TESTING
No. L2264

SAR TEST REPORT

Product Name	HSDPA/HSUPA/HSPA+/UMTS quad band / GSM quad band/LTE 6 band Mobile phone
Model Name	4045A
Brand Name	ALCATEL ONETOUCH
FCC ID	RAD536
Applicant	TCT Mobile Limited
Manufacturer	TCT Mobile Limited
Date of issue	February 2, 2015

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Reference Standard(s)	**FCC 47CFR §2.1093** Radiofrequency Radiation Exposure Evaluation: Portable Devices **ANSI C95.1- 1992:** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.(IEEE Std C95.1-1991) **IEEE Std 1528™-2003:** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. **KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03:** SAR Measurement Requirements for 100 MHz to 6 GHz **KDB 447498 D01 Mobile Portable RF Exposure v05r02:** Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies **KDB 648474 D04 Handset SAR v01r02:** SAR Evaluation Considerations for Wireless Handsets. **KDB 941225 D01 SAR test for 3G devices v03:** SAR Measurement Procedures CDMA 20001x RTT, 1x Ev-Do, WCDMA, HSDPA/HSPA **KDB 941225 D05 SAR for LTE Devices v02r03** SAR Test Considerations for LTE Handsets and Data Modems **KDB 248227 D01 SAR meas for 802 11 a b g v01r02:** SAR Measurement Procedures for 802.11a/b/g Transmitters.
Conclusion	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 7 of this test report are below limits specified in the relevant standards for the tested bands only. General Judgment: **Pass**
Comment	The test result only responds to the measured sample.

Approved by Kai Xu — Kai Xu, Director

Revised by Jiangpeng Lan — Jiangpeng Lan, SAR Manager

Performed by Jie Li — Jie Li, SAR Engineer

TABLE OF CONTENT

1. General Information

1.1. Notes of the Test Report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

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If the electronic report is inconsistent with the printed one, it should be subject to the latter.

1.2. Testing Laboratory

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1.3. Applicant Information

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1.4. Manufacturer Information

Company:	TCT Mobile Limited
Address:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai P.R. China 201203

1.5. Information of EUT

General Information

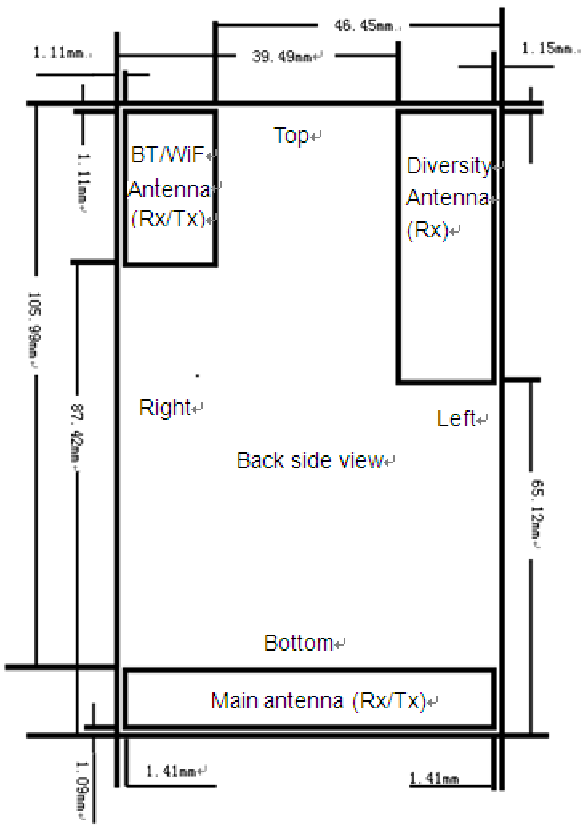
<table>
<tr><td>Device Type:</td><td colspan="2">Portable Device</td></tr>
<tr><td>Exposure Category:</td><td colspan="2">Uncontrolled Environment / General Population</td></tr>
<tr><td>State of Sample:</td><td colspan="2">Prototype Unit</td></tr>
<tr><td>Product IMEI:</td><td colspan="2">014261000100851</td></tr>
<tr><td>Hardware Version:</td><td colspan="2">PIO</td></tr>
<tr><td>Software Version:</td><td colspan="2">5L2E</td></tr>
<tr><td>Antenna Type:</td><td colspan="2">Internal Antenna</td></tr>
<tr><td colspan="3">Device Operating Configurations :</td></tr>
<tr><td>Test Mode(s):</td><td colspan="2">GSM 850/GSM 1900;
UMTS Band II/UMTS Band V;
LTE FDD Band 2/4/7;
802.11b/g/n HT20;
Bluetooth;
Bluetooth 4.0;</td></tr>
<tr><td>Test Modulation:</td><td colspan="2">(GSM)GMSK; (UMTS)QPSK, (LTE) QPSK, 16QAM; (WiFi)CCK</td></tr>
<tr><td>Device Class:</td><td colspan="2">B</td></tr>
<tr><td>HSDPA UE Category:</td><td colspan="2">10</td></tr>
<tr><td>HSUPA UE Category:</td><td colspan="2">6</td></tr>
<tr><td>DC- HSDPA UE Category:</td><td colspan="2">24</td></tr>
<tr><td>HSPA+ UE Downlink Category:</td><td colspan="2">14</td></tr>
<tr><td>LTE UE Category:</td><td colspan="2">4</td></tr>
<tr><td rowspan="3">GPRS Multislot Class(12):</td><td>Max Number of Timeslots in Uplink</td><td>4</td></tr>
<tr><td>Max Number of Timeslots in Downlink</td><td>4</td></tr>
<tr><td>Max Total Timeslot</td><td>5</td></tr>
<tr><td rowspan="3">EGPRS Multislot Class(12):</td><td>Max Number of Timeslots in Uplink</td><td>4</td></tr>
<tr><td>Max Number of Timeslots in Downlink</td><td>4</td></tr>
<tr><td>Max Total Timeslot</td><td>5</td></tr>
<tr><td rowspan="7">Operating Frequency Range(s):</td><td>Mode</td><td>Tx (MHz)</td></tr>
<tr><td>GSM 850</td><td>824.2 ~ 848.8</td></tr>
<tr><td>GSM 1900</td><td>1850.2 ~ 1909.8</td></tr>
<tr><td>UMTS Band II</td><td>1852.4 ~ 1907.6</td></tr>
<tr><td>UMTS Band V</td><td>826.4 ~ 846.6</td></tr>
<tr><td>LTE FDD 2</td><td>1850.7 ~ 1909.3</td></tr>
<tr><td>LTE FDD 4</td><td>1710.7 ~ 1754.3</td></tr>
</table>

	LTE FDD 7	2502.5 ~ 2567.5
	Bluetooth/ Bluetooth 4.0	2402 ~2480
	WiFi	2412 ~2462
Power Class:	GSM 850: 4	
	GSM 1900: 1	
	UMTS Band II/V: 3	
	LTE FDD 2/4/7: 3	
Power Level	GSM 850: level 5	
	GSM 1900: level 0	
	UMTS Band II/V: all up bits	
	LTE FDD 2/4/7: max power	

Auxiliary Equipment Details

Name	Model	Capacity	Manufacturer	S/N
Battery 1	TLi020F1	2000mAh	BYD	B2000009C11000ZV
Battery 2	TLi020F2	2000mAh	SCUD	B2000013C2Y0S9VG

1.6. EUT Antenna Locations



Mobile Hotspot Sides for SAR Testing

Mode	Back Side	Front Side	Left Edge	Right Edge	Top Edge	Bottom Edge
GSM 850	Yes	Yes	Yes	Yes	N/A	Yes
GSM 1900	Yes	Yes	Yes	Yes	N/A	Yes
UMTS Band II	Yes	Yes	Yes	Yes	N/A	Yes
UMTS Band V	Yes	Yes	Yes	Yes	N/A	Yes
LTE Band 2	Yes	Yes	Yes	Yes	N/A	Yes
LTE Band 4	Yes	Yes	Yes	Yes	N/A	Yes
LTE Band 7	Yes	Yes	Yes	Yes	N/A	Yes
WiFi	Yes	Yes	N/A	Yes	Yes	N/A
Note: When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.						

1.7. The Maximum Reported SAR_{1g}

Head SAR Configuration

Mode	Test Position	Channel /Frequency(MHz)	Limit SAR_{1g} 1.6 W/kg	
			Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
GSM 850	Left Cheek	190/836.6	0.601	0.774
GSM 1900	Right Cheek	661/1880	0.451	0.489
UMTS Band II	Right Cheek	9262/1852.4	0.934	1.019
UMTS Band V	Right Cheek	4183/836.6	0.654	0.739
LTE Band 2	Right Cheek	19100/1900	0.968	1.094
LTE Band 4	Right Cheek	20300/1745	0.873	0.901
LTE Band 7	Right Cheek	21350/2560	0.579	0.695
WiFi(802.11b)	Left Cheek	1/2412	0.747	0.768

Body Worn Configuration

Mode	Test Position	Channel /Frequency(MHz)	Limit SAR_{1g} 1.6 W/kg	
			Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
GPRS 850	Front Side	128/824.2	1.070	1.187
GPRS 1900	Back Side	661/1880	0.952	1.179
UMTS Band II	Back Side	9538/1907.6	1.120	1.197
UMTS Band V	Front Side	4183/836.6	0.649	0.733
LTE Band 2	Back Side	18900/1880	1.020	1.196
LTE Band 4	Back Side	20175/1732.5	1.140	1.199
LTE Band 7	Back Side	21100/2535	0.759	0.918
WiFi(802.11b)	Back Side	1/2412	0.212	0.218

hotspot Configuration

Mode	Test Position	Channel /Frequency(MHz)	Limit SAR_{1g} 1.6 W/kg	
			Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
GPRS 850	Front Side	128/824.2	1.070	1.187
GPRS 1900	Back Side	661/1880	0.952	1.179
UMTS Band II	Back Side	9538/1907.6	1.120	1.197
UMTS Band V	Front Side	4183/836.6	0.649	0.733
LTE Band 2	Back Side	18900/1880	1.020	1.196
LTE Band 4	Back Side	20175/1732.5	1.140	1.199
LTE Band 7	Back Side	21100/2535	0.759	0.918
WiFi(802.11b)	Back Side	1/2412	0.212	0.218

1.8. Test Date

The test performed from January 8, 2015 to January 19, 2015.

2. SAR Measurements System Configuration

2.1. SAR Measurement Set-up

The DASY5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
- The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY5 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

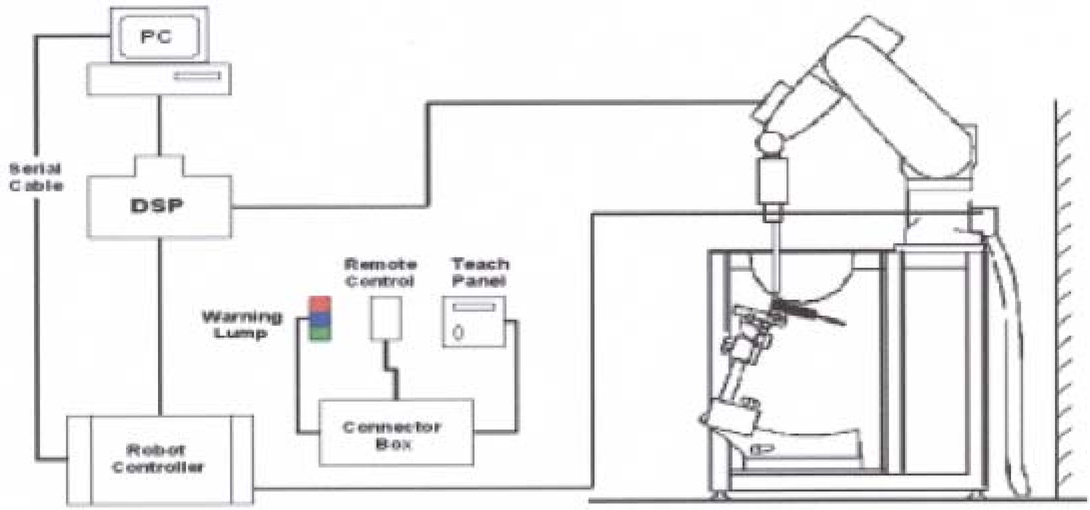


Figure 1 SAR Lab Test Measurement Set-up

2.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4(manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

2.2.1. EX3DV4 Probe Specification

Construction Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Figure 2.EX3DV4 E-field Probe

Calibration ISO/IEC 17025 calibration service available

Frequency 10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)

Directivity ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)

Dynamic Range 10 μW/g to > 100 mW/g Linearity:

± 0.2dB (noise: typically < 1 μW/g)

Dimensions Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

Application High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

Figure 3. EX3DV4 E-field probe

2.2.2. E-field Probe Calibration

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

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

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.
Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

2.3. Other Test Equipment

2.3.1. Device Holder for Transmitters

The DASY device holder is designed to cope with the die rent positions given in the standard.
It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.

Figure 4 Device Holder

2.3.2. Phantom

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

Shell Thickness 2±0.1 mm
Filling Volume Approx. 20 liters
Dimensions 810 x 1000 x 500 mm (H x L x W) Aailable Special

Figure 5 Generic Twin Phantom

2.4. Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

- The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid

spacing is set according to FCC KDB Publication 865664. During scan the distance of the probe to the phantom remains unchanged.
After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- Zoom Scan
  After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 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 then integrated with the trapezoidal algorithm.

- Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY5 system allows evaluations that combine measured data and robot positions, such as:
• maximum search
• extrapolation
• boundary correction
• peak search for averaged SAR
During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm) $\Delta z_{zoom}(n)$	Minimum Zoom Scan Volume (mm) (x,y,z)
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≥ 22

2.5. Data Storage and Evaluation

2.5.1. Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

2.5.2. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	
	- Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot c\,f / d\,c\,p_i$$

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: $$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)^2] for E-field Probes

$ConvF$ = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

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

H_i = magnetic field strength of channel i in A/m

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

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

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

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

with ***SAR*** = local specific absorption rate in mW/g

$\boldsymbol{E_{tot}}$ = total field strength in V/m

. = conductivity in [mho/m] or [Siemens/m]

. = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

$\boldsymbol{E_{tot}}$ = total electric field strength in V/m

$\boldsymbol{H_{tot}}$ = total magnetic field strength in A/m

3. Laboratory Environment

Table 2: The Requirements of the Ambient Conditions

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

4. Tissue-equivalent Liquid

4.1. Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, salt, Glycol, Sugar, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The table 3 and table 4 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB 865664 D01.

Table 3: Composition of the Head Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Brain) 835MHz
Water	41.45
Sugar	56
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz ε=41.5 σ=0.9

MIXTURE%	FREQUENCY(Brain) 1750MHz
Water	55.24
Glycol	44.45
Salt	0.31
Dielectric Parameters Target Value	f=1750MHz ε=40.1 σ=1.37

MIXTURE%	FREQUENCY(Brain) 1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz ε=40.0 σ=1.40

MIXTURE%	FREQUENCY(Brain) 2450MHz
Water	62.7
Glycol	36.8
Salt	0.5
Dielectric Parameters Target Value	f=2450MHz ε=39.2 σ=1.80

MIXTURE%	FREQUENCY(Brain) 2600MHz
Water	55.242
Glycol	44.452
Salt	0.306
Dielectric Parameters Target Value	f=2600MHz ε=39.0 σ=1.96

Table 4: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Body) 835MHz
Water	52.5
Sugar	45
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz ε=55.2 σ=0.97

MIXTURE%	FREQUENCY(Body) 1750MHz
Water	69.91
Glycol	29.97
Salt	0.12
Dielectric Parameters Target Value	f=1750MHz ε=53.4 σ=1.49

MIXTURE%	FREQUENCY (Body) 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz ε=53.3 σ=1.52

MIXTURE%	FREQUENCY(Body) 2450MHz
Water	73.2
Glycol	26.7
Salt	0.1
Dielectric Parameters Target Value	f=2450MHz ε=52.7 σ=1.95

MIXTURE%	FREQUENCY (Body) 2600MHz
Water	72.6
Glycol monobutyl	27.3
Salt	0.1
Dielectric Parameters Target Value	f=2600MHz ε=52.5 σ=2.16

4.2. Tissue-equivalent Liquid Properties

Table 5: Dielectric Performance of Tissue Simulating Liquid

Frequency	Test Date	Temp ℃	Measured Dielectric Parameters		Target Dielectric Parameters		Limit (Within ±5%)	
			ε_r	σ(s/m)	ε_r	σ(s/m)	Dev ε_r(%)	Dev σ(%)
835MHz (head)	2015-1-8	21.5	41.4	0.93	41.5	0.90	-0.24	3.33
1750MHz (head)	2015-1-14	21.5	39.7	1.32	40.1	1.37	-1.00	-3.65
1900MHz (head)	2015-1-9	21.5	39.6	1.43	40.0	1.40	-1.00	2.14
	2015-1-11	21.5	39.6	1.44	40.0	1.40	-1.00	2.86
2450MHz (head)	2015-1-19	21.5	38.6	1.81	39.2	1.80	-1.53	0.56
2600MHz (head)	2015-1-17	21.5	38.6	1.98	39.0	1.96	-1.03	1.02
835MHz (body)	2015-1-12	21.5	55.9	0.99	55.2	0.97	1.27	2.06
1750MHz (body)	2015-1-15	21.5	52.9	1.50	53.4	1.49	-0.94	0.67
1900MHz (body)	2015-1-10	21.5	53.1	1.52	53.3	1.52	-0.38	0.00
	2015-1-13	21.5	53.1	1.53	53.3	1.52	-0.38	0.66
2450MHz (body)	2015-1-18	21.5	52.1	1.99	52.7	1.95	-1.14	2.05
2600MHz (body)	2015-1-16	21.5	51.9	2.17	52.5	2.16	-1.14	0.46

5. System Check

5.1. Description of System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulates, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 6 and table 7.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.

.

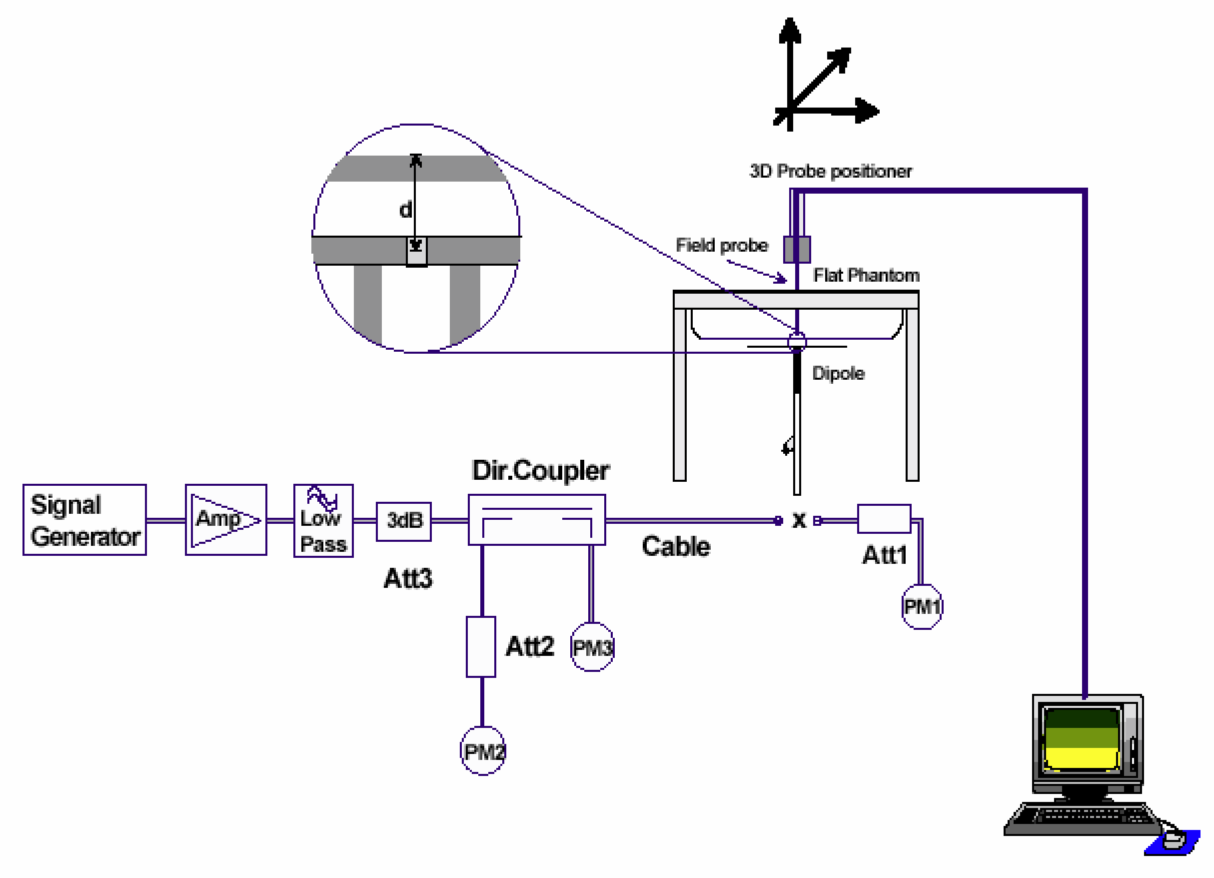


Figure 6 System Check Set-up

Justification for Extended SAR Dipole Calibrations

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (< - 20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB 865664 D01:

Dipole D2600V2 SN: 1012				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
5/2/2012	-25	/	48	/
5/1/2013	-23.5	6%	46.6	1.4Ω
4/29/2014	-24.1	3.6%	47.3	0.7Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
5/2/2012	-23.6	/	45	/
5/1/2013	-24.5	3.8%	43.2	1.8Ω
4/29/2014	-22.9	3.0%	43.6	1.4Ω

5.2. System Check Results

Table 6: System Check in Head Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		250mW Measured SAR_{1g}	1W Normalized SAR_{1g}	1W Target SAR_{1g}	Limit (±10% Deviation)
		ε_r	σ(s/m)	(W/kg)			
835MHz	2015-1-8	41.4	0.93	2.44	9.76	9.54	2.31%
1750MHz	2015-1-14	39.7	1.32	8.95	35.80	37.20	-3.76%
1900MHz	2015-1-9	39.6	1.43	9.48	37.92	39.20	-3.27%
	2015-1-11	39.6	1.44	9.59	38.36	39.20	-2.14%
2450MHz	2015-1-19	38.6	1.81	13.70	54.80	52.50	4.38%
2600MHz	2015-1-17	38.6	1.98	13.90	55.60	57.00	-2.46%
Note：1. The graph results see ANNEX B. 2. Target Values used derive from the calibration certificate							

Table 7: System Check in Body Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		250mW Measured SAR_{1g}	1W Normalized SAR_{1g}	1W Target SAR_{1g}	Limit (±10% Deviation)
		ε_r	σ(s/m)	(W/kg)			
835MHz	2015-1-12	55.9	0.99	2.41	9.64	9.54	1.05%
1750MHz	2015-1-15	52.9	1.50	9.24	36.96	38.80	-4.74%
1900MHz	2015-1-10	53.1	1.52	9.93	39.72	40.00	-0.70%
	2015-1-13	53.1	1.53	9.82	39.28	40.00	-1.80%
2450MHz	2015-1-18	52.1	1.99	12.50	50.00	52.40	-4.58%
2600MHz	2015-1-16	51.9	2.17	13.50	54.00	54.30	-0.55%
Note：1. The graph results see ANNEX B. 2. Target Values used derive from the calibration certificate							

6. Operational Conditions during Test

6.1. General Description of Test Procedures

A communication link is set up with a System Simulator (SS) by air link, and a call is established. The EUT is commanded to operate at maximum transmitting power.

Connection to the EUT is established via air interface with CMW 500, and the EUT is set to maximum output power by CMW 500. The EUT battery must be fully charged and checked periodically during the test to as certain uniform power output. The antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30 dB.

6.2. Test Positions

6.2.1. Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.
The positions used in the measurements were according to IEEE 1528 - 2003 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate(SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

6.2.2. Body Worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use 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. Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do 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 the device with each accessory. If multiple accessories 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. Test position spacing was documented. 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 in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6.3. Measurement Variability

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:
1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

6.4. Test Configuration

6.4.1. GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. Using E5515C the power level is set to “5” for GSM 850, set to “0” for GSM 1900. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5. the EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

Output power of reductions:

Table 8: The allowed power reduction in the multi-slot configuration

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power,(dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

6.4.2. UMTS Test Configuration

6.4.2.1. 3G SAR Test Reduction Procedure

In the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.3 This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

6.4.2.2. Output power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are requied in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

6.4.2.3. Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

6.4.2.4. Body-Worn Accessory SAR

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

6.4.2.5. Handsets with Release 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the "Release 5 HSDPA Data Devices" section of this document, for the highest reported SAR body-worn accessory exposure configuration in 12.2 kbps RMC. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

HSDPA should be configured according to the UE category of a test device.The number of HSDSCH/ HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Table 9: Subtests for UMTS Release 5 HSDPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (note 4)	15/15 (note 4)	64	12/15 (note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI}= 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$=30/15 ⇔ β_{hs}=30/15*β_c

Note2: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.

Note3: For subtest 2 the $\beta_c\beta_d$ 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 (TFC1,TF1) to β_c=11/15 and β_d=15/15.

6.4.3. HSUPA Test Configuration

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the "Release 6 HSPA Data Devices" section of this document, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body-worn accessory measurements is tested for next to the ear head exposure.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 2 and other applicable procedures described in the ‘WCDMA Handset’ and ‘Release 5 HSDPA Data Devices’ sections of this document

Table 10：Sub-Test 5 Setup for Release 6 HSUPA

Sub-set	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}, ΔNACK and Δ_{CQI} = 8 $\Leftrightarrow$ A_{hs} = β_{hs}/β_c = 30/15 $\Leftrightarrow$ β_{hs}= 30/15 *β_c.

Note 2: CM = 1 for βc/βd =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 βc/βd 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 βc = 10/15 and βd = 15/15.

Note 4: For subtest 5 the βc/βd 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 βc = 14/15 and βd = 15/15.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.

Note 6: βed can not be set directly; it is set by Absolute Grant Value.

Table 11: HSUPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI (ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	11484	5.76
	4	4	10		20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.
UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM. (TS25.306-7.3.0)

6.4.3.1. HSPA, HSPA+ and DC-HSDPA Test Configuration

measurement is required for HSPA, HSPA+ or DC-HSDPA, a KDB inquiry is required to confirm that the wireless mode configurations in the test setup have remained stable throughout the SAR measurements.35 Without prior KDB confirmation to determine the SAR results are acceptable, a PBA is required for TCB approval.

SAR test exclusion for HSPA, HSPA+ and DC-HSDPA is determined according to the following:

1) The HSPA procedures are applied to configure 3GPP Rel. 6 HSPA devices in the required sub-test mode(s) to determine SAR test exclusion.

2) SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode.36 Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

3) SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

4) Regardless of whether a PBA is required, the following information must be verified and included in the SAR report for devices supporting HSPA, HSPA+ or DC-HSDPA: a) The output power measurement results and applicable release version(s) of 3GPP TS 34.121.

i) Power measurement difficulties due to test equipment setup or availability must be resolved between the grantee and its test lab.

b) The power measurement results are in agreement with the individual device implementation and specifications. When Enhanced MPR (E-MPR) applies, the normal MPR targets may be modified according to the Cubic Metric (CM) measured by the device, which must be taken into consideration.

c) The UE category, operating parameters, such as the β and Δ values used to configure the device for testing, power setback procedures described in 3GGPP TS 34.121 for the power measurements, and HSPA/HSPA+ channel conditions (active and stable) for the entire duration of the measurement according to the required E-TFCI and AG index values.

5) When SAR measurement is required, the test configurations, procedures and power measurement results must be clearly described to confirm that the required test parameters are used, including E-TFCI and AG index stability and output power conditions.

Table 12: HS-DSCH UE category

Table 5.1a: FDD HS-DSCH physical layer categories

<table>
<tr><th>HS-DSCH category</th><th>Maximum number of HS-DSCH codes received</th><th>Minimum inter-TTI interval</th><th>Maximum number of bits of an HS-DSCH transport block received within an HS-DSCH TTI NOTE 1</th><th>Total number of soft channel bits</th><th>Supported modulations without MIMO operation or dual cell operation</th><th>Supported modulations with MIMO operation and without dual cell operation</th><th>Supported modulations with dual cell operation</th></tr>
<tr><td>Category 1</td><td>5</td><td>3</td><td>7298</td><td>19200</td><td rowspan="10">QPSK, 16QAM</td><td rowspan="14">Not applicable (MIMO not supported)</td><td rowspan="22">Not applicable (dual cell operation not supported)</td></tr>
<tr><td>Category 2</td><td>5</td><td>3</td><td>7298</td><td>28800</td></tr>
<tr><td>Category 3</td><td>5</td><td>2</td><td>7298</td><td>28800</td></tr>
<tr><td>Category 4</td><td>5</td><td>2</td><td>7298</td><td>38400</td></tr>
<tr><td>Category 5</td><td>5</td><td>1</td><td>7298</td><td>57600</td></tr>
<tr><td>Category 6</td><td>5</td><td>1</td><td>7298</td><td>67200</td></tr>
<tr><td>Category 7</td><td>10</td><td>1</td><td>14411</td><td>115200</td></tr>
<tr><td>Category 8</td><td>10</td><td>1</td><td>14411</td><td>134400</td></tr>
<tr><td>Category 9</td><td>15</td><td>1</td><td>20251</td><td>172800</td></tr>
<tr><td>Category 10</td><td>15</td><td>1</td><td>27952</td><td>172800</td></tr>
<tr><td>Category 11</td><td>5</td><td>2</td><td>3630</td><td>14400</td><td rowspan="2">QPSK</td></tr>
<tr><td>Category 12</td><td>5</td><td>1</td><td>3630</td><td>28800</td></tr>
<tr><td>Category 13</td><td>15</td><td>1</td><td>35280</td><td>259200</td><td rowspan="2">QPSK, 16QAM, 64QAM</td></tr>
<tr><td>Category 14</td><td>15</td><td>1</td><td>42192</td><td>259200</td></tr>
<tr><td>Category 15</td><td>15</td><td>1</td><td>23370</td><td>345600</td><td rowspan="2" colspan="2">QPSK, 16QAM</td></tr>
<tr><td>Category 16</td><td>15</td><td>1</td><td>27952</td><td>345600</td></tr>
<tr><td rowspan="2">Category 17 NOTE 2</td><td rowspan="2">15</td><td rowspan="2">1</td><td>35280</td><td>259200</td><td>QPSK, 16QAM, 64QAM</td><td>–</td></tr>
<tr><td>23370</td><td>345600</td><td>–</td><td>QPSK, 16QAM</td></tr>
<tr><td rowspan="2">Category 18 NOTE 3</td><td rowspan="2">15</td><td rowspan="2">1</td><td>42192</td><td>259200</td><td>QPSK, 16QAM, 64QAM</td><td>–</td></tr>
<tr><td>27952</td><td>345600</td><td>–</td><td>QPSK, 16QAM</td></tr>
<tr><td>Category 19</td><td>15</td><td>1</td><td>35280</td><td>518400</td><td rowspan="2" colspan="2">QPSK, 16QAM, 64QAM</td></tr>
<tr><td>Category 20</td><td>15</td><td>1</td><td>42192</td><td>518400</td></tr>
<tr><td>Category 21</td><td>15</td><td>1</td><td>23370</td><td>345600</td><td rowspan="4">-</td><td rowspan="4">-</td><td rowspan="2">QPSK, 16QAM</td></tr>
<tr><td>Category 22</td><td>15</td><td>1</td><td>27952</td><td>345600</td></tr>
<tr><td>Category 23</td><td>15</td><td>1</td><td>35280</td><td>518400</td><td rowspan="2">QPSK, 16QAM, 64QAM</td></tr>
<tr><td>Category 24</td><td>15</td><td>1</td><td>42192</td><td>518400</td></tr>
</table>

6.4.4. LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

A)Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

B)MPR

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 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

C)A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

D) Largest channel bandwidth standalone SAR test requirements

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

4) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

E) Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the *reported* SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

6.4.5. WiFi Test Configuration

For WLAN SAR testing, WLAN engineering testing software installed on the DUT can provide continuous transmitting RF signal. The Tx power is set to 18 for 802.11 b mode by software. This RF signal utilized in SAR measurement has almost 100% duty cycle and its crest factor is 1.

For the 802.11b/g/n SAR tests, a communication link is set up with the test mode software for WiFi mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. Testing at higher data rates is not required when the maximum average output power is less than 0.25dB higher than those measured at the lowest data rate.

802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g/n modes are tested on the maximum average output channel;
SAR is not required for 802.11g/n channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

7. Test Results

7.1. Conducted Power Results

Table 13: Conducted Power Measurement Results

GSM 850		Burst Conducted Power(dBm)			/	Average power(dBm)		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		128/824.2	190/836.6	251/848.8		128/824.2	190/836.6	251/848.8
GSM		32.76	32.40	32.56	-9.03dB	23.73	23.37	23.53
GPRS (GMSK)	1Txslot	32.71	32.47	32.48	-9.03dB	23.68	23.44	23.45
	2Txslots	30.86	31.09	30.56	-6.02dB	24.84	25.07	24.54
	3Txslots	29.04	29.14	29.20	-4.26dB	24.78	24.88	24.94
	4Txslots	28.05	28.10	28.13	-3.01dB	**25.04**	**25.09**	**25.12**
EGPRS (GMSK)	1Txslot	32.66	32.37	32.53	-9.03dB	23.63	23.34	23.50
	2Txslots	30.90	31.04	30.69	-6.02dB	24.88	25.02	24.67
	3Txslots	28.99	29.19	29.25	-4.26dB	24.73	24.93	24.99
	4Txslots	27.92	28.13	28.15	-3.01dB	**24.91**	**25.12**	**25.14**
EGPRS (8PSK)	1Txslot	26.65	26.62	26.67	-9.03dB	17.62	17.59	17.64
	2Txslots	25.58	25.58	25.61	-6.02dB	19.56	19.56	19.59
	3Txslots	24.11	23.89	23.98	-4.26dB	19.85	19.63	19.72
	4Txslots	22.57	22.69	22.56	-3.01dB	19.56	19.68	19.55
GSM 1900		**Burst Conducted Power(dBm)**			/	**Average power(dBm)**		
		Channel/Frequency(MHz)				Channel/Frequency(MHz)		
		512/1850.2	661/1880	810/1909.8		512/1850.2	661/1880	810/1909.8
GSM		30.08	30.15	30.08	-9.03dB	21.05	21.12	21.05
GPRS (GMSK)	1Txslot	29.92	29.98	30.06	-9.03dB	20.89	20.95	21.03
	2Txslots	28.25	28.26	28.37	-6.02dB	22.23	22.24	22.35
	3Txslots	26.60	26.61	26.61	-4.26dB	22.34	22.35	22.35
	4Txslots	25.65	25.57	25.52	-3.01dB	**22.64**	**22.56**	**22.51**
EGPRS (GMSK)	1Txslot	30.05	30.05	30.01	-9.03dB	21.02	21.02	20.98
	2Txslots	28.35	28.40	28.36	-6.02dB	22.33	22.38	22.34
	3Txslots	26.54	26.65	26.58	-4.26dB	22.28	22.39	22.32
	4Txslots	25.60	25.48	25.56	-3.01dB	**22.59**	**22.47**	**22.55**
EGPRS (8PSK)	1Txslot	25.97	26.05	26.12	-9.03dB	16.94	17.02	17.09
	2Txslots	24.96	25.05	25.08	-6.02dB	18.94	19.03	19.06
	3Txslots	23.58	23.65	23.65	-4.26dB	19.32	19.39	19.39
	4Txslots	22.10	22.17	22.18	-3.01dB	19.09	19.16	19.17

Note:

1) Division Factors

To average the power, the division factor is as follows:

1Txslot = 1 transmit time slot out of 8 time slots

=> conducted power divided by (8/1) => -9.03 dB
2Txslots = 2 transmit time slots out of 8 time slots
=> conducted power divided by (8/2) => -6.02 dB
3Txslots = 3 transmit time slots out of 8 time slots
=> conducted power divided by (8/3) => -4.26 dB
4Txslots = 4 transmit time slots out of 8 time slots
=> conducted power divided by (8/4) => -3.01 dB
2) Average power numbers
The maximum power numbers are marks in bold.

UMTS Band II		**Conducted Power (dBm)**		
		Channel/Frequency(MHz)		
		9262/1852.4	9400/1880	9538/1907.6
RMC	12.2kbps RMC	23.62	23.81	23.71
	64kbps RMC	23.67	23.76	23.62
	144kbps RMC	23.54	23.72	23.73
	384kbps RMC	23.59	23.75	23.67
HSDPA	Sub - Test 1	22.48	22.6	22.35
	Sub - Test 2	22.56	22.57	22.34
	Sub - Test 3	22.15	22.43	22.46
	Sub - Test 4	22.62	22.64	22.37
HSUPA	Sub - Test 1	22.06	21.88	21.54
	Sub - Test 2	21.37	21.05	20.97
	Sub - Test 3	21.86	21.65	21.24
	Sub - Test 4	21.96	21.86	21.95
	Sub - Test 5	22.59	22.73	22.36
DC-HSDPA	Sub - Test 1	22.43	22.41	22.53
	Sub - Test 2	22.16	22.32	21.97
	Sub - Test 3	21.98	22.46	21.94
	Sub - Test 4	22.46	22.57	22.06
HSPA+	16QAM	22.25	22.07	22.14
UMTS Band V		**Conducted Power (dBm)**		
		Channel/Frequency(MHz)		
		4132/826.4	4183/836.6	4233/846.6
RMC	12.2kbps RMC	22.81	22.97	22.97
	64kbps RMC	22.85	23.10	22.91
	144kbps RMC	22.75	22.96	22.89
	384kbps RMC	22.83	22.98	22.95
HSDPA	Sub - Test 1	21.53	21.61	21.51

	Sub - Test 2	21.64	21.46	21.48
	Sub - Test 3	21.49	21.58	21.42
	Sub - Test 4	21.55	21.60	21.52
HSUPA	Sub - Test 1	22.42	22.46	21.95
	Sub - Test 2	20.92	20.86	20.57
	Sub - Test 3	21.35	21.57	21.43
	Sub - Test 4	21.06	20.63	20.54
	Sub - Test 5	22.70	22.24	22.52
DC-HSDPA	Sub - Test 1	22.46	21.86	22.31
	Sub - Test 2	22.37	21.79	21.96
	Sub - Test 3	22.16	22.42	22.28
	Sub - Test 4	22.39	22.25	22.27
HSPA+	16QAM	22.15	22.11	22.21

LTE FDD Band 2				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18625/1852.5	18900/1880	19175/1907.5
5MHz	QPSK	1	0	23.88	23.41	23.73
		1	13	23.51	23.18	23.57
		1	24	23.47	22.77	23.22
		12	0	22.65	22.18	22.28
		12	6	22.64	22.75	22.34
		12	13	22.63	22.04	22.20
		25	0	22.64	22.19	22.15
	16QAM	1	0	21.97	21.67	21.67
		1	13	22.17	21.27	21.56
		1	24	22.24	21.49	21.55
		25	0	21.97	22.10	21.83
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18650/1855	18900/1880	19150/1905
10MHz	QPSK	1	0	23.88	23.41	23.72
		1	25	23.80	23.47	23.57
		1	49	23.77	23.06	23.71
		25	0	22.94	22.47	23.07
		25	13	22.93	23.04	23.13
		25	25	22.92	22.33	22.99
		50	0	22.93	22.48	22.94
	16QAM	1	0	21.54	21.96	21.74
		1	25	21.74	21.56	21.63
		1	49	21.81	21.79	21.62
		50	0	21.96	22.09	21.82
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18675/1857.5	18900/1880	19125/1902.5
15MHz	QPSK	1	0	23.89	23.42	23.74
		1	38	23.82	23.49	23.58
		1	74	23.78	23.08	23.72
		36	0	22.96	22.49	23.09
		36	18	22.94	23.06	23.14
		36	39	22.93	22.34	23.01
		75	0	22.95	22.50	22.95
	16QAM	1	0	21.28	21.98	21.48
		1	38	21.97	21.58	21.37
		1	74	21.54	21.80	21.36
		75	0	21.97	22.11	21.84
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				18700/1860	18900/1880	19100/1900

20MHz	QPSK	1	0	23.88	23.31	23.12
		1	50	23.40	23.08	23.47
		1	99	23.37	22.67	23.11
		50	0	22.54	22.08	22.18
		50	25	22.53	22.64	22.23
		50	50	22.52	21.93	22.09
		100	0	22.54	22.09	22.04
	16QAM	1	0	21.86	21.57	21.57
		1	50	22.06	21.16	21.46
		1	99	21.53	21.39	21.44
		100	0	21.86	21.99	21.72

LTE FDD Band 4				**Conducted Power(dBm)**		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5
5MHz	QPSK	1	0	23.88	23.75	23.57
		1	13	23.89	23.88	23.66
		1	24	23.68	23.57	23.64
		12	0	22.71	22.70	22.78
		12	6	22.70	22.71	22.79
		12	13	22.60	22.71	22.73
		25	0	22.70	22.73	22.72
	16QAM	1	0	23.80	23.80	23.78
		1	13	23.80	23.86	23.78
		1	24	23.81	23.81	23.80
		25	0	21.12	21.12	21.12
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20000/1715	20175/1732.5	20350/1750
10MHz	QPSK	1	0	23.87	23.74	23.57
		1	25	23.88	23.87	23.65
		1	49	23.67	23.56	23.63
		25	0	22.70	22.70	22.77
		25	13	22.69	22.70	22.78
		25	25	22.59	22.71	22.72
		50	0	22.69	22.73	22.71
	16QAM	1	0	23.29	23.30	23.27
		1	25	23.29	23.35	23.28
		1	49	23.30	23.30	23.29
		50	0	21.11	21.11	21.11
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20025/1717.5	20175/1732.5	20325/1747.5
15MHz	QPSK	1	0	23.88	23.75	23.58
		1	38	23.89	23.88	23.67

		1	74	23.68	23.57	23.64
		36	0	22.71	22.71	22.78
		36	18	22.71	22.71	22.79
		36	39	22.60	22.72	22.73
		75	0	22.70	22.74	22.72
	16QAM	1	0	23.30	23.31	23.29
		1	38	23.30	23.36	23.29
		1	74	23.31	23.32	23.31
		75	0	21.12	21.12	21.12
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20050/1720	20175/1732.5	20300/1745
20MHz	QPSK	1	0	23.78	23.65	23.48
		1	50	23.79	23.78	23.87
		1	99	23.79	23.47	23.54
		50	0	22.61	22.61	22.68
		50	25	22.61	22.61	22.69
		50	50	22.50	22.62	22.63
		100	0	22.60	22.64	22.62
	16QAM	1	0	23.20	23.21	23.19
		1	50	23.20	23.26	23.19
		1	99	23.21	23.21	23.20
		100	0	21.52	21.52	21.52

LTE FDD Band 7				**Conducted Power(dBm)**		
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20775/2502.5	21100/2535	21425/2567.5
5MHz	QPSK	1	0	21.61	21.77	21.81
		1	13	21.38	21.77	21.78
		1	24	21.50	21.76	21.61
		12	0	20.76	20.85	20.78
		12	6	20.72	20.95	20.71
		12	13	20.67	20.75	20.66
		25	0	20.67	20.71	20.71
	16QAM	1	0	20.41	20.43	20.39
		1	13	20.41	20.43	20.29
		1	24	20.39	20.35	20.28
		25	0	19.85	19.55	19.65
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20800/2505	21100/2535	21400/2565
10MHz	QPSK	1	0	21.60	21.76	21.80
		1	25	21.37	21.76	21.77
		1	49	21.49	21.75	21.60

		25	0	20.75	20.84	20.77
		25	13	20.71	20.94	20.70
		25	25	20.66	20.74	20.65
		50	0	20.66	20.70	20.70
	16QAM	1	0	20.40	20.42	20.38
		1	25	20.40	20.42	20.28
		1	49	20.38	20.34	20.27
		50	0	19.84	19.54	19.64
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20825/2507.5	21100/2535	21375/2562.5
15MHz	QPSK	1	0	21.60	21.77	21.80
		1	38	21.37	21.76	21.78
		1	74	21.49	21.75	21.60
		36	0	20.76	20.84	20.78
		36	18	20.71	20.94	20.71
		36	39	20.66	20.74	20.66
		75	0	20.66	20.70	20.70
	16QAM	1	0	20.40	20.43	20.38
		1	38	20.40	20.43	20.29
		1	74	20.39	20.34	20.27
		75	0	19.85	19.55	19.65
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency(MHz)		
				20850/2510	21100/2535	21350/2560
20MHz	QPSK	1	0	21.51	21.68	21.71
		1	50	21.28	21.67	21.69
		1	99	21.40	21.66	21.51
		50	0	20.67	20.75	20.69
		50	25	20.62	20.85	20.62
		50	50	20.57	20.65	20.57
		100	0	20.57	20.61	20.61
	16QAM	1	0	20.31	20.34	20.29
		1	50	20.31	20.34	20.20
		1	99	20.30	20.25	20.18
		100	0	19.76	19.46	19.56

BT	Conducted Power(dBm)		
	Channel/Frequency(MHz)		
	Ch 0/2402 MHz	Ch 39/2441 MHz	Ch 78/2480 MHz
GFSK	5.21	5.41	1.45
π/4DQPSK	2.72	2.83	-1.05
8DPSK	2.92	3.03	-0.89
BT 4.0	Ch 0/2402 MHz	Ch 19/2440 MHz	Ch 39/2480 MHz
GFSK	1.09	1.80	-1.85

Mode	Channel/ Frequency(MHz)	Data rate (Mbps)	Conducted Power (dBm)
802.11b	1/2412	1	15.28
		2	15.05
		5.5	14.89
		11	14.58
	6/2437	1	14.19
	11/2462	1	14.26
802.11g	1/2412	6	11.14
		9	10.94
		12	10.69
		18	10.33
		24	9.92
		36	9.28
		48	8.73
		54	8.57
	6/2437	6	10.56
	11/2462	6	10.72
802.11n HT20	1/2412	MCS0	10.16
		MCS1	9.68
		MCS2	9.28
		MCS3	8.92
		MCS4	8.43
		MCS5	7.87
		MCS6	7.66
		MCS7	7.42
	6/2437	MCS0	9.61
	11/2462	MCS0	9.78

7.2. Standalone SAR Test Exclusion Considerations

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

$$\frac{\textbf{(max. power of channel, including tune-up tolerance, mW)}}{\textbf{(min. test separation distance, mm)}} * \sqrt{\textbf{Frequency (GHz)}} \leq \textbf{3.0}$$

Band	Configuration	Frequency (MHz)	Maximum Power (dBm)	Separation Distance (mm)	Calculation Result	SAR Exclusion Thresholds	Standalone SAR
Bluetooth	Head	2480	7	5	1.58	3.0	No
	Body	2480	7	10	0.79	3.0	No
Wifi 2.4GHz	Head	2462	15.4	5	10.88	3.0	Yes
	Body	2462	15.4	10	5.44	3.0	Yes

7.3. SAR Test Results

7.3.1. GSM 850

Table 14: SAR Values [GSM 850 (GSM/GPRS/EGPRS)]

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR_{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Graph Results
Test Position of Head										
Left/Cheek	190/836.6	GSM	1:8.3	33.5	32.40	-0.020	0.567	1.29	0.730	/
Left/Tilt	190/836.6	GSM	1:8.3	33.5	32.40	-0.090	0.415	1.29	0.535	/
Right/Cheek	190/836.6	GSM	1:8.3	33.5	32.40	-0.064	0.525	1.29	0.676	/
Right/Tilt	190/836.6	GSM	1:8.3	33.5	32.40	-0.170	0.428	1.29	0.551	/
Worst Case Position of Head with Battery 2										
Left/Cheek	190/836.6	GSM	1:8.3	33.5	32.40	-0.076	0.601	1.29	0.774	Figure19
Test position of Body (Distance 10mm)										
Back Side	190/836.6	4 Txslots	1:2.07	28.5	28.10	-0.036	0.695	1.10	0.762	/
Front Side	251/848.8	4 Txslots	1:2.07	28.5	28.13	-0.040	0.692	1.09	0.754	/
	190/836.6	4 Txslots	1:2.07	28.5	28.10	-0.020	0.801	1.10	0.878	/
	128/824.2	4 Txslots	1:2.07	28.5	28.05	0.030	1.070	1.11	1.187	Figure20
Left Edge	190/836.6	4 Txslots	1:2.07	28.5	28.10	-0.190	0.602	1.10	0.660	/
Right Edge	190/836.6	4 Txslots	1:2.07	28.5	28.10	0.100	0.626	1.10	0.686	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	190/836.6	4 Txslots	1:2.07	28.5	28.10	0.026	0.332	1.10	0.364	/
Worst Case Position of Body with EGPRS (Distance 10mm)										
Front Side	128/824.2	4 Txslots	1:2.07	28.5	27.92	-0.010	0.836	1.14	0.955	/
Worst Case Position of Body with Battery 2 (Distance 10mm)										
Front Side	128/824.2	4 Txslots	1:2.07	28.5	28.05	-0.070	0.654	1.11	0.725	/
Worst Case Position of Body (1^{st} Repeated SAR)										
Front Side	128/824.2	4 Txslots	1:2.07	28.5	28.05	-0.130	0.980	1.11	1.087	/

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

3. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

Table 15: SAR Measurement Variability Results [GSM 850 (GSM/GPRS/EGPRS)]

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Front Side	128/824.2	1.070	0.980	1.09	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

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

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

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

7.3.2. GSM 1900

Table 16: SAR Values [GSM 1900(GSM/GPRS/EGPRS)]

Test Position	Channel/ Frequency (MHz)	Time slot	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR_{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Graph Results
Test Position of Head										
Left/Cheek	661/1880	GSM	1:8.3	30.5	30.15	0.034	0.365	1.08	0.396	/
Left/Tilt	661/1880	GSM	1:8.3	30.5	30.15	-0.190	0.146	1.08	0.158	/
Right/Cheek	661/1880	GSM	1:8.3	30.5	30.15	0.084	0.420	1.08	0.455	/
Right/Tilt	661/1880	GSM	1:8.3	30.5	30.15	-0.095	0.158	1.08	0.171	/
Worst Case Position of Head with Battery 2										
Right/Cheek	661/1880	GSM	1:8.3	30.5	30.15	-0.090	0.451	1.08	0.489	Figure21
Test position of Body (Distance 10mm)										
Back Side	810/1909.8	4Txslots	1:2.07	26.5	25.52	-0.040	0.864	1.25	1.083	/
	661/1880	4Txslots	1:2.07	26.5	25.57	-0.190	0.952	1.24	1.179	Figure22
	512/1850.2	4Txslots	1:2.07	26.5	25.65	0.110	0.955	1.22	1.161	/
Front Side	810/1909.8	4Txslots	1:2.07	26.5	25.52	-0.020	0.650	1.25	0.815	/
	661/1880	4Txslots	1:2.07	26.5	25.57	-0.050	0.699	1.24	0.866	/
	512/1850.2	4Txslots	1:2.07	26.5	25.65	0.030	0.726	1.22	0.883	/
Left Edge	661/1880	4Txslots	1:2.07	26.5	25.57	-0.037	0.214	1.24	0.265	/
Right Edge	661/1880	4Txslots	1:2.07	26.5	25.57	-0.170	0.243	1.24	0.301	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	661/1880	4Txslots	1:2.07	26.5	25.57	-0.023	0.437	1.24	0.541	/
Worst Case Position of Body with EGPRS (Distance 10mm)										
Back Side	661/1880	4Txslots	1:2.07	26.5	25.48	0.040	0.930	1.26	1.176	/
Worst Case Position of Body with Battery 2 (Distance 10mm)										
Back Side	661/1880	4Txslots	1:2.07	26.5	25.57	0.100	0.899	1.24	1.114	/
Worst Case Position of Body (1st Repeated SAR)										
Back Side	512/1850.2	4Txslots	1:2.07	26.5	25.65	0.010	0.891	1.22	1.084	/

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

3. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

Table 17: SAR Measurement Variability Results [GSM 1900 (GSM/GPRS/EGPRS)]

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back Side	512/1850.2	0.955	0.891	1.07	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

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

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

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

7.3.3. UMTS Band II

Table 18: SAR Values [UMTS Band II (WCDMA/HSDPA/HSUPA)]

Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR_{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Graph Results
Test Position of Head										
Left/Cheek	9538/1907.6	RMC 12.2K	1:1	24	23.71	-0.020	0.830	1.07	0.887	/
	9400/1880	RMC 12.2K	1:1	24	23.81	0.020	0.835	1.04	0.872	/
	9262/1852.4	RMC 12.2K	1:1	24	23.62	-0.040	0.886	1.09	0.967	Figure23
Left/Tilt	9400/1880	RMC 12.2K	1:1	24	23.81	0.010	0.274	1.04	0.286	/
Right/Cheek	9538/1907.6	RMC 12.2K	1:1	24	23.71	0.067	0.855	1.07	0.914	/
	9400/1880	RMC 12.2K	1:1	24	23.81	0.184	0.798	1.04	0.834	/
	9262/1852.4	RMC 12.2K	1:1	24	23.62	0.040	0.934	1.09	1.019	Figure24
Right/Tilt	9400/1880	RMC 12.2K	1:1	24	23.81	-0.050	0.363	1.04	0.379	/
Worst Case Position of Head with Battery 2										
Right/Cheek	9262/1852.4	RMC 12.2K	1:1	24	23.62	0.020	0.875	1.09	0.955	/
Test position of Body (Distance 10mm)										
Back Side	9538/1907.6	RMC 12.2K	1:1	24	23.71	0.030	1.120	1.07	1.197	Figure25
	9400/1880	RMC 12.2K	1:1	24	23.81	0.130	1.080	1.04	1.128	/
	9262/1852.4	RMC 12.2K	1:1	24	23.62	0.160	1.080	1.09	1.179	/
Front Side	9400/1880	RMC 12.2K	1:1	24	23.81	0.010	0.660	1.04	0.690	/
Left Edge	9400/1880	RMC 12.2K	1:1	24	23.81	0.000	0.232	1.04	0.242	/
Right Edge	9400/1880	RMC 12.2K	1:1	24	23.81	-0.150	0.245	1.04	0.256	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	9400/1880	RMC 12.2K	1:1	24	23.81	-0.040	0.637	1.04	0.665	/
Worst Case Position of Body with Battery 2 (Distance 10mm)										
Back Side	9538/1907.6	RMC 12.2K	1:1	24	23.71	0.029	1.120	1.07	1.197	/
Worst Case Position of Body (1st Repeated SAR)										
Back Side	9538/1907.6	RMC 12.2K	1:1	24	23.71	0.010	1.110	1.07	1.187	/

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode

3. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

Table 19: SAR Measurement Variability Results [UMTS Band II (WCDMA/HSDPA/HSUPA)]

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back Side	9538/1907.6	1.12	1.11	1.01	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

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

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

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

7.3.4. UMTS Band V

Table 20: SAR Values [UMTS Band V (WCDMA/HSDPA/HSUPA)]

Test Position	Channel/ Frequency (MHz)	Channel Type	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR_{1g} 1.6 W/kg			
						Drift (dB)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Graph Results
Test Position of Head										
Left/Cheek	4183/836.6	RMC 12.2K	1:1	23.5	22.97	0.010	0.654	1.13	0.739	Figure26
Left/Tilt	4183/836.6	RMC 12.2K	1:1	23.5	22.97	0.050	0.523	1.13	0.591	/
Right/Cheek	4183/836.6	RMC 12.2K	1:1	23.5	22.97	-0.190	0.599	1.13	0.677	/
Right/Tilt	4183/836.6	RMC 12.2K	1:1	23.5	22.97	-0.037	0.424	1.13	0.479	/
Worst Case Position of Head with Battery 2										
Left/Cheek	4183/836.6	RMC 12.2K	1:1	23.5	22.97	-0.087	0.637	1.13	0.720	/
Test position of Body (Distance 10mm)										
Back Side	4183/836.6	RMC 12.2K	1:1	23.5	22.97	0.000	0.494	1.13	0.558	/
Front Side	4183/836.6	RMC 12.2K	1:1	23.5	22.97	0.010	0.618	1.13	0.698	/
Left Edge	4183/836.6	RMC 12.2K	1:1	23.5	22.97	-0.080	0.429	1.13	0.485	/
Right Edge	4183/836.6	RMC 12.2K	1:1	23.5	22.97	0.010	0.419	1.13	0.473	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	4183/836.6	RMC 12.2K	1:1	23.5	22.97	0.040	0.220	1.13	0.249	/
Worst Case Position of Body with Battery 2 (Distance 10mm)										
Front Side	4183/836.6	RMC 12.2K	1:1	23.5	22.97	-0.010	0.649	1.13	0.733	Figure27

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode
3. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

7.3.5. LTE Band 2

Table 21: SAR Values (LTE Band 2/20MHz)

Test Position	Channel/ Frequency (MHz)	RB Offset	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB Drift (dB)	Limit SAR_{1g} 1.6 W/kg Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Graph Results
Test Position of Head (1RB,QPSK)									
Left/Cheek	19100/1900	50	24	23.47	0.130	0.861	1.13	0.973	Figure28
	18900/1880	0	24	23.31	0.034	0.805	1.17	0.944	/
	18700/1860	0	24	23.88	0.060	0.761	1.03	0.783	/
Left/Tilt	19100/1900	50	24	23.47	-0.034	0.239	1.13	0.270	/
Right/Cheek	19100/1900	50	24	23.47	0.050	0.925	1.13	1.046	/
	18900/1880	0	24	23.31	0.038	0.865	1.17	1.014	/
	18700/1860	0	24	23.88	0.031	0.773	1.03	0.795	/
Right/Tilt	19100/1900	50	24	23.47	-0.021	0.301	1.13	0.340	/
Test Position of Head (50% RB,QPSK)									
Left/Cheek	18900/1880	25	23	22.64	-0.040	0.678	1.09	0.736	/
Left/Tilt	18900/1880	25	23	22.64	0.070	0.158	1.09	0.172	/
Right/Cheek	19100/1900	25	23	22.23	0.080	0.644	1.19	0.769	/
	18900/1880	25	23	22.64	0.130	0.760	1.09	0.825	/
	18700/1860	0	23	22.54	-0.070	0.635	1.11	0.705	/
Right/Tilt	18900/1880	25	23	22.64	-0.072	0.179	1.09	0.194	/
Worst Case Position of Head with Battery 2 (1RB,QPSK)									
Right/Cheek	19100/1900	50	24	23.47	0.004	0.968	1.13	1.094	Figure29
Test position of Body (1RB,QPSK ,Distance 10mm)									
Back Side	19100/1900	50	24	23.47	0.020	1.010	1.13	1.142	/
	18900/1880	0	24	23.31	-0.037	1.020	1.17	1.196	Figure30
	18700/1860	0	24	23.88	0.074	1.100	1.03	1.131	/
Front Side	19100/1900	50	24	23.47	0.090	0.870	1.13	0.983	/
	18900/1880	0	24	23.31	0.050	0.885	1.17	1.038	/
	18700/1860	0	24	23.88	-0.056	0.918	1.03	0.944	/
Left Edge	19100/1900	50	24	23.47	-0.169	0.325	1.13	0.367	/
Right Edge	19100/1900	50	24	23.47	0.053	0.352	1.13	0.398	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	19100/1900	50	24	23.47	0.110	0.535	1.13	0.605	/
Test position of Body (50%RB,QPSK ,Distance 10mm)									
Back Side	19100/1900	25	23	22.23	0.050	0.781	1.19	0.932	/
	18900/1880	25	23	22.64	-0.010	0.775	1.09	0.841	/

	18700/1860	0	23	22.54	-0.020	0.804	1.11	0.893	/
Front Side	18900/1880	25	23	22.64	-0.100	0.664	1.09	0.721	/
Left Edge	18900/1880	25	23	22.64	-0.110	0.192	1.09	0.208	/
Right Edge	18900/1880	25	23	22.64	-0.080	0.273	1.09	0.296	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	18900/1880	25	23	22.64	-0.080	0.455	1.09	0.494	/
Worst Case Position of Body with Battery 2 (1RB,QPSK ,Distance 10mm)									
Back Side	18900/1880	0	24	23.31	0.02	0.988	1.17	1.158	/
Worst Case Position of Body (1st Repeated SAR)									
Back Side	18700/1860	0	24	23.88	0.02	1.110	1.03	1.141	/
Note: 1.The value with blue color is the maximum SAR Value of each test band.									

Table 22: SAR Measurement Variability Results [LTE Band 2/20MHz]

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Back Side	18700/1860	1.10	1.11	1.01	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

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

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

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

7.3.6. LTE Band 4

Table 23: SAR Values (LTE Band 4/20MHz)

Test Position	Channel/ Frequency (MHz)	RB Offset	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR$_{1g}$ 1.6 W/kg			
					Drift (dB)	Measured SAR$_{1g}$ (W/kg)	Scaling Factor	Reported SAR$_{1g}$ (W/kg)	Graph Results
Test Position of Head (1RB,QPSK)									
Left/Cheek	20175/1732.5	50	24	23.78	0.150	0.648	1.05	0.681	/
Left/Tilt	20175/1732.5	50	24	23.78	-0.020	0.248	1.05	0.261	/
Right/Cheek	20300/1745	50	24	23.87	-0.026	0.843	1.03	0.870	/
	20175/1732.5	50	24	23.78	0.130	0.775	1.05	0.815	/
	20050/1720	50	24	23.79	-0.080	0.765	1.05	0.803	/
Right/Tilt	20175/1732.5	50	24	23.78	-0.120	0.305	1.05	0.321	/
Test Position of Head (50% RB,QPSK)									
Left/Cheek	20300/1745	25	23	22.69	0.130	0.508	1.07	0.546	/
Left/Tilt	20300/1745	25	23	22.69	0.030	0.215	1.07	0.231	/
Right/Cheek	20300/1745	25	23	22.69	-0.050	0.662	1.07	0.711	/
Right/Tilt	20300/1745	25	23	22.69	-0.051	0.239	1.07	0.257	/
Worst Case Position of Head with Battery 2 (1RB,QPSK)									
Right/Cheek	20300/1745	50	24	23.87	0.056	0.873	1.03	0.901	Figure31
Test position of Body (1RB,QPSK ,Distance 10mm)									
Back Side	20300/1745	50	24	23.87	0.020	1.150	1.03	1.186	/
	20175/1732.5	50	24	23.78	0.030	1.130	1.05	1.188	/
	20050/1720	50	24	23.79	0.039	1.120	1.05	1.175	/
Front Side	20300/1745	50	24	23.87	0.027	0.900	1.03	0.928	/
	20175/1732.5	50	24	23.78	-0.044	0.876	1.05	0.921	/
	20050/1720	50	24	23.79	0.053	0.850	1.05	0.892	/
Left Edge	20175/1732.5	50	24	23.78	0.042	0.170	1.05	0.179	/
Right Edge	20175/1732.5	50	24	23.78	-0.049	0.284	1.05	0.299	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	20175/1732.5	50	24	23.78	-0.030	0.633	1.05	0.666	/
Test position of Body (50%RB,QPSK ,Distance 10mm)									
Back Side	20300/1745	25	23	22.69	-0.020	0.888	1.07	0.954	/
	20175/1732.5	50	23	22.62	-0.070	0.874	1.09	0.955	/
	20050/1720	0	23	22.61	0.050	0.850	1.09	0.930	/
Front Side	20300/1745	25	23	22.69	0.180	0.699	1.07	0.751	/
Left Edge	20300/1745	25	23	22.69	-0.050	0.148	1.07	0.159	/
Right Edge	20300/1745	25	23	22.69	-0.021	0.245	1.07	0.263	/

Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	20300/1745	25	23	22.69	0.021	0.532	1.07	0.571	/
Worst Case Position of Body with Battery 2 (1RB,QPSK ,Distance 10mm)									
Back Side	20175/1732.5	50	24	23.78	0.020	1.140	1.05	1.199	Figure32
Worst Case Position of Body (1^{st} Repeated SAR)									
Back Side	20300/1745	50	24	23.87	0.100	1.130	1.03	1.166	/
Note: 1.The value with blue color is the maximum SAR Value of each test band.									

Table 24: SAR Measurement Variability Results [LTE Band 4/20MHz]

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1^{st} Repeated SAR (1g)	Ratio	2^{nd} Repeated SAR (1g)	3^{rd} Repeated SAR (1g)
Back Side	20300/1745	1.15	1.13	1.02	N/A	N/A

Note: 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

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

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

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

7.3.7. LTE Band 7

Table 25: SAR Values (LTE Band 7/20MHz)

Test Position	Channel/ Frequency (MHz)	RB Offset	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit SAR$_{1g}$ 1.6 W/kg			
					Drift (dB)	Measured SAR$_{1g}$ (W/kg)	Scaling Factor	Reported SAR$_{1g}$ (W/kg)	Graph Results
Test Position of Head (1RB,QPSK)									
Left/Cheek	21350/2560	0	22.5	21.71	-0.074	0.529	1.20	0.635	/
Left/Tilt	21350/2560	0	22.5	21.71	0.041	0.252	1.20	0.302	/
Right/Cheek	21350/2560	0	22.5	21.71	-0.058	0.569	1.20	0.683	/
Right/Tilt	21350/2560	0	22.5	21.71	0.16	0.275	1.20	0.330	/
Test Position of Head (50% RB,QPSK)									
Left/Cheek	21100/2535	25	21.5	20.85	0.129	0.381	1.16	0.442	/
Left/Tilt	21100/2535	25	21.5	20.85	-0.02	0.174	1.16	0.202	/
Right/Cheek	21100/2535	25	21.5	20.85	0.105	0.387	1.16	0.449	/
Right/Tilt	21100/2535	25	21.5	20.85	0.04	0.199	1.16	0.231	/
Worst Case Position of Head with Battery 2 (1RB,QPSK)									
Right/Cheek	21350/2560	0	22.5	21.71	0.158	0.579	1.20	0.695	Figure33
Test position of Body (1RB,QPSK ,Distance 10mm)									
Back Side	21350/2560	0	22.5	21.71	-0.02	0.613	1.20	0.735	/
Front Side	21350/2560	0	22.5	21.71	0.072	0.26	1.20	0.312	/
Left Edge	21350/2560	0	22.5	21.71	0.19	0.317	1.20	0.380	/
Right Edge	21350/2560	0	22.5	21.71	-0.05	0.279	1.20	0.335	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	21350/2560	0	22.5	21.71	-0.05	0.321	1.20	0.385	/
Test position of Body (50%RB,QPSK ,Distance 10mm)									
Back Side	21100/2535	25	21.5	20.85	0.06	0.441	1.16	0.512	/
Front Side	21100/2535	25	21.5	20.85	0.08	0.212	1.16	0.246	/
Left Edge	21100/2535	25	21.5	20.85	0.09	0.257	1.16	0.298	/
Right Edge	21100/2535	25	21.5	20.85	0.06	0.198	1.16	0.230	/
Top Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bottom Edge	21100/2535	25	21.5	20.85	0.18	0.225	1.16	0.261	/
Worst Case Position of Body with Battery 2 (1RB,QPSK ,Distance 10mm)									
Back Side	21350/2560	0	22.5	21.71	0.032	0.764	1.20	0.917	/
	21100/2535	0	22.5	21.68	-0.033	0.759	1.21	0.918	Figure34
	20850/2510	0	22.5	21.51	0.010	0.717	1.26	0.901	/
Note: 1.The value with blue color is the maximum SAR Value of each test band.									

7.3.8. WiFi

Table 26: SAR Values(802.11b/g/n)

Test Position	Channel/ Frequency (MHz)	Service	Duty Cycle	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Drift ±0.21dB	Limit of SAR 1.6 W/kg			
						Drift (dB)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Graph Results
Test Position of Head										
Left/Cheek	1/2412	DSSS	1:1	15.4	15.28	0.058	0.743	1.03	0.764	/
Left/Tilt	1/2412	DSSS	1:1	15.4	15.28	0.047	0.368	1.03	0.378	/
Right/Cheek	1/2412	DSSS	1:1	15.4	15.28	0.029	0.281	1.03	0.289	/
Right/Tilt	1/2412	DSSS	1:1	15.4	15.28	0.184	0.239	1.03	0.246	/
Worst Case Position of Head with Battery 2										
Left/Cheek	1/2412	DSSS	1:1	15.4	15.28	0.036	0.747	1.03	0.768	Figure35
Test position of Body with Battery 1 (Distance 10mm)										
Back Side	1/2412	DSSS	1:1	15.4	15.28	0.151	0.205	1.03	0.211	/
Front Side	1/2412	DSSS	1:1	15.4	15.28	0.196	0.15	1.03	0.154	/
Left Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Right Edge	1/2412	DSSS	1:1	15.4	15.28	0.028	0.0912	1.03	0.094	/
Top Edge	1/2412	DSSS	1:1	15.4	15.28	0.049	0.12	1.03	0.123	/
Bottom Edge	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Worst Case Position of Body with Battery 2 (Distance 10mm)										
Back Side	1/2412	DSSS	1:1	15.4	15.28	0.168	0.212	1.03	0.218	Figure36

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. KDB 248227-SAR is not required for 802.11g/n channels when the maximum average output power is less than ¼ dB higher than measured on the corresponding 802.11b channels.

3. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

7.4. Simultaneous Transmission Conditions

Air-Interface	Band (MHz)	Type	SimultaneousTransmissions	Voice Over Digital Transport (Data)
GSM	850	Voice	Yes BT or WiFi	NA
	1900	Voice		
	GPRS	Data		
	EGPRS	Data		
WCDMA	UMTS Band II	Voice	Yes BT or WiFi	NA
	UMTS Band V	Voice		
	RMC	Data		
	HSDPA	Data		
	HSUPA	Data		
	DC-HSDPA	Data		
	HSPA+	Data		
LTE	Band 2	Data	Yes BT or WiFi	NA
	Band 4	Data		
	Band 7	Data		
WiFi	2450	Data	Yes GSM,GPRS,EGPRS, RMC,HSDPA,HSUPA,DC-HSDPA,HSPA+, LTE	Yes
Bluetooth (BT)	2450	Data	Yes GSM,GPRS,EGPRS, RMC,HSDPA,HSUPA,DC-HSDPA,HSPA+, LTE	NA

When standalone SAR is not required to be measured per FCC KDB 447498 D01, the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

$$\textbf{Estimated SAR} = \frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \cdot \frac{\sqrt{f\,(\text{GHz})}}{7.5}$$

Band	Configuration	Frequency (MHz)	Maximum Power (dBm)	Separation Distance (mm)	Estimated SAR （W/kg)
Bluetooth	Head	2480	7	5	0.210
Bluetooth	Body	2480	7	10	0.105

Per FCC KDB 447498 D01, 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 ≤1.6 W/kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{\text{(peak location separation, mm)}} < 0.04$$

WiFi & BT Mode

BT and WiFi antenna cannot transmit simultaneously.

About BT and GSM/UMTS/LTE antenna

SAR_{1g}(W/kg) / Test Position	GSM 850	GSM 1900	UMTS Band II	UMTS Band V	LTE 2	LTE 4	LTE 7	BT	MAX. ΣSAR_{1g}	Peak location separation ratio
Left, Touch	0.774	0.396	0.967	0.739	**0.973**	0.681	0.635	**0.210**	1.183	NA
Left, Tilt	0.535	0.158	0.286	**0.591**	0.270	0.261	0.302	**0.210**	0.801	NA
Right, Touch	0.676	0.489	1.019	0.677	**1.094**	0.901	0.695	**0.210**	1.304	NA
Right, Tilt	**0.551**	0.171	0.379	0.479	0.340	0.321	0.330	**0.210**	0.761	NA
Back Side	0.762	1.179	1.197	0.558	1.196	**1.199**	0.918	**0.105**	1.304	NA
Front Side	**1.187**	0.883	0.690	0.733	1.038	0.928	0.312	**0.105**	1.292	NA
Left Edge	**0.660**	0.265	0.242	0.485	0.367	0.179	0.380	**0.105**	0.765	NA
Right Edge	**0.686**	0.301	0.256	0.473	0.398	0.299	0.335	**0.105**	0.791	NA
Top Edge	NA	NA	NA	NA	NA	NA	NA	**0.105**	0.105	NA
Bottom Edge	0.364	0.541	0.665	0.249	0.605	**0.666**	0.385	**0.105**	0.771	NA

Note: 1.The value with blue color is the maximum ΣSAR_{1g} Value.
2. MAX. ΣSAR_{1g} =Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

MAX. ΣSAR_{1g} = 1.304 W/kg <1.6 W/kg, so the Simultaneous transimition SAR with volum scan are not required for BT and GSM/UMTS/LTE antenna.

About WiFi and GSM/UMTS/LTE antenna

SAR_{1g}(W/kg) / Test Position	GSM 850	GSM 1900	UMTS Band II	UMTS Band V	LTE 2	LTE 4	LTE 7	WiFi	MAX. ΣSAR_{1g}	Peak location separation ratio
Left, Touch	0.774	0.396	0.967	0.739	**0.973**	0.681	0.635	**0.768**	1.741	Yes
Left, Tilt	0.535	0.158	0.286	**0.591**	0.270	0.261	0.302	**0.378**	0.969	NA
Right, Touch	0.676	0.489	1.019	0.677	**1.094**	0.901	0.695	**0.289**	1.383	NA
Right, Tilt	**0.551**	0.171	0.379	0.479	0.340	0.321	0.330	**0.246**	0.797	NA
Back Side	0.762	1.179	1.197	0.558	1.196	**1.199**	0.918	**0.218**	1.417	NA
Front Side	**1.187**	0.883	0.690	0.733	1.038	0.928	0.312	**0.154**	1.341	NA
Left Edge	**0.660**	0.265	0.242	0.485	0.367	0.179	0.380	NA	0.660	NA
Right Edge	**0.686**	0.301	0.256	0.473	0.398	0.299	0.335	**0.094**	0.780	NA
Top Edge	NA	NA	NA	NA	NA	NA	NA	**0.123**	0.123	NA
Bottom Edge	0.364	0.541	0.665	0.249	0.605	**0.666**	0.385	NA	0.666	NA

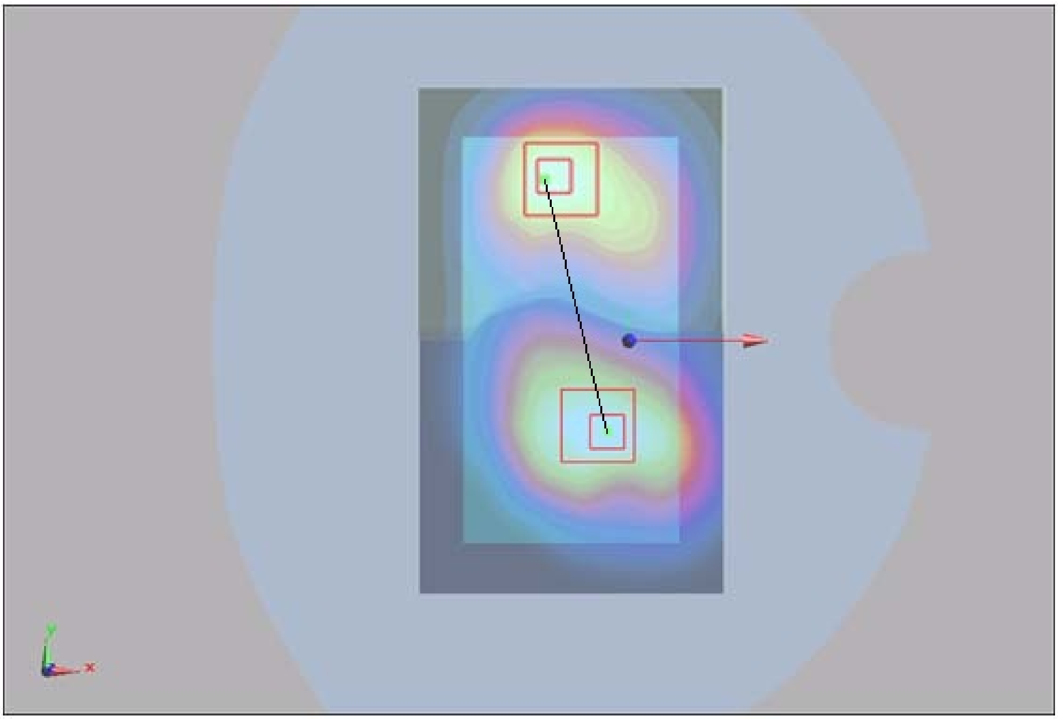
Note: 1.The value with blue color is the maximum ΣSAR_{1g} Value.
2. MAX. ΣSAR_{1g} =Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

Simultaneous Transmission for test position of right touch

SAR_{1g}(W/kg) / Test Position	GSM 850	GSM 1900	UMTS Band II	UMTS Band V	LTE 2	LTE 4	LTE 7	WiFi	MAX. ΣSAR_{1g}	Peak location separation ratio
Left Touch	0.774	/	/	/	/	/	/	0.768	1.542	NA
	/	0.396	/	/	/	/	/	0.768	1.164	NA
	/	/	0.967	/	/	/	/	0.768	1.735	Yes
	/	/	/	0.739	/	/	/	0.768	1.507	NA
	/	/	/	/	0.973	/	/	0.768	1.741	Yes
	/	/	/	/	/	0.681	/	0.768	1.449	NA
	/	/	/	/	/	/	0.635	0.768	1.403	NA

- **Pair Simultaneous Transmission for UMTS Band II and WiFi**

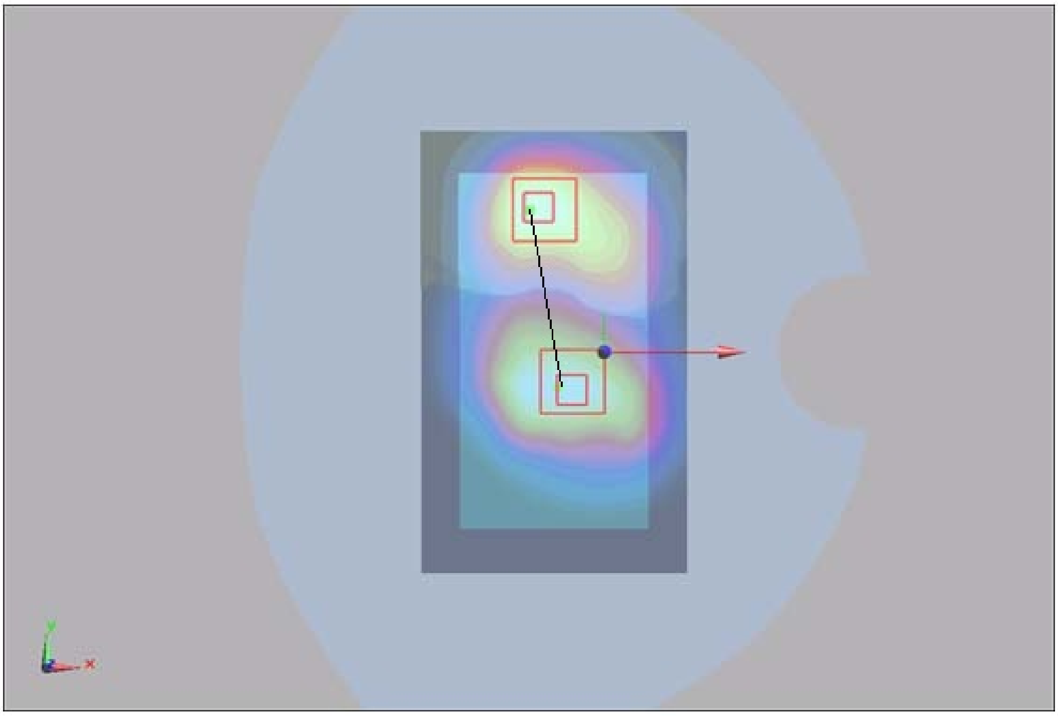
The position $SAR_{UMTS\ Band\ II}$ is (x_1=76.17, y_1=256.4,z_1= -173.4),
The position $SAR_{Max.WiFi}$ is (x_2= 47.59, y_2=320.5,z_2= -172.9)
so the distance between the $SAR_{Max.\ UMTS\ Band\ II}$ and $SAR_{Max.WiFi}$ is 70.18mm.



The peak location separation ratio is 0.033, so the Simultaneous transimition SAR with volum scan are not required for WiFi and UMTS Band 2 antenna.

- **Pair Simultaneous Transmission for LTE Band 2 and WiFi**

The position $SAR_{LTE\ 2}$ is (x_1=74.34, y_1=259.3,z_1= -174.1),
The position $SAR_{Max.WiFi}$ is(x_2= 47.59, y_2=320.5,z_2= -172.9)
so the distance between the $SAR_{Max.LTE\ 2}$ and $SAR_{Max.WiFi}$ is 66.80mm.



The peak location separation ratio is 0.034, so the Simultaneous transimition SAR with volum scan are not required for WiFi and LTE 2 antenna.

8. 700MHz to 3GHz Measurement Uncertainty

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard Uncertainty $u_i^{'}$ (%)	Degree of freedom V_{eff} or v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
	Measurement system							
2	-probe calibration	B	6.0	N	1	1	6.0	∞
3	-axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	1.9	∞
4	- Hemispherical isotropy of the probe	B	9.4	R	$\sqrt{3}$	$\sqrt{0.5}$	3.9	∞
5	-boundary effect	B	1.9	R	$\sqrt{3}$	1	1.1	∞
6	-probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
7	- System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
8	-readout Electronics	B	1.0	N	1	1	1.0	∞
9	-response time	B	0.8	R	$\sqrt{3}$	1	0.5	∞
10	-integration time	B	4.3	R	$\sqrt{3}$	1	2.5	∞
11	-RF Ambient noise	B	3.0	R	$\sqrt{3}$	1	1.7	∞
12	-RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.7	∞
13	-Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
14	-Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
15	-Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
	Test sample Related							
16	-Test Sample Positioning	A	2.9	N	1	1	2.9	71
17	-Device Holder Uncertainty	A	4.1	N	1	1	4.1	5
18	- Power drift	B	5.0	R	$\sqrt{3}$	1	2.9	∞
	Physical parameter							

19	-phantom Uncertainty	B	4.0	R	$\sqrt{3}$	1	2.3	∞
20	Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	N	1	0.84	0.9	∞
21	-Liquid conductivity (measurement uncertainty)	B	2.5	N	1	0.71	1.8	9
22	-Liquid permittivity (measurement uncertainty)	B	2.5	N	1	0.26	0.7	9
23	-Liquid conductivity -temperature uncertainty	B	1.7	R	$\sqrt{3}$	0.71	0.7	∞
24	-Liquid permittivity -temperature uncertainty	B	0.3	R	$\sqrt{3}$	0.26	0.05	∞
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{24} c_i^2 u_i^2}$					11.34	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		22.68	

9. Main Test Instruments

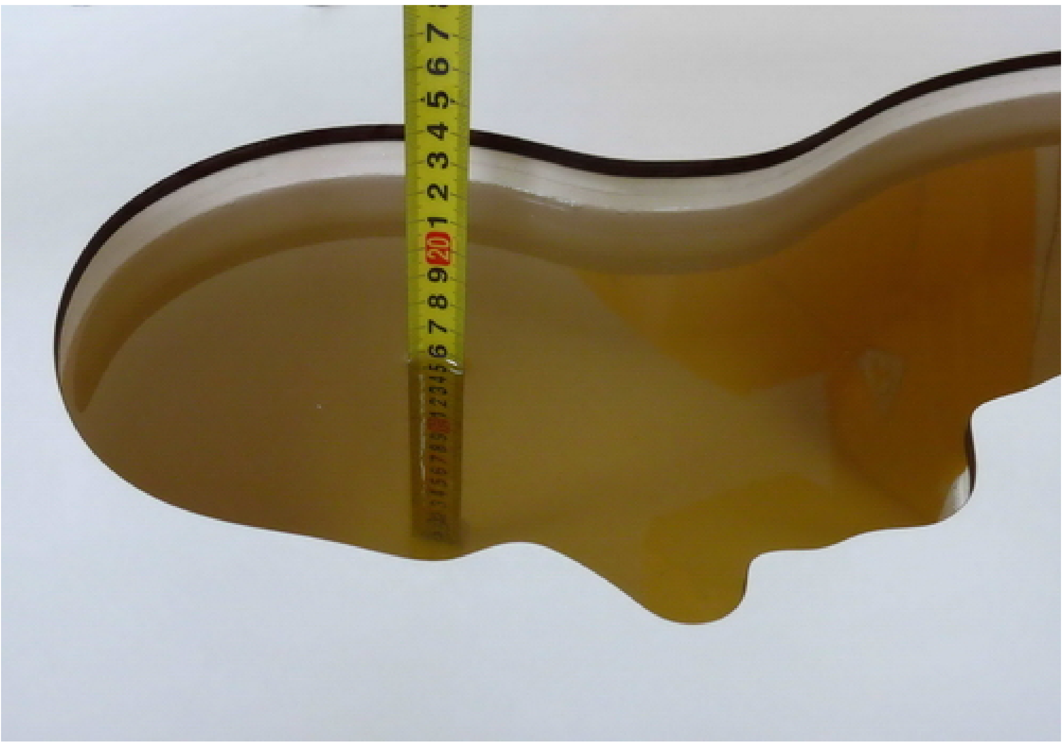
Table 27: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Expiration Time	Valid Period
01	Network analyzer	E5071B	MY42404014	2014-05-26	2015-05-25	1 year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested		
03	Power meter	Agilent E4417A	GB41291714	2014-03-09	2015-03-08	1 year
04	Power sensor	Agilent N8481H	MY50350004	2014-09-24	2015-09-23	1 year
05	Power sensor	E9327A	US40441622	2015-01-02	2016-01-01	1 year
06	Signal Generator	HP 8341B	2730A00804	2014-09-02	2015-09-01	1 year
07	Dual directional coupler	778D-012	50519	2014-03-24	2015-03-23	1 year
08	Dual directional coupler	777D	50146	2014-03-24	2015-03-23	1 year
09	Amplifier	IXA-020	0401	No Calibration Requested		
10	Wideband radio communication tester	CMW 500	113645	2014-09-28	2015-09-27	1 year
11	E-field Probe	EX3DV4	3977	2014-02-17	2015-02-16	1 year
13	DAE	DAE4	1291	2014-11-14	2015-11-13	1 year
14	Validation Kit 835MHz	D835V2	4d020	2014-08-28	2017-08-27	3 years
15	Validation Kit 1750MHz	D1750V2	1033	2014-01-26	2017-01-25	3 years
16	Validation Kit 1900MHz	D1900V2	5d060	2014-09-01	2017-08-31	3 years
17	Validation Kit 2450MHz	D2450V2	786	2014-09-01	2017-08-31	3 years
18	Validation Kit 2600MHz	D2600V2	1012	2012-05-02	2015-05-01	3 years
20	Temperature Probe	JM222	AA1009129	2014-03-13	2015-03-12	1 year
21	Hygrothermograph	WS-1	64591	2014-09-25	2015-09-24	1 year

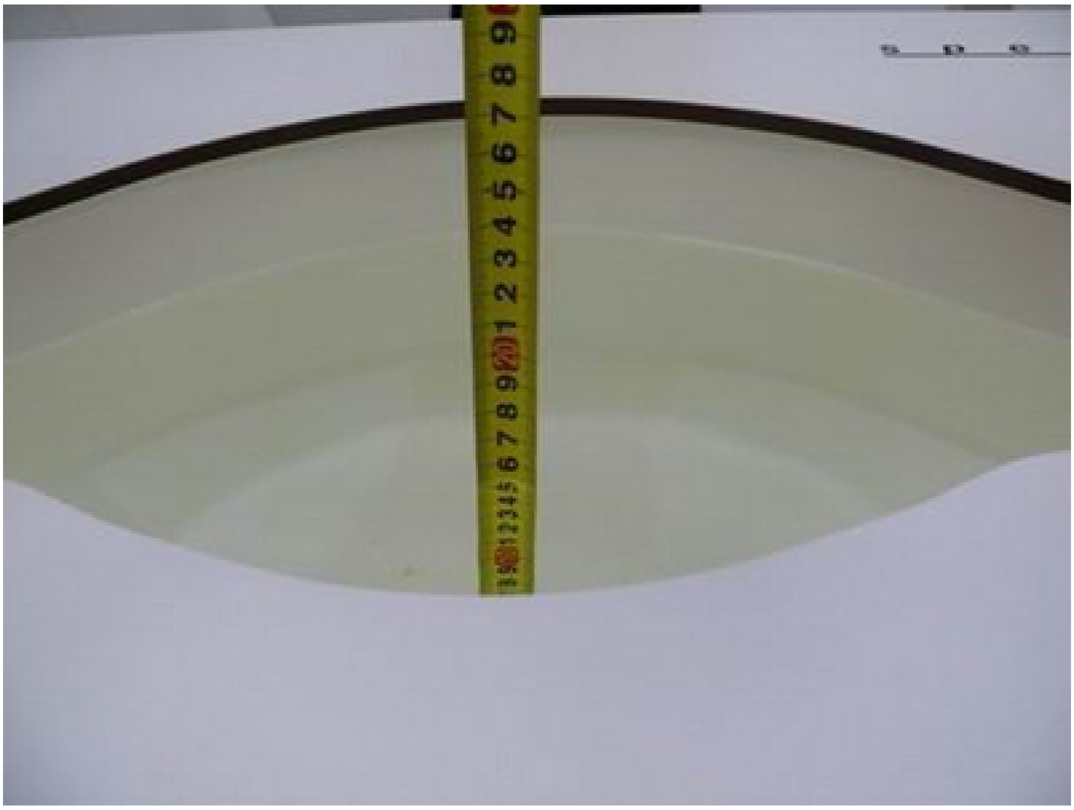
*****END OF REPORT *****

ANNEX A: Test Layout

Picture 1: Liquid depth in the flat Phantom (835MHz, 15.4cm depth)

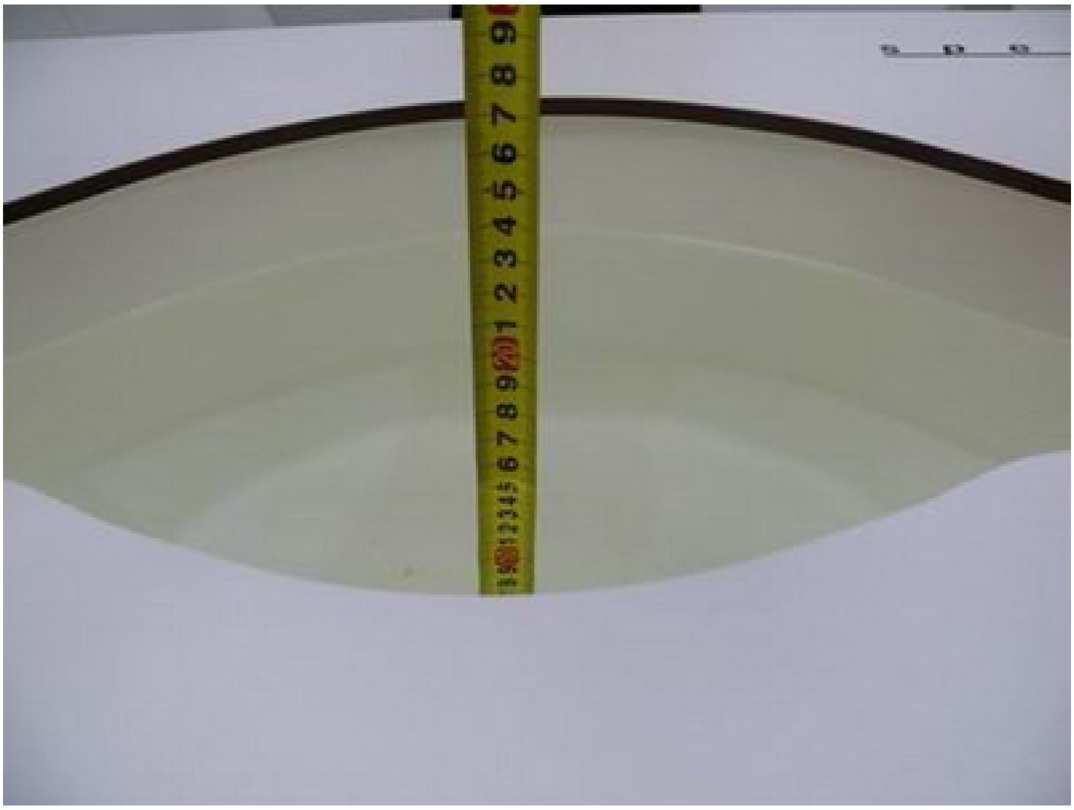


Picture 2: Liquid depth in the head Phantom (835MHz, 15.3cm depth)



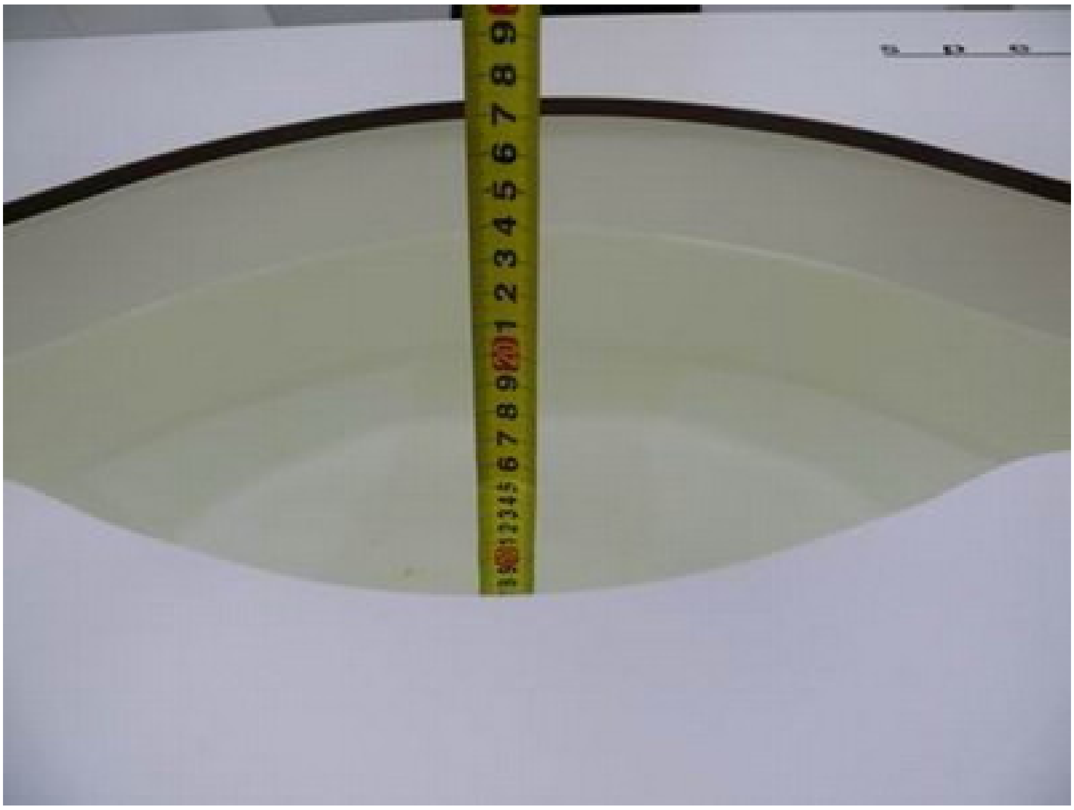
Picture 3: Liquid depth in the flat Phantom (1750 MHz, 15.2cm depth)

Picture 4: liquid depth in the head Phantom (1750 MHz, 15.3cm depth)



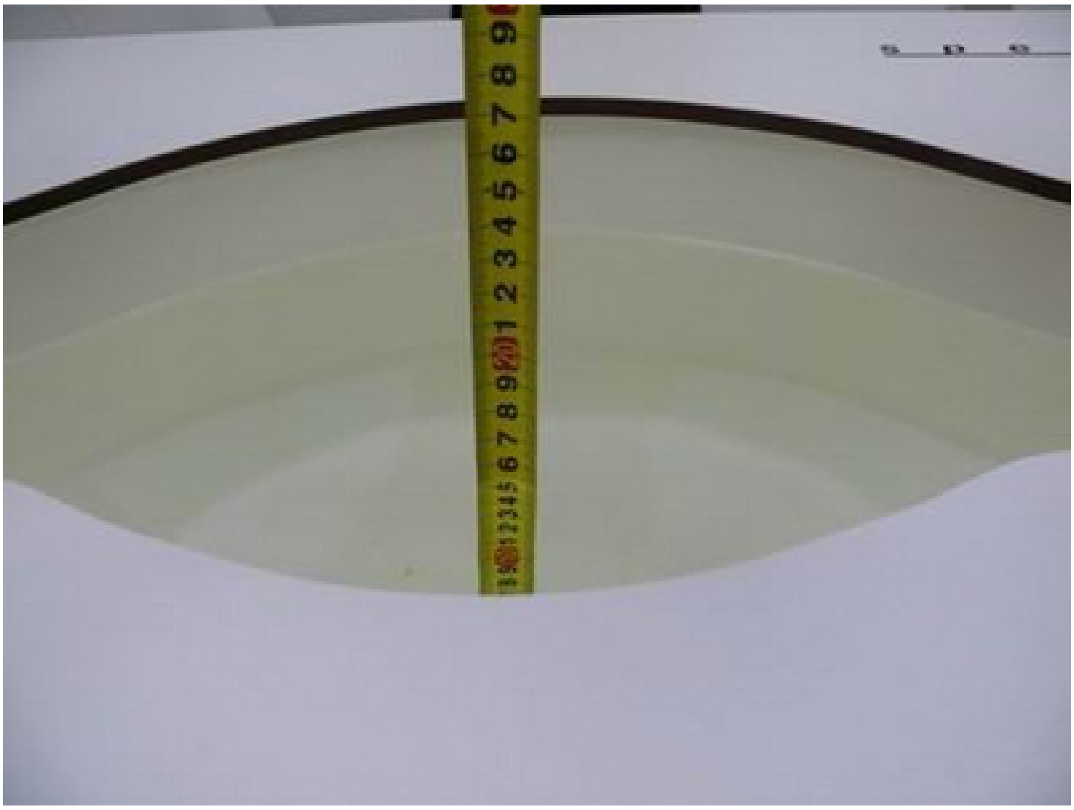
Picture 5: Liquid depth in the flat Phantom (1900 MHz, 15.2cm depth)

Picture 6: liquid depth in the head Phantom (1900 MHz, 15.3cm depth)



Picture 7: Liquid depth in the flat Phantom (2450 MHz, 15.3cm depth)

Picture 8: Liquid depth in the head Phantom (2450 MHz, 15.4cm depth)



Picture 9: Liquid depth in the flat Phantom (2600 MHz, 15.3cm depth)

Picture 10: Liquid depth in the head Phantom (2600 MHz, 15.4cm depth)

ANNEX B: System Check Results

System Performance Check at 835 MHz Head TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020

Date: 1/8/2015

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.62, 9.62, 9.62); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=15mm, Pin=250mW/Area Scan (41x121x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.64 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.4 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.64 mW/g

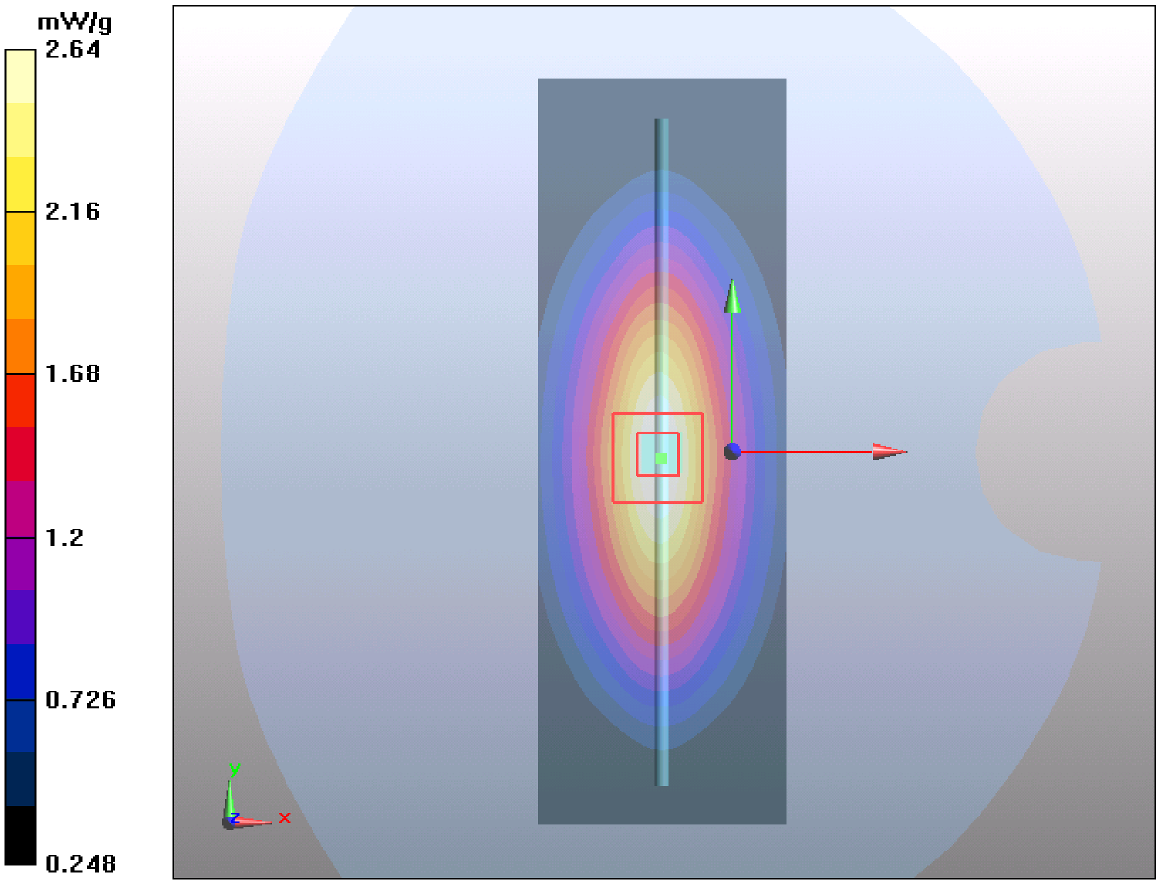


Figure 7 System Performance Check 835MHz 250mW

System Performance Check at 835 MHz Body TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d020

Date: 1/12/2015

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 55.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=15mm, Pin=250mW/Area Scan (41x121x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.58 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.9 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 3.5 W/kg

SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.6 mW/g

Maximum value of SAR (measured) = 2.6 mW/g

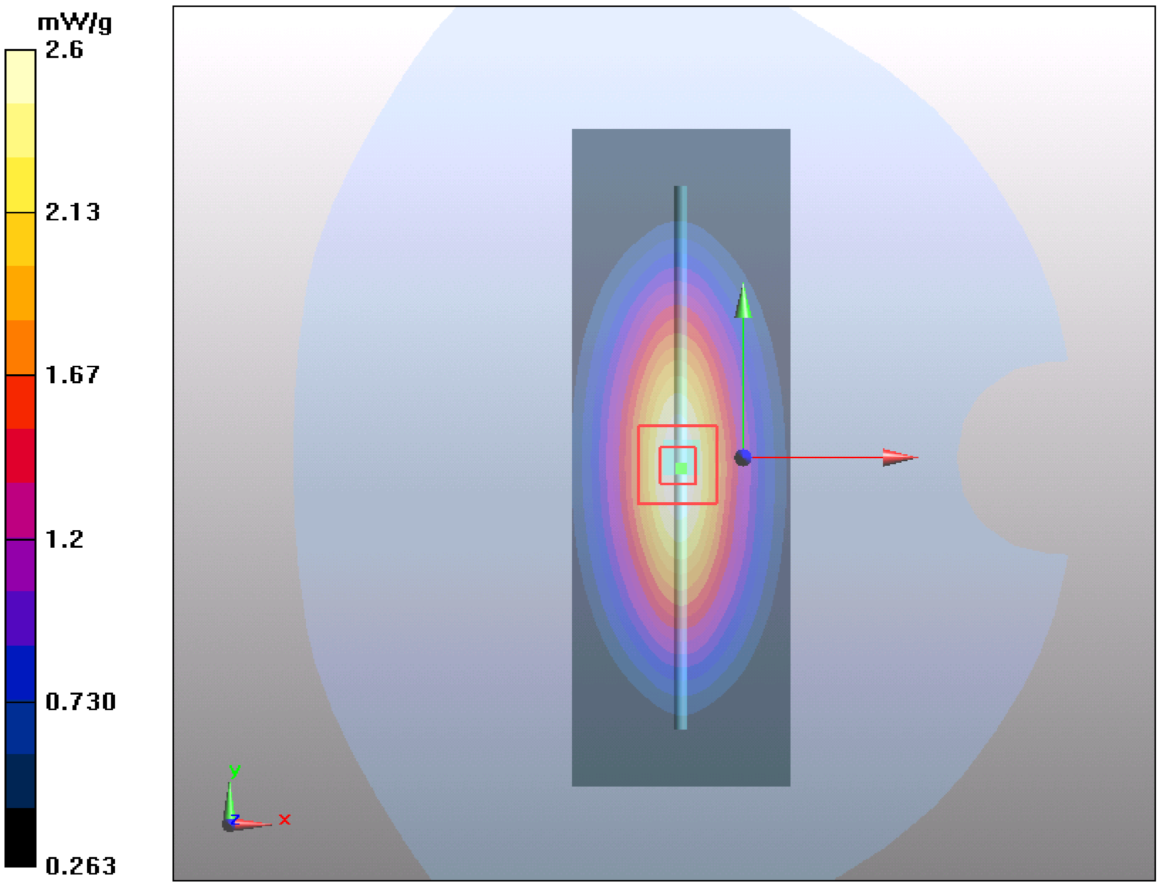


Figure 8 System Performance Check 835MHz 250Mw

System Performance Check at 1750 MHz Head TSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1033

Date: 1/14/2015

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; σ = 1.32 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(8.14, 8.14, 8.14); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (51x81x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 9.78 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 80 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 15.5 W/kg

SAR(1 g) = 8.95 mW/g; SAR(10 g) = 4.5 mW/g

Maximum value of SAR (measured) = 9.46 mW/g

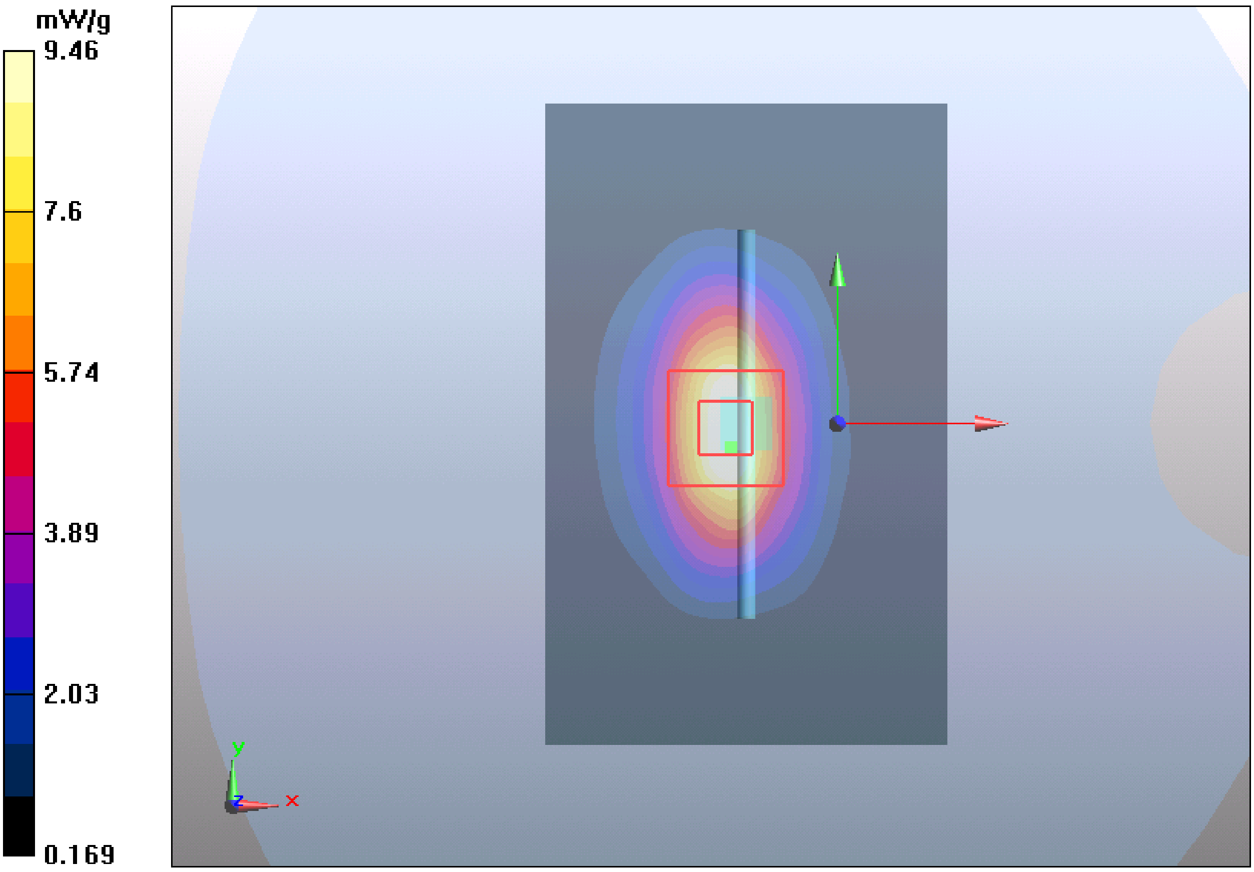


Figure 9 System Performance Check 1750MHz 250mW

System Performance Check at 1750 MHz Body TSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1033

Date: 1/15/2015

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; σ = 1.50 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.7℃

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.69, 7.69, 7.69); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (51x81x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 10.6 mW/g

d=10mm, Pin=250mW/Area Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 77.7 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.24 mW/g; SAR(10 g) = 4.9 mW/g

Maximum value of SAR (measured) = 10.3 mW/g

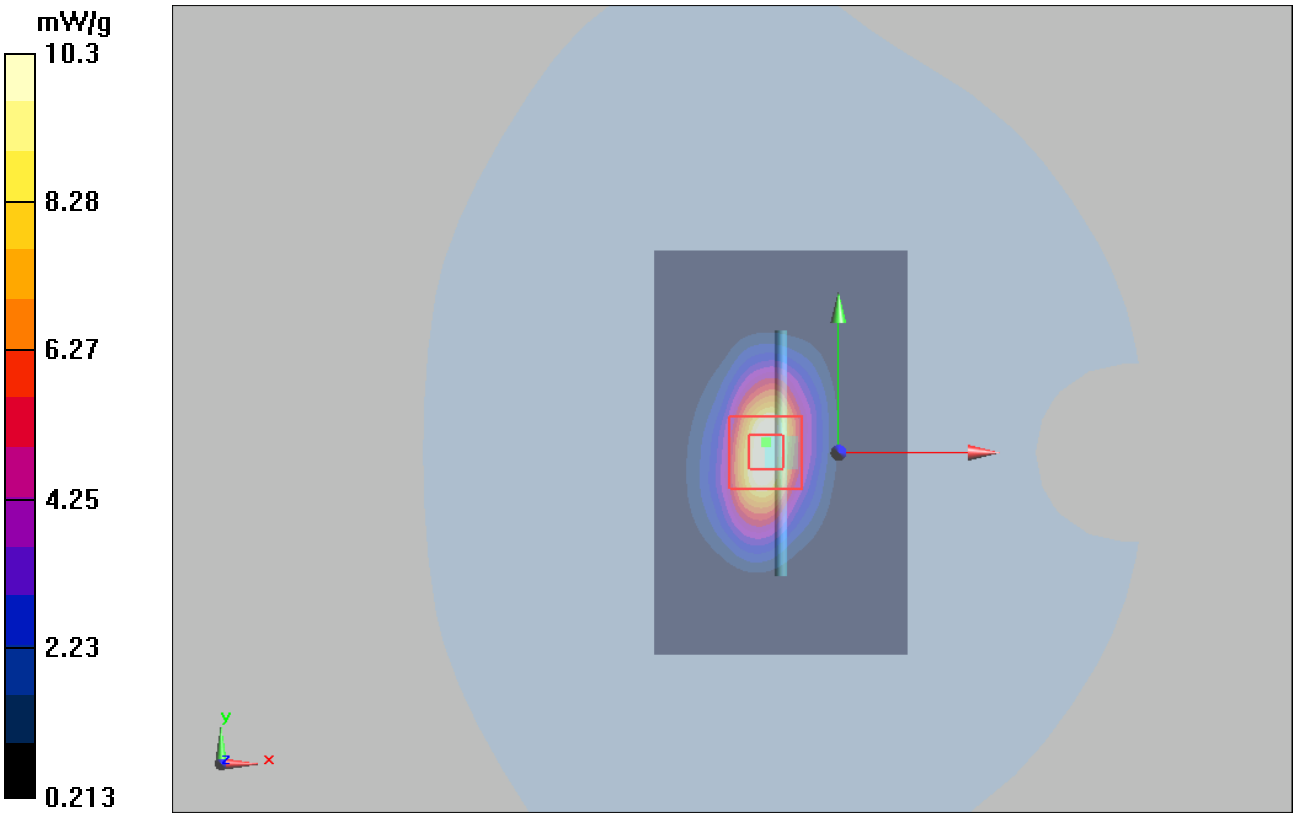


Figure 10 System Performance Check 1750MHz 250mW

System Performance Check at 1900 MHz Head TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

Date: 1/9/2015

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 11.3 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 85.5 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.48 mW/g; SAR(10 g) = 4.9 mW/g

Maximum value of SAR (measured) = 10.7 mW/g

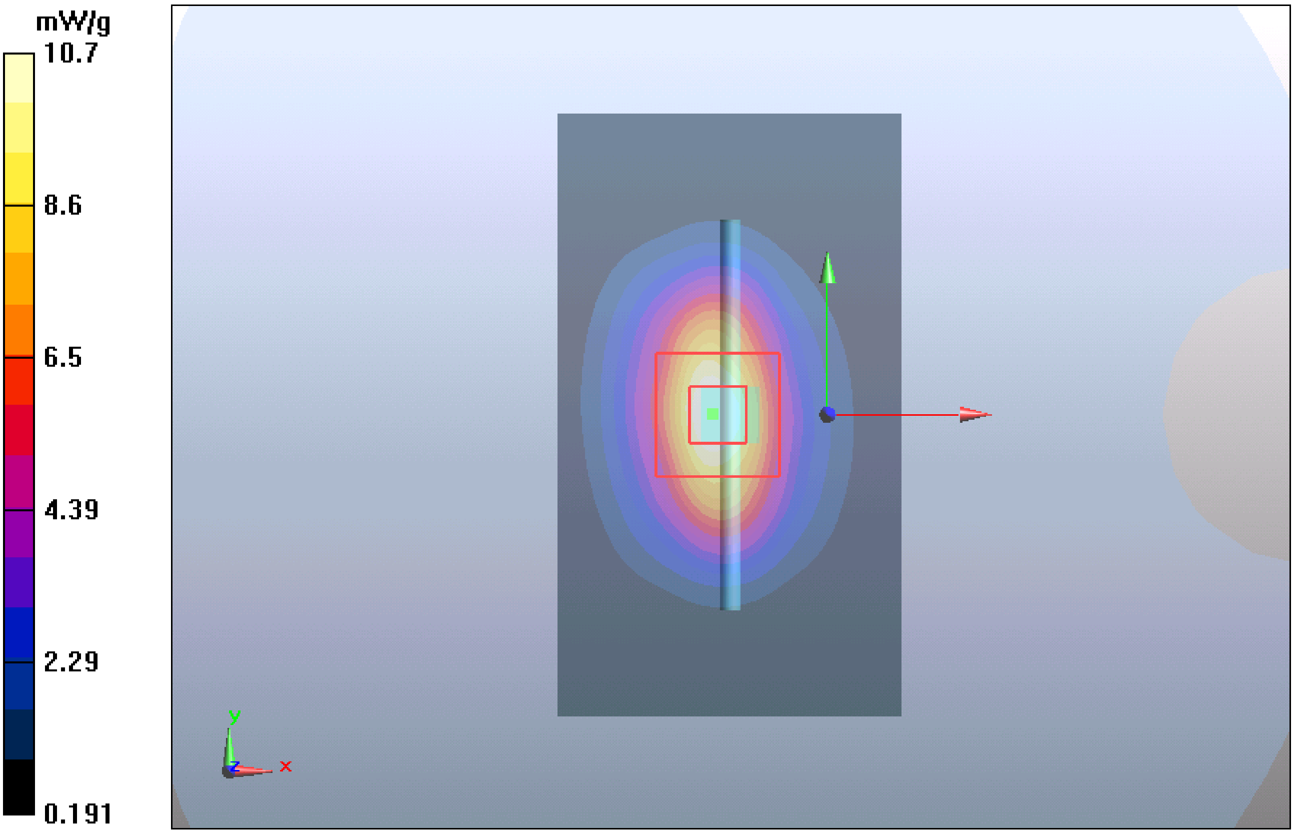


Figure 11 System Performance Check 1900MHz 250mW

System Performance Check at 1900 MHz Head TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

Date: 1/11/2015

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.500mm, dy=1.500mm

Maximum value of SAR (interpolated) = 12.9 mW/g

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 87.8 V/m; Power Drift = 0.041 dB

Peak SAR (extrapolated) = 20.1 W/kg

SAR(1 g) = 9.59 mW/g; SAR(10 g) = 5.29 mW/g

Maximum value of SAR (measured) = 11.52 mW/g

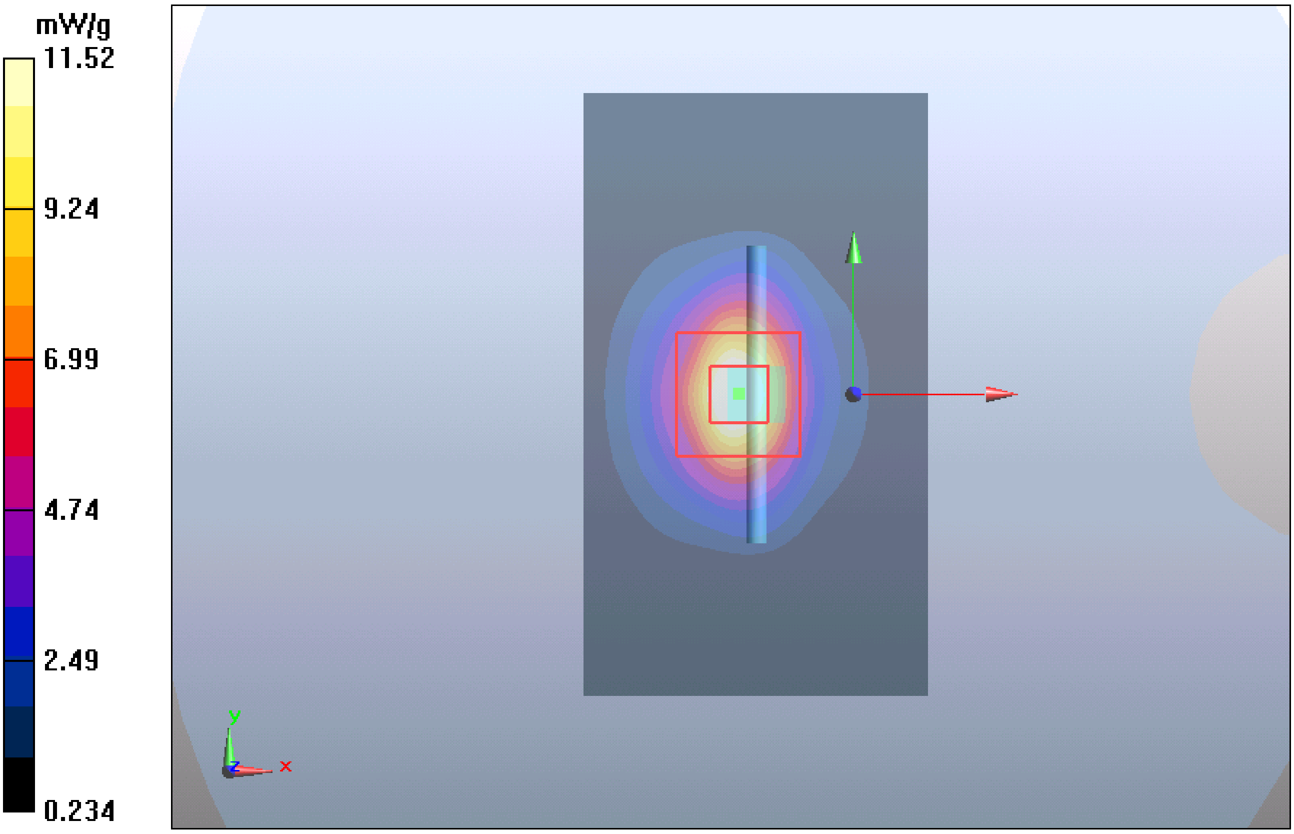


Figure 12 System Performance Check 1900MHz 250mW

System Performance Check at 1900 MHz Body TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

Date: 1/10/2015

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 12.2 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.3 V/m; Power Drift = 0.068 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.25 mW/g

Maximum value of SAR (measured) = 11.3 mW/g

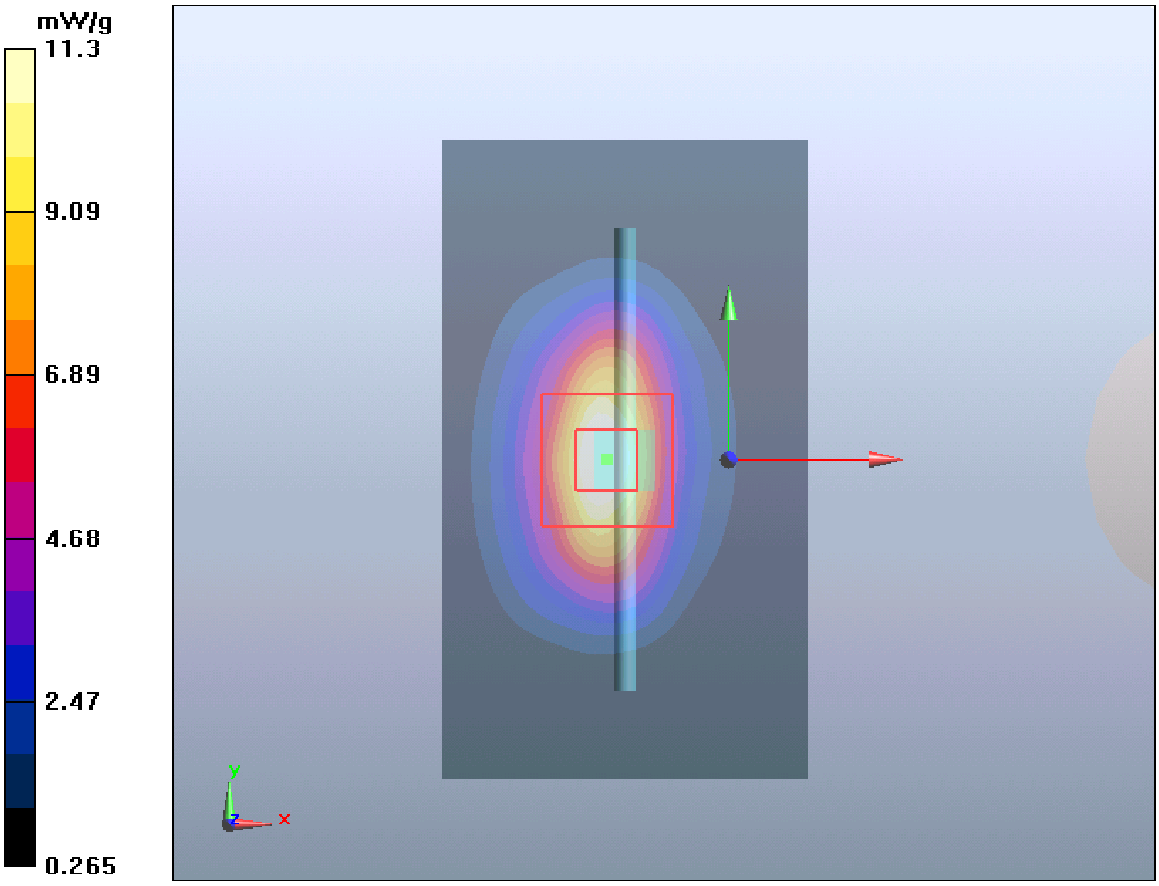


Figure 13 System Performance Check 1900MHz 250mW

System Performance Check at 1900 MHz Body TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d060

Date: 1/13/2015

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.9 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 80.8 V/m; Power Drift = -0.063 dB

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 9.82 mW/g; SAR(10 g) = 5.2 mW/g

Maximum value of SAR (measured) = 11 mW/g

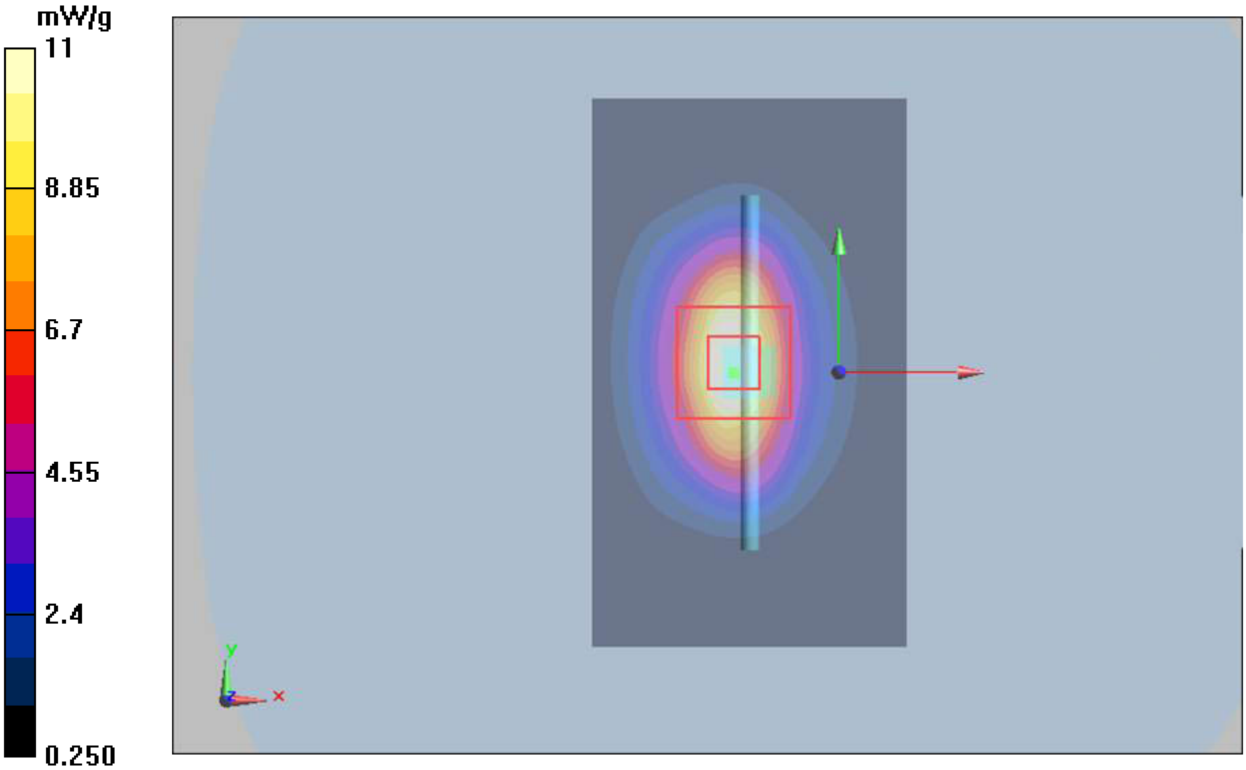


Figure 14 System Performance Check 1900MHz 250mW

System Performance Check at 2450 MHz Head TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786

Date: 1/19/2015

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.81 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 18.2 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.8 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 30 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.22 mW/g

Maximum value of SAR (measured) = 15.9 mW/g

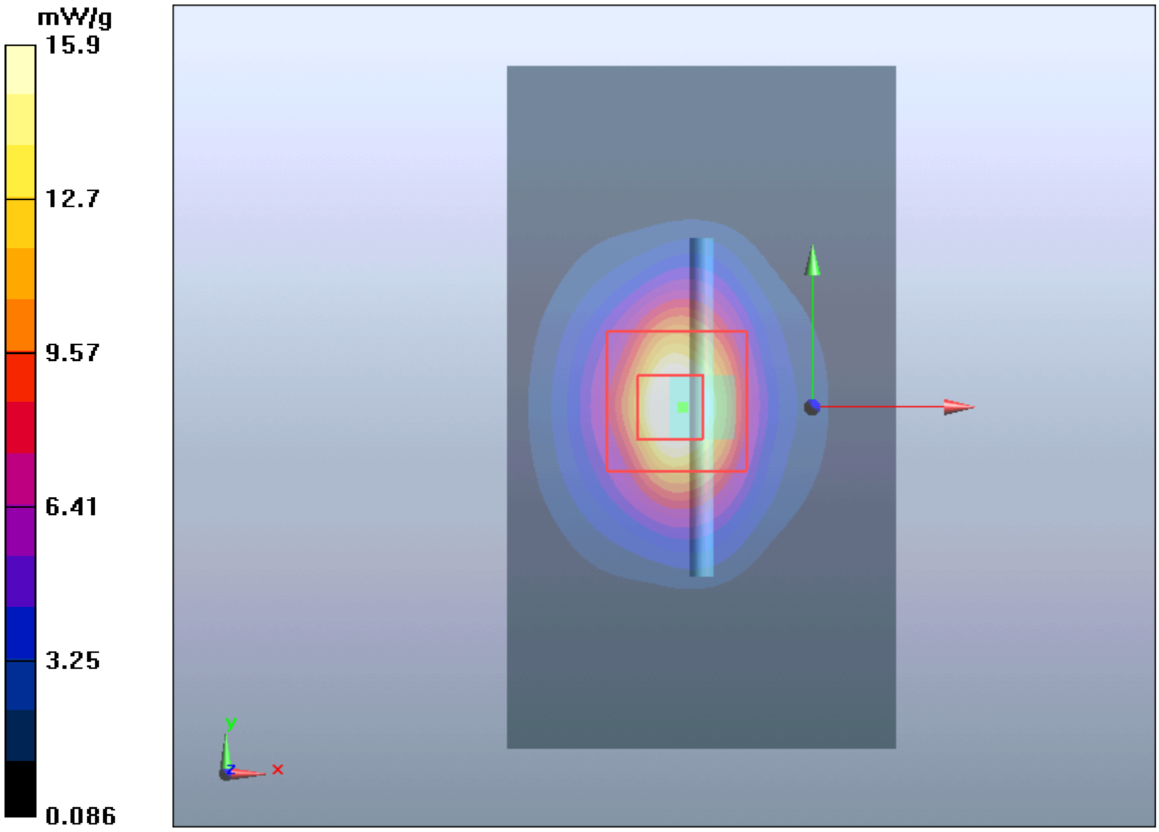


Figure 15 System Performance Check 2450MHz 250mW

System Performance Check at 2450 MHz Body TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786

Date: 1/18/2015

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM2; Type: SAM; Serial: TP-1524

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 16 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.2 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 25.4 W/kg

SAR(1 g) = 12.5 mW/g; SAR(10 g) = 6.20 mW/g

Maximum value of SAR (measured) = 14.4 mW/g

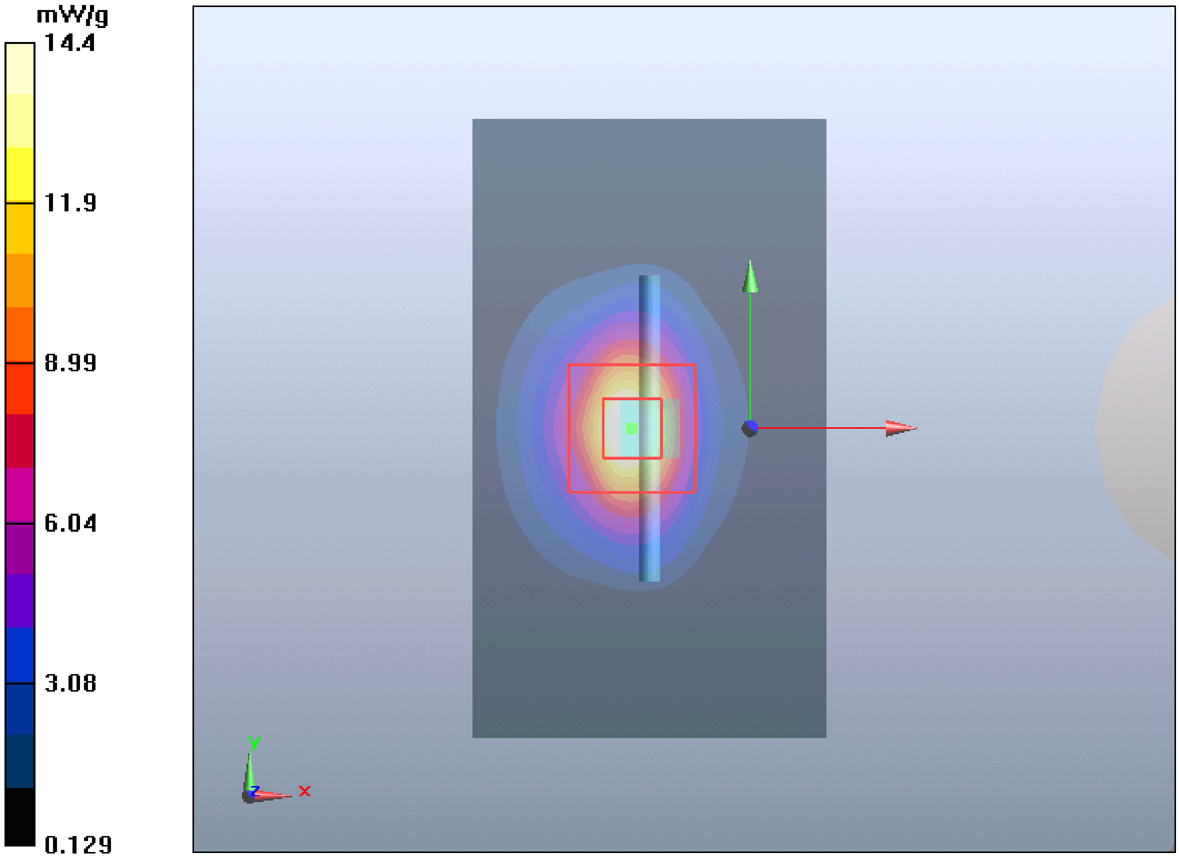


Figure 16 System Performance Check 2450MHz 250Mw

System Performance Check at 2600 MHz Head TSL

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1012

Date/Time: 1/17/2015

Communication System: CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz; σ = 1.98 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3977; ConvF(7.07, 7.07, 7.07); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 17.439 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.998 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 31.858 W/kg
SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.07 mW/g
Maximum value of SAR (measured) = 15.617 mW/g

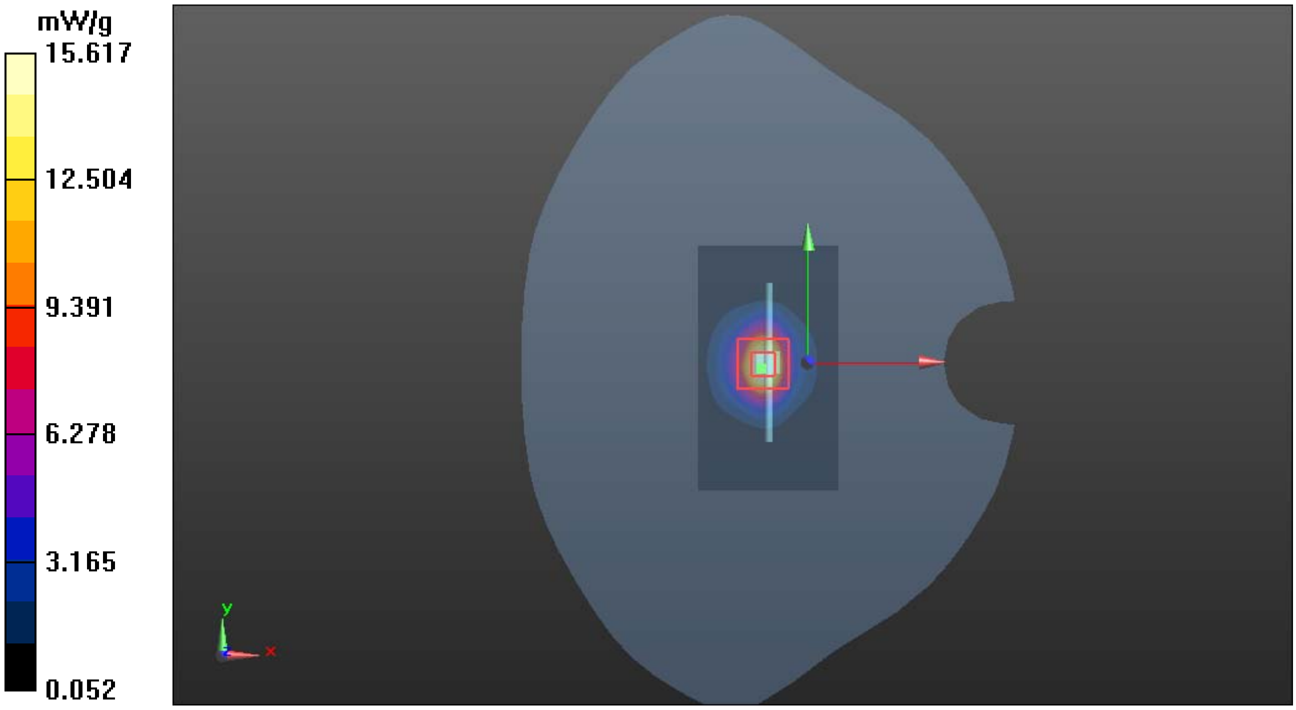


Figure 17 System Performance Check 2600MHz 250mW

System Performance Check at 2600 MHz Body TSL

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1012

Date/Time: 1/16/2015

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; σ = 2.17 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3977; ConvF(6.68, 6.68, 6.68); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

d=10mm, Pin=250mW /Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 17.7 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 74 V/m; Power Drift = -0.0027 dB

Peak SAR (extrapolated) = 28.5 W/kg

SAR(1 g) = 13.5 mW/g; SAR(10 g) = 5.99 mW/g

Maximum value of SAR (measured) = 15.7 mW/g

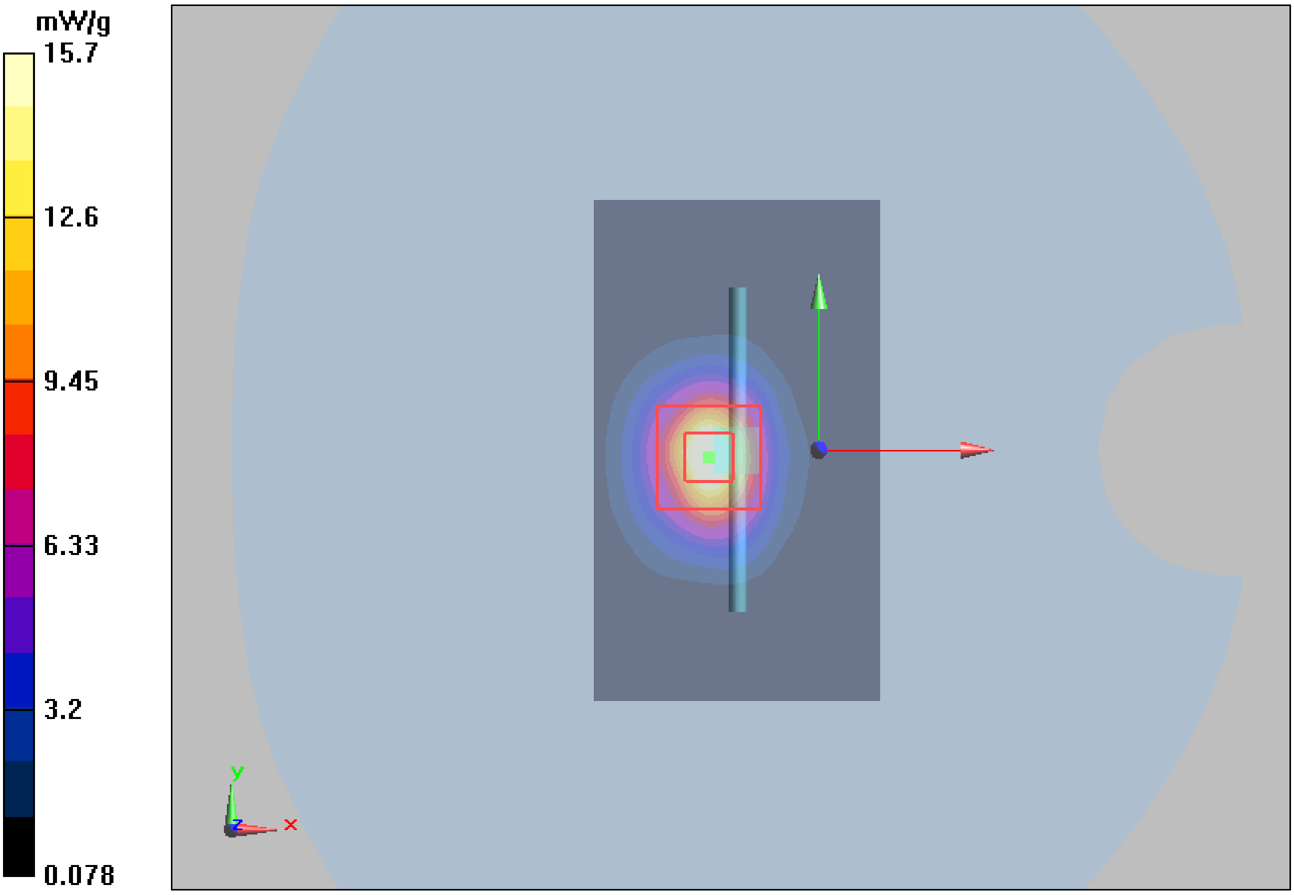


Figure 18 System Performance Check 2600MHz 250mW

ANNEX C: Highest Graph Results

GSM 850 Left Cheek Middle

Date: 1/8/2015

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 837 MHz; σ = 0.932 S/m; ε_r = 41.357; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.62, 9.62, 9.62); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Left/Cheek Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.613 W/kg

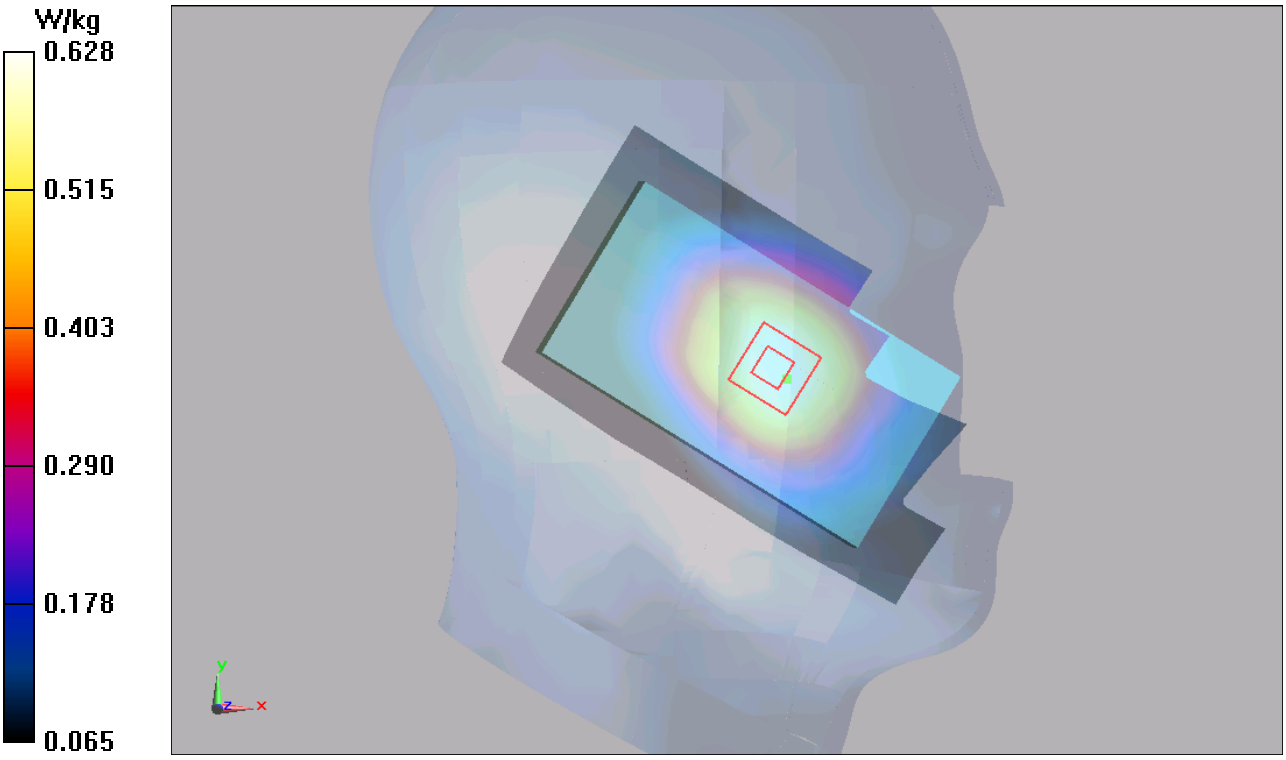
Left/Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.332 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 0.702 W/kg

SAR(1 g) = 0.601 W/kg; SAR(10 g) = 0.459 W/kg

Maximum value of SAR (measured) = 0.628 W/kg



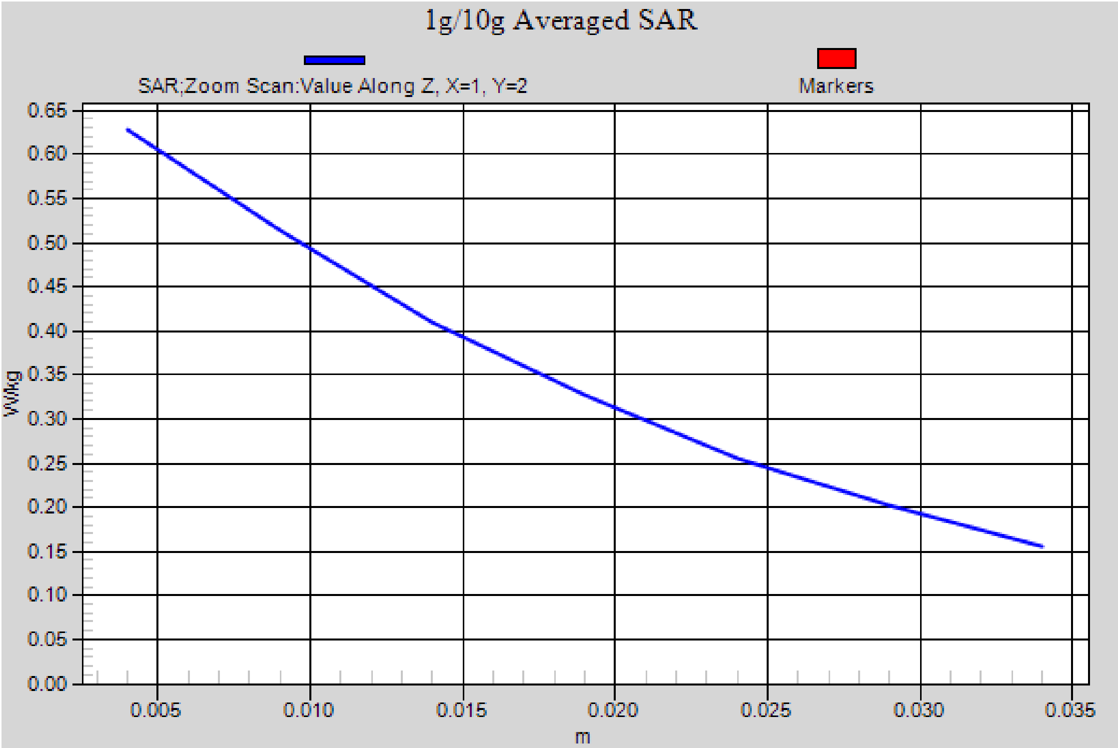


Figure 19 Left Hand Touch Cheek GSM 850 Channel 190

GSM 850 GPRS (4Txslots) Front Side Low

Date: 1/12/2015

Communication System: UID 0, GPRS 4TX (0); Frequency: 824.2 MHz;Duty Cycle: 1:2.07491

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.978 S/m; ε_r = 55.938; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Front Side Low/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.13 W/kg

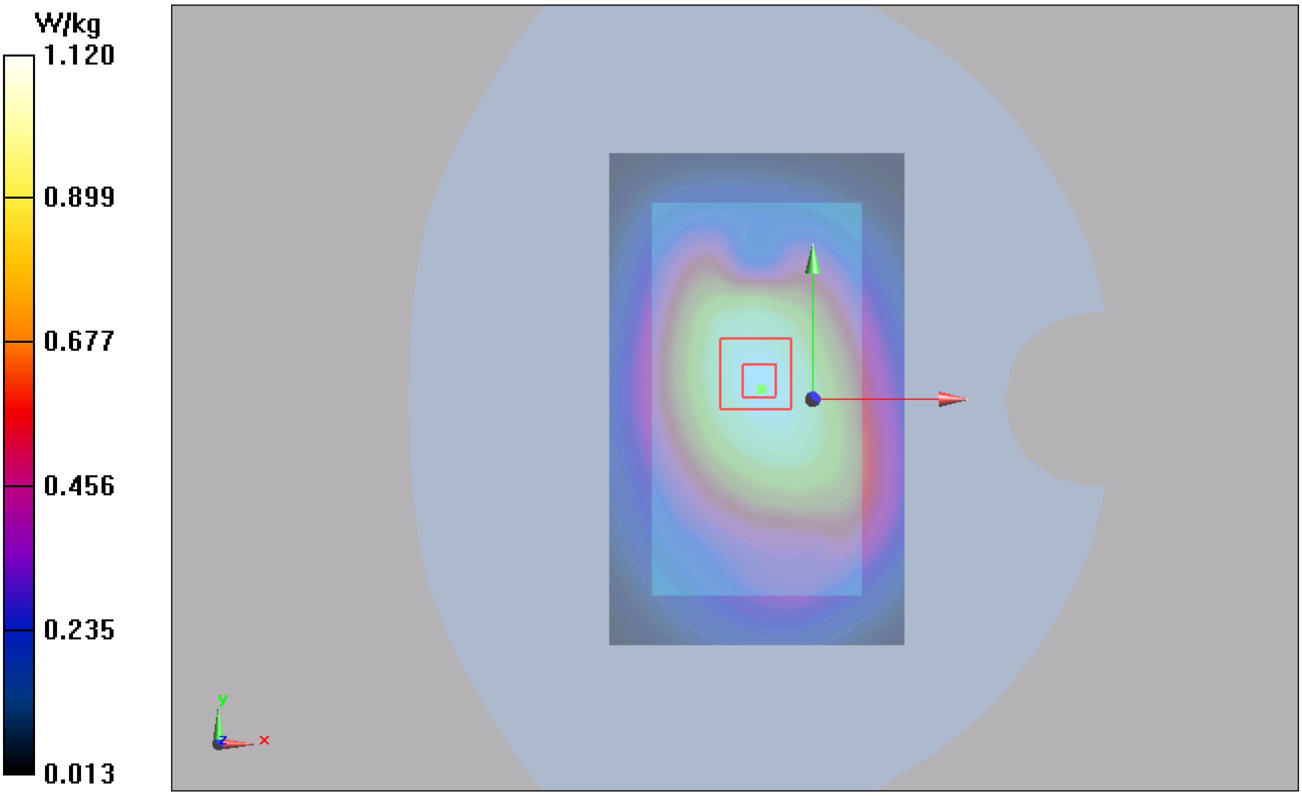
Front Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 35.17 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 1.07 W/kg; SAR(10 g) = 0.813 W/kg

Maximum value of SAR (measured) = 1.12 W/kg



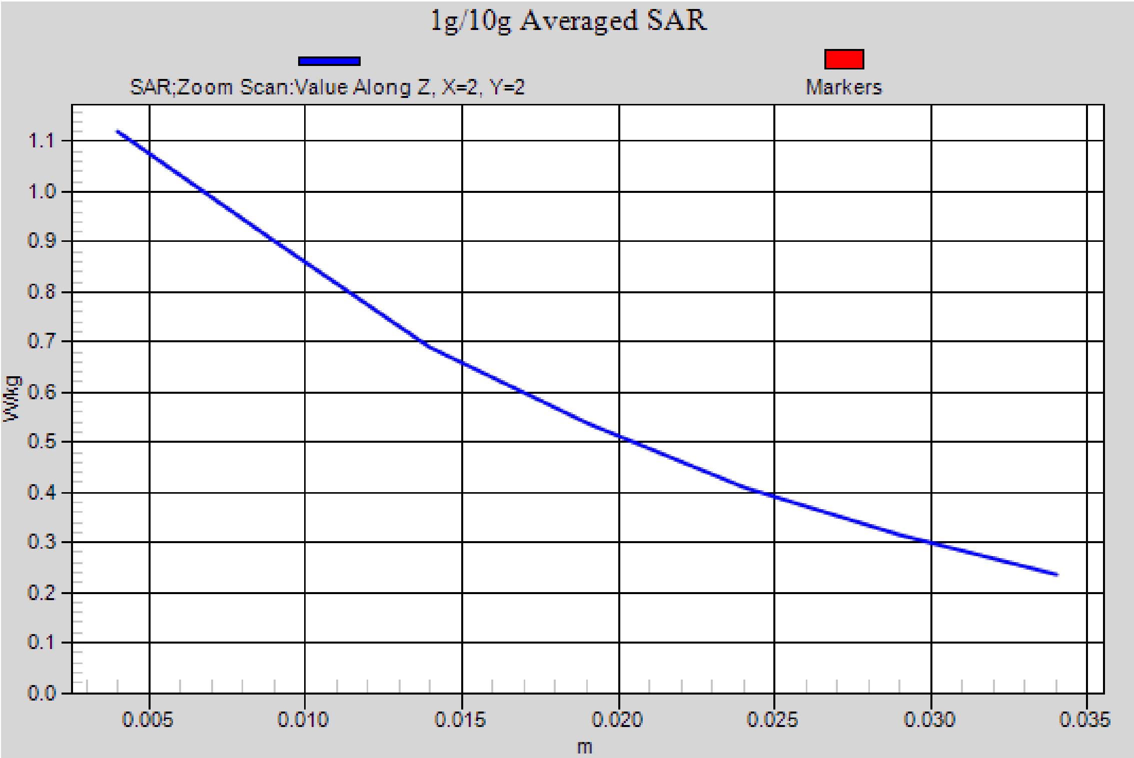


Figure 20 Body, Back Side, GSM 850 GPRS (4Txslots) Channel 128

GSM 1900 Right Cheek Middle

Date: 1/9/2015

Communication System: UID 0, GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042

Medium parameters used: f = 1880 MHz; σ = 1.413 S/m; ε_r = 39.689; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right/Cheek Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.474 W/kg

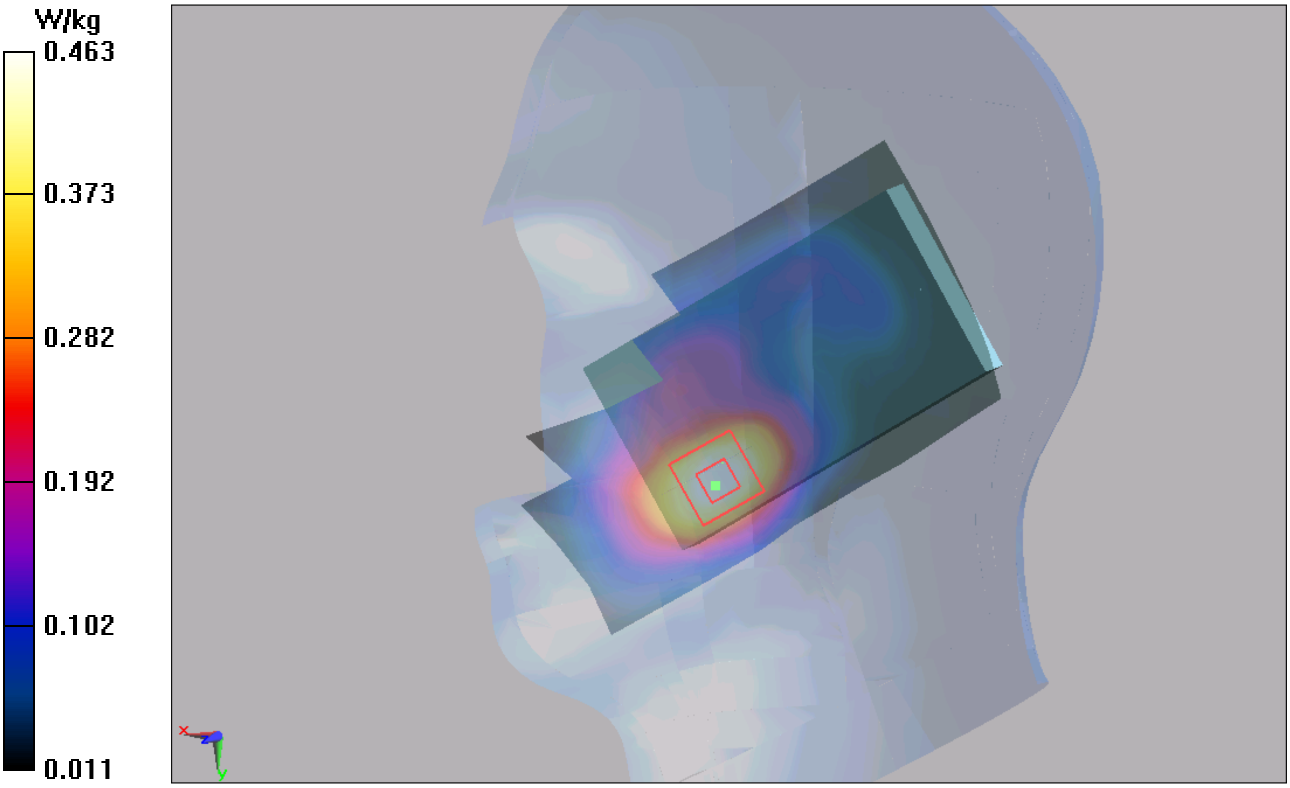
Right/Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.329 V/m; Power Drift = -0.090 dB

Peak SAR (extrapolated) = 0.638 W/kg

SAR(1 g) = 0.451 W/kg; SAR(10 g) = 0.272 W/kg

Maximum value of SAR (measured) = 0.463 W/kg



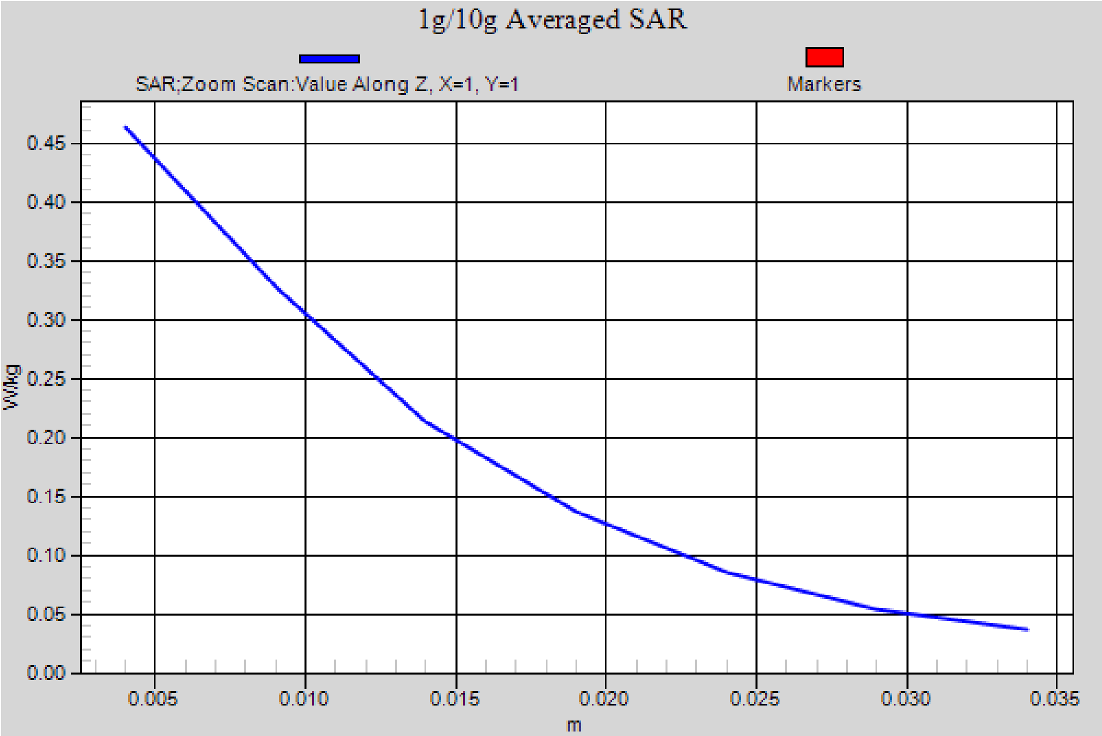


Figure 21 Right Hand Touch Cheek GSM 1900 Channel 661

GSM 1900 GPRS (4Txslots) Back Side Middle

Date: 1/13/2015

Communication System: UID 0, GPRS 4TX (0); Frequency: 1880 MHz;Duty Cycle: 1:2.07491

Medium parameters used: f = 1880 MHz; σ = 1.504 S/m; ε_r = 53.137; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.07 W/kg

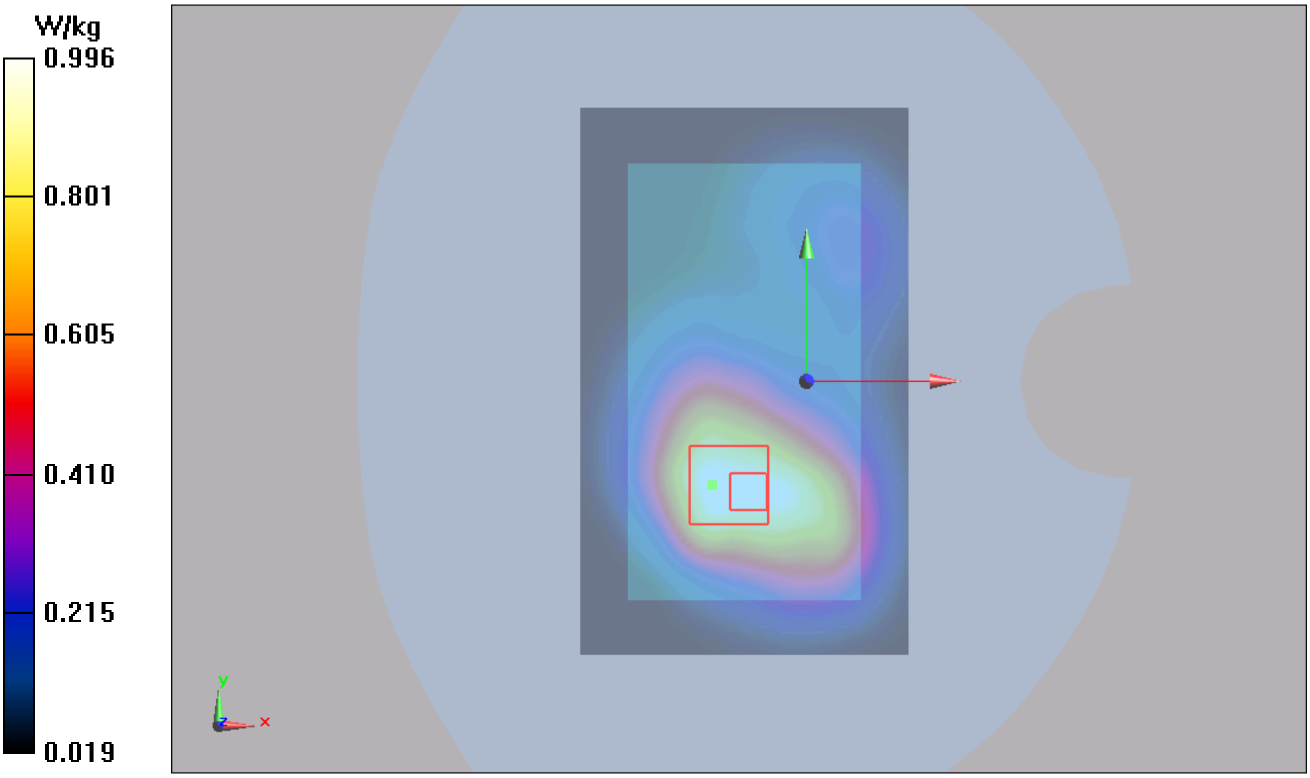
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.60 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.952 W/kg; SAR(10 g) = 0.582 W/kg

Maximum value of SAR (measured) = 0.996 W/kg



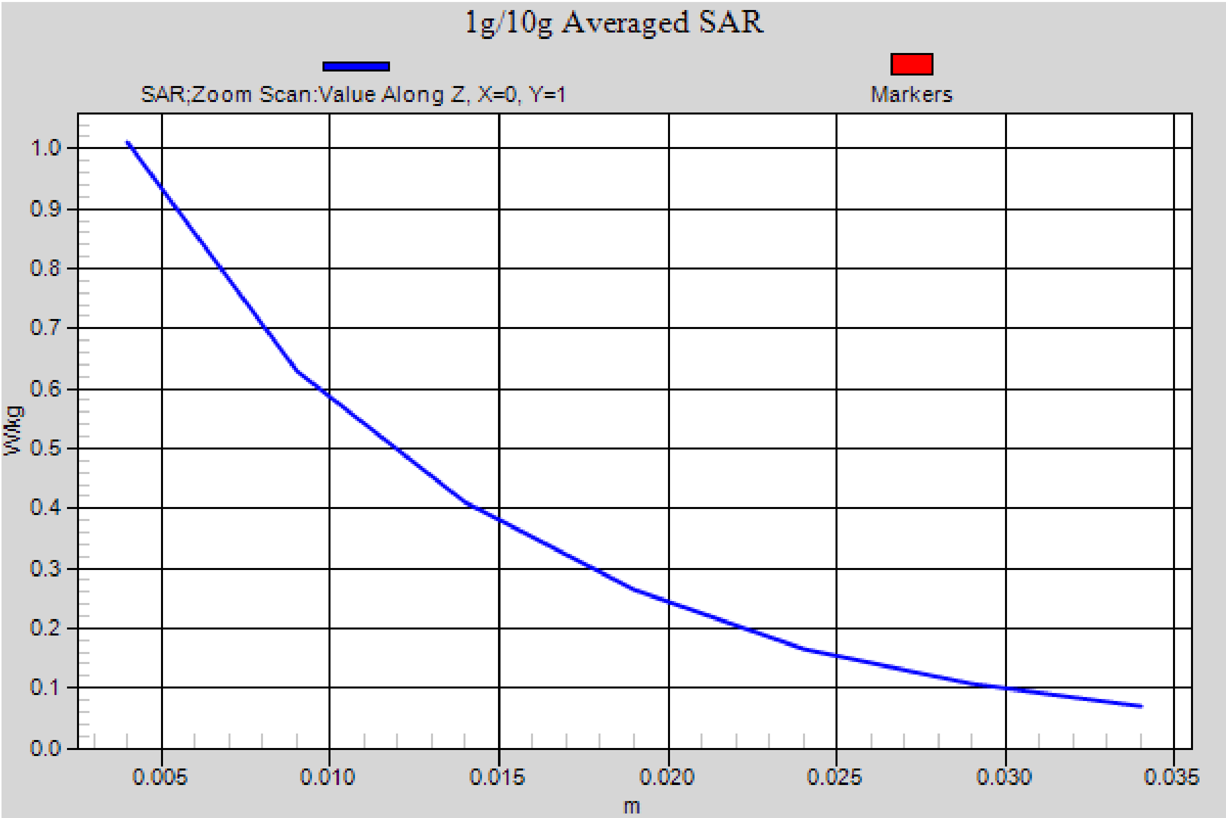


Figure 22 Body, Front Side, GSM 1900 GPRS (4Txslots) Channel 661

UMTS Band II Left Cheek Low

Date: 1/9/2015

Communication System: UID 0, WCDMA (0); Frequency: 1852.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.389 S/m; ε_r = 39.803; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Left/Cheek Low/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.968 W/kg

Left /Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.34 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.886 W/kg; SAR(10 g) = 0.565 W/kg

Maximum value of SAR (measured) = 0.913 W/kg

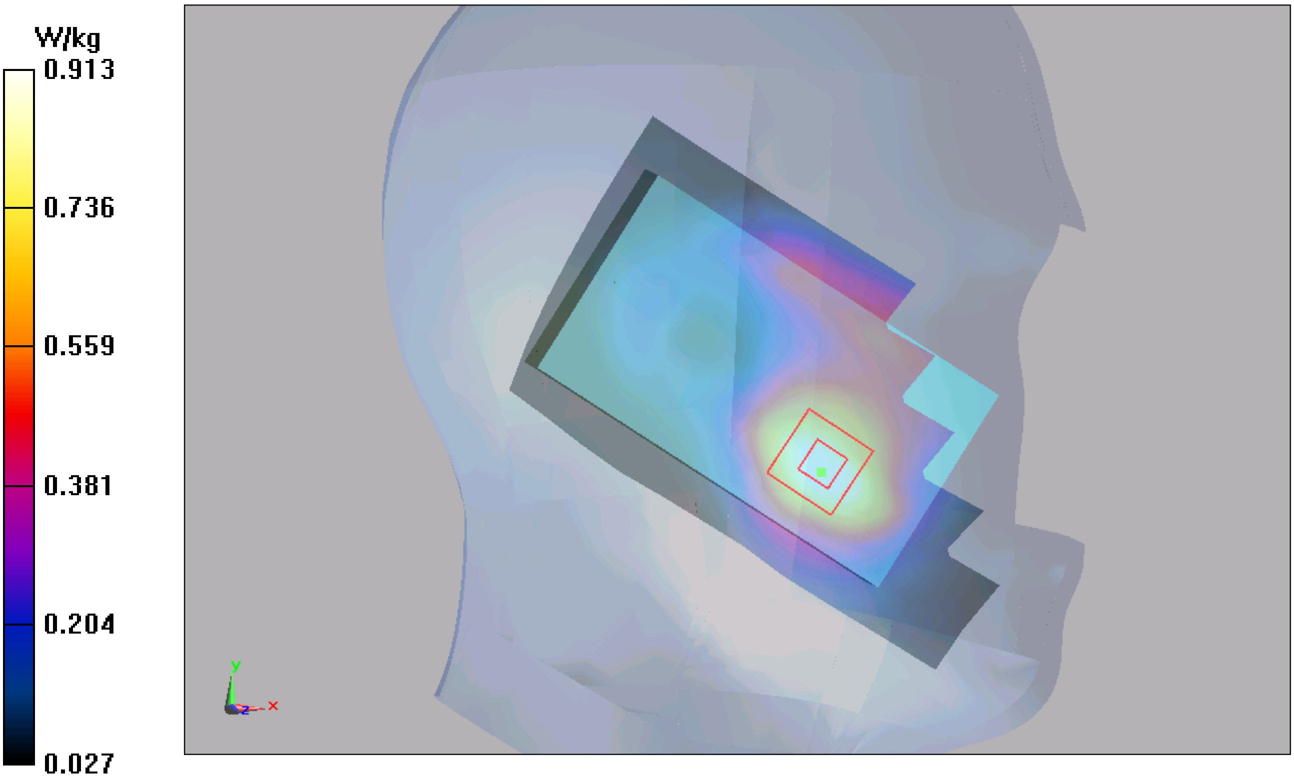


Figure 23 Left Hand Touch Cheek UMTS Band II Channel 9262

UMTS Band II Right Cheek Low

Date: 1/9/2015

Communication System: UID 0, WCDMA (0); Frequency: 1852.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.389 S/m; ε_r = 39.803; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right/Cheek Low/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.994 W/kg

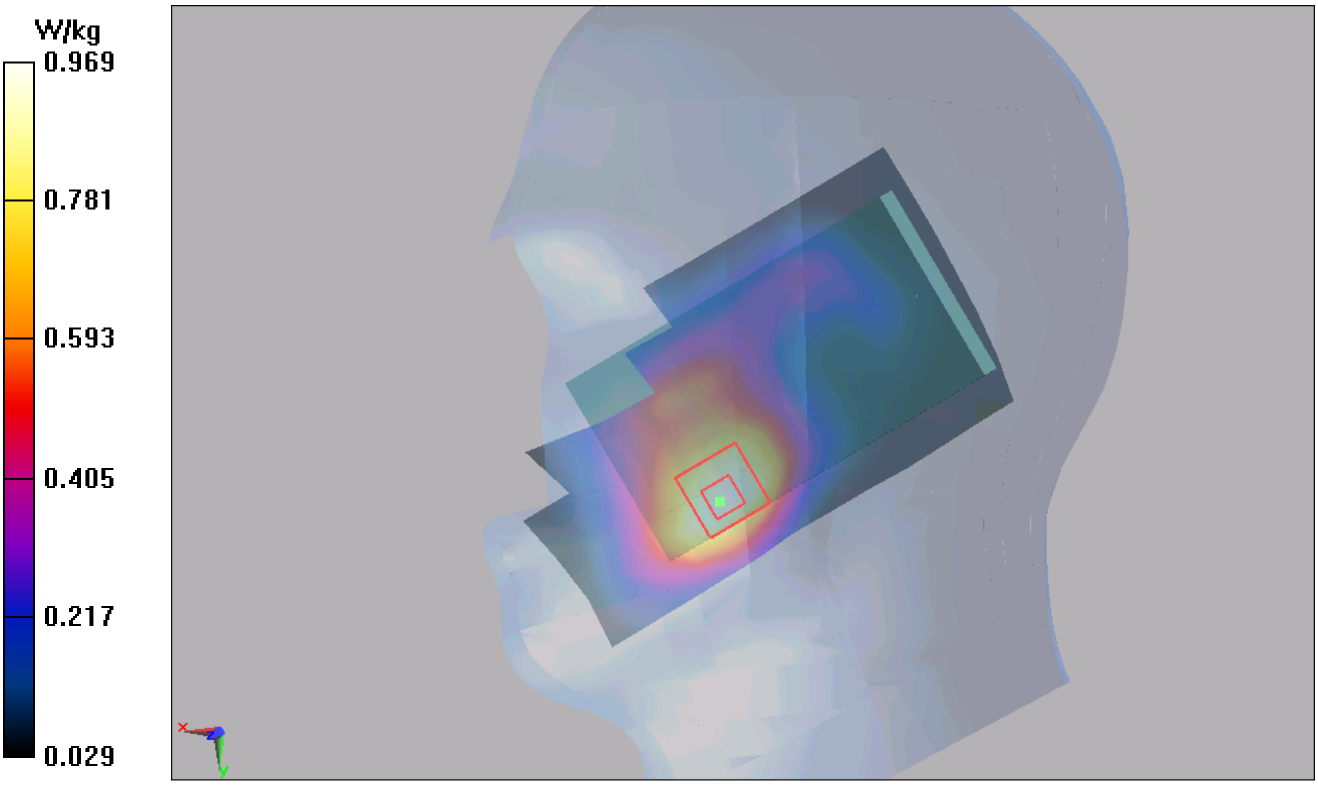
Right/Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.82 V/m; Power Drift = 0.040 dB

Peak SAR (extrapolated) = 1.26 W/kg

SAR(1 g) = 0.934 W/kg; SAR(10 g) = 0.591 W/kg

Maximum value of SAR (measured) = 0.969 W/kg



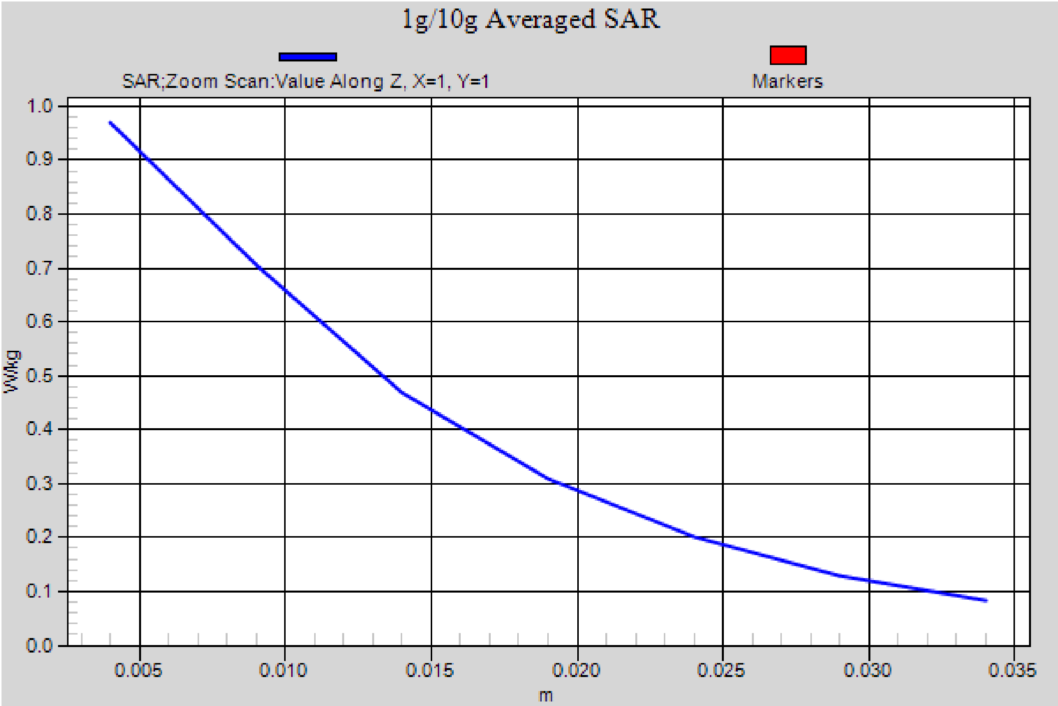


Figure 24 Right Hand Touch Cheek UMTS Band II Channel 9262

UMTS Band II Back Side High

Date: 1/13/2015

Communication System: UID 0, WCDMA (0); Frequency: 1907.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1908 MHz; σ = 1.532 S/m; ε_r = 53.111; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side High /Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.23 W/kg

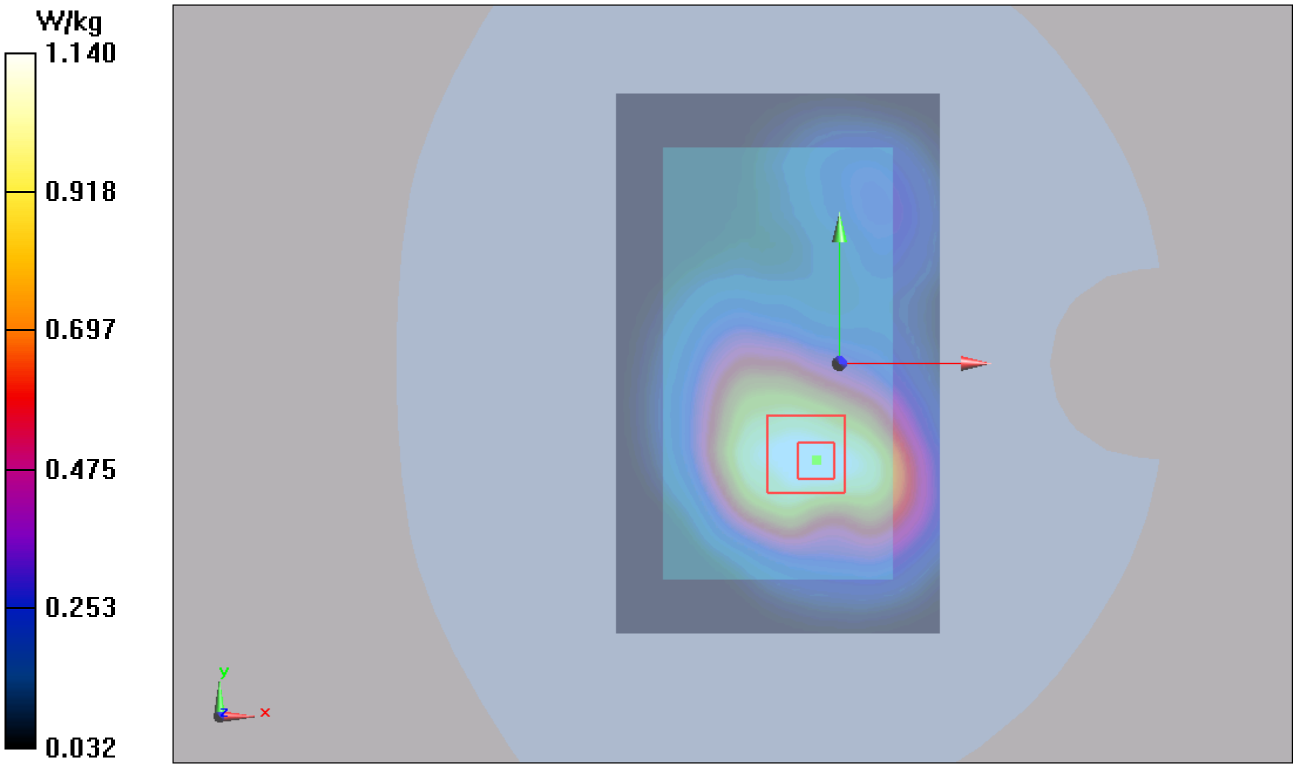
Back Side High /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.01 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.88 W/kg

SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.680 W/kg

Maximum value of SAR (measured) = 1.14 W/kg



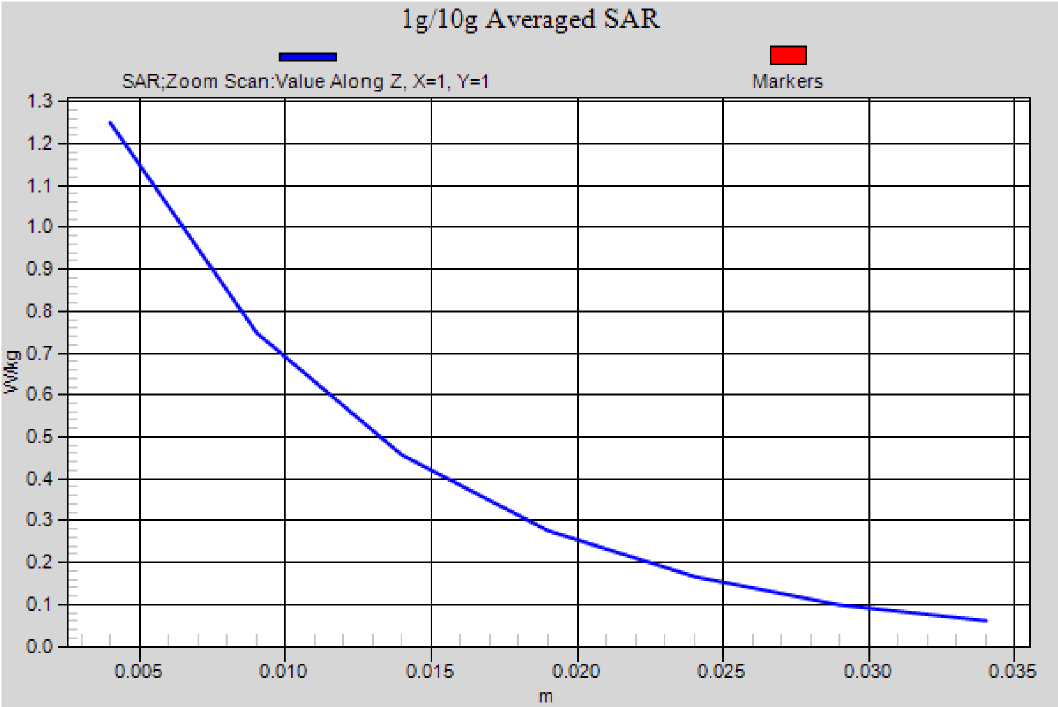


Figure 25 Body, Back Side, UMTS Band II Channel 9538

UMTS Band V Left Cheek Middle

Date: 1/8/2015

Communication System: UID 0, WCDMA (0); Frequency: 836.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.931 S/m; ε_r = 41.363; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.62, 9.62, 9.62); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Left/Cheek Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.657 W/kg

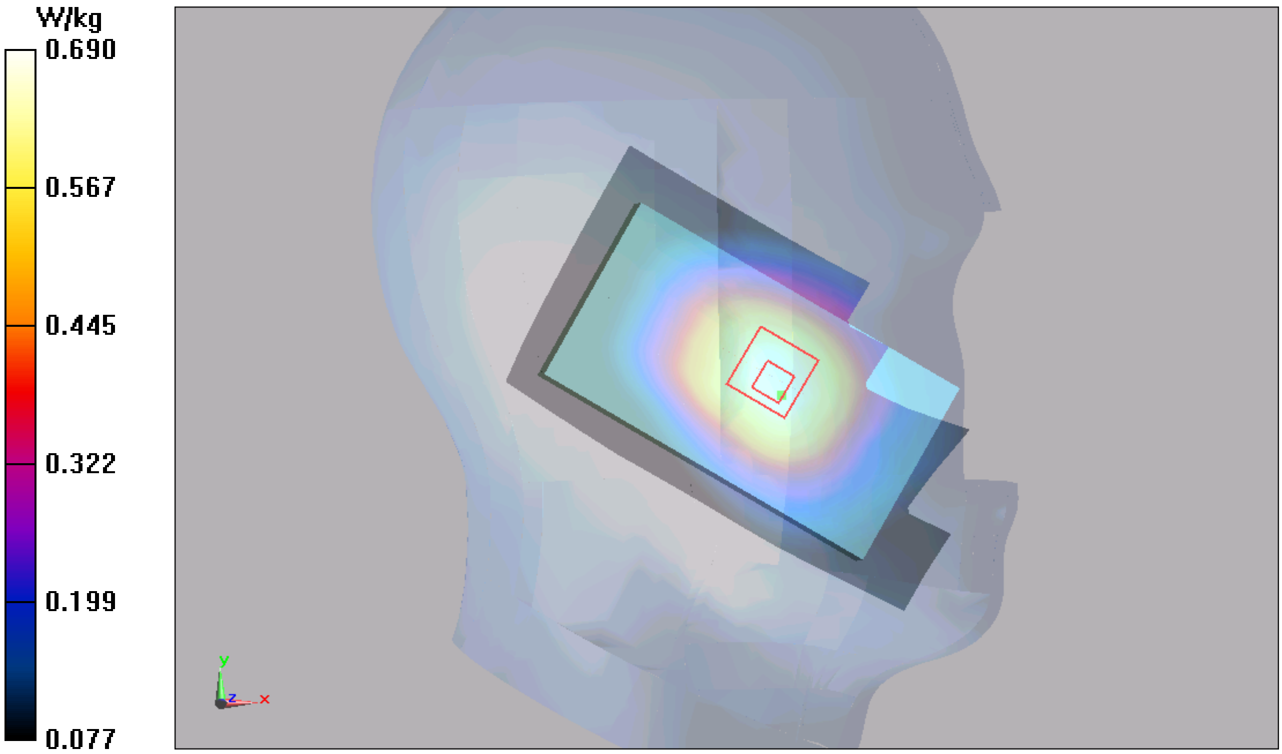
Left/Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.020 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.770 W/kg

SAR(1 g) = 0.654 W/kg; SAR(10 g) = 0.498 W/kg

Maximum value of SAR (measured) = 0.690 W/kg



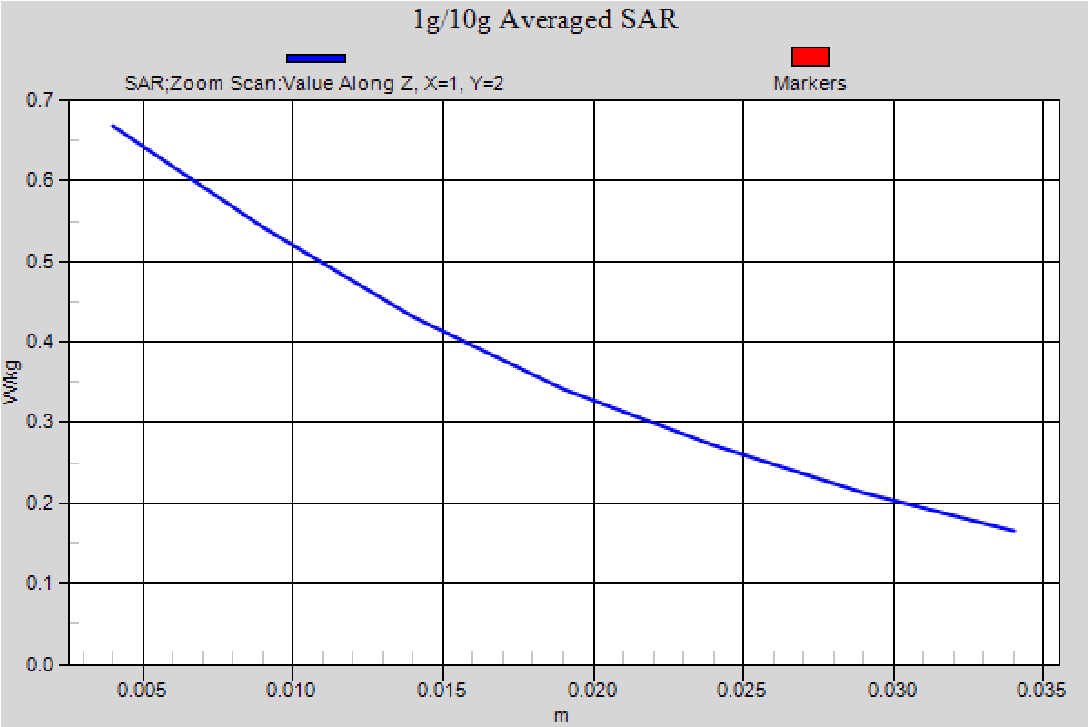


Figure 26 Left Hand Touch Cheek UMTS Band V Channel 4183

UMTS Band V Front Side Middle

Date: 1/12/2015

Communication System: UID 0, WCDMA (0); Frequency: 836.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.992 S/m; ε_r = 55.885; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(9.74, 9.74, 9.74); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM1; Type: SAM; Serial: TP-1534

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Front Side Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.692 W/kg

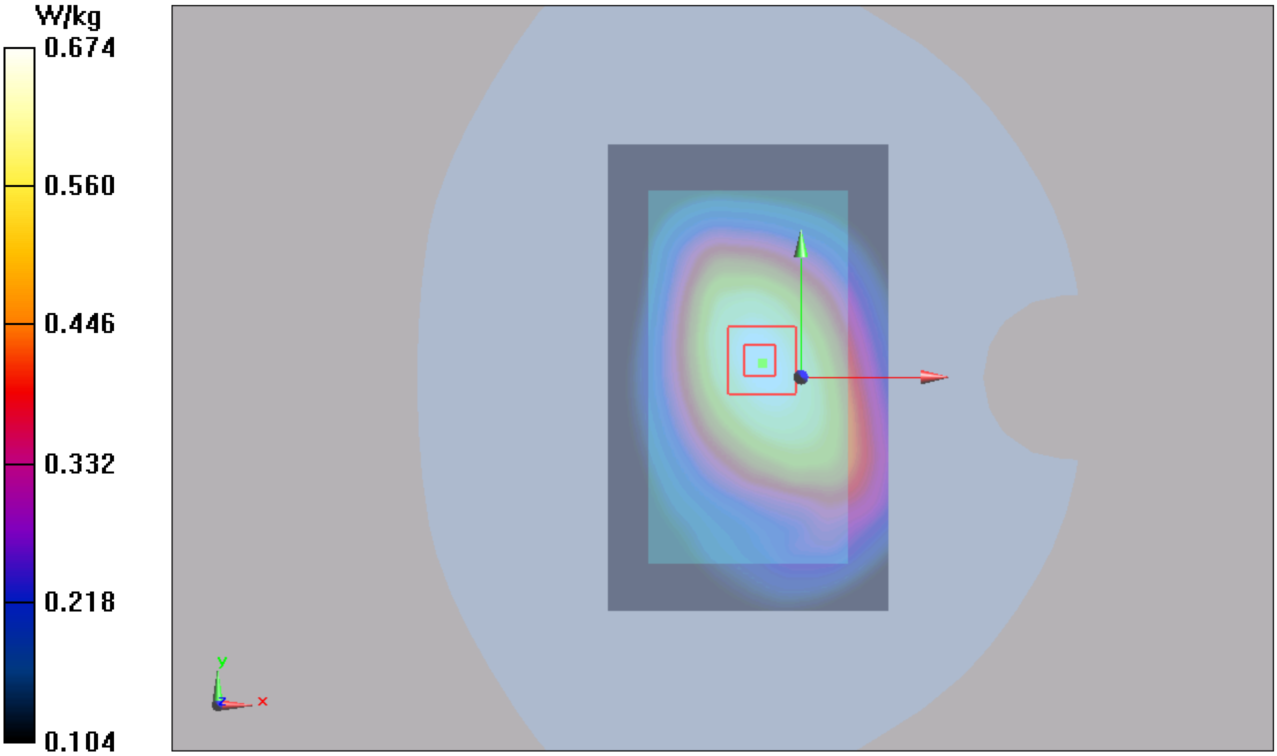
Front Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.99 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.767 W/kg

SAR(1 g) = 0.649 W/kg; SAR(10 g) = 0.492 W/kg

Maximum value of SAR (measured) = 0.674 W/kg



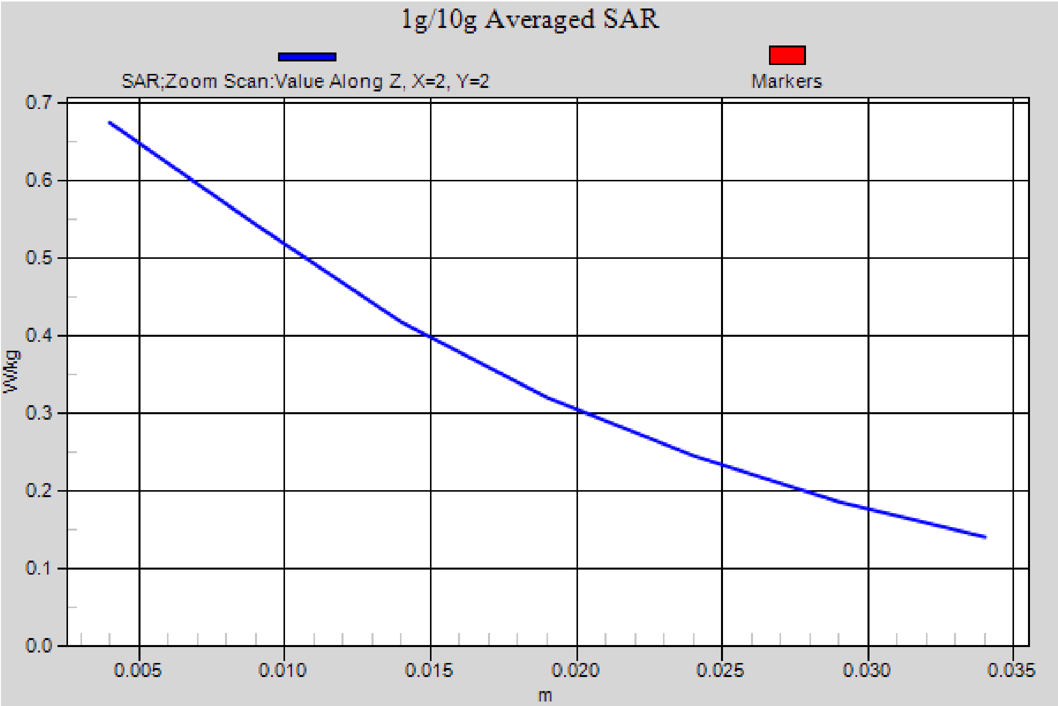


Figure 27 Body, Front Side, UMTS Band V Channel 4183

LTE Band 2 1RB Left Cheek High

Date: 1/11/2015

Communication System: UID 0, LTE (0); Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.431 S/m; ε_r = 39.602; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Left/Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.838 W/kg

Left/Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.114 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.861 W/kg; SAR(10 g) = 0.535 W/kg

Maximum value of SAR (measured) = 0.886 W/kg

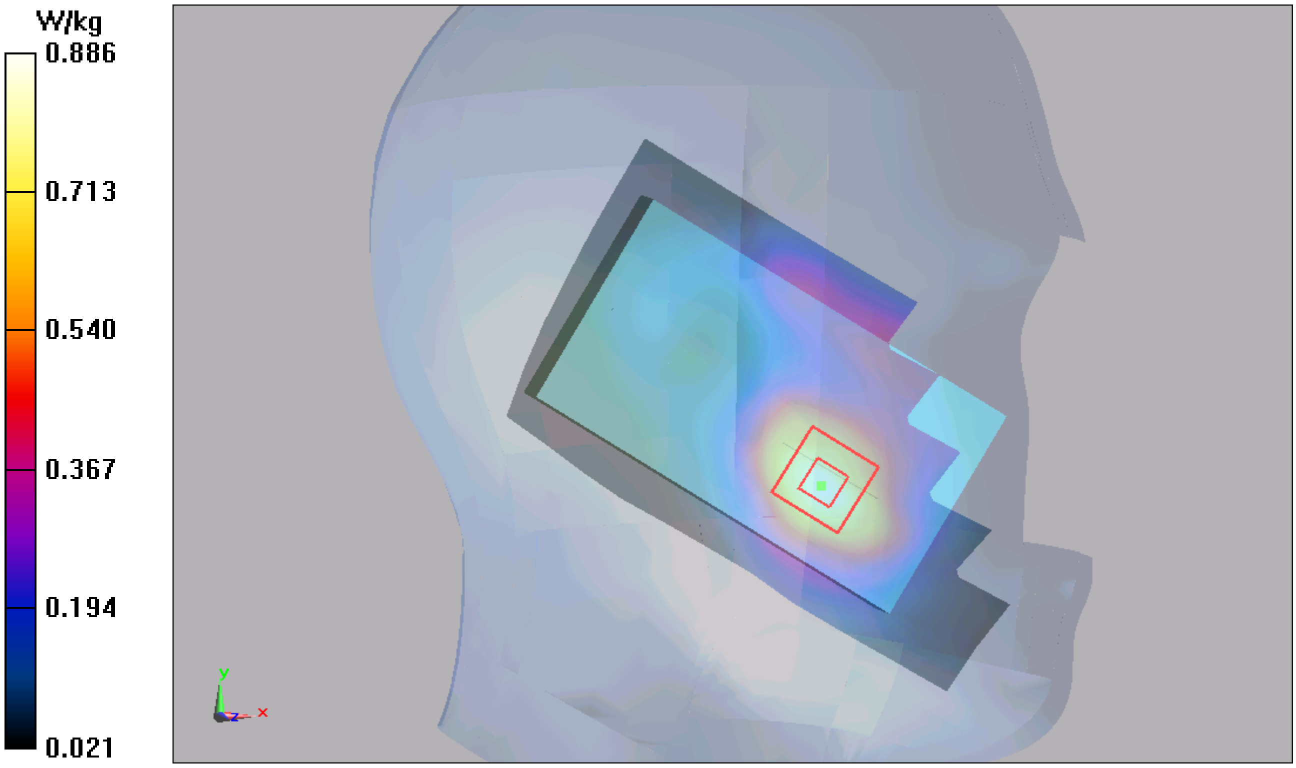


Figure 28 Left Hand Touch Cheek LTE Band 2 1RB Channel 19100

LTE Band 2 1RB Right Cheek High (Battery 2)

Date: 1/11/2015

Communication System: UID 0, LTE (0); Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.431 S/m; ε_r = 39.602; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.97, 7.97, 7.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right/Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.11 W/kg

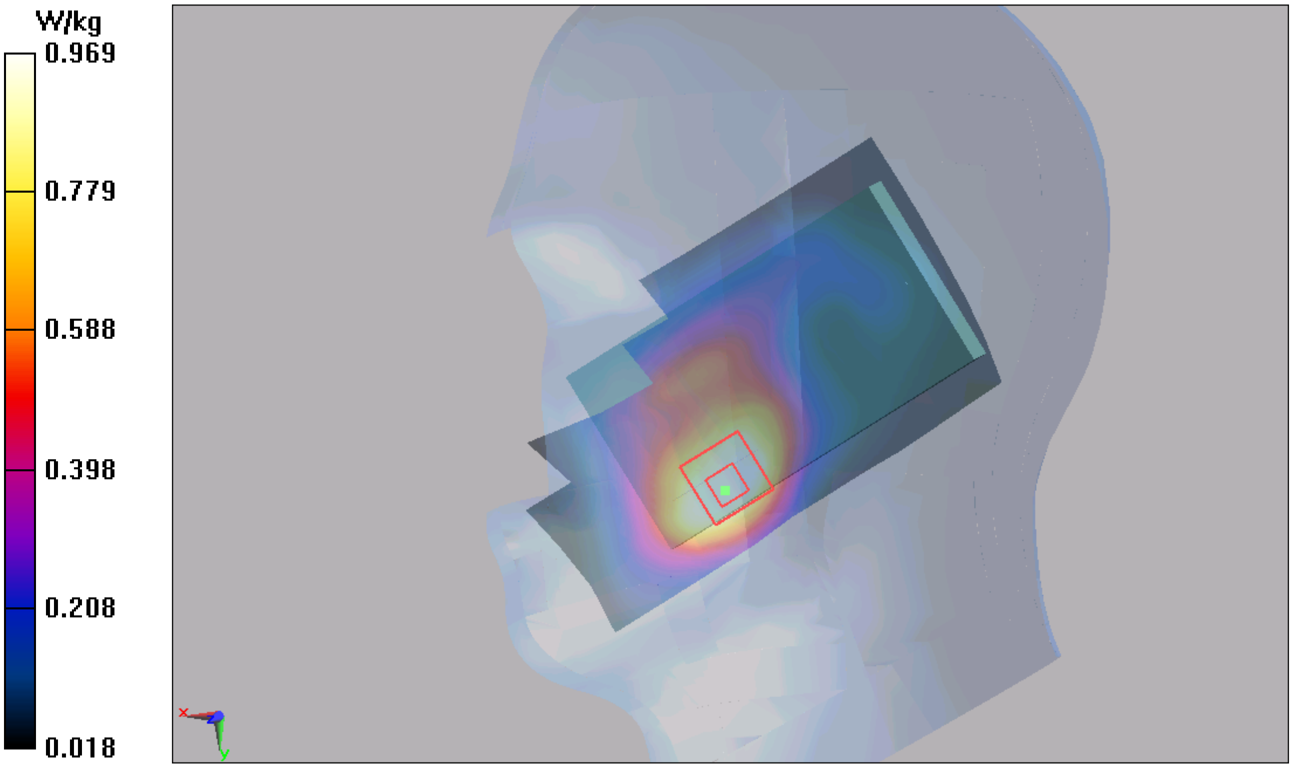
Right/Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.78 V/m; Power Drift = 0.004 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.968 W/kg; SAR(10 g) = 0.602 W/kg

Maximum value of SAR (measured) = 0.969 W/kg



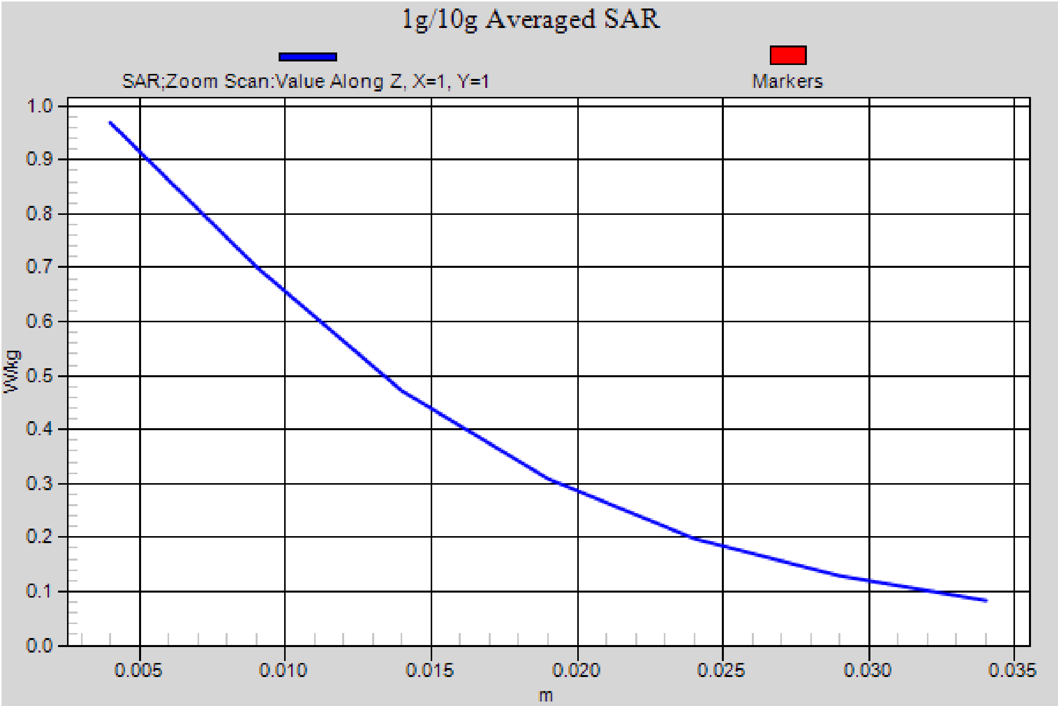


Figure 29 Right Hand Touch Cheek LTE Band 2 1RB Channel 19100

LTE Band 2 1RB Back Side Middle

Date: 1/10/2015

Communication System: UID 0, LTE (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; σ = 1.504 S/m; ε_r = 53.137; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.37, 7.37, 7.37); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.11 W/kg

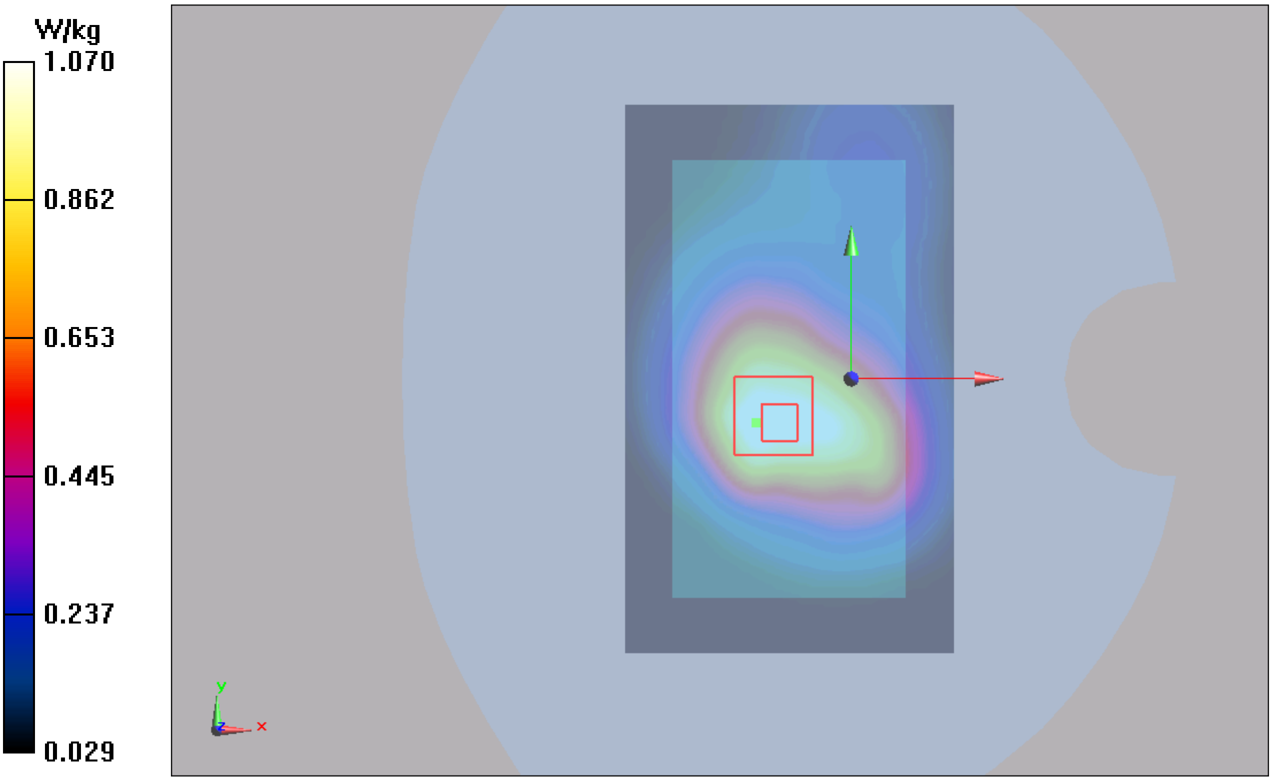
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.58 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 1.73 W/kg

SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.627 W/kg

Maximum value of SAR (measured) = 1.07 W/kg



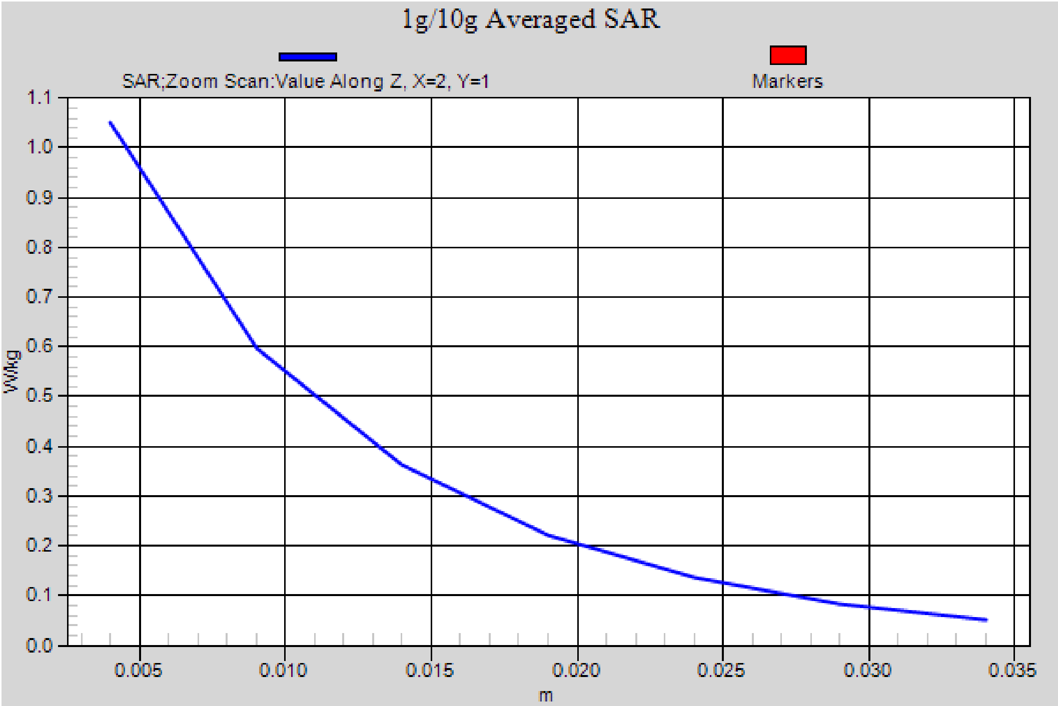


Figure 30 Body, Back Side, LTE Band 2 1RB Channel 18900

LTE Band 4 1RB Right Cheek High

Date: 1/14/2015

Communication System: UID 0, LTE (0); Frequency: 1745 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1745 MHz; σ = 1.315 S/m; ε_r = 39.688; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(8.14, 8.14, 8.14); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right/Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.870 W/kg

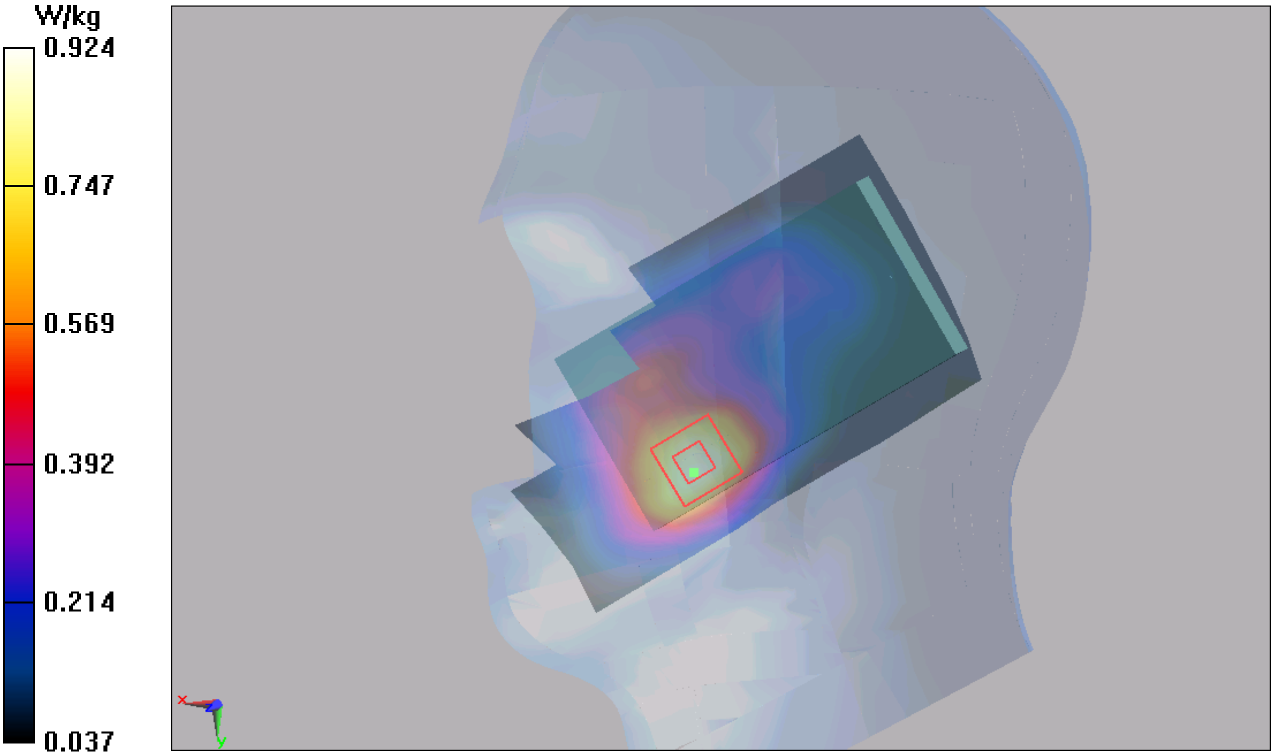
Right/Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.115 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.873 W/kg; SAR(10 g) = 0.551 W/kg

Maximum value of SAR (measured) = 0.924 W/kg



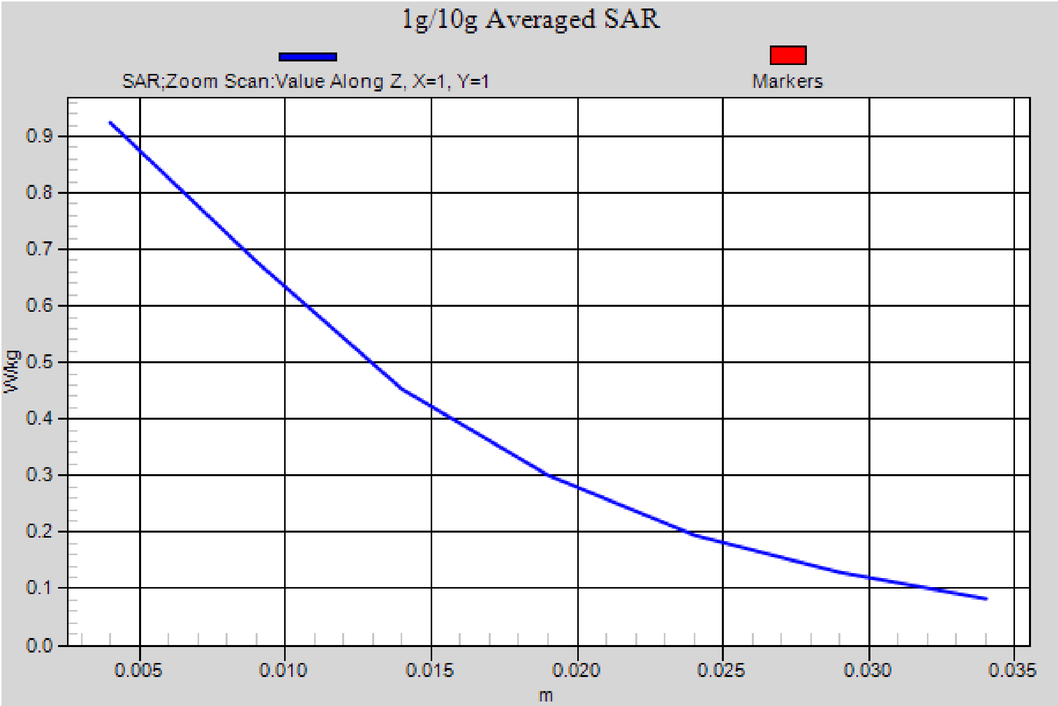


Figure 31 Right Hand Touch Cheek LTE Band 4 1RB Channel 20300

LTE Band 4 1RB Back Side Middle

Date: 1/15/2015

Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.488 S/m; ε_r = 52.928; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.69, 7.69, 7.69); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.39 W/kg

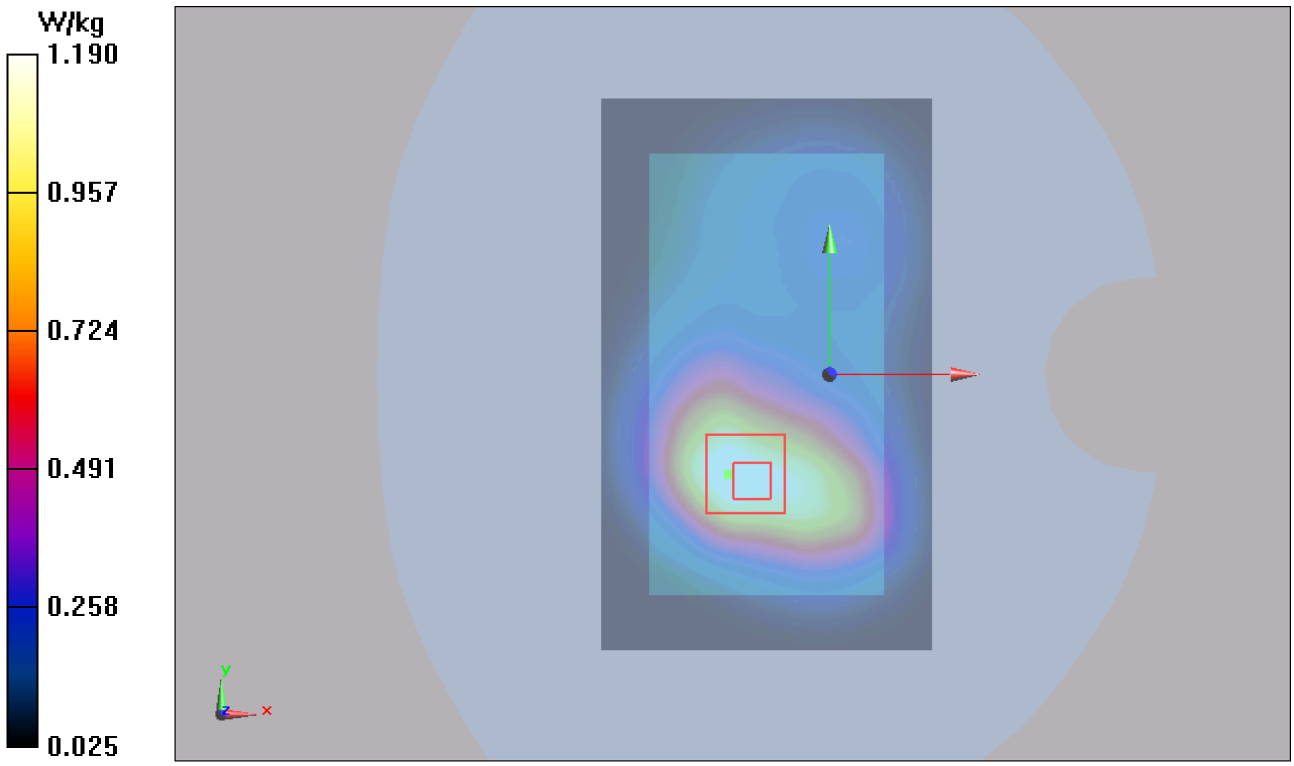
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.74 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.81 W/kg

SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.686 W/kg

Maximum value of SAR (measured) = 1.19 W/kg



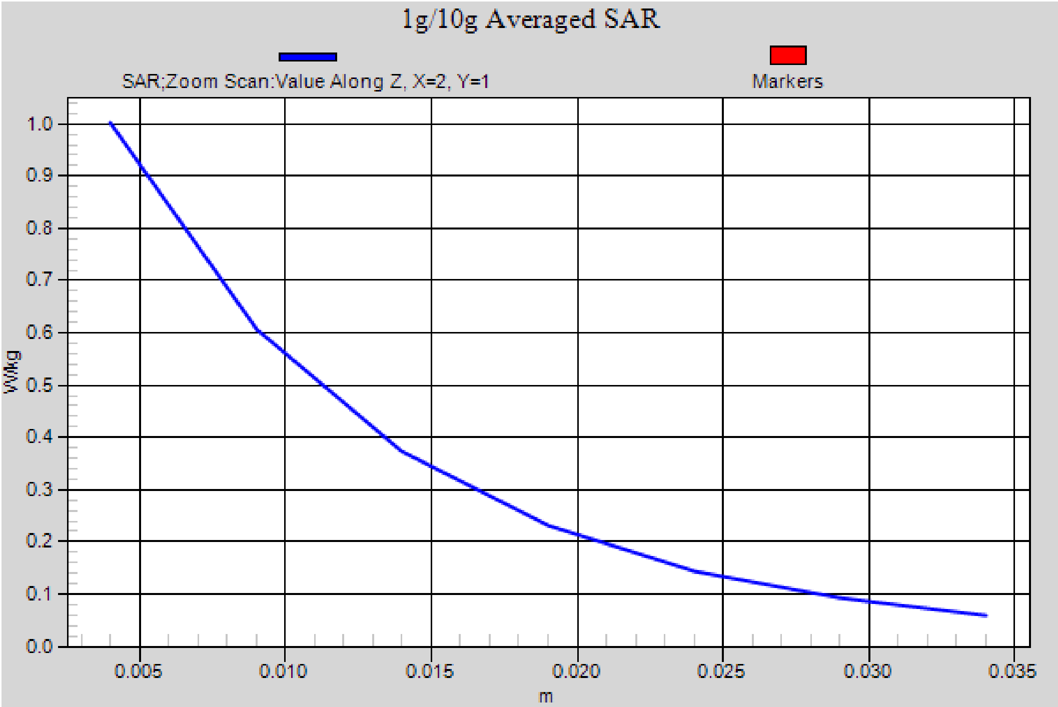


Figure 32 Body, Back Side, LTE Band 4 1RB Channel 20175

LTE Band 7 1RB Right Cheek High

Date: 1/17/2015

Communication System: UID 0, LTE (0); Frequency: 2560 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2560 MHz; σ = 1.941 S/m; ε_r = 38.761; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(7.07, 7.07, 7.07); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Right/Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.642 W/kg

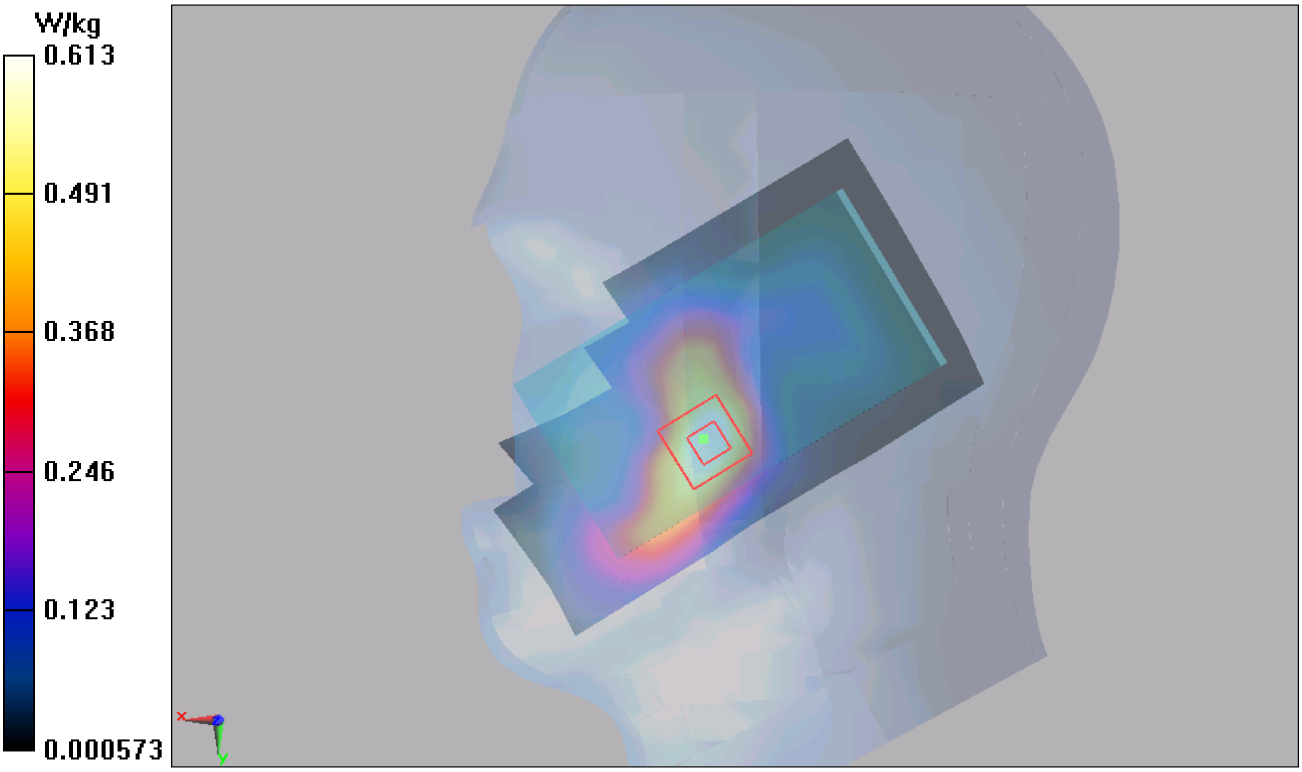
Right/Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.777 V/m; Power Drift = 0.158 dB

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.579 W/kg; SAR(10 g) = 0.317 W/kg

Maximum value of SAR (measured) = 0.613 W/kg



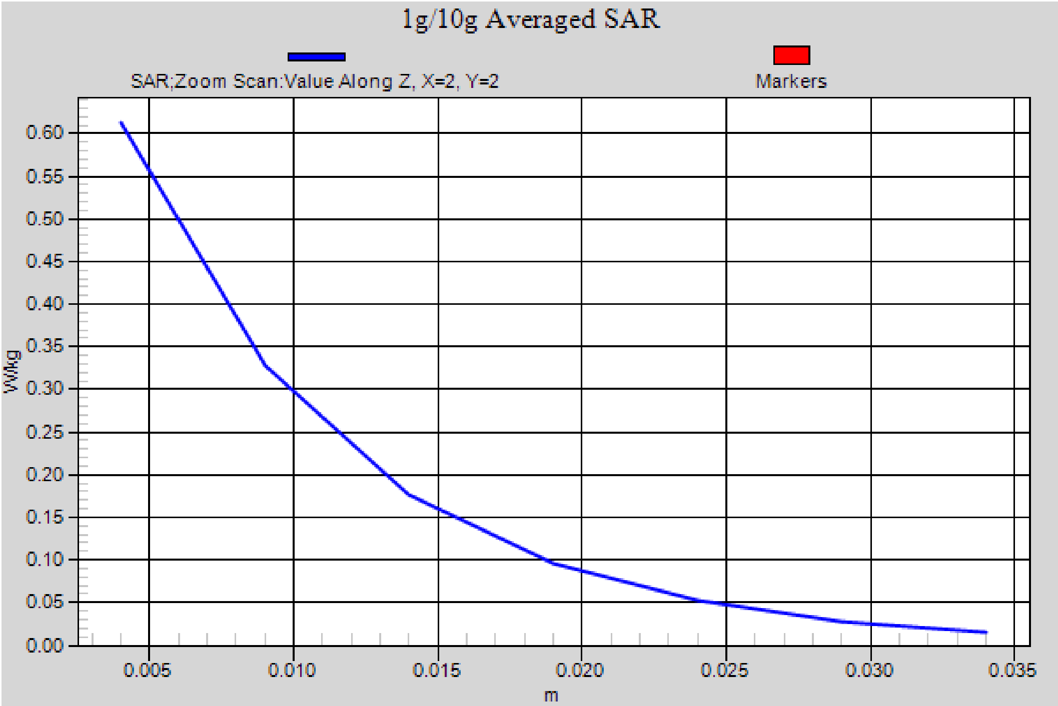


Figure 33 Right Hand Touch Cheek LTE Band 7 1RB Channel 21350

LTE Band 7 1RB Back Side Middle

Date: 1/16/2015

Communication System: UID 0, LTE (0); Frequency: 2535 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2535 MHz; σ = 2.079 S/m; ε_r = 52.162; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3977; ConvF(6.68, 6.68, 6.68); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 2; Type: SAM;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side Middle/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.789 W/kg

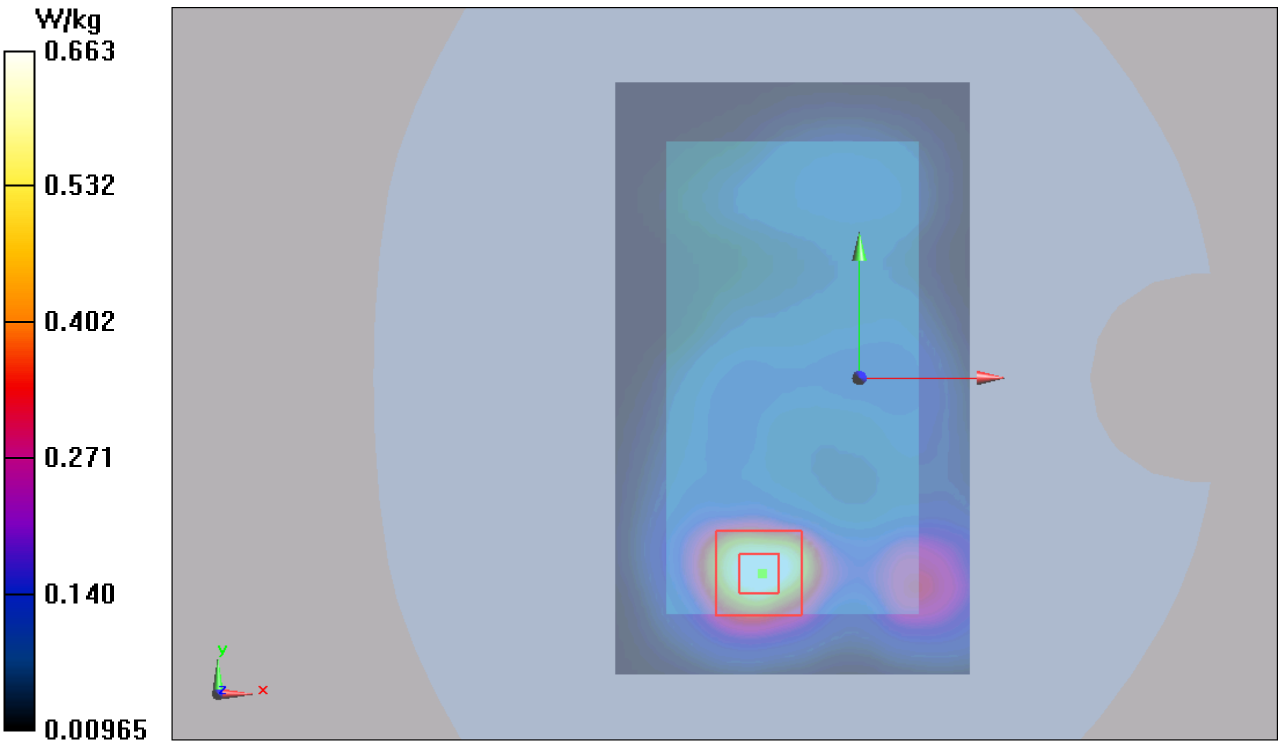
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.733 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 1.98 W/kg

SAR(1 g) = 0.759 W/kg; SAR(10 g) = 0.332 W/kg

Maximum value of SAR (measured) = 0.663 W/kg



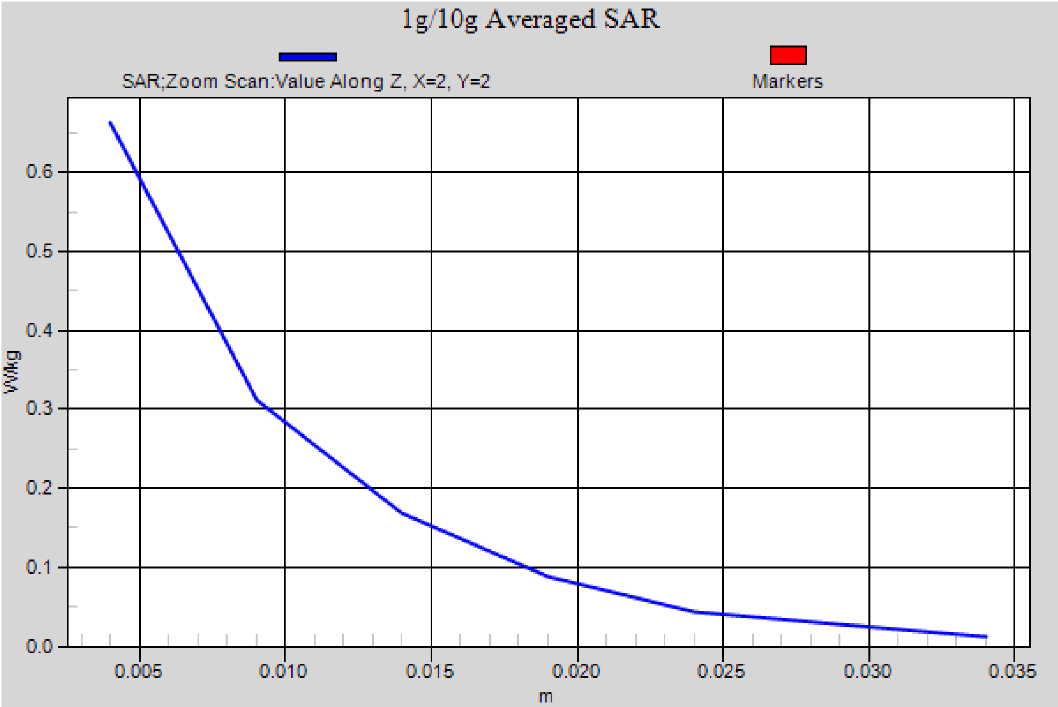


Figure 34 Body, Back Side, LTE Band 7 1RB Channel 21100

802.11b Left Cheek Low

Date: 1/19/2015

Communication System: 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2412 MHz; σ = 1.84 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Probe: EX3DV4 - SN3977; ConvF(7.24, 7.24, 7.24); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY5, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (interpolated) = 0.833 mW/g

Left Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.0 V/m; Power Drift = 0.036 dB

Peak SAR (extrapolated) = 1.98 W/kg

SAR(1 g) = 0.747 mW/g; SAR(10 g) = 0.300 mW/g

Maximum value of SAR (measured) = 0.913 mW/g

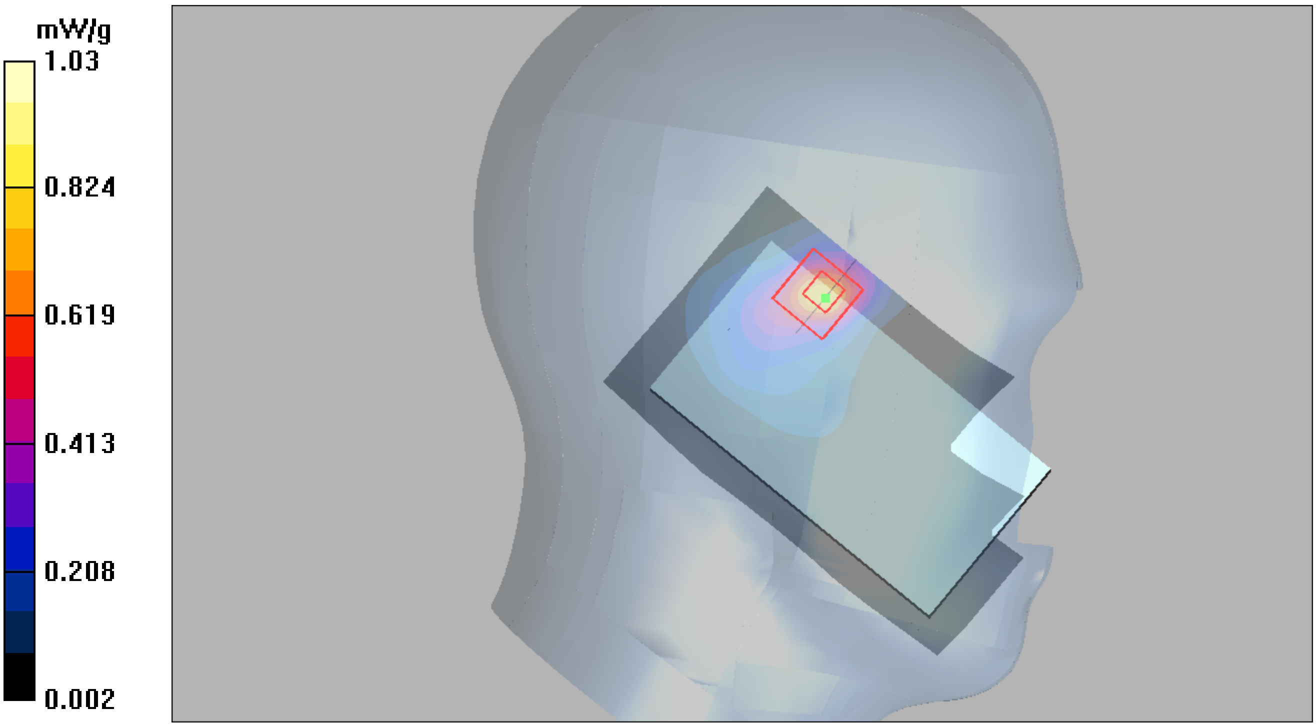


Figure 35 Left Hand Touch Cheek 802.11b Channel 1

802.11b Back Side Low

Date: 1/18/2015

Communication System: 802.11b; Frequency: 2412 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2412 MHz; σ = 1.92 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3977; ConvF(6.97, 6.97, 6.97); Calibrated: 2/17/2014;

Electronics: DAE4 Sn1291; Calibrated: 11/14/2014

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY5, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Back Side Low/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.232 mW/g

Back Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.60 V/m; Power Drift = 0.168 dB

Peak SAR (extrapolated) = 0.394 W/kg

SAR(1 g) = 0.212 mW/g; SAR(10 g) = 0.118 mW/g

Maximum value of SAR (measured) = 0.226 mW/g

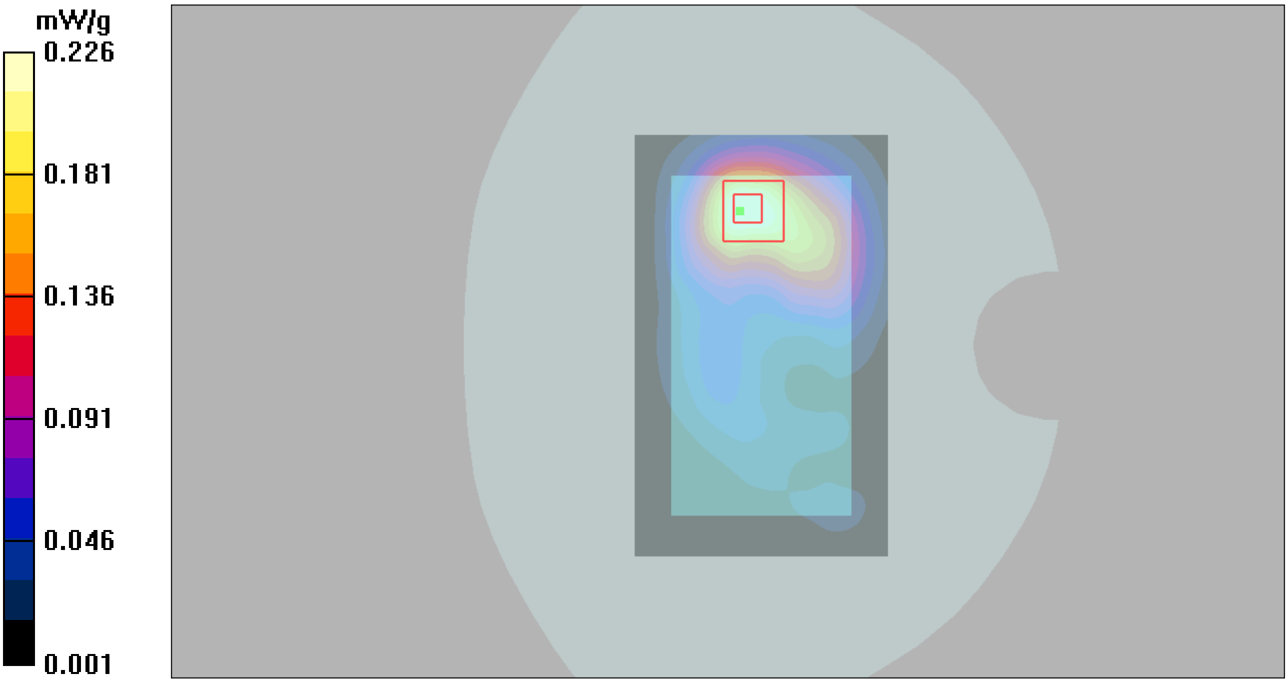


Figure 36 Body, Back Side, 802.11b Channel 1

ANNEX D: Probe Calibration Certificate

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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 ATL (Auden)

Certificate No: EX3-3977_Feb14

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3977

Calibration procedure(s): QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: February 17, 2014

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	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-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-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: February 19, 2014

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

Calibration Laboratory of
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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
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
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.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe EX3DV4

SN:3977

Manufactured: November 5, 2013
Calibrated: February 17, 2014

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3977

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.54	0.57	0.54	± 10.1 %
DCP (mV)[B]	99.5	100.0	99.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	133.3	±3.3 %
		Y	0.0	0.0	1.0		134.9	
		Z	0.0	0.0	1.0		146.5	

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:3977

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 [G]	Depth [G] (mm)	Unct. (k=2)
450	43.5	0.87	11.72	11.72	11.72	0.18	1.10	± 13.3 %
750	41.9	0.89	9.98	9.98	9.98	0.36	0.88	± 12.0 %
835	41.5	0.90	9.62	9.62	9.62	0.61	0.69	± 12.0 %
900	41.5	0.97	9.48	9.48	9.48	0.77	0.63	± 12.0 %
1750	40.1	1.37	8.14	8.14	8.14	0.78	0.60	± 12.0 %
1900	40.0	1.40	7.97	7.97	7.97	0.48	0.75	± 12.0 %
2000	40.0	1.40	7.93	7.93	7.93	0.69	0.63	± 12.0 %
2300	39.5	1.67	7.59	7.59	7.59	0.37	0.83	± 12.0 %
2450	39.2	1.80	7.24	7.24	7.24	0.27	1.10	± 12.0 %
2600	39.0	1.96	7.07	7.07	7.07	0.41	0.84	± 12.0 %
5200	36.0	4.66	5.09	5.09	5.09	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.82	4.82	4.82	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.76	4.76	4.76	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.55	4.55	4.55	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.52	4.52	4.52	0.40	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.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3977

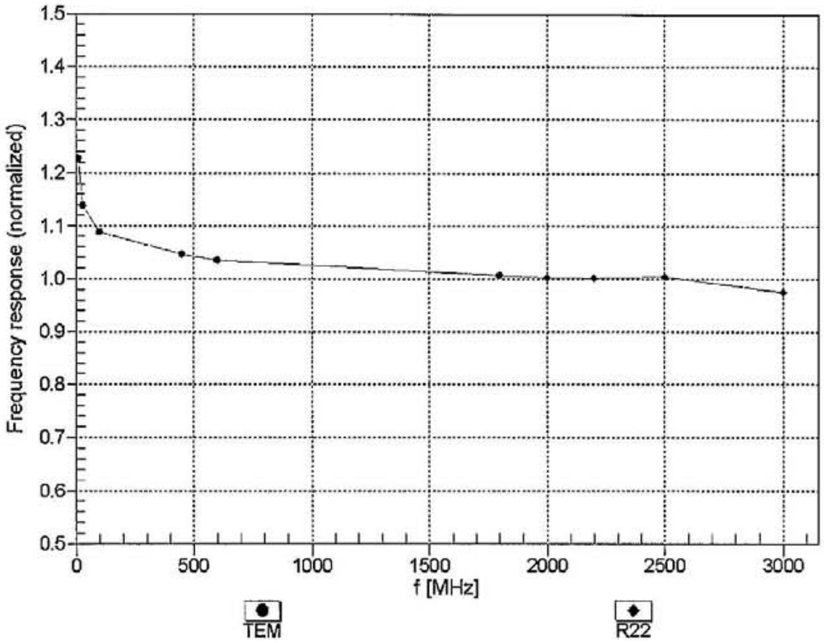
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
450	56.7	0.94	12.47	12.47	12.47	0.11	1.10	± 13.3 %
750	55.5	0.96	9.78	9.78	9.78	0.45	0.86	± 12.0 %
835	55.2	0.97	9.74	9.74	9.74	0.48	0.83	± 12.0 %
900	55.0	1.05	9.46	9.46	9.46	0.41	0.89	± 12.0 %
1750	53.4	1.49	7.69	7.69	7.69	0.41	0.88	± 12.0 %
1900	53.3	1.52	7.37	7.37	7.37	0.34	0.89	± 12.0 %
2000	53.3	1.52	7.41	7.41	7.41	0.24	1.14	± 12.0 %
2300	52.9	1.81	7.12	7.12	7.12	0.66	0.64	± 12.0 %
2450	52.7	1.95	6.97	6.97	6.97	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.68	6.68	6.68	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.50	4.50	4.50	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.28	4.28	4.28	0.45	1.90	± 13.1 %
5500	48.6	5.65	4.02	4.02	4.02	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.87	3.87	3.87	0.45	1.90	± 13.1 %
5800	48.2	6.00	4.12	4.12	4.12	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.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

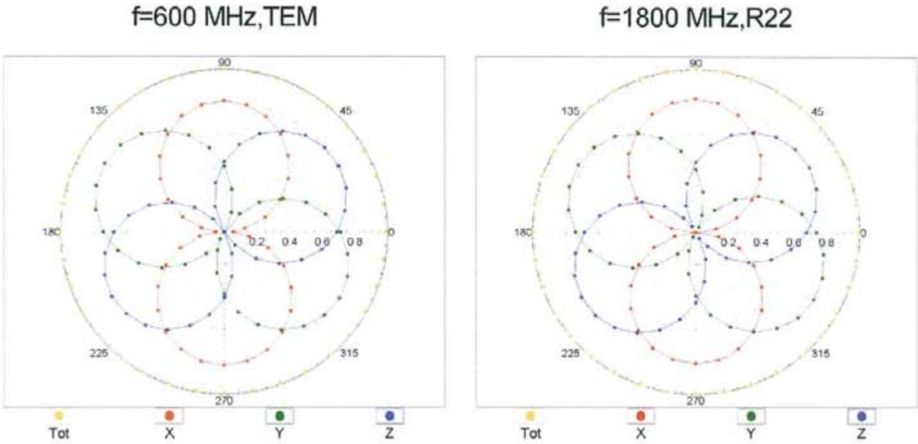
Frequency Response of E-Field

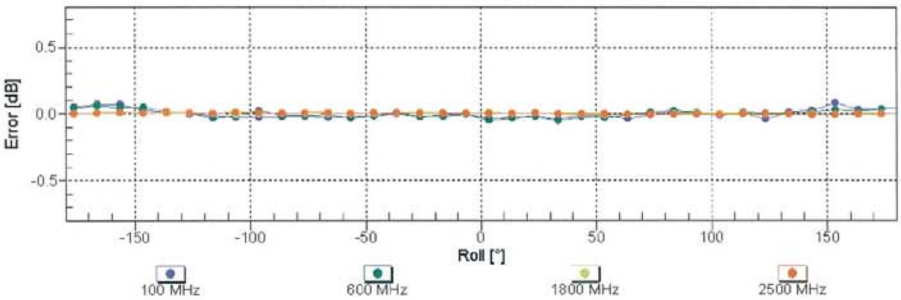
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

Receiving Pattern (ϕ), ϑ = 0°

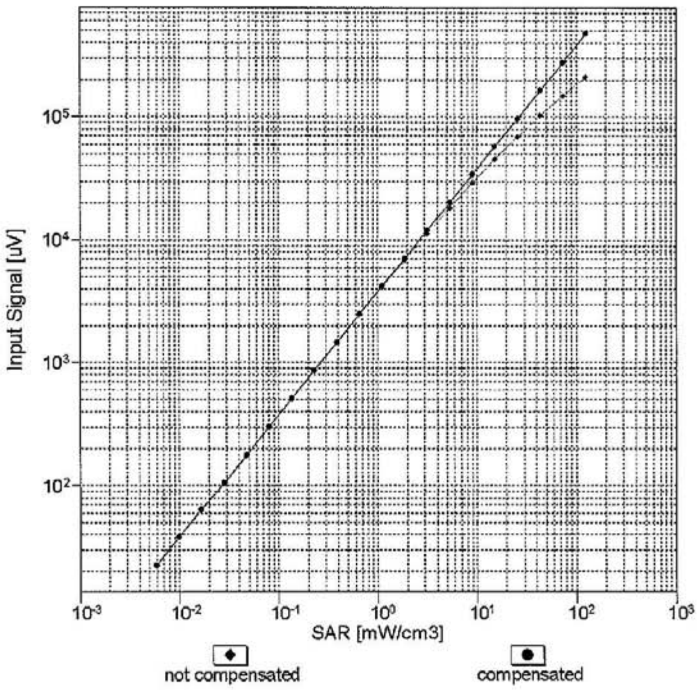


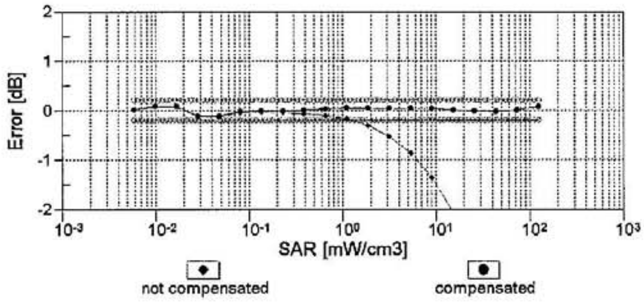


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

EX3DV4– SN:3977 February 17, 2014

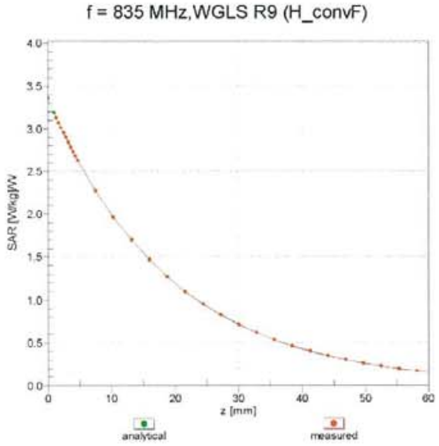
Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)

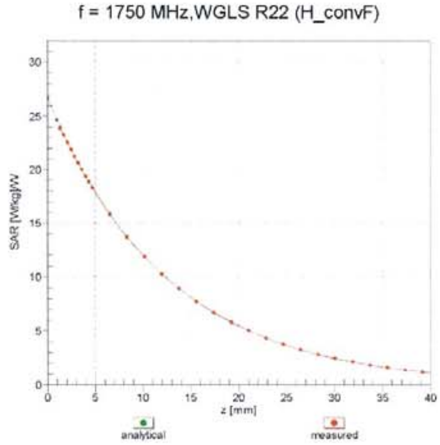




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

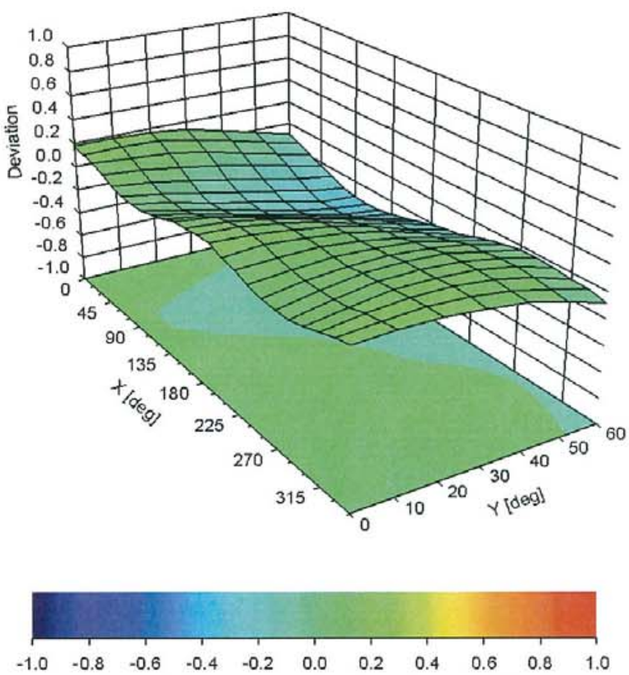
Conversion Factor Assessment





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:3977

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	23.6
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

ANNEX E: D750V3 Dipole Calibration Certificate

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

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TMC-Shanghai (Auden)**

Certificate No: **D750V3-1045_Sep11**

CALIBRATION CERTIFICATE

Object: D750V3 - SN: 1045

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: September 29, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

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

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

Issued: October 3, 2011

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Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.3 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.14 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**8.36 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**5.49 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.6 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.20 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**8.80 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**5.80 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2 Ω - 2.3 jΩ
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.5 Ω - 4.1 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.036 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 02, 2011

DASY5 Validation Report for Head TSL

Date: 29.09.2011

Test Laboratory: SPEAG, Zurich, Switzerland

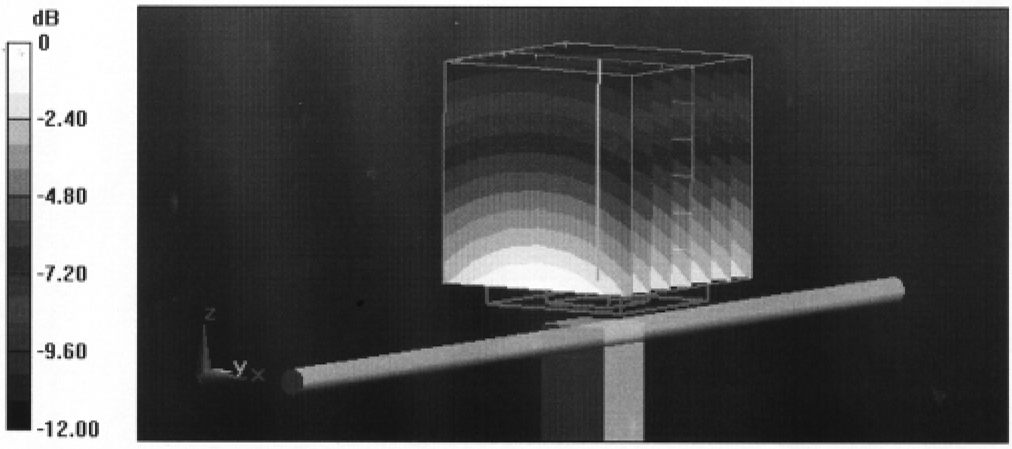
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045

Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.92 mho/m; ε_r = 42.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.33, 6.33, 6.33); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.433 V/m; Power Drift = 0.0062 dB
Peak SAR (extrapolated) = 3.216 W/kg
SAR(1 g) = 2.14 mW/g; SAR(10 g) = 1.4 mW/g
Maximum value of SAR (measured) = 2.501 mW/g



0 dB = 2.500mW/g