SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Nanshan District, Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594

FCC SAR TEST REPORT

Application No:	SZEM1512006897
Applicant:	Sky Phone LLC
Manufacturer:	Shenzhen Konka Telecommunications Technology Co., Ltd.
Product Name:	Smart Phone
Model No.(EUT):	Elite 5.5L
Trade Mark:	Sky Devices
FCC ID:	2ABOSELITE55L
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2015-12-02
Date of Test:	2015-12-03 to 2015-12-08
Date of Issue:	2016-01-14
Test Result :	**PASS ***

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

REVISION HISTORY

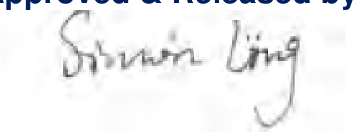
Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2015-12-23		Original
02		2016-01-14		Update WIFI SAR

TEST SUMMARY

Test Summary					
Frequency Band	**Test position**	**Test mode**	**Max Report SAR1g (W/kg)**	**SAR limit (W/kg)**	**Verdict**
GSM850	Head	GSM	0.562	1.6	PASS
	Body-worn	GSM	0.498	1.6	PASS
	Hotspot	GPRS 4TS	1.133	1.6	PASS
GSM1900	Head	GSM	0.134	1.6	PASS
	Body-worn	GSM	0.184	1.6	PASS
	Hotspot	GPRS 4TS	0.353	1.6	PASS
WCDMA Band V	Head	RMC	0.403	1.6	PASS
	Body-worn	RMC	0.459	1.6	PASS
	Hotspot	RMC	0.887	1.6	PASS
WCDMA Band II	Head	RMC	0.443	1.6	PASS
	Body-worn	RMC	0.404	1.6	PASS
	Hotspot	RMC	0.588	1.6	PASS
WCDMA Band IV	Head	RMC	0.651	1.6	PASS
	Body-worn	RMC	0.374	1.6	PASS
	Hotspot	RMC	0.664	1.6	PASS
LTE Band 2	Head	QPSK	0.416	1.6	PASS
	Body-worn	QPSK	0.248	1.6	PASS
	Hotspot	QPSK	0.677	1.6	PASS
LTE Band 4	Head	QPSK	0.390	1.6	PASS
	Body-worn	QPSK	0.381	1.6	PASS
	Hotspot	QPSK	0.559	1.6	PASS
LTE Band 12	Head	QPSK	0.605	1.6	PASS
	Body-worn	QPSK	0.433	1.6	PASS
	Hotspot	QPSK	0.692	1.6	PASS
LTE Band 17	Head	QPSK	0.648	1.6	PASS
	Body-worn	QPSK	0.457	1.6	PASS
	Hotspot	QPSK	0.765	1.6	PASS
LTE Band 7	Head	QPSK	0.205	1.6	PASS
	Body-worn	QPSK	0.487	1.6	PASS
	Hotspot	QPSK	0.762	1.6	PASS

Frequency Band	Test position	Test mode	Max Report SAR1g (W/kg)	SAR limit (W/kg)	Verdict
WI-FI (2.4GHz)	Head	802.11b	0.483	1.6	PASS
	Body-worn	802.11b	0.045	1.6	PASS
	Hotspot	802.11b	0.090	1.6	PASS
Maximum Simultaneous SAR for Head			**1.134**	1.6	PASS
Maximum Simultaneous SAR for Body-worn			**0.543**	1.6	PASS
Maximum Simultaneous SAR for Hotspot			**1.133**	1.6	PASS

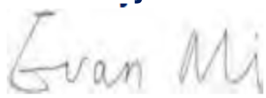
Approved & Released by



Simon Ling

SAR Manager

Tested by



Evan Mi

SAR Engineer

CONTENTS

1 General Information

1.1 Details of Client

Applicant:	Sky Phone LLC
Address:	1348 Washington Av. Suite 350 Miami Beach, Florida 33139 United States
Manufacturer:	Shenzhen Konka Telecommunications Technology Co., Ltd.
Address:	No.9008 Shennan Road,Overseas Chinese Town, ShenZhen, Guangdong, China

1.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594

1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-2, 4620C-3.

1.4 General Description of EUT

Product Name:	Smart Phone		
Model No.(EUT):	Elite 5.5L		
Trade Mark:	Sky Devices		
Product Phase:	production unit		
Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
FCC ID	2ABOSELITE55L		
IMEI	351372098213869/351372098213877		
Hardware Version:	V1.2		
Software Version:	SKY5.5L_V01		
Antenna Type:	Inner Antenna		
Device Operating Configurations :			
Modulation Mode:	GSM:GMSK, 8PSK WCDMA: QPSK LTE:QPSK,16QAM WIFI:IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(T20 and T40) : OFDM (64QAM, 16QAM, QPSK,BPSK) BT:GFSK,π/4DQPSK,8DPSK		
Device Class:	B		
GPRS Multi-slots Class:	12	EGPRS Multi-slots Class:	12
HSDPA UE Category:	14	HSUPA UE Category	6
Frequency Bands:	Band	Tx (MHz)	
	GSM850	824.2-848.8	
	GSM1900	1850.2-199.8	
	WCDMA Band V	826.4-846.6	
	WCDMA Band II	1852.4-1907.6	
	WCDMA Band IV	1712.4-1752.6	
	LTE Band 2	1850.7-1909.3	
	LTE Band 4	1710.7 -1754.3	
	LTE Band 12	698.7-715.3	
	LTE Band 17	706.5-713.5	
	LTE Band 7	2502.5-2567.5	
	WIFI	2412-2462	
	BT	2402-2480	
Battery Information:	Model: KLB270P350		
	Normal Voltage :3.8V		
	Rated capacity :2700mAh		
	Battery Type :Rechargeable Li-ion Battery		

1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
IEEE Std C95.1 – 1991	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 941225 D01 v03r01	3G SAR Procedures
KDB 941225 D05 v02r04	SAR for LTE Devices
KDB 248227 D01 v02r02	802.11 Wi-Fi SAR
KDB 941225 D06 v02r01	Hot Spot SAR
KDB 648474 D04 v01r03	Handset SAR
KDB447498 D01 v06	General RF Exposure Guidance
KDB447498 D03 v01	Supplement C Cross-Reference
KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
KDB 865664 D02 v01r02	RF Exposure Reporting

1.6 RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR* (Brain)	**1.60 mW/g**	8.00 mW/g
Spatial Average SAR** (Whole Body)	0.08 mW/g	0.40 mW/g
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)

2 SAR Measurements System Configuration

2.1 The SAR Measurement System

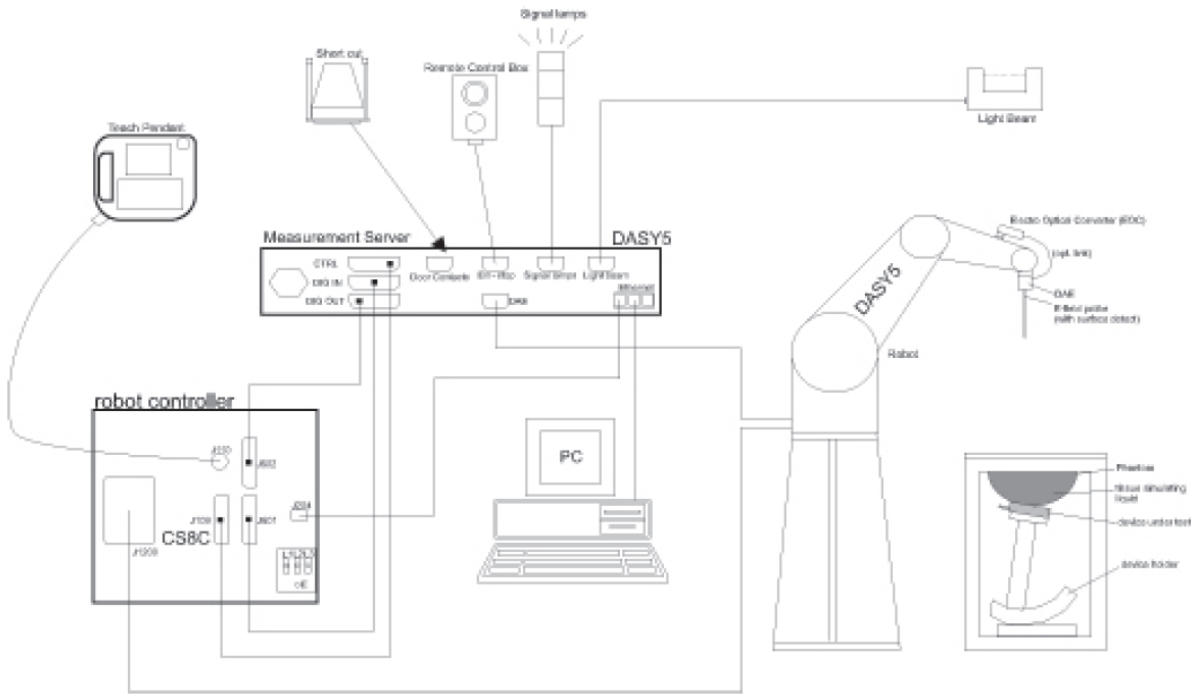
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

The DASY5 system for performing compliance tests consists of the following items:
A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation 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 electronics (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.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.



F-1. SAR Measurement System Configuration

- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system.

2.2 Isotropic E-field Probe EX3DV4

	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 TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 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); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

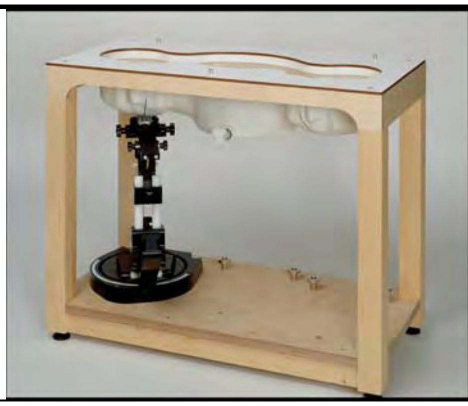
2.3 Data Acquisition Electronics (DAE)

Model	DAE3,DAE4	
Construction	Signal amplifier, multiplexer, A/D converter	

	and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)	
Input Offset Voltage	< 5μV (with auto zero)	
Input Bias Current	< 50 f A	
Dimensions	60 x 60 x 68 mm	

2.4 SAM Twin Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Wooden Support	SPEAG standard phantom table



The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.
Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

2.5 Device Holder for Transmitters

F-2. **Device Holder for Transmitters**

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

2.6 Measurement procedure

2.6.1 Scanning procedure

Step 1: Power reference measurement

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.

Step 2: *Area scan*

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm.Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: *Zoom scan*

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points (≤2GHz)and 7x7x7 points (≥2GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification).The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2003.

<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. ± 5 %

2.6.2 Data Storage

The DASY 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], [m W/g], [m W/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.

2.6.3 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, ai0, ai1, ai2
- Conversion factor ConvFi
- Diode compression point Dcpi
Device parameters: - Frequency f
- Crest factor cf
Media parameters: - Conductivity ε
- Density ρ

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 DASY 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:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

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

Ui = 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 Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)

[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m

Hi = 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.

$$SAR = (Etot^2 \cdot \sigma) / (\varepsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

Etot = total field strength in V/m

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

ε= equivalent tissue density in g/cm3

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.

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

with Ppwe = equivalent power density of a plane wave in mW/cm2
Etot = total electric field strength in V/m

Htot = total magnetic field strength in A/m

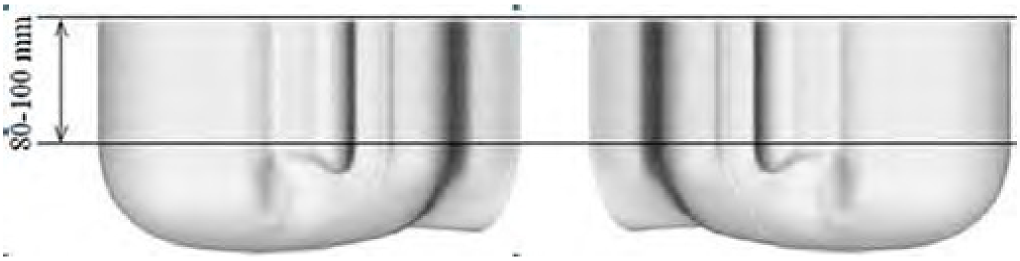
3 Description of Test Position

3.1 The Head Test Position

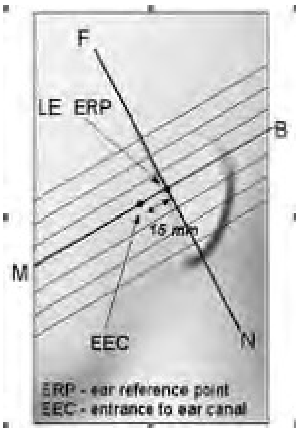
3.1.1 SAM Phantom Shape

F-3. Front, back, and side views of SAM (model for the phantom shell). Full-head model is for illustration purposes only-procedures in this recommended practice are intended primarily for the phantom setup.

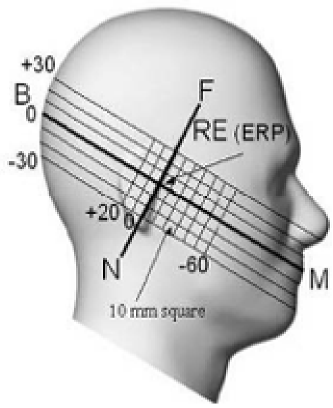
Note: The centre strip including the nose region has a different thickness tolerance.



F-4. Sagittally bisected phantom with extended perimeter (shown placed on its side as used for SAR measurements)

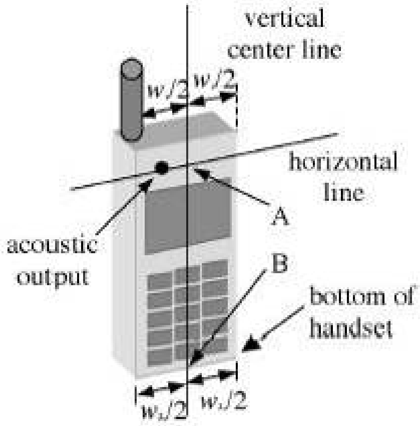


F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations

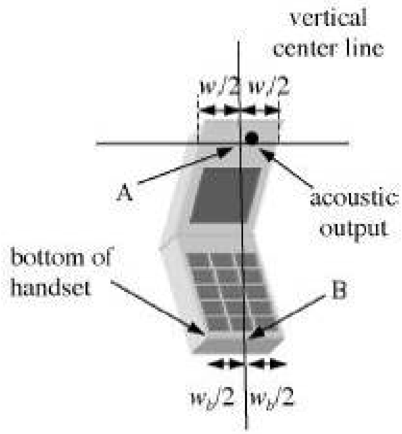


F-6. Side view of the phantom showing relevant markings and seven cross-sectional plane locations

3.1.2 EUT constructions



F-7. Handset vertical and horizontal reference lines-“fixed case”



F-8. Handset vertical and horizontal reference lines-“clam-shell case”

3.1.3 Definition of the “cheek” position

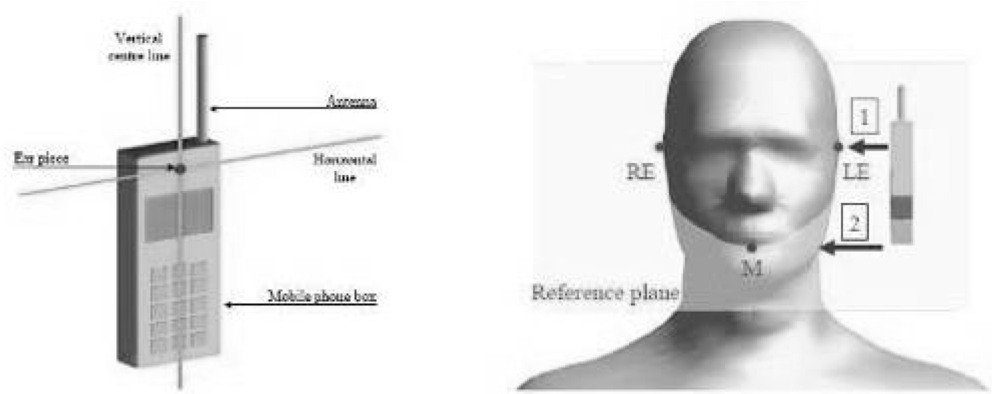
a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom ("initial position"). While maintaining the device in this plane, align the vertical centre line with the reference plane containing the three ear and mouth reference points (M, RE and LE) and align the centre of the ear piece with the line RE-LE.

b) Translate the mobile phone box towards the phantom with the ear piece aligned with the line LE-RE until telephone touches the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the box until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost.

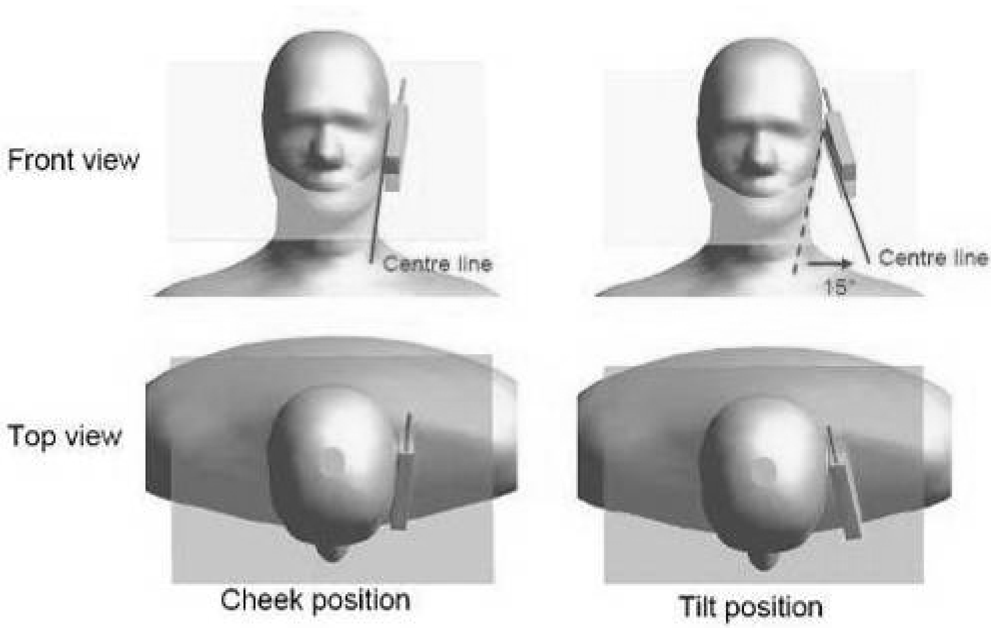
3.1.4 Definition of the “tilted” position

a) Position the device in the “cheek” position described above;

b) While maintaining the device in the reference plane described above and pivoting against the ear, move it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.



F-9. **Definition of the reference lines and points, on the phone and on the phantom and initial position**



F-10. **“Cheek” and “tilt” positions of the mobile phone on the left side**

3.2 The Body Test Position

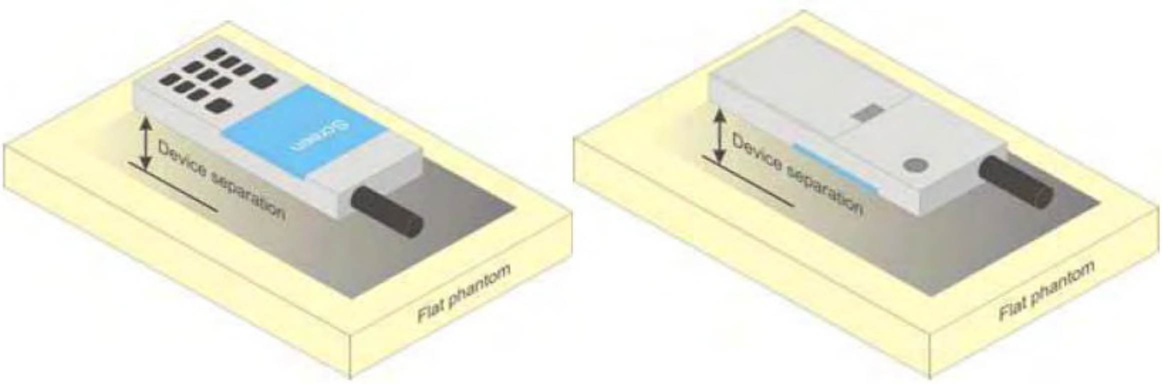
3.2.1 Body-worn accessory exposure conditions

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.



F-11. **Test positions for body-worn devices**

3.2.2 Extremity exposure conditions

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required.

When extremity SAR testing is required, a flat phantom must be used if the exposure condition is more conservative than the actual use conditions; otherwise, a KDB inquiry is required to determine the phantom and test requirements.

3.2.3 Wireless Router exposure conditions

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. For devices with form factors smaller than 9 cm x 5 cm, a test separation distance of 5 mm is required.

4 SAR System Verification Procedure

4.1 Tissue Simulate Liquid

4.1.1 Recipes for Tissue Simulate Liquid

The bellowing tables give the recipes for tissue simulating liquids to be used in different frequency bands：

Ingredients (% by weight)	**Frequency (MHz)**							
	750		**835**		**1700-2000**		**2400-2600**	
Tissue Type	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**	**Head**	**Body**
Water	38.89	51.53	40.30	50.75	55.24	70.17	55.00	68.53
Salt (NaCl)	3.91	1.32	1.38	0.94	0.31	0.39	0.2	0.1
Sucrose	56.25	46.71	57.90	48.21	0	0	0	0
HEC	0.82	0.43	0.24	0	0	0	0	0
Bactericide	0.13	0.01	0.18	0.10	0	0	0	0
Tween	0	0	0	0	44.45	29.44	44.80	31.37
Salt: 99^{+}% Pure Sodium Chloride					Sucrose: 98^{+}% Pure Sucrose			
Water: De-ionized, 16 $M\Omega^{+}$ resistivity					HEC: Hydroxyethyl Cellulose			
Tween: Polyoxyethylene (20) sorbitan monolaurate								

Table 1： Recipe of Tissue Simulate Liquid

4.1.2 Measurement for Tissue Simulate Liquid

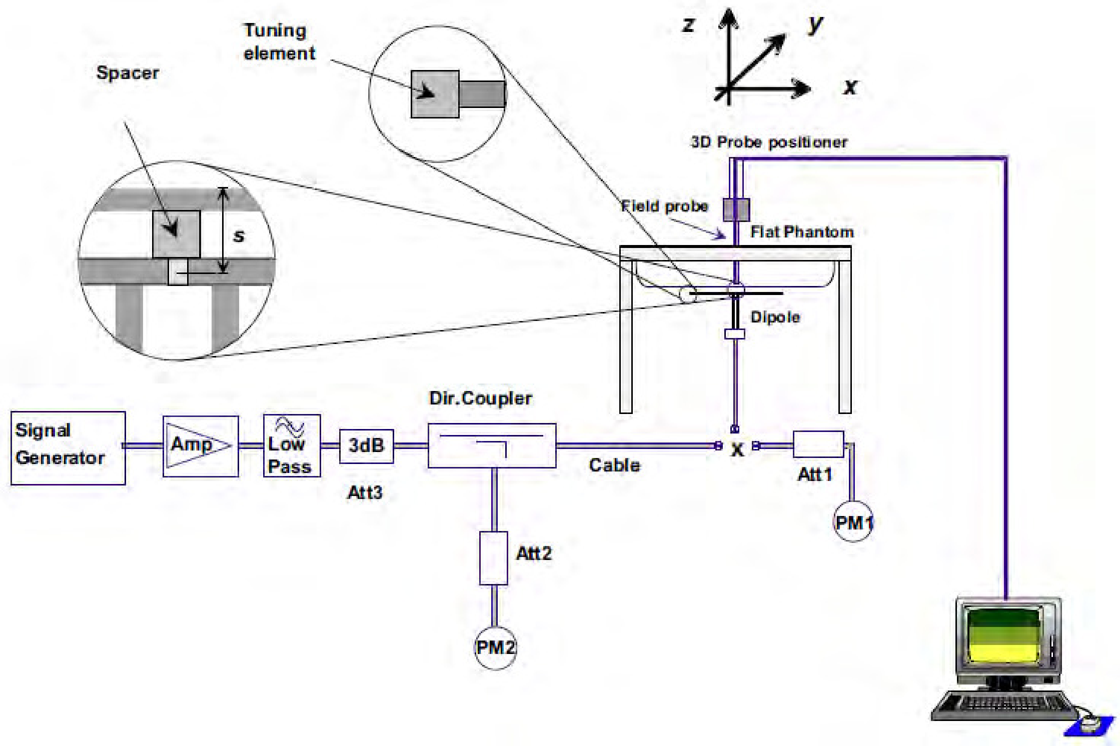
The dielectric properties for this Tissue Simulate Liquids were measured by using the Agilent Model 85070E Dielectric Probe in conjunction with Agilent E5071C Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±1°C.

Measurement for Tissue Simulate Liquid							
Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp. (℃)	Measured Date
		ε_r	σ(S/m)	ε_r	σ(S/m)		
750 Head	750	41.9 (39.8~44.0)	0.89 (0.85~0.93)	41.5	0.91	22.1	2015/12/03
750 Body	750	55.5 (52.7~58.3)	0.96 (0.91~1.01)	55.2	0.99	22.1	2015/12/03
835 Head	835	41.5 (39.43~43.58)	0.9 (0.86~0.95)	42.936	0.905	22.1	2015/12/04
835 Body	835	55.2 (52.44~57.96)	0.97 (0.92~1.02)	55.375	0.98	22.1	2015/12/04
1750 Head	1750	40.1 (38.09~42.10)	1.37 (1.30~1.44)	39.8	1.39	22.1	2015/12/05
1750 Body	1750	53.4 (50.73~56.07)	1.49 (1.41~1.56)	53.1	1.51	22.1	2015/12/05
1900 Head	1900	40.0 (38.00~42.00)	1.40 (1.33~1.47)	40.6	1.44	21.8	2015/12/06
1900 Body	1900	53.3 (50.64~55.97)	1.52 (1.44~1.60)	52.2	1.52	21.8	2015/12/06
2450 Head	2450	39.20 (37.24~41.15)	1.80 (1.71~1.88)	38.6	1.78	21.9	2015/12/07
2450 Body	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	51.7	1.95	21.9	2015/12/07
2600 Head	2600	39.0 (35.1~42.9)	1.96 (1.764~2.156)	38.1	1.94	22.1	2015/12/08
2600 Body	2600	52.50 (47.25~57.75)	2.16 (1.944~2.376)	52.9	2.17	22.1	2015/12/08

Table 2： Measurement result of Tissue electric parameters

4.2 SAR System Validation

The microwave circuit arrangement for system verification is sketched in F-12. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the table 5 (A power level of 250mw was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range 22±1°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-12. the microwave circuit arrangement used for SAR system verification

4.2.1 Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
a) There is no physical damage on the dipole;
b) System check with specific dipole is within 10% of calibrated value;
c) Return-loss is within 10% of calibrated measurement;
d) Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

4.2.2 Summary System Validation Result(s)

SAR System Validation Result(s)							
Validation Kit		Measured SAR 250mW	Measured SAR (normalized to 1w)	Target SAR (normalized to 1w) (±10%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	1g (W/kg)	1-g(W/kg)		
D750V2	Head	2.23	8.92	8.26 (7.434~9.086)	22.1	2015/12/03
	Body	2.35	9.4	8.65 (7.785~9.515)	22.1	2015/12/03
D835V2	Head	2.32	9.28	9.44 (8.496~10.384)	22.1	2015/12/04
	Body	2.26	9.04	9.64 (8.676`10.604)	22.1	2015/12/04
D1750V2	Head	9.18	36.72	37 (33.3~40.7)	22.1	2015/12/05
	Body	9.59	38.36	37.2 (33.48~40.92)	22.1	2015/12/05
D1900V2	Head	10.1	40.4	39.3 (35.37~43.23)	21.8	2015/12/06
	Body	10.9	43.6	40.5 (36.45~44.55)	21.8	2015/12/06
D2450V2	Head	13.9	55.6	52.4 (47.16~57.64)	21.9	2015/12/07
	Body	11.8	47.2	51.3 (46.17~56.43)	21.9	2015/12/07
D2600V2	Head	14.4	57.6	56.2 (50.58~61.82)	22.1	2015/12/08
	Body	13.1	52.4	56.7 (51.03~62.37)	22.1	2015/12/08

Table 3： SAR System Validation Result

4.2.3 Detailed System Validation Results

Please see the Appendix A

5 Test results and Measurement Data

5.1 3G SAR Test Reduction Procedure

According to KDB 941225D01 v03, 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. 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.

5.2 Operation Configurations

5.2.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMU200 the power lever is set to “5”and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. 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 timeslot 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 timeslot is 5.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

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.

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode

5.2.2 WCDMA Test Configuration

1）. <u>Output Power Verification</u>

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 required 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.

2）. <u>Head SAR</u>

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

3）. <u>Body SAR</u>

SAR for body 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.

4）. <u>HSDPA / HSUPA</u>

According to KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

a) <u>HSDPA</u>

HSDPA is configured according to the applicable UE category of a test device. The number of HS-DSCH/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 and 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) are set according to values indicated in the following table The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Sub-test	βc	Bd	βd(SF)	βc/βd	βhs	CM(dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	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: △ACK, △NACK and △CQI= 8 Ahs = βhs/βc=30/15 βhs=30/15*βc

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, △ACK and △NACK= 8 (Ahs=30/15) with βhs=30/15*βc,and

△CQI=

7 (Ahs=24/15) with βhs=24/15*βc.
Note3: CM=1 forβc/βd =12/15, βhs/βc=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.

The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK.

Parameter	Value
Nominal average inf. bit rate	534 kbit/s
Inter-TTI Distance	3 TTI‟s
Number of HARQ Processes	2 Processes
Information Bit Payload	3202 Bits
MAC-d PDU size	336 Bits
Number Code Blocks	1 Block
Binary Channel Bits Per TTI	4800 Bits
Total Available SMLs in UE	19200 SMLs
Number of SMLs per HARQ Process	9600 SMLs
Coding Rate	0.67
Number of Physical Channel Codes	5

Table 4： settings of required H-Set 1 QPSK acc. to 3GPP 34.121

HS-DSCH Category	Maximum HS-DSCH Codes Received	Minimum Inter-TTI Interval	MaximumH S-DSCH Transport BlockBits/HS-DSCH TTI	Total Soft Channel Bits
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

Table 5： HSDPA UE category

b) <u>HSUPA</u>

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	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: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference

Note 3 : For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$

Note 4 : For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$

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

Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Table 6： Subtests for UMTS Release 6 HSUPA

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI(ms)	Minimum Speading 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	10	2SF2&2SF4	11484	5.76
	4	4	2		20000	2.00
7 (No DPDCH)	4	8	2	2SF2&2SF4	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 support QPSK only. UE category 7 supports QPSK and 16QAM.(TS25.306-7.3.0).						

Table 7： HSUPA UE category

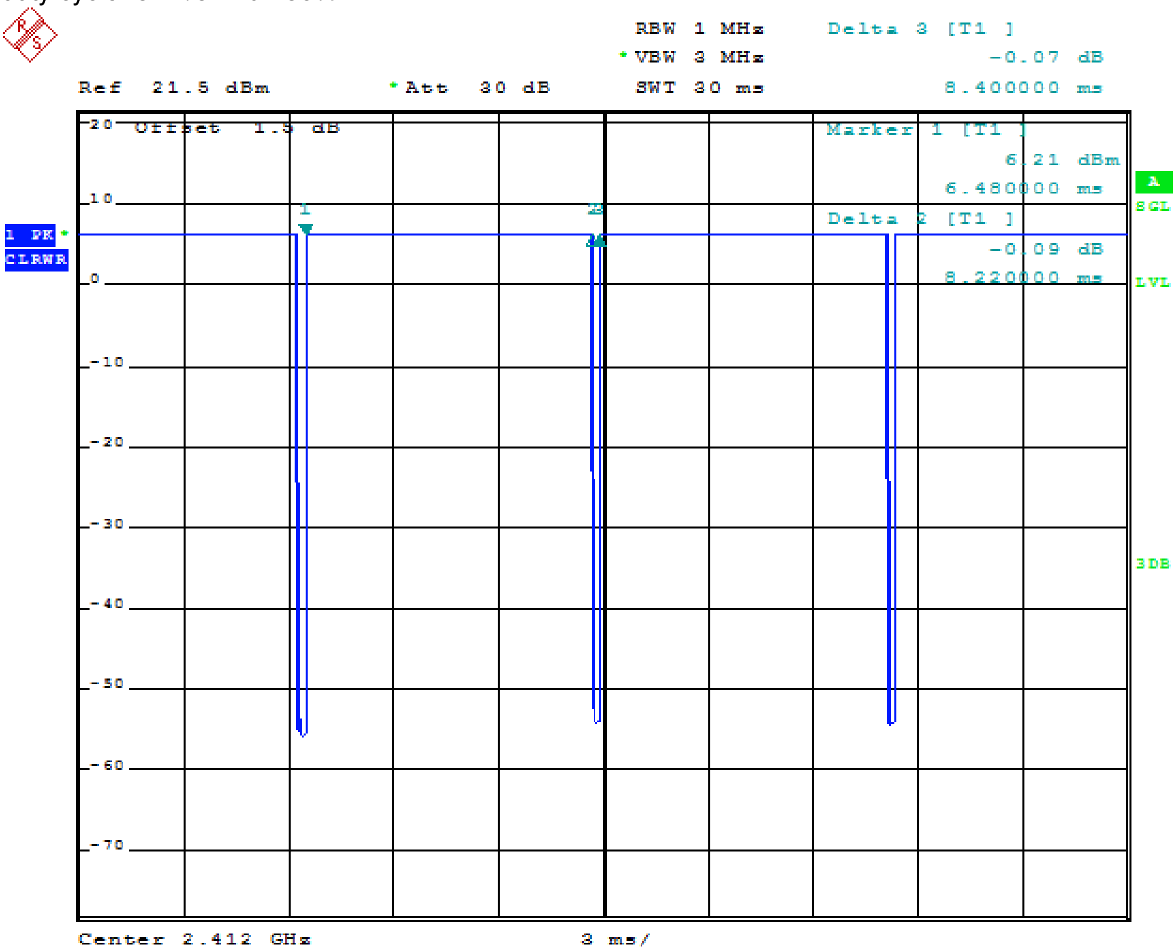
5.2.3 WiFi Test Configuration

Wi-Fi transmitters are designed to operate seamlessly across networks where traffic conditions are asynchronous and dynamic. Collision avoidance and retransmission of error packets are part of the network behavior, which can result in substantial variations in transmission patterns.

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies required for operations in the U.S. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. Unless it is permitted by specific KDB procedures or continuous transmission is specifically restricted by the device, the reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. When a device is not capable of sustaining continuous transmission or the output can become nonlinear, and it is limited by hardware design and unable to transmit at higher than 85% duty factor, a periodic duty factor within 15% of the maximum duty factor the device is capable of transmitting should be used. The reported SAR must be scaled to the maximum transmission duty factor to determine compliance. Descriptions of the procedures applied to establish the specific duty factor used for SAR testing are required in SAR reports to support the test results.

5.2.3.1 Duty cycle evaluation

For this device the highest transmission duty factor supported by the test mode tools for SAR measurement and the duty cycle=8.22/8.4=97.86%



5.2.3.2 Initial Test Position SAR Test Reduction Procedure

DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures. The initial test position procedure is described in the following:

1）. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band. SAR is also not required for that exposure configuration in the subsequent test configuration(s).

2）. When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest extrapolated or estimated 1-g SAR conditions determined by area scans or next closest/smallest test separation distance and maximum RF coupling test positions based on manufacturer justification, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions (left, right, touch, tilt or subsequent surfaces and edges) are tested.

3）. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested. a) Additional power measurements may be required for this step, which should be limited to those necessary for identifying the subsequent highest output power channels.

5.2.3.3 Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required. SAR test reduction for subsequent highest output test channels is determined according to *reported* SAR of the initial test configuration.

For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration. When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

5.2.3.4 Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following.

1）. When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.

2）. When the highest *reported* SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

3）. The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.

a)SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.

b) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the *reported* SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is > 1.2 W/kg or until all required channels are tested. i) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.

4）. SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by recursively applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:

a)replace “subsequent test configuration” with “next subsequent test configuration” (i.e., subsequent next highest specified maximum output power configuration)

b) replace “initial test configuration” with “all tested higher output power configurations”

5.2.3.5 2.4 GHz SAR Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in following.

- **802.11b DSSS SAR Test Requirements**

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1）. When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2）. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

- **2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3, including sub-sections). SAR is not required for the following 2.4 GHz OFDM conditions.

1）. When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

2）. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

5.2.4 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.

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

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.

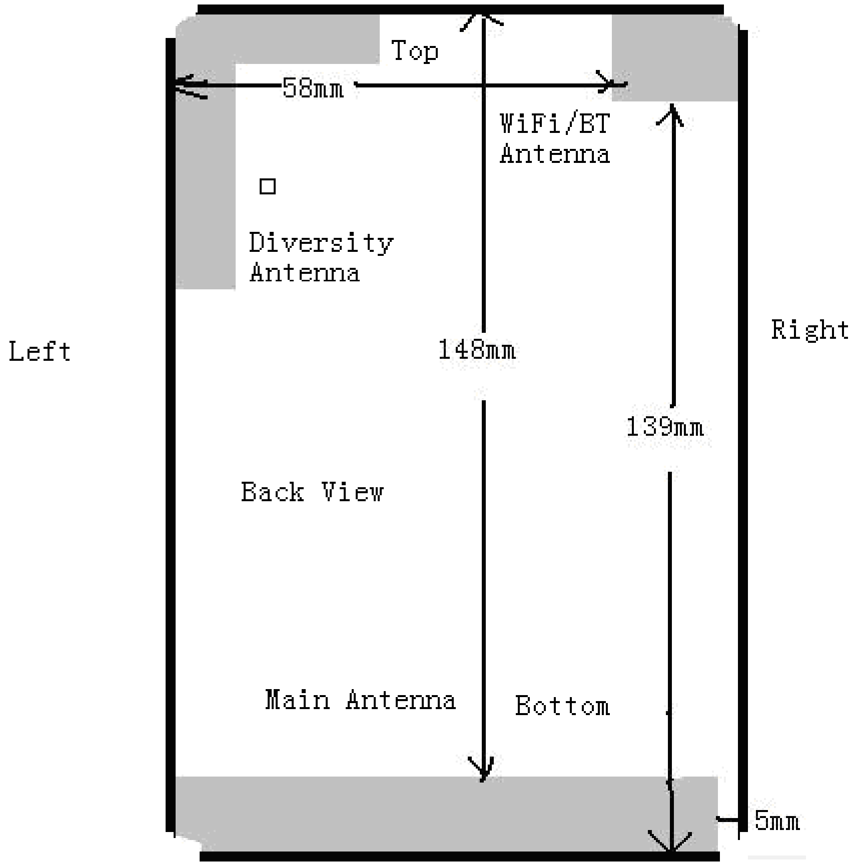
2) QPSK with 50% RB allocation
The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

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.

5.2.5 DUT Antenna Locations



5.2.6 EUT side for SAR Testing

According to the distance between LTE/WCDAM/GSM&WIFI antennas and the sides of the EUT we can draw the conclusion that:

EUT Sides for SAR Testing						
Mode	Front	Back	Left	Right	Top	Bottom
GSM	Yes	Yes	Yes	Yes	No	Yes
WCDMA	Yes	Yes	Yes	Yes	No	Yes
LTE	Yes	Yes	Yes	Yes	No	Yes
Wi-Fi（2.4GHz）	Yes	Yes	No	Yes	Yes	No

Table 8： EUT Sides for SAR Testing

Note: 1.When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.

2. Diversity antenna is only for Rx only, so it is not required SAR evaluation.

5.2.7 Stand-alone SAR test evaluation

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

Freq. Band	Frequency (GHz)	Position	Average Power		Test Separation (mm)	Calculate Value	Exclusion Threshold	Exclusion (Y/N)
			dBm	mW				
Wi-Fi	2.48	Head	16	39.81	0	12.5	3.0	N
		Body-worn	16	39.81	15	4.2	3.0	N
		hotspot	16	39.81	10	6.3	3.0	N
Bluetooth	2.48	Head	3	2	0	0.6	3.0	Y
		Body-worn	3	2	15	0.2	3.0	Y

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

5.3 Measurement of RF conducted Power

5.3.1 Conducted Power Of GSM

GSM 850								
Burst Output Power(dBm)					Division Factors	Frame-Average Output Power(dBm)		
Channel		128	190	251		128	190	251
GSM(GMSK)	GSM	32.49	32.68	32.74	-9.19	23.30	23.49	23.55
GPRS/EGPRS (GMSK)	1 TX Slot	32.51	32.66	32.71	-9.19	23.32	23.47	23.52
	2 TX Slots	31.57	31.61	31.54	-6.18	25.39	25.43	25.36
	3 TX Slots	30.52	30.54	30.45	-4.42	26.10	26.12	26.03
	4 TX Slots	29.41	29.40	29.38	-3.17	**26.24**	**26.23**	**26.21**
EGPRS(8PSK)	1 TX Slot	27.23	27.41	27.32	-9.19	18.04	18.22	18.13
	2 TX Slots	26.15	26.49	26.54	-6.18	19.97	20.31	20.36
	3 TX Slots	25.24	25.36	25.32	-4.42	20.82	20.94	20.90
	4 TX Slots	24.32	24.19	24.18	-3.17	21.15	21.02	21.01
GSM 1900								
Burst Output Power(dBm)					Division Factors	Frame-Average Output Power(dBm)		
Channel		512	661	810		512	661	810
GSM(GMSK)	GSM	29.61	29.37	29.45	-9.19	20.42	20.18	20.26
GPRS/EGPRS (GMSK)	1 TX Slot	29.48	29.52	29.38	-9.19	20.29	20.33	20.19
	2 TX Slots	28.46	28.31	28.47	-6.18	22.28	22.13	22.29
	3 TX Slots	27.41	27.35	27.45	-4.42	22.99	22.93	23.03
	4 TX Slots	26.35	26.41	26.34	-3.17	**23.18**	**23.24**	**23.17**
EGPRS(8PSK)	1 TX Slot	25.46	25.74	25.41	-9.19	16.27	16.55	16.22
	2 TX Slots	24.66	24.51	24.36	-6.18	18.48	18.33	18.18
	3 TX Slots	23.55	23.28	23.37	-4.42	19.13	18.86	18.95
	4 TX Slots	22.41	22.35	22.40	-3.17	19.24	19.18	19.23

Table 9： Conducted Power Of GSM

Note:

1）. CMU200 measures GSM peak and average output power for active timeslots. For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:

No. of timeslots	1	2	3	4
Duty Cycle	1:8.3	1:4.15	1:2.77	1:2.075
Time based avg. power compared to slotted avg. power	-9.19	-6.18	-4.42	-3.17

2）. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:

Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8

3）. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used

5.3.2 Conducted Power Of WCDMA

WCDMA Band V				
Average Conducted Power(dBm)				
Channel		4132	4182	4233
WCDMA	12.2kbps RMC	22.16	**22.25**	22.38
	64kbps RMC	22.12	22.21	22.32
	144kbps RMC	22.10	22.29	22.33
	384kbps RMC	22.14	22.26	22.31
HSDPA	Subtest 1	21.52	21.64	21.95
	Subtest 2	21.39	21.56	21.58
	Subtest 3	21.44	21.45	21.35
	Subtest 4	21.04	21.35	20.89
HSUPA	Subtest 1	21.53	21.43	21.35
	Subtest 2	21.21	21.04	21.14
	Subtest 3	21.04	21.15	21.13
	Subtest 4	20.65	20.76	20.75
	Subtest 5	20.46	20.35	20.57
WCDMA Band II				
Average Conducted Power(dBm)				
Channel		9262	9400	9538
WCDMA	12.2kbps RMC	22.42	**22.31**	22.15
	64kbps RMC	22.32	22.27	22.09
	144kbps RMC	22.29	22.17	22.03
	384kbps RMC	22.35	22.15	22.01
HSDPA	Subtest 1	21.55	21.34	21.54
	Subtest 2	21.40	21.24	21.31
	Subtest 3	21.32	21.33	21.05
	Subtest 4	20.89	20.94	20.74
HSUPA	Subtest 1	21.32	21.05	21.51
	Subtest 2	20.97	20.84	20.89
	Subtest 3	20.59	20.75	20.74
	Subtest 4	20.62	20.81	20.67
	Subtest 5	20.38	20.74	20.48
WCDMA Band IV				
Average Conducted Power(dBm)				
Channel		1312	1412	1513
WCDMA	12.2kbps RMC	22.16	**22.34**	22.09
	64kbps RMC	22.11	22.23	22.02
	144kbps RMC	22.12	22.21	22.04

	384kbps RMC	22.13	22.19	22.01
HSDPA	Subtest 1	21.65	21.64	21.58
	Subtest 2	21.42	21.53	21.52
	Subtest 3	20.57	20.79	20.86
	Subtest 4	20.68	20.75	20.45
HSUPA	Subtest 1	21.46	21.57	21.35
	Subtest 2	21.54	21.37	21.48
	Subtest 3	21.36	21.25	21.30
	Subtest 4	20.89	20.67	20.58
	Subtest 5	20.57	20.45	20.38

Table 10：Conducted Power Of WCDMA

1) when the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

5.3.3 Conducted Power Of LTE

LTE Band 2						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18625 1852.5MHz	Channel 18900 1880.0MHz	Channel 19175 1907.5MHz
5MHz	QPSK	1	0	21.86	21.47	21.60
		1	13	21.88	21.46	21.61
		1	24	21.86	21.48	21.58
		12	0	21.84	21.45	21.56
		12	6	21.85	21.48	21.54
		12	13	21.79	21.38	21.55
		25	0	20.80	20.42	20.59
	16QAM	1	0	20.51	20.81	20.69
		1	13	20.54	20.83	20.68
		1	24	20.53	20.86	20.63
		12	0	20.55	20.87	20.64
		12	6	20.59	20.84	20.65
		12	13	20.58	20.87	20.66
		25	0	19.86	19.47	19.66
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18650 1855.0MHz	Channel 18900 1880.0MHz	Channel 19150 1905.0MHz
10MHz	QPSK	1	0	21.84	21.57	21.58
		1	25	21.85	21.54	21.59
		1	49	21.87	21.49	21.55
		25	0	21.84	21.52	21.56
		25	13	21.83	21.50	21.58
		25	25	21.79	21.56	21.52
		50	0	20.81	20.52	20.61
	16QAM	1	0	20.94	20.64	21.10
		1	25	20.93	20.57	21.09
		1	49	20.98	20.69	21.20
		25	0	20.94	20.68	21.18
		25	13	20.89	20.64	21.12
		25	25	20.91	20.62	21.15
		50	0	19.83	19.60	19.66
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18675 1857.5MHz	Channel 18900 1880.0MHz	Channel 19125 1902.5MHz
15MHz	QPSK	1	0	21.85	21.70	21.62
		1	38	21.88	21.73	21.68
		1	74	21.84	21.72	21.59
		36	0	21.83	21.69	21.58
		36	18	21.79	21.74	21.64
		36	39	21.80	21.78	21.58
		75	0	20.88	20.58	20.69
	16QAM	1	0	21.17	21.27	20.76
		1	38	21.18	21.25	20.79

		1	74	21.20	21.26	20.73
		36	0	21.22	21.21	20.74
		36	18	21.14	21.20	20.80
		36	39	21.19	21.31	20.76
		75	0	19.83	19.61	19.70

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18700 1860.0MHz	Channel 18900 1880.0MHz	Channel 19100 1900.0MHz
20MHz	QPSK	1	0	21.85	21.75	21.63
		1	50	21.88	**21.80**	21.60
		1	99	21.82	21.76	21.62
		50	0	21.86	**21.74**	21.68
		50	25	21.80	21.72	21.59
		50	50	21.84	21.71	21.58
		100	0	20.78	20.59	20.61
	16QAM	1	0	21.03	21.28	20.84
		1	50	21.12	21.31	20.80
		1	99	21.11	21.20	21.81
		50	0	21.09	21.26	21.76
		50	25	21.08	21.25	21.78
		50	50	21.04	21.28	21.76
		100	0	19.80	19.65	19.70

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18615 1851.5MHz	Channel 18900 1880.0MHz	Channel 19185 1908.5MHz
3MHz	QPSK	1	0	21.76	21.31	21.54
		1	8	21.74	21.30	21.56
		1	14	21.72	21.29	21.52
		8	0	21.70	21.35	21.49
		8	4	21.69	21.32	21.64
		8	7	21.75	21.31	21.62
		15	0	21.94	21.55	21.72
	16QAM	1	0	21.17	20.52	20.55
		1	8	21.16	20.60	20.56
		1	15	21.25	20.53	20.54
		8	0	21.26	20.54	20.52
		8	4	21.35	20.48	20.49
		8	7	21.12	20.50	20.60
		15	0	20.88	20.66	20.79

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 18607 1850.7MHz	Channel 18900 1880.0MHz	Channel 19193 1909.3MHz
1.4MHz	QPSK	1	0	21.78	21.34	21.54
		1	2	21.69	21.39	21.58
		1	5	21.72	21.26	21.56
		3	0	21.63	21.32	21.61
		3	1	21.74	21.30	21.49

		3	2	21.82	21.36	21.62
		6	0	21.93	21.46	21.71
	16QAM	1	0	20.75	20.51	20.57
		1	2	20.82	20.53	20.62
		1	5	20.72	20.49	20.55
		3	0	20.74	20.48	20.55
		3	1	20.83	20.49	20.53
		3	2	20.89	20.51	20.58
		6	0	20.92	20.47	20.72
Band 4						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19975 1712.5MHz	Channel 20175 1732.5MHz	Channel 20375 1752.5MHz
5MHz	QPSK	1	0	22.09	21.94	22.16
		1	13	22.12	21.79	22.20
		1	24	22.05	21.84	22.10
		12	0	22.25	21.86	22.25
		12	6	22.26	21.99	22.36
		12	13	22.15	21.89	22.53
		25	0	21.11	20.93	21.21
	16QAM	1	0	21.14	21.14	21.14
		1	13	21.15	21.28	21.56
		1	24	21.26	21.43	21.25
		12	0	21.38	21.36	21.56
		12	6	21.42	21.25	21.86
		12	13	21.35	21.23	21.13
		25	0	20.18	19.98	20.31
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20000 1715.0MHz	Channel 20175 1732.5MHz	Channel 20350 1750.0MHz
10MHz	QPSK	1	0	22.19	22.13	22.13
		1	25	22.25	22.17	22.18
		1	49	22.35	22.19	22.20
		25	0	22.21	22.32	21.90
		25	13	22.15	22.24	22.10
		25	25	22.30	22.15	22.07
		50	0	21.16	21.04	21.14
	16QAM	1	0	21.78	21.35	21.23
		1	25	21.82	21.32	21.30
		1	49	21.76	21.28	21.28
		25	0	21.58	21.29	21.13
		25	13	21.82	21.30	21.35
		25	25	21.69	21.31	21.02
		50	0	20.24	20.08	20.25
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20025 1717.5MHz	Channel 20175 1732.5MHz	Channel 20325 1747.5MHz
15MHz	QPSK	1	0	22.19	22.13	22.16

		1	38	22.18	22.20	22.30
		1	74	22.20	22.18	22.21
		36	0	22.15	22.25	22.19
		36	18	22.05	22.09	22.18
		36	39	22.18	22.03	22.17
		75	0	21.17	21.08	21.19
	16QAM	1	0	21.77	21.35	21.63
	16QAM	1	38	21.76	21.29	21.62
	16QAM	1	74	21.82	21.39	21.68
	16QAM	36	0	21.68	21.52	21.69
	16QAM	36	18	21.59	21.45	21.58
	16QAM	36	39	21.81	21.32	21.52
	16QAM	75	0	20.21	20.12	20.24

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20050 1720.0MHz	Channel 20175 1732.5MHz	Channel 20300 1745.0MHz
20MHz	QPSK	1	0	21.99	**22.21**	21.94
20MHz	QPSK	1	50	21.89	21.82	21.82
20MHz	QPSK	1	99	21.96	21.88	21.95
20MHz	QPSK	50	0	22.02	21.98	21.83
20MHz	QPSK	50	25	21.78	**22.10**	22.02
20MHz	QPSK	50	50	22.00	21.79	22.15
20MHz	QPSK	100	0	20.98	21.06	21.17
20MHz	16QAM	1	0	21.52	20.32	21.23
20MHz	16QAM	1	50	21.62	20.35	21.33
20MHz	16QAM	1	99	21.58	20.69	21.28
20MHz	16QAM	50	0	21.56	20.34	21.02
20MHz	16QAM	50	25	21.48	20.48	21.36
20MHz	16QAM	50	50	21.68	20.42	21.32
20MHz	16QAM	100	0	19.98	19.92	20.03

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19965 1711.5MHz	Channel 20175 1732.5MHz	Channel 20385 1753.5MHz
3MHz	QPSK	1	0	22.03	21.79	22.05
3MHz	QPSK	1	8	22.13	21.81	22.02
3MHz	QPSK	1	14	22.08	21.85	22.12
3MHz	QPSK	8	0	22.21	21.69	22.15
3MHz	QPSK	8	4	22.15	21.75	22.20
3MHz	QPSK	8	7	21.95	21.82	22.32
3MHz	QPSK	15	0	21.12	20.90	21.21
3MHz	16QAM	1	0	21.19	20.90	21.68
3MHz	16QAM	1	8	21.23	20.75	21.68
3MHz	16QAM	1	15	21.35	20.68	21.56
3MHz	16QAM	8	0	21.45	20.35	21.72
3MHz	16QAM	8	4	21.02	20.85	21.86
3MHz	16QAM	8	7	21.18	20.89	21.98
3MHz	16QAM	15	0	20.14	20.01	20.35

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)

				Channel 19957 1710.7MHz	Channel 20175 1732.5MHz	Channel 20393 1754.3MHz
1.4MHz	QPSK	1	0	22.04	21.75	22.09
		1	2	22.01	22.02	22.12
		1	5	22.15	21.58	22.15
		3	0	22.25	21.79	22.26
		3	1	22.08	21.53	22.35
		3	2	21.98	21.85	22.47
		6	0	21.05	20.80	21.13
	16QAM	1	0	21.11	20.86	21.29
		1	2	21.95	20.78	21.35
		1	5	21.53	20.89	21.42
		3	0	21.35	20.91	21.68
		3	1	21.08	21.05	21.72
		3	2	21.21	20.53	21.52
		6	0	20.13	19.81	20.22

Band 12

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23035 701.5MHz	Channel 23095 707.5MHz	Channel 23155 713.5MHz
5MHz	QPSK	1	0	22.02	22.15	22.35
		1	13	22.13	21.99	22.45
		1	24	22.35	21.98	22.15
		12	0	21.98	22.18	22.45
		12	6	22.25	22.15	22.12
		12	13	22.45	22.05	21.98
		25	0	21.39	21.33	21.31
	16QAM	1	0	20.95	20.15	20.32
		1	13	20.32	20.75	20.61
		1	24	21.02	20.32	20.45
		12	0	20.65	20.21	20.32
		12	6	20.75	20.66	20.87
		12	13	20.85	20.56	20.95
		25	0	20.58	20.55	20.42

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23060 704.0MHz	Channel 23095 707.5MHz	Channel 23130 711.0MHz
10MHz	QPSK	1	0	22.56	**22.53**	22.41
		1	25	22.23	22.44	22.13
		1	49	22.15	22.53	22.58
		25	0	21.42	21.41	21.32
		25	13	21.56	21.35	21.65
		25	25	21.35	**21.42**	21.13
		50	0	21.45	21.42	21.36
	16QAM	1	0	21.66	21.45	21.99
		1	25	21.65	21.35	21.79
		1	49	21.23	21.48	21.69
		25	0	21.68	21.56	21.58

		25	13	21.77	21.51	21.12
		25	25	21.00	21.20	20.98
		50	0	20.42	20.43	20.46

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23025 700.5MHz	Channel 23095 707.5MHz	Channel 23165 714.5MHz
3MHz	QPSK	1	0	22.10	22.15	22.23
		1	8	21.98	22.18	22.15
		1	14	21.95	22.02	21.90
		8	0	22.15	21.58	22.90
		8	4	22.53	21.62	22.10
		8	7	21.85	21.58	21.98
		15	0	21.49	21.28	21.29
	16QAM	1	0	21.21	21.32	21.30
		1	8	21.15	21.16	21.25
		1	15	21.56	21.15	21.56
		8	0	21.84	21.50	21.50
		8	4	21.02	21.05	21.10
		8	7	21.10	21.02	20.98
		15	0	20.43	20.42	20.35

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23007 698.7MHz	Channel 23095 707.5MHz	Channel 23173 715.3MHz
1.4MHz	QPSK	1	0	22.02	22.10	22.32
		1	2	22.02	22.05	21.98
		1	5	21.98	22.15	22.84
		3	0	22.15	22.35	22.15
		3	1	21.98	21.97	21.65
		3	2	20.10	21.82	21.98
		6	0	21.36	21.09	21.22
	16QAM	1	0	21.35	21.06	21.15
		1	2	21.65	21.15	21.05
		1	5	21.50	21.32	21.53
		3	0	21.54	21.16	21.54
		3	1	21.32	20.90	20.98
		3	2	21.02	20.56	20.56
		6	0	20.46	20.14	20.29

Band 17

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23755 706.5MHz	Channel 23790 710.0MHz	Channel 23825 713.5MHz
5MHz	QPSK	1	0	22.10	22.30	22.05
		1	13	22.18	22.15	22.10
		1	24	22.32	22.13	22..2
		12	0	22.09	22.16	22.32
		12	6	21.65	21.98	21.98
		12	13	21.84	21.56	21.82

		25	0	21.39	21.33	21.25
	16QAM	1	0	21.32	21.20	21.68
		1	13	21.54	21.45	21.15
		1	24	21.12	21.47	21.56
		12	0	21.46	21.54	21.32
		12	6	21.16	21.45	21.10
		12	13	21.10	21.30	20.90
		25	0	20.47	20.40	20.38
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 23780 709.0MHz	Channel 23790 710.0MHz	Channel 23800 711.0MHz
10MHz	QPSK	1	0	22.25	**22.28**	22.23
		1	25	22.20	22.21	22.18
		1	49	22.15	22.14	22.13
		25	0	22.11	**22.08**	22.09
		25	13	22.06	22.02	22.04
		25	25	22.02	21.96	22.00
		50	0	21.99	21.91	21.97
	16QAM	1	0	21.95	21.86	21.93
		1	25	21.91	21.81	21.89
		1	49	21.88	21.76	21.86
		25	0	21.85	21.72	21.83
		25	13	21.82	21.68	21.80
		25	25	21.79	21.64	21.77
		50	0	21.76	21.60	21.74
Band 7						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20775 2502.5MHz	Channel 21100 2535MHz	Channel 21425 2567.5MHz
5MHz	QPSK	1	0	21.74	21.53	21.66
		1	13	21.15	21.86	21.59
		1	24	21.86	21.46	21.51
		12	0	21.84	21.54	21.86
		12	6	21.51	21.78	21.48
		12	13	21.12	21.13	21.23
		25	0	20.74	20.55	20.71
	16QAM	1	0	20.66	20.92	20.76
		1	13	20.54	20.48	20.84
		1	24	20.55	20.86	20.55
		12	0	20.54	20.16	20.15
		12	6	20.89	21.12	20.21
		12	13	20.12	20.20	20.41
		25	0	19.82	19.71	19.87
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20800 2505MHz	Channel 21100 2535MHz	Channel 21400 2565MHz
10MHz	QPSK	1	0	21.92	21.93	21.75
		1	25	21.89	21.90	21.89

		1	49	21.78	21.86	21.56
		25	0	21.56	21.45	21.74
		25	13	21.62	21.56	21.35
		25	25	21.20	21.31	21.30
		50	0	20.85	20.74	20.83
	16QAM	1	0	20.89	21.41	20.96
		1	25	20.95	21.12	20.65
		1	49	21.12	21.65	21.12
		25	0	20.85	21.15	20.86
		25	13	20.45	21.16	20.65
		25	25	20.23	20.21	20.54
		50	0	19.69	19.89	20.01
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20825 2507.5MHz	Channel 21100 2535MHz	Channel 21375 2562.5MHz
15MHz	QPSK	1	0	22.18	22.15	21.89
		1	38	22.23	22.16	21.56
		1	74	22.16	21.95	22.20
		36	0	22.65	21.86	21.65
		36	18	22.12	22.02	22.13
		36	39	21.15	21.35	21.25
		75	0	20.94	20.69	20.85
	16QAM	1	0	21.45	21.43	21.04
		1	38	21.65	21.56	21.02
		1	74	21.15	21.58	20.65
		36	0	21.16	21.53	20.95
		36	18	21.56	21.25	21.02
		36	39	21.20	21.15	20.65
		75	0	20.03	19.87	19.91
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20850 2510MHz	Channel 21100 2535MHz	Channel 21350 2560MHz
20MHz	QPSK	1	0	22.07	22.13	21.21
		1	50	22.05	22.18	21.58
		1	99	22.56	**22.26**	21.15
		50	0	22.15	21.68	20.95
		50	25	21.98	**21.92**	21.56
		50	50	21.65	21.38	21.32
		100	0	20.82	20.74	20.59
	16QAM	1	0	20.57	21.08	20.29
		1	50	20.83	21.56	20.48
		1	99	20.86	21.15	20.85
		50	0	20.48	21.36	20.20
		50	25	20.56	21.12	20.56
		50	50	20.15	20.56	20.37
		100	0	19.25	19.48	19.42

Table 11：Conducted Power Of LTE

5.3.4 Conducted Power Of WIFI and BT

Wi-Fi 2450MHz	Average Power (dBm) for Data Rates (Mbps)								
	Channel	1	2	5.5	11	/	/	/	/
802.11b	1	14.73	14.53	14.67	14.77	/	/	/	/
	6	14.27	14.92	14.99	14.98	/	/	/	/
	11	15.13	15.02	15.06	15.03	/	/	/	/
802.11g	Channel	6	9	12	18	24	36	48	54
	1	11.30	11.29	11.16	11.14	11.11	11.16	11.18	11.09
	6	12.50	12.37	12.35	12.27	12.38	12.26	12.29	12.47
	11	11.86	11.67	11.64	11.65	11.65	11.59	11.66	11.72
802.11n HT20	Channel	6.5	13	19.5	26	39	52	58.5	65
	1	11.31	11.24	11.16	11.23	11.21	11.44	11.26	11.18
	6	12.42	12.32	12.32	12.14	12.22	12.42	12.27	12.23
	11	12.06	12.02	12.01	12.02	11.98	11.86	11.78	11.87
802.11n HT40	Channel	13.5	27	40.5	54	81	108	121.5	135
	3	9.57	9.51	9.53	9.52	9.48	9.42	9.47	9.43
	6	10.12	10.03	10.09	10.01	10.13	10.16	10.11	10.09
	9	9.98	9.96	9.94	9.93	9.94	9.91	9.92	9.91

Table 12：Conducted Power Of WIFI

BT		Average Conducted Power(dBm)		
Band	Channel	GFSK	π/4DQPSK	8DPSK
BT	0	2.10	1.21	1.50
	39	2.25	1.33	1.63
	78	2.50	1.59	1.86
BLE	0	-5.91	/	/
	19	-5.85	/	/
	39	-5.57	/	/

Table 13：Conducted Power Of BT

5.4 Measurement of SAR Data

5.4.1 SAR Result Of GSM850

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1											
Left touch cheek	GSM	190/836.6	1:8.3	0.522	0.18	32.68	33	1.08	0.562	22.1	1.6
Left tilted 15 degree	GSM	190/836.6	1:8.3	0.294	0.17	32.68	33	1.08	0.316	22.1	1.6
Right touch cheek	GSM	190/836.6	1:8.3	0.427	0.14	32.68	33	1.08	0.460	22.1	1.6
Right tilted 15 degree	GSM	190/836.6	1:8.3	0.271	0.201	32.68	33	1.08	0.292	22.1	1.6
Head Test data with SIM2											
Left touch cheek	GSM	190/836.6	1:8.3	0.493	0.045	32.68	33	1.08	0.531	22.1	1.6
Body worn Test data with SIM1(Separate 15mm)											
Front side	GSM	190/836.6	1:8.3	0.447	-0.02	32.68	33	1.08	0.481	22.1	1.6
Back side	GSM	190/836.6	1:8.3	0.416	0.01	32.68	33	1.08	0.448	22.1	1.6
Body worn Test data with SIM2(Separate 15mm)											
Front side	GSM	190/836.6	1:8.3	0.463	-0.04	32.68	33	1.08	0.498	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm)											
Front side	GPRS 4TS	190/836.6	1:2.075	0.707	0.03	29.4	30	1.15	0.812	22.1	1.6
Front side	GPRS 4TS	128/824.2	1:2.075	0.665	0.01	29.41	30	1.15	0.762	22.1	1.6
Front side	GPRS 4TS	251/848.8	1:2.075	0.621	0.03	29.38	30	1.15	0.716	22.1	1.6
Back side	GPRS 4TS	190/836.6	1:2.075	0.648	-0.04	29.4	30	1.15	0.744	22.1	1.6
Left side	GPRS 4TS	190/836.6	1:2.075	0.917	0	29.4	30	1.15	1.053	22.1	1.6
Left side	GPRS 4TS	128/824.2	1:2.075	0.879	0.03	29.41	30	1.15	1.007	22.1	1.6
Left side	GPRS 4TS	251/848.8	1:2.075	0.982	0.03	29.38	30	1.15	**1.133**	22.1	1.6
Left side-repeat	GPRS 4TS	251/848.8	1:2.075	0.866	0.03	29.38	30	1.15	0.999	22.1	1.6
Right side	GPRS 4TS	251/848.8	1:2.075	0.435	0.01	29.38	30	1.15	0.502	22.1	1.6
Bottom side	GPRS 4TS	190/836.6	1:2.075	0.461	0.04	29.4	30	1.15	0.529	22.1	1.6
Hotspot Test data with SIM2 (Separate 10mm)											
Left side	GPRS 4TS	251/848.8	1:2.075	0.898	0.09	29.38	30	1.15	1.036	22.1	1.6

Table 14：SAR of GSM850 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

Test Position	Channel/ Frequency (MHz)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
Left side	251/848.8	0.982	0.866	1.15	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

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

5.4.2 SAR Result Of GSM1900

Test position	Test mode	Test Ch. /Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1											
Left touch cheek	GSM	661/1880	1:8.3	0.116	-0.07	29.37	30	1.16	0.134	21.8	1.6
Left tilted 15 degree	GSM	661/1880	1:8.3	0.0438	-0.19	29.37	30	1.16	0.051	21.8	1.6
Right touch cheek	GSM	661/1880	1:8.3	0.11	0.01	29.37	30	1.16	0.127	21.8	1.6
Right tilted 15 degree	GSM	661/1880	1:8.3	0.0106	0.18	29.37	30	1.16	0.012	21.8	1.6
Head Test data with SIM2											
Left touch cheek	GSM	661/1880	1:8.3	0.124	0.06	29.37	30	1.16	0.143	21.8	1.6
Body worn Test data with SIM1(Separate 15mm)											
Front side	GSM	661/1880	1:8.3	0.137	0.16	29.37	30	1.16	0.158	21.8	1.6
Back side	GSM	661/1880	1:8.3	0.139	0.03	29.37	30	1.16	0.161	21.8	1.6
Body worn Test data with SIM2(Separate 15mm)											
Back side	GSM	661/1880	1:8.3	0.159	0.12	29.37	30	1.16	0.184	21.8	1.6
Hotspot Test data with SIM1(Separate 10mm)											
Front side	GPRS 4TS	661/1880	1:2.075	0.307	0.17	26.41	27	1.15	0.352	21.8	1.6
Back side	GPRS 4TS	661/1880	1:2.075	0.3	0.12	26.41	27	1.15	0.344	21.8	1.6
Left side	GPRS 4TS	661/1880	1:2.075	0.0967	0.19	26.41	27	1.15	0.111	21.8	1.6
Right side	GPRS 4TS	661/1880	1:2.075	0.0543	0.19	26.41	27	1.15	0.062	21.8	1.6
Bottom side	GPRS 4TS	661/1880	1:2.075	0.308	0.14	26.41	27	1.15	**0.353**	21.8	1.6
Hotspot Test data with SIM2 (Separate 10mm)											
Bottom side	GPRS 4TS	661/1880	1:2.075	0.304	0.08	26.41	27	1.15	0.348	21.8	1.6

Table 16：SAR of GSM1900 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.3 SAR Result Of WCDMA Band V

Test position	Test mode	Test Ch./ Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1											
Left touch cheek	RMC	4182/836.6	1:1	0.339	0.02	22.25	23	1.19	0.403	22.1	1.6
Left tilted 15 degree	RMC	4182/836.6	1:1	0.23	0.18	22.25	23	1.19	0.273	22.1	1.6
Right touch cheek	RMC	4182/836.6	1:1	0.297	0.15	22.25	23	1.19	0.353	22.1	1.6
Right tilted 15 degree	RMC	4182/836.6	1:1	0.192	0.15	22.25	23	1.19	0.228	22.1	1.6
Body worn Test data with SIM1(Separate 15mm)											
Front side	RMC	4182/836.6	1:1	0.386	0.02	22.25	23	1.19	0.459	22.1	1.6
Back side	RMC	4182/836.6	1:1	0.354	0.04	22.25	23	1.19	0.421	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm)											
Front side	RMC	4182/836.6	1:1	0.481	0.09	22.25	23	1.19	0.572	22.1	1.6
Back side	RMC	4182/836.6	1:1	0.482	0.05	22.25	23	1.19	0.573	22.1	1.6
Left side	RMC	4182/836.6	1:1	0.695	-0.01	22.25	23	1.19	0.826	22.1	1.6
Left side	RMC	4132/826.4	1:1	0.731	0.02	22.16	23	1.21	**0.887**	22.1	1.6
Left side	RMC	4233/846.6	1:1	0.703	0.08	22.38	23	1.15	0.811	22.1	1.6
Right side	RMC	4182/836.6	1:1	0.324	0.08	22.38	23	1.15	0.374	22.1	1.6
Bottom side	RMC	4182/836.6	1:1	0.305	0.04	22.25	23	1.19	0.362	22.1	1.6

Table 17： SAR of WCDMA Band V for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B
2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.4 SAR Result Of WCDMA Band II

Test position	Test mode	Test Ch./ Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1											
Left touch cheek	RMC	9400/1880	1:1	0.344	0.04	22.31	23	1.17	0.403	22.1	1.6
Left tilted 15 degree	RMC	9400/1880	1:1	0.141	0.14	22.31	23	1.17	0.165	22.1	1.6
Right touch cheek	RMC	9400/1880	1:1	0.378	0.11	22.31	23	1.17	0.443	22.1	1.6
Right tilted 15 degree	RMC	9400/1880	1:1	0.119	0.17	22.31	23	1.17	0.139	22.1	1.6
Body worn Test data with SIM1(Separate 15mm)											
Front side	RMC	9400/1880	1:1	0.321	0.04	22.31	23	1.17	0.376	22.1	1.6
Back side	RMC	9400/1880	1:1	0.345	0.05	22.31	23	1.17	0.404	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm)											
Front side	RMC	9400/1880	1:1	0.445	0.04	22.31	23	1.17	0.522	22.1	1.6
Back side	RMC	9400/1880	1:1	0.502	0.02	22.31	23	1.17	**0.588**	22.1	1.6
Left side	RMC	9400/1880	1:1	0.211	0.03	22.31	23	1.17	0.247	22.1	1.6
Right side	RMC	9400/1880	1:1	0.193	0.08	22.31	23	1.17	0.226	22.1	1.6
Bottom side	RMC	9400/1880	1:1	0.304	0.15	22.31	23	1.17	0.356	22.1	1.6

Table 18： SAR of WCDMA Band II for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.5 SAR Result Of WCDMA Band IV

Test position	Test mode	Test Ch./ Freq.	Duty Cycle	SAR (W/kg) 1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1											
Left touch cheek	RMC	1412/1732.4	1:1	0.436	0.02	22.34	23	1.16	0.508	22.1	1.6
Left tilted 15 degree	RMC	1412/1732.4	1:1	0.303	-0.12	22.34	23	1.16	0.353	22.1	1.6
Right touch cheek	RMC	1412/1732.4	1:1	0.559	0.06	22.34	23	1.16	0.651	22.1	1.6
Right tilted 15 degree	RMC	1412/1732.4	1:1	0.341	0.01	22.34	23	1.16	0.397	22.1	1.6
Body worn Test data with SIM1(Separate 15mm)											
Front side	RMC	1412/1732.4	1:1	0.321	0.08	22.34	23	1.16	0.374	22.1	1.6
Back side	RMC	1412/1732.4	1:1	0.276	0.02	22.34	23	1.16	0.321	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm)											
Front side	RMC	1412/1732.4	1:1	0.57	-0.02	22.34	23	1.16	**0.664**	22.1	1.6
Back side	RMC	1412/1732.4	1:1	0.53	0.14	22.34	23	1.16	0.617	22.1	1.6
Left side	RMC	1412/1732.4	1:1	0.346	-0.02	22.34	23	1.16	0.403	22.1	1.6
Right side	RMC	1412/1732.4	1:1	0.292	-0.06	22.34	23	1.16	0.340	22.1	1.6
Bottom side	RMC	1412/1732.4	1:1	0.137	0.03	22.34	23	1.16	0.159	22.1	1.6

Table 19： SAR of WCDMA Band IV for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.6 SAR Result Of LTE Band 2(20MHz)

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power drift(dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1(1RB)											
Left touch cheek	QPSK	18900/1880	1:1	0.245	0.05	21.8	22.5	1.17	0.288	22.1	1.6
Left tilted 15 degree	QPSK	18900/1880	1:1	0.012	-0.08	21.8	22.5	1.17	0.014	22.1	1.6
Right touch cheek	QPSK	18900/1880	1:1	0.354	0.02	21.8	22.5	1.17	0.416	22.1	1.6
Right tilted 15 degree	QPSK	18900/1880	1:1	0.054	0.14	21.8	22.5	1.17	0.063	22.1	1.6
Head Test data with SIM1(50%RB)											
Left touch cheek	QPSK	18900/1880	1:1	0.211	0.09	21.74	22.5	1.19	0.251	22.1	1.6
Left tilted 15 degree	QPSK	18900/1880	1:1	0.011	0.01	21.74	22.5	1.19	0.013	22.1	1.6
Right touch cheek	QPSK	18900/1880	1:1	0.276	0.19	21.74	22.5	1.19	0.329	22.1	1.6
Right tilted 15 degree	QPSK	18900/1880	1:1	0.037	0.13	21.74	22.5	1.19	0.044	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 1RB)											
Front side	QPSK	18900/1880	1:1	0.211	-0.12	21.8	22.5	1.17	0.248	22.1	1.6
Back side	QPSK	18900/1880	1:1	0.176	-0.18	21.8	22.5	1.17	0.207	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 50%RB)											
Front side	QPSK	18900/1880	1:1	0.154	0.12	21.74	22.5	1.19	0.183	22.1	1.6
Back side	QPSK	18900/1880	1:1	0.132	0.09	21.74	22.5	1.19	0.157	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm 1RB)											
Front side	QPSK	18900/1880	1:1	0.534	0.07	21.8	22.5	1.17	0.627	22.1	1.6
Back side	QPSK	18900/1880	1:1	0.576	-0.05	21.8	22.5	1.17	**0.677**	22.1	1.6
Left side	QPSK	18900/1880	1:1	0.132	0.07	21.8	22.5	1.17	0.155	22.1	1.6
Right side	QPSK	18900/1880	1:1	0.146	0.02	21.8	22.5	1.17	0.172	22.1	1.6
Bottom side	QPSK	18900/1880	1:1	0.378	0.11	21.8	22.5	1.17	0.444	22.1	1.6
Body Test data (Separate 10mm 50%RB)											
Front side	QPSK	18900/1880	1:1	0.432	0.04	21.74	22.5	1.19	0.515	22.1	1.6
Back side	QPSK	18900/1880	1:1	0.468	-0.12	21.74	22.5	1.19	0.558	22.1	1.6
Left side	QPSK	18900/1880	1:1	0.113	0.13	21.74	22.5	1.19	0.135	22.1	1.6
Right side	QPSK	18900/1880	1:1	0.111	0.12	21.74	22.5	1.19	0.132	22.1	1.6
Bottom side	QPSK	18900/1880	1:1	0.321	-0.17	21.74	22.5	1.19	0.382	22.1	1.6

Table 20： SAR of LTE Band 2 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.7 SAR Result Of LTE Band 4(20MHz)

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power drift(dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1(1RB)											
Left touch cheek	QPSK	20175/1732.5	1:1	0.312	0.03	22.21	22.5	1.07	0.334	22.1	1.6
Left tilted 15 degree	QPSK	20175/1732.5	1:1	0.025	-0.18	22.21	22.5	1.07	0.027	22.1	1.6
Right touch cheek	QPSK	20175/1732.5	1:1	0.365	0.12	22.21	22.5	1.07	0.390	22.1	1.6
Right tilted 15 degree	QPSK	20175/1732.5	1:1	0.059	0.18	22.21	22.5	1.07	0.063	22.1	1.6
Head Test data with SIM1(50%RB)											
Left touch cheek	QPSK	20175/1732.5	1:1	0.268	0.04	22.1	22.5	1.10	0.294	22.1	1.6
Left tilted 15 degree	QPSK	20175/1732.5	1:1	0.011	0.02	22.1	22.5	1.10	0.012	22.1	1.6
Right touch cheek	QPSK	20175/1732.5	1:1	0.287	0.11	22.1	22.5	1.10	0.315	22.1	1.6
Right tilted 15 degree	QPSK	20175/1732.5	1:1	0.024	0.16	22.1	22.5	1.10	0.026	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 1RB)											
Front side	QPSK	20175/1732.5	1:1	0.318	-0.11	22.21	22.5	1.07	0.340	22.1	1.6
Back side	QPSK	20175/1732.5	1:1	0.356	-0.12	22.21	22.5	1.07	0.381	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 50%RB)											
Front side	QPSK	20175/1732.5	1:1	0.258	0.15	22.1	22.5	1.10	0.283	22.1	1.6
Back side	QPSK	20175/1732.5	1:1	0.279	0.13	22.1	22.5	1.10	0.306	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm 1RB)											
Front side	QPSK	20175/1732.5	1:1	0.498	0.02	22.21	22.5	1.07	0.532	22.1	1.6
Back side	QPSK	20175/1732.5	1:1	0.523	-0.08	22.21	22.5	1.07	**0.559**	22.1	1.6
Left side	QPSK	20175/1732.5	1:1	0.156	0.072	22.21	22.5	1.07	0.167	22.1	1.6
Right side	QPSK	20175/1732.5	1:1	0.123	0.015	22.21	22.5	1.07	0.131	22.1	1.6
Bottom side	QPSK	20175/1732.5	1:1	0.489	0.16	22.21	22.5	1.07	0.523	22.1	1.6
Body Test data (Separate 10mm 50%RB)											
Front side	QPSK	20175/1732.5	1:1	0.354	0.012	22.1	22.5	1.10	0.388	22.1	1.6
Back side	QPSK	20175/1732.5	1:1	0.378	-0.17	22.1	22.5	1.10	0.414	22.1	1.6
Left side	QPSK	20175/1732.5	1:1	0.111	0.11	22.1	22.5	1.10	0.122	22.1	1.6
Right side	QPSK	20175/1732.5	1:1	0.102	0.13	22.1	22.5	1.10	0.112	22.1	1.6
Bottom side	QPSK	20175/1732.5	1:1	0.298	-0.16	22.1	22.5	1.10	0.327	22.1	1.6

Table 21： SAR of LTE Band 4 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.8 SAR Result Of LTE Band 12(10MHz)

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power drift(dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1(1RB)											
Left touch cheek	QPSK	23095/707.5	1:1	0.543	0.09	22.53	23	1.11	0.605	22.1	1.6
Left tilted 15 degree	QPSK	23095/707.5	1:1	0.135	-0.12	22.53	23	1.11	0.150	22.1	1.6
Right touch cheek	QPSK	23095/707.5	1:1	0.458	0.16	22.53	23	1.11	0.510	22.1	1.6
Right tilted 15 degree	QPSK	23095/707.5	1:1	0.189	0.14	22.53	23	1.11	0.211	22.1	1.6
Head Test data with SIM1(50%RB)											
Left touch cheek	QPSK	23095/707.5	1:1	0.398	0.03	21.42	23	1.44	0.573	22.1	1.6
Left tilted 15 degree	QPSK	23095/707.5	1:1	0.111	0.08	21.42	23	1.44	0.160	22.1	1.6
Right touch cheek	QPSK	23095/707.5	1:1	0.346	0.18	21.42	23	1.44	0.498	22.1	1.6
Right tilted 15 degree	QPSK	23095/707.5	1:1	0.156	0.17	21.42	23	1.44	0.224	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 1RB)											
Front side	QPSK	23095/707.5	1:1	0.323	-0.14	22.53	23	1.11	0.360	22.1	1.6
Back side	QPSK	23095/707.5	1:1	0.389	-0.13	22.53	23	1.11	0.433	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 50%RB)											
Front side	QPSK	23095/707.5	1:1	0.279	0.18	21.42	23	1.44	0.401	22.1	1.6
Back side	QPSK	23095/707.5	1:1	0.3	0.11	21.42	23	1.44	0.432	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm 1RB)											
Front side	QPSK	23095/707.5	1:1	0.581	0.09	22.53	23	1.11	0.647	22.1	1.6
Back side	QPSK	23095/707.5	1:1	0.621	-0.01	22.53	23	1.11	**0.692**	22.1	1.6
Left side	QPSK	23095/707.5	1:1	0.176	0.075	22.53	23	1.11	0.196	22.1	1.6
Right side	QPSK	23095/707.5	1:1	0.117	0.017	22.53	23	1.11	0.130	22.1	1.6
Bottom side	QPSK	23095/707.5	1:1	0.289	0.13	22.53	23	1.11	0.322	22.1	1.6
Body Test data (Separate 10mm 50%RB)											
Front side	QPSK	23095/707.5	1:1	0.469	0.008	21.42	23	1.44	0.675	22.1	1.6
Back side	QPSK	23095/707.5	1:1	0.479	-0.18	21.42	23	1.44	0.689	22.1	1.6
Left side	QPSK	23095/707.5	1:1	0.123	0.13	21.42	23	1.44	0.177	22.1	1.6
Right side	QPSK	23095/707.5	1:1	0.112	0.11	21.42	23	1.44	0.161	22.1	1.6
Bottom side	QPSK	23095/707.5	1:1	0.245	-0.09	21.42	23	1.44	0.353	22.1	1.6

Table 22： SAR of LTE Band 12 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.9 SAR Result Of LTE Band 17(10MHz)

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power drift(dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1(1RB)											
Left touch cheek	QPSK	23790/710	1:1	0.549	0.02	22.28	23	1.18	0.648	22.1	1.6
Left tilted 15 degree	QPSK	23790/710	1:1	0.138	-0.13	22.28	23	1.18	0.163	22.1	1.6
Right touch cheek	QPSK	23790/710	1:1	0.452	0.11	22.28	23	1.18	0.534	22.1	1.6
Right tilted 15 degree	QPSK	23790/710	1:1	0.181	0.11	22.28	23	1.18	0.214	22.1	1.6
Head Test data with SIM1(50%RB)											
Left touch cheek	QPSK	23790/710	1:1	0.376	0.08	22.08	23	1.24	0.465	22.1	1.6
Left tilted 15 degree	QPSK	23790/710	1:1	0.134	0.03	22.08	23	1.24	0.166	22.1	1.6
Right touch cheek	QPSK	23790/710	1:1	0.331	0.04	22.08	23	1.24	0.409	22.1	1.6
Right tilted 15 degree	QPSK	23790/710	1:1	0.159	0.11	22.08	23	1.24	0.197	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 1RB)											
Front side	QPSK	23790/710	1:1	0.339	-0.11	22.28	23	1.18	0.400	22.1	1.6
Back side	QPSK	23790/710	1:1	0.387	-0.12	22.28	23	1.18	0.457	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 50%RB)											
Front side	QPSK	23790/710	1:1	0.223	0.08	22.08	23	1.24	0.276	22.1	1.6
Back side	QPSK	23790/710	1:1	0.278	0.03	22.08	23	1.24	0.344	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm 1RB)											
Front side	QPSK	23790/710	1:1	0.598	0.12	22.28	23	1.18	0.706	22.1	1.6
Back side	QPSK	23790/710	1:1	0.648	-0.15	22.28	23	1.18	**0.765**	22.1	1.6
Left side	QPSK	23790/710	1:1	0.187	0.02	22.28	23	1.18	0.221	22.1	1.6
Right side	QPSK	23790/710	1:1	0.127	0.16	22.28	23	1.18	0.150	22.1	1.6
Bottom side	QPSK	23790/710	1:1	0.294	0.08	22.28	23	1.18	0.347	22.1	1.6
Body Test data (Separate 10mm 50%RB)											
Front side	QPSK	23790/710	1:1	0.448	0.09	22.08	23	1.24	0.554	22.1	1.6
Back side	QPSK	23790/710	1:1	0.513	-0.13	22.08	23	1.24	0.634	22.1	1.6
Left side	QPSK	23790/710	1:1	0.135	0.04	22.08	23	1.24	0.167	22.1	1.6
Right side	QPSK	23790/710	1:1	0.109	0.08	22.08	23	1.24	0.135	22.1	1.6
Bottom side	QPSK	23790/710	1:1	0.248	-0.12	22.08	23	1.24	0.307	22.1	1.6

Table 23： SAR of LTE Band 17 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.10SAR Result Of LTE Band 7(20MHz)

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power drift(dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data with SIM1(1RB)											
Left touch cheek	QPSK	21100/2535.5	1:1	0.173	0.05	22.26	23	1.19	**0.205**	22.1	1.6
Left tilted 15 degree	QPSK	21100/2535.5	1:1	0.0756	-0.01	22.26	23	1.19	0.090	22.1	1.6
Right touch cheek	QPSK	21100/2535.5	1:1	0.13	0.06	22.26	23	1.19	0.154	22.1	1.6
Right tilted 15 degree	QPSK	21100/2535.5	1:1	0.0134	0.11	22.26	23	1.19	0.016	22.1	1.6
Head Test data with SIM1(50%RB)											
Left touch cheek	QPSK	21100/2535.5	1:1	0.0449	0.02	21.92	23	1.28	0.058	22.1	1.6
Left tilted 15 degree	QPSK	21100/2535.5	1:1	0.0449	0.02	21.92	23	1.28	0.058	22.1	1.6
Right touch cheek	QPSK	21100/2535.5	1:1	0.115	0.09	21.92	23	1.28	0.147	22.1	1.6
Right tilted 15 degree	QPSK	21100/2535.5	1:1	0.0715	0.12	21.92	23	1.28	0.092	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 1RB)											
Front side	QPSK	21100/2535.5	1:1	0.299	-0.15	22.26	23	1.19	0.355	22.1	1.6
Back side	QPSK	21100/2535.5	1:1	0.411	-0.15	22.26	23	1.19	0.487	22.1	1.6
Body worn Test data with SIM1(Separate 15mm 50%RB)											
Front side	QPSK	21100/2535.5	1:1	0.256	0.17	21.92	23	1.28	0.328	22.1	1.6
Back side	QPSK	21100/2535.5	1:1	0.307	0.19	21.92	23	1.28	0.394	22.1	1.6
Hotspot Test data with SIM1(Separate 10mm 1RB)											
Front side	QPSK	21100/2535.5	1:1	0.607	0.04	22.26	23	1.19	0.720	22.1	1.6
Back side	QPSK	21100/2535.5	1:1	0.625	-0.03	22.26	23	1.19	0.741	22.1	1.6
Left side	QPSK	21100/2535.5	1:1	0.142	0.01	22.26	23	1.19	0.168	22.1	1.6
Right side	QPSK	21100/2535.5	1:1	0.111	0.06	22.26	23	1.19	0.132	22.1	1.6
Bottom side	QPSK	21100/2535.5	1:1	0.643	0.19	22.26	23	1.19	**0.762**	22.1	1.6
Body Test data (Separate 10mm 50%RB)											
Front side	QPSK	21100/2535.5	1:1	0.322	0.09	21.92	23	1.28	0.413	22.1	1.6
Back side	QPSK	21100/2535.5	1:1	0.546	-0.13	21.92	23	1.28	0.700	22.1	1.6
Left side	QPSK	21100/2535.5	1:1	0.11	0.2	21.92	23	1.28	0.141	22.1	1.6
Right side	QPSK	21100/2535.5	1:1	0.08	0.15	21.92	23	1.28	0.103	22.1	1.6
Bottom side	QPSK	21100/2535.5	1:1	0.583	-0.09	21.92	23	1.28	0.748	22.1	1.6

Table 24： SAR of LTE Band 7 for Head and Body.

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B

2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).

5.4.11SAR Result Of WIFI

Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg) 1-g	Power drift (dB)	Conducted power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data												
Left touch cheek	802.11b	11/2462	97.86 %	1.022	0.204	-0.07	15.13	16	1.22	0.255	21.9	1.6
Left tilted 15 degree	802.11 b	11/2462	97.86 %	1.022	0.198	-0.11	15.13	16	1.22	0.247	21.9	1.6
Right touch cheek	802.11 b	11/2462	97.86 %	1.022	0.387	-0.1	15.13	16	1.22	**0.483**	21.9	1.6
Right tilted 15 degree	802.11 b	11/2462	97.86 %	1.022	0.373	-0.02	15.13	16	1.22	0.466	21.9	1.6
Body worn Test data(Separate 15mm)												
Front side	802.11 b	11/2462	97.86 %	1.022	0.0364	0.08	15.13	16	1.22	0.045	21.9	1.6
Back side	802.11 b	11/2462	97.86 %	1.022	0.0358	0.01	15.13	16	1.22	0.045	21.9	1.6
Hotspot Test data (Separate 10mm)												
Front side	802.11 b	11/2462	97.86 %	1.022	0.0702	-0.15	15.13	16	1.22	0.088	21.9	1.6
Back side	802.11 b	11/2462	97.86 %	1.022	0.071	0	15.13	16	1.22	0.089	21.9	1.6
Right side	802.11 b	11/2462	97.86 %	1.022	0.0724	-0.18	15.13	16	1.22	**0.090**	21.9	1.6
Top side	802.11 b	11/2462	97.86 %	1.022	0.0583	-0.01	15.13	16	1.22	0.073	21.9	1.6

Table 25：SAR of WIFI for Head and Body

Note:

1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B
2) If the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s).
3) Each channel was tested at the lowest data rate.
4) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, 802.11g/n OFDM SAR Test is not required.

5.5 Multiple Transmitter Evaluation

5.5.1 Simultaneous SAR SAR test evaluation

1) Simultaneous Transmission

NO.	Simultaneous Transmission Configuration	Head	Body worn	Hotspot
1	GSM(Voice) + WiFi	Yes	Yes	-
2	GSM(Voice) + BT	Yes	Yes	-
3	WCDMA(Voice) + WiFi	Yes	Yes	-
4	WCDMA(Voice) + BT	Yes	Yes	-
5	GPRS / EDGE(Data) + WiFi	-	-	Yes
6	GPRS / EDGE(Data) + BT	-	-	Yes
7	WCDMA(Data) + WiFi	-	-	Yes
8	WCDMA(Data) + BT	-	-	Yes
9	LTE(Data) + WiFi	Yes	Yes	Yes
10	LTE(Data) + BT	Yes	Yes	Yes
11	BT+WIFI (They share the same antenna and cannot transmit at the same time by design.)	No	No	No

5.5.2 Estimated SAR

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:

• (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;

Where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

• 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

Estimated SAR Result

Freq. Band	**Frequency (MHz)**	**Test Position**	**max. power(dBm)**	**Test Separation (mm)**	**Estimated 1g SAR (W/kg)**
Bluetooth	2480	Head	3	0	0.084
		Body-worn	3	15	0.028
		hotspot	3	NA	NA

2) Simultaneous Transmission SAR Summation Scenario for head

WWAN Band	Exposure position	① MAX.WWAN SAR(W/kg)	② MAX.WLAN SAR(W/kg)	③ MAX.BT SAR(W/kg)	Summed SAR①+②	Summed SAR①+③	Case NO.
GSM850	Left Touch	0.562	0.255	0.084	0.817	0.646	
	Left Tilt	0.316	0.247	0.084	0.563	0.400	
	Right Touch	0.46	0.483	0.084	0.943	0.544	
	Right Tilt	0.292	0.466	0.084	0.758	0.376	
GSM1900	Left Touch	0.134	0.255	0.084	0.389	0.218	
	Left Tilt	0.051	0.247	0.084	0.298	0.135	
	Right Touch	0.127	0.483	0.084	0.610	0.211	
	Right Tilt	0.012	0.466	0.084	0.478	0.096	
WCDMA Band V	Left Touch	0.403	0.255	0.084	0.658	0.487	
	Left Tilt	0.273	0.247	0.084	0.520	0.357	
	Right Touch	0.353	0.483	0.084	0.836	0.437	
	Right Tilt	0.228	0.466	0.084	0.694	0.312	
WCDMA Band II	Left Touch	0.403	0.255	0.084	0.658	0.487	
	Left Tilt	0.165	0.247	0.084	0.412	0.249	
	Right Touch	0.443	0.483	0.084	0.926	0.527	
	Right Tilt	0.139	0.466	0.084	0.605	0.223	
WCDMA Band IV	Left Touch	0.508	0.255	0.084	0.763	0.592	
	Left Tilt	0.353	0.247	0.084	0.600	0.437	
	Right Touch	0.651	0.483	0.084	**1.134**	0.735	
	Right Tilt	0.397	0.466	0.084	0.863	0.481	
LTE Band 2	Left Touch	0.288	0.255	0.084	0.543	0.372	
	Left Tilt	0.014	0.247	0.084	0.261	0.098	
	Right Touch	0.416	0.483	0.084	0.899	0.500	
	Right Tilt	0.063	0.466	0.084	0.529	0.147	
LTE Band 4	Left Touch	0.334	0.255	0.084	0.589	0.418	
	Left Tilt	0.027	0.247	0.084	0.274	0.111	
	Right Touch	0.390	0.483	0.084	0.873	0.474	
	Right Tilt	0.063	0.466	0.084	0.529	0.147	
LTE Band 12	Left Touch	0.605	0.255	0.084	0.860	0.689	
	Left Tilt	0.15	0.247	0.084	0.397	0.234	
	Right Touch	0.51	0.483	0.084	0.993	0.594	
	Right Tilt	0.211	0.466	0.084	0.677	0.295	

LTE Band 17	Left Touch	0.648	0.255	0.084	0.903	0.732	
	Left Tilt	0.163	0.247	0.084	0.410	0.247	
	Right Touch	0.534	0.483	0.084	1.017	0.618	
	Right Tilt	0.214	0.466	0.084	0.680	0.298	
LTE Band 7	Left Touch	0.205	0.255	0.084	0.460	0.289	
	Left Tilt	0.09	0.247	0.084	0.337	0.174	
	Right Touch	0.154	0.483	0.084	0.637	0.238	
	Right Tilt	0.016	0.466	0.084	0.482	0.100	

3) Simultaneous Transmission SAR Summation Scenario for body worn

WWAN Band	Exposure position	①MAX.WWAN SAR(W/kg)	② MAX.WLAN SAR(W/kg)	③ MAX.BT SAR(W/kg)	Summed SAR①+②	Summed SAR①+③	Case NO.
GSM850	Front	0.498	0.045	0.028	**0.543**	0.526	
	Back	0.448	0.045	0.028	0.493	0.476	
GSM1900	Front	0.158	0.045	0.028	0.203	0.186	
	Back	0.184	0.045	0.028	0.229	0.212	
WCDMA	Front	0.459	0.045	0.028	0.504	0.487	
Band V	Back	0.421	0.045	0.028	0.466	0.449	
WCDMA	Front	0.376	0.045	0.028	0.421	0.404	
Band II	Back	0.404	0.045	0.028	0.449	0.432	
WCDMA	Front	0.374	0.045	0.028	0.419	0.402	
Band IV	Back	0.321	0.045	0.028	0.366	0.349	
LTE Band 2	Front	0.248	0.045	0.028	0.293	0.276	
	Back	0.207	0.045	0.028	0.252	0.235	
LTE Band 4	Front	0.34	0.045	0.028	0.389	0.368	
	Back	0.381	0.045	0.028	0.426	0.409	
LTE Band 12	Front	0.36	0.045	0.028	0.405	0.388	
	Back	0.433	0.045	0.028	0.478	0.461	
LTE Band 17	Front	0.4	0.045	0.028	0.445	0.428	
	Back	0.457	0.045	0.028	0.502	0.485	
LTE Band 7	Front	0.355	0.045	0.028	0.400	0.383	
	Back	0.487	0.045	0.028	0.532	0.515	

4) Simultaneous Transmission SAR Summation Scenario for hotspot

WWAN Band	Exposure position	① MAX.WWAN SAR(W/kg)	②MAX.WLAN SAR(W/kg)	Summed SAR ①+②	Case NO.
GSM850	Front	0.812	0.088	0.900	
	Back	0.744	0.089	0.833	
	Left	1.133	/	**1.133**	
	Right	0.502	0.090	0.592	
	Top	/	0.073	0.073	
	Bottom	0.529	/	0.529	
GSM1900	Front	0.352	0.088	0.440	
	Back	0.344	0.089	0.433	
	Left	0.111	/	0.111	
	Right	0.062	0.090	0.152	
	Top	/	0.073	0.073	
	Bottom	0.353	/	0.353	
WCDMA Band V	Front	0.572	0.088	0.660	
	Back	0.573	0.089	0.662	
	Left	0.887	/	0.887	
	Right	0.374	0.090	0.464	
	Top	/	0.073	0.073	
	Bottom	0.362	/	0.362	
WCDMA Band II	Front	0.522	0.088	0.610	
	Back	0.588	0.089	0.677	
	Left	0.247	/	0.247	
	Right	0.226	0.090	0.316	
	Top	/	0.073	0.073	
	Bottom	0.356	/	0.356	
WCDMA Band IV	Front	0.664	0.088	0.752	
	Back	0.617	0.089	0.706	
	Left	0.403	/	0.403	
	Right	0.34	0.090	0.430	
	Top	/	0.073	0.073	
	Bottom	0.159	/	0.159	
LTE Band 2	Front	0.627	0.088	0.715	
	Back	0.677	0.089	0.766	
	Left	0.155	/	0.155	
	Right	0.172	0.090	0.262	
	Top	/	0.073	0.073	
	Bottom	0.444	/	0.444	
LTE Band 4	Front	0.532	0.088	0.620	
	Back	0.559	0.089	0.648	
	Left	0.167	/	0.167	
	Right	0.131	0.090	0.221	
	Top	/	0.073	0.073	
	Bottom	0.523	/	0.523	

LTE Band 12	Front	0.647	0.088	0.735	
	Back	0.692	0.089	0.781	
	Left	0.196	/	0.196	
	Right	0.13	0.090	0.220	
	Top	/	0.073	0.073	
	Bottom	0.322	/	0.322	
LTE Band 17	Front	0.706	0.088	0.794	
	Back	0.765	0.089	0.854	
	Left	0.221	/	0.221	
	Right	0.15	0.090	0.240	
	Top	/	0.073	0.073	
	Bottom	0.347	/	0.347	
LTE Band 7	Front	0.72	0.088	0.808	
	Back	0.741	0.089	0.830	
	Left	0.168	/	0.168	
	Right	0.132	0.090	0.222	
	Top	/	0.073	0.073	
	Bottom	0.762	/	0.762	

6 Equipment list

Test Platform	SPEAG DASY5 Professional
Location	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab
Description	SAR Test System (Frequency range 300MHz-6GHz)
Software Reference	DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Hardware Reference

	Equipment	Model	Serial Number	Calibration Date	Due date of calibration
☒	Robot	RX90L	F03/5V32A1/A01	NA	NA
☒	Twin Phantom	SAM 1	TP-1283	NA	NA
☐	Flat Phantom	ELI 5.0	1128	NA	NA
☒	DAE	DAE4	918	2014-12-29	2015-12-28
☒	E-Field Probe	ES3DV4	3343	2015-10-30	2016-10-29
☒	E-Field Probe	EX3DV4	7336	2015-10-30	2016-10-29
☒	Validation Kits	D750V2	1126	2014-09-19	2017-09-18
☒	Validation Kits	D835V2	4d015	2013-11-25	2016-11-24
☒	Validation Kits	D1750V2	1128	2014-09-23	2017-09-22
☒	Validation Kits	D1900V2	5d028	2013-11-27	2016-11-26
☒	Validation Kits	D2450V2	733	2013-11-26	2016-11-25
☒	Validation Kits	D2600V2	1093	2014-09-23	2017-09-22
☒	Agilent Network Analyzer	E5071C	MY46523590	2015-03-02	2016-03-01
☒	Dielectric Probe Kit	85070E	US01440210	NA	NA
☒	R&S Universal Radio Communication Tester	CMU200	103633	2015-04-25	2016-04-25
☒	R&S Universal Radio Communication Tester	CMW 500	103990	2015-01-09	2016-01-09
☒	RF Bi-Directional Coupler	ZABDC20-252H-N+	N989900825	2015-04-25	2016-04-25
☒	Agilent Signal Generator	E4438C	MY42082326	2015-04-25	2016-04-25
☒	Mini-Circuits Preamplifier	ZHL-42	QA0827002	2015-04-25	2016-04-25
☒	Agilent Power Meter	E4416A	GB41292095	2015-04-25	2016-04-25
☒	Agilent Power Sensor	8481H	MY41091234	2015-04-25	2016-04-25
☒	R&S Power Sensor	NRP-Z92	100025	2015-04-25	2016-04-25
☒	Attenuator	TS2-3dB	30704	2015-04-25	2016-04-25
☒	Coaxial low pass filter	VLF-2500(+)	NA	2015-04-25	2016-04-25
☒	50 Ω coaxial load	KARN-50+	00850	2015-04-25	2016-04-25
☒	DC POWER SUPPLY	SK1730SL5A	NA	2015-04-25	2016-04-25

7 Measurement Uncertainty

Measurements and results are all in compliance with the standards listed in section 12 of this report. All measurements and results are recorded and maintained at the laboratory performing the tests and measurement uncertainties are taken into account when comparing measurements to pass/ fail criteria. The Expanded uncertainty (95% CONFIDENCE INTERVAL) is **21.36%**.

A	b1	c	d	e = f(d,k)	g	i = C*g/e	K
Uncertainty Component	Section in P1528	Tol (%)	Prob . Dist.	Div.	Ci (1g)	1g ui (%)	Vi (Veff)
Probe calibration	E.2.1	6.3	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.5	R	$\sqrt{3}$		0.20	∞
hemispherical isotropy	E.2.2	2.6	R	$\sqrt{3}$	$\sqrt{Cp}$	1.06	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	0.58	∞
Linearity	E.2.4	0.6	R	$\sqrt{3}$	1	0.35	∞
System detection limit	E.2.5	0.25	R	$\sqrt{3}$	1	0.14	∞
Readout electronics	E.2.6	0.3	N	1	1	0.30	∞
Response time	E.2.7	0	R	$\sqrt{3}$	1	0.00	∞
Integration time	E.2.8	2.6	R	$\sqrt{3}$	1	1.50	∞
RF ambient Condition –Noise	E.6.1	3	R	$\sqrt{3}$	1	1.73	∞
RF ambient Condition - reflections	E.6.1	3	R	$\sqrt{3}$	1	1.73	∞
Probe positioning- mechanical tolerance	E.6.2	1.5	R	$\sqrt{3}$	1	0.87	∞
Probe positioning- with respect to phantom	E.6.3	2.9	R	$\sqrt{3}$	1	1.67	∞
Max. SAR evaluation	E.5.2	1	R	$\sqrt{3}$	1	0.58	∞
Test sample positioning	E.4.2	3.7	N	1	1	3.70	9
Device holder uncertainty	E.4.1	3.6	N	1	1	3.60	∞
Output power variation –SAR drift measurement	6.6.2	5	R	$\sqrt{3}$	1	2.89	∞
Phantom uncertainty (shape and thickness tolerances)	E.3.1	4	R	$\sqrt{3}$	1	2.31	∞
Liquid conductivity - deviation from target values	E.3.2	5	R	$\sqrt{3}$	0.64	1.85	∞
Liquid conductivity - measurement uncertainty	E.3.2	5.78	N	1	0.64	3.68	5
Liquid permittivity - deviation from target values	E.3.3	5	R	$\sqrt{3}$	0.6	1.73	∞

Liquid permittivity - measurement uncertainty	E.3.3	0.62	N	1	0.6	0.372	5
Combined standard uncertainty				RSS		10.68	430
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		**21.36**	

Table 26：Measurement Uncertainty

Appendix A: Detailed System Validation Results

System Performance Check at 750 MHz Head TSL

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1126

Date/Time: 12/03/2015

Communication System:CW (0); Frequency: 750 MHz;Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 41.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3– SN3343; ConvF(6.34, 6.34, 6.34); Calibrated 10/30/2015;

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

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

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

Maximum value of SAR (interpolated) = 2.29 W/kg

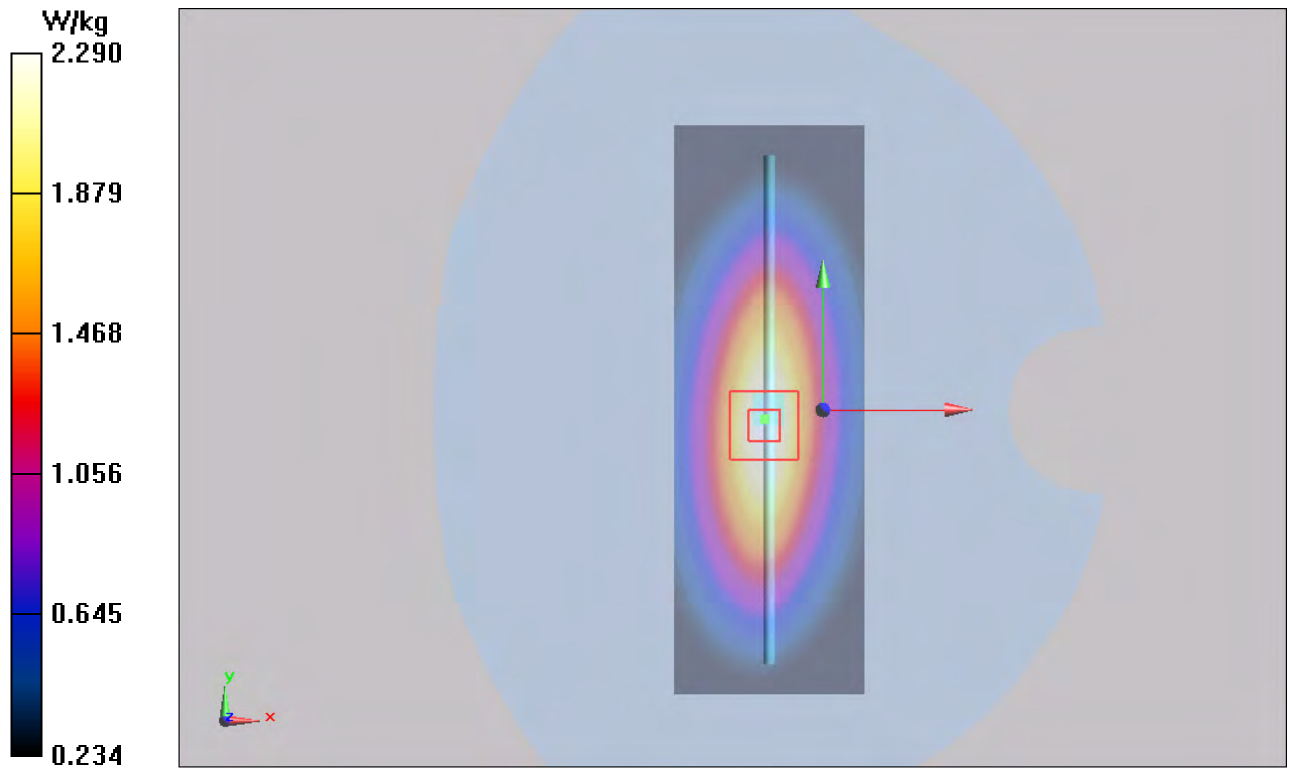
d=15mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 50.653 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 3.16 W/kg

SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.41 W/kg

Maximum value of SAR (measured) = 2.29 W/kg



System Performance Check at 750 MHz Body TSL

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1126

Date/Time: 12/03/2015

Communication System:CW (0); Frequency: 750 MHz;Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 55.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3– SN3343; ConvF(6.36, 6.36, 6.36); Calibrated 10/30/2015;

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

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

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

Maximum value of SAR (interpolated) = 2.36 W/kg

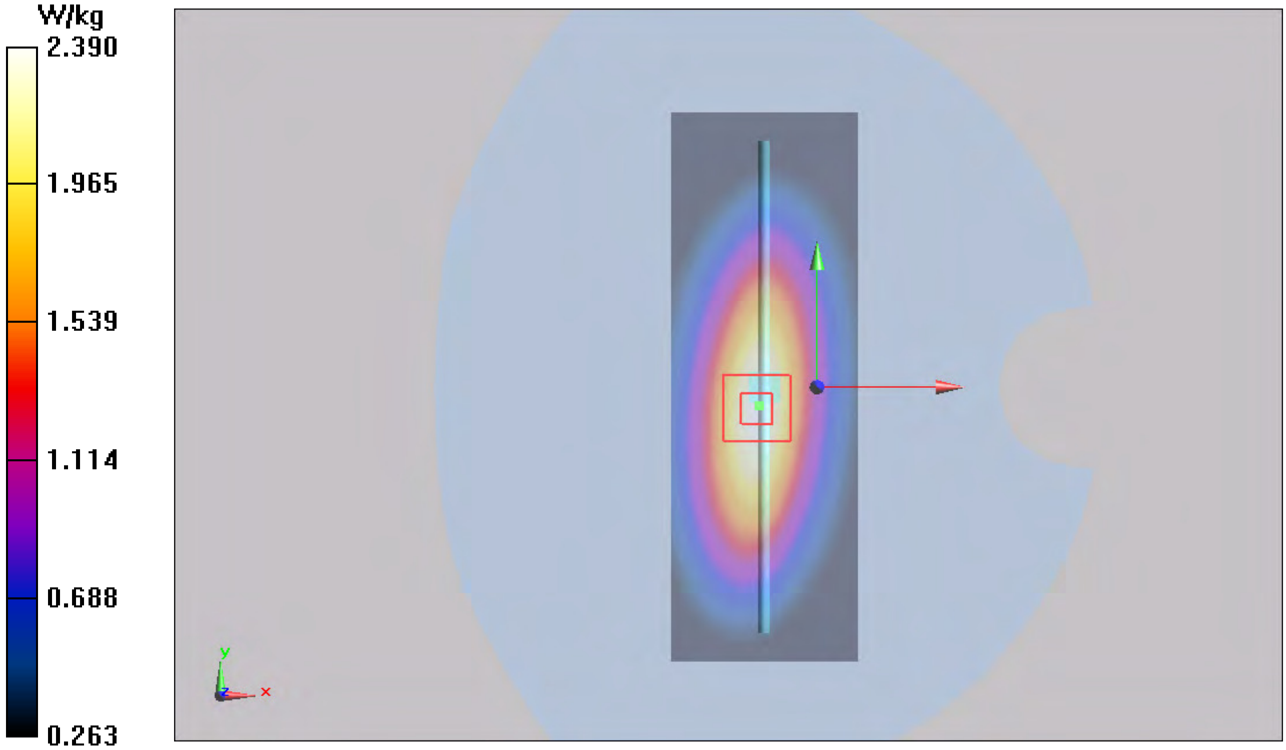
d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 48.998 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.24 W/kg

SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.49 W/kg

Maximum value of SAR (measured) = 2.39 W/kg



System Performance Check at 835 MHz Head TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d015

Date: 12/04/2015

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

Medium parameters used: f = 835 MHz; σ = 0.905 mho/m; ε_r = 42.9 ρ = 1000 kg/m^3

Ambient Temperature:22.1 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3– SN3343; ConvF(6.10, 6.10, 6.10); Calibrated 10/30/2015;

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

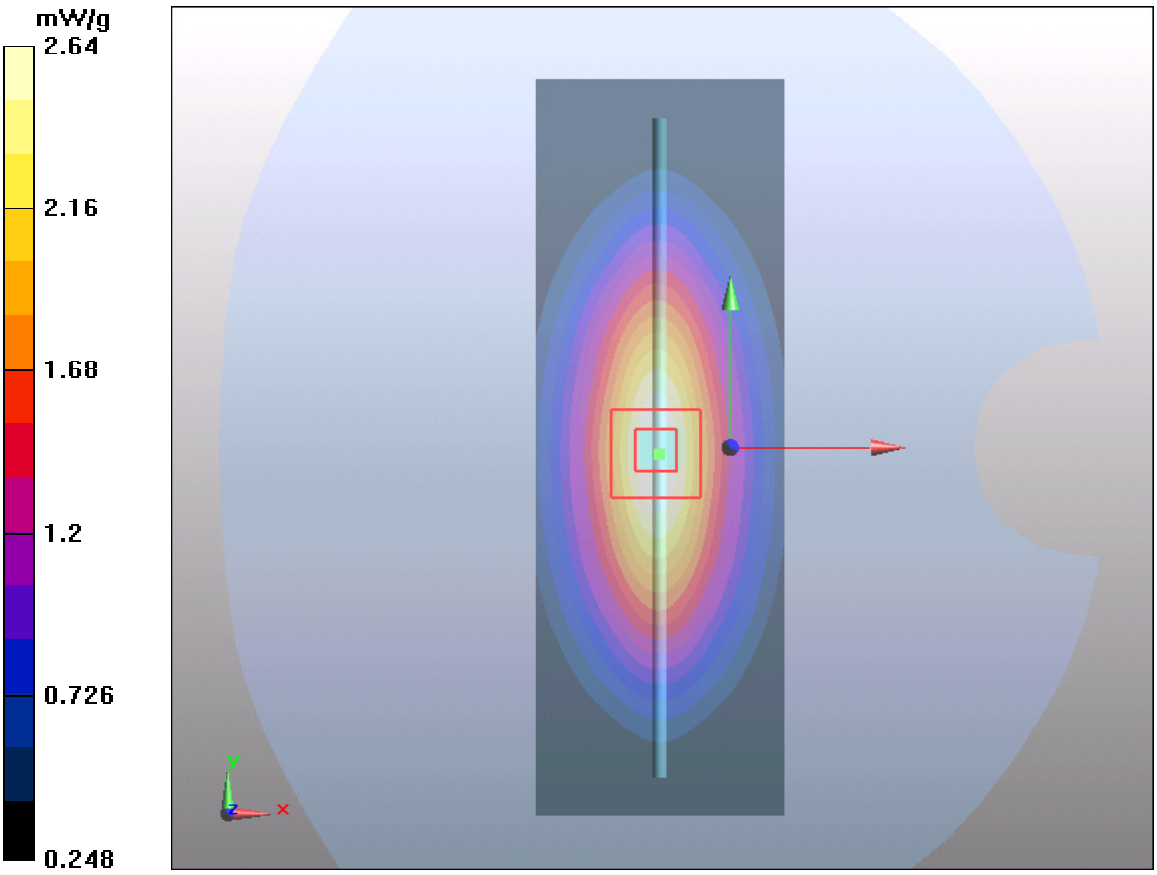
d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.63 mW/g

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



System Performance Check at 835 MHz Body TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d015

Date: 12/04/2015

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

Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 55.375; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3 – SN3343; ConvF(6.22, 6.22, 6.22); Calibrated:10/30/2015;

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

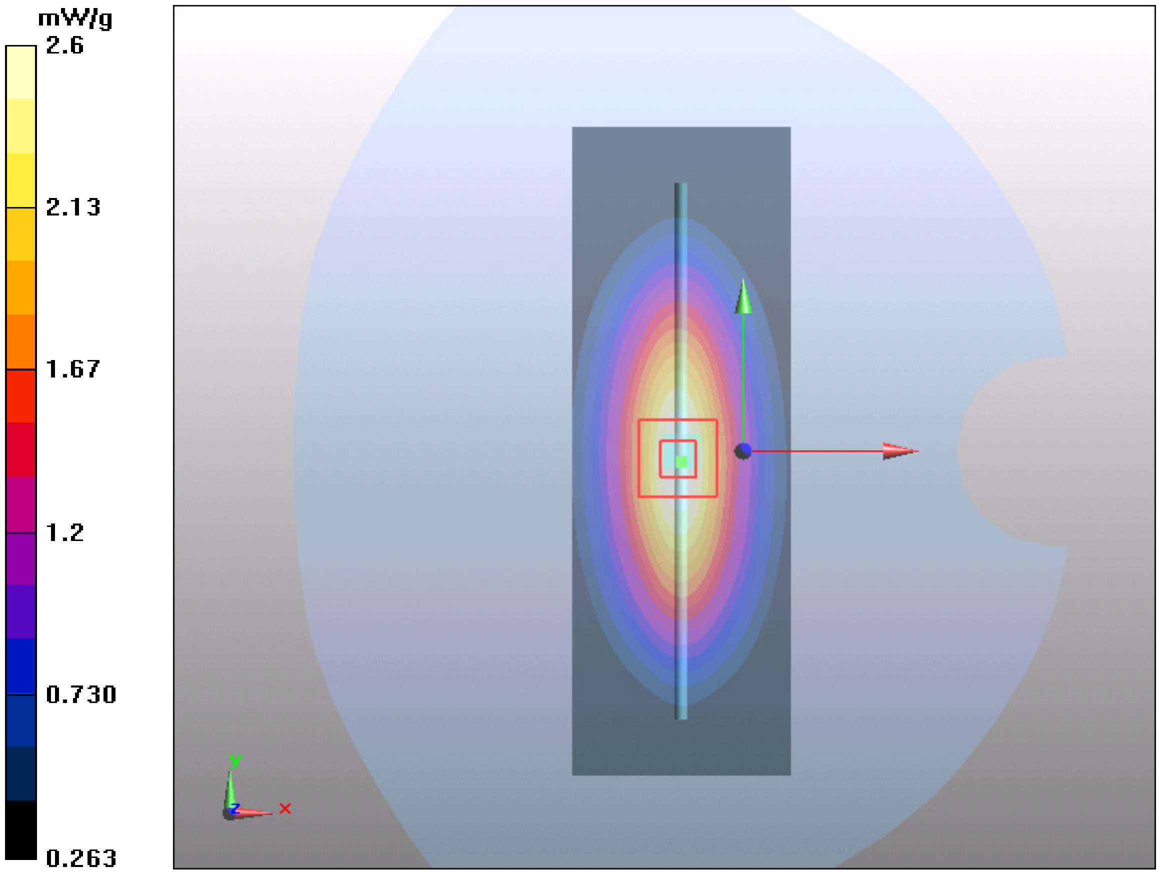
d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 3.5 W/kg

SAR(1 g) = 2.26 mW/g; SAR(10 g) = 1.54 mW/g

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



System Performance Check at 1750 MHz HSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1128

Date: 12/05/2015

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

Medium parameters used: f = 1750 MHz; σ = 1.39 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3 – SN3343; ConvF(5.18, 5.18, 5.18); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM2; Type: SAM; Serial: TP-1283

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

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

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

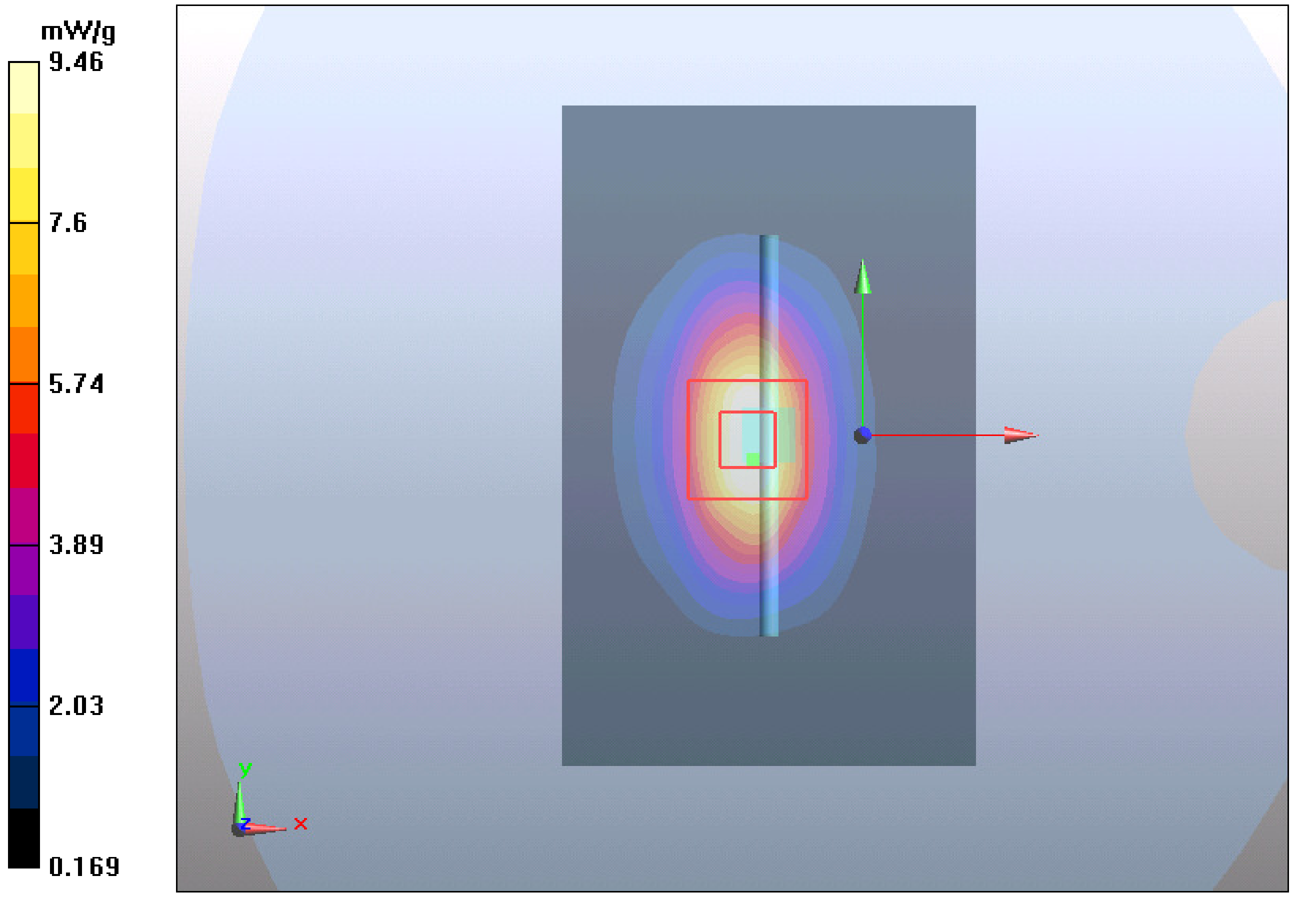
d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

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

Peak SAR (extrapolated) = 15.5 W/kg

SAR(1 g) = 9.18 mW/g; SAR(10 g) = 5.35 mW/g

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



System Performance Check at 1750 MHz MSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1128

Date/Time: 12/05/2015

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

Medium parameters used: f = 1750 MHz; σ = 1.51 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3 – SN3343; ConvF(4.90, 4.90, 4.90); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM2; Type: SAM; Serial: TP-1283

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

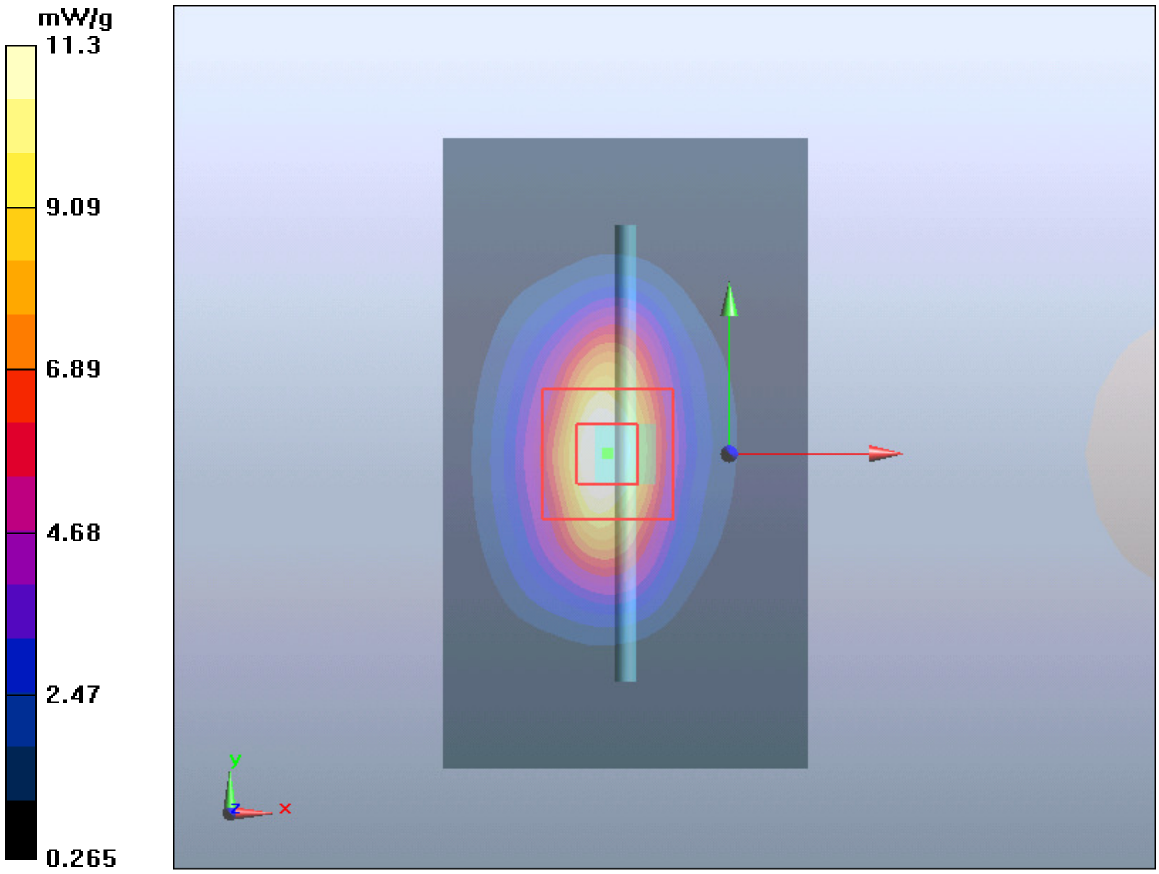
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.3 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.59 mW/g; SAR(10 g) = 5.45 mW/g

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



System Performance Check at 1900 MHz Head TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d028

Date: 12/06/2015

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

Medium parameters used: f = 1900 MHz; σ = 1.44 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.8℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3 – SN3343; ConvF(5.03, 5.03, 5.03); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

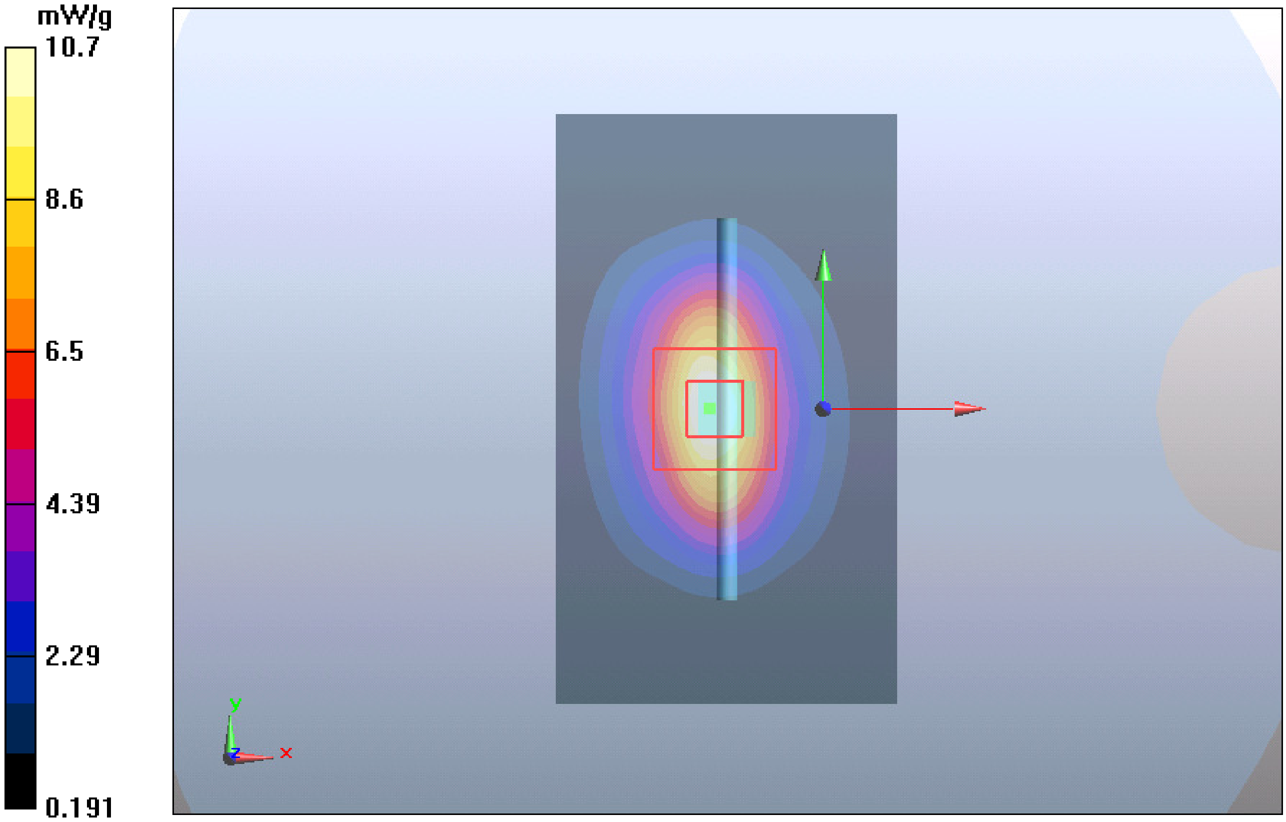
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 4.93 mW/g

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



System Performance Check at 1900 MHz Body TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d028

Date: 12/06/2015

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

Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.8℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3 – SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

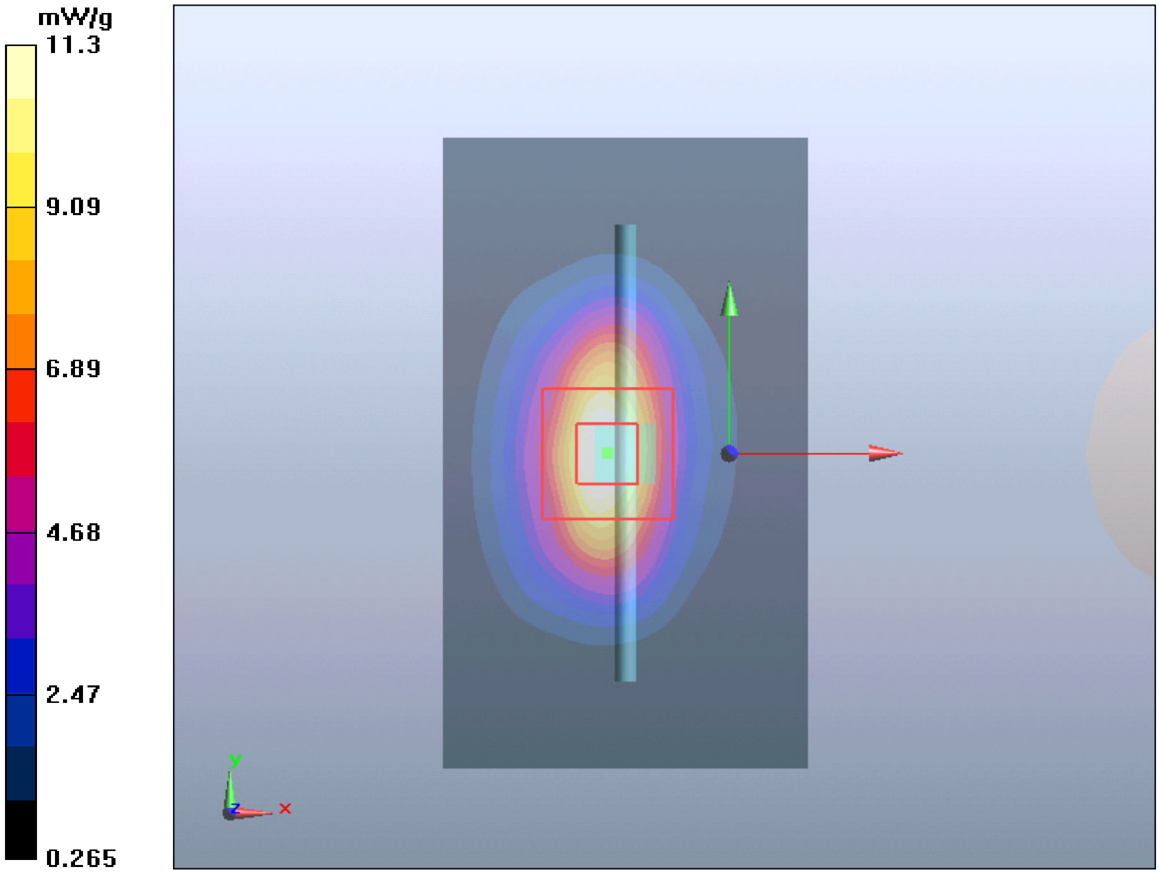
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 10.9mW/g; SAR(10 g) = 5.25 mW/g

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



System Performance Check at 2450 MHz Head TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:733

Date: 12/07/2015

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

Medium parameters used: f = 2450 MHz; σ = 1.78 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.9℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: ES3DV3 – SN3343; ConvF(4.54, 4.54, 4.54); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

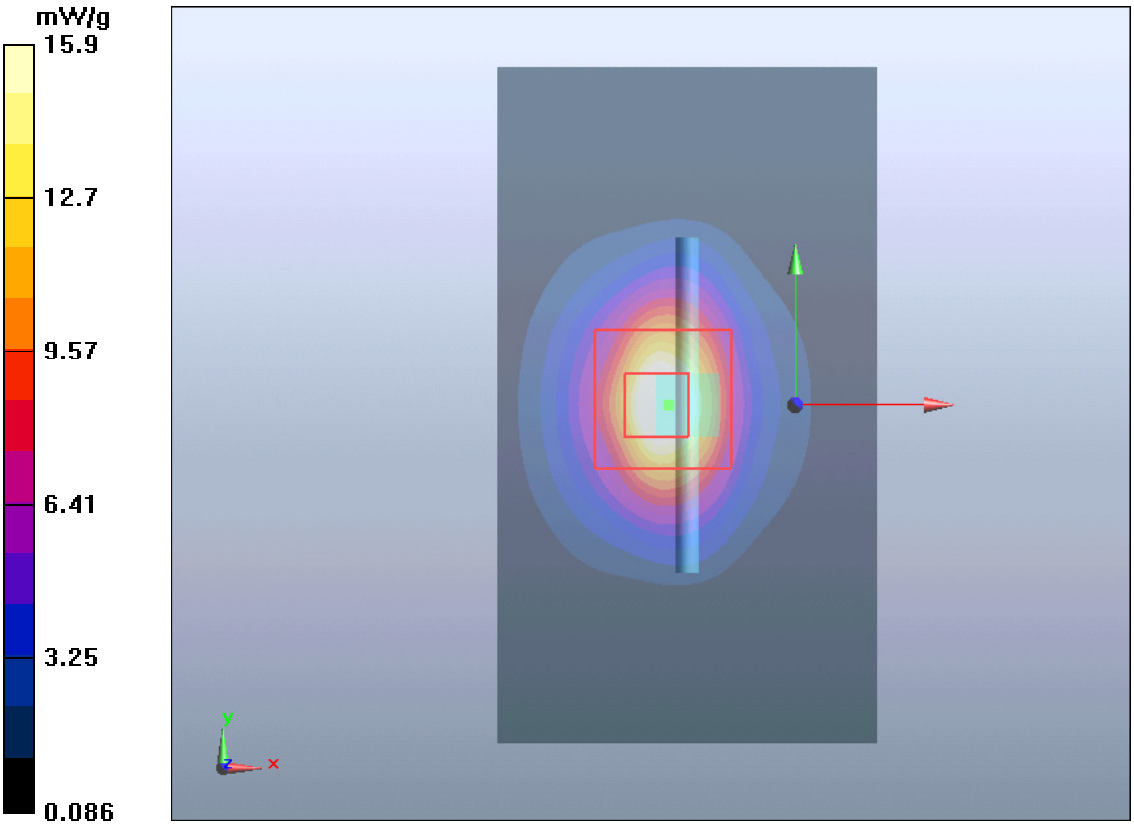
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 30 W/kg

SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.42 mW/g

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



System Performance Check at 2450 MHz Body TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:733

Date: 12/07/2015

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

Medium parameters used: f = 2450 MHz; σ = 1.95 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.9℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)
Probe: ES3DV3 – SN3343; ConvF(4.29, 4.29, 4.29); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

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

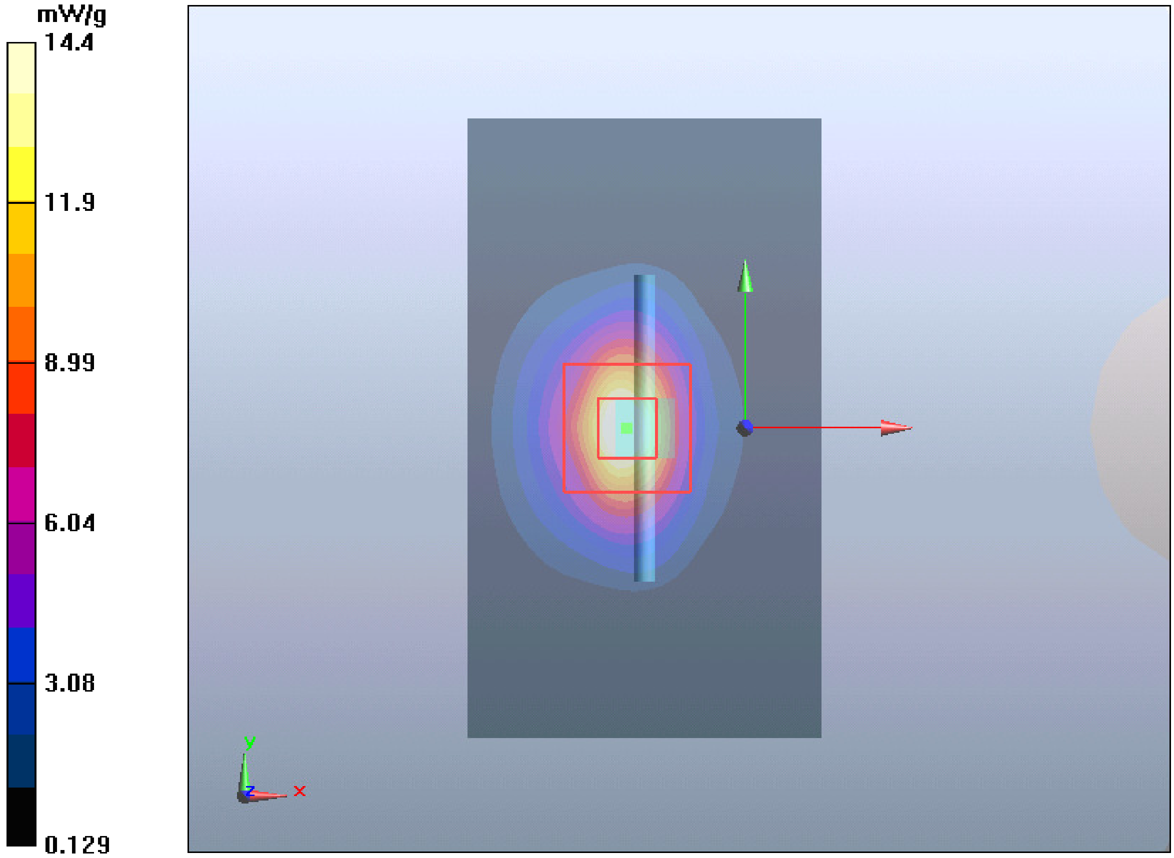
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 25.4 W/kg

SAR(1 g) = 11.8 mW/g; SAR(10 g) = 6.20 mW/g

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



System Performance Check at 2600 MHz Head TSL

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1093

Date/Time: 12/08/2015

Communication System: CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz; σ = 1.94 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 – SN7336; ConvF(7.33, 7.33, 7.33); Calibrated: 10/30/2015

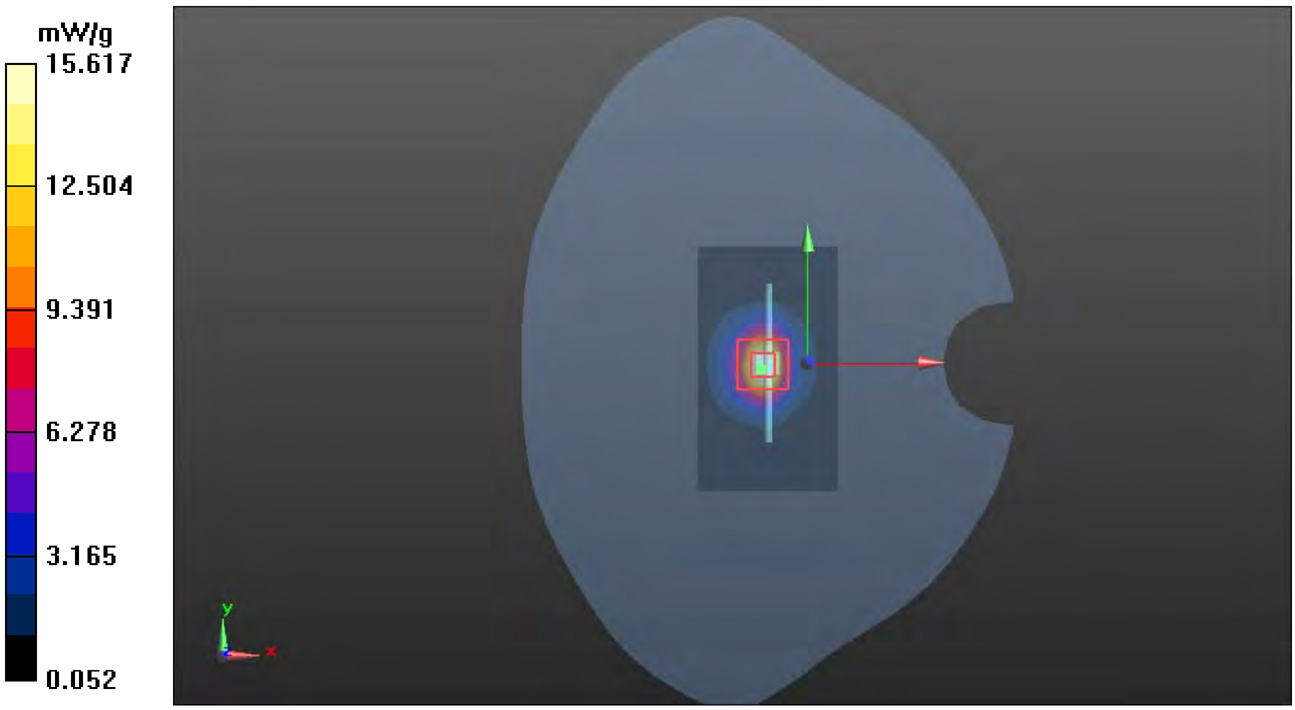
Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

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) = 14.4 mW/g; SAR(10 g) = 6.27 mW/g
Maximum value of SAR (measured) = 15.617 mW/g



System Performance Check at 2600 MHz Body TSL

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1093

Date/Time: 12/08/2015

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

Medium parameters used: f = 2600 MHz; σ = 2.17 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 22.1℃

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4– SN7336; ConvF(7.18, 7.18, 7.18); Calibrated: 10/30/2015

Electronics: DAE4 Sn918; Calibrated: 12/29/2014

Phantom: SAM1; Type: SAM; Serial: TP-1283

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

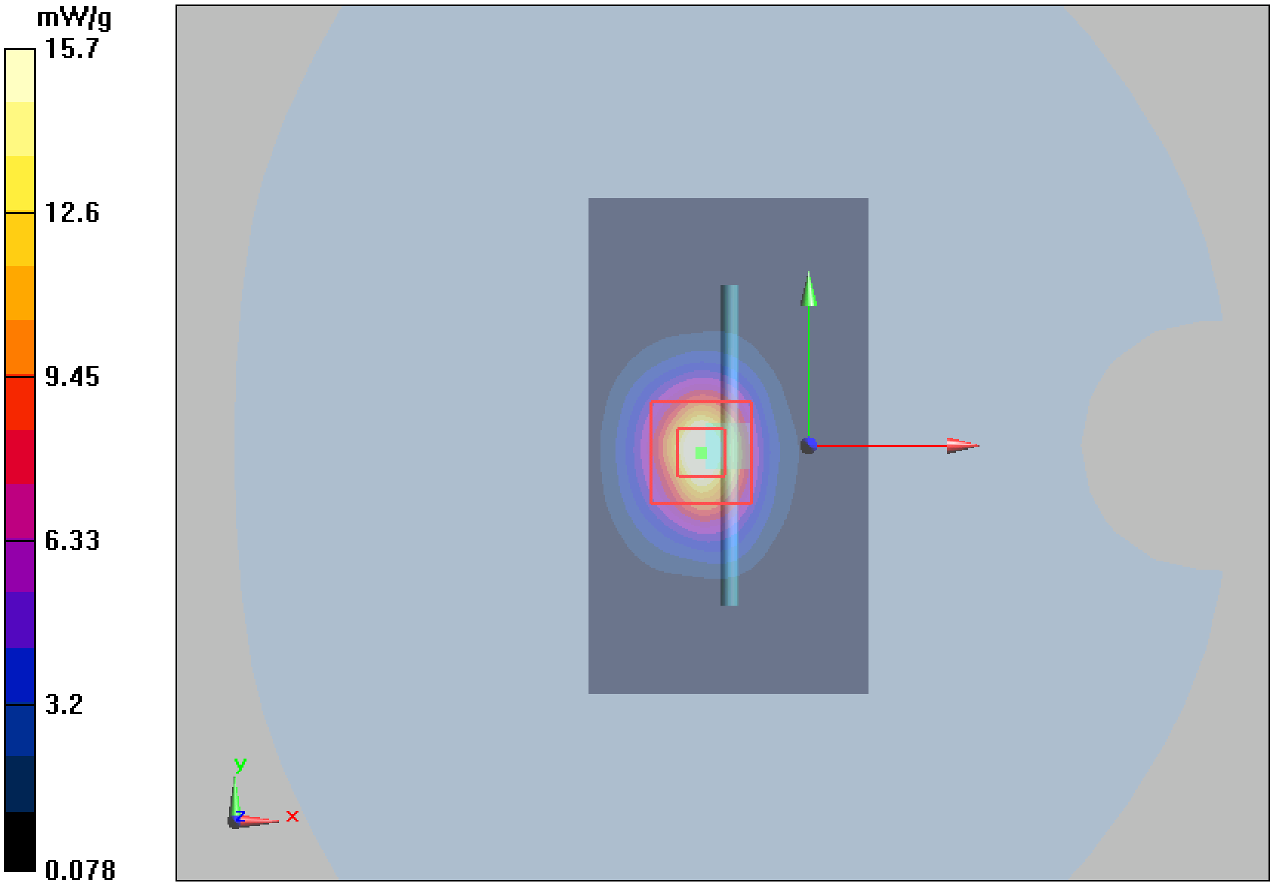
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Peak SAR (extrapolated) = 28.5 W/kg

SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.19 mW/g

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



Appendix B: Detailed Test Results

GSM850 190CH Left touch cheek

Date: 2015-12-04

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

Medium: HSL835;Medium parameters used: f = 837 MHz; ó = 0.907 S/m; år = 42.907; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(6.10, 6.10, 6.10); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.529 W/kg

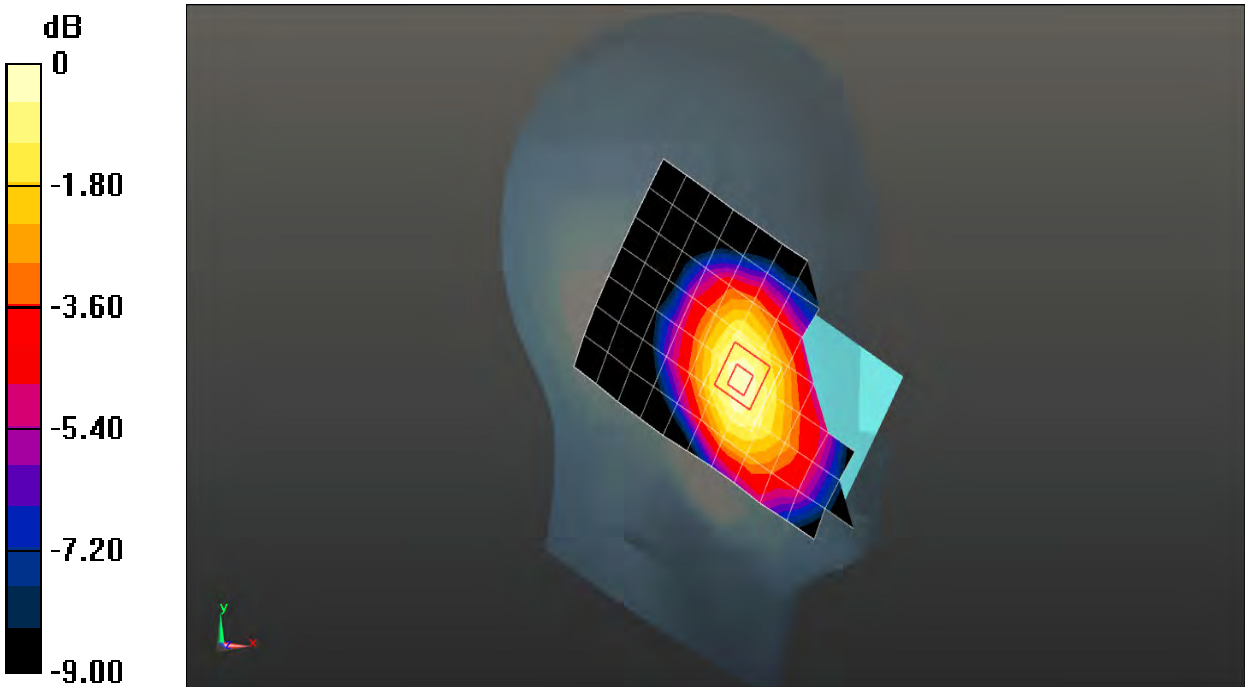
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.408 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.665 W/kg

SAR(1 g) = 0.522 W/kg; SAR(10 g) = 0.393 W/kg

Maximum value of SAR (measured) = 0.553 W/kg



0 dB = 0.553 W/kg = -2.57 dBW/kg

GSM850 190CH Front side 15mm with SIM2
Date: 2015-12-04
Communication System: UID 0, GSM Only Communication System (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042

Medium: MSL835;Medium parameters used: f = 837 MHz; ó = 0.984 S/m; år = 55.281; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(6.22, 6.22, 6.22); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.480 W/kg

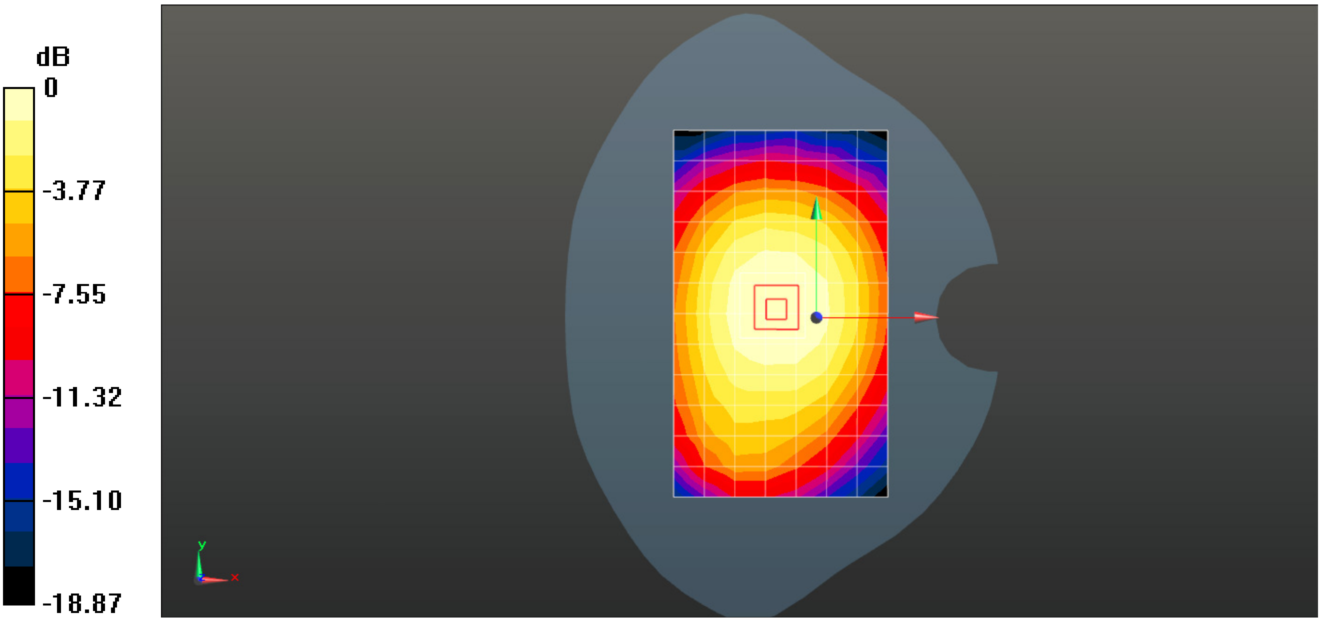
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.00 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.581 W/kg

SAR(1 g) = 0.463 W/kg; SAR(10 g) = 0.357 W/kg

Maximum value of SAR (measured) = 0.483 W/kg



0 dB = 0.483 W/kg = -3.19 dBW/kg

GSM850 GPRS 4TS 251CH Left side 10mm

Date: 2015-12-04

Communication System: UID 0, GPRS/EGPRS Mode(4up) Communication System (0); Frequency: 848.6 MHz;Duty Cycle: 1:2.0797

Medium: MSL835;Medium parameters used: f = 849 MHz; ó = 1.005 S/m; år = 55.167; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(6.22, 6.22, 6.22); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.957 W/kg

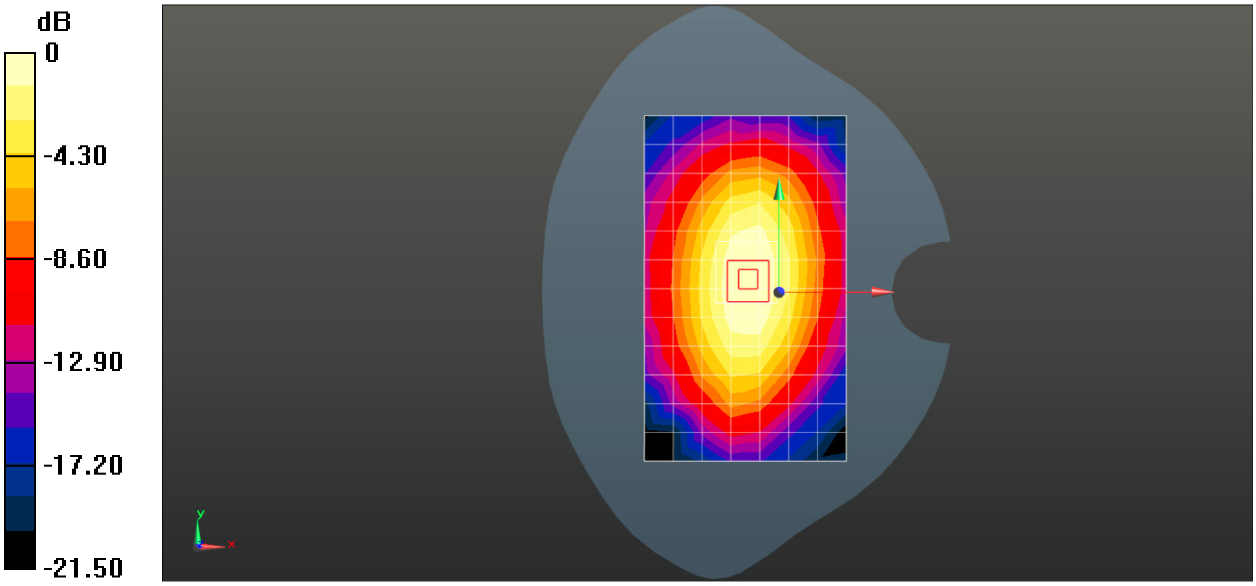
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 32.05 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.38 W/kg

SAR(1 g) = 0.982 W/kg; SAR(10 g) = 0.678 W/kg

Maximum value of SAR (measured) = 0.957W/kg



0 dB = 0.957 W/kg = -0.19 dBW/kg

GSM1900 661CH Left touch cheek with SIM2

Date: 2015-12-06

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

Medium: HSL1900;Medium parameters used: f = 1880 MHz; ó = 1.419 S/m; år = 40.582; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(5.03, 5.03, 5.03); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.110 W/kg

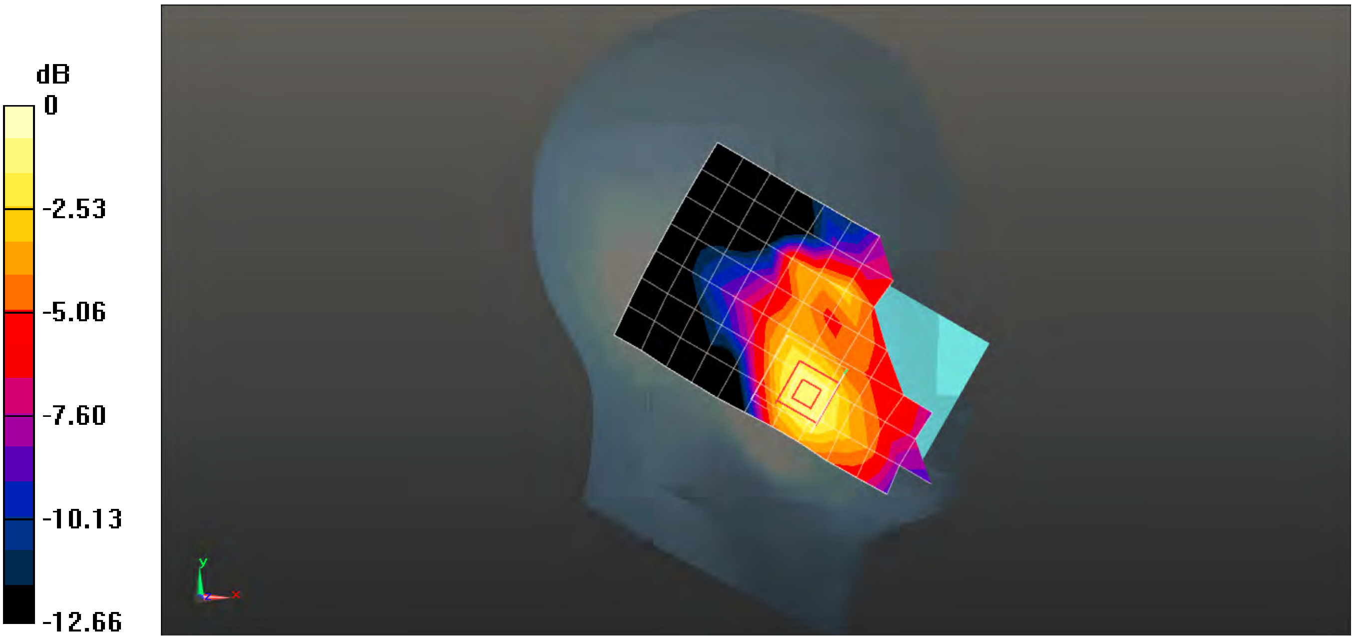
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.812 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.176 W/kg

SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.080 W/kg

Maximum value of SAR (measured) = 0.134 W/kg



0 dB = 0.134 W/kg = -8.73 dBW/kg

GSM1900 661CH Back side 15mm with SIM2

Date: 2015-12-06

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

Medium: MSL1900;Medium parameters used: f = 1880 MHz; ó = 1.493 S/m; år = 52.273; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.160 W/kg

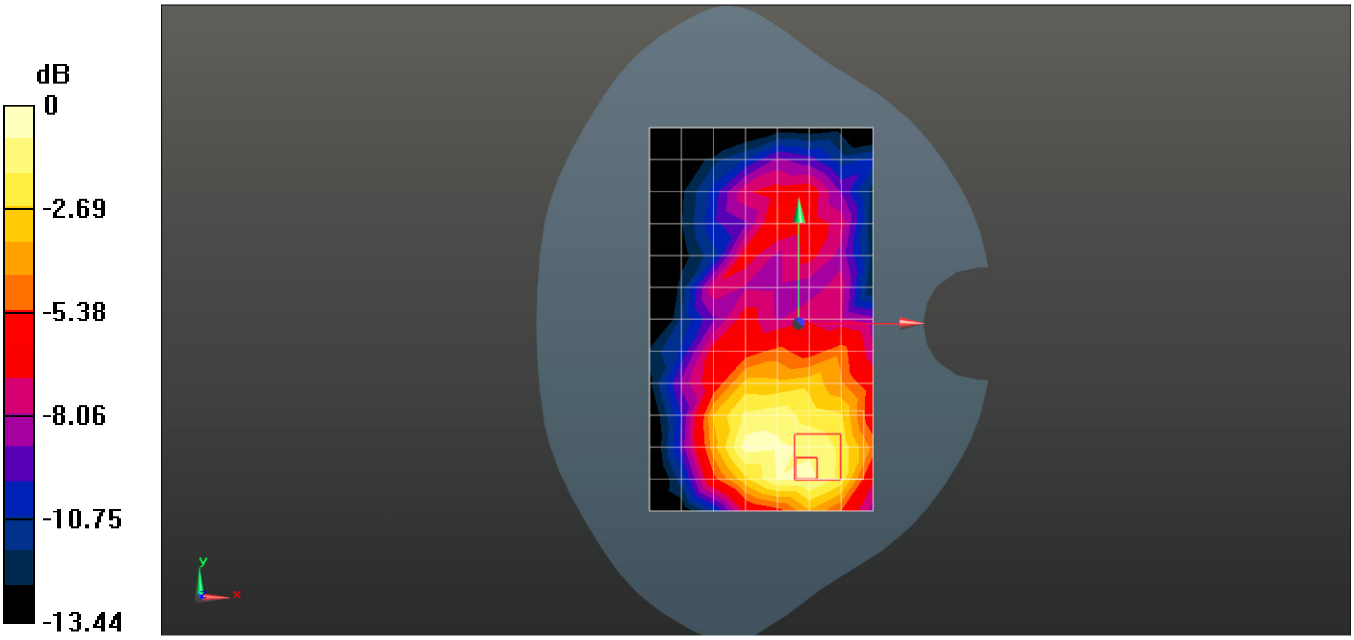
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.939 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.252 W/kg

SAR(1 g) = 0.159 W/kg; SAR(10 g) = 0.096 W/kg

Maximum value of SAR (measured) = 0.179 W/kg



0 dB = 0.179 W/kg = -7.47 dBW/kg

GSM1900 GPRS 4TS 661CH Bottom side 10mm

Date: 2015-12-06

Communication System: UID 0, GPRS/EGPRS Mode(4up) Communication System (0); Frequency: 1880 MHz;Duty Cycle: 1:2.0797

Medium: MSL1900;Medium parameters used: f = 1880 MHz; ó = 1.493 S/m; år = 52.273; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.333 W/kg

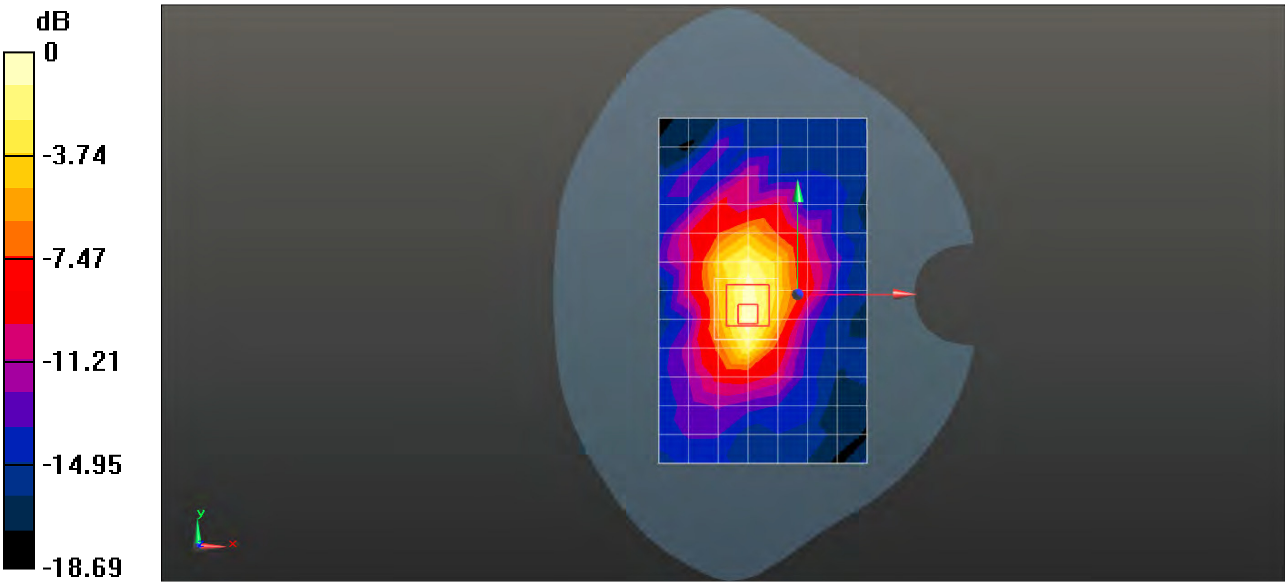
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.96 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.522 W/kg

SAR(1 g) = 0.308 W/kg; SAR(10 g) = 0.176 W/kg

Maximum value of SAR (measured) = 0.336 W/kg



0 dB = 0.336 W/kg = -4.73 dBW/kg

WCDMA Band V 4182CH Left touch cheek

Date: 2015-12-04

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

Medium: HSL835;Medium parameters used (interpolated): f = 836.4 MHz; ó = 0.906 S/m; år = 42.92; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(6.10, 6.10, 6.10); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.322 W/kg

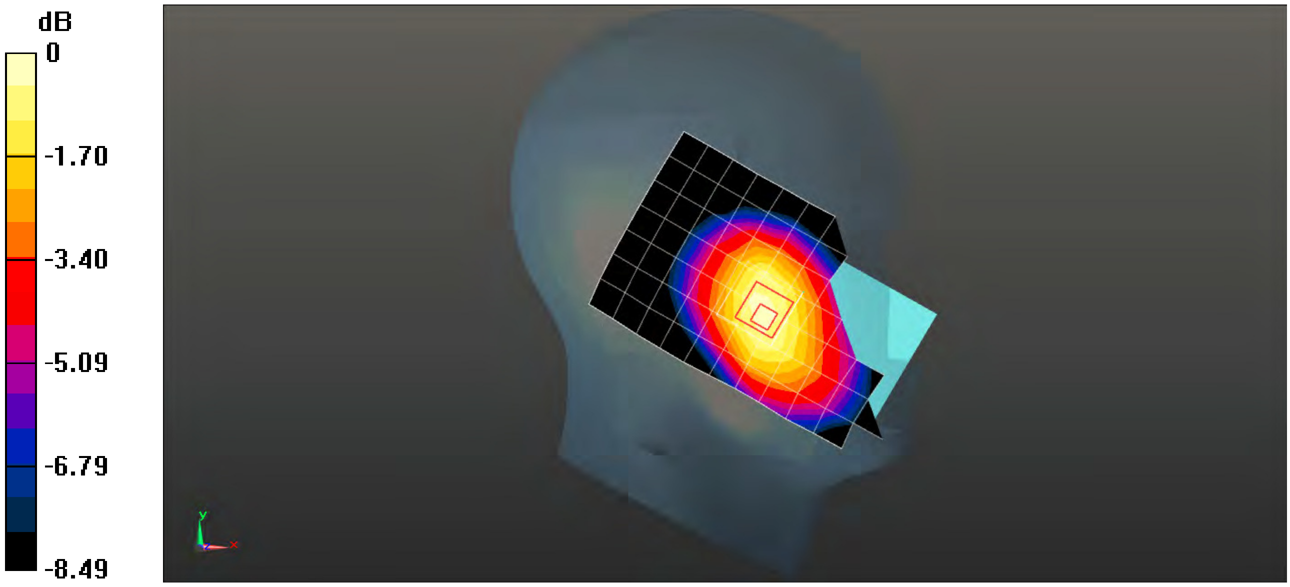
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.136 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.425 W/kg

SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.257 W/kg

Maximum value of SAR (measured) = 0.357 W/kg



0 dB = 0.357 W/kg = -4.47 dBW/kg

WCDMA Band V 4182CH Front side 15mm

Date: 2015-12-04

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

Medium: MSL835;Medium parameters used (interpolated): f = 836.4 MHz; ó = 0.984 S/m; år = 55.294; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(6.22, 6.22, 6.22); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.500 W/kg

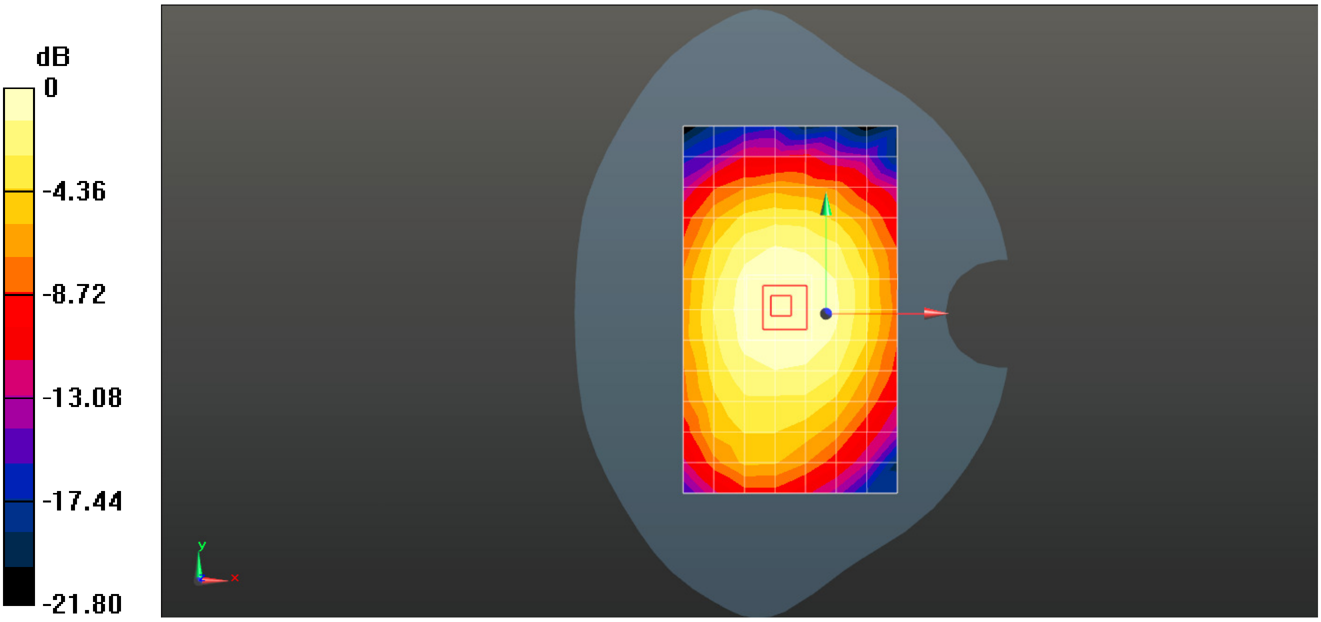
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.37 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.604 W/kg

SAR(1 g) = 0.386 W/kg; SAR(10 g) = 0.274 W/kg

Maximum value of SAR (measured) = 0.510 W/kg



0 dB = 0.510 W/kg = -3.01 dBW/kg

WCDMA Band V 4132CH Left side 10mm

Date: 2015-12-04

Communication System: UID 0, WCDMA (0); Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium: MSL835;Medium parameters used (interpolated): f = 826.4 MHz; ó = 0.976 S/m; år = 55.377; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(6.22, 6.22, 6.22); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.757 W/kg

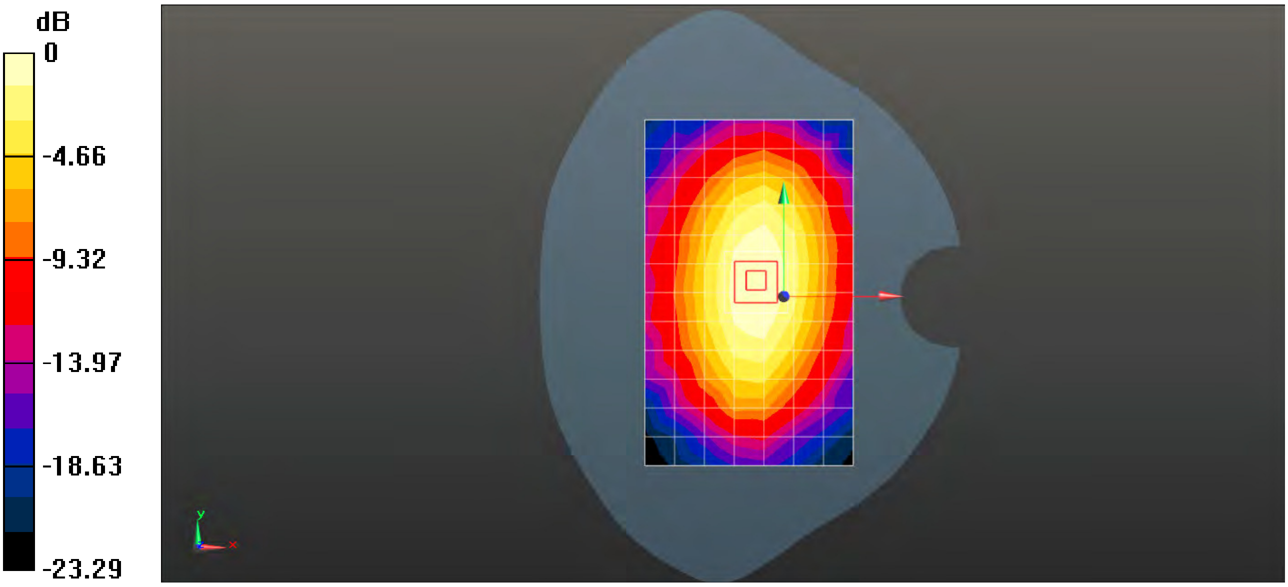
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.27 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.01 W/kg

SAR(1 g) = 0.731 W/kg; SAR(10 g) = 0.514 W/kg

Maximum value of SAR (measured) = 0.779 W/kg



0 dB = 0.757 W/kg = -1.21 dBW/kg

WCDMA Band II 9800CH Right touch cheek

Date: 2015-12-06

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

Medium: HSL1900;Medium parameters used: f = 1880 MHz; ó = 1.419 S/m; år = 40.582; ñ = 1000 kg/m3

Phantom section: Right Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(5.03, 5.03, 5.03); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.543 W/kg

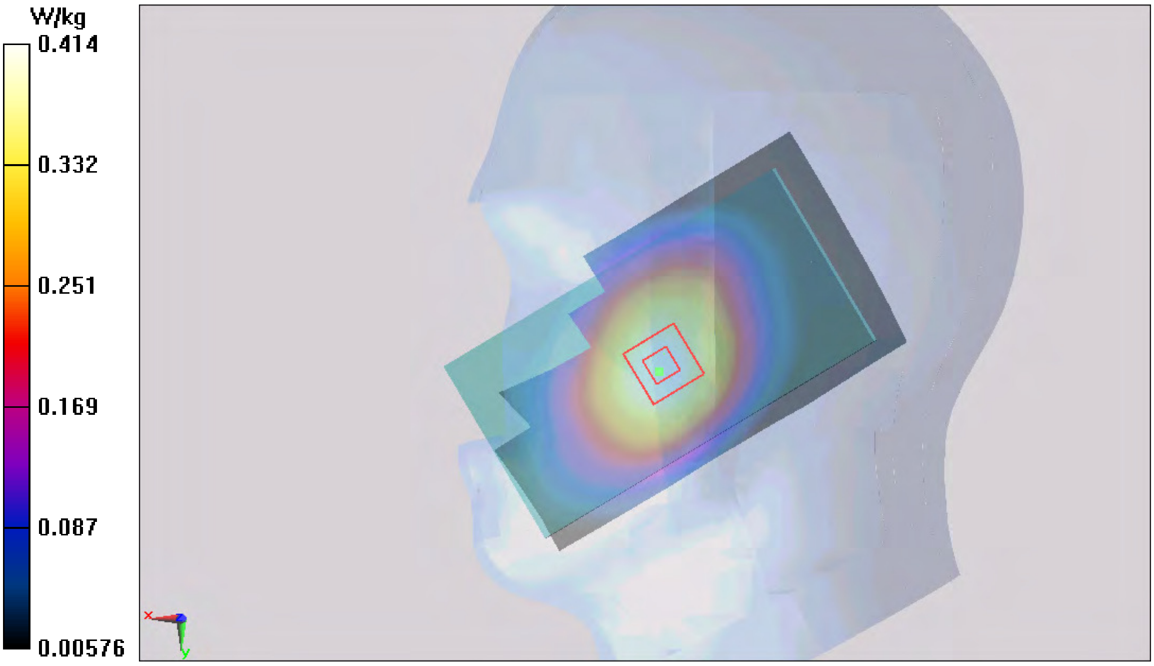
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.793 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.535 W/kg

SAR(1 g) = 0.378 W/kg; SAR(10 g) = 0.278 W/kg

Maximum value of SAR (measured) = 0.414 W/kg



WCDMA Band II 9800 CH Back side 15mm

Date: 2015-12-06

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

Medium: MSL1900;Medium parameters used: f = 1880 MHz; ó = 1.493 S/m; år = 52.273; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.598 W/kg

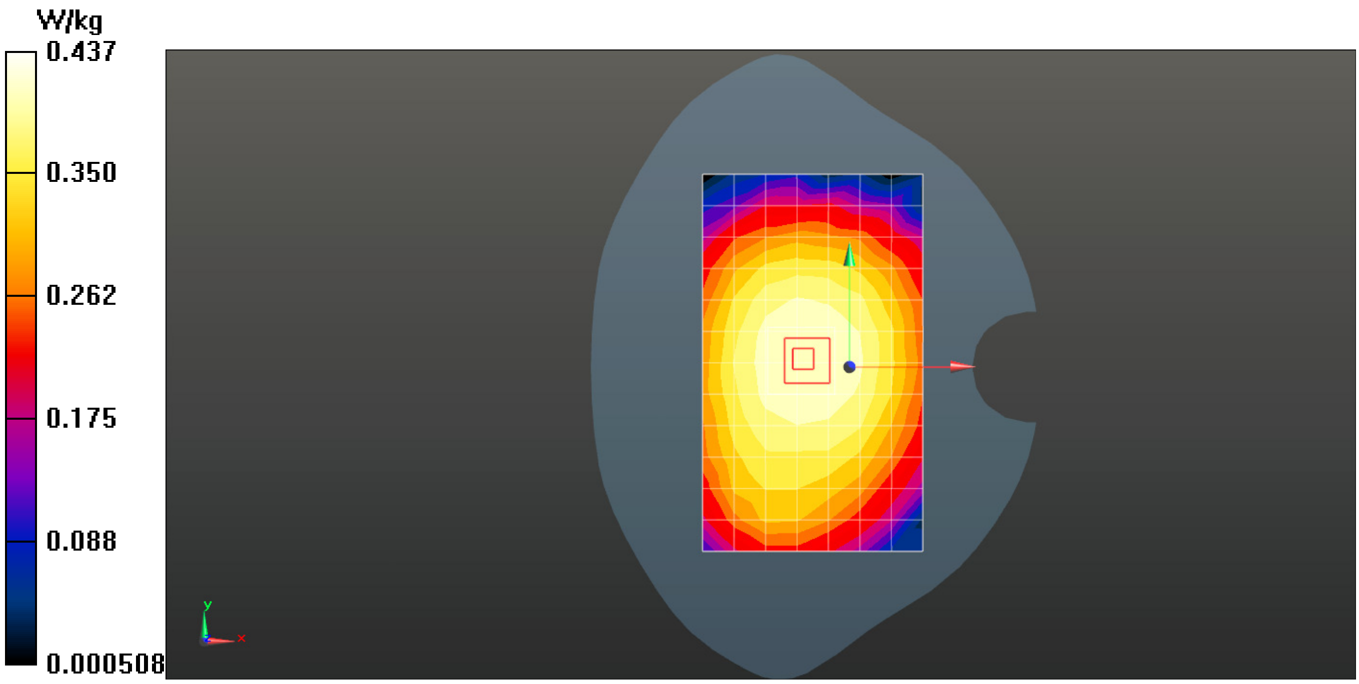
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.31 V/m; Power Drift = 0.05dB

Peak SAR (extrapolated) = 0.564 W/kg

SAR(1 g) = 0.345 W/kg; SAR(10 g) = 0.189 W/kg

Maximum value of SAR (measured) = 0.437 W/kg



WCDMA Band II 9800CH Left side 10mm

Date: 2015-12-06

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

Medium: MSL1900;Medium parameters used: f = 1880 MHz; ó = 1.493 S/m; år = 52.273; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.672 W/kg

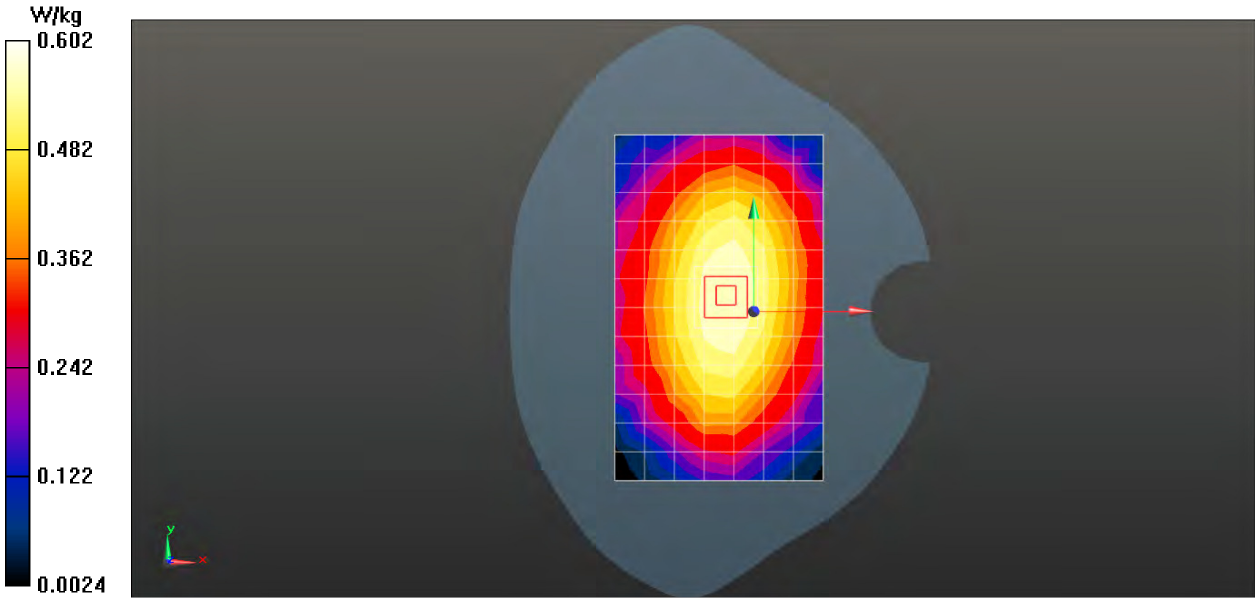
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.22 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.712W/kg

SAR(1 g) = 0.502W/kg; SAR(10 g) = 0.421 W/kg

Maximum value of SAR (measured) = 0.602W/kg



WCDMA Band IV 1412 CH Right touch cheek

Date: 2015-12-05

Communication System: UID 0, WCDMA (0); Frequency: 1732.4 MHz;Duty Cycle: 1:1

Medium: HSL1750;Medium parameters used (interpolated): f = 1732.4MHz; ó =1.36 S/m; år = 40.21; ñ = 1000 kg/m3

Phantom section: Right Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(5.18, 5.18, 5.18); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.722 W/kg

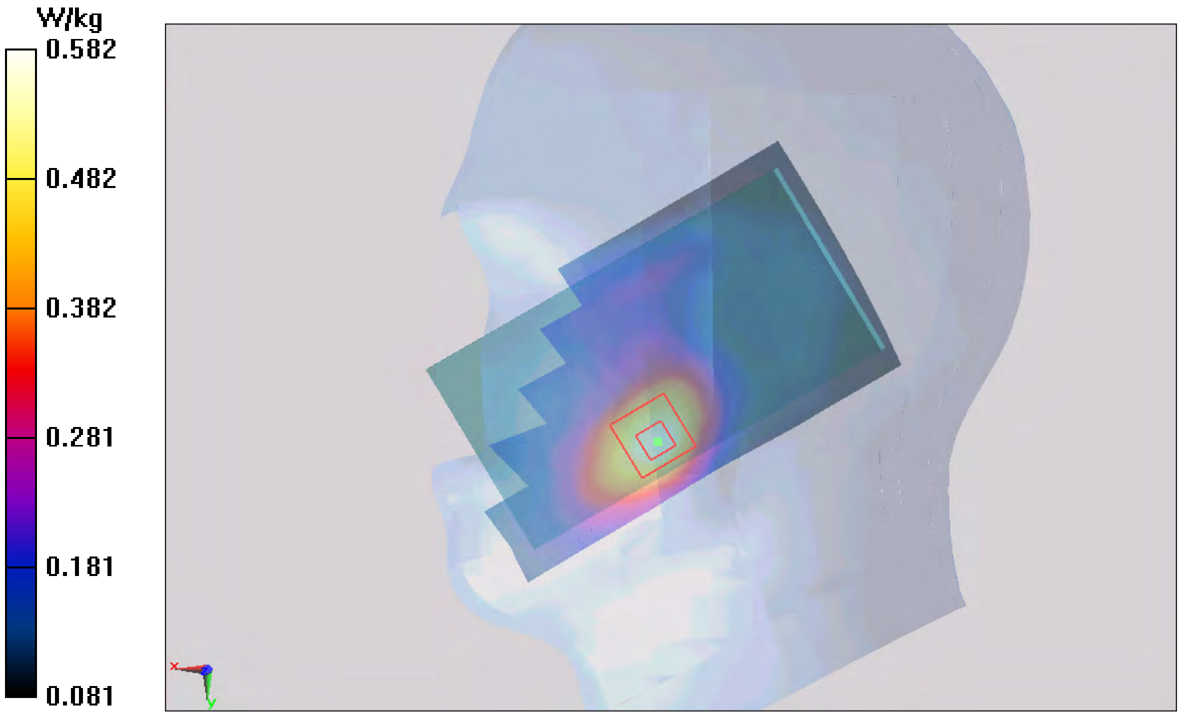
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.16 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.629 W/kg

SAR(1 g) = 0.559W/kg; SAR(10 g) = 0.357 W/kg

Maximum value of SAR (measured) = 0.582 W/kg



WCDMA Band IV 1412CH Front side 15mm

Date: 2015-12-05

Communication System: UID 0, WCDMA (0); Frequency:1732.4 MHz;Duty Cycle: 1:1

Medium: MSL1750;Medium parameters used (interpolated): f = 1732.4 MHz; ó = 1.49 S/m; år = 54.3; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.90,4.90, 4.90); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.510 W/kg

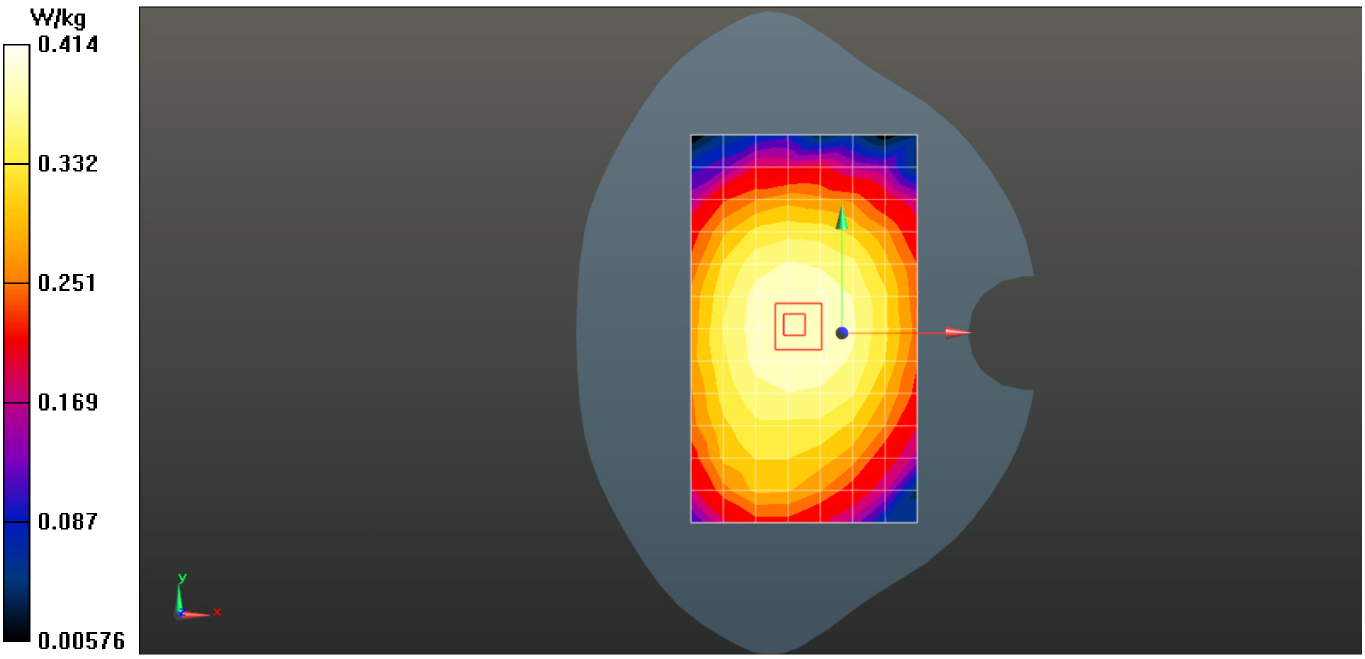
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.37 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.454 W/kg

SAR(1 g) = 0.321W/kg; SAR(10 g) = 0.164 W/kg

Maximum value of SAR (measured) = 0.414 W/kg



WCDMA Band IV 1412 CH Front side 10mm

Date: 2015-12-05

Communication System: UID 0, WCDMA (0); Frequency:1732.4 MHz;Duty Cycle: 1:1

Medium: MSL1750;Medium parameters used (interpolated): f = 1732.4 MHz; ó = 1.49 S/m; år = 54.3; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 - SN3343; ConvF(4.90, 4.90, 4.90); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.856 W/kg

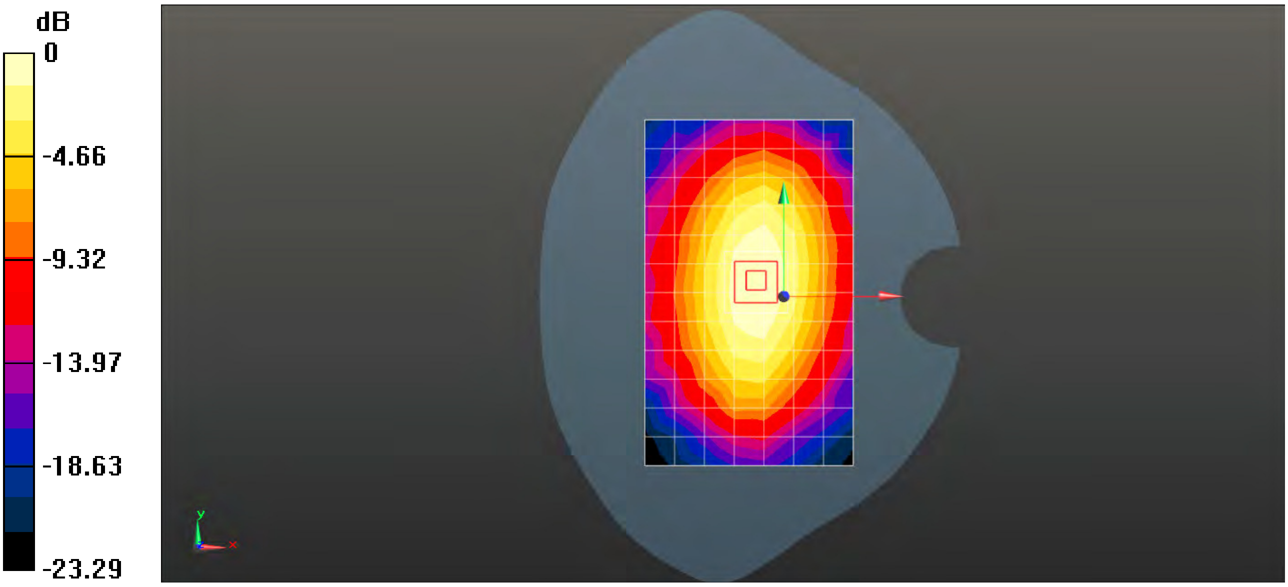
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.21 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.81 W/kg

SAR(1 g) = 0.57 W/kg; SAR(10 g) = 0.341 W/kg

Maximum value of SAR (measured) = 0.679 W/kg



0 dB = 0.679 W/kg = -1.68 dBW/kg

LTE Band 2 Bandwidth 20MHz QPSK 1RB 50Offset 18900CH Right touch cheek

Date: 2015-12-06

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency:1880 MHz;Duty Cycle: 1:1

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

Medium: HSL1900;Medium parameters used: f = 1880 MHz; ó = 1.419 S/m; år = 40.582; ñ = 1000 kg/m3

Phantom section: Right Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(5.03, 5.03, 5.03); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.489 W/kg

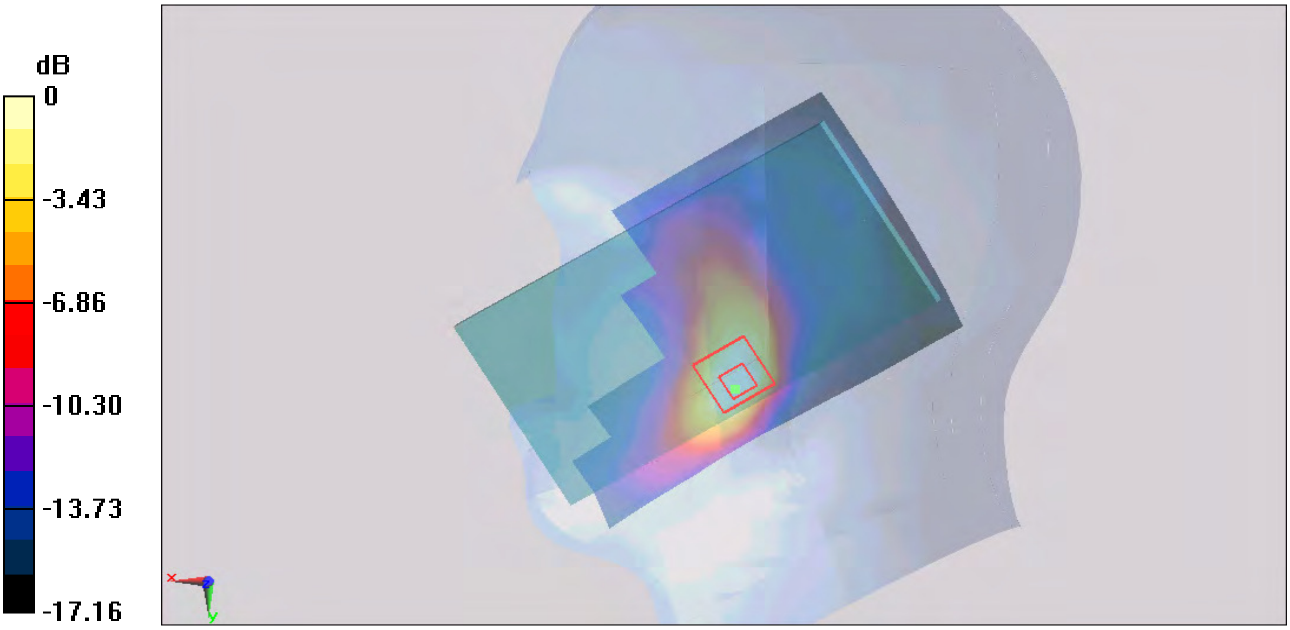
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.7967 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.398 W/kg

SAR(1 g) = 0.354 W/kg; SAR(10 g) = 0.145W/kg

Maximum value of SAR (measured) = 0.413 W/kg



0 dB = 0.413W/kg = -3.84dBW/kg

LTE Band 2 Bandwidth 20MHz QPSK 1RB 50Offset 18900CH Front side 15mm

Date: 2015-12-06

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium: MSL1900;Medium parameters used: f = 1880 MHz; ó = 1.493 S/m; år = 52.273; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.356 W/kg

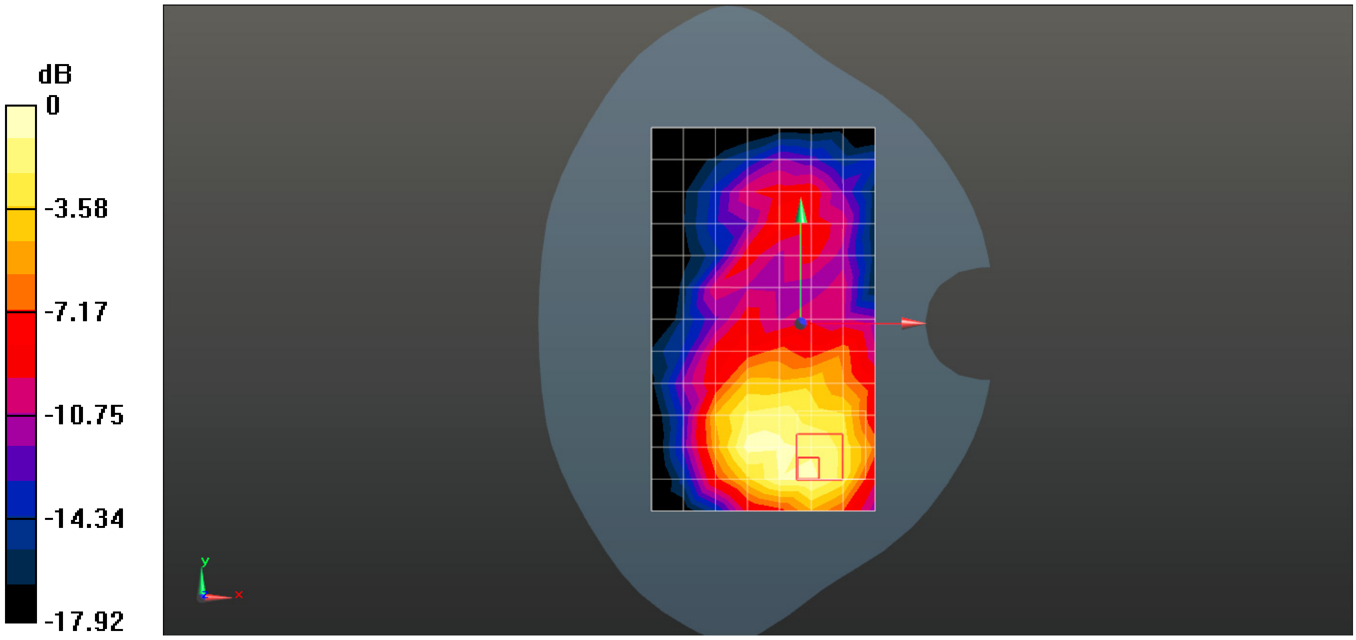
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value =5.327 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.321W/kg

SAR(1 g) = 0.211 W/kg; SAR(10 g) = 0.092 W/kg

Maximum value of SAR (measured) = 0.347 W/kg



0 dB = 0.347 W/kg = -4.60 dBW/kg

LTE Band 2 Bandwidth 20MHz QPSK 1RB 50Offset 18900CH Back side 10mm

Date: 2015-12-06

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium: MSL1900;Medium parameters used: f = 1880 MHz; ó = 1.493 S/m; år = 52.273; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF(4.62, 4.62, 4.62); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.778 W/kg

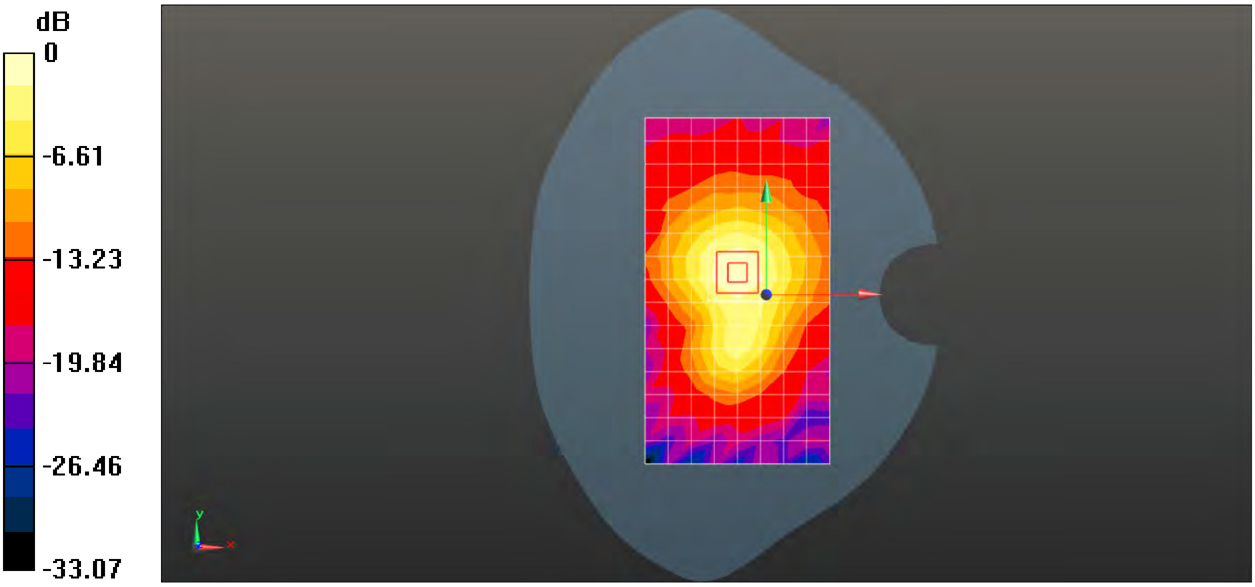
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.93 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.722W/kg

SAR(1 g) = 0.576 W/kg; SAR(10 g) = 0.417 W/kg

Maximum value of SAR (measured) = 0.670 W/kg



0 dB = 0.670W/kg = -1.73 dBW/kg

LTE Band 4 Bandwidth 20MHz QPSK 1RB 0Offset 20175CH Right touch cheek

Date: 2015-12-05

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1

Medium: HSL1750;Medium parameters used: f =1732.5 MHz; ó = 1.36S/m; år = 40.21; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF (5.18, 5.18, 5.18); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.465 W/kg

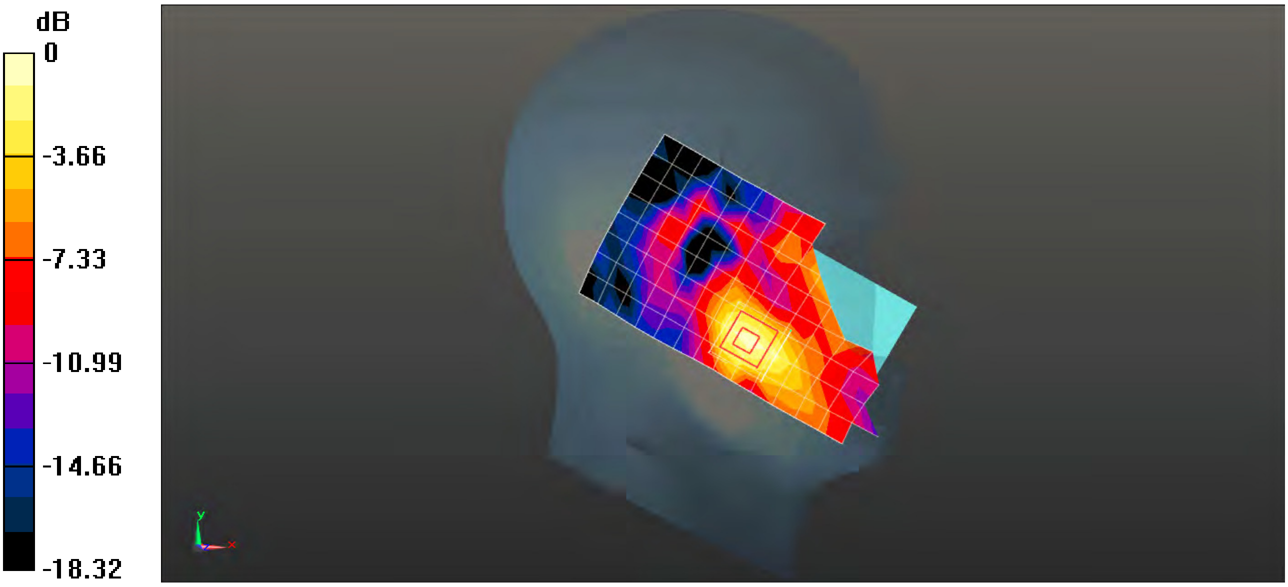
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.565V/m; Power Drift = 0.12dB

Peak SAR (extrapolated) = 0.425W/kg

SAR(1 g) = 0.365 W/kg; SAR(10 g) = 0.125W/kg

Maximum value of SAR (measured) = 0.498 W/kg



0 dB = 0.498 W/kg = -3.03 dBW/kg

LTE Band 4 Bandwidth 20MHz QPSK 1RB 0Offset 20175CH Back side 15mm

Date: 2015-12-05

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1

Medium: MSL1750;Medium parameters used (interpolated): f = 1732.5 MHz; ó = 1.49 S/m; år = 54.3; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 – SN3343; ConvF(4.90, 4.90, 4.90); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.527 W/kg

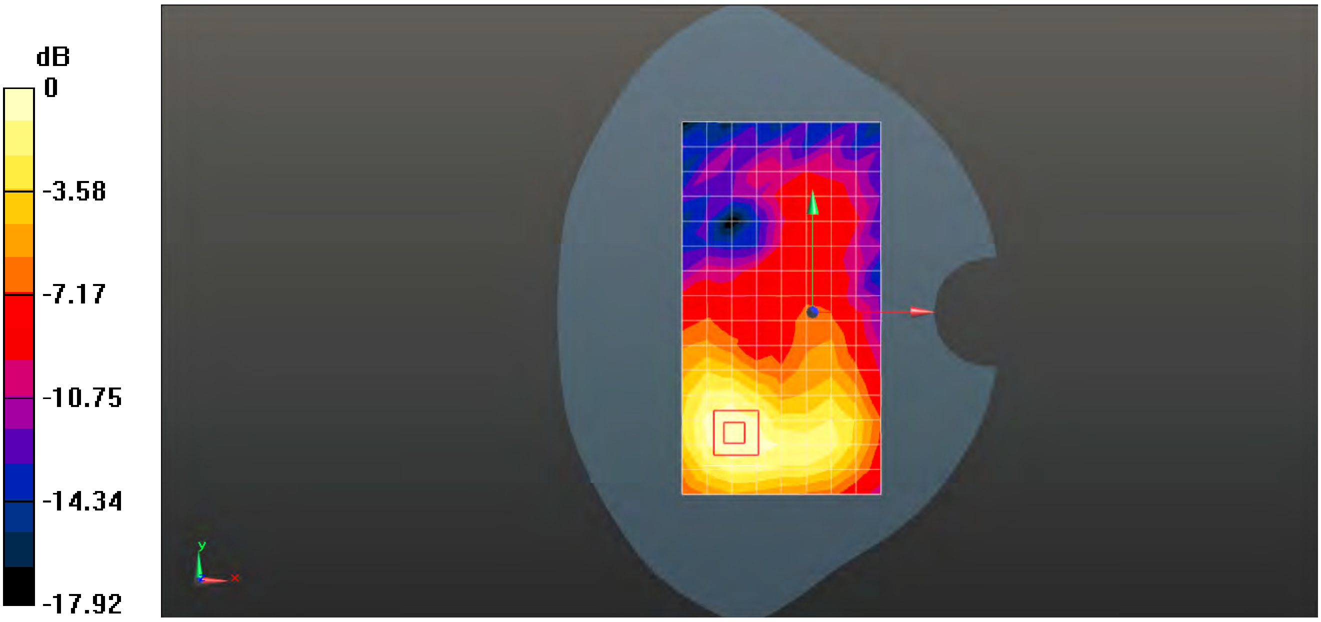
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.378 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.512W/kg

SAR(1 g) = 0.356 W/kg; SAR(10 g) = 0.201 W/kg

Maximum value of SAR (measured) = 0.431 W/kg



0 dB = 0.431W/kg = -3.65 dBW/kg

LTE Band 4 Bandwidth 20MHz QPSK 1RB 0Offset 20175CH Back side 10mm

Date: 2015-12-05

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1

Medium: MSL1750;Medium parameters used (interpolated): f = 1732.5 MHz; ó = 1.49 S/m; år = 54.3; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF(4.90, 4.90, 4.90); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.714 W/kg

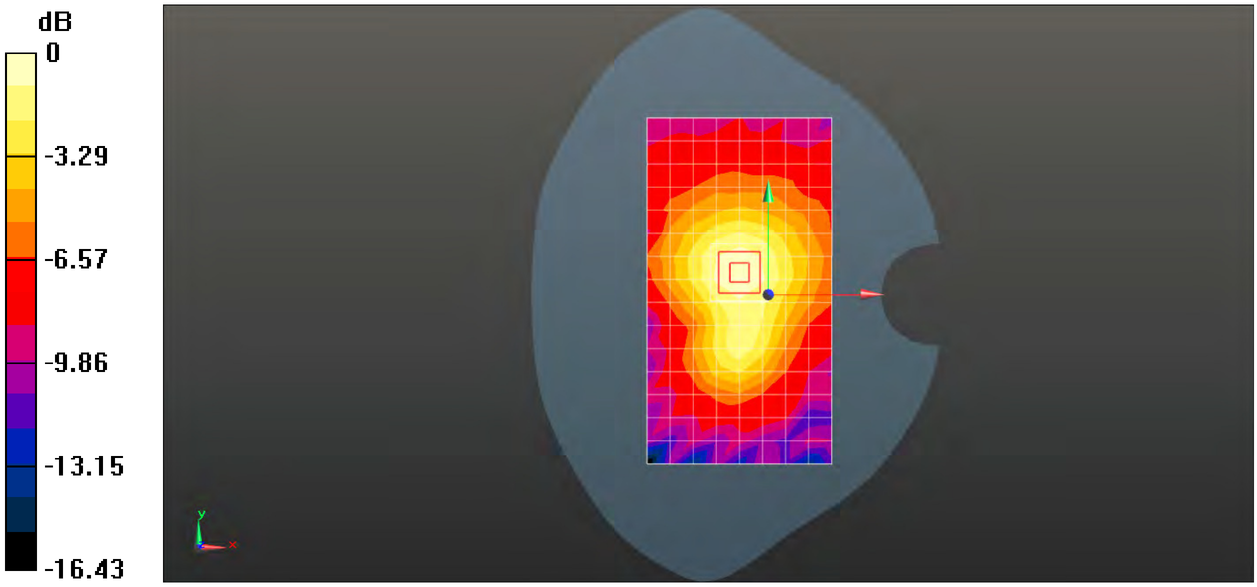
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.98 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.692 W/kg

SAR(1 g) = 0.523 W/kg; SAR(10 g) = 0.348 W/kg

Maximum value of SAR (measured) = 0.616 W/kg



0 dB = 0.616W/kg = -2.10 dBW/kg

LTE Band 12 Bandwidth 10MHz QPSK 1RB 0Offset 23095CH Left touch cheek

Date: 2015-12-03

Communication System: UID 0, LTE-FDD BW 10MHz (0); Frequency: 707.5 MHz;Duty Cycle: 1:1

Medium: HSL750;Medium parameters used: f = 707.5 MHz; ó = 0.87S/m; år = 39.2; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF (6.34, 6.34, 6.34); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.686 W/kg

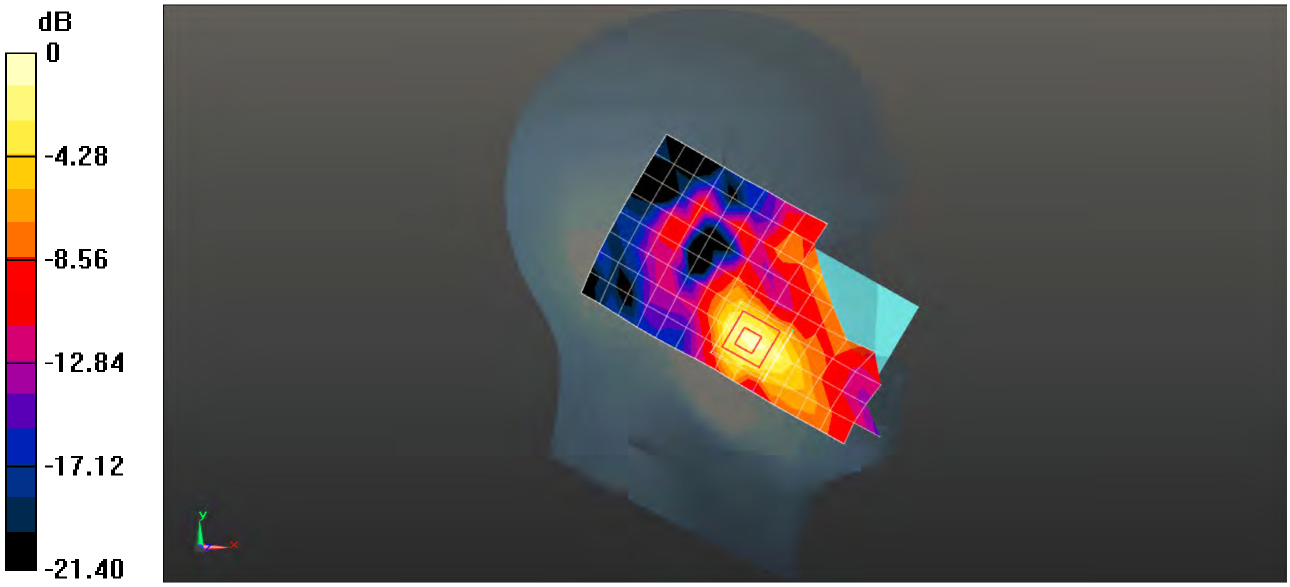
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.175 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.659 W/kg

SAR(1 g) = 0.543 W/kg; SAR(10 g) = 0.313 W/kg

Maximum value of SAR (measured) = 0.601 W/kg



0 dB = 0.198 W/kg = -2.21 dBW/kg

LTE Band 12 Bandwidth 10MHz QPSK 1RB 0Offset 23095CH Back side 15mm

Date: 2015-12-03

Communication System: UID 0, LTE-FDD BW 10MHz (0); Frequency: 707.5 MHz;Duty Cycle: 1:1

Medium: MSL750;Medium parameters used: f = 707.5 MHz; ó = 0.93 S/m; år = 56.1; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 – SN3343; ConvF(6.36, 6.36, 6.36); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.427 W/kg

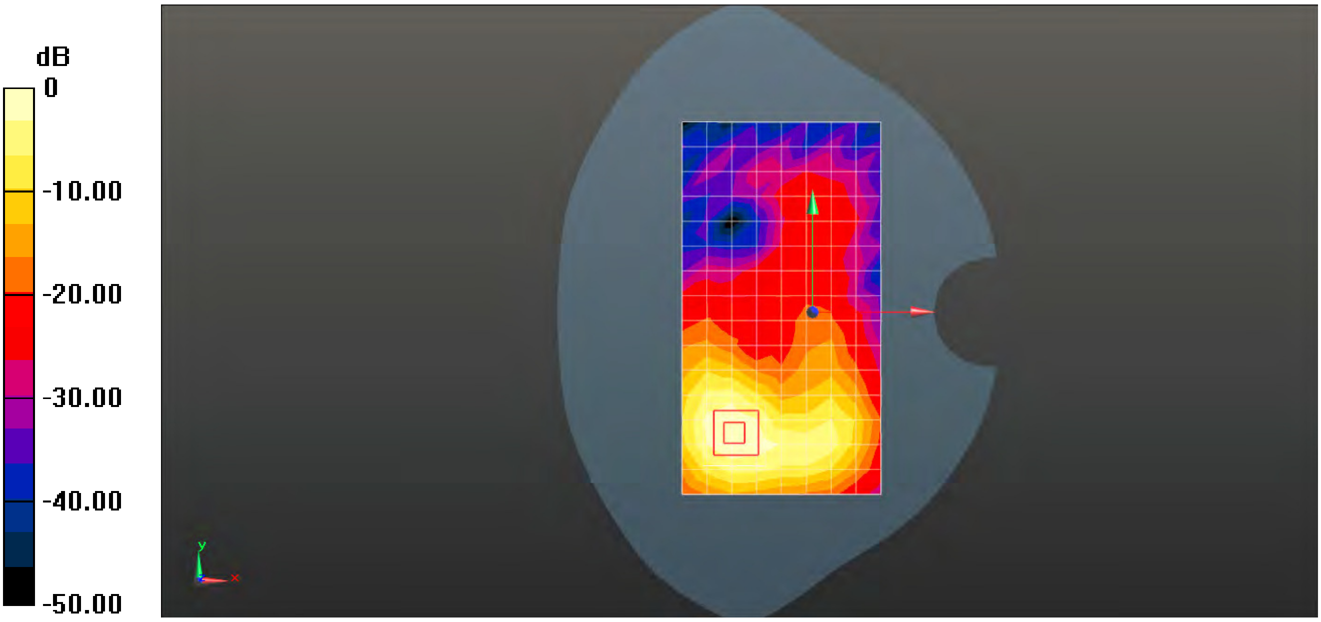
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.317 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.431W/kg

SAR(1 g) = 0.389W/kg; SAR(10 g) = 0.203 W/kg

Maximum value of SAR (measured) = 0.415 W/kg



0 dB = 0.415 W/kg = -3.82 dBW/kg

LTE Band 12 Bandwidth 10MHz QPSK 1RB 0Offset 20395CH Back side 10mm

Date: 2015-12-03

Communication System: UID 0, LTE-FDD BW 10MHz (0); Frequency: 707.5 MHz;Duty Cycle: 1:1

Medium: MSL750;Medium parameters used: f = 707.5 MHz; ó = 0.93 S/m; år = 56.1; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF(6.36, 6.36, 6.36); Calibrated: 10/30/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.777 W/kg

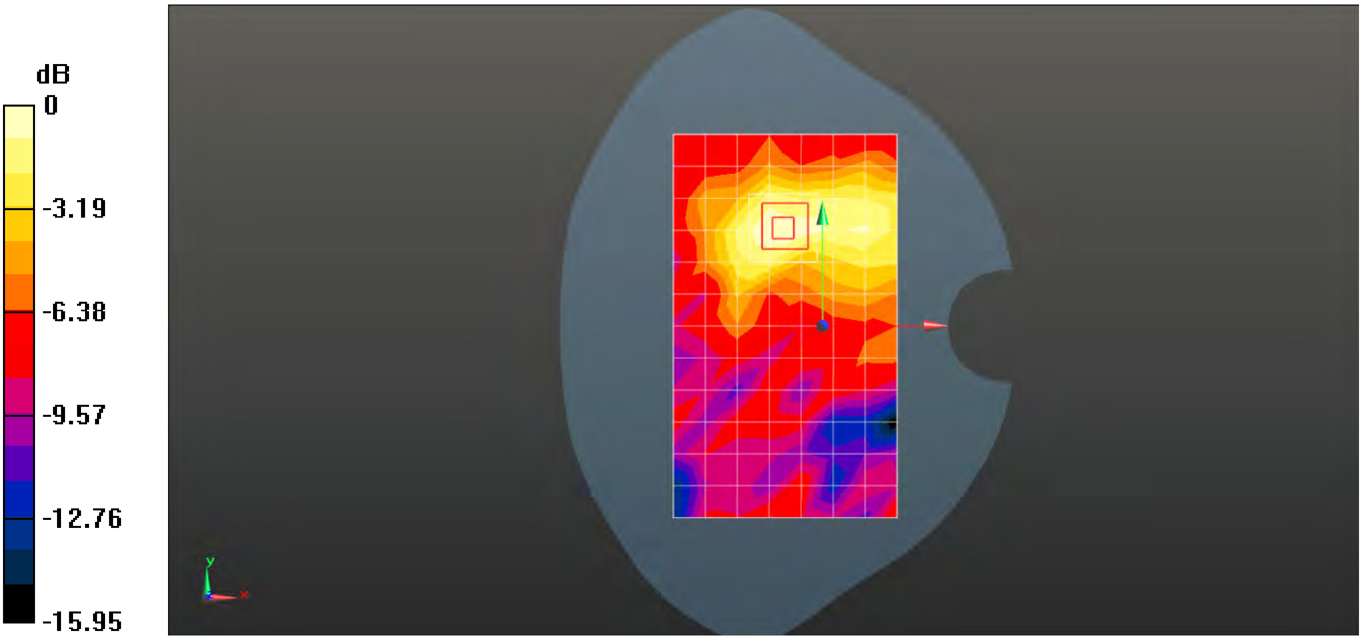
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.71 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.774 W/kg

SAR(1 g) = 0.621W/kg; SAR(10 g) = 0.317 W/kg

Maximum value of SAR (measured) = 0.765 W/kg



0 dB = 0.765W/kg = -1.16 dBW/kg

LTE Band 17 Bandwidth 10MHz QPSK 1RB 0Offset 23790CH Left touch cheek

Date: 2015-12-03

Communication System: UID 0, LTE-FDD BW 10MHz (0); Frequency: 710MHz;Duty Cycle: 1:1

Medium: HSL750;Medium parameters used: f = 710MHz; ó = 0.88 S/m; år = 39.1; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF (6.34, 6.34, 6.34); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.766 W/kg

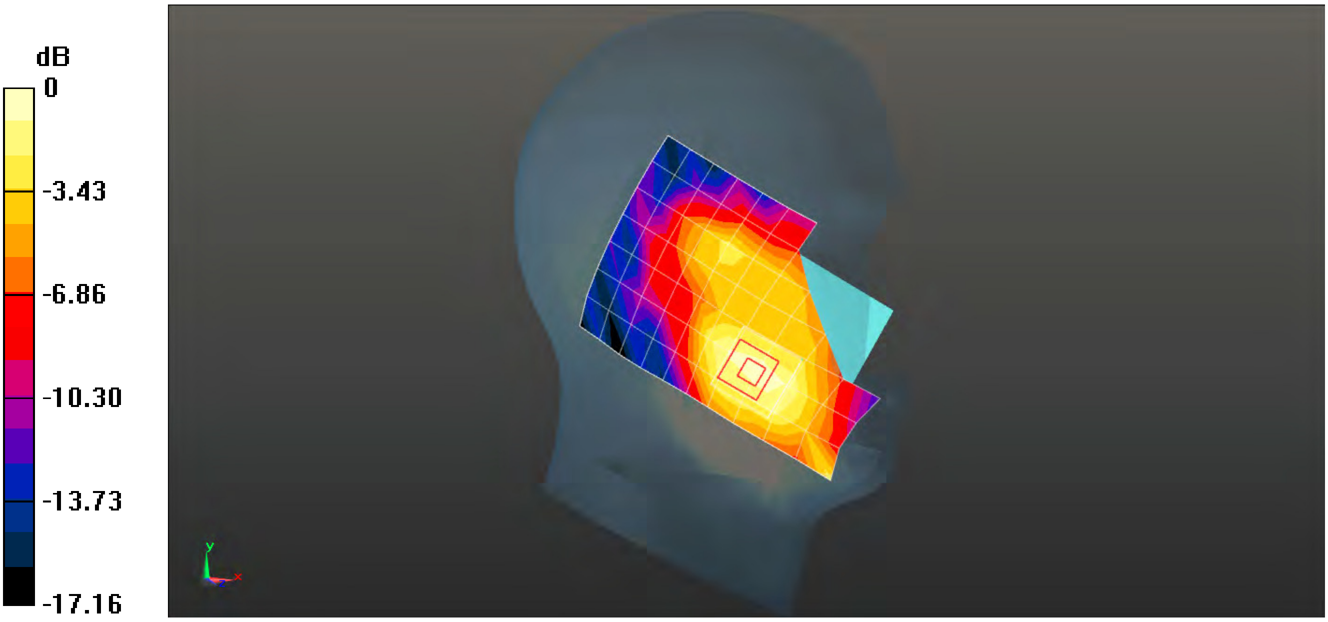
Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.571 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.812 W/kg

SAR(1 g) = 0.549W/kg; SAR(10 g) = 0.383 W/kg

Maximum value of SAR (measured) = 0.671 W/kg



0 dB = 0.671 W/kg = -1.73 dBW/kg

LTE Band 17 Bandwidth 10MHz QPSK 1RB 0Offset 23790CH Back side 15mm

Date: 2015-12-03

Communication System: UID 0, LTE-FDD BW 10MHz (0); Frequency: 710MHz;Duty Cycle: 1:1

Medium: MSL750;Medium parameters used: f = 710MHz; ó = 0.93 S/m; år = 56.0; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 – SN3343; ConvF(6.36, 6.36, 6.36); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-295
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.51 W/kg

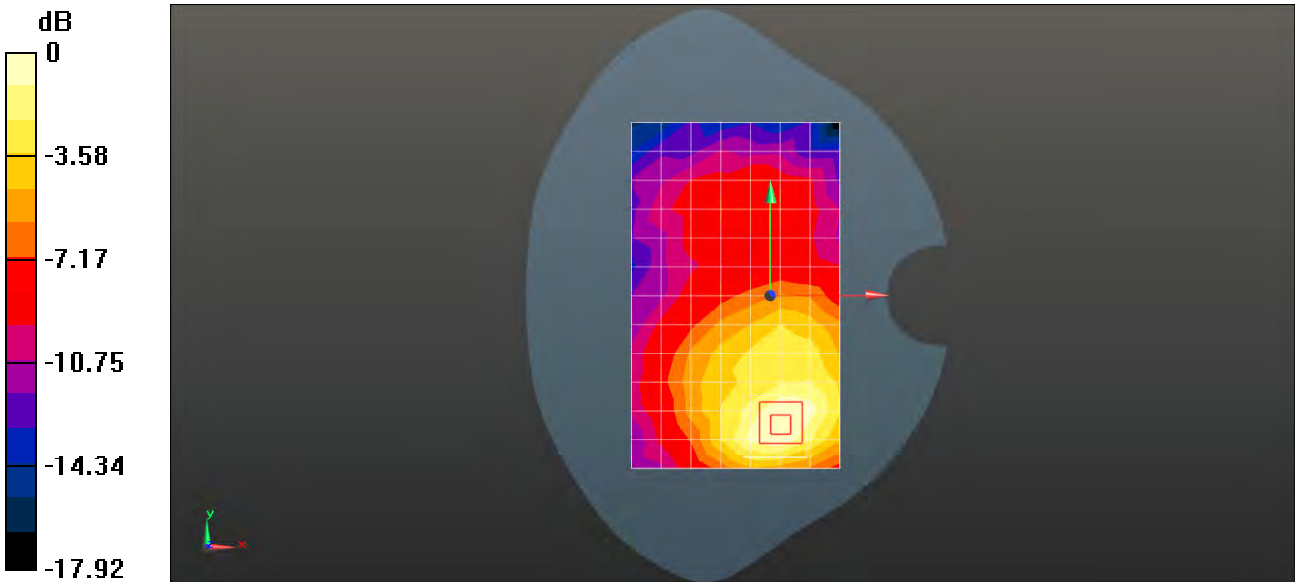
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.517 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.521 W/kg

SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.201 W/kg

Maximum value of SAR (measured) = 0.421 W/kg



0 dB = 0.421W/kg = -3.76 dBW/kg

LTE Band 17 Bandwidth 10MHz QPSK 1RB 0Offset 23790CH Back side 10mm

Date: 2015-12-03

Communication System: UID 0, LTE-FDD BW 10MHz (0); Frequency: 710MHz;Duty Cycle: 1:1

Medium: MSL750;Medium parameters used: f = 710MHz; ó = 0.93 S/m; år = 56.0; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: ES3DV3 – SN3343; ConvF(6.36, 6.36, 6.36); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.771 W/kg

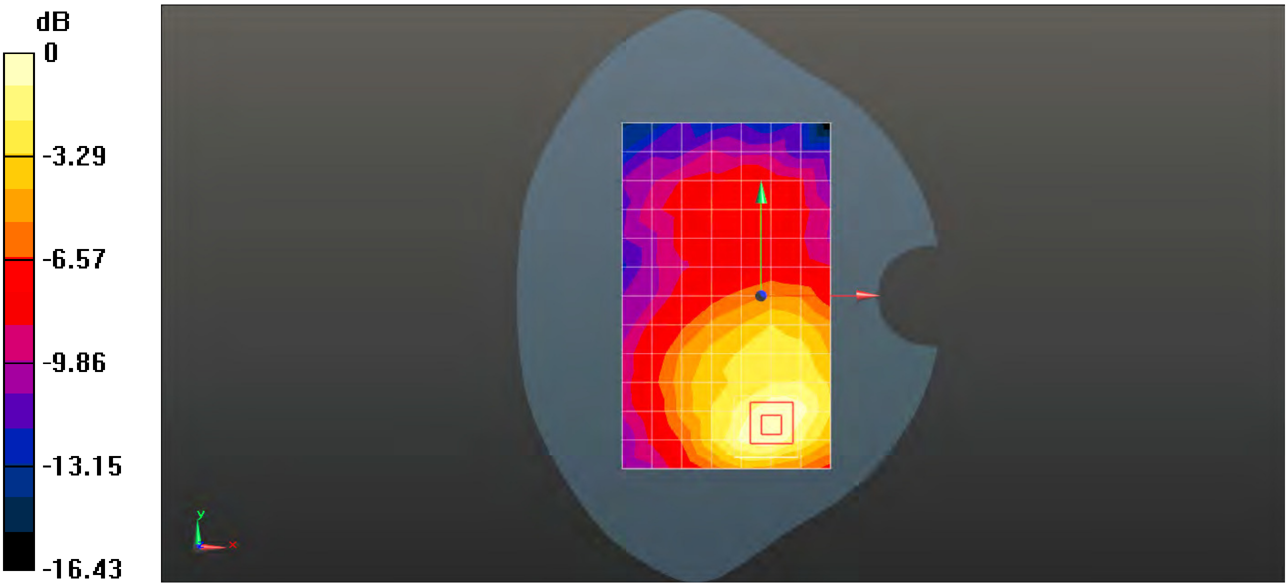
Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.91 V/m; Power Drift = -0.15dB

Peak SAR (extrapolated) = 0.798 W/kg

SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.344 W/kg

Maximum value of SAR (measured) = 0.781 W/kg



0 dB = 0.781W/kg = -1.07dBW/kg

LTE Band 7 Bandwidth 20MHz QPSK 1RB 99Offset 21100CH Left touch cheek

Date: 2015-12-08

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 2535 MHz;Duty Cycle: 1:1

Medium: HSL2600;Medium parameters used: f = 2535 MHz; ó = 1.861 S/m; år = 38.267; ñ = 1000 kg/m3

Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 – SN7336; ConvF (7.33, 7.33, 7.33); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.186 W/kg

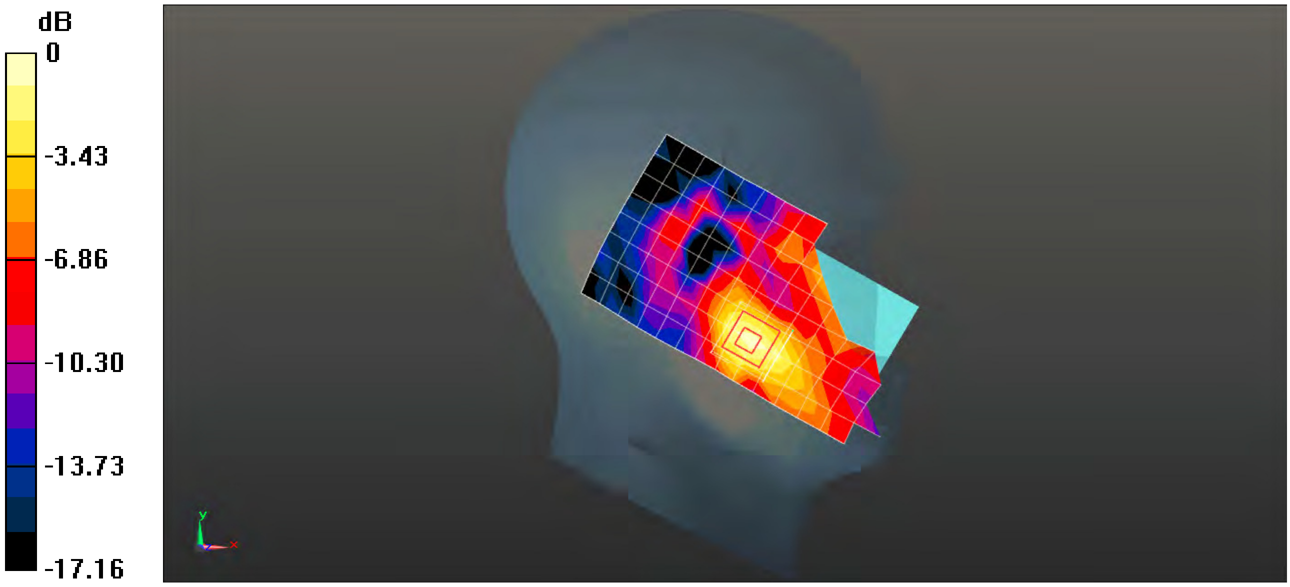
Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.575 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.315 W/kg

SAR(1 g) = 0.173 W/kg; SAR(10 g) = 0.093 W/kg

Maximum value of SAR (measured) = 0.198 W/kg



0 dB = 0.198 W/kg = -7.03 dBW/kg

LTE Band 7 Bandwidth 20MHz QPSK 1RB 99Offset 21100CH Back side 15mm

Date: 2015-12-08

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 2535 MHz;Duty Cycle: 1:1

Medium: MSL2600;Medium parameters used: f = 2535 MHz; ó = 2.085 S/m; år = 53.223; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 – SN7336; ConvF(7.18, 7.18, 7.18); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.427 W/kg

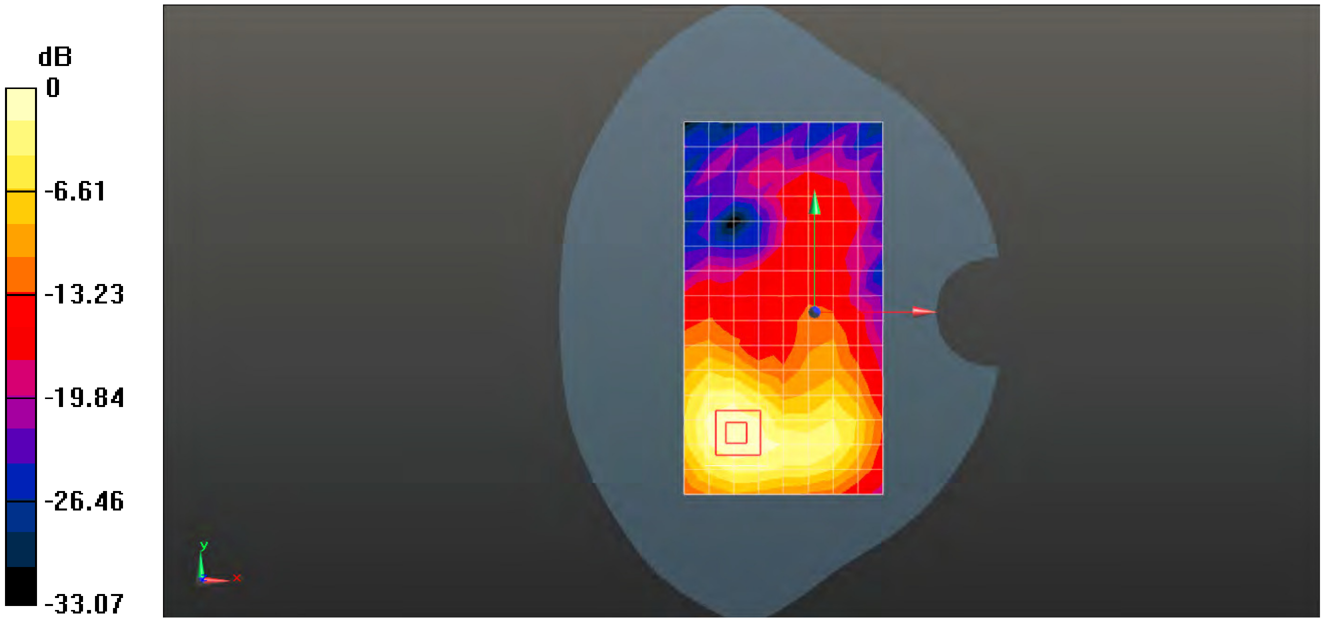
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.377 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.759 W/kg

SAR(1 g) = 0.411 W/kg; SAR(10 g) = 0.222 W/kg

Maximum value of SAR (measured) = 0.447 W/kg



0 dB = 0.447 W/kg = -3.70 dBW/kg

LTE Band 7Bandwidth 20MHz QPSK 1RB 99Offset 21100CH Bottom side 10mm

Date: 2015-12-08

Communication System: UID 0, LTE-FDD BW 20MHz (0); Frequency: 2535 MHz;Duty Cycle: 1:1

Medium: MSL2600;Medium parameters used: f = 2535 MHz; ó = 2.085 S/m; år = 53.223; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

• Probe: EX3DV4 – SN7336; ConvF(7.18, 7.18, 7.18); Calibrated: 10/30/2015;

• Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0

• Electronics: DAE4 Sn918; Calibrated: 2014-12-29

• Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283

• DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.774 W/kg

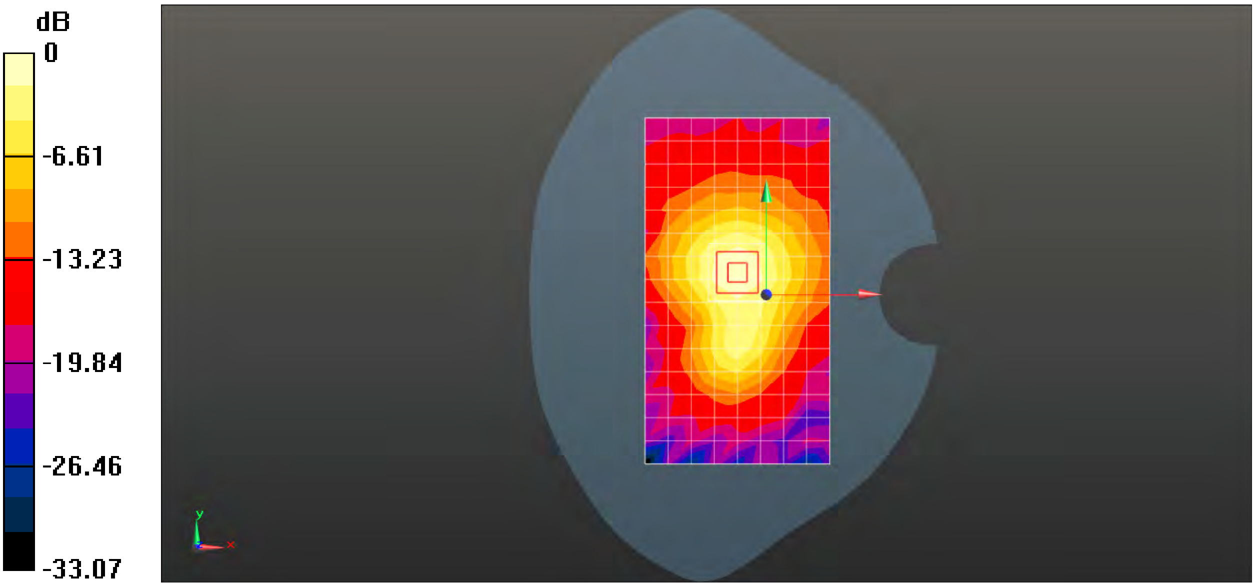
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.91 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.38 W/kg

SAR(1 g) = 0.643 W/kg; SAR(10 g) = 0.374 W/kg

Maximum value of SAR (measured) = 0.810 W/kg



0 dB = 0.810W/kg = -1.11 dBW/kg

Wi-Fi 802.11b 11CH Right touch cheek

Date: 2015-12-07

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2462 MHz;Duty Cycle: 1:1.022

Medium: HSL2450;Medium parameters used: f = 2462 MHz; ó = 1.797 S/m; år = 38.552; ñ = 1000 kg/m3

Phantom section: Right Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.54, 4.54, 4.54); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Head/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.354 W/kg

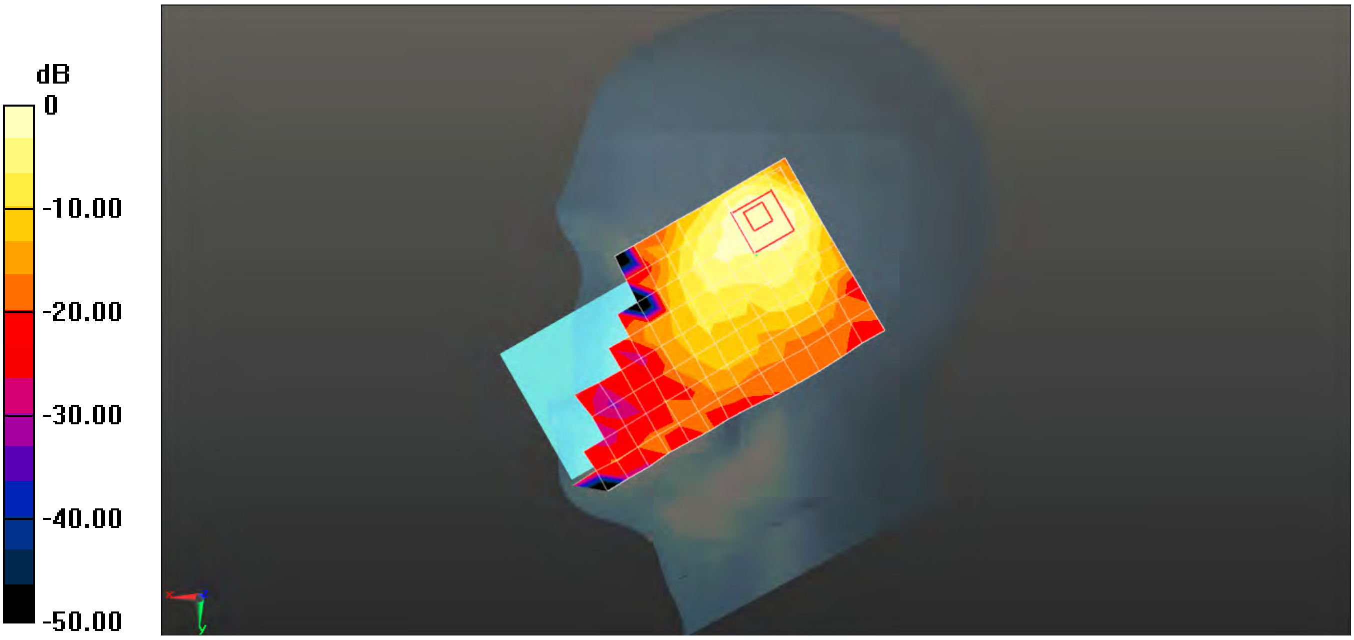
Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.469 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.898 W/kg

SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.180 W/kg

Maximum value of SAR (measured) = 0.354 W/kg



0 dB = 0.354 W/kg = -4.51 dBW/kg

Wi-Fi 802.11b 11CH Front side 15mm

Date: 2015-12-07

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2462 MHz;Duty Cycle: 1:1.022

Medium: MSL2450;Medium parameters used: f = 2462 MHz; ó = 1.966 S/m; år = 51.603; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.29, 4.29, 4.29); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.0437 W/kg

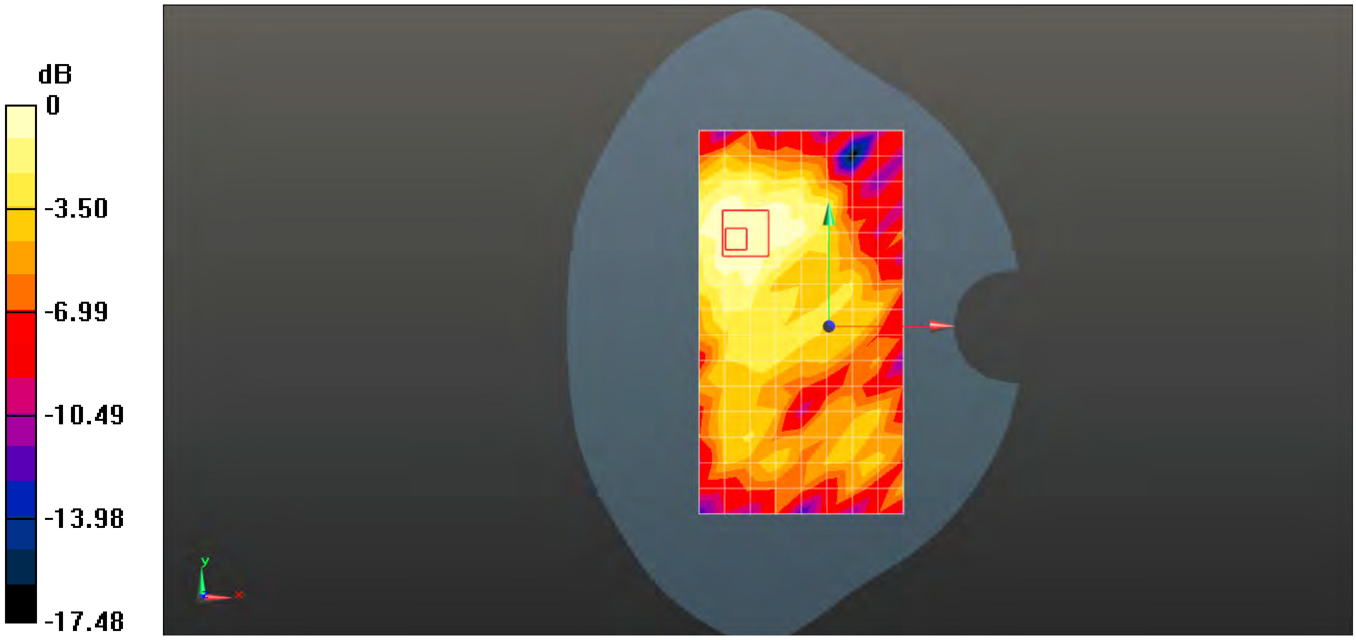
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.442 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.0910 W/kg

SAR(1 g) = 0.036 W/kg; SAR(10 g) = 0.018 W/kg

Maximum value of SAR (measured) = 0.0437 W/kg



0 dB = 0.0437 W/kg = -13.59 dBW/kg

Wi-Fi 802.11b 11CH Left side 10mm

Date: 2015-12-07

Communication System: UID 0, WI-FI(2.4GHz) (0); Frequency: 2462 MHz;Duty Cycle: 1:1.022

Medium: MSL2450;Medium parameters used: f = 2462 MHz; ó = 1.966 S/m; år = 51.603; ñ = 1000 kg/m3

Phantom section: Flat Section

DASY 5 Configuration:

- Probe: ES3DV3 - SN3343; ConvF(4.29, 4.29, 4.29); Calibrated: 10/30/2015;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn918; Calibrated: 2014-12-29
- Phantom: SAM 1; Type: SAM V4.0; Serial: TP-1283
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.0825 W/kg

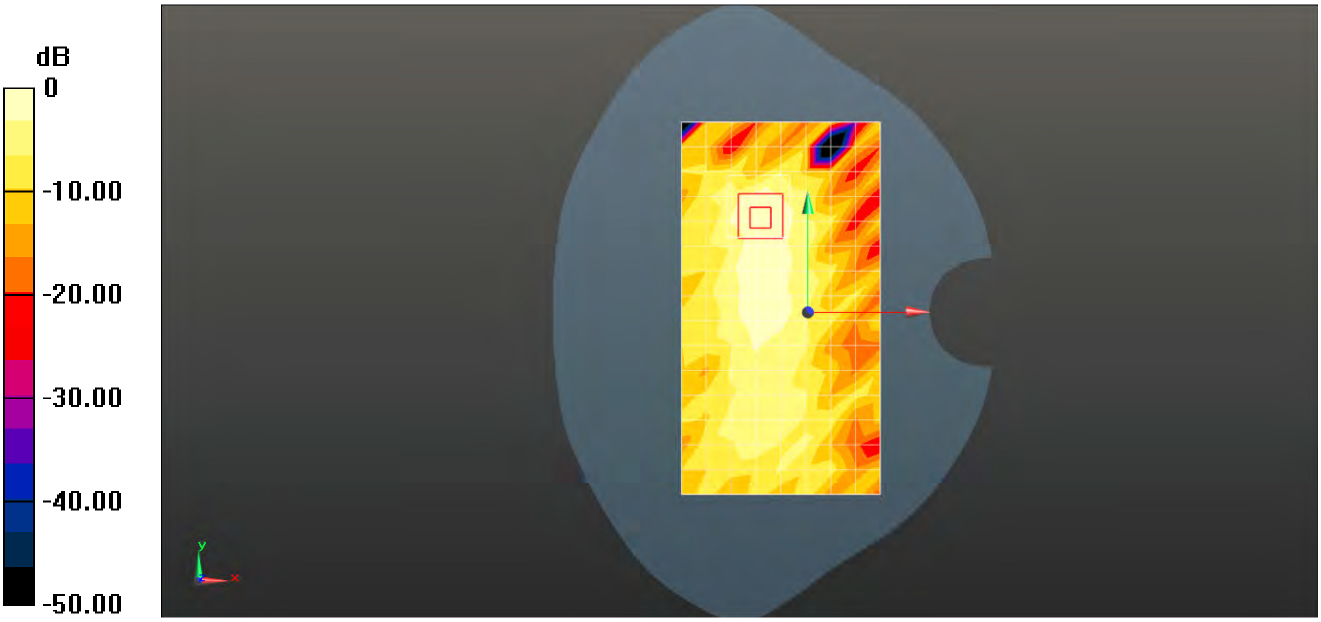
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.749 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.131 W/kg

SAR(1 g) = 0.072 W/kg; SAR(10 g) = 0.035 W/kg

Maximum value of SAR (measured) = 0.0825 W/kg



0 dB = 0.0825 W/kg = -10.83 dBW/kg

Appendix C: Calibration certificate

ES3DV3 SN 3343

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

CALIBRATION No. L0570

Client: Lenovo

Certificate No: Z15-97161

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3343

Calibration Procedure(s): FD-Z11-2-004-01
Calibration Procedures for Dosimetric E-field Probes

Calibration date: October 30, 2015

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(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Power sensor NRP-Z91	101547	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Power sensor NRP-Z91	101548	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Reference10dBAttenuator	18N50W-10dB	13-Mar-14(TMC,No.JZ14-1103)	Mar-16
Reference20dBAttenuator	18N50W-20dB	13-Mar-14(TMC,No.JZ14-1104)	Mar-16
Reference Probe EX3DV4	SN 7307	27-Feb-15(SPEAG,No.EX3-7307_Feb15)	Feb-16
DAE4	SN 771	27-Jan-15(SPEAG, No.DAE4-771_Jan15)	Jan -16
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGeneratorMG3700A	6201052605	01-Jul-15 (CTTL, No.J15X04255)	Jun-16
Network Analyzer E5071C	MY46110673	03-Feb-15 (CTTL, No.J15X00728)	Feb-16

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: October 31, 2015

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com [illegible]

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 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 300MHz to 3GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: 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 (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z:* A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f>800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued 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±50MHz to±100MHz.
- *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).

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Probe ES3DV3

SN: 3343

Calibrated: October 30, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3343

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(µV/(V/m)²)[A]	1.04	1.04	1.09	±10.8%
DCP(mV)[B]	104.8	105.9	103.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	283.2	±2.5%
		Y	0.0	0.0	1.0		281.1	
		Z	0.0	0.0	1.0		284.7	

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

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

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: [illegible] [illegible]

DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3343

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)
750	41.9	0.89	6.34	6.34	6.34	0.55	1.20	±12%
850	41.5	0.92	6.10	6.10	6.10	0.30	1.60	±12%
900	41.5	0.97	6.22	6.22	6.22	0.34	1.57	±12%
1750	40.1	1.37	5.18	5.18	5.18	0.60	1.28	±12%
1900	40.0	1.40	5.03	5.03	5.03	0.68	1.26	±12%
2100	39.8	1.49	4.94	4.94	4.94	0.34	1.94	±12%
2450	39.2	1.80	4.54	4.54	4.54	0.62	1.35	±12%

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

[F] At frequency 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 the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3343

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)
750	55.5	0.96	6.36	6.36	6.36	0.50	1.32	±12%
850	55.2	0.99	6.22	6.22	6.22	0.38	1.62	±12%
900	55.0	1.05	6.08	6.08	6.08	0.44	1.51	±12%
1750	53.4	1.49	4.90	4.90	4.90	0.62	1.31	±12%
1900	53.3	1.52	4.62	4.62	4.62	0.59	1.37	±12%
2100	53.2	1.62	4.66	4.66	4.66	0.51	1.55	±12%
2450	52.7	1.95	4.29	4.29	4.29	0.62	1.51	±12%

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

[F] At frequency 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 the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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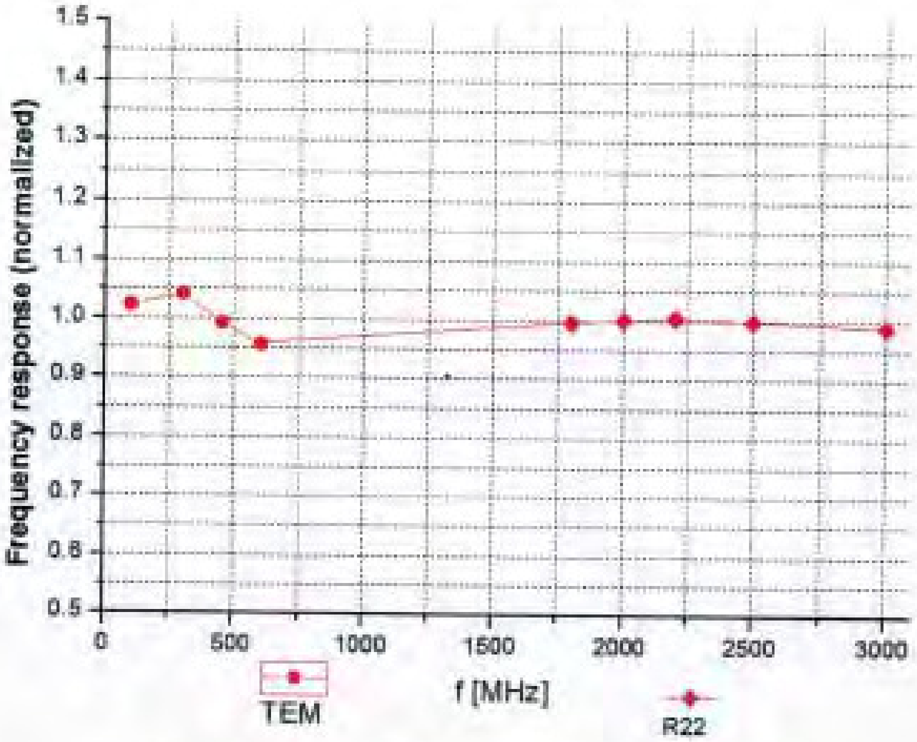
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.5% (k=2)

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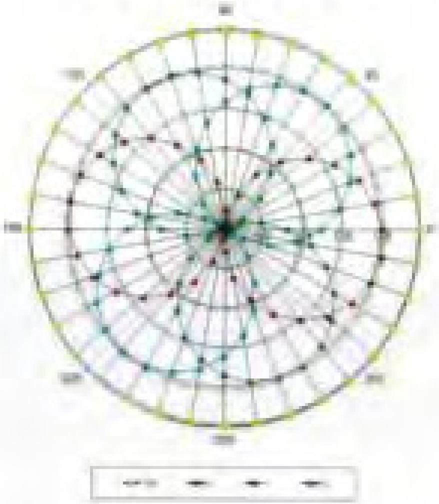
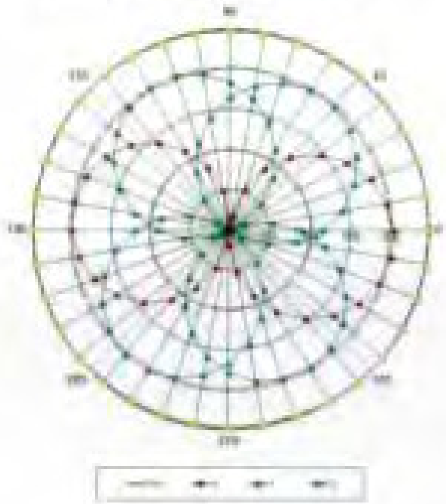
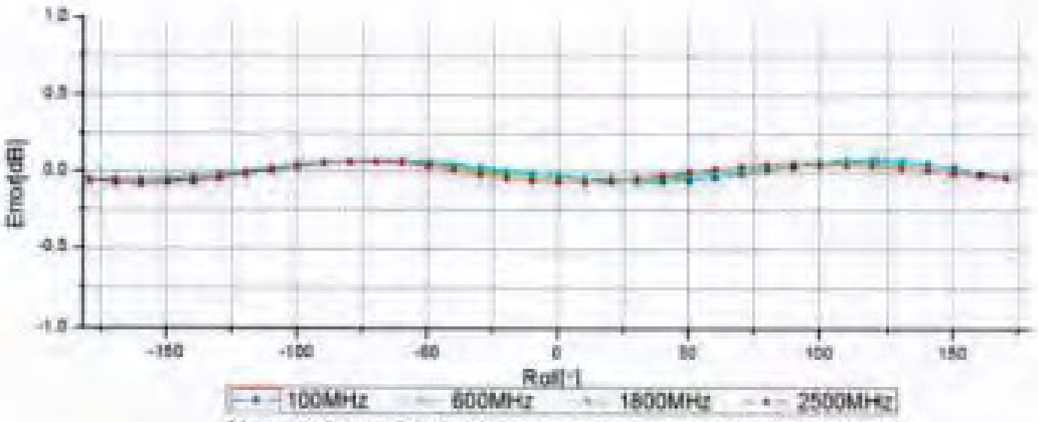
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

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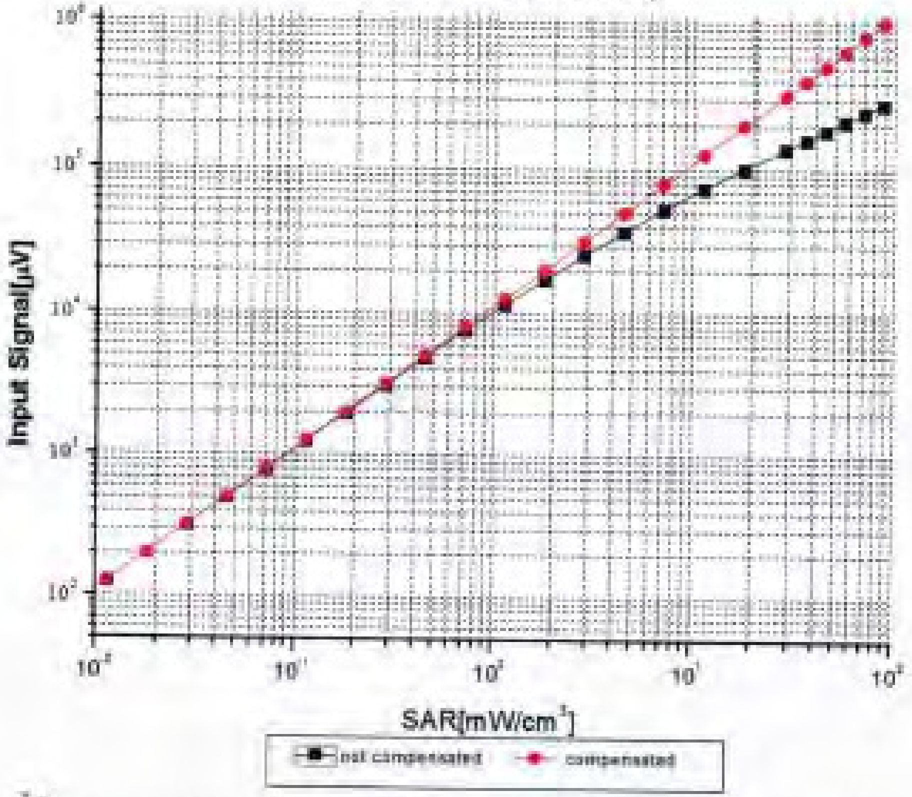
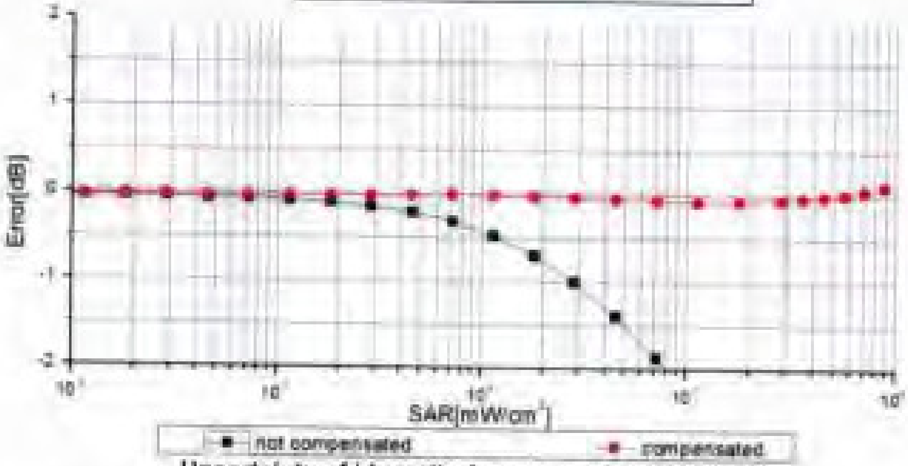
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (k=2)

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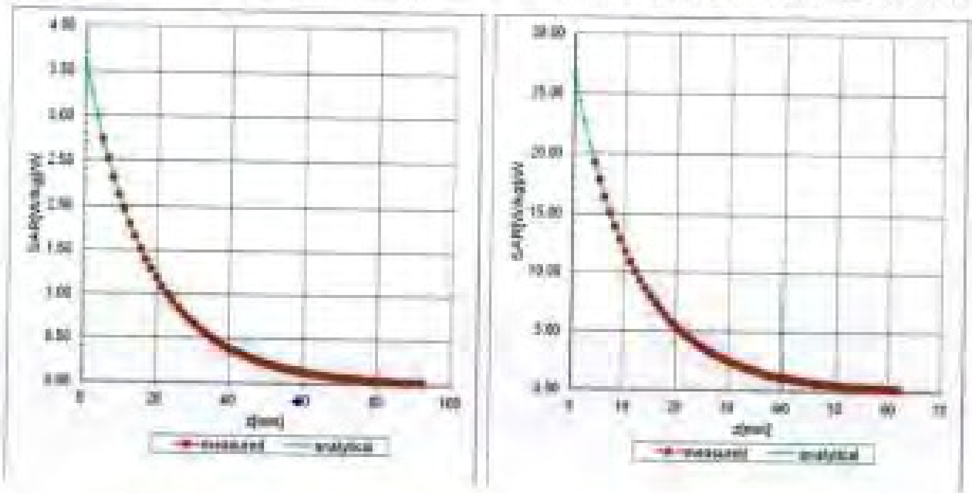
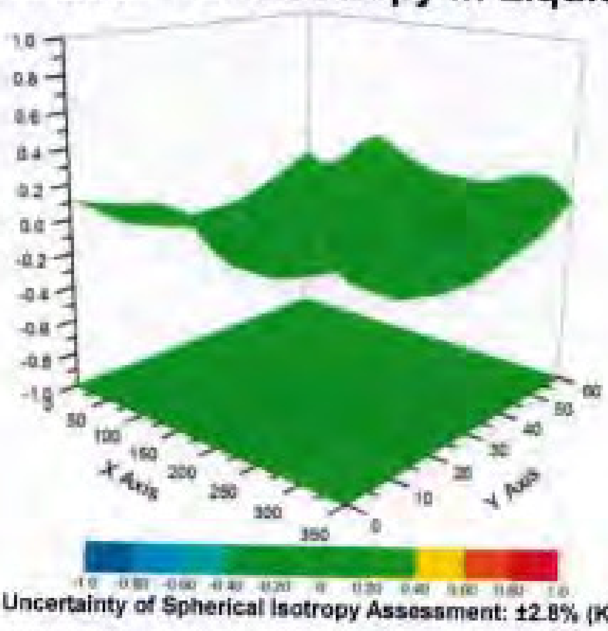
Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF) f=1750 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)

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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3343

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	148.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	10mm
Tip Diameter	4mm
Probe Tip to Sensor X Calibration Point	2mm
Probe Tip to Sensor Y Calibration Point	2mm
Probe Tip to Sensor Z Calibration Point	2mm
Recommended Measurement Distance from Surface	3mm

EX3DV4 SN7336

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CALIBRATION No. L0570

Client: Lenovo Certificate No: Z15-97162

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7336

Calibration Procedure(s): FD-Z11-2-004-01
Calibration Procedures for Dosimetric E-field Probes

Calibration date: October 30, 2015

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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Power sensor NRP-Z91	101547	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Power sensor NRP-Z91	101548	01-Jul-15 (CTTL, No.J15X04256)	Jun-16
Reference10dBAttenuator	18N50W-10dB	13-Mar-14(TMC,No.JZ14-1103)	Mar-16
Reference20dBAttenuator	18N50W-20dB	13-Mar-14(TMC,No.JZ14-1104)	Mar-16
Reference Probe EX3DV4	SN 7307	27-Feb-15(SPEAG,No.EX3-7307_Feb15)	Feb-16
DAE4	SN 771	27-Jan-15(SPEAG,No.DAE4-771_Jan15)	Jan -16
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGeneratorMG3700A	6201052605	01-Jul-15 (CTTL, No.J15X04255)	Jun-16
Network Analyzer E5071C	MY46110673	03-Feb-15 (CTTL, No.J15X00728)	Feb-16

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: October 31, 2015

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

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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 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 300MHz to 3GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect 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 (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued 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±50MHz to±100MHz.
- *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).

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Probe EX3DV4

SN: 7336

Calibrated: October 30, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7336

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu V/(V/m)^2$)[A]	0.64	0.52	0.55	±10.8%
DCP(mV)[B]	101.0	99.5	100.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	223.6	±2.4%
		Y	0.0	0.0	1.0		197.9	
		Z	0.0	0.0	1.0		204.3	

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

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

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7336

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)
2300	39.5	1.67	7.60	7.60	7.60	0.38	0.77	±12%
2600	39.0	1.96	7.33	7.33	7.33	0.24	1.35	±12%
5200	36.0	4.66	5.63	5.63	5.63	0.55	0.98	±13%
5300	35.9	4.76	5.39	5.39	5.39	0.55	0.98	±13%
5500	35.6	4.96	5.09	5.09	5.09	0.55	0.98	±13%
5600	35.5	5.07	4.85	4.85	4.85	0.60	0.90	±13%
5800	35.3	5.27	4.83	4.83	4.83	0.60	0.90	±13%

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequency 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 the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7336

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)
2300	52.9	1.81	7.51	7.51	7.51	0.47	0.82	±12%
2600	52.5	2.16	7.18	7.18	7.18	0.39	0.96	±12%
5200	49.0	5.30	4.86	4.86	4.86	0.55	0.95	±13%
5300	48.9	5.42	4.58	4.58	4.58	0.55	0.90	±13%
5500	48.6	5.65	4.23	4.23	4.23	0.58	0.95	±13%
5600	48.5	5.77	4.01	4.01	4.01	0.59	0.90	±13%
5800	48.2	6.00	4.16	4.16	4.16	0.63	0.91	±13%

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequency 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 the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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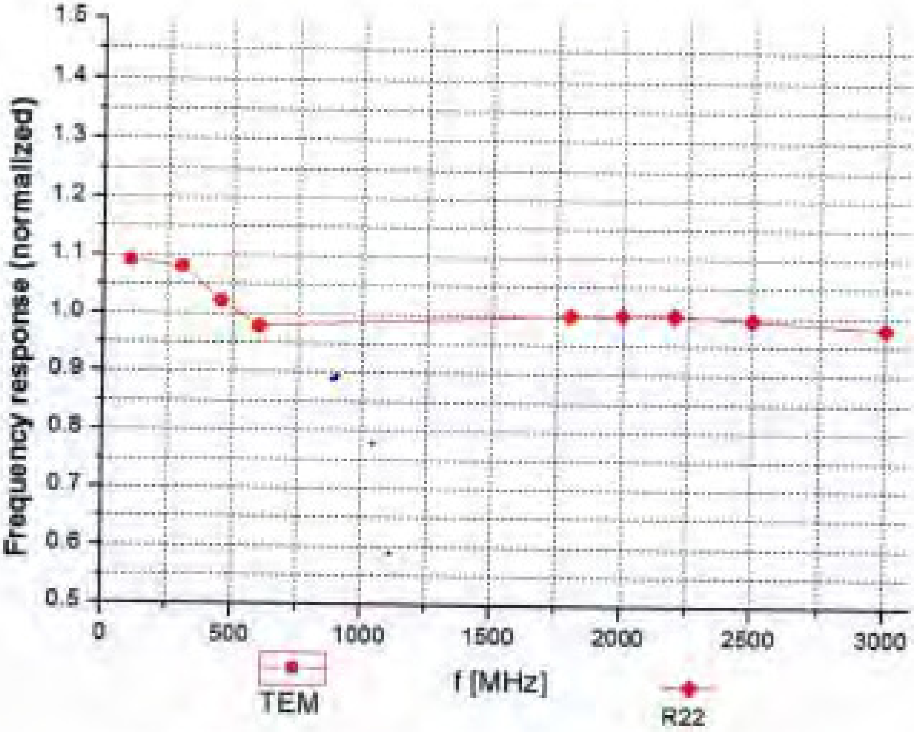
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.5% (k=2)

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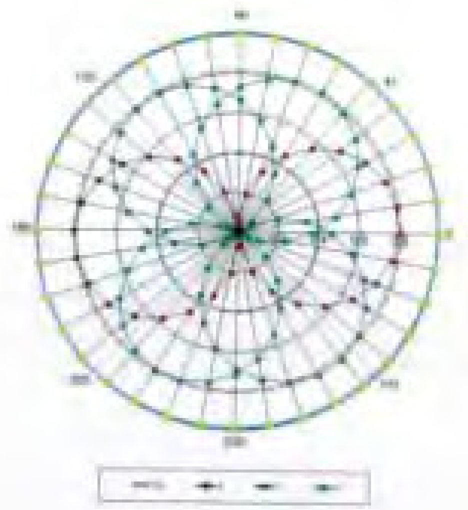
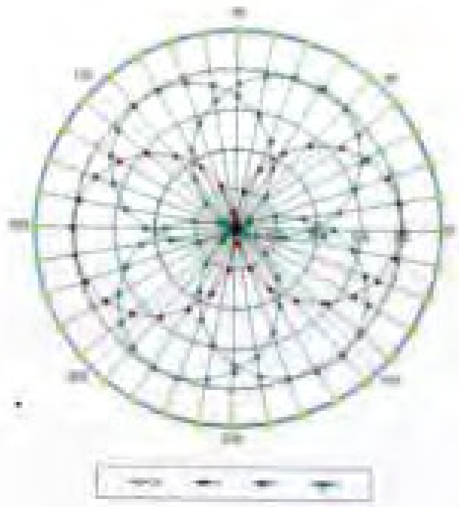
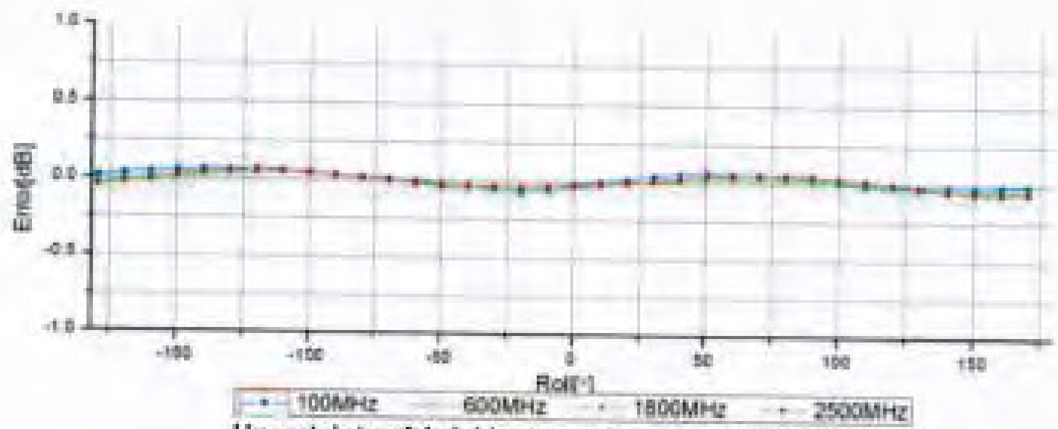
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

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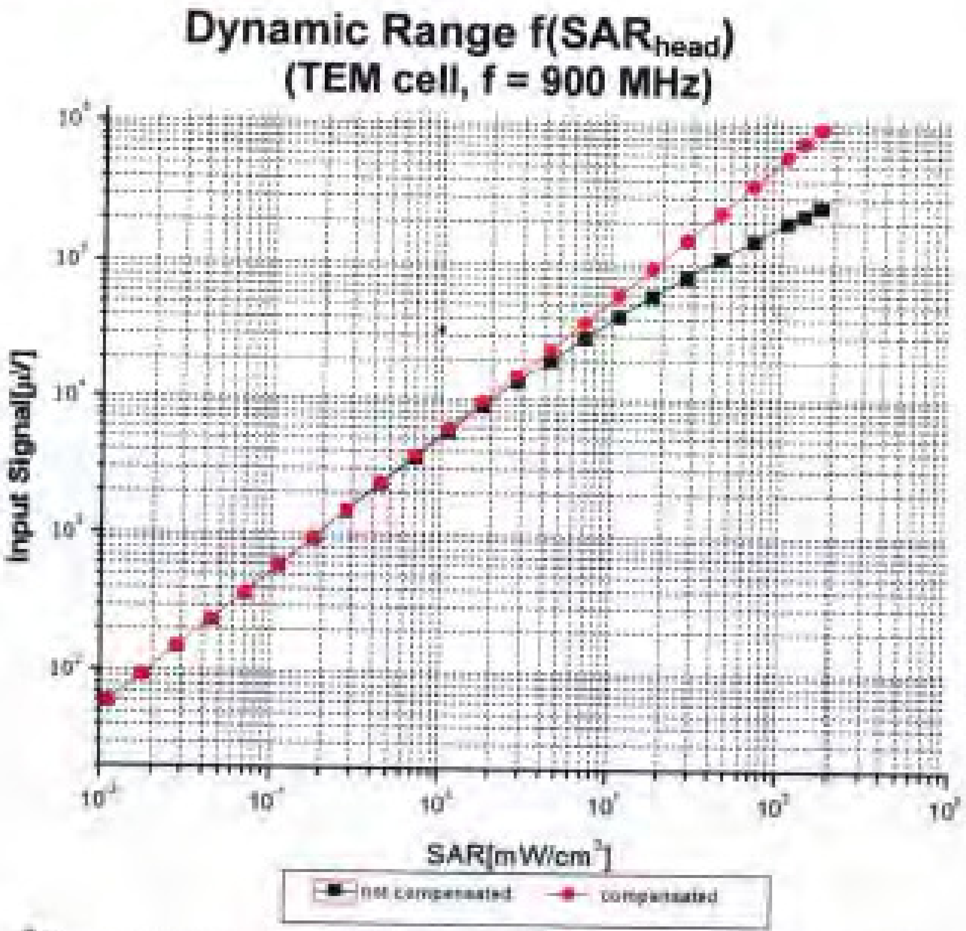
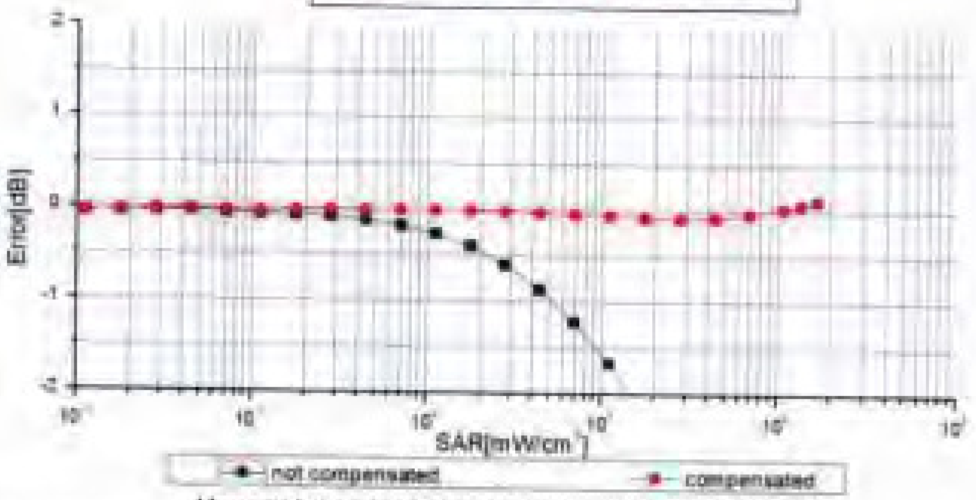
E-mail: cttl@chinattl.com Http://www.chinattl.cn





Uncertainty of Linearity Assessment: ±0.9% (k=2)

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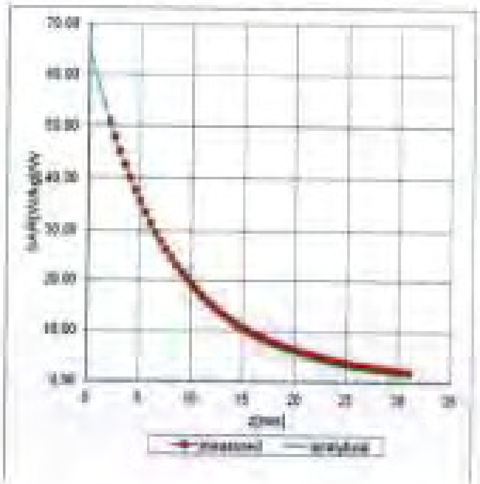
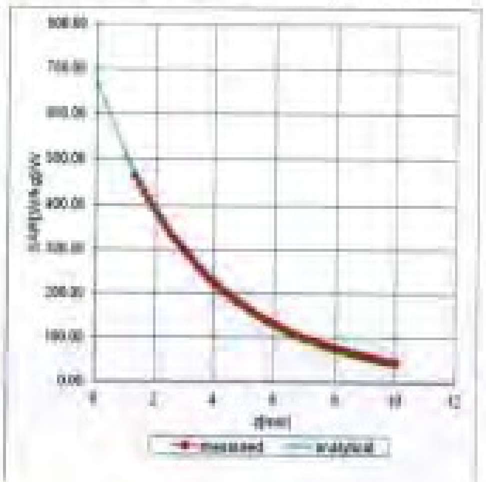
Conversion Factor Assessment

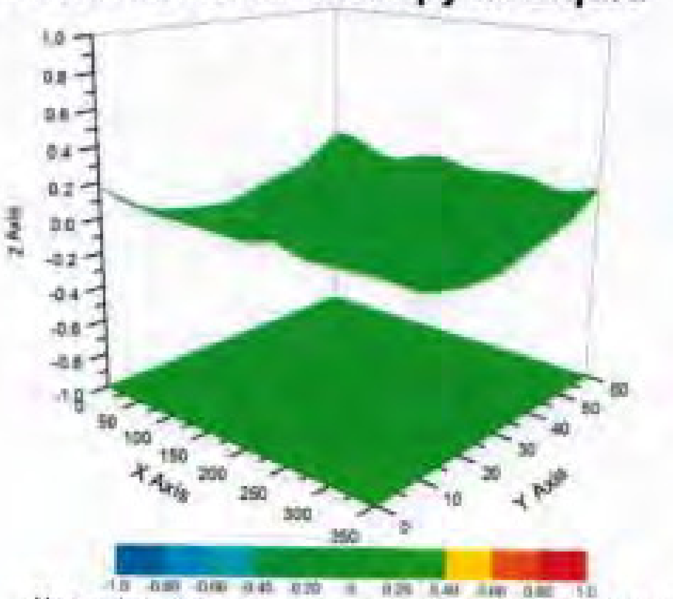
f=2600 MHz, WGLS R26(H_convF)



f=5200 MHz, WGLS R58(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)

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E-mail: cttl@chinattl.com Http://www.chinattl.cn

DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7336

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	160.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

DAE4 SN 918

Schmid & Partner Engineering AG

s p e a g

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

IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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Accreditation No.: **SCS 108**

Client **Auden**

Certificate No: **DAE4-918_Dec14**

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BK - SN: 918

Calibration procedure(s): QA CAL-06.v28
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: December 29, 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
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-14 (No:15573)	Oct-15
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-14 (in house check)	In house check: Jan-15
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-14 (in house check)	In house check: Jan-15

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	
Approved by:	Fin Bomholt	Deputy Technical Manager	

Issued: December 29, 2014

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Accreditation No.: **SCS 108**

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.263 ± 0.02% (k=2)	404.441 ± 0.02% (k=2)	403.975 ± 0.02% (k=2)
Low Range	3.99223 ± 1.50% (k=2)	3.98766 ± 1.50% (k=2)	3.99058 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	321.5 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS108)

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	200032.31	-4.38	-0.00
Channel X	+ Input	20003.84	-0.13	-0.00
Channel X	- Input	-20004.78	1.10	-0.01
Channel Y	+ Input	200032.27	-4.06	-0.00
Channel Y	+ Input	20002.00	-1.87	-0.01
Channel Y	- Input	-20006.00	0.05	-0.00
Channel Z	+ Input	200034.27	-2.10	-0.00
Channel Z	+ Input	20002.22	-1.48	-0.01
Channel Z	- Input	-20008.25	-2.23	0.01

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2000.31	0.03	0.00
Channel X	+ Input	200.99	0.68	0.34
Channel X	- Input	-198.48	1.20	-0.60
Channel Y	+ Input	2000.13	0.00	0.00
Channel Y	+ Input	199.66	-0.39	-0.20
Channel Y	- Input	-199.91	-0.16	0.08
Channel Z	+ Input	1999.95	-0.05	-0.00
Channel Z	+ Input	198.93	-1.21	-0.60
Channel Z	- Input	-201.20	-1.44	0.72

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	5.38	3.39
	- 200	-1.40	-3.69
Channel Y	200	11.47	11.14
	- 200	-12.53	-12.38
Channel Z	200	-14.52	-14.40
	- 200	11.50	11.86

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	-0.57	-5.19
Channel Y	200	8.22	-	0.42
Channel Z	200	9.83	6.01	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15962	16466
Channel Y	16023	17247
Channel Z	15984	16328

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.60	-2.24	1.43	0.75
Channel Y	1.14	-0.87	2.02	0.43
Channel Z	-0.52	-1.84	0.61	0.42

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	−0.01	-8	-9

D750V3 SN 1126

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Accreditation No.: **SCS 108**

Client **Lenovo (Auden)**

Certificate No: **D750V3-1126_Sep14**

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1126
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 19, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2014

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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 1528-2013, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
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	42.0 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.26 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.41 W/kg ± 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	55.0 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.65 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.76 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.1 Ω - 1.4 jΩ
Return Loss	- 29.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω - 3.2 jΩ
Return Loss	- 29.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	June 23, 2014

DASY5 Validation Report for Head TSL

Date: 19.09.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1126

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

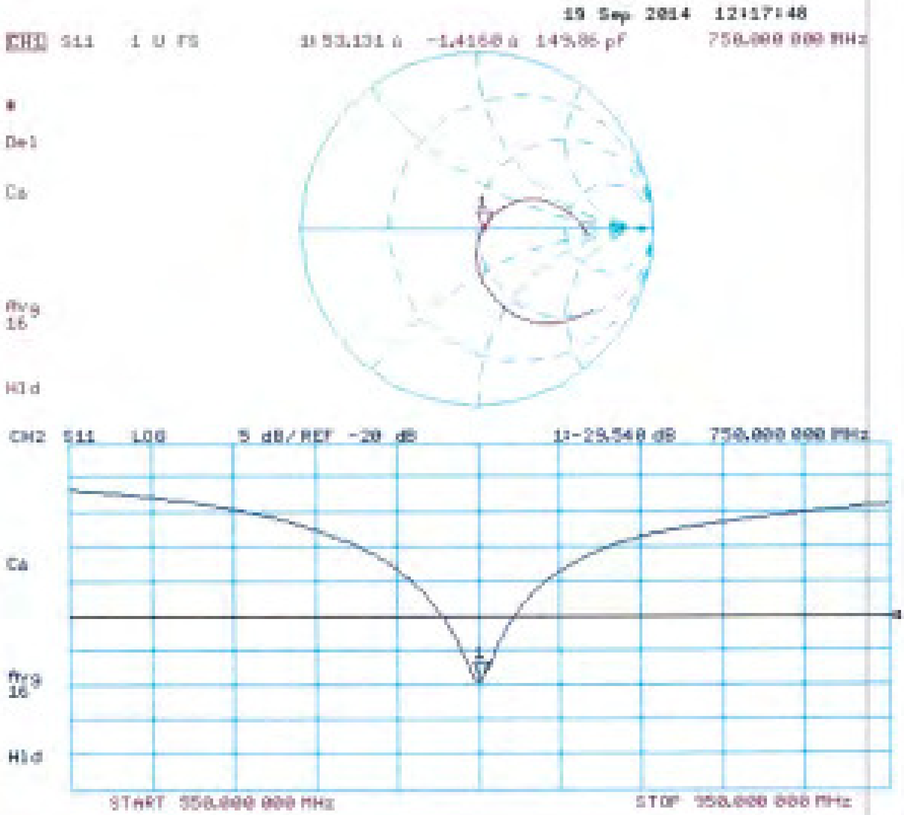
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.37, 6.37, 6.37); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.42 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.12 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.43 W/kg

0 dB = 2.43 W/kg = 3.86 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.09.2014

Test Laboratory: SPEAG, Zurich, Switzerland

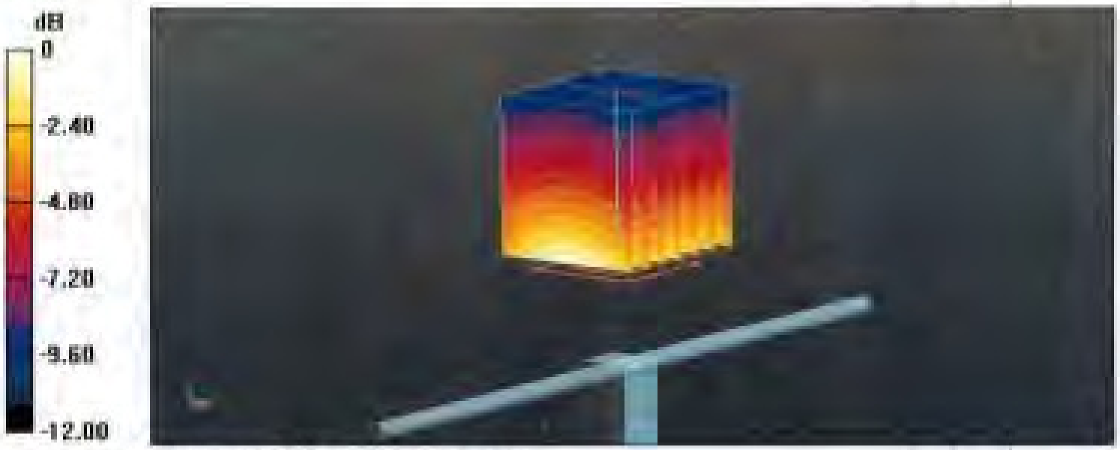
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1126

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.98 S/m; ϵ_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

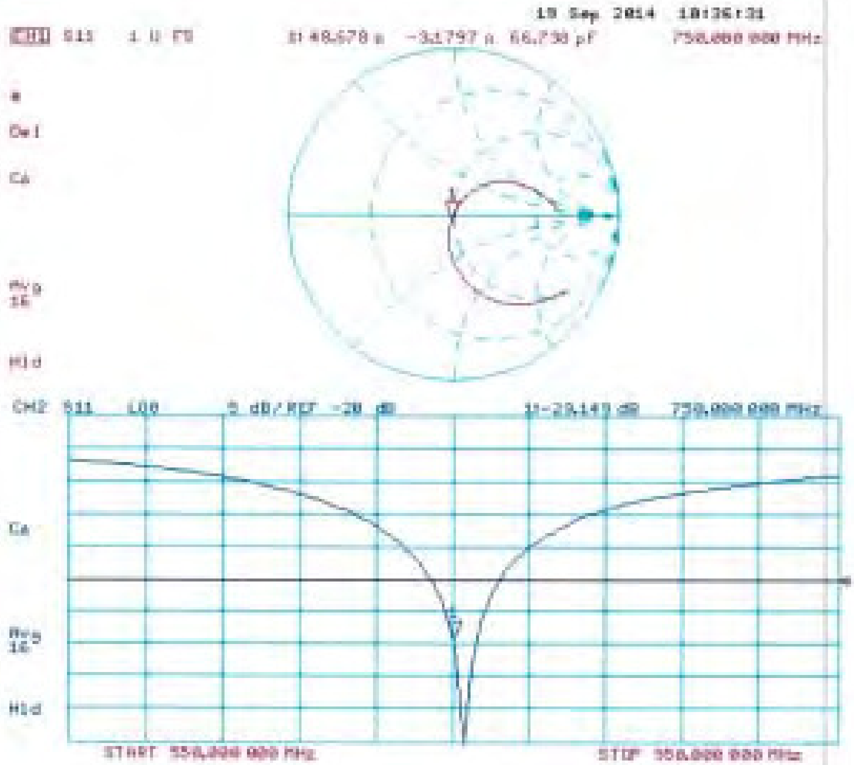
- Probe: ES3DV3 - SN3205; ConvF(6.13, 6.13, 6.13); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.03 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.20 W/kg
SAR(1 g) = 2.2 W/kg; SAR(10 g) = 1.46 W/kg
Maximum value of SAR (measured) = 2.56 W/kg



0 dB = 2.56 W/kg = 4.08 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D750V3 SN: 1126				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
9/14/2014	-29.5	/	53.1	/
9/13/2015	-28.9	2.03%	52.4	0.7Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
9/14/2014	-29.1	/	48.7	/
9/13/2015	-27.9	4.1%	48.2	0.5Ω

D835V2 SN4d105

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS-SZ (Auden)

Certificate No: D835V2-4d105_Nov13

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d105
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 25, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-15
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 26, 2013

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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 1528-2013, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

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Glossary:

TSL	tissue simulating liquid
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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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.94 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	2.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.64 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.26 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.7 ± 6 %	1.01 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	2.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.28 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.06 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.4 Ω - 4.1 jΩ
Return Loss	- 27.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω - 6.0 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	May 26, 2010

DASY5 Validation Report for Head TSL

Date: 25.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d105

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

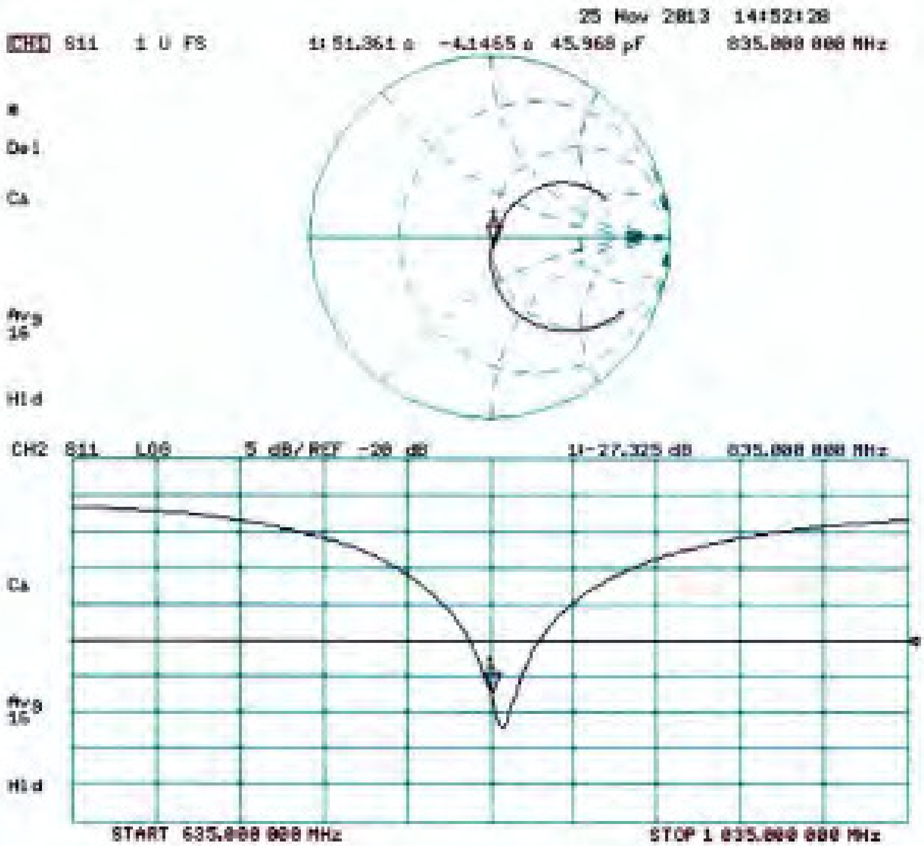
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.05, 6.05, 6.05); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.324 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.80 W/kg
SAR(1 g) = 2.5 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 2.92 W/kg

0 dB = 2.92 W/kg = 4.65 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

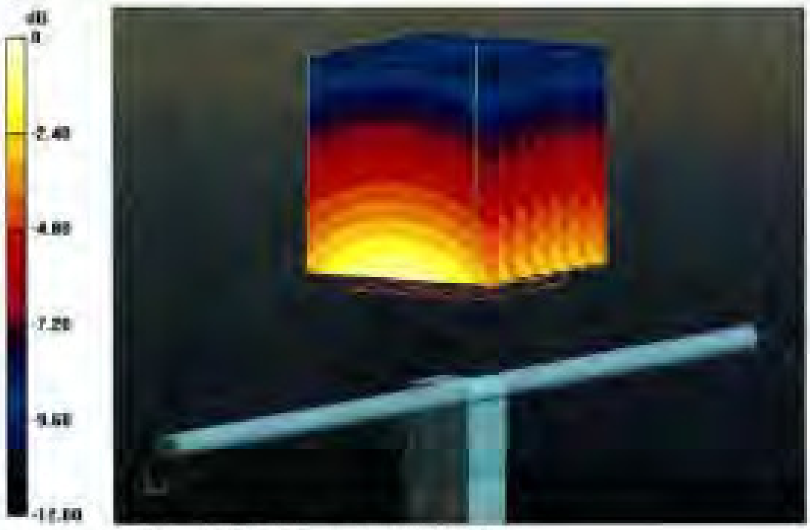
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d105

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.007 S/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

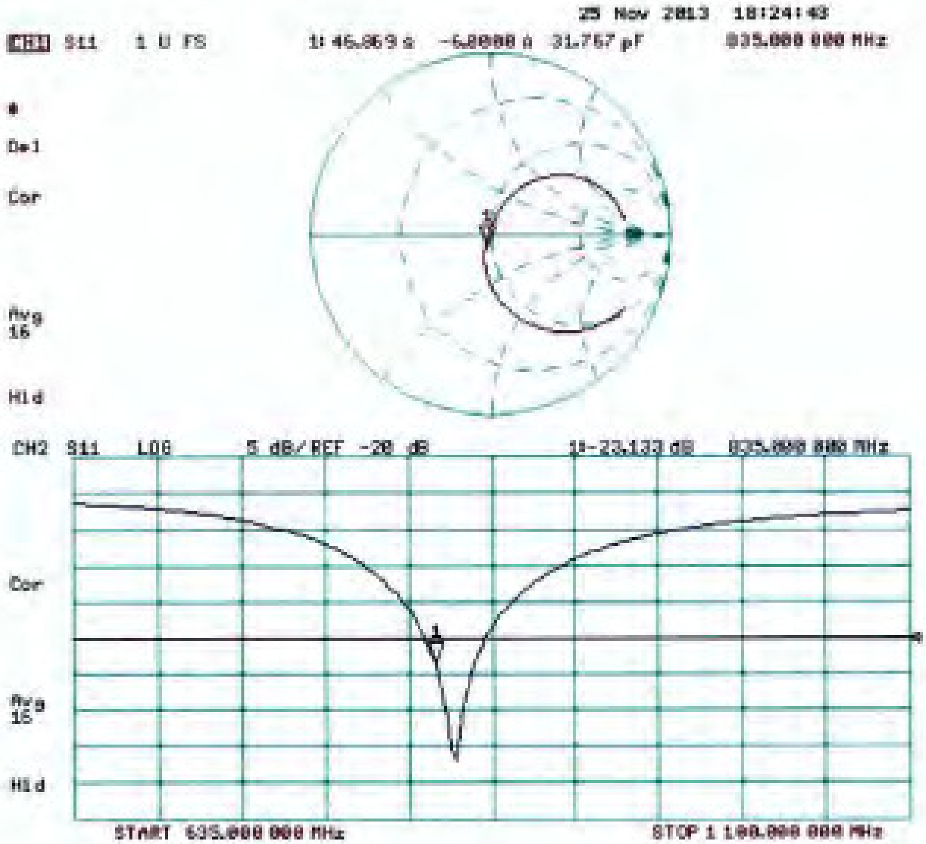
- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.53 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D835V2 SN: 4d105				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
11/25/2013	-27.3	/	51.4	/
11/24/2015	-26.1	4.3%	50.2	1.2Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
11/25/2013	-23.1	/	46.9	/
11/24/2015	-22.5	2.6%	45.2	1.7Ω

D1750v2 SN 1128

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Accreditation No.: **SCS 108**

Client **Lenovo (Auden)**

Certificate No: **D1750V2-1128_Sep14**

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1128
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 23, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 23, 2014

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Certificate No: D1750V2-1128_Sep14 Page 1 of 8

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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 1528-2013, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.9 ± 6 %	1.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.33 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.01 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.0 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω - 0.1 jΩ
Return Loss	- 44.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0 Ω - 0.2 jΩ
Return Loss	- 27.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	June 03, 2014

DASY5 Validation Report for Head TSL

Date: 19.09.2014

Test Laboratory: SPEAG, Zurich, Switzerland

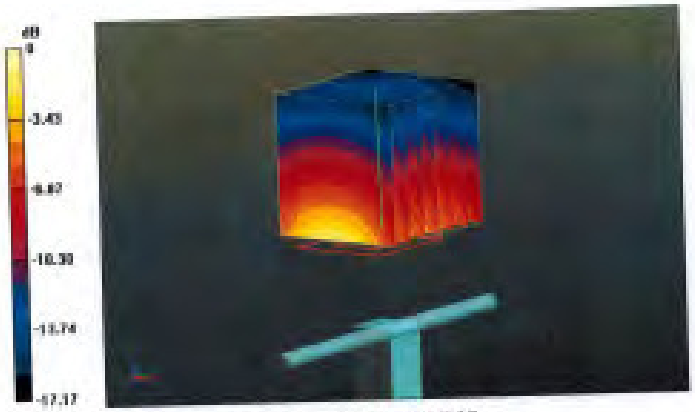
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1128

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

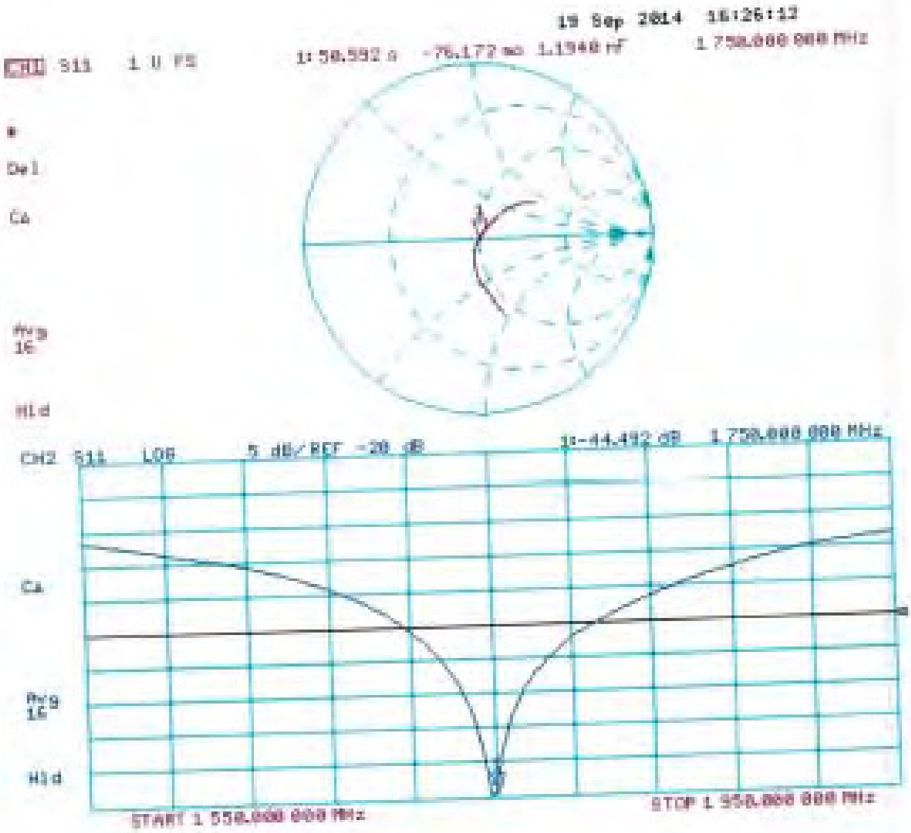
- Probe: ES3DV3 - SN3205; ConvF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.82 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.29 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.6 W/kg = 10.64 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.09.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1128

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.48 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

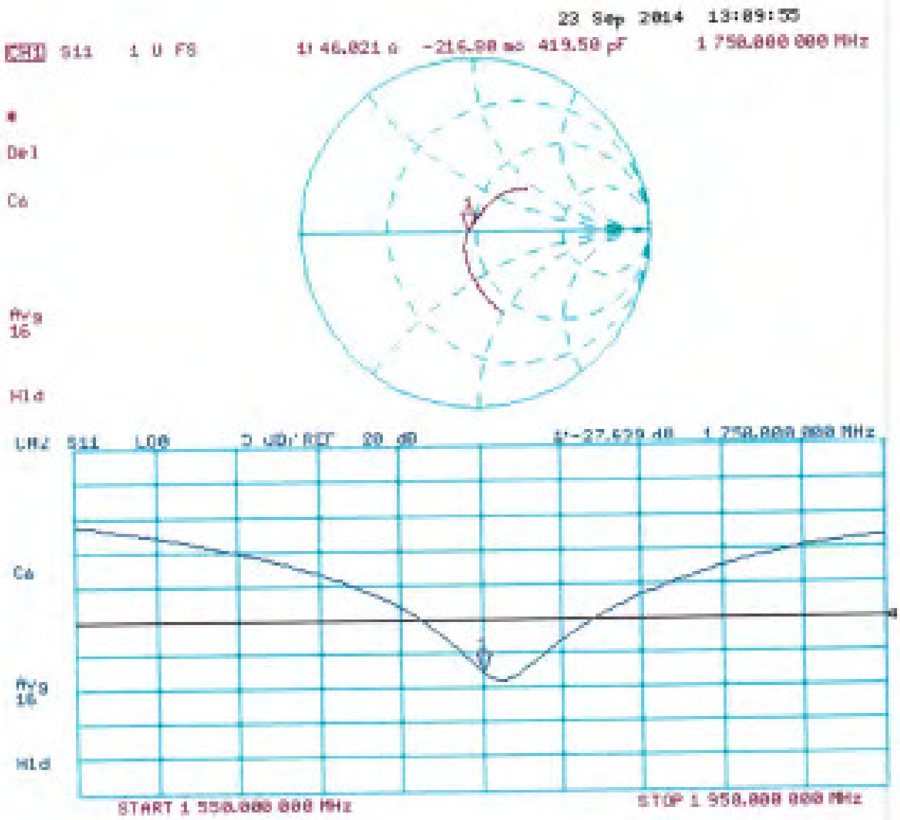
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.80 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.33 W/kg; SAR(10 g) = 5.01 W/kg
Maximum value of SAR (measured) = 11.7 W/kg

0 dB = 11.7 W/kg = 10.68 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D1750V2 SN: 1128				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
9/23/2014	-44.5	/	50.6	/
9/22/2015	-43.1	3.1%	50.1	0.5Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
9/23/2014	-27.6	/	46.0	/
9/22/2015	-26.5	4.0%	45.1	0.9Ω

D1900V2 SN 5d028

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Accreditation No.: SCS 108

Client **SGS-SZ (Auden)**

Certificate No: **D1900V2-5d028_Nov13**

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d028

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: November 27, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-15
Network Analyzer HP 8753E	US37390585 S4206	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: November 27, 2013

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S Servizio svizzero di taratura
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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 1528-2013, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.39 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	10.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.4 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.4 ± 6 %	1.51 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	10.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω + 5.8 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 5.8 jΩ
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.201 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

DASY5 Validation Report for Head TSL

Date: 27.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

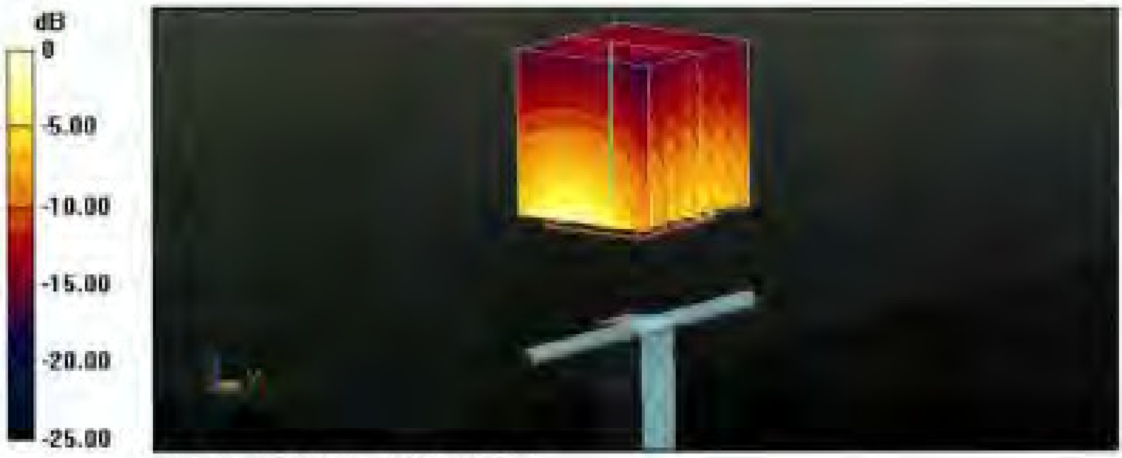
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d028

Communication System: UID 0 - CW ; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.39 S/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

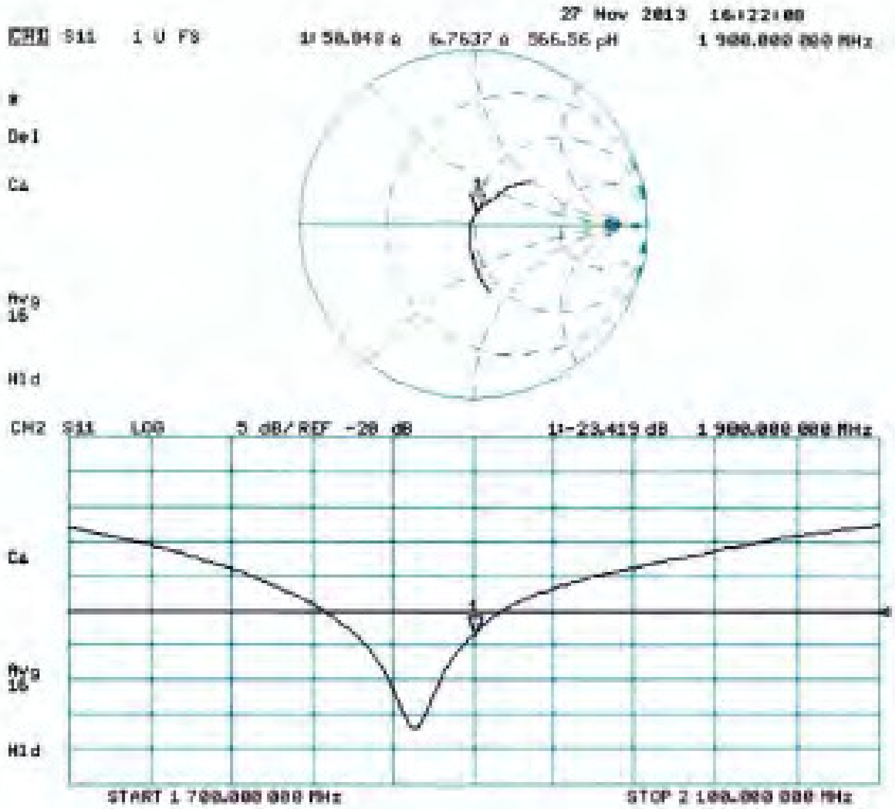
- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.112 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.33 W/kg
Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d028

Communication System: UID 0 - CW ; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.51 S/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

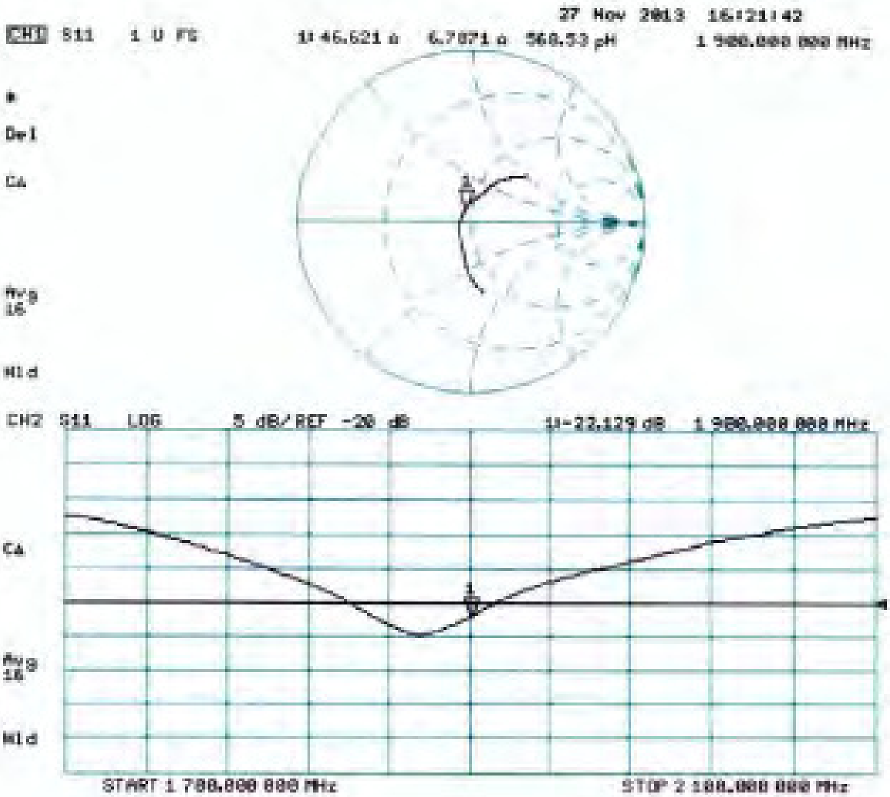
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.784 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.39 W/kg
Maximum value of SAR (measured) = 12.6 W/kg

0 dB = 12.6 W/kg = 11.00 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D1900V2 SN: 5d028				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
11/27/2013	-23.4	/	50.8	/
11/26/2015	-22.3	4.7%	50.3	0.5Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
11/27/2013	-22.1	/	46.6	/
11/26/2015	-21.3	3.6%	45.4	1.2Ω

D2450V2 SN 733

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Accreditation No.: **SCS 108**

Client **SGS-SZ (Auden)**

Certificate No: **D2450V2-733_Nov13**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 733
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 26, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-15
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: November 26, 2013

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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 1528-2013, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.84 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	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	2.02 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	12.6 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**49.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.0 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2 Ω + 2.5 jΩ
Return Loss	- 26.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.0 Ω + 4.2 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	May 07, 2003

DASY5 Validation Report for Head TSL

Date: 26.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

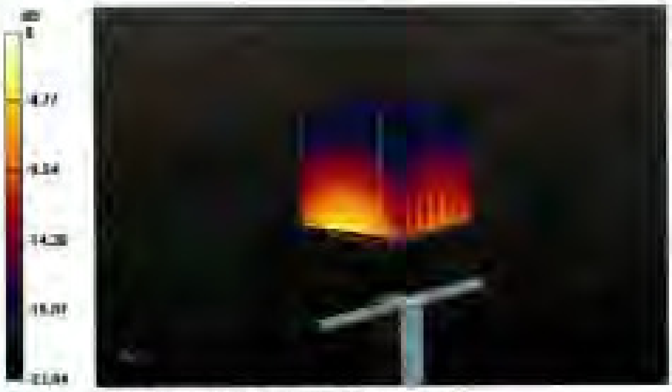
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 733

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

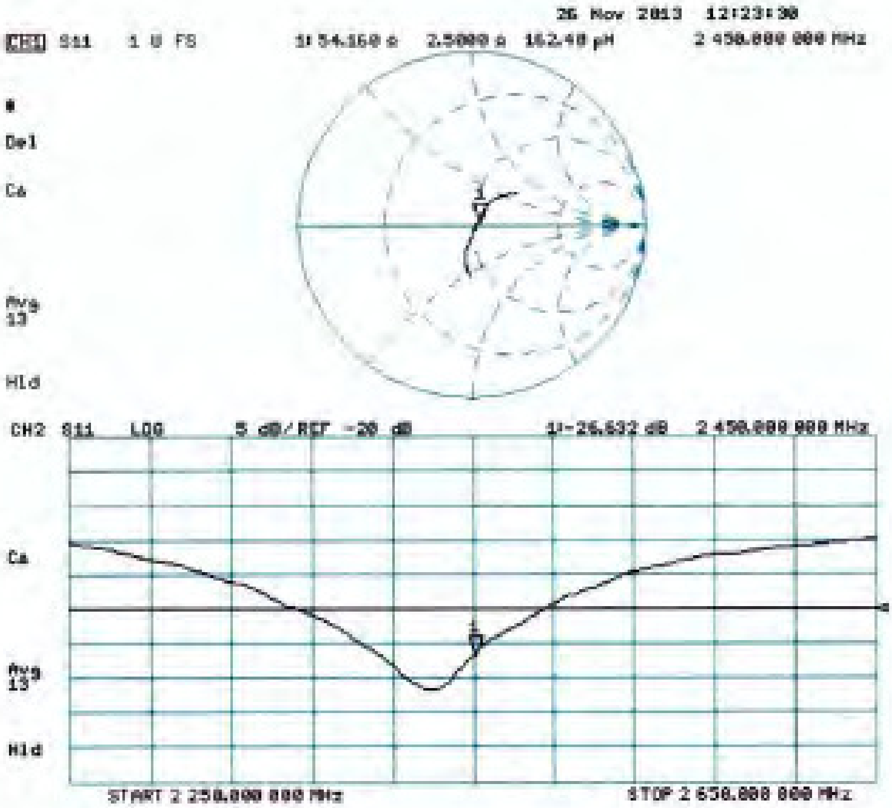
- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (8x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.010 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.1 W/kg
Maximum value of SAR (measured) = 17.4 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 26.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 733

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 S/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

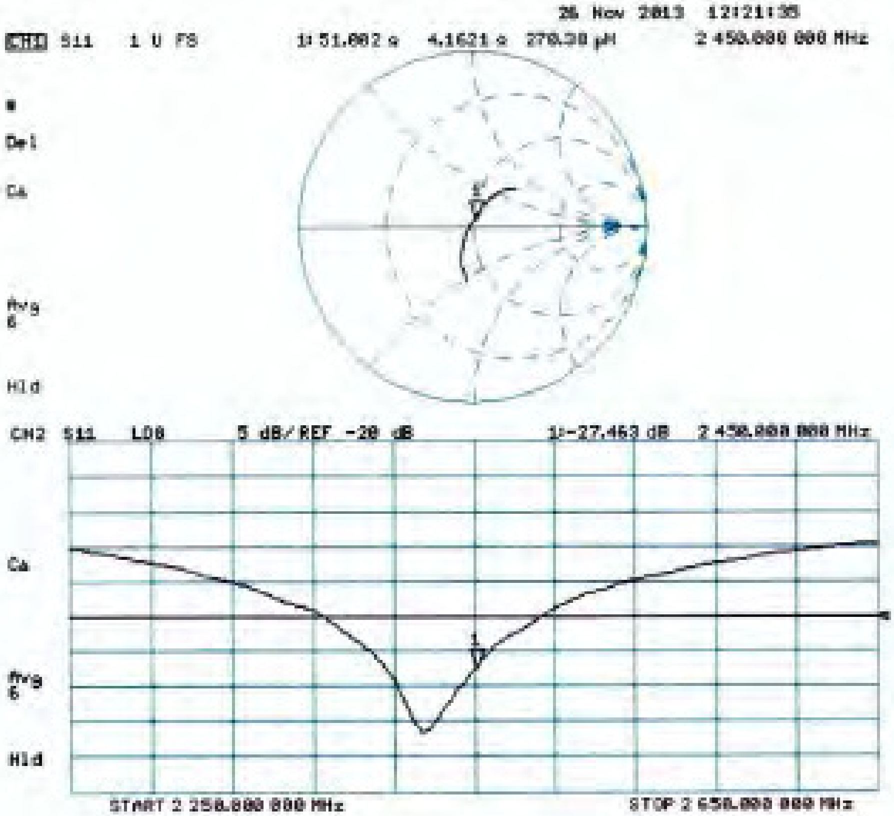
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.010 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 26.1 W/kg
SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.81 W/kg
Maximum value of SAR (measured) = 16.4 W/kg

0 dB = 16.4 W/kg = 12.15 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D2450V2 SN: 733				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
11/26/2013	-26.6	/	54.2	/
11/25/2015	-25.7	3.4%	53.8	0.4Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
11/26/2013	-27.5	/	51.0	/
11/25/2015	-26.3	4.3%	50.2	0.8Ω

D2600V2 SN1093

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Accreditation No.: **SCS 108**

Client **Lenovo (Auden)**

Certificate No: **D2600V2-1093_Sep14**

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1093
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 23, 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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 24, 2014

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S Swiss Calibration Service

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 1528-2013, "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

c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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.

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%.

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.2 ± 6 %	1.99 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	14.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.4 ± 6 %	2.19 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	14.4 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**56.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.31 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**25.0 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.4 Ω - 8.7 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 6.8 jΩ
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
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	August 27, 2014

DASY5 Validation Report for Head TSL

Date: 23.09.2014

Test Laboratory: SPEAG, Zurich, Switzerland

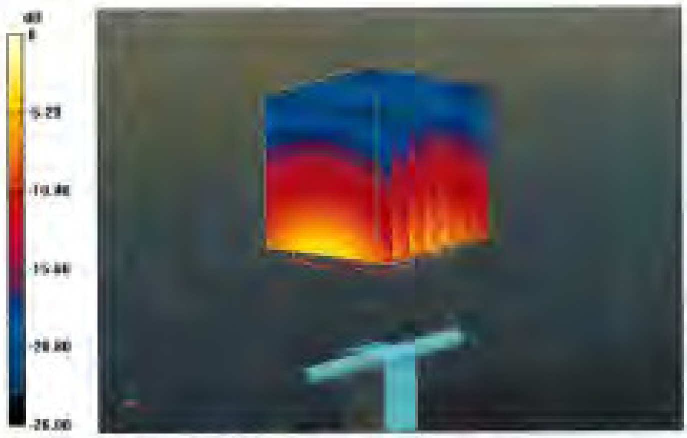
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1093

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 1.99 S/m; ε_r = 37.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

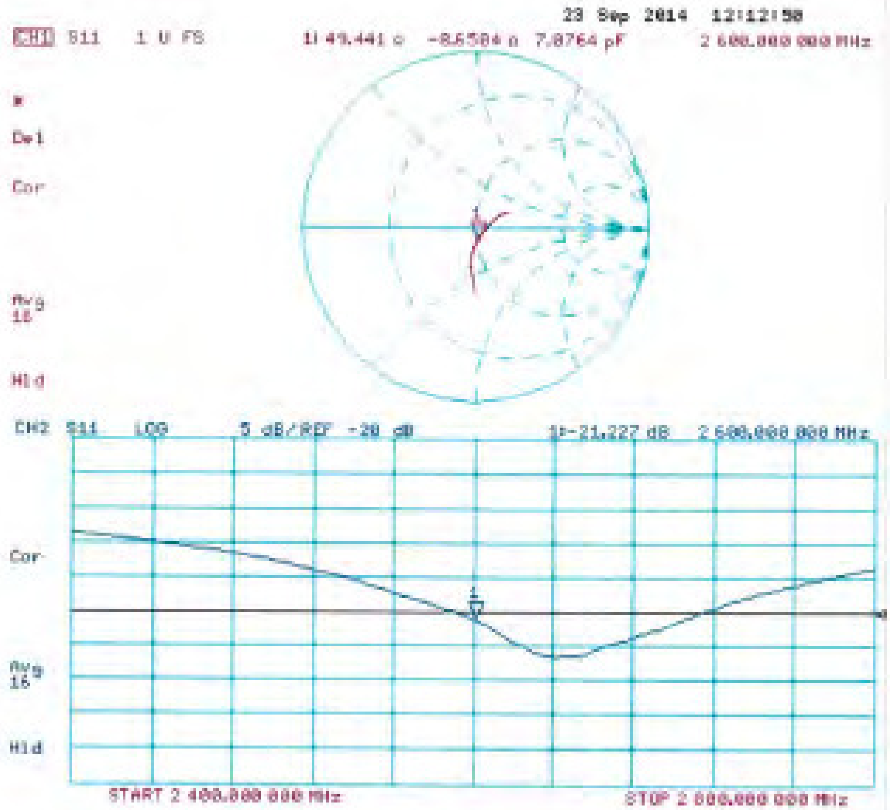
- Probe: ES3DV3 - SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.8 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.33 W/kg
Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.09.2014

Test Laboratory: SPEAG, Zurich, Switzerland

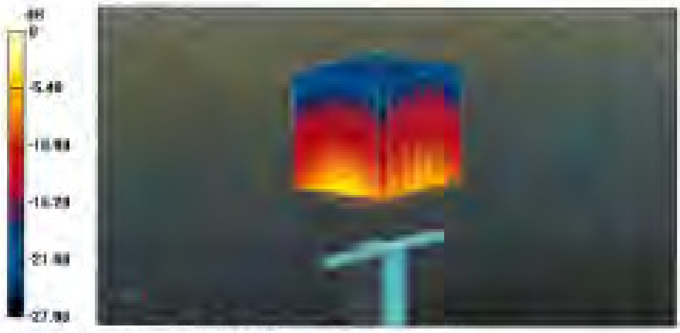
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1093

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.19 S/m; ε_r = 50.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

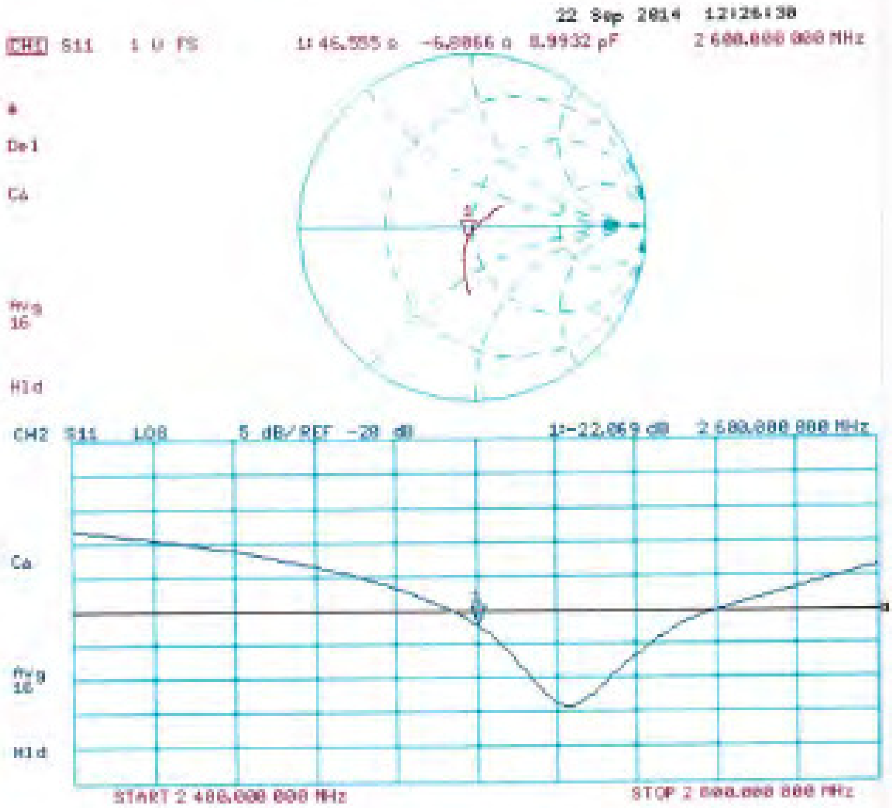
- Probe: ES3DV3 - SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.31 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.31 W/kg
Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg

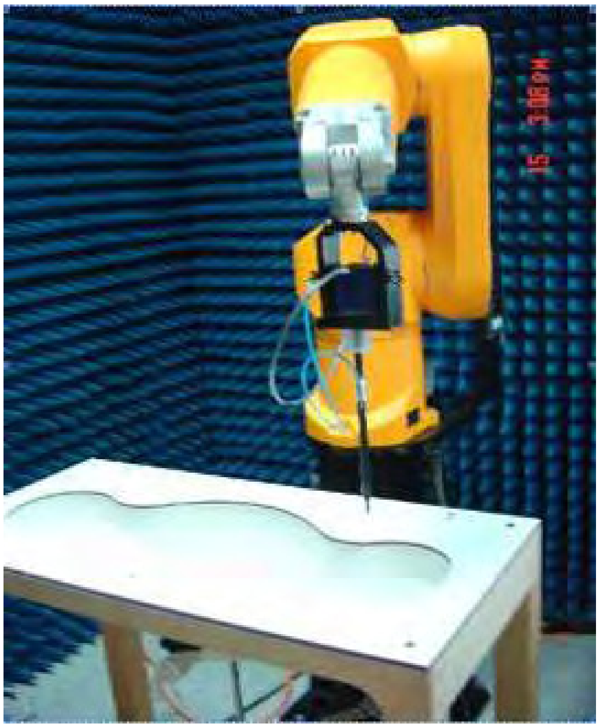
Impedance Measurement Plot for Body TSL



Dipole D2600V2 SN: 1093				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
9/23/2014	-21.2	/	49.4	/
9/22/2015	-20.7	2.4%	48.3	1.1Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
9/23/2014	-22.1	/	46.6	/
9/22/2015	-21.7	1.8%	45.7	0.9Ω

Appendix D: Photographs

SAR measurement System



Photographs of Tissue Simulate Liquid

Photo 1: Tissue Simulant Liquid for Head 750	**Photo 2: Tissue Simulant Liquid for Body 750**

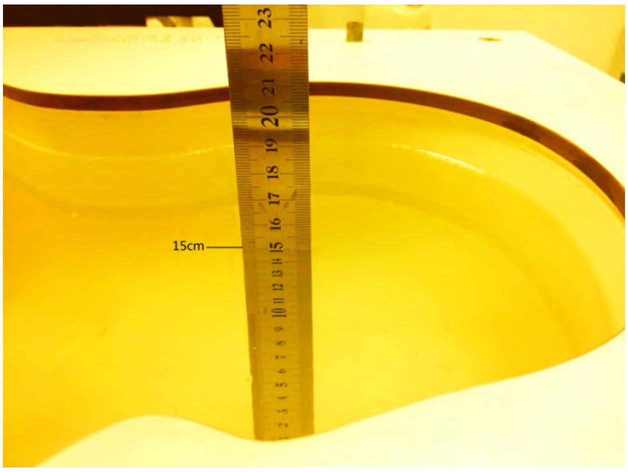
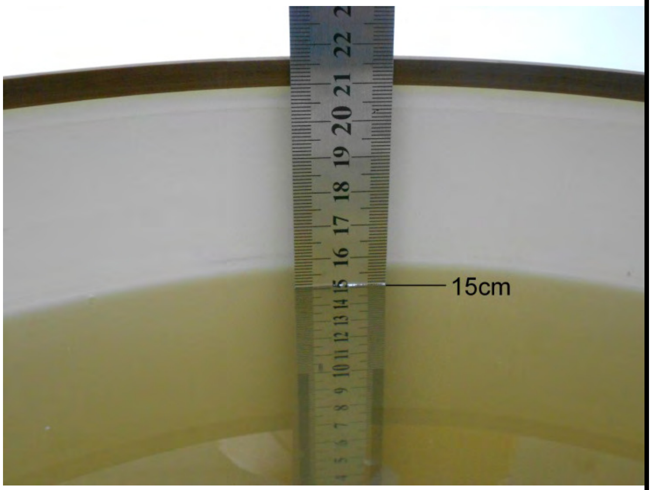
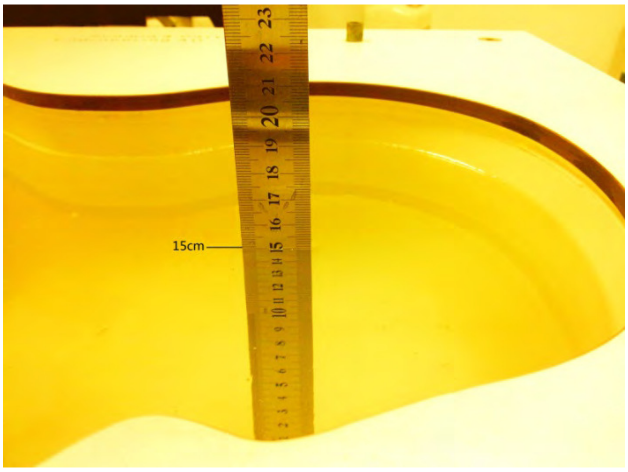
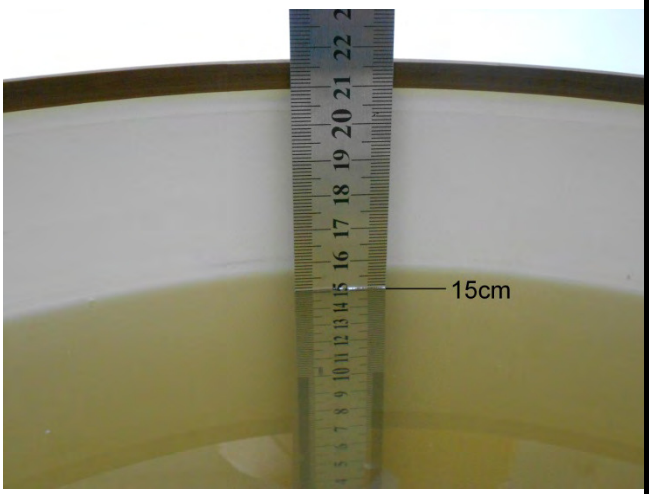

	

Photo 3: Tissue Simulant Liquid for Head 835	**Photo 4: Tissue Simulant Liquid for Body 835**
	

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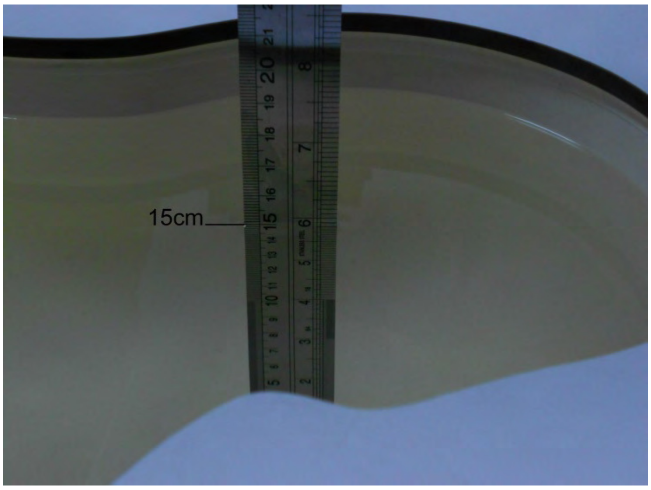
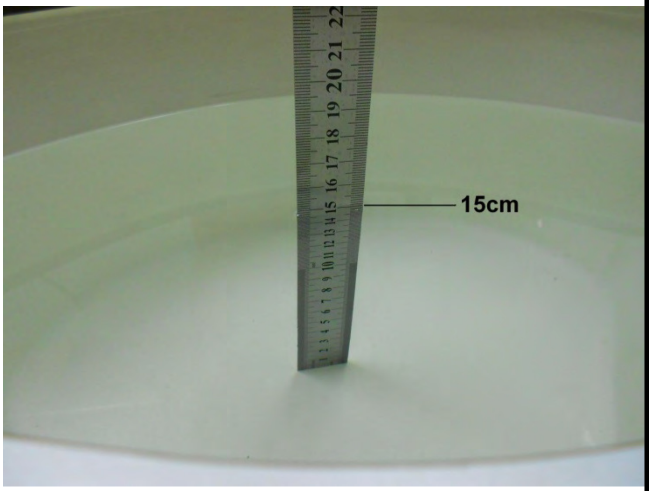
<tr><th>Photo 5: Tissue Simulant Liquid for Head 1750</th><th>Photo 6: Tissue Simulant Liquid for Body 1750</th></tr>
<tr><td>
</td><td>
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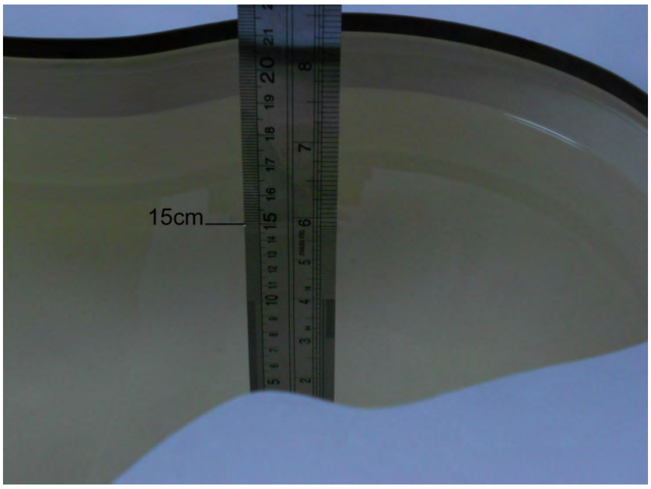
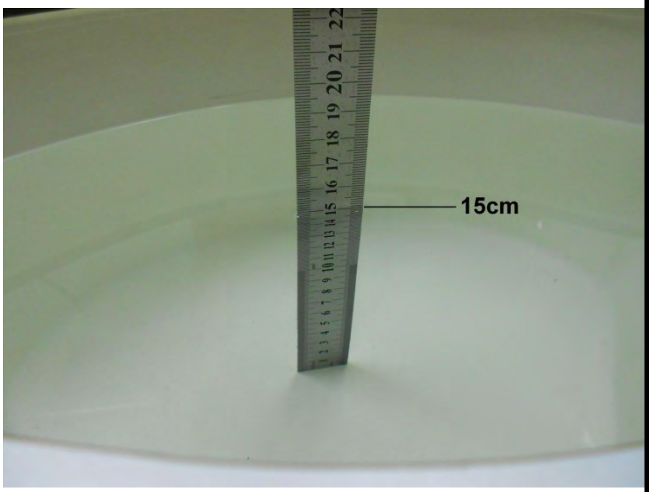
<tr><th>Photo 7: Tissue Simulant Liquid for Head 1900</th><th>Photo 8: Tissue Simulant Liquid for Body 1900</th></tr>
<tr><td>
</td><td>
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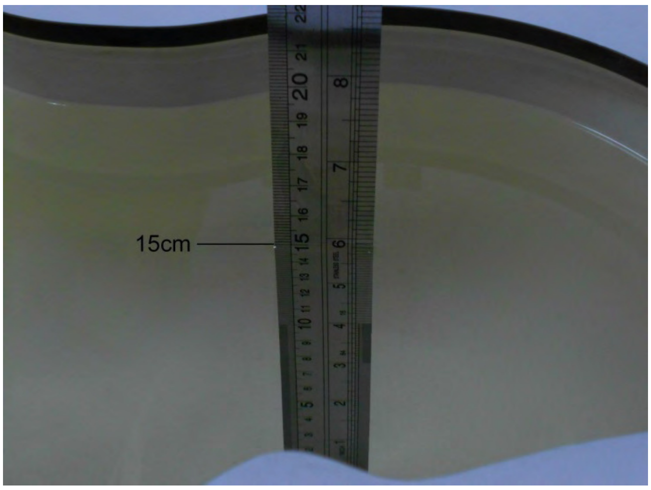
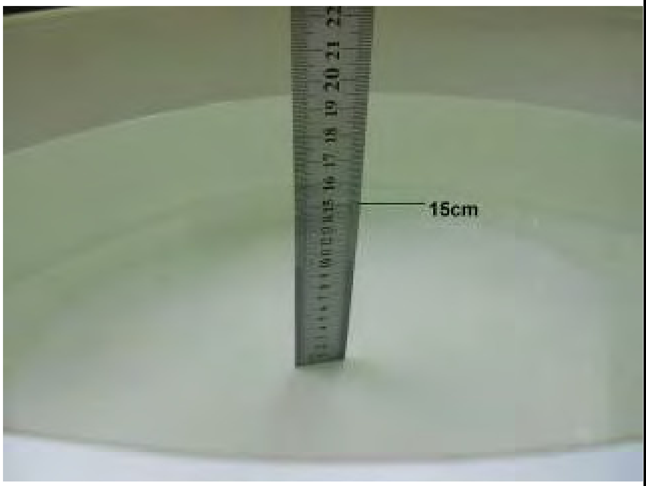
<tr><th>Photo 9: Tissue Simulant Liquid for Head 2450</th><th>Photo 10: Tissue Simulant Liquid for Body 2450</th></tr>
<tr><td>
</td><td>
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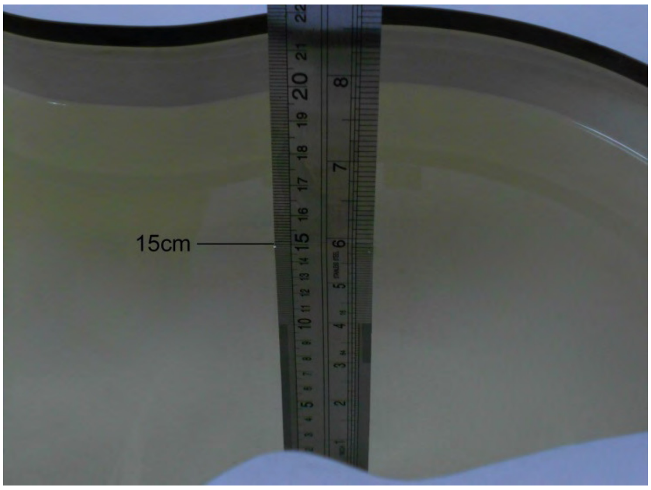
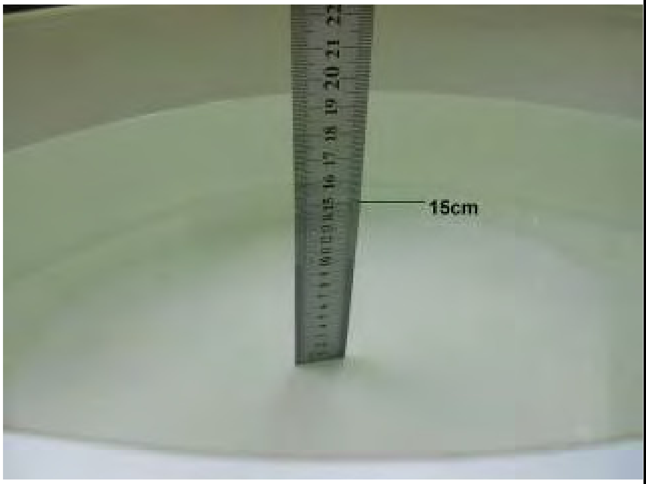
Photo 11: Tissue Simulant Liquid for Head 2600	Photo 12: Tissue Simulant Liquid for Body 2600
	

Photographs of EUT test position

Photo 13: Left touch cheek	Photo 14: Left tilted 15 degree

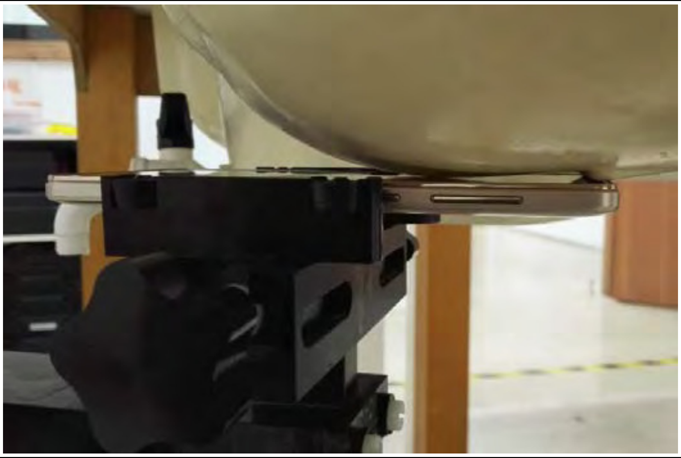
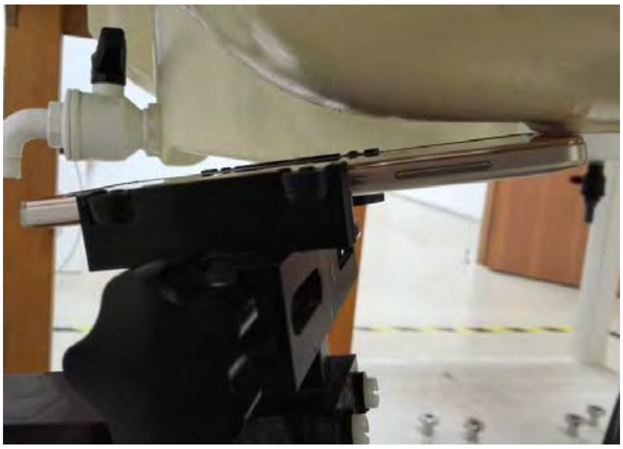
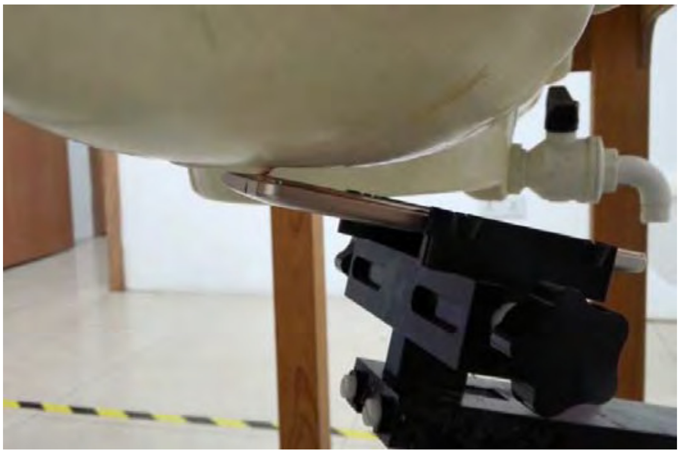

	

Photo 15: Right touch cheek	**Photo 16: Right tilted 15 degree**
	
Photo 17: Front side 15mm	**Photo 18: Back side 15mm**

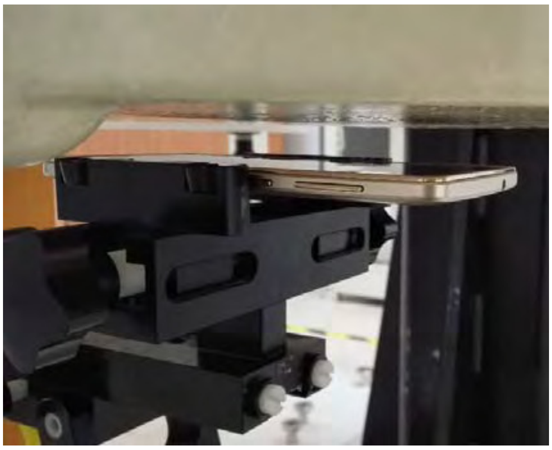
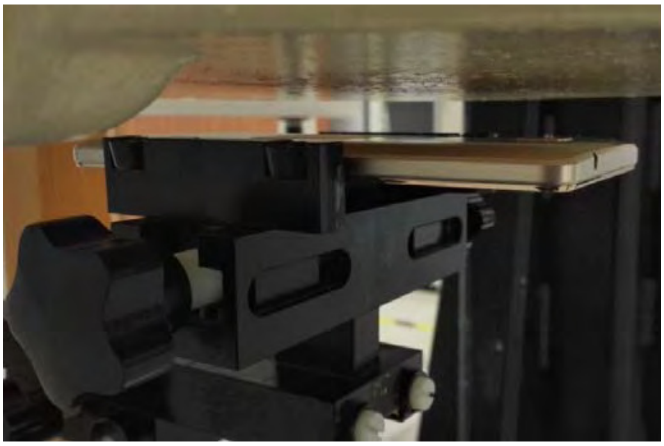
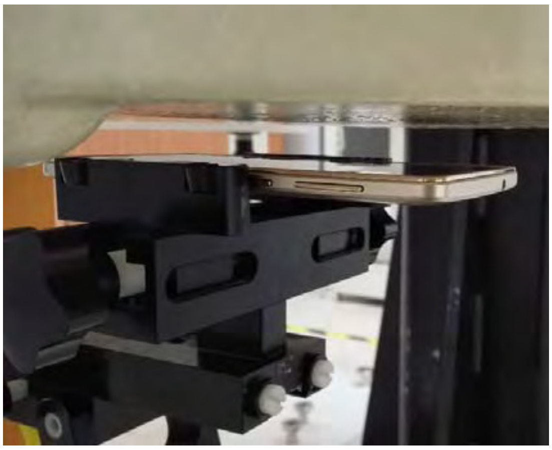

	

Photo 19: Front side 10mm	**Photo 20: Back side 10mm**



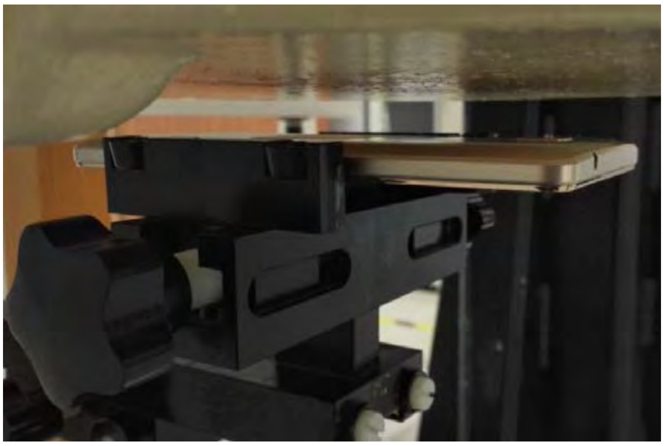
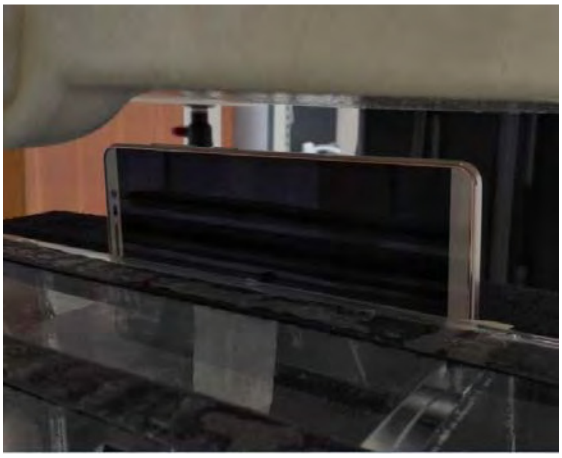
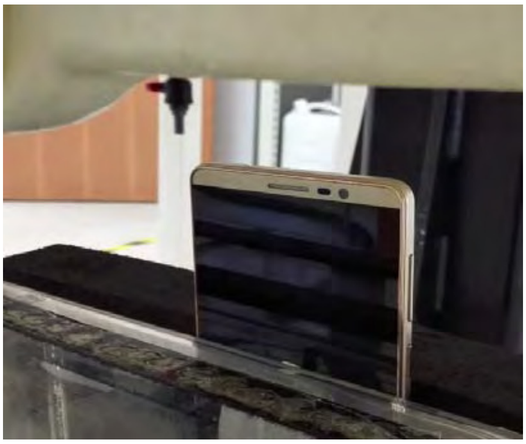
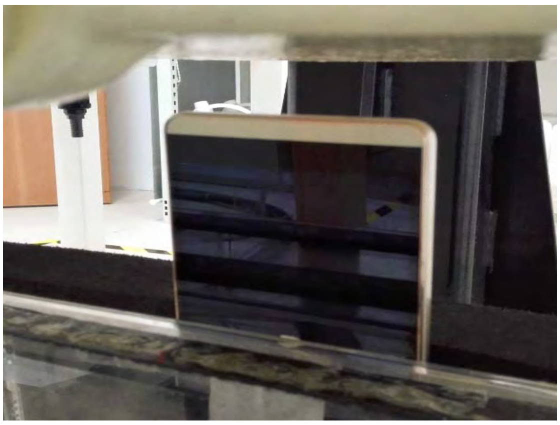


Photo 21: Left side 10mm	Photo 22: Right Side 10mm
	
Photo 23: Top side 10mm	**Photo 24: Bottom side 10mm**
	

EUT Constructional Details

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