

SAR Evaluation Report

FCC ID : TARCDX-650

Project Reference No. : NK2HR005

Product Type : Dual Band CDMA 1x- EVDO Express Card Modem

Brand Name : C-motech

Model : CDX-650

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

Tested Period : January. 02. 2007 to January. 12. 2007

Tested by Seob Lee  date : January. 15. 2007

Verified by Seonteag.Jin  date : January. 15. 2007

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.

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1. General Information

1.1 Applicant

Company Name: C-motech. Co.,Ltd
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1.2 Manufacturer

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Phone/Fax: Phone: +82-2-369-9881 / +82-2-785-5740
Contact Name: Byung-young Choi

1.3 Description of Device

Category:	Dual Band CDMA 1x-EVDO Express Card Modem
Model Name:	CDX-650
Brand Name:	C-motech
Serial Number:	3B08CA5E
Frequency of Operation	CDMA835 : Tx : 824MHz ~ 849MHz, Rx : 869MHz ~ 894MHz PCS : Tx : 1850MHz ~ 1910MHz, Rx : 1930MHz ~ 1990MHz
Power Output (Conducted)	0.285W (24.55dBm)
Type of Oscillation	PLL Synthesizer & VCTCXO (19.2MHz)
Modulation Method	OQPSK, QPSK
Channel Spacing	1.23MHz
Modulation	Code Division Multiple Access (CDMA)
Operating Condition	-20 to +60 °C 85% (at 50°C), relative humidity (non-condensing)
Power Supply	+3.3VDC from Express Card slot
Antenna Type	FIFA Antenna
Dimensions	34.5mm x 105.0mm x 5.0mm
Weight	Approx. 29g
Remarks:	-

2. General Test Condition

2.1 Location

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

2.2 Operating Environment

Parameters	Recording during test	Accepted deviation
Ambient temperature	21 ± 2°C	15 ~ 30°C
Relative humidity	35 ± 15%	20 ~ 75%

2.3 Support Equipment

Equipment	Manufacturer	Model Name	Serial Number
Laptop	Fujitsu Limited	C1410	R6900813
Laptop	ASUS	F3J	6BN0AS148062
Laptop	DELL	Inspiron PP20L	7BDF5BX

2.4 Test Frequency

CDMA		PCS CDMA	
Test Channel	Test Frequency (MHz)	Test Channel	Test Frequency (MHz)
1013	824.70	25	1851.25
363	835.89	600	1880.00
777	848.31	1175	1908.75

2.5 Position Information

Bottom Position : Laptop - Rear side facing phantom, EUT

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).

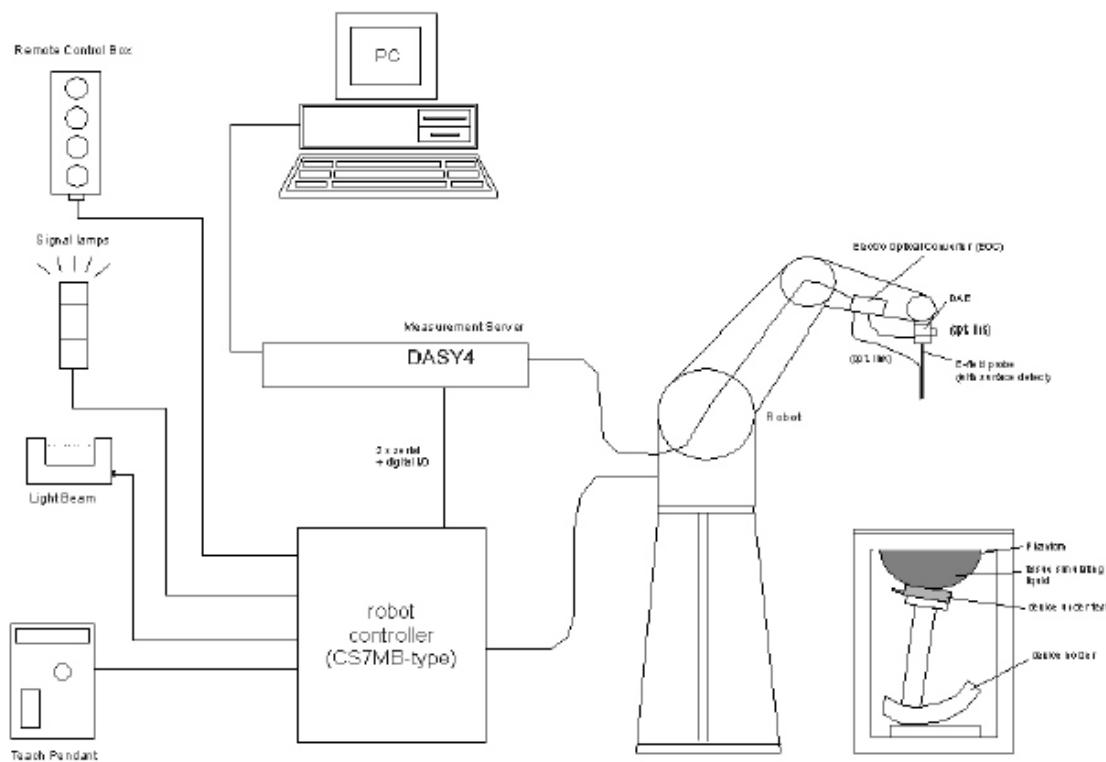


Figure 3.1 SAR Measurement System Setup

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. This 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 software reads 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

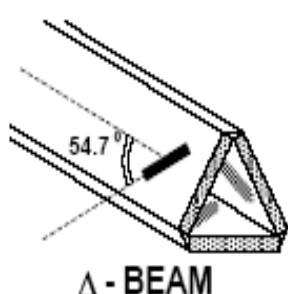


Figure 3.3 Triangular Probe Configuration



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, HSL1900 MHz, 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	5 μ W/g to > 100mW/g; Linearity: ± 0.2 dB
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 Device Holder for Transmitters

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.



Figure 3.6 Device Holder

4. Measurement Procedure

EUT 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 ρ 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 20 minutes.

The following steps are used for each test position:

STEP 1

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.

STEP 2

Measurement of the local E-Field value at a fixed location (P1).

This value serves as a reference value for calculating a possible power drift.

STEP 3

Measurement of the SAR distribution with a grid spacing of 15mm \times 15mm and a constant distance to the inner surface of the phantom.

Since the sensors cannot directly measure at the inner surface of the phantom.

Since the sensors can not 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.

STEP 4

Around this points, a cube of 30mm \times 30mm \times 30mm is assessed by measuring 5 \times 5 \times 5 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(P1) and repetition of the whole procedure if the two results differ by more than ± 0.22 dB.

4.1 Head / Muscle Simulating Mixture Characterization

The brain mixture consists of a viscous gel using hydroxethyl-cellulose (HEC) gelling agent and saline solution. Preservation with a bactericide 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.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Typical Composition of Ingredients for Liquid Tissue Phantoms

4.2 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table.

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

(ϵ_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m³)

4.3 FCC Limits for Specific Absorption Rate (SAR)

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE 1: See Section 1 for discussion of exposure categories.

NOTE 2: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

NOTE 3: At frequencies above 6.0 GHz, SAR limits are not applicable and MPE limits for power density should be applied at 5 cm or more from the transmitting device.

Note 4: The time averaging criteria for field strength and power density do not apply to general population SAR limit of 47 CFR §2.1093.

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

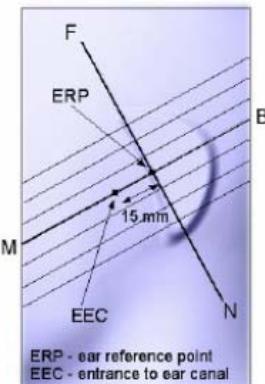


Figure 5.2 Close up side view

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.

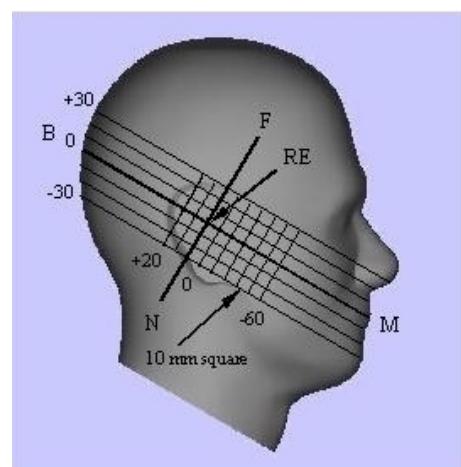


Figure 5.3 Side view of the phantom showing relevant markings

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 then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its 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.

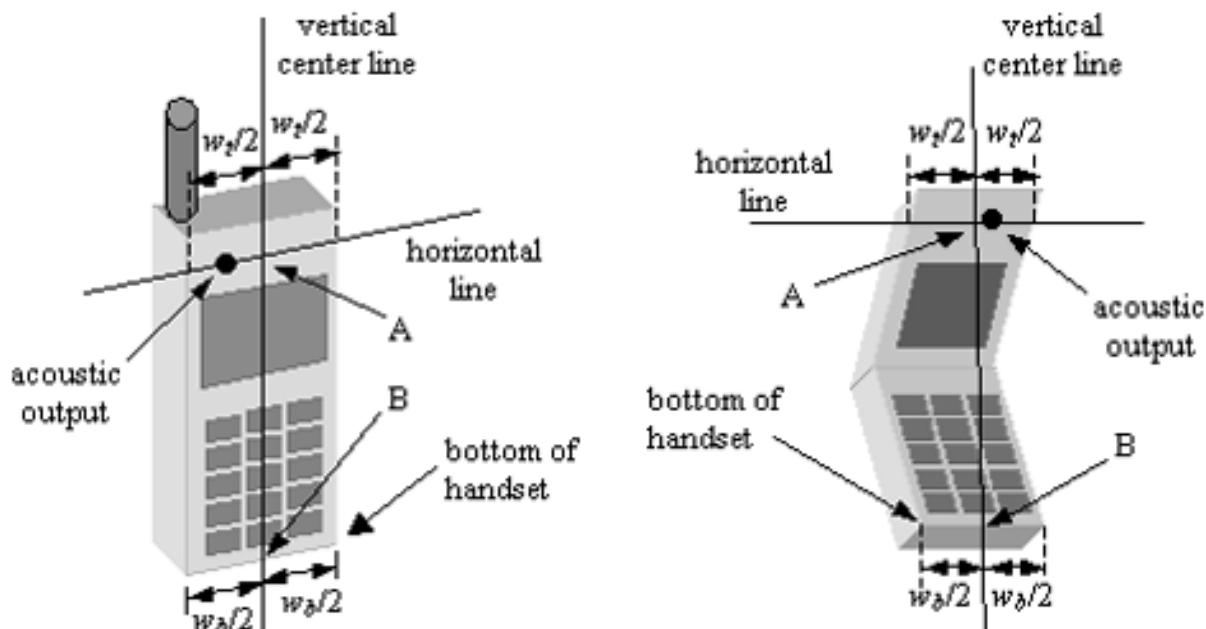


Figure 5.4 Handset vertical and horizontal reference lines

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.

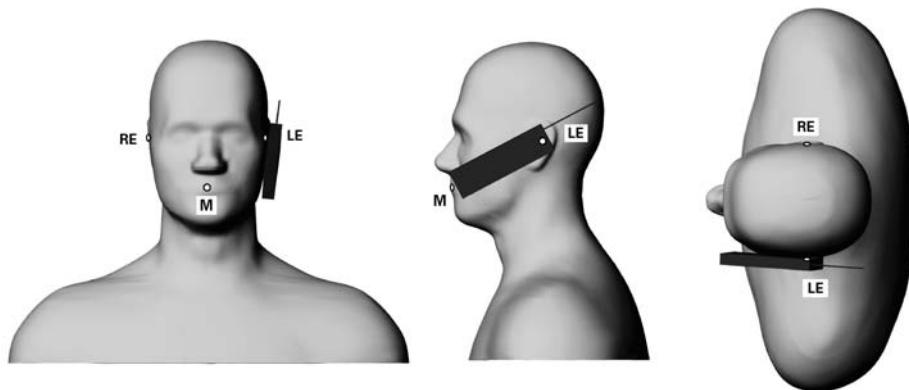


Figure 6.1 Front, Side and Top View of Cheek/Touch Position

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 with 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”

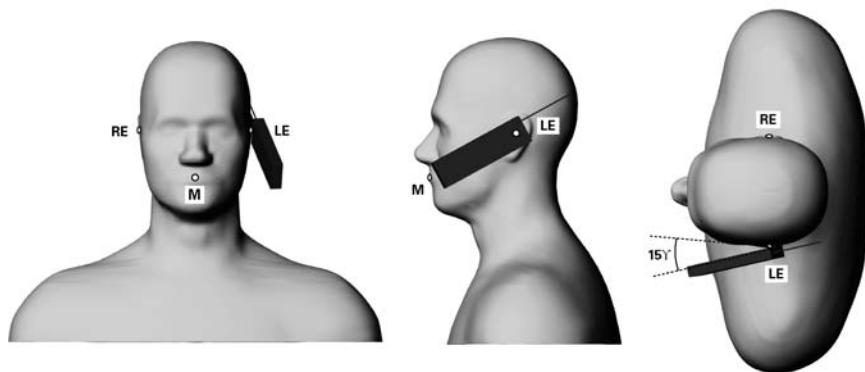


Figure 6.2 Front, side and Top View of Ear/Tilt 15° Position

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 Requirements

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 closest 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 closest 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.

* In this test, This Device is with belt-clip but only used for the holster covering USB DONGLE connection part and this USB DONGLE can't be attached to computer with this holster. So it's impossible to perform test with the holster.

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%	

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 $\pm 5\%$ of the recommended values given by the IEEE Standard C95.1 / OET Bulletin 65 Supplement C.

Table 8.1 Measured Tissue Parameters

	CDMA 835MHz Muscle		PCS Muscle	
Date	January 03, 2007		January 04, 2007	
Liquid Temperature(°C)	22.3°C		21.8°C	
	Recommended Value	Measured Value	Recommended Value	Measured Value
Dielectric Constant (ϵ)	55.2 ± 2.76	57.6	53.3 ± 2.660	52.3
Conductivity(σ)	0.97 ± 0.048	0.995	1.52 ± 0.076	1.57

8.2 Test System Validation

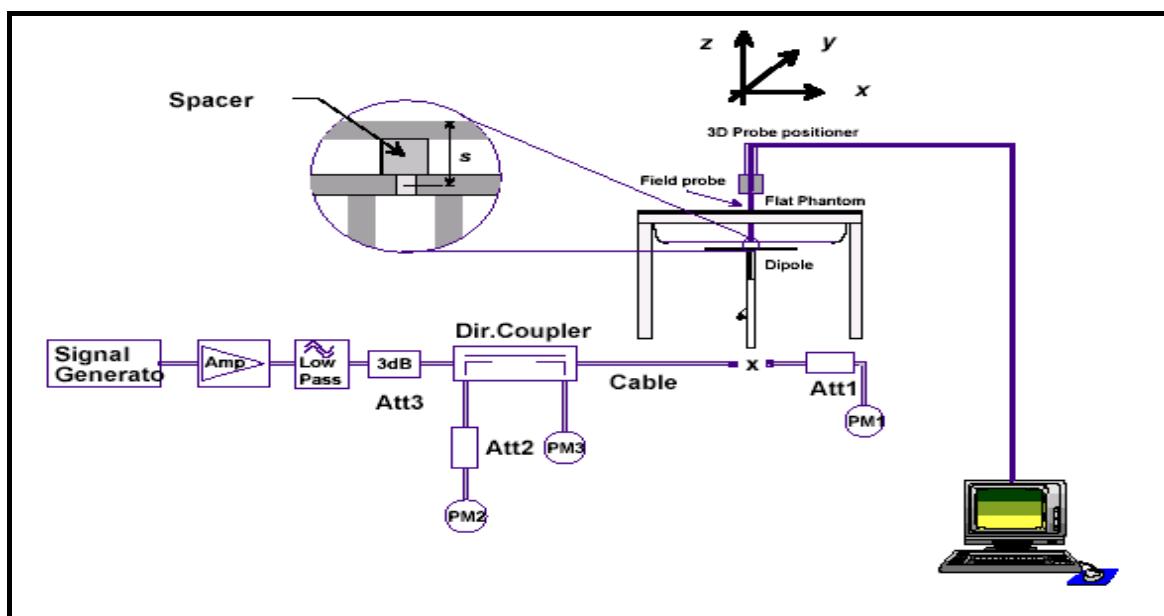
The simplified performance check was realized using the dipole validation kits.

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 (mW/g)	Measured SAR (mW/g)	Deviation (%)
			1g	1g	1g
835MHz Muscle	January 03, 2007	22.2 °C	2.375	2.46	-3.58
1900MHz Muscle	January 05, 2007	22.0 °C	9.925	10.3	-3.78



Dipole Validation Test Setup

8.3 Measurement Result of Test Data (Cellular Validation)

Date/Time: 2007-01-03 2:52:00

Test Laboratory: Nemko Korea File Name: [TARCDX-650 CDMA Validation.da4](#)**DUT: Dipole 835 MHz Type: D835V2 Serial: D835V2 - SN:4d017 Applicant Name: C-motech Co.,Ltd**

Communication System: CW Frequency: 835 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 835$ MHz; $\sigma = 0.995$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

CDX-650 CDMA Validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.56 mW/g

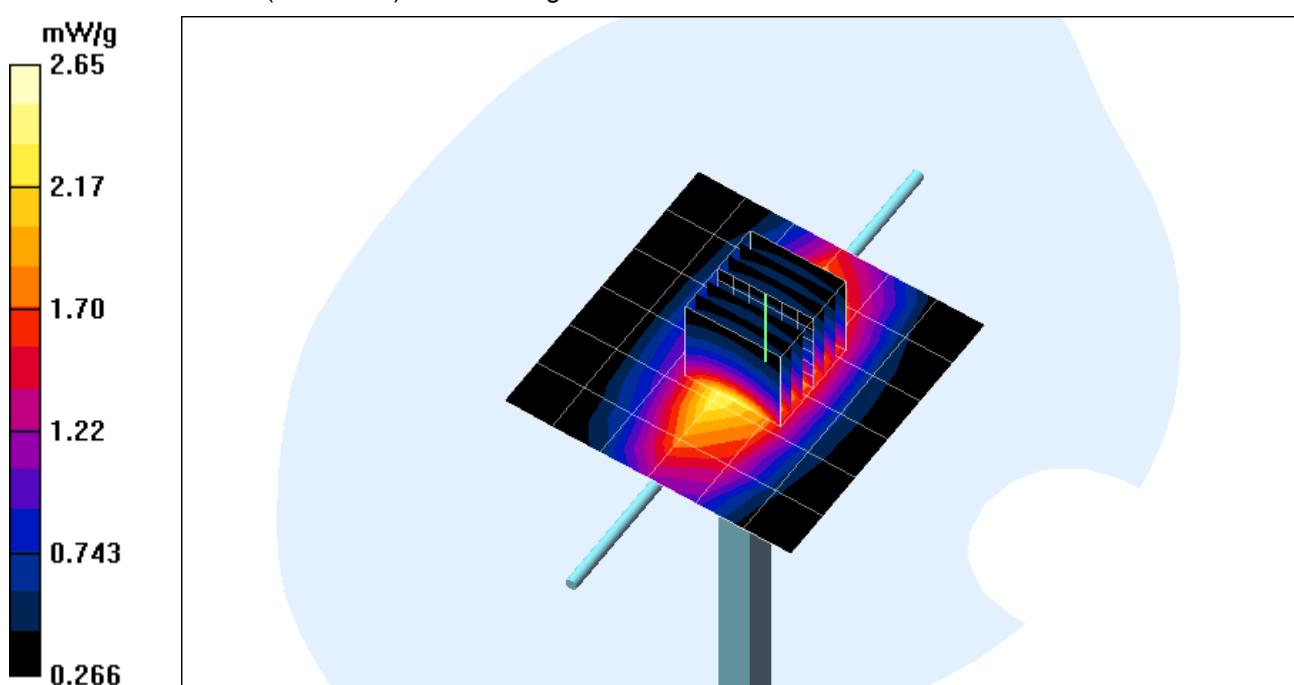
CDX-650 CDMA Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 52.6 V/m; Power Drift = -0.057 dB

Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.63 mW/g

Maximum value of SAR (measured) = 2.65 mW/g



8.4 Measurement Result of Test Data (PCS Validation)

Date/Time: 2007-01-05 10:52:04

Test Laboratory: Nemko Korea File Name: [TARCDX-650 PCS Validation.da4](#)

DUT: Dipole 1900 MHz Type: D1900V2 Serial: D1900V2 - SN:5d059 Applicant Name: C-motech Co.,Ltd

Communication System: CW Frequency: 1900 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

TARCDX-650 PCS Validation/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

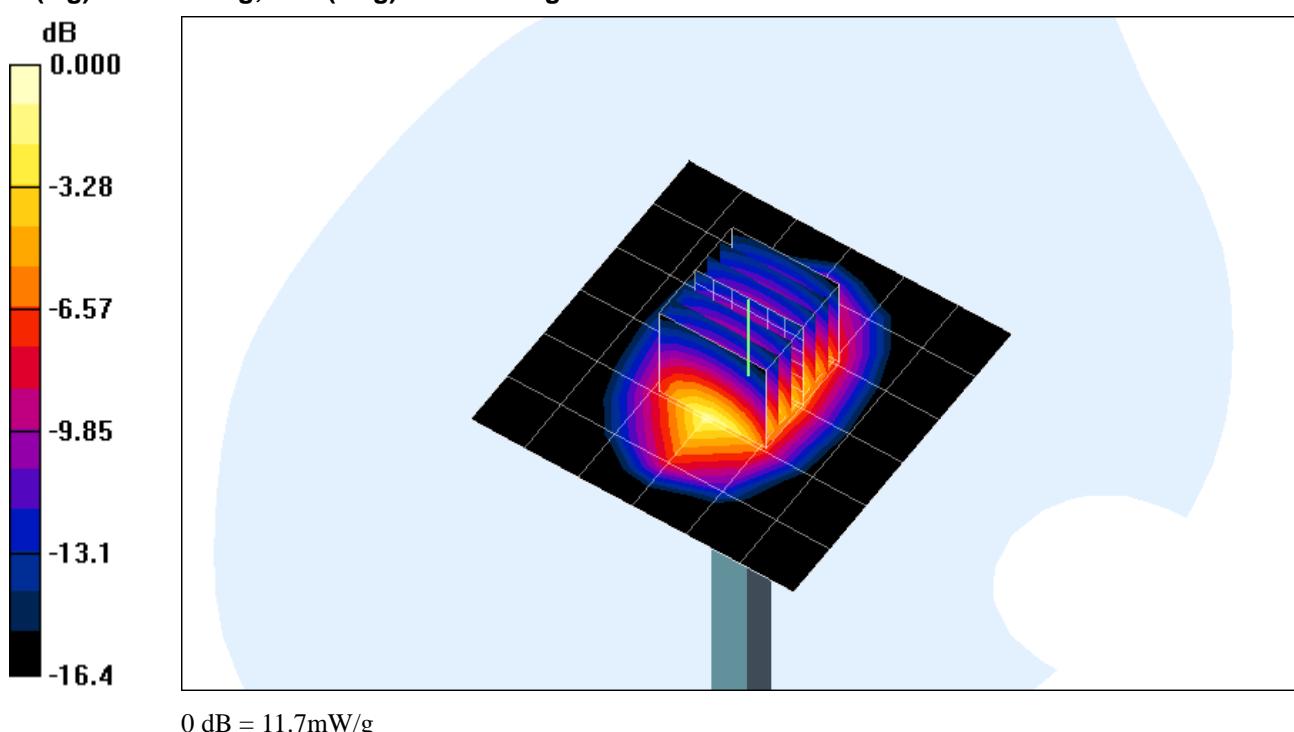
Maximum value of SAR (measured) = 11.7 mW/g

TARCDX-650 PCS Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.9 V/m; Power Drift = 0.002 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.52 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
$\frac{I_{or}}{E_c}$	dBm/1.23 MHz	-104
$\frac{Pilot}{I_{or}}$	dB	-7
$\frac{Traffic}{I_{or}}$	dB	-7.4

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

Parameter	Units	Value
$\frac{I_{or}}{I_{or}}$	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 disabled 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.

9.2.4 Handset with EV-DO

For handsets with EV-DO capabilities, when the maximum average output of each channel in Rev.0 is less than 1/4 dB higher than that measured in RC3, body SAR for EV-DO is not required. Otherwise, SAR for Rev.0 is measured on the maximum output channel at 153.6kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev.0 or less than 1/4 higher than that measured in RC3.

Otherwise, SAR is measured on the maximum output channel for Rev. A using reverse data channel payload size traffic channel data rate corresponding to the 2-slot version of 307.2kbps with the ASK channel transmitting in all slots should be configured in the downlink for both Rev.0 and Rev. A

Maximum Power Output Table for CDX-650

Band	CH	1x EV-DO FTAP (dBm)	1x EV-DO RTAP (dBm)	CDMA200 RC	SO2 Loopback (dBm)	SO55 Loopback (dBm)	TDSO SO32 Loopback (dBm)
Cellular	1013	24.55	24.52	RC1	24.17	24.18	-
				RC3	24.17	24.15	24.29
	363	24.52	24.48	RC1	24.05	24.01	-
				RC3	24.18	24.10	24.14
	777	24.46	24.40	RC1	24.01	24.00	-
				RC3	24.04	24.08	24.25
PCS	25	24.17	23.88	RC1	23.46	23.60	-
				RC3	23.46	23.68	23.95
	600	24.34	24.30	RC1	23.76	23.70	-
				RC3	23.69	23.85	24.05
	1175	24.04	24.06	RC1	23.59	23.71	-
				RC3	23.53	23.83	24.11

10. SAR Measurement Results

Procedures Used To Establish Test Signal

The device was placed into continuous transmit mode using a base station simulator. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR

◆ Maximum SAR (Cellular)

Laptop	CH	Frequency (MHz)	Position	SAR Limit (W/kg)	Measured SAR (W/kg)	Result
ASUS F3J	777	848.31	Bottom	1.6	0.740	Passed

◆ Maximum SAR (PCS)

Laptop	CH	Frequency (MHz)	Position	SAR Limit (W/kg)	Measured SAR (W/kg)	Result
DELL Inspiron PP20L	1175	1908.75	Bottom	1.6	0.535	Passed

11. SAR Data Summary (Cellular)

11.1 Laptop 1 [Fujitsu C1410]

Date of Test : January 04.2007

Mixture Type: 835MHz Muscle

Tissue Depth: 15.2 Cm

Mode	Application	Frequency		Power drift (dB)	Test Position	1g SAR (W/kg)
		CH	Freq. (MHz)			
Cellular	1x EV-DO	1013	824.70	-0.211	Bottom	0.695
		363	835.89	-0.200	Bottom	0.619
		777	848.31	-0.212	Bottom	0.591
	CDMA2000 (1x RTT)	363	835.89	-0.117	Bottom	0.621

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. SAR Measurement System

DASY4

4. Phantom Configuration

Left Head

Flat Phantom

Right Head

5. SAR Configuration

Head

Body

Hand

6. Test Signal Call Mode

Manu. Test Codes

Base Station Simulator

Date/Time: 2007-01-04 10:44:01

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH1013.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech 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; $\sigma = 0.981$ mho/m; $\epsilon_r = 57.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH1013/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.736 mW/g

FUJITSU C1410 Bottom Position CH1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

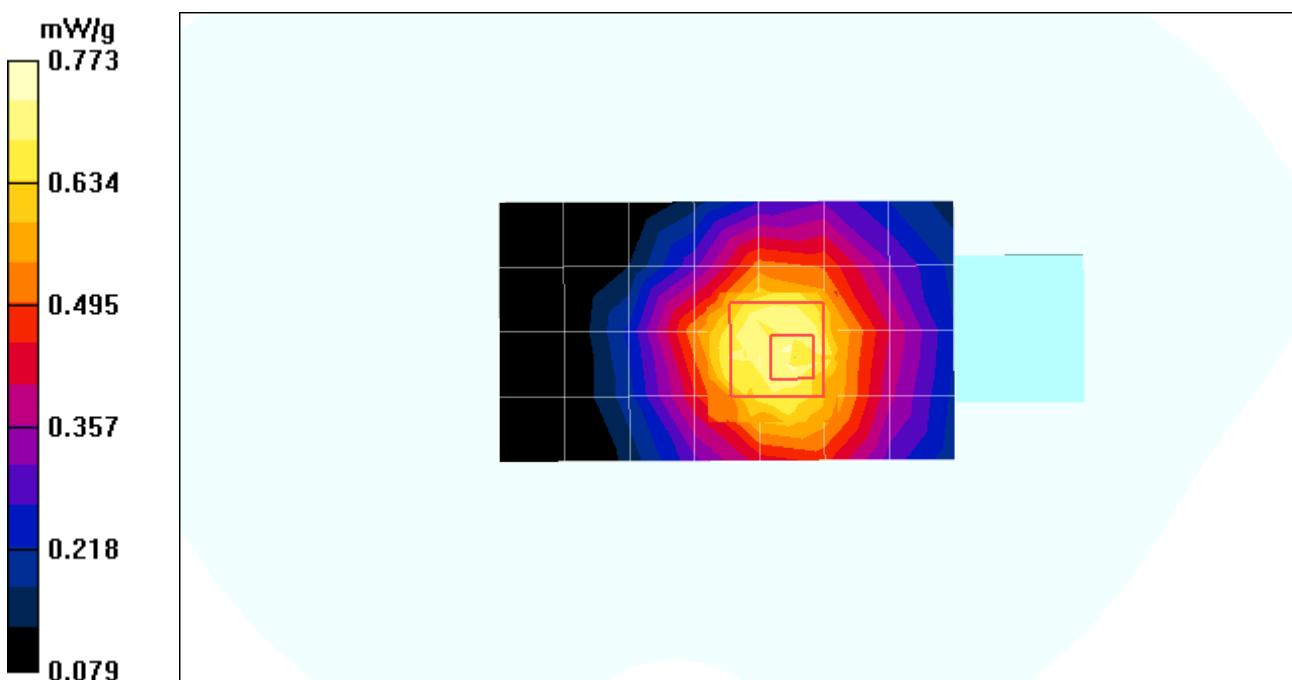
Reference Value = 21.8 V/m; Power Drift = -0.211 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.695 mW/g; SAR(10 g) = 0.478 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.773 mW/g



Date/Time: 2007-01-04 10:24:40

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH363.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 836$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH363/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.663 mW/g

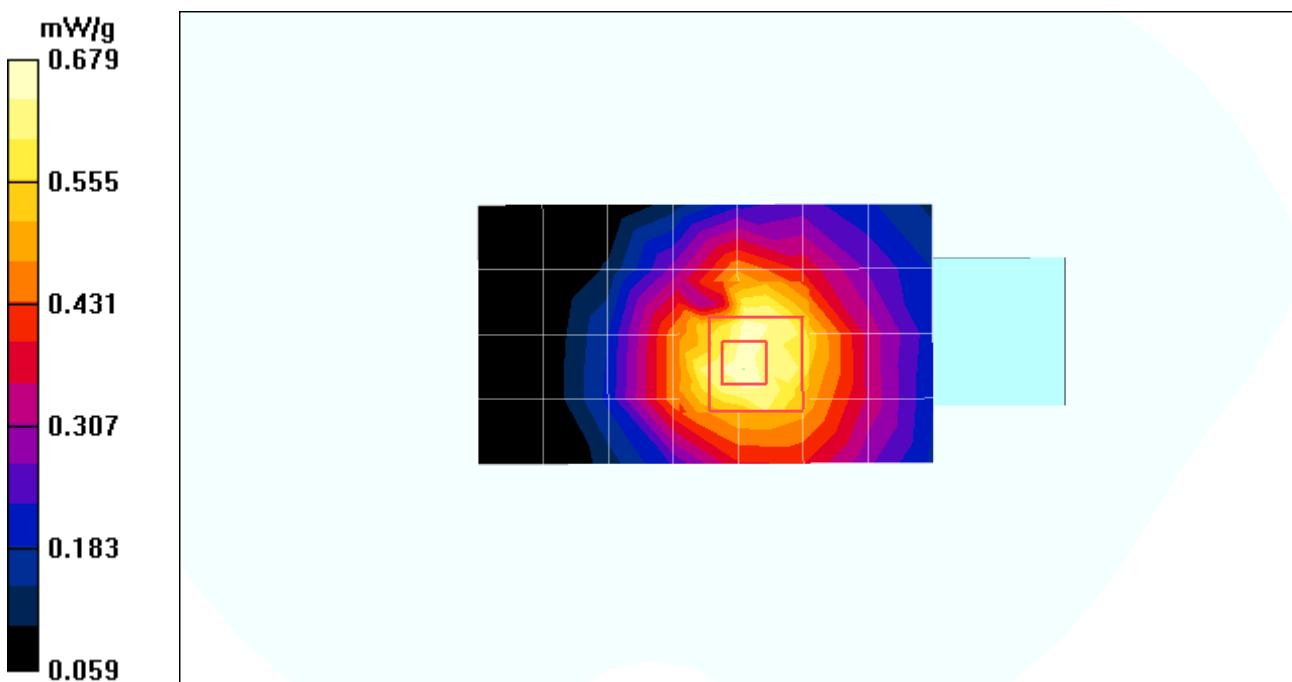
FUJITSU C1410 Bottom Position CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.9 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 0.988 W/kg

SAR(1 g) = 0.619 mW/g; SAR(10 g) = 0.421 mW/g

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



Date/Time: 2007-01-04 11:02:05

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH777.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 848.5$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 57.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH777/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.559 mW/g

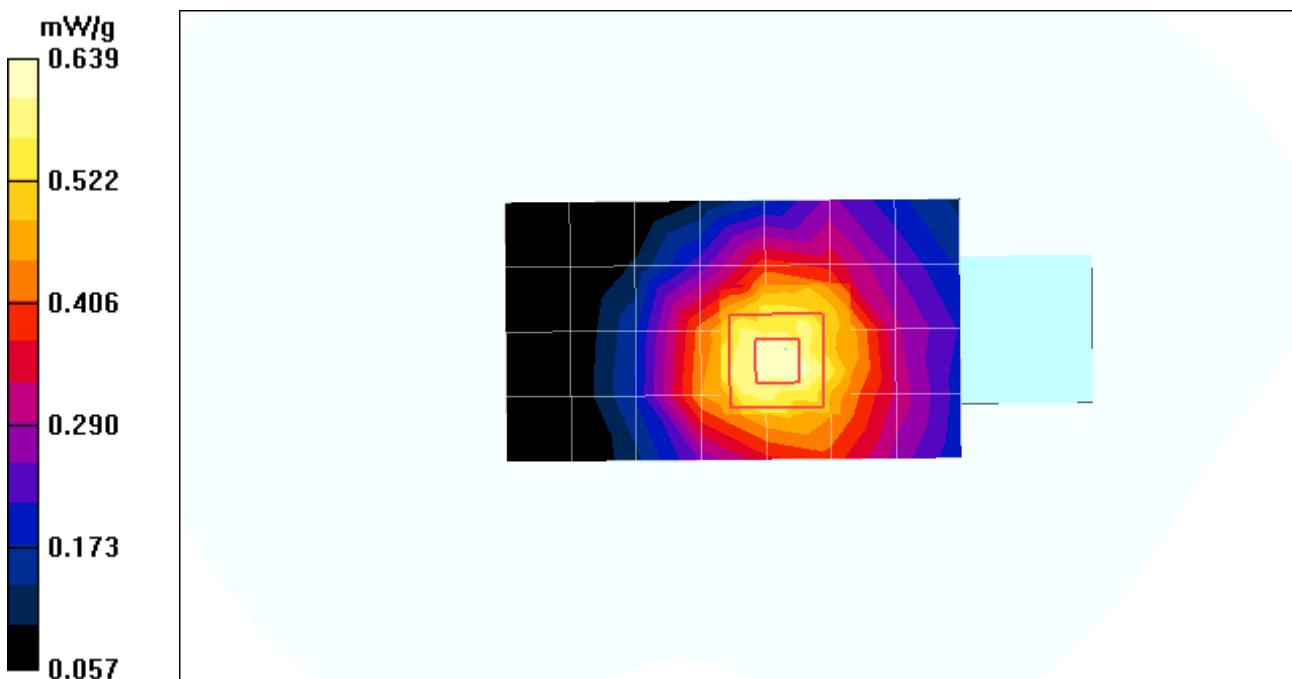
FUJITSU C1410 Bottom Position CH777/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.3 V/m; Power Drift = -0.212 dB

Peak SAR (extrapolated) = 0.941 W/kg

SAR(1 g) = 0.591 mW/g; SAR(10 g) = 0.395 mW/g

Maximum value of SAR (measured) = 0.639 mW/g



Date/Time: 2007-01-04 4:19:28

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position RC3 CH363.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 836$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position RC3 CH363/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.644 mW/g

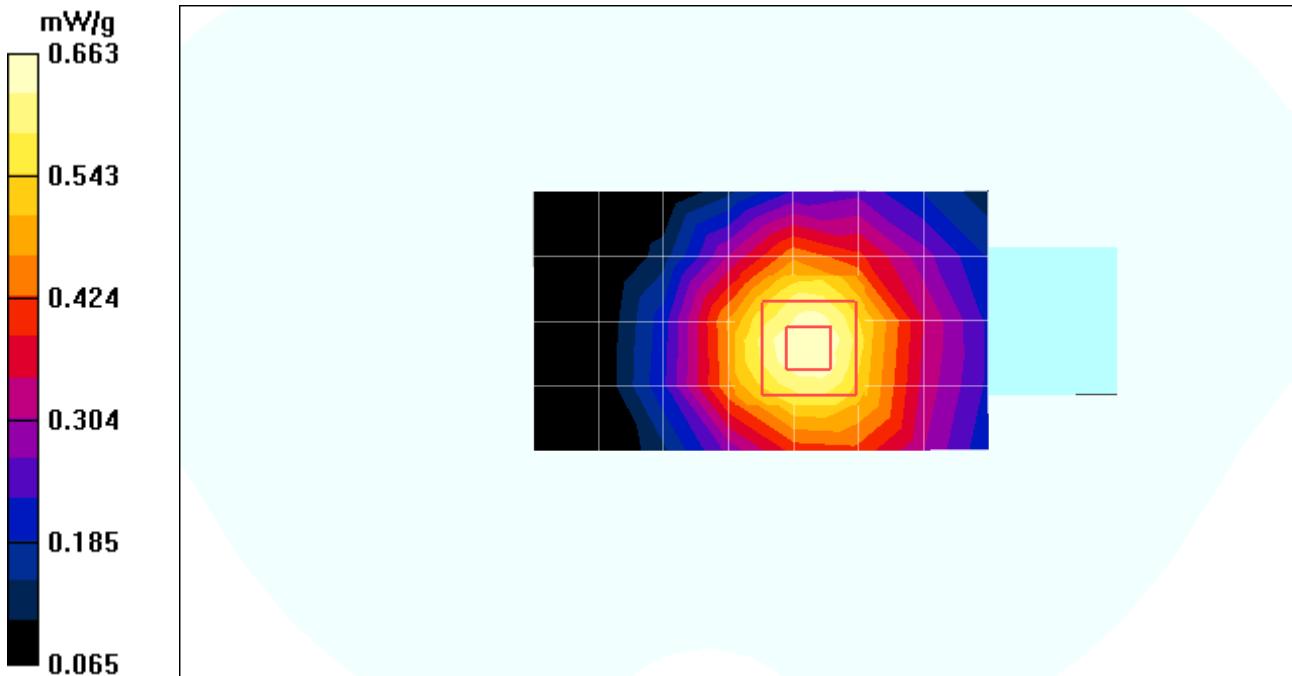
ASUS F3J Bottom Position RC3 CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.4 V/m; Power Drift = -0.117 dB

Peak SAR (extrapolated) = 0.878 W/kg

SAR(1 g) = 0.621 mW/g; SAR(10 g) = 0.427 mW/g

Maximum value of SAR (measured) = 0.663 mW/g



Date/Time: 2007-01-04 10:44:01

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH1013.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech 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; $\sigma = 0.981$ mho/m; $\epsilon_r = 57.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH1013/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.736 mW/g

FUJITSU C1410 Bottom Position CH1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

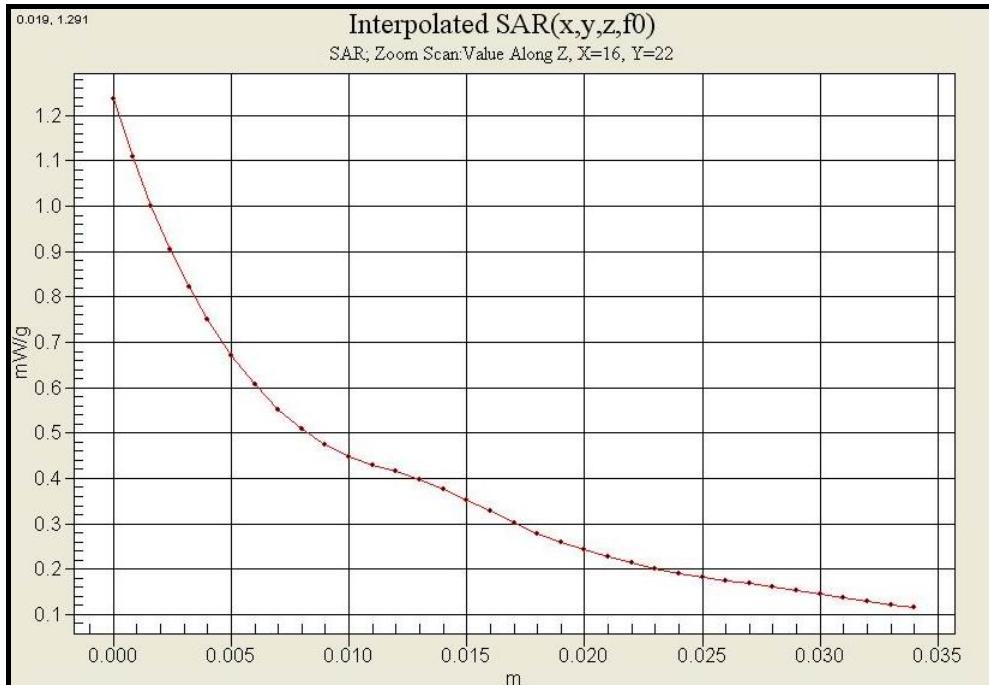
Reference Value = 21.8 V/m; Power Drift = -0.211 dB

Peak SAR (extrapolated) = 1.24 W/kg

SAR(1 g) = 0.695 mW/g; SAR(10 g) = 0.478 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.773 mW/g



11.2 Laptop 2 [ASUS F3J]

Date of Test : January 04.2007

Mixture Type: 835MHz Muscle

Tissue Depth: 15.2 Cm

Mode	Application	Frequency		Power drift (dB)	Test Position	1g SAR (W/kg)
		CH	Freq. (MHz)			
Cellular	1x EV-DO	1013	824.70	0.179	Bottom	0.698
		363	835.89	-0.116	Bottom	0.725
		777	848.31	0.114	Bottom	0.740
	CDMA2000 (1x RTT)	363	835.89	-0.193	Bottom	0.718

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. SAR Measurement System DASY4
4. Phantom Configuration Left Head Flat Phantom Right Head
5. SAR Configuration Head Body Hand
6. Test Signal Call Mode Manu. Test Codes Base Station Simulator

Date/Time: 2007-01-04 1:23:56

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH1013.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech 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; $\sigma = 0.981$ mho/m; $\epsilon_r = 57.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH1013/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.688 mW/g

ASUS F3J Bottom Position CH1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

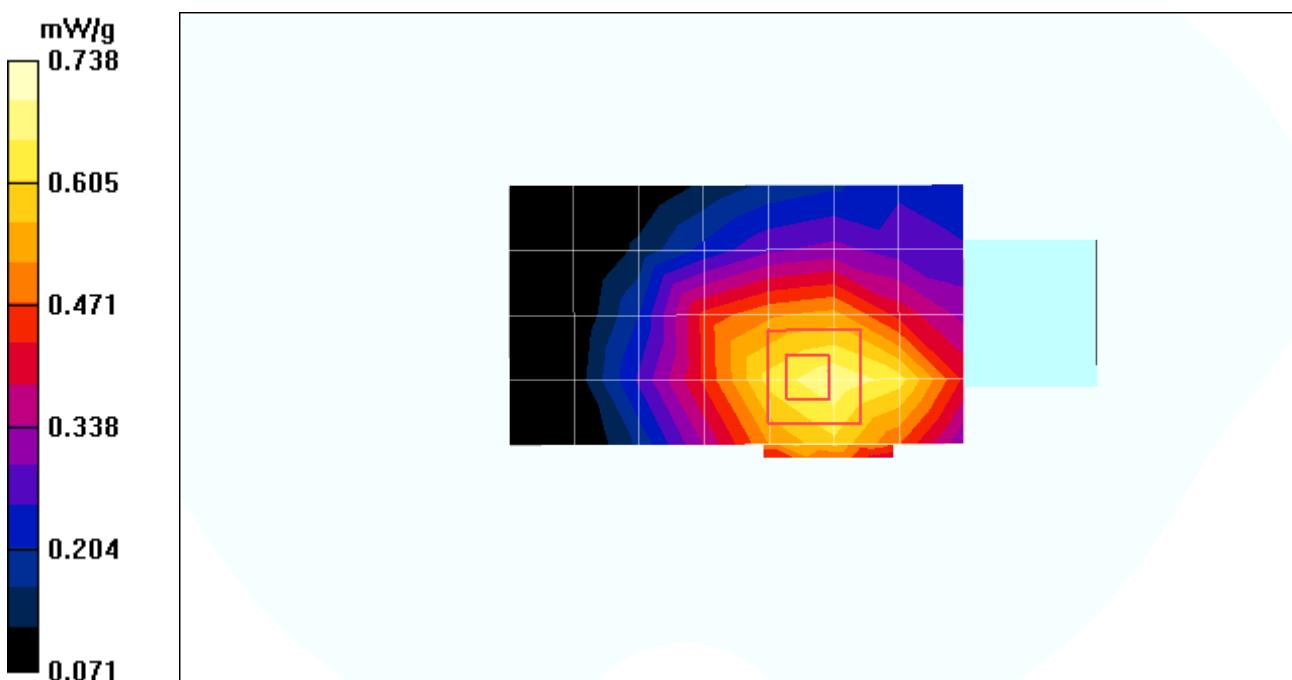
Reference Value = 19.2 V/m; Power Drift = 0.179 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.698 mW/g; SAR(10 g) = 0.486 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.738 mW/g



Date/Time: 2007-01-04 1:07:39

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH363.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 836$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH363/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.754 mW/g

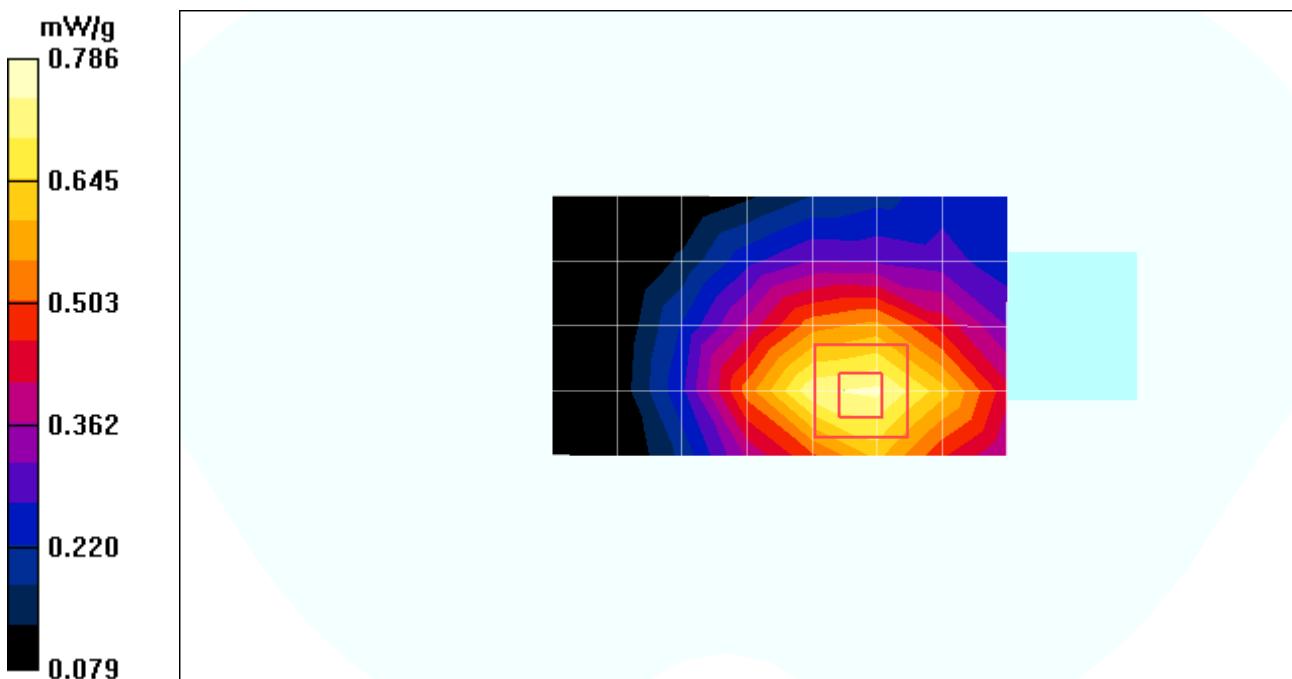
ASUS F3J Bottom Position CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.0 V/m; Power Drift = -0.116 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.725 mW/g; SAR(10 g) = 0.497 mW/g

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



Date/Time: 2007-01-04 1:43:00

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH777.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 848.5$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 57.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH777/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.798 mW/g

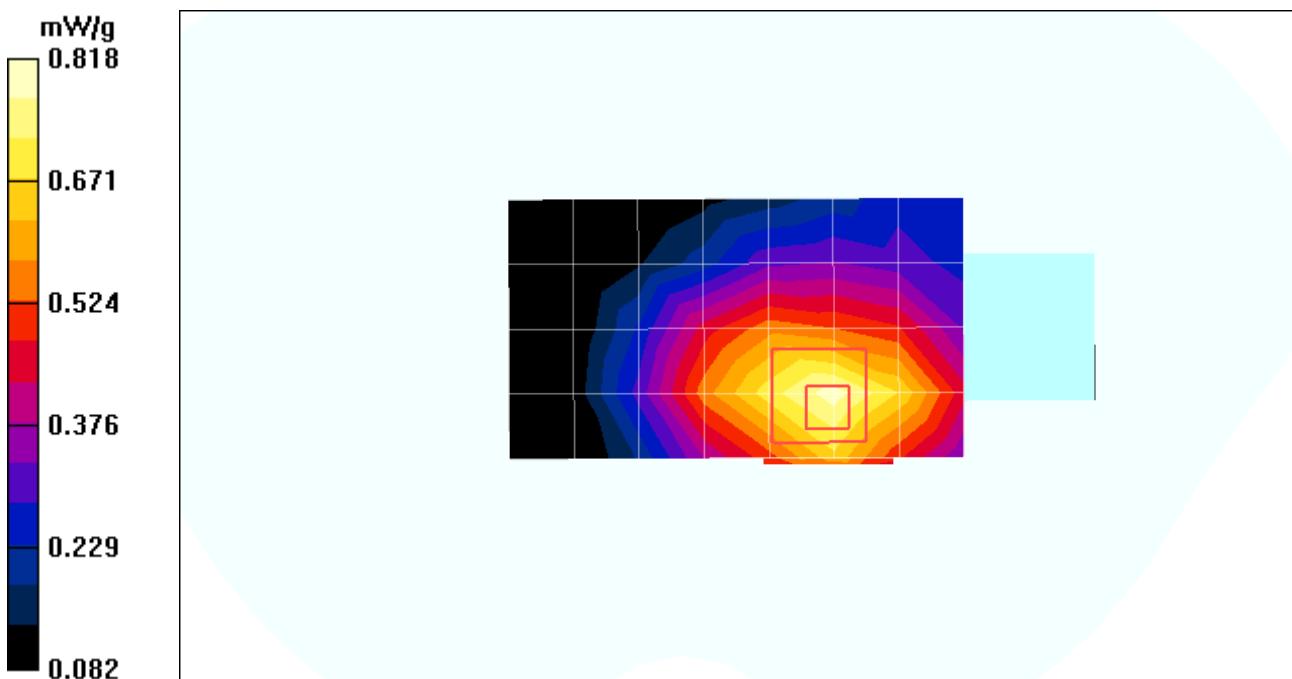
ASUS F3J Bottom Position CH777/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.6 V/m; Power Drift = 0.114 dB

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.740 mW/g; SAR(10 g) = 0.511 mW/g

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



Date/Time: 2007-01-04 5:31:14

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position RC3 CH363.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 836$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position RC3 CH363/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.767 mW/g

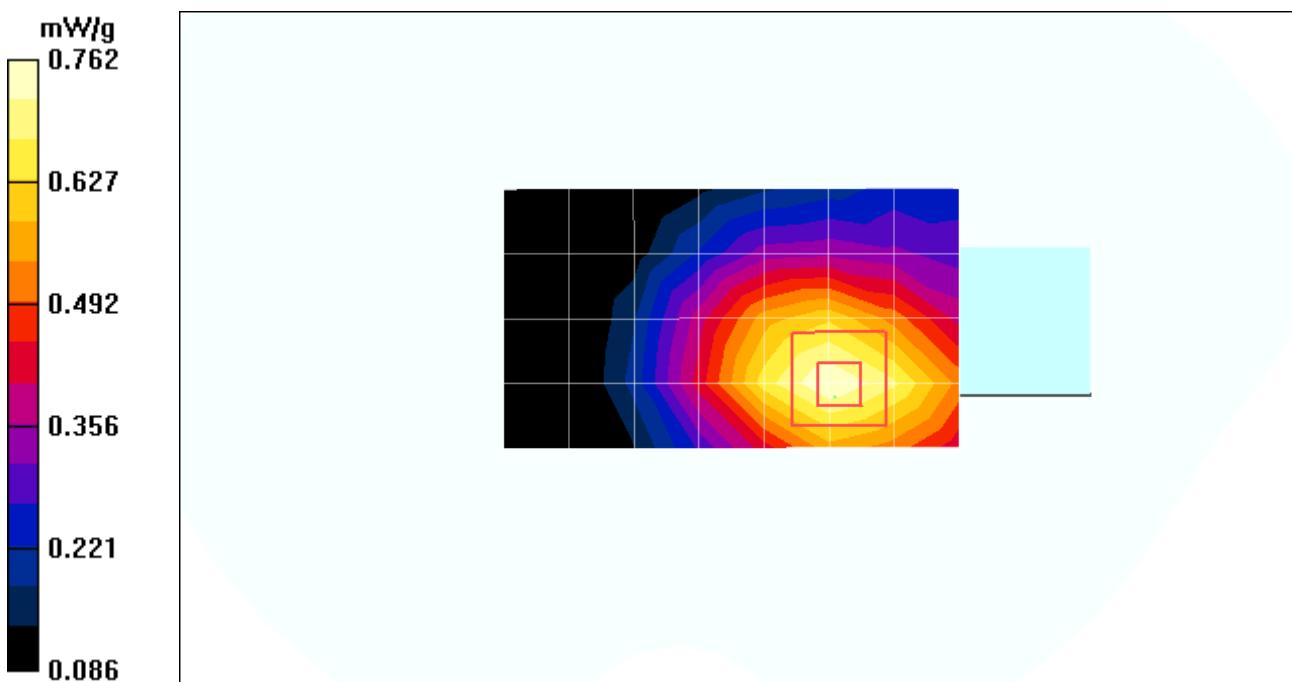
ASUS F3J Bottom Position RC3 CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.2 V/m; Power Drift = -0.193 dB

Peak SAR (extrapolated) = 0.974 W/kg

SAR(1 g) = 0.718 mW/g; SAR(10 g) = 0.504 mW/g

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



Date/Time: 2007-01-04 1:43:00

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH777.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 848.5$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 57.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH777/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.798 mW/g

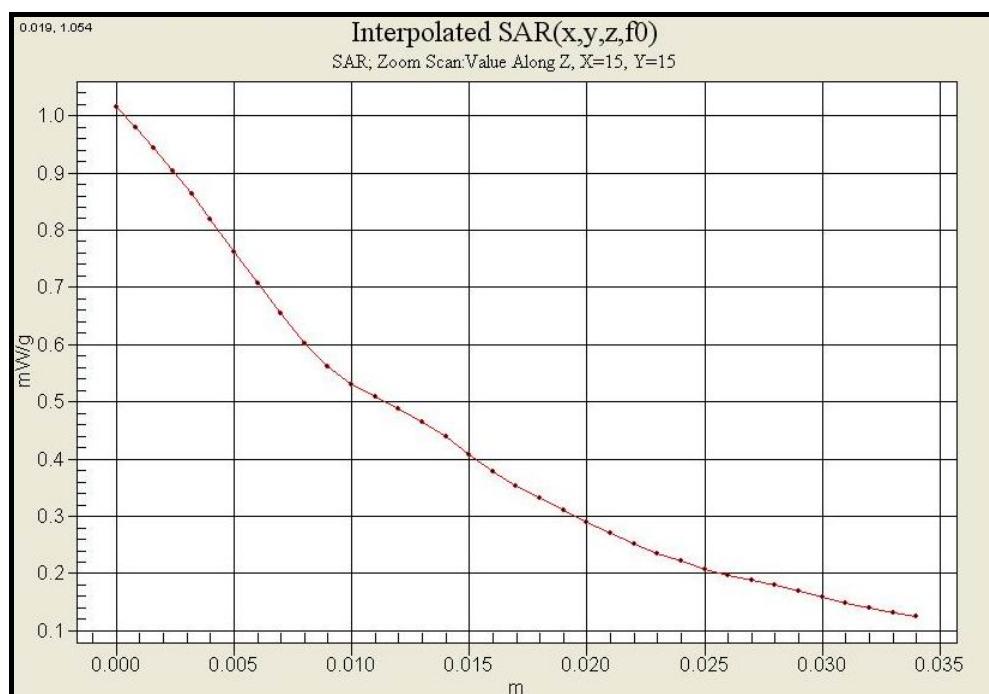
ASUS F3J Bottom Position CH777/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.6 V/m; Power Drift = 0.114 dB

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.740 mW/g; SAR(10 g) = 0.511 mW/g

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



11.3 Laptop 3 [DELL Inspiron C1410]

Date of Test : January 04.2007

Mixture Type: 835MHz Muscle

Tissue Depth: 15.2 Cm

Mode	Application	Frequency		Power drift (dB)	Test Position	1g SAR (W/kg)
		CH	Freq. (MHz)			
Cellular	1x EV-DO	1013	824.70	0.125	Bottom	0.672
		363	835.89	-0.195	Bottom	0.609
		777	848.31	-0.150	Bottom	0.628
	CDMA2000 (1x RTT)	363	835.89	-0.074	Bottom	0.564

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. SAR Measurement System DASY4
4. Phantom Configuration Left Head Flat Phantom Right Head
5. SAR Configuration Head Body Hand
6. Test Signal Call Mode Manu. Test Codes Base Station Simulator

Date/Time: 2007-01-04 11:57:22

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH1013.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech 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; $\sigma = 0.981$ mho/m; $\epsilon_r = 57.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH1013/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.686 mW/g

DELL INSPIRON PP20L Bottom Position CH1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

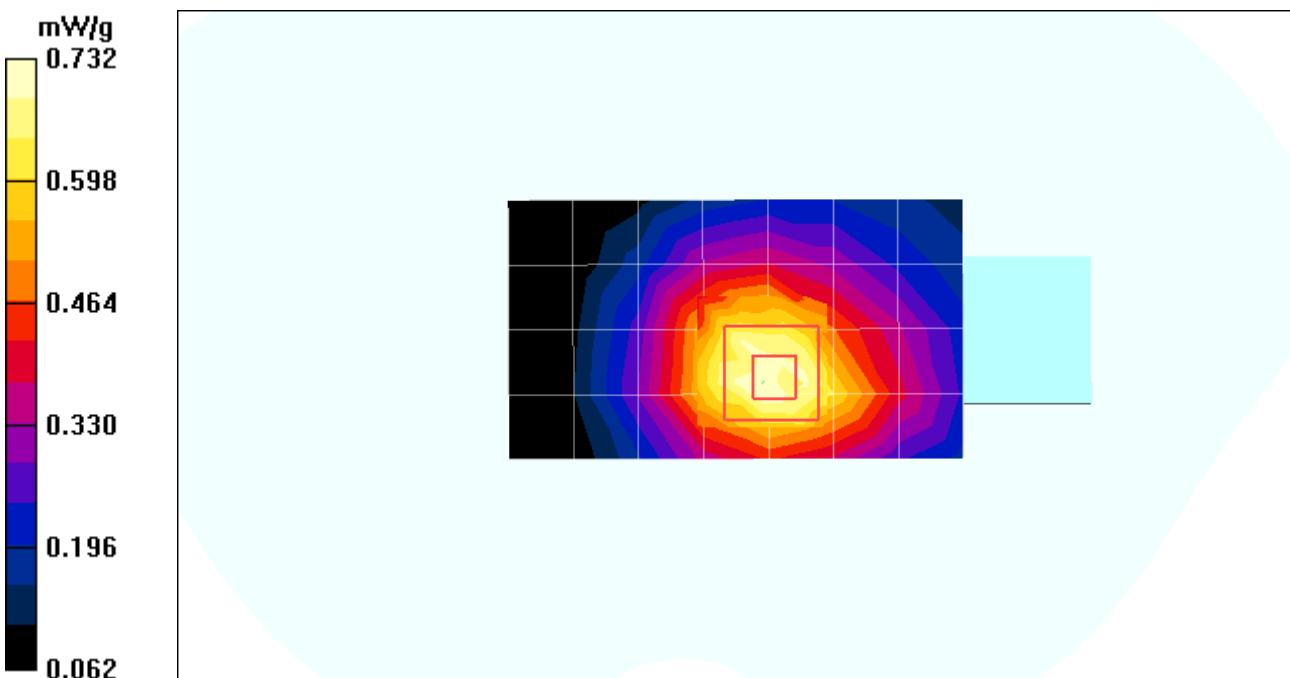
Reference Value = 22.0 V/m; Power Drift = 0.125 dB

Peak SAR (extrapolated) = 0.948 W/kg

SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.464 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.732 mW/g



Date/Time: 2007-01-04 11:39:35

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH363.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 836$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH363/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.639 mW/g

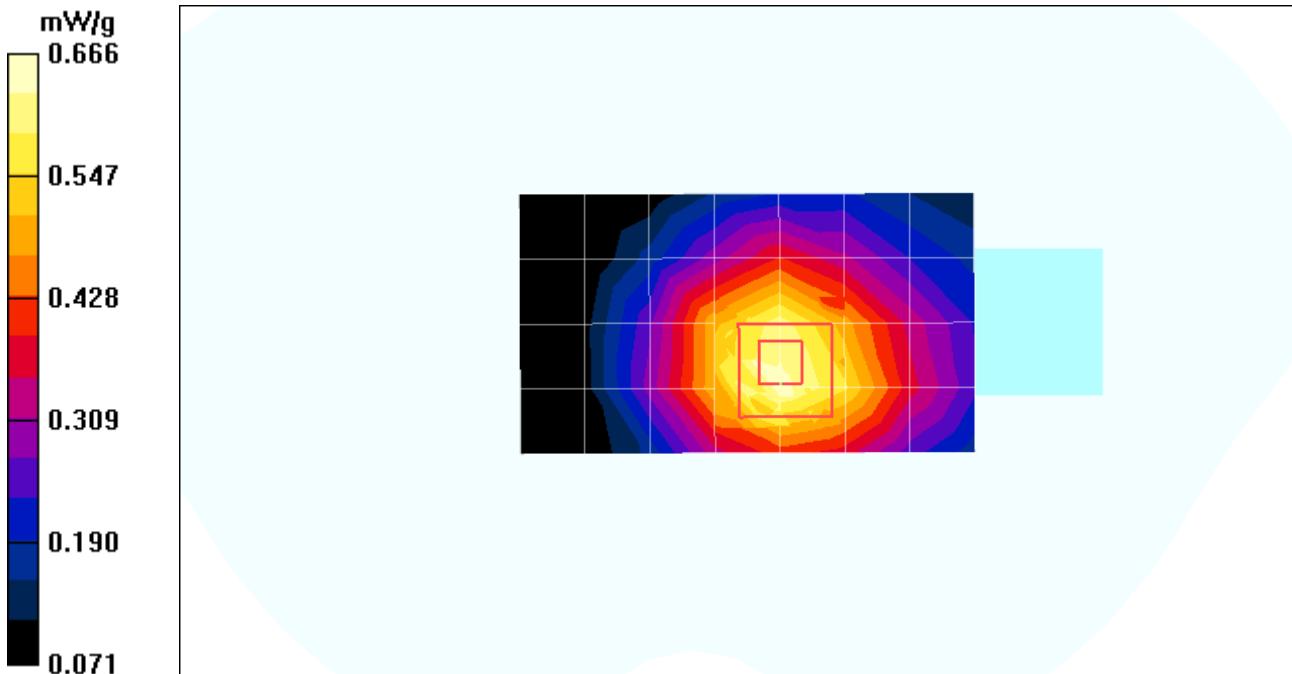
DELL INSPIRON PP20L Bottom Position CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.5 V/m; Power Drift = -0.195 dB

Peak SAR (extrapolated) = 0.823 W/kg

SAR(1 g) = 0.609 mW/g; SAR(10 g) = 0.419 mW/g

Maximum value of SAR (measured) = 0.666 mW/g



Date/Time: 2007-01-04 12:15:30

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH777.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 848.31 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 848.5$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 57.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH777/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.651 mW/g

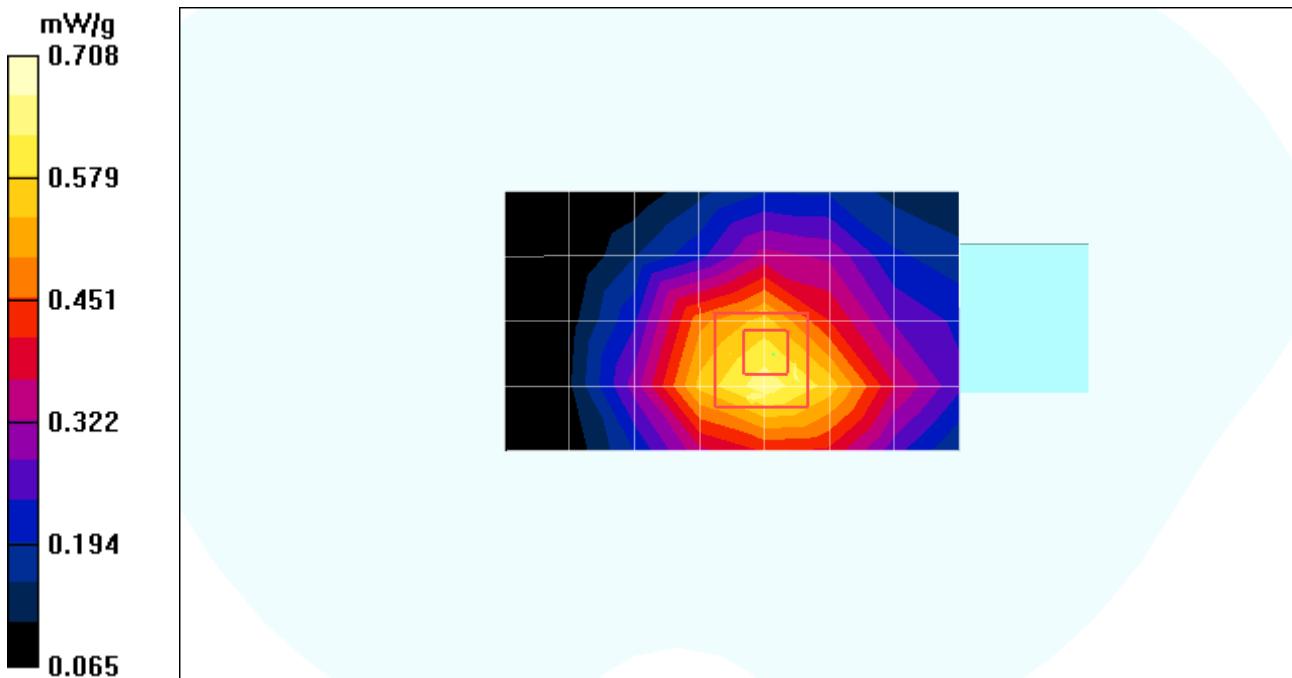
DELL INSPIRON PP20L Bottom Position CH777/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.7 V/m; Power Drift = -0.150 dB

Peak SAR (extrapolated) = 0.910 W/kg

SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.430 mW/g

Maximum value of SAR (measured) = 0.708 mW/g



Date/Time: 2007-01-04 4:40:15

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position RC3 CH363.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: CDMA Frequency: 835.89 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 836$ MHz; $\sigma = 0.998$ mho/m; $\epsilon_r = 57.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position RC3 CH363/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.601 mW/g

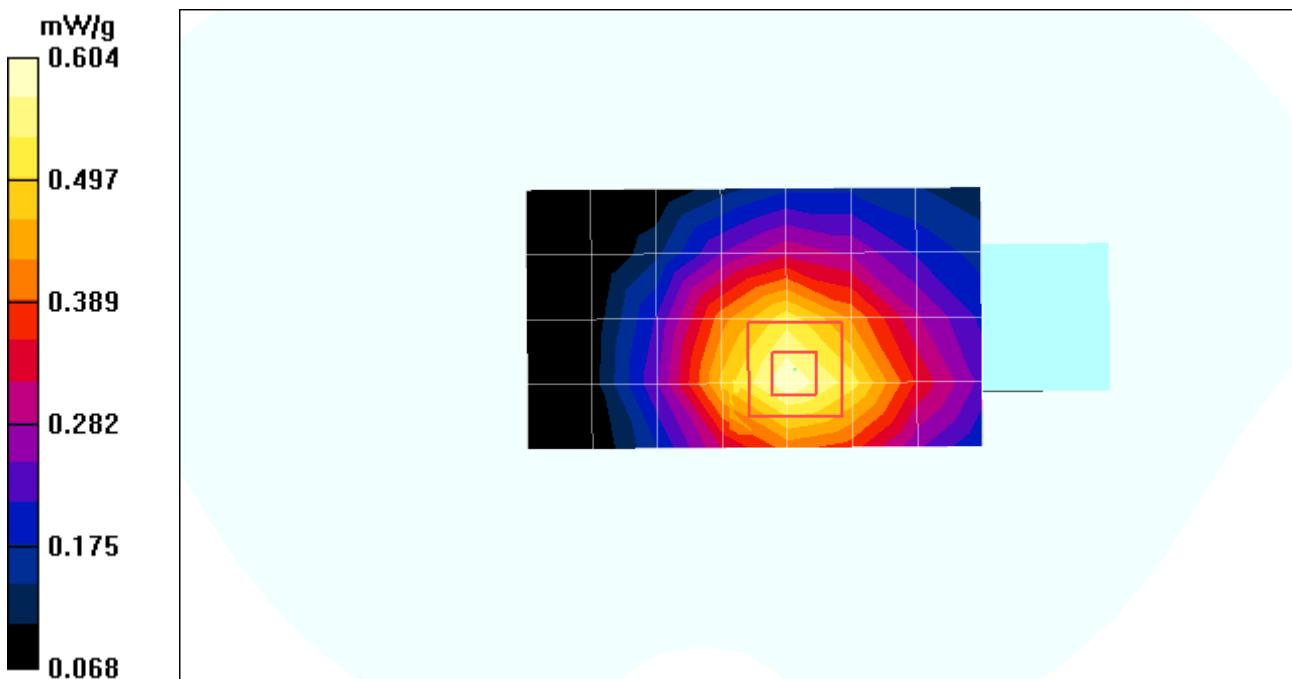
DELL INSPIRON PP20L Bottom Position RC3 CH363/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.4 V/m; Power Drift = -0.074 dB

Peak SAR (extrapolated) = 0.753 W/kg

SAR(1 g) = 0.564 mW/g; SAR(10 g) = 0.392 mW/g

Maximum value of SAR (measured) = 0.604 mW/g



Date/Time: 2007-01-04 11:57:22

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH1013.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech 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; $\sigma = 0.981$ mho/m; $\epsilon_r = 57.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

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

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH1013/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.686 mW/g

DELL INSPIRON PP20L Bottom Position CH1013/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

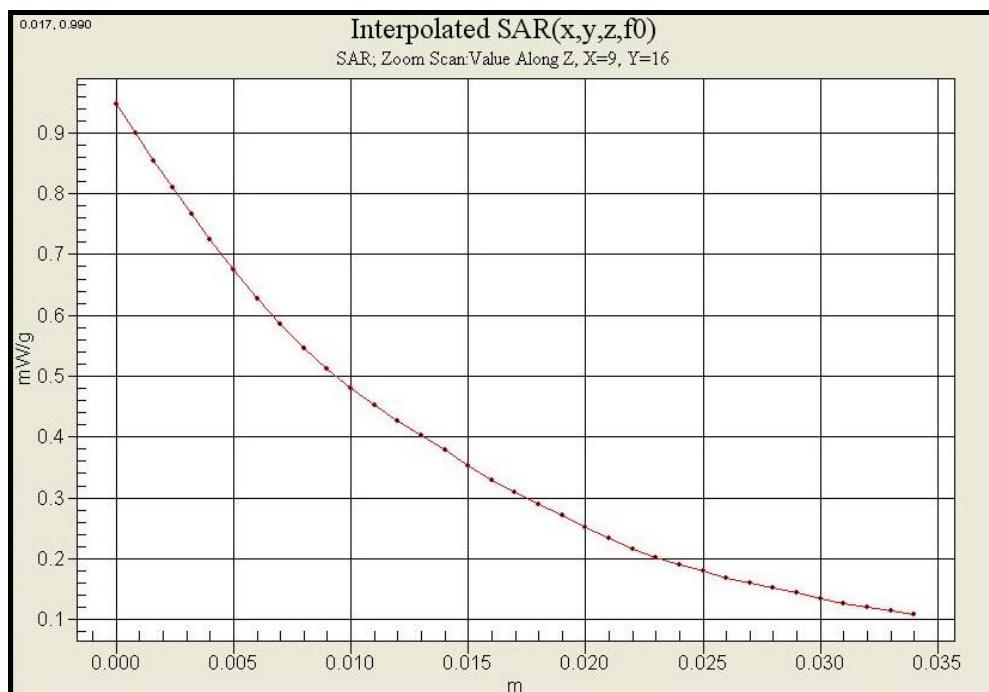
Reference Value = 22.0 V/m; Power Drift = 0.125 dB

Peak SAR (extrapolated) = 0.948 W/kg

SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.464 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.732 mW/g



12. SAR Data Summary (PCS)

12.1 Laptop 1 [Fujitsu C1410]

Date of Test : January 05.2007
 Mixture Type: 1900MHz Muscle
 Tissue Depth: 15.0 Cm

Mode	Application	Frequency		Power drift (dB)	Test Position	1g SAR (W/kg)
		CH	Freq. (MHz)			
PCS	1x EV-DO	25	1851.25	-0.156	Bottom	0.185
		600	1880.00	0.107	Bottom	0.326
		1172	1908.75	0.007	Bottom	0.426
	CDMA2000 (1x RTT)	600	1880.00	-0.191	Bottom	0.309

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. SAR Measurement System
 - DASY4
 - Left Head
 - Flat Phantom
 - Right Head
4. Phantom Configuration
 - Head
 - Body
 - Hand
5. SAR Configuration
 - Manu. Test Codes
 - Base Station Simulator
6. Test Signal Call Mode

Date/Time: 2007-01-05 12:00:35

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH25.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1851.25 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH25/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.214 mW/g

FUJITSU C1410 Bottom Position CH25/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

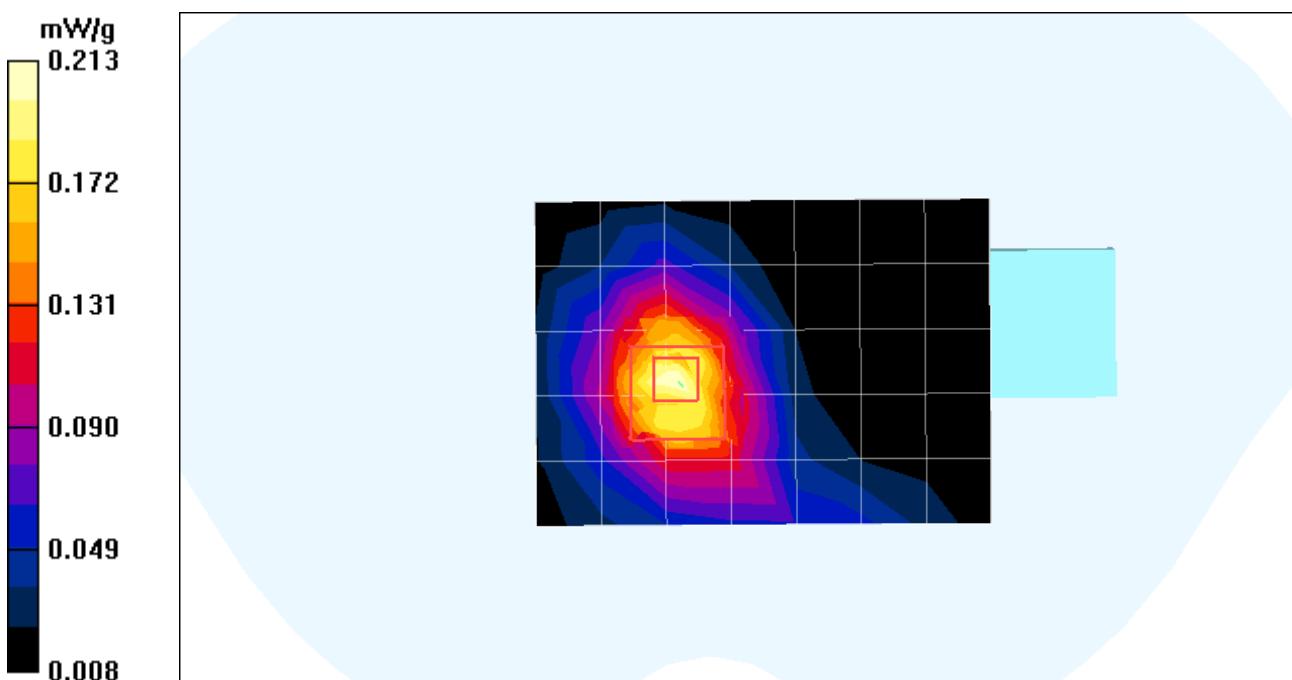
Reference Value = 9.72 V/m; Power Drift = -0.156 dB

Peak SAR (extrapolated) = 0.327 W/kg

SAR(1 g) = 0.185 mW/g; SAR(10 g) = 0.110 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

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



Date/Time: 2007-01-05 11:42:54

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH600.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1880 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH600/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.352 mW/g

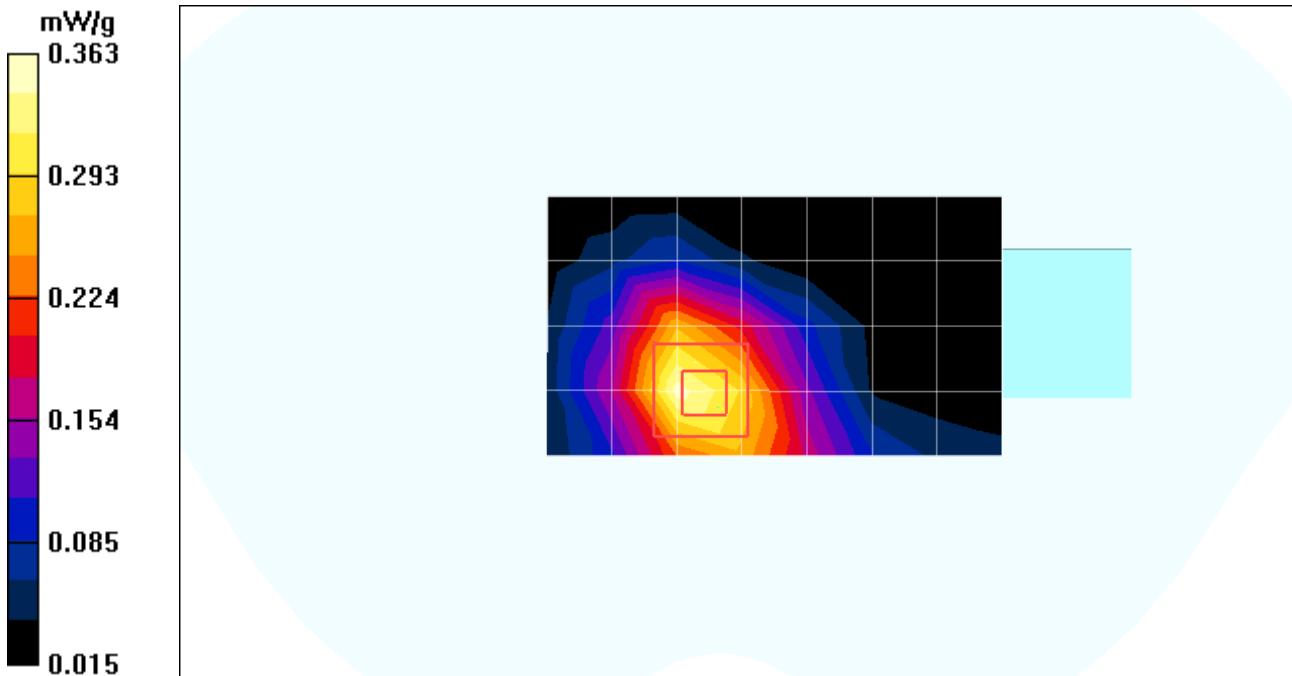
FUJITSU C1410 Bottom Position CH600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.7 V/m; Power Drift = 0.107 dB

Peak SAR (extrapolated) = 0.567 W/kg

SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.199 mW/g

Maximum value of SAR (measured) = 0.363 mW/g



Date/Time: 2007-01-05 12:18:31

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH1175.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1908.75 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH1175/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.354 mW/g

FUJITSU C1410 Bottom Position CH1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

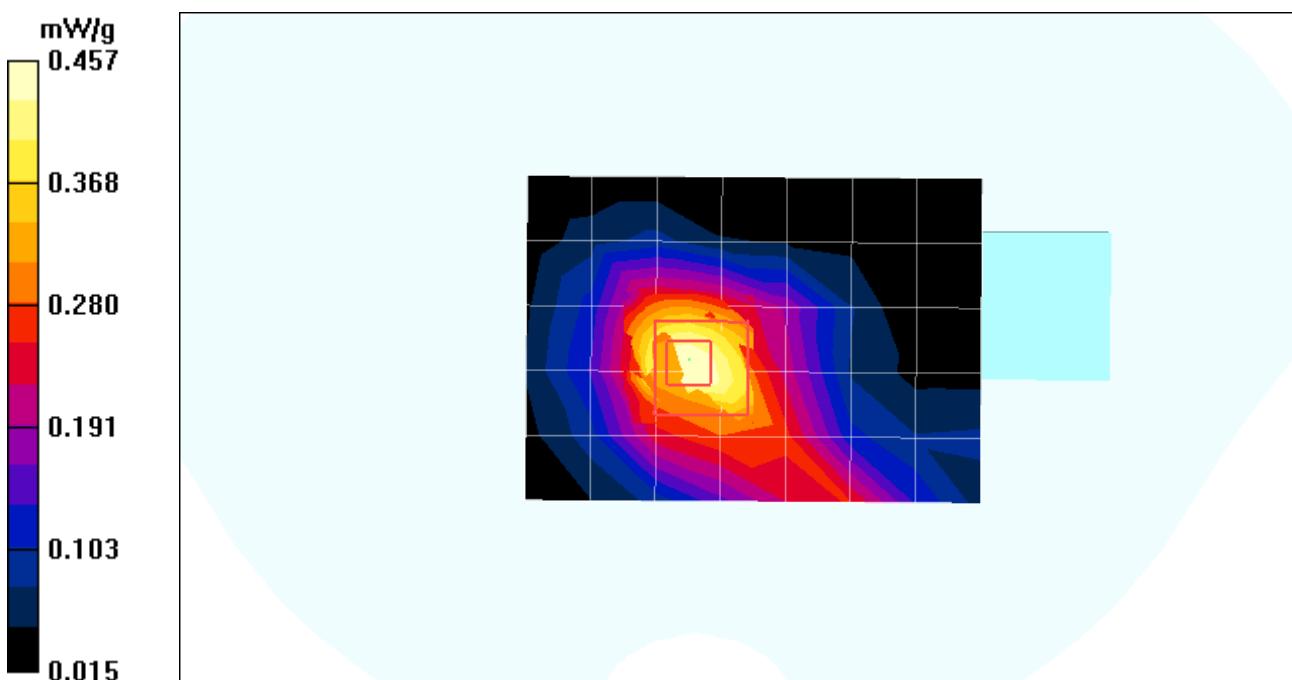
Reference Value = 14.6 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 0.714 W/kg

SAR(1 g) = 0.426 mW/g; SAR(10 g) = 0.255 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.457 mW/g



Date/Time: 2007-01-06 3:54:26

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom RC3 Position CH600.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: PCS Frequency: 1880 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom RC3 Position CH600/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.309 mW/g

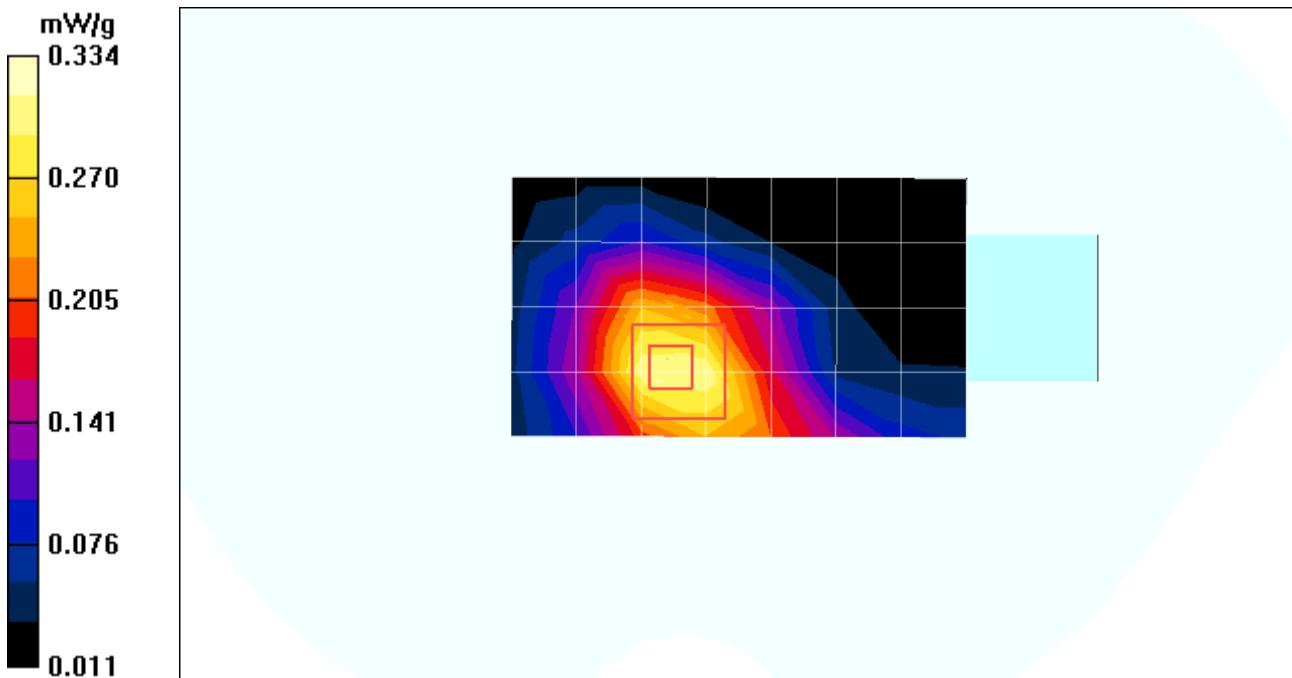
FUJITSU C1410 Bottom RC3 Position CH600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.4 V/m; Power Drift = -0.191 dB

Peak SAR (extrapolated) = 0.531 W/kg

SAR(1 g) = 0.309 mW/g; SAR(10 g) = 0.184 mW/g

Maximum value of SAR (measured) = 0.334 mW/g



Date/Time: 2007-01-05 12:18:31

Test Laboratory: Nemko Korea File Name: [FUJITSU C1410 Bottom Position CH1175.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1908.75 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

FUJITSU C1410 Bottom Position CH1175/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.354 mW/g

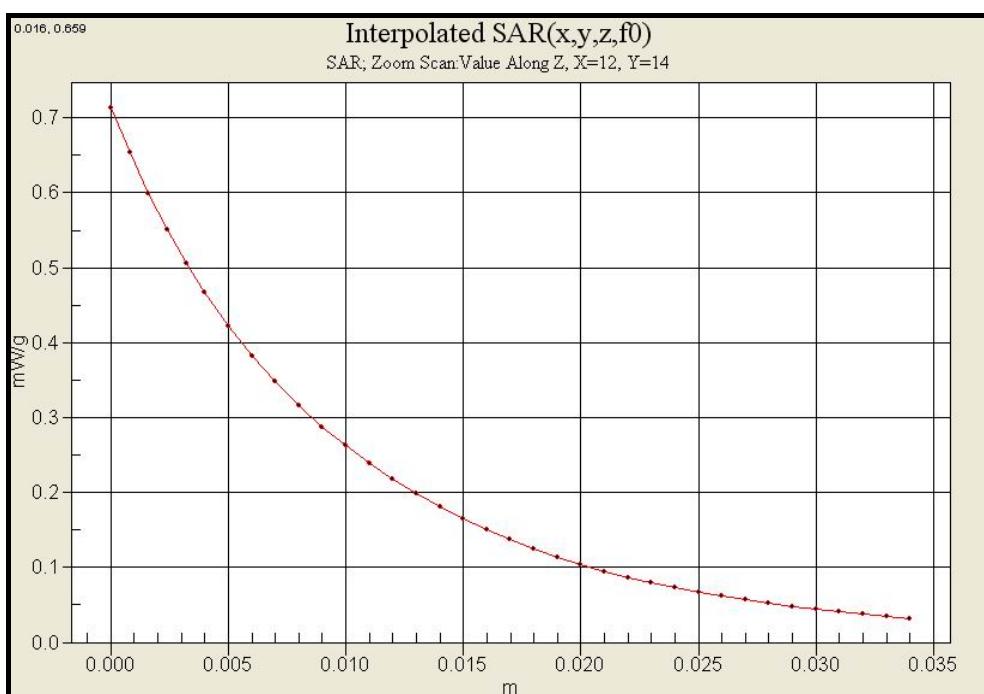
FUJITSU C1410 Bottom Position CH1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.6 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 0.714 W/kg

SAR(1 g) = 0.426 mW/g; SAR(10 g) = 0.255 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.457 mW/g



12.2 Laptop 2 [ASUS F3J]

Date of Test : January 05.2007
Mixture Type: 1900MHz Muscle
Tissue Depth: 15.0 Cm

Mode	Application	Frequency		Power drift (dB)	Test Position	1g SAR (W/kg)
		CH	Freq. (MHz)			
PCS	1x EV-DO	25	1851.25	-0.187	Bottom	0.163
		600	1880.00	0.061	Bottom	0.270
		1172	1908.75	0.074	Bottom	0.317
	CDMA2000 (1x RTT)	600	1880.00	-0.202	Bottom	0.271

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. SAR Measurement System DASY4
4. Phantom Configuration Left Head Flat Phantom Right Head
5. SAR Configuration Head Body Hand
6. Test Signal Call Mode Manu. Test Codes Base Station Simulator

Date/Time: 2007-01-05 2:37:36

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH25.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1851.25 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH25/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.165 mW/g

ASUS F3J Bottom Position CH25/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

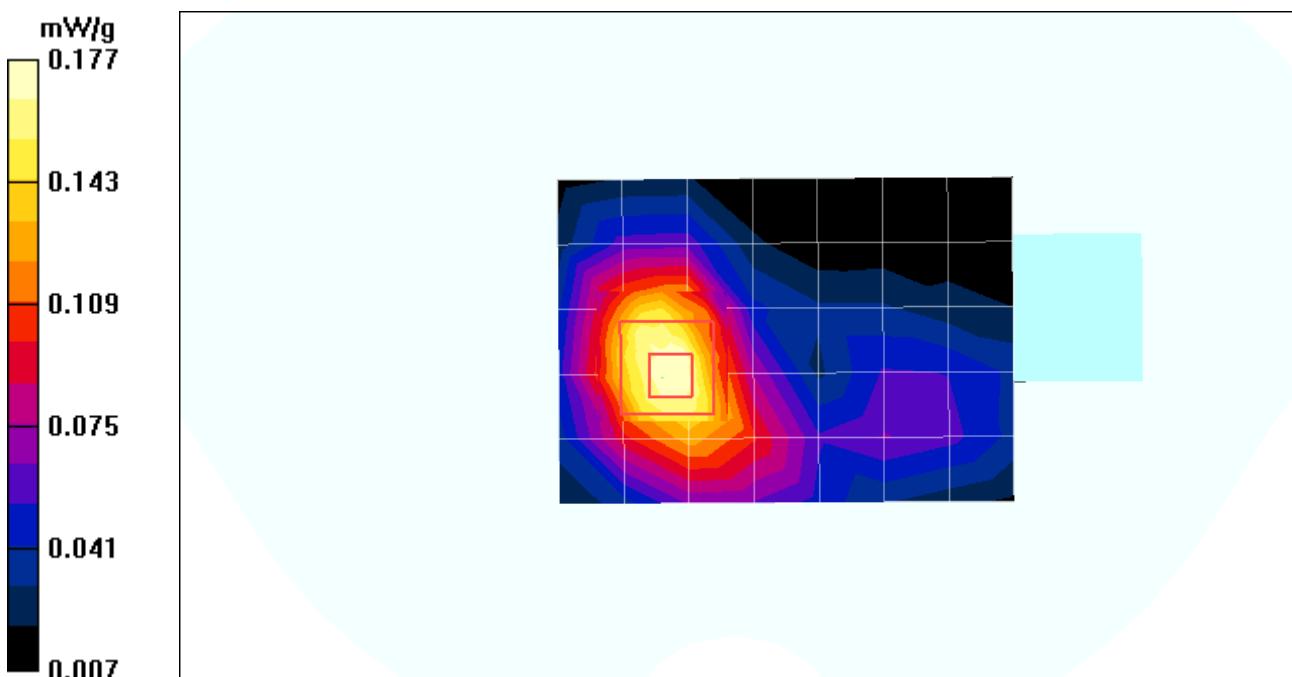
Reference Value = 7.64 V/m; Power Drift = -0.187 dB

Peak SAR (extrapolated) = 0.261 W/kg

SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.099 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.177 mW/g



Date/Time: 2007-01-05 2:18:53

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH600.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1880 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH600/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.276 mW/g

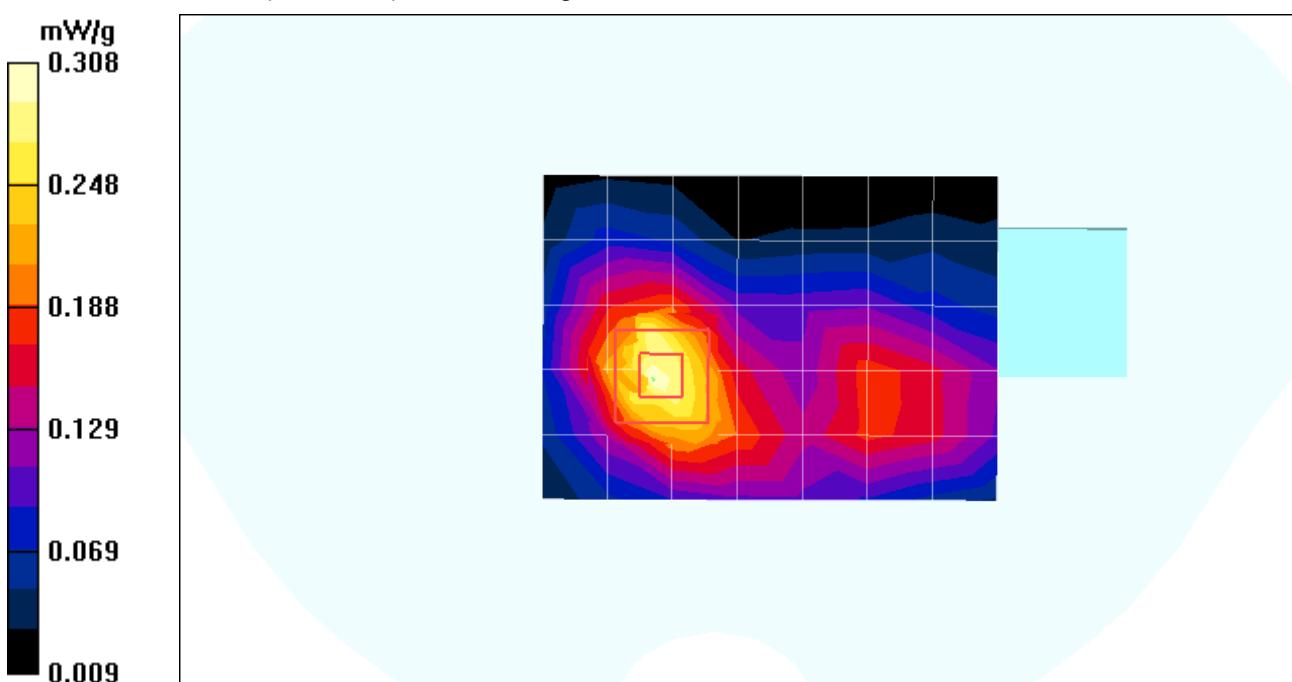
ASUS F3J Bottom Position CH600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.26 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 0.504 W/kg

SAR(1 g) = 0.270 mW/g; SAR(10 g) = 0.160 mW/g

Maximum value of SAR (measured) = 0.308 mW/g



Date/Time: 2007-01-05 3:15:36

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH1175.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1908.75 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH1175/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.336 mW/g

ASUS F3J Bottom Position CH1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

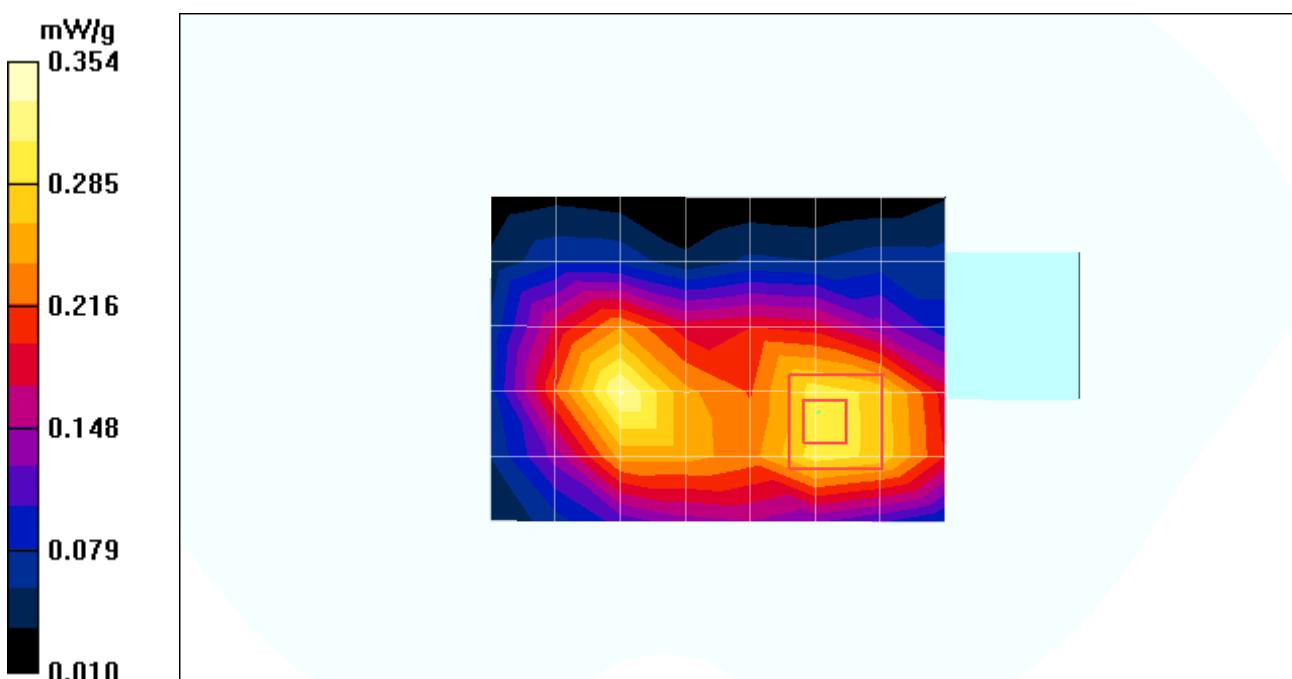
Reference Value = 11.6 V/m; Power Drift = 0.074 dB

Peak SAR (extrapolated) = 0.511 W/kg

SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.192 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.354 mW/g



Date/Time: 2007-01-05 6:42:47

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom RC3 Position CH600.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1880 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom RC3 Position CH600/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.271 mW/g

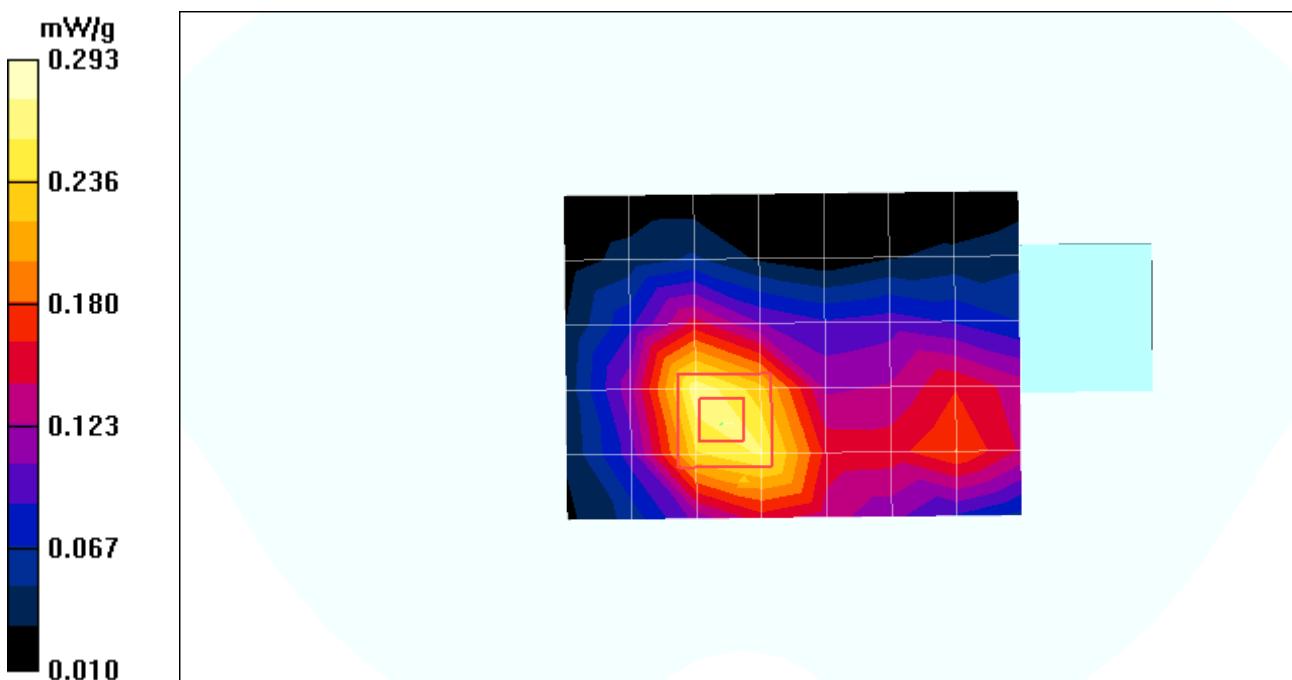
ASUS F3J Bottom RC3 Position CH600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.66 V/m; Power Drift = -0.202 dB

Peak SAR (extrapolated) = 0.447 W/kg

SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.162 mW/g

Maximum value of SAR (measured) = 0.293 mW/g



Date/Time: 2007-01-05 3:15:36

Test Laboratory: Nemko Korea File Name: [ASUS F3J Bottom Position CH1175.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1908.75 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

ASUS F3J Bottom Position CH1175/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.336 mW/g

ASUS F3J Bottom Position CH1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

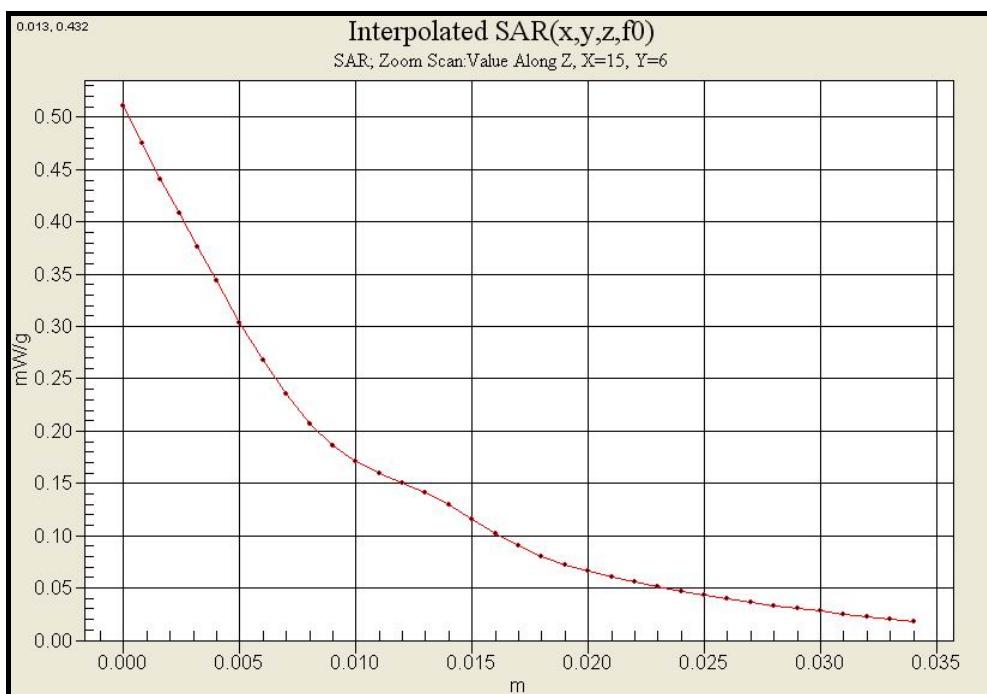
Reference Value = 11.6 V/m; Power Drift = 0.074 dB

Peak SAR (extrapolated) = 0.511 W/kg

SAR(1 g) = 0.317 mW/g; SAR(10 g) = 0.192 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.354 mW/g



12.3 Laptop 3 [DELL Inspiron PP20L]

Date of Test : January 05.2007

Mixture Type: 1900MHz Muscle

Tissue Depth: 15.0 Cm

Mode	Application	Frequency		Power drift (dB)	Test Position	1g SAR (W/kg)
		CH	Freq. (MHz)			
PCS	1x EV-DO	25	1851.25	0.125	Bottom	0.156
		600	1880.00	0.090	Bottom	0.295
		1172	1908.75	0.090	Bottom	0.535
	CDMA2000 (1x RTT)	600	1880.00	-0.206	Bottom	0.277

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. SAR Measurement System

DASY4

4. Phantom Configuration

Left Head Flat Phantom Right Head

5. SAR Configuration

Head Body

Hand

6. Test Signal Call Mode

Manu. Test Codes Base Station Simulator

Date/Time: 2007-01-05 1:10:11

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH25.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1851.25 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1851.25$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH25/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.156 mW/g

DELL INSPIRON PP20L Bottom Position CH25/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

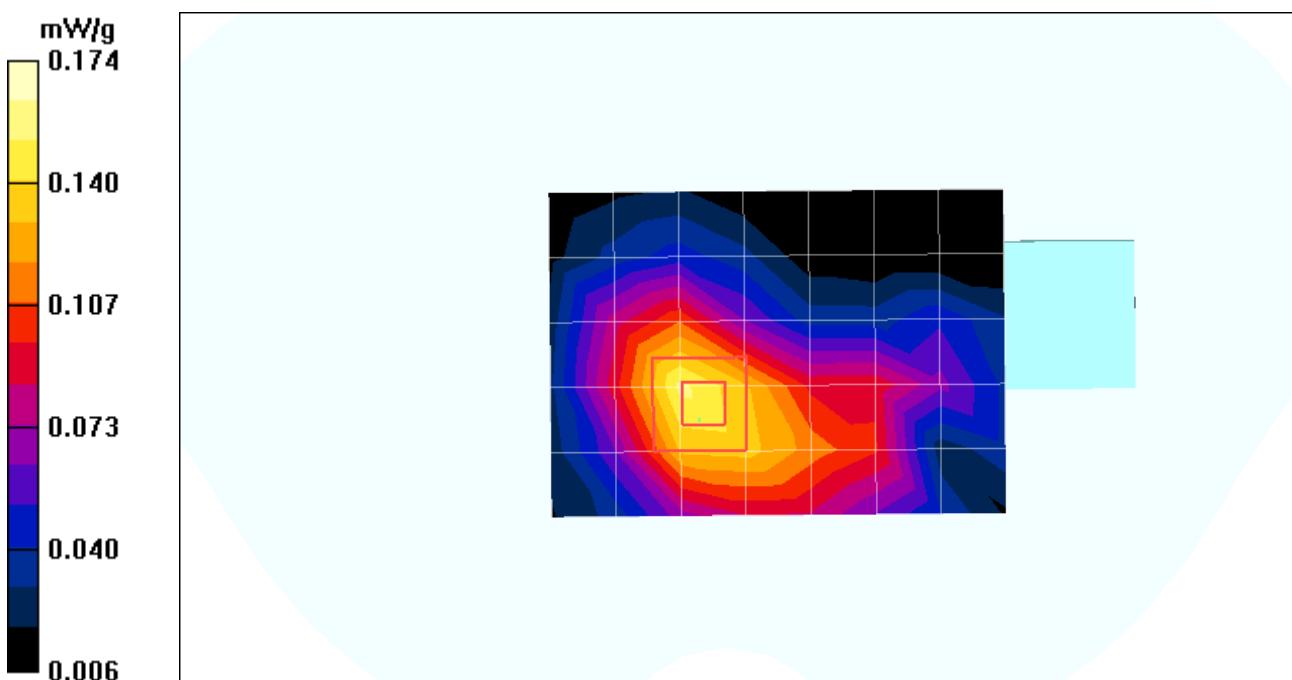
Reference Value = 9.11 V/m; Power Drift = 0.125 dB

Peak SAR (extrapolated) = 0.273 W/kg

SAR(1 g) = 0.156 mW/g; SAR(10 g) = 0.096 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.174 mW/g



Date/Time: 2007-01-05 12:52:32

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH600.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1880 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH600/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.321 mW/g

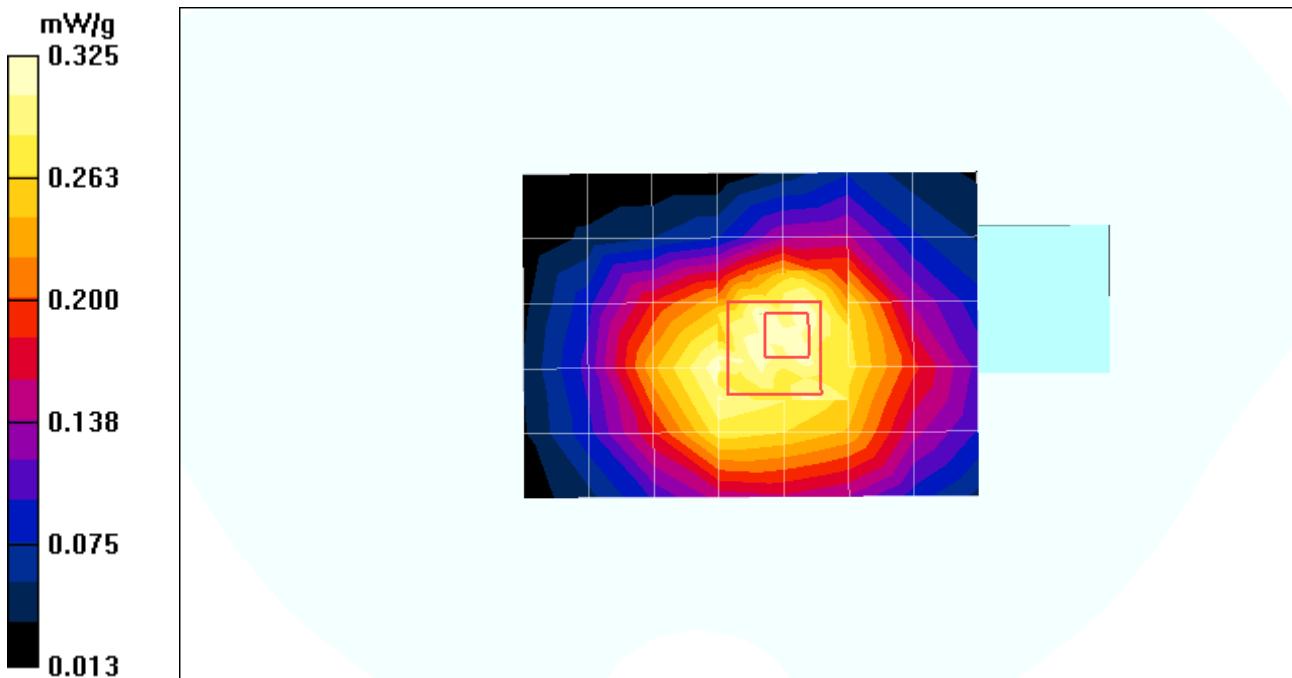
DELL INSPIRON PP20L Bottom Position CH600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.1 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 0.489 W/kg

SAR(1 g) = 0.295 mW/g; SAR(10 g) = 0.189 mW/g

Maximum value of SAR (measured) = 0.325 mW/g



Date/Time: 2007-01-05 1:57:57

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH1175.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1908.75 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH1175/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.555 mW/g

DELL INSPIRON PP20L Bottom Position CH1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

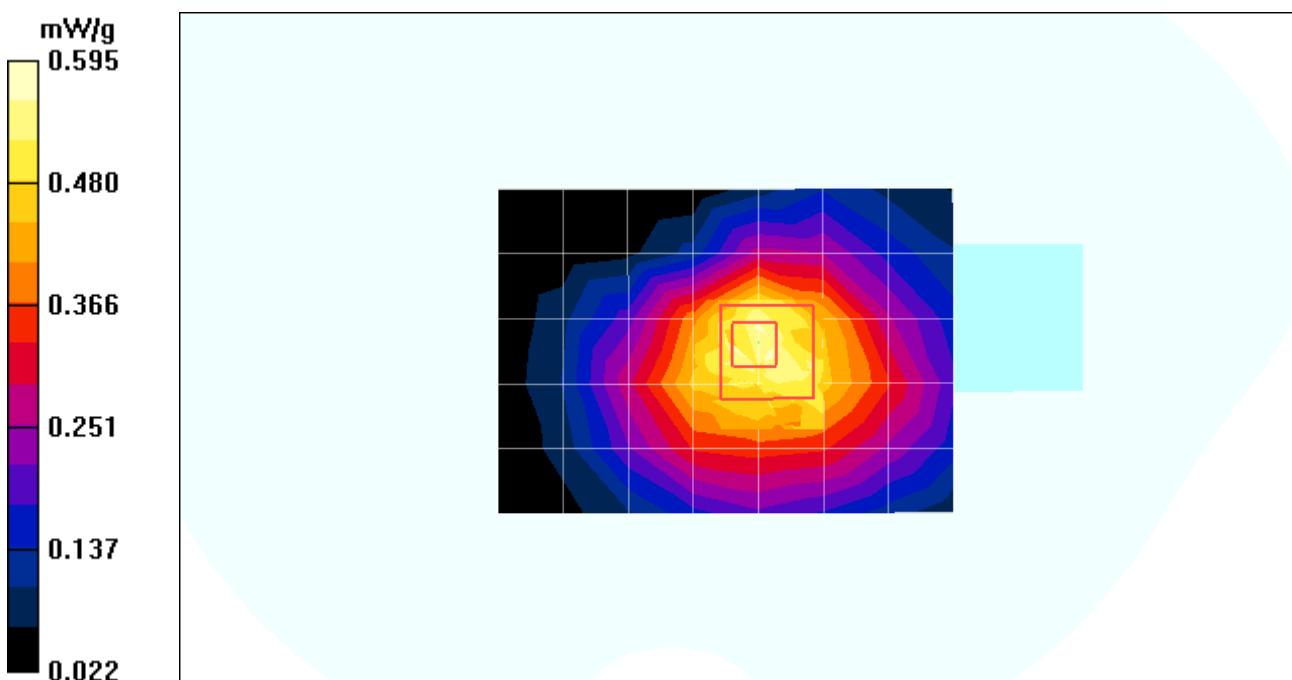
Reference Value = 14.5 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 0.958 W/kg

SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.325 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.595 mW/g



Date/Time: 2007-01-06 2:49:22

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom RC3 Position CH600.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co., Ltd**

Communication System: PCS Frequency: 1880 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom RC3 Position CH600/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.282 mW/g

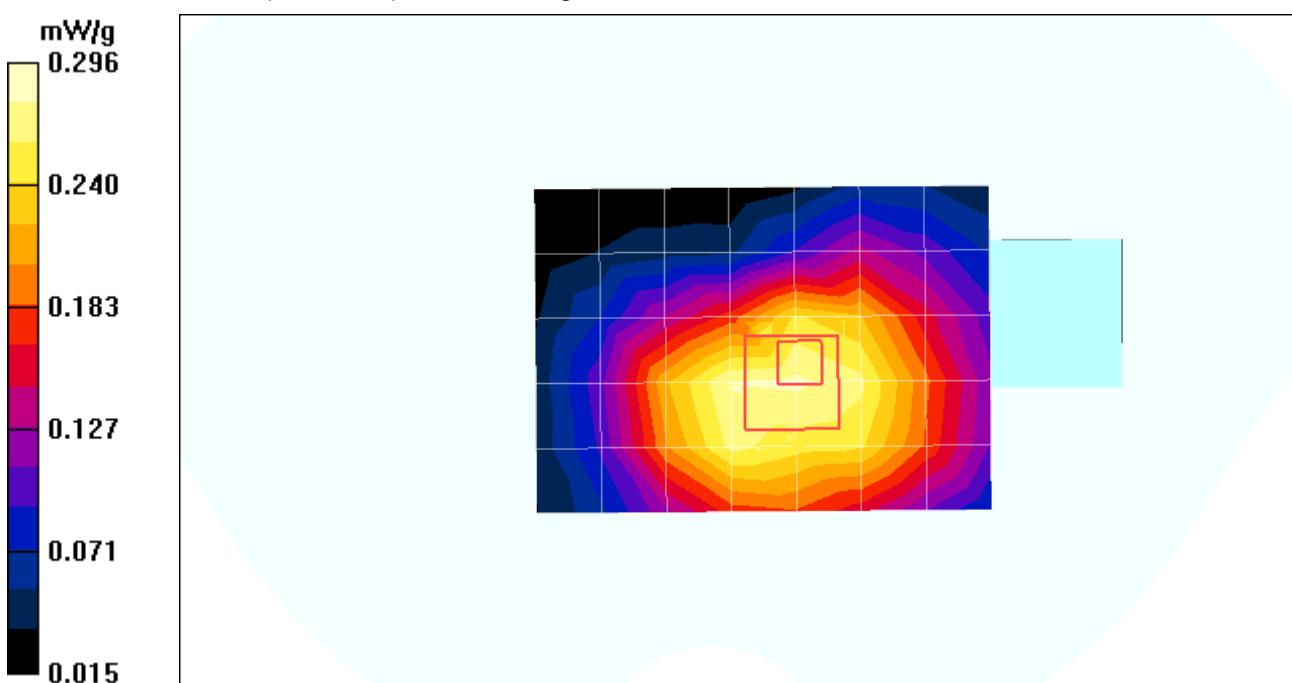
DELL INSPIRON PP20L Bottom RC3 Position CH600/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.9 V/m; Power Drift = -0.206 dB

Peak SAR (extrapolated) = 0.453 W/kg

SAR(1 g) = 0.277 mW/g; SAR(10 g) = 0.176 mW/g

Maximum value of SAR (measured) = 0.296 mW/g



Date/Time: 2007-01-05 1:57:57

Test Laboratory: Nemko Korea File Name: [DELL INSPIRON PP20L Bottom Position CH1175.da4](#)**DUT: TARCDX-650 Type: Express Card Serial: 3B08CA5F Applicant Name: C-motech Co.,Ltd**

Communication System: PCS Frequency: 1908.75 MHz

Duty Cycle: 1:1 Phantom section: Flat Section

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.58$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

Probe: ET3DV6 - SN1591; ConvF(4.67, 4.67, 4.67); Calibrated: 2006-03-23

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn479; Calibrated: 2006-02-23

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

Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

DELL INSPIRON PP20L Bottom Position CH1175/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.555 mW/g

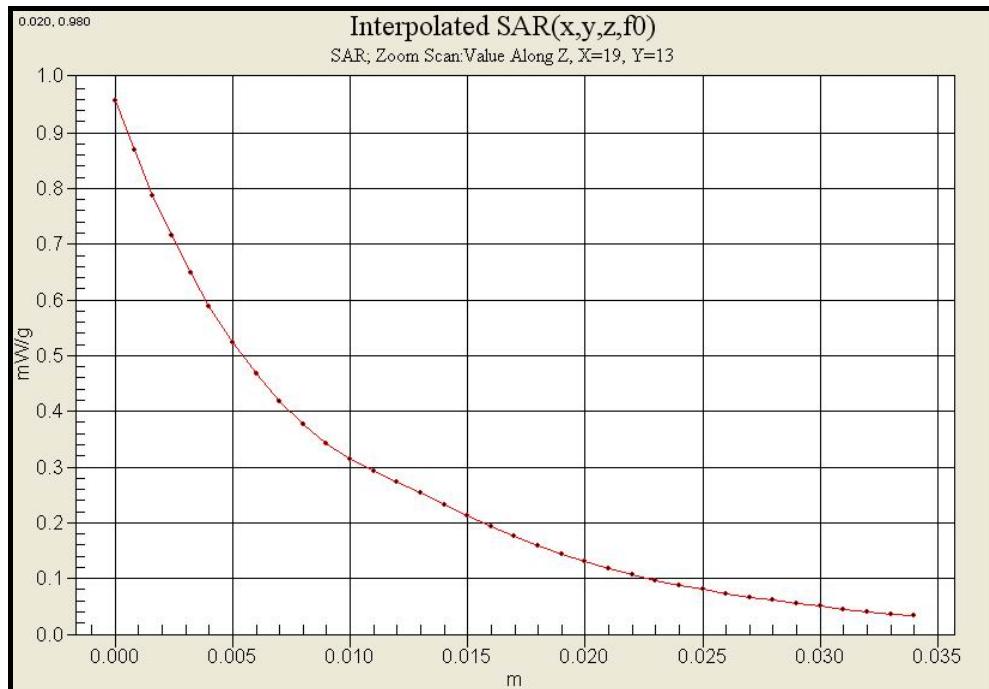
DELL INSPIRON PP20L Bottom Position CH1175/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.5 V/m; Power Drift = 0.090 dB

Peak SAR (extrapolated) = 0.958 W/kg

SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.325 mW/g**Info: Interpolated medium parameters used for SAR evaluation.**

Maximum value of SAR (measured) = 0.595 mW/g



13. SAR Test Equipment

Table 12.1 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	DAE3	479	February.23. 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.07.2006	1 year
PSA Series Spectrum Analyzer	E4440A	MY44022567	December.05.2006	1 year
Wireless Communications Test Set	8960 Series 10	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.05.2006	1 year
Power Sensor	8481A	3318A83210	August.14.2006	1 year
Power Meter	NRVS	835360/002	December.05.2006	1 year
Power Sensor	NRV-Z32	836019/028	December.05.2006	1 year
Series Signal Generator	E4436B	US39260598	December.05.2006	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.

14. References

- [1] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
- [2] EN 50361:2001, "Basic standard fields from mobile phones (200MHz – 3 GHz)", July 2001
- [3] IEC 62209 - 1, "Specific Absorption Rate (SAR) in the frequency range of 300 MHz to 3 GHz
- [4] IEC 62209 - 2, Draft Version 0.9, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body - Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation and Procedures Part 2: Procedure to determine the Specific Absorption Rate (SAR) for ... including accessories and multiple transmitters", December 2004
- [5] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields", Edition 01-01
- [6] ANSI-PC63.19-2001, Draft 3.6, "American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids", April 2005

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 (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. A.1).

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

Figure A.1 SAR Mathematical Equation

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

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

Where :

σ = conductivity of the tissue-simulant material (S/m)

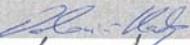
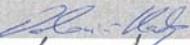
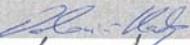
ρ = mass density of the tissue-simulant material (kg/m³)

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.

Appendix B : Probe Calibration

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 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																																																																		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>																																																																			
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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:

TS	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TS / NORM _{x,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., $\theta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

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

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TS (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep (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 $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TS corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

ET3DV6 SN:1591**March 23, 2006**

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 \pm 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.84 \pm 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.83 \pm 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression^B

DCP X	95 mV
DCP Y	95 mV
DCP Z	95 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary EffectTSL **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 OffsetProbe 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%.

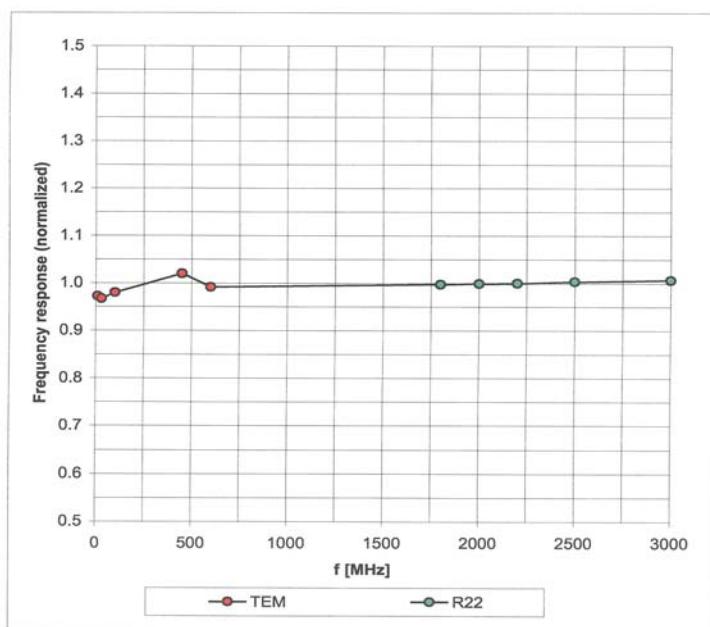
^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Page 8).^B Numerical linearization parameter: uncertainty not required.

ET3DV6 SN:1591

March 23, 2006

Frequency Response of E-Field

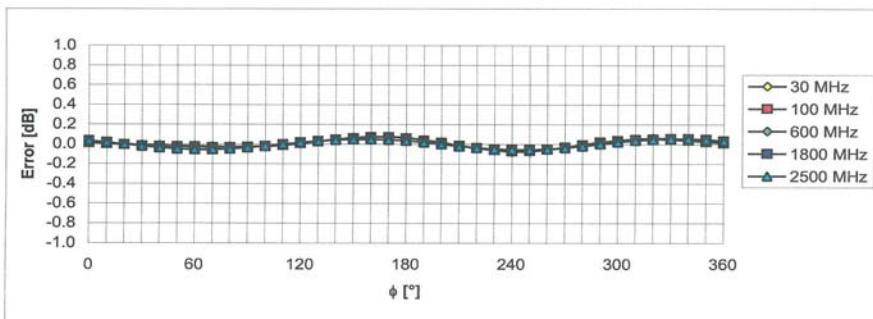
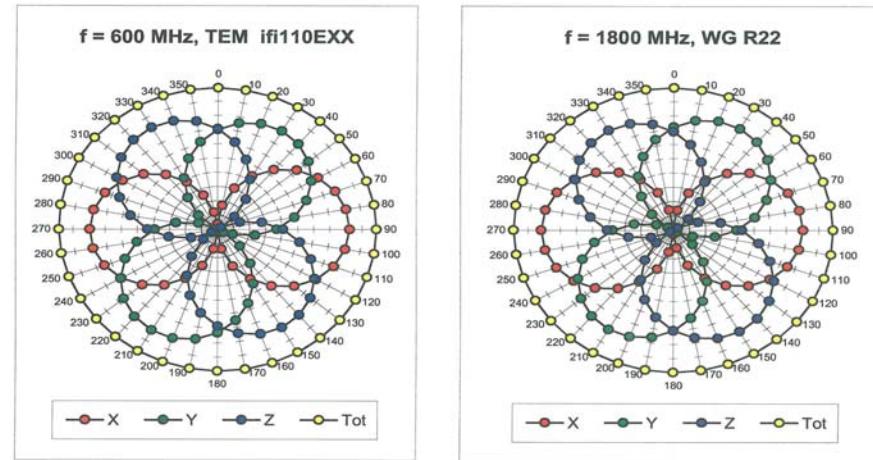
(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

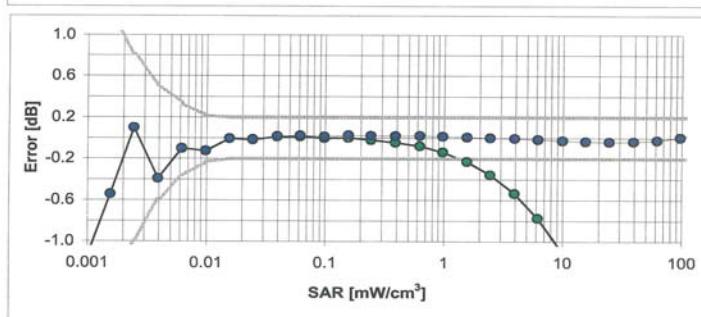
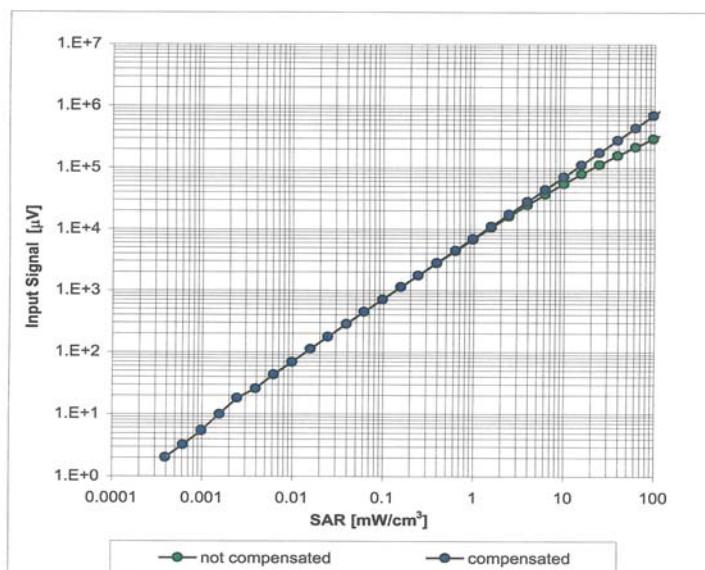
ET3DV6 SN:1591

March 23, 2006

Receiving Pattern (ϕ), $\theta = 0^\circ$ Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

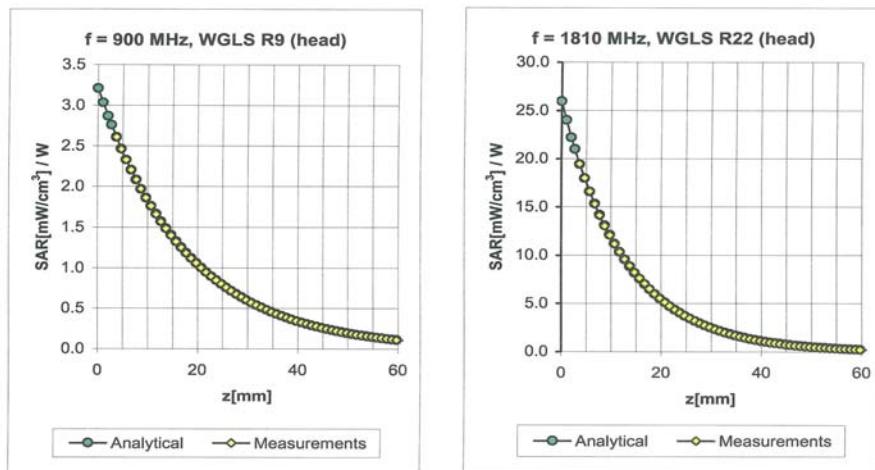
ET3DV6 SN:1591

March 23, 2006

Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

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)

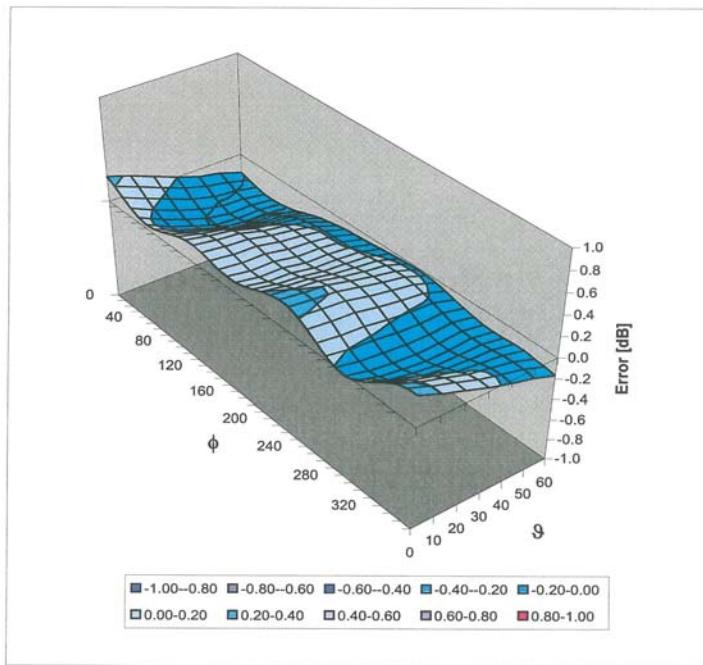
^c The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

ET3DV6 SN:1591

March 23, 2006

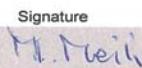
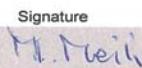
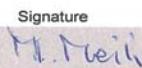
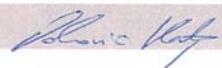
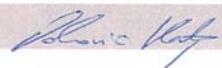
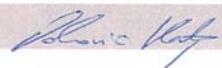
Deviation from Isotropy in HSL

Error (ϕ, θ), f = 900 MHz



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

Appendix C : Dipole Calibrations

<p>Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland</p>		 <p>S Schweizerischer Kalibrierdienst C Service suisse d'étalonnage C Servizio svizzero di taratura S Swiss Calibration Service</p>																												
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Client Nemko (Dymstec)	Accreditation No.: SCS 108																													
CALIBRATION CERTIFICATE																														
Object D835V2 - SN: 4d017																														
Calibration procedure(s) QA CAL-05.v6 Calibration procedure for dipole validation kits																														
Calibration date: February 20, 2006																														
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<small>Certificate No: D835V2-4d017_Feb06</small>		<small>Page 1 of 6</small>																												
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Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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S Swiss Calibration Service

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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:

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- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4 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 cm³ (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 cm³ (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 $j\Omega$
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; $\sigma = 0.945$ mho/m; $\epsilon_r = 42.1$; $\rho = 1000$ kg/m³

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:

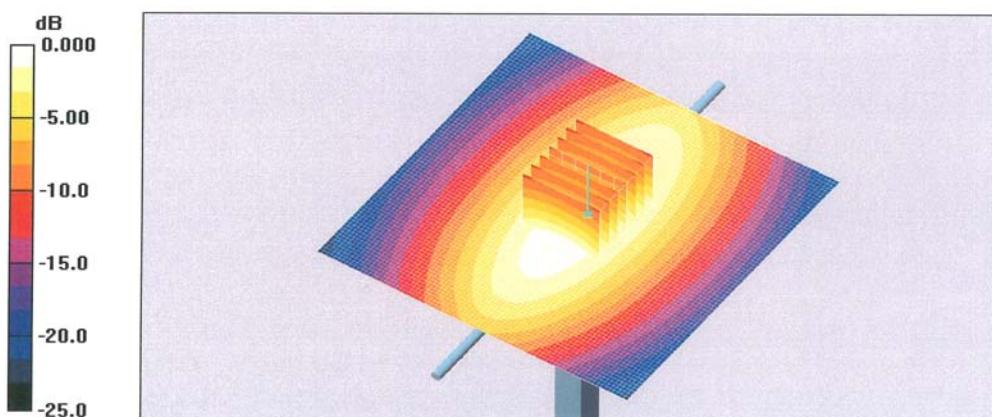
Measurement grid: dx=5mm, dy=5mm, dz=5mm

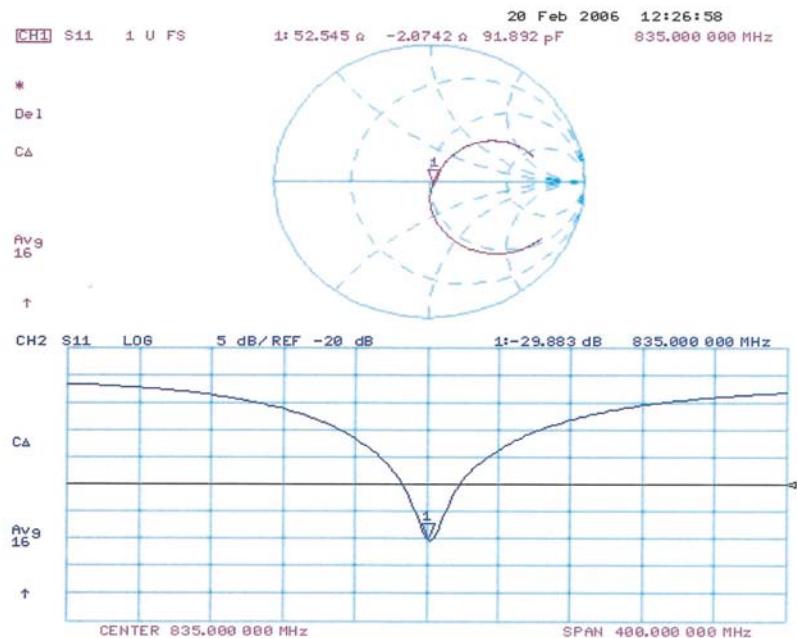
Reference Value = 54.1 V/m; Power Drift = -0.011 dB

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



Impedance Measurement Plot for Head TSL

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



S Schweizerischer Kalibrierdienst
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Nemko (Dymstec)**

Certificate No: **D1900V2-5d059_Jul06**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d059**

Calibration procedure(s) **QA CAL-05.v6**
Calibration procedure for dipole validation kits

Calibration date: **July 17, 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 $(22 \pm 3)^\circ\text{C}$ 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

Calibrated by: Name **Marcel Fehr** Function **Laboratory Technician** Signature

Approved by: Name **Katja Pokovic** Function **Technical Manager** Signature

Issued: **July 18, 2006**

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

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



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The Swiss Accreditation Service is one of the signatories to the EA
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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

- DASY4 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	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.44 mho/m ± 6 %
Head TSL temperature during test	(22.9 ± 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	9.56 mW / g
SAR normalized	normalized to 1W	38.2 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	37.4 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.04 mW / g
SAR normalized	normalized to 1W	20.2 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	19.9 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	54.5 Ω + 3.0 $j\Omega$
Return Loss	- 25.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.196 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	March 19, 2004

DASY4 Validation Report for Head TSL

Date/Time: 17.07.2006 15:58:20

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d059

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(4.74, 4.74, 4.74); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

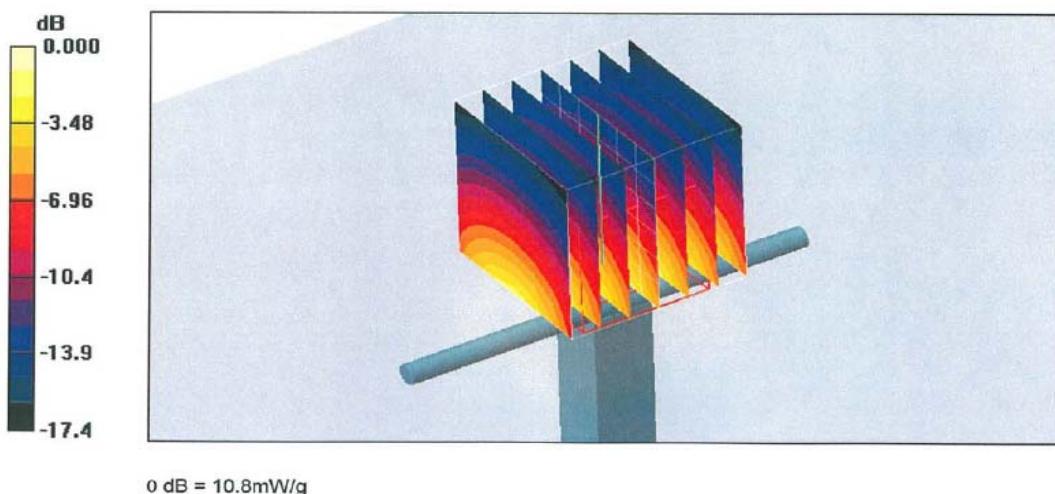
Measurement grid: dx=5mm, dy=5mm, dz=5mm

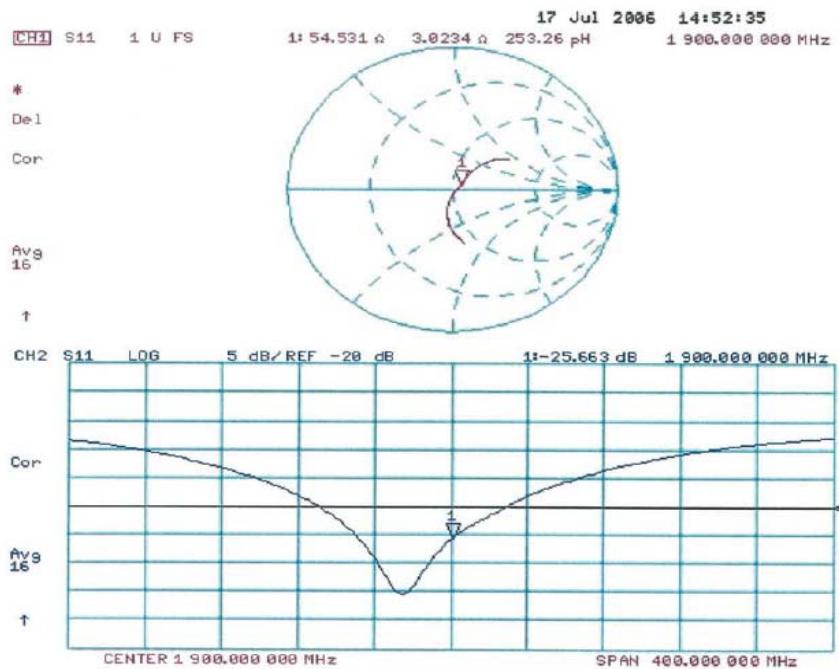
Reference Value = 92.9 V/m; Power Drift = -0.075 dB

Peak SAR (extrapolated) = 16.5 W/kg

SAR(1 g) = 9.56 mW/g; SAR(10 g) = 5.04 mW/g

Maximum value of SAR (measured) = 10.8 mW/g



Impedance Measurement Plot for Head TSL

Appendix E : Test Position of EUT

Fujitsu C1410



ASUS F3J



DELL Inspiron PP20L

