TEST REPORT

Report Reference No. .... :	**TRE17090253** R/C……….: 81825
FCC ID .... :	**WA6S5031**
Applicant's name .... :	**Verykool USA Inc**
Address..:	3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA
Manufacturer......................................:	TEM MOBILE LIMITED
Address..:	Room 1102, 11/F, Building B, TCL Plaza,GaoXin S. Rd. 1st, Hi-Tech industrial Park,Nanshan District, Shenzhen, China
Test item description .... :	**3G Smart phone**
Trade Mark ....:	Verykool
Model/Type reference.......................:	s5031
Listed Model(s) ....:	-
Standard .... :	**FCC 47 CFR Part2.1093** **ANSI/IEEE C95.1: 1999** **IEEE 1528: 2013**
Date of receipt of test sample……….:	Sept.29, 2017
Date of testing………………………...:	Sept.30, 2017 - Oct.12, 2017
Date of issue………………………….:	Oct.13, 2017
Result................. …………………...:	**PASS**

Compiled by (position+printedname+signature)...:	File administrators:Xiaodong Zhao	Xiaodong Zhao
Supervised by (position+printedname+signature)...:	Test Engineer: Xiaodong Zhao	Xiaodong Zhao
Approved by (position+printedname+signature)...:	Manager: Hans Hu	Hans Hu

Testing Laboratory Name .... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address..:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

The test report merely correspond to the test sample.

Contents

1 . Test Standards and Report version

1.1. Test Standards

The tests were performed according to following standards:

FCC 47 Part 2.1093 Radiofrequency Radiation Exposure Evaluation:Portable Devices
IEEE Std C95.1, 1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz.
IEEE Std 1528™-2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
KDB 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 248227 D01 802 11 Wi-Fi SAR v02r02: SAR Measurement Proceduresfor802.11 a/b/g Transmitters
KDB 648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets
KDB 941225 D01 3G SAR Procedures v03r01: SAR Measurement Procedures for 3G Devices
KDB 941225 D06 Hotspot Mode v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

1.2. Report version

Version No.	Date of issue	Description
00	Oct.13, 2017	Original

2. Summary

2.1. Client Information

Applicant:	Verykool USA Inc
Address:	3636 Nobel Drive, Suite 325, San Diego, CA 92122 USA
Manufacturer:	TEM MOBILE LIMITED
Address:	Room 1102, 11/F, Building B, TCL Plaza,GaoXin S. Rd. 1st, Hi-Tech industrial Park,Nanshan District, Shenzhen, China

2.2. Product Description

Name of EUT:	3G Smart phone			
Trade Mark:	Verykool			
Model No.:	s5031			
Listed Model(s):	-			
Power supply:	DC 3.7V From exchange battery			
Device Category:	Portable			
Product stage:	Production unit			
RF Exposure Environment:	General Population / Uncontrolled			
IMEI:	358723070876458			
Device Class:	B			
Hardware version:	ZH286-MB-V0.2A			
Software version:	s5031_VK_Generic_Dual_SW_1.0			
Maximum SAR Value				
Separation Distance:	Head: 0mm Body: 10mm			
Max Report SAR Value (1g):	Test location:	PCE	DTS	Simultaneous TX
	Head:	0.533 W/Kg	0.160 W/Kg	0.693 W/Kg
	Body:	0.792 W/Kg	0.160 W/Kg	0.952 W/Kg
	Hotspot:	0.792 W/Kg	0.160 W/Kg	0.952 W/Kg
GSM				
Support Network:	GSM, GPRS, EGPRS			
Support Band:	GSM850, PCS1900			
Modulation:	GSM/GPRS: GMSK,			
Transmit Frequency:	GSM850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz			
Receive Frequency:	GSM850: 869.20MHz-893.80MHz PCS1900: 1930.20MHz-1989.80MHz			
GPRS Class:	12			
Antenna type:	PIFA Antenna			

WCDMA	
Operation Band:	FDD Band II and FDD Band V
Power Class:	Power Class 3
Modilation Type:	QPSK/16QAM/64QAM/HSUPA/HSDPA
DC-HSUPA Release Version:	Not Supported
Antenna type:	PIFA Antenna
WIFI	
Supported type:	802.11b/802.11g/802.11n(HT20)/802.11n(HT40)
Modulation:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)/802.11n(HT40)
Operation frequency:	2412MHz~2462MHz
Channel number:	11
Channel separation:	5MHz
Antenna type:	PIFA Antenna
Bluetooth	
Version:	Supported BT4.0+EDR
Modulation:	GFSK, π/4DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PIFA Antenna
Bluetooth-BLE	
Version:	Supported BT4.0+BLE
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz
Antenna type:	PIFA Antenna

Remark:
The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power

The Test EUT support two SIM card(SIM1,SIM2),so all the tests are performed at each SIM card (SIM1,SIM2) mode, the datum recorded is the worst case for all the mode at SIM1 Card mode.

3. Test Environment

3.1. Test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

3.2. Test Facility

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025:2005 General Requirements) for the Competence of Testing and Calibration Laboratories

A2LA-Lab Cert. No. 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. 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.

IC-Registration No.:5377B

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4. Equipments Used during the Test

Test Equipment	Manufacturer	Type/Model	Serial Number	Calibration	
				Last Calibration	Calibration Interval
Data Acquisition Electronics DAEx	SPEAG	DAE4	1315	2017/08/15	1
E-field Probe	SPEAG	EX3DV4	3842	2017/08/15	1
System Validation Dipole	SPEAG	D835V2	4d153	2016/07/16	3
System Validation Dipole	SPEAG	D1900V2	5d101	2015/07/23	3
System Validation Dipole	SPEAG	D2450V2	884	2015/09/01	3
Dielectric Probe Kit	Agilent	85070E	US44020288	/	/
Power meter	Agilent	E4417A	GB41292254	2016/10/25	1
Power sensor	Agilent	8481H	MY41095360	2016/10/25	1
Power sensor	Agilent	E9327A	US40441621	2016/10/25	1
Network analyzer	Agilent	8753E	US37390562	2016/10/24	1
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	112012	2016/10/22	1
Signal Generator	ROHDE & SCHWARZ	SMBV100A	258525	2016/10/22	1
Power Divider	ARRA	A3200-2	N/A	N/A	N/A
Dual Directional Coupler	Agilent	778D	50783	Note	
Attenuator 1	PE	PE7005-10	N/A	Note	
Attenuator 2	PE	PE7005-10	N/A	Note	
Attenuator 3	PE	PE7005-3	N/A	Note	
Power Amplifier	AR	5S1G4M2	0328798	Note	

Note:

1. *The Probe,Dipole and DAE calibration reference to the Appendix A.*
2. *Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justifcatio. The dipole are also not physically damaged or repaired during the interval.*

5. Measurement Uncertainty

Measurement Uncertainty										
No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	6.0%	N	1	1	1	6.0%	6.0%	∞
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	∞
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	∞
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	∞
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	∞
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	∞
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
14	Max.SAR evalation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
Test Sample Related										
15	Test sample positioning	A	1.86%	N	1	1	1	1.86%	1.86%	∞
16	Device holder uncertainty	A	1.70%	N	1	1	1	1.70%	1.70%	∞
17	Drift of output power	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
19	Liquid conductivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	∞
21	Liquid permittivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
22	Liquid cpermittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	∞
Combined standard uncertainty		$u_c=\sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$	/	/	/	/	9.79%	9.67%	∞	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$	R	K=2	/	/	19.57%	19.34%	∞	

System Check Uncertainty										
No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	6.0%	N	1	1	1	6.0%	6.0%	∞
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	∞
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	∞
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	∞
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	∞
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	∞
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
14	Max.SAR evalation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
System validation source-dipole										
15	Deviation of experimental dipole from numerical dipole	A	1.58%	N	1	1	1	1.58%	1.58%	∞
16	Dipole axis to liquid distance	A	1.35%	N	1	1	1	1.35%	1.35%	∞
17	Input power and SAR drift	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	∞
22	Liquid cpermittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	∞
Combined standard uncertainty		$u_c=\sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$		/	/	/	/	8.80%	8.79%	∞
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		R	K=2	/	/	17.59%	17.58%	∞

6. SAR Measurements System Configuration

6.1. SAR Measurement Set-up

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

A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

A unit to operate the optical surface detector which is connected to the EOC.

The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.

The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.

DASY5 software and SEMCAD data evaluation software.

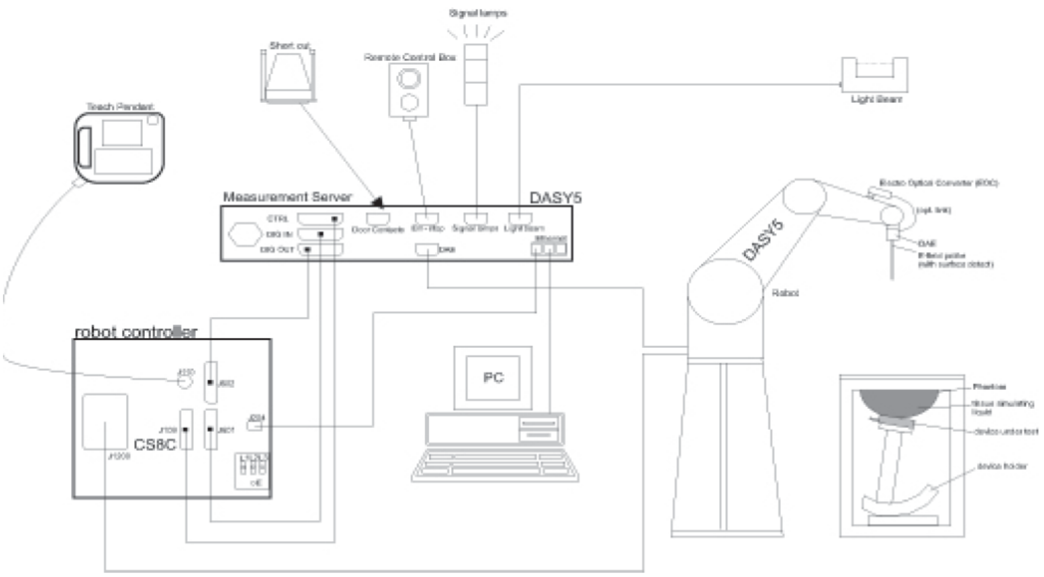
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

The generic twin phantom enabling the testing of left-hand and right-hand usage.

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

System validation dipoles allowing to validate the proper functioning of the system.



6.2. DASY5 E-field Probe System

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

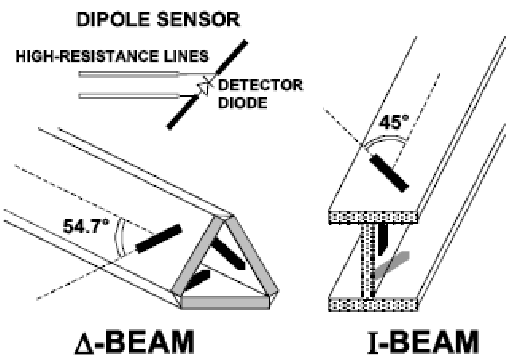
- **Probe Specification**

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 W/kg; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

- **Isotropic E-Field Probe**

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



6.3. Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM Twin Phantom

6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

Device holder supplied by SPEAG

7. SAR Test Procedure

7.1. Scanning Procedure

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

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

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

Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

Zoom Scan

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY5 system allows evaluations that combine measured data and robot positions, such as:

• maximum search
• extrapolation
• boundary correction
• peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.
They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation.

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

Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04

<table>
<tr><td colspan="3"></td><td>≤ 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 mm ± 1 mm</td><td>½·δ·ln(2) mm ± 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>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 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 ≤ 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>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 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>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 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>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 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 IEEE Std 1528-2013 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

7.2. Data Storage and Evaluation

Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors),s together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

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

Data Evaluation

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:	σ
	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 DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

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

Vi: compensated signal of channel (i = x, y, z)
Ui: input signal of channel (i = x, y, z)
cf: crest factor of exciting field (DASY parameter)
dcpi: diode compression point (DASY parameter)

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

$$\mathrm{E-fieldprobes:} \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

$$\mathrm{H-fieldprobes:} \qquad H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

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

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

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR:	local specific absorption rate in W/kg
Etot:	total field strength in V/m
σ:	conductivity in [mho/m] or [Siemens/m]
ρ:	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.

8. Position of the wireless device in relation to the phantom

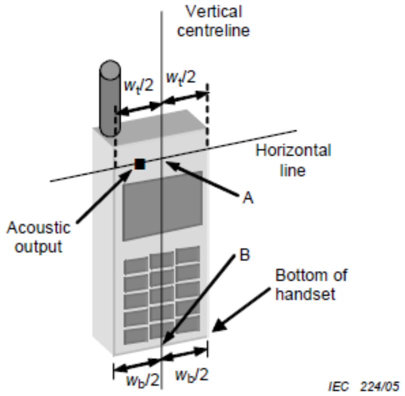
8.1. Head Position

The wireless device define two imaginary lines on the handset, the vertical centreline and the horizontal line, for the handset in vertical orientation as shown in Figures 5a and 5b.

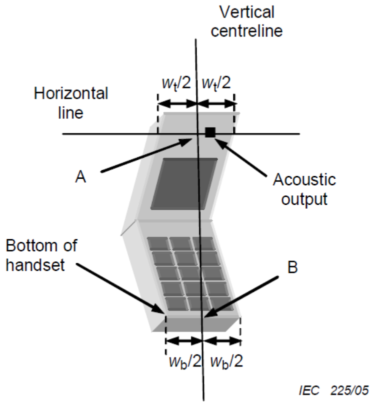
The vertical centreline passes through two points on the front side of the handset: the midpoint of the width W_t of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width W_b of the bottom of the handset (point B).

The horizontal line is perpendicular to the vertical centreline and passes through the centre of the acoustic output (see Figures 5a and 5b). The two lines intersect at point A.

Note that for many handsets, point A coincides with the centre of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset (see Figure 5b), especially for clam-shell handsets, handsets with flip cover pieces, and other irregularly shaped handsets.



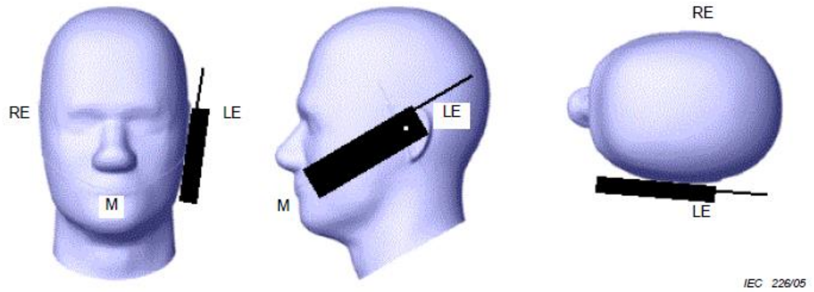
Figures 5a



Figures 5b

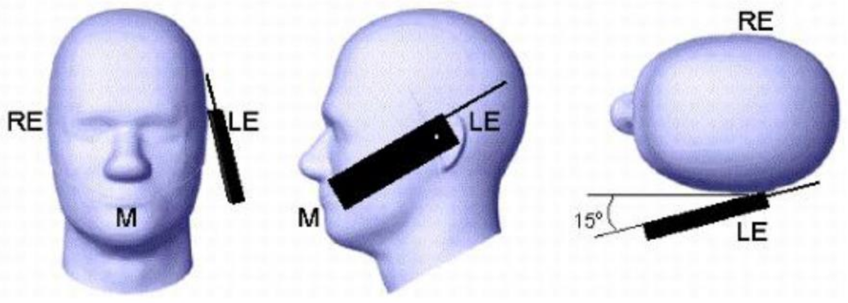
W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the widthwt of the handset at the level of the acoustic output
B	Midpoint of the width wb of the bottom of the handset

Cheek position



Picture 2 Cheek position of the wireless device on the left side of SAM

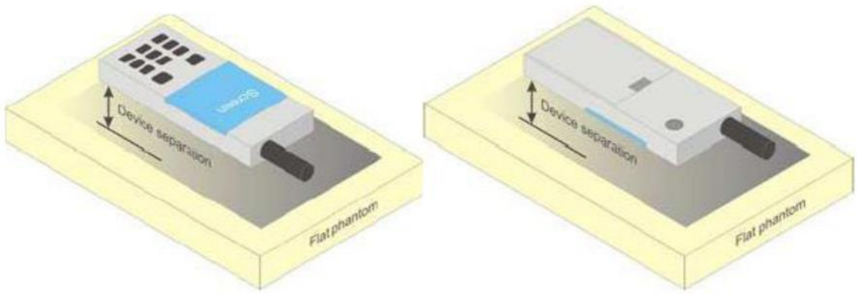
Tilt position



Picture 3 Tilt position of the wireless device on the left side of SAM

8.2. Body Position

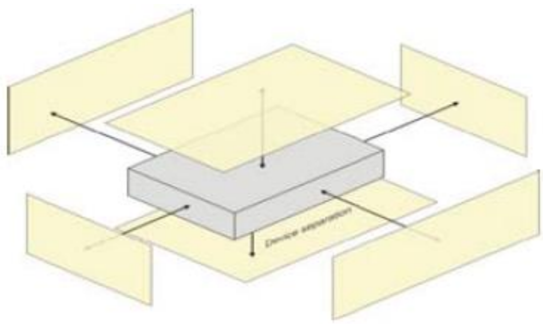
Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.
Devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance **≤ 10 mm** to support compliance



Picture 4 Test positions for body-worn devices

8.3. Hotspot Mode Exposure conditions

The hotspot mode and body-worn accessory SAR test configurations may overlap for handsets. When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations. This typically applies to the back and front surfaces of a handset when SAR is required for both hotspot mode and body-worn accessory exposure conditions. Depending on the form factor and dimensions of a device, the test separation distance used for hotspot mode SAR measurement is either **10 mm** or that used in the body-worn accessory configuration, whichever is less for devices with dimension > 9 cm x 5 cm. For smaller devices with dimensions ≤ 9 cm x 5 cm because of a greater potential for next to body use a test separation of ≤ 5 mm must be used.



Picture 5 Test positions for Hotspot Mode

9. System Check

9.1. Tissue Dielectric Parameters

The liquid is consisted of water,salt,Glycol,Sugar,Preventol and Cellulose.The liquid has previously been proven to be suited for worst-case.The table 3 and table 4 show the detail solition.It’s satisfying the latest tissue dielectric parameters requirements proposed by the KDB865664.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800,1900,2000	55.2	0	0	0.3	0	44.5	1.4	40
2450	55	0	0	0	0	45	1.8	39.2
For Body								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800.1900.2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Tissue dielectric parameters for head and body phantoms				
Target Frequency	Head		Body	
(MHz)	εr	σ(s/m)	εr	σ(s/m)
835	41.5	0.90	55.2	0.97
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95

Check Result:

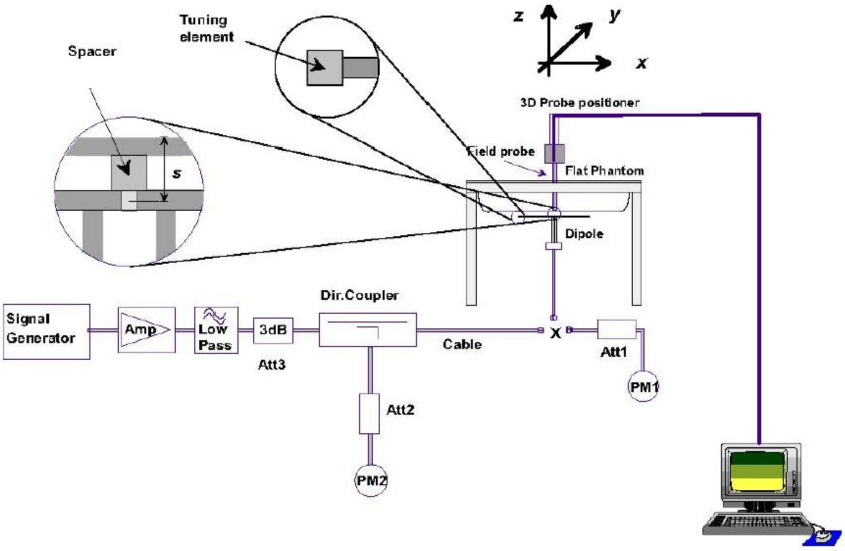
Dielectric performance of Head tissue simulating liquid				
Frequency (MHz)	Description	DielectricParameters		Temp
		εr	σ(s/m)	℃
835	Recommended result ±5% window	41.50 39.43 to 43.58	0.90 0.86 to 0.95	/
	Measurement value 2017-10-09	41.62	0.92	22
1900	Recommended result ±5% window	40.0 38.00 to 42.00	1.40 1.33 to 1.47	/
	Measurement value 2017-10-11	40.05	1.42	22
2450	Recommended result ±5% window	39.2 37.24 to 41.16	1.80 1.71 to 1.89	/
	Measurement value 2017-09-30	39.11	1.79	22

Dielectric performance of Body tissue simulating liquid				
Frequency (MHz)	Description	DielectricParameters		Temp
		εr	σ(s/m)	℃
835	Recommended result ±5% window	55.2 52.44 to 57.96	0.97 0.92 to 1.02	/
	Measurement value 2017-10-10	55.15	0.96	22
1900	Recommended result ±5% window	53.3 50.64 to 55.97	1.52 1.44 to 1.60	/
	Measurement value 2017-10-12	53.12	1.53	22
2450	Recommended result ±5% window	52.7 50.07 to 55.34	1.95 1.85 to 2.05	/
	Measurement value 2017-09-30	52.52	1.94	22

9.2. SAR System Check

The purpose of the system check is to verify that the system operates within its specifications at the decice test frequency.The system check is simple check of repeatability to make sure that the system works correctly at the time of the compliance test;

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10%).
System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.



The output power on dipole port must be calibrated to 24 dBm (250mW) before dipole is connected.

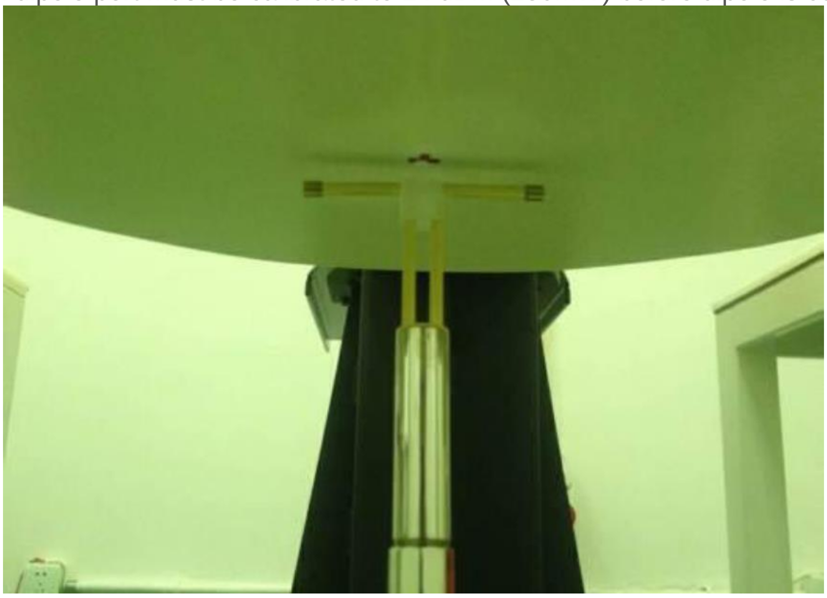


Photo of Dipole Setup

Check Result:

Head				
Frequency (MHz)	Description	SAR(W/kg)		Temp
		1g	10g	℃
835	Recommended result ±10% window	2.30 2.07 - 2.53	1.50 1.35 - 1.65	/
	Measurement value 2017-10-09	2.34	1.52	22
1900	Recommended result ±10% window	10.10 9.09 – 11.11	5.34 4.81 - 5.87	/
	Measurement value 2017-10-11	9.72	5.16	22
2450	Recommended result ±10% window	13.10 11.79 - 14.41	6.17 5.55 - 6.79	/
	Measurement value 2017-09-30	12.40	5.80	22

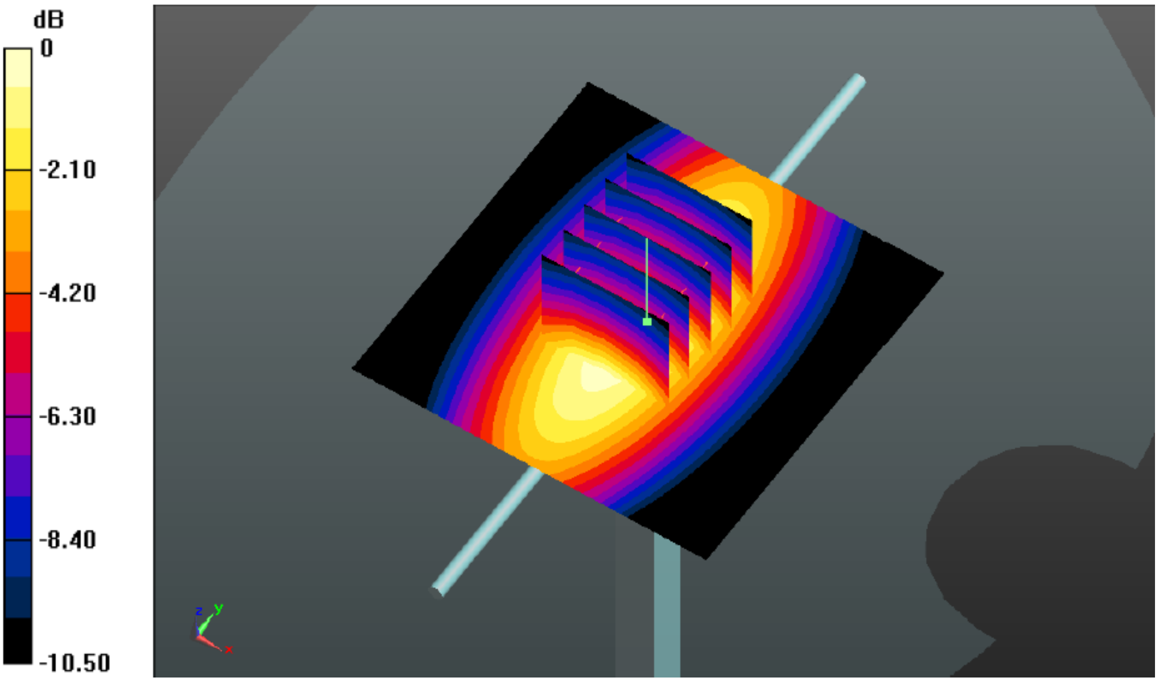
Body				
Frequency (MHz)	Description	SAR(W/kg)		Temp
		1g	10g	℃
835	Recommended result ±10% window	2.43 2.19 - 2.67	1.61 1.45 - 1.77	/
	Measurement value 2017-10-10	2.47	1.59	22
1900	Recommended result ±10% window	10.20 9.18 – 11.22	5.47 4.92 – 6.02	/
	Measurement value 2017-10-12	10.3	5.34	22
2450	Recommended result ±10% window	13.10 11.79 -14.41	6.11 5.50 -6.72	/
	Measurement value 2017-09-30	12.5	5.76	22

System Performance Check at 835 MHz Head

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d153
Date:2017-10-09
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.92 S/m; εr = 41.62; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.15, 9.15, 9.15); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x61x1): Measurement grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.834 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.865 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.286 W/kg
SAR(1 g) = 2.34 W/kg; SAR(10 g) = 1.52 W/kg
Maximum value of SAR (measured) = 2.825 W/kg



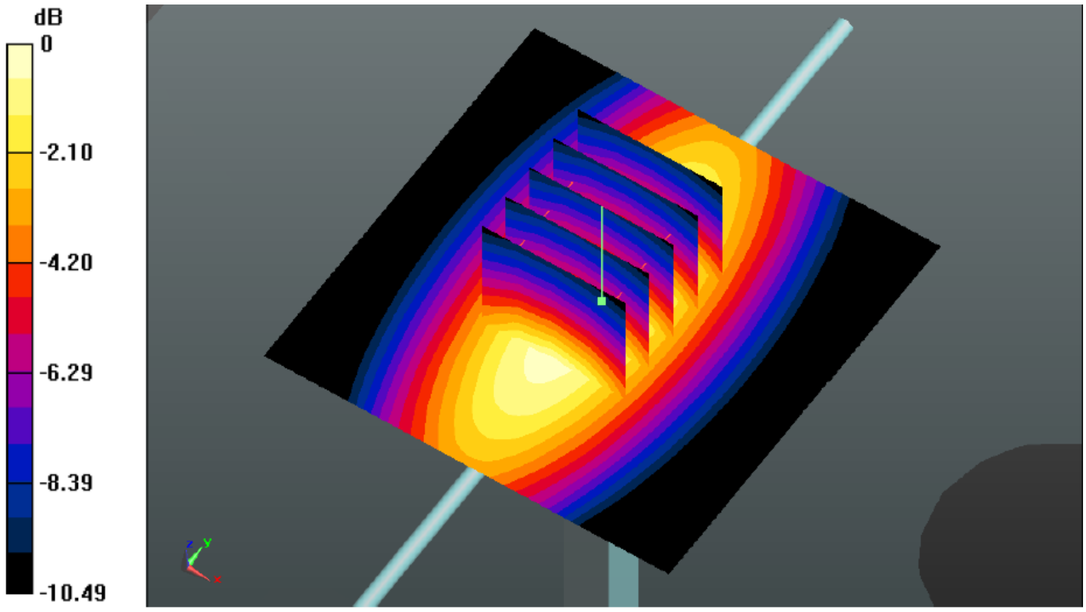
System Performance Check 835MHz Head 250mW

System Performance Check at 835 MHz Body

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d153
Date:2017-10-10
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.96 S/m; ε_r = 55.15; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.02, 9.02, 9.02); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 2; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x61x1): Measurement grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.888 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.236 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.339 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 2.871 W/kg



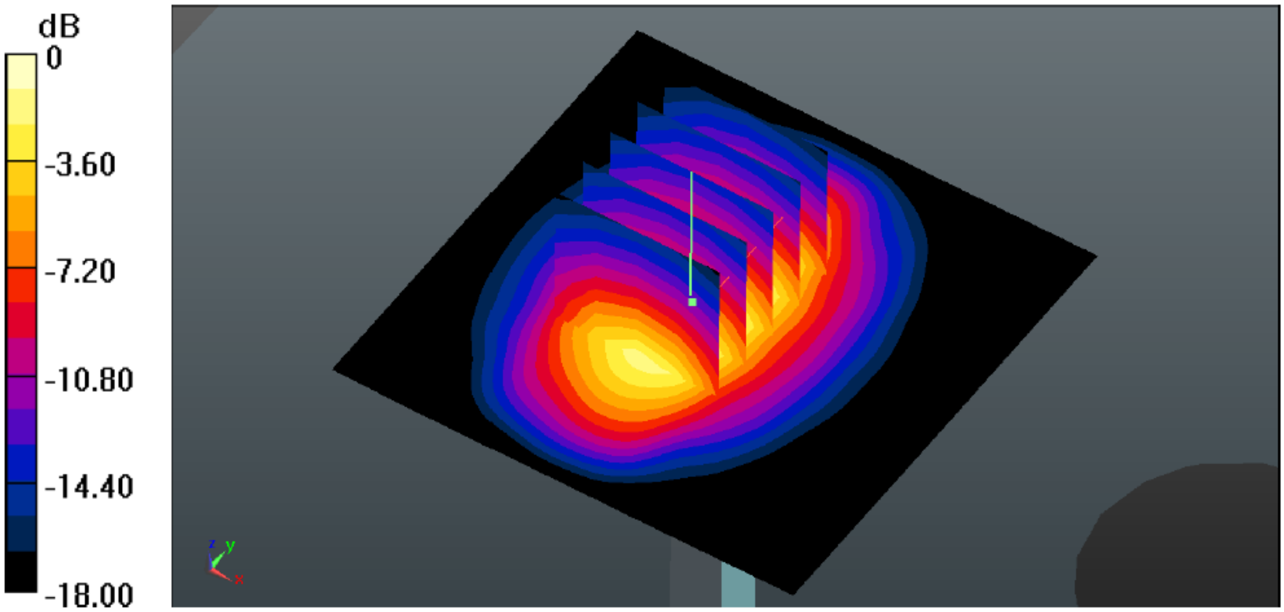
System Performance Check 835MHz Body 250mW

System Performance Check at 1900 MHz Head

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d101
Date:2017-10-11
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.42S/m; εr = 40.05; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.58, 7.58, 7.58); Calibrated: 15/08/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x61x1): Measurement grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 10.61 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 94.79 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 12.34 W/kg
SAR(1 g) = 9.72 W/kg; SAR(10 g) = 5.16 W/kg
Maximum value of SAR (measured) = 12.44 W/kg



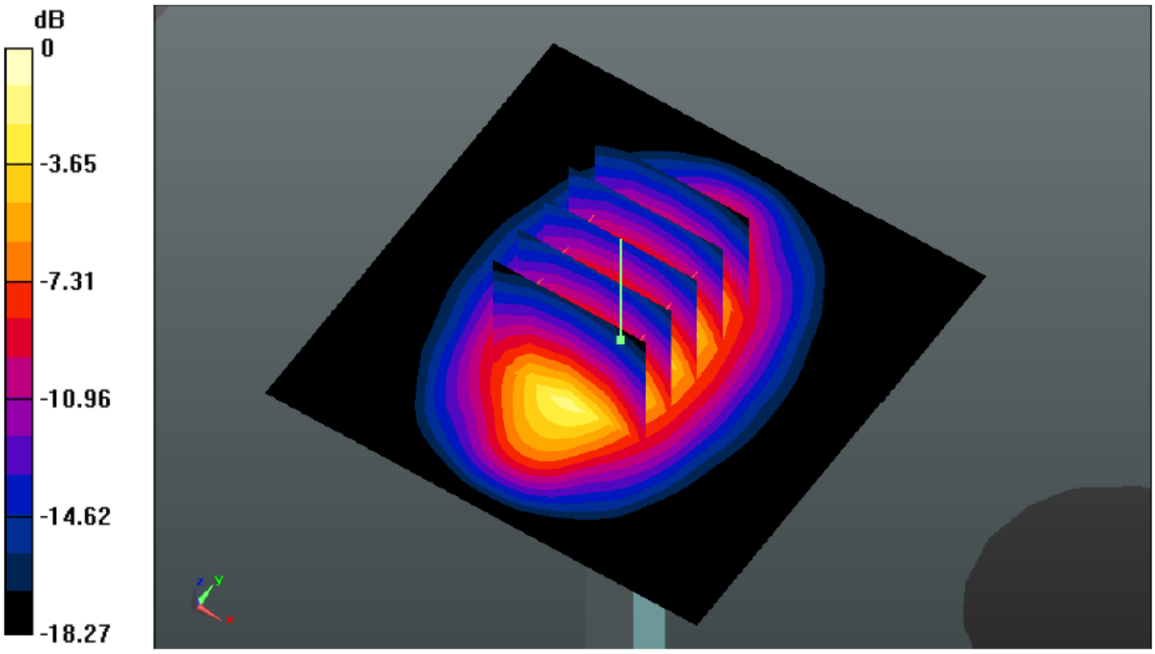
System Performance Check 1900MHz Head 250mW

System Performance Check at 1900 MHz Body

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d101
Date:2017-10-12
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.53S/m; εr = 53.12; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.32, 7.32, 7.32); Calibrated: 15/08/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
Phantom: SAM 2; Type: SAM;
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x61x1): Measurement grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.187 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 87.679 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 19.027 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.34 W/kg
Maximum value of SAR (measured) = 15.09 W/kg



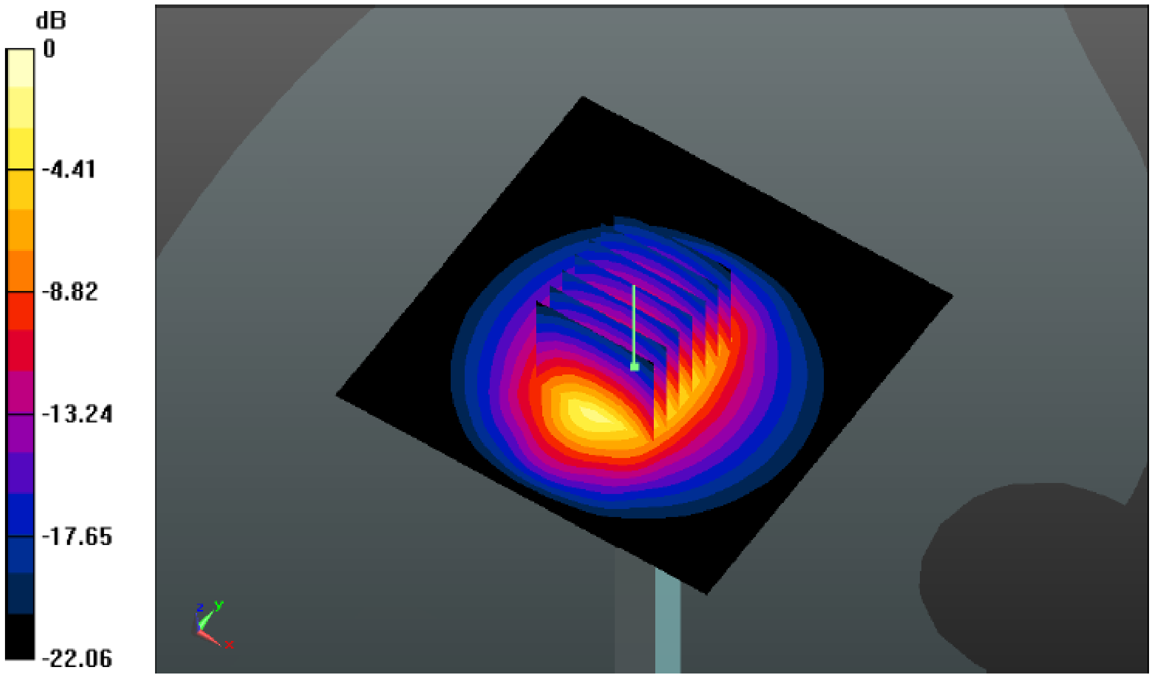
System Performance Check 1900MHz Body250mW

System Performance Check at 2450 MHz Head

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 884
Date:2017-09-30
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.79S/m; εr = 39.11; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(6.92, 6.92, 6.92); Calibrated: 15/08/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x61x1): Measurement grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 19.313 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.314 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 25.703 W/kg
SAR(1 g) = 12.4 W/kg; SAR(10 g) = 5.8 W/kg
Maximum value of SAR (measured) = 18.871 W/kg



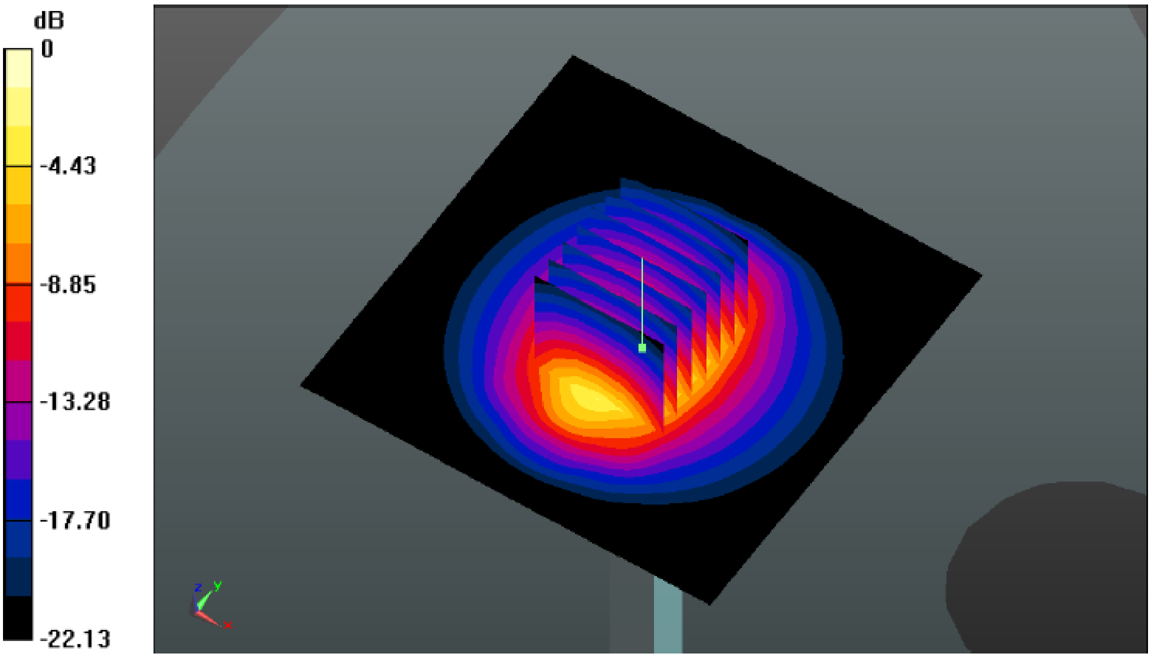
System Performance Check 2450MHz Head250mW

System Performance Check at 2450 MHz Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 884
Date:2017-09-20
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.94S/m; εr = 52.52; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.01, 7.01, 7.01); Calibrated: 15/08/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
Phantom: SAM 2; Type: SAM;
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x61x1): Measurement grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 19.266 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.170 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 26.174 W/kg
SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.76 W/kg
Maximum value of SAR (measured) = 19.27W/kg



System Performance Check 2450MHz Body250mW

10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of ANSI/IEEE C95.1-1992

Type Exposure	Limit (W/kg)	
	General Population / Uncontrolled Exposure Environment	Occupational / Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (1g cube tissue for head and trunk)	1.60	8.0
Spatial Peak SAR (10g for limb)	4.0	20.0

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

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

11. Conducted Power Measurement Results

GSM Conducted Power

1. *Per KDB 447498 D01, the maximum output power channel is used for SAR testing and further SAR test reduction*
2. *Per KDB 941225 D01, considering the possibility of e.g. 3rd party VoIP operation for Head and Body-worn SAR test reduction for GSM and GPRS modes is determined by the source-base time-averaged output power including tune-up tolerance. The 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. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850 and GPRS (4Tx slots) for PCS1900.*
3. *Per KDB941225 D01, for hotspot SAR test reduction for GPRS modes is determined by the source-based time-averaged output power including tune-up tolerance, For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850 and GPRS (4Tx slots) for PCS1900.*

Mode: GSM850		Conducted Power (dBm)			Division Factors	Averager Power (dBm)		
		CH128	CH190	CH251		CH128	CH190	CH251
		824.2MHz	836.6MHz	848.8MHz		824.2MHz	836.6MHz	848.8MHz
GSM		33.48	33.46	33.35	-9.03	24.45	24.43	24.32
GPRS (GMSK)	1TXslot	33.45	33.45	33.33	-9.03	24.42	24.42	24.30
	2TXslots	30.87	30.89	30.66	-6.02	24.85	24.87	24.64
	3TXslots	29.08	29.17	28.97	-4.26	24.82	24.91	24.71
	4TXslots	27.89	27.98	27.77	-3.01	24.88	24.97	24.76
Mode: PCS1900		Conducted Power (dBm)			Division Factors	Averager Power (dBm)		
		CH512	CH661	CH810		CH512	CH661	CH810
		1850.2MHz	1880.0MHz	1909.8MHz		1850.2MHz	1880.0MHz	1909.8MHz
GSM		29.76	29.43	29.29	-9.03	20.73	20.40	20.26
GPRS (GMSK)	1TXslot	29.73	29.42	29.28	-9.03	20.70	20.39	20.25
	2TXslots	27.44	27.17	27.04	-6.02	21.42	21.15	21.02
	3TXslots	25.85	25.65	25.48	-4.26	21.59	21.39	21.22
	4TXslots	24.79	24.61	24.39	-3.01	21.78	21.60	21.38

Note:

1) Division Factors

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

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

WCDMA Conducted Power

1. *The following tests were conducted according to the test requirements outlines in 3GPP TS34.121 specification.*
2. *The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode to determine SAR test exclusion*

A summary of thest setting are illustrated belowe:

HSDPA Setup Configureation:

a) The EUT was connected to base station RS CMU200 referred to the setup configuration
b) The RF path losses were compensated into the measurements
c) A call was established between EUT and base station with following setting:
   i. Set Gain Factors (βc and βd) and parameters were set according to each specific sub-test in the following table, C10.1.4, Quoted from the TS 34.121
   ii. Set RMC 12.2Kbps + HSDPA mode
   iii. Set Cell Power=-86dBm
   iv. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   v. Select HSDPA uplink parameters
   vi. Set Delta ACK, Delta NACK and Delta CQI=8
   vii. Set Ack-Nack repetition Factor to 3
   viii. Set CQI Feedback Cycle (K) to 4ms
   ix. Set CQI repetition factor to 2
   x. Power ctrl mode= all up bits
d) The transmitter maximum output power waw recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: 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 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configureation:

a) The EUT was connected to base station RS CMU200 referred to the setup configuration
b) The RF path losses were compensated into the measurements
c) A call was established between EUT and base station with following setting:
   i. Call configs = 5.2b, 5.9b, 5.10b, and 5.13.2B with QPSK
   ii. Set Gain Factors (βc and βd) and parameters (AG index) were set according to each specific sub-test in the following table, C11.1.3, Quoted from the TS 34.121
   iii. Set Cell Power=-86dBm
   iv. Set channel type= 12.2Kbps + HSPA mode
   v. Set UE Target power
   vi. Set Ctrl mode=Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal the target E-TFCI of 75 for Sub-test 1, and other subtest's E-TFCI
d) The transmitter maximum output power waw recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	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_{ed}1: 47/15 β_{ed}2: 47/15	4 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 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

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

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

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

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

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

Setup Configuration

General Note:

1. Per KDB 941225 D01, SAR for Head / Hotsport / Body-worn Exposure is measured using a 12.2Kbps RMC with TPC bit ocnfigured to all 1s
2. Per KDB 941225 D01 RMC12.2Kbps setting is used to evaluate SAR. If the maximum output power and Tune-up tolerance specified for production units in HSDPA/HSUPA is ≦1/4dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio fo specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is ≦1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

Mode		WCDMA Band V			WCDMA Band II		
		Conducted Power (dBm)			Conducted Power (dBm)		
		CH4132	CH4183	CH4233	CH9262	CH9400	CH9538
		826.4	836.6	846.6	1852.4	1880.0	1907.6
AMR 12.2K		23.30	23.28	23.16	23.43	23.52	23.51
RMC 12.2K		23.33	23.31	23.17	23.46	23.55	23.52
HSDPA	Subtest-1	21.42	21.40	21.29	21.54	21.63	21.62
	Subtest-2	21.25	21.23	21.12	21.37	21.45	21.44
	Subtest-3	21.25	21.24	21.11	21.37	21.46	21.43
	Subtest-4	20.97	20.95	20.84	21.09	21.17	21.16
HSUPA	Subtest-1	20.85	20.84	20.73	20.97	21.05	21.04
	Subtest-2	20.69	20.67	20.57	20.81	20.89	20.88
	Subtest-3	20.60	20.58	20.47	20.71	20.79	20.78
	Subtest-4	20.54	20.52	20.41	20.65	20.73	20.72
	Subtest-5	20.48	20.47	20.36	20.60	20.68	20.67

WLAN Conducted Power

For 2.4GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation. 802.11g/n were not investigated since the average putput powers over all channels and data rates were not more than 0.25dB higher than the tested channel in the lowest data rate of 802.11b mode.

WIFI					
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)	Data rate
802.11b	1	2412	13.81	11.78	1 Mbps
	6	2437	13.93	11.89	1 Mbps
	11	2462	13.92	11.86	1 Mbps
802.11g	1	2412	12.56	9.84	6 Mbps
	6	2437	12.09	9.45	6 Mbps
	11	2462	12.48	9.76	6 Mbps
802.11n(HT20)	1	2412	12.44	9.49	6.5 Mbps
	6	2437	12.56	9.56	6.5 Mbps
	11	2462	11.92	9.07	6.5 Mbps
802.11n(HT40)	3	2422	12.42	9.47	13.5 Mbps
	6	2437	12.33	9.38	13.5 Mbps
	9	2452	12.28	9.35	13.5 Mbps

*Note:*The output power was test all data rate and recorded worst case at recorded data rate.

Bluetooth Conducted Power

Bluetooth			
Mode	Channel	Frequency (MHz)	Conducted power (dBm)
GFSK	0	2402	1.98
	39	2441	0.30
	78	2480	3.18
π/4QPSK	0	2402	3.55
	39	2441	1.20
	78	2480	4.50
8DPSK	0	2402	3.88
	39	2441	1.45
	78	2480	4.78
BLE	0	2402	-5.53
	19	2440	-6.56
	39	2480	-5.17

12. Maximum Tune-up Limit

GSM		
Mode	Maximum Tune-up (dBm)	
	GSM850	PCS1900
GSM (GMSK, 1Tx Slot)	33.50	30.00
GPRS (GMSK, 1Tx Slot)	33.50	30.00
GPRS (GMSK, 2Tx Slot)	31.00	27.50
GPRS (GMSK, 3Tx Slot)	29.50	26.00
GPRS (GMSK, 4Tx Slot)	28.00	25.00

WCDMA		
Mode	Maximum Tune-up (dBm)	
	WCDMA Band V	WCDMA Band II
AMR 12.2Kbps	23.50	24.00
RMC 12.2Kbps	23.50	24.00
HSDPA Subtest-1	21.50	22.00
HSDPA Subtest-2	21.50	22.00
HSDPA Subtest-3	21.50	22.00
HSDPA Subtest-4	21.50	22.00
HSUPA Subtest-1	21.00	21.50
HSUPA Subtest-2	21.00	21.50
HSUPA Subtest-3	21.00	21.50
HSUPA Subtest-4	21.00	21.50
HSUPA Subtest-5	21.00	21.50

WLAN		
Mode	Maximum Tune-up (dBm) Peak Power	Maximum Tune-up (dBm) Burst Average Power
802.11b	14.00	12.00
802.11g	13.00	10.00
802.11n(HT20)	13.00	10.00
802.11n(HT40)	13.00	10.00

Bluetooth			
Mode	Channel	Frequency (MHz)	Maximum Tune-up (dBm)
GFSK	0	2402	5.00
	39	2441	5.00
	78	2480	5.00
π/4QPSK	0	2402	5.00
	39	2441	5.00
	78	2480	5.00
8DPSK	0	2402	5.00
	39	2441	5.00
	78	2480	5.00
BLE	0	2402	-5.00
	19	2440	-5.00
	39	2480	-5.00

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances ≦50mm are determined by:

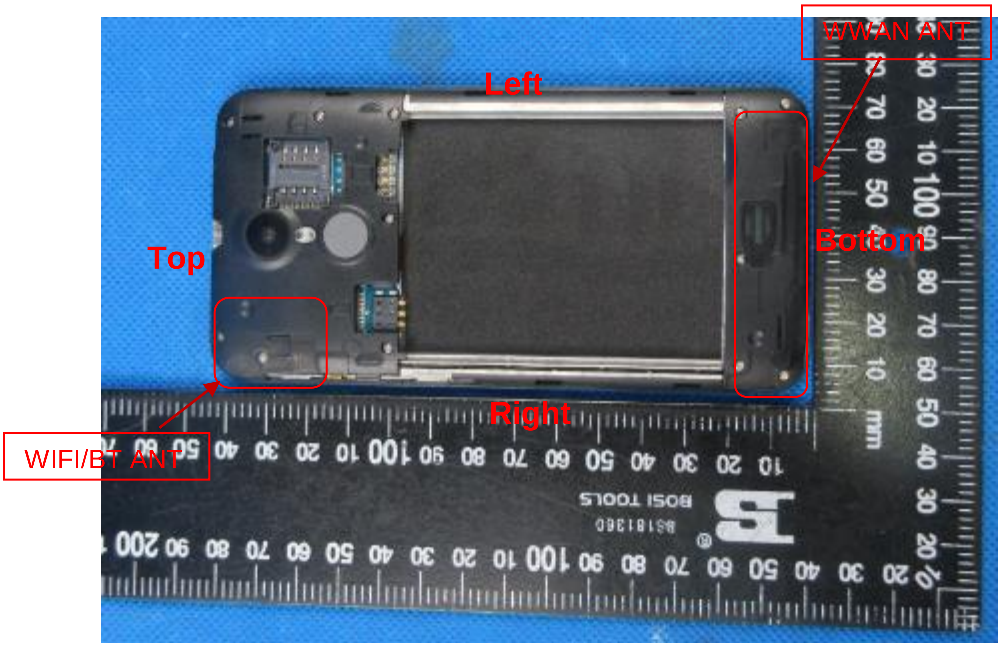
[(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≦3.0 for 1-g SAR

Type	Tune up power		SAR Exclusion Threshold Power (mW)		SAR Exclusion	
	dBm	mW	Head	Body	Head	Body
Bluetooth	5.00	3.2	9.6	19.2	Yes	Yes

Per KDB 447498 D01, when the minimum test separation distance is <5mm, a distance of 5mm is applied to determine SAR test exclusion.

The test exclusion thereshold is ≦3, SAR testing is not required.

13. Antenna Location



Positions for SAR tests; Hotspot mode						
Antenna	Back	Front	Top side	Bottom side	Right side	Left side
WWAN	Yes	Yes	No	Yes	Yes	Yes
WIFI / BT	Yes	Yes	Yes	No	Yes	No

General note:
Referring to KDB941225 D06, when the overall device length and width are >9cm*5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

14. SAR Measurement Results

Head SAR

GSM850										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Left-Cheek	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	-0.15	0.531	**0.533**	H1
		251	848.8	27.77	28.00	1.05	-	-	-	-
	Left-Tilt	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	0.17	0.406	0.408	-
		251	848.8	27.77	28.00	1.05	-	-	-	-
	Right-Cheek	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	0.07	0.492	0.494	-
		251	848.8	27.77	28.00	1.05	-	-	-	-
	Right-Tilt	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	-0.09	0.373	0.374	-
		251	848.8	27.77	28.00	1.05	-	-	-	-

PCS1900										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Left-Cheek	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	0.05	0.224	**0.245**	H2
		810	1909.8	24.39	25.00	1.15	-	-	-	-
	Left-Tilt	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	0.04	0.180	0.197	-
		810	1909.8	24.39	25.00	1.15	-	-	-	-
	Right-Cheek	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	-0.03	0.215	0.235	-
		810	1909.8	24.39	25.00	1.15	-	-	-	-
	Right-Tilt	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	-0.03	0.169	0.185	-
		810	1909.8	24.39	25.00	1.15	-	-	-	-

Note:
Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

WCDMA Band V										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
RMC 12.2K bps	Left-Cheek	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	0.18	0.196	**0.205**	H3
		4233	846.6	23.17	23.50	1.08	-	-	-	-
	Left-Tilt	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	0.15	0.161	0.168	-
		4233	846.6	23.17	23.50	1.08	-	-	-	-
	Right-Cheek	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	0.19	0.187	0.195	-
		4233	846.6	23.17	23.50	1.08	-	-	-	-
	Right-Tilt	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	-0.08	0.150	0.156	-
		4233	846.6	23.17	23.50	1.08	-	-	-	-

WCDMA Band II										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
RMC 12.2K bps	Left-Cheek	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	0.06	0.208	**0.231**	H4
		9538	1907.6	23.52	24.00	1.12	-	-	-	-
	Left-Tilt	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	0.03	0.167	0.185	-
		9538	1907.6	23.52	24.00	1.12	-	-	-	-
	Right-Cheek	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	-0.08	0.201	0.223	-
		9538	1907.6	23.52	24.00	1.12	-	-	-	-
	Right-Tilt	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	-0.03	0.158	0.175	-
		9538	1907.6	23.52	24.00	1.12	-	-	-	-

Note:
Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

WLAN										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
802.11b 1Mbps	Left-Cheek	01	2412	11.78	12.00	1.05	-	-	-	-
		06	2437	11.89	12.00	1.03	0.18	0.153	**0.157**	H5
		11	2462	11.86	12.00	1.03	-	-	-	-
	Left-Tilt	01	2412	11.78	12.00	1.05	-	-	-	-
		06	2437	11.89	12.00	1.03	-0.24	0.130	0.133	-
		11	2462	11.86	12.00	1.03	-	-	-	-
	Right-Cheek	01	2412	11.78	12.00	1.05	-	-	-	-
		06	2437	11.89	12.00	1.03	-0.10	0.147	0.151	-
		11	2462	11.86	12.00	1.03	-	-	-	-
	Right-Tilt	01	2412	11.78	12.00	1.05	-	-	-	-
		06	2437	11.89	12.00	1.03	0.13	0.123	0.127	-
		11	2462	11.86	12.00	1.03	-	-	-	-

Note:

1. According to the above table, the initial test position for head is “LeftCheek”, and its reported SAR is≤ 0.4W/kg. Thus further SAR measurement is not required for the other (remaining) test positions. Because the reported SAR of the highest measured maximum output power channel for the exposureconfiguration is ≤ 0.8W/kg, no further SAR testing is required for 802.11b DSSS in that exposureconfiguration.
2. When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.
   a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
   b) 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,the 802.11g/n is not required.

WLAN- Scaled Reported SAR							
Mode	Test Position	Frequency		Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
		CH	MHz				
802.11b 1Mbps	Left-Cheek	6	2437	98.23%	100%	0.157	0.160
	Left-Tilt	6	2437	98.23%	100%	0.133	0.136
	Right-Cheek	6	2437	98.23%	100%	0.151	0.154
	Right-Tilt	6	2437	98.23%	100%	0.127	0.129

Note:

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. A maximum transmission duty factor of 98.23% is achievable for WLAN in this project.

Body SAR

GSM850										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Front	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	0.10	0.475	0.476	-
		251	848.8	27.77	28.00	1.05	-	-	-	-
	Back	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	-0.20	0.719	**0.722**	B1
		251	848.8	27.77	28.00	1.05	-	-	-	-

PCS1900										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Front	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	-0.12	0.472	0.517	-
		810	1909.8	24.39	25.00	1.15	-	-	-	-
	Back	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	0.16	0.724	**0.792**	B2
		810	1909.8	24.39	25.00	1.15	-	-	-	-

WCDMA Band V										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
RMC 12.2Kbps	Front	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	0.03	0.321	0.335	-
		4233	846.6	23.17	23.50	1.08	-	-	-	-
	Back	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	-0.09	0.451	**0.471**	B3
		4233	846.6	23.17	23.50	1.08	-	-	-	-

WCDMA Band II										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
RMC 12.2Kbps	Front	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	0.05	0.434	0.481	-
		9538	1907.6	23.52	24.00	1.12	-	-	-	-
	Back	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	0.12	0.632	**0.701**	B4
		9538	1907.6	23.52	24.00	1.12	-	-	-	-

Note:
Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

WLAN										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
802.11b 1Mbps	Front	1	2412	11.78	12.00	1.05	-	-	-	-
		6	2437	11.89	12.00	1.03	-0.19	0.104	0.107	-
		11	2462	11.86	12.00	1.03	-	-	-	-
	Back	1	2412	11.78	12.00	1.05	-	-	-	-
		6	2437	11.89	12.00	1.03	0.13	0.153	**0.157**	B5
		11	2462	11.86	12.00	1.03	-	-	-	-

Note:
According to the above table, the initial test position for body is “Back”, and its reported SAR is≤ 0.4W/kg. Thus further SAR measurement is not required for the other (remaining) test positions. Because the reported SAR of the highest measured maximum output power channel for the exposureconfiguration is ≤ 0.8W/kg, no further SAR testing is required for 802.11b DSSS in that exposureconfiguration.

WLAN- Scaled Reported SAR							
Mode	Test Position	Frequency		Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
		CH	MHz				
802.11b 1Mbps	Front	6	2437	98.23%	100%	0.107	0.109
	Back	6	2437	98.23%	100%	0.157	0.160

Note:
According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. A maximum transmission duty factor of 98.23% is achievable for WLAN in this project.

Hotspot SAR

Positions for SAR tests; Hotspot mode						
Antenna	Back	Front	Top side	Bottom side	Right side	Left side
WWAN	Yes	Yes	No	Yes	Yes	Yes
WIFI / BT	Yes	Yes	Yes	No	Yes	No

General note:
Referring to KDB941225 D06, when the overall device length and width are >9cm*5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

GSM850										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Front	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	0.10	0.475	0.476	-
		251	848.8	27.77	28.00	1.05	-	-	-	-
	Back	128	824.2	27.89	28.00	1.03	-	-	-	-
		190	836.6	27.98	28.00	1.00	-0.20	0.719	**0.722**	B1
		251	848.8	27.77	28.00	1.05	-	-	-	-
	Left	190	836.6	27.98	28.00	1.00	0.11	0.514	0.516	-
	Right	190	836.6	27.98	28.00	1.00	-0.07	0.229	0.230	-
	Top	190	836.6	27.98	28.00	1.00	-	-	-	-
	Bottom	190	836.6	27.98	28.00	1.00	-0.15	0.489	0.491	-

PCS1900										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
GPRS (4Tx slot)	Front	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	-0.12	0.472	0.517	-
		810	1909.8	24.39	25.00	1.15	-	-	-	-
	Back	512	1850.2	24.79	25.00	1.05	-	-	-	-
		661	1880.0	24.61	25.00	1.09	0.16	0.724	**0.792**	B2
		810	1909.8	24.39	25.00	1.15	-	-	-	-
	Left	661	1880.0	24.61	25.00	1.09	-0.07	0.510	0.558	-
	Right	661	1880.0	24.61	25.00	1.09	-0.04	0.240	0.263	-
	Top	661	1880.0	24.61	25.00	1.09	-	-	-	-
	Bottom	661	1880.0	24.61	25.00	1.09	0.17	0.498	0.545	-

Note:
Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

WCDMA Band V										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
RMC 12.2Kbps	Front	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	0.03	0.321	0.335	-
		4233	846.6	23.17	23.50	1.08	-	-	-	-
	Back	4132	826.4	23.33	23.50	1.04	-	-	-	-
		4183	836.6	23.31	23.50	1.04	-0.09	0.451	**0.471**	B3
		4233	846.6	23.17	23.50	1.08	-	-	-	-
	Left	4183	836.6	23.31	23.50	1.04	-0.13	0.307	0.320	-
	Right	4183	836.6	23.31	23.50	1.04	0.10	0.168	0.176	-
	Top	4183	836.6	23.31	23.50	1.04	-	-	-	-
	Bottom	4183	836.6	23.31	23.50	1.04	0.03	0.297	0.310	-

WCDMA Band II										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
RMC 12.2Kbps	Front	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	0.05	0.434	0.481	-
		9538	1907.6	23.52	24.00	1.12	-	-	-	-
	Back	9262	1852.4	23.46	24.00	1.13	-	-	-	-
		9400	1880.0	23.55	24.00	1.11	0.12	0.632	**0.701**	B4
		9538	1907.6	23.52	24.00	1.12	-	-	-	-
	Left	9400	1880.0	23.55	24.00	1.11	-0.09	0.416	0.461	-
	Right	9400	1880.0	23.55	24.00	1.11	0.15	0.236	0.261	-
	Top	9400	1880.0	23.55	24.00	1.11	-	-	-	-
	Bottom	9400	1880.0	23.55	24.00	1.11	0.06	0.383	0.424	-

Note:
Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

WLAN										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Test Plot
		CH	MHz							
802.11b 1Mbps	Front	1	2412	11.78	12.00	1.05	-	-	-	-
		6	2437	11.89	12.00	1.03	-0.19	0.104	0.107	-
		11	2462	11.86	12.00	1.03	-	-	-	-
	Back	1	2412	11.78	12.00	1.05	-	-	-	-
		6	2437	11.89	12.00	1.03	0.13	0.153	**0.157**	B5
		11	2462	11.86	12.00	1.03	-	-	-	-
	Left	6	2437	11.86	12.00	1.03	-	-	-	-
	Right	6	2437	11.86	12.00	1.03	0.10	0.128	0.132	-
	Top	6	2437	11.86	12.00	1.03	-0.04	0.101	0.104	-
	Bottom	6	2437	11.86	12.00	1.03	-	-	-	-

Note:

1. According to the above table, the initial test position for body is “Back”, and its reported SAR is≤ 0.4W/kg. Thus further SAR measurement is not required for the other (remaining) test positions. Because the reported SAR of the highest measured maximum output power channel for the exposureconfiguration is ≤ 0.8W/kg, no further SAR testing is required for 802.11b DSSS in that exposureconfiguration.
2. When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.
   a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
   b) 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. the 802.11g/n is not required

WLAN- Scaled Reported SAR							
Mode	Test Position	Frequency		Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
		CH	MHz				
802.11b 1Mbps	Front	6	2437	98.23%	100%	0.107	0.109
	Back	6	2437	98.23%	100%	0.157	0.160
	Right	6	2437	98.23%	100%	0.132	0.134
	Top	6	2437	98.23%	100%	0.104	0.106

Note:

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. A maximum transmission duty factor of 98.23% is achievable for WLAN in this project.

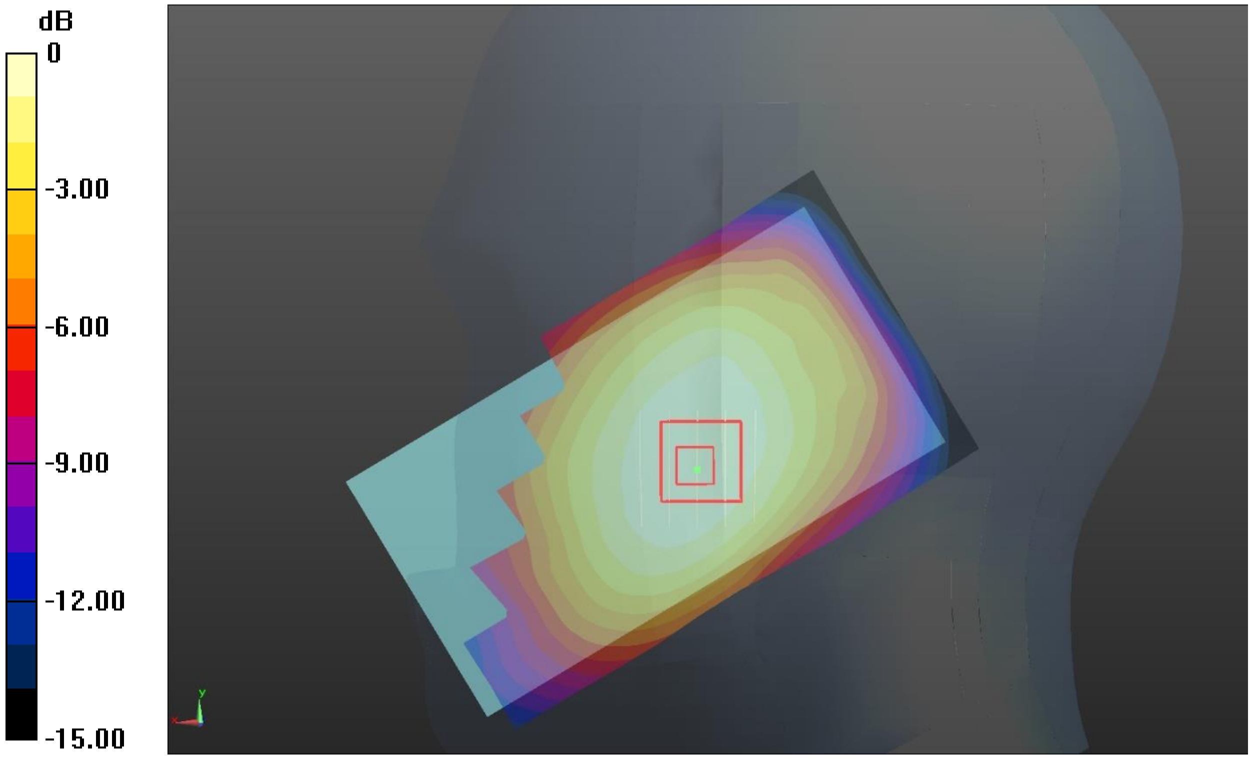
SAR Test Data Plots

Test mode:	GSM850-GPRS 4TS	Test Position:	Left Head Cheek	Test Plot:	H1

Date:2017-10-09
Communication System: Customer System; Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.478; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.15, 9.15, 9.15); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.603 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.939 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.625 W/kg
SAR(1 g) = 0.531 W/kg; SAR(10 g) = 0.417 W/kg
Maximum value of SAR (measured) = 0.574 W/kg

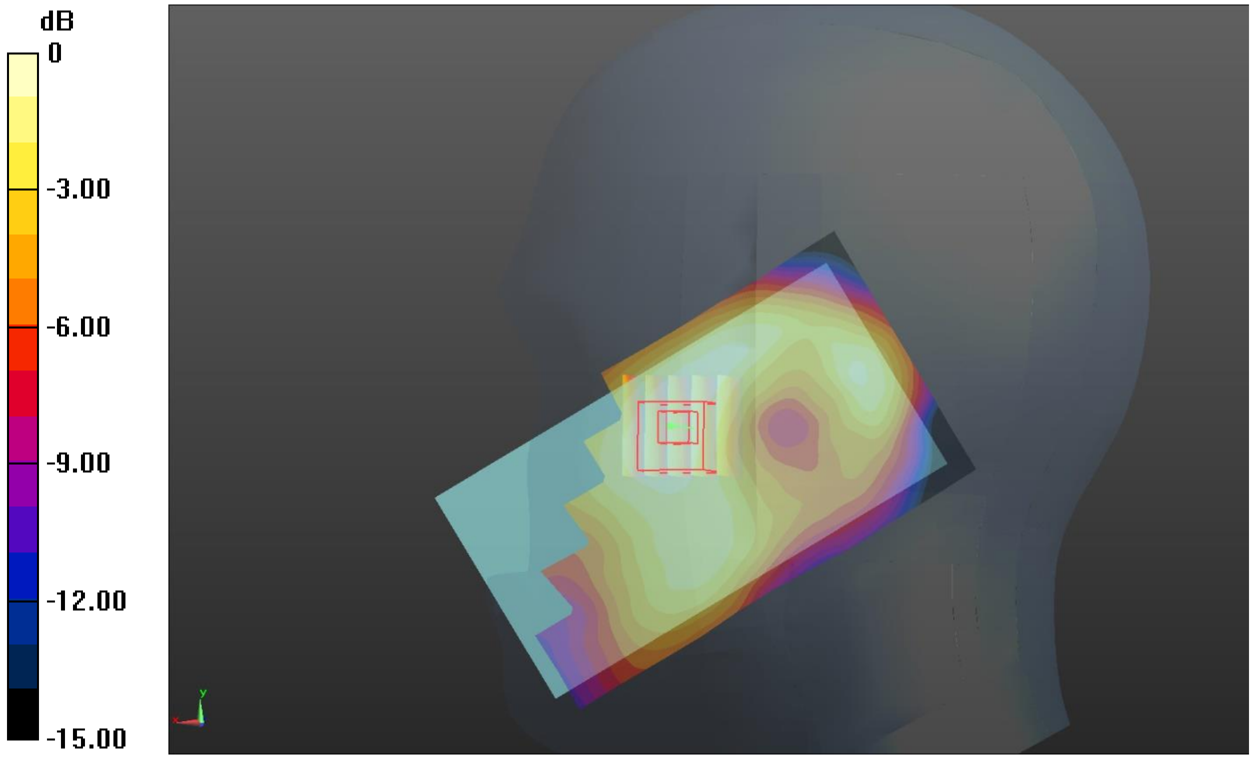


Test mode:	PCS1900 GPRS 4TS	Test Position:	Left Head Cheek	Test Plot:	H2

Date:2017-10-11
Communication System: Customer System; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.58, 7.58, 7.58); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.247 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.255 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.327 W/kg
SAR(1 g) = 0.224 W/kg; SAR(10 g) = 0.147 W/kg
Maximum value of SAR (measured) = 0.257 W/kg

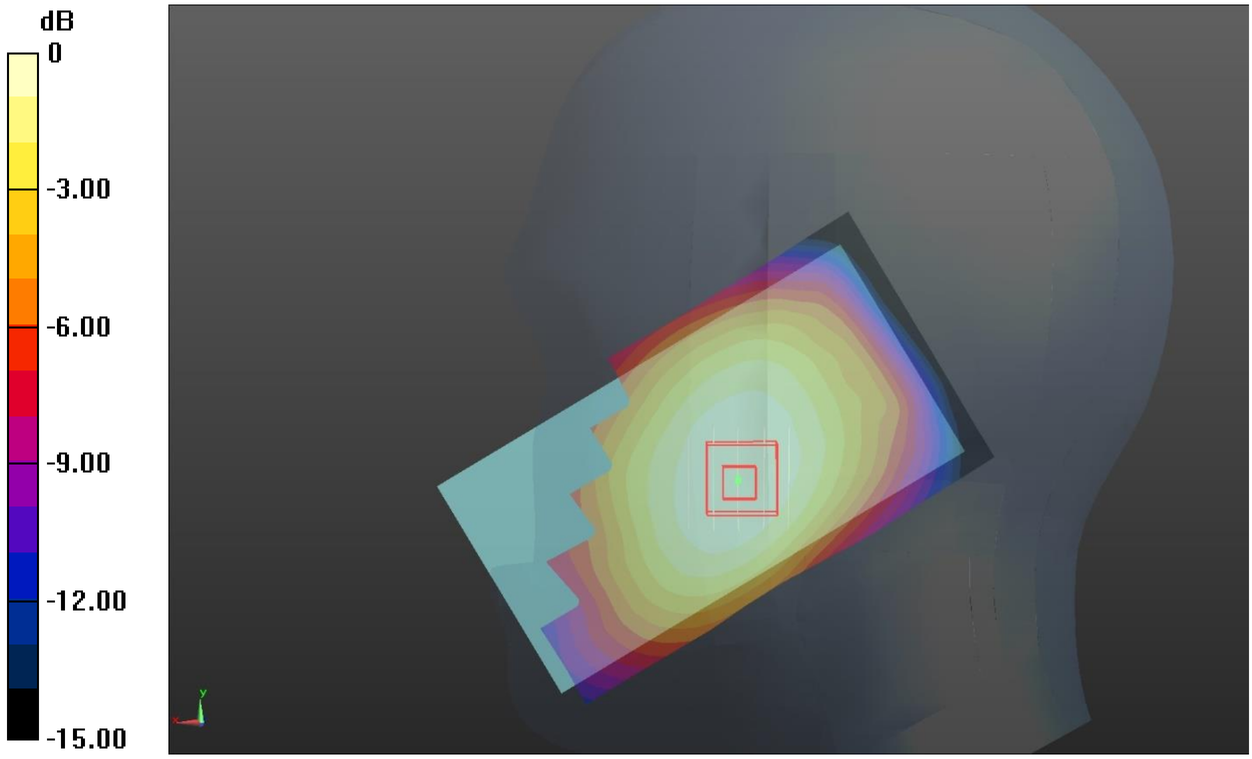


Test mode:	WCDMA Band V	Test Position:	Left Head Cheek	Test Plot:	H3

Date:2017-10-09
Communication System: WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.89 mho/m; ε_r = 41.478; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.15, 9.15, 9.15); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.212 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.004 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.227 W/kg
SAR(1 g) = 0.196 W/kg; SAR(10 g) = 0.155 W/kg
Maximum value of SAR (measured) = 0.211 W/kg

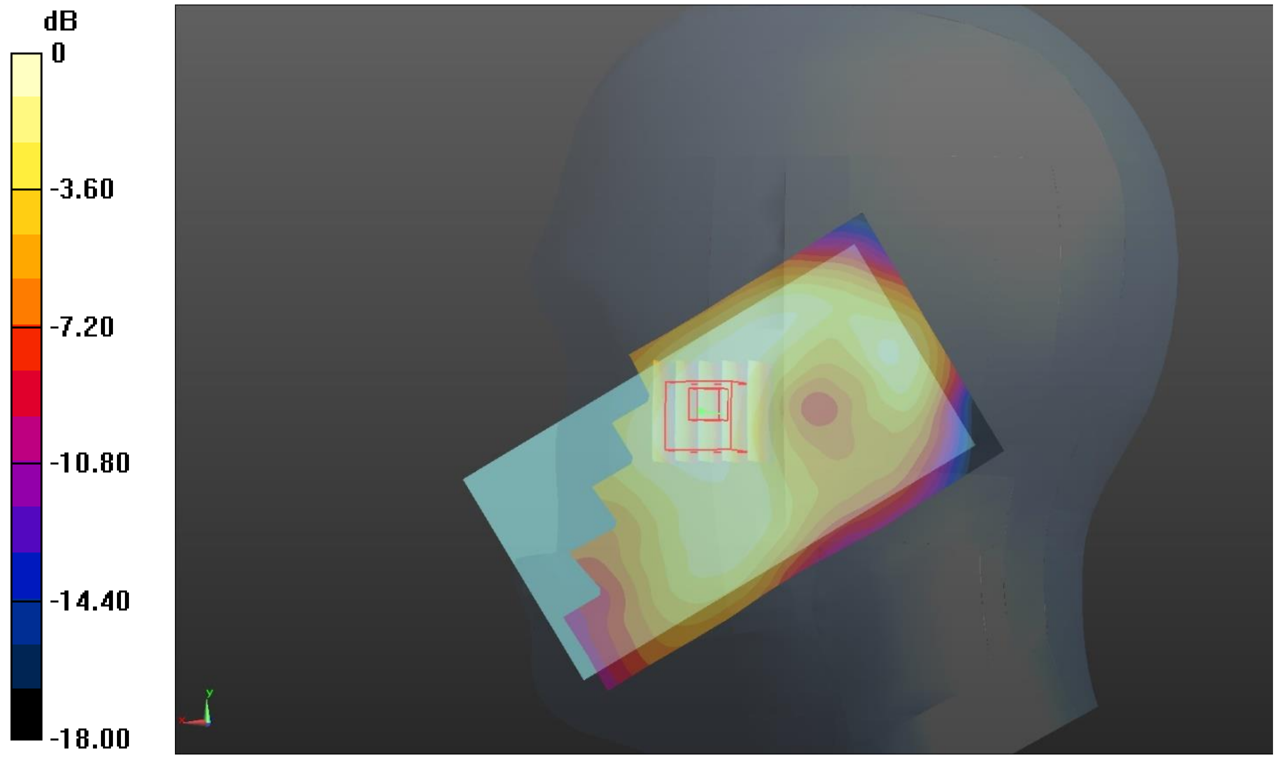


Test mode:	WCDMA Band II	Test Position:	Left Head Cheek	Test Plot:	H4

Date:2017-10-11
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.58, 7.58, 7.58); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.227 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.629 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.302 W/kg
SAR(1 g) = 0.208 W/kg; SAR(10 g) = 0.136 W/kg
Maximum value of SAR (measured) = 0.239 W/kg

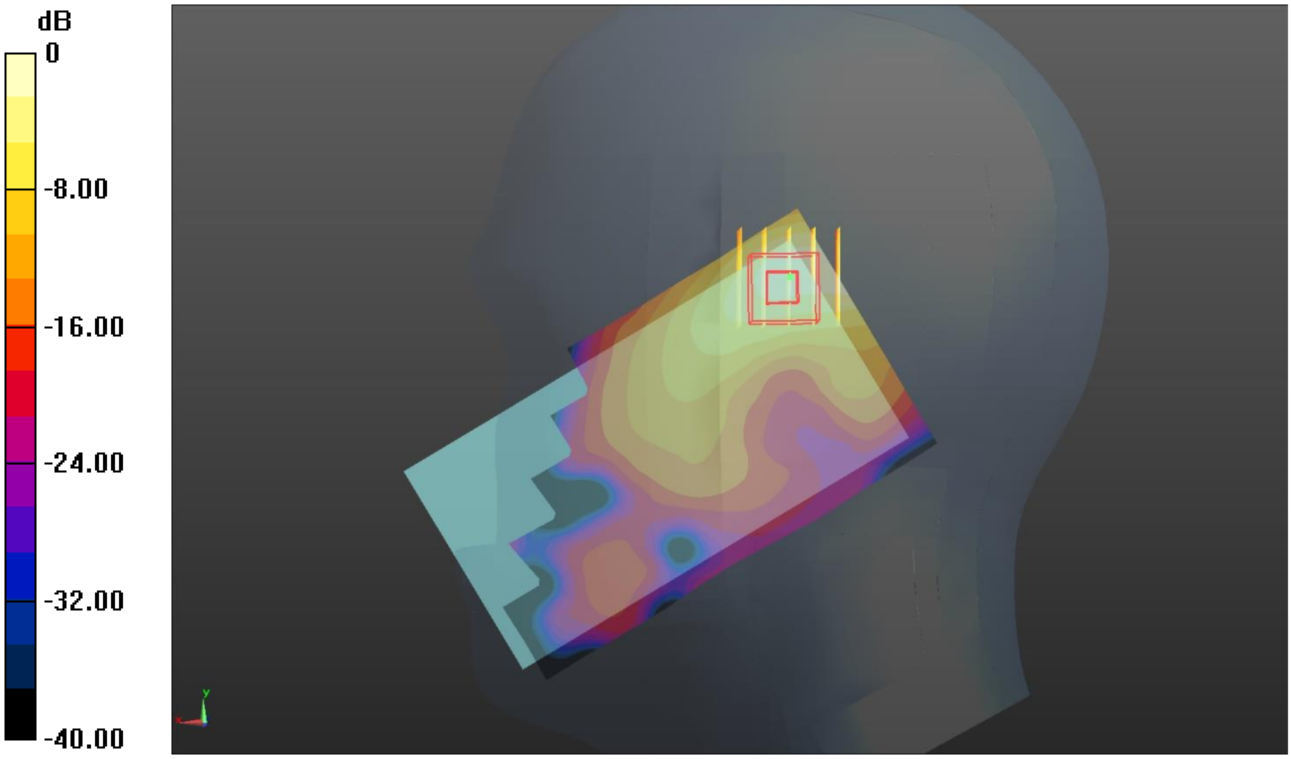


Test mode:	WLAN 802.11b	Test Position:	Left Head Cheek	Test Plot:	H5

Date:2017-09-30
Communication System: wifi; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.883 mho/m; ε_r = 38.021; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(6.92, 6.92, 6.92); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (81x141x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.244 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.813 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.153 W/kg; SAR(10 g) = 0.067 W/kg
Maximum value of SAR (measured) = 0.204 W/kg

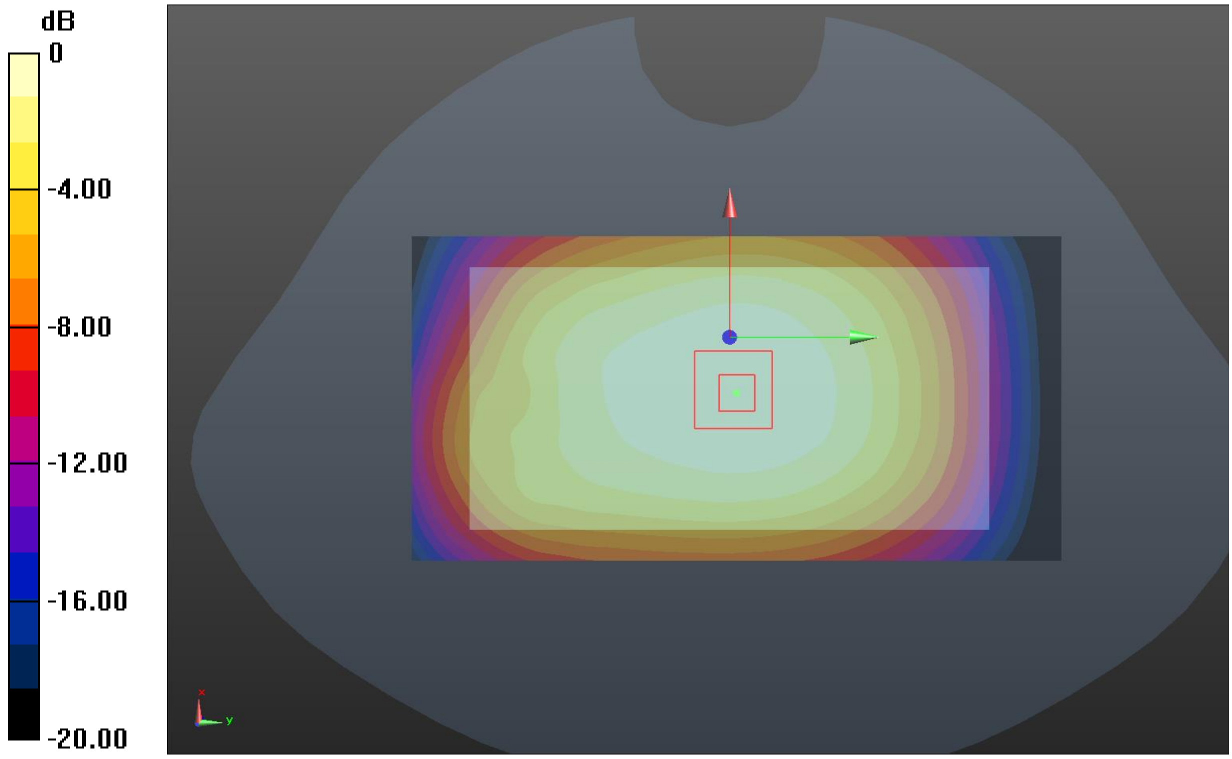


Test mode:	GSM850 GPRS 4TS	Test Position:	Body- worn Rear Side	Test Plot:	B1

Date:2017-10-10
Communication System: Customer System; Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 mho/m; ε_r = 55.858; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.02, 9.02, 9.02); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 2; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.829 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.583 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 1.165 W/kg
SAR(1 g) = 0.719 W/kg; SAR(10 g) = 0.461 W/kg
Maximum value of SAR (measured) = 0.826 W/kg

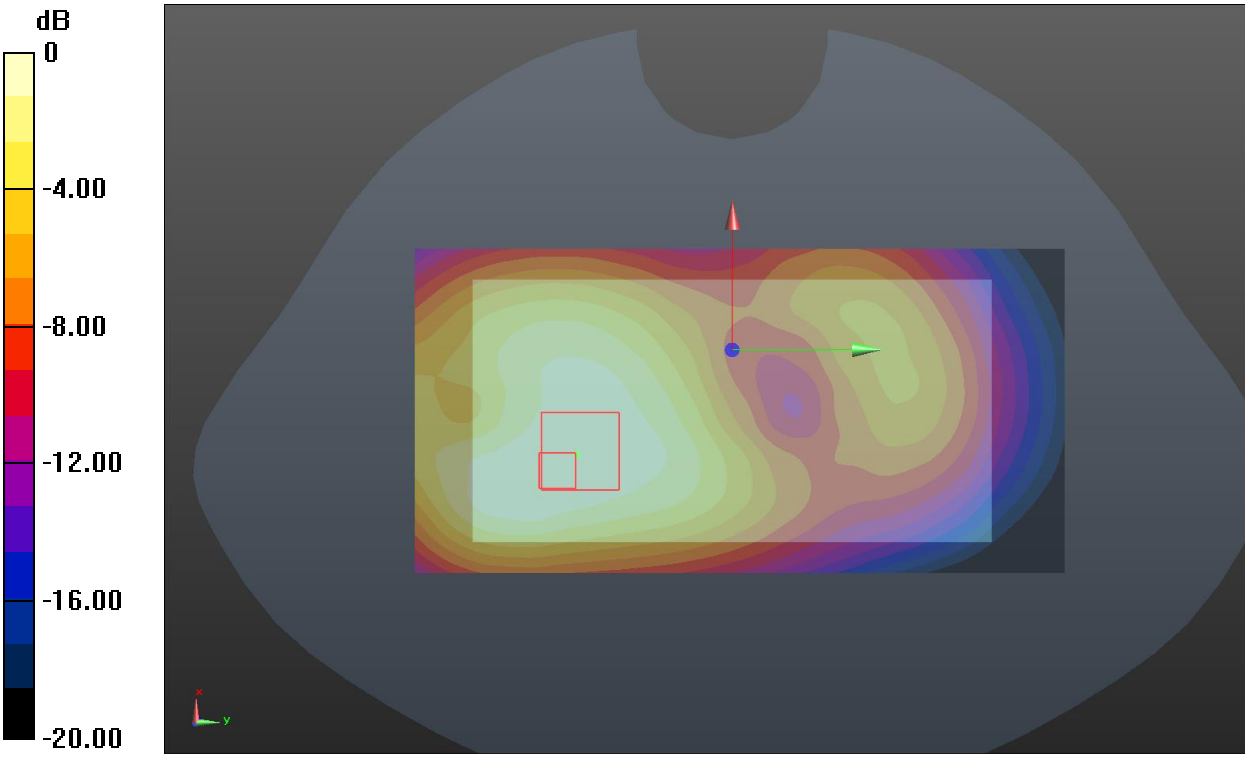


Test mode:	PCS1900 GPRS 4TS	Test Position:	Body- worn Rear Side	Test Plot:	B2

Date:2017-10-12
Communication System: Customer System; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.14; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.32, 7.32, 7.32); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 2; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.818 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.942 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 1.288 W/kg
SAR(1 g) = 0.724 W/kg; SAR(10 g) = 0.457 W/kg
Maximum value of SAR (measured) = 0.816 W/kg

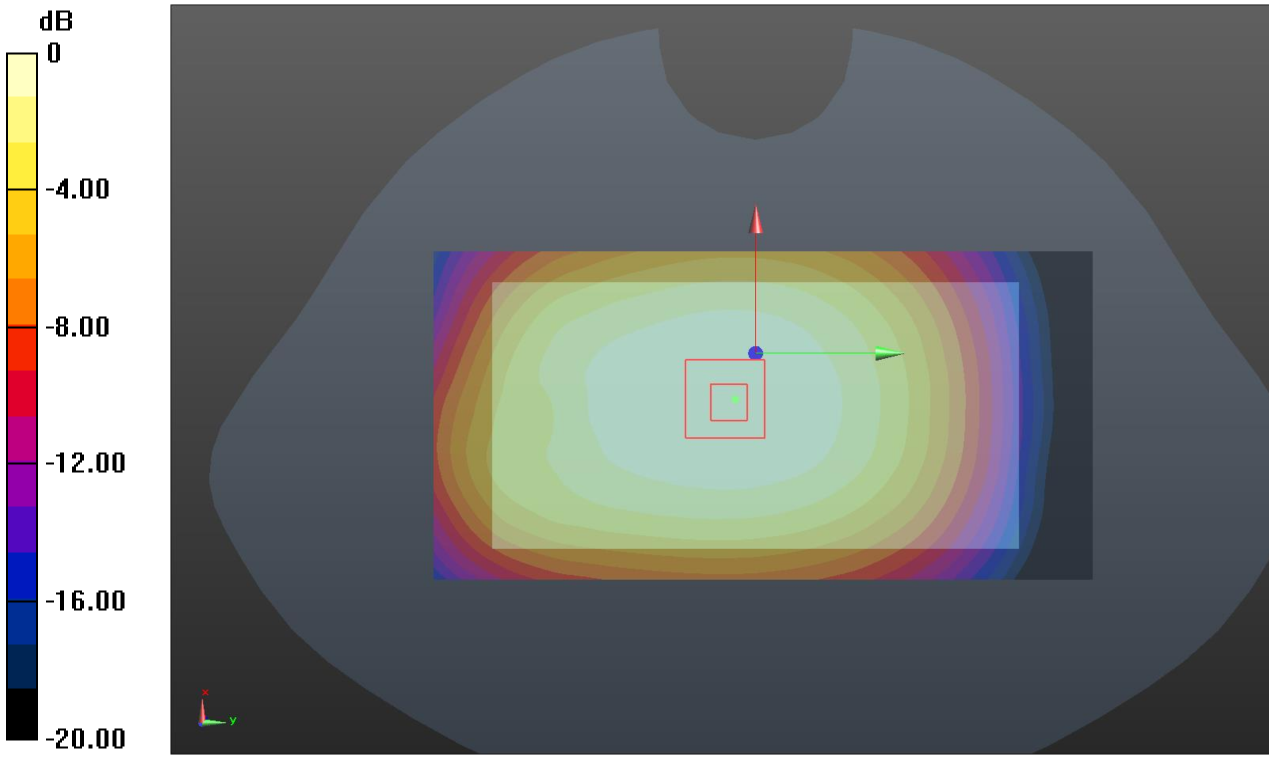


Test mode:	WCDMA Band V	Test Position:	Body- worn Rear Side	Test Plot:	B3

Date:2017-10-10
Communication System: WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 mho/m; ε_r = 55.858; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.02, 9.02, 9.02); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 2; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.472 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.689 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.550 W/kg
SAR(1 g) = 0.451 W/kg; SAR(10 g) = 0.345 W/kg
Maximum value of SAR (measured) = 0.472 W/kg

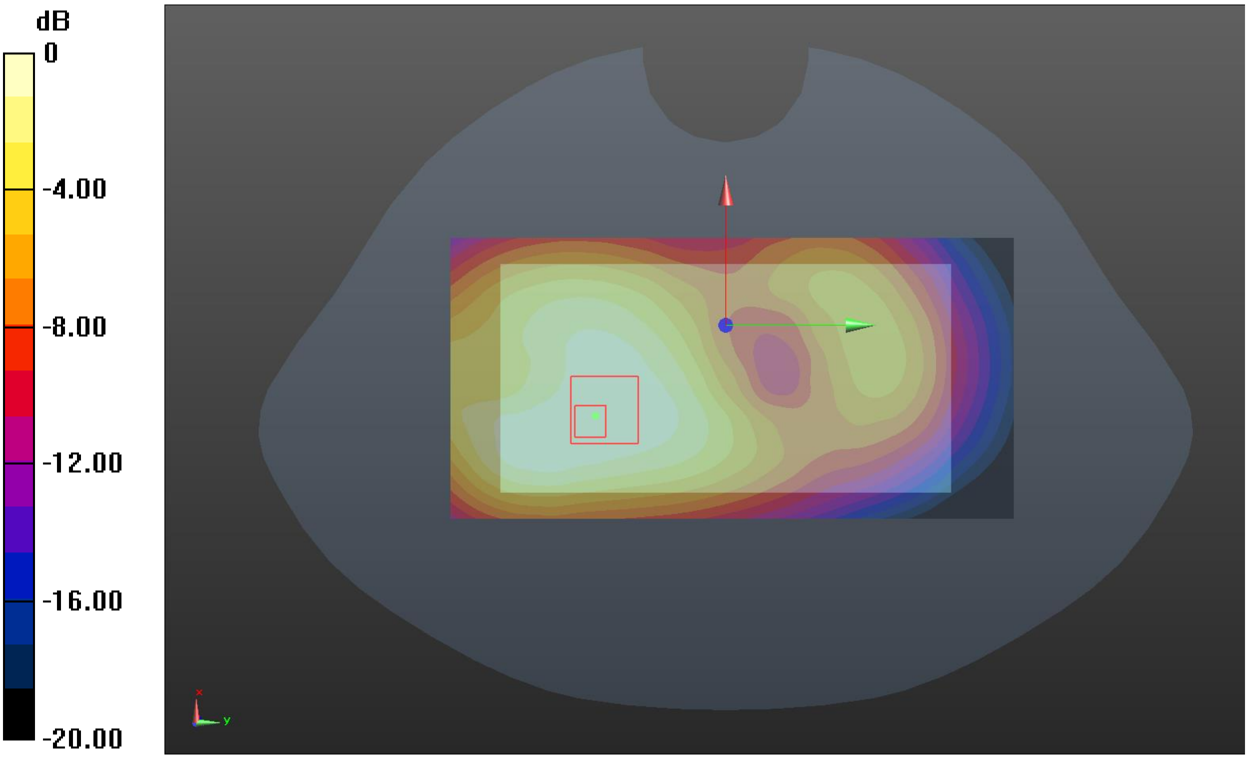


Test mode:	WCDMA Band II	Test Position:	Body- worn Rear Side	Test Plot:	B4

Date:2017-10-12
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.14; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.32, 7.32, 7.32); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 2; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.688 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.757 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.031 W/kg
SAR(1 g) = 0.632 W/kg; SAR(10 g) = 0.406 W/kg
Maximum value of SAR (measured) = 0.676 W/kg

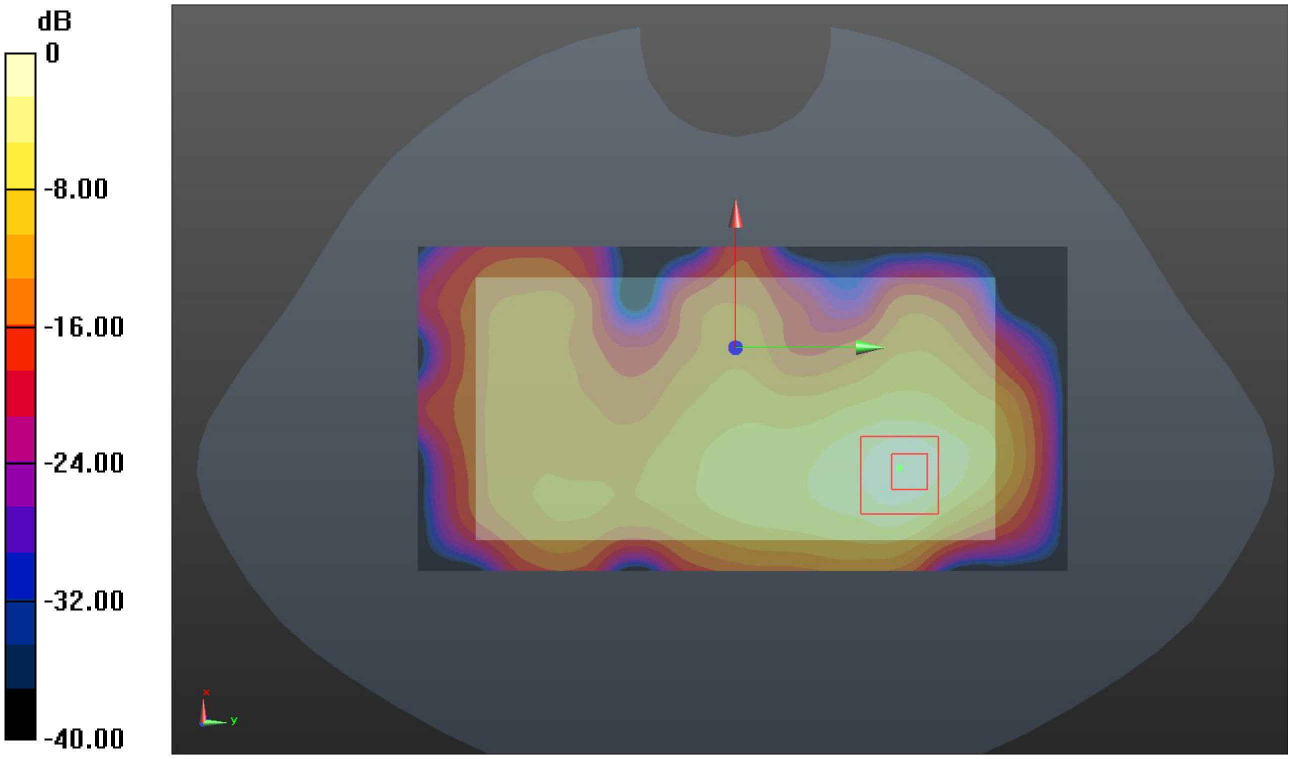


Test mode:	WLAN 802.11b	Test Position:	Body- worn Rear Side	Test Plot:	B5

Date:2017-09-30
Communication System: wifi; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 2.013 mho/m; ε_r = 50.739; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 – SN3842; ConvF(7.01, 7.01, 7.01); Calibrated: 15/08/2017;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
•Phantom: SAM 2; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.170 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.440 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.153 W/kg; SAR(10 g) = 0.066 W/kg
Maximum value of SAR (measured) = 0.171 W/kg



15. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Head	Body-worn	Hotspot	Note
1	GSM(voice) + Bluetooth (data)	Yes	Yes		
2	GSM(voice) + WIFI (data)	Yes	Yes		
3	WCDMA(voice) + Bluetooth (data)	Yes	Yes		
4	WCDMA(voice) + WIFI (data)	Yes	Yes		
5	GPRS (data) + Bluetooth (data)	Yes	Yes	NA	
6	GPRS (data) + WIFI (data)	Yes	Yes	Yes	
7	WCDMA (data) + Bluetooth (data)	Yes	Yes	NA	
8	WCDMA (data) + WIFI (data)	Yes	Yes	Yes	

General note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either GSM or WCDMA according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. The reported SAR summation is calculated based on the same configuration and test position
4. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below
   a) [(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)/x]W/kg for test separation distances ≦50mm; whetn x=7.5 for 1-g SAR, and x=18.75 for 10-g SAR.
   b) When the minimum separation distance is <5mm, the distance is used 5mm to determine SAR test exclusion
   c) 0.4 W/kg for 1-g SAR and 1.0W/kg for 10-g SAR, when the test separation distances is >50mm.

Bluetooth Max power	Exposure position	Head	Body worn
	Test separation	0mm	10mm
5.0 dBm	Estimated SAR (W/kg)	0.132 W/kg	0.066 W/kg

Maximum reported SAR value for Head

WWAN PCE + WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN PCE	WLAN DTS	(W/kg)
GSM	GSM850	Left Cheek	0.533	0.160	**0.693**
		Left Tilted	0.408	0.136	0.543
		Right Cheek	0.494	0.154	0.648
		Right Tilted	0.374	0.129	0.503
	PCS1900	Left Cheek	0.245	0.160	0.405
		Left Tilted	0.197	0.136	0.332
		Right Cheek	0.235	0.154	0.389
		Right Tilted	0.185	0.129	0.314
WCDMA	Band V	Left Cheek	0.205	0.160	0.365
		Left Tilted	0.168	0.136	0.304
		Right Cheek	0.195	0.154	0.349
		Right Tilted	0.156	0.129	0.285
	Band II	Left Cheek	0.231	0.160	0.390
		Left Tilted	0.185	0.136	0.321
		Right Cheek	0.223	0.154	0.376
		Right Tilted	0.175	0.129	0.304

WWAN PCE + Bluetooth					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN PCE	Bluetooth	(W/kg)
GSM	GSM850	Left Cheek	0.533	0.132	0.665
		Left Tilted	0.408	0.132	0.540
		Right Cheek	0.494	0.132	0.626
		Right Tilted	0.374	0.132	0.506
	PCS1900	Left Cheek	0.245	0.132	0.377
		Left Tilted	0.197	0.132	0.329
		Right Cheek	0.235	0.132	0.367
		Right Tilted	0.185	0.132	0.317
WCDMA	Band V	Left Cheek	0.205	0.132	0.337
		Left Tilted	0.168	0.132	0.300
		Right Cheek	0.195	0.132	0.327
		Right Tilted	0.156	0.132	0.288
	Band II	Left Cheek	0.231	0.132	0.363
		Left Tilted	0.185	0.132	0.317
		Right Cheek	0.223	0.132	0.355
		Right Tilted	0.175	0.132	0.307

Maximum reported SAR value for Body

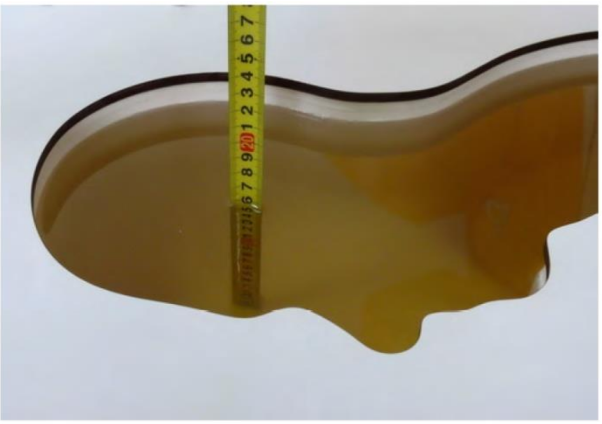
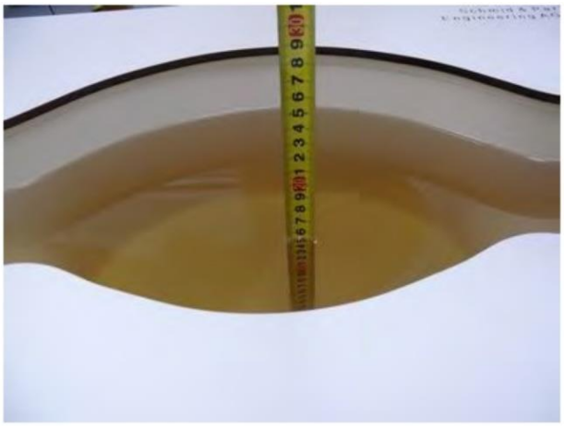
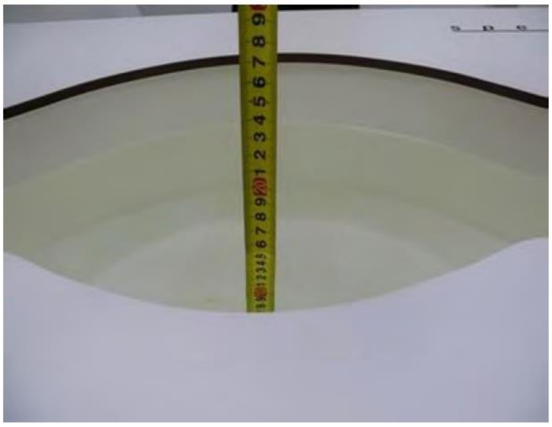
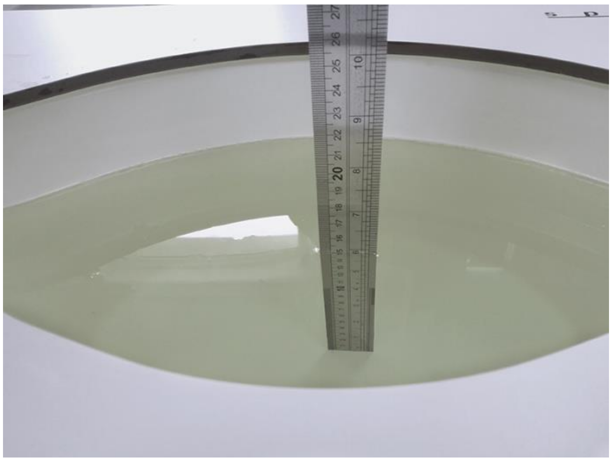
WWAN PCE + WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN PCE	WLAN DTS	(W/kg)
GSM	GSM850	Front	0.476	0.109	0.585
		Back	0.722	0.160	0.882
	PCS1900	Front	0.517	0.109	0.626
		Back	0.792	0.160	**0.951**
WCDMA	Band V	Front	0.335	0.109	0.444
		Back	0.471	0.160	0.631
	Band II	Front	0.481	0.109	0.590
		Back	0.701	0.160	0.860

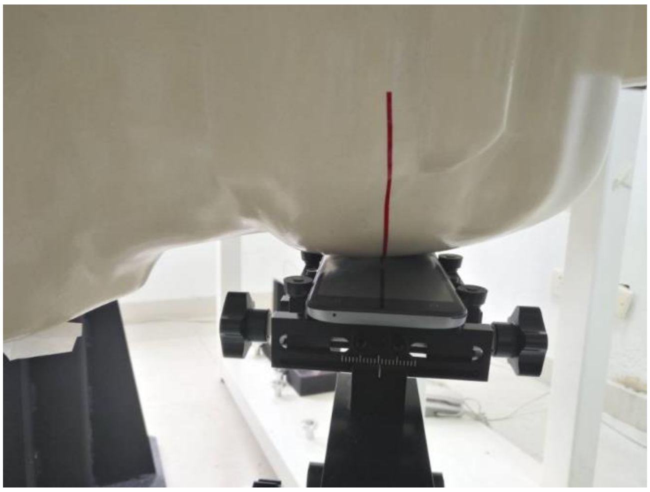
WWAN PCE + Bluetooth					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN PCE	Bluetooth	(W/kg)
GSM	GSM850	Front	0.476	0.066	0.542
		Back	0.722	0.066	0.788
	PCS1900	Front	0.517	0.066	0.583
		Back	0.792	0.066	0.858
WCDMA	Band V	Front	0.335	0.066	0.401
		Back	0.471	0.066	0.537
	Band II	Front	0.481	0.066	0.547
		Back	0.701	0.066	0.767

Maximum reported SAR value for Hotspot mode

WWAN PCE + WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN PCE	WLAN DTS	(W/kg)
GSM	GSM850	Front	0.476	0.109	0.585
		Back	0.722	0.160	0.882
		Left side	0.516	-	0.516
		Right side	0.230	0.134	0.364
		Top side	-	0.106	0.106
		Bottom side	0.491	-	0.491
	PCS1900	Front	0.517	0.109	0.626
		Back	0.792	0.160	**0.951**
		Left side	0.558	-	0.558
		Right side	0.263	0.134	0.397
		Top side	-	0.106	0.106
		Bottom side	0.545	-	0.545
WCDMA	Band V	Front	0.335	0.109	0.444
		Back	0.471	0.160	0.631
		Left side	0.320	-	0.320
		Right side	0.176	0.134	0.310
		Top side	-	0.106	0.106
		Bottom side	0.310	-	0.310
	Band II	Front	0.481	0.109	0.590
		Back	0.701	0.160	0.860
		Left side	0.461	-	0.461
		Right side	0.261	0.134	0.396
		Top side	-	0.106	0.106
		Bottom side	0.424	-	0.424

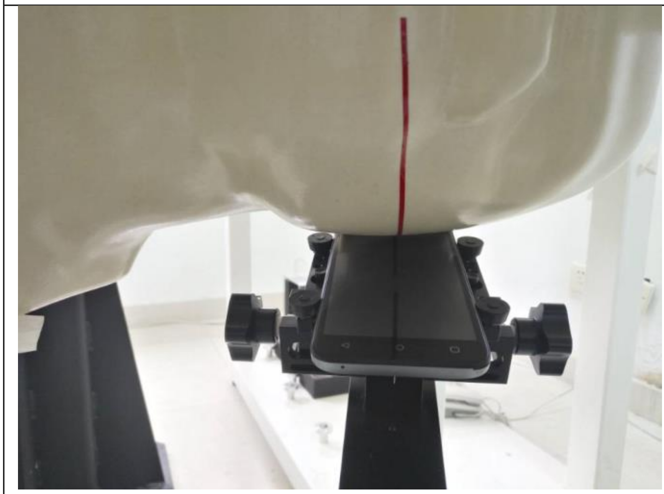
16. TestSetup Photos

	
Liquid depth in the head phantom (835MHz)	Liquid depth in the body phantom (835MHz)
	
Liquid depth in the head phantom (1900MHz)	Liquid depth in the body phantom (1900MHz)
	
Liquid depth in the head phantom (2450MHz)	Liquid depth in the body phantom (2450MHz)



Left Head Touch

Right Head Touch



Left Head Tilt (15°)

Right Head Tilt (15°)

Body-worn Front Side (10mm)

Body-worn Rear Side (10mm)

Front Side (10mm)

Rear Side (10mm)

Left Side (10mm)

Right Side (10mm)

Top Side (10mm)

Bottom Side (10mm)

17. External and Internal Photos of the EUT

Please reference to the report No.: TRE1709025201

---------End of Report----------

1.1. Probe Calibration Certificate

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
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中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client CIQ(Shenzhen) Certificate No: Z17-97110

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3842

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

Calibration date: August 15, 2017

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	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor NRP-Z91	101547	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor NRP-Z91	101548	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Reference10dBAttenuator	18N50W-10dB	13-Mar-16(CTTL,No.J16X01547)	Mar-18
Reference20dBAttenuator	18N50W-20dB	13-Mar-16(CTTL, No.J16X01548)	Mar-18
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 549	13-Dec-16(SPEAG, No.DAE4-549_Dec16)	Dec -17
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-17 (CTTL, No.J17X05858)	Jun-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan -18

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: August 16, 2017

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
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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, “Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)”, July 2016

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, “SAR Measurement Requirements for 100 MHz to 6 GHz”

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: 3842

Calibrated: August 15, 2017

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3842

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2)[A]	0.34	0.53	0.42	±10.0%
DCP(mV)[B]	102.3	102.6	101.2	

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	137.4	±2.1%
		Y	0.0	0.0	1.0		176.2	
		Z	0.0	0.0	1.0		153.3	

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: 3842

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	9.41	9.41	9.41	0.30	0.90	±12.1%
900	41.5	0.97	9.15	9.15	9.15	0.16	1.37	±12.1%
1750	40.1	1.37	7.89	7.89	7.89	0.23	1.09	±12.1%
1900	40.0	1.40	7.58	7.58	7.58	0.20	1.19	±12.1%
2450	39.2	1.80	6.92	6.92	6.92	0.32	1.16	±12.1%
2600	39.0	1.96	6.78	6.78	6.78	0.40	0.93	±12.1%

[C] Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[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: 3842

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	9.31	9.31	9.31	0.30	0.90	±12.1%
900	55.0	1.05	9.02	9.02	9.02	0.24	1.15	±12.1%
1750	53.4	1.49	7.57	7.57	7.57	0.23	1.12	±12.1%
1900	53.3	1.52	7.32	7.32	7.32	0.22	1.21	±12.1%
2450	52.7	1.95	7.01	7.01	7.01	0.42	1.04	±12.1%
2600	52.5	2.16	6.97	6.97	6.97	0.42	1.01	±12.1%

[C] Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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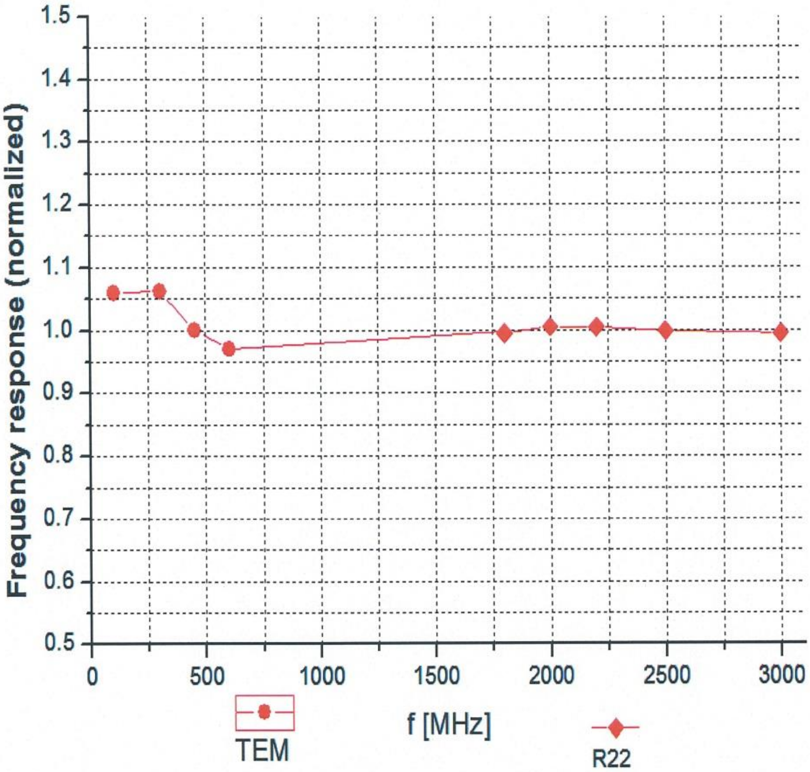
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (k=2)

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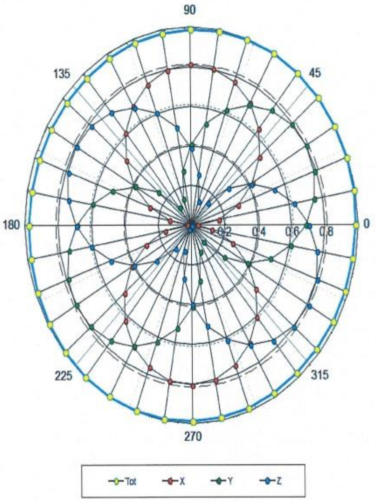
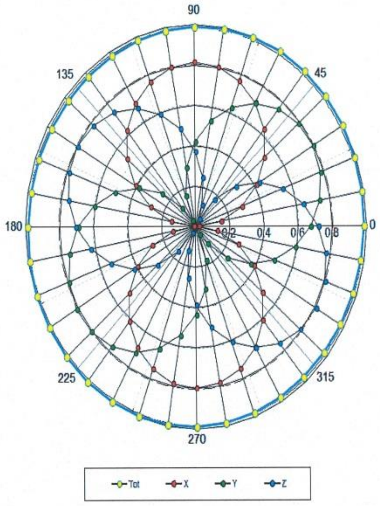
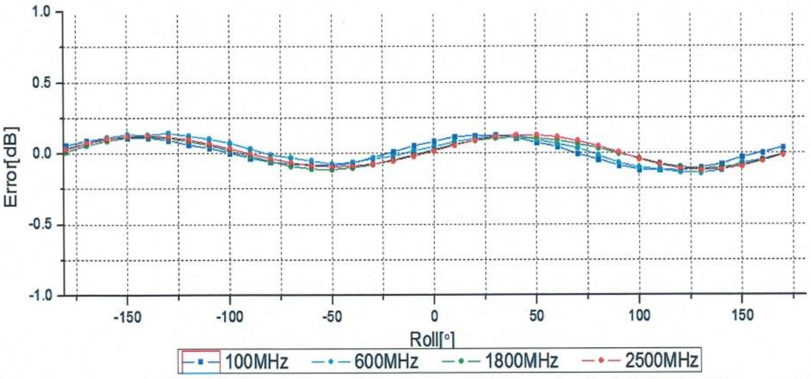
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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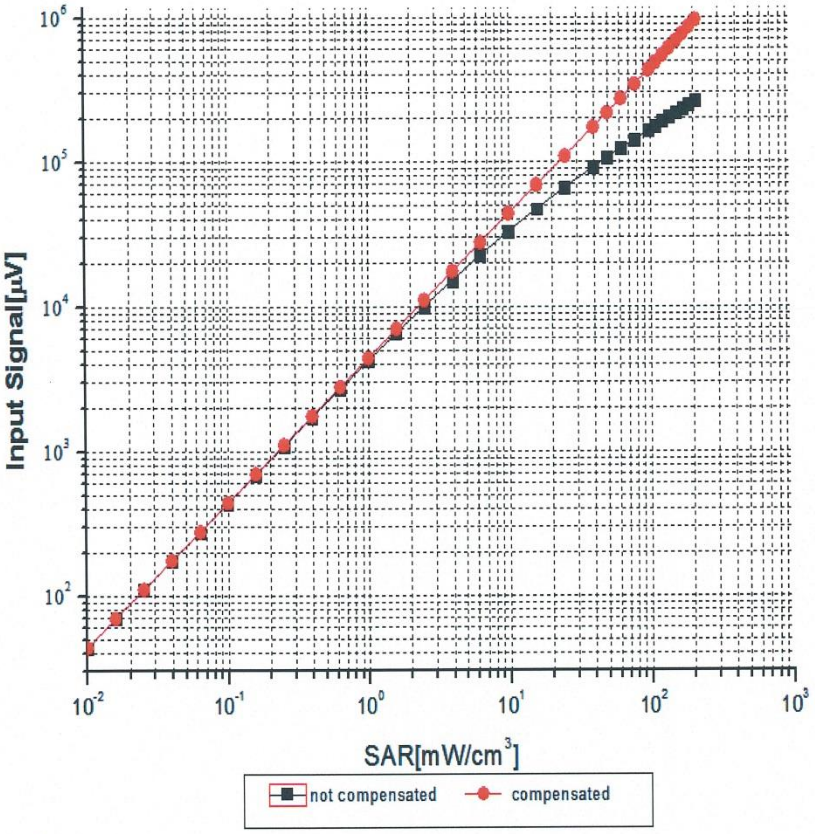
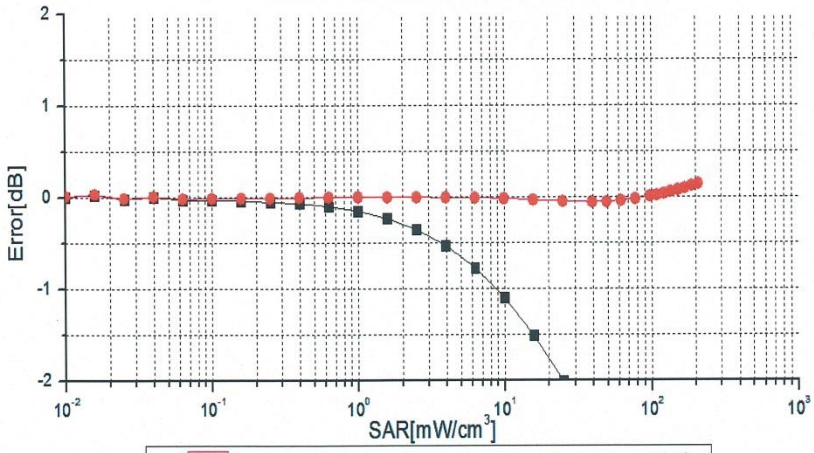
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





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

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