FCC SAR TEST REPORT

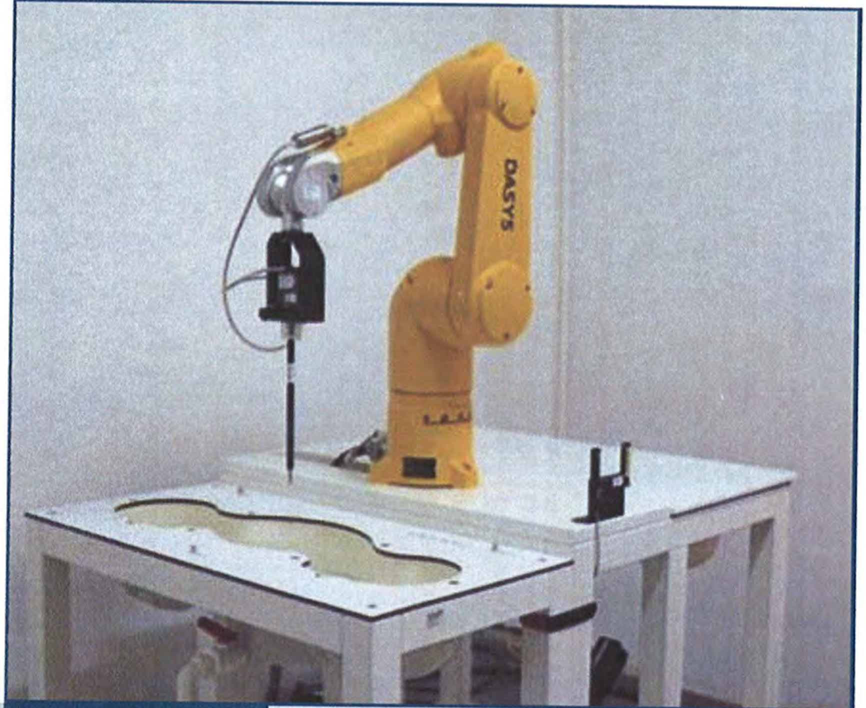
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

Mobile Phone

ISSUED TO
GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD

NO.18 HAIBINROAD, WUSHA, CHANG'AN, DONGGUAN, GUANGDONG, CHINA



Report No:	BL-SZ1540056-701
EUT Type:	Mobile Phone
Model Name:	OPPO 1206
Brand Name:	OPPO
FCC ID:	R9C-1206
Test Standard:	FCC 47 CFR Part 2.1093 ANSI C95.1: 1992 IEEE 1528: 2013
Maximum SAR:	Head (1 g): 0.730 W/kg Body (1 g): 1.200 W/kg
Test Conclusion:	Pass
Test Date:	Apr. 20, 2015 ~ Apr. 28, 2015
Date of Issue:	May. 12, 2015

Prepared by: Heng Aiping
Heng Aiping
(Reporting Specialist)
Date: May 12, 2015

Approved by: Wei Yanquan
Wei Yanquan
(Chief Engineer)
Date: May 12, 2015

BALUN CERTIFICATION CONSULTING SERVICE

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Revision History

Version	Issue Date	Revisions
Rev. 01	Apr. 30, 2015	Initial Issue
Rev. 02	May. 12, 2015	The Second Issue

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province,P. R. China
Phone Number	+86 755 66850100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province,P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625. The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	21 to 23℃
Ambient Relative Humidity	40 to 50%
Ambient Pressure	100 to 102KPa

1.4 Announce

(1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(2) The test report is invalid if there is any evidence and/or falsification.

(3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant

Applicant	GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP.,LTD
Address	NO.18 HAIBIN ROAD, WUSHA, CHANG'AN, DONGGUAN, GUANGDONG, CHINA

2.2 Manufacturer

Manufacturer	GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD
Address	NO.18 HAIBIN ROAD, WUSHA, CHANG'AN, DONGGUAN, GUANGDONG, CHINA

2.3 General Description for Equipment under Test (EUT)

EUT Type	Mobile Phone
EUT Model Name	OPPO 1206
Hardware Version	11
Software Version	ColorOS V2.0.1i
Dimensions	131 × 65 × 7mm
Weight	138.4 g
Network and Wireless connectivity	2G Network GSM 850/900/1800/1900;GPRS Class 12; EDGE Class 12; 3G Network WCDMA Band 1/ 2/ 5/ 8; 4G Network FDD LTE Band 1/ 4/ 7 2.4G WLAN, Bluetooth, Glonass

2.4 Technical Information

The requirement for the following technical information of the EUTwas tested in this report:

Operating Mode	GSM, WCDMA, FDD-LTE, 2.4G WLAN, Bluetooth		
Frequency Range	GSM 850	TX: 824 MHz ~ 849 MHz	RX: 869 MHz ~ 894 MHz
	GSM 1900	TX: 1850 MHz ~ 1910 MHz	RX: 1930 MHz ~ 1990 MHz
	WCDMA Band 2	TX: 1850 MHz ~ 1910 MHz	RX: 1930 MHz ~ 1990 MHz
	WCDMA Band 5	TX: 824 MHz ~ 849 MHz	RX: 869 MHz ~ 894 MHz
	FDD-LTE Band 4	TX: 1710 MHz ~ 1755 MHz	RX: 2110 MHz ~ 2155 MHz
	FDD-LTE Band 7	TX: 2500 MHz ~ 2570 MHz	RX: 2620 MHz ~ 2690 MHz
	802.11b/g/n (HT20/HT40)	2400~2483.5 MHz	
	Bluetooth	2400~2483.5 MHz	
DTM	Not Support		
Hotspot Function	Support		

Environment	Uncontrolled
EUT Stage	Portable Device

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	OPPO
	Model No.	BLP593
	Serial No.	N/A
	Capacitance	2000 mAh
	Rated Voltage	3.8 V
	Extreme Voltage	Low: 3.6 V / High:4.35 V
Ancillary Equipment 2	Charger 1	
	Brand Name	OPPO
	Model No.	AK901
	Rated Input	~ 100-240 V, 0.2 A, 50/60 Hz
	Rated Output	⎓ 5 V, 1 A
Ancillary Equipment 3	Charger 2	
	Brand Name	OPPO
	Model No.	S01A22
	Rated Input	~ 100-240 V, 0.2 A, 50/60 Hz
	Rated Output	⎓ 5 V, 1 A
Ancillary Equipment 4	Charger 3	
	Brand Name	OPPO
	Model No.	S005SU0500100
	Rated Input	~ 100-240 V, 150 mA, 50/60 Hz
	Rated Output	⎓ 5V, 1 A
Ancillary Equipment 5	Earphone	
	Length	1.2 m
Ancillary Equipment 6	USB Cable	
	Length	1.0 m

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D01 v05r02	Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
5	FCC KDB 941225 D01 v03	3G SAR MEAUREMENT PROCEDURES
6	FCC KDB 941225 D05 v02r03	SAR Evaluation Considerations for LTE Devices
7	FCC KDB 941225 D06 v01r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
8	FCC KDB 865664 D01 v01r03	SAR Measurement 100 MHz to 6 GHz
9	FCC KDB 865664 D02 v01r01	RF Exposure Reporting

3.2 Device Categoryand SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user.

Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

Table of Exposure Limits:

Body Position	SAR Value (W/Kg)	
	General Population/ Uncontrolled Exposure	Occupational/ ControlledExposure
Whole-Body SAR (averaged over the entire body)	0.08	0.4
Partial-Body SAR (averaged over any 1 gram of tissue)	1.60	8.0
SAR for hands, wrists, feet and ankles (averaged over any 1 grams of tissue)	4.0	20.0

NOTE:

General Population/Uncontrolled Exposure: Locationswhere there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are applicable to situations in which thegeneral public may be exposed or in which persons who are exposed as a consequence of theiremployment may not be made fully aware of the potential for exposure or cannot exercise control overtheir exposure. Members of the general public would come under this category when exposure is notemployment-related; for example, in the case of a wireless transmitter that exposes persons in itsvicinity.

Occupational/ControlledExposure: Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure,In general, occupational/controlled exposure limits are applicable to situations in which personsare exposed as a consequence of their employment, who have been made fully aware of the potentialfor exposure and can exercise control over their exposure. This exposure category is also applicablewhen the exposure is of a transient nature due to incidental passage through a location where theexposure levels may be higher than the general population/uncontrolled limits, but the exposed person isfully aware of the potential for exposure and can exercise control over his or her exposure by leaving thearea or by some other appropriate means.

3.3 Test Result Summary

3.3.1 Highest SAR (1 g Value)

Position	Band	Maximum Scaled SAR (W/kg)	Maximum Report SAR (W/kg)	Limit (W/kg)	Verdict
Head	GSM 850	0.187	0.730	1.6	Pass
	GSM 1900	0.186			Pass
	WCDMA Band 2	0.358			Pass
	WCDMA Band 5	0.139			Pass
	FDD-LTE Band 4	0.270			Pass
	FDD-LTE Band 7	0.388			Pass
	WLAN	0.740			Pass
	BT	0.021			Pass
Body-worn	GSM 850	0.562	1.200	1.6	Pass
	GSM 1900	0.511			Pass
	WCDMA Band 2	0.891			Pass
	WCDMA Band 5	0.332			Pass
	FDD-LTE Band 4	0.292			Pass
	FDD-LTE Band 7	1.200			Pass
	WLAN	0.287			Pass
	BT	0.063			Pass
Hotspot Mode	GSM 850	0.599	1.200	1.6	Pass
	GSM 1900	0.465			Pass
	WCDMA Band 2	0.891			Pass
	WCDMA Band 5	0.332			Pass
	FDD-LTE Band 4	0.292			Pass
	FDD-LTE Band 7	1.200			Pass
	WLAN	0.287			Pass
	BT	0.063			Pass

3.3.2 Highest Simultaneous SAR

Position	Simultaneous Configuration	Simultaneous SAR (W/kg)	Limit	Verdict
Head	FDD LTE + WLAN	1.128	1.6	Pass
	FDD LTE + BT	0.409		Pass
Body-worn	FDD LTE + WLAN	1.487	1.6	Pass
	FDD LTE + BT	1.263		Pass
Hotspot Mode	FDD LTE + WLAN	1.487	1.6	Pass
	FDD LTE + BT	1.263		Pass

3.4 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

System Measurement Uncertainty (frequency range from 300 MHz to 3 GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	6.0	N	1	1	1	6.00	6.00	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.90	3.90	∞
Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Reponse Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe positioner Mechanical Tolerance	0.4	R	$\sqrt{3}$	1	1	0.20	0.20	∞
Probe positioning with respect to Phantom Shell	2.9	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	2.0	R	$\sqrt{3}$	1	1	1.20	1.20	∞
Test sample Related								
Test sample positioning	2.9	N	1	1	1	2.90	2.90	N-1
Device Holder Uncertainty	3.6	N	1	1	1	3.60	3.60	N-1
Output power Variation - SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.90	2.90	∞
SAR scaling	0.0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	4.0	R	$\sqrt{3}$	1	1	3.50	3.50	∞
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.10	0.90	∞
Liquid conductivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.78	0.71	1.10	1.00	∞
Liquid permittivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.26	0.26	0.30	0.40	∞
Liquid conductivity - temperature uncertainty	3.4	N	$\sqrt{3}$	0.78	0.71	1.50	1.40	∞
Liquid permittivity - temperature uncertainty	0.4	N	$\sqrt{3}$	0.26	0.26	0.10	0.10	∞
Combined Standard Uncertainty		RSS				13.1	13.0	
Expanded Uncertainty (95% Confidence interval)		K=2				26.1	26.1	

System Measurement Uncertainty (frequency range from 3 GHz to 6 GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System								
Probe calibration	6.55	N	1	1	1	6.55	6.55	∞
Axial Isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.90	3.90	∞
Boundary effect	2.0	R	$\sqrt{3}$	1	1	1.20	1.20	∞
Linearity	4.7	R	$\sqrt{3}$	1	1	2.70	2.70	∞
System detection limits	1.0	R	$\sqrt{3}$	1	1	0.60	0.60	∞
Readout Electronics	0.3	N	1	1	1	0.30	0.30	∞
Reponse Time	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50	∞
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
RF ambient Conditions - Reflections	3.0	R	$\sqrt{3}$	1	1	1.70	1.70	∞
Probe positioner Mechanical Tolerance	0.8	R	$\sqrt{3}$	1	1	0.50	0.50	∞
Probe positioning with respect to Phantom Shell	6.7	R	$\sqrt{3}$	1	1	3.90	3.90	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	4.0	R	$\sqrt{3}$	1	1	2.30	2.30	∞
Test sample Related								
Test sample positioning	2.9	N	1	1	1	2.90	2.90	N-1
Device Holder Uncertainty	3.6	N	1	1	1	3.60	3.60	N-1
Output power Variation - SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.90	2.90	∞
SAR scaling	0.0	R	$\sqrt{3}$	1	1	0.00	0.00	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (Shape and thickness tolerances)	6.6	R	$\sqrt{3}$	1	1	3.80	3.80	∞
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.10	0.90	∞
Liquid conductivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.78	0.71	1.10	1.00	∞
Liquid permittivity - measurement uncertainty	2.5	N	$\sqrt{3}$	0.26	0.26	0.30	0.40	∞
Liquid conductivity - temperature uncertainty	3.4	N	$\sqrt{3}$	0.78	0.71	1.50	1.40	∞
Liquid permittivity - temperature uncertainty	0.4	N	$\sqrt{3}$	0.26	0.26	0.10	0.10	∞
Combined Standard Uncertainty		RSS				14.0	14.0	
Expanded Uncertainty (95% Confidence interval)		K=2				28.1	28.0	

4 MEASUREMENT SYSTEM

4.1 Specific Absorption Rate (SAR) Definition

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and generalpopulation/uncontrolled, based on a person's awarenessand ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{d}{\mathbf{dt}}\left(\frac{d\mathbf{W}}{\mathbf{dm}}\right) = \frac{d}{\mathbf{dt}}\left(\frac{d\mathbf{W}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

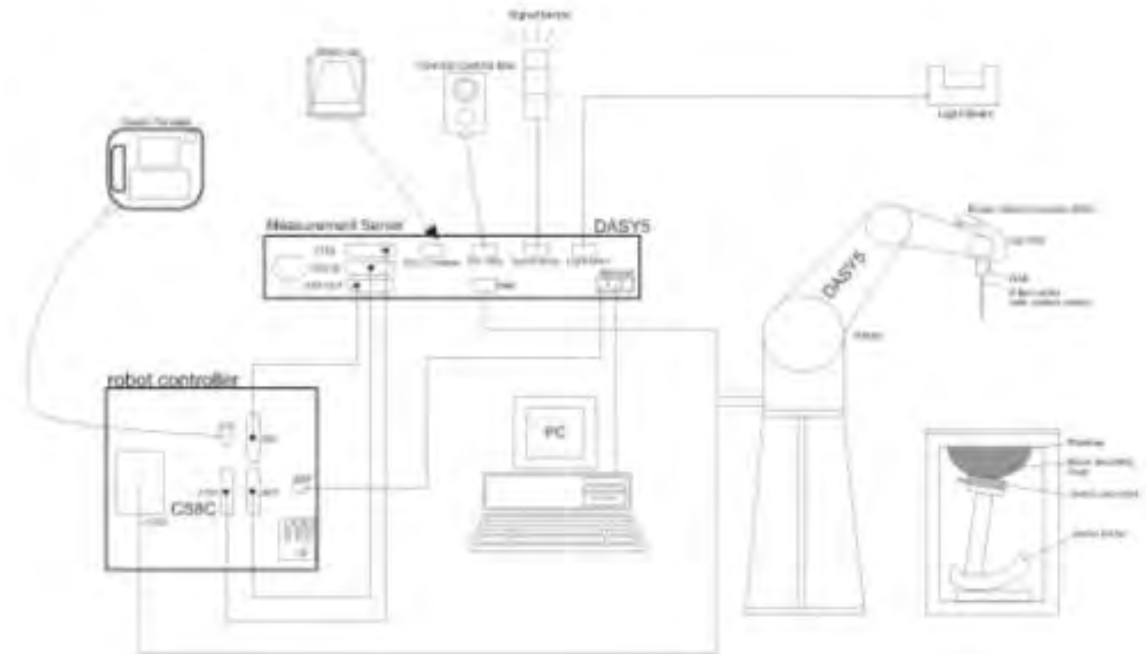
$$\mathbf{SAR} = \frac{\boldsymbol{\sigma}\mathbf{E}^2}{\boldsymbol{\rho}}$$

Where: ζ is the conductivity of the tissue,

ρis the mass density of the tissue and E is the RMS electrical field strength.

4.2 DASY SAR System

4.2.1 DASY SAR System Diagram



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

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. 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.
3. 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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. 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.
6. The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation.
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

4.2.2 Robot

The Dasy SAR system uses the high precision robots.Symmetrical design with triangular coreBuilt-in optical fiber for surface detection system For the 6-axis controller system, Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents) The robot series have many features that are important for our application:

- High precision
  (repeatability ±0.02 mm)
- High reliability
  (industrial design)
- Low maintenance costs
  (virtually maintenancefree due to direct drive gears; no belt drives)
- Jerk-free straight movements
  (brushless synchron motors; no stepper motors)
- Low ELF interference
  (motor control _elds shielded via the closed metallic constructionshields)

4.2.3 E-FieldProbe

The probe is specially designed and calibrated for use in liquids with high permittivities for the measurements the Specific Dosimetric E-Field Probe EX3DV4-SN:7340 with following specifications is used.

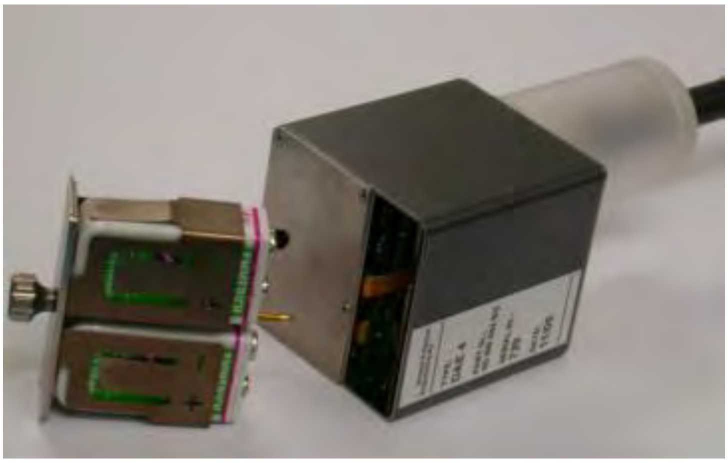
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection systemBuilt-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ; ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 9 mm) Tip diameter: 2.5 mm (Body: 10 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (EX3DV4)

E-Field Probe Calibration Process

Probe calibration is realized, in compliance with CENELEC EN 62209-1/-2 and IEEE 1528 std, withCALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1/2 annexe technique using reference guide at the five frequencies.

4.2.4 Data Acquisition Electronics

The data acquisition electronics (DAE) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converte and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.



- Input Impedance: 200MOhm
- The Inputs: Symmetrical and Floating
- Commom Mode Rejection: Above 80dB

4.2.5 Phantoms

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

- Left hand
- Right hand
- Flat phantom

Photo of Phantom SN1857

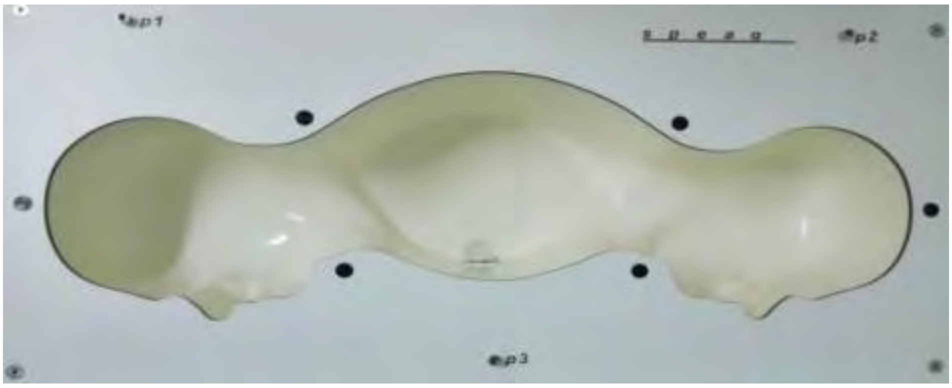
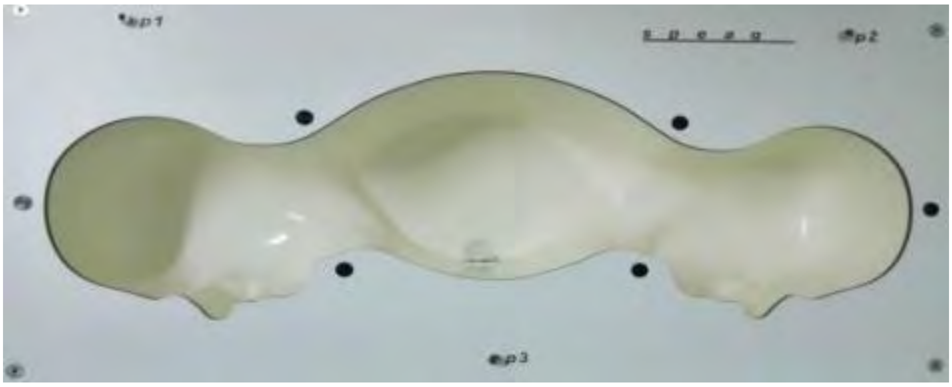


Photo of Phantom SN1859



Serial Number	Material	Length	Height
SN 1857 SAM1	Vinylester, glass fiber reinforced	1000	500
SN 1859 SAM2	Vinylester, glass fiber reinforced	1000	500

4.2.6 Device Holder

The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA‟s only. If necessary an additional support of polystyrene material is used. Larger DUT‟s (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values. Therefore those devices are normally only tested at the flat part of the SAM.

The positioning system allows obtaining cheek and tilting position with a very good accuracy. Incompliance with CENELEC, the tilt angle uncertainty is lower than 1°.

4.2.7 Simulating Liquid

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5%.

Head Liquid Depth	Body Liquid Depth
	

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water	Sugar	Cellulose	Salt	Preventol	DGBE	Conductivity	Permittivity
	%	%	%	%	%	%	σ	ε
Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.4	40.0
2450	55.0	0	0	0.1	0	44.9	1.80	39.2
2600	54.9	0	0	0.1	0	45.0	1.96	39.0
Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0.1	0	31.3	1.95	52.7
2600	68.2	0	0	0.1	0	31.7	2.16	52.5

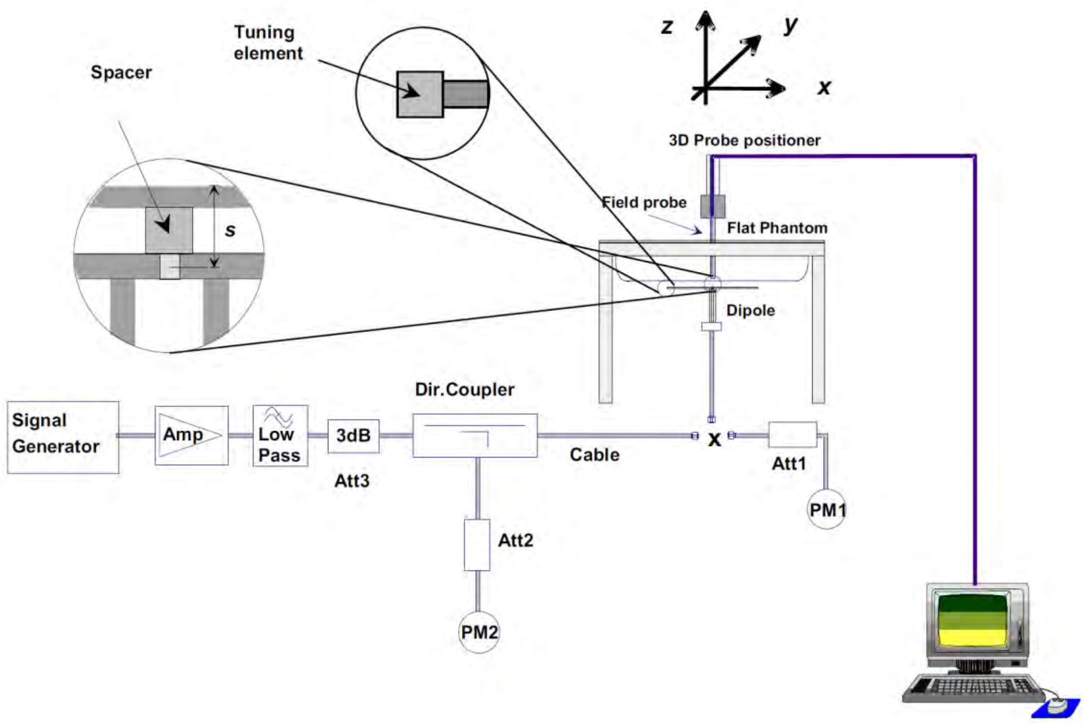
5 SYSTEM VERIFICATION

5.1 Purpose of System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source.This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

5.2 System Check Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



6 TEST POSITION CONFIGURATIONS

According to KDB 648474 D04 Handset v01r02, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

6.1 Head Exposure Conditions

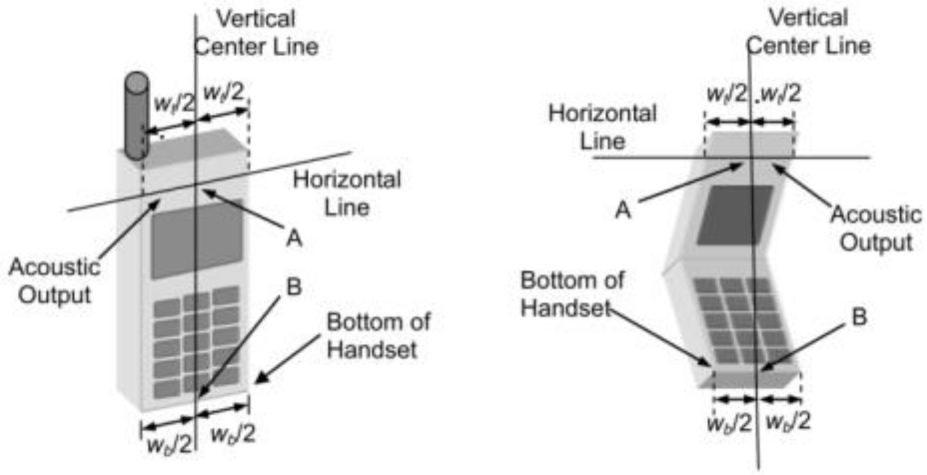
Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2013 using the SAM phantom illustrated as below.

6.1.1 Two Imaginary Lines on the Handset

(a) The vertical centerline 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, and the midpoint of the width w b of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

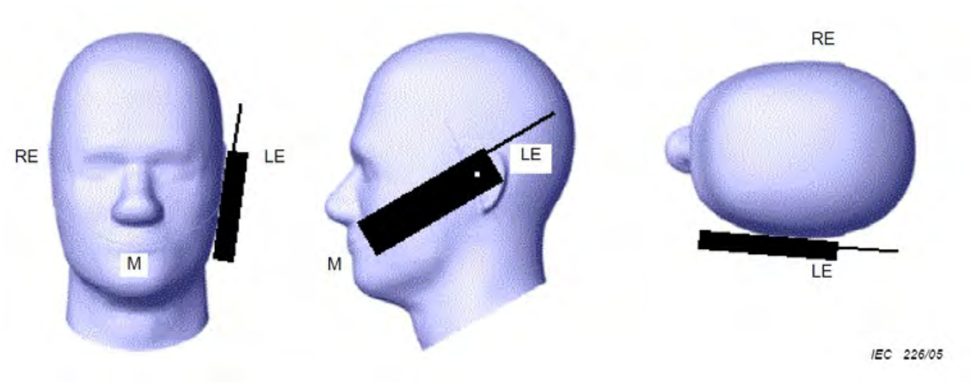
(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



6.1.2 Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

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



6.1.3 Tilted Position

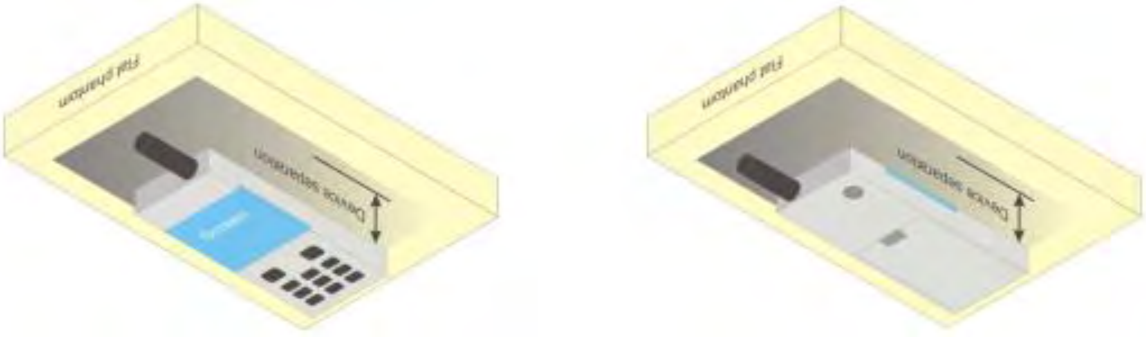
(a) To position the device in the “cheek” position described above.
(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost.

6.2 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in EN 62209-2 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-wornaccessory.

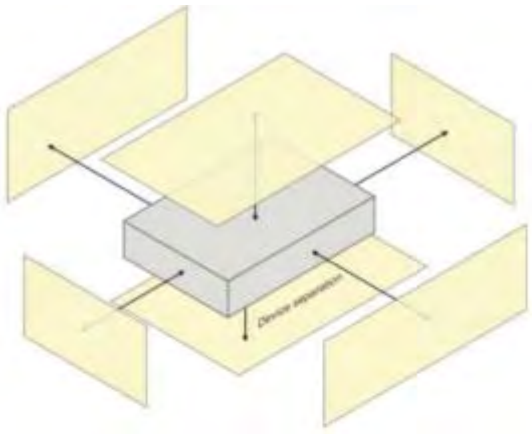
Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required. A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance <= 5 mm to support compliance.



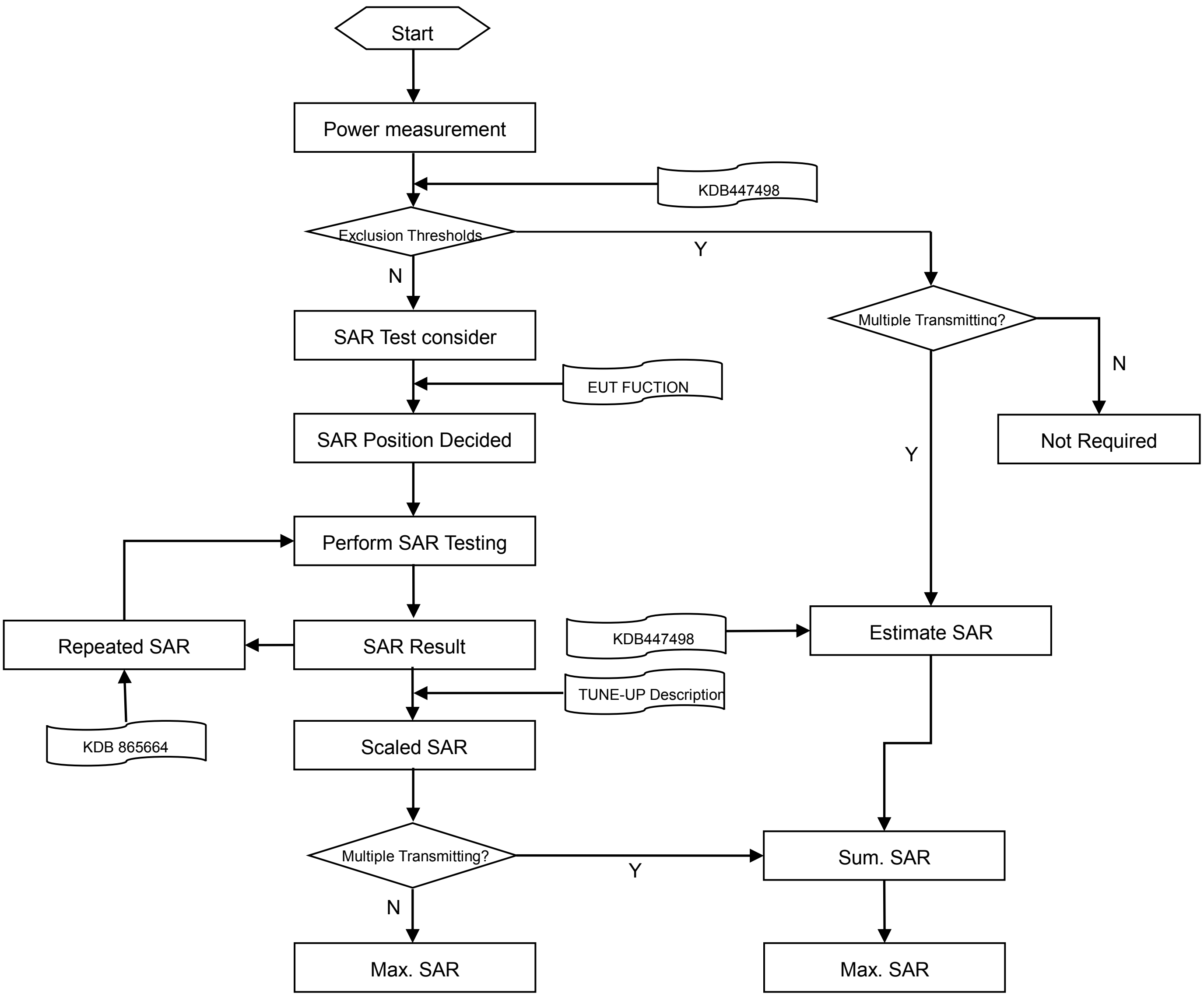
6.3 Hotspot Mode Exposure Position Conditions

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).



7 MEASUREMENT PROCEDURE

7.1 Measurement Process Diagram



7.2 SAR Scan General Requirement

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Boththe probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1 g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013.

<table>
<tr><th colspan="3"></th><th>≤3GHz</th><th>>3GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>½·δ·ln(2)±0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx Area , Δy Area</td><td>≤ 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="7">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2" rowspan="3">uniform grid: Δz Zoom (n)</td><td rowspan="3">≤ 5 mm</td><td>3–4 GHz: ≤ 4 mm</td></tr>
<tr><td>4–5 GHz: ≤ 3 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="4">graded grid</td><td rowspan="3">Δz Zoom (1): between 1st two points closest to phantom surface</td><td rowspan="3">≤ 4 mm</td><td>3–4 GHz: ≤ 3 mm</td></tr>
<tr><td>4–5 GHz: ≤ 2.5 mm</td></tr>
<tr><td>5–6 GHz: ≤ 2 mm</td></tr>
<tr><td>Δz Zoom (n>1): between subsequent points</td><td colspan="2">≤ 1.5·Δz Zoom (n-1)</td></tr>
<tr><td rowspan="3">Minimum zoom scan volume</td><td colspan="2" rowspan="3">x, y, z</td><td rowspan="3">≥30 mm</td><td>3–4 GHz: ≥ 28 mm</td></tr>
<tr><td>4–5 GHz: ≥ 25 mm</td></tr>
<tr><td>5–6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note:
1. δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
2. * When zoom scan is required and the reported SAR from the area scan based 1 g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

7.3 Measurement Procedure

The following steps are used for each test position

a. Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface

b. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.

c. Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.

d. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 *32 mm is assessed by measuring 5 or 8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

7.4 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan andzoom scan resolution setting follows KDB 865664 D01v01r03 quoted below.

When the 1 g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for otherpeaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

8 CONDUCTED RF OUPUT POWER

GSM						
GSM 850 Band	Burst Average Power(dBm)			Frame-averaged power(dBm)		
Channel	128	190	251	128	190	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
GSM (GMSK, 1-Slot)	34.12	34.18	34.29	25.12	25.18	**25.29**
GPRS (GMSK, 1-Slot)	33.88	34.16	34.20	24.88	25.16	25.20
GPRS (GMSK, 2-Slots)	32.35	32.61	32.48	26.35	26.61	26.48
GPRS (GMSK, 3-Slots)	31.04	30.99	30.86	26.78	26.73	26.6
GPRS (GMSK, 4-Slots)	29.42	29.30	29.11	**26.42**	26.30	26.11
EGPRS (8PSK, 1-Slot)	31.53	31.51	31.45	22.53	22.51	22.45
EGPRS (8PSK, 2-Slots)	31.42	31.41	31.34	25.42	25.41	25.34
EGPRS (8PSK, 3-Slots)	28.38	28.40	28.37	24.12	24.14	24.11
EGPRS (8PSK, 4-Slots)	28.27	28.29	28.28	25.27	**25.29**	25.28
GSM 1900 Band	Burst Average Power(dBm)			Frame-averaged power(dBm)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM (GMSK, 1-Slot)	30.67	30.63	30.69	21.67	21.63	**21.69**
GPRS (GMSK, 1-Slot)	30.90	30.90	30.94	21.90	21.90	21.94
GPRS (GMSK, 2-Slots)	28.33	28.25	28.39	22.33	22.25	22.39
GPRS (GMSK, 3-Slots)	27.16	27.08	27.35	22.90	22.82	23.09
GPRS (GMSK, 4-Slots)	25.63	25.47	25.74	22.63	22.47	**22.74**
EGPRS (8PSK, 1-Slot)	29.41	29.43	29.47	20.41	20.43	20.47
EGPRS (8PSK, 2-Slots)	29.33	28.24	29.33	23.33	22.24	23.33
EGPRS (8PSK, 3-Slots)	27.21	27.10	27.28	22.95	22.84	23.02
EGPRS (8PSK, 4-Slots)	26.18	26.09	26.31	23.18	23.09	**23.31**

Note:

1. SAR testing was performed on the maximum frame-averaged power mode.
2. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
   Frame-averaged power = Burst averaged power (1 Tx Slot) - 9 dB
   Frame-averaged power = Burst averaged power (2 Tx Slots) - 6 dB
   Frame-averaged power = Burst averaged power (3 Tx Slots) - 4.26 dB
   Frame-averaged power = Burst averaged power (4 Tx Slots) - 3 dB

WCDMA						
Band	Band 2			Band 5		
Channel	9263	9400	9537	4133	4175	4232
Frequency (MHz)	1852.6	1880.0	1907.4	826.6	835	846.4
RMC 12.2Kbps	**23.72**	23.71	23.66	23.23	**23.29**	23.28
HSDPA Subtest-1	22.57	22.62	22.49	22.25	22.23	22.24
HSDPA Subtest-2	22.32	22.53	22.51	22.04	22.23	22.24
HSDPA Subtest-3	21.99	22.01	21.75	21.78	21.85	21.53
HSDPA Subtest-4	21.95	22.01	22.00	21.54	21.84	21.83
HSUPA Subtest-1	21.97	21.84	21.92	21.97	21.92	21.90
HSUPA Subtest-2	20.83	21.39	21.33	20.72	20.73	21.32
HSUPA Subtest-3	21.18	21.01	21.50	21.29	21.22	21.22
HSUPA Subtest-4	21.80	21.67	21.33	21.13	21.81	21.76
HSUPA Subtest-5	22.37	22.46	22.52	22.20	22.21	22.24

LTE Band 4							
Bandwidth (MHz)	RB Set	Power (dBm)					
		QPSK			16QAM		
20 MHz	Channel	20050	20175	20300	20050	20175	20300
	1 (RB_Pos:0)	**22.67**	22.54	22.51	21.65	21.54	21.59
	1 (RB_Pos:50)	22.60	22.51	22.38	21.61	21.45	21.45
	1 (RB_Pos:99)	22.49	22.50	22.29	21.42	21.51	21.33
	50 (RB_Pos:0)	21.48	21.44	21.51	20.44	20.39	20.50
	50 (RB_Pos:25)	21.51	21.52	21.37	20.47	20.42	20.34
	50 (RB_Pos:50)	21.41	21.46	21.19	20.36	20.42	20.22
	100 (RB_Pos:0)	21.47	21.58	21.33	20.43	20.56	20.46
15 MHz	Channel	20025	20175	20325	20025	20175	20325
	1 (RB_Pos:0)	22.53	22.42	22.44	21.18	21.07	21.15
	1 (RB_Pos:38)	22.52	22.38	22.32	21.08	21.03	20.99
	1 (RB_Pos:74)	22.46	22.52	22.24	20.98	21.01	20.90
	36 (RB_Pos:0)	21.54	21.48	21.34	20.60	20.45	20.48
	36 (RB_Pos:20)	21.47	21.57	21.36	20.47	20.53	20.36
	36 (RB_Pos:39)	21.62	21.49	21.24	20.58	20.51	20.33
	75 (RB_Pos:0)	21.44	21.48	21.33	20.50	20.53	20.41
10 MHz	Channel	20000	20175	20350	20000	20175	20350
	1 (RB_Pos:0)	22.57	22.43	22.31	21.17	20.99	21.01
	1 (RB_Pos:25)	22.46	22.33	22.24	21.01	21.03	20.96
	1 (RB_Pos:49)	22.51	22.41	22.16	21.08	21.09	20.91
	25 (RB_Pos:0)	21.48	21.57	21.40	20.51	20.47	20.43
	25 (RB_Pos:12)	21.50	21.62	21.28	20.48	20.54	20.34
	25 (RB_Pos:25)	21.54	21.55	21.21	20.52	20.48	20.23
	50 (RB_Pos:0)	21.51	21.53	21.21	20.63	20.56	20.27
5 MHz	Channel	19975	20175	20375	19975	20175	20375

	1 (RB_Pos:0)	22.20	21.61	22.26	21.43	21.36	21.24
	1 (RB_Pos:13)	22.27	21.54	22.16	21.37	21.31	21.22
	1 (RB_Pos:24)	22.61	22.49	22.30	21.35	21.39	21.31
	12 (RB_Pos:0)	22.50	22.41	21.25	20.61	20.57	20.36
	12 (RB_Pos:6)	22.49	22.50	21.27	20.58	20.62	20.37
	12 (RB_Pos:13)	21.64	21.60	21.26	20.54	20.52	20.31
	25 (RB_Pos:0)	21.50	21.59	21.28	20.57	20.61	20.40
3 MHz	Channel	19965	20175	20385	19965	20175	20385
	1 (RB_Pos:0)	22.66	22.47	22.20	21.18	21.12	20.91
	1 (RB_Pos:8)	22.47	22.42	22.27	21.05	21.03	20.93
	1 (RB_Pos:14)	22.52	22.45	22.28	21.12	21.03	20.96
	8 (RB_Pos:0)	21.63	21.63	21.25	20.65	20.62	20.38
	8 (RB_Pos:3)	21.67	21.70	21.26	20.69	20.61	20.35
	8 (RB_Pos:7)	21.51	21.55	21.40	20.58	20.56	20.50
	15 (RB_Pos:0)	21.68	21.63	21.34	20.73	20.64	20.43
1.4 MHz	Channel	19957	20175	20393	19957	20175	20393
	1 (RB_Pos:0)	22.69	22.63	22.37	21.40	21.37	20.87
	1 (RB_Pos:3)	22.66	22.46	22.32	21.44	21.21	20.94
	1 (RB_Pos:5)	22.68	22.49	22.37	21.44	21.30	20.91
	3 (RB_Pos:0)	22.66	22.68	22.31	21.56	21.55	21.53
	3 (RB_Pos:1)	22.67	22.68	22.37	21.52	21.57	21.60
	3 (RB_Pos:3)	22.64	22.54	22.37	21.53	21.48	21.53
	6 (RB_Pos:0)	21.61	21.66	21.41	20.79	20.73	20.60

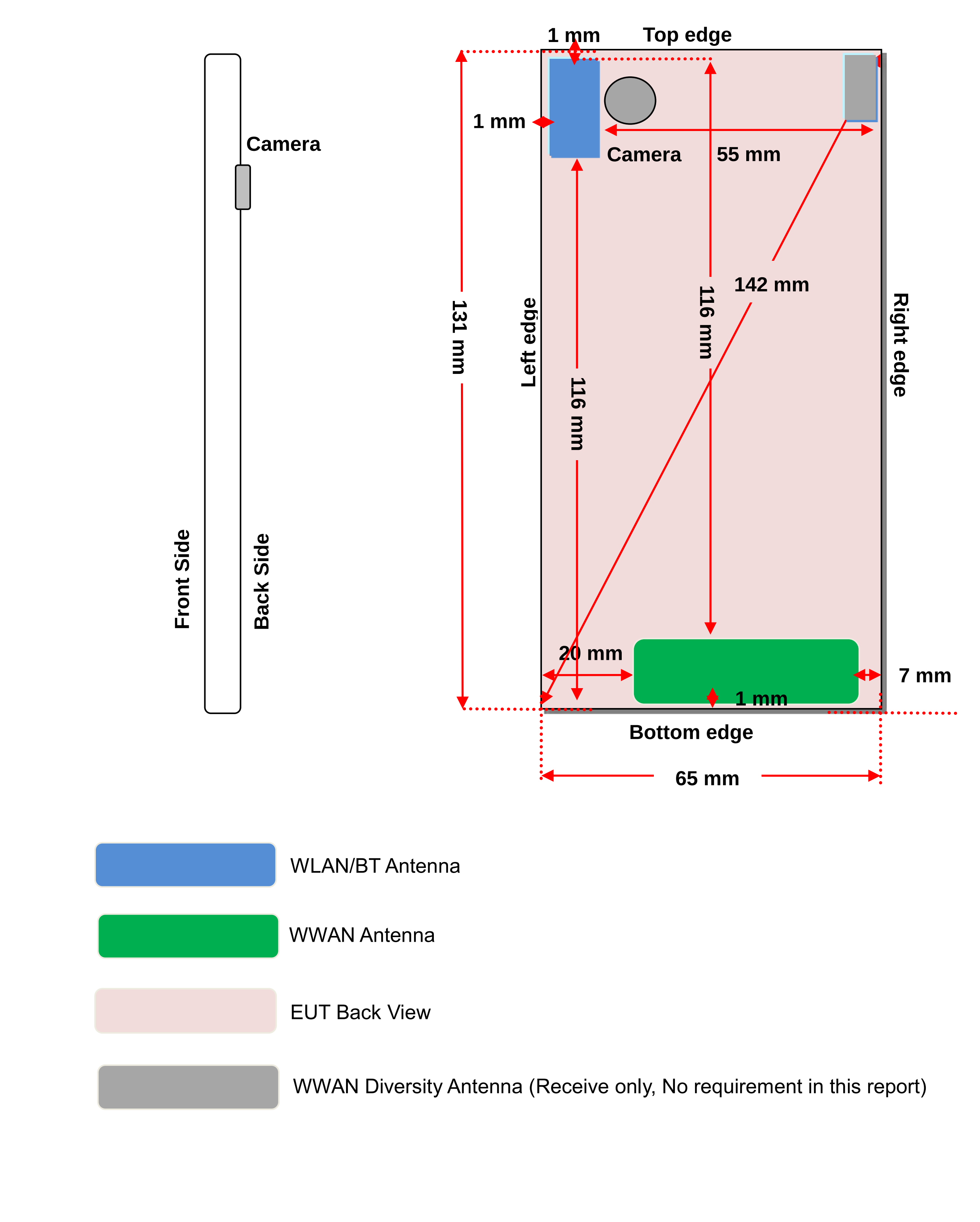
LTE Band 7							
Bandwidth (MHz)	RB Set	Power (dBm)					
		QPSK			16QAM		
20 MHz	Channel	20850	21100	21350	20850	21100	21350
	1 (RB_Pos:0)	22.43	22.60	22.41	19.99	21.76	21.43
	1 (RB_Pos:50)	22.62	22.59	22.53	21.61	20.99	21.78
	1 (RB_Pos:99)	**22.64**	22.35	22.23	21.70	21.42	21.24
	50 (RB_Pos:0)	21.49	21.54	21.52	20.41	20.49	20.33
	50 (RB_Pos:25)	21.50	21.49	21.46	20.43	20.47	20.37
	50 (RB_Pos:50)	21.46	21.46	21.29	20.40	20.42	20.30
	100 (RB_Pos:0)	21.53	21.51	21.29	20.48	20.50	20.43
15 MHz	Channel	20825	21100	21375	20825	21100	21375
	1 (RB_Pos:0)	22.33	22.51	22.51	20.96	21.20	21.01
	1 (RB_Pos:38)	22.45	22.49	22.51	21.05	21.17	21.02
	1 (RB_Pos:74)	22.57	22.42	22.38	21.32	20.64	20.84
	36 (RB_Pos:0)	21.43	21.49	21.32	20.41	20.51	20.53
	36 (RB_Pos:20)	21.46	21.51	21.34	20.43	20.49	20.38
	36 (RB_Pos:39)	21.64	21.61	21.14	20.50	20.52	20.30
	75 (RB_Pos:0)	21.39	21.48	21.23	20.37	20.48	20.31
10 MHz	Channel	20800	21100	21400	20800	21100	21400

	1 (RB_Pos:0)	22.42	22.62	22.52	18.70	21.22	21.14
	1 (RB_Pos:25)	22.31	22.55	22.35	20.91	21.14	20.97
	1 (RB_Pos:49)	22.50	22.51	22.26	21.04	21.10	20.86
	25 (RB_Pos:0)	21.37	21.57	21.42	20.34	20.53	20.36
	25 (RB_Pos:12)	21.48	21.58	21.36	20.38	20.54	20.39
	25 (RB_Pos:25)	21.58	21.54	21.23	19.62	20.55	20.33
	50 (RB_Pos:0)	21.39	21.53	21.29	20.34	20.41	20.23
5 MHz	Channel	20775	21100	21425	20775	21100	21425
	1 (RB_Pos:0)	22.41	22.64	22.26	21.34	21.55	21.21
	1 (RB_Pos:13)	22.46	22.61	22.32	21.32	21.47	21.27
	1 (RB_Pos:24)	22.38	22.58	22.28	21.32	21.49	21.25
	12 (RB_Pos:0)	21.43	21.55	21.38	20.42	20.54	20.37
	12 (RB_Pos:6)	21.35	21.54	21.41	20.39	20.55	20.32
	12 (RB_Pos:13)	21.49	21.56	21.21	20.44	20.59	20.31
	25 (RB_Pos:0)	21.36	21.54	21.27	20.33	20.52	20.27

WLAN 2.4G						
Mode	802.11b			802.11g		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak Power (dBm)	15.60	16.10	16.00	14.60	15.10	15.20
Average Power (dBm)	14.34	**15.24**	14.44	13.65	14.55	13.95
Mode	802.11n(HT-20)			802.11n(HT-40)		
Channel	1	6	11	3	6	9
Frequency (MHz)	2412	2437	2462	2422	2437	2452
Peak Power (dBm)	14.80	15.10	15.10	17.60	18.50	18.60
Average Power (dBm)	13.93	14.83	14.33	17.06	17.46	**17.76**

BLUETOOTH						
Mode	GFSK			π/4-DQPSK		
Channel	0	39	78	0	39	78
Frequency (MHz)	2402	2441	2480	2402	2441	2480
Peak Power (dBm)	10.18	10.81	9.44	10.34	10.88	9.52
Mode	8-DPSK			BLE		
Channel	0	39	78	0	19	39
Frequency (MHz)	2402	2441	2480	2402	2440	2480
Peak Power (dBm)	10.54	**11.12**	9.78	1.05	2.81	0.94

9 TEST EXCLUSION CONSIDERATION



9.1 SAR Test Exclusion Consideration Table

According with FCC KDB 447498 D01v05r02, Appendix A, <SAR Test Exclusion Thresholds for 100 MHz－6 GHz and ≤ 50 mm> Table, this Device SAR test configurations consider as following :

Band	Mode	Max. Peak Power		Test Position Configurations					
		dBm	mW	Head	Front/ Back	Left Edge	Right Edge	Top Edge	Bottom Edge
GSM 850	Distance to User			<5mm	<5mm	20mm	7mm	116mm	<5mm
	Voice	34.29	2685.34	Yes	Yes	Yes	Yes	No	Yes
	Data	29.42	874.98	No	Yes	Yes	Yes	No	Yes
GSM 1900	Distance to User			<5mm	<5mm	20mm	7mm	116mm	<5mm
	Voice	30.69	1172.20	Yes	Yes	Yes	Yes	No	Yes
	Data	26.31	427.56	No	Yes	Yes	Yes	No	Yes
WCDMA Band 2	Distance to User			<5mm	<5mm	20mm	7mm	116mm	<5mm
	RMC	23.72	235.50	Yes	Yes	Yes	Yes	No	Yes
WCDMA Band 5	Distance to User			<5mm	<5mm	20mm	7mm	116mm	<5mm
	RMC	23.29	213.30	Yes	Yes	Yes	Yes	No	Yes
LTE Band 4	Distance to User			<5mm	<5mm	20mm	7mm	116mm	<5mm
	VOIP	22.67	467.74	Yes	Yes	Yes	Yes	No	Yes
LTE Band 7	Distance to User			<5mm	<5mm	20mm	7mm	116mm	<5mm
	VOIP	22.53	176.06	Yes	Yes	Yes	Yes	No	Yes
WLAN 2.4 G	Distance to User			<5mm	<5mm	<5mm	55mm	<5mm	116mm
	802.11b	16.1	40.74	Yes	Yes	Yes	No	Yes	No
	802.11g	15.2	33.11	No	No	No	No	No	No
	802.11n(HT20)	15.1	32.36	No	No	No	No	No	No
	802.11n(HT40)	18.6	72.44	Yes	Yes	Yes	No	Yes	No
Bluetooth	Distance to User			<5mm	<5mm	<5mm	55mm	<5mm	116mm
	BT	11.12	12.94	Yes	Yes	Yes	No	Yes	No

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
2. Per KDB 447498 D01v05r02, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D01v05r02, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
   [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   a. f(GHz) is the RF channel transmit frequency in GHz
   b. Power and distance are rounded to the nearest mW and mm before calculation
   c. The result is rounded to one decimal place for comparison
   d. For < 50 mm distance, we just calculate mW of the exclusion threshold value (3.0) to do compare.
   This formula is [3.0] / [√f(GHz)] ·[(min. test separation distance, mm)] = exclusion threshold of mW.
5. Per KDB 447498 D01v05r02, at 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test

exclusion threshold is determined according to the following

a. [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz

b. [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

6. Per KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA /HSUPA /DC-HSDPA output power is < 0.25dB higher than RMC12.2Kbps, or reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA/HSUPA/DC-HSDPA SAR evaluation can be excluded.
7. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.8. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate
8. Apply the test exclusion rule in KDB 248227 D01 v01r02 11g, 11n-HT20 and HT40 output power is less than 1/4dB higher than 11b mode, thus the SAR can be excluded.

9.2 10g Extremity Exposure Consideration

According with FCC KDB 648474 D04 v01r02, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance;

The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

Conclusion:

The EUT overall diagonal dimension is 14.2cm, which is less than 16.0 cm, 10 g extremity SAR is not required.

10 TEST RESULT

10.1 Head SAR

Head SAR (1 g Value)

Band	Mode	Position	Ch.	Freq. (MHz)	Power Drift	Meas. SAR (W/Kg)	Meas. Power (dBm)	Max. tune-up Power(dBm)	Scaling Factor	Scaled SAR(W/Kg)	Meas. No.
GSM 850	Voice	Left Cheek	251	848.8	0.12	0.172	34.29	34.40	1.026	0.176	/
		Left Tilt	251	848.8	1.23	0.150	34.29	34.40	1.026	0.154	/
		Right Cheek	251	848.8	-0.05	**0.182**	34.29	34.40	1.026	**0.187**	1#
		Right Tilt	251	848.8	1.22	0.160	34.29	34.40	1.026	0.164	/
GSM 1900	Voice	Left Cheek	810	1909.8	0.17	**0.181**	30.69	30.80	1.026	**0.186**	2#
		Left Tilt	810	1909.8	0.56	0.104	30.69	30.80	1.026	0.107	/
		Right Cheek	810	1909.8	-2.33	0.140	30.69	30.80	1.026	0.144	/
		Right Tilt	810	1909.8	2.10	0.105	30.69	30.80	1.026	0.108	/
WCDMA Band 2	RMC	Left Cheek	9263	1852.6	-0.14	**0.351**	23.72	23.80	1.019	**0.358**	3#
		Left Tilt	9263	1852.6	3.02	0.313	23.72	23.80	1.019	0.319	/
		Right Cheek	9263	1852.6	-2.55	0.328	23.72	23.80	1.019	0.334	/
		Right Tilt	9263	1852.6	2.10	0.312	23.72	23.80	1.019	0.318	/
WCDMA Band 5	RMC	Left Cheek	4175	835	1.35	0.127	23.29	23.40	1.026	0.130	/
		Left Tilt	4175	835	-2.33	0.121	23.29	23.40	1.026	0.124	/
		Right Cheek	4175	835	0.56	**0.136**	23.29	23.40	1.026	**0.139**	4#
		Right Tilt	4175	835	0.98	0.125	23.29	23.40	1.026	0.128	/
LTE Band 4 20MHz 1 RB Pos: 0	VOIP	Left Cheek	20050	1720	0.32	0.254	22.67	22.80	1.030	0.262	/
		Left Tilt	20050	1720	-0.25	0.235	22.67	22.80	1.030	0.242	/
		Right Cheek	20050	1720	-0.18	**0.262**	22.67	22.80	1.030	**0.270**	5#
		Right Tilt	20050	1720	1.22	0.233	22.67	22.80	1.030	0.240	/
LTE Band 7 20MHz 1 RB Pos: 99	VOIP	Left Cheek	20850	2510	-0.66	**0.365**	22.64	22.90	1.062	**0.388**	6#
		Left Tilt	20850	2510	-2.69	0.309	22.64	22.90	1.062	0.328	/
		Right Cheek	20850	2510	1.02	0.247	22.64	22.90	1.062	0.262	/
		Right Tilt	20850	2510	0.98	0.228	22.64	22.90	1.062	0.242	/
802.11b	DATA	Left Cheek	6	2437	0.29	**0.468**	16.10	16.20	1.023	**0.479**	7#
		Left Tilt	6	2437	-0.69	0.446	16.10	16.20	1.023	0.456	/
		Right Cheek	6	2437	3.65	0.229	16.10	16.20	1.023	0.234	/
		Right Tilt	6	2437	-3.10	0.219	16.10	16.20	1.023	0.224	/
802.11n （HT40）	DATA	Left Cheek	9	2452	0.32	0.715	18.60	18.70	1.023	0.731	/
		Left Tilt	9	2452	-1.23	0.668	18.60	18.70	1.023	0.683	/
		Right Cheek	9	2452	-0.14	**0.723**	18.60	18.70	1.023	**0.740**	8#
		Right Tilt	9	2452	0.96	0.689	18.60	18.70	1.023	0.705	/
BT 8PSK	DATA	Left Cheek	39	2441	-0.32	0.017	11.12	11.20	1.019	0.017	9#
		Left Tilt	39	2441	1.02	0.012	11.12	11.20	1.019	0.012	/
		Right Cheek	39	2441	0.66	**0.021**	11.12	11.20	1.019	**0.021**	/
		Right Tilt	39	2441	0.68	0.016	11.12	11.20	1.019	0.016	/

10.2 Body-worn and Hotspot Mode SAR (10mm Separation)

Band	Mode	Position	Ch.	Freq. (MHz)	Power Drift	Meas. SAR (W/Kg)	Meas. Power (dBm)	Max. tune-up Power(dBm)	Scaling Factor	Scaled SAR(W/Kg)	Meas. No.
GSM 850	Voice (Body-worn)	Front Side	251	848.8	0.89	0.301	34.29	34.40	1.026	0.309	/
		Back Side	251	848.8	0.20	0.548	34.29	34.40	1.026	0.562	/
		Left Edge	251	848.8	-0.35	0.107	34.29	34.40	1.026	0.110	/
		Right Edge	251	848.8	1.23	0.118	34.29	34.40	1.026	0.121	/
		BottomEdge	251	848.8	1.25	0.095	34.29	34.40	1.026	0.097	/
	GPRS Data (Hotspot) Slot 4	Front Side	128	824.2	-3.65	0.391	29.42	29.50	1.019	0.398	/
		Back Side	128	824.2	-0.16	**0.588**	29.42	29.50	1.019	**0.599**	10#
		Left Edge	128	824.2	3.02	0.123	29.42	29.50	1.019	0.125	/
		Right Edge	128	824.2	-1.59	0.201	29.42	29.50	1.019	0.205	/
		BottomEdge	128	824.2	2.63	0.130	29.42	29.50	1.019	0.132	/
	EDGE Data (Hotspot) Slot 4	Front Side	190	836.6	-1.68	0.348	28.29	28.40	1.026	0.357	/
		Back Side	190	836.6	0.05	0.549	28.29	28.40	1.026	0.563	/
		Left Edge	190	836.6	0.69	0.192	28.29	28.40	1.026	0.197	/
		Right Edge	190	836.6	1.95	0.171	28.29	28.40	1.026	0.175	/
		BottomEdge	190	836.6	-2.36	0.107	28.29	28.40	1.026	0.110	/
GSM 1900	Voice (Body-worn)	Front Side	810	1909.8	0.88	0.368	30.69	30.80	1.026	0.377	/
		Back Side	810	1909.8	-2.33	0.484	30.69	30.80	1.026	0.496	/
		Left Edge	810	1909.8	0.99	0.068	30.69	30.80	1.026	0.070	/
		Right Edge	810	1909.8	-1.36	0.115	30.69	30.80	1.026	0.118	/
		BottomEdge	810	1909.8	-0.08	**0.498**	30.69	30.80	1.026	**0.511**	11#
	GPRS Data (Hotspot) Slot 4	Front Side	810	1909.8	0.36	0.329	25.74	25.80	1.014	0.334	/
		Back Side	810	1909.8	0.02	0.459	25.74	25.80	1.014	0.465	/
		Left Edge	810	1909.8	0.98	0.095	25.74	25.80	1.014	0.096	/
		Right Edge	810	1909.8	-0.35	0.082	25.74	25.80	1.014	0.083	/
		BottomEdge	810	1909.8	0.68	0.423	25.74	25.80	1.014	0.429	/
	EDGE Data (Hotspot) Slot 4	Front Side	810	1909.8	-1.35	0.256	26.31	26.40	1.021	0.261	/
		Back Side	810	1909.8	-0.07	0.280	26.31	26.40	1.021	0.286	/
		Left Edge	810	1909.8	1.36	0.059	26.31	26.40	1.021	0.060	/
		Right Edge	810	1909.8	2.63	0.109	26.31	26.40	1.021	0.111	/
		BottomEdge	810	1909.8	-3.02	0.230	26.31	26.40	1.021	0.235	/
WCDMA Band 2	RMC (Body-Worn and hotspot)	Front Side	9263	1852.6	1.02	0.494	23.72	23.80	1.019	0.503	/
		Back Side	9263	1852.6	-0.89	0.539	23.72	23.80	1.019	**0.549**	/
		Left Edge	9263	1852.6	-0.35	0.196	23.72	23.80	1.019	0.200	/
		Right Edge	9263	1852.6	1.35	0.257	23.72	23.80	1.019	0.262	/
		BottomEdge	9263	1852.6	0.01	**0.875**	23.72	23.80	1.019	0.891	12#
WCDMA Band 5	RMC (Body-Worn and hotspot)	Front Side	4175	835	1.02	0.161	23.29	23.40	1.026	0.165	/
		Back Side	4175	835	0.99	**0.324**	23.29	23.40	1.026	**0.332**	13#
		Left Edge	4175	835	2.33	0.057	23.29	23.40	1.026	0.058	/
		Right Edge	4175	835	-2.65	0.028	23.29	23.40	1.026	0.029	/
		BottomEdge	4175	835	1.23	0.042	23.29	23.40	1.026	0.043	/
LTE	VOIP	Front Side	20050	1720	-1.65	0.190	22.67	22.80	1.030	0.196	/

Band 4 20MHz 1 RB Pos: 0	(Body-Worn and hotspot)	Back Side	20050	1720	3.86	0.222	22.67	22.80	1.030	0.229	/
		Left Edge	20050	1720	-2.68	0.096	22.67	22.80	1.030	0.099	/
		Right Edge	20050	1720	0.36	0.211	22.67	22.80	1.030	0.217	/
		BottomEdge	20050	1720	-0.02	**0.283**	22.67	22.80	1.030	**0.292**	14#
LTE Band 7 20MHz 1 RB Pos: 99	VOIP (Body-Worn and hotspot)	Front Side	20850	2510	2.59	0.573	22.64	22.90	1.062	0.608	/
		Back Side	20850	2510	-0.36	0.695	22.64	22.90	1.062	0.738	/
		Left Edge	20850	2510	1.15	0.338	22.64	22.90	1.062	0.359	/
		Right Edge	20850	2510	0.69	0.113	22.64	22.90	1.062	0.120	/
		BottomEdge	20850	2510	0.03	**1.130**	22.64	22.90	1.062	**1.200**	15#
802.11b	DATA (Hotspot)	Front Side	6	2437	-1.09	0.076	16.10	16.20	1.023	0.078	/
		Back Side	6	2437	0.20	**0.077**	16.10	16.20	1.023	**0.079**	16#
		Left Edge	6	2437	0.68	0.045	16.10	16.20	1.023	0.046	/
		Top Edge	6	2437	-2.36	0.047	16.10	16.20	1.023	0.048	/
802.11n （HT40）	DATA (Hotspot)	Front Side	9	2452	0.65	0.024	18.60	18.70	1.023	0.025	/
		Back Side	9	2452	-0.07	**0.281**	18.60	18.70	1.023	**0.287**	17#
		Left Edge	9	2452	-2.35	0.113	18.60	18.70	1.023	0.116	/
		Top Edge	9	2452	1.35	0.184	18.60	18.70	1.023	0.188	/
BT 8-DPSK	DATA (Hotspot)	Front Side	39	2441	2.68	0.058	11.12	11.20	1.019	0.059	18#
		Back Side	39	2441	0.65	**0.062**	11.12	11.20	1.019	**0.063**	/
		Left Edge	39	2441	1.23	0.042	11.12	11.20	1.019	0.043	/
		Top Edge	39	2441	-2.35	0.048	11.12	11.20	1.019	0.049	/
Additional Channels											
WCDMA Band 2	RMC (Body-Worn and hotspot)	BottomEdge	9400	1880	0.02	0.762	23.71	23.80	1.021	0.778	19#
		BottomEdge	9537	1907.4	-0.20	0.736	23.66	23.80	1.033	0.760	20#
LTE Band 7 20MHz 1 RB Pos: 0	VOIP (Body-Worn and hotspot)	BottomEdge	21100	2535	-0.07	1.01	22.60	22.90	1.072	1.082	21#
LTE Band 7 20MHz 1 RB Pos: 50		BottomEdge	21350	2560	0.06	1.07	22.53	22.90	1.089	1.165	22#

10.3 SAR Measurement Variability

According to KDB 865664 D01 v01r03, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is >= 0.80 W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20, or when the original or repeated measurement is >= 1.45 W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20, and the original, first or second repeated measurement is >= 1.5 W/kg, perform a third repeated measurement.

SAR Repeated Measurement

Band	Mode	Position	Ch.	Freq.	Original	First repeated	Ratio	Second repeated	Ratio	Third repeated	Ratio
WCDMA Band 2	RMC (Body-Worn and hotspot)	Bottom Edge	9263	1852.6	0.875	0.827	1.06	--	--	--	--
LTE Band 7 20MHz 1RB Pos: 99	VOIP (Body-Worn and hotspot)	Bottom Edge	20850	2510	1.130	1.100	1.03	--	--	--	--
LTE Band 7 20MHz 1RB Pos: 0	VOIP (Body-Worn and hotspot)	Bottom Edge	21100	2535	1.01	1.030	1.02	--	--	--	--
LTE Band 7 20MHz 1RB Pos: 50	VOIP (Body-Worn and hotspot)	Bottom Edge	21350	2560	1.07	1.050	1.02	--	--	--	--

11 SIMULTANEOUS TRANSMISSION

11.1 Simultaneous Transmission Mode Consideration

Simultaneous Transmitting (Yes/NO)	BT	WLAN	LTE VOIP	WCDMA RMC	GSM Data	GSM Voice
GSM Voice	Yes	Yes	NO	NO	NO	-
GSM Data	Yes	Yes	NO	NO	-	-
WCDMA RMC	Yes	Yes	NO	-		-
LTE	Yes	Yes	-	-		
WLAN	NO	-	-	-	-	-
BT	-	-	-	-	-	-
Note: The BT and WLAN share the same antenna, cannot transmitting together.						

11.2 Sum SAR of Simultaneous Transmission

Simultaneous Mode	**Position**	**Mode**	**Max. 1 g SAR (W/kg)**	**1 g Sum SAR (W/kg)**
GSM Voice + BT	Head	GSM Voice	0.187	0.208
		BT	0.021	
	Body-worn	GSM Voice	0.562	0.625
		BT	0.063	
GSM DATA + BT	Hotspot Mode	GSM DATA	0.599	0.662
		BT	0.063	
GSM Voice + WLAN	Head	GSM Voice	0.187	0.927
		WLAN	0.740	
	Body-worn	GSM Voice	0.562	0.849
		WLAN	0.287	
GSM DATA + WLAN	Hotspot Mode	GSM DATA	0.599	0.883
		WLAN	0.287	
WCDMA RMC + BT	Head	WCDMA RMC	0.358	0.379
		BT	0.021	
	Body-worn Hotspot	WCDMA RMC	0.891	0.954
		BT	0.063	
WCDMA RMC + WLAN	Head	WCDMA RMC	0.358	1.098
		WLAN	0.740	
	Body-worn Hotspot	WCDMA RMC	0.891	1.178
		WLAN	0.287	
LTE VOIP + BT	Head	LTE VOIP	0.388	0.409
		BT	0.021	
	Body-worn Hotspot	LTE VOIP	1.200	1.263
		BT	0.063	
LTE VOIP + WLAN	Head	LTE VOIP	0.388	1.128
		WLAN	0.740	

	Body-worn	LTE VOIP	1.200	1.487
	Hotspot	WLAN	0.287	

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR 1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR 1g 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR 1g is greater than the SAR limit (SAR 1g 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

12 TEST EQUIPMENTS LIST

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
PC	Dell	N/A	N/A	N/A	N/A
835MHz Validation Dipole	Speag	D835V2	SN: 4d187	2014/11/26	2015/11/25
1750MHz Validation Dipole	Speag	D1750V2	SN: 1130	2014/11/28	2015/11/27
1900MHz Validation Dipole	Speag	D1900V2	SN: 5d193	2014/11/28	2015/11/27
2450MHz Validation Dipole	Speag	D2450V2	SN: 952	2014/11/27	2015/11/26
2600MHz Validation Dipole	Speag	D2600V2	SN: 1095	2014/11/27	2015/11/26
5G Validation Dipole	Speag	D5GHzV2	SN 1200	2014/12/4	2015/12/3
E-Field Probe	Speag	EX3DV4	SN: 7340	2014/12/02	2015/12/01
Phantom1	Speag	SAM	SN: 1859	N/A	N/A
Phantom2	Speag	SAM	SN: 1857	N/A	N/A
Data acquisition electronics	Speag	DAE4	SN: 1454	2014/12/01	2015/11/30
Signal Generator	R&S	SMF100A	1167.0000k02/104260	2014/07/07	2015/07/06
Power Meter	Agilent	5738A	11290	2014/10/18	2015/10/17
Power Sensor	R&S	NRP-Z21	103971	2014/11/03	2015/11/02
Power Amplifier	SATIMO	6552B	22374	2014/05/16	2015/05/15
Dielectric Probe Kit	SATIMO	SCLMP	SN 25/13 OCPG56	2014/08/17	2015/08/16
Wireless Communication Test Set	Agilent	8960-E5515C	MY50260493	2014/10/18	2015/10/18
Wireless Communications Test Set	R&S	CMW 500	138884	2014.07.07	2015.07.06
Network Analyzer	RS	5071C	EMY46103472	2014/11/03	2015/11/02
Attenuator	COM-MW	ZA-S1-31	1305003187	N/A	N/A
Directional coupler	AA-MCS	AAMCS-UDC	000272	N/A	N/A

ANNEX A SIMULATING LIQUID VERIFICATIONRESULT

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SATIMO SCLMP Dielectric Probe Kit and a RS Network Analyzer.

Date	Liquid Type	Fre. (MHz)	Temp. (℃)	Meas. Conductivity (ζ)	Meas. Permittivity (ε)	Target Conductivity (ζ)	Target Permittivity (ε)	Conductivity Tolerance (%)	Permittivity Tolerance (%)
2015.4.20	Head	835	22.0	0.89	41.50	0.90	41.50	-1.11	0.00
2015.4.20	Body	835	22.0	0.96	55.87	0.97	55.20	-1.03	1.21
2015.4.21	Head	1750	22.0	1.38	40.02	1.37	40.10	0.73	-0.20
2015.4.21	Body	1750	22.0	1.48	53.13	1.49	53.40	-0.67	-0.51
2015.4.23	Head	1900	22.0	1.45	39.75	1.40	40.00	3.57	-0.63
2015.4.23	Body	1900	22.0	1.57	51.05	1.52	53.30	3.29	-4.22
2015.4.27	Head	2450	22.0	1.88	37.97	1.80	39.20	4.44	-3.14
2015.4.27	Body	2450	22.0	2.02	50.71	1.95	52.70	3.59	-3.78
2015.4.24	Head	2600	22.0	1.96	39.01	1.96	39.00	0.00	0.03
2015.4.24	Body	2600	22.0	2.23	50.48	2.16	52.50	3.24	-3.85
Note: The tolerances limit of Conductivity and Permittivity is ± 5%.									

ANNEX B SYSTEM CHECK RESULT

Comparing to the original SAR value provided by SPEAG, the validation data should be within itsspecification of 10 %(for 1 g).

Date	Liquid Type	Freq. (MHz)	Power (mW)	Measured SAR (W/kg)	Normalized SAR (W/kg)	DipoleSAR (W/kg)	Tolerance (%)	Targeted SAR(W/kg)	Tolerance (%)
2015.4.20	Head	835	100	0.935	9.35	9.24	1.19	9.56	-2.20
2015.4.20	Body	835	100	0.896	8.96	9.48	-5.49	9.56	-6.28
2015.4.21	Head	1750	100	3.410	34.10	36.56	-6.73	36.40	-6.32
2015.4.21	Body	1750	100	3.520	35.20	37.56	-6.28	36.40	-3.30
2015.4.23	Head	1900	100	3.790	37.90	40.40	-6.19	39.70	-4.53
2015.4.23	Body	1900	100	4.210	42.10	40.00	5.25	39.70	6.05
2015.4.27	Head	2450	100	5.330	53.30	53.20	0.19	52.40	1.72
2015.4.27	Body	2450	100	4.900	49.00	52.00	-5.77	52.40	-6.49
2015.4.24	Head	2600	100	5.970	59.70	58.40	2.23	55.30	7.96
2015.4.24	Body	2600	100	5.340	53.40	58.00	-7.93	55.30	-3.44
Note: The tolerance limit of System validation ±10%.									

System Performance Check Data (835MHz Head)

835-HEAD-2015-4-20

Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;

Medium parameters used: f = 835 MHz; ζ = 0.89 S/m; ε_r = 41.5; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(9.91, 9.91, 9.91)

Configuration/CW 835 100mW HEAD/Area Scan (61x81x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 31.45 V/m; Power Drift = 0.05 dB

Fast SAR: SAR(1 g) = 0.830 W/kg; SAR(10 g) = 0.554 W/kg

Maximum value of SAR (interpolated) = 0.893 W/kg

Configuration/CW 835 100mW HEAD/Zoom Scan (7x7x7)/Cube 0:

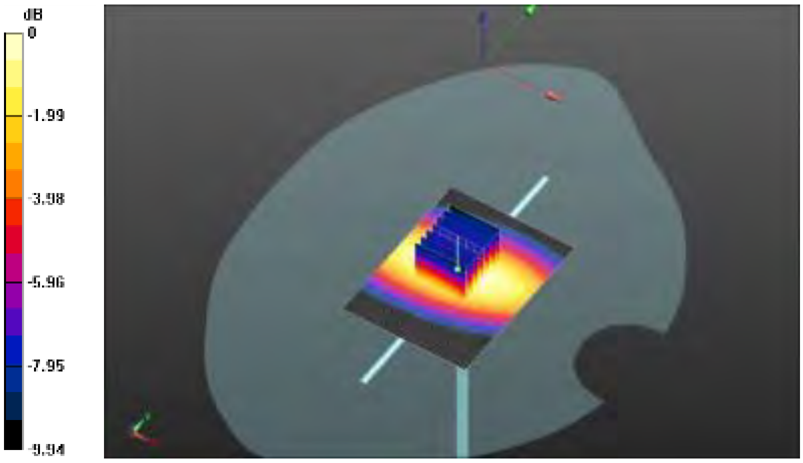
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 31.45 V/m; Power Drift = 0.05 dB

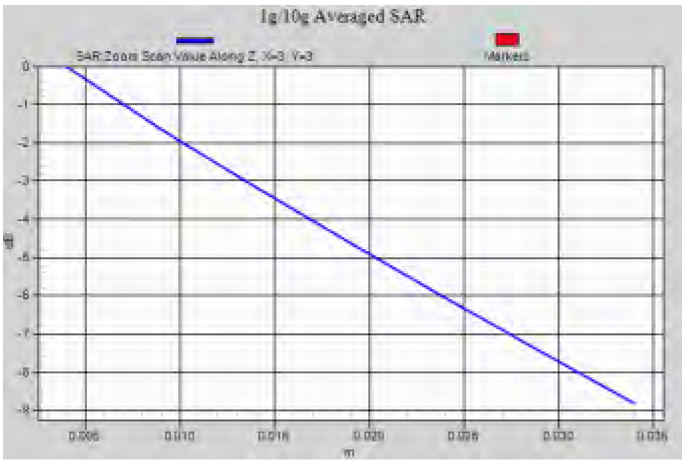
Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.935 W/kg; SAR(10 g) = 0.556 W/kg

Maximum value of SAR (measured) = 0.998 W/kg



0 dB = 0.998 W/kg = -0.009 dBW/kg



System Performance Check Data (835MHz Body)

835-Body-2015-4-20

Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;

Medium parameters used: f = 835 MHz; ζ = 0.96 S/m; ε_r 100 = 55.87; ρ =0 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(9.97, 9.97, 9.97)

Configuration/CW 835 100mW HEAD/Area Scan (61x81x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 31.35 V/m; Power Drift = 0.05 dB

Fast SAR: SAR(1 g) = 0.892 W/kg; SAR(10 g) = 0.595 W/kg

Maximum value of SAR (interpolated) = 0.959 W/kg

Configuration/CW 835 100mW HEAD/Zoom Scan (7x7x7)/Cube 0:

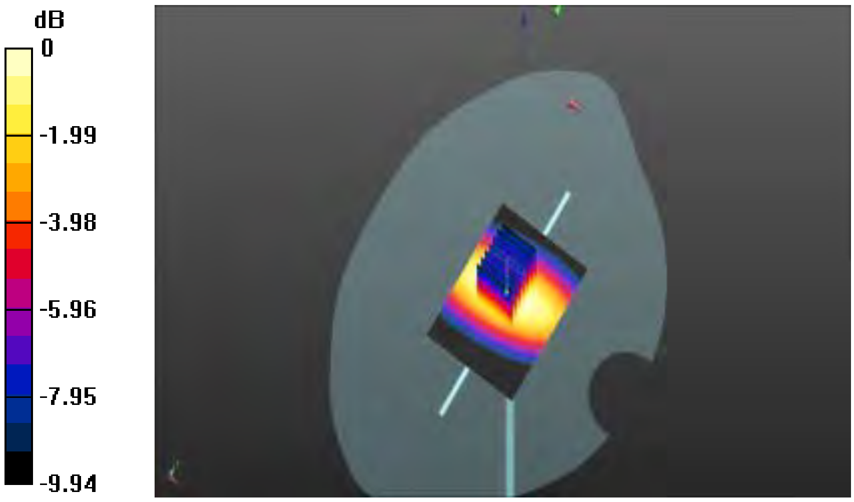
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 31.35 V/m; Power Drift = 0.05 dB

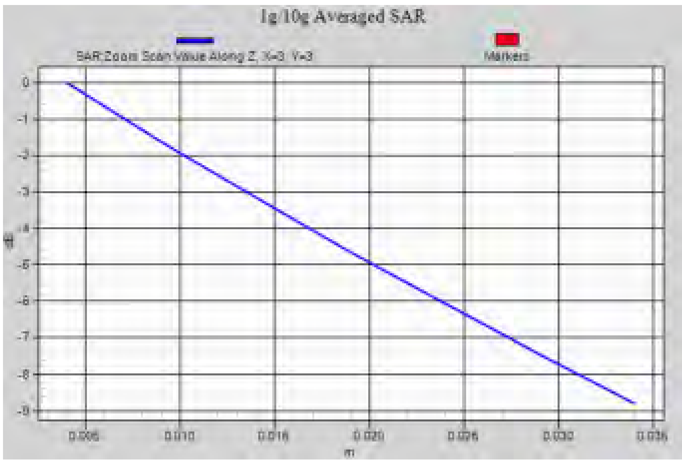
Peak SAR (extrapolated) = 1.32 W/kg

SAR(1 g) = 0.896 W/kg; SAR(10 g) = 0.597 W/kg

Maximum value of SAR (measured) = 0.964 W/kg



0 dB = 0.964 W/kg = -0.16 dBW/kg



System Performance Check Data (1750MHz Head)

1750-HEAD-2015-4-21

Communication System Band: D1750 (1750.0 MHz); Frequency: 1750 MHz;

Medium parameters used: f = 1750 MHz; ζ = 1.38 S/m; ε_r = 40.02; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(9.13, 9.13, 9.13)

Configuration/CW 1750 100mW HEAD/Area Scan (61x81x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 52.32 V/m; Power Drift = 0.04 dB

Fast SAR: SAR(1 g) = 3.42 W/kg; SAR(10 g) = 1.86 W/kg

Maximum value of SAR (interpolated) = 3.90 W/kg

Configuration/CW 1750 100mW HEAD/Zoom Scan (7x7x7)/Cube 0:

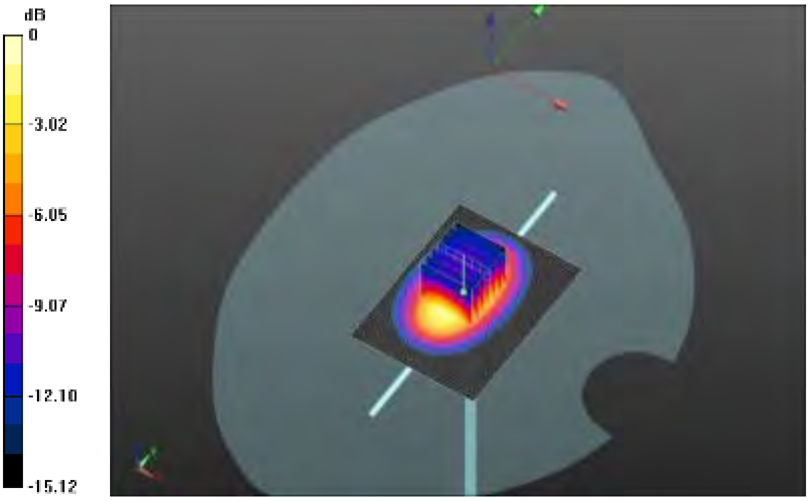
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.32 V/m; Power Drift = 0.04 dB

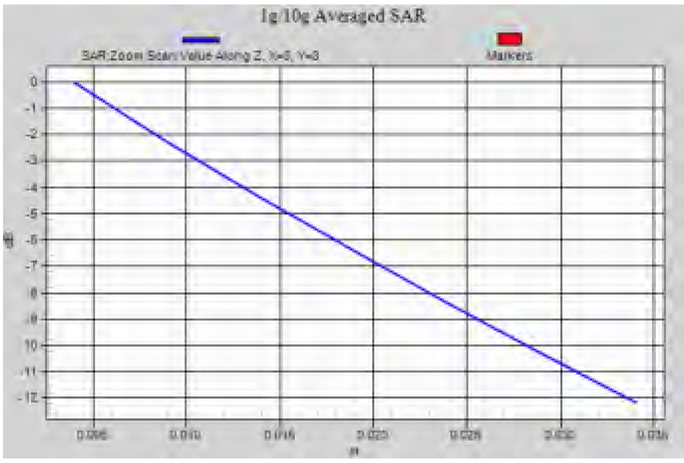
Peak SAR (extrapolated) = 6.00 W/kg

SAR(1 g) = 3.41 W/kg; SAR(10 g) = 1.87 W/kg

Maximum value of SAR (measured) = 3.82 W/kg



0 dB = 3.82 W/kg = 5.82 dBW/kg



System Performance Check Data (1750MHz Body)

1750-BODY-2015-4-21

Communication System Band: D1750 (1750.0 MHz); Frequency: 1750 MHz;

Medium parameters used: f = 1750 MHz; ζ = 1.48 S/m; ε_r = 53.13; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(8.53, 8.53, 8.53)

Configuration/CW1750 100mW BODY/Area Scan (61x81x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 51.45 V/m; Power Drift = 0.01 dB

Fast SAR: SAR(1 g) = 3.56 W/kg; SAR(10 g) = 1.9 W/kg

Maximum value of SAR (interpolated) = 4.12 W/kg

Configuration/CW1750 100mW BODY/Zoom Scan (7x7x7)/Cube 0:

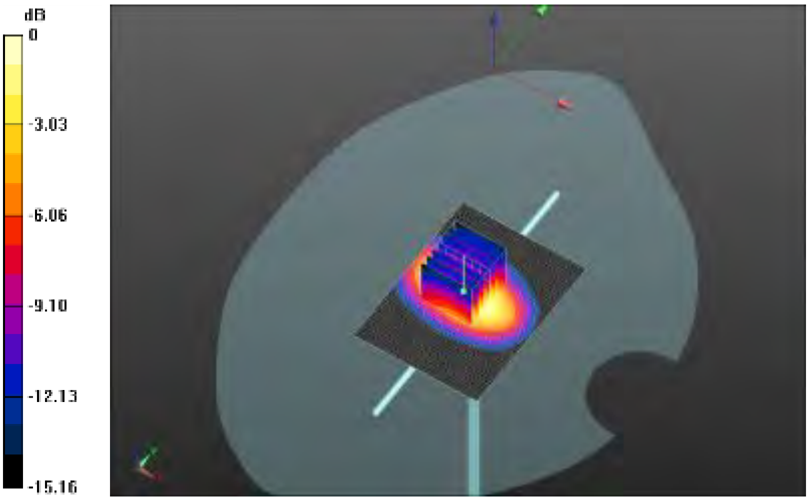
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.45 V/m; Power Drift = 0.01 dB

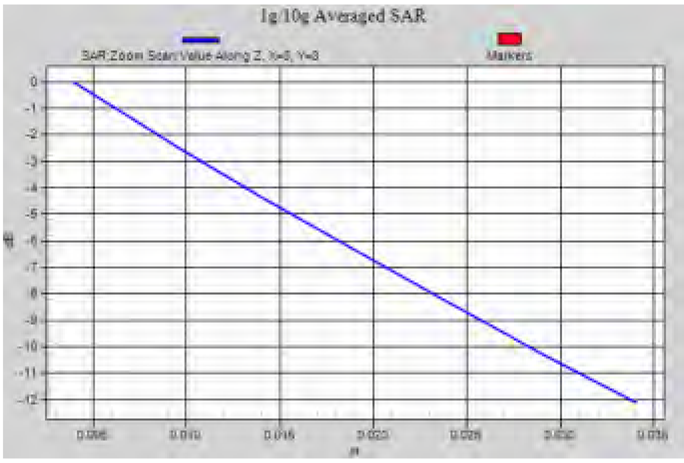
Peak SAR (extrapolated) = 6.15 W/kg

SAR(1 g) = 3.52 W/kg; SAR(10 g) = 1.92 W/kg

Maximum value of SAR (measured) = 3.96 W/kg



0 dB = 3.96 W/kg = 5.98 dBW/kg



System Performance Check Data (1900MHz Head)

1900-HEAD-2015-4-23

Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;

Medium parameters used: f = 1900 MHz; ζ = 1.45 S/m; ε_r = 39.75; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(8.77, 8.77, 8.77)

Configuration/CW 1900 100mW HEAD 2 2 2/Area Scan (61x81x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 54.95 V/m; Power Drift = -0.17 dB

Fast SAR: SAR(1 g) = 3.81 W/kg; SAR(10 g) = 2.01 W/kg

Maximum value of SAR (interpolated) = 4.39 W/kg

Configuration/CW 1900 100mW HEAD 2 2 2/Zoom Scan (7x7x7)/Cube 0:

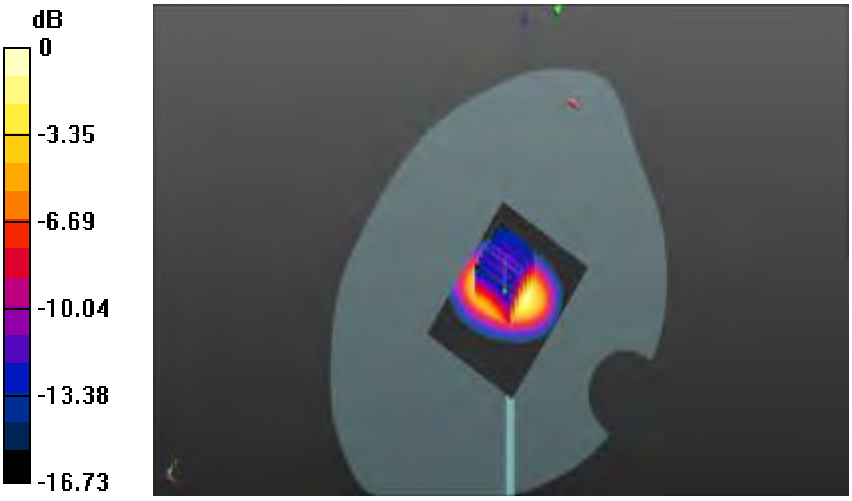
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.95 V/m; Power Drift = -0.17 dB

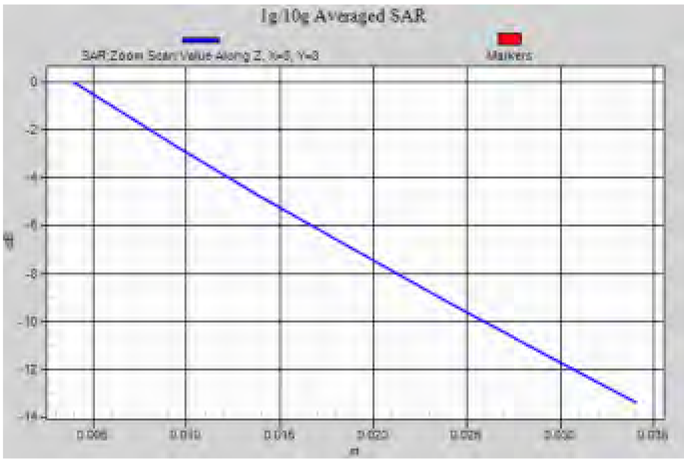
Peak SAR (extrapolated) = 6.91 W/kg

SAR(1 g) = 3.79 W/kg; SAR(10 g) = 2 W/kg

Maximum value of SAR (measured) = 4.26 W/kg



0 dB = 4.26 W/kg = 6.29 dBW/kg



System Performance Check Data (1900MHz Body)

1900-BODY-2015-4-23

Communication System: UID 0, CW (0); Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; ζ = 1.57 S/m; ε_r = 51.05; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(8.18, 8.18, 8.18)

Configuration/CW 1900 100mW BODY/Area Scan (61x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 53.28 V/m; Power Drift = 0.05 dB

Fast SAR: SAR(1 g) = 4.25 W/kg; SAR(10 g) = 2.2 W/kg

Maximum value of SAR (interpolated) = 5.00 W/kg

Configuration/CW 1900 100mW BODY/Zoom Scan (7x7x7)/Cube 0:

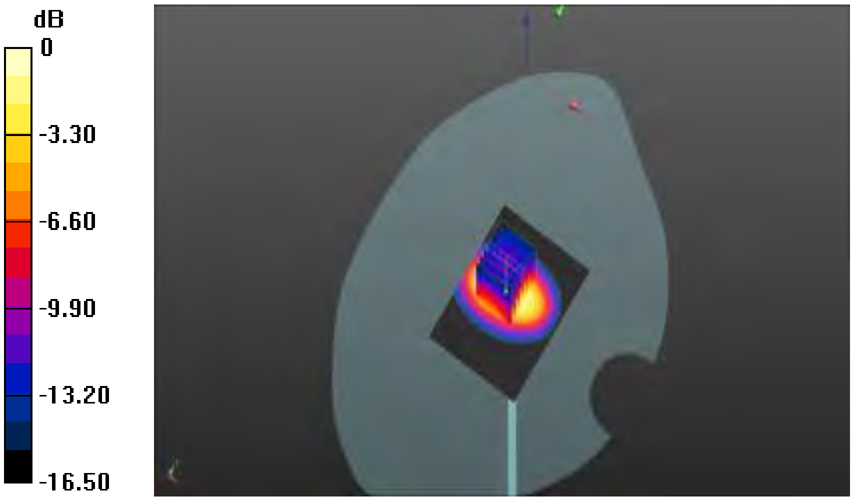
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.28 V/m; Power Drift = 0.05 dB

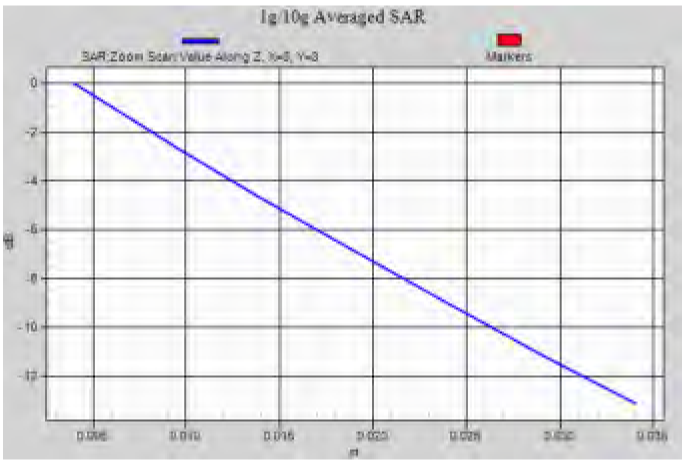
Peak SAR (extrapolated) = 7.69 W/kg

SAR(1 g) = 4.21 W/kg; SAR(10 g) = 2.21 W/kg

Maximum value of SAR (measured) = 4.76 W/kg



0 dB = 4.76 W/kg = 6.78 dBW/kg



System Performance Check Data (2450MHz Head)

2450-HEAD-2015-4-27

Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;

Medium parameters used: f = 2450 MHz; ζ = 1.88 S/m; ε_r = 37.97; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(7.83, 7.83, 7.83)

Configuration/CW 2450 100mW HEAD/Area Scan (61x81x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 54.15 V/m; Power Drift = 0.34 dB

Fast SAR: SAR(1 g) = 5.21 W/kg; SAR(10 g) = 2.45 W/kg

Maximum value of SAR (interpolated) = 6.25 W/kg

Configuration/CW 2450 100mW HEAD/Zoom Scan (7x7x7)/Cube 0:

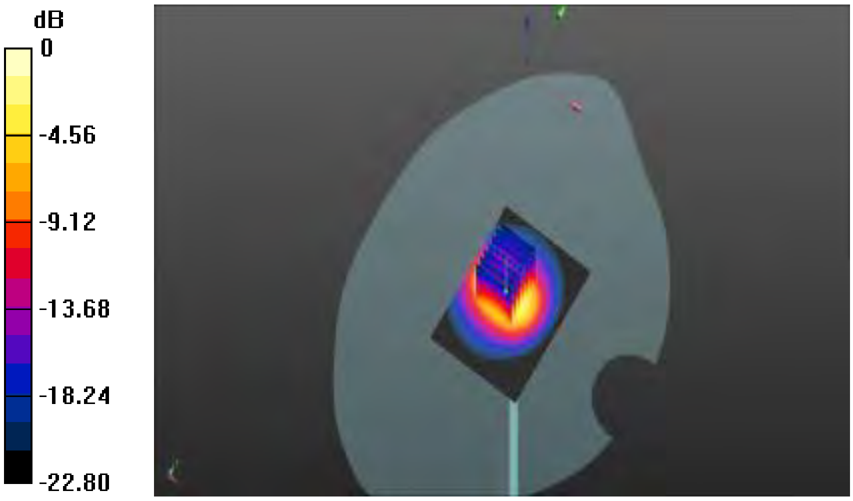
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.15 V/m; Power Drift = 0.34 dB

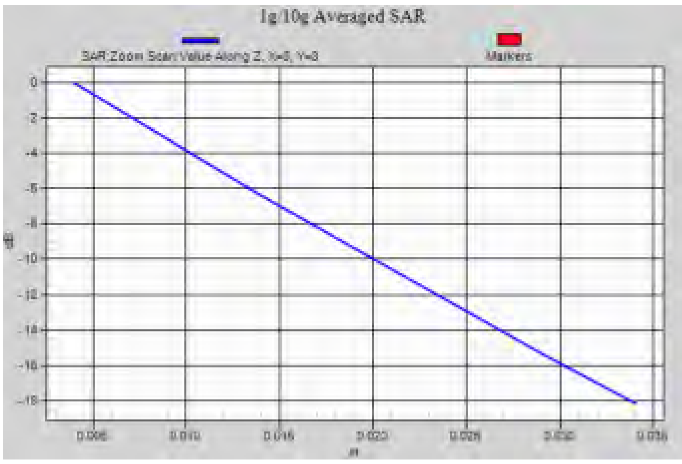
Peak SAR (extrapolated) = 11.6 W/kg

SAR(1 g) = 5.33 W/kg; SAR(10 g) = 2.43 W/kg

Maximum value of SAR (measured) = 6.07 W/kg



0 dB = 6.07 W/kg = 7.83 dBW/kg



System Performance Check Data (2450MHz Body)

2450-BODY-2015-4-27

Communication System Band: CD2450 (2450.0 MHz); Frequency: 2450 MHz;

Medium parameters used: f = 2450 MHz; ζ = 2.02 S/m; ε_r = 50.71; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(7.55, 7.55, 7.55)

Configuration/CW 2450 100mW BODY/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.83 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 10.6 W/kg

SAR(1 g) = 4.96 W/kg; SAR(10 g) = 2.24 W/kg

Maximum value of SAR (measured) = 5.65 W/kg

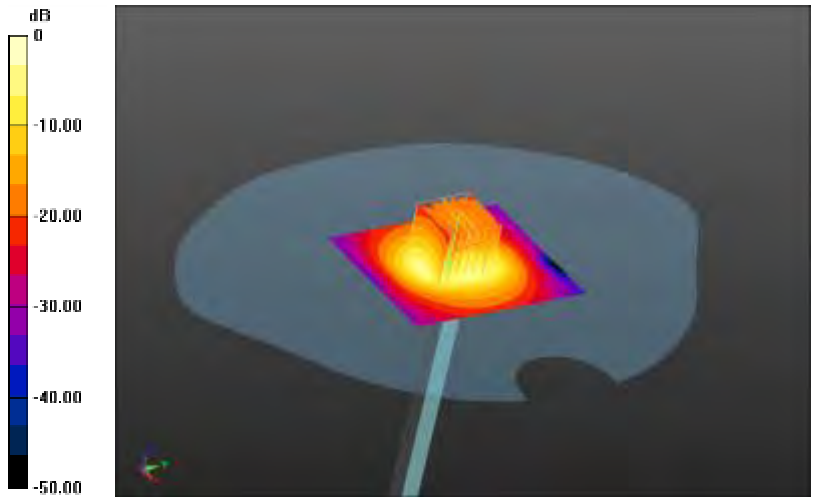
Configuration/CW 2450 100mW BODY/Area Scan (81x101x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

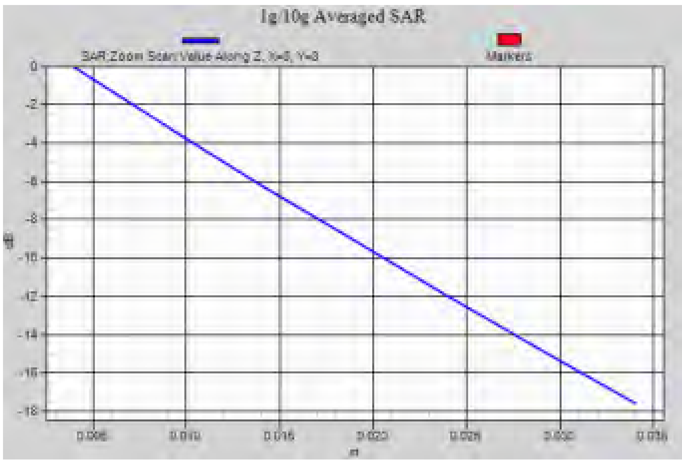
Reference Value = 52.83 V/m; Power Drift = -0.01 dB

Fast SAR: SAR(1 g) = 4.9 W/kg; SAR(10 g) = 2.26 W/kg

Maximum value of SAR (interpolated) = 5.76 W/kg



0 dB = 5.76 W/kg = 7.60 dBW/kg



System Performance Check Data (2600MHz Head)

2600-HEAD-2015-4-24

Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;

Medium parameters used: f = 2600 MHz; ζ = 1.964 S/m; ε_r = 39.01; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(7.64, 7.64, 7.64)

Configuration/CW 2600 100mW HEAD/Area Scan (81x101x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 52.08 V/m; Power Drift = 0.10 dB

Fast SAR: SAR(1 g) = 4.85 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (interpolated) = 5.60 W/kg

Configuration/CW 2600 100mW HEAD/Zoom Scan (7x7x7)/Cube 0:

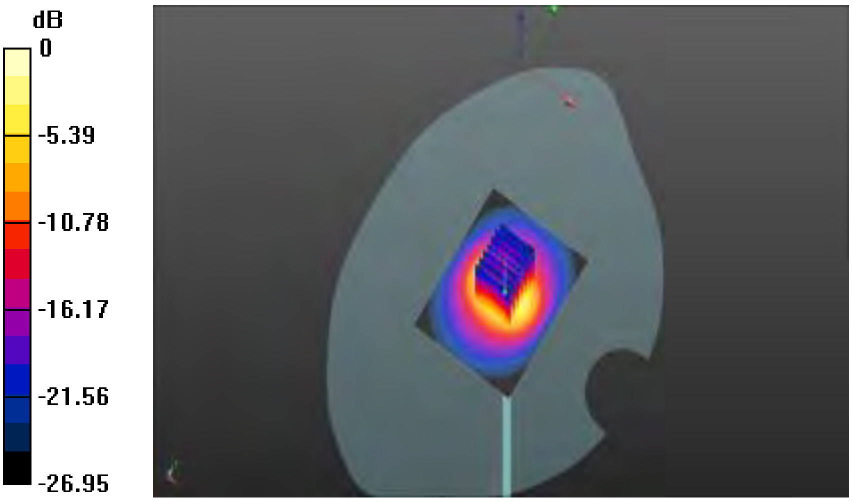
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.08 V/m; Power Drift = 0.10 dB

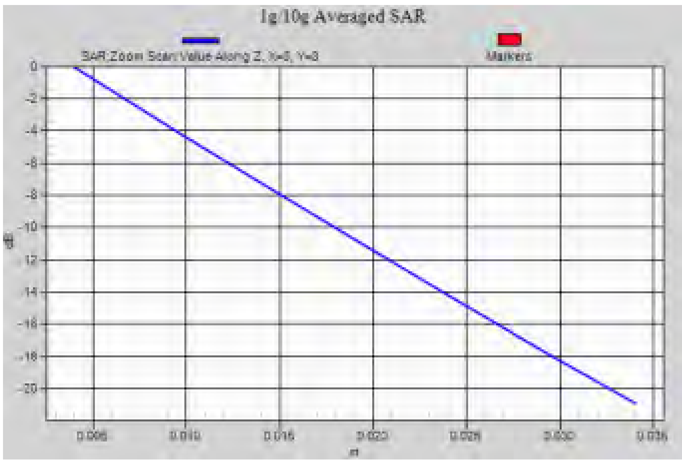
Peak SAR (extrapolated) = 11.8 W/kg

SAR(1 g) = 5.97 W/kg; SAR(10 g) = 2.14 W/kg

Maximum value of SAR (measured) = 6.22 W/kg



0 dB = 6.22 W/kg = 7.94 dBW/kg



System Performance Check Data (2600MHz Body)

2600-BODY-2015-4-24

Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;

Medium parameters used: f = 2600 MHz; ζ = 2.23 S/m; ε_r = 50.48; ρ = 1000 kg/m^3

Phantom section: Flat Section

Probe: EX3DV4-SN: 7340; ConvF(7.11, 7.11, 7.11)

Configuration/CW 2600 100mW BODY/Area Scan (81x101x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 49.57 V/m; Power Drift = 0.02 dB

Fast SAR: SAR(1 g) = 5.1 W/kg; SAR(10 g) = 2.27 W/kg

Maximum value of SAR (interpolated) = 6.08 W/kg

Configuration/CW 2600 100mW BODY/Zoom Scan (7x7x7)/Cube 0:

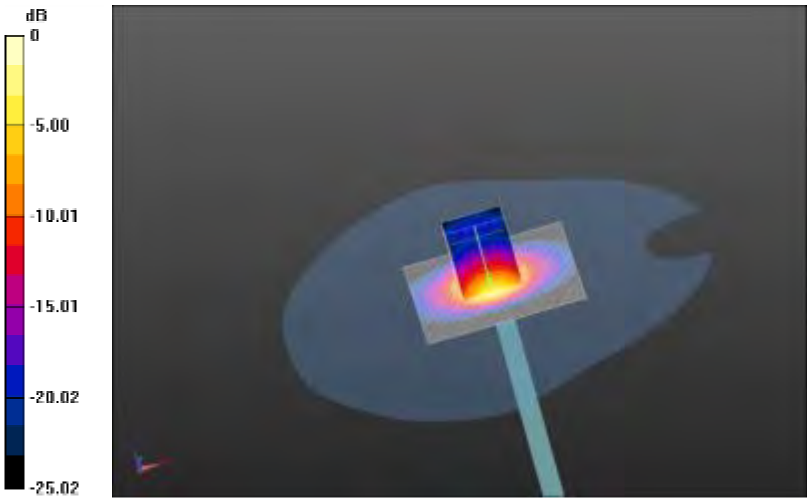
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 49.57 V/m; Power Drift = 0.02 dB

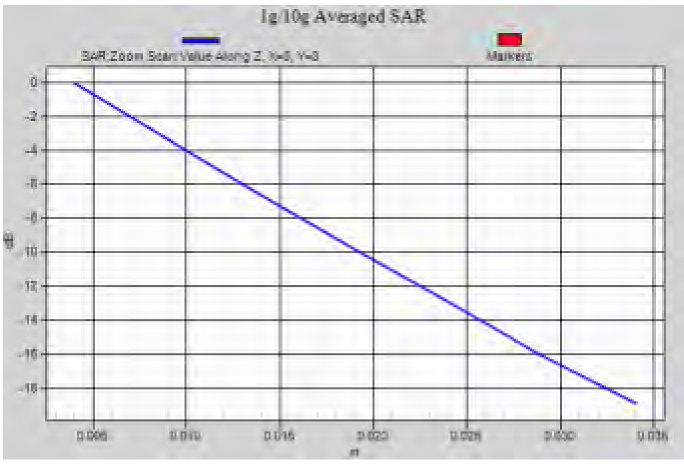
Peak SAR (extrapolated) = 11.5 W/kg

SAR(1 g) = 5.34 W/kg; SAR(10 g) = 2.24 W/kg

Maximum value of SAR (measured) = 5.92 W/kg



0 dB = 5.92 W/kg = 7.72 dBW/kg



ANNEX C TEST DATA

MEAS.1 Right Head with Cheek on High Channel in GSM850 mode

Test Date: 2015.04.20

Communication System Band: GSM 850; Frequency: 848.8 MHz;

Medium parameters used: f = 848.8 MHz; ζ = 0.899 S/m; ε_r = 41.327; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(9.91, 9.91, 9.91)

Area Scan (51x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 4.674 V/m; Power Drift = -0.05 dB

Fast SAR: SAR(1 g) = 0.178 W/kg; SAR(10 g) = 0.122 W/kg

Maximum value of SAR (interpolated) = 0.189 W/kg

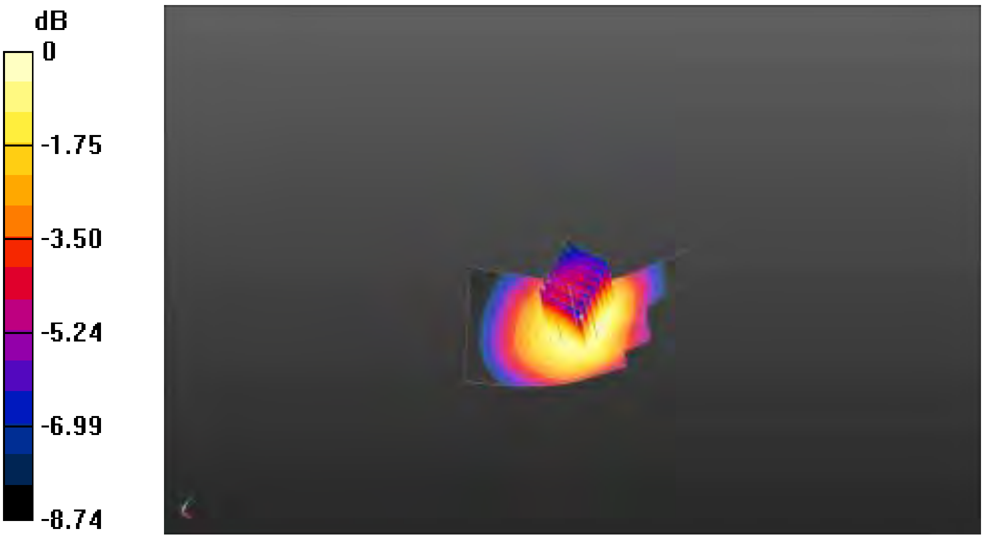
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.674 V/m; Power Drift = -0.05 dB

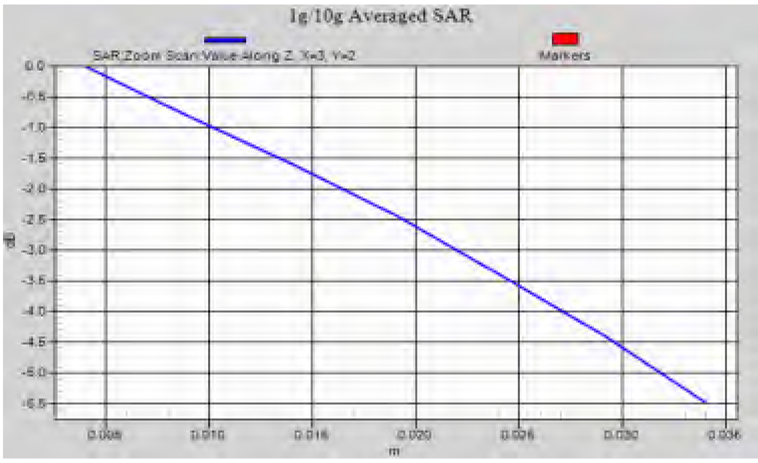
Peak SAR (extrapolated) = 0.218 W/kg

SAR(1 g) = 0.182 W/kg; SAR(10 g) = 0.142 W/kg

Maximum value of SAR (measured) = 0.190 W/kg



0 dB = 0.190 W/kg = -7.21 dBW/kg



MEAS.2 Left Head with Cheek on High Channel in GSM1900 mode

Test Date: 2015.04.23

Communication System Band: PCS 1900; Frequency: 1909.8 MHz;

Medium parameters used: f = 1909.8 MHz; ζ = 1.48 S/m; ε_r = 39.6; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(8.77, 8.77, 8.77)

Area Scan (51x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 4.675 V/m; Power Drift = 0.17 dB

Fast SAR: SAR(1 g) = 0.175 W/kg; SAR(10 g) = 0.100 W/kg

Maximum value of SAR (interpolated) = 0.194 W/kg

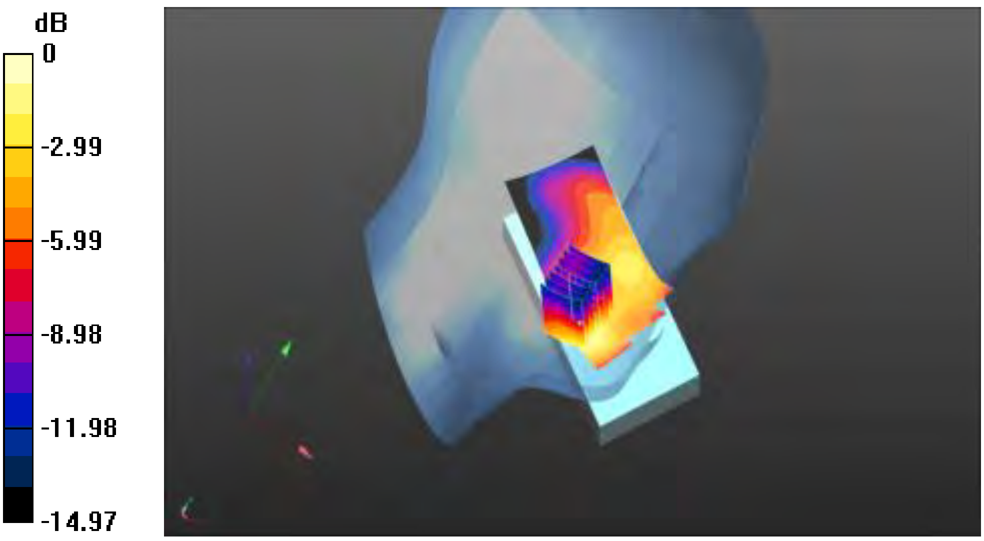
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.675 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.283 W/kg

SAR(1 g) = 0.181 W/kg; SAR(10 g) = 0.110 W/kg

Maximum value of SAR (measured) = 0.196 W/kg



0 dB = 0.196 W/kg = -7.08 dBW/kg

MEAS.3 Left Head with Cheek on Low Channel in WCDMA Band 2 mode

Test Date: 2015.04.23

Communication System Band: WCDMA Band 2; Frequency: 1852.6 MHz;

Medium parameters used: f = 1852.6 MHz; ζ = 1.422 S/m; ε_r = 39.86; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(8.77, 8.77, 8.77)

Area Scan (51x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 6.089 V/m; Power Drift = 0.14 dB

Fast SAR: SAR(1 g) = 0.343 W/kg; SAR(10 g) = 0.198 W/kg

Maximum value of SAR (interpolated) = 0.384 W/kg

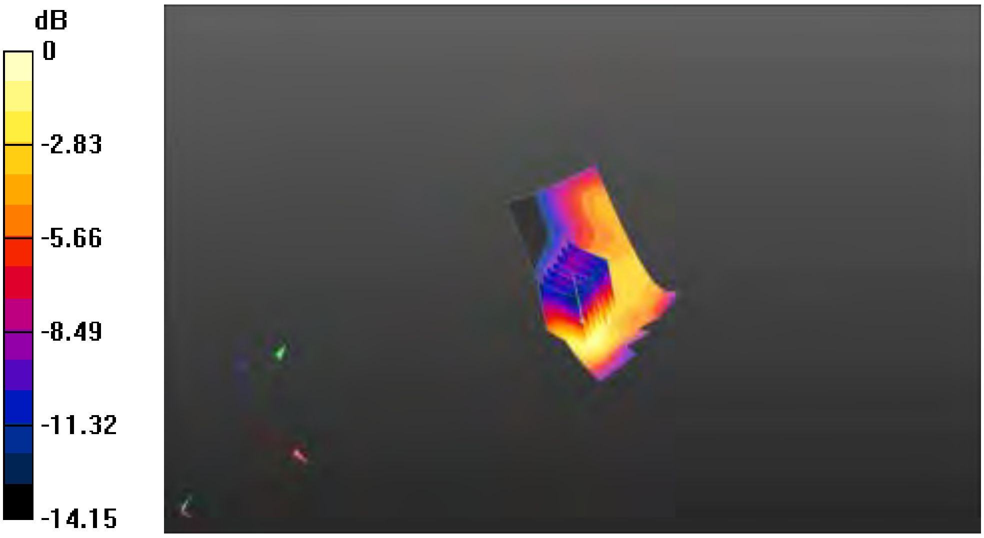
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.089 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.547 W/kg

SAR(1 g) = 0.351 W/kg; SAR(10 g) = 0.217 W/kg

Maximum value of SAR (measured) = 0.380 W/kg

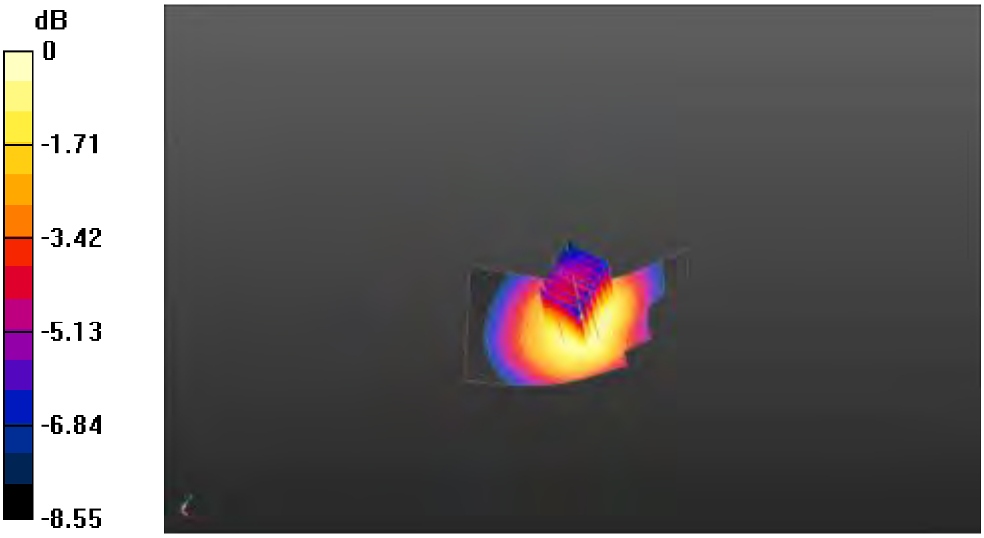


0 dB = 0.380 W/kg = -4.20 dBW/kg

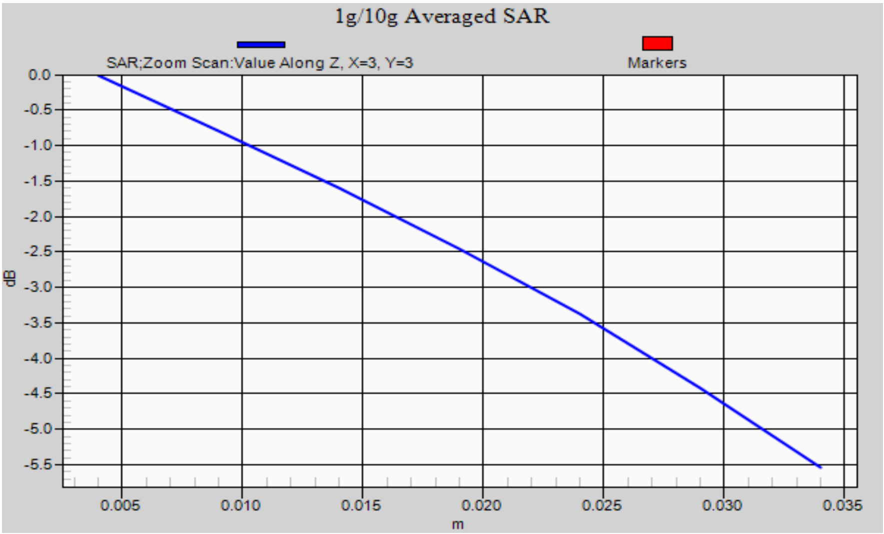
MEAS.4 Right Head with Cheek on Middle Channel in WCDMA Band 5 mode

Test Date: 2015.04.20
Communication System Band: WCDMA Band 5; Frequency: 835 MHz;
Medium parameters used: f = 835 MHz; ζ = 0.89 S/m; ε_r = 41.5; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(9.91, 9.91, 9.91)

Area Scan (51x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 3.507 V/m; Power Drift = 0.56 dB
Fast SAR: SAR(1 g) = 0.122 W/kg; SAR(10 g) = 0.084 W/kg
Maximum value of SAR (interpolated) = 0.129 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.507 V/m; Power Drift = 0.56 dB
Peak SAR (extrapolated) = 0.152 W/kg
SAR(1 g) = 0.136 W/kg; SAR(10 g) = 0.099 W/kg
Maximum value of SAR (measured) = 0.143 W/kg



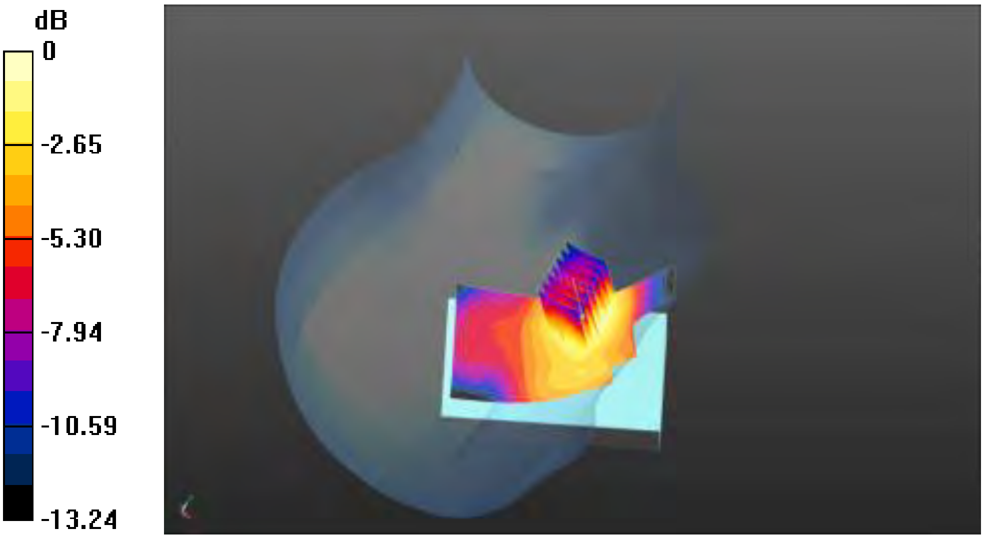
0 dB = 0.143 W/kg = -8.47 dBW/kg



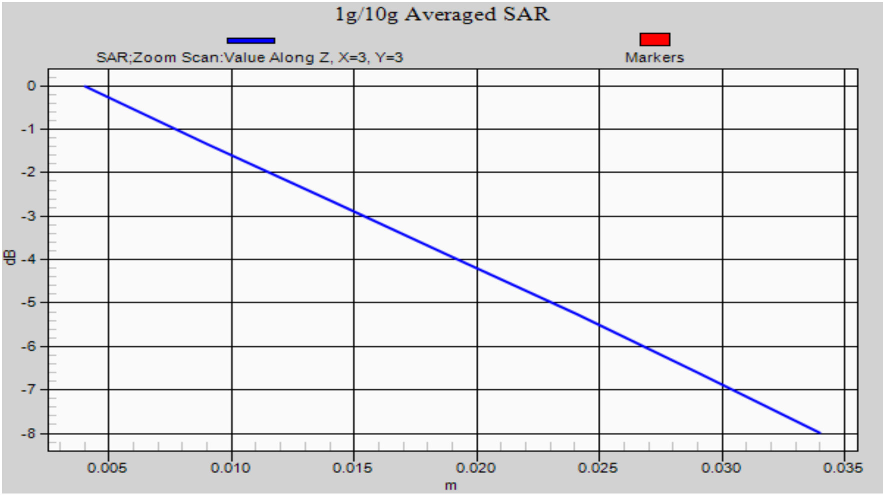
MEAS.5 Right Head with Cheek on Low Channel in LTE Band 4 mode

Test Date: 2015.04.21
Communication System Band: Band 4, E-UTRA/FDD; Frequency: 1720 MHz;
Medium parameters used: f = 1720 MHz; ζ = 1.291 S/m; ε_r = 40.465; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(9.13, 9.13, 9.13)

Area Scan (51x111x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 6.450 V/m; Power Drift = 0.18 dB
Fast SAR: SAR(1 g) = 0.249 W/kg; SAR(10 g) = 0.150 W/kg
Maximum value of SAR (interpolated) = 0.271 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.450 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.362 W/kg
SAR(1 g) = 0.262 W/kg; SAR(10 g) = 0.176 W/kg
Maximum value of SAR (measured) = 0.281 W/kg



0 dB = 0.281 W/kg = -5.51 dBW/kg



MEAS.6 Left Head with Cheek on Low Channel in LTE Band 7 mode

Test Date: 2015.04.24

Communication System Band: Band 7, E-UTRA/FDD; Frequency: 2510 MHz;

Medium parameters used: f = 2510 MHz; ζ = 1.945 S/m; ε_r = 36.336; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(7.64, 7.64, 7.64)

Area Scan (61x121x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 4.220 V/m; Power Drift = -0.66 dB

Fast SAR: SAR(1 g) = 0.353 W/kg; SAR(10 g) = 0.177 W/kg

Maximum value of SAR (interpolated) = 0.406 W/kg

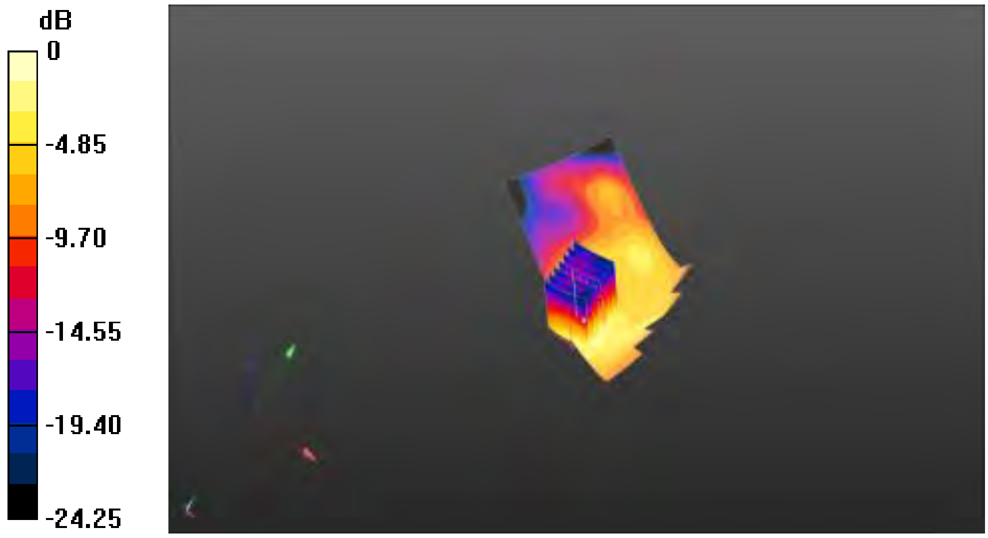
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.220 V/m; Power Drift = -0.66 dB

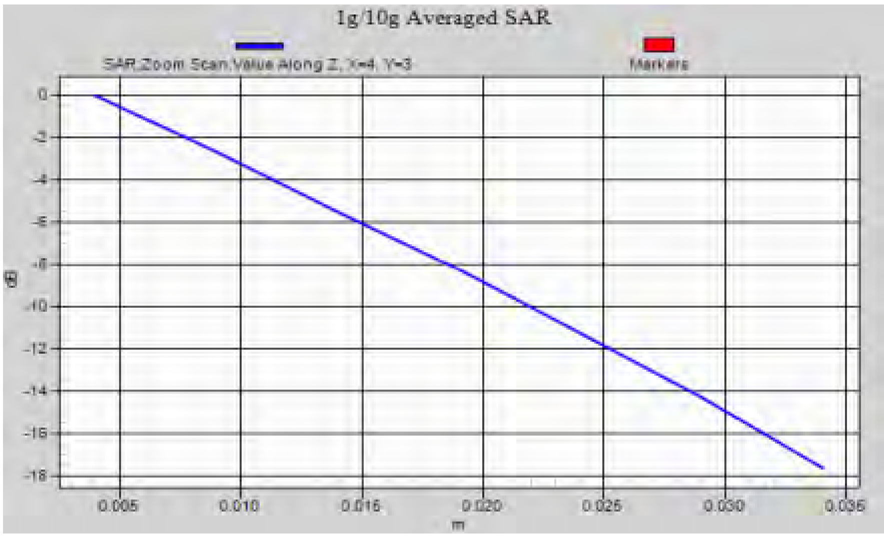
Peak SAR (extrapolated) = 0.712 W/kg

SAR(1 g) = 0.365 W/kg; SAR(10 g) = 0.184 W/kg

.Maximum value of SAR (measured) = 0.404 W/kg



0 dB = 0.404 W/kg = -3.94 dBW/kg



MEAS.7 Left Head with Cheek on Middle Channel in IEEE 802.11b mode

Test Date: 2015.04.27

Communication System Band: WLAN(b); Frequency: 2437 MHz;

Medium parameters used: f = 2437 MHz; ζ = 1.883 S/m; ε_r = 38.021; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(7.83, 7.83, 7.83)

Area Scan (61x121x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 9.697 V/m; Power Drift = 0.29 dB

Fast SAR: SAR(1 g) = 0.438 W/kg; SAR(10 g) = 0.218 W/kg

Maximum value of SAR (interpolated) = 0.526 W/kg

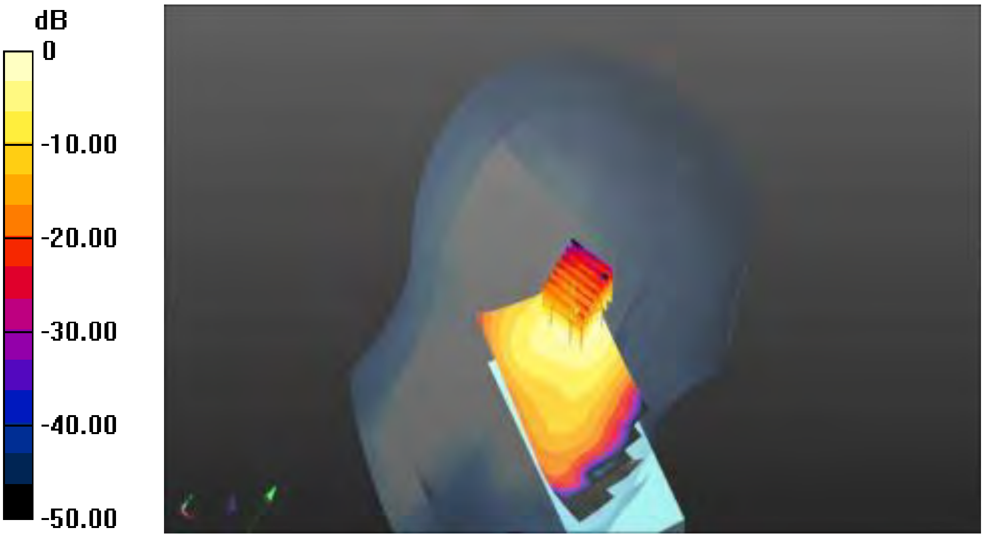
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.697 V/m; Power Drift = 0.29 dB

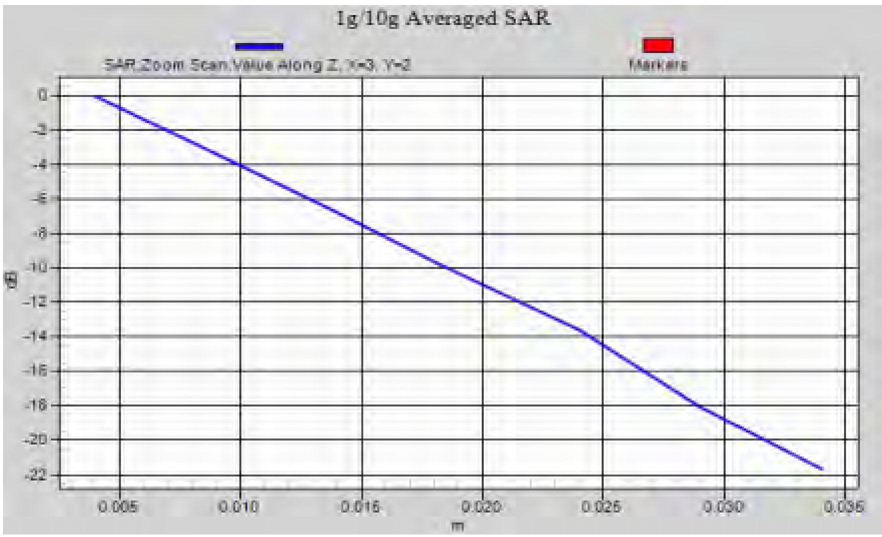
Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.468 W/kg; SAR(10 g) = 0.216 W/kg

Maximum value of SAR (measured) = 0.526 W/kg



0 dB = 0.526 W/kg = -2.79 dBW/kg



MEAS.8Left Head with Cheek on Middle Channel in IEEE 802.11n(HT-40) mode

Test Date: 2015.04.27

Communication System Band: WLAN(n); Frequency: 2452 MHz;

Medium parameters used (interpolated): f = 2452 MHz; ζ = 1.885 S/m; ε_r = 37.952; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(7.83, 7.83, 7.83)

Configuration/RIGHT CHEEK-CHANNEL40/Area Scan (71x141x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 18.93 V/m; Power Drift = -0.14 dB

Fast SAR: SAR(1 g) = 0.713 W/kg; SAR(10 g) = 0.375 W/kg

Maximum value of SAR (interpolated) = 0.811 W/kg

Configuration/RIGHT CHEEK-CHANNEL40/Zoom Scan (7x7x7)/Cube 0:

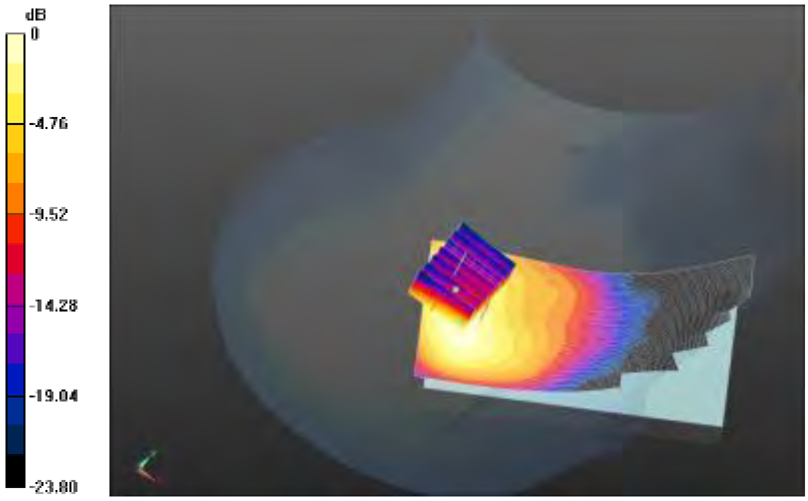
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.93 V/m; Power Drift = -0.14 dB

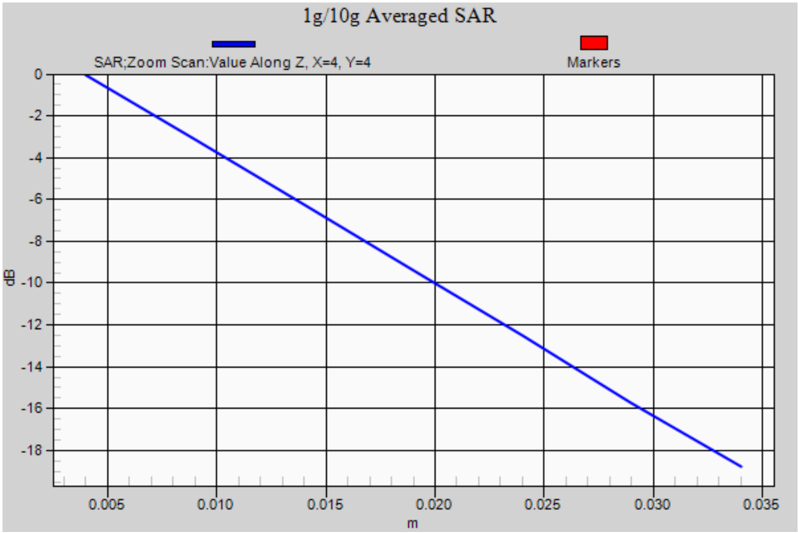
Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 0.723 W/kg; SAR(10 g) = 0.375 W/kg

Maximum value of SAR (measured) = 0.791 W/kg



0 dB = 0.791 W/kg = -1.02 dBW/kg



MEAS.9 Right Head with Cheek on Middle Channel in BT(8PSK) mode

Test Date: 2015.04.28

Communication System Band: Middle; Frequency: 2441 MHz;

Medium parameters used: f = 2441 MHz; ζ = 1.89 S/m; ε_r = 38; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(7.83, 7.83, 7.83)

Configuration/Bluetooth Head Right cheek Mid/Area Scan (61x111x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 2.915 V/m; Power Drift = 0.66 dB

Fast SAR: SAR(1 g) = 0.022 W/kg; SAR(10 g) = 0.011 W/kg

Maximum value of SAR (interpolated) = 0.0240 W/kg

Configuration/Bluetooth Head Right cheek Mid/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.915 V/m; Power Drift = 0.66 dB

Peak SAR (extrapolated) = 0.0350 W/kg

SAR(1 g) = 0.021 W/kg; SAR(10 g) = 0.00933 W/kg

Maximum value of SAR (measured) = 0.0236 W/kg

0 dB = 0.0236 W/kg = -16.27 dBW/kg

MEAS.10 Body Plane with Back Side on High Channel in GPRS850 mode

Test Date:2015.04.20

Communication System Band: GPRS850; Frequency: 824.2 MHz;

Medium parameters used (interpolated): f = 824.2 MHz; ζ = 0.95 S/m; ε_r = 55.959; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(9.97, 9.97, 9.97)

Configuration/GPRS850 BODY BACK 2/Area Scan (61x111x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 22.68 V/m; Power Drift = -0.16 dB

Fast SAR: SAR(1 g) = 0.528 W/kg; SAR(10 g) = 0.353 W/kg

Maximum value of SAR (interpolated) = 0.658 W/kg

Configuration/GPRS850 BODY BACK 2/Zoom Scan (7x7x7)/Cube 0:

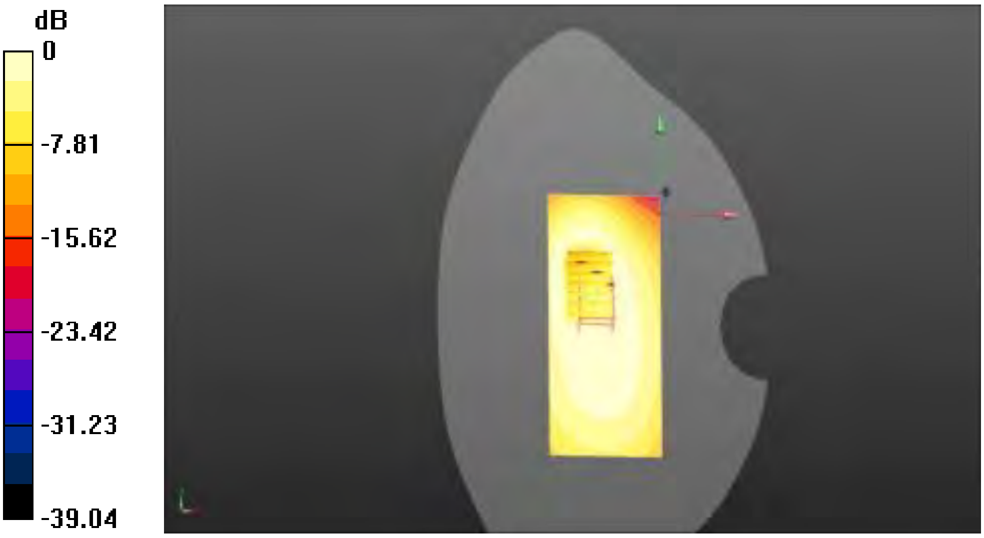
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.68 V/m; Power Drift = -0.16 dB

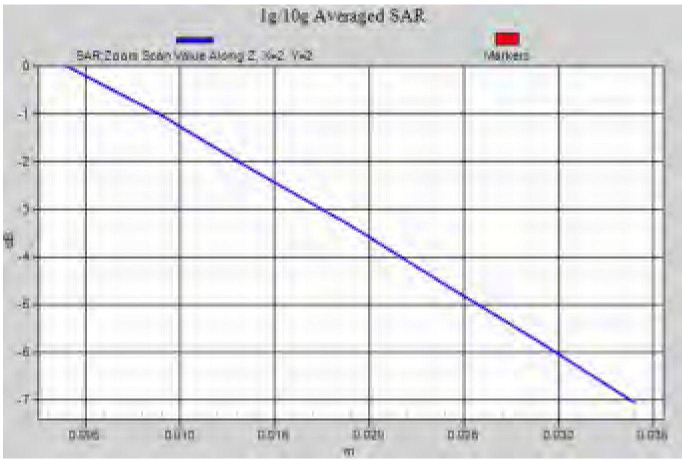
Peak SAR (extrapolated) = 0.622 W/kg

SAR(1 g) = 0.588 W/kg; SAR(10 g) = 0.350 W/kg

Maximum value of SAR (measured) = 0.594 W/kg



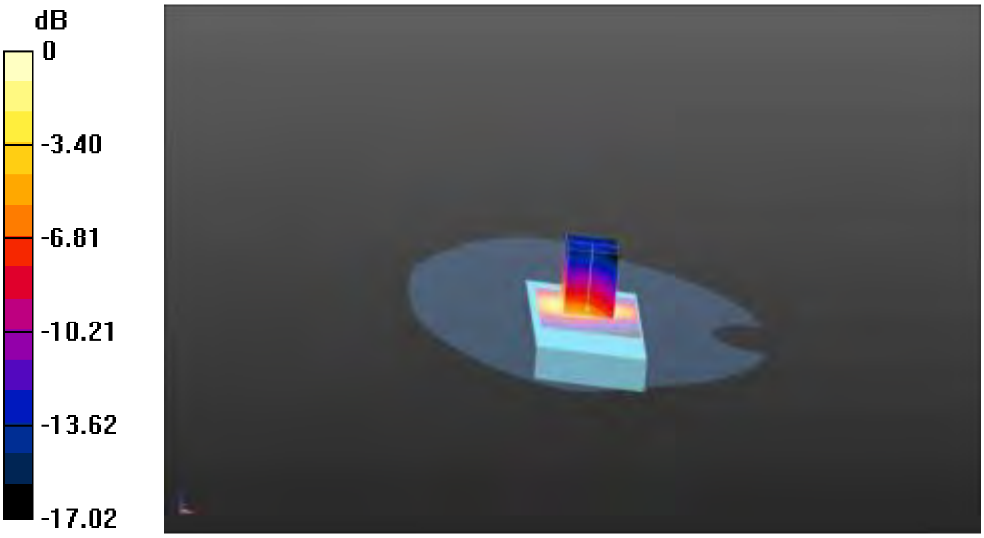
0 dB = 0.594 W/kg = -2.26 dBW/kg



MEAS.11 Body Plane with Back Side on High Channel in GSM1900 mode

Test Date: 2015.04.23
Communication System Band: PCS 1900; Frequency: 1909.8 MHz;
Medium parameters used: f = 1909.8 MHz; ζ = 1.6 S/m; ε_r = 51.04; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(8.18, 8.18, 8.18)

Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 18.81 V/m; Power Drift = -0.08 dB
Fast SAR: SAR(1 g) = 0.494 W/kg; SAR(10 g) = 0.254 W/kg
Maximum value of SAR (interpolated) = 0.565 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.81 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.852 W/kg
SAR(1 g) = 0.498 W/kg; SAR(10 g) = 0.266 W/kg
Maximum value of SAR (measured) = 0.567 W/kg

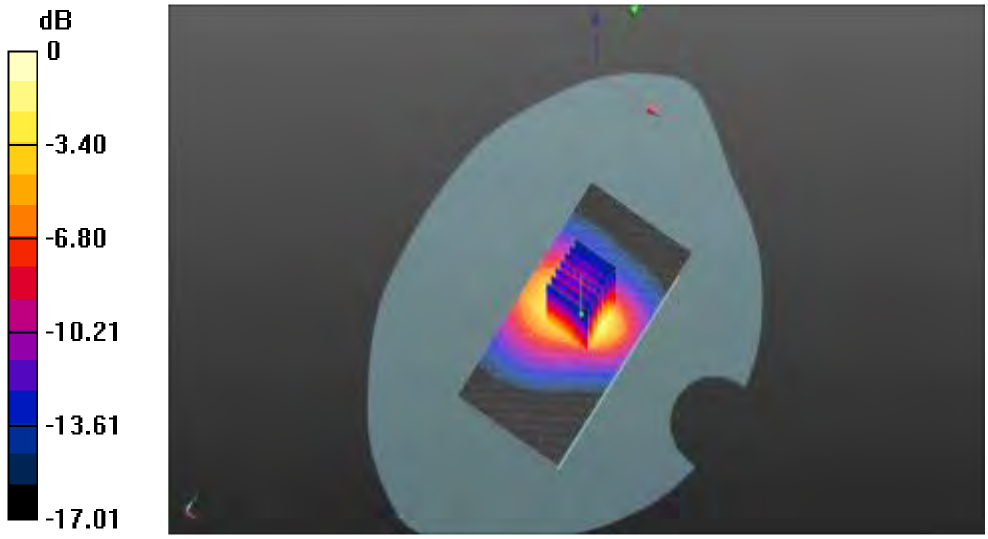


0 dB = 0.567 W/kg = -2.46 dBW/kg

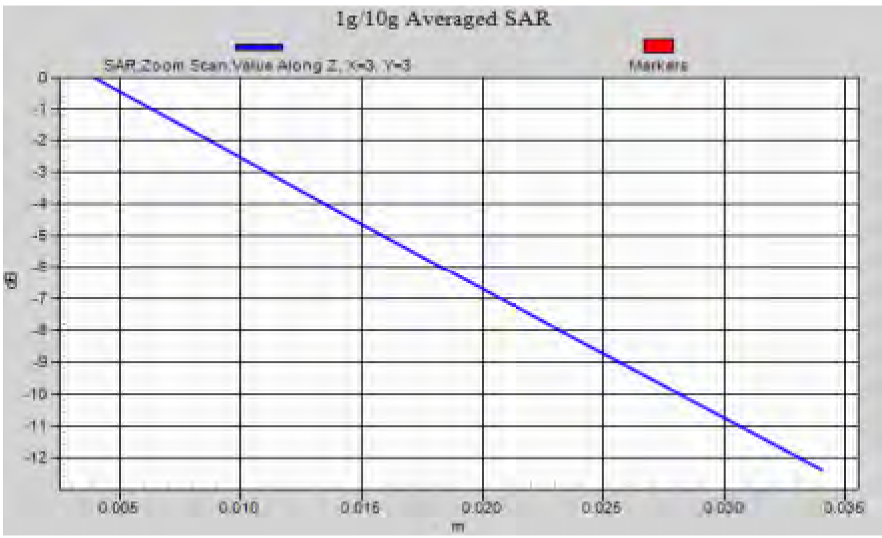
MEAS.12 Body Plane with Bottom Edge on Low Channel in WCDMA band 2 mode

Test Date: 2015.04.23
Communication System Band: WCDMA band 2; Frequency: 1852.6 MHz;
Medium parameters used: f = 1852.6 MHz; ζ = 1.533 S/m; ε_r = 51.232; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(8.18, 8.18, 8.18)

Area Scan (61x121x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 24.02 V/m; Power Drift = 0.01 dB
Fast SAR: SAR(1 g) = 0.836 W/kg; SAR(10 g) = 0.441 W/kg
Maximum value of SAR (interpolated) = 0.978 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.02 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.875 W/kg; SAR(10 g) = 0.469 W/kg
Maximum value of SAR (measured) = 0.995 W/kg



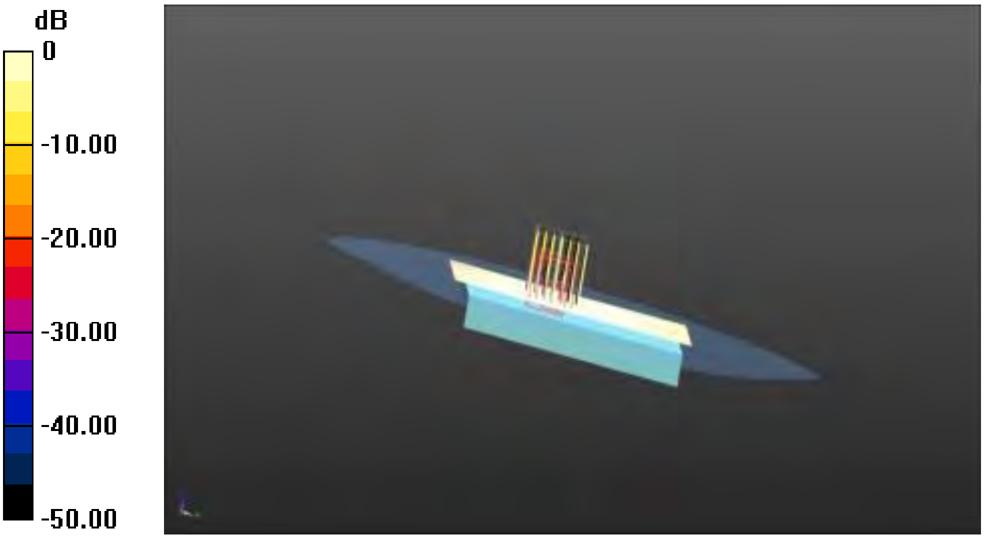
0 dB = 0.995 W/kg = -0.02 dBW/kg



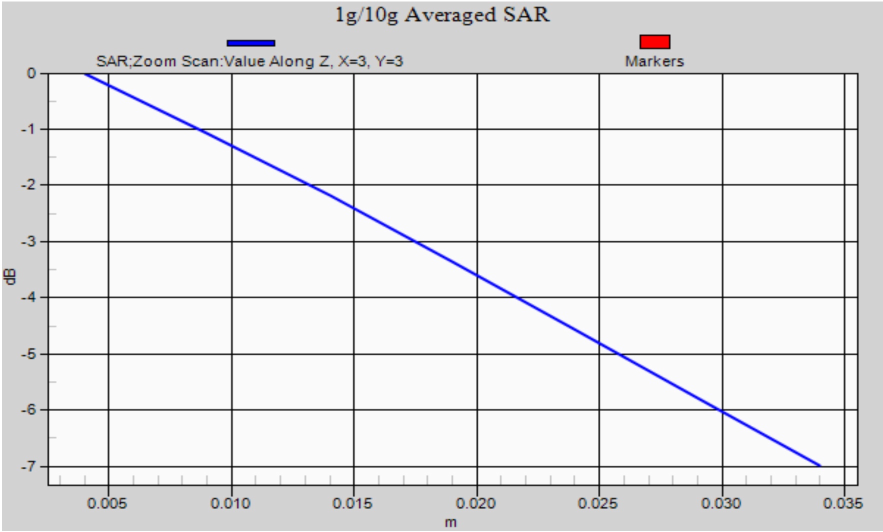
MEAS.13 Body Plane with Back Side on Middle Channel in WCDMA band 5 mode

Test Date: 2015.04.23
Communication System Band: WCDMA band 5; Frequency: 835 MHz;
Medium parameters used: f = 835 MHz; ζ = 0.89 S/m; ε_r = 41.5; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(9.97, 9.97, 9.97)

Area Scan (61x121x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 16.20 V/m; Power Drift = -0.99.00 dB
Fast SAR: SAR(1 g) = 0.252 W/kg; SAR(10 g) = 0.176 W/kg
Maximum value of SAR (interpolated) = 0.268 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.20 V/m; Power Drift = -0.99 dB
Peak SAR (extrapolated) = 0.841 W/kg
SAR(1 g) = 0.324 W/kg; SAR(10 g) = 0.188 W/kg
Maximum value of SAR (measured) = 0.263 W/kg



0 dB = 0.263 W/kg = -5.80 dBW/kg



MEAS.14 Body Plane with Bottom Edge on Low Channel in LTE band 4 mode

Test Date: 2015.04.21

Communication System Band: Band 4, E-UTRA/FDD; Frequency: 1720 MHz;

Medium parameters used (interpolated): f = 1720 MHz; ζ = 1.42 S/m; ε_r = 53.44; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(8.53, 8.53, 8.53)

Area Scan (61x131x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 10.64 V/m; Power Drift = -0.02 dB

Fast SAR: SAR(1 g) = 0.273 W/kg; SAR(10 g) = 0.154 W/kg

Maximum value of SAR (interpolated) = 0.321 W/kg

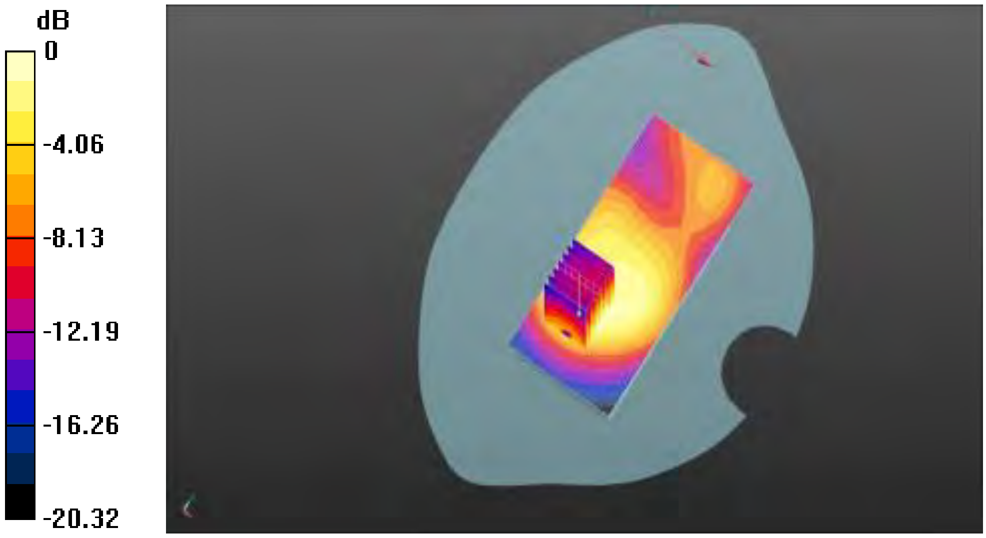
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.64 V/m; Power Drift = -0.02 dB

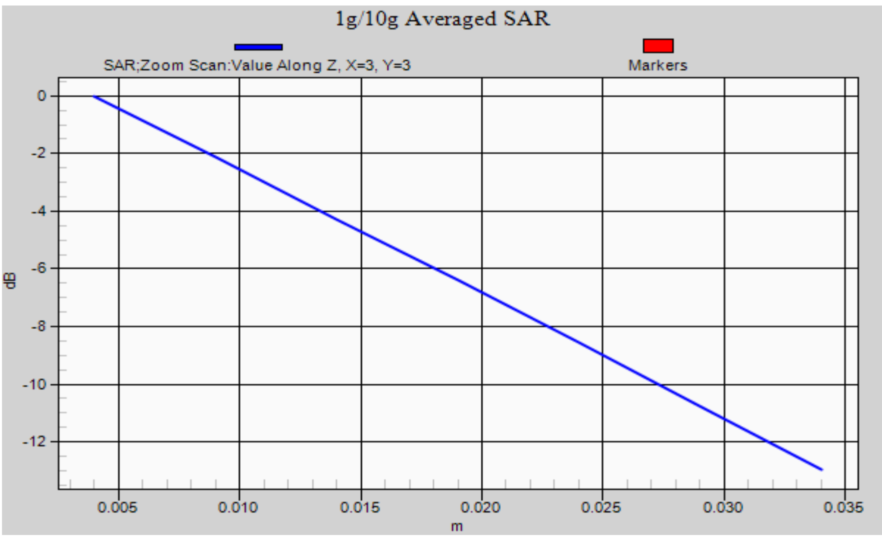
Peak SAR (extrapolated) = 0.463 W/kg

SAR(1 g) = 0.283 W/kg; SAR(10 g) = 0.160 W/kg

Maximum value of SAR (measured) = 0.317 W/kg



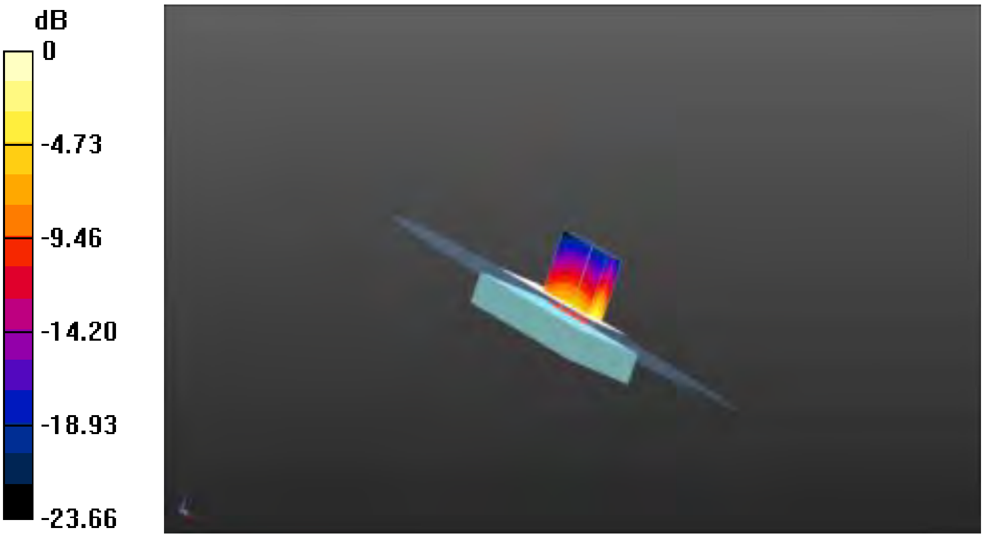
0 dB = 0.317 W/kg = -4.99 dBW/kg



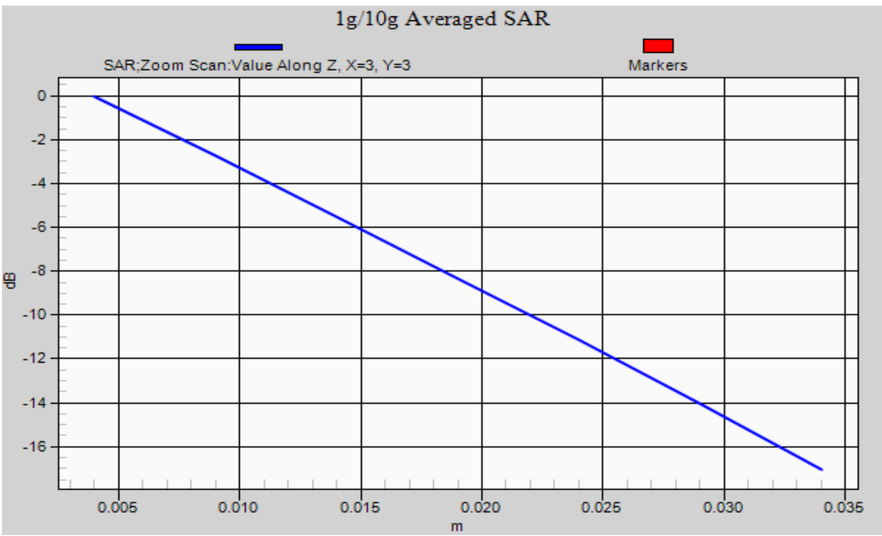
MEAS.15 Body Plane with Bottom Edge on Low Channel in LTE band 7 mode

Test Date: 2015.04.24
Communication System Band: Band 7, E-UTRA/FDD; Frequency: 2510 MHz;
Medium parameters used: f = 2510 MHz; ζ = 1.945 S/m; ε_r = 36.336; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(7.11, 7.11, 7.11)

Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 22.91 V/m; Power Drift = 0.00 dB
Fast SAR: SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.590 W/kg
Maximum value of SAR (interpolated) = 1.45 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.91 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.37 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.595 W/kg
Maximum value of SAR (measured) = 1.41 W/kg



0 dB = 1.41 W/kg = 1.49 dBW/kg



MEAS.16Body Plane with Back Side on Middle Channel in IEEE 802.11b mode

Test Date: 2015.04.27

Communication System Band: WLAN(n); Frequency: 2437 MHz;

Medium parameters used: f = 2437 MHz; ζ = 2.013 S/m; ε_r = 50.739; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(7.55, 7.55, 7.55)

Area Scan (71x121x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 3.243 V/m; Power Drift = 0.20 dB

Fast SAR: SAR(1 g) = 0.074 W/kg; SAR(10 g) = 0.039 W/kg

Maximum value of SAR (interpolated) = 0.0868 W/kg

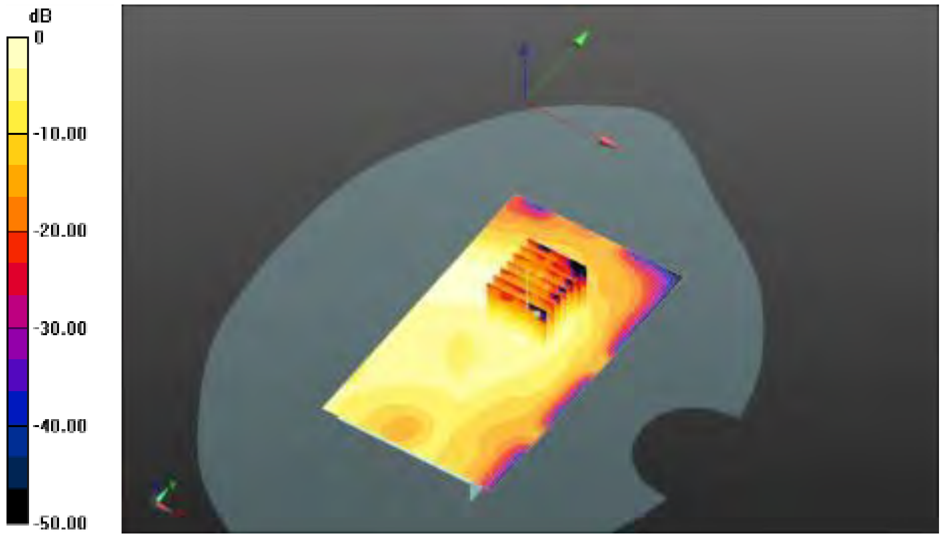
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.243 V/m; Power Drift = 0.20 dB

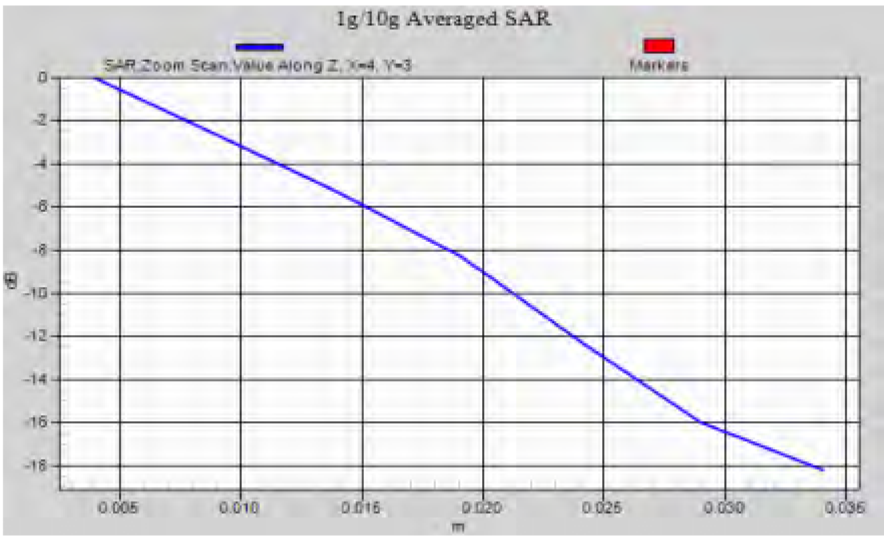
Peak SAR (extrapolated) = 0.151 W/kg

SAR(1 g) = 0.077 W/kg; SAR(10 g) = 0.039 W/k

Maximum value of SAR (measured) = 0.0887 W/kg



0 dB = 0.0887 W/kg = -10.52 dBW/kg

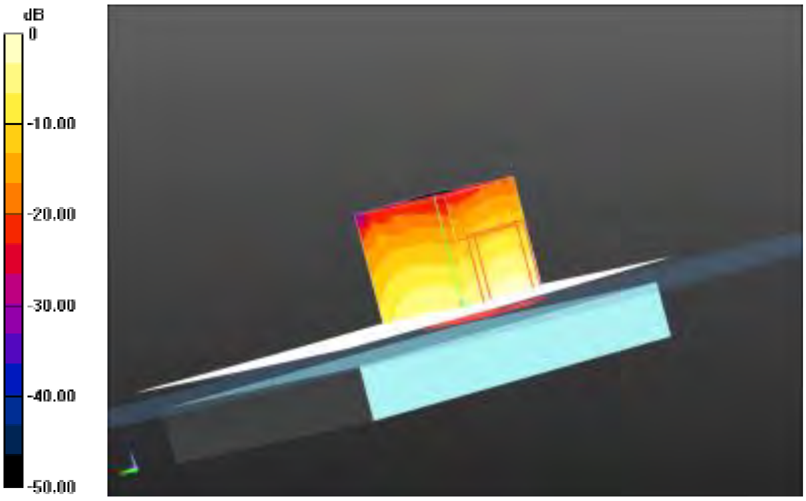


MEAS.17 Body Plane with Back Side on Middle Channel in IEEE 802.11n (HT-40) mode

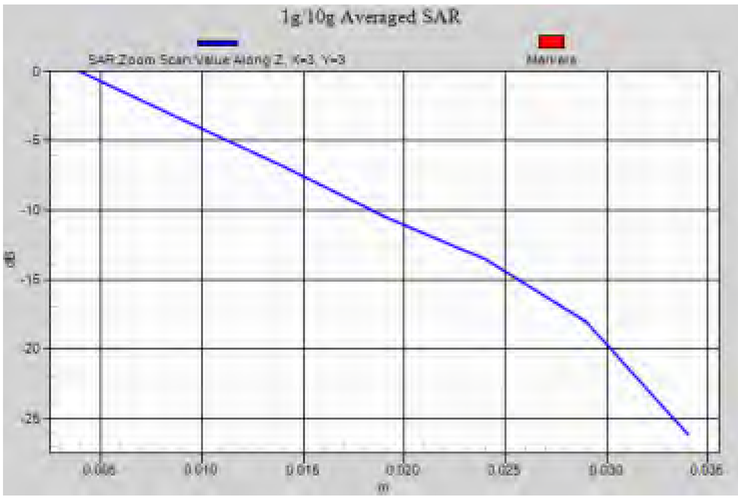
Test Date: 2015.04.27
Communication System Band: WLAN(n); Frequency: 2452 MHz;
Medium parameters used (interpolated): f = 2452 MHz; ζ = 2.025 S/m; ε_r = 50.695; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(7.55, 7.55, 7.55)

Configuration/BODY-BACK-WLAN/Area Scan (71x141x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 6.621 V/m; Power Drift = -0.07 dB
Fast SAR: SAR(1 g) = 0.279 W/kg; SAR(10 g) = 0.144 W/kg
Maximum value of SAR (interpolated) = 0.319 W/kg

Configuration/BODY-BACK-WLAN/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.621 V/m; Power Drift = -0.07 dB
SAR(1 g) = 0.281 W/kg; SAR(10 g) = 0.138 W/kg
Maximum value of SAR (measured) = 0.317 W/kg



0 dB = 0.317 W/kg = -4.99 dBW/kg

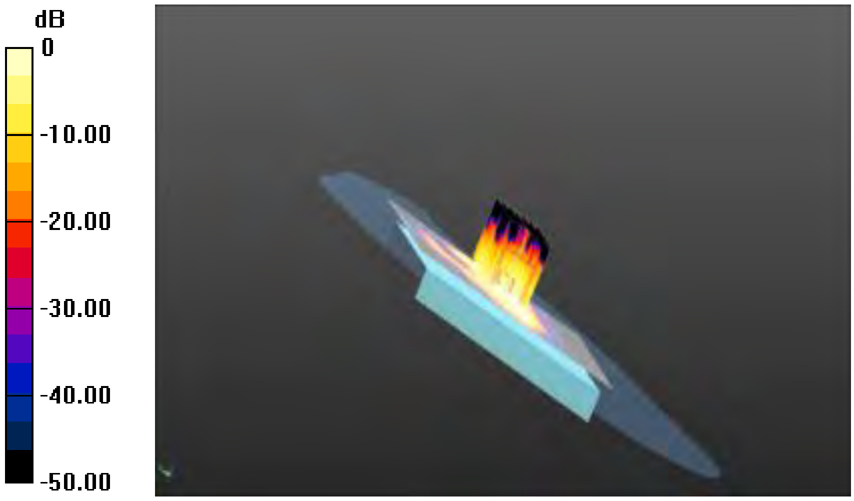


MEAS.18 Body Plane with Back Side on Middle Channel in BT(8PSK) mode

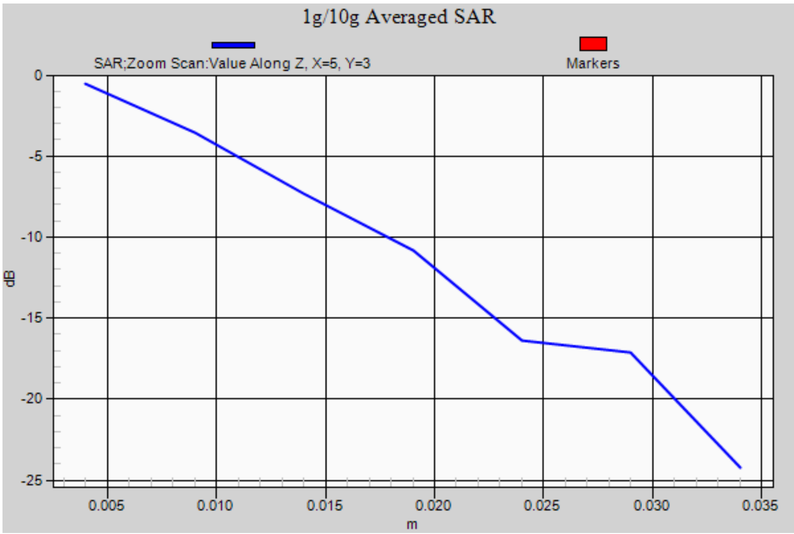
Test Date: 2015.04.28
Communication System Band: Middle; Frequency: 2441 MHz;
Medium parameters used: f = 2441 MHz; ζ = 2.02 S/m; ε_r = 50.72; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(7.55, 7.55, 7.55)

Configuration/Bluetooth Body Back Mid 3 2 2 2/Area Scan (61x121x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 4.067 V/m; Power Drift = 0.23 dB
Fast SAR: SAR(1 g) = 0.065 W/kg; SAR(10 g) = 0.030 W/kg
Maximum value of SAR (interpolated) = 0.0780 W/kg

Configuration/Bluetooth Body Back Mid 3 2 2 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.067 V/m; Power Drift = 0.23 dB
Peak SAR (extrapolated) = 0.153 W/kg
SAR(1 g) = 0.062 W/kg; SAR(10 g) = 0.027 W/kg
Maximum value of SAR (measured) = 0.0690 W/kg



0 dB = 0.0690 W/kg = -11.61 dBW/kg

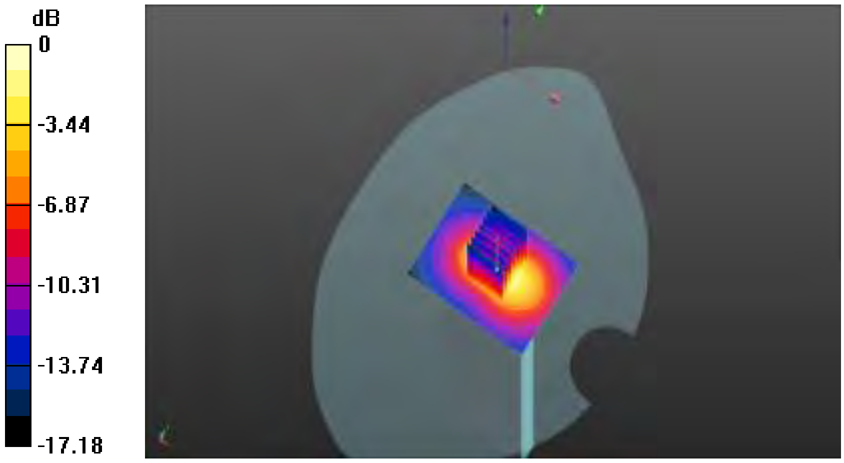


MEAS.19 Body Plane with Bottom Edge on Middle Channel in WCDMA Band 2 mode

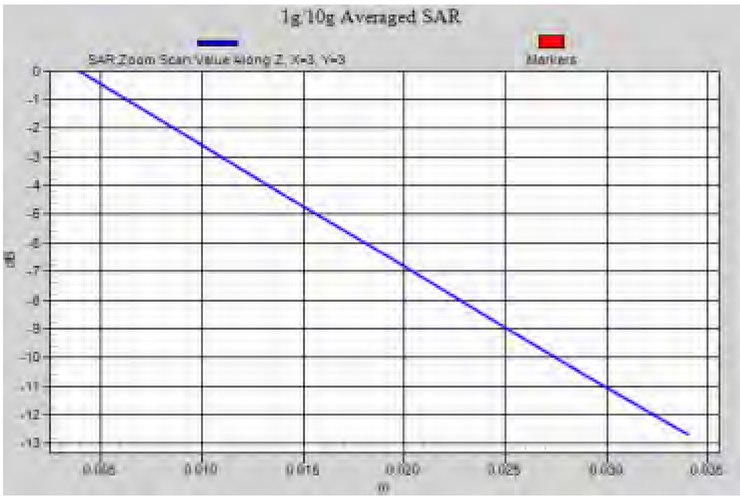
Test Date: 2015.04.23
Communication System Band: II; Frequency: 1880 MHz;
Medium parameters used (interpolated): f = 1880 MHz; ζ = 1.57 S/m; ε_r = 51.139; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(8.18, 8.18, 8.18)

Configuration/WCDMA Band 2 BODY Bottom MID/Area Scan (81x61x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 18.93 V/m; Power Drift = 0.02 dB
Fast SAR: SAR(1 g) = 0.751 W/kg; SAR(10 g) = 0.378 W/kg
Maximum value of SAR (interpolated) = 0.894 W/kg

Configuration/WCDMA Band 2 BODY Bottom MID/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.93 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.762 W/kg; SAR(10 g) = 0.401 W/kg
Maximum value of SAR (measured) = 0.873 W/kg



0 dB = 0.873 W/kg = -0.59 dBW/kg

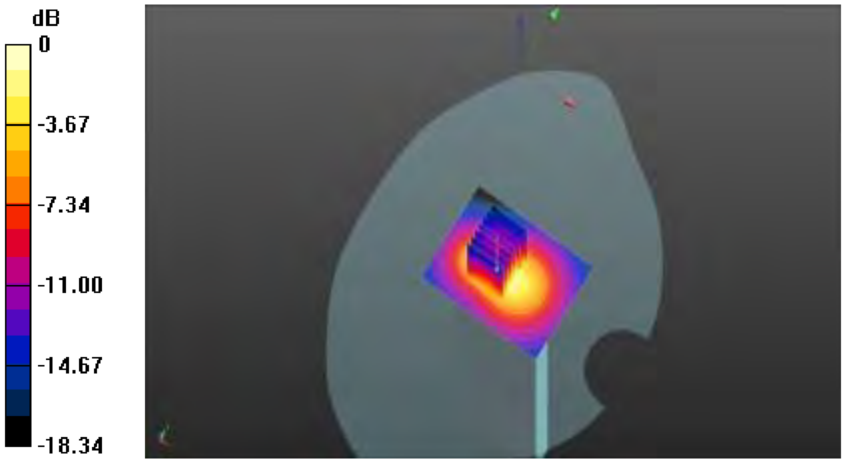


MEAS.20 Body Plane with Bottom Edge on High Channel in WCDMA Band 2 mode

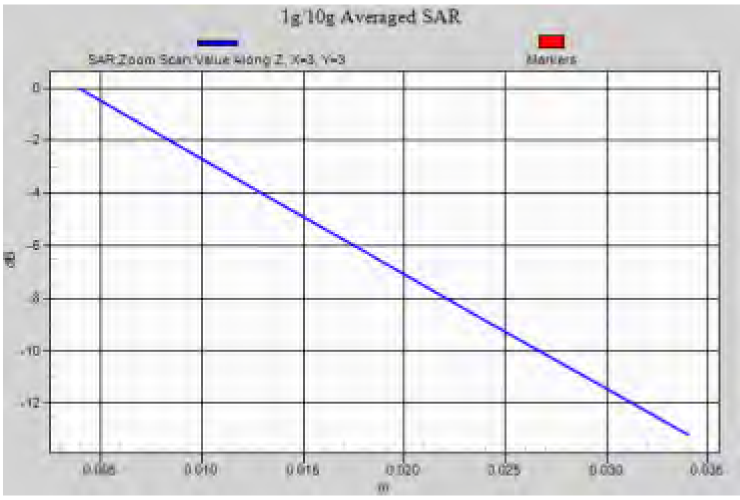
Test Date: 2015.04.23
Communication System Band: II; Frequency: 1907.4 MHz;
Medium parameters used (interpolated): f = 1907.4 MHz; ζ = 1.593 S/m; ε_r = 51.042; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(8.18, 8.18, 8.18)

Configuration/WCDMA Band 2 BODY Bottom HIG/Area Scan (81x61x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 22.30 V/m; Power Drift = -0.20 dB
Fast SAR: SAR(1 g) = 0.739 W/kg; SAR(10 g) = 0.380 W/kg
Maximum value of SAR (interpolated) = 0.883 W/kg

Configuration/WCDMA Band 2 BODY Bottom HIG/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.30 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.736 W/kg; SAR(10 g) = 0.386 W/kg
Maximum value of SAR (measured) = 0.838 W/kg



0 dB = 0.838 W/kg = -0.77 dBW/kg

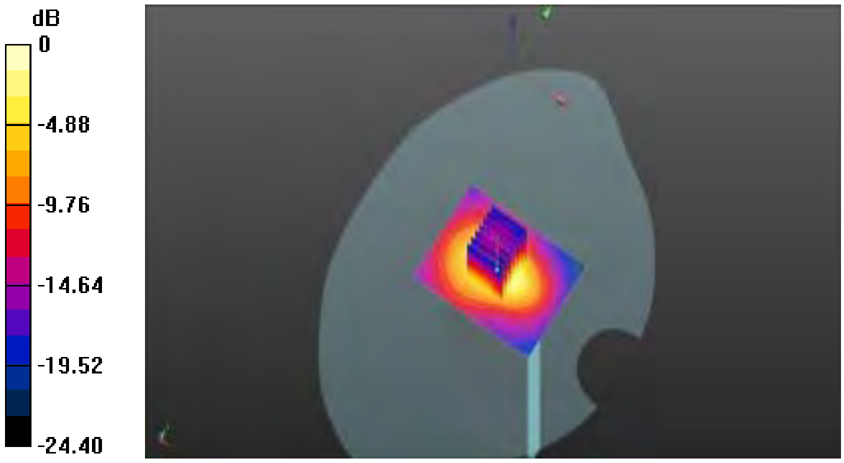


MEAS.21 Body Plane with Bottom Edge on Middle Channel in LTE Band 7 mode

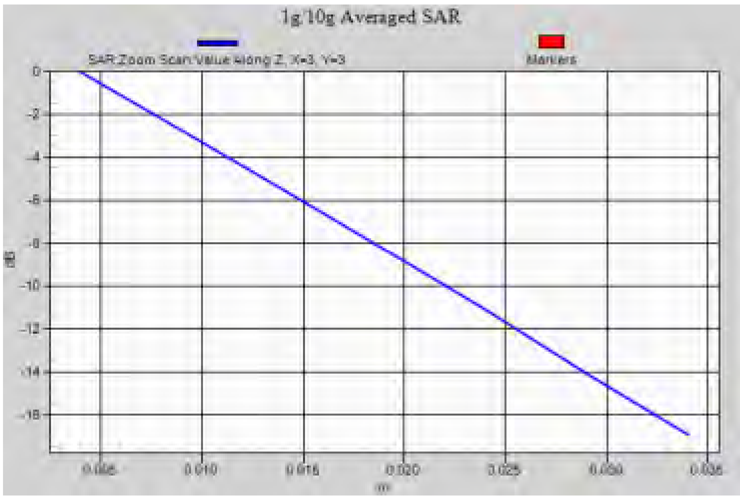
Test Date: 2015.04.24
Communication System Band: Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz); Frequency: 2535 MHz;
Medium parameters used: f = 2535 MHz; ζ = 2.092 S/m; ε_r = 52.57; ρ = 1000 kg/m^3
Probe: EX3DV4-SN: 7340; ConvF(7.11, 7.11, 7.11)

Configuration/LTE Band 7 BODY MID Bottom/Area Scan (81x61x1):
Interpolated grid: dx=1.200 mm, dy=1.200 mm
Reference Value = 20.61 V/m; Power Drift = -0.07 dB
Fast SAR: SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.476 W/kg
Maximum value of SAR (interpolated) = 1.19 W/kg

Configuration/LTE Band 7 BODY MID Bottom/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.61 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.483 W/kg
Maximum value of SAR (measured) = 1.14 W/kg



0 dB = 1.14 W/kg = 0.57 dBW/kg



MEAS.22 Body Plane with Bottom Edge on High Channel in LTE Band 7 mode

Test Date: 2015.04.24

Communication System Band: Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz); Frequency: 2560 MHz;

Medium parameters used: f = 2560 MHz; ζ = 2.092 S/m; ε_r = 52.57; ρ = 1000 kg/m^3

Probe: EX3DV4-SN: 7340; ConvF(7.11, 7.11, 7.11)

Configuration/LTE Band 7 BODY HIG Bottom 2 2/Area Scan (61x131x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Reference Value = 25.63 V/m; Power Drift = 0.06 dB

Fast SAR: SAR(1 g) = 1.35 W/kg; SAR(10 g) = 0.631 W/kg

Maximum value of SAR (interpolated) = 1.63 W/kg

Configuration/LTE Band 7 BODY HIG Bottom 2 2/Zoom Scan (7x7x7)/Cube 0:

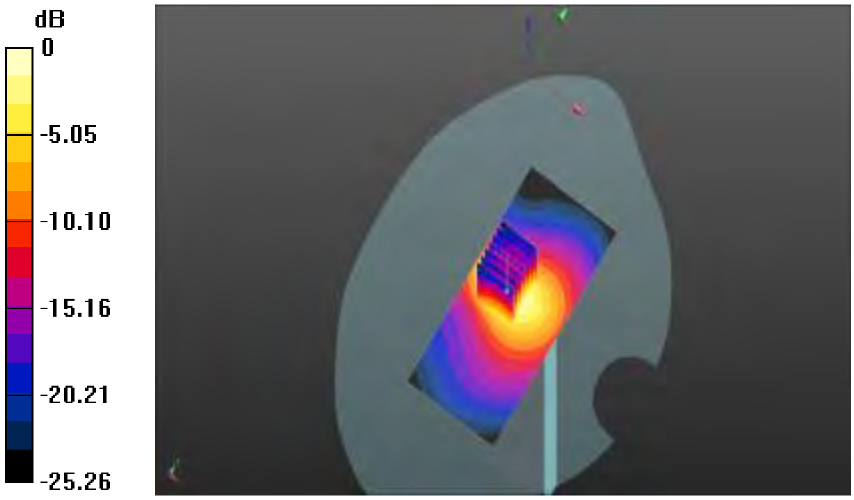
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.63 V/m; Power Drift = 0.06 dB

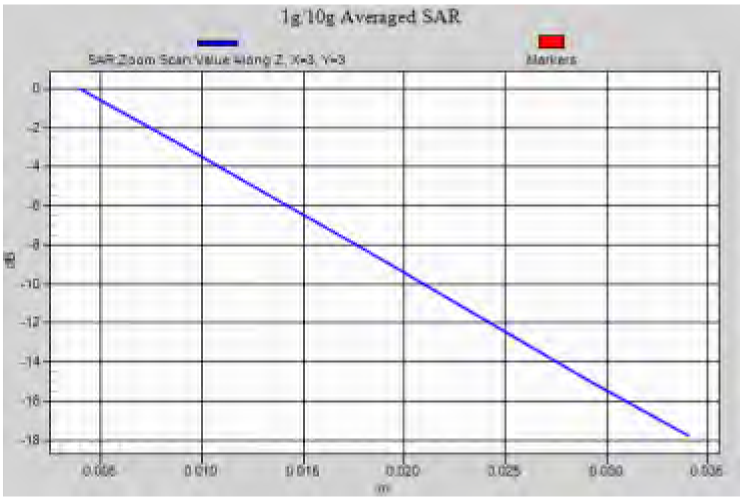
Peak SAR (extrapolated) = 2.76 W/kg

SAR(1 g) = 1.07 W/kg; SAR(10 g) = 0.646 W/kg

Maximum value of SAR (measured) = 1.57 W/kg

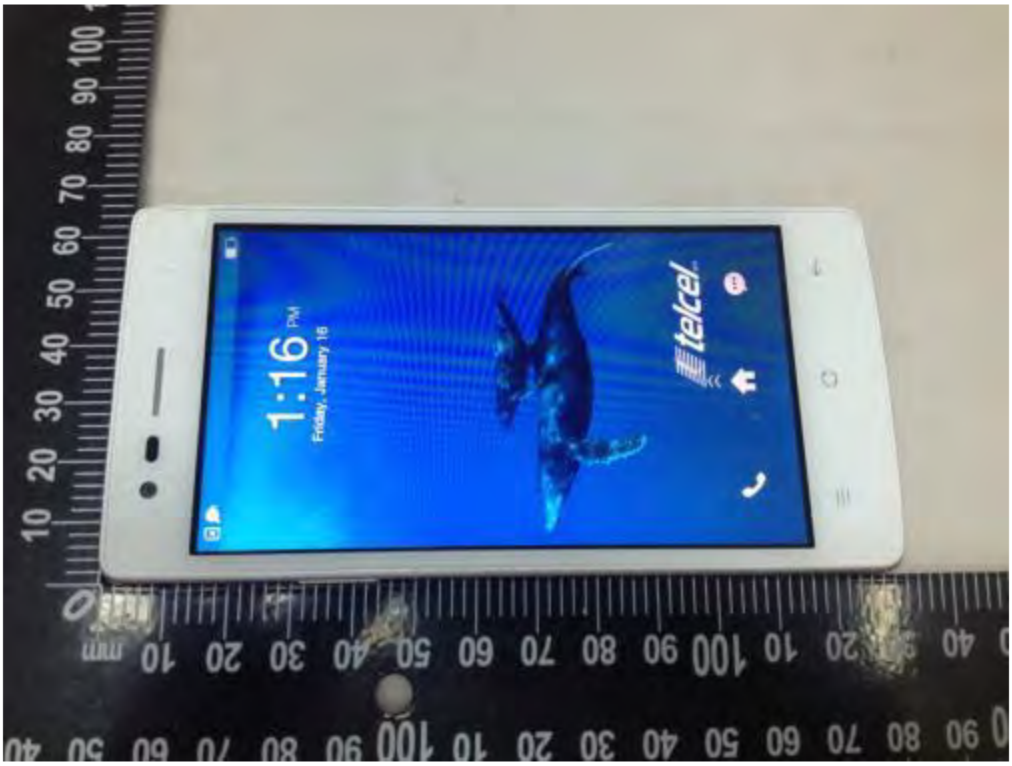


0 dB = 1.57 W/kg = 1.96 dBW/kg



ANNEX D EUT PHOTO

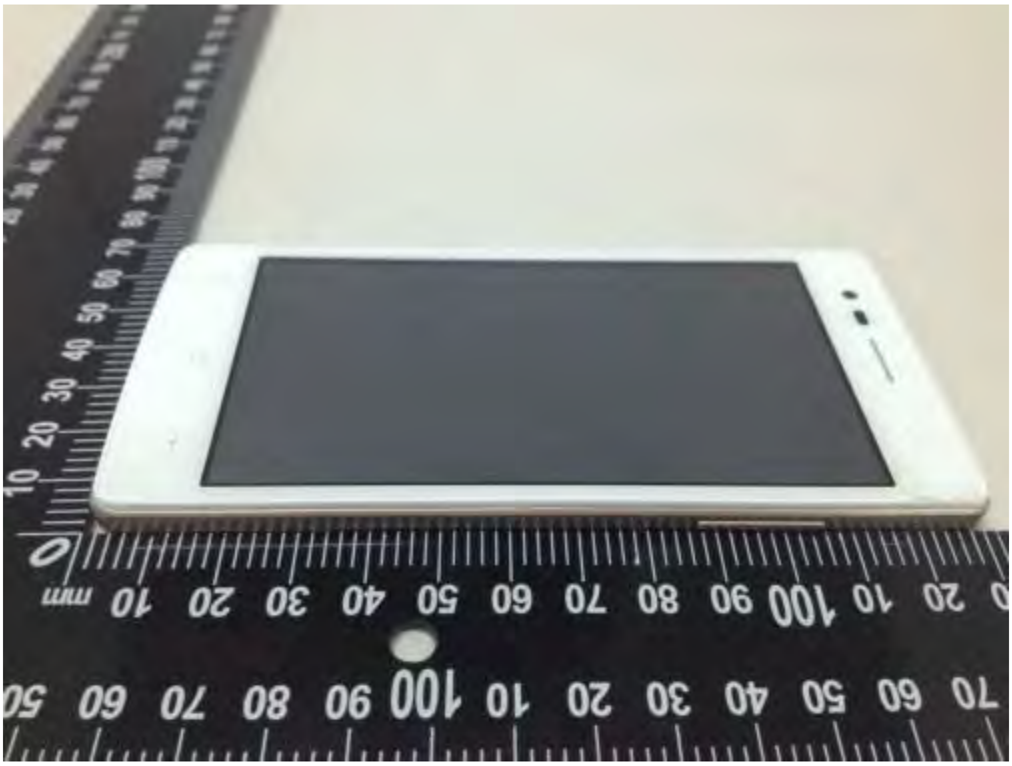
THE FRONT OF EUT



THE BACK OF EUT

THE LEFT OF EUT

THE RIGHT OF EUT



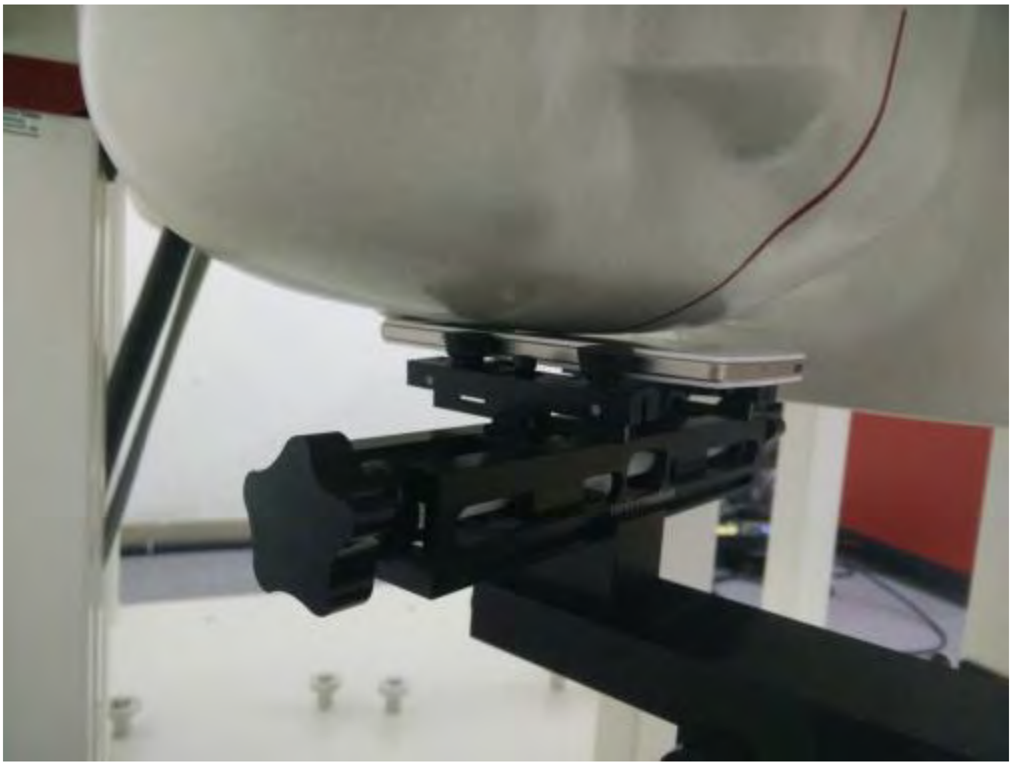
THE UP OF EUT

THE DOWN OF EUT

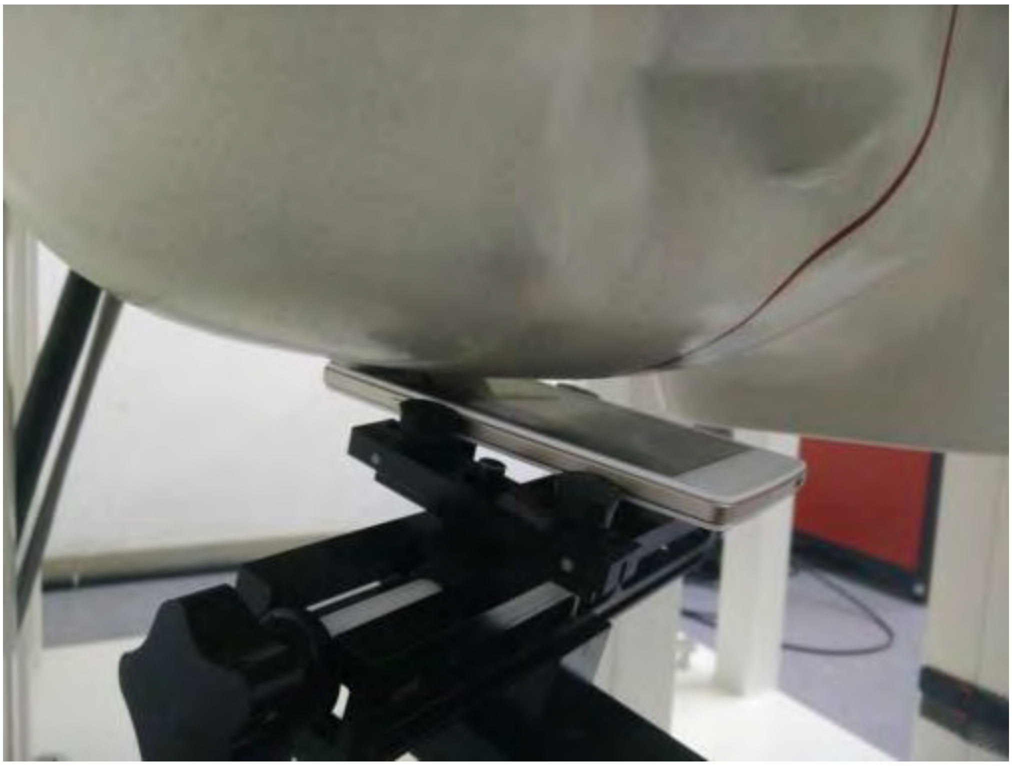
THE INSIDE OF EUT

ANNEX E TEST SETUP PHOTO

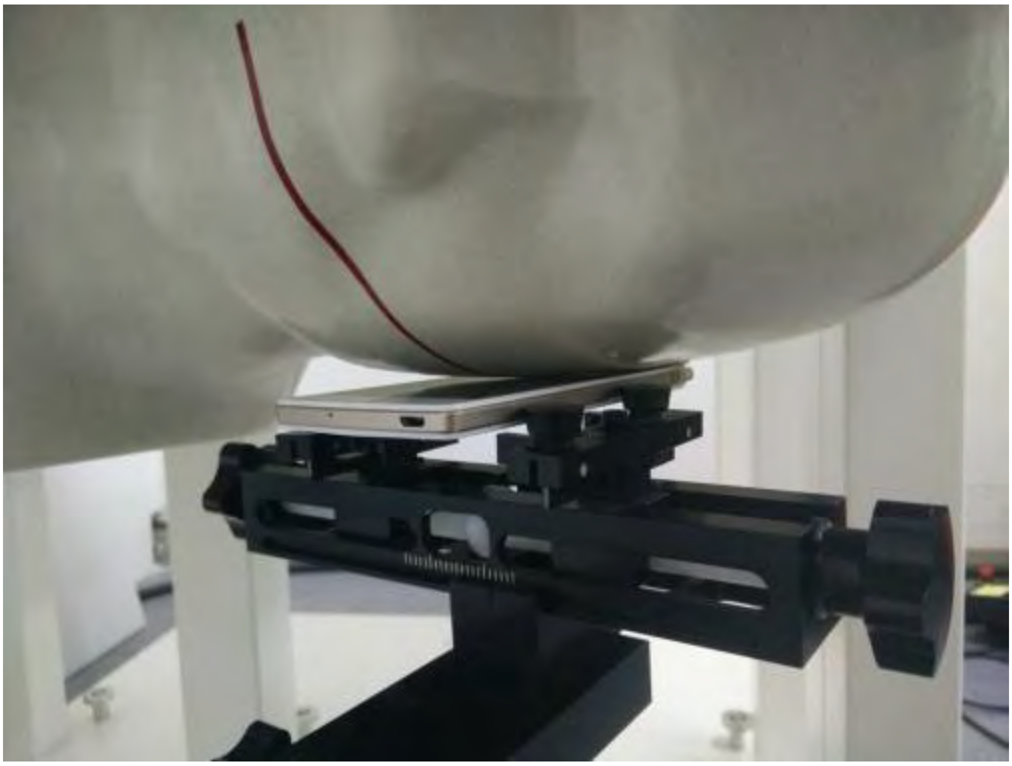
Right Head Cheek



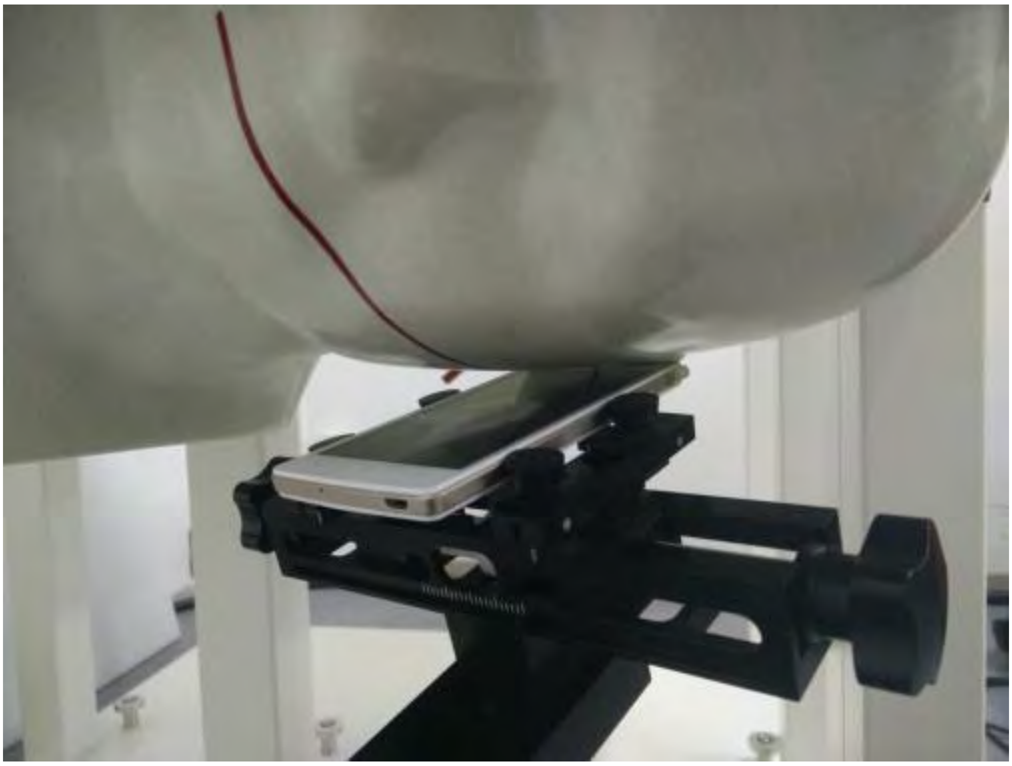
Right Head Tilt



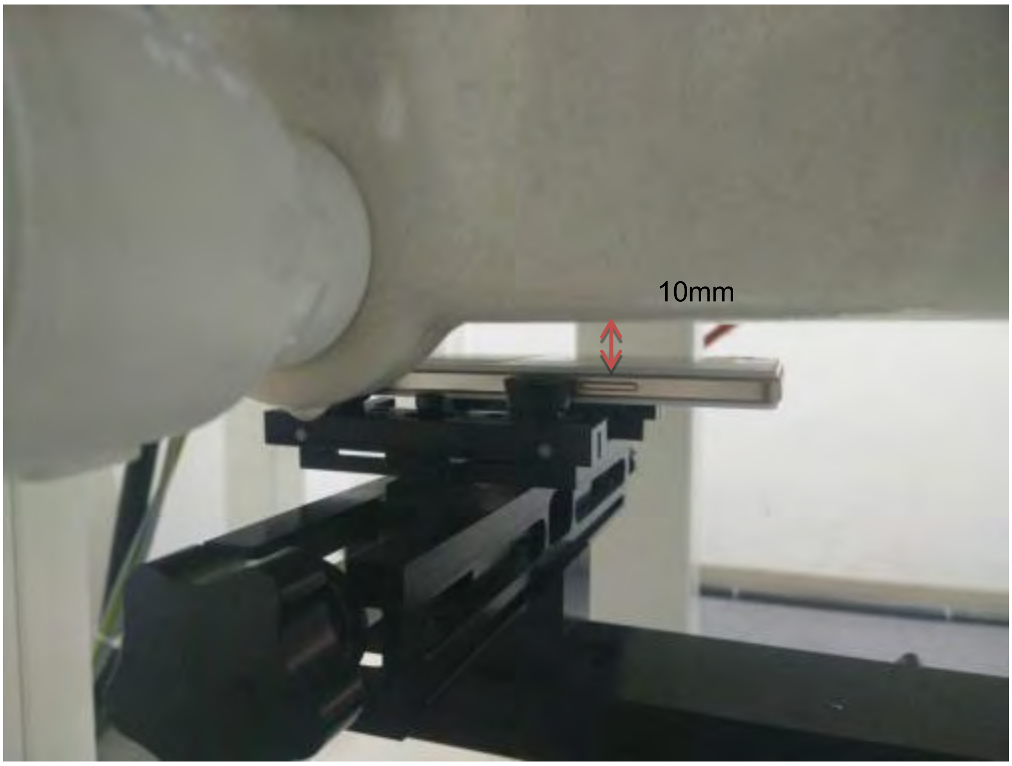
Left Head Cheek



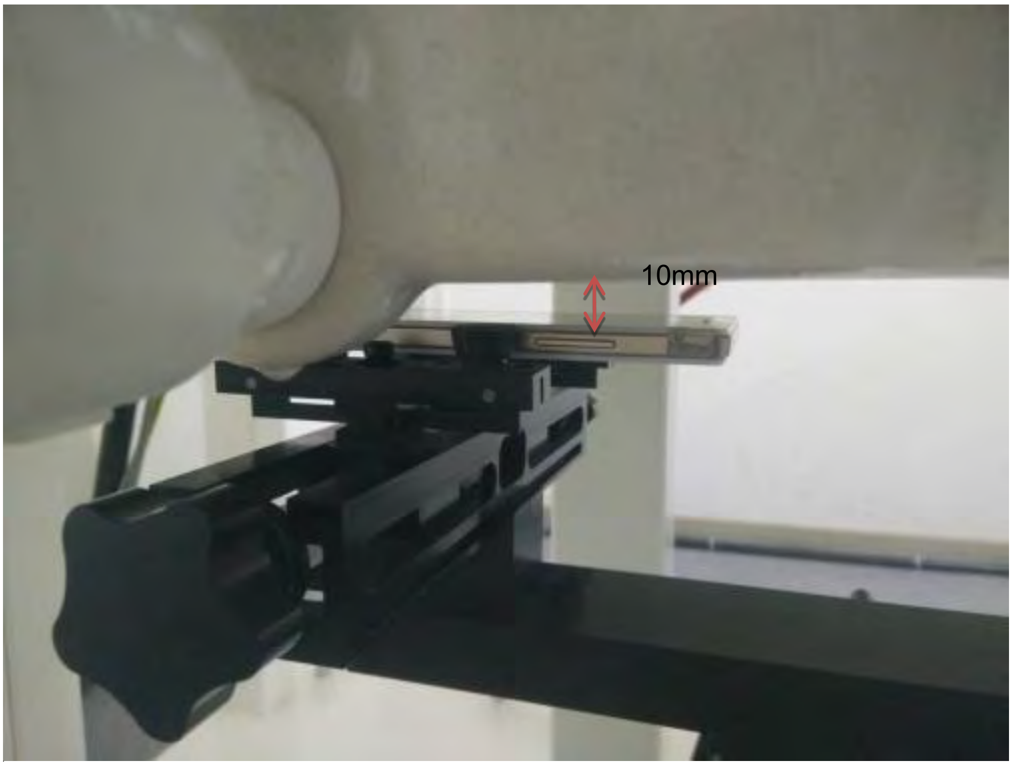
Left Head Tilt



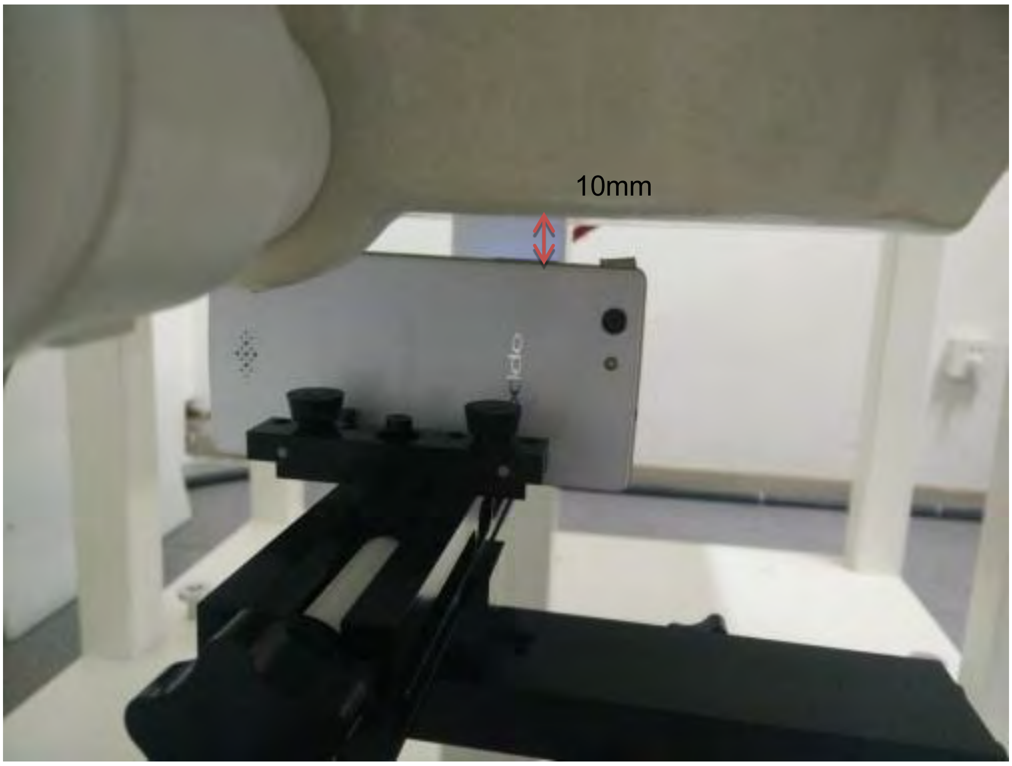
Back Side (10mm)



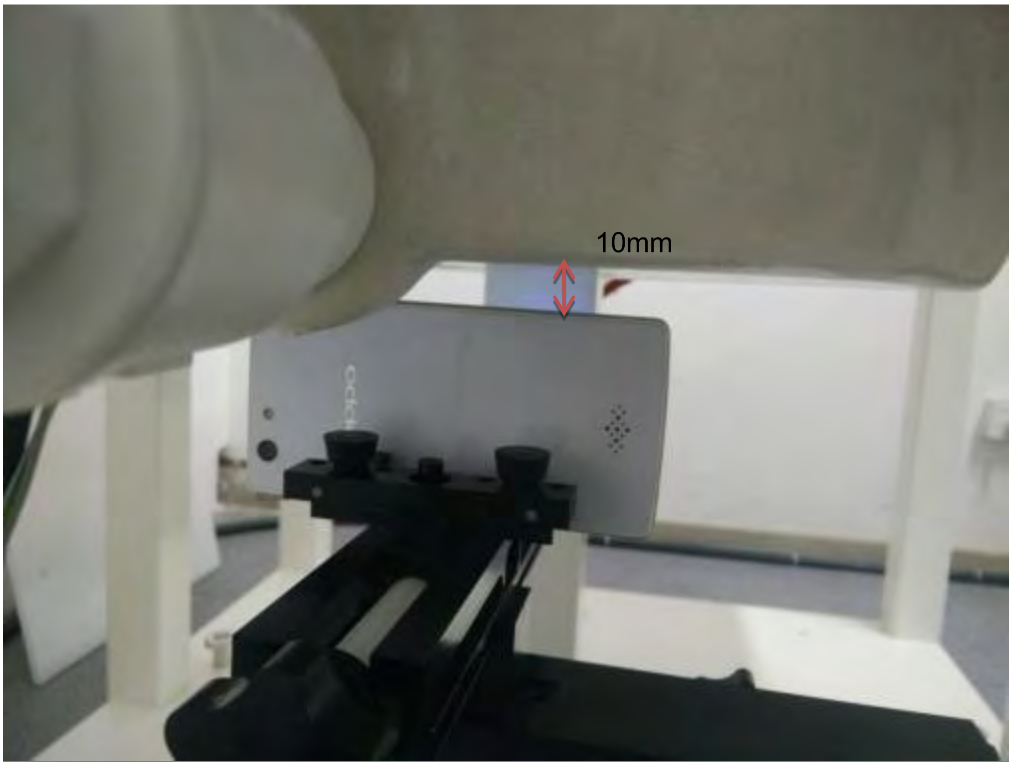
Front Side (10mm)



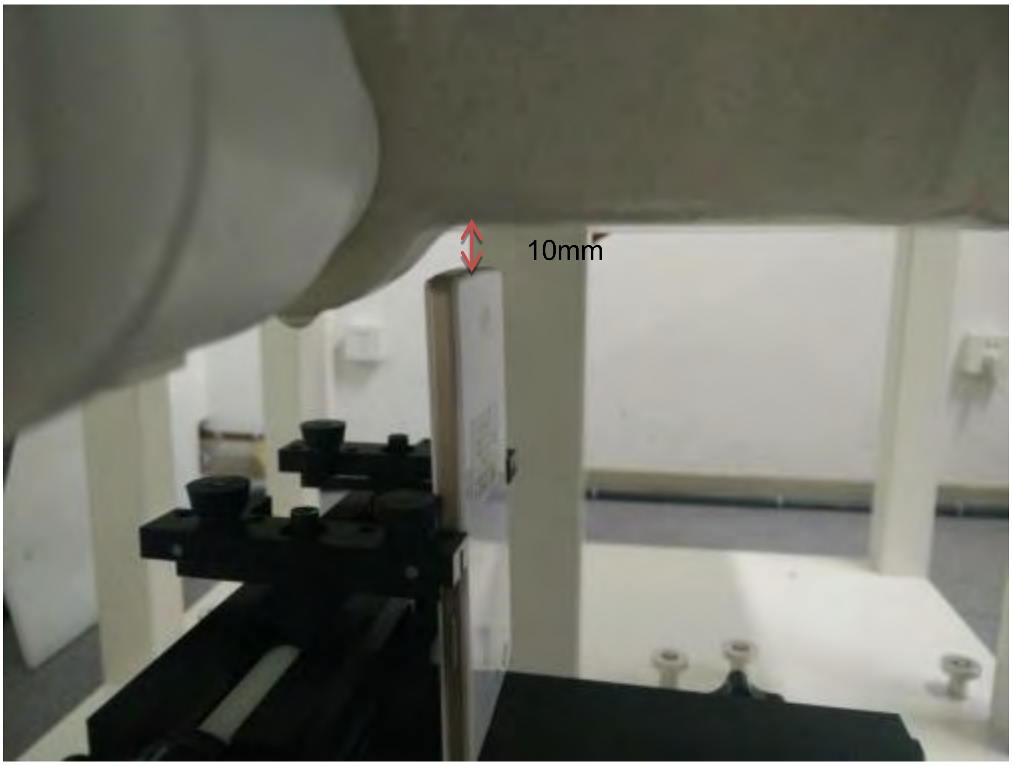
Left Side (10mm)



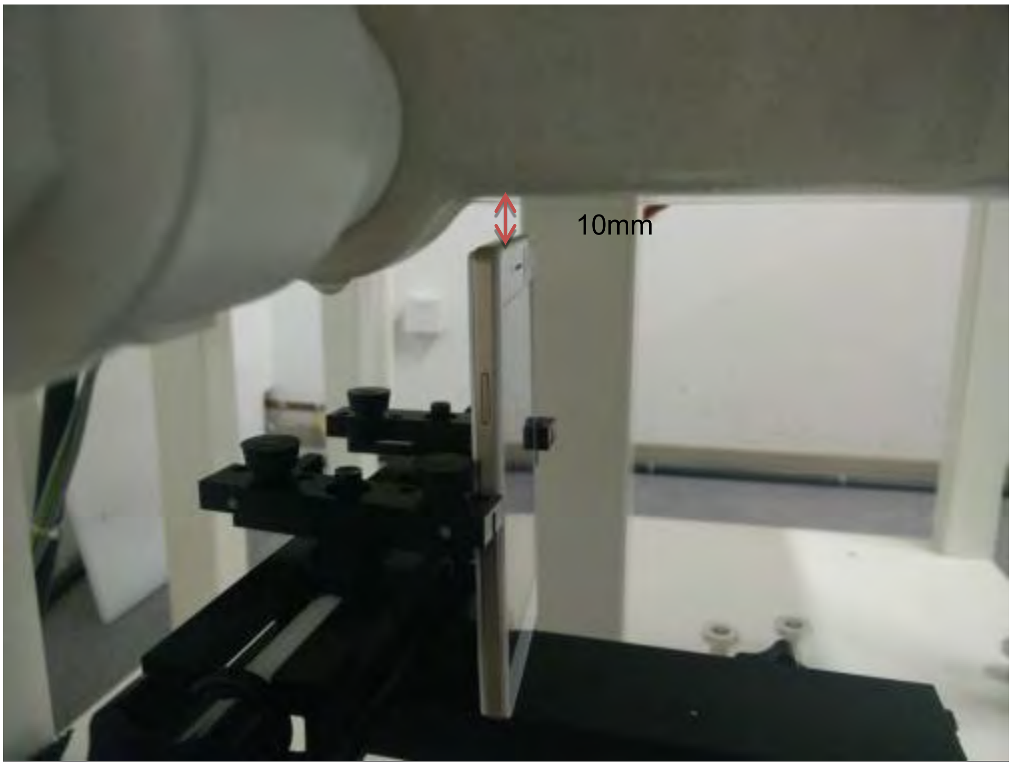
Right Side (10mm)



Bottom Edge (10mm)



Top Edge (10mm)



ANNEX F CALIBRATION REPORT

F.1 E-Field Probe

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

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

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

Accreditation No.: **SCS 108**

Client **Dgiele (Vitec)**

Certificate No: **EX3-7340_Dec14**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7340

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

Calibration date: December 2, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: December 2, 2014

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

Certificate No: EX3-7340_Dec14 Page 1 of 11

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

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

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:7340

Manufactured: July 23, 2014
Calibrated: December 2, 2014

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7340

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	0.53	0.49	0.46	± 10.1 %
DCP (mV)[B]	100.7	91.3	102.1	

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	166.9	±3.3 %
		Y	0.0	0.0	1.0		162.2	
		Z	0.0	0.0	1.0		149.8	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7340

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)
835	41.5	0.90	9.91	9.91	9.91	0.52	0.80	± 12.0 %
1750	40.1	1.37	9.13	9.13	9.13	0.55	0.75	± 12.0 %
1900	40.0	1.40	8.77	8.77	8.77	0.46	0.78	± 12.0 %
2450	39.2	1.80	7.83	7.83	7.83	0.41	0.86	± 12.0 %
2600	39.0	1.96	7.64	7.64	7.64	0.41	0.87	± 12.0 %
5200	36.0	4.66	5.28	5.28	5.28	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.75	4.75	4.75	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.72	4.72	4.72	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. 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 frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7340

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)
835	55.2	0.97	9.97	9.97	9.97	0.69	0.68	± 12.0 %
1750	53.4	1.49	8.53	8.53	8.53	0.41	0.93	± 12.0 %
1900	53.3	1.52	8.18	8.18	8.18	0.80	0.58	± 12.0 %
2450	52.7	1.95	7.55	7.55	7.55	0.80	0.50	± 12.0 %
2600	52.5	2.16	7.11	7.11	7.11	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.62	4.62	4.62	0.45	1.90	± 13.1 %
5600	48.5	5.77	4.10	4.10	4.10	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.31	4.31	4.31	0.50	1.90	± 13.1 %

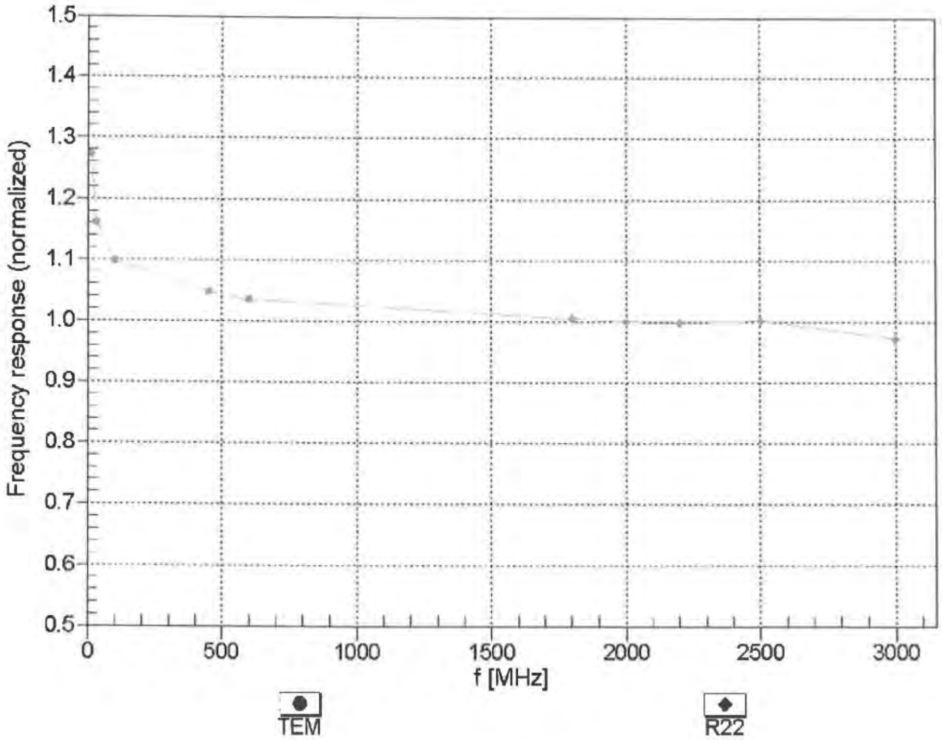
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz 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 frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

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

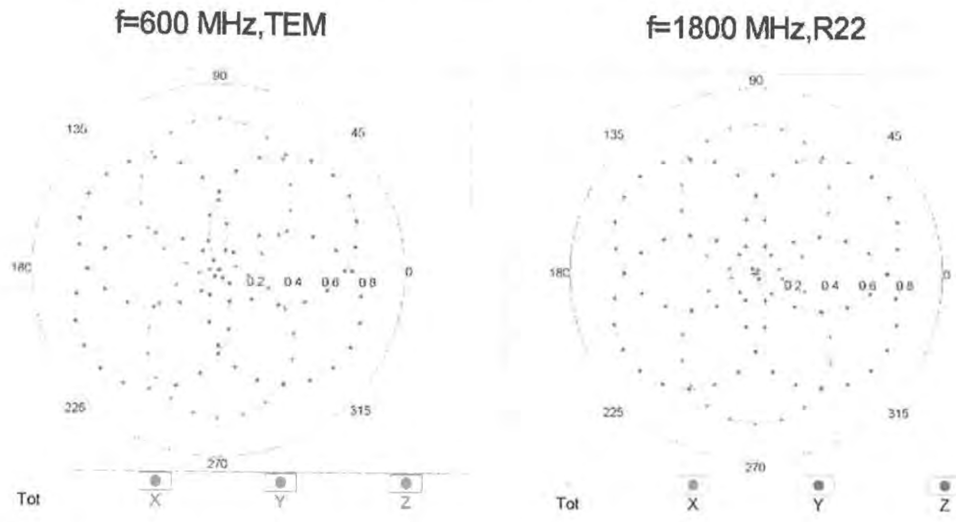


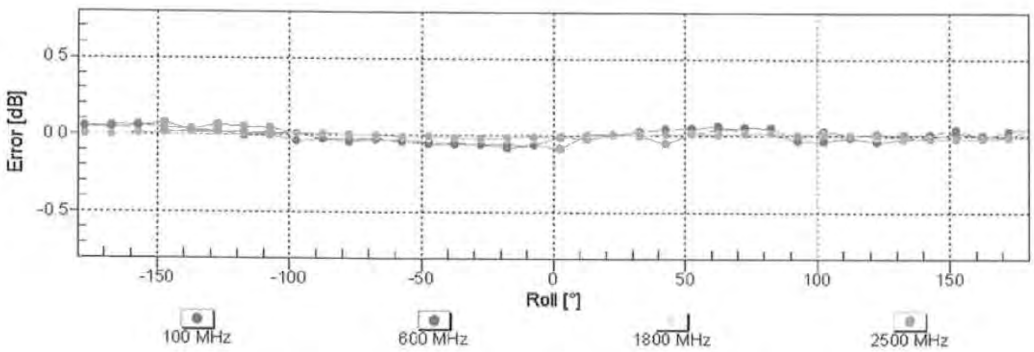
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

EX3DV4– SN:7340

December 2, 2014

Receiving Pattern (ϕ), ϑ = 0°

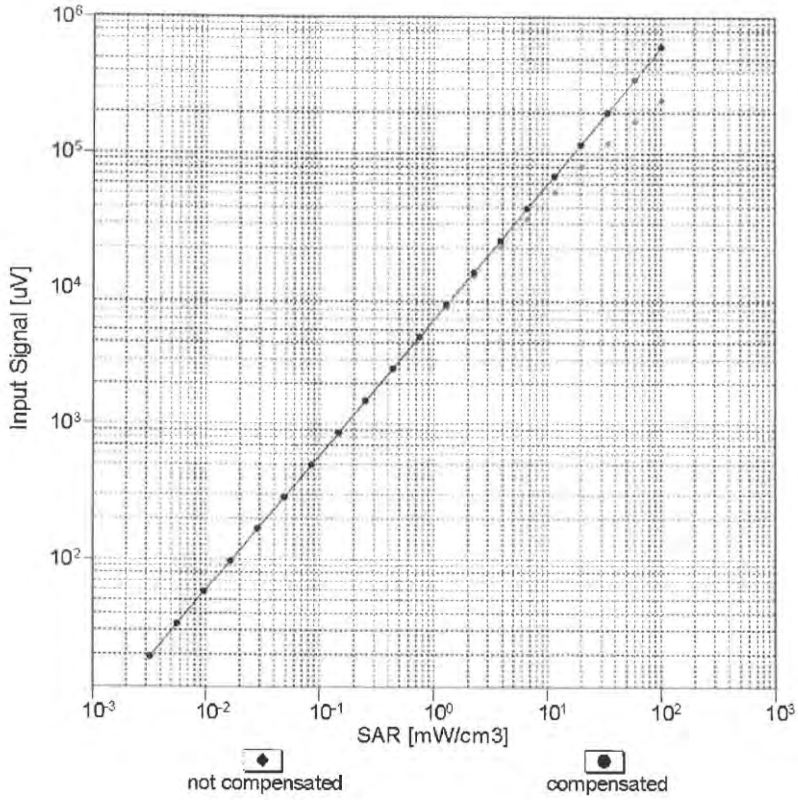


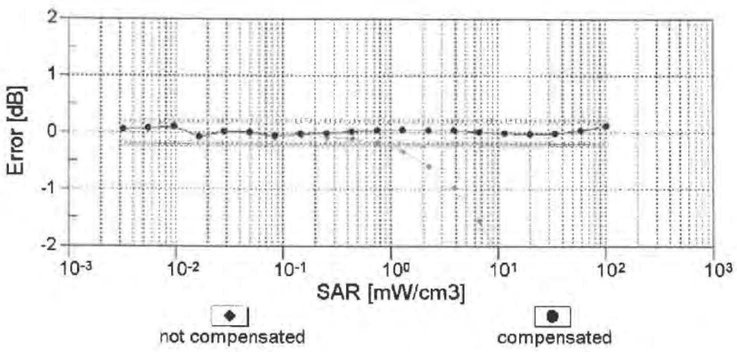


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

(TEM cell , f_{eval}= 1900 MHz)

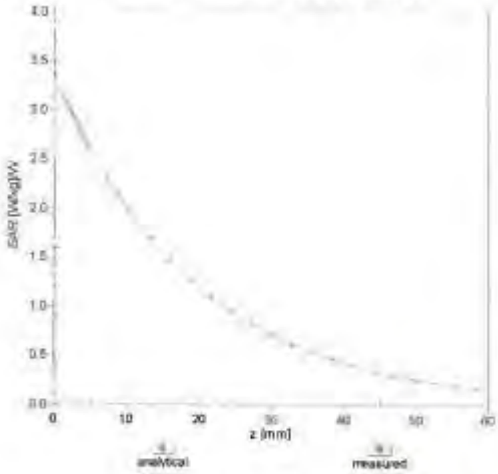




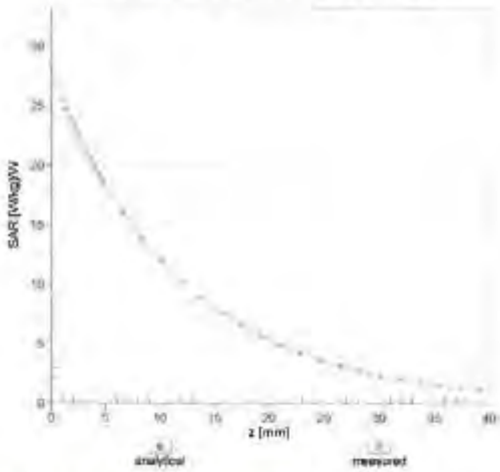
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

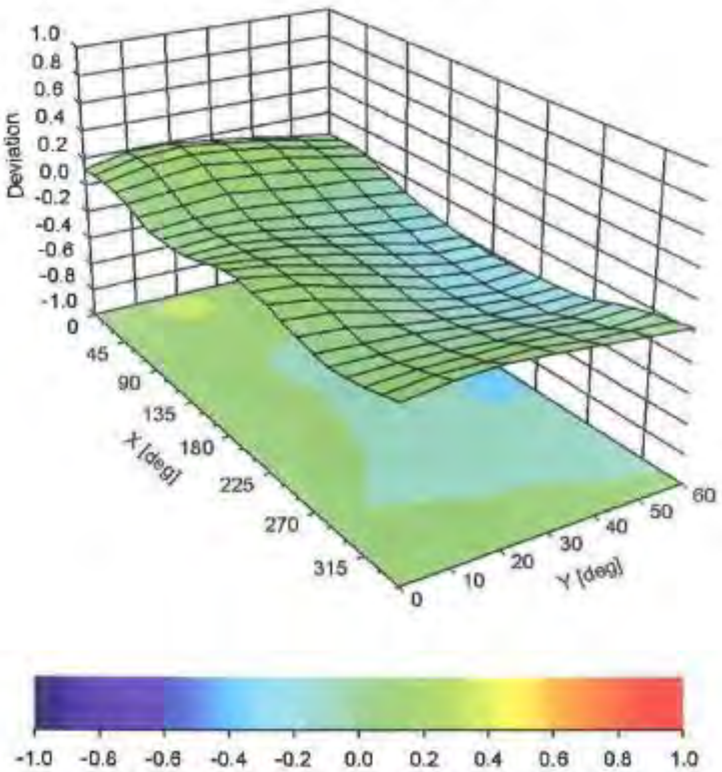


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

EX3DV4– SN:7340 December 2, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7340

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-47.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

F.2 Data Acquisition Electronics

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Accreditation No.: SCS 108

Client **Dgieie (Vitec)**

Certificate No: DAE4-1454_Dec14

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1454
Calibration procedure(s)	QA CAL-06.v28 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	December 01, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-14 (No:15573)	Oct-15
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-14 (in house check)	In house check: Jan-15
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-14 (in house check)	In house check: Jan-15

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	Deputy Technical Manager	i.V.

Issued: December 1, 2014

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Accreditation No.: SCS 108

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.134 ± 0.02% (k=2)	403.641 ± 0.02% (k=2)	403.713 ± 0.02% (k=2)
Low Range	4.01178 ± 1.50% (k=2)	3.98989 ± 1.50% (k=2)	3.99971 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	316.5 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200031.80	-0.26	-0.00
Channel X	+ Input	20001.23	-2.68	-0.01
Channel X	- Input	-20003.35	1.70	-0.01
Channel Y	+ Input	200039.44	7.23	0.00
Channel Y	+ Input	20000.28	-3.57	-0.02
Channel Y	- Input	-20006.44	-1.22	0.01
Channel Z	+ Input	200040.26	7.92	0.00
Channel Z	+ Input	20000.97	-2.84	-0.01
Channel Z	- Input	-20007.52	-2.33	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.65	0.03	0.00
Channel X	+ Input	200.83	0.05	0.02
Channel X	- Input	-198.91	0.45	-0.23
Channel Y	+ Input	2000.46	-0.10	-0.01
Channel Y	+ Input	199.94	-0.66	-0.33
Channel Y	- Input	-199.92	-0.45	0.23
Channel Z	+ Input	2000.59	0.10	0.01
Channel Z	+ Input	199.12	-1.46	-0.73
Channel Z	- Input	-200.88	-1.43	0.72

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-14.55	-16.51
	- 200	17.71	16.60
Channel Y	200	-22.05	-22.66
	- 200	22.22	21.96
Channel Z	200	-12.87	-12.55
	- 200	10.00	9.91

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-2.55	-2.28
Channel Y	200	4.25	-	-1.65
Channel Z	200	9.93	2.36	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16115	16385
Channel Y	16297	16505
Channel Z	16059	16142

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.24	-1.34	0.92	0.37
Channel Y	-0.07	-1.28	0.82	0.40
Channel Z	-1.81	-2.74	-0.39	0.48

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	–0.01	-8	-9

F.3 835MHz Dipole

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Accreditation No.: **SCS 108**

Client **Dgieie (Vitec)**

Certificate No: **D835V2-4d187_Nov14**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d187
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 26, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: November 26, 2014

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.2 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.15 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.95 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.5 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.37 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.17 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.04 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.5 Ω - 3.6 jΩ
Return Loss	- 28.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω - 4.9 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.394 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 24, 2014

DASY5 Validation Report for Head TSL

Date: 26.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

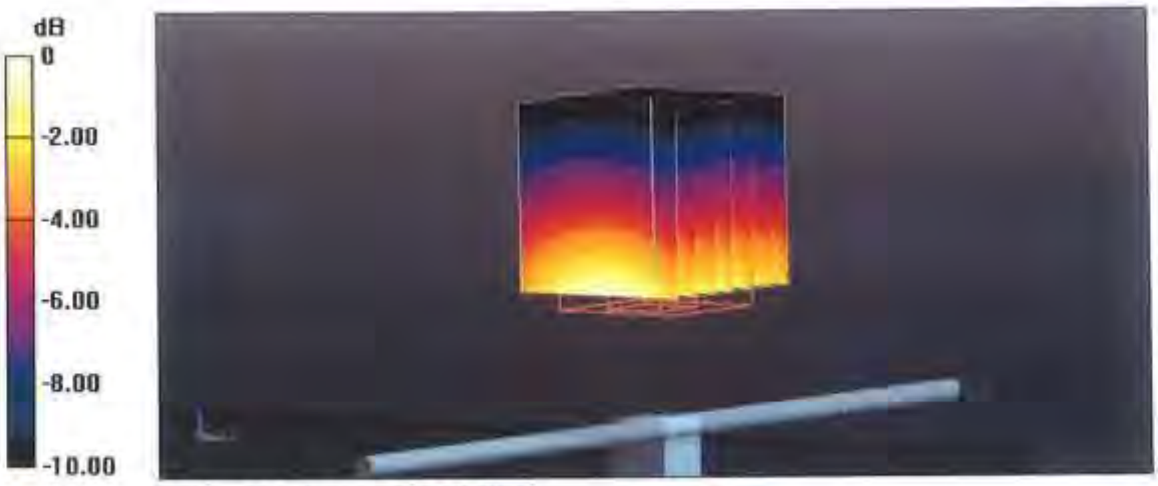
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d187

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 41.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

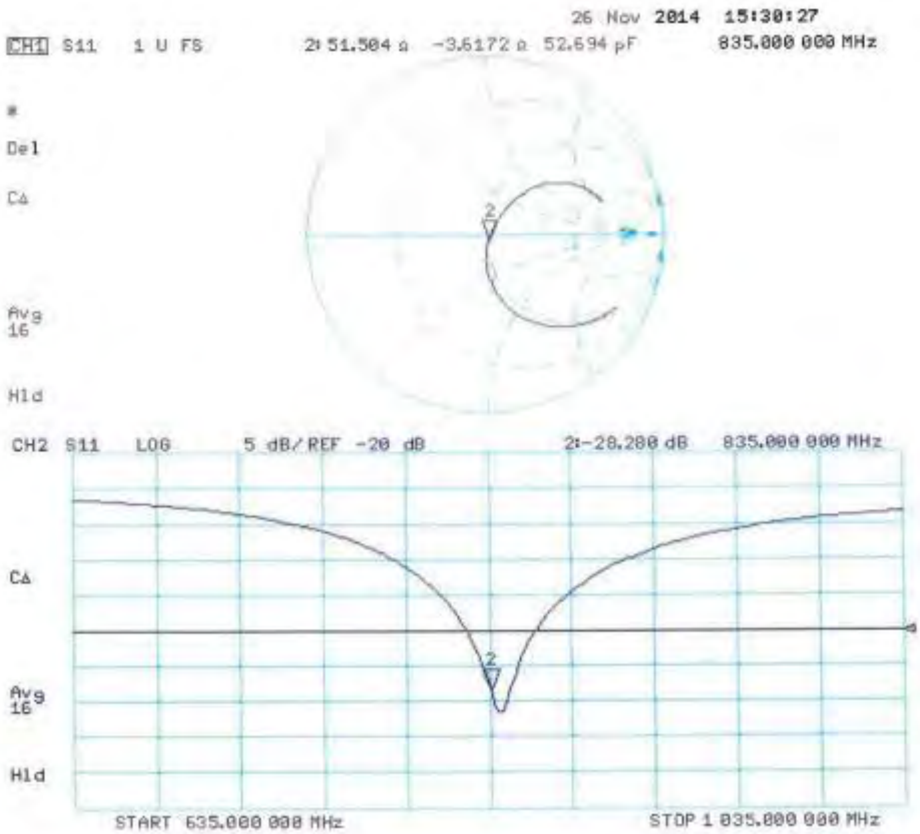
- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.30 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.44 W/kg
SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.5 W/kg
Maximum value of SAR (measured) = 2.71 W/kg



0 dB = 2.71 W/kg = 4.33 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 26.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

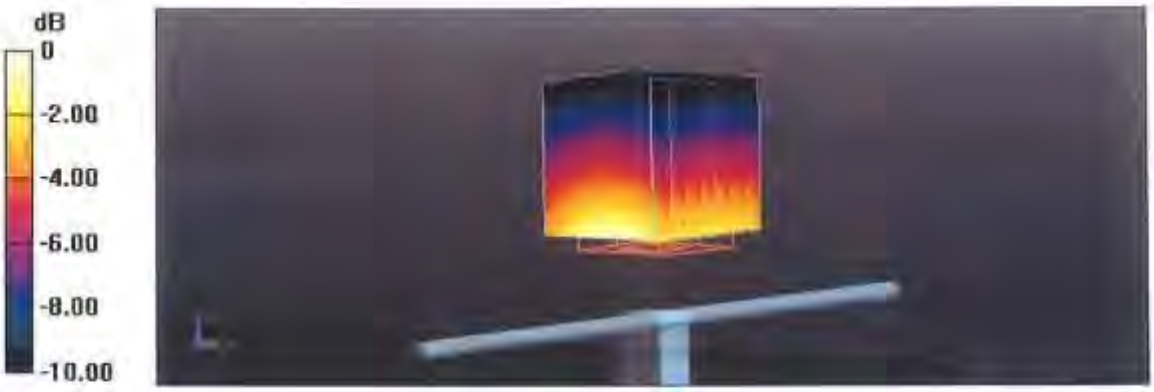
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d187

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

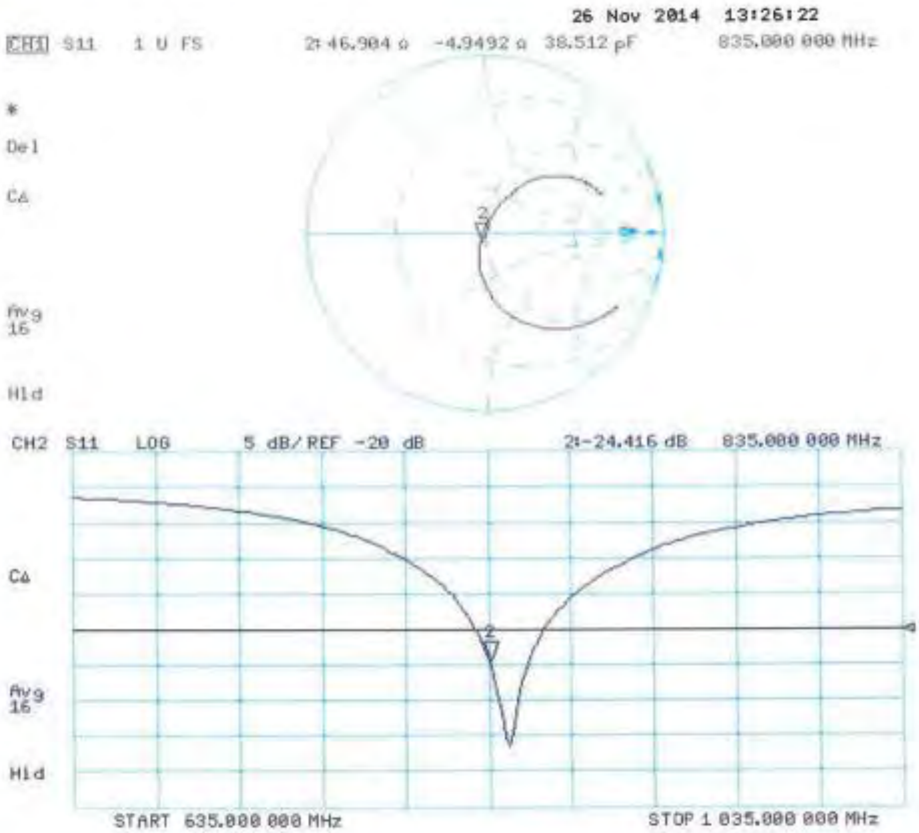
- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.07 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.48 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 2.77 W/kg



0 dB = 2.77 W/kg = 4.42 dBW/kg

Impedance Measurement Plot for Body TSL



Certificate No: D835V2-4d187_Nov14 Page 8 of 8

F.4 1750MHz Dipole

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Accreditation No.: SCS 108

Client **Dgleie (Vitec)**

Certificate No: D1750V2-1130_Nov14

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1130
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 28, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: November 28, 2014

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, “SAR Measurement Requirements for 100 MHz to 6 GHz”

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	1.49 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.1 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 1.2 jΩ
Return Loss	- 37.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 0.3 jΩ
Return Loss	- 28.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.223 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 03, 2014

DASY5 Validation Report for Head TSL

Date: 28.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

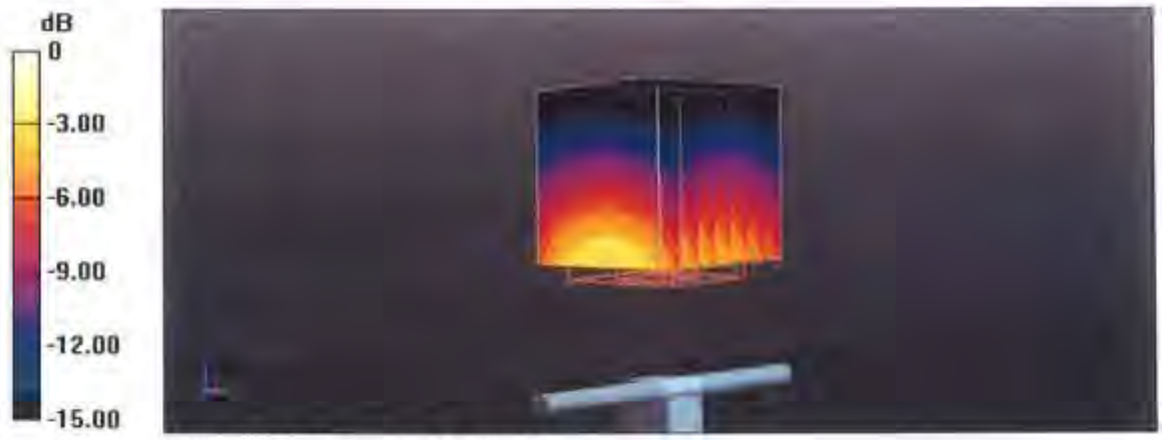
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1130

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma = 1.37$ S/m; $\varepsilon_r = 39.2$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

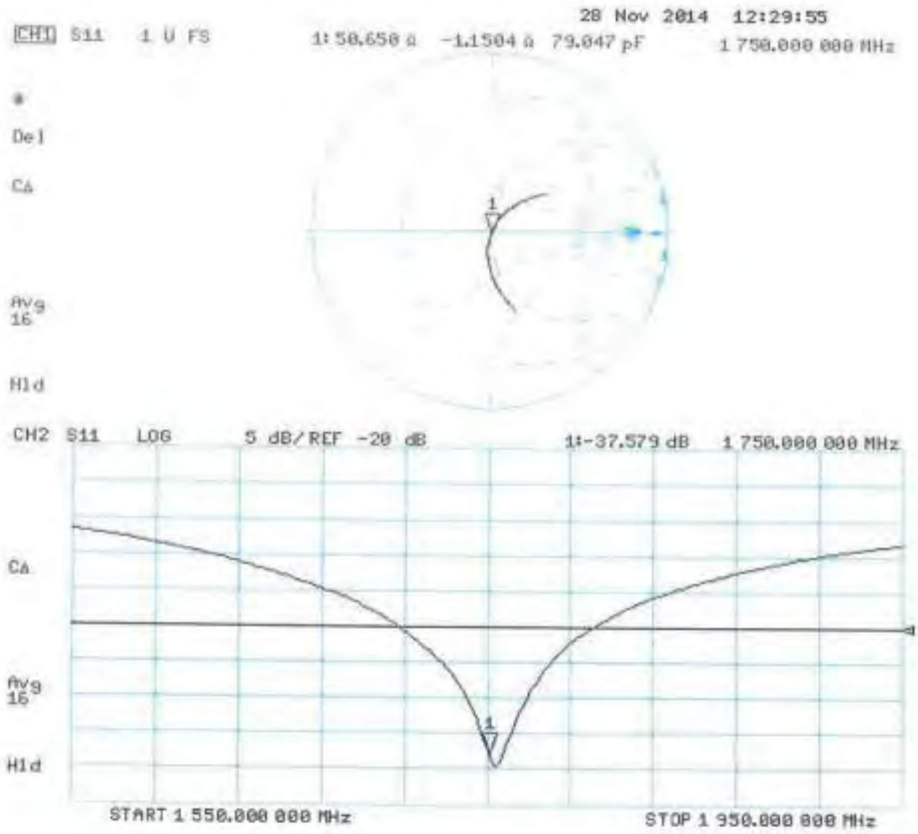
- Probe: ES3DV3 - SN3205; ConvF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.02 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.14 W/kg; SAR(10 g) = 4.85 W/kg
Maximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.6 W/kg = 10.64 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 28.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

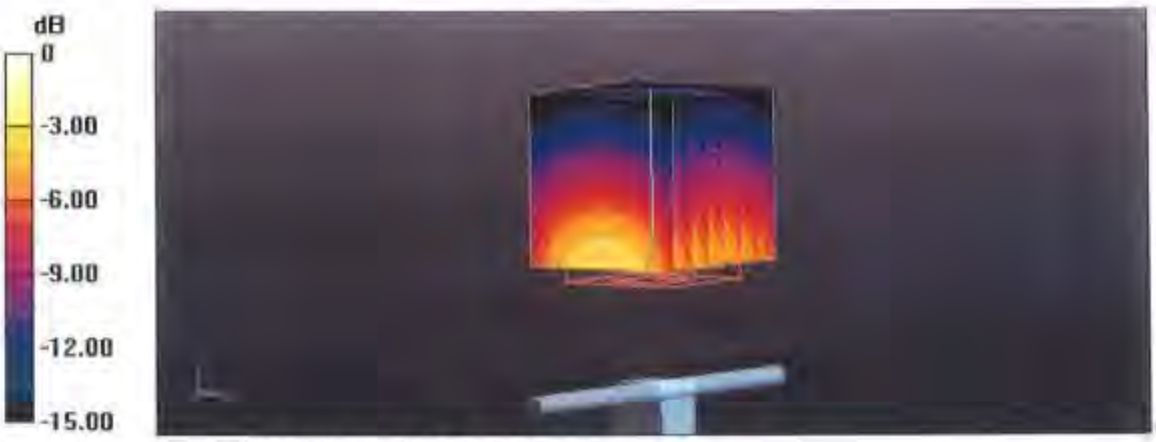
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1130

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.49 S/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

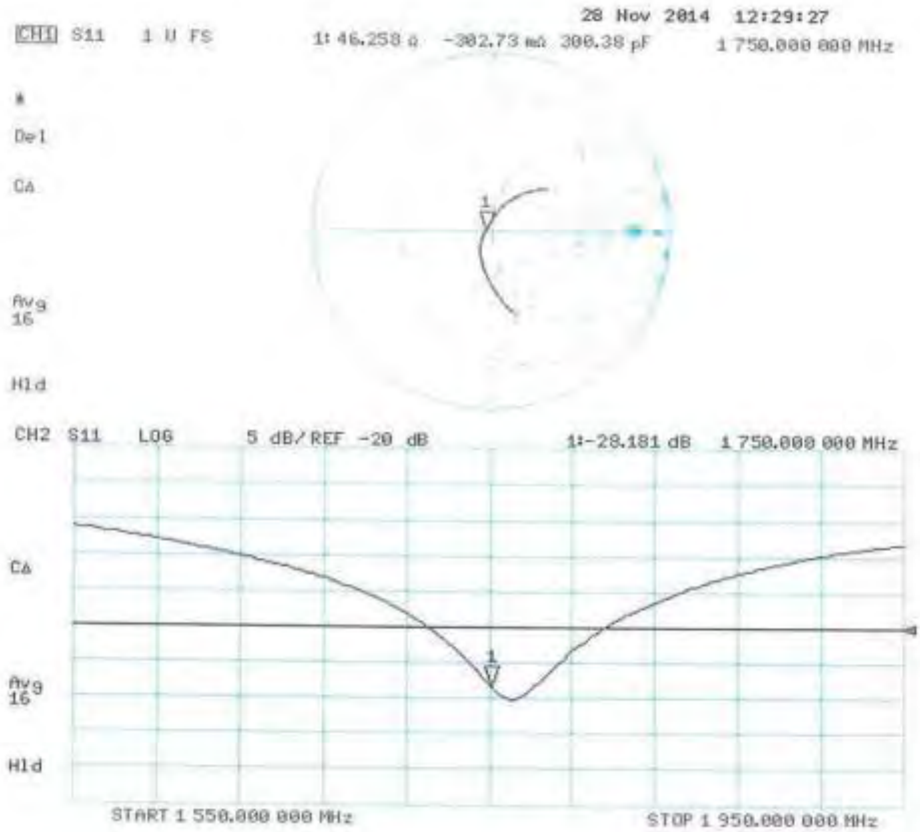
- Probe: ES3DV3 - SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.19 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.39 W/kg; SAR(10 g) = 5.05 W/kg
Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

Impedance Measurement Plot for Body TSL



F.5 1900MHz Dipole

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Accreditation No.: SCS 108

Client **Dgieie (Vitec)**

Certificate No: **D1900V2-5d193_Nov14**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d193
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 28, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: December 2, 2014

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

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.1 ± 6 %	1.39 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.2 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.3 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.00 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.31 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω + 4.8 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 5.1 jΩ
Return Loss	- 25.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 06, 2014

DASY5 Validation Report for Head TSL

Date: 21.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

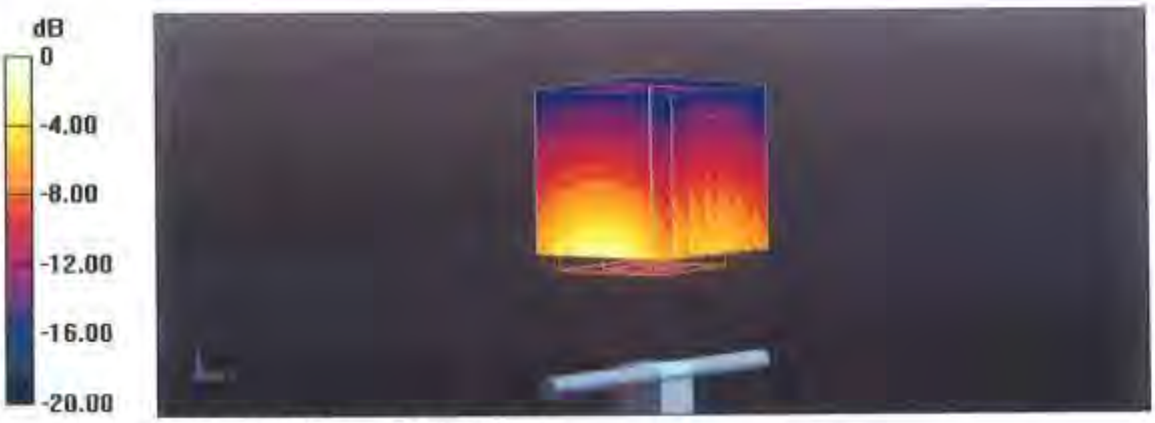
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d193

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.39 S/m; ε_r = 40.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

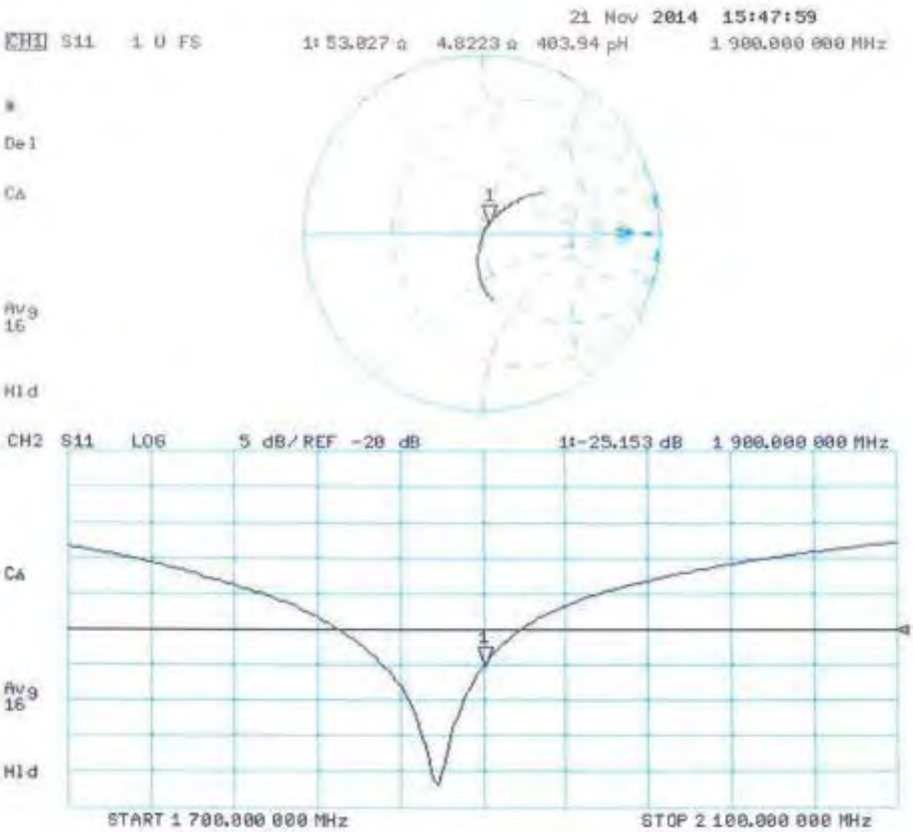
- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.65 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.29 W/kg
Maximum value of SAR (measured) = 12.8 W/kg



0 dB = 12.8 W/kg = 11.07 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 28.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

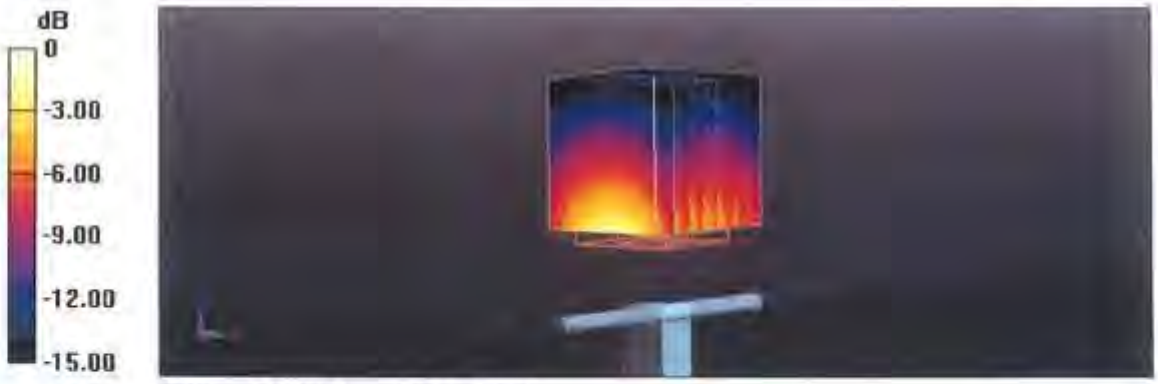
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d193

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.5$ S/m; $\varepsilon_r = 53.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

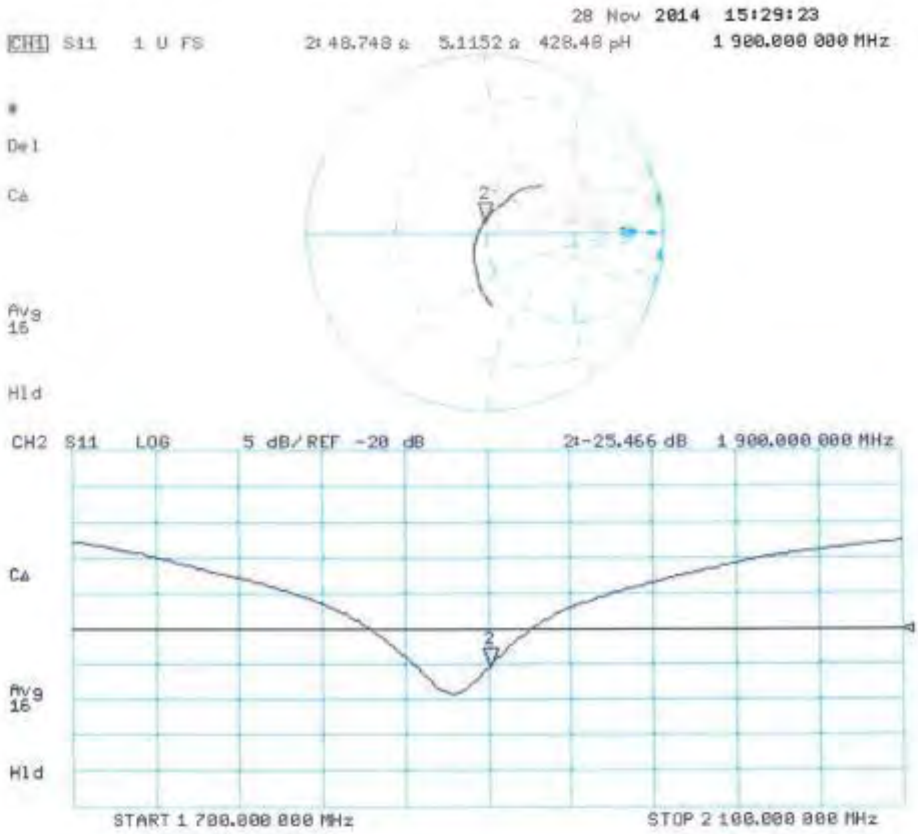
- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.76 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 10 W/kg; SAR(10 g) = 5.31 W/kg
Maximum value of SAR (measured) = 12.6 W/kg



0 dB = 12.6 W/kg = 11.00 dBW/kg

Impedance Measurement Plot for Body TSL



F.6 2450MHz Dipole

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Accreditation No.: SCS 108

Client **Dgieie (Vitec)**

Certificate No: D2450V2-952_Nov14

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 952
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 27, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 28, 2014

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.02 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω + 3.0 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω + 5.1 jΩ
Return Loss	- 25.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 05, 2014

DASY5 Validation Report for Head TSL

Date: 27.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

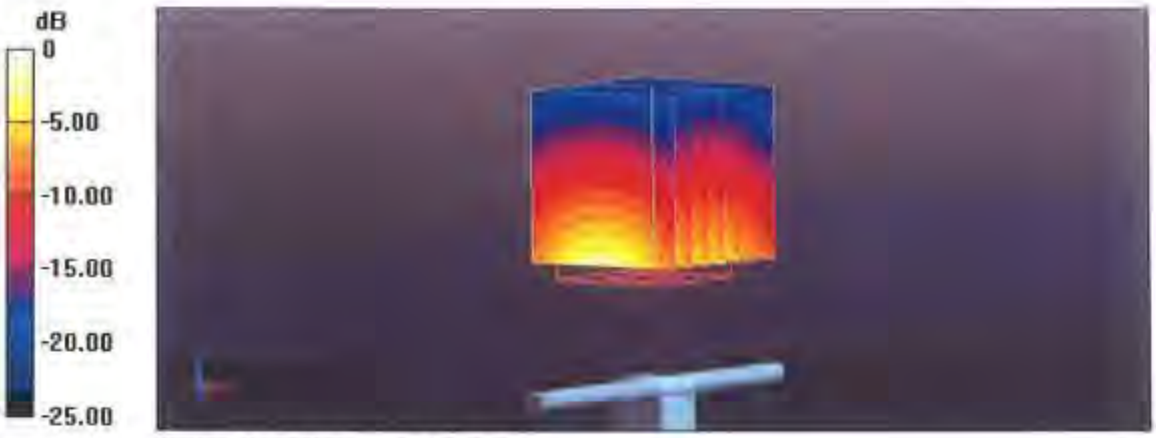
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 952

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma = 1.86$ S/m; $\varepsilon_r = 39$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

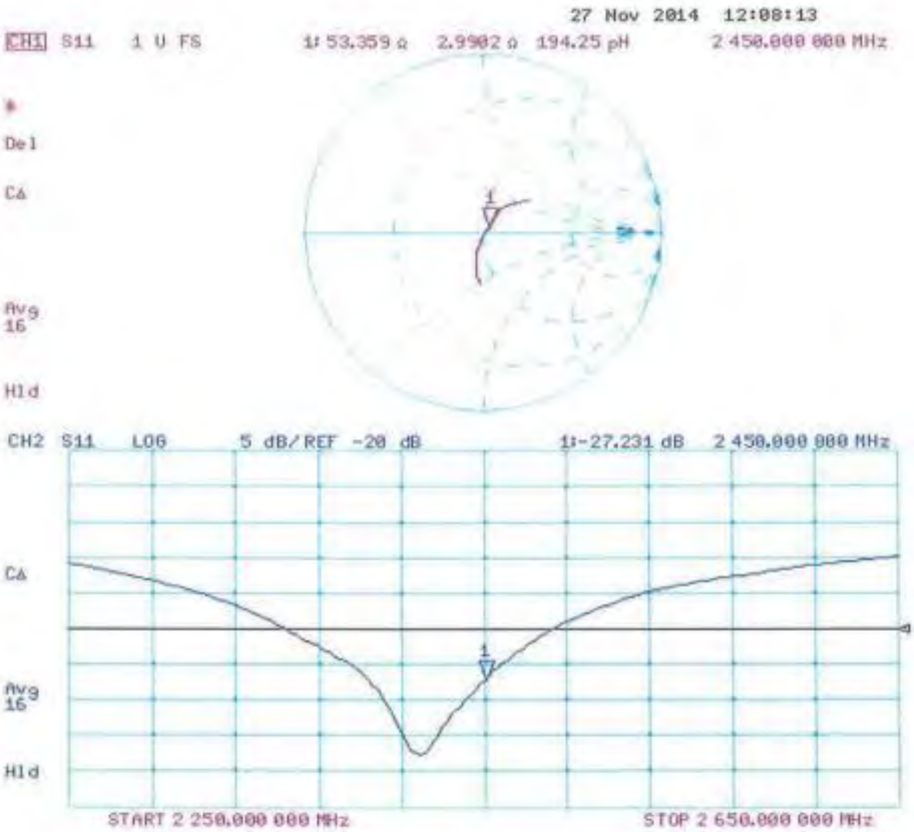
- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

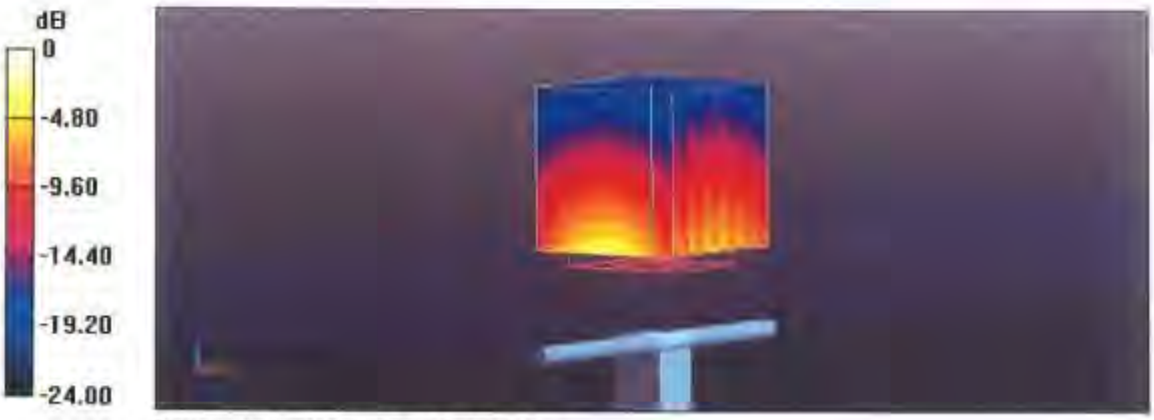
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 952

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma = 2.03$ S/m; $\varepsilon_r = 50.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

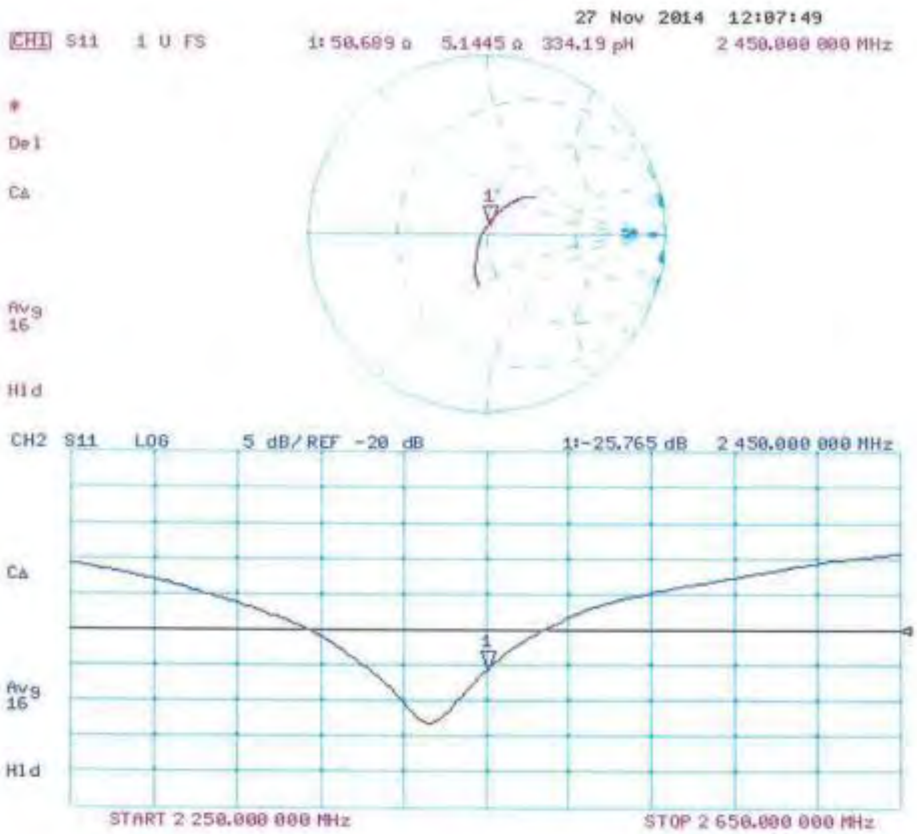
- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.25 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.2 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.02 W/kg
Maximum value of SAR (measured) = 17.3 W/kg



0 dB = 17.3 W/kg = 12.38 dBW/kg

Impedance Measurement Plot for Body TSL



F.7 2600MHz Dipole

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

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

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

Accreditation No.: **SCS 108**

Client **Dgieie (Vitec)**

Certificate No: **D2600V2-1095_Nov14**

CALIBRATION CERTIFICATE

Object: D2600V2 - SN: 1095

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: November 27, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 28, 2014

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

Certificate No: D2600V2-1095_Nov14 Page 1 of 8

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

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S Swiss Calibration Service

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	2.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.5 ± 6 %	2.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**56.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**25.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3 Ω - 5.4 jΩ
Return Loss	- 25.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.5 Ω - 3.9 jΩ
Return Loss	- 25.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.152 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 27, 2014

DASY5 Validation Report for Head TSL

Date: 27.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

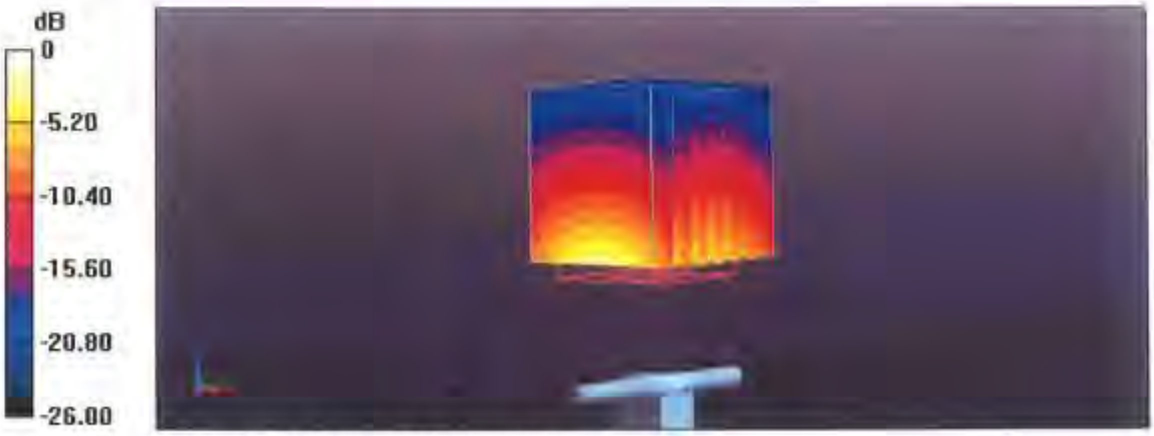
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1095

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.03 S/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

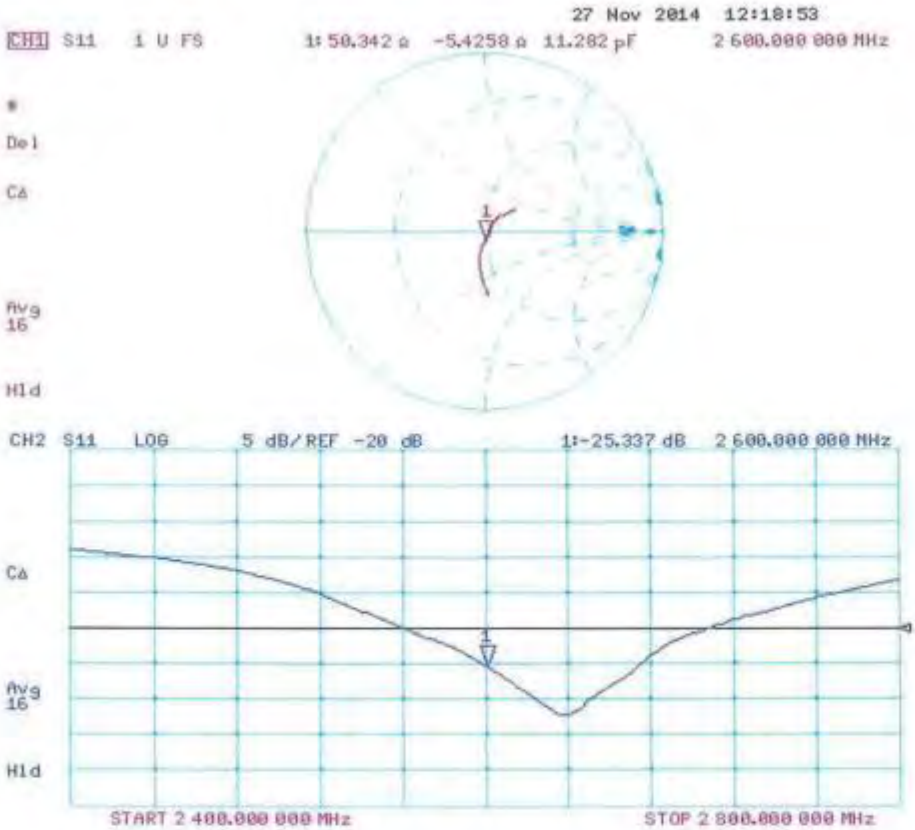
- Probe: ES3DV3 - SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.5 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.5 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

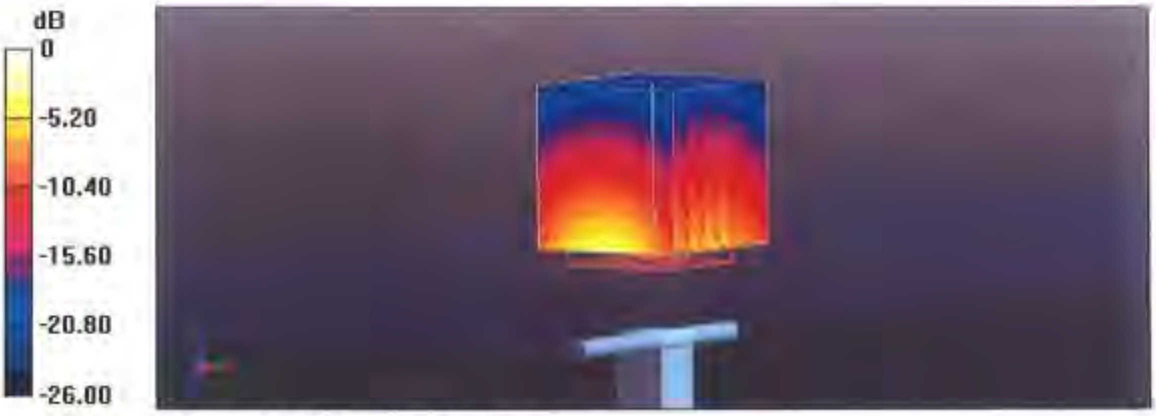
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1095

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.21 S/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

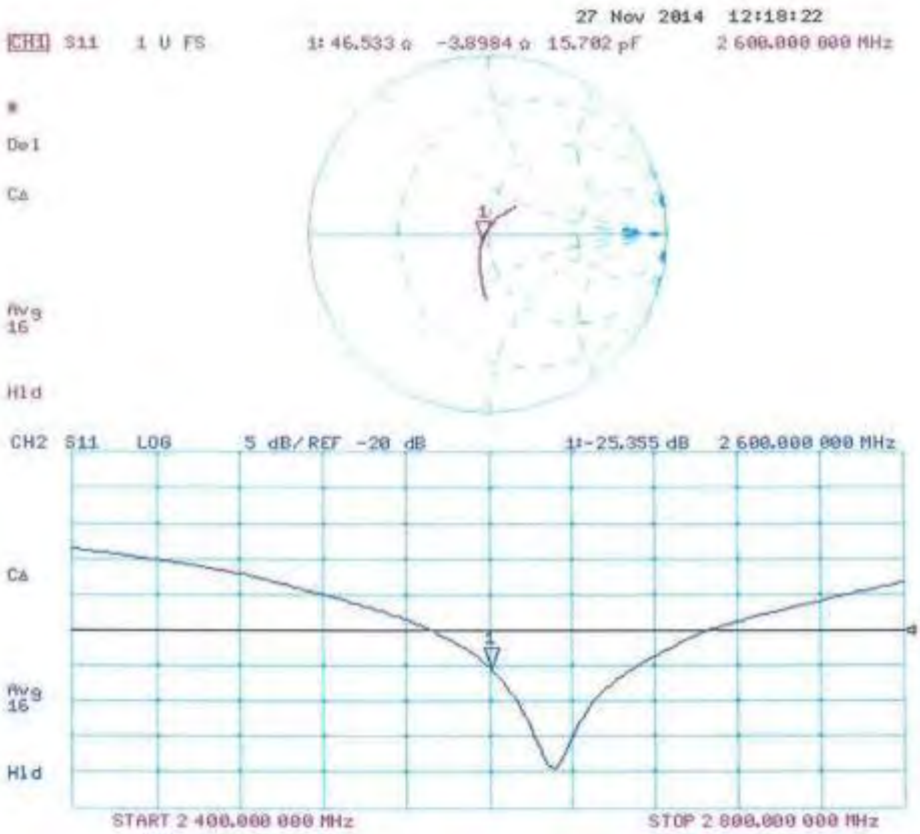
- Probe: ES3DV3 - SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.34 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.44 W/kg
Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dBW/kg

Impedance Measurement Plot for Body TSL



--END OF REPORT--