Variant Specific Absorption Rate (SAR) Test Report

for

Psion Teklogix Inc.

on the

GSM Module

Report Number	:	**FA710211-03**
Trade Name	:	**WORKABOUT PRO**
Model Name	:	**RA3030-G2**
FCC ID	:	**GM375273RADA**
IC ID	:	**2739D-7527RADA**
Date of Testing	:	**Dec. 28, 2008 ~ Jan. 12, 2009**
Issued Date of Report	:	**Jan. 12, 2009**

- This is a variant report which is only valid together with the original test report.
- The test results refer exclusively to the tested model/sample only.
- Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.
- Report Version: Rev. 01

SPORTON INTERNATIONAL INC.

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

Table of Contents

1. Statement of Compliance

This is a variant report which is only valid together with the original test report shown in appendix F. The major changes of DUT are LCM changing to Sharp and upgrading the H/W of Siemens MC75. The test position of this report is based on the worst case of original report. The Specific Absorption Rate (SAR) maximum results found during testing for the **Psion Teklogix Inc. GSM Module WORKABOUT PRO RA3030-G2** on PDA hosts 7527C / 7527S Series are as follows (with expanded uncertainty 21.9%):

Hosts	Band	Position	SAR (W/kg)
7527C Series	GSM850	Head	1.19
		Body (1.5cm Gap)	0.414
		Body (Holster)	0.258
	GSM1900	Head	0.474
		Body (1.5cm Gap)	0.127
		Body (Holster)	0.158
7527S Series	GSM850	Head	0.989
		Body (1.5cm Gap)	0.395
		Body (Holster)	0.176
	GSM1900	Head	0.464
		Body (1.5cm Gap)	0.155
		Body (Holster)	0.159

They are in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits specified in RSS-102 Issued 2 (2005), 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 IEEE P1528-2003 and 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.
Address :	No. 52, Hwa-Ya 1st RD., Hwa Ya Technology Park, Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
Test Site :	SAR01-HY
Telephone Number :	886-3-327-3456
Fax Number :	886-3-328-4978

2.2 Applicant

Company Name :	Psion Teklogix Inc.
Address :	2100 Meadowvale Blvd., Mississauga, Ontario, L5N 7J9, Canada

2.3 Manufacturer

Company Name :	ASKEY COMPUTER CORP.
Address :	10F, No. 119, Chienkang Rd., Chung-Ho, Taipeo, R.O.C.

2.4 Application Details

Date of reception of application:	Aug. 27, 2008
Start of test :	Dec. 28, 2008
End of test :	Jan. 12, 2009

3. General Information

3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
DUT Type	GSM Module
Trade Name	WORKABOUT PRO
Model Name	RA3030-G2
FCC ID	GM375273RADA
IC ID	2739D-7527RADA
Tx Frequency	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz
Rx Frequency	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	GSM850(GSM) : 31.5 dBm GSM850(GPRS10) : 29.9 dBm GSM1900(GSM) : 28.9 dBm GSM1900(GPRS10) : 27.2 dBm
GPRS / EGPRS Multi-slot Class	12
Antenna Type	PCB Antenna
HW Version	DV
SW Version	D
Type of Modulation	GSM / GPRS : GMSK EDGE : 8PSK
DUT Stage	Identical Prototype

Accessories List:

Accessories Specification		
Module	**Brand Name**	Siemens
	Model Name	MC75
	H/W version	B2.12
	S/W version	04.001(SVN 19)
LCD Panel	**Brand Name**	Sharp
	Model Name	LS037V7DW01

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

3.2 Product Photos

Refer to Appendix D.

3.3 Applied Standards

The Specific Absorption Rate (SAR) testing specification, method and procedure for this GSM Module on PDA hosts 7527C / 7527S Series is accordance with the following standards:

- RSS-102 Issued 2 (2005)
- 47 CFR Part 2 (2.1093)
- IEEE C95.1-1999
- IEEE P1528-2003
- OET Bulletin 65 Supplement C (Edition 01-01)
- KDB 648474 D01 v01r05

3.4 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.

3.5 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20-24℃
Humidity	<60%

3.5.2 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.

Based on the worst case of the original report, SAR was retested with modes GSM and GPRS multi-slot class 10 with 2 uplink slots. The crest factor is 8.3 for GSM and 4 for GPRS multi-slot class 10.

According to KDB 648474, the closest separation distance between WWAN and Bluetooth antennas is 7.533 cm and output power of Bluetooth is less than $2P_{Ref}$, so the standalone SAR of Bluetooth and simultaneous transmission SAR of WWAN and Bluetooth were not required.

The closest separation distance between WWAN and WLAN antennas is 7.404 cm which is larger than 5 cm. Summation of maximum SAR is 1.419 W/kg (GSM850: 1.19, 802.11b: 0.229) which is less than 1.6 W/kg. So the simultaneous transmission SAR of WWAN and WLAN was not required.

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:

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

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

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

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

, where C is the specific head capacity, δ T is the temperature rise and δ t the exposure duration, or related to the electrical field in the tissue by

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

, 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

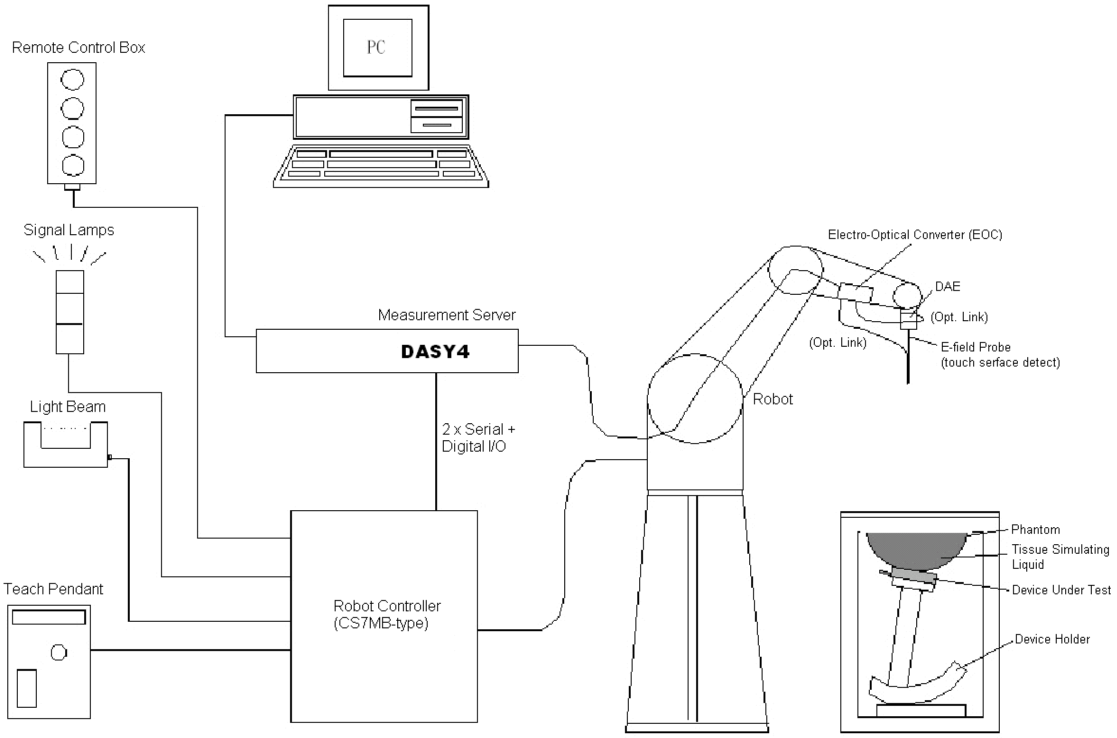


Fig. 5.1 DASY4 System

The DASY4 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
- DASY4 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 DASY4 E-Field Probe System

The SAR measurement is conducted with the dosimetric probe (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	5µW/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 sn1787 (Cal: Aug. 26, 2008)**

Sensitivity	X axis : 1.63 µV		Y axis : 1.67 µV	Z axis : 2.18 µV
Diode compression point	X axis : 90 mV		Y axis : 93 mV	Z axis : 92 mV
Conversion factor (Head / Body)	**Frequency (MHz)**	**X axis**	**Y axis**	**Z axis**
	800~1000	6.06 / 5.91	6.06 / 5.91	6.06 / 5.91
	1850~2050	5.01 / 4.49	5.01 / 4.49	5.01 / 4.49
Boundary effect (Head / Body)	**Frequency (MHz)**	**Alpha**	**Depth**	
	800~1000	0.30 / 0.31	2.80 / 2.98	
	1850~2050	0.59 / 0.68	1.96 / 1.95	

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

5.2 DATA Acquisition Electronics (DAE)

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

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

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

5.3 Robot

The DASY4 system uses the high precision robots RX90 XL type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY4 system, the CS7MB robot controller version from Stäubli is used. The RX 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 DASY4 measurement server is based on a PC/104 CPU board with

166 MHz CPU
32 MB chipset and
64 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 DASY4 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 center for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

The DASY4 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. 5.1 Device Holder

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY4 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 .DA4. 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-lose 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 DASY4 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 DASY4 components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

The formula for each channel can be given as：

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

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

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

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

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

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

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

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

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

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

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

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

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

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

with ***Ppwe*** = equivalent power density of a plane wave in mW/cm^2
Etot = total electric field strength in V/m
Htot = total magnetic field strength in A/m

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Filed Probe	ET3DV6	1787	Aug. 26, 2008	Aug. 25, 2009
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 17, 2008	Mar. 16, 2010
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 28, 2008	Mar. 27, 2010
SPEAG	Data Acquisition Electronics	DAE3	577	Nov. 12, 2008	Nov. 11, 2009
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1303	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1446	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1383	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BA	1029	NCR	NCR
Agilent	PNA Series Network Analyzer	E8358A	US40260131	Apr. 02, 2008	Apr. 01, 2009
Agilent	Wireless Communication Test Set	E5515C	MY48360383	Oct. 13, 2008	Oct. 12, 2009
R&S	Universal Radio Communication Tester	CMU200	105934	Nov. 11, 2008	Nov. 10, 2009
Agilent	Dielectric Probe Kit	85070D	US01440205	NCR	NCR
Agilent	Dual Directional Coupler	778D	50422	NCR	NCR
AR	Power Amplifier	5S1G4M2	0328767	NCR	NCR
R&S	Power Meter	NRVD	101394	Oct. 20, 2008	Oct. 19, 2009
R&S	Power Sensor	NRV-Z1	100130	Oct. 20, 2008	Oct. 19, 2009

Table 5.1 Test Equipment List

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY4, the phantom must be filled with around 25 liters of homogeneous tissue simulating liquid. The liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is (head SAR)or from the flat phantom to the liquid top surface (body SAR) is 15.2cm.

The following ingredients for tissue simulating liquid are used:

- **Water:** deionized water (pure H20), 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 head and body tissue simulating liquid for frequency band 850MHz and 1900 MHz.

Ingredient	**HSL-850**	**MSL-850**	**HSL-1900**	**MSL-1900**
Water	532.98 g	631.68 g	552.42 g	716.56 g
Cellulose	0 g	0 g	0 g	0 g
Salt	18.3 g	11.72 g	3.06 g	4.0 g
Preventol D-7	2.4 g	1.2 g	0 g	0 g
Sugar	766.0 g	600.0 g	0 g	0 g
DGMBE	0 g	0 g	444.52 g	300.67 g
Total amount	1 liter (1.3 kg)	1 liter (1.3 kg)	1 liter (1.0 kg)	1 liter (1.0 kg)
Dielectric Parameters at 22°	f = 835 MHz ε_r= 41.5±5%, σ= 0.90±5% S/m	f=835 MHz ε_r = 55.2±5%, σ= 0.97±5% S/m	f= 1900 MHz ε_r= 40.0±5%, σ= 1.4±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 head and muscle simulating liquid.

Band	Position	Temperature (℃)	Frequency (MHz)	Conductivity (σ)	Permittivity (ε_r)	Measurement date
GSM850	Head	21.5	824.2	0.891	43.5	Dec. 28, 2008
			836.4	0.905	43.4	
			848.8	0.915	43.2	
	Body	21.5	824.2	0.943	52.8	Dec. 28, 2008
			836.4	0.956	52.7	
			848.8	0.969	52.6	
		21.4	824.2	0.943	52.8	Jan. 12, 2009
			836.4	0.955	52.7	
			848.8	0.967	52.6	
GSM1900	Head	21.4	1850.2	1.34	41.9	Dec. 28, 2008
			1880.0	1.38	41.8	
			1909.8	1.42	41.8	
	Body	21.6	1850.2	1.48	51.2	Dec. 28, 2008
			1880.0	1.51	51.0	
			1909.8	1.54	51.0	
		21.3	1850.2	1.49	51.0	Jan. 12, 2009
			1880.0	1.52	50.8	
			1909.8	1.55	50.7	

Table 6.2 Measuring Results for Simulating Liquid

The measuring data are consistent with ε_r = 41.5±5% and σ= 0.9±5% for head GSM850, ε_r = 55.2 ± 5% and σ= 0.97 ± 5% for body GSM850, ε_r = 40.0 ± 5% and σ= 1.4 ± 5% for head GSM1900, and ε_r = 53.3 ± 5% and σ= 1.52 ± 5% for body GSM1900.

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 An 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/√3	1/√6	1/√2

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

(b) κ is the coverage factor

Table 7.1 Standard Uncertainty for Assumed Distribution

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

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY4 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 DASY4

8. SAR Measurement Evaluation

Each DASY4 system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY4 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:

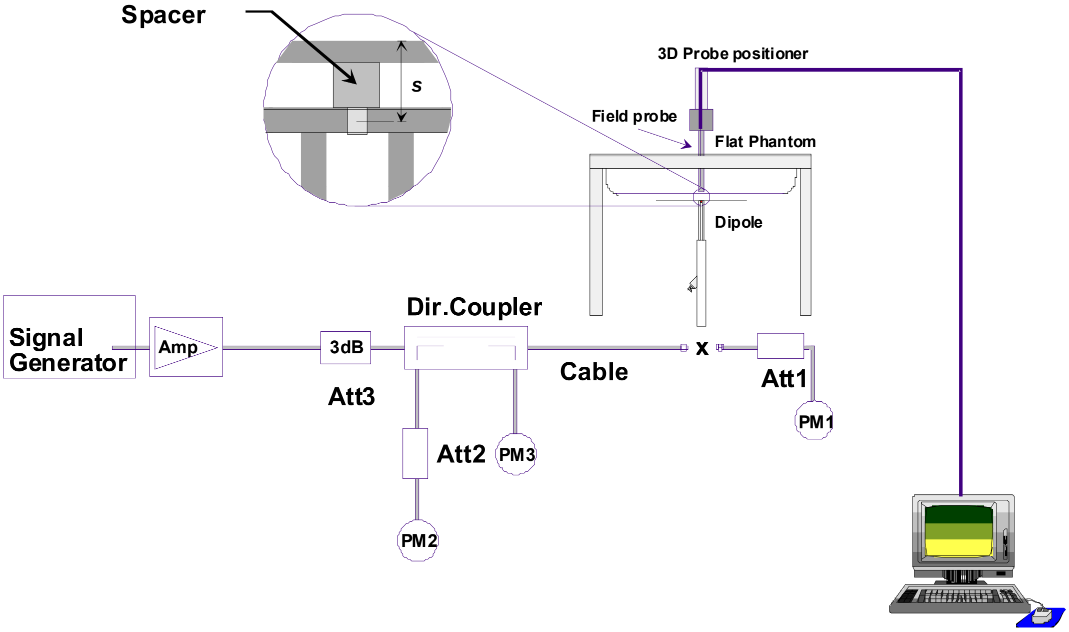


Fig. 8.1 System Setup for System Evaluation

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

Frequency	Position	SAR	Target (W/kg)	Measurement data (W/kg)	Variation	Measurement date
835MHz	Head	SAR (1g)	9.16	9.22	0.7 %	Dec. 28, 2008
		SAR (10g)	6.0	6.04	0.7 %	
	Body	SAR (1g)	9.52	9.65	1.4 %	Dec. 28, 2008
		SAR (10g)	6.37	6.35	-0.3 %	
		SAR (1g)	9.52	10.1	6.1 %	Jan. 12, 2009
		SAR (10g)	6.37	6.6	3.6 %	
1900MHz	Head	SAR (1g)	39.5	40.5	2.5 %	Dec. 28, 2008
		SAR (10g)	20.6	21.1	2.4 %	
	Body	SAR (1g)	40.1	41.3	3.0 %	Dec. 28, 2008
		SAR (10g)	21.3	21.7	1.9 %	
		SAR (1g)	40.1	40.0	-0.2 %	Jan. 12, 2009
		SAR (10g)	21.3	21.0	-1.4 %	

Table 8.1 Target and Measurement SAR after Normalized

9. Description for DUT Testing Position

This DUT was tested in three different positions. They are left tilted, LCD up with 1.5 cm gap and holster right side touch as illustrated below: (Please refer to Appendix E for the test setup photos.)

1) " Tilted Position"
   i) To position the device in the "cheek" position described above
   ii) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (sees Fig. 9.2).

2) " Body Worn"
   i) To position the device parallel to the phantom surface with either keypad up or down.
   ii) To adjust the phone parallel to the flat phantom.
   iii) To adjust the distance between the phone surface and the flat phantom to 1.5 cm or holster surface and the flat phantom to 0 cm.

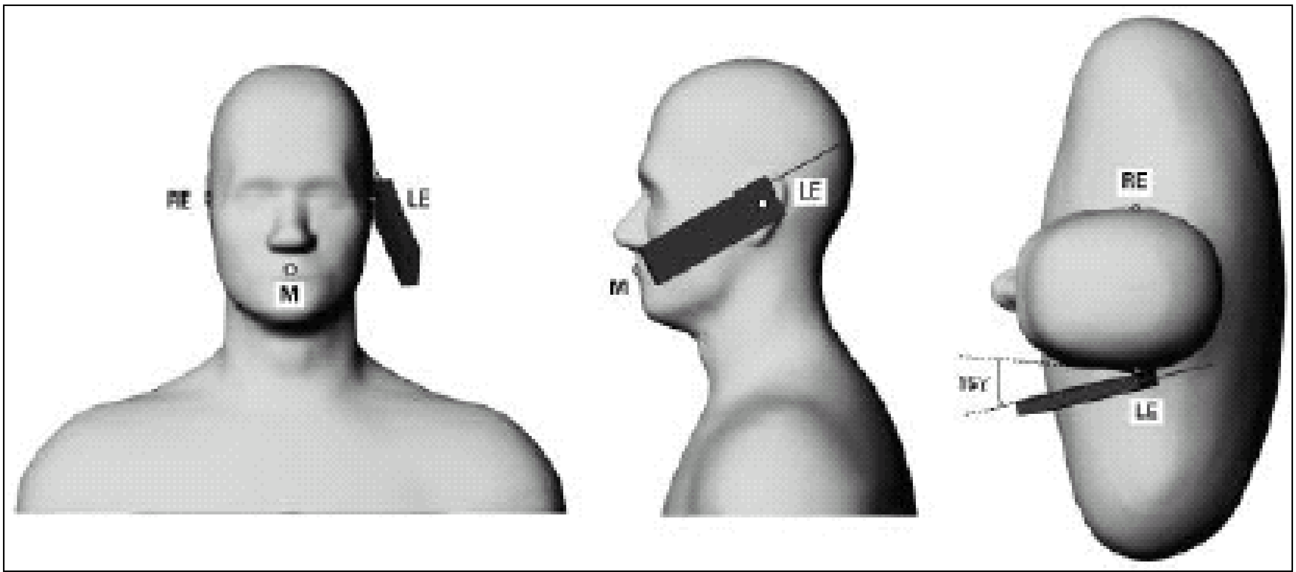


Fig. 9.1 Phone Position 2, "Tilted Position". The reference point for the right ear (RE), left ear (LE) and mouth (M), which define the plane for phone positioning, are indicated.

10. Measurement Procedures

The measurement procedures are as follows:

- Linking DUT with base station emulator CMU200 in middle channel
- Setting CMU200 to allow DUT to radiate maximum output power
- Measuring output power through RF cable and power meter
- Placing the DUT in the positions described in the last section
- Setting scan area, grid size and other setting on the DASY4 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 lowest and highest channels in this worst case testing position

According to the OET Bulletin 65 Supplement C standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

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

10.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the OET Bulletin 65 Supplement C standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY4 software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

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 DASY4, 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

Band	GSM 850 (dBm)			GSM 1900 (dBm)		
Channel	128	189	251	512	661	810
GSM	31.5	31.4	31.5	28.7	28.7	28.9
GPRS 10	29.9	29.9	29.8	27.2	27.1	26.9

※**Unit: dBm**

11.2 Test Records for Head SAR Test

Model	Position	Band	Chan.	Freq. (MHz)	Modulation Type	Measured 1g SAR (W/kg)	Limit (W/kg)	Result
7527C	**Left Tilted**	**GSM850**	**251**	**848.8**	**GMSK**	**1.19**	**1.6**	**Pass**
	Left Tilted	GSM850	189	836.4	GMSK	0.823	1.6	Pass
	Left Tilted	GSM850	128	824.2	GMSK	0.622	1.6	Pass
7527S	**Left Tilted**	**GSM850**	**251**	**848.8**	**GMSK**	**0.989**	**1.6**	**Pass**
	Left Tilted	GSM850	189	836.4	GMSK	0.735	1.6	Pass
	Left Tilted	GSM850	128	824.2	GMSK	0.562	1.6	Pass
7527C	**Left Tilted**	**GSM1900**	**512**	**1880.0**	**GMSK**	**0.474**	**1.6**	**Pass**
7527S	**Left Tilted**	**GSM1900**	**512**	**1880.0**	**GMSK**	**0.464**	**1.6**	**Pass**
	Left Tilted	GSM1900	661	1850.2	GMSK	0.361	1.6	Pass
	Left Tilted	GSM1900	810	1909.8	GMSK	0.265	1.6	Pass

11.3 Test Records for Body SAR Test

Model	Position	Band	Chan.	Freq. (MHz)	Modulation Type	Measured 1g SAR (W/kg)	Limit (W/kg)	Result
7527C	LCD Up with 1.5cm Gap	GSM850 (GPRS10)	251	848.8	GMSK	0.414	1.6	Pass
7527S	LCD Up with 1.5cm Gap	GSM850 (GPRS10)	251	848.8	GMSK	0.395	1.6	Pass
7527C	LCD Up with 1.5cm Gap	GSM1900 (GPRS10)	512	1850.2	GMSK	0.127	1.6	Pass
7527S	LCD Up with 1.5cm Gap	GSM1900 (GPRS10)	512	1850.2	GMSK	0.155	1.6	Pass
7527C	Holster Right Side Touch	GSM850 (GPRS10)	189	836.4	GMSK	0.258	1.6	Pass
7527S	Holster Right Side Touch	GSM850 (GPRS10)	189	836.4	GMSK	0.176	1.6	Pass
7527C	Holster Right Side Touch	GSM1900 (GPRS10)	661	1850.2	GMSK	0.158	1.6	Pass
7527S	Holster Right Side Touch	GSM1900 (GPRS10)	661	1850.2	GMSK	0.159	1.6	Pass

Remark :

1. The test position is based on the worst case of original report.
2. Test Engineer：A-Rod Chen

12. References

[1] RSS-102 Issued 2, "Radio Frequency Exposure Compliance of Radio Communication Apparatus (All Frequency Bands)", November 2005

[2] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"

[3] 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

[4] 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

[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] DASY4 System Handbook

[8] KDB 648474 D01 v01r05

Appendix A - System Performance Check Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

System Check_Head_835MHz_081228

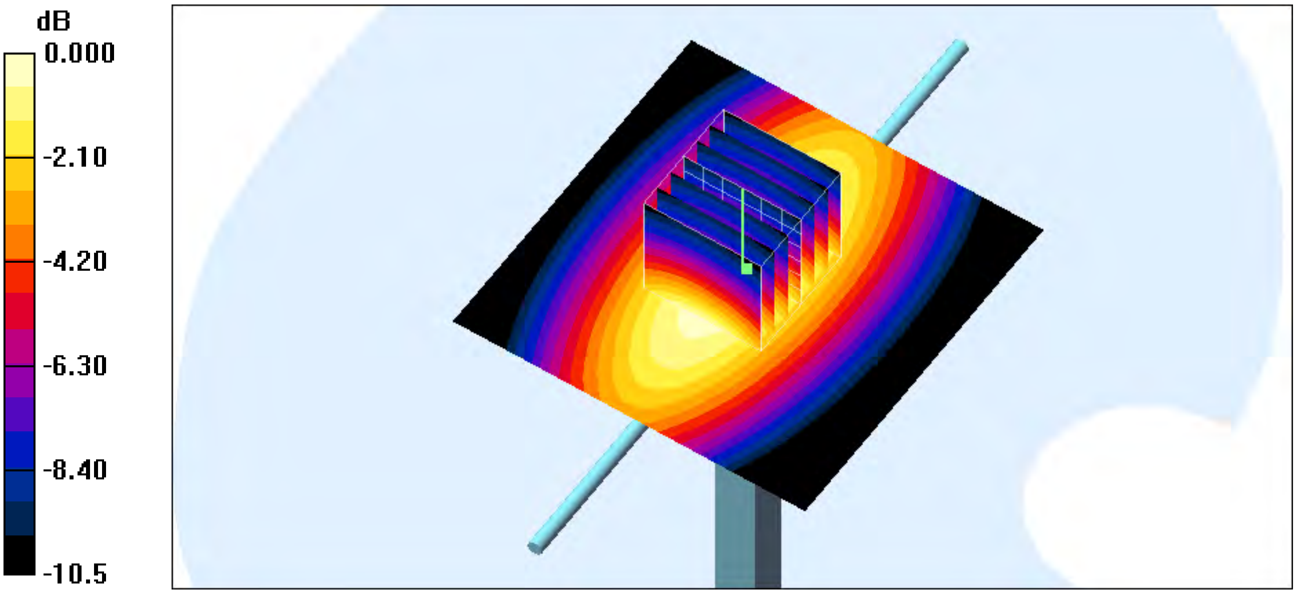
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL_850 Medium parameters used: f = 835 MHz; σ = 0.903 mho/m; ε_r = 43.4; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 ℃; Liquid Temperature : 21.5 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.06, 6.06, 6.06); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: SAM-Left; Type: QD 000 P40 C; Serial: TP-1477
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Pin=100mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.996 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.3 V/m; Power Drift = 0.005 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.922 mW/g; SAR(10 g) = 0.604 mW/g
Maximum value of SAR (measured) = 0.998 mW/g



0 dB = 0.998mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

System Check_Head_1900MHz_081228

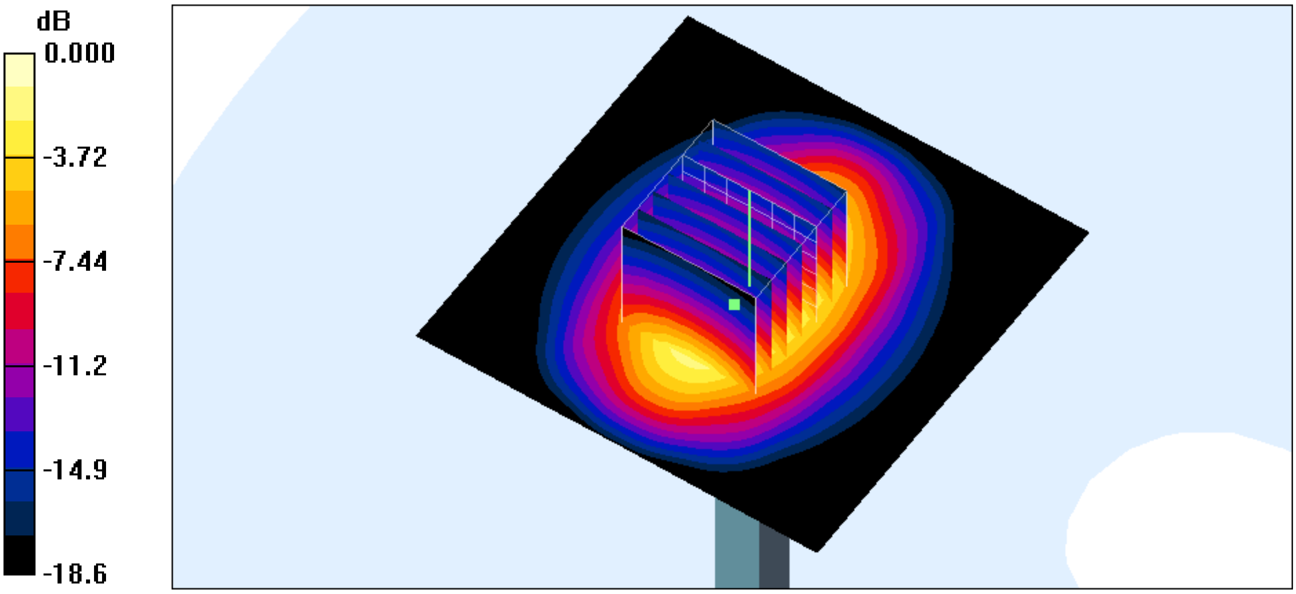
DUT: Dipole 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 41.8; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.4 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.01, 5.01, 5.01); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: SAM-Right; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Pin=100mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.91 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.4 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 7.44 W/kg
SAR(1 g) = 4.05 mW/g; SAR(10 g) = 2.11 mW/g
Maximum value of SAR (measured) = 4.53 mW/g



0 dB = 4.53mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

System Check_Body_835MHz_081228

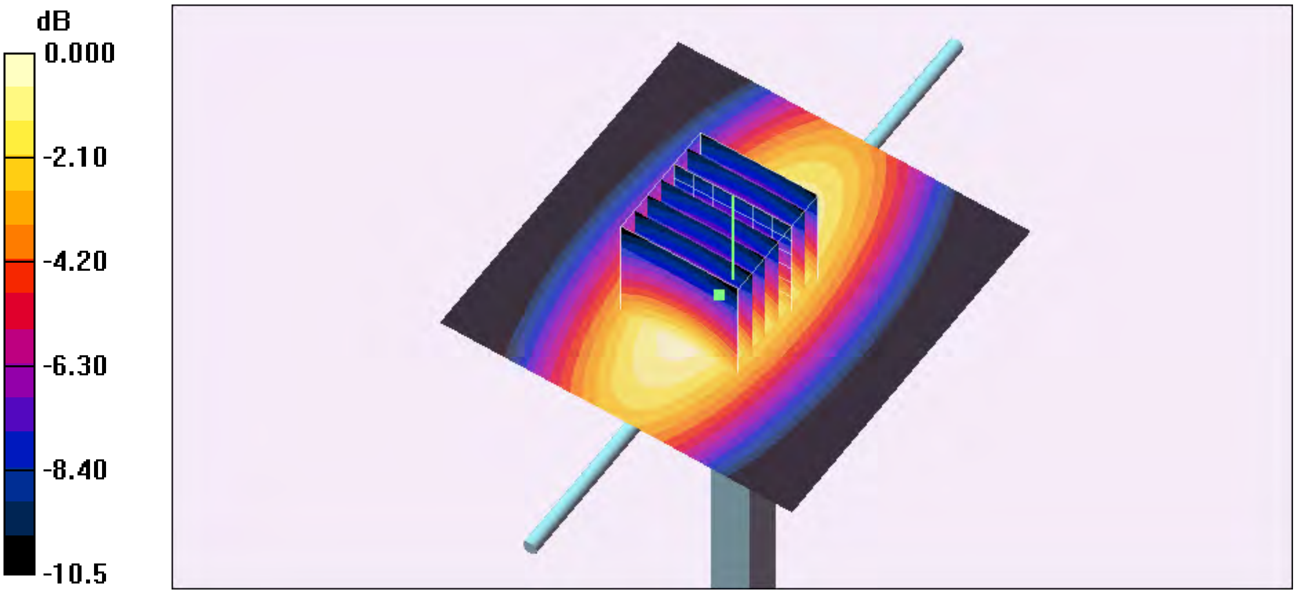
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; σ = 0.955 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Ambient Temperature : 22.3 ℃; Liquid Temperature : 21.5 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.91, 5.91, 5.91); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Pin=100mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.06 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.6 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.965 mW/g; SAR(10 g) = 0.635 mW/g
Maximum value of SAR (measured) = 1.05 mW/g



0 dB = 1.05mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2009/01/12

System Check_Body_835MHz_090112

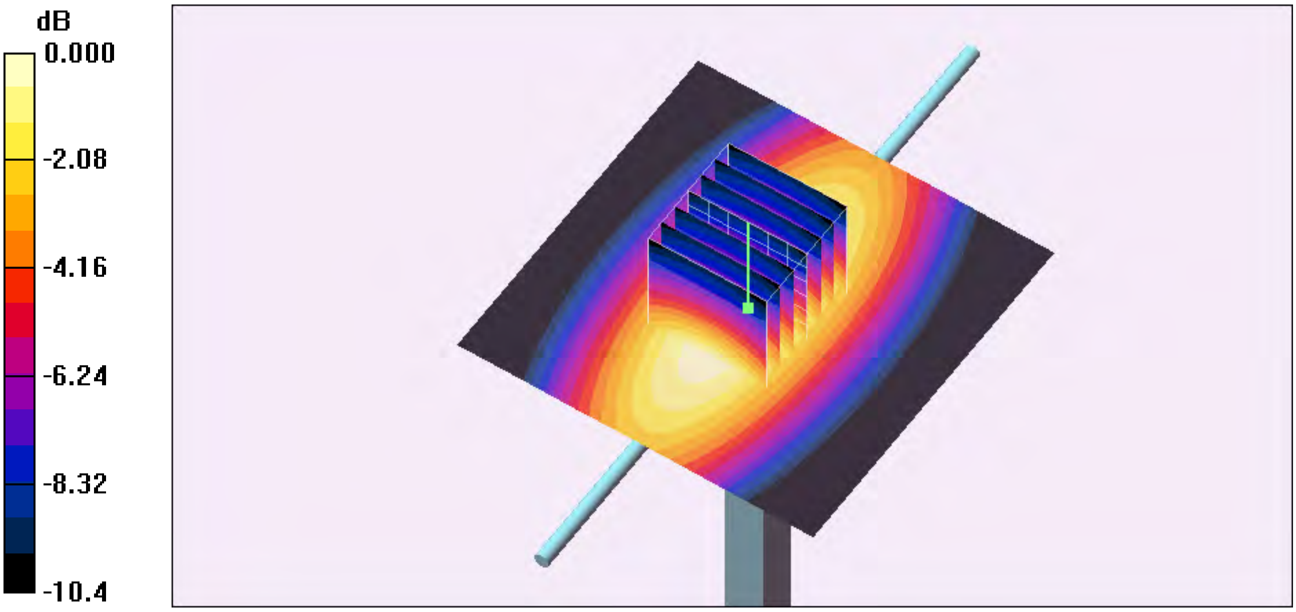
DUT: Dipole 835 MHz

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: MSL_850 Medium parameters used: f = 835 MHz; σ = 0.954 mho/m; ε_r = 52.8; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 ℃; Liquid Temperature : 21.4 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.91, 5.91, 5.91); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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 = 35.2 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 1.41 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: 2008/12/28

System Check_Body_1900MHz_081228

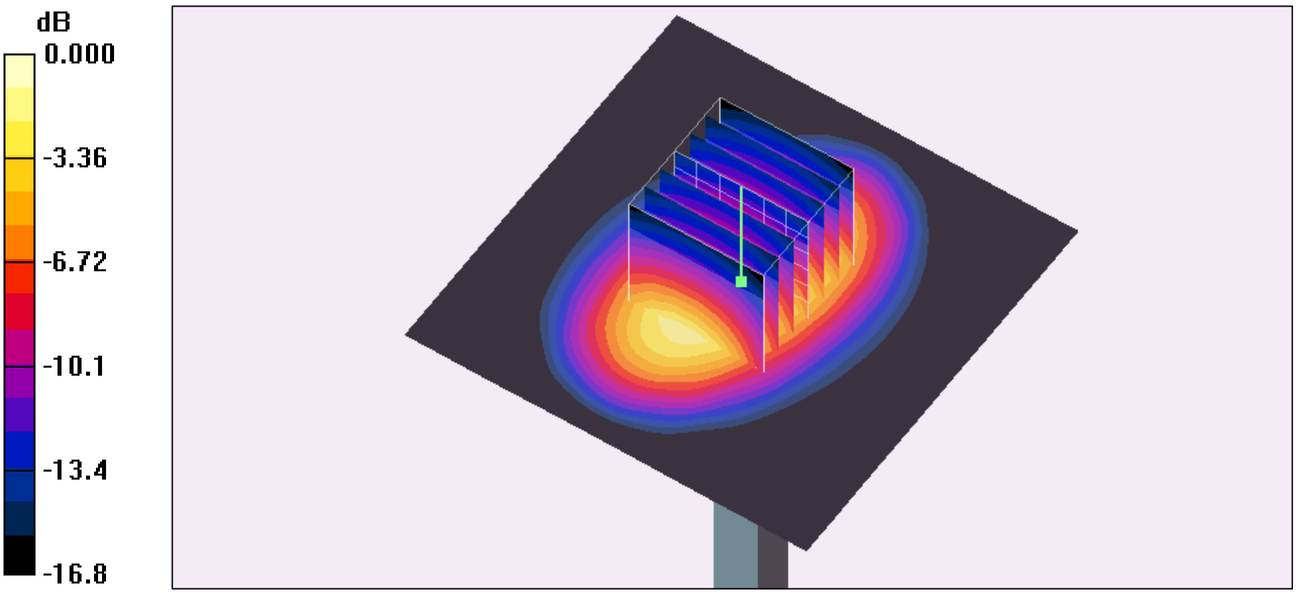
DUT: Dipole 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.53 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.6 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.49, 4.49, 4.49); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 4.70 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.6 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 7.54 W/kg
SAR(1 g) = 4.13 mW/g; SAR(10 g) = 2.17 mW/g
Maximum value of SAR (measured) = 4.65 mW/g



0 dB = 4.65mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2009/1/12

System Check_Body_1900MHz_090112

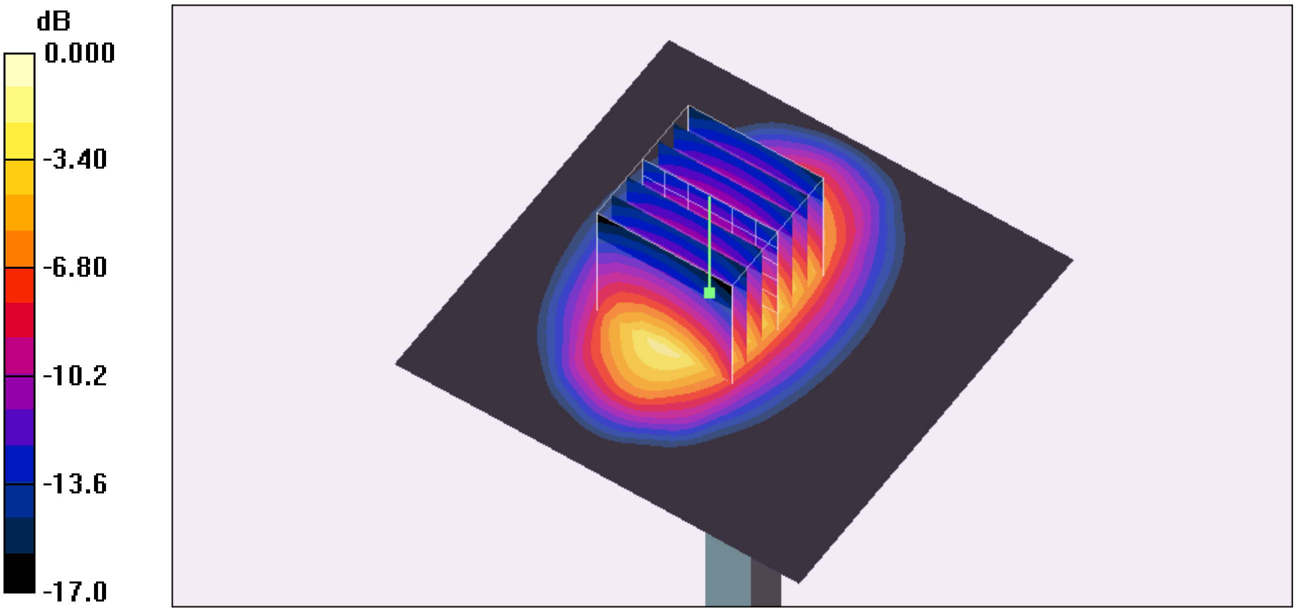
DUT: Dipole 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: MSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.3 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.49, 4.49, 4.49); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Pin=100mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 4.58 mW/g

Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.0 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 7.27 W/kg
SAR(1 g) = 4 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 4.50 mW/g



0 dB = 4.50mW/g

Appendix B - SAR Measurement Data

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Left Tilted_GSM850 Ch251_Bluetooth ON_7527C

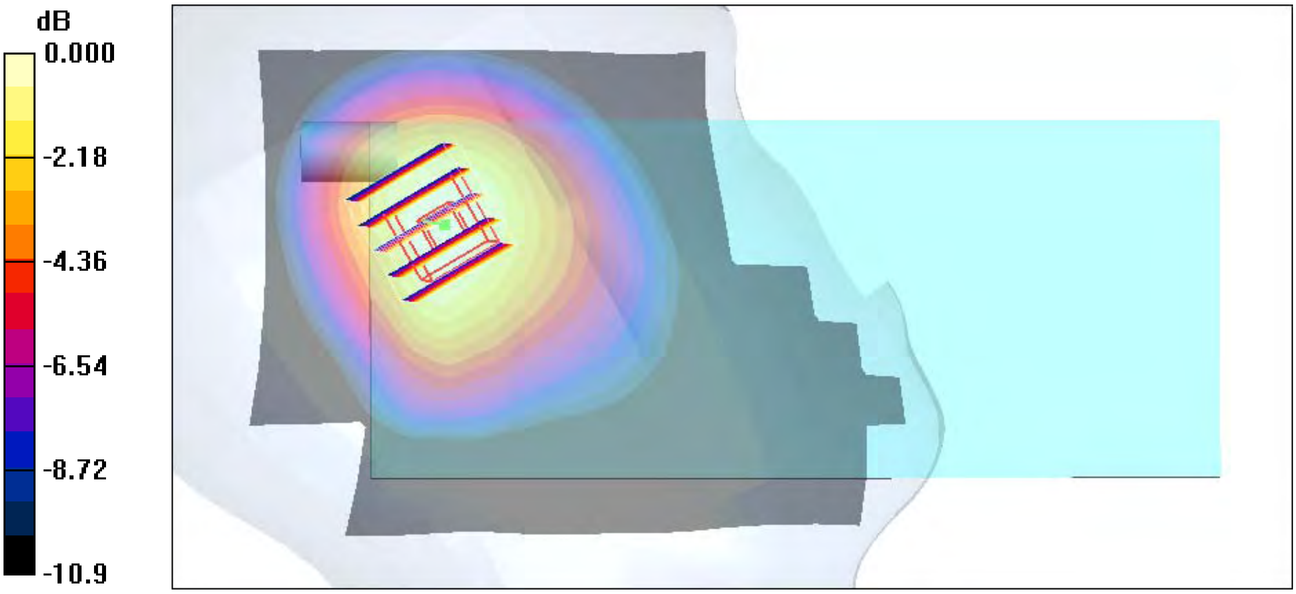
DUT: 710211-03

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium: HSL_850 Medium parameters used: f = 849 MHz; σ = 0.915 mho/m; ε_r = 43.2; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 ℃; Liquid Temperature : 21.5 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.06, 6.06, 6.06); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: SAM-Left; Type: QD 000 P40 C; Serial: TP-1477
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch251/Area Scan (91x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.29 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.9 V/m; Power Drift = 0.175 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.805 mW/g
Maximum value of SAR (measured) = 1.27 mW/g



0 dB = 1.27mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Left Tilted_GSM1900 Ch512_Bluetooth ON_7527C

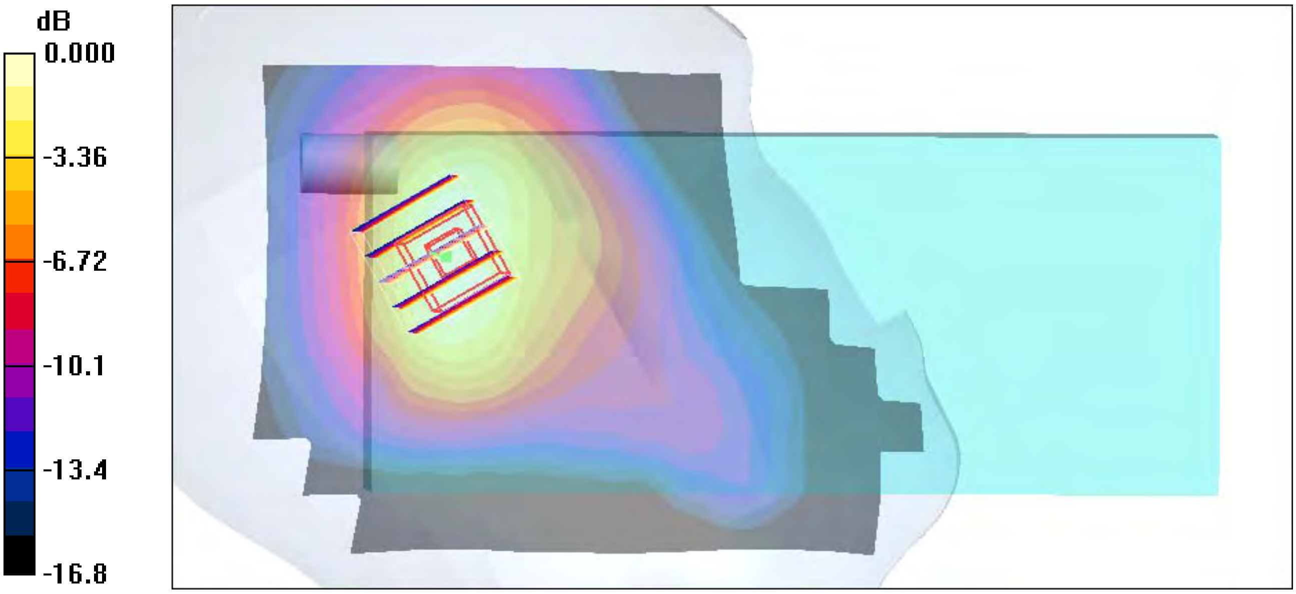
DUT: 710211-03

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.34 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.4 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.01, 5.01, 5.01); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: SAM-Right; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch512/Area Scan (91x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.495 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.1 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 0.863 W/kg
SAR(1 g) = 0.474 mW/g; SAR(10 g) = 0.271 mW/g
Maximum value of SAR (measured) = 0.508 mW/g



0 dB = 0.508mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Body_GSM850 Ch251_LCD Up with 1.5cm Gap_GPRS10_7527C

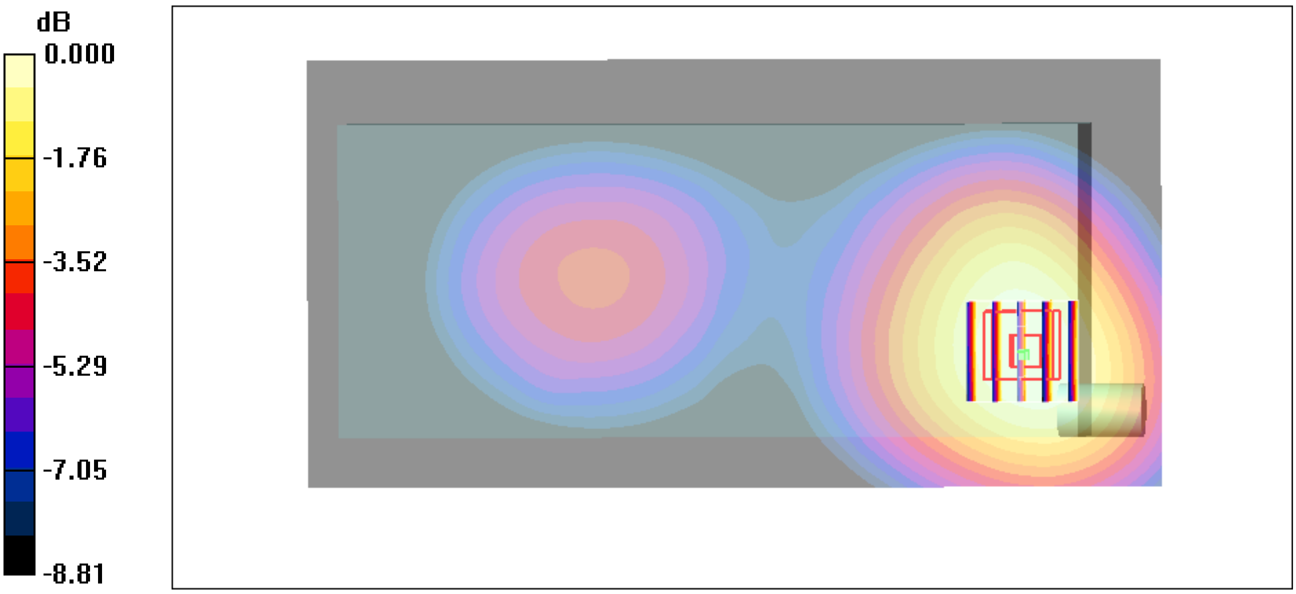
DUT: 710211-03

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:4
Medium: MSL_850 Medium parameters used: f = 849 MHz; σ = 0.969 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.5 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.91, 5.91, 5.91); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch251/Area Scan (91x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.444 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = -0.126 dB
Peak SAR (extrapolated) = 0.514 W/kg
SAR(1 g) = 0.414 mW/g; SAR(10 g) = 0.305 mW/g
Maximum value of SAR (measured) = 0.438 mW/g



0 dB = 0.438mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Body_GSM1900 Ch512_LCD Up with 1.5cm Gap_GPRS10_7527S

DUT: 710211-03

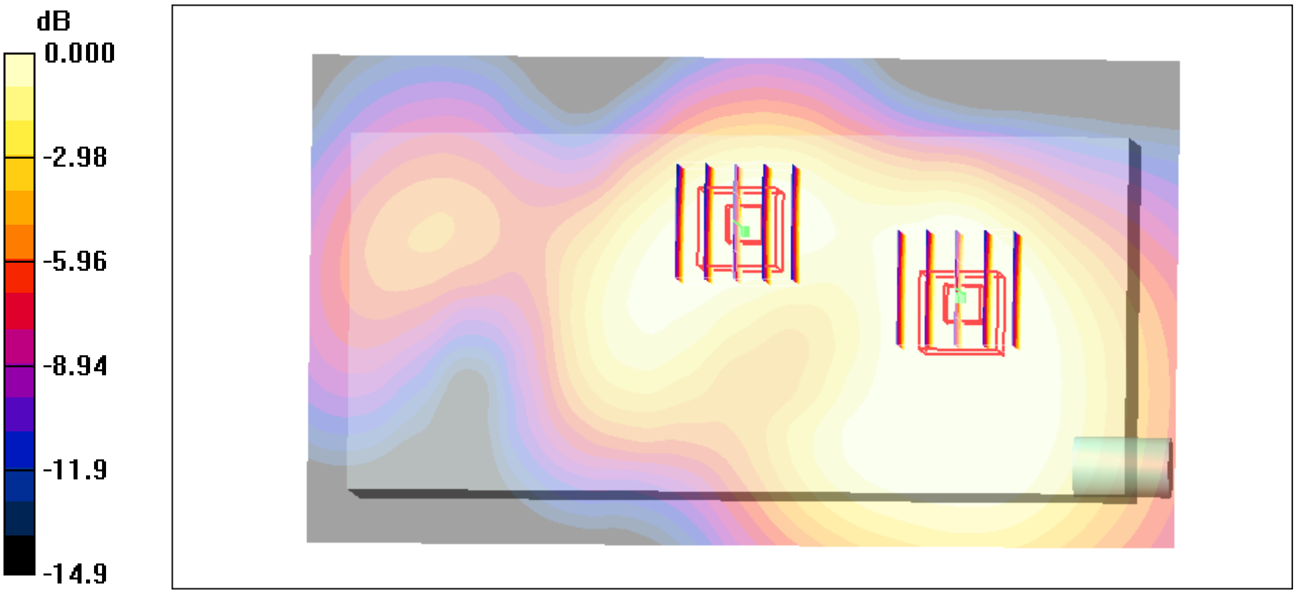
Communication System: PCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4
Medium: MSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.48 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 °C; Liquid Temperature : 21.6 °C

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.49, 4.49, 4.49); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch512/Area Scan (91x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.175 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.25 V/m; Power Drift = -0.157 dB
Peak SAR (extrapolated) = 0.254 W/kg
SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.166 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.25 V/m; Power Drift = -0.157 dB
Peak SAR (extrapolated) = 0.173 W/kg
SAR(1 g) = 0.111 mW/g; SAR(10 g) = 0.071 mW/g
Maximum value of SAR (measured) = 0.118 mW/g



0 dB = 0.118mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2009/1/12

Body_GSM850 Ch189_Right Side with Holster+Pistol Grips 0cm Gap_GPRS10_7527C

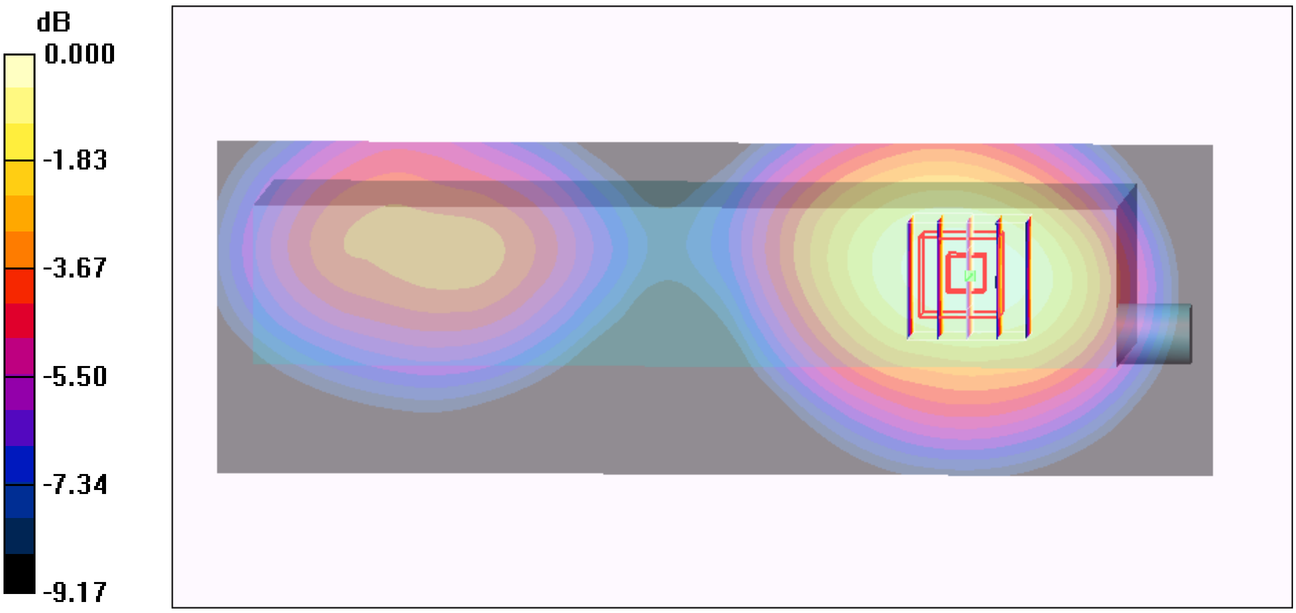
DUT: 710211-03

Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:4
Medium: MSL_850 Medium parameters used : f = 836.4 MHz; σ = 0.955 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.4 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.91, 5.91, 5.91); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch189/Area Scan (61x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.274 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.23 V/m; Power Drift = -0.091 dB
Peak SAR (extrapolated) = 0.329 W/kg
SAR(1 g) = 0.258 mW/g; SAR(10 g) = 0.186 mW/g
Maximum value of SAR (measured) = 0.274 mW/g



0 dB = 0.274mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2009/1/12

Body_GSM1900 Ch661_Right Side with Holster+Pistol Grips 0cm Gap_GPRS10_Bluetooth_7527S

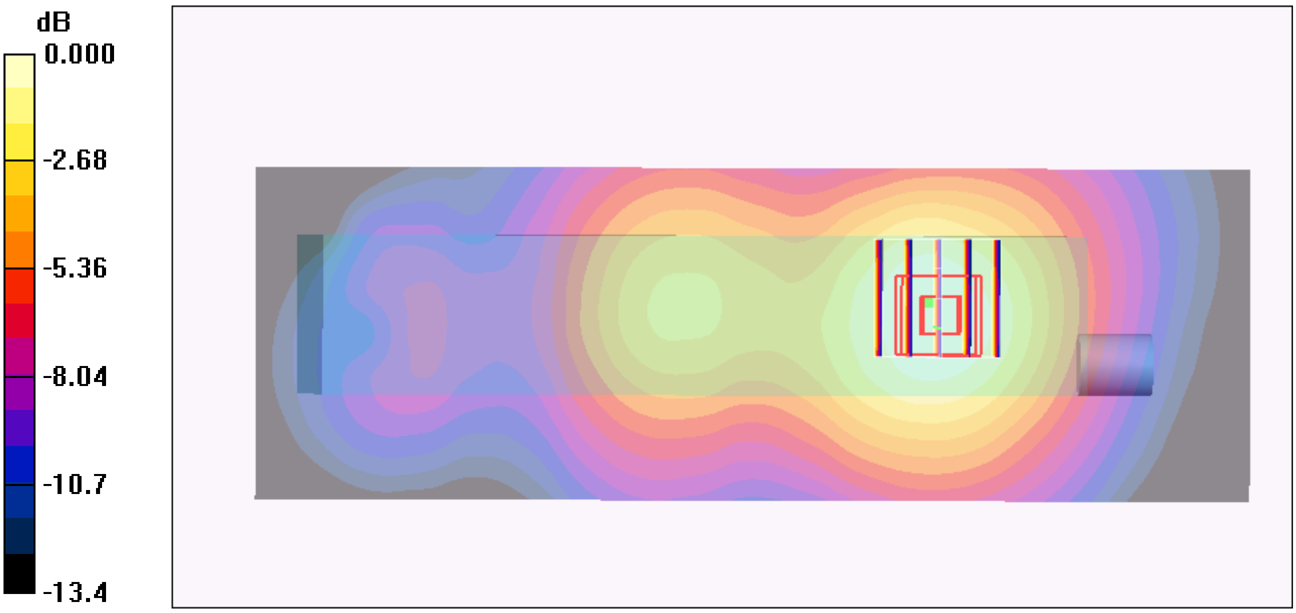
DUT: 710211-03

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 °C; Liquid Temperature : 21.3 °C

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.49, 4.49, 4.49); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch661/Area Scan (61x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.174 mW/g

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.74 V/m; Power Drift = -0.163 dB
Peak SAR (extrapolated) = 0.268 W/kg
SAR(1 g) = 0.159 mW/g; SAR(10 g) = 0.102 mW/g
Maximum value of SAR (measured) = 0.167 mW/g



0 dB = 0.167mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2008/12/28

Left Tilted_GSM850 Ch251_Bluetooth ON_7527C_2D

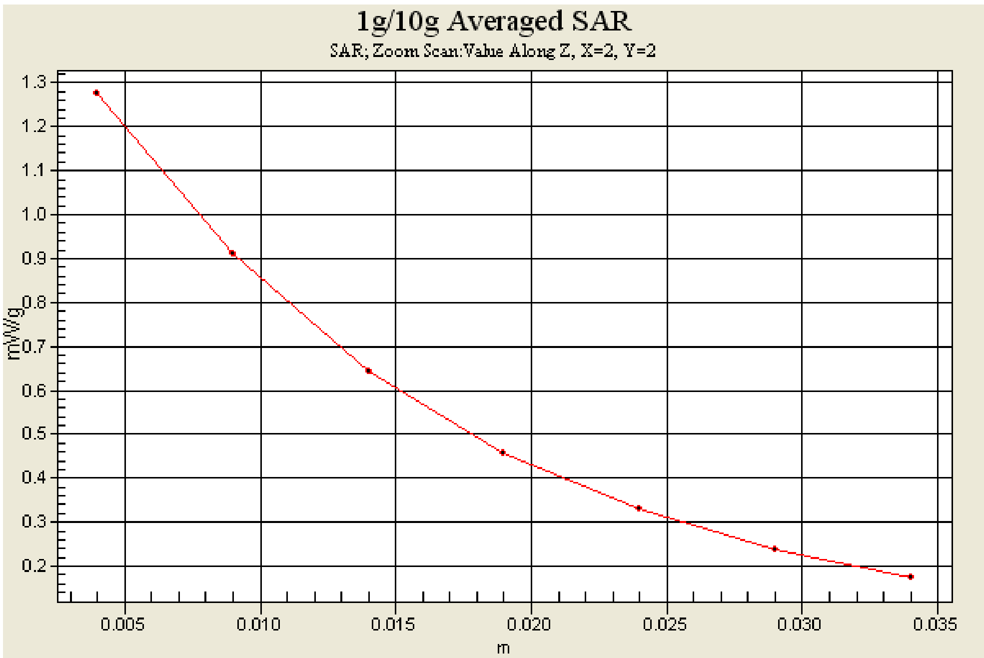
DUT: 710211-03

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium: HSL_850 Medium parameters used: f = 849 MHz; σ = 0.915 mho/m; ε_r = 43.2; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 ℃; Liquid Temperature : 21.5 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.06, 6.06, 6.06); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: SAM-Left; Type: QD 000 P40 C; Serial: TP-1477
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch251/Area Scan (91x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.29 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.9 V/m; Power Drift = 0.175 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.805 mW/g
Maximum value of SAR (measured) = 1.27 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Left Tilted_GSM1900 Ch512_Bluetooth ON_7527C_2D

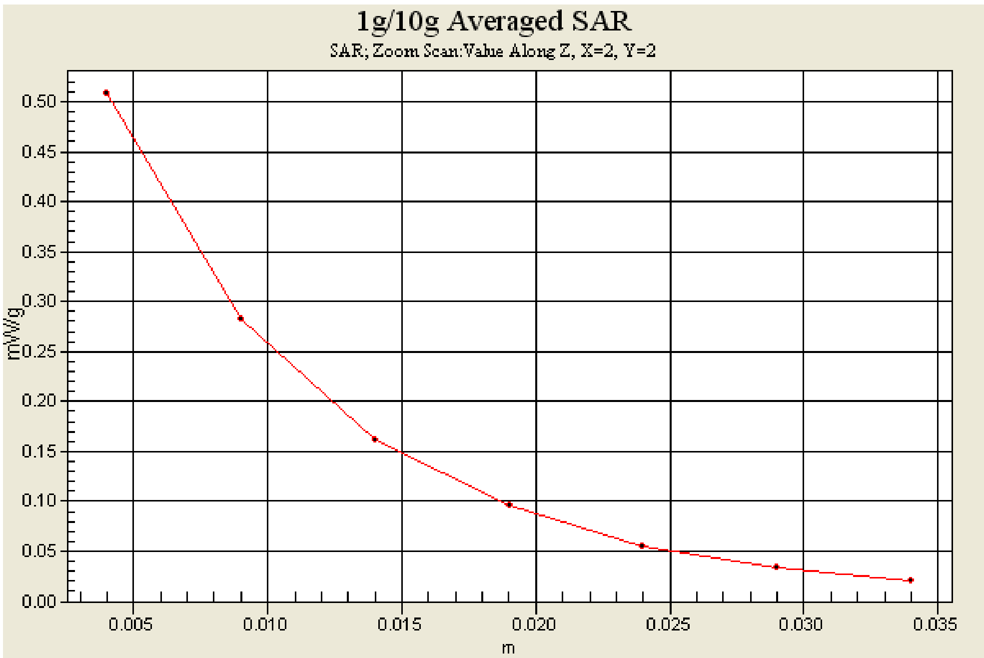
DUT: 710211-03

Communication System: PCS; Frequency: 1850.2 MHz;Duty Cycle: 1:8.3
Medium: HSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.34 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.4 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.01, 5.01, 5.01); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: SAM-Right; Type: QD 000 P40 C; Serial: TP-1383
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch512/Area Scan (91x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.495 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.1 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 0.863 W/kg
SAR(1 g) = 0.474 mW/g; SAR(10 g) = 0.271 mW/g
Maximum value of SAR (measured) = 0.508 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Body_GSM850 Ch251_LCD Up with 1.5cm Gap_GPRS10_7527C_2D

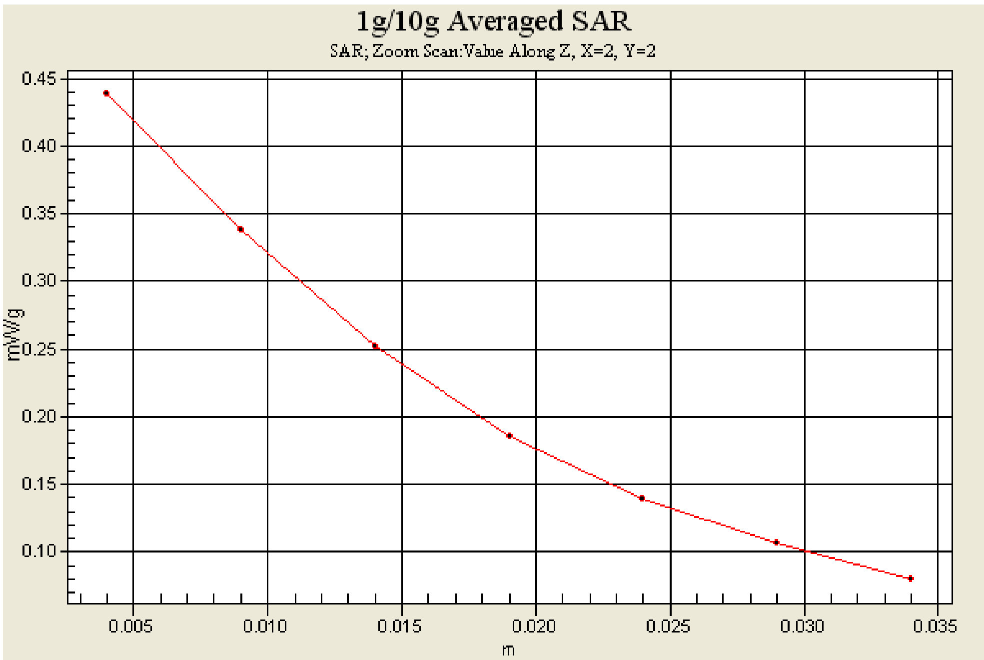
DUT: 710211-03

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:4
Medium: MSL_850 Medium parameters used: f = 849 MHz; σ = 0.969 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.5 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.91, 5.91, 5.91); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch251/Area Scan (91x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.444 mW/g

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = -0.126 dB
Peak SAR (extrapolated) = 0.514 W/kg
SAR(1 g) = 0.414 mW/g; SAR(10 g) = 0.305 mW/g
Maximum value of SAR (measured) = 0.438 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2008/12/28

Body_GSM1900 Ch512_LCD Up with 1.5cm Gap_GPRS10_7527S_2D

DUT: 710211-03

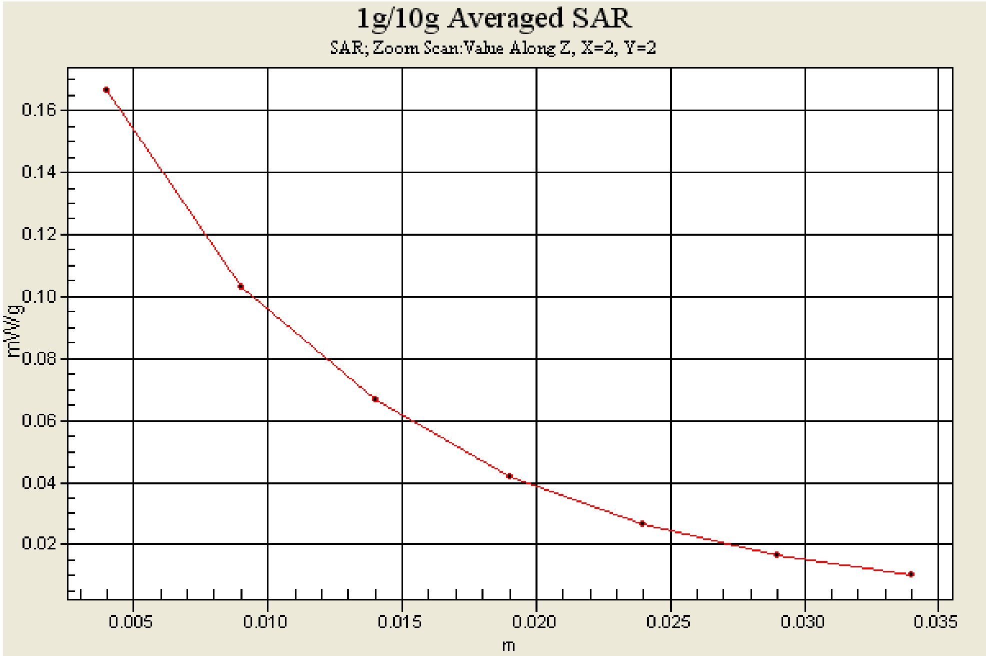
Communication System: PCS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:4
Medium: MSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.48 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3
Ambient Temperature : 22.5 ℃; Liquid Temperature : 21.6 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.49, 4.49, 4.49); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch512/Area Scan (91x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.175 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.25 V/m; Power Drift = -0.157 dB
Peak SAR (extrapolated) = 0.254 W/kg
SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.166 mW/g

Ch512/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.25 V/m; Power Drift = -0.157 dB
Peak SAR (extrapolated) = 0.173 W/kg
SAR(1 g) = 0.111 mW/g; SAR(10 g) = 0.071 mW/g
Maximum value of SAR (measured) = 0.118 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2009/1/12

Body_GSM850 Ch189_Right Side with Holster+Pistol Grips 0cm Gap_GPRS10_7527C_2D

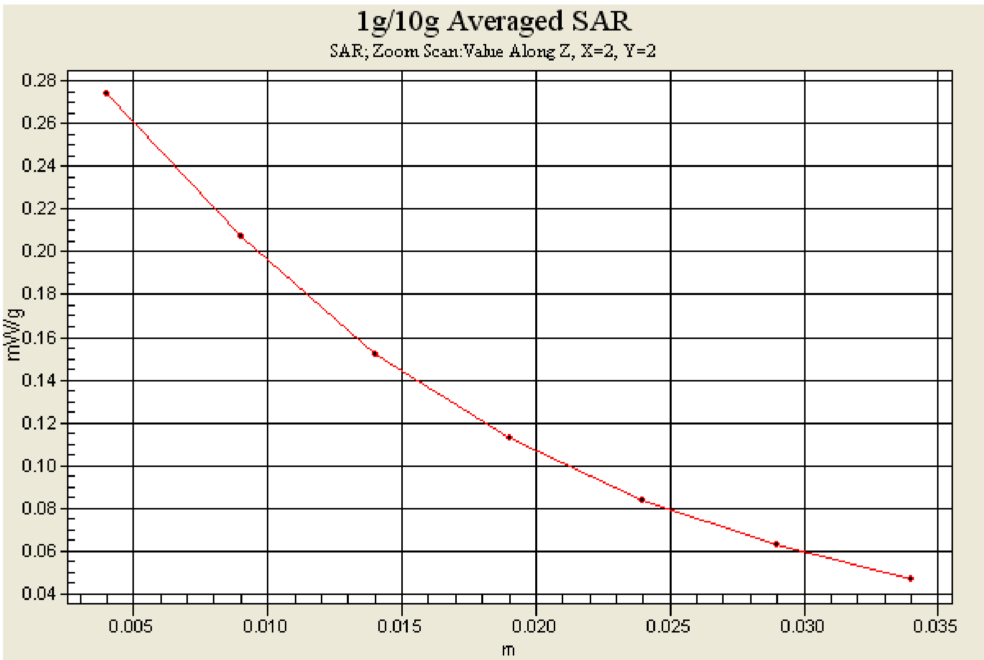
DUT: 710211-03

Communication System: GSM850; Frequency: 836.4 MHz;Duty Cycle: 1:4
Medium: MSL_850 Medium parameters used: f = 836.4 MHz; σ = 0.955 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 °C; Liquid Temperature : 21.4 °C

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(5.91, 5.91, 5.91); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch189/Area Scan (61x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.274 mW/g

Ch189/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.23 V/m; Power Drift = -0.091 dB
Peak SAR (extrapolated) = 0.329 W/kg
SAR(1 g) = 0.258 mW/g; SAR(10 g) = 0.186 mW/g
Maximum value of SAR (measured) = 0.274 mW/g



Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2009/1/12

Body_GSM1900 Ch661_Right Side with Holster+Pistol Grips 0cm Gap_GPRS10_Bluetooth_7527S_2D

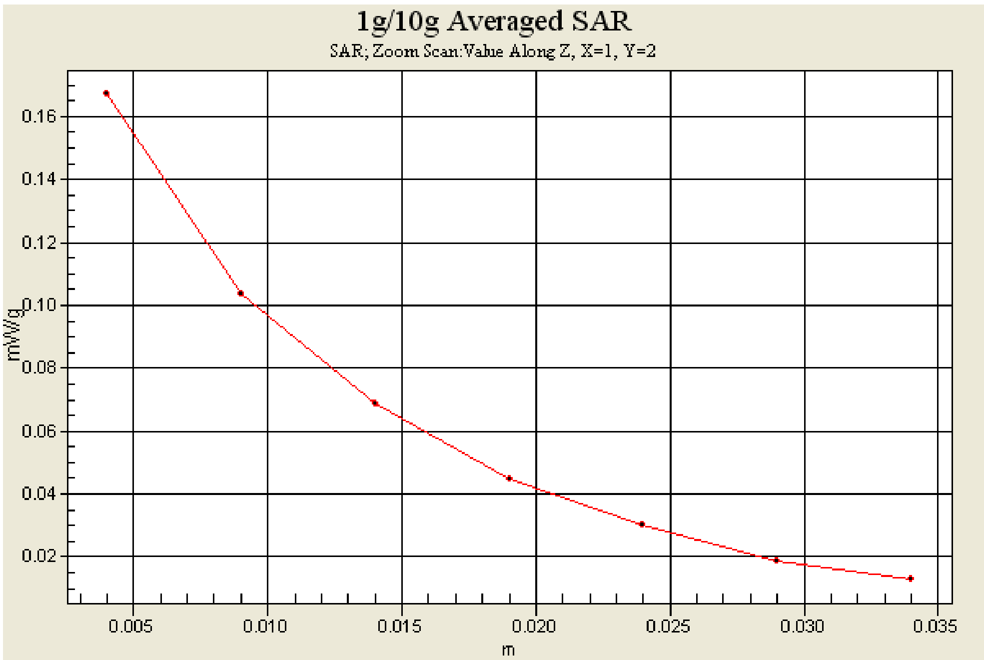
DUT: 710211-03

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: MSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Ambient Temperature : 22.6 ℃; Liquid Temperature : 21.3 ℃

DASY4 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.49, 4.49, 4.49); Calibrated: 2008/8/26
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn577; Calibrated: 2008/11/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Ch661/Area Scan (61x181x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.174 mW/g

Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.74 V/m; Power Drift = -0.163 dB
Peak SAR (extrapolated) = 0.268 W/kg
SAR(1 g) = 0.159 mW/g; SAR(10 g) = 0.102 mW/g
Maximum value of SAR (measured) = 0.167 mW/g



Appendix C – Calibration Data

Please refer to the calibration certificates of DASY as below.

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

ilac-MRA

SWISS CALIBRATION

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

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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S 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**

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

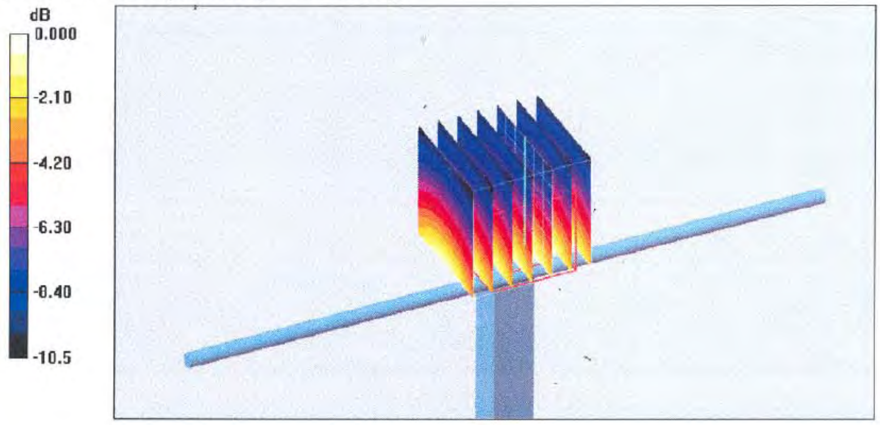
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

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:

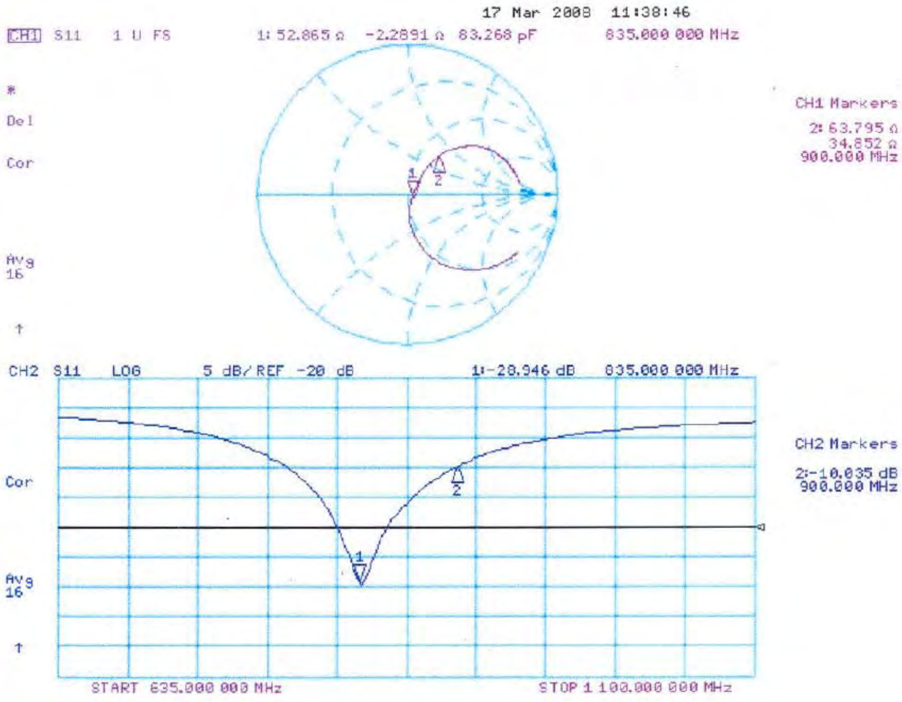
- Probe: ES3DV2 - SN3025; ConvF(6.09, 6.09, 6.09); Calibrated: 01.03.2008
- Sensor-Surface: 3.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 03.09.2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8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

Impedance Measurement Plot for Head TSL



DASY4 Validation Report for Body TSL

Date/Time: 10.03.2008 12:48:36

Test Laboratory: SPEAG, Zurich, Switzerland

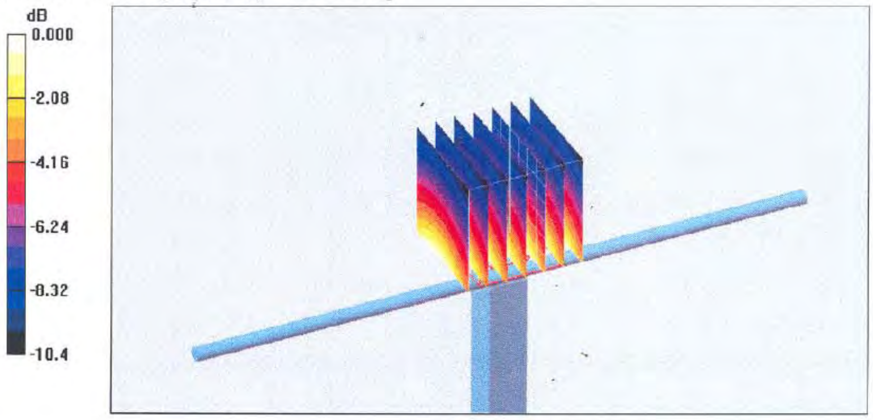
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:499

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900;
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 54; ρ = 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