A Test Lab Techno Corp.

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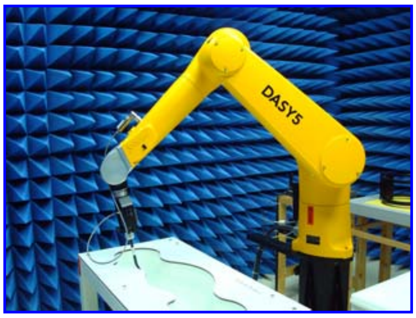
SAR EVALUATION REPORT

Test Report No.	:	**0811FS15**
Applicant	:	**Inventec Corporation**
FCC ID	:	**DGIBC0312AAA000**
Trade Name	:	**PHAROS**
Model Number	:	**Pharos Traveler 117**
Product Type	:	**PDA PHONE**
Dates of Test	:	**Apr. 08 ~ Jun. 28, 2008 ; Nov. 12 ~ Nov. 23, 2008**
Test Environment	:	**Ambient Temperature： 22 ±2˚C**
		Relative Humidity：40 - 70 %
Test Specification	:	**Standard C95.1-1999**
		IEEE Std. 1528-2003
		FCC KDB 941225 D01 SAR for 3G devices v02
Application	:	**Class II permissive change**
Max. SAR	:	**0.984 W/kg Head SAR**
		1.470 W/kg Body SAR
Test Lab	:	**Chang-an Lab**



1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
3. The measurement report has to be written approval of A Test Lab Techno Corp. It may only be reproduced or published in full.

Country Huang 20081202
Measurement Center Manager

Sam Chuang 20081202
Testing Engineer

Contents

1. Description of Equipment Under Test (EUT)

Applicant： **Inventec Corporation**
Inventec Building, 66 Hou-Kang Street, Shih-Lin District, Taipei 11170, Taiwan

Manufacturer	:	Inventec Corporation
Manufacturer Address	:	Inventec Building, 66 Hou-Kang Street, Shih-Lin District, Taipei 11170, Taiwan
Product Type	:	PDA PHONE
Trade Name	:	PHAROS
Model Number	:	Pharos Traveler 117
FCC ID	:	DGIBC0312AAA000
Test Device	:	Production Unit
Tx Frequency	:	824.2 - 848.8 MHz (GSM/GPRS/EGPRS 850) 1850.2 - 1909.8 MHz (PCS/GPRS/EGPRS 1900) 826.6 - 846.4 MHz (WCDMA/HSDPA/HSUPA Band V) 1852.6 - 1907.4 MHz (WCDMA/HSDPA/HSUPA Band II) 2412 - 2462 MHz (Wi-Fi 802.11b / 802.11g)
Max. RF Conducted Power	:	1.660 W (32.20 dBm) GSM/GPRS/EGPRS 850 0.813 W (29.10 dBm) PCS/GPRS/EGPRS 1900 0.166 W (22.20 dBm) WCDMA/HSDPA/HSUPA Band V 0.238 W (23.77 dBm) WCDMA/HSDPA/HSUPA Band II 0.069 W (18.40 dBm) Wi-Fi 802.11b 0.056 W (17.52 dBm) Wi-Fi 802.11g
Max. SAR Measurement	:	0.984 W/kg Head SAR 1.470 W/kg Body SAR
HW Version	:	N/A
SW Version	:	N/A
Antenna Type	:	Internal Type
Antenna Gain	:	-5.759 dB (GSM 850 / WCDMA Band V) -2.753 dB (PCS 1900 / WCDMA Band II) 1.71 dB (Wi-Fi 802.11b/802.11g)
Device Category	:	Portable
RF Exposure Environment	:	General Population / Uncontrolled
Battery Option	:	Standard
Application Type	:	Certification

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment / general population exposure limits specified in Standard C95.1-1999 and had been tested in accordance with the measurement procedures specified in IEEE Std. 1528-2003.

The model (PHAROS_Pharos Traveler 117) is the variant product of velocitymobile_velocity 103; velocitymobile_velocity 103 FCC ID is DGIBC8121AABAB0. PHAROS_Pharos Traveler 117 is changed from velocitymobile_velocity 103; the difference from velocitymobile_velocity 111 is the model number and the PCB Layout.

Some test items of PHAROS Pharos Traveler 117 copy from the original report which is velocitymobile Velocity 103 (report number: 0802FS29-01).

Front view	Back view

Figure 1. EUT Photo

2. Other Accessories

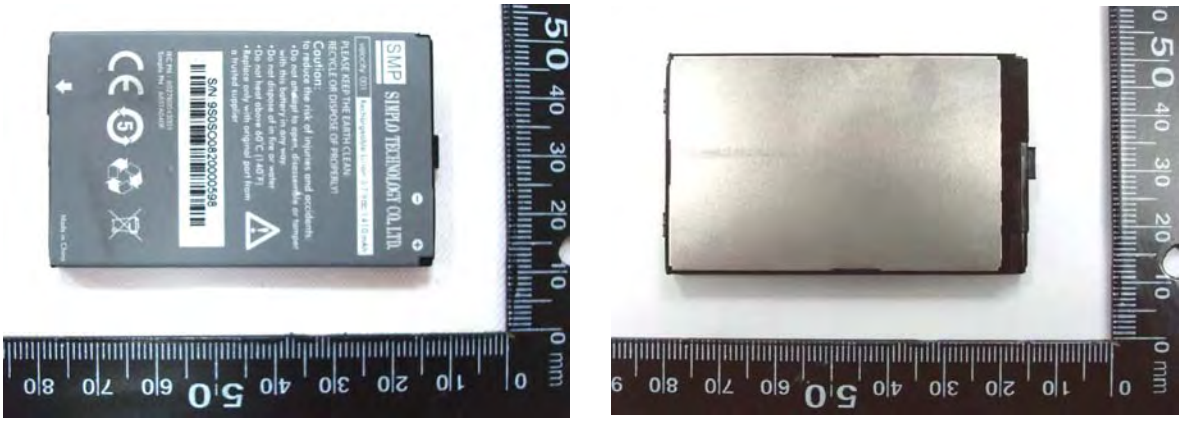


Figure 2. Li-ion Battery (3.7V 1410mAh)

Figure 3. AC Adapter

3. Introduction

The A Test Lab Techno Corp. has performed measurements of the maximum potential exposure to the user of **Inventec Corporation Trade Name：PHAROS Model(s)：Pharos Traveler 117.** The test procedures, as described in American National Standards, Institute C95.1 - 1999〔1〕, FCC/OET Bulletin 65 Supplement C [July 2001] were employed and they specify the maximum exposure limit of 1.6mW/g as averaged over any 1 gram of tissue for portable devices being used within 25cm between user and EUT in the uncontrolled environment. A description of the product and operating configuration, detailed summary of the test results, methodology and procedures used in the equipment used are included within this test report.

4. SAR Definition

Specific Absorption Rate (SAR) is defined as 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). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Figure 4).

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

Figure 4. SAR Mathematical Equation

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

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

Where：

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m^3)

E = RMS electric field strength (V/m)

＊**Note**：

The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane〔2〕

5. SAR Measurement Setup

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ±0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length = 300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The Measurement Server is based on a PC/104 CPU board with a 400MHz intel ULV Celeron, 128MB chipdisk and 128MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY5 I/O-board, which is directly connected to the PC/104 bus of the CPU board. The PC consists of the Intel Core(TM)2 CPU @1.86GHz computer with Windows XP system and SAR Measurement Software DASY5, Post Processor SEMCAD, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection…etc. is connected to the Electro-optical converter (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the Measurement Server.

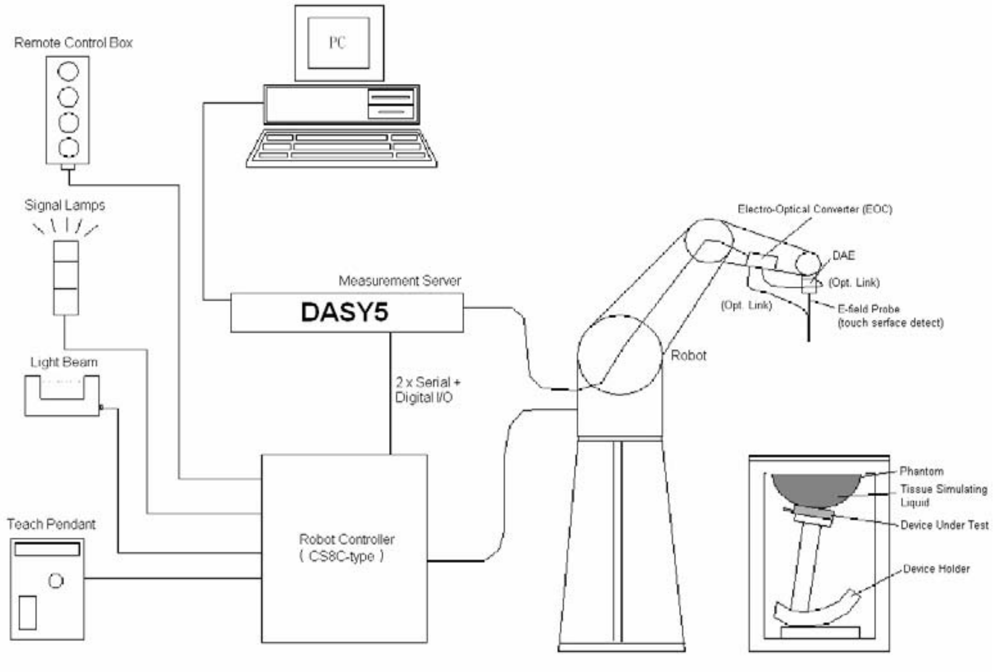


Figure 5. SAR Lab Test Measurement Setup

The DAE4 (or 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in〔3〕.

6. System Components

6.1 DASY5 E-Field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 or ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration〔3〕and optimized for dosimetric evaluation. The probes is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY5 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped when reaching the maximum.

6.1.1 E-Field Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycol)
Calibration	In air from 10 MHz to 6 GHz In brain and muscle simulating tissue at frequencies of 900MHz, 1800MHz, 1950MHz, 5200MHz and 5500MHz and 5800MHz (accuracy ±8%) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity	±0.3 dB in brain tissue (rotation around probe axis) ±0.5 dB in brain tissue (rotation normal probe axis)
Dynamic Range	10 μW/g to > 100mW/g; Linearity: ±0.2dB
Surface Detection	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surface(EX3DV3 only)
Dimensions	Overall length: 330mm Tip length: 20mm Body diameter: 12mm Tip diameter: 2.5mm Distance from probe tip to dipole centers: 1.0mm
Application	General dosimetry up to 6GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

Figure 6. E-field Probe

Figure 7.
Probe setup on robot

6.1.2 E-Field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure described in〔4〕with accuracy better than ±10%. The spherical isotropy was evaluated with the procedure described in〔5〕and found to be better than ±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 free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1GHz, and in a wave guide above 1GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

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

Where：

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (head or body),

ΔT = Temperature increase due to RF exposure.

Or

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

Where：

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

6.2 Data Acquisition Electronic (DAE) System

Cell Controller

Processor：	Intel Core(TM)2 CPU
Clock Speed：	@ 1.86GHz
Operating System：	Windows XP Professional

Data Converter

Features：	Signal Amplifier, multiplexer, A/D converter, and control logic
Software：	DASY5 v5.0 (Build 91) & SEMCAD X Version 12.4 Build 52
Connecting Lines：	Optical downlink for data and status info
	Optical uplink for commands and clock

6.3 Robot

Positioner：	Stäubli Unimation Corp. Robot Model: TX90XL
Repeatability：	±0.02 mm
No. of Axis：	6

6.4 Measurement Server

Processor：	PC/104 with a 400MHz intel ULV Celeron
I/O-board：	Link to DAE4(or DAE3)
	16-bit A/D converter for surface detection system
	Digital I/O interface
	Serial link to robot
	Direct emergency stop output for robot

6.5 Device Holder for Transmitters

In combination with the SAM Twin Phantom V4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeat ably positioned according to the IEEE SCC34-SC2 and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, and flat phantom).

＊**Note**：A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations〔6〕. To produce the worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Larger DUT cannot be tested using this device holder. Instead a support of bigger polystyrene cubes and thin polystyrene plates is used to position the DUT in all relevant positions to find and measure spots with maximum SAR values. Therefore those devices are normally only tested at the flat part of the SAM.

Figure 8. Device Holder

6.6 Phantom - SAM v4.0

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

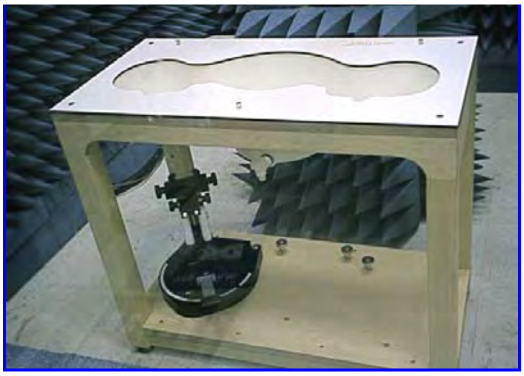


Figure 9. SAM Twin Phantom

Shell Thickness	2 ±0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	810x1000x500 mm (HxLxW)

Table 1. Specification of SAM v4.0

6.7 Data Storage and Evaluation

6.7.1 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 .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.

6.7.2 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	Normi, ai0, ai1, ai2
	- Conversion factor	ConvFi
	- Diode compression point	dcpi
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter 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：

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

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：

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

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

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

Hi = 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.

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

with SAR = local specific absorption rate in mW/g

E_{tot} = 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.

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

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

7. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Dosimetric E-Field Probe	ES3DV3	3150	Jan. 09, 2008	Jan. 09, 2009
SPEAG	900MHz System Validation Kit	D900V2	073	Mar. 17, 2008	Mar. 17, 2009
SPEAG	900MHz System Validation Kit	D900V2	1d053	Dec. 12, 2007	Dec. 12, 2008
SPEAG	1800MHz System Validation Kit	D1950V2	1117	Dec. 20, 2007	Dec. 20, 2008
SPEAG	2450MHz System Validation Kit	D2450V2	712	Jan. 30, 2008	Jan. 30, 2009
SPEAG	Data Acquisition Electronics	DAE4	779	Nov. 30, 2007	Nov. 30, 2008
SPEAG	Data Acquisition Electronics	DAE3	393	Sep. 25, 2008	Sep. 25, 2009
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	Phantom	SAM V4.0	TP-1150	NCR	NCR
SPEAG	Robot	Staubli TX90XL	F07/564ZA1/C/01	NCR	NCR
SPEAG	Software	DASY5 V5.0 Build 91	N/A	NCR	NCR
SPEAG	Software	SEMCAD X V12.4 Build 52	N/A	NCR	NCR
SPEAG	Measurement Server	SE UMS 011 AA	1025	NCR	NCR
R&S	Wireless Communication Test Set	CMU200	112387	Oct. 31, 2008	Oct. 31, 2009
Agilent	Wireless Communication Test Set	E5515C	GB47020167	Apr. 17, 2008	Apr. 17, 2009
Agilent	ENA Series Network Analyzer	E5071B	MY42402996	Nov. 04, 2008	Nov. 04, 2009
Agilent	Dielectric Probe Kit	85070C	US99360094	NCR	NCR
R&S	Power Sensor	NRP-Z22	100179	May. 03, 2008	May. 03, 2009
Agilent	Signal Generator	E8257D	MY44320425	Jul. 03, 2008	Jul. 03, 2009
Agilent	Dual Directional Coupler	778D	50334	NCR	NCR
Mini-Circuits	Power Amplifier	ZHL-42W-SMA	D111103#5	NCR	NCR
Mini-Circuits	Power Amplifier	ZVE-8G-SMA	D042005 671800514	NCR	NCR

Table 2. Test Equipment List

8. Tissue Simulating Liquids

The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the tissue.

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an 85070C Dielectric Probe Kit and an 8720ES Network Analyzer.

IEEE SCC-34/SC-2 in 1528 recommended Tissue Dielectric Parameters

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in human head. Other head and body tissue parameters that have not been s

pecified in 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equation and extrapolated according to the head parameter specified in 1528.

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 - 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00
(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)				

Table 3. Tissue dielectric parameters for head and body phantoms

8.1 Liquid Confirmation

8.1.1 Parameters

Liquid Verify								
Ambient Temperature： 22 ± 2 °C；Relative Humidity：40 -70%								
Liquid Type	**Frequency**	**Temp (°C)**	**Parameters**	**Target Value**	**Measured Value**	**Deviation (%)**	**Limit (%)**	**Measured Date**
900MHz Head	900MHz	22.0	**εr**	41.5	**41.4**	**-0.24%**	± 5	Apr. 08, 2008
			σ	0.97	**0.973**	**0.31%**	± 5	
900MHz Head	900MHz	22.0	**εr**	41.5	**41.4**	**-0.24%**	± 5	Apr. 14, 2008
			σ	0.97	**0.973**	**0.31%**	± 5	
900MHz Body	900MHz	22.0	**εr**	55.5	**55.1**	**-0.72%**	± 5	Apr. 14, 2008
			σ	1.05	**1.04**	**-0.95%**	± 5	
900MHz Body	900MHz	22.0	**εr**	55.5	**55.1**	**-0.72%**	± 5	Apr. 16, 2008
			σ	1.05	**1.04**	**-0.95%**	± 5	
1950MHz Head	1950MHz	22.0	**εr**	40.0	**40.4**	**1.00%**	± 5	Apr. 11, 2008
			σ	1.40	**1.43**	**2.14%**	± 5	
1950MHz Body	1950MHz	22.0	**εr**	53.3	**52.6**	**-1.31%**	± 5	Apr. 16, 2008
			σ	1.52	**1.55**	**1.97%**	± 5	
1950MHz Body	1950MHz	22.0	**εr**	53.3	**52.6**	**-1.31%**	± 5	Apr. 17, 2008
			σ	1.52	**1.55**	**1.97%**	± 5	
2450MHz Body	2450MHz	22.0	**εr**	52.7	**52.4**	**-0.57%**	± 5	Apr. 17, 2008
			σ	1.95	**1.96**	**0.51%**	± 5	
900MHz Body	900MHz	22.0	**εr**	55.5	**53.9**	**-2.88%**	± 5	Jun. 28, 2008
			σ	1.05	**1.04**	**-0.95%**	± 5	
1950MHz Body	1950MHz	22.0	**εr**	53.3	**51.1**	**-4.13%**	± 5	Jun. 28, 2008
			σ	1.52	**1.50**	**-1.32%**	± 5	

Liquid Type	Frequency	Temp (°C)	Parameters	Target Value	Measured Value	Deviation (%)	Limit (%)	Measured Date
900MHz Head	900MHz	22.0	εr	41.5	**41.3**	**-0.48%**	± 5	Nov. 13, 2008
			σ	0.97	**0.945**	**-2.58%**	± 5	
900MHz Body	900MHz	22.0	εr	55.5	**54.7**	**-1.44%**	± 5	Nov. 12, 2008
			σ	1.05	**1.03**	**-1.90%**	± 5	
1950MHz Head	1950MHz	22.0	εr	40.0	**39.6**	**-1.00%**	± 5	Nov. 13, 2008
			σ	1.40	**1.42**	**1.43%**	± 5	
1950MHz Body	1950MHz	22.0	εr	53.3	**51.8**	**-2.81%**	± 5	Nov. 12, 2008
			σ	1.52	**1.55**	**1.97%**	± 5	
2450MHz Body	2450MHz	22.0	εr	52.7	**50.5**	**-4.17%**	± 5	Nov. 23, 2008
			σ	1.95	**1.95**	**0.00%**	± 5	

Table 4. Measured Tissue dielectric parameters for head and body phantoms

8.1.2 Liquid Depth

The liquid level was during measurement 15cm ±0.5cm.

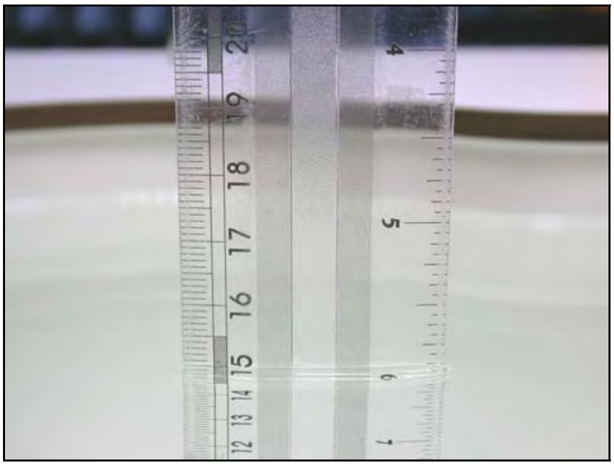


Figure 10. Head-Tissue-Simulating-Liquid

Figure 11. Body-Tissue-Simulating-Liquid

9. Measurement Process

9.1 Device and Test Conditions

The Test Device was provided by **Inventec Corporation** for this evaluation. The spatial peak SAR values were assessed for the lowest, middle and highest channels defined by **GSM 850** (#128=824.2MHz, #190=836.6MHz, #251=848.8MHz), **PCS 1900** (#512=1850.2MHz, #661=1880.0MHz, #810=1909.8MHz) , **WCDMA Band V** (#4133=826.6MHz, #4180=836MHz, #4232=846.6MHz), **WCDMA Band II** (#9263=1852.6MHz, #9400=1880.0MHz, #9537=1907.4MHz) and Wi-Fi 802.11b & 802.11g (Ch1 = 2412MHz , Ch6 = 2437MHz , Ch11 = 2462MHz) systems.

Note: The EUT has built-in test mode that used to evaluate SAR (802.11b/g).

HSDPA Date Devices setup for SAR Measurement.

HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Sub-test	βc	βd	Bd *(SF)*	Bc/βd	Bhs(1)	CM (dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note

1. ΔACK, ΔNACK and ΔCQI = 8 ⇔ Ahs = βhs/βc = 30/15 ⇔ βhs= 30/15 *βc
2. CM = 1 for βc/βd =12/15, βhs/βc=24/15.
3. For subtest 2 the βc/βd ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 11/15 and βd = 15/15.

Table 5. Setup for Release 5 HSDPA

The antenna(s), battery and accessories shall be those specified by the manufacturer. The battery shall be fully charged before each measurement and there shall be no external connections.

HSPA Date Devices setup for SAR Measurement.

The following procedures are applicable to HSPA (HSUPA/HSDPA) data devices operating under 3GPP Release 6. Body exposure conditions generally apply to these devices, including handsets and data modems operating in various electronic devices. HSUPA operates in conjunction with WCDMA and HSDPA. SAR is initially measured in WCDMA test configurations without HSPA. The default test configuration is to establish a radio link between the DUT and a communication test set to configure a 12.2 kbps RMC (reference measurement channel) in Test Loop Mode 1. SAR for HSPA is selectively measured with HS-DPCCH, EDPCCH and E-DPDCH, all enabled, along with a 12.2 kbps RMC using the highest SAR configuration in WCDMA with 12.2 kbps RMC only. An FRC is configured according to HSDPCCH Sub-test 1 using H-set 1 and QPSK. HSPA is configured according to E-DCH Subtest 5 requirements. SAR for other HSPA sub-test configurations is also confirmed selectively according to output power, exposure conditions and E-DCH UE Category. Maximum output power is verified according to procedures in applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. The UE Categories for HSDPCCH and HSPA should be clearly identified in the SAR report. The following procedures are applicable only if Maximum Power Reduction (MPR) is implemented according to Cubic Metric (CM) requirements.

When voice transmission and head exposure conditions are applicable to a WCDMA/HSPA data device, head exposure is measured according to the 'Head SAR Measurements' procedures in the 'WCDMA Handsets' section of this document. SAR for body exposure configurations are measured according to the 'Body SAR Measurements' procedures in the 'WCDMA Handsets' section of this document. In addition, body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurements should be used to test for head exposure.

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA should be configured according to the β values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of this document.

The highest body SAR measured in Antenna Extended & Retracted configurations on a channel in 12.2 kbps RMC. The possible channels are the High, Middle & Low channel. Contact the FCC Laboratory for test and approval requirements if the maximum output power measured in E-DCH Sub-test 2 - 4 is higher than Sub-test 5.

Sub-test	βc	βd	βd (SF)	βc/βd	βhs(1)	βec	βed	Bed (SF)	Bed (codes)	CM(2) (dB)	MPR (dB)	AG(4) Index	E-TFCI
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	βed1: 47/15 βed2: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: ΔACK, ΔNACK and ΔCQI = 8 ⇔ Ahs = βhs/βc = 30/15 ⇔ βhs= 30/15 *βc.

Note 2: CM = 1 for βc/βd =12/15, βhs/βc=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the βc/βd ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 10/15 and βd = 15/15.

Note 4: For subtest 5 the βc/βd ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to βc = 14/15 and βd = 15/15.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

Note 6: βed can not be set directly; it is set by Absolute Grant Value.

Usage	Operates with a Normal mode by client (GSM/PCS/WCDMA) Operates with a built-in test mode by client (802.11b/g)
Simulating human Head/Body	Head & Body
EUT Battery	Fully-charged with Li-ion batteries.

Band	Test Mode	CH	Frequency (MHz)	Peak Conducted power (dBm)	Worst
GSM850		Lowest	824.2	32.00	■
		Middle	836.6	31.50	□
		Highest	848.8	31.50	□
GSM850 GPRS	3Down2Up	Lowest	824.2	31.80	□
		Middle	836.6	31.50	□
		Highest	848.8	31.40	□
	3Down1Up	Lowest	824.2	31.80	□
		Middle	836.6	31.50	□
		Highest	848.8	31.40	□
GSM850 EGPRS	3Down2Up	Lowest	824.2	26.70	□
		Middle	824.2	26.60	□
		Highest	824.2	26.50	□
	3Down1Up	Lowest	824.2	26.70	□
		Middle	824.2	26.60	□
		Highest	824.2	26.50	□

Band	Test Mode	CH	Frequency (MHz)	Peak Conducted power (dBm)	Worst
PCS1900		Lowest	1850.2	29.10	■
		Middle	1880.0	28.90	□
		Highest	1909.8	28.70	□
PCS1900 GPRS	3Down2Up	Lowest	1850.2	28.40	□
		Highest	1909.8	28.20	□
		Highest	1909.8	28.10	□
	3Down1Up	Lowest	1850.2	28.40	□
		Middle	1880.0	28.20	□
		Highest	1909.8	28.10	□
PCS1900 EGPRS	3Down2Up	Lowest	1850.2	25.30	□
		Middle	1880.0	25.20	□
		Highest	1909.8	25.20	□
	3Down1Up	Lowest	1850.2	25.30	□
		Middle	1880.0	25.20	□
		Highest	1909.8	25.20	□

Band	Date Rate or Sub-test	CH	Frequency (MHz)	Peak Conducted power (dBm)	Worst
WCDMA V	---	Lowest	826.6	22.00	☐
		Middle	836.0	21.80	☐
		Highest	846.4	22.20	■
HSDPA V	**1**	Lowest	826.6	19.90	☐
		Middle	836.0	19.85	☐
		Highest	846.4	19.80	☐
	2	Lowest	826.6	19.85	☐
		Middle	836.0	19.80	☐
		Highest	846.4	19.78	☐
	3	Lowest	826.6	19.35	☐
		Middle	836.0	19.33	☐
		Highest	846.4	19.29	☐
	4	Lowest	826.6	19.45	☐
		Middle	836.0	19.42	☐
		Highest	846.4	19.31	☐
HSUPA V	1	Lowest	826.6	21.76	☐
		Middle	836.0	21.50	☐
		Highest	846.4	22.17	☐
	2	Lowest	826.6	19.79	☐
		Middle	836.0	19.55	☐
		Highest	846.4	20.18	☐
	3	Lowest	826.6	20.74	☐
		Middle	836.0	20.49	☐
		Highest	846.4	21.16	☐
	4	Lowest	826.6	19.75	☐
		Middle	836.0	19.48	☐
		Highest	846.4	20.19	☐
	5	Lowest	826.6	21.70	☐
		Middle	836.0	21.48	☐
		Highest	846.4	22.15	☐

Band	Date Rate or Sub-test	CH	Frequency (MHz)	Peak Conducted power (dBm)	Worst
WCDMA II	---	Lowest	1852.4	23.50	■
		Middle	1880.0	22.30	☐
		Highest	1907.6	22.10	☐
HSDPA II	1	Lowest	1852.4	22.90	☐
		Middle	1880.0	21.70	☐
		Highest	1907.6	21.62	☐
	2	Lowest	1852.4	22.88	☐
		Middle	1880.0	21.68	☐
		Highest	1907.6	21.61	☐
	3	Lowest	1852.4	22.45	☐
		Middle	1880.0	21.21	☐
		Highest	1907.6	21.19	☐
	4	Lowest	1852.4	22.46	☐
		Middle	1880.0	21.19	☐
		Highest	1907.6	21.14	☐
HSUPA II	1	Lowest	1852.4	22.70	☐
		Middle	1880.0	21.53	☐
		Highest	1907.6	21.30	☐
	2	Lowest	1852.4	20.72	☐
		Middle	1880.0	19.52	☐
		Highest	1907.6	19.33	☐
	3	Lowest	1852.4	21.70	☐
		Middle	1880.0	20.53	☐
		Highest	1907.6	20.30	☐
	4	Lowest	1852.4	20.71	☐
		Middle	1880.0	19.54	☐
		Highest	1907.6	19.28	☐
	5	Lowest	1852.4	22.60	☐
		Middle	1880.0	21.50	☐
		Highest	1907.6	21.32	☐

Band	Date Rate or Sub-test	CH	Frequency (MHz)	Peak Conducted power (dBm)	Worst
802.11b	1M	Lowest	2412	**18.40**	■
		Middle	2437	17.58	□
		Highest	2462	18.25	□
	11M	Lowest	2412	18.25	□
		Middle	2437	17.48	□
		Highest	2462	17.97	□
802.11g	6M	Lowest	2412	**17.52**	■
		Middle	2437	17.31	□
		Highest	2462	17.14	□
	54M	Lowest	2412	17.25	□
		Middle	2437	17.03	□
		Highest	2462	16.97	□

Max. RF Conducted Power:

1.660 W (32.00 dBm) GSM/GPRS/EGPRS 850

0.813 W (29.10 dBm) PCS/GPRS/EGPRS 1900

0.166 W (22.20 dBm) WCDMA/HSDPA/HSUPA Band V

0.238 W (23.00 dBm) WCDMA/HSDPA/HSUPA Band II

0.069 W (18.40 dBm) Wi-Fi 802.11b

0.056 W (17.52 dBm) Wi-Fi 802.11g

0.024 W (3.952 dBm) BT 2.0

0.015 W (1.810 dBm) BT EDR

BT and GSM and WLAN simultaneously SAR Description

BT Antenna and WLAN Antenna	4.5cm
BT Antenna and GSM/PCS/WCDMA(License) Antenna	2.6cm
WAN Antenna and GSM/PCS/WCDMA (License) Antenna	8.0cm

(1) Antenna Distance

1a. BT & GSM 2.6 CM >2.5cm

1b. BT & WLAN 4.5CM >2.5cm

(2) BT Power <Pref and antenna-to-antenna is >2.5 cm. ~ BT Stand alone SAR is not required.

(3) WLAN > 2*Pref and antenna-to-antenna < 5.0 cm. ~ WLAN Stand alone SAR is required.

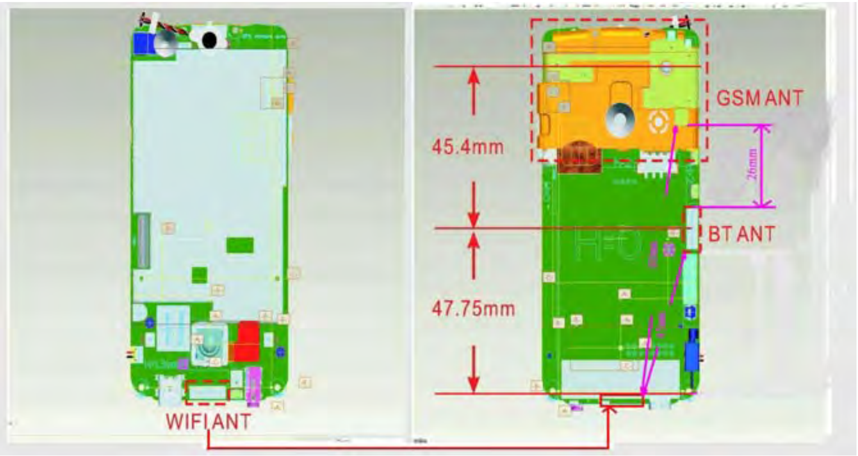
(4) Cell/PCS Stand alone SAR is required due to routine evaluation requirements.

(5) WLAN Stand alone SAR and License Device Stand alone SAR

1.470 (GPRS 850 Body) + 0.067 (Wi-Fi 802.11b) = 1.537mW <1.6mW

when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas 1.537/8=0.189 <0.3

The SAR to antenna separation ratio of simultaneous transmitting antenna pair is < 0.3



9.2 System Performance Check

9.2.1 Symmetric Dipoles for System Validation

Figure 12. Validation Kit

Construction Symmetrical dipole with l/4 balun enables measurement of feed point impedance with NWA matched for use near flat phantoms filled with head simulating solutions Includes distance holder and tripod adaptor Calibration Calibrated SAR value for specified position and input power at the flat phantom in head simulating solutions.

Frequency 450, 900, 1800, 1950, 2000, 2450, 5000MHz

Return Loss $>$ 20 dB at specified validation position

Power Capability $>$ 100 W (f $<$ 1GHz); $>$ 40 W (f $>$ 1GHz)

Options Dipoles for other frequencies or solutions and other calibration conditions are available upon request

Dimensions
D450V2：dipole length 270 mm; overall height 330 mm
D900V2：dipole length 149 mm; overall height 330 mm
D1800V2：dipole length 72 mm; overall height 300 mm
D1950V2：dipole length 62 mm; overall height 300 mm
D2000V2：dipole length 65 mm; overall height 300 mm
D2450V2：dipole length 51.5 mm; overall height 300 mm
D5GHzV2：dipole length 20.6 mm; overall height 450 mm

9.2.2 Validation

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ± 7%. The validation was performed at 900MHz, 1950MHz and 2450MHz.

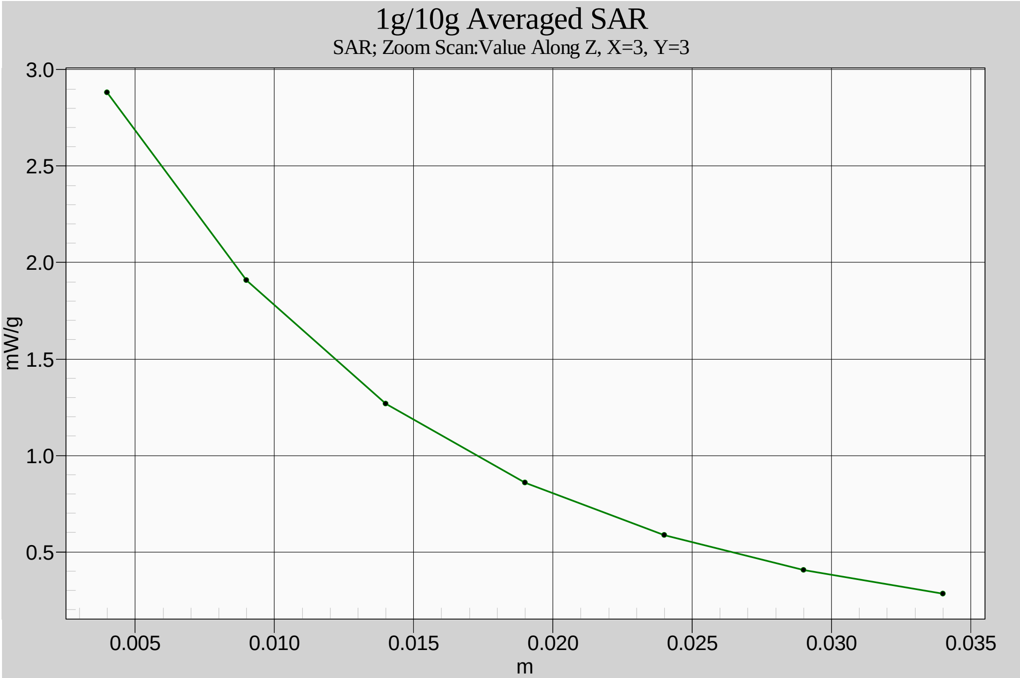
Validation kit	Mixture Type	SAR_{1g} [mW/g]	SAR_{10g} [mW/g]	Date of Calibration
D900V2-SN073	Head	10.76	6.92	Mar. 17, 2008
	Body	11.28	7.28	
D1950V2-SN1117	Head	40	20.96	Dec. 20, 2007
	Body	41.2	21.76	
D2450V2-SN712	Body	53.6	24.8	Jan. 30, 2008

Frequency (MHz)	Power (dBm)	SAR_{1g} (mW/g)	SAR_{10g} (mW/g)	Drift (dB)	Difference percentage		Date
					1g	10g	
900 (Head)	250mW	2.66	1.7	**0.016**	**-1.1 %**	**-1.7 %**	**Apr. 08, 2008**
	Normalize to 1 Watt	**10.64**	**6.8**				
900 (Head)	250mW	2.65	1.69	**0.014**	**-1.5 %**	**-2.3 %**	**Apr. 14, 2008**
	Normalize to 1 Watt	**10.6**	**6.76**				
900 (Body)	250mW	2.9	1.88	**0.018**	**2.8 %**	**3.3 %**	**Apr. 14, 2008**
	Normalize to 1 Watt	**11.6**	**7.52**				
900 (Body)	250mW	2.89	1.88	**-0.001**	**2.5 %**	**3.3 %**	**Apr. 16, 2008**
	Normalize to 1 Watt	**11.56**	**7.52**				
900 (Body)	250mW	2.83	1.84	**0.068**	**0.4 %**	**1.1 %**	**Jun. 28, 2008**
	Normalize to 1 Watt	**11.32**	**7.36**				
1950 (Head)	250mW	9.82	5.11	**-0.006**	**-1.8 %**	**-2.5 %**	**Apr. 11, 2008**
	Normalize to 1 Watt	**39.28**	**20.44**				
1950 (Body)	250mW	10.3	5.28	**-0.002**	**0.0 %**	**-2.9 %**	**Apr. 16, 2008**
	Normalize to 1 Watt	**41.2**	**21.12**				
1950 (Body)	250mW	10.3	5.29	**0.016**	**0.0 %**	**-2.8 %**	**Apr. 17, 2008**
	Normalize to 1 Watt	**41.2**	**21.16**				
1950 (Body)	250mW	10.4	5.45	**0.046**	**1.0 %**	**0.2 %**	**Jun. 28, 2008**
	Normalize to 1 Watt	**41.6**	**21.8**				
2450 (Body)	250mW	12.8	6.12	**-0.153**	**-4.5 %**	**-1.3 %**	**Apr. 17, 2008**
	Normalize to 1 Watt	**51.2**	**24.48**				

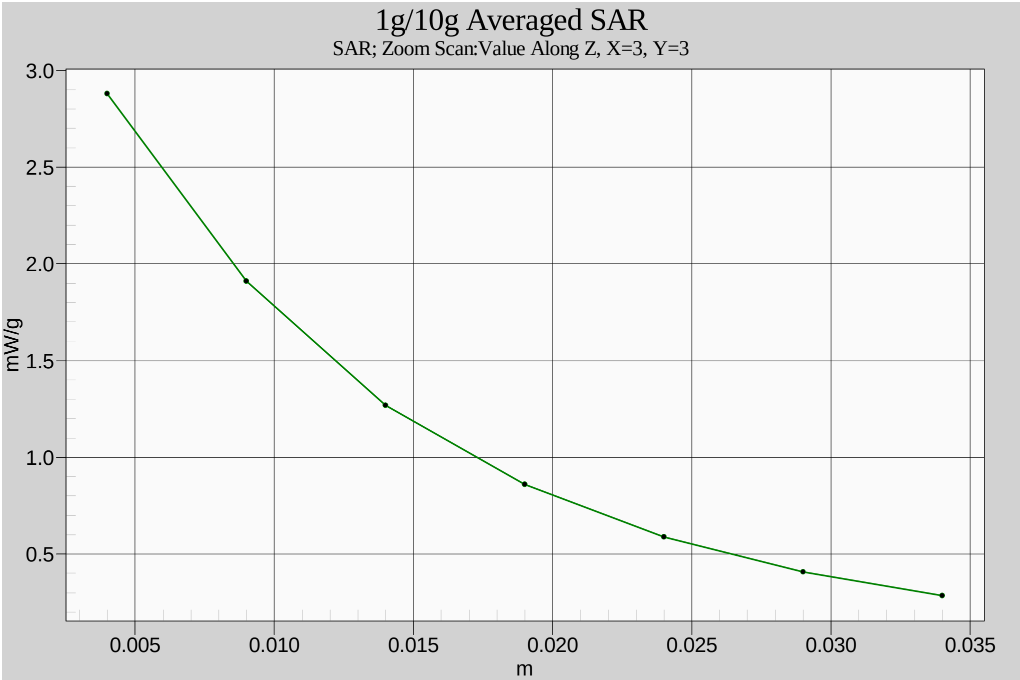
	Mixture Type	SAR_{1g} [mW/g]	SAR_{10g} [mW/g]	Date of Calibration
D900V2-SN1d053	Head	10.64	6.84	Dec. 12, 2007
	Body	11.56	7.48	
D1950V2-SN1117	Head	40	20.96	Dec. 20, 2007
	Body	41.2	21.76	
D2450V2-SN712	Body	53.6	24.8	Jan. 30, 2008

Frequency (MHz)	Power (dBm)	SAR_{1g} (mW/g)	SAR_{10g} (mW/g)	Drift (dB)	Difference percentage		Date
					1g	10g	
900 (Head)	250mW	2.6	1.68	**-0.01000**	**-2.3 %**	**-1.8 %**	**Nov. 13, 2008**
	Normalize to 1 Watt	**10.4**	**6.72**				
900 (Body)	250mW	2.84	1.86	**0.02500**	**-1.7 %**	**-0.5 %**	**Nov. 12, 2008**
	Normalize to 1 Watt	**11.36**	**7.44**				
1950 (Head)	250mW	10.1	5.16	**0.02000**	**1.0 %**	**-1.5 %**	**Nov. 13, 2008**
	Normalize to 1 Watt	**40.4**	**20.64**				
1950 (Body)	250mW	10.6	5.42	**0.04200**	**2.9 %**	**-0.4 %**	**Nov. 12, 2008**
	Normalize to 1 Watt	**42.4**	**21.68**				
2450 (Body)	250mW	13.6	6.28	**-0.02900**	**1.5 %**	**1.3 %**	**Nov. 23, 2008**
	Normalize to 1 Watt	**54.4**	**25.12**				

Z-axis Plot of System Performance Check

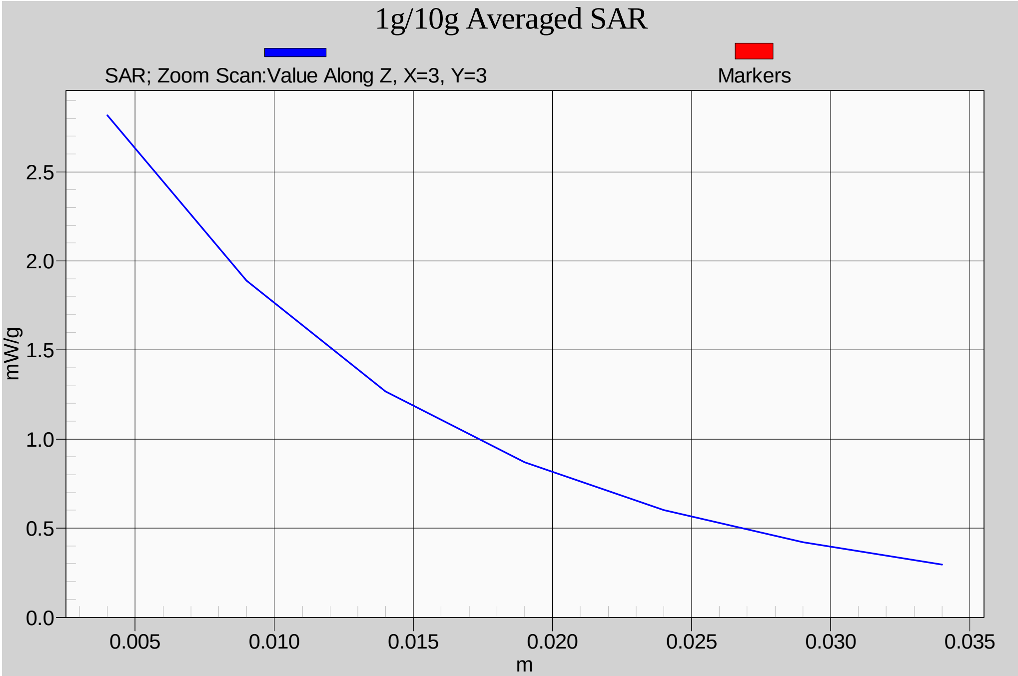


Head-Tissue-Simulating-Liquid 900MHz (2008.04.08)

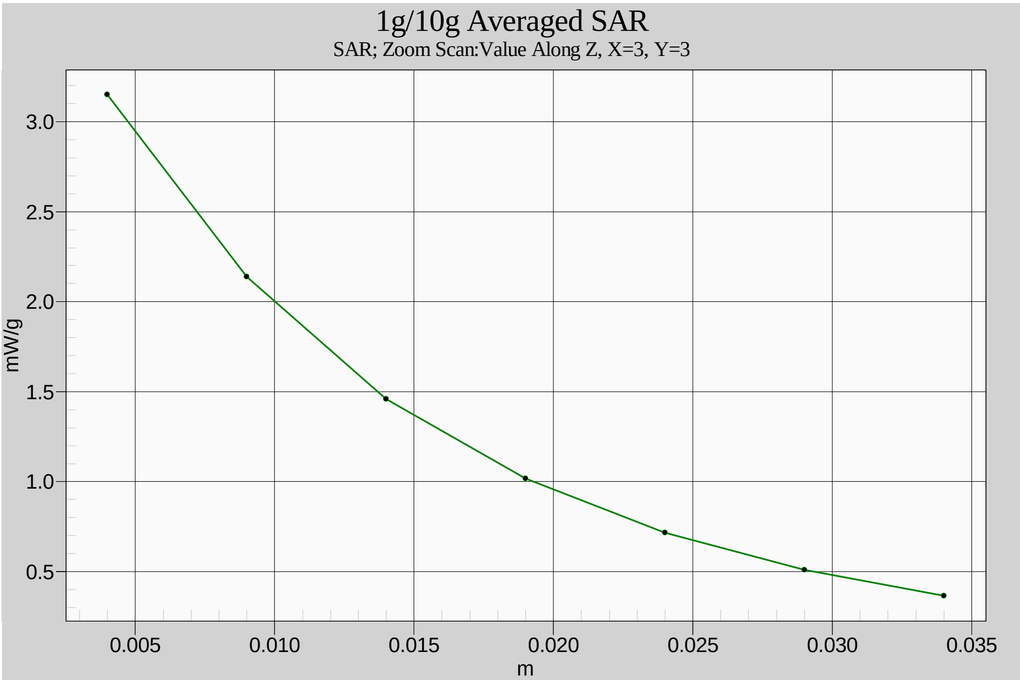


Head-Tissue-Simulating-Liquid 900MHz (2008.04.14)

Z-axis Plot of System Performance Check

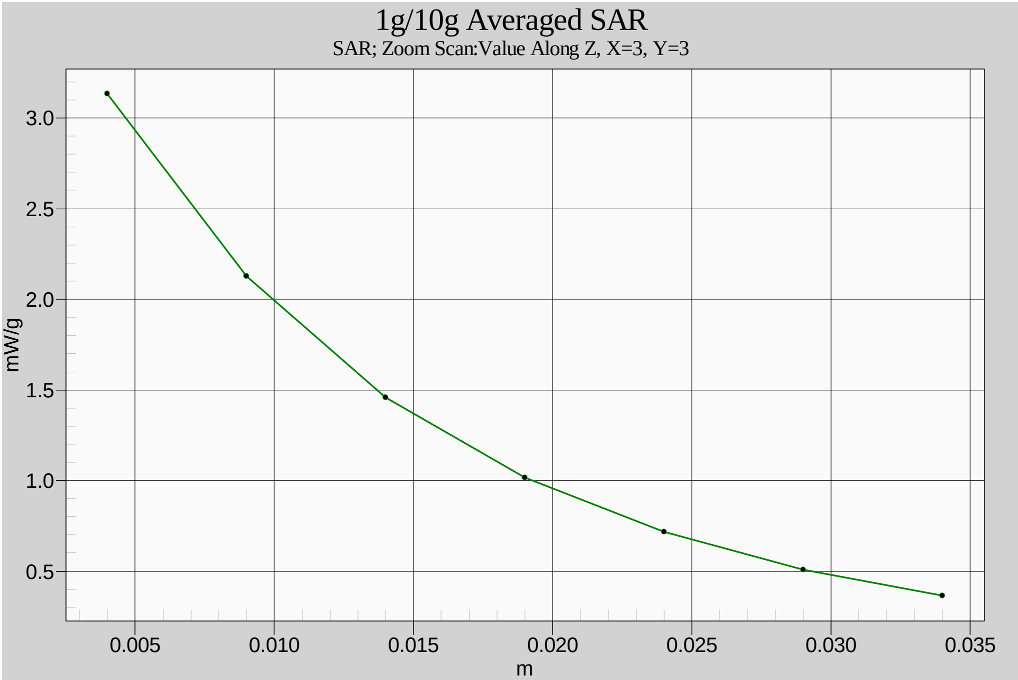


Head-Tissue-Simulating-Liquid 900MHz (2008.11.13)

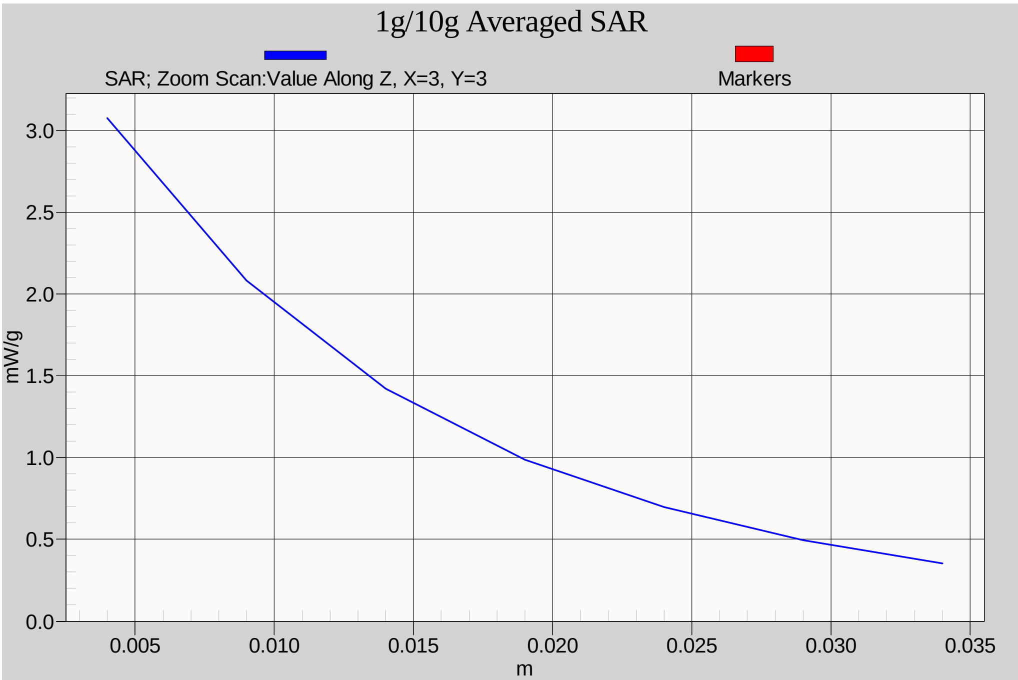


Body-Tissue-Simulating-Liquid 900MHz (2008.04.14)

Z-axis Plot of System Performance Check

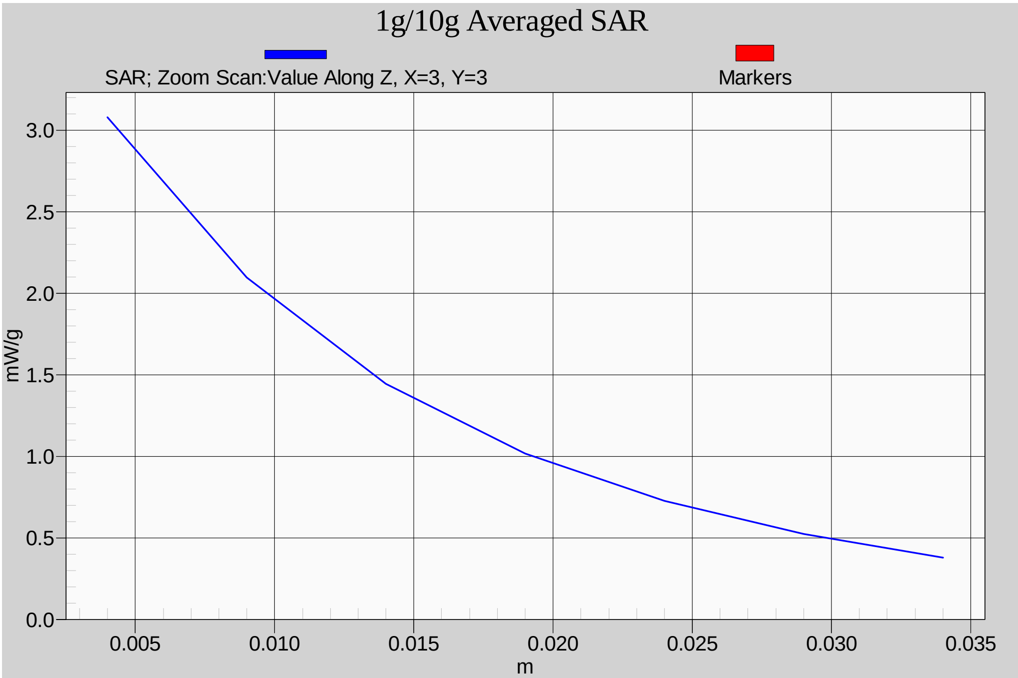


Body-Tissue-Simulating-Liquid 900MHz (2008.04.16)

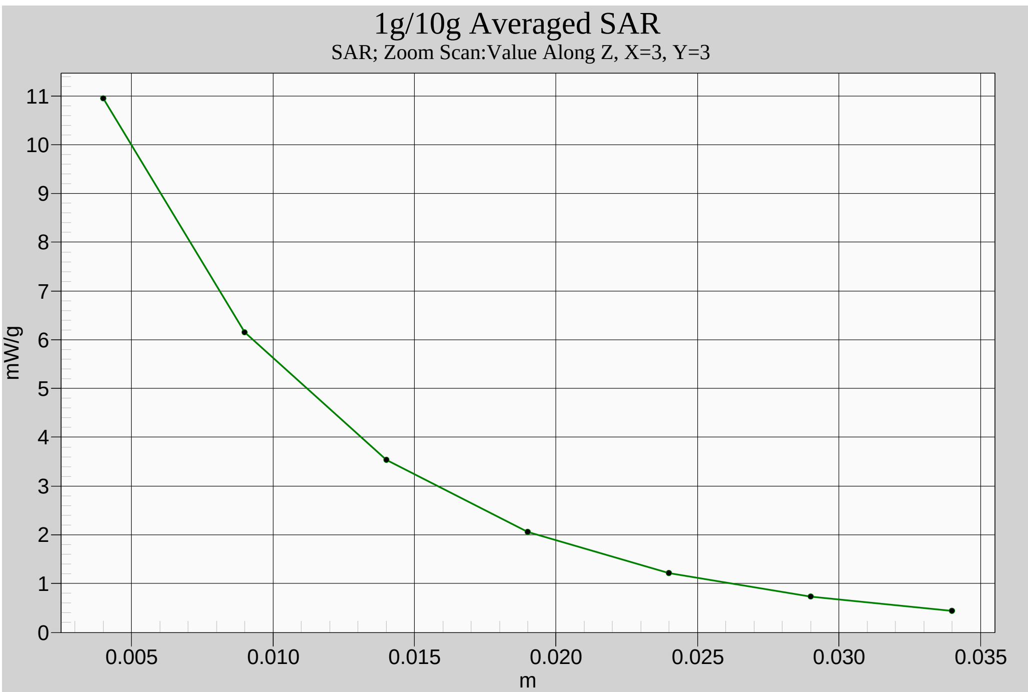


Body-Tissue-Simulating-Liquid 900MHz (2008.06.28)

Z-axis Plot of System Performance Check

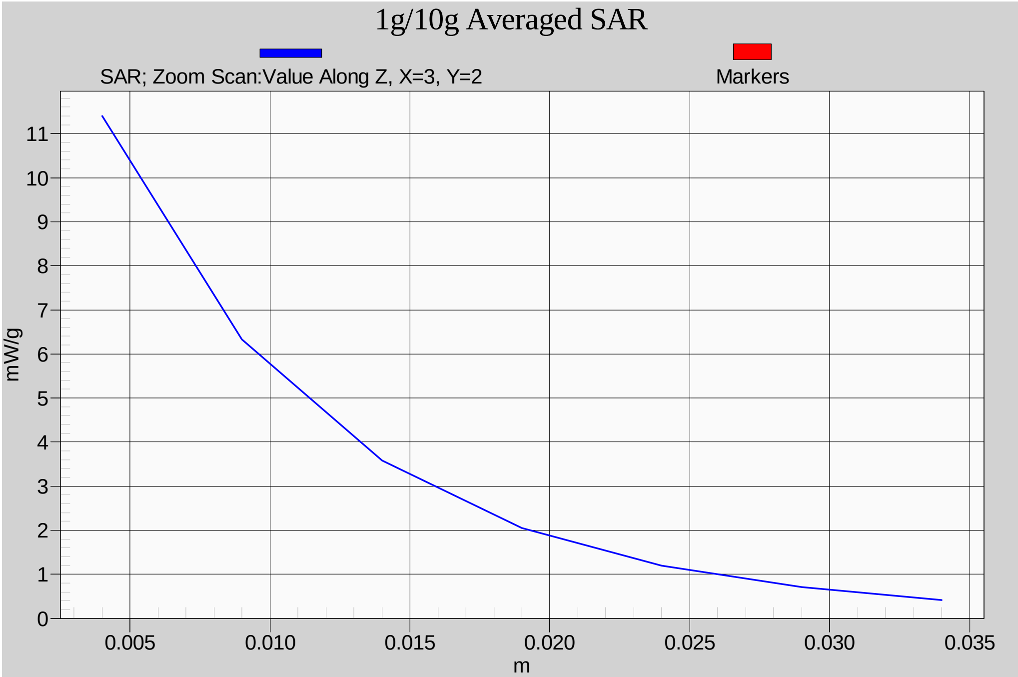


Body-Tissue-Simulating-Liquid 900MHz (2008.11.12)

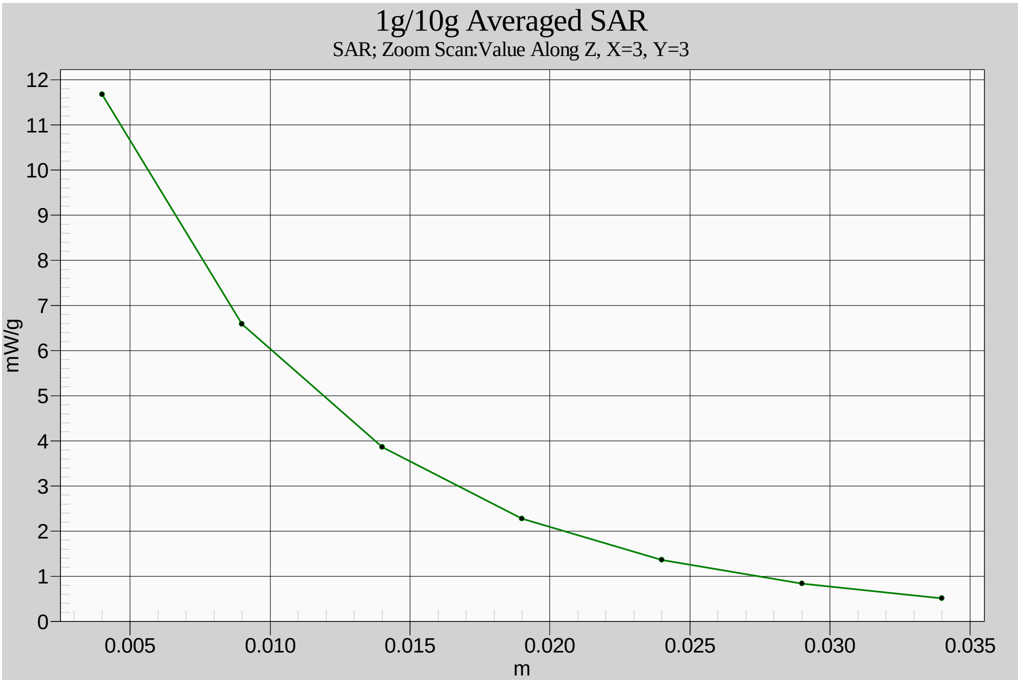


Head-Tissue-Simulating-Liquid 1950MHz (2008.04.11)

Z-axis Plot of System Performance Check

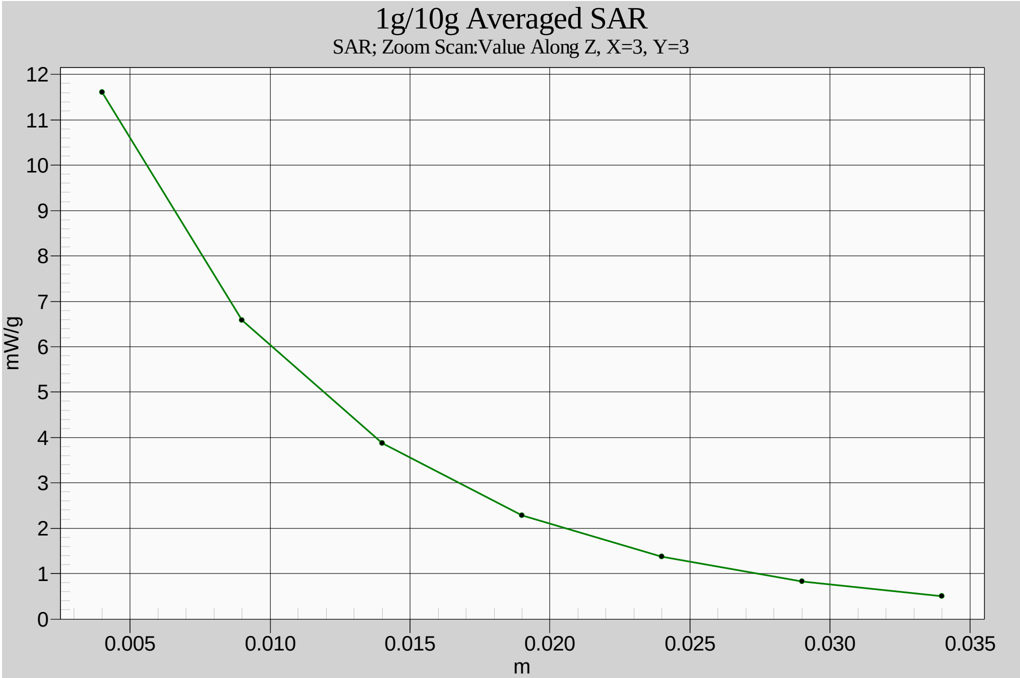


Head-Tissue-Simulating-Liquid 1950MHz (2008.11.13)

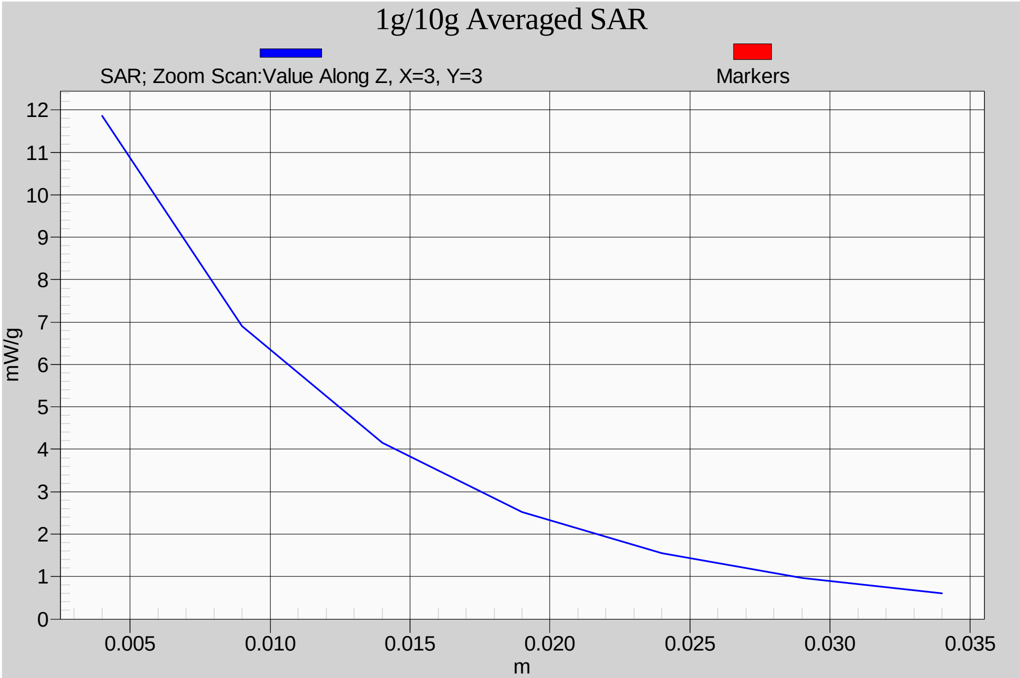


Body-Tissue-Simulating-Liquid 1950MHz (2008.04.16)

Z-axis Plot of System Performance Check

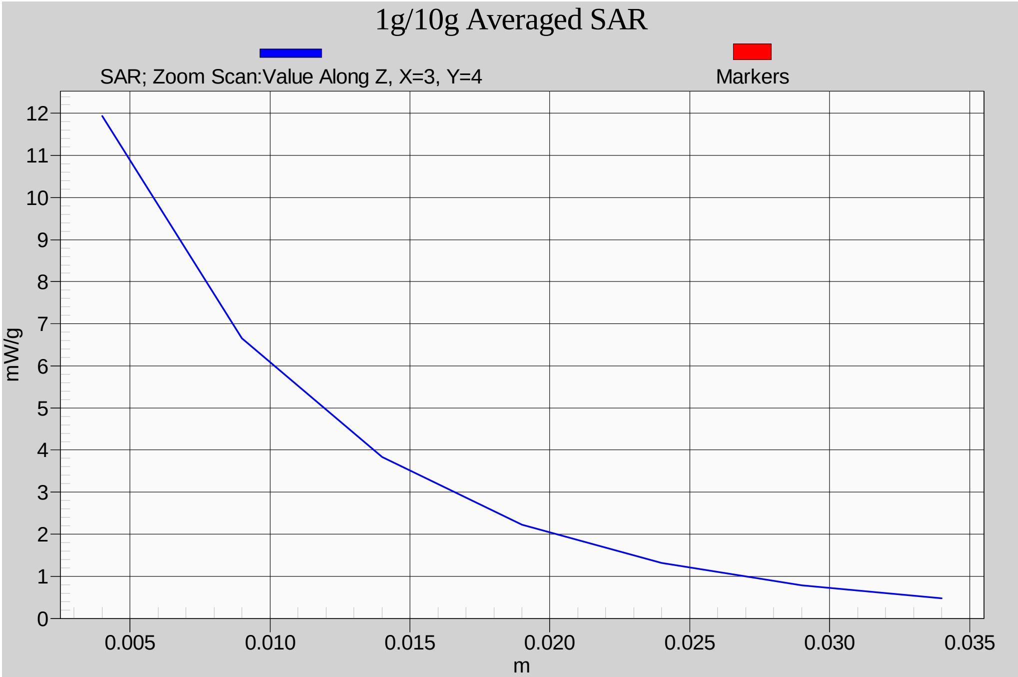


Body-Tissue-Simulating-Liquid 1950MHz (2008.04.17)

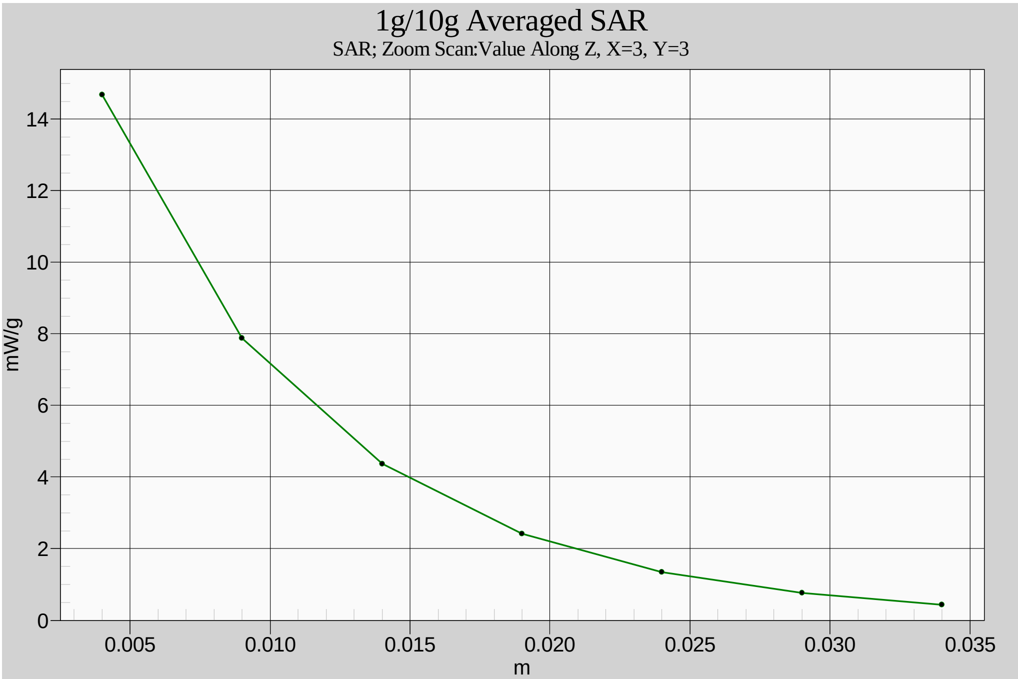


Body-Tissue-Simulating-Liquid 1950MHz (2008.06.28)

Z-axis Plot of System Performance Check

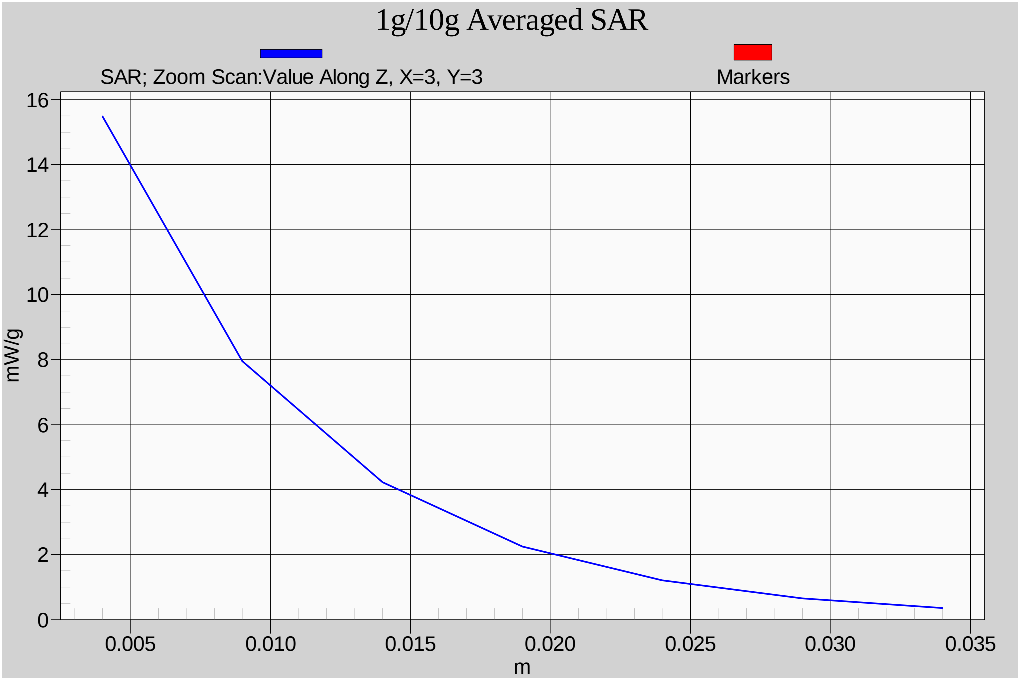


Body-Tissue-Simulating-Liquid 1950MHz (2008.11.12)



Body-Tissue-Simulating-Liquid 2450MHz (2008.04.17)

Z-axis Plot of System Performance Check



Body-Tissue-Simulating-Liquid 2450MHz (2008.11.23)

9.3 Dosimetric Assessment Setup

9.3.1 Body Test Position

Body - Worn Configuration

Body - Worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a handset output should be tested with a handset connected to the device.

Body - Worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 15 mm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances.
For this test：

☐ The EUT is placed into the holster/belt clip and the holster is positioned against the surface of the phantom in a normal operating position.

■ Since this EUT doesn’t supply any body-worn accessory to the end user, for **GSM850 band**, **PCS1900 band**, **WCDMA Band V** and **WCDMA Band II** the distance of **20 mm** was tested to confirm the necessary “minimum SAR separation distance”.
(∗Note：This distance includes the 2 mm phantom shell thickness.)

■ Since this EUT doesn’t supply any body-worn accessory to the end user, for **802.11b** and **802.11g** band the distance of **2 mm** was tested to confirm the necessary “minimum SAR separation distance”.
(∗Note：This distance includes the 2 mm phantom shell thickness.)

9.3.2 Measurement Procedures

The evaluation was performed with the following procedures：

Surface Check： A surface checks job gathers data used with optical surface detection. It determines the distance from the phantom surface where the reflection from the optical detector has its peak. Any following measurement jobs using optical surface detection will then rely on this value. The surface check performs its search a specified number of times, so that the repeatability can be verified. The probe tip distance is 1.3mm to phantom inner surface during scans.

Reference： The reference job measures the field at a specified reference position, at 4 mm from the selected section’s grid reference point.

Area Scan： The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines can find the maximum locations even in relatively coarse grids. When an area scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. Any following zoom scan within the same procedure will then perform fine scans around these maxima. The area covered the entire dimension of the EUT and the horizontal grid spacing was 15 mm × 15 mm.

Zoom Scan： Zoom scans are used to assess the highest averaged SAR for cubic averaging volumes with 1 g and 10 g of simulated tissue. The zoom scan measures 5 x 5 x 7 points in a 32 x 32 x 30 mm cube whose base faces are centered around the maxima returned from a preceding area scan within the same procedure.

Drift： The drift job measures the field at the same location as the most recent reference job within the same procedure, with the same settings. The drift measurement gives the field difference in dB from the last reference measurement. Several drift measurements are possible for each reference measurement. This allows monitoring of the power drift of the device in the batch process. If the value changed by more than 5%, the evaluation was repeated.

9.4 Spatial Peak SAR Evaluation

The DASY5 software includes all numerical procedures necessary to evaluate the spatial peak SAR values. Based on the Draft: SCC-34, SC-2, WG-2 - Computational Dosimetry, IEEE P1529/D0.0 (Draft Recommended Practice for Determining the Spatial-Peak Specific Absorption Rate (SAR) Associated with the Use of Wireless Handsets - Computational 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 in a volume of $(32\times32\times30)mm^3$ ($5\times5\times7$ points). 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. If the 10g cube or both cubes are not entirely inside the measured volumes, the system issues a warning regarding the evaluated spatial peak values within the Postprocessing engine (SEMCAD). This means that if the measured volume is shifted, higher values might be possible. To get the correct values you can use a finer measurement grid for the area scan. In complicated field distributions, a large grid spacing for the area scan might miss some details and give an incorrectly interpolated peak location.
The entire evaluation of the spatial peak values is performed within the Postprocessing 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 three stages:

Interpolation and Extrapolation

The probe is calibrated at the center of the dipole sensors which is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated.

In DASY5, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and SAR extrapolation routines. The interpolation, Maxima Search and extrapolation routines are all based on the modified Quadratic Shepard's method [7].

10. Measurement Uncertainty

Measurement uncertainties in SAR measurements are difficult to quantify due to several variables including biological, physiological, and environmental. However, we estimate the measurement uncertainties in SAR to be less than ±21.9 %〔8〕.

According to Std. C95.3〔9〕, the overall uncertainties are difficult to assess and will vary with the type of meter and usage situation. However, accuracy's of ±1 to 3 dB can be expected in practice, with greater uncertainties in near-field situations and at higher frequencies (shorter wavelengths), or areas where large reflecting objects are present. Under optimum measurement conditions, SAR measurement uncertainties of at least ±2dB can be expected.

According to CENELEC〔10〕, typical worst-case uncertainty of field measurements is ±5 dB. For well-defined modulation characteristics the uncertainty can be reduced to ±3 dB.

Error Description	Uncertainty value	Prob. Dist.	Div.	(*ci*) 1g	(*ci*) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(*vi*) *veff*
Measurement System								
Probe Calibration	± 5.9 %	N	1	1	1	± 5.9 %	± 5.9 %	
Axial Isotropy	± 4.7 %	R		0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical Isotropy	± 9.6 %	R	$\sqrt{3}$	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary Effects	± 1.0 %	R	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Linearity	± 4.7 %	R	$\sqrt{3}$	1	1	± 2.7 %	± 2.7 %	∞
System Detection Limits	± 1.0 %	R	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Readout Electronics	± 0.3 %	N	1	1	1	± 0.3 %	± 0.3 %	∞
Response Time	± 0.8 %	R	$\sqrt{3}$	1	1	± 0.5 %	± 0.5 %	∞
Integration Time	± 2.6 %	R	$\sqrt{3}$	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient Noise	± 3.0 %	R	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient Reflections	± 3.0 %	R	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	± 0.4 %	R	$\sqrt{3}$	1	1	± 0.2 %	± 0.2 %	∞
Probe Positioning	± 2.9 %	R	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
Max. SAR Eval.	± 1.0 %	R	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Test Sample Related								
Device Positioning	± 2.9 %	N	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	± 3.6 %	N	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	± 5.0 %	R	$\sqrt{3}$	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Setup								
Phantom Uncertainty	± 4.0 %	R	$\sqrt{3}$	1	1	± 2.3 %	2.3 %	∞
Liquid Conductivity (target)	± 5.0 %	R	$\sqrt{3}$	0.64	0.43	± 1.8 %	1.2 %	∞
Liquid Conductivity (meas.)	± 2.5 %	N	1	0.64	0.43	± 1.6 %	1.1 %	∞
Liquid Permittivity (target)	± 5.0 %	R	$\sqrt{3}$	0.6	0.49	± 1.7 %	1.4 %	∞
Liquid Permittivity (meas.)	± 2.5 %	N	1	0.6	0.49	± 1.5 %	1.2 %	∞
Combined Std. Uncertainty					**± 10.9 %**	**± 10.7 %**	387	
Expanded STD Uncertainty					**± 21.9 %**	**± 21.4 %**		

Table 6. Uncertainty Budget of DASY

11. SAR Test Results Summary

11.1 Head SAR

11.1.1 GSM 850 - Head SAR

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **HSL900** Liquid Temperature (℃)： **22.0**

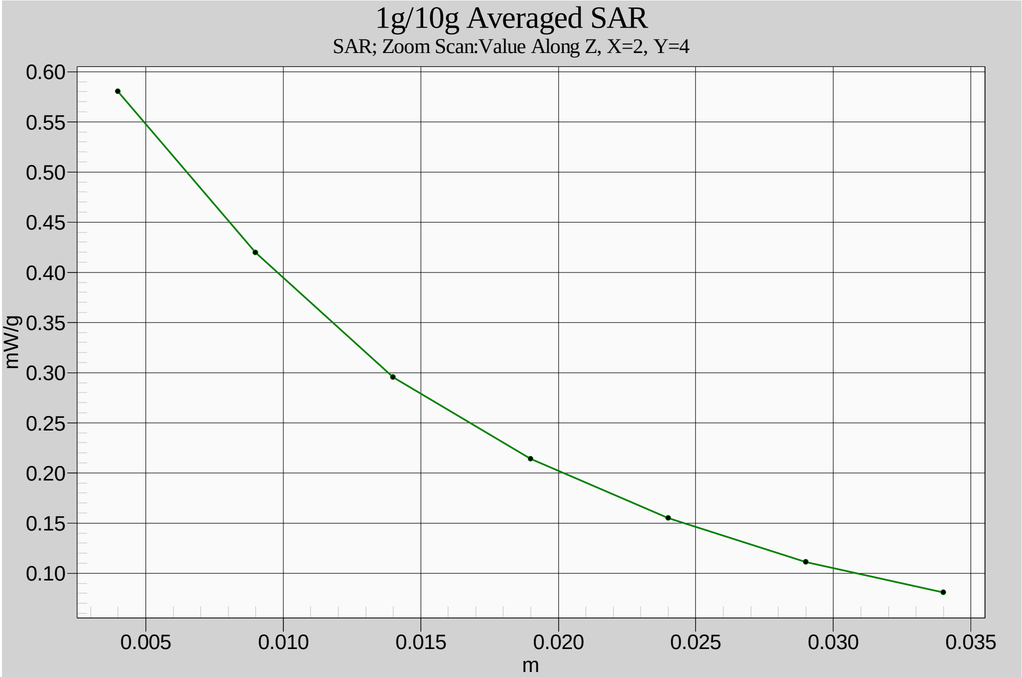
Depth of liquid (cm)： **15**

Measurement：

Crest Factor： **8.3** Probe S/N： **3150**

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
824.2	128	GSM 850	32.20	Right-cheek	Internal	N/A	0.473	-0.016	velocity 103
836.6	190	GSM 850	32.15	Right-cheek	Internal	N/A	0.545	0.004	velocity 103
836.6	190	GSM 850	32.00	Right-cheek	Internal	N/A	0.413	-0.023	Pharos Traveler 117
848.8	251	GSM 850	31.76	Right-cheek	Internal	N/A	0.437	0.026	velocity 103
824.2	128	GSM 850	32.20	Right-Tilted	Internal	N/A	0.357	0.020	velocity 103
836.6	190	GSM 850	32.15	Right-Tilted	Internal	N/A	0.415	0.043	velocity 103
848.8	251	GSM 850	31.76	Right-Tilted	Internal	N/A	0.337	0.025	velocity 103
824.2	128	GSM 850	32.20	Left-cheek	Internal	N/A	0.487	-0.029	velocity 103
836.6	190	GSM 850	32.15	Left-cheek	Internal	N/A	0.511	0.162	velocity 103
848.8	251	GSM 850	31.76	Left-cheek	Internal	N/A	0.389	-0.009	velocity 103
824.2	128	GSM 850	32.20	Left-Tilted	Internal	N/A	0.366	0.037	velocity 103
836.6	190	GSM 850	32.15	Left-Tilted	Internal	N/A	0.380	0.099	velocity 103
848.8	251	GSM 850	31.76	Left-Tilted	Internal	N/A	0.277	0.080	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Z-axis Plot of SAR Measurement



Z-axis Plot of Right-Cheek GSM850 CH190 _ velocity 103

11.1.2 PCS 1900 - Head SAR

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	HSL1950	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

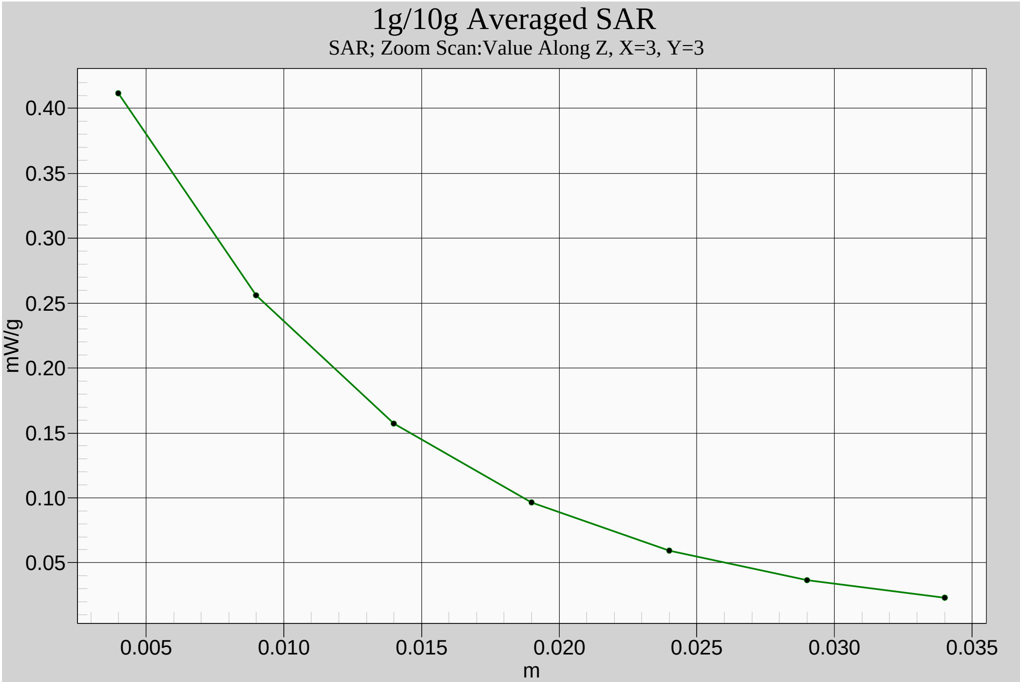
Measurement：

Crest Factor：	8.3	Probe S/N：	3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
1850.2	512	PCS	28.60	Right-cheek	Internal	N/A	0.351	0.028	velocity 103
1880.0	661	PCS	28.48	Right-cheek	Internal	N/A	0.346	0.001	velocity 103
1909.8	810	PCS	28.39	Right-cheek	Internal	N/A	0.269	0.091	velocity 103
1850.2	512	PCS	28.60	Right-Tilted	Internal	N/A	0.370	0.015	velocity 103
1850.2	512	PCS	29.10	Right-Tilted	Internal	N/A	0.491	-0.064	Pharos Traveler 117
1880.0	661	PCS	28.48	Right-Tilted	Internal	N/A	0.338	0.032	velocity 103
1909.8	810	PCS	28.39	Right-Tilted	Internal	N/A	0.248	-0.113	velocity 103
1850.2	512	PCS	28.60	Left-cheek	Internal	N/A	0.215	-0.138	velocity 103
1880.0	661	PCS	28.48	Left-cheek	Internal	N/A	0.214	0.004	velocity 103
1909.8	810	PCS	28.39	Left-cheek	Internal	N/A	0.177	0.024	velocity 103
1850.2	512	PCS	28.60	Left-Tilted	Internal	N/A	0.341	-0.141	velocity 103
1880.0	661	PCS	28.48	Left-Tilted	Internal	N/A	0.317	-0.116	velocity 103
1909.8	810	PCS	28.39	Left-Tilted	Internal	N/A	0.236	-0.182	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Right-Tilted PCS1900 CH512 _ Pharos Traveler 117

11.1.3 WCDMA Band V - Head SAR

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	HSL900	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

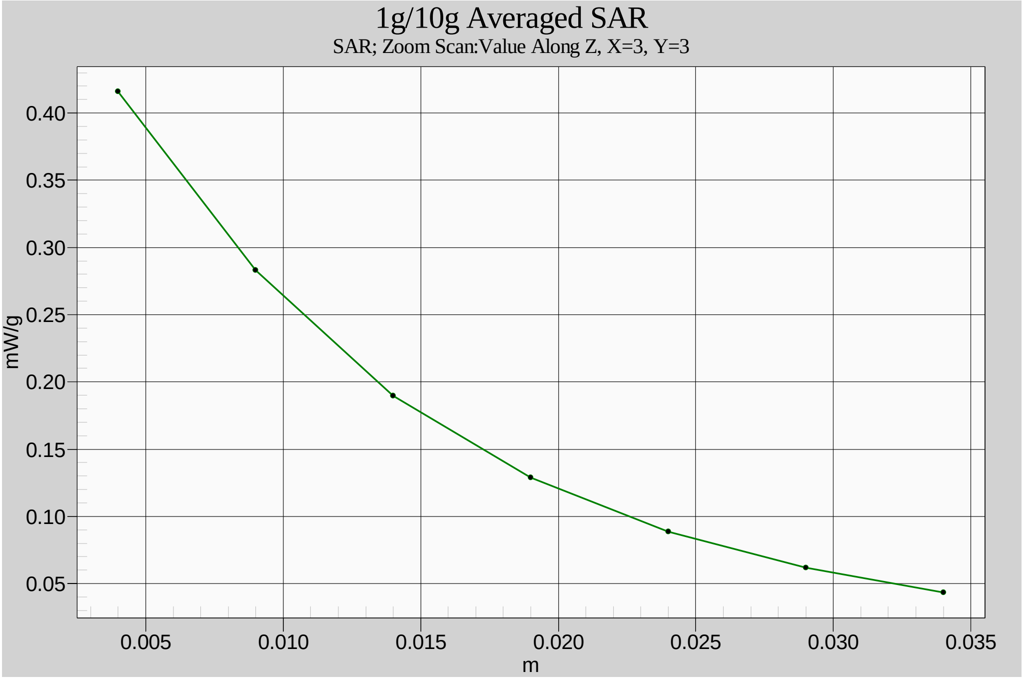
Measurement：

Crest Factor：	1	Probe S/N：	3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
826.6	4133	WCDMA V	22.05	Right-cheek	Internal	N/A	0.276	0.008	velocity 103
836.0	4180	WCDMA V	21.80	Right-cheek	Internal	N/A	0.169	0.168	velocity 103
846.6	4232	WCDMA V	21.45	Right-cheek	Internal	N/A	0.385	0.002	velocity 103
846.6	4232	WCDMA V	22.20	Right-cheek	Internal	N/A	0.239	-0.00131	Pharos Traveler 117
826.6	4133	WCDMA V	22.05	Right-Tilted	Internal	N/A	0.233	0.099	velocity 103
836.0	4180	WCDMA V	21.80	Right-Tilted	Internal	N/A	0.131	0.110	velocity 103
846.6	4232	WCDMA V	21.45	Right-Tilted	Internal	N/A	0.307	0.094	velocity 103
826.6	4133	WCDMA V	22.05	Left-cheek	Internal	N/A	0.264	0.082	velocity 103
836.0	4180	WCDMA V	21.80	Left-cheek	Internal	N/A	0.161	0.143	velocity 103
846.6	4232	WCDMA V	21.45	Left-cheek	Internal	N/A	0.379	0.035	velocity 103
826.6	4133	WCDMA V	22.05	Left-Tilted	Internal	N/A	0.210	0.167	velocity 103
836.0	4180	WCDMA V	21.80	Left-Tilted	Internal	N/A	0.127	0.192	velocity 103
846.6	4232	WCDMA V	21.45	Left-Tilted	Internal	N/A	0.277	0.135	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Right-Cheek WCDMA Band V CH4232 _ velocity 103

11.1.4 WCDMA Band II - Head SAR

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	HSL1950	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

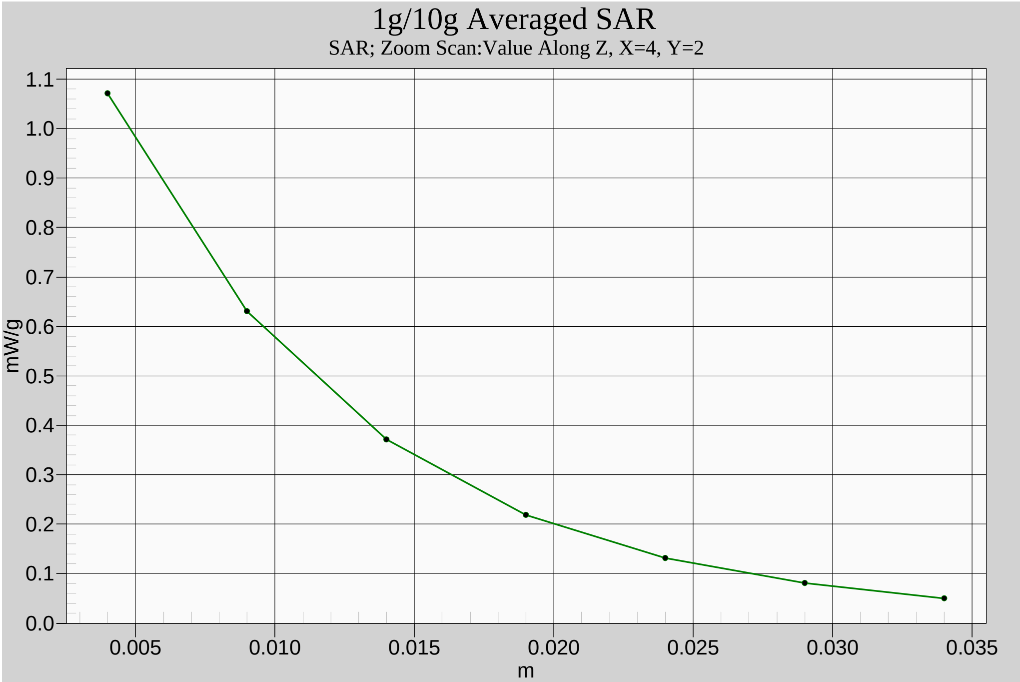
Measurement：

Crest Factor：	1	Probe S/N：	3150

Frequency MHz	Frequency CH	Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
1852.6	9263	WCDMA II	23.77	Right-cheek	Internal	N/A	0.984	0.196	velocity 103
1852.6	9263	WCDMA II	23.50	Right-cheek	Internal	N/A	0.733	0.173	Pharos Traveler 117
1880.0	9400	WCDMA II	22.85	Right-cheek	Internal	N/A	0.810	0.133	velocity 103
1907.4	9537	WCDMA II	22.45	Right-cheek	Internal	N/A	0.653	0.114	velocity 103
1852.6	9263	WCDMA II	23.77	Right-Tilted	Internal	N/A	0.937	-0.005	velocity 103
1880.0	9400	WCDMA II	22.85	Right-Tilted	Internal	N/A	0.720	0.001	velocity 103
1907.4	9537	WCDMA II	22.45	Right-Tilted	Internal	N/A	0.567	0.036	velocity 103
1852.6	9263	WCDMA II	23.77	Left-cheek	Internal	N/A	0.601	0.014	velocity 103
1880.0	9400	WCDMA II	22.85	Left-cheek	Internal	N/A	0.485	0.026	velocity 103
1907.4	9537	WCDMA II	22.45	Left-cheek	Internal	N/A	0.410	0.034	velocity 103
1852.6	9263	WCDMA II	23.77	Left-Tilted	Internal	N/A	0.872	0.066	velocity 103
1880.0	9400	WCDMA II	22.85	Left-Tilted	Internal	N/A	0.667	0.099	velocity 103
1907.4	9537	WCDMA II	22.45	Left-Tilted	Internal	N/A	0.531	-0.001	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Right-Cheek WCDMA Band II CH9263 _ velocity 103

11.2 Body SAR

11.2.1 GSM 850 - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 3** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL900** Liquid Temperature (℃) ： **22.0**

Depth of liquid (cm)： **15**

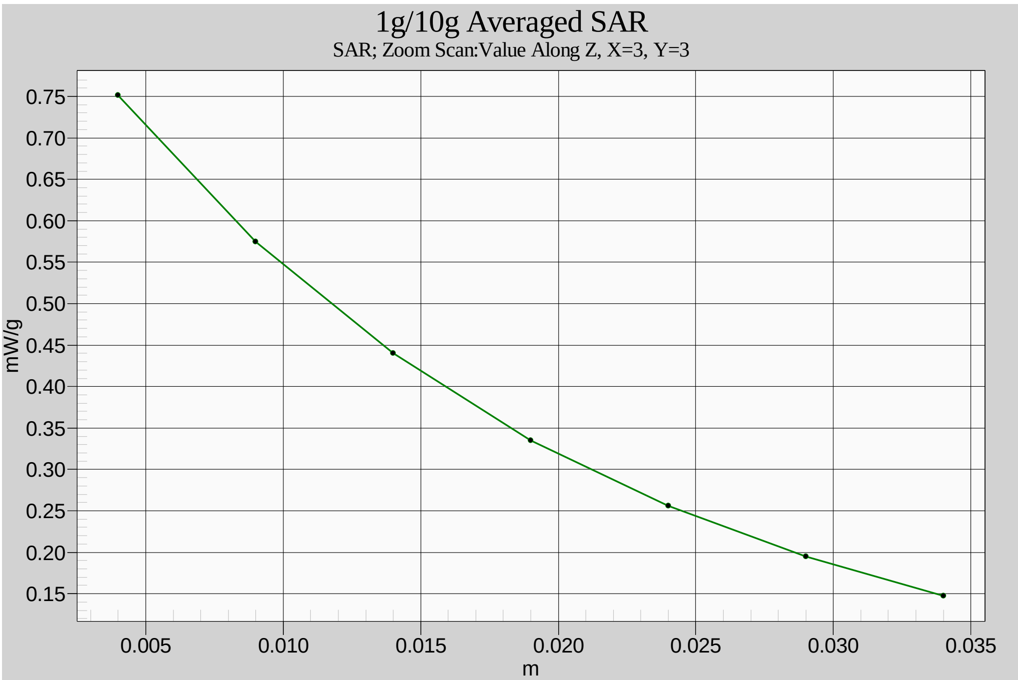
Measurement：

Crest Factor： **8.3** Probe S/N： **3150**

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
824.2	128	GSM 850	32.20	Flat	Internal	N/A	0.714	0.001	velocity 103
824.2	128	GSM 850	32.00	Flat	Internal	N/A	0.656	-0.075	Pharos Traveler 117
836.6	190	GSM 850	32.15	Flat	Internal	N/A	0.599	0.002	velocity 103
848.8	251	GSM 850	31.76	Flat	Internal	N/A	0.510	-0.031	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat GSM850 CH128 _ velocity 103

11.2.2 GPRS 850 - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 3** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL900** Liquid Temperature (℃)： **22.0**

Depth of liquid (cm)： **15**

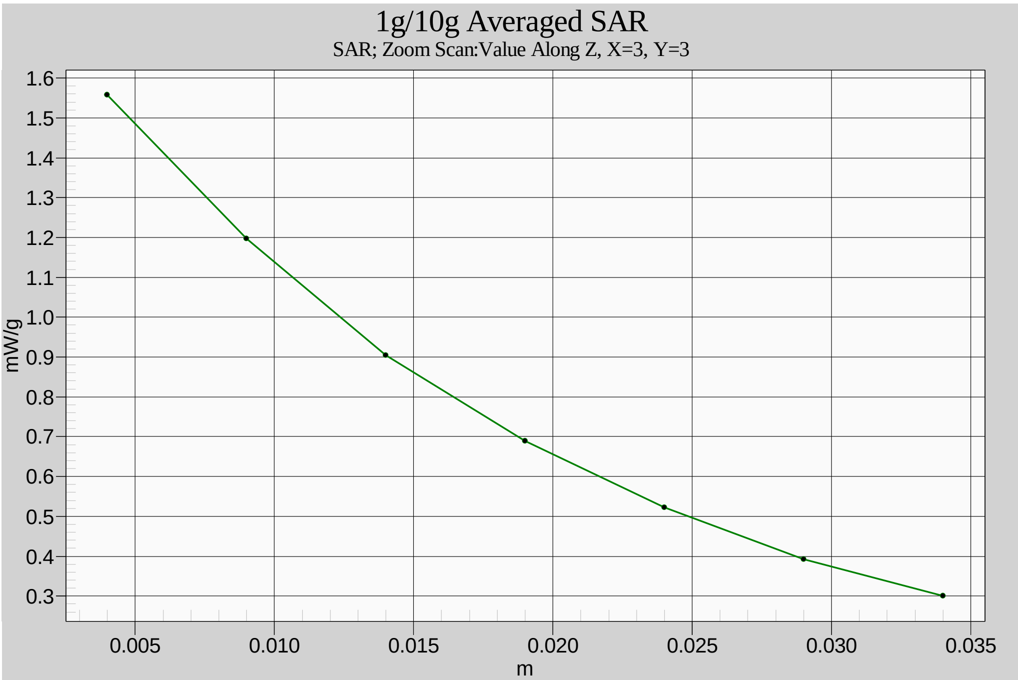
Measurement：

Crest Factor： **4.2** Probe S/N： **3150**

Frequency MHz	Frequency CH	Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
824.2	128	GPRS 850	31.18	Flat	Internal	N/A	1.470	0.144	3Down2Up_ 103
824.2	128	GPRS 850	31.80	Flat	Internal	N/A	1.340	-0.020	3Down2Up_ 117
824.2	128	GPRS 850	31.15	Flat	Internal	N/A	0.714	0.017	3Down1Up_ 103
836.6	190	GPRS 850	31.58	Flat	Internal	N/A	1.190	-0.107	3Down2Up_ 103
848.8	251	GPRS 850	31.00	Flat	Internal	N/A	0.987	0.004	3Down2Up_ 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat GPRS 850 CH128 (3Down2Up) _velocity 103

11.2.3 EGPRS 850 - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL900** Liquid Temperature (℃)： **22.0**

Depth of liquid (cm)： **15**

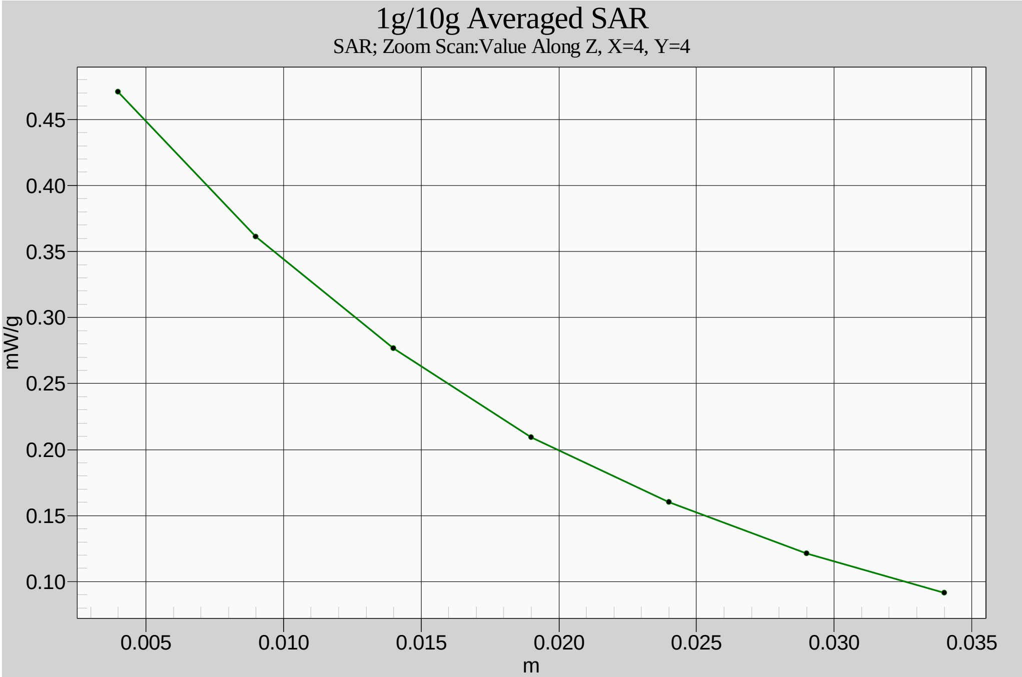
Measurement：

Crest Factor： **4.2** Probe S/N： **3150**

Frequency MHz	Frequency CH	Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
824.2	128	EGPRS 850	26.00	Flat	Internal	N/A	0.443	0.083	3Down2Up_ 103
824.2	128	EGPRS 850	26.70	Flat	Internal	N/A	0.371	-0.037	3Down2Up_ 117
824.2	128	EGPRS 850	25.97	Flat	Internal	N/A	0.223	0.076	3Down1Up_ 103
836.6	190	EGPRS 850	26.08	Flat	Internal	N/A	0.387	0.031	3Down2Up_ 103
848.8	251	EGPRS 850	26.00	Flat	Internal	N/A	0.341	0.016	3Down2Up_ 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat EGPRS 850 CH190 (3Down2Up) _velocity 103

11.2.4 PCS 1900 - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL1950** Liquid Temperature (℃)： **22.0**

Depth of liquid (cm)： **15**

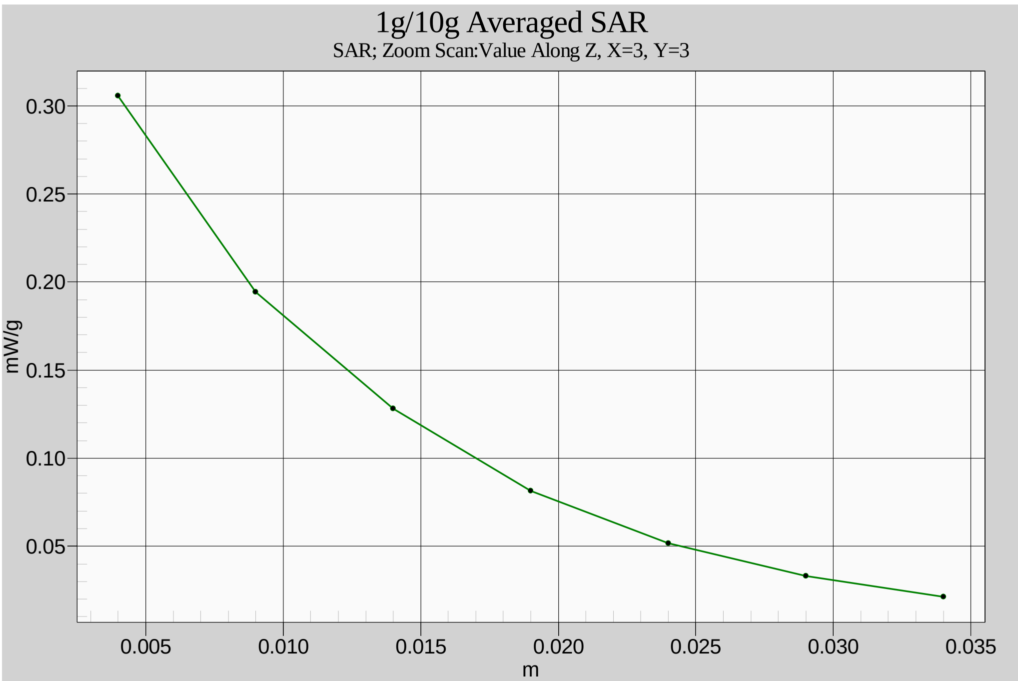
Measurement：

Crest Factor： **8.3** Probe S/N： **3150**

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
1850.2	512	PCS 1900	28.60	Flat	Internal	N/A	0.281	-0.028	velocity 103
1850.2	512	PCS 1900	29.10	Flat	Internal	N/A	0.256	0.086	Pharos Traveler 117
1880.0	661	PCS 1900	28.48	Flat	Internal	N/A	0.223	0.018	velocity 103
1909.8	810	PCS 1900	28.39	Flat	Internal	N/A	0.174	-0.047	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat PCS CH512 _velocity 103

11.2.5 GPRS 1900 - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL1950** Liquid Temperature (℃)： **22.0**

Depth of liquid (cm)： **15**

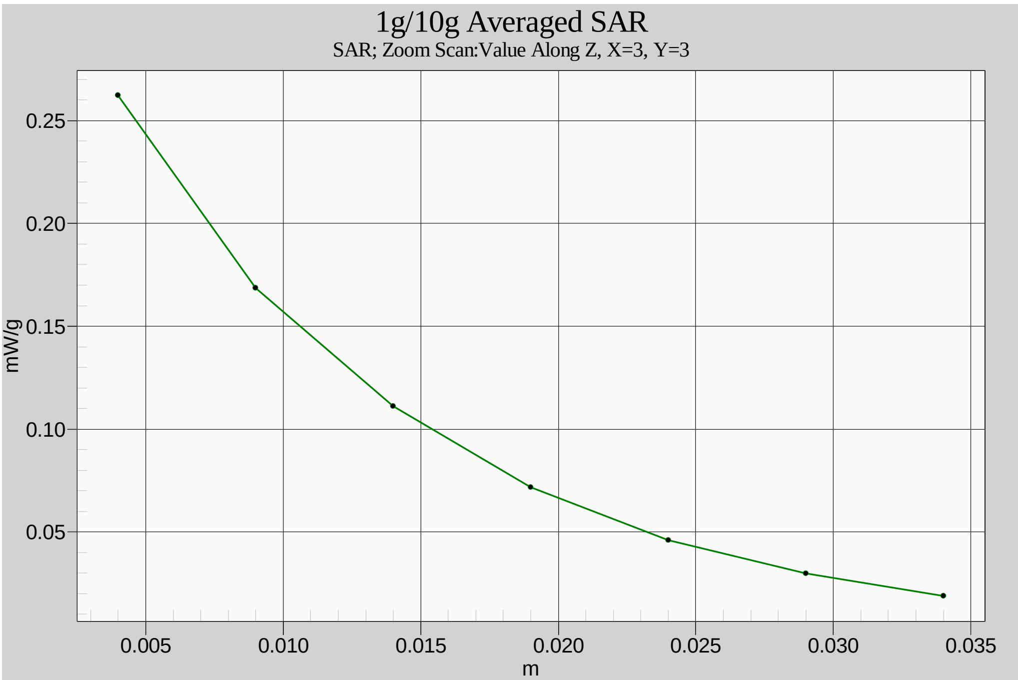
Measurement：

Crest Factor： **4.2** Probe S/N： **3150**

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
1850.2	512	GPRS 1900	28.38	Flat	Internal	N/A	0.244	-0.049	3Down2Up_ 103
1850.2	512	GPRS 1900	28.40	Flat	Internal	N/A	0.461	-0.103	3Down2Up_ 117
1850.2	512	GPRS 1900	28.35	Flat	Internal	N/A	0.125	0.001	3Down1Up_ 103
1880.0	661	GPRS 1900	28.07	Flat	Internal	N/A	0.205	0.032	3Down2Up_ 103
1909.8	810	GPRS 1900	28.19	Flat	Internal	N/A	0.159	0.000	3Down2Up_ 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat GPRS 1900 CH512 (3Down2Up) _ Pharos Traveler 117

11.2.6 EGPRS 1900 - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 3** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL1950** Liquid Temperature (℃) ： **22.0**

Depth of liquid (cm)： **15**

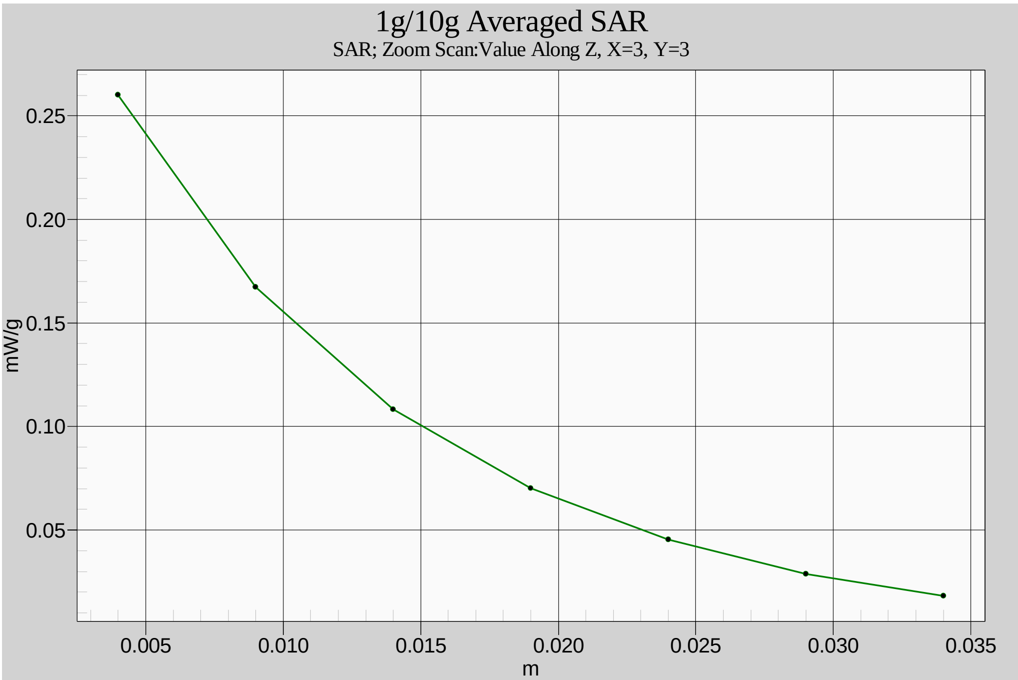
Measurement：

Crest Factor： **4.2** Probe S/N： **3150**

Frequency MHz	CH	Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
1850.2	512	EGPRS 1900	25.50	Flat	Internal	N/A	0.244	-0.007	3Down2Up_ 103
1850.2	512	EGPRS 1900	25.30	Flat	Internal	N/A	0.260	-0.170	3Down2Up_ 117
1850.2	512	EGPRS 1900	25.44	Flat	Internal	N/A	0.123	0.062	3Down1Up_ 103
1880.0	661	EGPRS 1900	25.50	Flat	Internal	N/A	0.203	0.019	3Down2Up_ 103
1909.8	810	EGPRS 1900	25.60	Flat	Internal	N/A	0.157	-0.021	3Down2Up_ 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat EGPRS 1900 CH512 (3Down2Up) _ Pharos Traveler 117

11.2.7 WCDMA Band V - Body SAR (20 mm separation)

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	MSL900	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

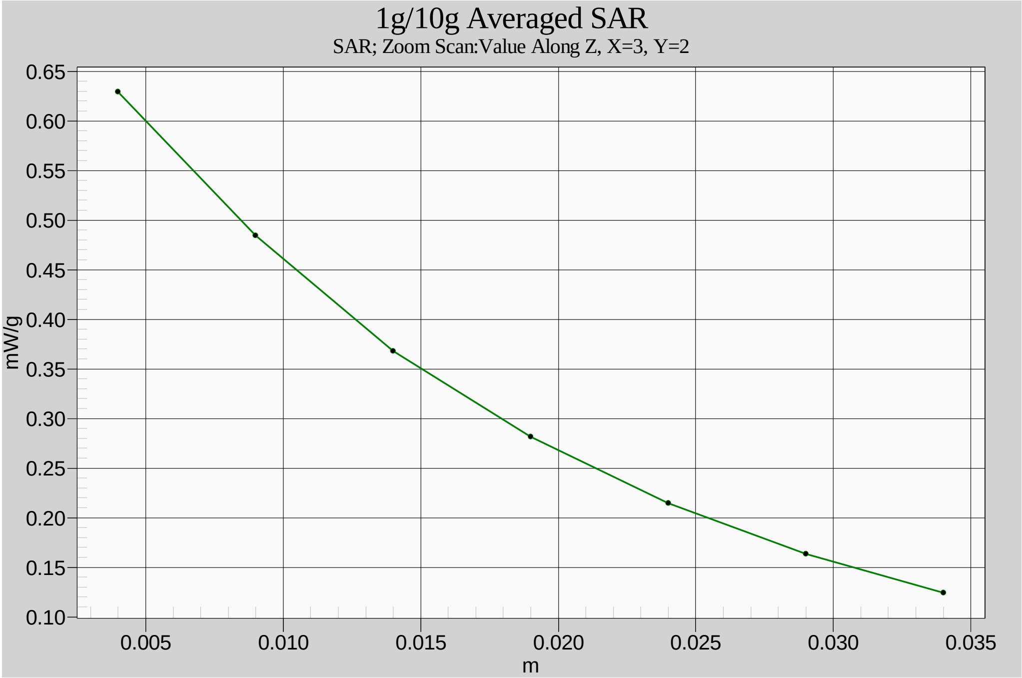
Measurement：

Crest Factor：	1	Probe S/N：	3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
826.6	4133	WCDMA V	22.05	Flat	Internal	N/A	0.558	0.104	velocity 103
836.0	4180	WCDMA V	21.80	Flat	Internal	N/A	0.362	0.063	velocity 103
846.6	4232	WCDMA V	21.45	Flat	Internal	N/A	0.594	0.004	velocity 103
846.6	4232	WCDMA V	22.20	Flat	Internal	N/A	0.501	0.022	Pharos Traveler 117
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat WCDMA Band V CH4232 _velocity 103

11.2.8 HSDPA Band V - Body SAR (20 mm separation)

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	MSL900	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

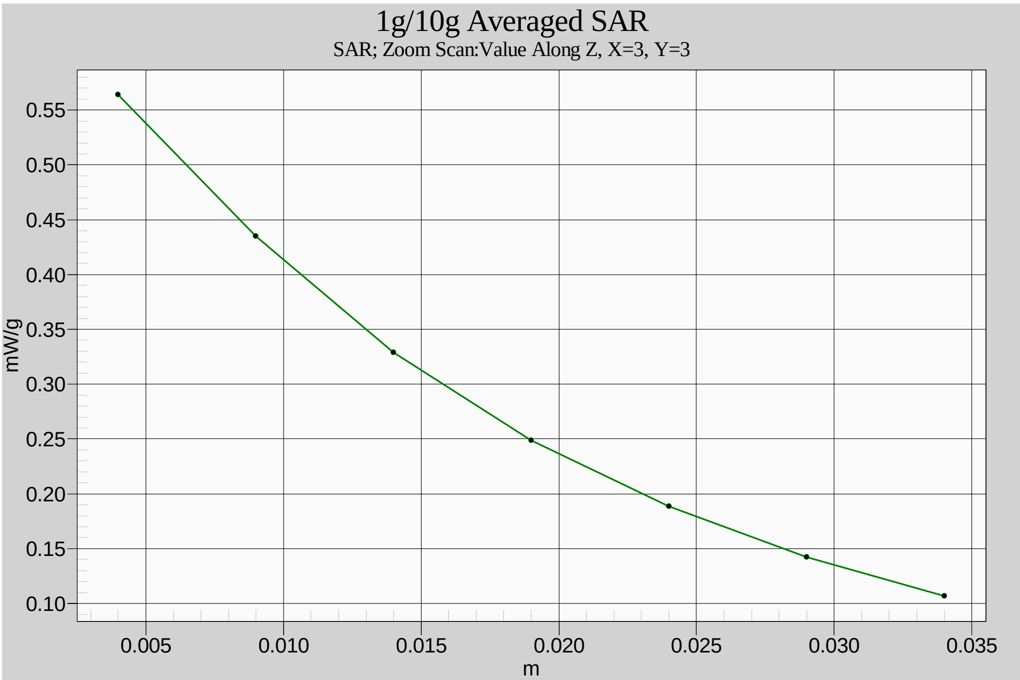
Measurement：

Crest Factor：	1	Probe S/N：	3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
826.6	4133	HSDPA V	19.75	Flat	Internal	N/A	0.488	0.042	velocity 103
836.0	4180	HSDPA V	19.45	Flat	Internal	N/A	0.339	0.020	velocity 103
846.6	4232	HSDPA V	19.05	Flat	Internal	N/A	0.533	0.008	velocity 103
846.6	4232	HSDPA V	19.80	Flat	Internal	N/A	0.460	-0.066	Pharos Traveler 117
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat HSDPA Band V CH4232 _velocity 103

11.2.9 HSUPA Band V - Body SAR (20 mm separation)

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	MSL900	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

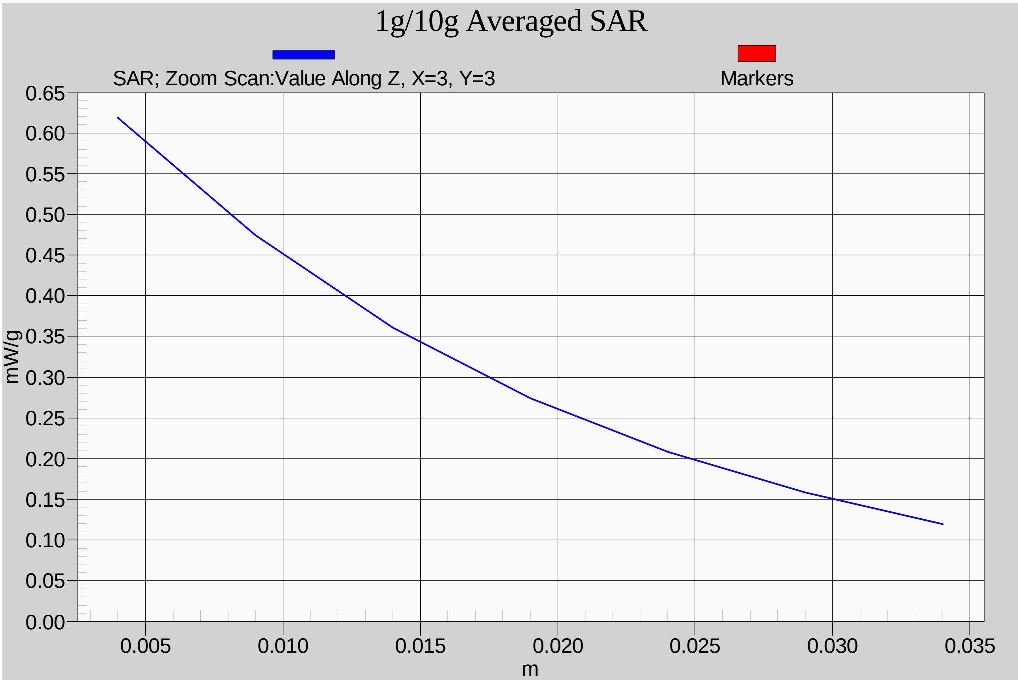
Measurement：

Crest Factor：	1	Probe S/N：	3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
826.6	4133	HSUPA V	22.18	Flat	Internal	N/A	0.541	0.103	velocity 103
836.0	4180	HSUPA V	21.16	Flat	Internal	N/A	0.356	0.023	velocity 103
846.6	4232	HSUPA V	21.76	Flat	Internal	N/A	0.585	0.019	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat HSUPA Band V CH4232 _velocity 103

11.2.10 WCDMA Band II - Body SAR (20 mm separation)

Ambient：

Temperature (℃)：	22 ± 2	Relative HUMIDITY (%)：	40-70

Liquid：

Mixture Type：	MSL1950	Liquid Temperature (℃)：	22.0
		Depth of liquid (cm)：	15

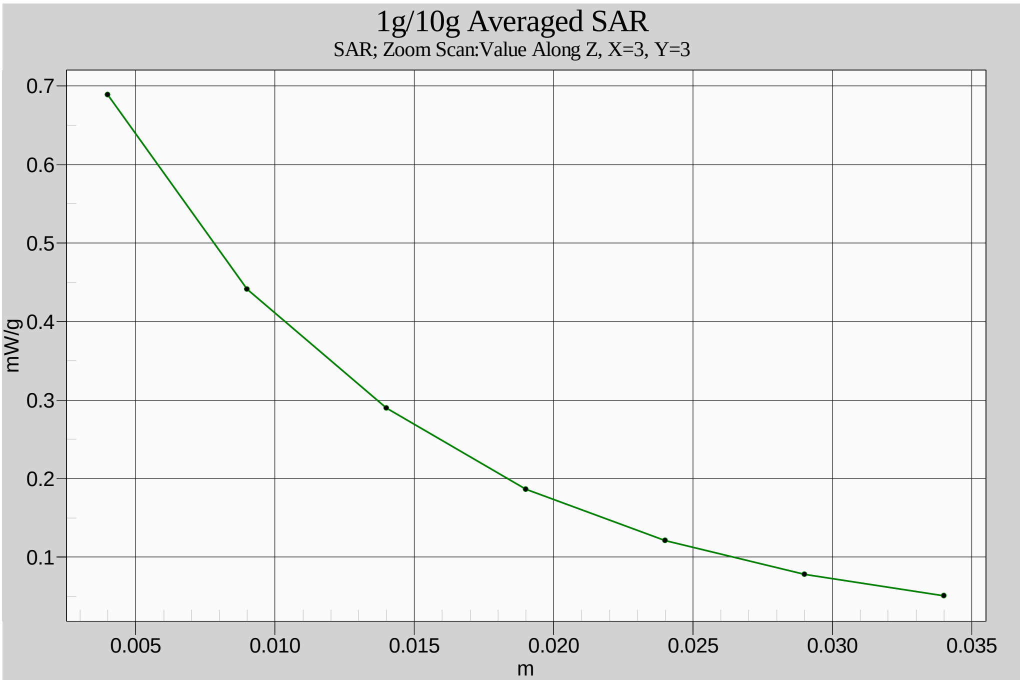
Measurement：

Crest Factor：	1	Probe S/N：	3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
1852.6	9263	WCDMA II	23.77	Flat	Internal	N/A	0.643	-0.017	velocity 103
1852.6	9263	WCDMA II	23.50	Flat	Internal	N/A	0.524	0.139	Pharos Traveler 117
1880.0	9400	WCDMA II	22.85	Flat	Internal	N/A	0.488	-0.019	velocity 103
1907.4	9537	WCDMA II	22.45	Flat	Internal	N/A	0.374	-0.003	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat WCDMA Band II CH9263 _velocity 103

11.2.11 HSDPA Band II - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL1950** Liquid Temperature (℃)： **22.0**

Depth of liquid (cm)： **15**

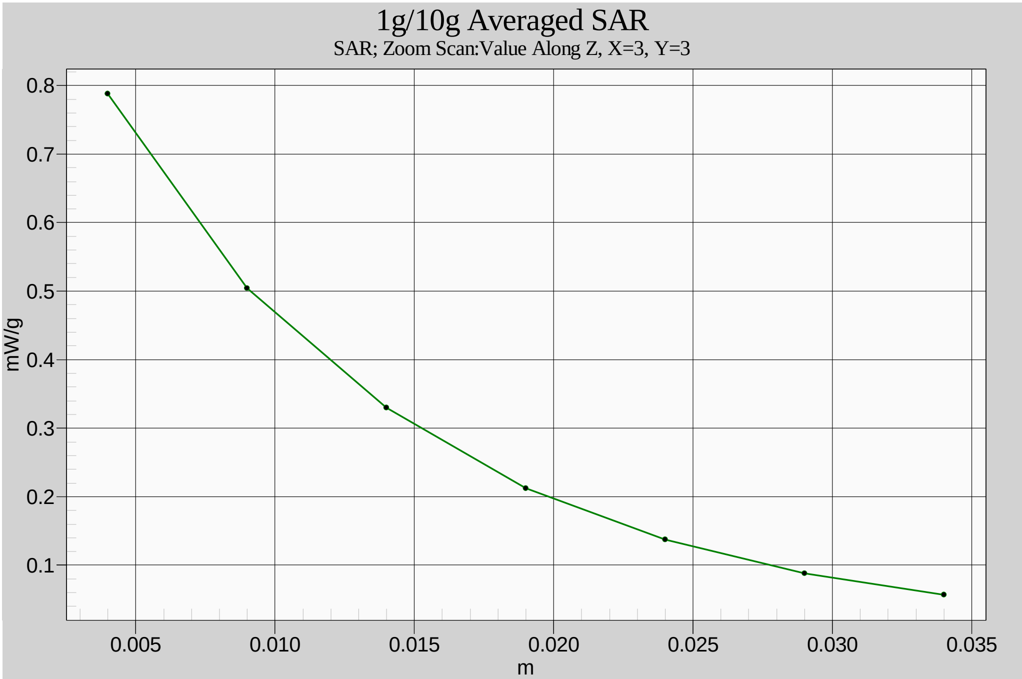
Measurement：

Crest Factor： **1** Probe S/N： **3150**

Frequency MHz	Frequency CH	Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
1852.6	9263	HSDPA II	21.75	Flat	Internal	N/A	0.737	-0.015	velocity 103
1852.6	9263	HSDPA II	21.70	Flat	Internal	N/A	0.554	-0.050	Pharos Traveler 117
1880.0	9400	HSDPA II	22.80	Flat	Internal	N/A	0.542	-0.005	velocity 103
1907.4	9537	HSDPA II	22.45	Flat	Internal	N/A	0.432	-0.019	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat HSDPA Band II CH9263 _velocity 103

11.2.12 HSUPA Band II - Body SAR (20 mm separation)

Ambient：

Temperature (℃)： 22 ± 2 | Relative HUMIDITY (%)： 40-70

Liquid：

Mixture Type： MSL1950 | Liquid Temperature (℃) ： 22.0

Depth of liquid (cm)： 15

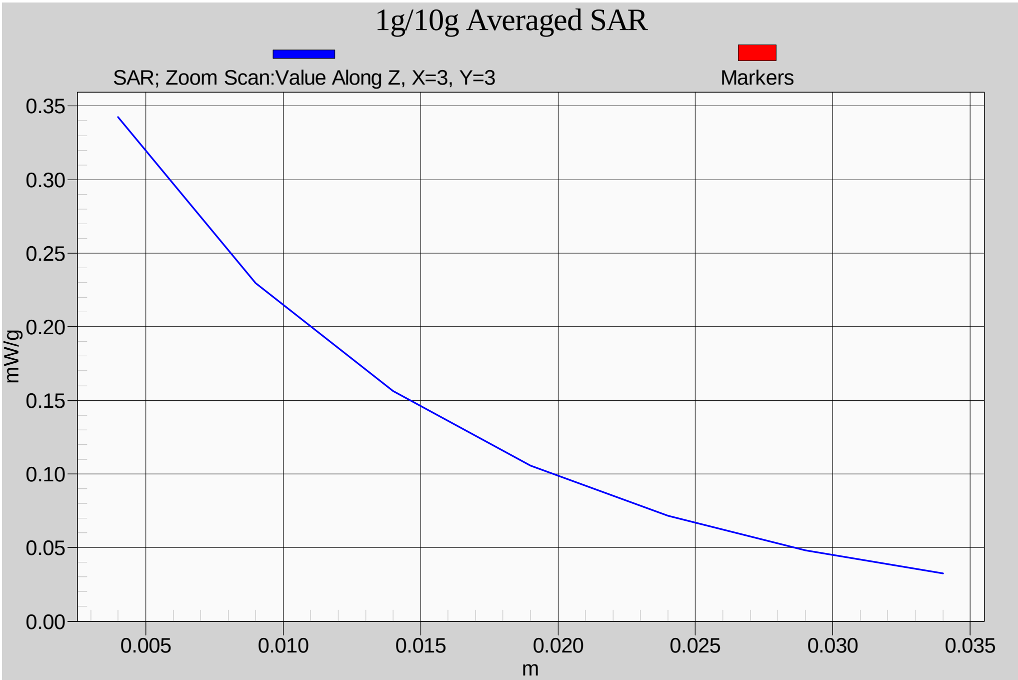
Measurement：

Crest Factor： 1 | Probe S/N： 3150

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
1852.6	9263	HSUPA II	22.60	Flat	Internal	N/A	0.319	-0.022	velocity 103
1880.0	9400	HSUPA II	21.30	Flat	Internal	N/A	0.247	-0.005	velocity 103
1907.4	9537	HSUPA II	21.50	Flat	Internal	N/A	0.200	0.007	velocity 103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat HSUPA Band II CH9263 _ velocity 103

11.2.13 Wi-Fi 802.11b - Body SAR (0 mm separation)

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL2450** Liquid Temperature (℃)： **22.0**

Depth of liquid (cm)： **15**

Measurement：

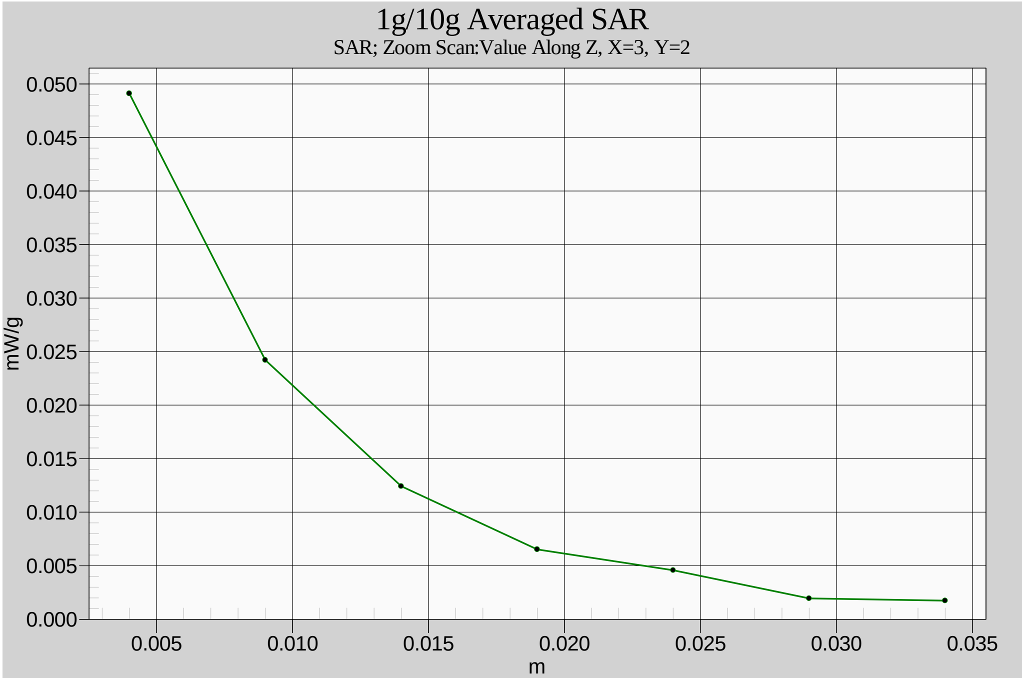
Crest Factor： **1** Probe S/N： **3510**

Frequency MHz	Frequency CH	Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
2412	1	802.11 b	18.31	Flat	Internal	N/A	0.012	0.131	1M_103
2437	6	802.11 b	17.54	Flat	Internal	N/A	0.027	0.119	1M_103
2462	11	802.11 b	18.19	Flat	Internal	N/A	0.042	-0.120	1M_103
2462	11	802.11 b	18.25	Flat	Internal	N/A	0.067	-0.051	1M_117
2462	11	802.11 b	17.92	Flat	Internal	N/A	0.040	0.128	11M_103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Note: 1M → Data rate 1MHz ； 11M → Data rate 11MHz

Z-axis Plot of SAR Measurement



Z-axis Plot of flat 802.11b CH11_ Data Rate 1M _ Pharos Traveler 117

11.2.14 Wi-Fi 802.11g - Body SAR (0 mm separation)

Ambient：

Temperature (℃)： **22 ± 2** Relative HUMIDITY (%)： **40-70**

Liquid：

Mixture Type： **MSL2450** Liquid Temperature (℃) ： **22.0**

Depth of liquid (cm)： **15**

Measurement：

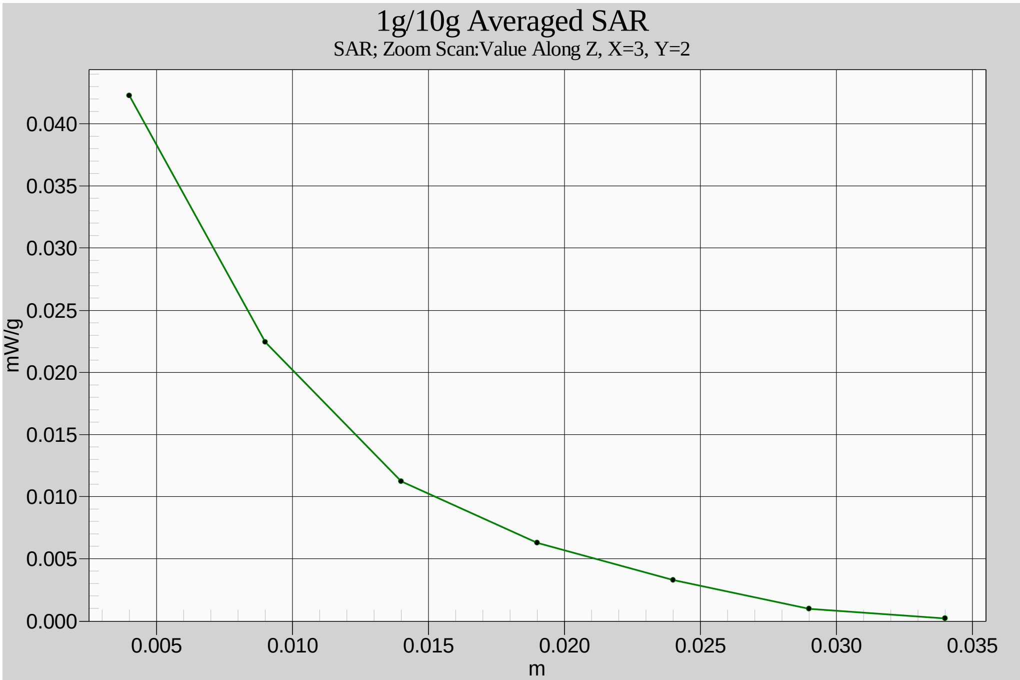
Crest Factor： **1** Probe S/N： **3510**

Frequency		Band	Power (dBm)	Phantom Position	Antenna Position	Accessory	SAR_{1g} [mW/g]	Power Drift (dB)	Remark
MHz	CH								
2412	1	802.11 g	17.45	Flat	Internal	N/A	0.013	0.104	6M_103
2437	6	802.11 g	17.26	Flat	Internal	N/A	0.019	0.137	6M_103
2462	11	802.11 g	17.11	Flat	Internal	N/A	0.036	-0.001	6M_103
2462	11	802.11 g	17.14	Flat	Internal	N/A	0.040	0.00456	6M_117
2462	11	802.11 g	16.94	Flat	Internal	N/A	0.026	-0.184	54M_103
Std. C95.1-1999 - Safety Limit Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1 gram				

Detail results see Appendix B.

Note: 6M → Data rate 6MHz ； 54M → Data rate 54MHz

Z-axis Plot of SAR Measurement



Z-axis Plot of Flat 802.11g CH11_Data Rate 6M_ Pharos Traveler 117

11.3 Setup Photo

Head Setup

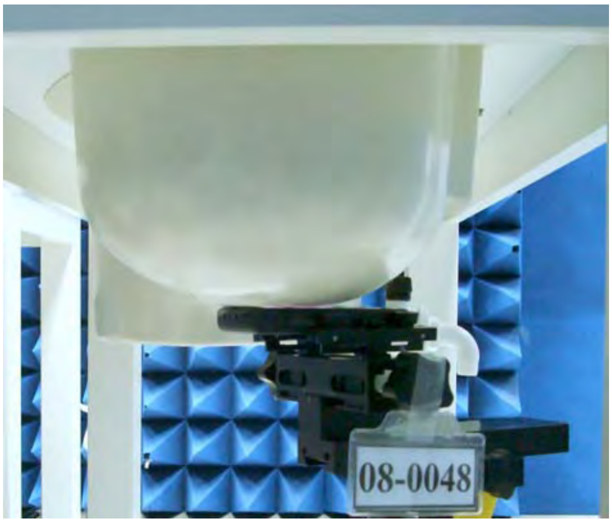


Figure 13. Right Head SAR Test Setup (Cheek)

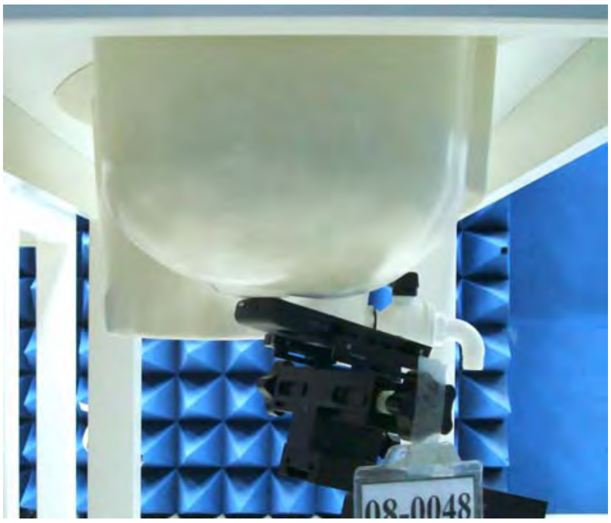


Figure 14. Right Head SAR Test Setup (Tilted)

Figure 15. Left Head SAR Test Setup (Cheek)

Figure 16. Left Head SAR Test Setup (Tilted)

Body Setup

Figure 17. Body SAR Test Setup (Flat Section) _ 20 mm separation

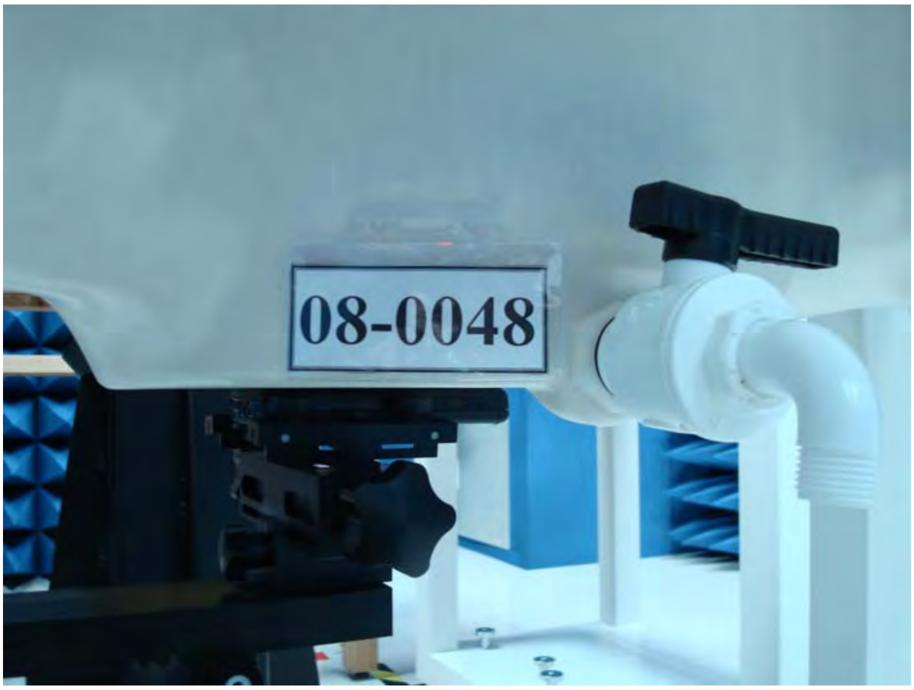


Figure 18. Body SAR Test Setup (Flat Section) _ 0 mm separation

11.4 Std. C95.1-1999 RF Exposure Limit

Human Exposure	Population Uncontrolled Exposure (W/kg) or (mW/g)	Occupational Controlled Exposure (W/kg) or (mW/g)
Spatial Peak SAR* (head)	1.60	8.00
Spatial Peak SAR** (Whole Body)	0.08	0.40
Spatial Peak SAR*** (Partial-Body)	1.60	8.00
Spatial Peak SAR**** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7. Safety Limits for Partial Body Exposure

Notes：

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

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

***　The Spatial Average value of the SAR averaged over the partial – body.

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

***Population / Uncontrolled Environments*：** are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

***Occupational / Controlled Environments*：** are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

12. Conclusion

The SAR test values found for the portable mobile phone **Inventec Corporation Trade Name：PHAROS Model(s)：Pharos Traveler 117** is below the maximum recommended level of 1.6 W/kg (mW/g).

13. References

[1] Std. C95.1-1999, "*American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300KHz to 100GHz",* New York.

[2] NCRP, National Council on Radiation Protection and Measurements, "*Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields"*, NCRP report NO. 86, 1986.

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

[4] K. Poković, T. Schmid, and N. Kuster, "*Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequency*", in ICECOM'97, Dubrovnik, October 15-17, 1997, pp.120-124.

[5] K. Poković, T. Schmid, and N. Kuster, "*E-field probe with improved isotropy in brain simulating liquids*", in Proceedings of the ELMAR, Zadar, Croatia, 23-25 June, 1996, pp.172-175.

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

[7] 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.

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

[9] Std. C95.3-1991, "*IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave,* New York: IEEE, Aug. 1992.

[10] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), *Human Exposure to Electromagnetic Fields High-frequency*: 10KHz-300GHz, Jan. 1995.

Appendix A - System Performance Check

See following Attached Pages for System Performance Check.

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/8/2008 5:40:03 PMDate/Time: 4/8/2008 5:48:20 PM

System Performance Check at 900MHz_20080408_Head

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:073

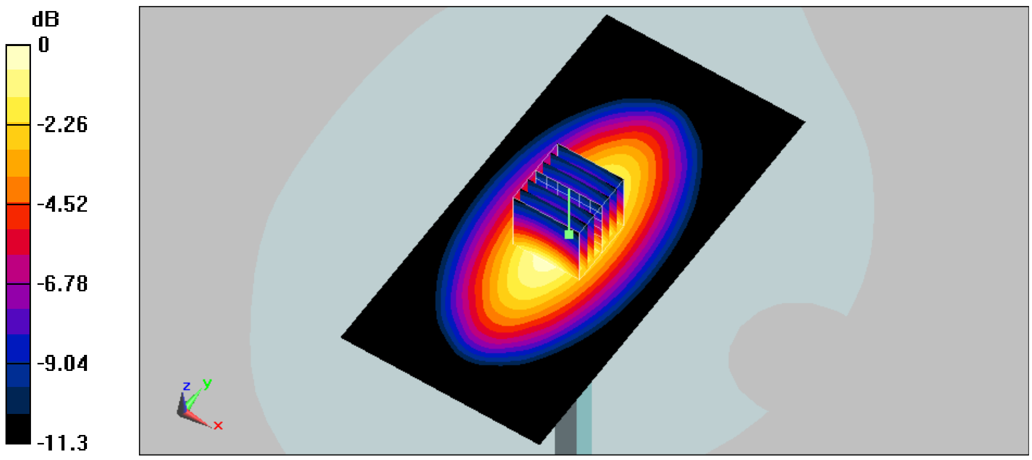
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.973 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(6.23, 6.23, 6.23); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 900MHz/Area Scan (61x121x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.89 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.6 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 3.97 W/kg
SAR(1 g) = 2.66 mW/g; SAR(10 g) = 1.7 mW/g
Maximum value of SAR (measured) = 2.88 mW/g



0 dB = 2.88mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/14/2008 9:44:11 AMDate/Time: 4/14/2008 9:52:31 AM

System Performance Check at 900MHz_20080414_Head

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:073

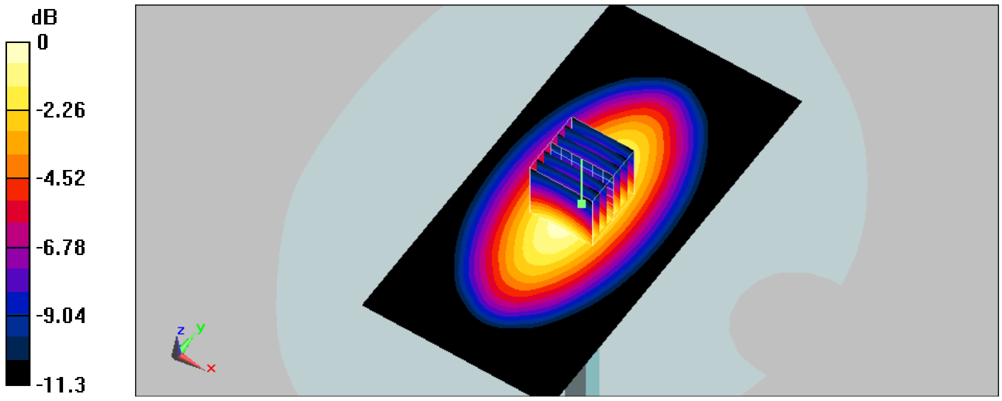
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.973 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(6.23, 6.23, 6.23); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 900MHz/Area Scan (61x121x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.88 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.5 V/m; Power Drift = 0.014 dB
Peak SAR (extrapolated) = 3.95 W/kg
SAR(1 g) = 2.65 mW/g; SAR(10 g) = 1.69 mW/g
Maximum value of SAR (measured) = 2.88 mW/g



0 dB = 2.88mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/13/2008 9:39:09 AM

System Performance Check at 900MHz_20081113_Head

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d053

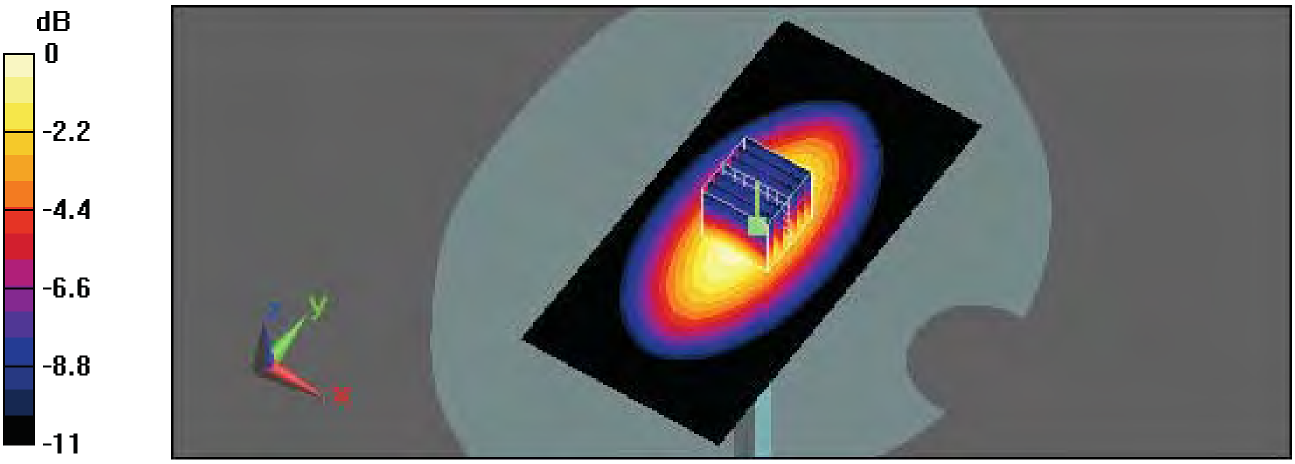
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.945 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(6.23, 6.23, 6.23); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

System Performance Check at 900MHz/Area Scan (61x121x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.81 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 3.83 W/kg
SAR(1 g) = 2.6 mW/g; SAR(10 g) = 1.68 mW/g
Maximum value of SAR (measured) = 2.82 mW/g



0 dB = 2.82mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/14/2008 9:56:20 PMDate/Time: 4/14/2008 10:04:35 PM

System Performance Check at 900MHz_20080414_Body

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:073

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 1.04 mho/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

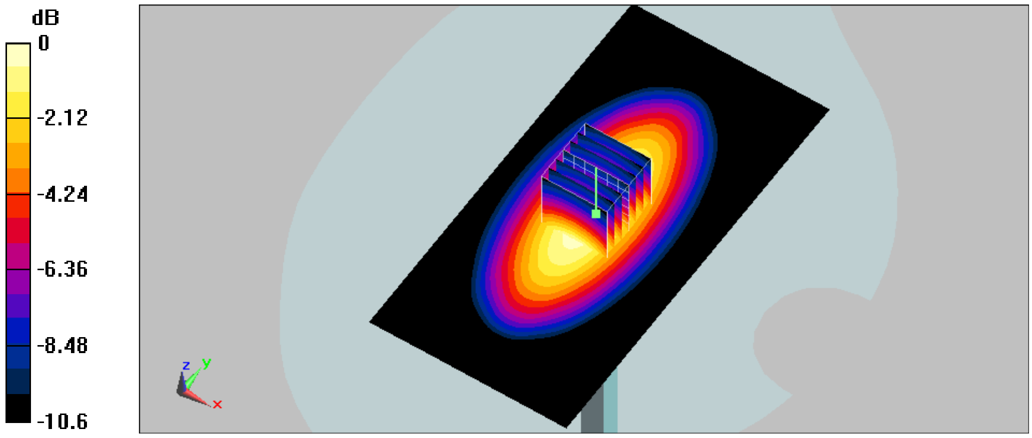
- Probe: ES3DV3 - SN3150; ConvF(6, 6, 6); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 900MHz/Area Scan (61x121x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.14 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.8 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 4.27 W/kg
SAR(1 g) = 2.9 mW/g; SAR(10 g) = 1.88 mW/g
Maximum value of SAR (measured) = 3.15 mW/g



0 dB = 3.15mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/16/2008 12:32:57 PMDate/Time: 4/16/2008 12:41:17 PM

System Performance Check at 900MHz_20080416_Body

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:073

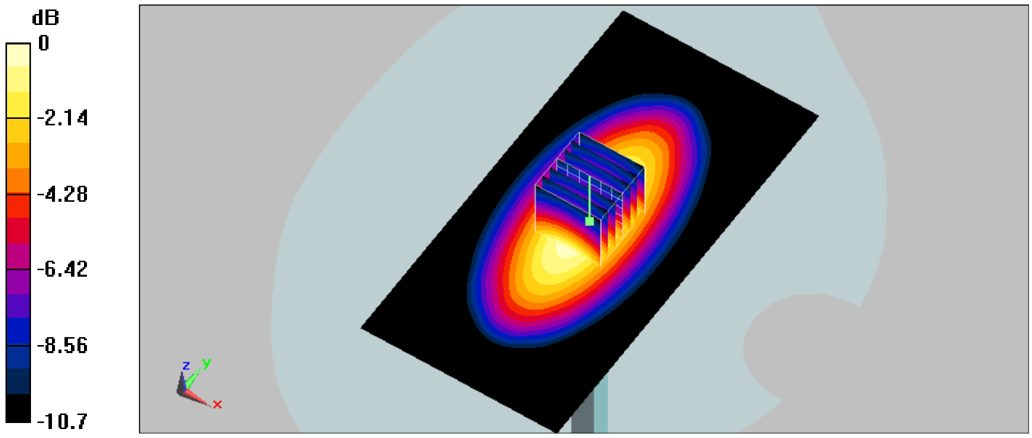
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 1.04 mho/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(6, 6, 6); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 900MHz/Area Scan (61x121x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.15 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.2 V/m; Power Drift = -0.00133 dB
Peak SAR (extrapolated) = 4.26 W/kg
SAR(1 g) = 2.89 mW/g; SAR(10 g) = 1.88 mW/g
Maximum value of SAR (measured) = 3.14 mW/g



0 dB = 3.14mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 6/28/2008 9:50:02 AM

System Performance Check at 900MHz_20080628_Body

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d053

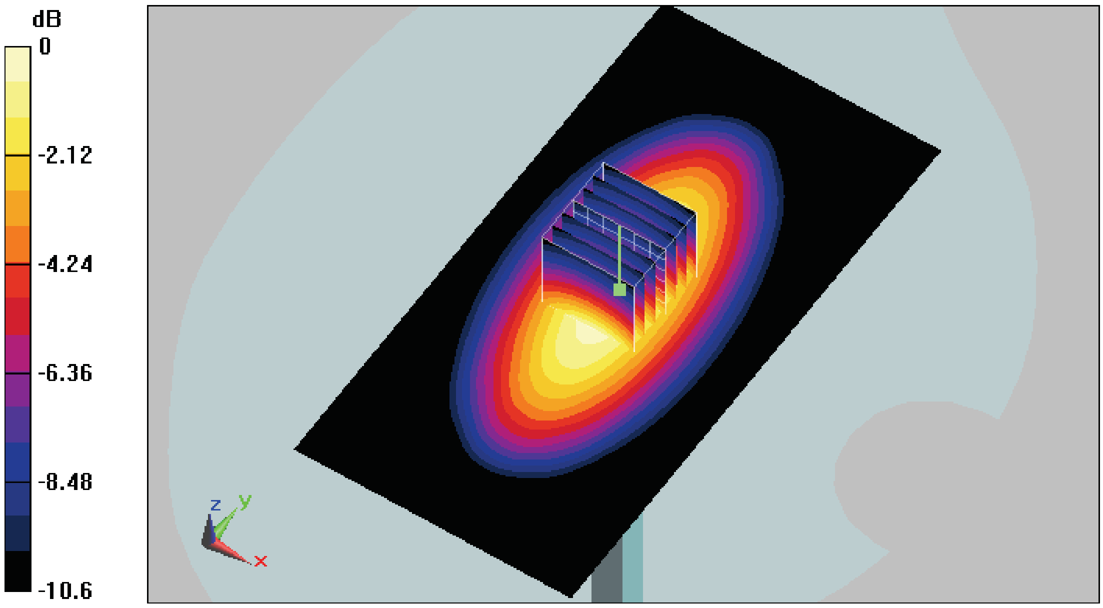
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 1.04 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(6, 6, 6); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 900MHz/Area Scan (61x121x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.07 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.1 V/m; Power Drift = 0.068 dB
Peak SAR (extrapolated) = 4.15 W/kg
SAR(1 g) = 2.83 mW/g; SAR(10 g) = 1.84 mW/g
Maximum value of SAR (measured) = 3.08 mW/g



0 dB = 3.08mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/12/2008 6:28:17 PM

System Performance Check at 900MHz_20081112_Body

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:1d053

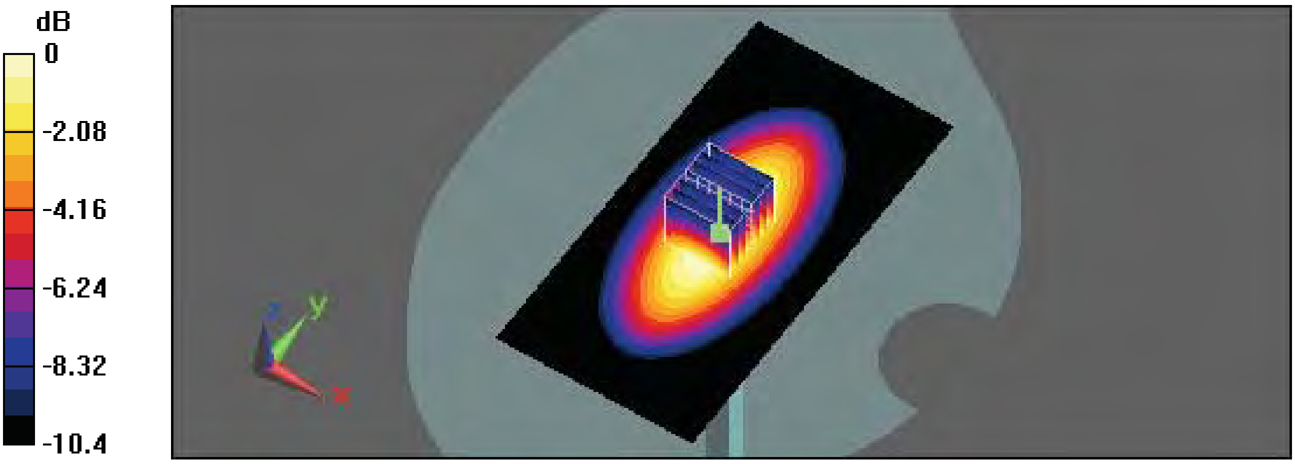
Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; $\sigma = 1.03$ mho/m; $\varepsilon_r = 54.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(6, 6, 6); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

System Performance Check at 900MHz/Area Scan (61x121x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 3.25 mW/g

System Performance Check at 900MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.9 V/m; Power Drift = 0.025 dB
Peak SAR (extrapolated) = 4.15 W/kg
SAR(1 g) = 2.84 mW/g; SAR(10 g) = 1.86 mW/g
Maximum value of SAR (measured) = 3.08 mW/g



0 dB = 3.08mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/11/2008 1:27:47 AMDate/Time: 4/11/2008 1:32:10 AM

System Performance Check at 1950MHz_20080411_Head

DUT: Dipole 1950 MHz; Type: D1950V3; Serial: D1950V3 - SN:1117

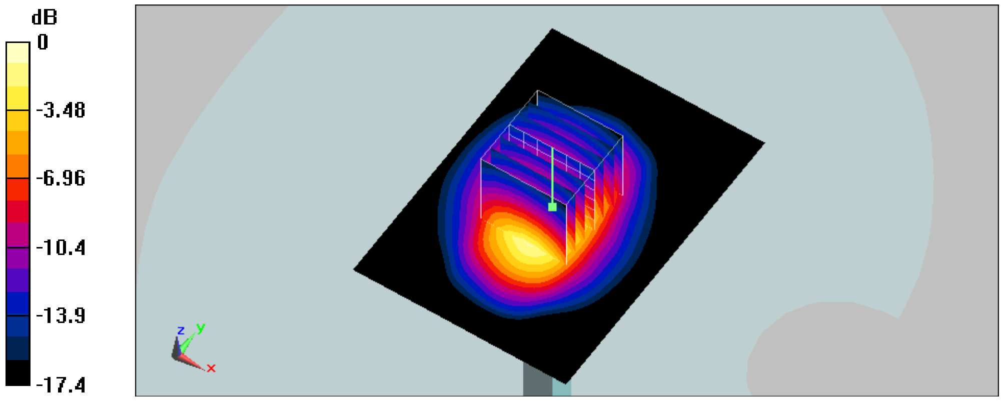
Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1950 MHz; σ = 1.43 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.84, 4.84, 4.84); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 1950MHz/Area Scan (51x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.3 mW/g

System Performance Check at 1950MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.4 V/m; Power Drift = -0.00552 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.82 mW/g; SAR(10 g) = 5.11 mW/g
Maximum value of SAR (measured) = 11.1 mW/g



0 dB = 11.1mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/13/2008 3:15:46 PM

System Performance Check at 1950MHz_20081113_Head

DUT: Dipole 1950 MHz; Type: D1950V3; Serial: D1950V3 - SN:1117

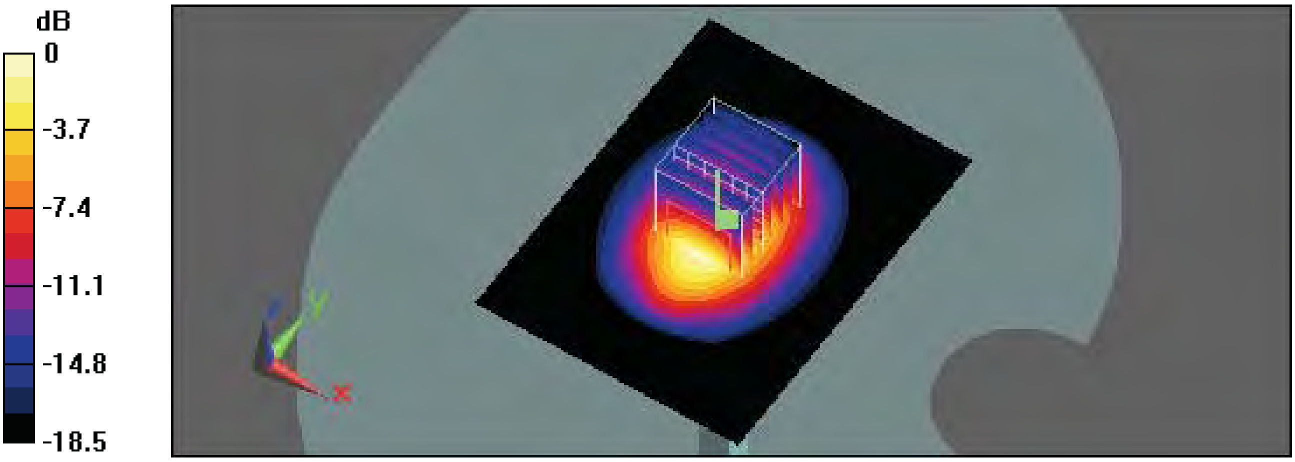
Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1950 MHz; σ = 1.42 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.84, 4.84, 4.84); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

System Performance Check at 1950MHz/Area Scan (61x81x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.6 mW/g

System Performance Check at 1950MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.9 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.16 mW/g
Maximum value of SAR (measured) = 11.4 mW/g



0 dB = 11.4mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/16/2008 8:15:23 PMDate/Time: 4/16/2008 8:19:43 PM

System Performance Check at 1950MHz_20080416_Body

DUT: Dipole 1950 MHz; Type: D1950V3; Serial: D1950V3 - SN:1117

Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1950 MHz; σ = 1.55 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

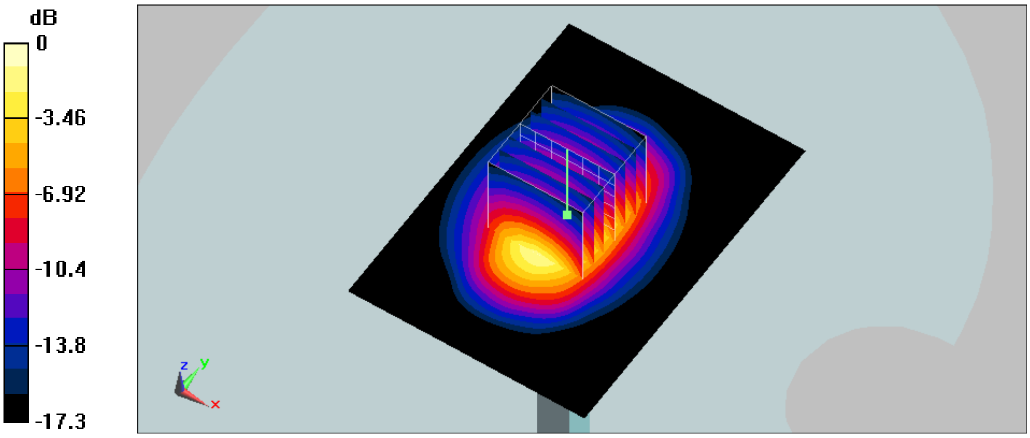
- Probe: ES3DV3 - SN3150; ConvF(4.55, 4.55, 4.55); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 1950MHz/Area Scan (51x71x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.1 mW/g

System Performance Check at 1950MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88 V/m; Power Drift = -0.00243 dB
Peak SAR (extrapolated) = 19 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.28 mW/g
Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 6/28/2008 2:32:44 PM

System Performance Check at 1950MHz_20080628_Body

DUT: Dipole 1950 MHz; Type: D1950V3; Serial: D1950V3 - SN:1117

Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1950 MHz; $\sigma = 1.5$ mho/m; $\varepsilon_r = 51.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

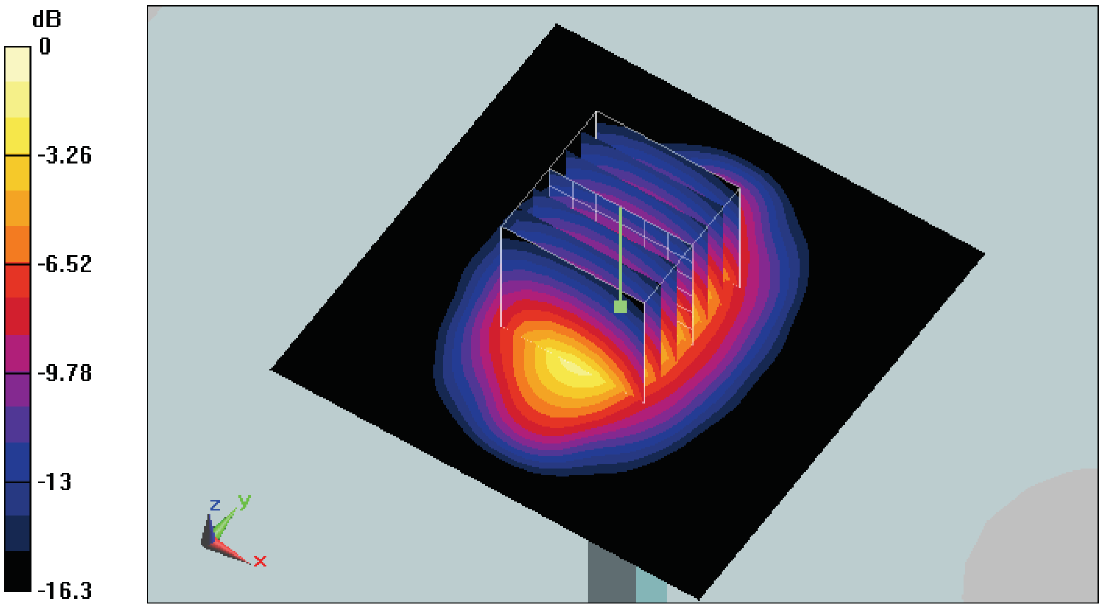
- Probe: ES3DV3 - SN3150; ConvF(4.55, 4.55, 4.55); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 1950MHz/Area Scan (61x61x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.9 mW/g

System Performance Check at 1950MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.8 V/m; Power Drift = 0.046 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.45 mW/g
Maximum value of SAR (measured) = 11.9 mW/g



0 dB = 11.9mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/17/2008 8:03:40 PMDate/Time: 4/17/2008 8:08:04 PM

System Performance Check at 1950MHz_20080417_Body

DUT: Dipole 1950 MHz; Type: D1950V3; Serial: D1950V3 - SN:1117

Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1950 MHz; σ = 1.55 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

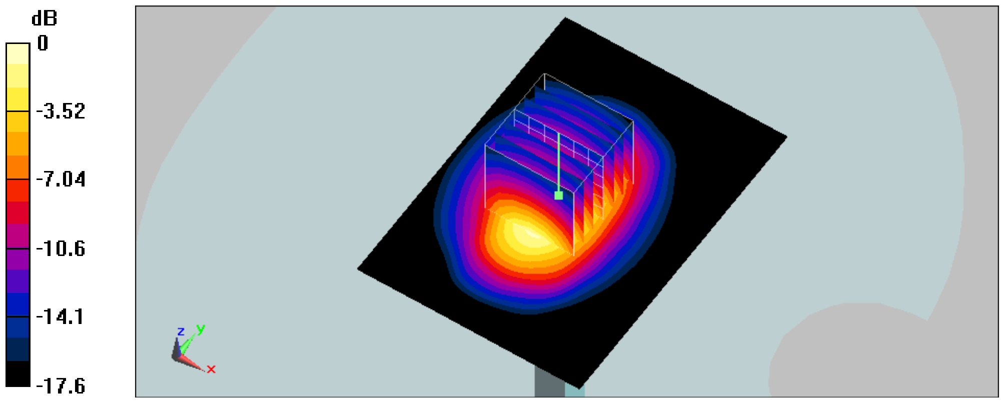
- Probe: ES3DV3 - SN3150; ConvF(4.55, 4.55, 4.55); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 1950MHz/Area Scan (51x71x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.7 mW/g

System Performance Check at 1950MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.4 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.29 mW/g
Maximum value of SAR (measured) = 11.6 mW/g



0 dB = 11.6mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/12/2008 10:55:13 PM

System Performance Check at 1950MHz_20081112_Body

DUT: Dipole 1950 MHz; Type: D1950V3; Serial: D1950V3 - SN:1117

Communication System: CW; Frequency: 1950 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1950 MHz; σ = 1.55 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

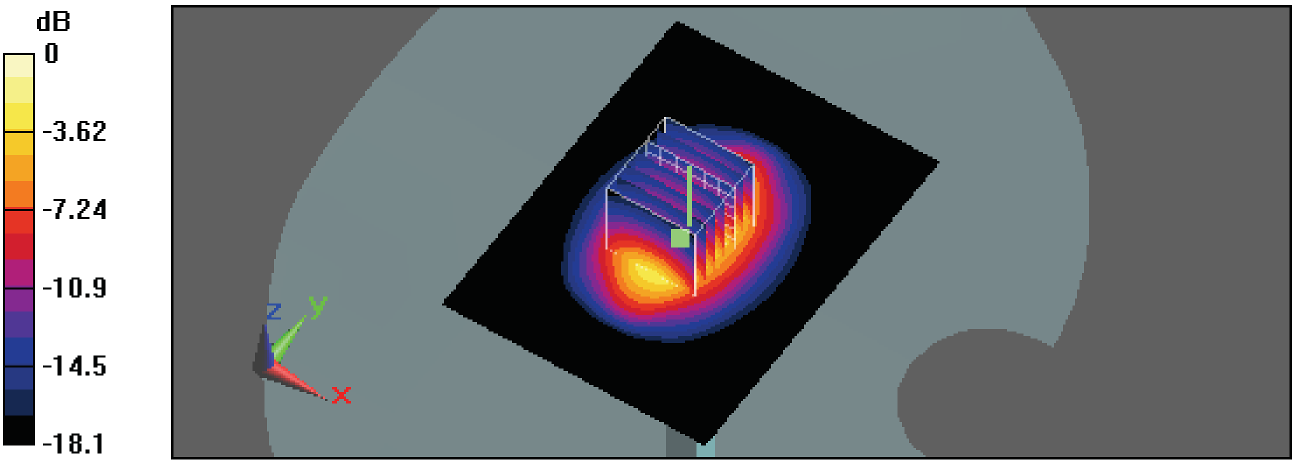
- Probe: ES3DV3 - SN3150; ConvF(4.55, 4.55, 4.55); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

System Performance Check at 1950MHz/Area Scan (61x81x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.8 mW/g

System Performance Check at 1950MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.6 V/m; Power Drift = 0.042 dB
Peak SAR (extrapolated) = 19.7 W/kg
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.42 mW/g
Maximum value of SAR (measured) = 11.9 mW/g



0 dB = 11.9mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 4/17/2008 2:00:39 PMDate/Time: 4/17/2008 2:06:30 PM

System Performance Check at 2450MHz_20080417_Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:712

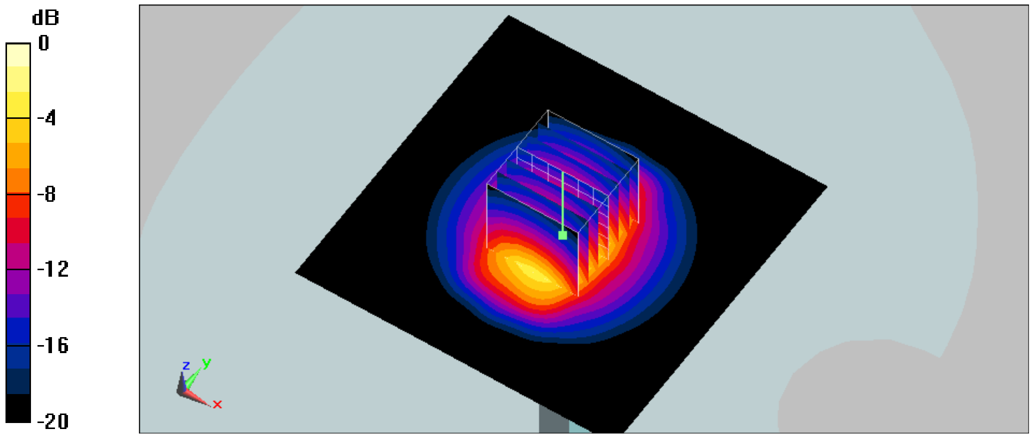
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.96 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn779; Calibrated: 11/30/2007
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 91; SEMCAD X Version 12.4 Build 52

System Performance Check at 2450MHz/Area Scan (71x71x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 15.3 mW/g

System Performance Check at 2450MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.4 V/m; Power Drift = -0.153 dB
Peak SAR (extrapolated) = 24.9 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 6.12 mW/g
Maximum value of SAR (measured) = 14.7 mW/g



0 dB = 14.7mW/g

Test Laboratory: A Test Lab Techno Corp.

Date/Time: 11/23/2008 2:47:55 PM

System Performance Check at 2450MHz_20081123_Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:712

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.95 mho/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY5 Configuration:

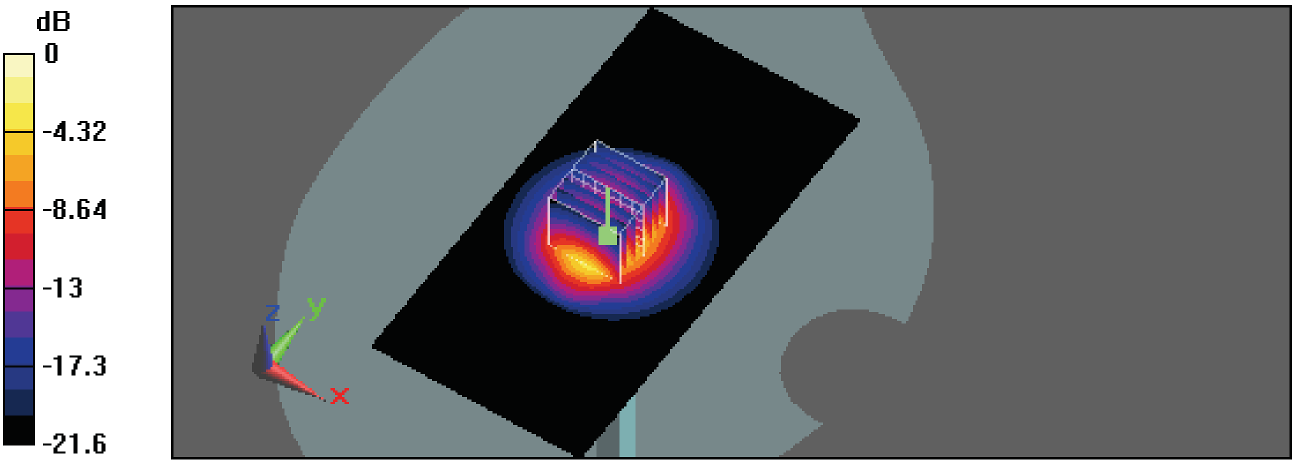
- Probe: ES3DV3 - SN3150; ConvF(4.19, 4.19, 4.19); Calibrated: 1/9/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn393; Calibrated: 8/25/2008
- Phantom: SAM with CRP; Type: SAM; Serial: TP-1150 and higher
- Measurement SW: DASY5, V5.0 Build 120; SEMCAD X Version 13.2 Build 87

System Performance Check at 2450MHz/Area Scan (61x121x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 15.8 mW/g

System Performance Check at 2450MHz/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.1 V/m; Power Drift = -0.029 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.28 mW/g
Maximum value of SAR (measured) = 15.5 mW/g



0 dB = 15.5mW/g

Appendix B - SAR Measurement Data

See following Attached Pages for SAR Measurement Data.

Appendix C -   3G SAR Measurement Procedures

See following Attached Pages.

Appendix D - Calibration

All of the instruments Calibration information are listed below.

- Dipole _ D900V2 SN:073 Calibration No.D900V2-073_Mar08
- Dipole _ D900V2 SN:1d053 Calibration No.D900V2-1d053_Dec07
- Dipole _ D1950V2 SN: 1117 Calibration No.D1950V1117_Dec07
- Dipole _ D2450V2 SN: 712 Calibration No.D2450V712_Jan08
- Probe _ ES3DV3 SN:3150 Calibration No.ES3-3150_Jan08
- DAE _ DAE4 SN:779 Calibration No.DAE4-779_ Nov07