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

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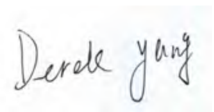
FCC SAR TEST REPORT

Application No:	SZEM1804002506RG
Applicant:	Hisense International Co., Ltd
Manufacturer:	Hisense Communications Co., Ltd.
Factory:	Hisense Communications Co., Ltd.
Product Name:	Mobile Phone
Model No.(EUT):	Hisense T17
Trade Mark:	Hisense
FCC ID:	2ADOBT17
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2018-03-25
Date of Test:	2018-03-28 to 2018-03-29
Date of Issue:	2018-04-10
Test conclusion:	**PASS ***

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

Authorized Signature:



Derek Yang

Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

REVISION HISTORY

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2018-04-10		Original

TEST SUMMARY

Frequency Band	Maximum Reported SAR(W/kg)		
	Head	Body-worn	Hotspot
GSM850	0.47	0.67	1.2
GSM1900	0.18	0.25	0.76
WCDMA Band II	0.29	0.39	0.79
WCDMA Band IV	0.22	0.26	0.55
WCDMA Band V	0.27	0.36	0.40
WI-FI (2.4GHz)	0.26	0.04	0.08
SAR Limited(w/kg)	1.6		
Maximum Simultaneous Transmission SAR (W/kg)			
Scenario	Head	Body-worn	Hotspot
Sum SAR	0.74	0.71	1.21
SPLSR			
SPLSR Limited	0.04		

Approved & Released by

Simon Ling

SAR Manager

Tested by

Gavin Gao

SAR Engineer

CONTENTS

1 General Information

1.1 Details of Client

Applicant:	Hisense International Co., Ltd.
Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
Manufacturer:	Hisense Communications Co., Ltd.
Address:	218 Qianwangang Road, Economic & Technological Development Zone, Qingdao, Shandong Province, P.R. China
Factory:	Hisense Communications Co., Ltd.
Address:	218 Qianwangang Road, Economic & Technological Development Zone, Qingdao, Shandong Province, P.R. China

1.2 Test Location

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

Address: No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China

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1.3 Test Facility

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

• CNAS (No. CNAS L2929)

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

• A2LA (Certificate No. 3816.01)

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

• VCCI

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

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

1.4 General Description of EUT

Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
Product Name:	Mobile Phone		
Model No.(EUT):	Hisense T17		
FCC ID:	2ADOBT17		
Trade Mark:	Hisense		
Product Phase:	production unit		
SN:	1MF75AZ9ES1SK0GFDY1/1MF75AZ9ES1SK0GFDY1		
Hardware Version:	YK736-MB-V3.0		
Software Version:	Hisense_F17_20_S03_20180225		
Antenna Type:	Inner Antenna		
Device Operating Configurations :			
Modulation Mode:	GSM:GMSK, 8PSK;WCDMA: QPSK; WIFI: DSSS,OFDM;BT: GFSK, π/4DQPSK,8DPSK		
Device Class:	B		
GPRS Multi-slots Class:	12	EGPRS Multi-slots Class:	12
HSDPA UE Category:	14	HSUPA UE Category	6
Power Class	4,tested with power level 5(GSM850)		
	1,tested with power level 0(GSM1900)		
	3, tested with power control “all 1”(UMTS Band II/IV/V)		
Frequency Bands:	Band	Tx (MHz)	Rx (MHz)
	GSM850	824 - 849	869 - 894
	GSM1900	1850-1910	1930-1990
	WCDMA Band V	824 - 849	869 - 894
	WCDMA Band IV	1710–1755	2110–2155
	WCDMA Band II	1850-1910	1930-1990
	Bluetooth	2402-2480	2402-2480
	Wi-Fi 2.4G	2412-2462	2412-2462
Battery Information:	Model: LIW38245		
	Rated capacity :2450mAh		
	Battery Type: Rechargeable Li-ion Battery		
	Manufacturer: Guangdong Teamgiant New Energy Tech Co., LTD		
Headset Information:	Model: KS639B		

This test report (Ref. No.: SZEM180400250606) is only valid with the original test report (Ref. No.: SZEM180100087906).

According to the declaration from the applicant, the model in this report and model in original report was identical, with only difference on the supplier of TP/LCD/Camera is as bellowing:

Main Supply

Part Name	Model Name	supplier	Remark
TP	Y138067F2-D-X	YUYE	
Front-facing Camera	C10910	CXTCCM	

LCD	Y87397	DIGITAL	
Rear Camera	C10911	CXTCCM	

Secondary Supply

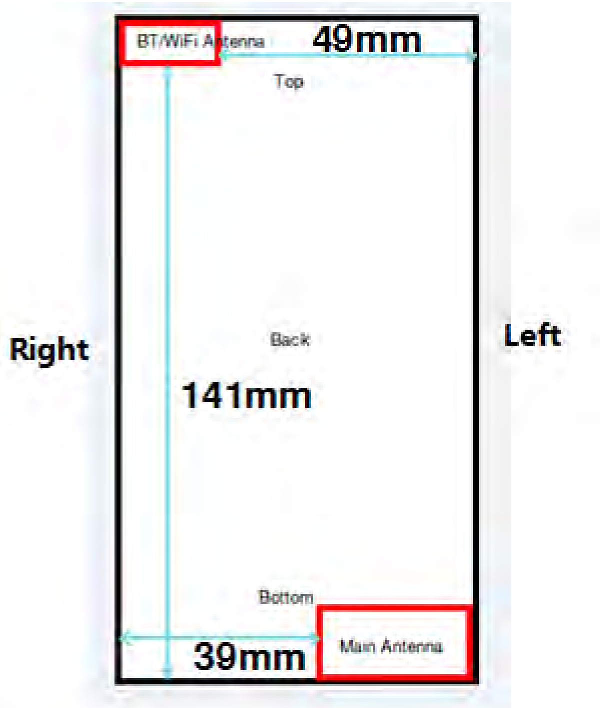
Part Name	Model Name	supplier	Remark
TP	CCG10117-5.5	HOLITHECH	
Front-facing Camera	HEPS7543-A	HOLITHECH	
LCD	HTT055H517	HOLITHECH	
Rear Camera	HFBS7545-A	HOLITHECH	

Considering to the difference, pre-scan was performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore, in this report worse case mode of SAR on Model Hisense T17 are retested and shown the data in this report.

1.4.1 DUT Antenna Locations

The test device is a mobile phone. The display diagonal dimension is 140mm and the overall diagonal dimension of this device is 155 mm.



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

EUT Sides for SAR Testing						
Mode	Front	Back	Left	Right	Top	Bottom
Ant (Main Antenna)	Yes	Yes	Yes	No	No	Yes
2.4G WIFI&BT	Yes	Yes	No	Yes	Yes	No

Table 1：EUT Sides for SAR Testing

Note:

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

1.5 Test Specification

Identity	Document Title
FCC 47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI/IEEE Std C95.1 – 1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 941225 D01 3G SAR Procedures v03r01	3G SAR Measurement Procedures
KDB 248227 D01 802.11 Wi-Fi SAR v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 941225 D06 Hotspot Mode SAR v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
KDB 648474 D04 Handset SAR v01r03	SAR Evaluation Considerations for Wireless Handsets
KDB447498 D01 General RF Exposure Guidance v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
KDB447498 D03 Supplement C Cross-Reference v01	OET Bulletin 65, Supplement C Cross-Reference
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04	SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02	RF Exposure Compliance Reporting and Documentation Considerations

1.6 RF exposure limits

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

Notes:

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

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

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

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

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

2 Laboratory Environment

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

Table 2：The Ambient Conditions

3 SAR Measurements System Configuration

3.1 The SAR Measurement System

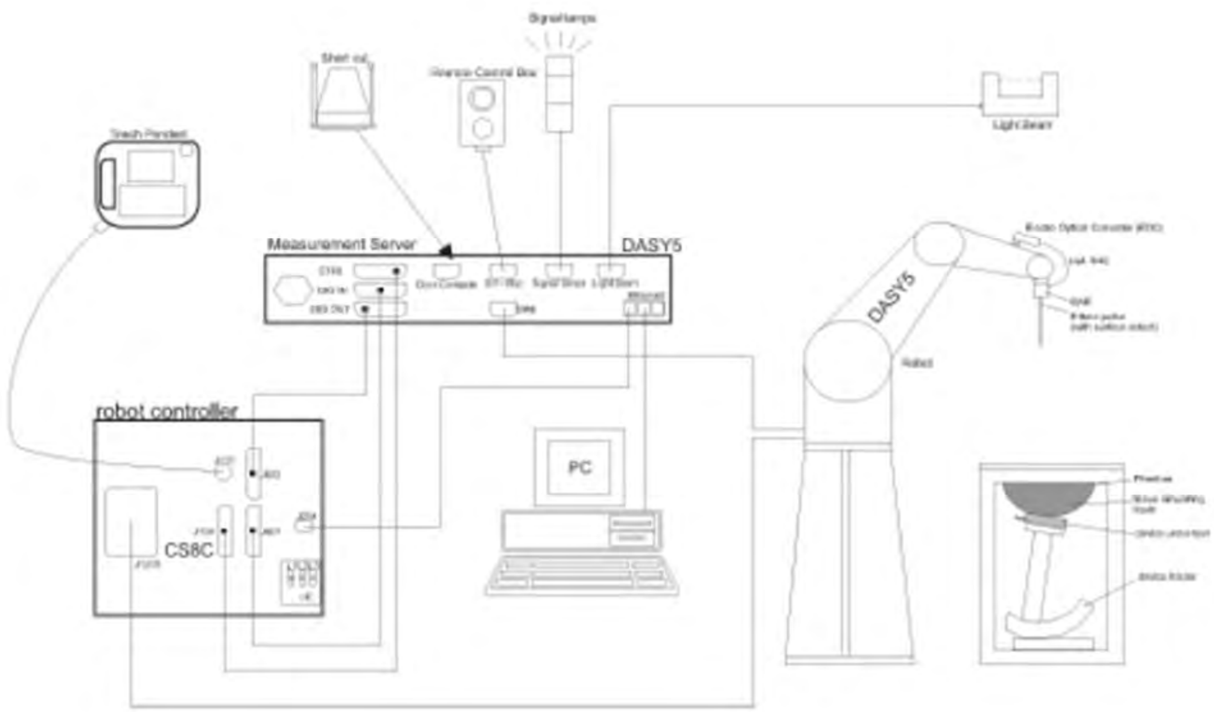
This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ (|Ei|2)/ ρ where σ and ρ are the conductivity and mass density of the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

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

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

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

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



F-1. SAR Measurement System Configuration

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

3.2 Isotropic E-field Probe EX3DV4

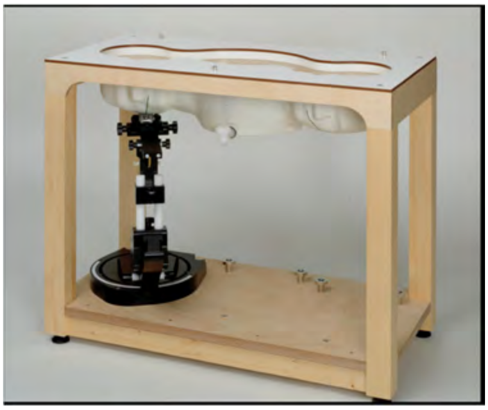
	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

3.3 Data Acquisition Electronics (DAE)

Model	DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV)
Input Offset Voltage	< 5μV (with auto zero)
Input Bias Current	< 50 f A
Dimensions	60 x 60 x 68 mm

3.4 SAM Twin Phantom

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

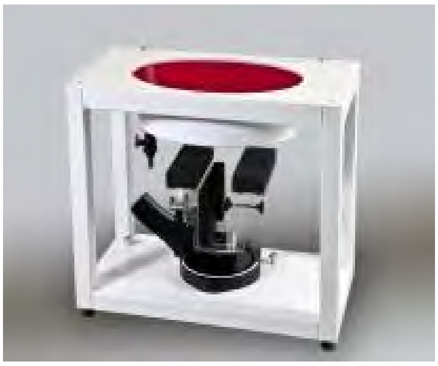


The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.

3.5 ELI Phantom

Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters
Wooden Support	SPEAG standard phantom table



Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.

3.6 Device Holder for Transmitters

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

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

3.7 Measurement procedure

3.7.1 Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: *Area scan*

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

Step 3: *Zoom scan*

Around this point, a volume of 32mm*32mm*30mm (f≤2GHz), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points (f≤2GHz), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

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

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

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			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.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Step 4: Power reference measurement (drift)

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

3.7.2 Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DAE4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.7.3 Data Evaluation by SEMCAD

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

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

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

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

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:

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

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

Ui = input signal of channel i (i = x, y, z)

cf = crest factor of exciting field (DASY parameter)

dcp i = diode compression point (DASY parameter)

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

E-field probes:

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

H-field probes:

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

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel I (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m

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

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

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

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

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

with SAR = local specific absorption rate in mW/g

Etot = total field strength in V/m

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

ε= equivalent tissue density in g/cm3

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

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

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

Htot = total magnetic field strength in A/m

4 SAR measurement variability and uncertainty

4.1 SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The 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.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only 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 (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

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

4.2 SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

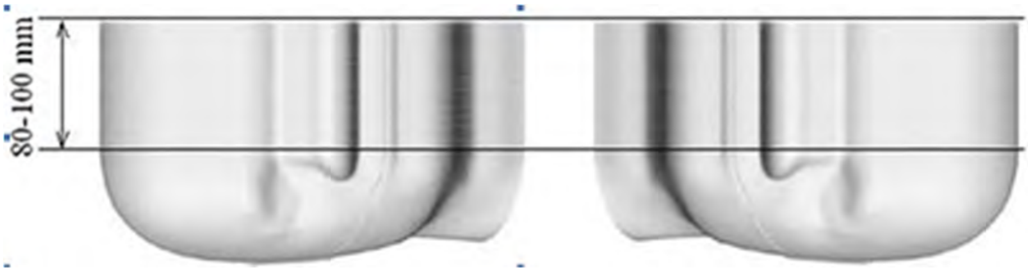
5 Description of Test Position

5.1 Head Exposure Condition

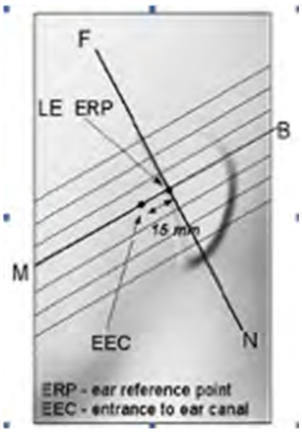
5.1.1 SAM Phantom Shape

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

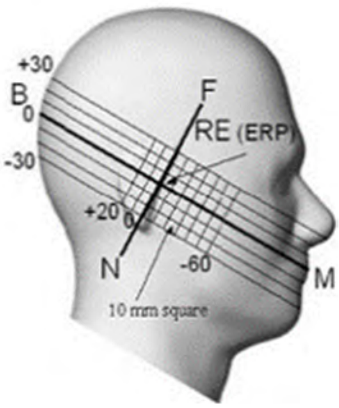
Note: The centre strip including the nose region has a different thickness tolerance.



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

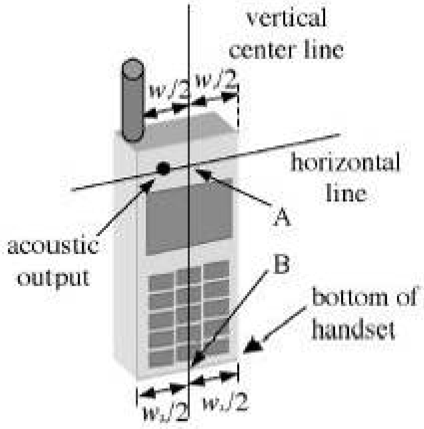


F-5. Close-up side view of phantom, showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations

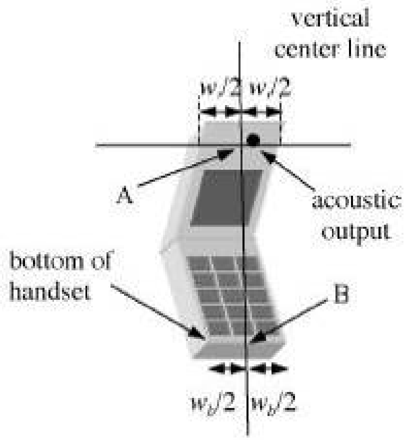


F-6. Side view of the phantom showing relevant markings and seven cross-sectional plane locations

5.1.2 EUT constructions



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



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

5.1.3 Definition of the “cheek” position

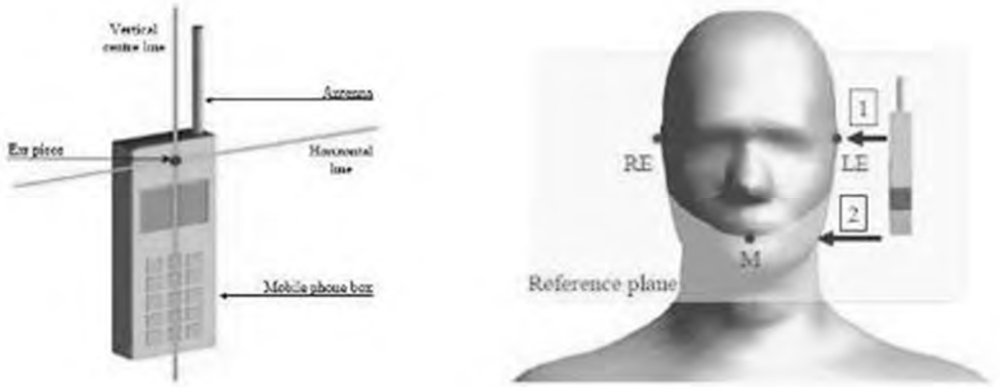
a) Position the device with the vertical centre line of the body of the device and the horizontal line crossing the centre of the ear piece in a plane parallel to the sagittal plane of the phantom ("initial position"). While maintaining the device in this plane, align the vertical centre line with the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

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

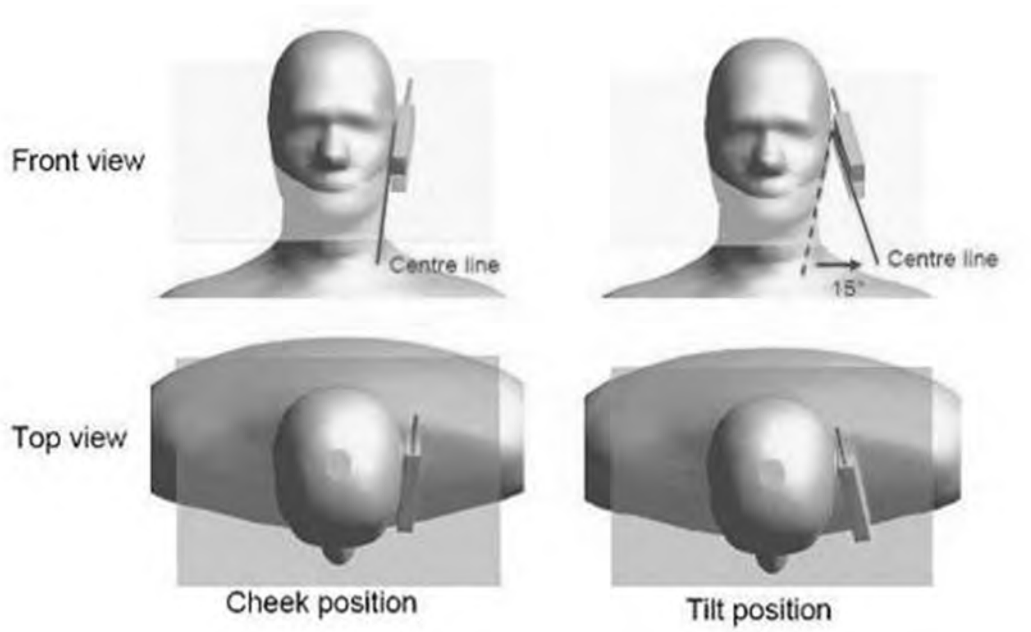
5.1.4 Definition of the “tilted” position

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

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



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



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

5.2 Body Exposure Condition

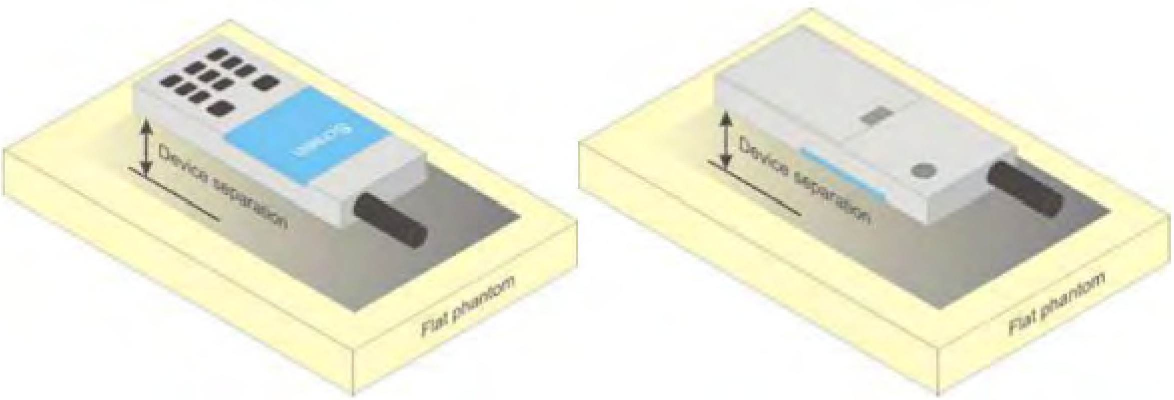
5.2.1 Body-worn accessory exposure conditions

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations.

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

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.



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

5.2.2 Wireless Router exposure conditions

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

6 SAR System Verification Procedure

6.1 Tissue Simulate Liquid

6.1.1 Recipes for Tissue Simulate Liquid

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

Ingredients (% by weight)	Frequency (MHz)							
	450		835		1800-2000		2300-2700	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	40.30	50.75	55.24	70.17	55.00	68.53
Salt (NaCl)	3.95	1.49	1.38	0.94	0.31	0.39	0.2	0.1
Sucrose	56.32	46.78	57.90	48.21	0	0	0	0
HEC	0.98	0.52	0.24	0	0	0	0	0
Bactericide	0.19	0.05	0.18	0.10	0	0	0	0
Tween	0	0	0	0	44.45	29.44	44.80	31.37

Salt: 99⁺% Pure Sodium Chloride
Sucrose: 98⁺% Pure Sucrose
Water: De-ionized, 16 MΩ⁺ resistivity
HEC: Hydroxyethyl Cellulose
Tween: Polyoxyethylene (20) sorbitan monolaurate

HSL5GHz is composed of the following ingredients：
Water：50-65%
Mineral oil：10-30%
Emulsifiers：8-25%
Sodium salt：0-1.5%

MSL5GHz is composed of the following ingredients：
Water：64-78%
Mineral oil：11-18%
Emulsifiers：9-15%
Sodium salt：2-3%

Table 3：Recipe of Tissue Simulate Liquid

6.1.2 Measurement for Tissue Simulate Liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the Agilent Model 85070E Dielectric Probe in conjunction with Agilent E5071C Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was 22±2°C.

Measurement for Tissue Simulate Liquid							
Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp.	Measured Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	(℃)	
835 Head	835	41.5 39.43~43.58)	0.90 0.86~0.95)	42.113	0.905	22.1	2018/2/14
835 Body	835	55.2 (52.44~57.96)	0.97 (0.92~1.02)	54.253	0.993	22.1	2018/2/21
1750 Head	1750	40.1 (38.10~42.11)	1.37 (1.30~1.44)	40.679	1.336	22.2	2018/2/22
1750 Body	1750	53.4 (50.73~56.07)	1.49 (1.42~1.56)	51.003	1.481	22.2	2018/2/14
1900 Head	1900	40.0 (38.00~42.00)	1.40 (1.33~1.47)	41.171	1.437	22.3	2018/2/22
1900 Body	1900	53.3 (50.64~55.97)	1.52 (1.44~1.60)	53.19	1.513	22.3	2018/2/14
2450 Head	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.232	1.806	22	2018/2/24
2450 Body	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	52.345	2.001	22	2018/2/24

Table 4：Measurement result of Tissue electric parameters(Original Report SZEM180100087906).

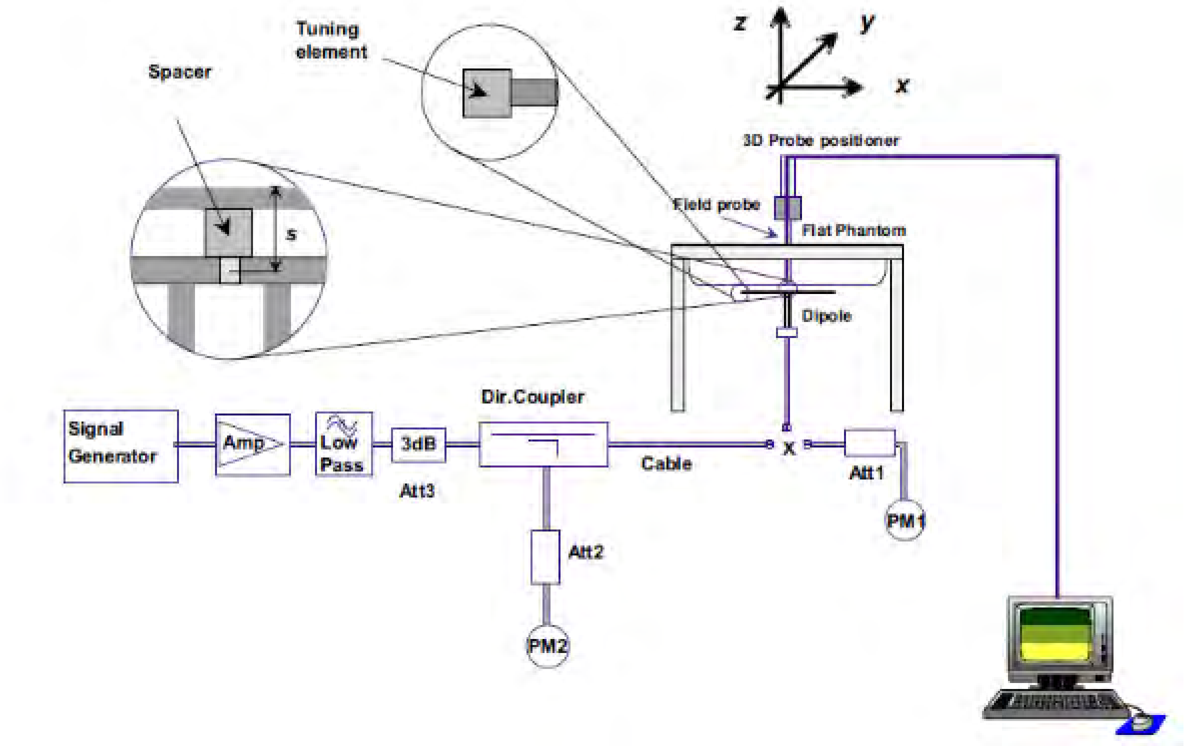
Measurement for Tissue Simulate Liquid For Sample2							
Tissue Type	Measured Frequency （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp.	Measured Date
		ε_r	σ(S/m)	ε_r	σ(S/m)	(℃)	
835 Head	835	41.5 (39.43~43.58)	0.90 (0.86~0.95)	0.909	42.04	22.1	2018/3/29
835 Body	835	55.2 (52.44~57.96)	0.97 (0.92~1.02)	0.986	55.389	22.1	2018/3/29
1750 Head	1750	40.1 (38.10~42.11)	1.37 (1.30~1.44)	1.332	40.757	22.2	2018/3/28
1750 Body	1750	53.4 (50.73~56.07)	1.49 (1.42~1.56)	1.457	53.062	22.2	2018/3/29
1900 Head	1900	40.0 (38.00~42.00)	1.40 (1.33~1.47)	1.372	40.64	22.3	2018/3/28

1900 Body	1900	53.3 (50.64~55.97)	1.52 (1.44~1.60)	1.513	53.19	22.3	2018/3/29
2450 Head	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	1.802	38.226	22	2018/3/29
2450 Body	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	1.957	53.331	22	2018/3/29

Table 5：Measurement result of Tissue electric parameters(Variant).

6.2 SAR System Check

The microwave circuit arrangement for system check is sketched in bellow figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table. During the tests, the ambient temperature of the laboratory was in the range 22±2°C, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



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

6.2.1 Justification for Extended SAR Dipole Calibrations

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

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

6.2.2 Summary System Check Result(s)

SAR System Check Result(s)							
Validation Kit		Measured SAR 250mW	Measured SAR (normalized to 1w)	Target SAR (normalized to 1w) (±10%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	1g (W/kg)	1-g(W/kg)		
D835V2	Head	2.06	8.24	9.59 (8.63~10.55)	22.1	2018/2/14
	Body	2.5	10	9.65 (8.69~10.62)	22.1	2018/2/21
D1750V2	Head	9.92	39.68	36.7 (33.03~40.37)	22.2	2018/2/22
	Body	8.58	34.32	37 (33.30~40.70)	22.2	2018/2/14
D1900V2	Head	10.8	43.2	40.7 (36.63~44.77)	22.3	2018/2/22
	Body	9.49	37.96	41.6 (37.44~45.76)	22.3	2018/2/14
D2450V2	Head	14	56	53.1 (47.79~58.41)	22	2018/2/24
	Body	13.6	54.4	51.0 (45.9~56.1)	22	2018/2/24

Table 6：SAR System Check Result(Original Report SZEM180100087906).

SAR System Check Result(s) For Sample2						
Validation Kit		Measured SAR 250mW	Measured SAR (normalized to 1w)	Target SAR (normalized to 1w) (±10%)	Liquid Temp. (℃)	Measured Date
		1g (W/kg)	1g (W/kg)	1-g(W/kg)		
D835V2	Head	2.49	9.96	9.59 (8.63~10.55)	22.1	2018/3/29
	Body	2.48	9.92	9.65 (8.69~10.62)	22.1	2018/3/29
D1750V2	Head	8.97	35.88	36.7 (33.03~40.37)	22.2	2018/3/28
	Body	9.05	36.2	37 (33.30~40.70)	22.2	2018/3/29
D1900V2	Head	10.2	40.8	40.7 (36.63~44.77)	22.3	2018/3/28
	Body	10.8	43.2	41.6 (37.44~45.76)	22.3	2018/3/29
D2450V2	Head	13.1	52.4	53.1 (47.79~58.41)	22	2018/3/29

	Body	12.6	50.4	51.0 (45.9~56.1)	22	2018/3/29

Table 7：SAR System Check Result(Variant)

6.2.3 Detailed System Check Results

Please see the Appendix A

7 Test Configuration

7.1 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

7.2 Operation Configurations

7.2.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMU200 the power lever is set to “5”and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

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

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

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

7.2.2 WCDMA Test Configuration

1）. <u>Output Power Verification</u>

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

2）. <u>Head SAR</u>

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

3）. <u>Body SAR</u>

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

4）. <u>HSDPA / HSUPA / DC-HSDPA</u>

According to KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA

a) <u>HSDPA</u>

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

Sub-test	βc	Bd	βd(SF)	βc/βd	βhs	CM(dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: △ACK, △NACK and △CQI= 8 Ahs = βhs/βc=30/15 βhs=30/15*βc
Note2:For the HS-DPCCH power mask requirement test in clause 5.2C,5.7A,and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, △ACK and △NACK= 8 (Ahs=30/15) with βhs=30/15*βc,and △CQI= 7 (Ahs=24/15) with βhs=24/15*βc.
Note3: CM=1 forβc/βd =12/15, βhs/βc=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

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

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

Table 8：settings of required H-Set 1 QPSK acc. to 3GPP 34.121

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

Table 9：HSDPA UE category

b) <u>HSUPA</u>

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: ΔACK, ΔNACK and ΔCQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$

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

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

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

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

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

Table 10： Subtests for UMTS Release 6 HSUPA

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

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

Table 11： HSUPA UE category

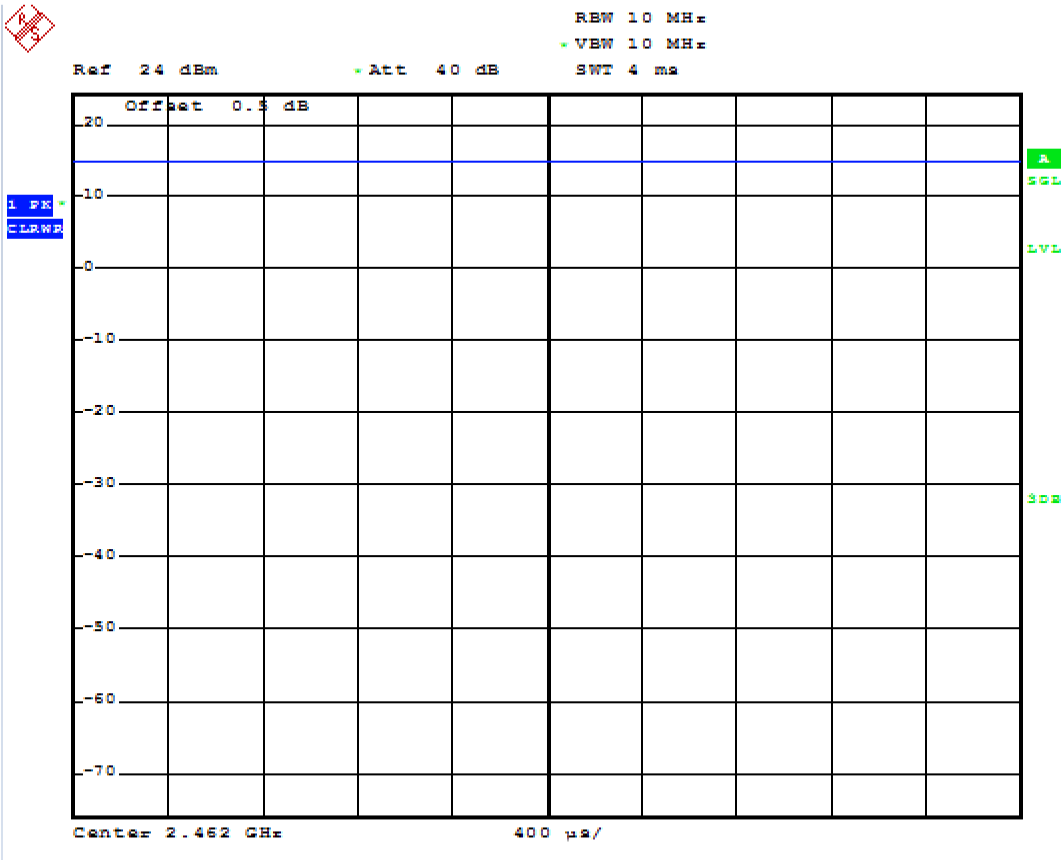
7.2.3 WiFi Test Configuration

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

7.2.3.1 Duty cycle

2.4GHz Wi-Fi 802.11b:

duty cycle=100%



7.2.3.2 Initial Test Position SAR Test Reduction Procedure

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

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

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

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

7.2.3.3 Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required. SAR test reduction for subsequent highest output test channels is determined according to *reported* SAR of the initial test configuration.
For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration.
When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

7.2.3.4 Subsequent Test Configuration Procedures

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

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

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

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

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

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

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

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

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

7.2.3.5 2.4 GHz WiFi SAR Procedures

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

- **802.11b DSSS SAR Test Requirements**

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

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

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

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

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

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

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

- **SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

8 Test Result

8.1 Measurement of RF Conducted Power

8.1.1 Conducted Power of GSM

GSM 850 full power										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		128	190	251			128	190	251	
GSM(GMSK)	GSM	33.12	33.34	33.39	34	-9.19	23.93	24.15	24.2	24.81
GPRS/EGPRS (GMSK)	1 TX Slot	33.15	33.31	33.34	34	-9.19	23.96	24.12	24.15	24.81
	2 TX Slots	32.26	32.48	32.53	33	-6.18	26.08	26.3	**26.35**	**26.82**
	3 TX Slots	29.92	30.17	30.25	31	-4.42	25.5	25.75	25.83	26.58
	4 TX Slots	28.49	28.79	28.78	29.5	-3.17	25.32	25.62	25.61	26.33
EGPRS(8PSK)	1 TX Slot	31.91	32.13	21.93	33	-9.19	22.72	22.94	12.74	23.81
	2 TX Slots	31.08	31.54	31.43	32	-6.18	24.9	25.36	25.25	25.82
	3 TX Slots	28.66	29.87	29.74	31	-4.42	24.24	25.45	25.32	26.58
	4 TX Slots	26.99	27.37	27.36	28	-3.17	23.82	24.2	24.19	24.83
GSM 1900 full power										
Burst Output Power(dBm)					Tune up	Division Factors	Frame-Average Output Power(dBm)			Tune up
Channel		512	661	810			512	661	810	
GSM(GMSK)	GSM	29.39	29.54	29.47	30	-9.19	20.2	20.35	20.28	20.81
GPRS/EGPRS (GMSK)	1 TX Slot	29.37	29.42	29.32	30	-9.19	20.18	20.23	20.13	20.81
	2 TX Slots	28.54	28.71	28.59	29	-6.18	22.36	**22.53**	22.41	22.82
	3 TX Slots	26.65	26.84	26.75	27	-4.42	22.23	22.42	22.33	22.58
	4 TX Slots	25.46	25.63	25.54	26	-3.17	22.29	22.46	22.37	**22.83**
EGPRS(8PSK)	1 TX Slot	23.61	23.43	23.52	24	-9.19	14.42	14.24	14.33	14.81
	2 TX Slots	23.42	23.35	23.57	24	-6.18	17.24	17.17	17.39	17.82
	3 TX Slots	23.16	23.17	23.26	24	-4.42	18.74	18.75	18.84	19.58
	4 TX Slots	22.79	22.41	22.85	23.5	-3.17	19.62	19.24	19.68	20.33

Table 12: Conducted Power Of GSM

Note:

1）. CMW500 measures GSM peak and average output power for active timeslots. For SAR the time based average power is relevant. The difference in between depends on the duty cycle of the TDMA signal:

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

2）. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum burst-averaged power based on time slots. The calculated method is shown as below:
Frame-averaged power = 10 x log (Burst-averaged power mW x Slot used / 8

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

8.1.2 Conducted Power Of WCDMA

WCDMA Band II full power					
Average Conducted Power(dBm)					
Channel		9262	9400	9538	Tune up
WCDMA	12.2kbps RMC	**22.57**	22.46	22.4	23
	12.2kbps AMR	22.46	22.36	22.31	23
HSDPA	Subtest 1	21.74	21.84	21.72	22.5
	Subtest 2	21.73	21.8	21.78	22.5
	Subtest 3	21.21	21.33	21.27	22
	Subtest 4	21.19	21.3	21.23	22
HSUPA	Subtest 1	21.47	21.45	21.41	22
	Subtest 2	21.02	21.13	21.22	21.5
	Subtest 3	19.87	19.91	19.76	21
	Subtest 4	20.93	20.92	20.81	21.5
	Subtest 5	21.21	21.32	21.29	22
WCDMA Band IV full power					
Average Conducted Power(dBm)					
Channel		1312	1412	1513	Tune up
WCDMA	12.2kbps RMC	22.51	22.55	22.4	23
	12.2kbps AMR	22.34	**22.41**	22.23	23
HSDPA	Subtest 1	21.92	22.02	21.78	22.5
	Subtest 2	21.88	21.98	21.72	22.5
	Subtest 3	21.46	21.55	21.24	22
	Subtest 4	21.45	21.52	21.23	22
HSUPA	Subtest 1	21.79	21.65	21.58	22
	Subtest 2	21.13	21.11	21.04	21.5
	Subtest 3	20.19	20.23	20.17	21
	Subtest 4	21.24	21.12	21.22	21.5
	Subtest 5	21.47	21.51	21.27	22
WCDMA Band V full power					
Average Conducted Power(dBm)					
Channel		4132	4182	4233	Tune up
WCDMA	12.2kbps RMC	23.35	**23.37**	23.16	24
	12.2kbps AMR	23.19	23.15	22.89	24
HSDPA	Subtest 1	22.14	22.23	22.02	23
	Subtest 2	22.07	22.19	22	23
	Subtest 3	21.63	21.74	21.49	22.5
	Subtest 4	21.72	21.7	21.45	22.5
HSUPA	Subtest 1	21.82	21.67	21.7	22.5
	Subtest 2	21.18	21.23	21.27	22
	Subtest 3	20.22	20.25	20.29	21.5
	Subtest 4	21.29	21.24	21.45	22
	Subtest 5	21.64	21.72	21.48	22.5

Table 13： Conducted Power Of WCDMA

Note:

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

8.1.3 Conducted Power of WIFI and BT

Mode	Channel	Frequency(MHz)	Data Rate(Mbps)	Tune up	Average Power (dBm)	SAR Test
802.11b	1	2412	1	14	13.28	No
	6	2437		14	13.46	No
	11	2462		14	13.66	Yes
802.11g	1	2412	6	12	10.37	No
	6	2437		12	10.55	No
	11	2462		12	10.58	No
802.11n HT20 SISO	1	2412	6.5	11	8.65	No
	6	2437		11	9.06	No
	11	2462		11	9.47	No

Table 14： Conducted Power Of WIFI

Note:

a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.

b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.

1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.

2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.

c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.

BT			Tune up (dBm)	Average Conducted Power(dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	5.5	4.98
	39	2441	5.5	4.88
	78	2480	5.5	4.68
π/4DQPSK	0	2402	4	2.78
	39	2441	4	2.44
	78	2480	4	2.13
8DPSK	0	2402	4	2.76
	39	2441	3	2.57
	78	2480	3	2.22

BLE			Tune up (dBm)	Average Conducted Power(dBm)
Modulation	Channel	Frequency(MHz)		
GFSK	0	2402	-2	-3.51
	19	2440	-2	-4.29
	39	2480	-2	-4.75

Table 15： Conducted Power Of BT

8.2 Stand-alone SAR test evaluation

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

Freq. Band	Frequency (GHz)	Position	Average Power		Test Separation (mm)	Calculate Value	Exclusion Threshold	Exclusion (Y/N)
			dBm	mW				
Wi-Fi	2.48	Head	14	25.1 2	0	7.9	3	N
		Body-worn	14	25.12	15	2.6	3	Y
		hotspot	14	25.12	10	3.9	3	N
Bluetooth	2.48	Head	5.5	3.55	0	1.1	3	Y
		Body-worn	5.5	3.55	15	0.4	3	Y

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

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

8.3 Measurement of SAR Data

8.3.1 SAR Result Of GSM850

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power Drift (dB)	Conducted Power (dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data											
Left cheek	GSM	190/836.6	1:8.3	0.294	0.01	33.34	34	1.164	**0.342**	22.1	1.6
Left tilted	GSM	190/836.6	1:8.3	0.193	-0.14	33.34	34	1.164	0.225	22.1	1.6
Right cheek	GSM	190/836.6	1:8.3	0.21	0.16	33.34	34	1.164	0.244	22.1	1.6
Right tilted	GSM	190/836.6	1:8.3	0.171	0.11	33.34	34	1.164	0.199	22.1	1.6
Body worn Test data(Separate 15mm)											
Front side	GSM	190/836.6	1:8.3	0.248	-0.11	33.34	34	1.164	0.289	22.1	1.6
Back side	GSM	190/836.6	1:8.3	0.372	-0.02	33.34	34	1.164	**0.433**	22.1	1.6
Hotspot Test data(Separate 10mm)											
Front side	GPRS 2TS	190/836.6	1:4.15	0.418	-0.19	32.48	33	1.127	0.471	22.1	1.6
Back side	GPRS 2TS	190/836.6	1:4.15	0.604	-0.06	32.48	33	1.127	0.681	22.1	1.6
Left side	GPRS 2TS	190/836.6	1:4.15	0.606	-0.04	32.48	33	1.127	**0.683**	22.1	1.6
Bottom side	GPRS 2TS	190/836.6	1:4.15	0.156	-0.08	32.48	33	1.127	0.176	22.1	1.6

Table 16： SAR of GSM850 for Head and Body(Original Report SZEM180100087906).

Note:

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

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

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg) 1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data at the Worst Case With Sample2											
Left cheek	GSM	190/836.6	1:8.3	0.407	-0.04	33.34	34	1.164	0.474	22.1	1.6
Body worn Test data at the Worst Case With Sample2(Separate 15mm)											
Back side	GSM	190/836.6	1:8.3	0.576	-0.01	33.34	34	1.164	0.671	22.1	1.6
Hotspot Test data at the Worst Case With Sample2(Separate 10mm)											
Left side	GPRS 2TS	190/836.6	1:4.15	0.872	-0.01	32.48	33	1.127	0.983	22.1	1.6
Left side	GPRS 2TS	128/824.2	1:4.15	1.01	0.08	32.26	33	1.186	1.198	22.1	1.6
Left side	GPRS 2TS	251/848.8	1:4.15	0.73	-0.03	32.53	33	1.114	0.813	22.1	1.6

Table 17： SAR of GSM850 for Head and Body(Variant).

8.3.2 SAR Result Of GSM1900

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data											
Left cheek	GSM	661/1880	1:8.3	0.137	0.03	29.54	30	1.112	**0.152**	22.3	1.6
Left tilted	GSM	661/1880	1:8.3	0.0508	0.18	29.54	30	1.112	0.056	22.3	1.6
Right cheek	GSM	661/1880	1:8.3	0.0932	0.05	29.54	30	1.112	0.104	22.3	1.6
Right tilted	GSM	661/1880	1:8.3	0.0582	0.17	29.54	30	1.112	0.065	22.3	1.6
Body worn Test data(Separate 15mm)											
Front side	GSM	661/1880	1:8.3	0.164	0.01	29.54	30	1.112	0.182	22.3	1.6
Back side	GSM	661/1880	1:8.3	0.213	0.06	29.54	30	1.112	**0.237**	22.3	1.6
Hotspot Test data(Separate 10mm)											
Front side	GPRS 4TS	661/1880	1:2.075	0.355	0.09	25.63	26	1.089	0.387	22.3	1.6
Back side	GPRS 4TS	661/1880	1:2.075	0.464	0.05	25.63	26	1.089	**0.505**	22.3	1.6
Left side	GPRS 4TS	661/1880	1:2.075	0.249	0.15	25.63	26	1.089	0.271	22.3	1.6
Bottom side	GPRS 4TS	661/1880	1:2.075	0.38	-0.09	25.63	26	1.089	0.414	22.3	1.6

Table 18： SAR of GSM1900 for Head and Body(Original Report SZEM180100087906).

Note:

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

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

est position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data at the Worst Case With Sample2											
Left cheek	GSM	661/1880	1:8.3	0.162	0.07	29.54	30	1.112	0.180	22.3	1.6
Body worn Test data at the Worst Case With Sample2(Separate 15mm)											
Back side	GSM	661/1880	1:8.3	0.224	0.09	29.54	30	1.112	0.249	22.3	1.6
Hotspot Test data at the Worst Case With Sample2(Separate 10mm)											
Back side	GPRS 4TS	661/1880	1:2.075	0.696	-0.13	25.63	26	1.089	0.758	22.3	1.6

Table 19： SAR of GSM1900 for Head and Body(Variant).

8.3.3 SAR Result Of WCDMA Band II

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data											
Left cheek	RMC	9400/1880	1:1	0.245	0.05	22.46	23	1.132	**0.277**	22.3	1.6
Left tilted	RMC	9400/1880	1:1	0.0985	0.02	22.46	23	1.132	0.112	22.3	1.6
Right cheek	RMC	9400/1880	1:1	0.177	0.01	22.46	23	1.132	0.200	22.3	1.6
Right tilted	RMC	9400/1880	1:1	0.103	0.16	22.46	23	1.132	0.117	22.3	1.6
Body worn Test data(Separate 15mm)											
Front side	RMC	9400/1880	1:1	0.202	0.19	22.46	23	1.132	0.229	22.3	1.6
Back side	RMC	9400/1880	1:1	0.266	0.1	22.46	23	1.132	**0.301**	22.3	1.6
Hotspot Test data(Separate 10mm)											
Front side	RMC	9400/1880	1:1	0.396	0.16	22.46	23	1.132	0.448	22.3	1.6
Back side	RMC	9400/1880	1:1	0.545	-0.05	22.46	23	1.132	**0.617**	22.3	1.6
Left side	RMC	9400/1880	1:1	0.277	0.02	22.46	23	1.132	0.314	22.3	1.6
Bottom side	RMC	9400/1880	1:1	0.467	0.05	22.46	23	1.132	0.529	22.3	1.6

Table 20： SAR of WCDMA Band II for Head and Body(Original Report SZEM180100087906).

Note:

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

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

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data at the Worst Case With Sample2											
Left cheek	RMC	9400/1880	1:1	0.258	0.14	22.46	23	1.132	0.292	22.3	1.6
Body worn Test data at the Worst Case With Sample2(Separate 15mm)											
Back side	RMC	9400/1880	1:1	0.347	0.05	22.46	23	1.132	0.393	22.3	1.6
Hotspot Test data at the Worst Case With Sample2(Separate 10mm)											
Back side	RMC	9400/1880	1:1	0.7	0.05	22.46	23	1.132	0.793	22.3	1.6

Table 21： SAR of WCDMA Band II for Head and Body(Variant).

8.3.4 SAR Result Of WCDMA Band IV

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data											
Left cheek	RMC	1412/1732.4	1:1	0.154	-0.01	22.55	23	1.109	**0.171**	22.2	1.6
Left tilted	RMC	1412/1732.4	1:1	0.0614	0.03	22.55	23	1.109	0.068	22.2	1.6
Right cheek	RMC	1412/1732.4	1:1	0.121	0.08	22.55	23	1.109	0.134	22.2	1.6
Right tilted	RMC	1412/1732.4	1:1	0.0675	0.07	22.55	23	1.109	0.075	22.2	1.6
Body worn Test data(Separate 15mm)											
Front side	RMC	1412/1732.4	1:1	0.111	0.09	22.55	23	1.109	0.123	22.2	1.6
Back side	RMC	1412/1732.4	1:1	0.149	0.10	22.55	23	1.109	**0.165**	22.2	1.6
Hotspot Test data(Separate 10mm)											
Front side	RMC	1412/1732.4	1:1	0.18	0.06	22.55	23	1.109	0.200	22.2	1.6
Back side	RMC	1412/1732.4	1:1	0.331	0.17	22.55	23	1.109	**0.367**	22.2	1.6
Left side	RMC	1412/1732.4	1:1	0.119	-0.02	22.55	23	1.109	0.132	22.2	1.6
Bottom side	RMC	1412/1732.4	1:1	0.232	0.02	22.55	23	1.109	0.257	22.2	1.6

Table 22：SAR of WCDMA Band IV for Head and Body(Original Report SZEM180100087906).

Note:

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

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

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data at the Worst Case With Sample2											
Left cheek	RMC	1412/1732.4	1:1	0.195	0.07	22.55	23	1.109	0.216	22.2	1.6
Body worn Test data at the Worst Case With Sample2(Separate 15mm)											
Back side	RMC	1412/1732.4	1:1	0.234	-0.01	22.55	23	1.109	0.260	22.2	1.6
Hotspot Test data at the Worst Case With Sample2(Separate 10mm)											
Back side	RMC	1412/1732.4	1:1	0.492	-0.04	22.55	23	1.109	0.546	22.2	1.6

Table 23：SAR of WCDMA Band IV for Head and Body(Variant).

8.3.5 SAR Result Of WCDMA Band V

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data											
Left cheek	RMC	4182/836.4	1:1	0.195	0.07	**23.37**	24	1.156	**0.225**	22.1	1.6
Left tilted	RMC	4182/836.4	1:1	0.118	0.02	**23.37**	24	1.156	0.136	22.1	1.6
Right cheek	RMC	4182/836.4	1:1	0.187	-0.06	**23.37**	24	1.156	0.216	22.1	1.6
Right tilted	RMC	4182/836.4	1:1	0.116	0.07	**23.37**	24	1.156	0.134	22.1	1.6
Body worn Test data(Separate 15mm)											
Front side	RMC	4182/836.4	1:1	0.197	0.1	**23.37**	24	1.156	0.228	22.1	1.6
Back side	RMC	4182/836.4	1:1	0.248	0.07	**23.37**	24	1.156	**0.287**	22.1	1.6
Hotspot Test data(Separate 10mm)											
Front side	RMC	4182/836.4	1:1	0.201	-0.03	**23.37**	24	1.156	0.232	22.1	1.6
Back side	RMC	4182/836.4	1:1	0.284	0.04	**23.37**	24	1.156	**0.328**	22.1	1.6
Left side	RMC	4182/836.4	1:1	0.234	0.16	**23.37**	24	1.156	0.271	22.1	1.6
Bottom side	RMC	4182/836.4	1:1	0.089	-0.04	**23.37**	24	1.156	0.103	22.1	1.6

Table 24：SAR of WCDMA Band V for Head and Body(Original Report SZEM180100087906).

Note:

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

Test position	Test mode	Test Ch./Freq.	Duty Cycle	SAR (W/kg)1-g	Power Drift(dB)	Conducted Power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp	SAR limit (W/kg)
Head Test data at the Worst Case With Sample2											
Left cheek	RMC	4182/836.4	1:1	0.232	0.01	23.37	24	1.156	0.268	22.1	1.6
Body worn Test data at the Worst Case With Sample2(Separate 15mm)											
Back side	RMC	4182/836.4	1:1	0.311	-0.04	23.37	24	1.156	0.360	22.1	1.6
Hotspot Test data at the Worst Case With Sample2(Separate 10mm)											
Back side	RMC	4182/836.4	1:1	0.343	-0.01	23.37	24	1.156	0.397	22.1	1.6

Table 25：SAR of WCDMA Band V for Head and Body(Variant).

8.3.6 SAR Result Of 2.4GHz WIFI

Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg)1-g	Power drift(dB)	Conducted power(dBm)	Tune up Limit (dBm)	Scaled factor	Scaled SAR (W/kg)	Liquid Temp.	SAR limit (W/kg)
Head Test data												
Left cheek	802.11b	11/2462	1:1	100%	0.244	0.01	13.66	14	1.081	**0.264**	22	1.6
Left tilted	802.11b	11/2462	1:1	100%	0.231	0.17	13.66	14	1.081	0.250	22	1.6
Right cheek	802.11b	11/2462	1:1	100%	0.095	0.06	13.66	14	1.081	0.103	22	1.6
Right tilted	802.11b	11/2462	1:1	100%	0.11	-0.03	13.66	14	1.081	0.119	22	1.6
Body worn Test data(Separate 15mm)												
Front side	802.11b	11/2462	1:1	100%	0.027	0.07	13.66	14	1.081	0.029	22	1.6
Back side	802.11b	11/2462	1:1	100%	0.027	0.06	13.66	14	1.081	**0.029**	22	1.6
Hotspot Test data (Separate 10mm)												
Front side	802.11b	11/2462	1:1	100%	0.054	0.05	13.66	14	1.081	0.058	22	1.6
Back side	802.11b	11/2462	1:1	100%	0.063	0.07	13.66	14	1.081	**0.068**	22	1.6
Right side	802.11b	11/2462	1:1	100%	0.043	0.06	13.66	14	1.081	0.047	22	1.6
Top side	802.11b	11/2462	1:1	100%	0.031	-0.07	13.66	14	1.081	0.034	22	1.6

Table 26： SAR of 2.4GHz WIFI for Head and Body(Original Report SZEM180100087906).

Note:

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

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

3) Each channel was tested at the lowest data rate.

4) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, 802.11g/n OFDM SAR Test is not required.

Test position	Test mode	Test Ch./Freq.	Duty Cycle	Duty Cycle Scaled factor	SAR (W/kg)1-g	Power drift(dB)	Conducted power(dBm)	Tune up Limit(dBm)	Scaled factor	Scaled SAR(W/kg)	Liquid Temp.	SAR limit(W/kg)
Head Test data at the Worst Case With Sample2												
Left cheek	802.11b	11/2462	1:1	100%	0.243	-0.04	13.66	14	1.081	0.263	22	1.6
Body worn Test data at the Worst Case With Sample2(Separate 15mm)												
Back side	802.11b	11/2462	1:1	100%	0.035	0.05	13.66	14	1.081	0.037	22	1.6
Hotspot Test data at the Worst Case With Sample2(Separate 10mm)												
Back side	802.11b	11/2462	1:1	100%	0.074	0.04	13.66	14	1.081	0.080	22	1.6

Table 27： SAR of 2.4GHz WIFI for Head and Body(Variant).

8.4 Multiple Transmitter Evaluation

8.4.1Simultaneous SAR SAR test evaluation

Simultaneous Transmission

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

Note:

1) Wi-Fi 2.4G and Bluetooth share the same Tx antenna and can’t transmit simultaneously.
2) The device does not support DTM function.
3) The Main Antenna and Second Antenna can’t transmit simultaneously.
4) The device supports VoWIFI function.

8.4.2 Estimated SAR

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

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

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

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

Estimated SAR Result

Freq. Band	Frequency (GHz)	Test Position	Max. power(dBm)	Max. power(mw)	Test Separation (mm)	Estimated SAR 1g (W/kg)
Bluetooth	2.48	Head	5.5	3.55	0	0.149
Bluetooth	2.48	Body-worn	5.5	3.55	15	0.050

1) Simultaneous Transmission SAR Summation Scenario for head

WWAN Band	Exposure position	① MAX.WWAN SAR(W/kg)	②MAX.WLAN SAR(W/kg)	③ MAX.BT SAR(W/kg)	Summed SAR①+②	Summed SAR①+③	Case NO.
GSM850	Left Touch	0.474	0.264	0.149	**0.738**	0.623	No
	Left Tilt	0.225	0.250	0.149	0.475	0.374	No
	Right Touch	0.244	0.103	0.149	0.347	0.393	No
	Right Tilt	0.199	0.119	0.149	0.318	0.348	No
GSM1900	Left Touch	0.180	0.264	0.149	0.444	0.329	No
	Left Tilt	0.056	0.250	0.149	0.306	0.205	No
	Right Touch	0.104	0.103	0.149	0.207	0.253	No
	Right Tilt	0.065	0.119	0.149	0.184	0.214	No
WCDMA Band II	Left Touch	0.292	0.264	0.149	0.556	0.441	No
	Left Tilt	0.112	0.250	0.149	0.362	0.261	No
	Right Touch	0.200	0.103	0.149	0.303	0.349	No
	Right Tilt	0.117	0.119	0.149	0.236	0.266	No
WCDMA Band IV	Left Touch	0.216	0.264	0.149	0.480	0.365	No
	Left Tilt	0.068	0.250	0.149	0.318	0.217	No
	Right Touch	0.134	0.103	0.149	0.237	0.283	No
	Right Tilt	0.075	0.119	0.149	0.194	0.224	No
WCDMA Band V	Left Touch	0.268	0.264	0.149	0.532	0.417	No
	Left Tilt	0.136	0.250	0.149	0.386	0.285	No
	Right Touch	0.216	0.103	0.149	0.319	0.365	No
	Right Tilt	0.134	0.119	0.149	0.253	0.283	No

2) Simultaneous Transmission SAR Summation Scenario for body worn

WWAN Band	Exposure position	① MAX.WWAN SAR(W/kg)	②MAX.WLAN SAR(W/kg)	③MAX.BT SAR(W/kg)	Summed SAR①+②	Summed SAR①+③	Case NO.
GSM850	Front	0.289	0.029	0.050	0.318	0.339	No
	Back	0.671	0.037	0.050	0.708	**0.721**	No
GSM1900	Front	0.182	0.029	0.050	0.211	0.232	No
	Back	0.249	0.037	0.050	0.286	0.299	No
WCDMA Band II	Front	0.229	0.029	0.050	0.258	0.279	No
	Back	0.393	0.037	0.050	0.430	0.443	No
WCDMA Band IV	Front	0.123	0.029	0.050	0.152	0.173	No
	Back	0.260	0.037	0.050	0.297	0.310	No
WCDMA Band V	Front	0.228	0.029	0.050	0.257	0.278	No
	Back	0.360	0.037	0.050	0.397	0.410	No

3) Simultaneous Transmission SAR Summation Scenario for hotspot

WWAN Band	Exposure position	① MAX.WWAN SAR(W/kg)	② MAX.WLAN SAR(W/kg)	Summed SAR①+②	Case NO.
GSM850	Front	0.471	0.058	0.529	No
	Back	0.681	0.080	0.761	No
	Left	1.198	0.009	**1.207**	No
	Right	0.567	0.047	0.614	No
	Top	0.000	0.034	0.034	No
	Bottom	0.176	0.000	0.176	No
GSM1900	Front	0.387	0.058	0.445	No
	Back	0.758	0.080	0.838	No
	Left	0.271	0.009	0.280	No
	Right	0.111	0.047	0.158	No
	Top	0.000	0.034	0.034	No
	Bottom	0.414	0.000	0.414	No
WCDMA Band II	Front	0.448	0.058	0.506	No
	Back	0.793	0.080	0.873	No
	Left	0.314	0.009	0.323	No
	Right	0.122	0.047	0.169	No
	Top	0.000	0.034	0.034	No
	Bottom	0.529	0.000	0.529	No
WCDMA Band IV	Front	0.200	0.058	0.258	No
	Back	0.546	0.080	0.626	No
	Left	0.132	0.009	0.141	No
	Right	0.052	0.047	0.099	No
	Top	0.000	0.034	0.034	No
	Bottom	0.257	0.000	0.257	No
WCDMA Band V	Front	0.232	0.058	0.290	No
	Back	0.397	0.080	0.477	No
	Left	0.271	0.009	0.280	No
	Right	0.234	0.047	0.281	No
	Top	0.000	0.034	0.034	No
	Bottom	0.103	0.000	0.103	No

9 Equipment list

Test Platform	SPEAG DASY5 Professional
Location	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Description	SAR Test System (Frequency range 300MHz-6GHz)
Software Reference	DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Hardware Reference

	Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
☒	Robot	Staubli	TX60L	F14/5T2NA1/A/01	NCR	NCR
☒	Robot	Staubli	TX60L	F13/5PP1B1/A/01	NCR	NCR
☒	ELI	SPEAG	ELI V5.0	1239	NCR	NCR
☒	Twin Phantom	SPEAG	SAM 1	1141	NCR	NCR
☒	Twin Phantom	SPEAG	SAM 1	1824	NCR	NCR
☒	DAE	SPEAG	DAE4	1267	2017-11-28	2018-11-27
☒	E-Field Probe	SPEAG	EX3DV4	3923	2017-08-24	2018-08-23
☒	Validation Kits	SPEAG	D835V2	4d105	2016-12-08	2019-12-07
☒	Validation Kits	SPEAG	D1750V2	1149	2016-06-23	2019-06-22
☒	Validation Kits	SPEAG	D1900V2	5d028	2016-12-07	2019-12-06
☒	Validation Kits	SPEAG	D2450V2	733	2016-12-07	2019-12-06
☒	Agilent Network Analyzer	Agilent	E5071C	MY46523590	2018-03-13	2019-03-12
☒	Dielectric Probe Kit	Agilent	85070E	US01440210	NCR	NCR
☒	Universal Radio Communication Tester	R&S	CMW500	124587	2017/11/24	2018/11/23
☒	RF Bi-Directional Coupler	Agilent	86205-60001	MY31400031	NCR	NCR
☒	Signal Generator	Agilent	N5171B	MY53050736	2018-03-13	2019-03-12
☒	Preamplifier	Mini-Circuits	ZHL-42W	15542	NCR	NCR
☒	Power Meter	Agilent	E4416A	GB41292095	2018-03-13	2019-03-12
☒	Power Sensor	Agilent	8481H	MY41091234	2018-03-13	2019-03-12
☒	Power Sensor	R&S	NRP-Z92	100025	2018-03-13	2019-03-12
☒	Attenuator	SHX	TS2-3dB	30704	NCR	NCR
☒	Coaxial low pass filter	Mini-Circuits	VLF-2500(+)	NA	NCR	NCR
☒	Coaxial low pass filter	Microlab Fxr	LA-F13	NA	NCR	NCR
☒	50 Ω coaxial load	Mini-Circuits	KARN-50+	00850	NCR	NCR
☒	DC POWER SUPPLY	SAKO	SK1730SL5A	NA	NCR	NCR
☒	Speed reading thermometer	MingGao	T809	NA	2018-03-13	2019-03-12
☒	Humidity and Temperature Indicator	KIMTOKA	KIMTOKA	NA	2018-03-13	2019-03-12

10 Calibration certificate

Please see the Appendix C

11 Photographs

Please see the Appendix D

Appendix A: Detailed System Validation Results

Appendix B: Detailed Test Results

Appendix C: Calibration certificate

Appendix D: Photographs

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Appendix A

Detailed System Validation Results

1. System Performance Check Head
System Performance Check 835 MHz Head
System Performance Check 1750 MHz Head
System Performance Check 1950MHz Head
System Performance Check 2450 MHz Head
2. System Performance Check Body
System Performance Check 835 MHz Body
System Performance Check 1750 MHz Body
System Performance Check 1950MHz Body
System Performance Check 2450 MHz Body

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

System Performance Check 835 MHz Head

DUT: D835V2; Type: D835V2; Serial: 4d105

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1

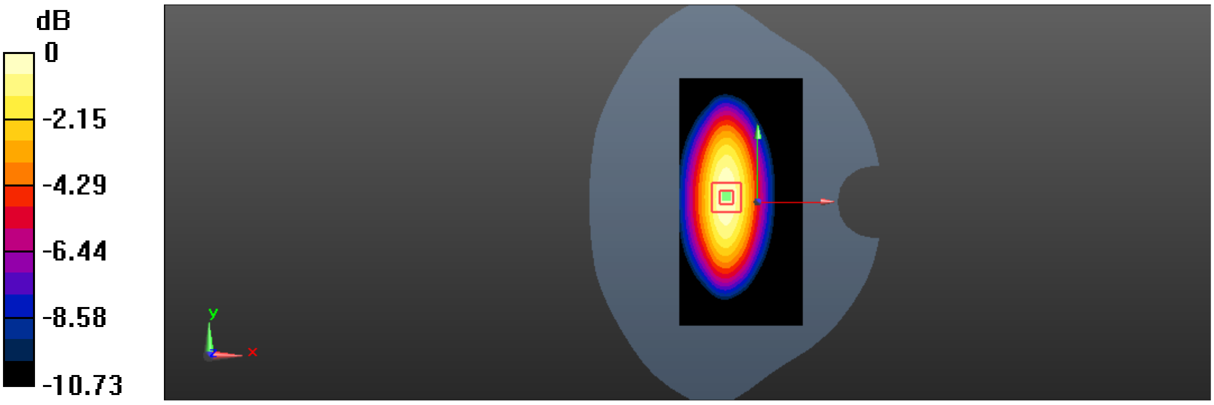
Medium: HSL835;Medium parameters used: f = 835 MHz; σ = 0.909 S/m; ε_r = 42.04; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.50, 10.50, 10.50); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Head/d=15mm, Pin=250mW/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.15 W/kg

Head/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.11 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.76 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 3.18 W/kg



0 dB = 3.18 W/kg = 5.02 dBW/kg

Date: 2018/3/28

Test Laboratory: SGS SAR Lab

System Performance Check 1750 MHz Head

DUT: D1750V2; Type: D1750V2; Serial: 1149

Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1

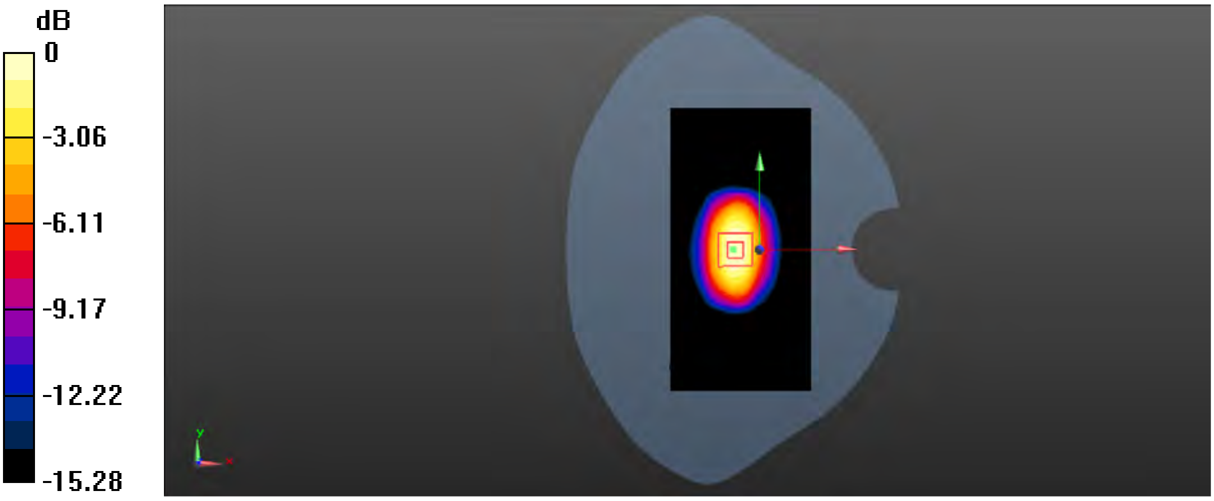
Medium: HSL1750;Medium parameters used: f = 1750 MHz; σ = 1.332 S/m; ε_r = 40.757; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(9.13, 9.13, 9.13); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin phanton; Type: SAM1; Serial: 1141
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 10.4 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.01 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 15.6 W/kg
SAR(1 g) = 8.97 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 10.0 W/kg



0 dB = 10.0 W/kg = 10.00 dBW/kg

Date: 2018/3/28

Test Laboratory: SGS SAR Lab

System Performance Check 1900 MHz Head

DUT: D1900V2; Type: D1900V2; Serial: 5d028

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

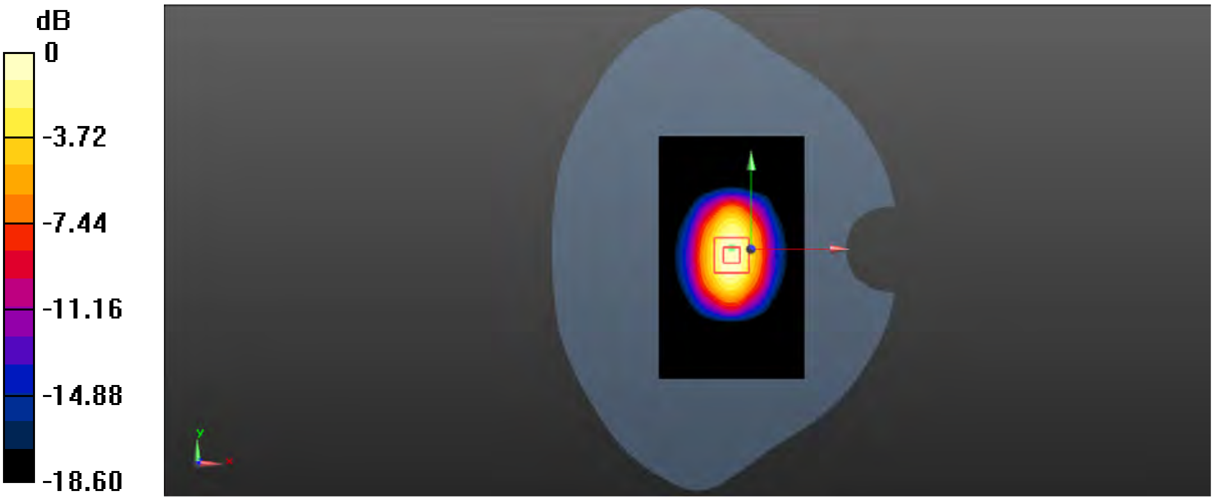
Medium: HSL1900;Medium parameters used: f = 1900 MHz; σ = 1.372 S/m; ε_r = 40.64; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.75, 8.75, 8.75); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin phanton; Type: SAM1; Serial: 1141
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 11.6 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.20 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 19.3 W/kg
SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.26 W/kg
Maximum value of SAR (measured) = 11.4 W/kg



0 dB = 11.4 W/kg = 10.57 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

System Performance Check 2450MHz Head

DUT: D2450V2; Type: D2450V2; Serial: 733

Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1

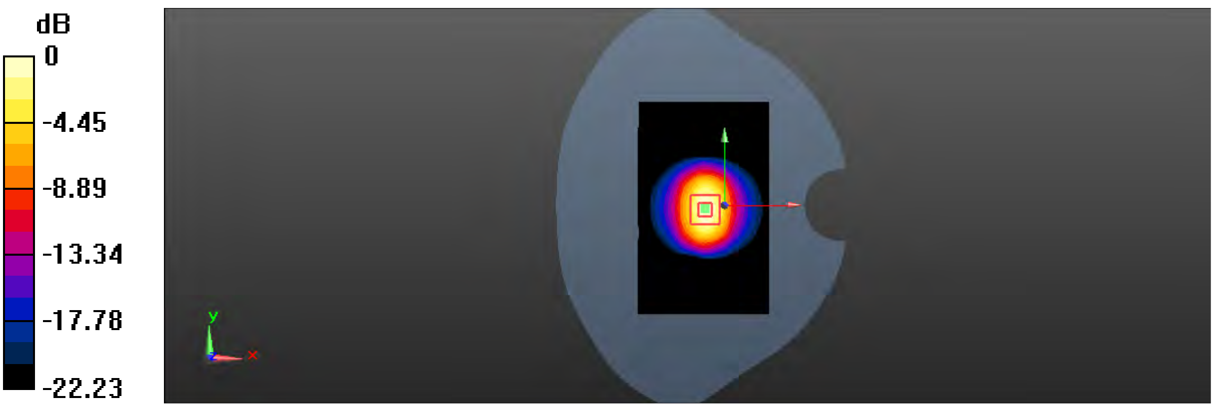
Medium: HSL2450;Medium parameters used: f = 2450 MHz; σ = 1.802 S/m; ε_r = 38.226; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(7.81, 7.81, 7.81); Calibrated: 2017/8/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (81x131x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 15.3 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.57 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.08 W/kg
Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

System Performance Check 835 MHz Body

DUT: D835V2; Type: D835V2; Serial: 4d105

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1

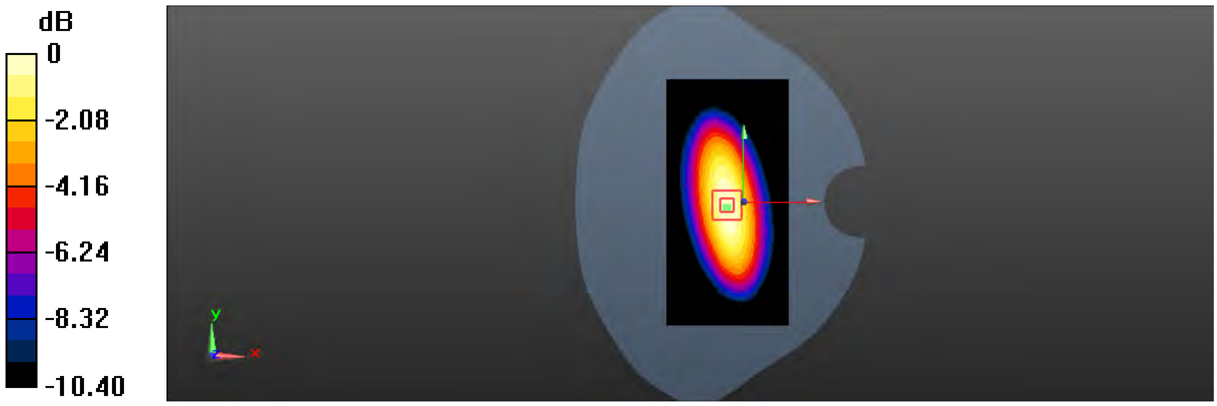
Medium: MSL835;Medium parameters used: f = 835 MHz; σ = 0.986 S/m; ε_r = 55.389; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.58, 10.58, 10.58); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=15mm, Pin=250mW/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.13 W/kg

Body/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.78 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.63 W/kg
Maximum value of SAR (measured) = 3.12 W/kg



0 dB = 3.12 W/kg = 4.94 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

System Performance Check 1750 MHz Body

DUT: D1750V2; Type: D1750V2; Serial: 1149

Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1

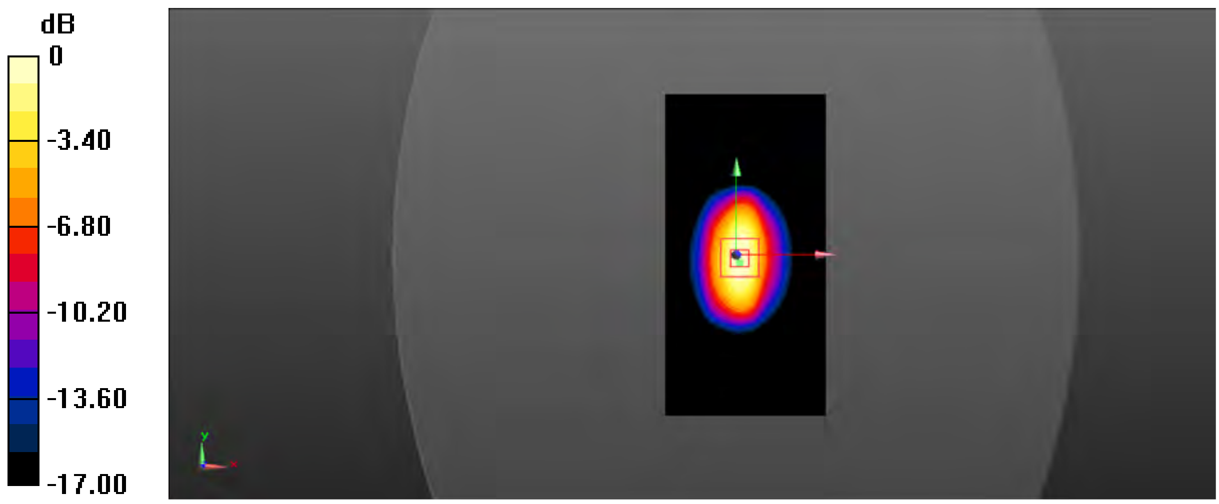
Medium: MSL1750;Medium parameters used: f = 1750 MHz; σ = 1.457 S/m; ε_r = 53.062; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.79, 8.79, 8.79); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.0 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 82.82 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.05 W/kg; SAR(10 g) = 4.79 W/kg
Maximum value of SAR (measured) = 12.8 W/kg



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

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

System Performance Check 1900 MHz Body

DUT: D1900V2; Type: D1900V2; Serial: 5d028

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

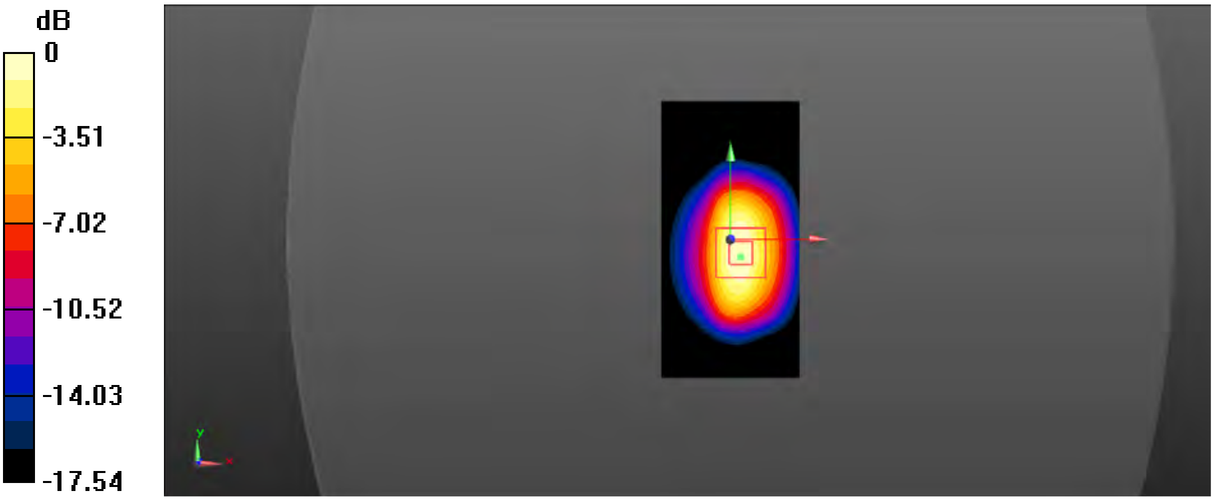
Medium: MSL1900;Medium parameters used: f = 1900 MHz; σ = 1.513 S/m; ε_r = 53.19; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.44, 8.44, 8.44); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (41x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 16.2 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 82.55 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 19.0 W/kg
SAR(1 g) = 10.8 W/kg; SAR(10 g) = 5.69 W/kg
Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.82 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

System Performance Check 2450MHz Body

DUT: D2450V2; Type: D2450V2; Serial: 733

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1

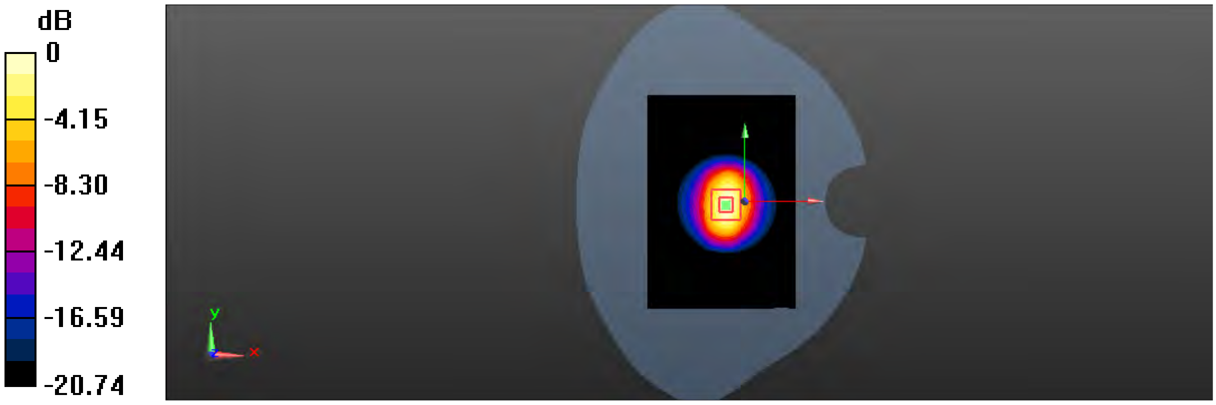
Medium: MSL2450;Medium parameters used: f = 2450 MHz; σ = 1.957 S/m; ε_r = 53.331; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(7.93, 7.93, 7.93); Calibrated: 2017/8/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Body/d=10mm, Pin=250mW/Area Scan (91x131x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 14.6 W/kg

Body/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 79.74 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 25.1 W/kg
SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.89 W/kg
Maximum value of SAR (measured) = 14.5 W/kg



0 dB = 14.5 W/kg = 11.61 dBW/kg

Appendix B

Detailed Test Results

1. GSM
GSM850 for Head & Body Worn & Hotspot
GSM1900 for Head & Body Worn & Hotspot
2. WCDMA
WCDMA850 for Head & Body Worn & Hotspot
WCDMA1750 for Head & Body Worn & Hotspot
WCDMA1900 for Head & Body Worn & Hotspot
4. WIFI
WIFI 802.11b for Head & Body Worn & Hotspot

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 GSM850 190CH Left touch cheek

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

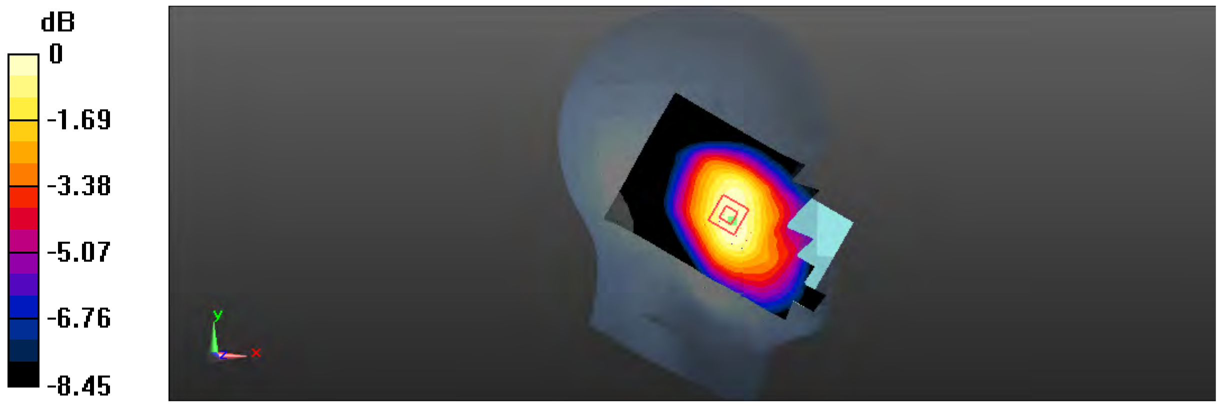
Medium: HSL835;Medium parameters used: f = 837 MHz; σ = 0.897 S/m; ε_r = 41.911; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.5, 10.5, 10.5); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Head/Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.456 W/kg

Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.870 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.511 W/kg
SAR(1 g) = 0.407 W/kg; SAR(10 g) = 0.312 W/kg
Maximum value of SAR (measured) = 0.460 W/kg



0 dB = 0.460 W/kg = -3.37 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 GSM850 190CH Back side 15mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

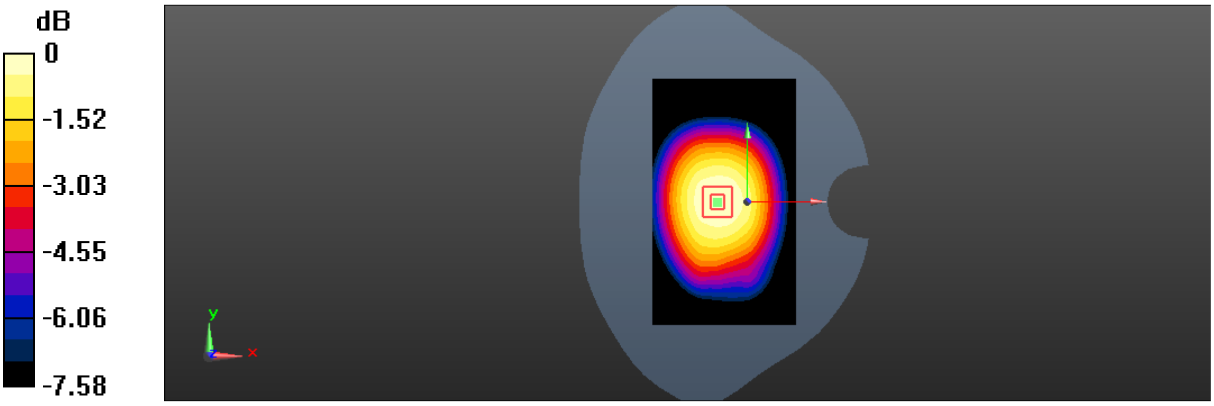
Medium: MSL835;Medium parameters used: f = 837 MHz; σ = 0.99 S/m; ε_r = 55.318; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.58, 10.58, 10.58); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.664 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.67 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.729 W/kg
SAR(1 g) = 0.576 W/kg; SAR(10 g) = 0.442 W/kg
Maximum value of SAR (measured) = 0.664 W/kg



0 dB = 0.664 W/kg = -1.78 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 GSM850 GPRS 2TS 128CH Left side 10mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

Communication System: UID 0, GPRS/EGPRS Mode(2up) Communication System (0); Frequency: 824.2 MHz;Duty Cycle: 1:4.14954

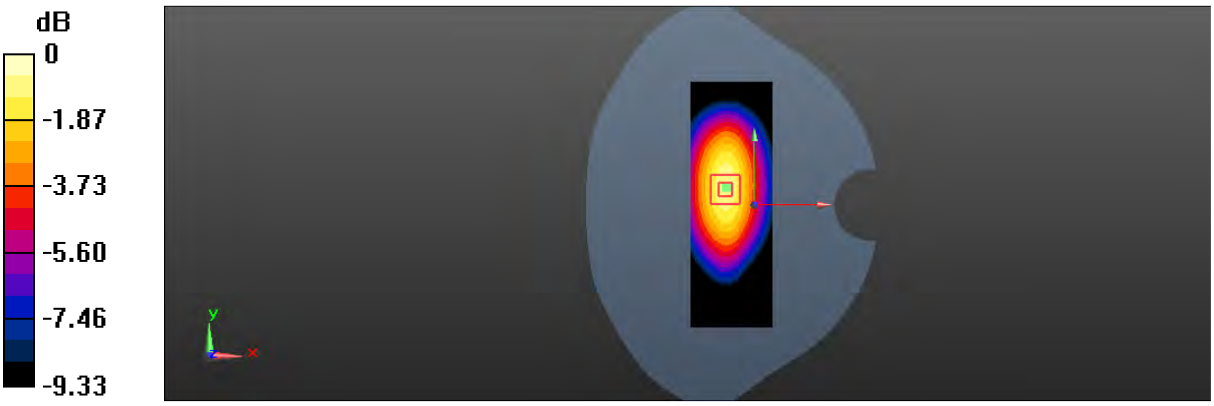
Medium: MSL835;Medium parameters used: f = 824.2 MHz; σ = 0.976 S/m; ε_r = 55.422; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.58, 10.58, 10.58); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (41x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.05 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.30 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.706 W/kg
Maximum value of SAR (measured) = 1.24 W/kg



0 dB = 1.24 W/kg = 0.93 dBW/kg

Date: 2018/3/28

Test Laboratory: SGS SAR Lab

Hisense T17 GSM1900 GSM 661CH Left cheek

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

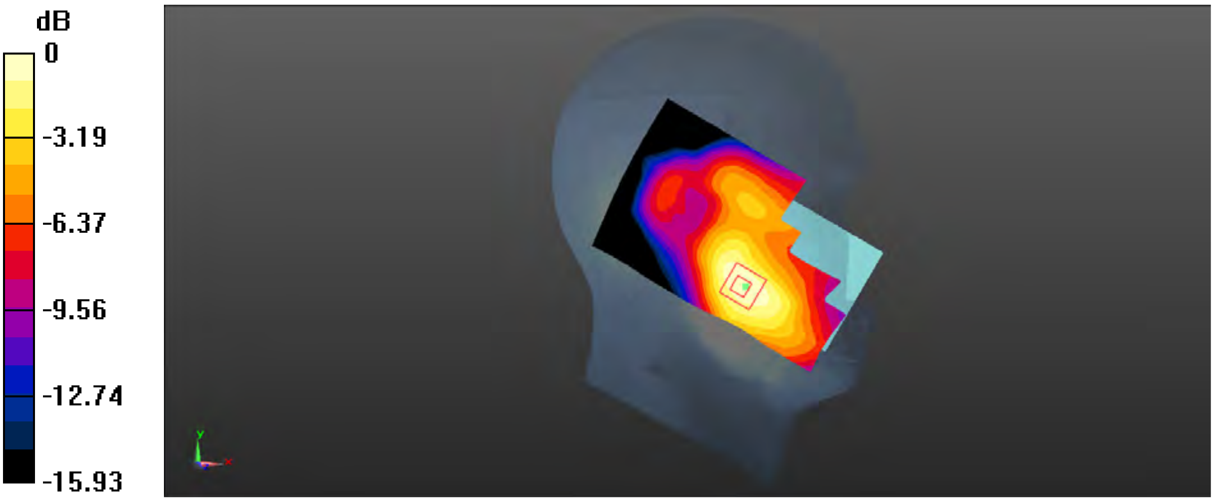
Medium: HSL1900;Medium parameters used: f = 1880 MHz; σ = 1.36 S/m; ε_r = 40.732; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.75, 8.75, 8.75); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin phanton; Type: SAM1; Serial: 1141
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.171 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.525 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.259 W/kg
SAR(1 g) = 0.162 W/kg; SAR(10 g) = 0.099 W/kg
Maximum value of SAR (measured) = 0.172 W/kg



0 dB = 0.172 W/kg = -7.64 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

Hisense T17 GSM1900 GSM 661CH Back side 15mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

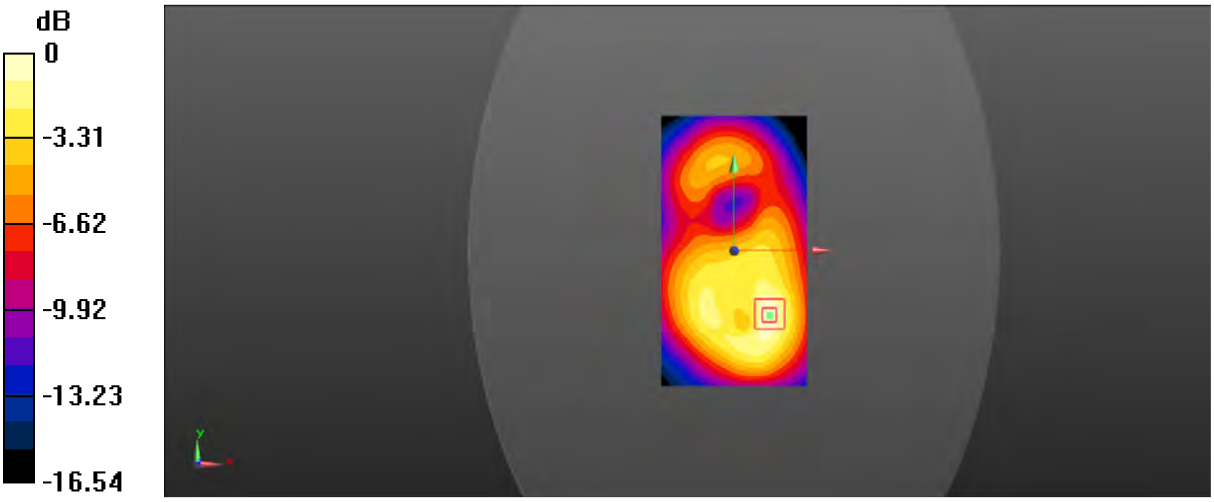
Medium: MSL1900;Medium parameters used: f = 1880 MHz; σ = 1.503 S/m; ε_r = 53.465; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.44, 8.44, 8.44); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.225 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.341 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.398 W/kg
SAR(1 g) = 0.224 W/kg; SAR(10 g) = 0.127 W/kg
Maximum value of SAR (measured) = 0.248 W/kg



0 dB = 0.248 W/kg = -6.06 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

Hisense T17 GSM1900 GPRS 4TS 661CH Back side 10mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

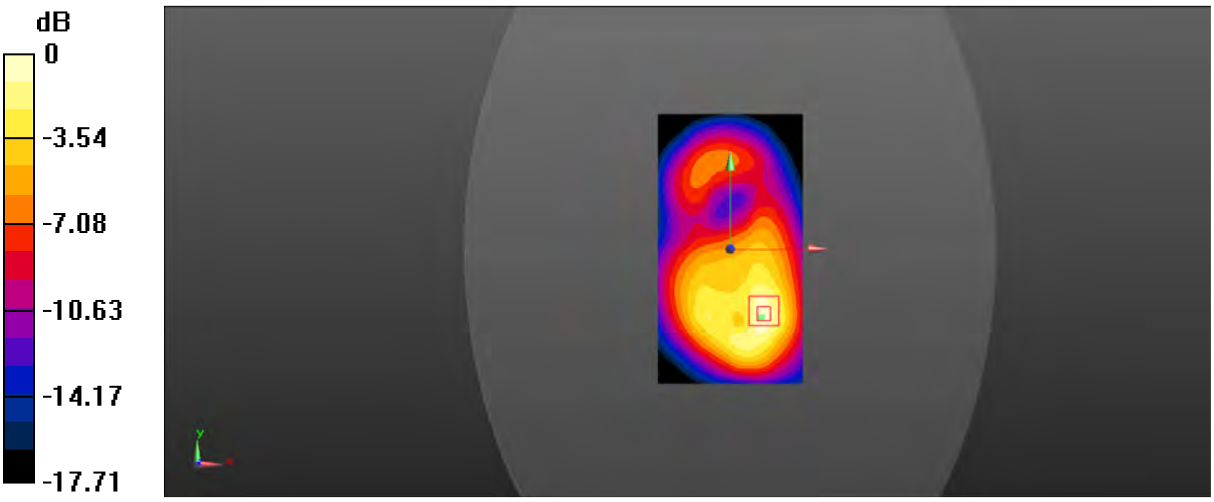
Medium: MSL1900;Medium parameters used: f = 1880 MHz; σ = 1.503 S/m; ε_r = 53.465; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.44, 8.44, 8.44); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.714 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.31 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.696 W/kg; SAR(10 g) = 0.377 W/kg
Maximum value of SAR (measured) = 0.757 W/kg



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

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 WCDMA Band V RMC 4182CH Left touch cheek

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

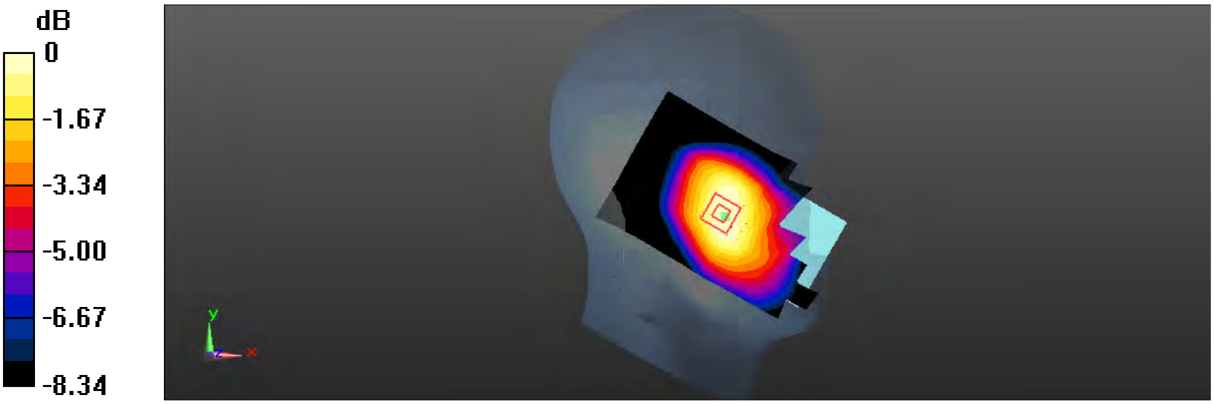
Medium: HSL835;Medium parameters used: f = 836.4 MHz; σ = 0.901 S/m; ε_r = 42.051; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.5, 10.5, 10.5); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Head/Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.260 W/kg

Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.594 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.177 W/kg
Maximum value of SAR (measured) = 0.262 W/kg



0 dB = 0.262 W/kg = -5.82 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 WCDMA Band V RMC 4182CH Back side 15mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

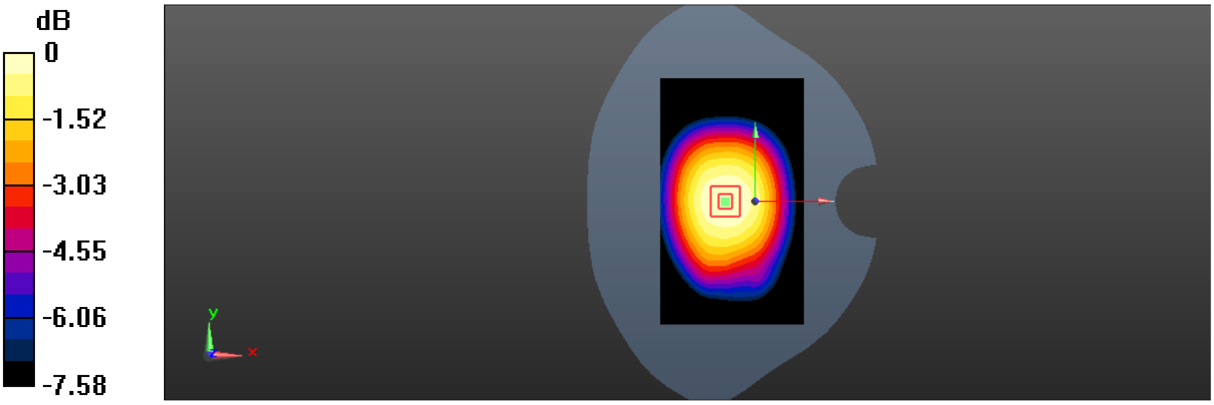
Medium: MSL835;Medium parameters used: f = 836.4 MHz; σ = 0.987 S/m; ε_r = 55.31; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.58, 10.58, 10.58); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.359 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.27 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.394 W/kg
SAR(1 g) = 0.311 W/kg; SAR(10 g) = 0.238 W/kg
Maximum value of SAR (measured) = 0.358 W/kg



0 dB = 0.358 W/kg = -4.46 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 WCDMA Band V RMC 4182CH Back side 10mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

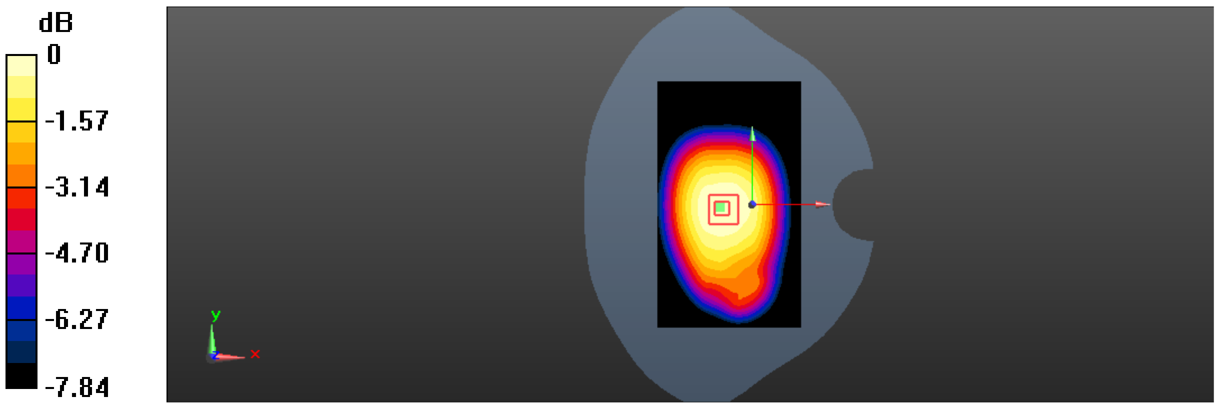
Medium: MSL835;Medium parameters used: f = 836.4 MHz; σ = 0.987 S/m; ε_r = 55.31; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(10.58, 10.58, 10.58); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.392 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.02 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.432 W/kg
SAR(1 g) = 0.343 W/kg; SAR(10 g) = 0.265 W/kg
Maximum value of SAR (measured) = 0.393 W/kg



0 dB = 0.393 W/kg = -4.06 dBW/kg

Date: 2018/3/28

Test Laboratory: SGS SAR Lab

Hisense T17 WCMA Band IV RMC 1412CH Left cheek

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

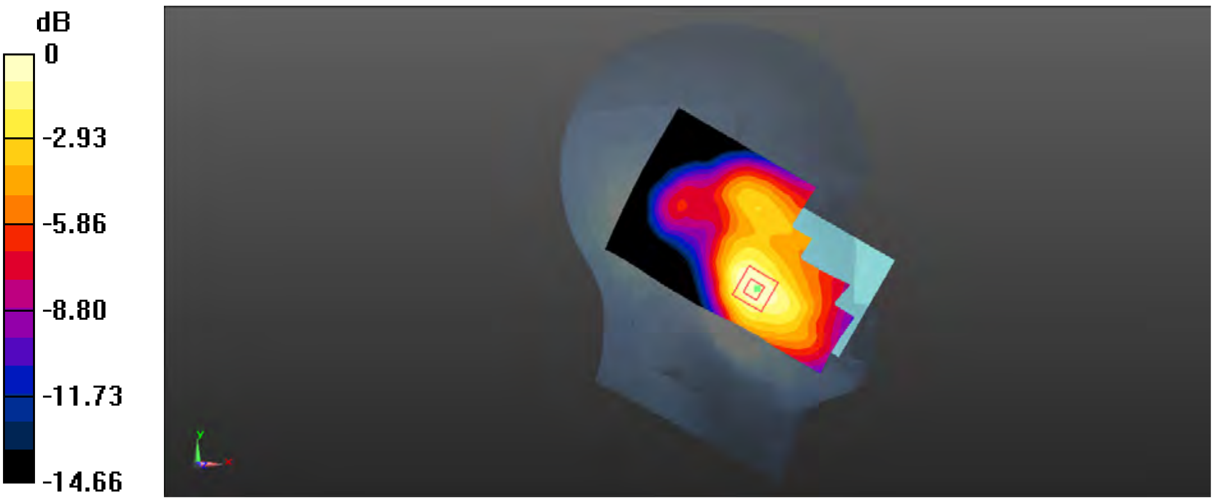
Medium: HSL1750;Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.32 S/m; ε_r = 40.669; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(9.13, 9.13, 9.13); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin phanton; Type: SAM1; Serial: 1141
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.204 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.054 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.293 W/kg
SAR(1 g) = 0.195 W/kg; SAR(10 g) = 0.124 W/kg
Maximum value of SAR (measured) = 0.209 W/kg



0 dB = 0.209 W/kg = -6.80 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

Hisense T17 WCMA Band IV RMC 1412CH Back side 15mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

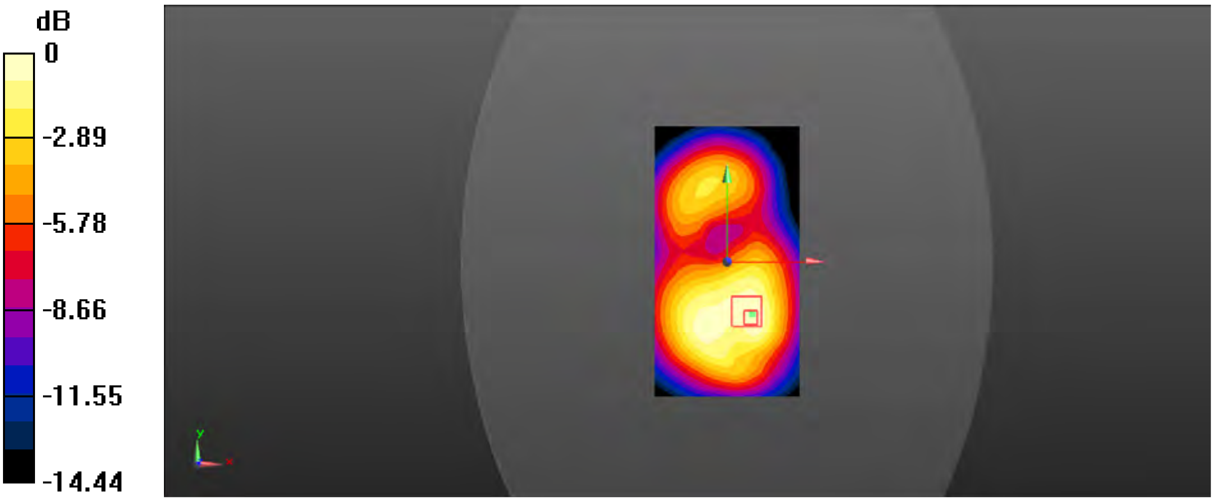
Medium: MSL1750;Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.436 S/m; ε_r = 52.851; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.79, 8.79, 8.79); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.251 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.423 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.374 W/kg
SAR(1 g) = 0.234 W/kg; SAR(10 g) = 0.148 W/kg
Maximum value of SAR (measured) = 0.249 W/kg



0 dB = 0.249 W/kg = -6.04 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

Hisense T17 WCMA Band IV RMC 1412CH Back side 10mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

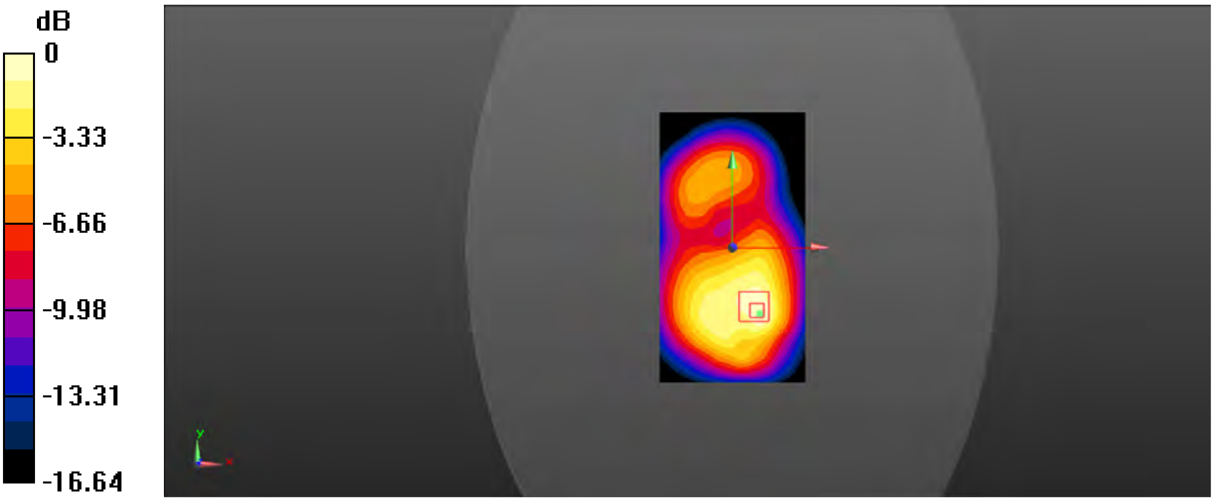
Medium: MSL1750;Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.436 S/m; ε_r = 52.851; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.79, 8.79, 8.79); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.536 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.501 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.848 W/kg
SAR(1 g) = 0.492 W/kg; SAR(10 g) = 0.295 W/kg
Maximum value of SAR (measured) = 0.536 W/kg



0 dB = 0.536 W/kg = -2.71 dBW/kg

Date: 2018/3/28

Test Laboratory: SGS SAR Lab

Hisense T17 WCMA Band II RMC 9400CH Left cheek

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

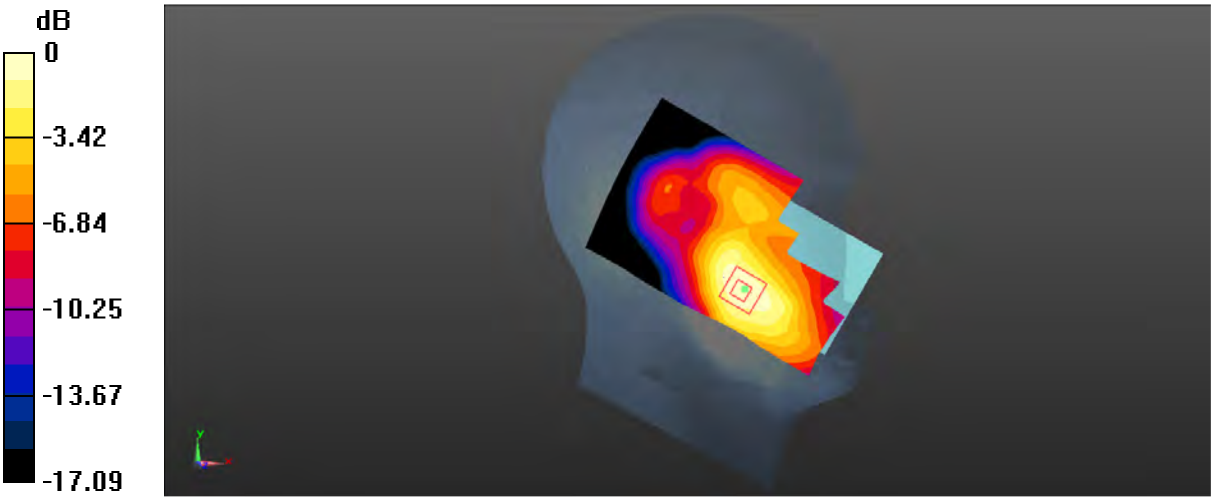
Medium: HSL1900;Medium parameters used: f = 1880 MHz; σ = 1.36 S/m; ε_r = 40.732; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.75, 8.75, 8.75); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin phanton; Type: SAM1; Serial: 1141
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.278 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.082 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.405 W/kg
SAR(1 g) = 0.258 W/kg; SAR(10 g) = 0.159 W/kg
Maximum value of SAR (measured) = 0.277 W/kg



0 dB = 0.277 W/kg = -5.58 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

Hisense T17 WCMA Band II RMC 9400CH Back side 15mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

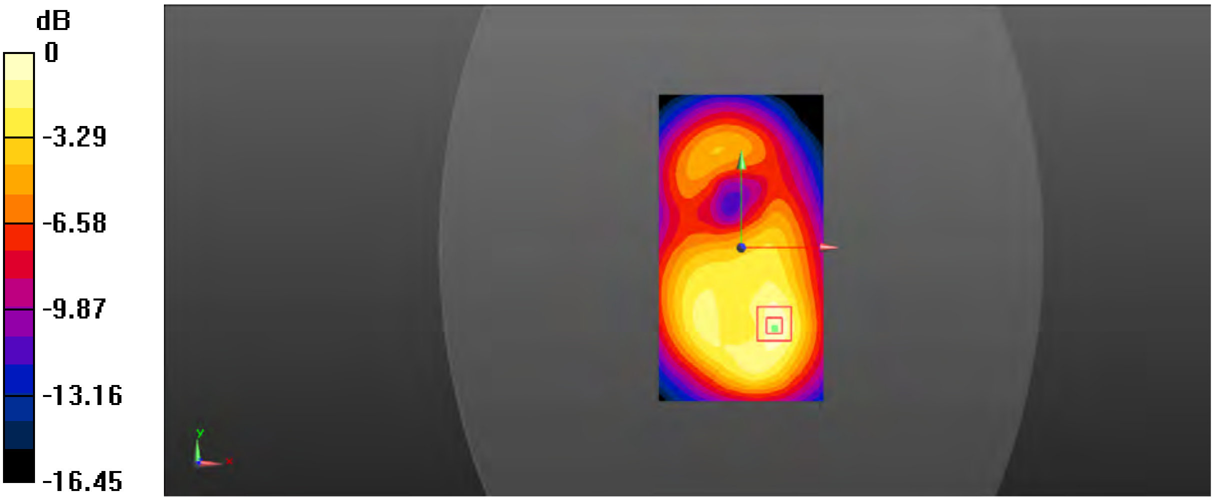
Medium: MSL1900;Medium parameters used: f = 1880 MHz; σ = 1.503 S/m; ε_r = 53.465; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.44, 8.44, 8.44); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.382 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.27 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.595 W/kg
SAR(1 g) = 0.347 W/kg; SAR(10 g) = 0.199 W/kg
Maximum value of SAR (measured) = 0.383 W/kg



0 dB = 0.383 W/kg = -4.17 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS SAR Lab

Hisense T17 WCMA Band II RMC 9400CH Back side 10mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

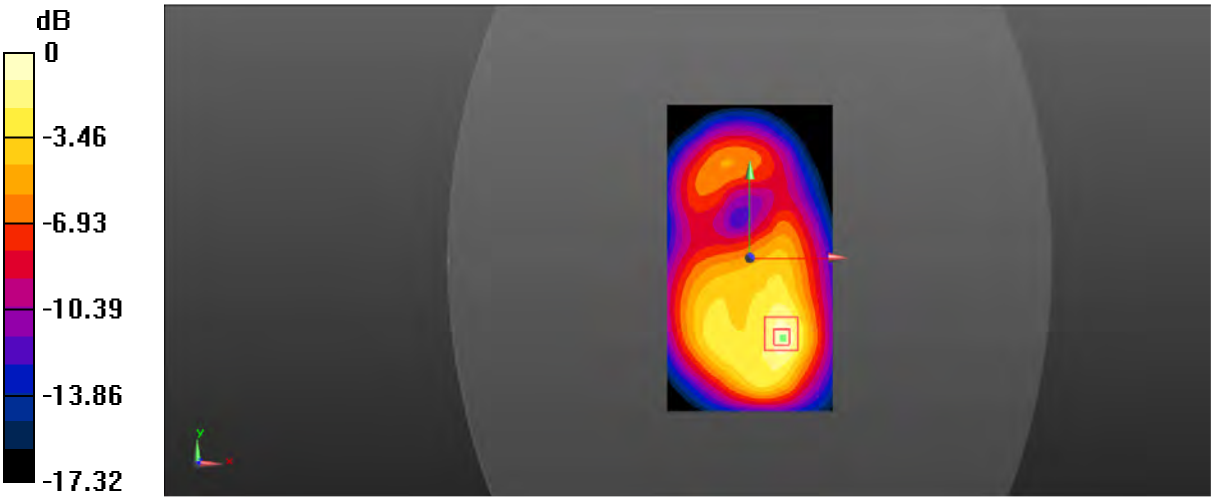
Medium: MSL1750;Medium parameters used: f = 1880 MHz; σ = 1.558 S/m; ε_r = 50.845; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(8.44, 8.44, 8.44); Calibrated: 2017/8/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection), z = -2.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: ELI5; Type: ELI5; Serial: 1143
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.804 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.38 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.7 W/kg; SAR(10 g) = 0.391 W/kg
Maximum value of SAR (measured) = 0.802 W/kg



0 dB = 0.802 W/kg = -0.96 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 WiFi 2.4G 802.11b 11CH Left cheek

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

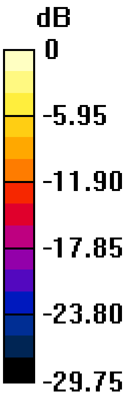
Medium: HSL2450;Medium parameters used: f = 2462 MHz; σ = 1.818 S/m; ε_r = 38.234; ρ = 1000 kg/m^3
Phantom section: Left Section

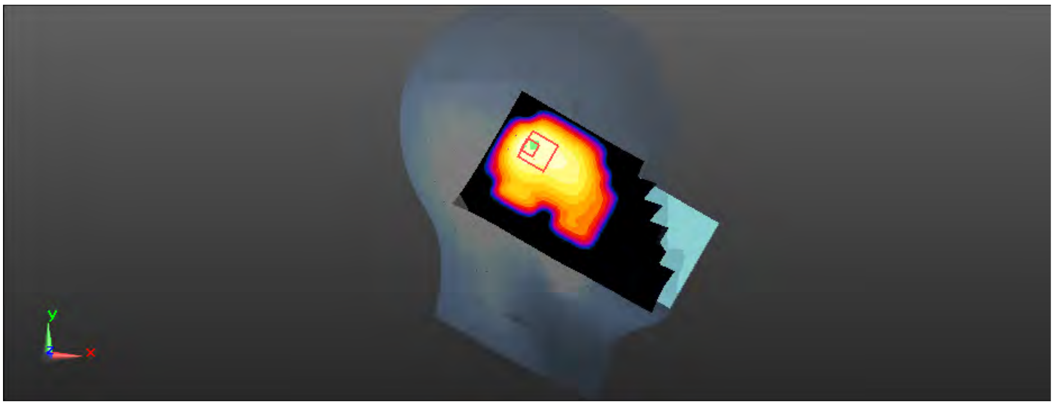
DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(7.81, 7.81, 7.81); Calibrated: 2017/8/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Head/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.338 W/kg

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.081 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.577 W/kg
SAR(1 g) = 0.243 W/kg; SAR(10 g) = 0.123 W/kg
Maximum value of SAR (measured) = 0.270 W/kg





0 dB = 0.270 W/kg = -5.69 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 WiFi 2.4G 802.11b 11CH Back side 15mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

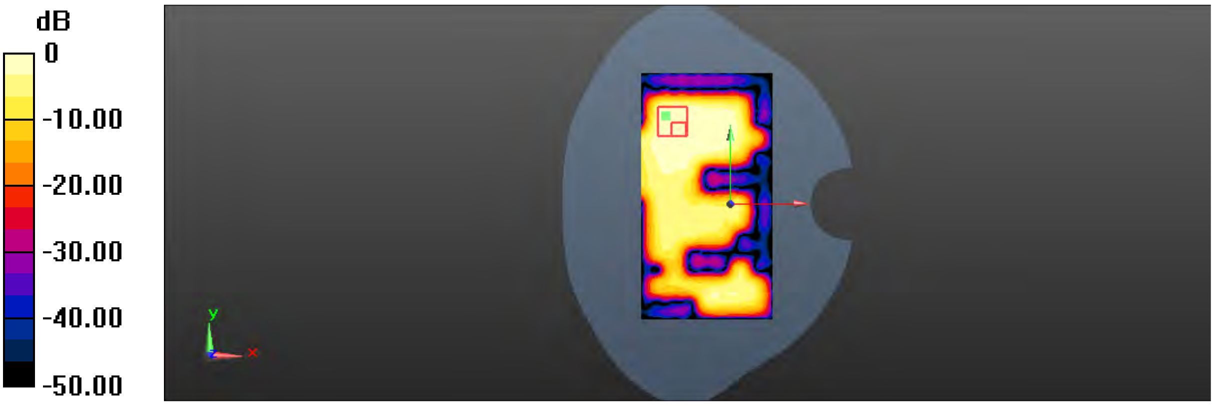
Medium: MSL2450;Medium parameters used: f = 2462 MHz; σ = 1.961 S/m; ε_r = 53.28; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(7.93, 7.93, 7.93); Calibrated: 2017/8/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0492 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.102 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.0650 W/kg
SAR(1 g) = 0.035 W/kg; SAR(10 g) = 0.015 W/kg
Maximum value of SAR (measured) = 0.0406 W/kg



0 dB = 0.0406 W/kg = -13.91 dBW/kg

Date: 2018/3/29

Test Laboratory: SGS-SAR Lab

Hisense T17 WiFi 2.4G 802.11b 11CH Back side 10mm

DUT: Hisense T17; Type: Mobile Handset; Serial: 1MF75AZ9ES1SK0GFDY1

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

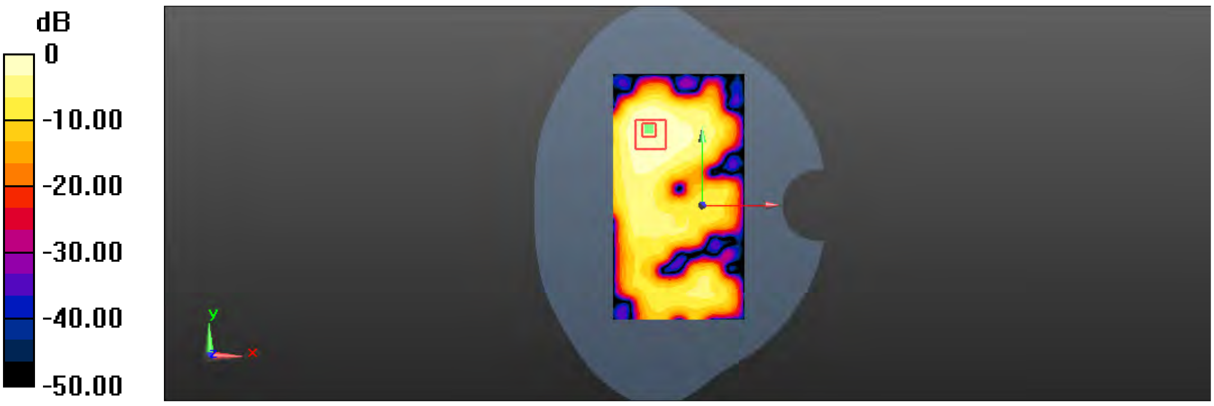
Medium: MSL2450;Medium parameters used: f = 2462 MHz; σ = 1.961 S/m; ε_r = 53.28; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY 5 Configuration:

- Probe: EX3DV4 - SN3923; ConvF(7.93, 7.93, 7.93); Calibrated: 2017/8/24;
- Sensor-Surface: 4mm (Mechanical Surface Detection), z = -2.0, 31.0
- Electronics: DAE4 Sn1267; Calibrated: 2017/11/28
- Phantom: Twin Phantom; Type: SAM1; Serial: 1824
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0878 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.665 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.159 W/kg
SAR(1 g) = 0.074 W/kg; SAR(10 g) = 0.040 W/kg
Maximum value of SAR (measured) = 0.0804 W/kg



0 dB = 0.0804 W/kg = -10.95 dBW/kg

Appendix C

Calibration certificate

1. Dipole
D835V2 - SN 4d105(2016-12-08)
D1750V2 - SN 1149(2016-06-23)
D1900V2 - SN 5d028(2016-12-07)
D2450V2 - SN 733 (2016-12-07)
2. DAE
DAE4-SN 1267(2017-11-28)
3. Probe
EX3DV4 - SN 3923(2017-8-24)

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client **SGS(Boce)** **Certificate No: Z16-97239**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d105
Calibration Procedure(s)	FD-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	December 8, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

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

Issued: December 11, 2016

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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%.

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Measurement Conditions

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.59 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.59 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.29 mW /g ± 20.4 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.7 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.65 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.63 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.46 mW /g ± 20.4 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2Ω- 3.41jΩ
Return Loss	- 29.1dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8Ω- 3.25jΩ
Return Loss	- 25.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.500 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

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DASY5 Validation Report for Head TSL Date: 12.08.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d105

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.912 S/m; ε_r = 40.78; ρ = 1000 kg/m^3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.82, 9.82, 9.82); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

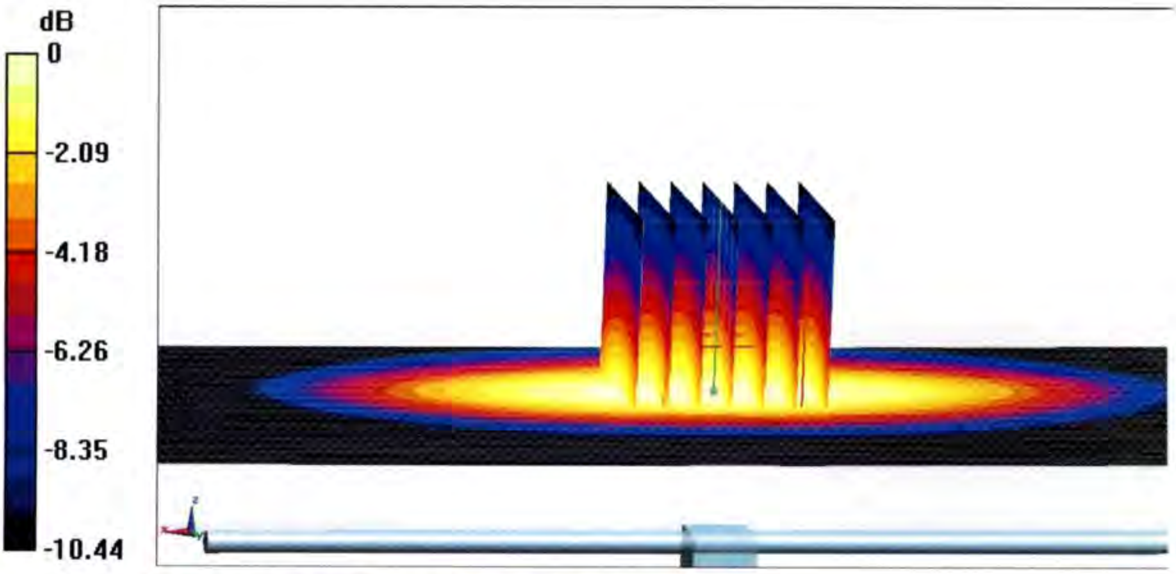
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 49.08V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.62 W/kg

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 3.08 W/kg



0 dB = 3.08 W/kg = 4.89 dBW/kg

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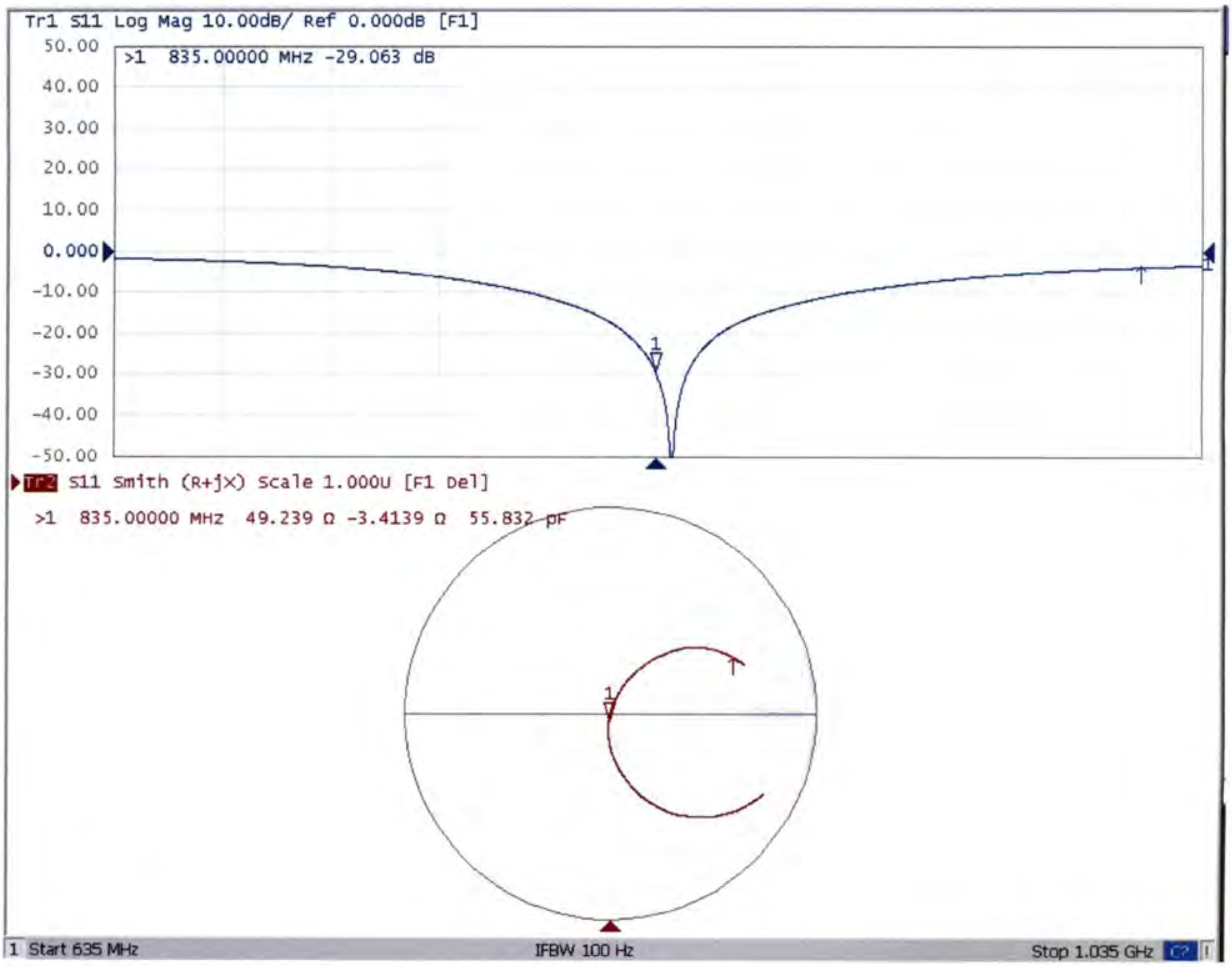
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 12.08.2016

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d105

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.983 S/m; ε_r = 54.74; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.5,9.5, 9.5); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

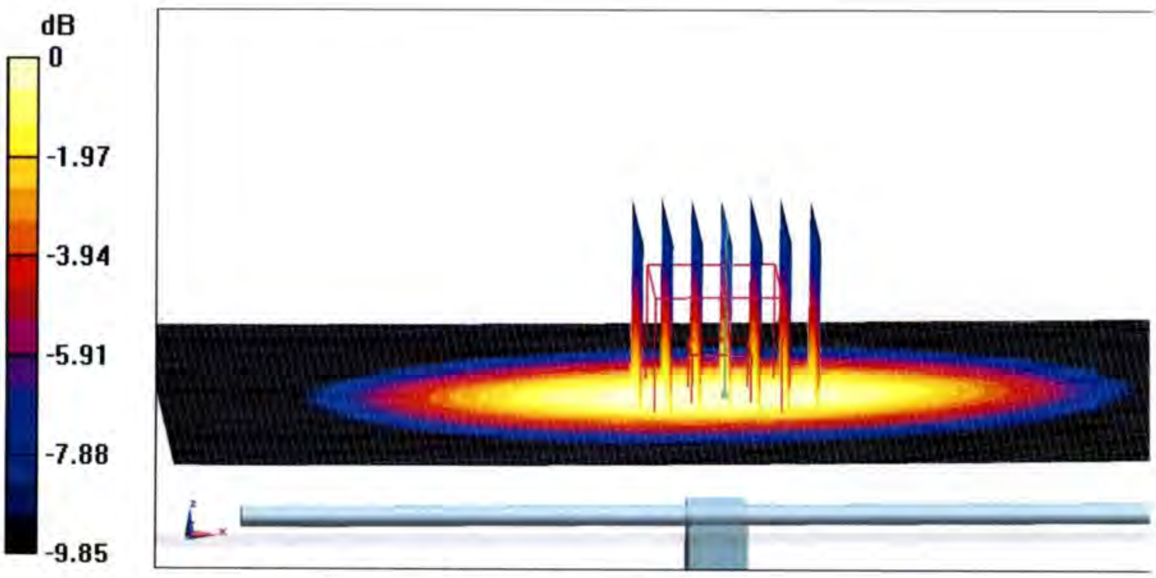
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.10 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.54 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.63 W/kg

Maximum value of SAR (measured) = 3.06 W/kg



0 dB = 3.06 W/kg = 4.86 dBW/kg

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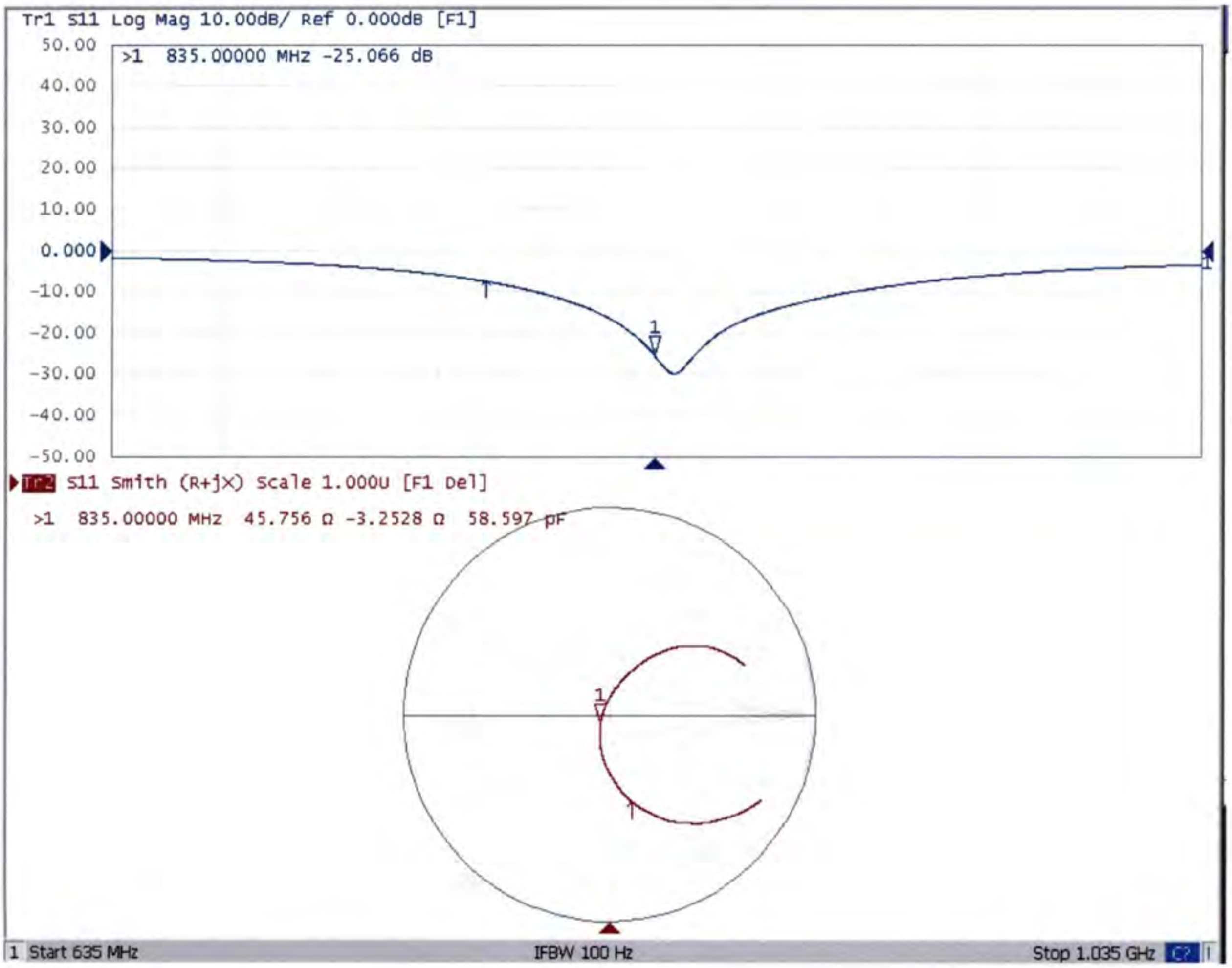
Impedance Measurement Plot for Body TSL



Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 0108

Client **SGS-SZ (Auden)**

Certificate No: D1750V2-1149_Jun16

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1149
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	June 23, 2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: June 28, 2016

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) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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	39.8 ± 6 %	1.36 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	9.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.5 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	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.8 ± 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	9.27 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.0 Ω - 0.5 jΩ
Return Loss	- 38.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.6 Ω + 0.0 jΩ
Return Loss	- 23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.213 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	April 10, 2015

DASY5 Validation Report for Head TSL

Date: 23.06.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1149

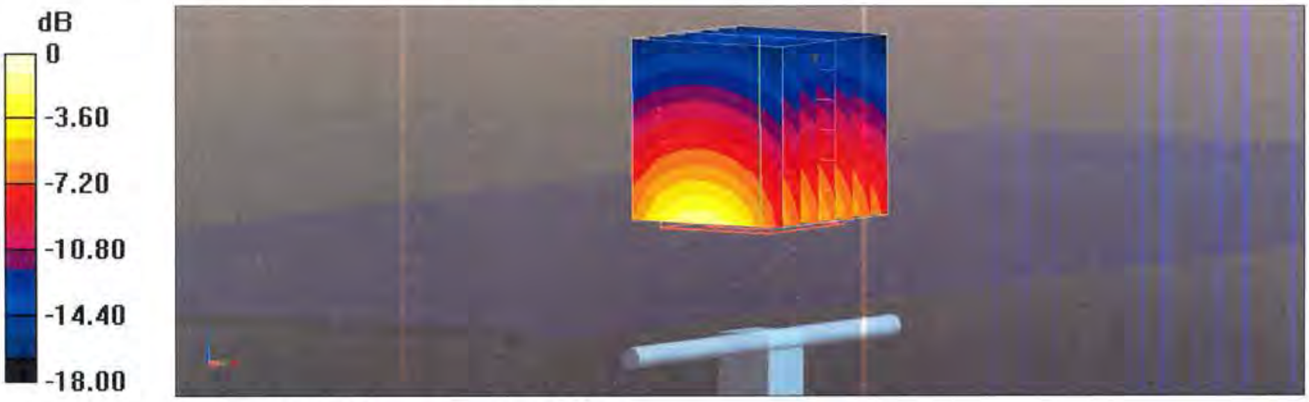
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7372)

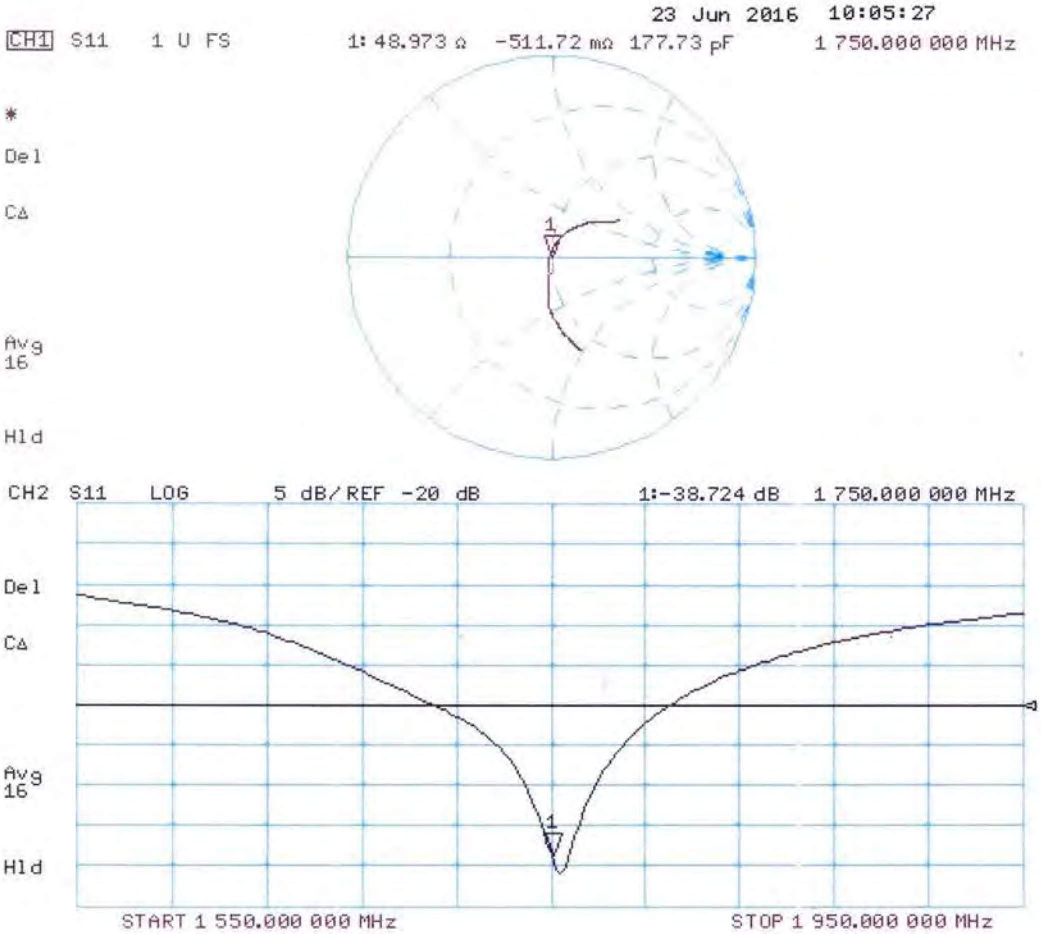
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.0 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.16 W/kg; SAR(10 g) = 4.87 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.06.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1149

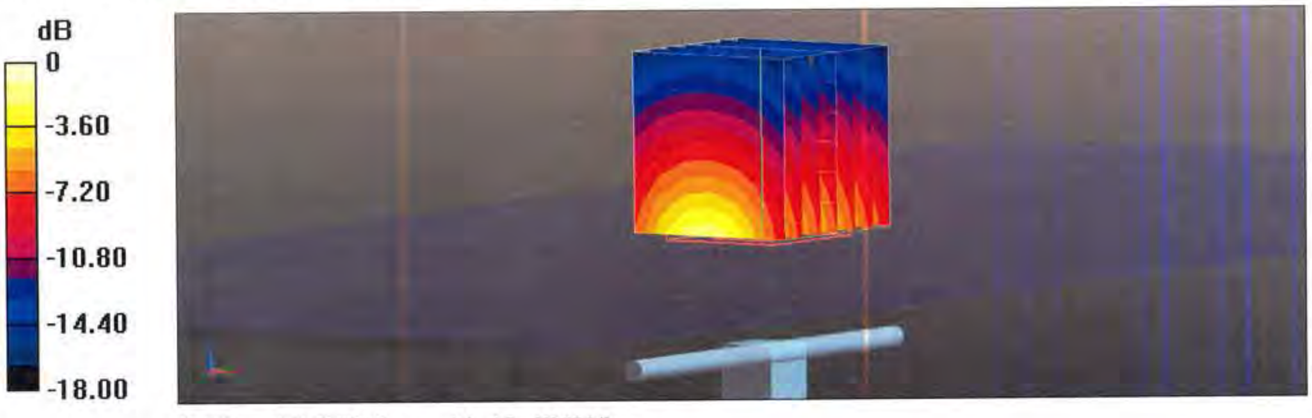
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.5 S/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

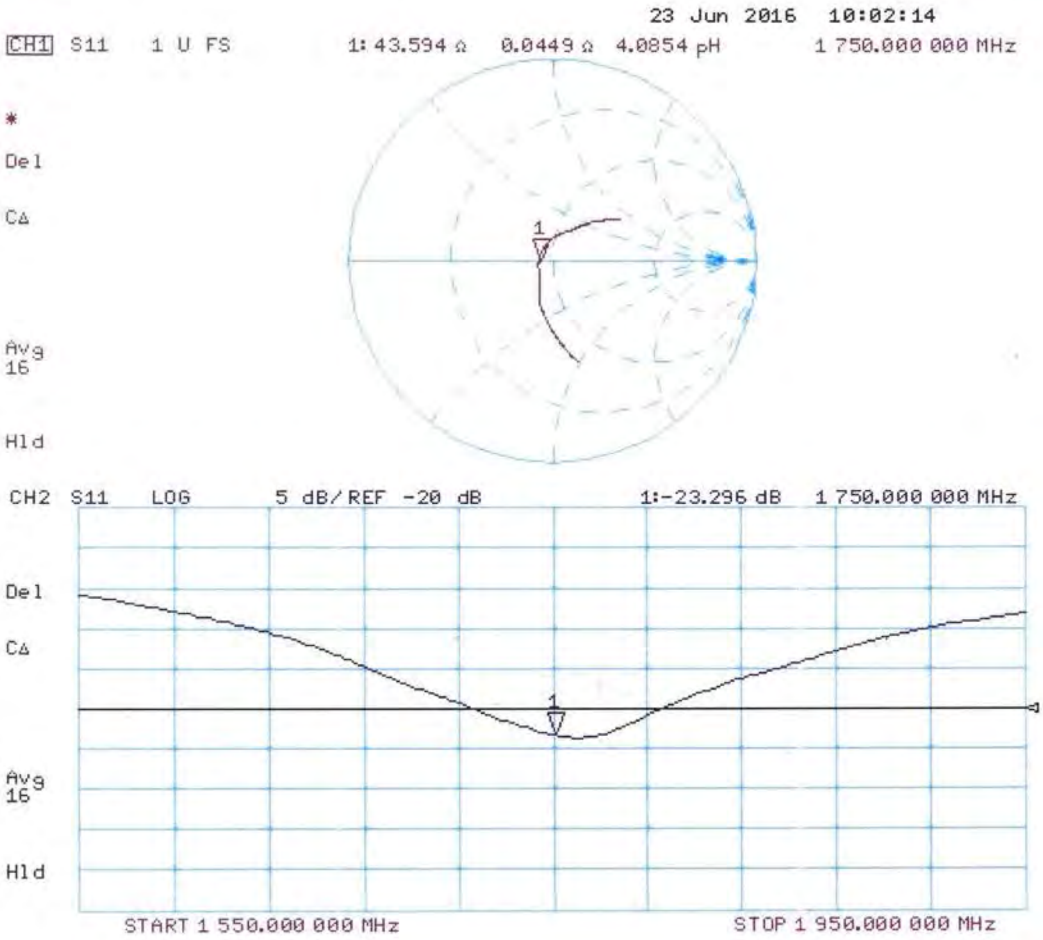
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.6 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.27 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

Impedance Measurement Plot for Body TSL



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Client **SGS(Boce)** **Certificate No: Z16-97240**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d028
Calibration Procedure(s)	FD-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	December 7, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

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

Issued: December 11, 2016

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
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	40.2 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °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 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.7 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**21.1 mW /g ± 20.4 % (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	54.3 ± 6 %	1.51 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**41.6 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.32 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 mW /g ± 20.4 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8Ω+ 5.90jΩ
Return Loss	- 24.4dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1Ω+ 5.82jΩ
Return Loss	- 24.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.306 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

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DASY5 Validation Report for Head TSL Date: 12.07.2016

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.383 S/m; εr = 40.16; ρ = 1000 kg/m3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.98, 7.98, 7.98); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

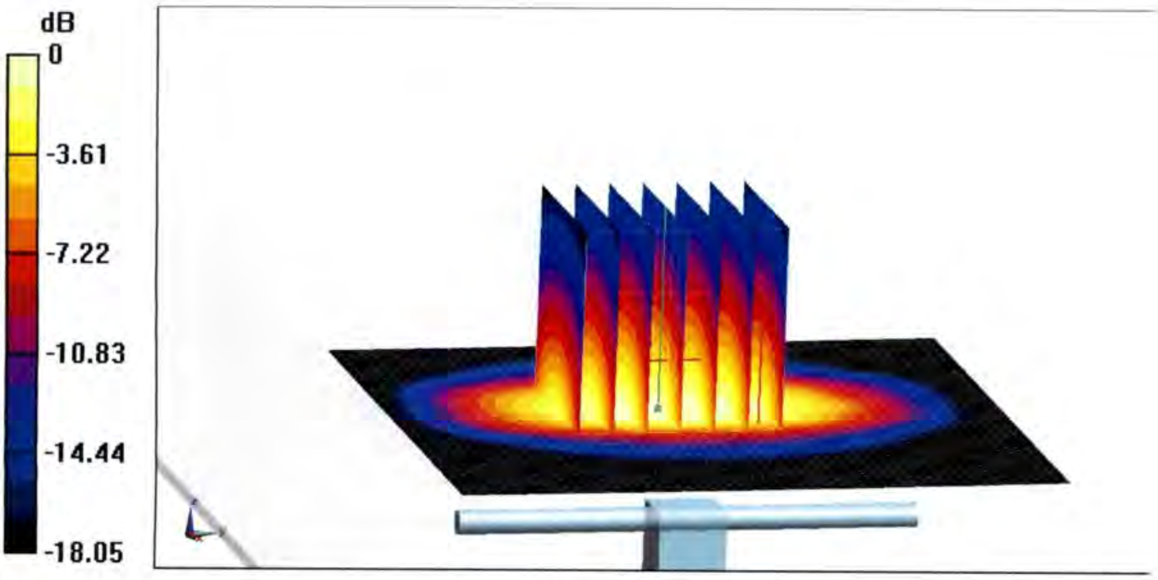
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.5 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.24 W/kg

Maximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.4 W/kg = 11.58 dBW/kg

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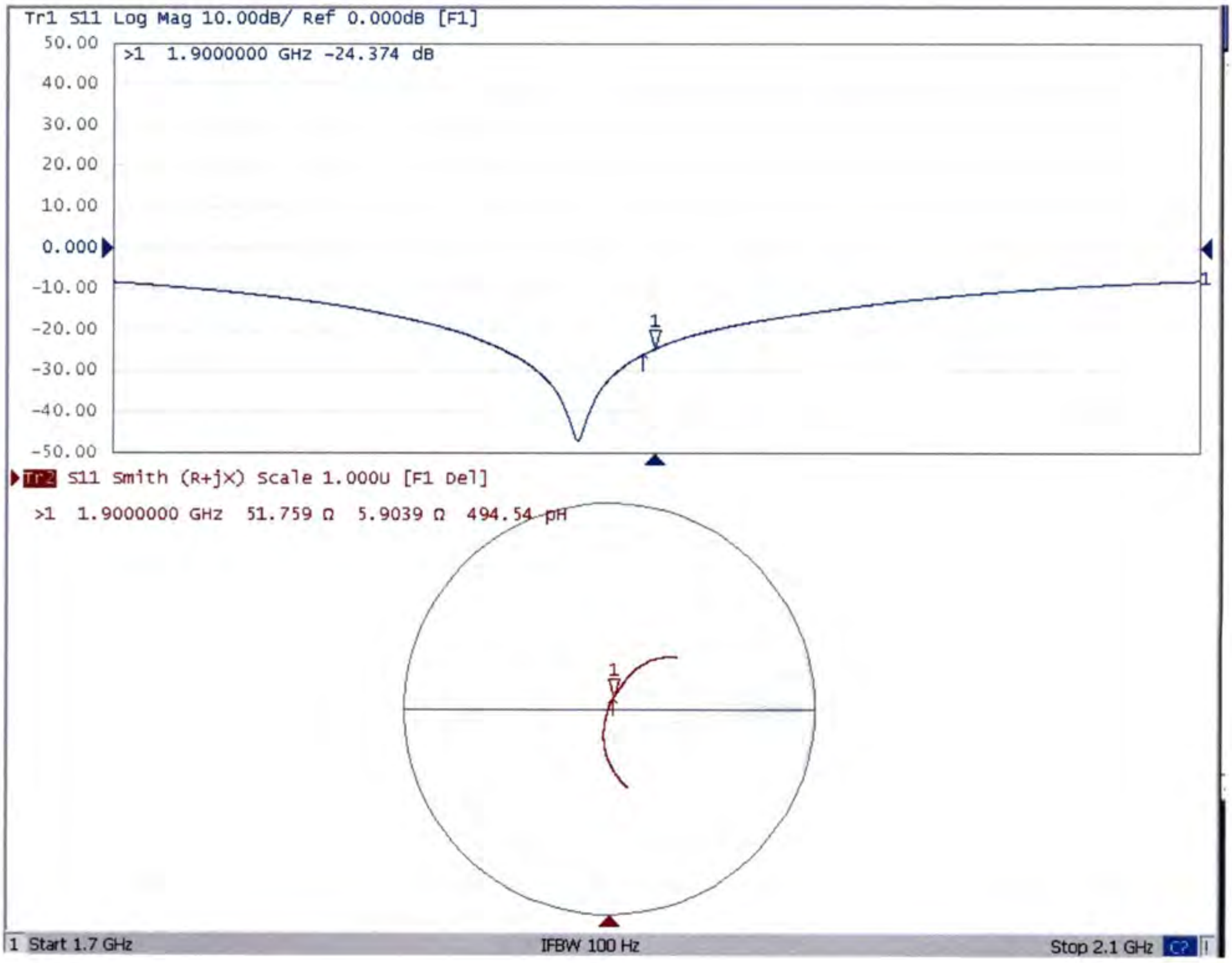
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 12.07.2016

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.506 S/m; ε_r = 54.26; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.7, 7.7, 7.7); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

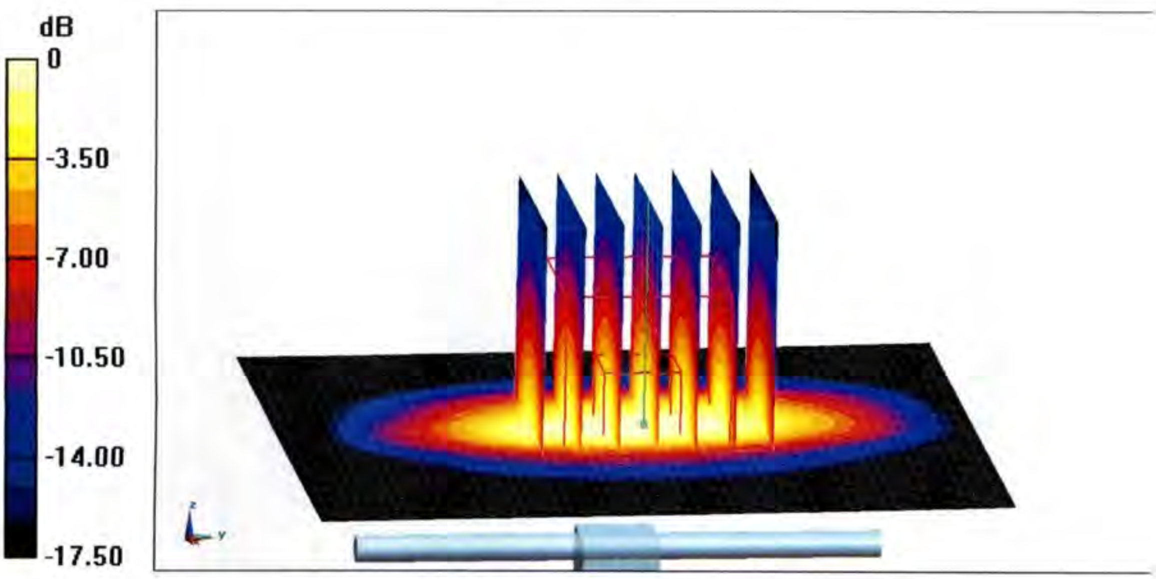
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.69 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 18.8 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.32 W/kg

Maximum value of SAR (measured) = 14.8 W/kg



0 dB = 14.8 W/kg = 11.70 dBW/kg

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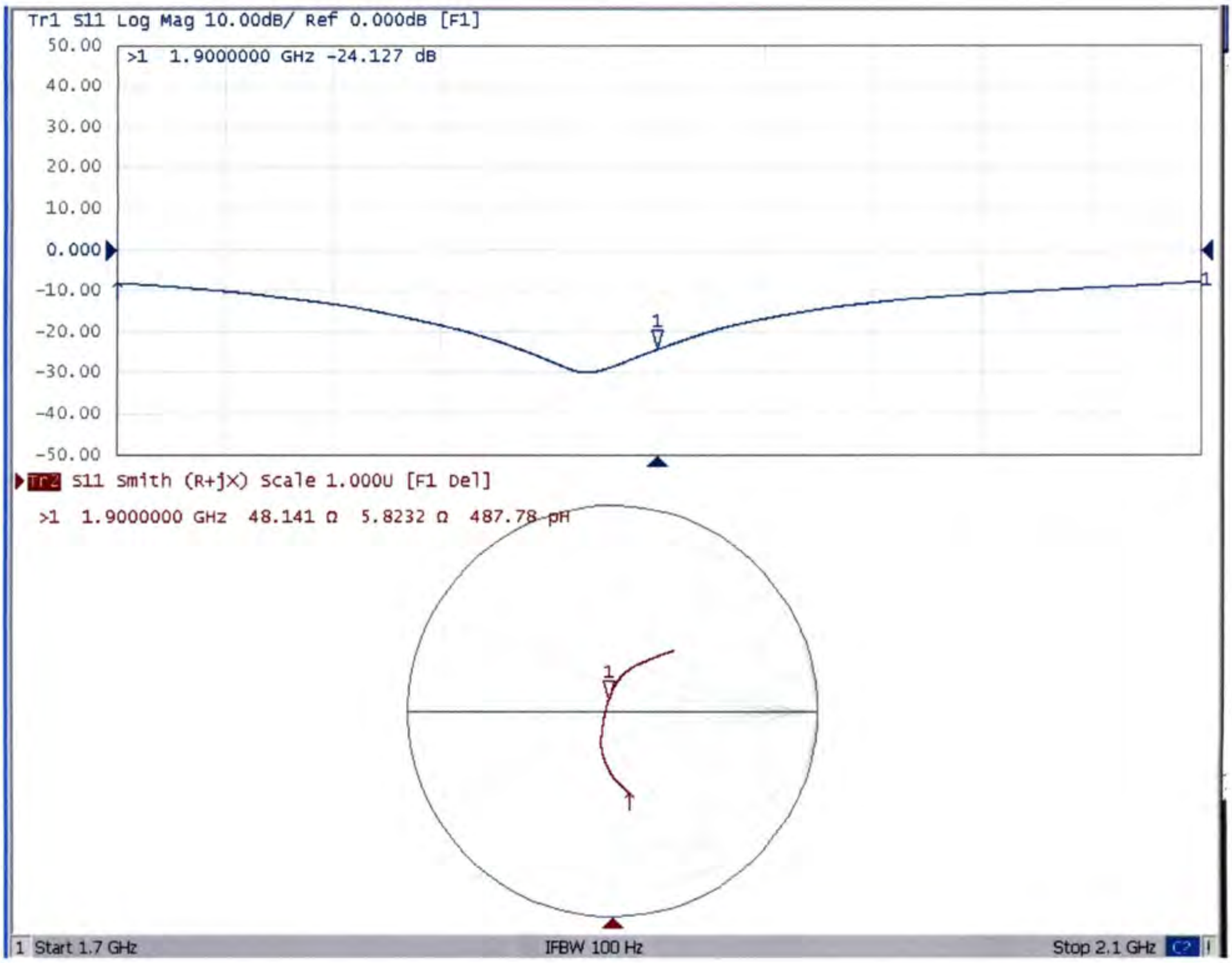
Impedance Measurement Plot for Body TSL



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Client **SGS(Boce)** **Certificate No: Z16-97242**

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 733

Calibration Procedure(s): FD-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: December 7, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Power sensor NRP-Z91	101547	27-Jun-16 (CTTL, No.J16X04777)	Jun-17
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG,No.EX3-7433_Sep16)	Sep-17
DAE4	SN 771	02-Feb-16(CTTL-SPEAG,No.Z16-97011)	Feb-17
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	01-Feb-16 (CTTL, No.J16X00893)	Jan-17
Network Analyzer E5071C	MY46110673	26-Jan-16 (CTTL, No.J16X00894)	Jan-17

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

Issued: December 11, 2016

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 300MHz to 3GHz)", February 2005
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
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	39.4 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °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 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**53.1 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.22 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.9 mW /g ± 20.4 % (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	53.1 ± 6 %	1.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**51.0 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.85 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.5 mW /g ± 20.4 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9Ω+ 4.11jΩ
Return Loss	- 26.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.7Ω+ 5.90jΩ
Return Loss	- 24.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.257 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

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DASY5 Validation Report for Head TSL Date: 11.07.2016

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.809 S/m; εr = 39.42; ρ = 1000 kg/m3

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.45, 7.45, 7.45); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

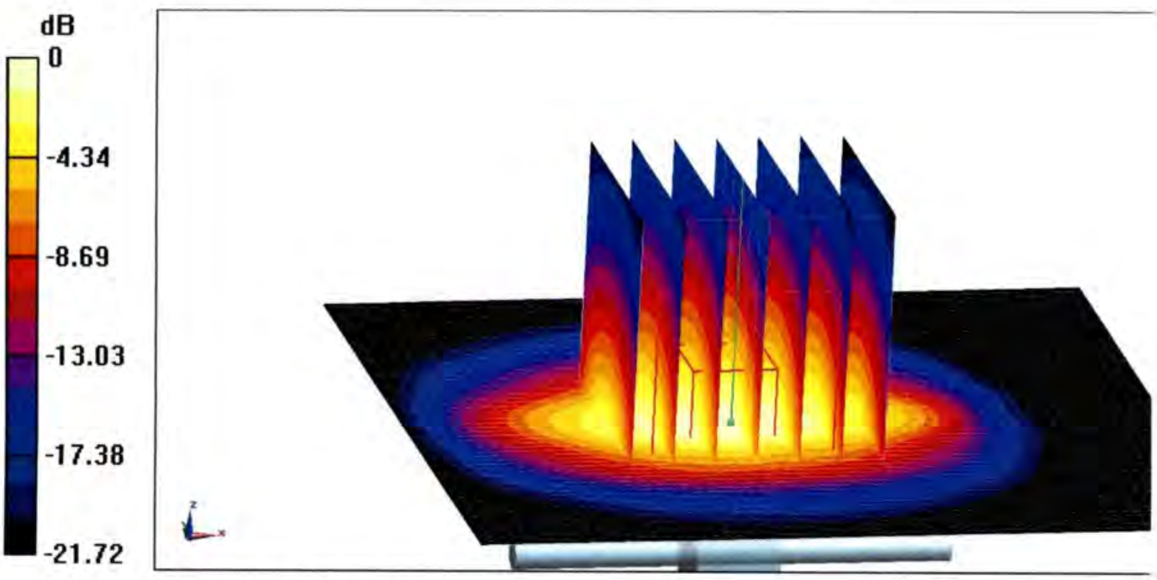
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.8 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 27.5 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.22 W/kg

Maximum value of SAR (measured) = 20.4 W/kg



0 dB = 20.4 W/kg = 13.10 dBW/kg

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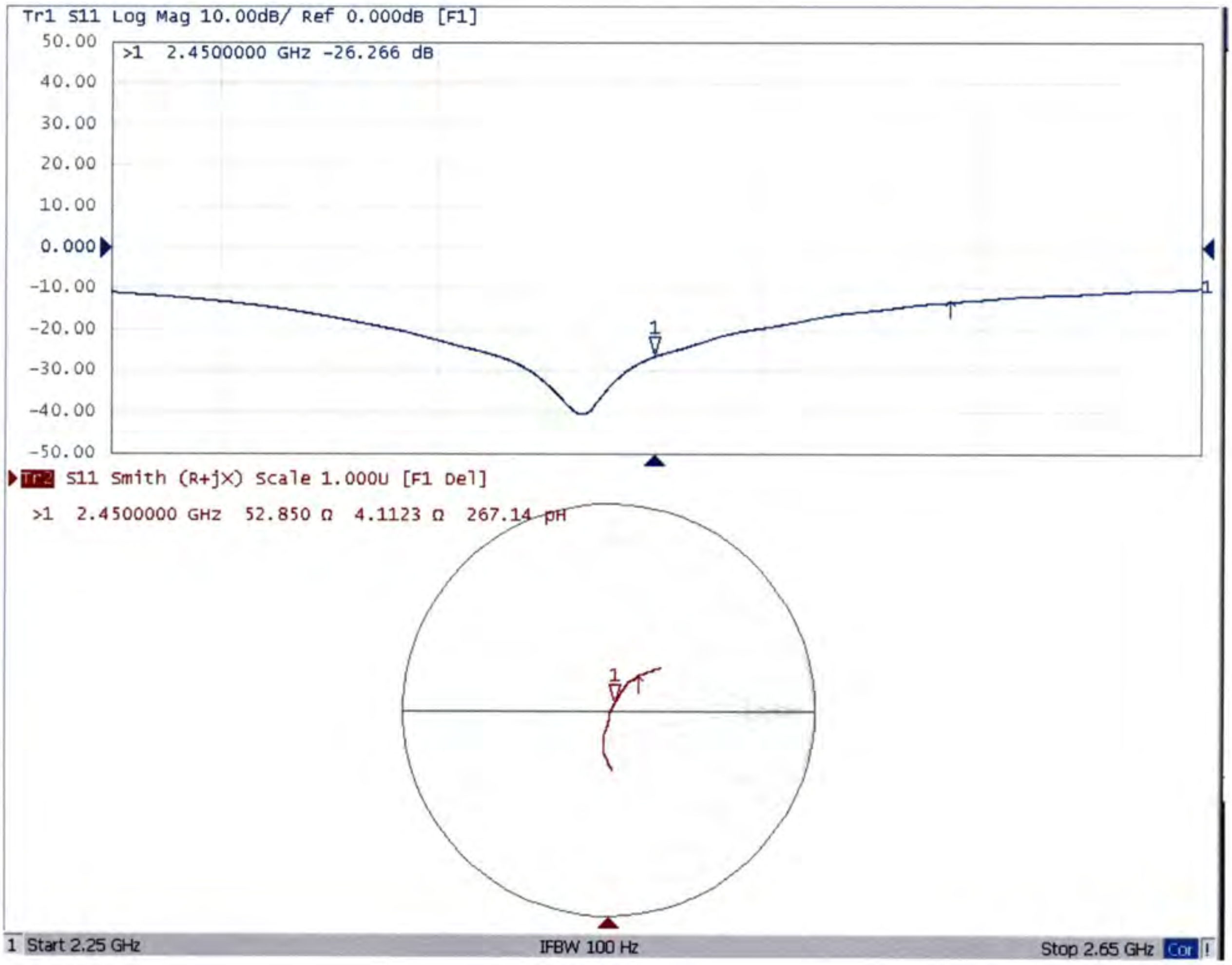
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 12.07.2016

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.943 S/m; ε_r = 53.12; ρ = 1000 kg/m^3

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.46, 7.46, 7.46); Calibrated: 9/26/2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2016
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

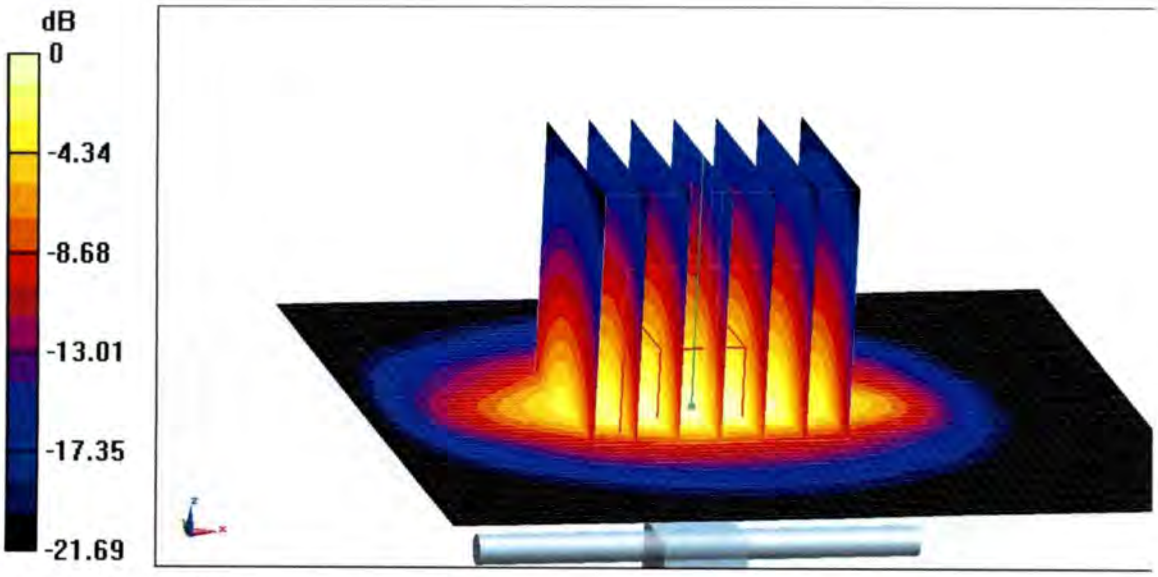
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.60 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 26.0 W/kg

SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.85 W/kg

Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg

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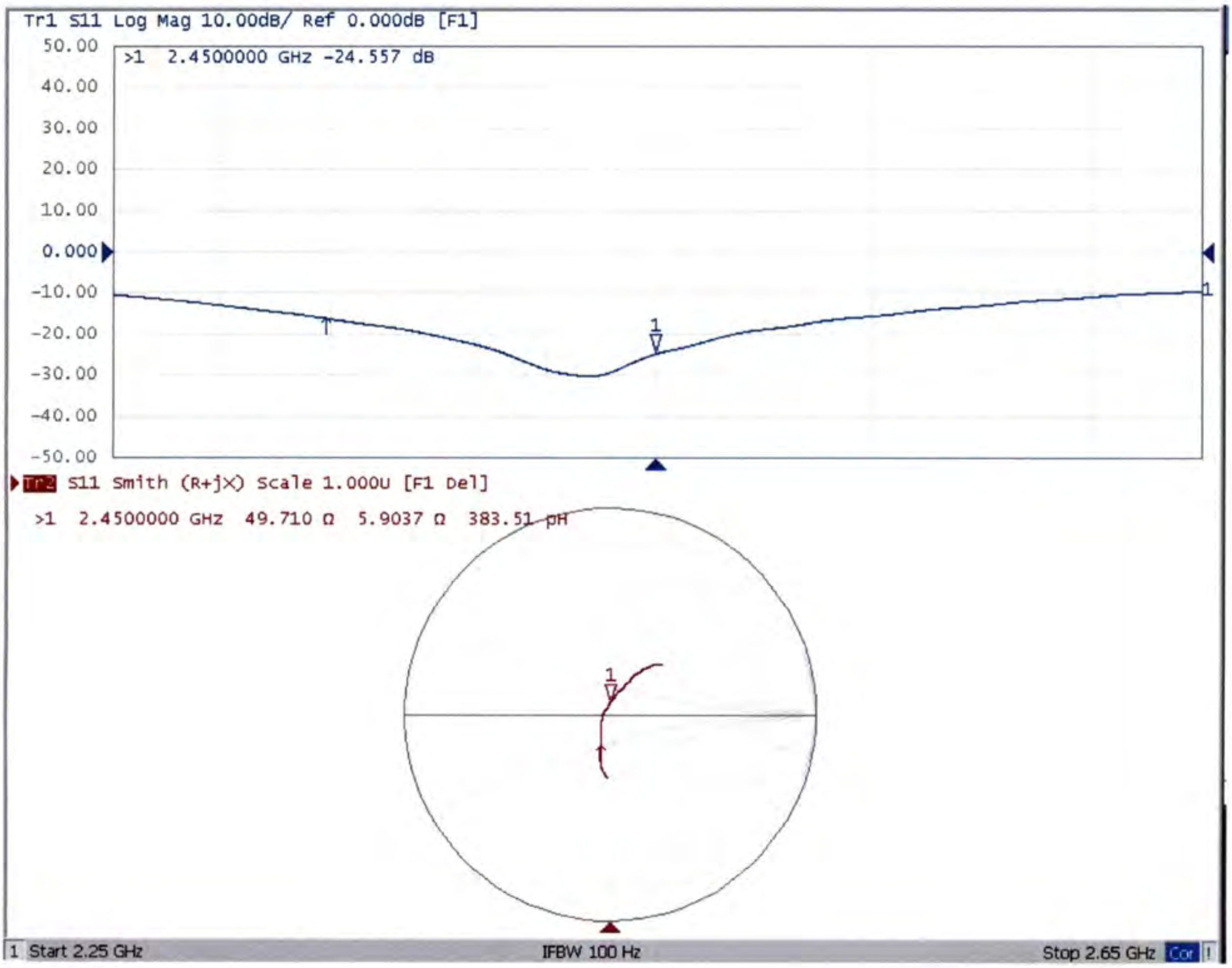
Impedance Measurement Plot for Body TSL



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IMPORTANT NOTICE

USAGE OF THE DAE 4

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

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

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

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

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

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

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

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

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

Schmid & Partner Engineering

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

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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 0108

Client **SGS-SZ (Auden)**

Certificate No: DAE4-1267_Nov17

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BM - SN: 1267

Calibration procedure(s): QA CAL-06.v29
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: November 28, 2017

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°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	31-Aug-17 (No:21092)	Aug-18
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-17 (in house check)	In house check: Jan-18
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-17 (in house check)	In house check: Jan-18

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	i.V.

Issued: November 28, 2017

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	404.484 ± 0.02% (k=2)	404.058 ± 0.02% (k=2)	404.289 ± 0.02% (k=2)
Low Range	3.99933 ± 1.50% (k=2)	3.96768 ± 1.50% (k=2)	3.99615 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	165.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200001.85	5.80	0.00
Channel X	+ Input	20003.20	1.82	0.01
Channel X	- Input	-20000.40	0.96	-0.00
Channel Y	+ Input	199999.12	3.29	0.00
Channel Y	+ Input	20001.50	0.07	0.00
Channel Y	- Input	-20002.29	-1.00	0.01
Channel Z	+ Input	200000.18	4.54	0.00
Channel Z	+ Input	20001.50	0.12	0.00
Channel Z	- Input	-20002.74	-1.33	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2001.48	0.67	0.03
Channel X	+ Input	201.89	0.59	0.29
Channel X	- Input	-198.55	-0.02	0.01
Channel Y	+ Input	2000.60	-0.37	-0.02
Channel Y	+ Input	201.03	-0.35	-0.18
Channel Y	- Input	-199.34	-0.88	0.45
Channel Z	+ Input	2001.22	0.41	0.02
Channel Z	+ Input	200.27	-0.89	-0.44
Channel Z	- Input	-199.56	-0.92	0.46

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	-9.32	-11.22
	- 200	12.19	10.55
Channel Y	200	0.75	-0.10
	- 200	-1.24	-1.12
Channel Z	200	-12.40	-12.15
	- 200	10.36	10.34

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	-	3.30	-3.11
Channel Y	200	9.03	-	4.17
Channel Z	200	9.91	6.94	-

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	15910	16232
Channel Y	16145	17201
Channel Z	16118	14991

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	0.63	-1.37	2.51	0.67
Channel Y	-0.36	-1.89	1.11	0.56
Channel Z	-1.59	-3.77	0.28	0.61

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

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 0108**

Client **SGS-TW (Auden)**

Certificate No: EX3-3923_Aug17

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3923
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:	August 24, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02525)	Apr-18
Reference 20 dB Attenuator	SN: S5277 (20x)	07-Apr-17 (No. 217-02528)	Apr-18
Reference Probe ES3DV2	SN: 3013	31-Dec-16 (No. ES3-3013_Dec16)	Dec-17
DAE4	SN: 660	7-Dec-16 (No. DAE4-660_Dec16)	Dec-17
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

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

Issued: August 24, 2017

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.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, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 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:3923

Manufactured: March 8, 2013
Calibrated: August 24, 2017

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.56	0.47	0.46	± 10.1 %
DCP (mV)[B]	99.6	101.4	102.8	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	140.3	±2.7 %
		Y	0.0	0.0	1.0		150.2	
		Z	0.0	0.0	1.0		142.4	

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see 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:3923

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)	Unc (k=2)
750	41.9	0.89	10.80	10.80	10.80	0.44	0.80	± 12.0 %
835	41.5	0.90	10.50	10.50	10.50	0.43	0.80	± 12.0 %
900	41.5	0.97	10.15	10.15	10.15	0.44	0.80	± 12.0 %
1750	40.1	1.37	9.13	9.13	9.13	0.34	0.85	± 12.0 %
1900	40.0	1.40	8.75	8.75	8.75	0.39	0.85	± 12.0 %
2000	40.0	1.40	8.69	8.69	8.69	0.38	0.80	± 12.0 %
2450	39.2	1.80	7.81	7.81	7.81	0.36	0.86	± 12.0 %
2600	39.0	1.96	7.64	7.64	7.64	0.42	0.81	± 12.0 %
5250	35.9	4.71	4.98	4.98	4.98	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.87	4.87	4.87	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.78	4.78	4.78	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:3923

Calibration Parameter Determined in Body Tissue Simulating Media

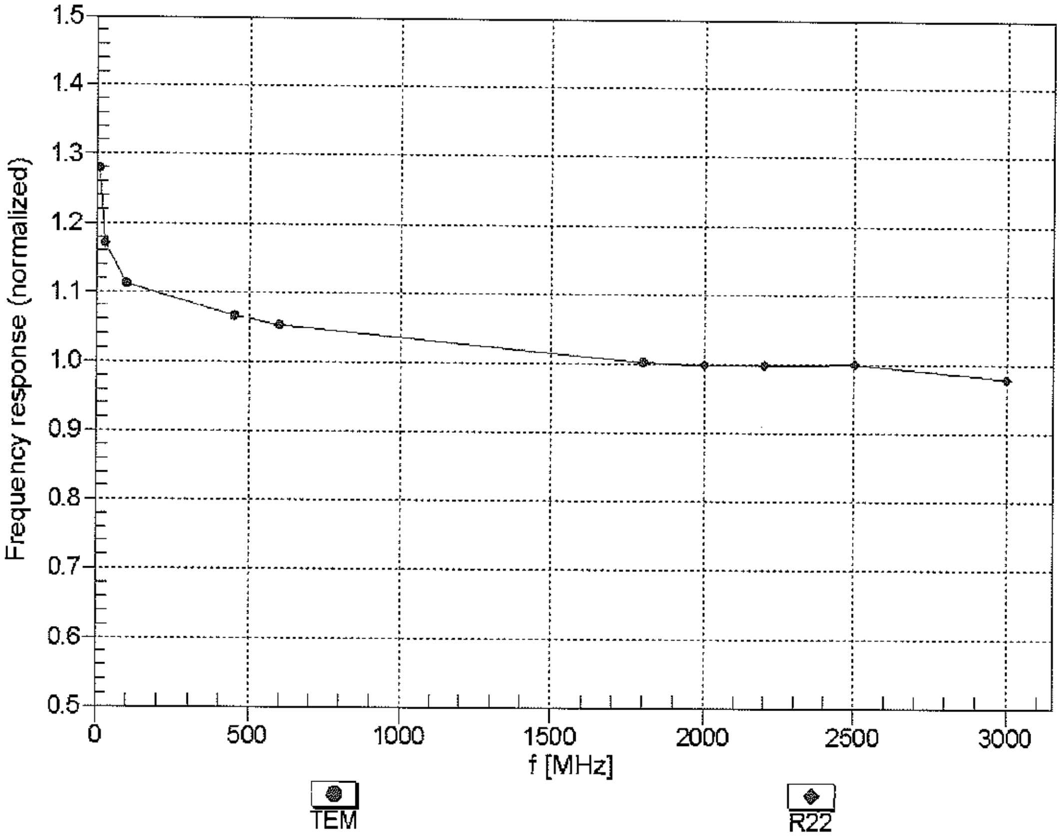
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	10.82	10.82	10.82	0.40	0.94	± 12.0 %
835	55.2	0.97	10.58	10.58	10.58	0.31	1.06	± 12.0 %
900	55.0	1.05	10.44	10.44	10.44	0.34	0.97	± 12.0 %
1750	53.4	1.49	8.79	8.79	8.79	0.39	0.80	± 12.0 %
1900	53.3	1.52	8.44	8.44	8.44	0.25	1.10	± 12.0 %
2000	53.3	1.52	8.64	8.64	8.64	0.41	0.80	± 12.0 %
2450	52.7	1.95	7.93	7.93	7.93	0.38	0.88	± 12.0 %
2600	52.5	2.16	7.78	7.78	7.78	0.26	0.90	± 12.0 %
5250	48.9	5.36	4.75	4.75	4.75	0.40	1.90	± 13.1 %
5600	48.5	5.77	4.23	4.23	4.23	0.40	1.90	± 13.1 %
5750	48.3	5.94	4.39	4.39	4.39	0.40	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.

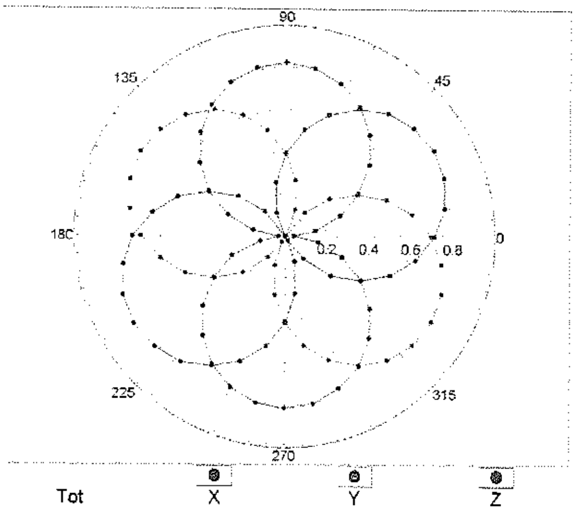
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



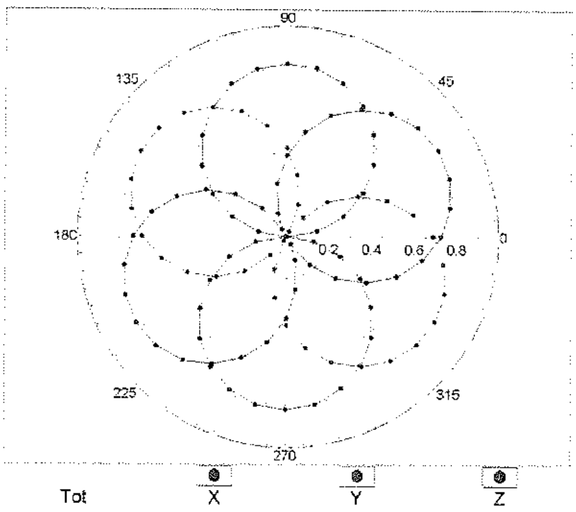
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

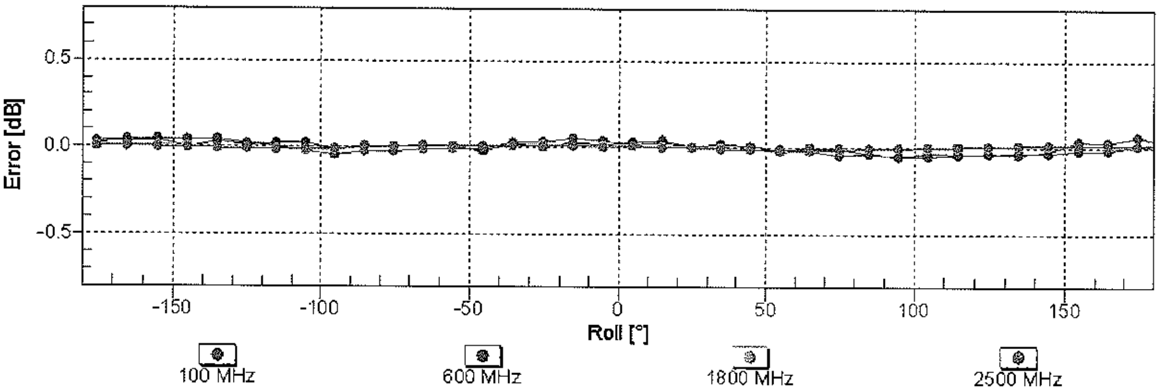
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



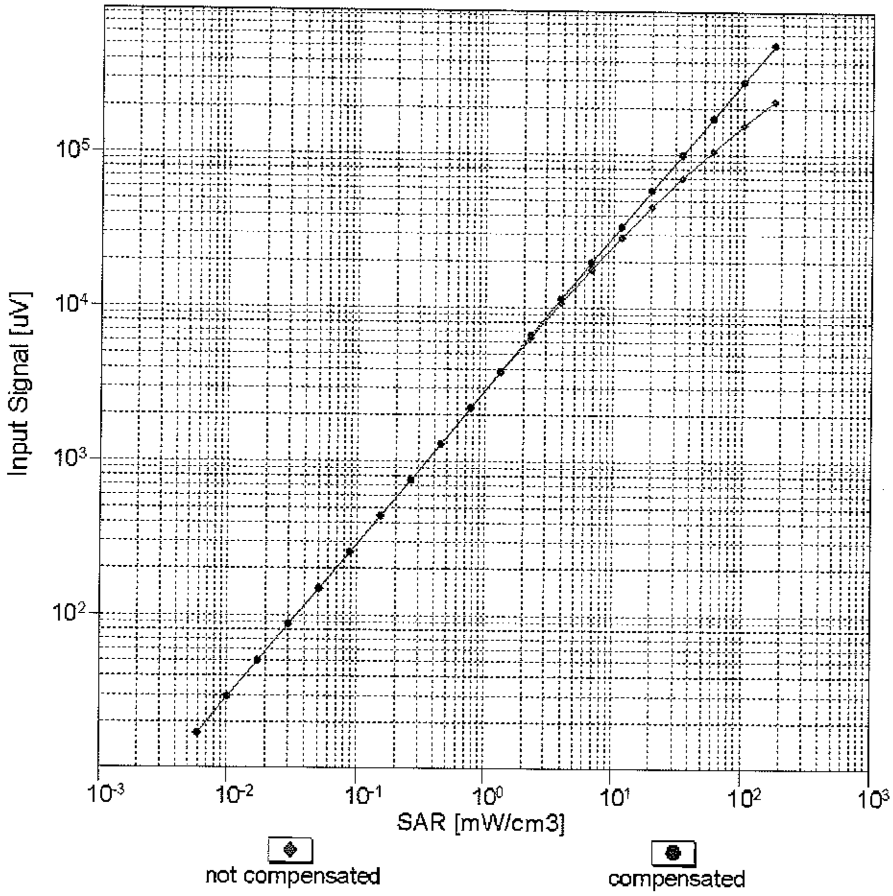
f=1800 MHz,R22

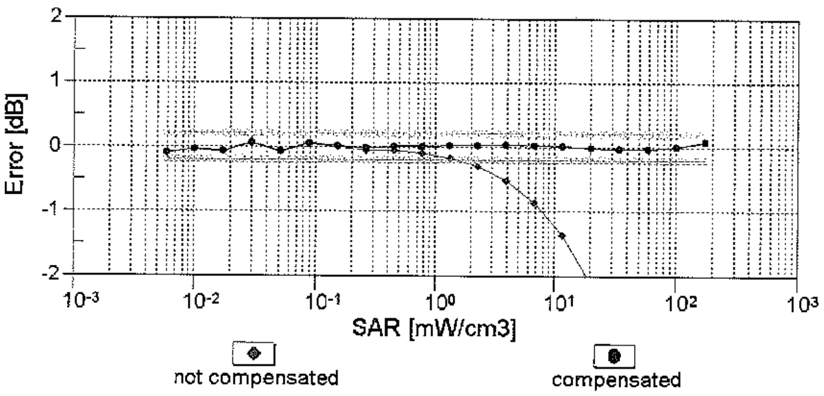




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

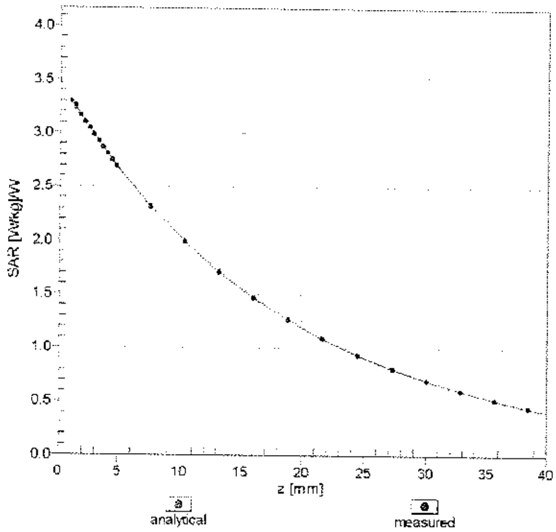




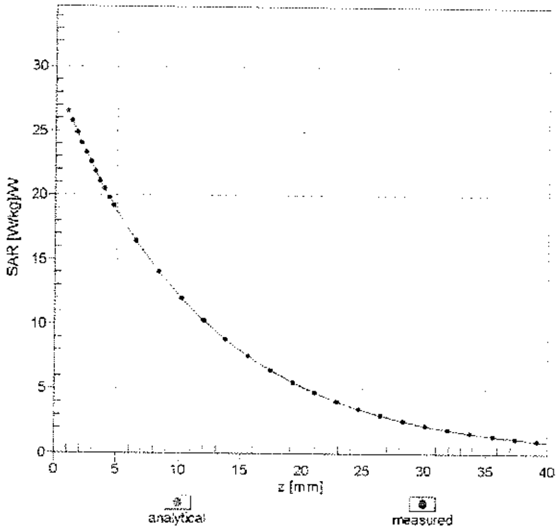
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

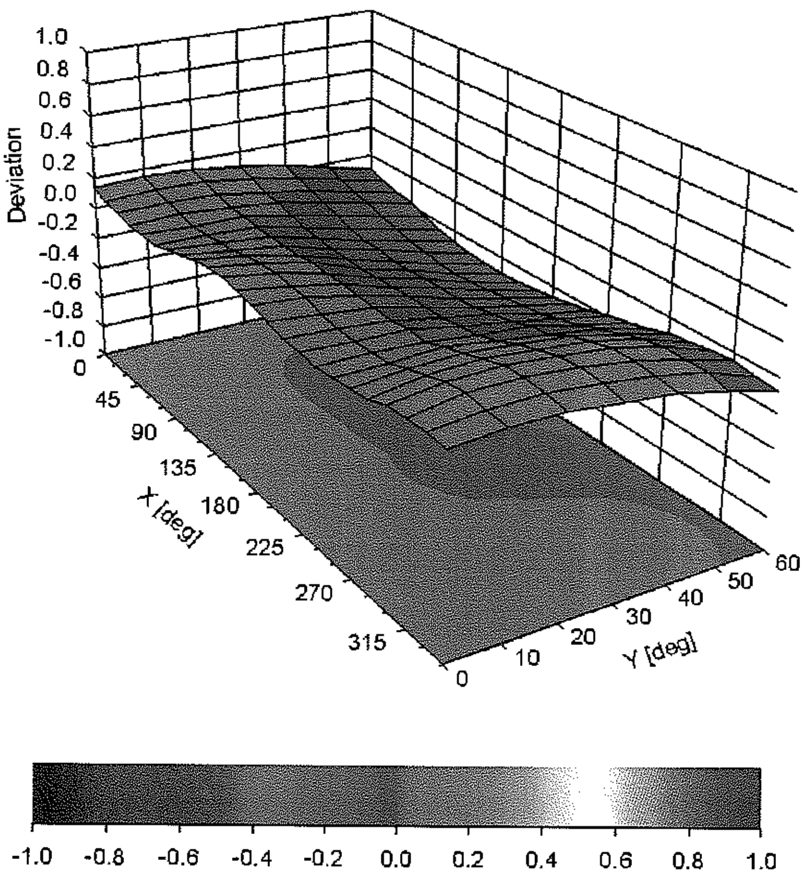


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	24.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Dipole D835V2 SN 4d105				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-12-08	-29.1	/	49.2	/
2017-12-07	-29.7	2.06%	51.3	2.1Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-12-08	-25.1	/	45.8	/
2017-12-07	-25.5	1.59%	47.7	1.9Ω

Dipole D1750V2 SN 1149				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-06-23	-38.7	/	49	/
2017-06-22	-39.6	2.33%	52.2	3.2Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-06-23	-23.3	/	43.6	/
2017-06-22	-23.8	2.15%	46	2.4Ω

Dipole D1900V2 SN 5d028				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-12-07	-24.4	/	51.8	/
2017-12-06	-25.2	3.28%	53.6	1.8Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-12-07	-24.1	/	48.1	/
2017-12-06	-24.8	2.9%	49.6	1.5Ω

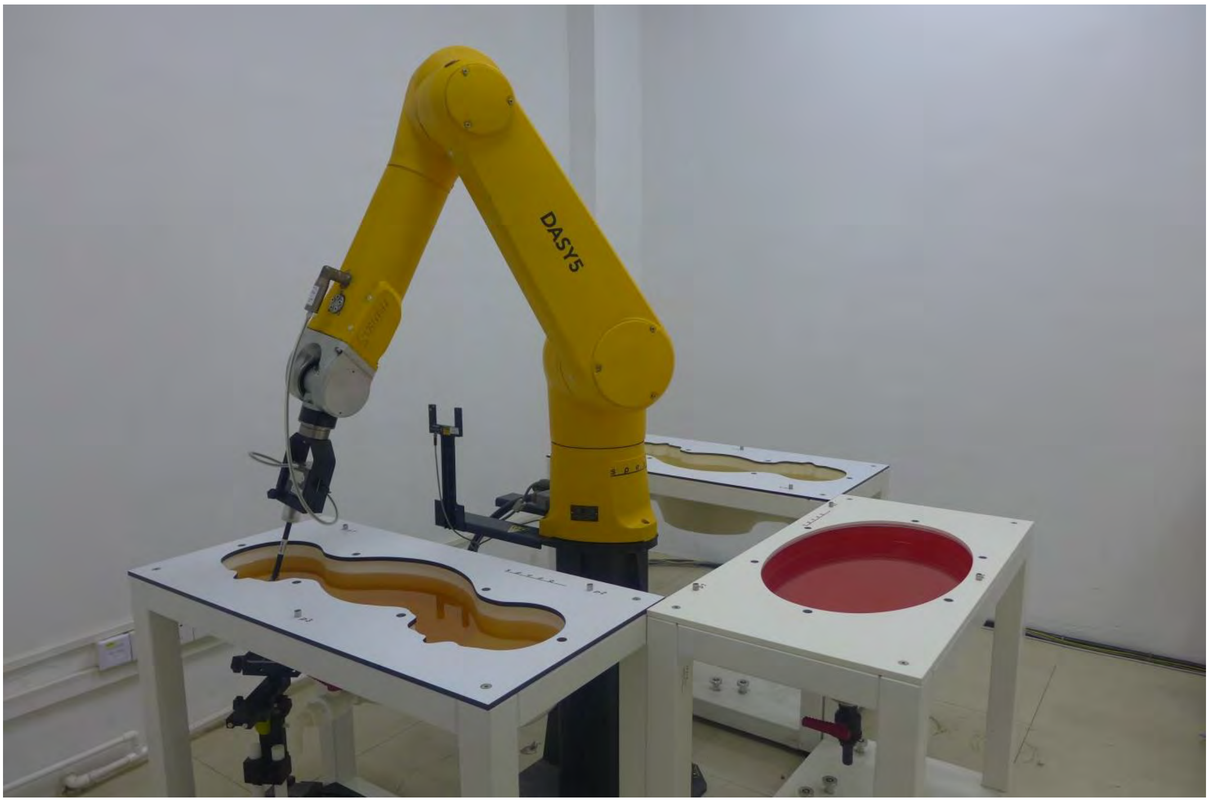
Dipole D2450V2 SN 733				
Head Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-12-07	-26.3	/	52.9	/
2017-12-06	-27.5	4.56%	56.1	3.2Ω
Body Liquid				
Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
2016-12-07	-24.6	/	49.7	/
2017-12-06	-25.3	2.85%	51.8	2.1Ω

Appendix D

Photographs

1. SAR measurement System
2. Photographs of Tissue Simulate Liquid
3. Photographs of EUT test position
4. EUT Constructional Details

1. SAR measurement System



2. Photographs of Tissue Simulate Liquid

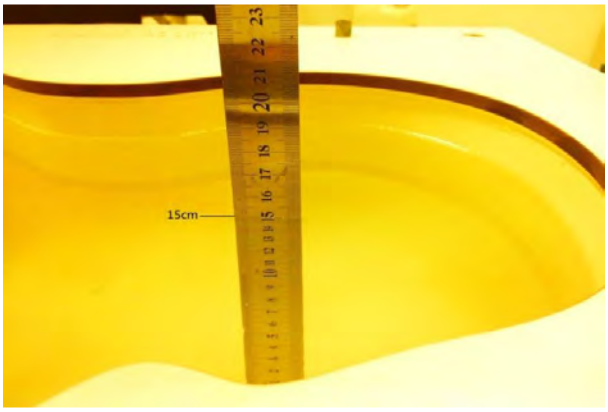
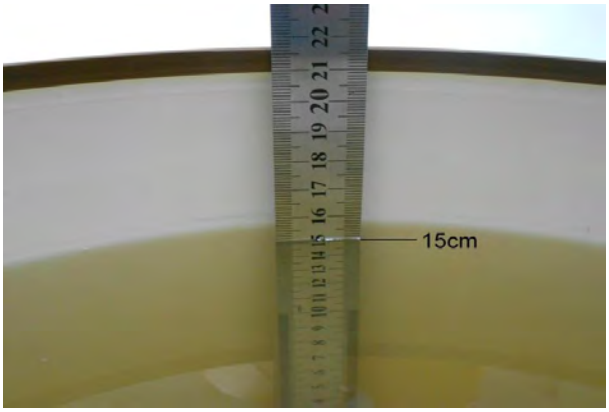
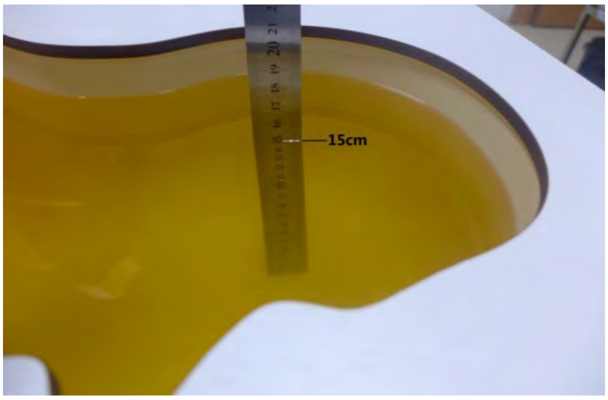
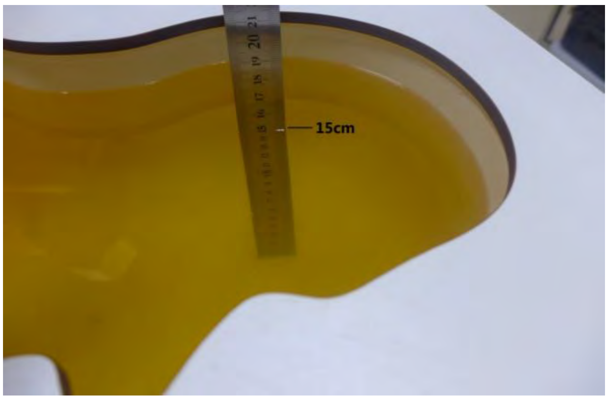
<table>
<tr><td>Photo 1: Tissue Simulant Liquid for Head 835</td><td>Photo 2: Tissue Simulant Liquid for Body 835</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Photo 3: Tissue Simulant Liquid for Head 1750</td><td>Photo 4: Tissue Simulant Liquid for Body 1750</td></tr>
<tr><td>
</td><td></td></tr>
<tr><td>Photo 5: Tissue Simulant Liquid for Head 1900</td><td>Photo 6: Tissue Simulant Liquid for Body 1900</td></tr>
<tr><td>
</td><td></td></tr>
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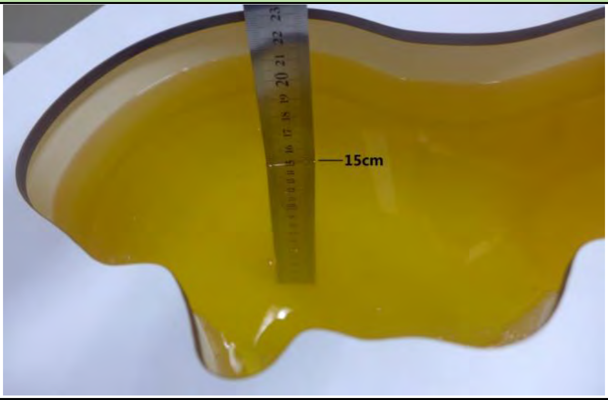
Photo 7: Tissue Simulant Liquid for Head 2450	Photo 8: Tissue Simulant Liquid for Body 2450
	

3. Photographs of EUT test position

Photo 9: Left touch cheek	Photo 10: Left tilted 15 degree

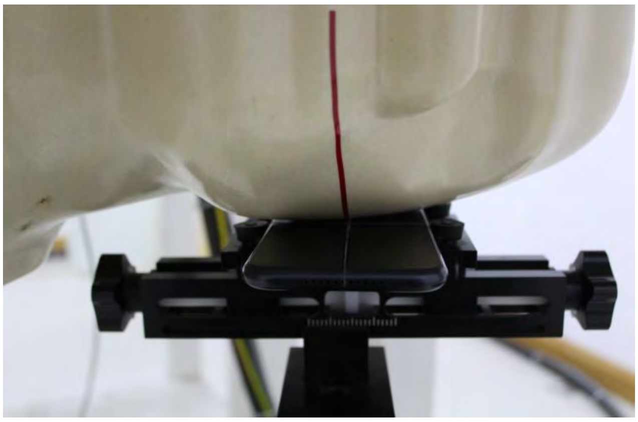
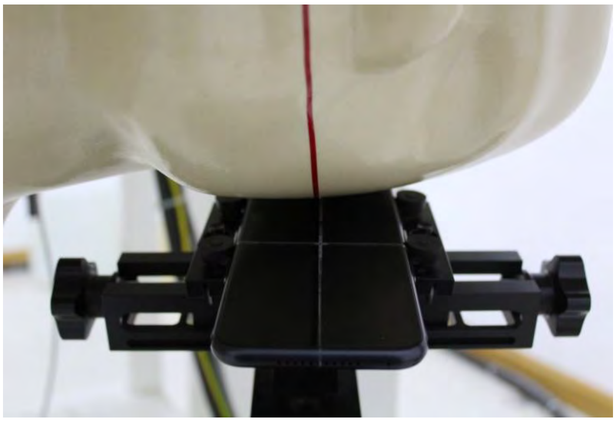

	

Photo 11: Right touch cheek	**Photo 12: Right tilted 15 degree**

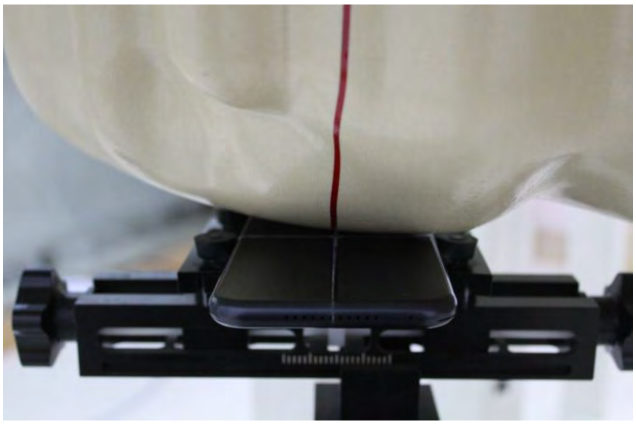
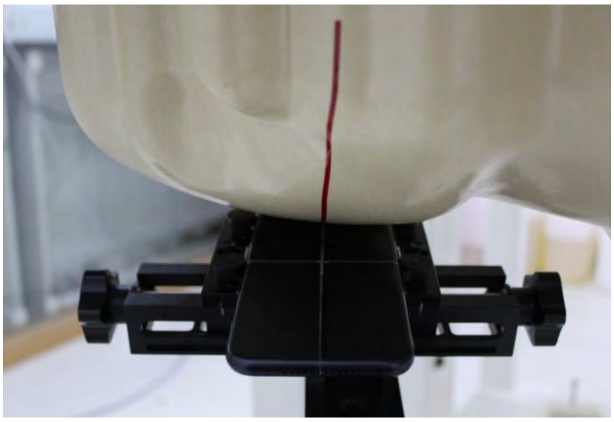

	

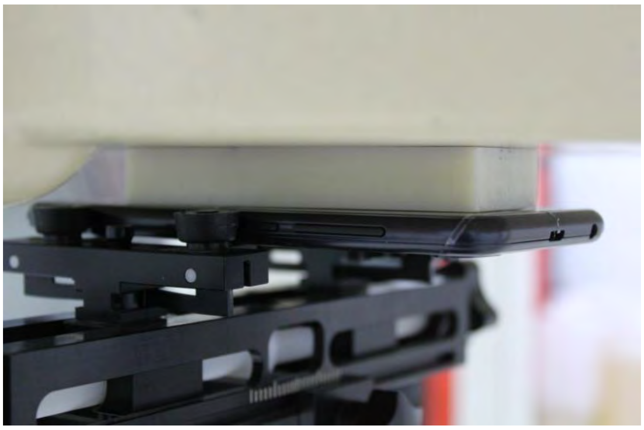
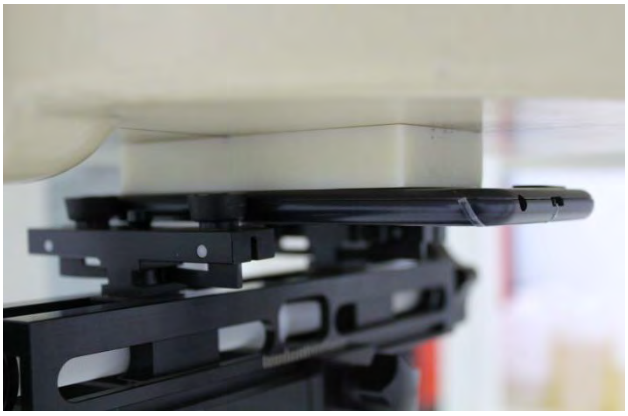
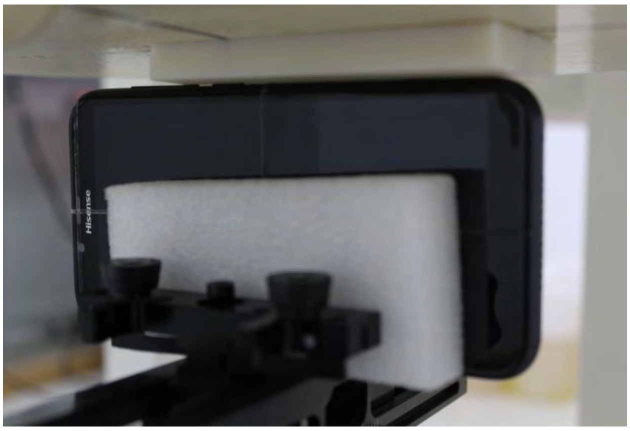
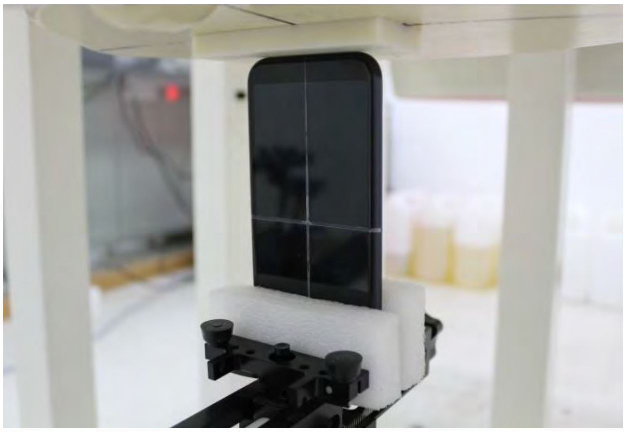
Photo 13: Front Side 15mm	**Photo 14: Back side 15mm**
	

Photo 15: Front Side 10mm	**Photo 16: Back side 10mm**
	
Photo 17: Left Side 10mm	**Photo 18: Right side 10mm**
	
Photo 19: Top Side 10mm	**Photo 20: Bottom side 10mm**
	

4. EUT Constructional Details

Photo 21: Front View	Photo 22: Back View