Specific Absorption Rate (SAR) Test Report

for

MiTAC Technology Corp.

on the

Notebook PC

Report No.	:	FA841815A
Trade Name	:	MTC; GETAC
Model Name	:	E100 / E100N
FCC ID	:	MAUE03
Date of Testing	:	May 29, 2008 ~ Aug. 27, 2008
Date of Report	:	Sep. 17, 2008
Date of Review	:	Sep. 17, 2008

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- Report Version: Rev. 09

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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 results found during testing for the **MiTAC Technology Corp. Notebook PC MTC; GETAC E100 / E100N** are as follows (with expanded uncertainty 21.9%):

<Standalone SAR>

Model	GSM850 Body SAR (W/kg)	GSM1900 Body SAR (W/Kg)	WCDMA Band V Body SAR (W/kg)	WCDMA Band II Body SAR (W/kg)
E100N	1.08	1.09	1.26	0.406
E100	1.06	0.868	1.24	0.425

<Volume Scan SAR>

Position	Mode	Channel	Multi Band 1g SAR (W/kg)
Rear Face with Holster 0cm Gap	WCDMA Band V (RMC 12.2K)	4182	1.32
	802.11b	6	
Rear Face with Holster 0cm Gap	WCDMA Band V (RMC 12.2K)	4182	1.31
	Bluetooth	39	

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 Corp.
Address :	9th. FL., No. 75, Ming Sheng E. Rd., Sec.3, Taipei, Taiwan

2.3 Detail of Manufacturer

Company Name :	GeTAC Technology(Kunshan) LTD.
Address :	No.269, 2nd Road, Export Processing Zone, Changjiang South Road, Kunshan, Jiangsu, P.R.C

2.4 Application Details

Date of reception of application:	Apr. 18, 2008
Start of test :	May 29, 2008
End of test :	Aug. 27, 2008

3. General Information

3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
DUT Type :	Notebook PC
Trade Name :	MTC; GETAC
Model Name :	E100 / E100N
FCC ID :	MAUE03
Tx Frequency :	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 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 GSM1900 : 1930 MHz ~ 1990 MHz WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna :	GSM850 : 31.88 dBm GSM1900 : 28.76 dBm WCDMA Band V : 22.82 dBm WCDMA Band II : 23.22 dBm
Antenna Type :	Retractable Antenna
HW Version :	R03
SW Version :	R102 (BIOS)
Type of Modulation :	GSM / GPRS : GMSK EDGE : 8PSK WCDMA : QPSK HSDPA : QPSK / 16QAM HSUPA : BPSK
DUT Stage :	Identical Prototype
Application Type :	Certification

3.2 Basic Description of Device under Test

DUT Name		Notebook PC
Trade Name		MTC; GETAC
Model Name		E100 / E100N
FCC ID		MAUE03
AC Adapter	**Brand Name**	FSP
	Model Name	FSP050-1AD101C
	Power Rating	I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 12Vdc, 4.16A
	AC Power Cord Type	1.8 meter non-shielded cable without ferrite core
Battery	**Brand Name**	Sayno
	Model Name	BP2S2P2600(S)
	Power Rating	7.4Vdc, 5200mAh, 4cell
	Type	Li-ion

Remark:

1. E100 is almost the same as E100N. The differences between these models are panel and keyboard as follows:
   a. Panel of E100 is 8.4 inch, and E100N is 8.9 inch.
   b. E100N doesn’t have the number key on the keyboard, but E100.
2. Above EUT's information was declared by manufacturer. Please refer to the specifications of manufacturer or User's Manual for more detailed features description.

3.3 Configuration of the Equipment

Model Name: E100 (Sample A)

Notebook Specification				
Item	**Brand**	**Model**	**P/N**	**Specification**
CPU	Intel Stealey	TDP 3W	---	800 MHz
LCD	AUO 8.4" SVGA	G084SN02 V0 for digitizer option	G084SN02 V0	8.4 inch SVGA Color TFT LCD Module 800x600
HDD	Toshiba	MK1011GAH	---	100GB
Memory	HYNIX	HYMP512S64CP8-Y5	---	DDR2 667 1GB
Adapter	FSP	PS050-1AD101C	---	---
Battery	Sayno	Sayno BP2S2P2600(S)	---	DC 7.4V, Li-ION/ Sayno cell -5200mAH/4cell, (P)
WLAN	Billionton, MiniCard (USB I/F)	GMEWLGRL	---	802.11b/g
Bluetooth	Billionton (USB I/F)	GUBTCR42M	---	V2.0 + EDR
GPS	GlobalSat	ET-312	---	RS232
3G	SIERRA WIRELESS	MC8785V	---	---

Model Name: E100N (Sample B)

Notebook Specification				
Item	**Brand**	**Model**	**P/N**	**Specification**
CPU	Intel Stealey	TDP 3W	---	800 MHz
LCD	Toshiba	Toshiba 8.9 inch TFT-LCD MODULE LTD089EXYM 1024x768	LTD089EXYM	8.9 inch TFT-LCD Module 1024x768
HDD	Toshiba	MK1011GAH	---	100 GB
Memory	Qimonda	HYS64T128021EDL-3S-B2	---	DDR2 667 1GB
Adapter	FSP	PS050-1AD101C	---	---
Battery	Sayno	Sanyo BP2S2P2600(S)	---	DC 7.4V, Li-ION/ Sayno cell -5200mAH/4cell,(P)
WLAN	Billionton, MiniCard (USB I/F)	GMEWLGRL	---	802.11b/g
Bluetooth	Billionton (USB I/F)	GUBTCR42M	---	V2.0 + EDR
GPS	GlobalSat	ET-312	---	RS232
3G	SIERRA WIRELESS	MC8785V	---	---

3.4 Product Photos

Please refer to Appendix D.

3.5 Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this Notebook PC 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)
Preliminary Guidance for Reviewing Applications for Certification of 3G Device
KDB 941225 D01 v02 SAR test for 3G devices
KDB 447498 D01 v03r01 Mobile and Portable Device RF Exposure Procedures

3.6 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.

3.7 Test Conditions

3.7.1 Ambient Condition

Item	MSL_850	MSL_850	MSL_850	MSL_850	MSL_1900	MSL_1900
Date	May 30, 2008	Jun. 11, 2008	Jul. 11, 2008	Aug. 06, 2008	May 29, 2008	Jun. 11, 2008
Tissue simulating liquid temperature (°C)	21.3°C	21.3°C	21.4°C	21.3°C	21.6°C	21.5°C
Ambient Temperature (°C)	20-24℃					
Humidity (%)	<60%					

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

Measurements were performed on the lowest, middle, and highest channel for each testing position. However, measurements were performed only on the middle channel if the SAR is below 3 dB of limit.
For SAR testing, EUT is in GPRS/EDGE or WCDMA/HSUPA link mode. In GPRS/EDGE link mode, its crest factor is 2 because EUT is GPRS/EDGE class 12 device. In WCDMA/HSUPA link mode, its crest factor is 1.

3.7.3 FCC 3G SAR Measurement Procedures

The EUT was tested according to the requirements of the FCC 3G procedures and the TS 34.121. For details, please find it at separate report.

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 standard 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:

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

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

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

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

, 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

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

, 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

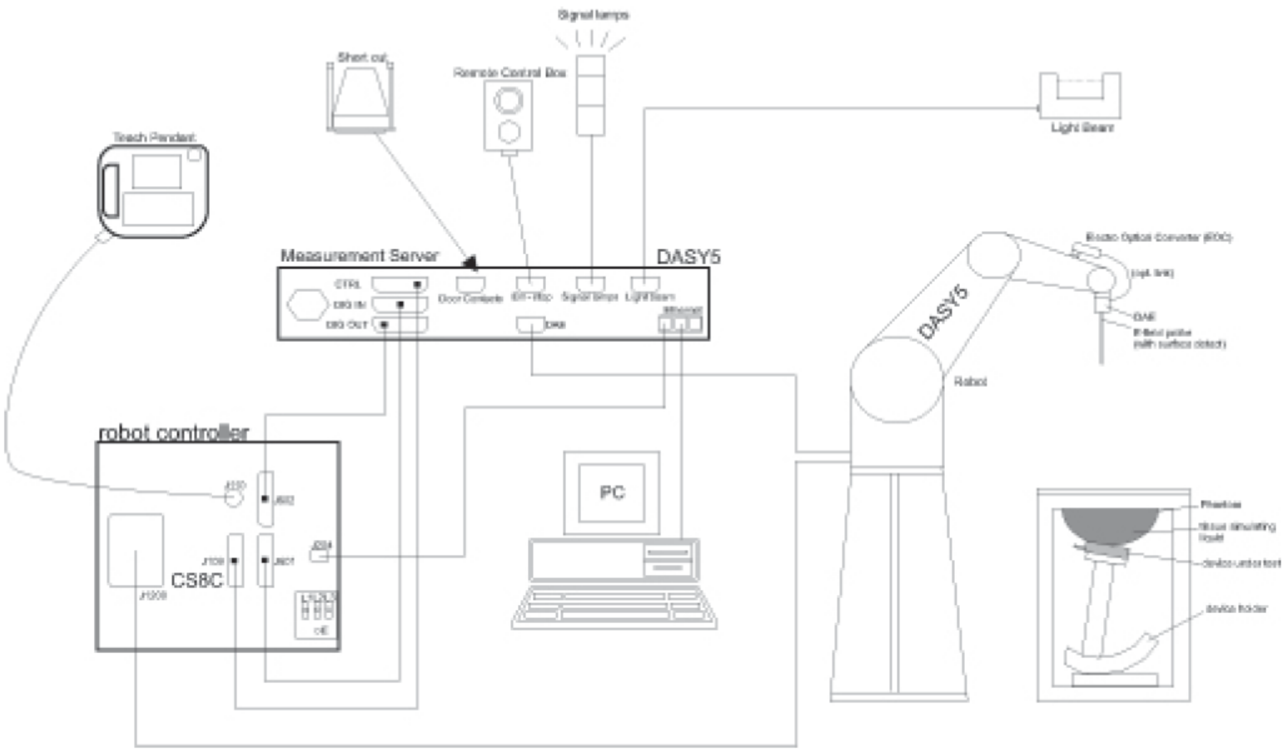


Fig. 5.1 DASY5 System

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

<ET3DV6>

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 (Head / Body)	**Frequency (MHz)**	**X axis**	**Y axis**	**Z axis**
	800~1000	6.54 / 6.37	6.54 / 6.37	6.54 / 6.37
	1710~1910	5.28 / 4.75	5.28 / 4.75	5.28 / 4.75
Boundary effect (Head / Body)	**Frequency (MHz)**	**Alpha**	**Depth**	
	800~1000	0.22 / 0.28	3.28 / 2.94	
	1710~1910	0.59 / 0.63	2.15/ 2.39	

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

5.2 DATA Acquisition Electronics (DAE)

The data acquisition electronics (DAE) 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 DAE 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 DAE3 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

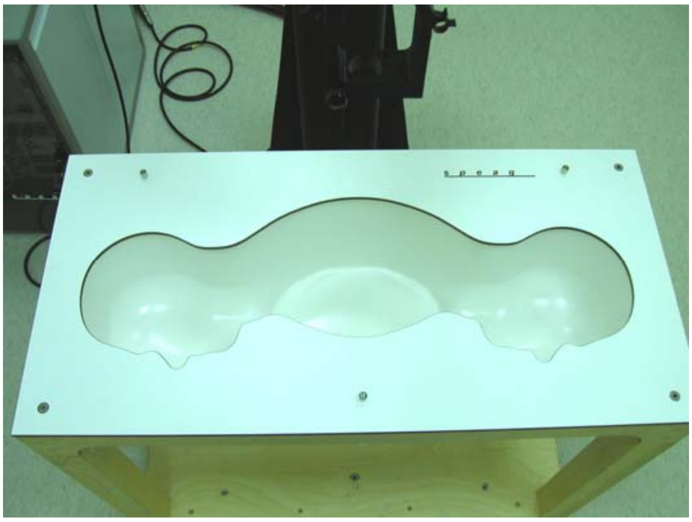


Fig. 5.3 Top View of Twin Phantom

Fig. 5.4 Bottom View of Twin Phantom

5.6 Device Holder for SAM Twin Phantom

The SAR in the Phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source in 5 mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ± 20%. An accurate device position is therefore crucial for accurate and repeatable measurement. The position in which the devices must be measured, are defined by the standards.

The DASY5 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (EPR).
Thus the device needs no repositioning when changing the angles.

The DASY5 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε_r =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Fig. 5.5 Device Holder

5.7 Data Storage and Evaluation

5.7.1 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-less media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.7.2 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 DASY5 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)
μ V/(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/cm³

＊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/cm²
E_{tot} = total electric field strength in V/m
H_{tot} = total magnetic field strength in A/m

5.8 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. 17, 2008	Mar. 17, 2010
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 28, 2008	Mar. 28, 2010
SPEAG	Data Acquisition Electronics	DAE3	577	Nov. 16, 2007	Nov. 16, 2008
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	Phantom	QD 000 P40 C	TP-1303	NCR	NCR
SPEAG	Phantom	QD 000 P40 C	TP-1383	NCR	NCR
SPEAG	Robot	Staubli TX90XL	F03/5W15A1/A/01	NCR	NCR
SPEAG	Measurement Server	SE UMS 011 AA	1014	NCR	NCR
Agilent	PNA Series Network Analyzer	E8358A	US40260131	Apr. 02, 2008	Apr. 01, 2009
Agilent	Wireless Communication Test Set	E5515C	GB46311322	Dec. 22, 2006	Dec. 22, 2008
Agilent	Dielectric Probe Kit	85070D	US01440205	NCR	NCR
Agilent	Dual Directional Coupler	778D	50422	NCR	NCR
Agilent	Power Amplifier	8449B	3008A01917	NCR	NCR
R&S	Power Meter	NRVD	101394	Oct. 31, 2007	Oct. 30, 2008
R&S	Power Sensor	NRV-Z1	100130	Oct. 31, 2007	Oct. 30, 2008

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 ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm.

The following ingredients for tissue simulating liquid are used:

- **Water**: deionized water (pure H_20), resistivity ≧16MΩ- as basis for the liquid
- **Sugar**: refined sugar in crystals, as available in food shops – to reduce relative permittivity
- **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 850MHZ 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 for 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.

Band	Frequency (MHz)	Permittivity (ε_r)	Conductivity (σ)	Measurement Date
GSM850	824.2	56.3	0.976	May 30, 2008
	836.4	56.3	0.988	
	848.8	56.1	0.997	
	824.2	56.3	0.976	Jun. 11, 2008
	836.4	56.3	0.988	
	848.8	56.1	0.997	
GSM1900	1850.2	51.3	1.47	May 29, 2008
	1880.0	51.2	1.50	
	1909.8	51.1	1.53	
WCDMA Band V	826.4	56.3	0.978	May 30, 2008
	836.4	56.3	0.988	
	846.6	56.1	0.996	
	826.4	56.3	0.978	Jun. 11, 2008
	836.4	56.3	0.988	
	846.6	56.1	0.996	
	826.4	56.3	0.962	Jul. 11, 2008
	836.4	56.3	0.972	
	846.6	56.2	0.980	
	826.4	56.6	0.969	Aug. 06, 2008
	836.4	56.3	0.978	
	846.6	56.1	0.987	
WCDMA Band II	1852.4	51.2	1.47	May 29, 2008
	1880.0	51.2	1.50	
	1907.6	51.1	1.53	
	1852.4	51.0	1.47	Jun. 11, 2008
	1880.0	50.9	1.50	
	1907.6	50.9	1.53	

Table 6.2 Measuring Results for Simulating Liquid

The measuring data are consistent with ε_r= 55.2 ± 5% and σ= 0.97 ± 5% for body SAR of GSM850 and WCDMA Band V, and ε_r = 53.3 ± 5% and σ= 1.52 ± 5% for body SAR of GSM1900 and WCDMA Band II.

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 Multiplying Factions for Various Distributions

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:

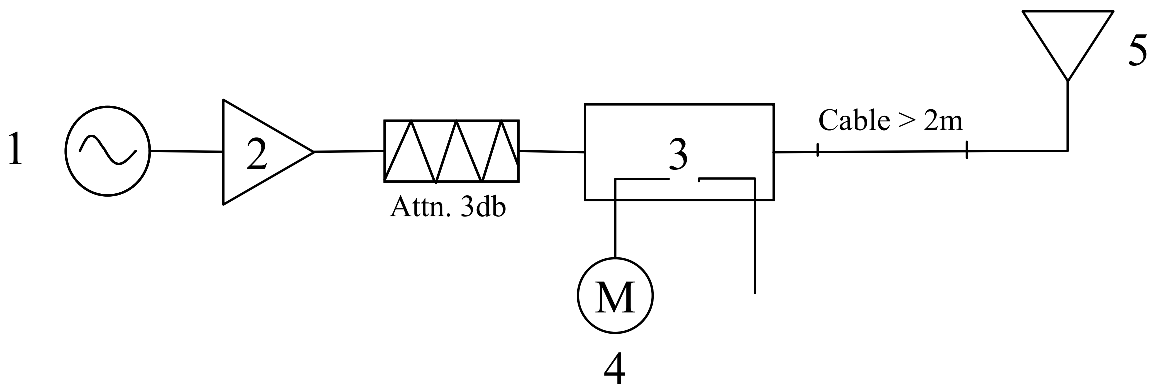


Fig. 8.1 System Setup for System Evaluation

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 20dBm (100mW) 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 be within its specification of 10 %. Table 8.1 shows the target SAR and measured SAR after normalized to 1W input power.

Frequency (MHz)	SAR	Target (W/kg)	Measurement Data (W/kg)	Variation	Measurement Date
835	SAR (1g)	9.52	10.1	6.1 %	May 30, 2008
	SAR (10g)	6.37	6.6	3.6 %	
	SAR (1g)	9.52	9.35	-1.8 %	Jun. 11, 2008
	SAR (10g)	6.37	6.14	-3.6 %	
	SAR (1g)	9.52	9.38	-1.5 %	Jul. 11, 2008
	SAR (10g)	6.37	6.17	-3.1 %	
	SAR (1g)	9.52	10.2	7.1 %	Aug. 06, 2008
	SAR (10g)	6.37	6.71	5.3 %	
1900	SAR (1g)	40.1	38.0	-5.2 %	May 29, 2008
	SAR (10g)	21.3	20.2	-5.2 %	
	SAR (1g)	40.1	42.2	5.2 %	Jun. 11, 2008
	SAR (10g)	21.3	22.5	5.6 %	

Table 8.1 Target and Measurement Data Comparison

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

9. Description for DUT Testing Position

This DUT was tested in two different positions. They are “Rear Face with Holster 0cm Gap” and “Bottom Side with Holster 0cm Gap” as illustrated below:

1) “ Body Worn”
   i) To position the device parallel to the phantom surface.
   ii) To adjust the phone parallel to the flat phantom.
   iii) To adjust the distance between the EUT surface and the flat phantom to 0 cm.

Remark: Please refer to Appendix E for the test setup photos.

10.Measurement Procedures

The measurement procedures are as follows:

- Linking DUT with base station simulator 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 middle channel on each testing position
- Finding out the largest SAR result on these testing positions of each band
- Measuring output power and SAR results for the low and high channels in this worst case testing position

According to the EN50361 draft standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Verification of the 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 IEEE P1528-2003 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, IEEE 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 Conducted Power

Mode \ Band / Channel	GSM 850 (dBm)			GSM 1900 (dBm)		
	128	189	251	512	661	810
GSM	31.88	31.86	31.75	28.55	28.64	28.76
GPRS 10	31.71	31.78	31.68	28.37	28.47	28.60
GPRS 12	25.82	25.81	25.73	28.27	28.37	28.48
EGPRS 12	26.83	26.81	26.70	25.47	25.58	25.72

WCDMA SAR Test mode - Conducted Power

Mode	Setup	Cell band (850)			PCS band (1900)		
		CH4132	CH4182	CH4233	CH9262	CH9400	CH9538
		826.4 (MHz)	836.4 (MHz)	846.6 (MHz)	1852.4 (MHz)	1880.0 (MHz)	1907.6 (MHz)
R99- WCDMA	RMC 12.2Kbps	22.23	22.82	22.22	22.74	23.22	23.16
R5-HSDPA Only	HSDPA - subtest 1	22.00	22.58	22.12	22.89	23.17	23.03
	HSDPA - subtest 2	21.60	22.08	21.69	22.29	22.72	22.48
	HSDPA - subtest 3	21.35	21.97	21.63	22.37	22.80	22.60
	HSDPA - subtest 4	20.92	21.55	21.10	21.84	22.29	22.14
R6- HSPA (HSUPA&HSDPA)	HSUPA - subtest 1	21.80	21.93	22.21	22.23	22.40	22.23
	HSUPA - subtest 2	19.62	20.17	19.84	20.48	20.70	20.46
	HSUPA - subtest 3	20.61	21.19	20.88	21.34	21.79	21.60
	HSUPA - subtest 4	20.06	20.67	20.33	20.88	21.23	20.97
	HSUPA - subtest 5	21.88	21.92	22.25	22.05	22.26	22.13

11.2 Test Records for Body SAR

Position	Band	Mode	Ch.	Freq. (MHz)	Modulation Type	Antenna	EUT	Measured 1g SAR	Power Drift	Limit (W/kg)	Result	App. Plot
Bottom Side with 0cm Gap	GSM850	GPRS12	189	836.4	GMSK	Out	E100N	0.035	-0.194	1.6	Pass	1
Bottom Side with 0cm Gap	GSM850	GPRS12	189	836.4	GMSK	In	E100N	0.000038	-0.14	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	GPRS12	189	836.4	GMSK	Out	E100N	0.888	-0.164	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	GPRS12	189	836.4	GMSK	In	E100N	0.000225	-0.147	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	GPRS12	189	836.4	GMSK	Out	E100N	1.02	0.135	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	EDGE12	189	836.4	GMSK	Out	E100N	1.05	-0.04	1.6	Pass	-
Rear Face with Holster 0cm Gap	**GSM850**	EDGE12	**128**	**824.2**	**GMSK**	**Out**	**E100N**	**1.08**	**0.056**	**1.6**	**Pass**	**2**
Rear Face with Holster 0cm Gap	GSM850	EDGE12	251	848.8	GMSK	Out	E100N	1.05	0.143	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	GPRS12	128	824.2	GMSK	Out	E100N	0.899	-0.045	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	GPRS12	251	848.8	GMSK	Out	E100N	0.746	-0.012	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	EDGE12	128	824.2	GMSK	Out	E100	1	-0.035	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM850	EDGE12	189	836.4	GMSK	Out	E100	1.05	0.065	1.6	Pass	-
Rear Face with Holster 0cm Gap	**GSM850**	**EDGE12**	**251**	**848.8**	**GMSK**	**Out**	**E100**	**1.06**	**0.12**	**1.6**	**Pass**	**3**
Rear Face with Holster 0cm Gap	WCDMA850	12.2K	4132	826.4	QPSK	Out	E100N	1.14	-0.112	1.6	Pass	-
Rear Face with Holster 0cm Gap	**WCDMA850**	12.2K	**4182**	**836.4**	**QPSK**	**Out**	**E100N**	**1.26**	**0.113**	**1.6**	**Pass**	**4**
Rear Face with Holster 0cm Gap	WCDMA850	12.2K	4233	846.6	QPSK	Out	E100N	1.19	0.156	1.6	Pass	-
Rear Face with Holster 0cm Gap	WCDMA850	HSUPA (Sub-1)	4182	836.4	QPSK	Out	E100N	1.13	0.0063	1.6	Pass	-
Rear Face with Holster 0cm Gap	WCDMA850	HSUPA (Sub-1)	4132	826.4	QPSK	Out	E100N	1.01	0.043	1.6	Pass	-
Rear Face with Holster 0cm Gap	WCDMA850	HSUPA (Sub-1)	4233	846.6	QPSK	Out	E100N	1.04	0.026	1.6	Pass	-
Rear Face with Holster 0cm Gap	WCDMA850	HSUPA (Sub-5)	4182	836.4	QPSK	Out	E100N	1.22	0.046	1.6	Pass	12
Rear Face with Holster 0cm Gap	WCDMA850	HSUPA (Sub-5)	4132	826.4	QPSK	Out	E100N	1.11	0.145	1.6	Pass	11
Rear Face with Holster 0cm Gap	WCDMA850	HSUPA (Sub-5)	4233	846.6	QPSK	Out	E100N	1.03	0.121	1.6	Pass	13
Rear Face with Holster 0cm Gap	WCDMA850	12.2K	4182	836.4	QPSK	Out	E100	1.21	0.016	1.6	Pass	-
Rear Face with Holster 0cm Gap	**WCDMA850**	**12.2K**	**4132**	**826.4**	**QPSK**	**Out**	**E100**	**1.24**	**-0.071**	**1.6**	**Pass**	**5**
Rear Face with Holster 0cm Gap	WCDMA850	12.2K	4233	846.6	QPSK	Out	E100	1.22	0.034	1.6	Pass	-

Position	Band	Mode	Ch.	Freq. (MHz)	Modulation Type	Antenna	EUT	Measured 1g SAR	Power Drift	Limit (W/kg)	Result	App. Plot
Bottom Side with 0cm Gap	GSM1900	GPRS12	661	1880	GMSK	Out	E100N	0.048	-0.106	1.6	Pass	-
Bottom Side with 0cm Gap	GSM1900	GPRS12	661	1880	GMSK	In	E100N	0.049	0.12	1.6	Pass	6
Rear Face with Holster 0cm Gap	GSM1900	GPRS12	661	1880	GMSK	Out	E100N	0.684	-0.118	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM1900	GPRS12	661	1880	GMSK	In	E100N	0.00669	0.132	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM1900	EDGE12	661	1880	GMSK	Out	E100N	0.405	-0.135	1.6	Pass	-
Rear Face with Holster 0cm Gap	**GSM1900**	GPRS12	**512**	**1850**	**GMSK**	**Out**	**E100N**	**1.09**	**0.113**	**1.6**	**Pass**	**7**
Rear Face with Holster 0cm Gap	GSM1900	GPRS12	810	1910	GMSK	Out	E100N	0.568	-0.068	1.6	Pass	-
Rear Face with Holster 0cm Gap	**GSM1900**	**GPRS12**	**512**	**1850**	**GMSK**	**Out**	**E100**	**0.868**	**0.143**	**1.6**	**Pass**	**8**
Rear Face with Holster 0cm Gap	GSM1900	GPRS12	661	1880	GMSK	Out	E100	0.502	-0.192	1.6	Pass	-
Rear Face with Holster 0cm Gap	GSM1900	GPRS12	810	1910	GMSK	Out	E100	0.395	0.111	1.6	Pass	-
Rear Face with Holster 0cm Gap	**WCDMA1900**	**12.2K**	**9400**	**1880**	**QPSK**	**Out**	**E100N**	**0.406**	**0.127**	**1.6**	**Pass**	**9**
Rear Face with Holster 0cm Gap	WCDMA1900	12.2K	9262	1852	QPSK	Out	E100N	0.367	0.136	1.6	Pass	-
Rear Face with Holster 0cm Gap	WCDMA1900	12.2K	9538	1908	QPSK	Out	E100N	0.333	0.105	1.6	Pass	-
Rear Face with Holster 0cm Gap	WCDMA1900	HSUPA (Sub-1)	9400	1880	QPSK	Out	E100N	0.38	0.148	1.6	Pass	-
Rear Face with Holster 0cm Gap	**WCDMA1900**	12.2K	**9400**	**1880**	**QPSK**	**Out**	**E100**	**0.425**	**0.124**	**1.6**	**Pass**	**10**

11.3 Volume Scan

Position	Mode	Channel	Power Drift (dB)	Measured 1g SAR (W/kg)	Multi Band 1g SAR (W/kg)	Limit (W/kg)	Result
Rear Face with Holster 0cm Gap	WCDMA Band V (RMC 12.2K)	4182	0.00484	1.31	1.32	1.6	Pass
	802.11b	6	0.12	0.04			
Rear Face with Holster 0cm Gap	WCDMA Band V (RMC 12.2K)	4182	0.00484	1.31	1.31	1.6	Pass
	Bluetooth	39	0.001	0.00087			

Remark:

1. The worst configuration on each position is used for the volume scan.
2. Test Engineer：Gordon Lin, Jason Wang, Robert Liu and A-Rod Chen

12. References

[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] DASY5 System Handbook

Appendix A - System Performance Check Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/30

System Check_Body_835MHz

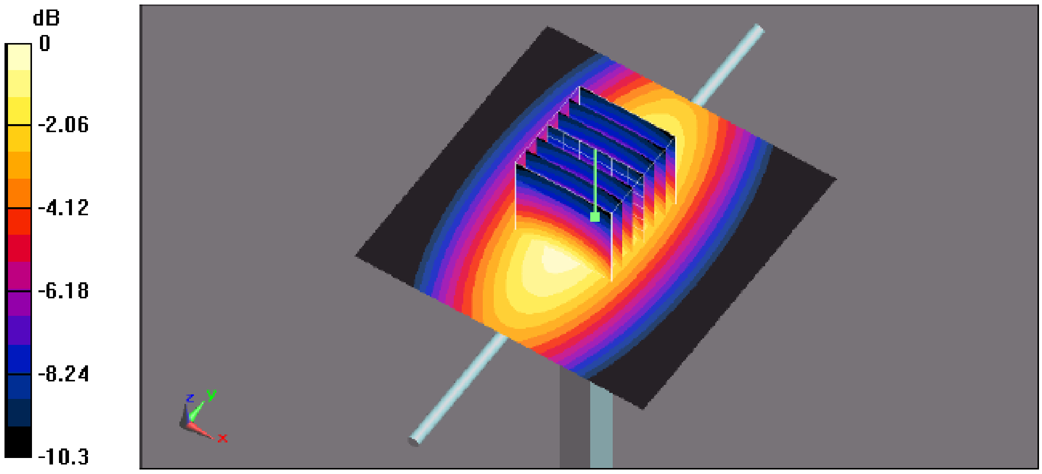
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; $\sigma = 0.987$ mho/m; $\varepsilon_r = 56.3$; $\rho = 1000$ kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.3 ℃

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 (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.09 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.4 V/m; Power Drift = -0.00952 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.660 mW/g
Maximum value of SAR (measured) = 1.09 mW/g



0 dB = 1.09mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/6/11

System Check_Body_835MHz

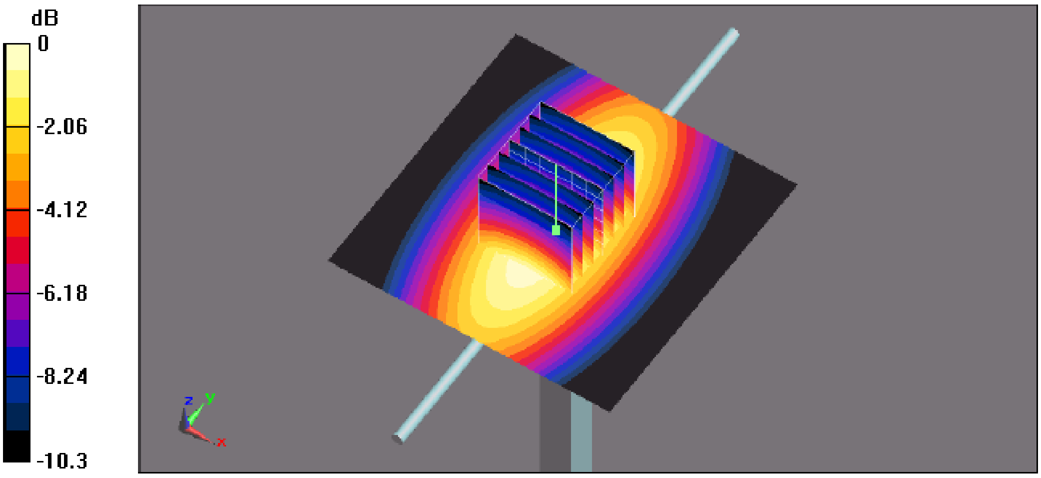
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; σ = 0.987 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.1 ℃; Liquid Temperature：21.3 ℃

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 (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.01 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 33.4 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.935 mW/g; SAR(10 g) = 0.614 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.01mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

System Check_Body_835MHz

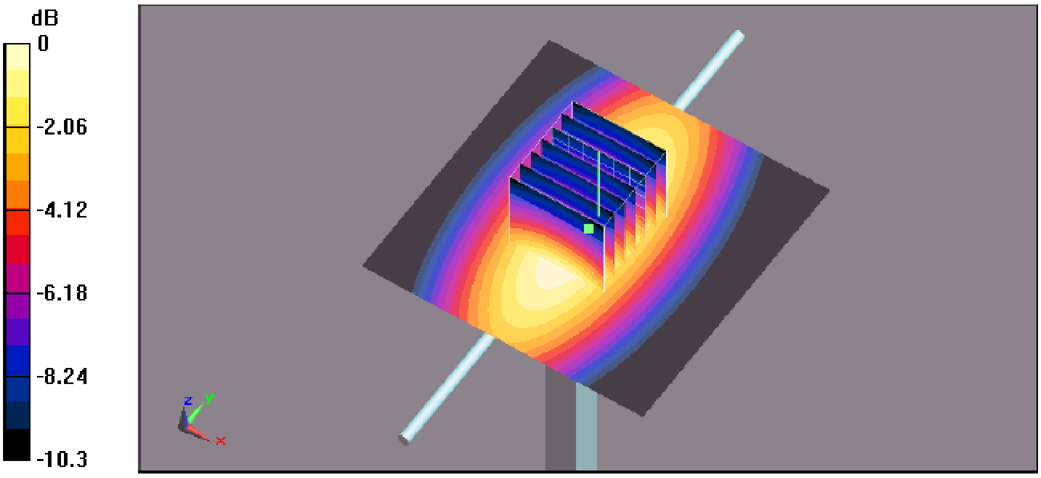
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; σ = 0.971 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.4 ℃

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 (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.02 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 33.4 V/m; Power Drift = -0.00761 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.938 mW/g; SAR(10 g) = 0.617 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.01mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/8/6

System Check_Body_835MHz

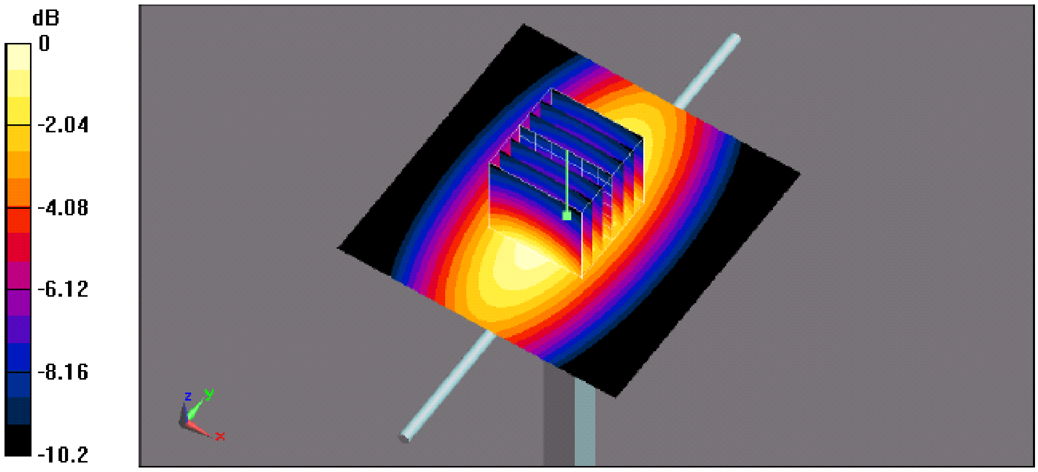
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; σ = 0.977 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.3 ℃

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 (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.1 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.9 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.671 mW/g
Maximum value of SAR (measured) = 1.1 mW/g



0 dB = 1.1mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/29

System Check_Body_1900MHz

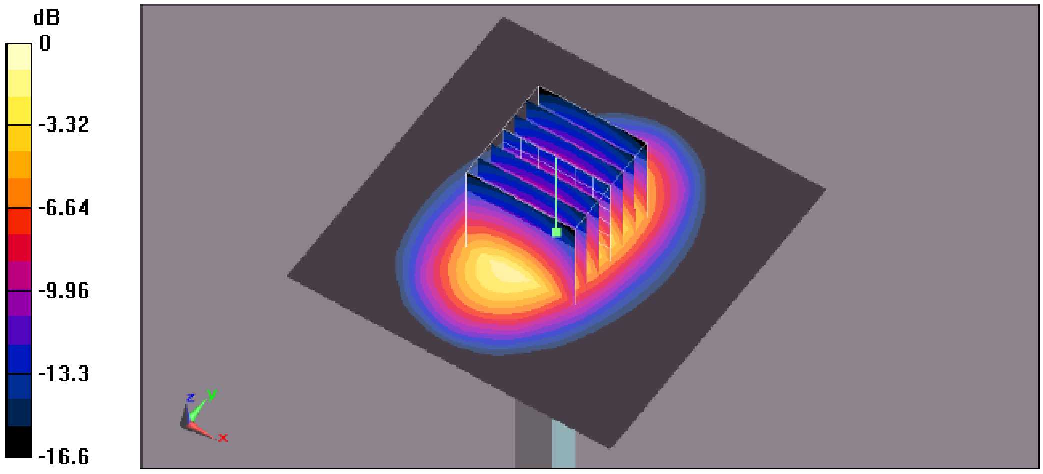
DUT: Dipole 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1900 MHz; $\sigma = 1.52$ mho/m; $\varepsilon_r = 51.1$; $\rho = 1000$ kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.6 ℃

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) = 4.36 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.7 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 6.54 W/kg
SAR(1 g) = 3.8 mW/g; SAR(10 g) = 2.02 mW/g
Maximum value of SAR (measured) = 4.32 mW/g



0 dB = 4.32mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/6/11

System Check_Body_1900MHz

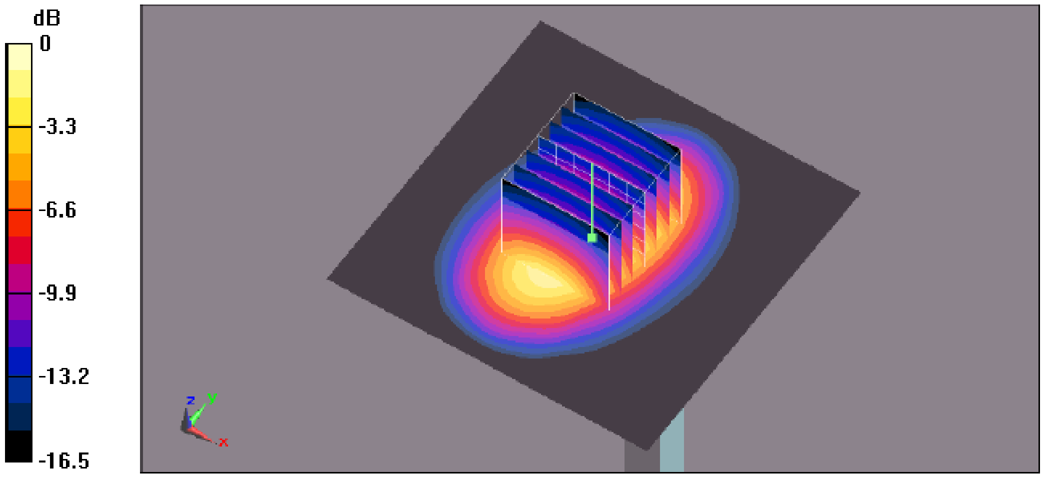
DUT: Dipole 1900 MHz

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 = 50.9; ρ = 1000 kg/m^3
Ambient Temperature：22.7 ℃; Liquid Temperature：21.5 ℃

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) = 4.86 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.6 V/m; Power Drift = 0.00448 dB
Peak SAR (extrapolated) = 7.21 W/kg
SAR(1 g) = 4.22 mW/g; SAR(10 g) = 2.25 mW/g
Maximum value of SAR (measured) = 4.78 mW/g



0 dB = 4.78mW/g

Appendix B - SAR Measurement Data

<Plot 1>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2008/5/30

Body_GSM850 Ch189_Bottom Side with Holster 0cm Gap_GPRS12_Antenna Out_E100N

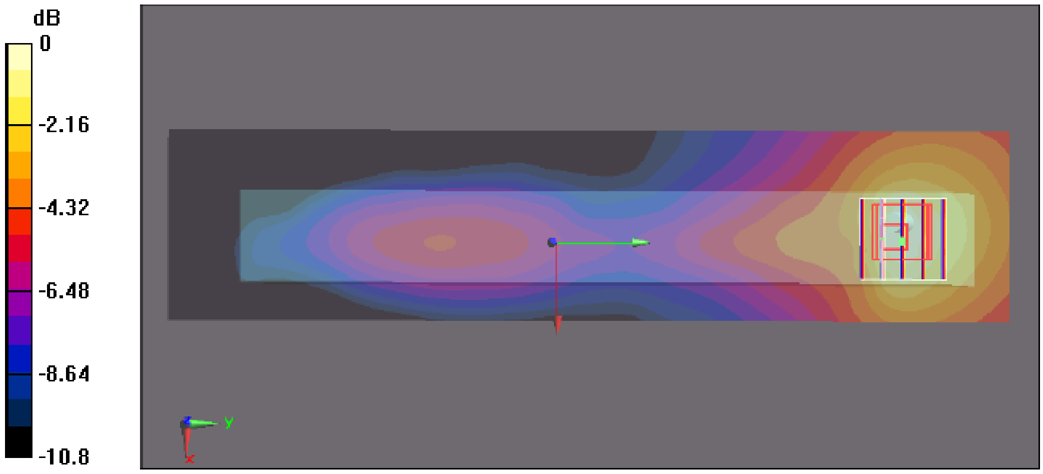
DUT: 841815

Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:2
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.988 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.3 ℃

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 (51x221x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.037 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.94 V/m; Power Drift = -0.194 dB
Peak SAR (extrapolated) = 0.061 W/kg
SAR(1 g) = 0.035 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.038 mW/g



0 dB = 0.038mW/g

<Plot 2>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab　　Date: 2008/5/30

Body_GSM850 Ch128_Rear Face with Holster 0cm Gap_EDGE12_Antenna Out_E100N

DUT: 841815

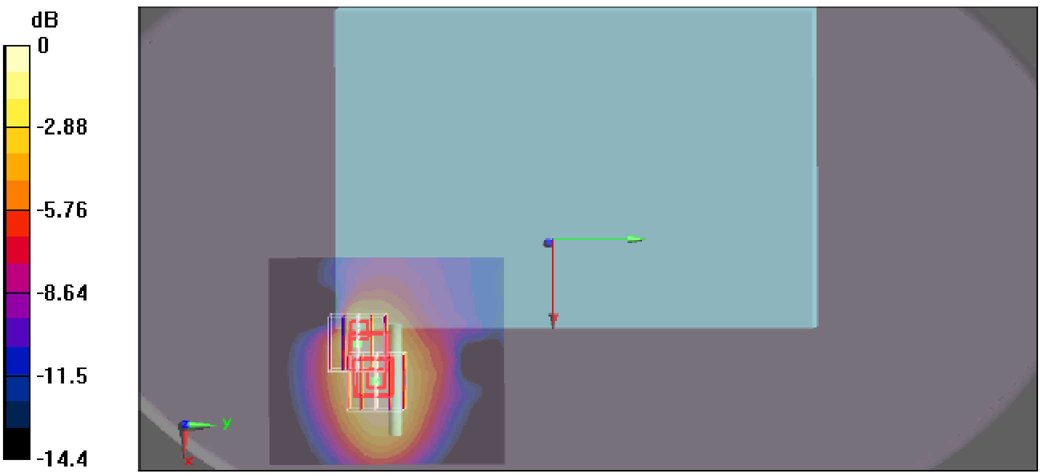
Communication System: GSM850; Frequency: 824.2 MHz;Duty Cycle: 1:2
Medium: MSL_850 Medium parameters used: f = 824.2 MHz; σ = 0.976 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.3 ℃

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

Ch128/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.01 mW/g

Ch128/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.55 V/m; Power Drift = 0.056 dB
Peak SAR (extrapolated) = 2.59 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.560 mW/g
Maximum value of SAR (measured) = 1.55 mW/g

Ch128/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.55 V/m; Power Drift = 0.056 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.903 mW/g; SAR(10 g) = 0.628 mW/g
Maximum value of SAR (measured) = 0.982 mW/g



0 dB = 0.982mW/g

<Plot 3>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/30

Body_GSM850 Ch251_Rear Face with Holster 0cm Gap_EDGE12_Antenna Out_E100

DUT: 841815

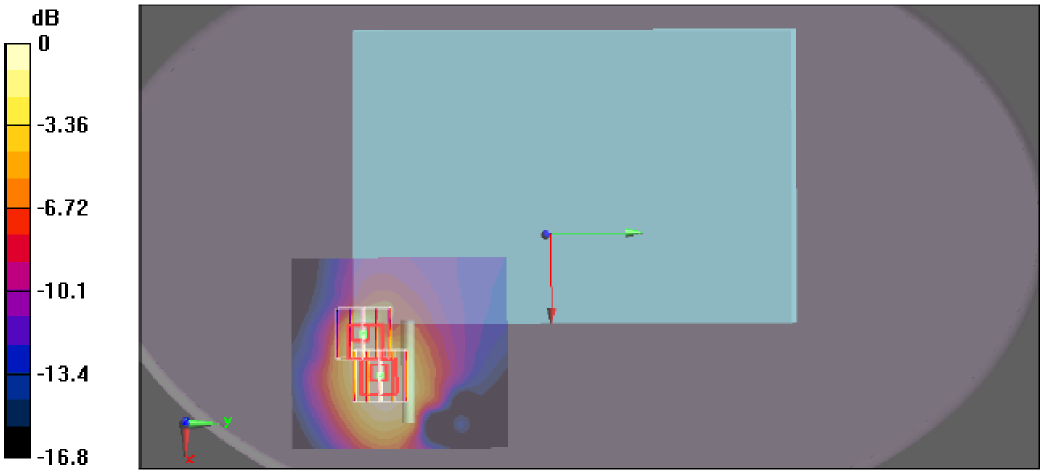
Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:2
Medium: MSL_850 Medium parameters used: f = 849 MHz; $\sigma = 0.997$ mho/m; $\varepsilon_r = 56.1$; $\rho = 1000$ kg/m^3
Ambient Temperature：22.3 ℃; Liquid Temperature：21.3 ℃

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

Ch251/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.48 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.49 V/m; Power Drift = 0.120 dB
Peak SAR (extrapolated) = 3 W/kg
SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.538 mW/g
Maximum value of SAR (measured) = 1.21 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.49 V/m; Power Drift = 0.120 dB
Peak SAR (extrapolated) = 2.16 W/kg
SAR(1 g) = 0.887 mW/g; SAR(10 g) = 0.591 mW/g
Maximum value of SAR (measured) = 0.926 mW/g



0 dB = 0.926mW/g

<Plot 4>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2008/5/31

Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100N

DUT: 841815

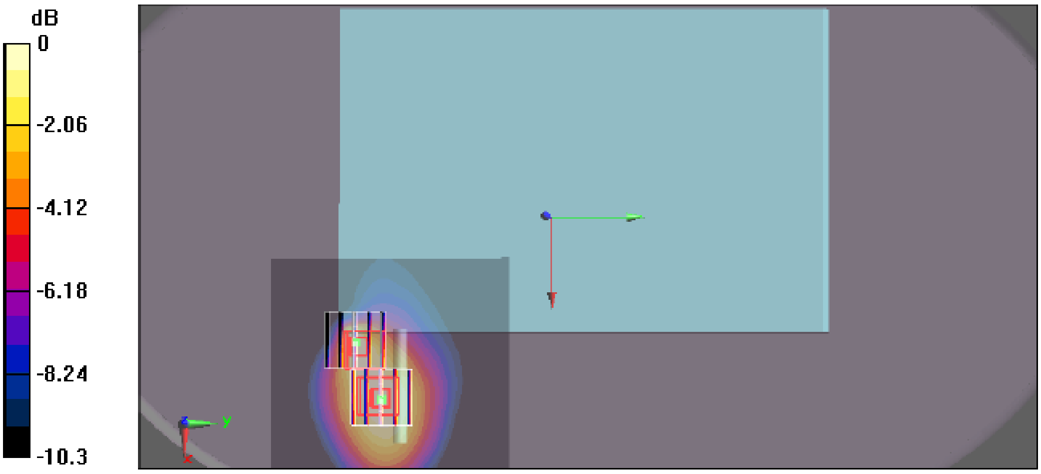
Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.988 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.4 ℃; Liquid Temperature：21.3 ℃

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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.28 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.48 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 3.99 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.570 mW/g
Maximum value of SAR (measured) = 1.76 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.48 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.933 mW/g; SAR(10 g) = 0.641 mW/g
Maximum value of SAR (measured) = 1 mW/g



0 dB = 1mW/g

<Plot 5>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/31

Body_WCDMA850 Ch4132_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100

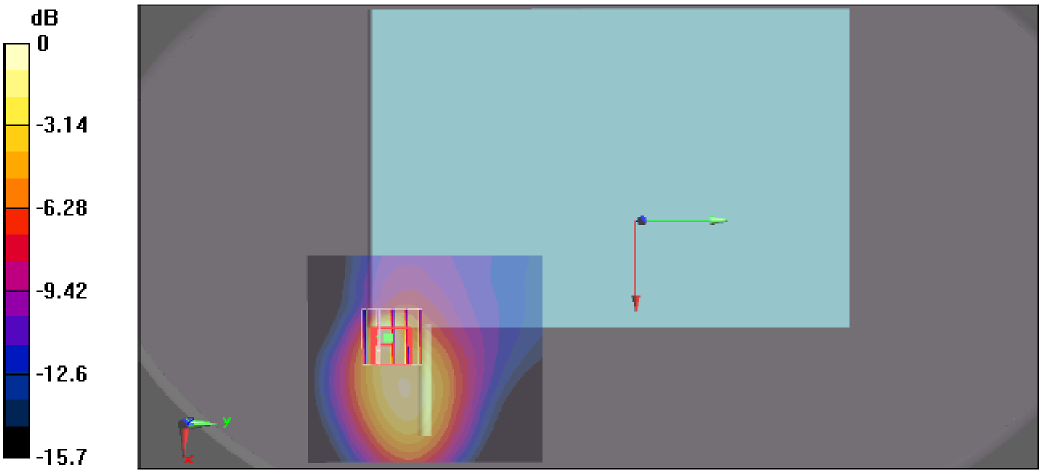
DUT: 841815

Communication System: WCDMA; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 826.4 MHz; σ = 0.978 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.3 ℃

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

Ch4132/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.76 mW/g

Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.59 V/m; Power Drift = -0.071 dB
Peak SAR (extrapolated) = 4.24 W/kg
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.604 mW/g
Maximum value of SAR (measured) = 1.34 mW/g



0 dB = 1.34mW/g

<Plot 6>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/29

Body_GSM1900 Ch661_Bottom Side with Holster 0cm Gap_GPRS12_Antenna In

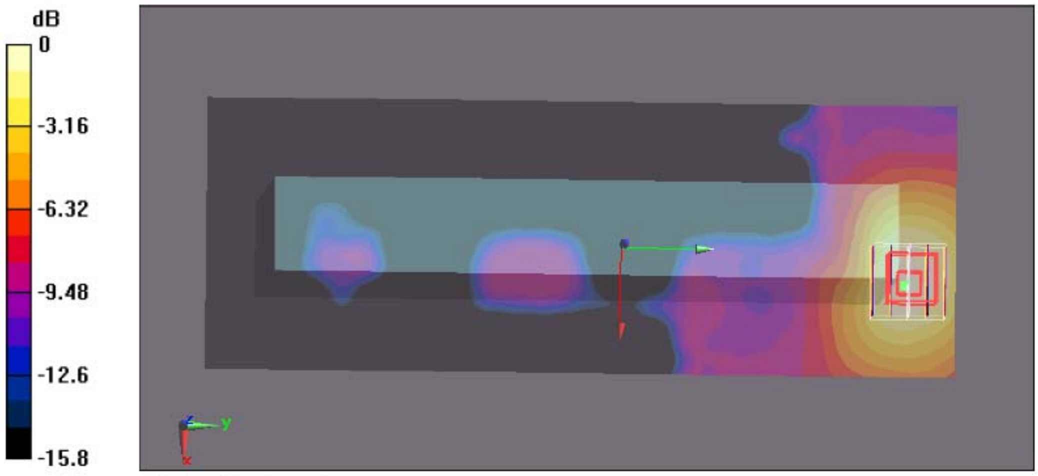
DUT: 841815

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 = 51.2; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.6 ℃

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 (81x221x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.052 mW/g

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.994 V/m; Power Drift = 0.120 dB
Peak SAR (extrapolated) = 0.077 W/kg
SAR(1 g) = 0.049 mW/g; SAR(10 g) = 0.030 mW/g
Maximum value of SAR (measured) = 0.053 mW/g



0 dB = 0.053mW/g

<Plot 7>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/29

Body_GSM1900 Ch512_Rear Face with Holster 0cm Gap_GPRS12_Antenna Out

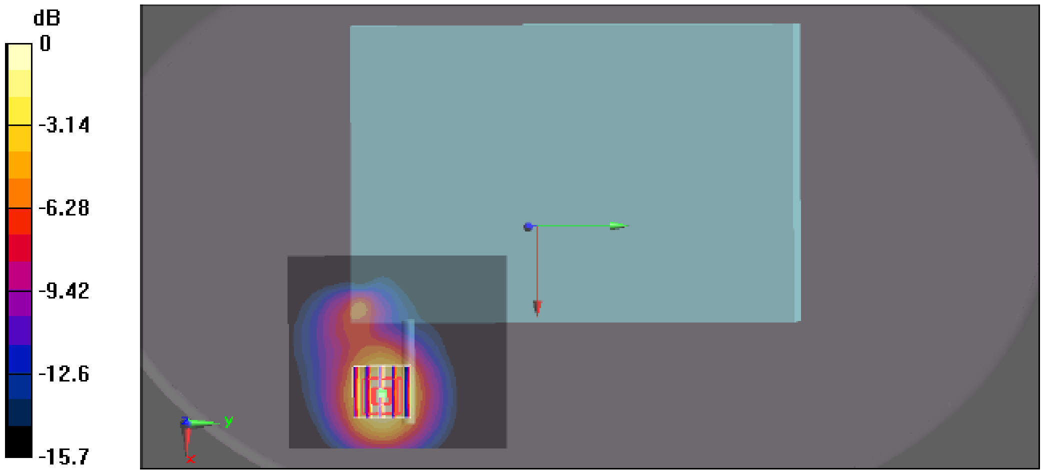
DUT: 841815

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:2
Medium: MSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.47 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

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

Ch512/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.23 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.18 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.648 mW/g
Maximum value of SAR (measured) = 1.18 mW/g



0 dB = 1.18mW/g

<Plot 8>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/29

Body_GSM1900 Ch512_Rear Face with Holster 0cm Gap_GPRS12_Antenna Out_E100

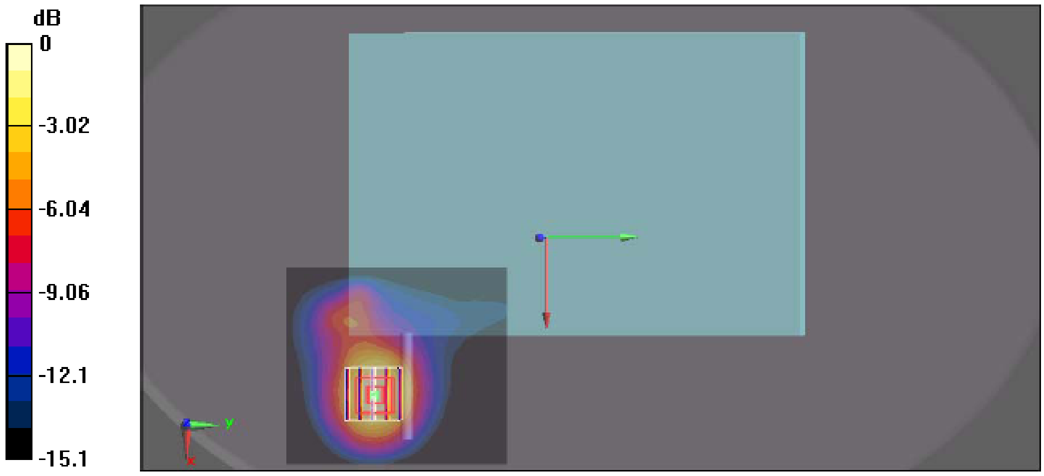
DUT: 841815

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:2
Medium: MSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.47 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.6 ℃

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

Ch512/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.994 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.22 V/m; Power Drift = 0.143 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.868 mW/g; SAR(10 g) = 0.513 mW/g
Maximum value of SAR (measured) = 0.956 mW/g



0 dB = 0.956mW/g

<Plot 9>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2008/5/30

Body_WCDMA1900 Ch9400_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100N

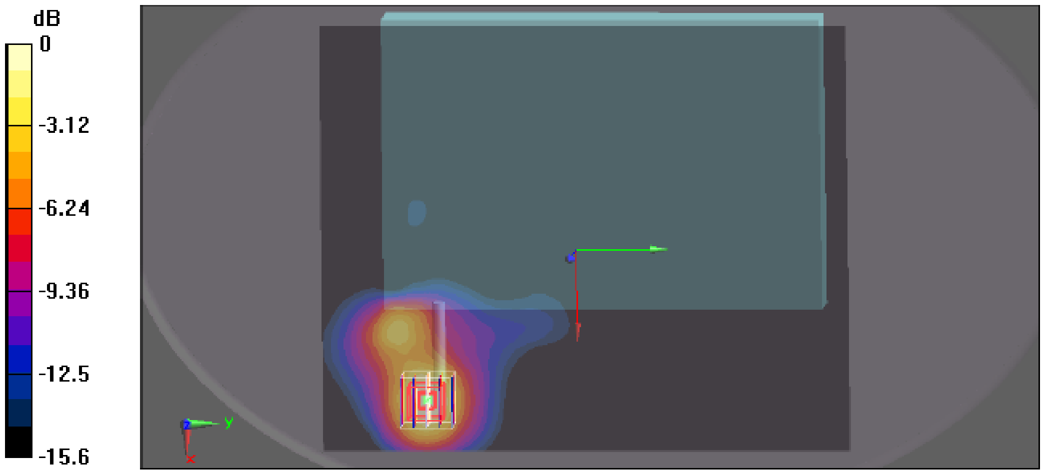
DUT: 841815

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; $\sigma = 1.5$ mho/m; $\varepsilon_r = 51.2$; $\rho = 1000$ kg/m^3
Ambient Temperature : 22.4 ℃; Liquid Temperature : 21.6 ℃

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

Ch9400/Area Scan (181x221x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.450 mW/g

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.865 V/m; Power Drift = 0.127 dB
Peak SAR (extrapolated) = 0.652 W/kg
SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.237 mW/g
Maximum value of SAR (measured) = 0.437 mW/g



0 dB = 0.437mW/g

<Plot 10>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/30

Body_WCDMA1900 Ch9400_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100

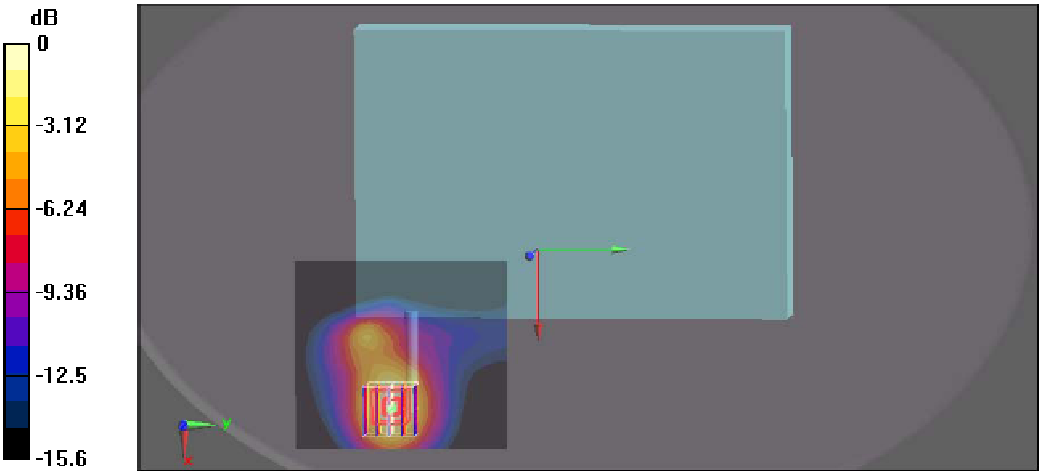
DUT: 841815

Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.5 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.6 ℃

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

Ch9400/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.469 mW/g

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.35 V/m; Power Drift = 0.124 dB
Peak SAR (extrapolated) = 0.676 W/kg
SAR(1 g) = 0.425 mW/g; SAR(10 g) = 0.249 mW/g
Maximum value of SAR (measured) = 0.465 mW/g



0 dB = 0.465mW/g

<Plot 11>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/8/6

Body_WCDMA850 Ch4132_Rear Face with Holster 0cm Gap_RMC12.2K+HSUPA_Sub-5_Antenna Out_E100N

DUT: 841815

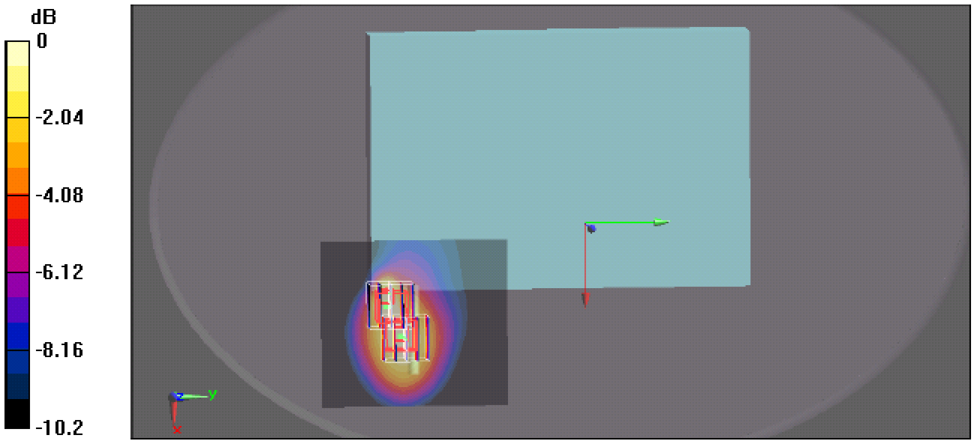
Communication System: WCDMA; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used : f = 826.4 MHz; $\sigma = 0.969$ mho/m; $\varepsilon_r = 56.3$; $\rho = 1000$ kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.3 ℃

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

Ch4132/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.15 mW/g

Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.53 V/m; Power Drift = 0.145 dB
Peak SAR (extrapolated) = 4 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.504 mW/g
Maximum value of SAR (measured) = 1.38 mW/g

Ch4132/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.53 V/m; Power Drift = 0.145 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.745 mW/g; SAR(10 g) = 0.510 mW/g
Maximum value of SAR (measured) = 0.797 mW/g



0 dB = 0.797mW/g

<Plot 12>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/8/6

Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K+HSUPA_Sub-5_Antenna Out_E100N

DUT: 841815

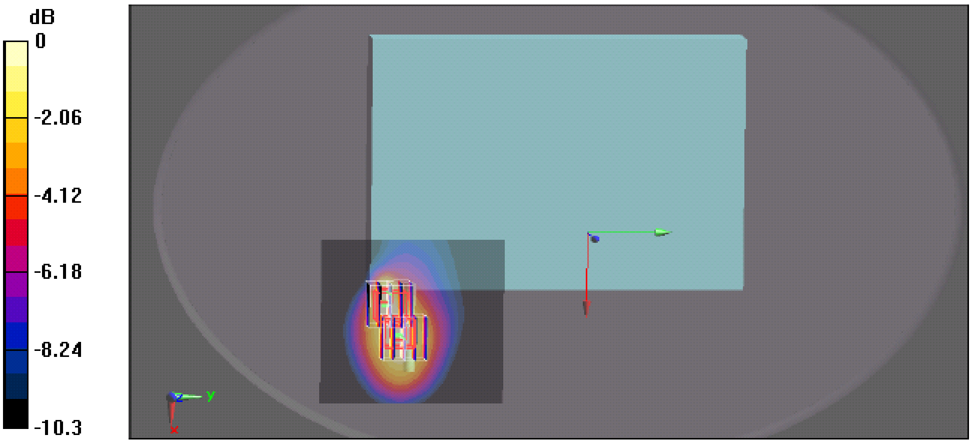
Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.978 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.3 ℃

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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.26 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.64 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 4.41 W/kg
SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.555 mW/g
Maximum value of SAR (measured) = 1.5 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.64 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.831 mW/g; SAR(10 g) = 0.570 mW/g
Maximum value of SAR (measured) = 0.886 mW/g



0 dB = 0.886mW/g

<Plot 13>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/8/6

Body_WCDMA850 Ch4233_Rear Face with Holster 0cm Gap_RMC12.2K+HSUPA_Sub-5_Antenna Out_E100N

DUT: 841815

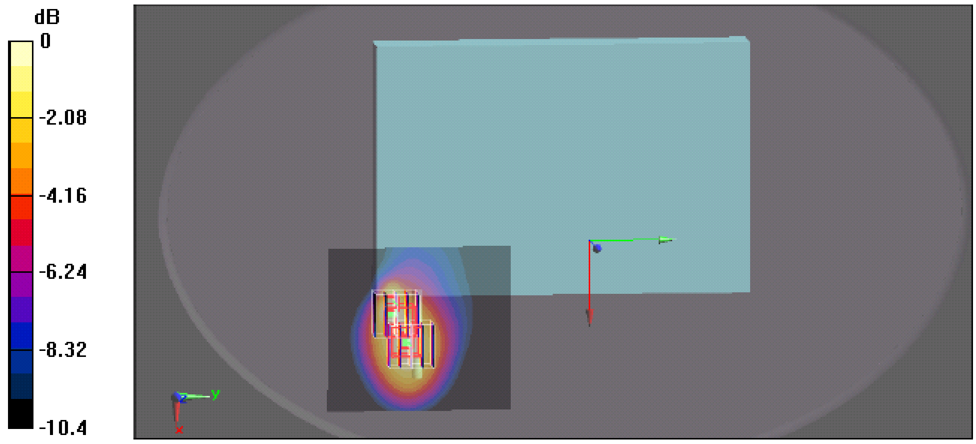
Communication System: WCDMA; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 847 MHz; σ = 0.987 mho/m; ε_r = 56.1; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.3 ℃

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

Ch4233/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.12 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.47 V/m; Power Drift = 0.121 dB
Peak SAR (extrapolated) = 3.16 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.511 mW/g
Maximum value of SAR (measured) = 1.3 mW/g

Ch4233/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.47 V/m; Power Drift = 0.121 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.786 mW/g; SAR(10 g) = 0.534 mW/g
Maximum value of SAR (measured) = 0.844 mW/g



0 dB = 0.844mW/g

<2D Plots>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/31

Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100N_2D

DUT: 841815

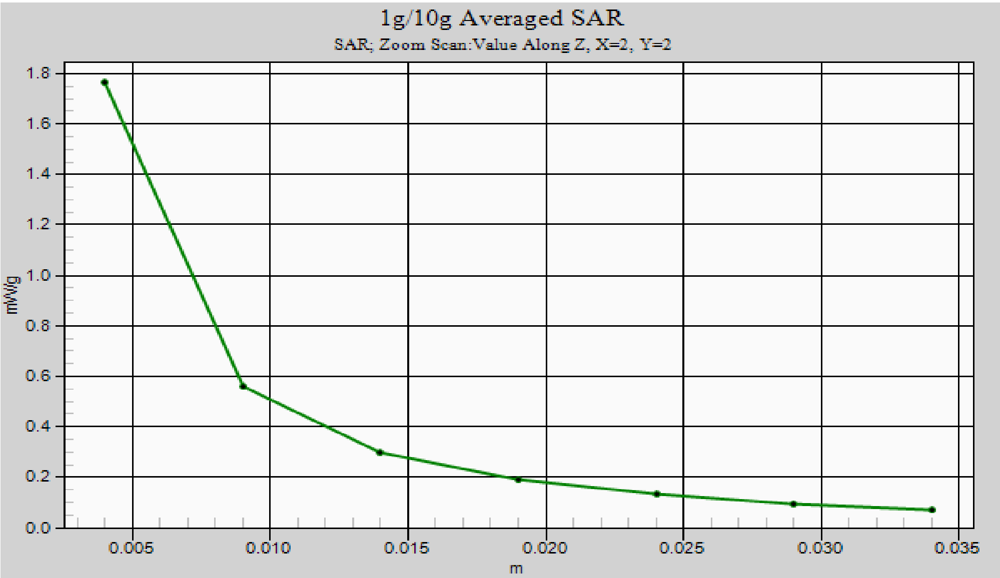
Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.988 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.4 ℃; Liquid Temperature：21.3 ℃

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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.28 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.48 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 3.99 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.570 mW/g
Maximum value of SAR (measured) = 1.76 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.48 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.933 mW/g; SAR(10 g) = 0.641 mW/g
Maximum value of SAR (measured) = 1 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/5/31

Body_WCDMA850 Ch4132_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100_2D

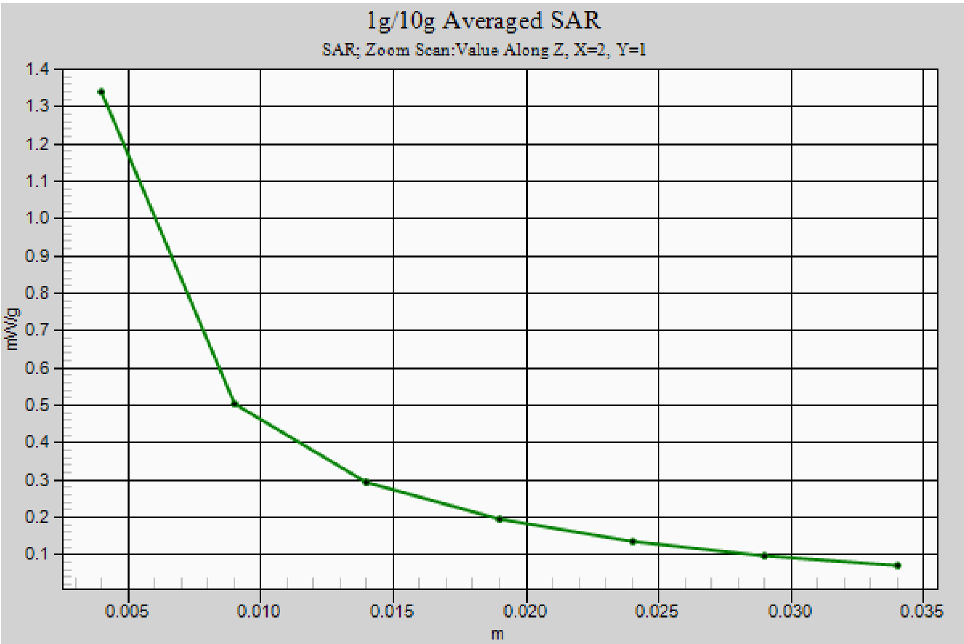
DUT: 841815

Communication System: WCDMA; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 826.4 MHz; σ = 0.978 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.3 ℃

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

Ch4132/Area Scan (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.76 mW/g

Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.59 V/m; Power Drift = -0.071 dB
Peak SAR (extrapolated) = 4.24 W/kg
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.604 mW/g
Maximum value of SAR (measured) = 1.34 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/8/6

Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K+HSUPA_Sub-5_Antenna Out_E100N_2D

DUT: 841815

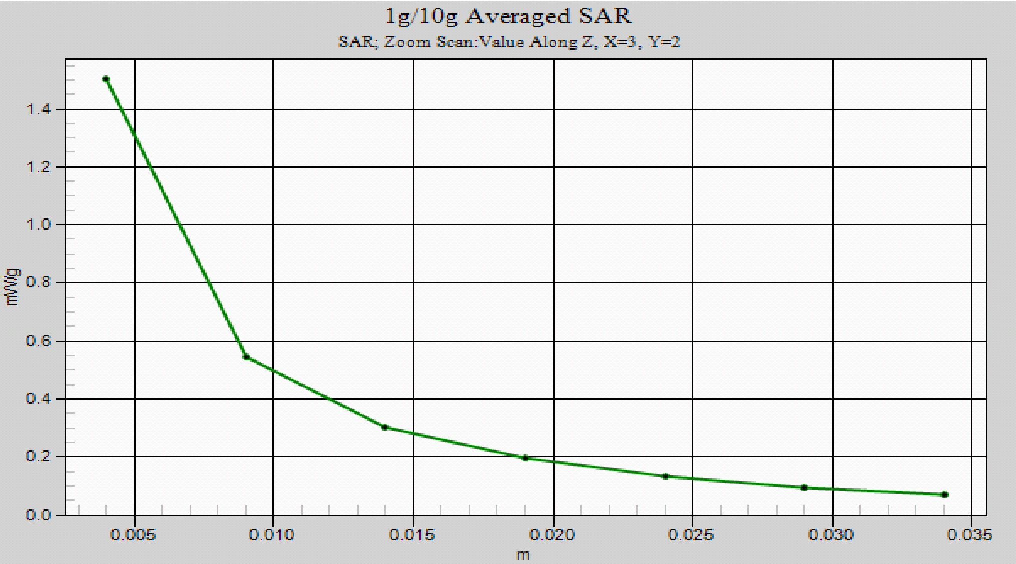
Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.978 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.3 ℃

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 (81x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.26 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.64 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 4.41 W/kg
SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.555 mW/g
Maximum value of SAR (measured) = 1.5 mW/g

Ch4182/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.64 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.831 mW/g; SAR(10 g) = 0.570 mW/g
Maximum value of SAR (measured) = 0.886 mW/g



<Volume Scan SAR>

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

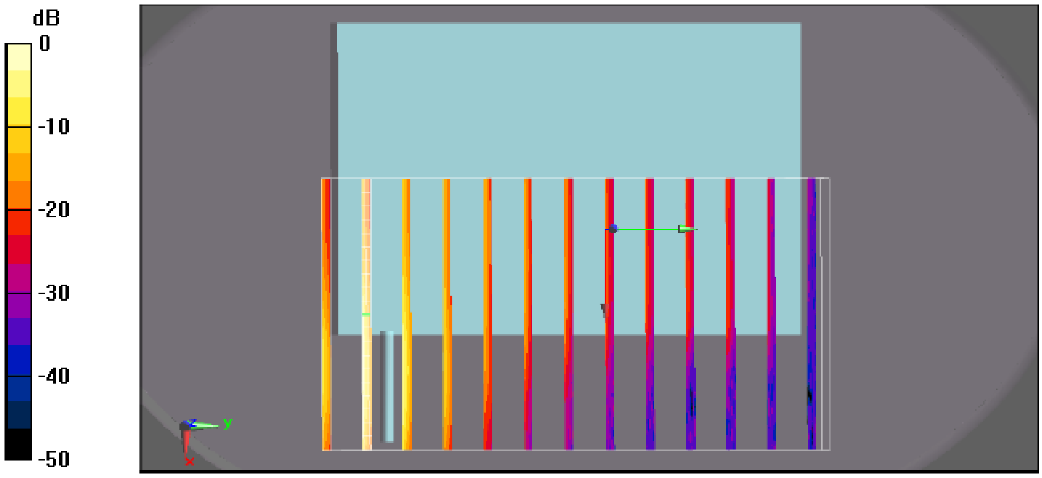
Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100N_Volume Scan

DUT: 841815

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.972 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.4 ℃

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/Volume Scan (21x38x10): Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.06 V/m; Power Drift = 0.00484 dB
Peak SAR (extrapolated) = 4.01 W/kg
SAR(1 g) = 1.31 mW/g; SAR(10 g) = 0.676 mW/g
Total Absorbed Power = 0.0938079 W
Maximum value of SAR (measured) = 1.43 mW/g



0 dB = 1.43mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

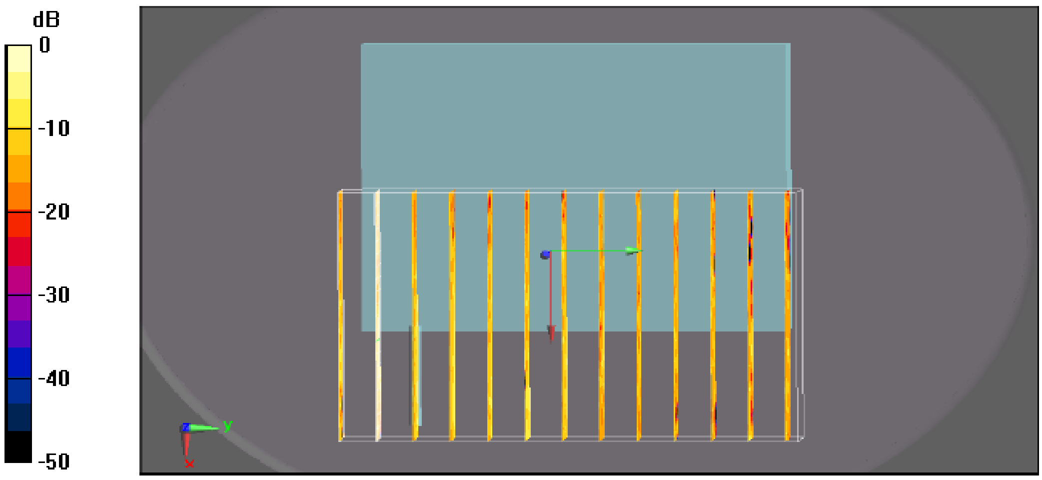
Body_802.11b Ch6_Rear Face with Holster 0cm Gap_Antenna Out_E100N_Volume Scan

DUT: 841815

Communication System: 802.11b ; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.92 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Ambient Temperature : 22.4 ℃; Liquid Temperature : 21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(4.17, 4.17, 4.17); 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

Ch6/Volume Scan (21x38x10): Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.28 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.177 W/kg
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.016 mW/g
Total Absorbed Power = 0.00161294 W
Maximum value of SAR (measured) = 0.038 mW/g



0 dB = 0.038mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

Body_BT Ch39_Rear Face with Holster 0cm Gap_Antenna Out_E100N_Volume Scan:
DUT: 841815
Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.972 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

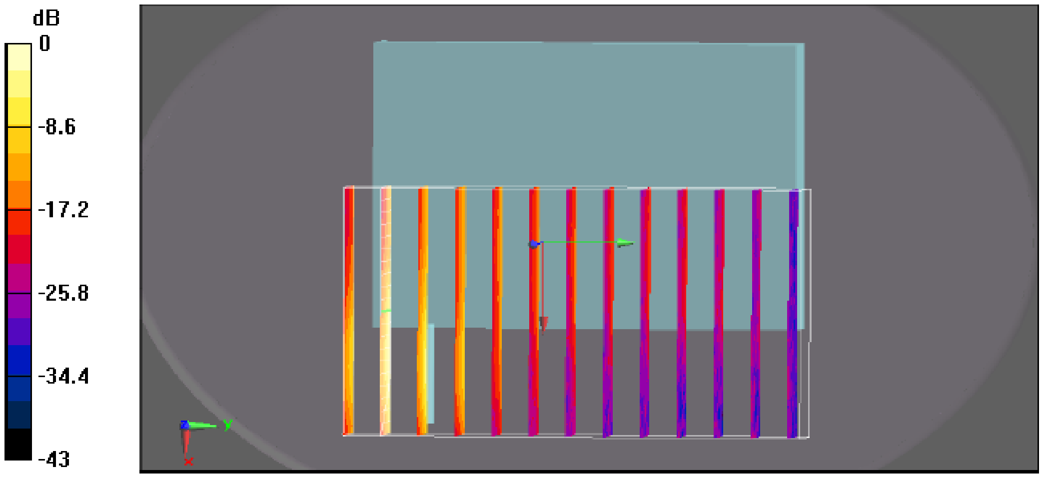
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

Body_802.11b Ch6_Rear Face with Holster 0cm Gap_Antenna Out_E100N_Volume Scan:
DUT: 841815
Communication System: 802.11b ; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.92 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

- Probe: ET3DV6 - SN1788; ConvF(4.17, 4.17, 4.17); 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

Multi Band Result:
SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.687 mW/g
Maximum value of SAR (measured) = 1.44 mW/g



0 dB = 1.44mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

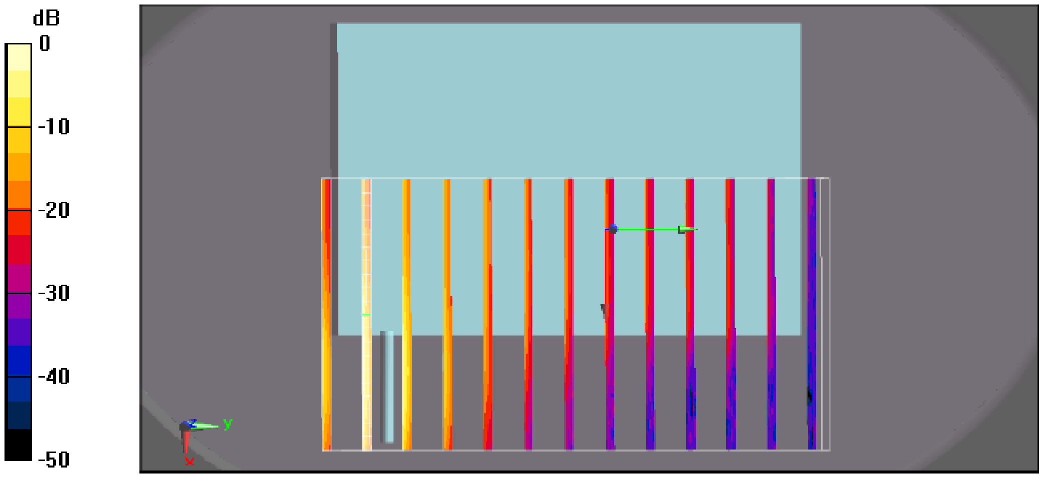
Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100N_Volume Scan

DUT: 841815

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; $\sigma = 0.972$ mho/m; $\varepsilon_r = 56.3$; $\rho = 1000$ kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.4 ℃

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/Volume Scan (21x38x10): Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.06 V/m; Power Drift = 0.00484 dB
Peak SAR (extrapolated) = 4.01 W/kg
SAR(1 g) = 1.31 mW/g; SAR(10 g) = 0.676 mW/g
Total Absorbed Power = 0.0938079 W
Maximum value of SAR (measured) = 1.43 mW/g



0 dB = 1.43mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

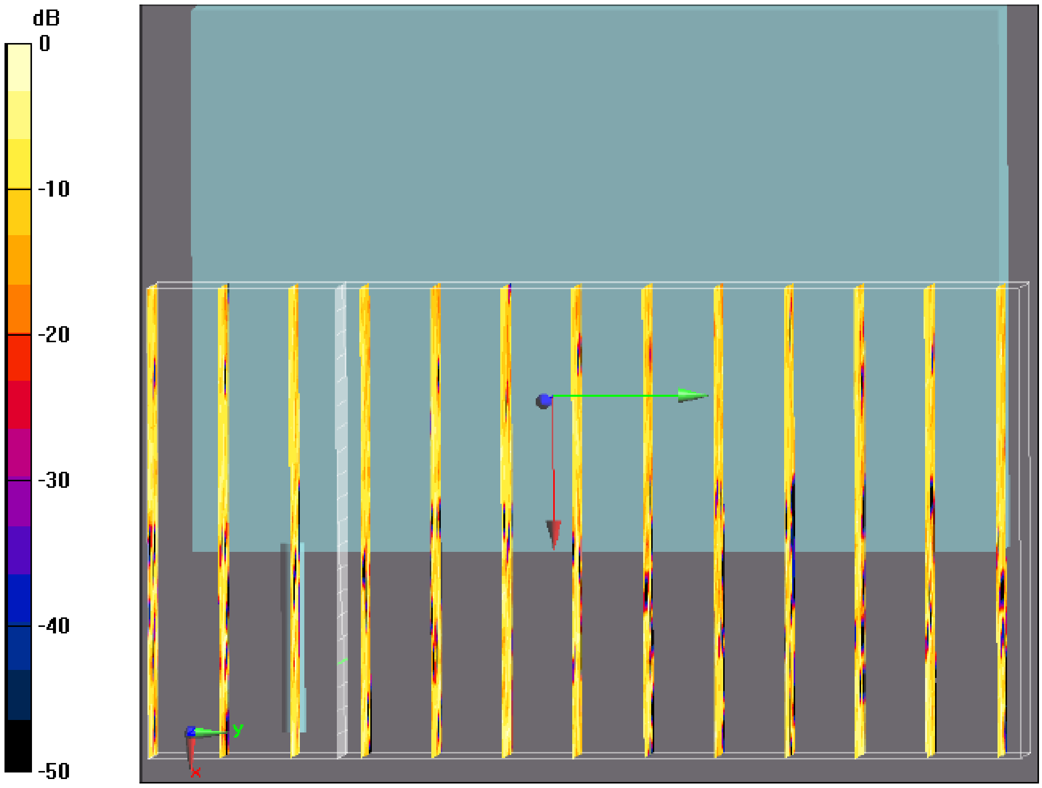
Body_BT Ch39_Rear Face with Holster 0cm Gap_Antenna Out_E100N_Volume Scan

DUT: 841815

Communication System: Bluetooth; Frequency: 2441 MHz;Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2441 MHz; σ = 1.92 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 ℃; Liquid Temperature : 21.4 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1788; ConvF(4.17, 4.17, 4.17); 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

Ch39/Volume Scan (21x38x10): Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.001 dB
Peak SAR (extrapolated) = 0.00958 W/kg
SAR(1 g) = 0.000867 mW/g; SAR(10 g) = 0.000123 mW/g
Total Absorbed Power = 5.50869e-006 W
Maximum value of SAR (measured) = 0.00958 mW/g



0 dB = 0.00958mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

Body_WCDMA850 Ch4182_Rear Face with Holster 0cm Gap_RMC12.2K_Antenna Out_E100N_Volume Scan
DUT: 841815
Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.972 mho/m; ε_r = 56.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

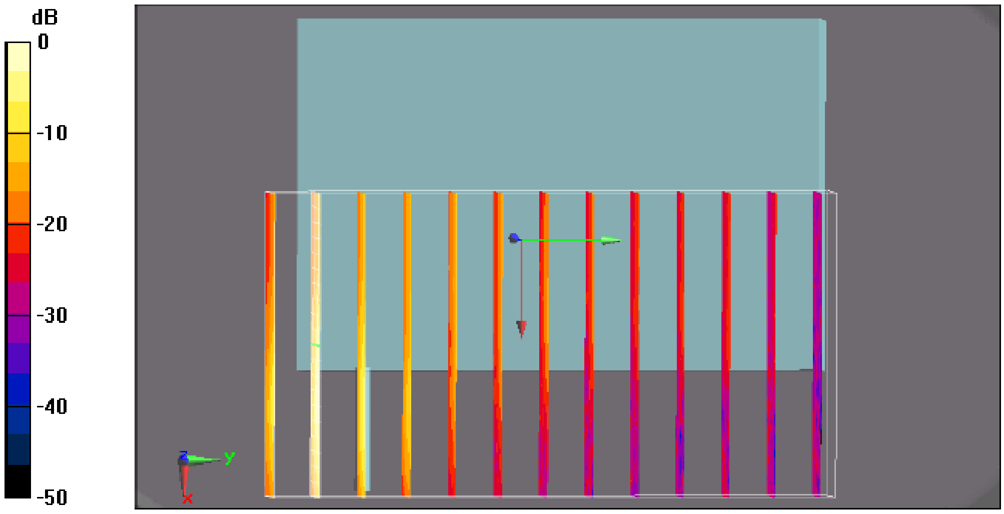
- Probe: ET3DV6 - SN1788; ConvF(6.37, 6.37, 6.37); Calibrated: 2007/9/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2007/11/16
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1029
- Measurement SW: DASY5, V5.0 Build 91

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/7/11

Body_BT Ch39_Rear Face with Holster 0cm Gap_Antenna Out_E100N_Volume Scan
DUT: 841815
Communication System: Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: MSL_2450 Medium parameters used: f = 2441 MHz; σ = 1.92 mho/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

- Probe: ET3DV6 - SN1788; ConvF(4.17, 4.17, 4.17); 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

Multi Band Result:
SAR(1 g) = 1.31 mW/g; SAR(10 g) = 0.677 mW/g
Maximum value of SAR (measured) = 1.43 mW/g



0 dB = 1.43mW/g

Appendix C – Calibration Data

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

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

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

Accreditation No.: **SCS 108**

Client **Sporton (Auden)**

Certificate No: **D835V2-499_Mar08**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 499
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	March 17, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ES3DV2	SN: 3025	01-Mar-08 (SPEAG, No. ES3-3025_Mar08)	Mar-09
DAE4	SN 909	03-Sep-07 (SPEAG, No. DAE4-909_Sep07)	Sep-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	04-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 17, 2008

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 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 V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
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	41.5 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.29 mW / g
SAR normalized	normalized to 1W	9.16 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**9.16 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.50 mW / g
SAR normalized	normalized to 1W	6.00 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.00 mW / g ± 16.5 % (k=2)**

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

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.0 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.46 mW / g
SAR normalized	normalized to 1W	9.84 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**9.52 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.63 mW / g
SAR normalized	normalized to 1W	6.52 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**6.37 mW / g ± 16.5 % (k=2)**

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Ω - 2.3 jΩ
Return Loss	- 28.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω - 3.3 jΩ
Return Loss	- 29.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.392 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	July 10, 2003

DASY4 Validation Report for Head TSL

Date/Time: 17.03.2008 11:32:45

Test Laboratory: SPEAG, Zurich, Switzerland

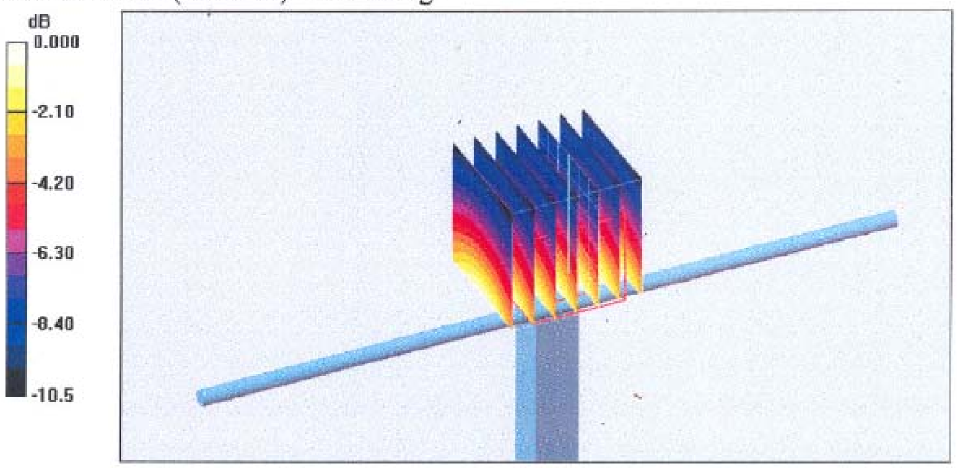
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

Communication System: CW-835; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL 900 MHz;
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(6.09, 6.09, 6.09); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

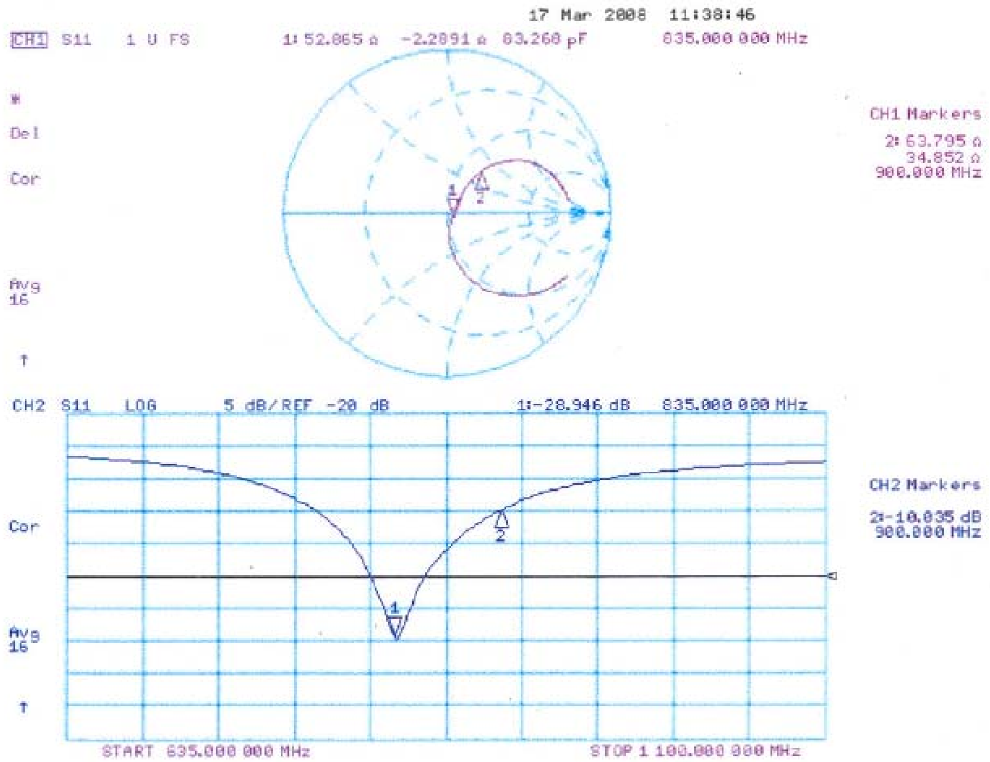
Unnamed procedure/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.9 V/m; Power Drift = -0.005 dB
Peak SAR (extrapolated) = 3.34 W/kg
SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.5 mW/g
Maximum value of SAR (measured) = 2.58 mW/g



0 dB = 2.58mW/g

Certificate No: D835V2-499_Mar08 Page 6 of 9

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-499_Mar08 Page 7 of 9

DASY4 Validation Report for Body TSL

Date/Time: 10.03.2008 12:48:36

Test Laboratory: SPEAG, Zurich, Switzerland

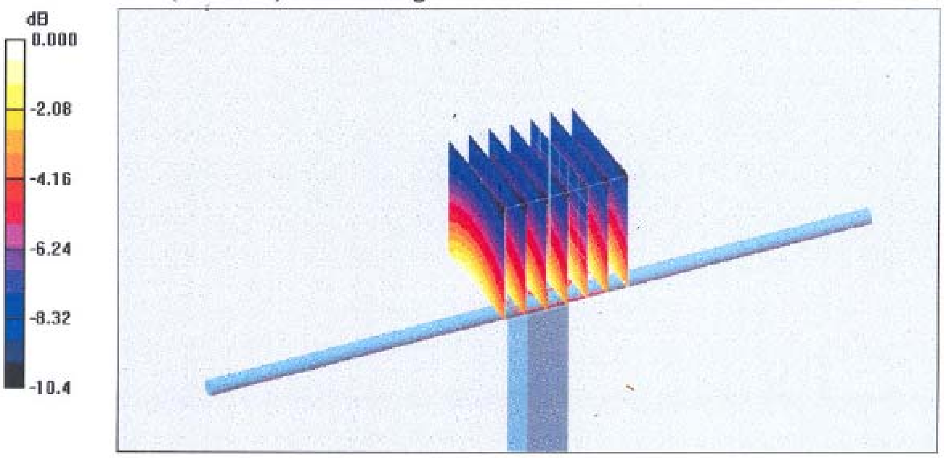
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900;
Medium parameters used: f = 835 MHz; $\sigma = 1$ mho/m; $\varepsilon_r = 54$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

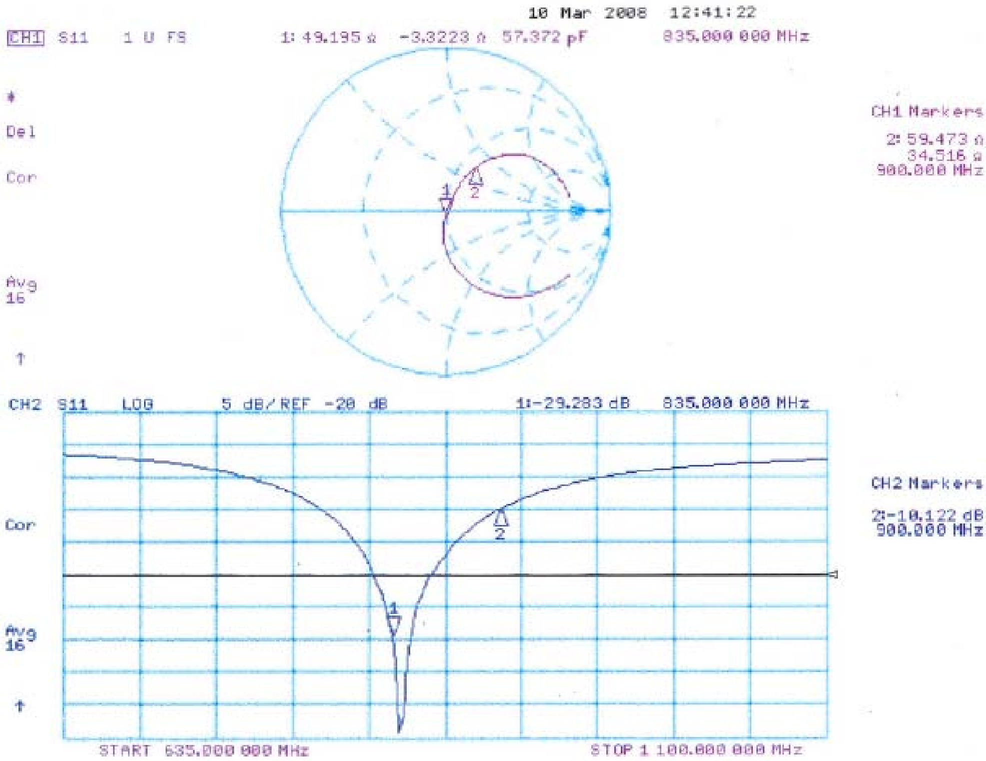
- Probe: ES3DV2 - SN3025; ConvF(5.85, 5.85, 5.85); Calibrated: 01.03.2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250mW, d = 15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.8 V/m; Power Drift = 0.036 dB
Peak SAR (extrapolated) = 3.59 W/kg
SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.63 mW/g
Maximum value of SAR (measured) = 2.64 mW/g



0 dB = 2.64mW/g

Impedance Measurement Plot for Body TSL



Certificate No: D835V2-499_Mar08 Page 9 of 9

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Accreditation No.: **SCS 108**

Client **Sporton (Auden)**

Certificate No: **D1900V2-5d041_Mar08**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d041
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	March 18, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ES3DV2	SN: 3025	01-Mar-08 (SPEAG, No. ES3-3025_Mar08)	Mar-09
DAE4	SN 909	3-Sep-08 (SPEAG, No. DAE4-909_Sep07)	Sep-07
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-08
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08
Power meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: March 18, 2008

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Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.7
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	40.2 ± 6 %	1.47 mho/m ± 6 %
Head TSL temperature during test	(21.1 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**39.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.20 mW / g
SAR normalized	normalized to 1W	20.8 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**20.6 mW / g ± 16.5 % (k=2)**

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

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.6 ± 6 %	1.57 mho/m ± 6 %
Body TSL temperature during test	(21.4 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.4 mW / g
SAR normalized	normalized to 1W	41.6 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**40.1 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.44 mW / g
SAR normalized	normalized to 1W	21.8 mW / g
SAR for nominal Body TSL parameters [2]	normalized to 1W	**21.3 mW / g ± 16.5 % (k=2)**

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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.0 Ω + 5.1 jΩ
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω + 6.1 jΩ
Return Loss	- 23.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 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	July 04, 2003

DASY4 Validation Report for Head TSL

Date/Time: 18.03.2008 12:05:10

Test Laboratory: SPEAG, Zurich, Switzerland

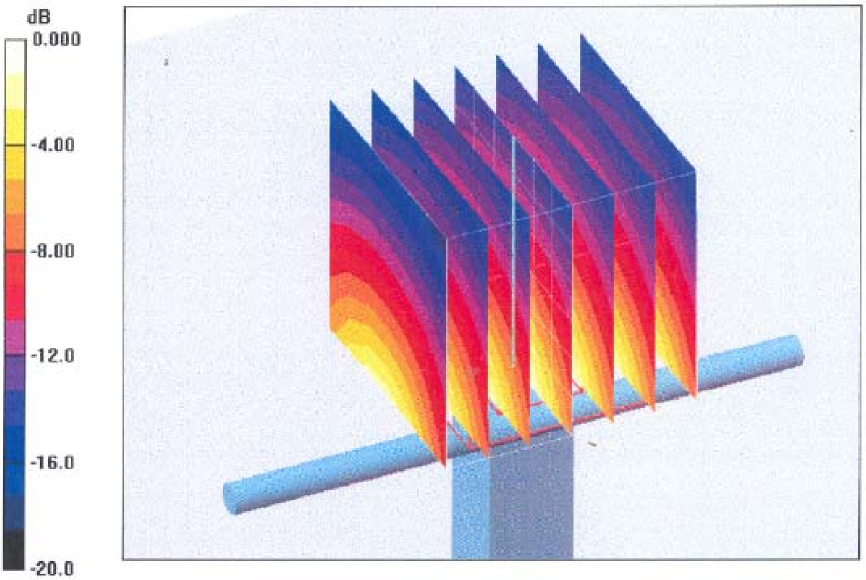
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d041

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025; ConvF(4.9, 4.9, 4.9); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

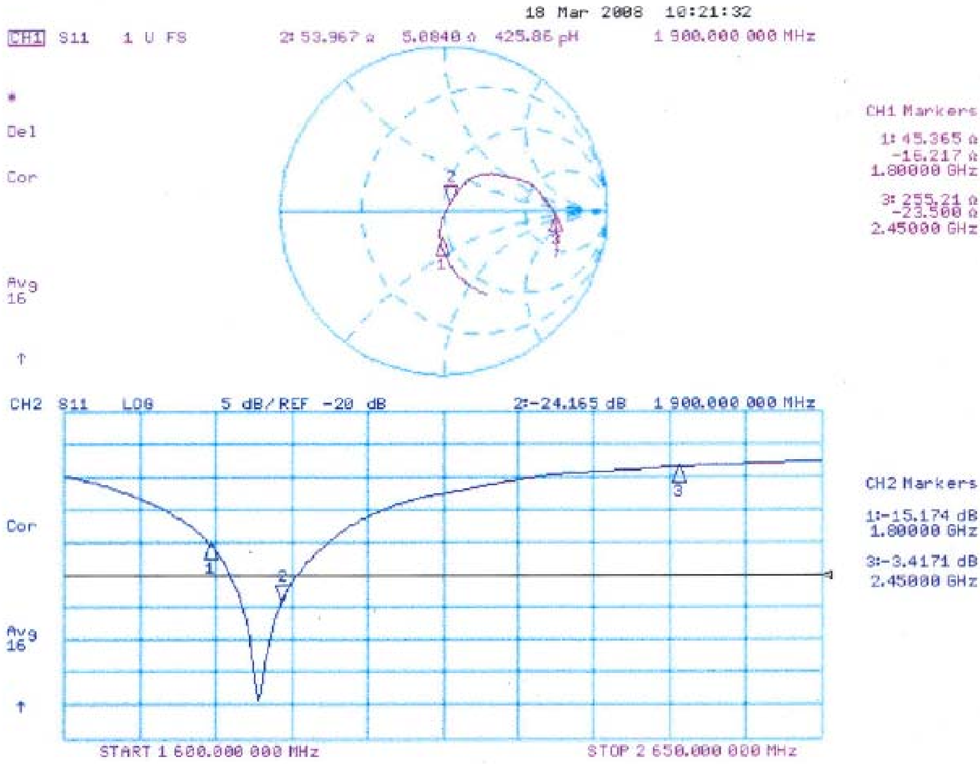
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.7 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 19.1 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.2 mW/g
Maximum value of SAR (measured) = 11.8 mW/g



0 dB = 11.8mW/g

Certificate No: D1900V2-5d041_Mar08 Page 6 of 9

Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d041_Mar08 Page 7 of 9

DASY4 Validation Report for Body TSL

Date/Time: 14.03.2008 13:22:24

Test Laboratory: SPEAG, Zurich, Switzerland

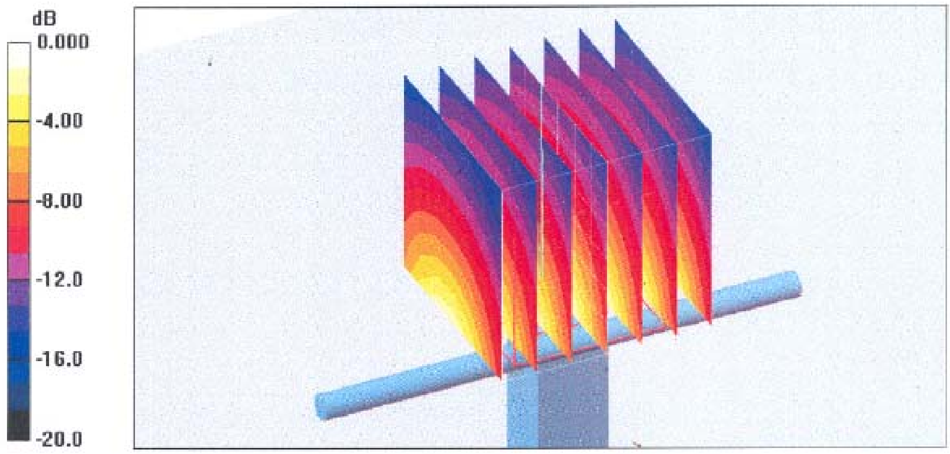
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d041

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL U10 BB;
Medium parameters used: f = 1900 MHz; σ = 1.57 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

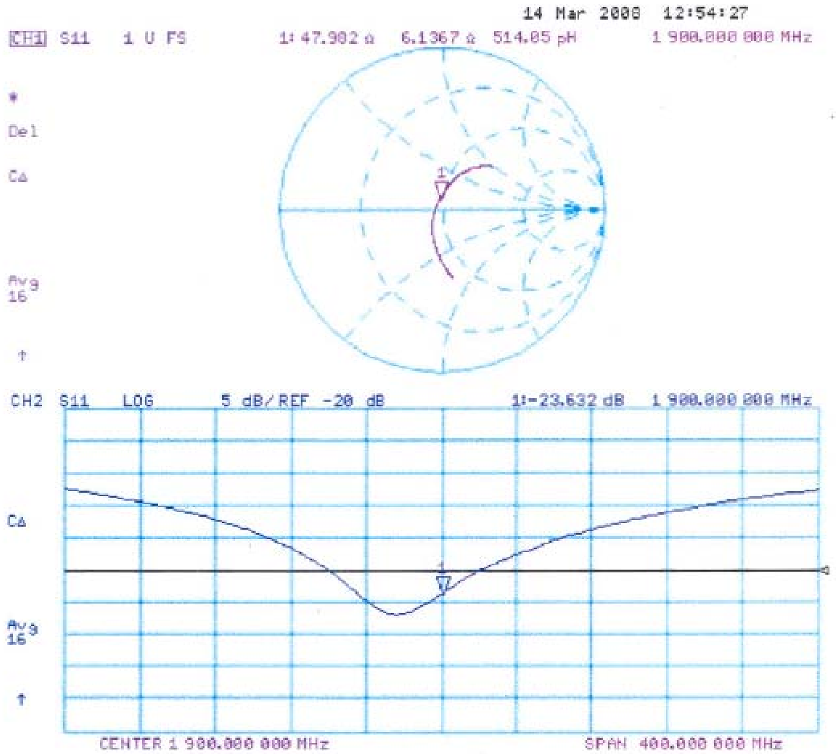
- Probe: ES3DV2 - SN3025; ConvF(4.5, 4.5, 4.5); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.7 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 18.6 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.44 mW/g
Maximum value of SAR (measured) = 12.0 mW/g



0 dB = 12.0mW/g

Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d041_Mar08 Page 9 of 9

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Accreditation No.: **SCS 108**

Client **Sporton (Auden)**

Certificate No: **ET3-1788_Sep07**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1788
Calibration procedure(s)	QA CAL-01.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	September 26, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

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

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

Issued: September 26, 2007

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ET3DV6

SN:1788

Manufactured:	May 28, 2003
Last calibrated:	September 19, 2006
Modified:	September 24, 2007
Recalibrated:	September 26, 2007

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1788 September 26, 2007

DASY - Parameters of Probe: ET3DV6 SN:1788

Sensitivity in Free Space[A]

NormX	**1.72** ± 10.1%	$\mu V/(V/m)^2$
NormY	**1.66** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**1.70** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**91** mV
DCP Y	**93** mV
DCP Z	**94** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	6.2	3.3
SAR_{be} [%]	With Correction Algorithm	0.4	1.0

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	12.0	8.1
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

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

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

[B] Numerical linearization parameter: uncertainty not required.

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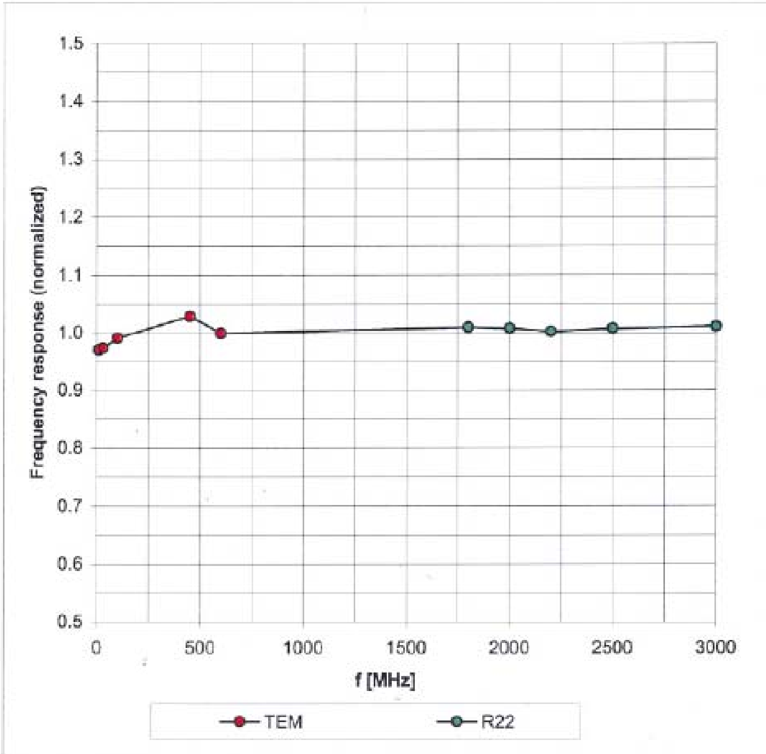
Frequency Response of E-Field

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



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

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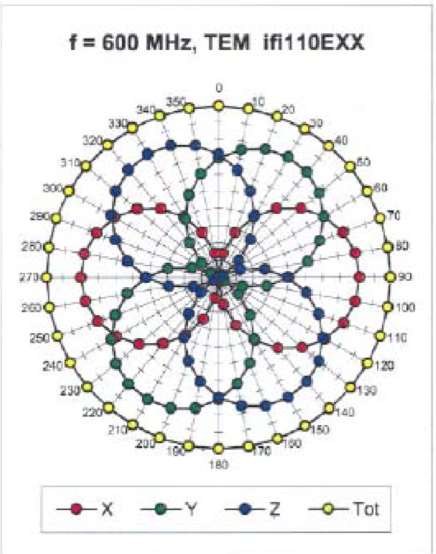
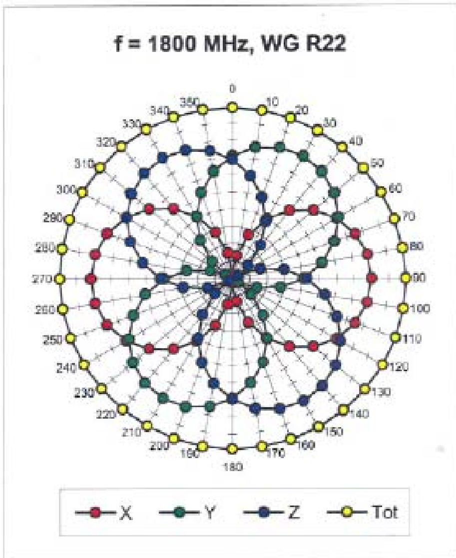
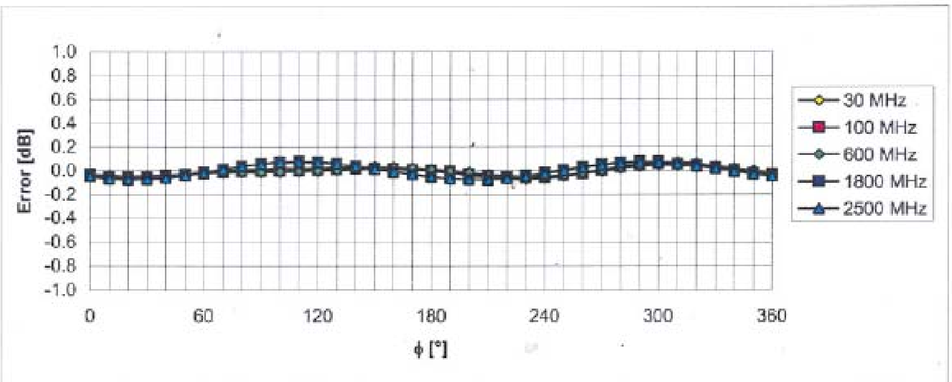
Receiving Pattern (ϕ), $\vartheta = 0°$







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

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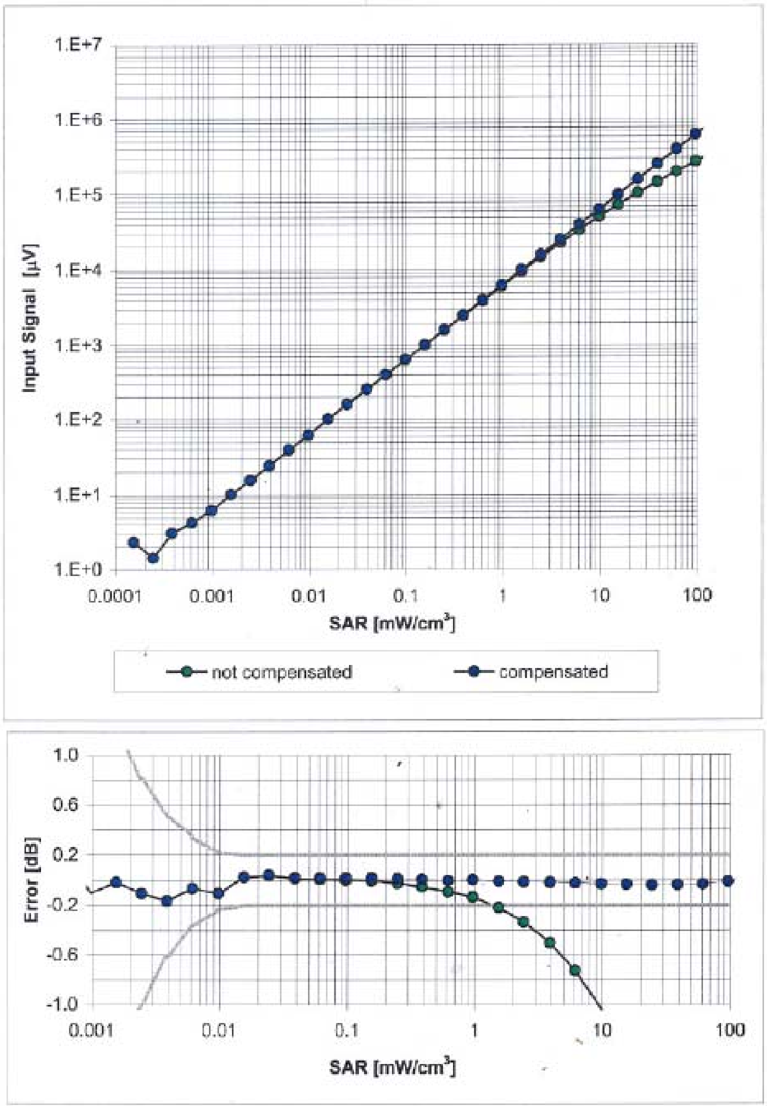
Dynamic Range f(SAR_{head})

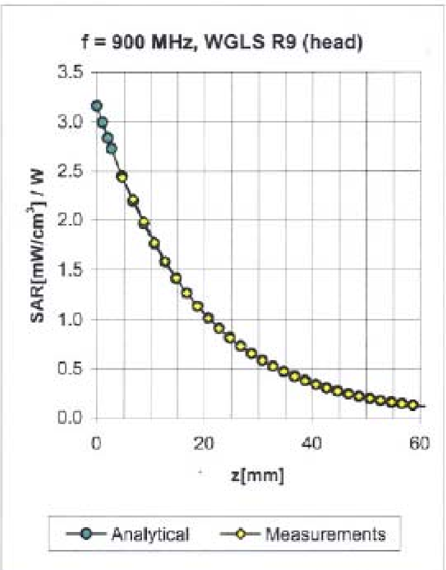
(Waveguide R22, f = 1800 MHz)

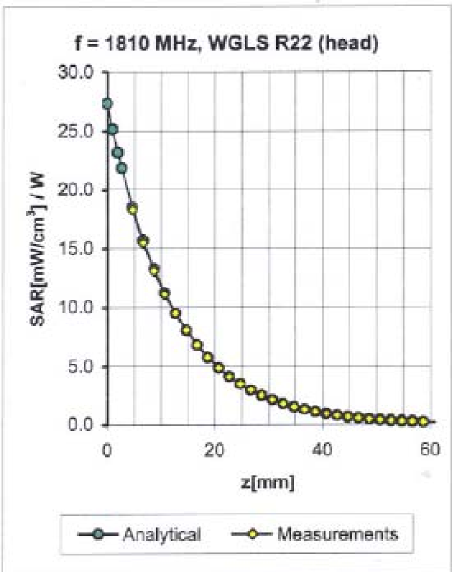


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1788 September 26, 2007

Conversion Factor Assessment





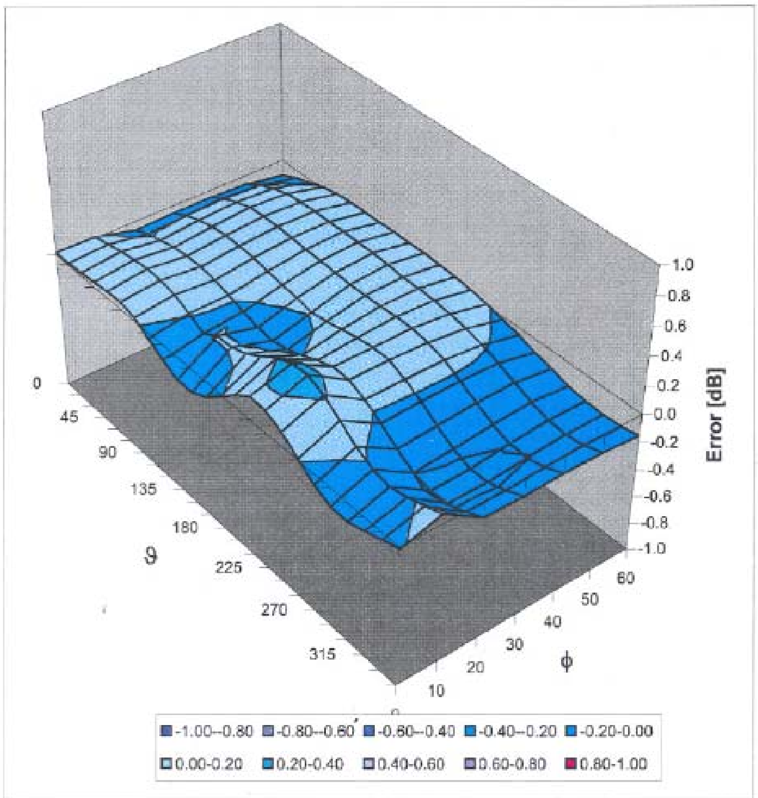
f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.22	3.28	6.54 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.59	2.15	5.28 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.60	2.23	4.87 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.61	2.39	4.58 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.28	2.94	6.37 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.39	4.75 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.63	2.33	4.36 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.61	2.58	4.17 ± 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:1788 September 26, 2007

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: ET3-1788_Sep07 Page 9 of 9

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Accreditation No.: **SCS 108**

Client **Sporton (Auden)**

Certificate No: **DAE3-577_Nov07**

CALIBRATION CERTIFICATE

Object	DAE3 - SD 000 D03 AA - SN: 577
Calibration procedure(s)	QA CAL-06.v12 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	November 16, 2007
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Fluke Process Calibrator Type 702	SN: 6295803	04-Oct-07 (Elcal AG, No: 6467)	Oct-08
Keithley Multimeter Type 2001	SN: 0810278	03-Oct-07 (Elcal AG, No: 6465)	Oct-08
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	25-Jun-07 (SPEAG, in house check)	In house check Jun-08

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	D. Steffen
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: November 16, 2007

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

Certificate No: DAE3-577_Nov07 Page 1 of 5

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Accreditation No.: **SCS 108**

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.432 ± 0.1% (k=2)	403.884 ± 0.1% (k=2)	404.331 ± 0.1% (k=2)
Low Range	3.94218 ± 0.7% (k=2)	3.94771 ± 0.7% (k=2)	3.94526 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	268 ° ± 1 °

Appendix

1. DC Voltage Linearity

High Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	200000	199999.3	0.00
Channel X	+ Input	20000	20005.75	0.03
Channel X	- Input	20000	-19997.67	-0.01
Channel Y	+ Input	200000	199999.5	0.00
Channel Y	+ Input	20000	20002.82	0.01
Channel Y	- Input	20000	-20004.40	0.02
Channel Z	+ Input	200000	199999.6	0.00
Channel Z	+ Input	20000	20005.54	0.03
Channel Z	- Input	20000	-20001.11	0.01

Low Range		Input (μV)	Reading (μV)	Error (%)
Channel X	+ Input	2000	2000.1	0.00
Channel X	+ Input	200	199.12	-0.44
Channel X	- Input	200	-200.64	0.32
Channel Y	+ Input	2000	2000	0.00
Channel Y	+ Input	200	199.96	-0.02
Channel Y	- Input	200	-201.00	0.50
Channel Z	+ Input	2000	1999.9	0.00
Channel Z	+ Input	200	199.05	-0.47
Channel Z	- Input	200	-201.08	0.54

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	13.88	12.97
	- 200	-12.40	-14.29
Channel Y	200	-6.32	-6.22
	- 200	5.34	5.31
Channel Z	200	1.08	0.59
	- 200	-1.42	-1.66

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	1.14	0.16
Channel Y	200	1.52	-	3.87
Channel Z	200	0.23	0.75	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15969	16269
Channel Y	15848	16148
Channel Z	16203	16661

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.12	-1.70	1.72	0.50
Channel Y	-2.46	-3.42	-1.39	0.44
Channel Z	-0.78	-2.16	0.00	0.29

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance

	Zeroing (MOhm)	Measuring (MOhm)
Channel X	0.2000	199.3
Channel Y	0.2001	199.9
Channel Z	0.1999	199.4

8. Low Battery Alarm Voltage (verified during pre test)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (verified during pre test)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.0	+6	+14
Supply (- Vcc)	–0.01	-8	-9