



No. L0442



No. DAT-P-114/01-10

TEST REPORT

No. SAR2004001

Test name	Electromagnetic Field (Specific Absorption Rate)
Product	GSM Mobile Phone
Model	T528
Client	TCL Mobile Communication Co., Ltd.
Type of test	Entrusted

Telecommunication Metrology Center
of Ministry of Information Industry



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No. SAR2004001

Page 3 of 60

GENERAL SUMMARY

Product	GSM Mobile Phone	Model	T528
Client	TCL Mobile Communication Co., Ltd	Manufacturer	TCL Mobile Communication Co., Ltd
Type of test	Entrusted	Arrival Date of sample	June. 1 st , 2004
Place of sampling	(Blank)	Carrier of the samples	Yuanpeng Hu
Quantity of the samples	One	Date of product	(Blank)
Base of the samples	(Blank)	Items of test	SAR
Series number	353543000009805		
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: Jun 9th, 2004		
Comment	TX Freq. Band: 1850-1910 MHz (PCS) Max. Power: 1 Watt (PCS) Antenna Character: 21mm The test result only responds to the measured sample.		

Approved by 卢民牛 (Lu Minniu) Revised by 王洪波 (Wang Hongbo) Performed by 齐 Dianyuan (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.....	6
4 OPERATIONAL CONDITIONS DURING TEST	7
4.1 SCHEMATIC TEST CONFIGURATION.....	7
4.2 SAR MEASUREMENT SET-UP.....	7
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.....	10
4.7 SYSTEM SPECIFICATIONS	11
4.7.1 ROBOTIC SYSTEM SPECIFICATIONS	11
5 CHARACTERISTICS OF THE TEST	11
5.1 APPLICABLE LIMIT REGULATIONS	11
5.2 APPLICABLE MEASUREMENT STANDARDS.....	12
5.3 CHARACTER OF THE TEST	12
6 LABORATORY ENVIRONMENT	12
7 TEST RESULTS	12
7.1 DIELECTRIC PERFORMANCE	12
7.2 SYSTEM VALIDATION.....	13
7.3 SUMMARY OF MEASUREMENT RESULTS (HEAD, PCS 1900 MHz BAND)	14
7.4 SUMMARY OF MEASUREMENT RESULTS (BODY-WORN, PCS 1900 MHz BAND).....	15
7.5 CONCLUSION.....	15
8 MEASUREMENT UNCERTAINTY	16
9 MAIN TEST INSTRUMENTS.....	17
10 TEST PERIOD	17
11 TEST LOCATION.....	17
ANNEX A : MEASUREMENT PROCESS	18
ANNEX B : TEST LAYOUT	19
ANNEX C: GRAPH RESULTS	24
ANNEX D SYSTEM VALIDATION RESULTS.....	60

1 COMPETENCE AND WARRANTIES

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

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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	23 Zone, Zhongkai High-technology Development Zone
City	Huizhou
Postal Code	516006
Country	China
Telephone	+86 752 2636526
Fax	+86 752 2611800

Table 2: Manufacturer

Name or Company	TCL Mobile Communication Co., Ltd.
Address/Post	23 Zone, Zhongkai High-technology Development Zone
City	Huizhou
Postal Code	516006
Country	China
Telephone	+86 752 2636526
Fax	+86 752 2611800

3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handset	T528	353543000009805	TCL Mobile Communication Co., Ltd.
Lithium Battery	GC06LB550	J1680000023	TCL Hyperpower Batteries Inc.
AC/DC Adapter	WYS-036	HOP18061003920	Huizhou Wei Ye Shun Electric 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 II portable Mobile Station (MS) with integrated antenna. It consists of Handset and normal options: Lithium Battery and AC/DC Adapter as Table 3 and Fig.1.

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. Upon the client's request, only the band of PCS 1900 MHz will be tested and the result will be showed in this report. The Absolute Radio Frequency Channel Number (ARFCN) is allocated 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 $\pm 0.02\text{mm}$. 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.

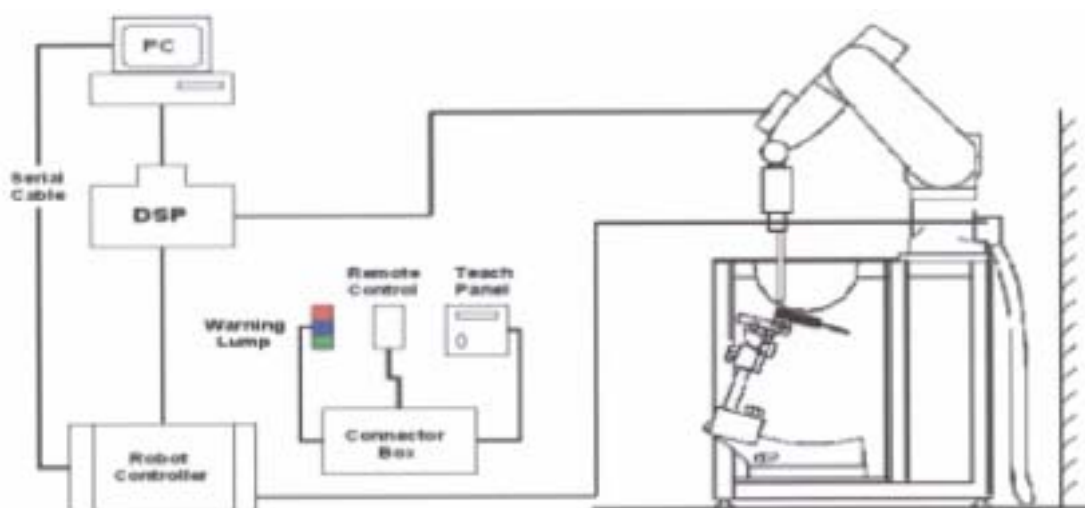


Figure 2. SAR Lab Test Measurement Set-up

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 $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$.

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$\pm 8\%$) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz; Linearity: $\pm 0.2\text{ dB}$ (30 MHz to 3 GHz)
Directivity	$\pm 0.2\text{ dB}$ in brain tissue (rotation around probe axis)



Figure 3. ET3DV6 E-field Probe

	±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



Figure 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 below 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).

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).



Figure 5. Device Holder

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±0.1 mm
Filling Volume	Approx. 20 liters
Dimensions	810 x 1000 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.



Figure 6. Generic Twin Phantom

Table 4. Composition of the Head Tissue Equivalent Matter

MIXTURE %	FREQUENCY 1850-1910MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz $\epsilon=40.0$ $\sigma=1.40$

Table 5. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz $\epsilon=53.3$ $\sigma=1.52$

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 cm 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 cm 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-held Mobile Phone (Part 2)

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.

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

5.3 Character of the Test

Handsets that are held on the side of a person's head next to the ear have been tested using realistic-shaped head phantoms.

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

6 LABORATORY ENVIRONMENT

Table 5: 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 6: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 49%. Liquid temperature during the test: 21.4°C			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	1900 MHz	40.0	1.40
Measurement value (Average of 10 tests)	1900 MHz	40.1	1.41

Table 7: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22.6 °C and relative humidity 51%. Liquid temperature during the test: 22.0°C			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	1900 MHz	53.30	1.52
Measurement value (Average of 10 tests)	1900 MHz	52.9	1.54

7.2 System Validation

Table 8: System Validation

Measurement is made at temperature 23.3 °C, relative humidity 47%, input power 250 mW. Liquid temperature during the test: 22.6°C					
Liquid parameters		Frequency	Permittivity ϵ		Conductivity σ (S/m)
		1900 MHz	40.1		1.41
Verification results	Frequency	Target value (W/kg)		Measurement value (W/kg)	
		10 g Average	1 g Average	10 g Average	1 g Average
	1900 MHz	5.31	10.1	4.91	9.8

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

Table 9: SAR Values (PCS 1900 MHz Band, head)

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	
Left hand, Touch cheek, Top frequency	0.326	0.672	29.41/29.52
Left hand, Touch cheek, Mid frequency	0.268	0.486	29.88/29.79
Left hand, Touch cheek, Bottom frequency	0.183	0.326	29.68/29.72
Left hand, Tilt 15 Degree, Top frequency	0.291	0.587	29.42/29.38
Left hand, Tilt 15 Degree, Mid frequency	0.269	0.505	29.79/29.87
Left hand, Tilt 15 Degree, Bottom frequency	0.196	0.38	29.53/29.65
Right hand, Touch cheek, Top frequency	0.618	1.29	29.45/29.41
Right hand, Touch cheek, Mid frequency	0.285	0.58	29.66/29.52
Right hand, Touch cheek, Bottom frequency	0.189	0.364	29.87/29.68
Right hand, Tilt 15 Degree, Top frequency	0.397	0.869	29.54/29.46
Right hand, Tilt 15 Degree, Mid frequency	0.383	0.764	29.90/29.96
Right hand, Tilt 15 Degree, Bottom frequency	0.253	0.498	29.74/29.72

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

Table 10: SAR Values (PCS 1900 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 phantom, Top Frequency	0.108	0.175	29.31/29.55
Display of EUT towards the phantom, Mid Frequency	0.115	0.187	29.89/29.88
Display of EUT towards the phantom, Bottom Frequency	0.066	1.06	29.47/29.36
Display of EUT towards the ground, Top frequency	0.23	0.368	29.71/29.42
Display of EUT towards the ground, Mid frequency	0.221	0.361	29.86/29.84
Display of EUT towards the ground, Bottom frequency	0.144	0.234	29.64/29.65

7.5 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.

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.

**Telecommunication Metrology Center
of Ministry of Information Industry**

No. SAR2004001

Page 16 of 60

8 Measurement Uncertainty

No.	Error source	Type	Uncertainty Value (%)	Probability Distribution	k	c_i	Standard Uncertainty (%) u_i (%)	Degree of freedom V_{eff} or ν_i
1	System repetivity	A	0.5	N	1	1	0.5	9
Measurement system								
2	- probe calibration	B	7	N	2	1	3.5	∞
3	- axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	4.3	∞
4	- hemisphere isotropy of the probe	B	9.4	R	$\sqrt{3}$	$\sqrt{0.5}$		
5	- spatial resolution	B	0	R	$\sqrt{3}$	1	0	∞
6	- boundary effect	B	11.0	R	$\sqrt{3}$	1	6.4	∞
7	- probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
8	- detection limit	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	- electronic readout	B	1.0	N	1	1	1.0	∞
10	- RF interference	B	3.0	R	$\sqrt{3}$	1	1.73	∞
11	- probe mechanical positioning constraint	B	0.4	R	$\sqrt{3}$	1	0.2	∞
12	- matching between probe and phantom references	B	2.9	R	$\sqrt{3}$	1	1.7	∞
13	- SAR interpolation and extrapolation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Uncertainties of the DUT								
14	- position of the DUT	A	4.9	N	1	1	4.9	5
15	- holder of the DUT	A	6.1	N	1	1	6.1	5
16	- drift of the output power	B	5.0	R	$\sqrt{3}$	1	2.9	∞
physical parameters								
17	- phantom shell	B	1.0	R	$\sqrt{3}$	1	0.6	∞
18	- liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
19	- liquid conductivity(measurement error)	B	10.0	R	$\sqrt{3}$	0.6	3.4	∞

**Telecommunication Metrology Center
of Ministry of Information Industry**

No. SAR2004001

Page 17 of 60

20	- liquid permittivity(deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
21	- liquid permittivity(measurement error)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
Combined standard uncertainty		$u'_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					13.5	88.7
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		27	

9 MAIN TEST INSTRUMENTS

Table 13: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753C	3146A01905	August 18,2003	One year
02	Dielectric Probe Kit	Agilent 85070C	US99360113	No Calibration Requested	
03	Power meter	HP 436A	2101A11858	August 19,2003	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 835MHz	SPEAG D 835V2	443	September 3, 2003	Two years
08	Validation Kit 900MHz	SPEAG D 900V2	125	September 3, 2003	Two years
09	Validation Kit 1800MHz	SPEAG D 1800V2	2d010	September 3, 2003	Two years
10	Validation Kit 1900MHz	1900 V2	541	September 3, 2003	Two years
11	BTS	CMU 200	100680	September 13, 2003	One year
12	E-field Probe	SPEAG ET3DV6	1738	December 9, 2002	Two years
13	DAE	SPEAG DAE3	589	October 21 2003	Two years

10 TEST PERIOD

The test is performed from Jun 7, 2004 to Jun 8, 2004.

11 TEST LOCATION

The test is performed at
Radio Communication & Electromagnetic Compatibility Laboratory of
Telecommunication Metrology Center of
Ministry of Information Industry of
The People's Republic 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 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 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.

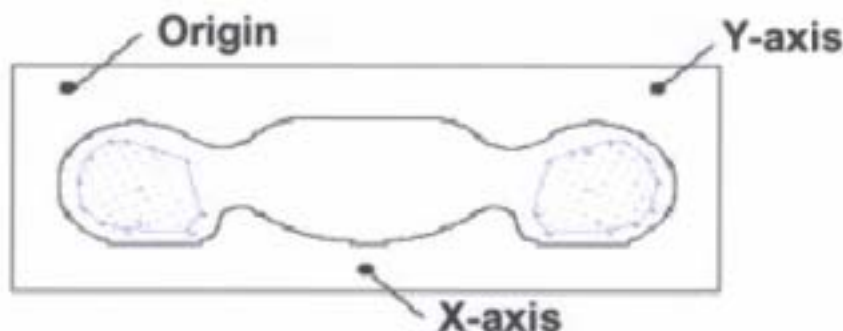


Figure 2 SAR Measurement Points in Area Scan

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



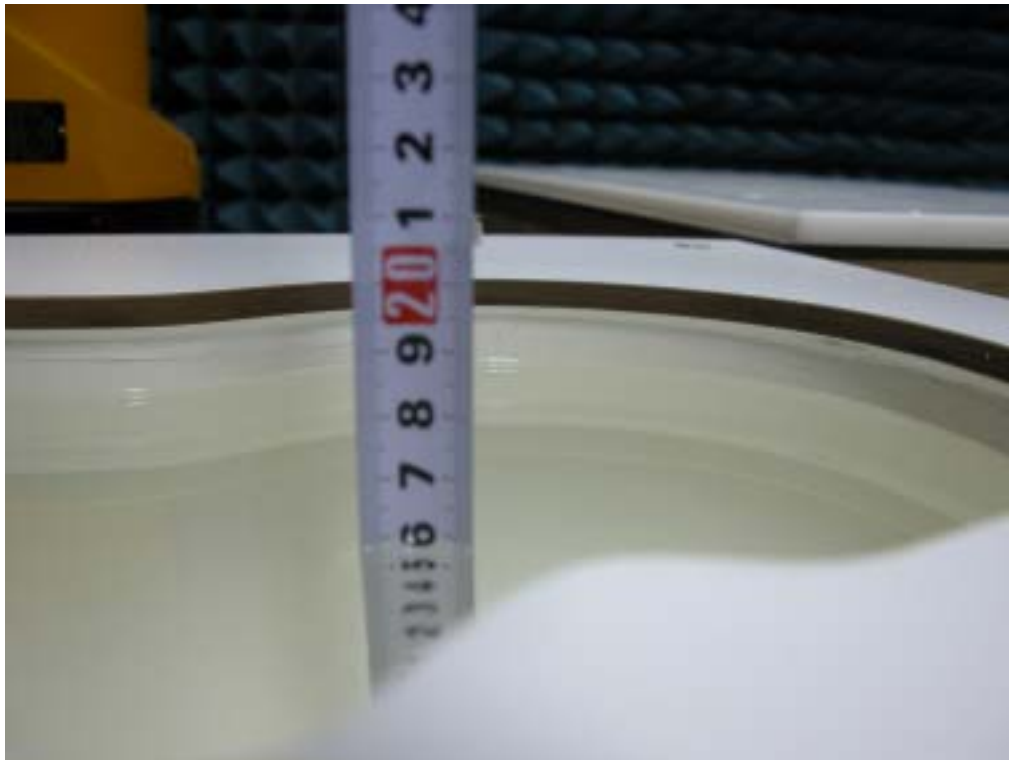
Picture 5 Right Hand Tilt 15° Position



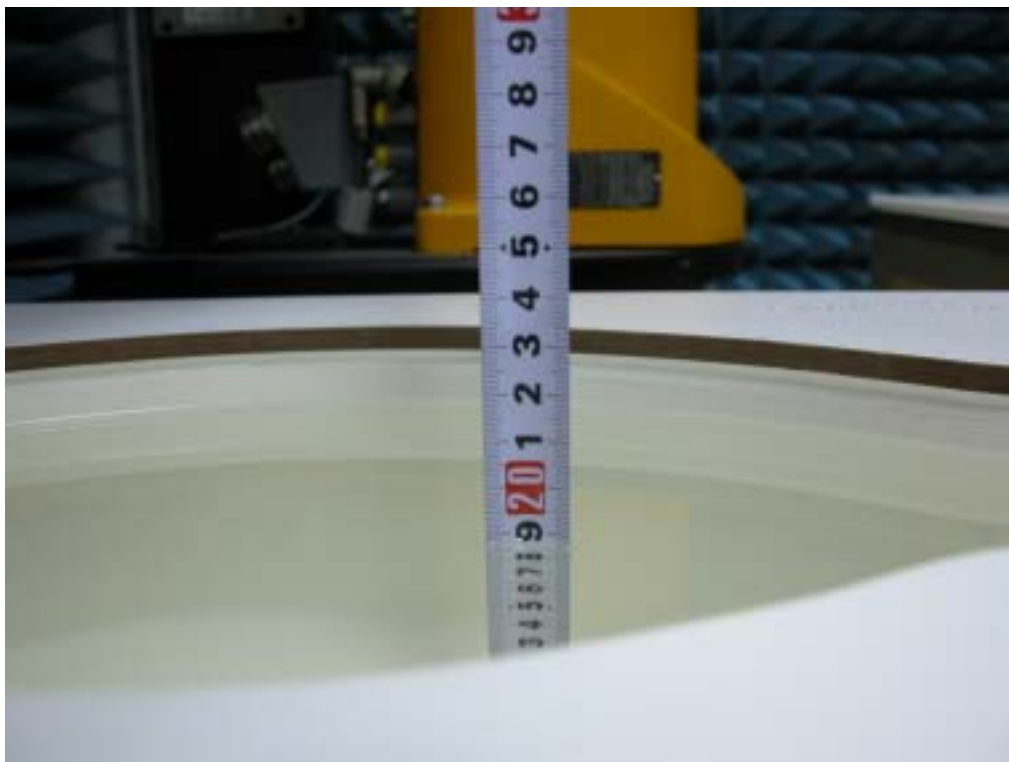
Picture 6 Flat Phantom -- Body-worn Position (toward phantom, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture 7 Flat Phantom -- Body-worn Position (toward ground, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture 8 Liquid depth in the Head Phantom (Head,1900MHz)



Picture 9 Liquid depth in the Flat Phantom (Body 1900MHz)

ANNEX C: GRAPH RESULTS

1900 Left Cheek Low

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Cheek L/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 12.8 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.377 mW/g

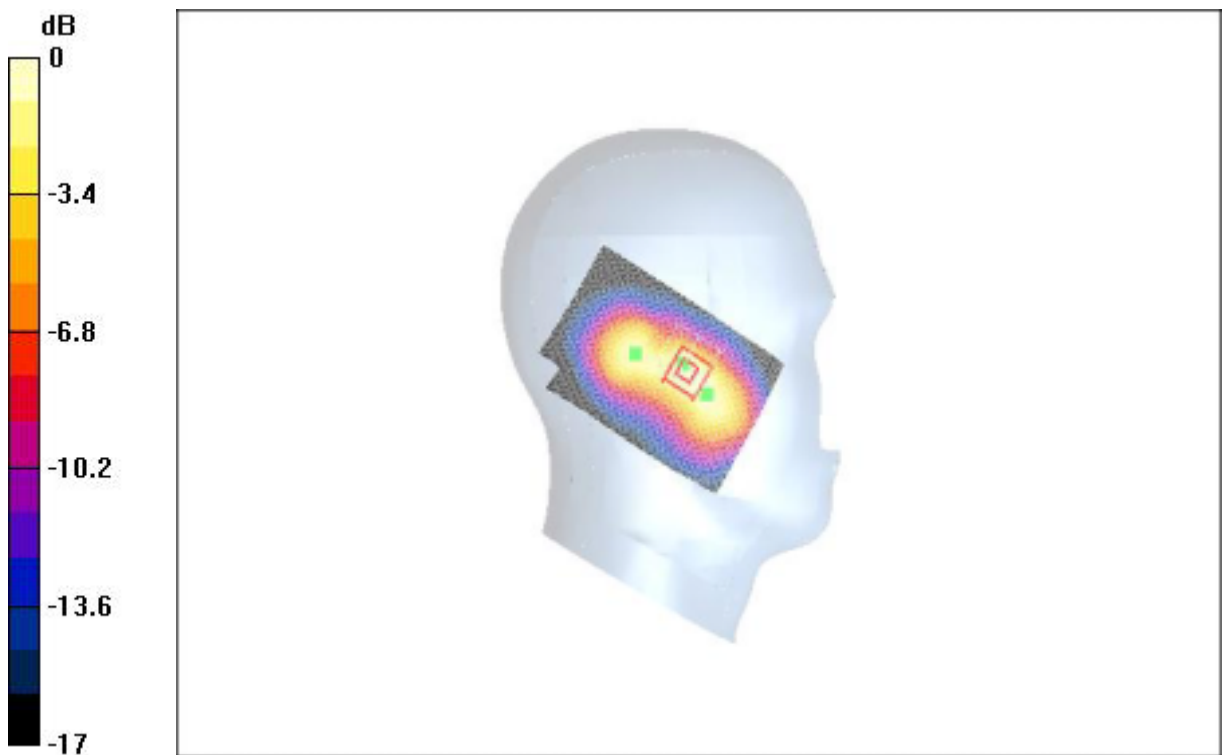
Cheek L/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.8 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.358 mW/g

Peak SAR (extrapolated) = 0.613 W/kg

SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.183 mW/g



0 dB = 0.358mW/g

Fig. 1 Left Hand Touch Cheek 1900MHz CH512

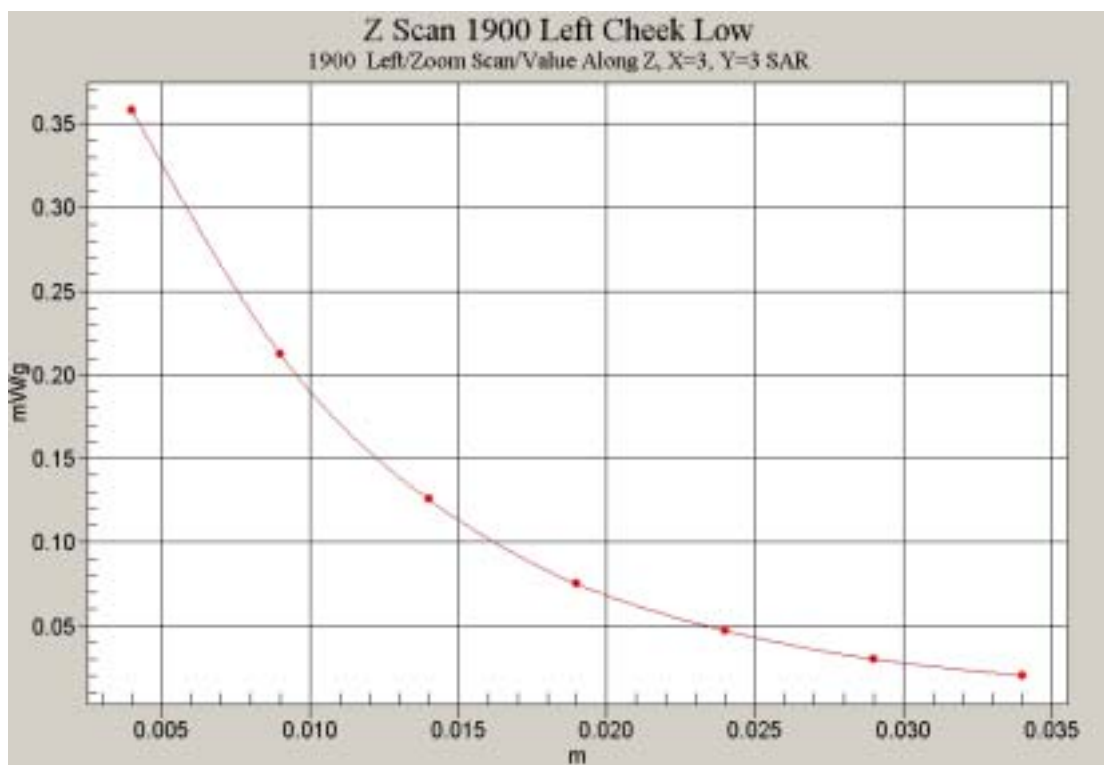


Fig. 2 Z-Scan at power reference point (Left Hand Touch Cheek 1900MHz CH512)

1900 Left Cheek Middle

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Cheek M/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 15.7 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.523 mW/g

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

Reference Value = 15.7 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.558 mW/g

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.486 mW/g; SAR(10 g) = 0.268 mW/g

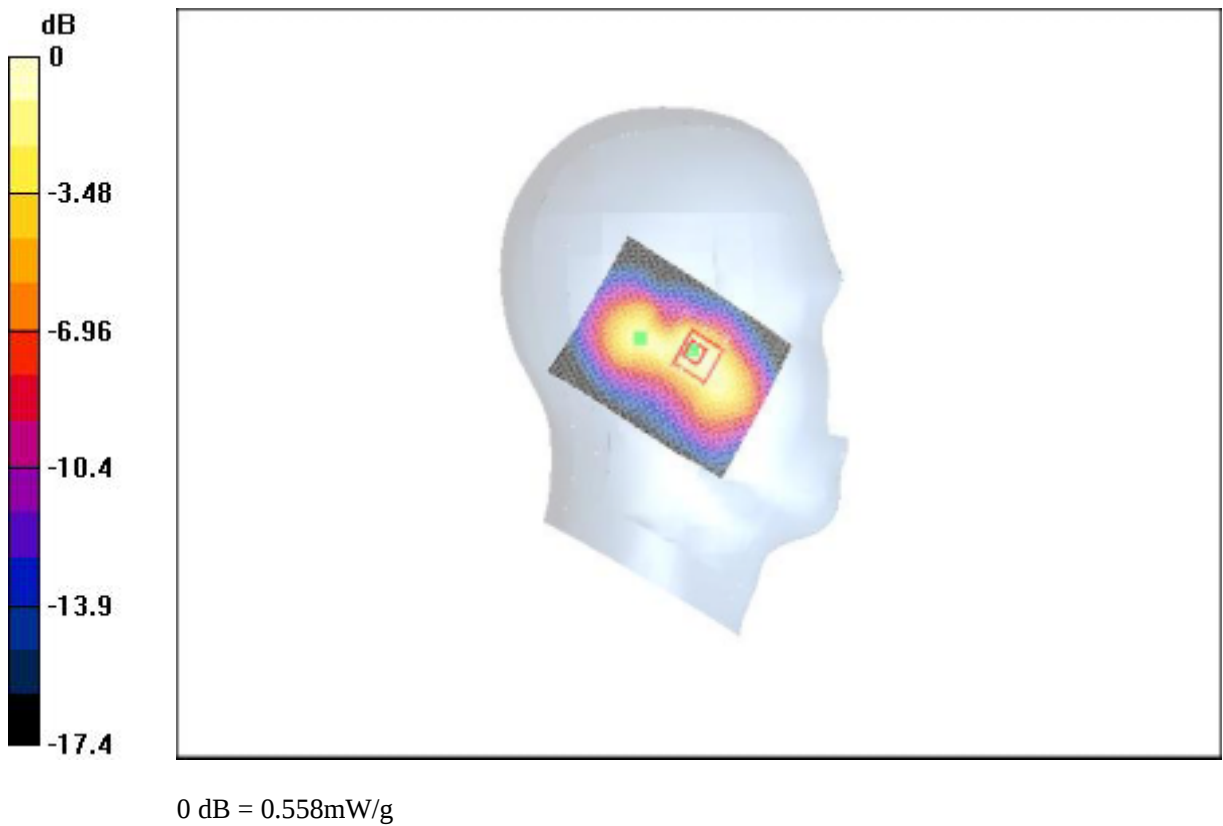


Fig. 3 Left Hand Touch Cheek 1900MHz CH661

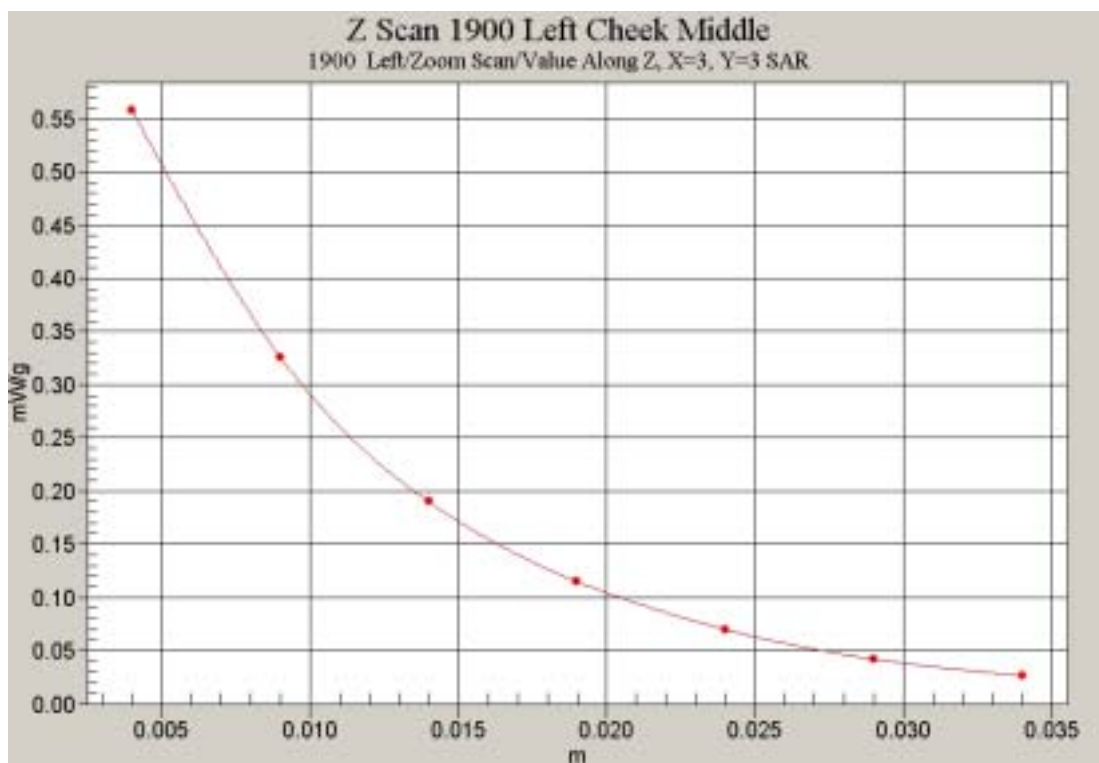


Fig. 4 Z-Scan at power reference point (Left Hand Touch Cheek 1900MHz CH661

1900 Left Cheek High

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Cheek H/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 20.8 V/m; Power Drift = -0.005 dB

Maximum value of SAR (interpolated) = 0.662 mW/g

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

Reference Value = 20.8 V/m; Power Drift = -0.005 dB

Maximum value of SAR (measured) = 0.780 mW/g

Peak SAR (extrapolated) = 1.28 W/kg

SAR(1 g) = 0.672 mW/g; SAR(10 g) = 0.326 mW/g

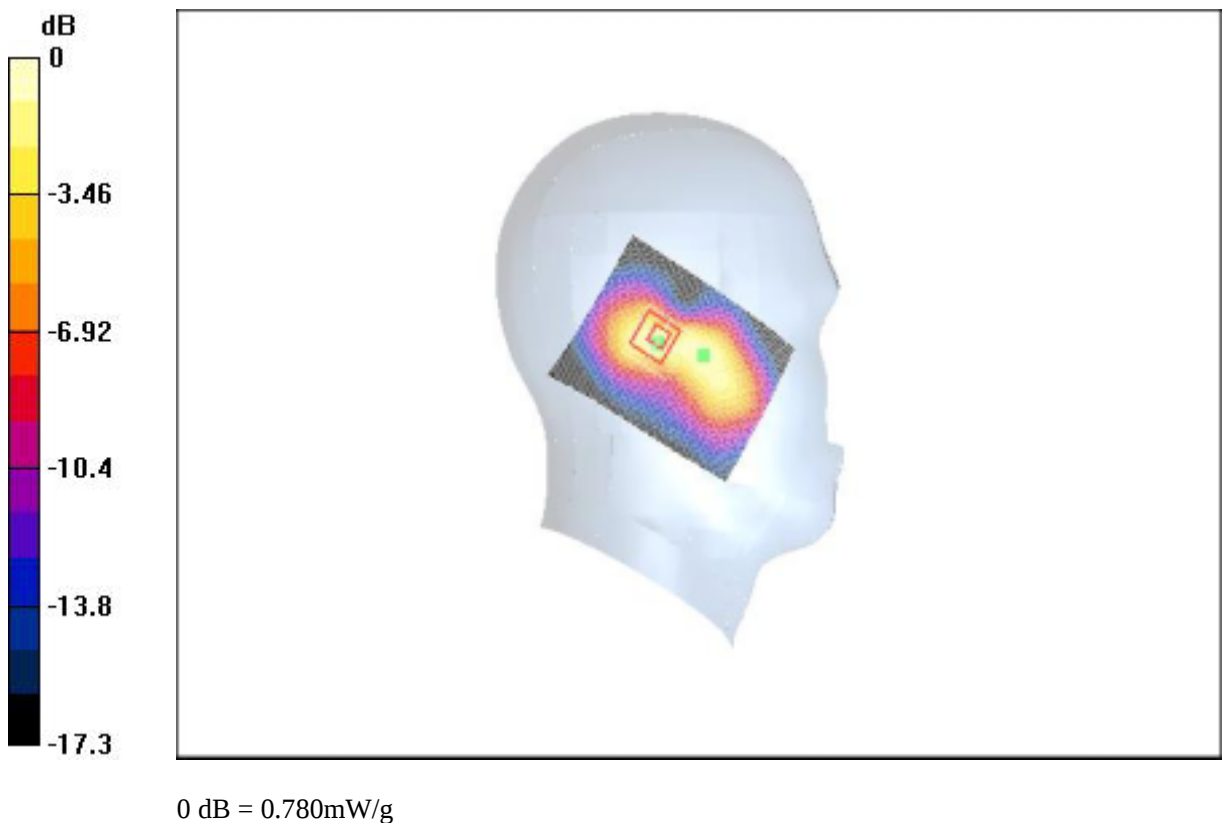


Fig. 5 Left Hand Touch Cheek 1900MHz CH810

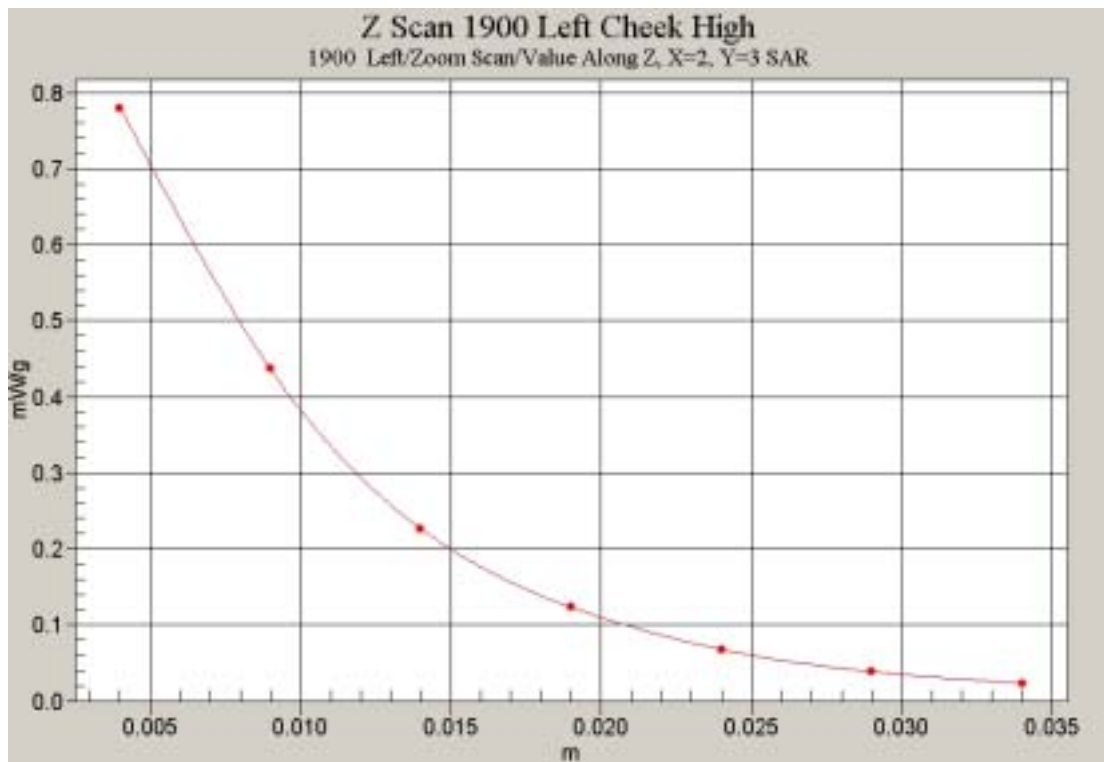


Fig. 6 Z-Scan at power reference point (Left Hand Touch Cheek 1900MHz CH810)

1900 Left Tilt Low

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Tilt L/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 13.3 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.422 mW/g

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

Reference Value = 13.3 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.400 mW/g

Peak SAR (extrapolated) = 0.598 W/kg

SAR(1 g) = 0.380 mW/g; SAR(10 g) = 0.196 mW/g

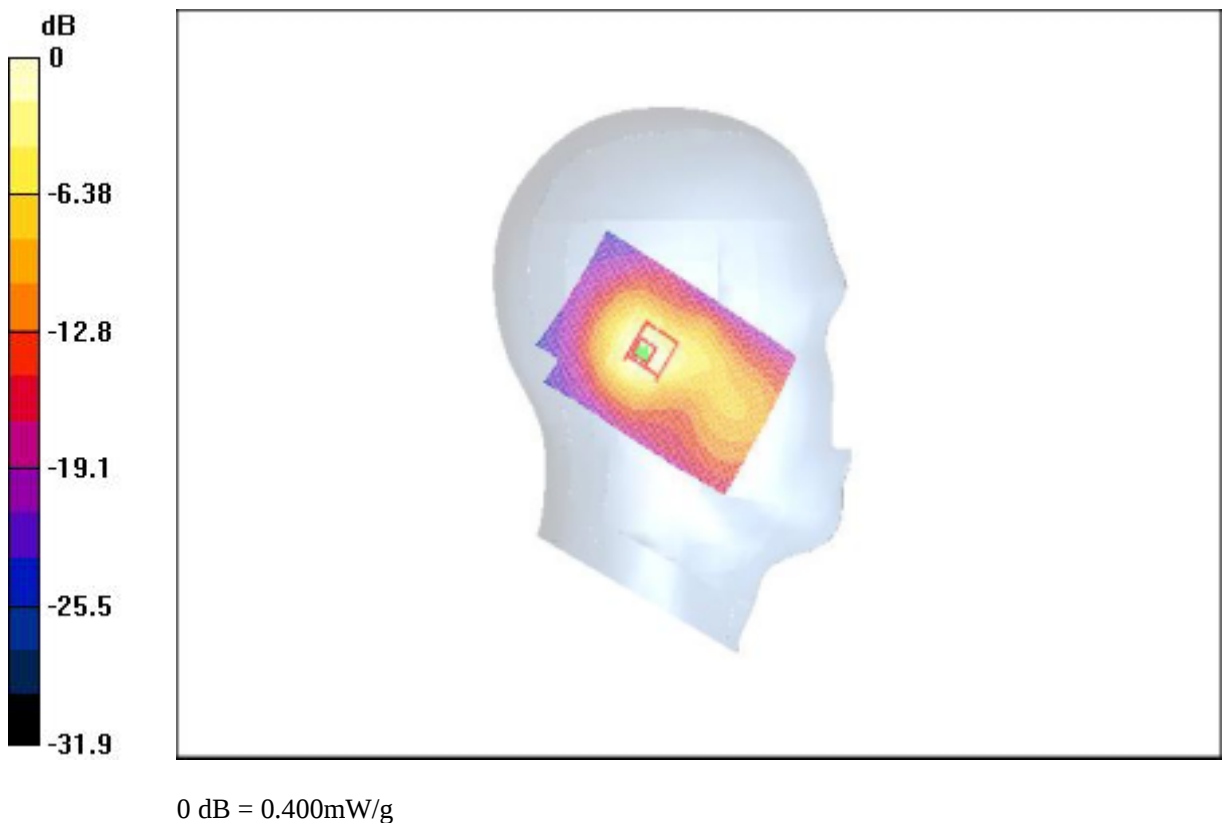


Fig. 7 Left Hand Tilt 15° 1900MHz CH512

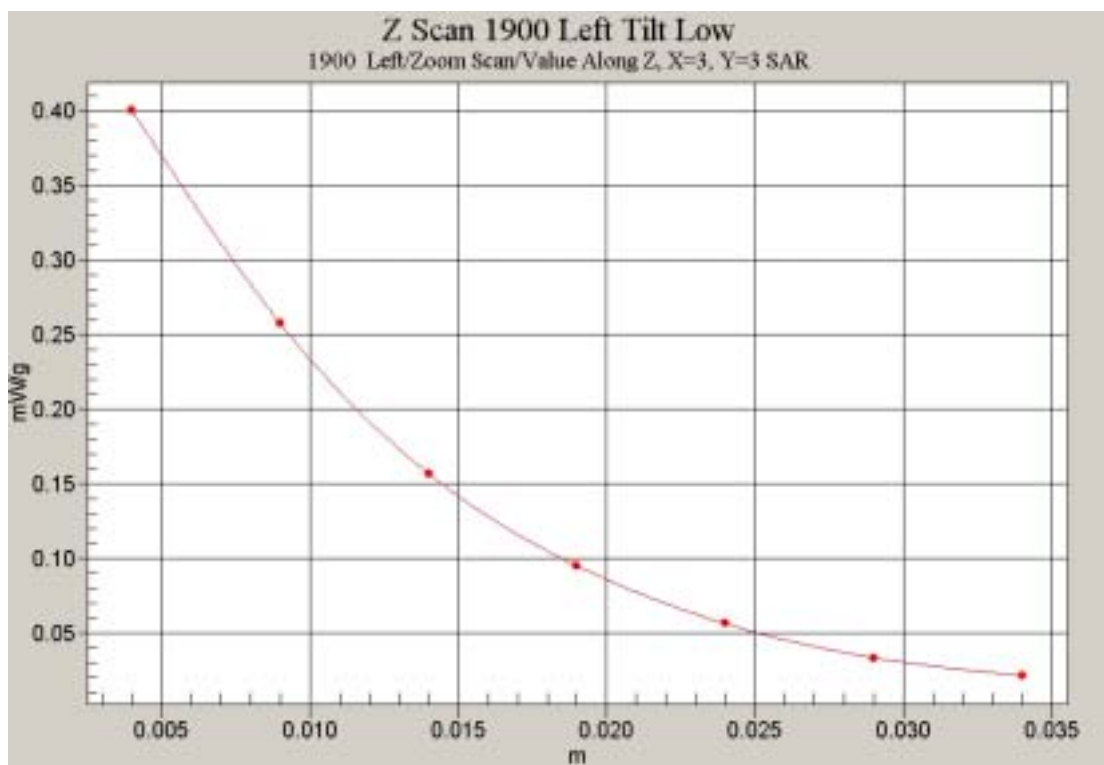


Fig. 8 Z-Scan at power reference point (Left Hand Tilt 15° 1900MHz CH512)

1900 Left Tilt Middle

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Tilt M/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 15.3 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.579 mW/g

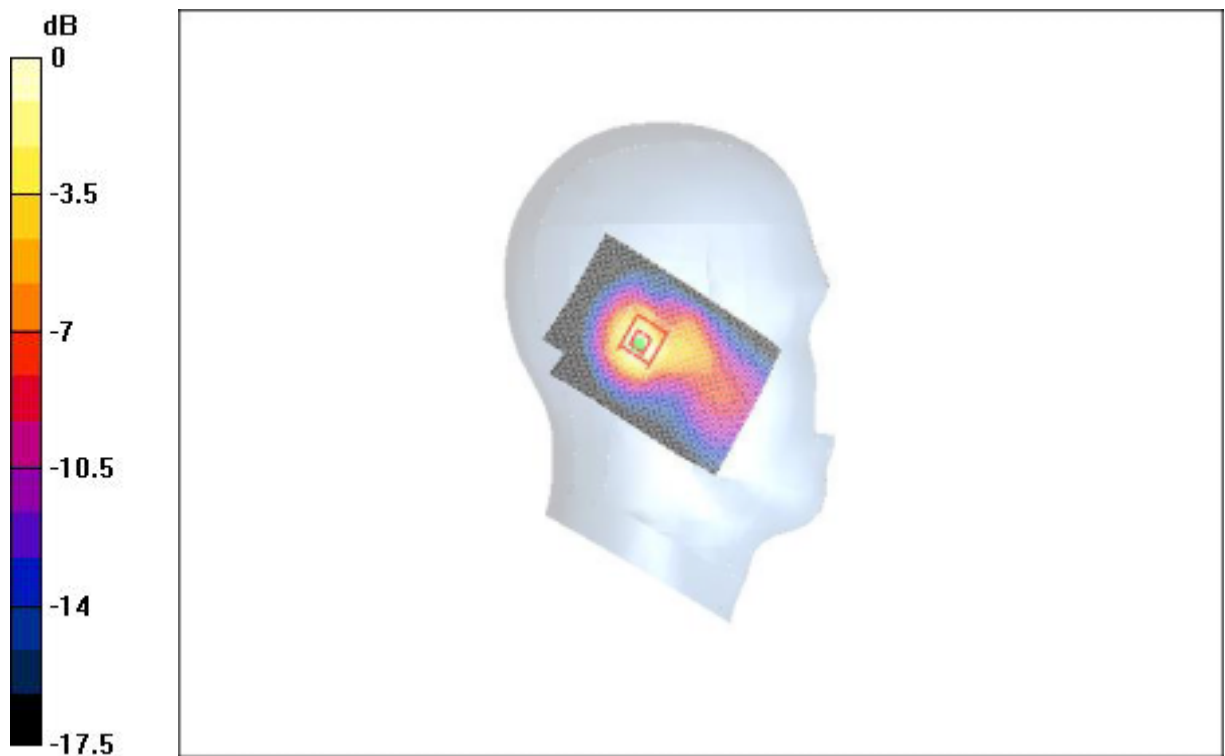
Tilt M/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.3 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.562 mW/g

Peak SAR (extrapolated) = 0.824 W/kg

SAR(1 g) = 0.505 mW/g; SAR(10 g) = 0.269 mW/g



0 dB = 0.562mW/g

Fig. 9 Left Hand Tilt 15° 1900MHz CH661

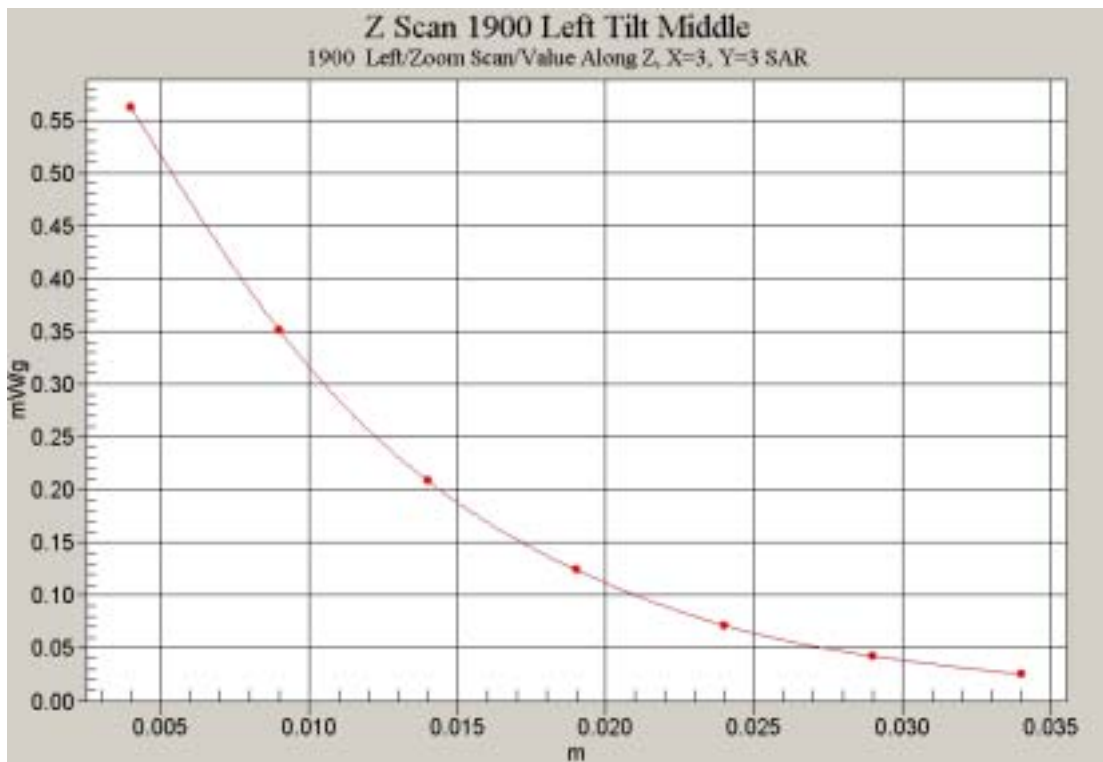


Fig. 10 Z-Scan at power reference point (Left Hand Tilt 15° 1900MHz CH661)

1900 Left Tilt High

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Tilt H/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 17 V/m; Power Drift = -0.003 dB

Maximum value of SAR (interpolated) = 0.661 mW/g

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

Reference Value = 17 V/m; Power Drift = -0.003 dB

Maximum value of SAR (measured) = 0.714 mW/g

Peak SAR (extrapolated) = 1.21 W/kg

SAR(1 g) = 0.587 mW/g; SAR(10 g) = 0.291 mW/g

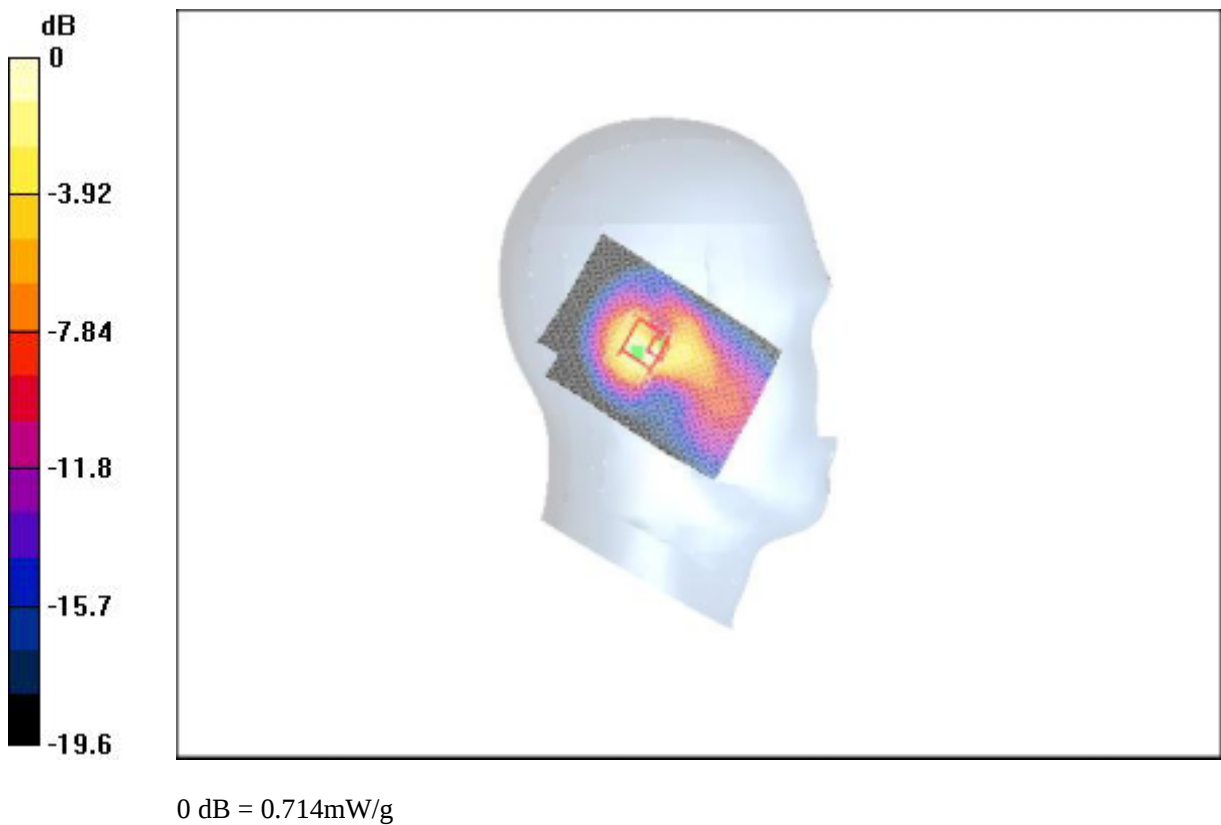


Fig. 11 Left Hand Tilt 15° 1900MHz CH810

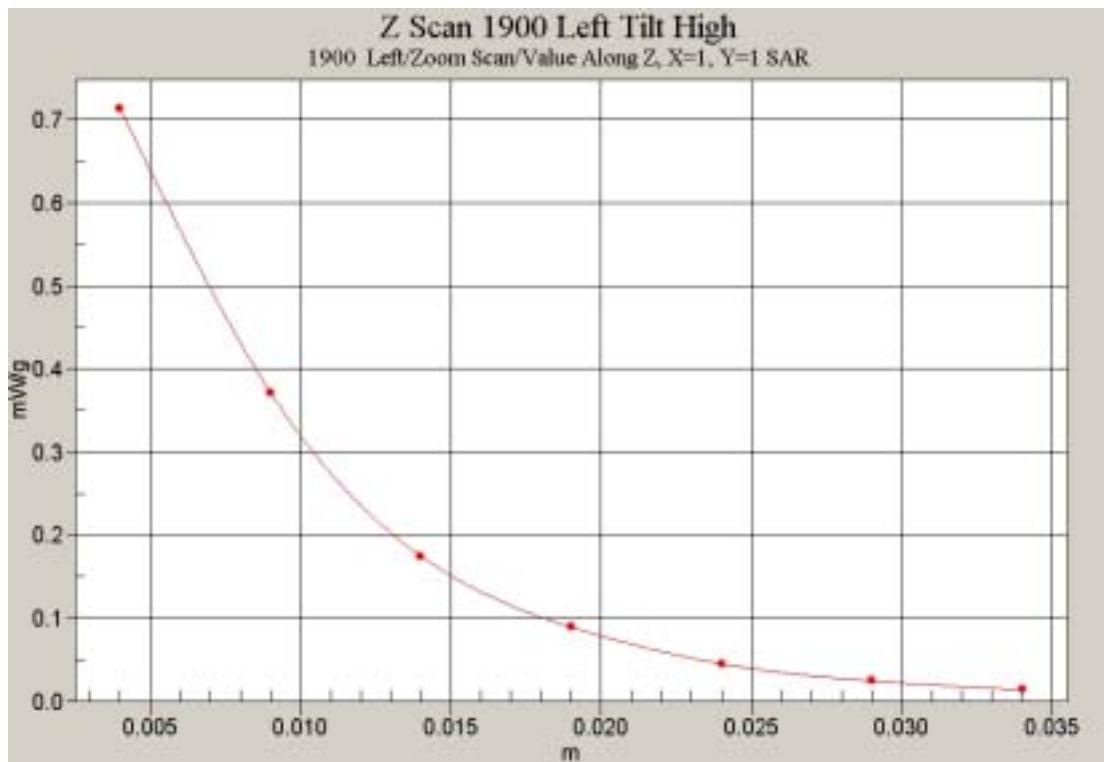


Fig. 12 Z-Scan at power reference point (left Hand Tilt 15° 1900MHz CH810)

1900 Right Cheek Low

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Cheek L/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 14.4 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.388 mW/g

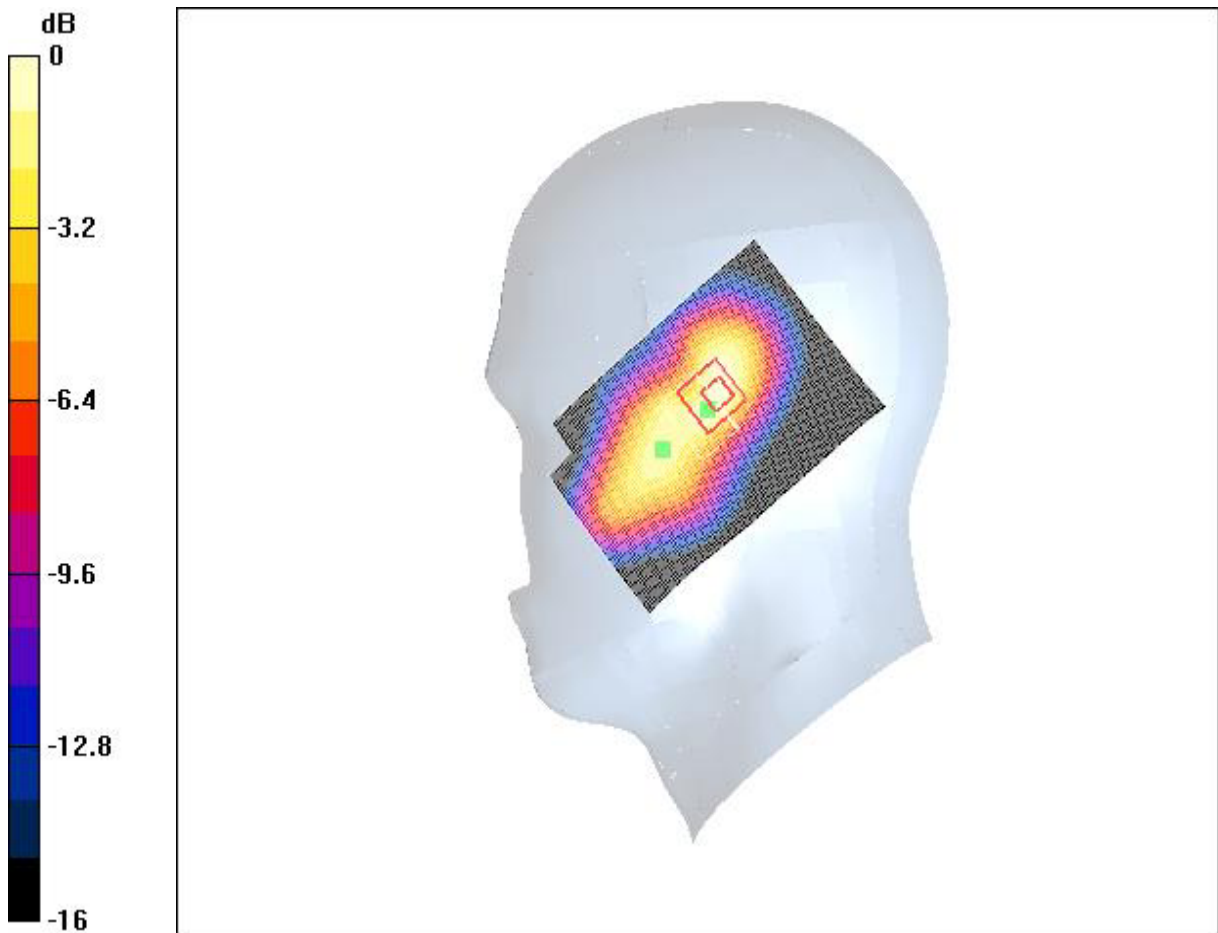
Cheek L/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.4 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.413 mW/g

Peak SAR (extrapolated) = 0.693 W/kg

SAR(1 g) = 0.364 mW/g; SAR(10 g) = 0.189 mW/g



0 dB = 0.413mW/g

Fig. 13 Right Hand Touch Cheek 1900MHz CH512

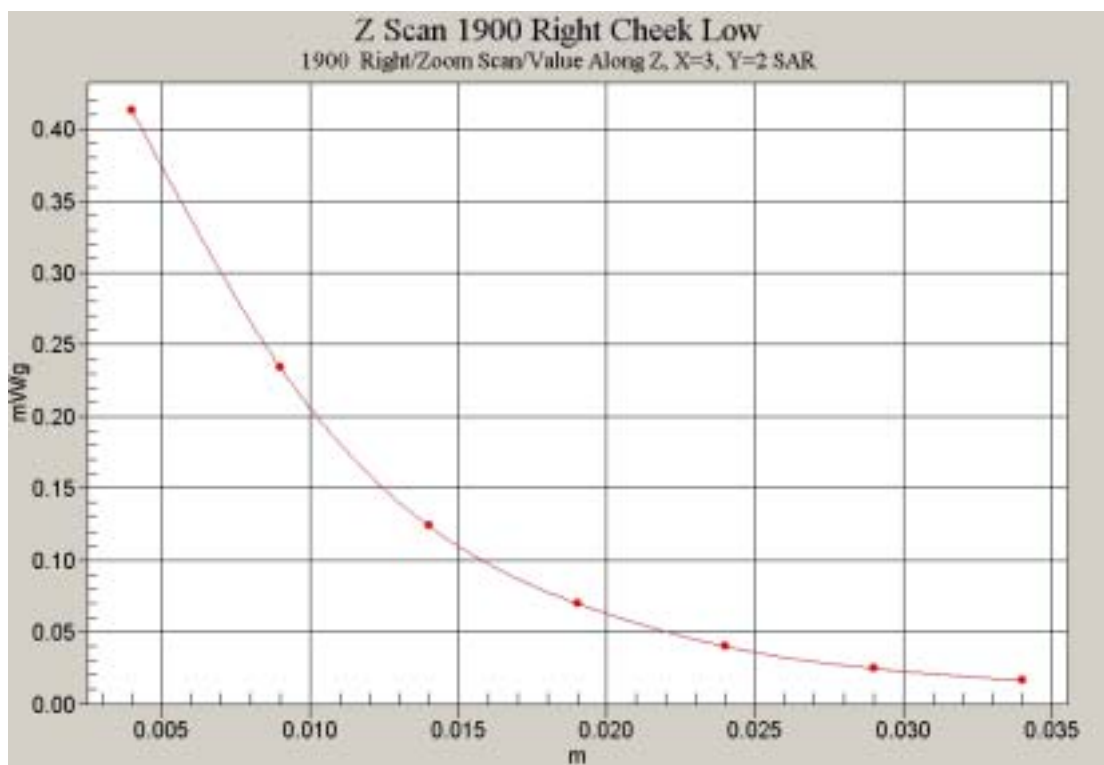


Fig. 14 Z-Scan at power reference point (Right Hand Touch Cheek 1800MHz CH512)

1900 Right Cheek Middle

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Cheek M/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 17.3 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.595 mW/g

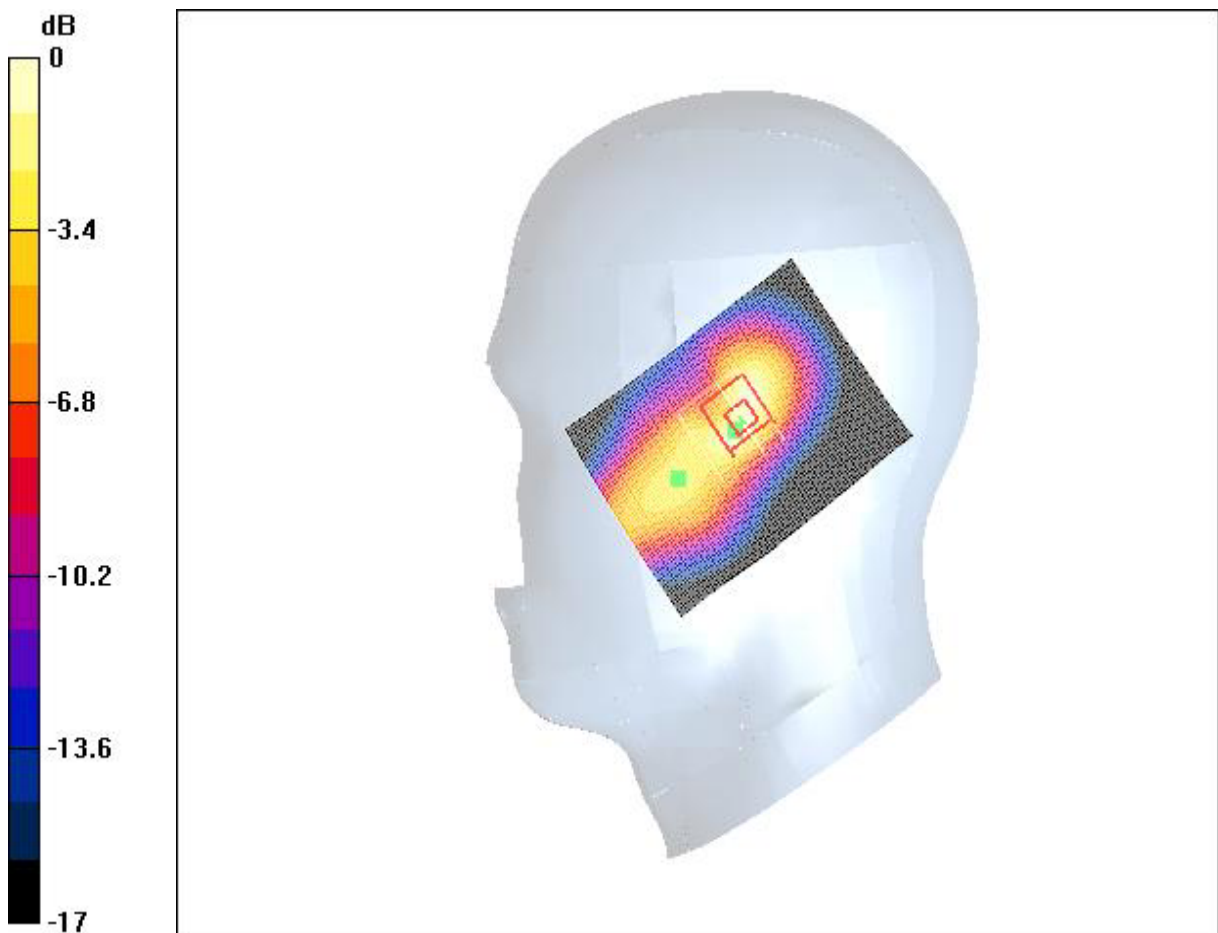
Cheek M/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.3 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.663 mW/g

Peak SAR (extrapolated) = 1.02 W/kg

SAR(1 g) = 0.580 mW/g; SAR(10 g) = 0.285 mW/g



0 dB = 0.663mW/g

Fig. 15 Right Hand Touch Cheek 1900MHz CH661

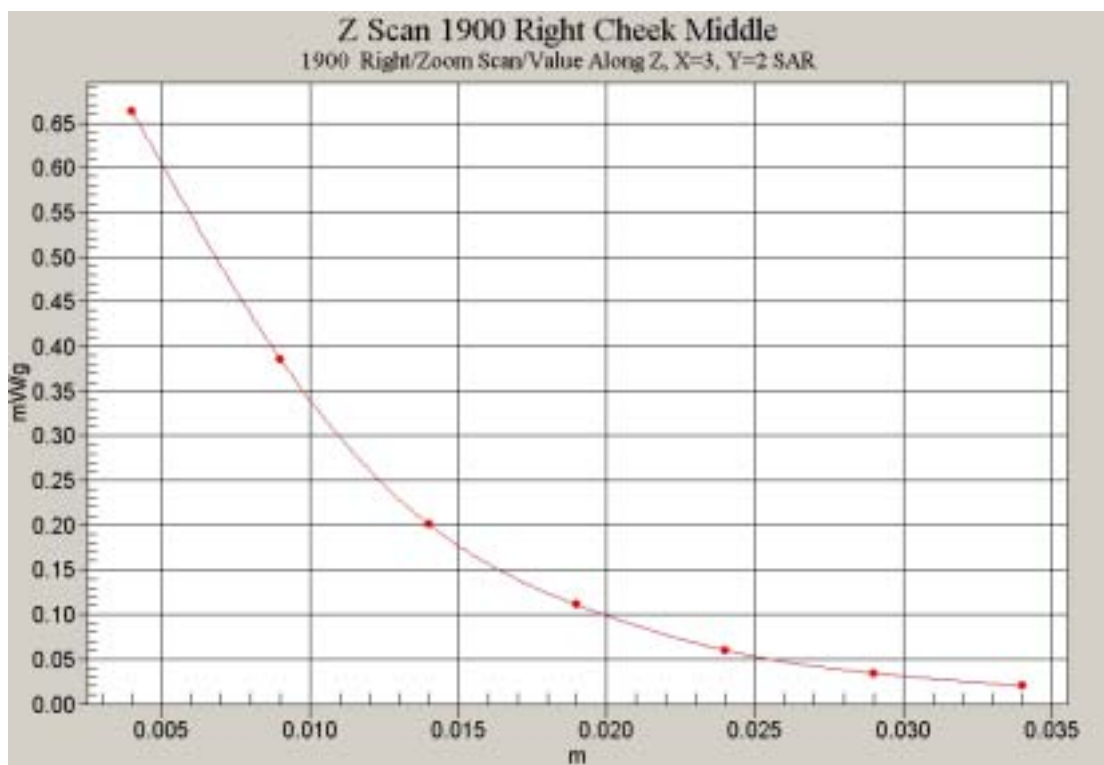


Fig. 16 Z-Scan at power reference point (Right Hand Touch Cheek 1900MHz CH661)

1900 Right Cheek High

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Cheek H/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 13.9 V/m; Power Drift = -0.1 dB

Maximum value of SAR (interpolated) = 1.33 mW/g

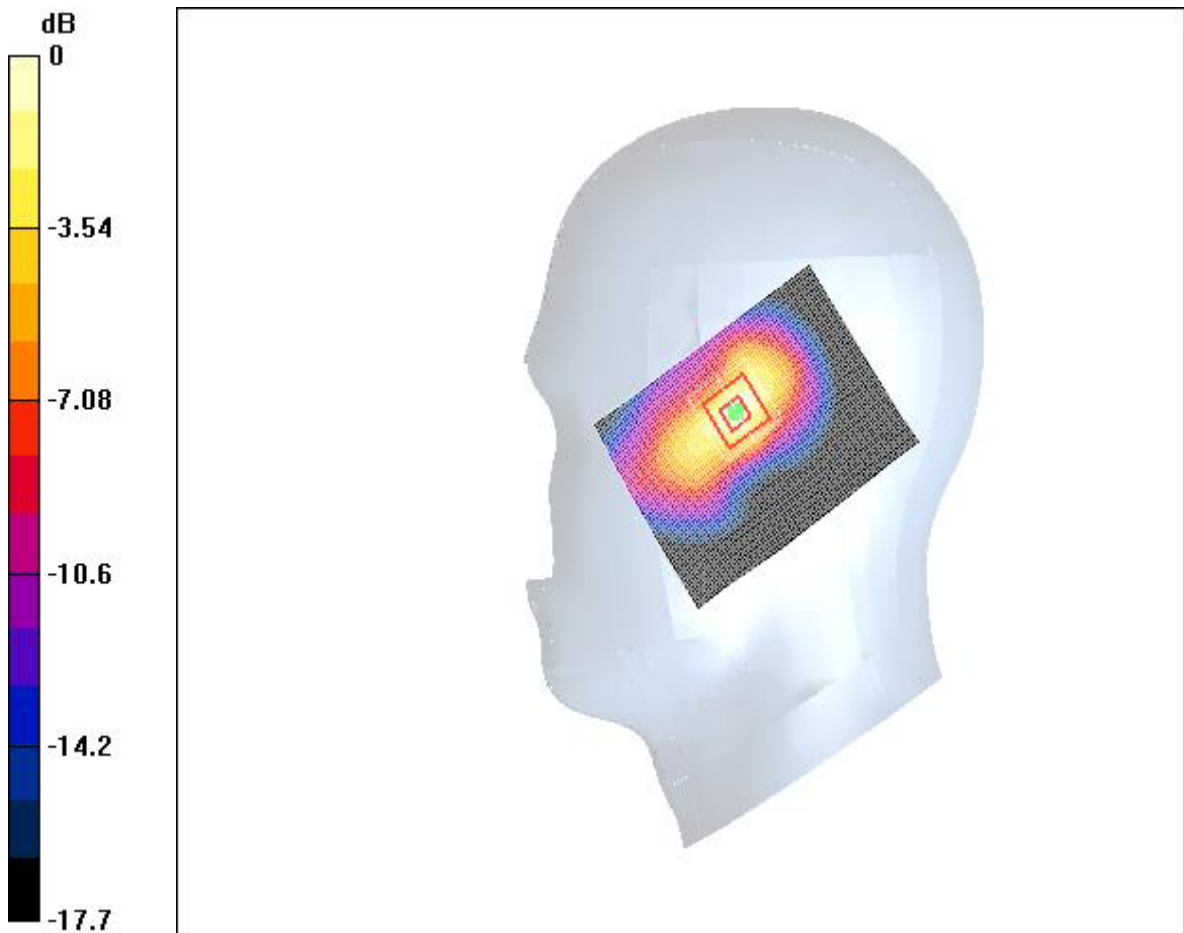
Cheek H/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.1 dB

Maximum value of SAR (measured) = 1.35 mW/g

Peak SAR (extrapolated) = 2.67 W/kg

SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.618 mW/g



0 dB = 1.35mW/g

Fig. 17 Right Hand Touch Cheek 1900MHz CH810

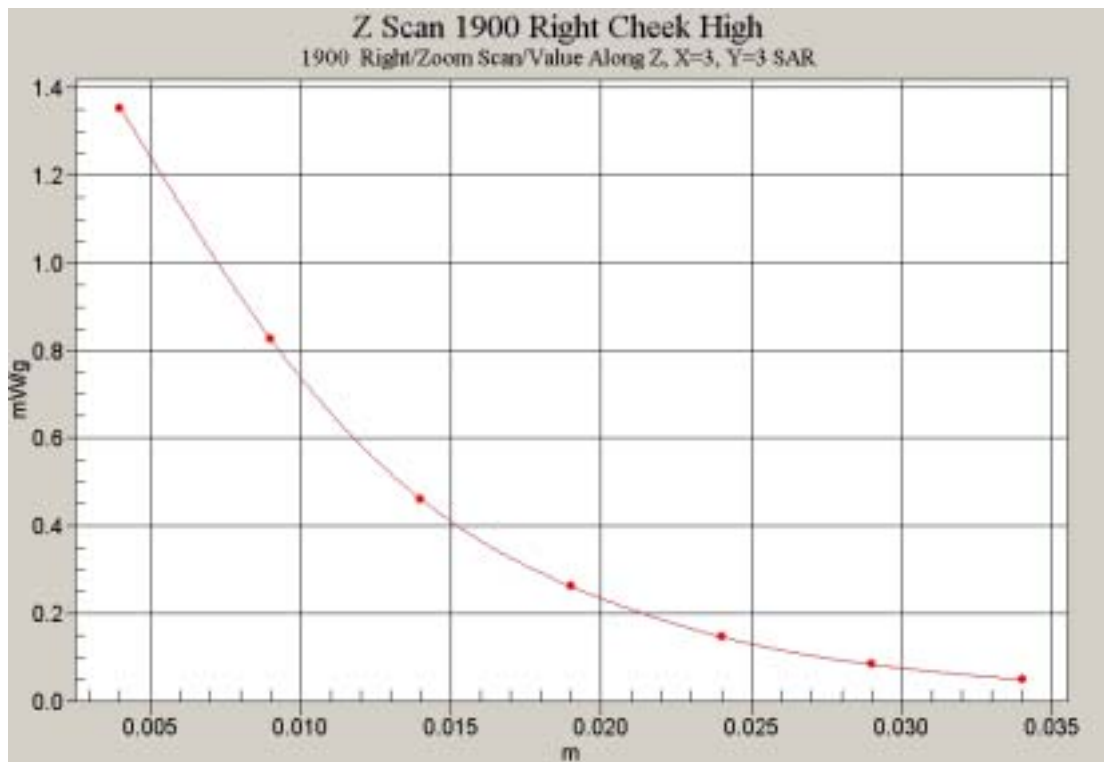


Fig. 18 Z-Scan at power reference point (Right Hand Touch Cheek 1900MHz CH810)

1900 Right Tilt Low

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Tilt L/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 15.5 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.532 mW/g

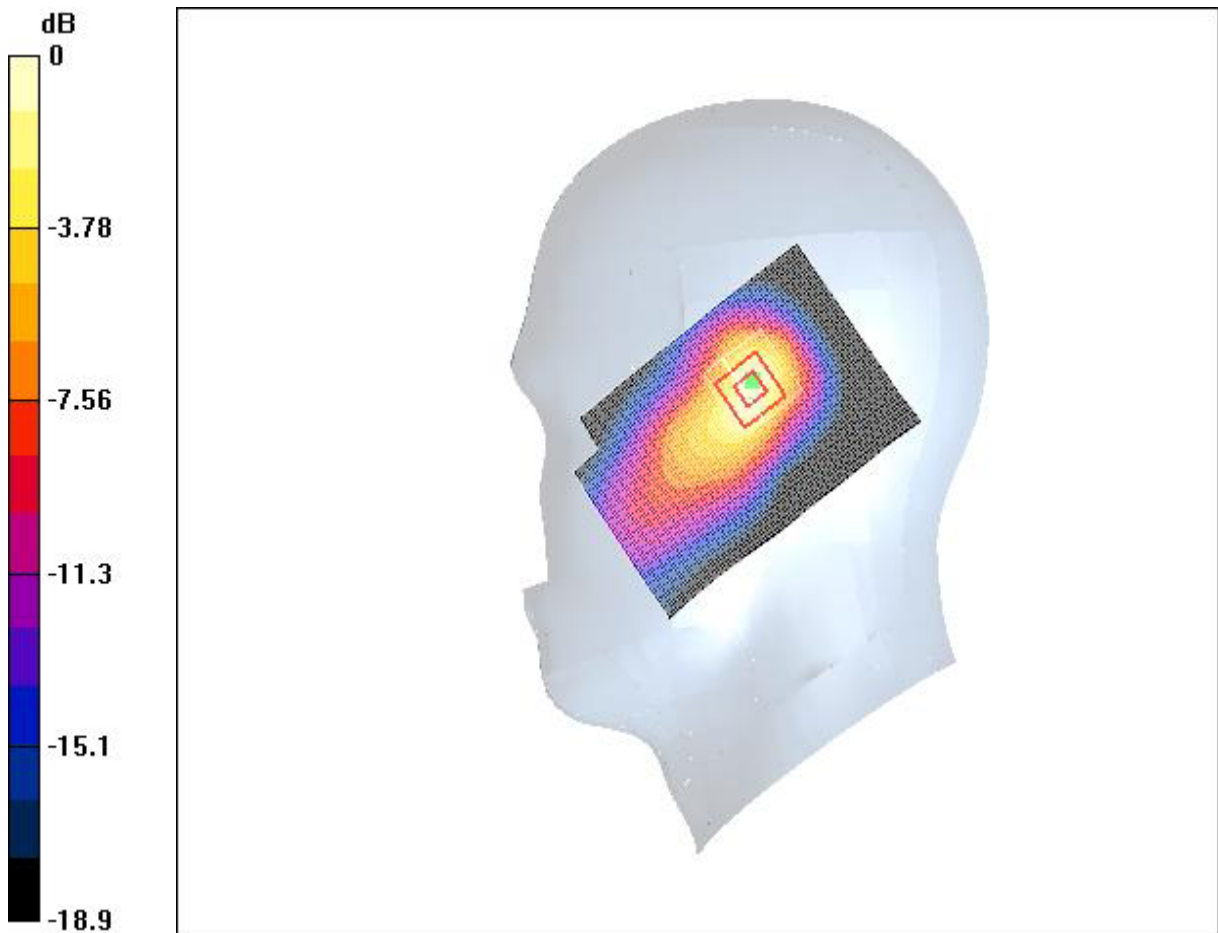
Tilt L/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.5 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.555 mW/g

Peak SAR (extrapolated) = 0.860 W/kg

SAR(1 g) = 0.498 mW/g; SAR(10 g) = 0.253 mW/g



0 dB = 0.555mW/g

Fig. 19 Right Hand Tilt 15° 1900MHz CH512

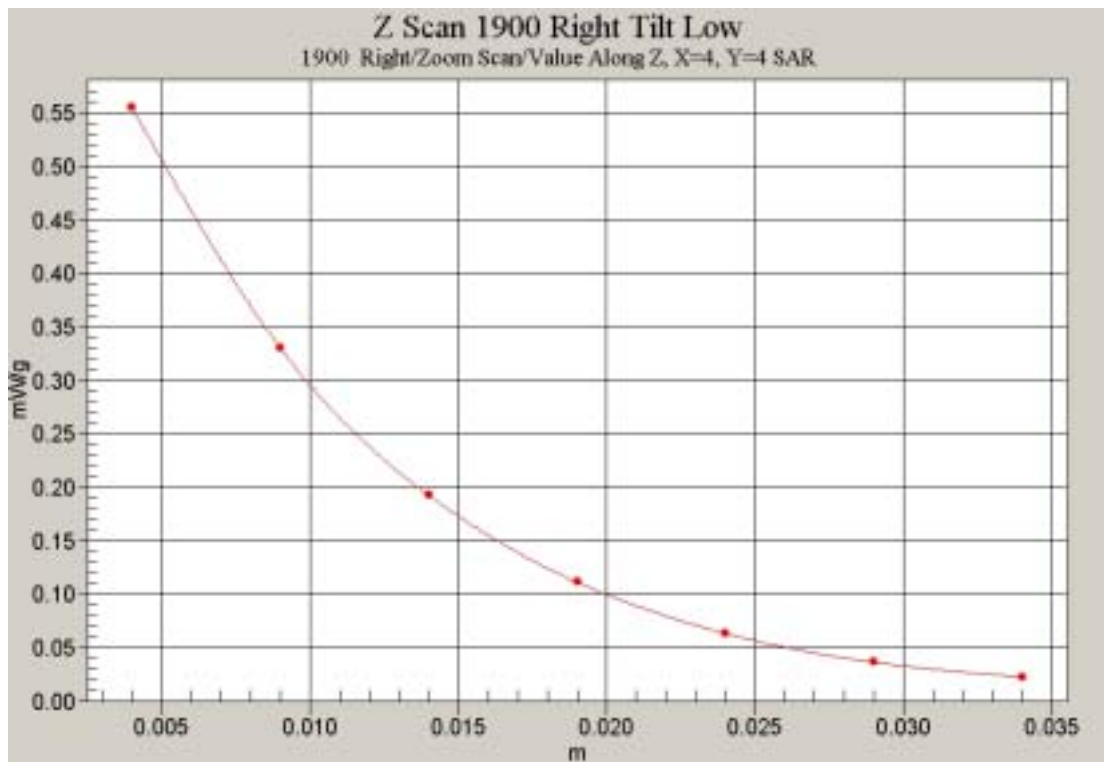


Fig. 20 Z-Scan at power reference point (Right Hand Tilt 15° 1900MHz CH512)

1900 Right Tilt Middle

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Tilt M/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 18.7 V/m; Power Drift = 0.0 dB

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

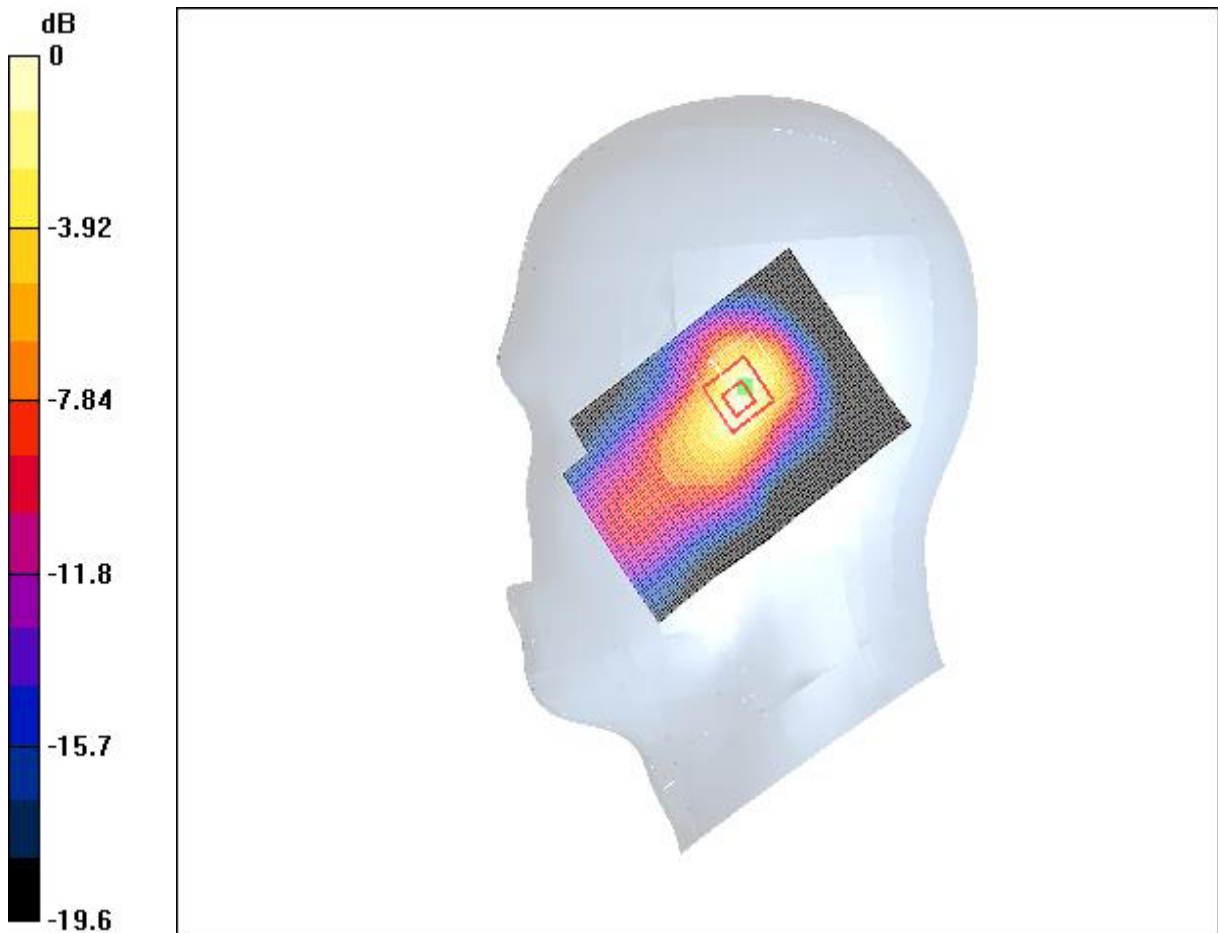
Tilt M/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.7 V/m; Power Drift = 0.0 dB

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

Peak SAR (extrapolated) = 1.39 W/kg

SAR(1 g) = 0.764 mW/g; SAR(10 g) = 0.383 mW/g



0 dB = 0.854mW/g

Fig. 21 Right Hand Tilt 15° 1900MHz CH661

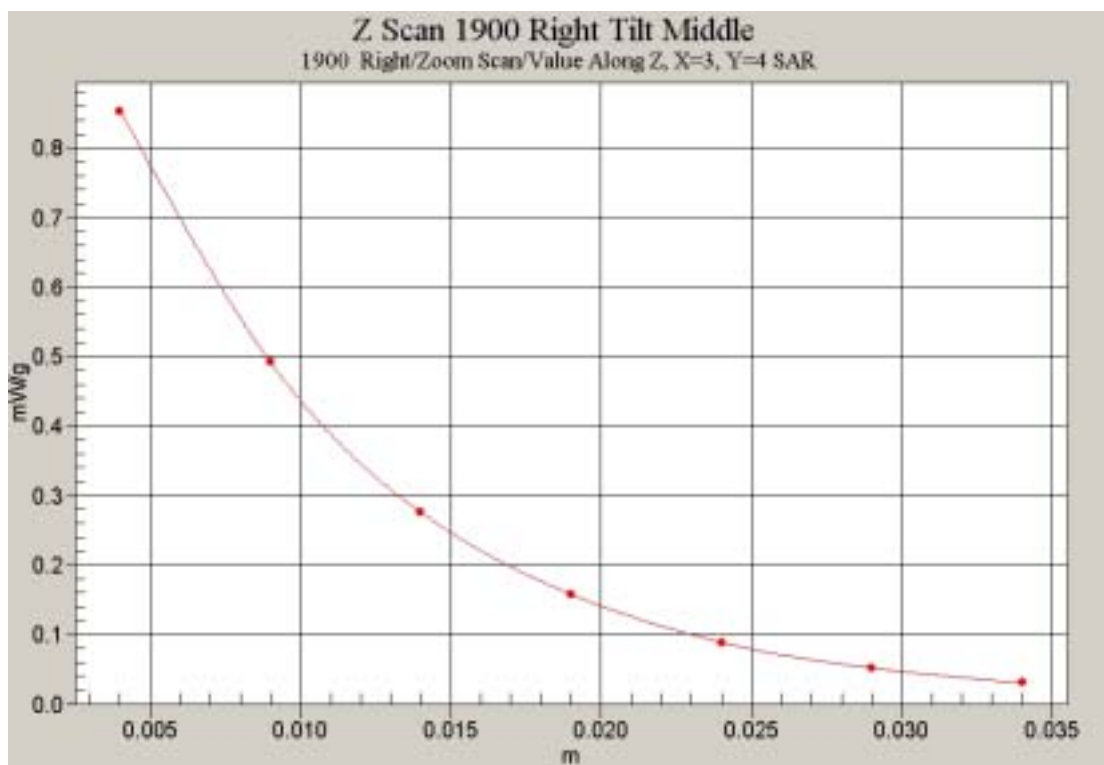


Fig. 22 Z-Scan at power reference point (Right Hand Tilt 15° 1900MHz CH661)

1900 Right Tilt High

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Tilt H/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 18.2 V/m; Power Drift = 0.0 dB

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

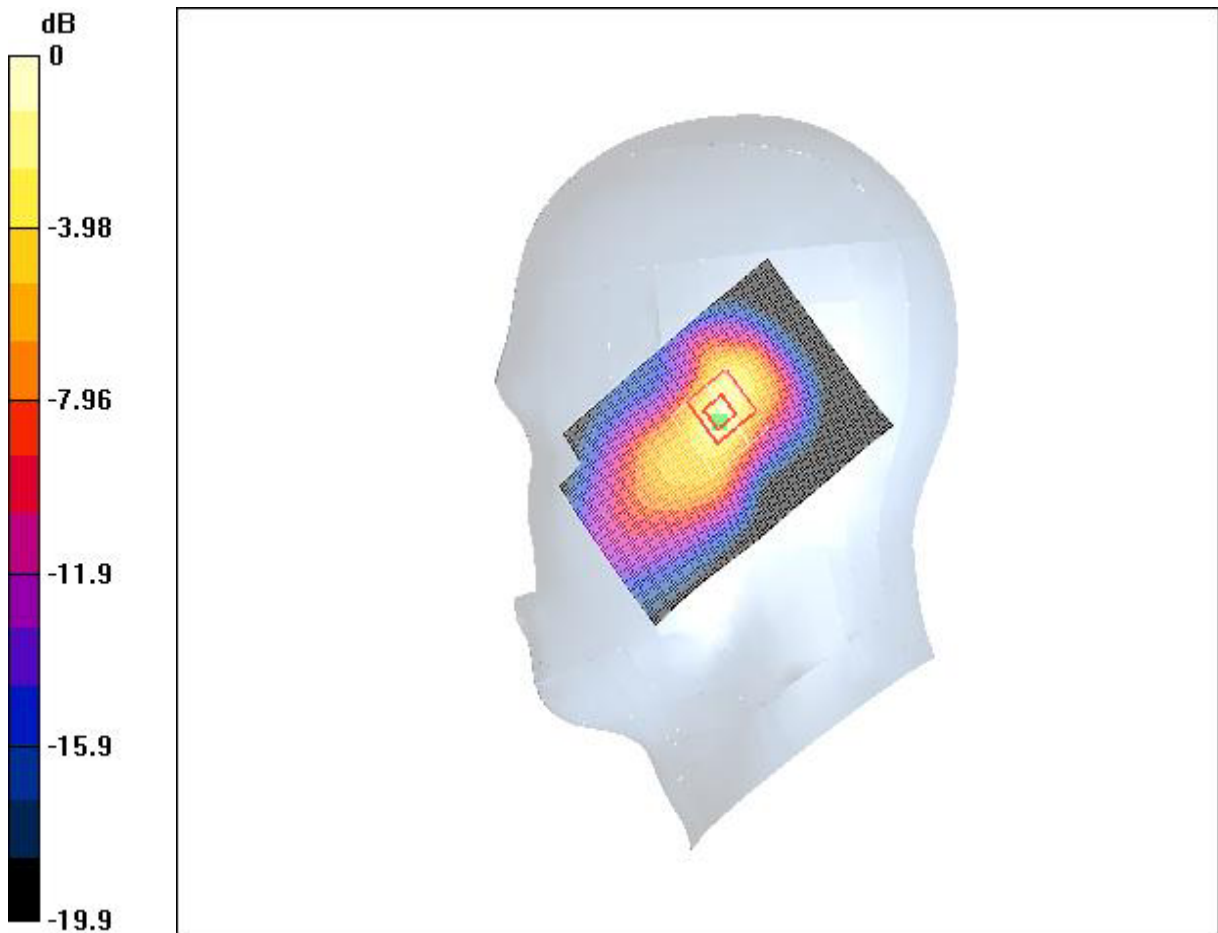
Tilt H/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.2 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 1.01 mW/g

Peak SAR (extrapolated) = 1.71 W/kg

SAR(1 g) = 0.869 mW/g; SAR(10 g) = 0.397 mW/g



0 dB = 1.01mW/g

Fig. 23 Right Hand Tilt 15° 1900MHz CH810

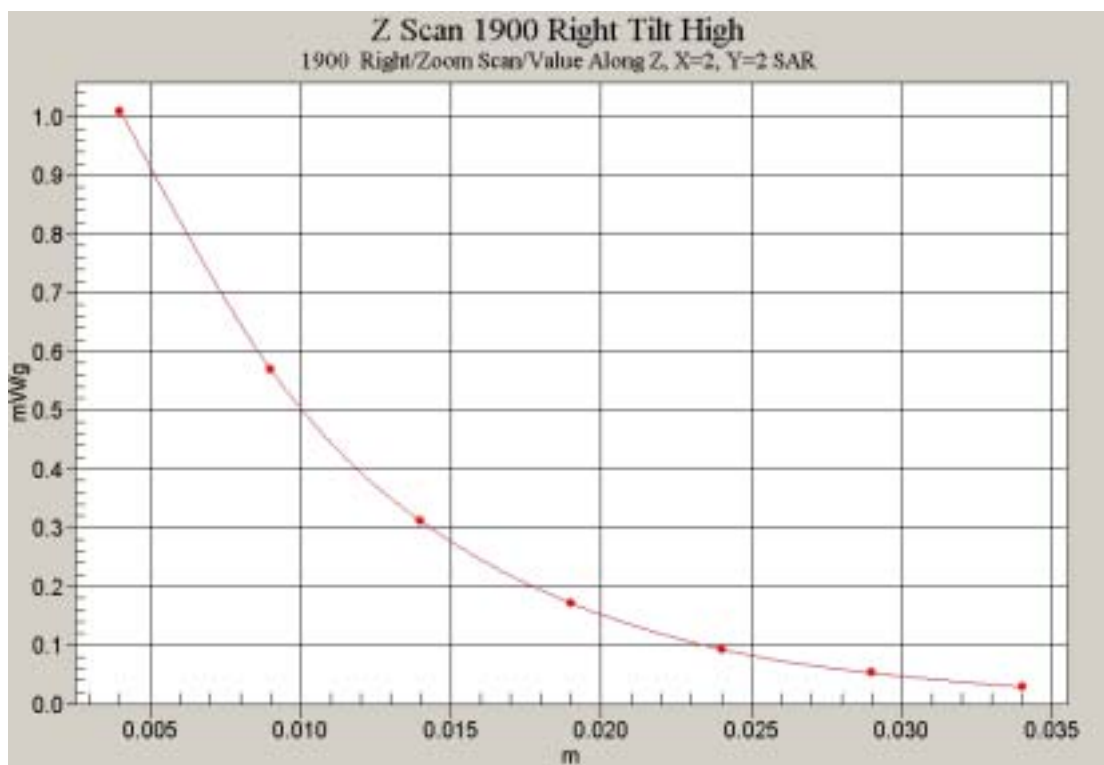


Fig. 24 Z-Scan at power reference point (Right Hand Tilt 15° 1900MHz CH8101)

1900 Body Toward Phantom Low

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Toward Phantom L/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 4.36 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.116 mW/g

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

Reference Value = 4.36 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.116 mW/g

Peak SAR (extrapolated) = 0.157 W/kg

SAR(1 g) = 0.106 mW/g; SAR(10 g) = 0.066 mW/g

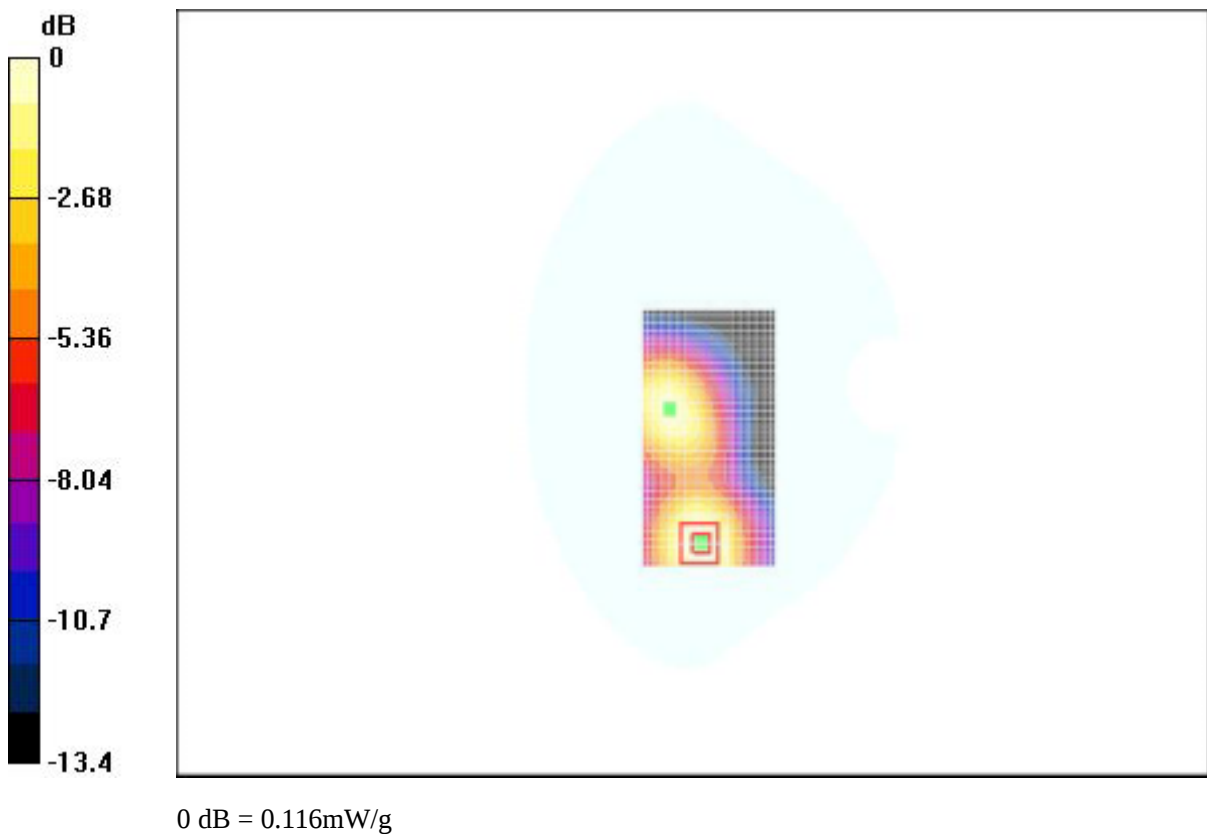


Fig. 25 Flat Phantom Body-worn Position 1900MHz CH512 with the display of the handset towards the phantom

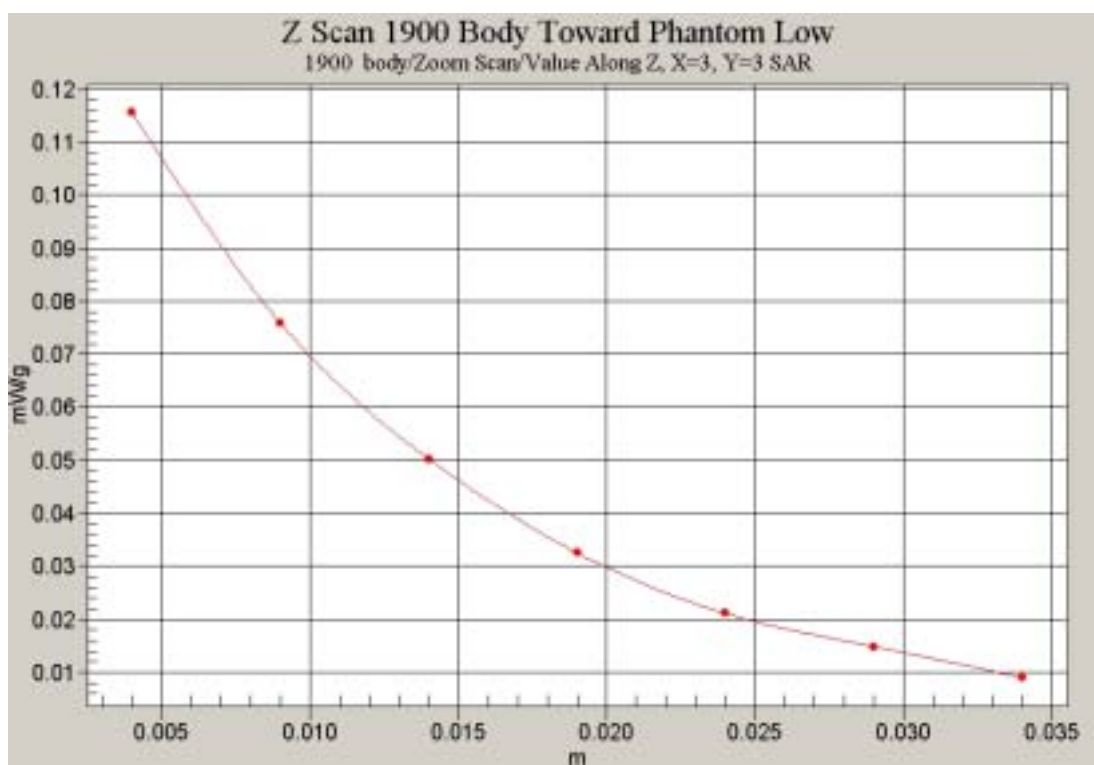


Fig. 26 Z-Scan at power reference point (Flat Phantom 1900MHz CH512 with the display of the handset towards the phantom)

1900 Body Toward Phantom Middle

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Toward Phantom M/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 5.66 V/m; Power Drift = 0.1 dB

Maximum value of SAR (interpolated) = 0.209 mW/g

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

Reference Value = 5.66 V/m; Power Drift = 0.1 dB

Maximum value of SAR (measured) = 0.204 mW/g

Peak SAR (extrapolated) = 0.270 W/kg

SAR(1 g) = 0.187 mW/g; SAR(10 g) = 0.115 mW/g

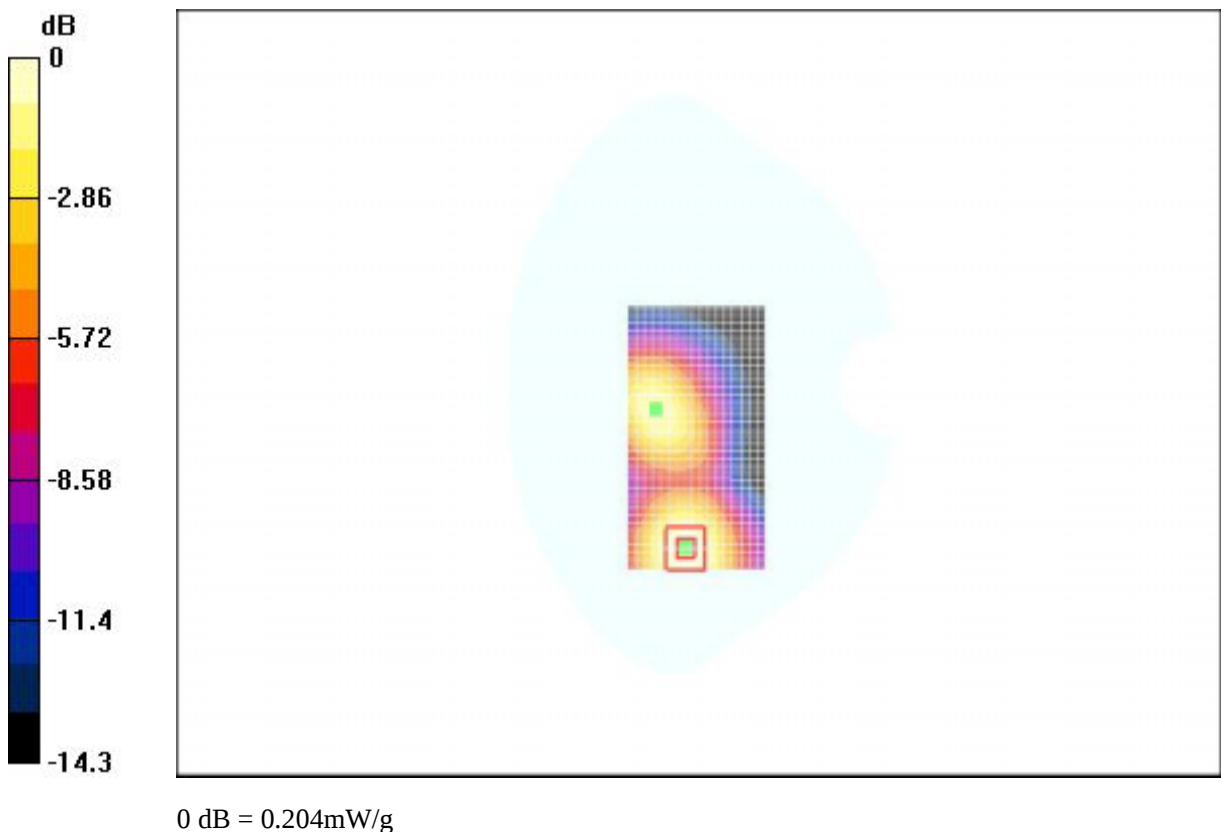


Fig. 27 Flat Phantom Body-worn Position 1900MHz CH661 with the display of the handset towards the phantom

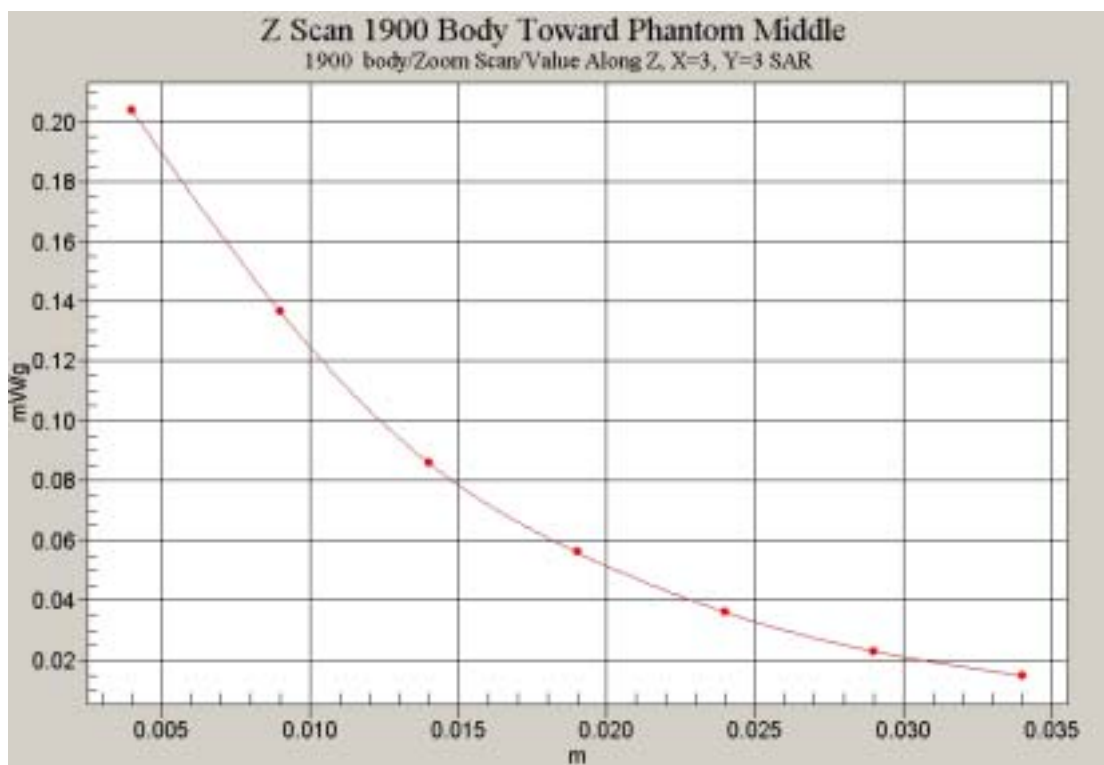


Fig. 28 Z-Scan at power reference point (Flat Phantom 1900MHz CH661 with the display of the handset towards the phantom)

1900 Body Toward Phantom High

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Toward Phantom H/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 5.19 V/m; Power Drift = 0.2 dB

Maximum value of SAR (interpolated) = 0.190 mW/g

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

Reference Value = 5.19 V/m; Power Drift = 0.2 dB

Maximum value of SAR (measured) = 0.192 mW/g

Peak SAR (extrapolated) = 0.265 W/kg

SAR(1 g) = 0.175 mW/g; SAR(10 g) = 0.108 mW/g



Fig. 29 Flat Phantom Body-worn Position 1900MHz CH810 with the display of the handset towards the phantom

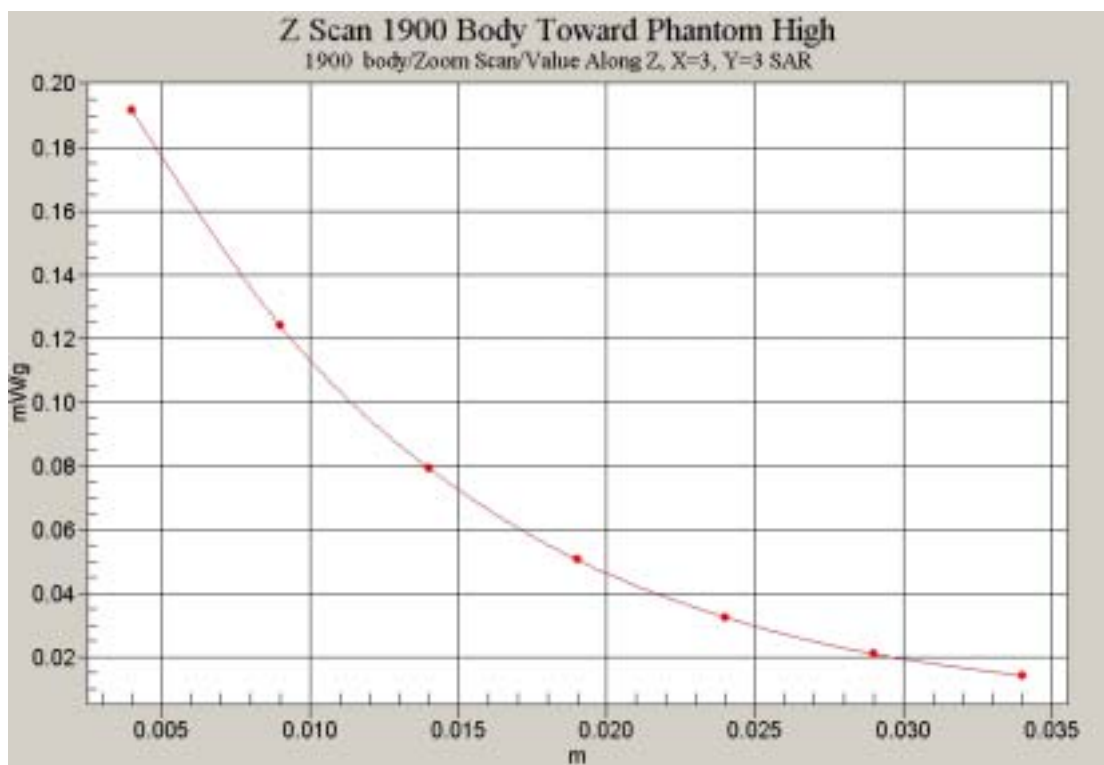


Fig. 30 Z-Scan at power reference point (Flat Phantom 1900MHz CH810 with the display of the handset towards the phantom)

1900 Body Toward Ground Low

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Toward Ground L/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 12 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.263 mW/g

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

Reference Value = 12 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.256 mW/g

Peak SAR (extrapolated) = 0.346 W/kg

SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.144 mW/g



Fig. 31 Flat Phantom Body-worn Position 1900MHz CH512 with the display of the handset towards the ground

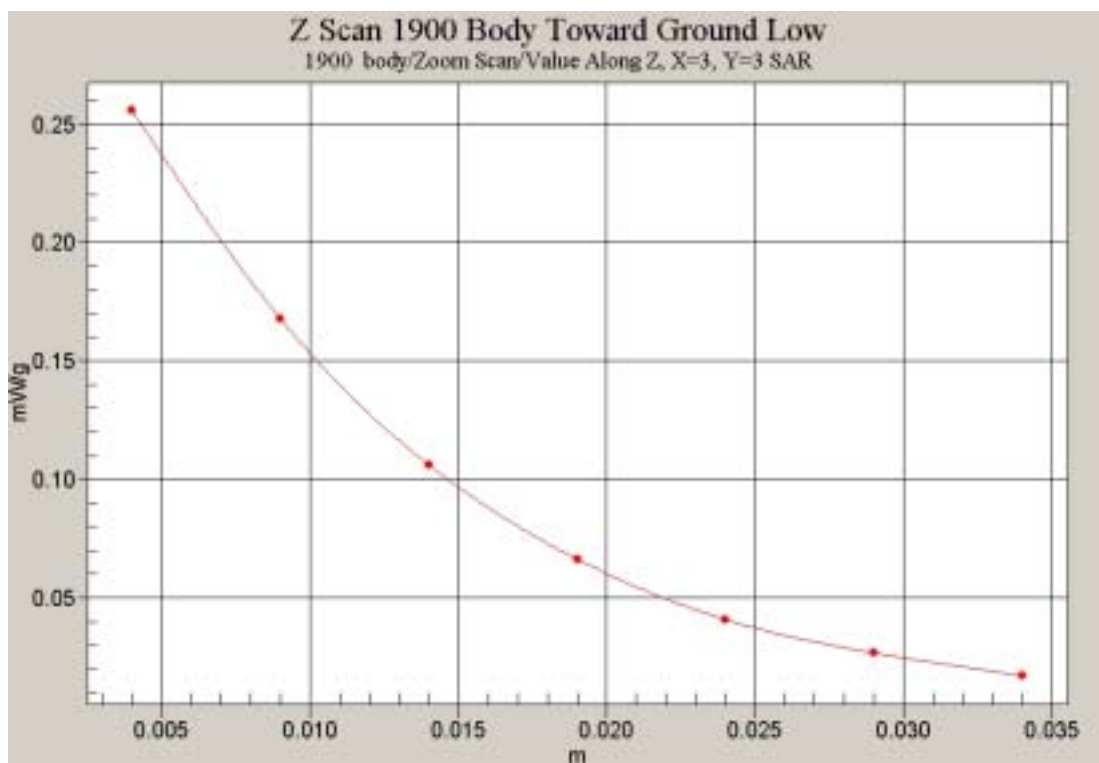


Fig. 32 Z-Scan at power reference point (Flat Phantom 1900MHz CH512 with the display of the handset towards the ground)

1900 Body Toward Ground Middle

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Toward Ground M/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 14.7 V/m; Power Drift = 0.0 dB

Maximum value of SAR (interpolated) = 0.402 mW/g

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

Reference Value = 14.7 V/m; Power Drift = 0.0 dB

Maximum value of SAR (measured) = 0.393 mW/g

Peak SAR (extrapolated) = 0.527 W/kg

SAR(1 g) = 0.361 mW/g; SAR(10 g) = 0.221 mW/g



Fig. 33 Flat Phantom Body-worn Position 1900MHz CH661 with the display of the handset towards the ground

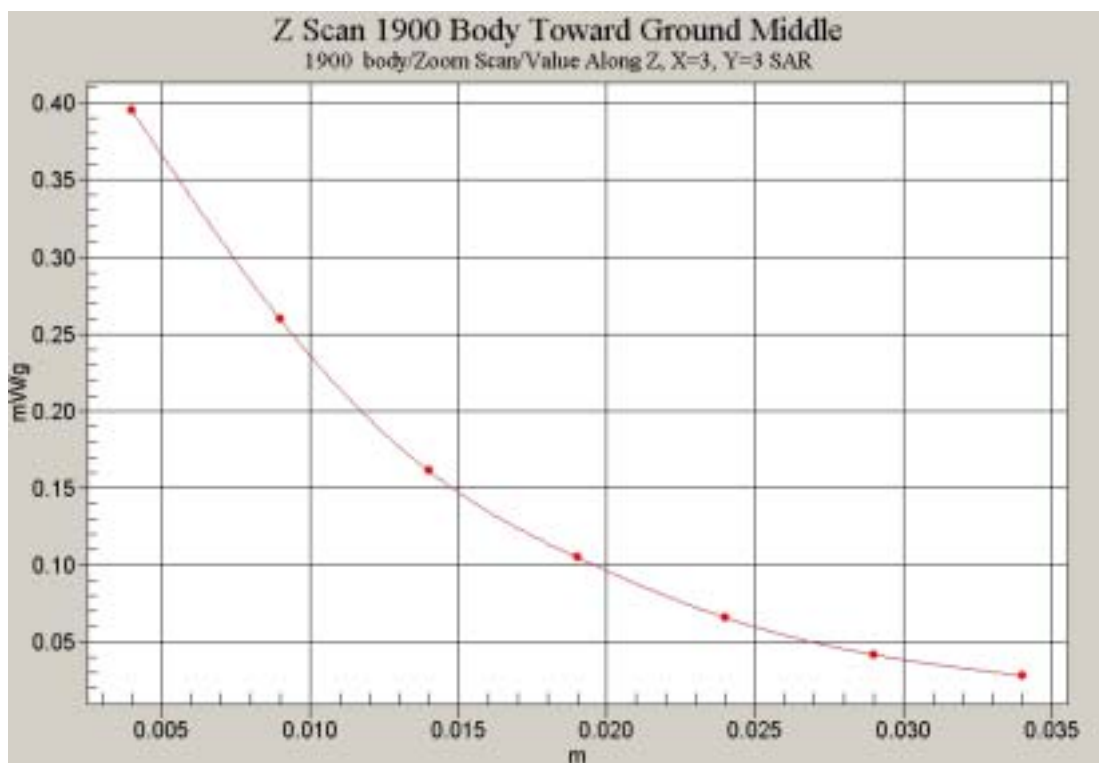


Fig. 34 Z-Scan at power reference point (Flat Phantom 1900MHz CH661 with the display of the handset towards the ground)

1900 Body Toward Ground High

Electronics: DAE3 Sn536

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8

Probe: ET3DV6 - SN1600 ConvF(5.04, 5.04, 5.04)

Toward Ground H/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Reference Value = 14.1 V/m; Power Drift = -0.0 dB

Maximum value of SAR (interpolated) = 0.411 mW/g

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

Reference Value = 14.1 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 0.401 mW/g

Peak SAR (extrapolated) = 0.539 W/kg

SAR(1 g) = 0.368 mW/g; SAR(10 g) = 0.230 mW/g

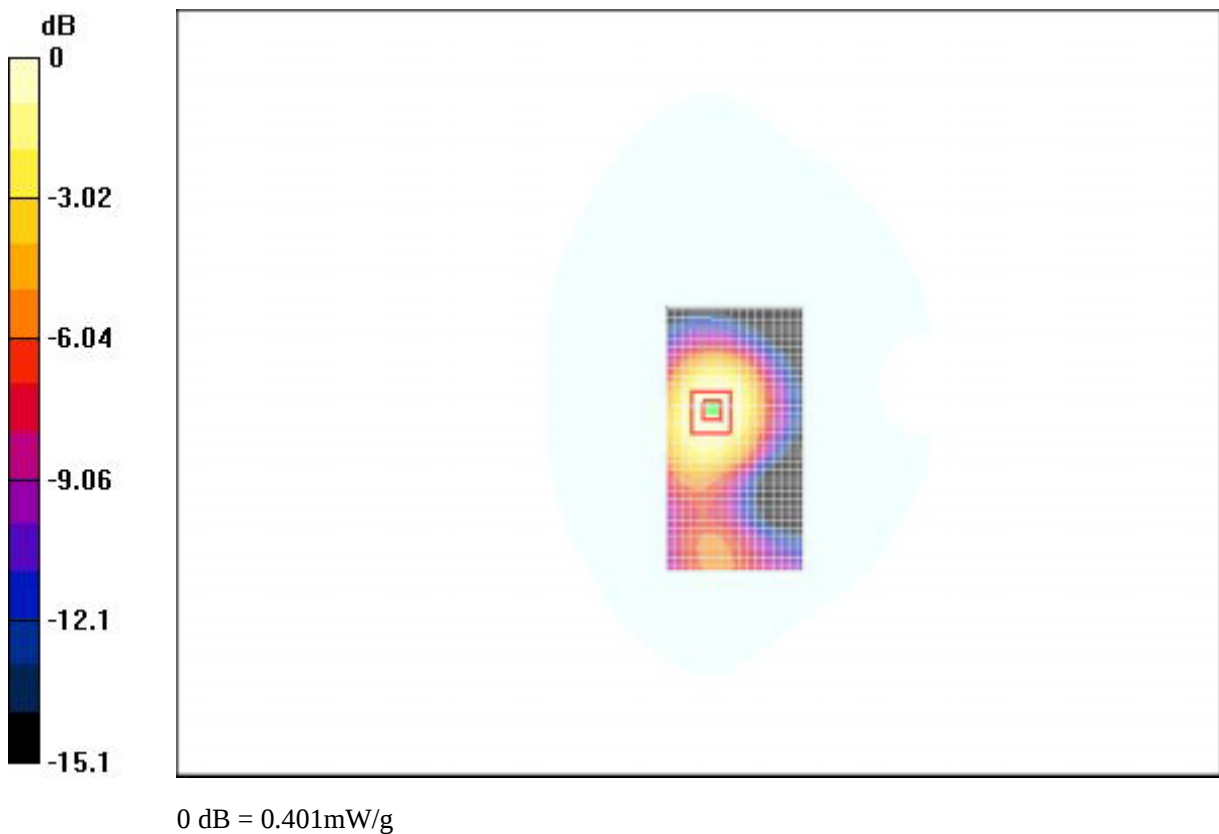


Fig.35 Flat Phantom Body-worn Position 1900MHz CH810 with the display of the handset towards the ground

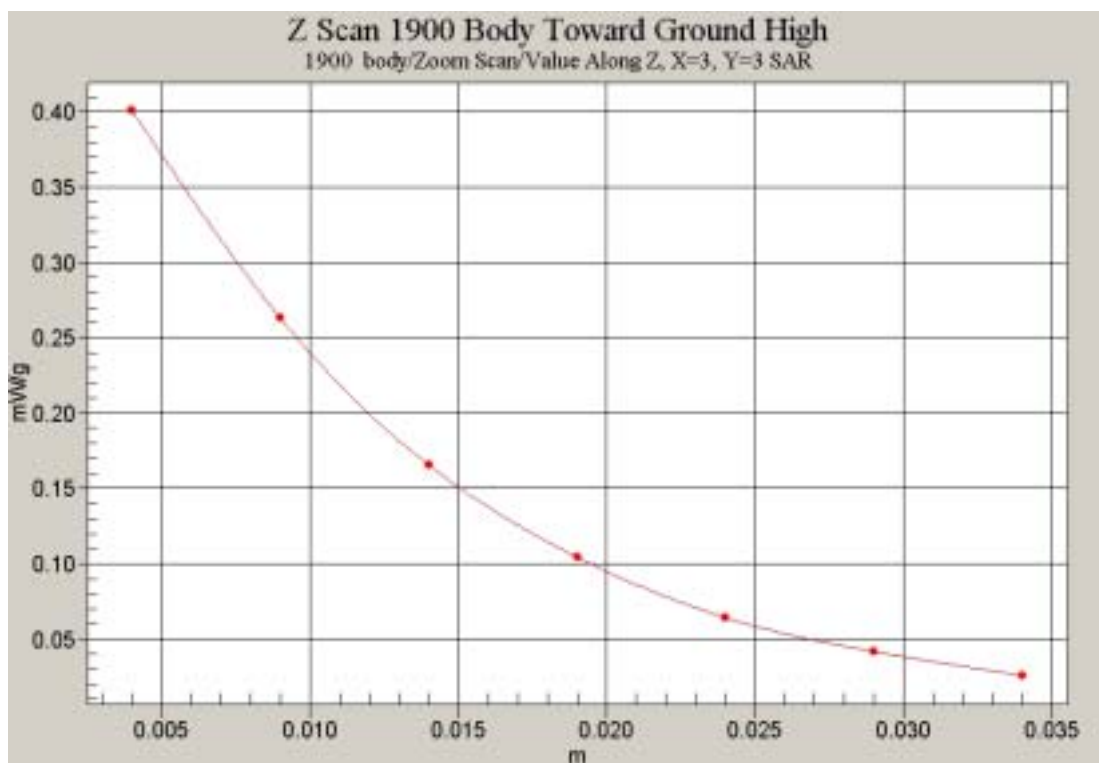


Fig. 36 Z-Scan at power reference point (Flat Phantom 1900MHz CH810 with the display of the handset towards the ground)

ANNEX D SYSTEM VALIDATION RESULTS

Test Laboratory: TMC

File Name: D1900_SystemCheck_040403.da4

DUT: Dipole 1900 MHz Type & Serial Number: D1900V2 - SN:541

Program: Unnamed Program; Dipole 1900MHz

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

Reference Value = 90.9 V/m

Peak SAR = 18.3 mW/g

SAR(1 g) = 9.8 mW/g; SAR(10 g) = 4.91 mW/g

Power Drift = 0.004 dB

Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm

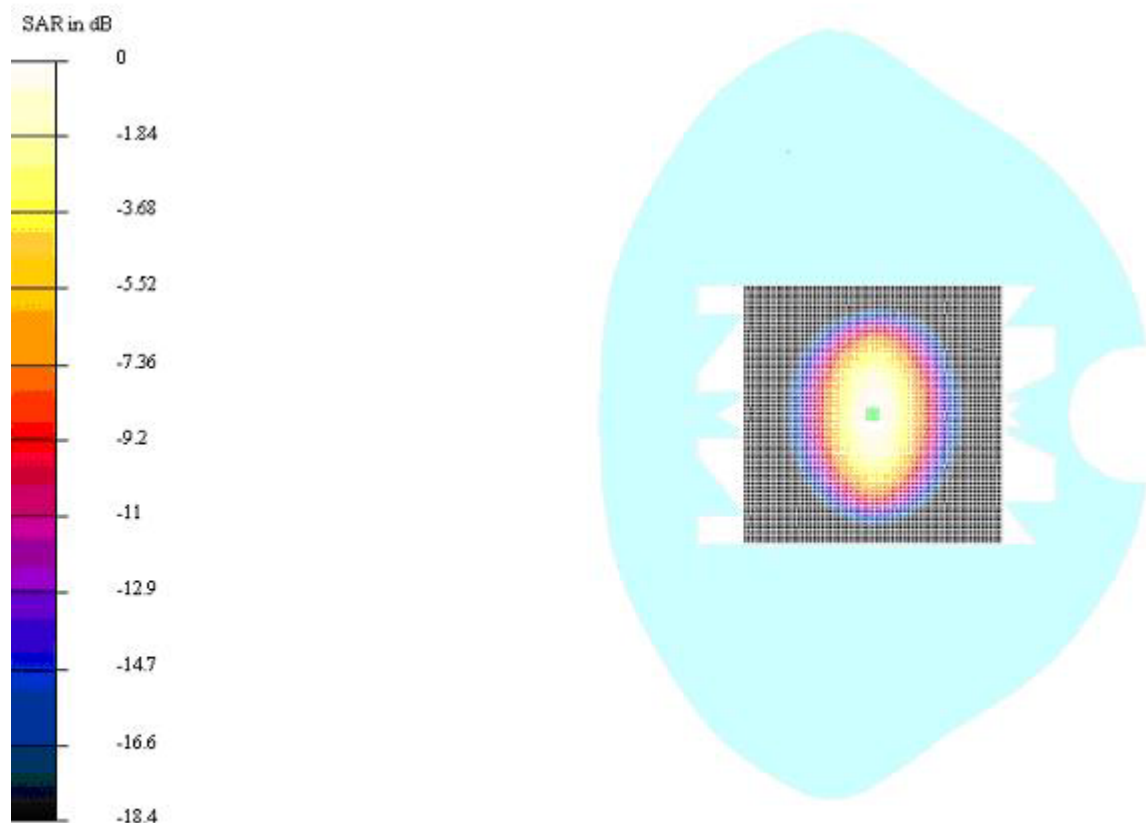


Fig.37 System Performance Check 1900MHz 250mW