FCC SAR TEST REPORT

Report No. <GTSE15030032004>

FCC ID 2AEB5-A17

Client:	AOC
Sample:	Feature Phone
Type/Model:	A17
Client Address:	8F-3, No. 166, Jian 1 Road, Zhonghe Dist., New Taipei City 23511, Taiwan
Manufacturer:	New Flying
Manufacturer Address:	10/F Block C, Tairan Building, Tairan 8 Road, Chegongmiao, Shenzhen City, Guangdong Province, China
Date of Test:	2015-3-25

Approved by:

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Note：

1. The test results presented in this report relate only to the object tested.
2. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Reference documents (Code, Name):

: **IEEE Std. 1528-2013, 47CFR § 2.1093**

: **FCC KDB Publication 447498 D01v05r02**

: **FCC KDB Publication 648474 D04v01r02**

: **FCC KDB Publication 865664 D01v01r03**

: **FCC KDB Publication 941225 D01~D06**

Subcontractor:

1. The Probe is rented from Shenzhen Academy of Metrology and Quality Inspection(SMQ) EMC Laboratory by National Institute of Metrology（NIM） and the DASY52 test system is subcontracted from National Institute of Metrology（NIM）
2. SMQ Address : No.4 Tongfa Road, Xili Town, Nanshan District, Shenzhen, Guangdong, China
   NIM Address：No.18 Bei San Huan Dong Lu, Beijing, P.R.China
3. Because SMQ is NIM 's subordinate relationship, so the SAR test is finished finally form NIM
4. Test location: National Institute of Metrology SAR test Laboratory.

CNAS number	
NIM	L0502
SMQ	L0579

SMQ and NIM are subordinate relationship

Tested by： Berl **Checked:** Joyce

Finish Date: 2015-03-28 Finish Date: 2015-03-28

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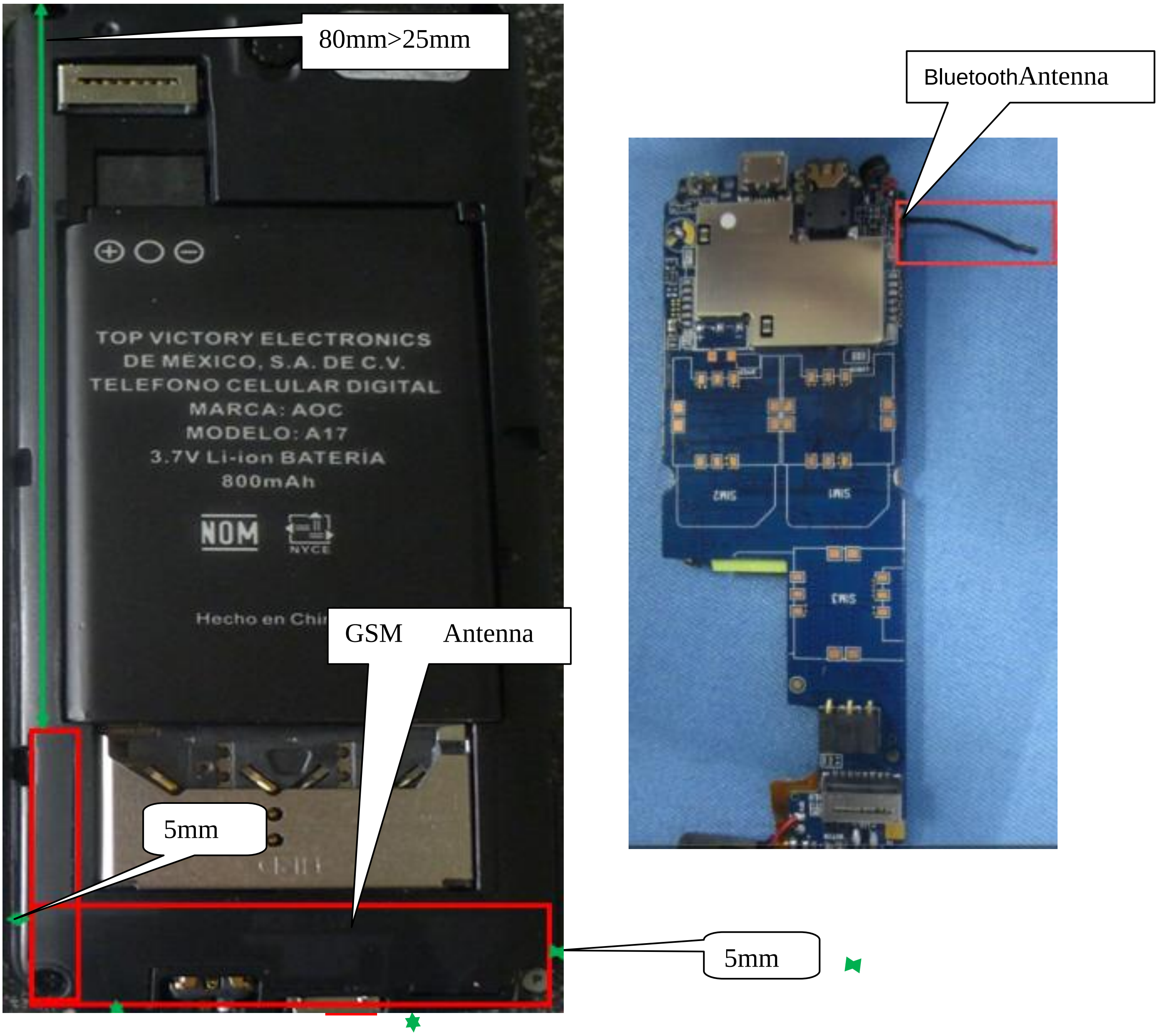
1. GENERAL INFORMATION

1.1. DUT Description

Product Name	Feature Phone	
Model No.	A17	
IMEI1 IMEI2	3515 4807 0019 347 3515 4807 0019 354	
Device Category	Portable	
RF Exposure Environment	Uncontrolled	
Antenna Type	Internal	
Support Band	GSM850 :824.2~848.8MHz PCS1900:1850.2~1909.8MHz Bluetooth:2420~2480MHz	
Type of modulation	GSMK for GSM/GPRS	
GPRS Class	12	
Max. Reported SAR(1g)	Head: **0.729** W/g GSM850 :**0.440** W/g PCS1900:**0.729** W/g	Body:**0.645**W/g GSM850 :**0.447** W/g PCS1900: **0.645**W/g
Bluetooth		
Bluetooth Frequency	2402~2480MHz	
Bluetooth Version	BT2.1	
Type of modulation	GFSK	
Data Rate	1Mbps(GFSK)	

1.2. EUT Antenna Locations



Mobile Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Left	Right
GPRS850	Yes	Yes	NO	NO	NO	NO
GPRS1900	Yes	Yes	NO	NO	NO	NO

Note: EUT does not support hotspot mode.

1.3. SAR Test Exclusions Applied

(A) Bluetooth

Per FCC KDB 447498 D01v05R02, the SAR exclusion threshold for distances<50mmis defined by the following equation:

Based on the maximum output power of Bluetooth and the antenna to use separation distance, Bluetooth SAR was not required;

(B) Licensed - $\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$

GSM/GPRS DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS Data.

This device is only capable of QPSK HSPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSPA in KDB 941225D01v02.

When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.

2. TEST CONDITIONS

2.1. Measurement Uncertainty

Expanded Uncertainty (k=2) 95%	± 21.5%

2.2. Temperature and Humidity

ITEMS	Required	Actual
Ambient temperature (°C):	18-25	22±2
Ambient humidity (RH %):	30-70	50

2.3. Introduction of SAR

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for general public group.

SAR Definition:

$$SAR = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right) \qquad SAR = C\frac{\delta T}{\delta t} \quad SAR = \frac{\sigma |E|^2}{\rho}$$

In the first equation, the SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density ρ).

In the second equation, C is the specific head capacity, δT is the temperature rise and δt is the exposure duration.

The last equation relates to the electrical field, where σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the rms electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

SAR is expressed in units of Watts per kilogram (W/kg)

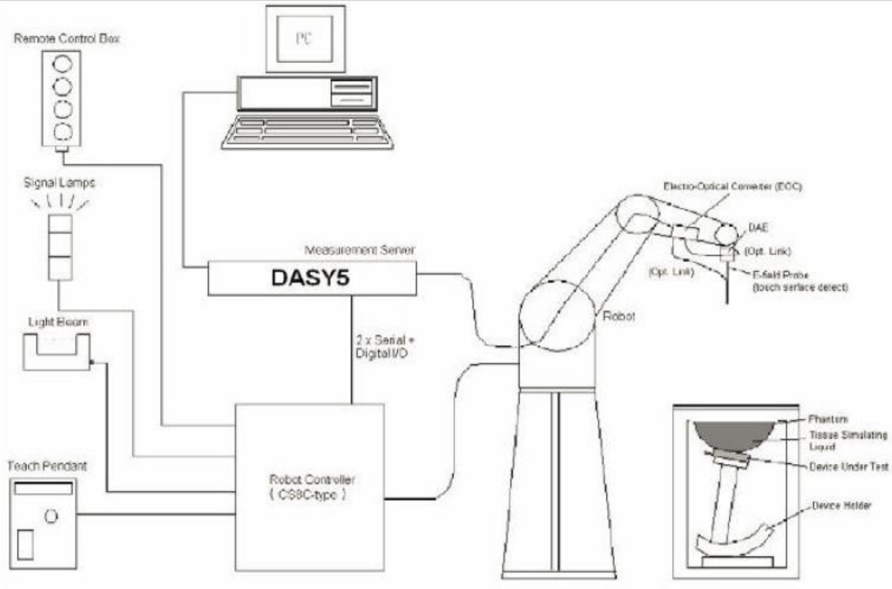
2.4. Test Configuration

GSM Test Configuration

The tests for GSM850 and GSM1900, a communication link is set up with a System Simulator by air link. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 189 and 251 respectively in the case of GSM850, to 512, 661 and 810 respectively in the case of GSM1900. The tests in the band of GSM850 and GSM1900 are performed in the mode of GSM and GPRS function.

3. SAR MEASUREMENT SYSTEM

3.1. DASY5 System Description



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

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

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

The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.

The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.

A computer running WinXP and the DASY5 software.

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

The phantom, the device holder and other accessories according to the targeted measurement.

3.2. Applications

Predefined procedures and evaluations for automated compliance testing with all worldwide standards, e.g., IEEE 1528, OET 65, IEC 62209-1, IEC 62209-2, EN 50360, EN50383, EN62311 and others

3.3. Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a10mm^2 step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments

When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE1528-2003, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan).

3.4. Zoom scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm, with the side length of the 10 g cube 21,5mm.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications utilize a physical step of 7x7x7 (5mmx5mmx5mm)providing a volume of 30mm in the X & Y axis, and 30mm in the Z axis.

3.5. DASY5 E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG.

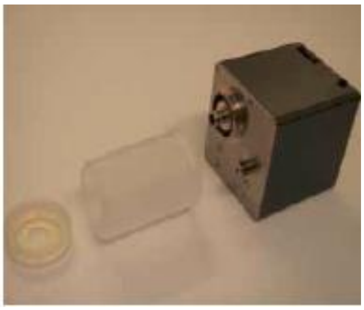
The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO 17025. The calibration data are in Appendix D.

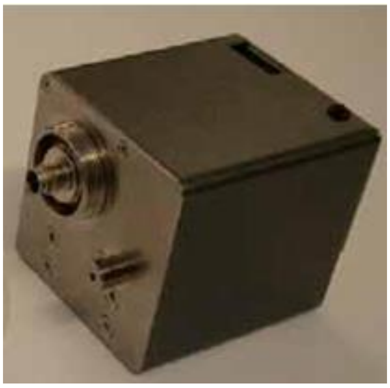
Isotropic E-Field Probe EX3DV4 for Dosimetric Measurements		
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 
Calibration	ISO/IEC 17025 calibration service available.	
Frequency	10 MHz to >6 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 6 GHz)	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic range	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically<1 µW/g)	
Dimensions	Overall length: 337 mm (Tip: 20mm) Tip length: 2.5 mm (Body: 12mm) Typical distance from probe tip to dipole centers: 1mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

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 µW/g to > 100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones	

3.6. Boundary Detection Unit and Probe Mounting Device

The DASY probes use a precise connector and an additional holder for the probe, consisting of a plastic tube and a flexible silicon ring to center the probe. The connector at the DAE is flexibly mounted and held in the default position with magnets and springs. Two switching systems in the connector mount detect frontal and lateral probe collisions and trigger the necessary software response	

3.7. DATA Acquisition Electronics (DAE) and Measurement Server

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and 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 input impedance of the DAE4 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.	
The DASY5 measurement server is based on a PC/104CPU board with a 400MHz intel ULV Celeron, 128MBchipdisk and 128MB RAM. The necessary circuits for communication with the DAE electronics box, as well as the16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.	

3.8. Robot

<table>
<tr><td>
The DASY5 system uses the high precision robots TX60 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY5 system, the CS8C robot controller version from Stäubli is used.
The XL robot series have many features that are important for our application:
➢ High precision (repeatability 0.02 mm)
➢ High reliability (industrial design)
➢ Jerk-free straight movements
➢ Low ELF interference (the closed metallic construction shields against motor control fields)
➢ 6-axis controller
</td><td></td></tr>
</table>

3.9. Light Beam Unit

<table>
<tr><td>
The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.
The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within0.1 mm, even if the other probe has different dimensions.
During probe rotations, the probe tip will keep its actual position.
</td><td></td></tr>
</table>

3.10. 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.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent σ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

The device holder permits the device to be positioned with a tolerance of ±1° in the tilt angle.

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.

3.11. Phantom description

SAM Twin Phantom

Shell Thickness	2mm +/- 0.2 mm; The ear region: 6mm
Filling Volume	Approximately 25 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

<table>
<tr><td>Shell Thickness</td><td>2mm +/- 0.2 mm</td><td rowspan="5"></td></tr>
<tr><td>Filling Volume</td><td>Approximately 30 liters</td></tr>
<tr><td>Dimensions</td><td>Major axis:600mm; Minor axis:400mm</td></tr>
<tr><td>Measurement Areas</td><td>Flat phantom</td></tr>
<tr><td colspan="2">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.</td></tr>
</table>

The phantom shell material is resistant to all ingredients used in the tissue-equivalent liquid recipes. The shell of the phantom including ear spacers is constructed from low permittivity and low loss material, with a relative permittivity ≤5 and a loss tangent ≤0.05.

Tissue-equivalent liquid Recipes

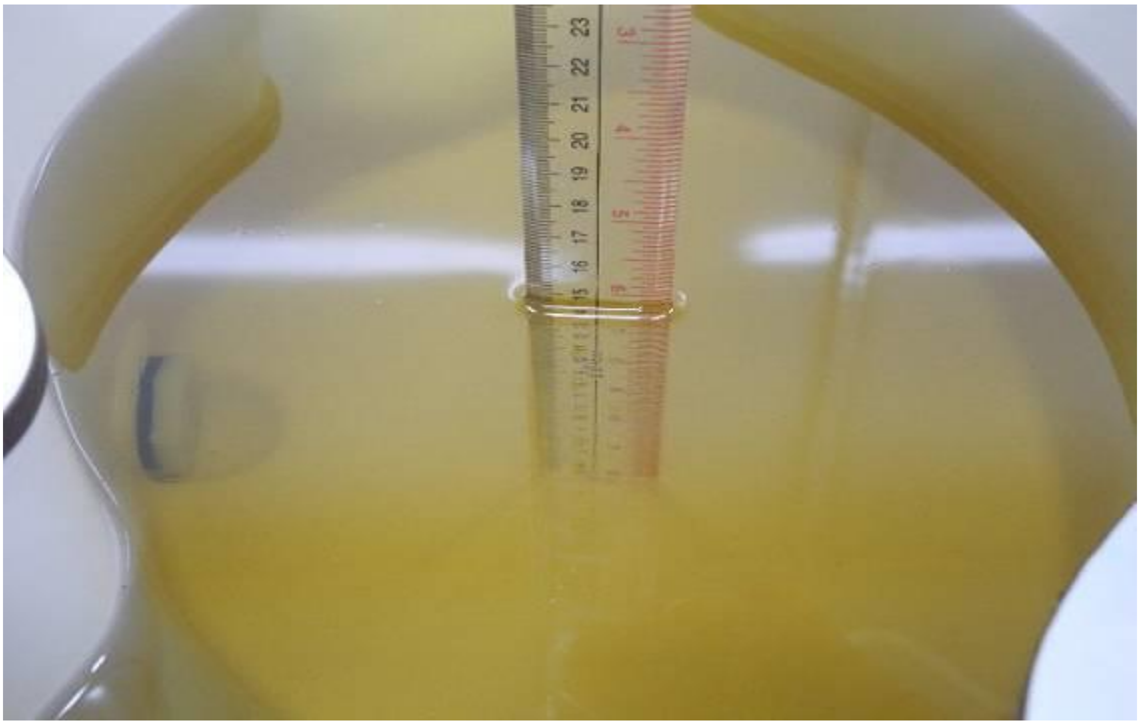
3.12. Tissue-equivalent Liquids

Tissue-equivalent liquids that are used for testing, which are made mainly of sugar, salt and water solution. All tests were carried out using tissue-equivalent liquids whose dielectric parameters were within ± 5% of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the Tissue-equivalent liquid was 15.0±0.5 cm measured from the ear reference point (ERP) during system checking and device measurements.

Tissue-equivalent liquid Recipes

The following recipe(s) were used for Head Tissue-equivalent liquid(s):



4. TISSUE SIMULATING LIQUID

4.1. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY5 Dielectric Probe Kit and Agilent Vector Network Analyzer E5071C

Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer.

Head Tissue-equivalent liquid measurements: Reference result (+/-5%)				
Frequency	Description	Dielectric Parameters		Temp (ºC)
		εr	σ(S/m)	
850MHz	calibration date	41.50 39.43 to 43.58	0.90 0.85 to 0.95	N/A
	2015-03-25	41.50	0.89	22
1900MHz	calibration date	40.0 38.00 to 42.00	1.40 1.33 to 1.47	N/A
	2015-03-25	39.75	1.45	22
εr= Relative permittivity, σ= Conductivity				

Body Tissue-equivalent liquid measurements: Reference result (+/-5%)				
Frequency	Description	Dielectric Parameters		Temp (ºC)
		εr	σ(S/m)	
850MHz	calibration date	55.2 52.44 to57.96	0.97 0.92to 1.02	N/A
	2015-03-25	55.87	0.96	22
1900MHz		53.3 50.64 to 55.97	1.52 1.44 to 1.60	N/A
	2015-03-25	51.05	1.57	22
εr= Relative permittivity, σ= Conductivity				

4.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	**41.5**	**0.90**	**55.2**	**0.97**
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	**40.0**	**1.40**	**53.3**	**1.52**
2450	**39.2**	**1.80**	**52.7**	**1.95**
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

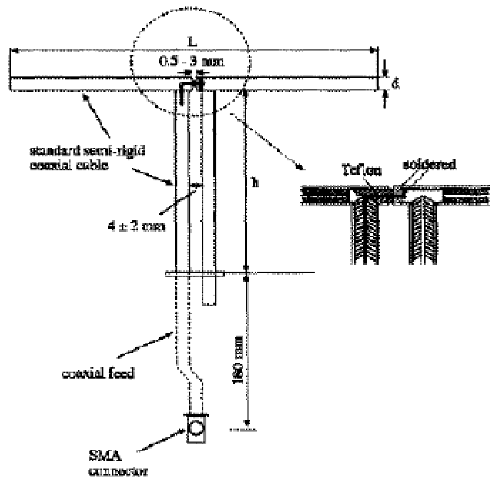
(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

5. SAR MEASUREMENT PROCEDURE

5.1. SAR System Validation

Validation Dipoles

The dipoles used is based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles



Frequency	L (mm)	h (mm)	d (mm)
900MHz	149.0	83.3	3.6
1800MHz	72.0	41.7	3.6
1900MHz	68.0	39.5	3.6
2450MHz	53.5	30.4	3.6
5200MHz	20.6	14.2	3.6
5500 MHz	20.6	14.2	3.6
5800 MHz	20.6	14.2	3.6

5.2. Validation Result

Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the stimulant, using the dipole system check kit. A power level of 250 mW as supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the following table.

Results system check

System Check	Target SAR (1W) (+/-10%)	Measured SAR (Normalized to 1W)	Liquid Temp	Test Date
	1-g (W/Kg)	1-g (W/kg)		
D850 Head	9.35 (8.415~10.285)	9.32	22	2015-3-25
D1900 Head	39.4 (35.46~43.34)	40.4	22	2015-3-25

System Check	Target SAR (1W) (+/-10%)	Measured SAR (Normalized to 1W)	Liquid Temp	Test Date
	1-g (mW/g)	1-g (mW/g)		
D850 Body	9.46 (8.514~10.406)	9.92	22	2015-3-25
D1900 Body	40.70 (36.63~44.77)	44.4	22	2015-3-25

6. SAR EXPOSURE LIMITS

SAR assessments have been made in line with the requirements of IEEE-1528, FCC Supplement C, and comply with ANSI/IEEE C95.1-1992 “Uncontrolled Environments” limits. These limits apply to a location which is deemed as “Uncontrolled Environment” which can be described as a situation where the general public may be exposed to an RF source with no prior knowledge or control over their exposure.

Limits for General Population/Uncontrolled Exposure (W/kg)

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for brain or body)	1.60 W/kg
Spatial Average SAR (whole body)	0.08 W/kg
Spatial Peak SAR (10g for hands, feet, ankles and wrist)	4.00 W/kg

7. DESCRIPTION OF THE TEST EQUIPMENTS

7.1. Measurement System and Components

No.	Equipment	Model No.	Serial No.	Manufacturer	Last Calibration Date	Period
1	SAR test system	TX60L	F08/5AY8A1/A/01+F08/	SPEAG	NCR	NCR
2	Electronic Data Transmitter	DAE4	876	SPEAG	2015.03.09	1year
3	SAR Probe	ES3DV3	3203	SPEAG	2014.12.19	1year
4	SAR Probe	EX3DV4	3881	SPEAG	2014.07.22	1year
5	System Validation Dipole,835MHz	D835V2	4d141	SPEAG	2012.09.24	3year
6	System Validation Dipole,900MHz	D900V2	101077	SPEAG	2012.10.16	3year
7	System Validation Dipole,1900MHz	D1900V2	5d162	SPEAG	2012.09.21	3year
8	System Validation Dipole,2450MHz	D2450V2	818	SPEAG	2012.10.18	3year
9	Dielectric Probe Kit	85070E	MY44300455	Agilent	NCR	NCR
10	Dual-directional coupler,0.10-2.0GHz	778D	MY48220198	Agilent	NCR	NCR
11	Dual-directional coupler,2.00-18GHz	772D	MY46151160	Agilent	NCR	NCR
12	Coaxial attenuator	8491A	MY39266348	Agilent	NCR	NCR
13	Power Amplifier	ZHL42W	81709	Agilent	NCR	NCR
14	Signal Generator	SMR20	100047	R&S	2015.01.14	1year
15	Power Meter	NRVD	100041	R&S	2015.01.22	1year
16	Call Tester	CMU 200	100110	R&S	2015.01.06	1year
17	Network Analyzer	E5071C	MY46109550	Agilent	2015.01.24	1Year
18	Flat Phantom	ELI4.0	TP-1904	SPEAG	NCR	NCR
19	Twin Phantom	SAM	TP-1504	SPEAG	NCR	NCR

Note:

1) Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three year extended calibration interval. Each measured dipole is expected to evalute with following criteria at least on annual interval.
   a) There is no physical damage on the dipole;
   b) System check with specific dipole is within 10% of calibrated values;
   c) The most recent return-loss results,measued at least annually,deviates by no more than 20% from the previous measurement;
   d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 50 Ω from the provious measurement.

7.2. Test Position

Against Phantom Head

The Mobile phone shall be tested in the “cheek” and “tilted” position on left and right sides of the phantom.

Define of the “cheek” position:

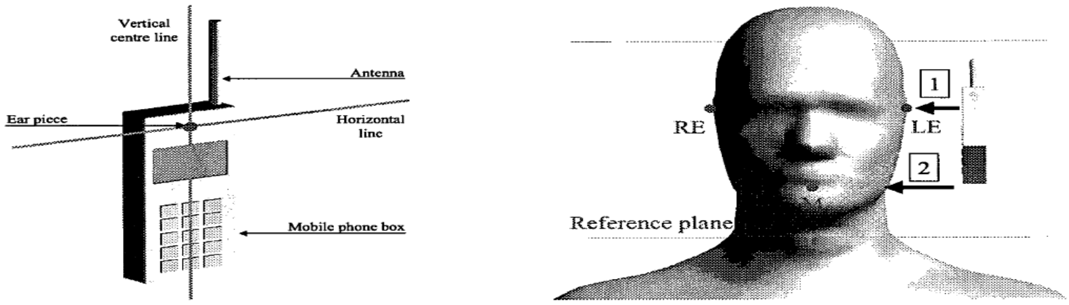
a) Position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the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

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

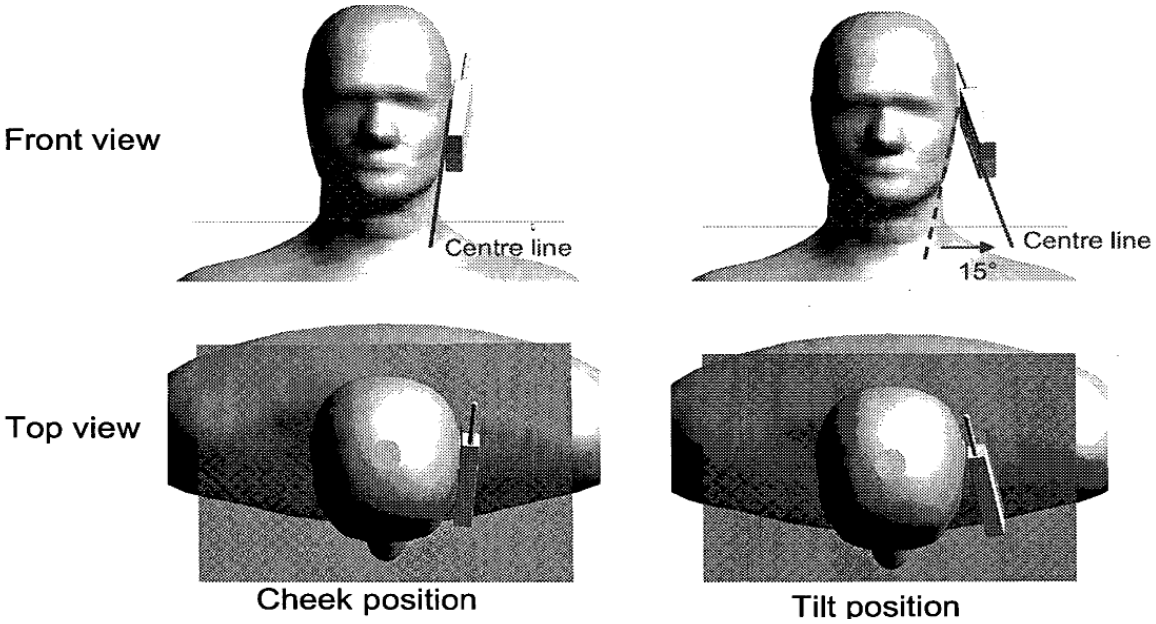
Define of the “tilted” position:

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

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



Define of the reference lines and points,
on the phone and on the phantom and initial position



"Cheek" and "tilted" position of the mobile phone on the left side

Body Worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. The distance between of the device and the phantom was kept 15mm.

7.3. Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan, a minimum of 5x5x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

7.4. SAR Averaging Methods

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values. The base for the evaluation is a “cube” measurement in a volume of (30mm)3 (7x7x7 points). The maximum SAR value was averaged over the cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy5 are all based on the modified Quadratic Shepard’s method.

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner

The measurements were performed using an automated near-field scanning system, DASY5, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements was the “advanced extrapolation” algorithm

8. MEASUREMENT UNCERTAINTY

8.1. Uncertainty for Sar Test

Uncertainty Component	Tol. (%)	Prob Dist.	Div	ci (1g)	ci.ui(%) (1g)	Vi
Measurement System						
Probe Calibration	±5.9	N	1	1	±5.9	∞
Axial Isotropy	±4.7	R		0.7	±1.9	∞
Hemispherical Isotropy	±9.6	R		0.7	±3.9	∞
Boundary Effect	±1.0	R		1	±0.6	∞
Linearity	±4.7	R		1	±2.7	∞
System Detection Limits	±1.0	R		1	±0.6	∞
Readout Electronics	±0.3	N	1	1	±0.3	∞
Response Time	±0.8	R		1	±0.5	∞
Integration Time	±2.6	R		1	±1.5	∞
RF Ambient Conditions – Noise	±3.0	R		1	±1.7	∞
RF Ambient Conditions – Reflections	±3.0	R		1	±1.7	∞
Probe Positioner Mechanical Tolerance	±0.4	R		1	±0.2	∞
Probe Positioning with respect to Phantom Shell	±2.9	R		1	±1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	±1.0	R		1	±0.6	∞
Test Sample Related						
Test Sample Positioning	±2.9	N	1	1	±2.9	145
Device Holder Uncertainty	±3.6	N	1	1	±3.6	5
Output Power Variation - SAR drift measurement	±5.0	R		1	±2.9	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	±4.0	R		1	±2.3	∞
Conductivity Target – tolerance	±5.0	R		0.43	±1.2	∞
Conductivity - measurement uncertainty	±2.5	N	1	0.43	±1.1	∞
Permittivity Target – tolerance	±5.0	R		0.49	±1.4	∞
Permittivity - measurement uncertainty	±2.5	N	1	0.49	±1.2	5
Combined Standard Uncertainty					**±10.7**	**387**
Expanded STD Uncertainty					**±21.5**	

8.2. Uncertainty for System Validation

Uncertainty Component	Uncert. value	Prob. Dist.	Div.	(ci) (1g)	Std. Unc. (1g)	(vi) veff
Probe Calibration	±6.55 %	N	1	1	±6.55 %	1
Axial Isotropy	±4.7 %	R		1	±2.7 %	1
Hemispherical Isotropy	±9.6 %	R		0	±0 %	1
Boundary E_ects	±1.0 %	R		1	±0.6 %	1
Linearity	±4.7 %	R		1	±2.7 %	1
System Detection Limits	±1.0 %	R		1	±0.6 %	1
Modulation Response	±0 %	R		1	±0 %	1
Readout Electronics	±0.3 %	N	1	1	±0.3 %	1
Response Time	±0 %	R		1	±0 %	1
Integration Time	±0 %	R		1	±0 %	1
RF Ambient Noise	±1.0 %	R		1	±0.6 %	1
RF Ambient Re ections	±1.0 %	R		1	±0.6 %	1
Probe Positioner	±0.8 %	R		1	±0.5 %	1
Probe Positioning	±6.7 %	R		1	±3.9 %	1
Max. SAR Eval.	±2.0 %	R		1	±1.2 %	1
Dipole Related						
Deviation of exp. dipole	±5.5 %	R		1	±3.2 %	1
Dipole Axis to Liquid Dist.	±2.0 %	R		1	±1.2 %	1
Input power & SAR drift	±3.4 %	R		1	±2.0 %	1
Phantom and Setup						
Phantom Uncertainty	±4.0 %	R		1	±2.3 %	1
SAR correction	±1.9 %	R		0.84	±0.9 %	1
Liquid Conductivity (meas.)	±2.5 %	N	1	0.71	±1.8 %	1
Liquid Permittivity (meas.)	±2.5 %	N	1	0.26	±0.7 %	1
Temp. unc. -Conductivity	±1.7 %	R		0.71	±0.7 %	1
Temp. unc. -Permittivity	±0.3 %	R		0.26	±0.0 %	∞
Combined Std. Uncertainty					±10.1 %	
Expanded STD Uncertainty					±20.2%	

9. EUT TUNE-UP PROCEDURES AND TEST MODE

The following procedure had been used to prepare the EUT for the SAR test.

To setup the desire channel frequency and the maximum output power. A Radio Communication Tester.“CMU200 ” was used to program the EUT.

General Note:

1. Per KDB 447498 D01v05r02, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. For head SAR testing, the EUT was set in GSM Voice for GSM850 and PCS1900
3. For body worn SAR testing, the EUT was set in GPRS 2Tx slots for GSM850 and GPRS 2Tx PCS1900 due to its highest frame-average power.

9.1. Conducted Power Measurement

Mode	Channel	Frequency (MHz)	Avg.Burst Power (dBm)	Duty Cycle Factor (dB)	Frame Power (dBm)
GSM850	128	824.2	32.36	-9	23.36
	189	836.6	32.40	-9	23.4
	251	848.8	32.44	-9	23.44
GPRS850(1 Slot)	128	824.2	32.56	-9	23.56
	189	836.6	32.70	-9	23.7
	251	848.8	32.73	-9	23.73
GPRS850(2 Slot)	128	824.2	30.22	-6	24.22
	189	836.6	30.20	-6	24.2
	251	848.8	30.24	-6	**24.24**
GPRS850 (3 Slot)	128	824.2	27.95	-4.25	23.7
	189	836.6	28.10	-4.25	23.85
	251	848.8	28.14	-4.25	23.89
GPRS850 (4 Slot)	128	824.2	25.98	-3	22.98
	189	836.6	26.07	-3	23.07
	251	848.8	26.13	-3	23.13
PCS1900	512	1850.2	29.42	-9	20.42
	810	1880.0	29.59	-9	20.59
	661	1909.8	29.45	-9	20.45
GPRS1900(1 Slot)	512	1850.2	29.23	-9	20.23
	810	1880.0	29.82	-9	20.82
	661	1909.8	29.91	-9	20.91
GPRS1900(2 Slot)	512	1850.2	26.92	-6	**20.92**
	810	1880.0	26.70	-6	20.07
	661	1909.8	26.31	-6	20.31
GPRS1900(3 Slot)	512	1850.2	25.27	-4.25	21.02
	810	1880.0	24.89	-4.25	20.64
	661	1909.8	24.53	-4.25	20.28

GPRS1900(4 Slot)	512	1850.2	23.20	-3	20.2
	810	1880.0	22.49	-3	19.49
	661	1909.8	22.13	-3	19.13

Note

1: This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05r02.

2: Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged powers were calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots

3: The bolded GPRS modes were selected for SAR testing according to the highest frame-averaged output power table per KDB 941225 D03v01

4: GPRS (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.

9.2. Bluetooth 2.1 Conducted output power (dBm):

Channel	Frequency	Average power(dBm)		
		Date Rate		
		1Mbps	2Mbps	3Mbps
CH00	2402MHZ	5.30	/	/
CH39	2441MHZ	5.20	/	/
CH78	2480MHZ	5.22	/	/

- According to KDB447498 D01:The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,24 where

• f(GHz) is the RF channel transmit frequency in GHz

• Power and distance are rounded to the nearest mW and mm before calculation25

• The result is rounded to one decimal place for comparison

• 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

If the test separation distance (antenna-user) is < 5mm, 5mm is used for excluded SAR Calculation

Bluetooth		
Tune-up Maximum power (dBm)		6
Tune-up Maximum rated power (mW)		3.98
Head	Antenna to user (mm)	5
	Frequency(GHz)	2.480
	SAR exclusion threshold	0.167
Body	Antenna to user (mm)	10
	Frequency(GHz)	2.480
	SAR exclusion threshold	0.079

9.3. The scaling factor of the test mode

Mode	Channel	Frequency (MHz)	Avg.BurstPower(dBm)	Tune-upLimit (dBm)	Scaling Factor
GSM850	128	824.2	32.36	33	1.158
	189	836.4	32.40	33	1.148
	251	848.8	32.44	33	1.137
GPRS850 (2 Slot)	128	824.2	30.22	31	1.196
	189	836.4	30.20	31	1.202
	251	848.8	30.24	31	1.191
PCS1900	512	1850.2	29.42	30	1.142
	661	1880.0	29.59	30	1.099
	810	1909.8	29.45	30	1.135
GPRS1900 (2 Slot)	512	1850.2	26.92	27	1.018
	661	1880.0	26.70	27	1.071
	810	1909.8	26.31	27	1.172

Note: Scaling Factor = Max. Power(mW) -Avg. Burst Power(mW)/10.The powers of 10 for it.

10. SAR MEASUREMENT RESULTS

10.1. SAR measurement Result of GSM850

Test Mode GSM850						
Position Head	Frequency		Test SAR 1g(W/kg)	Scaling Factor	Scaled SAR 1g(W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	128	824.2				1.6
Left-Cheek	189	836.4	0.383	1.148	0.440	1.6
Left-Cheek	251	848.8				1.6
Left-Tilt	189	836.4	0.239	1.148	0.274	1.6
Right-Cheek	128	824.2				1.6
Right-Cheek	189	836.4	0.294	1.148	0.338	1.6
Right-Cheek	251	848.8				1.6
Right-Tilt	189	836.4	0.162	1.148	0.186	1.6
Note: when the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional, refer to KDB 447498 D01 v05r02						

Test Mode GPRS850 (2 Slot)						
Position Head	Frequency		Test SAR 1g(W/kg)	Scaling Factor	Scaled SAR 1g(W/kg)	Limit (W/kg)
	Channel	MHz				
Face up	128	824.2				1.6
Face up	189	836.4	0.337	1.202	0.405	1.6
Face up	251	848.8				1.6
Face down	128	824.2				1.6
Face down	189	836.4	0.372	1.202	0.447	1.6
Face down	251	848.8				1.6
Note: when the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional, refer to KDB 447498 D01 v05r02						

10.2. SAR measurement Result of PCS1900

Test Mode PCS1900						
Position Head	Frequency		Test SAR 1g(W/kg)	Scaling Factor	Scaled SAR 1g(W/kg)	Limit (W/kg)
	Channel	MHz				
Left-Cheek	512	1850.2				1.6
Left-Cheek	661	1880.0	0.663	1.099	0.729	1.6
Left-Cheek	180	1909.8				1.6
Left-Tilt	661	1880.0	0.357	1.099	0.392	1.6
Right-Cheek	512	1850.2				1.6
Right-Cheek	661	1880.0	0.460	1.099	0.506	1.6
Right-Cheek	180	1909.8				1.6
Right-Tilt	661	1880.0	0.273	1.099	0.300	1.6
Note: when the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional, refer to KDB 447498 D01 v05r02						

Test Mode GPRS1900 (2 Slot)						
Position Head	Frequency		Test SAR 1g (W/kg)	Scaling Factor	Scaled SAR 1g (W/kg)	Limit (W/kg)
	Channel	MHz				
Face up	512	1850.2				1.6
Face up	661	1880.0	0.557	1.071	0.597	1.6
Face up	180	1909.8				1.6
Face down	512	1850.2				1.6
Face down	661	1880.0	0.602	1.071	0.645	1.6
Face down	180	1909.8				1.6
Note: when the 1-g SAR is ≤ 0.8 W/kg, testing for low and high channel is optional, refer to KDB 447498 D01 v05r02						

According to October 2013TCB Workshop, For GSM / GPRS, the number of time slots to test for SAR should correspond to the highest source-based time-averaged maximum output power configuration, Considering the possibility of e.g. 3rd party VoIP operation for body-worn SAR testing, the EUT was set in GPRS (2Tx slots) for GSM850/GSM1900 band due to its highest frame-average power.

Estimated SAR for Bluetooth

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{7.5} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

Bluetooth

	Max Power	Head (5mm distance)	Body (10mm distance)
Estimated SAR(W/kg)	**6dBm**	**0.167 W/Kg**	**0.084 W/Kg**

10.3. REPEATED SAR MEASUREMENT (N/A)

Band	Test position	channel	Original Measured SAR1g (mW/g)	1st Repeated SAR1g (mW/g	Ratio	Scaled SAR1g (mW/g)
N/A						

Note:

1. Per KDB 865664 D01v01,for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8W/Kg
2. Per KDB 865664 D01v01,if the ratio of largest to smallest SAR for the original and first repeated measurement is ≤1.2 and the measured SAR < 1.45W/Kg, only one repeated measurement is required.
3. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg
4. The ratio is the difference in percentage between original and repeated measured SAR.

11. SULT OF SUM ∑SAR1G

11.1. Result of SUM ∑SAR1g of Head

SUM ∑SAR1g (GSM850+ Bluetooth)						
Position	Distance	Stand alone SAR(1g) [W/kg]			SUM SAR(1g)[W/kg]	SUM SAR(1g)[W/kg]
	[mm]	GSM850	WLAN 2.4G	Bluetooth	WWAN + WLAN(2.4G)	WWAN +Bluetooth
Right Cheek	0	0.338	/	0.167	/	0.505
Right Tilted	0	0.186	/	0.167	/	0.353
Left Cheek	0	0.440	/	0.167	/	0.607
Left Tilted	0	0.274	/	0.167	/	0.441

SUM ∑SAR1g (PCS1900+ Bluetooth)						
Position	Distance	Stand alone SAR(1g) [W/kg]			SUM SAR(1g)[W/kg]	SUM SAR(1g)[W/kg]
	[mm]	PCS1900	WLAN 2.4G	Bluetooth	WWAN + WLAN(2.4G)	WWAN +Bluetooth
Right Cheek	0	0.506	/	0.167	/	0.673
Right Tilted	0	0.300	/	0.167	/	0.467
Left Cheek	0	0.729	/	0.167	/	0.896
Left Tilted	0	0.392	/	0.167	/	0.559

11.2. Result of SUM ∑SAR1g for Body

SUM ∑SAR1g (GSM850+ Bluetooth)						
Position	Distance	Stand alone SAR(1g) [W/kg]			SUM SAR(1g)[W/kg]	SUM SAR(1g)[W/kg]
	[mm]	GSM850	WLAN 2.4G	Bluetooth	WWAN + WLAN(2.4G)	WWAN +Bluetooth
Face up	10	0.405	/	0.084	/	0.489
Face down	10	0.447	/	0.084	/	0.531

SUM ∑SAR1g (PCS1900+ Bluetooth)						
Position	Distance	Stand alone SAR(1g) [W/kg]			SUM SAR(1g)[W/kg]	SUM SAR(1g)[W/kg]
	[mm]	PCS1900	WLAN 2.4G	Bluetooth	WWAN + WLAN(2.4G)	WWAN +Bluetooth
Face up	10	0.597	/	0.084	/	0.681
Face down	10	0.645	/	0.084	/	0.729

12. APPENDIX A: SYSTEM CHECKING SCANS

Date: 2015.3.26

Test Laboratory: NIM SAR Test

Dipole835V2 Head 1

DUT: Dipole 835 MHz D835V2; Type: D835V2;

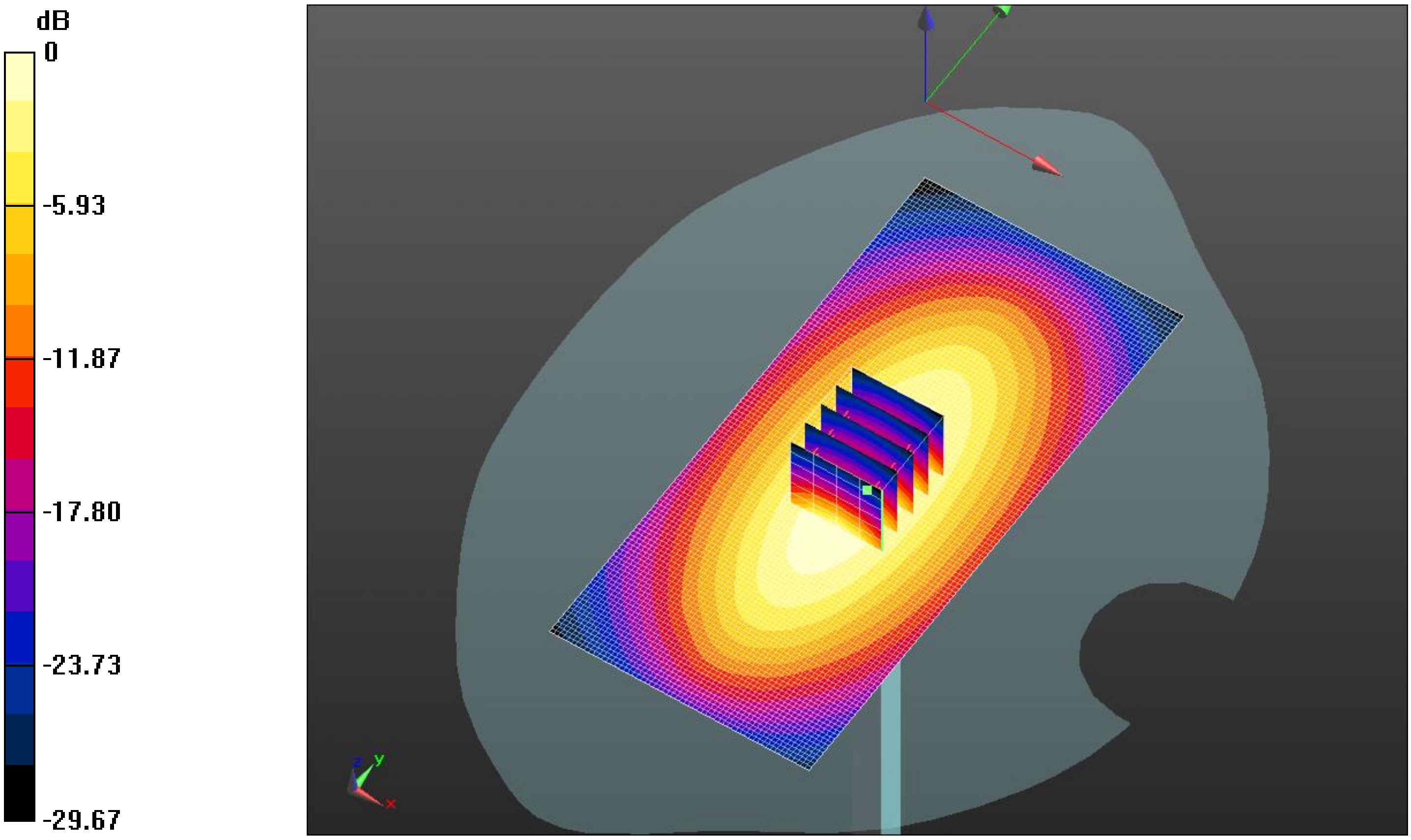
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV4 - SN3881; ConvF(8.25, 8.25, 8.25);Calibrated: 2014.07.22.;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 2014.03.09.
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1504
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Head/Dipole835/Area Scan (61x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 53.222 V/m; Power Drift = 0.00 dB
Fast SAR: SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (interpolated) = 2.52 W/kg

Head/Dipole835/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.222 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.557 mW/g
SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.51 mW/g
Maximum value of SAR (measured) = 2.52 W/kg



0 dB = 2.52 W/kg = 8.02 dB W/kg

Date: 2015.3.26

Test Laboratory: NIM SAR Test

Dipole1900V2 Head 1

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2;

Communication System: CW; Communication System Band: D1900 (1900.0 MHz);
Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 39.75; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

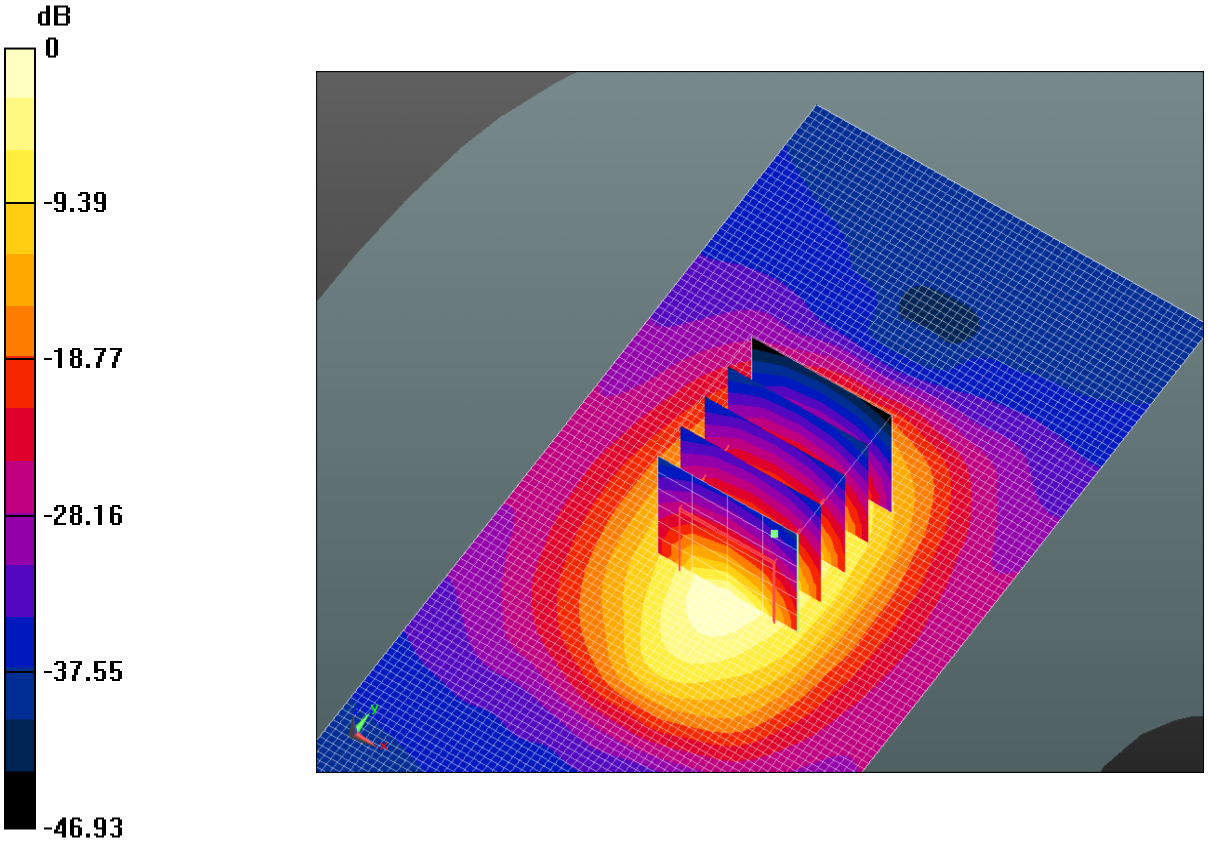
DASY5 Configuration:

- Probe: ES3DV4 - SN3881; ConvF(8.25, 8.25, 8.25);Calibrated: 2014.07.22.;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 2014.03.09.
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1504
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Head/Dipole1900/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 86.469 V/m; Power Drift = 0.07 dB
Fast SAR: SAR(1 g) = 10.1 mW/g; SAR(10 g) = 4.9 mW/g
Maximum value of SAR (interpolated) = 11.9 W/kg

Head/Dipole1900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 86.469 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 19.751 mW/g
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5 mW/g

Maximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.9 W/kg = 21.50 dB W/kg

Date: 2015.3.26

Test Laboratory: NIM SAR Test

Dipole835V2 Body 1

DUT: Dipole 835 MHz D835V2; Type: D835V2;

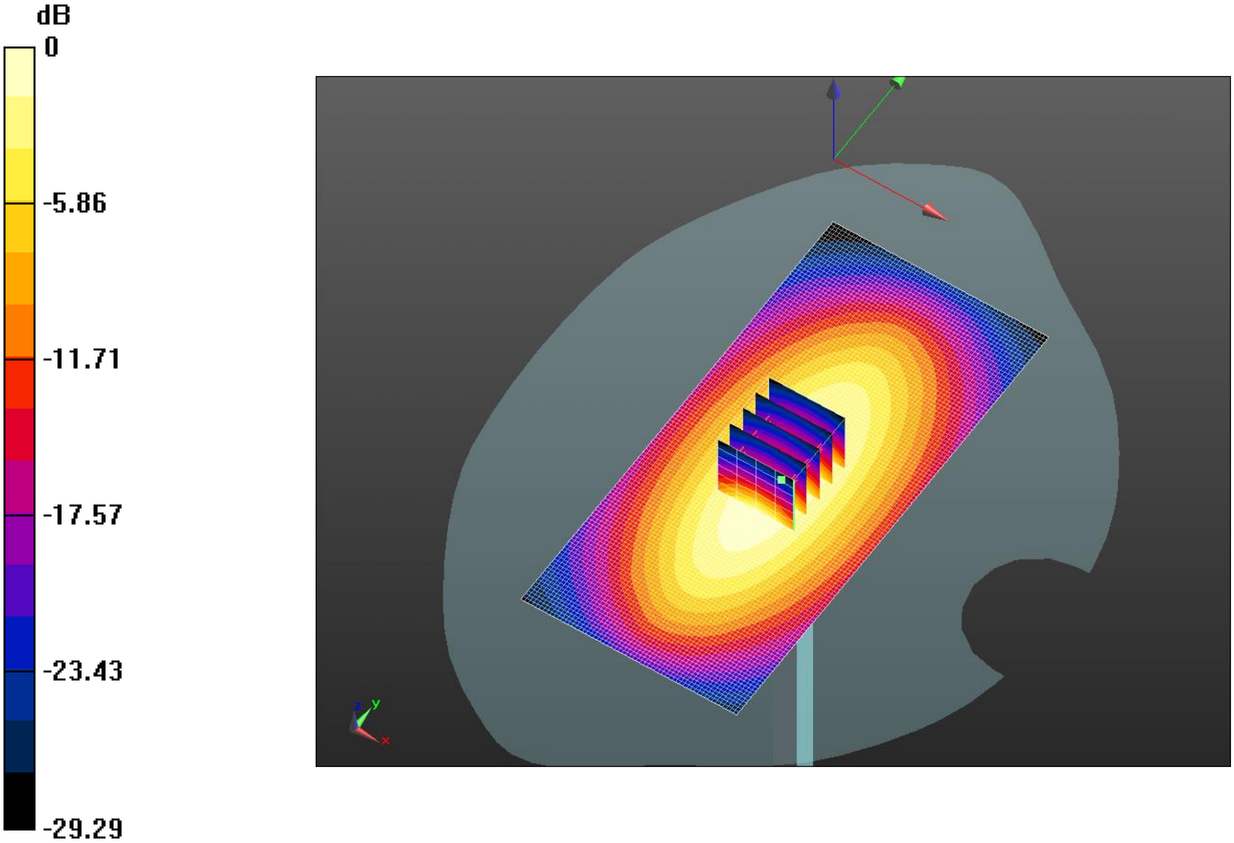
Communication System: CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.96 mho/m; ε_r = 55.87; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV4 - SN3881; ConvF(8.25, 8.25, 8.25);Calibrated: 2014.07.22.;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 2014.03.09.
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1504
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Body/Dipole835/Area Scan (61x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 55.902 V/m; Power Drift = -0.52 dB
Fast SAR: SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.67 mW/g
Maximum value of SAR (interpolated) = 2.76 W/kg

Body/Dipole835/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 55.902 V/m; Power Drift = -0.52 dB
Peak SAR (extrapolated) = 3.791 mW/g
SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.61 mW/g
Maximum value of SAR (measured) = 2.69 W/kg



0 dB = 2.76 W/kg = 8.82 dB W/kg

Date: 2015.3.26

Test Laboratory: NIM SAR Test

Dipole1900V2 Body 1

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2;

Communication System: CW; Communication System Band: D1900 (1900.0 MHz);
Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.05; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

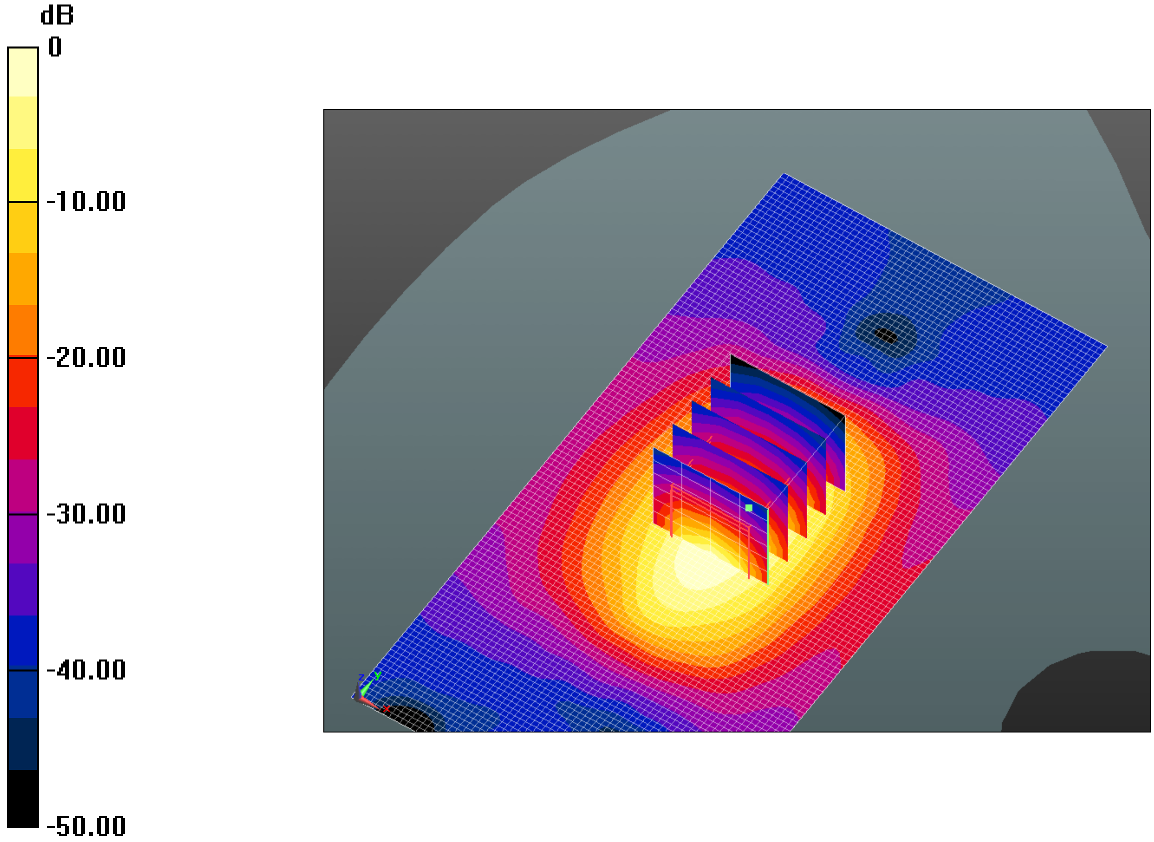
DASY5 Configuration:

- Probe: ES3DV4 - SN3881; ConvF(8.25, 8.25, 8.25);Calibrated: 2014.07.22.;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 2014.03.09.
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1504
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Body/Dipole1900/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 87.333 V/m; Power Drift = 0.06 dB
Fast SAR: SAR(1 g) = 11 mW/g; SAR(10 g) = 5.38 mW/g
Maximum value of SAR (interpolated) = 13.0W/kg

Body/Dipole1900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 87.333 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 21.434 mW/g
SAR(1 g) = 11.1 mW/g; SAR(10 g) = 5.54 mW/g

Maximum value of SAR (measured) = 12.7W/kg



0 dB = 13.0 W/kg = 22.31 dB W/kg

13. APPENDIX B: MEASUREMENT SCANS

AOC A17 GSM 850 Head Left Cheek Mid

DUT: AOC; Type: A17;

Communication System: UID 0, Left Cheek-Mid; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 7.78 dB
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.89 S/m; ε_r = 41.478; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(9.13, 9.13, 9.13); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

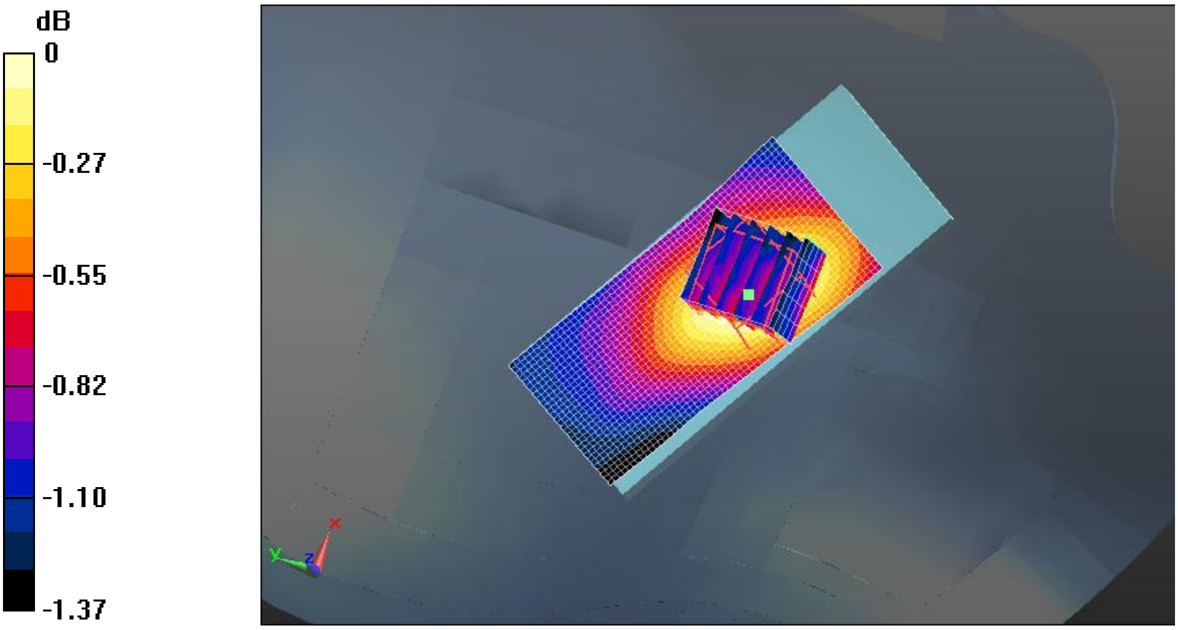
GSM 850 Left cheek/Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 19.64 V/m; Power Drift = -0.09 dB
Fast SAR: SAR(1 g) = 0.367 W/kg; SAR(10 g) = 0.259 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.388 W/kg

GSM 850 Left cheek/Mid/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.64 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.457 W/kg
SAR(1 g) = 0.383 W/kg; SAR(10 g) = 0.351 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.389 W/kg



0 dB = 0.388 W/kg = -4.12 dBW/kg

Date/Time: 3/27/2015 7:10:14 PM

AOC A17 GSM 850 Head Left Tilted Mid

DUT: AOC; Type: A17;

Communication System: UID 0, Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 9.191 dB
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.89 S/m; ε_r = 41.478; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(9.13, 9.13, 9.13); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

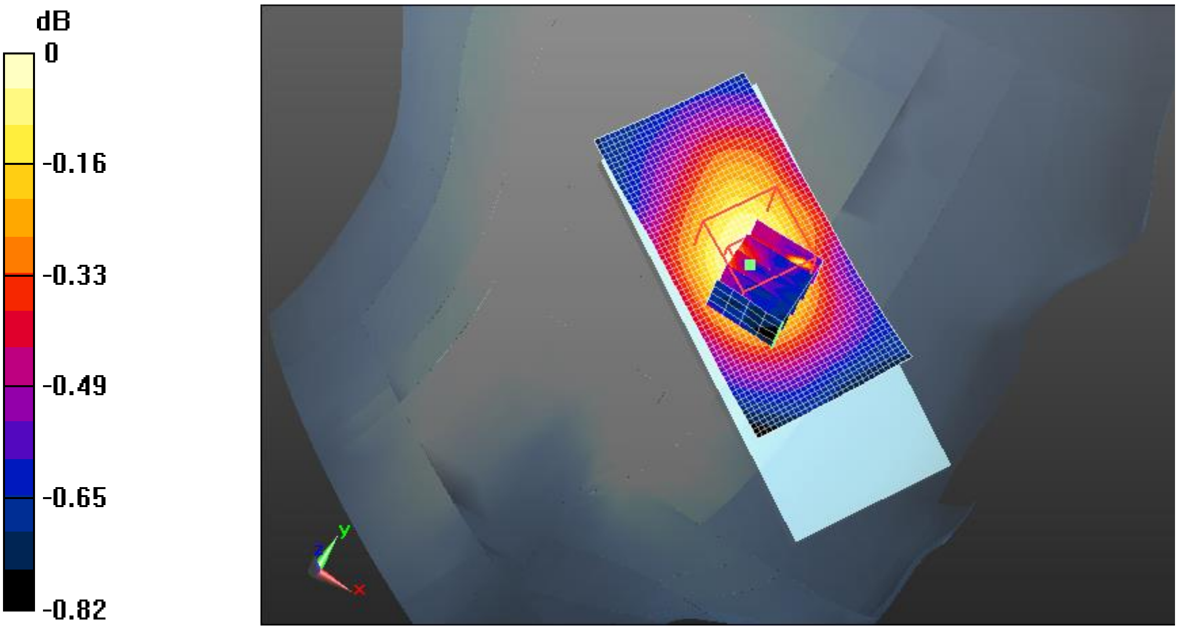
GSM 850_Left Tilted/Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 16.60 V/m; Power Drift = -0.13 dB
Fast SAR: SAR(1 g) = 0.234 W/kg; SAR(10 g) = 0.167 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.247 W/kg

GSM 850_Left Tilted/Mid/Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.60 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.261 W/kg
SAR(1 g) = 0.239 W/kg; SAR(10 g) = 0.213 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.245 W/kg



0 dB = 0.247 W/kg = -6.07 dBW/kg

Date/Time: 3/27/2015 7:22:35 PM

AOC A17 GSM 850 Head Right Cheek Mid

DUT: AOC; Type: A17;

Communication System: UID 10001, Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 9.191 dB
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.89 S/m; ε_r = 41.478; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(9.13, 9.13, 9.13); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

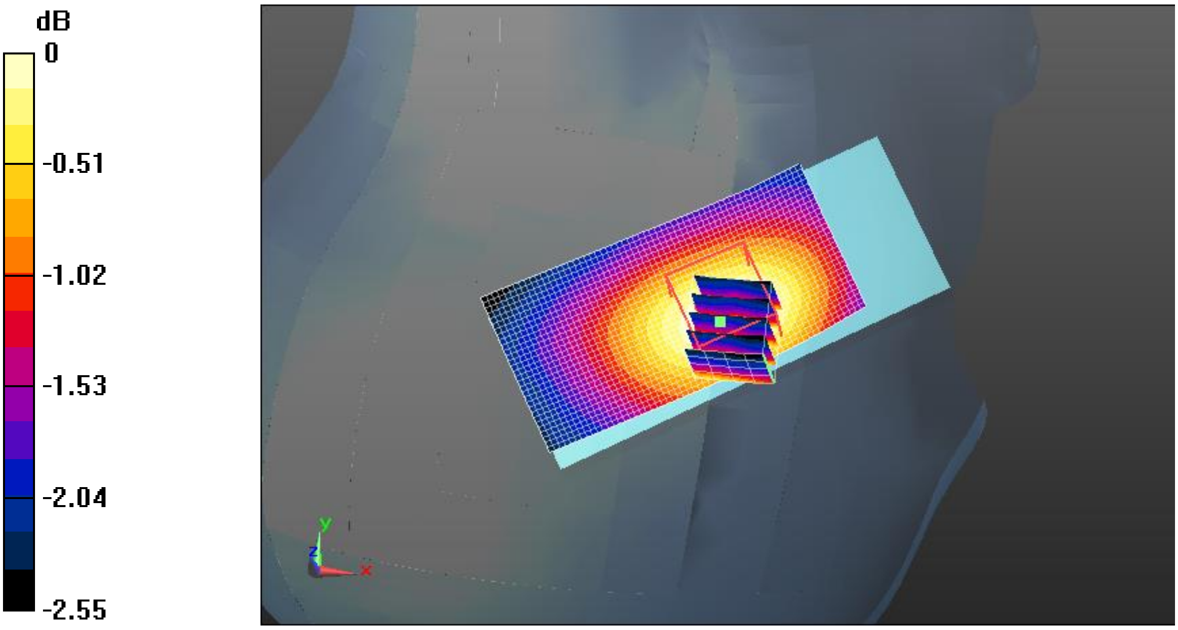
GSM 850_Right Cheek/Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 16.43 V/m; Power Drift = -0.09 dB
Fast SAR: SAR(1 g) = 0.313 W/kg; SAR(10 g) = 0.219 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.331 W/kg

GSM 850_Right Cheek/Mid/Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.43 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.341 W/kg
SAR(1 g) = 0.294 W/kg; SAR(10 g) = 0.193 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.300 W/kg



0 dB = 0.331 W/kg = -4.81 dBW/kg

Date/Time: 3/27/2015 7:32:28 PM

AOC A17 GSM 850 Head Right Tilted Mid

DUT: AOC; Type: A17;

Communication System: UID 10001, Generic GSM; Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 9.191 dB
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.89 S/m; ε_r = 41.478; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(9.13, 9.13, 9.13); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

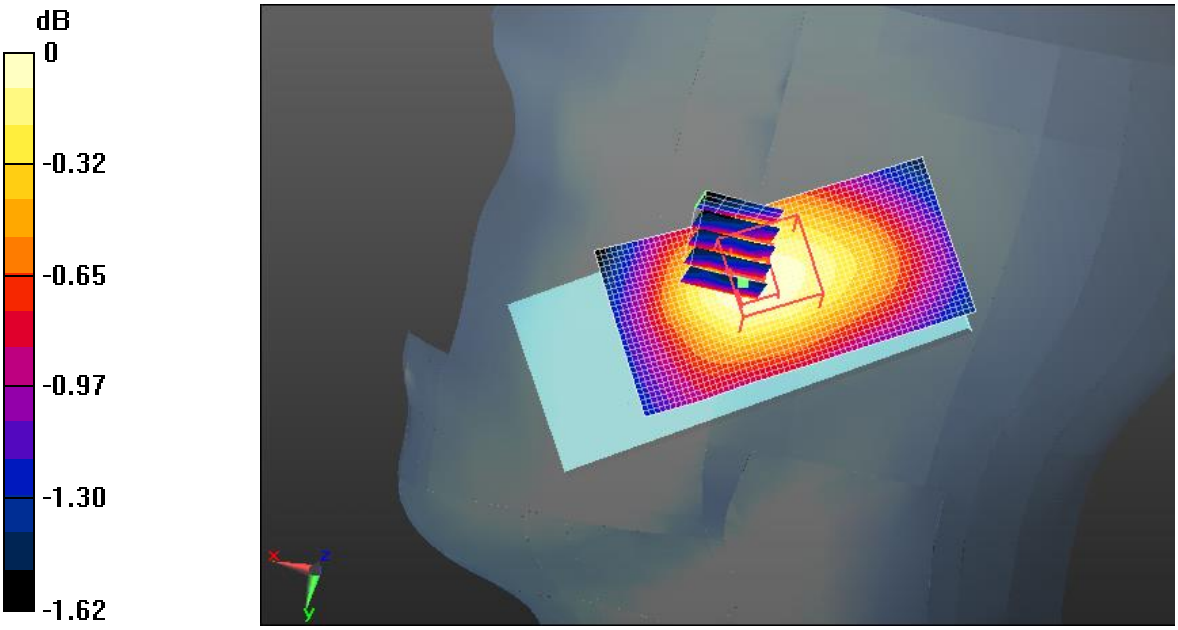
GSM 850_Right_Tilted/Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 13.28 V/m; Power Drift = -0.17 dB
Fast SAR: SAR(1 g) = 0.171 W/kg; SAR(10 g) = 0.121 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.180 W/kg

GSM 850_Right_Tilted/Mid/Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.28 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.198 W/kg
SAR(1 g) = 0.162 W/kg; SAR(10 g) = 0.106 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.167 W/kg



0 dB = 0.180 W/kg = -7.44 dBW/kg

AOC A17 GPRS 850 Body Faceup Mid

DUT: AOC; Type: A17;

Communication System: UID 0, GPRS FDD(TDMA,GSMK); Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 7 dB
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 S/m; ε_r = 55.858; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(9.14, 9.14, 9.14); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

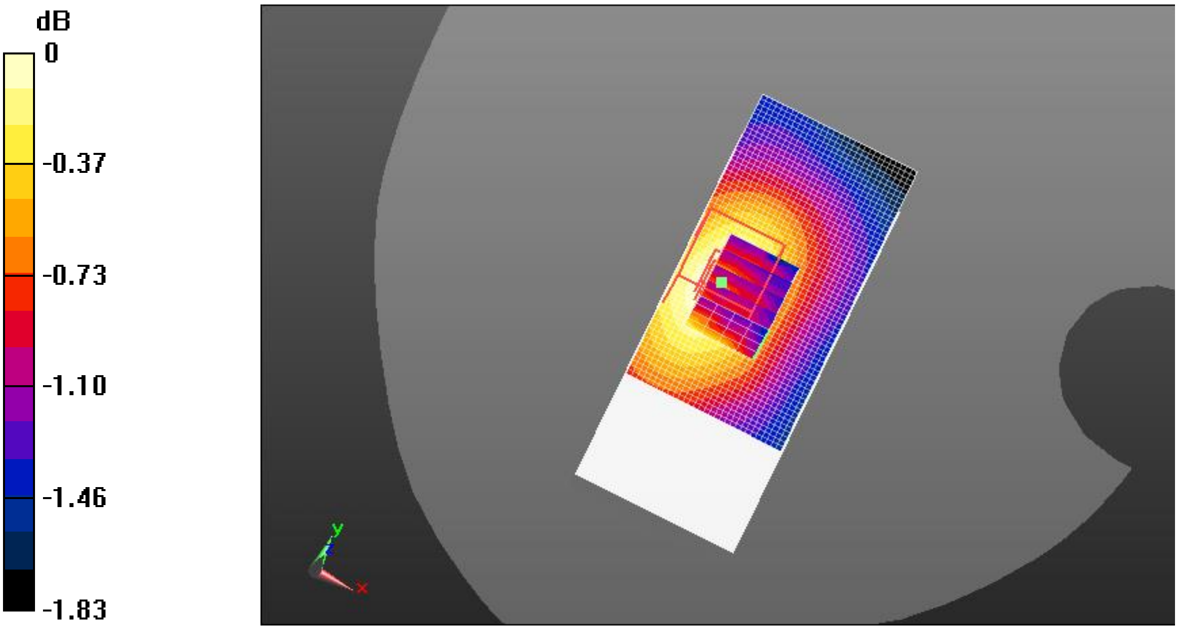
GPRS 850_Faceup/Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 17.33 V/m; Power Drift = -0.11 dB
Fast SAR: SAR(1 g) = 0.327 W/kg; SAR(10 g) = 0.230 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.346 W/kg

GPRS 850_Faceup/Mid/Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.33 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.368 W/kg
SAR(1 g) = 0.337 W/kg; SAR(10 g) = 0.239 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.346 W/kg



0 dB = 0.346 W/kg = -4.61 dBW/kg

Date/Time: 3/27/2015 8:06:37 PM

AOC A17 GPRS 850 Body Facedown Mid

DUT: AOC; Type: A17; Serial: IMEI Number

Communication System: UID 0, GPRS FDD(TDMA,GSMK); Communication System Band: GSM 850 (824.0 - 849.0 MHz); Frequency: 836.6 MHz;Communication System PAR: 7 dB
Medium parameters used (interpolated): f = 836.6 MHz; σ = 1.01 S/m; ε_r = 55.858; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(9.14, 9.14, 9.14); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

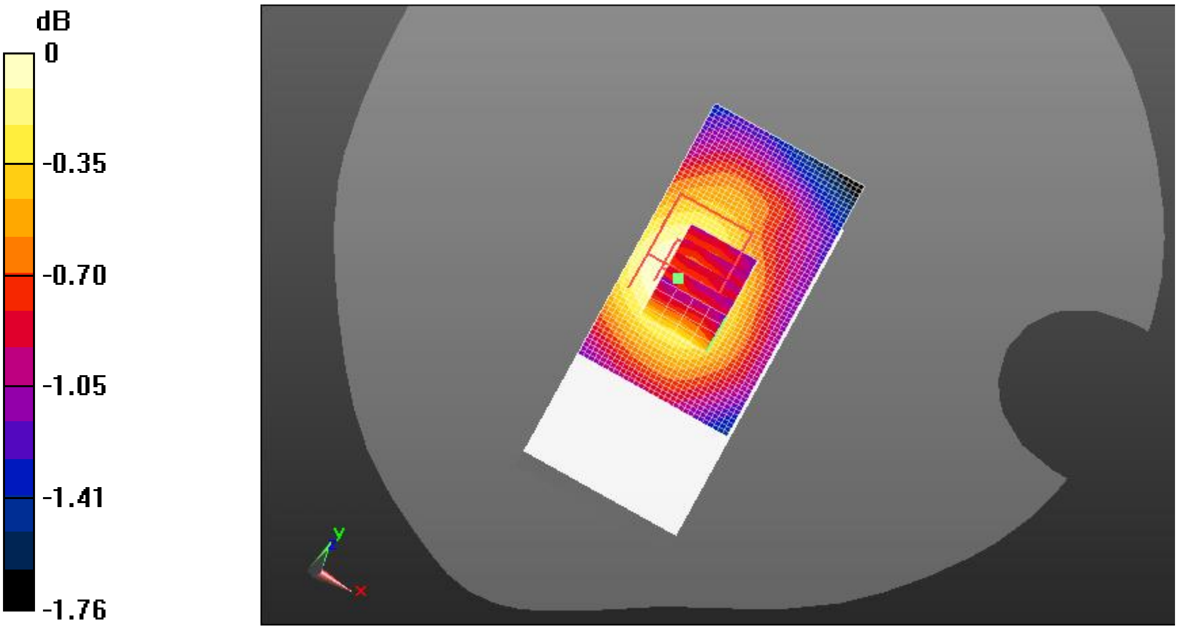
GPRS 850_Facedown/Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 18.13 V/m; Power Drift = 0.06 dB
Fast SAR: SAR(1 g) = 0.363 W/kg; SAR(10 g) = 0.257 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.382 W/kg

GPRS 850_Facedown/Mid/Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.13 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.407 W/kg
SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.327 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.379 W/kg



0 dB = 0.379 W/kg = -4.21 dBW/kg

Date/Time: 3/27/2015 4:58:33 PM

AOC A17 GSM1900 Head Left Cheek Mid

DUT: AOC; Type: A17;

Communication System: UID 0, Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;Communication System PAR: 9.191 dB
Medium parameters used: f = 1880 MHz; σ = 1.45 S/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

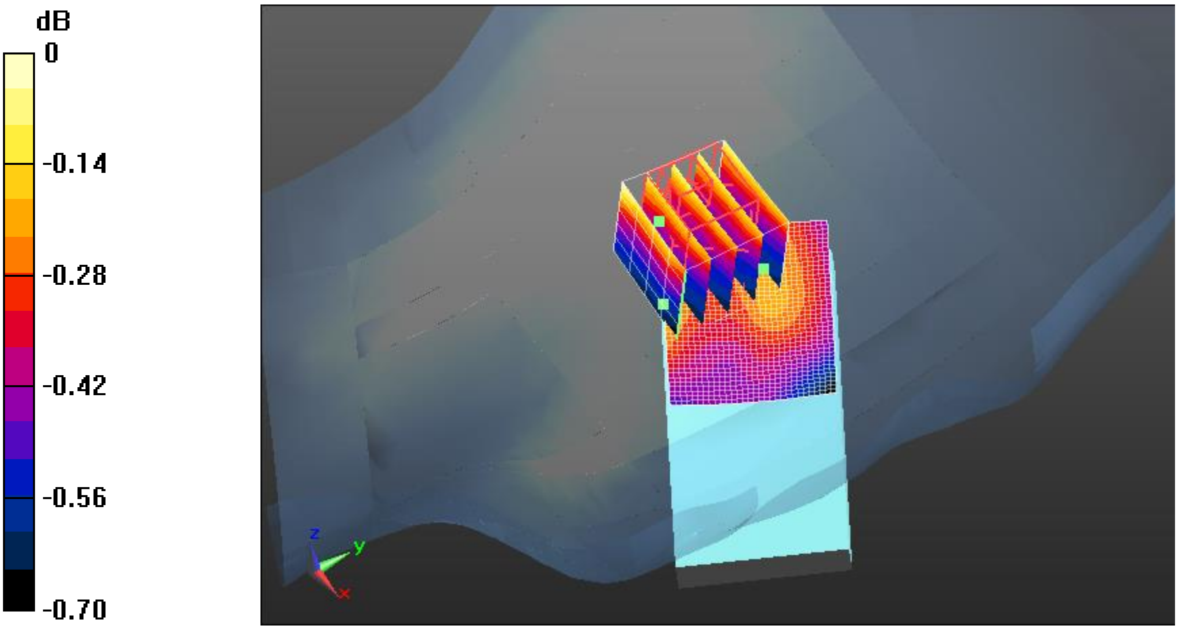
DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(7.91, 7.91, 7.91); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900_Left GSM Head/1900 GSM Cheek-Mid/Area Scan (31x41x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 19.80 V/m; Power Drift = -0.13 dB
Fast SAR: SAR(1 g) = 0.527 W/kg; SAR(10 g) = 0.337 W/kg

Maximum value of SAR (interpolated) = 0.576 W/kg

1900_Left GSM Head/1900 GSM Cheek-Mid/Zoom Scan (5x5x6)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=6mm
Reference Value = 19.80 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.745 W/kg
SAR(1 g) = 0.663 W/kg; SAR(10 g) = 0.618 W/kg
Maximum value of SAR (measured) = 0.745 W/kg



0 dB = 0.576 W/kg = -2.40 dBW/kg

Date/Time: 3/27/2015 5:08:50 PM

AOC A17 GSM1900 Head Left Tilted Mid

DUT: AOC; Type: A17;

Communication System: UID 10001, Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;Communication System PAR: 9.191 dB
Medium parameters used: f = 1880 MHz; $\sigma = 1.45$ S/m; $\varepsilon_r = 39.74$; $\rho = 1000$ kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

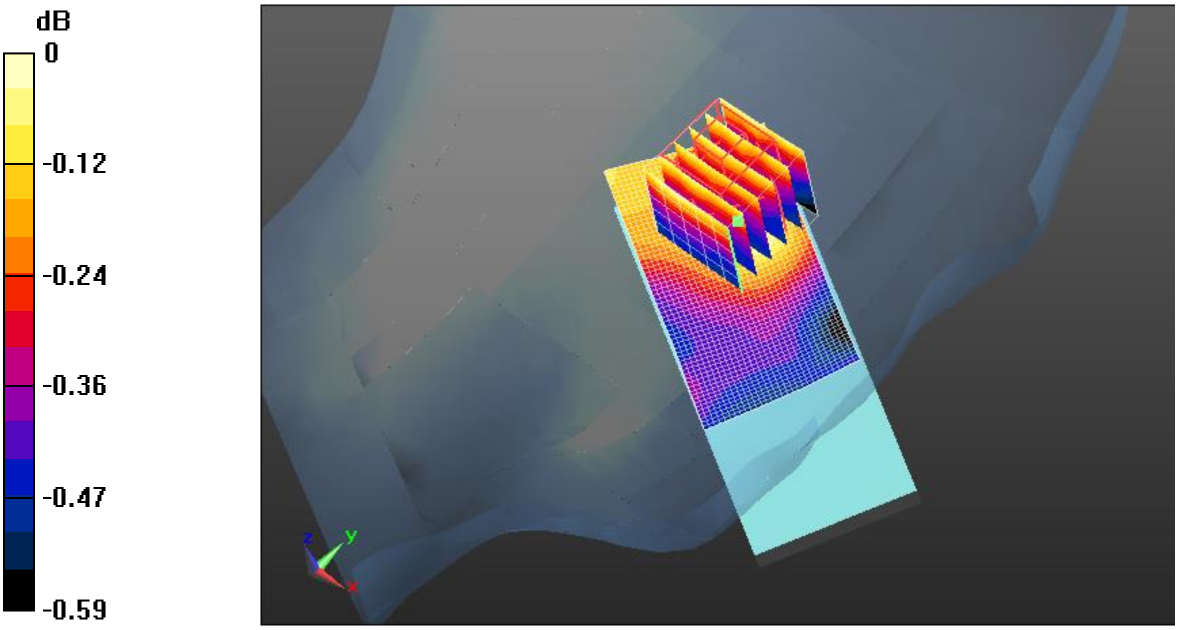
DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(7.91, 7.91, 7.91); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900_Left GSM Head/1900GSM Tilted-Mid/Area Scan (31x61x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 15.20 V/m; Power Drift = -0.13 dB
Fast SAR: SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.194 W/kg
Maximum value of SAR (interpolated) = 0.320 W/kg

1900_Left GSM Head/1900GSM Tilted-Mid/Zoom Scan (6x6x6)/Cube 0:
Measurement grid: dx=6mm, dy=6mm, dz=6mm
Reference Value = 15.20 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.394 W/kg
SAR(1 g) = 0.357 W/kg; SAR(10 g) = 0.336 W/kg

Maximum value of SAR (measured) = 0.394 W/kg



0 dB = 0.320 W/kg = -4.95 dBW/kg

Date/Time: 3/27/2015 5:23:29 PM

AOC A17 GSM1900 Head Right Cheek- Mid

DUT: AOC; Type: A17;

Communication System: UID 0, Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;Communication System PAR: 9.191 dB
Medium parameters used: f = 1880 MHz; σ = 1.45 S/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

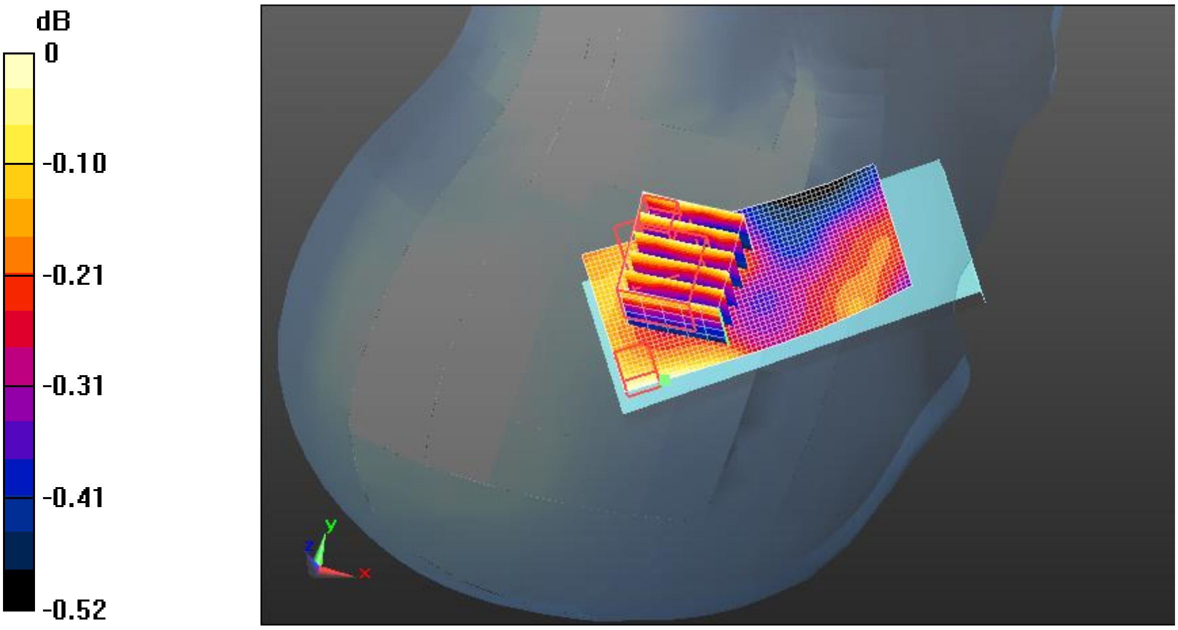
- Probe: EX3DV4 - SN3381; ConvF(7.91, 7.91, 7.91); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900_Right GSM Head/1900 GSM Cheek-Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 17.16 V/m; Power Drift = -0.11 dB
Fast SAR: SAR(1 g) = 0.383 W/kg; SAR(10 g) = 0.247 W/kg

Maximum value of SAR (interpolated) = 0.415 W/kg

1900_Right GSM Head/1900 GSM Cheek-Mid/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=6mm, dy=6mm, dz=6mm
Reference Value = 17.16 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.507 W/kg
SAR(1 g) = 0.460 W/kg; SAR(10 g) = 0.430 W/kg

Maximum value of SAR (measured) = 0.507 W/kg



0 dB = 0.415 W/kg = -3.82 dBW/kg

Date/Time: 3/27/2015 5:39:03 PM

AOC A17 GSM1900 Head Right Tilted- Mid

DUT: AOC; Type: A17;

Communication System: UID 10001, Generic GSM; Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;Communication System PAR: 9.191 dB
Medium parameters used: f = 1880 MHz; σ = 1.45 S/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

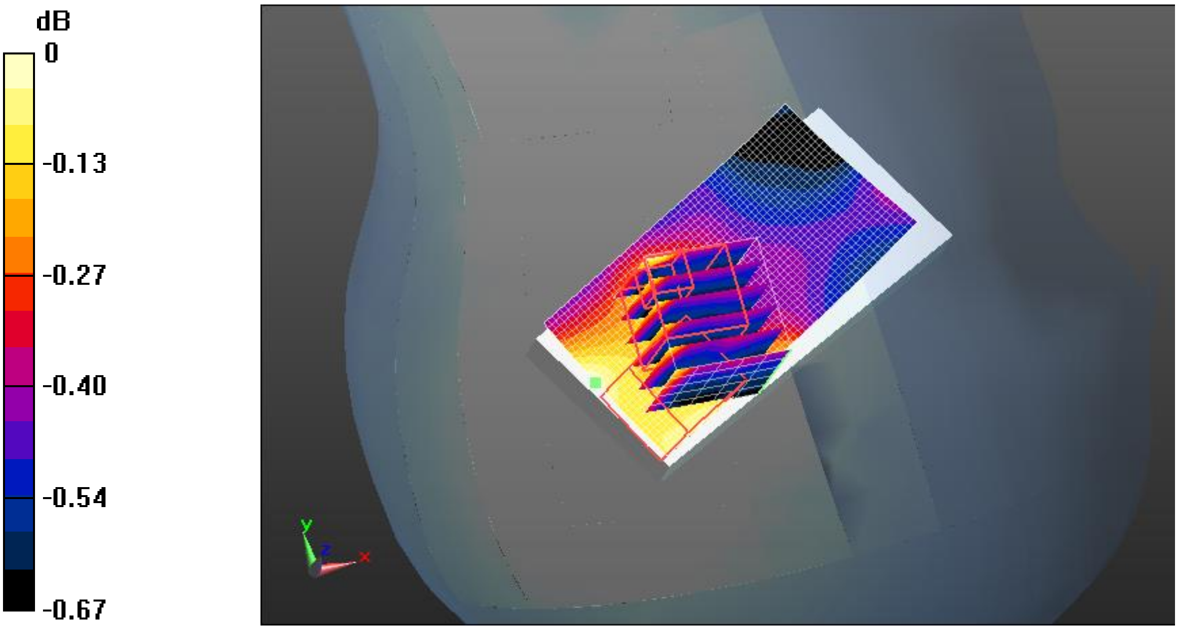
- Probe: EX3DV4 - SN3381; ConvF(7.91, 7.91, 7.91); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900_Right GSM Head/1900 GSM Tilted-Mid/Area Scan (31x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 12.83 V/m; Power Drift = 0.12 dB
Fast SAR: SAR(1 g) = 0.215 W/kg; SAR(10 g) = 0.138 W/kg

Maximum value of SAR (interpolated) = 0.231 W/kg

1900_Right GSM Head/1900 GSM Tilted-Mid/Zoom Scan (6x6x6)/Cube 0:
Measurement grid: dx=6mm, dy=6mm, dz=6mm
Reference Value = 12.83 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.379 W/kg
SAR(1 g) = 0.273 W/kg; SAR(10 g) = 0.244 W/kg

Maximum value of SAR (measured) = 0.369 W/kg



0 dB = 0.231 W/kg = -6.36 dBW/kg

Date/Time: 3/27/2015 6:06:15 PM

AOC A17 GRPS1900 Body Faceup Mid

DUT: AOC; Type: A17;

Communication System: UID 0, GPRS FDD(TDMA,GSMK); Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;Communication System PAR: 7 dB
Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 51.14; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

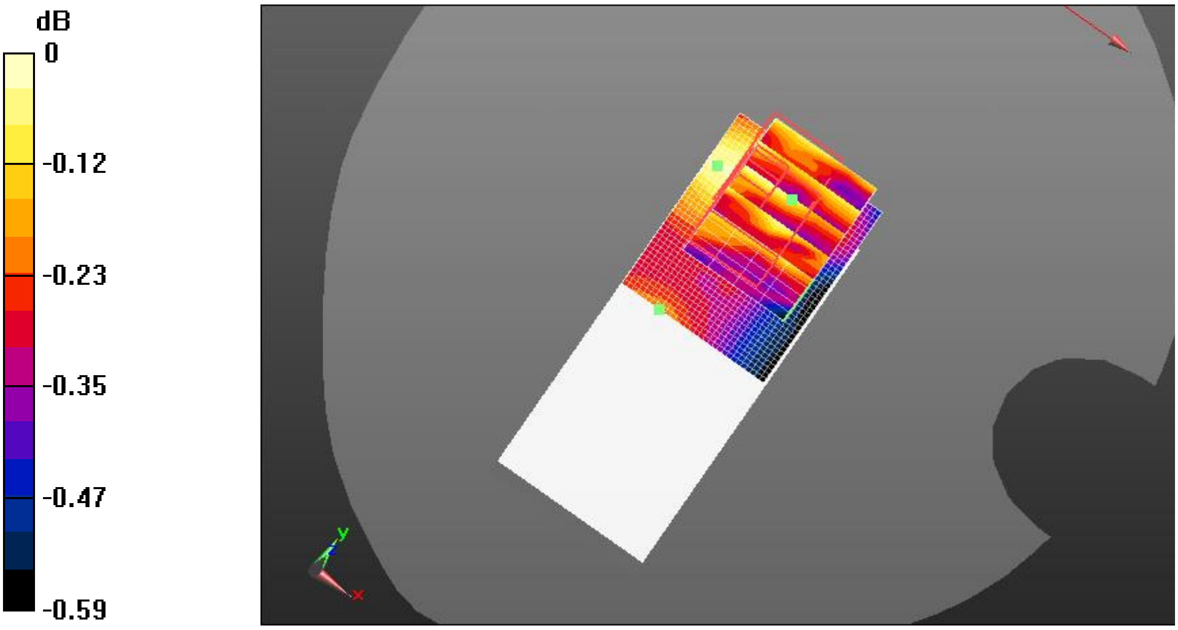
DASY5 Configuration:

- Probe: EX3DV4 - SN3381; ConvF(7.49, 7.49, 7.49); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900_GPRS/GPRS1900 Faceup-Mid/Area Scan (31x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 18.22 V/m; Power Drift = 0.14 dB
Fast SAR: SAR(1 g) = 0.494 W/kg; SAR(10 g) = 0.319 W/kg
Maximum value of SAR (interpolated) = 0.526 W/kg

1900_GPRS/GPRS1900 Faceup-Mid/Zoom Scan (5x5x6)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=6mm
Reference Value = 18.22 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.594 W/kg
SAR(1 g) = 0.557 W/kg; SAR(10 g) = 0.537 W/kg

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



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

Date/Time: 3/27/2015 6:32:53 PM

AOC A17 GRPS1900 Body Facedown Mid

DUT: AOC; Type: A17;

Communication System: UID 0, GPRS FDD(TDMA,GSMK); Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;Communication System PAR: 7 dB
Medium parameters used: f = 1880 MHz; $\sigma = 1.57$ S/m; $\varepsilon_r = 51.14$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

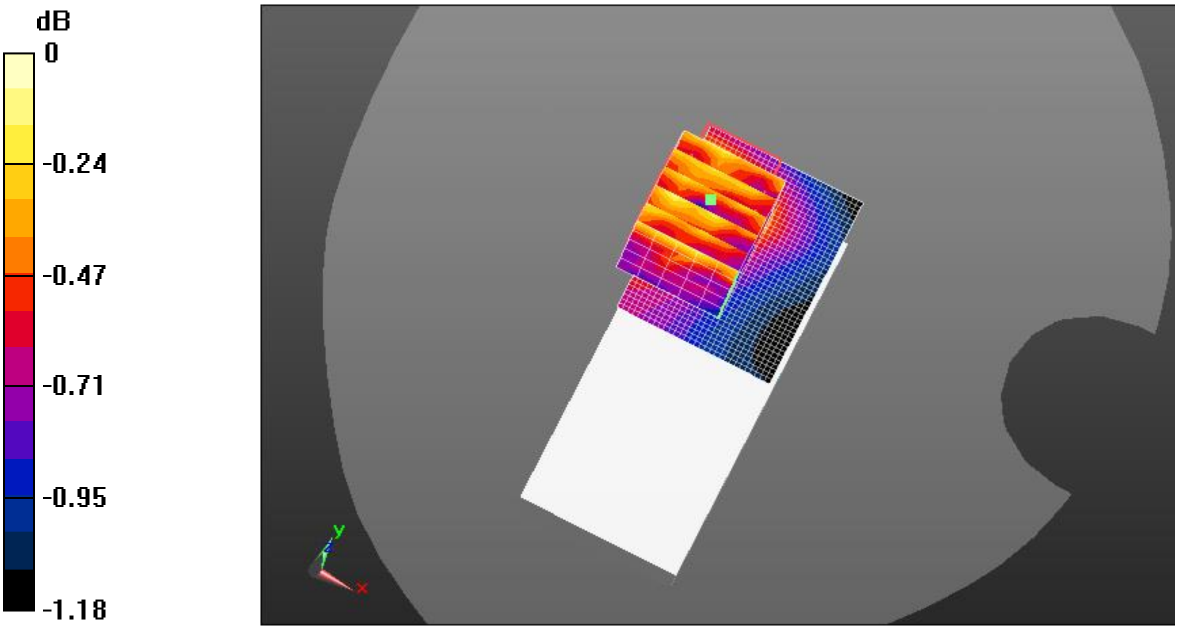
- Probe: EX3DV4 - SN3381; ConvF(7.49, 7.49, 7.49); Calibrated: 07/22/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 03/09/2015
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900_GPRS/GPRS1900 Facedown-Mid/Area Scan (31x41x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 19.33 V/m; Power Drift = 0.04 dB
Fast SAR: SAR(1 g) = 0.595 W/kg; SAR(10 g) = 0.373 W/kg

Maximum value of SAR (interpolated) = 0.643 W/kg

1900_GPRS/GPRS1900 Facedown-Mid/Zoom Scan (6x6x6)/Cube 0: Measurement grid: dx=6mm, dy=6mm, dz=6mm
Reference Value = 19.33 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.677 W/kg
SAR(1 g) = 0.602 W/kg; SAR(10 g) = 0.561 W/kg

Maximum value of SAR (measured) = 0.621 W/kg



0 dB = 0.621 W/kg = -2.07 dBW/kg

14. APPENDIX C: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

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

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Swiss Calibration Service

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

Accreditation No.: SCS 108

Client **SMQ (Auden)**

Certificate No: EX3-3881_Jul14

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3881
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	July 22, 2014

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Issued: July 23, 2014

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

Certificate No: EX3-3881_Jul14 Page 1 of 11

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**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3881

Manufactured: April 30, 2012
Calibrated: July 22, 2014

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3881

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.18	0.37	0.53	± 10.1 %
DCP (mV)[B]	96.5	100.9	101.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	133.4	±4.1 %
		Y	0.0	0.0	1.0		131.0	
		Z	0.0	0.0	1.0		132.8	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3881

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
450	43.5	0.87	10.60	10.60	10.60	0.18	1.80	± 13.3 %
835	41.5	0.90	9.41	9.41	9.41	0.49	0.70	± 12.0 %
1900	40.0	1.40	8.09	8.09	8.09	0.57	0.64	± 12.0 %

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3881

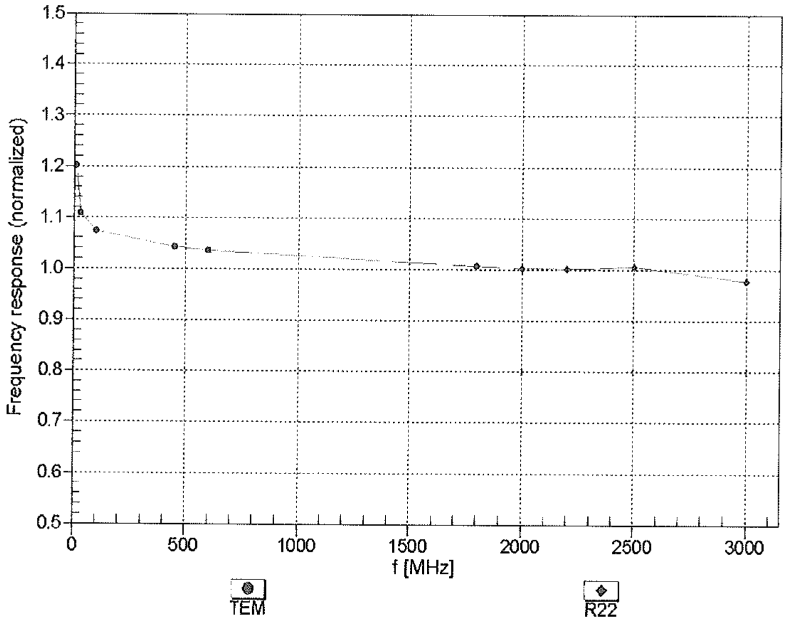
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
450	56.7	0.94	10.75	10.75	10.75	0.10	1.50	± 13.3 %
835	55.2	0.97	9.34	9.34	9.34	0.30	1.03	± 12.0 %
1900	53.3	1.52	8.25	8.25	8.25	0.46	1.00	± 12.0 %

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

Frequency Response of E-Field

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

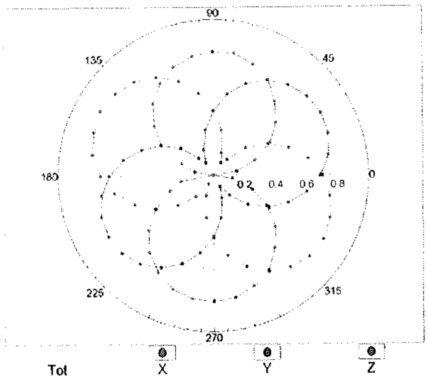


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

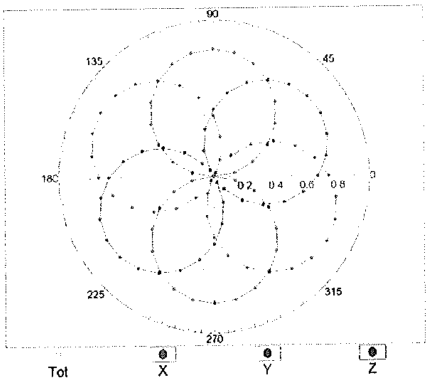
EX3DV4– SN:3881 July 22, 2014

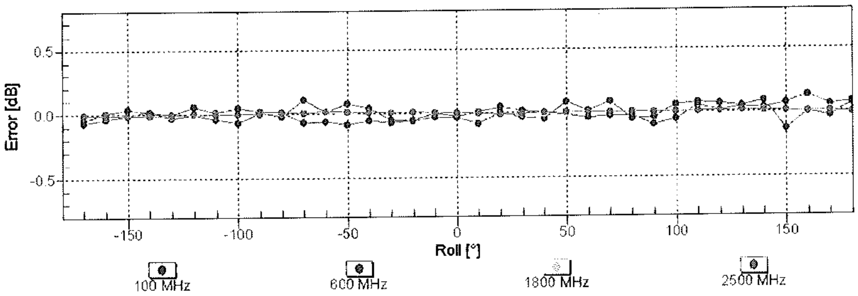
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



f=1800 MHz,R22

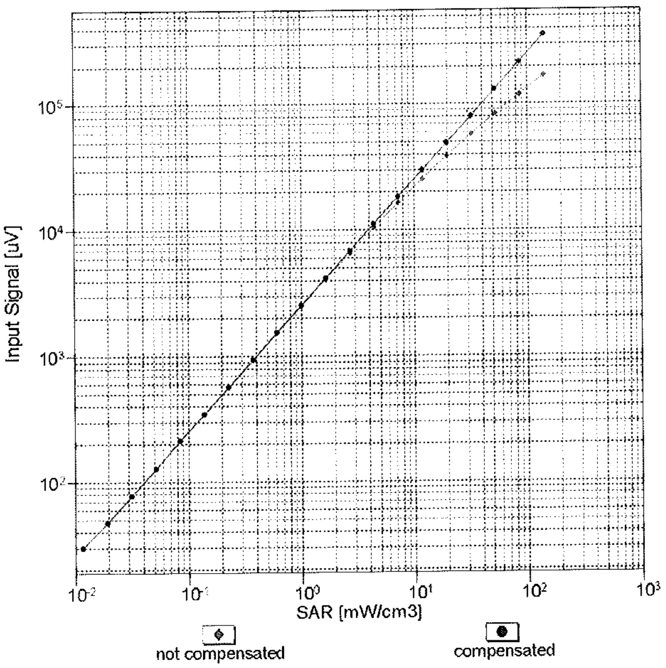


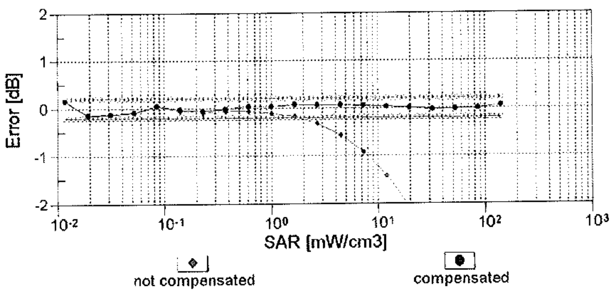


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

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

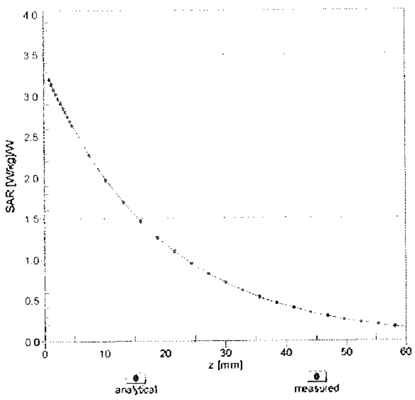




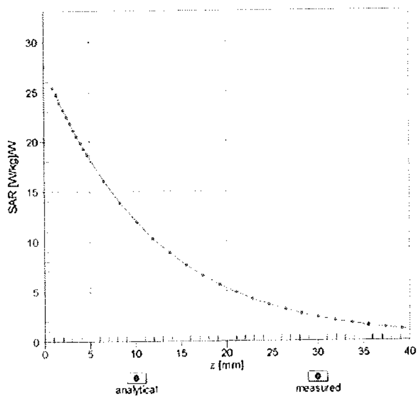
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

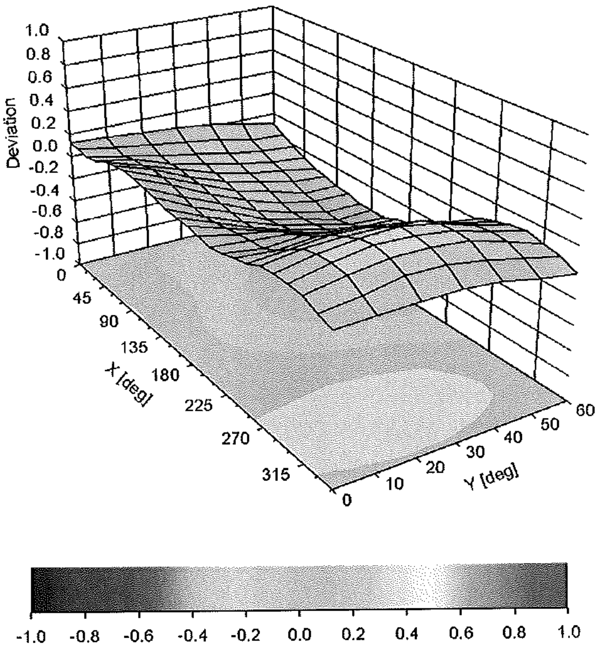


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (φ, ϑ), f = 900 MHz



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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3881

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-10.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

15. APPENDIX D: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)

CB 10364/01

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

ilac-MRA

SWISS CALIBRATION

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Accreditation No.: SCS 108

Client **SMQ (Auden)**

Certificate No: D835V2-4d141_Sep12

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d141
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 24, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 24, 2012

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

Certificate No: D835V2-4d141_Sep12 Page 1 of 8

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "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.

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.3 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.34 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.35 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.12 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.2 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.46 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.25 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.6 Ω - 2.7 jΩ
Return Loss	- 28.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.1 Ω - 1.9 jΩ
Return Loss	- 34.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 27, 2012

DASY5 Validation Report for Head TSL

Date: 24.09.2012

Test Laboratory: SPEAG, Zurich, Switzerland

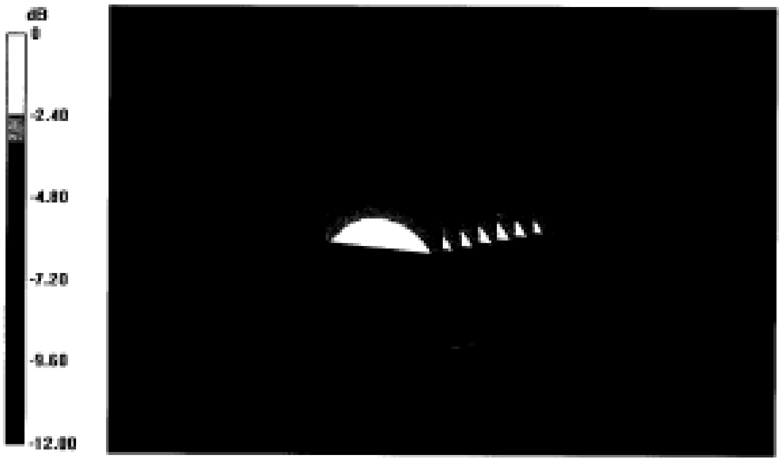
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d141

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

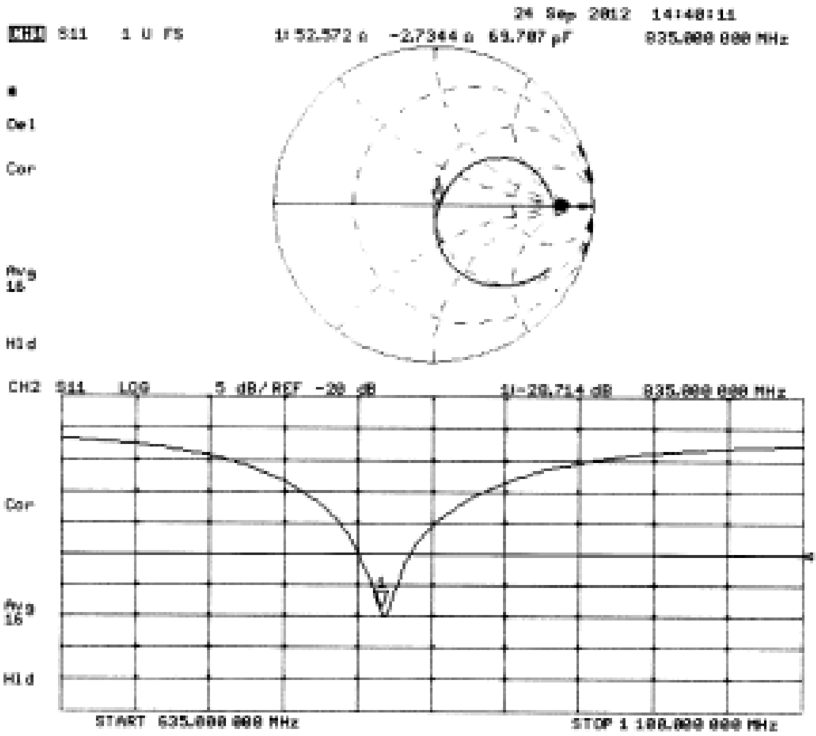
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.647 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.447 mW/g
SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (measured) = 2.71 W/kg



0 dB = 2.71 W/kg = 8.66 dB W/kg

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d141_Sep12 Page 6 of 8

DASY5 Validation Report for Body TSL

Date: 24.09.2012

Test Laboratory: SPEAG, Zurich, Switzerland

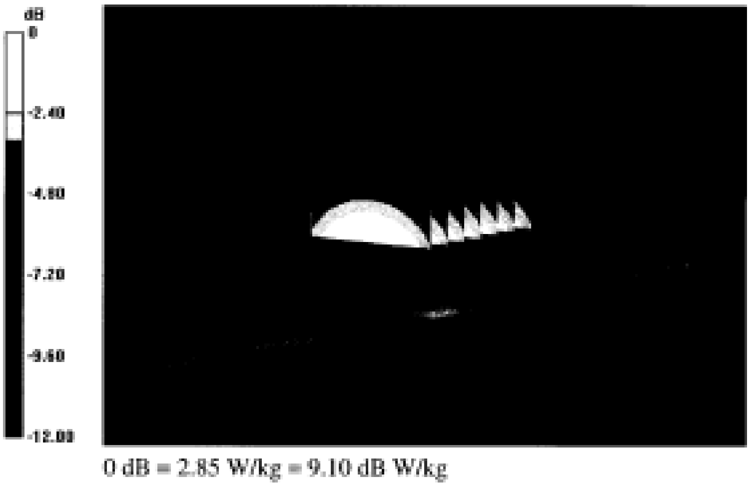
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d141

Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

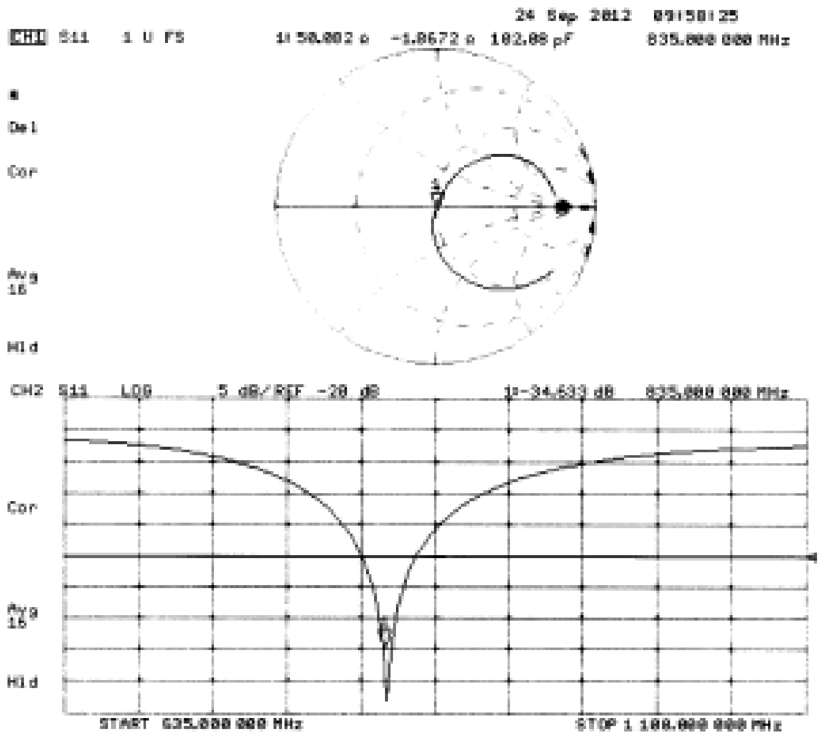
- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.345 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.541 mW/g
SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 9.10 dB W/kg

Impedance Measurement Plot for Body TSL



Justification of the extended calibration Dipole D835V2

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
September 24, 2012	-28.7		52.6		-2.7j	
September 22, 2013	-29.8	3.8	51.4	1.2	-2.3j	0.4j
September 20, 2014	-29.6	3.1	51.9	0.7	-2.2 j	0.5j

Body						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
September 24, 2012	-34.6		50.1		-1.9j	
September 22, 2013	-32.7	5.5	51.2	1.1	-2.0j	0.1
September 20, 2014	-32.9	4.9	50.8	0.7	-2.1j	0.2

The return loss is < -20dB, and within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

SS/0364/02

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

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

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

Accreditation No.: SCS 108

Client **SMQ (Auden)**

Certificate No: D1900V2-5d162_Sep12

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d162
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 21, 2012

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	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 21, 2012

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

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

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

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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
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.

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
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 ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.69 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**39.4 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.13 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	1.54 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**40.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.45 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2 Ω + 4.0 jΩ
Return Loss	- 26.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω + 5.0 jΩ
Return Loss	- 25.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 20, 2011

DASY5 Validation Report for Head TSL

Date: 21.09.2012

Test Laboratory: SPEAG, Zurich, Switzerland

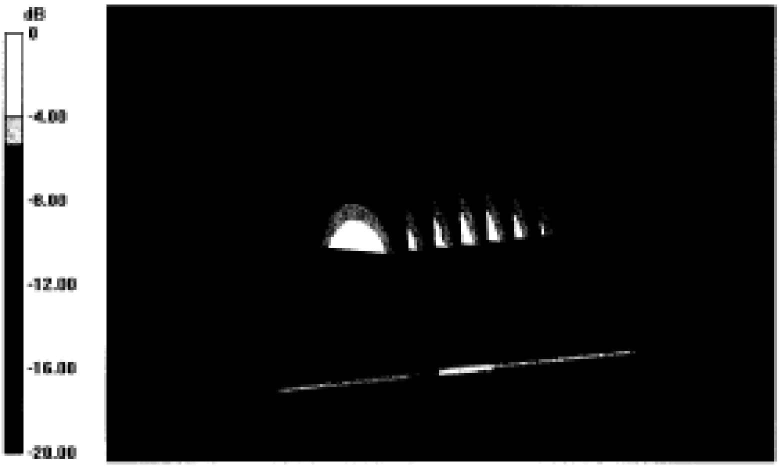
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d162

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

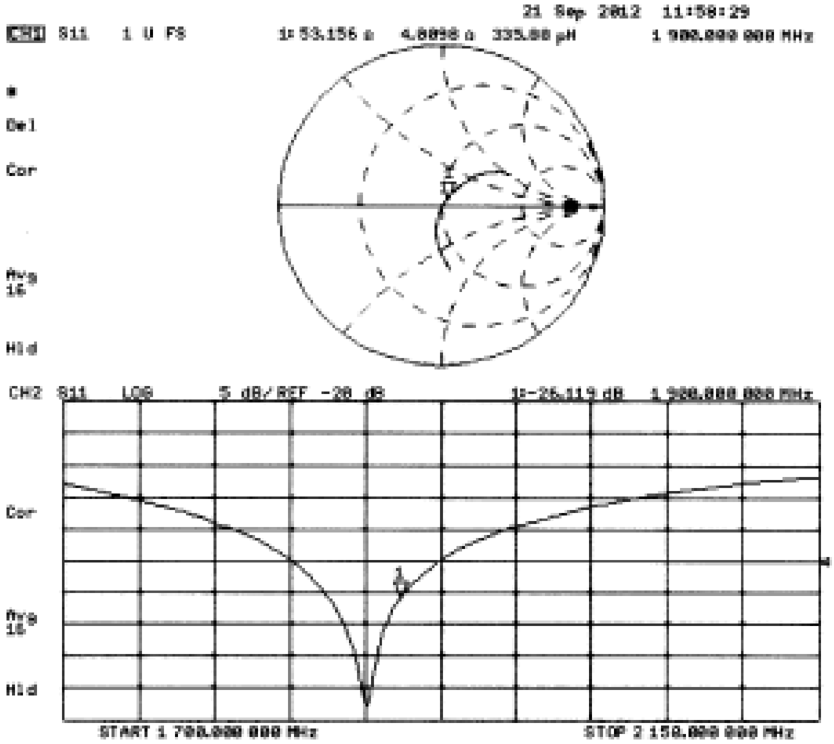
- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.423 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 17.236 mW/g
SAR(1 g) = 9.69 mW/g; SAR(10 g) = 5.13 mW/g
Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 21.51 dB W/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.09.2012

Test Laboratory: SPEAG, Zurich, Switzerland

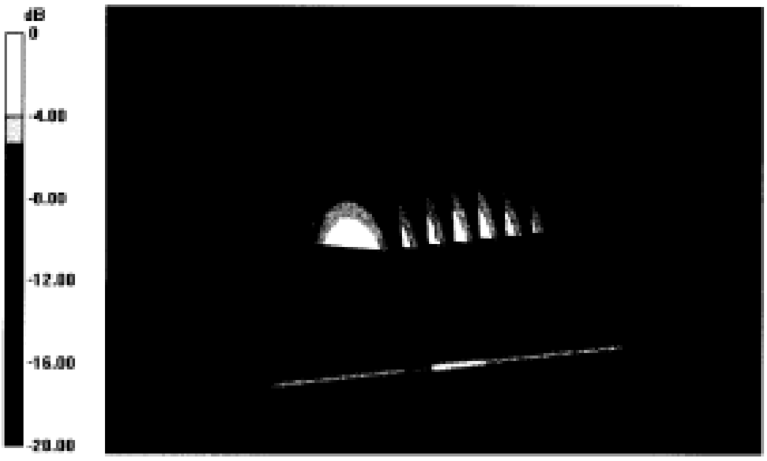
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d162

Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

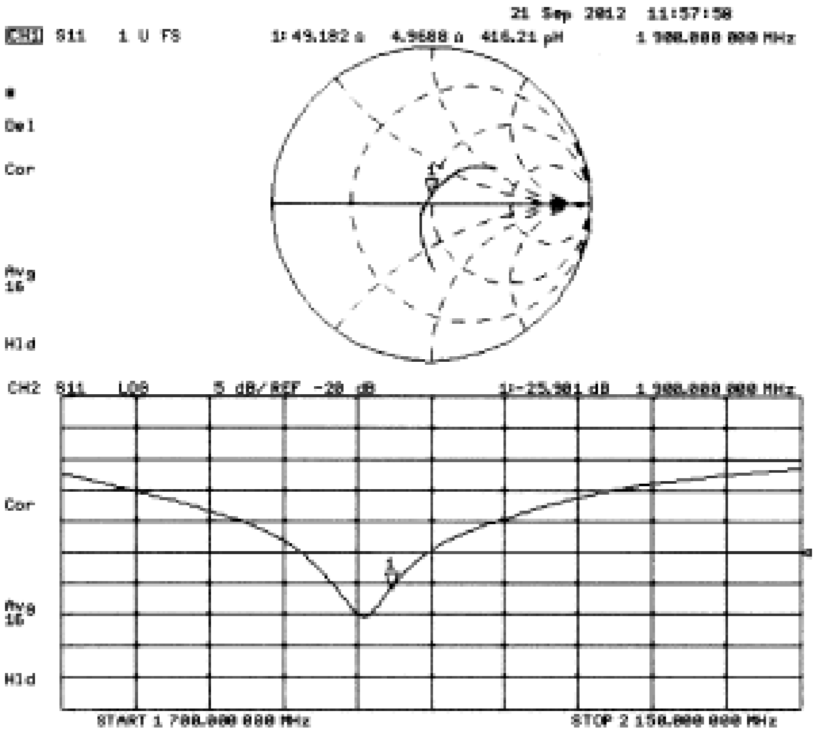
- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.423 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 17.979 mW/g
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.45 mW/g
Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kg = 22.21 dB W/kg

Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d162_Sep12 Page 8 of 8

Justification of the extended calibration Dipole D1900V2

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
September 21, 2012	-26.1		53.2		4.0j	
September 20, 2013	-25.1	3.8	51.6	1.6	3.1j	0.9j
September 18, 2014	-24.8	5.0	51.9	1.3	3.5j	0.5j

Body						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
September 21, 2012	-25.9		49.2		5.0j	
September 20, 2013	-24.6	5.0	48.2	1.0	4.3j	0.7j
September 18, 2014	-24.9	3.9	47.9	1.3	4.9j	0.1j

The return loss is < -20dB, and within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

APPENDIX E: DAE VALIDATION KIT REPORT(S)

In Collaboration with
speag
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

CALIBRATION
No. L0570

Client : SMQ Certificate No: Z15-97033

CALIBRATION CERTIFICATE

Object: DAE4 - SN: 876

Calibration Procedure(s): FD-Z11-2-002-01
Calibration Procedure for the Data Acquisition Electronics (DAEx)

Calibration date: March 09, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	01-July-14 (CTTL, No:J14X02147)	July-15

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

Issued: March 10, 2015

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

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

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

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

TTL In Collaboration with s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	405.537 ± 0.15% (k=2)	405.188 ± 0.15% (k=2)	405.399 ± 0.15% (k=2)
Low Range	3.99003 ± 0.7% (k=2)	3.97261 ± 0.7% (k=2)	3.99803 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	181.5° ± 1 °

OET

February 24, 2015

Acceptable Conditions for SAR Measurements Using Probes and Dipoles Calibrated under the SPEAG-CTTL Dual-Logo Calibration Program to Support FCC Equipment Certification

The acceptable conditions for SAR measurements using probes, dipoles and DAEs calibrated by CTTL (*China Telecommunication Technology Labs*), under the Dual-Logo Calibration Certificate program and quality assurance (QA) protocols established between SPEAG (*Schmid & Partner Engineering AG, Switzerland*) and CTTL, to support FCC (*U.S. Federal Communications Commission*) equipment certification are defined and described in the following. The conditions in this KDB are valid until December 31, 2015.

1) The agreement established between SPEAG and CTTL is only applicable to calibration services performed by CTTL where its clients (companies and divisions of such companies) are headquartered in the Greater China Region, including Taiwan and Hong Kong. CTTL shall inform the FCC of any changes or early termination to the agreement.
2) Only a subset of the calibration services specified in the SPEAG-CTTL agreement, while it remains valid, are applicable to SAR measurements performed using such equipment for supporting FCC equipment certification. These are identified in the following.
   a) Calibration of dosimetric (SAR) probes EX3DVx, ET3DVx and ES3DVx.
      i) Free-space E-field and H-field probes, including those used for HAC (hearing aid compatibility) evaluation, temperature probes, other probes or equipment not identified in this document, when calibrated by CTTL, are excluded and cannot be used for measurements to support FCC equipment certification.
      ii) Signal specific and bundled probe calibrations based on PMR (probe modulation response) characteristics or probe sensor model based linearization methods that are not fully described in SAR standards are excluded and cannot be used for measurements to support FCC equipment certification.
   b) Calibration of SAR system validation dipoles, excluding HAC dipoles.
   c) Calibration of data acquisition electronics DAE3Vx, DAE4Vx and DAEasyVx.
   d) For FCC equipment certification purposes, the frequency range of SAR probe and dipole calibrations is limited to 700 MHz - 6 GHz and provided it is supported by the equipment identified in the CTTL QA protocol (a separate attachment to this document).
   e) The identical system and equipment setup, measurement configurations, hardware, evaluation algorithms, calibration and QA protocols, including the format of calibration certificates and reports used by SPEAG shall be applied by CTTL. Equivalent test equipment and measurement configurations may be considered only when agreed by both SPEAG and the FCC.
   f) The calibrated items are only applicable to SPEAG DASY 4 and DASY 5 systems or higher version systems that satisfy the requirements of this KDB.
3) The SPEAG-CTTL agreement includes specific protocols identified in the following to ensure the quality of calibration services provided by CTTL under this SPEAG-

1

CTTL Dual-Logo calibration agreement are equivalent to the calibration services provided by SPEAG. CTTL shall apply the required protocols without modification and, upon request, provide copies of documentation to the FCC to substantiate program implementation.

a) The Inter-laboratory Calibration Evaluation (ILCE) stated in the CTTL QA protocol shall be performed between SPEAG and CTTL at least once every 12 months. The ILCE acceptance criteria defined in the CTTL QA protocol shall be satisfied for the CTTL, SPEAG and FCC agreements to remain valid.
b) Check of Calibration Certificate (CCC) shall be performed by SPEAG for all calibrations performed by CTTL. Written confirmation from SPEAG is required for CTTL to issue calibration certificates under the SPEAG-CTTL Dual-Logo calibration program. Quarterly reports for all calibrations performed by CTTL under the program are also issued by SPEAG.
c) The calibration equipment and measurement system used by CTTL shall be verified before each calibration service according to the specific reference SAR probes, dipoles, and DAE calibrated by SPEAG. The results shall be reproducible and within the defined acceptance criteria specified in the CTTL QA protocol before each actual calibration can commence. CTTL shall maintain records of the measurement and calibration system verification results for all calibrations.
d) Quality Check of Calibration (QCC) certificates shall be performed by SPEAG at least once every 12 months. SPEAG shall visit CTTL facilities to verify the laboratory, equipment, applied procedures and plausibility of randomly selected certificates.

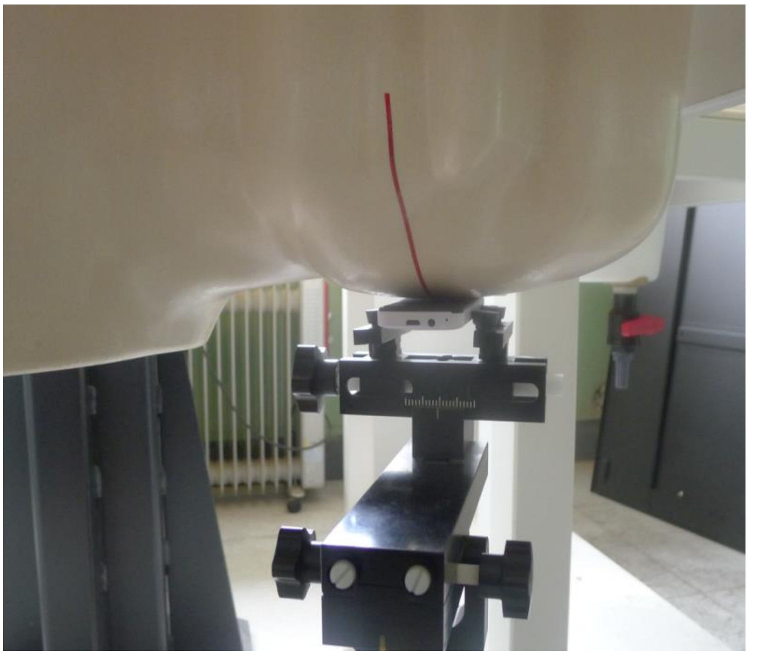
4) A copy of this document shall be provided to CTTL clients that accept calibration services according to the SPEAG-CTTL Dual-Logo calibration program, which should be presented to a TCB (*Telecommunication Certification Body*), to facilitate FCC equipment approval.
5) CTTL shall address any questions raised by its clients or TCBs relating to the SPEAG-CTTL Dual-Logo calibration program and inform the FCC and SPEAG of any critical issues.

16. APPENDIX F:DUT PHOTOS

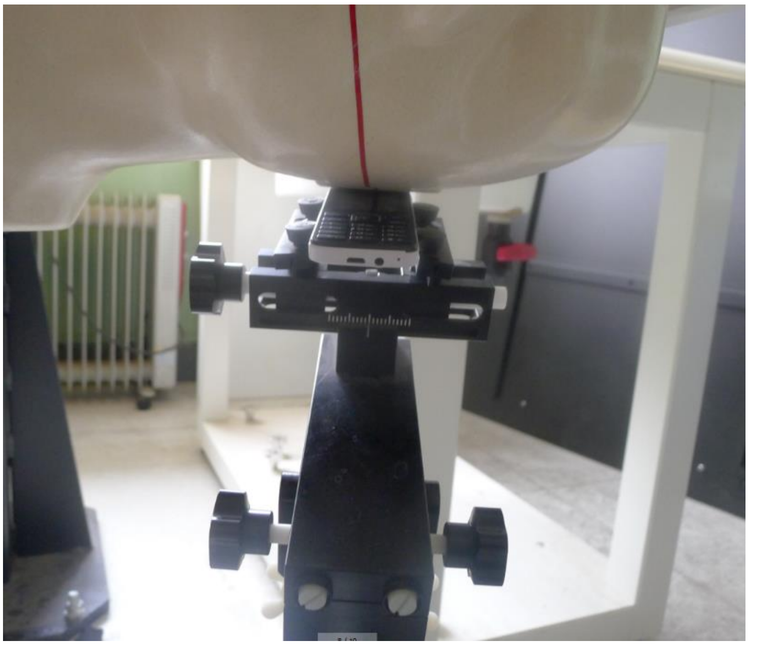

TOP VICTORY ELECTRONICS
DE MEXICO, S.A. DE C.V.
TELEFONO CELULAR DIGITAL
MARCA: AOC
MODELO: A17
3.7V Li-ion BATERIA
800mAh
NOM
NYCE
Hecho en China

17. APPENDIX G: TEST POSITION PHOTOS

Left Cheek



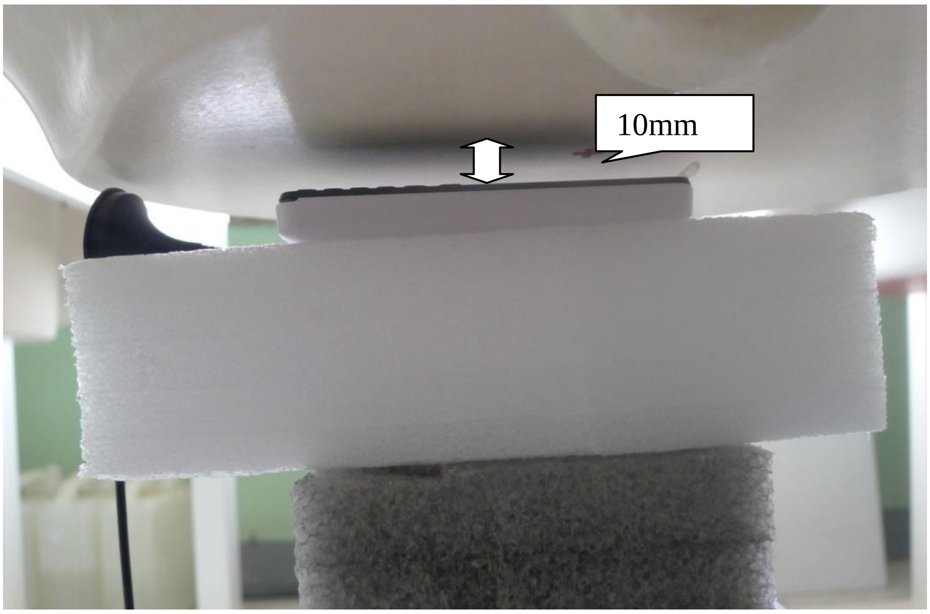
Left Tilted



Right Cheek

Right Tilted

Faceup position 10mm



Facedown position 10mm