



FCC SAR Compliance Test Report

Project Name: HSPA USB Stick

Model : E173z-6

FCC ID : QISE173Z-6

Report No. : SYBH (Z-SAR)009092011-2

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DATE	2011-09-15	2011-09-15	2011-09-15

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Reliability Laboratory of Huawei Technologies Co., Ltd.

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※ ※ **Modified History** ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev. 1.0	Initial Test Report Release	2011-09-15	Luchaogan

1 General Information

1.1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for HUAWEI E173z-6 are as below Table 1.

Band	Position	Test Mode	Measured MAX SAR _{1g} (W/kg)	MAX Conducted Power (dBm)	Turn-up Power (dBm)	Extrapolated Result (W/kg)
GSM850	Body	GPRS	1.010	32.10	33.00	1.243
GSM1900	Body	GPRS	0.733	23.00	24.00	0.923
Band V	Body	RMC	0.948	21.89	23.00	1.224
		HSDPA	0.746	21.88	23.00	0.965
		HSUPA	0.950	21.30	23.00	1.405
Band II	Body	RMC	0.970	21.89	23.00	1.252
		HSDPA	0.936	21.23	23.00	1.407
		HSUPA	0.776	21.00	23.00	1.230

Table 1: Summary of test result

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits of 1.6 W/Kg as averaged over any 1 g tissue according to the FCC rule §2.1093, the ANSI/IEEE C 95.1:1999, the NCRP Report Number 86 for uncontrolled environment, according to the Health Canada's Safety Code 6 and the Industry Canada Radio Standards Specification RSS-102 for General Population/Uncontrolled exposure, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003 and FCC OET Bulletin 65 Supplement.

1.2 RF exposure limits

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

Table 2: RF exposure limits

The limit applied in this test report is shown in **bold** letters

Notes:

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

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

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

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

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

1.3 EUT Description

Device Information:			
DUT Name:	HSPA USB Stick		
Type Identification:	E173z-6		
FCC ID :	QISE173Z-6		
SN No:	D8Z2A11172700171		
Device Type :	portable device		
Exposure Category:	uncontrolled environment / general population		
Hardware Version :	CH2E303SM		
Software Version :	21.150.03.00.00		
Antenna Type :	internal antennas		
Tested with host laptop:	Lenovo ThinkPad T61 Lenovo ThinkPad X301		
Device Operating Configurations:			
Supporting Mode(s)	GSM850/1900,WCDMA 850/1900, (Tested)		
Test Modulation	GSM(GMSK), WCDMA(QPSK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM 1900	1850-1910	1930-1990
	GSM850	824-849	869-894
	WCDMA Band II	1850-1910	1930-1990
	WCDMA Band V	824-849	869-894
GPRS Multislot Class (12)	Max Number of Timeslots in Uplink:		4
	Max Number of Timeslots in Downlink:		4
	Max Total Timeslot:		5
HSDPA UE Category	8		
HSUPA UE Category	6		
Power Class :	1, tested with power level 0 (GSM 1900)		
	4, tested with power level 5 (GSM 850)		
	3, tested with power control „all 1’(WCDMA Band II)		
	3, tested with power control „all 1’(WCDMA Band V)		
Test Channels (low-mid-high) :	512-661-810 (GSM 1900)		
	128-190-251(GSM 850)		
	9262-9400-9538(WCDMA Band II)		
	4132-4182-4233(WCDMA Band V)		

Table 3: Device information and operating configuration

1.3.1 General Description

E173z-6 HSPA/WCDMA/EDGE/GPRS/GSM dual mode USB Stick is subscriber equipment in the UMTS/GSM system. E173z-6 implement such functions as RF signal receiving/transmitting, HSPA/WCDMA and EDGE/GPRS/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface. (EDGE only support downlink, don't support uplink.)

1.4 Test specification(s)

IEEE Std C95.1 – 1999	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.
IEEE 1528-2003	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
OET Bulletin No. 65, Supplement C– 2001	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields---Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions
Canada's Safety Code 6	Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz (99-EHD-237)
RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands (Issue 4 of March 2010)
KDB941225 D01	SAR test for 3G devices v02 ,Published on Nov 13 2009
KDB941225 D03	SAR Test Reduction GSM GPRS EDGE vo1 ,Published on Nov 13 2009

1.5 Testing laboratory

Test Site	Reliability Laboratory of Huawei Technologies Co., Ltd.
Test Location	Section K3,Bantian, Longgang District, Shenzhen, P.R.China
Telephone	+86-755-28785513
Fax	+86-755-36834474
State of accreditation	The Test laboratory (area of testing) is accredited according to ISO/IEC 17025. CNAS Registration number: L0310

1.6 Applicant and Manufacturer

Company Name	HUAWEI TECHNOLOGIES CO., LTD
Address	Huawei Base, Bantian, Longgang District, Shenzhen, P.R.China

1.7 Application details

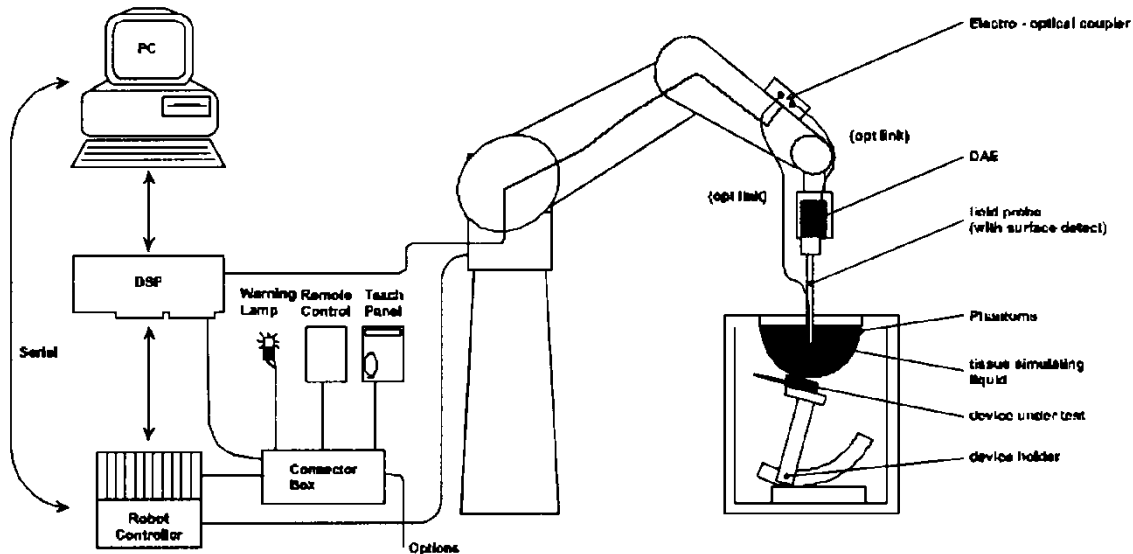
Start Date of test	2011-09-03
End Date of test	2011-09-11

1.8 Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

2 SAR Measurement System

2.1 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 XP.
- 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.

2.2 Test environment

The DASY4 measurement system is placed at the head end of a room with dimensions: 5 x 2.5 x 3 m³, the SAM phantom is placed in a distance of 75 cm from the side walls and 1.1m from the rear wall. Above the test system a 1.5 x 1.5 m² array of pyramid absorbers is installed to reduce reflections from the ceiling.

Picture 1 of the photo documentation shows a complete view of the test environment.

The system allows the measurement of SAR values larger than 0.005 mW/g.

2.3 Data Acquisition Electronics description

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

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

DAE4

Input Impedance	200MOhm	
The Inputs	symmetrical and floating	
Common mode rejection	above 80 dB	

2.4 Probe description

These probes are specially designed and calibrated for use in liquids with high permittivities. They should not be used in air, since the spherical isotropy in air is poor (± 2 dB). The dosimetric probes have special calibrations in various liquids at different frequencies.

Isotropic E-Field Probe ES3DV3 for Dosimetric Measurements

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to 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 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 330 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	

Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements

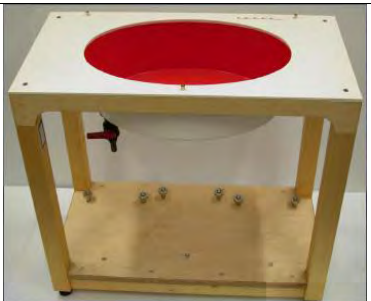
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycolether)	
Calibration	In air from 10 MHz to 2.5 GHz In head tissue simulating liquid (HSL) at 900 (800-1000) MHz and 1.8 GHz (1700-1910 MHz) (accuracy $\pm 11\%$; $k=2$) Calibration for other liquids and frequencies upon request	
Frequency	10 MHz to 3 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 3 GHz)	
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)	
Dynamic range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB	
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces (EX3DV4 only)	
Dimensions	Overall length: 337 mm Tip length: 9 mm Body diameter: 10 mm Tip diameter: 2.5 mm Distance from probe tip to dipole centers: 1.0 mm	
Application	General dosimetry up to 3 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms (EX3DV4)	

2.5 Phantom description

SAM Twin Phantom

Shell Thickness	2mm +/- 0.2 mm; The ear region: 6mm	
Filling Volume	Approximately 30 liters	
Dimensions	Length:1000mm; Width:500mm; Height: adjustable feet	
Measurement Areas	Left hand Right hand Flat phantom	
The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to cover the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. Free space scans of devices on top of this phantom cover are possible. Three reference marks are provided on the phantom counter. These reference marks are used to teach the absolute phantom position relative to the robot.		

ELI4 Phantom

Shell Thickness	2mm +/- 0.2 mm	
Filling Volume	Approximately 30 liters	
Dimensions	Length:1000mm; Width:500mm; Height: adjustable feet	
Measurement Areas	Flat phantom	
The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.		

2.6 Device holder description

The DASY5 device holder has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. This device holder is used for standard mobile phones or PDA's only. If necessary an additional support of polystyrene material is used.



Larger DUT's (e.g. notebooks) cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values.

Therefore those devices are normally only tested at the flat part of the SAM.

2.7 Test Equipment List

This table gives a complete overview of the SAR measurement equipment
Devices used during the test described are marked ☒

	Manufacturer	Device	Type	Serial number	Date of last calibration)*
☒	SPEAG	Dosimetric E-Field Probe	ES3DV3	3254	2011-03-11
☒	SPEAG	Dosimetric E-Field Probe	EX3DV4	3753	2010-12-13
☐	SPEAG	Dosimetric E-Field Probe	EX3DV4	3744	2010-11-26
☒	SPEAG	900 MHz Validation Dipole	D900V2	1d112	2011-03-09
☐	SPEAG	1800 MHz Validation Dipole	D1800V2	2d184	2011-03-08
☒	SPEAG	1900 MHz Validation Dipole	D1900V2	5d018	2011-06-16
☐	SPEAG	Data acquisition electronics	DAE4	851	2010-06-30
☒	SPEAG	Data acquisition electronics	DAE4	1235	2010-10-22
☒	SPEAG	Data acquisition electronics	DAE4	1236	2010-10-26
☒	SPEAG	Software	DASY 5	N/A	N/A
☒	SPEAG	Twin Phantom	SAM1	TP-1475	N/A
☒	SPEAG	Twin Phantom	SAM2	TP-1474	N/A
☐	SPEAG	Twin Phantom	SAM3	TP-1597	N/A
☐	SPEAG	Twin Phantom	SAM4	TP-1620	N/A
☐	SPEAG	Flat Phantom	ELI 4.0	TP-1038	N/A
☐	SPEAG	Flat Phantom	ELI 4.0	TP-1111	N/A
☒	R & S	Universal Radio Communication Tester	CMU 200	113989	2011-06-02
☒	Agilent)*	Network Analyser	E5071B	MY42404956	2011-02-22
☒	Agilent	Dielectric Probe Kit	85070E	2484	N/A
☒	Agilent	Signal Generator	N5181A	MY47420989	2011-02-22
☒	MINI-CIRCUITS	Amplifier	ZHL-42W	QA0746001	N/A
☒	Agilent	Power Meter	E4417A	MY45101339	2011-02-22
☒	Agilent	Power Meter Sensor	E9321A	MY44420359	2011-02-22

Note: The calibration interval of validation dipoles is 3 years.

1) Per KDB 450824 D02 requirements for dipole calibration, Huawei SAR lab has adopted three years calibration interval. But each measured dipole is expected to evaluate with the following criteria at least on annual interval.

- There is no physical damage on the dipole;
- System validation with specific dipole is within 10% of calibrated value;
- Return-loss is within 10% of calibrated measurement;
- Impedance is within 5Ω from the previous measurement.

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

3) 900 MHz probe/dipole calibration is valid +/-100 MHz and fully covers the 800 MHz band

3 SAR Measurement Procedure

3.1 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 $\pm 0.1\text{mm}$). 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 $\pm 30^\circ$.)
- The „area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid spacing for head measurements is 15 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation. Results of this coarse scan are shown in Appendix B.
- A „7x7x7 zoom scan“ measures the field in a volume around the 2D peak SAR value acquired in the previous „coarse“ scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5 mm in x and y-direction and 5 mm in z-direction. DASY5 is also able to perform repeated zoom scans if more than 1 peak is found during area scan. In this document, the evaluated peak 1g and 10g averaged SAR values are shown in the 2D-graphics in Appendix B. Test results relevant for the specified standard (see chapter 1.4.) are shown in table form in chapter 7.2.
- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps. This measurement shows the continuity of the liquid and can - depending in the field strength – also show the liquid depth. A z-axis scan of the measurement with maximum SAR value is shown in Appendix B.

3.2 Spatial Peak SAR Evaluation

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 7 x 7 x 7 points. The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting „Graph Evaluated”.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

Extrapolation

The extrapolation is based on a least square algorithm [W. Gander, Computermathematik, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

Interpolation

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computermathematik, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

Volume Averaging

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

Advanced Extrapolation

DASY5 uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

3.3 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 by SEMCAD

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

Probe parameters:	- Sensitivity	Norm _i , a _{i0} , a _{i1} , a _{i2}
	- Conversion factor	ConvF _i
	- 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:

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

with V_i = compensated signal of channel i (i = x, y, z)
 U_i = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

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

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

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

with V_i = compensated signal of channel i (i = x, y, z)
 $Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)²] for E-field Probes
ConvF = sensitivity enhancement in solution
 a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
 E_i = electric field strength of channel i in V/m
 H_i = magnetic field strength of channel i in A/m

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

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

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

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

with SAR = local specific absorption rate in mW/g
 E_{tot} = 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. The power flow density is calculated assuming the excitation field to be a free space field.

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm²
 E_{tot} = total electric field strength in V/m
 H_{tot} = total magnetic field strength in A/m

4 System Verification Procedure

4.1 Tissue Verification

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

The following materials are used for producing the tissue-equivalent materials.

Ingredients (% of weight)	Head Tissue					
Frequency Band (MHz)	450	835	900	1800	1950	2450
Water	38.56	41.45	40.92	52.64	55.242	62.7
Salt (NaCl)	3.95	1.45	1.48	0.36	0.306	0.5
Sugar	56.32	56.0	56.5	0.0	0.0	0.0
HEC	0.98	1.0	1.0	0.0	0.0	0.0
Bactericide	0.19	0.1	0.1	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	0.0	47.0	44.542	36.8
Ingredients (% of weight)	Body Tissue					
Frequency Band (MHz)	450	835	900	1800	1950	2450
Water	51.16	52.4	56.0	69.91	69.91	73.2
Salt (NaCl)	1.49	1.40	0.76	0.13	0.13	0.04
Sugar	46.78	45.0	41.76	0.0	0.0	0.0
HEC	0.52	1.0	1.21	0.0	0.0	0.0
Bactericide	0.05	0.1	0.27	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0
DGBE	0.0	0.0	0.0	29.96	29.96	26.7

Table 4: Tissue Dielectric Properties

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M Ω + resistivity
 HEC: Hydroxyethyl Cellulose; DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
 Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

Used Target Frequency	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
	ϵ_r (+/-5%)	σ (S/m) (+/-5%)	ϵ_r	σ (S/m)		
825MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	53.25	0.951	21.8°C	2011-09-02
835MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	52.89	0.952	21.8°C	
850MHz Body	55.2 (52.44~57.96)	0.99 (0.94~1.04)	53.15	0.980	21.8°C	
900MHz Body	55 (52.25~57.75)	1.05 (0.99~1.10)	52.55	1.015	21.8°C	
825MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	53.4	0.945	21.8°C	2011-09-07
835MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	52.92	0.956	21.8°C	
850MHz Body	55.2 (52.44~57.96)	0.99 (0.94~1.04)	53.10	0.978	21.8°C	
900MHz Body	55 (52.25~57.75)	1.05 (0.99~1.10)	52.79	1.018	21.8°C	
825MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	53.48	0.962	21.7°C	2011-09-10
835MHz Body	55.2 (52.44~57.96)	0.97 (0.92~1.02)	53.13	0.973	21.7°C	
850MHz Body	55.2 (52.44~57.96)	0.99 (0.94~1.04)	53.06	0.995	21.7°C	

900MHz Body	55 (52.25~57.75)	1.05 (0.99~1.10)	52.64	1.027	21.7°C	2011-09-09
1850MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	51.69	1.475	21.6°C	
1880MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	51.57	1.498	21.6°C	
1910MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	51.59	1.530	21.6°C	
1900MHz Body	53.3 (50.64~55.97)	1.52 (1.44~1.60)	51.53	1.528	21.6°C	
ε _r = Relative permittivity, σ= Conductivity						

Table 5: Measured Tissue Parameter

The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

Note:

1) KDB 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.

2)The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

3) For GSM and WCDMA measurements in 850MHz/Band V and for 900 MHz system verification the same TSL and 835 MHz SAR probe calibration point have been used.

4.2 System Check

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system validation is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows validation results for all frequency bands and tissue liquids used during the tests (Graphic Plot(s) see Appendix A).

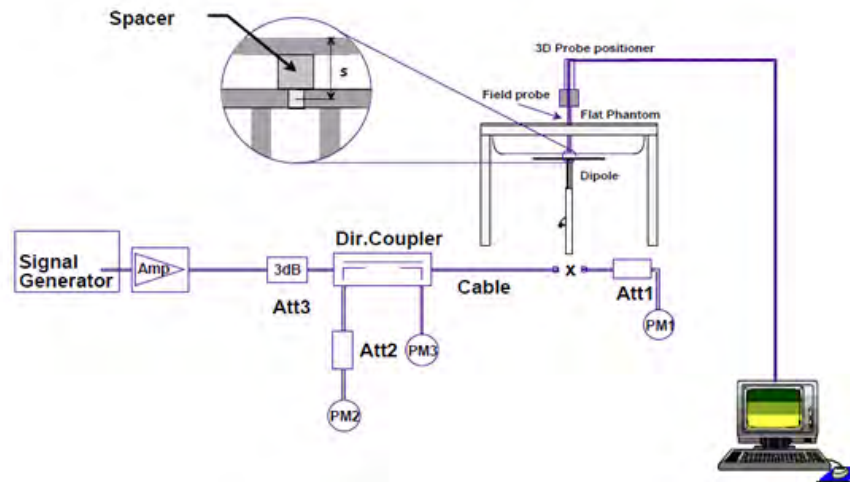
System Check	Target SAR (1W) (+/-10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (mW/g)	10-g (mW/g)	1-g (mW/g)	10-g (mW/g)		
D900V2 Body	11.3 (10.17~12.43)	7.30 (6.57~8.03)	11.32	7.28	21.8°C	2011-09-02
D900V2 Body	11.3 (10.17~12.43)	7.30 (6.57~8.03)	11.28	7.28	21.8°C	2011-09-07
D900V2 Body	11.3 (10.17~12.43)	7.30 (6.57~8.03)	11.00	7.08	21.7°C	2011-09-10
D1900V2 Body	40.5 (36.45~44.55)	21.1 (18.99~23.21)	38.88	20.24	21.6°C	2011-09-09

Table 6: System Check Results

4.3 Validation Procedure

The validation is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 250 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the validation to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

Validation results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system.



5 Measurement Uncertainty Evaluation

5.1 Measurement uncertainty evaluation for SAR test

The overall combined measurement uncertainty of the measurement system is $\pm 10.9\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 21.9\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 6.0\%$	Normal	1	1	1	$\pm 6.0\%$	$\pm 6.0\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 1.9\%$	$\pm 1.9\%$	∞
Hemispherical isotropy	$\pm 9.6\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 3.9\%$	$\pm 3.9\%$	∞
Spatial resolution	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Boundary effects	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 0.3\%$	Normal	1	1	1	$\pm 0.3\%$	$\pm 0.3\%$	∞
Response time	$\pm 0.8\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.5\%$	$\pm 0.5\%$	∞
Integration time	$\pm 2.6\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.5\%$	$\pm 1.5\%$	∞
RF ambient conditions	$\pm 3.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Probe positioner	$\pm 0.4\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe positioning	$\pm 2.9\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Test Sample Related								
Device positioning	$\pm 2.9\%$	Normal	1	1	1	$\pm 2.9\%$	$\pm 2.9\%$	145
Device holder uncertainty	$\pm 3.6\%$	Normal	1	1	1	$\pm 3.6\%$	$\pm 3.6\%$	5
Power drift	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.9\%$	$\pm 2.9\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 10.9\%$	$\pm 10.7\%$	387
Expanded Std. Uncertainty						$\pm 21.9\%$	$\pm 21.4\%$	

Table 7: Measurement uncertainties

5.2 Measurement uncertainty evaluation for system validation

The overall combined measurement uncertainty of the measurement system is $\pm 9.5\%$ ($K=1$).

The expanded uncertainty ($k=2$) is assessed to be $\pm 18.9\%$

This measurement uncertainty budget is suggested by IEEE P1528 and determined by Schmid & Partner Engineering AG. The breakdown of the individual uncertainties is as follows:

Error Sources	Uncertainty Value	Probability Distribution	Divisor	c_i 1g	c_i 10g	Standard Uncertainty 1g	Standard Uncertainty 10g	v_i^2 or v_{eff}
Measurement System								
Probe calibration	$\pm 6.0\%$	Normal	1	1	1	$\pm 6.0\%$	$\pm 6.0\%$	∞
Axial isotropy	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
Hemispherical isotropy	$\pm 9.6\%$	Rectangular	$\sqrt{3}$	0.7	0.7	$\pm 0.0\%$	$\pm 0.0\%$	∞
Boundary effects	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe linearity	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
System detection limits	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Readout electronics	$\pm 0.3\%$	Normal	1	1	1	$\pm 0.3\%$	$\pm 0.3\%$	∞
Response time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
Integration time	$\pm 0.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.0\%$	$\pm 0.0\%$	∞
RF ambient conditions	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Probe positioner	$\pm 0.4\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.2\%$	$\pm 0.2\%$	∞
Probe positioning	$\pm 2.9\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 1.7\%$	$\pm 1.7\%$	∞
Max. SAR evaluation	$\pm 1.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 0.6\%$	$\pm 0.6\%$	∞
Dipole								
Deviation of experimental dipole	$\pm 5.5\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 3.2\%$	$\pm 3.2\%$	∞
Dipole axis to liquid distance	$\pm 2.0\%$	Rectangular	1	1	1	$\pm 1.2\%$	$\pm 1.2\%$	∞
Power drift	$\pm 4.7\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.7\%$	$\pm 2.7\%$	∞
Phantom and Set-up								
Phantom uncertainty	$\pm 4.0\%$	Rectangular	$\sqrt{3}$	1	1	$\pm 2.3\%$	$\pm 2.3\%$	∞
Liquid conductivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.64	0.43	$\pm 1.8\%$	$\pm 1.2\%$	∞
Liquid conductivity (meas.)	$\pm 2.5\%$	Normal	1	0.64	0.43	$\pm 1.6\%$	$\pm 1.1\%$	∞
Liquid permittivity (target)	$\pm 5.0\%$	Rectangular	$\sqrt{3}$	0.6	0.49	$\pm 1.7\%$	$\pm 1.4\%$	∞
Liquid permittivity (meas.)	$\pm 2.5\%$	Normal	1	0.6	0.49	$\pm 1.5\%$	$\pm 1.2\%$	∞
Combined Uncertainty						$\pm 9.5\%$	$\pm 9.2\%$	
Expanded Std. Uncertainty						$\pm 18.9\%$	$\pm 18.4\%$	

Table 8: Measurement uncertainties

6 SAR Test Configuration

6.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMU200 the power lever is set to “5”and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. EDGE only support downlink, don’t support uplink.

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot.

The allowed power reduction in the multi-slot configuration is as following:

Number of timeslots in uplink assignment		Reduction of maximum output power, (dB)
Band	Time Slots	GPRS (GMSK)
GSM850	1 TX slot	0
	2 TX slots	2
	3 TX slots	4.5
	4 TX slots	6
GSM1900	1 TX slot	0
	2 TX slots	2
	3 TX slots	4.5
	4 TX slots	6

Table 9: The allowed power reduction in the multi-slot configuration of GSM

6.2 WCDMA Test Configuration

1) RMC

As the SAR body tests for WCDMA Band II and WCDMA Band V, we established the radio link through call processing. The maximum output power were verified on high, middle and low channels for each test band according to 3GPP TS 34.121 with the following configuration:

- 1) 12.2kbps RMC, 64,144,384 kbps RMC with TPC set to „all 1’.
- 2) Test loop Mode 1.

For the output power, the configurations for the DPCCH and DPDCH₁ are as followed (EUT do not support the DPDCH_{2-n})

	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	Spreading Factor	Spreading Code Number	Bits/Slot
DPCCH	15	15	256	0	10
DPDCH ₁	15	15	256	64	10
	30	30	128	32	20
	60	60	64	16	40
	120	120	32	8	80
	240	240	16	4	160
	480	480	8	2	320
	960	960	4	1	640
DPDCH _n	960	960	4	1, 2, 3	640

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits configured to all “1s”. SAR for other spreading codes and multiple DPDCH_n, when supported by the EUT, are not required when the maximum average outputs of each RF channel, for each spreading code and DPDCH_n configuration, are less than ¼ dB higher than those measured in 12.2 kbps RMC.

2) HSDPA

SAR for body exposure configurations is measured according to the “Body SAR Measurements” procedures of 3G device. In addition, body SAR is also measured for HSDPA when the maximum average outputs of each RF channel with HSDPA active is at ¼ dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.

HSDPA should be configured according to UE category of a test device. The number of HS-DSCH/ HS-PDSCHs, HAPRQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. The β_c and β_d gain factors for DPCCH and DPDCH were set according to the values in the below table, β_{hs} for HS-DPCCH is set automatically to the correct value when ΔACK , $\Delta NACK$, $\Delta CQI = 8$. The variation of the β_c / β_d ratio causes a power reduction at sub-tests 2 - 4.

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs} (1)	CM(dB)(2)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0	0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5
Note 1: ΔACK, $\Delta NACK$ and $\Delta CQI = 8$. $A_{hs} = \beta_{hs} / \beta_c = 30/15$. $\beta_{hs} = 30/15 * \beta_c$ Note 2 : CM = 1 for $\beta_c / \beta_d = 12/15$, $\beta_{hs} / \beta_c = 24/15$ Note 3 : For subtest 2 the β_c / β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1,TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$							

Table 10: Sub-tests for UMTS Release 5 HSDPA

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

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

Table 11: settings of required H-Set 1 QPSK acc. to 3GPP 34.121

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

Table 12: HSDPA UE category

3) HSUPA

Body SAR is also measured for HSDPA when the maximum average outputs of each RF channel with HSDPA active is at ¼ dB higher than that measured without HSDPA using 12.2kbps RMC or the maximum SAR 12.2kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-set 1 and QPSK for FRC and 12.2kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA.

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

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

Note 1: Δ ACK, Δ NACK and Δ CQI = 8. $A_{hs} = \beta_{hs}/\beta_c = 30/15$. $\beta_{hs} = 30/15 * \beta_c$

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

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

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

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

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

Table 13: Subtests for HSUPA.

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

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

Table 14: HSUPA UE category

7 SAR Measurement Results

7.1 Conducted power measurements

For the measurements a Rohde & Schwarz Radio Communication Tester CMU 200 was used.

The output power was measured using an integrated RF connector and attached RF cable.

The conducted output power was also checked before and after each SAR measurement. The resulting power values were within a 0.2 dB tolerance of the values shown below.

Note: CMU200 measures GSM peak and average output power for active timeslots.

For SAR the timebased average power is relevant. The difference in between depends on the duty cycle of the TDMA signal :

No. of timeslots	1	2	3	4
Duty Cycle	1 : 8	1: 4	1 : 2.66	1 : 2
timebased avg. power compared to slotted avg. power	- 9 dB	- 6 dB	- 4.25 dB	- 3 dB

The signalling modes differ as follows:

mode	coding scheme	modulation
GPRS	CS1 to CS4	GMSK

Apart from modulation change (GMSK/8PSK) coding schemes differ in code rate without influence on the RF signal. Therefore one coding scheme per mode was selected for conducted power measurements.

7.1.1 Conducted power measurements GSM 850 MHz

GSM850		Conducted Power (dBm)			Division Factors	Average Power (dBm)		
		128CH	190CH	251CH		128CH	190CH	251CH
GPRS (GMSK)	1 Tx Slot	32.18	32.10	31.89	-9.00	23.18	23.10	22.89
	2 Tx Slot	30.23	30.14	29.90	-6.00	24.23	24.14	23.90
	3 Tx Slot	28.25	28.11	27.83	-4.25	24.00	23.86	23.58
	4 Tx Slot	26.20	26.00	25.79	-3.00	23.20	23.00	22.79

Table 15: Test results conducted power measurement GSM 850 MHz

7.1.2 Conducted power measurements GSM 1900 MHz

GSM1900		Conducted Power (dBm)			Division Factors	Average Power (dBm)		
		512CH	661CH	810CH		512CH	661CH	810CH
GPRS (GMSK)	1 Tx Slot	29.22	29.11	28.93	-9.00	20.90	20.11	19.93
	2 Tx Slot	27.14	27.14	26.89	-6.00	21.14	21.14	20.89
	3 Tx Slot	25.18	25.06	24.90	-4.25	20.93	20.81	20.65
	4 Tx Slot	23.09	23.00	22.90	-3.00	20.03	20.00	19.9

Table 16: Test results conducted power measurement GSM 1900 MHz

7.1.3 Conducted power measurements WCDMA FDD V (850 MHz)

UMTS850 (Band V)		Conducted Power (dBm)		
		4132CH	4183CH	4233CH
WCDMA	12.2kbps RMC	21.90	21.89	21.81
	64kbps RMC	21.86	21.88	21.80
	144kbps RMC	21.88	21.90	21.81
	384kbps RMC	21.90	21.91	21.85
HSDPA	Subtest 1	21.87	21.88	21.89
	Subtest 2	21.40	21.49	21.28
	Subtest 3	20.92	21.00	20.97
	Subtest 4	20.51	20.51	20.48
HSUPA	Subtest 1	21.49	21.33	21.31
	Subtest 2	19.69	19.71	19.77
	Subtest 3	20.57	20.49	20.46
	Subtest 4	19.75	19.71	19.62
	Subtest 5	21.40	21.30	21.17

Table 17: Test results conducted power measurement WCDMA 850

7.1.4 Conducted power measurements WCDMA FDD II (1900 MHz)

UMTS1900 (Band II)		Conducted Power (dBm)		
		9262CH	9400CH	9538CH
WCDMA	12.2kbps RMC	21.83	21.89	21.80
	64kbps RMC	21.90	21.88	21.70
	144kbps RMC	21.88	21.90	21.66
	384kbps RMC	21.80	21.84	21.68
HSDPA	Subtest 1	21.30	21.23	21.22
	Subtest 2	21.25	21.18	21.04
	Subtest 3	20.94	21.03	20.91
	Subtest 4	20.61	20.80	20.60
HSUPA	Subtest 1	21.13	21.09	20.84
	Subtest 2	19.73	19.64	19.61
	Subtest 3	20.38	20.33	20.13
	Subtest 4	19.60	19.61	19.62
	Subtest 5	21.16	21.00	20.94

Table 18: Test results conducted power measurement WCDMA 1900

7.2 SAR measurement Result

7.2.1 SAR measurement Result of GSM 850

Test Position of Body with 5mm	Test Mode	Test channel /Frequency	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
Front Side	GPRS 1TS	190/836.6	0.896	0.543	0.164	1.6	21.8°C
Front Side	GPRS 2TS	190/836.6	0.774	0.468	-0.171	1.6	21.8°C
Front Side	GPRS 3TS	190/836.6	0.791	0.477	-0.119	1.6	21.8°C
Front Side	GPRS 4TS	190/836.6	0.824	0.496	-0.083	1.6	21.8°C
Rear Side	GPRS 1TS	190/836.6	1.010	0.641	0.141	1.6	21.8°C
Left Side	GPRS 1TS	190/836.6	0.468	0.296	-0.012	1.6	21.8°C
Right Side	GPRS 1TS	190/836.6	0.337	0.233	0.074	1.6	21.8°C
Top Side	GPRS 1TS	190/836.6	0.017	0.012	-0.137	1.6	21.8°C
Front Side	GPRS 1TS	251/848.8	0.757	0.456	-0.038	1.6	21.8°C
Front Side	GPRS 1TS	128/824.2	0.949	0.577	0.042	1.6	21.8°C
Front Side	GPRS 4TS	251/848.8	0.654	0.394	-0.054	1.6	21.8°C
Front Side	GPRS 4TS	128/824.2	0.910	0.553	-0.021	1.6	21.8°C
Rear Side	GPRS 1TS	251/848.8	0.965	0.601	0.175	1.6	21.8°C
Rear Side	GPRS 1TS	128/824.2	1.000	0.631	0.198	1.6	21.8°C

Table 19: Test results body SAR GSM 850 MHz

Note: 1) The maximum SAR value are marks in **bold**.

2) The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

3) Tests in body position were performed with 5 mm air gap between DUT and SAM.

7.2.2 SAR measurement Result of GSM 1900

Test Position of Body with 5mm	Test Mode	Test channel /Frequency	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
Front Side	661/1880	GPRS 1TS	0.728	0.408	-0.108	1.6	21.4°C
Front Side	661/1880	GPRS 2TS	0.730	0.408	-0.045	1.6	21.4°C
Front Side	661/1880	GPRS 3TS	0.689	0.388	-0.045	1.6	21.4°C
Front Side	661/1880	GPRS 4TS	0.733	0.410	0.001	1.6	21.4°C
Rear Side	661/1880	GPRS 4TS	0.629	0.360	0.011	1.6	21.4°C
Left Side	661/1880	GPRS 4TS	0.586	0.325	0.006	1.6	21.4°C
Right Side	661/1880	GPRS 4TS	0.231	0.126	-0.092	1.6	21.4°C
Top Side	661/1880	GPRS 4TS	0.033	0.022	0.060	1.6	21.4°C

Table 20: Test results body SAR GSM 1900 MHz

Note: 1) The maximum SAR value are marks in **bold**.

2) The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 0.8 W/kg), testing at the high and low channels is optional.

3) Tests in body position were performed with 5 mm air gap between DUT and SAM.

7.2.3 SAR measurement Result of WCDMA Band V

Test Position of Body with 5mm	Test Mode	Test channel /Frequency	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
Front Side	4182/836.4	RMC	0.870	0.526	-0.080	1.6	21.7℃
Rear Side	4182/836.4	RMC	0.948	0.588	0.142	1.6	21.7℃
Left Side	4182/836.4	RMC	0.397	0.248	-0.178	1.6	21.7℃
Right Side	4182/836.4	RMC	0.364	0.247	-0.199	1.6	21.7℃
Top Side	4182/836.4	RMC	0.022	0.015	-0.100	1.6	21.7℃
Front Side	4233/846.6	RMC	0.717	0.433	-0.029	1.6	21.7℃
Front Side	4132/826.4	RMC	0.809	0.490	0.011	1.6	21.7℃
Rear Side	4233/846.6	RMC	0.927	0.576	0.097	1.6	21.7℃
Rear Side	4132/826.4	RMC	0.858	0.534	-0.080	1.6	21.7℃
Rear Side	4182/836.4	HSDPA	0.746	0.464	-0.078	1.6	21.7℃
Rear Side	4182/836.4	HSUPA	0.950	0.587	0.107	1.6	21.7℃

Table 21: Test results body SAR UMTS FDD V 850 MHz

Note: 1) The maximum SAR value are marks in **bold**.

2) The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit ($< 0.8 \text{ W/kg}$), testing at the high and low channels is optional.

3) Tests in body position were performed with 5 mm air gap between DUT and SAM.

7.2.4 SAR measurement Result of WCDMA Band II

Test Position of Body with 5mm	Test Mode	Test channel /Frequency	SAR Value (W/kg)		Power Drift (dB)	Limit (W/kg)	Liquid Temp.
			1-g	10-g			
Front Side	9400/1880	RMC	0.970	0.541	-0.073	1.6	21.4℃
Rear Side	9400/1880	RMC	0.802	0.459	0.095	1.6	21.4℃
Left Side	9400/1880	RMC	0.729	0.405	-0.017	1.6	21.4℃
Right Side	9400/1880	RMC	0.367	0.207	-0.018	1.6	21.4℃
Top Side	9400/1880	RMC	0.048	0.032	0.012	1.6	21.4℃
Front Side	9538/1907.6	RMC	0.898	0.507	-0.030	1.6	21.4℃
Front Side	9262/1852.4	RMC	0.894	0.498	-0.033	1.6	21.4℃
Rear Side	9538/1907.6	RMC	0.728	0.417	0.005	1.6	21.4℃
Rear Side	9262/1852.4	RMC	0.713	0.409	-0.076	1.6	21.4℃
Front Side	9400/1880	HSDPA	0.936	0.524	0.034	1.6	21.4℃
Front Side	9400/1880	HSUPA	0.776	0.436	-0.005	1.6	21.4℃

Table 22: Test results body SAR UMTS FDD II 1900 MHz

Note: 1) The maximum SAR value are marks in **bold**.

2) The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit ($< 0.8 \text{ W/kg}$), testing at the high and low channels is optional.

3) Tests in body position were performed with 5 mm air gap between DUT and SAM.

Appendix A. System Check Plots

(Pls See Appendix A.)

Appendix B. SAR Measurement Plots

(Pls See Appendix B.)

Appendix C. Calibration Certificate

(Pls See Appendix C.)

Appendix D. Photo documentation

(Pls See Appendix D.)



Appendix A. System Check Plots

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SystemPerformanceCheck-D900-EX-Body
SystemPerformanceCheck-D900-EX-Bod
SystemPerformanceCheck-D900- ES-Body
SystemPerformanceCheck-D1900-ES-Body

Test Laboratory: HUAWEI SAR Lab

SystemPerformanceCheck-D900-EX-Body

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d112

Communication System: CW; Frequency: 900 MHz

Medium parameters used: $f = 900$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.86 mW/g

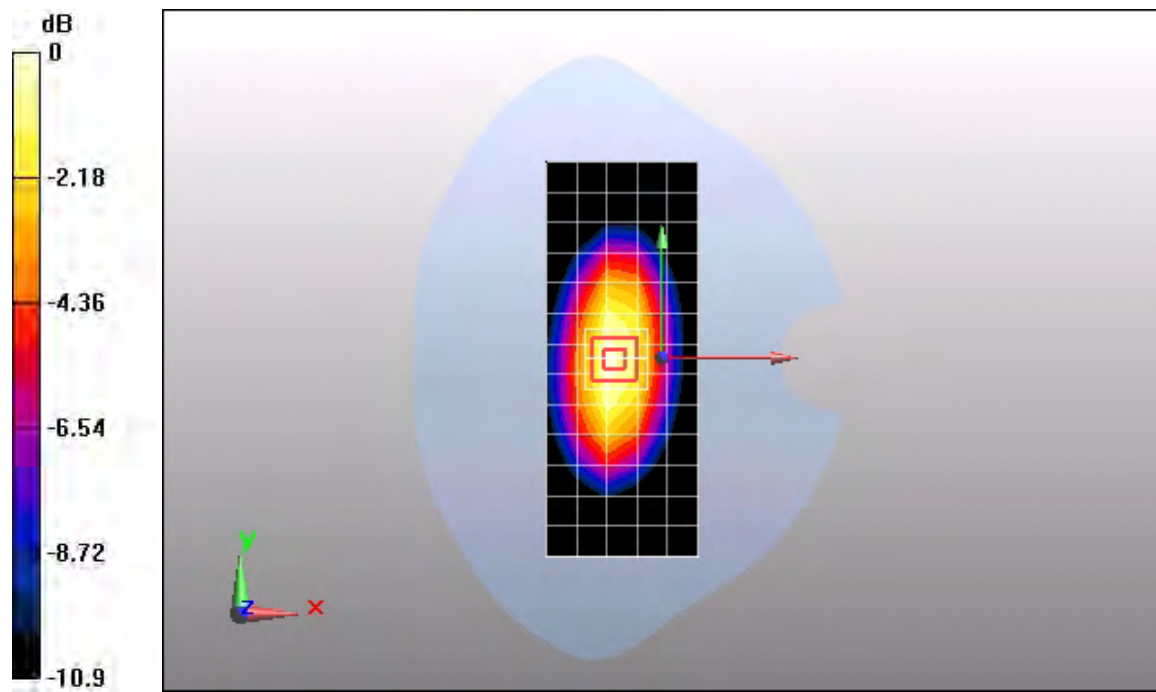
Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.3 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 4.3 W/kg

SAR(1 g) = 2.83 mW/g; SAR(10 g) = 1.82 mW/g

Maximum value of SAR (measured) = 3.07 mW/g



0 dB = 3.07mW/g

Test Laboratory: HUAWEI SAR Lab

SystemPerformanceCheck-D900-EX-Body

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d112

Communication System: CW; Frequency: 900 MHz

Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 1.02 \text{ mho/m}$; $\epsilon_r = 52.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM1; Type: SAM; Serial: TP-1475
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.77 mW/g

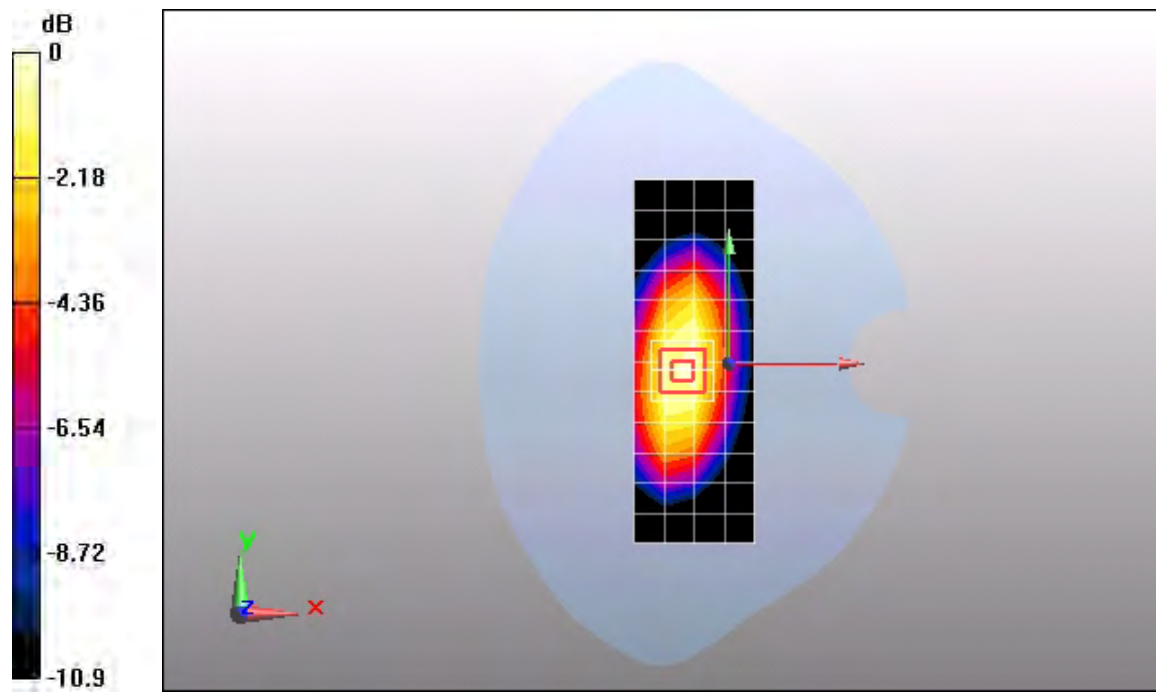
Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.4 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 4.3 W/kg

SAR(1 g) = 2.82 mW/g; SAR(10 g) = 1.82 mW/g

Maximum value of SAR (measured) = 3.06 mW/g



0 dB = 3.06mW/g

Test Laboratory: The name of your organization

SystemPerformanceCheck-D900-ES-Body

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d112

Communication System: CW; Frequency: 900 MHz

Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 1.03 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=15mm, Pin=250mW/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.69 mW/g

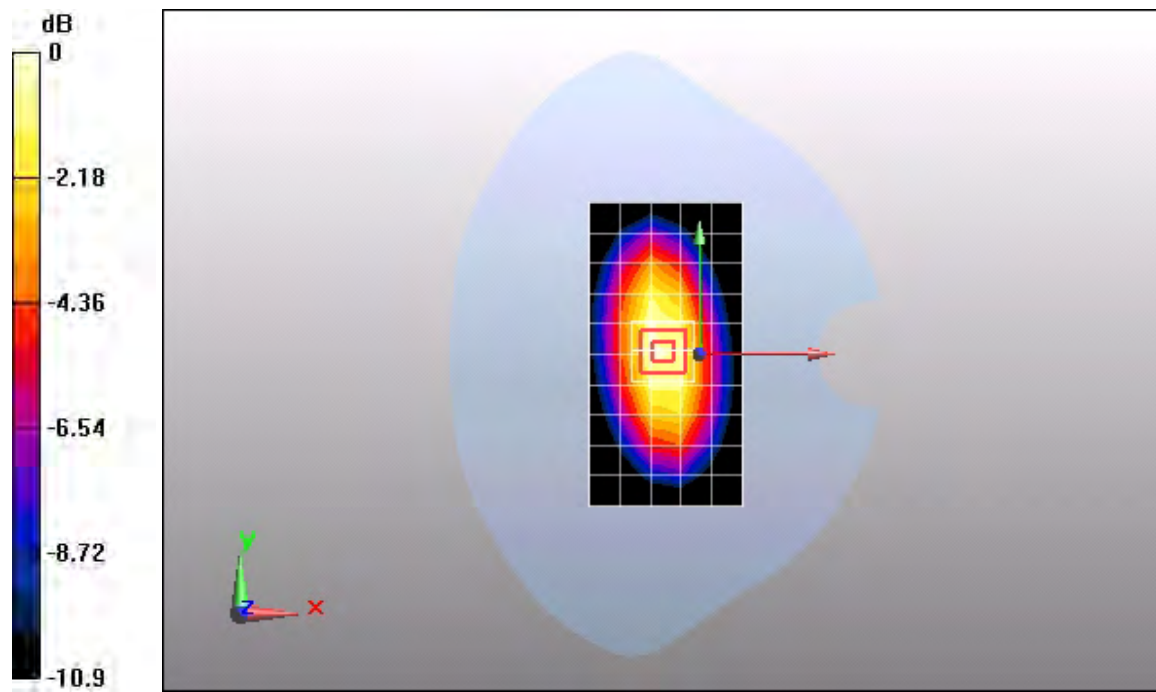
Configuration/d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.3 V/m; Power Drift = -0.027 dB

Peak SAR (extrapolated) = 4.2 W/kg

SAR(1 g) = 2.75 mW/g; SAR(10 g) = 1.77 mW/g

Maximum value of SAR (measured) = 2.97 mW/g



0 dB = 2.97mW/g

Test Laboratory: The name of your organization

SystemPerformanceCheck-D1900-ES-Body

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d018

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 51.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/d=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 8 mW/g

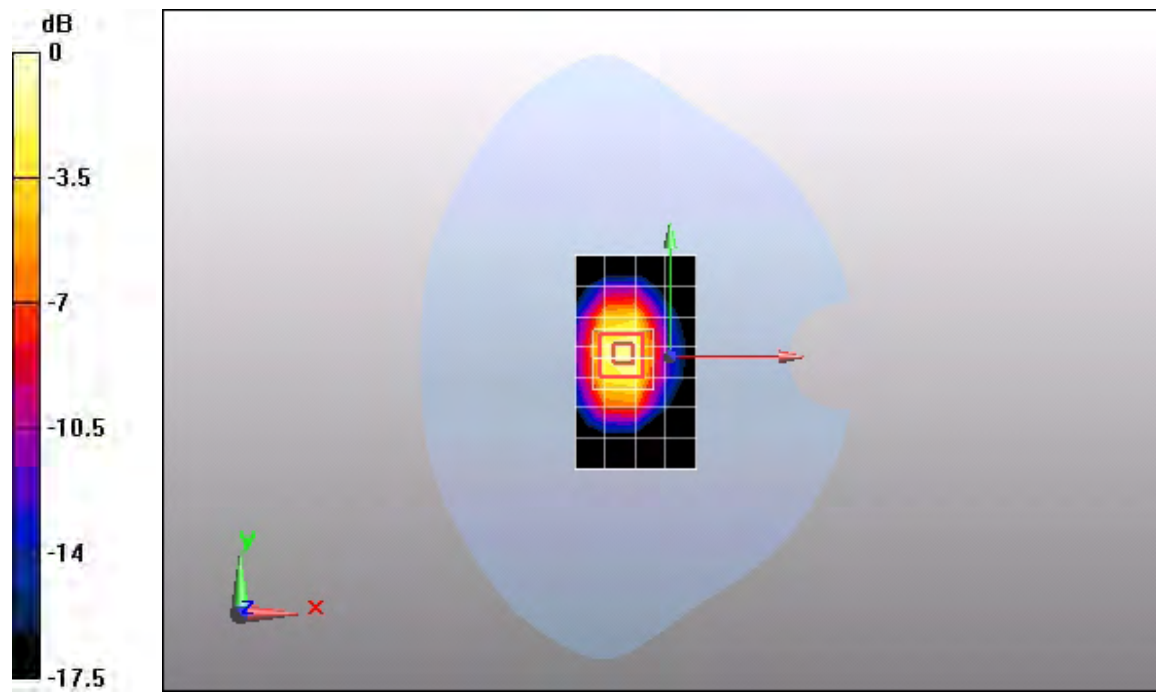
Configuration/d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 74 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 9.72 mW/g; SAR(10 g) = 5.06 mW/g

Maximum value of SAR (measured) = 10.9 mW/g



0 dB = 10.9mW/g



Appendix B. SAR Measurement Plots

Table of contents
GSM 850 MHz body
GSM 1900 MHz body
WCDMA 850 MHz body
WCDMA 1900 MHz body

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 190CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.927 mW/g

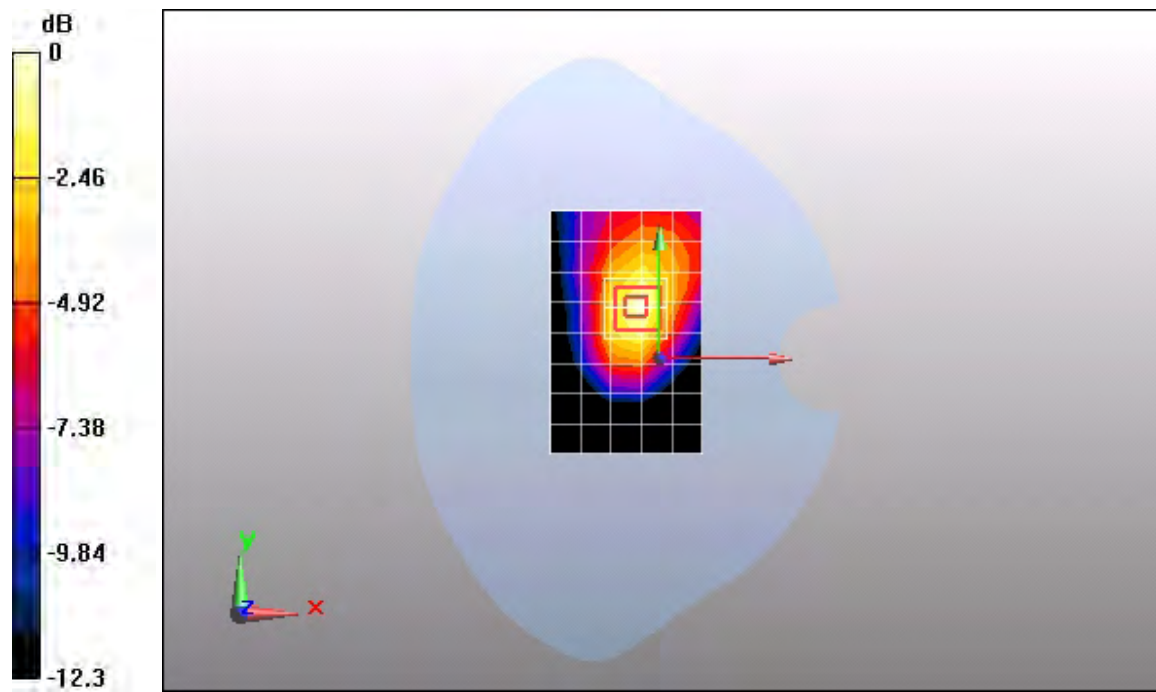
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.1 V/m; Power Drift = 0.164 dB

Peak SAR (extrapolated) = 1.44 W/kg

SAR(1 g) = 0.896 mW/g; SAR(10 g) = 0.543 mW/g

Maximum value of SAR (measured) = 0.980 mW/g



0 dB = 0.980mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 2TS 190CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 2TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.811 mW/g

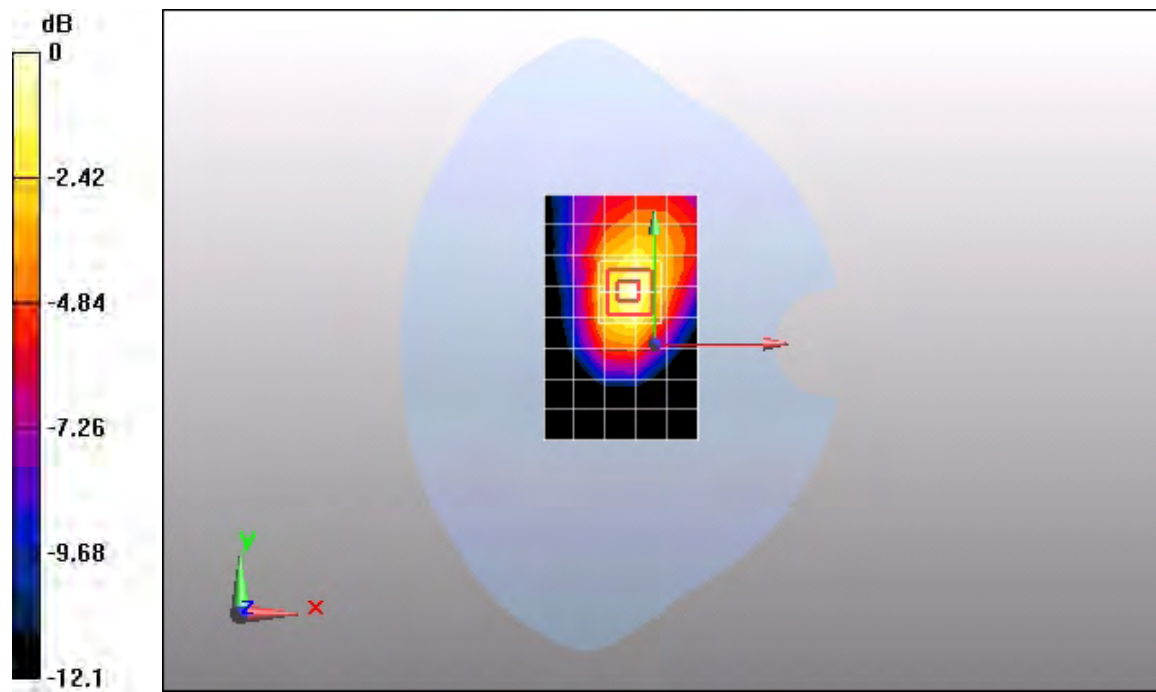
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.1 V/m; Power Drift = -0.171 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.774 mW/g; SAR(10 g) = 0.468 mW/g

Maximum value of SAR (measured) = 0.851 mW/g



0 dB = 0.851mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 3TS 190CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 3TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.837 mW/g

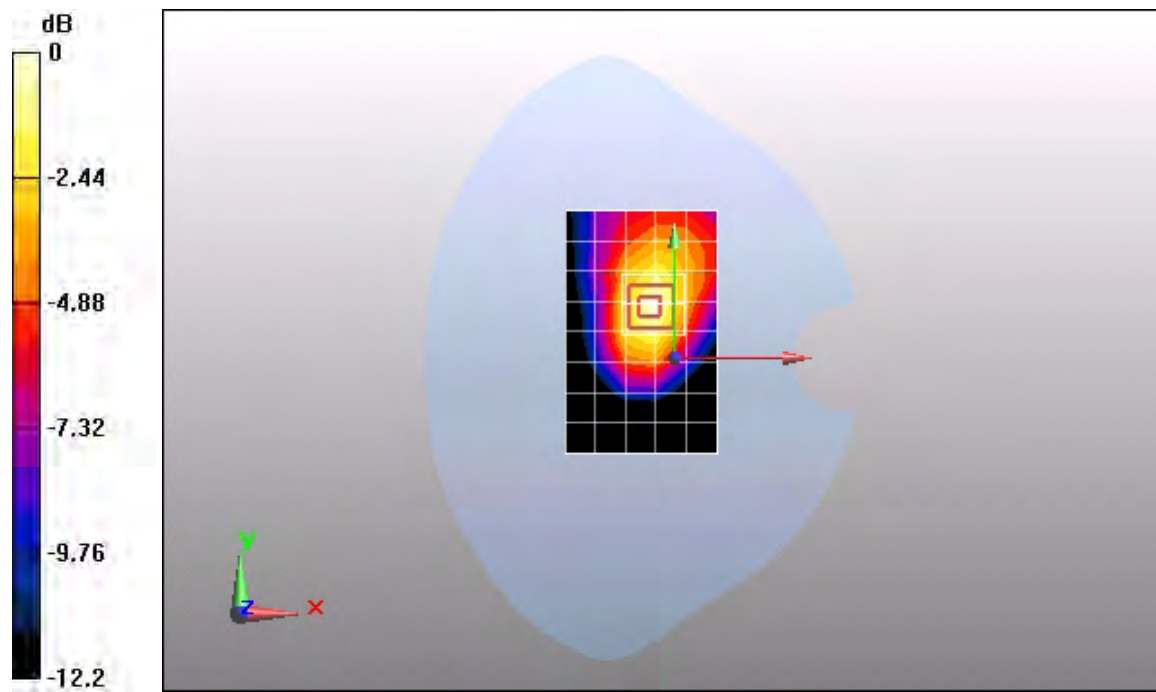
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.4 V/m; Power Drift = -0.119 dB

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.791 mW/g; SAR(10 g) = 0.477 mW/g

Maximum value of SAR (measured) = 0.854 mW/g



0 dB = 0.854mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 4TS 190CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.860 mW/g

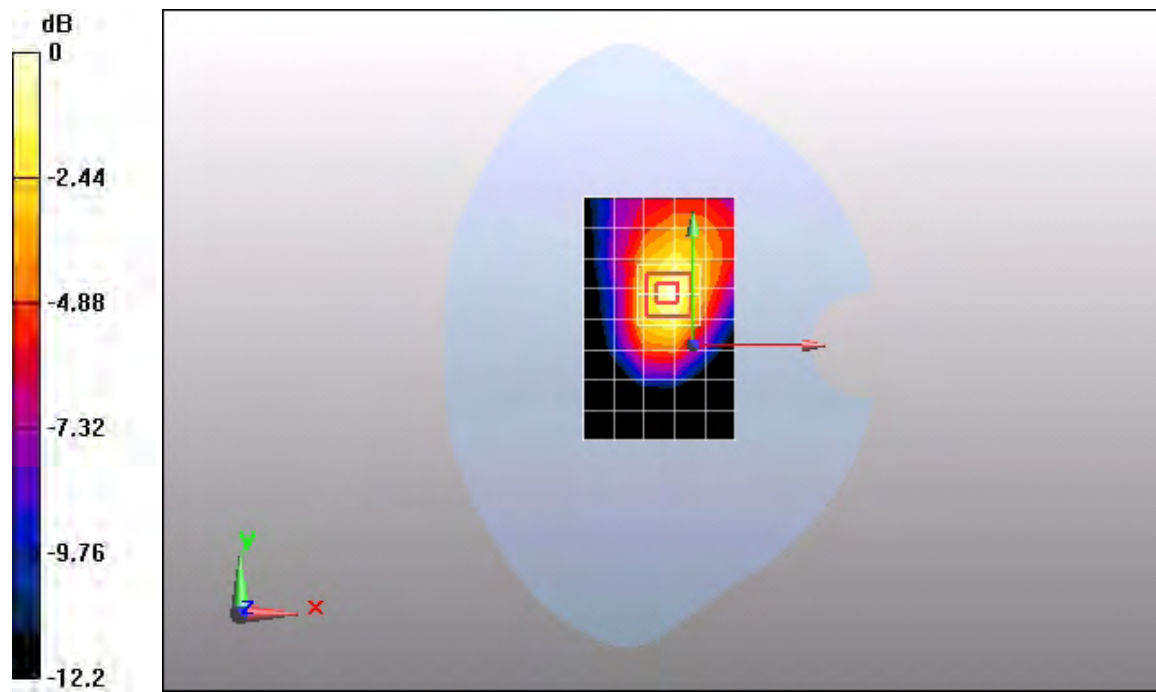
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.8 V/m; Power Drift = -0.083 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.824 mW/g; SAR(10 g) = 0.496 mW/g

Maximum value of SAR (measured) = 0.904 mW/g



0 dB = 0.904mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 190CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.11 mW/g

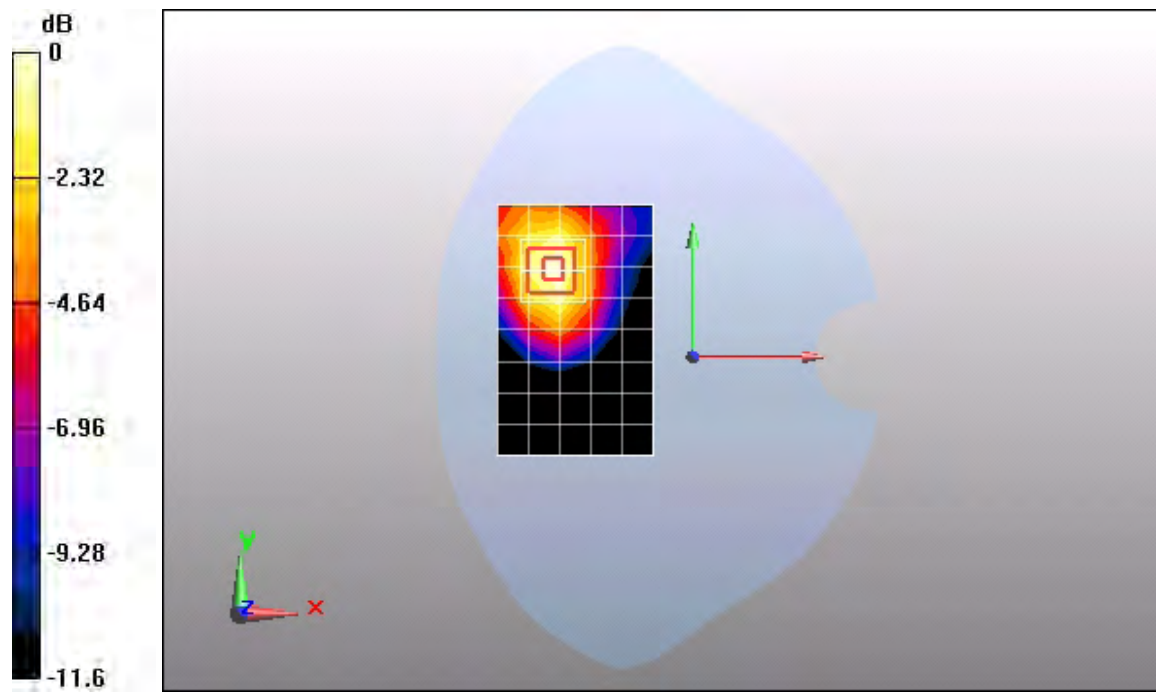
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.65 V/m; Power Drift = 0.141 dB

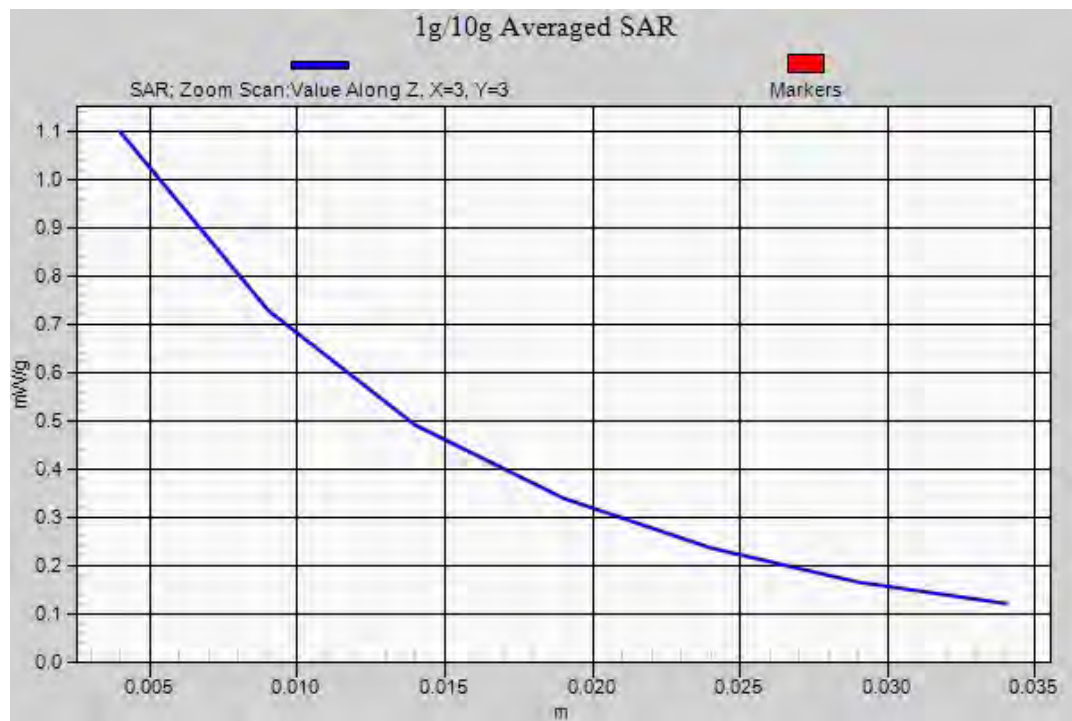
Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.641 mW/g

Maximum value of SAR (measured) = 1.1 mW/g



0 dB = 1.1mW/g



Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 190CH Left side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.962$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.479 mW/g

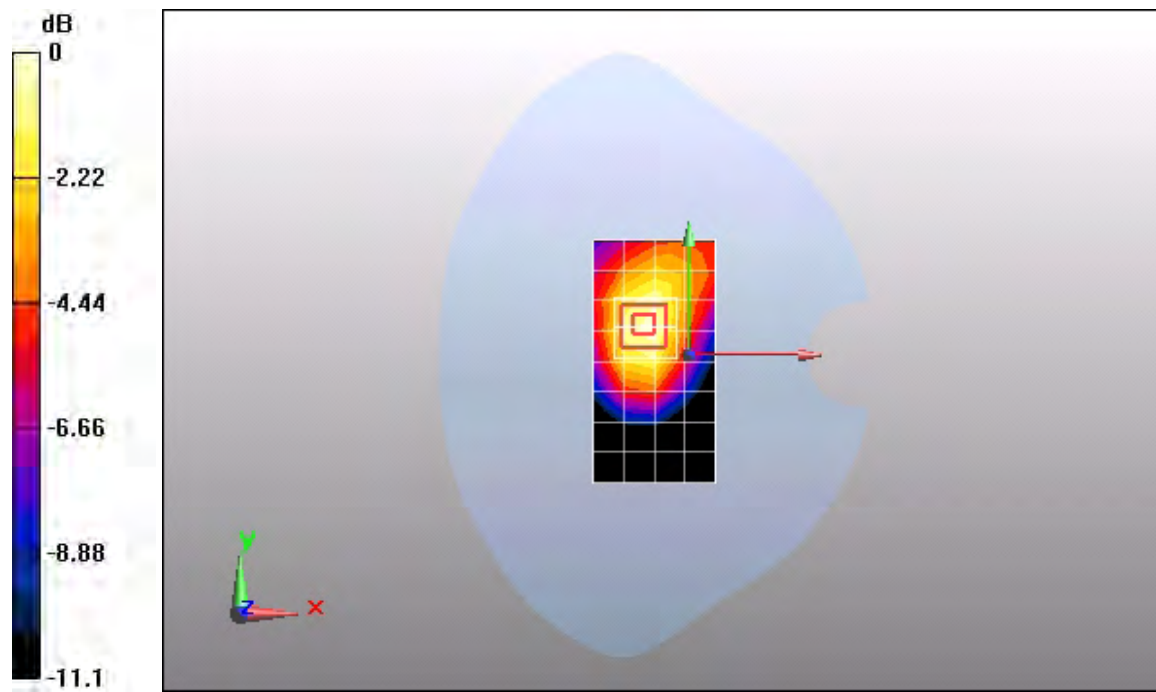
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.2 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.728 W/kg

SAR(1 g) = 0.468 mW/g; SAR(10 g) = 0.296 mW/g

Maximum value of SAR (measured) = 0.508 mW/g



0 dB = 0.508mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 190CH Right side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.962$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (5x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.341 mW/g

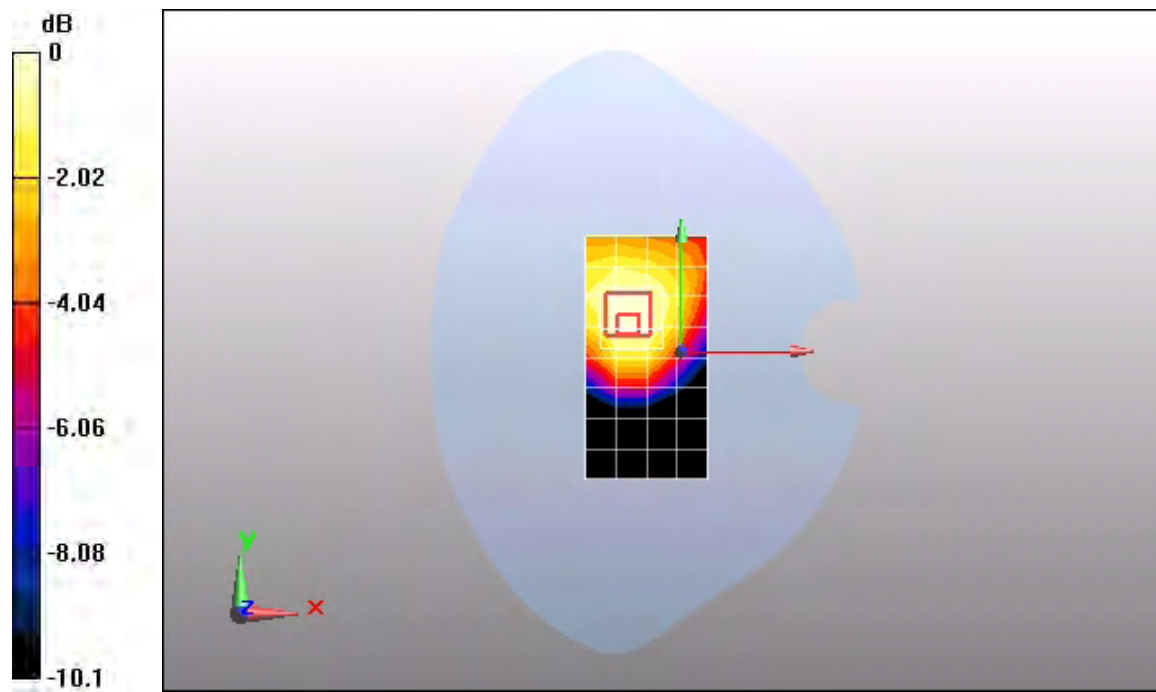
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.8 V/m; Power Drift = 0.074 dB

Peak SAR (extrapolated) = 0.504 W/kg

SAR(1 g) = 0.337 mW/g; SAR(10 g) = 0.233 mW/g

Maximum value of SAR (measured) = 0.359 mW/g



0 dB = 0.359mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 190CH Top side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 836.6 MHz

Medium parameters used: $f = 837$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 52.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

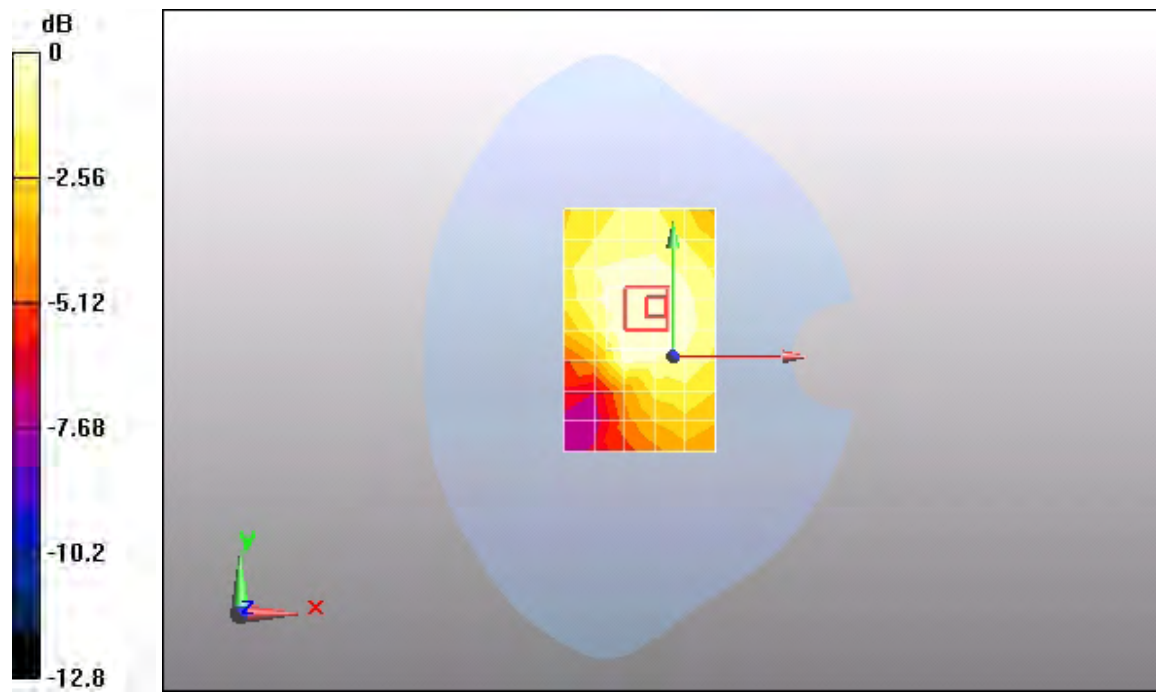
Maximum value of SAR (measured) = 0.018 mW/g

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

Reference Value = 4.24 V/m; Power Drift = -0.137 dB

Peak SAR (extrapolated) = 0.026 W/kg

SAR(1 g) = 0.017 mW/g; SAR(10 g) = 0.012 mW/g



Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 251CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 848.8 MHz

Medium parameters used: $f = 849$ MHz; $\sigma = 0.971$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.786 mW/g

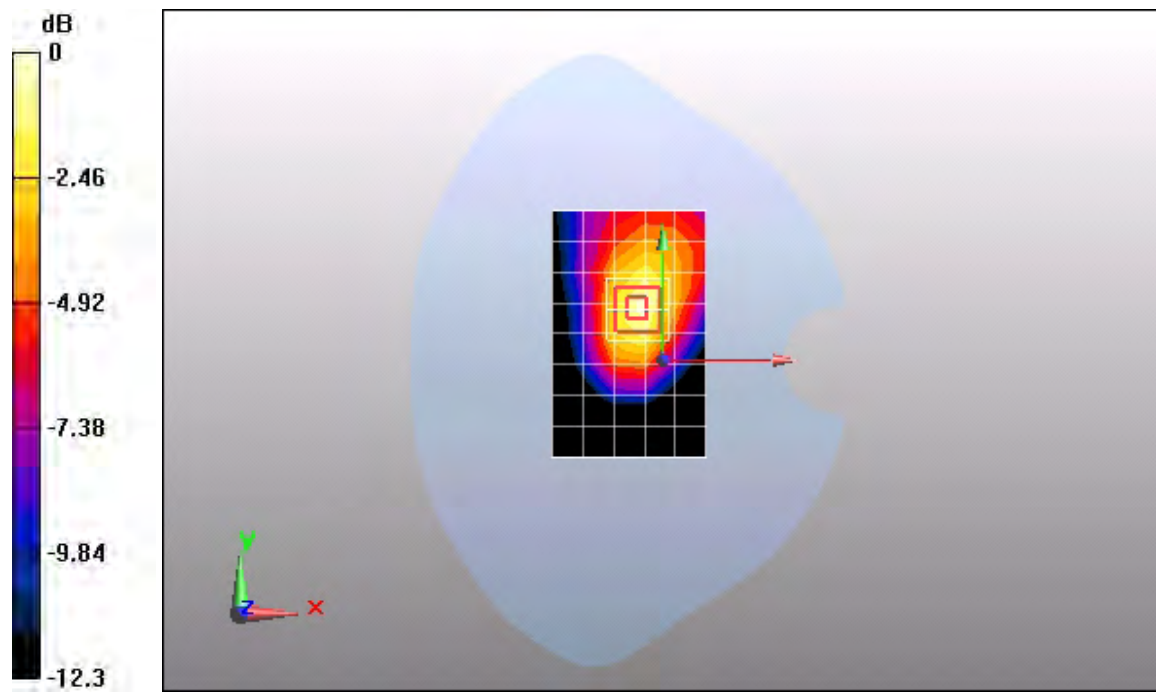
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.8 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.757 mW/g; SAR(10 g) = 0.456 mW/g

Maximum value of SAR (measured) = 0.833 mW/g



0 dB = 0.833mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 128CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 824.2 MHz

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.976 mW/g

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

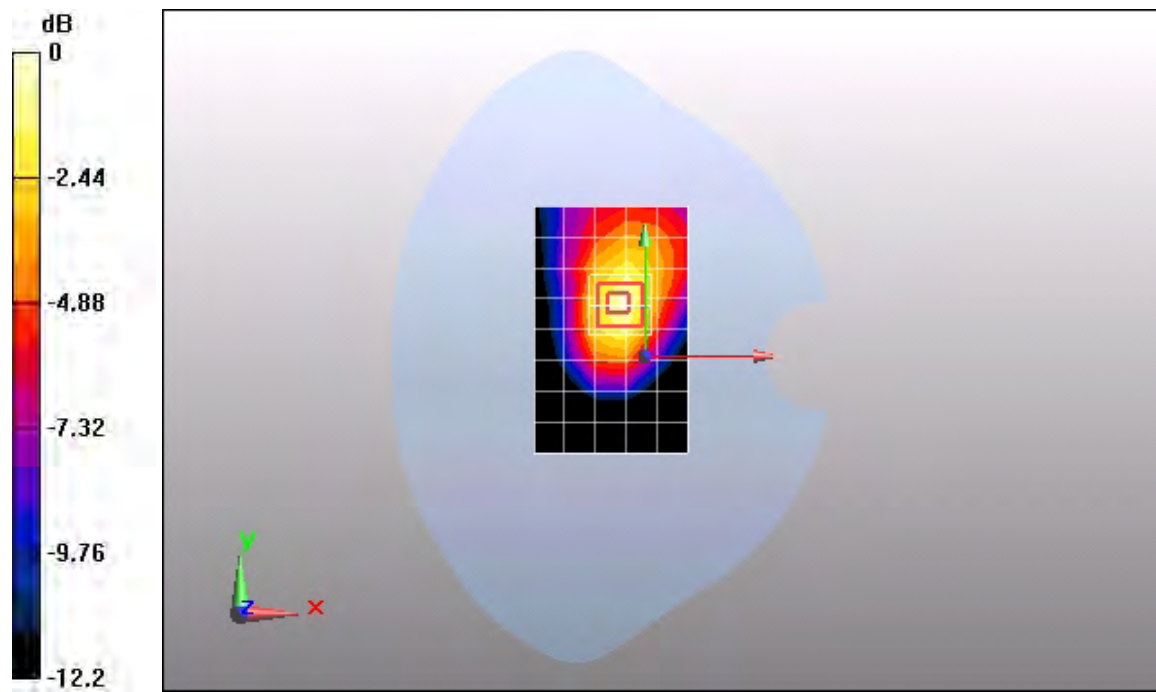
Reference Value = 22.2 V/m; Power Drift = 0.042 dB

Peak SAR (extrapolated) = 1.53 W/kg

SAR(1 g) = 0.949 mW/g; SAR(10 g) = 0.577 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 4TS 251CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 848.8 MHz

Medium parameters used: $f = 849 \text{ MHz}$; $\sigma = 0.971 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.685 mW/g

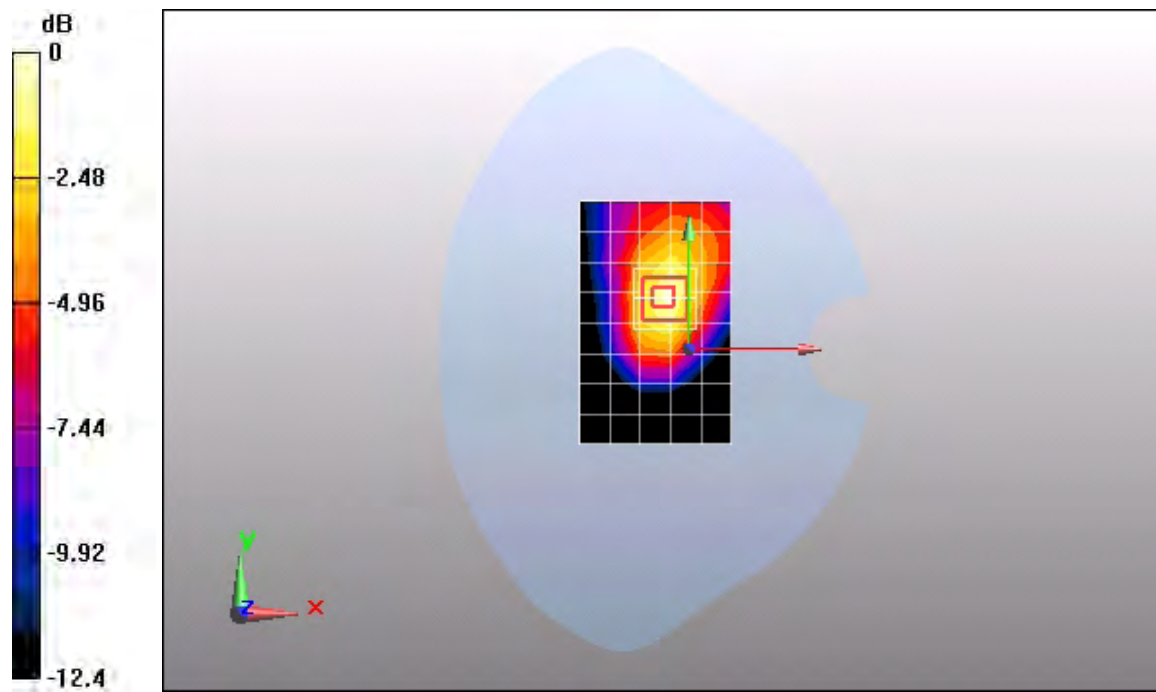
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.4 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.654 mW/g; SAR(10 g) = 0.394 mW/g

Maximum value of SAR (measured) = 0.723 mW/g



Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 4TS 128CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 824.2 MHz

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.953 mW/g

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

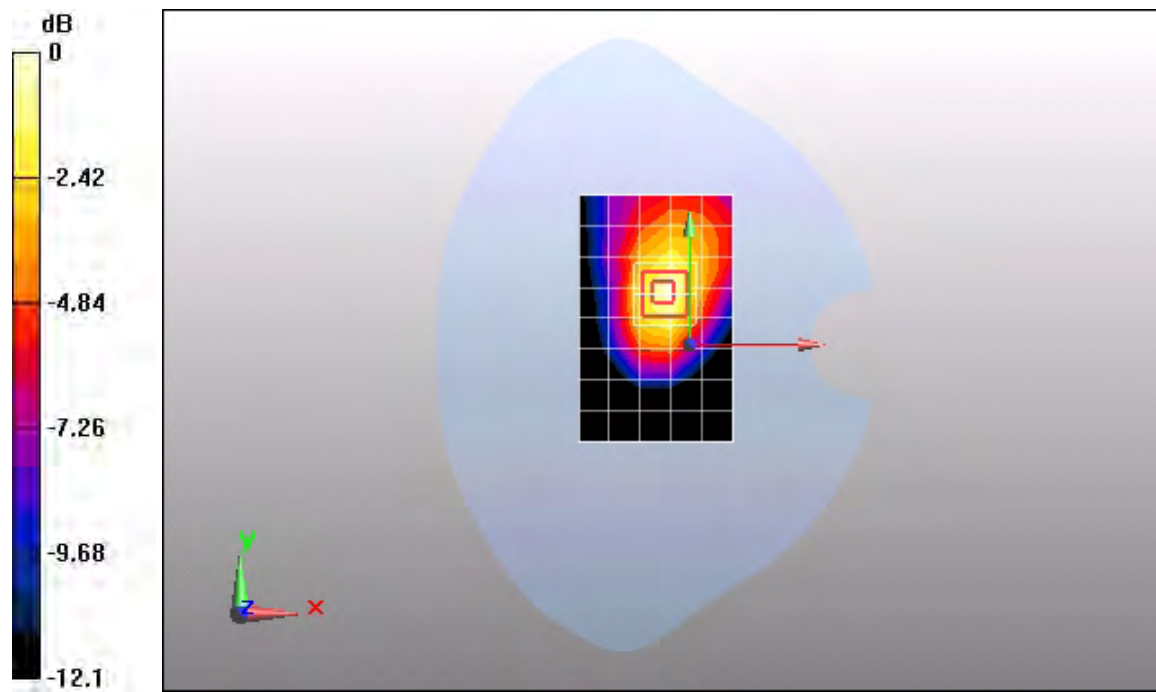
Reference Value = 21.9 V/m; Power Drift = -0.021 dB

Peak SAR (extrapolated) = 1.47 W/kg

SAR(1 g) = 0.910 mW/g; SAR(10 g) = 0.553 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.999 mW/g



0 dB = 0.999mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 251CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 848.8 MHz

Medium parameters used: $f = 849 \text{ MHz}$; $\sigma = 0.971 \text{ mho/m}$; $\epsilon_r = 52.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.01 mW/g

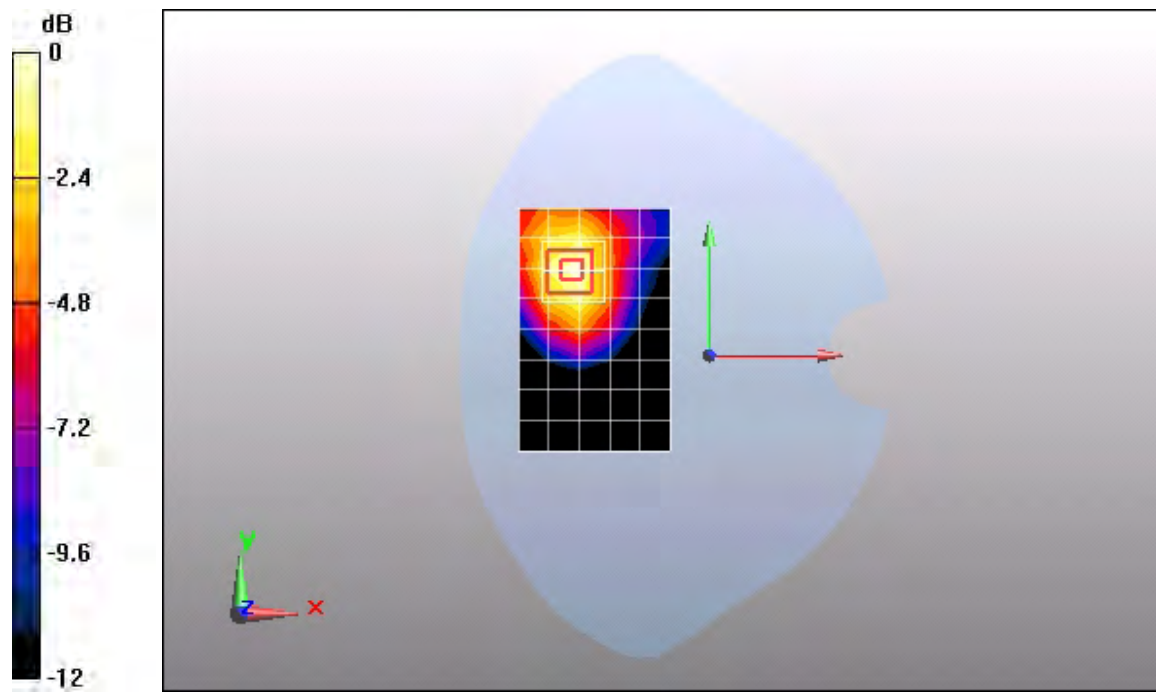
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 3.6 V/m; Power Drift = 0.175 dB

Peak SAR (extrapolated) = 1.51 W/kg

SAR(1 g) = 0.965 mW/g; SAR(10 g) = 0.601 mW/g

Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Test Laboratory: HUAWEI SAR Lab

E173z-6 GSM850 GPRS 1TS 128CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 824.2 MHz

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3753; ConvF(9.07, 9.07, 9.07); Calibrated: 12/13/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1235; Calibrated: 10/22/2010
- Phantom: SAM2; Type: SAM; Serial: TP-1474
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.05 mW/g

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

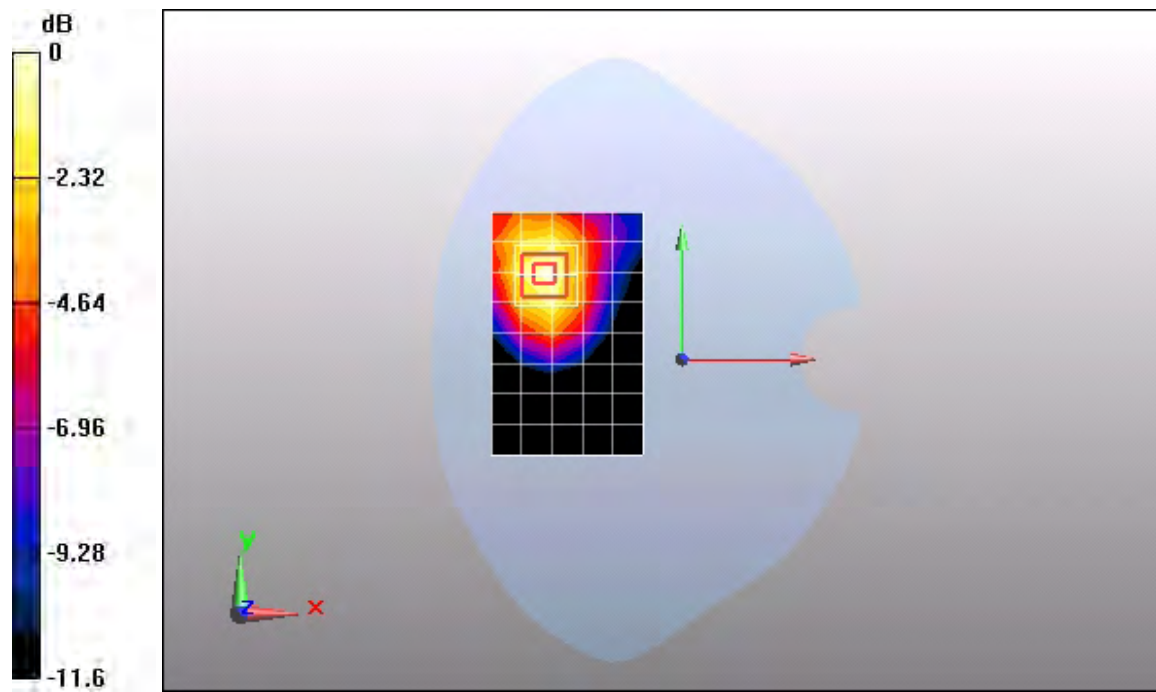
Reference Value = 3.81 V/m; Power Drift = 0.198 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 1 mW/g; SAR(10 g) = 0.631 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.09 mW/g



0 dB = 1.09mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 1TS 661CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 1TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.671 mW/g

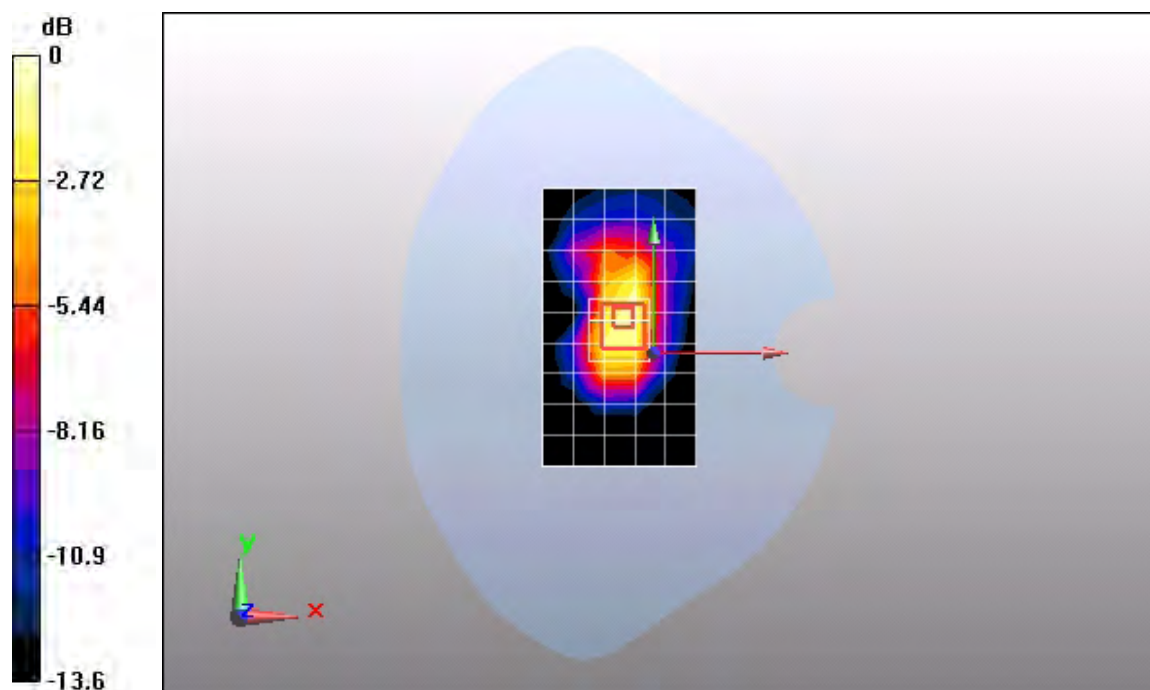
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.4 V/m; Power Drift = -0.108 dB

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.728 mW/g; SAR(10 g) = 0.408 mW/g

Maximum value of SAR (measured) = 0.809 mW/g



0 dB = 0.809mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 2TS 661CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 2TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.673 mW/g

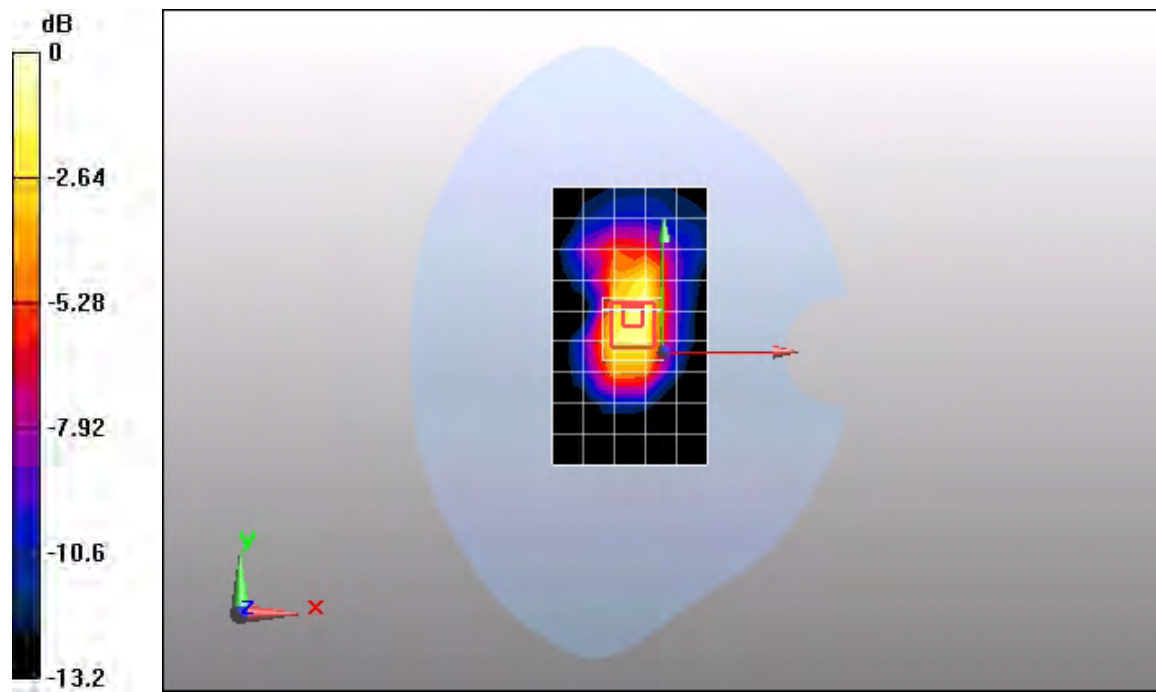
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.3 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 1.3 W/kg

SAR(1 g) = 0.730 mW/g; SAR(10 g) = 0.408 mW/g

Maximum value of SAR (measured) = 0.814 mW/g



0 dB = 0.814mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 3TS 661CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 3TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.635 mW/g

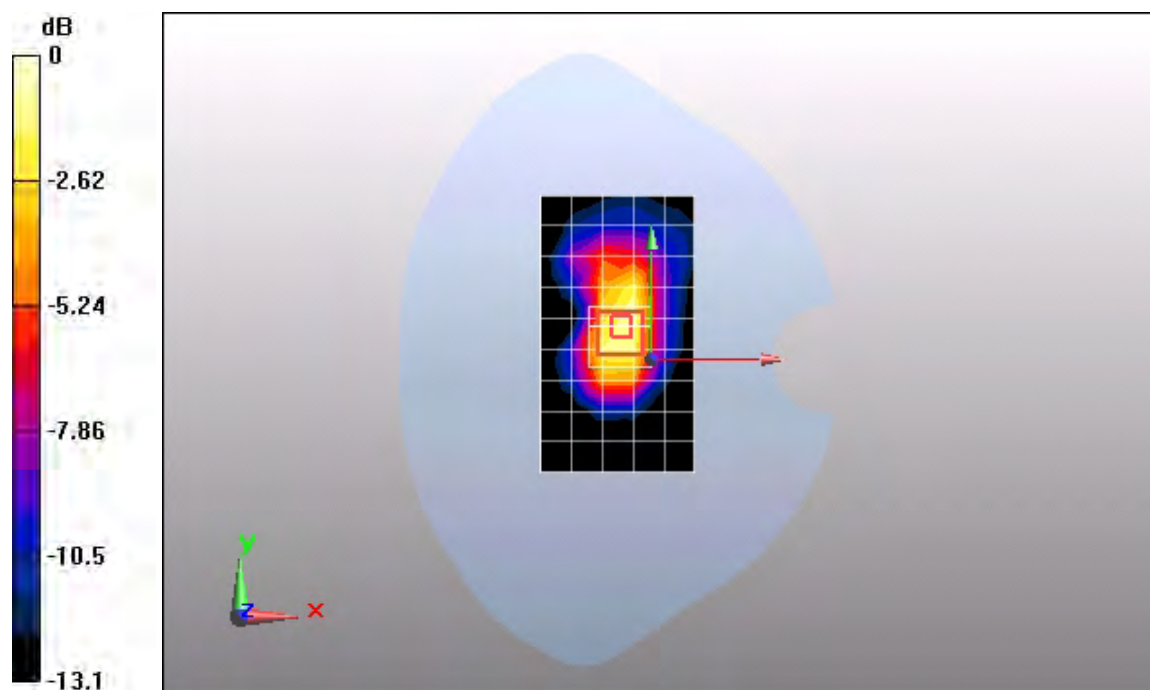
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.9 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.689 mW/g; SAR(10 g) = 0.388 mW/g

Maximum value of SAR (measured) = 0.771 mW/g



0 dB = 0.771mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 4TS 661CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.679 mW/g

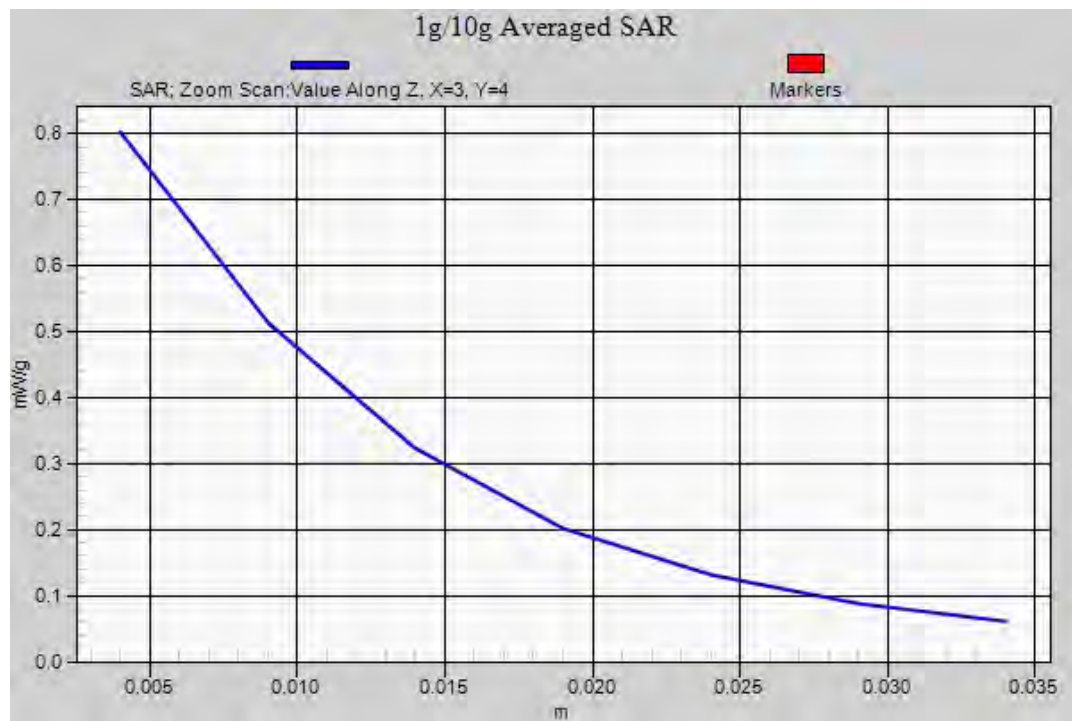
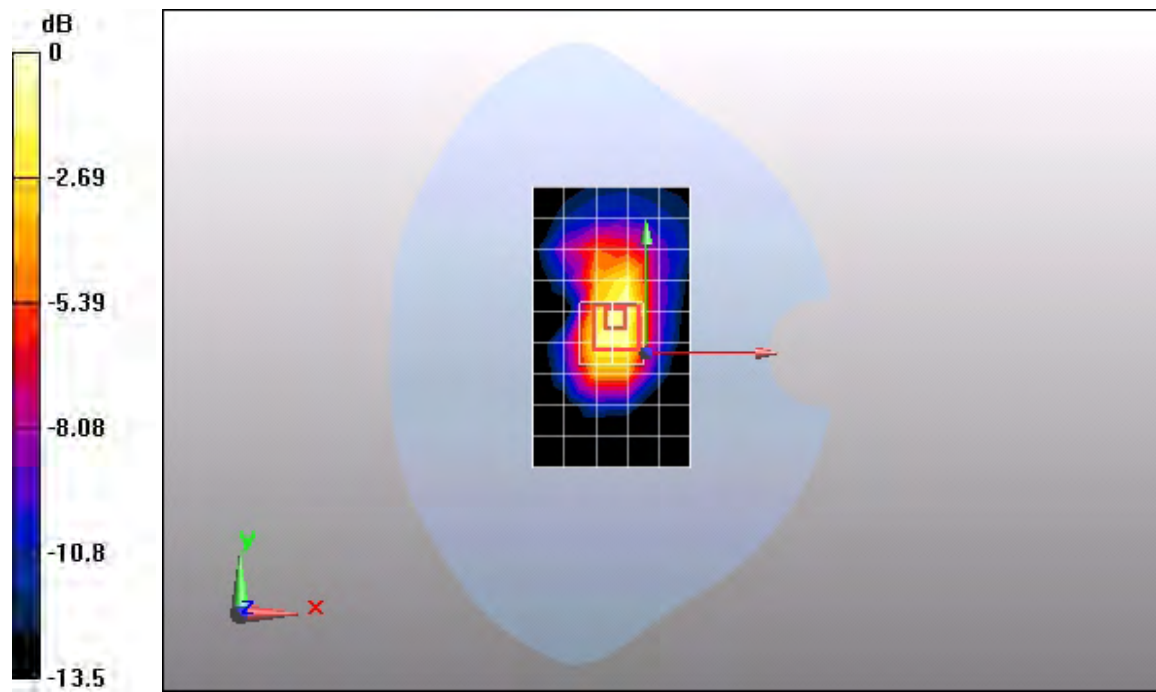
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.5 V/m; Power Drift = 0.00127 dB

Peak SAR (extrapolated) = 1.29 W/kg

SAR(1 g) = 0.733 mW/g; SAR(10 g) = 0.410 mW/g

Maximum value of SAR (measured) = 0.802 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 4TS 661CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.654 mW/g

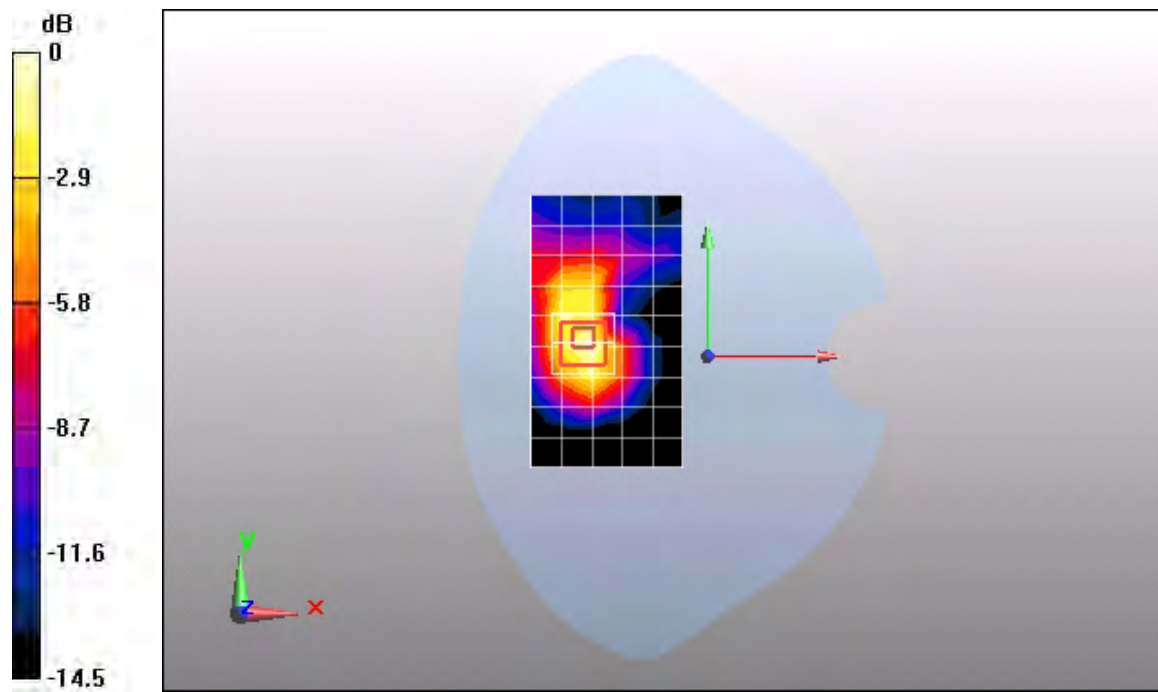
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.09 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.629 mW/g; SAR(10 g) = 0.360 mW/g

Maximum value of SAR (measured) = 0.696 mW/g



0 dB = 0.696mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 4TS 661CH Left side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.633 mW/g

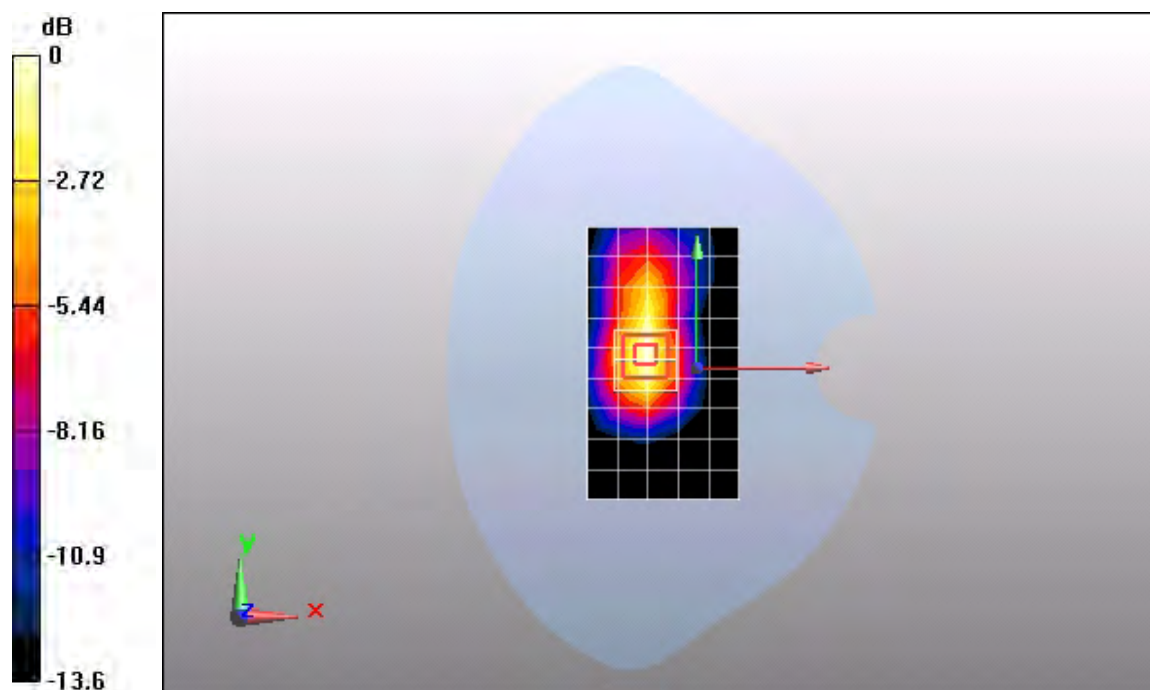
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.2 V/m; Power Drift = 0.00625 dB

Peak SAR (extrapolated) = 0.991 W/kg

SAR(1 g) = 0.586 mW/g; SAR(10 g) = 0.325 mW/g

Maximum value of SAR (measured) = 0.653 mW/g



0 dB = 0.653mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 4TS 661CH Right side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.248 mW/g

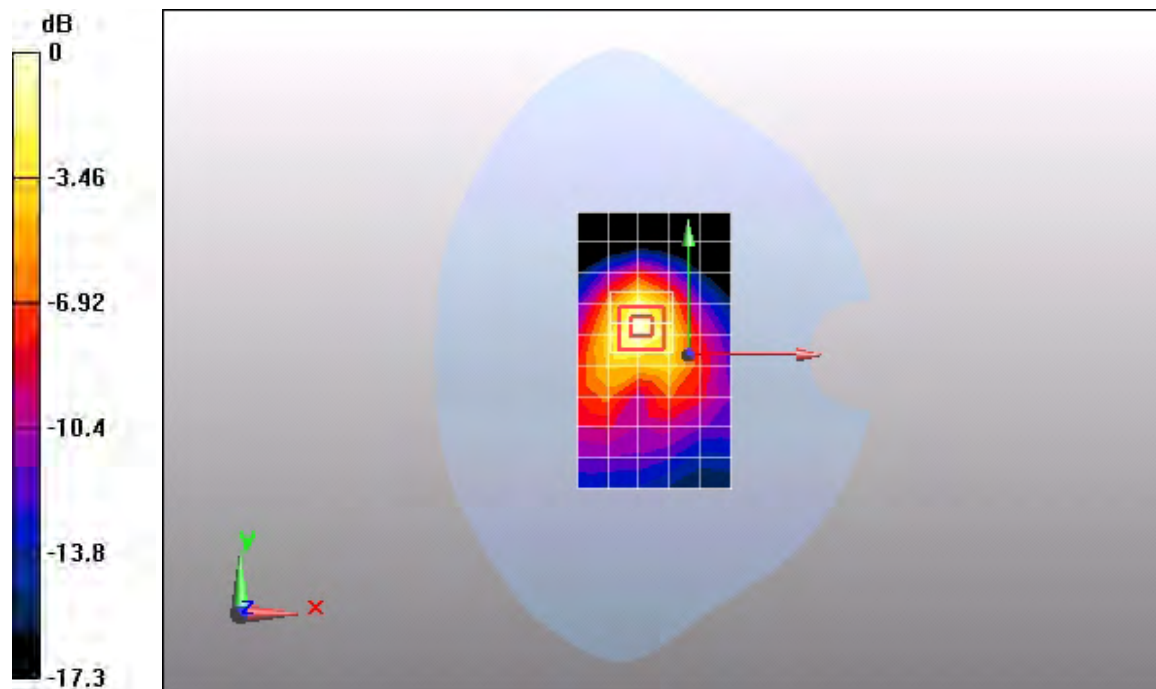
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.2 V/m; Power Drift = -0.092 dB

Peak SAR (extrapolated) = 0.405 W/kg

SAR(1 g) = 0.231 mW/g; SAR(10 g) = 0.126 mW/g

Maximum value of SAR (measured) = 0.257 mW/g



0 dB = 0.257mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 GSM1900 GPRS 4TS 661CH Top side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -GSM/GPRS/EDGE 4TS; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.033 mW/g

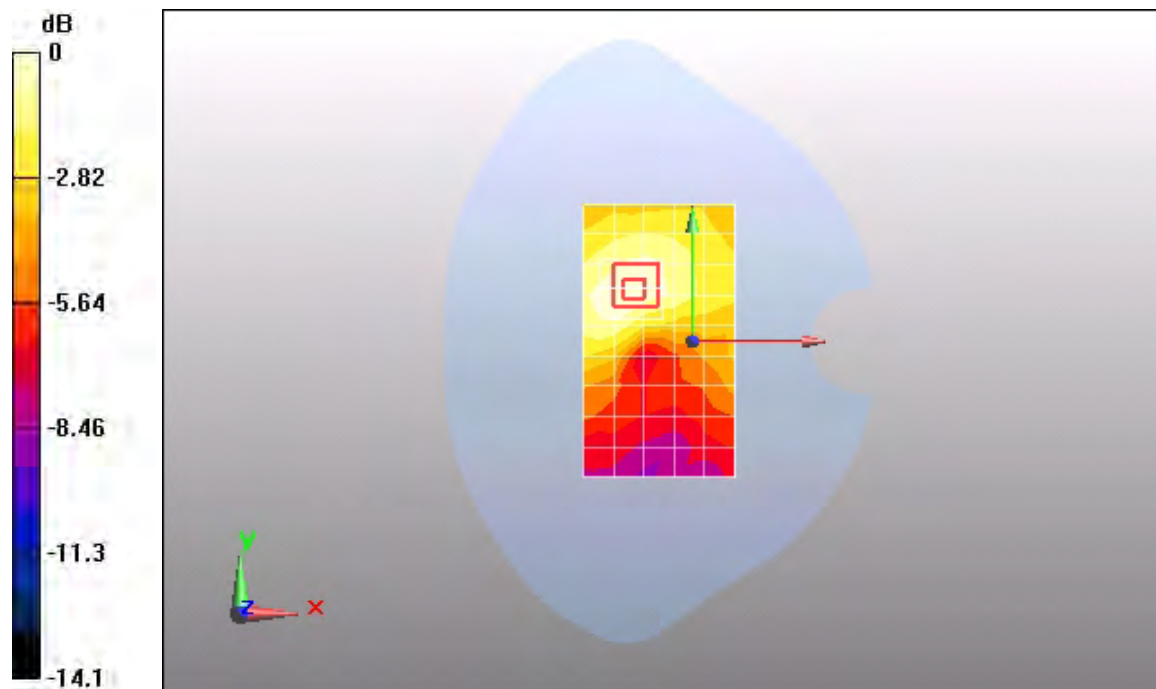
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.55 V/m; Power Drift = 0.060 dB

Peak SAR (extrapolated) = 0.054 W/kg

SAR(1 g) = 0.033 mW/g; SAR(10 g) = 0.022 mW/g

Maximum value of SAR (measured) = 0.035 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.965 mW/g

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

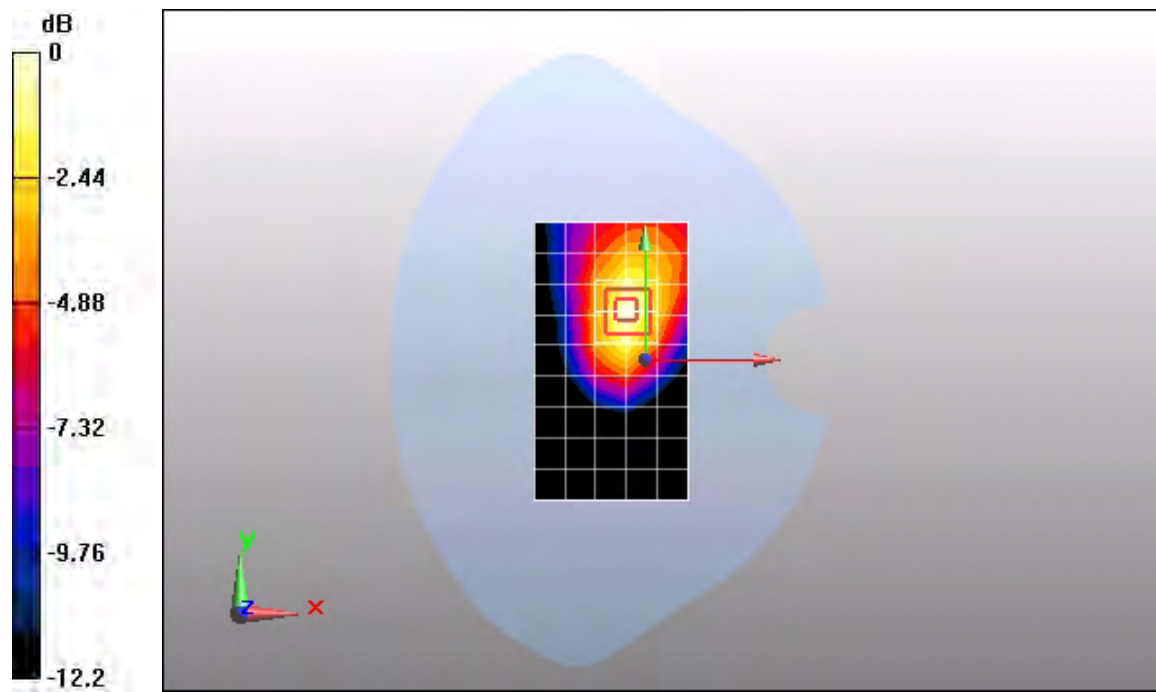
Reference Value = 21.6 V/m; Power Drift = -0.080 dB

Peak SAR (extrapolated) = 1.41 W/kg

SAR(1 g) = 0.870 mW/g; SAR(10 g) = 0.526 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.955 mW/g



0 dB = 0.955mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.980 mW/g

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

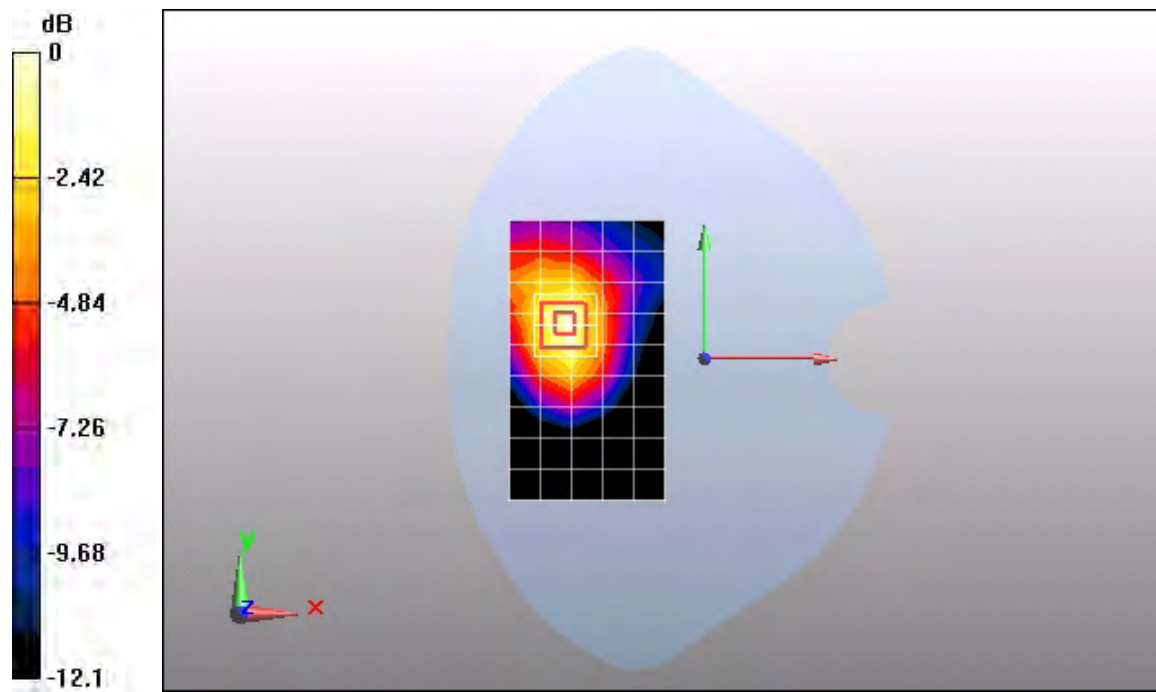
Reference Value = 5.12 V/m; Power Drift = 0.142 dB

Peak SAR (extrapolated) = 1.5 W/kg

SAR(1 g) = 0.948 mW/g; SAR(10 g) = 0.588 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Left side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.376 mW/g

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

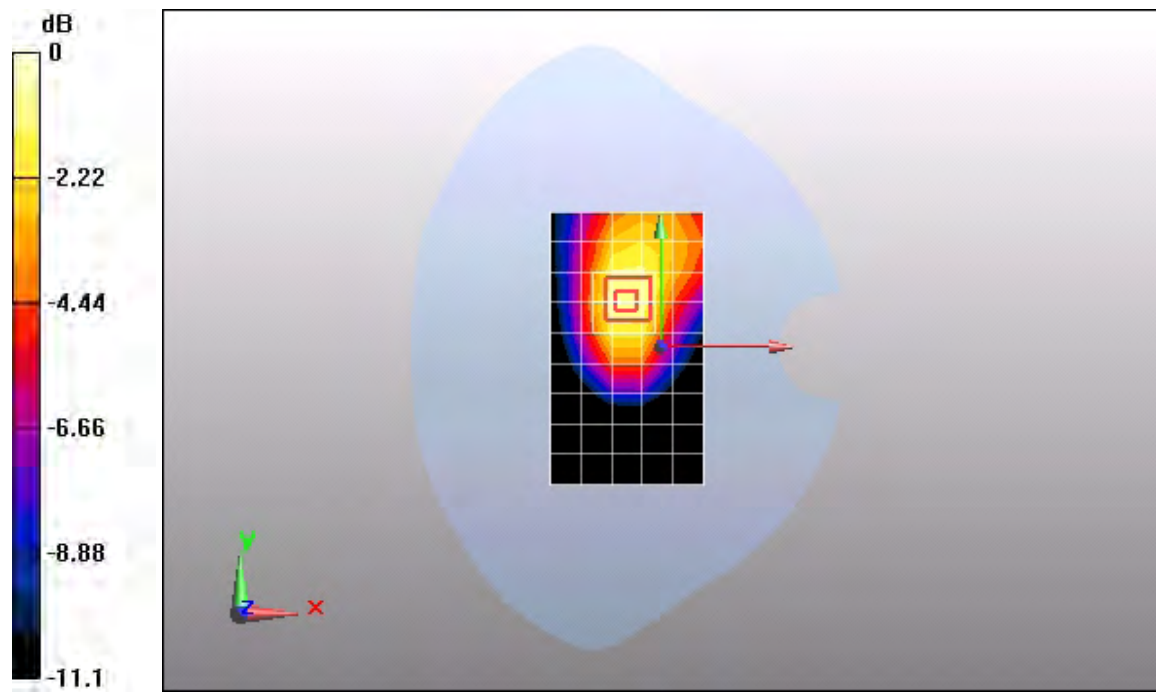
Reference Value = 17.3 V/m; Power Drift = -0.178 dB

Peak SAR (extrapolated) = 0.631 W/kg

SAR(1 g) = 0.397 mW/g; SAR(10 g) = 0.248 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.436 mW/g



0 dB = 0.436mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Right side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.386 mW/g

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

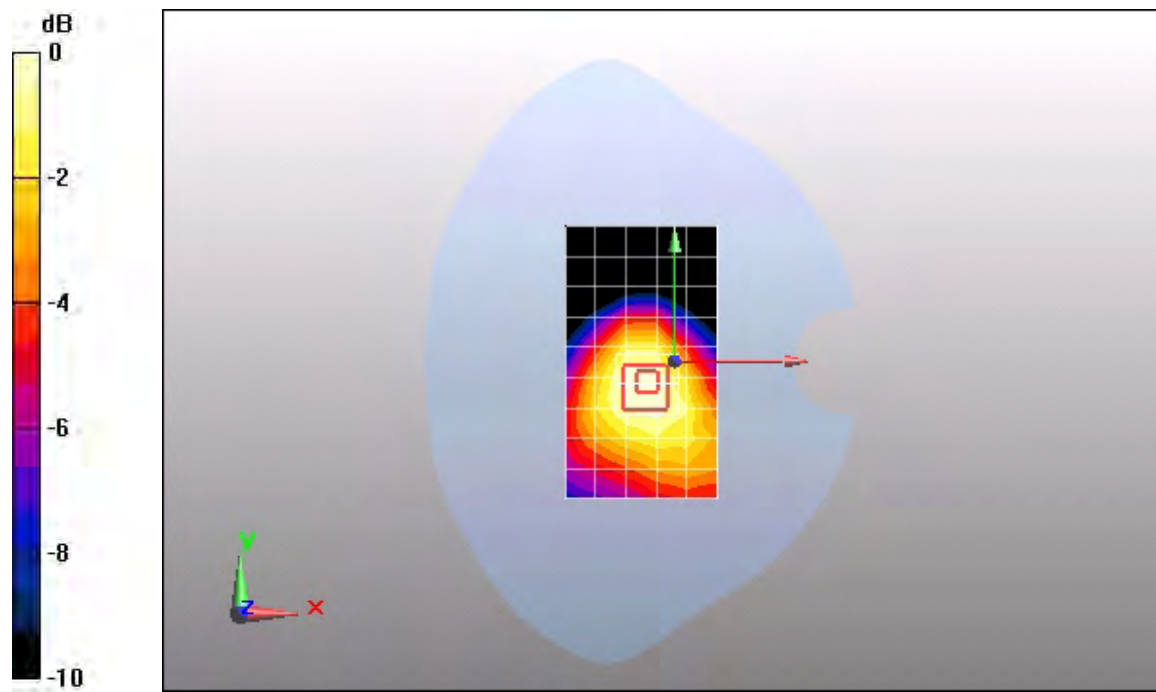
Reference Value = 19.9 V/m; Power Drift = -0.199 dB

Peak SAR (extrapolated) = 0.549 W/kg

SAR(1 g) = 0.364 mW/g; SAR(10 g) = 0.247 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.387 mW/g



0 dB = 0.387mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Top side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.027 mW/g

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

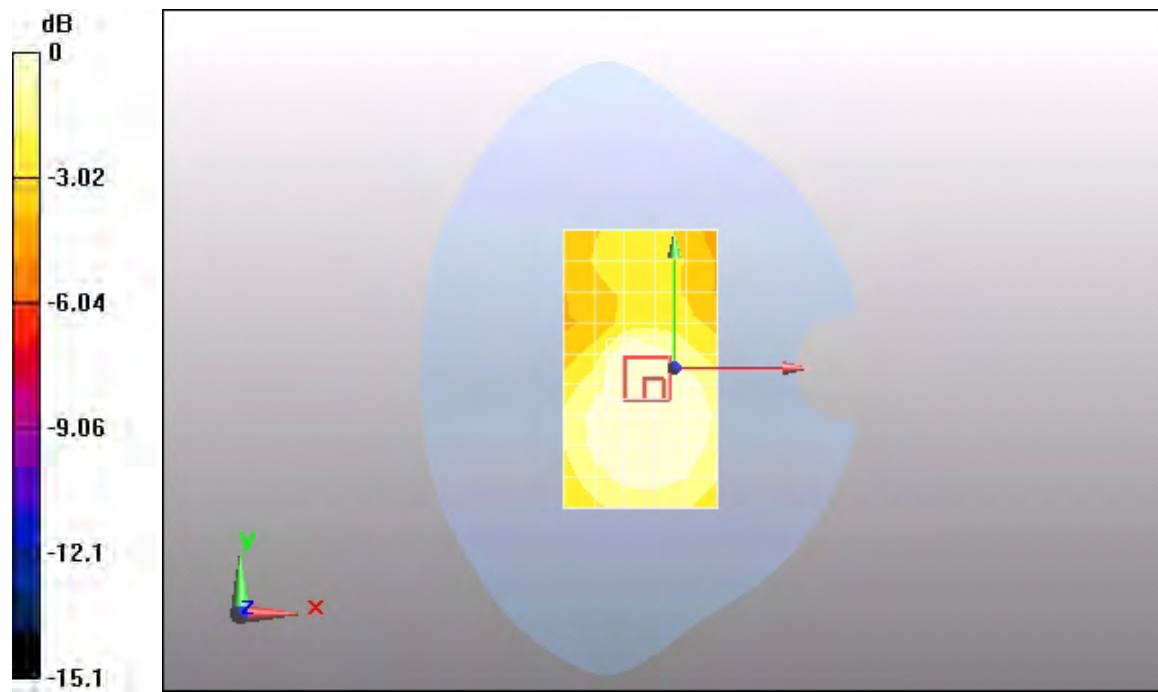
Reference Value = 5.12 V/m; Power Drift = -0.100 dB

Peak SAR (extrapolated) = 0.042 W/kg

SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.015 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.024 mW/g



0 dB = 0.024mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4233CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 846.6 MHz

Medium parameters used: $f = 847$ MHz; $\sigma = 0.967$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.788 mW/g

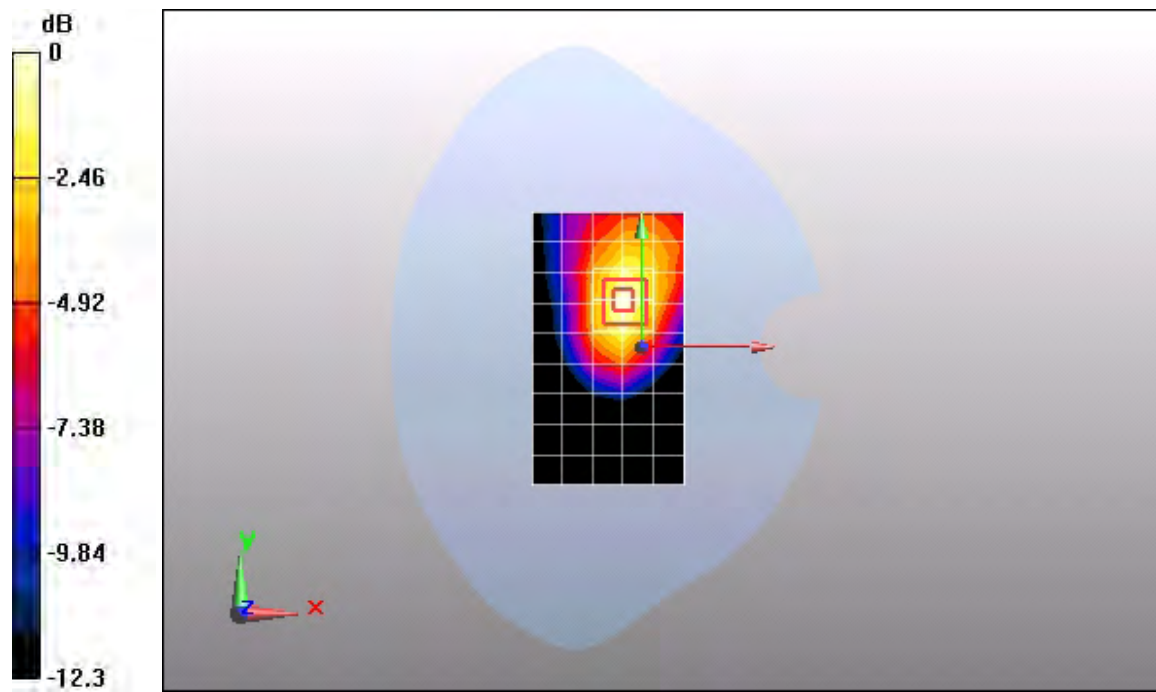
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.9 V/m; Power Drift = -0.029 dB

Peak SAR (extrapolated) = 1.17 W/kg

SAR(1 g) = 0.717 mW/g; SAR(10 g) = 0.433 mW/g

Maximum value of SAR (measured) = 0.784 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4132CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 826.4 MHz

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.957$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.883 mW/g

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

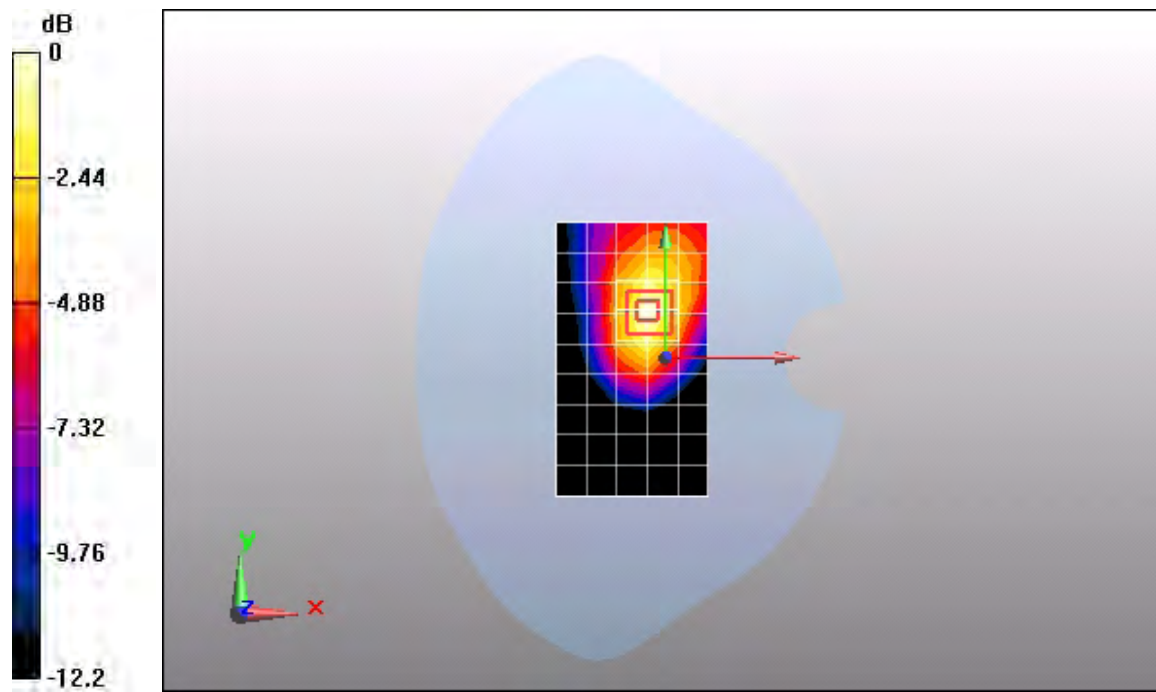
Reference Value = 21.2 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.809 mW/g; SAR(10 g) = 0.490 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.888 mW/g



0 dB = 0.888mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4233CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 846.6 MHz

Medium parameters used: $f = 847$ MHz; $\sigma = 0.967$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.948 mW/g

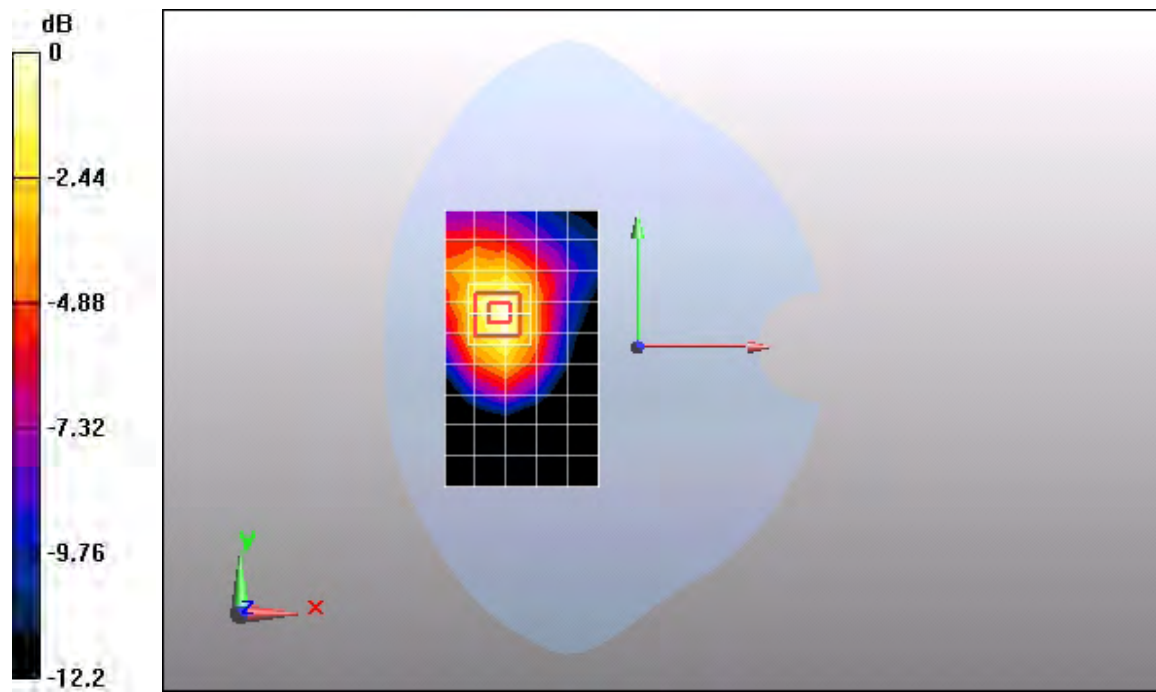
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.13 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 0.927 mW/g; SAR(10 g) = 0.576 mW/g

Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.01mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4132CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 826.4 MHz

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.957$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.886 mW/g

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

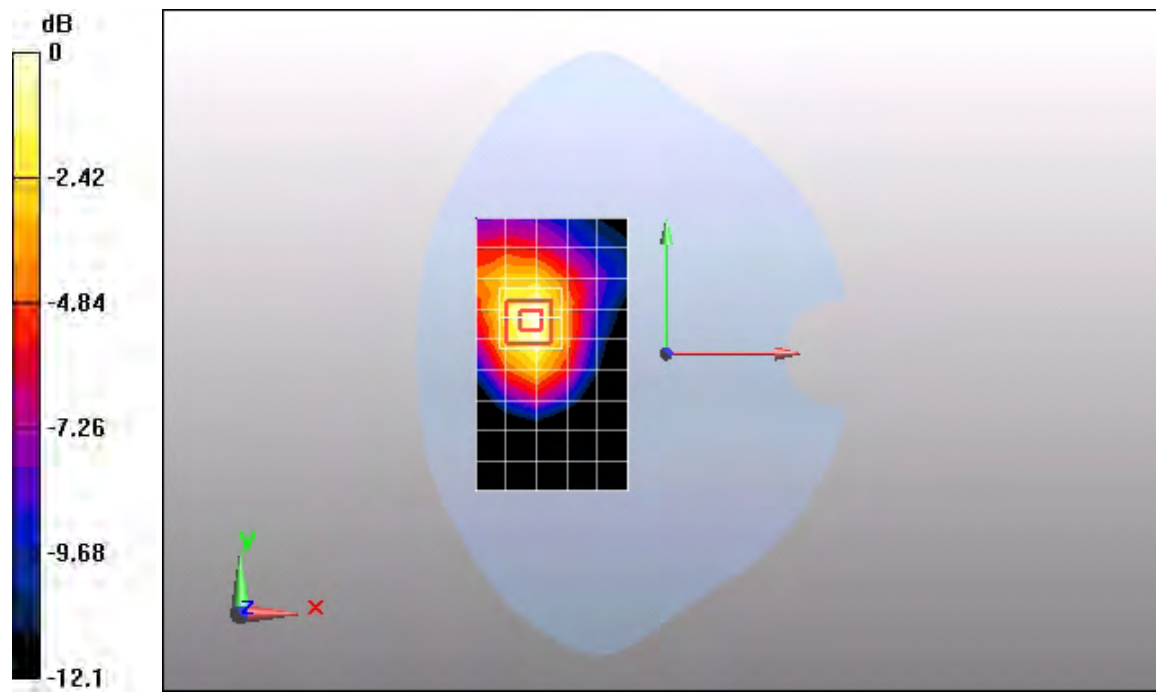
Reference Value = 5.05 V/m; Power Drift = -0.080 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.858 mW/g; SAR(10 g) = 0.534 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.937 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Rear side 5mm with HSDPA

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.884 mW/g

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

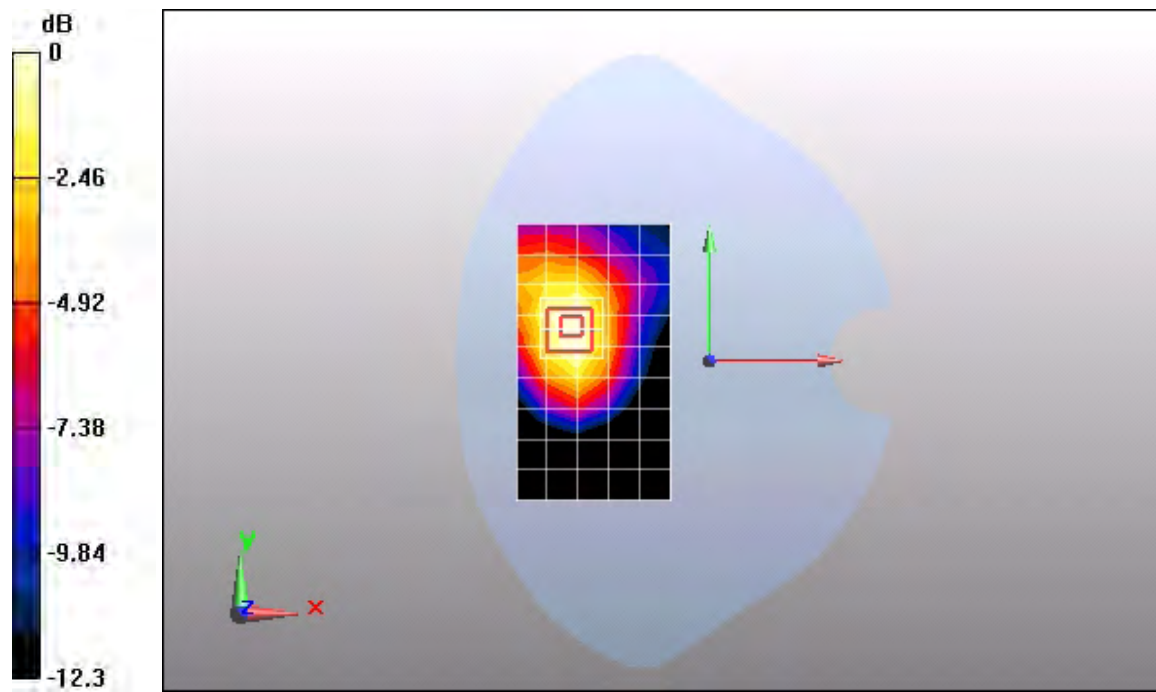
Reference Value = 4.9 V/m; Power Drift = -0.078 dB

Peak SAR (extrapolated) = 1.17 W/kg

SAR(1 g) = 0.746 mW/g; SAR(10 g) = 0.464 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.814 mW/g



0 dB = 0.814mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA850 4182CH Rear side 5mm with HSUPA

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 836.4 MHz

Medium parameters used (interpolated): $f = 836.4$ MHz; $\sigma = 0.982$ mho/m; $\epsilon_r = 53.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(6.03, 6.03, 6.03); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM4; Type: SAM; Serial: TP-1620
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.967 mW/g

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

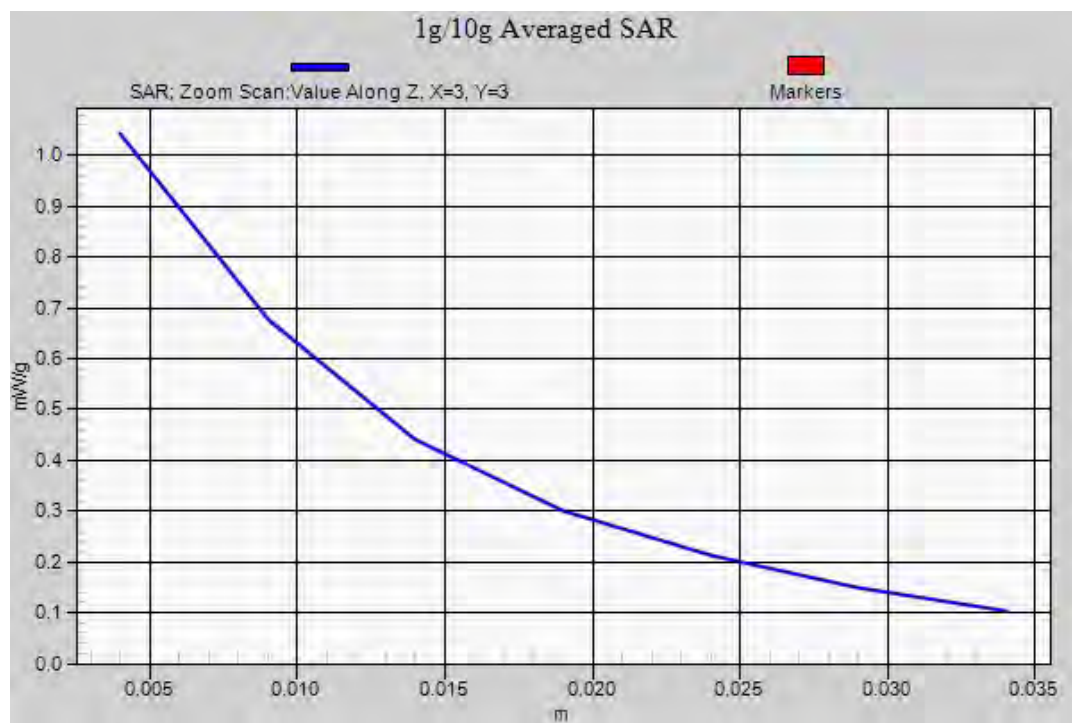
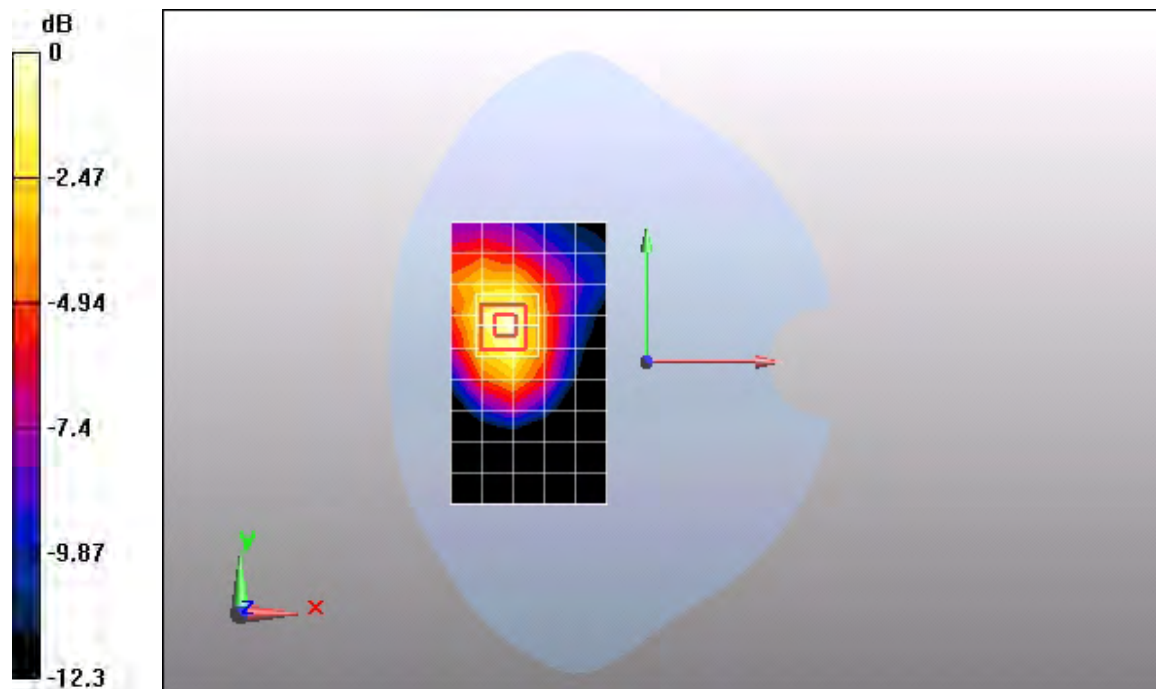
Reference Value = 4.93 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 1.49 W/kg

SAR(1 g) = 0.950 mW/g; SAR(10 g) = 0.587 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.04 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.854 mW/g

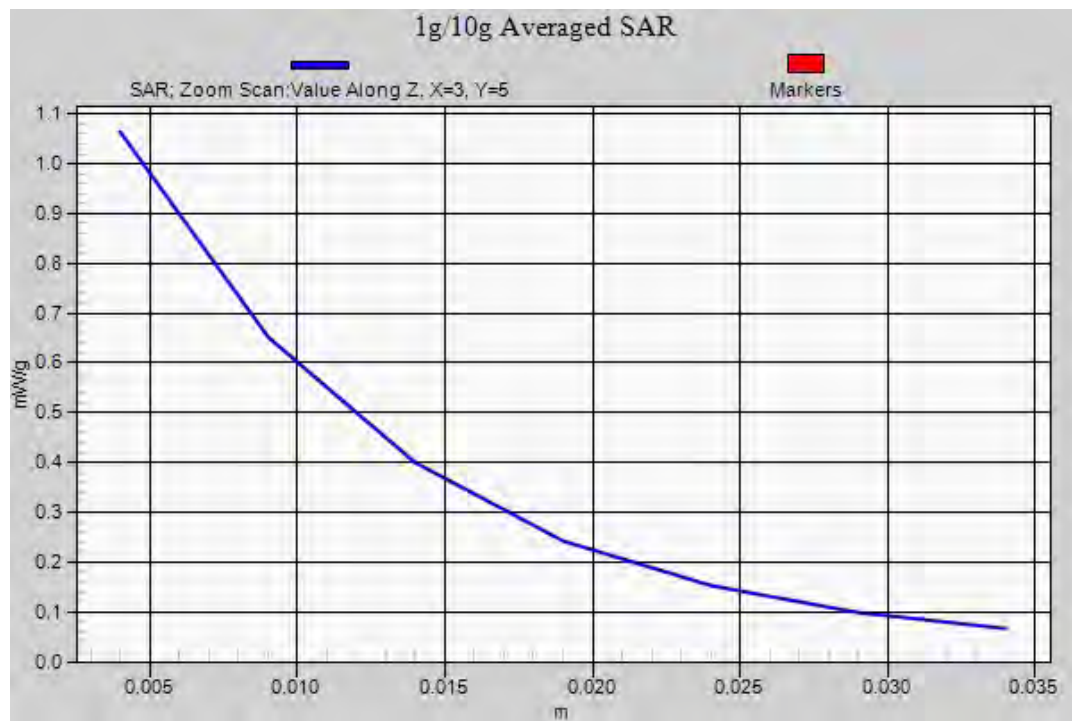
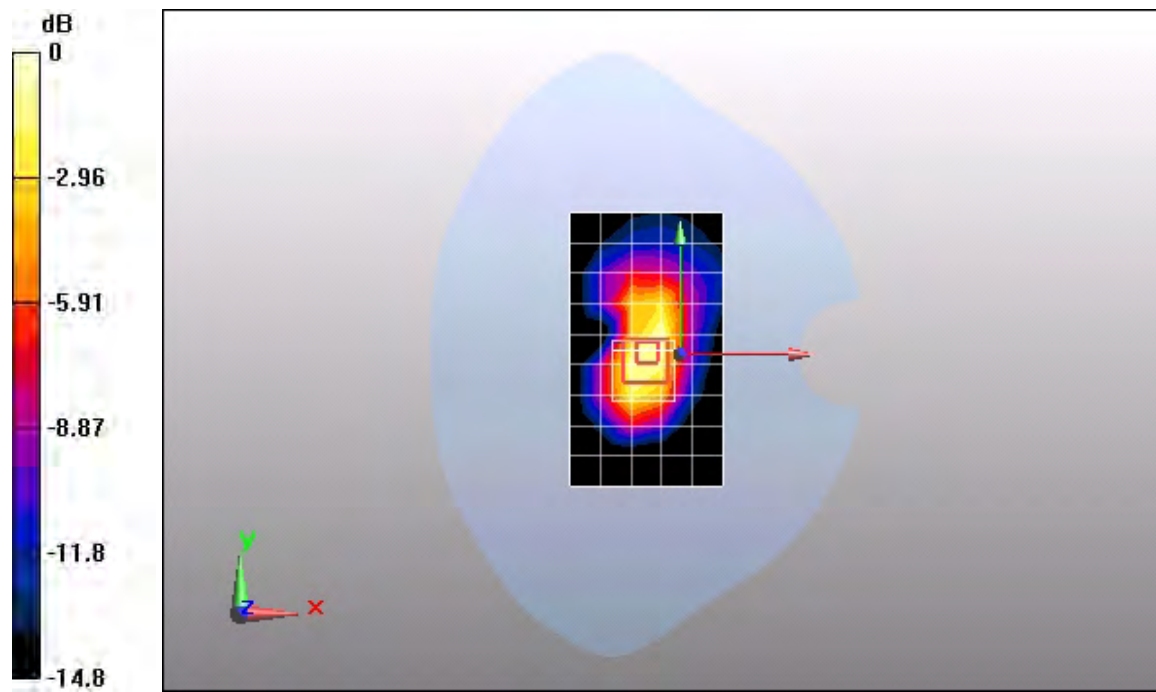
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 27.7 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 1.69 W/kg

SAR(1 g) = 0.970 mW/g; SAR(10 g) = 0.541 mW/g

Maximum value of SAR (measured) = 1.06 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.802 mW/g

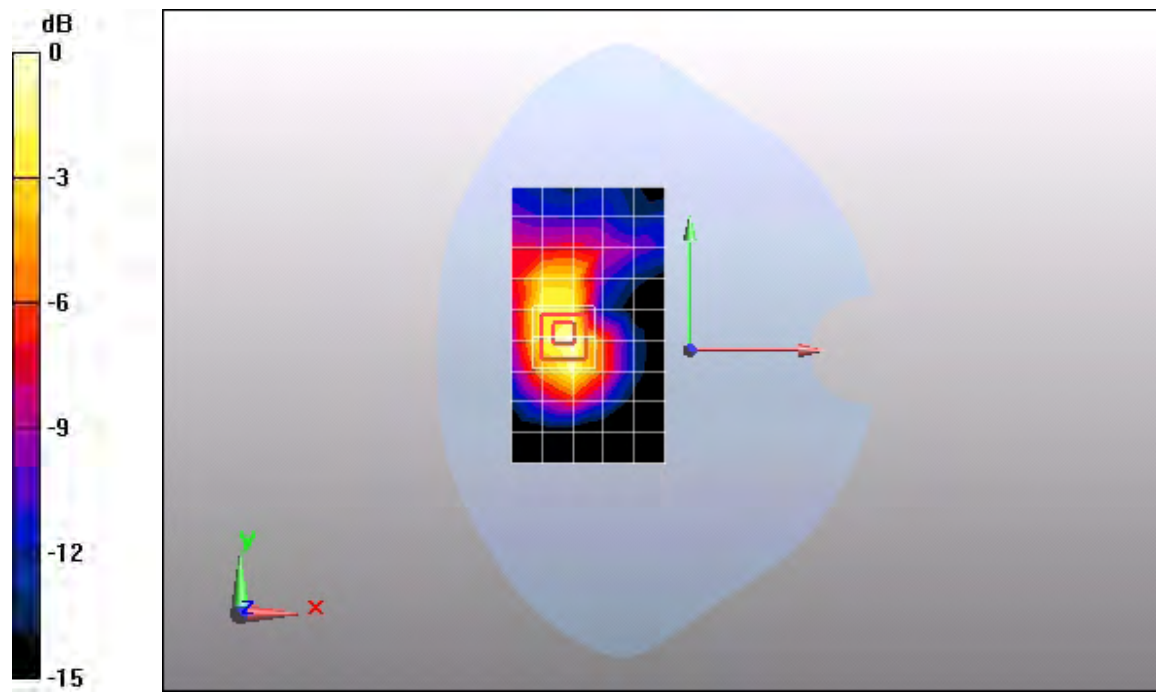
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.24 V/m; Power Drift = 0.095 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.802 mW/g; SAR(10 g) = 0.459 mW/g

Maximum value of SAR (measured) = 0.885 mW/g



0 dB = 0.885mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Left side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.793 mW/g

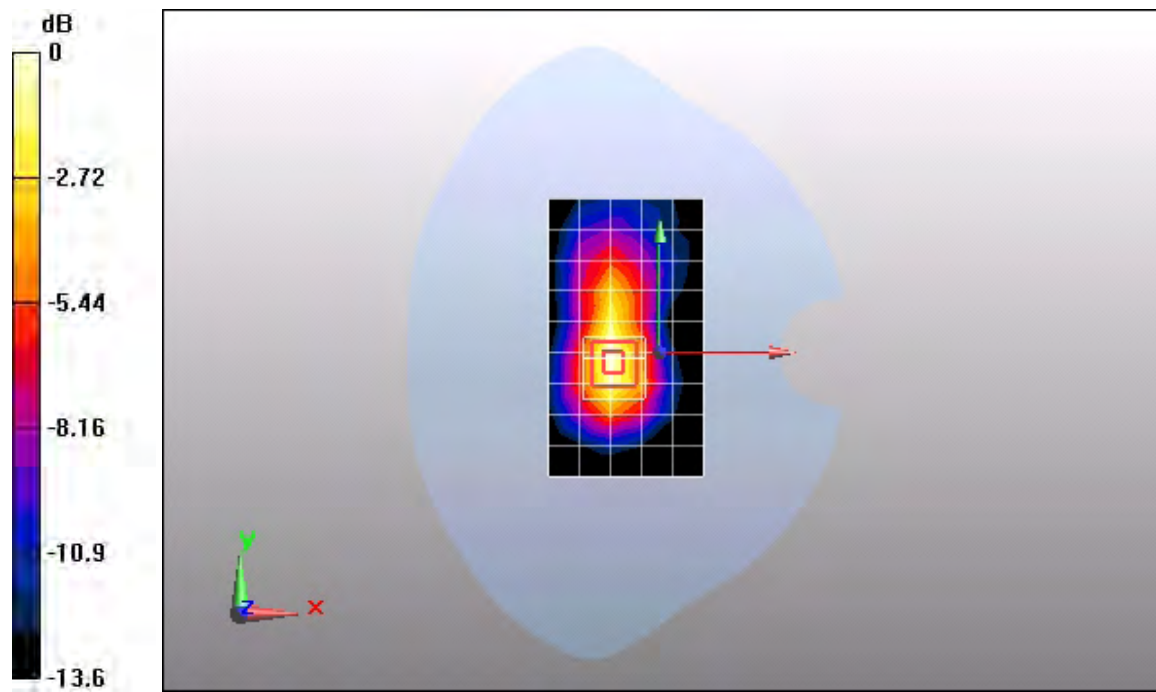
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.6 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.729 mW/g; SAR(10 g) = 0.405 mW/g

Maximum value of SAR (measured) = 0.809 mW/g



0 dB = 0.809mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Right side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.351 mW/g

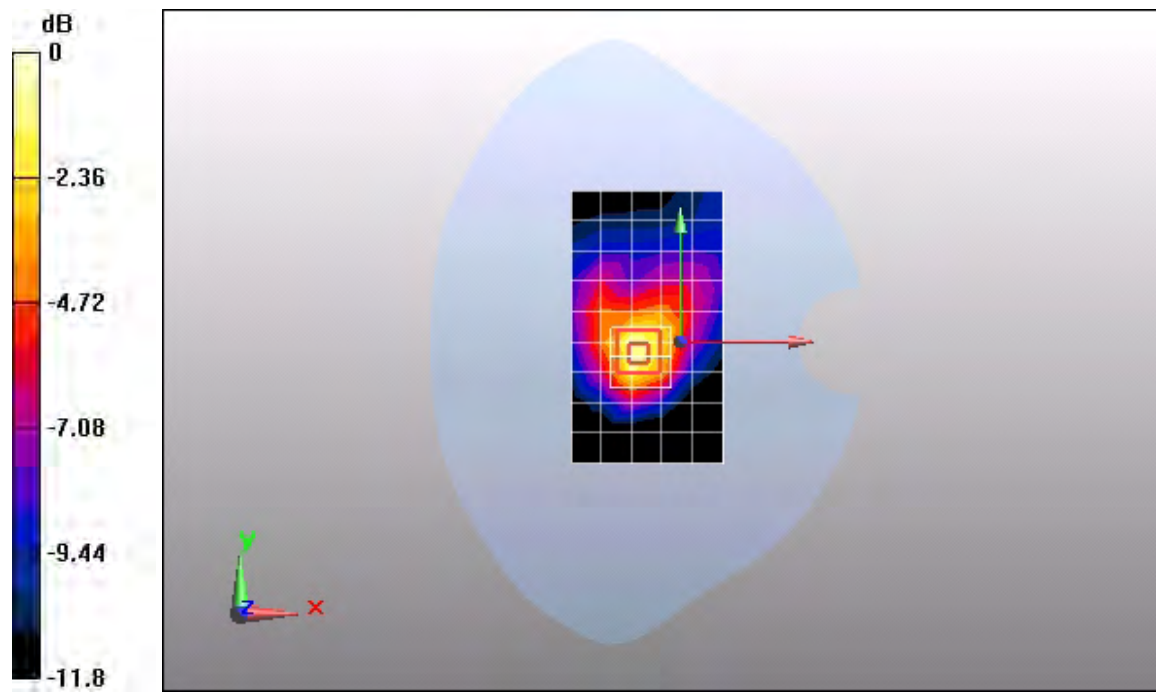
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.6 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 0.636 W/kg

SAR(1 g) = 0.367 mW/g; SAR(10 g) = 0.207 mW/g

Maximum value of SAR (measured) = 0.405 mW/g



0 dB = 0.405mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Top side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.050 mW/g

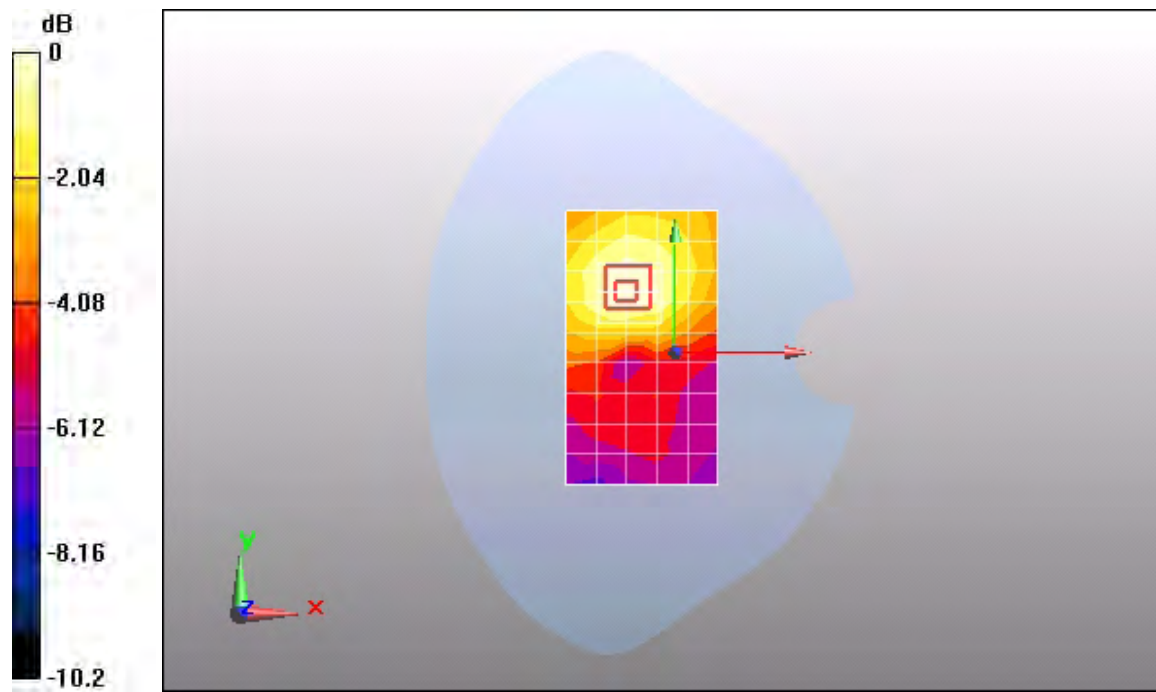
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.29 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 0.072 W/kg

SAR(1 g) = 0.048 mW/g; SAR(10 g) = 0.032 mW/g

Maximum value of SAR (measured) = 0.051 mW/g



Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9538CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1907.6 MHz

Medium parameters used: $f = 1908$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 51.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.818 mW/g

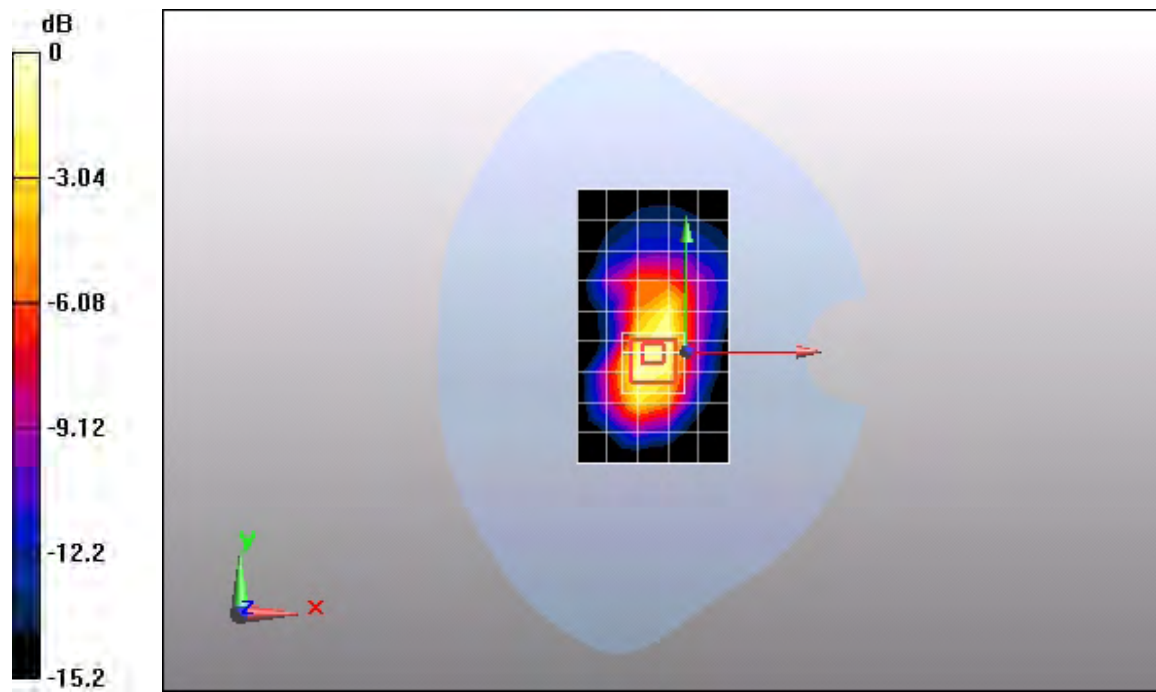
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.1 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 1.54 W/kg

SAR(1 g) = 0.898 mW/g; SAR(10 g) = 0.507 mW/g

Maximum value of SAR (measured) = 1 mW/g



0 dB = 1mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9262CH Front side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1852.4 MHz

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.785 mW/g

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

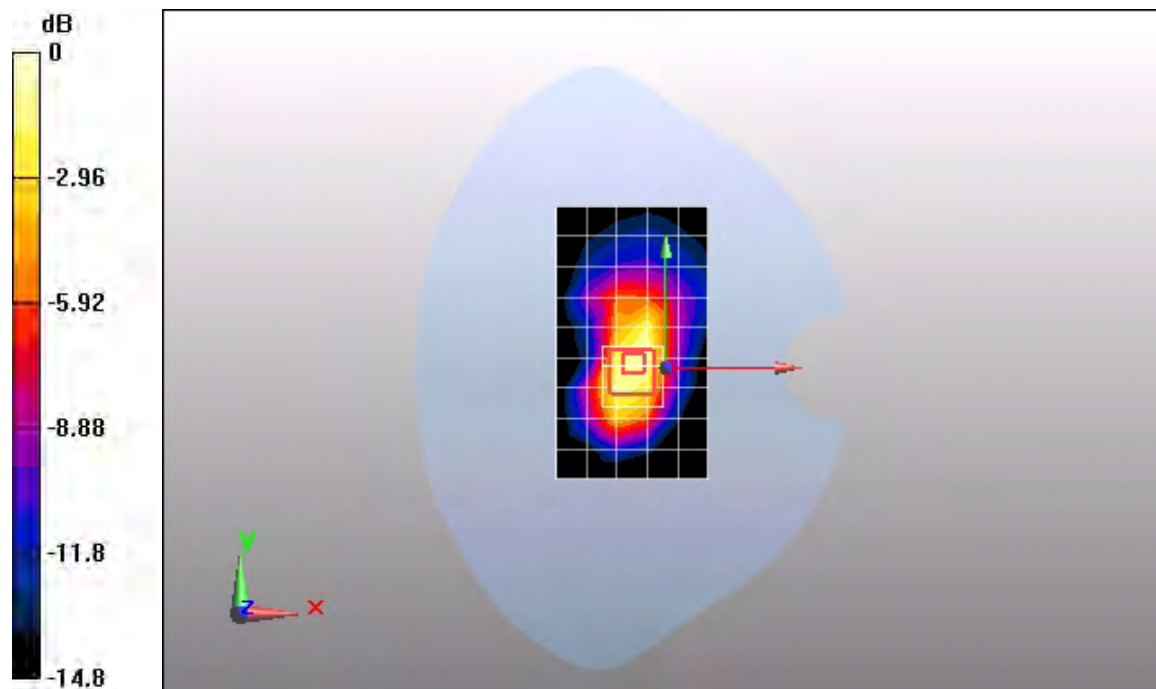
Reference Value = 26.5 V/m; Power Drift = -0.033 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.894 mW/g; SAR(10 g) = 0.498 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 1.000 mW/g



0 dB = 1mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9538CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1907.6 MHz

Medium parameters used: $f = 1908$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 51.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.689 mW/g

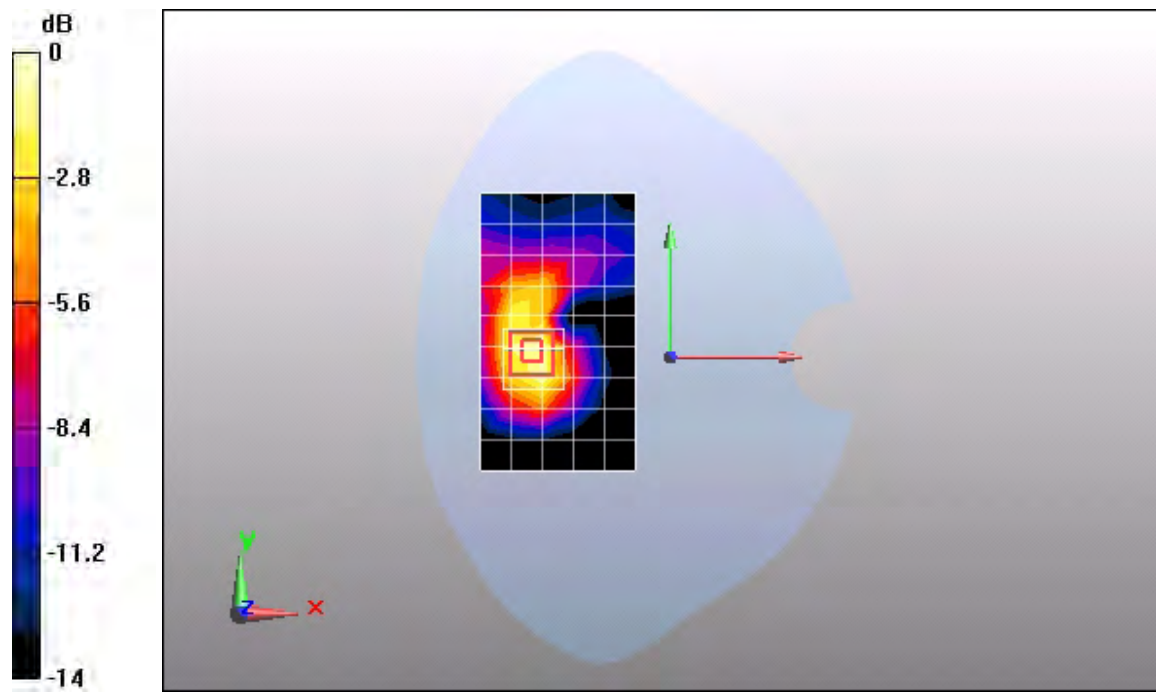
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.05 V/m; Power Drift = 0.00518 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.728 mW/g; SAR(10 g) = 0.417 mW/g

Maximum value of SAR (measured) = 0.806 mW/g



0 dB = 0.806mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9262CH Rear side 5mm

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1852.4 MHz

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.47$ mho/m; $\epsilon_r = 51.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.682 mW/g

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

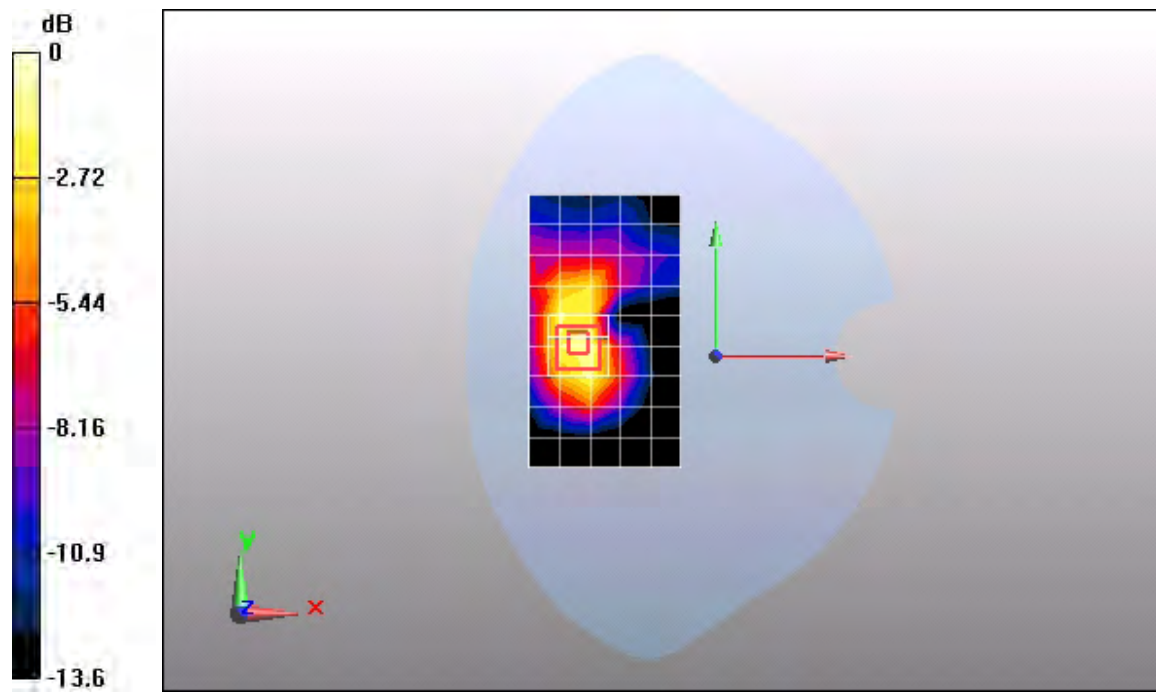
Reference Value = 4.09 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 1.2 W/kg

SAR(1 g) = 0.713 mW/g; SAR(10 g) = 0.409 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.790 mW/g



0 dB = 0.790mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Front side 5mm with HSDPA

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.821 mW/g

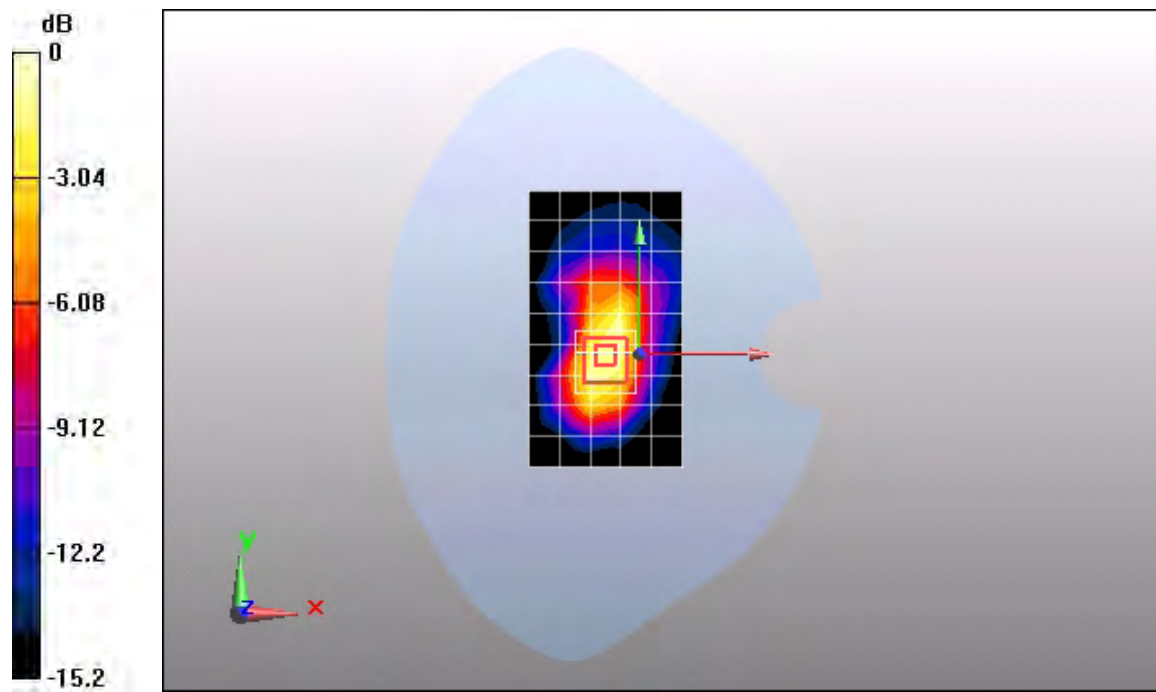
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.8 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 1.65 W/kg

SAR(1 g) = 0.936 mW/g; SAR(10 g) = 0.524 mW/g

Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Test Laboratory: Huawei SAR Lab

E173z-6 WCDMA1900 9400CH Front side 5mm with HSUPA

DUT: E173z-6; Type: HSPA USB Stick; Serial: D8Z2A11172700171

Communication System: HW -UMTS-FDD; Frequency: 1880 MHz

Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.5 \text{ mho/m}$; $\epsilon_r = 51.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3254; ConvF(4.73, 4.73, 4.73); Calibrated: 3/11/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1236; Calibrated: 10/26/2010
- Phantom: SAM3; Type: SAM; Serial: TP-1597
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

Configuration/Body/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.684 mW/g

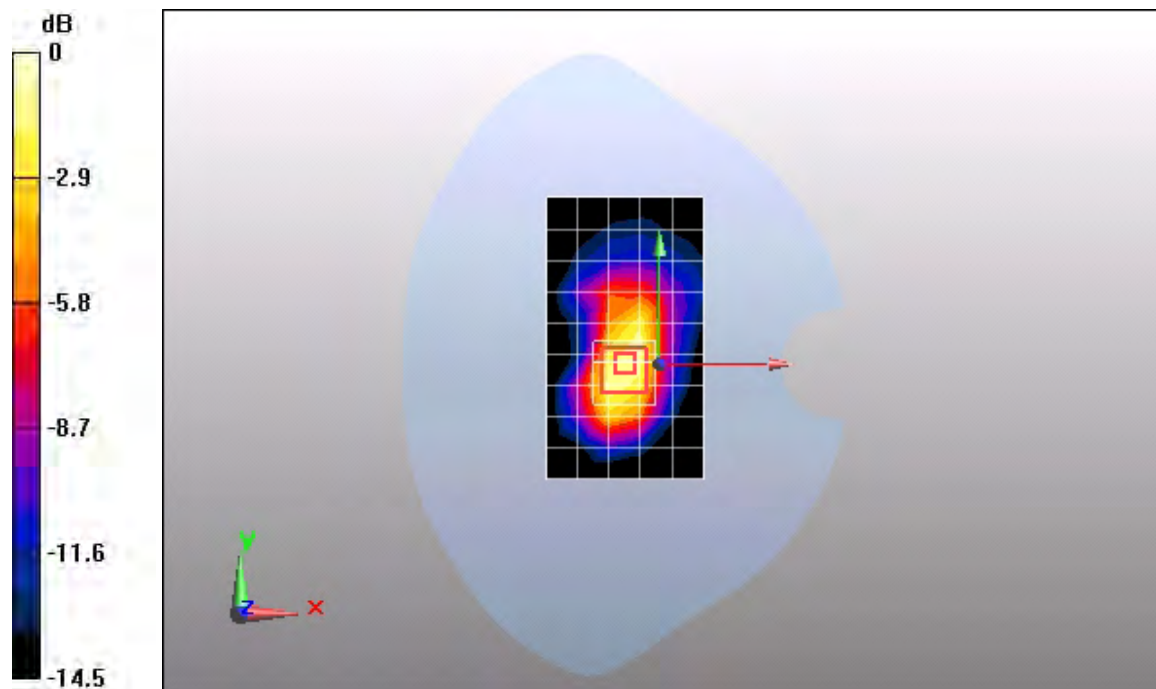
Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 24.6 V/m; Power Drift = -0.00468 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.776 mW/g; SAR(10 g) = 0.436 mW/g

Maximum value of SAR (measured) = 0.881 mW/g



0 dB = 0.881mW/g



Appendix C. Calibration Certificate

Table of contents
Calibration report "DAE4-SN1235"
Calibration report "DAE4-SN1236"
Calibration report "Probe EX3DV4-SN3753"
Calibration report "Probe ES3DV3-SN3254"
Calibration report "D900-SN1d112"
Calibration report "D1900-SN5d018"

IMPORTANT NOTICE

USAGE OF THE DAE 4

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

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

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

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

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

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

Important Note:

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

Important Note:

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

Important Note:

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: SCS 108

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client: Huawei SH (Auden)

Certificate No: DAE4-1235_Oct10

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BJ - SN: 1235

Calibration procedure(s): QA CAL-06.v22
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: October 22, 2010

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0010278	26-Sep-10 (No:10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

Calibrated by: Eric Hainfeld Function: Technician Signature:

Approved by: Fin Bornholt R&D Director

Issued: October 22, 2010

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



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

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	405.043 $\pm$ 0.1% (k=2)	403.796 $\pm$ 0.1% (k=2)	404.476 $\pm$ 0.1% (k=2)
Low Range	3.98307 $\pm$ 0.7% (k=2)	3.99486 $\pm$ 0.7% (k=2)	4.00121 $\pm$ 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	336.0 $^{\circ}$ $\pm$ 1 $^{\circ}$
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Appendix

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199997.9	5.39	0.00
Channel X	+ Input	20001.01	1.41	0.01
Channel X	- Input	-19999.44	0.46	-0.00
Channel Y	+ Input	200004.3	3.03	0.00
Channel Y	+ Input	19998.90	-0.60	-0.00
Channel Y	- Input	-20002.96	-3.08	0.02
Channel Z	+ Input	200006.9	6.51	0.00
Channel Z	+ Input	19999.61	0.21	0.00
Channel Z	- Input	-20001.30	-1.40	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.0	0.08	0.00
Channel X	+ Input	200.18	0.08	0.04
Channel X	- Input	-199.66	0.34	-0.17
Channel Y	+ Input	2000.0	0.09	0.00
Channel Y	+ Input	198.98	-1.12	-0.56
Channel Y	- Input	-200.36	-0.46	0.23
Channel Z	+ Input	2000.0	-0.06	-0.00
Channel Z	+ Input	198.38	-1.62	-0.81
Channel Z	- Input	-200.42	-0.42	0.21

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	6.15	4.28
	- 200	-3.38	-5.02
Channel Y	200	-24.10	-24.67
	- 200	24.10	23.63
Channel Z	200	6.41	6.19
	- 200	-8.23	-8.29

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	4.15	0.10
Channel Y	200	1.18	-	5.30
Channel Z	200	2.50	-0.57	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16175	16115
Channel Y	16301	15823
Channel Z	15852	16484

5. Input Offset Measurement

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

Input 10mV

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	-0.38	-1.26	0.18	0.28
Channel Y	-0.06	-1.25	1.85	0.46
Channel Z	-0.93	-2.13	0.48	0.39

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

Calibration Report "DAE4-SN1236"

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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **Huawei SH (Auden)**

Certificate No. **DAE4-1236_Oct10**

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BJ - SN: 1236**

Calibration procedure(s) **QA CAL-06.v22
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **October 26, 2010**

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 criteria for calibration):

Primary Standards	ID #	Cal. Date (Certificate No.)	Scheduled Calibration
Kethley Multimeter Type 2001	SN: 0610278	28-Sep-10 (No 10376)	Sep-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Calibrator Box V1.1	SE LMS 008 AB 1004	07-Jun-10 (in house check)	in house check: Jun-11

Calibrated by:	Name Eng. Hamfeld	Function Technician	Signature
Approved by:	Fin. Bommelt	R&D Director	

Issued: October 26, 2010

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



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Accreditation No.: SCS 108

Glossary

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

Methods Applied and Interpretation of Parameters

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

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range 1LSB = 5.1 μ V full range = -100 ... +300 mV

Low Range 1LSB = 51 nV full range = -1 ... +3 mV

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

Calibration Factors	X	Y	Z
High Range	404.985 $\pm$ 0.1% (k=2)	404.913 $\pm$ 0.1% (k=2)	405.914 $\pm$ 0.1% (k=2)
Low Range	3.98821 $\pm$ 0.7% (k=2)	3.96798 $\pm$ 0.7% (k=2)	4.00517 $\pm$ 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	136,0° $\pm$ 1°
---	-----------------

Appendix

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199987.8	-5.07	-0.00
Channel X + Input	19999.45	-0.25	-0.00
Channel X - Input	-19998.48	1.54	-0.01
Channel Y + Input	199997.9	-3.16	-0.00
Channel Y + Input	19998.97	-2.53	-0.01
Channel Y - Input	-20000.89	-1.19	0.01
Channel Z + Input	200011.7	1.18	0.00
Channel Z + Input	19998.30	-3.10	-0.02
Channel Z - Input	-20000.89	-1.19	0.01

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2000.1	0.05	0.00
Channel X + Input	200.81	0.71	0.35
Channel X - Input	-199.97	-0.07	0.04
Channel Y + Input	2000.5	0.57	0.03
Channel Y + Input	199.61	-0.29	-0.15
Channel Y - Input	-201.03	-1.03	0.52
Channel Z + Input	2001.1	1.19	0.06
Channel Z + Input	199.04	-0.86	-0.43
Channel Z - Input	-200.59	-0.59	0.30

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	15.27	14.67
	-200	-14.51	-15.99
Channel Y	200	-15.41	-15.97
	-200	14.99	14.94
Channel Z	200	-14.10	-14.71
	-200	12.74	12.83

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	2.01	1.24
Channel Y	200	0.12	-	2.79
Channel Z	200	1.72	-0.74	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15748	17238
Channel Y	16003	17264
Channel Z	16296	16350

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	-0.08	-2.17	2.32	0.78
Channel Y	-0.81	-3.36	2.86	0.79
Channel Z	-0.94	-2.13	0.38	0.54

6. Input Offset Current

Nominal input circuitry offset current on all channels: <251A

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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



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Accreditation No.: **SCS 108**

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Client

Auden

Certificate No. **EX3-3753_Dec10**

CALIBRATION CERTIFICATE

Object

EX3DV4 - SN:3753

Calibration procedure(s)

DA CAL 31 V1, DA CAL 14 V1, DA CAL 25 V1 and DA CAL 25 V2
 Calibration procedure for equipment E-test probes

Calibration date:

December 13, 2010

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Kate Pokovic	Technical Manager	
Approved by:	Heidi Kuster	Quality Manager	

Issued: December 14, 2010

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	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., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ 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 NORM_{x,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.

Probe EX3DV4

SN:3753

Manufactured:	March 16, 2010
Calibrated:	December 13, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 SN:3753**Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.34	0.49	0.52	± 10.1%
DCP (mV) ^B	99.3	98.8	103.0	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	120.2	± 2.9 %
			Y	0.00	0.00	1.00	111.7	
			Z	0.00	0.00	1.00	118.9	

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the maximum deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 SN:3753

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	9.52	9.52	9.52	0.52	0.72 ± 11.0%
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	9.06	9.06	9.06	0.58	0.70 ± 11.0%
1750	± 50 / ± 100	40.1 ± 5%	1.37 ± 5%	8.25	8.25	8.25	0.67	0.64 ± 11.0%
1900	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.90	7.90	7.90	0.54	0.71 ± 11.0%
2000	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	7.82	7.82	7.82	0.62	0.65 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	7.11	7.11	7.11	0.38	0.83 ± 11.0%
5200	± 50 / ± 100	36.0 ± 5%	4.66 ± 5%	4.96	4.96	4.96	0.32	1.90 ± 13.1%
5300	± 50 / ± 100	35.9 ± 5%	4.76 ± 5%	4.69	4.69	4.69	0.40	1.90 ± 13.1%
5500	± 50 / ± 100	35.6 ± 5%	4.96 ± 5%	4.43	4.43	4.43	0.45	1.90 ± 13.1%
5600	± 50 / ± 100	35.5 ± 5%	5.07 ± 5%	4.44	4.44	4.44	0.45	1.90 ± 13.1%
5800	± 50 / ± 100	35.3 ± 5%	5.27 ± 5%	4.32	4.32	4.32	0.45	1.90 ± 13.1%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

DASY/EASY - Parameters of Probe: EX3DV4 SN:3753

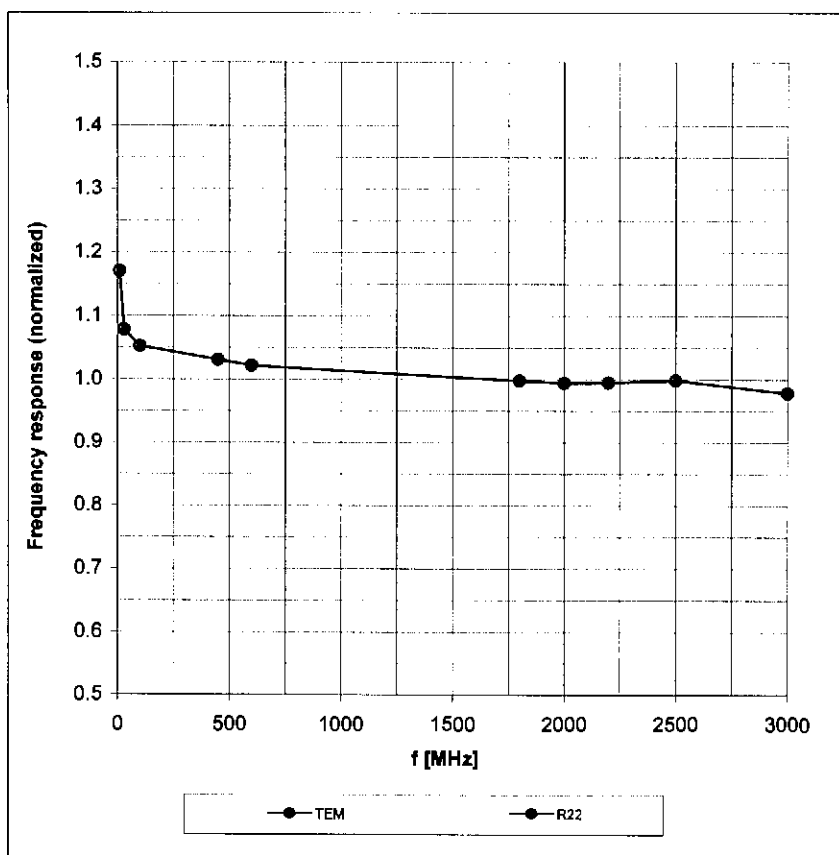
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	55.5 ± 5%	0.96 ± 5%	9.25	9.25	9.25	0.54	0.74 ± 11.0%
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	9.07	9.07	9.07	0.55	0.73 ± 11.0%
1750	± 50 / ± 100	53.4 ± 5%	1.49 ± 5%	7.48	7.48	7.48	0.32	1.19 ± 11.0%
1900	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.17	7.17	7.17	0.55	0.96 ± 11.0%
2000	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	7.22	7.22	7.22	0.96	0.52 ± 11.0%
2300	± 50 / ± 100	52.8 ± 5%	1.85 ± 5%	7.11	7.11	7.11	0.54	0.75 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	6.91	6.91	6.91	0.54	0.88 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	6.86	6.86	6.86	0.97	0.34 ± 11.0%
3500	± 50 / ± 100	51.3 ± 5%	3.31 ± 5%	6.19	6.19	6.19	0.35	1.20 ± 13.1%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.21	4.21	4.21	0.55	1.95 ± 13.1%
5300	± 50 / ± 100	48.9 ± 5%	5.42 ± 5%	4.02	4.02	4.02	0.55	1.95 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	5.65 ± 5%	3.69	3.69	3.69	0.55	1.95 ± 13.1%
5600	± 50 / ± 100	48.5 ± 5%	5.77 ± 5%	3.41	3.41	3.41	0.60	1.95 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	3.90	3.90	3.90	0.60	1.95 ± 13.1%

^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

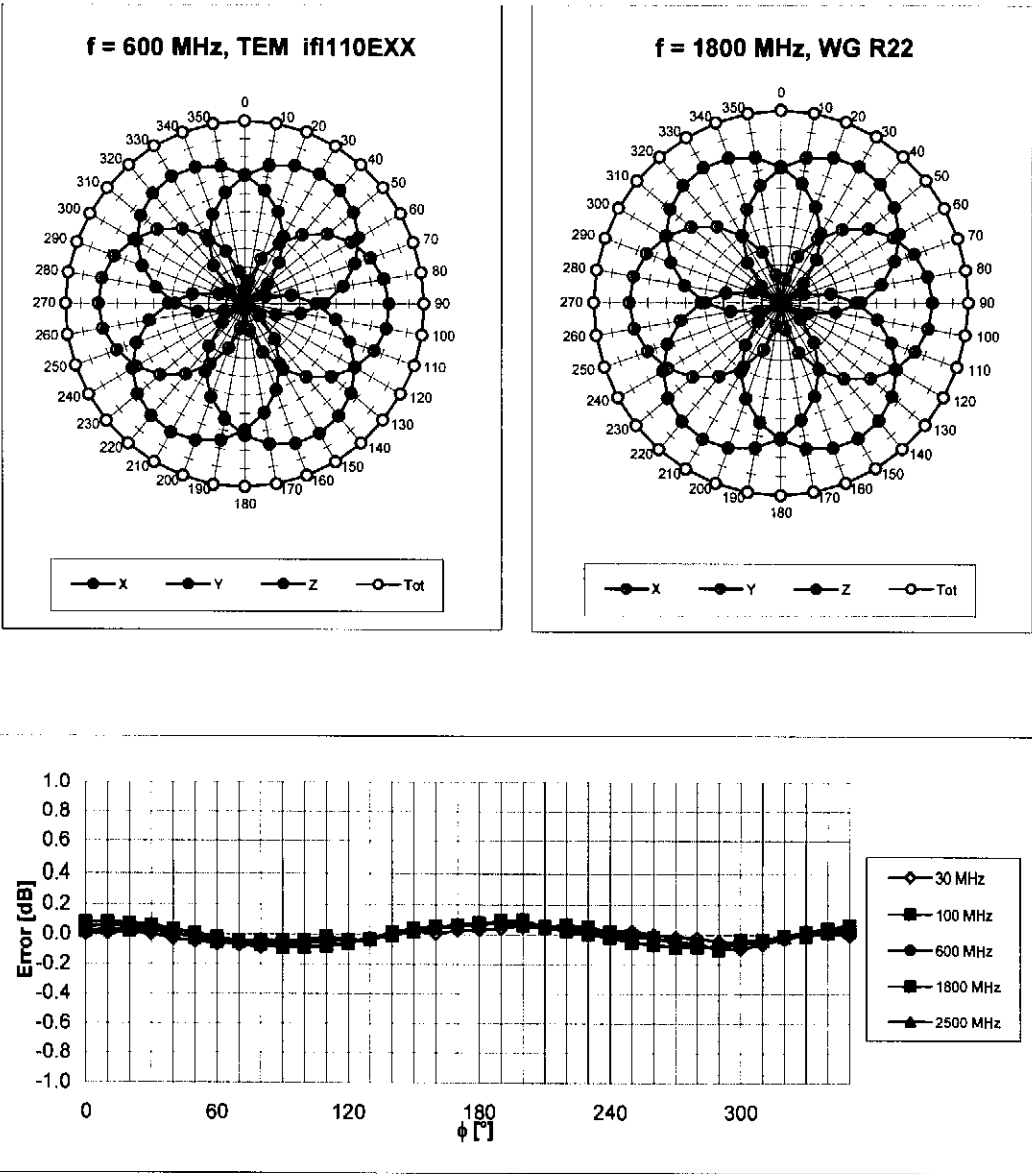
Frequency Response of E-Field

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



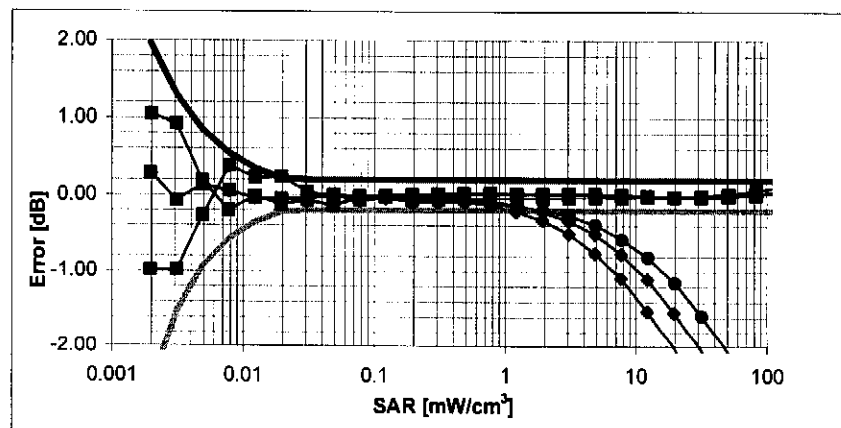
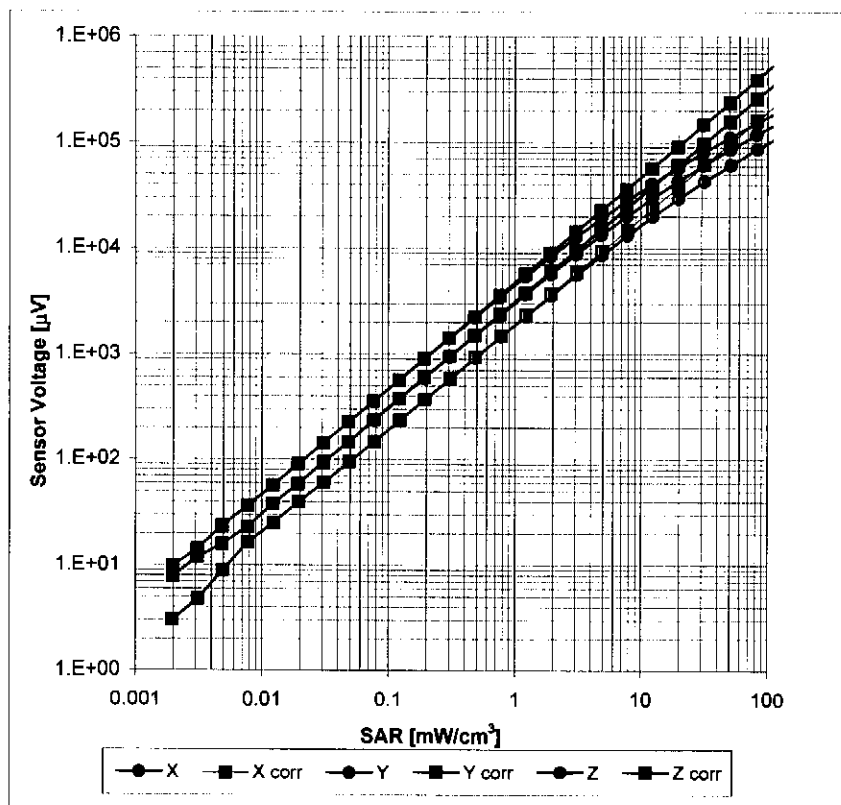
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$



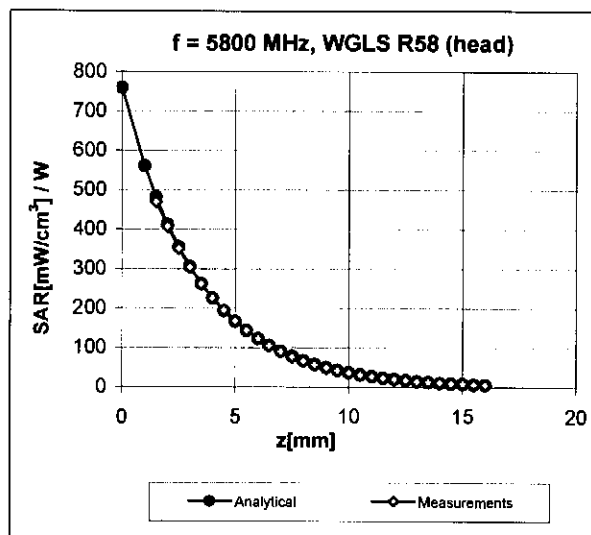
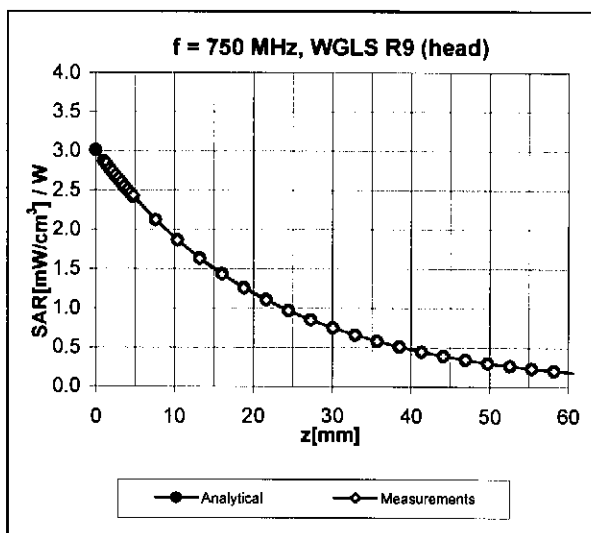
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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



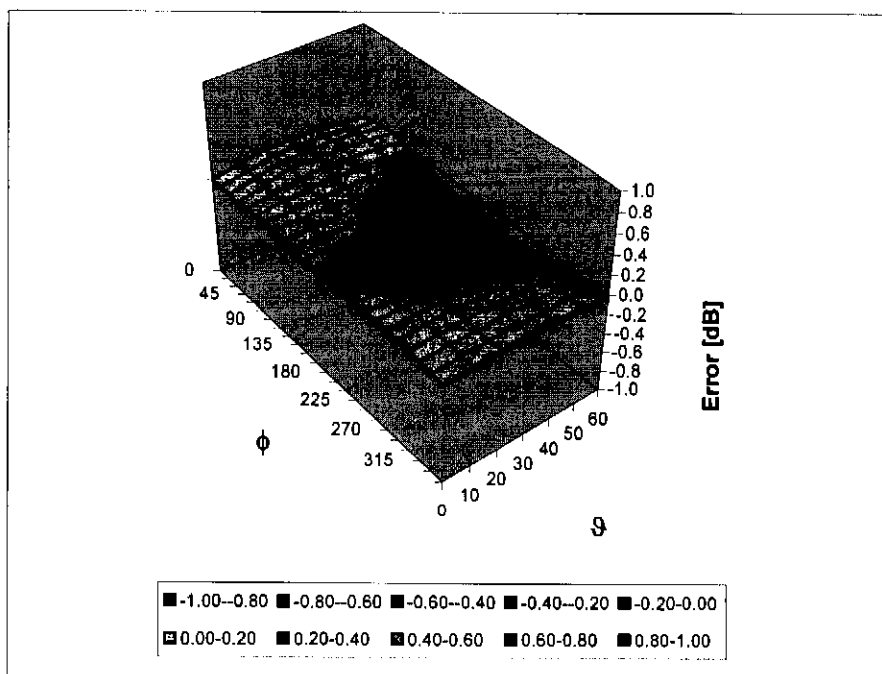
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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	2 mm



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Accreditation No.: **SCS 108**

Client **Huawei Shenzhen (Auden)**

Certificate No: **ES3-3254_Mar11**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3254**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-23.v4, QA CAL-25.v3
Calibration procedure for dosimetric E-field probes**

Calibration date **March 11, 2011**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	01-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5088 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013 Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8848C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Jeton Kastati	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 
Issued: March 16, 2011			
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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,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.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}** are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- VR**: VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- 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 NORM_{x,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.

Probe ES3DV3

SN:3254

Manufactured: June 29, 2009
Calibrated: March 11, 2011

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3254

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V/m})^2$) ^A	1.31	1.35	1.34	$\pm 10.1 \%$
DCP (mV) ^E	100.5	100.7	101.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	117.3	$\pm 2.2 \%$
			Y	0.00	0.00	1.00	115.3	
			Z	0.00	0.00	1.00	116.3	

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

^A The uncertainties of 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:3254

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^d	Conductivity (S/m) ^e	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	6.01	6.01	6.01	1.00	1.00	± 12.0 %
900	41.5	0.97	5.92	5.92	5.92	1.00	1.13	± 12.0 %
1750	40.1	1.37	5.10	5.10	5.10	1.00	1.07	± 12.0 %
1900	40.0	1.40	4.96	4.96	4.96	0.91	1.15	± 12.0 %
2000	40.0	1.40	4.91	4.91	4.91	0.91	1.13	± 12.0 %
2600	39.0	1.96	4.25	4.25	4.25	0.82	1.24	± 12.0 %

^c Frequency validity 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.

^d 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.

DASY/EASY - Parameters of Probe: ES3DV3- SN:3254

Calibration Parameter Determined in Body Tissue Simulating Media

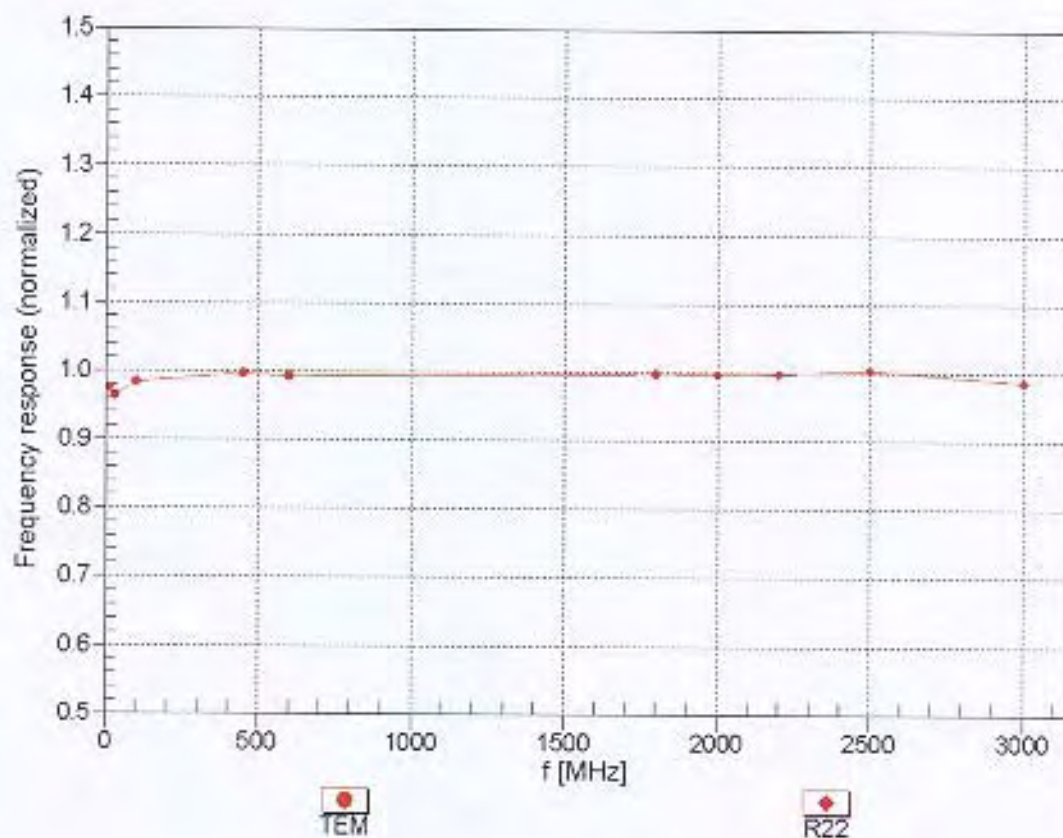
f (MHz) ^c	Relative Permittivity ^e	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	6.03	6.03	6.03	1.00	1.00	± 12.0 %
900	55.0	1.05	5.93	5.93	5.93	1.00	1.00	± 12.0 %
1750	53.4	1.49	4.91	4.91	4.91	0.99	1.23	± 12.0 %
1900	53.3	1.52	4.73	4.73	4.73	0.89	1.25	± 12.0 %
2000	53.3	1.52	4.71	4.71	4.71	0.81	1.34	± 12.0 %
2800	52.5	2.16	4.13	4.13	4.13	1.00	1.11	± 12.0 %

^c Frequency validity 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.

^e 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.

Frequency Response of E-Field

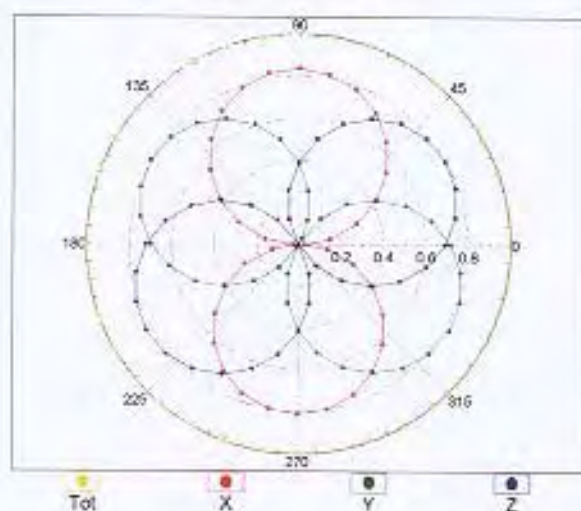
(TEM-Cell:ifi110 EXX, Waveguide: R22)



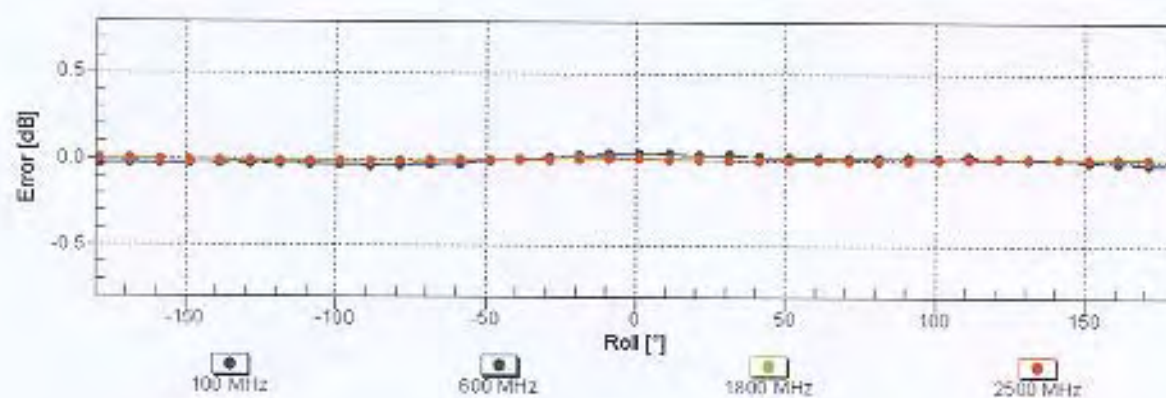
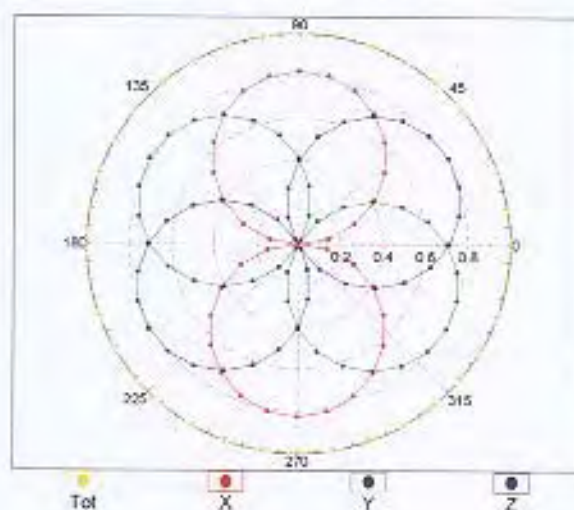
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

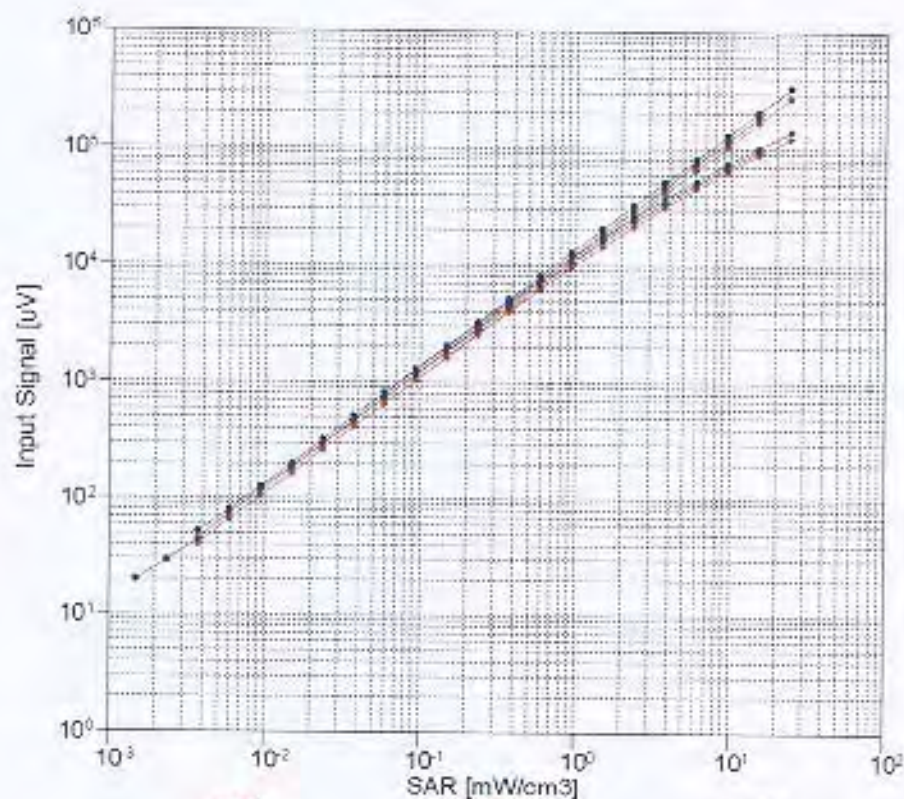
f=600 MHz,TEM



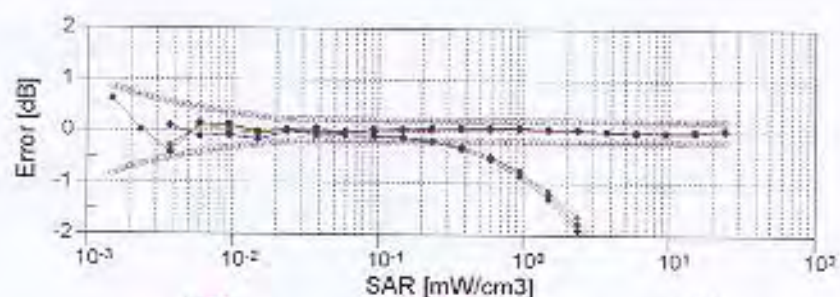
f=1800 MHz,R22

Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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



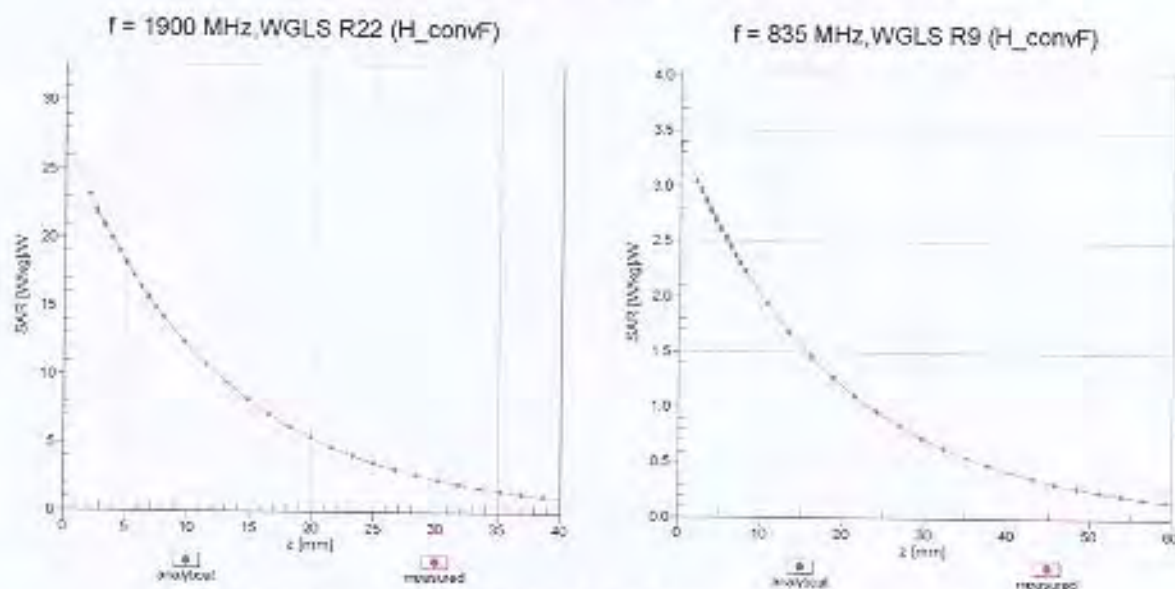
X compensated
 X not compensated
 Y compensated
 Y not compensated
 Z compensated
 Z not compensated



X compensated
 X not compensated
 Y compensated
 Y not compensated
 Z compensated
 Z not compensated

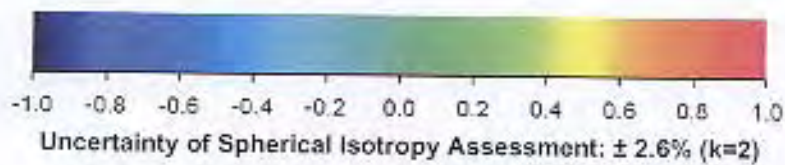
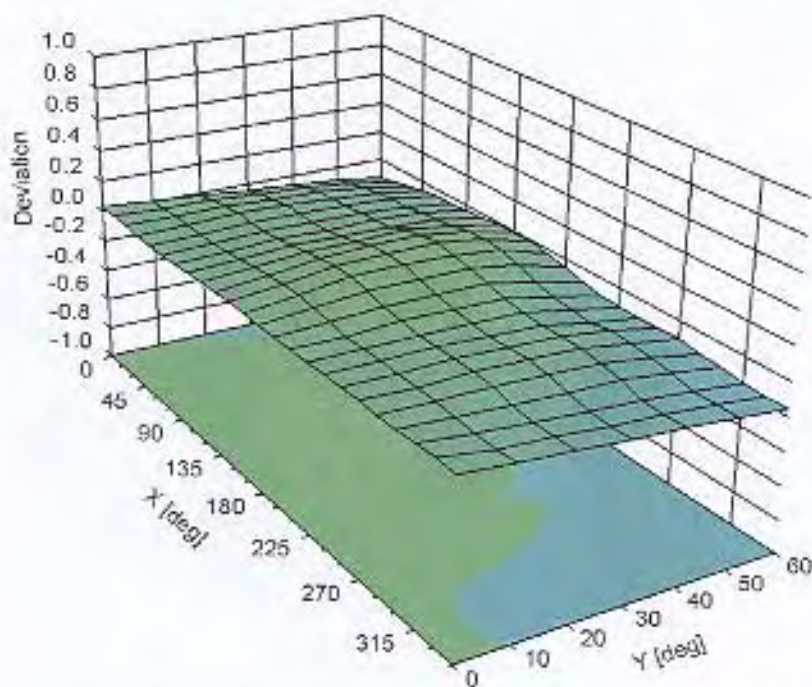
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3254**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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



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Accreditation No.: **SCS 108**

Client **Huawei Shenzhen (Auden)**

Certificate No: **D900V2-1d112_Mar11**

CALIBRATION CERTIFICATE

Object **D900V2 - SN: 1d112**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits

Calibration date: **March 9, 2011**

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 $(22 \pm 3)^{\circ}\text{C}$ 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	08-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: March 10, 2011

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



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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- 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.

Measurement Conditions

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

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.2 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.2 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Head TSL temperature during test	(22.0 $\pm$ 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.75 mW / g
SAR normalized	normalized to 1W	11.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	11.2 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.76 mW / g
SAR normalized	normalized to 1W	7.04 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	7.13 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.7 ± 6 %	1.05 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.84 mW / g
SAR normalized	normalized to 1W	11.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	11.3 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.83 mW / g
SAR normalized	normalized to 1W	7.32 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	7.30 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3 Ω - 6.0 j Ω
Return Loss	- 24,4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2 Ω - 8.3 j Ω
Return Loss	- 20.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.411 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.

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 22, 2010

DASY5 Validation Report for Head TSL

Date/Time: 09.03.2011 15:53:14

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d112

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL900

Medium parameters used: $f = 900$ MHz; $\sigma = 0.95$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.88, 5.88, 5.88); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

Head/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

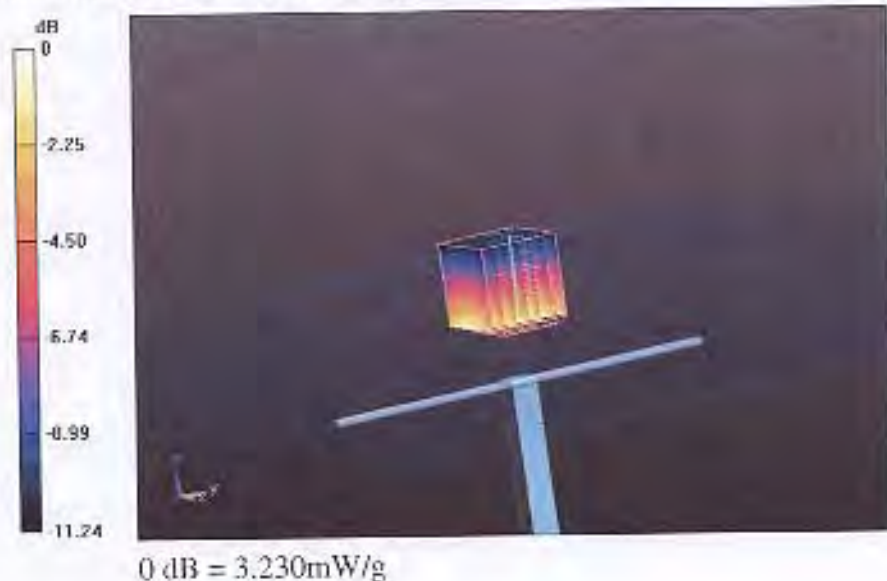
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 60.051 V/m; Power Drift = -0.0029 dB

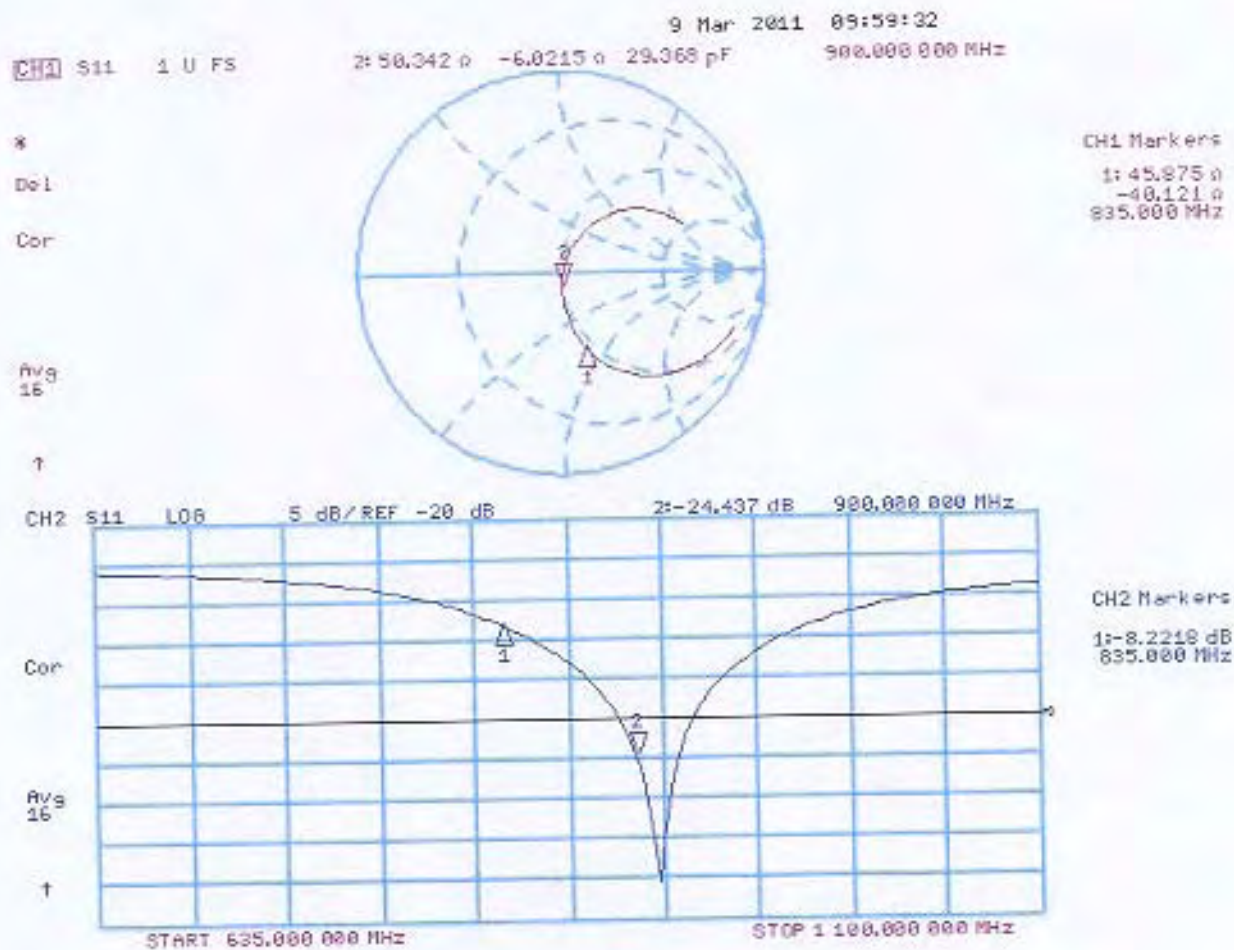
Peak SAR (extrapolated) = 4.164 W/kg

SAR(1 g) = 2.75 mW/g; SAR(10 g) = 1.76 mW/g

Maximum value of SAR (measured) = 3.230 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 09.03.2011 11:47:22

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d112

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: M900

Medium parameters used: $f = 900$ MHz; $\sigma = 1.05$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.81, 5.81, 5.81); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

Body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

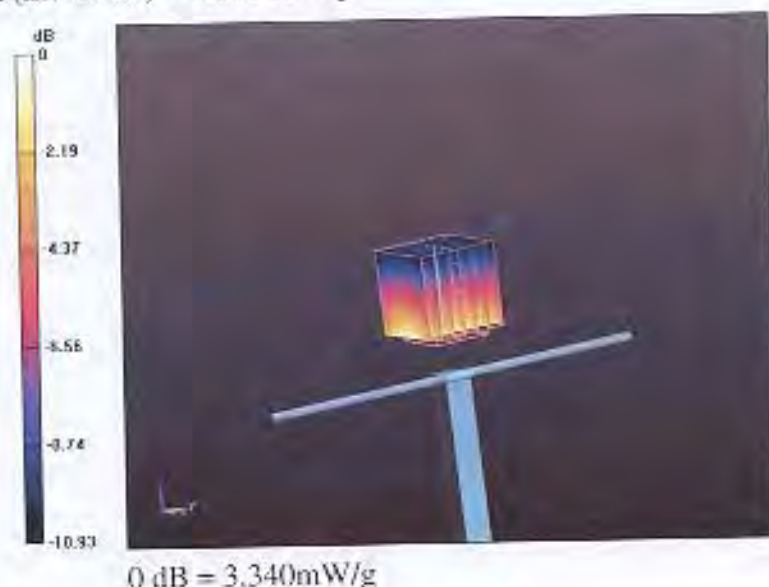
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.188 V/m; Power Drift = 0.03 dB

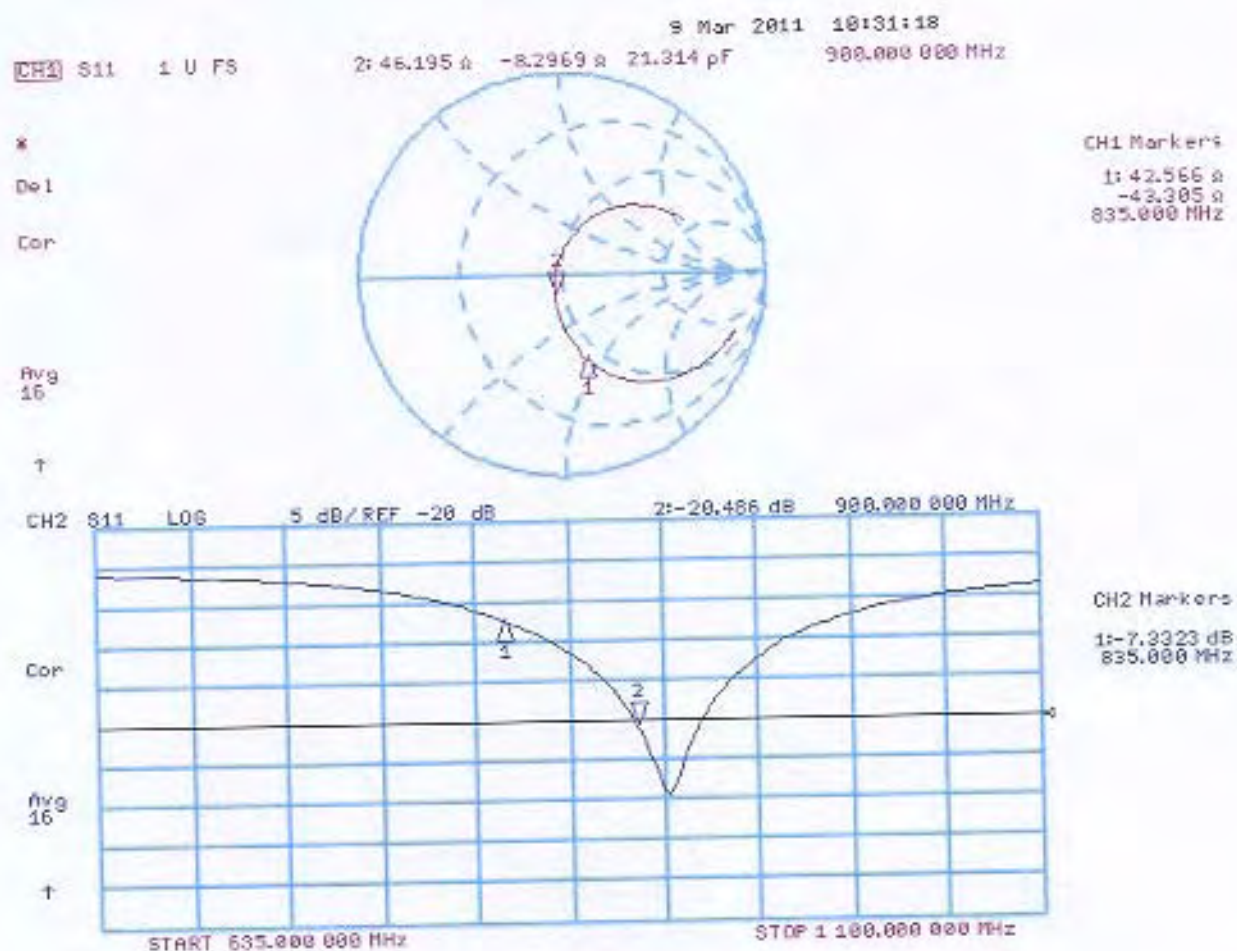
Peak SAR (extrapolated) = 4.264 W/kg

SAR(1 g) = 2.84 mW/g; SAR(10 g) = 1.83 mW/g

Maximum value of SAR (measured) = 3.341 mW/g



Impedance Measurement Plot for Body TSL





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Accreditation No.: **SCS 108**

Client

Auden

Certificate No: **D1900V2-5d018_Jun11**

CALIBRATION CERTIFICATE

Object

D1900V2 - SN: 5d018

Calibration procedure(s)

QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date:

June 16, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	8-Jun-11 (No. DAE4-601_Jun11)	Jun-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 16, 2011

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Accreditation No.: **SCS 108**

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Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 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 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.40 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.8 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.21 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.8 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.3 $\pm$ 6 %	1.53 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.5 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.31 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.1 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.3 \Omega + 3.9 j\Omega$
Return Loss	- 27.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.4 \Omega + 3.8 j\Omega$
Return Loss	- 26.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 ns
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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.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 04, 2002

DASY5 Validation Report for Head TSL

Date: 15.06.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d018

Communication System: CW; Frequency: 1900 MHz

Medium: HSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 08.06.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

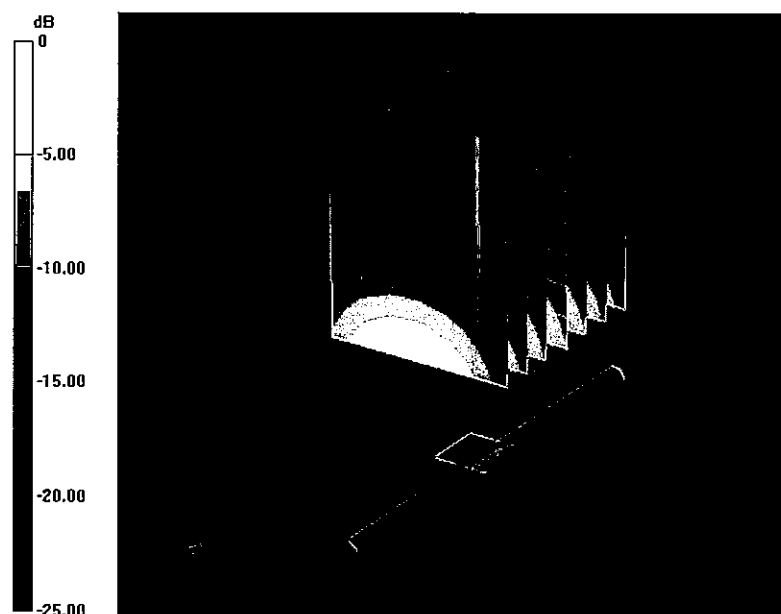
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.065 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.190 W/kg

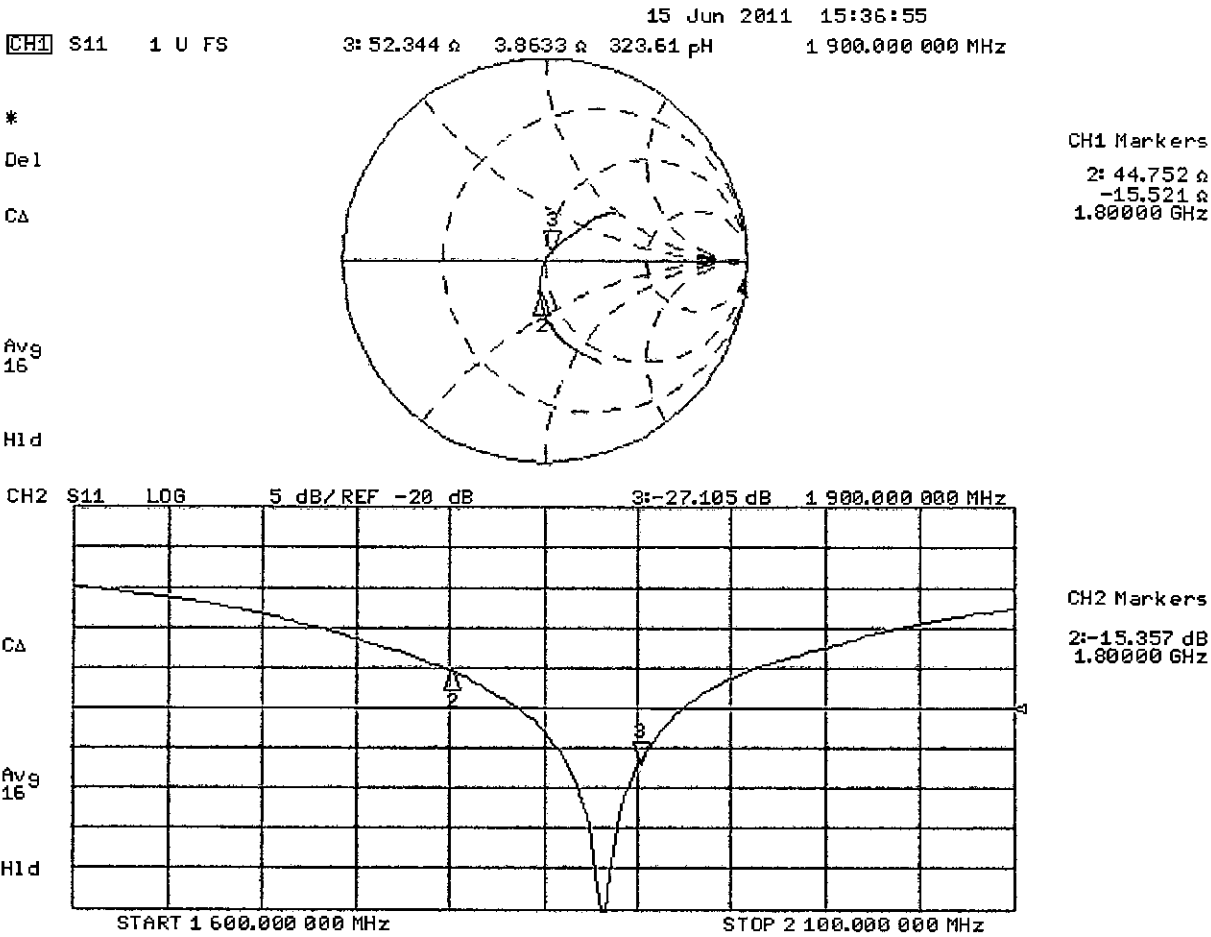
SAR(1 g) = 10 mW/g; SAR(10 g) = 5.21 mW/g

Maximum value of SAR (measured) = 12.484 mW/g



0 dB = 12.480mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.06.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d018

Communication System: CW; Frequency: 1900 MHz

Medium: MSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 08.06.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

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

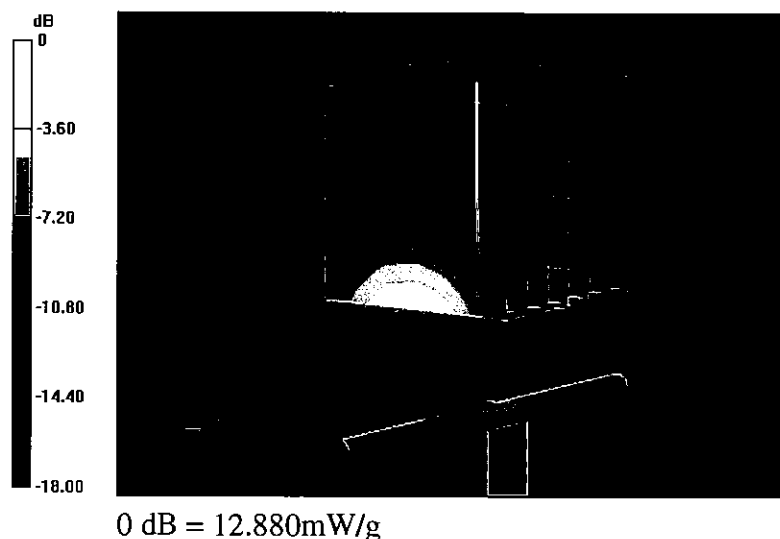
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.056 V/m; Power Drift = -0.06 dB

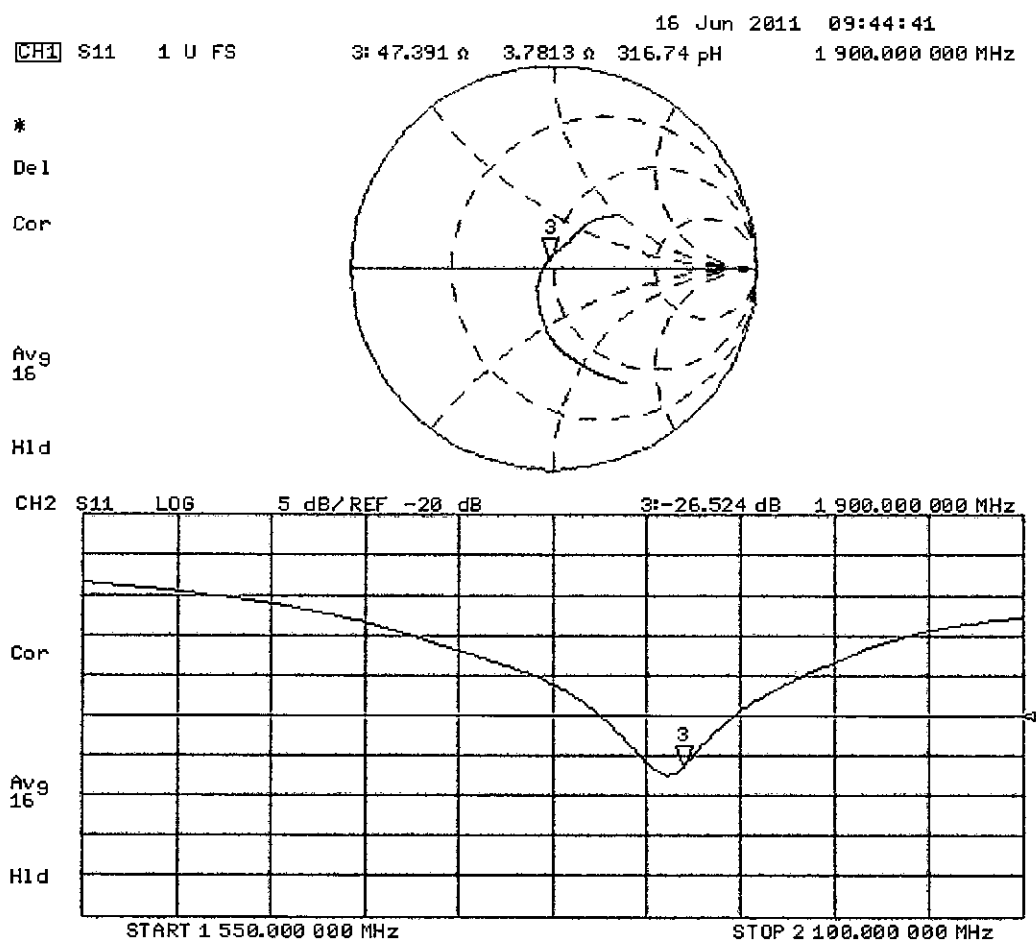
Peak SAR (extrapolated) = 18.054 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.31 mW/g

Maximum value of SAR (measured) = 12.877 mW/g



Impedance Measurement Plot for Body TSL





Appendix D. Photo documentation

Table of contents
Test Facility
Test Positions
Liquid depth

Test Facility

Photo 1: Measurement System DASY 5



Test Positions

Photo 2: Front View



Photo 3: Rear View



Photo 4: Front Side 5mm



Photo 5: Rear Side 5mm



Photo 6: Left Side 5mm



Photo 7: Right Side 5mm

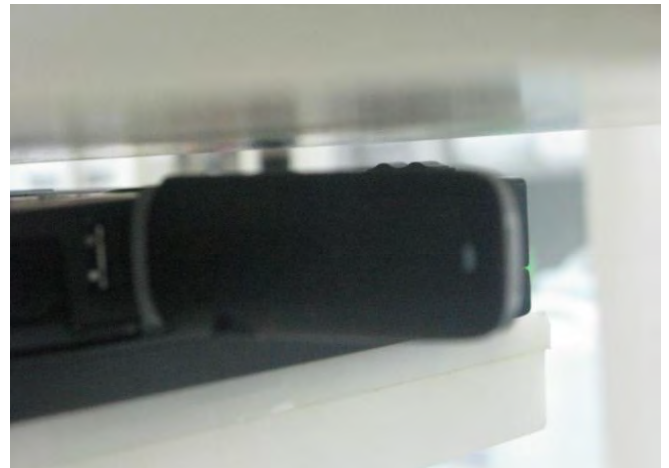


Photo 8: Top Side 5mm	NA
	NA

Liquid depth

Photo 9: MSL900MHz depth (15.00cm)	Photo 10: MSL1900MHz depth (15.00cm)
