SAR TEST REPORT

For

LOFT

Model Number: F101P

FCC ID: 2ACCJB004

Report Number : WT148003750

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection National Testing Center for Digital Electronic Products
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Test report declaration

Applicant	:	TCL Communication Ltd.
Address	:	5F, C-Tower, No. 232, Liang Jing Road,ZhangJiang High-Tech Park, Pudong,Shanghai, China
Manufacturer	:	TCL COMMUNICATION TECHNOLOGY HOLDINGS LIMITED
Address	:	70 Huifeng 4rd,ZhongKai Hi-tech Development District ,Huizhou,Guangdong 516006 P.R.China（TCL Mobile Communication Co.,LTD.Huizhou）
EUT Description	:	LOFT
Model No	:	F101P
Trade mark	:	: ALCATEL ONETOUCH
Marketing name		: ALCATEL ONETOUCH HOME F101
FCC ID	:	: 2ACCJB004

Test Standards:

IEEE 1528-2003 FCC KDB 865664 D01 v01r3

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the compliance of the applicable standards stated above.
Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results.
The results documented in this report only apply to the tested sample, under the conditions and modes of operation as described herein.
The test report shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	(Liu Zheng)	Date:	Dec.19.2014
Checked by:	(Yang Dongping)	Date:	Dec.19.2014
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Revision History

No	Date	Reason
--	2014-12-19	Initial issue

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1. REPORTED SAR SUMMARY

The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

Highest Reported Standalone SAR Summary

Exposure Position	Frequency Band	Highest Reported1g-SAR (W/kg)
Head	CDMA BC1	0.689
Body-worn(15mm Gap)	CDMA BC1	0.687

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

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2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 446246 806614 994606 (semi anechoic chamber).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is IC4174.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

3. DESCRIPTION OF THE DEVICE UNDER TEST（DUT）

3.1. DUT Description

Frequency Bands		CDMA BC1
Modulation Mode	：	CDMA BC1: QPSK&BPSK
Antenna type		Fixed Internal Antenna
Battery Model		TLi008A1
Battery Specification		3.7V/ 850mAh
Hardware Revision		PIO14
Software Revision		N/A

Remark: This product is prototype.

3.2. RF output power Tune up limit

Technology/Band	Mode	Target Power and Tolerance (dBm)
CDMA PCS(1900)	1*RTT	24.0±0.5 dBm

3.3. Applied Standards

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 447498 D01 v05r02
- FCC KDB 648474 D04v01r02
- FCC KDB 248227 D01 v01r02
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D06 v01
- FCC KDB 865664 D01 v03
- FCC KDB 616217 D04v01

3.4. SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

4. TEST CONDITIONS

4.1. Temperature and Humidity

Ambient temperature (°C):	21-22
Ambient humidity (RH %):	59-60

4.2. 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:

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

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)

4.3. Test Configuration

CDMA Test Configuration

CDMA 1x Devices

For SAR test, the maximum power output is very important and essential; it is identical under the measurement uncertainty. It is proper to use typical test mode 3(FW RC3, RVS RC3, SO55) as the worst case for SAR test.

Test parameter setup for maximum RF output power according to 3GPP2;

Parameter	Units	Value
I or	dBm/1.23MHz	-104
PilotE c/I or	dB	-7
TrafficE c/I or	dB	-7.4

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using loopback service option SO55.SAR for RC1 is not required when the maximum average output of each channel is less than1/4 dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

SAR for body exposure configuration is measured in RC3 with the DUT configured using TDSO/SO32, to transmit at full rate on FCH with all other code channel disabled. SAR for multiple code channels(FCH+SCHn) is not required when the maximum average output of each RF channel is less than 1/4dB higher than that measured with FCH at full rate and SCH0 enabled at 9600 bps, using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5dB and lead to higher SAR drifts and SCH dropouts.

Body SAR in RC1 is not required when the maximum average output of each channel is less than 1/4dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with loopback service option SO55, at full rate, using the body exposure configuration that results in the highest SAR that channel in RC3.

5. DESCRIPTION OF THE TEST EQUIPMENTS

5.1. Measurement System and Components

No.	Equipment	Model No.	Manufacturer	Asset No.	Last Calibration Data	Period
1	SAR test system	TX60L	SPEAG	SB6810	---	---
2	SAR Probe	EX3DV4	SPEAG	SB6810/02	2014.07.22	1year
4	System Validation Dipole,1900MHz	D1900V2	SPEAG	SB6810/05	2012.09.21	3year
6	Dielectric Probe Kit	85070E	SPEAG	SB6810/12	---	---
7	Dual-directional coupler,0.10-2.0GHz	778D	Agilent	SB6810/07	---	---
8	Dual-directional coupler,2.00-18GHz	772D	Agilent	SB6810/08		
9	Coaxial attenuator	8491A	Agilent	SB6810/09	---	---
10	Power Amplifier	ZHL42W	Agilent	SB6810/10	---	---
11	Signal Generator	SMR20	R&S	SB3438	2014.01.16	1year
12	Power Meter	NRVD	R&S	SB3437	2014.01.19	1year
13	Call Tester	CMU 200	R&S	SB3441	2014.03.30	1year
14	Data Acquisition Electronics	DAE4	SPEAG	SB6810/01	2014.03.03	1Year
15	Software	DASY52	SPEAG	SB6810/14	--	--
16	Network Analyzer	E5071C	Agilent	SB9011/01	2014.04.24	1Year

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.

5.2. Isotropic E-field Probe Type EX3DV4

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix C
Frequency	10MHz to 4GHz (dosimetry); Linearity: ±0.2dB (30MHz to 4GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

5.3. Phantoms

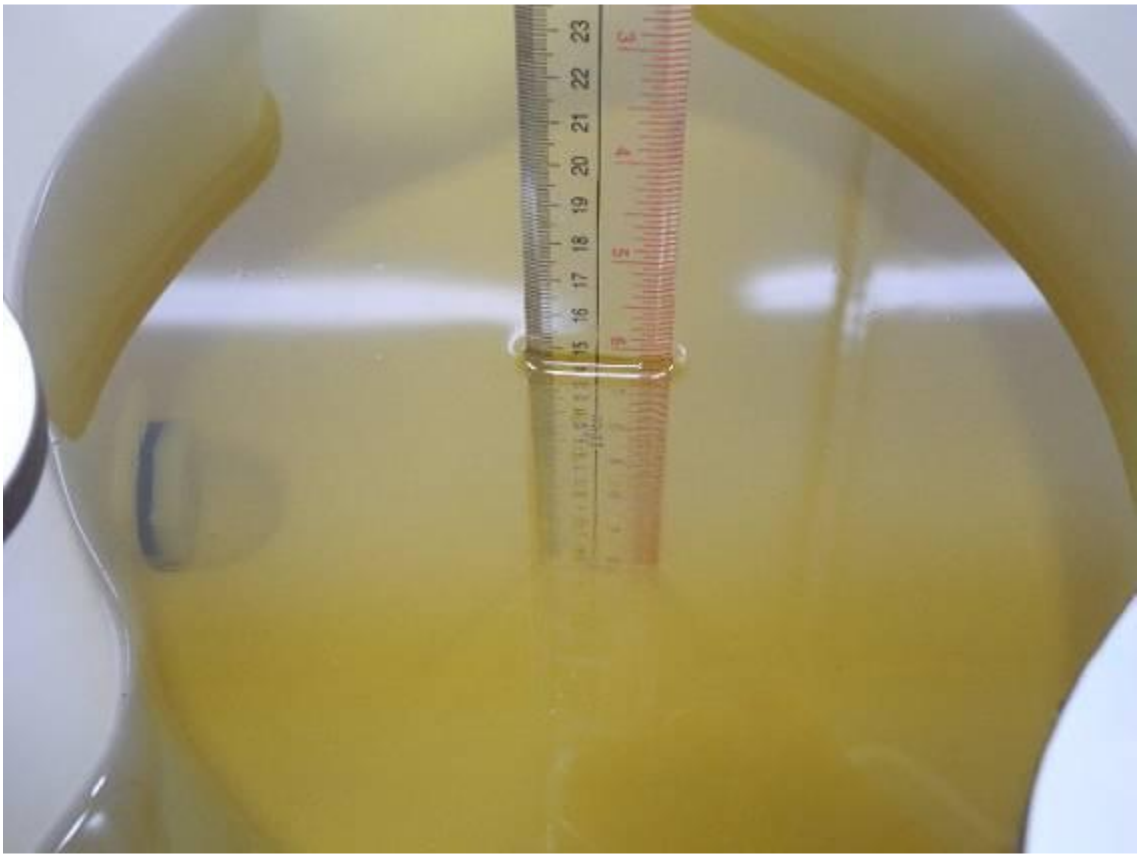
The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).
System checking was performed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

5.4. 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):



Ingredient	Frequency Band			
(% by weight)	800-900	1800-1900	800-900	1800-1900
Tissue Type	Head	Head	Body	Body
Water	40.6	56.1	50.8	68.9
Sugar	58.2	--	48.2	--
Salt	1.0	0.03	0.9	0.1
Preventol D-7	0.1	--	0.1	--
DGMBE	--	43.87	--	31
Cellulose	0.1	--	--	--
Ingredient	Frequency Band			
(% by weight)	2450	2450		
Tissue Type	Head	Body		
Water	54.8	68.4		
Sugar	--	--		
Salt	--	--		
Preventol D-7	--	--		
DGMBE	45.2	31.6		
Cellulose	--	--		

Tissue-equivalent liquids used in the Measurements

Dielectric parameters of the Tissue-equivalent liquids were measured before testing using the dielectric probe kit and the Network Analyzer. The measurement is carried out following the Agilent 85070 dielectric probe software instruction. A calibration of the probe open in air, probe with shorting block and probe in water is performed before measurement. After calibration, Insert the probe into the tissue liquid, trigger a measurement on software interface and record the data.

Head Tissue-equivalent liquid measurements:

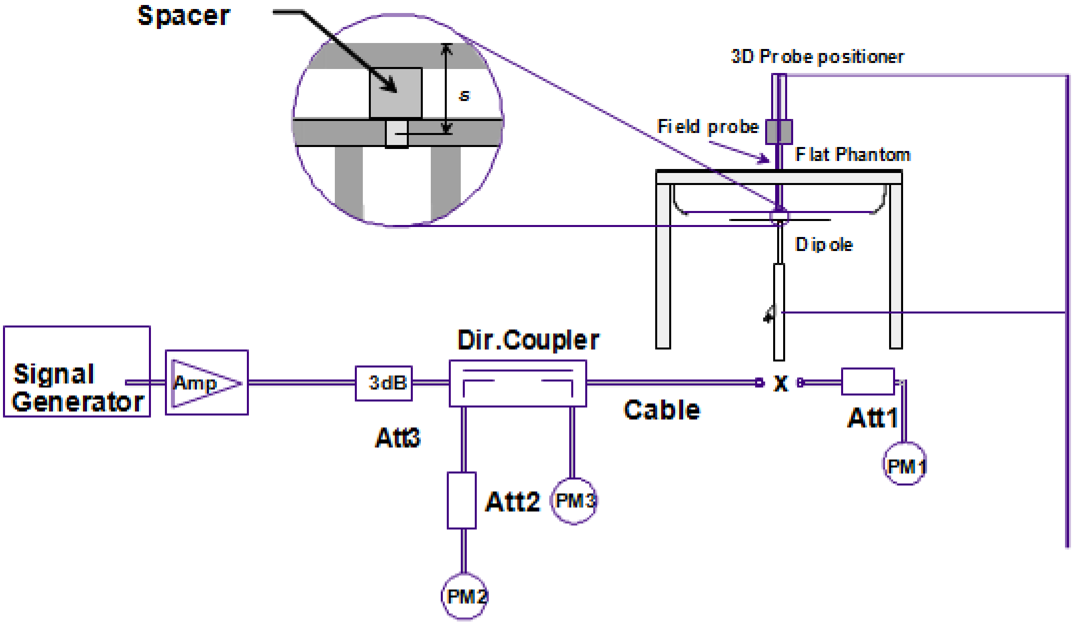
f/MHz	Date Tested	Dielectric Parameters	Target	Delta(%)	Tolerance (%)	Temp (ºC)
1900	2014/12/19	ε_r =40.7	40.0	1.75%	±5	22
		σ =1.43	1.40	2.14%		

Body Tissue-equivalent liquid measurements:

f/MHz	Date Tested	Dielectric Parameters	Target	Delta(%)	Tolerance (%)	Temp (ºC)
1900	2014/12/19	ε_r =52.8	53.3	-0.94%	±5	22
		σ =1.45	1.52	-4.61%		

System Checking

The manufacturer calibrates the probes annually. A system check measurement was made following the determination of the dielectric parameters of the tissue-equivalent liquid, using the dipole validation kit. A power level of 250mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom.



The system checking results (dielectric parameters and SAR values) are given in the table below.

System checking, Head Tissue-equivalent liquid:

f/MHz	Date Tested	SAR(W/kg), 1g	Target	Delta(%)	Tolerance (%)	Temp (ºC)
1900	2014/12/19	39.04	39.4	-0.92%	±10	22

System checking, Body Tissue-equivalent liquid:

f/MHz	Date Tested	SAR(W/kg), 1g	Target	Delta(%)	Tolerance (%)	Temp (ºC)
1900	2014/12/19	40.8	40.7	-0.25%	±10	22

Plots of the system checking scans are given in Appendix A.

5.5. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

Device holder supplied by SPEAG

5.6. 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:

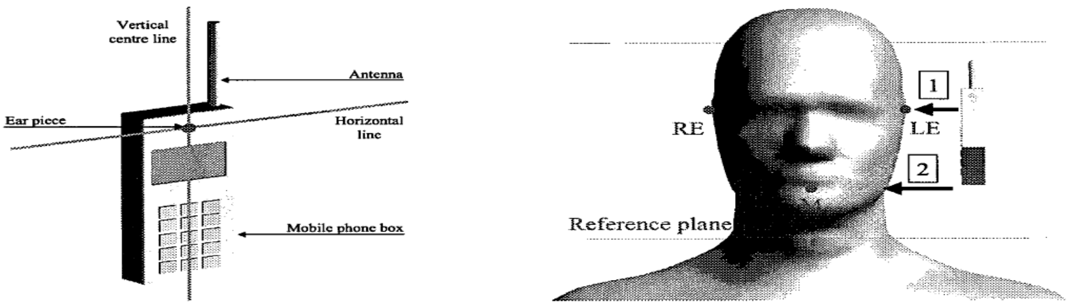
a) Position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the 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.

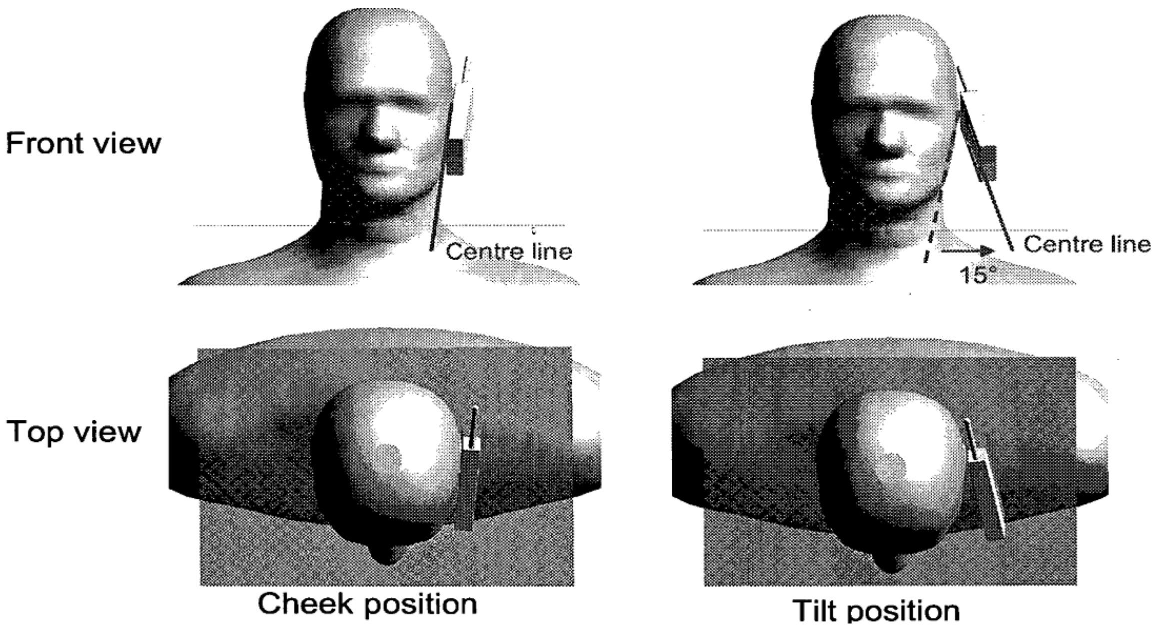
Define of the “ tilted” position:

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 Worm 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.

5.7. 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.

5.8. 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 surface of the phantom.

6. MEASUREMENT UNCERTAINTY

6.1. Uncertainty for SAR Test

Uncertainty Budget of DASY for frequency range 300 MHz to 3 GHz

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	$\sqrt{3}$	0.7	±1.9	∞
Hemispherical Isotropy	±9.6	R	$\sqrt{3}$	0.7	±3.9	∞
Boundary Effect	±1.0	R	$\sqrt{3}$	1	±0.6	∞
Linearity	±4.7	R	$\sqrt{3}$	1	±2.7	∞
System Detection Limits	±1.0	R	$\sqrt{3}$	1	±0.6	∞
Readout Electronics	±0.3	N	1	1	±0.3	∞
Response Time	±0.8	R	$\sqrt{3}$	1	±0.5	∞
Integration Time	±2.6	R	$\sqrt{3}$	1	±1.5	∞
RF Ambient Conditions - Noise	±3.0	R	$\sqrt{3}$	1	±1.7	∞
RF Ambient Conditions - Reflections	±3.0	R	$\sqrt{3}$	1	±1.7	∞
Probe Positioner Mechanical Tolerance	±0.4	R	$\sqrt{3}$	1	±0.2	∞
Probe Positioning with respect to Phantom Shell	±2.9	R	$\sqrt{3}$	1	±1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	±1.0	R	$\sqrt{3}$	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	$\sqrt{3}$	1	±2.9	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	±4.0	R	$\sqrt{3}$	1	±2.3	∞
Conductivity Target - tolerance	±5.0	R	$\sqrt{3}$	0.43	±1.2	∞
Conductivity - measurement uncertainty	±2.5	N	1	0.43	±1.1	∞
Permittivity Target - tolerance	±5.0	R	$\sqrt{3}$	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					**±21.4**	

6.2. 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	$\sqrt{3}$	1	±2.7 %	1
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0	±0 %	1
Boundary E_ects	±1.0 %	R	$\sqrt{3}$	1	±0.6 %	1
Linearity	±4.7 %	R	$\sqrt{3}$	1	±2.7 %	1
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	±0.6 %	1
Modulation Response	±0 %	R	$\sqrt{3}$	1	±0 %	1
Readout Electronics	±0.3 %	N	1	1	±0.3 %	1
Response Time	±0 %	R	$\sqrt{3}$	1	±0 %	1
Integration Time	±0 %	R	$\sqrt{3}$	1	±0 %	1
RF Ambient Noise	±1.0 %	R	$\sqrt{3}$	1	±0.6 %	1
RF Ambient Re ections	±1.0 %	R	$\sqrt{3}$	1	±0.6 %	1
Probe Positioner	±0.8 %	R	$\sqrt{3}$	1	±0.5 %	1
Probe Positioning	±6.7 %	R	$\sqrt{3}$	1	±3.9 %	1
Max. SAR Eval.	±2.0 %	R	$\sqrt{3}$	1	±1.2 %	1
Dipole Related						
Deviation of exp. dipole	±5.5 %	R	$\sqrt{3}$	1	±3.2 %	1
Dipole Axis to Liquid Dist.	±2.0 %	R	$\sqrt{3}$	1	±1.2 %	1
Input power & SAR drift	±3.4 %	R	$\sqrt{3}$	1	±2.0 %	1
Phantom and Setup						
Phantom Uncertainty	±4.0 %	R	$\sqrt{3}$	1	±2.3 %	1
SAR correction	±1.9 %	R	$\sqrt{3}$	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	$\sqrt{3}$	0.71	±0.7 %	1
Temp. unc. -Permittivity	±0.3 %	R	$\sqrt{3}$	0.26	±0.0 %	∞
Combined Std. Uncertainty					±10.1 %	
Expanded STD Uncertainty					±20.1 %	

7. CONDUCTED TEST RESULTS

WWAN
CDMA BC1 1xRTT
RF Output Power for Cellular Band

RF Power Output for 1xRTT - 1900 Band				
Radio Configuration (RC)	Service Option(SO)	Conducted Output Power (dBm)		
		Ch. 25/1851.25 MHz	Ch. 600/1880MHz	Ch. 1175/1908.75 MHz
		Average	Average	Average
RC1 (Fwd1, Rvs1)	55 (Loopback)	23.90	24.45	24.06
RC3 (Fwd3, Rvs3)	55 (Loopback)	23.93	24.36	24.12
	32 (+F-SCH)	23.91	24.36	23.87
	32 (+SCH)	23.64	24.44	23.98

8. SAR TEST RESULTS

Remark:

1. Per KDB 447498 D01v05r2, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   Reported SAR(W/kg)= Measured SAR(W/kg)* Scaling Factor
2. Per KDB 447498 D01v05r2, for each exposure position, if the mid channel or highest output channel reported SAR ≤0.8W/kg, other channels SAR testing are not necessary
3. Per KDB 941225 D06v01r01, when the same wireless mode and device transmission configurations are required for testing body-worn accessories and hotspot mode, it is not necessary to test body-worn accessory SAR for the same device orientation if the test separation distance for hotspot mode is more conservative than that used for body-worn

8.1. CDMA BC1 SAR results

CDMA BC1 Head

Band	Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
CDMA BC1	RC3	Right Cheek	600	1880.0	24.36	24.50	1.033	0.667	0.689
CDMA BC1	RC3	Right Tilted	600	1880.0	24.36	24.50	1.033	0.183	0.189
CDMA BC1	RC3	Left Cheek	600	1880.0	24.36	24.50	1.033	0.578	0.597
CDMA BC1	RC3	Left Tilted	600	1880.0	24.36	24.50	1.033	0.238	0.246

CDMA BC1 Body

Distance 15mm

Band	Mode	Test Position	Ch.	Freq. (MHz)	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)
CDMA BC1	RC3	Front	600	1880.0	24.36	24.50	1.033	0.350	0.361
CDMA BC1	RC3	Back	600	1880.0	24.36	24.50	1.033	0.665	0.687

Remark:

1) Per KDB941225 D01-Head SAR was tested with RC3,RC1 was not required since the average output power was not more than 0.25dB than the RC3 powers

2) The SAR test shall be performed at the high, middle and low frequency channels of each operating the SAR limit (<0.8 W/kg), testing at the high and low channels is optional.

8.2. Repeated SAR results

Remark:

1 According to KDB 865664 D01v01r3, for each frequency band, repeated SAR measurement is required only when the measured SAR is ⩾0.8W/kg.

2 KDB 865664 D01v01r3, if the deviation among the repeated measurement is ⩽ 20% and the measured SAR<1.45W/kg, only one repeated measurement is required.

3 The variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Measured SAR (W/kg)	Reported SAR (W/kg)	Ratio
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Measured SAR of all frequency band are lower than 0.8W/kg, repeated SAR is not required .

9. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Remark:

This product is not applicable in Simultaneous Transmission.

APPENDIX A: SYSTEM CHECKING SCANS

SystemPerformanceCheck-D1900 Head

Date 2014.12.19.

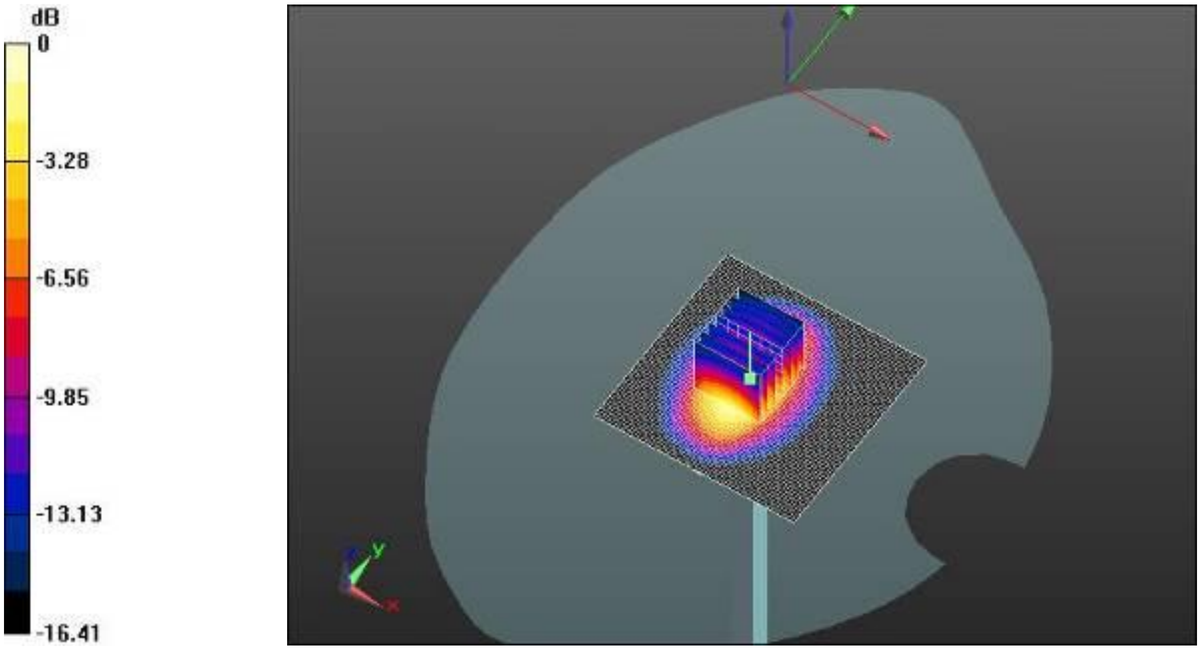
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d162

Communication System: CW; Communication System Band: Not Specified; Frequency: 1900 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3881; ConvF(8.09, 8.09, 8.09); Calibrated: 2014.07.22.
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 2014.03.03.
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1504
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 14.8 W/kg
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 85.692 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 18.506 mW/g
SAR(1 g) = 9.76 mW/g; SAR(10 g) = 6.09 mW/g
Maximum value of SAR (measured) = 14.7 W/kg



0 dB = 14.7 W/kg

SystemPerformanceCheck-D1900 Body

Date 2014.12.19.

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

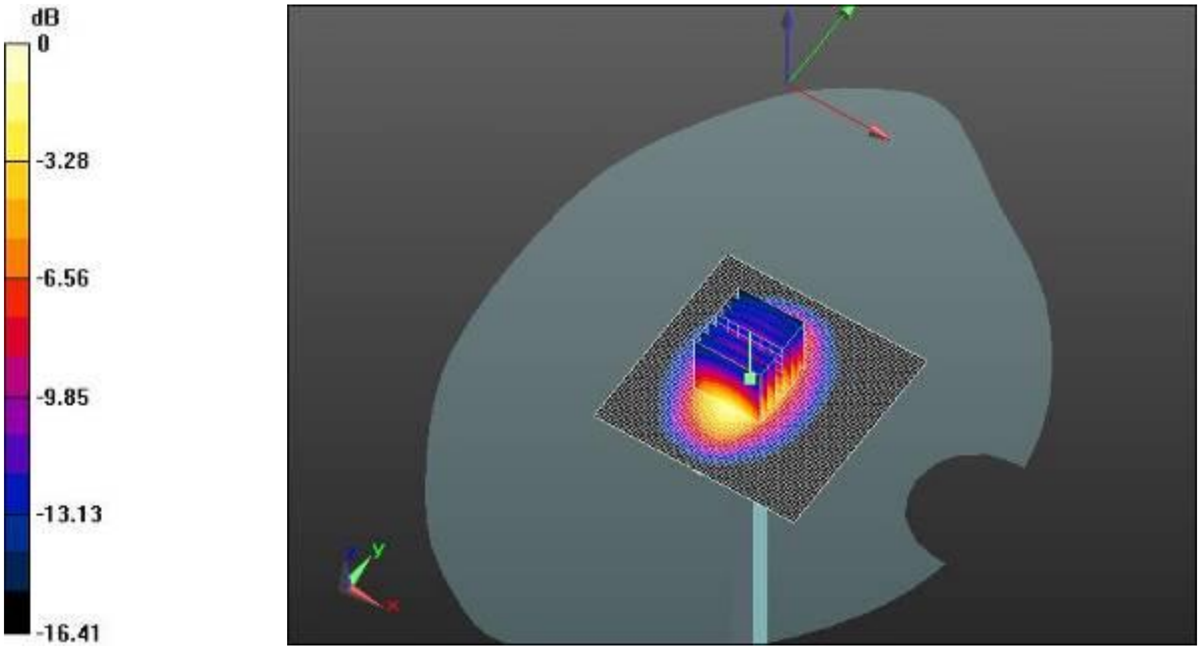
Communication System: CW; Communication System Band: Not Specified; Frequency: 1900 MHz;Communication System PAR: 0 dB
Medium parameters used: f = 1900 MHz; σ = 1.45 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3881; ConvF(8.25, 8.25, 8.25); Calibrated: 2014.07.22.
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn876; Calibrated: 2014.03.03.
- Phantom: SAM 1; Type: QD000P40CC; Serial: TP:1504
- Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 14.5 W/kg
Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 85.872 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 18.503 mW/g
SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/g

Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg

APPENDIX B: System Validation

Per KDB 865664 D02v01, SAR system validation status should be documented to confirm measurement accuracy. SAR measurement systems are validated according to procedures in KDB 865664 D01v01r3. The validation status is documented according to the validation date(s), measurement frequencies, SAR probe and tissue dielectric parameters. When multiple SAR system is used, the validation status of each SAR system is needed to be documented separately according to the associated system components.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probe and tissue dielectric parameters are shown as below.

Date	Probe S/N	Tested Freq MHz	Tissue	CW			Mod. Validation		
				Sensitivity	Linearity	Isotropy	Mod	Duty Factor	Peak to Average Power Ration
2014.09.21	3881	1900	body	pass	pass	pass	QPSK	pass	N/A
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

APPENDIX C: MEASUREMENT SCANS

Date: 2014.12.19.

F101P Head Left Cheek Mid

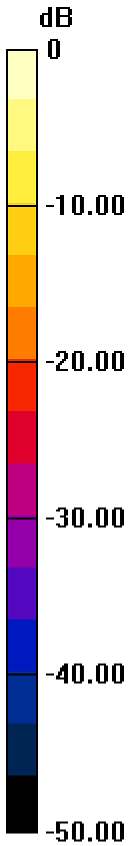
Medium: HSL1900

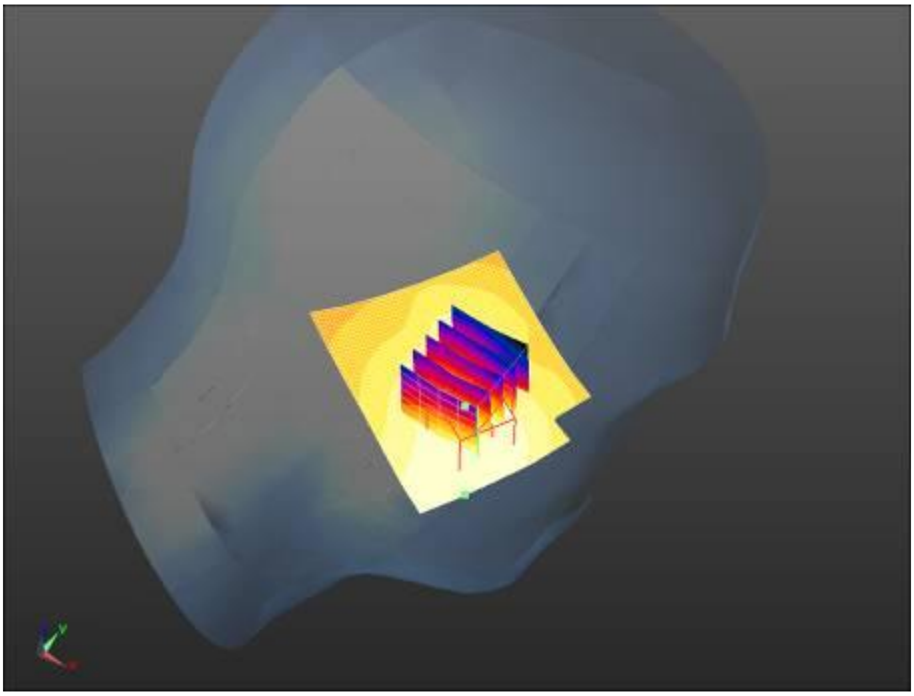
Communication System: CDMA 1X ; Communication System Band: CDMA BC1; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:Probe: EX3DV4 - SN3881; ConvF(8.09, 8.09, 8.09); Calibrated: 2014.07.22.; Electronics: DAE4 Sn876; Calibrated: 2014.03.03.

CDMA BC1-Left Cheek/Mid/Area Scan (51x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 0.553 mW/g; SAR(10 g) = 0.336 mW/g
Maximum value of SAR (interpolated) = 0.616 W/kg

CDMA BC1-Left Cheek/Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.923 mW/g
SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.346 mW/g

Maximum value of SAR (measured) = 0.646 W/kg





0 dB = 0.616 W/kg = -4.21 dB W/kg

Date: 2014.12.19.

F101P Head Left Tilted Mid

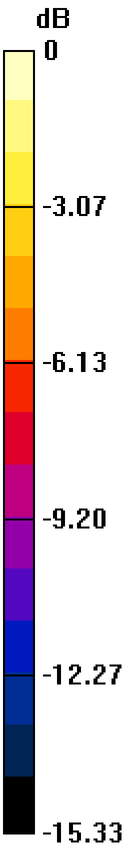
Medium: HSL1900

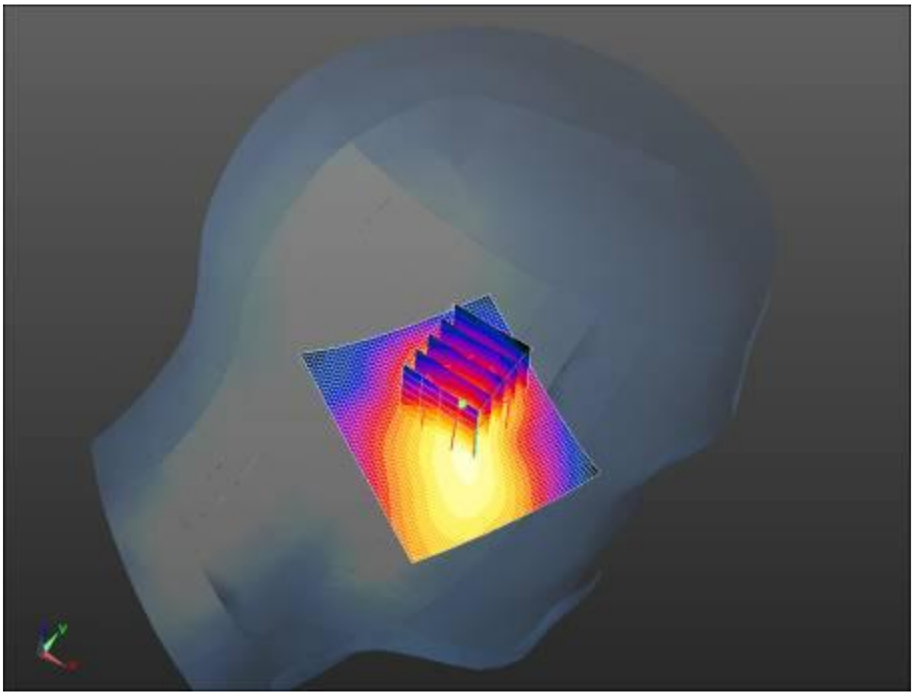
Communication System: CDMA 1X ; Communication System Band: CDMA BC1; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:Probe: EX3DV4 - SN3881; ConvF(8.09, 8.09, 8.09); Calibrated: 2014.07.22.; Electronics: DAE4 Sn876; Calibrated: 2014.03.03.

CDMA BC1-Left Tilted/Mid/Area Scan (51x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 0.239 mW/g; SAR(10 g) = 0.135 mW/g
Maximum value of SAR (interpolated) = 0.275 W/kg

CDMA BC1-Left Tilted/Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.433 mW/g
SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.135 mW/g

Maximum value of SAR (measured) = 0.259 W/kg





0 dB = 0.275 W/kg = -11.23 dB W/kg

Date: 2014.12.19.

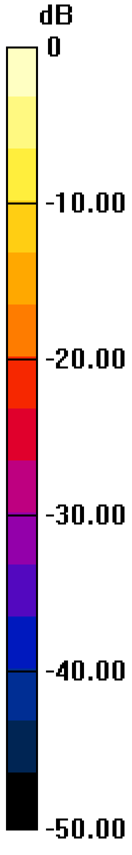
F101P Head Right Cheek Mid

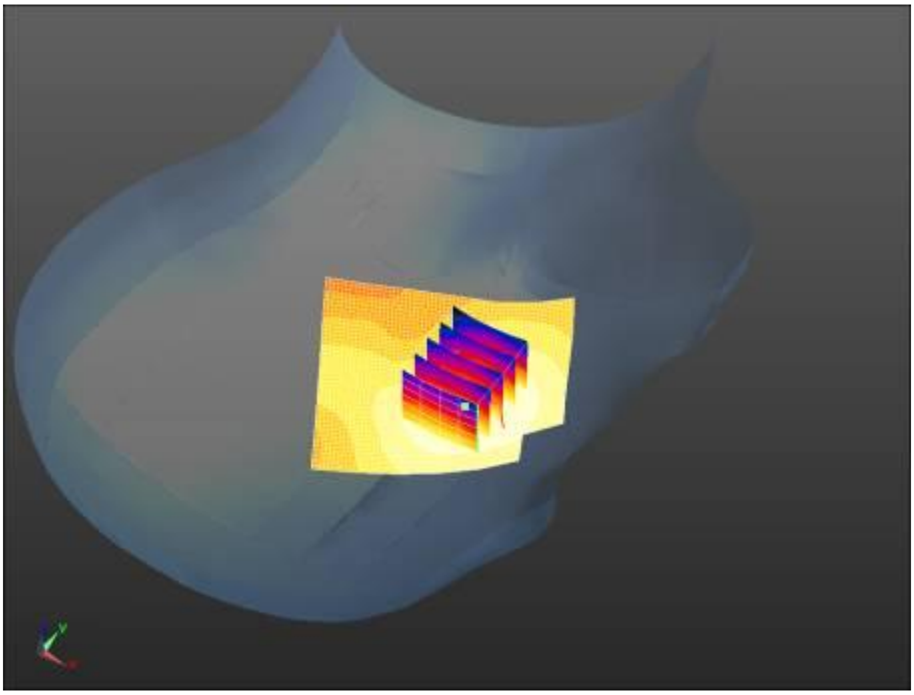
Medium: HSL1900

Communication System: CDMA 1X ; Communication System Band: CDMA BC1; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/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 - SN3881; ConvF(8.09, 8.09, 8.09); Calibrated: 2014.07.22.; Electronics: DAE4 Sn876; Calibrated: 2014.03.03.

CDMA BC1-Right Cheek/Mid/Area Scan (51x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 0.676 mW/g; SAR(10 g) = 0.399 mW/g
Maximum value of SAR (interpolated) = 0.751 W/kg

CDMA BC1-Right Cheek/Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.025 mW/g
SAR(1 g) = 0.667 mW/g; SAR(10 g) = 0.394 mW/g
Maximum value of SAR (measured) = 0.736 W/kg





0 dB = 0.751 W/kg = -2.48 dB W/kg

Date: 2014.12.19.

F101P Head Right Tilted Mid

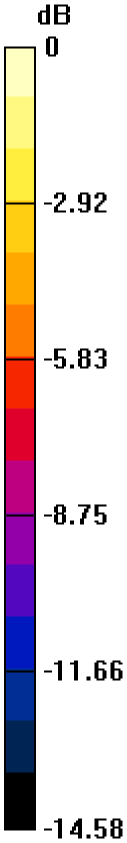
Medium: HSL1900

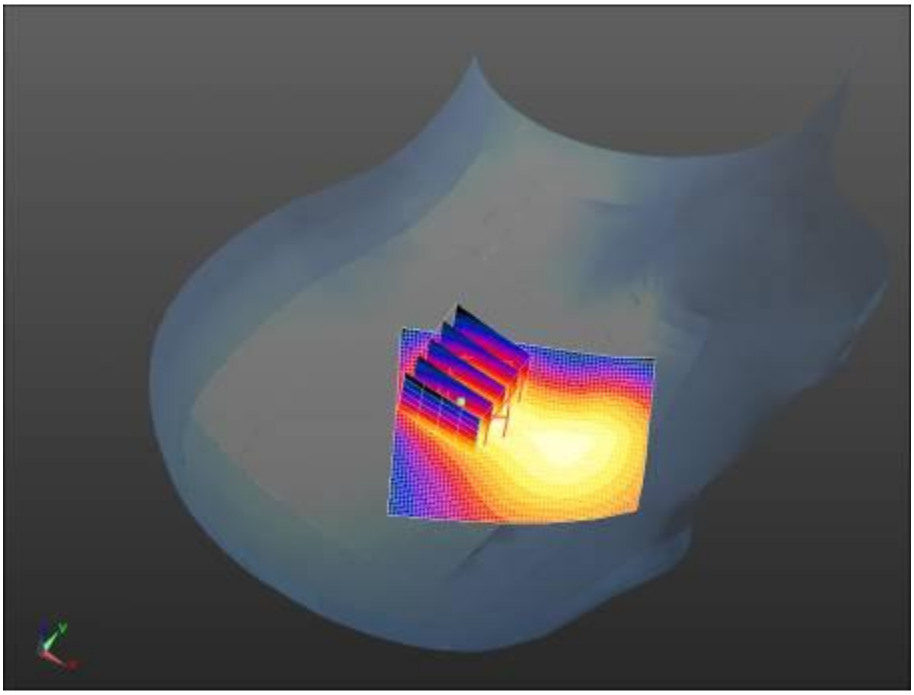
Communication System: CDMA 1X ; Communication System Band: CDMA BC1; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.45 mho/m; ε_r = 39.74; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:Probe: EX3DV4 - SN3881; ConvF(8.09, 8.09, 8.09); Calibrated: 2014.07.22.; Electronics: DAE4 Sn876; Calibrated: 2014.03.03.

CDMA BC1-Right Tilted/Mid/Area Scan (51x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 0.194 mW/g; SAR(10 g) = 0.110 mW/g
Maximum value of SAR (interpolated) = 0.222 W/kg

CDMA BC1-Right Tilted/Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.311 mW/g
SAR(1 g) = 0.183 mW/g; SAR(10 g) = 0.103 mW/g

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





0 dB = 0.222 W/kg = -13.07 dB W/kg

Date: 2014.12.19.

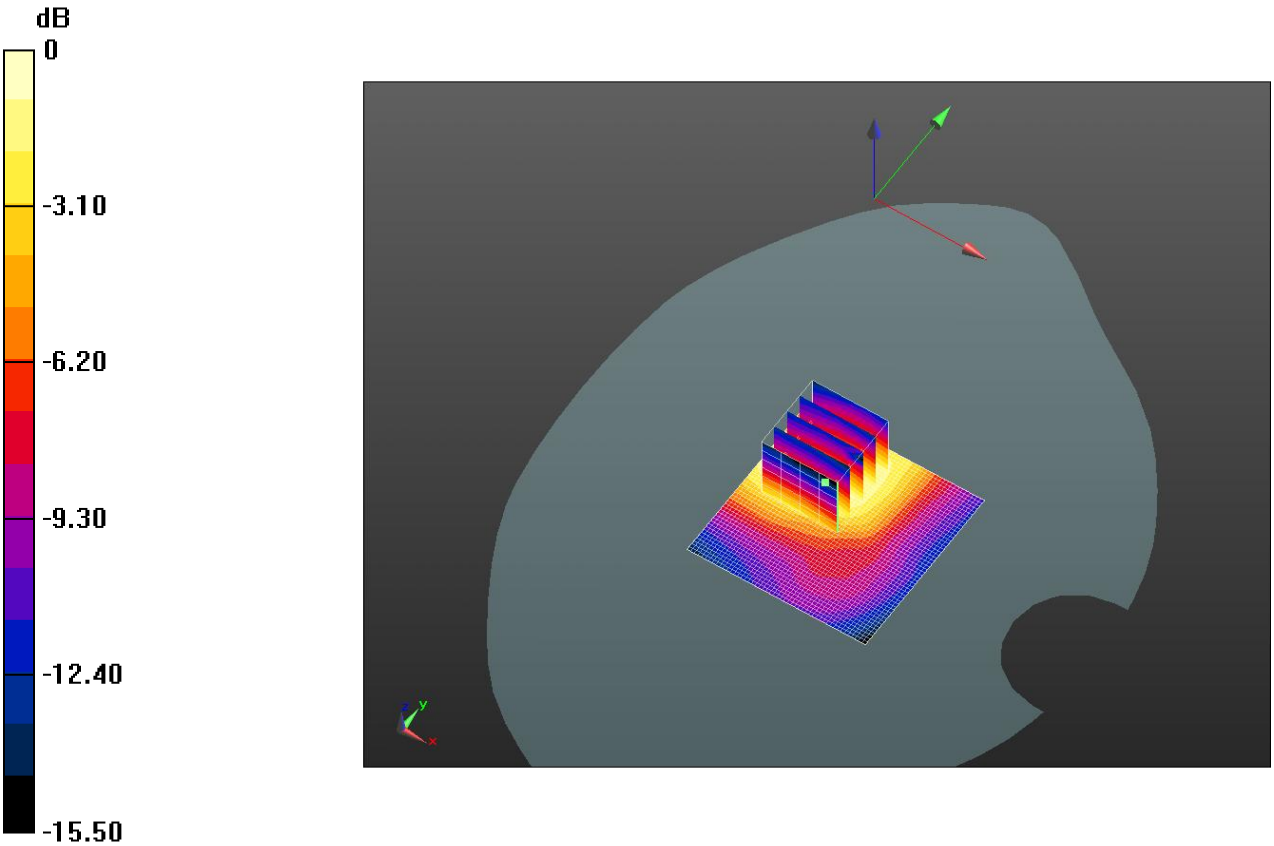
F101P Body Front Mid

Medium: MSL1900

Communication System: CDMA 1X ; Communication System Band: CDMA BC1; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/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 - SN3881; ConvF(8.25, 8.25, 8.25); Calibrated: 2014.07.22.; Electronics: DAE4 Sn876; Calibrated: 2014.03.03.

CDMA BC1-Faceup/Mid/Area Scan (51x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (interpolated) = 0.380 W/kg

CDMA BC1-Faceup/Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.608 mW/g
SAR(1 g) = 0.350 mW/g; SAR(10 g) = 0.197 mW/g
Maximum value of SAR (measured) = 0.382 W/kg



0 dB = 0.380 W/kg = -8.41 dB W/kg

Date: 2014.12.19.

F101P Body Rear Mid

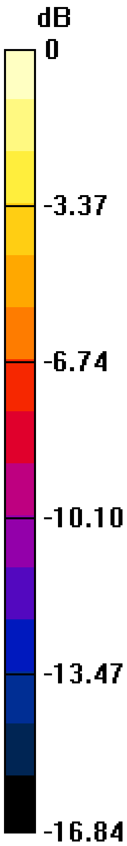
Medium: MSL1900

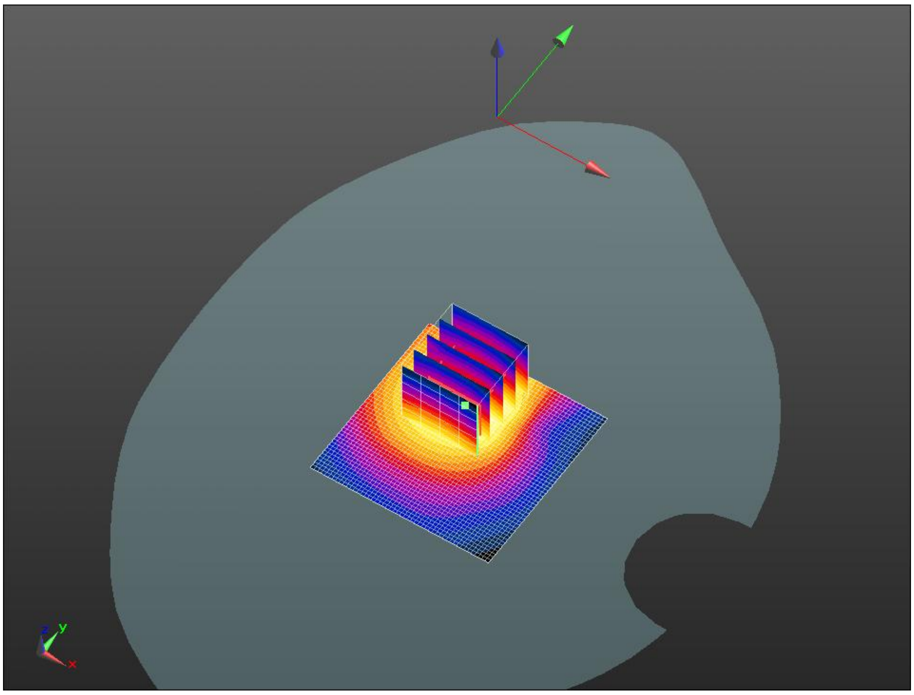
Communication System: CDMA 1X ; Communication System Band: CDMA BC1; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.14; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:Probe: EX3DV4 - SN3881; ConvF(8.25, 8.25, 8.25); Calibrated: 2014.07.22.; Electronics: DAE4 Sn876; Calibrated: 2014.03.03.

CDMA BC1-Facedown/Mid/Area Scan (51x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Fast SAR: SAR(1 g) = 0.679 mW/g; SAR(10 g) = 0.401 mW/g
Maximum value of SAR (interpolated) = 0.755 W/kg

CDMA BC1-Facedown/Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.135 mW/g
SAR(1 g) = 0.665 mW/g; SAR(10 g) = 0.378 mW/g
Maximum value of SAR (measured) = 0.707 W/kg





0 dB = 0.755 W/kg = -2.45 dB W/kg

APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

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: **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

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

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$\sqrt{\mu V}$	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

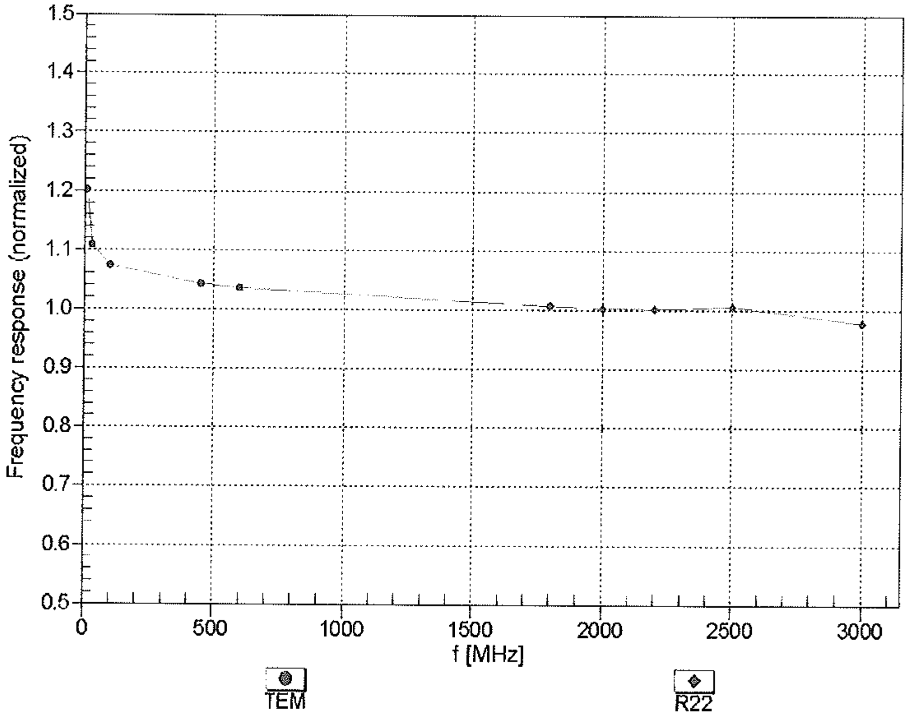
Calibration Parameter Determined in Body Tissue Simulating Media

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.

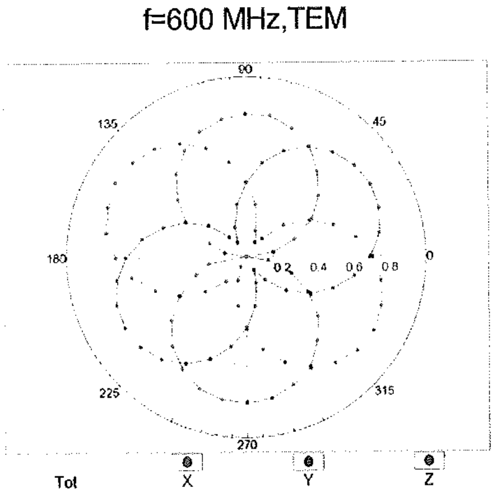
Frequency Response of E-Field

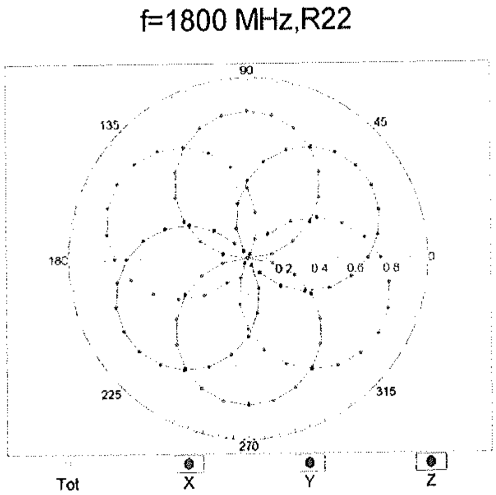
(TEM-Cell:ifi110 EXX, Waveguide: R22)

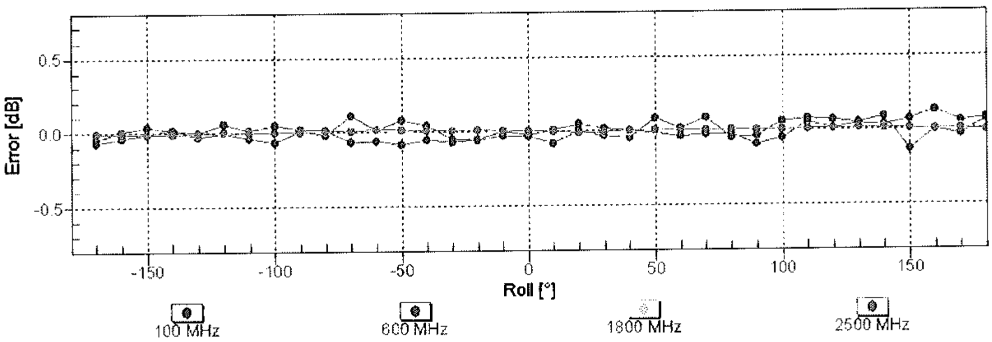


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



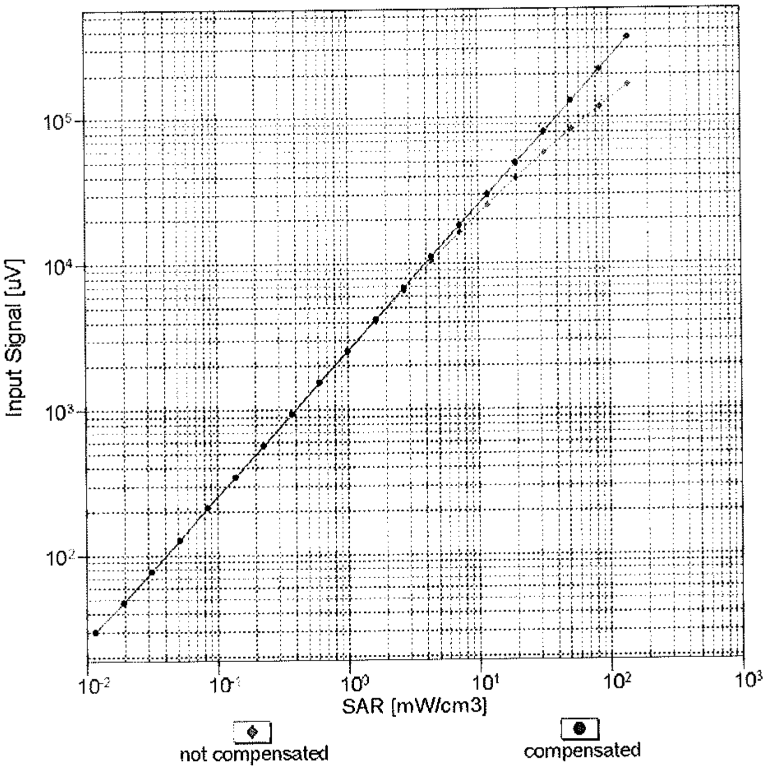


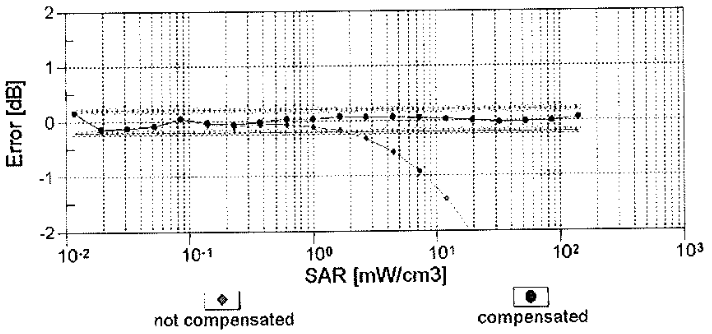


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

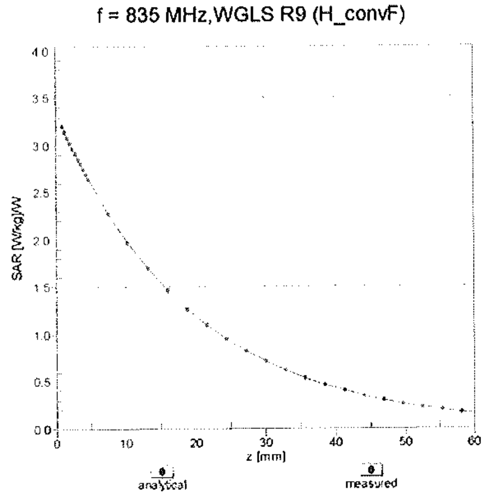
(TEM cell , f_{eval}= 1900 MHz)

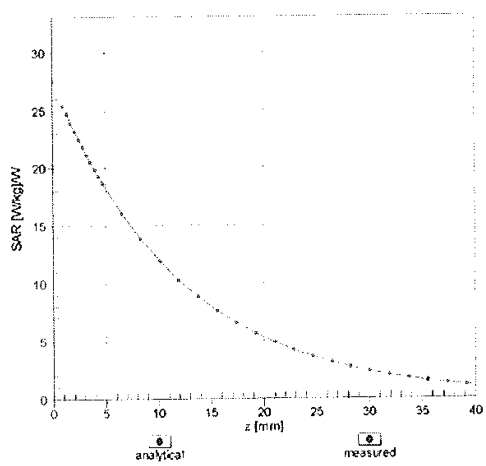




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

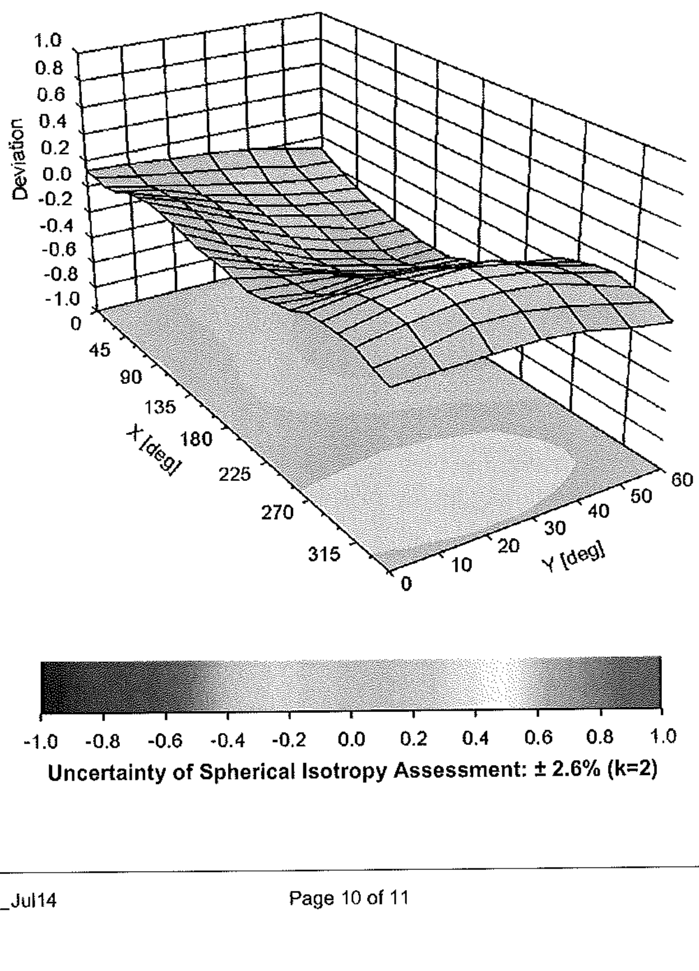
Conversion Factor Assessment





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

APPENDIX E: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)

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
S Swiss Calibration Service

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

Accreditation No.: **SCS 108**

Client **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	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 21, 2012

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

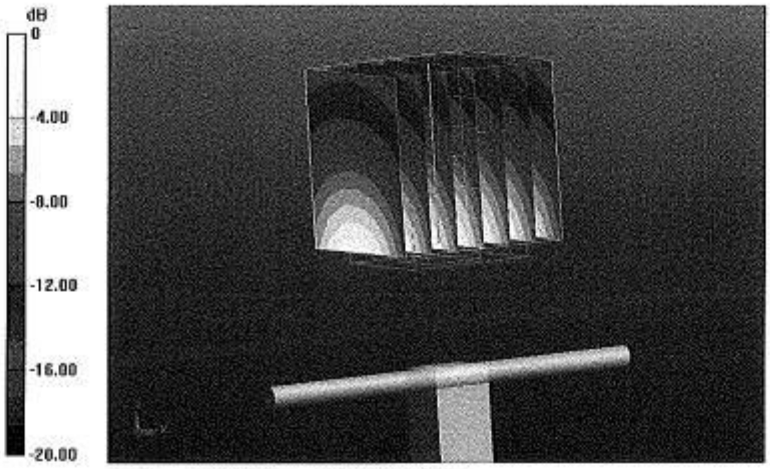
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

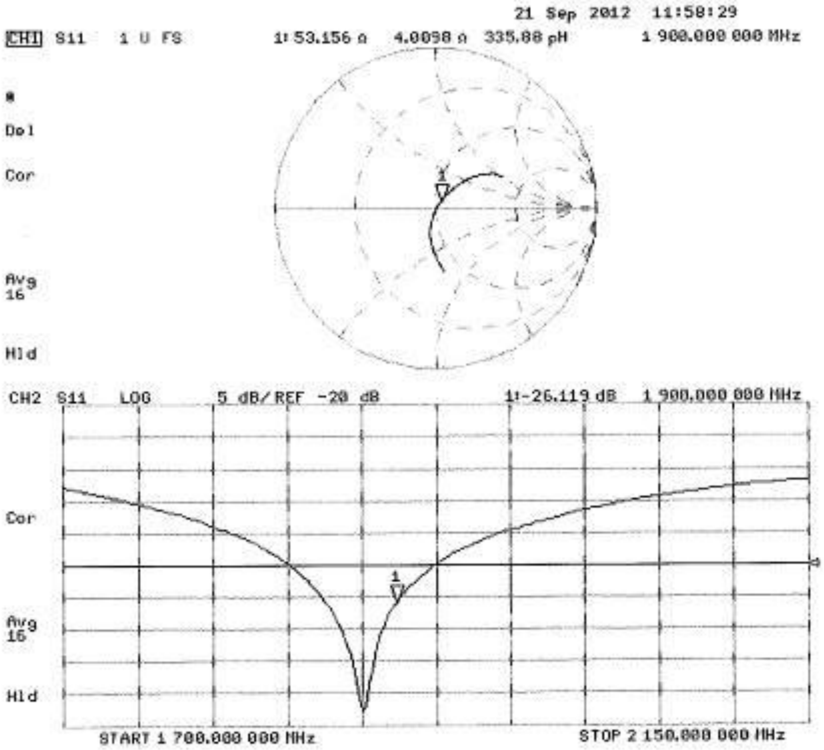
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

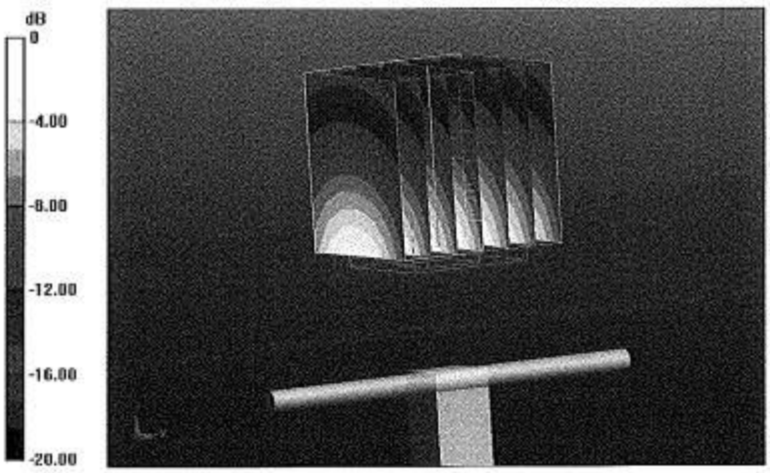
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.54$ mho/m; $\varepsilon_r = 52.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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)

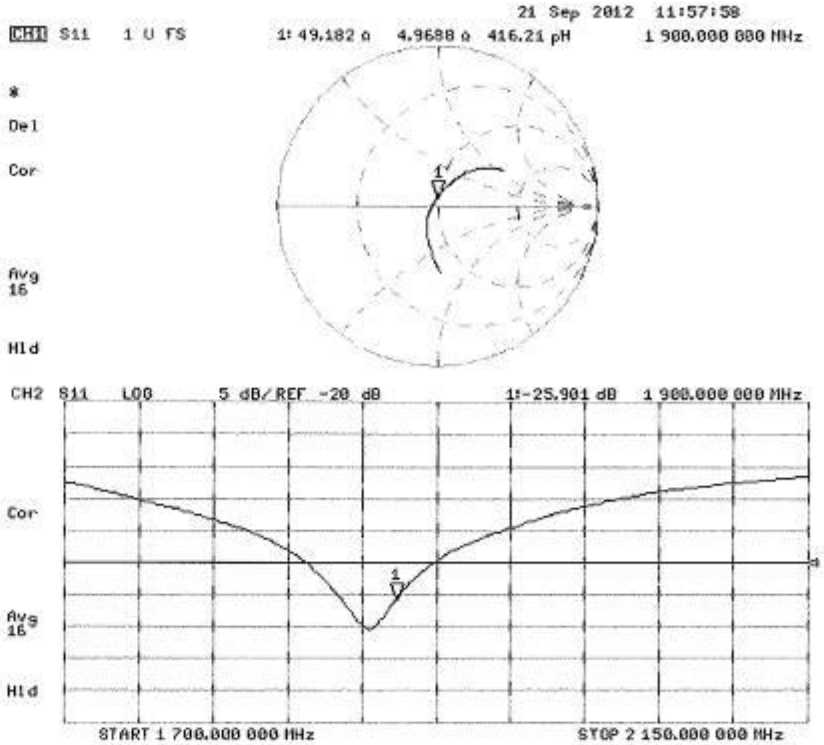
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

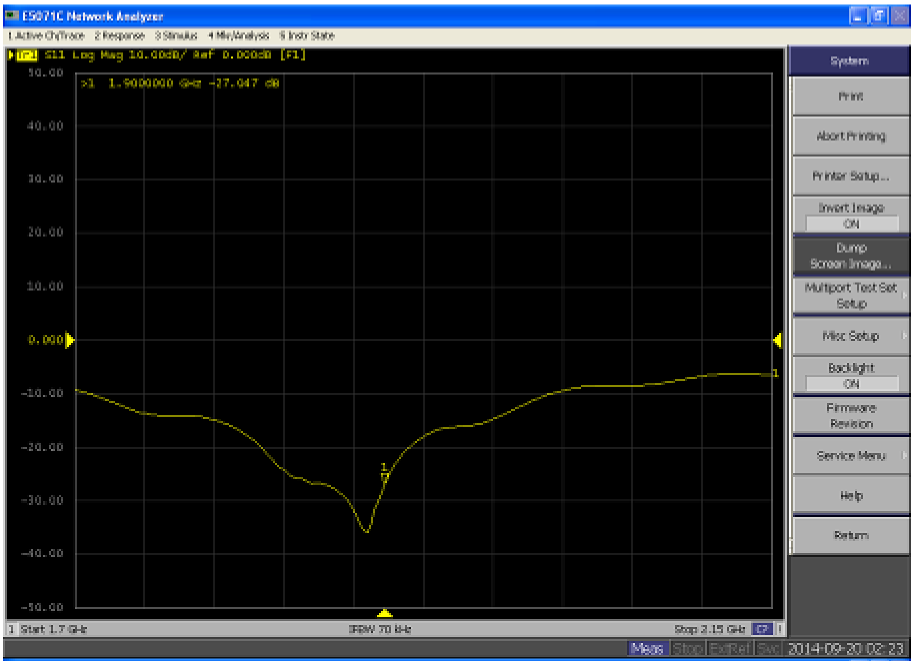
D1900V2, serial No. 5d162 Extended Dipole Calibrations

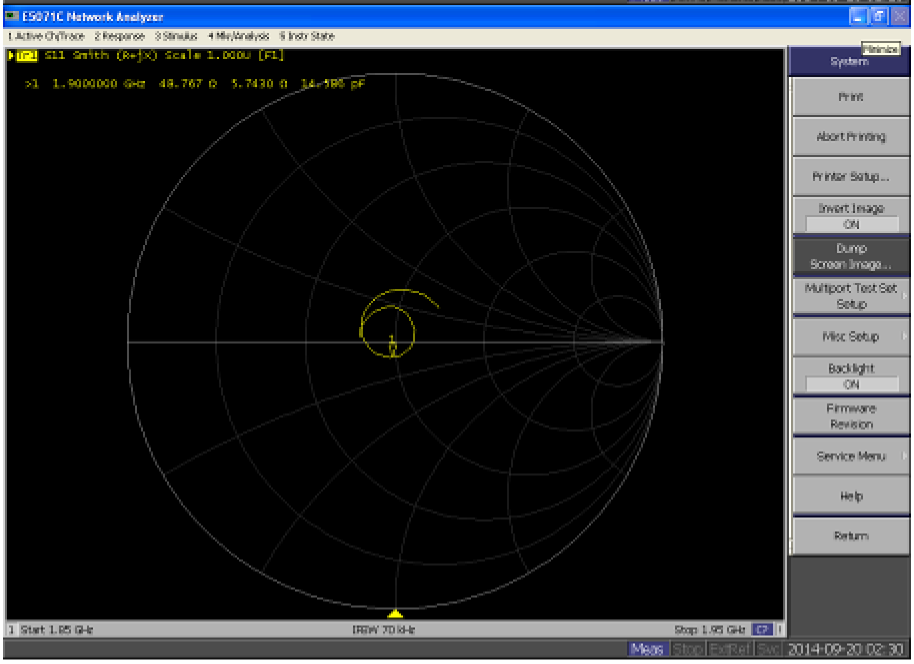
Referring to KDB 865664, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of the extended calibration

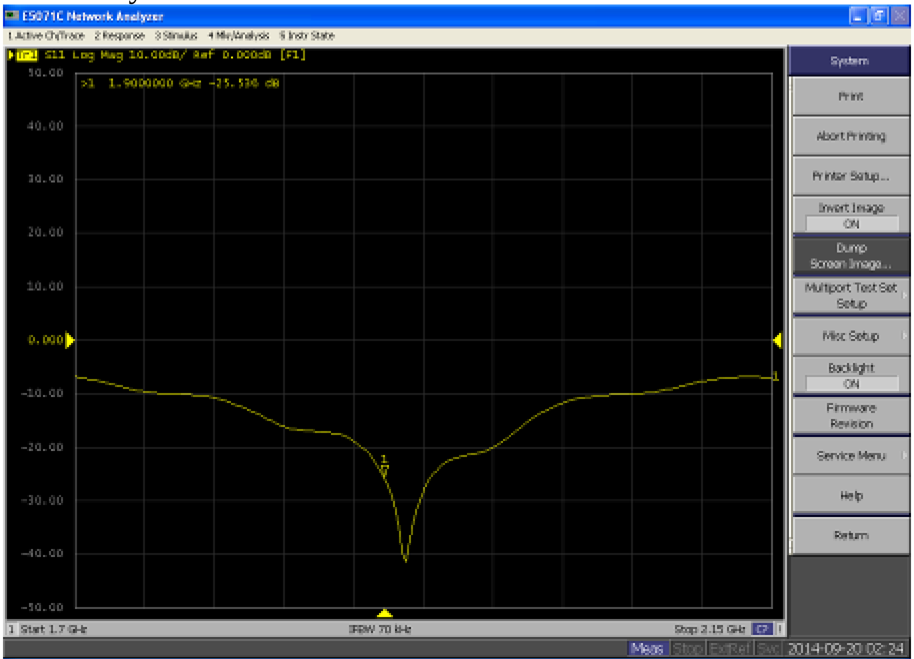
r	1900 Head					
Date of Measurement	Return-Loss (dB)	Delta(%)	Real Impedance(ohm)	Delta (ohm)	Imaginary Impedance(ohm)	Delta (ohm)
2012-9-21	-26.119		53.156		4.0098	
2014-9-20	-27.047	3.55	48.767	-4.389	5.7430	1.7332
	1900 Body					
	Return-Loss (dB)	Delta(%)	Real Impedance(ohm)	Delta (ohm)	Imaginary Impedance(ohm)	Delta (ohm)
2012-9-21	-28.393		52.982		2.543	
2014-9-20	-25.536	10.06	49.498	-3.484	-1.0725	-3.6155

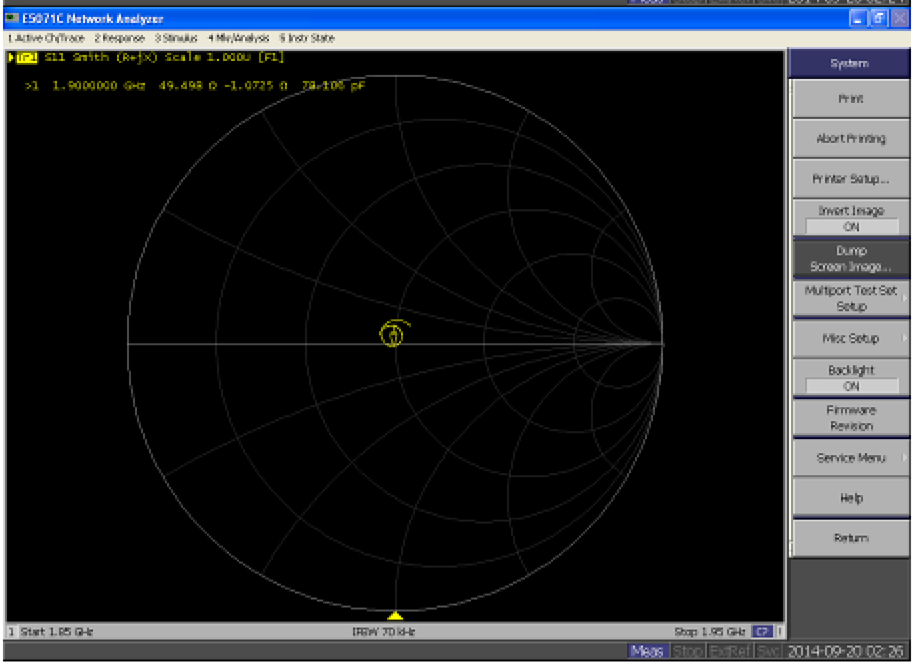
1900 Head


E5071C Network Analyzer
S11 Log Mag 10.00dB/ Ref 0.000dB [F1]
>1 1.9000000 GHz -27.047 dB
Start 1.7 GHz
IFBW 70 kHz
Stop 2.15 GHz
2014-09-20 02:23


E5071C Network Analyzer
S11 Smith (R+jX) Scale 1.000U [F1]
Start 1.85 GHz
IFBW 70 kHz
Stop 1.95 GHz
2014-09-20 02:30

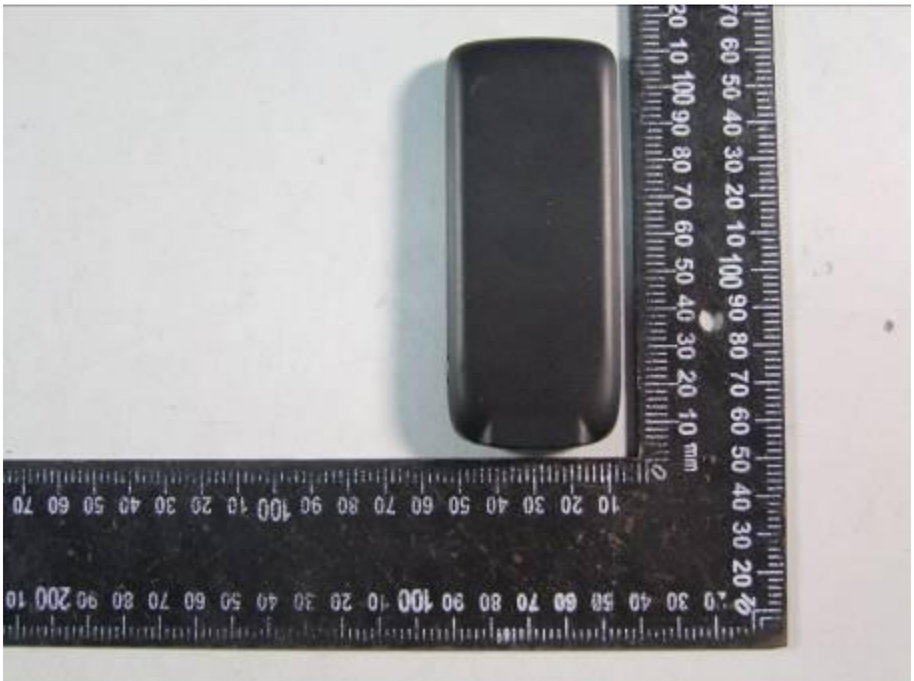
1900 Body

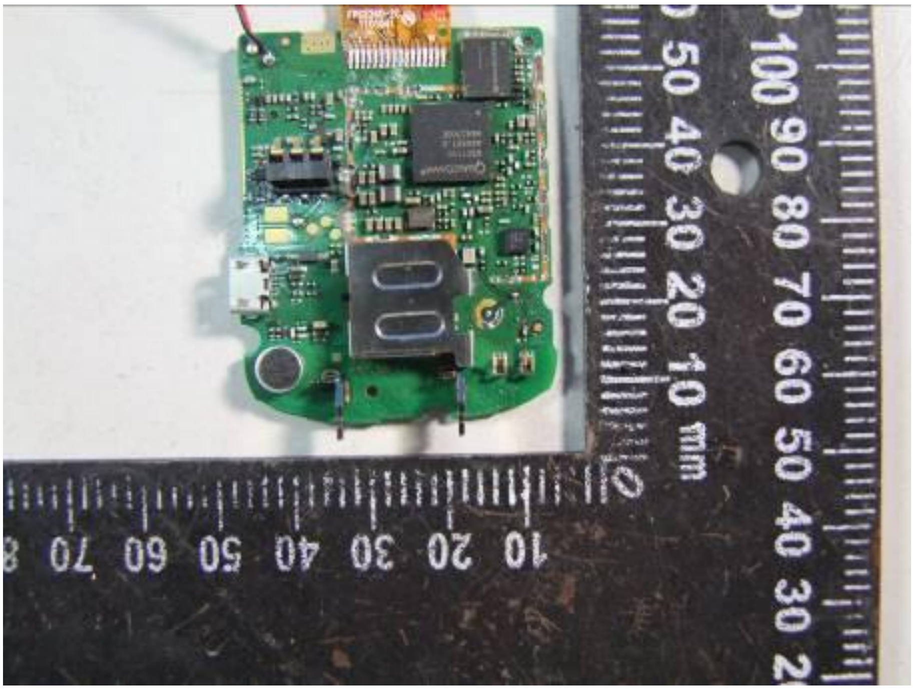

E5071C Network Analyzer
1 Active Ch/Trace
2 Response
3 Stimulus
4 Mkr/Analysis
5 Instr State
S11 Log Mag 10.00dB/ Ref 0.000dB [F1]
System
Print
Abort Printing
Printer Setup...
Invert Image
ON
Dump Screen Image...
Multiport Test Set Setup
Misc Setup
Backlight
ON
Firmware Revision
Service Menu
Help
Return
1 Start 1.7 GHz
IFBW 70 kHz
Stop 2.15 GHz
Meas
2014-09-20 02:24


E5071C Network Analyzer
1 Active Ch/Trace
2 Response
3 Stimulus
4 Mkr/Analysis
5 Instr State
S11 Smith (R+jX) Scale 1.000U [F1]
System
Print
Abort Printing
Printer Setup...
Invert Image
ON
Dump Screen Image...
Multiport Test Set Setup
Misc Setup
Backlight
ON
Firmware Revision
Service Menu
Help
Return
1 Start 1.85 GHz
IFBW 70 kHz
Stop 1.95 GHz
Meas
2014-09-20 02:26

APPENDIX E: DUT Photos


ALCATEL
onetouch



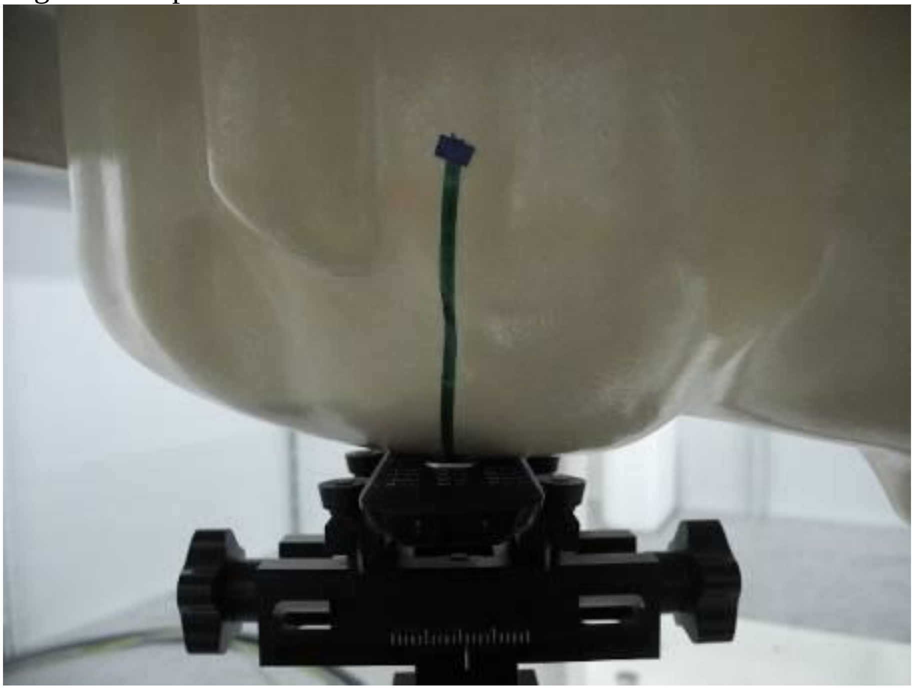


APPENDIX F: Test Position Photos

Left Cheek position

Left Tilted position

Right Cheek position



Right Cheek position

Faceup position 15mm

Facedown position 15mm

APPENDIX G: Laboratory Accreditation Certificate

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L0579)

Shenzhen Academy of Metrology & Quality Inspection

Middle Section of Longzhu Avenue, Nanshan District, Shenzhen, Guangdong, China

is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) *for the competence of testing and calibration.*

The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.

Date of Issue：2012-12-10

Date of Expiry：2015-12-09

Date of Initial Accreditation：1998-11-30

Date of Update：2012-12-10

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment (CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is the signatory to International Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (ILAC MRA) and Asia Pacific Laboratory Accreditation Cooperation Multilateral Recognition Arrangement (APLAC MRA).

No.CNAS AL 2 0005789