Specific Absorption Rate (SAR) Test Report

for

MITAC Technology Corporation

on the

Notebook Personal Computer

Report No.	:	FA821324
Trade Name	:	MITAC / GETAC
Model Name	:	M230
FCC ID	:	MAU032
Date of Testing	:	Mar. 04, 2008
Date of Report	:	Apr. 08, 2008
Date of Review	:	Apr. 08, 2008

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SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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1. Statement of Compliance

The Specific Absorption Rate (SAR) maximum result found during testing for the MITAC Technology Corporation Notebook Personal Computer MITAC / GETAC M230 are as follows (with expanded uncertainty 21.9%.)

GSM850 (W/kg)	PCS1900 (W/Kg)	WCDMA Band V (W/kg)	WCDMA Band II (W/kg)
0.00259	0.023	0.00215	0.015

They are in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1999 and had been tested in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C (Edition 01-01).

Approved by

Roy Wu
Manager

2. Administration Data

2.1 Testing Laboratory

Company Name : Sporton International Inc.
Department : Antenna Design/SAR
Address : No.52, Hwa-Ya 1st RD., Hwa Ya Technology Park, Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
Telephone Number : 886-3-327-3456
Fax Number : 886-3-328-4978

2.2 Detail of Applicant

Company Name : MITAC Technology Corporation
Address : No.1, R&D Road 2, Hsinchu Science-Based industrial Park, Hsinchu 300, Taiwan, R.O.C.

2.3 Detail of Manufacturer

Company Name :
1. MITAC Technology Corporation
2. Getac Technology (Kunshan) Co., Ltd.

Address :
1. No. 1, R&D Road 2, Hsinchu Science-Based industrial Park, Hsinchu 300, Taiwan, R.O.C.
2. No. 269, 2nd Road, Export Processing Zone, Changjiang South Road, Kunshan, Jiangsu, P.R.C Zip code: 215300

2.4 Application Details

Date of reception of application: Feb. 13, 2008
Start of test : Mar. 04, 2008
End of test : Mar. 04, 2008

3. General Information

3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
DUT Type	Notebook Personal Computer
Trade Name	MITAC / GETAC
Model Name	M230
FCC ID	MAU032
Tx Frequency	GSM850 : 824 MHz ~ 849 MHz PCS1900 : 1850 MHz ~1910 MHz WCDMA Band V : 824 MHz ~ 849 MHz WCDMA Band II : 1850 MHz ~ 1910 MHz
Rx Frequency	GSM850 : 869 MHz ~ 894 MHz PCS1900 : 1930 MHz ~ 1990 MHz WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	GSM850 : 31.91 dBm (GSM) / 25.74 dBm (GPRS12) / 26.96 dBm (EDGE12) PCS1900 : 28.64 dBm (GSM) / 28.54 dBm (GPRS12) / 26.04 dBm (EDGE12) WCDMA Band V : 22.66 dBm(12.2kbps) / 22.96 dBm(64kbps) / 22.95 dBm(144kbps) / 23.06 dBm(384kbps) / 22.83 dBm (12.2kbps+HSDPA) WCDMA Band II : 23.64 dBm(12.2kbps) / 23.43 dBm(64kbps) / 23.46 dBm(144kbps) / 23.41 dBm(384kbps) / 23.36 dBm (12.2kbps+HSDPA)
HW Version	2.1.4.0
SW Version	R2.0.1.1 Build1444
GPRS / EGPRS Multislot class	12
Type of Modulation	GSM / GPRS : GMSK EDGE : 8PSK WCDMA / HSDPA : QPSK
DUT Stage	Identical Prototype

3.2 Basic Description of Equipment under Test

Equipment		Notebook Personal Computer
Trade Name		MITAC / GETAC
Model Name		M230
FCC ID		MAU032
AC Adapter	**Brand Name**	EPS
	Model Name	F10903-A
	Power Rating	I/P: 100-240Vac, 50-60Hz, 1.2A; O/P: 19Vdc, 4.75A
	AC Power Cord Type	1.8 meter shielded cable without ferrite core
Battery	**Brand Name**	MITAC
	Model Name	BP-LC2600/32-01PI
	Power Rating	11.1Vdc, 5200mAh
	Type	Li-ion

Remark:

1. Above EUT's information was declared by manufacturer. Please refer to the specifications of manufacturer or User's Manual for more detailed features description.

Notebook System Specification				
		Manufacturer	**Model Name**	**Description**
a.	CPU	Intel	Core 2 L7400	1.5GHz
b.	Power Adapter Type	EPS	F10903-A	INPUT:100-240V, 1.2A, 50/60Hz OUTPUT:19V, 4.75A
c.	Hard Disk Driver	Toshiba	MK8032GSX	80GB
		Toshiba	MK1234GSX	120GB
		Toshiba	MK1637GSX	160GB
d.	DVD Dual	Panasonic	UJ-840	N/A
		Panasonic	UJ-850	N/A
e.	Modem Card	Conexant	RD-02-D330	N/A
f.	3G WCDMA card	Sierra Wireless	MC8755V	N/A
g.	GPS Module	Globalsat	ET-301	N/A
h.	LCD	CHI MEI	N150P5-L02 Rev C1	N/A
i.	Battery	MITAC	BP-LC2600/32-01PI	11.1V, 5200mAh
j.	DDR Memory	HYNIX	HYMP512S64CP8-Y5 AB	1G*2
k.	Inverter	MITAC	412116000002	Input: 8.5-20Vdc, 0.9A Output: 1730V min, 6.5mA max
l.	USB Connector			two
m.	RJ11 Connector			one
n.	Serial Port			two
o.	RJ45 Connector			one
p.	VGA Connector			one
q.	Line out Port			one
r.	Line-in Port			one
s.	PCMCIA Slot			two
t.	DC IN Port			one
u.	1394B Port			one
v.	Dock Port			one
w.	Power Cord			Non-shielded, Detachable
x.	WWAN Right antenna	MITAC	P/N: 313002000361	-0.51dBi(850MHz), 1.15dBi(900MHz), 2.94dBi(1800MHz),4.21dBi(1900MHz), 4.02dBi(2100MHz), PIFA Antenna
y.	WWAN Left antenna	MITAC	P/N: 313002000360	0.97dBi(850MHz), -0.63dBi(900MHz), 2.61dBi(1800MHz),2.96dBi(1900MHz), 2.75dBi(2100MHz), PIFA Antenna

3.3 Product Photo

Please refer to Appendix E

3.4 Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this Notebook Personal Computer is in accordance with the following standards:

47 CFR Part 2 (2.1093),
IEEE C95.1-1999,
IEEE C95.3-2002,
IEEE P1528 -2003, and
OET Bulletin 65 Supplement C (Edition 01-01)

3.5 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user.

Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

3.6 Test Conditions

3.6.1 Ambient Condition

Item	HSL_850	MSL_1900
Ambient Temperature (^{o}C)	20-24℃	
Tissue simulating liquid temperature (^{o}C)	21.5°C	21.0°C
Humidity (%)	<60%	

3.6.2 Test Configuration

The device was controlled by using a base station emulator R&S CMU200. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT.

Measurements were performed only on the middle channel if the SAR is below 3 dB of limit for body SAR testing

The DUT was set from the emulator to radiate maximum output power during all tests.

For body SAR testing, EUT is in GPRS/EDGE or WCDMA/HSDPA link mode. In GPRS/EDGE link mode, its crest factor is 2 because EUT is GPRS/EDGE class 12 device. In WCDMA/HSDPA link mode, its crest factor is 1.

4. Specific Absorption Rate (SAR)

4.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The FCC recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

4.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density. ρ). The equation description is as below:

$$\textbf{SAR} = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

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

SAR measurement can be either related to the temperature elevation in tissue by

$$\textbf{SAR} = C\frac{\delta T}{\delta t}$$

, where C is the specific head capacity, δT is the temperature rise and δt the exposure duration,

or related to the electrical field in the tissue by

$$\textbf{SAR} = \frac{\sigma |E|^2}{\rho}$$

, where σ is the conductivity of the tissue, ρ is the mass density of the tissue and ***E*** is the rms electrical field strength.

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

5. SAR Measurement Setup

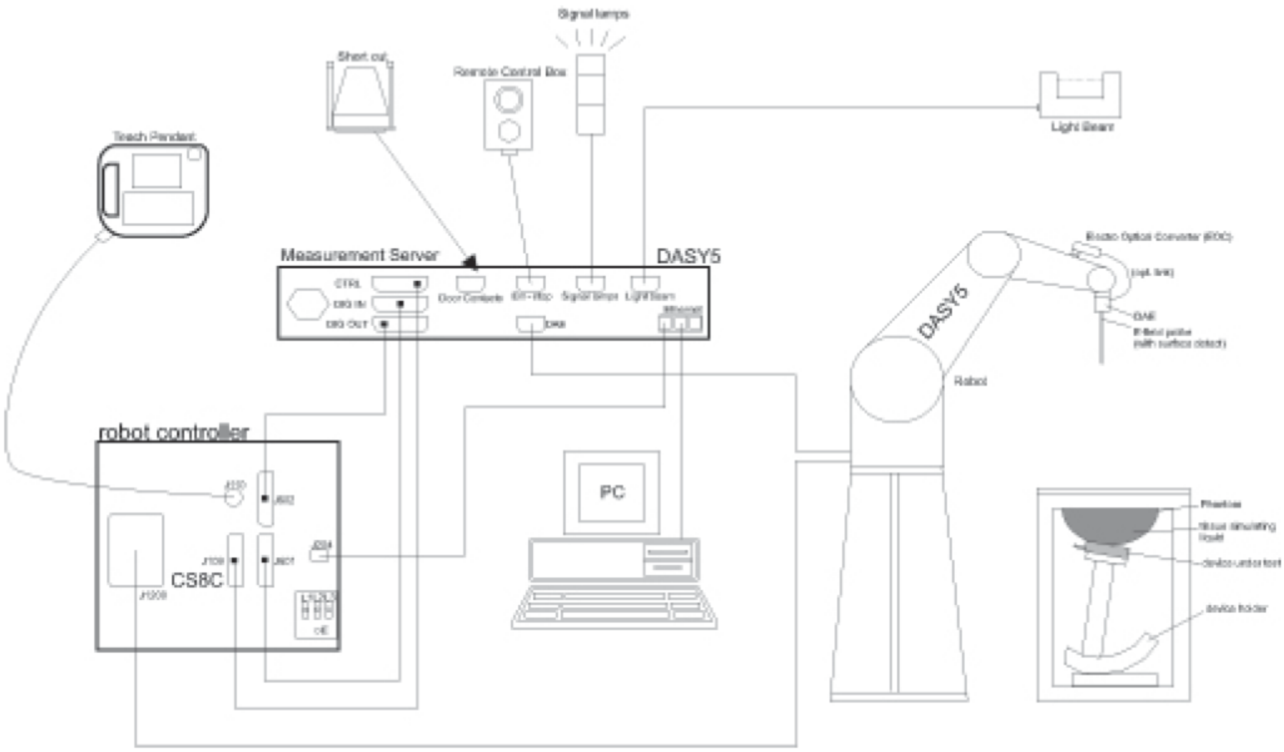


Fig. 5.1 DASY5 System

The DASY5 system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (ECO) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY5 software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Some of the components are described in details in the following sub-sections.

5.1 DASY5 E-Field Probe System

The SAR measurement is conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

5.1.1 ET3DV6 E-Field Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents)
Frequency	10 MHz to 3 GHz
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation perpendicular to probe axis)
Dynamic Range	5 μ W/g to 100mW/g; Linearity: ±0.2dB
Surface Detection	± 0.2 mm repeatability in air and clear liquids on reflecting surface
Dimensions	Overall length: 330mm Tip length: 16mm Body diameter: 12mm Tip diameter: 6.8mm Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 3GHz Compliance tests for mobile phones and Wireless LAN Fast automatic scanning in arbitrary phantoms

Fig. 5.2 Probe Setup on Robot

5.1.2 ET3DV6 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data are as below:

- **ET3DV6 sn1788**

Sensitivity	X axis : 1.72 µV	Y axis : 1.66 µV	Z axis : 1.70 µV	
Diode compression point	X axis : 91 mV	Y axis : 93 mV	Z axis : 94 mV	
Conversion factor (Body)	**Frequency (MHz)**	**X axis**	**Y axis**	**Z axis**
	800~1000	6.37	6.37	6.37
	1710~1910	4.75	4.75	4.75
Boundary effect (Body)	**Frequency (MHz)**	**Alpha**	**Depth**	
	800~1000	0.28	2.94	
	1710~1910	0.63	2.39	

NOTE: The probe parameters have been calibrated by the SPEAG.

5.2 DATA Acquisition Electronics (DAE)

The data acquisition electronics (DAE3) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

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

The input impedance of the DAE3 is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.

5.3 Robot

The DASY5 system uses the high precision robots TX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY5 system, the CS8C robot controller version from Stäubli is used. The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

5.4 Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with
400 MHz CPU
128 MB chipdisk and
128 MB RAM.

Communication with
the DAE4 electronic box
the 16-bit AD-converter system for optical detection and digital I/O interface.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

5.5 SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters.

On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

The phantom can be used with the following tissue simulating liquids:
*Water-sugar based liquid
*Glycol based liquids

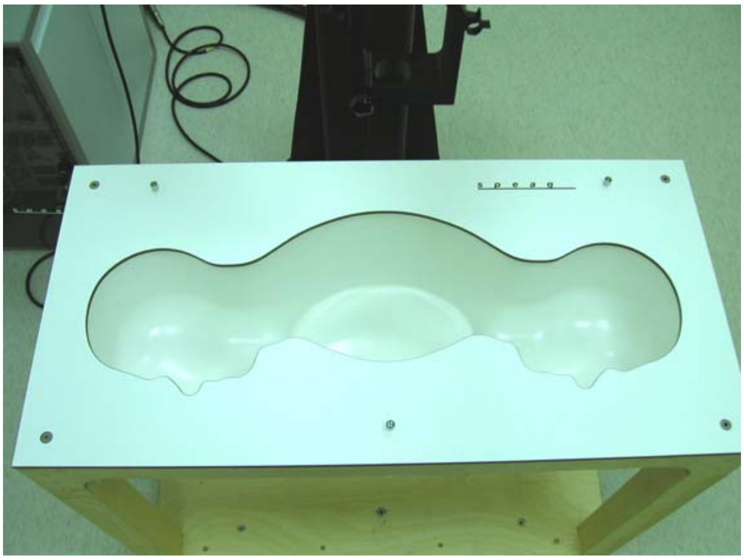


Fig. 5.3 Top View of Twin Phantom

Fig. 5.4 Bottom View of Twin Phantom

5.6 Data Storage and Evaluation

5.6.1 Data Storage

The DASY5 software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension .DA5. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-louse media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.6.2 Data Evaluation

The DASY5 post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software：

Probe parameters：	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as：

$$Vi = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with *V_i = compensated signal of channel i (i = x, y, z)*
U_i = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated：

E-field probes： $E_i = \sqrt{\frac{V_i}{Norm_i ConvF}}$

H-field probes： $H_i = \sqrt{V_i}\frac{a_{i0+}a_{i1}f + a_{i2}f^2}{f}$

with ***V_i*** = compensated signal of channel *i* (*i* = x, y, z)
$Norm_i$ = sensor sensitivity of channel i (*i* = x, y, z)
μV/(V/m)2 for E-field Probes
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
E_i = electric field strength of channel *i* in V/m
H_i = magnetic field strength of channel *i* in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude)：

$$E_{tot} = \sqrt{E_X^2 + E_Y^2 + E_Z^2}$$

The primary field data are used to calculate the derived field units.

$$\text{SAR} = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with ***SAR*** = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/ cm^3

∗Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770} \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2
E_{tot} = total electric field strength in V/m
H_{tot} = total magnetic field strength in A/m

5.7 Test Equipment List

Manufacture	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Filed Probe	ET3DV6	1788	Sep. 26, 2007	Sep. 26, 2008
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 15, 2006	Mar. 15, 2008
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 21, 2006	Mar. 21, 2008
SPEAG	Data Acquisition Electronics	DAE3	577	Nov. 16, 2007	Nov. 16, 2008
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BB	1029	NCR	NCR
SPEAG	Twin Phantom	QD 000 P40 CB	TP-1446	NCR	NCR
SPEAG	Robot	Staubli TX90 XL	F07/554JA1/A/01	NCR	NCR
SPEAG	Software	DASY5 V5.0 Build 91	N/A	NCR	NCR
SPEAG	Software	SEMCAD X V12.4 Build 52	N/A	NCR	NCR
SPEAG	Measurement Server	SE UMS 011 AA	1014	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071B	MY42403579	Mar. 29, 2007	Mar. 28, 2008
Agilent	Dielectric Probe Kit	85070D	US01440205	NCR	NCR
Agilent	Dual Directional Coupler	778D	50422	NCR	NCR
Agilent	Power Amplifier	8449B	3008A01917	NCR	NCR
Agilent	Power Meter	E4416A	GB41292344	Feb. 21, 2008	Feb. 20, 2009
Agilent	Power Sensor	E9327A	US40441548	Feb. 21, 2008	Feb. 20, 2009

Table 5.1 Test Equipment List

6. *Tissue Simulating Liquids*

For the measurement of the field distribution inside the SAM phantom with DASY5, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. The liquid height from the bottom of the phantom body is 15.2 centimeters, which is shown in Fig. 6.1.

The following ingredients for tissue simulating liquid are used:

- **Water**: deionized water (pure $H_2 0$), resistivity ≧16MΩ - as basis for the liquid
- **Sugar**: refined sugar in crystals, as available in food shops – to reduce relative permittyvity
- **Salt**: pure NaCl – to increase conductivity
- **Cellulose**: Hydroxyethyl-cellulose, medium viscosity (75-125 mPa.s, 2% in water, 20°C), CAS#54290-to increase viscosity and to keep sugar in solution.
- **Preservative**: Preventol D-7 Bayer AG, D-51368 Leverkusen, CAS#55965-84-9- to prevent the spread of bacteria and molds.
- **DGMBE**: Deithlenglycol-monobuthyl ether (DGMBE), Fluka Chemie GmbH, CAS#112-34-5 – to reduce relative permittivity.

Table 6.1 gives the recipes for one liter of body tissue simulating liquid for frequency band 850 and 1900 MHz.

Ingredient	**MSL_850**	**MSL-1900**
Water	631.68 g	716.56 g
Cellulose	0 g	0 g
Salt	11.72 g	4.0 g
Preventol D-7	1.2 g	0 g
Sugar	600.0 g	0 g
DGMBE	0 g	300.67 g
Total amount	1 liter (1.3 kg)	1 liter (1.0 kg)
Dielectric Parameters at 22°	f=835 MHz ε_r = 55.2±5%, σ = 0.97±5% S/m	f= 1900 MHz ε_r= 53.3±5 %, σ= 1.52±5% S/m

Table 6.1 Recipes of tissue Simulating Liquid

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

Table 6.2 shows the measuring results for muscle simulating liquid.

Bands	Frequency(MHz)	Permittivity (ε_r)	Conductivity (σ)	Measurement date
GSM850 (824 ~ 849 MHz)	824.2	56.5	0.938	Mar. 04, 2008
	836.4	56.4	0.950	
	848.8	56.3	0.959	
PCS1900 (1850 ~ 1910 MHz)	1850.2	52.0	1.47	Mar. 04, 2008
	1880.0	52.0	1.50	
	1909.8	51.9	1.53	
WCDMA Band V (824 ~ 849 MHz)	826.4	56.5	0.940	Mar. 04, 2008
	836.4	56.4	0.950	
	846.6	56.3	0.958	
WCDMA Band II (1850 ~ 1910 MHz)	1852.4	52.0	1.47	Mar. 04, 2008
	1880.0	52.0	1.50	
	1907.6	51.9	1.53	

Table 6.2 Measuring Results for Muscle Simulating Liquid

The measuring data are consistent with ε r= 55.2 ± 5% and σ = 0.97 ± 5% for body GSM850 and WCDMA band V, ε r = 53.3 ± 5%, σ = 1.52 ± 5% for body PCS1900 and WCDMA band II.

Fig 6.1 Liquid height from the bottom of the phantom body is 15.2 centimeters

7. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 7.1

Uncertainty Distributions	Normal	Rectangular	Triangular	U-shape
Multiplying factor[(a)]	1/k [(b)]	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) k is the coverage factor

Table 7.1 Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY5 uncertainty Budget is showed in Table 7.2.

Error Description	Uncertainty Value ± %	Probability Distribution	Divisor	Ci (1g)	Standard Unc. (1g)	vi or Veff
Measurement Equipment						
Probe Calibration	±5.9 %	Normal	1	1	±5.9 %	∞
Axial Isotropy	±4.7 %	Rectangular	√3	0.7	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	Rectangular	√3	0.7	±3.9 %	∞
Boundary Effects	±1.0 %	Rectangular	√3	1	±0.6 %	∞
Linearity	±4.7 %	Rectangular	√3	1	±2.7 %	∞
System Detection Limits	±1.0 %	Rectangular	√3	1	±0.6 %	∞
Readout Electronics	±0.3 %	Normal	1	1	±0.3 %	∞
Response Time	±0.8 %	Rectangular	√3	1	±0.5 %	∞
Integration Time	±2.6 %	Rectangular	√3	1	±1.5 %	∞
RF Ambient Noise	±3.0 %	Rectangular	√3	1	±1.7 %	∞
RF Ambient Reflections	±3.0 %	Rectangular	√3	1	±1.7 %	∞
Probe Positioner	±0.4 %	Rectangular	√3	1	±0.2 %	∞
Probe Positioning	±2.9 %	Rectangular	√3	1	±1.7 %	∞
Max. SAR Eval.	±1.0 %	Rectangular	√3	1	±0.6 %	∞
Test Sample Related						
Device Positioning	±2.9 %	Normal	1	1	±2.9	145
Device Holder	±3.6 %	Normal	1	1	±3.6	5
Power Drift	±5.0 %	Rectangular	√3	1	±2.9	∞
Phantom and Setup						
Phantom Uncertainty	±4.0 %	Rectangular	√3	1	±2.3	∞
Liquid Conductivity (target)	±5.0 %	Rectangular	√3	0.64	±1.8	∞
Liquid Conductivity (meas.)	±2.5 %	Normal	1	0.64	±1.6	∞
Liquid Permittivity (target)	±5.0 %	Rectangular	√3	0.6	±1.7	∞
Liquid Permittivity (meas.)	±2.5 %	Normal	1	0.6	±1.5	∞
Combined Standard Uncertainty					**±10.9**	**387**
Coverage Factor for 95 %		**K=2**				
Expanded uncertainty (Coverage factor = 2)					**±21.9**	

Table 7.2 Uncertainty Budget of DASY5

8. SAR Measurement Evaluation

Each DASY5 system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY5 software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

8.1 Purpose of System Performance Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

8.2 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835 MHz and 1900 MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

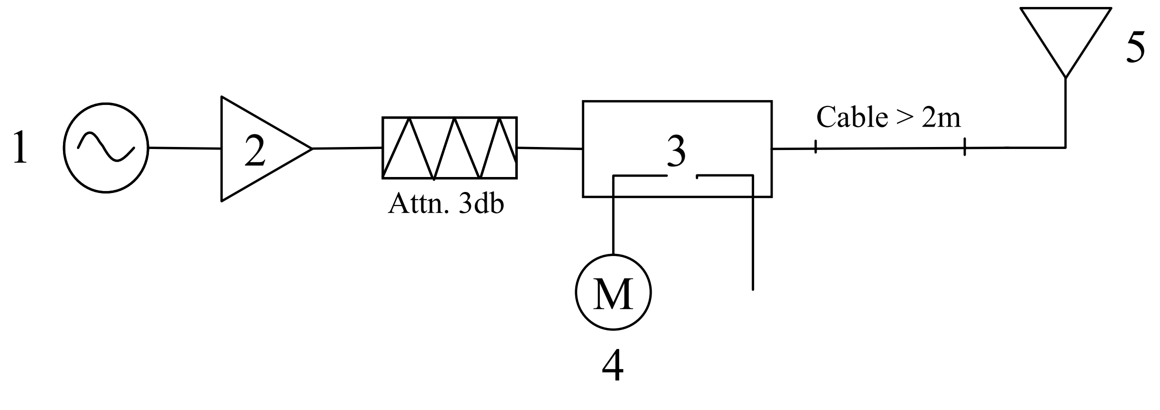


Fig. 8.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. 835 MHz or 1900 MHz Dipole

The output power on dipole port must be calibrated to 100 mW (20 dBm) before dipole is connected.

Fig 8.2 Dipole Setup

8.3 Validation Results

Comparing to the original SAR value provided by SPEAG, the validation data should within its specification of 10 %. Table 8.1 shows the target SAR and measured SAR after normalized to 1W input power.

Band	SAR	Target (W/kg)	Measurement data (W/kg)	Variation	Measurement date
GSM and WCDMA Band V (835MHz)	SAR (1g)	9.91	9.5	-4.1 %	Mar. 04, 2008
	SAR (10g)	6.55	6.27	-4.3 %	
PCS and WCDMA Band II (1900MHz)	SAR (1g)	41.1	40.3	-1.9 %	Mar. 04, 2008
	SAR (10g)	21.8	21.4	-1.8 %	

Table 8.1 Target and Measured SAR after Normalized

The table above indicates the system performance check can meet the variation criterion.

9. Description for DUT Testing Position

This DUT was tested in 5 different positions. "Notebook Bottom Touch"

Remark: Please refer to Appendix F for the test setup photo.

10. Measurement Procedures

The measurement procedures are as follows:

- Linking DUT with base station emulator CMU200 in middle channel
- Setting CMU200 to allow DUT to radiate maximum output power
- Measuring output power through RF cable and power meter
- Placing the DUT in the positions described in the last section
- Setting scan area, grid size and other setting on the DASY5 software

Taking data for the lowest, middle, and highest channel on each testing position

According to the IEEE P1528 draft standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power reference measurement

10.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1528-2003 standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

Base on the Draft: SCC-34, SC-2, WG-2-Computational Dosimetry, P1528/D1.2 (Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques), a new algorithm has been implemented. The spatial-peak SAR can be computed over any required mass.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- extraction of the measured data (grid and values) from the Zoom Scan
- calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- generation of a high-resolution mesh within the measured volume
- interpolation of all measured values form the measurement grid to the high-resolution grid
- extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- calculation of the averaged SAR within masses of 1g and 10g

10.2 Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 1 g.

10.3 SAR Averaged Methods

In DASY5, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

11.SAR Test Results

11.1 Notebook Bottom Touch

Band	Chan.	Freq. (MHz)	Modulation Type	Conducted Power (dBm)	Power Drift (dB)	Measured 1g SAR (W/kg)	Limits (W/Kg)	Results
GSM850 (GPRS10)	128	824.2 (Low)	GMSK	31.48	0.107	0.00251	2.0	Pass
	189	**836.4 (Mid)**	**GMSK**	**31.53**	**-0.131**	**0.00259**	**2.0**	**Pass**
	251	848.8 (High)	GMSK	31.59	-0.105	0.00252	2.0	Pass
GSM850 (GPRS10) with BT on	189	836.4 (Mid)	GMSK	31.53	-0.176	0.00246	2.0	Pass
GSM850 (GPRS12)	128	824.2 (Low)	GMSK	25.64	-	-	-	-
	189	836.4 (Mid)	GMSK	25.70	-0.11	0.00135	2.0	Pass
	251	848.8 (High)	GMSK	25.74	-	-	-	-
GSM850 (EDGE12)	128	824.2 (Low)	8PSK	26.93	-	-	-	-
	189	836.4 (Mid)	8PSK	26.96	-0.121	0.00187	2.0	Pass
	251	848.8 (High)	8PSK	26.92	-	-	-	-
PCS1900 (GPRS12)	512	1850.2 (Low)	GMSK	28.54	-0.158	0.022	2.0	Pass
	661	1880.0 (Mid)	GMSK	28.48	-0.129	0.02	2.0	Pass
	810	**1909.8 (High)**	**GMSK**	**28.37**	**-0.137**	**0.023**	**2.0**	**Pass**
PCS1900 (GPRS12) with BT on	810	1909.8 (High)	GMSK	28.37	-0.178	0.022	2.0	Pass
PCS1900 (EDGE12)	512	1850.2 (Low)	8PSK	26.04	-	-	-	-
	661	1880.0 (Mid)	8PSK	25.96	0.126	0.011	2.0	Pass
	810	1909.8 (High)	8PSK	25.89	-	-	-	-
WCDMA Band V (RMC 12.2K)	4132	826.4 (Low)	QPSK	22.45	-	-	-	-
	4182	836.6 (Mid)	QPSK	22.49	0.188	0.00207	2.0	Pass
	4233	846.6 (High)	QPSK	22.66	-	-	-	-
WCDMA Band V (RMC 64K)	4132	826.4 (Low)	QPSK	22.81	-	-	-	-
	4182	836.6 (Mid)	QPSK	22.96	0.142	0.00209	2.0	Pass
	4233	846.6 (High)	QPSK	22.58	-	-	-	-
WCDMA Band V (RMC 144K)	4132	826.4 (Low)	QPSK	22.84	-	-	-	-
	4182	836.6 (Mid)	QPSK	22.94	0.142	0.00191	2.0	Pass
	4233	846.6 (High)	QPSK	22.95	-	-	-	-
WCDMA Band V (RMC 384K)	4132	826.4 (Low)	QPSK	22.89	-	-	-	-
	4182	836.6 (Mid)	QPSK	23.06	-0.149	0.0021	2.0	Pass
	4233	846.6 (High)	QPSK	22.96	-	-	-	-
WCDMA Band V (RMC 12.2K+ HSDPA)	4132	826.4 (Low)	QPSK	22.83	-0.11	0.00193	2.0	Pass
	4182	**836.6 (Mid)**	**QPSK**	**22.75**	**-0.187**	**0.00215**	**2.0**	**Pass**
	4233	846.6 (High)	QPSK	22.64	-0.122	0.00156	2.0	Pass
WCDMA Band V (RMC 12.2K+ HSDPA) with BT on	4182	836.6 (Mid)	QPSK	22.75	-0.17	0.00202	2.0	Pass
WCDMA Band II (RMC 12.2K)	9262	1852.4 (Low)	QPSK	23.64	-	-	-	-
	9400	1880.0 (Mid)	QPSK	23.23	0.193	0.013	2.0	Pass
	9538	1907.6 (High)	QPSK	22.62	-	-	-	-
WCDMA Band II (RMC 64K)	9262	1852.4 (Low)	QPSK	23.43	-	-	-	-
	9400	1880.0 (Mid)	QPSK	23.37	-0.181	0.015	2.0	Pass
	9538	1907.6 (High)	QPSK	22.68	-	-	-	-
WCDMA Band II (RMC 144K)	9262	1852.4 (Low)	QPSK	23.46	-	-	-	-
	9400	1880.0 (Mid)	QPSK	23.37	-0.18	0.015	2.0	Pass
	9538	1907.6 (High)	QPSK	22.68	-	-	-	-
WCDMA Band II (RMC 384K)	9262	1852.4 (Low)	QPSK	23.41	-0.137	0.015	2.0	Pass
	9400	**1880.0 (Mid)**	**QPSK**	**23.36**	**-0.109**	**0.015**	**2.0**	**Pass**
	9538	1907.6 (High)	QPSK	22.74	0.113	0.013	2.0	Pass
WCDMA Band II (RMC 384K) with BT on	9400	1880.0 (Mid)	QPSK	23.36	-0.155	0.014	2.0	Pass
WCDMA Band II (RMC 12.2K+ HSDPA)	9262	1852.4 (Low)	QPSK	23.36	-	-	-	-
	9400	1880.0 (Mid)	QPSK	23.27	-0.171	0.014	2.0	Pass
	9538	1907.6 (High)	QPSK	22.59	-	-	-	-

Test Engineer：Jason Wang and Robert Liu

12. Reference

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
[2] IEEE Std. P1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, April 21, 2003.
[3] Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), “Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to RF Emissions”, June 2001
[4] IEEE Std. C95.3-2002, “IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields-RF and Microwave”, 2002
[5] IEEE Std. C95.1-1999, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, 1999
[6] Robert J. Renka, “Multivariate Interpolation Of Large Sets Of Scattered Data”, University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148
[7] DAYS5 System Handbook

Appendix A - System Performance Check Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2008/3/4

System Check_Body_835MHz

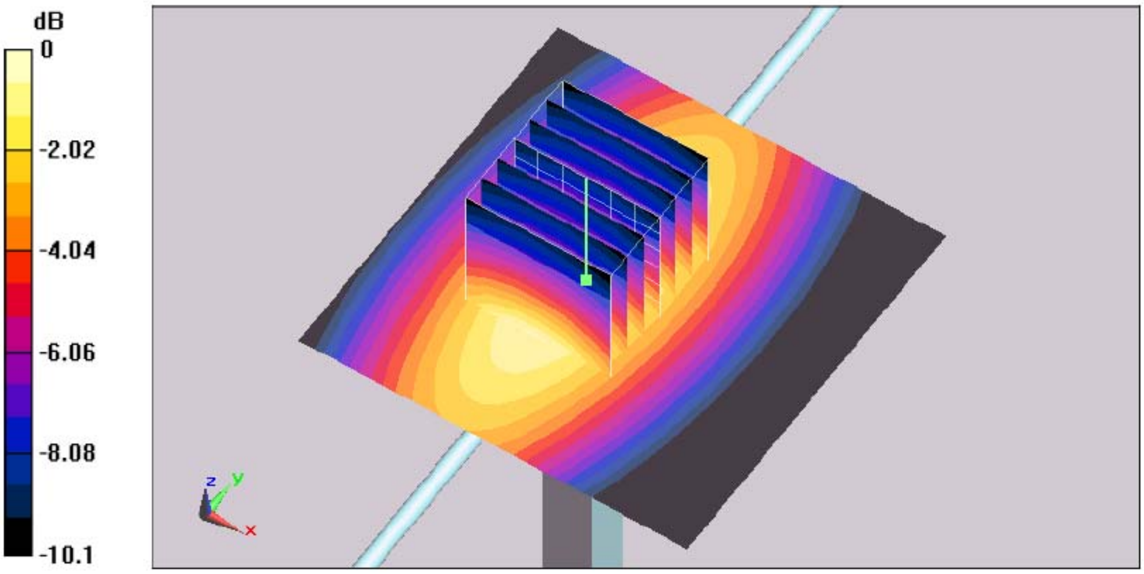
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; σ = 0.948 mho/m; ε_r = 56.5; ρ = 1000 kg/m^3
Ambient Temperature：22.9 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Pin=100mW/Area Scan (41x41x1): Measurement grid: dx=20mm, dy=20mm
Maximum value of SAR (interpolated) = 0.931 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.1 V/m; Power Drift = -0.023 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.950 mW/g; SAR(10 g) = 0.627 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

System Check_Body_1900MHz

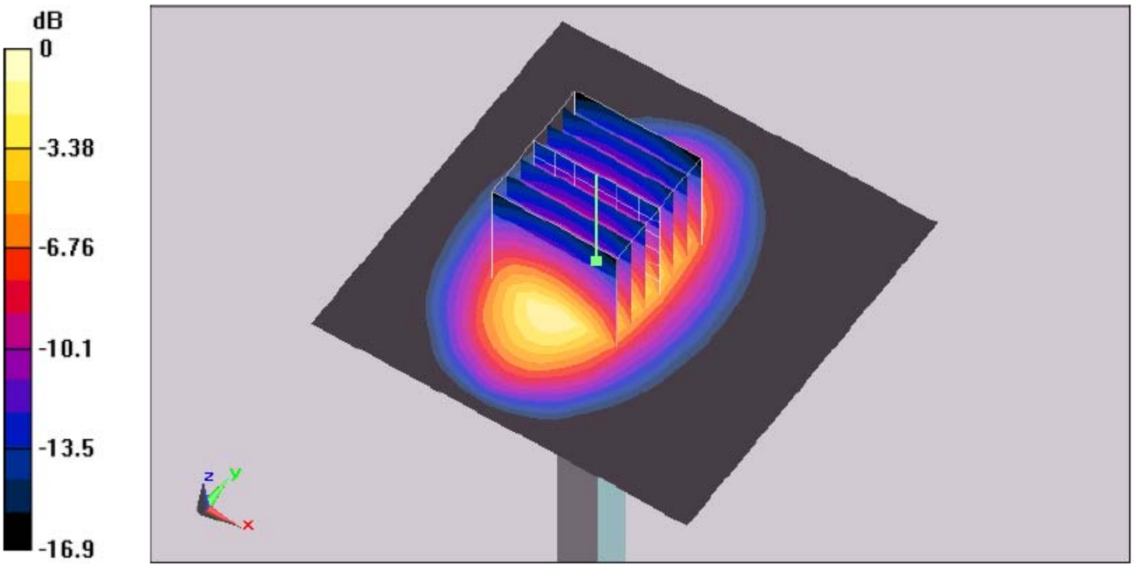
DUT: Dipole 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature：22.9 ℃; Liquid Temperature：21.0 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(4.75, 4.75, 4.75); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 4.72 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.7 V/m; Power Drift = -0.00983 dB
Peak SAR (extrapolated) = 6.95 W/kg
SAR(1 g) = 4.03 mW/g; SAR(10 g) = 2.14 mW/g
Maximum value of SAR (measured) = 4.59 mW/g



0 dB = 4.59mW/g

Appendix B - SAR Measurement Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_GSM850 Ch189_NB Bottom Touch_GPRS10

DUT: 821324

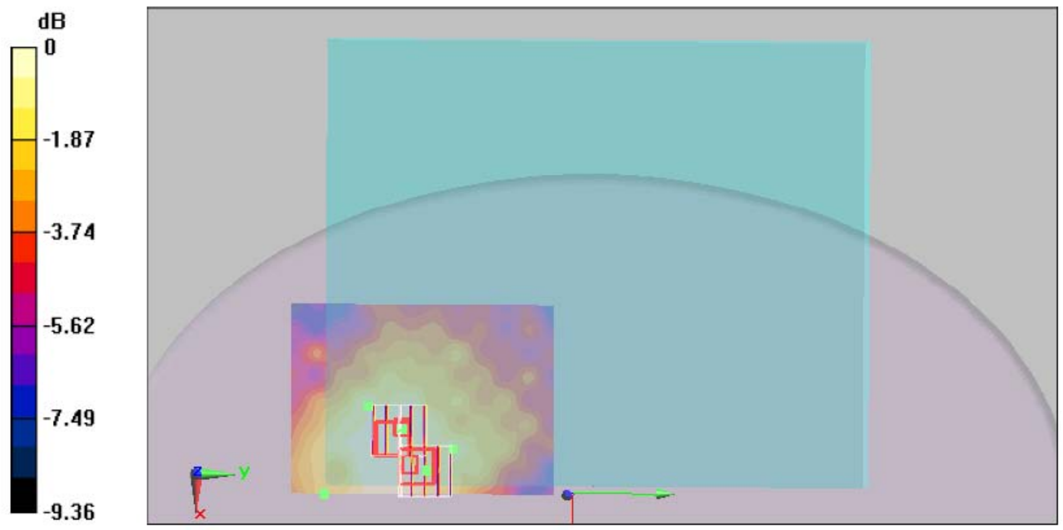
Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:4
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.95 mho/m; ε_r = 56.4; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch189/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.00284 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.567 V/m; Power Drift = -0.131 dB
Peak SAR (extrapolated) = 0.0036 W/kg
SAR(1 g) = 0.00259 mW/g; SAR(10 g) = 0.00193 mW/g
Maximum value of SAR (measured) = 0.00282 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.567 V/m; Power Drift = -0.131 dB
Peak SAR (extrapolated) = 0.00313 W/kg
SAR(1 g) = 0.00238 mW/g; SAR(10 g) = 0.00177 mW/g
Maximum value of SAR (measured) = 0.00262 mW/g



0 dB = 0.00262mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_GSM850 Ch189_NB Bottom Touch_GPRS10_Bluetooth

DUT: 821324

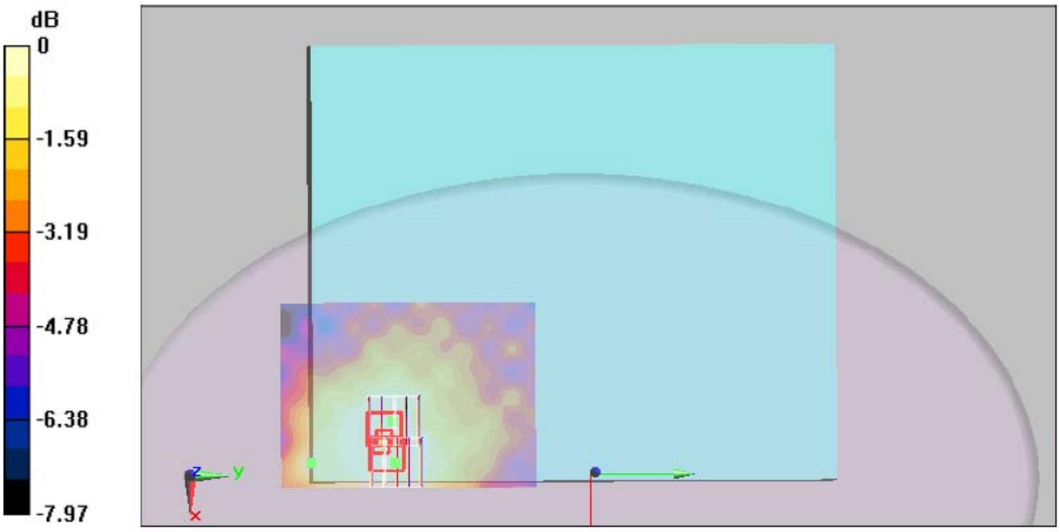
Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:4
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.95 mho/m; ε_r = 56.4; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch189/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.00289 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.633 V/m; Power Drift = -0.176 dB
Peak SAR (extrapolated) = 0.00355 W/kg
SAR(1 g) = 0.00246 mW/g; SAR(10 g) = 0.00185 mW/g
Maximum value of SAR (measured) = 0.00271 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.633 V/m; Power Drift = -0.176 dB
Peak SAR (extrapolated) = 0.00311 W/kg
SAR(1 g) = 0.00229 mW/g; SAR(10 g) = 0.00173 mW/g
Maximum value of SAR (measured) = 0.00242 mW/g



0 dB = 0.00242mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_GSM850 Ch1891_NB Bottom Touch_GPRS12

DUT: 821324

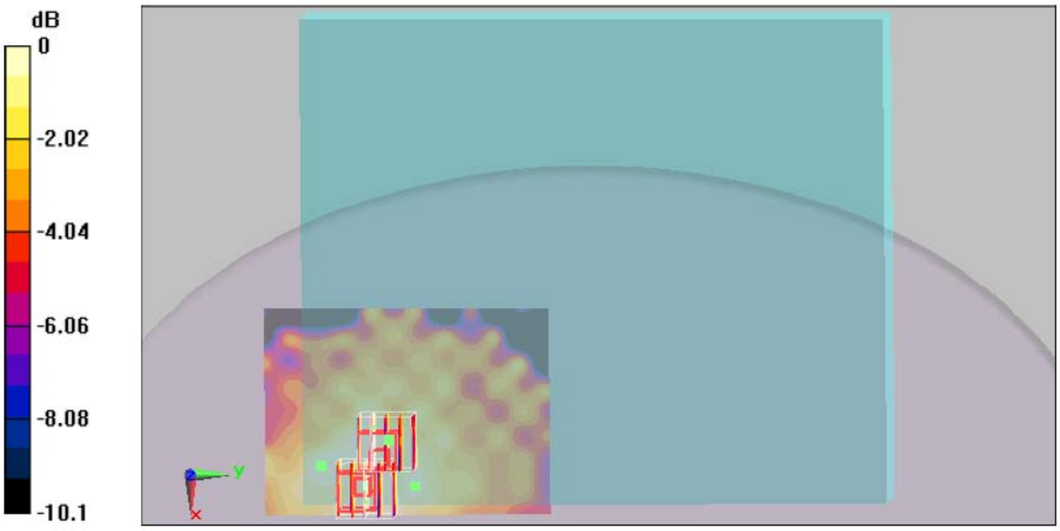
Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:2
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.95 mho/m; ε_r = 56.4; ρ = 1000 kg/m^3
Ambient Temperature：22.8 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch189/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.00155 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.412 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.00299 W/kg
SAR(1 g) = 0.00135 mW/g; SAR(10 g) = 0.00105 mW/g
Maximum value of SAR (measured) = 0.00195 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.412 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.00214 W/kg
SAR(1 g) = 0.00134 mW/g; SAR(10 g) = 0.000951 mW/g
Maximum value of SAR (measured) = 0.00143 mW/g



0 dB = 0.00143mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_GSM850 Ch189_NB Bottom Touch_EDGE12

DUT: 821324

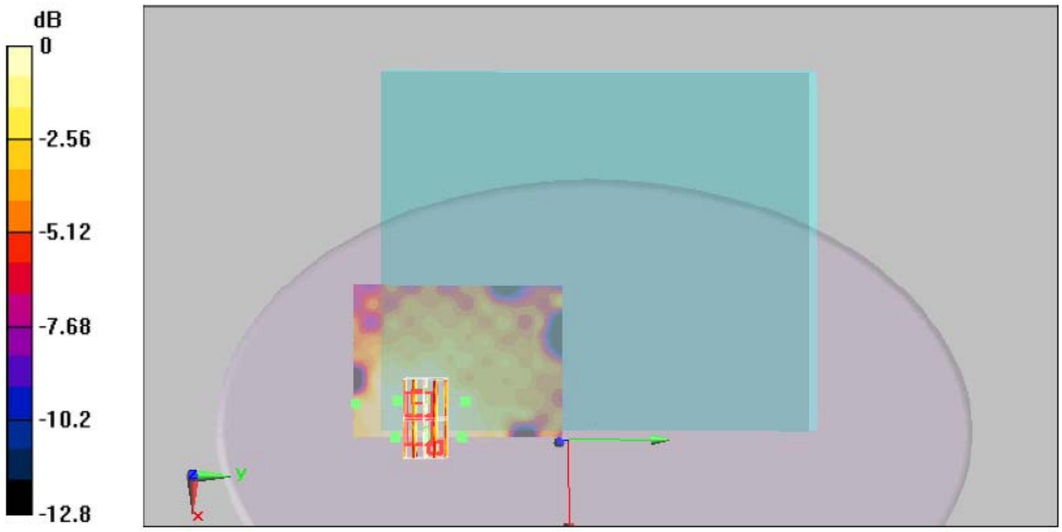
Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:2
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.95 mho/m; ε_r = 56.4; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch189/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.00222 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.486 V/m; Power Drift = -0.121 dB
Peak SAR (extrapolated) = 0.00255 W/kg
SAR(1 g) = 0.00187 mW/g; SAR(10 g) = 0.00136 mW/g
Maximum value of SAR (measured) = 0.00201 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.486 V/m; Power Drift = -0.121 dB
Peak SAR (extrapolated) = 0.00237 W/kg
SAR(1 g) = 0.00174 mW/g; SAR(10 g) = 0.00133 mW/g
Maximum value of SAR (measured) = 0.00187 mW/g



0 dB = 0.00187mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_PCS Ch810_NB Bottom Touch_GPRS12

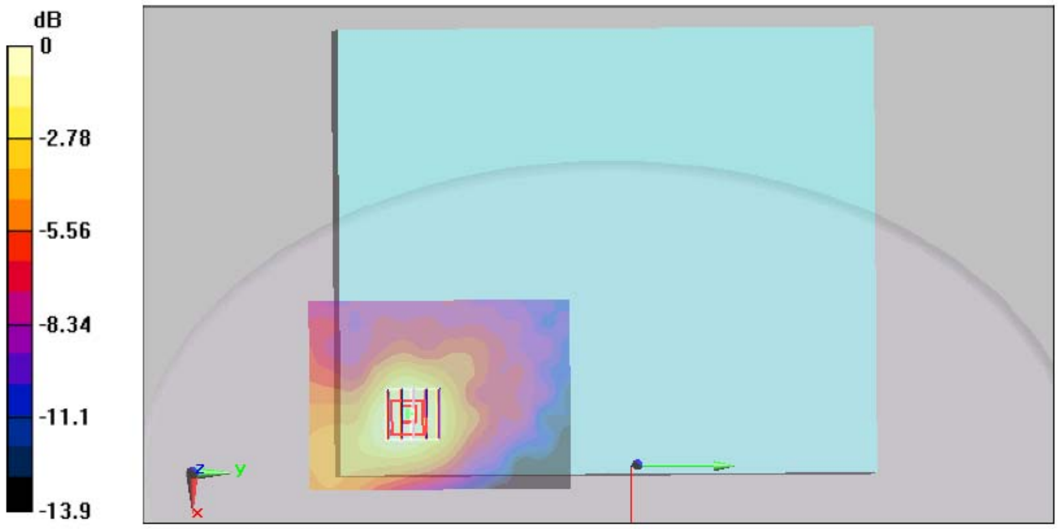
DUT: 821324

Communication System: PCS; Frequency: 1909.8 MHz;Duty Cycle: 1:2
Medium: MSL_1900 Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature：22.3 ℃; Liquid Temperature：21.0 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(4.75, 4.75, 4.75); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch810/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.025 mW/g

Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.624 V/m; Power Drift = -0.137 dB
Peak SAR (extrapolated) = 0.040 W/kg
SAR(1 g) = 0.023 mW/g; SAR(10 g) = 0.015 mW/g
Maximum value of SAR (measured) = 0.024 mW/g



0 dB = 0.024mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_PCS Ch810_NB Bottom Touch_GPRS12_Bluetooth

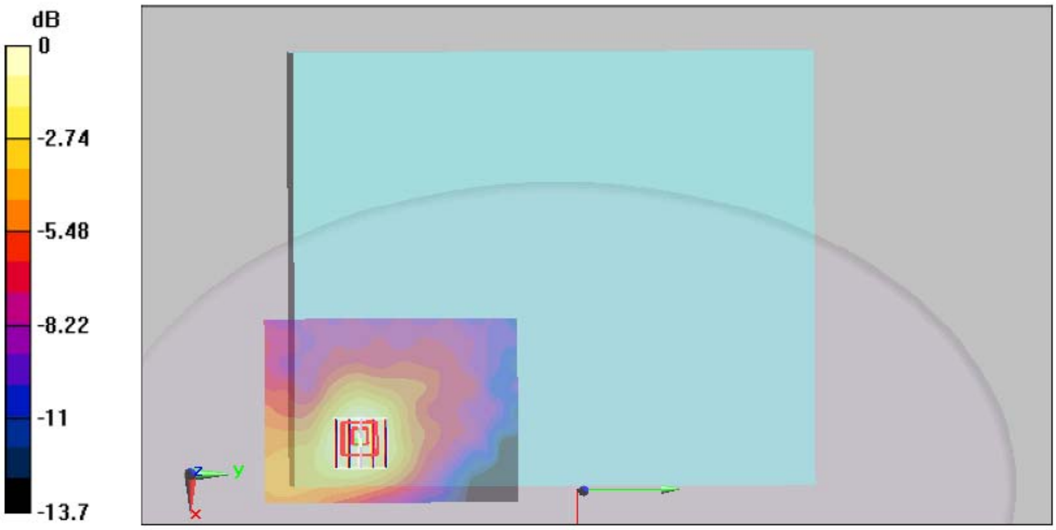
DUT: 821324

Communication System: PCS; Frequency: 1909.8 MHz;Duty Cycle: 1:2
Medium: MSL_1900 Medium parameters used: f = 1910 MHz; σ = 1.53 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature：22.3 ℃; Liquid Temperature：21.0 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(4.75, 4.75, 4.75); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch810/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.024 mW/g

Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.628 V/m; Power Drift = -0.178 dB
Peak SAR (extrapolated) = 0.033 W/kg
SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.014 mW/g
Maximum value of SAR (measured) = 0.023 mW/g



0 dB = 0.023mW/g

Body_PCS Ch661_NB Bottom Touch_EDGE12

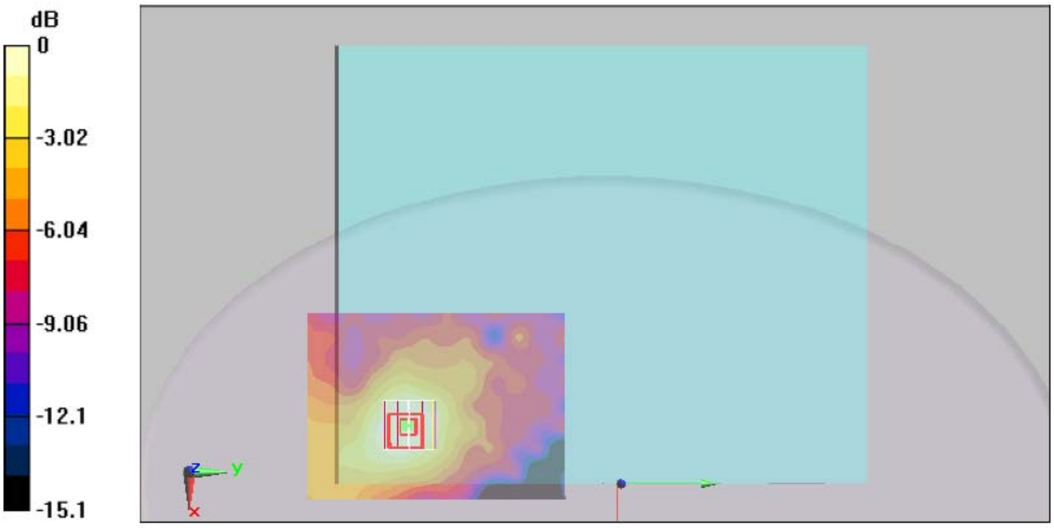
DUT: 821324

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Ambient Temperature：22.3 ℃; Liquid Temperature：21.0 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(4.75, 4.75, 4.75); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch661/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.012 mW/g

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.594 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 0.017 W/kg
SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00664 mW/g
Maximum value of SAR (measured) = 0.011 mW/g



0 dB = 0.011mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_WCDMA Ch4182_NB Bottom Touch_RMC12.2K

DUT: 821324

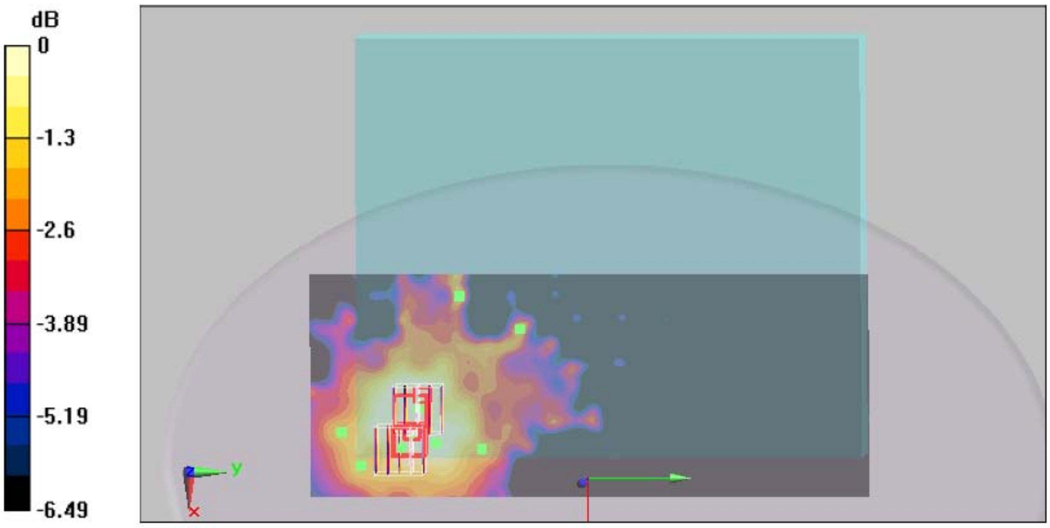
Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.95 mho/m; ε_r = 56.4; ρ = 1000 kg/m^3
Ambient Temperature：22.9 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch4182/Area Scan (101x251x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.00225 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.380 V/m; Power Drift = 0.188 dB
Peak SAR (extrapolated) = 0.00313 W/kg
SAR(1 g) = 0.00207 mW/g; SAR(10 g) = 0.00153 mW/g
Maximum value of SAR (measured) = 0.00225 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.380 V/m; Power Drift = 0.188 dB
Peak SAR (extrapolated) = 0.00275 W/kg
SAR(1 g) = 0.00202 mW/g; SAR(10 g) = 0.00157 mW/g
Maximum value of SAR (measured) = 0.00209 mW/g



0 dB = 0.00209mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/3/4

Body_WCDMA Ch4182_NB Bottom Touch_RMC144K

DUT: 821324

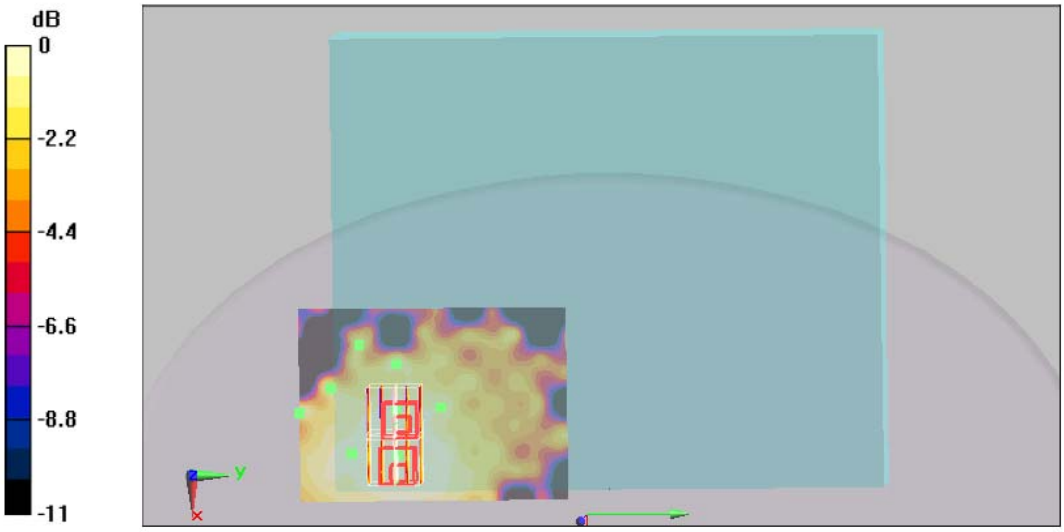
Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.95 mho/m; ε_r = 56.4; ρ = 1000 kg/m^3
Ambient Temperature：22.9 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

Ch4182/Area Scan (81x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.00214 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.258 V/m; Power Drift = 0.142 dB
Peak SAR (extrapolated) = 0.00347 W/kg
SAR(1 g) = 0.00191 mW/g; SAR(10 g) = 0.00145 mW/g
Maximum value of SAR (measured) = 0.00206 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.258 V/m; Power Drift = 0.142 dB
Peak SAR (extrapolated) = 0.0025 W/kg
SAR(1 g) = 0.00178 mW/g; SAR(10 g) = 0.00128 mW/g
Maximum value of SAR (measured) = 0.00188 mW/g



0 dB = 0.00188mW/g

