TEST REPORT

Ref. Report No.
06-341-25

Name and address of the applicant

Enustech. Inc
JnJ Bldg, 5th Yeoksam 2-dong, 785-12,
Gangnam_gu, Seoul, Republic of Korea

Standard / Test regulation

FCC Part2 ; OET Bulletin 65, Supplement C(July 2001)

Test result

Pass

Incoming date : 05th/ July/ 2006

Test date : 07th / July/ 2006

Test item(s) ;

Bluetooth VoIP Phone

Model;

CP100L

Manufacturer ;

Enustech. Inc
JnJ Bldg, 5th Yeoksam 2-dong, 785-12,
Gangnam_gu, Seoul, Republic of Korea

Additional information ;

-Required Authorization : Certification
-FCC ID. : TT2CP100L

Issue date : 19th / July/ 2006

Tested and reported by

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Reviewed by

S. J. Kim

Seok-Jin Kim , Telecommunication Team Manager

KOREA TESTING LABORATORY

TABLE OF CONTENTS

1. EQUIPMENT UNDER TEST

1.1 General Information :

1) Test Sample : Bluetooth VoIP Phone

2) Device Category : Portable Device

3) Model Number : CP100L

4) Test Device : Production unit

4) FCC ID : TT2CP100L

6) Applicant & Address : Enustech.Inc
JnJ Bldg, 5th Yeoksam 2-dong, 785-12, Gangnam_gu
Republic of Korea

7) Rule and Test Standard : - FCC 47 CFR § 2.1093; OET Bulletin 65, Supplement C(July 2001)

8) FCC Clasification : Licensed Portable Transmitter Held to Ear (PCE)

9) RF exposure Category : General Population/Uncontrolled

1.2 Description of Device :

Operation Modes	Bluetooth
Device Output power	(Class 1) 20dBm
Tx Frequency Range	2400 ~ 2483.5MHz
Device Dimensions (L x W x H)	100 x 47 x 12 mm
Antenna Type & Location	Internal Type(ceramic chip antenna) The left top of the DUT
Antenna Manufacturer	Amotech
Battery Type	Standard: 4.2VDC Lithium Polymer

2. DESCRIPTION OF SAR MEASREMENT SYSTEM

2.1 Probe Positioning System

The measurements were performed with the state of the automated near-field scanning system **DASY4 V4.6 Build 23** from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision 6-axis robot (working range greater that 1.1 m), which positions the SAR measurement probes with a positional repeatability of better than ± 0.02 mm. The DASY4 fully complies with the OET 65 C (01-01), IEEE 1528 and EN50361 SAR measurement requirements.

<Photo 1. DASY4 system >

2.2 E-Field Probe Type and Performance

The SAR measurements were conducted with the dosimetric probe ET3DV6, SN : 1773 (manufactured by SPEAG) designed in the classical triangular configuration and optimised for dosimetric evaluation. The probe has been calibrated and found to be accurate to better than ± 0.25 dB. The probe is suitable for measurements close to material discontinuity at the surface of the phantom. The sensors of the probe are directly loaded with Schottky diodes and connected via highly resistive lines (length = 300 mm) to the data acquisition unit.

2.3 Data Acquisition Electronics

The data acquisition electronics (DAE4) 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. The input impedance of the DAE4 box is 200 Mohm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.Transmission to the PC-card is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

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

2.4 Phantom Properties

The phantom support structures were all non-metallic and spaced more than one device width away in transverse directions. For SAR testing in the head positions, a head section of SAM Twin Phantom from SPEAG was used and for SAR testing in the body worn positions, a flat section of SAM Twin Phantom was used. Table 1 provides a summary of the measured flat section phantom properties. The phantom was filled with the required tissue simulating liquid.

Table 1 : Flat Section Properties of SAM Twin Phantom

Phantom Properties	Requirement for specific EUT	Measured
Depth of Phantom	> 150 mm	200 mm
Width of flat section	> 10 cm (Twice EUT Width)	20 cm
Length of flat section	> 26 cm (Twice EUT Length)	30 cm
Thickness of fla section	2 mm ± 0.2 mm	2.08 ~ 2.20 mm

2.5 Device Holder for DASY4

The DASY4 device holder supplied by SPEAG is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The rotation centres for both scales is the ear opening. Thus the device needs no repositioning when changing the angles.
The DASY4 device holder is made of low-loss material having the following dielectric parameters :
relative permittivity $\varepsilon_r = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, to reduce the influence on the clamp on the test results. Refer to Appendix B of photograph of device positioning.

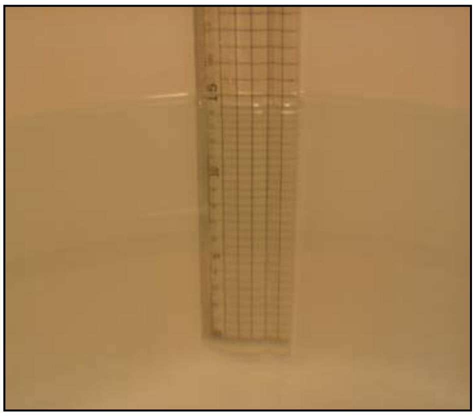
2.6 Brain & Muscle Simulating Mixture Characteristic

The tissue simulating liquids are created prior to the SAR evaluation and often require slight modification each day to obtain the correct dielectric parameters. The brain & muscle mixtures consist of Water and DGBE (refer DASY4 manual V4.6 Build 23). The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue.

Table 2 : Composition of Tissue Equivalent Matter

Ingredients	2450MHz Brain	2450MHz Muscle
Water	55.00%	68.64%
DGBE	45.00%	31.37%

During the SAR measurement process the liquid level was maintained to a level of a least 15 cm tolerance of ± 0.2 cm.The following photo shows the depth of the liquid maintained during the testing.



<Photo 2. Liquid depth 15cm>

3. System Verification

3.1 Tissue Verification

The dielectric parameters of the brain and muscle simulating liquid were measured prior to SAR assessment using the HP85070D dielectric probe kit and Agilent 8753ES Network Analyzer. The actual dielectric parameters are shown in the following table.

Table 3 : Measured Simulating Liquid Dielectric Values

Freq. MHz	Date	Head/ Body	parameters	Target Value	Measured Value	Deviation (%)	Deviation Limit (%)
2450 MHz	7th July 2006	Head	ε_r	39.2	39.7	+1.3%	±5%
			σ	1.80	1.86	+3.3%	±5%
	7th July 2006	Body	ε_r	52.7	52.5	-0.4%	±5%
			σ	1.95	2.03	+4.1%	±5%

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

Table 4 : Temperature and Humidity recorded

Date	Ambient Temperature(°C)	Liquid Temperature(°C)		Humidity(%)
		Head	Body	
7th July 2006	21.0	20.5	20.7	46

3.2 System Validation

<Photo 3. Validation setup>

Prior to the SAR assessment, the system validation kit was used to verify that the DASY4 was operating within its specifications. The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole. System validation is performed by feeding a known power level into a reference dipole, set at a know distance from the phantom. The measured SAR is compared to the theoretically derived level.

The reference SAR values are derived using a reference dipole and flat phantom suitable. The forward power into the reference dipole for each SAR validation was adjusted to 250 mW. These reference SAR values are obtained from the IEEE Std 1528 and are normalized to 1 W.
The measured one-gram SAR should be within 10 % of the expected target reference values shown in table 5 below.

Table 5 : Deviation from Reference Validation Values

Validation Dipole Ant.	Date	Liquid Temp.(˚ C)	SAR_{1g} Target (mW/g)	Measured SAR_{1g} (mW/g)	Deviation(%)
D2450V2 S/N:746	7th July 2006	21.0	52.4	50.8	-4.1

4. SAR MEASUREMENT PROCEDURE USING DASY4

The SAR evaluation was performed with the SPEAG DASY4 system. A summary of the procedure follows ;

a) A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the phantom is measured at a distance of 3.9 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 15 mm x 15 mm(or 20mm x 20mm). The actual Area Scan has dimensions surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume is assessed by measuring 5 x 5 x 7 (7 x 7 x 7) points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure ;

(i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

(ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the "Not a knot"- condition (in x, y and z-direction). The volume is integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

(iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

(iv) The SAR value at the same location as in Step (a) is again measured

In DASY4 system, the algorithm to find the cube with highest averaged SAR is divided into the following stages :

(i) extraction of the measured data (grid and values) from the Zoom Scan

(ii) calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)

(iii) generation of high-resolution mesh within the measured volume

(iv) interpolation of all measured values from the measurement grid to the high-resolution grid

(v) extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface

(vi) calculation of the averaged SAR within masses of 1g and 10g

In DASY4, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and extrapolation routines. The interpolation, extrapolation and maximum search routines are all based on the modified Quadratic Shepard's method.

Thereby, the interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation. The DASY4 routines construct a once-continuously differentiable function that interpolates the measurement values as follows:

- For each measurement point a trivariate (3-D) / bivariate (2-D) quadratic is computed. It interpolates the measurement values at the data point and forms a least-square fit to neighboring measurement values.

- the spatial location of the quadratic with respect to the measurement values is attenuated by an inverse distance weighting. This is performed since the calculated quadratic will fit measurement values at nearby points more accurate than at points located further away.

- After the quadratics are calculated for at all measurement points, the interpolating function is calculated as a weighted average of the quadratics.

There are two control parameters that govern the behavior of the interpolation method. One specifies the number of measurement points to be used in computing the least-square fits for local quadratics, These measurement points are the ones nearst the input point for which the quadratic is being computed. The second parameter specifies the number of measurement points that will be used in calculating the weights for the quadratics to produce the final function . The input data points used there are the ones nearst the point at which the interpolation is desired. Appropriate defaults are chosen for each of the control parameters.

The trivariate quadratics that have been previously computed for the 3-D interpolation and whose input data are at the closest distance from the phantom surface, are used in order to extrapolate the fields to the surface of the phantom.

In order to determine all the field maxima in 2-D (Area Scan) and 3-D (Zoom Scan), the measurement grid is refined by a default factor 10 and the interpolation function is used to evaluate all field values between corresponding measurement points. Subsquently, a linear search is applied to find all the candidate maxima. In a last step, non physical maxima are removed and only those maxima which are within 2dB of the global maximam value are retained.

5. MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both EUT SAR tests and Validation uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95 % confidence level) must be less than 25 %.

Table 6. EUT SAR Test - Uncertainty Budget for DASY4 Version V4.6 Build 19

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (± %)	10 g Ui (± %)	vi
Measurement System									
Probe Calibration (k=1)	E.2.1	5.9	N	1	1	1	5.9	5.9	∞
Axial lsotropy	E.2.2	4.7	R	√3	0.7	0.7	1.9	1.9	∞
Hemispherical lsotropy	E.2.2	9.6	R	√3	0.7	0.7	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	√3	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	√3	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	√3	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	√3	1	1	0.5	0.5	∞
lntegration Time	E.2.8	2.6	R	√3	1	1	1.5	1.5	∞
RF Ambient Noise	E.6.1	3.0	R	√3	1	1	1.7	1.7	∞
RF Ambient Refections	E.6.1	3.0	R	√3	1	1	1.7	1.7	∞
Probe Positioner	E.6.2	0.4	R	√3	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	√3	1	1	1.7	1.7	∞
Algorithms for Max. SAR Evaluation	E.5	1.0	R	√3	1	1	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	2.9	N	1	1	1	2.9	2.9	145
Device Holder Uncertainty	E.4.1	3.6	N	1	1	1	3.6	3.6	5
Output Power Variation — SAR Drift Measurement	6.6.2	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	√3	1	1	2.3	2.3	∞
Liquid Conductivity — Deviation from target values	E.3.2	5.0	R	√3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity — Measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permititivity — Deviation from target values	E.3.2	5.0	R	√3	0.6	0.49	1.7	1.4	∞
Liquid Pemiittivity — Measurement uncertainty	E.3.3	2.5	N	1	0.6	0.49	1.5	1.2	∞
Cornbined standard Uncertainty			RSS				± 10.9	± 10.7	387
Expanded Uncertainty (95% CONFIDENCE LEVEL)			K=2				± 21.9	± 21.4	

Estimated total measurement uncertainity for the DASY4 measurement system was ± 10.9 %. The extended uncertainity (K=2) was assessed to be ± 21.9 % based on 95 % confidence level. The uncertainity is not added to the measurement result.

Table 7. Validation - Uncertainty Budget for DASY4 Version V4.6 Build 19

a	b	c	d	e= f(d,k)	f	g	h=cxf/e	i=cxg/e	k
Uncertainty Component	Sec.	Tol. (%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (± %)	10 g Ui (± %)	vi
Measurement System									
Probe Calibration (k=1)	E.2.1	5.9	N	1	1	1	5.9	5.9	∞
Axial lsotropy	E.2.2	4.7	R	√ 3	1	1	2.7	2.7	∞
Hemispherical lsotropy	E.2.2	9.6	R	√ 3	0	0	0	0	∞
Boundary Effect	E.2.3	1.0	R	√ 3	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	√ 3	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	√ 3	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0	R	√ 3	1	1	0	0	∞
lntegration Time	E.2.8	0	R	√ 3	1	1	0	0	∞
RF Ambient Noise	E.6.1	3.0	R	√ 3	1	1	1.7	1.7	∞
RF Ambient Refections	E.6.1	3.0	R	√ 3	1	1	1.7	1.7	∞
Probe Positioner	E.6.2	0.4	R	√ 3	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	E.6.3	2.9	R	√ 3	1	1	1.7	1.7	∞
Algorithms for Max. SAR Evaluation	E.5.2	1.0	R	√ 3	1	1	0.6	0.6	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	√ 3	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	4.7	R	√ 3	1	1	2.7	2.7	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (shape and thickness tolerances)	E.3.1	4.0	R	√ 3	1	1	2.3	2.3	∞
Liquid Conductivity — Deviation from target values	E.3.2	5.0	R	√ 3	0.64	0.43	1.8	1.2	∞
Liquid Conductivity — Measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	1.6	1.1	∞
Liquid Permititivity — Deviation from target values	E.3.2	5.0	R	√ 3	0.6	0.49	1.7	1.4	∞
Uquid Pemiittivity — Measurement unceilainty	E.3.3	2.5	N	1	0.6	0.49	1.5	1.2	∞
Cornbined standard Uncertainty			RSS				± 9.2	± 8.9	∞
Expanded Uncertainty (95% CONFIDENCE LEVEL)			K=2				± 18.4	± 17.8	

Estimated total measurement uncertainty for the DASY4 measurement system was ± 9.2 %. The extended uncertainty (K = 2) was assessed to be ± 18.4 % based on 95 % confidence level. The uncertainty is not added to the validation measurement result.

6. Description of Test Position

SAR measurements were performed in the “cheek” and “tilted” positions on left and right sides of the phantom. Both were measured in the head section of the SAM Twin Phantom . For the “Belt ” position , it was measured in the flat section of the SAM Twin Phantom .

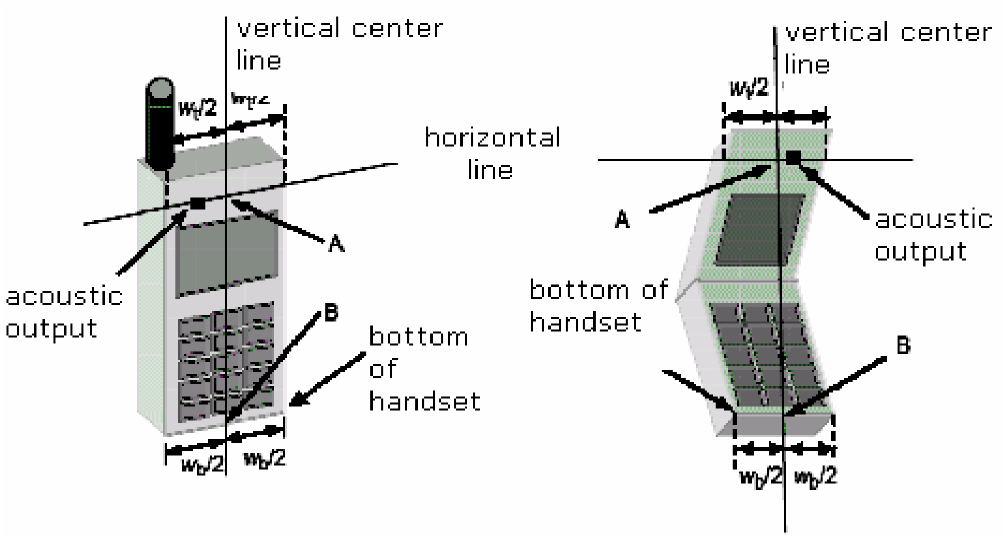


Figure 2. Handset vertical and horizontal reference line

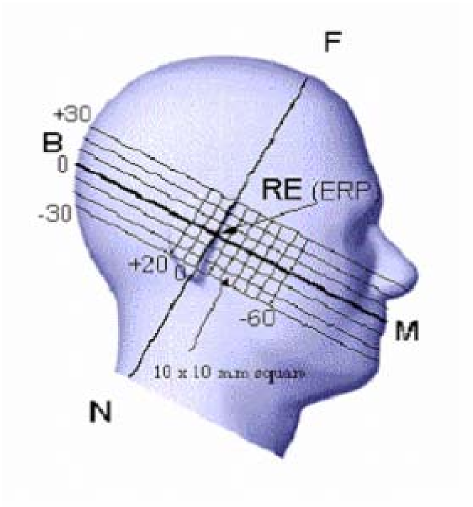


Figure 3. Side view of SAM phantom

1) Cheek /Touch Position

The device was positioned with the vertical center line of the body of the device and the horizontal line crossing the center (see Figure 2) of the ear piece in a plane parallel to the sagittal plane of the phantom(see Figure 3). While maintaining the device in this plane, it was aligned the vertical center line with the reference plane containing the three ear and mouth reference points(M, RE and LE) and aligned the center of the ear piece with the line RE-LE. Then device was translated towards the phantom with the ear piece aligned with the line LE-RE until it touched the ear. While maintaining the device in the reference plane and maintaining the device contact with the ear, the bottom of the device was moved until any point on the front side is in contact with the cheek of the phantom.(see Figure 4)

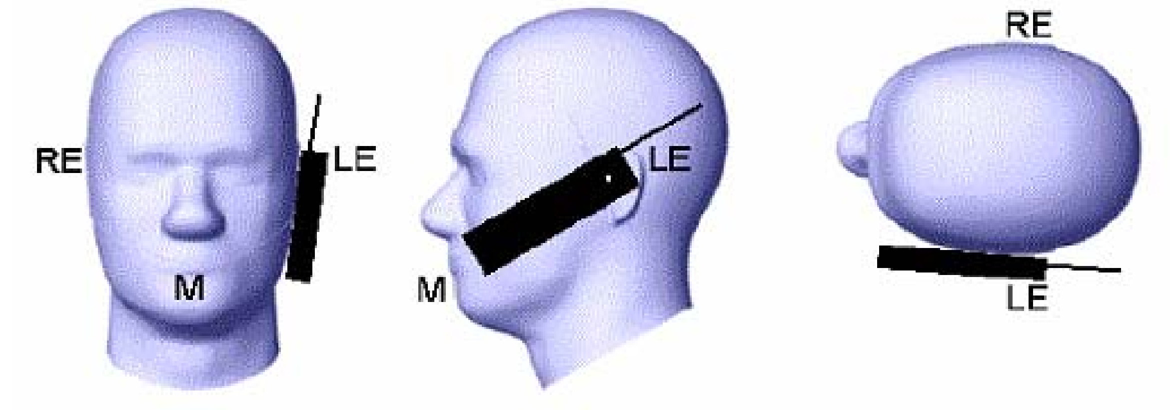
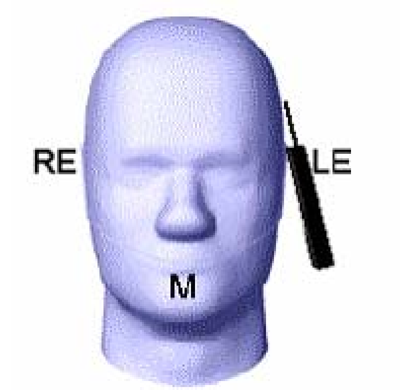


Figure 4. Cheek/Touch Position

2) Ear/Tilt Position



The device was positioned in the “Cheek” position. While maintaining the device in the reference plane described above cheek position and pivoting against the ear, device was moved outward away from the mouth by an angle of 15 degrees.
(see Figure 5)

“

Figure 5. Cheek/Tilt Position

3) 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 body dielectric parameters are used.

Body-worn accessories may not always be supplied or available as options for some devises that are intended to be authorized for body-worn use. A separation distance of 1.5cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. For this DUT any body-worn accessory is not provided to the end user.

Photo 4. Belt Position setup without holster

8. FCC RF Exposure Limits

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/Kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/Kg) or (mW/g)
SPATIAL PEAK SAR (Brain)	1.60	8.00
SPATIAL AVERAGE SAR (Whole Body)	0.08	0.40
SPATIAL PEAK SAR (Hand / Feet / Ankle / Wrist)	4.00	20.00

Table. 8 Safety Limits for Partial Body Exposure

NOTE 1 :**Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. **SAR for hands, wrists, feet and ankles** is averaged ower any 10 grams of tissue defined as a tissue volume in the shape of cube

NOTE 2 : At frequencies above 6.0 GHz, SAR limits ajre not applicable and MPE limits for power density should be appoied at 5 cm or more from the transmitting device.

NOTE 3 : The time averaging criteria for field strength and power density do not apply to general population SAR limit of 47 CFR § 2.1093.

8. SAR MEASUREMENT RESULTS

Procedures Used To Establich Test Signal
The handset was placed into simulated call mode using manufacturers test codes. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR.

Bluetooth 2450 Head SAR Measurement Result

Date of Test : 7th July 2006
Mixture Type : 2450MHz Brain
Ambient Temperature (C) : 21.0
Dielectric Constant : 39.7
Liquid Temperature (C) : 20.5
Humidity (%) : 46
Conductivuty : 1.86

Frequency		Modulation	Begin/End Power		Head Position	Device test Position	Antenna Position	SAR 1g (W/Kg)
MHz	CH		(dBm)	Batt.				
2402	0	Bluetooth	14.6	Standard	Left	Cheek /Touch	Internal Antenna	0.532
2441	39		14.8	Standard		Cheek /Touch	Internal Antenna	0.705
2480	78		15.1	Standard		Cheek /Touch	Internal Antenna	0.719
2402	0	Bluetooth	14.6	Standard	Left	Cheek /Tilt	Internal Antenna	-
2441	39		14.8	Standard		Cheek /Tilt	Internal Antenna	0.063
2480	78		15.1	Standard		Cheek /Tilt	Internal Antenna	-
2402	0	Bluetooth	14.6	Standard	Right	Cheek /Touch	Internal Antenna	0.307
2441	39		14.8	Standard		Cheek /Touch	Internal Antenna	0.342
2480	78		15.1	Standard		Cheek /Touch	Internal Antenna	0.619
2402	0	Bluetooth	14.6	Standard	Right	Cheek /Tilt	Internal Antenna	-
2441	39		14.8	Standard		Cheek /Tilt	Internal Antenna	0.057
2480	78		15.1	Standard		Cheek /Tilt	Internal Antenna	-

NOTES:
1.The test data reported are the worst-case SAR value with the antenna –head position set in a typical configuration
2.All modes of operation were investigated and the worst-case are reported.
3.Battery is fully charged for all readings.
4.Power Measured : Conducted
5.SAR Configuration : Head

6.Test Signal Call mode : Manual Test Code (continuous wave/unmodulated)
7.SAR Measurement System : SPEAG-DASY4
8.Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (left, right, cheek/touch, tilt/ear) is least 3.0dB lower than the SAR limit, testing at the high and low channel is optional for such test configurations.

Bluetooth 2450 Body SAR Measurement Result

Date of Test : 7th July 2006
Mixture Type : 2450MHz Muscle
Ambient Temperature (C) : 21.0
Dielectric Constant : 52.5
Liquid Temperature (C) : 20.7
Humidity (%) : 46
Conductivuty : 2.03

Frequency		**Modulation (dBm)**	**Begin/End Power**		**DUT Position**	**Device test Position**	**Antenna Position**	**SAR 1g (W/Kg)**
MHz	**CH**		**(dBm)**	**Batt.**				
2402	0	Bluetooth	14.6	standard	Body (back to phantom)	Belt without Holster	Internal Antenna	0.00791
2441	39		14.8	standard	Body (back to phantom)	Belt without Holster	Internal Antenna	0.00994
2480	78		15.1	standard	Body (back to phantom)	Belt without Holster	Internal Antenna	0.026

NOTES:
1.The test data reported are the worst-case SAR value with the antenna –head position set in a typical configuration
2.All modes of operation were investigated and the worst-case are reported.
3.Battery is fully charged for all readings.
4. Power Measured : Conducted
5.SAR Configuration : Body
6.Test Signal Call mode : Manual Test Code (continuous wave/unmodulated)
7.SAR Measurement System : SPEAG-DASY4
8. Per OET Bulletin 65 Supplement C(July-2001), if Body-worn accessories is not supplied for device, a separation distance of 15mm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances.

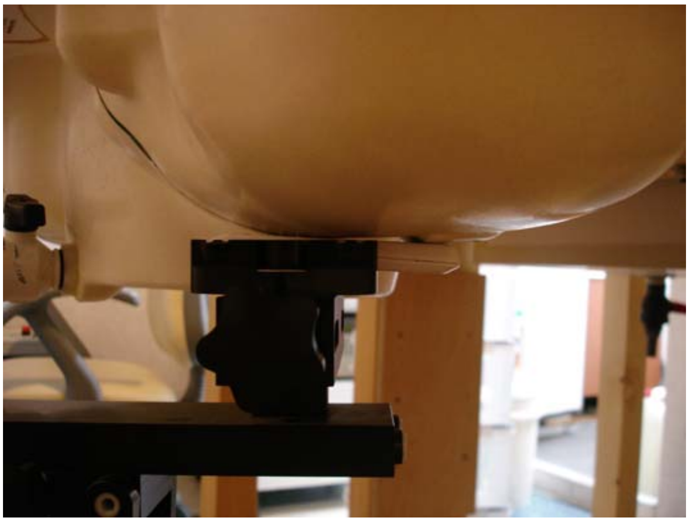
9. COMPLIANCE STATEMENT

The Bluetooth VoIP phone, Model; CP100L was found to comply with the FCC SAR requirements. The highest SAR level recorded was **0.719 W/kg for a 1 g cube** in 2450MHz. This value was measured on channel 78 in the Head Left /touch position supplementing the DC 4.2 V Rechargeable Standard Battery Pack . **This was below the uncontrolled limit of 1.6 W/kg.**

10. EQUIPMENT LIST AND CALIBRATION DETAILS

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX60	N/A	N/A	Yes
Robot Remote Control	SPEAG	CS7MB	F03/5U96A1 /C/01	N/A	Yes
SAM Twin Phantom	SPEAG	TP1276	QD000P40CA	N/A	Yes
Flat Phantom V4.4	SPEAG	QD000P44B A,BB	1001, higher	N/A	No
Data Acquisition Electronics	SPEAG	DAE4	559	06.03.20	Yes
Probe E-Field	SPEAG	ES3DV2	3020	05.07.20	No
Probe E-Field	SPEAG	ET3DV6	1773	06.05.30	Yes
Antenna Dipole 450 MHz	SPEAG	D450V2	1016	05.09.21	No
Antenna Dipole 835 MHz	SPEAG	D835V2	481	05.05.24	No
Antenna Dipole 900 MHz	SPEAG	D900V2	194	05.11.04	No
Antenna Dipole 1800 MHz	SPEAG	D1800V2	2d066	05.05.19	No
Antenna Dipole 1900 MHz	SPEAG	D1900V2	5d038	05.11.03	Yes
Antenna Dipole 1950 MHz	SPEAG	D1950V2	1027	06.03.13	No
Antenna Dipole 2450 MHz	SPEAG	D2450V2	746	06.02.16	Yes
High power RF Amplifier	EMPOWER	2057-BBS3Q5KCK	1002D/C0321	05.10.13	Yes
Universal Radio Communication Tester	R&S	CMU200	110019	06.03.22	No
Signal Generator	Hewlett Packard	8648C	3629U00868	06.05.20	Yes
RF Power Meter Dual	Hewlett Packard	E4419A	GB37170495	06.04.28	Yes
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481A	US37299851	06.01.14	Yes
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481A	3318A92872	06.01.14	Yes
S-Parameter Network Analyzer	Agilent	8753ES	MY40002303	06.04.21	Yes
Dual Directional Coupler	Hewlett Packard	778D	1144AO4576	05.10.13	No
Directional Coupler	Agilent	773D	MY28390213	05.10.13	Yes

APPENDIX A : TEST SET-UP PHOTOGRAPHS



< Photo B.1. Right Head-Cheek >

< Photo B.2. Right Ear-Tilt >

< Photo B.3. Left Head-Cheek >

< Photo B.4. Left Ear Tilt >

< Photo B.5. Belt Position without Holster >

< Photo B.6. Belt Position without Holster-Near View>

APPENDIX B : PLOTS OF THE SAR MEASUREMENTS

Test Laboratory: KTL

CP100L 0.CH Left Cheek Touch

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

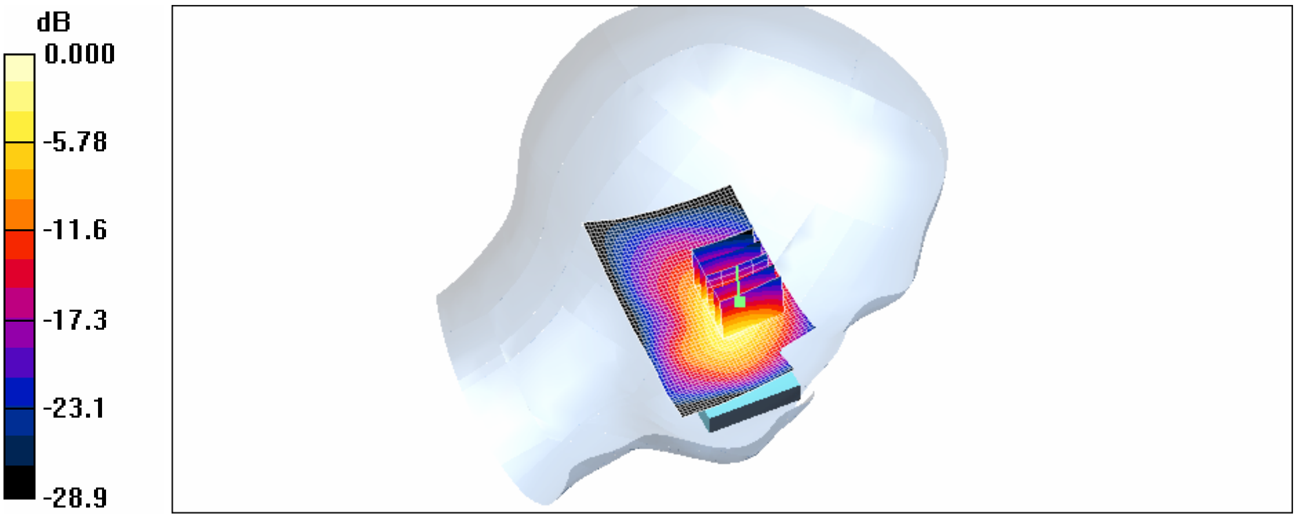
Communication System: Bluetooth; Frequency: 2402 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2402 MHz; σ = 1.89 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x61x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.668 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.88 V/m; Power Drift = -0.142 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 0.532 mW/g; SAR(10 g) = 0.215 mW/g
Maximum value of SAR (measured) = 0.540 mW/g



0 dB = 0.540mW/g

Test Laboratory: KTL

CP100L 39.CH Left Cheek Touch

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

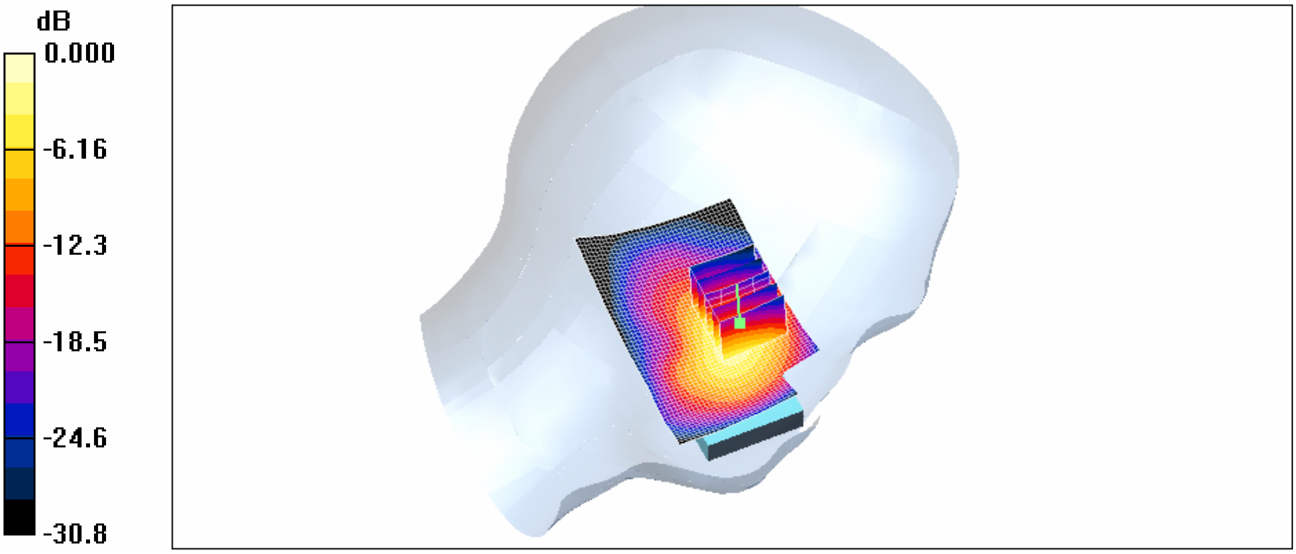
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2441 MHz; σ = 1.86 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x61x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.865 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.01 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 2.20 W/kg
SAR(1 g) = 0.705 mW/g; SAR(10 g) = 0.284 mW/g
Maximum value of SAR (measured) = 0.745 mW/g



0 dB = 0.745mW/g

CP100L 78.CH Left Cheek Touch

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0, Ambient Temerpature(C) : 21.0

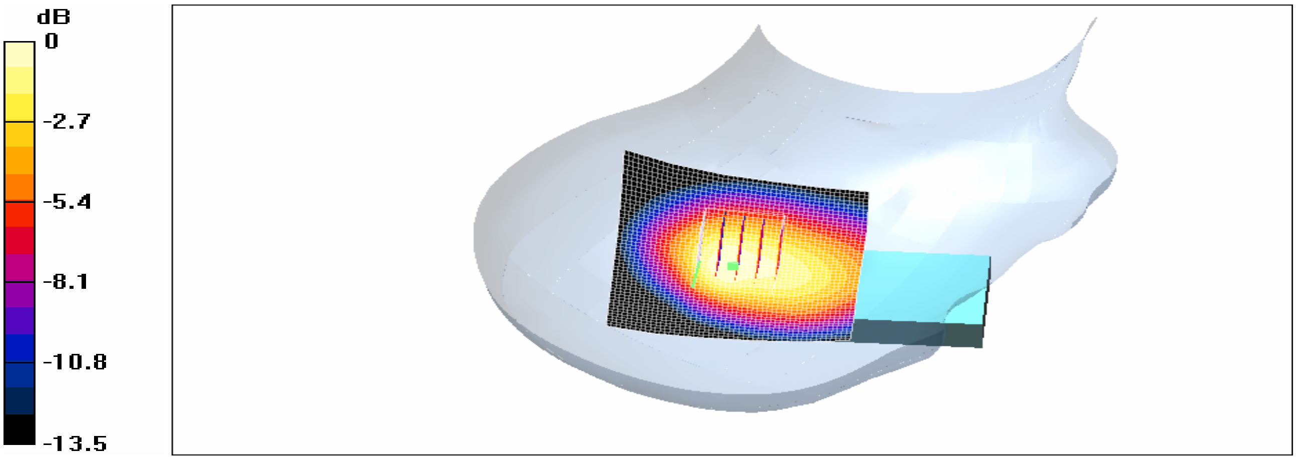
Communication System: Bluetooth; Frequency: 2480 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2480 MHz; σ = 1.92 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x61x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.909 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.21 V/m; Power Drift = -0.048 dB
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 0.719 mW/g; SAR(10 g) = 0.295 mW/g
Maximum value of SAR (measured) = 0.723 mW/g



0 dB = 0.723mW/g

Test Laboratory: KTL

CP100L CH.39 Left Cheek Tilt

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006, Measured Liquid Temperature(C) : 21.0**

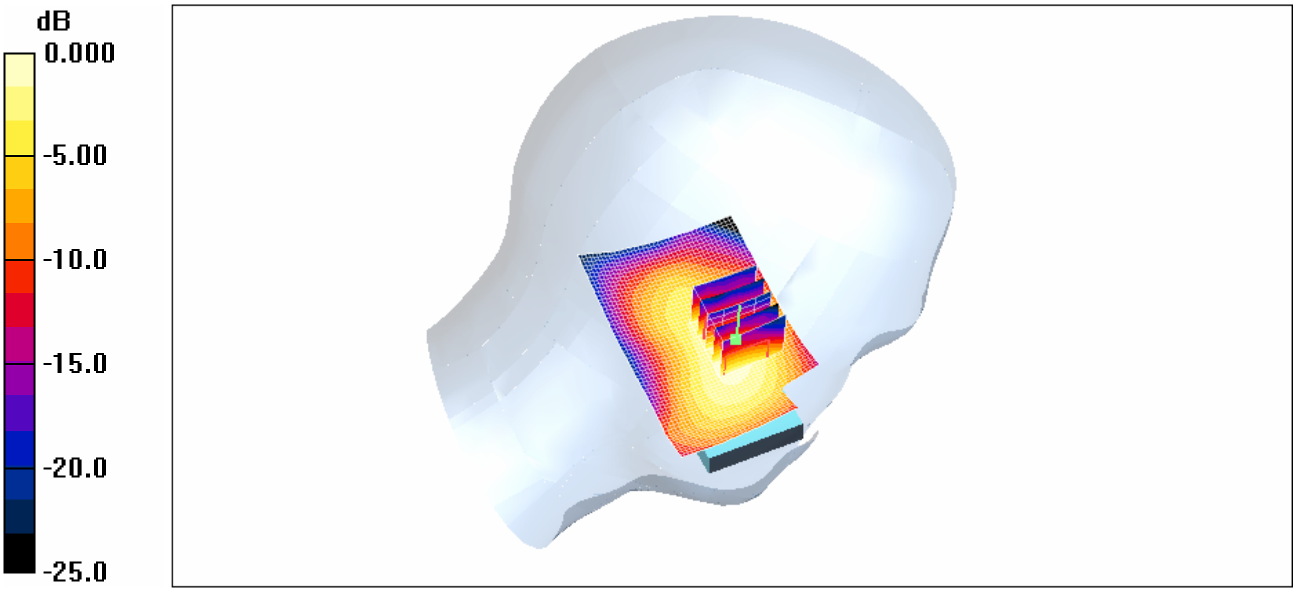
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2441 MHz; $\sigma = 1.86$ mho/m; $\varepsilon_r = 39.8$; $\rho = 1000$ kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x61x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.067 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.95 V/m; Power Drift = 0.099 dB
Peak SAR (extrapolated) = 0.147 W/kg
SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.032 mW/g
Maximum value of SAR (measured) = 0.066 mW/g



0 dB = 0.066mW/g

Test Laboratory: KTL

CP100L 0.CH Right Cheek Touch

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

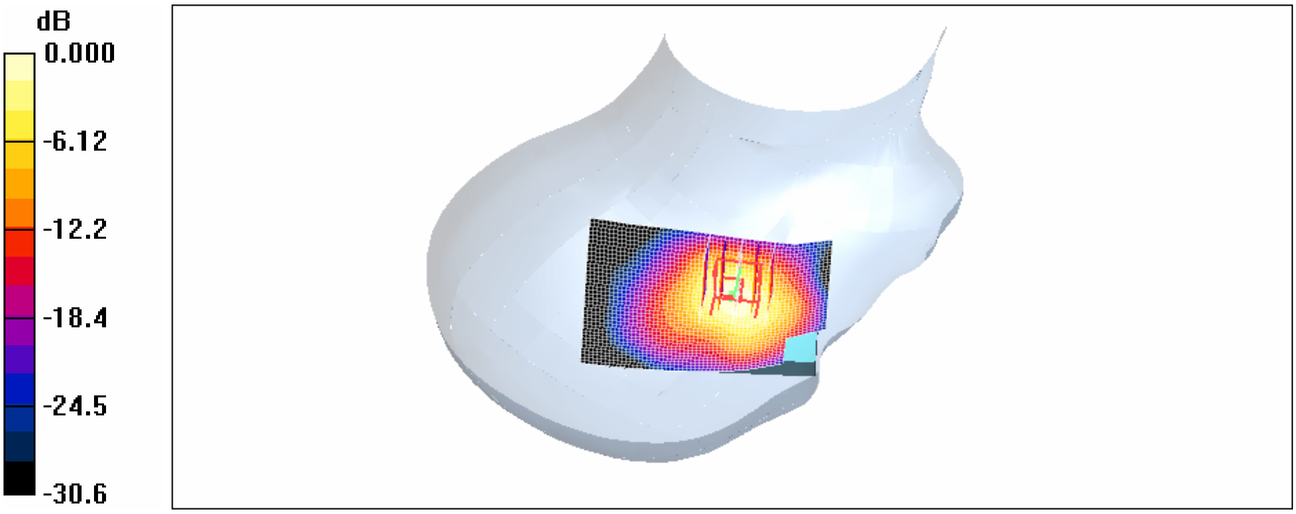
Communication System: Bluetooth; Frequency: 2402 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2402 MHz; σ = 1.89 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x61x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.307 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.25 V/m; Power Drift = -0.134 dB
Peak SAR (extrapolated) = 0.764 W/kg
SAR(1 g) = 0.307 mW/g; SAR(10 g) = 0.143 mW/g
Maximum value of SAR (measured) = 0.326 mW/g



0 dB = 0.326mW/g

Test Laboratory: KTL

CP100L 39.CH Right Cheek Touch

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

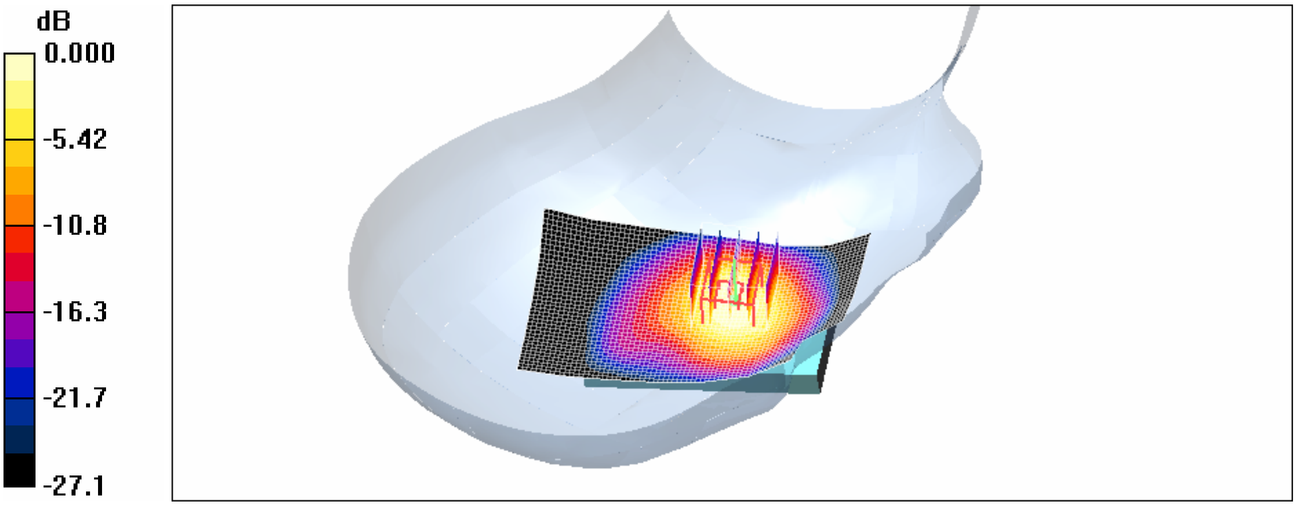
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2441 MHz; σ = 1.86 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.415 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.42 V/m; Power Drift = 0.081 dB
Peak SAR (extrapolated) = 0.846 W/kg
SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.161 mW/g
Maximum value of SAR (measured) = 0.361 mW/g



0 dB = 0.361mW/g

Test Laboratory: KTL

CP100L 78CH Right Cheek Touch

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

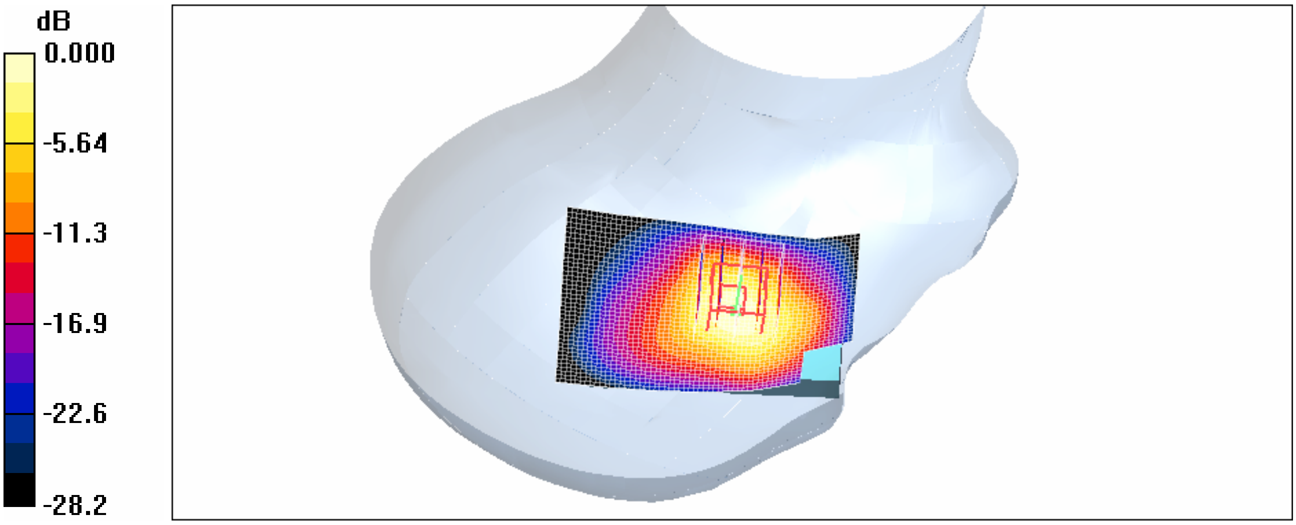
Communication System: Bluetooth; Frequency: 2480 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2480 MHz; $\sigma = 1.92$ mho/m; $\varepsilon_r = 39.4$; $\rho = 1000$ kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x61x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.595 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.49 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 1.70 W/kg
SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.282 mW/g
Maximum value of SAR (measured) = 0.623 mW/g



0 dB = 0.623mW/g

Test Laboratory: KTL

CP100L 39.CH Right Cheek Tilt

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

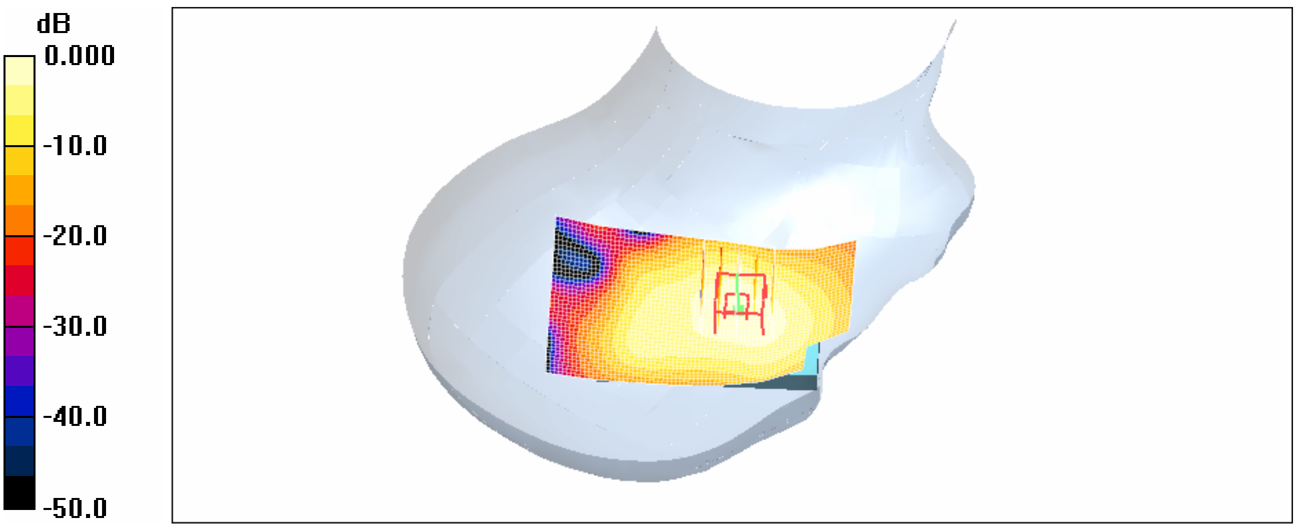
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2441 MHz; σ = 1.86 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (41x71x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.053 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.86 V/m; Power Drift = 0.087 dB
Peak SAR (extrapolated) = 0.102 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.027 mW/g
Maximum value of SAR (measured) = 0.057 mW/g



0 dB = 0.057mW/g

Test Laboratory: KTL

CP100L 0.CH Body

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

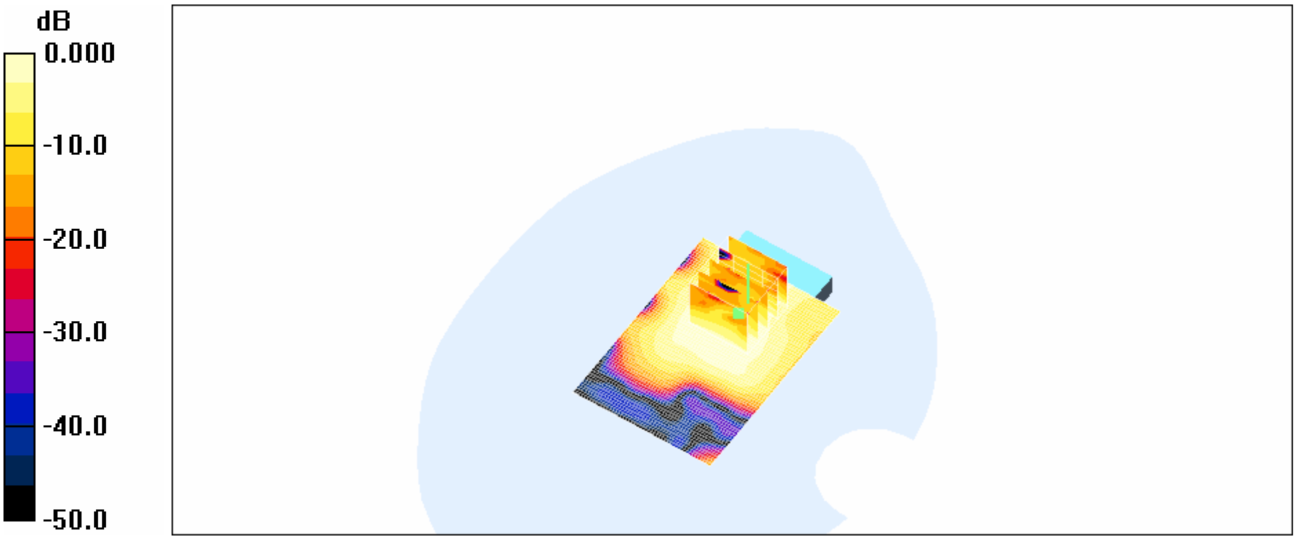
Communication System: Bluetooth; Frequency: 2402 MHz;Duty Cycle: 1:1
Medium: 2450D Medium parameters used: f = 2402 MHz; σ = 1.96 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.09, 4.09, 4.09); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (51x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.009 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.00 V/m; Power Drift = 0.163 dB
Peak SAR (extrapolated) = 0.015 W/kg
SAR(1 g) = 0.00791 mW/g; SAR(10 g) = 0.00423 mW/g
Maximum value of SAR (measured) = 0.009 mW/g



0 dB = 0.009mW/g

Test Laboratory: KTL

CP100L 39.CH Body

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

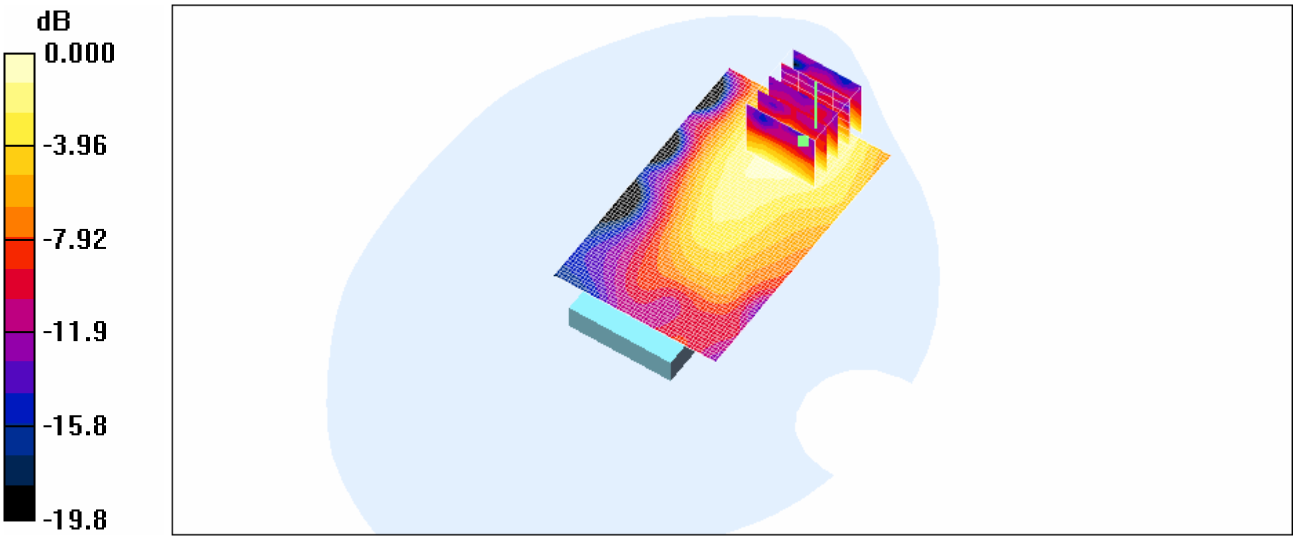
Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: 2450D Medium parameters used: f = 2441 MHz; σ = 2 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.09, 4.09, 4.09); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.011 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.897 V/m; Power Drift = 0.189 dB
Peak SAR (extrapolated) = 0.021 W/kg
SAR(1 g) = 0.00994 mW/g; SAR(10 g) = 0.00579 mW/g
Maximum value of SAR (measured) = 0.011 mW/g



0 dB = 0.011mW/g

Test Laboratory: KTL

CP100L 78.CH Body

DUT: CP100L; Type: Bar type

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0 , Ambient Temerpature(C) : 21.0

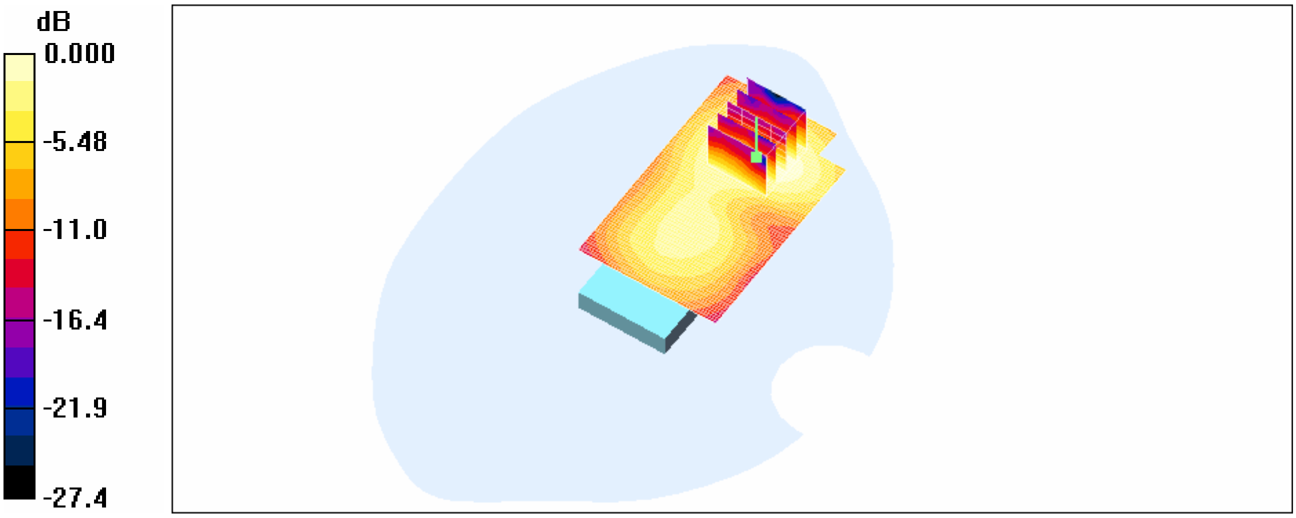
Communication System: Bluetooth; Frequency: 2480 MHz;Duty Cycle: 1:1
Medium: 2450D Medium parameters used: f = 2480 MHz; σ = 2.06 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.09, 4.09, 4.09); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (51x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.028 mW/g

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.52 V/m; Power Drift = 0.111 dB
Peak SAR (extrapolated) = 0.051 W/kg
SAR(1 g) = 0.026 mW/g; SAR(10 g) = 0.014 mW/g
Maximum value of SAR (measured) = 0.028 mW/g



0 dB = 0.028mW/g

Test Laboratory: KTL

System Validation 2450MHz

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:746

***Test Date : 07/July/2006**

Measured Liquid Temperature(C) : 21.0, Ambient Temerpature(C) : 21.0

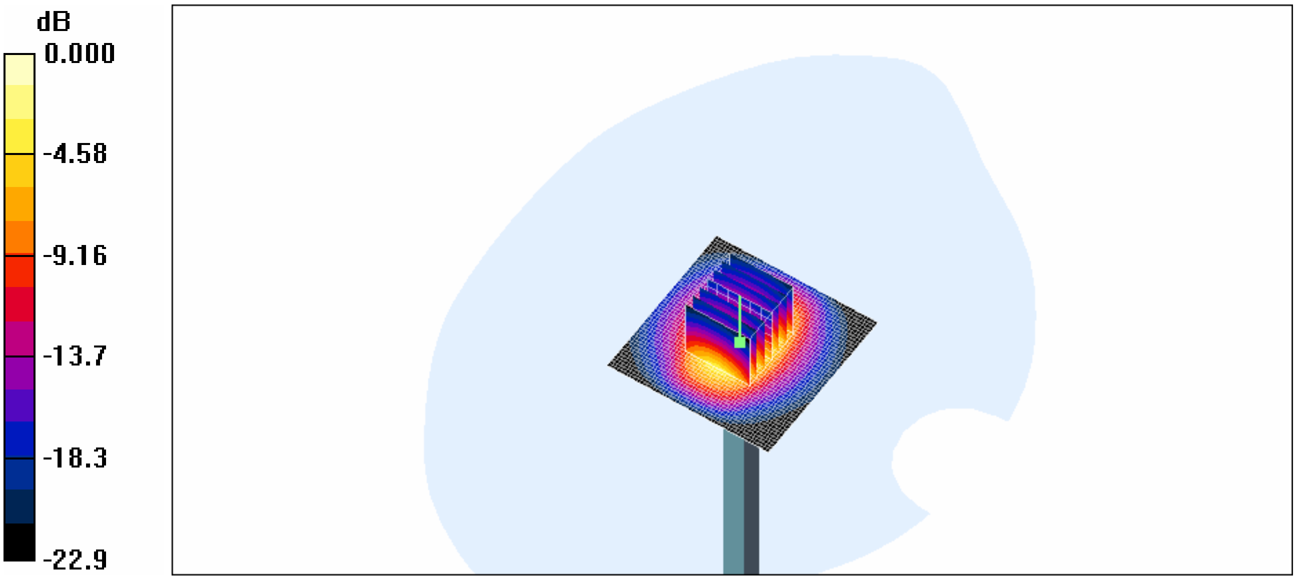
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: M2450 Medium parameters used: f = 2450 MHz; σ = 1.86 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1773; ConvF(4.41, 4.41, 4.41); Calibrated: 2006-05-30
- Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)
- Electronics: DAE4 Sn559; Calibrated: 2006-03-20
- Phantom: SAM Twin Phantom; Type: SAM; Serial: TP-1276
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Area Scan (51x51x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 18.0 mW/g

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.2 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 12.7 mW/g; SAR(10 g) = 5.84 mW/g
Maximum value of SAR (measured) = 14.3 mW/g



0 dB = 14.3mW/g

APPENDIX C : SAR TESTING EQUIPMENT CALIBRATION CERTIFICATE ATTACHMENTS

1. E-Field Probe Calibration Sheet (7 pages)

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

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

Accredited by the Swiss Federal Office of Metrology and Accreditation
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 **KTL (Dymstec)**

Certificate No: ET3-1773_May06

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN: 1773
Calibration procedure(s)	QA CAL-01.v5 and QA CAL-12.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	May 30, 2006
Condition of the calibrated item	In Tolerance

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: May 31, 2006

Probe ET3DV6

SN:1773

Manufactured:	February 22, 2003
Last calibrated:	May 26, 2005
Recalibrated:	May 30, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1773

Sensitivity in Free Space[A]

NormX	**1.75** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.62** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.69** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**94** mV
DCP Y	**94** mV
DCP Z	**94** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	7.8	4.0
SAR_{be} [%]	With Correction Algorithm	0.0	0.0

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	6.7	3.7
SAR_{be} [%]	With Correction Algorithm	0.2	0.3

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

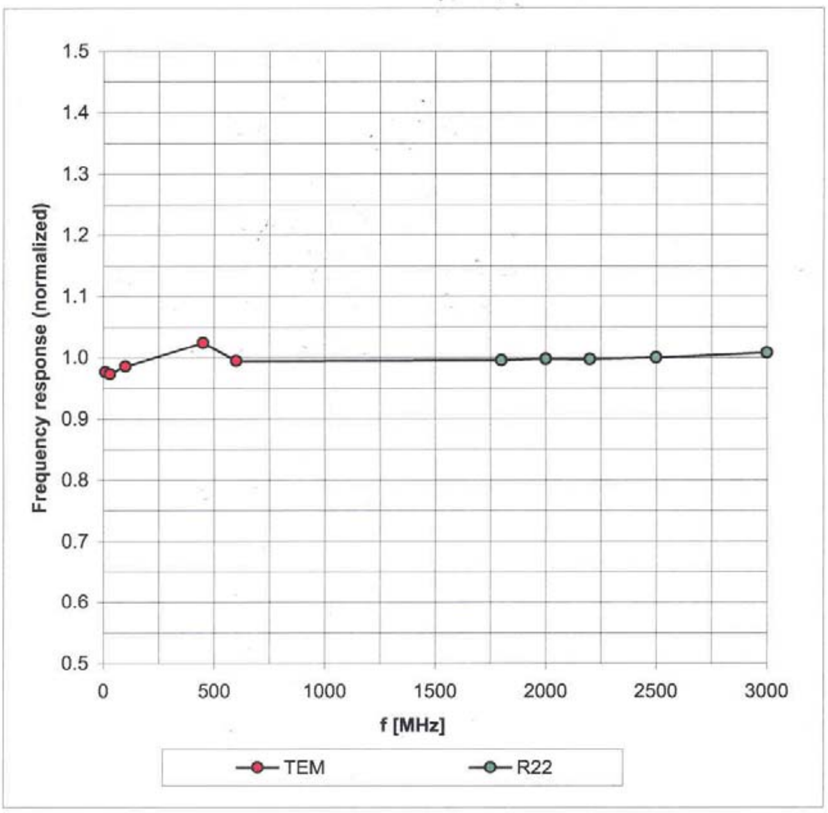
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).

[B] Numerical linearization parameter: uncertainty not required.

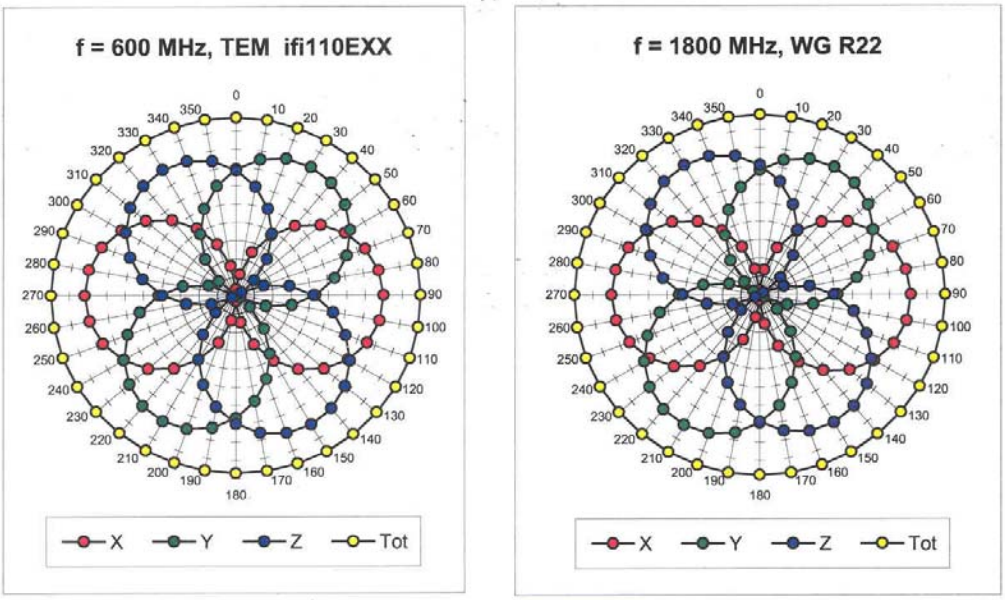
Frequency Response of E-Field

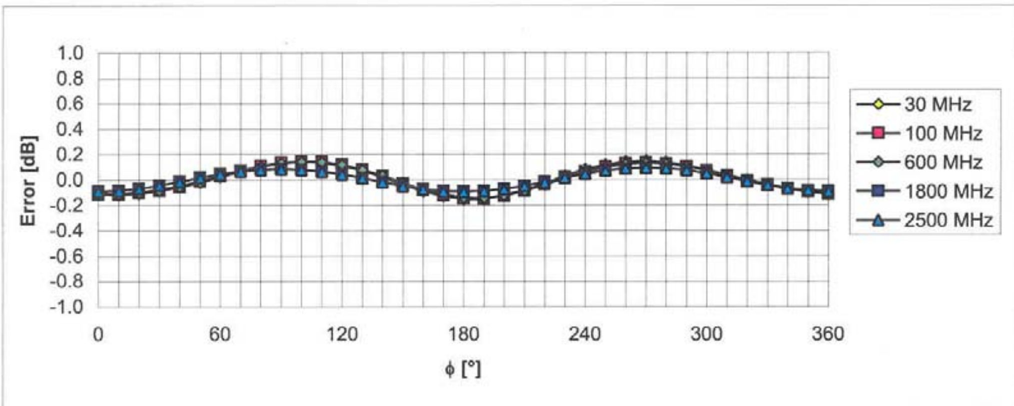
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

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

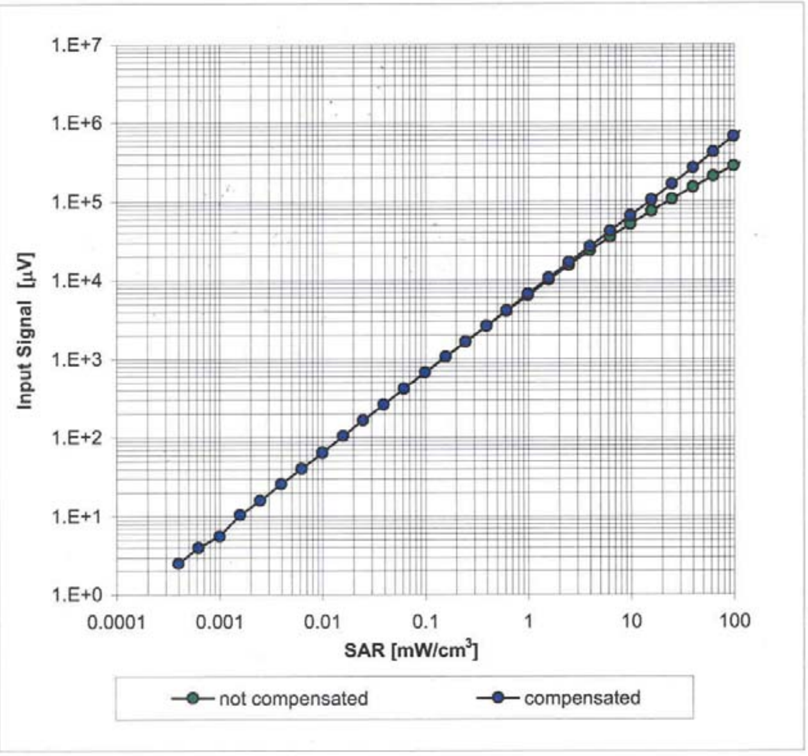


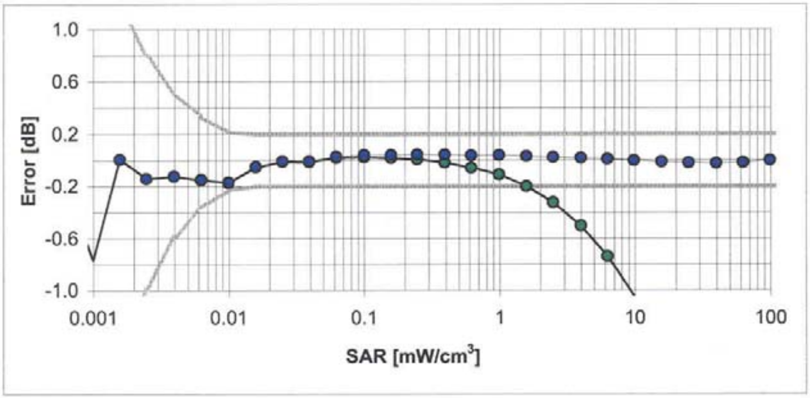


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

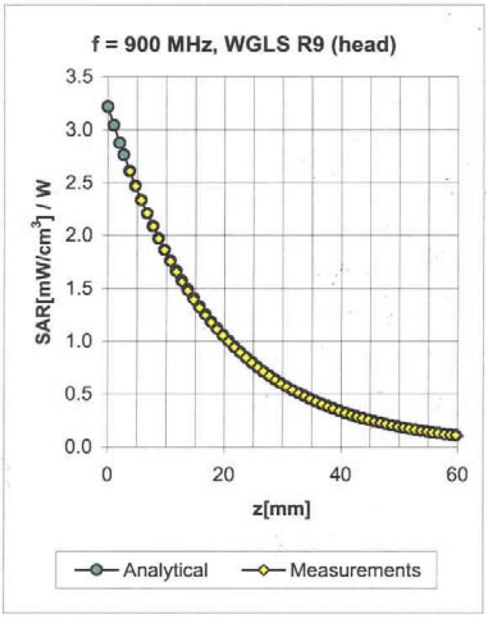
(Waveguide R22, f = 1800 MHz)

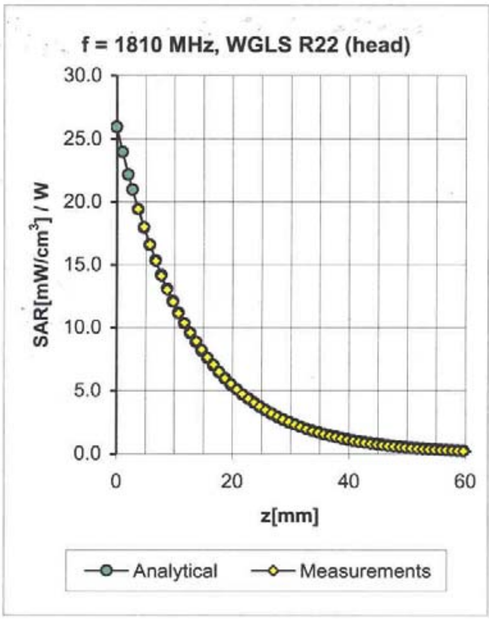




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



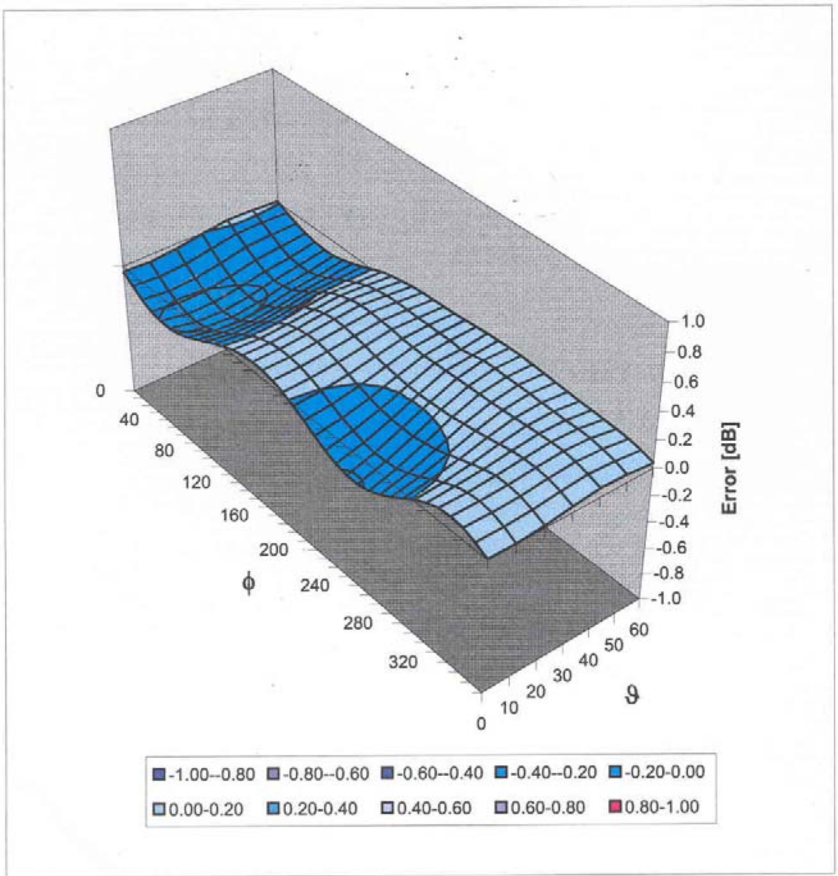


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.36	1.86	6.81	± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.72	1.61	6.12	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.48	2.70	5.09	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.71	4.71	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.68	1.88	4.41	± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.30	1.86	7.42	± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.61	1.76	6.13	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.72	2.33	4.39	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.64	2.08	4.09	± 11.8% (k=2)

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

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

2.2450MHz Dipole Antenna Calibration sheets

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 Federal Office of Metrology and Accreditation
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 **KTL (Dymstec)**

Certificate No: **D2450V2-746_Feb06**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 746
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	February 16, 2006
Condition of the calibrated item	In Tolerance

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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ES3DV2	SN 3025	28-Oct-05 (SPEAG, No. ES3-3025_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Dec05)	Dec-06
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

	Name	Function	Signature
Calibrated by:	Judith Müller	Laboratory Technician	J. Müller
Approved by:	Katja Pokovic	Technical Manager	Katja Pokovic

Issued: February 16, 2006

D

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 Federal Office of Metrology and Accreditation
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) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
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 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.5 ± 6 %	1.79 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 0.2) °C	-------	------

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**54.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.34 mW / g
SAR normalized	normalized to 1W	25.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**25.2 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω + 4.8 jΩ
Return Loss	- 25.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 1, 2003

DASY4 Validation Report for Head TSL

Date/Time: 16.02.2006 15:02:37

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN746

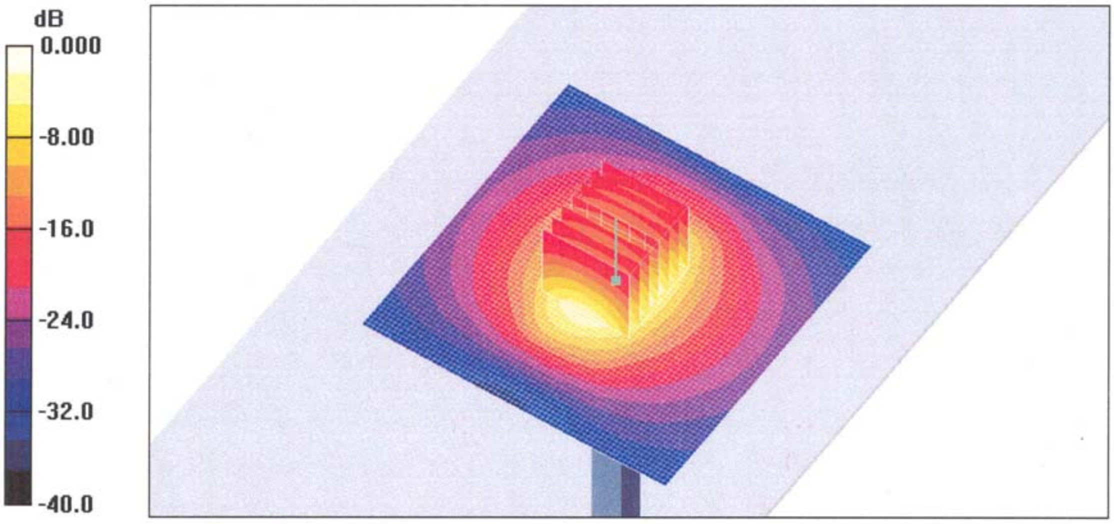
Communication System: CW-2450; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 2450 MHz; σ = 1.79 mho/m; ε_r = 38.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.4, 4.4, 4.4); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.6 Build 57; Postprocessing SW: SEMCAD, V1.8 Build 160

Pin = 250 mW; d = 10 mm/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 17.2 mW/g

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.8 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.34 mW/g
Maximum value of SAR (measured) = 15.5 mW/g



0 dB = 15.5mW/g

Impedance Measurement Plot for Head TSL