Shenzhen Huatongwei International Inspection Co., Ltd.
1/F,Bldg 3,Hongfa Hi-tech Industrial Park,Genyu Road,Tianliao,Gongming,Shenzhen,China
Phone:86-755-26748019 Fax:86-755-26748089 http://www.szhtw.com.cn

TEST REPORT

Report Reference No.................... :	**TRE16030192**	R/C……….:	70999
Applicant's name .... :	**Vonino Electronics Limited**		
Address..:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong		
Manufacturer.....................................:	Vonino Electronics Limited		
Address..:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong		
Test item description .... :	**XAVY L8 / Epic M8**		
Trade Mark ....:	vonino		
Model/Type reference.......................:	T8S		
Listed Model(s) ....:	-		
Standard .... :	**EN50360:2001/A1:2012**	**EN50566:2013**	
	EN62209-2:2010	**EN62479:2010**	
	EN62209-1:2006		
Date of receipt of test sample………..:	Mar 29, 2016		
Date of testing…………………………:	Apr 07, 2016- Apr 13, 2016		
Date of issue…………………………...:	Apr 21, 2016		
Result................. ……………………...:	**PASS**		

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

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

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1 . Test Standards and Test Desciption

1.1. Test Standards

The tests were performed according to following standards:

EN 50360:2001/A1:2012: Product standard to demonstrate the compliance of GSM phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz - 3 GHz)
EN 62209-1: 2006: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)
EN 62209-2: 2010: Human exposure to radio frequency fields from hand-held and bodymounted wireless communication devices.Human models,instrumentation, and procedures.Part 2: Procedure to determine thespecific absorption rate (SAR) forwireless communication devices usedin close proximity to the human body(frequency range of 30 MHz to 6 GHz)
EN 62479: 2010: Assesment of the compliance of low-power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)
EN50566: 2013: Product standard to demonstrate compliance of radio frequency fields from handheld and body-mounted wireless communication devices used by the general public (30 MHz - 6 GHz)

1.2. Test Description

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

2. Summary

2.1. Client Information

Applicant:	Vonino Electronics Limited
Address:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer:	Vonino Electronics Limited
Address:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong

2.2. Product Description

Name of EUT:	XAVY L8 / Epic M8	
Trade Mark:	vonino	
Model/Type reference:	T8S	
Listed Model(s):	-	
Device Category:	Portable	
RF Exposure Environment:	General Population / Uncontrolled	
Power supply:	DC 3.7V From internal battery	
Hardware version:	V1.1	
Software version:	vonino_v1.1.2	
Maximum SAR Value		
Separation Distance:	Head:	0mm
	Body:	0mm
Maximun SAR Value (10g):	Head:	**0.307 W/Kg**
	Body:	**1.720 W/Kg**
2G		
Operation Band:	GSM900, DCS1800	
Supported type:	GSM/GPRS/EGPRS	
Power Class:	GSM900:Power Class 4 DCS1800:Power Class 1	
Modilation Type:	GMSK for GSM/GPRS GMSK ,8PSK for EGPRS	
GSM Release Version	R99	
GPRS Multislot Class	12	
EGPRS Multislot Class	12	
Antenna type:	PIFA	
WCDMA		
Operation Band:	FDD Band I and FDD Band VIII	
Power Class:	Power Class 3	
Modilation Type:	QPSK for WCDMA/HSUPA/HSDPA /HSPA+	
WCDMA Release Version:	R7	
HSDPA Release Version:	Release 8	
HSUPA Release Version:	Release 6	
DC-HSUPA Release Version:	Not Supported	

Report version Imformation:

LTE	
Support Band:	FDD Band 3, FDD Band 7, FDD Band 20
Operation Frquency:	FDD Band 3: UL: 1710MHz-1785MHz, DL: 1805MHz-1880MHz FDD Band 7: UL: 2500MHz-2570MHz, DL: 2620MHz-2690MHz FDD Band 20: UL: 832MHz-862MHz, DL: 791MHz-821MHz
Support bandwidth:	FDD Band 3: 1.4/3/5/10/15/20MHz FDD Band 7: 5/10/15/20MHz FDD Band 20: 5/10/15/20MHz
Power Class:	Power Class 3
Modilation Type:	QPSK, 16QAM
WIFI -2.4G	
Supported type:	802.11b/802.11g/802.11n(H20)/ 802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/n(HT20)/n(HT40):OFDM
Operation frequency:	2412MHz~2472MHz for 802.11b/g/n(HT20) 2422MHz~2462MHz for 802.11n(HT40)
Channel number:	13 for 802.11b/g/n(HT20) 9 for 802.11n(HT40)
Channel separation:	5MHz
WIFI -5G	
Supported type:	802.11a/n(H20),802.11n(H40)
Modulation:	OFDM
Operation frequency:	5150MHz~5250MHz
Operation bandwidth:	802.11a/n(H20):20MHz , 802.11n(H40):40MHz
Channel number:	802.11a/n(H20):4 , 802.11n(H40):2
Antenna type:	Internal Antenna
Bluetooth	
Version:	Supported BT4.0+EDR
Modulation:	GFSK, π/4QPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Bluetooth- BLE	
Version:	Bluetooth 4.0+BLE
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz

3. Test Environment

3.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

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

CNAS-Lab Code: L1225
Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 3902.01
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

FCC-Registration No.: 317478
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B
The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.
Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

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

VCCI
The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 29, 2015.
Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.
Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV
Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	18-25 ° C
Humidity:	40-65 %
Atmospheric pressure:	950-1050mbar

4. Equipments Used during the Test

Test Equipment	Manufacturer	Type/Model	Serial Number	Calibration	
				Last Calibration	Calibration Interval
Data Acquisition Electronics DAEx	SPEAG	DAE4	1315	2015/07/22	1
E-field Probe	SPEAG	ES3DV3	3292	2015/08/15	1
E-field Probe	SPEAG	EX3DV4	3650	2015/07/28	1
System Validation Dipole D900V2	SPEAG	D900V2	1d129	2015/09/01	1
System Validation Dipole D1750V2	SPEAG	D1750V2	1062	2015/07/25	1
System Validation Dipole D1900V2	SPEAG	D1900V2	5d150	2015/12/12	1
System Validation Dipole 2450V2	SPEAG	D2450V2	884	2015/09/01	1
System Validation Dipole D5GHzV2	SPEAG	D5GHzV2	1019	2015/08/025	1
Dielectric Probe Kit	Agilent	85070E	US44020288	/	/
Power meter	Agilent	E4417A	GB41292254	2015/10/26	1
Power sensor	Agilent	8481H	MY41095360	2015/10/26	1
Network analyzer	Agilent	8753E	US37390562	2015/10/25	1
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	112012	2015/10/23	1

Note:
The Probe,Dipole and DAE calibration reference to the Appendix A.

5. Measurement Uncertainty

No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	5.50%	N	1	1	1	5.50%	5.50%	∞
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	∞
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	∞
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	∞
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	∞
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	∞
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
14	Max.SAR evalation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
Test Sample Related										
15	Test sample positioning	A	1.86%	N	1	1	1	1.86%	1.86%	∞
16	Device holder uncertainty	A	1.70%	N	1	1	1	1.70%	1.70%	∞
17	Drift of output power	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
19	Liquid conductivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	∞
21	Liquid permittivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
22	Liquid cpermittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	∞
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$		/	/	/	/	10.20%	10.00%	∞
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		R	K=2	/	/	20.40%	20.00%	∞

6. SAR Measurements System Configuration

6.1. SAR Measurement Set-up

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

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

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

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

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

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

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

DASY5 software and SEMCAD data evaluation software.

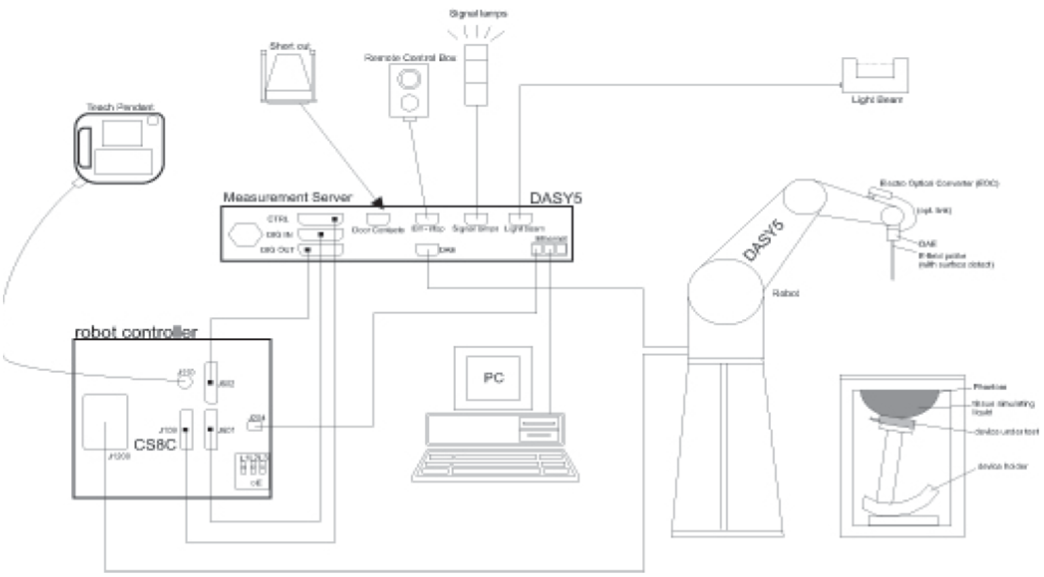
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

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



6.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

- **Probe Specification**

ConstructionSymmetrical design with triangular core
Interleaved sensors
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

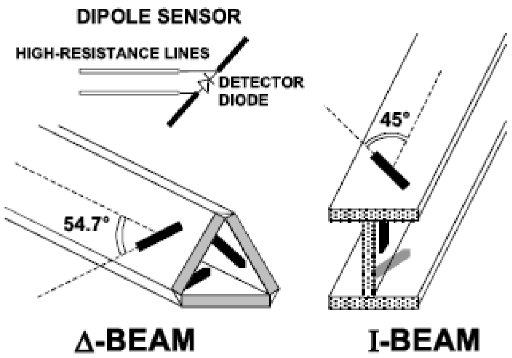
CalibrationISO/IEC 17025 calibration service available.

Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

- **Isotropic E-Field Probe**

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

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



6.3. Phantoms

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

SAM Twin Phantom

6.4. Device Holder

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

Device holder supplied by SPEAG

7. SAR Test Procedure

7.1. Scanning Procedure

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

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

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

Area Scan

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

Zoom Scan

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x5 points within a cube whose base is centered around the maxima found in the preceding area scan.

Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY5 system allows evaluations that combine measured data and robot positions, such as: • maximum search • extrapolation • boundary correction • peak search for averaged SAR During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation. For a grid using 7x7x5 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x5 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

7.2. Data Storage and Evaluation

Data Storage

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

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

Data Evaluation

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

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

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

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

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

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

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

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

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

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

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

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

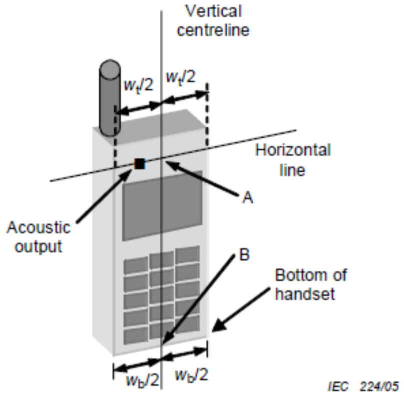
SAR: local specific absorption rate in mW/g
Etot: total field strength in V/m
σ: conductivity in [mho/m] or [Siemens/m]
ρ: equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

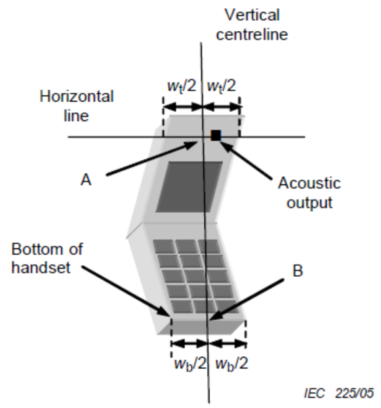
8. Position of the wireless device in relation to the phantom

8.1. Head Position

The wireless device define two imaginary lines on the handset, the vertical centreline and the horizontal line, for the handset in vertical orientation as shown in Figures 5a and 5b.
The vertical centreline passes through two points on the front side of the handset: the midpoint of the width W_t of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width W_b of the bottom of the handset (point B).
The horizontal line is perpendicular to the vertical centreline and passes through the centre of the acoustic output (see Figures 5a and 5b). The two lines intersect at point A.
Note that for many handsets, point A coincides with the centre of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset (see Figure 5b), especially for clam-shell handsets, handsets with flip cover pieces, and other irregularly shaped handsets.



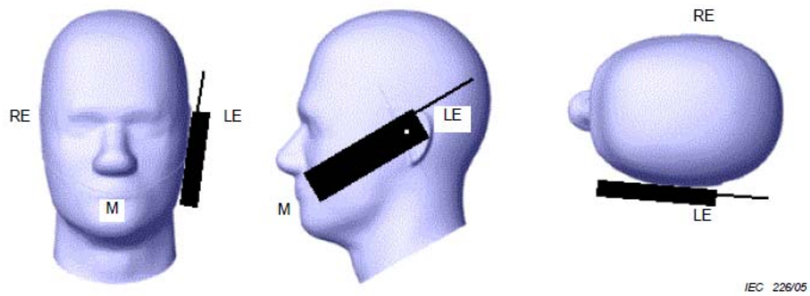
Figures 5a



Figures 5b

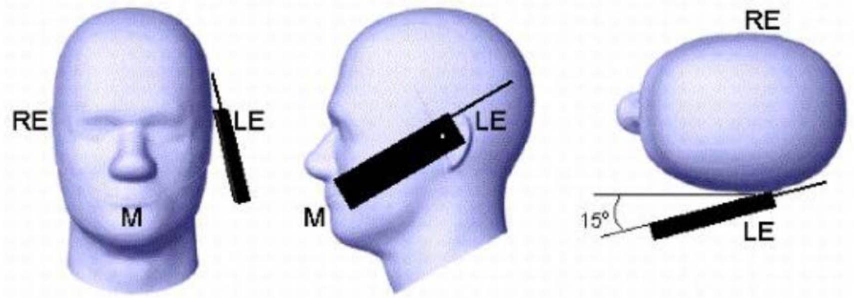
W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the widthwt of the handset at the level of the acoustic output
B	Midpoint of the width wb of the bottom of the handset

Cheek position



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

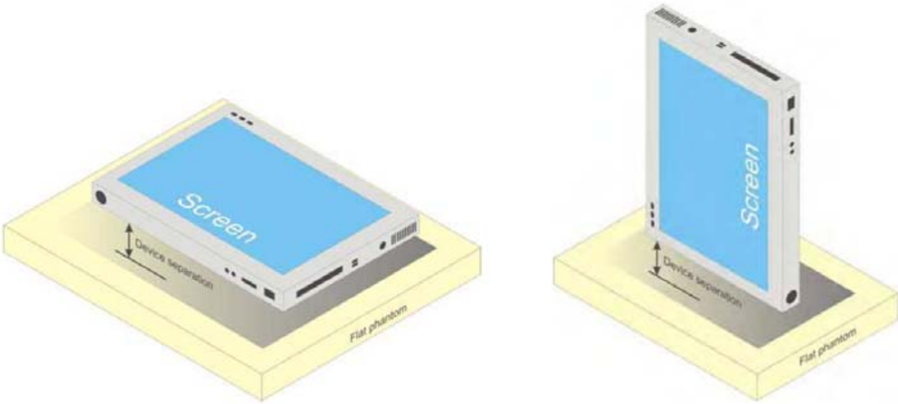
Tilt position



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

8.2. Body Position

A typical example of a body supported device is a wireless enabled laptop device that among other orientations may be supported on the thighs of a sitting user. To represent this orientation, the device shall be positioned with its base against the flat phantom. Other orientations may be specified by the manufacturer in the user instructions. If the intended use is not specified, the device shall be tested directly against the flat phantom in all usable orientations.



b) Tablet form factor portable computer

a tablet form factor portable computer for which SAR should be separately assessed with
d) each surface and
e) the separation distances
positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. If the intended use is not specified in the user instructions, the device shall be tested directly against the flat phantom in all usable orientations

9. System Check

9.1. Tissue Dielectric Parameters

The liquid used for the frequency range of 400-3000 MHz consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 1 and 2 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

Table 1. Composition of the Head Tissue Equivalent Matter

Ingredients (% by weight)	Frequency (MHz)				
	835	900	1800	1950	2450
Water	41.45	40.92	16.33	54.89	46.70
Sugar	56.0	56.5	/	/	/
Salt	4.45	1.48	0.41	0.18	/
Preventol	0.19	0.1	/	/	/
Cellulose	0.1	0.4	/	/	/
Clycol Monobutyl	/	/	65.3	44.93	53.3
Dielectric ParametersTarget Value	f=835MHz ε=42.5 σ=0.91	f=900MHz ε=41.5 σ=0.97	f=1800MHz ε=40.0 σ=1.40	f=1950 MHz ε=40.0 σ=1.40	f=2450 MHz ε=39.2 σ=1.80

Table 2. Targets for tissue simulating liquid

Frequency (MHz)	Liquid Type	Liquid Type (σ)	± 5% Range	Permittivity (ε)	± 5% Range
300	Head	0.87	0.83～0.91	45.30	40.04～47.57
450	Head	0.87	0.83～0.91	43.50	41.33～45.68
835	Head	0.90	0.86～0.95	41.50	39.43～43.58
900	Head	0.97	0.92～1.02	41.50	39.43～43.58
1450	Head	1.20	1.14～1.26	40.50	38.48～42.53
1800-2000	Head	1.40	1.33～1.47	40.00	38.00～42.00
2450	Head	1.80	1.71～1.89	39.20	37.24～41.16
3000	Head	2.40	2.28～2.52	38.50	36.58～40.43
300	Body	0.87	0.83～0.91	45.30	40.04～47.57
450	Body	0.87	0.83～0.91	43.50	41.33～45.68
835	Body	0.90	0.86～0.95	41.50	39.43～43.58
900	Body	0.97	0.92～1.02	41.50	39.43～43.58
1450	Body	1.20	1.14～1.26	40.50	38.48～42.53
1800-2000	Body	1.40	1.33～1.47	40.00	38.00～42.00
2100	Body	1.49	1.42～1.56	39.80	37.81～41.79
2450	Body	1.80	1.71～1.89	39.20	37.24～41.16
2600	Body	1.96	1.86～2.06	39.00	37.05～40.95
3000	Body	2.40	2.28～2.52	38.50	36.58～40.43
3500	Body	2.91	2.77～3.06	37.90	36.01～39.80
4000	Body	3.43	3.26～3.61	37.40	35.53～39.27
4500	Body	3.94	3.74～4.14	36.80	34.96～38.64
5000	Body	4.45	4.23～4.67	36.20	34.39～38.01
5200	Body	4.66	4.23～4.89	36.00	34.20～37.80
5400	Body	4.86	4.62～5.10	35.80	34.01～37.59
5600	Body	5.07	4.82～5.32	35.50	33.73～37.28
5800	Body	5.27	5.01～5.53	35.30	33.54～37.07

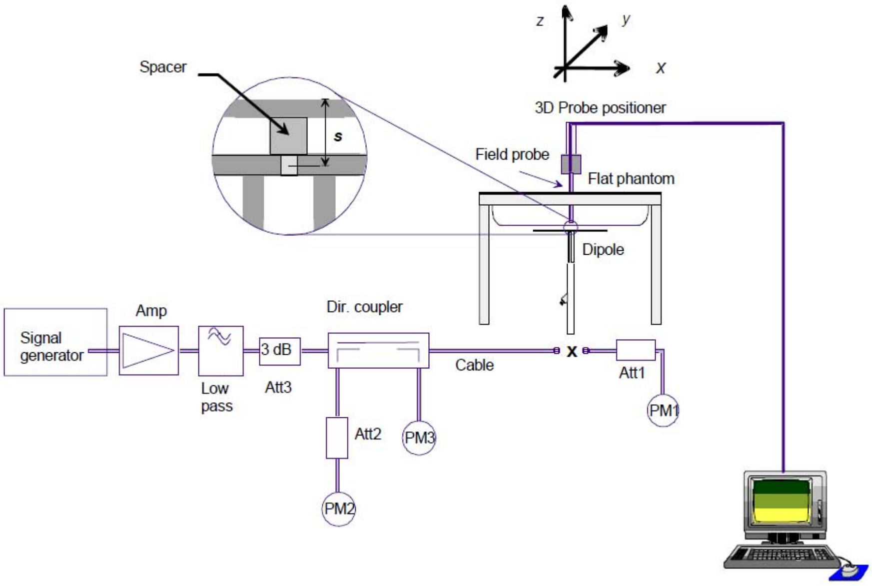
CheckResult:

Frequency (MHz)	Description	DielectricParameters		Temp
		εr	σ(s/m)	℃
900	Recommended result ±5% window	41.50 39.43 - 43.58	0.97 0.92 - 1.02	/
	Measurement value 2016-04-07	41.36	0.96	21
1750	Recommended result ±5% window	40.00 38.00 - 42.00	1.40 1.33 - 1.47	/
	Measurement value 2016-04-11	40.72	1.45	21
1900	Recommended result ±5% window	40.0 38.00 to 42.00	1.40 1.33 to 1.47	/
	Measurement value 2016-04-11	40.05	1.42	21
2450	Recommended result ±5% window	39.20 37.24 - 41.16	1.80 1.71 - 1.89	/
	Measurement value 2016-04-12	39.39	1.76	21
5200	Recommended result ±5% window	35.99 34.19～37.79	4.66 4.43～4.89	/
	Measurement value 2016-04-13	36.7	4.64	21

9.2. SAR System Check

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

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



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

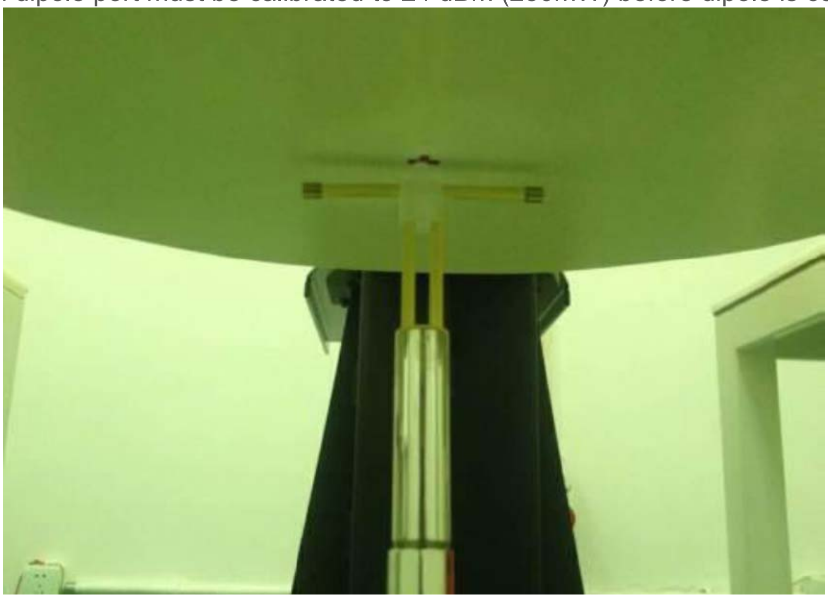


Photo of Dipole Setup

Check Result:

Frequency (MHz)	Description	SAR(W/kg)		Temp
		1g	10g	℃
900	Recommended result ±10% window	2.64 2.38 - 2.90	1.70 1.53 - 1.87	/
	Measurement value 2016-04-07	2.55	1.61	21
1750	Recommended result ±10% window	9.20 8.28 -10.12	4.97 4.48 - 5.46	/
	Measurement value 2016-04-11	9.62	4.98	21
1900	Recommended result ±5% window	9.71 9.22 - 10.20	5.08 4.83 - 5.33	/
	Measurement value 2016-04-11	9.62	4.96	21
2450	Recommended result ±10% window	13.1 11.79 - 14.41	6.17 5.56 - 6.78	/
	Measurement value 2016-04-12	12.78	5.96	21
5200	Recommended result ±10% window	8.04 7.64 - 8.44	2.30 2.19 – 2.42	/
	Measurement value 2016-04-13	8.02	2.27	21

Note:

1. *the graph results see follow.*

System Performance Check at 900 MHz

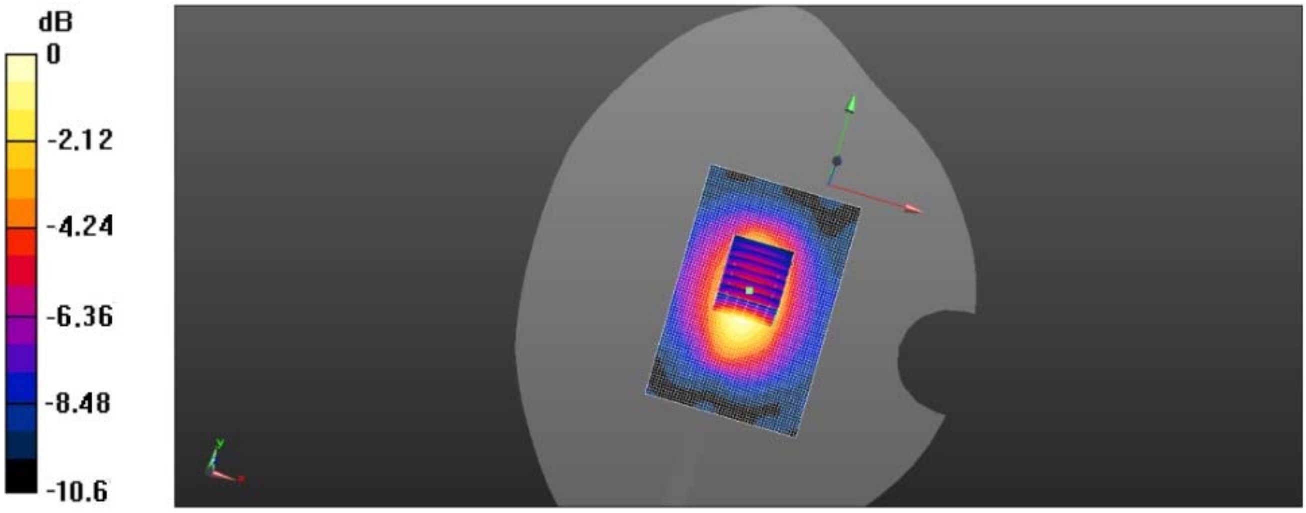
DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2
Date: 2016-04-07
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f =900 MHz; σ =0.96S/m; ε_r =41.36; ρ =1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: ES3DV3 - SN3292; ConvF(6.71, 6.71,6.10); Calibrated: 15/08/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 3.48 W/kg
Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.1 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 4.06 mW/g

SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.61 mW/g

Maximum value of SAR (measured) = 3.16 W/kg



System Performance Check 900MHz 250mW

System Performance Check at 1750 MHz

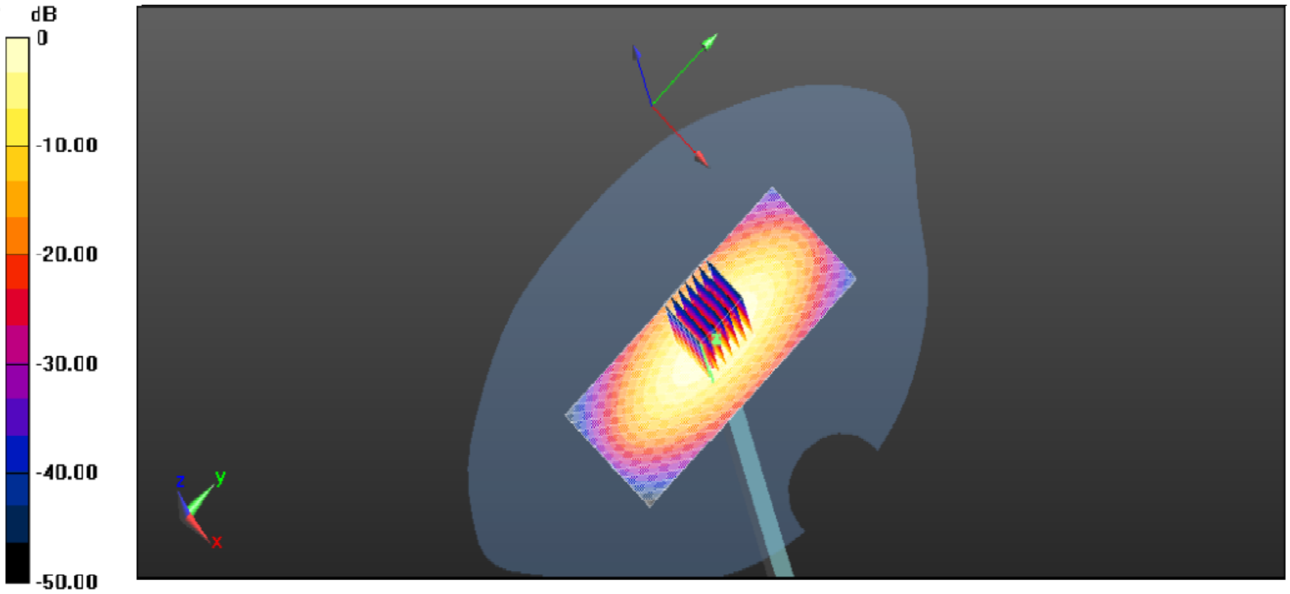
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2
Date: 2016-04-11
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f =1750 MHz; σ =1.45 S/m; εr =40.72; ρ =1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: ES3DV3 - SN3292; ConvF(5.07,5.07,5.07); Calibrated: 15/08/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 12.6 W/kg
Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.561 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 16.828 mW/g

SAR(1 g) =9.62 mW/g; SAR(10 g) = 4.98 mW/g

Maximum value of SAR (measured) = 13.0 W/kg



System Performance Check 1750MHz 250mW

System Performance Check at 1900 MHz

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2
Date: 2016-04-11
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.42S/m; εr = 40.05; ρ = 1000 kg/m3
Phantom section: Flat Section

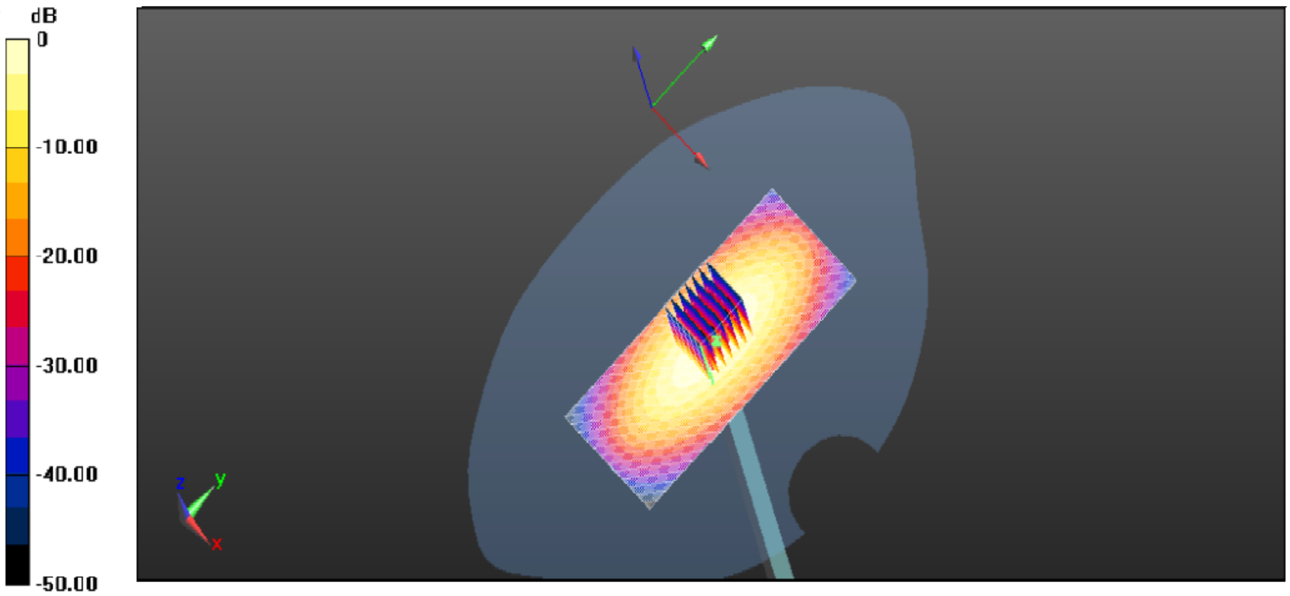
DASY5 Configuration:
Probe: ES3DV3 - SN3292; ConvF(5.03, 5.03,5.03); Calibrated: 15/08/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 22/07/2015;
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 10.61 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 94.79 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 12.34 W/kg

SAR(1 g) = 9.62 W/kg; SAR(10 g) = 4.96 W/kg

Maximum value of SAR (measured) = 12.44 W/kg



System Performance Check 1900MHz 250mW

System Performance Check at 2450 MHz

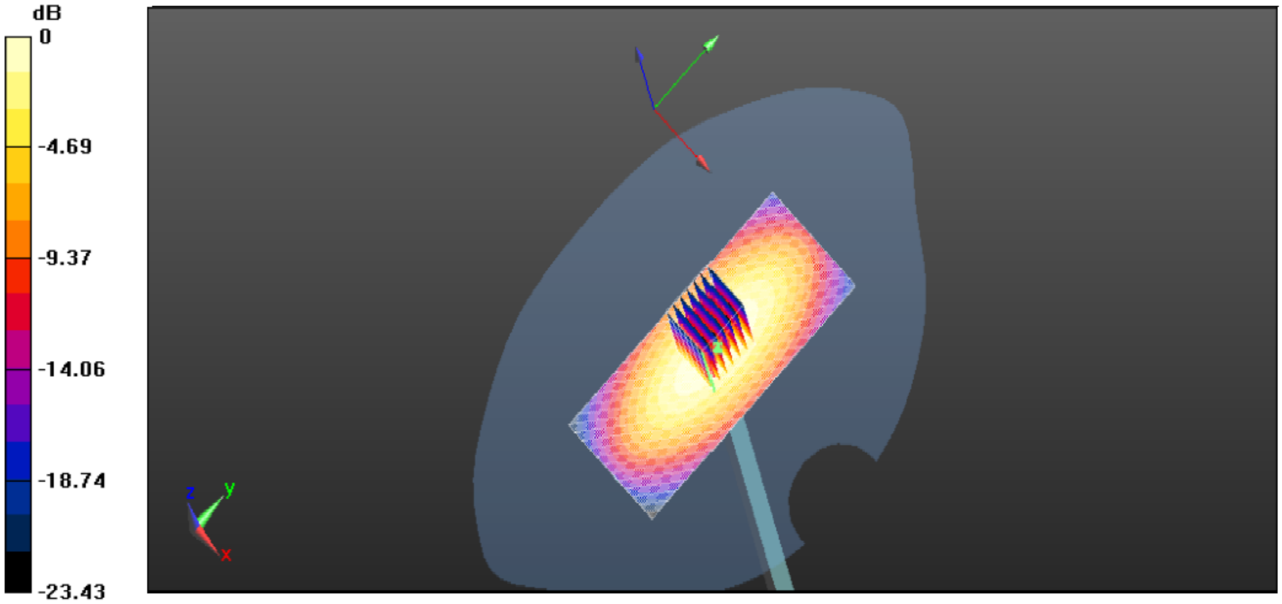
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 884
Date: 2016-04-12
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f =2450 MHz; σ =1.76S/m; εr =39.39; ρ =1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: ES3DV3 - SN3292; ConvF(4.43,4.43,4.43); Calibrated: 15/08/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 22/07/2015;
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 12.97W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.872 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 17.651 mW/g

SAR(1 g) = 12.78 mW/g; SAR(10 g) = 5.96 mW/g

Maximum value of SAR (measured) = 13.563 W/kg

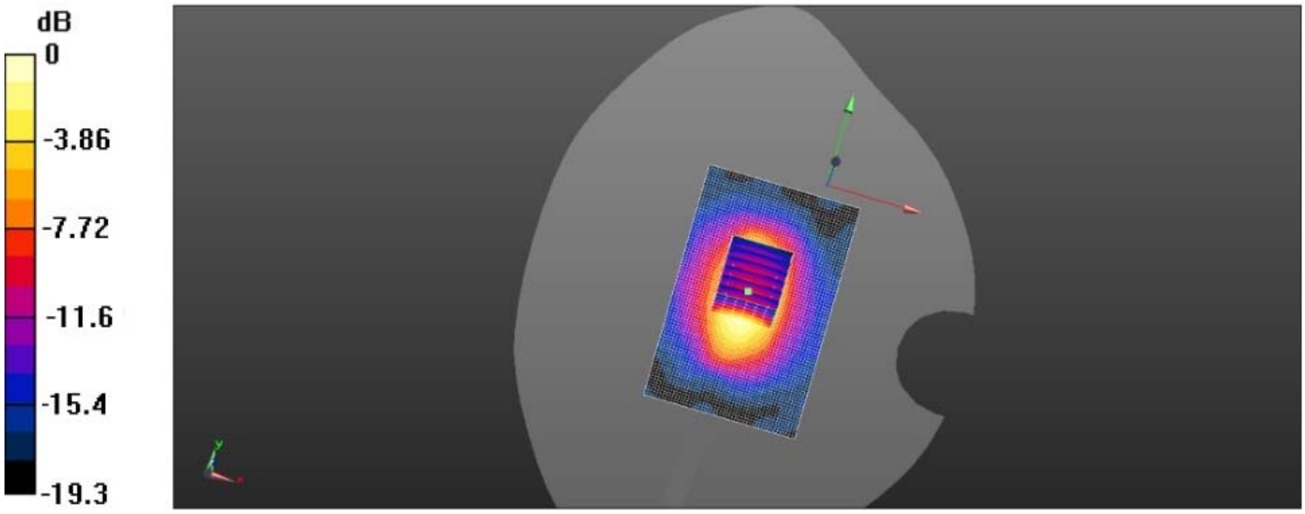


System Performance Check 2450MHz 250mW

System Performance Check at 5200 MHz
Date: 2016-04-13
Communication System: CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.641 mho/m; εr = 36.70; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3650; ConvF(5.31, 5.31, 5.31);
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 22/07/2015;
Phantom: SAM 1; Type: SAM;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 9.67 W/kg
Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=4mm
Reference Value = 60.64 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 32.73 W/kg
SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.27 W/kg
Maximum value of SAR (measured) = 9.70 W/kg



System Performance Check 5200MHz 100mW

10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of 1999/519/EC, EN50360, and EN62311.

Type Exposure	Limit (W/kg)	
	General Population / Uncontrolled Exposure Environment	Occupational / Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (10g cube tissue for head and trunk)	2.0	10
Spatial Peak SAR (10g for limb)	4.0	20.0

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

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

11. Conducted Power Measurement Results

Mode: GSM900		Conducted Power (dBm)			Division Factors	Averager Power (dBm)		
		CH975	CH62	CH124		CH975	CH62	CH124
		880.2MHz	902.4MHz	914.8MHz		880.2MHz	902.4MHz	914.8MHz
GSM		32.85	32.47	32.93	-9.03	23.82	23.44	23.90
GPRS	1TXslot	32.82	32.44	32.91	-9.03	23.79	23.41	23.88
	2TXslots	30.25	29.98	30.40	-6.02	24.23	23.96	24.38
	3TXslots	28.54	28.24	28.62	-4.26	24.28	23.98	24.36
	4TXslots	27.30	26.99	27.36	-3.01	24.29	23.98	24.35
EGPRS (8PSK)	1TXslot	24.44	24.16	24.49	-9.03	15.41	15.13	15.46
	2TXslots	23.46	23.20	23.51	-6.02	17.44	17.18	17.49
	3TXslots	22.41	22.16	22.46	-4.26	18.15	17.90	18.20
	4TXslots	21.34	21.11	21.39	-3.01	18.33	18.10	18.38
Mode: GSM1800		Conducted Power (dBm)			Division Factors	Averager Power (dBm)		
		CH512	CH698	CH885		CH512	CH698	CH885
		1710.2MHz	1747.4MHz	1784.8MHz		1710.2MHz	1747.4MHz	1784.8MHz
GSM		29.85	29.74	29.76	-9.03	20.82	20.71	20.73
GPRS	1TXslot	29.82	29.71	29.75	-9.03	20.79	20.68	20.72
	2TXslots	27.49	27.46	27.47	-6.02	21.47	21.44	21.45
	3TXslots	25.93	25.87	25.86	-4.26	21.67	21.61	21.60
	4TXslots	24.81	24.72	24.72	-3.01	21.80	21.71	21.71
EGPRS (8PSK)	1TXslot	23.31	23.23	23.23	-9.03	14.28	14.20	14.20
	2TXslots	22.22	22.15	22.15	-6.02	16.20	16.13	16.13
	3TXslots	21.11	21.04	21.04	-4.26	16.85	16.78	16.78
	4TXslots	20.14	20.07	20.07	-3.01	17.13	17.06	17.06

Note:

1) Division Factors

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

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

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

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

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

2) According to the conducted power as above, the body measurements are performed with 4Txslots for 900MHz and 4 Txslots for 1800MHz for GPRS

Mode		WCDMA Band I			WCDMA Band VIII		
		Conducted Power (dBm)			Conducted Power (dBm)		
		CH9612	CH9750	CH9888	CH2712	CH2788	CH2863
		1922.4	1950.0	1977.6	882.4	897.6	912.6
AMR 12.2K		22.36	22.47	22.58	21.69	21.98	21.79
RMC 12.2K		22.38	22.51	22.59	21.71	22.01	21.80
HSDPA	Subtest-1	20.56	20.66	20.76	19.94	20.21	20.03
	Subtest-2	20.39	20.49	20.59	19.78	20.04	19.87
	Subtest-3	20.39	20.51	20.58	19.78	20.05	19.86
	Subtest-4	20.12	20.22	20.32	19.52	19.78	19.61
HSUPA	Subtest-1	20.01	20.11	20.21	19.41	19.67	19.50
	Subtest-2	19.86	19.95	20.05	19.26	19.52	19.35
	Subtest-3	19.77	19.86	19.96	19.17	19.43	19.26
	Subtest-4	19.71	19.81	19.90	19.12	19.37	19.21
	Subtest-5	19.66	19.75	19.85	19.07	19.32	19.16

LTE Conducted Power

LTE FDD Band 3						
BW(MHz)	Modulation	RB Size	RB Offset	Power		
Channel number:				19207	19575	19943
Frequency (MHz):				1710.7	1747.5	1784.3
1.4	QPSK	1	0	22.21	22.32	22.2
		1	2	22.19	22.3	22.18
		1	5	22.16	22.27	22.15
		3	0	22.21	22.32	22.2
		3	1	22.18	22.29	22.17
		3	2	22.21	22.30	22.12
		6	0	21.13	21.23	21.12
	16QAM	1	0	21.11	21.21	21.1
		1	2	21.09	21.19	21.08
		1	5	21.04	21.14	21.03
		3	0	20.23	20.33	20.22
		3	1	20.3	20.4	20.29
		3	2	20.25	20.35	20.25
		6	0	20.28	20.38	20.27
Channel number:				19215	19575	19935
Frequency (MHz):				1711.5	1747.5	1783.5
3	QPSK	1	0	22.23	22.34	22.22
		1	7	22.21	22.32	22.2
		1	14	22.19	22.3	22.18
		8	0	21.22	21.32	21.21
		8	4	21.17	21.28	21.17
		8	7	21.22	21.32	21.21
		15	0	21.15	21.26	21.14
	16QAM	1	0	21.13	21.23	21.12
		1	7	21.11	21.21	21.1
		1	14	21.06	21.17	21.05
		8	0	20.25	20.35	20.24
		8	4	20.32	20.42	20.31
		8	7	20.27	20.37	20.27
		15	0	20.3	20.4	20.29
Channel number:				19225	19575	19925
Frequency (MHz):				1712.5	1747.5	1782.5
5	QPSK	1	0	22.21	22.32	22.2
		1	12	22.18	22.29	22.17
		1	24	21.22	21.32	21.21
		12	0	21.17	21.28	21.16
		12	6	21.22	21.32	21.21
		12	11	21.15	21.25	21.14
		25	0	21.13	21.23	21.12
	16QAM	1	0	21.1	21.21	21.1
		1	12	21.06	21.16	21.05
		1	24	20.25	20.35	20.24
		12	0	20.32	20.42	20.31
		12	6	20.27	20.37	20.26
		12	11	20.29	20.39	20.29
		25	0	20.26	20.36	20.26

Channel number:				19250	19575	19900
Frequency (MHz):				1715	1747.5	1780
10	QPSK	1	0	22.21	22.32	22.2
		1	24	22.19	22.3	22.18
		1	49	21.22	21.33	21.21
		25	0	21.18	21.28	21.17
		25	12	21.22	21.33	21.21
		25	24	21.16	21.26	21.15
		50	0	21.13	21.24	21.12
	16QAM	1	0	21.11	21.22	21.1
		1	24	21.07	21.17	21.06
		1	49	20.26	20.36	20.25
		25	0	20.32	20.42	20.32
		25	12	20.28	20.38	20.27
		25	24	22.21	22.32	22.2
		50	0	22.19	22.3	22.18
Channel number:				19275	19575	19875
Frequency (MHz):				1717.5	1747.5	1777.5
15	QPSK	1	0	22.22	22.33	22.21
		1	37	22.2	22.31	22.19
		1	74	22.18	22.29	22.17
		36	0	21.21	21.32	21.2
		36	18	21.17	21.27	21.16
		36	37	21.21	21.32	21.2
		75	0	21.14	21.25	21.13
	16QAM	1	0	21.12	21.22	21.11
		1	37	21.1	21.2	21.09
		1	74	21.05	21.16	21.04
		36	0	20.24	20.34	20.24
		36	18	20.31	20.41	20.3
		36	37	20.27	20.37	20.26
		75	0	20.29	20.39	20.28
Channel number:				19300	19575	19850
Frequency (MHz):				1720	1747.5	1775
20	QPSK	1	0	22.29	22.3	22.28
		1	49	22.22	22.33	22.21
		1	99	22.2	22.31	22.19
		50	0	21.23	21.34	21.22
		50	24	21.19	21.29	21.18
		50	49	21.23	21.34	21.22
		100	0	21.16	21.27	21.16
	16QAM	1	0	21.14	21.25	21.13
		1	49	21.12	21.22	21.11
		1	99	21.07	21.18	21.07
		50	0	20.26	20.36	20.26
		50	24	20.33	20.43	20.32
		50	49	20.29	20.39	20.28
		100	0	20.31	20.41	20.3

LTE FDD Band 7						
BW(MHz)	Modulation	RB Size	RB Offset	Power		
Channel number:				20775	21100	21425
Frequency (MHz):				2502.5	2535	2567.5
5	QPSK	1	0	22.15	22.36	22.34
		1	12	22.13	22.34	22.32
		1	24	21.15	21.35	21.33
		12	0	21.11	21.31	21.29
		12	6	21.15	21.35	21.33
		12	11	21.08	21.28	21.27
		25	0	21.06	21.26	21.24
	16QAM	1	0	21.04	21.24	21.22
		1	12	20.99	21.19	21.17
		1	24	20.18	20.37	20.35
		12	0	20.24	20.43	20.42
		12	6	20.2	20.39	20.37
		12	11	20.22	20.41	20.39
		25	0	20.14	20.33	20.31
Channel number:				20800	21100	21400
Frequency (MHz):				2505	2535	2565
10	QPSK	1	0	22.16	22.37	22.35
		1	24	22.14	22.35	22.33
		1	49	22.12	22.33	22.31
		25	0	21.14	21.34	21.32
		25	12	21.09	21.29	21.27
		25	24	21.14	21.34	21.32
		50	0	21.07	21.27	21.25
	16QAM	1	0	21.05	21.25	21.23
		1	24	21.03	21.22	21.21
		1	49	20.98	21.18	21.16
		25	0	20.16	20.35	20.34
		25	12	20.23	20.42	20.4
		25	24	20.19	20.38	20.36
		50	0	20.21	20.4	20.38
Channel number:				20825	21100	21375
Frequency (MHz):				2507.5	2535	2562.5
15	QPSK	1	0	22.15	22.36	22.34
		1	37	22.12	22.33	22.31
		1	74	21.15	21.35	21.33
		36	0	21.1	21.3	21.28
		36	18	21.15	21.35	21.33
		36	37	21.08	21.28	21.26
		75	0	21.06	21.25	21.24
	16QAM	1	0	21.03	21.23	21.21
		1	37	20.99	21.18	21.17
		1	74	20.17	20.36	20.34
		36	0	20.24	20.43	20.41
		36	18	20.19	20.38	20.36
		36	37	20.21	20.4	20.39
		75	0	20.18	20.37	20.36

Channel number:				20850	21100	21350
Frequency (MHz):				2510	2535	2560
20	QPSK	1	0	22.23	22.43	22.42
		1	49	22.16	22.37	22.35
		1	99	22.14	22.35	22.33
		50	0	21.16	21.36	21.34
		50	24	21.12	21.31	21.3
		50	49	21.16	21.36	21.34
		100	0	21.09	21.29	21.27
	16QAM	1	0	21.07	21.27	21.25
		1	49	21.05	21.25	21.23
		1	99	21	21.2	21.18
		50	0	20.18	20.37	20.36
		50	24	20.25	20.44	20.43
		50	49	20.21	20.4	20.38
		100	0	20.23	20.42	20.4

LTE FDD Band 20						
BW(MHz)	Modulation	RB Size	RB Offset	Power		
Channel number:				24175	24300	24425
Frequency (MHz):				834.5	847	859.5
5	QPSK	1	0	22.44	22.47	22.45
		1	12	22.42	22.45	22.48
		1	24	21.45	21.47	21.5
		12	0	21.4	21.43	21.46
		12	6	21.45	21.47	21.5
		12	11	21.38	21.41	21.43
		25	0	21.36	21.38	21.41
	16QAM	1	0	21.33	21.36	21.39
		1	12	21.29	21.32	21.34
		1	24	20.47	20.5	20.53
		12	0	20.54	20.57	20.59
		12	6	20.49	20.52	20.55
		12	11	20.52	20.54	20.57
		25	0	20.43	20.46	20.49
Channel number:				24200	24300	24400
Frequency (MHz):				837	847	857
10	QPSK	1	0	22.45	22.48	22.51
		1	24	22.43	22.46	22.49
		1	49	22.41	22.44	22.47
		25	0	21.43	21.46	21.49
		25	12	21.39	21.42	21.44
		25	24	21.43	21.46	21.49
		50	0	21.36	21.39	21.42
	16QAM	1	0	21.34	21.37	21.4
		1	24	21.32	21.35	21.38
		1	49	21.27	21.3	21.33
		25	0	20.46	20.49	20.51
		25	12	20.53	20.55	20.58
		25	24	20.48	20.51	20.54
		50	0	20.5	20.53	20.56
Channel number:				24225	24300	24375
Frequency (MHz):				839.5	847	854.5
15	QPSK	1	0	22.44	22.47	22.5
		1	37	22.41	22.44	22.47
		1	74	21.44	21.47	21.5
		36	0	21.39	21.42	21.45
		36	18	21.44	21.47	21.5
		36	37	21.37	21.4	21.43
		75	0	21.35	21.38	21.41
	16QAM	1	0	21.33	21.35	21.38
		1	37	21.28	21.31	21.34
		1	74	20.46	20.49	20.52
		36	0	20.53	20.56	20.59
		36	18	20.49	20.51	20.54
		36	37	20.51	20.54	20.56
		75	0	20.48	20.51	20.53

Channel number:				24250	24300	24350
Frequency (MHz):				842	847	852
20	QPSK	1	0	22.52	22.55	22.58
		1	49	22.45	22.48	22.51
		1	99	22.43	22.46	22.49
		50	0	21.45	21.48	21.51
		50	24	21.41	21.44	21.47
		50	49	21.45	21.48	21.51
		100	0	21.39	21.41	21.44
	16QAM	1	0	21.36	21.39	21.42
		1	49	21.34	21.37	21.4
		1	99	21.3	21.32	21.35
		50	0	20.48	20.51	20.53
		50	24	20.55	20.57	20.6
		50	49	20.5	20.53	20.56
		100	0	20.52	20.55	20.58

WIFI-2.4G				
Mode	Channel	Frequency (MHz)	Conducted power (dBm)	Data rate
802.11b	01	2412	9.37	1 Mbps
	07	2442	9.82	1 Mbps
	13	2472	9.64	1 Mbps
802.11g	01	2412	8.79	6 Mbps
	07	2442	9.23	6 Mbps
	13	2472	9.42	6 Mbps
802.11n(H20)	01	2412	8.46	6.5 Mbps
	07	2442	9.43	6.5 Mbps
	13	2472	9.62	6.5 Mbps
802.11n(H40)	03	2422	8.32	13.5 Mbps
	07	2442	9.69	13.5 Mbps
	11	2462	9.53	13.5 Mbps

WIFI-5G										
Mode	Channel	Frequency (MHz)	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
802.11a	36	5180	13.38	11.51	11.58	11.13	10.89	9.61	8.45	7.26
	40	5200	13.12	-	-	-	-	-	-	-
	44	5220	13.26	-	-	-	-	-	-	-
	48	5240	13.06	-	-	-	-	-	-	-

WIFI-5G										
Mode	Channel	Frequency (MHz)	MSC0	MSC1	MSC2	MSC3	MSC4	MSC5	MSC6	MSC7
802.11n (HT20)	36	5180	12.61	12.01	11.76	10.52	9.35	9.07	7.82	7.77
	40	5200	12.42	-	-	-	-	-	-	-
	44	5220	12.36	-	-	-	-	-	-	-
	48	5240	12.28	-	-	-	-	-	-	-

WIFI-5G										
Mode	Channel	Frequency (MHz)	MSC0	MSC1	MSC2	MSC3	MSC4	MSC5	MSC6	MSC7
802.11n (HT40)	38	5190	12.17	12.17	11.44	11.08	11.1	9.64	9.29	8.29
	46	5230	11.92	-	-	-	-	-	-	-

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

Bluetooth			
Mode	Channel	Frequency (MHz)	Conducted power (dBm)
GFSK	00	2402	7.17
	39	2441	7.13
	78	2480	7.08
π/4QPSK	00	2402	4.15
	39	2441	4.13
	78	2480	4.10
8DPSK	00	2402	3.25
	39	2441	3.23
	78	2480	3.21
GFSK (BLE)	00	2402	-1.82
	19	2440	-0.82
	39	2480	-1.86

Note: beause the ouput power(eirp) of Bluetooth of the EUT is less than 20mW(13dBm), so standalone SAR are exempt according EN62479.

12. SAR Measurement Results

GSM900						
Test Position **Head**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	975	880.2	32.85	-	-	2.00
	62	902.4	32.47	-0.17	**0.087**	2.00
	124	914.8	32.93	-	-	2.00
Left-Tilt	975	880.2	32.85	-	-	2.00
	62	902.4	32.47	0.20	0.065	2.00
	124	914.8	32.93	-	-	2.00
Right-Cheek	975	880.2	32.85	-	-	2.00
	62	902.4	32.47	-0.07	0.077	2.00
	124	914.8	32.93	-	-	2.00
Right-Tilt	975	880.2	32.85	-	-	2.00
	62	902.4	32.47	-0.14	0.059	2.00
	124	914.8	32.93	-	-	2.00
GSM900 (GPRS 4Txslots)						
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back	975	880.2	27.30	-	-	2.00
	62	902.4	26.99	0.11	**0.461**	2.00
	124	914.8	27.36	-	-	2.00
Body-Front	975	880.2	27.30	-	-	2.00
	62	902.4	26.99	0.09	0.398	2.00
	124	914.8	27.36	-	-	2.00
Left-Side	975	880.2	27.30	-	-	2.00
	62	902.4	26.99	-0.02	0.147	2.00
	124	914.8	27.36	-	-	2.00
Right-Side	975	880.2	27.30	-	-	2.00
	62	902.4	26.99	0.06	0.006	2.00
	124	914.8	27.36	-	-	2.00
Top-Side	975	880.2	27.30	-	-	2.00
	62	902.4	26.99	-0.04	0.048	2.00
	124	914.8	27.36	-	-	2.00
Bottom-Side	975	880.2	27.30	-	-	2.00
	62	902.4	26.99	0.03	0.100	2.00
	124	914.8	27.36	-	-	2.00
GSM900						
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back With headset	975	880.2	32.85	-	-	2.00
	62	902.4	32.47	0.06	0.433	2.00
	124	914.8	32.93	-	-	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

DCS1800						
Test Position **Head**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	512	1710.2	29.85	-	-	2.00
	698	1747.4	29.74	0.10	**0.080**	2.00
	885	1784.8	29.76	-	-	2.00
Left-Tilt	512	1710.2	29.85	-	-	2.00
	698	1747.4	29.74	-0.02	0.057	2.00
	885	1784.8	29.76	-	-	2.00
Right-Cheek	512	1710.2	29.85	-	-	2.00
	698	1747.4	29.74	0.08	0.068	2.00
	885	1784.8	29.76	-	-	2.00
Right-Tilt	512	1710.2	29.85	-	-	2.00
	698	1747.4	29.74	-0.03	0.049	2.00
	885	1784.8	29.76	-	-	2.00
DCS1800 (GPRS 4Txslots)						
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back	512	1710.2	24.81	0.02	0.884	2.00
	698	1747.4	24.72	0.09	**0.902**	2.00
	885	1784.8	24.72	0.13	0.876	2.00
Body-Front	512	1710.2	24.81	-	-	2.00
	698	1747.4	24.72	-0.09	0.775	2.00
	885	1784.8	24.72	-	-	2.00
Left-Side	512	1710.2	24.81	-	-	2.00
	698	1747.4	24.72	-0.04	0.288	2.00
	885	1784.8	24.72	-	-	2.00
Right-Side	512	1710.2	24.81	-	-	2.00
	698	1747.4	24.72	0.05	0.011	2.00
	885	1784.8	24.72	-	-	2.00
Top-Side	512	1710.2	24.81	-	-	2.00
	698	1747.4	24.72	-0.08	0.093	2.00
	885	1784.8	24.72	-	-	2.00
Bottom-Side	512	1710.2	24.81	-	-	2.00
	698	1747.4	24.72	0.03	0.595	2.00
	885	1784.8	24.72	-	-	2.00
DCS1800						
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back With headset	512	1710.2	29.85	-	-	2.00
	698	1747.4	29.74	0.05	0.866	2.00
	885	1784.8	29.76	-	-	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the*

SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.

WCDMA Band I						
Test Position **Head**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	9612	1922.4	22.38	-	-	2.00
	9750	1950.0	22.51	0.11	**0.112**	2.00
	9888	1977.6	22.59	-	-	2.00
Left-Tilt	9612	1922.4	22.38	-	-	2.00
	9750	1950.0	22.51	-0.04	0.075	2.00
	9888	1977.6	22.59	-	-	2.00
Right-Cheek	9612	1922.4	22.38	-	-	2.00
	9750	1950.0	22.51	0.09	0.091	2.00
	9888	1977.6	22.59	-	-	2.00
Right-Tilt	9612	1922.4	22.38	-	-	2.00
	9750	1950.0	22.51	0.07	0.063	2.00
	9888	1977.6	22.59	-	-	2.00
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back	9612	1922.4	22.38	0.04	1.08	2.00
	9750	1950	22.51	0.14	**1.11**	2.00
	9888	1977.6	22.59	0.06	1.09	2.00
Body-Front	9612	1922.4	22.38	-	-	2.00
	9750	1950	22.51	0.17	0.929	2.00
	9888	1977.6	22.59	-	-	2.00
Left-Side	9612	1922.4	22.38	-	-	2.00
	9750	1950	22.51	-0.06	0.335	2.00
	9888	1977.6	22.59	-	-	2.00
Right-Side	9612	1922.4	22.38	-	-	2.00
	9750	1950	22.51	0.08	0.020	2.00
	9888	1977.6	22.59	-	-	2.00
Top-Side	9612	1922.4	22.38	-	-	2.00
	9750	1950	22.51	0.05	0.122	2.00
	9888	1977.6	22.59	-	-	2.00
Bottom-Side	9612	1922.4	22.38	-	-	2.00
	9750	1950	22.51	-0.32	0.669	2.00
	9888	1977.6	22.59	-	-	2.00
Body-Back With headset	9612	1922.4	22.38	-	-	2.00
	9750	1950	22.51	0.14	0.983	2.00
	9888	1977.6	22.59	-	-	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

WCDMA Band VIII						
Test Position **Head**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	2712	882.4	21.97	-	-	2.00
	2788	897.6	22.04	-0.10	**0.140**	2.00
	2863	912.6	22.08	-	-	2.00
Left-Tilt	2712	882.4	21.97	-	-	2.00
	2788	897.6	22.04	-0.13	0.091	2.00
	2863	912.6	22.08	-	-	2.00
Right-Cheek	2712	882.4	21.97	-	-	2.00
	2788	897.6	22.04	-0.11	0.111	2.00
	2863	912.6	22.08	-	-	2.00
Right-Tilt	2712	882.4	21.97	-	-	2.00
	2788	897.6	22.04	-0.21	0.072	2.00
	2863	912.6	22.08	-	-	2.00
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	-0.08	**0.544**	2.00
	2863	912.6	21.80	-	-	2.00
Body-Front	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	0.10	0.477	2.00
	2863	912.6	21.80	-	-	2.00
Left-Side	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	-0.03	0.235	2.00
	2863	912.6	21.80	-	-	2.00
Right-Side	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	0.05	0.012	2.00
	2863	912.6	21.80	-	-	2.00
Top-Side	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	-0.03	0.062	2.00
	2863	912.6	21.80	-	-	2.00
Bottom-Side	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	-0.10	0.126	2.00
	2863	912.6	21.80	-	-	2.00
Body-Back With headset	2712	882.4	21.71	-	-	2.00
	2788	897.6	22.01	-0.12	0.527	2.00
	2863	912.6	21.80	-	-	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

LTE Band 3									
Test Position **Head**	Freq.		BW (MHz)	RB Size	RB Offset	Modulation	Power Drift (dB)	SAR(1g) (W/kg)	Limit (W/kg)
	Ch.	MHz							
Left-Cheek	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	0.05	**0.183**	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Left-Tilt	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	0.06	0.137	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Right-Cheek	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	0.02	0.161	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Right-Tilt	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	0.04	0.124	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Test Position **Body**	Freq.		BW (MHz)	RB Size	RB Offset	Modulation	Power Drift (dB)	SAR(1g) (W/kg)	Limit (W/kg)
	Ch.	MHz							
Body-Back	19300	1720	20	1	0	QPSK	-0.13	0.605	2.00
	19575	1747.5	20	1	0	QPSK	0.03	**1.400**	2.00
	19850	1775	20	1	0	QPSK	-0.20	0.628	2.00
Body-Front	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	-0.22	0.384	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Left-Side	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	-0.07	0.192	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Right-Side	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	-0.10	0.007	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Top-Side	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	-0.06	0.070	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Bottom-Side	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	-0.05	0.728	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00
Body-Back With headset	19300	1720	20	1	0	QPSK	-	-	2.00
	19575	1747.5	20	1	0	QPSK	0.02	1.326	2.00
	19850	1775	20	1	0	QPSK	-	-	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

LTE Band 7									
Test Position Head	Freq.		BW (MHz)	RB Size	RB Offset	Modulation	Power Drift (dB)	SAR(1g) (W/kg)	Limit (W/kg)
	Ch.	MHz							
Left-Cheek	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.07	**0.028**	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Left-Tilt	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.08	0.021	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Right-Cheek	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.03	0.025	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Right-Tilt	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.06	0.019	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Test Position Body	Freq.		BW (MHz)	RB Size	RB Offset	Modulation	Power Drift (dB)	SAR(1g) (W/kg)	Limit (W/kg)
	Ch.	MHz							
Body-Back	20850	2510	20	1	0	QPSK	0.01	1.598	2.00
	21100	2535	20	1	0	QPSK	0.02	**1.610**	2.00
	21350	2560	20	1	0	QPSK	0.03	1.552	2.00
Body-Front	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.02	1.208	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Left-Side	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.01	1.217	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Right-Side	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.02	1.094	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Top-Side	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	-0.09	0.212	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Bottom-Side	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.01	0.510	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00
Body-Back With headset	20850	2510	20	1	0	QPSK	-	-	2.00
	21100	2535	20	1	0	QPSK	0.08	1.554	2.00
	21350	2560	20	1	0	QPSK	-	-	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

LTE Band 20									
Test Position **Head**	Freq.		BW (MHz)	RB Size	RB Offset	Modulation	Power Drift (dB)	SAR(1g) (W/kg)	Limit (W/kg)
	Ch.	MHz							
Left-Cheek	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.13	**0.071**	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Left-Tilt	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.18	0.046	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Right-Cheek	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.16	0.056	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Right-Tilt	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.30	0.037	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Test Position **Body**	Freq.		BW (MHz)	RB Size	RB Offset	Modulation	Power Drift (dB)	SAR(1g) (W/kg)	Limit (W/kg)
	Ch.	MHz							
Body-Back	24225	842	20	1	0	QPSK	0.13	0.727	2.00
	24300	847	20	1	0	QPSK	0.19	**0.732**	2.00
	24375	852	20	1	0	QPSK	0.27	0.705	2.00
Body-Front	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.23	0.549	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Left-Side	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.08	0.644	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Right-Side	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.16	0.497	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Top-Side	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	-0.09	0.402	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Bottom-Side	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	-0.11	0.601	2.00
	24375	852	20	1	0	QPSK	-	-	2.00
Body-Back With headset	24225	842	20	1	0	QPSK	-	-	2.00
	24300	847	20	1	0	QPSK	0.12	0.715	2.00
	24375	852	20	1	0	QPSK	-	-	2.00

Note:

4. *The value with blue color is the maximum SAR Value of each test band.*
5. *The distance of the Body test is 0mm;*
6. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

Wifi 2.4G						
Test Position **Head**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	7	2442	9.82	-0.11	**0.096**	2.00
Left-Tilt	7	2442	9.82	-0.07	0.069	2.00
Right-Cheek	7	2442	9.82	0.08	0.081	2.00
Right-Tilt	7	2442	9.82	-0.03	0.058	2.00

Wifi 2.4G						
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back	7	2442	9.82	-0.03	**0.087**	2.00
Body-Front	7	2442	9.82	-0.04	0.072	2.00
Left-Side	7	2442	9.82	0.01	0.033	2.00
Body-Back	7	2442	9.82	-0.02	0.002	2.00
Top-Side	7	2442	9.82	0.01	0.045	2.00
Bottom-Side	7	2442	9.82	-0.10	0.003	2.00
Rear with headset	7	2442	9.82	-0.06	0.079	2.00

Note:

1. *The value with blue color is the maximum SAR Value of each test band.*
2. *The distance of the Body test is 0mm;*
3. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

Wifi 5G						
Test Position **Head**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	36	5180	13.38	-0.07	**0.124**	2.00
Left-Tilt	36	5180	13.38	-0.04	0.089	2.00
Right-Cheek	36	5180	13.38	0.05	0.105	2.00
Right-Tilt	36	5180	13.38	-0.02	0.075	2.00

Wifi 5G						
Test Position **Body**	Frequency		Conducted Power (dBm)	Power Drift(dB)	SAR(10g) (W/kg)	Limit (W/kg)
	Channel	MHz				
Body-Back	36	5180	13.38	-0.08	**0.110**	2.00
Body-Front	36	5180	13.38	-0.03	0.091	2.00
Left-Side	36	5180	13.38	-0.12	0.042	2.00
Body-Back	36	5180	13.38	-0.15	0.003	2.00
Top-Side	36	5180	13.38	-0.04	0.024	2.00
Bottom-Side	36	5180	13.38	-0.10	0.003	2.00
Rear with headset	36	5180	13.38	-0.06	0.095	2.00

Note:

4. *The value with blue color is the maximum SAR Value of each test band.*
5. *The distance of the Body test is 0mm;*
6. *If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst case configuration.*

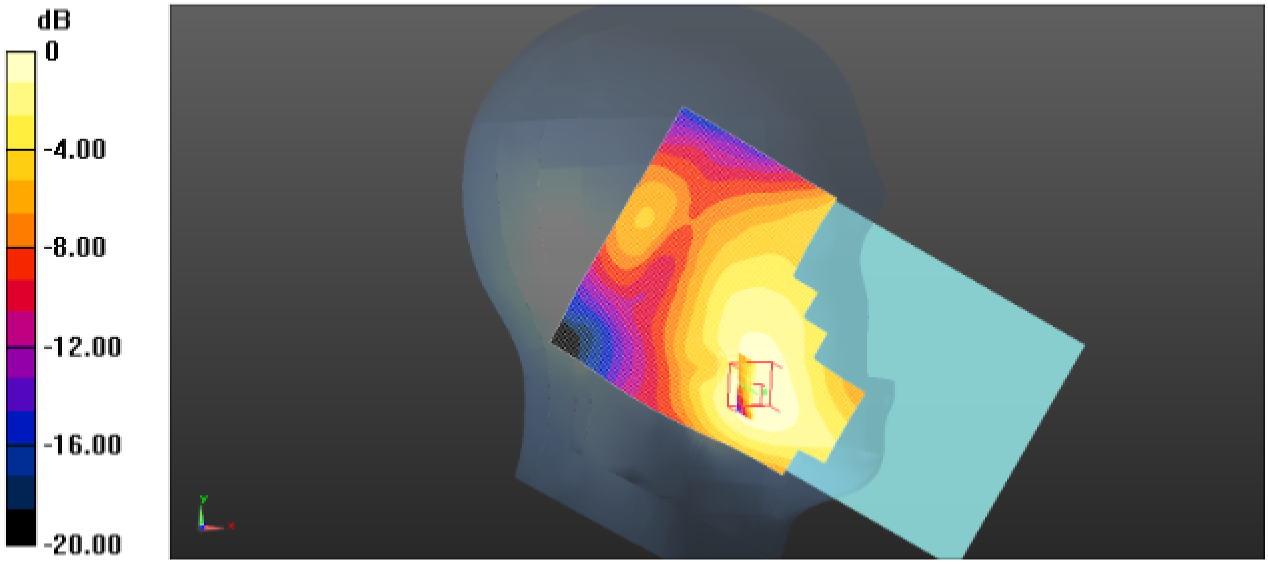
SAR Test Data Plots

GSM900 Head Left Cheek
Date: 2016-04-07
Communication System: Customer System; Frequency:902.4 MHz;Duty Cycle:1:8.30042
Medium parameters used (interpolated): f=902.4 MHz; σ=0.96S/m; εr=41.36; ρ=1000 kg/m3
Phantom section: Left Head Section:

DASY 5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.71, 6.71, 6.10); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.103 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.101 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.112 mW/g
SAR(1 g) = 0.104 mW/g; SAR(10 g) = 0.087 mW/g

Maximum value of SAR (measured) = 0.107 W/kg



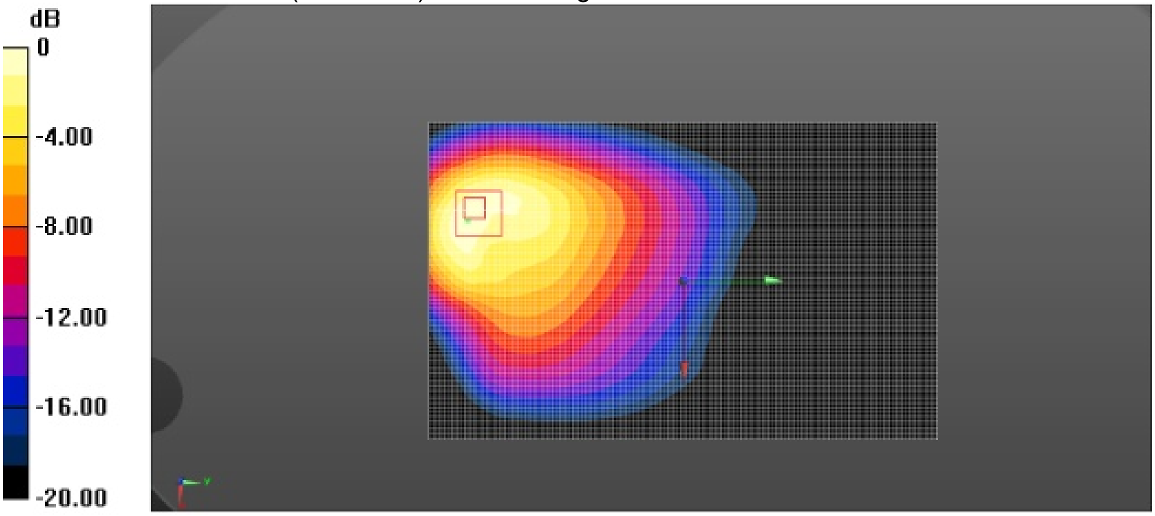
Left Head Cheek (GSM900 Middle Channel)

Body- worn Rear Side (GSM900 GPRS 4TSMiddle Channel)
Date: 2016-04-07
Communication System: Customer System; Frequency:902.4 MHz;Duty Cycle:1:2
Medium parameters used (interpolated): f=902.4 MHz; σ=0.95S/m; εr=41.82; ρ=1000 kg/m3
Phantom section: Flat Section:

DASY 5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.900 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.997 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.506 mW/g
SAR(1 g) = 0.790 mW/g; SAR(10 g) = 0.461 mW/g
Maximum value of SAR (measured) = 0.854 W/kg

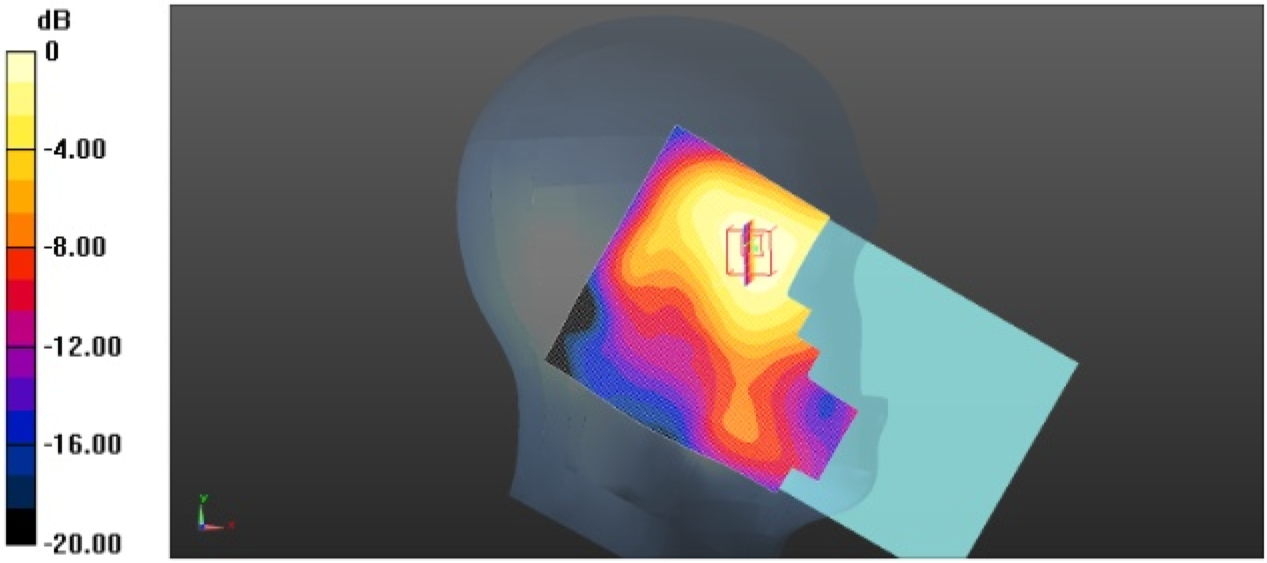


0 dB = 0.900 W/kg = -0.92 dB W/kg
Body- worn Rear Side (GSM900GPRS 4TS Middle Channel)

DCS1800 Head Left Cheek
Date: 2016-04-11
Communication System: Customer System; Frequency: 1747.4 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1747.4 MHz; σ = 1.44 s/m; ε = 40.88; ρ = 1000 kg/m 3
Phantom section: Left Head Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(5.07, 5.07, 5.07); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.125 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.242 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.168 mW/g
SAR(1 g) = 0.117 mW/g; SAR(10 g) = 0.080 mW/g
Maximum value of SAR (measured) = 0.125 W/kg

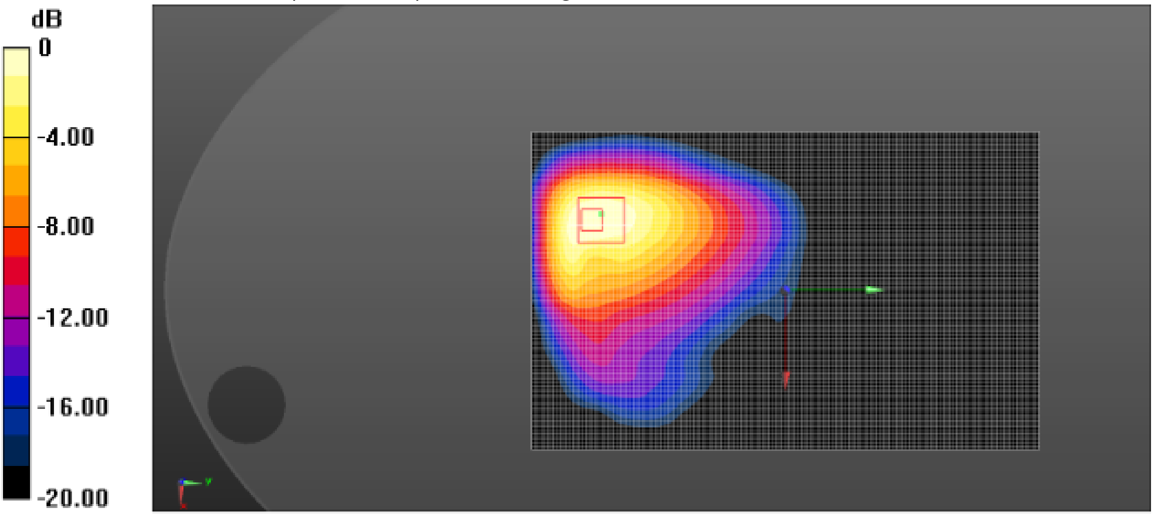


Left Head Tilt (DCS1800 Middle Channel)

Body- worn Rear Side (DCS1800 GPRS 4TS Middle Channel)
Date: 2016-04-11
Communication System: Customer System; Frequency: 1747.4 MHz;Duty Cycle: 1:2
Medium parameters used: f = 1747.4 MHz; σ = 1.32 mho/m; ε = 40.34; ρ = 1000 kg/m 3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.95 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.534 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.799 mW/g
SAR(1 g) = 1.7 mW/g; SAR(10 g) = 0.902 mW/g
Maximum value of SAR (measured) = 1.86 W/kg



0 dB = 1.95 W/kg = 5.80 dB W/kg
Body- worn Rear Side (DCS1800 GPRS 4TS Middle Channel)

WCDMA Band I Head Left Cheek
Date: 2016-04-11
Communication System: Customer System; Frequency: 1950.0 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f =1950.0 MHz; σ=1.45S/m; εr=40.15; ρ=1000 kg/m3
Phantom section: Left Head Section:

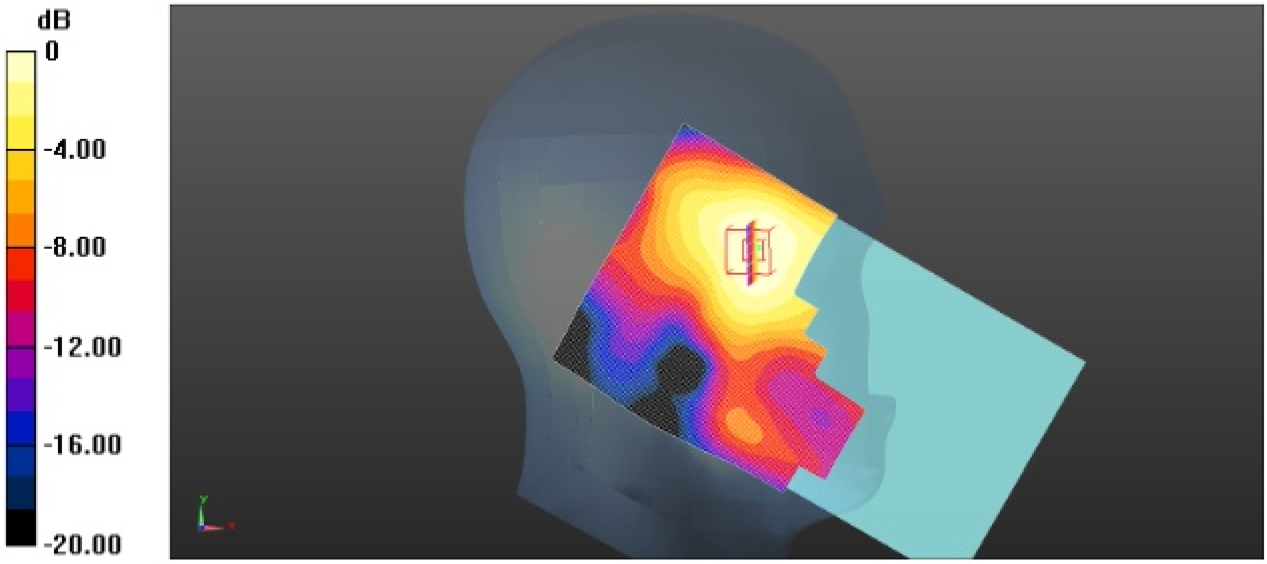
DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(5.03, 5.03, 5.03); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.188 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 5.094 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.238 mW/g

SAR(1 g) = 0.165 mW/g; SAR(10 g) = 0.112 mW/g

Maximum value of SAR (measured) = 0.176 W/kg

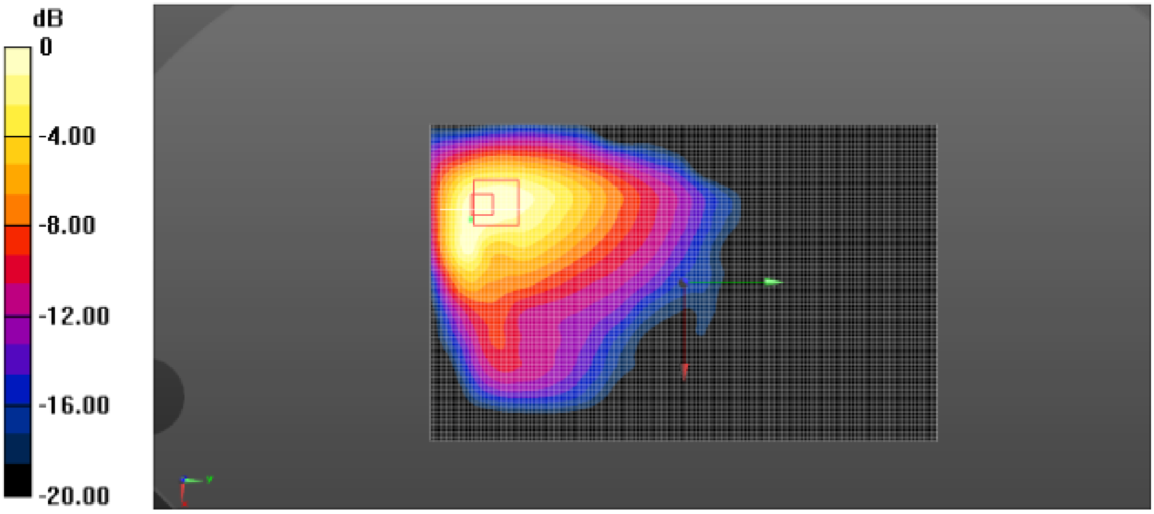


Left Head Cheek (WCDMA Band I Middle Channel)

Body- worn Rear Side (WCDMA Band I Middle Channel)
Date: 2016-04-11
Communication System: Customer System; Frequency: 1950.0 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=1950.0 MHz; σ=1.44S/m; εr=40.75; ρ=1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.47 W/kg
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.629 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 5.395 mW/g
SAR(1 g) = 2.2 mW/g; SAR(10 g) = 1.11 mW/g
Maximum value of SAR (measured) = 2.37 W/kg



0 dB = 2.47 W/kg = 7.85 dB W/kg

Body- worn Rear Side (WCDMA Band I Middle Channel)

WCDMA Band VIII Head Left Cheek
Date: 2016-04-07
Communication System: Customer System; Frequency: 897.6 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=897.6 MHz; σ=0.96S/m; εr=41.36; ρ=1000 kg/m3
Phantom section: Left Head Section:

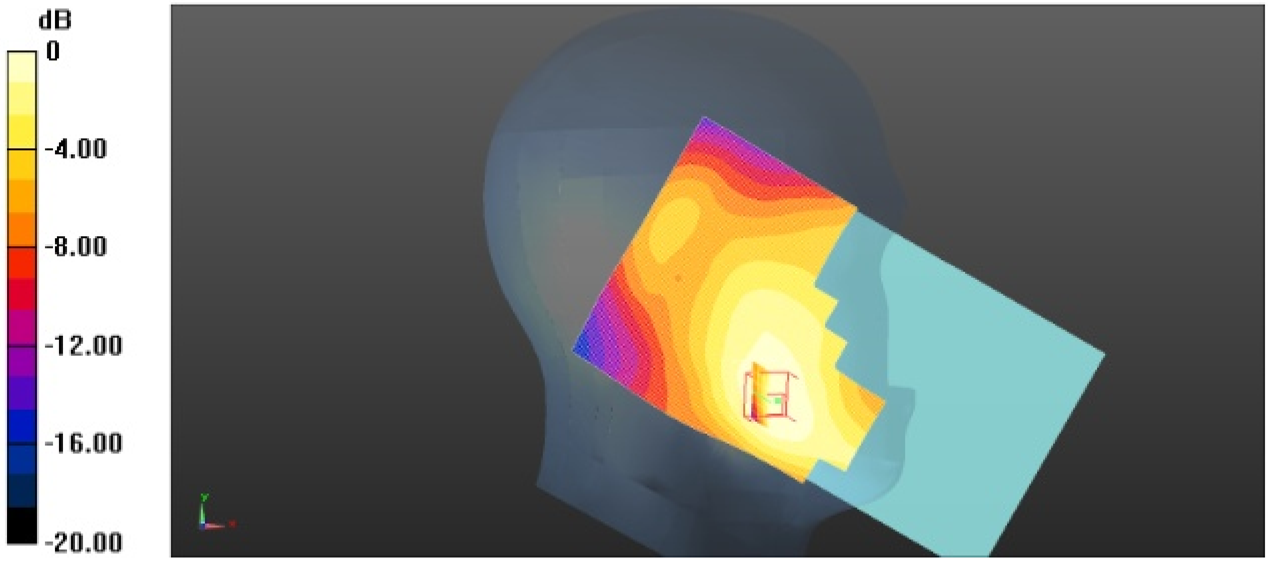
DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.71, 6.71, 6.10); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.118 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 6.058 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.121 mW/g
SAR(1 g) = 0.110 mW/g; SAR(10 g) = 0.093 mW/g

SAR(1 g) = 0.188 mW/g; SAR(10 g) = 0.140 mW/g

Maximum value of SAR (measured) = 0.115 W/kg

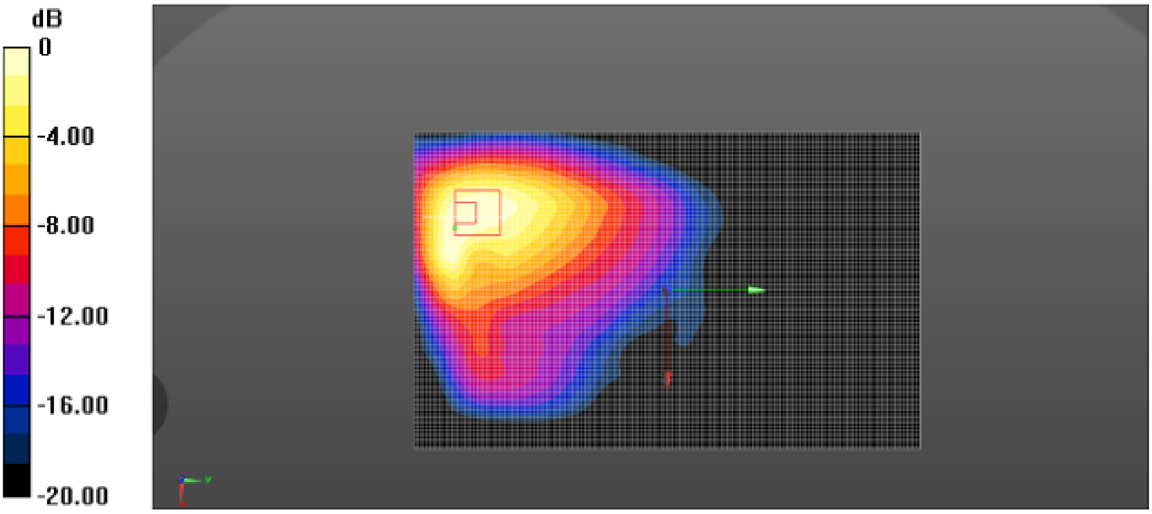


Left Head Cheek (WCDMA Band VIII Middle Channel)

Body- worn Rear Side (WCDMA Band VIII Middle Channel)
Date: 2016-04-07
Communication System: Customer System; Frequency: 897.6 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=897.6 MHz; σ=0.96S/m; εr=41.36; ρ=1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.22 W/kg
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.416 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 2.623 mW/g
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.544 mW/g
Maximum value of SAR (measured) = 1.17 W/kg



0 dB = 1.22 W/kg = 1.73 dB W/kg

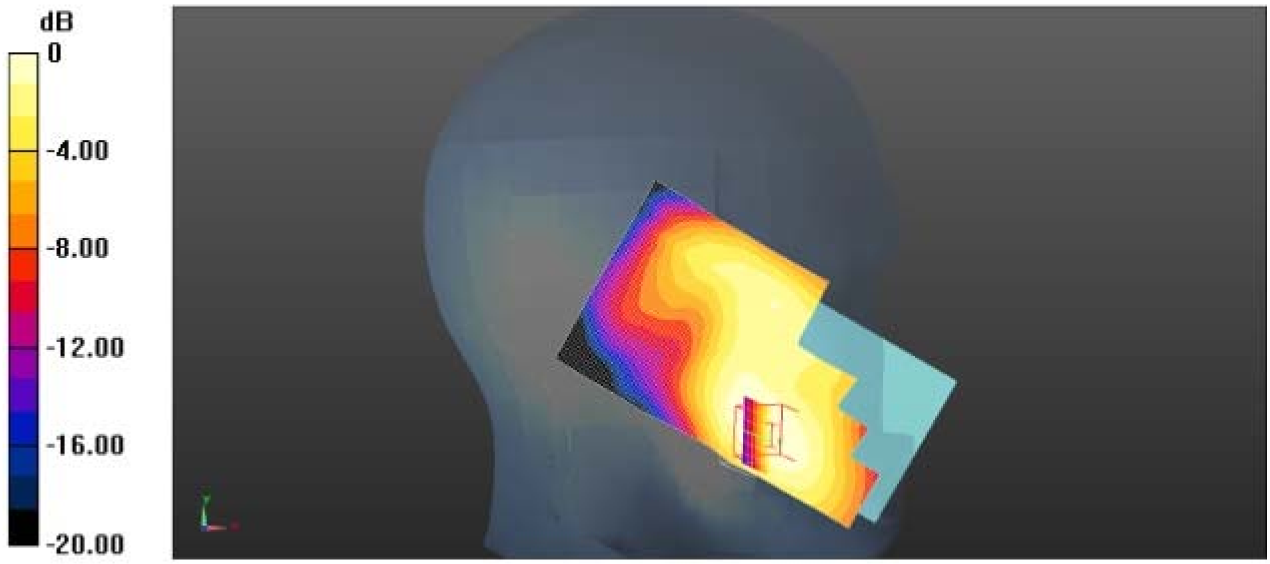
Body- worn Rear Side (WCDMA Band VIII Middle Channel)

LTE Band 3 Head Left Cheek
Date: 2016-04-11
Communication System: Customer System; Frequency: 1747.5 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f =1747.5 MHz; σ=1.44S/m; εr=40.88; ρ=1000 kg/m3
Phantom section: Left Head Section:

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(5.07, 5.07, 5.07); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.289 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 5.238 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.414 mW/g
SAR(1 g) = 0.278 mW/g; SAR(10 g) = 0.183 mW/g
Maximum value of SAR (measured) = 0.301 W/kg

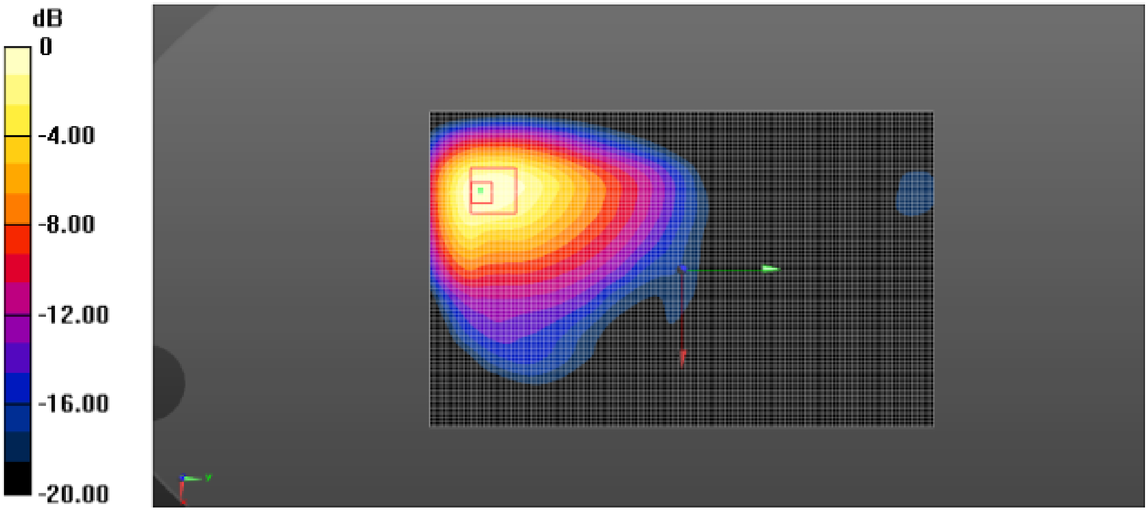


Left Head Cheek (LTE Band 3 Middle Channel)

Body- worn Rear Side (LTE FDD Band 3 Middle Channel)
Date: 2016-04-11
Communication System: Customer System; Frequency:1747.5 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=1747.5 MHz; σ=1.44S/m; εr=40.88; ρ=1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.03 W/kg
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.995 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 5.828 mW/g
SAR(1 g) = 2.64 mW/g; SAR(10 g) = 1.4 mW/g
Maximum value of SAR (measured) = 2.89 W/kg



0 dB = 3.03 W/kg = 9.63 dB W/kg

Body- worn Rear Side (LTE FDD Band 3 Middle Channel)

LTE Band 7
Date: 2016-04-12
Communication System: Customer System; Frequency:2535 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=2535 MHz; σ=1.77S/m; εr=39.37; ρ=1000 kg/m3
Phantom section: Left Head Section:

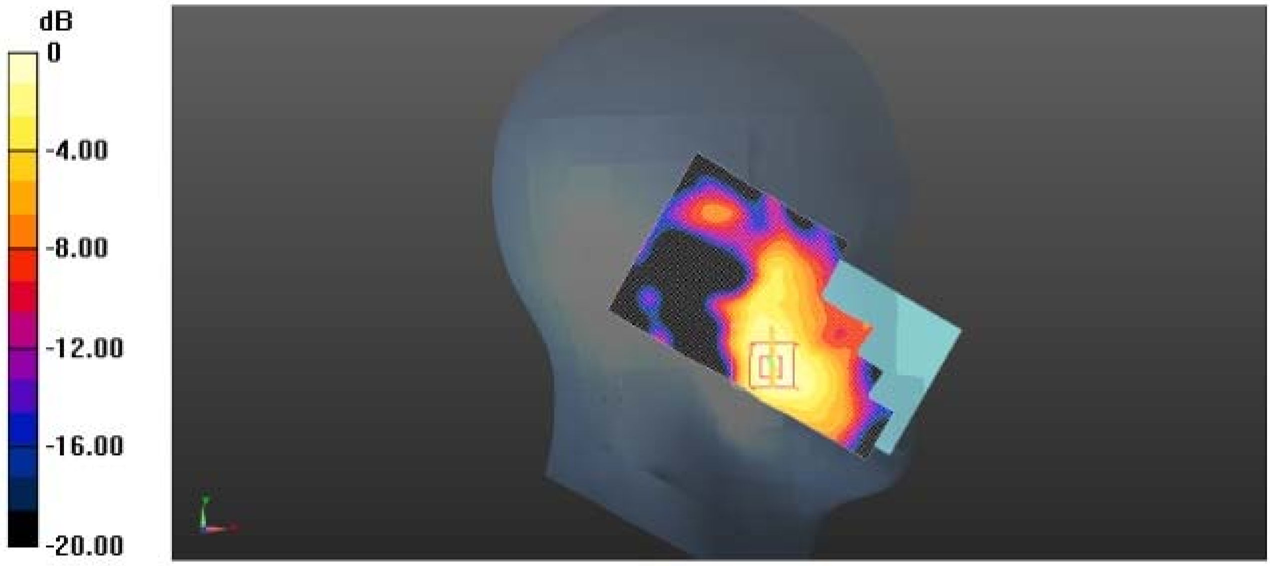
DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(4.43, 4.43, 4.43); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0633 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value =6.571 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) =0.0881 mW/g

SAR(1 g) = 0.055 mW/g; SAR(10 g) = 0.028 mW/g

Maximum value of SAR (measured) =0.0646 W/kg



Left Head Cheek (LTE Band 7 Middle Channel)

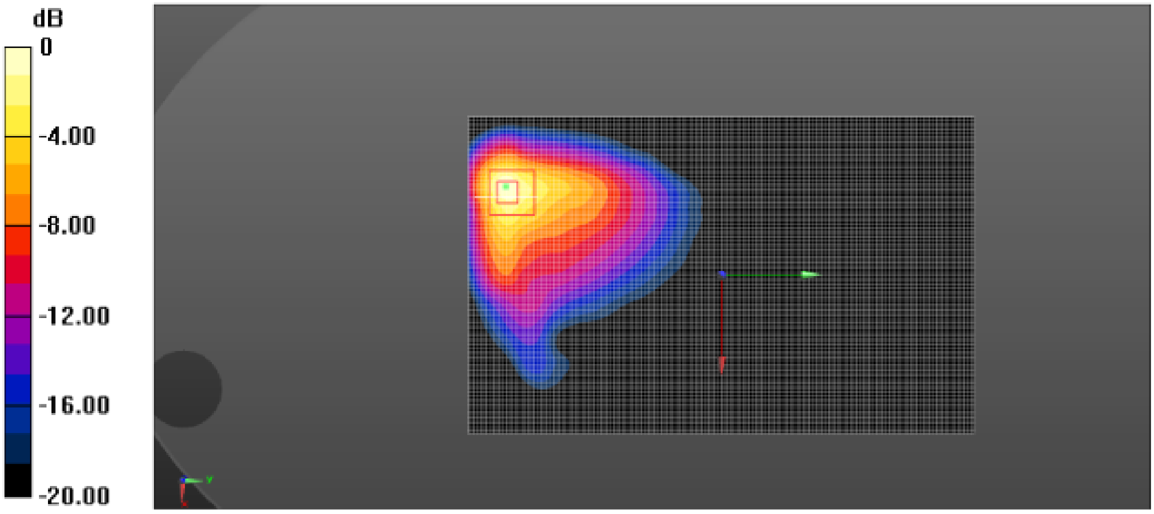
Body- worn Rear Side (LTE FDD Band 7 Middle Channel)

Date: 2016-04-12
Communication System: Customer System; Frequency:2535 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=2535 MHz; σ=1.77S/m; εr=39.37; ρ=1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) =5.27 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 3.227 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 19.521 mW/g
SAR(1 g) = 4.92 mW/g; SAR(10 g) = 1.61 mW/g
Maximum value of SAR (measured) =5.29 W/kg



Body- worn Rear Side (LTE FDD Band 7 Middle Channel)

LTE Band 20
Date: 2016-04-07
Communication System: Customer System; Frequency:847 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=847 MHz; σ=0.91S/m; εr=41.48; ρ=1000 kg/m3
Phantom section: Left Head Section:

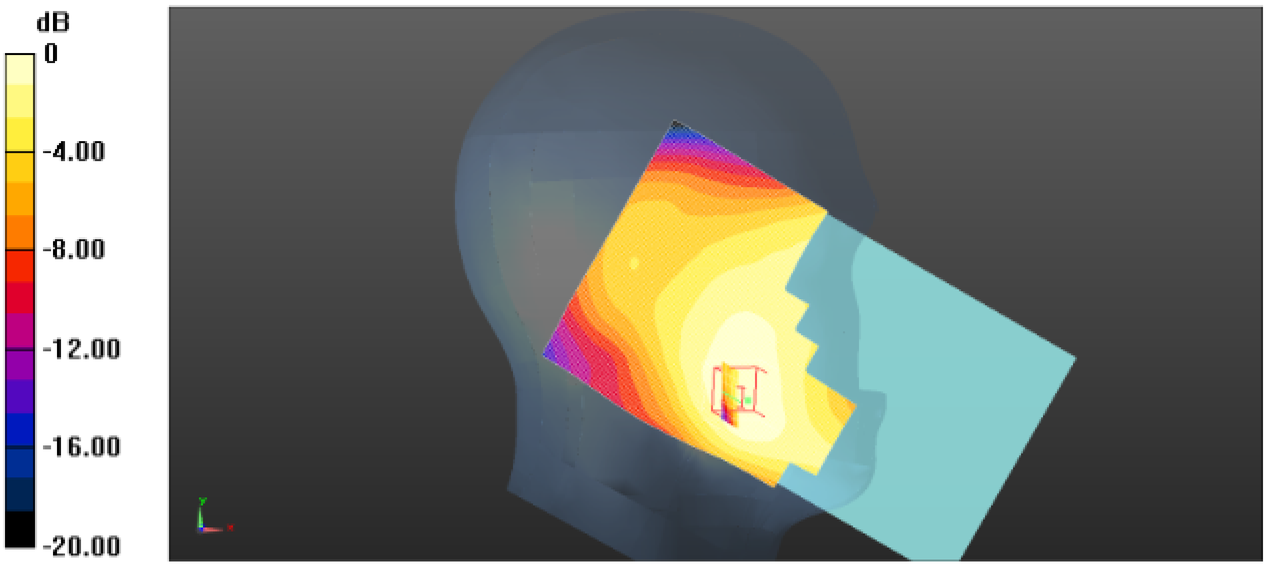
DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(4.43, 4.43, 4.43); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0814 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 5.847 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.094 mW/g

SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.071 mW/g

Maximum value of SAR (measured) = 0.0880 W/kg



Left Head Cheek (LTE Band 20 Middle Channel)

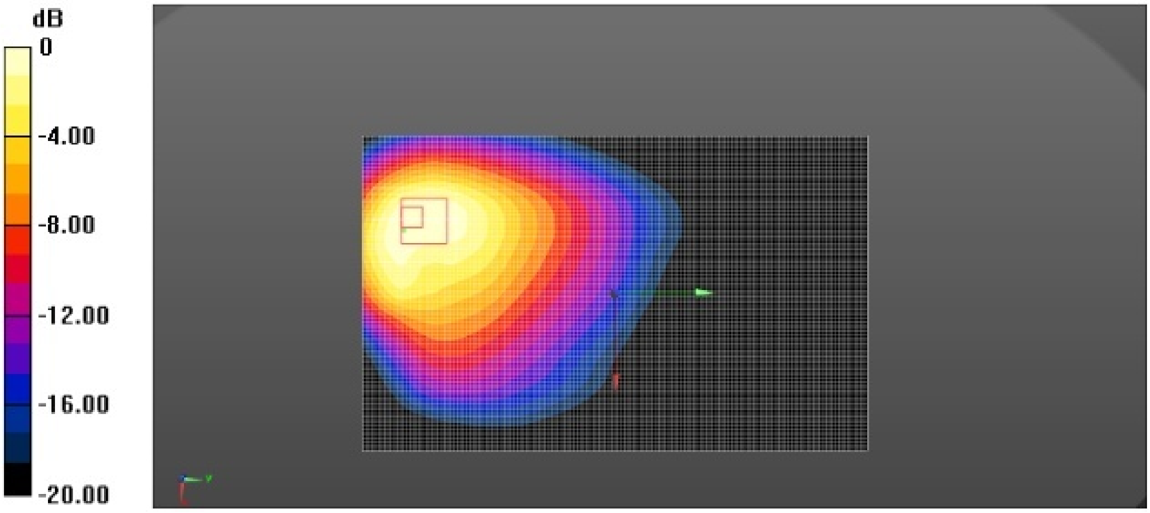
Body- worn Rear Side (LTE FDD Band 20 Middle Channel)

Date: 2016-04-07
Communication System: Customer System; Frequency:847 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=847 MHz; σ=0.91S/m; εr=41.48; ρ=1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) =1.28 W/kg

Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm
Reference Value = 6.687 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.287 mW/g
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.732 mW/g
Maximum value of SAR (measured) =1.33 W/kg



0 dB = 1.28 W/kg = 2.14 dB W/kg

Body- worn Rear Side (LTE FDD Band 20 Middle Channel)

Wifi 802.11b
Date: 2016-04-12
Communication System: Customer System; Frequency: 2442.0 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=2442.0 MHz; σ=1.82S/m; εr=38.80; ρ=1000 kg/m3
Phantom section: Left Head Section:

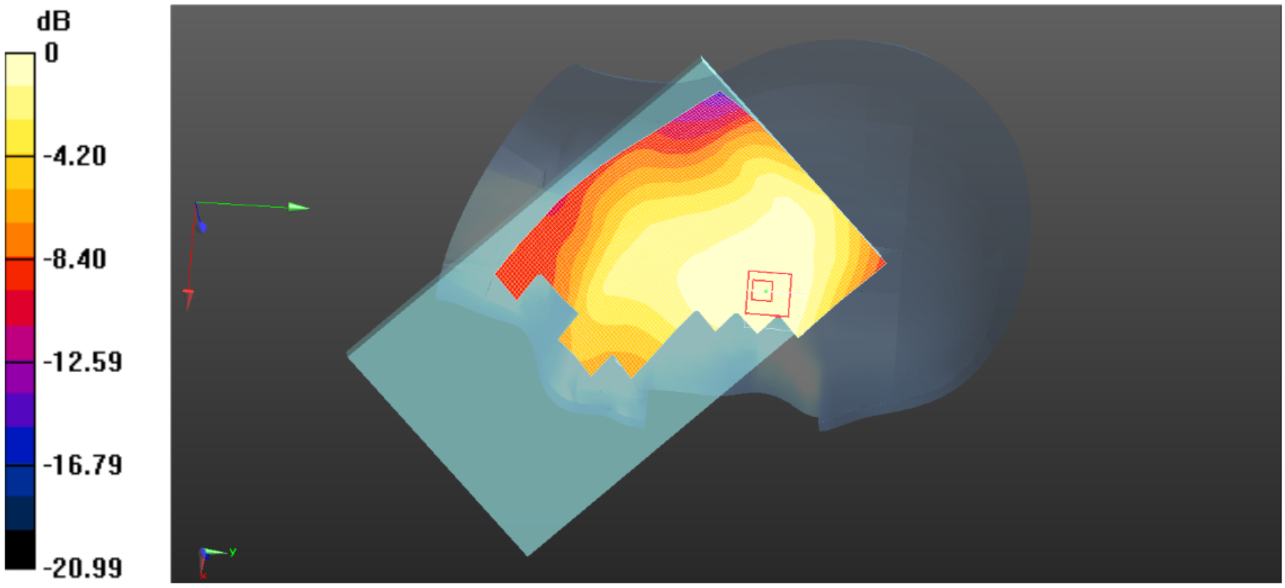
DASY 5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.23, 6.23, 6.23); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (91x161x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) =0.240 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =2.688 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.298 mW/g

SAR(1 g) = 0.191 mW/g; SAR(10 g) = 0.096 mW/g

Maximum value of SAR (measured) = 0.227 W/kg



Left Head Cheek (Wifi 802.11b)

Body- worn Rear side (WLAN 802.11b Middle Channel)
Date: 2016-04-12
Communication System: Customer System; Frequency: 2442.0 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f=2442.0 MHz; σ=1.82S/m; εr=38.80; ρ=1000 kg/m3
Phantom section : Body- worn

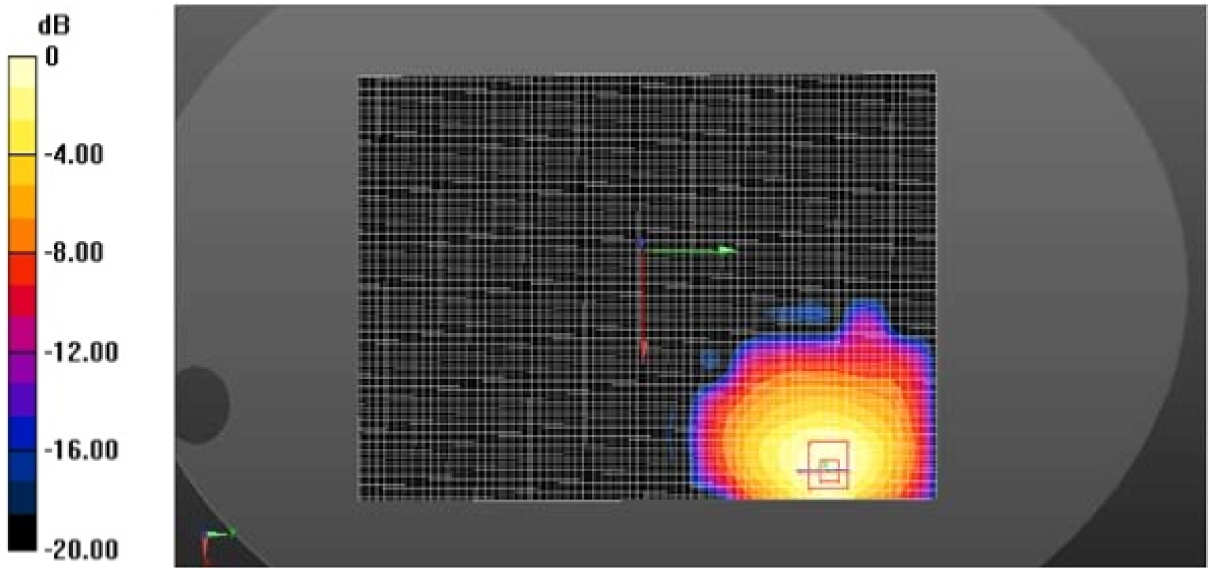
DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(6.1, 6.1, 6.1); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.246 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =1.541 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.229 mW/g

SAR(1 g) = 0.196 mW/g; SAR(10 g) = 0.087 mW/g

Maximum value of SAR (measured) =0.238 W/kg



Body- worn Rear side (WLAN802.11bMiddle Channel)

Wifi 802.11a Channel 36
Date: 2016-04-13
Communication System: Customer System; Frequency: 5180.0 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f = 5180 MHz; σ = 4.63 mho/m; εr = 36.722; ρ = 1000 kg/m3
Phantom section: Left Head Section:

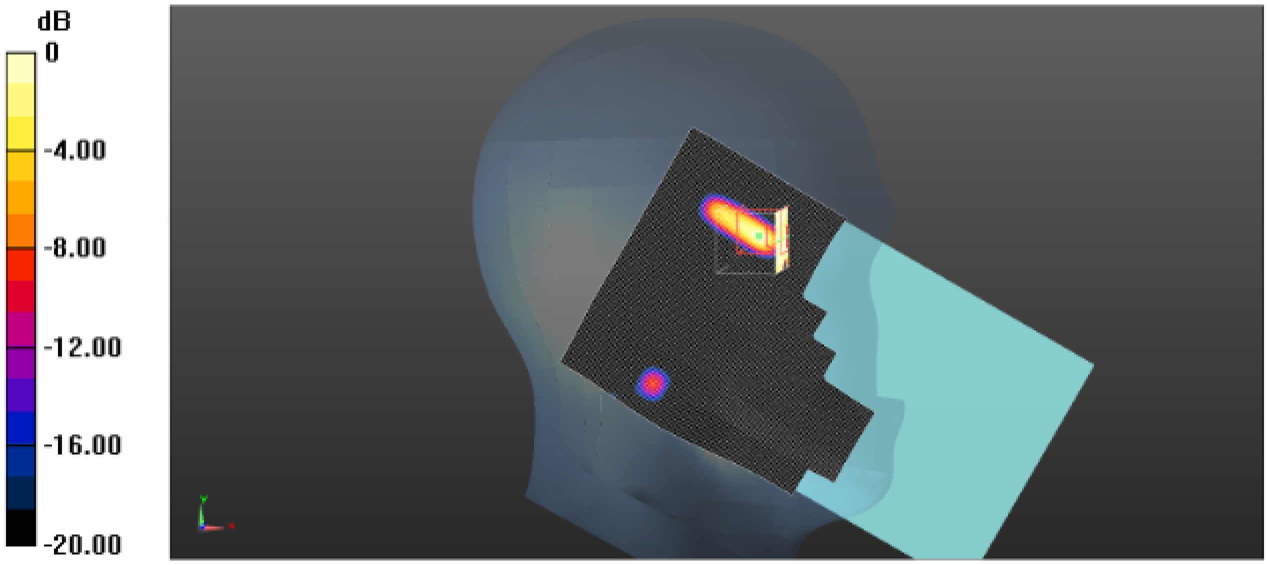
DASY5 Configuration:
•Probe: ES3DV3 - SN3292; ConvF(4.43, 4.43, 4.43); Calibrated: 15/08/2015;
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
•Phantom: SAM 1; Type: SAM;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.323 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.276 V/m; Power Drift =-0.07 dB
Peak SAR (extrapolated) = 0.331 mW/g

SAR(1 g) = 0.247 mW/g; SAR(10 g) = 0.124 mW/g

Maximum value of SAR (measured) = 0.326 W/kg



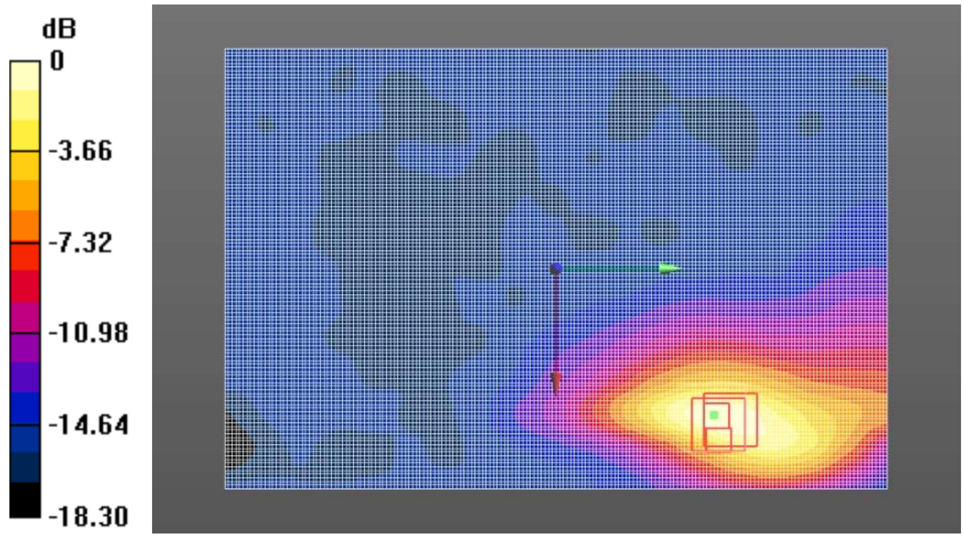
Left Head Cheek (Wifi 802.11a Channel 36)

Body- worn Rear side (Wifi 802.11a Channel 36)

Date: 2016-04-13
Communication System: Customer System; Frequency: 5180.0 MHz;Duty Cycle:1:1
Medium parameters used (interpolated): f = 5180 MHz; σ = 4.63 mho/m; εr = 36.722; ρ = 1000 kg/m3
Phantom section : Body- worn

DASY5 Configuration:
•Probe: EX3DV4 - SN3650; ConvF(5.31, 5.31, 5.31);
•Sensor-Surface: 4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 22/07/2015
• Phantom: ELI v4.0; Type: QDOVA001BB
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.296 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.475 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.567 W/kg
SAR(1 g) = 0.248 W/kg; SAR(10 g) = 0.110 W/kg
Maximum value of SAR (measured) =3.54 W/kg



Body- worn Rear side (Wifi 802.11a Channel 36)

13. Simultaneous Transmission analysis

According to EN62209-2 Annex K:

Method 1:

The maximum power level, *P*max,m, that can be transmitted by a device before the SAR averaged over a mass, *m*, exceeds a given limit, *SAR*lim, can be defined. Any device transmitting at power levels below *P*max,m can then be excluded from SAR testing. The lowest possible value for *P*max,m is:

$P_{max,m} = SAR_{lim} \times m$

(SARlim = 2 W/kg, an averaging mass of *m* = 10 g, *P*max,m = 20 mW;
SARlim = 1,6 W/kg, an averaging mass of *m* = 1 g, *P*max,m = 1,6 mW)

Method 2:

Simultaneous multi-band transmission means that the device can transmit multiple transmission modes at the same time

In some cases, the secondary transmitter can be excluded from SAR testing when used alone (e.g., using Method 1). However, when the primary and secondary transmitters are used together, the SAR limit may still be exceeded. A means of determining the threshold power for the secondary transmitter that allows it to be excluded from SAR testing is needed.

One way of determining the threshold power level available to the secondary transmitter (Pavailable) is to calculate it from the measured peak spatial-average SAR of the primary transmitter (SAR1) according to the equation:

$P_{available} = P_{th,m} \times (SAR_{lim} - SAR_1) / SAR_{lim}$

where Pth,m is the threshold exclusion power level taken from Annex B of IEC 62479 for the frequency of the secondary transmitter at the separation distance used in the testing.

If the output power of the secondary transmitter is less than $P_{available}$, SAR measurement forthe secondary transmitter is not necessary. The above formula can be easily generalized to the case where more than two transmitters are communicating simultaneously. If there are *N* simultaneous transmitters and the peak spatial-average SAR of the first *N* – 1 transmitters are known (SAR_i), then the threshold power level available to the *N*th transmitter can be found from

$$P_{available} = P_{max,m} \times (SAR_{lim} - \sum_{i=1}^{N-1} SAR_i) / SAR_{lim}$$

Alternatively, $P_{th,m}$ can be replaced by $P_{max,m}$, which is an easier approach but leads to more restrictive power threshold.

EN62479 Annex B:

f GHz	*BW* %	Example air interface	P_{max}' mW			
			s = 5 mm		*s* = 25 mm	
			m = 1 g	*m* = 10 g	*m* = 1 g	*m* = 10 g
2,442	3,4	802.11b	7,3	32	130	328

Test result:

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

Pavailable = Pth,m × (SARlim - SAR1) / SARlim

Maxmium SAR Value (W/Kg)	Pth (mW)	SAR lim (W/Kg)	Pavailable
1.610	32	2.0	6.24

Pmax(Bluetooth)= 7.17 dBm=5.21 mW < Pavailable
Pmax(wifi 2.4G)= 9.82 dBm=9.59 mW > Pavailable
So the Bluetooth simultaneous Transmission mode don't be evaluated andhe wifi 2.4G simultaneous Transmission mode should be tested.
.

Head Exposure condition

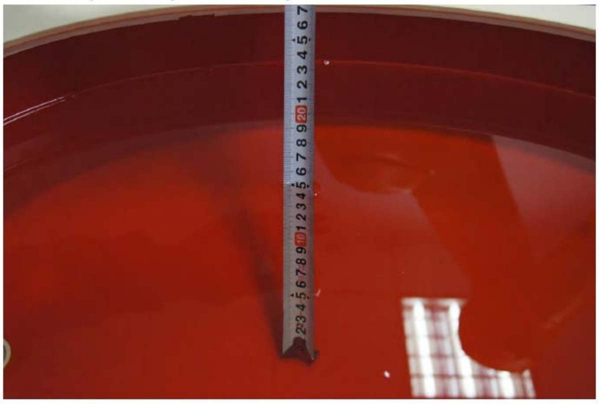
WWAN PCE + WLAN UNII					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR (W/kg)
			WWAN PCS	WIFI UNII	
GSM	GSM900	Left Cheek	0.087	0.124	0.211
		Left Tilted	0.065	0.089	0.154
		Right Cheek	0.077	0.105	0.182
		Right Tilted	0.059	0.075	0.135
	PCS1800	Left Cheek	0.080	0.124	0.204
		Left Tilted	0.057	0.089	0.146
		Right Cheek	0.068	0.105	0.173
		Right Tilted	0.049	0.075	0.124
WCDMA	Band I	Left Cheek	0.112	0.124	0.236
		Left Tilted	0.075	0.089	0.164
		Right Cheek	0.091	0.105	0.196
		Right Tilted	0.063	0.075	0.138
	Band VIII	Left Cheek	0.140	0.124	0.264
		Left Tilted	0.091	0.089	0.180
		Right Cheek	0.111	0.105	0.216
		Right Tilted	0.072	0.075	0.148
LTE	Band 3	Left Cheek	0.183	0.124	**0.307**
		Left Tilted	0.137	0.089	0.226
		Right Cheek	0.161	0.105	0.266
		Right Tilted	0.124	0.075	0.200
	Band 7	Left Cheek	0.028	0.124	0.152
		Left Tilted	0.021	0.089	0.110
		Right Cheek	0.025	0.105	0.130
		Right Tilted	0.019	0.075	0.094
	Band 20	Left Cheek	0.071	0.124	0.195
		Left Tilted	0.046	0.089	0.135
		Right Cheek	0.056	0.105	0.161
		Right Tilted	0.037	0.075	0.112

Body-Worn Accessory Exposure condition

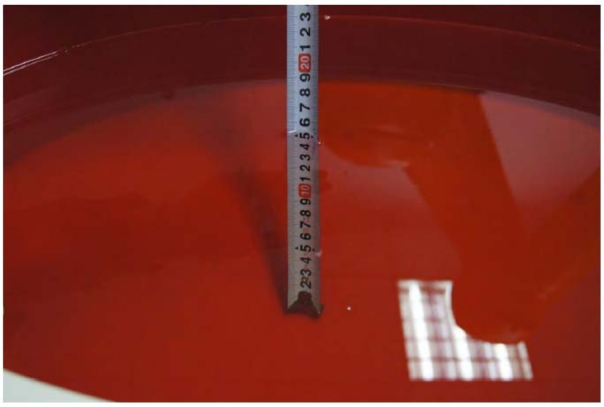
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR (W/kg)
			WWAN PCS	WIFI UNII	
GSM	GSM900	Body-Back	0.461	0.110	0.571
		Body-Front	0.398	0.091	0.489
		Left-Side	0.147	0.042	0.189
		Right-Side	0.006	0.003	0.009
		Top-Side	0.048	0.024	0.072
		Bottom-Side	0.100	0.003	0.103
	DCS1800	Body-Back	0.902	0.110	1.012
		Body-Front	0.775	0.091	0.866
		Left-Side	0.288	0.042	0.33
		Right-Side	0.011	0.003	0.014
		Top-Side	0.093	0.024	0.117
		Bottom-Side	0.595	0.003	0.598
WCDMA	Band I	Body-Back	1.110	0.110	1.22
		Body-Front	0.929	0.091	1.02
		Left-Side	0.335	0.042	0.377
		Right-Side	0.020	0.003	0.023
		Top-Side	0.122	0.024	0.146
		Bottom-Side	0.669	0.003	0.672
	Band VIII	Body-Back	0.544	0.110	0.654
		Body-Front	0.477	0.091	0.568
		Left-Side	0.235	0.042	0.277
		Right-Side	0.012	0.003	0.015
		Top-Side	0.062	0.024	0.086
		Bottom-Side	0.126	0.003	0.129

LTE	Band 3	Body-Back	1.400	0.110	1.51
		Body-Front	0.384	0.091	0.475
		Left-Side	0.192	0.042	0.234
		Right-Side	0.007	0.003	0.01
		Top-Side	0.070	0.024	0.094
		Bottom-Side	0.728	0.003	0.731
	Band 7	Body-Back	1.610	0.110	**1.720**
		Body-Front	1.208	0.091	1.299
		Left-Side	1.417	0.042	1.459
		Right-Side	1.094	0.003	1.097
		Top-Side	0.212	0.024	0.236
		Bottom-Side	0.510	0.003	0.513
	Band 20	Body-Back	0.732	0.110	0.842
		Body-Front	0.549	0.091	0.64
		Left-Side	0.644	0.042	0.686
		Right-Side	0.497	0.003	0.500
		Top-Side	0.402	0.024	0.426
		Bottom-Side	0.601	0.003	0.604

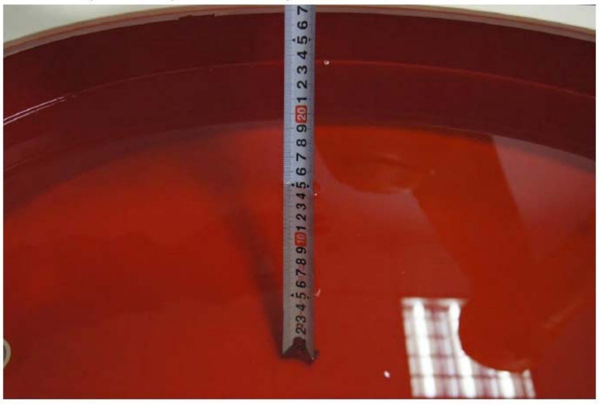
14. TestSetup Photos



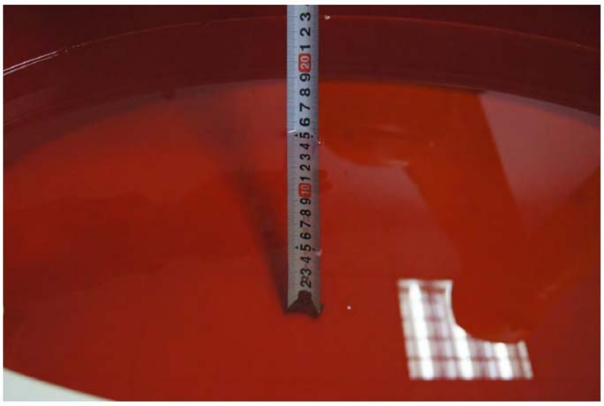
835MHz



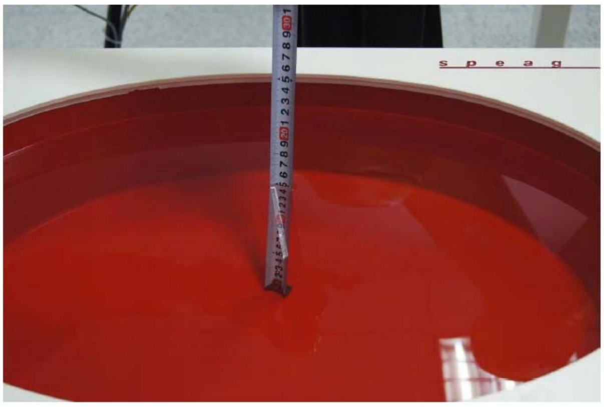
900MHz



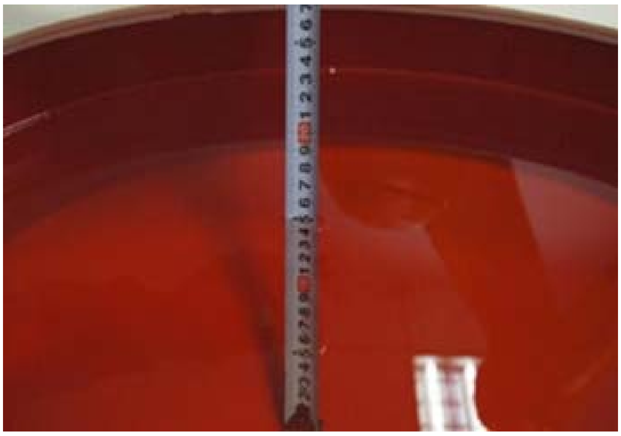
1750MHz



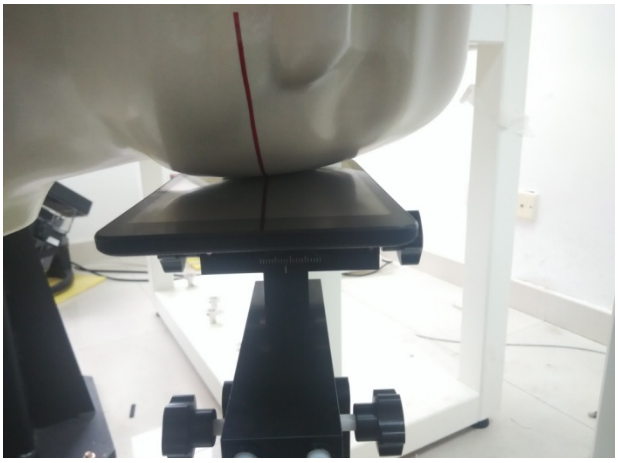
1900MHz

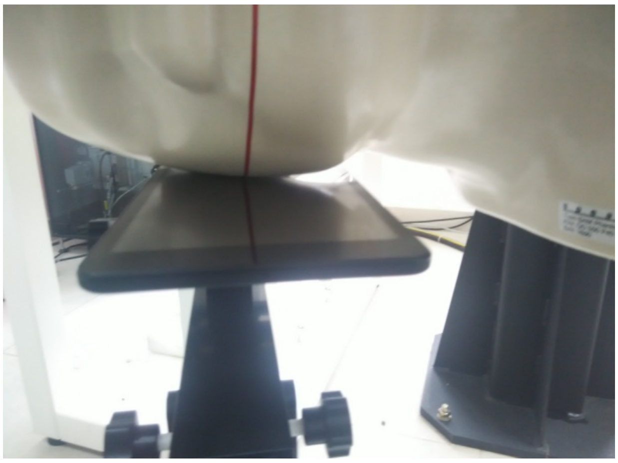


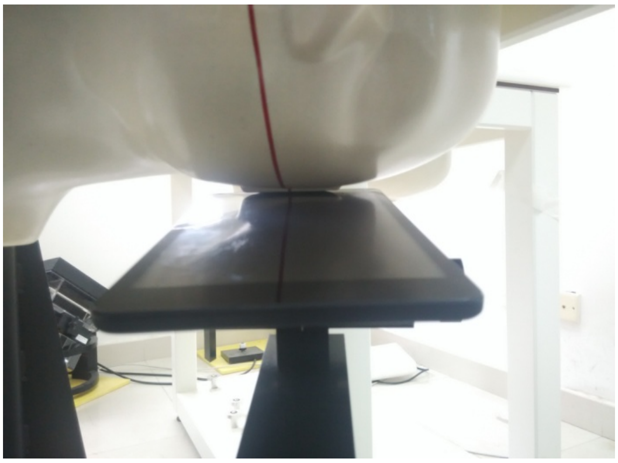
2450MHz

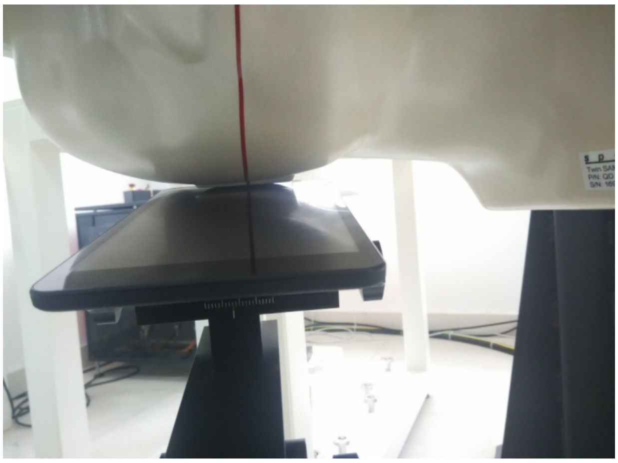


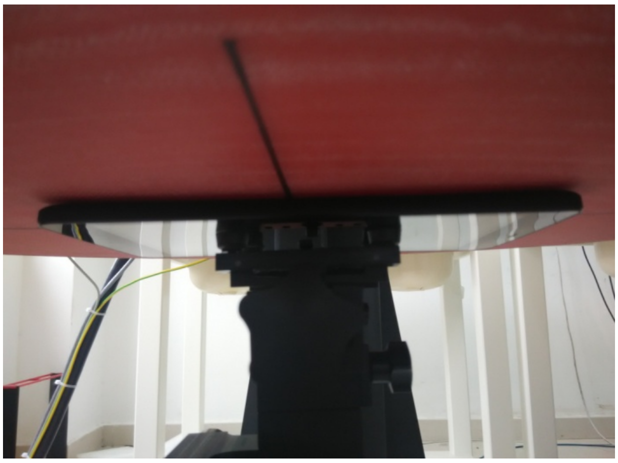
5G Hz

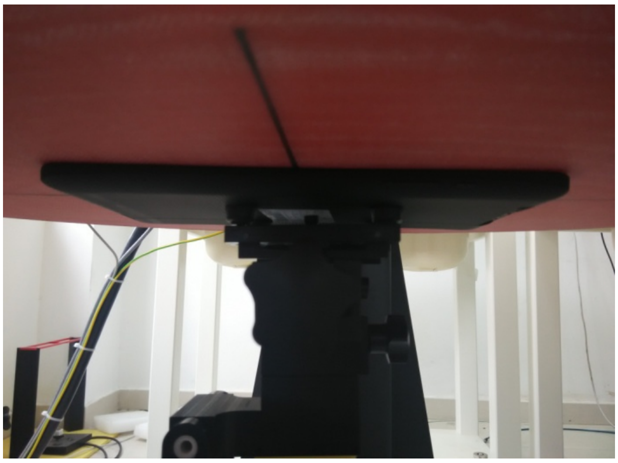

Left Head Touch

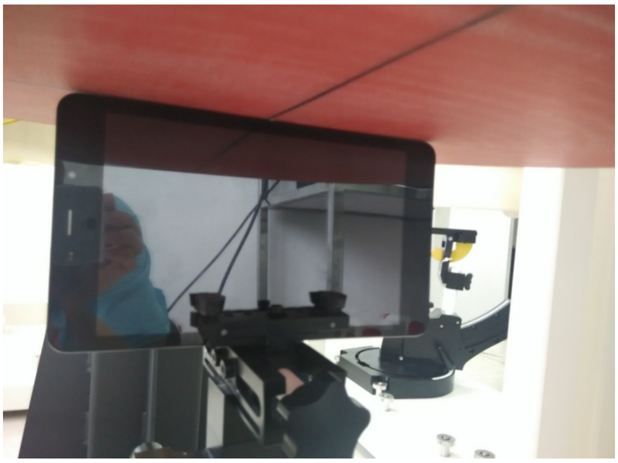

Right Head Touch


Left Head Tilt (15°)


Right Head Tilt (15°)

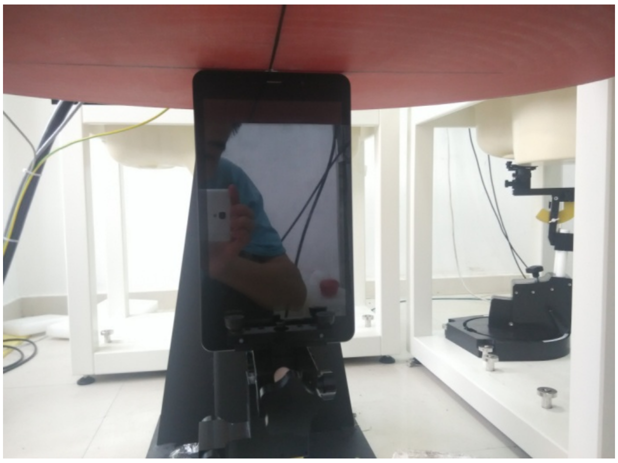

Rear Side (0mm)

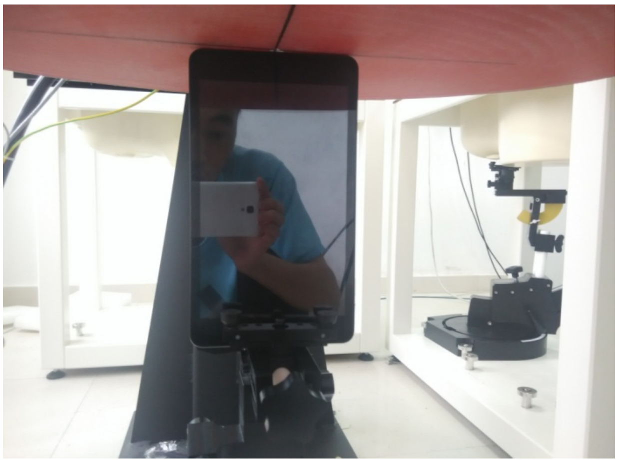

Front Side (0mm)



Left Side (0mm)

Right Side (0mm)





Top Side (0mm)

Bottom Side (0mm)

15. External and Internal Photos of the EUT

Please refer to the test report No. TRE1603019101

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

1.1. Probe Calibration Certificate

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

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C Service suisse d'étalonnage
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Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **CIQ (Auden)**

Certificate No: **ES3-3292_Aug15**

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3292

Calibration procedure(s): QA CAL-01.v9, QA CAL-12.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: August 15, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

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

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 15, 2015

Certificate No: ES3-3292_Aug15 Page 1 of 11

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

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Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3292

Manufactured: July 6, 2010
Repaired: July 28, 2015
Calibrated: August 15, 2015

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.89	0.95	1.46	± 10.1 %
DCP (mV)[B]	107.1	106.1	103.9	

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	209.7	±3.8 %
		Y	0.0	0.0	1.0		218.8	
		Z	0.0	0.0	1.0		198.5	

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

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
450	43.5	0.87	6.71	6.71	6.71	0.18	1.80	± 13.3 %
835	41.5	0.90	6.23	6.23	6.23	0.80	1.11	± 12.0 %
900	41.5	0.97	6.71	6.71	6.10	6.71	1.17	± 12.0 %
1810	40.0	1.40	5.07	5.07	5.07	0.61	1.36	± 12.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.45	1.55	± 12.0 %
2100	39.8	1.49	5.04	5.04	5.04	0.77	1.17	± 12.0 %
2450	39.2	1.80	4.43	4.43	4.43	0.73	1.23	± 12.0 %

[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: ES3DV3 - SN:3292

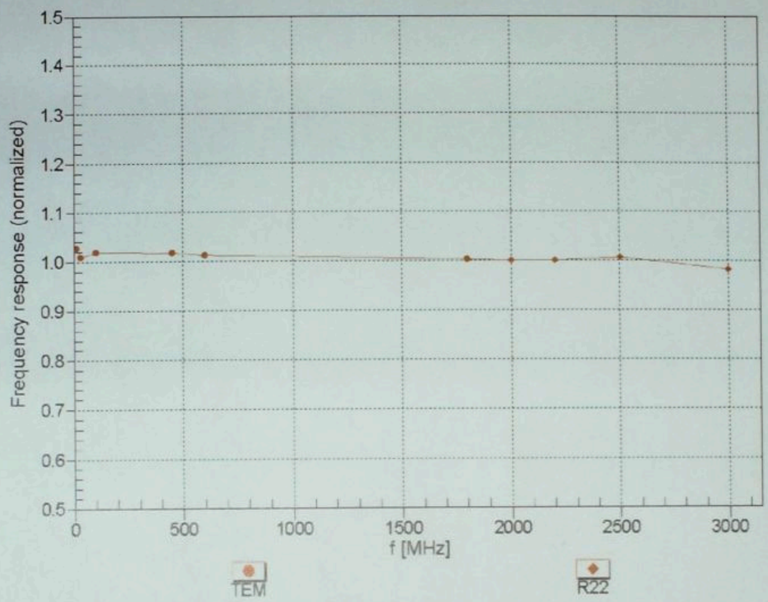
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
450	56.7	0.94	7.10	7.10	7.10	0.13	1.00	± 13.3 %
835	55.2	0.97	6.11	6.11	6.11	0.36	1.78	± 12.0 %
900	55.0	1.05	5.97	5.97	5.97	0.73	1.22	± 12.0 %
1810	53.3	1.52	4.79	4.79	4.79	0.59	1.45	± 12.0 %
1900	53.3	1.52	4.66	4.66	4.66	0.41	1.79	± 12.0 %
2100	53.2	1.62	4.77	4.77	4.77	0.63	1.42	± 12.0 %
2450	52.7	1.95	4.23	4.23	4.23	0.66	0.98	± 12.0 %

[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)



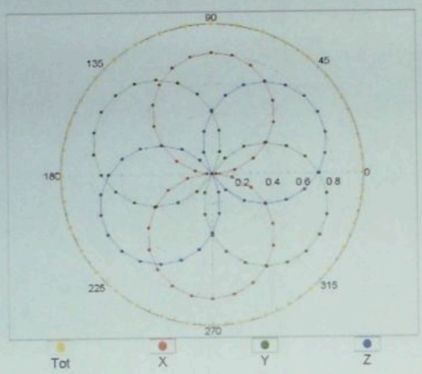
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

ES3DV3– SN:3292

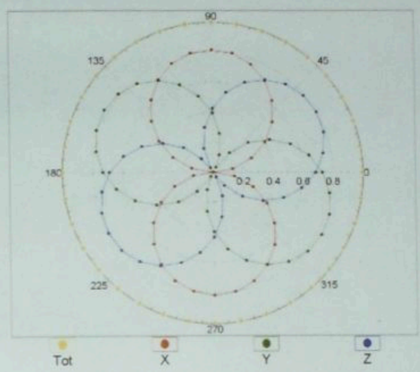
August 15, 2015

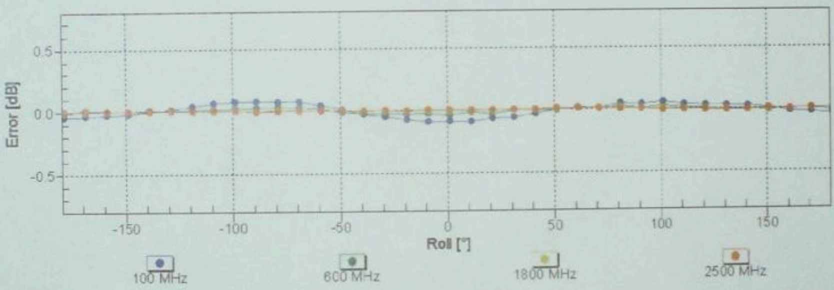
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



f=1800 MHz,R22





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

Certificate No: ES3-3292_Aug15

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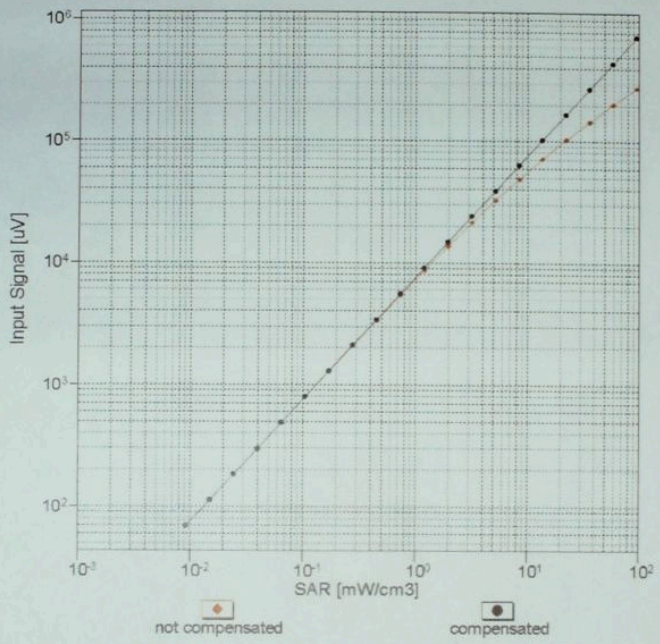
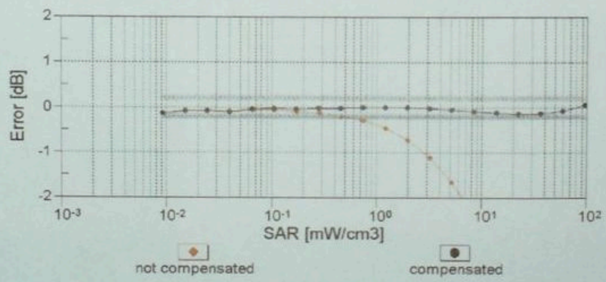
ES3DV3– SN:3292 August 15, 2015

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





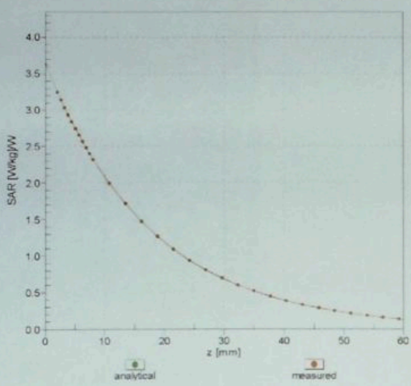
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ES3-3292_Aug15 Page 9 of 11

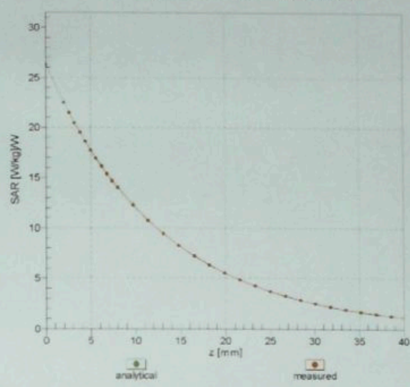
ES3DV3– SN:3292 August 15, 2015

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

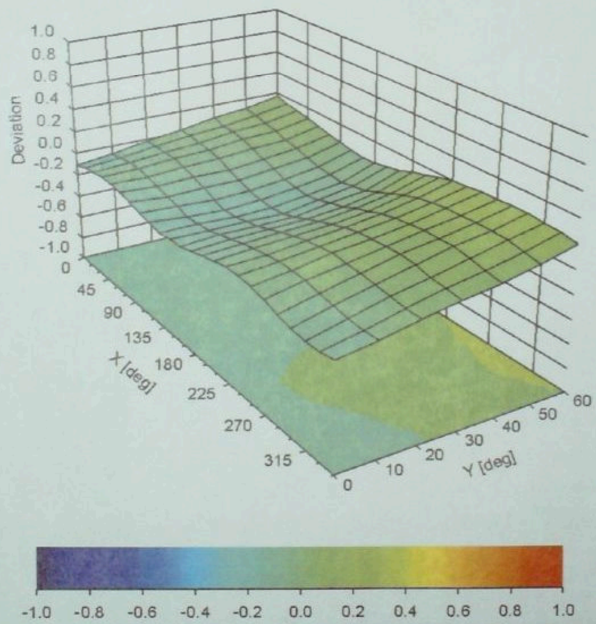


f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ES3-3292_Aug15 Page 10 of 11

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3292

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-8.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

1.2. Probe Calibration Certificate

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

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Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **CIQ-SZ (Auden)**

Certificate No: **EX3-3650_Jul15**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3650

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: July 28, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-15 (No. 217-01911)	Apr-16
Power sensor E4412A	MY41498087	03-Apr-15 (No. 217-01911)	Apr-16
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-15 (No. 217-01915)	Apr-16
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-15 (No. 217-01919)	Apr-16
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-15 (No. 217-01920)	Apr-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	13-Dec-14 (No. DAE4-660_Dec14)	Dec-15
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 29, 2015

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

Certificate No: EX3-3650_Jul15 Page 1 of 11

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

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Swiss Calibration Service

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ 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:3650

Manufactured: March 18, 2008
Calibrated: July 28, 2015

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.40	0.43	0.42	± 10.1 %
DCP (mV)[B]	96.9	98.8	98.0	

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	131.1	±3.3 %
		Y	0.0	0.0	1.0		148.7	
		Z	0.0	0.0	1.0		136.9	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
750	41.9	0.89	9.93	9.93	9.93	0.51	0.78	± 12.0 %
835	41.5	0.90	9.52	9.52	9.52	0.25	1.15	± 12.0 %
900	41.5	0.97	9.33	9.33	9.33	0.28	1.10	± 12.0 %
1450	40.5	1.20	8.76	8.76	8.76	0.45	0.83	± 12.0 %
1640	40.3	1.29	8.59	8.59	8.59	0.80	0.50	± 12.0 %
1750	40.1	1.37	8.10	8.10	8.10	0.75	0.57	± 12.0 %
1900	40.0	1.40	7.92	7.92	7.92	0.40	0.80	± 12.0 %
2000	40.0	1.40	7.93	7.93	7.93	0.67	0.62	± 12.0 %
2300	39.5	1.67	7.57	7.57	7.57	0.34	0.85	± 12.0 %
2450	39.2	1.80	7.18	7.18	7.18	0.49	0.74	± 12.0 %
2600	39.0	1.96	7.01	7.01	7.01	0.49	0.75	± 12.0 %
3500	37.9	2.91	7.19	7.19	7.19	0.38	1.09	± 13.1 %
5200	36.0	4.66	5.31	5.31	5.31	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.10	5.10	5.10	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.85	4.85	4.85	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.77	4.77	4.77	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.86	4.86	4.86	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:3650

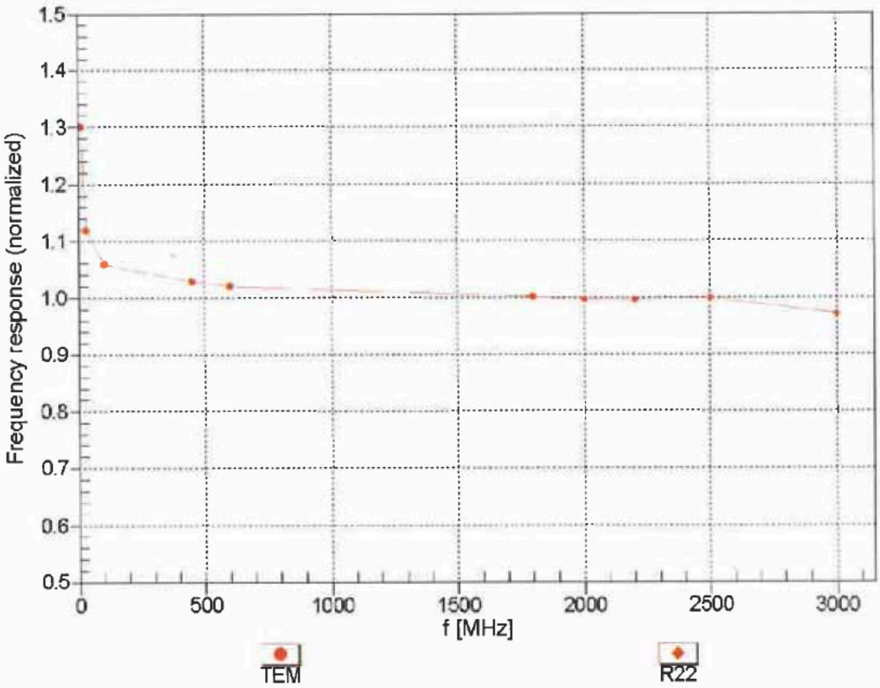
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
750	55.5	0.96	9.62	9.62	9.62	0.18	1.50	± 12.0 %
835	55.2	0.97	9.70	9.70	9.70	0.79	0.65	± 12.0 %
900	55.0	1.05	9.32	9.32	9.32	0.28	1.22	± 12.0 %
1450	54.0	1.30	8.21	8.21	8.21	0.37	0.91	± 12.0 %
1640	53.8	1.40	8.19	8.19	8.19	0.59	0.75	± 12.0 %
1750	53.4	1.49	7.78	7.78	7.78	0.40	0.96	± 12.0 %
1900	53.3	1.52	7.41	7.41	7.41	0.35	1.00	± 12.0 %
2000	53.3	1.52	7.50	7.50	7.50	0.32	0.99	± 12.0 %
2300	52.9	1.81	7.21	7.21	7.21	0.61	0.71	± 12.0 %
2450	52.7	1.95	6.81	6.81	6.81	0.68	0.50	± 12.0 %
2600	52.5	2.16	6.69	6.69	6.69	0.80	0.57	± 12.0 %
3500	51.3	3.31	6.77	6.77	6.77	0.32	1.27	± 13.1 %
5200	49.0	5.30	4.87	4.87	4.87	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.56	4.56	4.56	0.45	1.90	± 13.1 %
5500	48.6	5.65	4.27	4.27	4.27	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.99	3.99	3.99	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.40	4.40	4.40	0.50	1.90	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

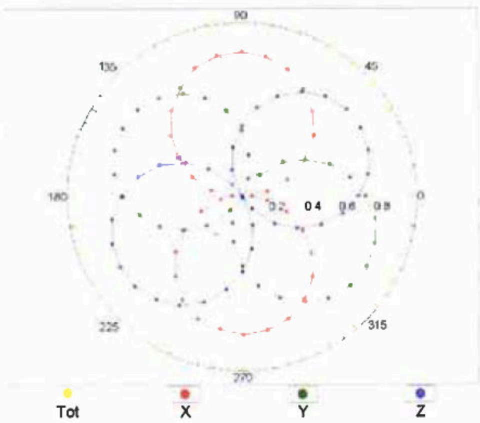
Frequency Response of E-Field

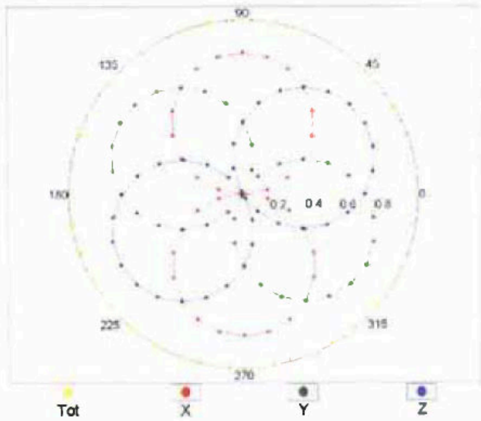
(TEM-Cell:ifi110 EXX, Waveguide: R22)

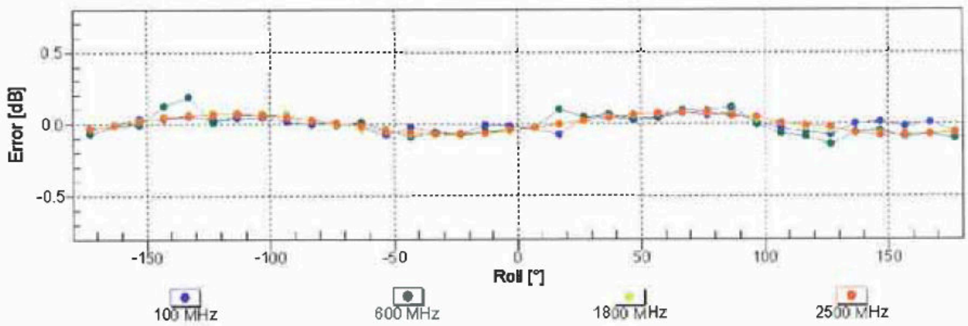


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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



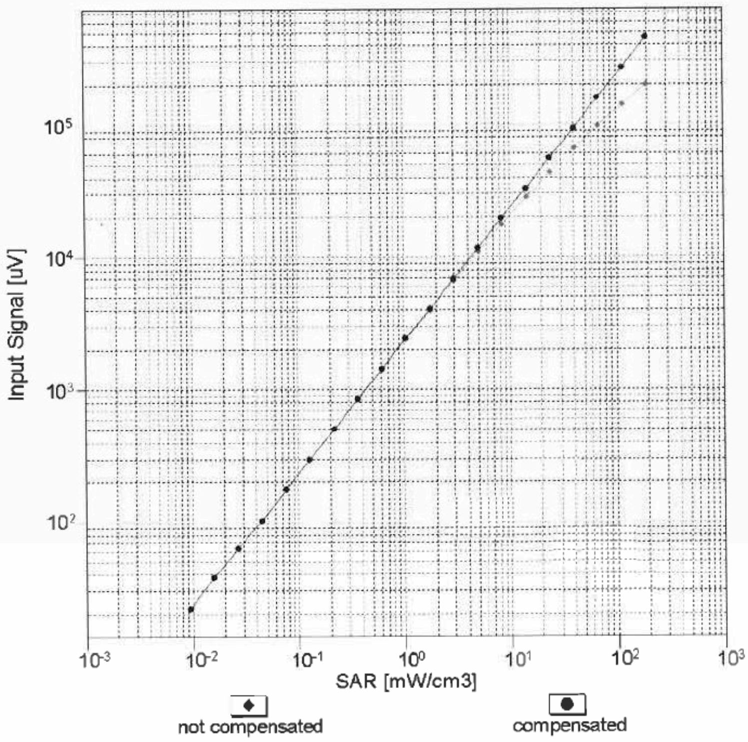


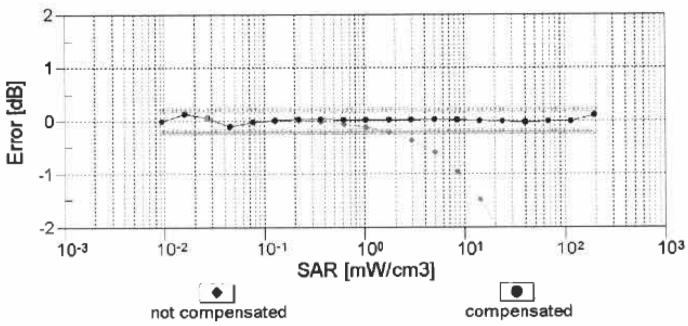


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)

(TEM cell , f$_{eval}$= 1900 MHz)





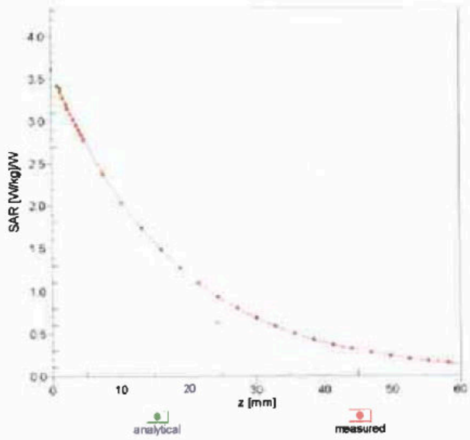
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

EX3DV4– SN:3650

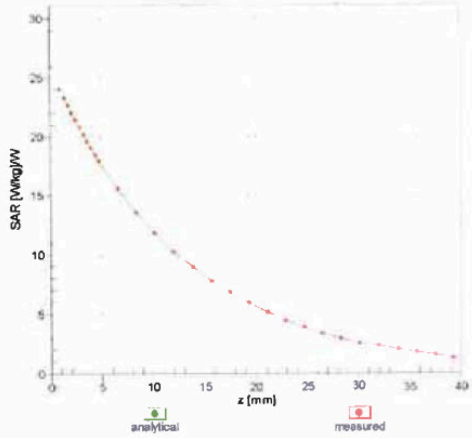
July 28, 2015

Conversion Factor Assessment

f = 900 MHz,WGLS R9 (H_convF)

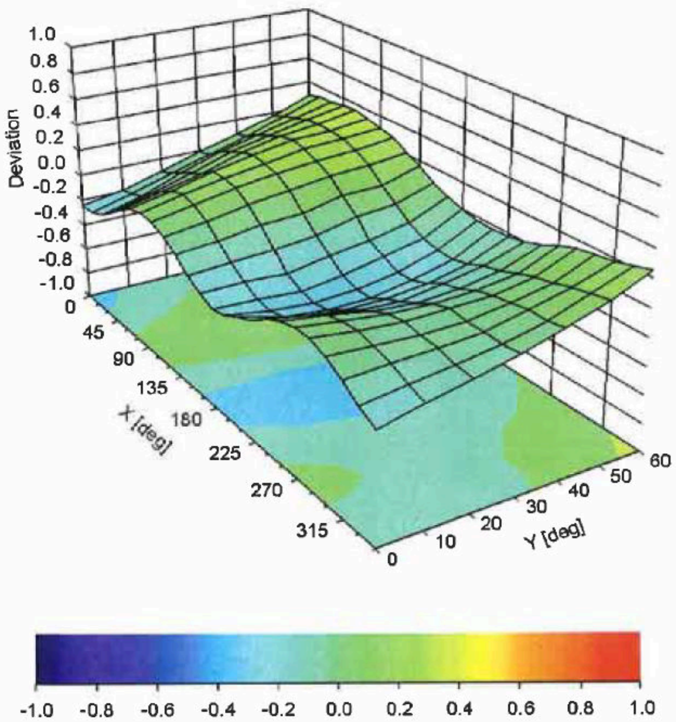


f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: EX3-3650_Jul15

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3650

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-23.2
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

1.3. D900V2 Dipole Calibration Certificate

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CALIBRATION
No. L0570

Client **CIQ-SZ(Auden)** **Certificate No: Z15-97068**

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 1d129
Calibration Procedure(s)	TMC-OS-E-02-194 Calibration procedure for dipole validation kits
Calibration date:	September 1, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-14 (TMC, No.JZ13-443)	Sep-15
Power sensor NRV-Z5	100595	11-Sep-14 (TMC, No. JZ13-443)	Sep -15
Reference Probe ES3DV3	SN 3149	5- Sep-14 (SPEAG, No.ES3-3149_Sep13)	Sep-15
DAE3	SN 536	23-Jan-15 (SPEAG, DAE3-536_Jan14)	Jan -16
Signal Generator E4438C	MY49070393	13-Nov-14 (TMC, No.JZ13-394)	Nov-15
Network Analyzer E8362B	MY43021135	19-Oct-14 (TMC, No.JZ13-278)	Oct-15

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

Issued: September 4, 2015

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

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CALIBRATION
No. L0570

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) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: Z15-97068 Page 2 of 8

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CALIBRATION
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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
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	900 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	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.7 ± 6 %	0.98 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	2.64 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**10.5 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.70 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.78 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	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.4 ± 6 %	1.05 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	2.64 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.7 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.73 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.96 mW /g ± 20.4 % (k=2)**

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CALIBRATION
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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	45.8Ω + 4.28jΩ
Return Loss	- 24.0dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5Ω + 6.67jΩ
Return Loss	- 23.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.384 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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CALIBRATION
No. L0570

DASY5 Validation Report for Head TSL Date: 01.09.2015

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d129

Communication System: UID 0, CW (0); Frequency: 900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 900 MHz; σ = 0.975 S/m; ε_r = 41.72; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(6.15, 6.15, 6.15); Calibrated: 2014-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2015-01-23
- 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 (7331)

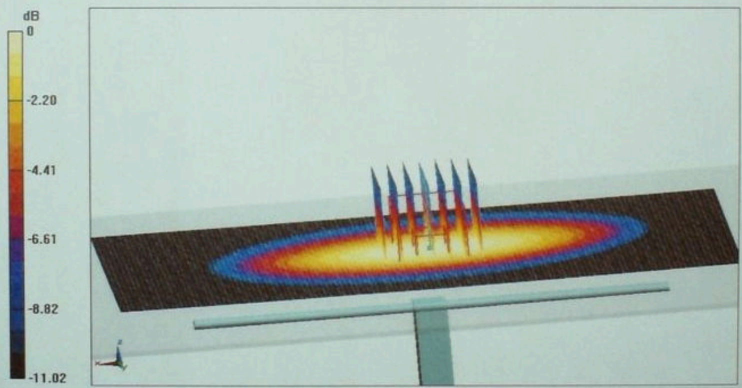
System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.103 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 4.03 W/kg

SAR(1 g) = 2.64 W/kg; SAR(10 g) = 1.70 W/kg

Maximum value of SAR (measured) = 3.12 W/kg



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

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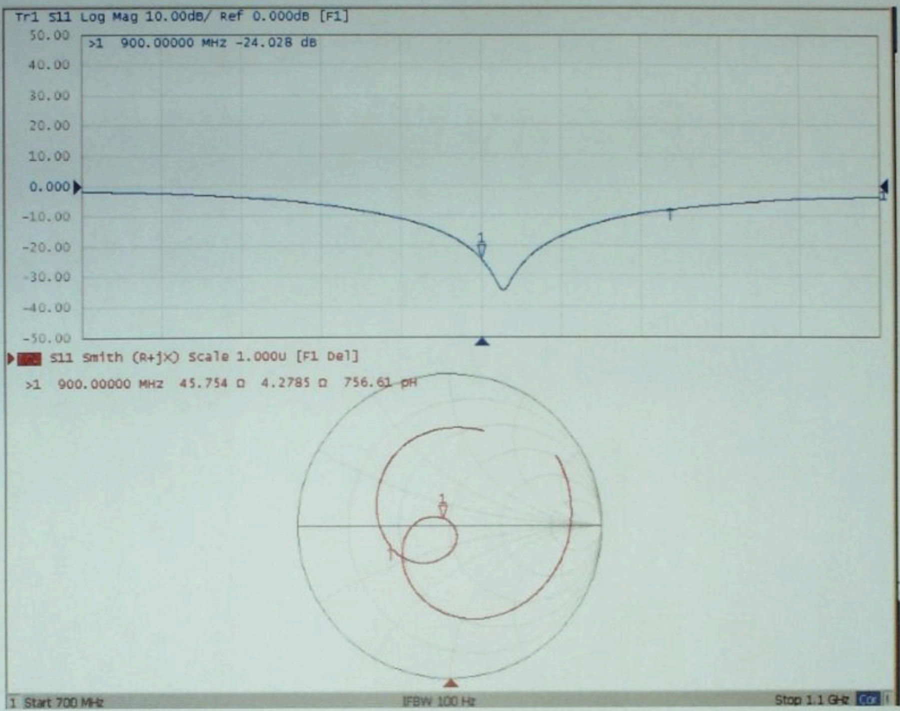
ilac-MRA CNAS CALIBRATION No. L0570

Impedance Measurement Plot for Head TSL



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CNAS CALIBRATION No. L0570

DASY5 Validation Report for Body TSL Date: 01.09.2015

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 1d129

Communication System: UID 0, CW (0); Frequency: 900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 900 MHz; σ = 1.045 S/m; ε_r = 56.41; ρ = 1000 kg/m^3

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(5.94, 5.94, 5.94); Calibrated: 2014-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2015-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/2
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

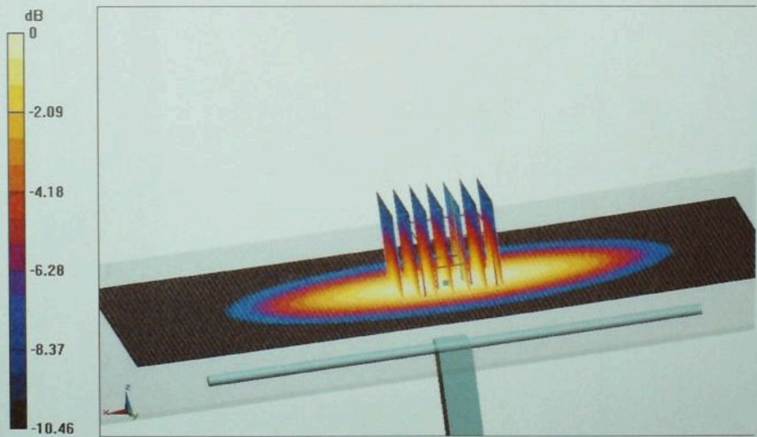
System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.551 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.89 W/kg

SAR(1 g) = 2.64 W/kg; SAR(10 g) = 1.73 W/kg

Maximum value of SAR (measured) = 3.09 W/kg



0 dB = 3.09 W/kg = 4.90 dBW/kg

Certificate No: Z15-97068 Page 7 of 8

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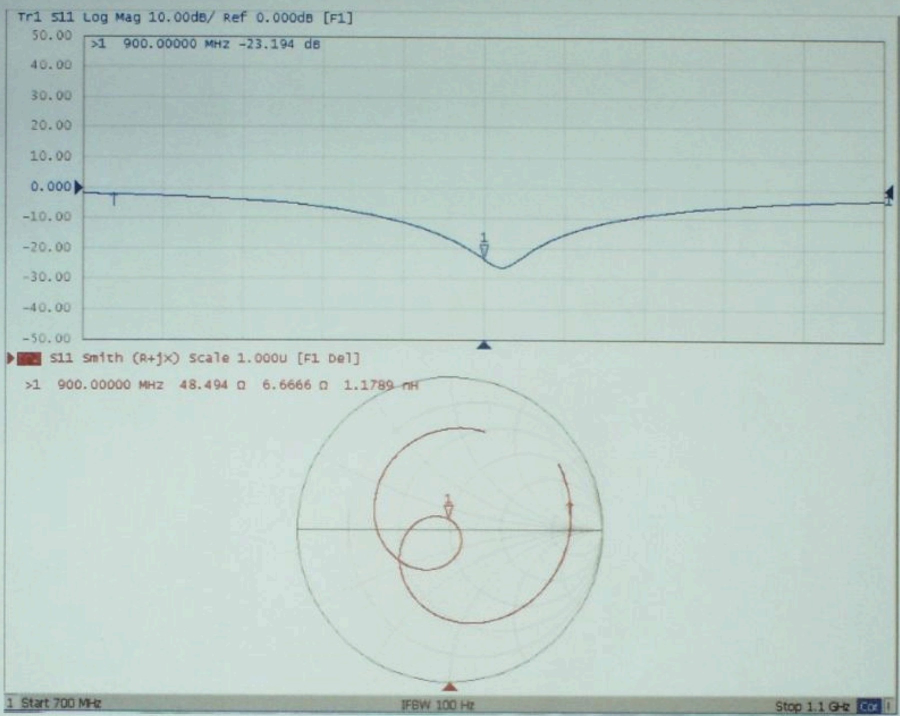
CALIBRATION
No. L0570

Impedance Measurement Plot for Body TSL



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1.4. D1750V2 Dipole Calibration Certificate

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CALIBRATION No. L0570

Client CIQ-SZ(Auden) Certificate No: Z15-97069

CALIBRATION CERTIFICATE

Object D1750V2 - SN: 1062

Calibration Procedure(s) TMC-OS-E-02-194
Calibration procedure for dipole validation kits

Calibration date: July 25, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-14 (TMC, No.JZ13-443)	Sep-15
Power sensor NRV-Z5	100595	11-Sep-14 (TMC, No. JZ13-443)	Sep -15
Reference Probe EX3DV4	SN 3846	3- Sep-14 (SPEAG, No.EX3-3846_Sep13)	Sep-15
DAE4	SN 1331	23-Jan-15 (SPEAG, DAE4-1331_Jan14)	Jan -16
Signal Generator E4438C	MY49070393	13-Nov-14 (TMC, No.JZ13-394)	Nov-15
Network Analyzer E8362B	MY43021135	19-Oct-14 (TMC, No.JZ13-278)	Oct-15

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

Issued: July 28, 2015

Certificate No: Z15-97069 Page 1 of 8

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CALIBRATION
No. L0570

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) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
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	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	39.7 ± 6 %	1.35 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	9.20 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**37.1 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.97 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.0 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	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.3 ± 6 %	1.47 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	9.22 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**37.3 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.95 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.0 mW /g ± 20.4 % (k=2)**

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CALIBRATION
No. L0570

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.1Ω+ 1.62jΩ
Return Loss	- 34.2dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2Ω+ 4.25jΩ
Return Loss	- 27.2dB

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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CALIBRATION
No. L0570

DASY5 Validation Report for Head TSL Date: 25.07.2015

Test Laboratory: TMC, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1062

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

Medium parameters used: f = 1750 MHz; σ = 1.352 S/m; ε_r = 39.69; ρ = 1000 kg/m^3

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3846; ConvF(7.85, 7.85, 7.85); Calibrated: 2014-09-03;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2015-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/2
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

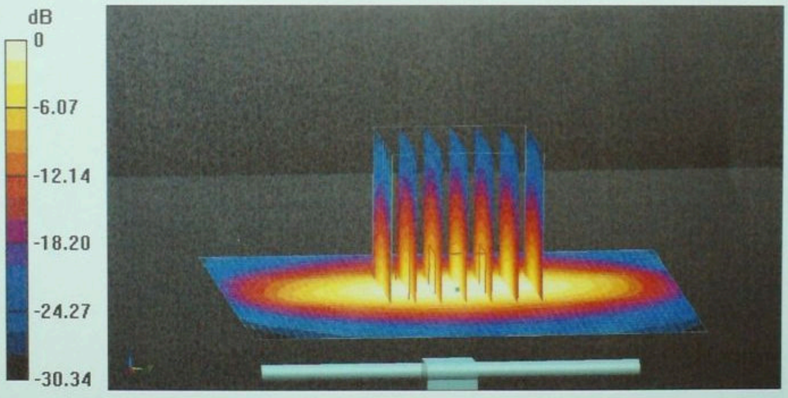
System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.92 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 9.2 W/kg; SAR(10 g) = 4.97 W/kg

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 12.9 W/kg = 11.10 dBW/kg

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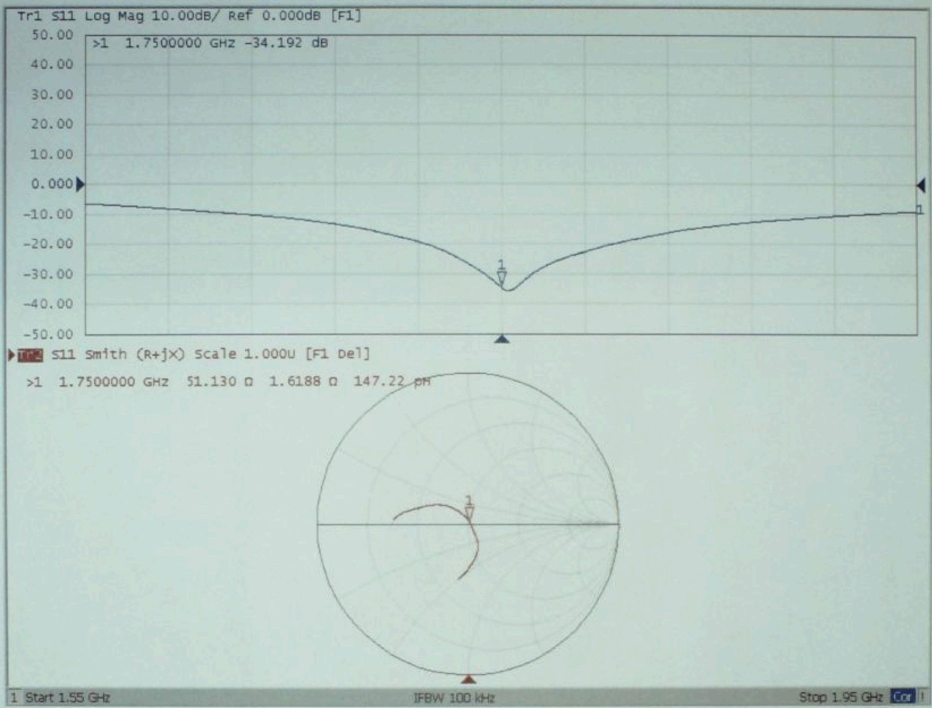
CALIBRATION
No. L0570

Impedance Measurement Plot for Head TSL



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CALIBRATION No. L0570

DASY5 Validation Report for Body TSL Date: 25.07.2015

Test Laboratory: TMC, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1062

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

Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 54.3; ρ = 1000 kg/m^3

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3846; ConvF(7.56, 7.56, 7.56); Calibrated: 2014-09-03;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2015-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

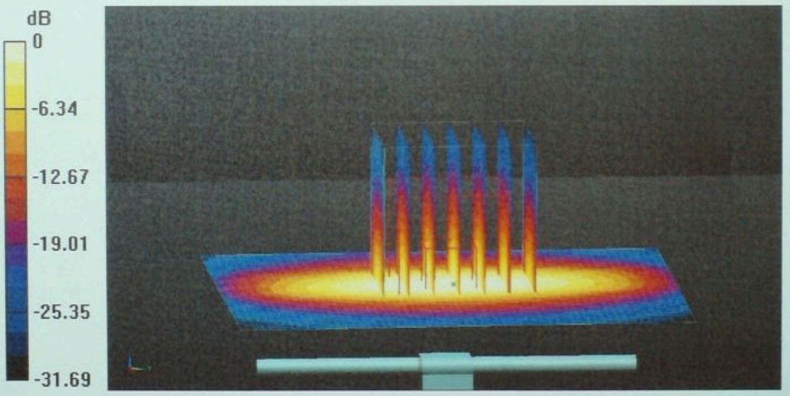
System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.11 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.22 W/kg; SAR(10 g) = 4.95 W/kg

Maximum value of SAR (measured) = 13.0 W/kg



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

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CALIBRATION
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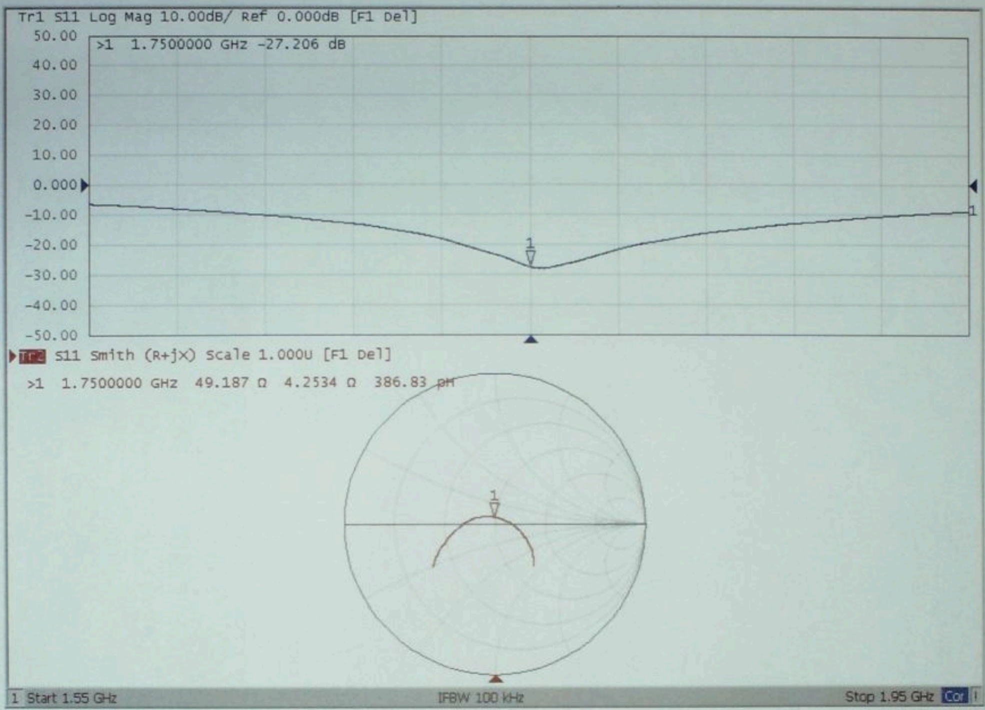
Impedance Measurement Plot for Body TSL



Certificate No: Z15-97069 Page 8 of 8

1.5. D1900V2 Dipole Calibration Certificate

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ilac-MRA CNAS 校准 CNAS L0442

Client CIQ SZ (Auden) **Certificate No: J15-2-3052**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d150
Calibration Procedure(s)	TMC-OS-E-02-194 Calibration procedure for dipole validation kits
Calibration date:	December 12, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-15 (TMC, No.JZ13-443)	Sep-16
Power sensor NRV-Z5	100595	11-Sep-15 (TMC, No. JZ13-443)	Sep -16
Reference Probe ES3DV3	SN 3149	5- Sep-15 (SPEAG, No.ES3-3149_Sep13)	Sep-16
DAE4	SN 777	22-Feb-15 (SPEAG, DAE4-777_Feb13)	Feb -16
Signal Generator E4438C	MY49070393	13-Nov-15 (TMC, No.JZ13-394)	Nov-16
Network Analyzer E8362B	MY43021135	19-Oct-15 (TMC, No.JZ13-278)	Oct-16

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

Issued: December 17, 2015

Certificate No: J15-2-3052 Page 1 of 8

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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) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	52.8.7.1137
Extrapolation	Advanced Extrapolation	
Phantom	Twin Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.42 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	9.71 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**38.3 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.08 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.2 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	53.7 ± 6 %	1.53 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	9.98 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.9 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.26 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 mW /g ± 20.4 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3Ω+ 3.17jΩ
Return Loss	- 30.0dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8Ω+ 3.92jΩ
Return Loss	- 27.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.048 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: 12.12.2015

Test Laboratory: TMC, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d150

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; σ = 1.416 mho/m; εr = 38.91; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(5.06,5.06,5.06); Calibrated: 2015/9/5
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 22/2/2015
- Phantom: SAM 1186; Type: QD000P40CC;
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.10 (7164)

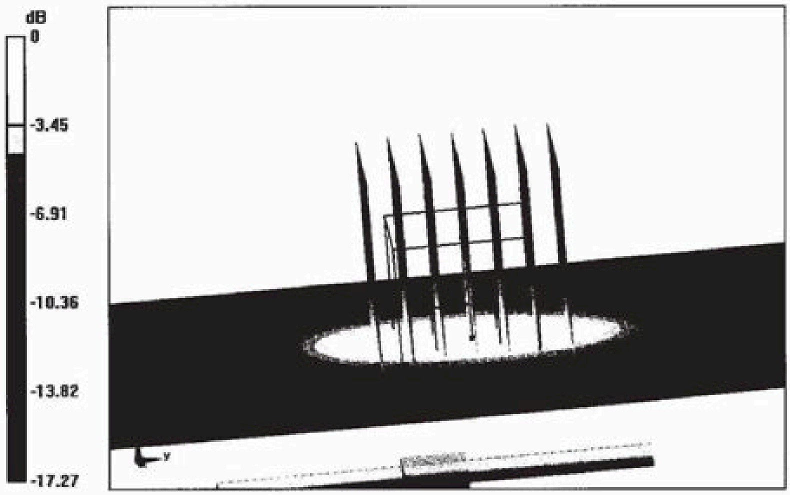
Dipole Calibration for Head Tissue/Pin=250mW, d=10mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.054 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.08 W/kg

Maximum value of SAR (measured) = 11.8 W/kg



0 dB = 11.8 W/kg = 10.72 dBW/kg

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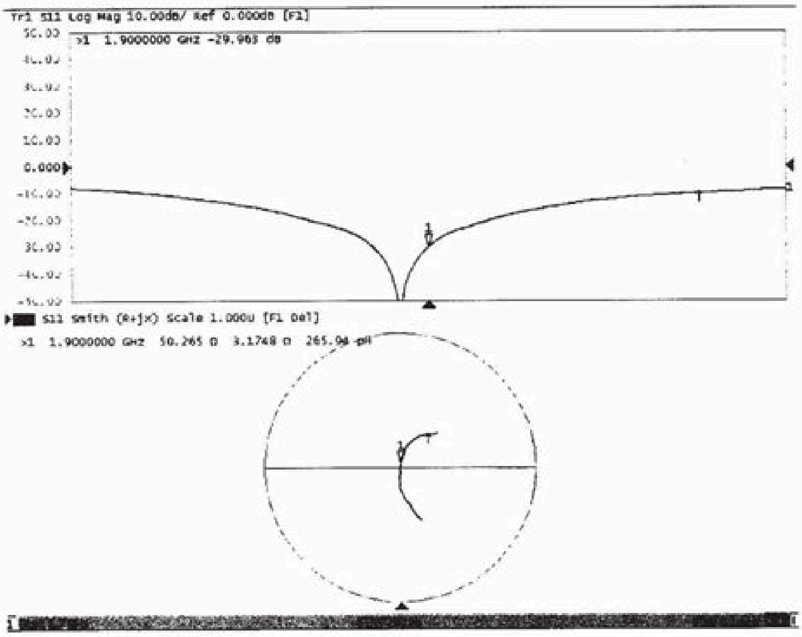
Impedance Measurement Plot for Head TSL



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E-mail: Info@emcite.com Http://www.emcite.com

DASY5 Validation Report for Body TSL Date: 12.10.2015

Test Laboratory: TMC, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d150

Communication System: CW; Frequency: 1900 MHz;

Medium parameters used: f = 1900 MHz; σ = 1.528 mho/m; εr = 53.74; ρ = 1000 kg/m^3

Phantom section: Flat Phantom

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.72,4.72,4.72) ; Calibrated: 2015/9/5
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 22/2/2015
- Phantom: SAM1186; Type: QD000P40CC;
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.10 (7164)

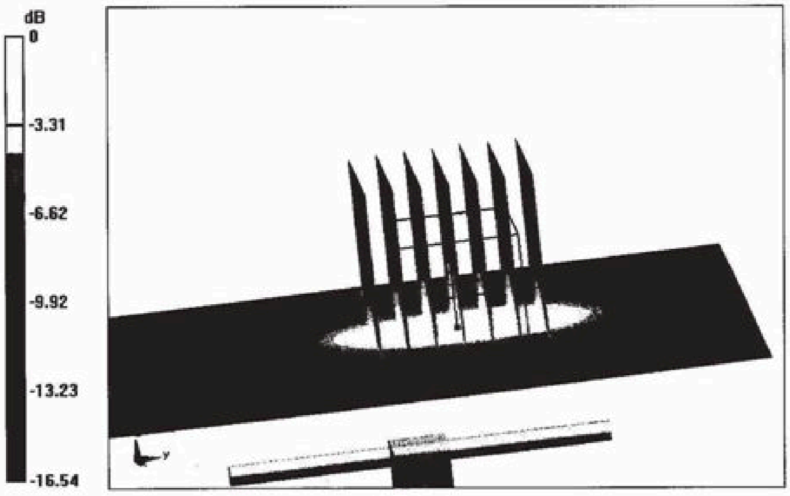
Dipole Calibration for Body Tissue/Pin=250mW, d=10mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 83.606 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 9.98 W/kg; SAR(10 g) = 5.26 W/kg

Maximum value of SAR (measured) = 12.1 W/kg



0 dB = 12.1 W/kg = 10.83 dBW/kg

Certificate No: J15-2-3052 Page 7 of 8

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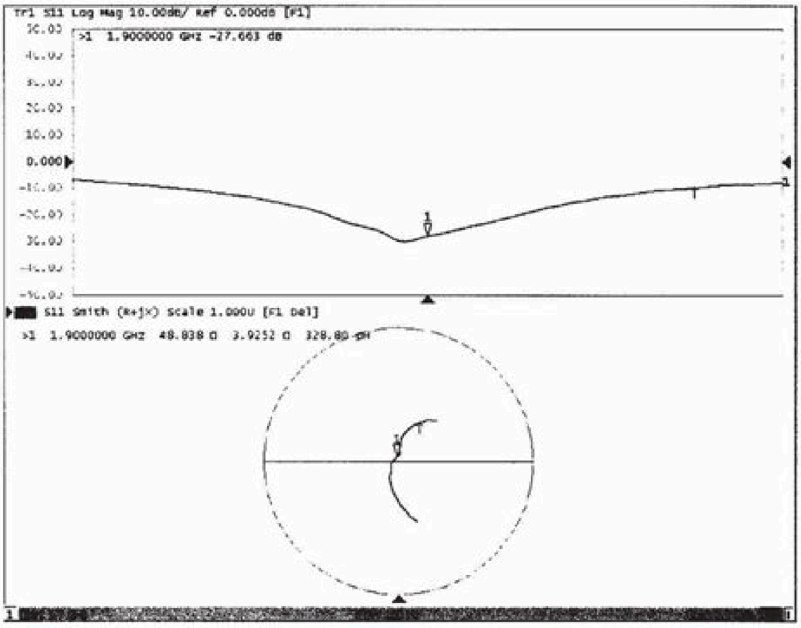
E-mail: Info@emcite.com Http://www.emcite.com

Impedance Measurement Plot for Body TSL



1.6. D2450V2 Dipole Calibration Certificate

In Collaboration with
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CALIBRATION LABORATORY

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CALIBRATION
No. L0570

Client CIQ-SZ(Auden) Certificate No: Z15-97070

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 884
Calibration Procedure(s)	TMC-OS-E-02-194 Calibration procedure for dipole validation kits
Calibration date:	September 1, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	11-Sep-14 (TMC, No.JZ13-443)	Sep-15
Power sensor NRV-Z5	100595	11-Sep-14 (TMC, No. JZ13-443)	Sep -15
Reference Probe ES3DV3	SN 3149	5- Sep-14 (SPEAG, No.ES3-3149_Sep13)	Sep-15
DAE3	SN 536	23-Jan-15 (SPEAG, DAE3-536_Jan14)	Jan -16
Signal Generator E4438C	MY49070393	13-Nov-14 (TMC, No.JZ13-394)	Nov-15
Network Analyzer E8362B	MY43021135	19-Oct-14 (TMC, No.JZ13-278)	Oct-15

	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: September 4, 2015

Certificate No: Z15-97070 Page 1 of 8

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CALIBRATION LABORATORY
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CALIBRATION No. L0570

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) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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CALIBRATION
No. L0570

Measurement Conditions

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

DASY Version	DASY52	52.8.8.1222
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	40.2 ± 6 %	1.84 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	13.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.1 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 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	51.3 ± 6 %	2.00 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	13.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**51.6 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.11 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**24.2 mW /g ± 20.4 % (k=2)**

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CALIBRATION
No. L0570

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	58.3Ω- 0.76jΩ
Return Loss	- 22.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	58.1Ω+ 2.61jΩ
Return Loss	- 22.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.224 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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CALIBRATION No. L0570

DASY5 Validation Report for Head TSL

Date: 01.09.2015

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 884

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

Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 40.2; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.48, 4.48, 4.48); Calibrated: 2014-09-05;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2015-01-23
- 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 (7331)

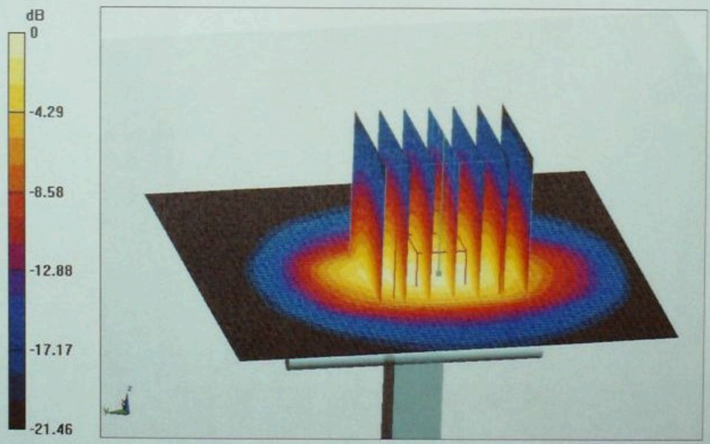
System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.491 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 26.6 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.17 W/kg

Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

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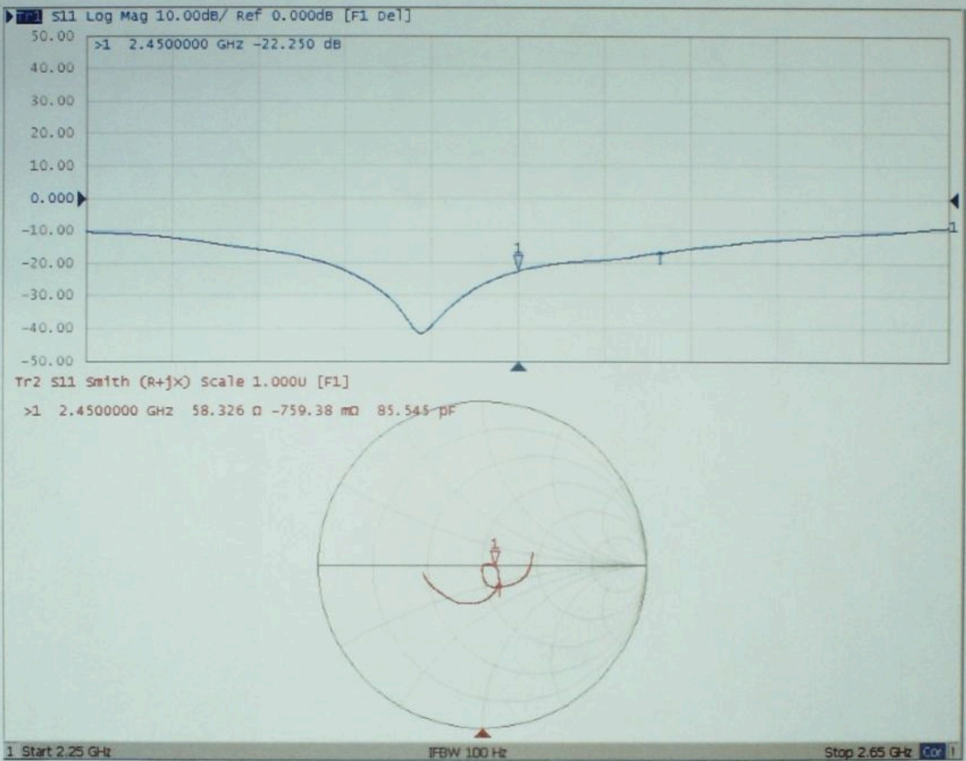
CALIBRATION
No. L0570

Impedance Measurement Plot for Head TSL



Certificate No: Z15-97070 Page 6 of 8

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

CALIBRATION No. L0570

DASY5 Validation Report for Body TSL Date: 01.09.2015

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 884

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

Medium parameters used: f = 2450 MHz; σ = 1.988 S/m; ε_r = 51.25; ρ = 1000 kg/m^3

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3149; ConvF(4.21, 4.21, 4.21); Calibrated: 2014-09-03;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn536; Calibrated: 2015-01-23
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/2
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

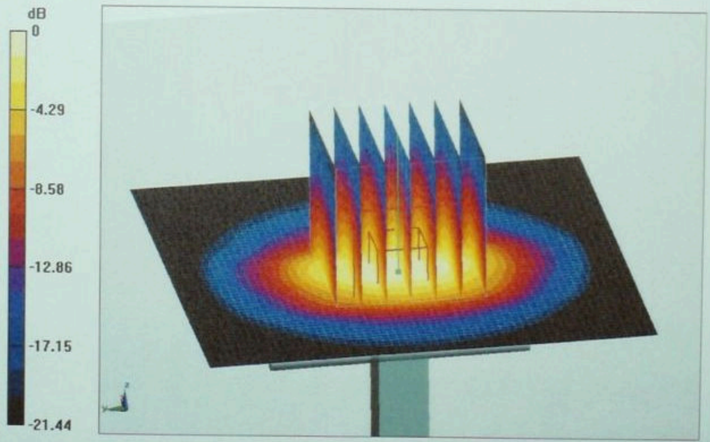
System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.180 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 27.6 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.11 W/kg

Maximum value of SAR (measured) = 17.4 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg

Certificate No: Z15-97070 Page 7 of 8

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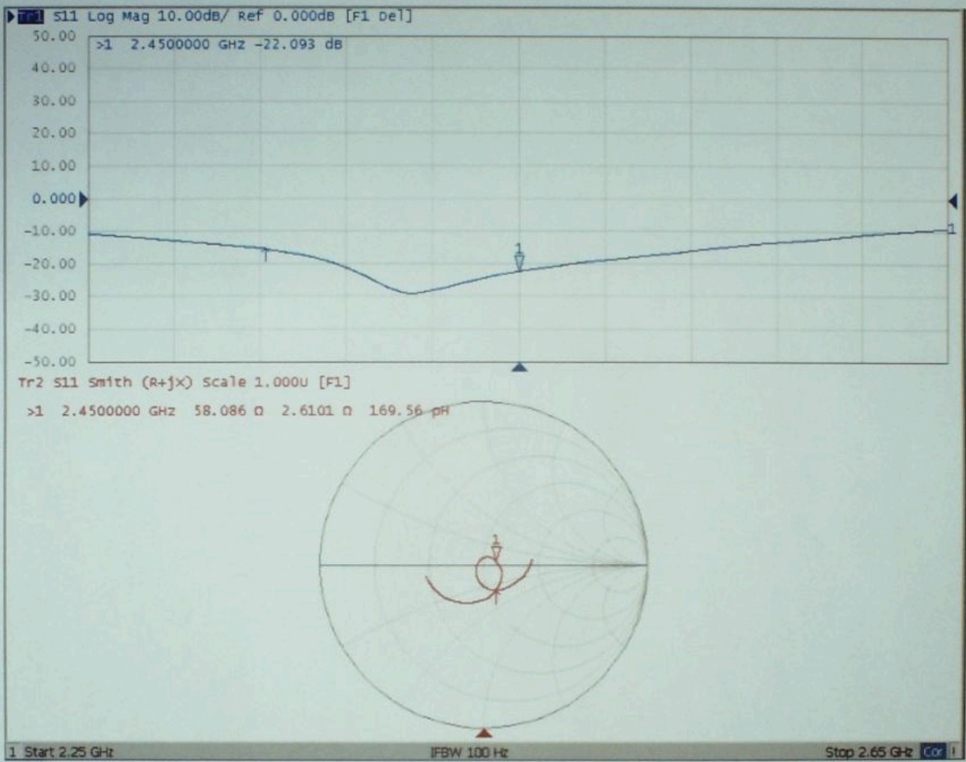
ilac-MRA CNAS CALIBRATION No. L0570

Impedance Measurement Plot for Body TSL



Certificate No: Z15-97070 Page 8 of 8

1.7. D5GHzV2 Dipole Calibration Certificate

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

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

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

Accreditation No.: SCS 108

Client **CIQ-SZ (Auden)**

Certificate No: D5GHzV2-1019_Aug15

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN: 1019

Calibration procedure(s): QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: August 25, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-14 (No. 217-01827)	Oct-15
Power sensor HP 8481A	US37292783	09-Oct-14 (No. 217-01827)	Oct-15
Power sensor HP 8481A	MY41092317	09-Oct-14 (No. 217-01828)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-15 (No. 217-01918)	Apr-16
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-15 (No. 217-01921)	Apr-16
Reference Probe EX3DV4	SN: 3503	30-Dec-14 (No. EX3-3503_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-15 (No. DAE4-601_Aug15)	Aug-16

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

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

Issued: August 25, 2015

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

Certificate No: D5GHzV2-1019_Aug15 Page 1 of 16

Calibration Laboratory of
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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
c) 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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5500 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.48 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.57 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.4 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.3 ± 6 %	4.76 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.1 ± 6 %	4.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.9 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.32 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.53 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.45 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.78 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.71 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**78.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.3 ± 6 %	5.84 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**80.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.12 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**73.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	51.3 Ω - 8.5 jΩ
Return Loss	- 21.5 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	53.2 Ω - 1.4 jΩ
Return Loss	- 29.4 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.8 Ω - 1.6 jΩ
Return Loss	- 35.0 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.3 Ω - 2.9 jΩ
Return Loss	- 23.7 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.7 Ω + 1.9 jΩ
Return Loss	- 24.8 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	52.2 Ω - 6.6 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	53.2 Ω - 0.8 jΩ
Return Loss	- 29.9 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.1 Ω - 0.6 jΩ
Return Loss	- 37.8 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	57.5 Ω - 0.7 jΩ
Return Loss	- 23.1 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.9 Ω + 4.4 jΩ
Return Loss	- 22.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.205 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	February 05, 2004

DASY5 Validation Report for Head TSL

Date: 25.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1019

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.48 S/m; ε_r = 34.7; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 4.57 S/m; ε_r = 34.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.76 S/m; ε_r = 34.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.86 S/m; ε_r = 34.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.06 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.52, 5.52, 5.52); Calibrated: 30.12.2014, ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014, ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2014, ConvF(4.86, 4.86, 4.86); Calibrated: 30.12.2014, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

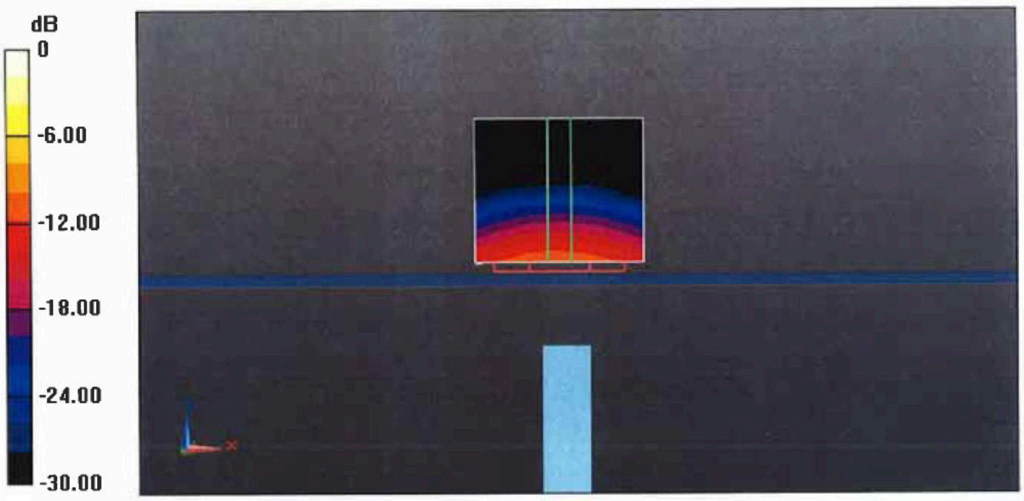
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.25 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 28.8 W/kg
SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 18.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.75 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 8.42 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.08 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 8.54 W/kg; SAR(10 g) = 2.45 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

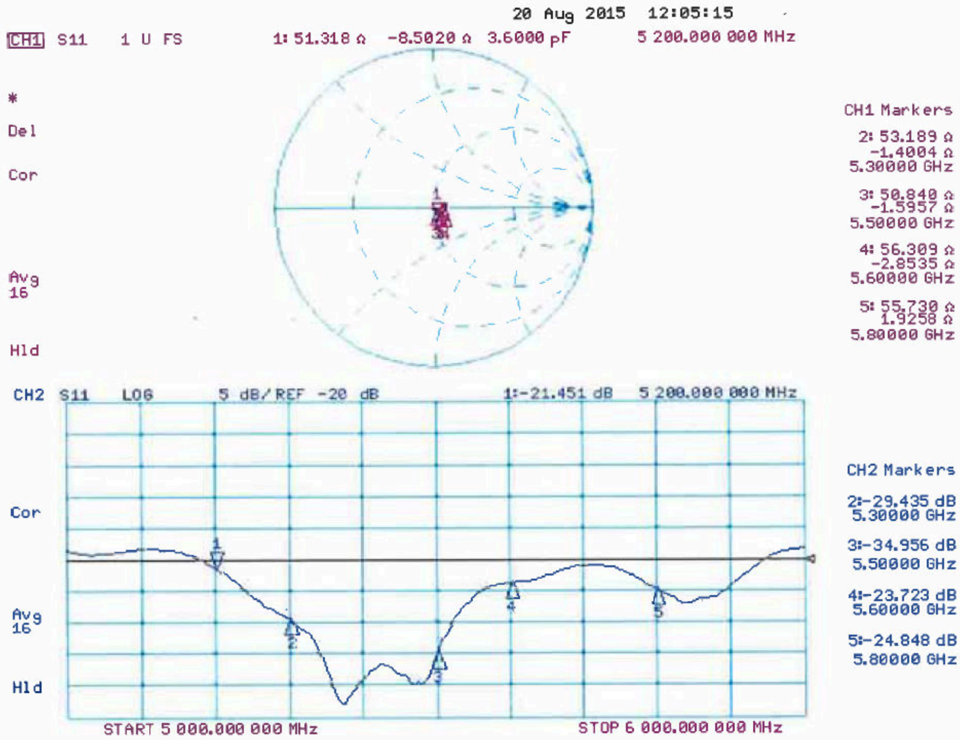
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.30 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 33.1 W/kg
SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 20.1 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.27 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

Impedance Measurement Plot for Head TSL



Certificate No: D5GHzV2-1019_Aug15 Page 13 of 16

DASY5 Validation Report for Body TSL

Date: 25.08.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1019

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.32 S/m; ε_r = 47; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 5.45 S/m; ε_r = 46.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.71 S/m; ε_r = 46.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.84 S/m; ε_r = 46.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.12 S/m; ε_r = 46; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2014, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2014, ConvF(4.52, 4.52, 4.52); Calibrated: 30.12.2014, ConvF(4.3, 4.3, 4.3); Calibrated: 30.12.2014, ConvF(4.47, 4.47, 4.47); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

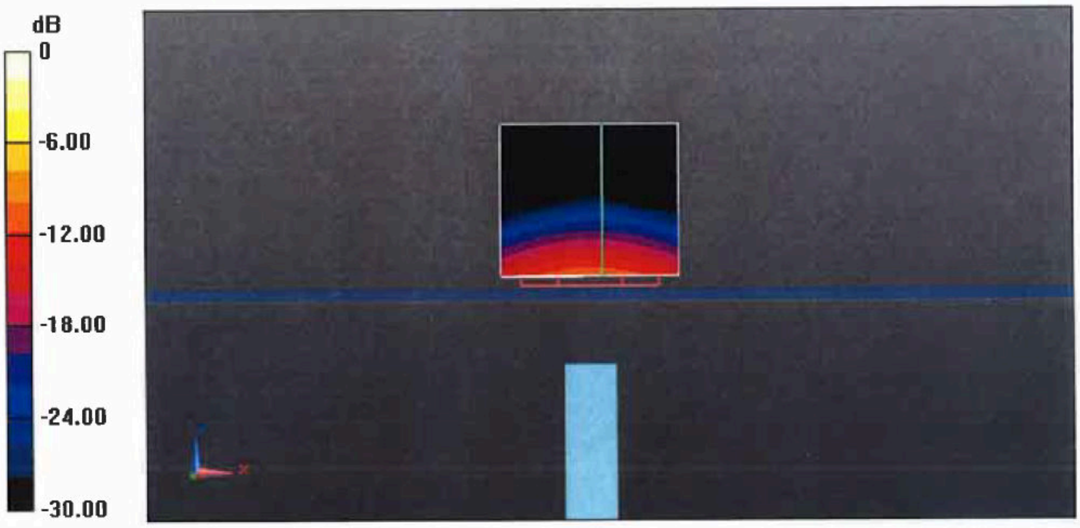
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.85 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 28.7 W/kg
SAR(1 g) = 7.53 W/kg; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 17.5 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.61 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 7.78 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 18.7 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.11 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 7.92 W/kg; SAR(10 g) = 2.21 W/kg
Maximum value of SAR (measured) = 19.1 W/kg

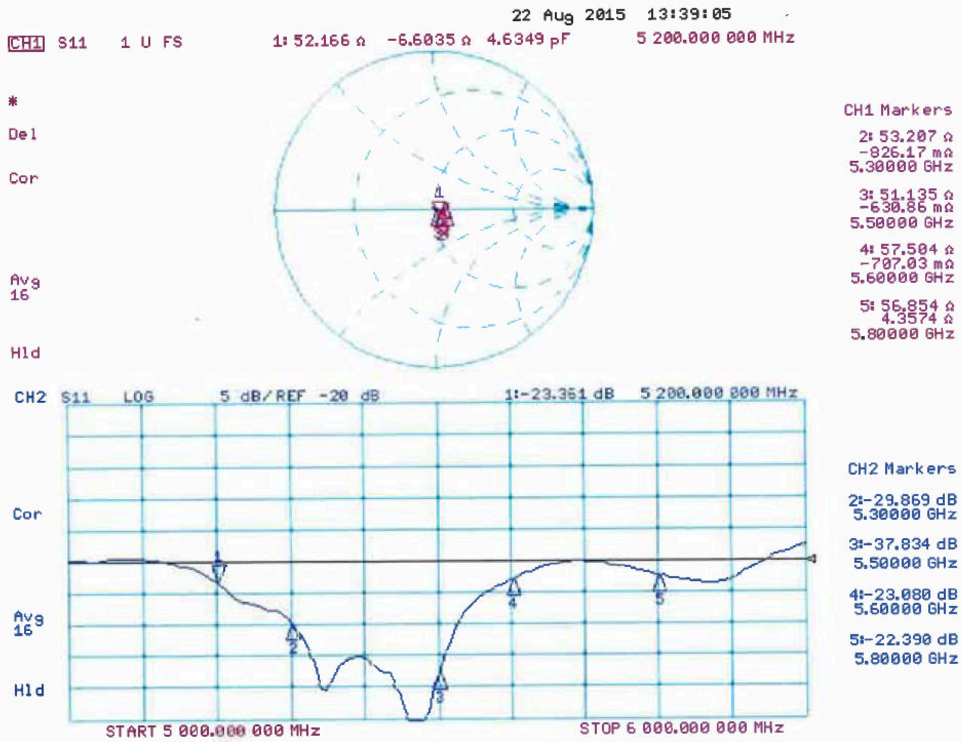
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.88 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 34.7 W/kg
SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.48 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 33.2 W/kg
SAR(1 g) = 7.45 W/kg; SAR(10 g) = 2.08 W/kg
Maximum value of SAR (measured) = 18.6 W/kg



0 dB = 18.6 W/kg = 12.70 dBW/kg

Impedance Measurement Plot for Body TSL



Certificate No: D5GHzV2-1019_Aug15 Page 16 of 16

1.8. DAE4 Calibration Certificate

TTL In Collaboration with speag CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
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E-mail: cttl@chinattl.com Http://www.chinattl.cn

ilac-MRA CNAS CALIBRATION No. L0570

Client : CIQ–SZ(Auden) Certificate No: Z15-97066

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1315
Calibration Procedure(s)	TMC-OS-E-01-198 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	July 22, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Documenting Process Calibrator 753	1971018	01-July-15 (CTTL, No:J14X02147)	July-16

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

Issued: July 23, 2015

Certificate No: Z15-97066 Page 1 of 3

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

CALIBRATION
No. L0570

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 report provide only calibration results for DAE, it does not contain other performance test results.

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CALIBRATION
No. L0570

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	405.162 ± 0.15% (k=2)	405.006 ± 0.15% (k=2)	404.963 ± 0.15% (k=2)
Low Range	3.99072 ± 0.7% (k=2)	3.98481 ± 0.7% (k=2)	3.98836 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	22° ± 1 °

Certificate No: Z15-97066 Page 3 of 3

------End------