mbps	9.71	16.92
5220	44	6.5 Mbps	9.79	16.92
		13 Mbps	9.51	16.92
		19.5 Mbps	9.21	16.92
		26 Mbps	9.09	16.92
		39 Mbps	8.78	16.92
		52 Mbps	9.54	16.92
		58.5 Mbps	9.42	16.92
		65 Mbps	9.31	16.92
5240	48	6.5 Mbps	10.07	16.92
		13 Mbps	10.06	16.92
		19.5 Mbps	10.01	16.92
		26 Mbps	10.15	16.92
		39 Mbps	10.10	16.92
		52 Mbps	10.01	16.92
		58.5 Mbps	9.88	16.92
		65 Mbps	9.98	16.92

Conducted Output Power Measurements (802.11n 20MHz Mode: 5260~5320)

802.11n Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5260	52	6.5 Mbps	9.06	23.90
		13 Mbps	9.14	23.90
		19.5 Mbps	8.96	23.90
		26 Mbps	9.03	23.90
		39 Mbps	9.01	23.90
		52 Mbps	9.02	23.90
		58.5 Mbps	9.04	23.90
		65 Mbps	8.88	23.90
5280	56	6.5 Mbps	9.00	23.90
		13 Mbps	8.81	23.90
		19.5 Mbps	8.71	23.90
		26 Mbps	8.60	23.90
		39 Mbps	8.21	23.90
		52 Mbps	8.11	23.90
		58.5 Mbps	8.05	23.90
		65 Mbps	8.04	23.90
5300	60	6.5 Mbps	8.97	23.90
		13 Mbps	8.97	23.90
		19.5 Mbps	8.99	23.90
		26 Mbps	8.99	23.90
		39 Mbps	8.89	23.90
		52 Mbps	8.94	23.90
		58.5 Mbps	8.88	23.90
		65 Mbps	8.94	23.90
5320	64	6.5 Mbps	8.95	23.90
		13 Mbps	8.93	23.90
		19.5 Mbps	8.96	23.90
		26 Mbps	9.02	23.90
		39 Mbps	8.93	23.90
		52 Mbps	8.93	23.90
		58.5 Mbps	8.97	23.90
		65 Mbps	8.86	23.90

Conducted Output Power Measurements (802.11n 20MHz Mode: 5500~5700)

802.11a Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5500	100	6.5 Mbps	9.77	23.91
		13 Mbps	9.79	23.91
		19.5 Mbps	9.78	23.91
		26 Mbps	9.85	23.91
		39 Mbps	9.85	23.91
		52 Mbps	9.91	23.91
		58.5 Mbps	9.80	23.91
		65 Mbps	9.86	23.91
5520	104	6.5 Mbps	9.21	23.91
		13 Mbps	9.06	23.91
		19.5 Mbps	8.79	23.91
		26 Mbps	8.62	23.91
		39 Mbps	8.36	23.91
		52 Mbps	8.19	23.91
		58.5 Mbps	8.06	23.91
		65 Mbps	7.92	23.91
5540	108	6.5 Mbps	9.03	23.91
		13 Mbps	8.87	23.91
		19.5 Mbps	8.70	23.91
		26 Mbps	8.58	23.91
		39 Mbps	8.34	23.91
		52 Mbps	8.06	23.91
		58.5 Mbps	7.96	23.91
		65 Mbps	7.80	23.91
5560	112	6.5 Mbps	9.28	23.91
		13 Mbps	9.12	23.91
		19.5 Mbps	8.89	23.91
		26 Mbps	8.66	23.91
		39 Mbps	8.39	23.91
		52 Mbps	8.22	23.91
		58.5 Mbps	8.09	23.91
		65 Mbps	8.02	23.91
5580	116	6.5 Mbps	9.83	23.91
		13 Mbps	9.78	23.91
		19.5 Mbps	9.73	23.91
		26 Mbps	9.74	23.91
		39 Mbps	9.71	23.91
		52 Mbps	9.76	23.91
		58.5 Mbps	9.73	23.91
		65 Mbps	9.75	23.91

5660	132	6.5 Mbps	9.36	23.91
		13 Mbps	9.18	23.91
		19.5 Mbps	9.05	23.91
		26 Mbps	8.83	23.91
		39 Mbps	8.58	23.91
		52 Mbps	8.30	23.91
		58.5 Mbps	8.24	23.91
		65 Mbps	8.14	23.91
5680	136	6.5 Mbps	9.40	23.91
		13 Mbps	9.29	23.91
		19.5 Mbps	9.11	23.91
		26 Mbps	8.92	23.91
		39 Mbps	8.71	23.91
		52 Mbps	8.39	23.91
		58.5 Mbps	8.34	23.91
		65 Mbps	8.17	23.91
5700	140	6.5 Mbps	9.34	23.91
		13 Mbps	9.34	23.91
		19.5 Mbps	9.33	23.91
		26 Mbps	9.26	23.91
		39 Mbps	9.31	23.91
		52 Mbps	9.22	23.91
		58.5 Mbps	9.43	23.91
		65 Mbps	9.25	23.91

Conducted Output Power Measurements (802.11n 20 MHz BW Mode: 5745~5825)

802.11n Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5745	149	6.5 Mbps	9.02	30
		13 Mbps	9.06	30
		19.5 Mbps	9.10	30
		26 Mbps	8.96	30
		39 Mbps	8.97	30
		52 Mbps	9.12	30
		58.5 Mbps	8.97	30
		65 Mbps	8.99	30
5765	153	6.5 Mbps	10.11	30
		13 Mbps	9.94	30
		19.5 Mbps	9.61	30
		26 Mbps	9.48	30
		39 Mbps	9.19	30
		52 Mbps	8.91	30
		58.5 Mbps	8.80	30
		65 Mbps	8.79	30
5785	157	6.5 Mbps	9.00	30
		13 Mbps	9.14	30
		19.5 Mbps	9.09	30
		26 Mbps	9.22	30
		39 Mbps	8.98	30
		52 Mbps	8.95	30
		58.5 Mbps	9.01	30
		65 Mbps	9.06	30
5805	161	6.5 Mbps	10.04	30
		13 Mbps	9.71	30
		19.5 Mbps	9.49	30
		26 Mbps	9.31	30
		39 Mbps	8.93	30
		52 Mbps	8.74	30
		58.5 Mbps	8.60	30
		65 Mbps	8.72	30
5825	165	6.5 Mbps	9.17	30
		13 Mbps	9.16	30
		19.5 Mbps	9.19	30
		26 Mbps	9.01	30
		39 Mbps	9.02	30
		52 Mbps	9.22	30
		58.5 Mbps	9.08	30
		65 Mbps	9.14	30

40 MHz BW

Conducted Output Power Measurements (802.11n 40 MHz Mode: 5190~5230)

802.11a Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5190	38	13.5 Mbps	8.46	16.99
		27 Mbps	8.48	16.99
		40.5 Mbps	8.50	16.99
		54 Mbps	8.50	16.99
		81 Mbps	8.53	16.99
		108 Mbps	8.39	16.99
		121.5 Mbps	8.55	16.99
		135 Mbps	8.43	16.99
5230	46	13.5 Mbps	8.61	16.99
		27 Mbps	8.60	16.99
		40.5 Mbps	8.68	16.99
		54 Mbps	8.42	16.99
		81 Mbps	8.59	16.99
		108 Mbps	8.59	16.99
		121.5 Mbps	8.75	16.99
		135 Mbps	8.64	16.99
5270	54	13.5 Mbps	8.89	23.98
		27 Mbps	8.90	23.98
		40.5 Mbps	8.90	23.98
		54 Mbps	8.90	23.98
		81 Mbps	8.84	23.98
		108 Mbps	8.76	23.98
		121.5 Mbps	8.81	23.98
		135 Mbps	8.96	23.98
5310	62	13.5 Mbps	8.85	23.98
		27 Mbps	8.80	23.98
		40.5 Mbps	8.77	23.98
		54 Mbps	8.75	23.98
		81 Mbps	8.81	23.98
		108 Mbps	8.90	23.98
		121.5 Mbps	8.77	23.98
		135 Mbps	8.79	23.98
5510	102	13.5 Mbps	9.01	23.98
		27 Mbps	8.94	23.98
		40.5 Mbps	8.90	23.98
		54 Mbps	8.90	23.98
		81 Mbps	8.90	23.98
		108 Mbps	8.89	23.98
		121.5 Mbps	8.84	23.98
		135 Mbps	8.78	23.98

5550	110	13.5 Mbps	9.01	23.98
		27 Mbps	8.88	23.98
		40.5 Mbps	8.89	23.98
		54 Mbps	9.02	23.98
		81 Mbps	8.94	23.98
		108 Mbps	8.80	23.98
		121.5 Mbps	8.96	23.98
		135 Mbps	8.84	23.98
5670	134	13.5 Mbps	8.52	23.98
		27 Mbps	8.43	23.98
		40.5 Mbps	8.51	23.98
		54 Mbps	8.43	23.98
		81 Mbps	8.46	23.98
		108 Mbps	8.39	23.98
		121.5 Mbps	8.48	23.98
		135 Mbps	8.53	23.98

Conducted Output Power Measurements (802.11n 40 MHz BW Mode: 5755~5795)

5755	151	13.5 Mbps	8.71	30
		27 Mbps	8.44	30
		40.5 Mbps	8.42	30
		54 Mbps	8.40	30
		81 Mbps	8.60	30
		108 Mbps	8.56	30
		121.5 Mbps	8.62	30
		135 Mbps	8.36	30
5795	159	13.5 Mbps	8.64	30
		27 Mbps	8.68	30
		40.5 Mbps	8.50	30
		54 Mbps	8.46	30
		81 Mbps	8.55	30
		108 Mbps	8.55	30
		121.5 Mbps	8.59	30
		135 Mbps	8.43	30

20 MHz BW

Conducted Output Power Measurements (802.11ac 20 MHz Mode: 5180~5240)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5180	36	6.5	9.91	16.99
		13	9.90	16.99
		19.5	9.74	16.99
		26	9.91	16.99
		39	9.95	16.99
		52	9.99	16.99
		58.5	9.85	16.99
		65	9.85	16.99
		78	9.83	16.99
5200	40	6.5	9.91	16.99
		13	9.65	16.99
		19.5	9.98	16.99
		26	9.81	16.99
		39	9.75	16.99
		52	9.78	16.99
		58.5	9.76	16.99
		65	9.72	16.99
		78	9.80	16.99
5220	44	6.5	9.83	16.99
		13	9.85	16.99
		19.5	9.58	16.99
		26	9.62	16.99
		39	9.84	16.99
		52	9.76	16.99
		58.5	9.69	16.99
		65	9.73	16.99
		78	9.72	16.99
5240	48	6.5	10.13	16.99
		13	10.18	16.99
		19.5	9.96	16.99
		26	9.93	16.99
		39	10.08	16.99
		52	10.00	16.99
		58.5	10.02	16.99
		65	10.08	16.99
		78	10.00	16.99

Conducted Output Power Measurements (802.11ac 20 MHz Mode: 5260~5320)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5260	52	6.5	8.97	23.98
		13	8.98	23.98
		19.5	9.08	23.98
		26	9.10	23.98
		39	9.03	23.98
		52	9.03	23.98
		58.5	9.11	23.98
		65	8.88	23.98
		78	9.08	23.98
5280	56	6.5	8.59	23.98
		13	8.45	23.98
		19.5	8.33	23.98
		26	8.49	23.98
		39	8.58	23.98
		52	8.56	23.98
		58.5	8.50	23.98
		65	8.56	23.98
		78	8.61	23.98
5300	60	6.5	8.98	23.98
		13	8.92	23.98
		19.5	8.91	23.98
		26	8.91	23.98
		39	8.95	23.98
		52	8.91	23.98
		58.5	8.88	23.98
		65	9.01	23.98
		78	9.08	23.98
5320	64	6.5	8.95	23.98
		13	8.98	23.98
		19.5	8.97	23.98
		26	8.82	23.98
		39	9.01	23.98
		52	8.98	23.98
		58.5	9.01	23.98
		65	8.98	23.98
		78	8.99	23.98

Conducted Output Power Measurements (802.11ac 20 MHz Mode: 5500~5720)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5500	100	6.5	9.64	23.98
		13	9.71	23.98
		19.5	9.68	23.98
		26	9.78	23.98
		39	9.69	23.98
		52	9.81	23.98
		58.5	9.69	23.98
		65	9.71	23.98
		78	9.46	23.98
5520	104	6.5	9.65	23.98
		13	9.79	23.98
		19.5	9.94	23.98
		26	9.98	23.98
		39	9.87	23.98
		52	9.90	23.98
		58.5	9.80	23.98
		65	9.69	23.98
		78	9.81	23.98
5540	108	6.5	9.65	23.98
		13	9.72	23.98
		19.5	9.58	23.98
		26	9.74	23.98
		39	9.60	23.98
		52	9.70	23.98
		58.5	9.68	23.98
		65	9.69	23.98
		78	9.51	23.98
5560	112	6.5	9.66	23.98
		13	9.68	23.98
		19.5	9.57	23.98
		26	9.71	23.98
		39	9.68	23.98
		52	9.75	23.98
		58.5	9.64	23.98
		65	9.68	23.98
		78	9.52	23.98
5580	116	6.5	9.81	23.98
		13	9.70	23.98
		19.5	9.71	23.98
		26	9.80	23.98
		39	9.71	23.98
		52	9.74	23.98
		58.5	9.76	23.98
		65	9.78	23.98
		78	9.75	23.98

5660	132	6.5	9.68	23.98
		13	9.88	23.98
		19.5	9.67	23.98
		26	9.79	23.98
		39	9.72	23.98
		52	9.84	23.98
		58.5	9.65	23.98
		65	9.70	23.98
		78	9.57	23.98
5680	136	6.5	9.60	23.98
		13	9.82	23.98
		19.5	9.58	23.98
		26	9.62	23.98
		39	9.61	23.98
		52	9.79	23.98
		58.5	9.56	23.98
		65	9.49	23.98
		78	9.52	23.98
5700	140	6.5	9.58	23.98
		13	9.68	23.98
		19.5	9.57	23.98
		26	9.70	23.98
		39	9.58	23.98
		52	9.66	23.98
		58.5	9.67	23.98
		65	9.72	23.98
		78	9.56	23.98
5720	144	6.5	9.32	23.98
		13	9.35	23.98
		19.5	9.29	23.98
		26	9.22	23.98
		39	9.26	23.98
		52	9.29	23.98
		58.5	9.28	23.98
		65	9.20	23.98
		78	9.32	23.98

Conducted Output Power Measurements (802.11ac 20 MHz Mode: 5745~5825)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5745	149	6.5	9.14	30
		13	9.08	30
		19.5	9.07	30
		26	9.04	30
		39	8.96	30
		52	9.01	30
		58.5	9.13	30
		65	9.10	30
		78	9.13	30
5765	153	6.5	9.13	30
		13	9.08	30
		19.5	9.09	30
		26	9.07	30
		39	9.01	30
		52	9.05	30
		58.5	9.10	30
		65	9.07	30
		78	9.07	30
5785	157	6.5	9.09	30
		13	9.07	30
		19.5	9.07	30
		26	9.09	30
		39	9.16	30
		52	9.07	30
		58.5	9.07	30
		65	9.06	30
		78	9.05	30
5805	161	6.5	9.17	30
		13	9.11	30
		19.5	9.06	30
		26	9.12	30
		39	9.16	30
		52	9.10	30
		58.5	9.01	30
		65	9.17	30
		78	9.04	30
5825	165	6.5	9.25	30
		13	9.12	30
		19.5	9.04	30
		26	9.15	30
		39	9.19	30
		52	9.11	30
		58.5	9.01	30
		65	9.21	30
		78	9.04	30

40 MHz BW

Conducted Output Power Measurements (802.11ac 40 MHz Mode: 5190~5230)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5190	38	13.5	8.53	16.99
		27	8.61	16.99
		40.5	8.55	16.99
		54	8.59	16.99
		81	8.63	16.99
		108	8.30	16.99
		121.5	8.54	16.99
		135	8.36	16.99
		162	8.58	16.99
		180	8.30	16.99
5230	46	13.5	8.63	16.99
		27	8.66	16.99
		40.5	8.65	16.99
		54	8.67	16.99
		81	8.63	16.99
		108	8.66	16.99
		121.5	8.50	16.99
		135	8.39	16.99
		162	8.44	16.99
		180	8.46	16.99

Conducted Output Power Measurements (802.11ac 40MHz Mode: 5270~5310)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5270	54	13.5	8.86	23.98
		27	8.89	23.98
		40.5	8.68	23.98
		54	8.81	23.98
		81	8.88	23.98
		108	8.83	23.98
		121.5	8.66	23.98
		135	8.82	23.98
		162	8.81	23.98
		180	8.78	23.98
5310	62	13.5	8.76	23.98
		27	8.86	23.98
		40.5	8.74	23.98
		54	8.70	23.98
		81	8.84	23.98
		108	8.69	23.98
		121.5	8.74	23.98
		135	8.65	23.98
		162	8.64	23.98
		180	8.71	23.98

Conducted Output Power Measurements (802.11ac 40 MHz Mode: 5510~5670)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5510	102	13.5	8.85	23.98
		27	8.75	23.98
		40.5	8.73	23.98
		54	8.62	23.98
		81	8.77	23.98
		108	8.80	23.98
		121.5	8.87	23.98
		135	8.71	23.98
		162	8.74	23.98
		180	8.73	23.98
5550	110	13.5	8.90	23.98
		27	8.83	23.98
		40.5	8.88	23.98
		54	8.74	23.98
		81	8.84	23.98
		108	8.85	23.98
		121.5	8.90	23.98
		135	8.83	23.98
		162	8.80	23.98
		180	8.85	23.98
5710	142	13.5	8.62	23.98
		27	8.51	23.98
		40.5	8.56	23.98
		54	8.49	23.98
		81	8.42	23.98
		108	8.46	23.98
		121.5	8.46	23.98
		135	8.50	23.98
		162	8.41	23.98
		180	8.59	23.98

Conducted Output Power Measurements (802.11ac 40 MHz BW Mode: 5755~5795)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5755	151	13.5	8.65	30
		27	8.42	30
		40.5	8.40	30
		54	8.43	30
		81	8.44	30
		108	8.48	30
		121.5	8.59	30
		135	8.32	30
		162	8.57	30
		180	8.40	30
5795	159	13.5	8.48	30
		27	8.51	30
		40.5	8.52	30
		54	8.34	30
		81	8.64	30
		108	8.49	30
		121.5	8.46	30
		135	8.39	30
		162	8.57	30
		180	8.53	30

80 MHz BW

Conducted Output Power Measurements (802.11ac 80MHz Mode: 5210)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5210	42	29.3	8.73	16.99
		58.5	8.78	16.99
		87.8	8.65	16.99
		117	8.67	16.99
		175.5	8.69	16.99
		234	8.63	16.99
		263.3	8.68	16.99
		292.5	8.73	16.99
		351	8.66	16.99
		390	8.65	16.99

Conducted Output Power Measurements (802.11ac 80MHz Mode: 5290)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5290	58	29.3	9.77	23.98
		58.5	9.73	23.98
		87.8	9.75	23.98
		117	9.80	23.98
		175.5	9.67	23.98
		234	9.68	23.98
		263.3	9.72	23.98
		292.5	9.73	23.98
		351	9.70	23.98
		390	9.69	23.98

Conducted Output Power Measurements (802.11ac 80MHz Mode: 5530~5690)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.			
5530	106	29.3	8.68	23.98
		58.5	8.71	23.98
		87.8	8.62	23.98
		117	8.61	23.98
		175.5	8.64	23.98
		234	8.63	23.98
		263.3	8.66	23.98
		292.5	8.74	23.98
		351	8.58	23.98
		390	8.74	23.98
5690	138	29.3	8.55	23.98
		58.5	8.46	23.98
		87.8	8.48	23.98
		117	8.35	23.98
		175.5	8.41	23.98
		234	8.32	23.98
		263.3	8.38	23.98
		292.5	8.50	23.98
		351	8.35	23.98
		390	8.40	23.98

Conducted Output Power Measurements (802.11ac 80 MHz BW Mode: 5775)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency[MHz]	Channel No.			
5775	155	29.3	9.07	30
		58.5	9.16	30
		87.8	9.02	30
		117	8.98	30
		175.5	9.09	30
		234	9.07	30
		263.3	9.01	30
		292.5	9.03	30
		351	9.06	30
		390	8.95	30

11.4 SAR Test Exclusions Applied

11.4.1 Wi-Fi/BT

Per FCC KDB 447498 D01v05, 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	2441	10	10	1.56

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(10/10)*√2.441] = 1.56 < 3.0.

his device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05 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 D01v05 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	2441	10	10	0.21

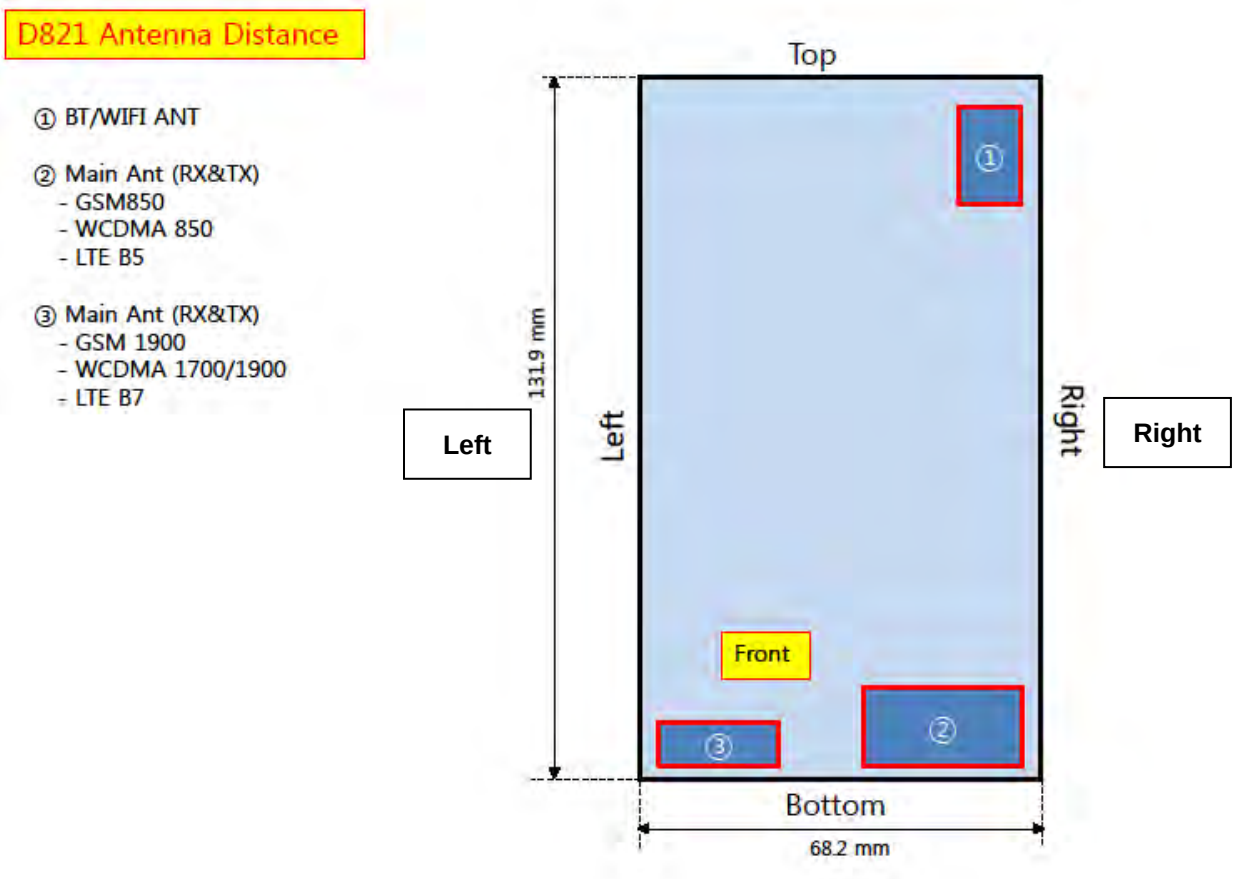
Note : Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. The Estimated SAR results were determined according to FCC KDB447498 D01v05

12. SAR Test configuration & Antenna Information

12.1 Mobile Hotspot sides for SAR Testing configurations

Mode	Rear	Front	Left	Right	Bottom	Top
GSM 850	Yes	Yes	No	Yes	Yes	No
GSM 1 900	Yes	Yes	Yes	No	Yes	No
WCDMA 850	Yes	Yes	No	Yes	Yes	No
WCDMA 1 700	Yes	Yes	Yes	No	Yes	No
WCDMA 1 900	Yes	Yes	Yes	No	Yes	No
LTE Band 5	Yes	Yes	No	Yes	Yes	No
LTE band 7	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN	Yes	Yes	No	Yes	No	Yes
5 GHz WLAN	Yes	Yes	No	Yes	No	Yes

12.2 Antenna and Device Information



Note;

Per FCC KDB Publication 941225 D06v01, 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 the LGD821_Antenna distance for futher information.

13. SAR TEST DATA SUMMARY

13.1-1 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	32.65	-0.136	Standard	Left Ear	0.203	1.135	0.230	-
836.6	190		32.65	-0.043	Standard	Left Tilt	0.127	1.135	0.144	-
836.6	190		32.65	-0.097	Standard	Right Ear	0.221	1.135	0.251	-
836.6	190		32.65	-0.010	Standard	Right Tilt	0.107	1.135	0.121	-
836.6	190	GPRS 2Tx	31.51	-0.159	Standard	Left Ear	0.432	1.172	0.506	-
836.6	190		31.51	-0.018	Standard	Left Tilt	0.281	1.172	0.329	-
836.6	190		31.51	-0.129	Standard	Right Ear	0.466	1.172	0.546	1
836.6	190		31.51	-0.150	Standard	Right Tilt	0.256	1.172	0.300	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g) **Averaged over 1 gram				

13.1-2 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	29.93	-0.045	Standard	Left Ear	0.363	1.194	0.433	-
1 880.0	661		29.93	0.030	Standard	Left Tilt	0.215	1.194	0.257	-
1 880.0	661		29.93	-0.058	Standard	Right Ear	0.369	1.194	0.441	-
1 880.0	661		29.93	-0.079	Standard	Right Tilt	0.147	1.194	0.176	-
1 880.0	661	GPRS 2Tx	29.00	-0.000	Standard	Left Ear	0.576	1.175	0.677	2
1 880.0	661		29.00	0.015	Standard	Left Tilt	0.331	1.175	0.389	-
1 880.0	661		29.00	0.026	Standard	Right Ear	0.551	1.175	0.647	-
1 880.0	661		29.00	0.047	Standard	Right Tilt	0.217	1.175	0.255	-
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g) **Averaged over 1 gram				

13.1-3 Measurement Results (WCDMA850 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	4183	WCDMA850	23.99	-0.119	Standard	Left Ear	0.351	1.050	0.368	-
836.6	4183		23.99	0.154	Standard	Left Tilt	0.212	1.050	0.223	-
836.6	4183		23.99	0.006	Standard	Right Ear	0.385	1.050	0.404	3
836.6	4183		23.99	0.052	Standard	Right Tilt	0.181	1.050	0.190	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13.1-4 Measurement Results (WCDMA1700 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									
1 732.4	1412	WCDMA1700	24.38	-0.099	Standard	Left Ear	**0.644**	1.076	0.693	4
1 732.4	1412		24.38	0.099	Standard	Left Tilt	0.408	1.076	0.439	-
1 732.4	1412		24.38	-0.024	Standard	Right Ear	0.565	1.076	0.608	-
1 732.4	1412		24.38	-0.060	Standard	Right Tilt	0.355	1.076	0.382	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13.1-5 Measurement Results (WCDMA1900 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									
1 852.4	9262	WCDMA1900	24.23	0.070	Standard	Left Ear	0.706	1.114	0.787	-
1 880.0	9400		24.15	-0.008	Standard	Left Ear	0.814	1.135	0.924	-
1 907.6	9538		24.37	0.122	Standard	Left Ear	0.820	1.079	0.885	-
1 880.0	9400		24.15	-0.051	Standard	Left Tilt	0.449	1.135	0.510	-
1 852.4	9262		24.23	0.013	Standard	Right Ear	0.729	1.114	0.812	-
1 880.0	9400		24.15	-0.199	Standard	Right Ear	0.804	1.135	0.913	-
1 907.6	9538		24.37	0.055	Standard	Right Ear	0.823	1.079	0.888	5
1 880.0	9400		24.15	0.114	Standard	Right Tilt	0.366	1.135	0.415	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13.1-6 Measurement Results (LTE Band 5 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	RB Size	RB Offset	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g)	MPR.	Plot No
MHz	Ch.												
836.5	20525	QPSK	23.60	-0.124	Standard	Left Ear	1	24	0.285	1.023	0.292	0	-
836.5	20525	QPSK	23.60	-0.079	Standard	Left Tilt	1	24	0.167	1.023	0.171	0	-
836.5	20525	QPSK	23.60	-0.046	Standard	Right Ear	1	24	0.329	1.023	0.337	0	6
836.5	20525	QPSK	23.60	0.167	Standard	Right Tilt	1	24	0.142	1.023	0.145	0	-
844.0	20600	QPSK	22.29	-0.128	Standard	Left Ear	25	12	0.212	1.099	0.233	1	-
844.0	20600	QPSK	22.29	0.024	Standard	Left Tilt	25	12	0.116	1.099	0.127	1	-
844.0	20600	QPSK	22.29	-0.165	Standard	Right Ear	25	12	0.251	1.099	0.276	1	-
844.0	20600	QPSK	22.29	-0.085	Standard	Right Tilt	25	12	0.106	1.099	0.116	1	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**							**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram						

13.1-7 Measurement Results (LTE Band 7 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	RB Size	RB Offset	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g)	MPR.	Plot No
MHz	Ch.												
2510.0	20850	QPSK	22.7	0.151	Standard	Left Ear	1	49	0.912	1.000	0.912	0	7
2535.0	21100	QPSK	22.7	-0.023	Standard	Left Ear	1	49	0.855	1.000	0.855	0	-
2560.0	21350	QPSK	22.7	0.157	Standard	Left Ear	1	99	0.900	1.000	0.900	0	-
2510.0	20850	QPSK	21.3	-0.158	Standard	Left Ear	50	0	0.673	1.096	0.738	1	-
2510.0	20850	QPSK	21.1	0.144	Standard	Left Ear	100	0	0.584	1.148	0.671	1	-
2510.0	20850	QPSK	22.7	0.132	Standard	Left Tilt	1	49	0.121	1.000	0.121	0	-
2510.0	20850	QPSK	21.3	0.130	Standard	Left Tilt	50	0	0.101	1.096	0.111	1	-
2510.0	20850	QPSK	22.7	-0.034	Standard	Right Ear	1	49	0.541	1.000	0.541	0	-
2510.0	20850	QPSK	21.3	0.067	Standard	Right Ear	50	0	0.373	1.096	0.409	1	-
2510.0	20850	QPSK	22.7	0.127	Standard	Right Tilt	1	49	0.494	1.000	0.494	0	-
2510.0	20850	QPSK	21.3	0.141	Standard	Right Tilt	50	0	0.264	1.096	0.289	1	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**							**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram						

13.1-8 Measurement Results (DTS 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	Channel										
2 437	6	802.11b	16.05	0.061	Standard	Left Ear	1Mbps	0.486	1.109	0.539	8
			16.05	0.077	Standard	Left Tilt	1Mbps	0.316	1.109	0.350	-
			16.05	0.048	Standard	Right Ear	1Mbps	0.165	1.109	0.183	-
			16.05	0.063	Standard	Right Tilt	1Mbps	0.126	1.109	0.140	-
5 825	165	802.11a	10.06	0.130	Standard	Left Ear	6Mbps	0.055	1.563	0.086	-
			10.06	0.150	Standard	Left Tilt	6Mbps	0.048	1.563	0.075	-
			10.06	-0.190	Standard	Right Ear	6Mbps	0.057	1.563	0.089	-
			10.06	0.161	Standard	Right Tilt	6Mbps	0.058	1.563	0.091	9
5 775	155	802.11ac	9.07	-0.180	Standard	Left Ear	29.3M bps	0.028	1.239	0.035	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram					

13.1-9 Measurement Results (Nll 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	Ch										
5 240	48	802.11a	10.56	0.130	Standard	Left Ear	6Mbps	0.027	1.393	0.038	-
5 240	48	802.11a	10.56	0.180	Standard	Left Tilt	6Mbps	0.024	1.393	0.033	-
5 240	48	802.11a	10.56	0.100	Standard	Right Ear	6Mbps	0.00589	1.393	0.008	-
5 240	48	802.11a	10.56	0.148	Standard	Right Tilt	6Mbps	0.00973	1.393	0.014	-
5 210	42	802.11ac	8.73	0.156	Standard	Right Tilt	29.3Mbps	0.139	1.340	0.186	-
5 260	52	802.11a	9.83	-0.139	Standard	Left Ear	6Mbps	0.027	1.648	0.045	-
5 260	52	802.11a	9.83	0.179	Standard	Left Tilt	6Mbps	0.020	1.648	0.033	-
5 260	52	802.11a	9.83	0.150	Standard	Right Ear	6Mbps	0.006	1.648	0.010	-
5 260	52	802.11a	9.83	0.120	Standard	Right Tilt	6Mbps	0.005	1.648	0.008	-
5 290	58	802.11ac	9.77	0.151	Standard	Left Tilt	29.3Mbps	0.197	1.054	0.208	10
5 500	100	802.11a	10.26	0.170	Standard	Left Ear	6Mbps	0.045	1.493	0.067	-
5 500	100	802.11a	10.26	0.120	Standard	Left Tilt	6Mbps	0.042	1.493	0.063	-
5 500	100	802.11a	10.26	0.170	Standard	Right Ear	6Mbps	0.039	1.493	0.058	-
5 500	100	802.11a	10.26	0.120	Standard	Right Tilt	6Mbps	0.027	1.493	0.040	-
5 530	106	802.11ac	8.68	0.160	Standard	Left Tilt	29.3Mbps	0.065	1.355	0.088	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Head** **1.6 W/kg (mW/g)** Averaged over 1 gram					

13.2-1 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									
836.6	190	GPRS 2Tx	31.51	-0.174	Rear	1.0 cm	0.485	1.172	0.569	11
836.6	190		31.51	-0.080	Front	1.0 cm	0.440	1.172	0.516	-
836.6	190		31.51	-0.045	Right	1.0 cm	0.492	1.172	0.577	12
836.6	190		31.51	-0.063	Bottom	1.0 cm	0.215	1.172	0.252	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Body** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13. 2-2 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	Channel									
1 880.0	661	GPRS 2Tx	29.0	0.010	Rear	1.0 cm	0.584	1.175	0.686	13
1 880.0	661		29.0	0.027	Front	1.0 cm	0.593	1.175	0.697	14
1 880.0	661		29.0	0.067	Left	1.0 cm	0.546	1.175	0.641	-
1 880.0	661		29.0	-0.064	Bottom	1.0 cm	0.505	1.175	0.593	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Body** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13. 2-3 Measurement Results (WCDMA850 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									
836.6	4183	WCDMA850	23.99	-0.059	Rear	1.0 cm	0.307	1.050	0.322	15
836.6	4183		23.99	-0.076	Front	1.0 cm	0.324	1.050	0.340	-
836.6	4183		23.99	-0.113	Right	1.0 cm	0.399	1.050	0.419	16
836.6	4183		23.99	-0.025	Bottom	1.0 cm	0.214	1.050	0.225	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**0.093Body** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13. 2-4 Measurement Results (WCDMA1700 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									
1 712.4	1312	WCDMA1700	24.48	0.022	Rear	1.0 cm	0.891	1.052	0.937	17
1 732.4	1412		24.38	-0.017	Rear	1.0 cm	0.823	1.076	0.886	-
1 752.6	1512		24.36	0.040	Rear	1.0 cm	0.771	1.081	0.834	-
1 712.4	1312		24.48	-0.035	Front	1.0 cm	1.040	1.052	1.094	18
1 732.4	1412		24.38	-0.114	Front	1.0 cm	1.010	1.076	1.087	-
1 752.6	1512		24.48	0.038	Front	1.0 cm	0.913	1.052	0.960	-
1 732.4	1412		24.38	-0.151	Left	1.0 cm	0.598	1.076	0.644	-
1 732.4	1412		24.38	0.020	Bottom	1.0 cm	0.601	1.076	0.647	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**0.093Body** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13. 2-5 Measurement Results (WCDMA1900 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									
1 852.4	9262	WCDMA1900	24.23	0.081	Rear	1.0 cm	0.773	1.250	0.966	-
1 880.0	9400		24.15	0.073	Rear	1.0 cm	**0.790**	1.274	1.006	19
1 907.6	9538		24.37	0.058	Rear	1.0 cm	0.785	1.211	0.950	-
1 852.4	9262		24.23	0.019	Front	1.0 cm	**0.986**	1.250	1.233	20
1 880.0	9400		24.15	0.008	Front	1.0 cm	0.959	1.274	1.221	-
1 907.6	9538		24.37	-0.126	Front	1.0 cm	0.860	1.211	1.041	-
1 852.4	9262		24.23	0.065	Left	1.0 cm	0.697	1.250	0.871	-
1 880.0	9400		24.15	0.028	Left	1.0 cm	0.706	1.274	0.899	-
1 907.6	9538		24.37	0.033	Left	1.0 cm	0.843	1.211	1.021	-
1 852.4	9262		24.23	-0.028	Bottom	1.0 cm	0.726	1.250	0.908	
1 880.0	9400		24.15	0.042	Bottom	1.0 cm	0.737	1.274	0.939	
1 907.6	9538		24.37	-0.045	Bottom	1.0 cm	0.744	1.211	0.901	
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**0.093Body** **1.6 W/kg (mW/g)** Averaged over 1 gram				

13. 2-6 Measurement Results (LTE Band 5 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	RB Size	RB Offset	Separation Distance	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g)	MPR.	Plot No.
MHz	ch.												
836.5	20525	QPSK	23.60	0.109	Rear	1	24	1.0 cm	**0.266**	1.023	0.272	0	21
844.0	20600	QPSK	22.29	-0.008	Rear	25	12	1.0 cm	0.195	1.099	0.214	1	-
836.5	20525	QPSK	23.60	-0.008	Front	1	24	1.0 cm	0.273	1.023	0.279	0	-
844.0	20600	QPSK	22.29	0.027	Front	25	12	1.0 cm	0.194	1.099	0.213	1	-
836.5	20525	QPSK	23.60	0.032	Right	1	24	1.0 cm	**0.287**	1.023	0.294	0	22
844.0	20600	QPSK	22.29	-0.002	Right	25	12	1.0 cm	0.183	1.099	0.201	1	-
836.5	20525	QPSK	23.60	-0.019	Bottom	1	24	1.0 cm	0.199	1.023	0.204	0	-
844.0	20600	QPSK	22.29	-0.017	Bottom	25	12	1.0 cm	0.140	1.099	0.154	1	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**								**Body** **1.6 W/kg (mW/g)** Averaged over 1 gram					

13. 2-7 Measurement Results (LTE Band 7 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	RB Size	RB Offset	Separation Distance	Measured SAR (mW/g)	Scaling Facor	Scaled SAR (mW/g)	MPR.	Plot No.
MHz	ch.												
2510.0	20850	QPSK	22.7	-0.052	Rear	1	49	1.0 cm	0.845	1.000	0.845	0	-
2535.0	21100	QPSK	22.7	0.182	Rear	1	49	1.0 cm	0.887	1.000	0.887	0	23
2560.0	21350	QPSK	22.7	0.141	Rear	1	99	1.0 cm	0.809	0.794	0.643	1	-
2510.0	20850	QPSK	21.3	-0.138	Rear	50	0	1.0 cm	0.654	1.096	0.717	1	-
2510.0	20850	QPSK	21.1	0.179	Rear	100	0	1.0 cm	0.649	1.148	0.745	1	-
2510.0	20850	QPSK	22.7	0.065	Front	1	49	1.0 cm	0.750	1.000	0.750	0	-
2510.0	20850	QPSK	21.3	0.173	Front	50	0	1.0 cm	0.547	1.096	0.600	1	-
2510.0	20850	QPSK	22.7	0.078	Left	1	49	1.0 cm	0.332	1.000	0.332	0	-
2510.0	20850	QPSK	21.3	-0.008	Left	50	0	1.0 cm	0.335	1.096	0.367	1	-
2510.0	20850	QPSK	22.7	0.046	Bottom	1	49	1.0 cm	0.590	1.000	0.590	0	-
2510.0	20850	QPSK	21.3	-0.114	Bottom	50	0	1.0 cm	0.602	1.096	0.660	1	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**								**Body** **1.6 W/kg (mW/g)** Averaged over 1 gram					

13. 2-8 Measurement Results (WLAN 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	Ch										
2 437	6	802.11b	16.05	0.135	Rear	1Mbps	1.0 cm	**0.094**	1.109	0.104	24
			16.05	-0.007	Front	1Mbps	1.0 cm	0.056	1.109	0.062	-
			16.05	-0.086	Right	1Mbps	1.0 cm	**0.098**	1.109	0.109	25
			16.05	-0.185	Top	1Mbps	1.0 cm	0.033	1.109	0.037	-
5 825	165	802.11a	10.06	-0.170	Rear	6Mbps	1.0 cm	0.015	1.563	0.023	26
			10.06	-0.109	Front	6Mbps	1.0 cm	0.000371	1.563	0.001	-
			10.06	-0.130	Right	6Mbps	1.0 cm	0.047	1.563	0.073	27
			10.06	-0.120	Top	6Mbps	1.0 cm	0.029	1.563	0.045	-
5 775	155	802.11ac	9.07	-0.120	Right	29.3Mbps	1.0 cm	0.00926	1.239	0.011	-
ANSI/ IEEE C95.1 - 1992– Safety Limit **Spatial Peak** **Uncontrolled Exposure/ General Population**						**Body** **1.6 W/kg (mW/g)** Averaged over 1 gram					

13.3-1 Measurement Results (WLAN Body-worn 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	Ch.										
2 437	6	802.11b	16.05	0.135	Rear	1Mbps	1.0 cm	0.094	1.109	0.104	24
5 825	165	802.11a	10.06	-0.170	Rear	6Mbps	1.0 cm	0.015	1.563	0.023	26
5 775	155	802.11ac	9.07	-0.134	Rear	29.3Mbps	1.0 cm	0.0011	1.239	0.001	
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g) **Averaged over 1 gram					

13.3-2 Measurement Results (Nll Body-worn 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	Ch.										
5 240	48	802.11a	10.56	0.100	Rear	6Mbps	1 cm	0.001	1.393	0.001	-
5 210	42	802.11ac	8.73	-0.187	Rear	29.3Mbps	1 cm	0.006	1.340	0.008	-
5 260	52	802.11a	9.83	0.170	Rear	6Mbps	1 cm	0.002	1.648	0.003	-
5 290	58	802.11ac	9.77	-0.100	Rear	29.3Mbps	1 cm	0.013	1.054	0.014	-
5 500	100	802.11a	10.26	-0.140	Rear	6Mbps	1 cm	0.012	1.493	0.018	-
5 530	106	802.11ac	8.68	-0.180	Rear	29.3Mbps	1 cm	0.035	1.355	0.047	27
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g) **Averaged over 1 gram					

13.3-3 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	32.65	-0.123	Rear	1.0 cm	0.354	1.135	0.402	-
836.6	190	GPRS 2Tx	31.51	-0.174	Rear	1.0 cm	0.485	1.172	0.569	11
1 880.0	661	GSM1900	29.93	0.024	Rear	1.0 cm	0.385	1.194	0.460	-
1 880.0	661	GPRS 2Tx	29.0	0.010	Rear	1.0 cm	0.584	1.175	0.686	13
836.6	4183	WCDMA850	23.99	-0.059	Rear	1.0 cm	0.307	1.050	0.322	15
1 712.4	1312	WCDMA1700	24.48	0.022	Rear	1.0 cm	0.891	1.052	0.937	17
1 732.4	1412	WCDMA1700	24.38	-0.017	Rear	1.0 cm	0.823	1.076	0.886	-
1 752.6	1512	WCDMA1700	24.36	0.040	Rear	1.0 cm	0.771	1.081	0.834	-
1 852.4	9262	WCDMA1900	24.23	0.081	Rear	1.0 cm	0.773	1.250	0.966	-
1 880.0	9400	WCDMA1900	24.15	0.073	Rear	1.0 cm	0.790	1.274	1.006	19
1 907.6	9538	WCDMA1900	24.37	0.058	Rear	1.0 cm	0.785	1.211	0.950	-
844.0	20600	LTE Band 5	23.60	0.109	Rear	1.0 cm	0.266	1.023	0.272	21
2510.0	20850	LTE Band 7	22.7	0.182	Rear	1.0 cm	0.887	1.000	0.887	23
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							**Body 1.6 W/kg (mW/g) **Averaged over 1 gram			

13.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC KDB Procedure.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v05.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluation using a headset cable were required.
8. Per FCC KDB 865664 D01v01, variability SAR tests were not performed since the measured SAR results for all frequency bands were less than 0.8 W/kg. Please see Section 14 for variability analysis information.

GSM/GPRS Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. This device supports GSM VOIP in the head and body-worn configurations; therefore GPRS was additionally evaluated for head and body-worn compliance.
3. Justification for reduced test configurations per KDB 941225 D03v01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR.
4. Per FCC KDB 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is 1/2 dB, instead of the middle channel, the highest output power channel must be used.

UMTS Notes:

1. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the channel highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Consideration for LTE Devices in FCC KDB 941125 D05v02r01. The general test procedures used for testing can be found in Section 8.4.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 2.5 under Table 6.2.3-1.
3. A-MPR was diabled for all SAR tests by setting NS=01 on the base station simulator.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB 248227 D01v01r02 and Oct. 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11 g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB 248227 D01v01r02 and Oct. 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11 n 20MHz and 40 MHz bandwidths) were not investigated since the average output power over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data of IEEE 802.11a mode.
3. Per Apr. 2013 TCB Workshop notes, full SAR test for all IEEE 802.11 ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11 a mode. IEEE 802.11 ac was evaluated for the highest IEEE 802.11 a configuration in each 5 GHz band and exposure condition.
4. When wireless router is enabled, 5.2, 5.3 and 5.5 GHz bands are disabled. Only 5.8 GHz WIFI Wireless Router SAR Data was required.
5. This device can operate in the 2.4 GHz and 5.8 GHz bands using WIFI Direct Go capability. Per FCC KDB 941225, 5.8 GHz WIFI Direct Go is evaluated for SAR using wireless router SAR evaluation procedures.
6. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was ≤ 1.6 W/kg and the reported 1g averaged SAR was < 0.8 W/kg, SAR testing on other default channels was not required.

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							
1 712.4	1312	WCDMA1700	Standard	Front	1.04	1.01	1.030	28
1 852.4	9262	WCDMA1900	Standard	Front	0.986	0.948	1.040	29
2510.0	20850	LTE 7	Standard	Left Ear	0.912	0.849	1.074	30

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/Data + 2.4 GHz WiFi	
		GSM 1900 Voice/Data + 2.4 GHz WiFi	
		WCDMA850 Voice + 2.4 GHz WiFi	
		WCDMA1700 Voice + 2.4 GHz WiFi	
		WCDMA1900 Voice + 2.4 GHz WiFi	
		LTE Band 5 + 2.4 GHz WiFi	
		LTE Band 7 + 2.4 GHz WiFi	
		GSM 850 Voice/Data + 5 GHz WiFi	
		GSM 1900 Voice/Data + 5 GHz WiFi	
		WCDMA850 Voice +5 GHz WiFi	
		WCDMA1700 Voice +5 GHz WiFi	
		WCDMA1900 Voice +5 GHz WiFi	
		LTE Band 5 + 5 GHz WiFi	
		LTE Band 7 + 5 GHz WiFi	
	Hotspot	GPRS 850 Data + 2.4 GHz WiFi	
		GPRS 1900 Data + 2.4 GHz WiFi	
		WCDMA850 Data + 2.4 GHz WiFi	
		WCDMA1700 Voice + 2.4 GHz WiFi	
		WCDMA1900 Voice + 2.4 GHz WiFi	
		LTE Band 5 + 2.4 GHz WiFi	
		LTE Band 7 + 2.4 GHz WiFi	
		GPRS 850 Data + 5 GHz WiFi	Wifi Direct GO
		GPRS 1900 Data + 5 GHz WiFi	
		WCDMA850 Data + 5 GHz WiFi	
		WCDMA1700 Voice + 5 GHz WiFi	
		WCDMA1900 Voice + 5 GHz WiFi	
		LTE Band 5 + 5 GHz WiFi	
		LTE Band 7 + 5 GHz WiFi	

	Position	Applicable Combination	Note
Simultaneous Transmission	Body-worn	GSM 850 Voice/Data + 2.4 GHz WiFi	
		GSM 1900 Voice/Data + 2.4 GHz WiFi	
		WCDMA850 Voice + 2.4 GHz WiFi	
		WCDMA1700 Voice + 2.4 GHz WiFi	
		WCDMA1900 Voice + 2.4 GHz WiFi	
		LTE Band 5 + 2.4 GHz WiFi	
		LTE Band 7 + 2.4 GHz WiFi	
		GSM 850 Voice/Data + 5 GHz WiFi	
		GSM 1900 Voice/Data + 5 GHz WiFi	
		WCDMA850 Voice + 5 GHz WiFi	
		WCDMA1700 Voice + 5 GHz WiFi	
		WCDMA1900 Voice + 5 GHz WiFi	
		LTE Band 5 + 5 GHz WiFi	
		LTE Band 7 + 5 GHz WiFi	
		GSM 850 Voice + 2.4 GHz Bluetooth	
		GSM 1900 Voice + 2.4 GHz Bluetooth	
		WCDMA850 Voice+ 2.4 GHz Bluetooth	
		WCDMA1700 Voice + 2.4 GHz Bluetooth	
		WCDMA1900 Voice + 2.4 GHz Bluetooth	
		LTE Band 5 + 2.4 GHz Bluetooth	
		LTE Band 7 + 2.4 GHz Bluetooth	
* BT and WLAN are not simultaneous transmission.			

15.1 Simultaneous Transmission Summation for Head

Simultaneous Transmission Summation with 2.4 GHz WIFI

Band	configuration	Scaled SAR (W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)	Band	configuration	Scaled SAR (W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM850	Left Cheek	0.230	0.539	0.769	GSM 1900	Left Cheek	0.433	0.539	0.972
	Left Tilt	0.144	0.350	0.494		Left Tilt	0.257	0.350	0.607
	Right Cheek	0.251	0.183	0.434		Right Cheek	0.441	0.183	0.624
	Right Tilt	0.121	0.140	0.261		Right Tilt	0.176	0.140	0.316
GPRS 850	Left Cheek	0.506	0.539	1.045	GPRS 1900	Left Cheek	0.677	0.539	1.216
	Left Tilt	0.329	0.350	0.679		Left Tilt	0.389	0.350	0.739
	Right Cheek	0.546	0.183	0.729		Right Cheek	0.647	0.183	0.830
	Right Tilt	0.300	0.140	0.440		Right Tilt	0.255	0.140	0.395
WCDMA 850	Left Cheek	0.368	0.539	0.907	WCDMA 1700	Left Cheek	0.693	0.539	1.232
	Left Tilt	0.223	0.350	0.573		Left Tilt	0.439	0.350	0.789
	Right Cheek	0.404	0.183	0.587		Right Cheek	0.608	0.183	0.791
	Right Tilt	0.190	0.140	0.330		Right Tilt	0.382	0.140	0.522
WCDMA 1900	Left Cheek	0.924	0.539	1.463	LTE Band 5	Left Cheek	0.292	0.539	0.831
	Left Tilt	0.510	0.350	0.860		Left Tilt	0.171	0.350	0.521
	Right Cheek	0.913	0.183	1.096		Right Cheek	0.337	0.183	0.520
	Right Tilt	0.415	0.140	0.555		Right Tilt	0.145	0.140	0.285
LTE Band 7	Left Cheek	0.912	0.539	1.451					
	Left Tilt	0.121	0.350	0.471					
	Right Cheek	0.541	0.183	0.724					
	Right Tilt	0.494	0.140	0.634					

Simultaneous Transmission Summation with 5 GHz WIFI

Band	configuration	Scaled SAR (W/kg)	5 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)	Band	configuration	Scaled SAR (W/kg)	5 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM850	Left Cheek	0.230	0.086	0.316	GSM 1900	Left Cheek	0.433	0.086	0.519
	Left Tilt	0.144	0.208	0.352		Left Tilt	0.257	0.208	0.465
	Right Cheek	0.251	0.089	0.340		Right Cheek	0.441	0.089	0.530
	Right Tilt	0.121	0.186	0.307		Right Tilt	0.176	0.186	0.362
GPRS 850	Left Cheek	0.506	0.086	0.592	GPRS 1900	Left Cheek	0.677	0.086	0.763
	Left Tilt	0.329	0.208	0.537		Left Tilt	0.389	0.208	0.597
	Right Cheek	0.546	0.089	0.635		Right Cheek	0.647	0.089	0.736
	Right Tilt	0.300	0.186	0.486		Right Tilt	0.255	0.186	0.441
WCDMA 850	Left Cheek	0.368	0.086	0.454	WCDMA 1700	Left Cheek	0.693	0.086	0.779
	Left Tilt	0.223	0.208	0.431		Left Tilt	0.439	0.208	0.647
	Right Cheek	0.404	0.089	0.493		Right Cheek	0.608	0.089	0.697
	Right Tilt	0.190	0.186	0.376		Right Tilt	0.382	0.186	0.568
WCDMA 1900	Left Cheek	0.924	0.086	1.010	LTE Band 5	Left Cheek	0.292	0.086	0.378
	Left Tilt	0.510	0.208	0.718		Left Tilt	0.171	0.208	0.379
	Right Cheek	0.913	0.089	1.002		Right Cheek	0.337	0.089	0.426
	Right Tilt	0.415	0.186	0.601		Right Tilt	0.145	0.186	0.331
LTE Band 7	Left Cheek	0.912	0.086	0.998					
	Left Tilt	0.121	0.208	0.329					
	Right Cheek	0.541	0.089	0.630					
	Right Tilt	0.494	0.186	0.680					

15.2 Simultaneous Transmission Summation for Body-Worn

Simultaneous Transmission Summation with 2.4 GHz 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	0.569	0.104	0.673
GSM 1900	Rear	0.686	0.104	0.790
WCDMA850	Rear	0.322	0.104	0.426
WCDMA1700	Rear	0.937	0.104	1.041
WCDMA1900	Rear	1.006	0.104	1.110
LTE Band 5	Rear	0.272	0.104	0.376
LTE Band 7	Rear	0.887	0.104	0.991

Simultaneous Transmission Summation with 5 GHz WIFI (1 cm)

Band	configuration	Scaled SAR (W/kg)	5 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM 850	Rear	0.569	0.023	0.592
GSM 1900	Rear	0.686	0.023	0.709
WCDMA850	Rear	0.322	0.023	0.345
WCDMA1700	Rear	0.937	0.023	0.960
WCDMA1900	Rear	1.006	0.023	1.029
LTE Band 5	Rear	0.272	0.023	0.295
LTE Band 7	Rear	0.887	0.023	0.910

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	0.569	0.21	0.779
GSM 1900	Rear	0.686	0.21	0.896
WCDMA850	Rear	0.322	0.21	0.532
WCDMA1700	Rear	0.937	0.21	1.147
WCDMA1900	Rear	1.006	0.21	1.216
LTE Band 5	Rear	0.272	0.21	0.482
LTE Band 7	Rear	0.887	0.21	1.097

15.3 Simultaneous Transmission Summation for Hotspot

Simultaneous Transmission Summation with 2.4 GHz WIFI (1 cm)

Band	configuration	Scaled SAR (W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)	Band	configuration	Scaled SAR (W/kg)	2.4 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM 850	Rear	0.569	0.104	0.673	GSM 1900	Rear	0.686	0.104	0.790
	Front	0.516	0.062	0.578		Front	0.697	0.062	0.759
	Left			0.000		Left	0.641		0.641
	Right	0.577	0.109	0.614		Right		0.109	0.109
	Bottom	0.252		0.252		Bottom	0.593		0.593
	Top		0.037	0.037		Top		0.037	0.037
WCDMA 850	Rear	0.322	0.104	0.426	WCDMA 1700	Rear	0.937	0.104	1.041
	Front	0.340	0.062	0.402		Front	1.094	0.062	1.156
	Left			0.000		Left	0.644		0.644
	Right	0.419	0.109	0.528		Right		0.109	0.109
	Bottom	0.225		0.225		Bottom	0.647		0.647
	Top		0.037	0.037		Top		0.037	0.037
WCDMA 1900	Rear	1.006	0.104	1.110	LTE Band 5	Rear	0.272	0.104	0.376
	Front	1.233	0.062	1.295		Front	0.279	0.062	0.341
	Left	1.021		1.021		Left			0.000
	Right		0.109	0.109		Right	0.294	0.109	0.403
	Bottom	0.939		0.939		Bottom	0.204		0.204
	Top		0.037	0.037		Top		0.037	0.037
LTE Band 7	Rear	0.887	0.104	0.991					
	Front	0.750	0.062	0.812					
	Left	0.367		0.367					
	Right		0.109	0.109					
	Bottom	0.660		0.660					
	Top		0.037	0.037					

Simultaneous Transmission Summation with 5 GHz WIFI (1 cm)

Band	configuration	Scaled SAR (W/kg)	5 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)	Band	configuration	Scaled SAR (W/kg)	5 GHz WIFI Scaled SAR (W/kg)	∑ 1-g SAR (W/kg)
GSM 850	Rear	0.569	0.023	0.592	GSM 1900	Rear	0.686	0.023	0.709
	Front	0.516	0.001	0.517		Front	0.697	0.001	0.698
	Left			0.000		Left	0.641		0.641
	Right	0.577	0.073	0.650		Right		0.073	0.073
	Bottom	0.252		0.252		Bottom	0.593		0.593
	Top		0.045	0.045		Top		0.045	0.045
WCDMA 850	Rear	0.322	0.023	0.345	WCDMA 1700	Rear	0.937	0.023	0.960
	Front	0.340	0.001	0.341		Front	1.094	0.001	1.095
	Left			0.000		Left	0.644		0.644
	Right	0.419	0.073	0.492		Right		0.073	0.073
	Bottom	0.225		0.225		Bottom	0.647		0.647
	Top		0.045	0.045		Top		0.045	0.045
WCDMA 1900	Rear	1.006	0.023	1.029	LTE Band 5	Rear	0.272	0.023	0.295
	Front	1.233	0.001	1.234		Front	0.279	0.001	0.280
	Left	1.021		1.021		Left			0.000
	Right		0.073	0.073		Right	0.294	0.073	0.367
	Bottom	0.939		0.939		Bottom	0.204		0.204
	Top		0.045	0.045		Top		0.045	0.045
LTE Band 7	Rear	0.887	0.023	0.910					
	Front	0.750	0.001	0.751					
	Left	0.367		0.367					
	Right		0.073	0.073					
	Bottom	0.660		0.660					
	Top		0.045	0.045					

15.4 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05

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

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Attachment 1. – SAR Test Plots

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	Aug.20, 2013
Plot NO.	1

DUT: LGD821; Type: Bar; Serial: #1

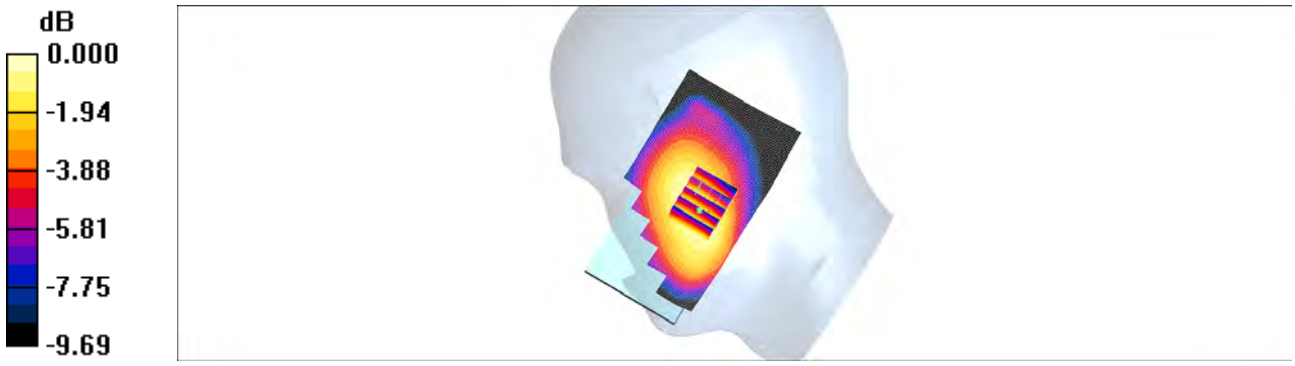
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.92 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.56, 6.56, 6.56); Calibrated: 2013-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

GSM850 Right Touch GPRS 2Tx 190/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.495 mW/g

GSM850 Right Touch GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = -0.129 dB
Peak SAR (extrapolated) = 0.609 W/kg
SAR(1 g) = 0.466 mW/g; SAR(10 g) = 0.343 mW/g
Maximum value of SAR (measured) = 0.500 mW/g



0 dB = 0.500mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.2 ℃
Ambient Temperature:	20.4 ℃
Test Date:	Aug.27, 2013
Plot NO.	2

DUT: LGD821; Type: Bar; Serial: #1

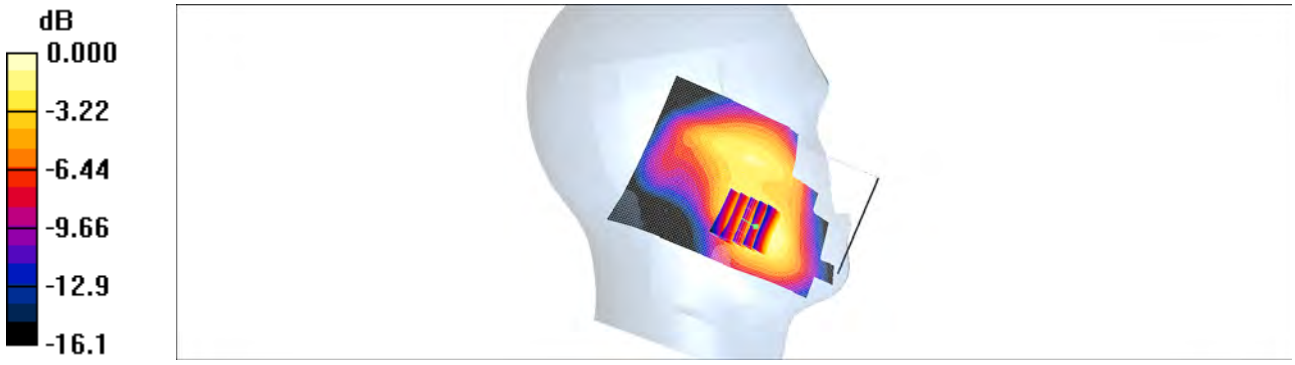
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.39 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.3, 8.3, 8.3); Calibrated: 2013-03-18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: 800/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

GSM1900 Left Touch GPRS 2Tx 661/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.647 mW/g

GSM1900 Left Touch GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.29 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 0.896 W/kg
SAR(1 g) = 0.576 mW/g; SAR(10 g) = 0.355 mW/g
Maximum value of SAR (measured) = 0.631 mW/g



0 dB = 0.631mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	Aug.20, 2013
Plot NO.	3

DUT: LGD821; Type: Bar; Serial: #1

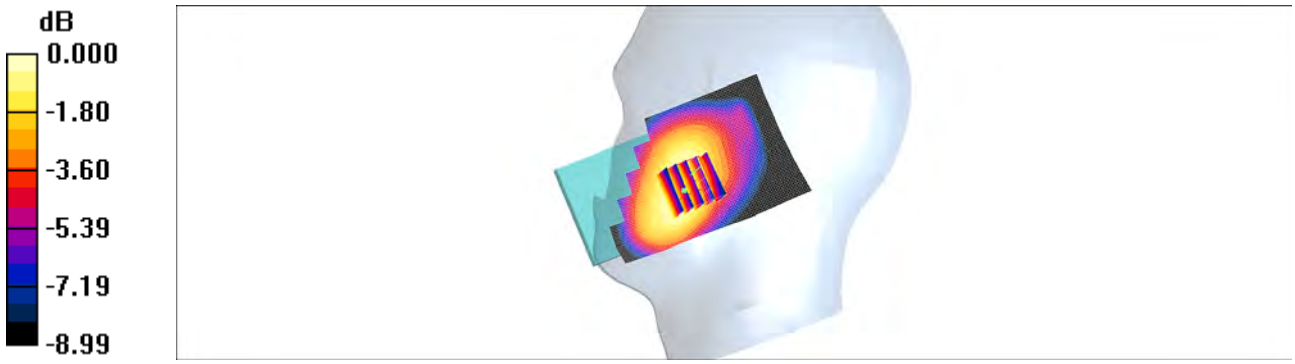
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.92 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.56, 6.56, 6.56); Calibrated: 2013-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA850 Right Touch 4183/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.405 mW/g

WCDMA850 Right Touch 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.3 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 0.496 W/kg
SAR(1 g) = 0.385 mW/g; SAR(10 g) = 0.286 mW/g
Maximum value of SAR (measured) = 0.409 mW/g



0 dB = 0.409mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.5 ℃
Ambient Temperature:	20.7 ℃
Test Date:	Aug.22, 2013
Plot NO.	4

DUT: LGD821; Type: Bar; Serial: #1

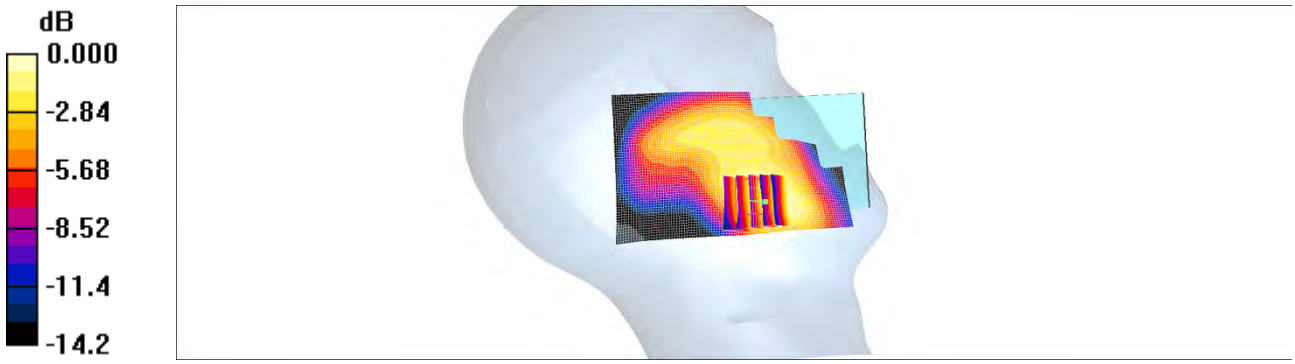
Communication System: WCDMA IV; Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.34 mho/m; ε_r = 42.7; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.6, 8.6, 8.6); Calibrated: 2013-03-18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: 800/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1700 Left Touch 1412/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.709 mW/g

WCDMA1700 Left Touch 1412/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.9 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 0.935 W/kg
SAR(1 g) = 0.644 mW/g; SAR(10 g) = 0.423 mW/g
Maximum value of SAR (measured) = 0.697 mW/g



0 dB = 0.697mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.2 ℃
Ambient Temperature:	20.4 ℃
Test Date:	Aug.27, 2013
Plot NO.	5

DDUT: LGD821; Type: Bar; Serial: #1

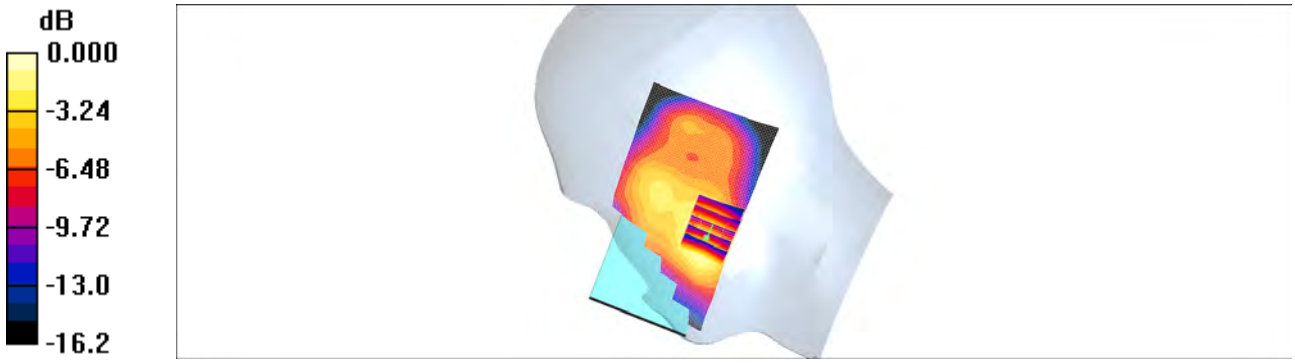
Communication System: WCDMA1900; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.42 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.3, 8.3, 8.3); Calibrated: 2013-03-18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: 800/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1900 Right Touch 9538/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.909 mW/g

WCDMA1900 Right Touch 9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.7 V/m; Power Drift = 0.055 dB
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.823 mW/g; SAR(10 g) = 0.518 mW/g
Maximum value of SAR (measured) = 0.896 mW/g



0 dB = 0.896mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	Aug.20, 2013
Plot NO.	6

DUT: LGD821; Type: Bar; Serial: #1

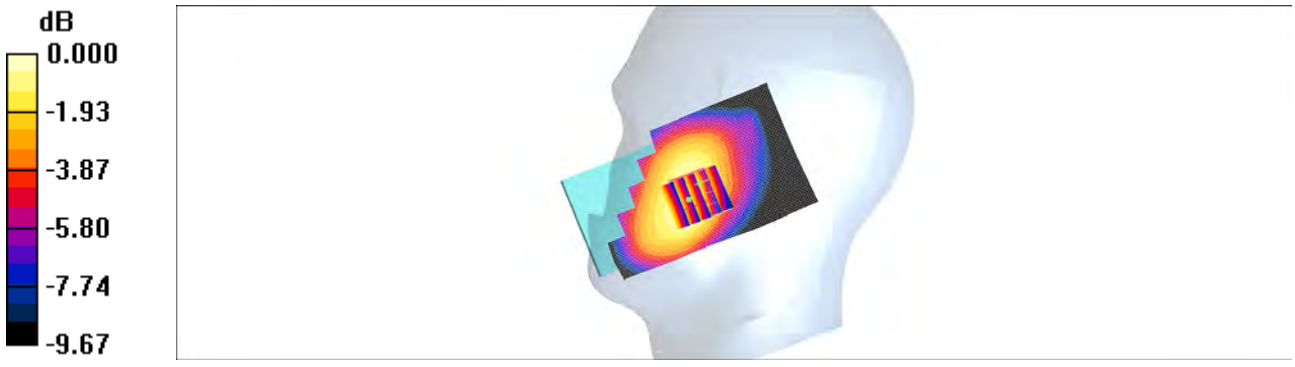
Communication System: LTE Band 5; Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.92 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.56, 6.56, 6.56); Calibrated: 2013-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

LTE5 Right Touch QPSK 10MHz 1RB 24offset 20525/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.337 mW/g

LTE5 Right Touch QPSK 10MHz 1RB 24offset 20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.25 V/m; Power Drift = -0.046 dB
Peak SAR (extrapolated) = 0.428 W/kg
SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.240 mW/g
Maximum value of SAR (measured) = 0.352 mW/g



0 dB = 0.352mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.5 ℃
Ambient Temperature:	20.7 ℃
Test Date:	Aug.30, 2013
Plot NO.	7

DUT: LGD821; Type: Bar; Serial: #1

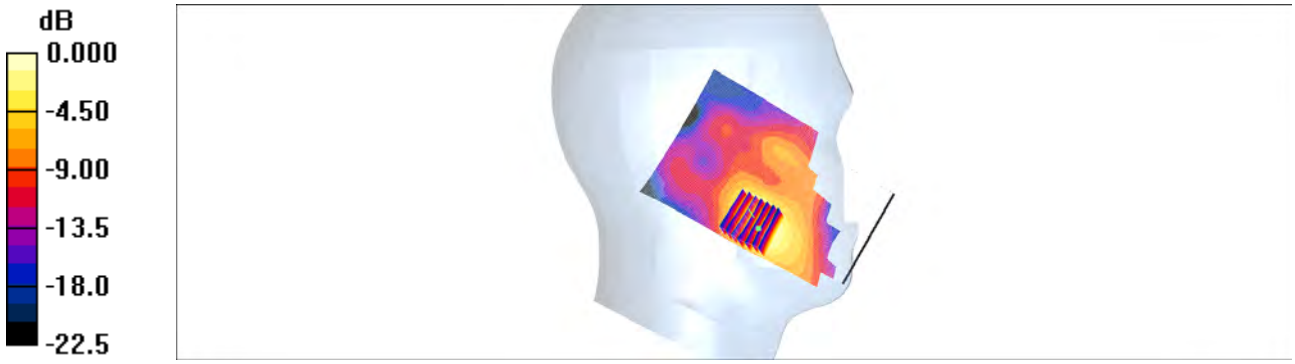
Communication System: LTE Band 7; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2510 MHz; σ = 1.89 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.68, 6.68, 6.68); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 800/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

LTE Band7 Left Touch QPSK 20MHz 1RB 49offset 20850/Area Scan (81x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.06 mW/g

LTE Band7 Left Touch QPSK 20MHz 1RB 49offset 20850/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.88 V/m; Power Drift = 0.151 dB
Peak SAR (extrapolated) = 1.82 W/kg
SAR(1 g) = 0.912 mW/g; SAR(10 g) = 0.448 mW/g
Maximum value of SAR (measured) = 0.996 mW/g



0 dB = 0.996mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Sep. 02, 2013
Plot NO.	8

DUT: LGD821; Type: Bar; Serial: #1

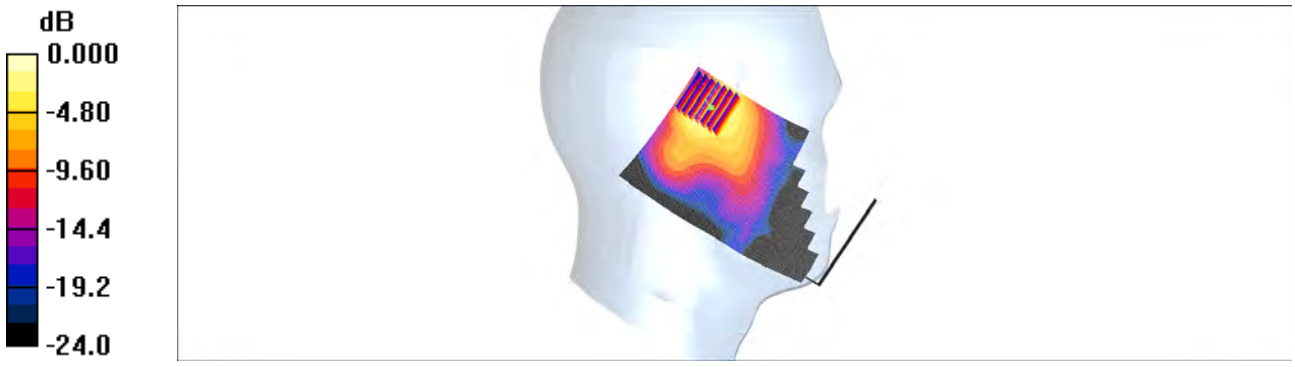
Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.79 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.08, 7.08, 7.08); Calibrated: 2013-07-31
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2012-04-27
- Phantom: 835/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

802.11b Left Touch 1Mbps 6/Area Scan (81x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.542 mW/g

802.11b Left Touch 1Mbps 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.01 V/m; Power Drift = 0.061 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.486 mW/g; SAR(10 g) = 0.219 mW/g
Maximum value of SAR (measured) = 0.532 mW/g



0 dB = 0.532mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.1 ℃
Ambient Temperature:	20.3 ℃
Test Date:	Sep. 03 2013
Plot NO.	9

DUT: LGD821; Type: Bar; Serial: #1

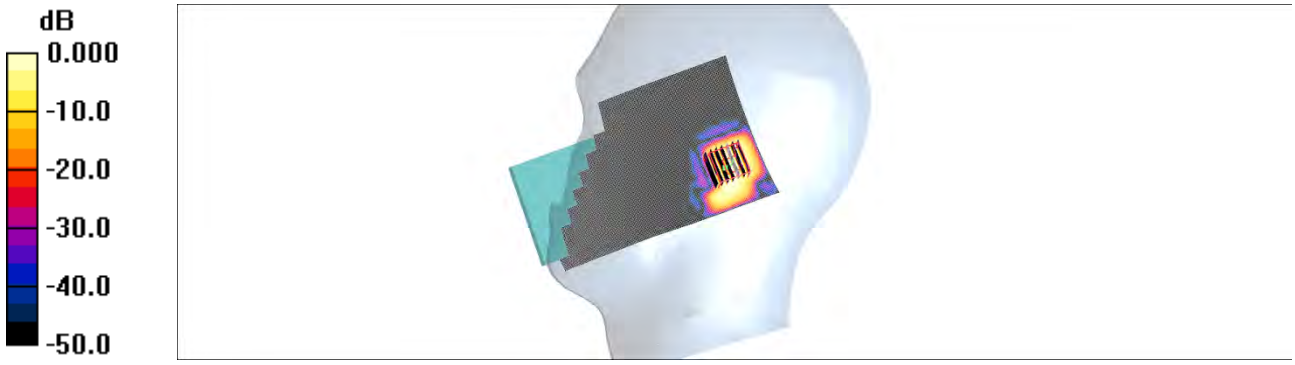
Communication System: WIFI 5GHz; Frequency: 5825 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 5.33 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.7, 4.7, 4.7); Calibrated: 2013-07-31
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: 835/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

802.11a Right tilt 165ch 6Mbps/Area Scan (101x171x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.194 mW/g

802.11a Right tilt 165ch 6Mbps/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.00 V/m; Power Drift = 0.161 dB
Peak SAR (extrapolated) = 0.220 W/kg
SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.124 mW/g



0 dB = 0.124mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.1 ℃
Ambient Temperature:	20.3 ℃
Test Date:	Sep. 03, 2013
Plot NO.	10

DUT: LGD821; Type: Bar; Serial: #1

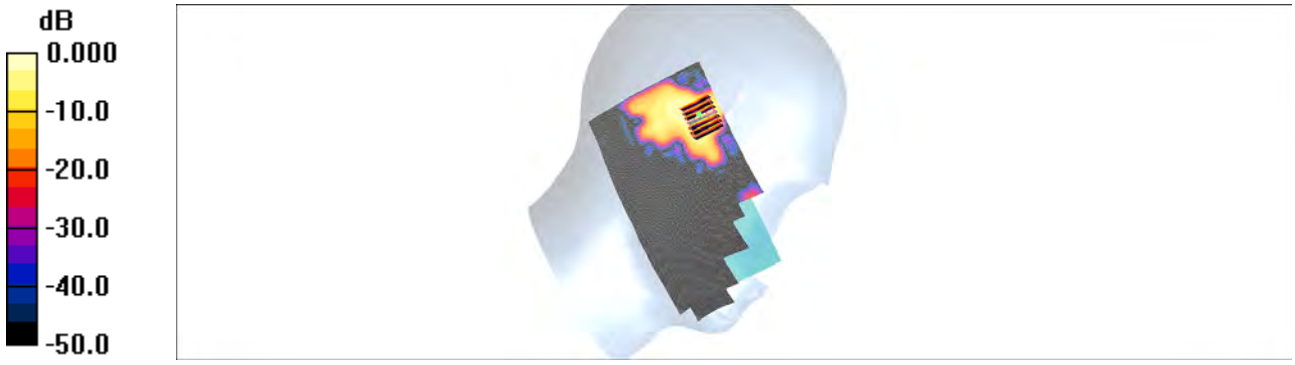
Communication System: WIFI 5GHz; Frequency: 5290 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5290 MHz; σ = 4.65 mho/m; ε_r = 35.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.83, 4.83, 4.83); Calibrated: 2013-07-31
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: 835/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

802.11ac Left touch 58ch MCS0/Area Scan (101x171x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.449 mW/g

802.11ac Left touch 58ch MCS0/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.95 V/m; Power Drift = 0.151 dB
Peak SAR (extrapolated) = 0.875 W/kg
SAR(1 g) = 0.197 mW/g; SAR(10 g) = 0.056 mW/g
Maximum value of SAR (measured) = 0.423 mW/g



0 dB = 0.423mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Aug. 21, 2013
Plot NO.	11

DUT: DUT: LGD821; Type: Bar; Serial: #1

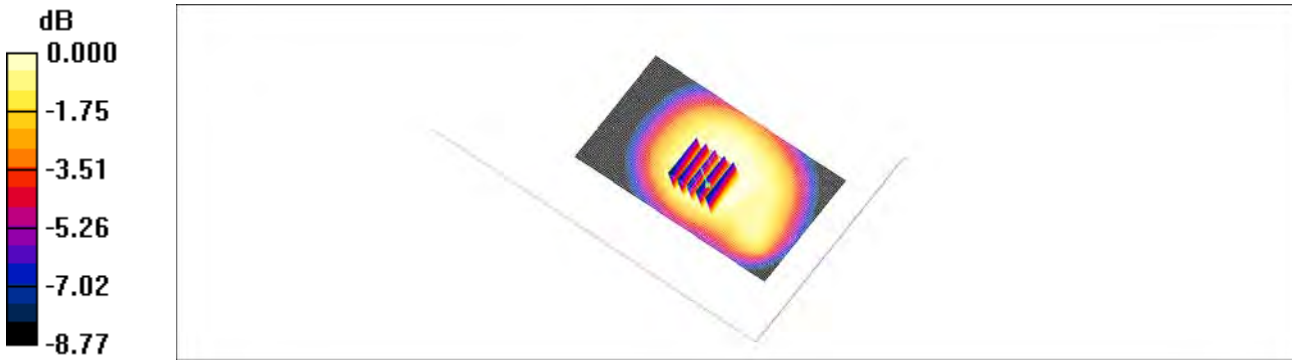
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

GSM850 Body Rear GPRS 2Tx 190/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.532 mW/g

GSM850 Body Rear GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.9 V/m; Power Drift = -0.174 dB
Peak SAR (extrapolated) = 0.628 W/kg
SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.372 mW/g
Maximum value of SAR (measured) = 0.509 mW/g



0 dB = 0.509mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Aug. 21, 2013
Plot NO.	12

DUT: LGD821; Type: Bar; Serial: #1

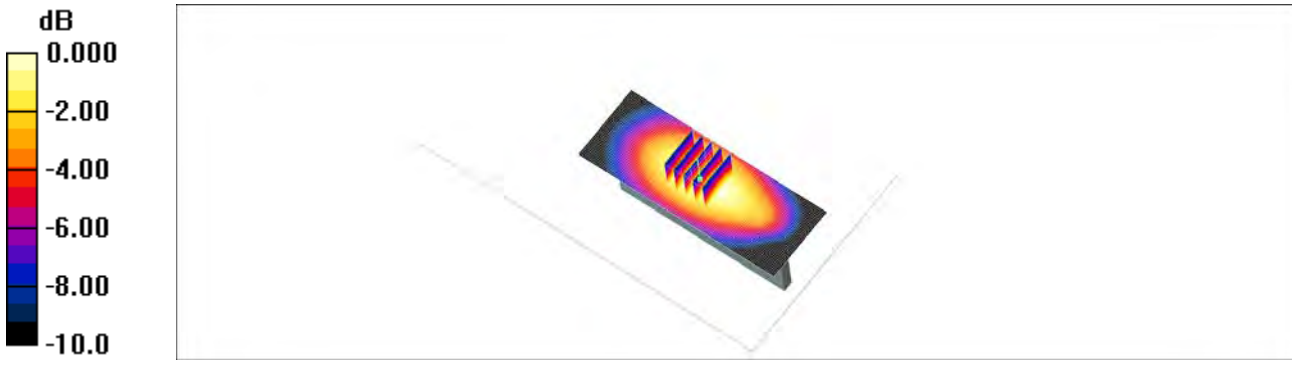
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

GSM850 Body Right GPRS 2Tx 190/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.532 mW/g

GSM850 Body Right GPRS 2Tx 190/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.9 V/m; Power Drift = -0.045 dB
Peak SAR (extrapolated) = 0.670 W/kg
SAR(1 g) = 0.492 mW/g; SAR(10 g) = 0.340 mW/g
Maximum value of SAR (measured) = 0.527 mW/g



0 dB = 0.527mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.3 ℃
Ambient Temperature:	20.5 ℃
Test Date:	Aug. 28, 2013
Plot NO.	13

DUT: LGD821; Type: Bar; Serial: #1

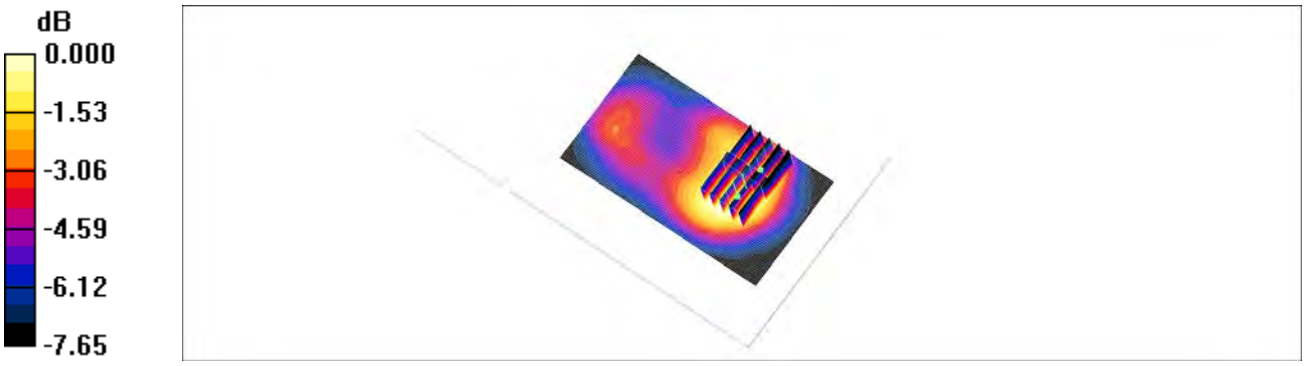
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

GSM1900 Body Rear GPRS 2Tx 661/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.632 mW/g

GSM1900 Body Rear GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 0.821 W/kg
SAR(1 g) = 0.584 mW/g; SAR(10 g) = 0.406 mW/g
Maximum value of SAR (measured) = 0.620 mW/g
GSM1900 Body Rear GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.2 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 0.813 W/kg
SAR(1 g) = 0.523 mW/g; SAR(10 g) = 0.358 mW/g
Maximum value of SAR (measured) = 0.579 mW/g



0 dB = 0.579mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.3 ℃
Ambient Temperature:	20.5 ℃
Test Date:	Aug. 28, 2013
Plot NO.	14

DUT: LGD821; Type: Bar; Serial: #1

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

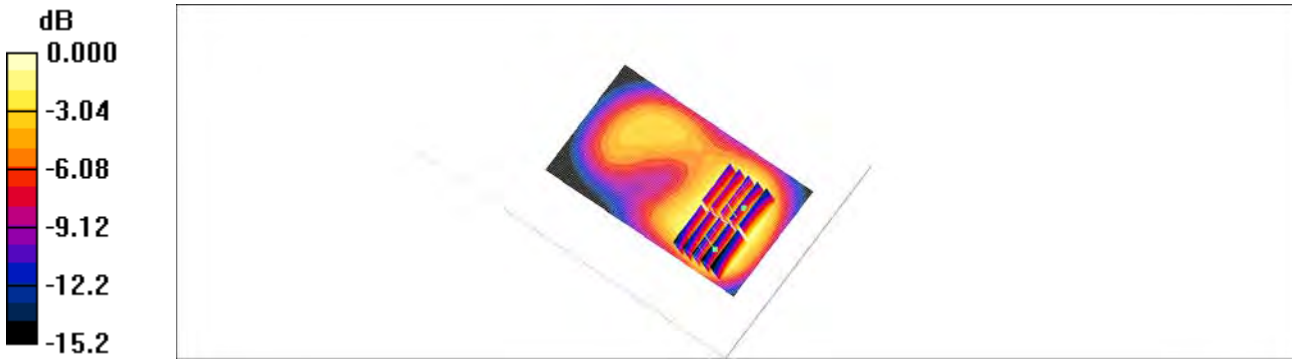
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

GSM1900 Body Front GPRS 2Tx 661/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.670 mW/g

GSM1900 Body Front GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.0 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 0.950 W/kg
SAR(1 g) = 0.553 mW/g; SAR(10 g) = 0.354 mW/g
Maximum value of SAR (measured) = 0.596 mW/g

GSM1900 Body Front GPRS 2Tx 661/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.0 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 0.884 W/kg
SAR(1 g) = 0.593 mW/g; SAR(10 g) = 0.393 mW/g
Maximum value of SAR (measured) = 0.629 mW/g



0 dB = 0.629mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Aug.21, 2013
Plot NO.	15

DUT: LGD821; Type: Bar; Serial: #1

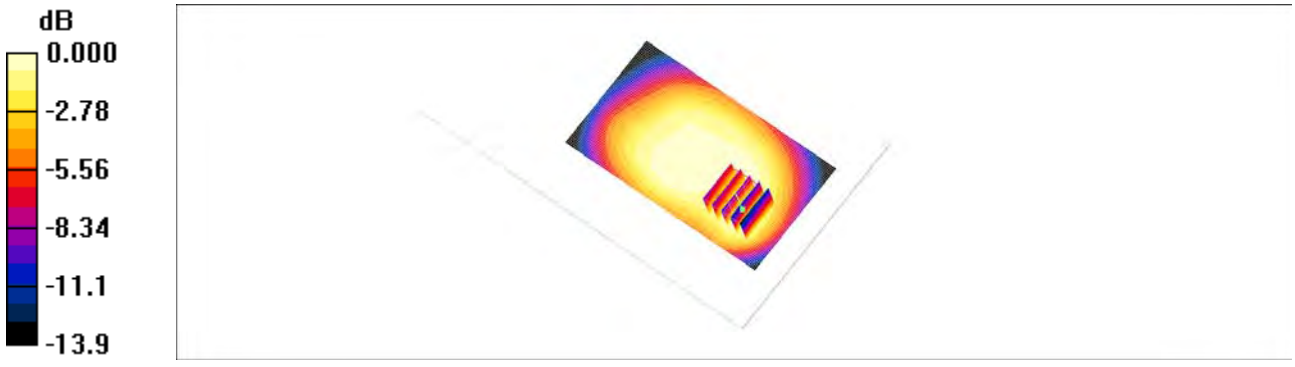
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA850 Body Rear 4183/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.316 mW/g

WCDMA850 Body Rear 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.2 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 0.433 W/kg
SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.213 mW/g
Maximum value of SAR (measured) = 0.329 mW/g



0 dB = 0.329mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Aug.21, 2013
Plot NO.	16

DUT: LGD821; Type: Bar; Serial: #1

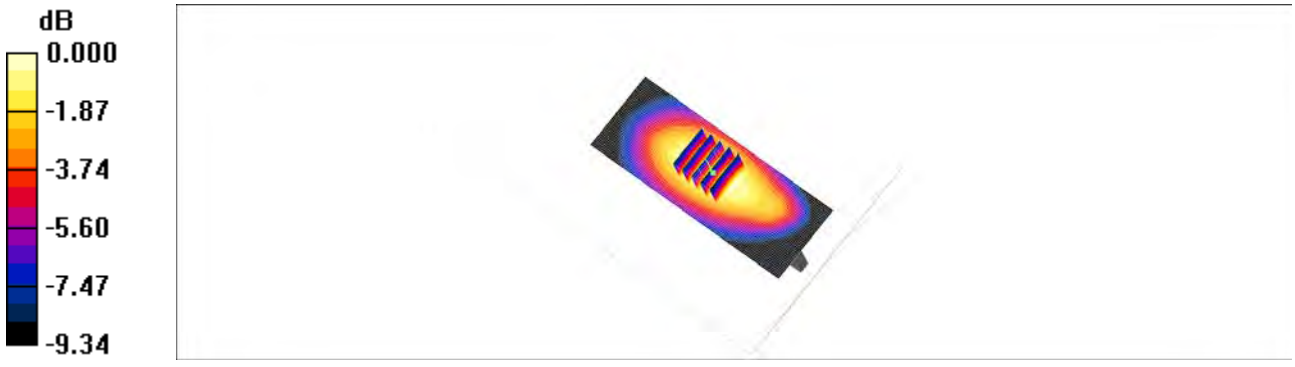
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.985 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA850 Body Right 4183/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.432 mW/g

WCDMA850 Body Right 4183/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.0 V/m; Power Drift = -0.113 dB
Peak SAR (extrapolated) = 0.543 W/kg
SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.275 mW/g
Maximum value of SAR (measured) = 0.431 mW/g



0 dB = 0.431mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.2 ℃
Ambient Temperature:	20.4 ℃
Test Date:	Aug.23, 2013
Plot NO.	17

DUT: LGD821; Type: Bar; Serial: #1

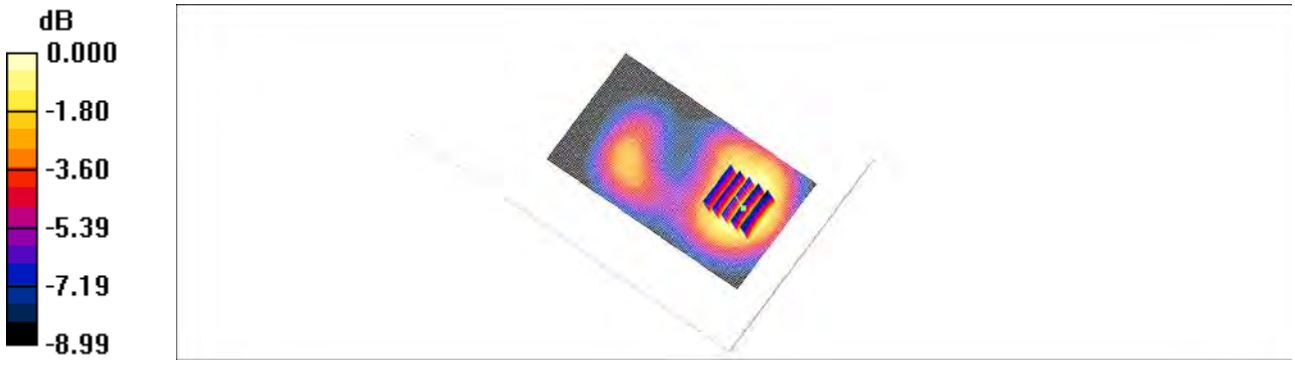
Communication System: WCDMA IV; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1712.4 MHz; σ = 1.47 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.58, 7.58, 7.58); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1700 Body Rear 1312/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.950 mW/g

WCDMA1700 Body Rear 1312/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.9 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.891 mW/g; SAR(10 g) = 0.626 mW/g
Maximum value of SAR (measured) = 0.949 mW/g



0 dB = 0.949mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.2 ℃
Ambient Temperature:	20.4 ℃
Test Date:	Aug.23, 2013
Plot NO.	18

DUT: LGD821; Type: Bar; Serial: #1

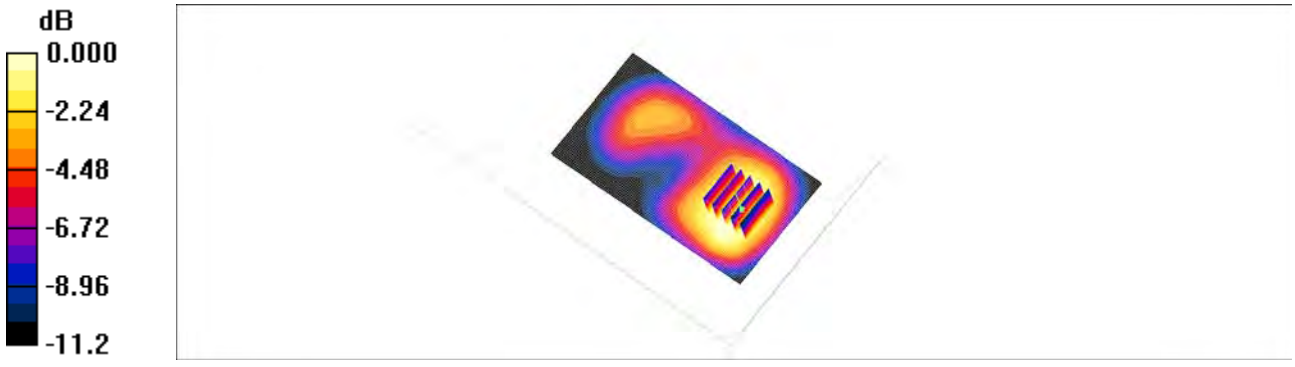
Communication System: WCDMA IV; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1712.4 MHz; σ = 1.47 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.58, 7.58, 7.58); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1700 Body Front 1312/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.12 mW/g

WCDMA1700 Body Front 1312/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.0 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.720 mW/g
Maximum value of SAR (measured) = 1.11 mW/g



0 dB = 1.11mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.3 ℃
Ambient Temperature:	20.5 ℃
Test Date:	Aug.28, 2013
Plot NO.	19

DUT: LGD821; Type: Bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

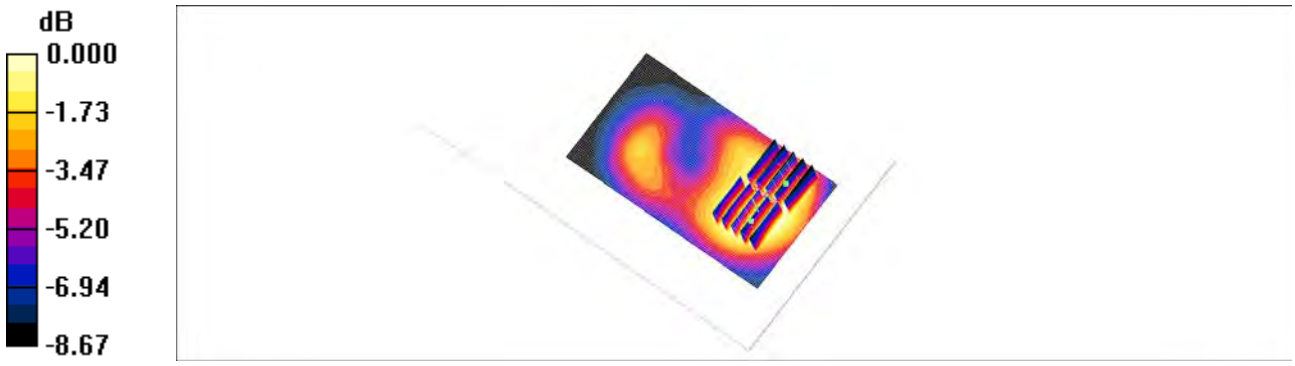
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1900 Body Rear 9400/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.843 mW/g

WCDMA1900 Body Rear 9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.2 V/m; Power Drift = 0.073 dB
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.790 mW/g; SAR(10 g) = 0.544 mW/g
Maximum value of SAR (measured) = 0.833 mW/g

WCDMA1900 Body Rear 9400/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.2 V/m; Power Drift = 0.073 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.443 mW/g
Maximum value of SAR (measured) = 0.734 mW/g



0 dB = 0.734mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.3 ℃
Ambient Temperature:	20.5 ℃
Test Date:	Aug.28, 2013
Plot NO.	20

DUT: LGD821; Type: Bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.46 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

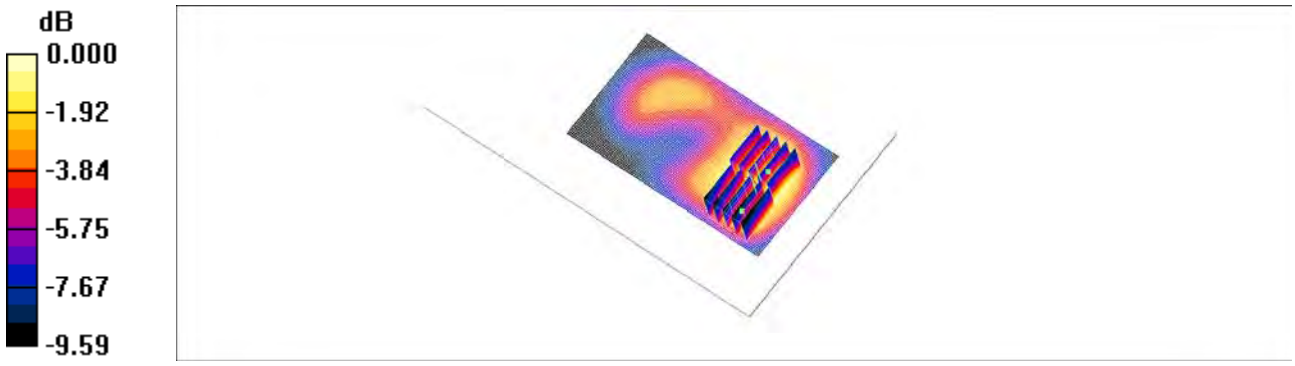
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1900 Body Front 9262/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.06 mW/g

WCDMA1900 Body Front 9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.4 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.986 mW/g; SAR(10 g) = 0.683 mW/g
Maximum value of SAR (measured) = 1.04 mW/g

WCDMA1900 Body Front 9262/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.4 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.897 mW/g; SAR(10 g) = 0.586 mW/g
Maximum value of SAR (measured) = 0.973 mW/g



0 dB = 0.973mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Aug.21, 2013
Plot NO.	21

DUT: LGD821; Type: Bar; Serial: #1

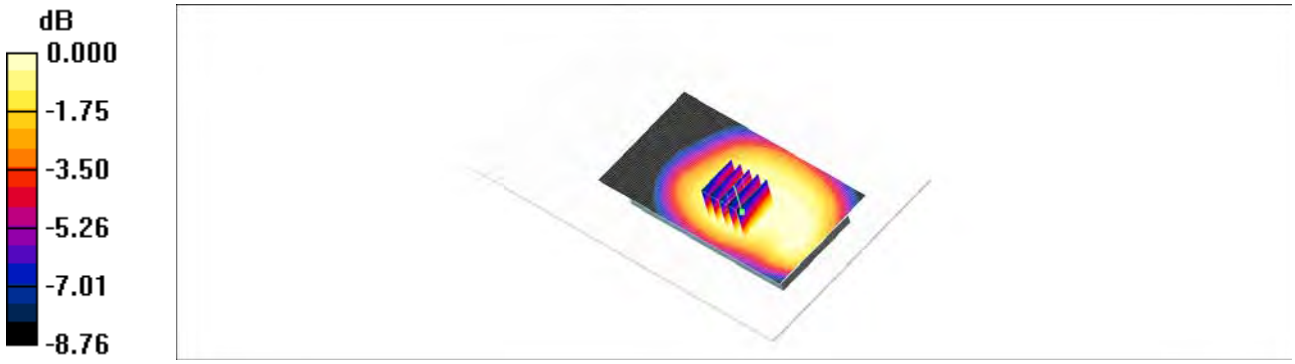
Communication System: LTE Band 5; Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.985 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

LTE Band5 Body Rear QPSK 10MHz 1RB 24offset 20525/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.286 mW/g

LTE Band5 Body Rear QPSK 10MHz 1RB 24offset 20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = 0.109 dB
Peak SAR (extrapolated) = 0.347 W/kg
SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.203 mW/g
Maximum value of SAR (measured) = 0.280 mW/g



0 dB = 0.280mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Aug.21, 2013
Plot NO.	22

DUT: LGD821; Type: Bar; Serial: #1

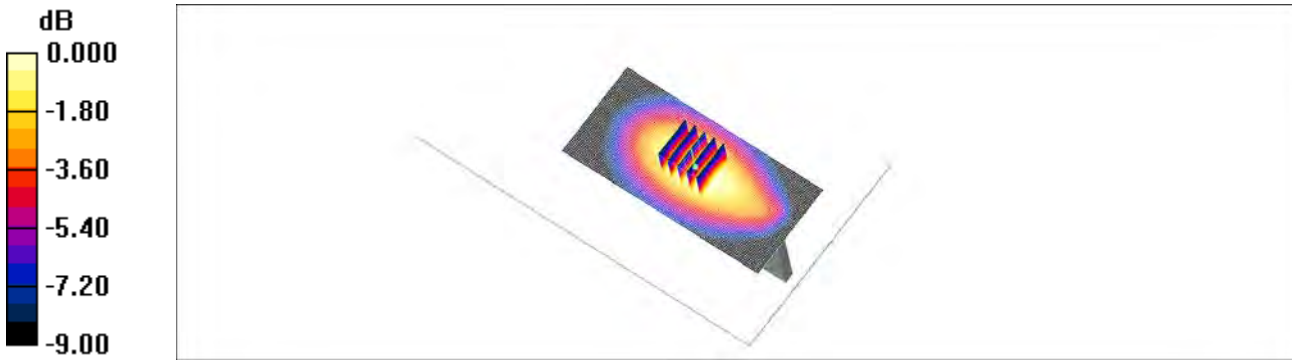
Communication System: LTE Band 5; Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.985 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

LTE Band5 Body Right QPSK 10MHz 1RB 24offset 20525/Area Scan (51x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.308 mW/g

LTE Band5 Body Right QPSK 10MHz 1RB 24offset 20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.8 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 0.384 W/kg
SAR(1 g) = 0.287 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.306 mW/g



0 dB = 0.306mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.0 ℃
Ambient Temperature:	20.2 ℃
Test Date:	Aug. 31, 2013
Plot NO.	23

DUT: LGD821; Type: Bar; Serial: #1

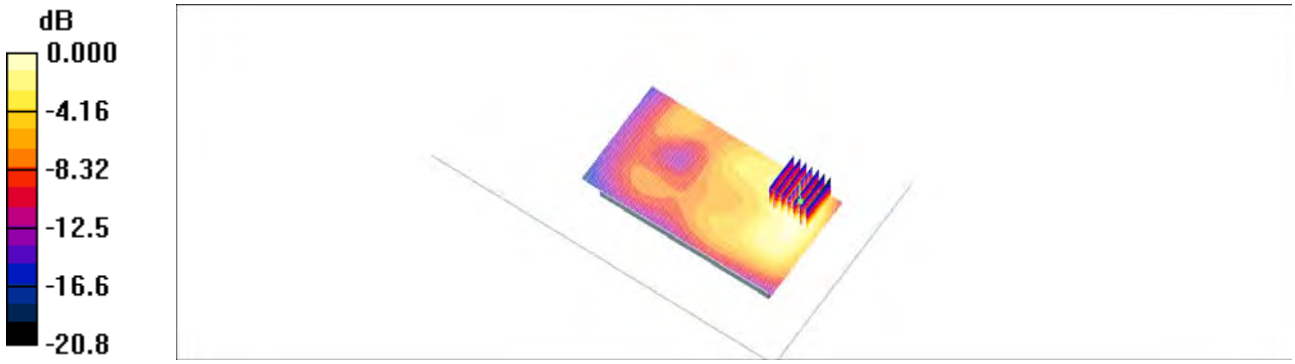
Communication System: LTE Band 7; Frequency: 2535 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2535 MHz; σ = 2.09 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.73, 6.73, 6.73); Calibrated: 2012-11-22
- 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;

LTE Band7 Body Rear QPSK 20MHz 1RB 49offset 21100/Area Scan (71x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.960 mW/g

LTE Band7 Body Rear QPSK 20MHz 1RB 49offset 21100/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.39 V/m; Power Drift = 0.182 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 0.887 mW/g; SAR(10 g) = 0.482 mW/g
Maximum value of SAR (measured) = 0.981 mW/g



0 dB = 0.981mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Sep. 02, 2013
Plot NO.	24

DUT: LGD821; Type: Bar; Serial: #1

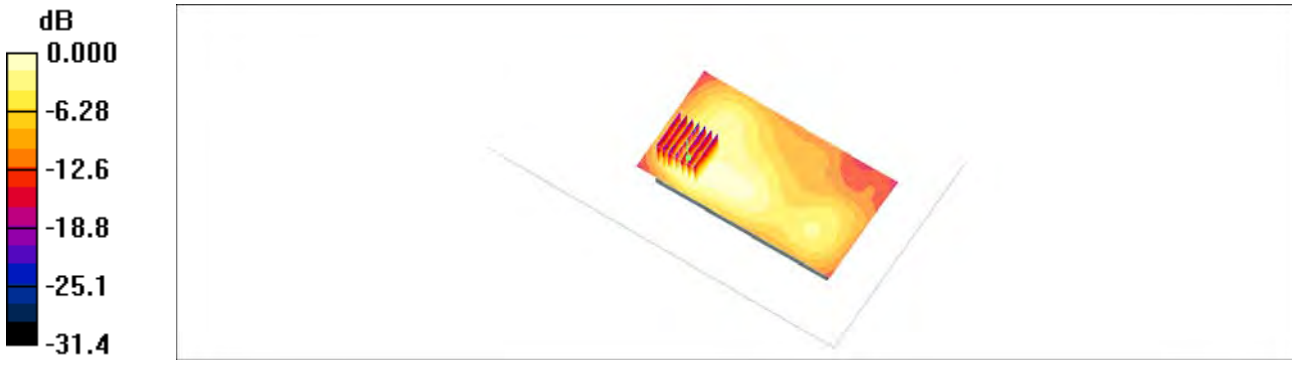
Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- 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;

802.11b Body Rear 1Mbps 6/Area Scan (71x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.106 mW/g

802.11b Body Rear 1Mbps 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.19 V/m; Power Drift = 0.135 dB
Peak SAR (extrapolated) = 0.198 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.047 mW/g
Maximum value of SAR (measured) = 0.105 mW/g



0 dB = 0.105mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.4 ℃
Ambient Temperature:	20.6 ℃
Test Date:	Sep. 02, 2013
Plot NO.	25

DUT: LGD821; Type: Bar; Serial: #1

Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- 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;

802.11b Body Right 1Mbps 6/Area Scan (41x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.108 mW/g

802.11b Body Right 1Mbps 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.82 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 0.177 W/kg
SAR(1 g) = 0.098 mW/g; SAR(10 g) = 0.053 mW/g
Maximum value of SAR (measured) = 0.109 mW/g

0 dB = 0.109mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.1 ℃
Ambient Temperature:	20.3 ℃
Test Date:	Sep. 03, 2013
Plot NO.	26

DUT: LGD821; Type: Bar; Serial: #1

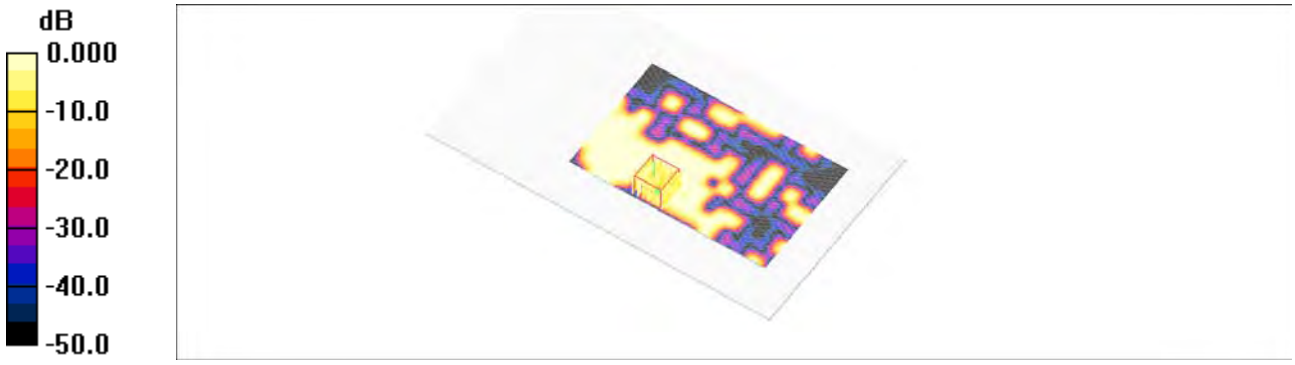
Communication System: WIFI 5GHz; Frequency: 5825 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 6.19 mho/m; ε_r = 46.3; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(4.01, 4.01, 4.01); Calibrated: 2013-03-18
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

802.11a Body Rear 165ch 6Mbps/Area Scan (101x161x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.049 mW/g

802.11a Body Rear 165ch 6Mbps/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.45 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.186 W/kg
SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00566 mW/g
Maximum value of SAR (measured) = 0.032 mW/g



0 dB = 0.032mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.1 ℃
Ambient Temperature:	20.3 ℃
Test Date:	Sep. 03, 2013
Plot NO.	27

DUT: LGD821; Type: Bar; Serial: #1

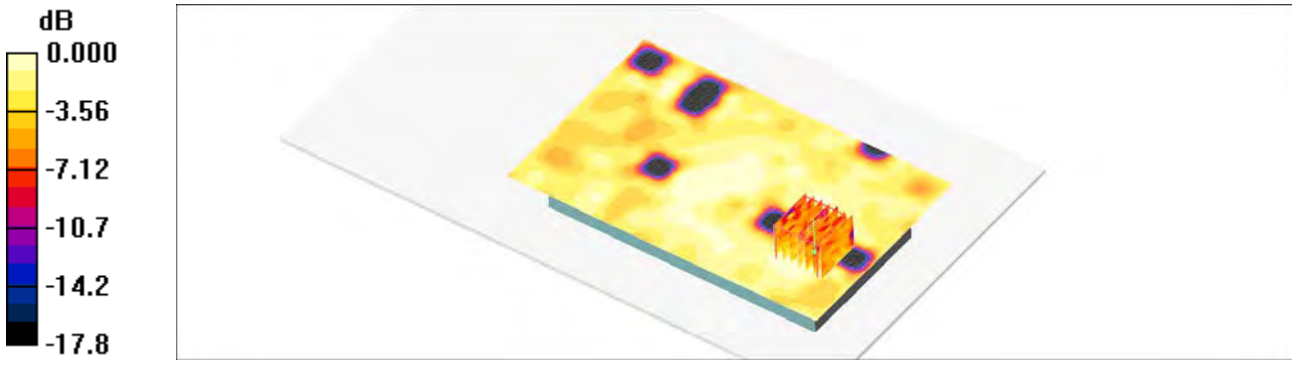
Communication System: WIFI 5GHz; Frequency: 5530 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5530 MHz; σ = 5.74 mho/m; ε_r = 47.2; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(3.86, 3.86, 3.86); Calibrated: 2013-03-18
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 71;

802.11ac Body Rear 106ch MCS0/Area Scan (101x161x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.068 mW/g

802.11ac Body Rear 106ch MCS0/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.81 V/m; Power Drift = -3.18 dB
Peak SAR (extrapolated) = 0.171 W/kg
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.018 mW/g
Maximum value of SAR (measured) = 0.058 mW/g



0 dB = 0.058mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.2 ℃
Ambient Temperature:	20.4 ℃
Test Date:	Aug.23, 2013
Plot NO.	28

DUT: LGD821; Type: Bar; Serial: #1

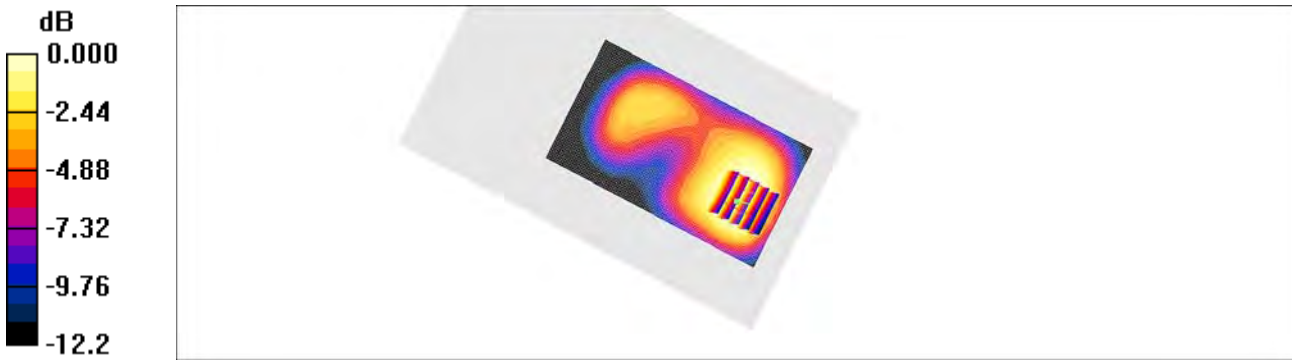
Communication System: WCDMA IV; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1712.4 MHz; σ = 1.47 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.58, 7.58, 7.58); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1700 Body Front 1312/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.10 mW/g

WCDMA1700 Body Front 1312/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.7 V/m; Power Drift = 0.012 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.701 mW/g
Maximum value of SAR (measured) = 1.08 mW/g



0 dB = 1.08mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.3 ℃
Ambient Temperature:	20.5 ℃
Test Date:	Aug.28, 2013
Plot NO.	29

DUT: LGD821; Type: Bar; Serial: #1

Communication System: WCDMA1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.46 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

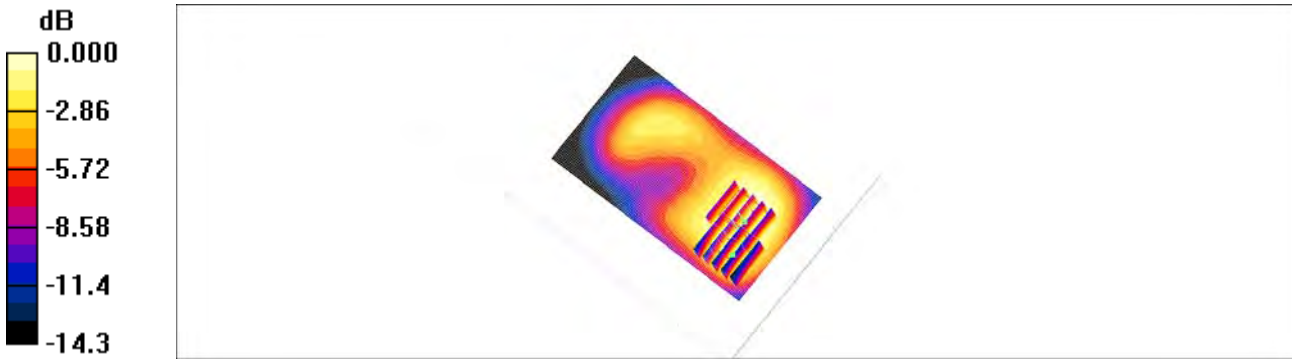
DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C_20120905; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

WCDMA1900 Body Front 9262/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.983 mW/g

WCDMA1900 Body Front 9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.4 V/m; Power Drift = -0.163 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.948 mW/g; SAR(10 g) = 0.636 mW/g
Maximum value of SAR (measured) = 1.01 mW/g

WCDMA1900 Body Front 9262/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.4 V/m; Power Drift = -0.163 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.877 mW/g; SAR(10 g) = 0.553 mW/g
Maximum value of SAR (measured) = 0.965 mW/g



0 dB = 0.965mW/g

Test Laboratory:	HCT CO., LTD
EUT Type:	GSM/WCDMA/LTE Phone with Bluetooth, WLAN(2.4GHz & 5GHz) and NFC
Liquid Temperature:	20.5 ℃
Ambient Temperature:	20.7 ℃
Test Date:	Aug.30, 2013
Plot NO.	30

DUT: LGD821; Type: Bar; Serial: #1

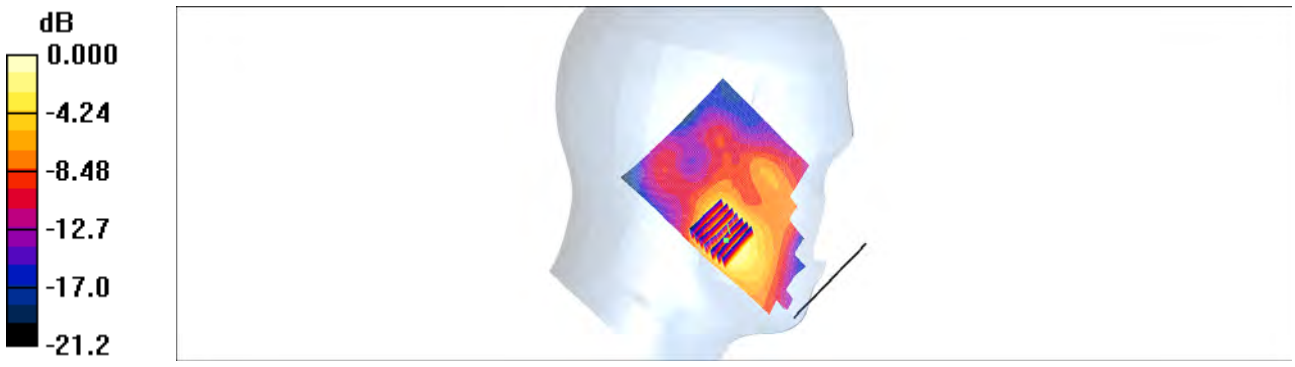
Communication System: LTE Band 7; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2510 MHz; σ = 1.89 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.68, 6.68, 6.68); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 800/900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

LTE Band7 Left Touch QPSK 20MHz 1RB 49offset 20850/Area Scan (81x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.977 mW/g

LTE Band7 Left Touch QPSK 20MHz 1RB 49offset 20850/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.04 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 1.61 W/kg
SAR(1 g) = 0.849 mW/g; SAR(10 g) = 0.432 mW/g
Maximum value of SAR (measured) = 0.934 mW/g



0 dB = 0.934mW/g

Attachment 2. – Dipole Verification Plots

■ Verification Data (835 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.6 ℃
Test Date:	Aug.20, 2013

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

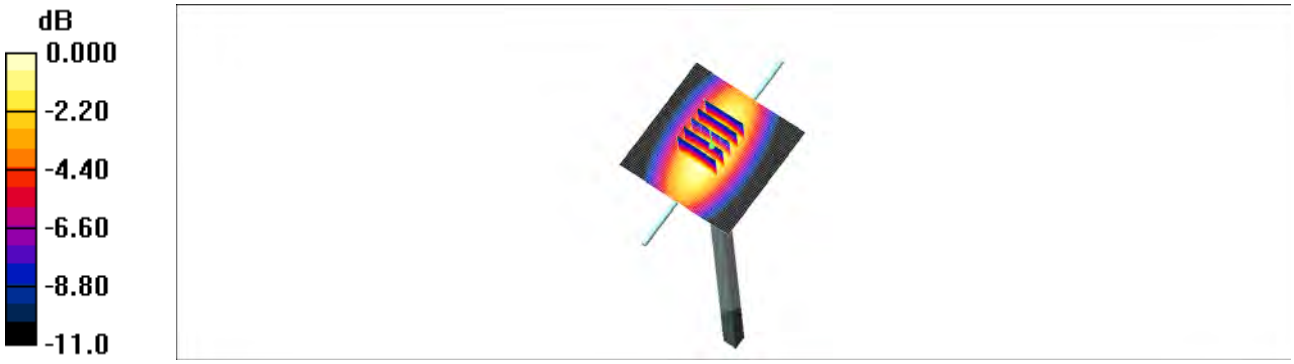
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.919 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1630; ConvF(6.56, 6.56, 6.56); Calibrated: 2013-01-24
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2013-04-24
- Phantom: SAM 1800/1900 MHz; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 835MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.05 mW/g

Verification 835MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.1 V/m; Power Drift = 0.009 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 0.967 mW/g; SAR(10 g) = 0.620 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.06mW/g

■ Verification Data (835 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.4 ℃
Test Date: Aug.21, 2013

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

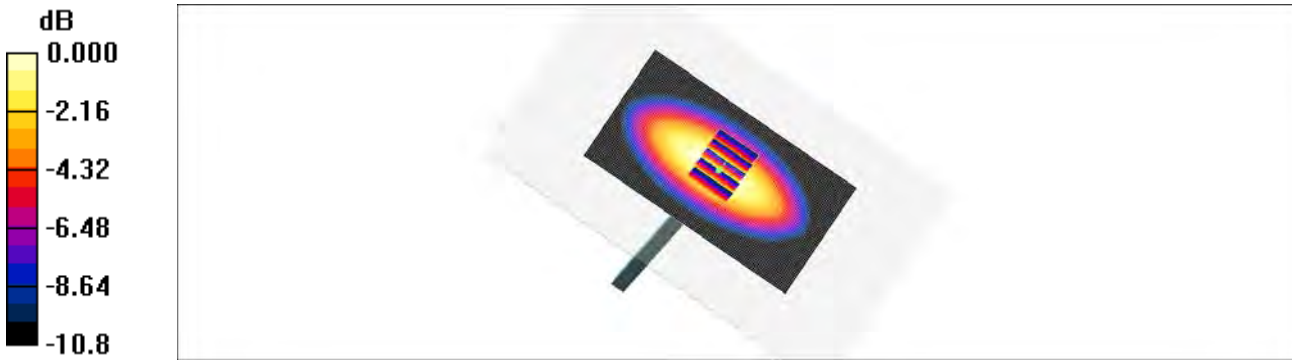
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.983 mho/m; ε_r = 56.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1798; ConvF(6.46, 6.46, 6.46); Calibrated: 2013-04-29
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

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

Verification 835 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.7 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.960 mW/g; SAR(10 g) = 0.621 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

■ Verification Data (1 800 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.2 ℃
Test Date: Aug.27, 2013

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d007

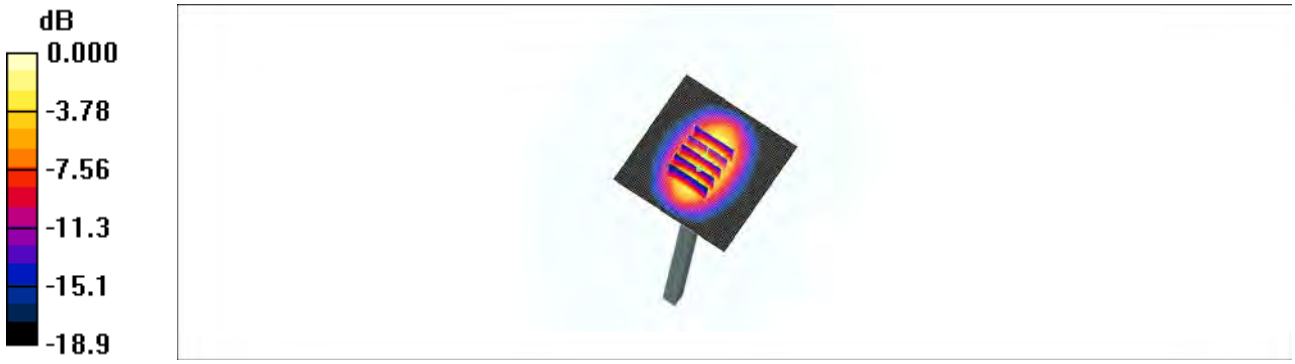
Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.4 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.6, 8.6, 8.6); Calibrated: 2013-03-18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: 1800/1900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Dipole 1800MHz Verification/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.10 mW/g

Dipole 1800MHz Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.0 V/m; Power Drift = 0.051 dB
Peak SAR (extrapolated) = 6.61 W/kg
SAR(1 g) = 3.57 mW/g; SAR(10 g) = 1.86 mW/g
Maximum value of SAR (measured) = 3.95 mW/g



0 dB = 3.95mW/g

■ Verification Data (1 800 MHz body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.3 ℃
Test Date: Aug.28, 2013

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d007

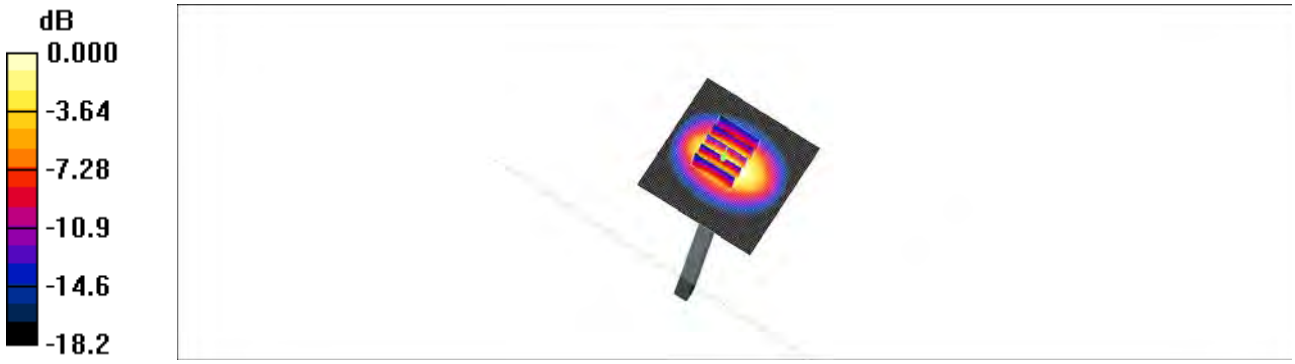
Communication System: CW; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.56 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.58, 7.58, 7.58); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

Verification1800 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.75 mW/g

Verification1800 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 7.17 W/kg
SAR(1 g) = 3.94 mW/g; SAR(10 g) = 2.07 mW/g
Maximum value of SAR (measured) = 4.33 mW/g



0 dB = 4.33mW/g

■ Verification Data (1 900 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.2 ℃
Test Date:	Aug.27, 2013

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

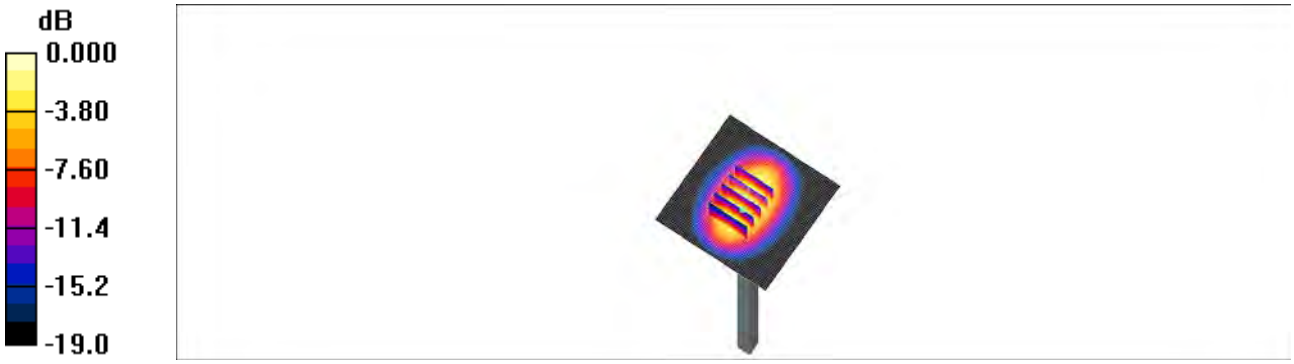
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(8.3, 8.3, 8.3); Calibrated: 2013-03-18
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: 1800/1900 Phantom; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Dipole 1900MHz Verification/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.90 mW/g

Dipole 1900MHz Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.7 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 7.90 W/kg
SAR(1 g) = 4.25 mW/g; SAR(10 g) = 2.21 mW/g
Maximum value of SAR (measured) = 4.70 mW/g



0 dB = 4.70mW/g

■ Verification Data (1 900 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.3 ℃
Test Date: Aug.28, 2013

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

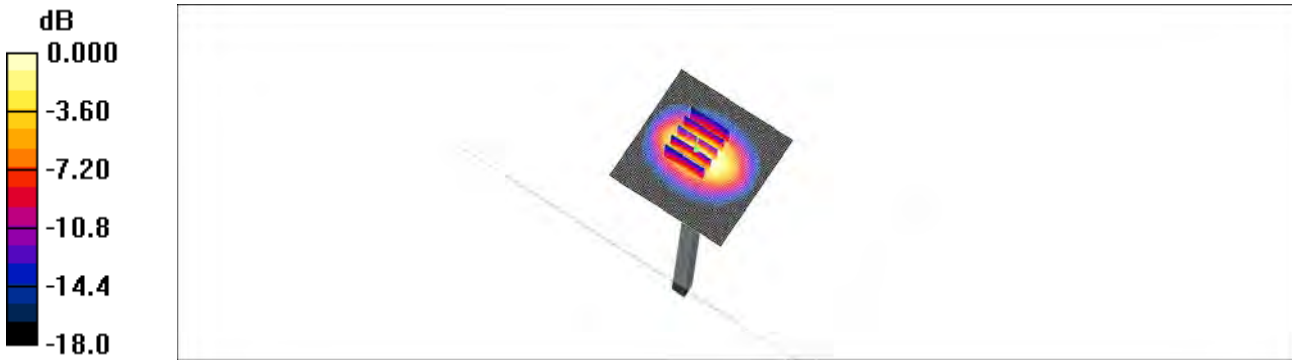
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.48 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.28, 7.28, 7.28); Calibrated: 2012-11-22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2012-09-18
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

Verification1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 5.04 mW/g

Verification1900 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.4 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 7.59 W/kg
SAR(1 g) = 4.2 mW/g; SAR(10 g) = 2.21 mW/g
Maximum value of SAR (measured) = 4.61 mW/g



0 dB = 4.61mW/g

■ Verification Data (2 450 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.4 ℃
Test Date:	Sep.02, 2013

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:746

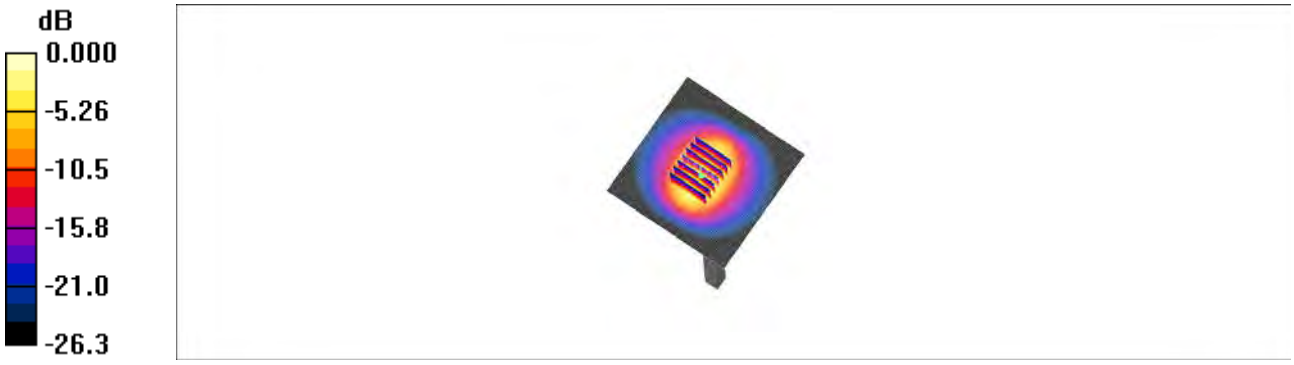
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.08, 7.08, 7.08); Calibrated: 2013-07-31
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2013-04-24
- Phantom: 835/900 Phamtom ; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 2450MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 8.99 mW/g

Verification 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.9 V/m; Power Drift = -0.040 dB
Peak SAR (extrapolated) = 12.7 W/kg
SAR(1 g) = 5.51 mW/g; SAR(10 g) = 2.41 mW/g
Maximum value of SAR (measured) = 8.69 mW/g



0 dB = 8.69mW/g

■ Verification Data (2 450 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.4 ℃
Test Date:	Sep.02, 2013

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:746

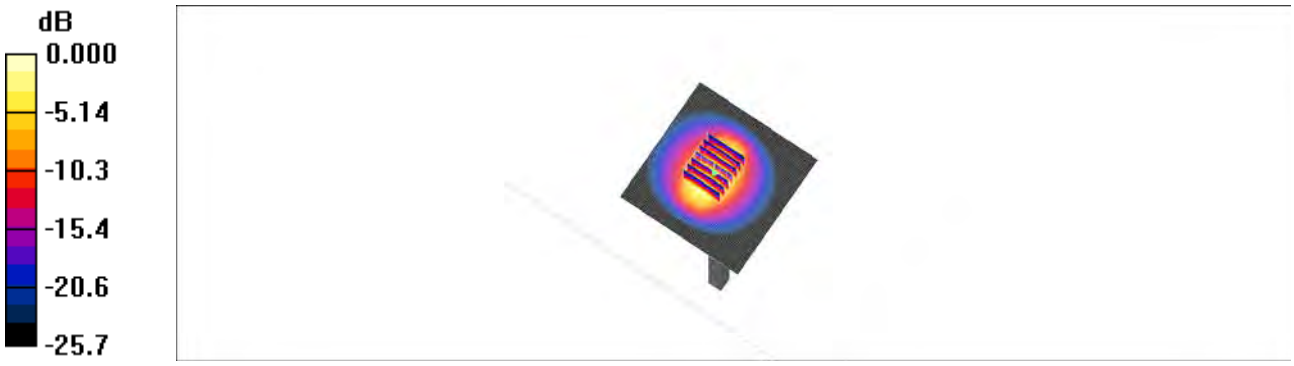
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.96 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.98, 6.98, 6.98); Calibrated: 2012-11-22
- Sensor-Surface: 2mm (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;

Verification 2450MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 8.52 mW/g

Verification 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.1 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 5.2 mW/g; SAR(10 g) = 2.26 mW/g
Maximum value of SAR (measured) = 8.35 mW/g



0 dB = 8.35mW/g

■ Verification Data (2 600 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.5 ℃
Test Date:	Aug. 30, 2013

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1015

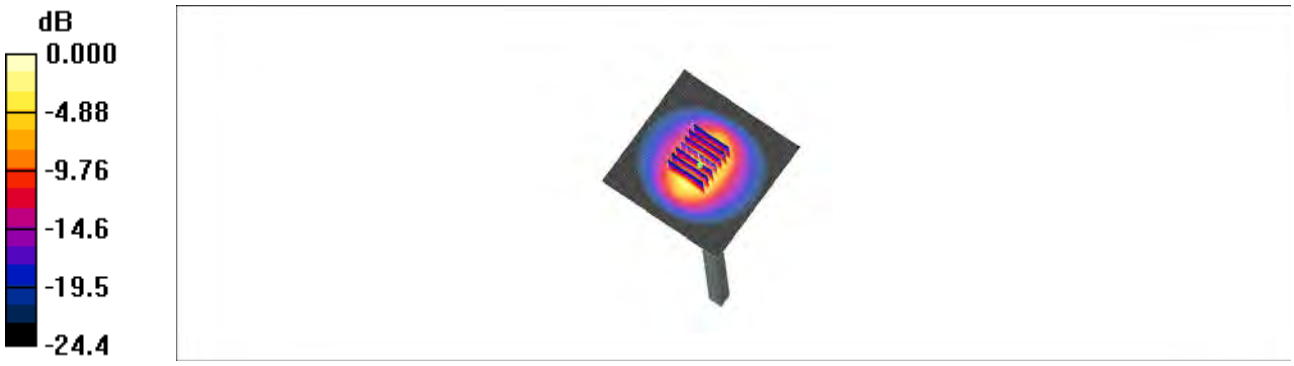
Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2 mho/m; ε_r = 40.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.68, 6.68, 6.68); Calibrated: 2012-11-22
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2013-02-21
- Phantom: 835/900 Phamtom ; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 2600MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 9.08 mW/g

Verification 2600MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.5 V/m; Power Drift = -0.034 dB
Peak SAR (extrapolated) = 12.8 W/kg
SAR(1 g) = 5.74 mW/g; SAR(10 g) = 2.55 mW/g
Maximum value of SAR (measured) = 9.07 mW/g



0 dB = 9.07mW/g

■ Verification Data (2 600 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.0 ℃
Test Date:	Aug. 31, 2013

DUT: Dipole 2600MHz; Type: D2600V2; Serial: D2600V2 - SN:1015

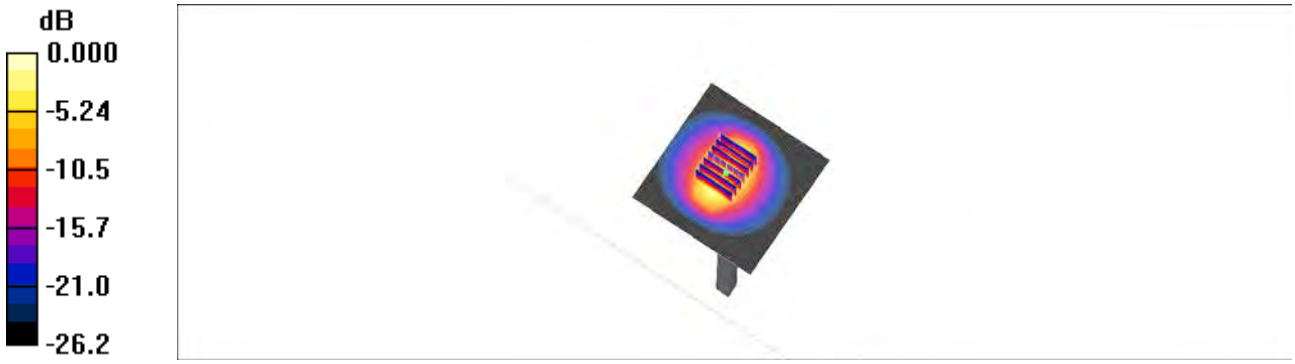
Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.17 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(6.73, 6.73, 6.73); Calibrated: 2012-11-22
- Sensor-Surface: 2mm (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;

Verification 2600MHz/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 9.27 mW/g

Verification 2600MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 49.9 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 13.7 W/kg
SAR(1 g) = 5.75 mW/g; SAR(10 g) = 2.47 mW/g
Maximum value of SAR (measured) = 9.32 mW/g



0 dB = 9.32mW/g

■ Verification Data (5 200 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.1 ℃
Test Date:	Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 - SN:1107

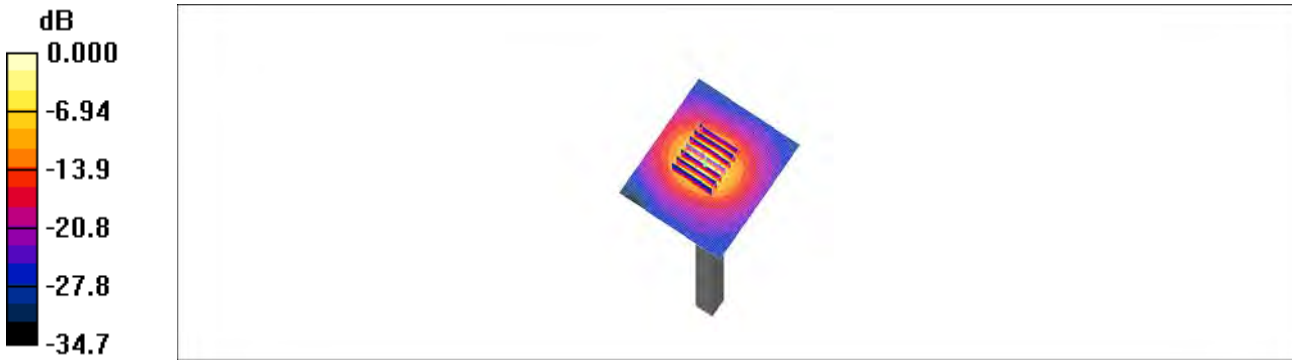
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.53 mho/m; ε_r = 36.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(5.11, 5.11, 5.11); Calibrated: 2013-07-31
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: SAM 1800/1900 MHz; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5200MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.50 mW/g

Verification 5200MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 42.4 V/m; Power Drift = 0.056 dB
Peak SAR (extrapolated) = 35.3 W/kg
SAR(1 g) = 8.12 mW/g; SAR(10 g) = 2.27 mW/g
Maximum value of SAR (measured) = 16.3 mW/g



0 dB = 16.3mW/g

■ Verification Data (5 300 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.1 ℃
Test Date:	Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 - SN:1107

Communication System: CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 4.67 mho/m; ε_r = 35.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.83, 4.83, 4.83); Calibrated: 2013-07-31
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: SAM 1800/1900 MHz; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5300MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.82 mW/g

Verification 5300MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 42.4 V/m; Power Drift = 0.070 dB
Peak SAR (extrapolated) = 35.6 W/kg
SAR(1 g) = 8.29 mW/g; SAR(10 g) = 2.31 mW/g
Maximum value of SAR (measured) = 16.6 mW/g

0 dB = 16.6mW/g

■ Verification Data (5 500 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.1 ℃
Test Date:	Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 - SN:1107

Communication System: CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 4.88 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.81, 4.81, 4.81); Calibrated: 2013-07-31
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: SAM 1800/1900 MHz; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5500MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.44 mW/g

Verification 5500MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 40.1 V/m; Power Drift = 0.033 dB
Peak SAR (extrapolated) = 35.8 W/kg
SAR(1 g) = 7.89 mW/g; SAR(10 g) = 2.18 mW/g
Maximum value of SAR (measured) = 15.6 mW/g

0 dB = 15.6mW/g

■ Verification Data (5 600 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.1 ℃
Test Date:	Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 - SN:1107

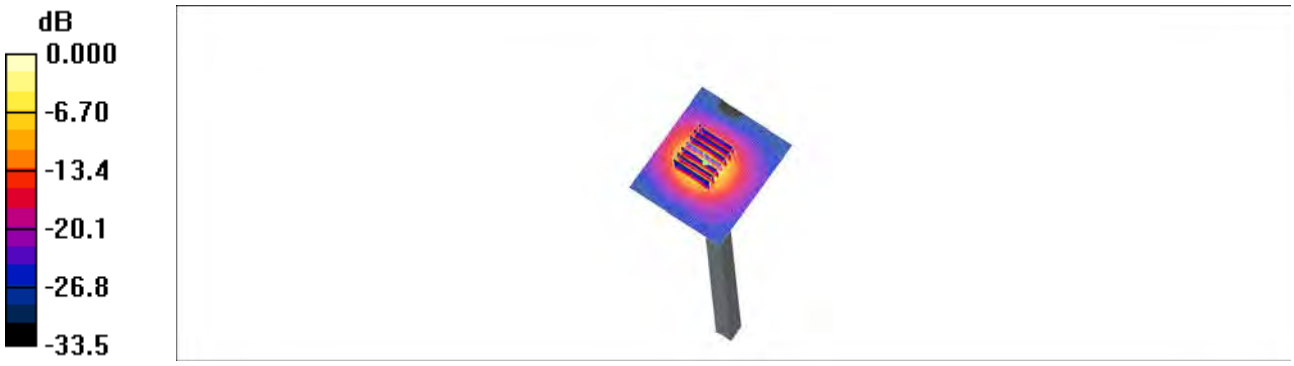
Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 4.99 mho/m; ε_r = 35.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.44, 4.44, 4.44); Calibrated: 2013-07-31
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: SAM 1800/1900 MHz; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5600MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.89 mW/g

Verification 5600MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 40.4 V/m; Power Drift = -0.175 dB
Peak SAR (extrapolated) = 35.3 W/kg
SAR(1 g) = 8.28 mW/g; SAR(10 g) = 2.29 mW/g
Maximum value of SAR (measured) = 16.9 mW/g



0 dB = 16.9mW/g

■ Verification Data (5 800 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	100 mW (20 dBm)
Liquid Temp:	20.1 ℃
Test Date:	Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 - SN: 1107

Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.26 mho/m; ε_r = 34.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.7, 4.7, 4.7); Calibrated: 2013-07-31
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2013-01-16
- Phantom: SAM 1800/1900 MHz; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5800MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.23 mW/g

Verification 5800MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 38.5 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 37.3 W/kg
SAR(1 g) = 7.95 mW/g; SAR(10 g) = 2.21 mW/g

0 dB = 16.0mW/g

■ Verification Data (5 200 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.1 ℃
Test Date: Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

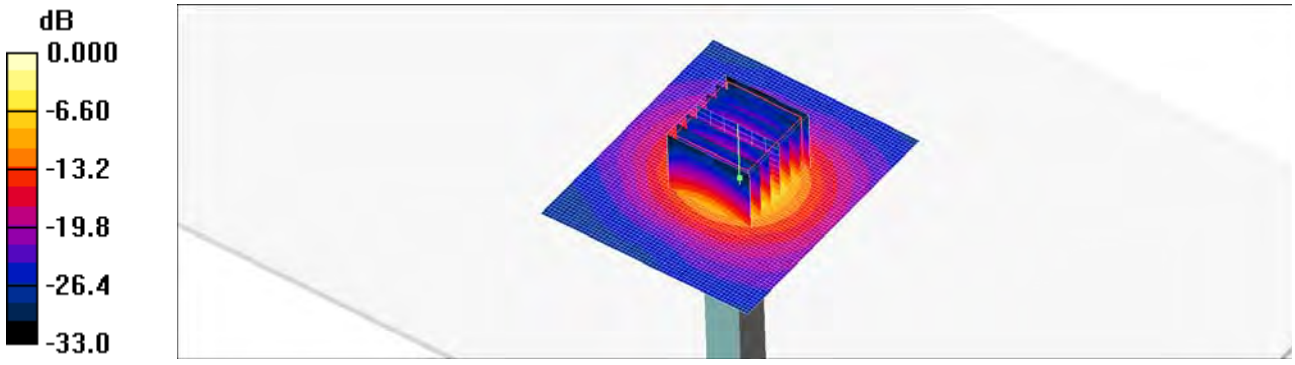
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.22 mho/m; ε_r = 47.8; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 – SN3903; ConvF(4.32, 4.32, 4.32); Calibrated: 2013-03-18
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5200MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 8.72 mW/g

Verification 5200MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 38.9 V/m; Power Drift = 0.088 dB
Peak SAR (extrapolated) = 30.2 W/kg
SAR(1 g) = 7.32 mW/g; SAR(10 g) = 2.07 mW/g
Maximum value of SAR (measured) = 15.2 mW/g



0 dB = 15.2mW/g

■ Verification Data (5 300 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.1 ℃
Test Date: Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

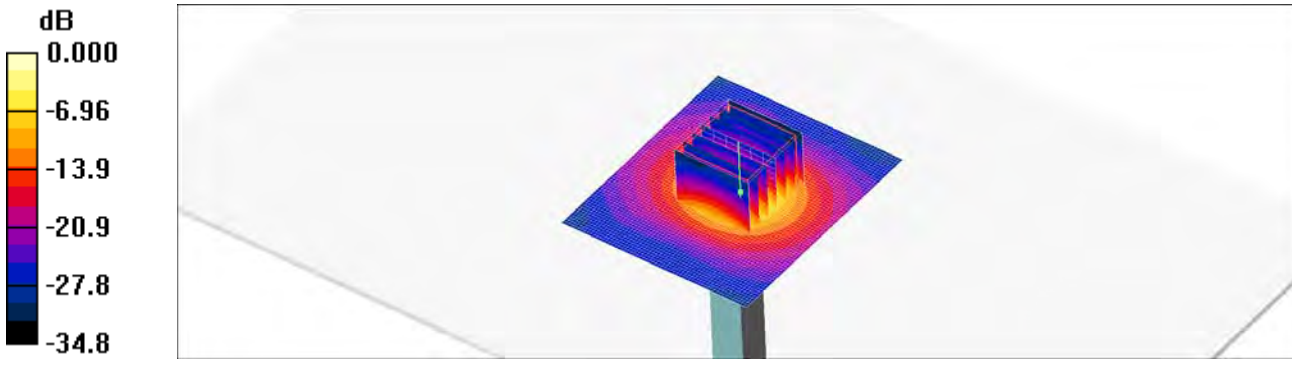
Communication System: CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.39 mho/m; ε_r = 47.4; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 – SN3903; ConvF(4.24, 4.24, 4.24); Calibrated: 2013-03-18
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5300MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 8.89 mW/g

Verification 5300MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 39.4 V/m; Power Drift = -0.063 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 7.56 mW/g; SAR(10 g) = 2.13 mW/g
Maximum value of SAR (measured) = 15.7 mW/g



0 dB = 15.7mW/g

■ Verification Data (5 600 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.1 ℃
Test Date: Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

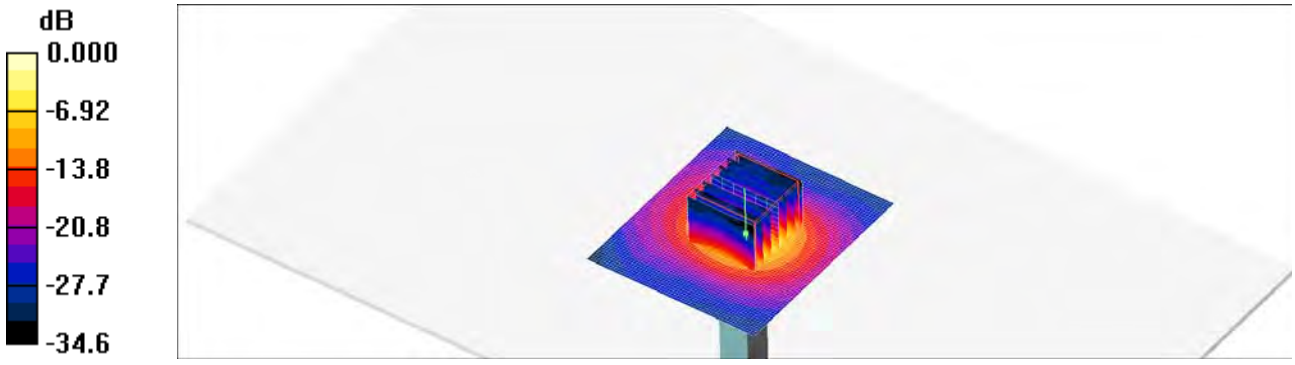
Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.71 mho/m; ε_r = 47; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 – SN3903; ConvF(3.73, 3.73, 3.73); Calibrated: 2013-03-18
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5600MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 9.13 mW/g

Verification 5600MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 39.0 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 36.0 W/kg
SAR(1 g) = 8.03 mW/g; SAR(10 g) = 2.24 mW/g
Maximum value of SAR (measured) = 16.9 mW/g



0 dB = 16.9mW/g

■ Verification Data (5 800 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.1 ℃
Test Date: Sep. 03, 2013

DUT: Dipole 5GHz; Type: D5000V2; Serial: D5000V2 – SN:1107

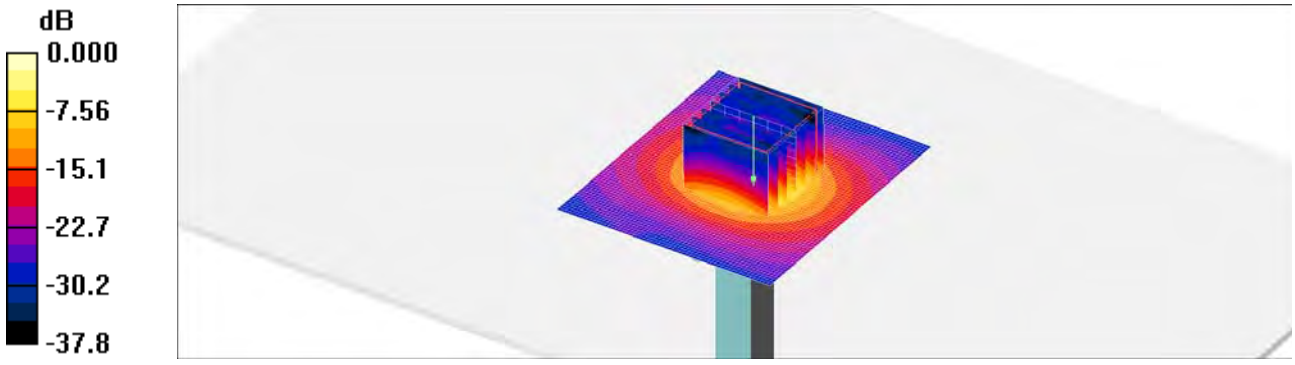
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.1 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: EX3DV4 – SN3903; ConvF(4.01, 4.01, 4.01); Calibrated: 2013-03-18
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2013-03-21
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA;
- Measurement SW: DASY4, V4.7 Build 80;

Verification 5800MHz/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 8.60 mW/g

Verification 5800MHz/Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 36.9 V/m; Power Drift = 0.104 dB
Peak SAR (extrapolated) = 33.7 W/kg
SAR(1 g) = 7.67 mW/g; SAR(10 g) = 2.15 mW/g
Maximum value of SAR (measured) = 16.4 mW/g



0 dB = 16.4mW/g

Attachment 3. – Probe Calibration Data

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

s p e a g

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1630**
Place of Assessment:	**Zurich**
Date of Assessment:	**January 28, 2013**
Probe Calibration Date:	**January 24, 2013**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 900 MHz or at 1750 MHz.

Assessed by:

Schmid & Partner Engineering AG
s p e a g
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Dosimetric E-Field Probe ET3DV6 - SN:1630

Conversion factor (± standard deviation)

150 ± 50 MHz	*ConvF*	8.47 ± 10%	ε_r = 52.3 ± 5% σ = 0.76 ± 5% mho/m (head tissue)
150 ± 50 MHz	*ConvF*	8.75 ± 10%	ε_r = 61.9 ± 5% σ = 0.80 ± 5% mho/m (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

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

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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **HCT (Dymstec)** Certificate No: **ET3-1630_Jan13**

CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1630

Calibration procedure(s) QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: January 24, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: January 28, 2013

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

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1630

Manufactured: October 12, 2001
Calibrated: January 24, 2013

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1630

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.72	1.62	1.61	± 10.1 %
DCP (mV)[B]	97.8	97.2	98.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	135.9	±3.3 %
		Y	0.0	0.0	1.0		139.4	
		Z	0.0	0.0	1.0		134.7	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ET3DV6– SN:1630 January 24, 2013

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1630

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	45.3	0.87	7.83	7.83	7.83	0.32	1.69	± 13.4 %
450	43.5	0.87	7.37	7.37	7.37	0.24	2.41	± 13.4 %
750	41.9	0.89	6.91	6.91	6.91	0.29	3.00	± 12.0 %
835	41.5	0.90	6.56	6.56	6.56	0.29	3.00	± 12.0 %
900	41.5	0.97	6.50	6.50	6.50	0.32	2.68	± 12.0 %
1450	40.5	1.20	5.33	5.33	5.33	0.48	3.00	± 12.0 %
1750	40.1	1.37	5.47	5.47	5.47	0.59	2.68	± 12.0 %
1900	40.0	1.40	5.28	5.28	5.28	0.80	2.21	± 12.0 %
1950	40.0	1.40	5.06	5.06	5.06	0.80	2.00	± 12.0 %
2450	39.2	1.80	4.59	4.59	4.59	0.80	1.84	± 12.0 %

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

Certificate No: ET3-1630_Jan13 Page 5 of 11

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1630

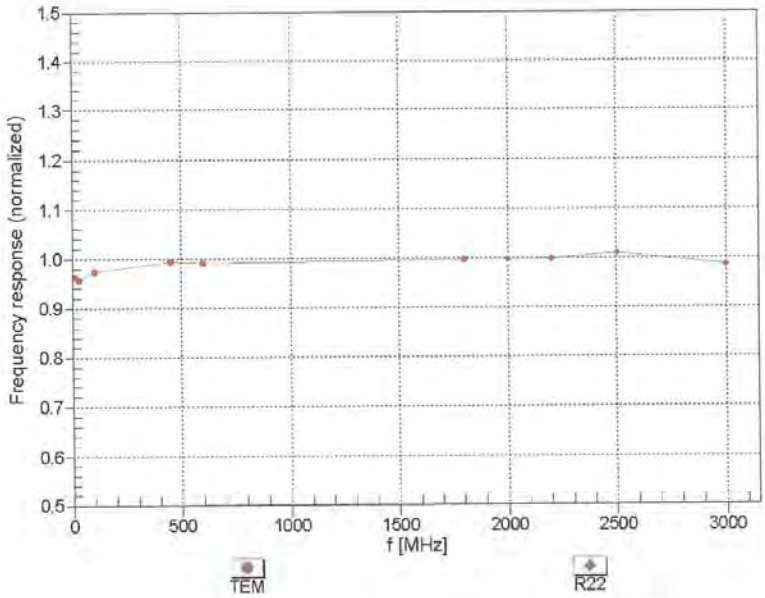
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
300	58.2	0.92	7.58	7.58	7.58	0.27	2.03	± 13.4 %
450	56.7	0.94	7.64	7.64	7.64	0.17	2.38	± 13.4 %
750	55.5	0.96	6.44	6.44	6.44	0.40	2.37	± 12.0 %
835	55.2	0.97	6.32	6.32	6.32	0.54	2.07	± 12.0 %
1750	53.4	1.49	4.91	4.91	4.91	0.77	2.60	± 12.0 %
1900	53.3	1.52	4.73	4.73	4.73	0.80	2.30	± 12.0 %
2450	52.7	1.95	4.26	4.26	4.26	0.53	0.93	± 12.0 %

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

ET3DV6– SN:1630 January 24, 2013

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

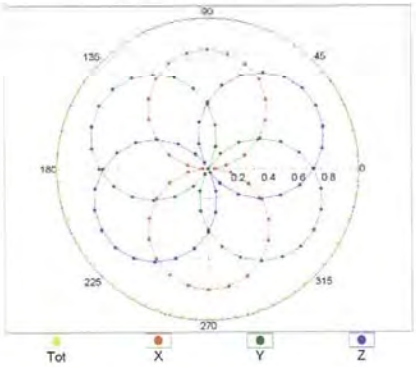


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

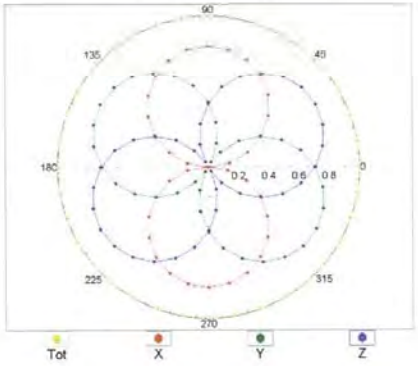
ET3DV6– SN:1630 January 24, 2013

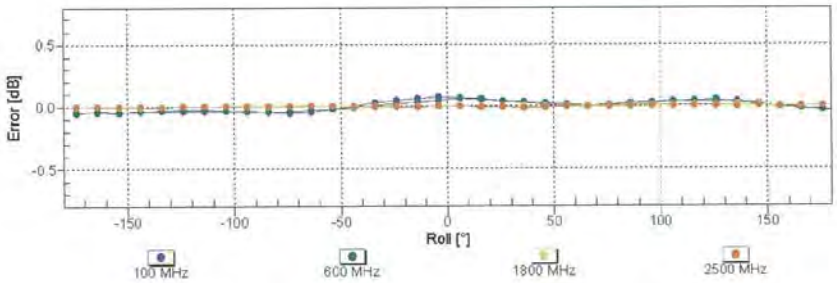
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

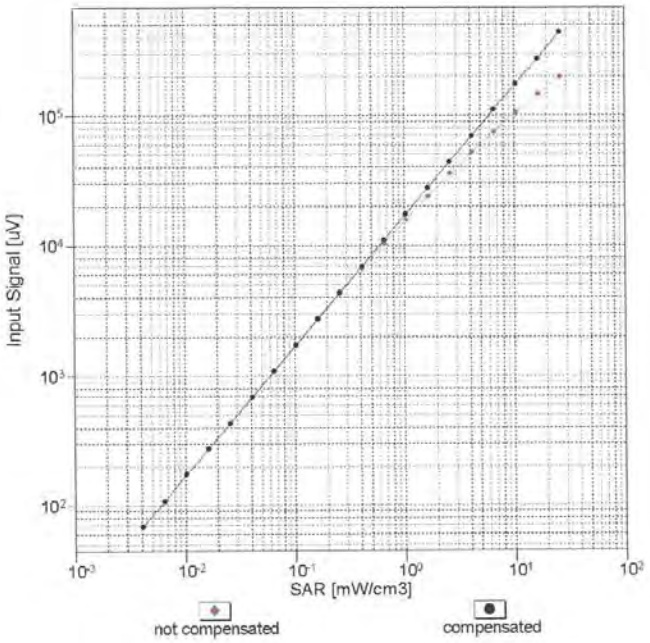


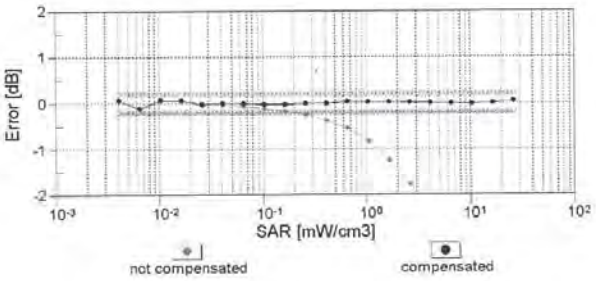


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6– SN:1630 January 24, 2013

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



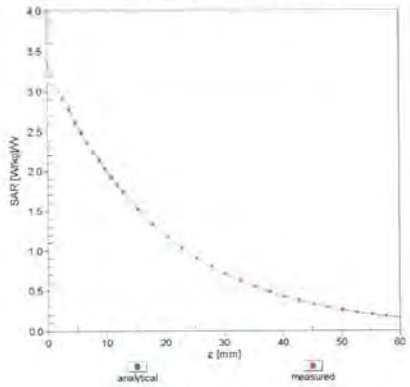


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

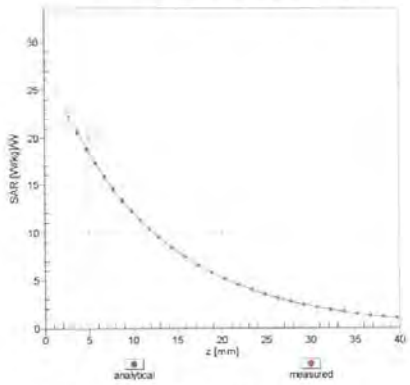
ET3DV6– SN:1630 January 24, 2013

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

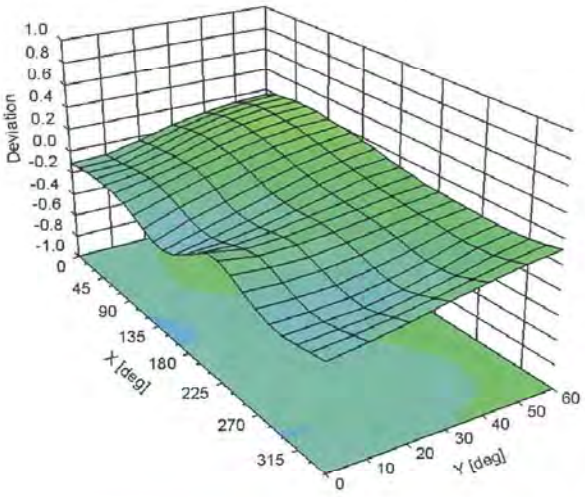


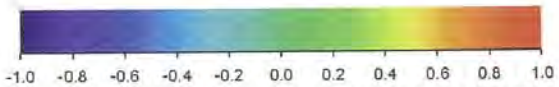
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1630

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-53.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: SCS 108

Client HCT (Dymstec) Certificate No: ET3-1798_Apr13

CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1798

Calibration procedure(s) QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 29, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: April 30, 2013

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

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Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe ET3DV6

SN:1798

Manufactured: August 14, 2003
Calibrated: April 29, 2013

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)²)[A]	1.99	1.78	2.03	± 10.1 %
DCP (mV)[B]	99.9	101.3	97.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	152.8	±2.7 %
		Y	0.0	0.0	1.0		146.8	
		Z	0.0	0.0	1.0		149.2	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

ET3DV6– SN:1798 April 29, 2013

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.74	7.74	7.74	0.23	2.32	± 13.4 %
750	41.9	0.89	7.00	7.00	7.00	0.31	2.62	± 12.0 %
835	41.5	0.90	6.64	6.64	6.64	0.33	2.51	± 12.0 %
900	41.5	0.97	6.54	6.54	6.54	0.41	2.21	± 12.0 %
1450	40.5	1.20	5.55	5.55	5.55	0.45	3.00	± 12.0 %
1750	40.1	1.37	5.51	5.51	5.51	0.69	2.28	± 12.0 %
1900	40.0	1.40	5.29	5.29	5.29	0.80	2.16	± 12.0 %
1950	40.0	1.40	5.09	5.09	5.09	0.80	2.23	± 12.0 %
2450	39.2	1.80	4.63	4.63	4.63	0.80	1.82	± 12.0 %

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

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798

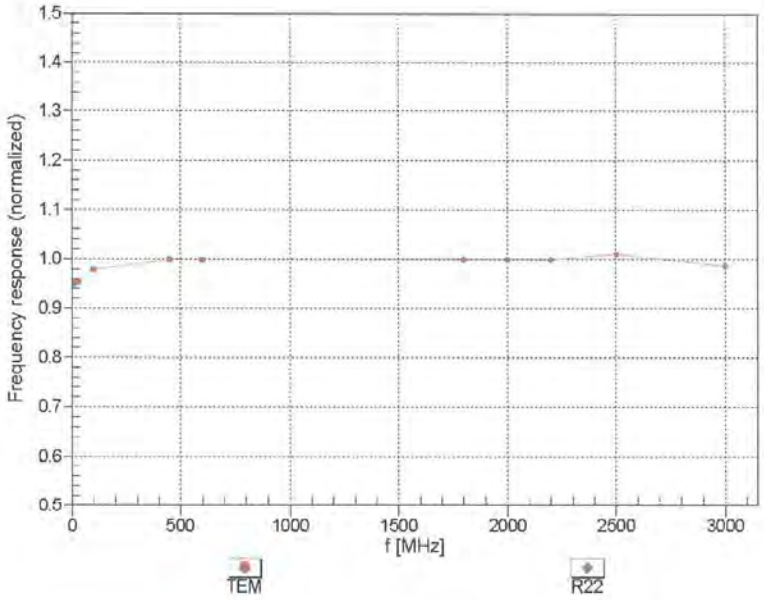
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	8.11	8.11	8.11	0.23	2.33	± 13.4 %
750	55.5	0.96	6.62	6.62	6.62	0.26	3.00	± 12.0 %
835	55.2	0.97	6.46	6.46	6.46	0.41	2.30	± 12.0 %
1750	53.4	1.49	4.93	4.93	4.93	0.80	2.42	± 12.0 %
1900	53.3	1.52	4.70	4.70	4.70	0.80	2.35	± 12.0 %
2450	52.7	1.95	4.16	4.16	4.16	0.63	1.15	± 12.0 %

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

ET3DV6– SN:1798 April 29, 2013

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



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

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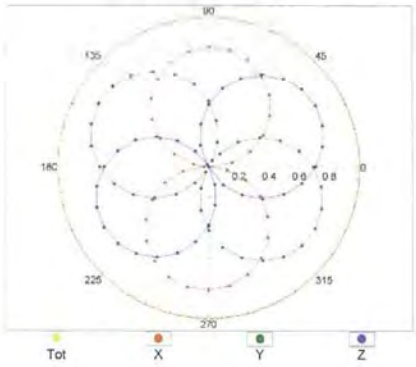
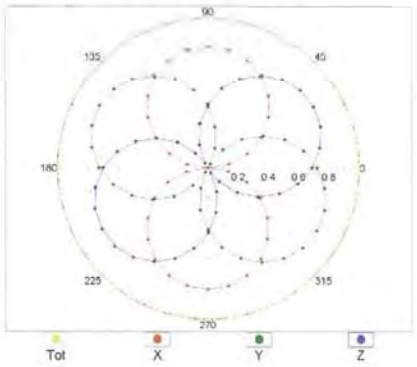
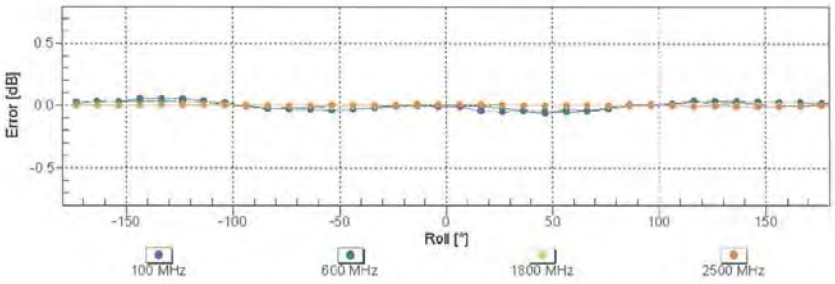
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

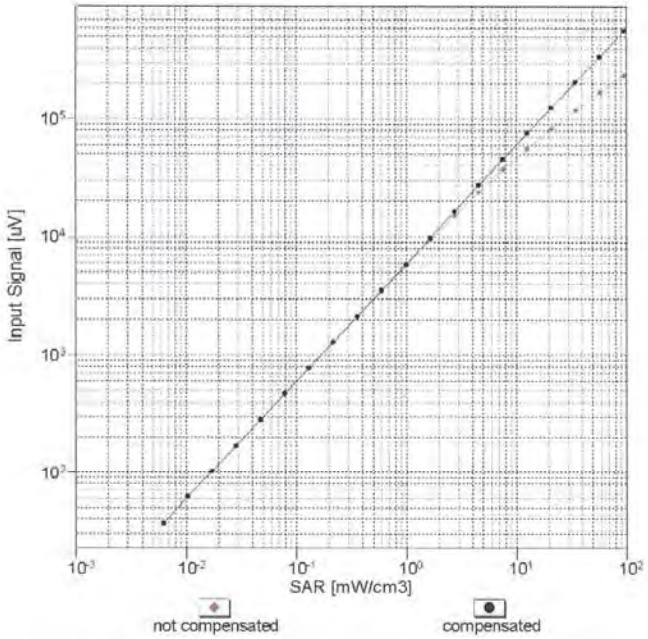


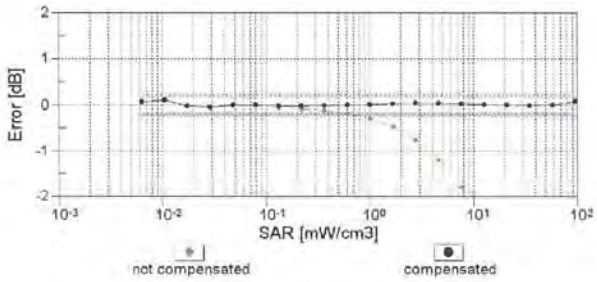


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6– SN:1798 April 29, 2013

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



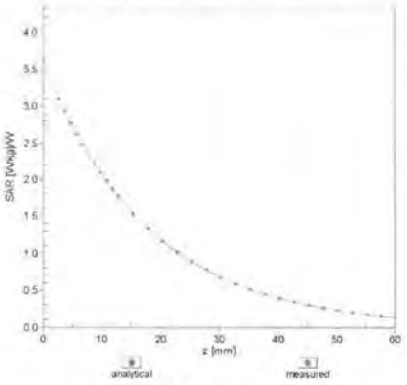


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

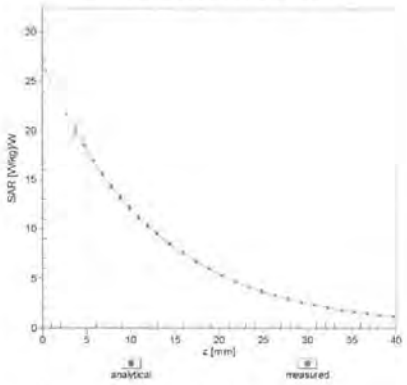
ET3DV6– SN:1798 April 29, 2013

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

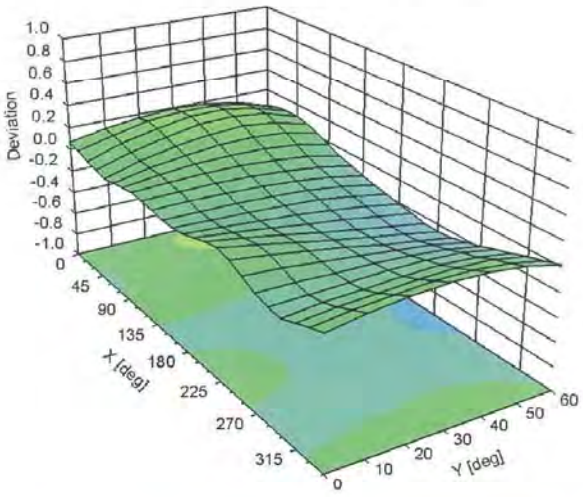


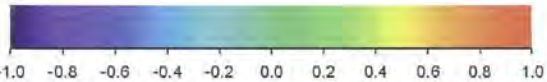
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

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DASY/EASY - Parameters of Probe: ET3DV6 - SN:1798

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	56.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

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Accreditation No.: SCS 108

Client **HCT (Dymstec)** Certificate No: **EX3-3903_Mar13**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3903
Calibration procedure(s)	QA CAL-01.v8, QA CAL-12.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	March 18, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: March 18, 2013

Calibration Laboratory of
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3903

Manufactured: September 4, 2012
Calibrated: March 18, 2013

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3903

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.52	0.48	0.53	± 10.1 %
DCP (mV)[B]	98.8	103.2	100.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[F] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	129.0	±3.5 %
		Y	0.0	0.0	1.0		122.0	
		Z	0.0	0.0	1.0		124.7	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[F] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3903

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	10.72	10.72	10.72	0.15	1.66	± 13.4 %
750	41.9	0.89	10.21	10.21	10.21	0.21	1.28	± 12.0 %
835	41.5	0.90	9.87	9.87	9.87	0.28	1.07	± 12.0 %
900	41.5	0.97	9.77	9.77	9.77	0.17	1.66	± 12.0 %
1450	40.5	1.20	8.59	8.59	8.59	0.18	1.76	± 12.0 %
1750	40.1	1.37	8.60	8.60	8.60	0.61	0.67	± 12.0 %
1900	40.0	1.40	8.30	8.30	8.30	0.45	0.76	± 12.0 %
1950	40.0	1.40	8.10	8.10	8.10	0.30	0.90	± 12.0 %
2450	39.2	1.80	7.43	7.43	7.43	0.33	0.85	± 12.0 %
2600	39.0	1.96	7.23	7.23	7.23	0.31	0.95	± 12.0 %
5200	36.0	4.66	4.79	4.79	4.79	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.60	4.60	4.60	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.49	4.49	4.49	0.45	1.80	± 13.1 %
5600	35.5	5.07	4.46	4.46	4.46	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.14	4.14	4.14	0.45	1.80	± 13.1 %

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3903

Calibration Parameter Determined in Body Tissue Simulating Media

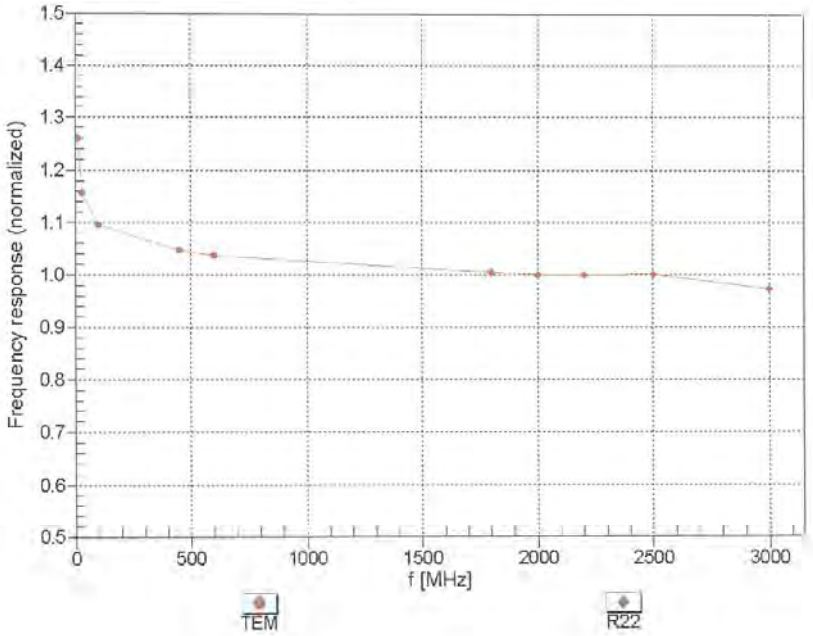
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	11.20	11.20	11.20	0.05	1.10	± 13.4 %
750	55.5	0.96	9.91	9.91	9.91	0.27	1.21	± 12.0 %
835	55.2	0.97	9.75	9.75	9.75	0.33	1.06	± 12.0 %
1750	53.4	1.49	7.82	7.82	7.82	0.35	0.87	± 12.0 %
1900	53.3	1.52	7.53	7.53	7.53	0.28	1.03	± 12.0 %
2450	52.7	1.95	7.14	7.14	7.14	0.80	0.57	± 12.0 %
2600	52.5	2.16	6.89	6.89	6.89	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.32	4.32	4.32	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.24	4.24	4.24	0.40	1.90	± 13.1 %
5500	48.6	5.65	3.86	3.86	3.86	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.73	3.73	3.73	0.40	1.90	± 13.1 %
5800	48.2	6.00	4.01	4.01	4.01	0.50	1.90	± 13.1 %

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

EX3DV4– SN:3903 March 18, 2013

Frequency Response of E-Field

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

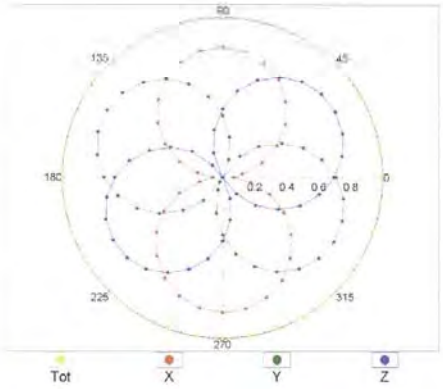


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

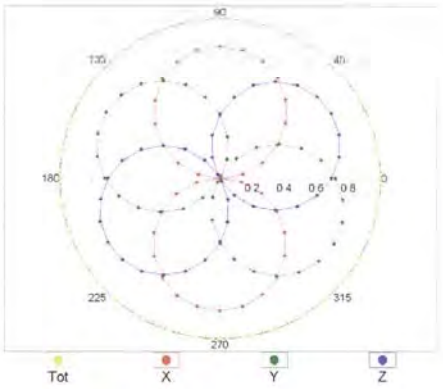
EX3DV4– SN:3903 March 18, 2013

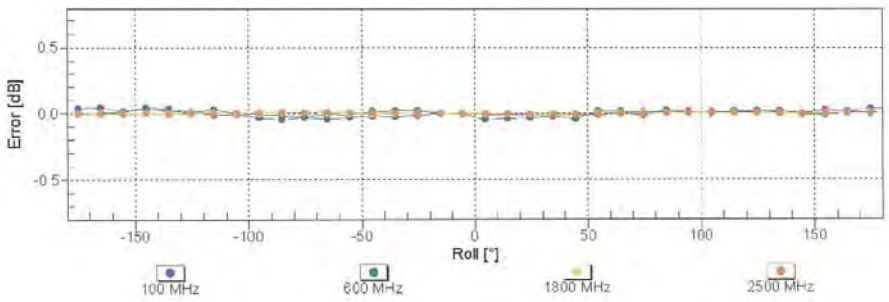
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

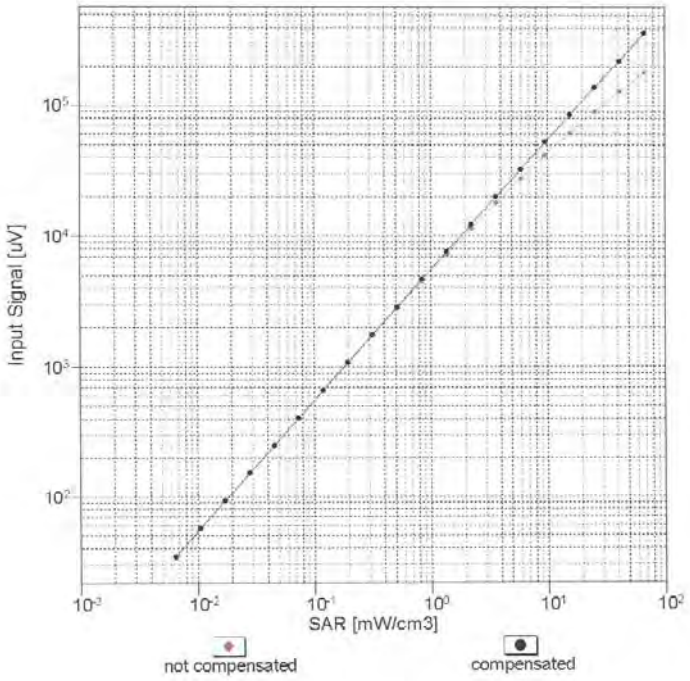


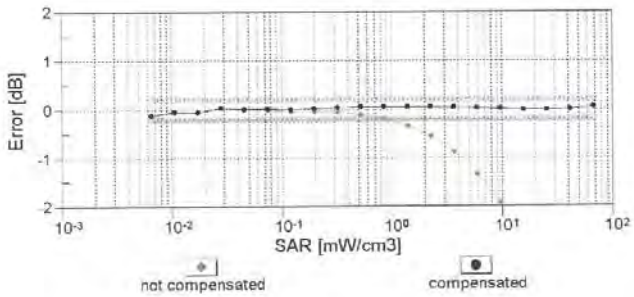


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3903 March 18, 2013

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



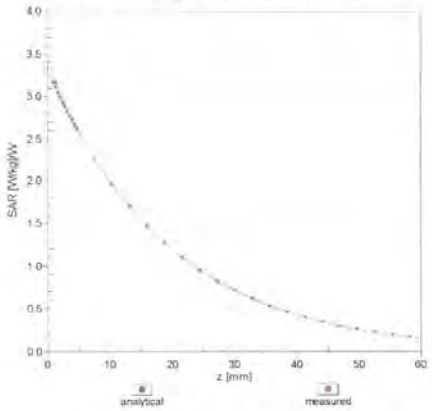


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

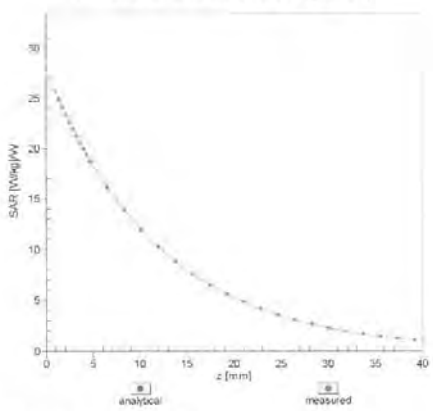
EX3DV4– SN:3903 March 18, 2013

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

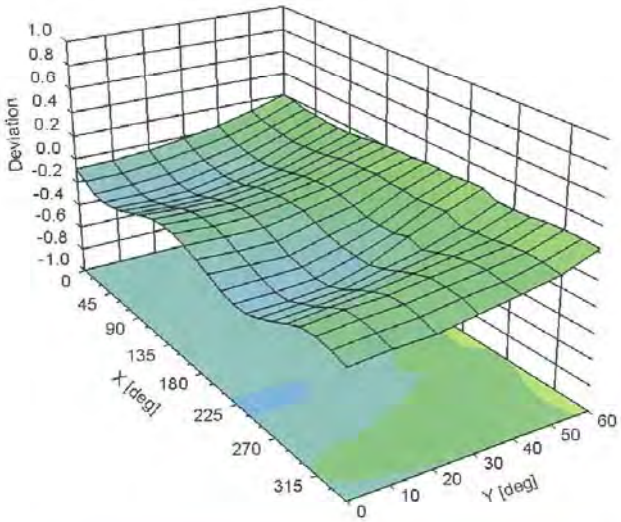


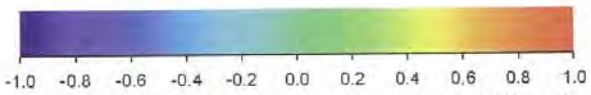
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3903

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-85.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **HCT (Dymstec)** **Certificate No: EX3-3797_Nov12**

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3797

Calibration procedure(s) QA CAL-01.v8, QA CAL-12.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: November 22, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: November 22, 2012

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3797

Manufactured: April 5, 2011
Calibrated: November 22, 2012

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

EX3DV4– SN:3797 November 22, 2012

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.63	0.59	0.57	± 10.1 %
DCP (mV)[B]	97.5	94.8	93.7	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.0	0.0	1.0	134.7	±3.0 %
			Y	0.0	0.0	1.0	130.7	
			Z	0.0	0.0	1.0	130.3	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	9.30	9.30	9.30	0.15	3.00	± 13.4 %
835	41.5	0.90	8.94	8.94	8.94	0.44	0.78	± 12.0 %
900	41.5	0.97	8.83	8.83	8.83	0.37	0.88	± 12.0 %
1450	40.5	1.20	7.89	7.89	7.89	0.24	1.28	± 12.0 %
1750	40.1	1.37	7.77	7.77	7.77	0.75	0.60	± 12.0 %
1900	40.0	1.40	7.47	7.47	7.47	0.44	0.82	± 12.0 %
1950	40.0	1.40	7.27	7.27	7.27	0.80	0.59	± 12.0 %
2450	39.2	1.80	6.76	6.76	6.76	0.41	0.83	± 12.0 %
2600	39.0	1.96	6.68	6.68	6.68	0.46	0.81	± 12.0 %
5200	36.0	4.66	4.84	4.84	4.84	0.34	1.80	± 13.1 %
5300	35.9	4.76	4.61	4.61	4.61	0.34	1.80	± 13.1 %
5500	35.6	4.96	4.58	4.58	4.58	0.34	1.80	± 13.1 %
5600	35.5	5.07	4.45	4.45	4.45	0.31	1.80	± 13.1 %
5800	35.3	5.27	4.50	4.50	4.50	0.34	1.80	± 13.1 %

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

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

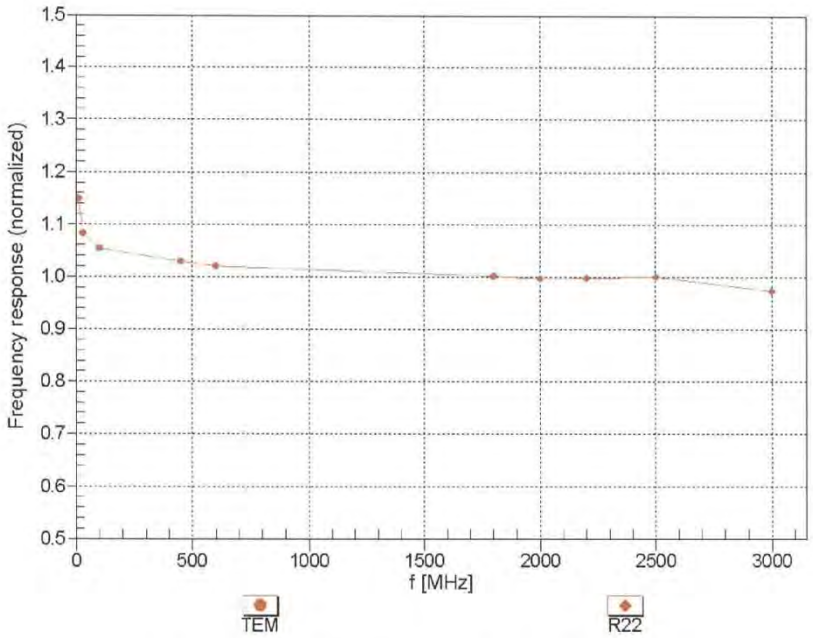
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	10.22	10.22	10.22	0.07	3.31	± 13.4 %
835	55.2	0.97	8.98	8.98	8.98	0.44	0.85	± 12.0 %
1750	53.4	1.49	7.58	7.58	7.58	0.68	0.66	± 12.0 %
1900	53.3	1.52	7.28	7.28	7.28	0.49	0.79	± 12.0 %
2450	52.7	1.95	6.98	6.98	6.98	0.80	0.58	± 12.0 %
2600	52.5	2.16	6.73	6.73	6.73	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.17	4.17	4.17	0.46	1.90	± 13.1 %
5300	48.9	5.42	4.20	4.20	4.20	0.42	1.90	± 13.1 %
5500	48.6	5.65	4.05	4.05	4.05	0.41	1.90	± 13.1 %
5600	48.5	5.77	4.06	4.06	4.06	0.30	1.90	± 13.1 %
5800	48.2	6.00	4.19	4.19	4.19	0.42	1.90	± 13.1 %

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

EX3DV4– SN:3797 November 22, 2012

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



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

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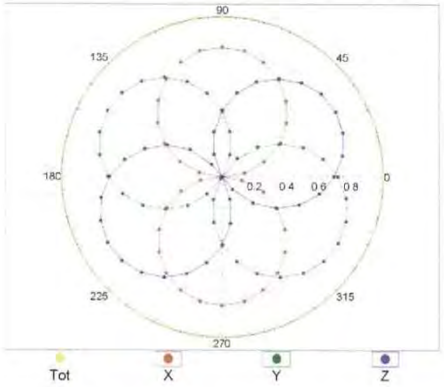
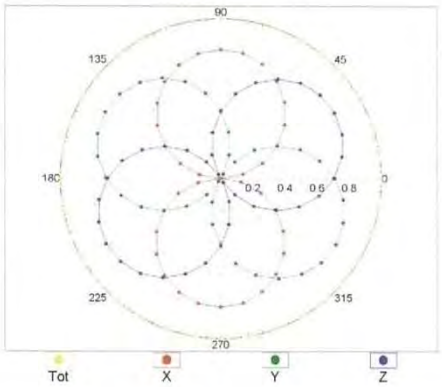
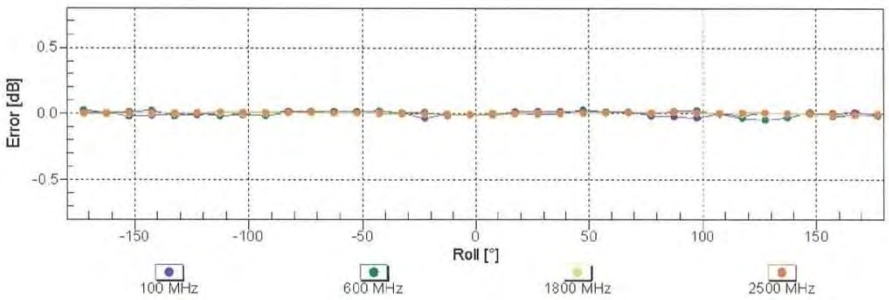
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

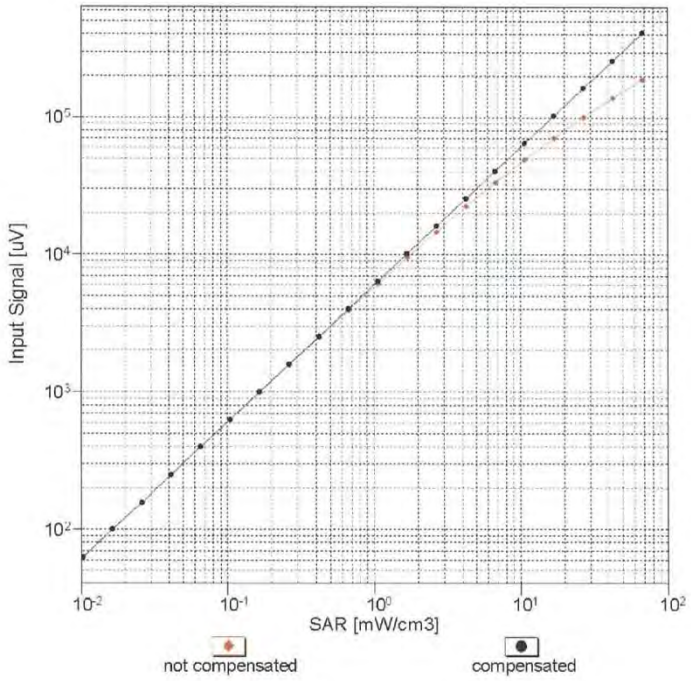


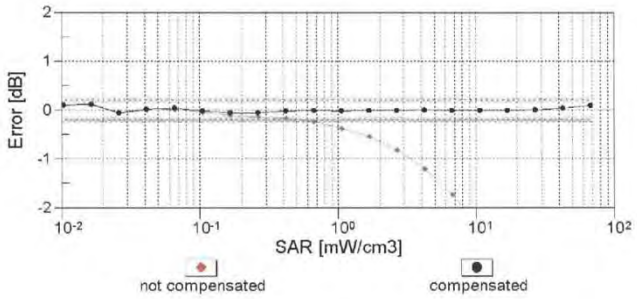


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3797 November 22, 2012

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)



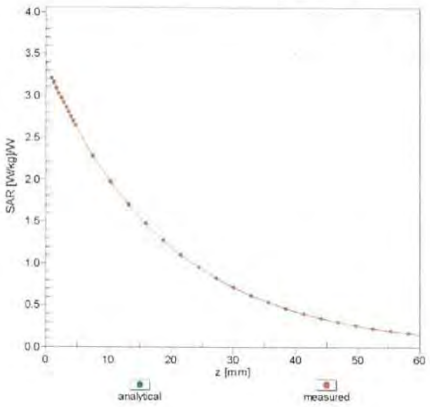


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

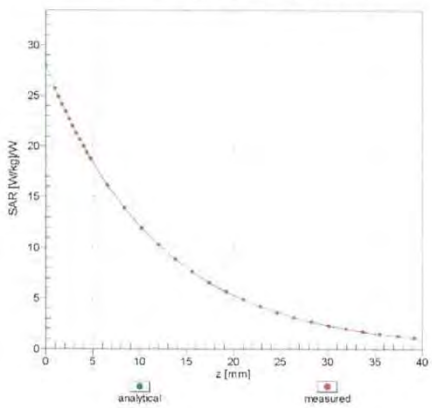
EX3DV4– SN:3797 November 22, 2012

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

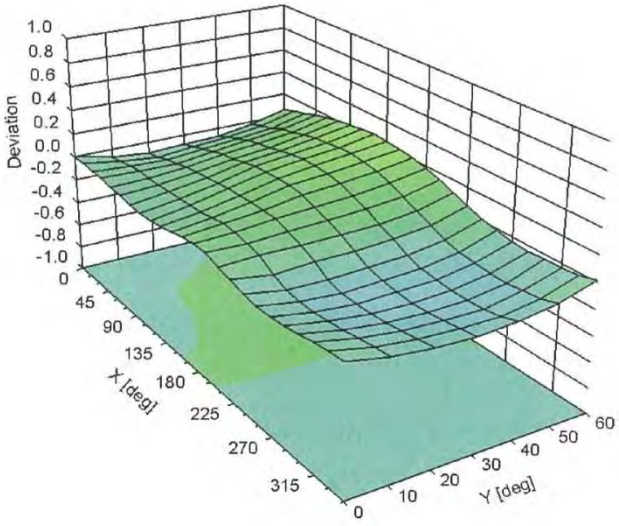


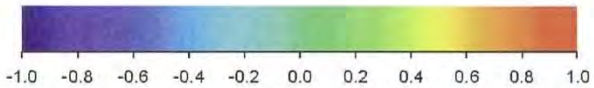
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	67.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm