TESTING
No. L2264

OET 65

TEST REPORT

Product Name	Tablet PC
Model	60014;2288;
Brand Name	Lenovo
FCC ID	YDUA2105AH
Client	PLANER CHEVAL TECH PTE.LTD

TA Technology (Shanghai) Co., Ltd.

GENERAL SUMMARY

Product Name	Tablet PC	**Model**	60014;2288;
FCC ID	YDUA2105AH	**Report No.**	RXA1205-0171SAR01R3
Client	PLANER CHEVAL TECH PTE.LTD		
Manufacturer	PLANER CHEVAL TECH PTE.LTD		
Reference Standard(s)	**IEEE Std C95.1, 1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields, 3 kHz to 300 GHz. **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. **SUPPLEMENT C Edition 01-01 to OET BULLETIN 65 Edition 97-01 June 2001 including DA 02-1438, published June 2002:** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields Additional Information for Evaluation Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions. **KDB 648474 D01 SAR Handsets Multi Xmiter and Ant, v01r05:** SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas. **KDB 941225 D06 Hot Spot SAR v01** SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities **KDB941225 D01 SAR test for 3G devices v02:** SAR Measurement Procedures CDMA 20001x RTT, 1x Ev-Do, WCDMA, HSDPA/HSPA		
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. General Judgment: **Pass** (Stamp) **Date of issue: May 30th, 2012**		
Comment	The test result only responds to the measured sample.		

Approved by ______________ Revised by ______________ Performed by ______________

Director SAR Manager SAR Engineer

TABLE OF CONTENT

1. General Information

1.1. Notes of the Test Report

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

1.2. Testing Laboratory

Company:	TA Technology (Shanghai) Co., Ltd.
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1.3. Applicant Information

Company:	PLANER CHEVAL TECH PTE.LTD
Address:	No. 10 Anson Road #15-17/18, International Plaza Singapore 079903
City:	/
Postal Code:	/
Country:	Singapore

1.4. Manufacturer Information

Company:	PLANER CHEVAL TECH PTE.LTD
Address:	No. 10 Anson Road #15-17/18, International Plaza Singapore 079903
City:	/
Postal Code:	/

1.5. Information of EUT

General Information

Device Type:	Portable Device		
Exposure Category:	Uncontrolled Environment / General Population		
State of Sample:	Prototype Unit		
Product Name:	Tablet PC		
IMEI:	864853010001201		
Hardware Version:	A2105CU_HW_P1		
Software Version:	A2105CU_A403_002_004_0080_SC		
Antenna Type:	Internal Antenna		
Device Operating Configurations :			
Supporting Mode(s):	GSM 850/GSM 1900 /WCDMA Band V; (tested) WiFi (802.11b/g/n HT20); (tested) GSM 900/GSM 1800/WCDMA Band I/Bluetooth; (untested)		
Test Modulation:	(GSM)GMSK; (WCDMA)QPSK		
Device Class:	B		
HSDPA UE Category:	8		
HSUPA UE Category:	6		
GPRS Multislot Class(10):	Max Number of Timeslots in Uplink		2
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
EGPRS Multislot Class(10):	Max Number of Timeslots in Uplink		2
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
Operating Frequency Range(s):	Mode	Tx (MHz)	Rx (MHz)
	GSM 850	824.2 ~ 848.8	869.2 ~ 893.8
	GSM 1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	WCDMA Band V	826.4 ~ 846.6	871.4 ~ 891.6
Power Class:	GSM 850: 4, tested with power level 5		
	GSM 1900: 1, tested with power level 0		
	WCDMA Band V: 3, tested with power control all up bits		
Test Channel: (Low - Middle - High)	128 - 190 - 251 (GSM 850) (tested) 512 - 661 - 810 (GSM 1900) (tested) 4132 - 4183 - 4233 (WCDMA Band V) (tested) 1 - 6 - 11 (802.11b) (tested)		

Auxiliary Equipment Details

AE:Battery

Model:	H11NT201A
Manufacturer:	Lenovo
S/N:	11S73041910ZZAP723WOFY

Equipment Under Test (EUT) is a Tablet PC. The device has an internal antenna for GSM/WCDMA Tx/Rx, the second is BT/WiFi antenna that can be used for Tx/Rx, and the third is GPS antenna that can be used for Rx. It has Personal Wireless Routers (hot spots) function. The detail about EUT and Lithium Battery is in chapter 1.5 in this report. SAR is tested for GSM 850, GSM 1900, WCDMA Band V and WiFi.

The sample under test was selected by the client.
Components list please refer to documents of the manufacturer.

1.6. The Maximum SAR_{1g} Values

Head SAR Configuration

Mode	Channel	Position	SAR_{1g} (W/kg)
GSM 850	High/251	Left, Cheek	**0.391**
GSM 1900	Low/512	Right, Cheek	**0.288**
WCDMA Band V	High/4233	Left, Cheek	**0.216**
WiFi(802.11b)	High/11	Right, Cheek	**0.396**

Body Worn Configuration

Mode	Channel	Position	Separation distance	SAR_{1g} (W/kg)
2Txslots EGPRS 850	High/251	Back Side	10mm	**1.230**
2Txslots GPRS 1900	Low/512	Back Side	10mm	**0.605**
WCDMA Band V	Low/4132	Back Side	10mm	**0.281**
WiFi(802.11b)	High/11	Front Side	10mm	**0.077**

Hotspot SAR Configuration

Mode	Channel	Position	Separation distance	SAR_{1g} (W/kg)
2Txslots EGPRS 850	High/251	Back Side	10mm	**1.230**
2Txslots GPRS 1900	Low/512	Back Side	10mm	**0.605**
WCDMA Band V	Low/4132	Back Side	10mm	**0.281**
WiFi(802.11b)	High/11	Front Side	10mm	**0.077**

Simultaneous SAR

SAR_{1g}(W/kg) / Test Position	GSM 850	WIFI (802.11b)	MAX. ΣSAR_{1g}
Body, Back Side	1.230	0.069	1.299

1.7. Test Date

The test performed from May 12, 2012 to May 15, 2012.

2. SAR Measurements System Configuration

2.1. SAR Measurement Set-up

The DASY4 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 DASY4 measurement server.
- The DASY4 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
- DASY4 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.

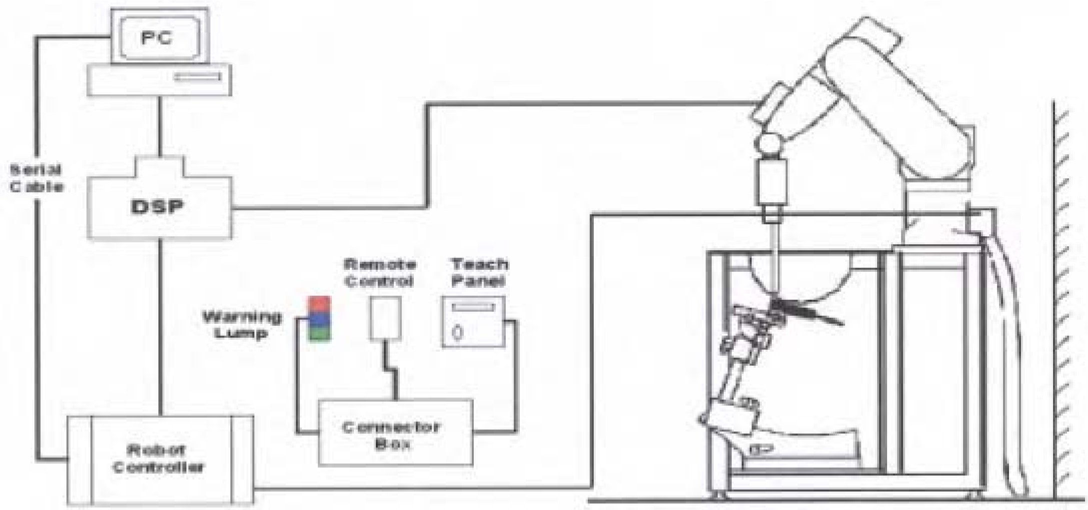

Figure 1 SAR Lab Test Measurement Set-up

2.2. DASY4 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)

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 2.EX3DV4 E-field Probe

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 DASY4 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 DASY4 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 of 15 mm x 15 mm is set. During the 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
  Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 5x5x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

- 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 DASY4 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. For a grid using 5x5x7 measurement points with 8 mm resolution amounting to 175 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 5x5x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

2.5. Data Storage and Evaluation

2.5.1. Data Storage

The DASY4 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 ".DA4". 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 DASY4 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 $\boldsymbol{SAR}$ = local specific absorption rate in mW/g

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

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

ρ = 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.

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

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 1: 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, Sugar, Preventol, Cellulose and Glycol. The liquid has previously been proven to be suited for worst-case. The table 2 and table 3 show the detail solution. It’s satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

Table 2: 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) 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=39.20 σ=1.80

Table 3: 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) 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=52.70 σ=1.95

4.2. Tissue-equivalent Liquid Properties

Table 4: Dielectric Performance of Head Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp ℃
		ε_r	σ(s/m)	
835MHz (head)	Target value ± 5% window	41.50 39.43 — 43.58	0.90 0.86 — 0.95	22.0
	Measurement value 2012-5-12	41.3	0.908	21.5
1900MHz (head)	Target value ±5% window	40.00 38.00 — 42.00	1.40 1.33 — 1.47	22.0
	Measurement value 2012-5-14	40.1	1.39	21.5
2450MHz (head)	Target value ±5% window	39.20 37.24 — 41.16	1.80 1.71 — 1.89	22.0
	Measurement value 2012-5-15	38.3	1.88	21.5

Table 5: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp ℃
		ε_r	σ(s/m)	
835MHz (body)	Target value ±5% window	55.20 52.44 — 57.96	0.97 0.92 — 1.02	22.0
	Measurement value 2012-5-13	54.3	0.986	21.5
1900MHz (body)	Target value ±5% window	53.30 50.64 — 55.97	1.52 1.44 — 1.60	22.0
	Measurement value 2012-5-14	52.0	1.56	21.5
2450MHz (body)	Target value ±5% window	52.70 50.07 — 55.34	1.95 1.85 — 2.05	22.0
	Measurement value 2012-5-15	51.6	1.96	21.5

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 DASY4 system.

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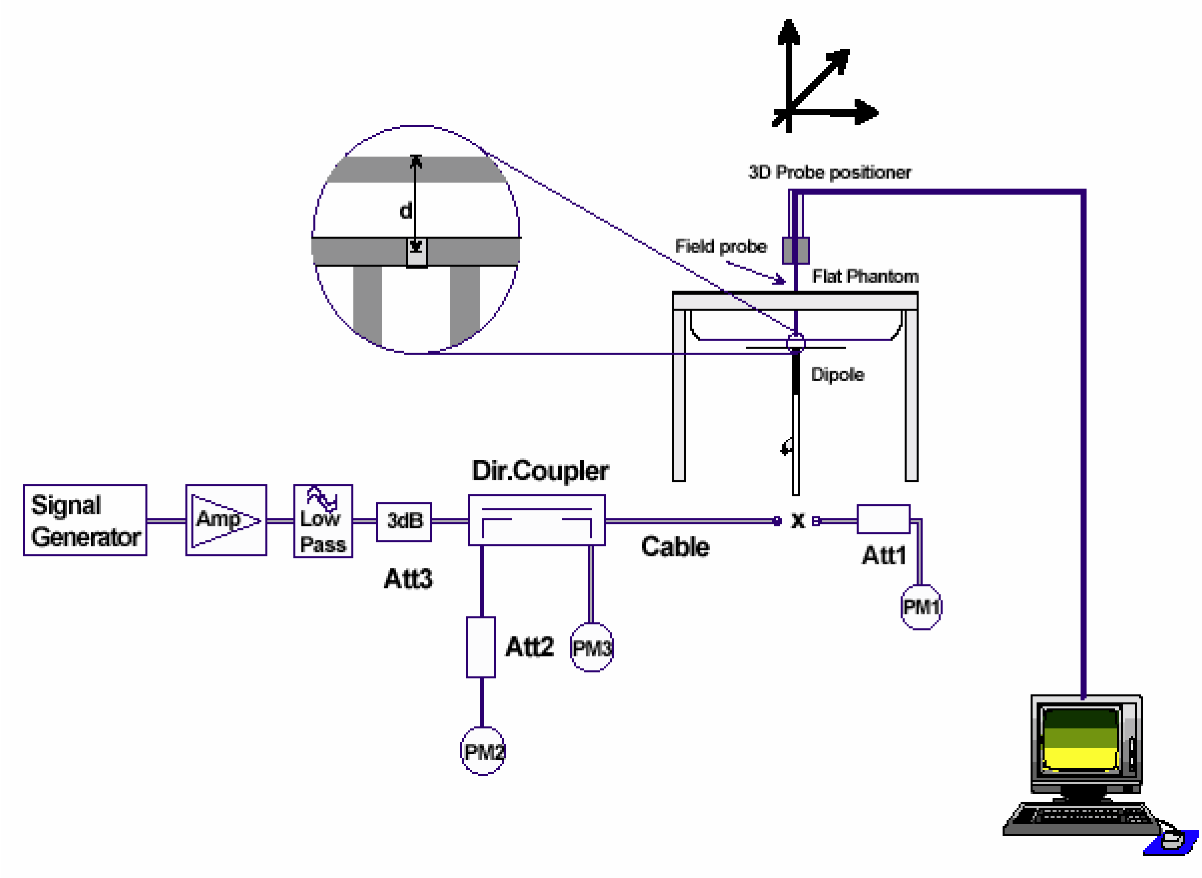


Figure 6 System Check Set-up

5.2. System Check Results

Table 6: System Check in Head Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		Temp	250mW Measured SAR_{1g}	1W Normalized SAR_{1g}	1W Target SAR_{1g} (±10%deviation)
		ε_r	σ(s/m)	(℃)	(W/kg)		
835MHz	2012-5-12	41.3	0.908	21.5	2.50	10.00	9.34 (8.41~10.27)
1900MHz	2012-5-14	40.1	1.39	21.5	9.48	37.92	
2450MHz	2012-5-15	38.3	1.88	21.5	14.70	58.80	53.80 (48.42~ 59.18)

Note：1. The graph results see ANNEX B.
2. Target Values derive from the calibration certificate

Table 7: System Check in Body Tissue Simulating Liquid

Frequency	Test Date	Dielectric Parameters		Temp	250mW Measured SAR_{1g}	1W Normalized SAR_{1g}	1W Target SAR_{1g} (±10% deviation)
		ε_r	σ(s/m)	(℃)	(W/kg)		
835MHz	2012-5-13	54.3	0.986	21.5	2.41	9.64	9.46 (8.51~10.41)
1900MHz	2012-5-14	52.0	1.56	21.5	10.80	43.2	41.70 (37.53~45.87)
2450MHz	2012-5-15	51.6	1.96	21.5	13.2	52.8	51.70 (46.53~56.87)

Note：1. The graph results see ANNEX B.
2. Target Values 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 Absolute Radiofrequency Channel Number (ARFCN) is allocated to 128, 190 and 251 in the case of GSM 850, to 512, 661 and 810 in the case of GSM 1900, to 4132, 4183 and 4233 in the case of WCDMA Band V. The EUT is commanded to operate at maximum transmitting power.

Connection to the EUT is established via air interface with E5515C, and the EUT is set to maximum output power by E5515C. The EUT battery must be fully charged and checked periodically during the test to ascertain 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. Devices with a headset output should be tested with a headset connected to the device.

Based upon KDB941225 D06 V01, when the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested. The distance between the device and the phantom was kept 10mm of wireless routers.

6.3. Test Configuration

6.3.1. 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 lever is set to “5” for GSM 850, set to “0” for GSM 1900. Since the GPRS class is 10 for this EUT, it has at most 2 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5; the EGPRS class is 10 for this EUT, it has at most 2 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:

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

6.3.2. WCDMA Test Configuration

6.3.2.1. Output power Verification

Maximum output power is verified on the High, Middle and Low channel according to the 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 up bits for WCDMA/HSDPA or applying the required inner loop power control procedures to the maximum output power while HSUPA is active. Results for all applicable physical channel configuration (DPCCH, $DPDCH_n$ and spreading codes, HSDPA, HSPA) should be tabulated in the SAR report. All configuration that are not supported by the DUT or can not be measured due to technical or equipment limitations should be clearly identified

6.3.2.2. Head SAR Measurements

SAR for head exposure configurations in voice mode is measured using a 12.2kbps RMC with TPC bits configured to all up bits. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2kbps AMR is less than 1/4 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2kbps AMR with a 3.4 kbps SRB(Signaling radio bearer) using the exposure configuration that results in the highest SAR in 12.2kbps RMC for that RF channel.

6.3.2.3. Body SAR Measurements

SAR for body exposure configurations in voice and data modes is measured using 12.2kbps RMC with TPC bits configured to all up bits. SAR for other spreading codes and multiple $DPDCH_n$, when supported by the DUT, are not required when the maximum average output of each RF channel, for each spreading code and $DPDCH_n$ configuration, are less than 1/4 dB higher than those measured in 12.2kbps RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or $DPDCH_n$ using the exposure configuration that results in the highest SAR with 12.2 kbps RMC. When more than 2 $DPDCH_n$ are supported by the DUT, it may be necessary to configure additional $DPDCH_n$ for a DUT using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

6.3.3. HSDPA Test Configuration

SAR for body exposure configurations is measured according to the 'Body SAR Measurements' procedures of that section. In addition,body SAR is also measured for HSDPA when the maximum average output of each RF channel with HSDPA active is at least ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit.30 Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.

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.32 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: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$= 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$=30/15 ⇔ β_{hs}=30/15*β_c							
Note2:For the HS-DPCCH power mask requirement test in clause 5.2C,5.7A,and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, $\triangle_{ACK}$ and $\triangle_{NACK}$= 8 (A_{hs}=30/15) with β_{hs}=30/15*β_c,and $\triangle_{CQI}$=							

7 (A_{hs}=24/15) with β_{hs}=24/15*β_c.

Note3: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: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.

Table 10: Settings of required H-Set 1 QPSK in HSDPA mode

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	534
Inter-TTI Distance	TTI's	3
Number of HARQ Processes	Processes	2
Information Bit Payload (N_{INF})	Bits	3202
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	4800
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	9600
Coding Rate	/	0.67
Number of Physical Channel Codes	Codes	5
Modulation	/	QPSK

Table 11: HSDPA UE category

HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	Maximum Transport Bits/HS-DSCH	Total Channel
1	5	3	7298	19200
2	5	3	7298	28800
3	5	2	7298	28800
4	5	2	7298	38400
5	5	1	7298	57600
6	5	1	7298	67200
7	10	1	14411	115200
8	10	1	14411	134400
9	15	1	25251	172800
10	15	1	27952	172800
11	5	2	3630	14400
12	5	1	3630	28800
13	15	1	34800	259200
14	15	1	42196	259200
15	15	1	23370	345600
16	15	1	27952	345600

6.3.4. HSUPA Test Configuration

Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA.[40]

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests.[41] The 12.2 kbps RMC, FRC H-set 1 and E- DCH configurations for HSPA should be configured according to the β values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of 3 G device.

Table 12：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 13: 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)

6.3.5. WIFI Test Configuration

For WLAN SAR testing, WLAN engineering testing software installed on the DUT can provide continuous transmitting RF signal. This RF signal utilized in SAR measurement has almost 100% duty cycle and its crest factor is 1.

For the 802.11b/g SAR tests, a communication link is set up with the test mode software for WIFI mode test. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1, 6 and 11 respectively in the case of 2450 MHz. 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 operating modes are tested independently according to the service requirements in each frequency band.802.11b/g modes are tested on channels1,6,11; however, if output power reduction is necessary for channels 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels must be tested instead.

SAR is not required for 802.11g channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels. When the maximum average output channel in each frequency band is not included in the "default test channels", the maximum channel should be tested instead of an adjacent "default test channels", these are referred to as the "required test channels" and are illustrated in table 14.

Table 14: "Default Test Channels"

<table>
<tr><th rowspan="3">Mode</th><th rowspan="3">GHz</th><th rowspan="3">Channel</th><th rowspan="3">Turbo Channel</th><th colspan="4">"Default Test Channels"</th></tr>
<tr><th colspan="2">15.247</th><th colspan="2" rowspan="2">UNII</th></tr>
<tr><th>802.11b</th><th>802.11g</th></tr>
<tr><td rowspan="3">802.11b/g</td><td>2.412</td><td>1#</td><td></td><td>√</td><td>*</td><td></td><td></td></tr>
<tr><td>2.437</td><td>6</td><td>6</td><td>√</td><td>*</td><td></td><td></td></tr>
<tr><td>2.462</td><td>11#</td><td></td><td>√</td><td>*</td><td></td><td></td></tr>
<tr><td colspan="8">Note: #=when output power is reduced for channel 1 and /or 11to meet restricted band requirements the highest out put channels closet to each of these channels should be tested.
√= "default test channels"
* =possible 802.11g channels with maximum average output 0.25dB>=the "default test channels</td></tr>
</table>

"

7. Test Results

7.1. Conducted Power Results

Table 15: Conducted Power Measurement Results

GSM 850		Burst Conducted Power(dBm)				Average power(dBm)		
		Channel 128	Channel 190	Channel 251		Channel 128	Channel 190	Channel 251
GSM		32.27	32.45	32.48	-9.03dB	23.24	23.42	23.45
GPRS (GMSK)	1Txslot	32.25	32.42	32.45	-9.03dB	23.22	23.39	23.42
	2Txslots	32.19	32.38	32.39	-6.02dB	**26.17**	**26.36**	**26.37**
EGPRS (GMSK)	1Txslot	32.24	32.4	32.42	-9.03dB	23.21	23.37	23.39
	2Txslots	32.17	32.35	32.35	-6.02dB	**26.15**	**26.33**	**26.33**
GSM 1900		**Burst Conducted Power(dBm)**				**Average power(dBm)**		
		Channel 512	Channel 661	Channel 810		Channel 512	Channel 661	Channel 810
GSM		30.55	30.28	30	-9.03dB	21.52	21.25	20.97
GPRS (GMSK)	1Txslot	30.54	30.25	29.98	-9.03dB	21.51	21.22	20.95
	2Txslots	30.47	30.21	29.94	-6.02dB	**24.45**	**24.19**	**23.92**
EGPRS (GMSK)	1Txslot	30.52	30.23	29.96	-9.03dB	21.49	21.2	20.93
	2Txslots	30.45	30.2	29.91	-6.02dB	**24.43**	**24.18**	**23.89**

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
2) Average power numbers
The maximum power numbers are marks in bold.

WCDMA Band V		Conducted Power (dBm)		
		Channel 4132	Channel 4183	Channel 4233
RMC	12.2kbps RMC	22.35	22.53	22.41
	64kbps RMC	22.33	22.5	22.4
	144kbps RMC	22.31	22.48	22.38
	384kbps RMC	22.32	22.46	22.36
HSDPA	Sub - Test 1	22.23	22.48	22.35
	Sub - Test 2	22.22	22.47	22.33
	Sub - Test 3	21.68	21.92	21.79
	Sub - Test 4	21.78	22	21.9
HSUPA	Sub - Test 1	20.95	21.13	21.02
	Sub - Test 2	20.3	20.34	20.31
	Sub - Test 3	20.57	20.76	20.64
	Sub - Test 4	20.26	20.38	20.36
	Sub - Test 5	20.99	21.16	21.03

7.2. SAR Test Results

7.2.1. GSM 850 (GPRS/EGPRS)

Table 16: SAR Values [GSM 850 (GPRS/EGPRS)]

Limit of SAR		10 g Average	1 g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Different Test Position	Channel	Measurement Result(W/kg)		Power Drift (dB)	
		10 g Average	1 g Average		
Test Position of Head					
Left hand, Touch Cheek	High/251	0.306	0.391	0.048	Figure 13
	Middle/190	0.195	0.249	-0.096	Figure 14
	Low/128	0.106	0.135	0.135	Figure 15
Left hand, Tilt 15 Degree	Middle/190	0.110	0.138	0.064	Figure 16
Right hand, Touch Cheek	Middle/190	0.189	0.241	-0.023	Figure 17
Right hand, Tilt 15 Degree	Middle/190	0.098	0.124	0.151	Figure 18
Test position of Body (Distance 10mm)					
Back Side(2Txslots)	High/251	0.942	1.220	0.024	Figure 19
	Middle/190	0.688	0.885	-0.016	Figure 20
	Low/128	0.441	0.572	-0.063	Figure 21
Front Side(2Txslots)	High/251	0.561	0.752	0.006	Figure 22
Left Edge(2Txslots)	High/251	0.325	0.482	0.008	Figure 23
Right Edge(2Txslots)	High/251	0.397	0.576	0.041	Figure 24
Top Edge(2Txslots)	N/A	N/A	N/A	N/A	N/A
Bottom Edge(2Txslots)	High/251	0.091	0.142	0.032	Figure 25
Worst Case Position of Body with Earphone (Distance 10mm)					
Back Side(GSM)	High/251	0.649(max.cube)	0.926(max.cube)	-0.004	Figure 26
Worst Case Position of Body with EGPRS (GMSK, Distance 10mm)					
Back Side(2Txslots)	High/251	0.947	1.230	-0.044	Figure 27

Note: 1.The value with blue color is the maximum SAR Value of each test band.
2. High, middle and low channel were measured at the worst position.
3. The Body SAR test firstly shall be performed at the maximum source-based time-averaged output power channel of each operating mode. If the SAR measured is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the other channels is optional.
4. WWAN antenna is located at bottom edge; antenna-to-top edge distance is more than 2.5 cm (see ANNEX I). Based upon KDB941225 D06, when the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
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.
6. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which was within 2.0dB of the highest peak. The value of the highest cube is given in the table above; the value from the second assessed cube is given in the SAR distribution plots (See ANNEX C).

7.2.2. GSM 1900 (GPRS/EGPRS)

Table 17: SAR Values [GSM 1900(GPRS/EGPRS)]

Limit of SAR		10 g Average	1 g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Different Test Position	Channel	Measurement Result(W/kg)		Power Drift (dB)	
		10 g Average	1 g Average		
Test Position of Head					
Left hand, Touch Cheek	Middle/661	0.091	0.141	0.097	Figure 28
Left hand, Tilt 15 Degree	Middle/661	0.031	0.051	0.073	Figure 29
Right hand, Touch Cheek	High/810	0.149	0.234	-0.010	Figure 30
	Middle/661	0.173	0.269	-0.099	Figure 31
	Low/512	0.186	0.288	0.008	Figure 32
Right hand, Tilt 15 Degree	Middle/661	0.062	0.100	0.015	Figure 33
Test position of Body (Distance 10mm)					
Back Side(2Txslots)	High/810	0.232	0.369	-0.004	Figure 34
	Middle/661	0.331(max.cube)	0.507(max.cube)	0.009	Figure 35
	Low/512	0.395(max.cube)	0.605(max.cube)	0.025	Figure 36
Front Side(2Txslots)	Low/512	0.270	0.442	0.164	Figure 37
Left Edge(2Txslots)	Low/512	0.122	0.200	0.040	Figure 38
Right Edge(2Txslots)	Low/512	0.351	0.577	0.047	Figure 39
Top Edge(2Txslots)	N/A	N/A	N/A	N/A	N/A
Bottom Edge(2Txslots)	Low/512	0.265	0.439	0.023	Figure 40
Worst Case Position of Body with Earphone (Distance 10mm)					
Back Side(GSM)	Low/512	0.187	0.284	0.060	Figure 41
Worst Case Position of Body with EGPRS (GMSK, Distance 10mm)					
Back Side(2Txslots)	Low/512	0.381(max.cube)	0.575(max.cube)	0.011	Figure 42

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

2. High, middle and low channel were measured at the worst position.
3. The Body SAR test firstly shall be performed at the maximum source-based time-averaged output power channel of each operating mode. If the SAR measured is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the other channels is optional.
4. WWAN antenna is located at bottom edge; antenna-to-top edge distance is more than 2.5 cm (see ANNEX I). Based upon KDB941225 D06, when the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
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.
6. The (max.cube) labeling indicates that during the grid scanning an additional peak was found which was within 2.0dB of the highest peak. The value of the highest cube is given in the table above; the value from the second assessed cube is given in the SAR distribution plots (See ANNEX C).

7.2.3. WCDMA Band V (WCDMA/HSDPA/HSUPA)

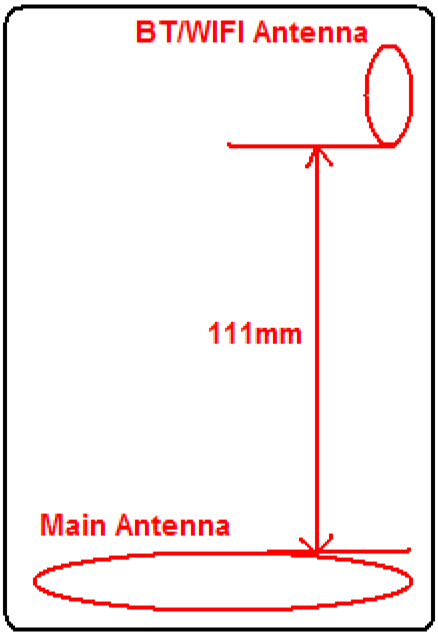
Table 18: SAR Values [WCDMA Band V (WCDMA/HSDPA/HSUPA)]

Limit of SAR		10 g Average	1 g Average	Power Drift	Graph Results
		2.0 W/kg	1.6 W/kg	± 0.21 dB	
Different Test Position	Channel	Measurement Result(W/kg)		Power Drift (dB)	
		10 g Average	1 g Average		
Test Position of Head					
Left Hand, Touch Cheek	High/4233	0.169	0.216	0.016	Figure 43
	Middle/4183	0.132	0.170	0.130	Figure 44
	Low/4132	0.124	0.157	0.065	Figure 45
Left Hand, Tilt 15 Degree	Middle/4183	0.064	0.080	0.018	Figure 46
Right Hand, Touch Cheek	Middle/4183	0.129	0.163	0.194	Figure 47
Right Hand, Tilt 15 Degree	Middle/4183	0.070	0.089	0.081	Figure 48
Test position of Body (Distance 10mm)					
Back Side	High/4233	0.168	0.250	-0.017	Figure 49
	Middle/4183	0.205	0.264	0.038	Figure 50
	Low/4132	0.218	0.281	0.021	Figure 51
Front Side	Middle/4183	0.143	0.184	0.039	Figure 52
Left Edge	Middle/4183	0.104	0.151	0.109	Figure 53
Right Edge	Middle/4183	0.101	0.145	-0.033	Figure 54
Top Edge	N/A	N/A	N/A	N/A	N/A
Bottom Edge	Middle/4183	0.051	0.098	-0.024	Figure 55
Worst Case Position of Body with Earphone (Distance 10mm)					
Back Side	Low/4132	0.213	0.275	0.060	Figure 56

Note: 1.The value with blue color is the maximum SAR Value of each test band.
2. High, middle and low channel were measured at the worst position.
3.The Body SAR test firstly shall be performed at the highest output power channel of each operating mode. If the SAR measured is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the other channels is optional.
4. WWAN antenna is located at bottom edge; antenna-to-top edge distance is more than 2.5 cm (see ANNEX I). Based upon KDB941225 D06, when the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
5. WCDMA mode were tested under RMC 12.2kbps with HSPA (HSDPA/HSUPA) inactive per KDB Publication 941225 D01. HSPA (HSDPA/HSUPA) SAR for body was not required since the average output power of the HSPA (HSDPA/HSUPA) subtests was not more than 0.25 dB higher than the RMC level and the maximum SAR for 12.2kbps RMC was less than 75% SAR limit.

7.2.4. Bluetooth/WiFi Function

The distance between BT/WIFI antenna and GSM/WCDMA antenna is ＞5cm. The location of the antennas inside EUT is shown in Annex I:



The output power of BT antenna is as following:

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz
Average Conducted Output Power(dBm)	3.01	2.98	2.94

The output power of WIFI antenna is as following:

Mode	Channel	Data rate (Mbps)	AV Power (dBm)	PK Power (dBm)
11b	1	1	14.05	16.53
		2	14.02	16.45
		5.5	14.01	16.42
		11	13.94	16.40
	6	1	14.07	16.5
		2	14.05	16.42
		5.5	14.02	16.40
		11	13.97	16.38
	11	1	14.45	16.85

		2	14.35	16.78
		5.5	14.32	16.75
		11	14.30	16.73
11g	1	6	11.80	20.74
		9	11.78	20.72
		12	11.75	20.70
		18	11.72	20.51
		24	11.71	20.49
		36	11.70	20.48
		48	11.68	20.45
		54	11.66	20.38
	6	6	11.89	20.50
		9	11.86	20.20
		12	11.83	19.98
		18	11.80	19.95
		24	11.79	19.92
		36	11.76	19.90
		48	11.74	19.85
		54	11.72	19.84
	11	6	12.18	20.74
		9	12.16	20.72
		12	12.13	20.69
		18	12.10	20.65
		24	12.08	20.62
		36	12.06	20.60
		48	12.04	20.57
		54	12.02	20.55
11n HT20	1	MCS0	8.36	18.03
		MCS1	8.34	18.01
		MCS2	8.33	18.00
		MCS3	8.31	17.98
		MCS4	8.30	17.97
		MCS5	8.28	17.95
		MCS6	8.25	17.94

		MCS7	8.24	17.93
	6	MCS0	8.42	17.95
		MCS1	8.40	17.94
		MCS2	8.38	17.92
		MCS3	8.36	17.91
		MCS4	8.34	17.90
		MCS5	8.34	17.86
		MCS6	8.32	17.85
		MCS7	8.30	17.82
	11	MCS0	8.37	17.85
		MCS1	8.35	17.83
		MCS2	8.34	17.81
		MCS3	8.33	17.80
		MCS4	8.32	17.79
		MCS5	8.31	17.77
		MCS6	8.30	17.74
		MCS7	8.28	17.72
Note: 1. KDB 248227-SAR is not required for 802.11g/n HT20 channels when the maximum average output power is less than ¼ dB higher than measured on the corresponding 802.11b channels.				

Output Power Thresholds for Unlicensed Transmitters

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

Stand-alone SAR

According to the output power measurement result and the distance between BT/WIFI antenna and GSM/WCDMA antenna we can draw the conclusion that:

Stand-alone SAR are required for WIFI, because WIFI antenna is ＞5cm from other antennas and the output power of WIFI transmitter is ＞$2P_{Ref}$ =13.8dBm

Table 19: SAR Values (802.11b)

Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.21	
Different Test Position	Channel	Measurement Result(W/kg) 10 g Average	Measurement Result(W/kg) 1g Average	Power Drift (dB)	
Test Position of Head					
Left hand, Touch cheek	High/11	0.058	0.109	0.150	Figure 57
Left hand, Tilt 15 Degree	High/11	0.055	0.111	0.144	Figure 58
Right hand, Touch cheek	High/11	0.177	0.396	0.104	Figure 59
Right hand, Tilt 15 Degree	High/11	0.133	0.274	0.175	Figure 60
Test position of Body (Distance 10mm)					
Back Side	High/11	0.035	0.069	0.035	Figure 61
Front Side	High/11	0.040	0.077	0.014	Figure 62
Left Edge	High/11	0.024	0.050	0.077	Figure 63
Right Edge	N/A	N/A	N/A	N/A	N/A
Top Edge	High/11	0.038	0.076	-0.063	Figure 64
Bottom Edge	N/A	N/A	N/A	N/A	N/A

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

2. The SAR test shall be performed at the highest output power channel of each operating mode. If the SAR measured is at least 3.0 dB lower than the SAR limit (< 0.8W/kg), testing at the other channels is optional.

3. WLAN antenna is located at Left edge; antenna-to-Bottom/Right edge distance is more than 2.5 cm (see ANNEX I). Based upon KDB941225 D06, when the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.

4. KDB 248227-SAR is not required for 802.11g/n HT20 channels when the maximum average output power is less than ¼ dB higher than measured on the corresponding 802.11b channels.

BT antenna is ＞5cm from GSM/WCDMA antenna, stand-alone SAR are not required for BT, because the output power of BT transmitter is ≤$2P_{Ref}$=13.8dBm.
BT antenna is ＜2.5cm from WIFI antenna, stand-alone SAR are not required for BT, because $SAR_{MAX.WIFI}$ ≤1.2W/Kg.

Simultaneous SAR

About WIFI and GSM/WCDMA Antenna,

SAR_{1g}(W/kg) Test Position	GSM850	GSM1900	WCDMA Band V	WIFI (802.11b)	MAX. ΣSAR_{1g}
Left hand, Touch cheek	**0.391**	0.141	0.216	0.109	0.500
Left hand, Tilt 15 Degree	**0.138**	0.051	0.080	0.111	0.249
Right hand, Touch cheek	0.241	0.288	0.163	0.396	0.985
Right hand, Tilt 15 Degree	**0.124**	0.100	0.089	0.274	0.398
Body, Back Side	**1.230**	0.605	0.281	0.069	1.299
Body, Front Side	**0.752**	0.442	0.184	0.077	0.829
Body, Left Edge	**0.482**	0.200	0.151	0.050	0.532
Body, Right Edge	0.576	**0.577**	0.145	N/A	0.577
Body, Top Edge	N/A	N/A	N/A	0.076	0.076
Body, Bottom Edge	0.142	**0.439**	0.098	N/A	0.439

WIFI antenna is ＞5cm from GSM/WCDMA Antenna. (GSM/WCDMA Antenna SAR_{MAX})1.230 +(WIFI Antenna SAR_{MAX})0.069 =1.299 ＜1.6, So the Simultaneous SAR are not required for WIFI and GSM/WCDMA antenna.

About BT and GSM/WCDMA Antenna,

SAR_{1g}(W/kg) Test Position	GSM850	GSM1900	WCDMA Band V	BT	MAX. ΣSAR_{1g}
Left hand, Touch cheek	**0.391**	0.141	0.216	0	0.391
Left hand, Tilt 15 Degree	**0.138**	0.051	0.080	0	0.138
Right hand, Touch cheek	0.241	0.288	0.163	0	0.589
Right hand, Tilt 15 Degree	**0.124**	0.100	0.089	0	0.124
Body, Back Side	**1.230**	0.605	0.281	0	1.230
Body, Front Side	**0.752**	0.442	0.184	0	0.752
Body, Left Edge	**0.482**	0.200	0.151	0	0.482
Body, Right Edge	0.576	**0.577**	0.145	0	0.577
Body, Top Edge	N/A	N/A	N/A	0	0
Body, Bottom Edge	0.142	**0.439**	0.098	0	0.439

BT antenna is ＞5cm from GSM/WCDMA Antenna. (GSM/WCDMA Antenna SAR_{MAX})1.230 +(BT Antenna SAR_{MAX})0 =1.230 ＜1.6, So the Simultaneous SAR are not required for BT and GSM/WCDMA antenna.

About BT and WIFI Antenna, BT antenna is ＜2.5cm from WIFI Antenna. (WIFI Antenna SAR_{MAX})0.396 +(BT Antenna SAR_{MAX})0 =0.396 ＜1.6, So the Simultaneous SAR are not required for BT and WIFI antenna.

8. Measurement Uncertainty

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard ncertainty $u_i^{'}$ (%)	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	∞
6	-boundary effect	B	1.9	R	$\sqrt{3}$	1	1.1	∞
7	-probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
8	- System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	-readout Electronics	B	1.0	N	1	1	1.0	∞
10	-response time	B	0	R	$\sqrt{3}$	1	0	∞
11	-integration time	B	4.32	R	$\sqrt{3}$	1	2.5	∞
12	-noise	B	0	R	$\sqrt{3}$	1	0	∞
13	-RF Ambient Conditions	B	3	R	$\sqrt{3}$	1	1.73	∞
14	-Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
15	-Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
16	-Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
				Test sample Related				
17	-Test Sample Positioning	A	2.9	N	1	1	2.9	71
18	-Device Holder Uncertainty	A	4.1	N	1	1	4.1	5
19	-Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
				Physical parameter				
20	-phantom	B	4.0	R	$\sqrt{3}$	1	2.3	∞

21	-liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.64	1.8	∞
22	-liquid conductivity (measurement uncertainty)	B	2.5	N	1	0.64	1.6	9
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
24	-liquid permittivity (measurement uncertainty)	B	2.5	N	1	0.6	1.5	9
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					12.16	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		23.00	

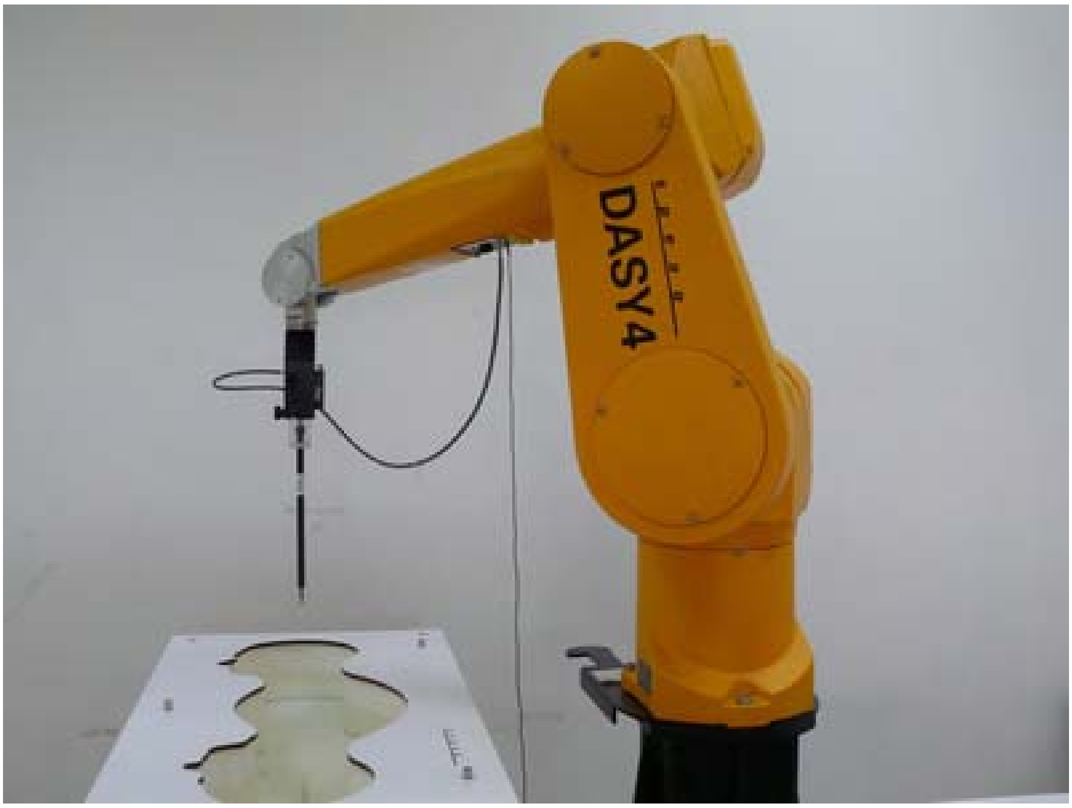
9. Main Test Instruments

Table 20: List of Main Instruments

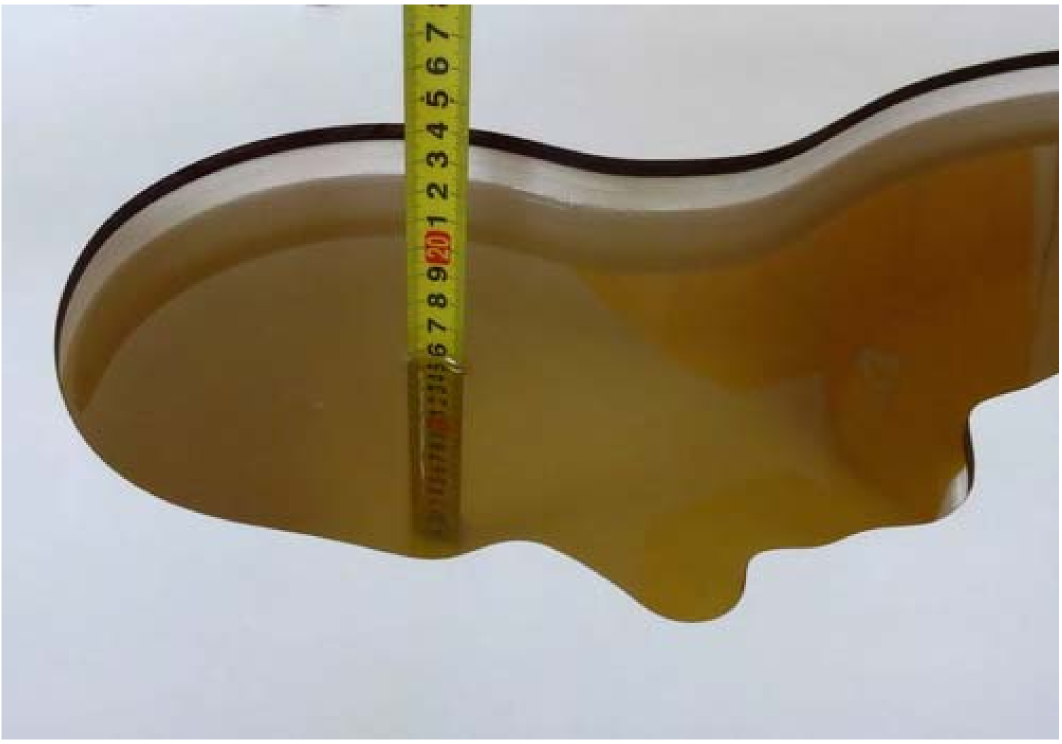
No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 12, 2011	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 11, 2012	One year
04	Power sensor	Agilent N8481H	MY50350004	September 25, 2011	One year
05	Power sensor	E9327A	US40441622	September 24, 2011	One year
06	Signal Generator	HP 8341B	2730A00804	September 12, 2011	One year
07	Dual directional coupler	778D-012	50519	March 26, 2012	One year
08	Dual directional coupler	777D	50146	March 26, 2012	One year
09	Amplifier	IXA-020	0401	No Calibration Requested	
10	BTS	E5515C	MY48360988	December 2, 2011	One year
11	E-field Probe	EX3DV4	3816	October 3, 2011	One year
12	DAE	DAE4	1317	January 23, 2012	One year
13	Validation Kit 835MHz	D835V2	4d020	August 26, 2011	One year
14	Validation Kit 1900MHz	D1900V2	5d060	August 31, 2011	One year
15	Validation Kit 2450MHz	D2450V2	786	August 29, 2011	One year
16	Temperature Probe	JM222	AA1009129	March 15, 2012	One year
17	Hygrothermograph	WS-1	64591	September 28, 2011	One year

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

ANNEX A: Test Layout



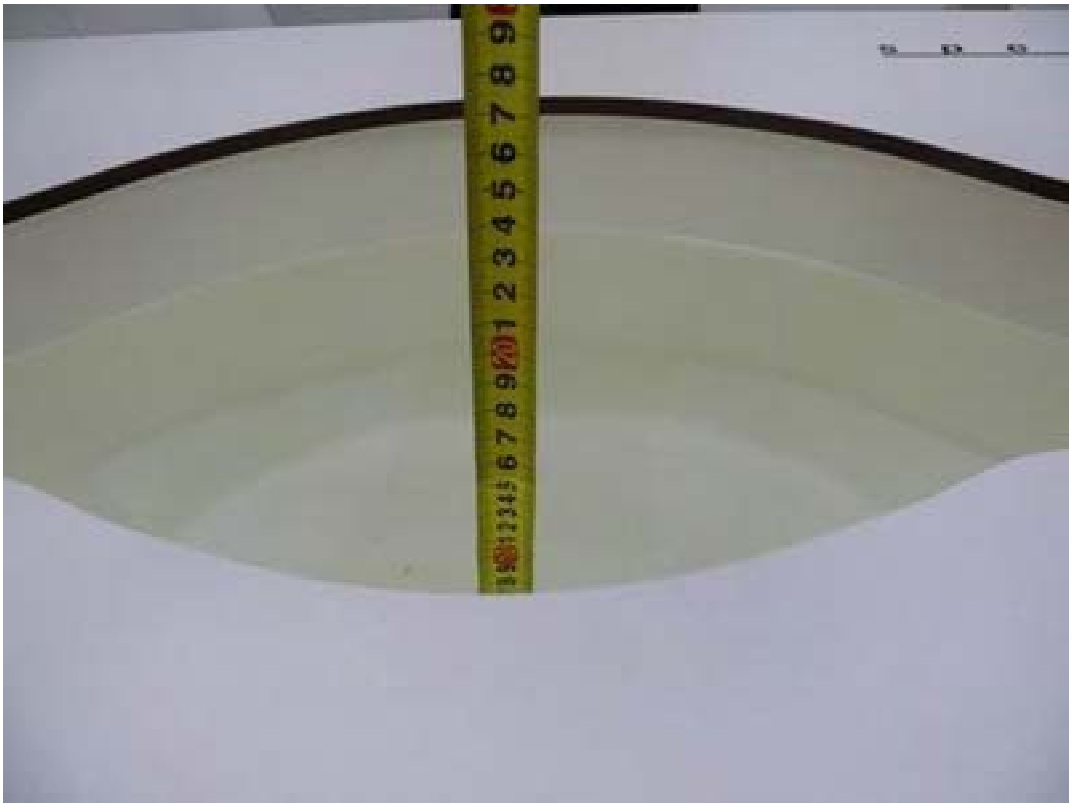
Picture 1: Specific Absorption Rate Test Layout



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

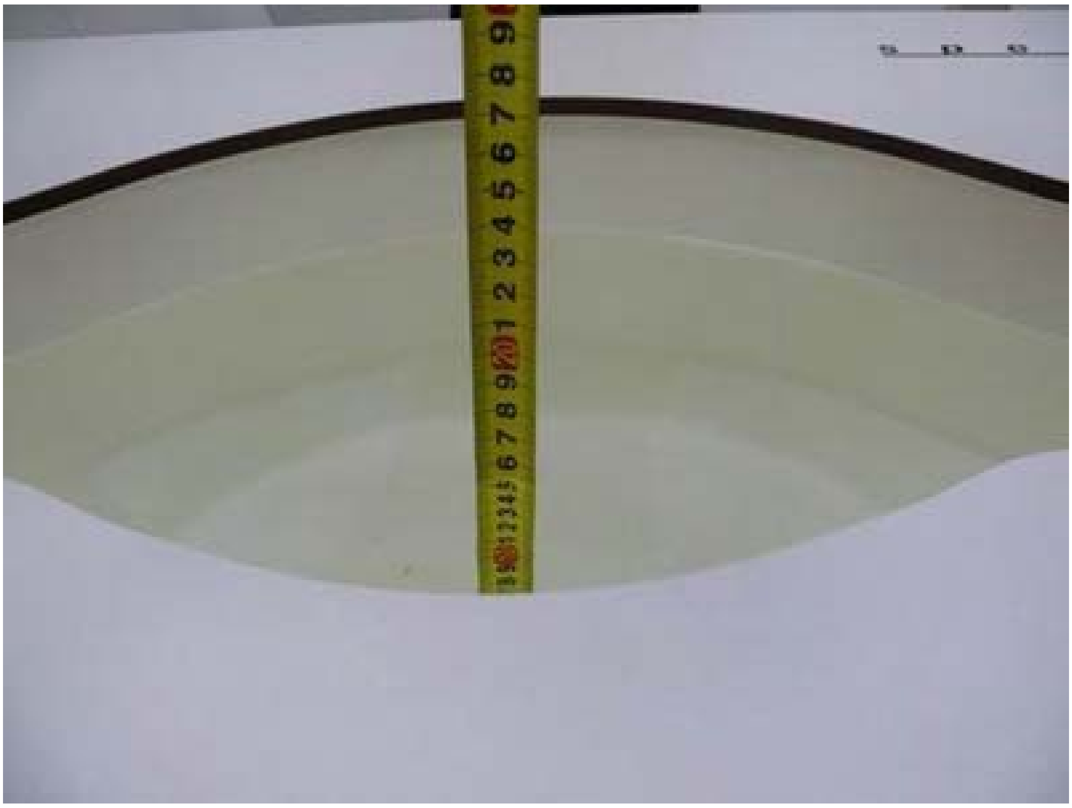
Picture 3: Liquid depth in the flat Phantom (835MHz, 15.4cm depth)

Picture 4: liquid depth in the head Phantom (1900 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 (2450 MHz, 15.4cm depth)



Picture 7: Liquid depth in the flat Phantom (2450 MHz, 15.3cm 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/Time: 5/12/2012 3:35:55 PM

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

Medium parameters used: f = 835 MHz; σ = 0.908 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (interpolated) = 2.74 mW/g

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

Reference Value = 54.6 V/m; Power Drift = -0.049 dB

Peak SAR (extrapolated) = 3.75 W/kg

SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.65 mW/g

Maximum value of SAR (measured) = 2.69 mW/g

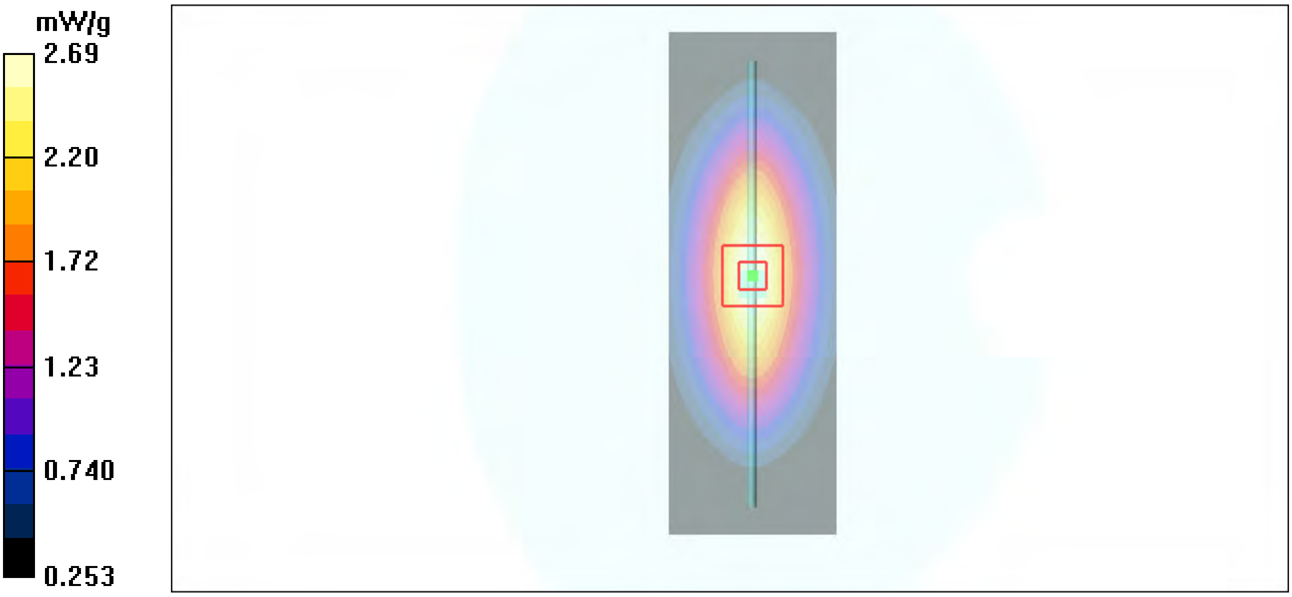


Figure 7 System Performance Check 835MHz 250mW

System Performance Check at 835 MHz Body TSL

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

Date/Time: 5/13/2012 10:10:55 AM

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

Medium parameters used: f = 835 MHz; σ = 0.986 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.38, 9.38, 9.38); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (interpolated) = 2.69 mW/g

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

Reference Value = 52.7 V/m; Power Drift = -0.026 dB

Peak SAR (extrapolated) = 3.59 W/kg

SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.59 mW/g

Maximum value of SAR (measured) = 2.59 mW/g

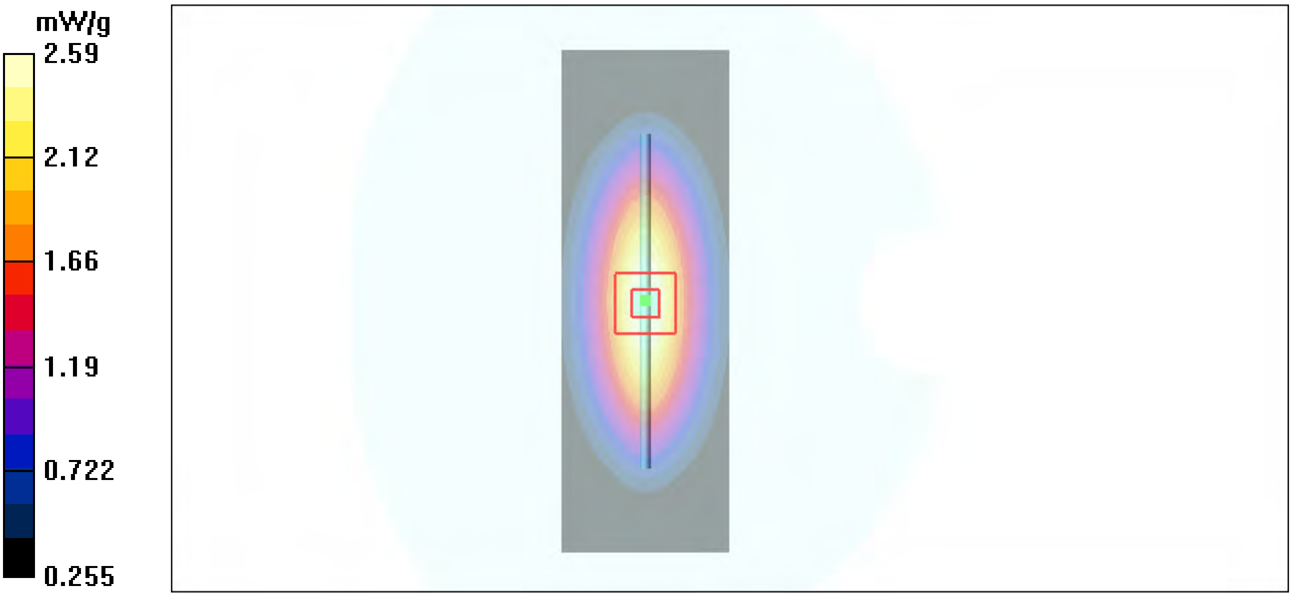


Figure 8 System Performance Check 835MHz 250mW

System Performance Check at 1900 MHz Head TSL

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

Date/Time: 5/14/2012 11:40:06 AM

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

Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; ε_r = 40.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.9, 7.9, 7.9); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: SAM000 T01; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

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 = 86.5 V/m; Power Drift = -0.086 dB

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 9.48 mW/g; SAR(10 g) = 4.94 mW/g

Maximum value of SAR (measured) = 10.4 mW/g

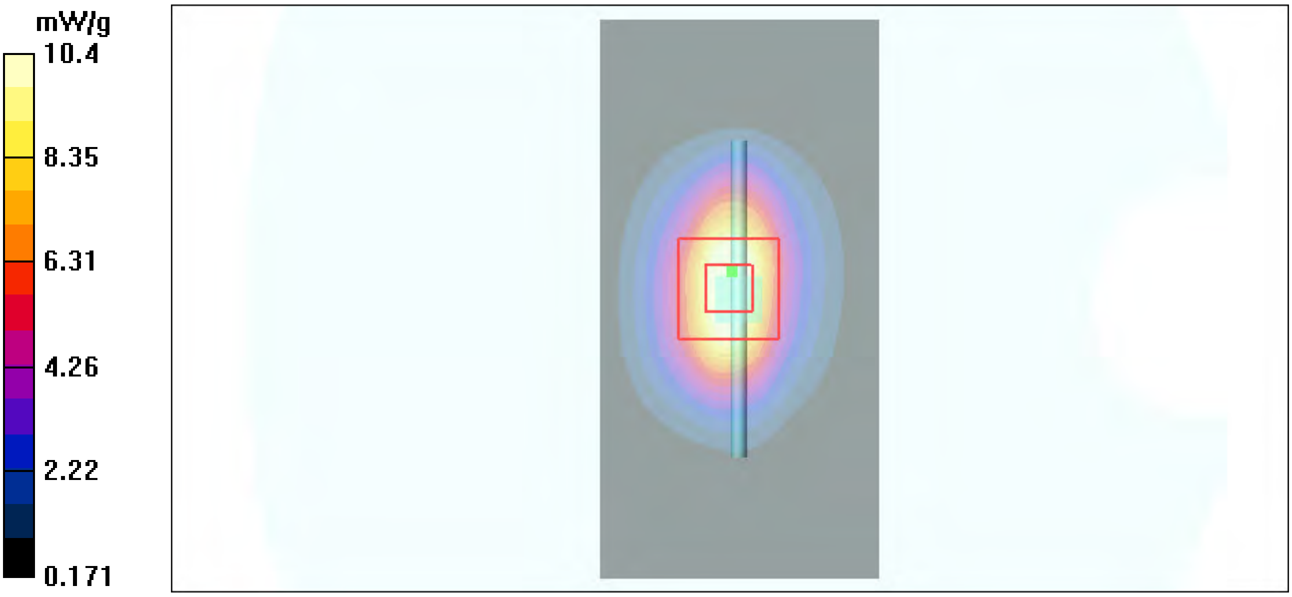


Figure 9 System Performance Check 1900MHz 250mW

System Performance Check at 1900 MHz Body TSL

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

Date/Time: 5/14/2012 9:55:17 PM

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

Medium parameters used: f = 1900 MHz; σ = 1.56 mho/m; ε_r = 52; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.51, 7.51, 7.51); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: SAM000 T01; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (41x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.1 mW/g

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

Reference Value = 87.8 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 19.7 W/kg

SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.61 mW/g

Maximum value of SAR (measured) = 12.1 mW/g

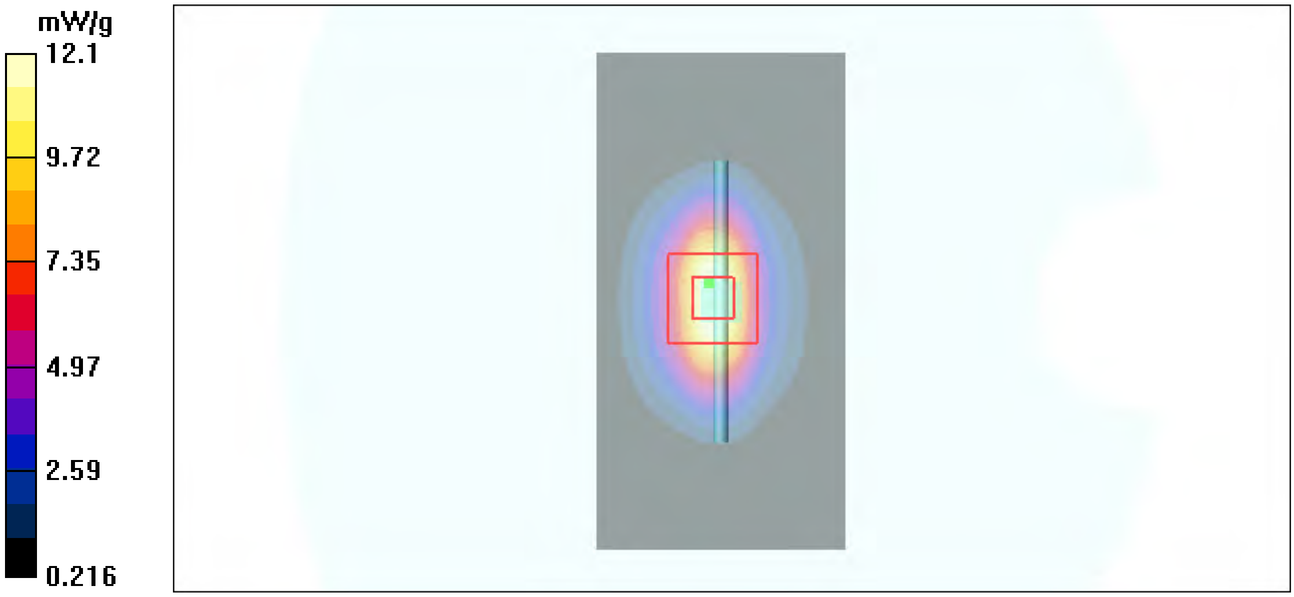


Figure 10 System Performance Check 1900MHz 250mW

System Performance Check at 2450 MHz Head TSL

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

Date/Time: 5/15/2012 1:33:45 PM

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

Medium parameters used: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.17, 7.17, 7.17); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: SAM000 T01; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Maximum value of SAR (interpolated) = 19.1 mW/g

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

Reference Value = 90.8 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 31.8 W/kg

SAR(1 g) = 14.7 mW/g; SAR(10 g) = 6.66 mW/g

Maximum value of SAR (measured) = 16.7 mW/g

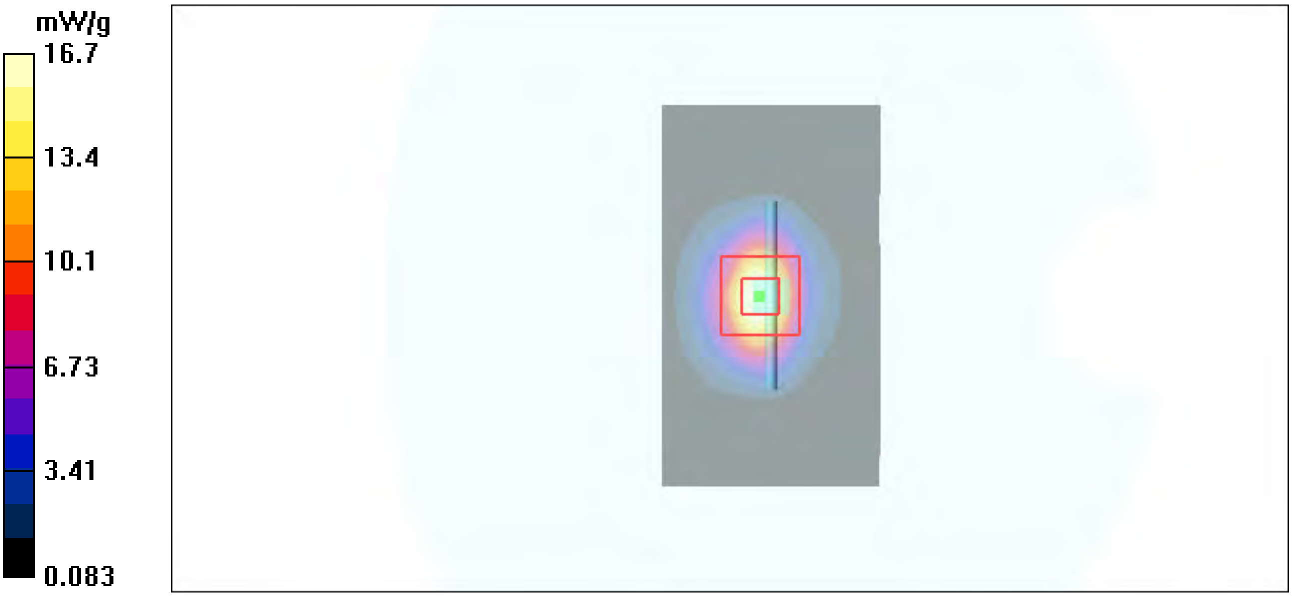


Figure 11 System Performance Check 2450MHz 250mW

System Performance Check at 2450 MHz Body TSL

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

Date/Time: 5/15/2012 11:02:43 AM

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

Medium parameters used: f = 2450 MHz; σ = 1.96 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(7.19, 7.19, 7.19); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

Phantom: SAM000 T01; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 17.5 mW/g

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

Reference Value = 85.9 V/m; Power Drift = -0.047 dB

Peak SAR (extrapolated) = 26.2 W/kg

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.23 mW/g

Maximum value of SAR (measured) = 15.3 mW/g

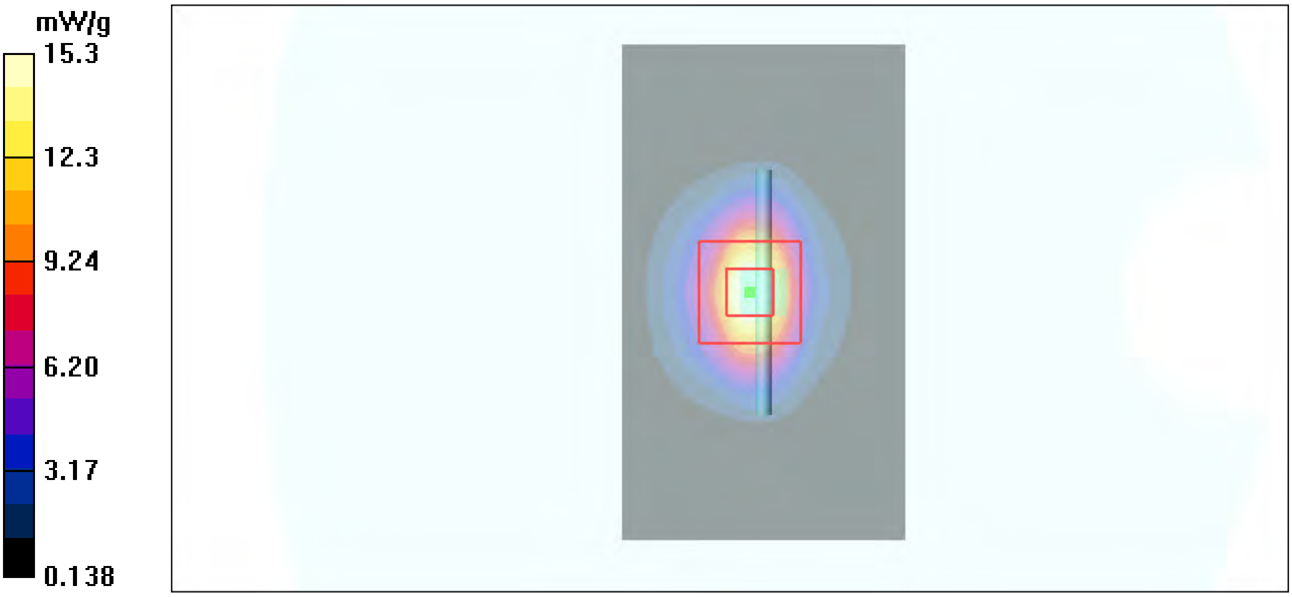


Figure 12 System Performance Check 2450MHz 250mW

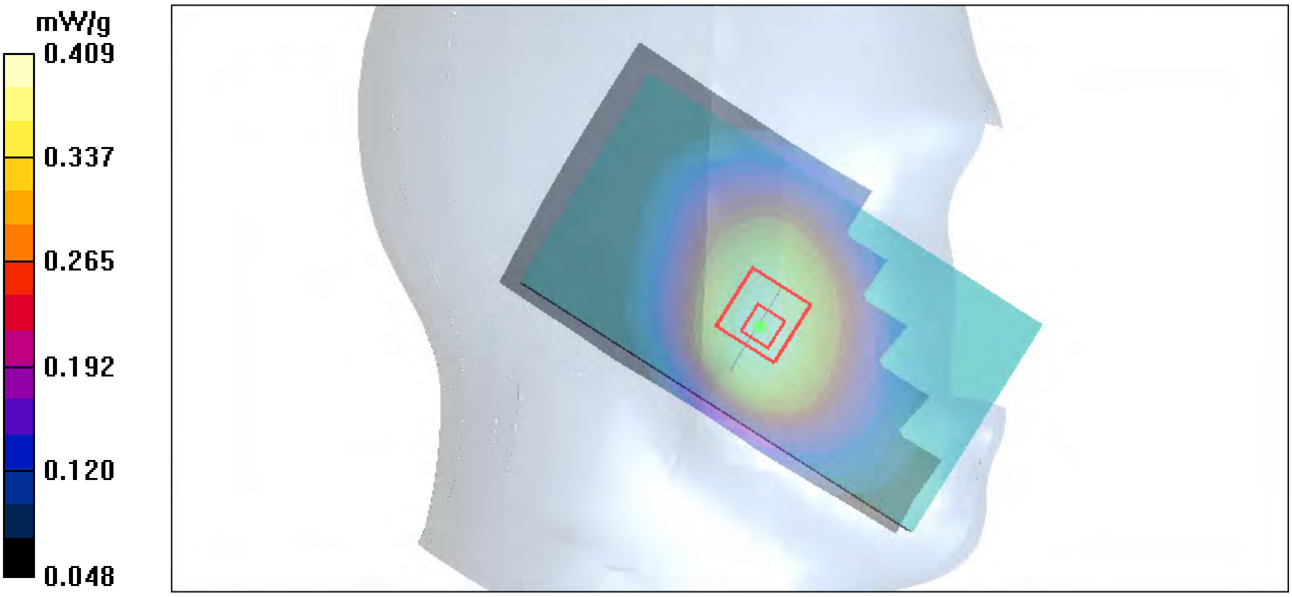
ANNEX C: Graph Results

GSM 850 Left Cheek High

Date/Time: 5/12/2012 5:25:49 PM
Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 849 MHz; σ = 0.92 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃
Phantom section: Left Section
DASY4 Configuration:
Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011
Electronics: DAE4 Sn1317; Calibrated: 1/23/2012
Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246
Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek High/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.408 mW/g

Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.42 V/m; Power Drift = 0.048 dB
Peak SAR (extrapolated) = 0.478 W/kg
SAR(1 g) = 0.391 mW/g; SAR(10 g) = 0.306 mW/g
Maximum value of SAR (measured) = 0.409 mW/g



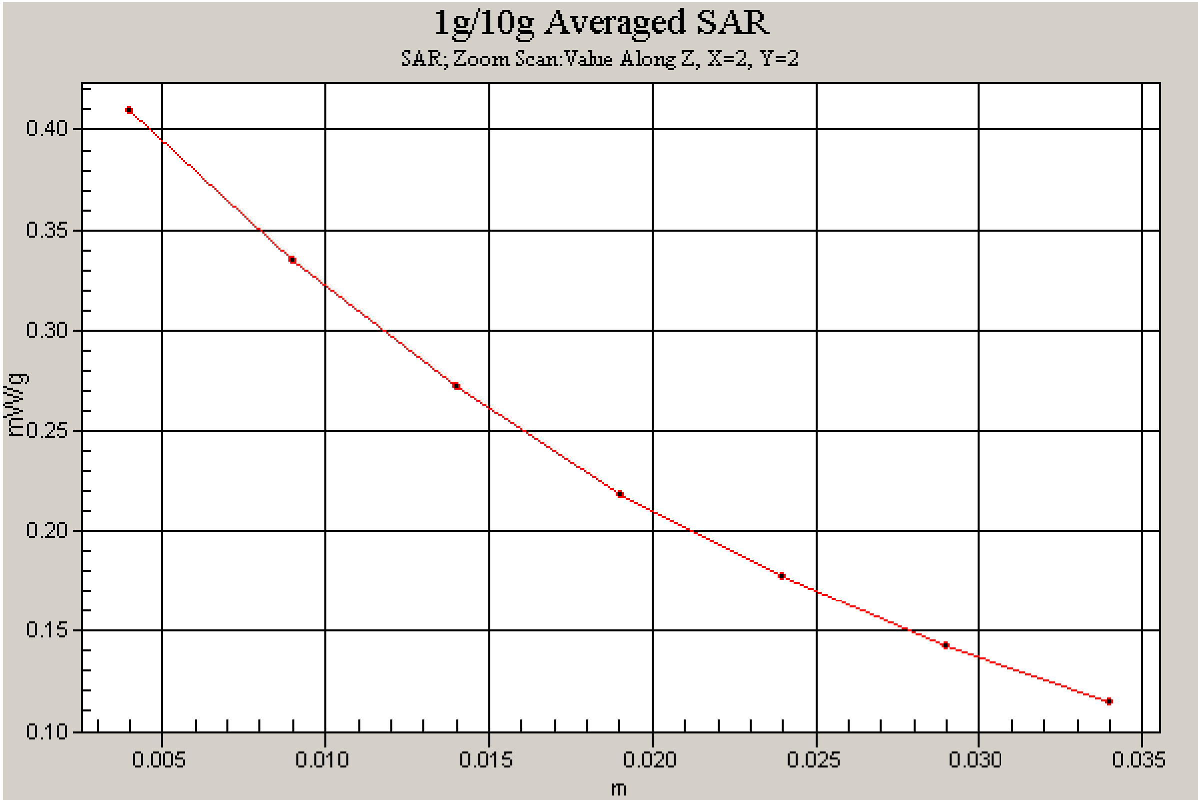


Figure 13 Left Hand Touch Cheek GSM 850 Channel 251

GSM 850 Left Cheek Middle

Date/Time: 5/12/2012 5:11:27 PM

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 837 MHz; σ = 0.908 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Middle/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.260 mW/g

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

Reference Value = 3.73 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 0.306 W/kg

SAR(1 g) = 0.249 mW/g; SAR(10 g) = 0.195 mW/g

Maximum value of SAR (measured) = 0.258 mW/g

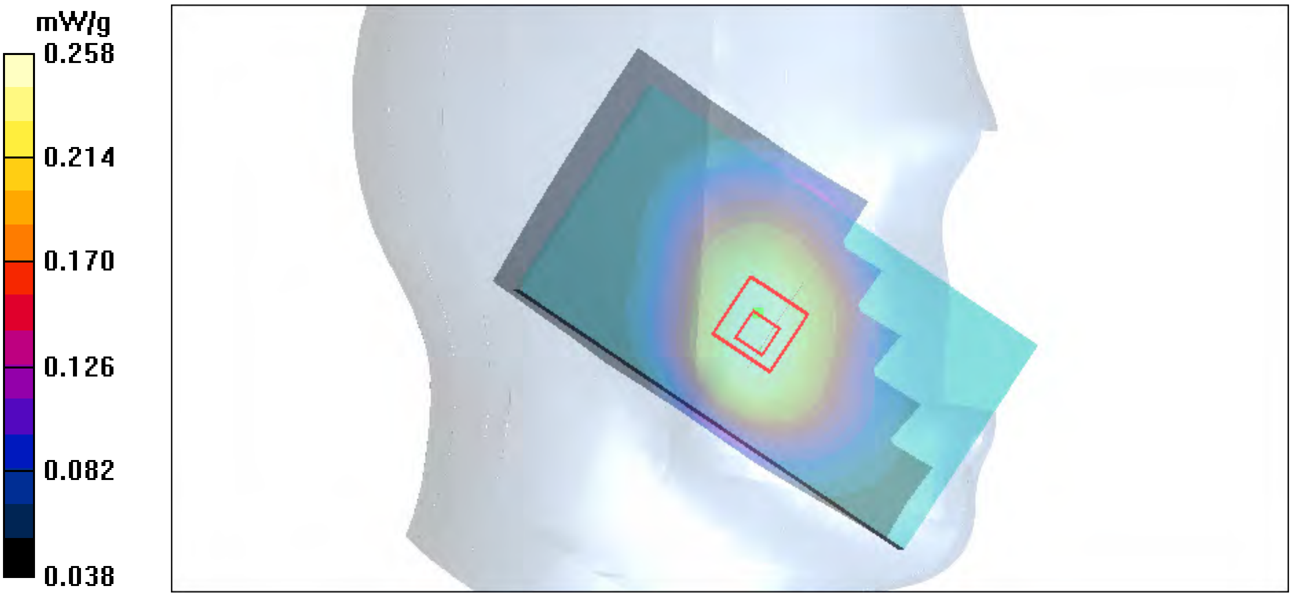


Figure 14 Left Hand Touch Cheek GSM 850 Channel 190

GSM 850 Left Cheek Low

Date/Time: 5/12/2012 5:40:23 PM

Communication System: GSM850; Frequency: 824.2 MHz;Duty Cycle: 1:8.3

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.895 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Low/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.141 mW/g

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

Reference Value = 2.47 V/m; Power Drift = 0.135 dB

Peak SAR (extrapolated) = 0.164 W/kg

SAR(1 g) = 0.135 mW/g; SAR(10 g) = 0.106 mW/g

Maximum value of SAR (measured) = 0.141 mW/g

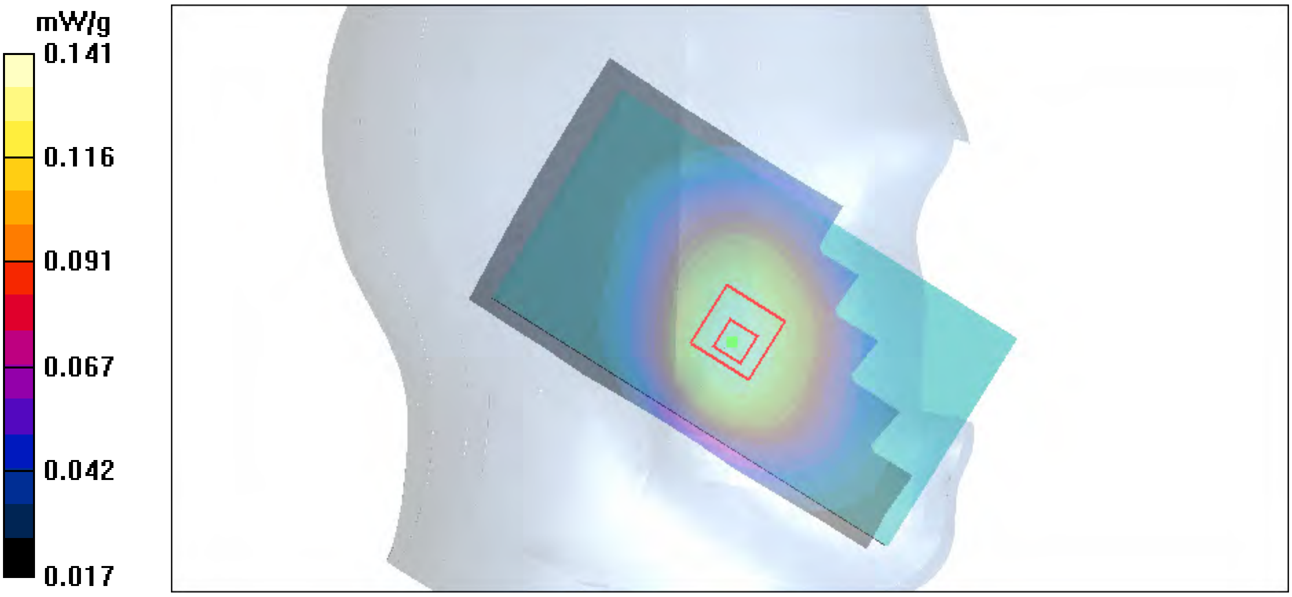


Figure 15 Left Hand Touch Cheek GSM 850 Channel 128

GSM 850 Left Tilt Middle

Date/Time: 5/12/2012 7:17:14 PM

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 837 MHz; σ = 0.908 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt Middle/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.142 mW/g

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

Reference Value = 5.92 V/m; Power Drift = 0.064 dB

Peak SAR (extrapolated) = 0.166 W/kg

SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.110 mW/g

Maximum value of SAR (measured) = 0.143 mW/g

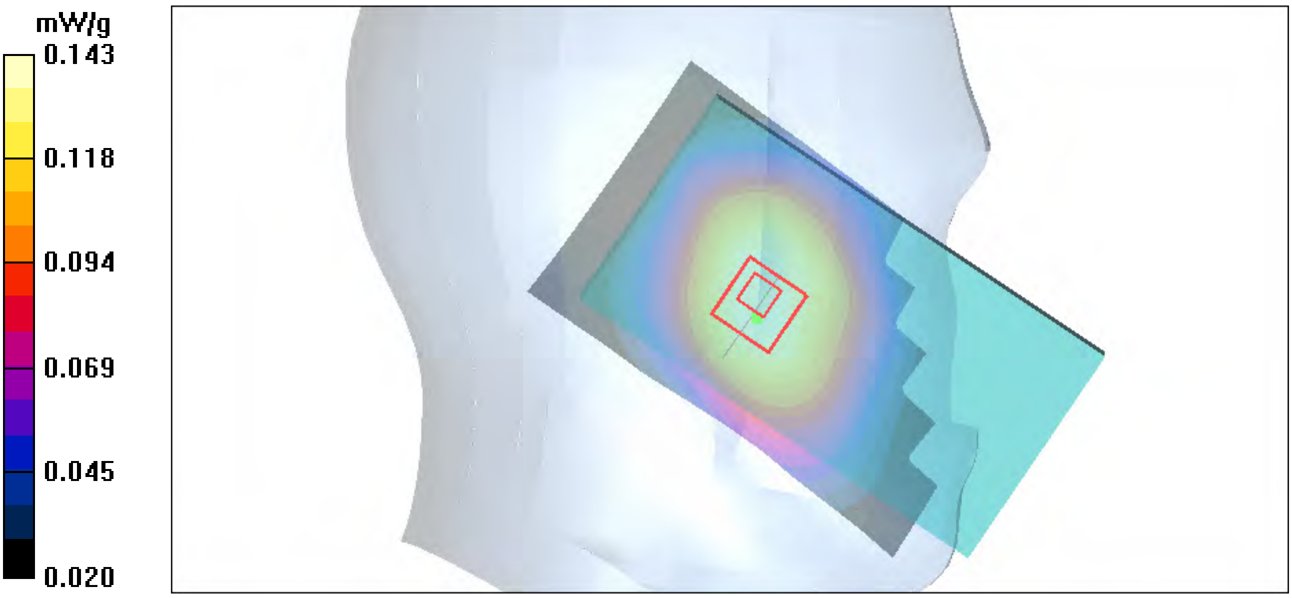


Figure 16 Left Hand Tilt 15° GSM 850 Channel 190

GSM 850 Right Cheek Middle

Date/Time: 5/12/2012 4:11:44 PM

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 837 MHz; σ = 0.908 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Cheek Middle/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.253 mW/g

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

Reference Value = 3.79 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 0.295 W/kg

SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.189 mW/g

Maximum value of SAR (measured) = 0.254 mW/g

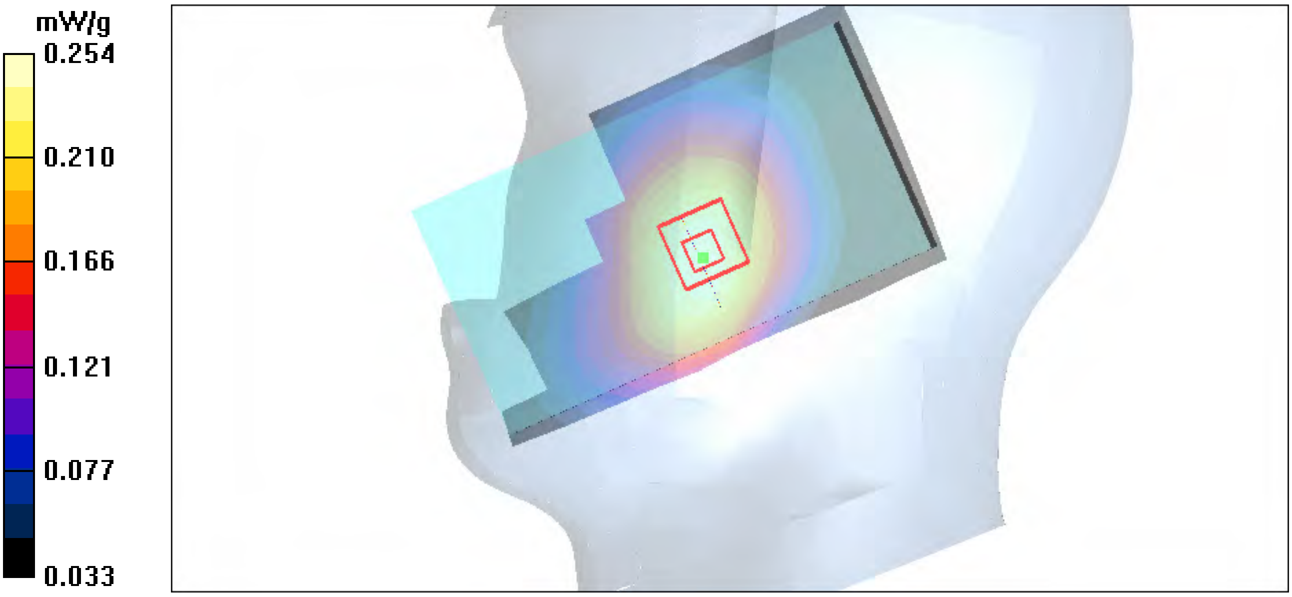


Figure 17 Right Hand Touch Cheek GSM 850 Channel 190

GSM 850 Right Tilt Middle

Date/Time: 5/12/2012 4:54:25 PM

Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3

Medium parameters used: f = 837 MHz; σ = 0.908 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY4 Configuration:

Probe: EX3DV4 - SN3816; ConvF(9.22, 9.22, 9.22); Calibrated: 10/3/2011

Electronics: DAE4 Sn1317; Calibrated: 1/23/2012

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

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt Middle/Area Scan (61x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.125 mW/g

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

Reference Value = 5.26 V/m; Power Drift = 0.151 dB

Peak SAR (extrapolated) = 0.146 W/kg

SAR(1 g) = 0.124 mW/g; SAR(10 g) = 0.098 mW/g

Maximum value of SAR (measured) = 0.129 mW/g

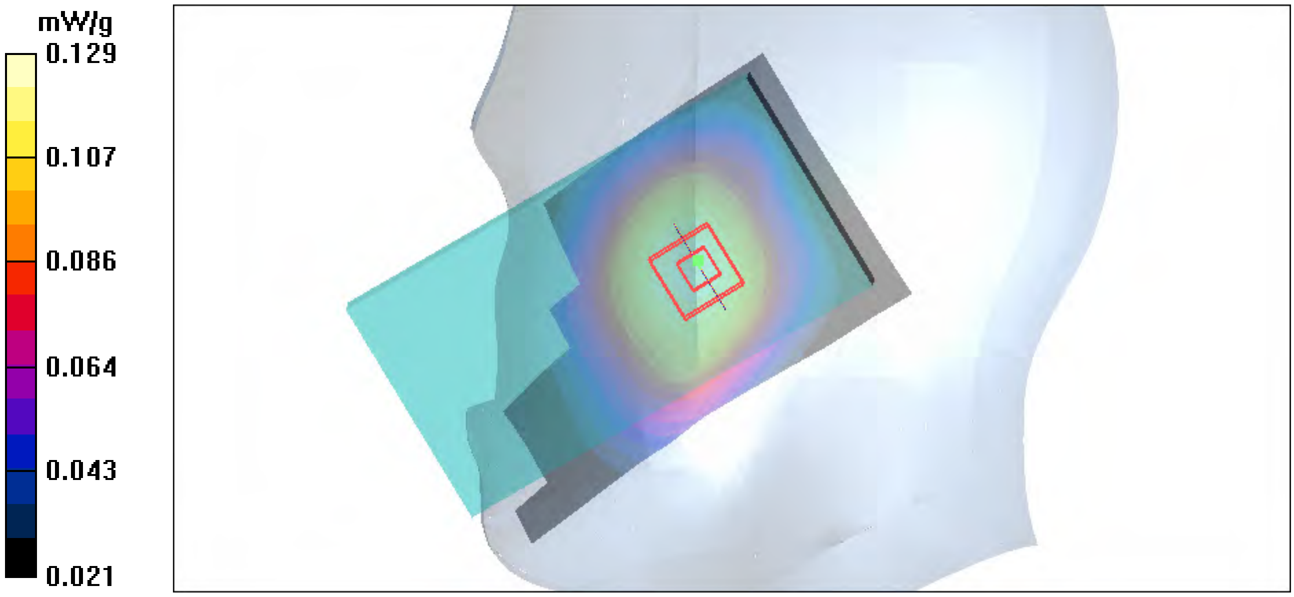


Figure 18 Right Hand Tilt 15° GSM 850 Channel 190