SAR Evaluation Report

FCC ID : T7OUZ400

Project Reference No. : NK2GR131

Product Type : Single Band CDMA Mobile Phone

Brand Name : SKY MOBILE

Model : SKYmobile 6400

Tested According to : IEEE Standard C95.1 / OET Bulletin 65 Supplement C

Tested Period : June. 13 . 2006 to June. 16 . 2006

Tested by	Minchul.Shin		date	: June. 19 . 2006
Verified by	Seonteag.Jin	Seonteag Jin	date	: June. 19 . 2006

This test results are only related to the item tested.
This test report is only limited to the client company and the product.
This report must not be used by the client to claim product endorsement by any agency of the U.S. Government.

Lab Address : Nemko Korea Co., Ltd
300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Gyunggi-Do, Korea
Phone : 82-31-322-2333 Fax : 82-31-322-2332

Contents of This Report

1.General Information

1.1 Applicant

Company Name:	UZONE wireless Co.,Ltd.
Company Address:	5F, Jungmin B/D, 97-4, Imae-Dong, Bundang-Gu, Seongnam-City, Kyunggi-Do, Korea
Phone/Fax:	Phone: +82-31-779-8041
Contact Name:	Kwang, Lee

1.2 Manufacturer

Company Name:	ROSE Telecom Co., Ltd.
Company Address:	2F, Chungrok ldg. 721-29 Yeoksam-dong, Kangnam-gu, Seoul, Korea
Phone/Fax:	Phone: +82-31-779-8041
Contact Name:	Kwang, Lee

1.3 Description of Device

Category:	Single Band CDMA Mobile Phone
Model Name:	SKYmobile 6400
Brand Name:	SKY MOBILE
Serial Number:	0000123
Frequency of Operation	Tx : 824MHz ~ 849MHz, Rx : 869MHz ~ 894MHz
RF Output Power (Conducted)	23.28dBm
Modulation/Demodulation	OQPSK/QPSK
Channel Spacing	1.23MHz
Receiver Sensitivity	-104dBm
Power Supply	Li-ion Battery: 3.7V DC, 1100mAh
Phone Type	Folder Type
Antenna Type	Inverted F Antenna
Dimensions	87(open:163)(H) X44(W) X 17(T)mm
Weight	85g(with Battery)
Remarks:	-

2. General Test Condition

2.1 Location

Nemko Korea
300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Gyunggi-Do
Phone : 82-31-322-2333 , Fax : 82-31-322-2332

2.2 Operating Environment

Parameters	Recording during test	Accepted deviation
Ambient temperature	20 ~22℃	15 ~ 30℃
Relative humidity	40 ~65%	20 ~ 75%

2.3 Test Frequency

CDMA (Head)		CDMA (Muscle)	
Test Channel	**Test Frequency (MHz)**	**Test Channel**	**Test Frequency (MHz)**
1013	824.70	1013	824.70
363	835.89	363	835.89
777	848.31	777	848.31

2.4 Support Equipment

Equipment	Manufacturer	Model Name	Serial Number
-	-	-	-

3. Description of Test Equipment

3.1 SAR Measurement Setup

Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. Which is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Stäubli), robot controller, measurement server, H/P computer, nearfield probe, probe alignment sensor, and the SAM twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Fig. 3.1).

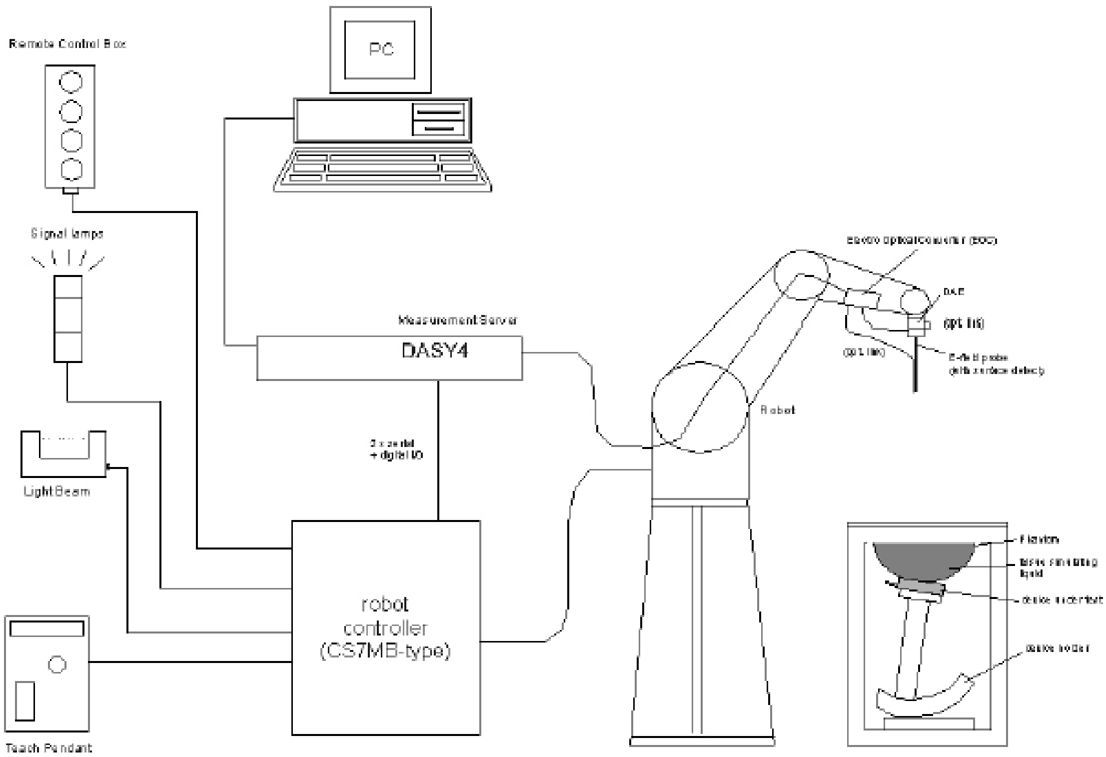


Figure 3.1 SAR Measurement System Setup

System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control is used to drive the robot motors. The PC consists of the H/P computer with Windows XP system and SAR Measurement Software DASY4, LCD monitor, mouse and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A Data Acquisition Electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. Is connected to the Electro-Optical Coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the measurement server.

System Electronics

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with autozeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

3.2 E-field Probe

The SAR measurement were conducted with the dosimetric probe ES3DV3, designed in the classical triangular configuration (see Fig.3.3) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates.
The probe is equipped with an optical multi-fiber line ending at the front of the probe tip (see Fig.3.4). It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface.
Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a System maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero.
The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 softwarereads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Fig.3.2).
The approach is stopped at reaching the maximum.

Figure3.2 DAE System

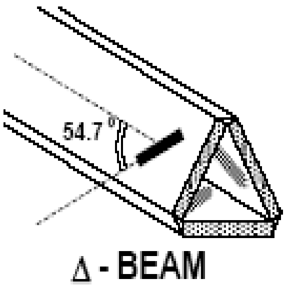


Figure 3.3 Triangular Probe Configuration

Figure 3.4 Probe Thick-Film Technique

Probe Specifications

Construction : Symmetrical design with triangular core
Interleaved sensors
Built-in shielding against static charges
PEEK enclosure material (resistant to organic DGBE)
Calibration : Basic Broad Band Calibration In air from 10 MHz to 3.0 GHz
In brain and muscle simulating tissue at Frequencies of HSL835, MSL835, Calibration certificates please find attached.
Frequency : 10 MHz to > 6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity ±0.2 dB in HSL (rotation around probe axis)
±0.3 dB in HSL (rotation normal to probe axis)
Dynamic Range 5μW/g to > 100mW/g; Linearity: ±0.2dB
Dimensions Overall length: 330mm (Tip : 20mm)
Tip diameter: 4.0mm (Body : 12mm)
Distance from probe tip to dipole centers: 2.0mm
Application General dosimetry up to 3 GHz
Compliance tests of mobile phones
Fast automatic scanning in arbitrary phantoms
Optical Surface Detection
± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces

3.3 SAM Phantom

The SAM Twin Phantom V4.0C is constructed of a fiberglass shell Integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users.
It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region.
A cover prevents the evaporation of the liquid Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.
(See Figure 3.5)

Figure 3.5 SAM Twin Phantom

Phantom Specification

Construction : The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Shell Thickness 2 ± 0.2 mm
Filling Volume Approx. 25 liters
Dimensions Height; 830 mm; Length: 1000 mm; Width: 500 mm

3.4 Head & Muscle Simulating Mixture Characterization

The head and muscle mixture consist of a viscous gel using hydroxethyl-cellullose (HEC) gelling agent and saline solution(see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air Bubbles are not trapped during the mixing process.
The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table.

Table 3.1 Composition of the Head & Muscle Tissue Equivalent Matter

INGREDIENTS	SIMULATING TISSUE	
	835MHz Head	835MHz Muscle
De-ionised water	41.45%	52.40%
Sugar	56.00%	45.00%
Salt	1.45%	1.40%
Hydroxyethyl Cellulose	1.00%	1.00%
DGBE	-	-
Bacteriacide	0.10%	0.10%
Dielectric Constant Target	41.50	55.20
Conductivity Target (S/M)	0.90	0.97

3.5 Device Holder for Transmitters

Figure 3.6Device Holder

In combination with the SAM Twin Phantom V4.0, the Mounting Device (see Fig. 3.6) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening.
The device holder can be locked at different phantom locations (left head, right head, flat phantom).
* Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produce infinite number of configurations .
To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

3.6 Dipole Validation

The reference dipole should have a return loss better than –20dB(measured in the setup) at the resonant frequency to reduce the uncertainty in the power measurement.

835MHz Dipole

Frequency	835MHz
Return Loss	< -20 dB at specified validation position
Dimensions	D835V2: dipole length: 161 mm; overall height: 330 mm

4. Measurement Procedure

The mobile phone operating at the maximum power level is placed by a non metallic device holder in the above described positions at a shell phantom of a human being.
The distribution of the electric field strength E is measured in the tissue simulating liquid within the shell phantom.
For this miniaturized field probes with high sensitivity and low field disturbance are used.
Afterwards the corresponding SAR values are calculated with the known electrical conductivity σ and the mass density *p* of the tissue in the SEMCAD software.
The software is able to determine the averaged SAR values(averaging region 1g or 10g) for compliance testing.

The measurements are done by two scans: first a coarse scan determines the region of the maximum SAR, afterwards the averaged SAR is measured in a second scan within the sharp of a cube. The measurement times takes about 15 minutes.

The following steps are used for each test position:

STEP1
Establish a call with the maximum output power with a base station simulator.
The connection between the mobile phone and the base station simulator is established via air interface.

STEP2
Measurement of the local E-Field value at a fixed location.
This value serves as a reference value for calculating a possible power drift.

STEP3
Measurement of the SAR distribution with a grid spacing of 15mm × 15mm and a constant distance to the inner surface of the phantom.
Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With this values the area of the maximum SAR is calculated by a interpolation scheme (combination of a least-square fitted function and a weighted average method). Additional peaks within 3dB of the maximum SAR are searched.

STEP4
Around this points, a cube of 30mm×30mm×30mm is assessed by measuring 5×5×7 points.
With these data, the peak spatial-average SAR value can be calculated with the SEMCAD software.

STEP 5
The used extrapolation and interpolation routines are all based on the modified Quadratic Shepard’s method [DASY4].

STEP 6
Repetition of the E-Field measurement at the fixed location and repetition of the whole procedure if the two results differ by more than ±0.223dB.

5. Definition of Reference Points

5.1 EAR Reference Point

Figure 5.1 shows the front, back and side views of SAM. The point “M” is the reference point For the center of mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERPs are 15 mm posterior to the entrance to ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5.2.

Figure 5.1 Front, back and side view of SAM

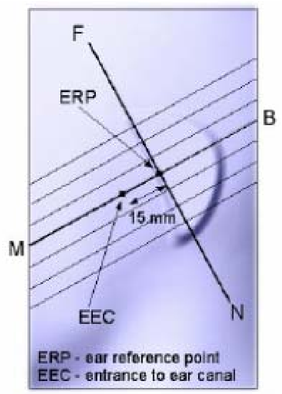


Figure 5.2 Close up side view

The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front)perpendicular to the reference plane and passing through the RE(or LE) is called the Reference Pivoting Line (see Figure 5.3).
Line B-M is perpendicular to the N-F line. Both N-F and B-M Lines should be marked on the external phantom shell to Facilitate handset positioning. Posterior to the N-F line, the thickness of the phantom shell with the shape of an ear is a flat surface 6 mm thick at the ERPs.

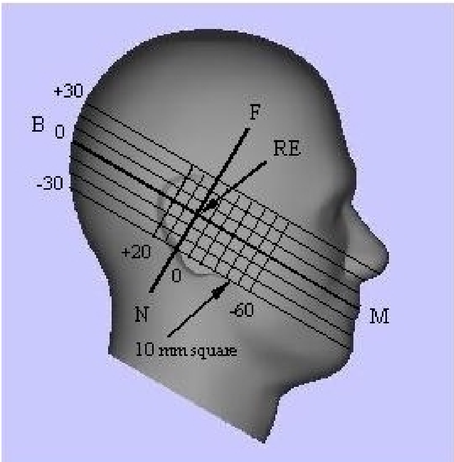


Figure 5.3 Side view of the phantom showing relevant markings

5.2 Handset Reference Points

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (see Fig. 5.4).
The “test device reference point” was than located at the same level as the center of the eat reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at it’s tip and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.

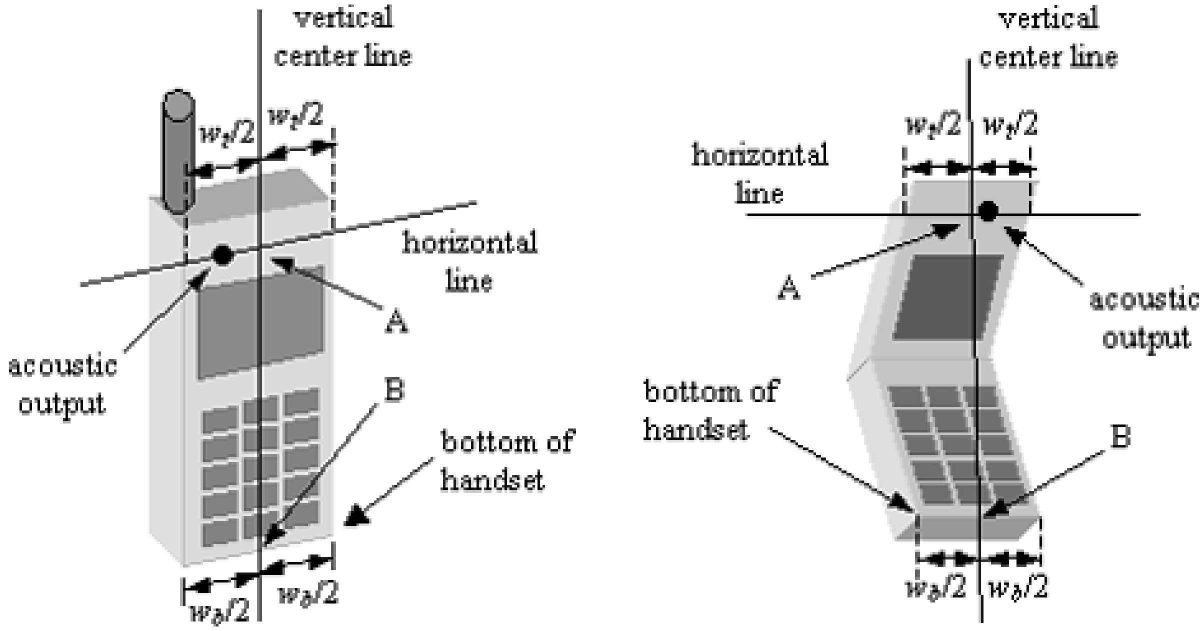


Figure 5.4 Handset vertical and horizontal reference lines

6. Test Configuration Positions

6.1 Cheek/Touch Position

Step 1
The test device was positioned with the handset close to the surface of the phantom such that point. A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

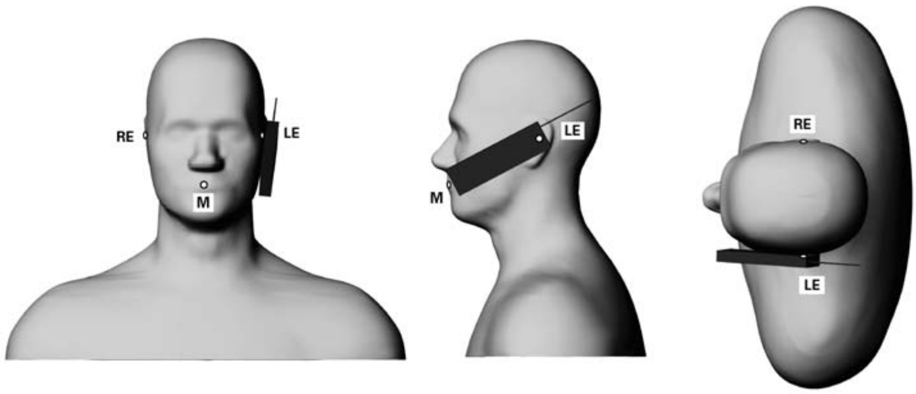


Figure 6.1 Front, Side and Top View of Cheek/Touch Position

Step 2
The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.

Step 3
While maintaining the handset in this plane, the handset was rotated around the LE-RE line Until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).

Step 4
Rotate the handset around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.

Step 5
While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear cheek.(See Figure 5.2)

6.2 EAR/Tilt 15° Position

With the test device aligned in the “Cheek/Touch Position”:

Step 1
Repeat steps 1 to 5 of 5.2 to place the device in the “Cheek/Touch Position”

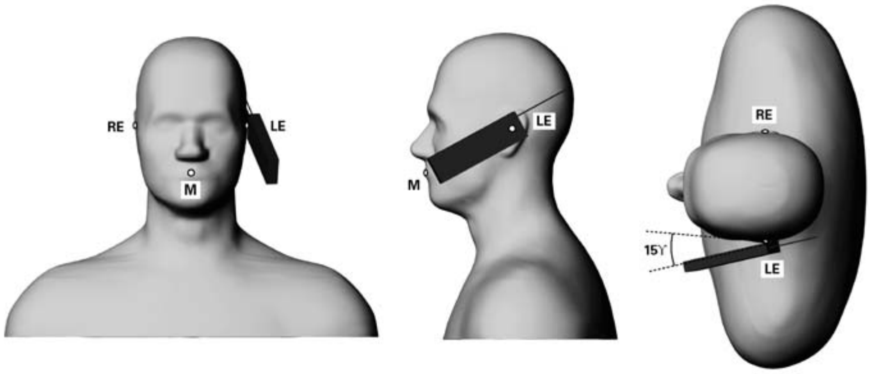


Figure 6.2 Front, side and Top View of Ear/Tilt 15° Position

Step 2
While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.

Step 3
The phone was then rotated around the horizontal line by 15 degree.

Step 4
While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head.
(In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced.
The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head. (See Figure 6.2)

6.3 Body-worn and Other Configurations

6.3.1 Phantom Requirement

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.

6.3.2 Test Position

The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration. Devices with a headset output shall be tested with a connected headset. Since the Supplement C to OET Bulletin 65 was mainly issued for mobile phones it is only a guideline and therefore some requirements are not usable or practical for devices other than mobile phones.

6.3.3 Test to be Performed

For purpose of determining test requirements, accessories may be divided into two categories: those that do not contain metallic components and those that do. For multiple accessories that do not contain metallic components, the device may be tested only with that accessory which provides the closet spacing to the body.
For multiple accessories that contain metallic components, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component, only the accessory that provides the closet spacing to the body must be tested.
If the manufacturer provides none body accessories, a separation distance of 1.5 cm between the back of the device and the flat phantom is recommended. Other separation distances may be used, but they shall not exceed 2.5cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.
For devices with retractable antenna, the SAR test shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure shall also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.
The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at the middle channel for each test configuration is at least 3.0dB lower than the SAR limit, testing at the high and low channel is optional.

7. Measurement Uncertainty

DASY4 Uncertainty Budget
According to IEEE 1528 [1]

Error Description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±5.9 %	N	1	1	1	±5.9 %	±5.9 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Conditions	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Phantom and Setup								
Phantom Uncertainty	±4.0 %	R	$\sqrt{3}$	1	1	±2.3 %	±2.3 %	∞
Liquid Conductivity (target)	±5.0 %	R	$\sqrt{3}$	0.64	0.43	±1.8 %	±1.2 %	∞
Liquid Conductivity (meas.)	±2.5 %	N	1	0.64	0.43	±1.6 %	±1.1 %	∞
Liquid Permittivity (target)	±5.0 %	R	$\sqrt{3}$	0.6	0.49	±1.7 %	±1.4 %	∞
Liquid Permittivity (meas.)	±2.5 %	N	1	0.6	0.49	±1.5 %	±1.2 %	∞
Combined Std. Uncertainty						±10.8 %	±10.6 %	330
Expanded STD Uncertainty						**±21.6 %**	**±21.1 %**	

Table 21.6: Worst-Case uncertainty budget for DASY4 assessed according to IEEE 1528 [1] . The budget is valid for the frequency range 300 MHz - 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerable smaller.

8. System Verification

8.1 Tissue Verification

For the measurement of the following parameters the HP 85070E dielectric probe kit is used, representing the open-ended slim form probe measurement procedure. The measured values should be within ±5% of the recommended values given by the IEEE Standard C95.1 / OET Bulletin 65 Supplement C.

Table 8.1 Measured Tissue Parameters

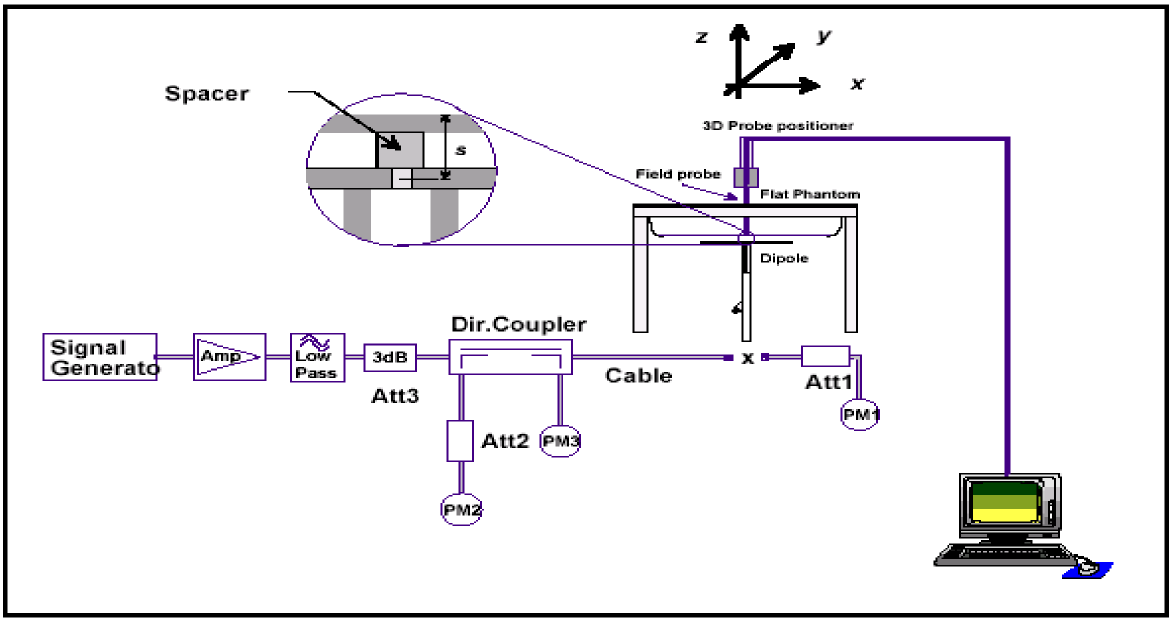
	835MHz Head		835MHz Muscle	
Date	June 13, 2006		June 15, 2006	
Liquid Temperature(°C)	21.6°C		21.2°C	
	Recommended Value	Measured Value	Recommended Value	Measured Value
Dielectric Constant (ε)	41.50±2.075	**40.7**	55.20±2.760	**57.1**
Conductivity(σ)	0.90 ±0.045	**0.898**	0.97 ±0.049	**0.941**

8.2 Test System Validation

The simplified performance check was realized using the dipole validation kits.
The input power of the dipole antennas were 250mW and they were placed under the flat Part of the SAM phantoms.
The target and measured results are listed in the table 8.2

Table 8.2 System Validation Results

Tissue	Date	Liquid Temperature (°C)	Targeted SAR (W/Kg)	Measured SAR (W/Kg)	Deviation (%)
			1g	1g	1g
835MHz Head	December 14, 2005	21.6°C	2.375	2.32	2.32
835MHz Muscle	December 15, 2005	21.2°C	2.375	2.32	2.32



Dipole Validation Test Setup

8.3 Measurement Result of Test Data (Head Validation)

Date/Time: 2006-06-14 10:46:29

Test Laboratory: Nemko Korea File Name: UZ400 Validation.da4

DUT: Dipole 835 MHz Type: D835V2 Serial: D835V2 - SN:4d017 FCC ID: T7OUZ400

Communication System: CW Frequency: 835 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: f = 835 MHz; σ = 0.899 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

UZ400 Validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

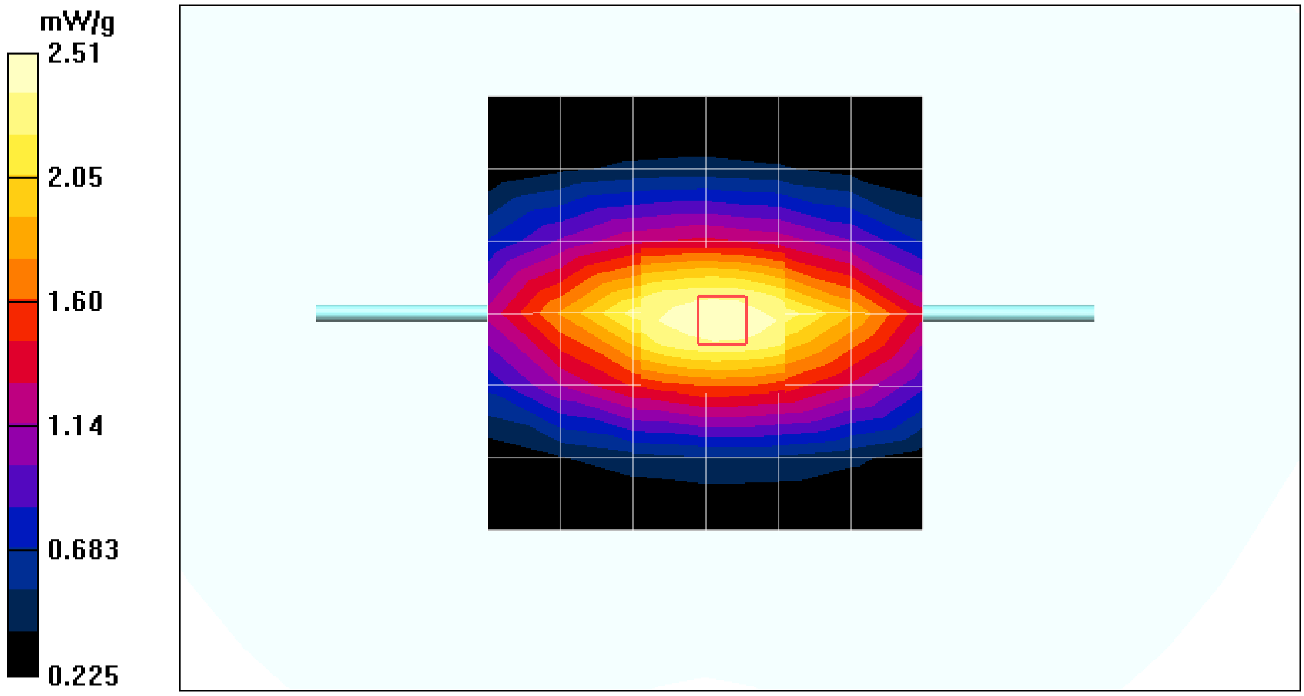
Maximum value of SAR (measured) = 2.51 mW/g

UZ400 Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.3 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 3.51 W/kg

SAR(1 g) = 2.32 mW/g



8.4 Measurement Result of Test Data (Muscle Validation)

Date/Time: 2006-06-16 10:20:21

Test Laboratory: Nemko Korea File Name: UZ400(muscle) Validation.da4

DUT: Dipole 835 MHz Type: D835V2 Serial: D835V2 - SN:4d017 FCC ID: T7OUZ400

Communication System: CW Frequency: 835 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: f = 835 MHz; σ = 0.942 mho/m; ε_r = 57.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.35, 6.35, 6.35); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

UZ400 Validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

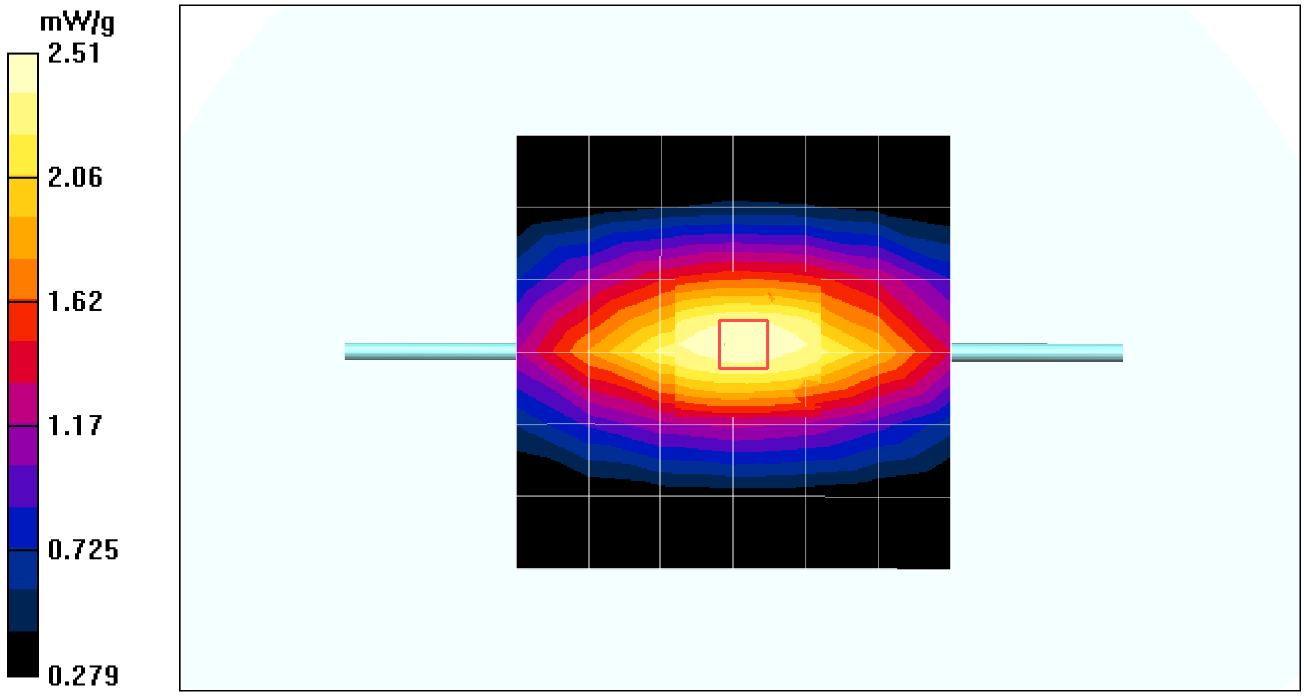
Maximum value of SAR (measured) = 2.51 mW/g

UZ400 Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.1 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 3.33 W/kg

SAR(1 g) = 2.32 mW/g



9. Device Test Conditions

9.1 Procedures Used To Establish Test Signal

The handset was placed into simulated call mode using a base station simulator (MS protocol rev. number 6) in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts.

9.2 SAR measurement Conditions for CDMA2000

The following procedures were followed according to FCC
"SAR Measurement Procedures for 3G Devices", May 2006

9.2.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices" May 2006. Maximum Output Power is verified on the High, Middle, Low channels According to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E.
SO55 tests were measured with power control bits in " ALL Up" condition.

1. If the mobile station supports Reverse TCH RC1 and Forward TCH RC 1, set-up a call using Fundamental Channel Test Mode 1 (RC 1/1) with 9600bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 9-1 parameters were applied.
3. If the mobile station supports the RC3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC3, RC4, RC5, set-up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600bps fundamental channel and 9600bps SCH0 data rate.
4. Under RC3 C.S0011 Table 4.4.5.2-2, Table 9-2 was applied.
5. FCHs were configured at full rate for maximum SAR with "ALL-Up" power control bits.

Table 9-1 Test Parameters for Maximum RF Output Power for RC 1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 9-2 **Test Parameters for Maximum RF Output Power for RC 3**

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

9.2.2 Head SAR Measurements

SAR for head exposure configurations is measured in RC3 with the EUT 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 than 1/4dB 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.

9.2.3 Body SAR Measurements

SAR for body exposure configurations is measured in RC3 with the EUT configured to transmit at full rate on FCH with all other code channels disables using TDSO/SO32.
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 only. Otherwise, SAR is measured on the maximum output channel (FCH+SCHn) with FCH at full rate and SCH0 enabled at 9600bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the output may shift by more than 0.5dB and lead to higher SAR drifts and SCH dropouts.
Body SAR was measured using TDSO/SO32 with power control bits in the “ALL Up”.
Body SAR For 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 the body exposure configuration that results in the highest SAR for that channel in RC3.

Maximum Power Output Table for SKYmobile 6400

Band	CH	Frequency (MHz)	CDMA200 RC	SO2 Loopback (dBm)	SO55 Loopback (dBm)	TDSO SO32 Loopback (dBm)
Cellular	1013	824.70	RC1	23.10	23.22	-
			RC3	23.14	23.20	23.25
	363	835.89	RC1	23.04	23.06	-
			RC3	23.05	23.04	23.03
	777	848.31	RC1	23.05	23.08	-
			RC3	23.07	23.13	23.15

10. SAR Measurement Results

10.1 SAR Measurement Result (Right Head Touch Position)

Date of Test : June. 15. 2006
Mixture Type: Head
Tissue Depth: 15.2 cm

Modulation	FREQUENCY		Power Drift (dB)	Device Test Position	Antenna Position	SAR (W/kg)
	CH	MHz				1g
CDMA	1013	824.70	**0.042**	Cheek / Touch	Intenna	**0.353**
	363	835.89	**-0.171**	Cheek / Touch	Intenna	**0.938**
	777	848.31	**0.010**	Cheek / Touch	Intenna	**0.801**

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 worst-case results are reported.
3. Battery is fully charged for all readings.
4. SAR Measurement System ■ DASY4
5. Phantom Configuration □ Left Head □ Flat Phantom ■ Right Head
6. SAR Configuration ■ Head □ Body □ Hand
7. Test Signal Call Mode □ Manu. Test Codes ■ Base Station Simulator
8. Battery Option ■ Standard Type □ Slim Type

Figure 9.1 Right Head SAR Test Setup
-- Cheek / Touch Position --

Measurement Result of Test Data (Right Head Touch Position)

Date/Time: 2006-06-15 10:16:36

Test Laboratory: Nemko Korea File Name: Right Head CH1013 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 824.7 MHz

Duty Cycle: 1:1 Phantom section: Right Section

Medium parameters used (interpolated): f = 824.7 MHz; σ = 0.889 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Right Head CH1013 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.366 mW/g

Right Head CH1013 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

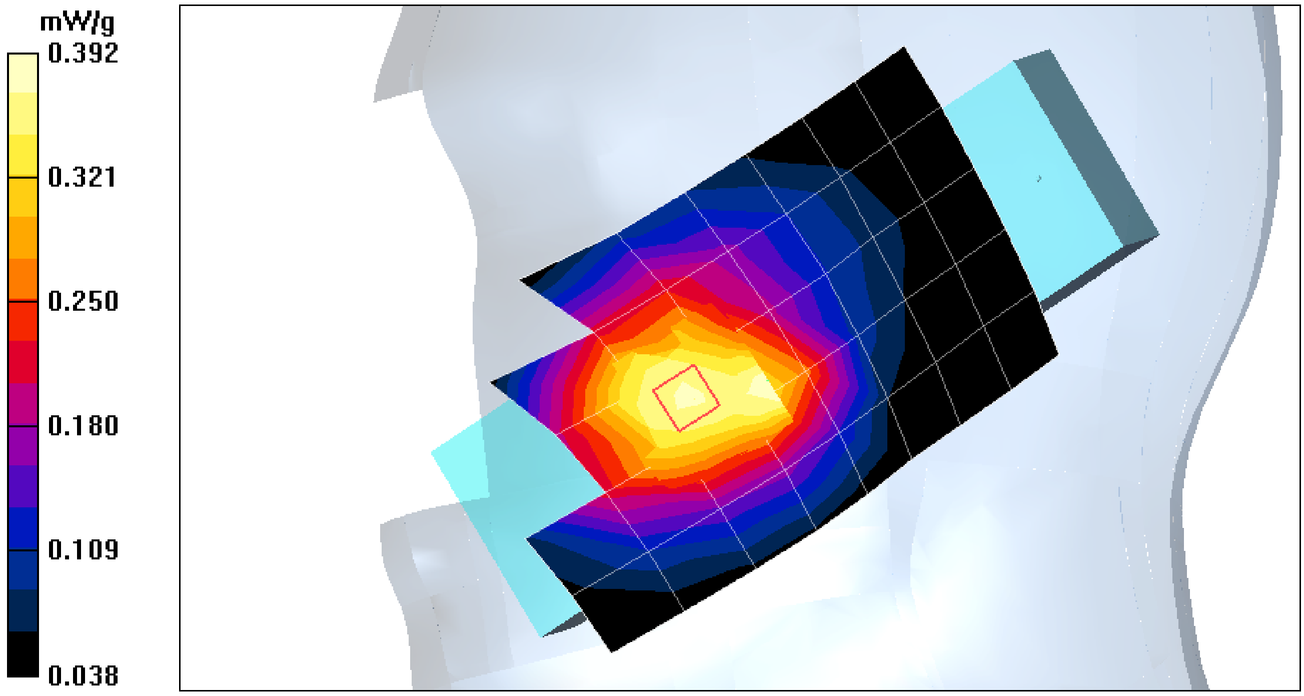
Reference Value = 5.14 V/m; Power Drift = 0.042 dB

Peak SAR (extrapolated) = 0.703 W/kg

SAR(1 g) = 0.353 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.392 mW/g



Date/Time: 2006-06-15 9:33:02

Test Laboratory: Nemko Korea File Name: Right Head CH363 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Right Section

Medium parameters used: f = 836 MHz; σ = 0.901 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Right Head CH363 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.972 mW/g

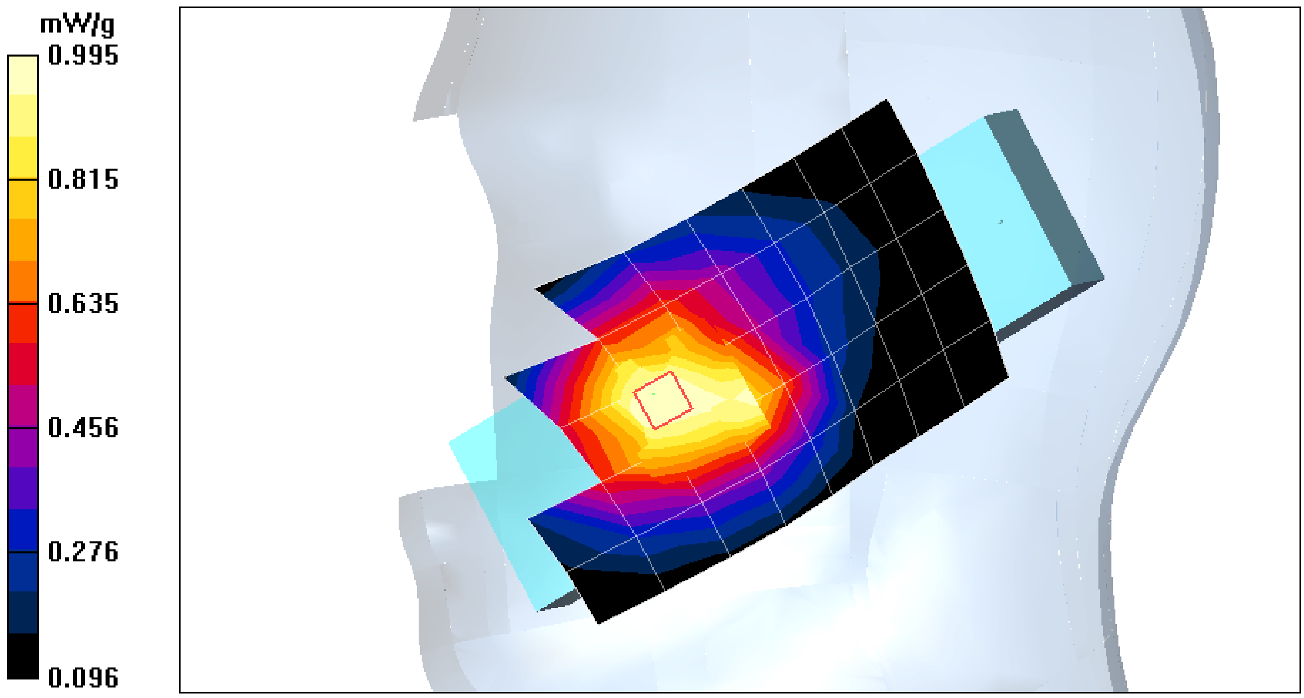
Right Head CH363 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.25 V/m; Power Drift = -0.171 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.938 mW/g

Maximum value of SAR (measured) = 0.995 mW/g



Date/Time: 2006-06-15 10:40:40

Test Laboratory: Nemko Korea File Name: Right Head CH777 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Right Section

Medium parameters used: f = 848.5 MHz; σ = 0.912 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Right Head CH777 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.805 mW/g

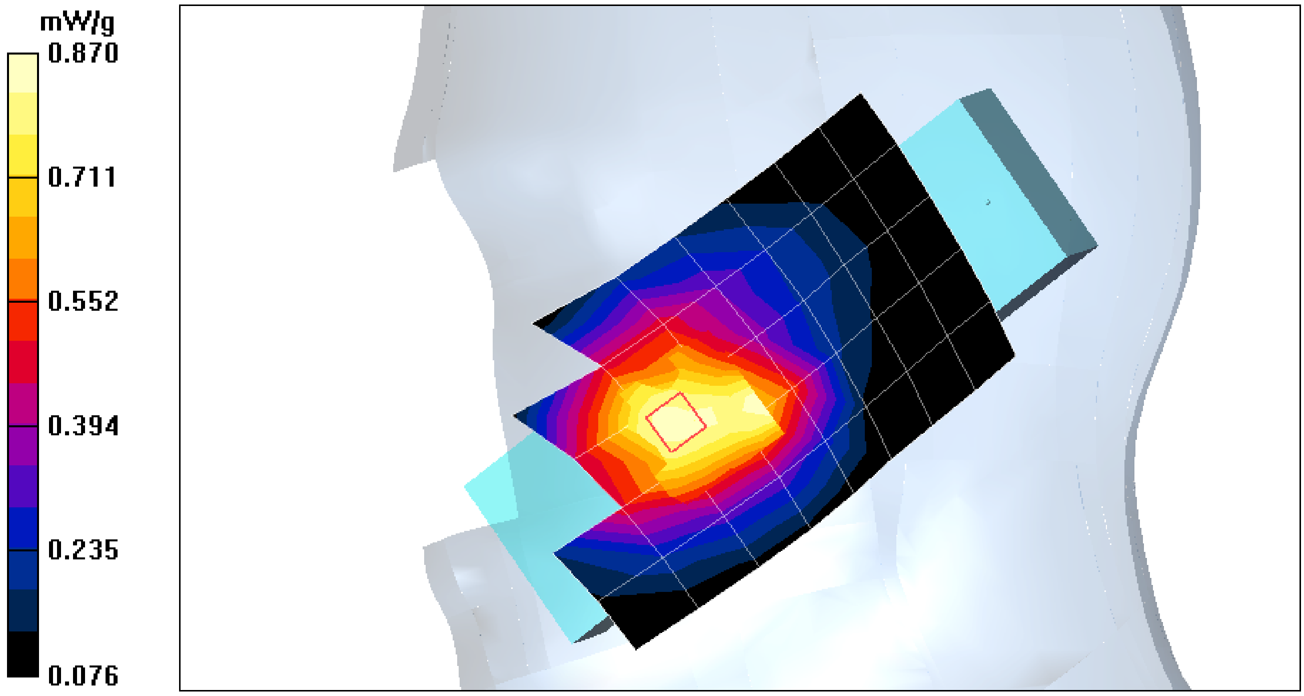
Right Head CH777 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.28 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.801 mW/g

Maximum value of SAR (measured) = 0.870 mW/g



Date/Time: 2006-06-15 9:33:02

Test Laboratory: Nemko Korea File Name: Right Head CH363 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Right Section

Medium parameters used: f = 836 MHz; σ = 0.901 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Right Head CH363 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.972 mW/g

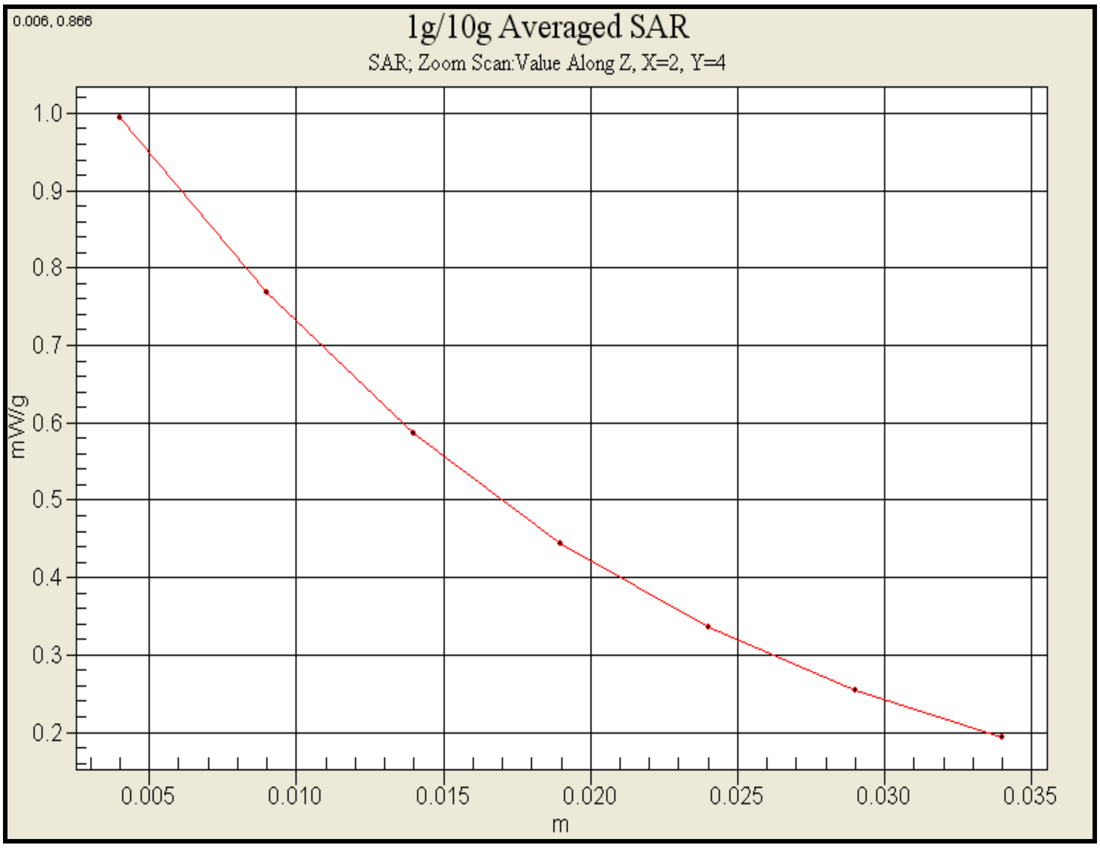
Right Head CH363 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.25 V/m; Power Drift = -0.171 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.938 mW/g

Maximum value of SAR (measured) = 0.995 mW/g



10.2 SAR Measurement Result (Right Head Tilted Position)

Date of Test : June. 15. 2006
Mixture Type: Head
Tissue Depth: 15.2 cm

Modulation	FREQUENCY		Power Drift (dB)	Device Test Position	Antenna Position	SAR (W/kg)
	CH	MHz				1g
CDMA	363	835.89	0.018	Cheek / Tilted	Intenna	0.205

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 worst-case results are reported.
3. Battery is fully charged for all readings.
4. SAR Measurement System ■ DASY4
5. Phantom Configuration □ Left Head □ Flat Phantom ■ Right Head
6. SAR Configuration ■ Head □ Body □ Hand
7. Test Signal Call Mode □ Manu. Test Codes ■ Base Station Simulator
8. Battery Option ■ Standard Type □ Slim Type

Figure 9.2 Right Head SAR Test Setup
-- Ear / Tilted Position --

Measurement Result of Test Data (Right Head Tilted Position)

Date/Time: 2006-06-15 11:04:39

Test Laboratory: Nemko Korea File Name: Right Head CH363 Tilted Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Right Section

Medium parameters used: f = 836 MHz; σ = 0.901 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Right Head CH363 Tilted Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.206 mW/g

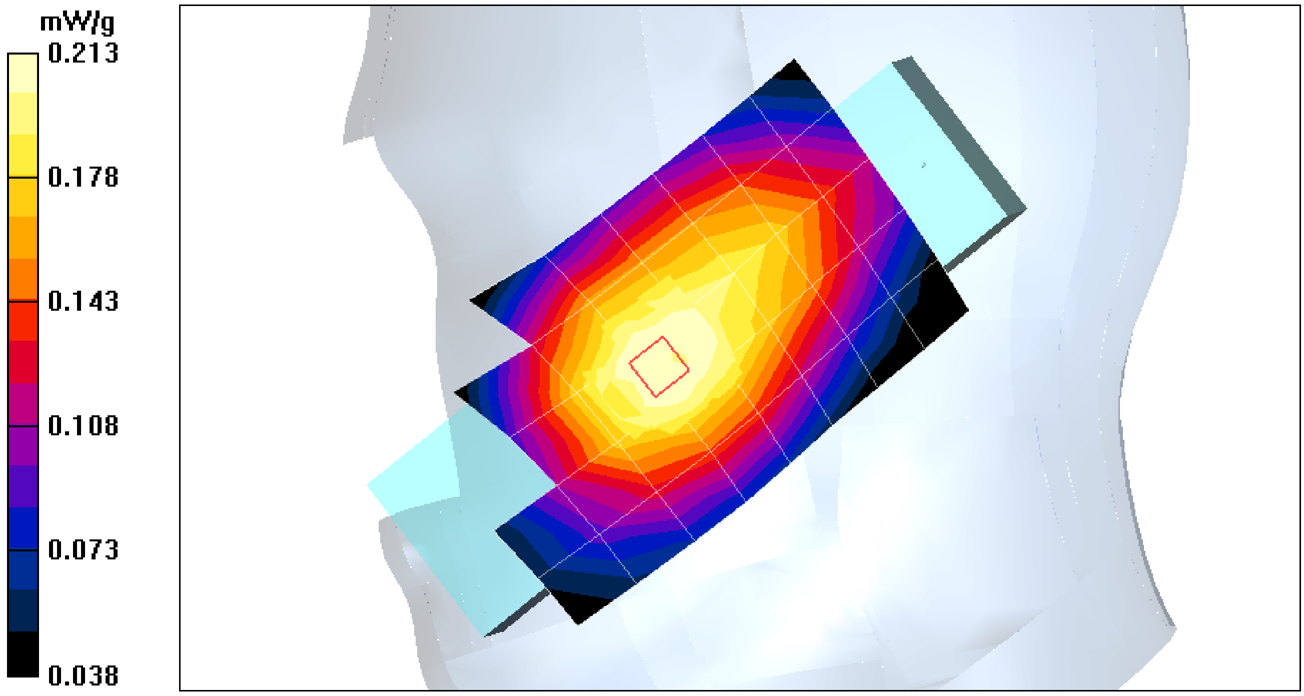
Right Head CH363 Tilted Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.1 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 0.254 W/kg

SAR(1 g) = 0.205 mW/g

Maximum value of SAR (measured) = 0.213 mW/g



10.3 SAR Measurement Result (Left Head Touch Position)

Date of Test : June. 15. 2006
Mixture Type: Head
Tissue Depth: 15.2 cm

Modulation	FREQUENCY		Power Drift (dB)	Device Test Position	Antenna Position	SAR (W/kg)
	CH	MHz				1g
CDMA	1013	824.70	0.069	Cheek / Touch	Intenna	0.350
	363	835.89	0.029	Cheek / Touch	Intenna	0.783
	777	848.31	0.209	Cheek / Touch	Intenna	0.713

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 worst-case results are reported.
3. Battery is fully charged for all readings.
4. SAR Measurement System ■ DASY4
5. Phantom Configuration ■ Left Head □ Flat Phantom □ Right Head
6. SAR Configuration ■ Head □ Body □ Hand
7. Test Signal Call Mode □ Manu. Test Codes ■ Base Station Simulator
8. Battery Option ■ Standard Type □ Slim Type

Figure 9.3 Left Head SAR Test Setup
-- Cheek / Touch Position --

Measurement Result of Test Data (Left Head Touch Position)

Date/Time: 2006-06-15 12:23:15

Test Laboratory: Nemko Korea File Name: Left Head CH1013 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 824.7 MHz

Duty Cycle: 1:1 Phantom section: Left Section

Medium parameters used (interpolated): f = 824.7 MHz; σ = 0.889 mho/m; ε_r = 40.9; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Left Head CH1013 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.362 mW/g

Left Head CH1013 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

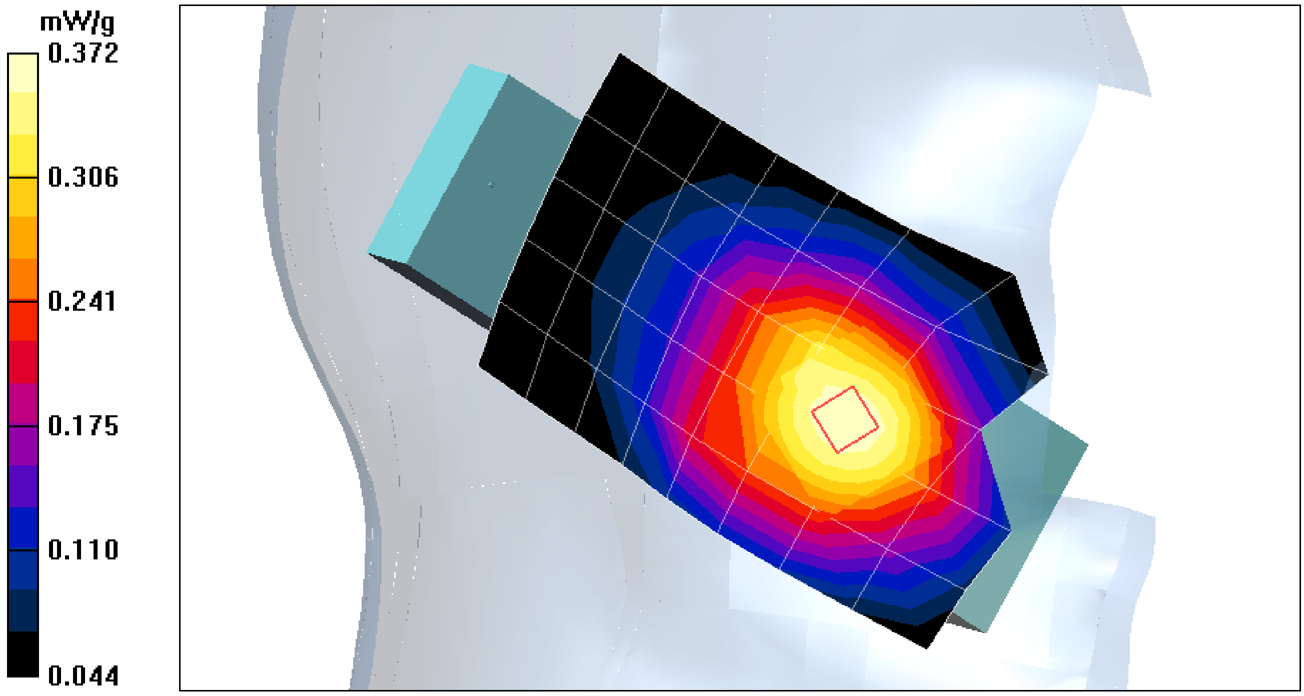
Reference Value = 5.49 V/m; Power Drift = 0.069 dB

Peak SAR (extrapolated) = 0.463 W/kg

SAR(1 g) = 0.350 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.372 mW/g



Date/Time: 2006-06-15 11:51:26

Test Laboratory: Nemko Korea File Name: Left Head CH363 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Left Section

Medium parameters used: f = 836 MHz; σ = 0.901 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Left Head CH363 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

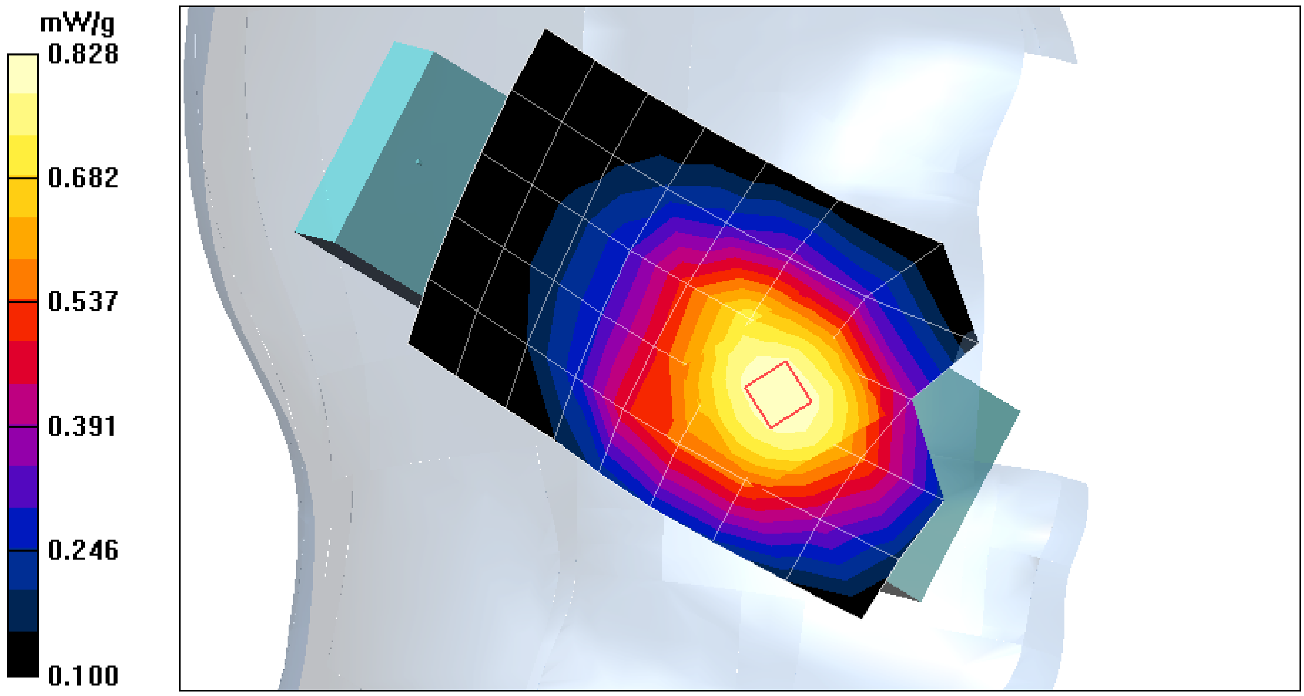
Maximum value of SAR (measured) = 0.828 mW/g

Left Head CH363 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.59 V/m; Power Drift = 0.029 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.783 mW/g



Date/Time: 2006-06-15 12:53:43

Test Laboratory: Nemko Korea File Name: Left Head CH777 Touch Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Left Section

Medium parameters used: f = 848.5 MHz; σ = 0.912 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Left Head CH777 Touch Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.743 mW/g

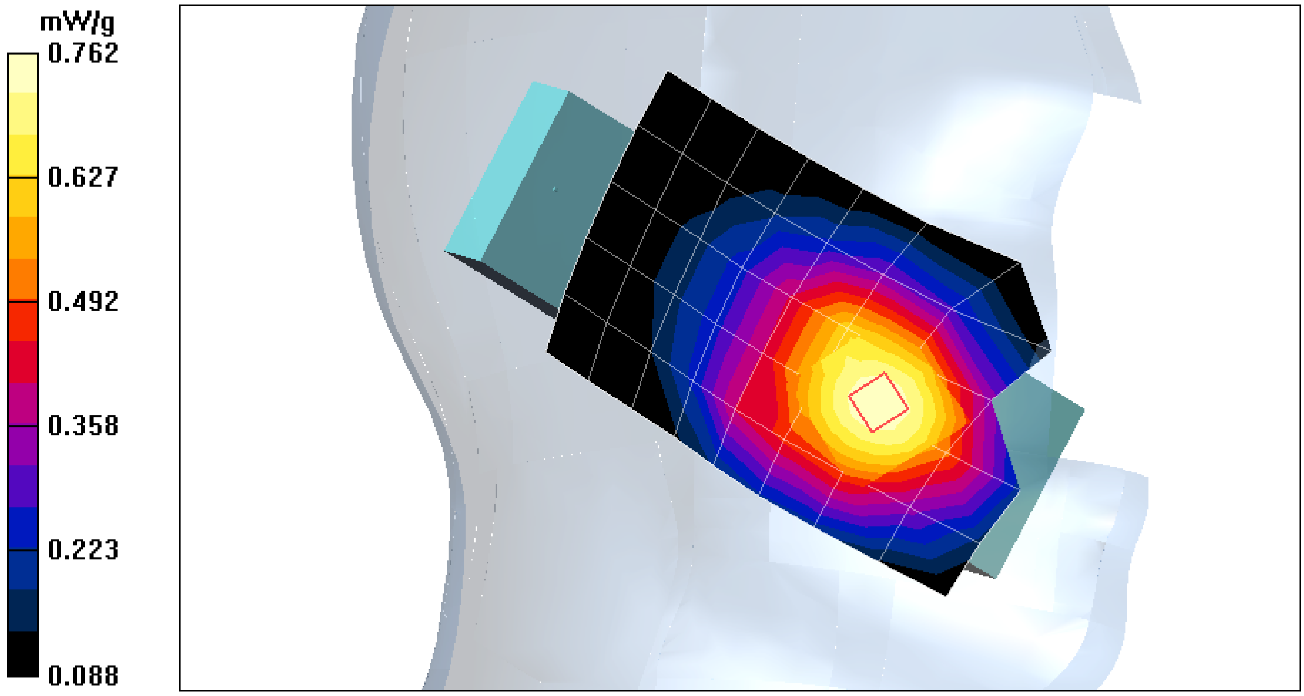
Left Head CH777 Touch Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.14 V/m; Power Drift = 0.209 dB

Peak SAR (extrapolated) = 0.947 W/kg

SAR(1 g) = 0.713 mW/g

Maximum value of SAR (measured) = 0.762 mW/g



10.4 SAR Measurement Result (Left Head Tilted Position)

Date of Test : June. 15. 2006
Mixture Type: Head
Tissue Depth: 15.2 cm

Modulation	FREQUENCY		Power Drift (dB)	Device Test Position	Antenna Position	SAR (W/kg)
	CH	MHz				1g
CDMA	363	835.89	0.159	Cheek / Tilted	Intenna	0.164

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 worst-case results are reported.
3. Battery is fully charged for all readings.
4. SAR Measurement System ■ DASY4
5. Phantom Configuration ■ Left Head □ Flat Phantom □ Right Head
6. SAR Configuration ■ Head □ Body □ Hand
7. Test Signal Call Mode □ Manu. Test Codes ■ Base Station Simulator
8. Battery Option ■ Standard Type □ Slim Type

Figure 9.4 Left Head SAR Test Setup
-- Ear / Tilted Position --

Measurement Result of Test Data (Left Head Tilted Position)

Date/Time: 2006-06-15 1:17:39

Test Laboratory: Nemko Korea File Name: Left Head CH363 Tilted Position.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Left Section

Medium parameters used: f = 836 MHz; σ = 0.901 mho/m; ε_r = 40.7; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.87, 6.87, 6.87); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Left Head CH363 Tilted Position/Area Scan (6x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.167 mW/g

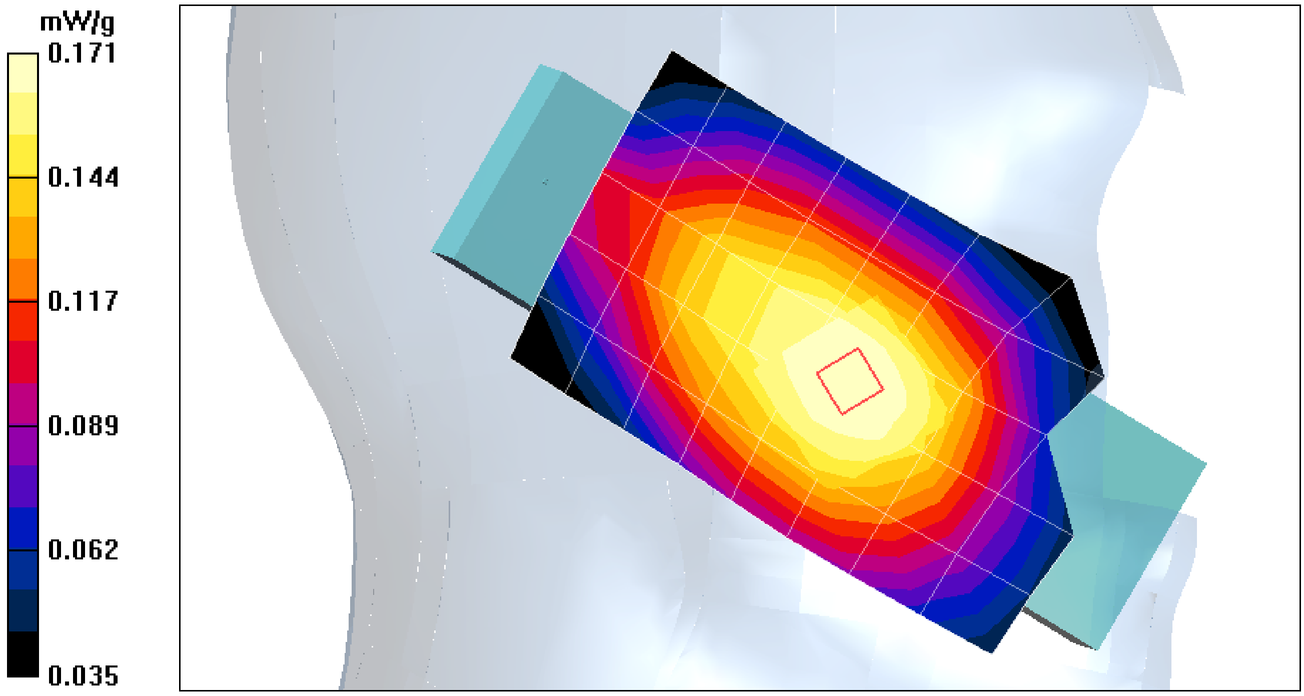
Left Head CH363 Tilted Position/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.5 V/m; Power Drift = 0.159 dB

Peak SAR (extrapolated) = 0.202 W/kg

SAR(1 g) = 0.164 mW/g

Maximum value of SAR (measured) = 0.171 mW/g



10.5 SAR Measurement Result (Muscle -15mm Distance- Position)

Date of Test : June. 16. 2006
Mixture Type: Muscle
Tissue Depth: 15.2cm

Modulation	FREQUENCY		Power Drift (dB)	Device Test Position	Antenna Position	SAR (W/kg)
	CH	MHz				1g
CDMA	1013	824.70	**-0.044**	15mm Distance From Phantom	Intenna	**0.469**
	363	835.89	**0.198**	15mm Distance From Phantom	Intenna	**1.380**
	777	848.31	**0.138**	15mm Distance From Phantom	Intenna	**0.951**

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 worst-case results are reported.
3. Battery is fully charged for all readings.
4. SAR Measurement System ■ DASY4
5. Phantom Configuration □ Left Head ■ Flat Phantom □ Right Head
6. SAR Configuration □ Head ■ Muscle □ Hand
7. Test Signal Call Mode □ Manu. Test Codes ■ Base Station Simulator
8. Battery Option ■ Standard Type □ Slim Type

Figure 9.5 Muscle SAR Test Setup
-- 15mm Distance Position --

Measurement Result of Test Data (Muscle -15mm Distance- Position)

Date/Time: 2006-06-16 1:30:53

Test Laboratory: Nemko Korea File Name: 15mm distance CH1013.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 824.7 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): f = 824.7 MHz; σ = 0.927 mho/m; ε_r = 57.3; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.35, 6.35, 6.35); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

15mm distance CH1013/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.482 mW/g

15mm distance CH1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

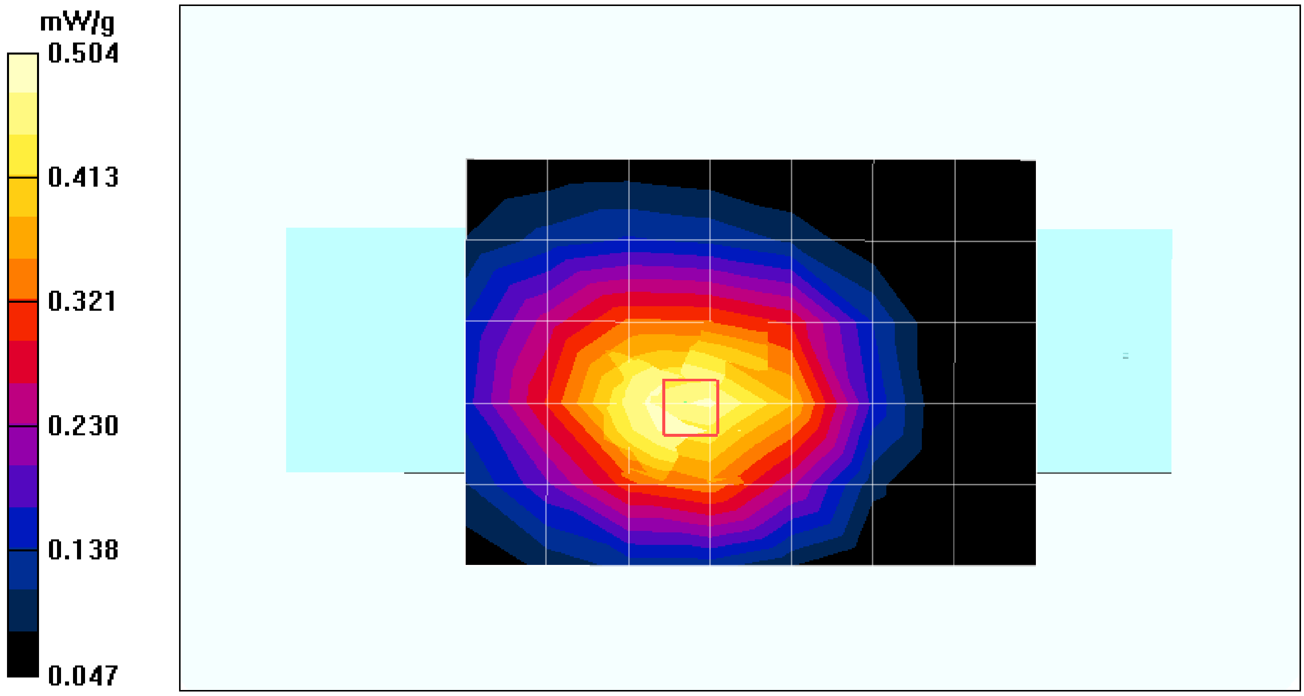
Reference Value = 21.0 V/m; Power Drift = -0.044 dB

Peak SAR (extrapolated) = 0.669 W/kg

SAR(1 g) = 0.469 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.504 mW/g



Date/Time: 2006-06-16 1:03:37

Test Laboratory: Nemko Korea File Name: 15mm distance CH363.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: f = 836 MHz; σ = 0.944 mho/m; ε_r = 57.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.35, 6.35, 6.35); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

15mm distance CH363/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.41 mW/g

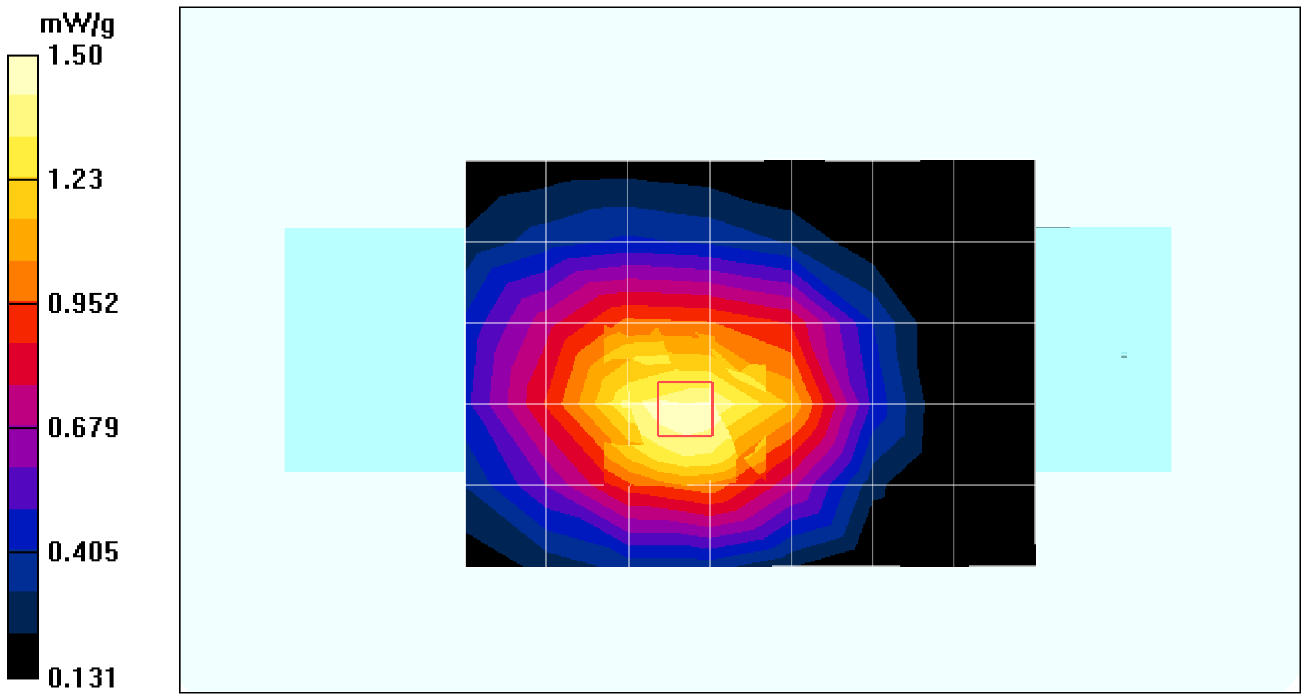
15mm distance CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 35.0 V/m; Power Drift = 0.198 dB

Peak SAR (extrapolated) = 1.92 W/kg

SAR(1 g) = 1.38 mW/g

Maximum value of SAR (measured) = 1.50 mW/g



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Test Laboratory: Nemko Korea File Name: 15mm distance CH777.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: f = 848.5 MHz; σ = 0.956 mho/m; ε_r = 57; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.35, 6.35, 6.35); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

15mm distance CH777/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.961 mW/g

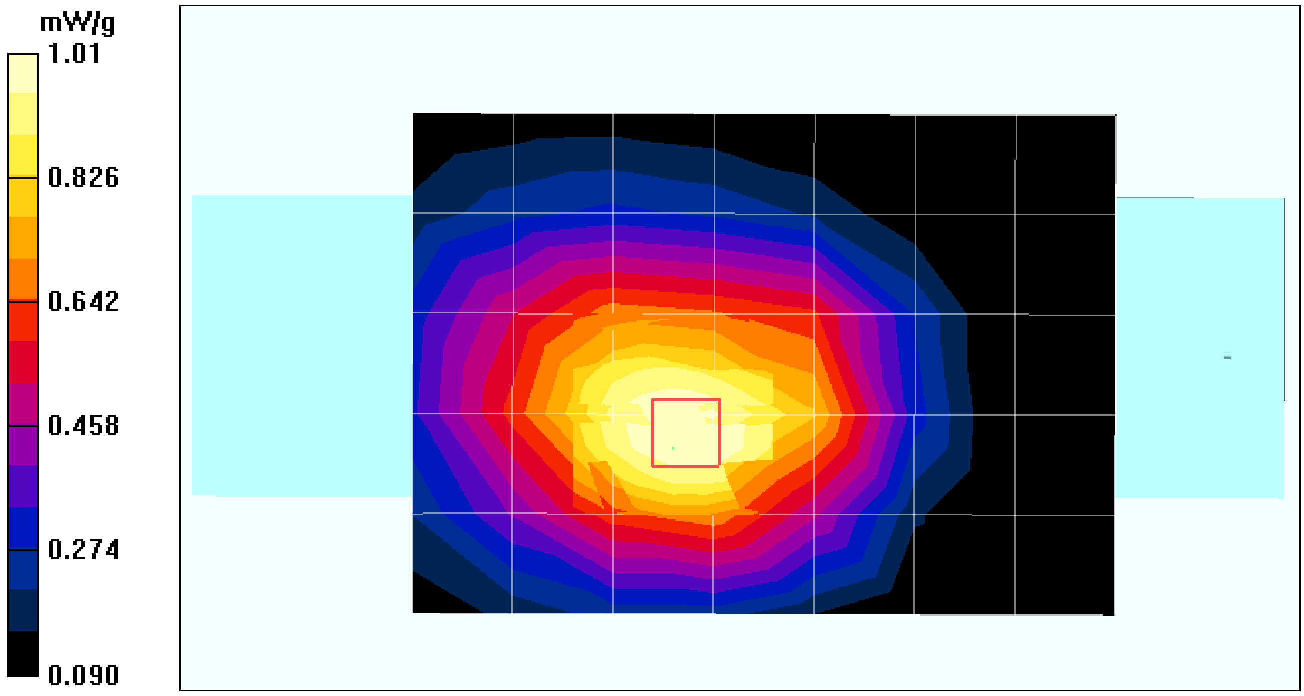
15mm distance CH777/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 28.8 V/m; Power Drift = 0.138 dB

Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.951 mW/g

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



Date/Time: 2006-06-16 1:03:37

Test Laboratory: Nemko Korea File Name: 15mm distance CH363.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: f = 836 MHz; σ = 0.944 mho/m; ε_r = 57.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.35, 6.35, 6.35); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

15mm distance CH363/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.41 mW/g

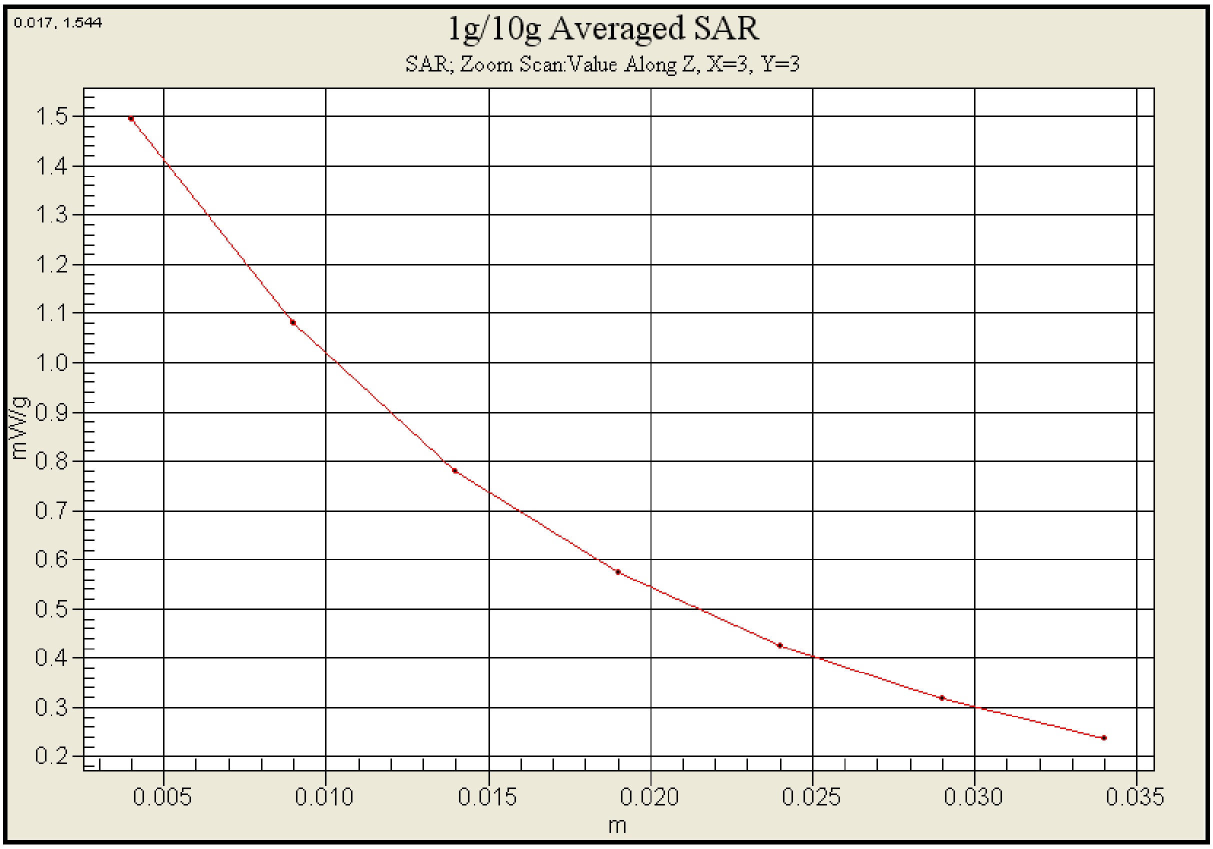
15mm distance CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 35.0 V/m; Power Drift = 0.198 dB

Peak SAR (extrapolated) = 1.92 W/kg

SAR(1 g) = 1.38 mW/g

Maximum value of SAR (measured) = 1.50 mW/g



10.6 SAR Measurement Result (Muscle -15mm Distance- with headset)

Date of Test : June. 16. 2006
Mixture Type: Muscle
Tissue Depth: 15.2cm

Modulation	FREQUENCY		Power Drift (dB)	Device Test Position	Antenna Position	SAR (W/kg)
	CH	MHz				1g
CDMA	363	835.89	0.004	15mm Distance From Phantom with Earphone	Intenna	1.360

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 worst-case results are reported.
3. Battery is fully charged for all readings.
4. SAR Measurement System ■ DASY4
5. Phantom Configuration □ Left Head ■ Flat Phantom □ Right Head
6. SAR Configuration □ Head ■ Muscle □ Hand
7. Test Signal Call Mode □ Manu. Test Codes ■ Base Station Simulator
8. Battery Option ■ Standard Type □ Slim Type

Figure 9.6 Muscle SAR Test Setup
-- 15mm Distance with headset Position --

Measurement Result of Test Data (Muscle -15mm Distance- with headset)

Date/Time: 2006-06-16 6:20:15

Test Laboratory: Nemko Korea File Name: 15mm distance(with Earphone) CH363.da4

DUT: UZ400 Type: Folder Serial: 0000123 Applicant Name: UZONE wireless Co.,Ltd

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: f = 836 MHz; σ = 0.944 mho/m; ε_r = 57.1; ρ = 1000 kg/m^3

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(6.35, 6.35, 6.35); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical And Optical Surface Detection)

Electronics: DAE4 Sn672; Calibrated: 2006-03-17

Phantom: SAM Phantom; Type: SAM; Serial: TP-1358

Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

15mm distance(with Earphone) CH363/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.40 mW/g

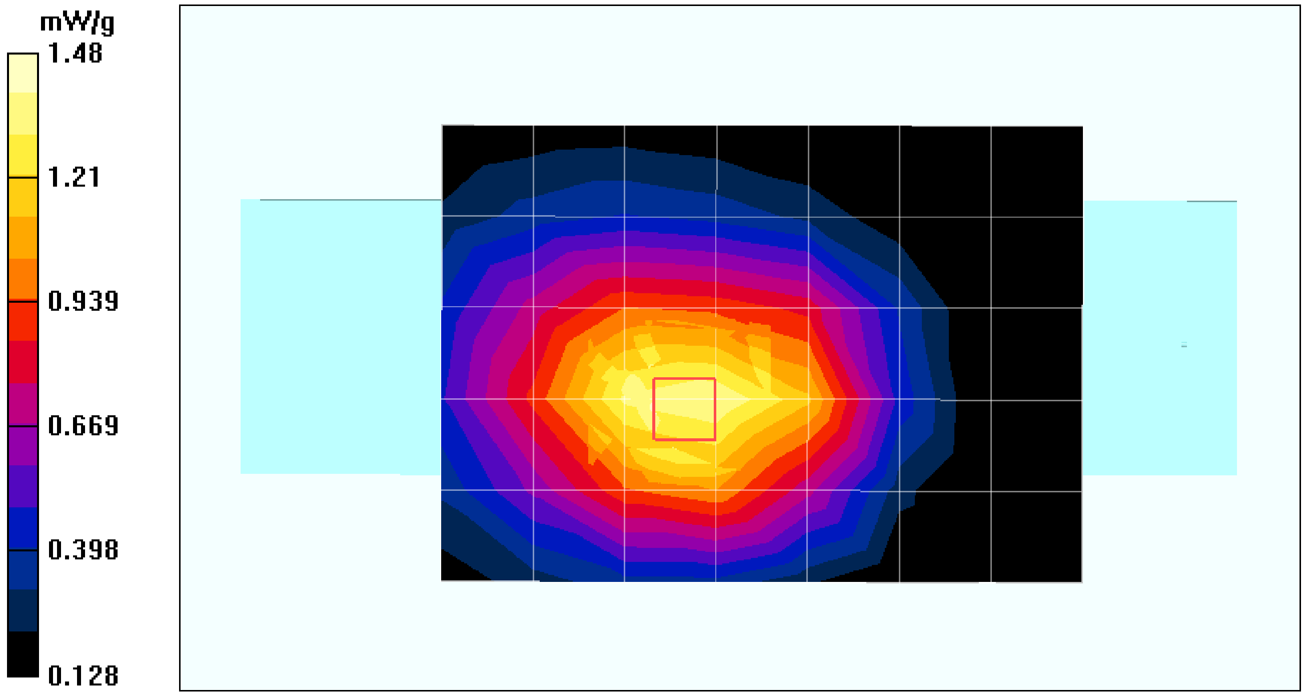
15mm distance(with Earphone) CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 34.3 V/m; Power Drift = 0.004 dB

Peak SAR (extrapolated) = 1.95 W/kg

SAR(1 g) = 1.36 mW/g

Maximum value of SAR (measured) = 1.48 mW/g



11. SAR Test Equipment

Equipment Calibration

Table 10.1 Test Equipment Calibration

Description	Model	Serial No.	Calibration Date	Calibration Interval
Staubli Robot Unit	RX60L	F05/51E1A1/A/01	N/A	N/A
Data Acquisition Electronics	DAE4	672	March.17. 2006	1 year
E-Field Probe	ET3DV6	1591	March.23. 2006	1 year
Electro-Optical Converter	EOC3	398	N/A	N/A
SAM Twin Phantom V4.0C	TP-1358	SM 00 T02 DA	N/A	N/A
Validation Dipole Antenna	D835V2	4d017	February.20. 2006	2 year
Validation Dipole Antenna	D900V2	1d016	April.05. 2006	2 year
Validation Dipole Antenna	D1800V2	2d111	February.17. 2006	2 year
Validation Dipole Antenna	D1900V2	5d059	April.11. 2006	2 year
VSA Series Transmitter Tester	E4406A	US39480757	August.17.2005	1 year
PSA Series Spectrum Analyzer	E4440A	MY44022567	December.31.2005	1 year
Wireless Communications Test Set	E5515C	GB43193659	June.09. 2006	1 year
Dielectric Probe Kit	85070E	MY44300121	N/A	N/A
Network Analyzer	8753ES	US39171172	Mar.10. 2006	1 year
Power Amplifier	NKRFSPA	NK00SP18	May.11. 2006	1 year
Power Meter	437B	2912U01687	December.06.2005	1 year
Power Sensor	8481A	3318A83210	August.17.2005	1 year
Power Meter	NRVS	835360/002	December.06.2005	1 year
Power Sensor	NRV-Z32	836019/028	December.06.2005	1 year
Series Signal Generator	E4436B	US39260598	December.06.2005	1 year

Note:
The E-field probe was calibrated by SPEAG, by waveguide technique procedure. Dipole Validation measurement is performed by Nemkokorea Lab. before each test. The brain simulating material is calibrated by Nemkokorea using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material.

12. References

[1] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003 (Draft 6.1 – July 2001), *IEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.*

[2] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*, July 2001.

[3] ANSI/IEEE C95.3 – 1991, *IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE*, 1992.

[4] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[5] ANSI/IEEE C95.1 – 1991, *American National Standard Safety levels with respect to human exposure to radio frequency electromagnetic fields, 300kHz to 100GHz*, New York: : IEEE, Aug. 1992.

[6] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[7] NCRP, National Council on Radiation Protection and Measurements, *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,* NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[8] T. Schmid, O. Egger, N. Kuster, *Automated E-field scanning system for dosimetric assessments,* IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[9] K. Pokovic, T.Schmid, N. Kuster, *Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies*, ICECOM97, Oct. 1997, pp. 120-124.

[10] G.Hartsgrove, A. raszewski, A. Surowiec, *Simulated Biological Materials for Electromagnetic Radiation Absorption Studies*, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36

[11] Q. Balzano, O. Garay, T. Manning Jr,. *Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones*, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[12] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, *Numerical Recepies in C,* The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[13] K. Pokovic, T.Schmid, N. Kuster, *E-field Probe with improved isotropy in brain simulating liquids*, Proceedings of the ELMAR, Zadar, June 23-25, 1996, pp. 172-175.

[14] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[15] V. Hombach, K.Meier, M. Burkhardt, E. Kuhn, N. Kuster, *The Dependence of EM Energy Absorption upon Human Head Modeling at 900MHz*, IEEE Transaction on Microwave Theory and Techniques, vol 44 no. 10, Oct. 1996, pp. 1865-1873.

[16] N. Kuster and Q. Balzano, *Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz*, IEEE Transaction on Vehicular Technology, vol. 41, no.1, Feb.1992, pp. 17-23.

[17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp.645-652.

APPENDIX A

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (*dU*) absorbed by (dissipated in) an incremental mass (*dm*) contained in a volume element (*dV*) of a given density (*p*). It is also defined as the rate of RF energy absorption pet unit mass at a point in an absorbing body (see Fig. A.1).

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{pdv}\right)$$

Figure A.1 SAR Mathematical Equation

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

$$SAR = \sigma E^2 / p$$

Where :

σ = conductivity of the tissue-simulant material (S/m)
p = mass density of the tissue-simulant material (kg/m3)
E = Total RMS electric field strength (V/m)

Note:
The primary factors that control rate or energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

ANSI/IEEE C95.1 – 1992 RF EXPOSURE LIMITS

Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is the exposure that may be incurred by persons who are aware of the potential for exposure,(i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table C.1 Safety Limits for Partial Body Exposure

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)
SPATIAL PEAK SAR1 Brain	1.60	8.00
SPATIAL PEAK SAR2 Whole Body	0.08	0.40
SPATIAL PEAK SAR3 Hands,Feet,Ankles, Wrists	4.00	20.00

Note:

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

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

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

APPENDIX B : Probe Calibration

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**

Client **Dymstec**

Certificate No: **ET3-1591_Mar06**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1591
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	March 23, 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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
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: March 23, 2006

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

Certificate No: ET3-1591_Mar06   Page 1 of 9

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 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
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
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

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

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 effect 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 (no uncertainty required). DCP does not depend on frequency nor media.
- *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.

Certificate No: ET3-1591_Mar06 Page 2 of 9

Probe ET3DV6

SN:1591

Manufactured: May 18, 2001
Last calibrated: July 22, 2004
Recalibrated: March 23, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1591 March 23, 2006

DASY - Parameters of Probe: ET3DV6 SN:1591

Sensitivity in Free Space[A]

NormX	**1.88** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**1.84** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**95** mV
NormZ	**1.83** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Diode Compression[B]

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	7.6	4.2
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

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	6.4	3.5
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%.

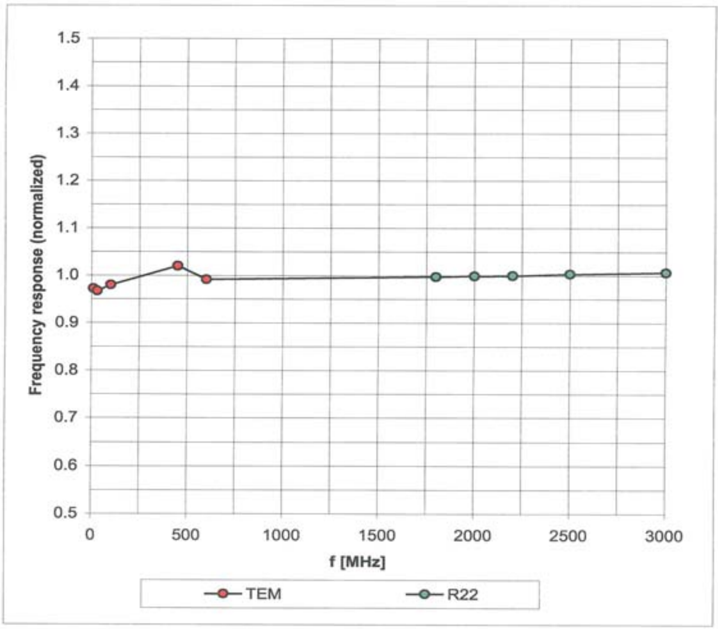
[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).
[B] Numerical linearization parameter: uncertainty not required.

Certificate No: ET3-1591_Mar06 Page 4 of 9

ET3DV6 SN:1591 March 23, 2006

Frequency Response of E-Field

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

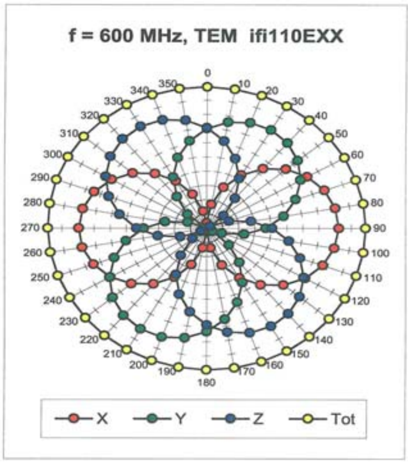


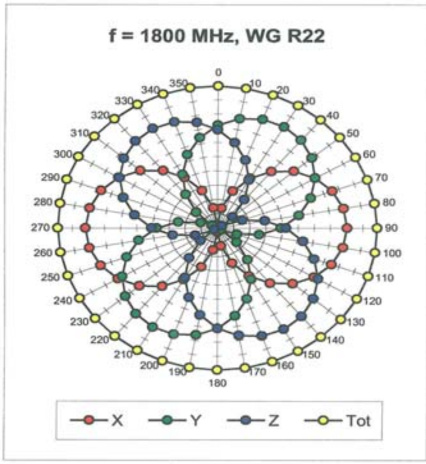
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

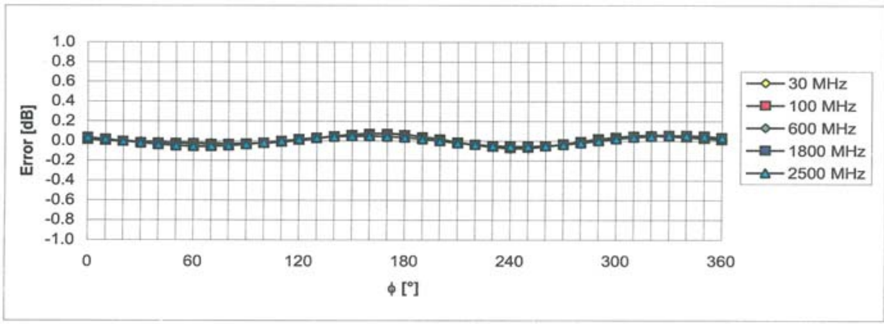
Certificate No: ET3-1591_Mar06 Page 5 of 9

ET3DV6 SN:1591 March 23, 2006

Receiving Pattern (ϕ), ϑ = 0°







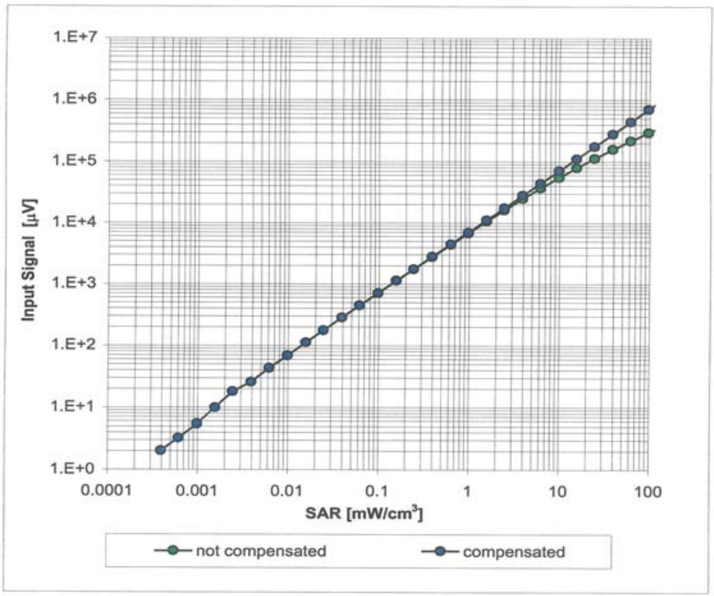
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

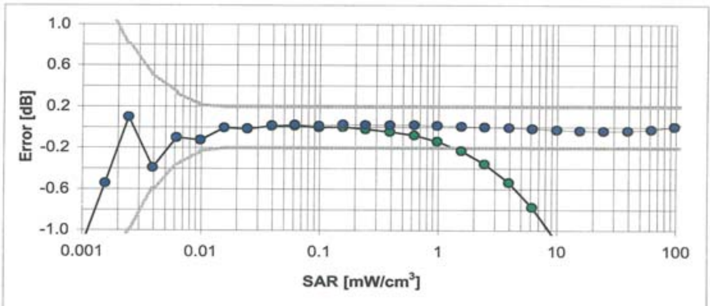
Certificate No: ET3-1591_Mar06 Page 6 of 9

ET3DV6 SN:1591 March 23, 2006

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



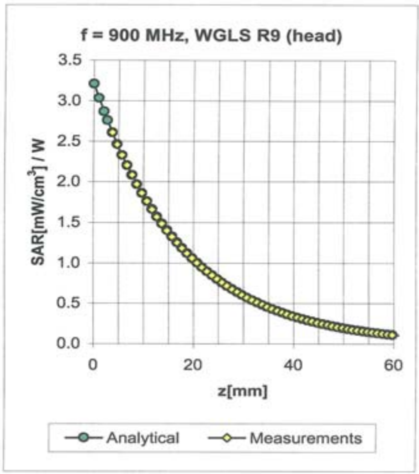


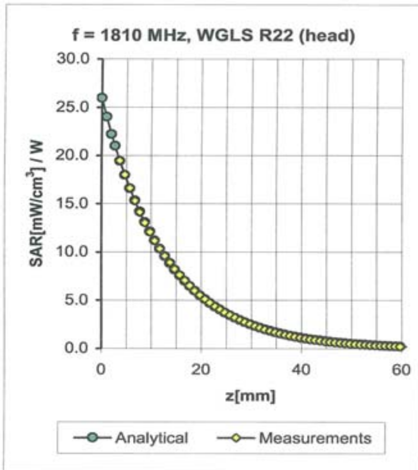
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1591_Mar06 Page 7 of 9

ET3DV6 SN:1591 March 23, 2006

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.49	1.91	6.87	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.43	2.66	5.41	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.58	2.15	4.59	± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.40	2.24	6.35	± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.34	4.67	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.62	2.03	4.18	± 11.8% (k=2)

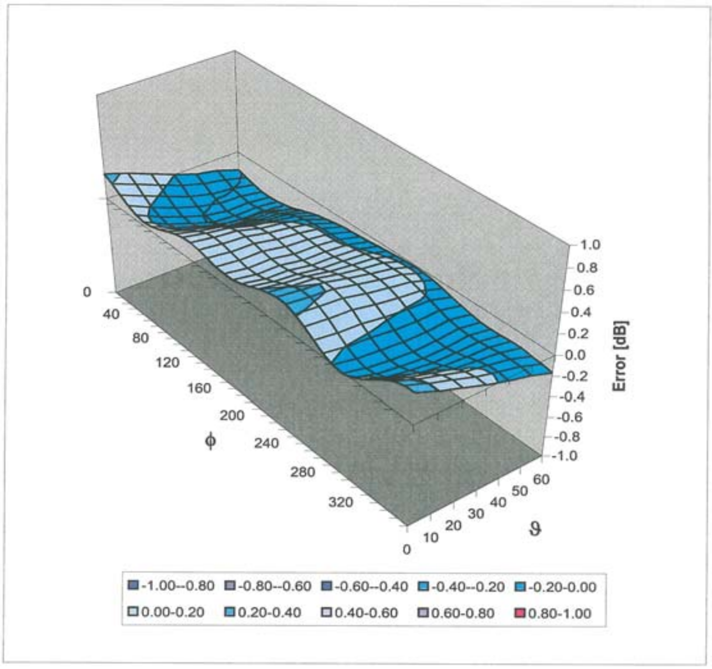
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Certificate No: ET3-1591_Mar06 Page 8 of 9

ET3DV6 SN:1591 March 23, 2006

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1591_Mar06 Page 9 of 9

APPENDIX C : Dipole Calibration

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

ilac-MRA

SWISS CALIBRATION

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**

Client **Nemko (Dymstec)**

Certificate No: **D835V2-4d017_Feb06**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d017
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	February 20, 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 ET3DV6	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_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:	Mike Meili	Laboratory Technician	M. Meili
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: February 21, 2006

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

Certificate No: D835V2-4d017_Feb06 Page 1 of 6

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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 V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 ± 6 %	0.95mho/m ± 6 %
Head TSL temperature during test	(22.4 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	2.38 mW / g
SAR normalized	normalized to 1W	9.52 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.36 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 mW / g
SAR normalized	normalized to 1W	6.16 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.11 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	52.5 Ω - 2.1 jΩ
Return Loss	- 29.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.389 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	April 22, 2004

DASY4 Validation Report for Head TSL

Date/Time: 20.02.2006 17:15:40

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d017

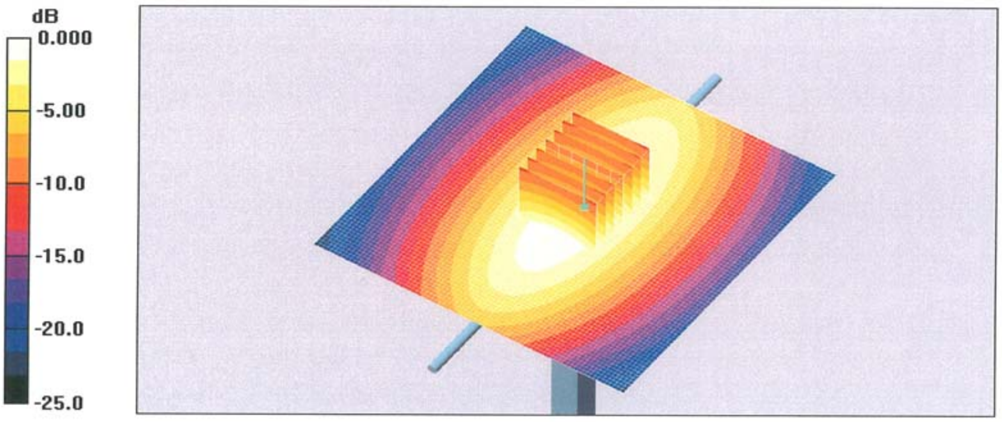
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 835 MHz; σ = 0.945 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA
- Measurement SW: DASY4, V4.6 Build 57; Postprocessing SW: SEMCAD, V1.8 Build 160

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.58 mW/g

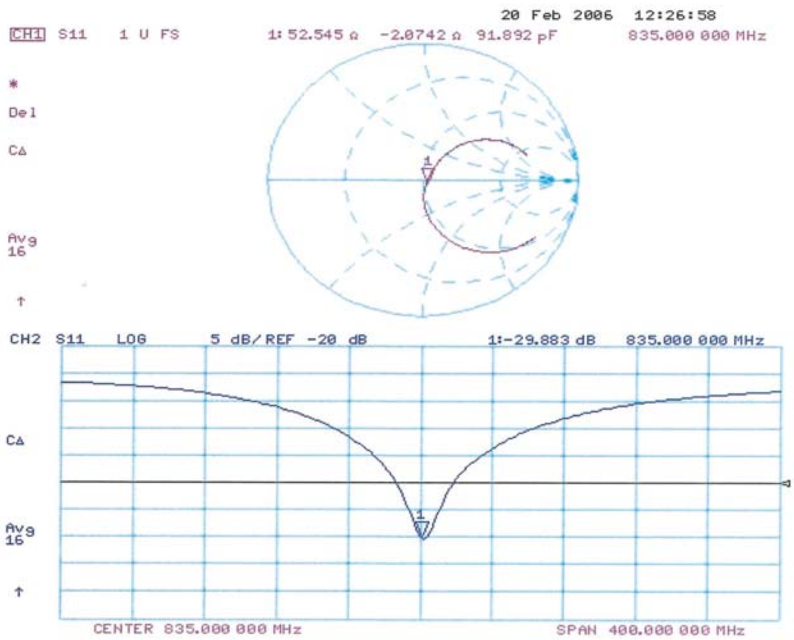
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.1 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 3.59 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.54 mW/g
Maximum value of SAR (measured) = 2.58 mW/g



0 dB = 2.58mW/g

Certificate No: D835V2-4d017_Feb06 Page 5 of 6

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d017_Feb06 Page 6 of 6

APPENDIX D : Photographs of EUT

Front View Of EUT

Front View Of EUT

Rear View Of EUT

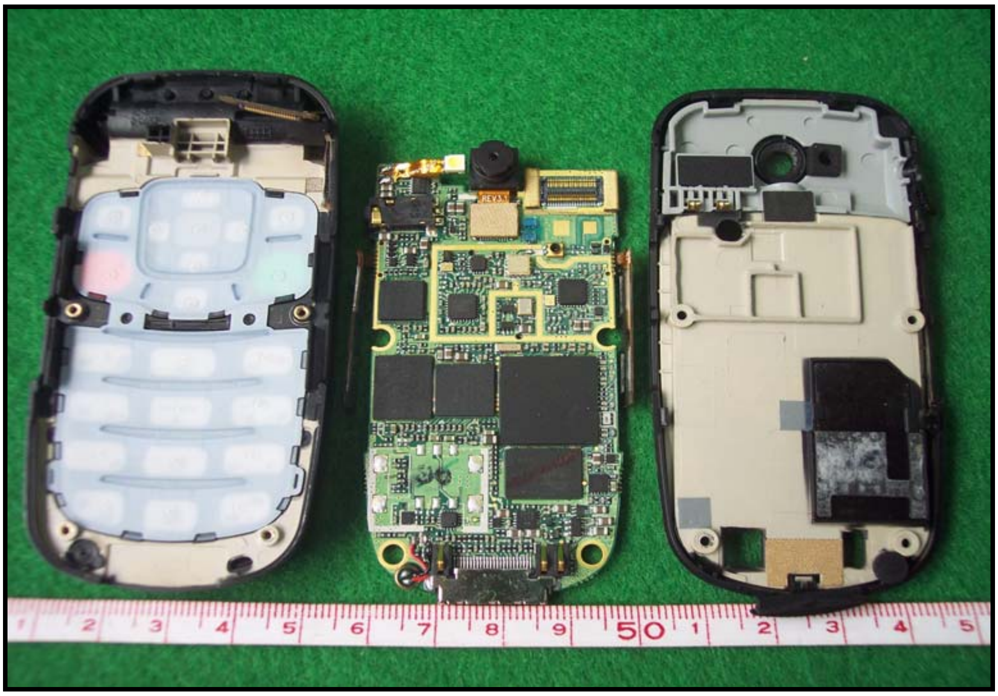
Top View Of EUT

Base View Of EUT

Side View Of EUT

Side View Of EUT

Inside View Of EUT



Label View Of EUT

View Of Adaptor