Deutscher Akkreditierungs Rat

DAR

No. DAT-P-114/01-01

TEST REPORT

No. SAR2006014

FCCID	Q4X-HHTU1
Test name	Electromagnetic Field (Specific Absorption Rate)
Product	Handheld Transceiver
Model	308SU/MT16U
Client	Techwall Electronics Co., Ltd.
Type of test	Non Type approval

Telecommunication Metrology Center

of Ministry of Information Industry

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TABLE OF CONTENT

1 COMPETENCE AND WARRANTIES 5
2 GENERAL CONDITIONS 5
3 DESCRIPTION OF EUT 5
3.1 ADDRESSING INFORMATION RELATED TO EUT 5
3.2 CONSTITUENTS OF EUT 6
3.3 GENERAL DESCRIPTION 7
4 OPERATIONAL CONDITIONS DURING TEST 8
4.1 SCHEMATIC TEST CONFIGURATION 8
4.2 SAR MEASUREMENT SET-UP 8
4.3 DASY4 E-FIELD PROBE SYSTEM 9
4.4 E-FIELD PROBE CALIBRATION 10
4.5 OTHER TEST EQUIPMENT 11
4.6 EQUIVALENT TISSUES 12
4.7 SYSTEM SPECIFICATIONS 12
5 CHARACTERISTICS OF THE TEST 13
5.1 APPLICABLE LIMIT REGULATIONS 13
5.2 APPLICABLE MEASUREMENT STANDARDS 13
5.3 CHARACTER OF THE TEST 13
6 LABORATORY ENVIRONMENT 13
7 CONDUCTED OUTPUT POWER MEASUREMENT 14
7.1 SUMMARY 14
7.2 CONDUCTED POWER 14
8 TEST RESULTS 15
8.1 DIELECTRIC PERFORMANCE 15
8.2 SYSTEM VALIDATION 15
8.3 SUMMARY OF MEASUREMENT RESULTS 16
8.4 CONCLUSION 17
9 MEASUREMENT UNCERTAINTY 17
10 MAIN TEST INSTRUMENTS 18
11 TEST PERIOD 18
12 TEST LOCATION 18
ANNEX A： MEASUREMENT PROCESS 19
ANNEX B： TEST LAYOUT 20
ANNEX C: GRAPH RESULTS 23
ANNEX D: SYSTEM VALIDATION RESULTS 47
ANNEX E: PROBE CALIBRATION CERTIFICATE 48
ANNEX F: DIPOLE CALIBRATION CERTIFICATE 57

Product name	Handheld Transceiver	Sample Model	308SU/MT16U
Client	Techwall Electronics Co., Ltd.	Type of test	Non Type Approval
Factory	Techwall Electronics Co., Ltd..	Sampling arrival date	October 24th, 2006
Manufacturer	Techwall Electronics Co., Ltd.		
Sampling/ Sending sample	Sending sample	Sample sent by	SM Wong
Sampling location	/	Sampling person	/
Sample quantity	1	Sample matrix	/
Series number of the Sample	/		
Manufacture date	/	Manufacture location	/
Test basis	**EN 50360–2001:** Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **ANSI C95.1–1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz **IEC 62209-2 (Draft):** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the Body **IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques. **OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01):** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.		
Test 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 5.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: Nov 2nd, 2006**		
Note	The test results relate only to the items tested of the sample(s).		

Approved by ______ (Lu Bingsong) **Deputy Director of the laboratory**

Reviewed by ______ (Wang Hongbo)

Tested by ______ (Sun Qian)

1 COMPETENCE AND WARRANTIES

Telecommunication Metrology Center of Ministry of Information Industry is a test laboratory accredited by DAR (DATech) – Deutschen Akkreditierungs Rat (Deutsche Akkreditierungsstelle Technik) for the tests indicated in the Certificate No. **DAT-P-114/01-01**.

Telecommunication Metrology Center of Ministry of Information Industry is a test laboratory competent to carry out the tests described in this test report.

Telecommunication Metrology Center of Ministry of Information Industry 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 **Telecommunication Metrology Center of Ministry of Information Industry** 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 of Company	Techwall Electronics Co., Ltd.
Address/Post	24/F, Tan Centre, Tower 1, 237, Queen's Road, HK, China
City	HongKong
Postal Code	\
Country	China
Telephone	0852-28506860
Fax	0852-28506936

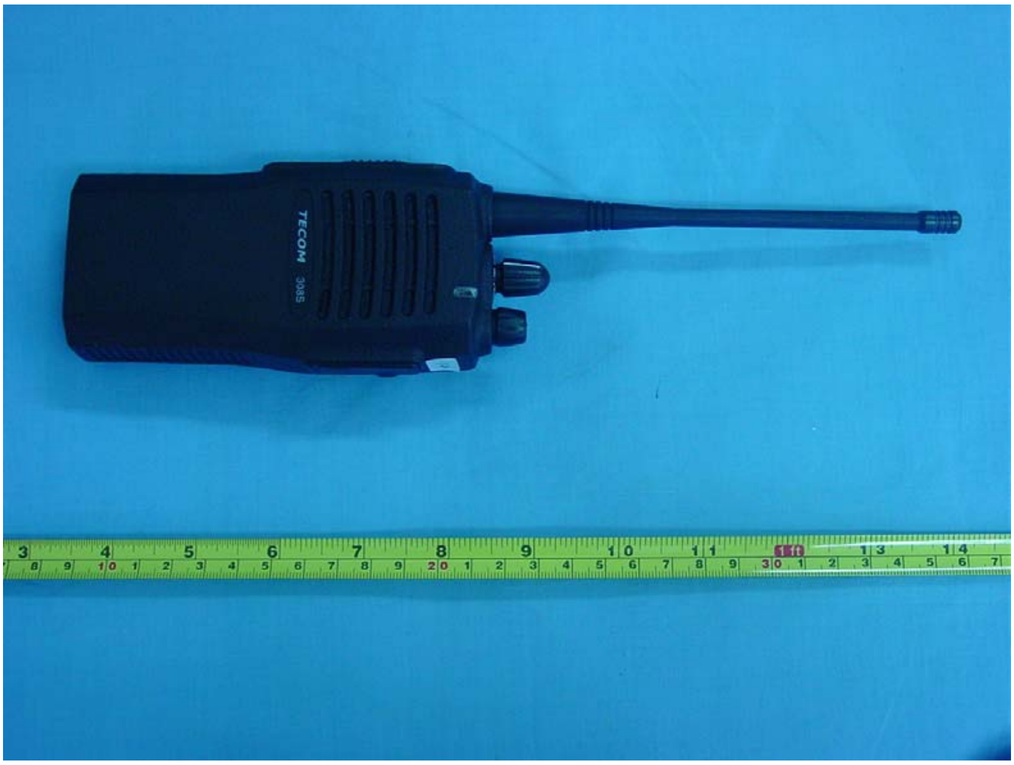
Table 2: Manufacturer

Name of Company	Techwall Electronics Co., Ltd.
Address/Post	24/F, Tan Centre, Tower 1, 237, Queen's Road, HK, China
City	HongKong
Postal Code	\
Country	China
Telephone	0852-28506860
Fax	0852-28506936

3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handheld Transceiver	308SU/MT16u	\	Techwall Electronics Co., Ltd.
Rapid Charger	TQC-70	\	Techwall Electronics Co., Ltd.
Li-ion Battery	TNB-20	\	Techwall Electronics Co., Ltd
Ni-mH Battery	TNB-18	\	Techwall Electronics Co., Ltd.



Picture 1.1: Handheld Transceiver

Picture 1.2: Li-ion Battery TNB-20

Picture 1.3: Ni-mH Battery TNB-18

Picture 1: Constituents of the sample

3.3 General Description

Equipment Under Test (EUT) is a handheld transceiver and working under F3E mode. It consists of Handset and normal options: two Batteries and charger as Table 3 and Picture 1.Its frequency band is from 440MHz to 470MHz.

The sample under test was selected by the Client.
Components list please refer to documents of the manufacturer.

4 OPERATIONAL CONDITIONS DURING TEST

4.1 Schematic Test Configuration

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. Using the programming software and cable to set the channel 1, 2 and 3 respectively to 440.012 MHz, 455.012 MHz and 469.91 3MHz.

Since the belt clip is a standard accessory of the EUT, for each channel, the EUT is tested at the following 2 modes:

Mode 1: The EUT is face towards the flat phantom and the separation distance is 2.5cm between the surface of the EUT and the bottom of the flat phantom. The phantom is fulfilled with 450MHz head tissue equivalent matter. (See Annex B Picture B.4)

Mode 2: The EUT is face towards the ground with the belt clip touched the bottom of the flat phantom. The phantom is fulfilled with 450MHz body tissue equivalent matter. (See Annex B Picture B.5)

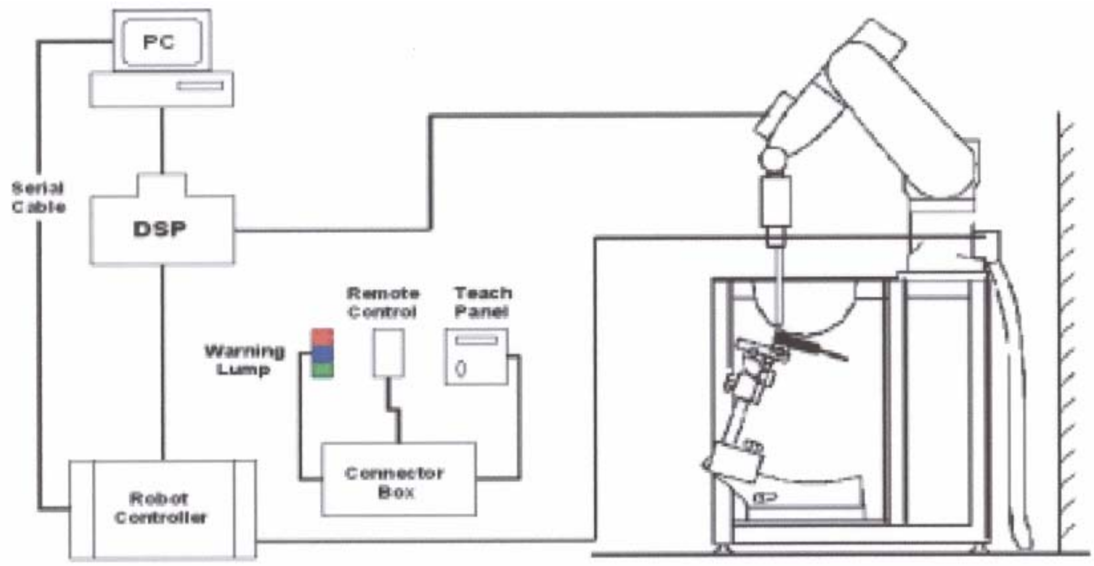
Since the EUT has two standard kinds of battery, one is Li-ion, and the other is Ni-mH (see Table 3 and Picture 1). For each test mode, EUT is tested with the two kinds of battery separately.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 30 dB.

4.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 Professional 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, teaches pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Stäubli 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 coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.



Picture 2. SAR Lab Test Measurement Set-up

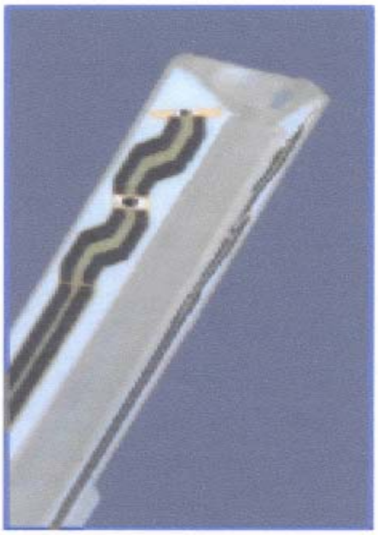
The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information 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.

4.3 Dasy4 E-field Probe System

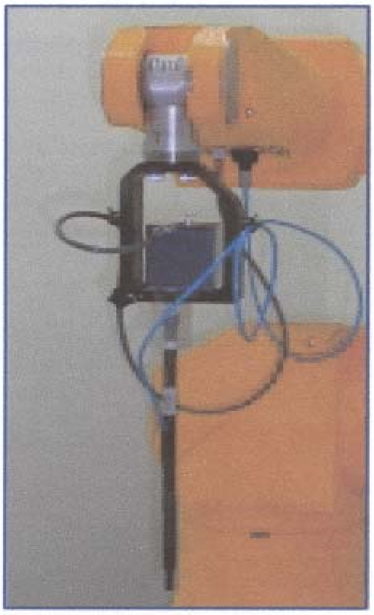
The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

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 2.5 GHz In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz and 1.8GHz (accuracy±8%) Calibration for other liquids and frequencies upon request
Frequency	l 0 MHz to > 6 GHz; Linearity: ±0.2 dB (30 MHz to 3 GHz)
Directivity	±0.2 dB in brain tissue (rotation around probe axis) ±0.4 dB in brain tissue (rotation normal 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 diameter: 6.8mm Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 3GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms



Picture 3. ET3DV6 E-field Probe



Picture 4. ET3DV6 E-field probe

4.4 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).

Note: Please see Annex E to check the probe calibration certificate.

Picture 5. Device Holder

4.5 Other Test Equipment

4.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, 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 FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

4.5.2 Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. 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 the 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 in the robot.

Shell Thickness	2±0. l mm
Filling Volume	Approx. 20 liters
Dimensions	810 x l000 x 500 mm (H x L x W)
Available	Special

Picture 6. Generic Twin Phantom

4.6 Equivalent Tissues

The liquid used for the frequency range of 450 MHz consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 4 and Table 5 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEC 62209 Draft(Part 2) and OET Bulletin 65 C(Edition 01-01).

Table 4. Composition of the Head Tissue Equivalent Matter

MIXTURE %	FREQUENCY 450MHz
Water	38.91
Sugar	56.93
Cellulose	0.25
Salt	3.79
Preventol	0.12
Dielectric Parameters Target Value	f=450MHz ε=43.5 σ=0.87

Table 5. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 450MHz
Water	46.21
Sugar	51.17
Cellulose	0.18
Salt	2.34
Preventol	0.08
Dielectric Parameters Target Value	f=450MHz ε=56.7 σ=0.94

4.7 System Specifications

4.7.1 Robotic System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX90L

Repeatability: ±0.02 mm

No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium III

Clock Speed: 800 MHz

Operating System: Windows 2000

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic

Software: DASY4 software

Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

5 CHARACTERISTICS OF THE TEST

5.1 Applicable Limit Regulations

EN 50360–2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

It specifies the maximum exposure limit of **10.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 cm of the user in the controlled environment.

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

It specifies the maximum exposure limit of **8.0 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the controlled environment.

5.2 Applicable Measurement Standards

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

IEC 62209-2 (Draft): Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.

OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01): Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.

They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

5.3 Character of the Test

Since it may be used for body-worn situation, the EUT is test with the flat phantom to simulate this case.

6 LABORATORY ENVIRONMENT

Table 6: The Ambient Conditions during EMF Test

Temperature	Min. = 15 °C, Max. = 30 °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 CONDUCTED OUTPUT POWER MEASUREMENT

7.1 Summary

During the process of testing, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition with the programming software and cable setting the channel. This result contains conducted output power and ERP for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

7.2 Conducted Power

7.2.1 Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured with Agilent Spectrum Analyzer E4440A. These measurements were done at 3 channels, 1, 2 and 3 before SAR test and after SAR test with the different two batteries respectively.

7.2.2 Measurement result

Table 7: Conducted Power Measurement Results

	Conducted Power with Li-ion Battery TNB-20 (dBm)		
	Channel 1(440.012 MHz)	**Channel 2(455.012MHz)**	**Channel 3(469.913 MHz)**
Before Test	34.89	35.25	34.81
After Test	34.76	35.39	34.73
	Conducted Power with Ni-mH Battery TNB-18 (dBm)		
	Channel 1(440.012 MHz)	**Channel 2(455.012MHz)**	**Channel 3(469.913 MHz)**
Before Test	34.89	35.25	34.85
After Test	34.75	35.40	34.71

7.2.3 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 11 to Table 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

8 TEST RESULTS

8.1 Dielectric Performance

Table 8: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 22.9 °C and relative humidity 45%.
Liquid temperature during the test: 22.1°C

/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	450 MHz	43.5	0.87
Measurement value (Average of 10 tests)	450 MHz	45.6	0.84

Table 9: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 23.0 °C and relative humidity 44%.
Liquid temperature during the test: 22.5°C

/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	450 MHz	56.7	0.94
Measurement value (Average of 10 tests)	450 MHz	57.1	0.96

8.2 System Validation

Table 10: System Validation

Measurement is made at temperature 22.9 °C, relative humidity 45%, input power 250 mW.
Liquid temperature during the test: 22.1°C

Liquid parameters	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
	450 MHz	45.6	0.84

Verification results	**Frequency**	**Target value (W/kg)**		**Measurement value (W/kg)**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**
	450 MHz	0.825	1.225	0.823	1.23

Note：Target Values used are one fourth of those in IEEE Std 1528-2003 (feeding power is normalized to 1 Watt), i.e. 250 mW is used as feeding power to the validation dipole (SPEAG using).

8.3 Summary of Measurement Results

Table 11: SAR Values (Mode 1with Li-ion Battery)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	10.0	8.0	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Flat Phantom, Mode 1, High frequency (See Fig. 1)	2.51	3.9	-0.195
Flat Phantom, Mode 1, Mid frequency (See Fig. 3)	2.27	3.06	-0.200
Flat Phantom, Mode 1, Bottom frequency (See Fig. 5)	1.92	2.58	-0.075

Table 12: SAR Values (Mode 1 with Ni-mh Battery)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	10.0	8.0	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Flat Phantom, Mode 1, High frequency (See Fig. 7)	1.98	2.69	-0.153
Flat Phantom, Mode 1, Mid frequency (See Fig. 9)	1.85	2.52	-0.148
Flat Phantom, Mode 1, Bottom frequency (See Fig. 11)	1.81	2.42	-0.182

Table 13: SAR Values (Mode 2 with Li-ion battery)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	10.0	8.0	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Flat Phantom, Mode 2, High frequency (See Fig. 13)	3.14	4.36	-0.166
Flat Phantom, Mode 2, Mid frequency (See Fig. 15)	3.1	4.29	-0.152
Flat Phantom, Mode 2, Bottom frequency (See Fig. 17)	2.95	4.07	-0.174

Table 14: SAR Values (Mode 2 with Ni-mh Battery)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	10.0	8.0	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Flat Phantom, Mode 2, High frequency (See Fig. 19)	2.42	3.32	-0.154
Flat Phantom, Mode 2, Mid frequency (See Fig. 21)	2.44	3.35	-0.169
Flat Phantom, Mode 2, Bottom frequency (See Fig. 23)	2.51	3.44	-0.121

8.4 Conclusion

Localized Specific Absorption Rate (SAR) of this EUT has been measured in all cases requested by the relevant standards cited in Clause 5.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

9 Measurement Uncertainty

SN	a	Type	c	d	e = f(d,k)	f	h = c x f / e	k
	Uncertainty Component		Tol. (± %)	Prob. Dist.	Div.	c_i (1 g)	1 g u_i (±%)	v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
	Measurement System							
2	Probe Calibration	B	5	N	2	1	2.5	∞
3	Axial Isotropy	B	4.7	R	√3	$(1-cp)^{1/2}$	4.3	∞
4	Hemispherical Isotropy	B	9.4	R	√3	$\sqrt{c_p}$		∞
5	Boundary Effect	B	0.4	R	√3	1	0.23	∞
6	Linearity	B	4.7	R	√3	1	2.7	∞
7	System Detection Limits	B	1.0	R	√3	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞
9	RF Ambient Conditions	B	3.0	R	√3	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	√3	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	√3	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	√3	1	2.3	∞
	Test sample Related							
13	Test Sample Positioning	A	4.9	N	1	1	4.9	N-1
14	Device Holder Uncertainty	A	6.1	N	1	1	6.1	N-1
15	Output Power Variation - SAR drift measurement	B	5.0	R	√3	1	2.9	∞
	Phantom and Tissue Parameters							
16	Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	√3	1	0.6	∞
17	Liquid Conductivity - deviation from target values	B	5.0	R	√3	0.64	1.7	∞
18	Liquid Conductivity - measurement uncertainty	B	5.0	N	1	0.64	1.7	M
19	Liquid Permittivity - deviation from target values	B	5.0	R	√3	0.6	1.7	∞
20	Liquid Permittivity - measurement uncertainty	B	5.0	N	1	0.6	1.7	M
	Combined Standard Uncertainty			RSS			11.25	
	Expanded Uncertainty (95% CONFIDENCE INTERVAL)			K=2			22.5	

10 MAIN TEST INSTRUMENTS

Table 15: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 30,2006	One year
02	Dielectric Probe Kit	Agilent 85070C	US99360113	No Calibration Requested	
03	Power meter	NRVD	101253	June 20, 2006	One year
04	Power sensor	NRV-Z5	100333		
05	Power sensor	NRV-Z6	100011	September 2, 2006	One year
06	Signal Generator	MG 3633A	M73386	No Calibration Requested	
07	Amplifier	AT 50S1G4A	26549	No Calibration Requested	
08	E-field Probe	SPEAG ET3DV6	1600	January 20, 2006	One year
09	DAE	SPEAG DAE3	536	July 11, 2006	One year
10	Validation Dipole	IndexSAR IXD-045	0111	December, 2004	Two years

11 TEST PERIOD

The test is performed on October 27th, 2006.

12 TEST LOCATION

The test is performed at Radio Communication & Electromagnetic Compatibility Laboratory of Telecommunication Metrology Center of Ministry of Information Industry of China

END OF REPORT BODY

ANNEX A： MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

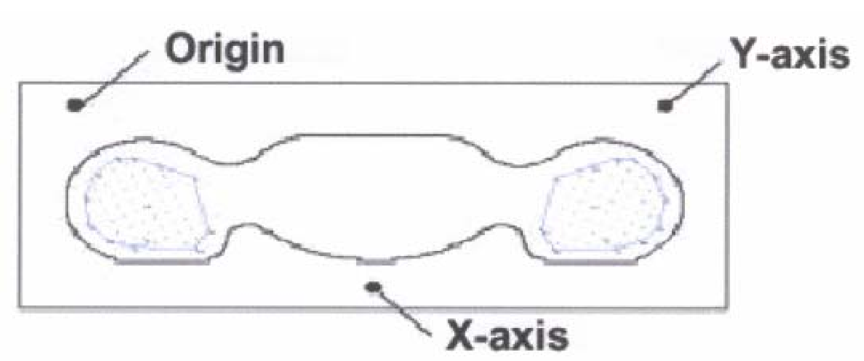
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot"-condition (in x ~ y and z-directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

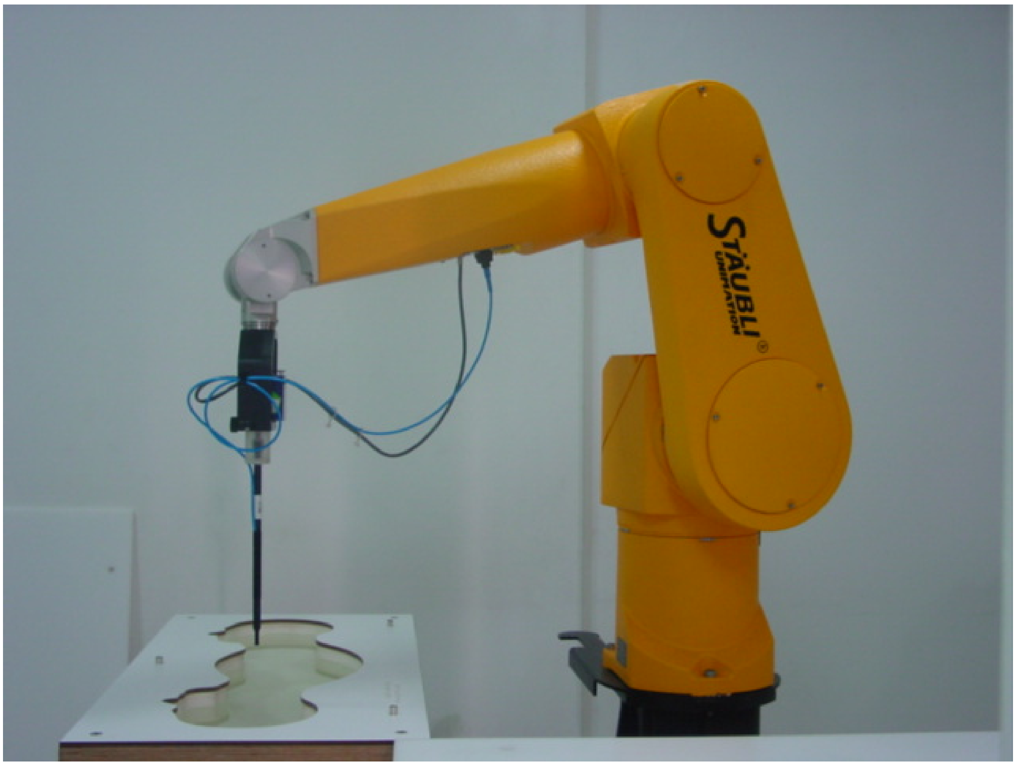
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.



Picture A: SAR Measurement Points in Area Scan

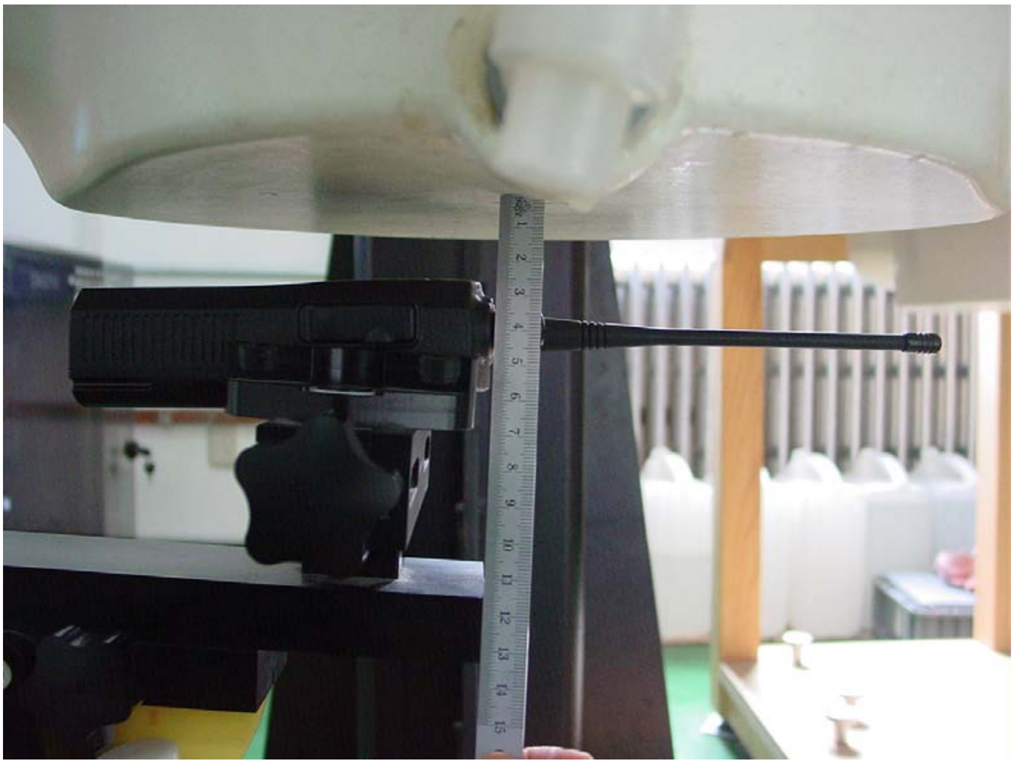
ANNEX B： TEST LAYOUT



Picture B1: Specific Absorption Rate Test Layout

Picture B2: Liquid depth in the Flat Phantom (450MHz Head)

Picture B3: Liquid depth in the Flat Phantom (450MHz Body)



Picture B4: Mode 1 Test Position

Picture B5: Mode 2 Test Position

ANNEX C: GRAPH RESULTS

Mode 1 with Li-ion Battery, High Frequency

Date/Time: 2006-10-27 11:02:22
Electronics: DAE3 Sn536
Medium: 450 MHZ Head
Medium parameters used: f = 450 MHz; σ = 0.84 mho/m; ε_r = 45.6; ρ = 1000 kg/m^3
Ambient Temperature:22.9°C Liqiud Temperature: 22.1°C
Communication System: Handy Transceiver Frequency: 469.913 MHz Duty Cycle: 1:1
Probe: ET3DV6 - SN1600 ConvF(7.95, 7.95, 7.95)

High Frequency/Area Scan (81x161x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 3.44 mW/g

High Frequency/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.3 V/m; Power Drift = -0.195 dB
Peak SAR (extrapolated) = 9.52 W/kg
SAR(1 g) = 3.9 mW/g; SAR(10 g) = 2.51 mW/g
Maximum value of SAR (measured) = 3.34 mW/g

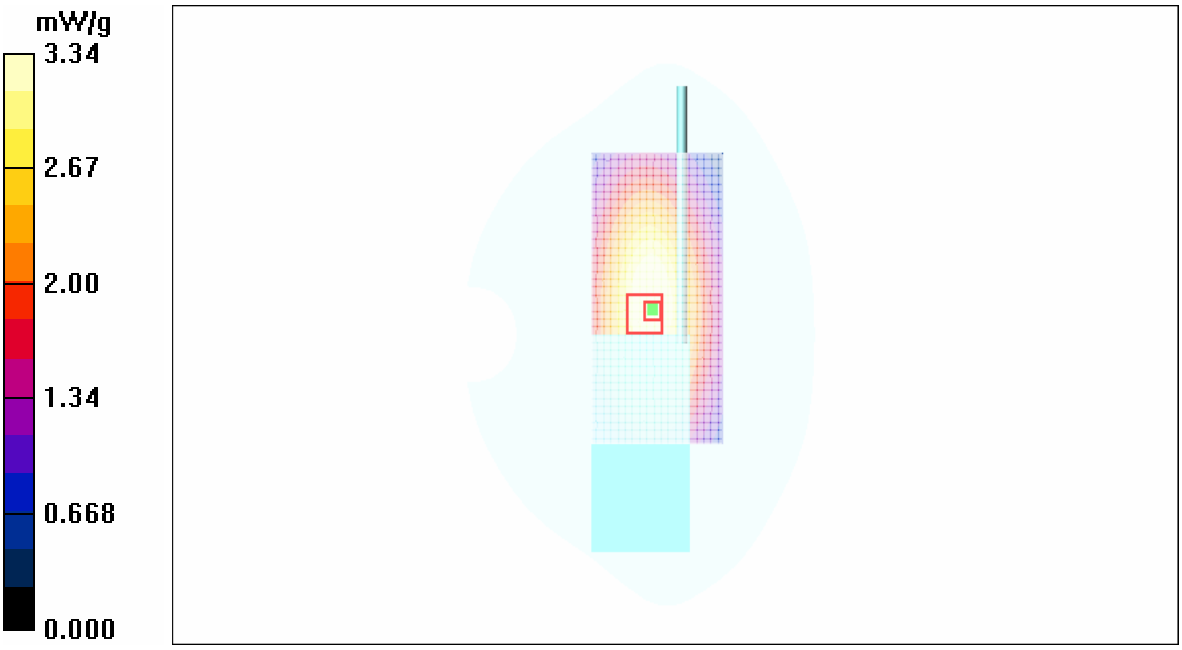


Fig. 1 Mode 1 with Li-ion Battery, Channel 3

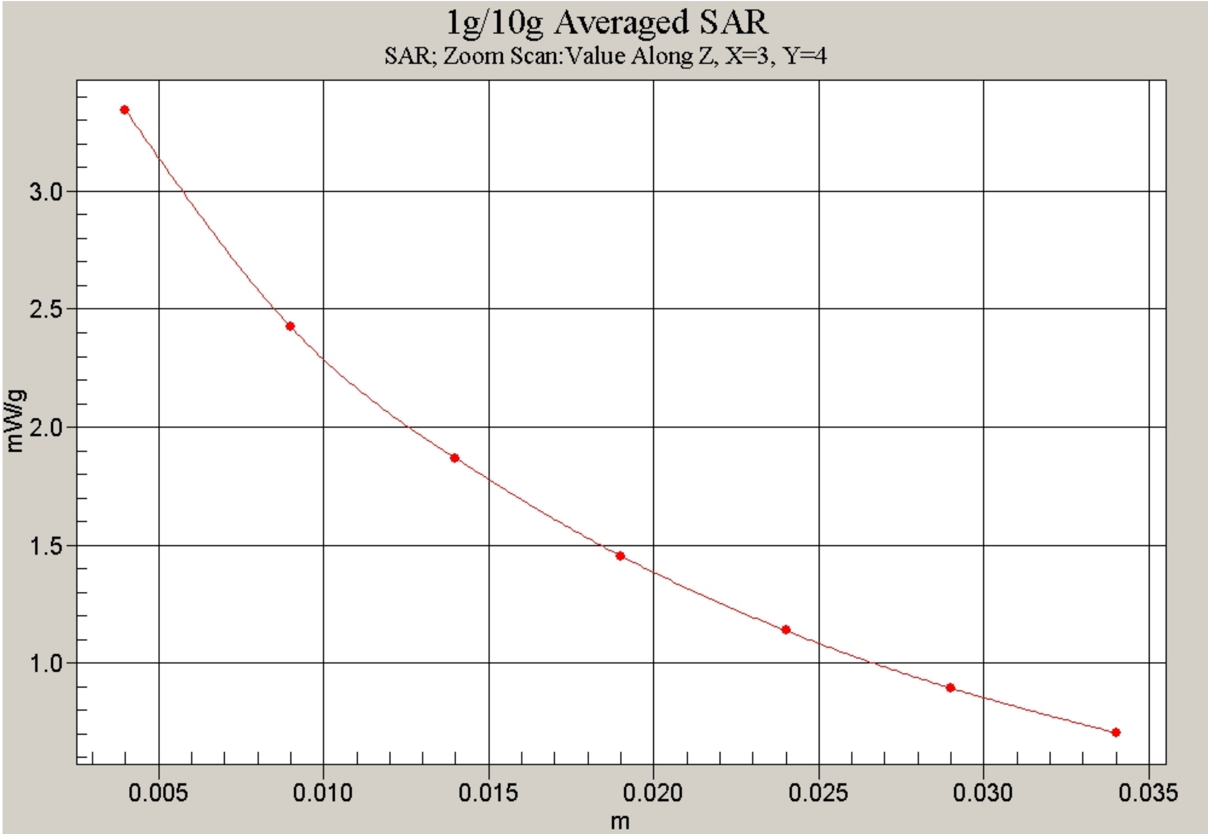


Fig. 2 Z-Scan at power reference point (Mode 1 with Li-ion Battery, Channel 3)

Mode 1 with Li-ion Battery, Middle Frequency

Date/Time: 2006-10-27 11:43:56

Electronics: DAE3 Sn536

Medium: 450 MHZ Head

Medium parameters used: f = 450 MHz; σ = 0.84 mho/m; ε_r = 45.6; ρ = 1000 kg/m^3

Ambient Temperature:22.9°C Liqiud Temperature: 22.1°C

Communication System: Handy Transceiver Frequency: 455.012 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1600 ConvF(7.95, 7.95, 7.95)

Middle Frequency/Area Scan (81x161x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 3.24 mW/g

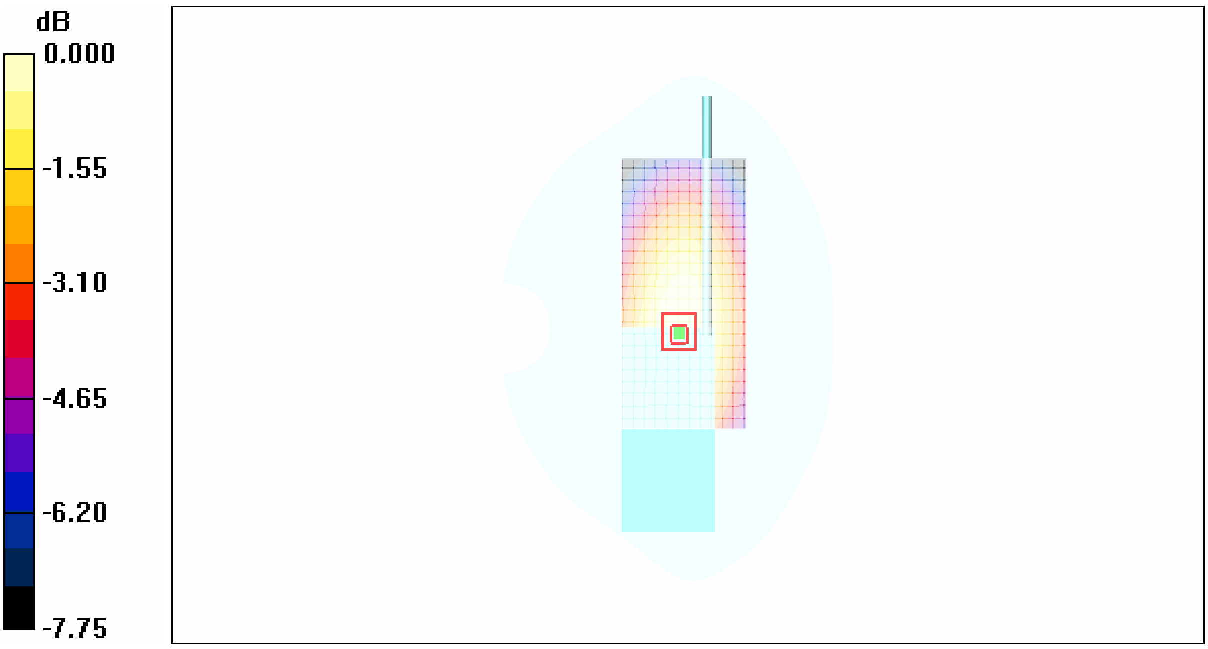
Middle Frequency/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 61.8 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 4.35 W/kg

SAR(1 g) = 3.06 mW/g; SAR(10 g) = 2.27 mW/g

Maximum value of SAR (measured) = 3.19 mW/g



0 dB = 3.19mW/g

Fig. 3 Mode 1 with Li-ion Battery, Channel 2

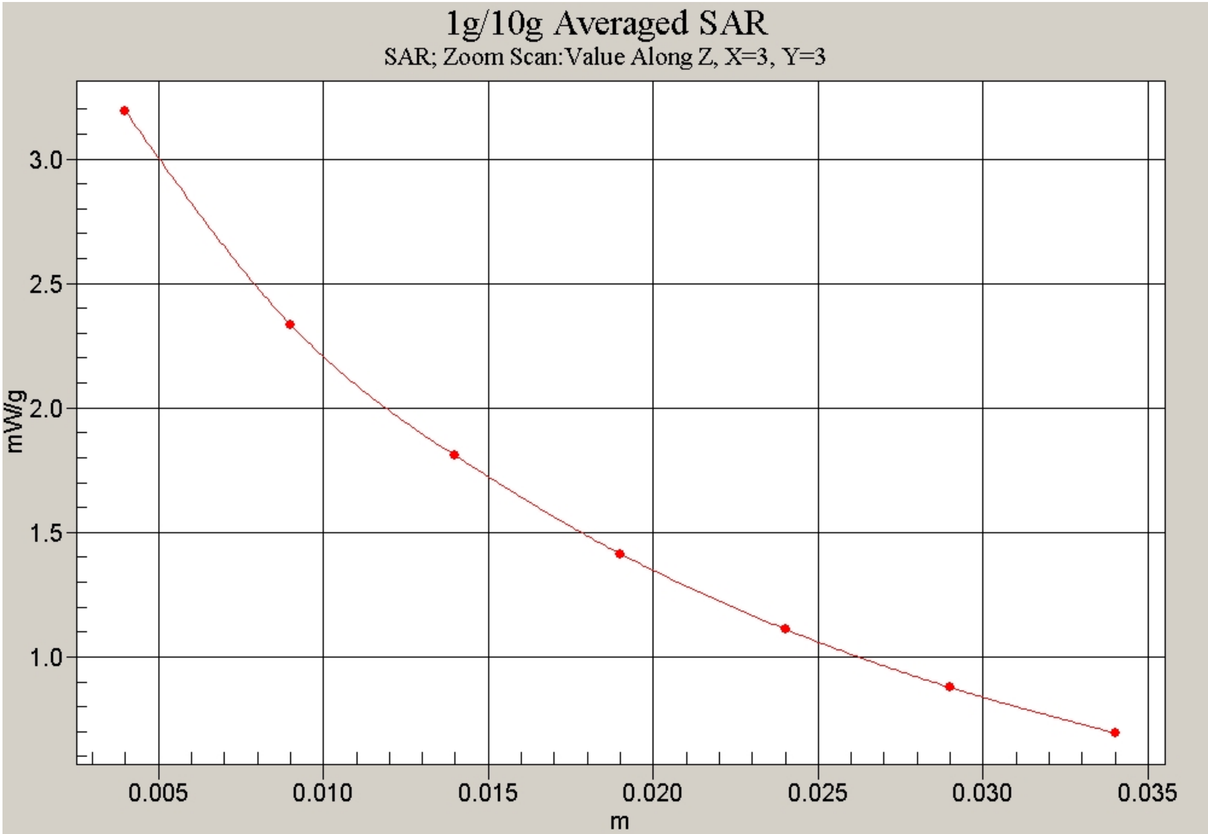


Fig. 4 Z-Scan at power reference point (Mode 1 with Li-ion Battery, Channel 2)

Mode 1 with Li-ion Battery, Low Frequency

Date/Time: 2006-10-27 9:53:23

Electronics: DAE3 Sn536

Medium: 450 MHZ Head

Medium parameters used: f = 450 MHz; σ = 0.84 mho/m; ε_r = 45.6; ρ = 1000 kg/m^3

Ambient Temperature:22.9^{o}C Liqiud Temperature: 22.1^{o}C

Communication System: Handy Transceiver Frequency: 440.012 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1600 ConvF(7.95, 7.95, 7.95)

Low Frequency/Area Scan (81x161x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 2.67 mW/g

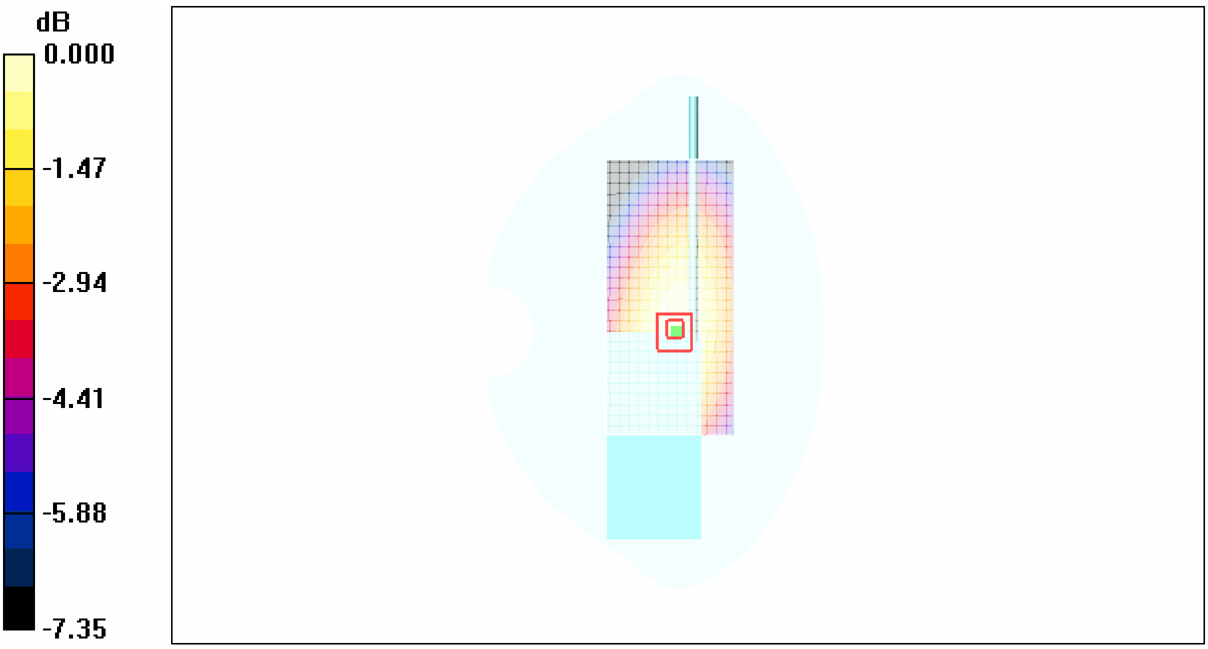
Low Frequency/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.8 V/m; Power Drift = -0.075 dB

Peak SAR (extrapolated) = 3.71 W/kg

SAR(1 g) = 2.58 mW/g; SAR(10 g) = 1.92 mW/g

Maximum value of SAR (measured) = 2.69 mW/g



0 dB = 2.69mW/g

Fig. 5 Mode 1 with Li-ion Battery, Channel 1

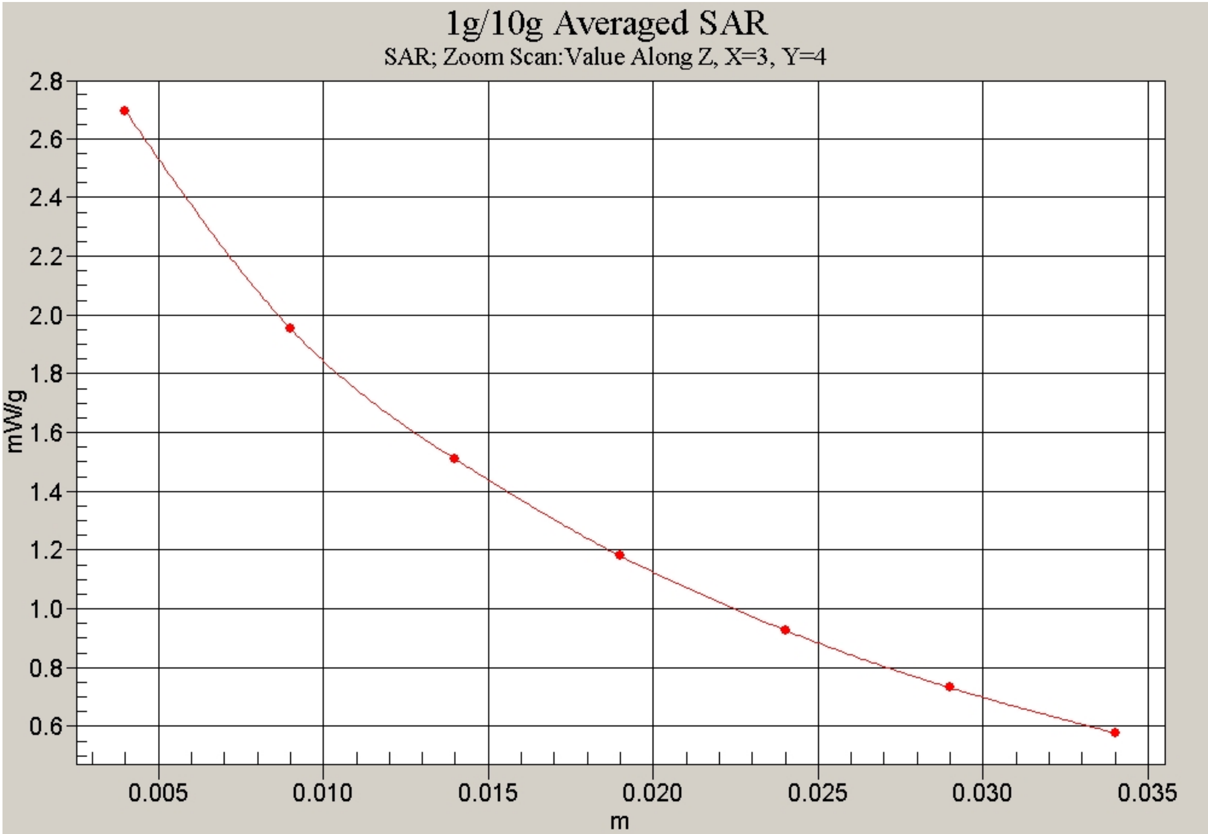


Fig. 6 Z-Scan at power reference point (Mode 1 with Li-ion Battery, Channel 1)

Mode 1 with Ni-mh Battery, High Frequency

Date/Time: 2006-10-27 14:36:47

Electronics: DAE3 Sn536

Medium: 450 MHZ Head

Medium parameters used: f = 450 MHz; σ = 0.84 mho/m; ε_r = 45.6; ρ = 1000 kg/m^3

Ambient Temperature:22.9°C Liqiud Temperature: 22.1°C

Communication System: Handy Transceiver Frequency: 469.913 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1600 ConvF(7.95, 7.95, 7.95)

High Frequency/Area Scan (81x161x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 2.78 mW/g

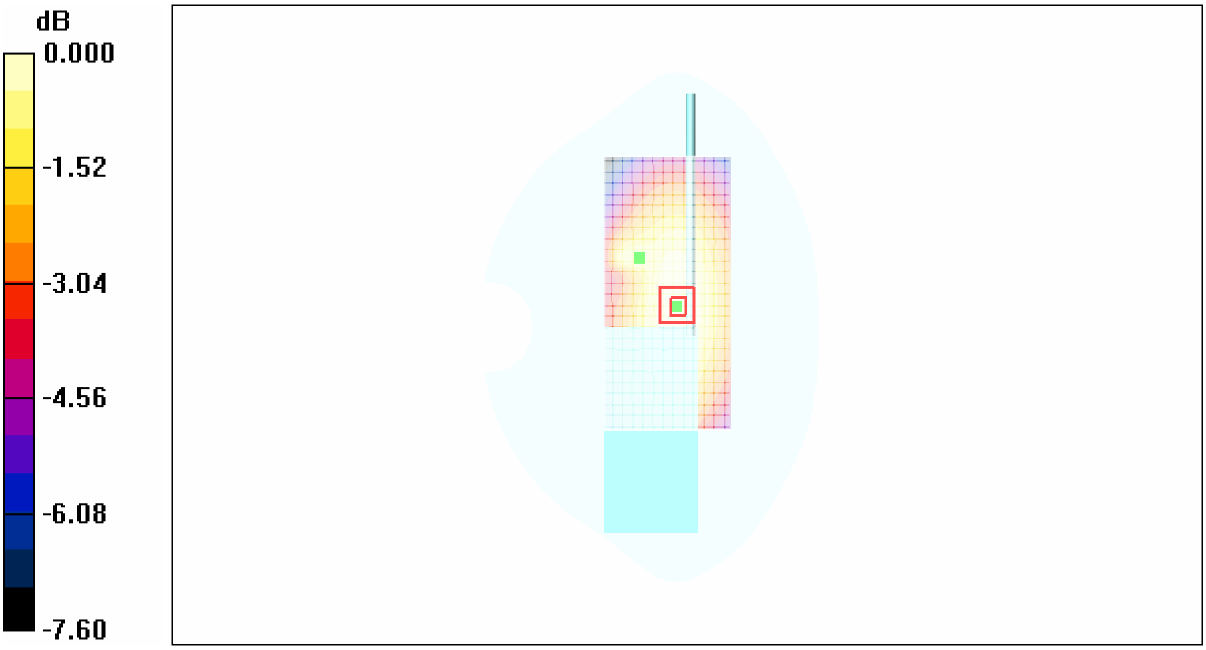
High Frequency/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.2 V/m; Power Drift = -0.153 dB

Peak SAR (extrapolated) = 3.88 W/kg

SAR(1 g) = 2.69 mW/g; SAR(10 g) = 1.98 mW/g

Maximum value of SAR (measured) = 2.82 mW/g



0 dB = 2.82mW/g

Fig. 7 Mode 1 with Ni-mh Battery, Channel 3

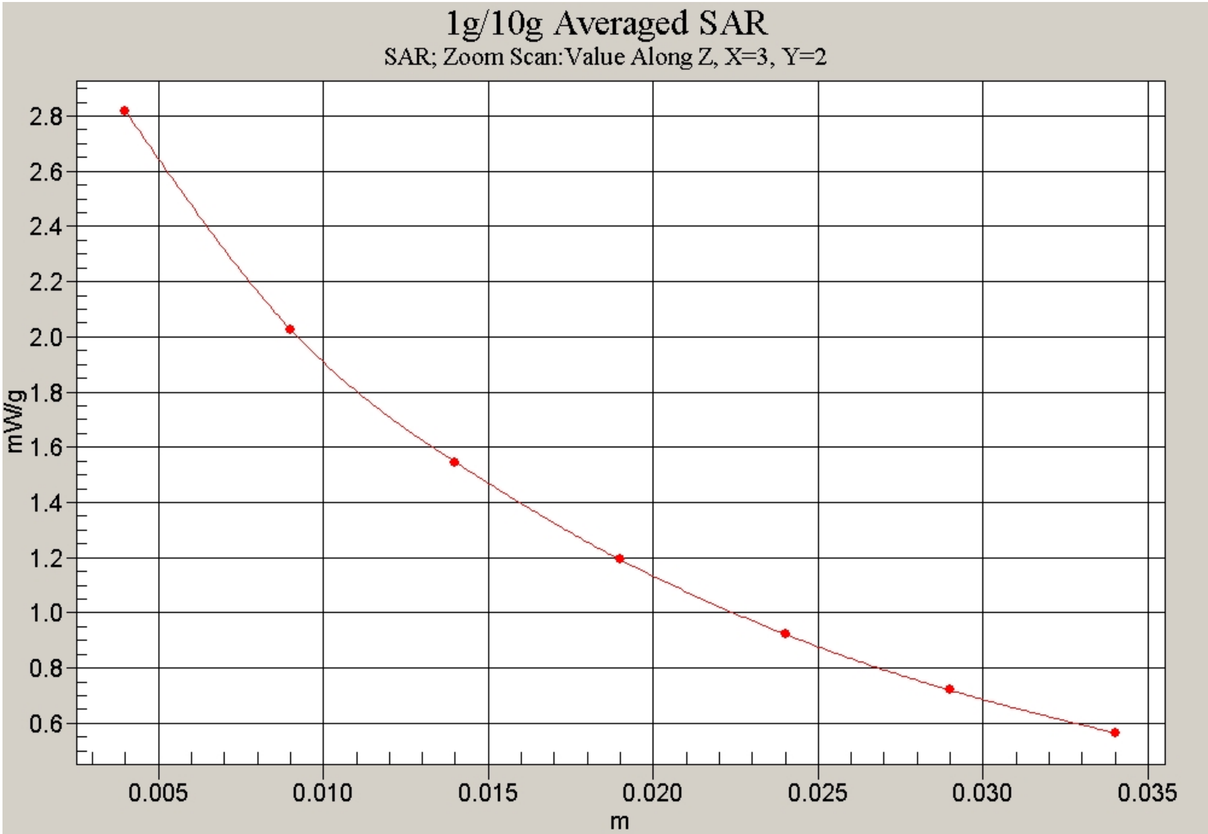


Fig. 8 Z-Scan at power reference point (Mode 1 with Ni-mh Battery, Channel 3)