Deutscher Akkreditierungs Rat

DAR

No. DAT-P-114/01-10

TEST REPORT

No. SAR2005014

Test name	Electromagnetic Field (Specific Absorption Rate)
Product	GSM Triple Frequency Mobile Station
Model	T728
Client	TCL Mobile Communication Co., Ltd
Type of test	Entrusted

Telecommunication Metrology Center

of Ministry of Information Industry

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GENERAL SUMMARY

Product	GSM Triple Frequency Mobile Station	**Model** / **Trade mark**	T728
Client	TCL Mobile Communication Co., Ltd.	**Manufacturer**	TCL Mobile Communication Co., Ltd.
Type of test	Entrusted	**Arrival Date of sample**	June. 22, 2005
Place of sampling	(Blank)	**Carrier of the samples**	Luo Jian
Quantity of the samples	One	**Date of product**	(Blank)
Base of the samples	(Blank)	**Items of test**	SAR
Series number	355995001000597		
Standard(s)	**EN 50360–2001:** Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **EN 50361–2001:** Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones. **IEC 62209 Draft:** Procedure to Determine the Specific Absorption Rate(SAR) for Hand-hold Mobile Phone (Part 2) **ANSI C95.1–1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz **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. **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.		
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: July 7th, 2005**		
Comment	TX Freq. Band: 824-849MHz (GSM) 1850-1910 MHz (PCS) Max. Power: 2 Watt (GSM) 1 Watt (PCS) Antenna Character: 21mm The test results relate only to the items tested of the sample(s).		

Approved by (Lu Minniu) **Revised by** (Wang Hongbo) **Performed by** (Qi Dianyuan)

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 7
4.1 Schematic Test Configuration 7
4.2 SAR Measurement Set-up 8
4.3 Dasy4 E-field Probe System 8
4.4 E-field Probe Calibration 9
4.5 Other Test Equipment 10
4.5.1 Device Holder for Transmitters 10
4.5.2 Phantom 10
4.6 Equivalent Tissues 11
4.7 System Specifications 12
4.7.1 Robotic System Specifications 12
5 CHARACTERISTICS OF THE TEST 12
5.1 Applicable Limit Regulations 12
5.2 Applicable Measurement Standards 12
6 LABORATORY ENVIRONMENT 13
7 TEST RESULTS 13
7.1 Dielectric Performance 13
7.2 System Validation 13
7.3 Summary of Measurement Results (Head, GSM 850 MHz Band) 14
7.4 Summary of Measurement Results (Body-Worn, GSM 850 MHz Band) 15
7.5 Summary of Measurement Results (Head, PCS 1900 MHz Band) 16
7.6 Summary of Measurement Results (Body-Worn, PCS 1900 MHz Band) 17
7.7 Conclusion 17
8 Measurement Uncertainty 17
9 MAIN TEST INSTRUMENTS 19
10 TEST PERIOD 19
11 TEST LOCATION 19
ANNEX A MEASUREMENT PROCESS 20
ANNEX B TEST LAYOUT 21
ANNEX C GRAPH RESULTS 25
ANNEX D SYSTEM VALIDATION RESULTS 85

1 COMPETENCE AND WARRANTIES

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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 or Company	TCL Mobile Communication Co., Ltd.
Address/Post	No.23 Zone, Zhongkai High Technology Development Zone, Huizhou, Guangdong
City	Hui Zhou
Postal Code	516006
Country	China
Telephone	0752-2636729
Fax	0752-2636525

Table 2: Manufacturer

Name or Company	TCL Mobile Communication Co., Ltd.
Address/Post	No.23 Zone, Zhongkai High Technology Development Zone, Huizhou, Guangdong
City	Hui Zhou
Postal Code	516006
Country	China
Telephone	0752-2636729
Fax	0752-2636525

3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handset	T728	355995001000597	TCL Mobile Communication Co., Ltd.
Lithium Battery	GB02-5LB600	GB02-51232591	TCL Hyper-Power Batteries Inc.
AC/DC Adapter	WYS-036	WYQ5104335648	TCL Mobile Communication Co., Ltd.

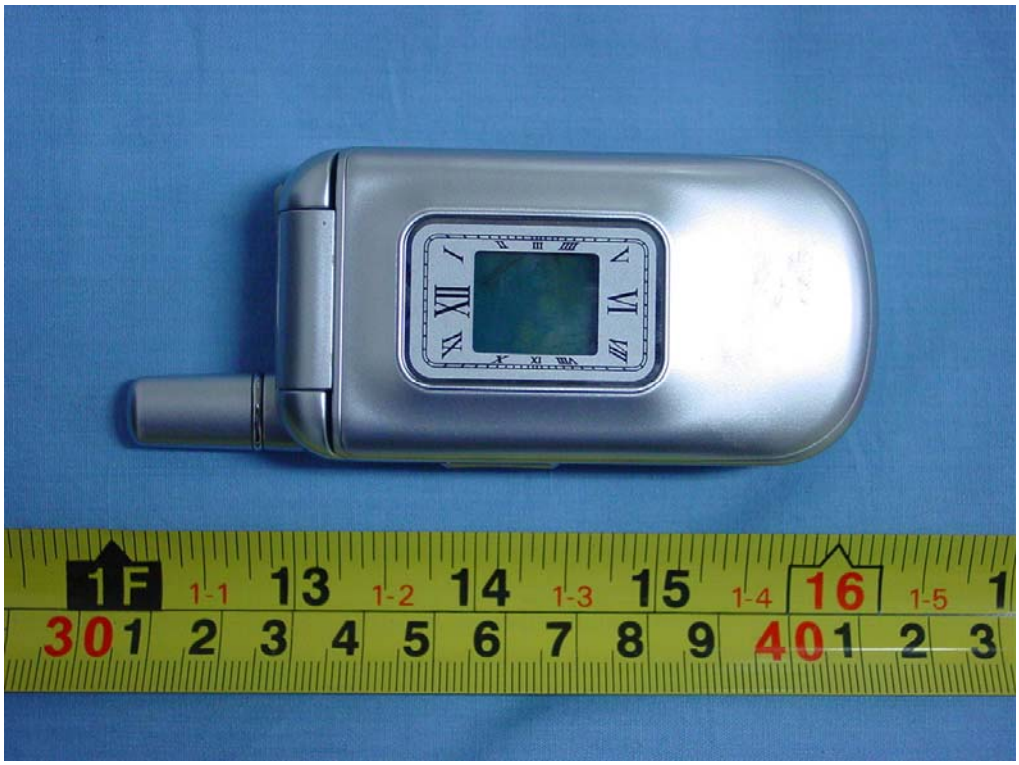


Figure 1: Constituents of the sample (Lithium Battery is in the Handset)

3.3 General Description

Equipment Under Test (EUT) is a model of GSM Phase Ⅲ portable Mobile Station (MS) with non-integrated antenna. It consists of Handset and normal options: Lithium Battery and AC/DC Adapter as Table 1 and Fig. 1. Upon the request of the client, SAR is tested respectively for two bands: GSM 850MHz and PCS1900MHz.

The sample undergoing 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. A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128,190 and 251 respectively in the case of GSM 850 MHz, or to 512, 661 and 810 respectively in the case of PCS 1900 MHz. The EUT is commanded to operate at maximum transmitting power.

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 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.

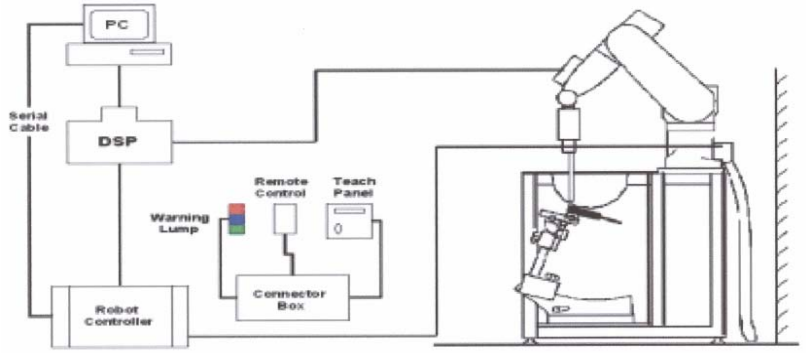


Figure2. SAR Lab Test Measurement Set-up

The 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.

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 diarneter: 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

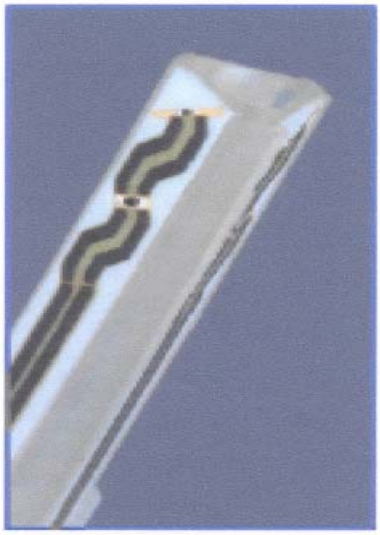


Figure3. ET3DV6 E-field Probe

Figure4. 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.

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

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

Figure5. 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).

Figure6. Generic Twin 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

4.6 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 4 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

Table 4. Composition of the Head Tissue Equivalent Matter

MIXTURE %	FREQUENCY 850MHz
Water	41.45
Sugar	56.0
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=850MHz ε=41.5 σ=0.90

MIXTURE %	FREQUENCY 1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz ε=40.0 σ=1.40

Table 5. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 850MHz
Water	52.4
Sugar	45.0
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=850MHz ε=55.2 σ=0.97

MIXTURE %	FREQUENCY 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz ε=53.3 σ=1.52

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 **2.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 mm of the user in the uncontrolled 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 **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 mm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

EN 50361–2001: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.
IEC 62209 Draft : Procedure to Determine the Specific Absorption Rate(SAR) for Hand-hold Mobile Phone (Part 2)
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.
They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

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 TEST RESULTS

7.1 Dielectric Performance

Table 7: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 22 °C and relative humidity 40%.			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	850 MHz	41.5	0.90
	1900 MHz	40.0	1.40
Measurement value (Average of 10 tests)	850 MHz	41.5	0.93
	1900 MHz	40.27	1.45

Table 8: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22 °C and relative humidity 40%.			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	850 MHz	55.2	0.97
	1900 MHz	53.3	1.52
Measurement value (Average of 10 tests)	850 MHz	53.84	1.04
	1900 MHz	55.85	1.55

7.2 System Validation

Table 9: System Validation

Measurement is made at temperature 23 °C, relative humidity 40%, input power 250 mW.					
Liquid parameters		**Frequency**	**Permittivity ε**		**Conductivity σ (S/m)**
		850 MHz	41.7		0.88
		1900 MHz	39.66		1.46
Verification results	**Frequency**	**Target value (W/kg)**		**Measurement value (W/kg)**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**
	850 MHz	1.55	2.375	1.52	2.35
	1900 MHz	5.125	9.925	4.91	9.8

7.3 Summary of Measurement Results(HEAD, GSM850 MHz Band)

Table 10: SAR Values (GSM 850 MHz Band)

Temperature: 22 ℃, humidity: 50%. Liquid temperature during the test: 22.2℃			
Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Conducted Power before/after each test (dBm)**
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Left hand, Touch cheek, Top frequency (See ANNEX C GRAPH RESULTS Fig.1)	0.514	0.804	**32.09/32.10**
Left hand, Touch cheek, Mid frequency (See ANNEX C GRAPH RESULTS Fig.3)	0.503	0.781	**31.50/31.51**
Left hand, Touch cheek, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.5)	0.510	0.786	**31.10/31.08**
Left hand, Tilt 15 Degree, Top frequency (See ANNEX C GRAPH RESULTS Fig.7)	0.152	0.204	**32.08/32.06**
Left hand, Tilt 15 Degree, Mid frequency (See ANNEX C GRAPH RESULTS Fig.9)	0.143	0.190	**31.47 /31.48**
Left hand, Tilt 15 Degree, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.11)	0.142	0.188	**31.05/31.07**
Right hand, Touch cheek, Top frequency (See ANNEX C GRAPH RESULTS Fig.13)	0.554	0.860	**32.08/32.09**
Right hand, Touch cheek, Mid frequency (See ANNEX C GRAPH RESULTS Fig.15)	0.511	0.791	**31.49/31.48**
Right hand, Touch cheek, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.17)	0.493	0.757	**31.06/31.07**
Right hand, Tilt 15 Degree, Top frequency (See ANNEX C GRAPH RESULTS Fig.19)	0.182	0.247	**32.05/32.06**
Right hand, Tilt 15 Degree, Mid frequency (See ANNEX C GRAPH RESULTS Fig.21)	0.164	0.222	**31.50/31.52**
Right hand, Tilt 15 Degree, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.23)	0.160	0.217	**31.09/31.11**

7.4 Summary of Measurement Results (Body-Worn, GSM 850 MHz Band)

Table 11: SAR Values (GSM 850 MHz Band, body-worn)

Temperature: 22 °C, humidity: 50%. Liquid temperature during the test: 22.2°C			
Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Conducted Power before/after each test (dBm)**
	2.0	**1.6**	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Display of EUT towards the ground, Top frequency (See ANNEX C GRAPH RESULTS Fig.25)	0.253	0.404	**32.08/32.06**
Display of EUT towards the ground, Mid frequency (See ANNEX C GRAPH RESULTS Fig.27)	0.235	0.375	**31.49/31.52**
Display of EUT towards the ground, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.29)	0.231	0.365	**31.08/31.10**

7.5 Summary of Measurement Results (Head, PCS 1900 MHz Band)

Table 12: SAR Values (PCS 1900 MHz Band, head)

Temperature: 22 ºC, humidity: 50%. Liquid temperature during the test: 22.2ºC			
Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Conducted Power before/after each test (dBm)**
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Left hand, Touch cheek, Top frequency (See ANNEX C GRAPH RESULTS Fig.31)	0.361	0.627	**29.36/29.38**
Left hand, Touch cheek, Mid frequency (See ANNEX C GRAPH RESULTS Fig.33)	0.471	0.792	**29.82/29.79**
Left hand, Touch cheek, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.35)	0.557	0.940	**29.95/29.90**
Left hand, Tilt 15 Degree, Top frequency (See ANNEX C GRAPH RESULTS Fig.37)	0.056	0.087	**29.38/29.41**
Left hand, Tilt 15 Degree, Mid frequency (See ANNEX C GRAPH RESULTS Fig.39)	0.068	0.105	**29.84/29.87**
Left hand, Tilt 15 Degree, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.41)	0.073	0.115	**29.97/29.94**
Right hand, Touch cheek, Top frequency (See ANNEX C GRAPH RESULTS Fig.43)	0.484	0.795	**29.38/29.41**
Right hand, Touch cheek, Mid frequency (See ANNEX C GRAPH RESULTS Fig.45)	0.553	0.903	**29.80/29.83**
Right hand, Touch cheek, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.47)	0.634	1.03	**29.96/29.99**
Right hand, Tilt 15 Degree, Top frequency (See ANNEX C GRAPH RESULTS Fig.49)	0.077	0.121	**29.34/29.33**
Right hand, Tilt 15 Degree, Mid frequency (See ANNEX C GRAPH RESULTS Fig.51)	0.087	0.136	**29.85/29.88**
Right hand, Tilt 15 Degree, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.53)	0.075	0.118	**29.98/29.95**

7.6 Summary of Measurement Results (Body-Worn, PCS 1900 MHz Band)

Table 13: SAR Values (PCS 1900 MHz Band, body-worn)

Temperature: 22 ºC, humidity: 50%. Liquid temperature during the test: 22.2ºC			
Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Conducted Power before/after each test (dBm)**
	2.0	**1.6**	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Display of EUT towards the ground, Top frequency (See ANNEX C GRAPH RESULTS Fig.55)	0.210	0.319	**29.36/29.39**
Display of EUT towards the ground, Mid frequency (See ANNEX C GRAPH RESULTS Fig.57)	0.234	0.354	**29.82/29.84**
Display of EUT towards the ground, Bottom frequency (See ANNEX C GRAPH RESULTS Fig.59)	0.247	0.372	**29.95/29.99**

7.7 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 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.

8 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	$\sqrt{3}$	$(1\text{-}cp)^{1/2}$	4.3	∞
4	Hemispherical Isotropy	B	9.4	R	$\sqrt{3}$	$\sqrt{c_p}$		∞
5	Boundary Effect	B	0.4	R	$\sqrt{3}$	1	0.23	∞
6	Linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
7	System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞
9	RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	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	$\sqrt{3}$	1	2.9	∞
	Phantom and Tissue Parameters							
16	Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	$\sqrt{3}$	1	0.6	∞
17	Liquid Conductivity - deviation from target values	B	5.0	R	$\sqrt{3}$	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	$\sqrt{3}$	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	

9 MAIN TEST INSTRUMENTS

Table 14: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US38433212	September 1, 2004	One year
02	Dielectric Probe Kit	Agilent 85070C	US99360113	No Calibration Requested	
03	Power meter	HP 436A	2101A11858	September 12, 2004	One year
04	Power sensor	HP 8481H	2349A07289		
05	Signal Generator	MG 3633A	M73386	No Calibration Requested	
06	Amplifier	AT 50S1G4A	26549	No Calibration Requested	
07	Validation Kit 900MHz	SPEAG D 900V2	125	September 2, 2003	Two years
08	Validation Kit 1900MHz	SPEAG D 1900V2	2d010	September 2, 2003	Two years
09	BTS	CMU 200	100680	September 13, 2004	One year
10	E-field Probe	SPEAG ET3DV6	1600	January 20, 2005	One year
11	DAE	SPEAG DAE3	589	October 21, 2004	One year

10 TEST PERIOD

The test is performed from June 29, 2005 to June 30, 2005

11 TEST LOCATION

The test is performed at Radio Communication & Electromagnetic Compatibility Laboratory of Telecommunication Metrology Center

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 ear 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 head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 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.

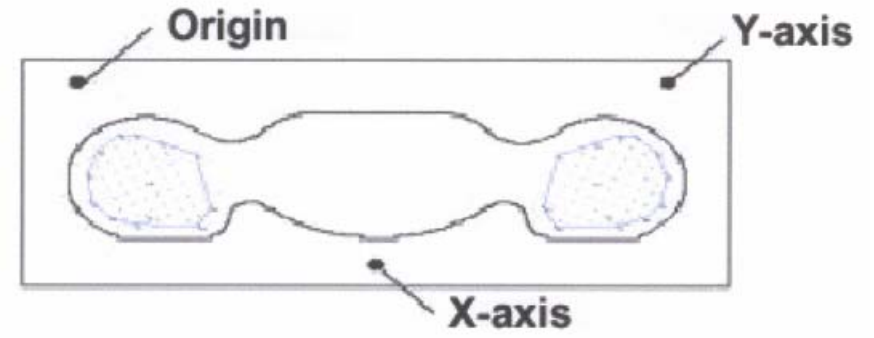
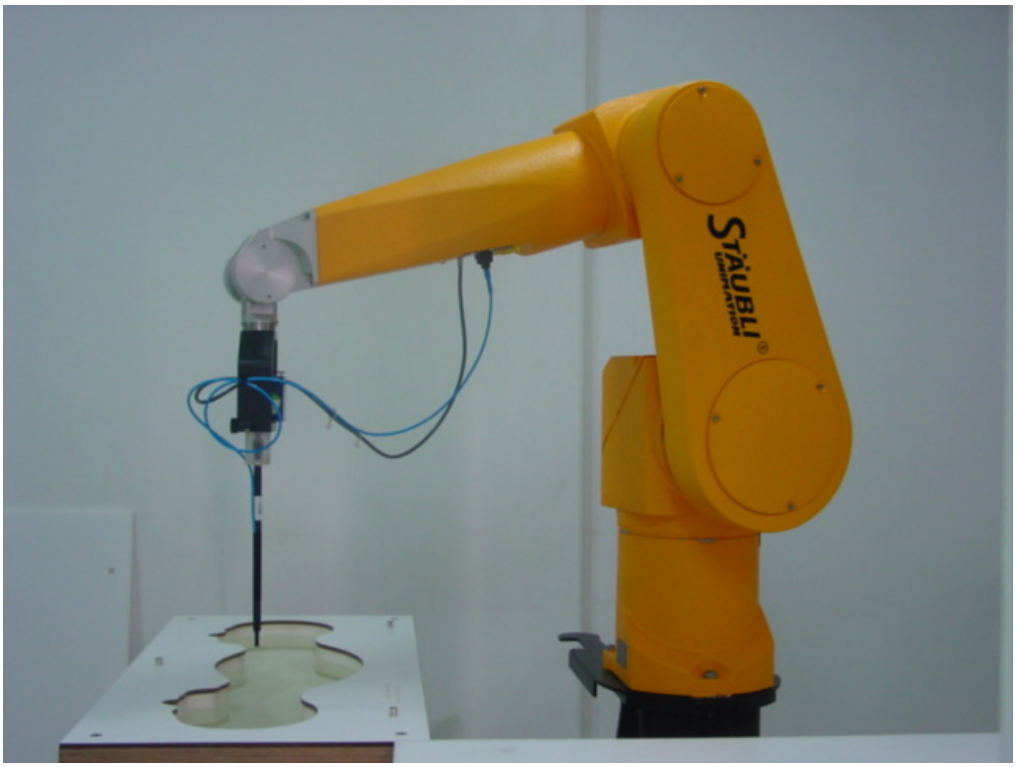


Figure 1 SAR Measurement Points in Area Scan

ANNEX B TEST LAYOUT

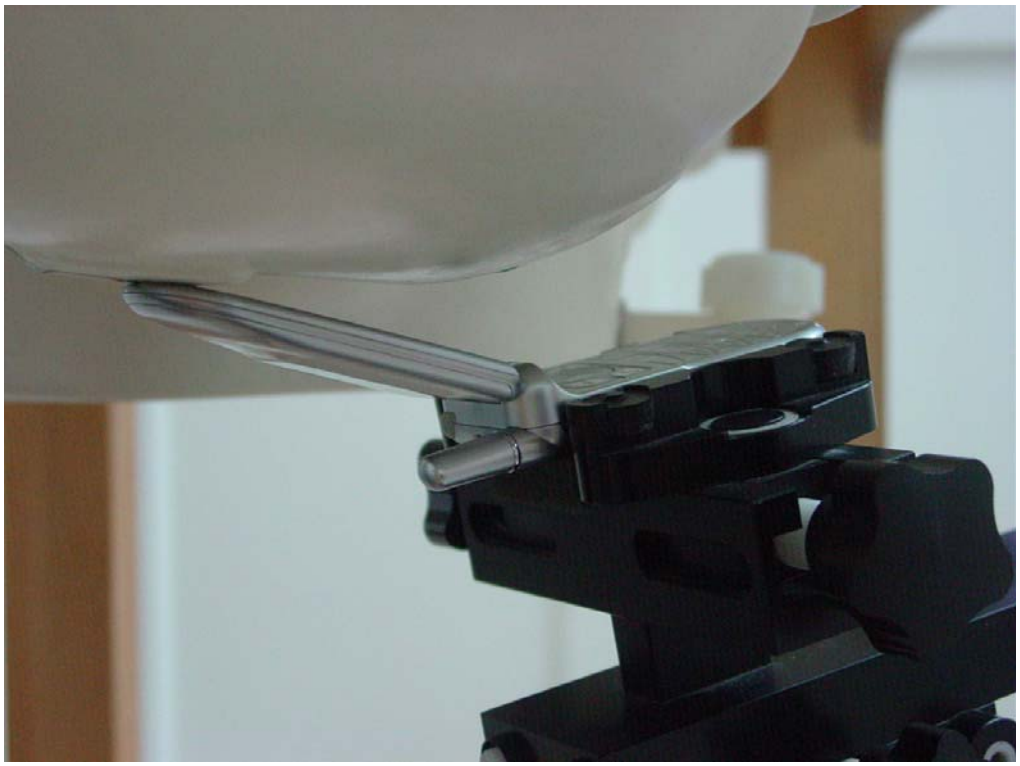


Picture 1 Specific Absorption Rate Test Layout

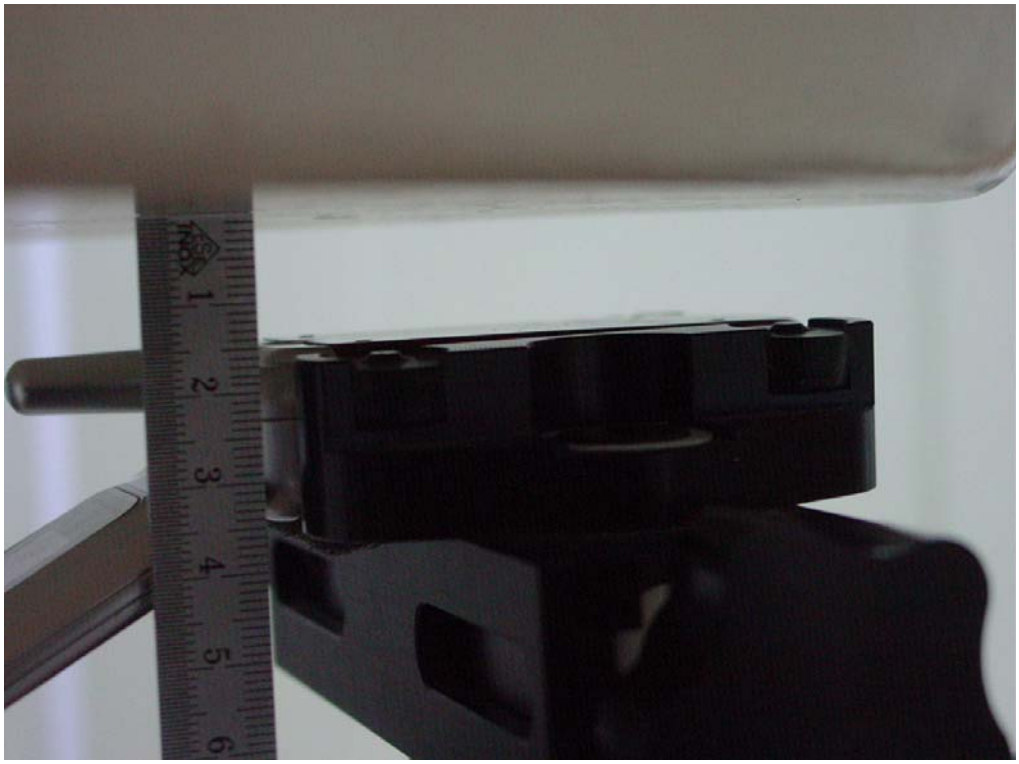
Picture 2 Left Hand Touch Cheek Position

Picture 3 Left Hand Tilt 15° Position

Picture 4 Right Hand Touch Cheek Position



Picture 5 Right Hand Tilt 15° Position



Picture 6 Flat Phantom -- Body-worn Position (towards ground, the distance from handset to the bottom of the Phantom is 1.5cm)

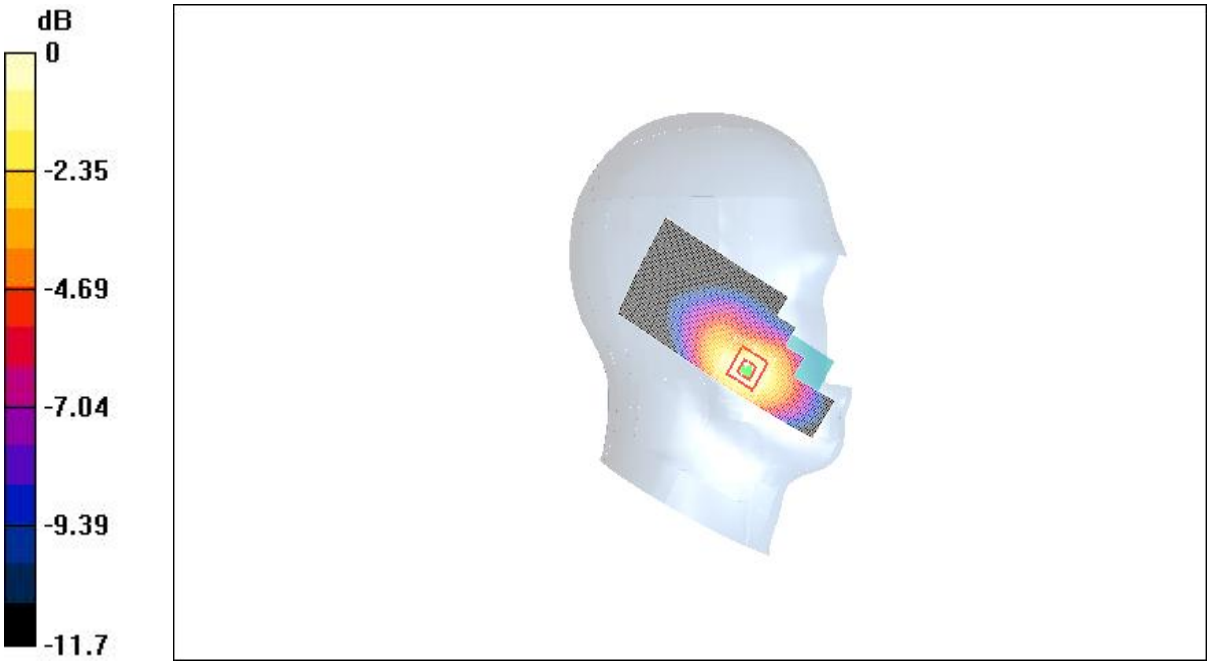
ANNEX C GRAPH RESULTS

850 Left Cheek High

Electronics: DAE3 Sn589
Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3
Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Cheek High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 8.02 V/m; Power Drift = 0.0 dB
Maximum value of SAR (interpolated) = 0.856 mW/g

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.02 V/m; Power Drift = 0.0 dB
Maximum value of SAR (measured) = 0.852 mW/g
Peak SAR (extrapolated) = 1.21 W/kg
SAR(1 g) = 0.804 mW/g; SAR(10 g) = 0.514 mW/g



0 dB = 0.852mW/g

Fig. 1 Left Hand Touch Cheek 850MHz CH251

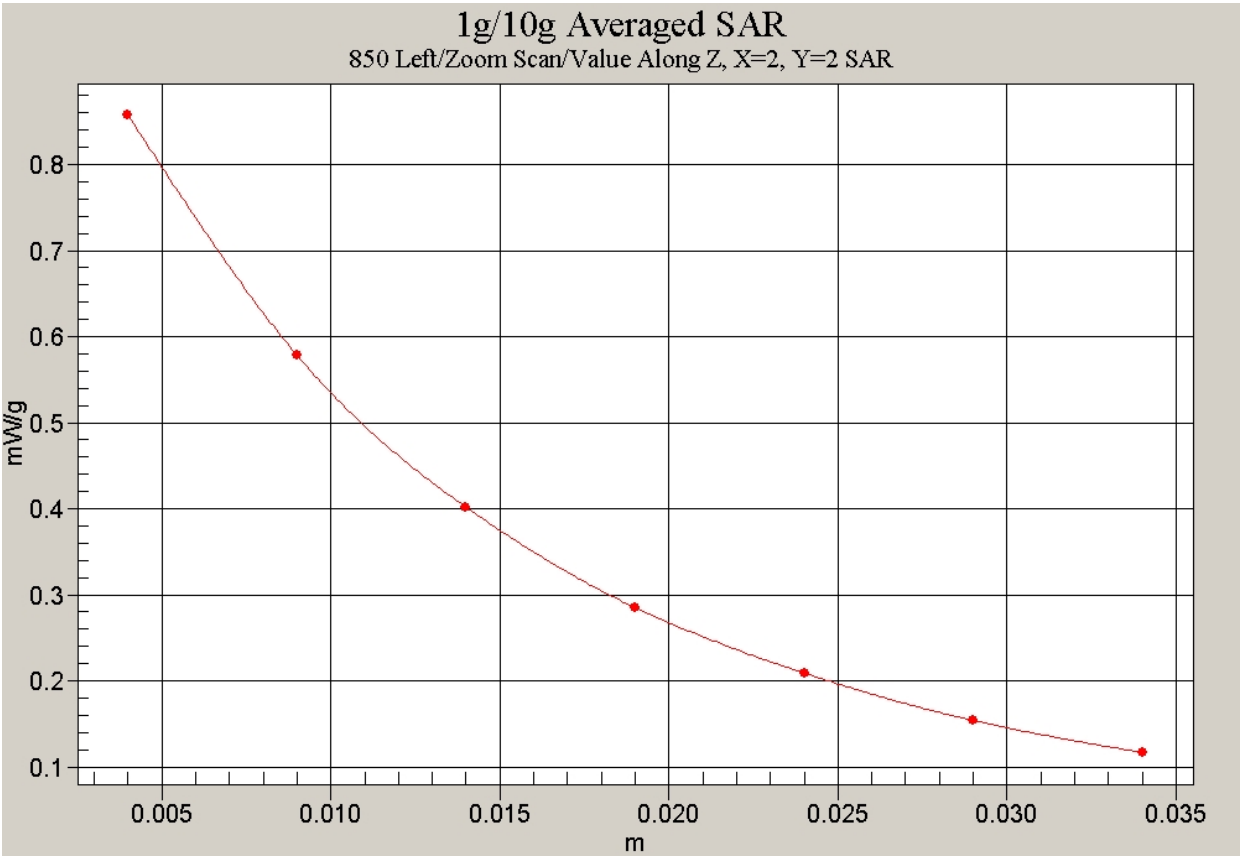


Fig. 2 Z-Scan at power reference point (Left Hand Touch Cheek 850MHz CH251)

850 Left Cheek Middle

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Cheek Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 7.9 V/m; Power Drift = -0.2 dB

Maximum value of SAR (interpolated) = 0.832 mW/g

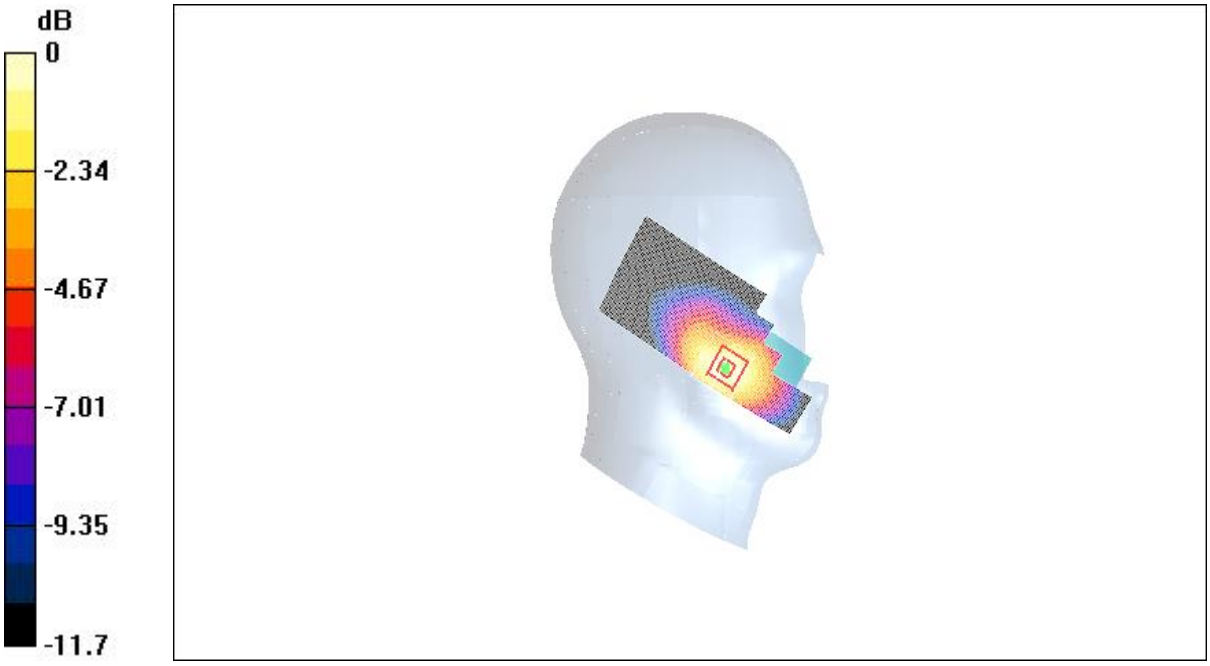
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.9 V/m; Power Drift = -0.2 dB

Maximum value of SAR (measured) = 0.834 mW/g

Peak SAR (extrapolated) = 1.17 W/kg

SAR(1 g) = 0.781 mW/g; SAR(10 g) = 0.503 mW/g



0 dB = 0.834mW/g

Fig. 3 Left Hand Touch Cheek 850MHz CH190

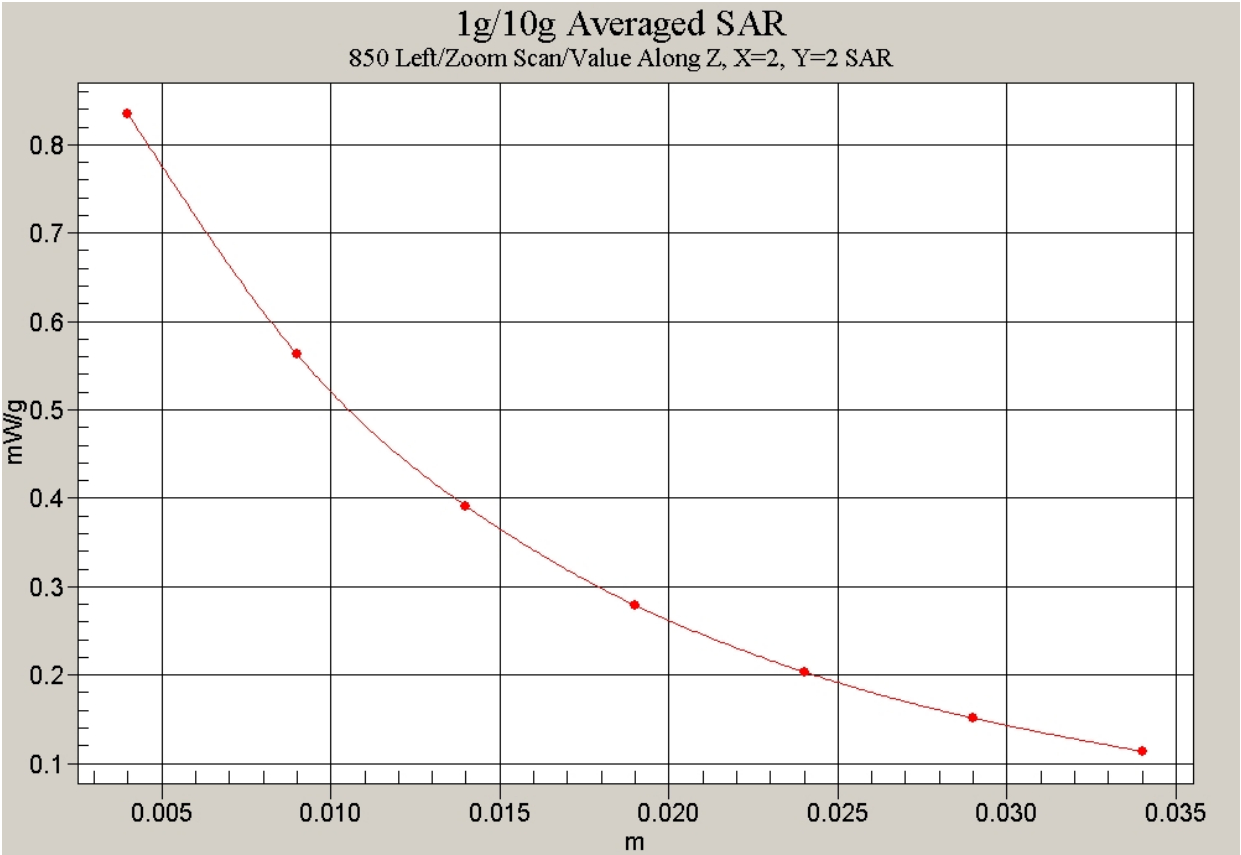


Fig. 4 Z-Scan at power reference point (Left Hand Touch Cheek 850MHz CH190)

850 Left Cheek Low

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Cheek Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 8.43 V/m; Power Drift = -0.2 dB

Maximum value of SAR (interpolated) = 0.837 mW/g

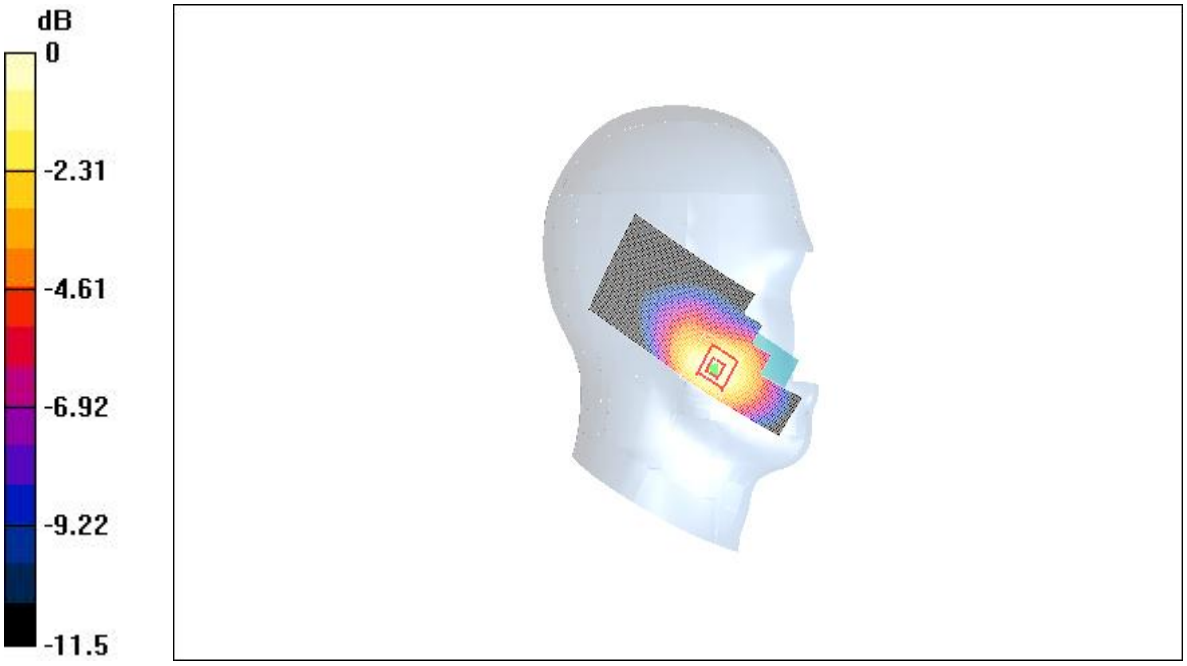
Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.43 V/m; Power Drift = -0.2 dB

Maximum value of SAR (measured) = 0.826 mW/g

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.786 mW/g; SAR(10 g) = 0.510 mW/g



0 dB = 0.826mW/g

Fig. 5 Left Hand Touch Cheek 850MHz CH128

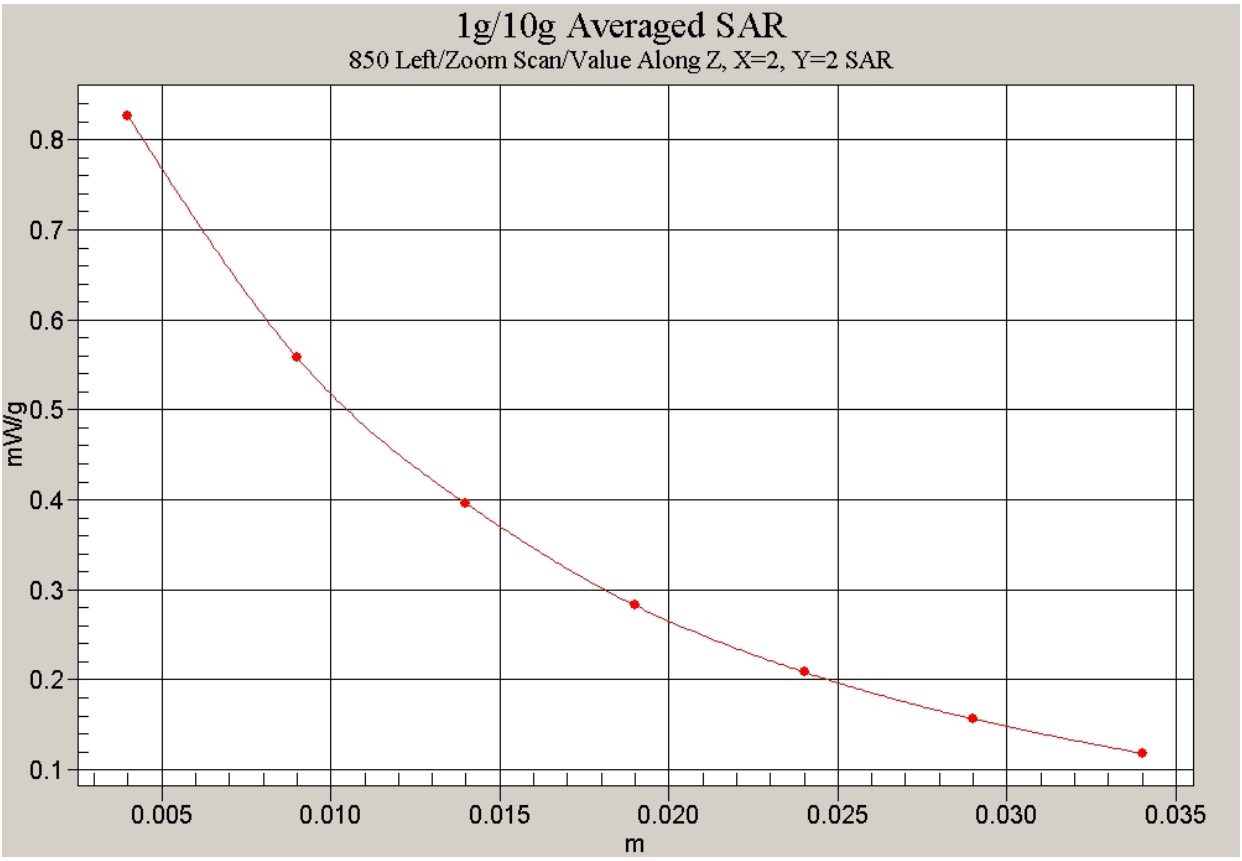


Fig. 6 Z-Scan at power reference point (Left Hand Touch Cheek 850MHz CH128)

850 Left Tilt High

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Tilt High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 9.34 V/m; Power Drift = 0.2 dB

Maximum value of SAR (interpolated) = 0.214 mW/g

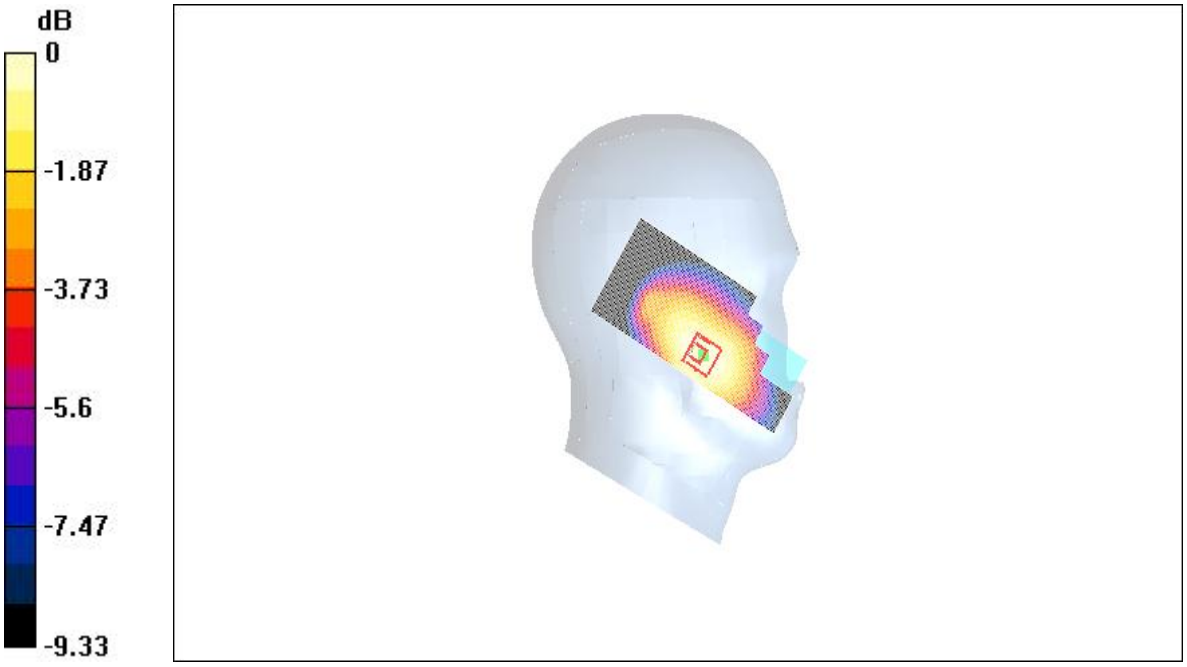
Tilt High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.34 V/m; Power Drift = 0.2 dB

Maximum value of SAR (measured) = 0.212 mW/g

Peak SAR (extrapolated) = 0.255 W/kg

SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.152 mW/g



0 dB = 0.212mW/g

Fig. 7 Left Hand Tilt 15° 850MHz CH251

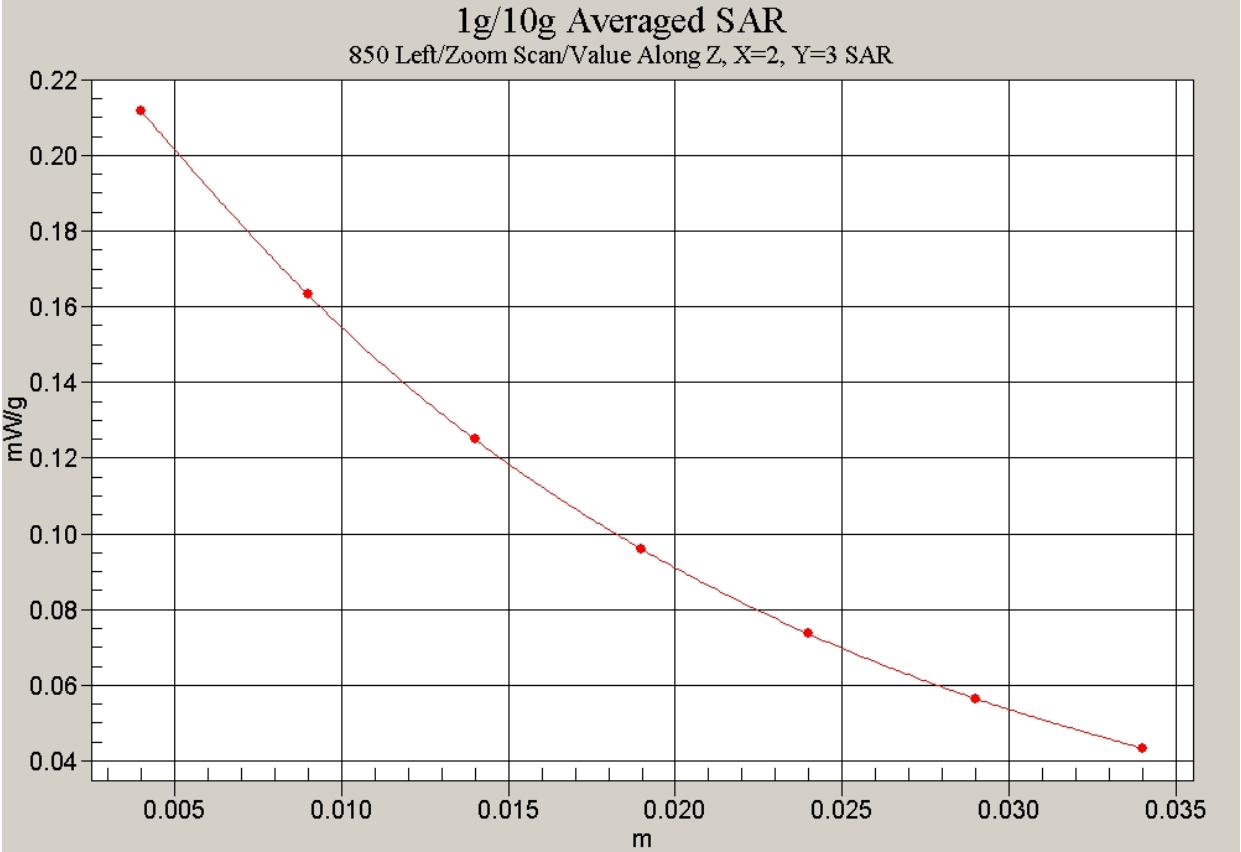


Fig. 8 Z-Scan at power reference point (Left Hand Tilt 15° 850MHz CH251)

850 Left Tilt Middle

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Tilt Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 9.19 V/m; Power Drift = -0.2 dB

Maximum value of SAR (interpolated) = 0.200 mW/g

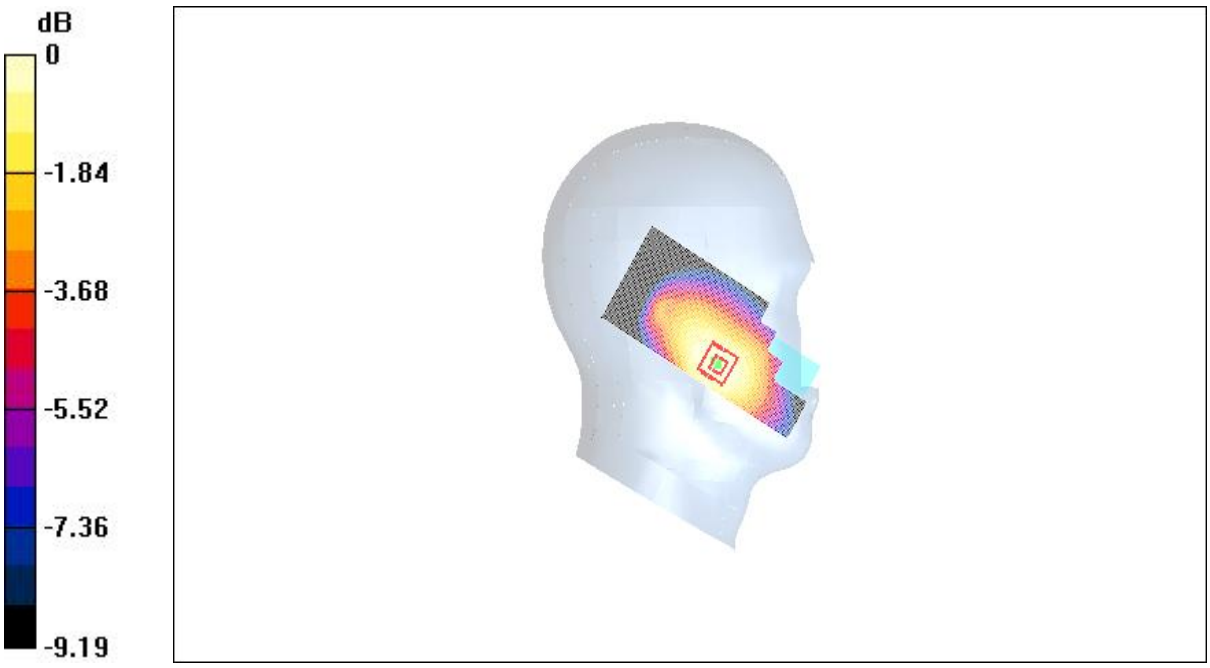
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.19 V/m; Power Drift = -0.2 dB

Maximum value of SAR (measured) = 0.199 mW/g

Peak SAR (extrapolated) = 0.240 W/kg

SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.143 mW/g



0 dB = 0.199mW/g

Fig. 9 Left Hand Tilt 15° 850MHz CH190

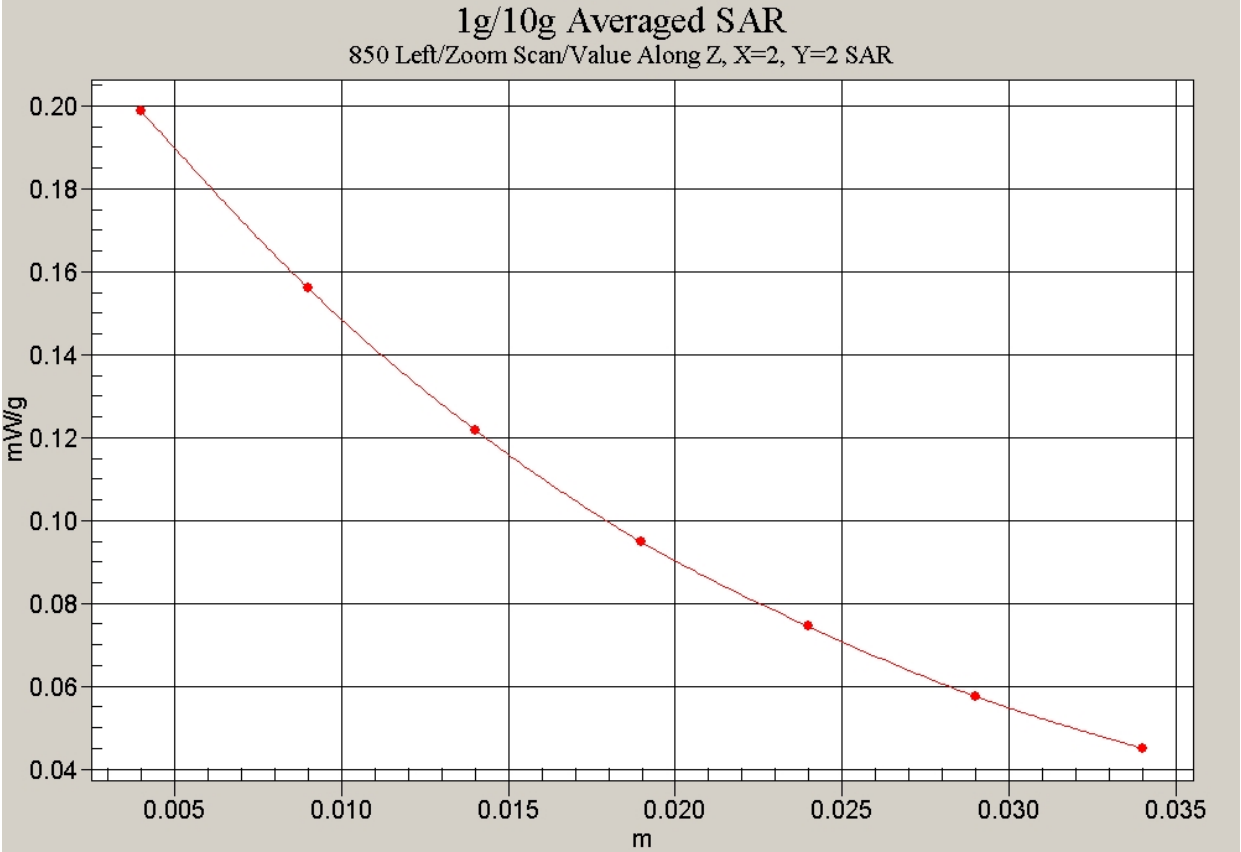


Fig. 10 Z-Scan at power reference point (Left Hand Tilt 15° 850MHz CH190)

850 Left Tilt Low

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Tilt Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 8.88 V/m; Power Drift = -0.003 dB

Maximum value of SAR (interpolated) = 0.199 mW/g

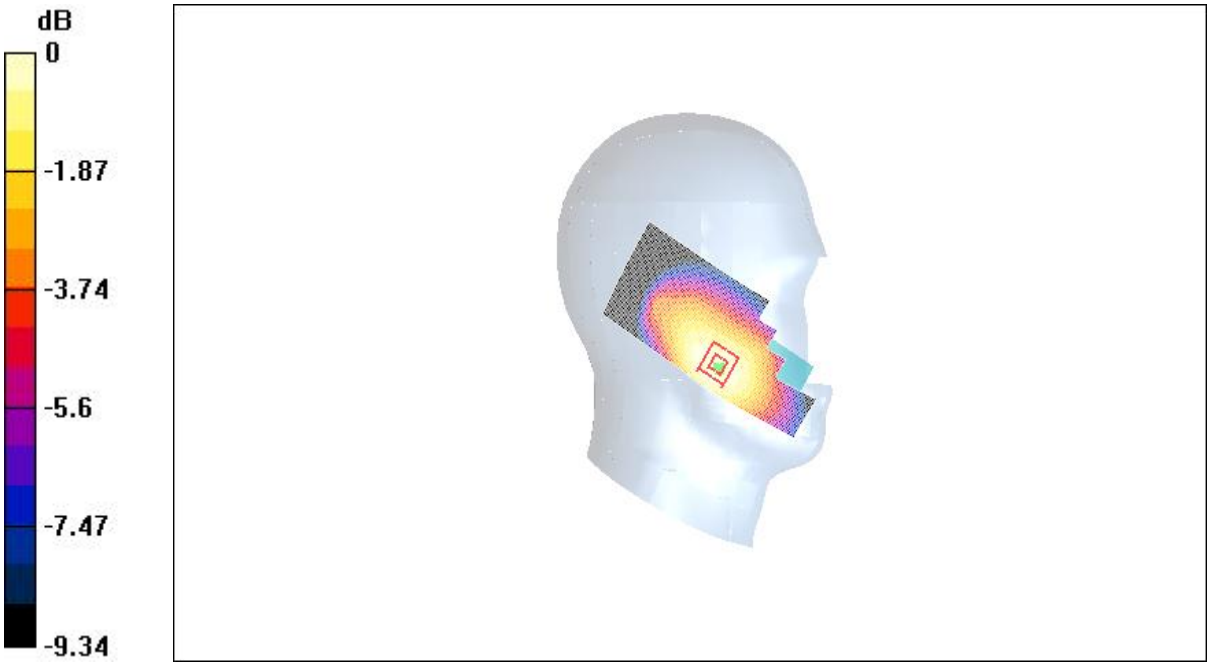
Tilt Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.88 V/m; Power Drift = -0.003 dB

Maximum value of SAR (measured) = 0.196 mW/g

Peak SAR (extrapolated) = 0.237 W/kg

SAR(1 g) = 0.188 mW/g; SAR(10 g) = 0.142 mW/g



0 dB = 0.196mW/g

Fig. 11 Left Hand Tilt 15° 850MHz CH128

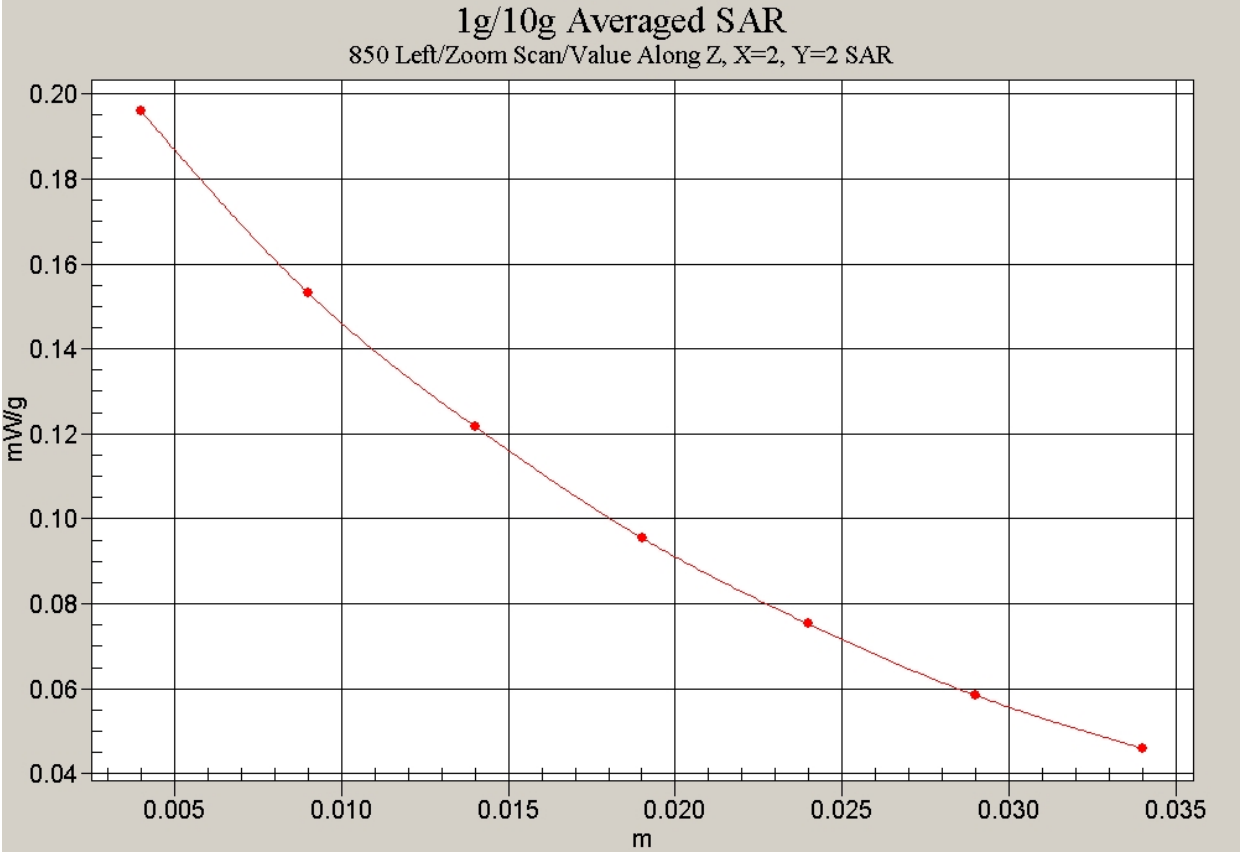


Fig. 12 Z-Scan at power reference point (Left Hand Tilt 15° 850MHz CH128)

850 Right Cheek High

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Cheek High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 8.58 V/m; Power Drift = 0.002 dB

Maximum value of SAR (interpolated) = 0.926 mW/g

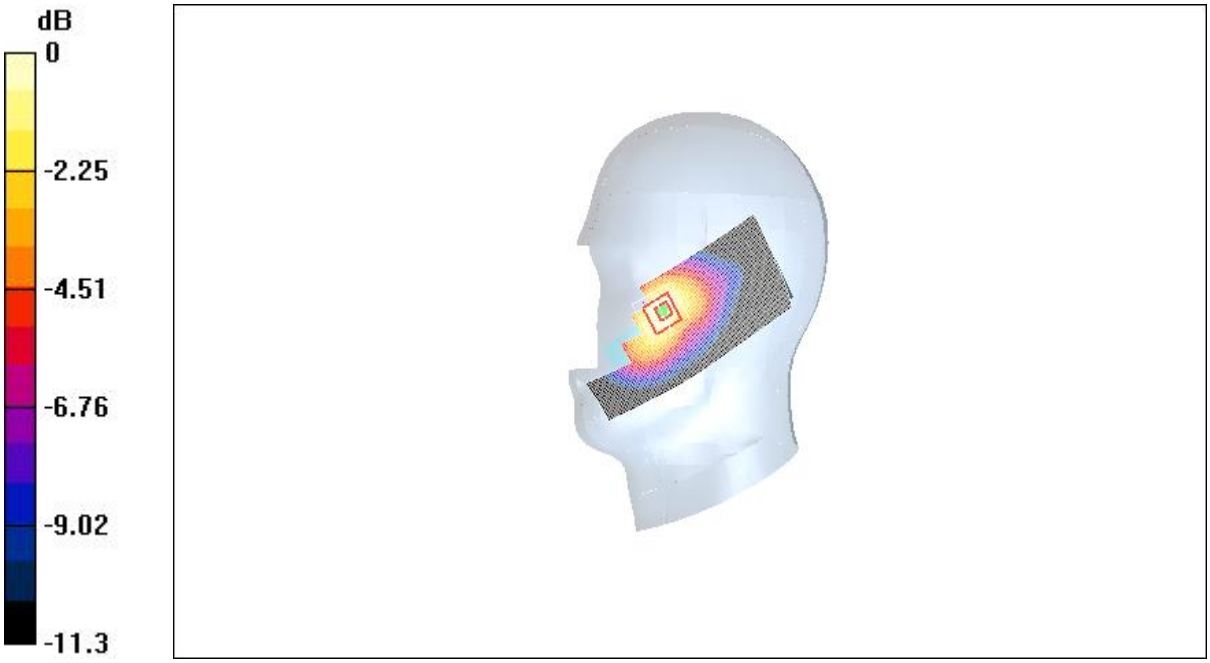
Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.58 V/m; Power Drift = 0.002 dB

Maximum value of SAR (measured) = 0.922 mW/g

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.860 mW/g; SAR(10 g) = 0.554 mW/g



0 dB = 0.922mW/g

Fig. 13 Right Hand Touch Cheek 850MHz CH251

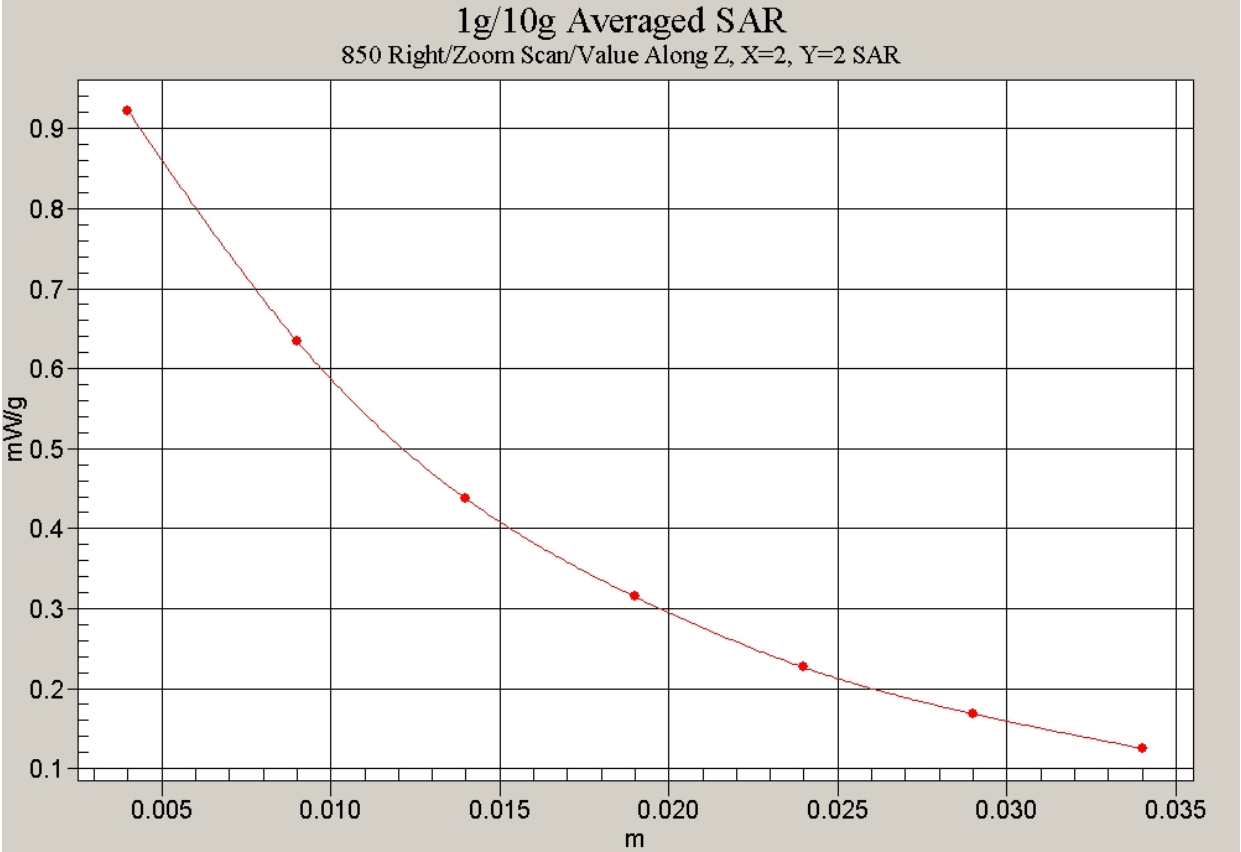


Fig. 14 Z-Scan at power reference point (Right Hand Touch Cheek 850MHz CH251)

850 Right Cheek Middle

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Cheek Middle/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 7.89 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.843 mW/g

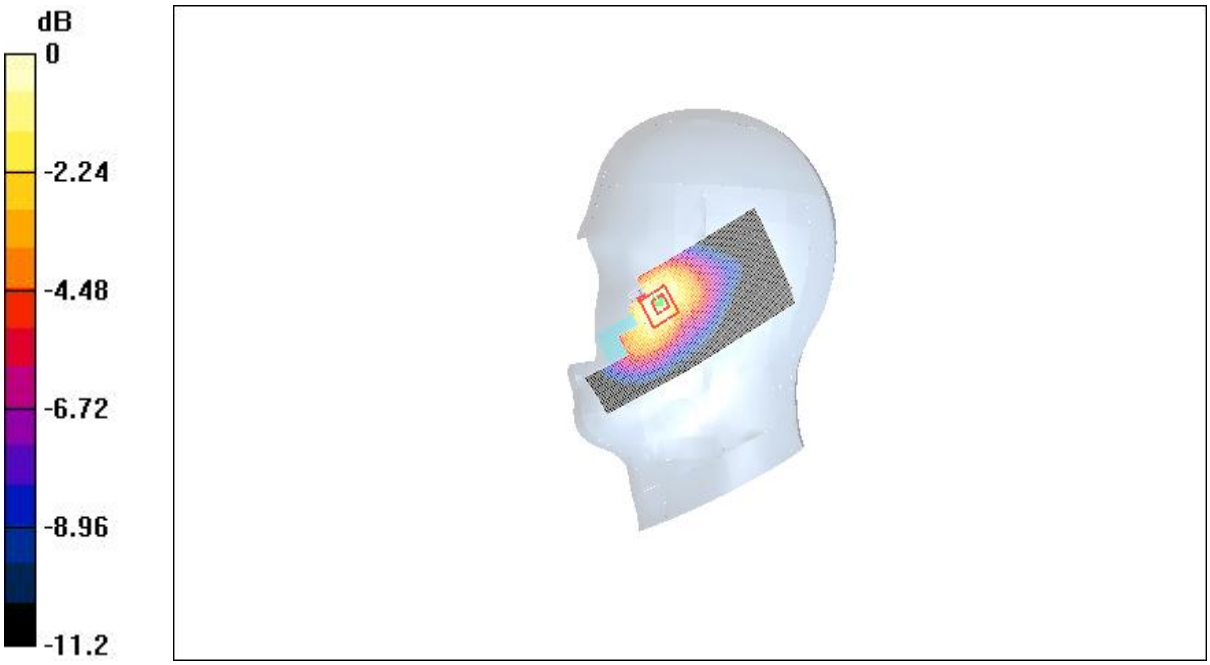
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.89 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.854 mW/g

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.791 mW/g; SAR(10 g) = 0.511 mW/g



0 dB = 0.854mW/g

Fig.15 Right Hand Touch Cheek 850MHz CH190

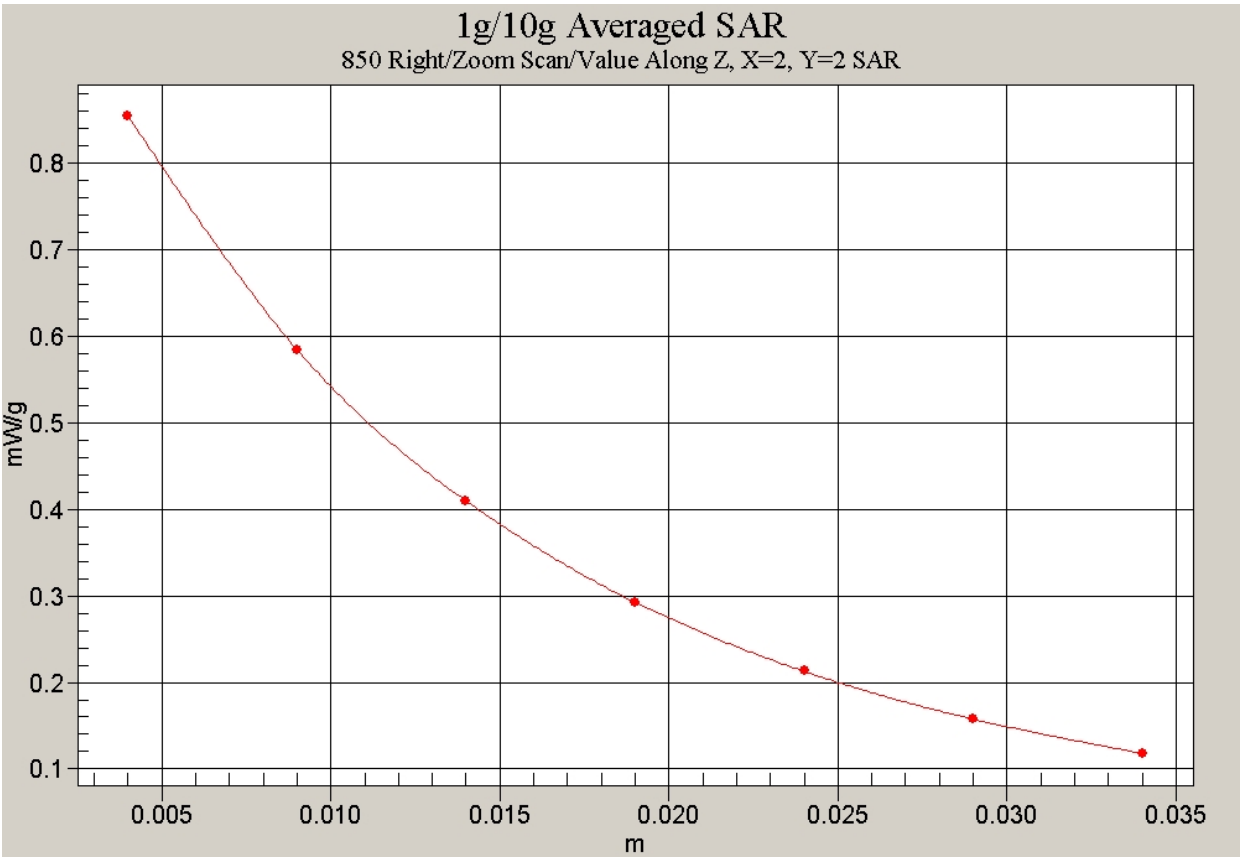


Fig. 16 Z-Scan at power reference point (Right Hand Touch Cheek 850MHz CH190)

850 Right Cheek Low

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Cheek Low/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 7.85 V/m; Power Drift = -0.2 dB

Maximum value of SAR (interpolated) = 0.799 mW/g

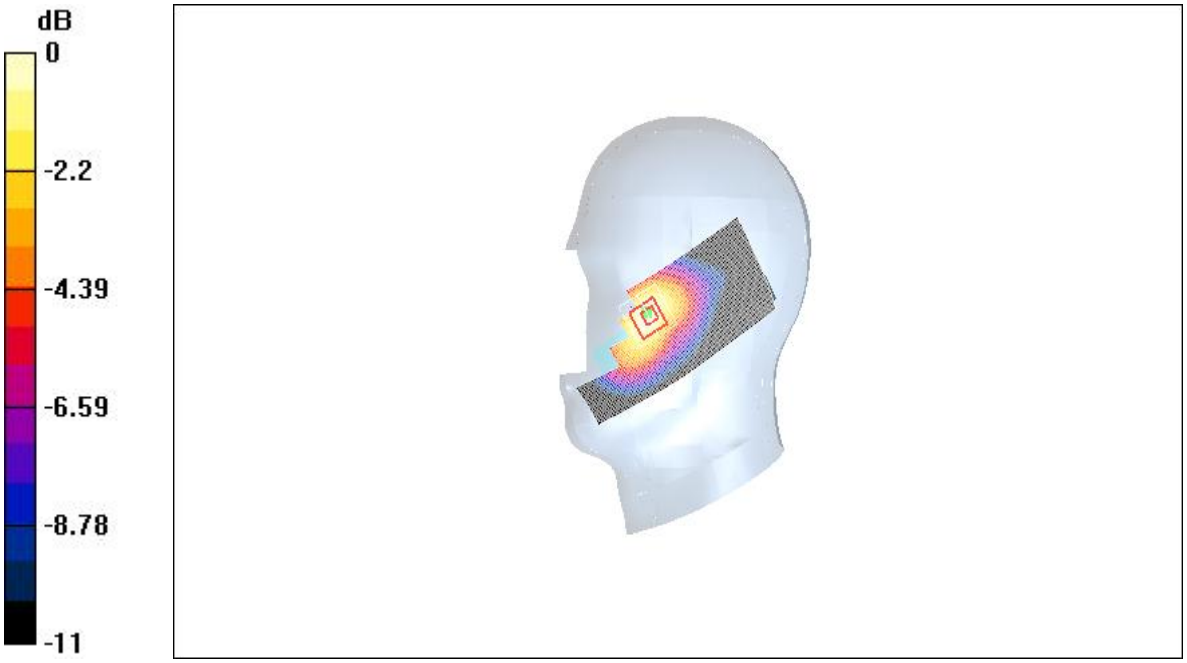
Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.85 V/m; Power Drift = -0.2 dB

Maximum value of SAR (measured) = 0.815 mW/g

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.757 mW/g; SAR(10 g) = 0.493 mW/g



0 dB = 0.815mW/g

Fig. 17 Right Hand Touch Cheek 850MHz CH128

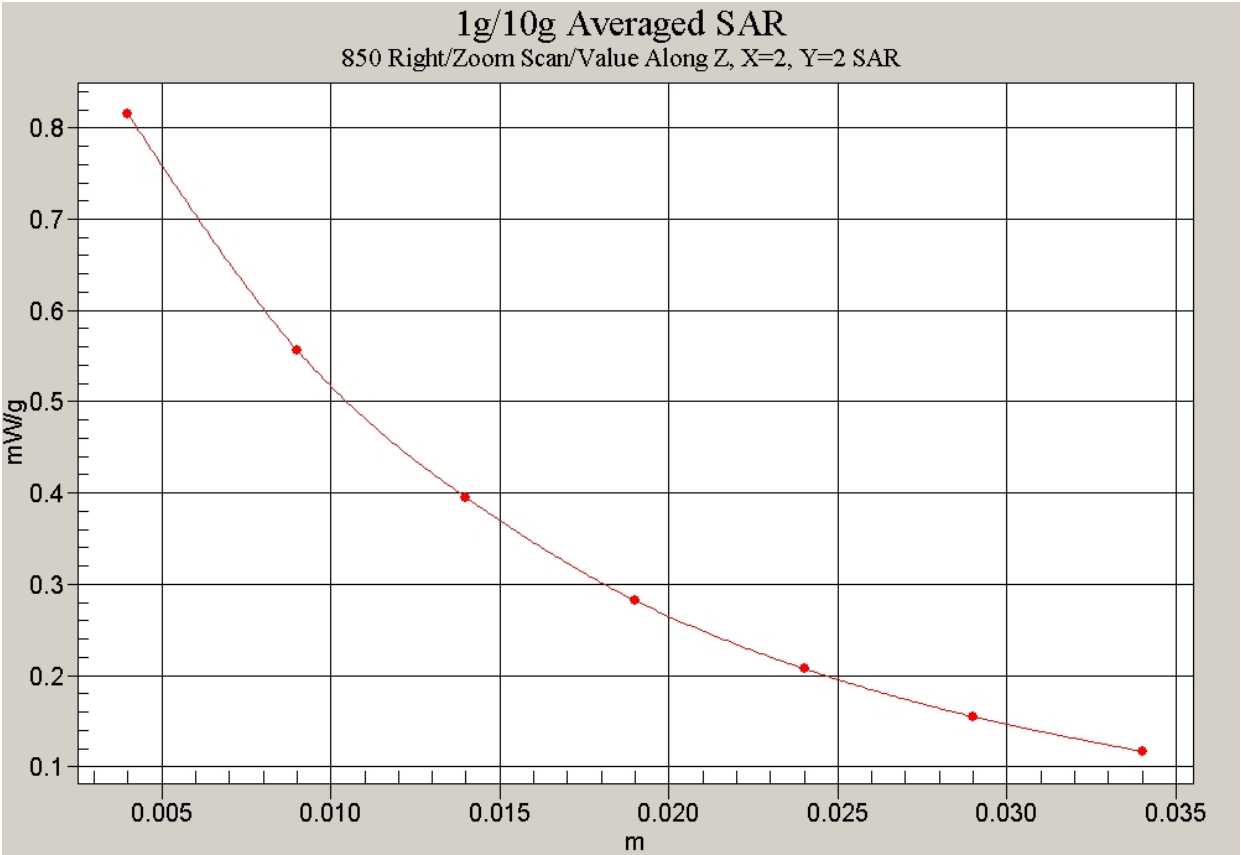


Fig. 18 Z-Scan at power reference point (Right Hand Touch Cheek 850MHz CH128)

850 Right Tilt High

Electronics: DAE3 Sn589

Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: ET3DV6 - SN1600 ConvF(6.68, 6.68, 6.68)

Tilt High/Area Scan (51x111x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 10.2 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.264 mW/g

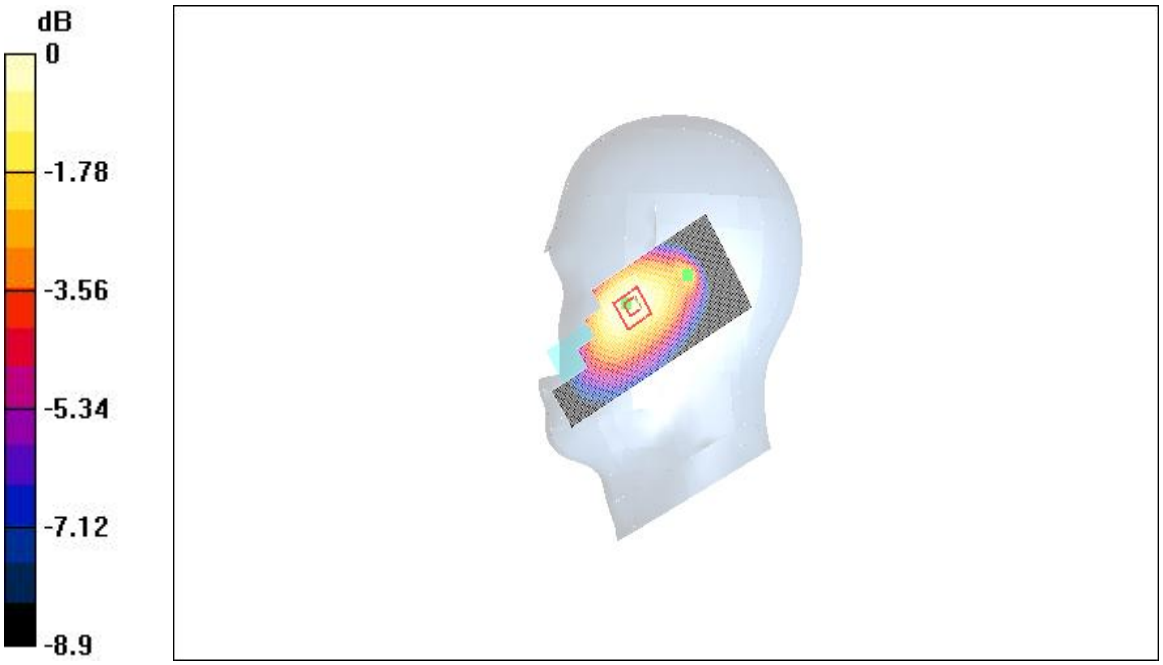
Tilt High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.2 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.259 mW/g

Peak SAR (extrapolated) = 0.316 W/kg

SAR(1 g) = 0.247 mW/g; SAR(10 g) = 0.182 mW/g



0 dB = 0.259mW/g

Fig. 19 Right Hand Tilt 15°850MHz CH251