NO.: RZA2009-0808

TESTING
No. L2264

TEST REPORT

Test name	Electromagnetic Field (Specific Absorption Rate)
Product	Two-way Radio
Model	TC-310U(2)
FCC ID	R74TC-310U2
Client	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD.

TA Technology (Shanghai) Co., Ltd.

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GENERAL SUMMARY

Product	T wo-way Radio	**Model**	TC-310U(2)
Client	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD.	**Type of test**	Entrusted
Manufacturer	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD.	**Arrival Date of sample**	June 30th, 2009
Place of sampling	(Blank)	**Carrier of the samples**	Eason Zhao
Quantity of the samples	One	**Date of product**	(Blank)
Base of the samples	(Blank)	**Items of test**	SAR
Series number	/		
Standard(s)	**ANSI/IEEE C95.1-1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. **IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques. **OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65. **IEC 62209-1:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz). **IEC 62209-2:2008(106/162/CDV):** Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)for wireless communication devices used in close proximity to the human body .(frequency rang of 30MHz to 6GHz)		
Conclusion	Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: July 7th, 2009**		
Comment	The test result only responds to the measured sample.		

Approved by ____ Weizhong Yang **Revised by** ____ Minbao Ling **Performed by** ____ Lu Wang

TABLE OF CONTENT

1. COMPETENCE AND WARRANTIES

TA Technology (Shanghai) Co., Ltd. is a test laboratory competent to carry out the tests described in this test report.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and teCHnical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

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3. DESCRIPTION OF EUT

3.1. Addressing Information Related to EUT

Table 1: Applicant (The Client)

Name or Company	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD.
Address/Post	HYT TOWER, SHENZHEN HI-TECH INDUSTRIAL PARK NORTH, BEIHUAN RD., NANSHAN DISTRICT, SHENZHEN, P.R.C.
City	ShenZhen
Postal Code	/
Country	China
Telephone	/
Fax	/

Table 2: Manufacturer

Name or Company	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD.
Address/Post	HYT TOWER, SHENZHEN HI-TECH INDUSTRIAL PARK NORTH, BEIHUAN RD., NANSHAN DISTRICT, SHENZHEN, P.R.C.
City	ShenZhen
Postal Code	/
Country	China
Telephone	/
Fax	/

3.2. Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
The EUT	TC-310U(2)	/	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD
Lithium Battery	BL1104	/	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD
AC/DC Adapter	DSA-5W-05 FCH 050060	/	SHENZHEN HYT SCIENCE & TECHNOLOGY CO., LTD

Note:
The EUT appearances see ANNEX G.

3.3. General Description

Equipment Under Test (EUT) is a model of transceiver with external antenna. The detail about Mobile phone, Lithium Battery and AC/DC Adapter is in Table 3. SAR is tested for 450.0 - 470.0 MHz UHF only.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

3.4. Test item

Table 4: Test item of EUT

Device type :	portable device
Exposure category:	controlled environment / Occupational
Device operating configurations :	
Operating mode(s):	450.0 - 470.0 MHz UHF
Modulation:	FM
Operating frequency range(s)	transmitter frequency range
UHF	450MHz ~ 470 MHz
Test channel	451.3MHz -459.4MHz –468.8MHz
Hardware version:	/
Software version:	/
Antenna type:	External antenna

4. OPERATIONAL CONDITIONS DURING TEST

The spatial peak SAR values were assessed for the lowest, middle and highest channels defined by UHF (451.3 MHz, 459.4MHz, 468.8MHz) systems UHF, 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.

5. SAR MEASUREMENTS SYSTEM CONFIGURATION

5.1. SAR Measurement Set-up

The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- A unit to operate the optical surface detector which is connected to the EOC.
- The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY4 measurement server.
- The DASY4 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003
- DASY4 software and SEMCAD data evaluation software.
- Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.

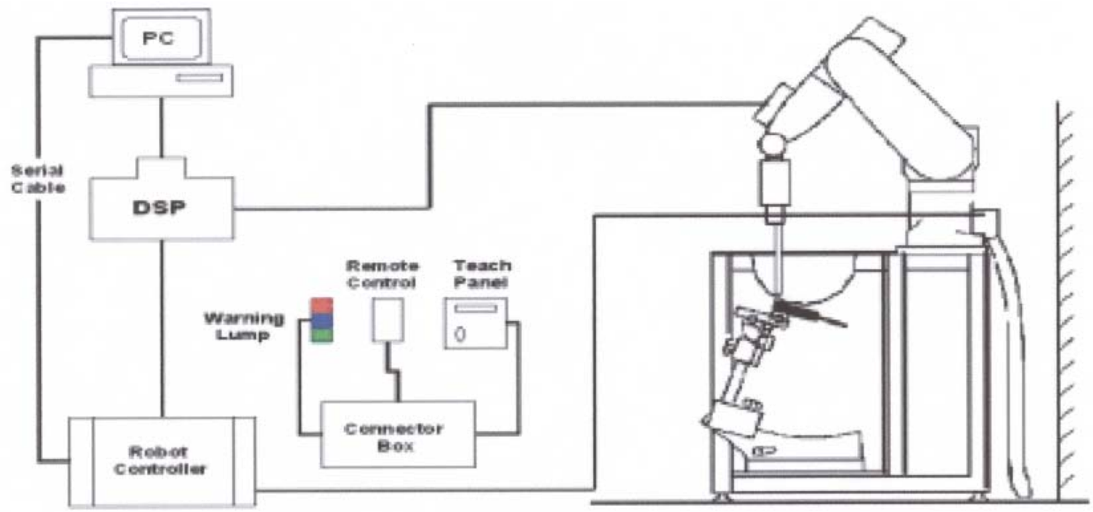

Figure 1. SAR Lab Test Measurement Set-up

5.2. Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

5.2.1. ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.q., glycol)
Calibration	In air from 10 MHz to 3 GHz In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz, 1750 MHz, 1950MHz and 2450 MHz. (accuracy±8%) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to 2.5 GHz; Linearity: ±0.2 dB (30 MHz to 2.5 GHz)
Directivity	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation around probe axis)
Dynamic Range	5u W/g to > 100mW/g; Linearity: ±0.2dB
Surface Detection	±0.2 mm repeatability in air and clear liquids over diffuse reflecting surface (ET3DV6 only)
Dimensions	Overall length: 330mm Tip length: 16mm Body diameter: 12mm Tip diarneter: 6.8mm Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 2.5GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

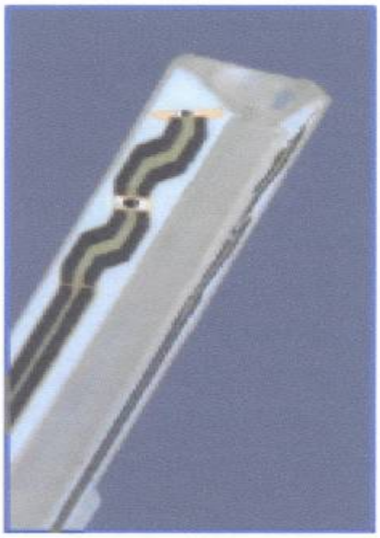

Figure 2 ET3DV6 E-field Probe

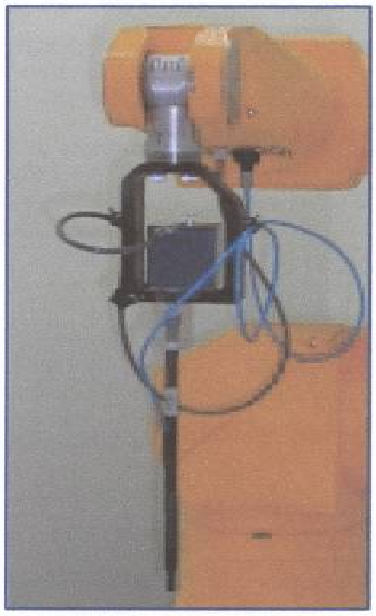

Figure 3 ET3DV6 E-field probe

5.2.2. E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, 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 1 GHz, and in a wave guide above 1 GHz 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 (brain or muscle),
ΔT = Temperature increase due to RF exposure.
Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m3).

5.3. Other Test Equipment

5.3.1. Device Holder for Transmitters

The DASY device holder is designed to cope with the die rent positions given in the standard.
It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
The DASY device holder is constructed of low-loss POM material.The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the inference of the clamp on the test results could thus be lowered.

Figure 4.Device Holder

5.3.2. Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (Oval Flat) phantom defined in IEEE 1528-2003, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of wireless portable device 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.

Shell Thickness 2 ±0.2 mm
Filling Volume Approx. 30 liters
Dimensions 190×600×400 mm (H×L×W)

Figure 5.Generic Twin Phantom

5.4. Scanning procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The ”reference“ and ”drift“ measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

- The ”surface check“ measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged.
After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

- Zoom Scan
  Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

- Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY4 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard' s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard' s method for extrapolation. For a grid using 7x7x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

5.5. Data Storage and Evaluation

5.5.1. Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all 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 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 incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.5.2. Data Evaluation by SEMCAD

The SEMCAD software 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, ai_0, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the 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:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

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: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)

[mV/(V/m)^2] for E-field Probes

$ConvF$ = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

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

$$E_{tot} = (E_X^2 + E_Y^2 + E_Z^2)^{1/2}$$

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

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

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 normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

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

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

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

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

5.6. System check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 398 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the table 11.

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).

System check is performed regularly on all frequency bands where tests are performed with the DASY 4 system.

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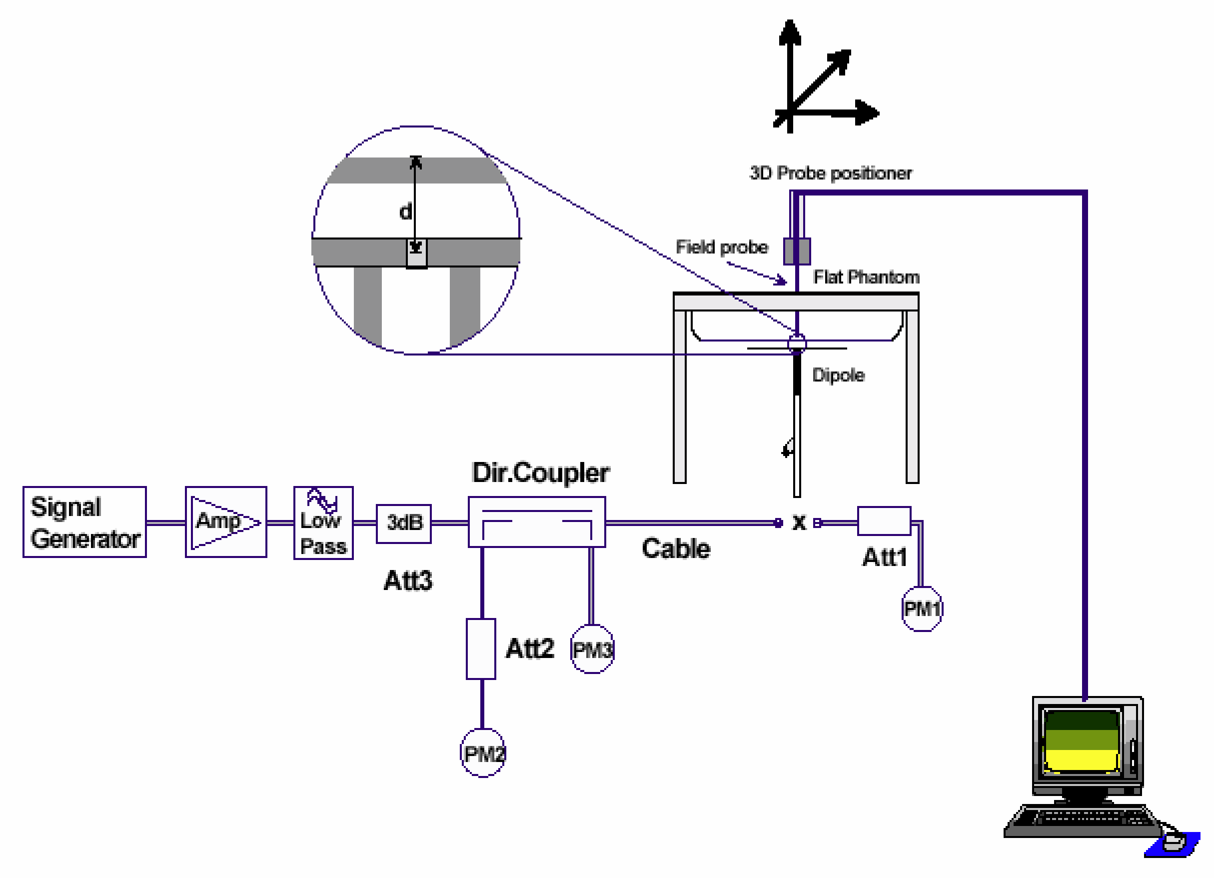


Figure 6. System Check Set-up

5.7. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 5 and Table 6 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

Table 5: Composition of the Head Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Brain) 450MHz
Water	38.56
Sugar	56.32
Salt	3.95
Preventol	0.10
Cellulose	1.07
Dielectric Parameters Target Value	f=450MHz ε=43.5 σ=0.87

Table 6: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Body)450MHz
Water	51.16
Sugar	46.78
Salt	1.49
Preventol	0.10
Cellulose	0.47
Dielectric Parameters Target Value	f=450MHz ε=56.7 σ=0.94

6. LABORATORY ENVIRONMENT

Table 7: The Ambient Conditions during Test

Temperature	Min. = 20°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

7. CHARACTERISTICS OF THE TEST

7.1. Applicable Limit Regulations

ANSI/IEEE C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

7.2. Applicable Measurement Standards

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques.

OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.

IEC 62209-1: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz).

IEC 62209-2:2008(106/162/CDV): Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)for wireless communication devices used in close proximity to the human body .(frequency rang of 30MHz to 6GHz)

8. CONDUCTED OUTPUT POWER MEASUREMENT

8.1. Conducted Power Results

Table 8: Conducted Power Measurement Results

UHF	Conducted Power		
	(451.3MHz)	(459.4MHz)	(468.8MHz)
Before test (dBm)	32.98	32.92	32.75
After test (dBm)	32.99	32.91	32.76

9. TEST RESULTS

9.1. Dielectric Performance

Table 9: Dielectric Performance of Head Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
450MHz (head)	Target value ±5% window	43.50 41.33 — 45.68	0.87 0.83 — 0.91	/
	Measurement value 2009-7-06	44.93	0.85	21.8

Table 10: Dielectric Performance of Body Tissue Simulating Liquid

Frequency	Description	Dielectric Parameters		Temp
		ε_r	σ(s/m)	℃
450MHz (body)	Target value ±5% window	56.70 53.87 — 59.54	0.94 0.89— 0.99	/
	Measurement value 2009-7-06	57.03	0.94	21.9

9.2. System Check Results

Table 11: System Check

Frequency	Description	SAR(W/kg)		Dielectric Parameters		Temp
		10g	1g	ε_r	σ(s/m)	℃
450MHz	Recommended result ±10% window	1.27 1.143—1.397	1.9 1.71 — 2.09	43.3	0.83	/
	Measurement value 2009-7-6	1.32	2.02	44.93	0.85	21.9

Note：1. The graph results see ANNEX B.

1. 2. Target Values used derive from the calibration certificate and 398 mW is used as feeding power to the calibrated dipole.

9.3. Summary of Measurement Results

Table 12: SAR Values (UHF)

Frequency	Channel	1 g Average Limits 8.0 W/kg Duty cycle 100%	1 g Average Limits 8.0 W/kg Duty cycle 50%	Power Drift (dB) ± 0.21 Power Drift(dB)	Graph Results
The EUT display towards phantom, Distance 15mm (Face Held)					
468.8 MHz	8	4.380	2.19	-0.058	Figure 8
459.4 MHz	7	4.240	2.12	0.001	Figure 10
451.3 MHz	11	3.460	1.73	-0.042	Figure 12
The EUT display towards ground with belt clip, Distance 0mm (Body-Worn)					
468.8 MHz	8	3.510	1.775	0.014	Figure 14
459.4 MHz	7	3.350	1.675	-0.039	Figure 16
451.3 MHz	11	3.370	1.685	-0.019	Figure 18

Table 13:SAR Values are scaled for the power drift

Frequency	Channel	1 g Average Limits 8.0 W/kg Duty cycle 100%	1 g Average Limits 8.0 W/kg Duty cycle 50%	Power Drift (dB) ± 0.21 Power Drift(dB)	+ Power Drift 10^(dB/10)	SAR 1g(W/kg) (include +power drift) Duty cycle 100%	SAR 1g(W/kg) (include +power drift) Duty cycle 50%
The EUT display towards phantom, Distance 15mm (Face Held)							
468.8 MHz	8	4.380	2.190	-0.058	1.013	4.437	2.218
459.4 MHz	7	4.240	2.120	0.001	1.000	4.240	2.120
451.3 MHz	11	3.460	1.730	-0.042	1.010	3.495	1.747
The EUT display towards ground with belt clip, Distance 0mm (Body-Worn)							
468.8 MHz	8	3.510	1.775	0.014	1.003	3.521	1.760
459.4 MHz	7	3.350	1.675	-0.039	1.009	3.380	1.690
451.3 MHz	11	3.370	1.685	-0.019	1.004	3.383	1.692

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. The Exposure category about EUT: controlled environment / Occupational, so the SAR limit is 8.0 W/kg averaged over any 1 gram of tissue.

9.4. Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this report. Maximum localized SAR is 2.218W/kg that are below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report.

10. MEASUREMENT UNCERTAINTY

No.	source	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard ncertainty $u_i^{'}$ (%)	Degree of freedom V_{eff} or v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
Measurement system								
2	probe calibration	B	5.9	N	1	1	5.9	∞
3	axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	1.9	∞
4	Hemispherical isotropy of the probe	B	9.4	R	$\sqrt{3}$	$\sqrt{0.5}$	3.9	∞
6	boundary effect	B	1.9	R	$\sqrt{3}$	1	1.1	∞
7	probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
8	System detection limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	readout Electronics	B	1.0	N	1	1	1.0	∞
10	response time	B	0	R	$\sqrt{3}$	1	0	∞
11	integration time	B	4.32	R	$\sqrt{3}$	1	2.5	∞
12	noise	B	0	R	$\sqrt{3}$	1	0	∞
13	RF Ambient Conditions	B	3	R	$\sqrt{3}$	1	1.73	∞
14	Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
15	Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
16	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Test sample Related								
17	-Test Sample Positioning	A	2.9	N	1	1	2.9	5
18	-Device Holder Uncertainty	A	4.1	N	1	1	4.1	5
19	-Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
Physical parameter								

20	-phantom	B	4.0	R	$\sqrt{3}$	1	2.3	∞
21	-liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.64	1.8	∞
22	-liquid conductivity (measurement uncertainty)	B	5.0	N	1	0.64	3.2	∞
23	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
24	-liquid permittivity (measurement uncertainty)	B	5.0	N	1	0.6	3.0	∞
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					12.0	
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		24.0	

11. MAIN TEST INSTRUMENTS

Table 14: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 14, 2008	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 14, 2009	One year
04	Power sensor	Agilent 8481H	MY41091316	March 14, 2009	One year
05	Signal Generator	HP 8341B	2730A00804	September 14, 2008	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	E-field Probe	ET3DV6	1737	November 25, 2008	One year
08	DAE	DAE4	452	November 18, 2008	One year
09	Validation Kit 450MHz	D450V2	1021	February 2, 2009	One year

12. TEST PERIOD

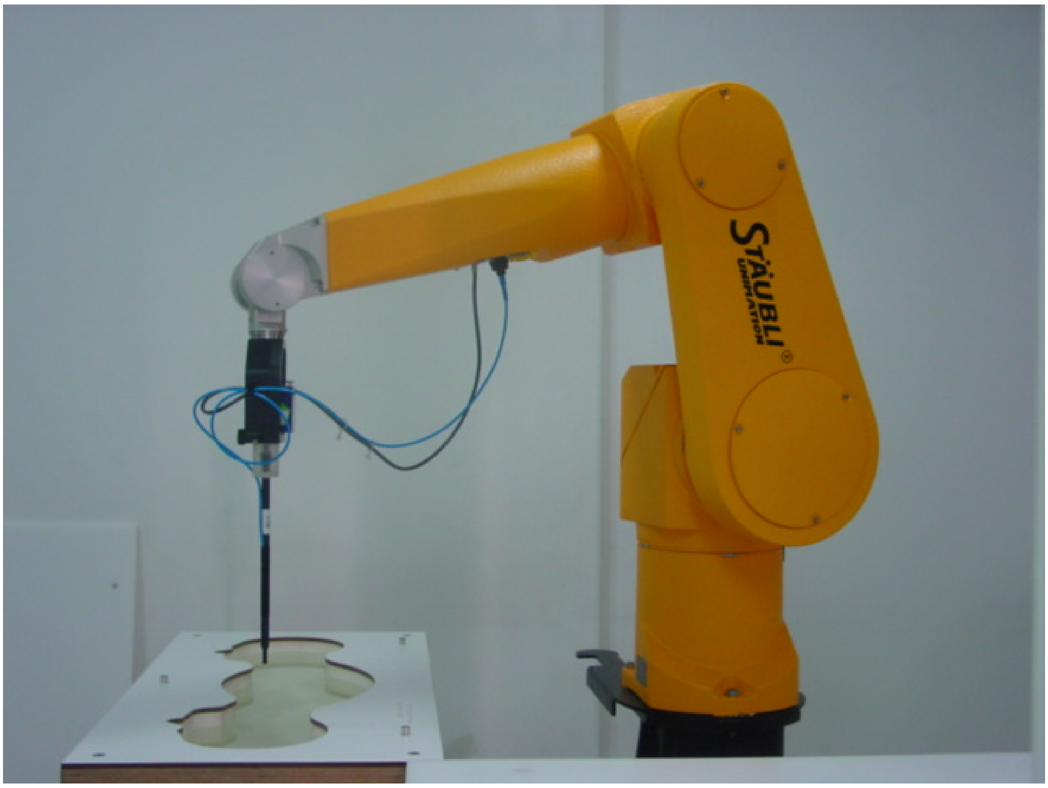
The test is performed in July 6, 2009.

13. TEST LOCATION

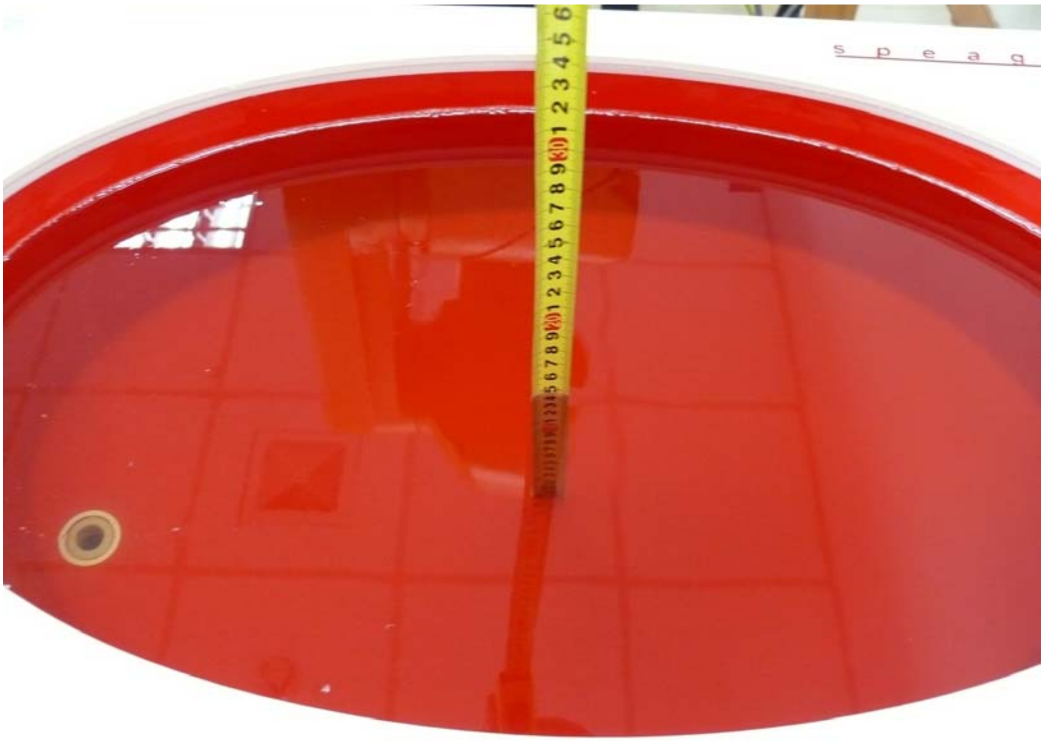
The test is performed at TA Technology (Shanghai) Co., Ltd.

*******END OF REPORT BODY*******

ANNEX A: TEST LAYOUT



Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the Flat Phantom (450 MHz)

ANNEX B: SYSTEM VALIDATION RESULTS

System Performance Check at 450 MHz

DUT: Dipole450 MHz; Type: D450V2; Serial: 1021

Date/Time: 7/06/2009 3:14:33 PM

Communication System: CW; Frequency: 450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 450 MHz; σ = 0.854 mho/m; ε_r = 44.93; ρ = 1000 kg/m^3

- Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2);
- Electronics: DAE4 Sn452;

d=15mm, Pin=398mW/Area Scan (41x131x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.15 mW/g

d=15mm, Pin=398mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.1 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 3.29 W/kg
SAR(1 g) = 2.02 mW/g; SAR(10 g) = 1.32 mW/g
Maximum value of SAR (measured) = 2.15 mW/g

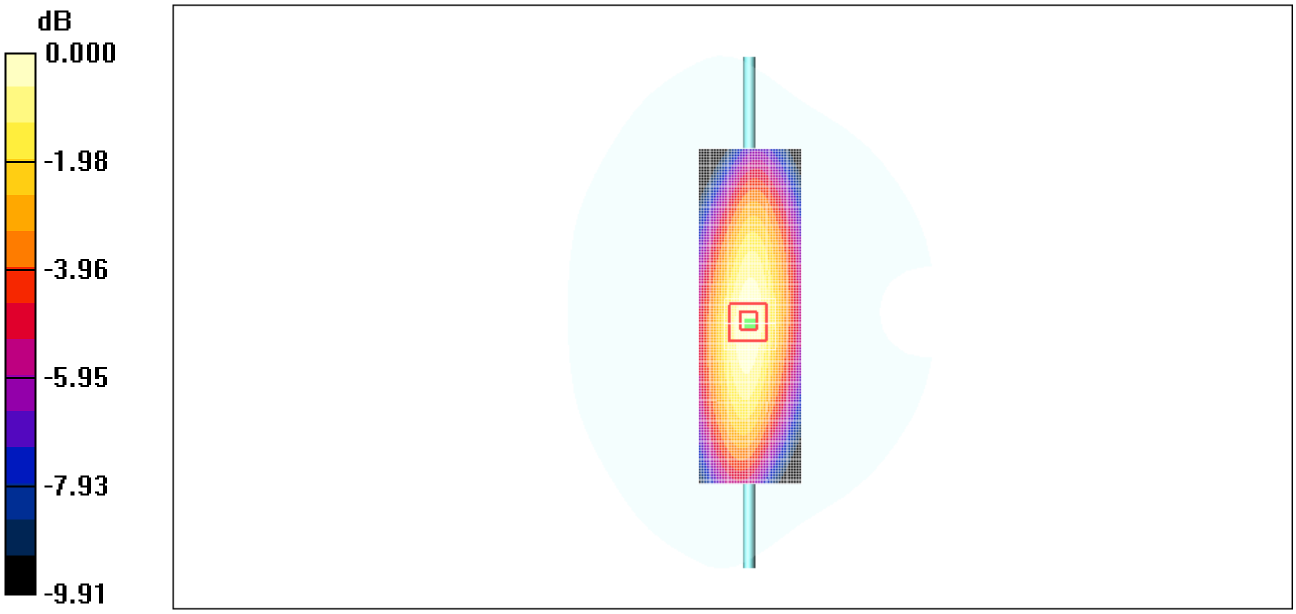


Figure 7 System Performance Check 450MHz 398mW

ANNEX C: GRAPH RESULTS

Face Held, Front towards Phantom, distance 15 mm, High

Date/Time: 7/6/2009 5:39:26 PM

Communication System: PTT 450; Frequency: 468.8 MHz;Duty Cycle: 1:1

Medium parameters used: f = 469 MHz; σ = 0.864 mho/m; ε_r = 44.5; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Towards Phantom High/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.72 mW/g

Towards Phantom High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 73.5 V/m; Power Drift =-0.058 dB

Peak SAR (extrapolated) = 6.34 W/kg

SAR(1 g) = 4.38 mW/g;

Maximum value of SAR (measured) = 4.63 mW/g

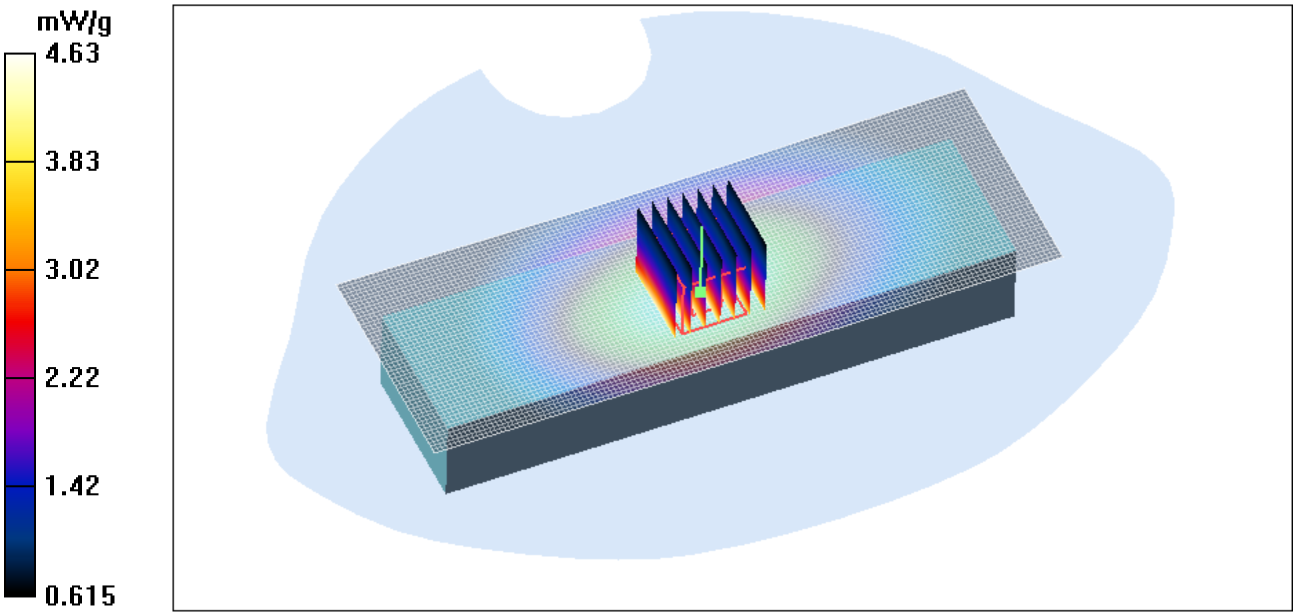


Figure 8 Face Held, Towards Phantom, distance 15mm 468.8MHz

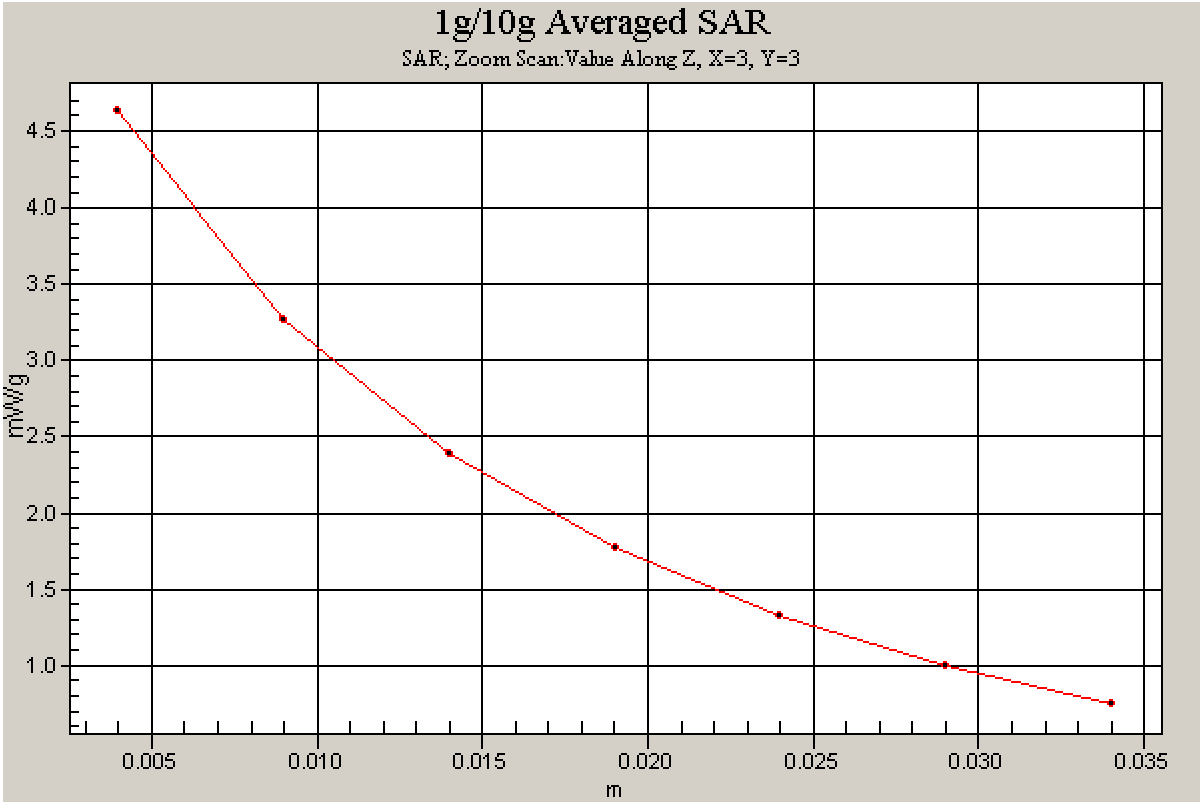


Figure 9 Z-Scan at power reference point (Face Held, Towards Phantom, distance 15mm 468.8MHz)

Face Held , Front towards Phantom, distance 15 mm,Middle

Date/Time: 7/6/2009 5:59:56 PM

Communication System: PTT 450; Frequency: 459.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 459.4 MHz; σ = 0.86 mho/m; ε_r = 44.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Towards Phantom Middle/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 4.54 mW/g

Towards Phantom Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 72.3 V/m; Power Drift = 0.001 dB

Peak SAR (extrapolated) = 6.12 W/kg

SAR(1 g) = 4.24 mW/g;

Maximum value of SAR (measured) = 4.48 mW/g

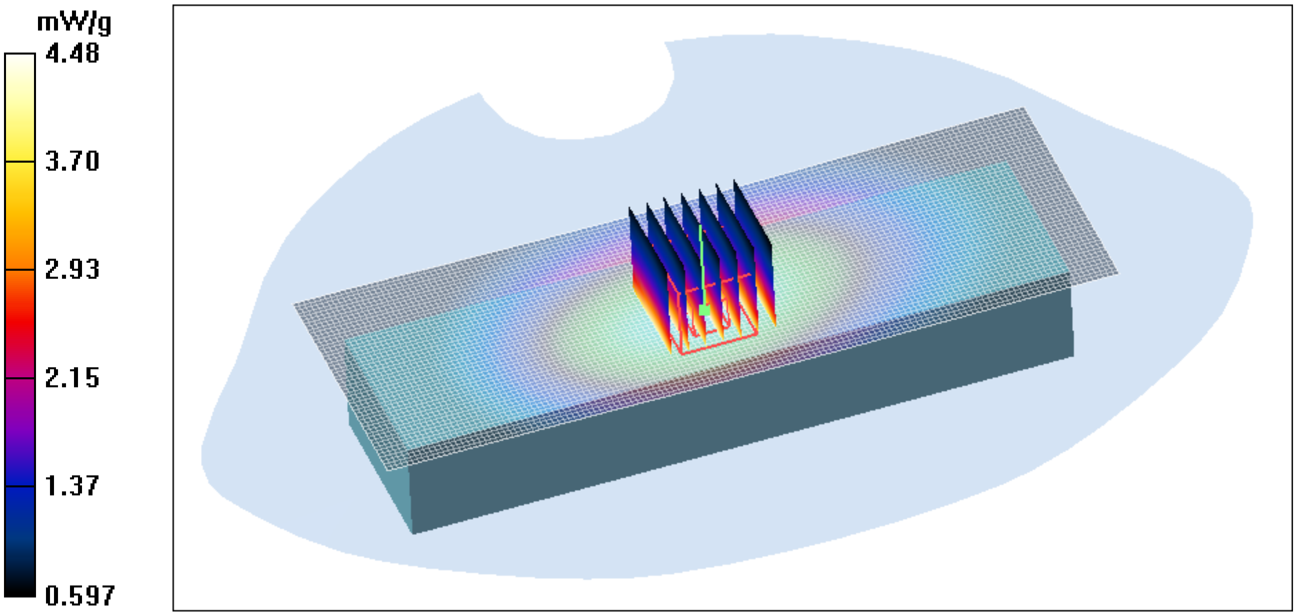


Figure 10 Face Held, Front Towards Phantom, distance 15 mm, 459.4MHz

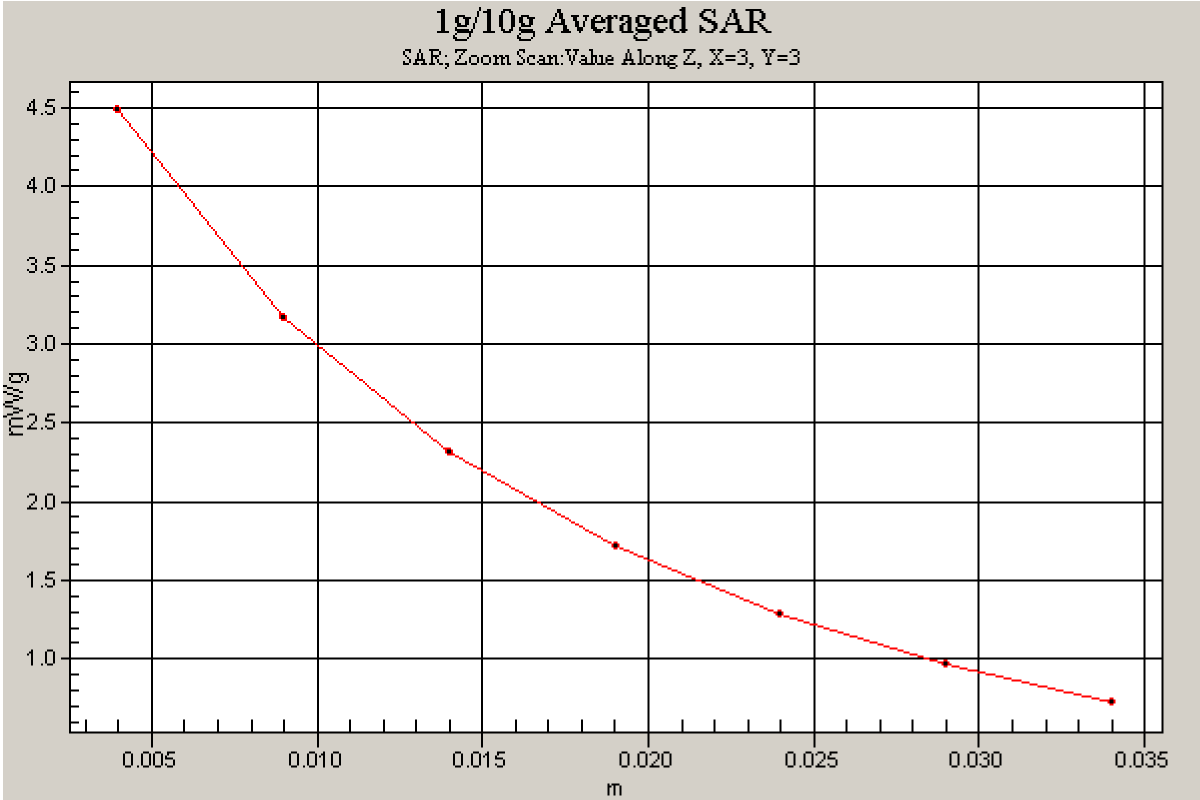


Figure 11 Z-Scan at power reference point (Face Held, Front Towards Phantom, distance 15 mm, 459.4MHz)

Face Held, Front towards Phantom, distance 15 mm, Low

Date/Time: 7/6/2009 6:20:26 PM

Communication System: PTT 450; Frequency: 451.3 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 451.3 MHz; σ = 0.853 mho/m; ε_r = 44.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.2, 7.2, 7.2); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Towards Phantom Low/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.35 mW/g

Towards Phantom Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 71.6 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 4.96 W/kg
SAR(1 g) = 3.46 mW/g;
Maximum value of SAR (measured) = 3.63 mW/g

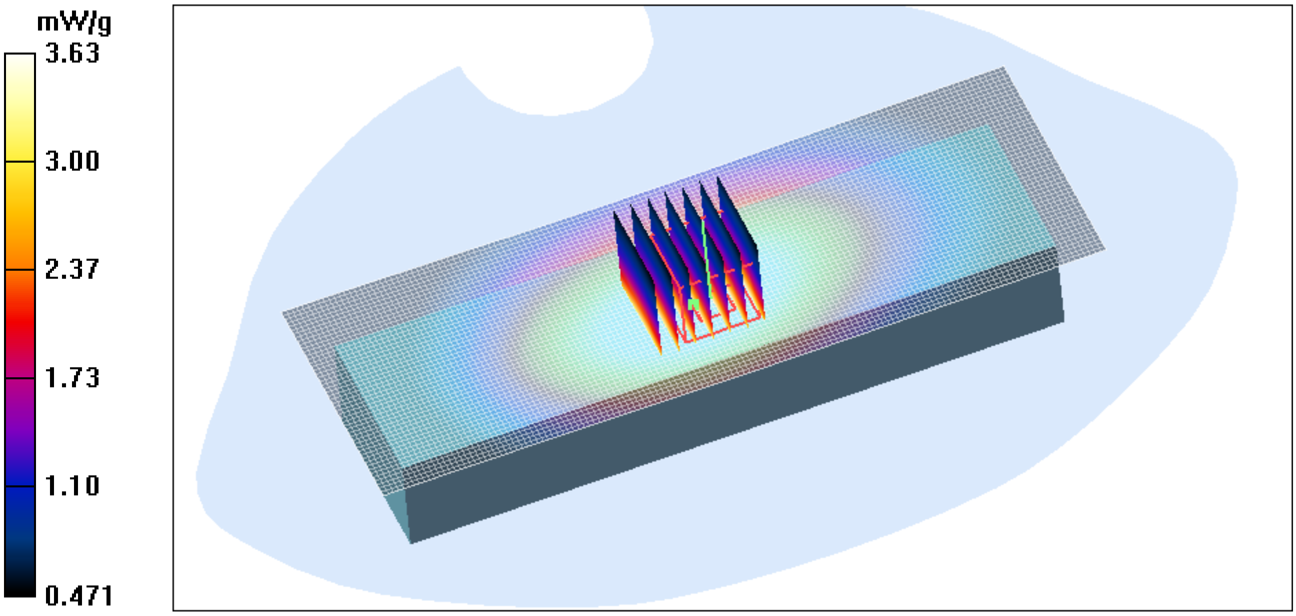


Figure 12 Face Held, Front Towards Phantom, distance 15 mm, 451.3 MHz

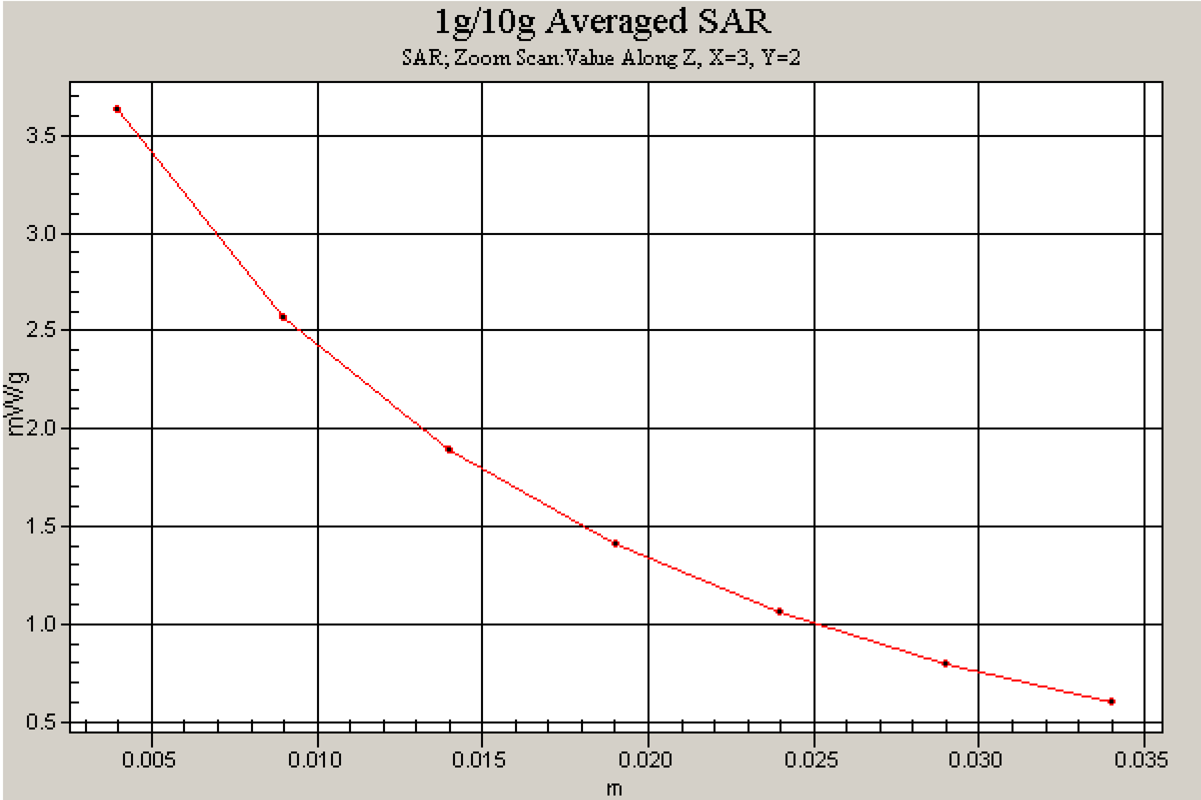


Figure 13 Z-Scan at power reference point (Face Held, Front Towards Phantom, distance 15 mm, 451.3 MHz)

Body-Worn, Front towards Ground, Belt clip attach Phanntom High

Date/Time: 7/6/2009 9:51:12 PM

Communication System: PTT 450; Frequency: 468.8 MHz;Duty Cycle: 1:1

Medium parameters used: f = 469 MHz; σ = 0.954 mho/m; ε_r = 56.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.52, 7.52, 7.52); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Towards Ground High/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.86 mW/g

Towards Ground High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 61.4 V/m; Power Drift = 0.014 dB

Peak SAR (extrapolated) = 5.17 W/kg

SAR(1 g) = 3.51 mW/g;

Maximum value of SAR (measured) = 3.70 mW/g

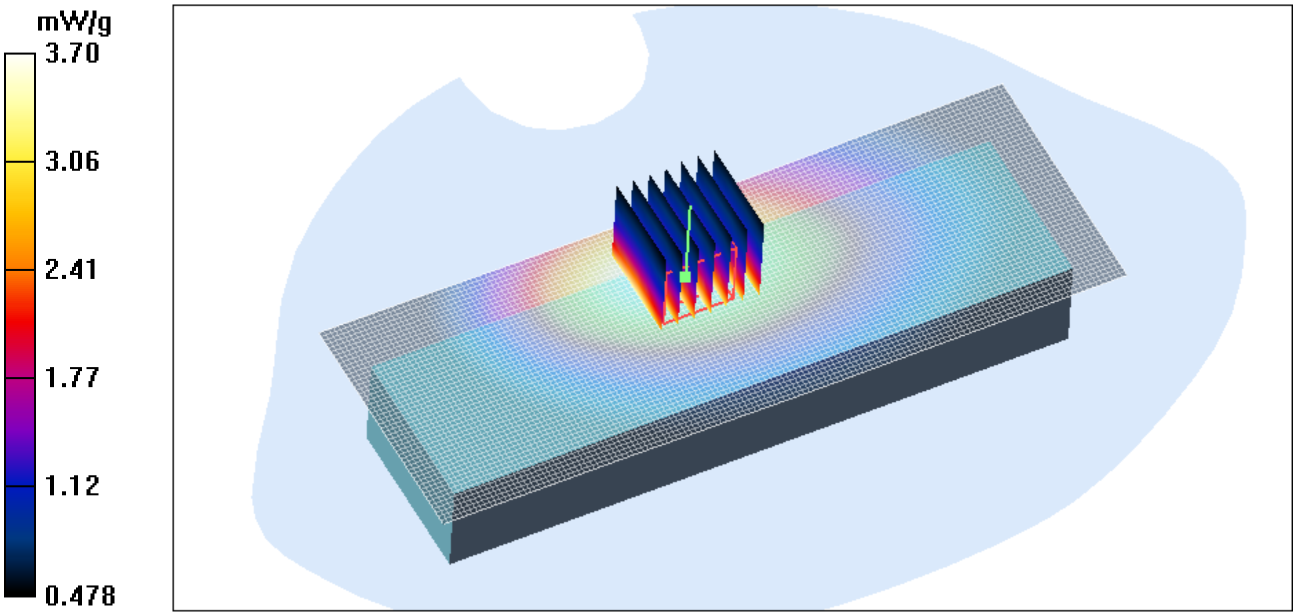


Figure 14 Body-Worn, Front towards Ground, Belt clip attach Phanntom 468.8MHz

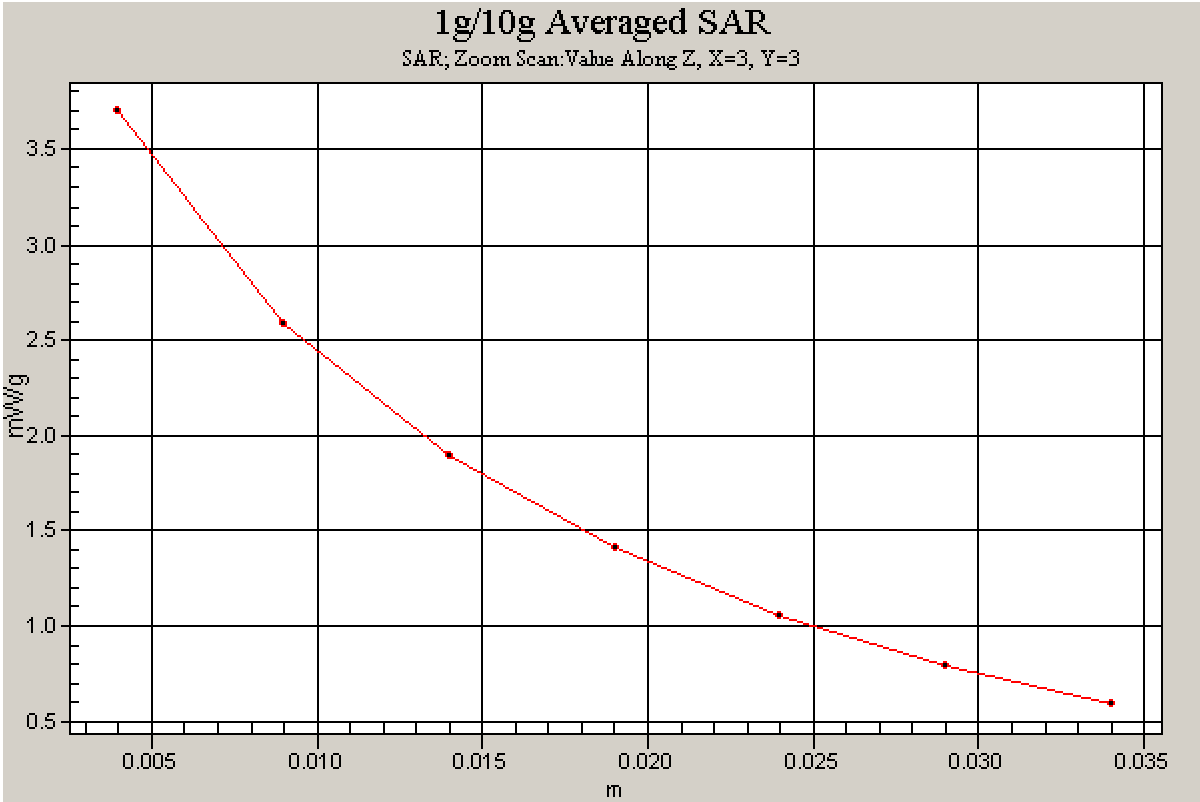


Figure 15 Z-Scan at power reference point (Body-Worn, Front towards Ground, Belt clip attach Phanntom 468.8MHz)

Body-Worn, Front towards Ground, Belt clip attach Phanntom Middle

Date/Time: 7/6/2009 10:11:40 PM

Communication System: PTT 450; Frequency: 459.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 459.4 MHz; σ = 0.95 mho/m; ε_r = 56.9; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.52, 7.52, 7.52); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Towards Ground Middle/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.61 mW/g

Towards Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.9 V/m; Power Drift = -0.039 dB

Peak SAR (extrapolated) = 4.95 W/kg

SAR(1 g) = 3.35 mW/g;

Maximum value of SAR (measured) = 3.55 mW/g

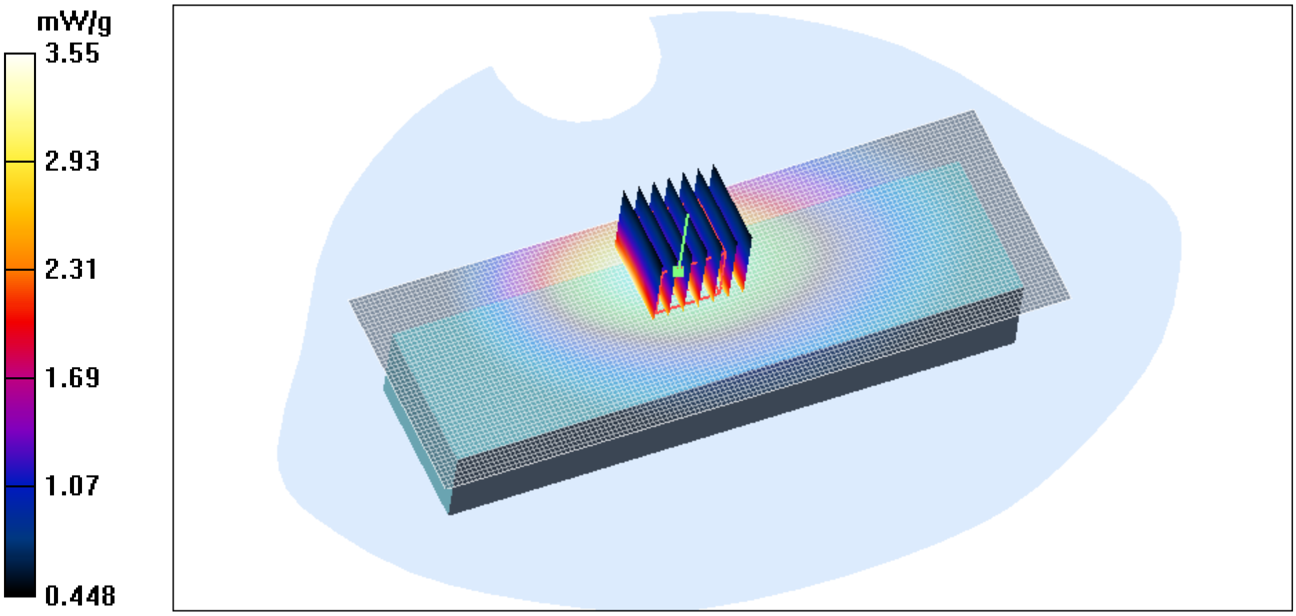


Figure 16 Body-Worn, Front towards Ground, Belt clip attach Phanntom 459.4MHz

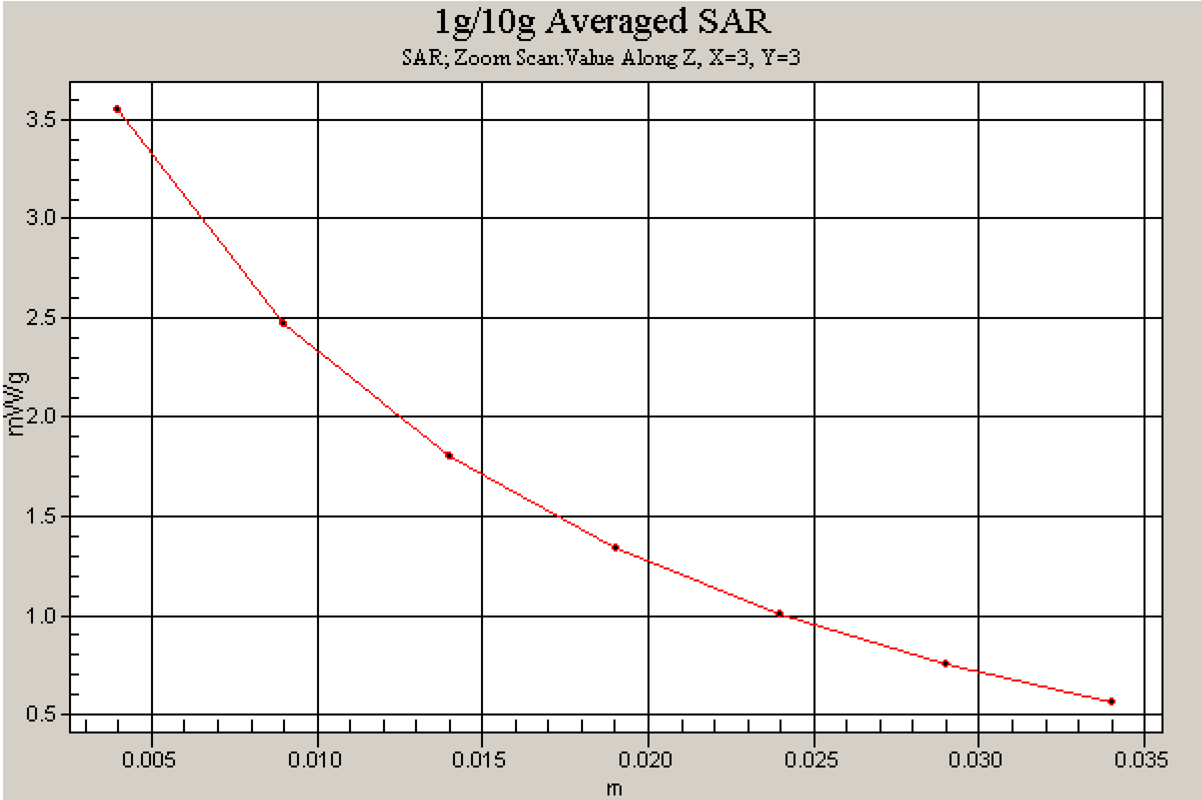


Figure 17 Z-Scan at power reference point (Body-Worn, Front towards Ground, Belt clip attach Phanntom 459.4MHz)

Body-Worn, Front towards Ground, Belt clip attach Phanntom Low

Date/Time: 7/6/2009 11:03:34 PM

Communication System: PTT 450; Frequency: 451.3 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 451.3 MHz; σ = 0.946 mho/m; ε_r = 57; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liqiud Temperature: 21.5℃

Phantom section: Flat Section

DASY4 Configuration:

Probe: ET3DV6 - SN1737; ConvF(7.52, 7.52, 7.52); Calibrated: 11/25/2008

Electronics: DAE4 Sn452; Calibrated: 11/18/2008

Phantom: SAM 12; Type: SAM V4.0; Serial: TP-1246

Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Towards Ground Low/Area Scan (51x141x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 3.62 mW/g

Towards Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.2 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 10.3 W/kg

SAR(1 g) = 3.37 mW/g;

Maximum value of SAR (measured) = 3.43 mW/g

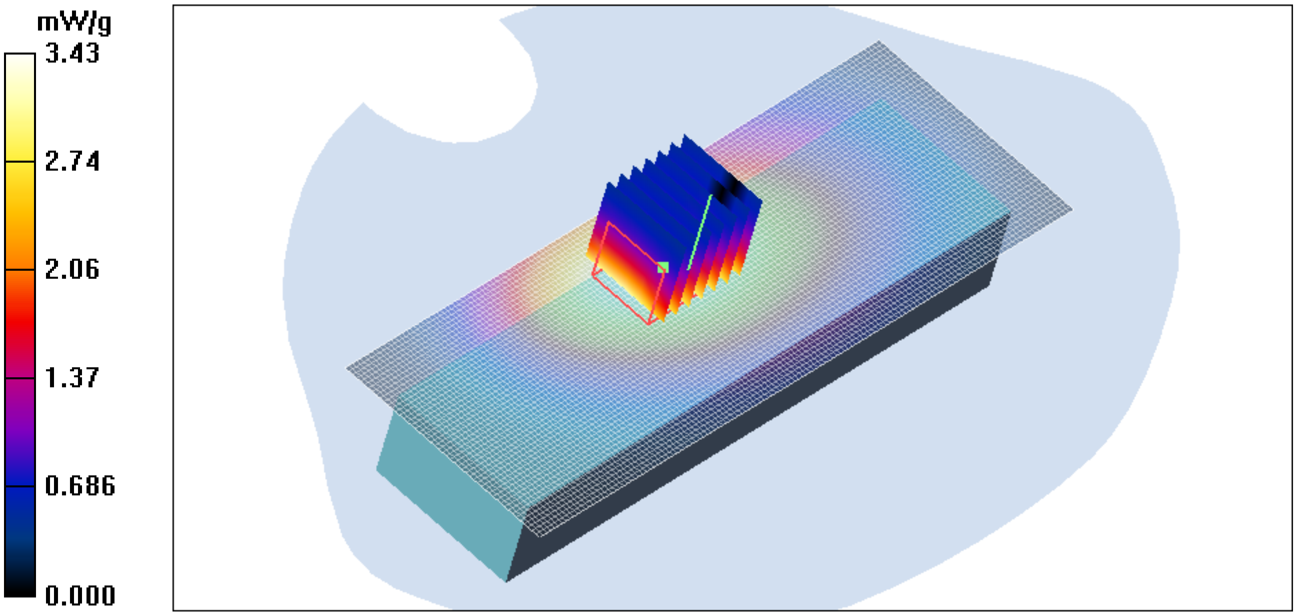


Figure 18 Body-Worn, Front towards Ground, Belt clip attach Phanntom 451.3MHz

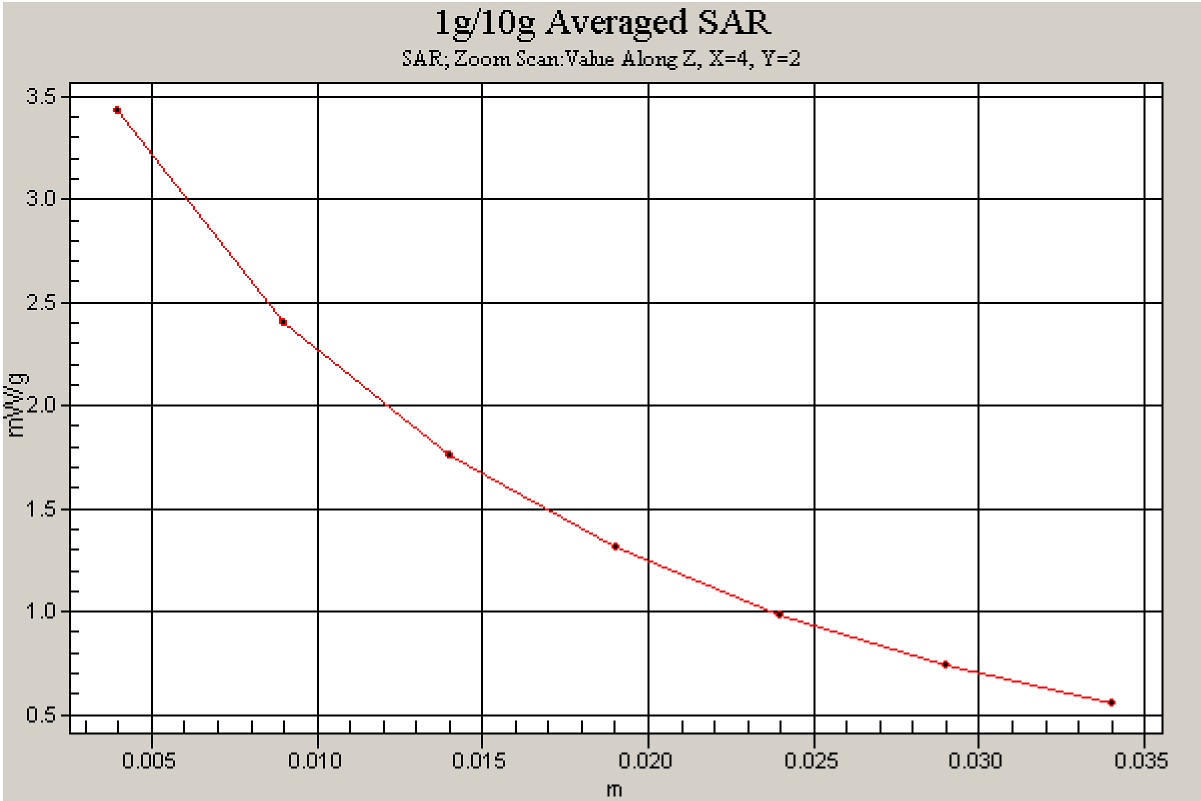


Figure 19 Z-Scan at power reference point (Body-Worn, Front towards Ground, Belt clip attach Phanntom 451.3MHz)