



SAR EVALUATION REPORT

Applicant Name:

Samsung Electronics, Co. Ltd.
416, Maetan 3-dong, Yeongtong-gu, Suwon-si
Gyeonggi-do, 443-742
Republic of Korea

Date of Testing:

04/23/2012-05/8/2012

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

0Y1204120455.A3L

FCC ID:

A3LSCHI200

APPLICANT:

SAMSUNG ELECTRONICS, CO. LTD.

DUT Type:

Portable Handset

Application Type:

Certification

FCC Rule Part(s):

CFR §2.1093

Model(s):

SCH-I200

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
Cell. CDMA/EVDO	824.70 - 848.31 MHz	24.68	0.41	0.71	0.71
PCS CDMA/EVDO	1851.25 - 1908.75 MHz	25.00	0.50	0.65	0.65
LTE Band 13	782 MHz	23.15	0.45	0.42	0.45
2.4 GHz WLAN	2412 - 2462 MHz	15.33	0.02	0.07	0.07
5.8 GHz WLAN	5745 - 5825 MHz	13.86	0.03	0.00	
5.2 GHz WLAN	5180 - 5240 MHz	13.84	0.14	0.05	
5.3 GHz WLAN	5260 - 5320 MHz	14.06	0.14	0.06	
5.5 GHz WLAN	5500 - 5700 MHz	14.25	0.06	0.00	
Bluetooth	2402 - 2480 MHz	10.84	N/A		
Simultaneous SAR per KDB 690783 D01:			0.64	0.82	0.82

Note: Powers in the above table represent output powers for the SAR test configurations and may not represent the highest output powers for all configurations for each mode.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.


Randy Ortanez
President



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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode		Tx Frequency
CDMA/EVDO	Cell. CDMA/EVDO	824.70 - 848.31 MHz
	PCS CDMA/EVDO	1851.25 - 1908.75 MHz
LTE	LTE Band 13	782 MHz
WLAN	2.4 GHz WLAN	2412 - 2462 MHz
	5.8 GHz WLAN	5745 - 5825 MHz
	5.2 GHz WLAN	5180 - 5240 MHz
	5.3 GHz WLAN	5260 - 5320 MHz
	5.5 GHz WLAN	5500 - 5700 MHz
Bluetooth	Bluetooth	2402 - 2480 MHz

1.2 DUT Antenna Locations

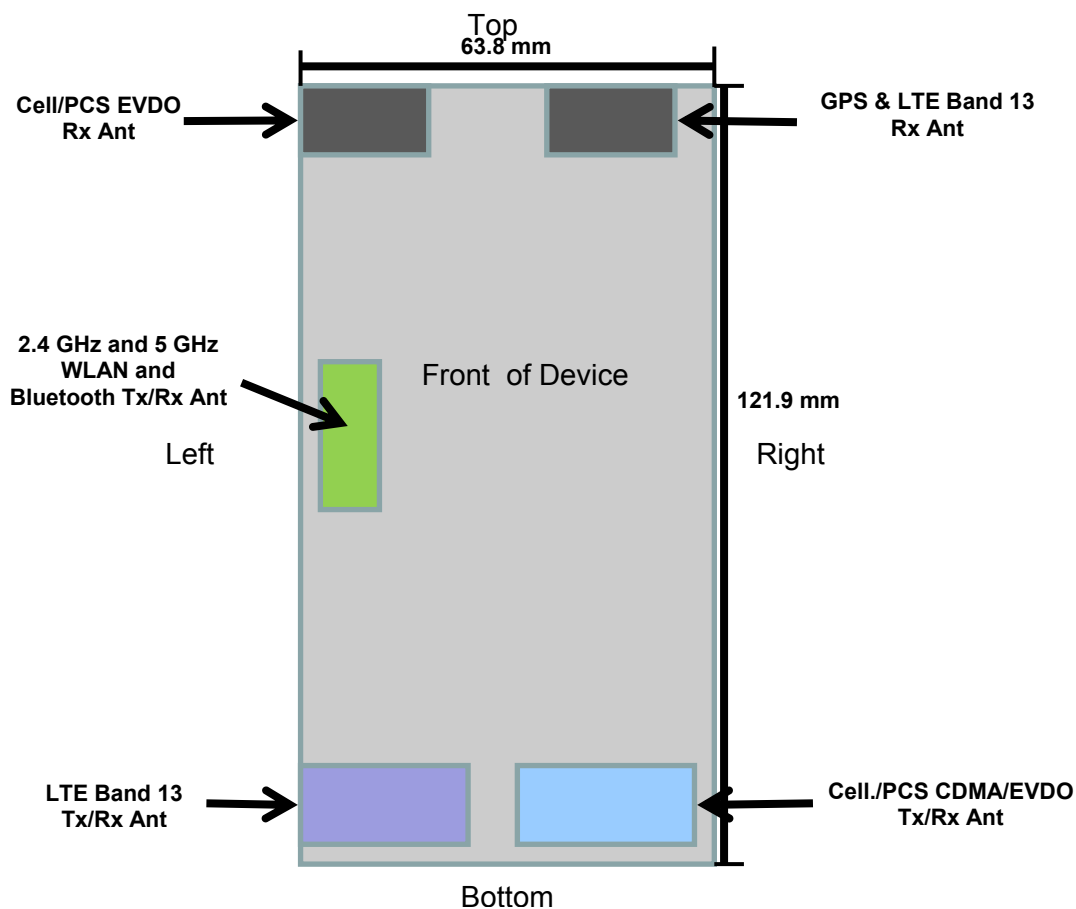


Figure 1-1
DUT Antenna Locations

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Table 1-1
Mobile Hotspot Sides required for SAR Testing per KDB 941225 D06

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
Cell. CDMA/EVDO	Yes	Yes	No	Yes	Yes	No
PCS CDMA/EVDO	Yes	Yes	No	Yes	Yes	No
LTE Band 13	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN	Yes	Yes	No	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06 guidance, page 2. The antenna document shows the distances between the transmit antennas and the edges of the device. When the wireless router mode is enabled, all 5 GHz bands are disabled. Therefore 5 GHz WIFI is not considered in this section.

1.3 Power Reduction for SAR

This device uses power reduction mechanisms for LTE during SVLTE (voice + LTE data) operations for SAR compliance. See Section 11 for more details.

1.4 Simultaneous Transmission Capabilities

According to KDB 648474, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-2 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



Figure 1-2
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to KDB 447498 3) procedures.

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Table 1-2
Simultaneous Transmission Scenarios

Ref.	Simultaneous Transmit Configurations	Power Reduction	SAR Report Section	Head	Body-Worn Accessory	Hot Spot	Note
				IEEE 1528, Supp C	Supplement C	FCC KDB 941225 D06 edges/sides	
A	1X CDMA 850 Voice + LTE 782 MHz Data	LTE	Section 14.6	√	√	-	SVLTE
B	1X CDMA 1900 Voice + LTE 782 MHz Data			√	√	-	SVLTE
C	1X CDMA 850 Voice + 2.4 GHz WIFI	None	Section 14.4	√	√	-	
D	1X CDMA 850 Voice + 5 GHz WIFI			√	√	-	
E	1X CDMA 1900 Voice + 2.4 GHz WIFI			√	√	-	
F	1X CDMA 1900 Voice + 5 GHz WIFI			√	√	-	
G	1X CDMA 850 Voice + LTE 782 MHz Data + 2.4 GHz WIFI	LTE	Section 14.6	√	√	√	Voice + LTE + WIFI Hotspot
H	1X CDMA 1900 Voice + LTE 782 MHz Data + 2.4 GHz WIFI			√	√	√	Voice + LTE + WIFI Hotspot
I	1X CDMA 850 Data + 2.4 GHz WIFI	None	Section 14.5	-	-	√	1X CDMA Data +WIFI Hotspot
J	1X CDMA 1900 Data + 2.4 GHz WIFI			-	-	√	1X CDMA Data +WIFI Hotspot
K	EVDO 850 Data + 2.4 GHz WIFI			-	-	√	EVDO+WIFI Hotspot
L	EVDO 1900 Data + 2.4 GHz WIFI			-	-	√	EVDO+WIFI Hotspot
M	LTE 782 MHz Data + 2.4 GHz WIFI			-	-	√	LTE+WIFI Hotspot
N	1X CDMA 850 Voice + EVDO 850 Data						SVDO Not Supported by HW
O	1X CDMA 850 Voice + EVDO 1900 Data						SVDO Not Supported by HW
P	1X CDMA 1900 Voice + EVDO 850 Data						SVDO Not Supported by HW
Q	1X CDMA 1900 Voice + EVDO 1900 Data						SVDO Not Supported by HW
R	1X CDMA 850 Voice + EVDO 850 Data + 2.4 GHz WIFI						SVDO Not Supported by HW
S	1X CDMA 1900 Voice + EVDO 850 Data + 2.4 GHz WIFI						SVDO Not Supported by HW
T	1X CDMA 850 Voice + EVDO 1900 Data + 2.4 GHz WIFI						SVDO Not Supported by HW
U	1X CDMA 1900 Voice + EVDO 1900 Data + 2.4 GHz WIFI						SVDO Not Supported by HW
V	1X CDMA 850 Voice + LTE 782 MHz Data + 5 GHz WIFI						Wireless Router functions not available in 5 GHz
W	1X CDMA 1900 Voice + LTE 782 MHz Data + 5 GHz WIFI						Not Supported by SW
X	LTE 782MHz Data + 5 GHz WIFI						Not Supported by SW
Y	1X 850/1900 Data + 5 GHz WIFI						Not Supported by SW
Z	EVDO 850/1900 Data + 5 GHz WIFI						Not Supported by SW
AA	850/1900 EVDO data + LTE 782 MHz Data						Not Supported by SW

1.5 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5 GHz WIFI, only 2.4 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations based on KDB 941225 D06.

The separation distance between the CDMA/EVDO Antenna and the Bluetooth/WLAN antenna is 41 mm.

The separation distance between the LTE Antenna and the Bluetooth/ WLAN antenna is 15 mm.

The maximum RF Conducted Power of Bluetooth Tx is 12.134 mW (See DSS Report for a full set of Bluetooth powers). The maximum RF Conducted Power of 2.4 GHz WLAN is 34.36 mW. The maximum RF Conducted Power of 5 GHz WLAN is 26.73 mW.

Per KDB Publication 648474, **Bluetooth SAR was not required** based on the maximum conducted power, the Bluetooth/WLAN to main antennas separation distance and Body-SAR of the main antennas.

This device supports 20MHz and 40MHz Bandwidths for IEEE 802.11n for 5 GHz WIFI only. 802.11n was not evaluated for SAR since the average output power of 20 MHz and 40 MHz bandwidths was not more than 0.25 dB higher than the average output power of 802.11a.

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1.6 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB 941225 (2G/3G/4G and Hotspot)
- FCC KDB 248227 (802.11)
- FCC KDB 648474 (Simultaneous)
- FCC KDB 865664 (5 GHz)

1.7 Samples Used for SAR Testing

Several samples were used with identical hardware. Reduced power levels were configured by the manufacturer via software to support SAR test cases. The software used by the manufacturer to configure power levels is only available to the manufacturer.

Mode/Band:	CDMA 850		CDMA 1900		EVDO 850	EVDO 1900
Target Power (dBm):	24.5	18	24.5	18	24.5	24.5
Serial Number:	SAR #1	SAR #4	SAR #3	SAR #4	SAR #2	SAR #2

Mode/Band:	LTE		2.4 GHz WIFI	5 GHz WIFI
Target Power (dBm):	23	19	-	-
Serial Number:	SAR #1	SAR #4	SAR #4, 99000023090468	SAR #3

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LTE CHECKLIST PER KDB 941225 D05

Device Information per KDB 941225 pub (12/15/2010)

KDB 941225 Pub LTE Information			
KDB 941225 Section	FCC ID	A3LSCHI200	
	Form Factor	Handset	
1)	Frequency Range of each LTE transmission band	BAND13 : Tx (782MHz)	
2)	Channel Bandwidths	BAND13 : 10MHz	
3)	Channel Numbers and Frequencies (MHz)		Mid
	LTE Band 13 and BW 10MHz		782MHz(23230)
4)(a)	UE Category	3	
(b)	Modulations Supported in UL	QPSK, 16QAM	
	LTE Transmitter and Antenna Implementation	LTE and CDMA/EVDO operate on separate transmission paths	
5)	Description of LTE Tx and Ant. Implementation	1 Main TX/RX Ant and 1 Diversity RX Ant	
6)	LTE Voice available?	No	
	Hotspot with LTE+WIFI	Yes	
	Hotspot with LTE+WIFI active with 1XVoice sessions?	Yes	
7)	LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	Yes	
	A-MPR (Additional MPR) disabled for SAR Testing?	Yes	
8)	Conducted power Table provided for 1RB (low and high offset), 50% RB (centered), 100% RB	Yes	
9-10)	Non-LTE US Wireless Operating Modes/BandModulations	RF Output Power	RF Exposure Configurations
	850 MHz CDMA	See page 1	
	1900 MHz US-PCS		
	2.4GHz Bluetooth		
	2.4GHz WI-FI		
	5GHz WI-FI		
11)	Simultaneous Tx Conditions (Voice and Data Configurations)	See Section 1.4	
12)	Power Reduction used for SAR Compliance?	Yes	
13)	Describe Power Reduction (LTE Modes)	See Section 11	
14)	SAR Test Plan	See Section 11	
15)	SAR Test Data	See Section 13	

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3

INTRODUCTION

The FCF has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

Equation 3-1
SAR Mathematical Equation

$$SAR = \frac{d}{dt} \left(\frac{dU}{dm} \right) = \frac{d}{dt} \left(\frac{dU}{\rho dV} \right)$$

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

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

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m³)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

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4 SAR MEASUREMENT SETUP

4.1 Automated SAR Measurement System

Measurements are performed using the DASY automated dosimetric SAR assessment system. The DASY is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). See WWW.SPEAG.COM for more information about the specification of the SAR assessment system.



Figure 4-1
SAR Measurement System



Figure 4-2
Near-Field Probe

Table 4-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	835	1900	1900	2450	2450	5200-5800	5200-5800
Tissue	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)								
Bactericide	0.1	0.1						
DGBE			44.92	29.44	7.99	26.7		
HEC	1	1						
NaCl	1.45	0.94	0.18	0.39	0.16	0.1		
Sucrose	57	44.9						
Triton X-100					19.97		17.24	
Diethylenglycol monohexylether							17.24	
Polysorbate (Tween) 80								20
Water	40.45	53.06	54.9	70.17	71.88	73.2	65.52	80

See next page for 750 MHz Tissue Information

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Table 4-2
Composition of 750 MHz Head and Body Tissue Equivalent Matter

2 Composition / Information on ingredients	
The Item is composed of the following ingredients:	
H ₂ O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-82-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%
Relevant for safety: Refer to the respective Safety Data Sheet*.	

Note: 750MHz liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL 750)
Product No.	SL AAM 075 AA (Charge: 110606-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

Ambient Condition 22°C ; 30% humidity
TSL Temperature 22°C
Test Date 8-Jun-11

Additional Information

TSL Density 1.212 g/cm³
TSL Heat-capacity 3.006 kJ/(kg*K)

Results

f (MHz)	Measured			Target		Diff. to Target (%)	
	HP- ϵ'	HP- ϵ''	sigma	eps	sigma	Δ -eps	Δ -sigma
600	57.4	24.88	0.83	56.1	0.95	2.4	-12.7
625	57.2	24.53	0.85	56.0	0.95	2.1	-10.6
650	57.0	24.18	0.87	55.9	0.96	1.8	-8.5
675	56.7	23.90	0.90	55.8	0.96	1.5	-6.3
700	56.4	23.61	0.92	55.7	0.96	1.2	-4.2
725	56.2	23.37	0.94	55.6	0.96	0.9	-2.0
750	55.9	23.12	0.96	55.5	0.96	0.7	0.1
775	55.7	22.95	0.99	55.4	0.97	0.4	2.5
800	55.4	22.78	1.01	55.3	0.97	0.1	4.8
825	55.2	22.61	1.04	55.2	0.98	-0.2	6.1
838	55.0	22.52	1.05	55.2	0.98	-0.3	6.7
850	54.9	22.44	1.06	55.2	0.99	-0.4	7.3
875	54.7	22.30	1.09	55.1	1.02	-0.7	6.5
900	54.5	22.17	1.11	55.0	1.05	-1.0	5.7
925	54.2	22.05	1.13	55.0	1.06	-1.3	6.8
950	54.0	21.94	1.16	54.9	1.08	-1.7	7.8
975	53.8	21.85	1.18	54.9	1.09	-2.0	9.0
1000	53.6	21.75	1.21	54.8	1.10	-2.3	10.2

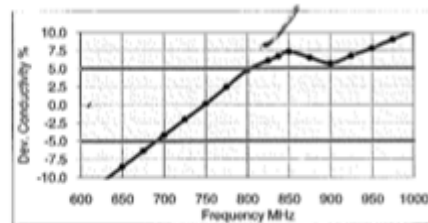
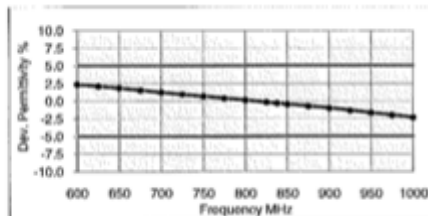


Figure 4-3
750MHz Body Tissue Equivalent Matter

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Measurement Certificate / Material Test

Item Name **Head Tissue Simulating Liquid (HSL 750)**
 Product No. SL AAH 075 (Charge: 110601-1)
 Manufacturer SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

Ambient Condition 22°C ; 30% humidity
 TSL Temperature 22°C
 Test Date 8-Jun-11

Additional Information

TSL Density 1.284 g/cm³
 TSL Heat-capacity 2.701 kJ/(kg*K)

Results

f (MHz)	Measured			Target		Diff. to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	43.9	23.01	0.77	42.7	0.88	2.7	-12.9
625	43.5	22.75	0.79	42.6	0.88	2.1	-10.5
650	43.1	22.49	0.81	42.5	0.89	1.5	-8.2
675	42.7	22.26	0.84	42.3	0.89	1.0	-5.9
700	42.4	22.03	0.86	42.2	0.89	0.4	-3.5
725	42.0	21.84	0.88	42.1	0.89	-0.1	-1.2
750	41.7	21.65	0.90	41.9	0.89	-0.6	1.1
775	41.4	21.50	0.93	41.8	0.90	-1.1	3.5
800	41.0	21.34	0.95	41.7	0.90	-1.6	5.9
825	40.7	21.19	0.97	41.6	0.91	-2.1	7.3
838	40.5	21.12	0.98	41.5	0.91	-2.4	8.0
850	40.4	21.05	1.00	41.5	0.92	-2.7	8.6
875	40.1	20.91	1.02	41.5	0.94	-3.3	7.9
900	39.8	20.77	1.04	41.5	0.97	-4.0	7.2
925	39.6	20.66	1.06	41.5	0.98	-4.6	8.2
950	39.3	20.55	1.09	41.4	0.99	-5.2	9.2
975	39.0	20.44	1.11	41.4	1.00	-5.8	10.3
1000	38.7	20.32	1.13	41.3	1.01	-6.4	11.4

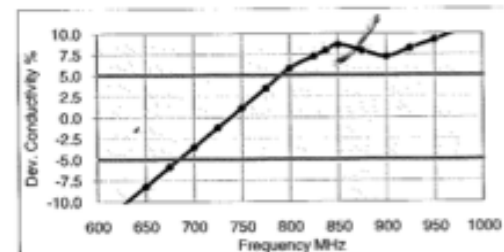
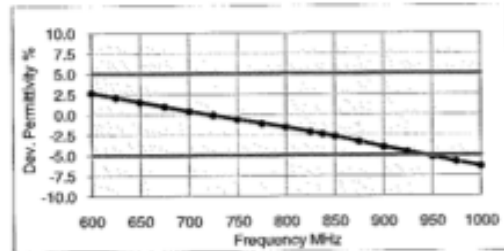


Figure 4-4
750MHz Head Tissue Equivalent Matter

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5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head interface and the horizontal grid resolution was 15mm and 15mm for frequencies < 3 GHz in the x and y directions respectively. When applicable, for frequencies above 3 GHz, a 10 mm by 10 mm resolution was used.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring at least 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 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 then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.
5. For testing 5 GHz devices, finer resolution zoom scans were performed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB 865664 publication. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.

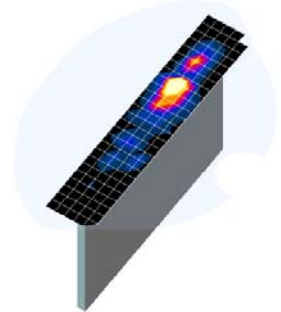


Figure 5-1
Sample SAR Area Scan

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6

DEFINITION OF REFERENCE POINTS

6.1 EAR REFERENCE POINT

Figure 6-2 shows the front, back and side views of the SAM Twin Phantom. The point “M” is the reference point for the center of the mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 6-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 6-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

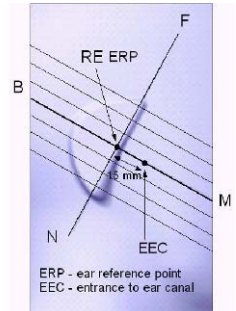


Figure 6-1
Close-Up Side view
of ERP

6.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 6-3). The “test device reference point” was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at it’s top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



Figure 6-2
Front, back and side view of SAM Twin Phantom

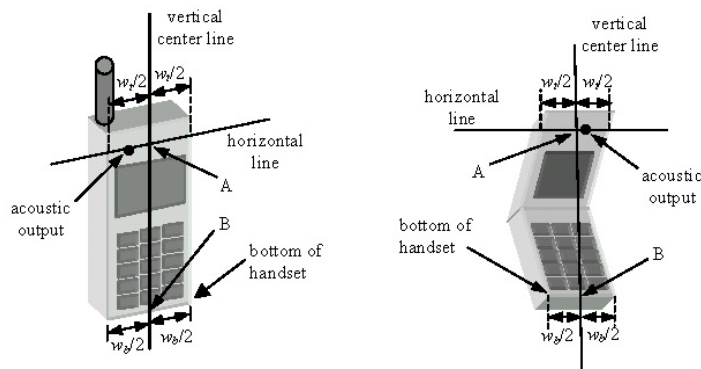


Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

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7 TEST CONFIGURATION POSITIONS FOR HANDSETS

7.1 Device Holder

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon = 3$ and loss tangent $\delta = 0.02$.

7.2 Positioning for Cheek/Touch

1. The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 7-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

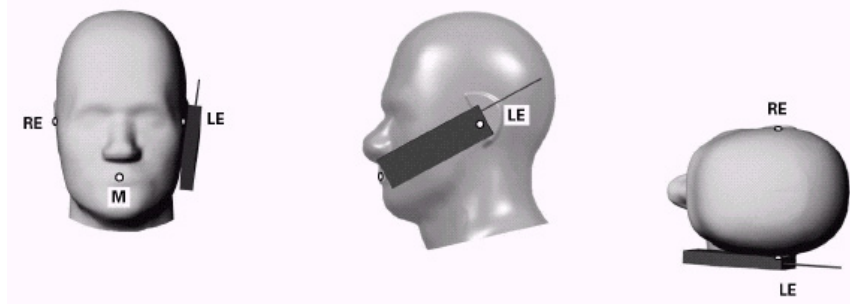


Figure 7-1 Front, Side and Top View of Cheek/Touch Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 7-2).

7.3 Positioning for Ear / 15° Tilt

With the test device aligned in the “Cheek/Touch Position”:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 7-2).

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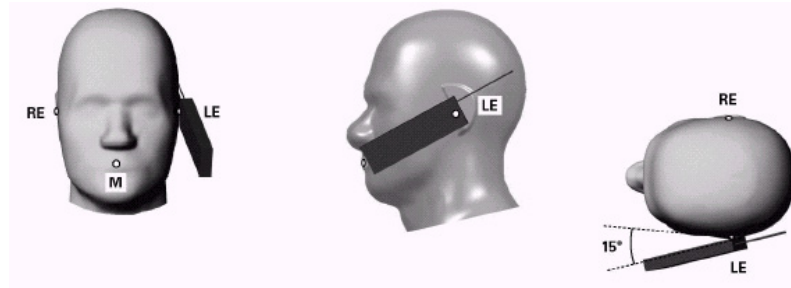


Figure 7-2 Front, Side and Top View of Ear/15° Tilt Position

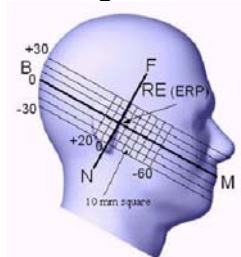


Figure 7-3
Side view w/ relevant markings



Figure 7-4 Body SAR Sample Photo
(Not Actual EUT)

7.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document publication 648474. The SAR required in these regions of SAM should be measured using a flat phantom. **Rectangular shaped phones** should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned $\frac{1}{2}$ cm from the flat phantom shell. **Clam-shell phones** should be positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone is unfolded and extended beyond the phantom side wall. The lower half of the phone is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the phone in the cheek touching position using SAM. Any case with substantial variation in separation distance along the lower edge of a clam shell is discussed with the FCC for best-to-use methodology.

The latest IEEE 1528 committee developments propose the usage of a tilted phantom when the antenna of the phone is mounted at the bottom or in all cases the peak absorption is in the chin region. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed individually from the table for emptying and cleaning.

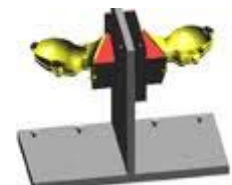


Figure 7-5 Twin SAM
Chin20

7.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 7-4). A device with a headset output is tested with a headset connected to the device.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic

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components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

7.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests. Since this device meets the minimum size requirements, procedures in KDB Publication 941225 D06 were used for SAR testing. See Figure 1-1 for device dimensions.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

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8 EXPOSURE LIMITS

8.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

8.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 8-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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9

FCC MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

9.1 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

The device was placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test were evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device was tested throughout the SAR test at maximum output power, the SAR measurement system measures a "point SAR" at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviated by more than 5%, the SAR test and drift measurements were repeated.

9.2 SAR Measurement Conditions for CDMA2000

The following procedures were performed according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

9.2.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices" v02, October 2007. Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 9-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH₀ and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH₀ data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 9-2 was applied.

FCHs were configured at full rate for maximum SAR with "All Up" power control bits.

Table 9-1
Parameters for Max. Power for RC1

Parameter	Units	Value
I_{or}	dBm/1.23 MHz	-104
$\frac{Pilot E_c}{I_{or}}$	dB	-7
$\frac{Traffic E_c}{I_{or}}$	dB	-7.4

Table 9-2
Parameters for Max. Power for RC3

Parameter	Units	Value
I_{or}	dBm/1.23 MHz	-86
$\frac{Pilot E_c}{I_{or}}$	dB	-7
$\frac{Traffic E_c}{I_{or}}$	dB	-7.4

9.2.2 Head SAR Measurements

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

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9.2.3 Body-Worn and Hotspot SAR Measurements

CDMA 1x SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCH_n) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCH_n) with FCH at full rate and SCH₀ enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the “All Up.” Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

EVDO Rev. 0 SAR was also tested in hotspot configurations. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0. Otherwise, SAR is measured on the maximum output channel for Rev. A for the configuration that produced the highest SAR with Rev. 0 using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots would be configured in the downlink for both Rev. 0 and Rev. A.

9.3 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes following SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

9.3.1 MPR

MPR is implemented for this device by the manufacturer when the transmit power is not limited by the power reduction mechanism. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1. See Section 10.2 and Section 11.3.1 for MPR targets.

9.3.2 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

9.3.3 Required RB Size and RB Offsets for SAR Testing

Per FCC KDB 941225 D05, Page 2, footnote 1, the available channels are tested when LTE bands that do not support at least 3 channels in certain bandwidths. There is only one 10 MHz channel in LTE Band 13.

According to FCC KDB 941225 D05:

- Per Page 4, 3) A), QPSK with 50% RB is required.
- Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required.
- Per Page 4, 4) A), 16QAM with 50% RB is required.
- Per Page 4, 4) B), 16 QAM with 1 RB for both channel edges are required.

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- e. Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the 50% RB SAR is not > 1.45 W/kg.

9.4 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 for more details.

9.4.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.4.2 Frequency Channel Configurations [27]

For 2.4 GHz, the highest average RF output power channel between the low, mid and high channel at the lowest data rate was selected for SAR evaluation in 802.11b mode. 802.11g/n modes and higher data rates for 802.11b were additionally evaluated for SAR if the output power of the respective mode was 0.25 dB or higher than the powers of the SAR configurations tested in the 802.11b mode.

For 5 GHz, the highest average RF output power channel across the default test channels at the lowest data rate was selected for SAR evaluation in 802.11a. When the adjacent channels are higher in power than the default channels, these “required channels” were considered instead of the default channels for SAR testing. 802.11n modes and higher data rates for 802.11a/n were evaluated only if the respective mode was 0.25 dB or higher than the 802.11a mode.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg or if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band.

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10 STANDALONE RF CONDUCTED POWERS

10.1 Standalone CDMA Conducted Powers

Table 10-1
CDMA/EVDO Average RF Power

Band	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	824.7	24.58	24.59	24.58	24.56	24.42	24.48
	384	836.52	24.67	24.68	24.63	24.63	24.44	24.51
	777	848.31	24.45	24.44	24.38	24.38	24.14	24.18
PCS	25	1851.25	24.87	24.85	24.83	24.84	24.73	24.80
	600	1880	25.00	25.00	24.99	24.98	24.74	24.78
	1175	1908.75	24.73	24.68	24.71	24.74	24.64	24.73

Note: RC1 is only applicable for IS-95 compatibility.

CDMA 1x Test Notes:

Per KDB Publication 941225 D01:

1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn and Hotspot SAR was tested with 1x RTT with TDSO / SO32 FCH Only. TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.

EVDO Test Notes:

Per KDB Publication 941225 D01:

1. EVDO SAR (hotspot) was tested with EVDO Rev 0 to support simultaneous transmission capabilities. SAR was also measured on the maximum output channel for Rev. A for the configuration that produced the highest SAR with Rev. 0 since the maximum average output for Rev. A was greater than that measured in Rev. 0 configurations.

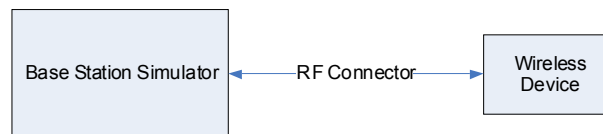


Figure 10-1
Power Measurement Setup

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10.2 Standalone LTE Conducted Powers

Table 10-2
LTE Band 13 Average RF Power

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
782.0	23230	10	QPSK	1	0	23.09	0	0
782.0	23230	10	QPSK	1	49	23.15	0	0
782.0	23230	10	QPSK	25	12	22.21	1	0-1
782.0	23230	10	QPSK	50	0	22.24	1	0-1
782.0	23230	10	16QAM	1	0	21.83	1	0-1
782.0	23230	10	16QAM	1	49	21.72	1	0-1
782.0	23230	10	16QAM	25	12	21.39	2	0-2
782.0	23230	10	16QAM	50	0	21.17	2	0-2

According to FCC KDB 941225 D05:

- 1) Per Page 4, 3) A), QPSK with 50% RB is required.
- 2) Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required.
- 3) Per Page 4, 4) A), 16QAM with 50% RB is required.
- 4) Per Page 4, 4) B), 16 QAM with 1 RB for both channel edges are required.
- 5) Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the 50% RB SAR is not > 1.45 W/kg.
- 6) The bolded configurations in the table above were tested for SAR.



10.3 Measured WLAN Conducted Powers

Table 10-3
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1	15.33	15.21	15.27	15.36
802.11b	2437	6	15.31	15.25	14.97	14.30
802.11b	2462	11	14.42	14.38	14.45	13.64

Table 10-4
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	12.67	12.55	12.70	13.07	12.38	12.28	12.22	12.33
802.11g	2437	6	11.78	11.51	11.50	11.35	11.74	11.72	11.85	1.73
802.11g	2462	11	11.21	11.37	11.96	11.45	11.97	11.27	11.00	11.19

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Table 10-5
IEEE 802.11n Average RF Power

Mode	Freq	Channel	802.11n Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	2412	1	13.28	13.22	13.33	13.15	13.19	13.26	12.98	13.13
802.11n	2437	6	12.25	12.15	12.07	12.24	12.22	12.17	12.33	12.11
802.11n	2462	11	12.30	12.51	12.36	12.06	12.38	12.26	12.36	11.85

Table 10-6
IEEE 802.11a Average RF Power

Mode	Freq	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11a	5180	36*	13.64	13.80	13.40	12.90	13.40	13.16	13.38	13.05
802.11a	5200	40	13.72	13.38	13.49	13.80	13.56	13.17	13.90	13.38
802.11a	5220	44	13.67	13.47	13.41	13.60	13.88	13.92	13.43	13.30
802.11a	5240	48*	13.84	13.42	13.50	13.71	13.30	13.46	13.30	13.50
802.11a	5260	52*	14.06	13.77	13.68	13.90	14.02	14.13	13.94	14.27
802.11a	5280	56	13.96	14.20	13.82	13.81	14.07	13.98	13.68	13.61
802.11a	5300	60	13.96	13.86	13.84	13.81	14.13	14.11	13.64	14.11
802.11a	5320	64*	13.90	13.89	13.97	13.89	13.90	13.69	14.15	13.74
802.11a	5500	100	14.25	13.99	13.93	14.02	14.06	13.53	13.60	13.72
802.11a	5520	104*	13.12	13.15	13.37	13.17	13.04	12.80	13.07	12.91
802.11a	5540	108	12.81	12.94	12.62	12.81	12.72	12.86	13.00	12.67
802.11a	5560	112	12.70	12.78	12.72	12.68	12.53	12.48	12.28	12.69
802.11a	5580	116*	12.49	12.53	12.57	12.69	12.60	12.18	12.26	12.69
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	11.72	11.97	11.78	11.77	11.94	11.79	11.96	11.95
802.11a	5680	136*	11.78	11.92	11.74	11.63	11.78	11.65	11.81	11.98
802.11a	5700	140	11.69	11.60	11.87	11.94	11.80	11.63	11.73	11.75
802.11a	5745	149*	13.49	13.42	13.57	13.58	13.42	13.33	13.58	13.49
802.11a	5765	153	13.79	13.60	13.58	13.69	13.72	13.64	13.95	13.70
802.11a	5785	157*	13.86	13.55	13.53	13.40	13.65	13.46	13.42	13.49
802.11a	5805	161*	13.72	13.73	13.70	13.97	13.82	13.44	13.67	13.87
802.11a	5825	165	13.64	13.77	13.72	13.73	13.80	13.60	13.71	13.64

Per FCC KDB Publication 443999, transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band. (*) – indicates default channels per KDB Publication 248227. When the adjacent channels are higher in power then the default channels, these “required channels” are considered instead of the default channels for SAR testing.

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Table 10-7
IEEE 802.11n (20 MHz) Average RF Power

Mode	Freq	Channel	802.11n (20MHz Bandwidth) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	5180	36*	12.96	12.99	12.84	12.69	12.75	12.67	12.82	12.72
802.11n	5200	40	12.83	12.80	13.10	12.92	12.96	12.94	12.83	12.74
802.11n	5220	44	13.14	13.50	13.15	12.91	13.19	12.90	13.11	12.97
802.11n	5240	48*	12.93	13.08	13.02	12.86	13.03	12.85	12.91	12.88
802.11n	5260	52*	13.16	13.23	13.16	13.09	13.04	13.25	13.29	13.09
802.11n	5280	56	13.04	13.04	12.99	12.85	12.99	12.86	12.97	12.90
802.11n	5300	60	13.04	12.94	13.13	12.93	12.67	12.96	13.00	12.94
802.11n	5320	64*	12.84	12.83	12.87	12.74	12.64	12.95	12.74	12.70
802.11n	5500	100	13.13	13.05	13.19	13.21	13.16	13.19	13.11	12.96
802.11n	5520	104*	12.56	12.67	12.64	12.48	12.67	12.56	12.49	12.68
802.11n	5540	108	12.72	12.41	12.56	12.40	12.30	12.49	12.35	12.24
802.11n	5560	112	12.25	12.22	12.18	12.00	12.07	11.96	11.98	12.16
802.11n	5580	116*	12.03	12.29	12.06	11.85	11.92	11.87	12.05	12.17
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	11.46	11.41	11.42	11.29	11.19	11.56	11.36	11.31
802.11n	5680	136*	11.42	11.28	11.32	11.34	11.20	11.33	11.37	11.18
802.11n	5700	140	11.48	11.60	11.28	11.29	11.41	11.32	11.46	11.21
802.11n	5745	149*	12.90	12.83	12.84	12.74	12.61	12.78	12.67	12.79
802.11n	5765	153	13.12	13.11	13.22	13.09	13.23	13.18	13.02	13.25
802.11n	5785	157*	12.68	12.94	12.62	12.74	12.42	12.53	12.51	12.62
802.11n	5805	161*	13.06	13.11	12.99	12.87	13.08	13.24	13.08	13.06
802.11n	5825	165	13.15	13.16	13.36	12.93	13.10	13.07	12.96	13.08

Per FCC KDB Publication 443999, transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Bands.

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Table 10-8
IEEE 802.11n (40 MHz) Average RF Power

Mode	Freq	Channel	802.11n (40MHz Bandwidth) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38*	13.16	13.21	13.00	13.14	13.14	13.20	13.02	13.21
802.11n	5230	46	13.24	13.20	13.25	13.29	13.24	13.27	13.31	13.30
802.11n	5270	54	12.62	12.64	12.58	12.74	12.72	12.50	12.69	12.68
802.11n	5310	62*	12.68	12.71	12.79	12.83	12.70	12.83	12.80	12.84
802.11n	5510	102*	12.97	12.99	13.07	13.09	13.04	13.04	13.06	13.08
802.11n	5550	110	13.04	13.06	13.18	13.07	13.15	13.09	13.02	13.19
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	13.03	13.12	13.15	13.11	13.16	13.08	13.00	13.20
802.11n	5755	151*	13.25	13.28	13.29	13.34	13.35	13.30	13.19	13.10
802.11n	5795	159	13.24	13.20	13.26	13.33	13.29	13.24	13.20	13.32

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Bands.

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) and data rates were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n for 20 MHz and 40 MHz bandwidths) and data rates were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- Because the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg for all bands and configurations, SAR testing on other channels was not required.
- SAR was evaluated on the channels and data rates indicated in bold.

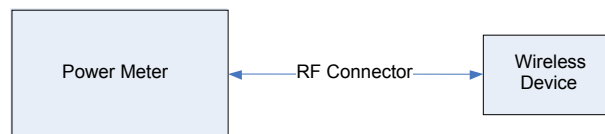


Figure 10-2
Power Measurement Setup

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11 LTE POWER REDUCTION

11.1 Introduction to LTE Power Reduction

This device is capable of Simultaneous Voice and LTE (SVLTE) calls, with the voice call supported by a CDMA 1xRTT transmitter and the data connection supported by separate LTE transmitter. A LTE power reduction scheme is applied during a LTE connection operating simultaneously with 1x-RTT voice calls. The maximum transmit power of LTE is limited depending on the CDMA 1x voice power level. When CDMA 1x Voice is operating at a certain range of high power levels, maximum LTE transmit power is limited. When CDMA 1x Voice power is below a certain threshold transmit power level, LTE can transmit at the maximum power. Target levels of power reduction and CDMA voice threshold levels are provided in Table 11-1.

Table 11-1
SVLTE Power Reduction Scheme

Mode	Voice Avg Power(P) 1x 850/1900 MHz (dBm)	Max. B13 LTE Data Avg Power (dBm)
SVLTE	$P \geq 18$	19
	$P < 18$	23

11.2 Output Power Verification

Per page 7 of KDB Publication 941225 D05, 5) B), output powers were measured in SVLTE mode to determine that the power reduction mechanism was operating reliably and consistently. The power reduction was investigated by simultaneously connecting the device to both LTE and CDMA base station simulators. LTE output powers were measured through conducted RF connections by first connecting the device in a LTE data call and subsequently a CDMA 1xRTT call. CDMA powers were controlled by setting the CDMA base station simulator to active bits. The LTE output power was monitored while changing the CDMA cell output power level.

The power reduction targets and threshold level described in Table 11-1 were confirmed. Please see results in Table 11-2 - Table 11-7.

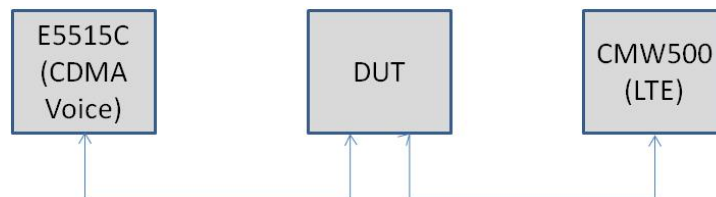


Figure 11-1
SVLTE Conducted Test Setup Diagram

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Table 11-2
SVLTE Power Reduction Verification Results – Low Ch. Cell CDMA

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 13 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1013 (Low)	24	18.96	18.82	19.20	19.12	18.72	18.70	19.23	19.19
	23	18.89	18.87	19.19	19.15	18.82	18.72	19.31	19.15
	22	18.91	18.90	19.21	19.11	18.88	18.84	19.28	19.18
	21	18.90	18.84	19.22	19.13	18.85	18.82	19.34	19.13
	20	18.92	18.83	19.21	19.16	18.78	18.74	19.37	19.17
	19	18.97	18.82	19.18	19.14	18.81	18.72	19.22	19.18
	18	18.92	18.87	19.21	19.15	18.88	18.74	19.36	19.12
	17	23.04	22.58	22.38	22.21	22.02	21.78	21.33	21.17
	16	23.02	22.64	22.34	22.20	21.97	21.82	21.35	21.31
	15	22.94	22.62	22.35	22.19	21.79	21.77	21.32	21.23
	14	22.96	22.57	22.37	22.21	22.02	21.79	21.28	21.22
	13	22.97	22.61	22.37	22.32	21.88	21.78	21.30	21.20
	12	22.89	22.58	22.35	22.33	21.97	21.80	21.31	21.23
	11	22.98	22.57	22.37	22.24	21.95	21.79	21.27	21.24

Table 11-3
SVLTE Power Reduction Verification Results – Mid. Ch. Cell CDMA

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 13 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
384 (Mid)	24	19.04	18.93	19.31	19.04	19.00	19.02	19.21	19.31
	23	18.94	18.84	19.24	18.95	19.02	19.02	19.16	19.27
	22	18.95	18.94	19.27	18.91	18.94	18.88	19.19	19.25
	21	19.02	19.02	19.28	19.01	18.97	18.78	19.20	19.27
	20	19.00	19.04	19.32	19.02	18.88	18.74	19.21	19.20
	19	18.87	19.02	19.27	18.98	18.92	18.97	19.25	19.28
	18	18.97	18.91	19.29	19.01	18.86	18.74	19.28	19.25
	17	22.92	22.82	22.31	22.18	22.09	21.90	21.34	21.21
	16	23.04	22.87	22.37	22.08	22.18	22.11	21.37	21.07
	15	22.91	22.81	22.38	22.10	22.07	22.10	21.32	21.02
	14	22.97	22.90	22.34	22.18	22.05	21.94	21.34	21.18
	13	22.94	22.94	22.34	22.21	22.14	21.95	21.28	21.24
	12	22.96	22.84	22.42	22.07	22.08	21.98	21.34	21.08
	11	23.02	22.95	22.37	22.14	22.12	21.94	21.38	21.07

Table 11-4
SVLTE Power Reduction Verification Results – High Ch. Cell CDMA

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 13 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
777 (High)	24	18.92	18.84	19.18	19.14	18.87	18.72	19.25	19.08
	23	18.90	18.76	19.17	19.15	18.92	18.80	19.27	19.12
	22	18.97	18.85	19.20	19.14	18.95	18.79	19.24	19.05
	21	18.92	18.78	19.16	19.15	18.94	18.77	19.24	19.19
	20	18.97	18.78	19.18	19.14	18.91	18.81	19.27	19.18
	19	18.93	18.75	19.15	19.16	18.88	18.79	19.26	19.17
	18	18.92	18.76	19.21	19.12	18.92	18.77	19.24	19.14
	17	22.99	23.02	22.34	22.12	21.98	21.81	21.38	21.21
	16	22.98	22.97	22.32	22.11	21.97	21.78	21.32	21.19
	15	23.02	22.95	22.28	22.12	22.01	21.79	21.33	21.26
	14	22.98	23.01	22.30	22.14	21.89	21.84	21.37	21.20
	13	23.01	22.98	22.36	22.22	22.04	21.83	21.33	21.18
	12	22.98	22.96	22.35	22.10	22.02	21.78	21.27	21.23
	11	22.97	22.89	22.37	22.13	21.99	21.82	21.35	21.22

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Table 11-5
SVLTE Power Reduction Verification Results – Low Ch. PCS CDMA

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 13 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
25 (Low)	24	19.02	18.84	19.19	19.14	18.88	18.84	19.22	19.16
	23	19.03	18.87	19.22	19.12	18.89	18.82	19.18	19.17
	22	18.98	18.83	19.20	19.15	18.85	18.87	19.22	19.14
	21	18.97	18.82	19.21	19.14	18.84	18.85	19.23	19.18
	20	19.05	18.88	19.22	19.12	18.87	18.83	19.18	19.13
	19	19.02	18.85	19.23	19.11	18.88	18.86	19.17	19.17
	18	19.00	18.87	19.21	19.12	18.87	18.87	19.22	19.16
	17	22.92	22.78	22.29	22.11	22.04	21.95	21.37	21.21
	16	23.02	22.74	22.31	22.24	21.98	21.97	21.33	21.23
	15	23.04	22.81	22.30	22.10	21.97	21.92	21.34	21.18
	14	22.98	22.80	22.31	22.21	21.99	21.94	21.35	21.22
	13	22.91	22.79	22.28	22.22	22.02	21.94	21.36	21.24
	12	22.96	22.78	22.30	22.23	22.01	21.93	21.37	21.22
	11	22.98	22.76	22.27	22.21	22.03	21.98	21.34	21.23

Table 11-6
SVLTE Power Reduction Verification Results – Mid. Ch. PCS CDMA

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 13 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
600 (Mid)	24	18.89	18.77	19.08	19.15	18.74	18.72	19.22	19.16
	23	18.88	18.78	19.11	19.12	18.72	18.81	19.21	19.17
	22	18.95	18.82	19.21	19.13	18.77	18.79	19.23	19.14
	21	18.92	18.79	19.24	19.11	18.75	18.77	19.20	19.18
	20	18.89	18.81	19.12	19.16	18.74	18.74	19.19	19.13
	19	18.95	18.82	19.18	19.12	18.78	18.74	19.22	19.17
	18	18.94	18.78	19.21	19.14	18.80	18.72	19.21	19.16
	17	22.98	22.87	22.26	22.21	22.11	22.04	21.38	21.18
	16	22.96	22.74	22.28	22.22	22.12	22.02	21.33	21.22
	15	23.01	22.78	22.24	22.11	22.08	22.03	21.34	21.23
	14	23.02	22.86	22.29	22.10	22.14	21.98	21.27	21.24
	13	22.99	22.81	22.27	22.12	22.09	21.97	21.32	21.20
	12	23.03	22.77	22.30	22.11	22.07	22.06	21.37	21.22
	11	22.98	22.83	22.26	22.09	22.13	22.02	21.32	21.19

Table 11-7
SVLTE Power Reduction Verification Results – High Ch. PCS CDMA

BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx(dBm)	LTE Band 13 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1175 (High)	24	18.98	18.84	19.19	19.14	18.98	18.79	19.22	19.21
	23	18.97	18.88	19.21	19.15	18.97	18.81	19.21	19.11
	22	19.03	18.85	19.17	19.13	19.02	18.77	19.22	19.08
	21	18.97	18.87	19.16	19.16	18.99	18.77	19.23	19.19
	20	19.02	18.89	19.20	19.14	18.96	18.82	19.21	19.18
	19	18.99	18.84	19.18	19.12	19.01	18.83	19.22	19.20
	18	19.02	18.85	19.21	19.11	18.97	18.87	19.31	19.17
	17	22.91	22.84	22.28	22.23	21.97	21.92	21.24	21.13
	16	22.94	22.82	22.31	22.24	21.98	21.88	21.27	21.25
	15	22.89	22.83	22.29	22.21	22.02	21.90	21.26	21.28
	14	22.94	22.80	22.32	22.24	22.00	21.91	21.28	21.24
	13	22.92	22.84	22.30	22.23	21.98	21.87	21.27	21.18
	12	22.92	22.84	22.32	22.21	21.86	21.93	21.28	21.22
	11	22.94	22.89	22.31	22.22	22.01	21.92	21.27	21.24

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11.3 SVLTE SAR Testing Procedures

SAR testing was additionally performed at the reduced CDMA and LTE power levels with respect to the various SVLTE simultaneous transmission scenarios. Additional samples were tuned to reduced power levels for the purpose of evaluating the simultaneous SAR based on the sum SAR of standalone 1x-RTT CDMA and standalone LTE combinations. While the power reduction mechanism is activated at the CDMA Voice power level of 18 dBm, simultaneous SAR summations were evaluated maximum power LTE. SAR was additionally evaluated at reduced power LTE levels to perform simultaneous SAR analysis when CDMA voice is at maximum output power.

11.3.1 Reduced LTE Conducted Powers

Table 11-8
Reduced LTE Conducted Powers

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
782.0	23230	10	QPSK	1	0	19.05	0	0
782.0	23230	10	QPSK	1	49	19.02	0	0
782.0	23230	10	QPSK	25	12	19.46	0	0-1
782.0	23230	10	QPSK	50	0	19.44	0	0-1
782.0	23230	10	16QAM	1	0	18.97	0	0-1
782.0	23230	10	16QAM	1	49	18.88	0	0-1
782.0	23230	10	16QAM	25	12	19.50	0	0-2
782.0	23230	10	16QAM	50	0	19.43	0	0-2

According to FCC KDB 941225 D05:

- 1) Per Page 4, 3) A), QPSK with 50% RB is required.
- 2) Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required.
- 3) Per Page 4, 4) A), 16QAM with 50% RB is required.
- 4) Per Page 4, 4) B), 16 QAM with 1 RB for both channel edges are required.
- 5) Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the 50% RB SAR is not > 1.45 W/kg.
- 6) The bolded configurations in the table above were tested for SAR.

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11.3.2 Fixed CDMA Conducted Powers

Table 11-9
Fixed CDMA Conducted Powers

Band	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]
	F-RC	MHz	RC1	RC3	FCH+SCH	FCH
Cellular	1013	824.7	18.09	18.01	18.00	18.02
	384	836.52	18.29	18.18	18.17	18.19
	777	848.31	18.24	18.17	18.12	18.18
PCS	25	1851.25	18.22	18.17	18.14	18.17
	600	1880	18.29	18.26	18.24	18.26
	1175	1908.75	18.10	18.00	18.01	18.02

Note: There is no power reduction applied to the CDMA Voice modes, however the device with output powers represented in the table above was tuned down (for SAR Test purposes only) to analyze simultaneous SAR scenarios in the SVLTE condition where LTE is operating at maximum output power in conjunction with a lower CDMA voice level (See Table 11-1).

CDMA 1x Test Notes:

Per KDB Publication 941225 D01:

1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn and Hotspot SAR was tested with 1x RTT with TDSO / SO32 FCH Only. TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.

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12 SYSTEM VERIFICATION

12.1 Tissue Verification

Table 12-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
5/7/2012	770H	22.4	750	0.851	43.49	0.890	41.900	-4.38%	3.79%
			755	0.854	43.39	0.891	41.876	-4.15%	3.62%
			770	0.867	43.14	0.892	41.806	-2.80%	3.19%
			785	0.882	42.93	0.894	41.735	-1.34%	2.86%
4/23/2012	835H	22.7	820	0.896	40.83	0.898	41.571	-0.22%	-1.78%
			835	0.910	40.64	0.900	41.500	1.11%	-2.07%
			850	0.925	40.45	0.916	41.500	0.98%	-2.53%
4/27/2012	1900H	22.6	1850	1.338	39.70	1.400	40.000	-4.43%	-0.75%
			1880	1.369	39.56	1.400	40.000	-2.21%	-1.10%
			1910	1.397	39.46	1.400	40.000	-0.21%	-1.35%
5/8/2012	2450H	22.4	2401	1.721	37.79	1.758	39.298	-2.10%	-3.84%
			2450	1.790	37.41	1.800	39.200	-0.56%	-4.57%
			2499	1.936	37.21	1.852	39.135	4.54%	-4.92%
04/24/2012	5200H-5800H	23.5	5200	4.481	35.71	4.660	36.000	-3.84%	-0.81%
			5240	4.506	35.67	4.700	35.960	-4.13%	-0.81%
			5260	4.527	35.66	4.720	35.940	-4.09%	-0.78%
			5500	4.737	35.37	4.965	35.650	-4.59%	-0.79%
			5785	5.013	34.95	5.255	35.315	-4.61%	-1.03%
			5800	5.029	34.90	5.270	35.300	-4.57%	-1.13%
4/30/2012	770B	22.7	750	0.981	53.40	0.962	55.677	1.98%	-4.09%
			755	0.986	53.35	0.963	55.649	2.39%	-4.13%
			770	0.994	53.20	0.964	55.564	3.11%	-4.25%
			785	1.012	53.08	0.965	55.480	4.87%	-4.33%
4/25/2012	835B	22.7	820	0.971	52.71	0.969	55.284	0.21%	-4.66%
			835	0.987	52.58	0.970	55.200	1.75%	-4.75%
			850	1.000	52.44	0.988	55.154	1.21%	-4.92%
4/23/2012	1900B	21.7	1850	1.475	52.22	1.520	53.300	-2.96%	-2.03%
			1880	1.510	52.12	1.520	53.300	-0.66%	-2.21%
			1910	1.536	52.05	1.520	53.300	1.05%	-2.35%
4/24/2012	2450B	21.2	2401	1.997	50.63	1.903	52.765	4.94%	-4.05%
			2450	2.019	50.15	1.950	52.700	3.54%	-4.84%
			2499	2.082	50.16	2.019	52.638	3.12%	-4.71%
04/25/2012	5200B-5800B	23.9	5200	5.225	47.92	5.299	49.014	-1.40%	-2.23%
			5240	5.311	47.97	5.346	48.933	-0.65%	-1.97%
			5260	5.340	48.14	5.369	48.906	-0.54%	-1.57%
			5500	5.648	47.85	5.650	48.580	-0.04%	-1.50%
			5785	5.984	46.97	5.982	48.242	0.03%	-2.64%
			5800	5.976	46.66	6.000	48.200	-0.40%	-3.20%

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2).

The SAR test plots may slightly differ from the table due to rounding.

Probe calibration used within ± 100 MHz of the test frequency in either 5.725 - 5.85 or 5.47-5.725 GHz is acceptable per KDB Publication 865664 since the design of the SAR probe supports the extended frequency, provided the DASY software version recommended is used for the tests, and the expanded calibration uncertainty ($k=2$) is less than or equal to 15% (See SAR probe calibration certificate for this information).

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12.2 Measurement Procedure for Tissue verification

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the sample which was placed in a nonmetallic container.
Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity ϵ can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

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12.3 Test System Verification

Prior to assessment, the system is verified to $\pm 10\%$ of the manufacturer SAR measurement on the reference dipole at the time of calibration.

Table 12-2
System Verification Results

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation (%)
750	Head	05/07/2012	24.7	22.9	0.1000	1003	3022	0.812	8.400	8.120	-3.33%
835	Head	04/23/2012	21.7	21.6	0.1000	4d133	3561	0.942	9.450	9.420	-0.32%
1900	Head	04/27/2012	23.8	22.4	0.1000	5d149	3288	3.88	39.300	38.800	-1.27%
2450	Head	05/08/2012	23.7	22.1	0.1000	719	3209	5.16	53.800	51.600	-4.09%
5200	Head	04/24/2012	23.2	21.6	0.0160	1057	3589	1.27	79.100	79.375	0.35%
5500	Head	04/24/2012	23.5	21.7	0.0160	1057	3589	1.35	84.900	84.375	-0.62%
5800	Head	04/24/2012	23.8	21.9	0.0160	1057	3589	1.3	79.500	81.250	2.20%
750	Body	04/30/2012	24.1	22.4	0.1000	1003	3022	0.869	8.720	8.690	-0.34%
835	Body	04/25/2012	23.7	22.2	0.1000	4d026	3258	1.02	9.660	10.200	5.59%
1900	Body	04/23/2012	21.8	20.8	0.1000	5d149	3288	3.92	39.300	39.200	-0.25%
2450	Body	04/24/2012	23.2	22.7	0.1000	719	3022	5.3	51.300	53.000	3.31%
5200	Body	04/25/2012	23.6	22.1	0.0174	1057	3589	1.32	73.400	75.862	3.35%
5500	Body	04/25/2012	23.7	22.3	0.0174	1057	3589	1.32	78.900	75.862	-3.85%
5800	Body	04/25/2012	23.8	22.6	0.0174	1057	3589	1.24	74.300	71.264	-4.09%

Note: Per KDB Publication 865664, when a reference dipole is not defined within $\pm 100\text{MHz}$ of the test frequency, the system verification may be conducted within $\pm 200\text{ MHz}$ of the center frequency of the measurement frequencies if the SAR probe calibration is valid and the same tissue-equivalent matter is used for verification and test measurements.

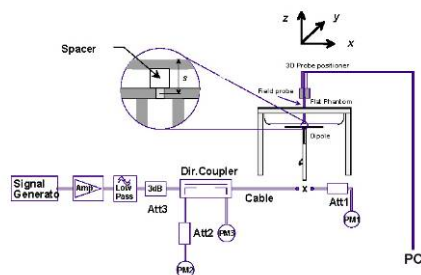


Figure 12-1
System Verification Setup Diagram



Figure 12-2
System Verification Setup Photo

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13 SAR DATA SUMMARY

13.1 Standalone Head SAR Data

Table 13-1
Cell. CDMA Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode/Band	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.									(W/kg)
836.52	384	Cell. CDMA	SO55	24.5	24.68	0.04	Right	Touch	SAR #1	0.412
836.52	384	Cell. CDMA	SO55	24.5	24.68	0.05	Right	Tilt	SAR #1	0.272
836.52	384	Cell. CDMA	SO55	24.5	24.68	0.05	Left	Touch	SAR #1	0.323
836.52	384	Cell. CDMA	SO55	24.5	24.68	0.02	Left	Tilt	SAR #1	0.234
836.52	384	Cell. CDMA	SO55	18	18.18	0.04	Right	Touch	SAR #4	0.080
836.52	384	Cell. CDMA	SO55	18	18.18	-0.01	Right	Tilt	SAR #4	0.047
836.52	384	Cell. CDMA	SO55	18	18.18	0.02	Left	Touch	SAR #4	0.064
836.52	384	Cell. CDMA	SO55	18	18.18	-0.02	Left	Tilt	SAR #4	0.041
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram			

Table 13-2
PCS CDMA Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode/Band	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.									(W/kg)
1880.00	600	PCS CDMA	SO55	24.5	25.00	-0.01	Right	Touch	SAR #3	0.440
1880.00	600	PCS CDMA	SO55	24.5	25.00	0.01	Right	Tilt	SAR #3	0.223
1880.00	600	PCS CDMA	SO55	24.5	25.00	0.06	Left	Touch	SAR #3	0.496
1880.00	600	PCS CDMA	SO55	24.5	25.00	0.06	Left	Tilt	SAR #3	0.215
1880.00	600	PCS CDMA	SO55	18	18.26	0.07	Right	Touch	SAR #4	0.067
1880.00	600	PCS CDMA	SO55	18	18.26	-0.16	Right	Tilt	SAR #4	0.019
1880.00	600	PCS CDMA	SO55	18	18.26	0.14	Left	Touch	SAR #4	0.065
1880.00	600	PCS CDMA	SO55	18	18.26	0.06	Left	Tilt	SAR #4	0.018
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram			

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Table 13-3
LTE Head SAR Results – Maximum Power

MEASUREMENT RESULTS														
FREQUENCY		Mode	Bandwidth [MHz]	Target Power [dBm]	MPR [dB]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
782	23230	LTE Band 13	10	22	1	22.21	0.07	Right	Touch	QPSK	25	12	SAR #1	0.225
782	23230	LTE Band 13	10	23	0	23.09	0.02	Right	Touch	QPSK	1	0	SAR #1	0.300
782	23230	LTE Band 13	10	23	0	23.15	-0.04	Right	Touch	QPSK	1	49	SAR #1	0.212
782	23230	LTE Band 13	10	21	2	21.39	0.12	Right	Touch	16 QAM	25	12	SAR #1	0.185
782	23230	LTE Band 13	10	22	1	21.83	-0.16	Right	Touch	16 QAM	1	0	SAR #1	0.230
782	23230	LTE Band 13	10	22	1	21.72	0.03	Right	Touch	16 QAM	1	49	SAR #1	0.162
782	23230	LTE Band 13	10	22	1	22.21	0.00	Right	Tilt	QPSK	25	12	SAR #1	0.150
782	23230	LTE Band 13	10	23	0	23.09	-0.02	Right	Tilt	QPSK	1	0	SAR #1	0.184
782	23230	LTE Band 13	10	23	0	23.15	-0.11	Right	Tilt	QPSK	1	49	SAR #1	0.140
782	23230	LTE Band 13	10	21	2	21.39	0.00	Right	Tilt	16 QAM	25	12	SAR #1	0.123
782	23230	LTE Band 13	10	22	1	21.83	0.14	Right	Tilt	16 QAM	1	0	SAR #1	0.148
782	23230	LTE Band 13	10	22	1	21.72	-0.02	Right	Tilt	16 QAM	1	49	SAR #1	0.108
782	23230	LTE Band 13	10	22	1	22.21	0.10	Left	Touch	QPSK	25	12	SAR #1	0.352
782	23230	LTE Band 13	10	23	0	23.09	-0.02	Left	Touch	QPSK	1	0	SAR #1	0.447
782	23230	LTE Band 13	10	23	0	23.15	-0.10	Left	Touch	QPSK	1	49	SAR #1	0.347
782	23230	LTE Band 13	10	21	2	21.39	0.19	Left	Touch	16 QAM	25	12	SAR #1	0.284
782	23230	LTE Band 13	10	22	1	21.83	-0.19	Left	Touch	16 QAM	1	0	SAR #1	0.374
782	23230	LTE Band 13	10	22	1	21.72	-0.05	Left	Touch	16 QAM	1	49	SAR #1	0.306
782	23230	LTE Band 13	10	22	1	22.21	0.11	Left	Tilt	QPSK	25	12	SAR #1	0.177
782	23230	LTE Band 13	10	23	0	23.09	-0.04	Left	Tilt	QPSK	1	0	SAR #1	0.219
782	23230	LTE Band 13	10	23	0	23.15	0.03	Left	Tilt	QPSK	1	49	SAR #1	0.194
782	23230	LTE Band 13	10	21	2	21.39	0.15	Left	Tilt	16 QAM	25	12	SAR #1	0.151
782	23230	LTE Band 13	10	22	1	21.83	0.04	Left	Tilt	16 QAM	1	0	SAR #1	0.184
782	23230	LTE Band 13	10	22	1	21.72	0.10	Left	Tilt	16 QAM	1	49	SAR #1	0.158
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram					

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Table 13-4
LTE Head SAR Results – Reduced Power

MEASUREMENT RESULTS														
FREQUENCY		Mode	Bandwidth [MHz]	Target Power [dBm]	MPR [dB]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
782	23230	LTE Band 13	10	19	0	19.46	0.07	Right	Touch	QPSK	25	12	SAR #4	0.027
782	23230	LTE Band 13	10	19	0	19.05	-0.04	Right	Touch	QPSK	1	0	SAR #4	0.028
782	23230	LTE Band 13	10	19	0	19.02	0.03	Right	Touch	QPSK	1	49	SAR #4	0.020
782	23230	LTE Band 13	10	19	0	19.50	0.11	Right	Touch	16 QAM	25	12	SAR #4	0.027
782	23230	LTE Band 13	10	19	0	18.97	0.04	Right	Touch	16 QAM	1	0	SAR #4	0.027
782	23230	LTE Band 13	10	19	0	18.88	0.00	Right	Touch	16 QAM	1	49	SAR #4	0.019
782	23230	LTE Band 13	10	19	0	19.46	-0.16	Right	Tilt	QPSK	25	12	SAR #4	0.018
782	23230	LTE Band 13	10	19	0	19.05	0.21	Right	Tilt	QPSK	1	0	SAR #4	0.020
782	23230	LTE Band 13	10	19	0	19.02	-0.07	Right	Tilt	QPSK	1	49	SAR #4	0.015
782	23230	LTE Band 13	10	19	0	19.50	-0.03	Right	Tilt	16 QAM	25	12	SAR #4	0.019
782	23230	LTE Band 13	10	19	0	18.97	-0.02	Right	Tilt	16 QAM	1	0	SAR #4	0.018
782	23230	LTE Band 13	10	19	0	18.88	0.15	Right	Tilt	16 QAM	1	49	SAR #4	0.014
782	23230	LTE Band 13	10	19	0	19.46	-0.04	Left	Touch	QPSK	25	12	SAR #4	0.035
782	23230	LTE Band 13	10	19	0	19.05	-0.03	Left	Touch	QPSK	1	0	SAR #4	0.036
782	23230	LTE Band 13	10	19	0	19.02	0.07	Left	Touch	QPSK	1	49	SAR #4	0.026
782	23230	LTE Band 13	10	19	0	19.50	0.11	Left	Touch	16 QAM	25	12	SAR #4	0.034
782	23230	LTE Band 13	10	19	0	18.97	0.02	Left	Touch	16 QAM	1	0	SAR #4	0.035
782	23230	LTE Band 13	10	19	0	18.88	0.20	Left	Touch	16 QAM	1	49	SAR #4	0.026
782	23230	LTE Band 13	10	19	0	19.46	0.04	Left	Tilt	QPSK	25	12	SAR #4	0.021
782	23230	LTE Band 13	10	19	0	19.05	0.03	Left	Tilt	QPSK	1	0	SAR #4	0.020
782	23230	LTE Band 13	10	19	0	19.02	0.19	Left	Tilt	QPSK	1	49	SAR #4	0.017
782	23230	LTE Band 13	10	19	0	19.50	0.10	Left	Tilt	16 QAM	25	12	SAR #4	0.020
782	23230	LTE Band 13	10	19	0	18.97	0.12	Left	Tilt	16 QAM	1	0	SAR #4	0.019
782	23230	LTE Band 13	10	19	0	18.88	-0.02	Left	Tilt	16 QAM	1	49	SAR #4	0.016
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram					

Table 13-5
2.4 GHz WIFI Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
2412	1	IEEE 802.11b	DSSS	15.33	0.07	Right	Touch	SAR #4	1	0.008
2412	1	IEEE 802.11b	DSSS	15.33	0.07	Right	Tilt	SAR #4	1	0.003
2412	1	IEEE 802.11b	DSSS	15.33	0.08	Left	Touch	SAR #4	1	0.015
2412	1	IEEE 802.11b	DSSS	15.33	0.12	Left	Tilt	SAR #4	1	0.006
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram			

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Table 13-6
5 GHz WIFI Head SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
5785	157	IEEE 802.11a	OFDM	13.86	0.20	Right	Touch	SAR #3	6	0.000
5785	157	IEEE 802.11a	OFDM	13.86	0.00	Right	Tilt	SAR #3	6	0.000
5785	157	IEEE 802.11a	OFDM	13.86	0.19	Left	Touch	SAR #3	6	0.027
5785	157	IEEE 802.11a	OFDM	13.86	0.13	Left	Tilt	SAR #3	6	0.006
5240	48	IEEE 802.11a	OFDM	13.84	0.12	Right	Touch	SAR #3	6	0.058
5240	48	IEEE 802.11a	OFDM	13.84	0.21	Right	Tilt	SAR #3	6	0.014
5240	48	IEEE 802.11a	OFDM	13.84	0.19	Left	Touch	SAR #3	6	0.143
5240	48	IEEE 802.11a	OFDM	13.84	0.14	Left	Tilt	SAR #3	6	0.029
5260	52	IEEE 802.11a	OFDM	14.06	-0.11	Right	Touch	SAR #3	6	0.053
5260	52	IEEE 802.11a	OFDM	14.06	0.15	Right	Tilt	SAR #3	6	0.016
5260	52	IEEE 802.11a	OFDM	14.06	0.16	Left	Touch	SAR #3	6	0.135
5260	52	IEEE 802.11a	OFDM	14.06	0.14	Left	Tilt	SAR #3	6	0.027
5500	100	IEEE 802.11a	OFDM	14.25	0.12	Right	Touch	SAR #3	6	0.004
5500	100	IEEE 802.11a	OFDM	14.25	0.19	Right	Tilt	SAR #3	6	0.003
5500	100	IEEE 802.11a	OFDM	14.25	0.15	Left	Touch	SAR #3	6	0.059
5500	100	IEEE 802.11a	OFDM	14.25	0.18	Left	Tilt	SAR #3	6	0.004
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram				

13.2 Standalone Body-Worn SAR Data

Table 13-7
CDMA Body-Worn SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.									(W/kg)
836.52	384	Cell. CDMA	TDSO / SO32	24.5	24.63	0.03	1.0 cm	SAR#1	back	0.714
836.52	384	Cell. CDMA	TDSO / SO32	18	18.19	0.02	1.0 cm	SAR #4	back	0.146
1880.00	600	PCS CDMA	TDSO / SO32	24.5	24.98	-0.04	1.0 cm	SAR #3	back	0.653
1880.00	600	PCS CDMA	TDSO / SO32	18	18.26	0.02	1.0 cm	SAR #4	back	0.071
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note: For CDMA 1x mode, Hotspot back side SAR Data was also used for supporting body-worn-accessory compliance per FCC KDB Publication 941225 D06.

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Table 13-8
LTE Body-Worn SAR Results

MEASUREMENT RESULTS														
FREQUENCY		Mode	Bandwidth [MHz]	Target Power [dBm]	MPR [dB]	Conducted Power [dBm]	Power Drift [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
782	23230	LTE Band 13	10	22	1	22.21	0.02	SAR#1	QPSK	25	12	1.0 cm	back	0.309
782	23230	LTE Band 13	10	23	0	23.09	0.12	SAR#1	QPSK	1	0	1.0 cm	back	0.424
782	23230	LTE Band 13	10	23	0	23.15	0.02	SAR#1	QPSK	1	49	1.0 cm	back	0.295
782	23230	LTE Band 13	10	21	2	21.39	0.09	SAR#1	16 QAM	25	12	1.0 cm	back	0.251
782	23230	LTE Band 13	10	22	1	21.83	0.20	SAR#1	16 QAM	1	0	1.0 cm	back	0.360
782	23230	LTE Band 13	10	22	1	21.72	-0.09	SAR#1	16 QAM	1	49	1.0 cm	back	0.248
782	23230	LTE Band 13	10	19	0	19.46	-0.01	SAR#4	QPSK	25	12	1.0 cm	back	0.041
782	23230	LTE Band 13	10	19	0	19.05	-0.05	SAR#4	QPSK	1	0	1.0 cm	back	0.041
782	23230	LTE Band 13	10	19	0	19.02	-0.10	SAR#4	QPSK	1	49	1.0 cm	back	0.033
782	23230	LTE Band 13	10	19	0	19.50	0.03	SAR#4	16 QAM	25	12	1.0 cm	back	0.041
782	23230	LTE Band 13	10	19	0	18.97	0.02	SAR#4	16 QAM	1	0	1.0 cm	back	0.039
782	23230	LTE Band 13	10	19	0	18.88	0.04	SAR#4	16 QAM	1	49	1.0 cm	back	0.033
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: For LTE mode, Hotspot back side SAR Data was also used for supporting body-worn-accessory compliance per FCC KDB Publication 941225 D06.

Table 13-9
WIFI Body-Worn SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2412	1	IEEE 802.11b	DSSS	15.33	0.18	1.0 cm	99000023090468	1	back	0.066
5785	157	IEEE 802.11a	OFDM	13.86	0.00	1.0 cm	SAR #3	6	back	0.000
5240	48	IEEE 802.11a	OFDM	13.84	0.13	1.0 cm	SAR #3	6	back	0.049
5260	52	IEEE 802.11a	OFDM	14.06	0.15	1.0 cm	SAR #3	6	back	0.056
5500	100	IEEE 802.11a	OFDM	14.25	0.00	1.0 cm	SAR #3	6	back	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note: For IEEE 802.11b mode, Hotspot back side SAR Data was also used for supporting body-worn-accessory compliance per FCC KDB Publication 941225 D06.

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13.3 Standalone Wireless Router SAR Data

Table 13-10
CDMA/EVDO Hotspot SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.									(W/kg)
836.52	384	Cell. CDMA	EVDO Rev.0	24.5	24.44	0.00	1.0 cm	SAR#2	back	0.647
836.52	384	Cell. CDMA	EVDO Rev.A	24.5	24.51	-0.03	1.0 cm	SAR#2	back	0.647
836.52	384	Cell. CDMA	EVDO Rev.0	24.5	24.44	-0.01	1.0 cm	SAR#2	front	0.416
836.52	384	Cell. CDMA	EVDO Rev.0	24.5	24.44	-0.03	1.0 cm	SAR#2	Bottom	0.131
836.52	384	Cell. CDMA	EVDO Rev.0	24.5	24.44	0.04	1.0 cm	SAR#2	right	0.537
836.52	384	Cell. CDMA	TDSO / SO32	24.5	24.63	0.03	1.0 cm	SAR#1	back	0.714
836.52	384	Cell. CDMA	TDSO / SO32	24.5	24.63	-0.01	1.0 cm	SAR#1	front	0.536
836.52	384	Cell. CDMA	TDSO / SO32	24.5	24.63	0.03	1.0 cm	SAR#1	bottom	0.192
836.52	384	Cell. CDMA	TDSO / SO32	24.5	24.63	-0.02	1.0 cm	SAR#1	right	0.602
836.52	384	Cell. CDMA	TDSO / SO32	18	18.19	0.02	1.0 cm	SAR #4	back	0.146
836.52	384	Cell. CDMA	TDSO / SO32	18	18.19	0.00	1.0 cm	SAR #4	front	0.089
836.52	384	Cell. CDMA	TDSO / SO32	18	18.19	0.03	1.0 cm	SAR #4	bottom	0.028
836.52	384	Cell. CDMA	TDSO / SO32	18	18.19	0.00	1.0 cm	SAR #4	right	0.115
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.74	0.00	1.0 cm	SAR #2	back	0.476
1851.25	25	PCS CDMA	EVDO Rev. A	24.5	24.80	0.04	1.0 cm	SAR #2	back	0.492
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.74	-0.01	1.0 cm	SAR #2	front	0.423
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.74	-0.02	1.0 cm	SAR #2	bottom	0.419
1880.00	600	PCS CDMA	EVDO Rev. 0	24.5	24.74	-0.05	1.0 cm	SAR #2	right	0.196
1880.00	600	PCS CDMA	TDSO / SO32	24.5	24.98	-0.04	1.0 cm	SAR #3	back	0.653
1880.00	600	PCS CDMA	TDSO / SO32	24.5	24.98	-0.01	1.0 cm	SAR #3	front	0.622
1880.00	600	PCS CDMA	TDSO / SO32	24.5	24.98	-0.04	1.0 cm	SAR #3	bottom	0.547
1880.00	600	PCS CDMA	TDSO / SO32	24.5	24.98	0.04	1.0 cm	SAR #3	right	0.257
1880.00	600	PCS CDMA	TDSO / SO32	18	18.26	0.02	1.0 cm	SAR #4	back	0.071
1880.00	600	PCS CDMA	TDSO / SO32	18	18.26	0.01	1.0 cm	SAR #4	front	0.066
1880.00	600	PCS CDMA	TDSO / SO32	18	18.26	0.17	1.0 cm	SAR #4	bottom	0.062
1880.00	600	PCS CDMA	TDSO / SO32	18	18.26	-0.06	1.0 cm	SAR #4	right	0.029
Spatial Peak							1.6 W/kg (mW/g)			
Uncontrolled Exposure/General Population							averaged over 1 gram			

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Table 13-11
LTE Hotspot SAR Results – Maximum Power

MEASUREMENT RESULTS														
FREQUENCY		Mode	Bandwidth [MHz]	Target Power [dBm]	MPR [dB]	Conducted Power [dBm]	Power Drift [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
782	23230	LTE Band 13	10	22	1	22.21	0.02	SAR#1	QPSK	25	12	1.0 cm	back	0.309
782	23230	LTE Band 13	10	23	0	23.09	0.12	SAR#1	QPSK	1	0	1.0 cm	back	0.424
782	23230	LTE Band 13	10	23	0	23.15	0.02	SAR#1	QPSK	1	49	1.0 cm	back	0.295
782	23230	LTE Band 13	10	21	2	21.39	0.09	SAR#1	16 QAM	25	12	1.0 cm	back	0.251
782	23230	LTE Band 13	10	22	1	21.83	0.20	SAR#1	16 QAM	1	0	1.0 cm	back	0.360
782	23230	LTE Band 13	10	22	1	21.72	-0.09	SAR#1	16 QAM	1	49	1.0 cm	back	0.248
782	23230	LTE Band 13	10	22	1	22.21	-0.07	SAR#1	QPSK	25	12	1.0 cm	front	0.269
782	23230	LTE Band 13	10	23	0	23.09	0.05	SAR#1	QPSK	1	0	1.0 cm	front	0.367
782	23230	LTE Band 13	10	23	0	23.15	0.02	SAR#1	QPSK	1	49	1.0 cm	front	0.245
782	23230	LTE Band 13	10	21	2	21.39	0.00	SAR#1	16 QAM	25	12	1.0 cm	front	0.211
782	23230	LTE Band 13	10	22	1	21.83	-0.01	SAR#1	16 QAM	1	0	1.0 cm	front	0.285
782	23230	LTE Band 13	10	22	1	21.72	-0.05	SAR#1	16 QAM	1	49	1.0 cm	front	0.212
782	23230	LTE Band 13	10	22	1	22.21	0.08	SAR#1	QPSK	25	12	1.0 cm	bottom	0.143
782	23230	LTE Band 13	10	23	0	23.09	0.07	SAR#1	QPSK	1	0	1.0 cm	bottom	0.170
782	23230	LTE Band 13	10	23	0	23.15	-0.02	SAR#1	QPSK	1	49	1.0 cm	bottom	0.174
782	23230	LTE Band 13	10	21	2	21.39	-0.05	SAR#1	16 QAM	25	12	1.0 cm	bottom	0.133
782	23230	LTE Band 13	10	22	1	21.83	-0.10	SAR#1	16 QAM	1	0	1.0 cm	bottom	0.139
782	23230	LTE Band 13	10	22	1	21.72	-0.05	SAR#1	16 QAM	1	49	1.0 cm	bottom	0.144
782	23230	LTE Band 13	10	22	1	22.21	0.03	SAR#1	QPSK	25	12	1.0 cm	left	0.344
782	23230	LTE Band 13	10	23	0	23.09	-0.07	SAR#1	QPSK	1	0	1.0 cm	left	0.450
782	23230	LTE Band 13	10	23	0	23.15	0.00	SAR#1	QPSK	1	49	1.0 cm	left	0.355
782	23230	LTE Band 13	10	21	2	21.39	-0.09	SAR#1	16 QAM	25	12	1.0 cm	left	0.281
782	23230	LTE Band 13	10	22	1	21.83	0.01	SAR#1	16 QAM	1	0	1.0 cm	left	0.357
782	23230	LTE Band 13	10	22	1	21.72	-0.10	SAR#1	16 QAM	1	49	1.0 cm	left	0.295
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram					

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Table 13-12
LTE Hotspot SAR Results – Reduced Power

MEASUREMENT RESULTS														
FREQUENCY		Mode	Bandwidth [MHz]	Target Power [dBm]	MPR [dB]	Conducted Power [dBm]	Power Drift [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
782	23230	LTE Band 13	10	19	0	19.46	-0.01	SAR #4	QPSK	25	12	1.0 cm	back	0.041
782	23230	LTE Band 13	10	19	0	19.05	-0.05	SAR #4	QPSK	1	0	1.0 cm	back	0.041
782	23230	LTE Band 13	10	19	0	19.02	-0.10	SAR #4	QPSK	1	49	1.0 cm	back	0.033
782	23230	LTE Band 13	10	19	0	19.50	0.03	SAR #4	16 QAM	25	12	1.0 cm	back	0.041
782	23230	LTE Band 13	10	19	0	18.97	0.02	SAR #4	16 QAM	1	0	1.0 cm	back	0.039
782	23230	LTE Band 13	10	19	0	18.88	0.04	SAR #4	16 QAM	1	49	1.0 cm	back	0.033
782	23230	LTE Band 13	10	19	0	19.46	0.16	SAR #4	QPSK	25	12	1.0 cm	front	0.028
782	23230	LTE Band 13	10	19	0	19.05	-0.03	SAR #4	QPSK	1	0	1.0 cm	front	0.029
782	23230	LTE Band 13	10	19	0	19.02	0.01	SAR #4	QPSK	1	49	1.0 cm	front	0.023
782	23230	LTE Band 13	10	19	0	19.50	0.16	SAR #4	16 QAM	25	12	1.0 cm	front	0.028
782	23230	LTE Band 13	10	19	0	18.97	0.10	SAR #4	16 QAM	1	0	1.0 cm	front	0.027
782	23230	LTE Band 13	10	19	0	18.88	0.06	SAR #4	16 QAM	1	49	1.0 cm	front	0.010
782	23230	LTE Band 13	10	19	0	19.46	-0.03	SAR #4	QPSK	25	12	1.0 cm	bottom	0.015
782	23230	LTE Band 13	10	19	0	19.05	-0.04	SAR #4	QPSK	1	0	1.0 cm	bottom	0.009
782	23230	LTE Band 13	10	19	0	19.02	0.03	SAR #4	QPSK	1	49	1.0 cm	bottom	0.007
782	23230	LTE Band 13	10	19	0	19.50	-0.07	SAR #4	16 QAM	25	12	1.0 cm	bottom	0.013
782	23230	LTE Band 13	10	19	0	18.97	0.08	SAR #4	16 QAM	1	0	1.0 cm	bottom	0.009
782	23230	LTE Band 13	10	19	0	18.88	-0.12	SAR #4	16 QAM	1	49	1.0 cm	bottom	0.008
782	23230	LTE Band 13	10	19	0	19.46	0.15	SAR #4	QPSK	25	12	1.0 cm	left	0.043
782	23230	LTE Band 13	10	19	0	19.05	-0.11	SAR #4	QPSK	1	0	1.0 cm	left	0.044
782	23230	LTE Band 13	10	19	0	19.02	-0.01	SAR #4	QPSK	1	49	1.0 cm	left	0.036
782	23230	LTE Band 13	10	19	0	19.50	-0.04	SAR #4	16 QAM	25	12	1.0 cm	left	0.045
782	23230	LTE Band 13	10	19	0	18.97	0.12	SAR #4	16 QAM	1	0	1.0 cm	left	0.043
782	23230	LTE Band 13	10	19	0	18.88	0.00	SAR #4	16 QAM	1	49	1.0 cm	left	0.035
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram						

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Table 13-13
WIFI Hotspot SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2412	1	IEEE 802.11b	DSSS	15.33	0.18	1.0 cm	99000023090468	1	back	0.066
2412	1	IEEE 802.11b	DSSS	15.33	0.14	1.0 cm	99000023090468	1	front	0.006
2412	1	IEEE 802.11b	DSSS	15.33	0.02	1.0 cm	99000023090468	1	left	0.020
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

13.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE 1528-2003.
2. Batteries are fully charged for all readings. The standard battery was used.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
5. Per FCC/OET Bulletin 65 Supplement C (June 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

CDMA/EVDO Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per KDB Publication 941225 D01.
2. Body-Worn and CDMA 1x RTT wireless router SAR was tested with 1x RTT with TDSO / SO32 FCH Only. TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.
3. EVDO SAR (hotspot) was tested with EVDO Rev 0 to support simultaneous transmission capabilities. SAR was also measured on the maximum output channel for Rev. A for the configuration that produced the highest SAR with Rev. 0 since the maximum average output for Rev. A was greater than that measured in Rev. 0 configurations.
4. Per FCC KDB Publication 941225 D06, when the same wireless modes and device transmission configurations are required for body-worn accessories and hotspot mode, it is not necessary to additionally test body-worn accessory SAR for the same device orientation. Therefore, the CDMA 1x RTT hotspot data for the back side configuration additionally shows body-worn compliance at the same distance.

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LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication and were evaluated independently of position. General test procedures can be found in Section 9.3.3.
2. MPR is implemented for this device by the manufacturer when the transmit power is not limited by the power reduction mechanism. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
4. Per FCC KDB Publication 941225 D06, when the same wireless modes and device transmission configurations are required for body-worn accessories and hotspot mode, it is not necessary to additionally test body-worn accessory SAR for the same device orientation. Therefore, the hotspot data for the back side configuration additionally shows body-worn compliance at the same distance.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n for 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. WLAN transmission was verified using an uncalibrated spectrum analyzer.
4. Because the maximum extrapolated peak SAR of the zoom scan for the maximum output channel of the lowest data rate is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg for all bands and configurations, SAR testing on other channels was not required.
5. Per FCC KDB Publication 941225 D06, when the same wireless modes and device transmission configurations are required for body-worn accessories and hotspot mode, it is not necessary to additionally test body-worn accessory SAR for the same device orientation. Therefore, the hotspot data for the back side configuration additionally shows body-worn compliance at the same distance.

Hotspot Notes:

1. Top and left edges for the CDMA/EVDO transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.2).
2. Top and right edges for the LTE transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.2).
3. Top, bottom and left edges for the WLAN transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.2).
4. During SAR Testing for the Wireless Router conditions per KDB 941225 D06, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 7.6.)

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14 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

14.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” FCC KDB Publication 648474 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

14.2 FCC Power Tables & Conditions

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P_{Ref}	12	6	5	mW

Device output power should be rounded to the nearest mW to compare with values specified in this table.

Figure 14-1
Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	SAR not required: <u>Unlicensed only</u> - when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas Licensed & Unlicensed - when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas - when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3
Unlicensed Transmitters	When there is no simultaneous transmission – - output ≤ 60 f: SAR not required - output > 60 f: stand-alone SAR required When there is simultaneous transmission – <u>Stand-alone SAR not required when</u> - output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas - output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas - output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <u>Otherwise stand-alone SAR is required</u> When stand-alone SAR is required - test SAR on highest output channel for each wireless mode and exposure condition - if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures	SAR required: <u>Licensed & Unlicensed</u> antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply

Figure 14-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

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14.3 Simultaneous Transmission Capabilities

According to Figure 14-1 and Figure 14-2, simultaneous transmission analysis of SAR may be required for this device for the two licensed and unlicensed transmitters. Possible simultaneous transmissions (between the two licensed transmitters and the unlicensed transmitter) for this device indicated in Table 14-1 were numerically summed using stand-alone SAR data and are shown in the following tables.

Per KDB Publication 648474, standalone Bluetooth SAR tests were not required. Standalone SAR tests for 2.4 GHz and 5 GHz WLAN were required. See Section 1.5(A) for more information.

Table 14-1
Possible Simultaneous Transmission Scenarios

Ref.	Simultaneous Transmit Configurations	Power Reduction	SAR Report Section	Head	Body-Worn Accessory	Hot Spot	Note
				IEEE 1528, Supp C	Supplement C	FCC KDB 941225 D06 edges/sides	
A	1X CDMA 850 Voice + LTE 782 MHz Data	LTE	Section 14.6	√	√	-	SVLTE
B	1X CDMA 1900 Voice + LTE 782 MHz Data			√	√	-	SVLTE
C	1X CDMA 850 Voice + 2.4 GHz WIFI	None	Section 14.4	√	√	-	
D	1X CDMA 850 Voice + 5 GHz WIFI			√	√	-	
E	1X CDMA 1900 Voice + 2.4 GHz WIFI			√	√	-	
F	1X CDMA 1900 Voice + 5 GHz WIFI			√	√	-	
G	1X CDMA 850 Voice + LTE 782 MHz Data + 2.4 GHz WIFI			√	√	√	Voice + LTE + WIFI Hotspot
H	1X CDMA 1900 Voice + LTE 782 MHz Data + 2.4 GHz WIFI	LTE	Section 14.6	√	√	√	Voice + LTE + WIFI Hotspot
I	1X CDMA 850 Data + 2.4 GHz WIFI	None	Section 14.5	-	-	√	1X CDMA Data +WIFI Hotspot
J	1X CDMA 1900 Data + 2.4 GHz WIFI			-	-	√	1X CDMA Data +WIFI Hotspot
K	EVDO 850 Data + 2.4 GHz WIFI			-	-	√	EVDO+WIFI Hotspot
L	EVDO 1900 Data + 2.4 GHz WIFI			-	-	√	EVDO+WIFI Hotspot
M	LTE 782 MHz Data + 2.4 GHz WIFI			-	-	√	LTE+WIFI Hotspot

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14.4 Voice + WIFI Simultaneous Transmission Analysis

Table 14-2
Simultaneous Transmission Scenario (Held to Ear)

Table 14-1 Simult Tx Ref.	Configuration	Cell. CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Table 14-1 Simult Tx Ref.	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
C	Target Power (dBm)	24.5	-	0.420	E	Target Power (dBm)	24.5	-	0.448
	Reference	Table 13-1	Table 13-5			Reference	Table 13-2	Table 13-5	
	Right Cheek	0.412	0.008			Right Cheek	0.440	0.008	
	Right Tilt	0.272	0.003			Right Tilt	0.223	0.003	
	Left Cheek	0.323	0.015			Left Cheek	0.496	0.015	
	Left Tilt	0.234	0.006			Left Tilt	0.215	0.006	
D	Target Power (dBm)	24.5	-	0.470	F	Target Power (dBm)	24.5	-	0.498
	Reference	Table 13-1	Table 13-6			Reference	Table 13-2	Table 13-6	
	Right Cheek	0.412	0.058			Right Cheek	0.440	0.058	
	Right Tilt	0.272	0.016			Right Tilt	0.223	0.016	
	Left Cheek	0.323	0.143			Left Cheek	0.496	0.143	
	Left Tilt	0.234	0.029			Left Tilt	0.215	0.029	

Table 14-3
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Table 14-1 Simult Tx. Ref.	Mode	Configuration	CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		Target Power (dBm)	Table 13-7	Table 13-9	
C	Cell. CDMA	24.5	0.714	0.066	0.780
E	PCS CDMA	24.5	0.653	0.066	0.719
Table 14-1 Simult Tx. Ref.	Mode	Configuration	CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		Target Power (dBm)	Table 13-7	Table 13-9	
D	Cell. CDMA	24.5	0.714	0.056	0.770
F	PCS CDMA	24.5	0.653	0.056	0.709

14.5 Hotspot Simultaneous Transmission Analysis

Table 14-4
Simultaneous Transmission Scenario (Hotspot at 1.0 cm)

Table 14-1 Simult Tx Ref.	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Table 14-1 Simult Tx Ref.	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
	Target Power (dBm)	24.5	-			Target Power (dBm)	24.5	-	
I, K	Reference	Table 13-10	Table 13-13	0.713	J, L	Reference	Table 13-10	Table 13-13	0.558
	Back	0.647	0.066			0.492	0.066		
	Front	0.416	0.006			0.423	0.006		
	Top	-	-			-	-		
	Bottom	0.131	-			0.419	-		
	Right	0.537	-			0.196	-		
	Left	-	0.020			-	0.020		

Table 14-1 Simult Tx Ref.	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
	Target Power (dBm)	23	-		
M	Reference	Table 13-11	Table 13-13	0.490	
	Back	0.424	0.066		
	Front	0.367	0.006		0.373
	Top	-	-		0.000
	Bottom	0.174	-		0.174
	Right	-	-		0.000
	Left	0.450	0.020		0.470

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR (“-”).

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14.6 SVLTE Simultaneous Transmission Scenario Analysis

Table 14-5
Simultaneous Transmission Scenario (Held to Ear)

Table 14-1 Simult. Tx Ref.	CDMA Power Level (dBm)	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
		Tx Ant	1	2	3	1+2	1+2+3
A,G	$P \geq 18$	Target Power (dBm)	24.5	19	-	1+2	1+2+3
		Reference	Table 13-1	Table 13-4	Table 13-5		
		Right Cheek	0.412	0.028	0.008	0.440	0.448
		Right Tilt	0.272	0.020	0.003	0.292	0.295
		Left Cheek	0.323	0.036	0.015	0.359	0.374
		Left Tilt	0.234	0.021	0.006	0.255	0.261
	$P < 18$	Target Power (dBm)	18	23	-		
		Reference	Table 13-1	Table 13-3	Table 13-5		
		Right Cheek	0.080	0.300	0.008	0.380	0.388
		Right Tilt	0.047	0.184	0.003	0.231	0.234
		Left Cheek	0.064	0.447	0.015	0.511	0.526
		Left Tilt	0.041	0.219	0.006	0.260	0.266

Table 14-1 Simult. Tx Ref.	CDMA Power Level (dBm)	Configuration	PCS CDMA SAR (W/kg)	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
		Tx Ant	1	2	3	1+2	1+2+3
B,H	$P \geq 18$	Target Power (dBm)	24.5	19	-	1+2	1+2+3
		Reference	Table 13-2	Table 13-4	Table 13-5		
		Right Cheek	0.440	0.028	0.008	0.468	0.476
		Right Tilt	0.223	0.020	0.003	0.243	0.246
		Left Cheek	0.496	0.036	0.015	0.532	0.547
		Left Tilt	0.215	0.021	0.006	0.236	0.242
	$P < 18$	Target Power (dBm)	18	23	-		
		Reference	Table 13-2	Table 13-3	Table 13-5		
		Right Cheek	0.067	0.300	0.008	0.367	0.375
		Right Tilt	0.019	0.184	0.003	0.203	0.206
		Left Cheek	0.065	0.447	0.015	0.512	0.527
		Left Tilt	0.018	0.219	0.006	0.237	0.243

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Table 14-6
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Table 14-1 Simult Tx Ref.	CDMA Power Level (dBm)	Mode	CDMA SAR (W/kg)	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	
			1	2	3	1+2	1+2+3
		Reference	Table 13-7	Table 13-8	Table 13-9		
		Target Power (dBm)	24.5	19	-		
A, G	$P \geq 18$	Cell. CDMA	0.714	0.041	0.066	0.755	0.821
B, H		PCS CDMA	0.653	0.041	0.066	0.694	0.760
		Reference	Table 13-7	Table 13-8	Table 13-9		
		Target Power (dBm)	18	23	-		
A, G	$P < 18$	Cell. CDMA	0.146	0.424	0.066	0.570	0.636
B, H		PCS CDMA	0.071	0.424	0.066	0.495	0.561

Table 14-7
Simultaneous Transmission Scenario (Hotspot at 1.0 cm)

Table 14-1 Simult. Tx Ref.	CDMA Power Level (dBm)	Configuration	Cell. CDMA SAR (W/kg)	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		Tx Ant	1	2	3	1+2+3
G	$P \geq 18$	Target Power (dBm)	24.5	19	-	
		Reference	Table 13-10	Table 13-12	Table 13-13	
		Back	0.714	0.041	0.066	0.821
		Front	0.536	0.029	0.006	0.571
		Top	-	-	-	0.000
		Bottom	0.192	0.015	-	0.207
		Right	0.602	-	-	0.602
		Left	-	0.045	0.020	0.065
	$P < 18$	Target Power (dBm)	18	23	-	
		Reference	Table 13-10	Table 13-11	Table 13-13	
		Back	0.146	0.424	0.066	
		Front	0.089	0.367	0.006	
		Top	-	-	-	
		Bottom	0.028	0.174	-	
		Right	0.115	-	-	
		Left	-	0.450	0.020	

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Table 14-1 Simult. Tx Ref.	CDMA Power Level (dBm)	Configuration	PCS CDMA SAR (W/kg)	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		Tx Ant	1	2	3	1+2+3
H	$P \geq 18$	Target Power (dBm)	24.5	19	-	1+2+3
		Reference	Table 13-10	Table 13-12	Table 13-13	
		Back	0.653	0.041	0.066	0.760
		Front	0.622	0.029	0.006	0.657
		Top	-	-	-	0.000
		Bottom	0.547	0.015	-	0.562
		Right	0.257	-	-	0.257
		Left	-	0.045	0.020	0.065
	$P < 18$	Target Power (dBm)	18	23	-	
		Reference	Table 13-10	Table 13-11	Table 13-13	
		Back	0.071	0.424	0.066	0.561
		Front	0.066	0.367	0.006	0.439
		Top	-	-	-	0.000
		Bottom	0.062	0.174	-	0.236
		Right	0.029	-	-	0.029
		Left	-	0.450	0.020	0.470

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR ("-").

14.7 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation is required per FCC KDB Publication 648474.

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EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85070E	Dielectric Probe Kit	3/ 8/ 2012	Annual	3/ 8/ 2013	MY44300833
Agilent	8648D	(9KHz- 4GHz) Signal Generator	10/ 10/ 2011	Annual	10/ 10/ 2012	3613A00315
Agilent	8753E	(30KHz- 6GHz) Network Analyzer	4/ 4/ 2012	Annual	4/ 4/ 2013	JP38020182
Agilent	E5515C	Wireless Communications Test Set	10/ 14/ 2011	Annual	10/ 14/ 2012	GB41450275
Agilent	E5515C	Wireless Communications Test Set	2/ 14/ 2012	Annual	2/ 14/ 2013	GB43163447
Agilent	E5515C	Wireless Communications Test Set	2/ 14/ 2012	Annual	2/ 14/ 2013	GB43304447
Agilent	E5515C	Wireless Communications Test Set	2/ 9/ 2012	Annual	2/ 9/ 2013	GB43460554
Agilent	E5515C	Wireless Communications Test Set	2/ 12/ 2012	Annual	2/ 12/ 2013	GB45360985
Agilent	E5515C	Wireless Communications Test Set	10/ 10/ 2011	Annual	10/ 10/ 2012	GB46110872
Agilent	E5515C	Wireless Communications Test Set	10/ 20/ 2011	Annual	10/ 20/ 2012	GB46310798
Anritsu	MA2411B	Pulse Sensor	10/ 13/ 2011	Annual	10/ 13/ 2012	1027293
Anritsu	MA2481A	Power Sensor	2/ 14/ 2012	Annual	2/ 14/ 2013	2400
Anritsu	MA2481A	Power Sensor	2/ 14/ 2012	Annual	2/ 14/ 2013	5318
Anritsu	MA2481A	Power Sensor	2/ 14/ 2012	Annual	2/ 14/ 2013	5442
Anritsu	MA2481A	Power Sensor	2/ 14/ 2012	Annual	2/ 14/ 2013	5821
Anritsu	MA2481A	Power Sensor	2/ 14/ 2012	Annual	2/ 14/ 2013	8013
Anritsu	ML2438A	Power Meter	10/ 13/ 2011	Annual	10/ 13/ 2012	1070030
Anritsu	ML2438A	Power Meter	2/ 14/ 2012	Annual	2/ 14/ 2013	1190013
Anritsu	ML2438A	Power Meter	2/ 14/ 2012	Annual	2/ 14/ 2013	98150041
Anritsu	ML2495A	Power Meter	10/ 13/ 2011	Annual	10/ 13/ 2012	1039008
Anritsu	MT8820C	Radio Communication Tester	11/ 11/ 2011	Annual	11/ 11/ 2012	6200901190
COMTECH	R85729- 5/ 5759E	Solid State Amplifier		CBT		M3WIA00- 1002
Control Company	36934- 158	Wall- Mounted Thermometer	1/ 4/ 2012	Biennial	1/ 4/ 2014	122014488
Control Company	36934- 158	Wall- Mounted Thermometer	1/ 4/ 2012	Biennial	1/ 4/ 2014	122014497
Control Company	61220- 416	Long- Stem Thermometer	10/ 12/ 2011	Biennial	10/ 12/ 2013	111860775
Control Company	61220- 416	Long- Stem Thermometer	10/ 12/ 2011	Biennial	10/ 12/ 2013	111860820
Control Company	61220- 416	Long- Stem Thermometer	10/ 12/ 2011	Biennial	10/ 12/ 2013	111860844
Gigatronics	80701A	(0.05- 18GHz) Power Sensor	10/ 12/ 2011	Annual	10/ 12/ 2012	1833460
Gigatronics	8651A	Universal Power Meter	10/ 12/ 2011	Annual	10/ 12/ 2012	8650319
Intelligent Weigh	PD- 3000	Electronic Balance	3/ 27/ 2012	Annual	3/ 27/ 2013	11081534
MiniCircuits	SLP- 2400+	Low Pass Filter		CBT		R6979500903
MiniCircuits	VLP- 6000+	Low Pass Filter		CBT		N/ A
Mini- Circuits	BW N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator		CBT		N/ A
Mini- Circuits	NLP- 1200+	Low Pass Filter DC to 1000 MHz		CBT		N/ A
Mini- Circuits	NLP- 2950+	Low Pass Filter DC to 2700 MHz		CBT		N/ A
Narda	4014C- 6	4 - 8 GHz SMA 6 dB Directional Coupler		CBT		N/ A
Narda	4772- 3	Attenuator (3dB)		CBT		9406
Narda	BW S3W2	Attenuator (3dB)		CBT		120
Pasternack	PE2208- 6	Bidirectional Coupler	6/ 3/ 2011	Annual	6/ 3/ 2012	N/ A
Pasternack	PE2209- 10	Bidirectional Coupler	6/ 3/ 2011	Annual	6/ 3/ 2012	N/ A
Rohde & Schwarz	CMU200	Base Station Simulator	6/ 1/ 2011	Annual	6/ 1/ 2012	833855/ 0010
Rohde & Schwarz	CMM500	LTE Radio Communication Tester	8/ 25/ 2011	Annual	8/ 25/ 2012	100976
Rohde & Schwarz	CMM500	LTE Radio Communication Tester	11/ 30/ 2011	Annual	11/ 30/ 2012	101699
Rohde & Schwarz	CMM500	LTE Radio Communication Tester	3/ 5/ 2012	Annual	3/ 5/ 2013	102060
Rohde & Schwarz	CMM500	LTE Radio Communication Tester	10/ 7/ 2011	Annual	10/ 7/ 2012	103962
Rohde & Schwarz	CMM500	LTE Radio Communication Tester	8/ 5/ 2011	Annual	8/ 5/ 2012	112347
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/ 8/ 2011	Biennial	4/ 8/ 2013	101695
Seekonk	NC- 100	Torque Wrench (8" lb)	11/ 29/ 2011	Triennial	11/ 29/ 2014	21053
Seekonk	NC- 100	Torque Wrench (8" lb)	3/ 5/ 2012	Triennial	3/ 5/ 2015	N/ A
Seekonk	NC- 100	Torque Wrench (8" lb)	3/ 5/ 2012	Triennial	3/ 5/ 2015	N/ A
SPEAG	D1900V2	1900 MHz SAR Dipole	2/ 22/ 2012	Annual	2/ 22/ 2013	50149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/ 19/ 2011	Annual	8/ 19/ 2012	719
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/ 19/ 2012	Annual	1/ 19/ 2013	1057
SPEAG	D750V3	750 MHz Dipole	1/ 27/ 2012	Annual	1/ 27/ 2013	1003
SPEAG	D750V3	750 MHz Dipole	10/ 27/ 2011	Annual	10/ 27/ 2012	1046
SPEAG	D835V2	835 MHz SAR Dipole	8/ 15/ 2011	Annual	8/ 15/ 2012	40026
SPEAG	D835V2	835 MHz SAR Dipole	2/ 17/ 2012	Annual	2/ 17/ 2013	40133
SPEAG	DAE3	Dasy Data Acquisition Electronics	11/ 9/ 2011	Annual	11/ 9/ 2012	455
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/ 20/ 2012	Annual	2/ 20/ 2013	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/ 19/ 2012	Annual	4/ 19/ 2013	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/ 19/ 2011	Annual	5/ 19/ 2012	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/ 18/ 2012	Annual	1/ 18/ 2013	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/ 15/ 2012	Annual	2/ 15/ 2013	1323
Speag	DAK- 3.5	Dielectric Assessment Kit	12/ 1/ 2011	Annual	12/ 1/ 2012	1031
SPEAG	ES3DV2	SAR Probe	8/ 25/ 2011	Annual	8/ 25/ 2012	3022
SPEAG	ES3DV3	SAR Probe	3/ 16/ 2012	Annual	3/ 16/ 2013	3209
SPEAG	ES3DV3	SAR Probe	2/ 21/ 2012	Annual	2/ 21/ 2013	3258
SPEAG	ES3DV3	SAR Probe	2/ 7/ 2012	Annual	2/ 7/ 2013	3288
SPEAG	EX3DV4	SAR Probe	7/ 27/ 2011	Annual	7/ 27/ 2012	3561
SPEAG	EX3DV4	SAR Probe	1/ 27/ 2012	Annual	1/ 27/ 2013	3589
Tektronix	RSA- 6114A	Real Time Spectrum Analyzer	4/ 5/ 2012	Annual	4/ 5/ 2013	B010177
VWR	36934- 158	Wall- Mounted Thermometer	9/ 30/ 2011	Biennial	9/ 30/ 2013	111859332

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, attenuator, amplifier, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

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16 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.1	11.7
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.2	23.5

The above measurement uncertainties are according to IEEE Std. 1528-2003

FCC ID: A3LSCHI200	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
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Applicable for frequencies up to 6 GHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.4	12.0
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.7	24.0

The above measurement uncertainties are according to IEEE Std. 1528-2003

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17 CONCLUSION

17.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested. Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.879 \text{ mho/m}$; $\epsilon_r = 42.972$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-07-2012; Ambient Temp: 24.7°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(6.27, 6.27, 6.27); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/19/2012

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Right Head, Touch, Mid.ch, QPSK, 1 RB, 0 RB Offset

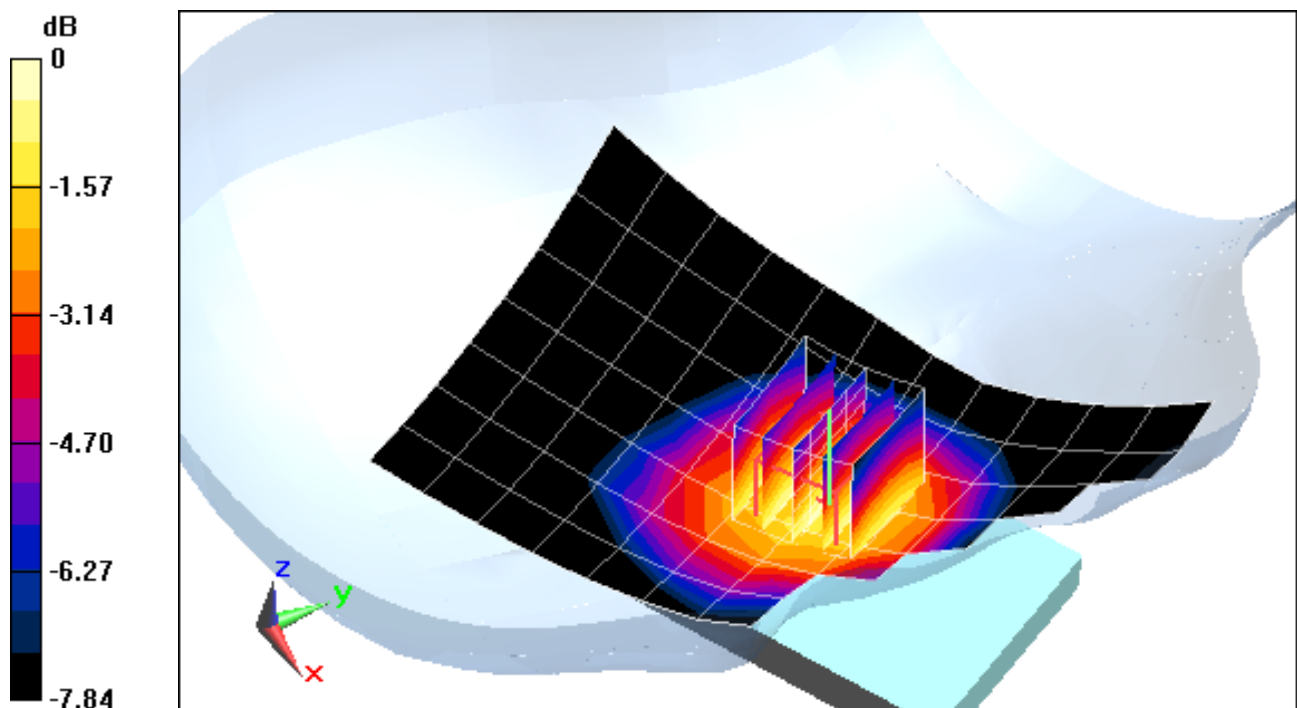
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.626 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.3540

SAR(1 g) = 0.300 mW/g; SAR(10 g) = 0.236 mW/g



0 dB = 0.310mW/g = -10.17 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.879 \text{ mho/m}$; $\epsilon_r = 42.972$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-07-2012; Ambient Temp: 24.7°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(6.27, 6.27, 6.27); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/19/2012

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Right Head, Tilt, Mid.ch, QPSK, 1 RB, 0 RB Offset

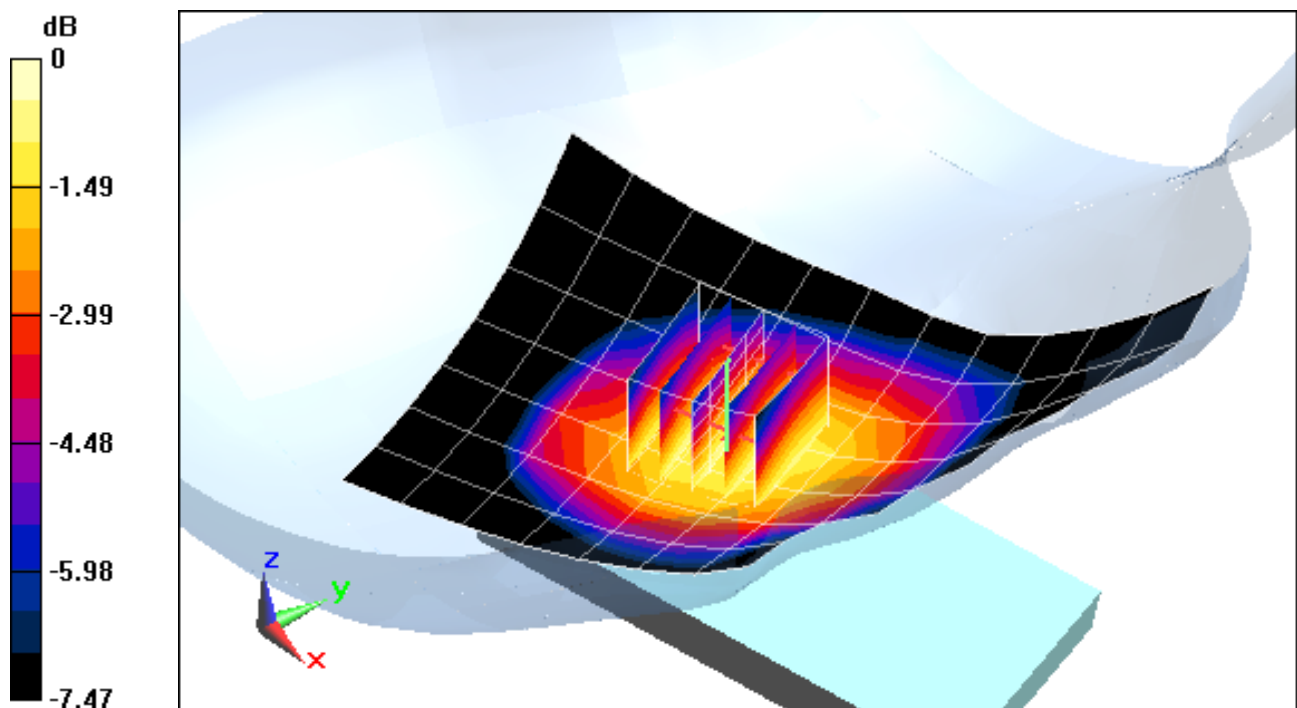
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.085 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.2210

SAR(1 g) = 0.184 mW/g; SAR(10 g) = 0.146 mW/g



0 dB = 0.190mW/g = -14.42 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.879 \text{ mho/m}$; $\epsilon_r = 42.972$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 05-07-2012; Ambient Temp: 24.7°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(6.27, 6.27, 6.27); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/19/2012

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Left Head, Touch, Mid. Ch, QPSK, 1 RB, 0 RB Offset

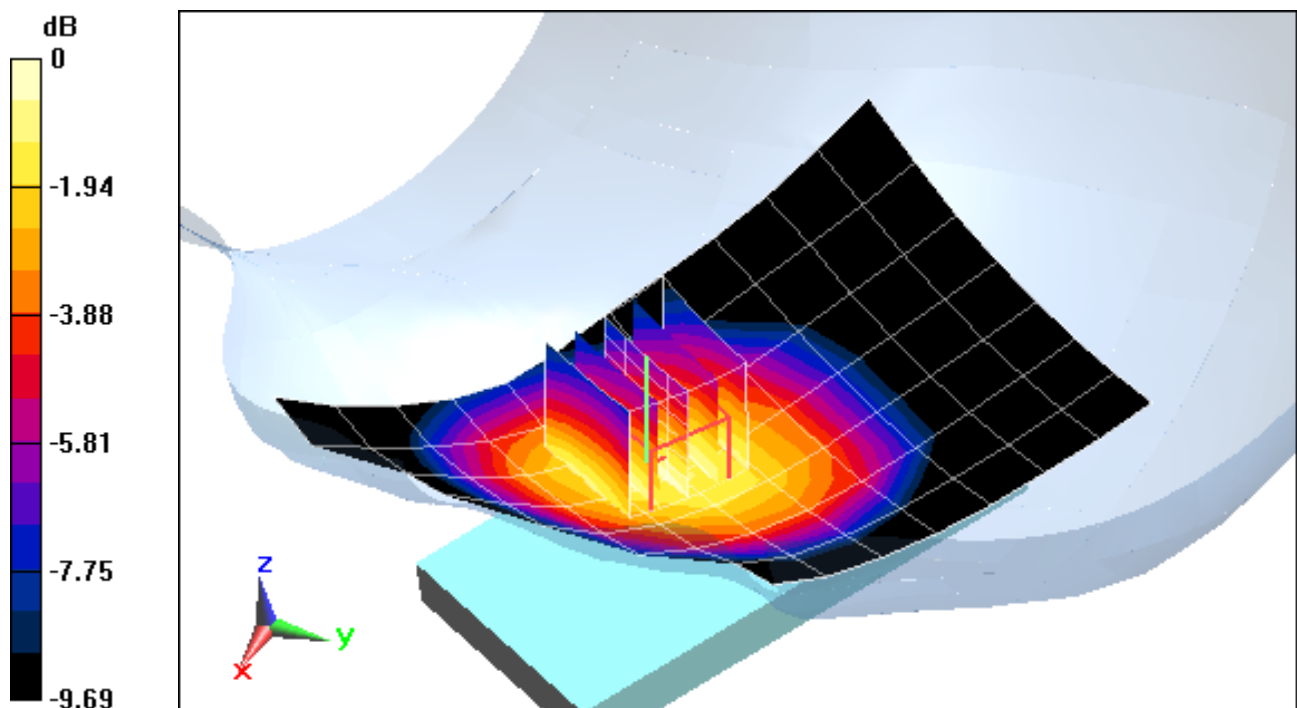
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.539 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.6060

SAR(1 g) = 0.447 mW/g; SAR(10 g) = 0.334 mW/g



0 dB = 0.470mW/g = -6.56 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.879 \text{ mho/m}$; $\epsilon_r = 42.972$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 05-07-2012; Ambient Temp: 24.7°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(6.27, 6.27, 6.27); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/19/2012

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Left Head, Tilt, Mid.ch, QPSK, 1 RB, 0 RB Offset

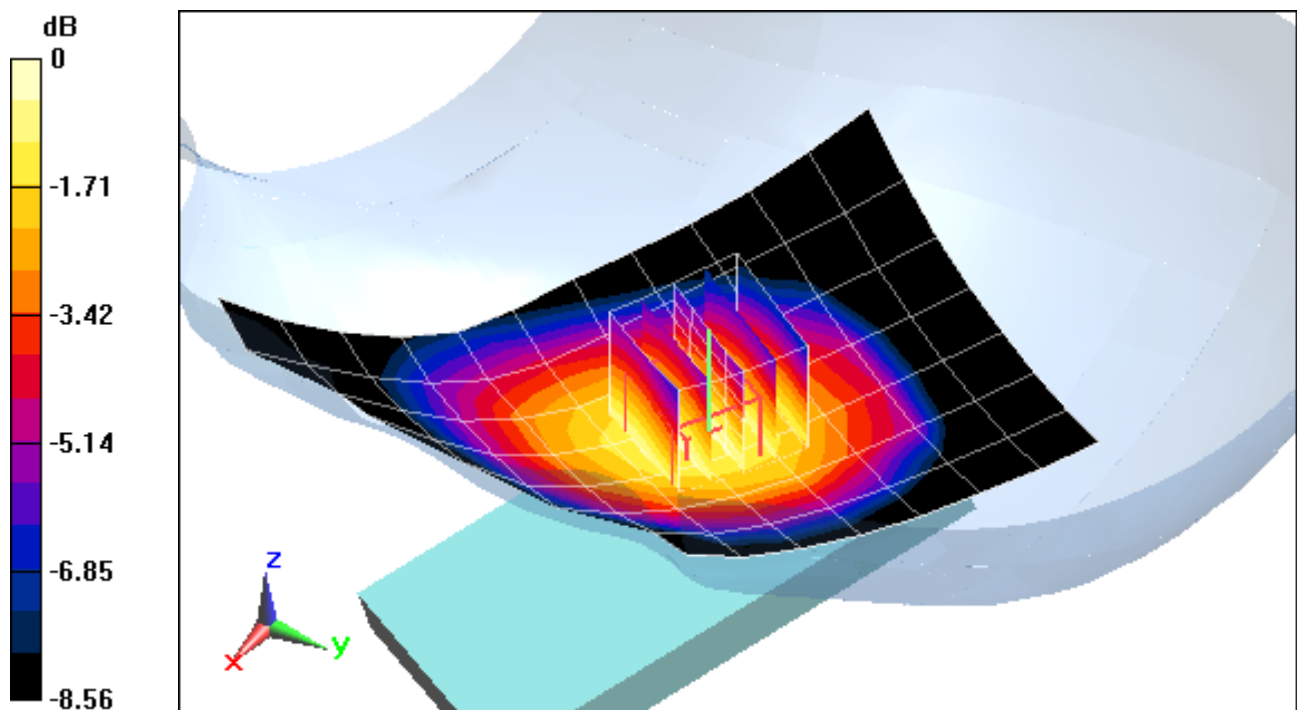
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.765 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.2570

SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.174 mW/g



0 dB = 0.230mW/g = -12.77 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #1

Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.912 \text{ mho/m}$; $\epsilon_r = 40.621$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-23-2012; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(8.07, 8.07, 8.07); Calibrated: 7/27/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: Cell. CDMA, Right Head, Touch, Mid.ch

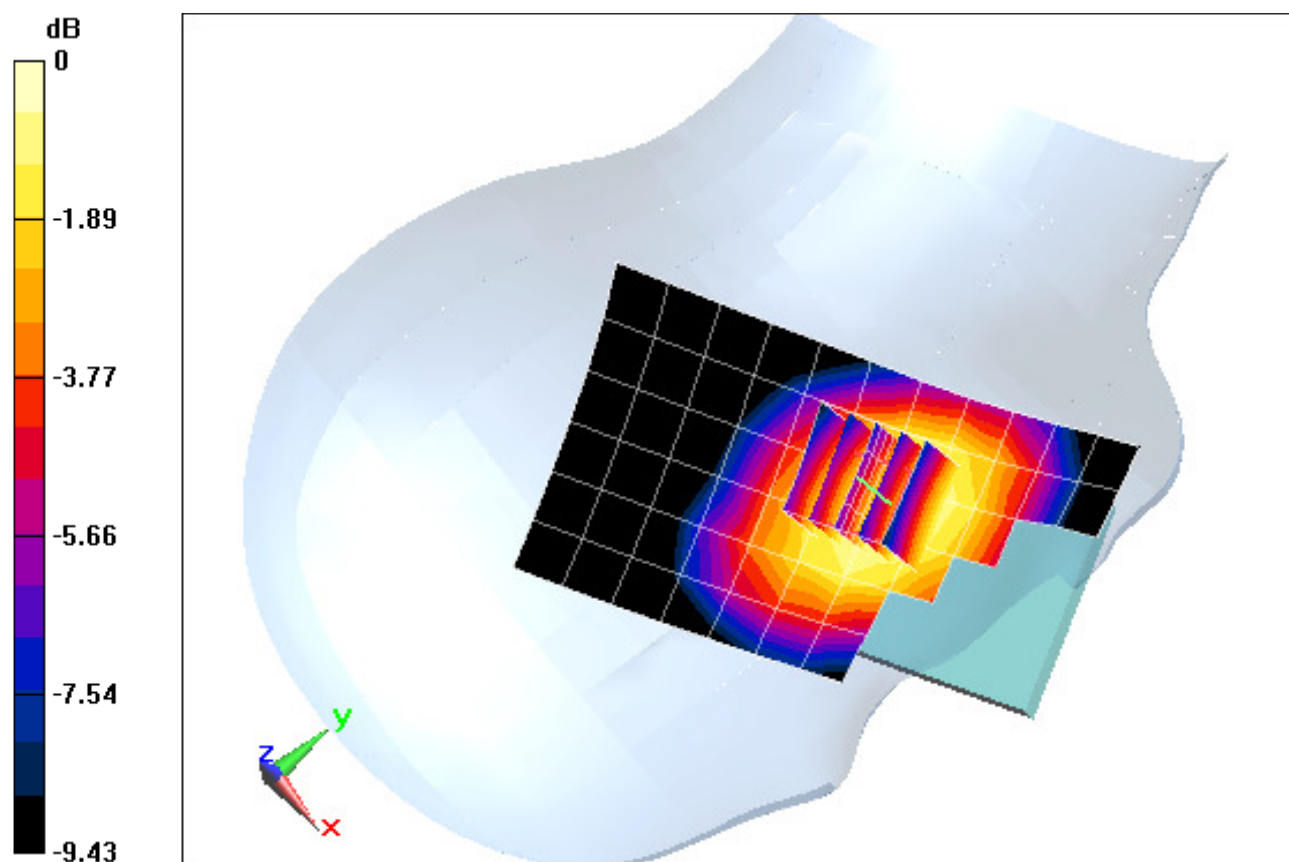
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.294 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.5110

SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.315 mW/g



0 dB = 0.430mW/g = -7.33 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #1

Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.912 \text{ mho/m}$; $\epsilon_r = 40.621$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-23-2012; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(8.07, 8.07, 8.07); Calibrated: 7/27/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: Cell. CDMA, Right Head, Tilt, Mid.ch

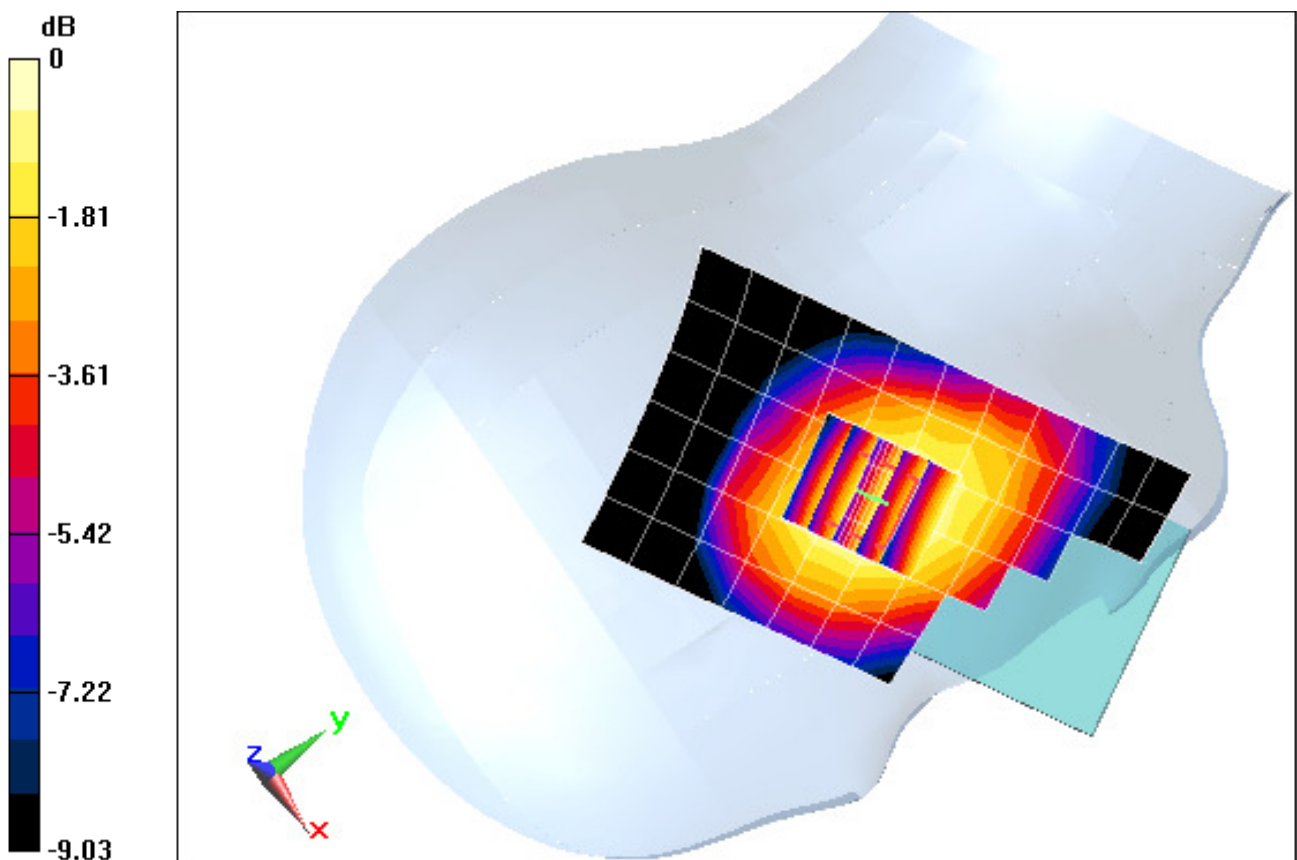
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.692 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.3320

SAR(1 g) = 0.272 mW/g; SAR(10 g) = 0.211 mW/g



0 dB = 0.290mW/g = -10.75 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #1

Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.912 \text{ mho/m}$; $\epsilon_r = 40.621$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-23-2012; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(8.07, 8.07, 8.07); Calibrated: 7/27/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: Cell. CDMA, Left Head, Touch, Mid.ch

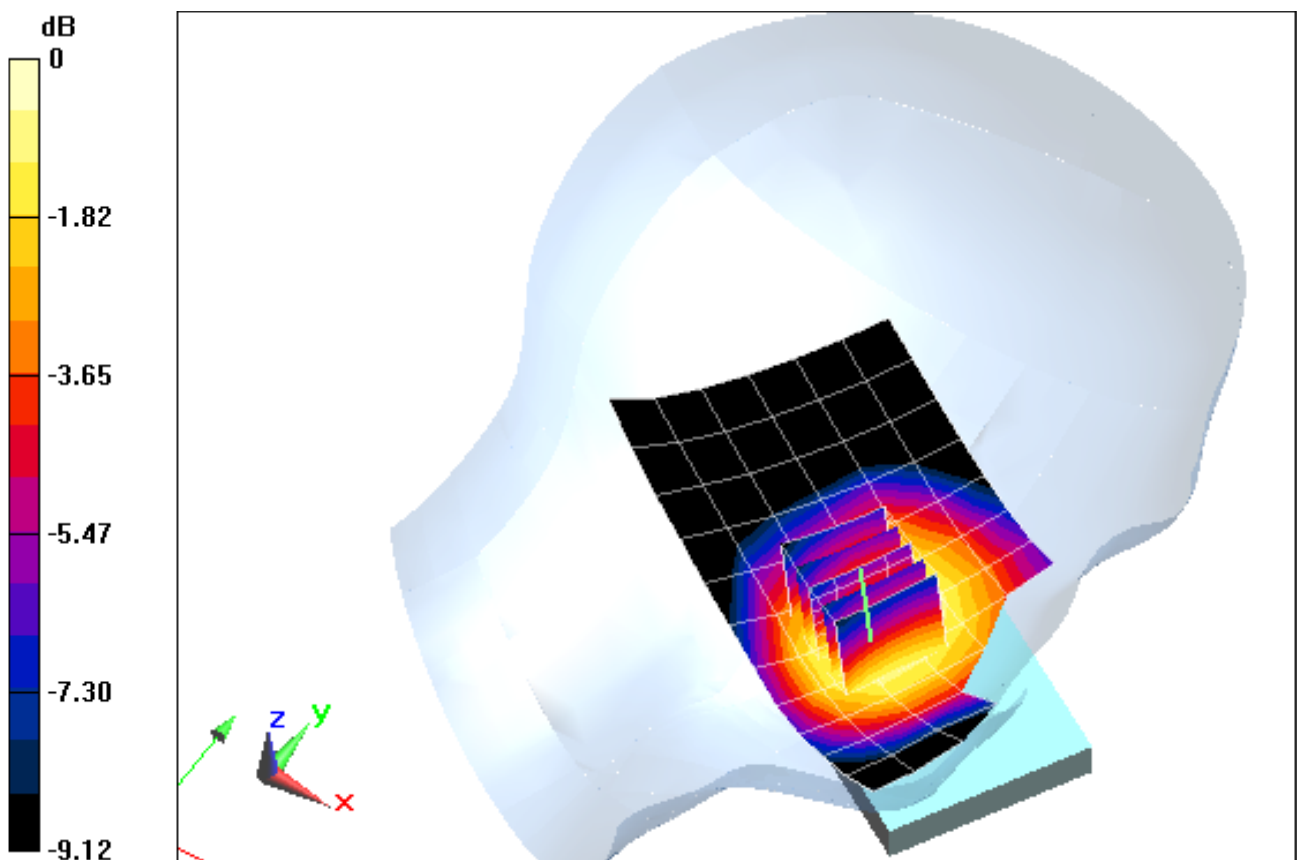
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.114 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.3870

SAR(1 g) = 0.323 mW/g; SAR(10 g) = 0.249 mW/g



0 dB = 0.340mW/g = -9.37 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #1

Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.912 \text{ mho/m}$; $\epsilon_r = 40.621$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-23-2012; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(8.07, 8.07, 8.07); Calibrated: 7/27/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: Cell. CDMA, Left Head, Tilt, Mid.ch

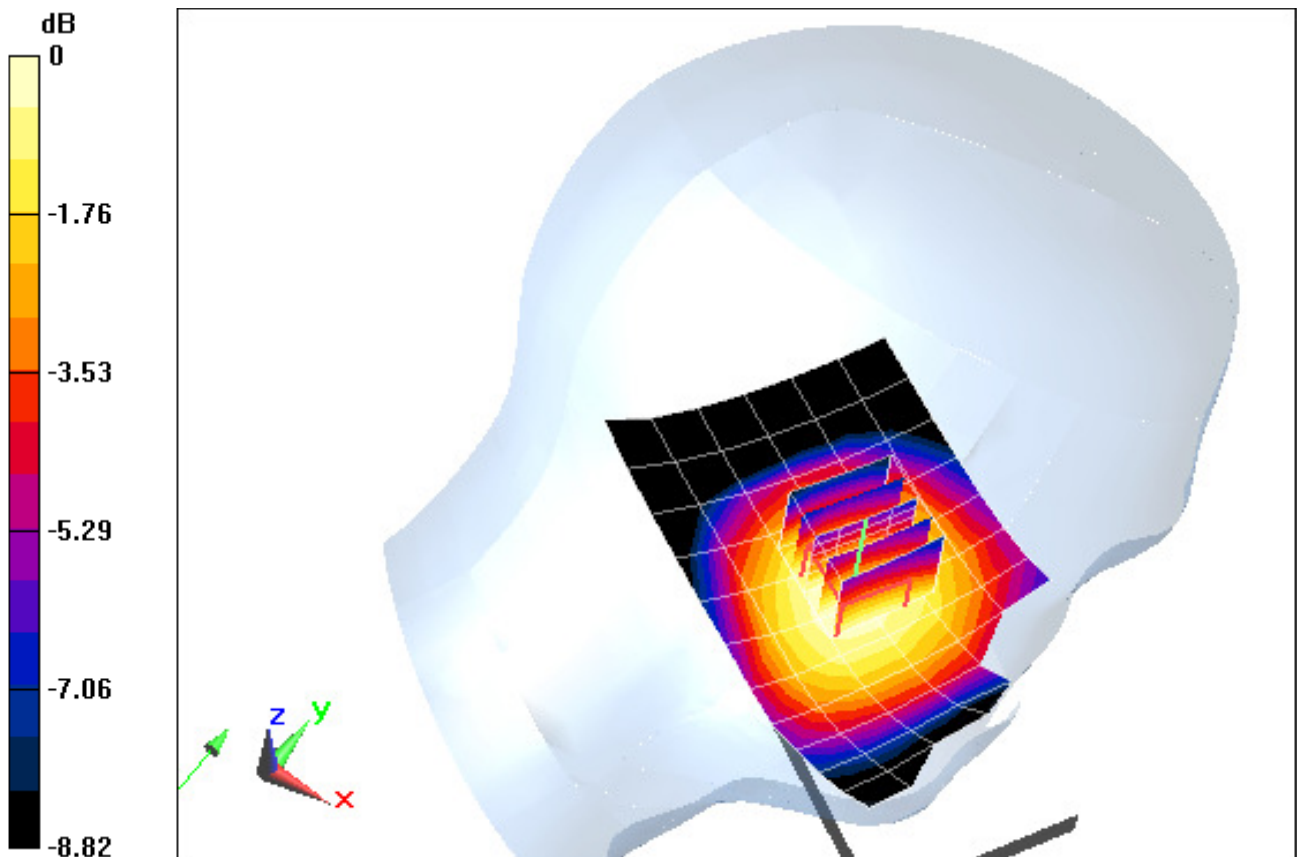
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.043 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.2860

SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.182 mW/g



0 dB = 0.240mW/g = -12.40 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-27-2012; Ambient Temp: 23.8 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3288; ConvF(5.16, 5.16, 5.16); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, V52.8 Build 0; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Right Head, Touch, Mid.ch

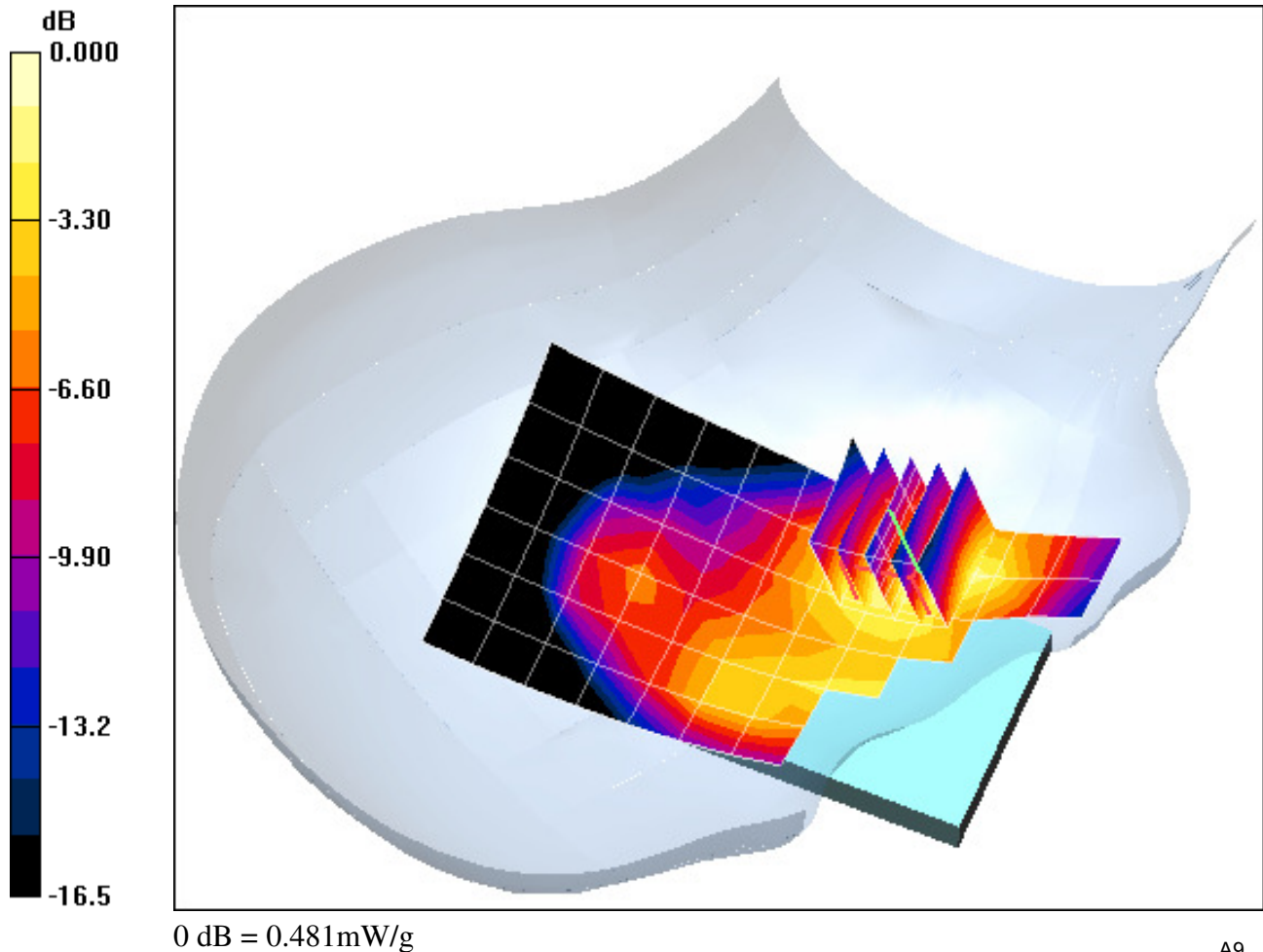
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.5 V/m; Power Drift = -0.012 dB

Peak SAR (extrapolated) = 0.718 W/kg

SAR(1 g) = 0.440 mW/g; SAR(10 g) = 0.259 mW/g



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-27-2012; Ambient Temp: 23.8 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3288; ConvF(5.16, 5.16, 5.16); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, V52.8 Build 0; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Right Head, Tilt, Mid.ch

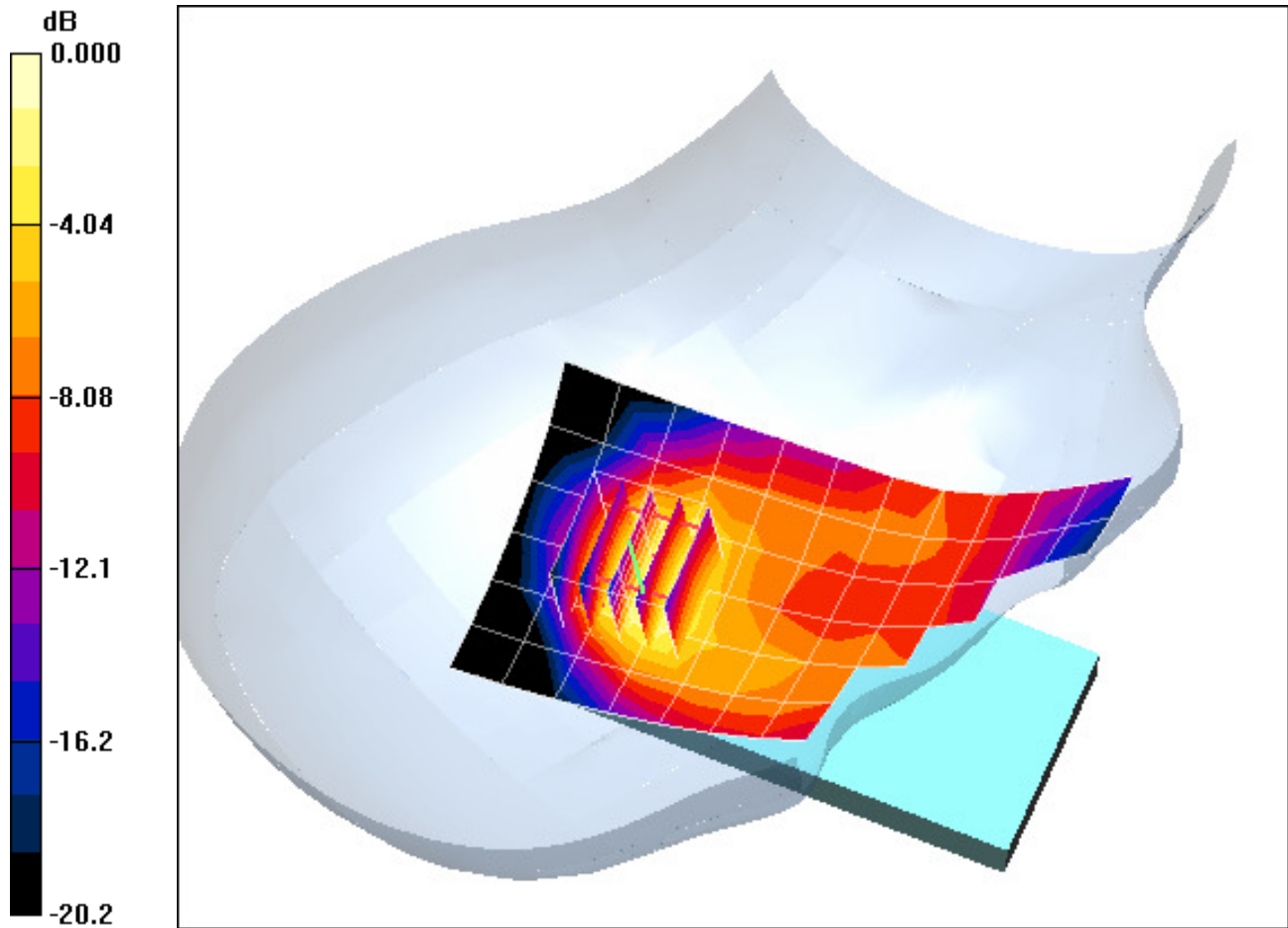
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.6 V/m; Power Drift = 0.009 dB

Peak SAR (extrapolated) = 0.374 W/kg

SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.124 mW/g



0 dB = 0.245mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-27-2012; Ambient Temp: 23.8 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3288; ConvF(5.16, 5.16, 5.16); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, V52.8 Build 0; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Left Head, Touch, Mid.ch

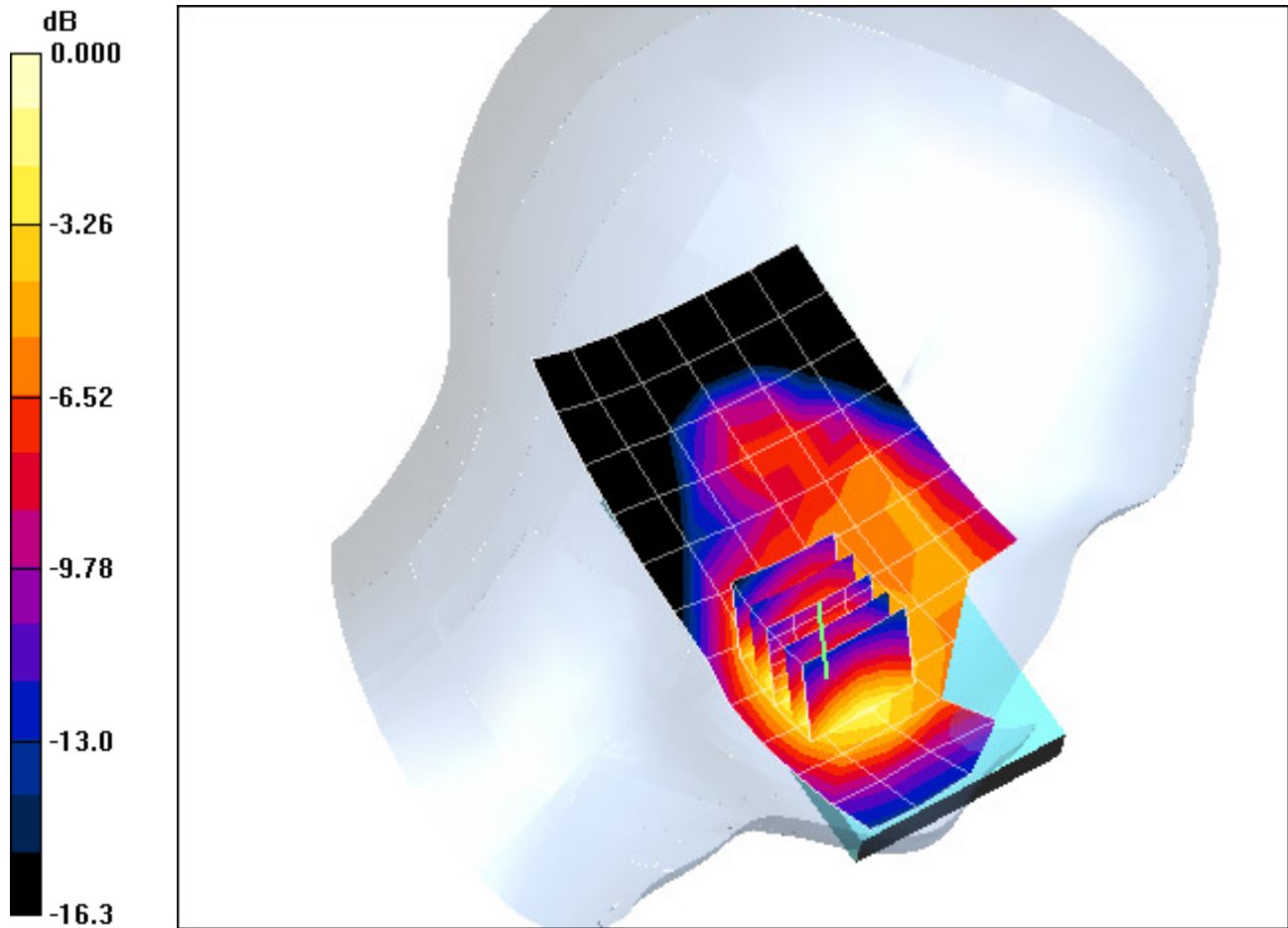
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.4 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 0.761 W/kg

SAR(1 g) = 0.496 mW/g; SAR(10 g) = 0.309 mW/g



0 dB = 0.534mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.37 \text{ mho/m}$; $\epsilon_r = 39.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-27-2012; Ambient Temp: 23.8 °C; Tissue Temp: 22.4 °C

Probe: ES3DV3 - SN3288; ConvF(5.16, 5.16, 5.16); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, V52.8 Build 0; Postprocessing SW: SEMCAD, V1.8 Build 186

Mode: PCS CDMA, Left Head, Tilt, Mid.ch

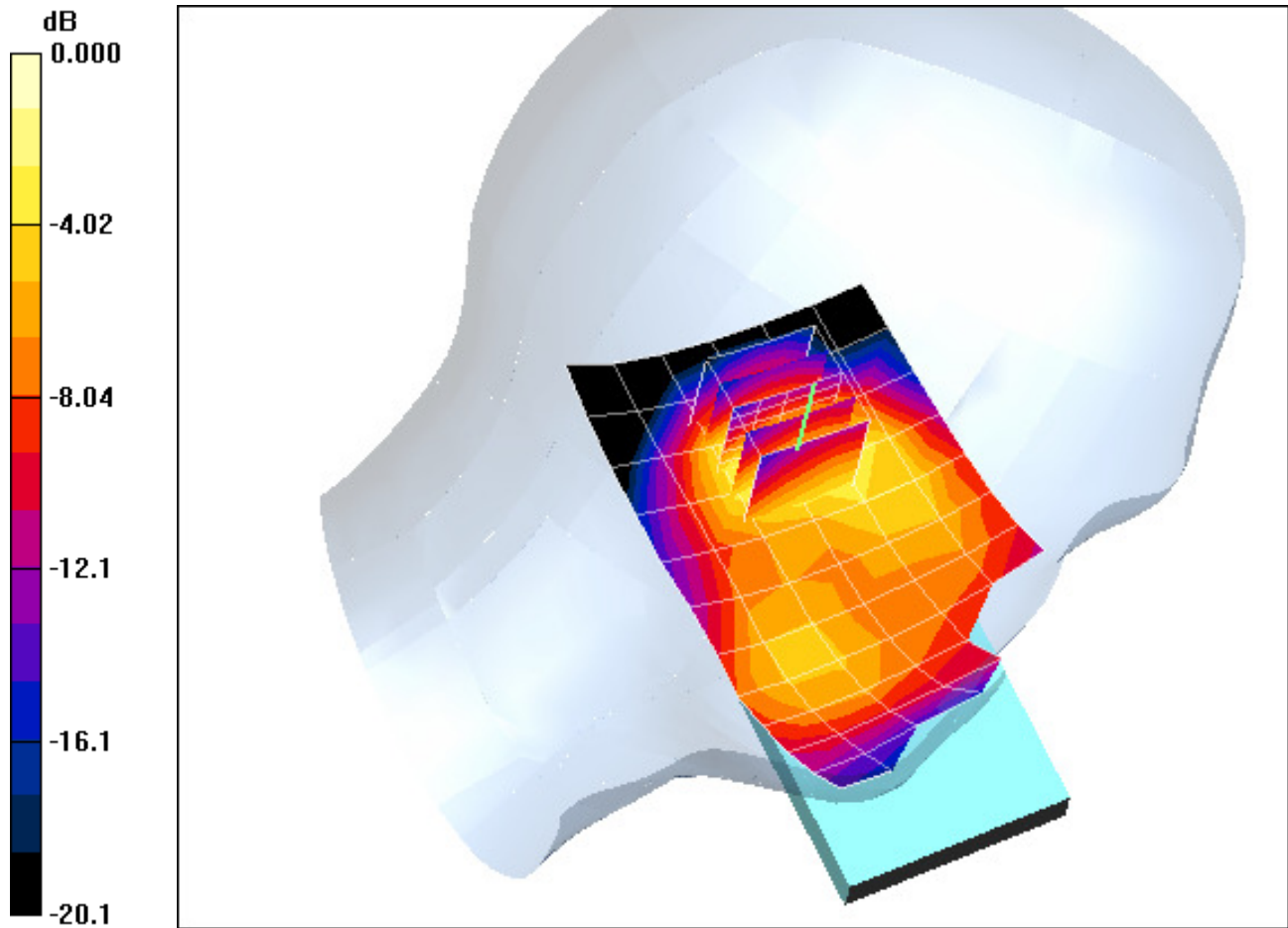
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.9 V/m; Power Drift = 0.057 dB

Peak SAR (extrapolated) = 0.358 W/kg

SAR(1 g) = 0.215 mW/g; SAR(10 g) = 0.121 mW/g



0 dB = 0.236mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#4

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 1.74 \text{ mho/m}$; $\epsilon_r = 37.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-08-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3209; ConvF(4.46, 4.46, 4.46); Calibrated: 3/16/2012

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11b, Right Head, Touch, Ch 01, 1 Mbps

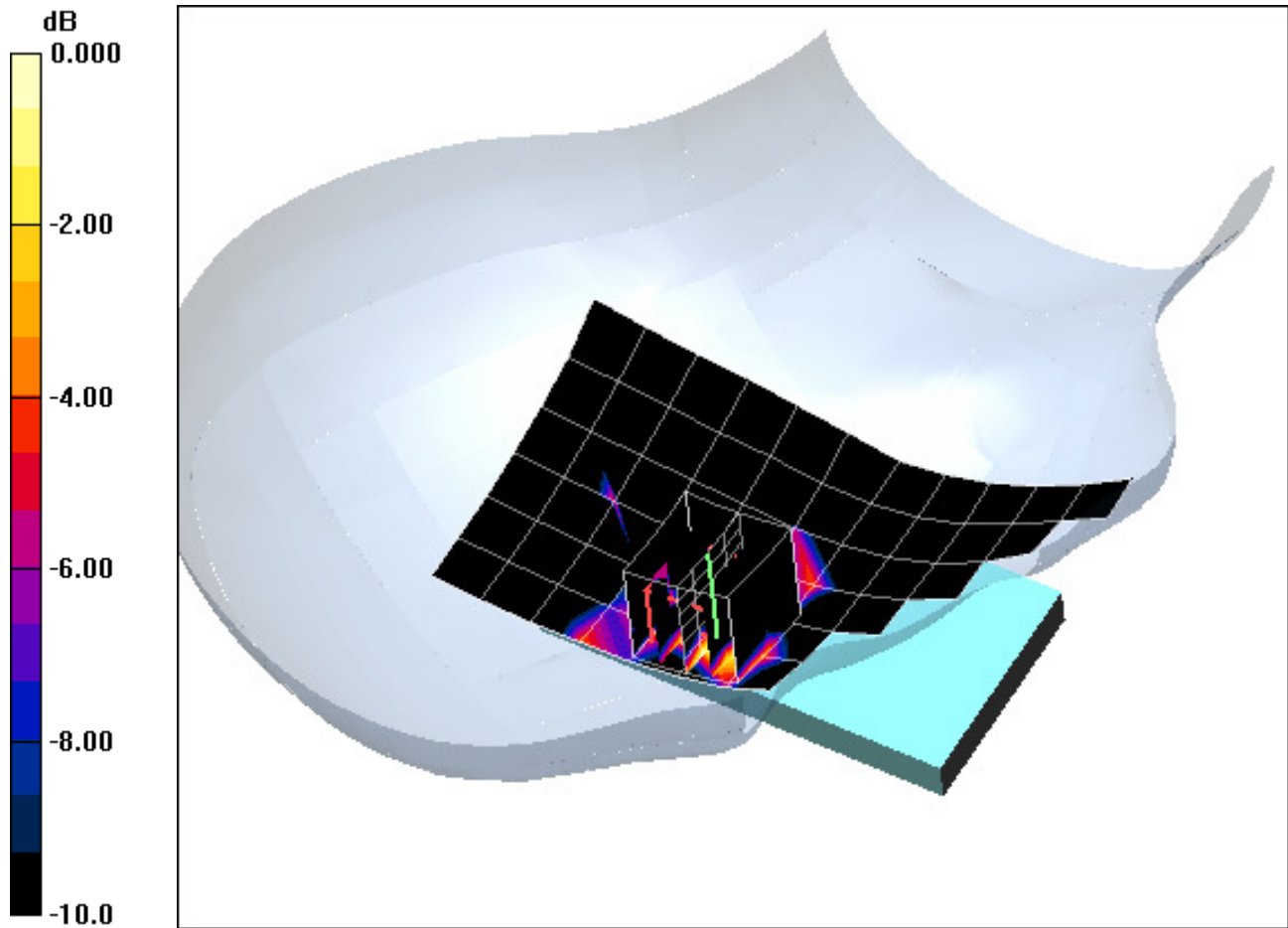
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.37 V/m; Power Drift = 0.074 dB

Peak SAR (extrapolated) = 0.031 W/kg

SAR(1 g) = 0.00766 mW/g; SAR(10 g) = 0.0029 mW/g



0 dB = 0.011mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#4

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 1.74 \text{ mho/m}$; $\epsilon_r = 37.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-08-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3209; ConvF(4.46, 4.46, 4.46); Calibrated: 3/16/2012

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11b, Right Head, Tilt, Ch 01, 1 Mbps

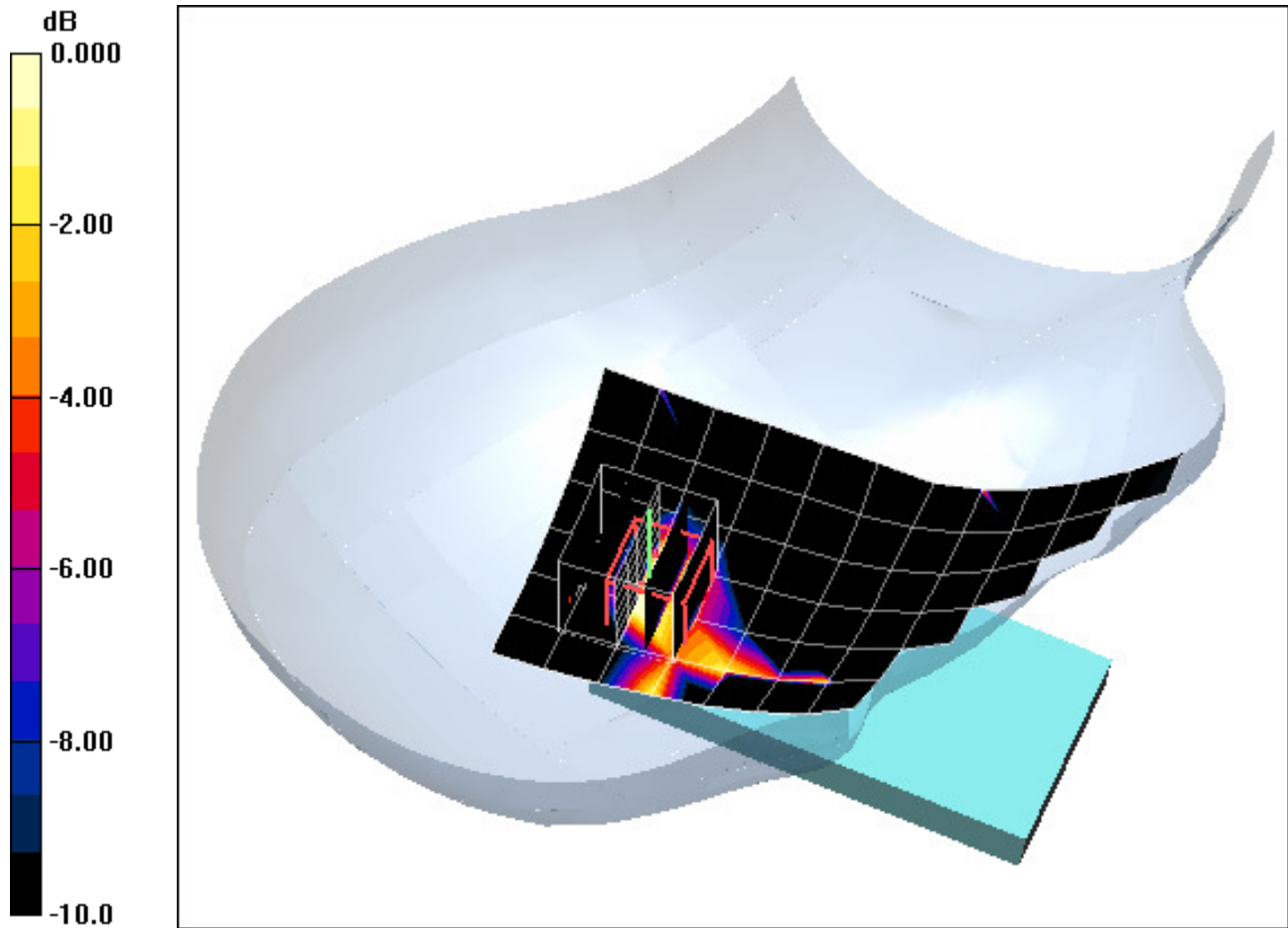
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.60 V/m; Power Drift = 0.071 dB

Peak SAR (extrapolated) = 0.015 W/kg

SAR(1 g) = 0.00273 mW/g; SAR(10 g) = 0.00063 mW/g



0 dB = 0.006mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#4

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 1.74 \text{ mho/m}$; $\epsilon_r = 37.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 05-08-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3209; ConvF(4.46, 4.46, 4.46); Calibrated: 3/16/2012

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11b, Left Head, Touch, Ch 01, 1 Mbps

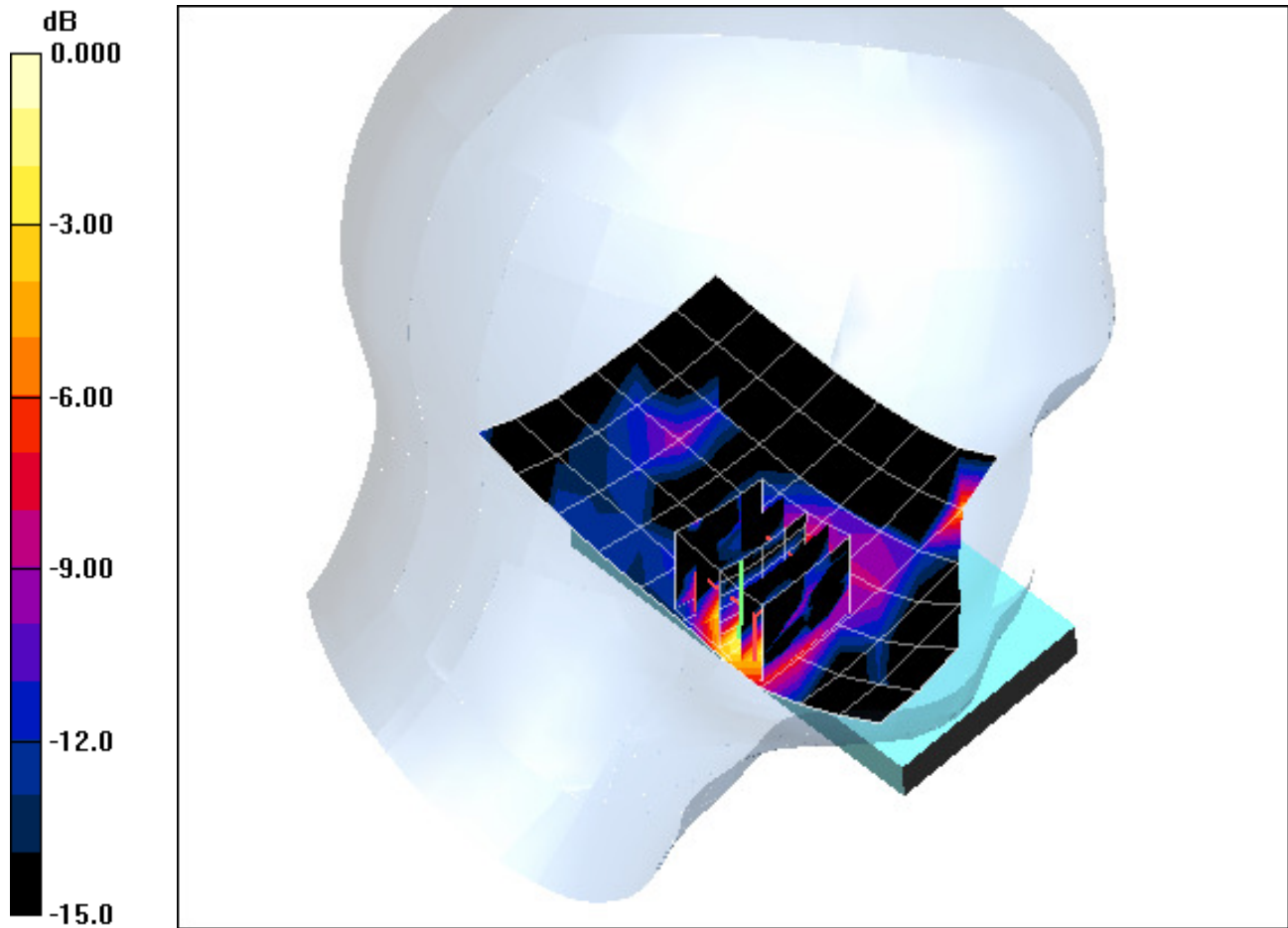
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.75 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 0.042 W/kg

SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.00542 mW/g



0 dB = 0.019mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#4

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 1.74 \text{ mho/m}$; $\epsilon_r = 37.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 05-08-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.1 °C

Probe: ES3DV3 - SN3209; ConvF(4.46, 4.46, 4.46); Calibrated: 3/16/2012

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11b, Left Head, Tilt, Ch 01, 1 Mbps

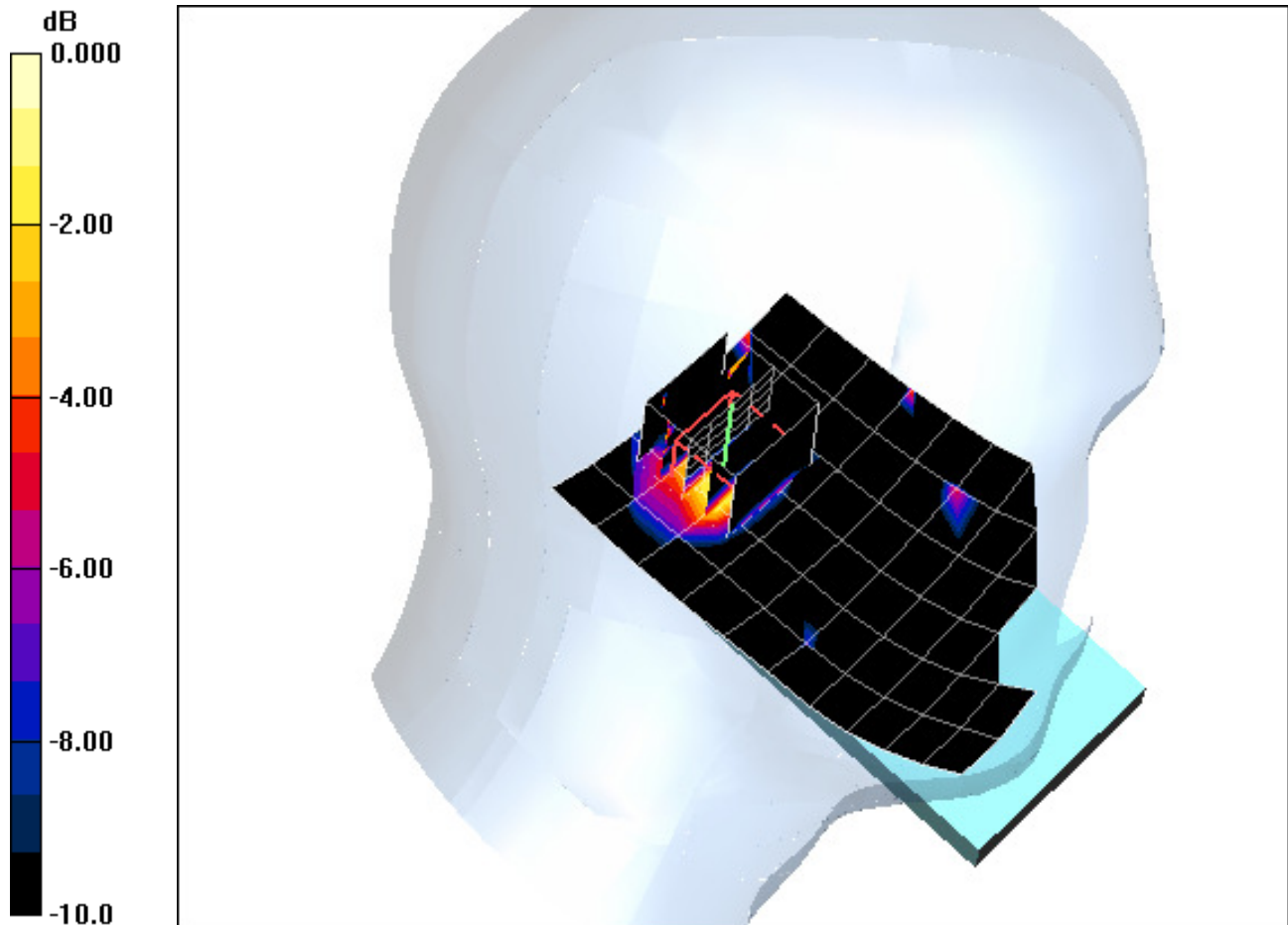
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.55 V/m; Power Drift = 0.120 dB

Peak SAR (extrapolated) = 0.012 W/kg

SAR(1 g) = 0.00555 mW/g; SAR(10 g) = 0.002 mW/g



0 dB = 0.007mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #3

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5240 \text{ MHz}$; $\sigma = 4.506 \text{ mho/m}$; $\epsilon_r = 35.67$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-24-2012; Ambient Temp: 23.2 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11a 5.2 GHz, Right Head, Touch, Ch 48, 6 Mbps

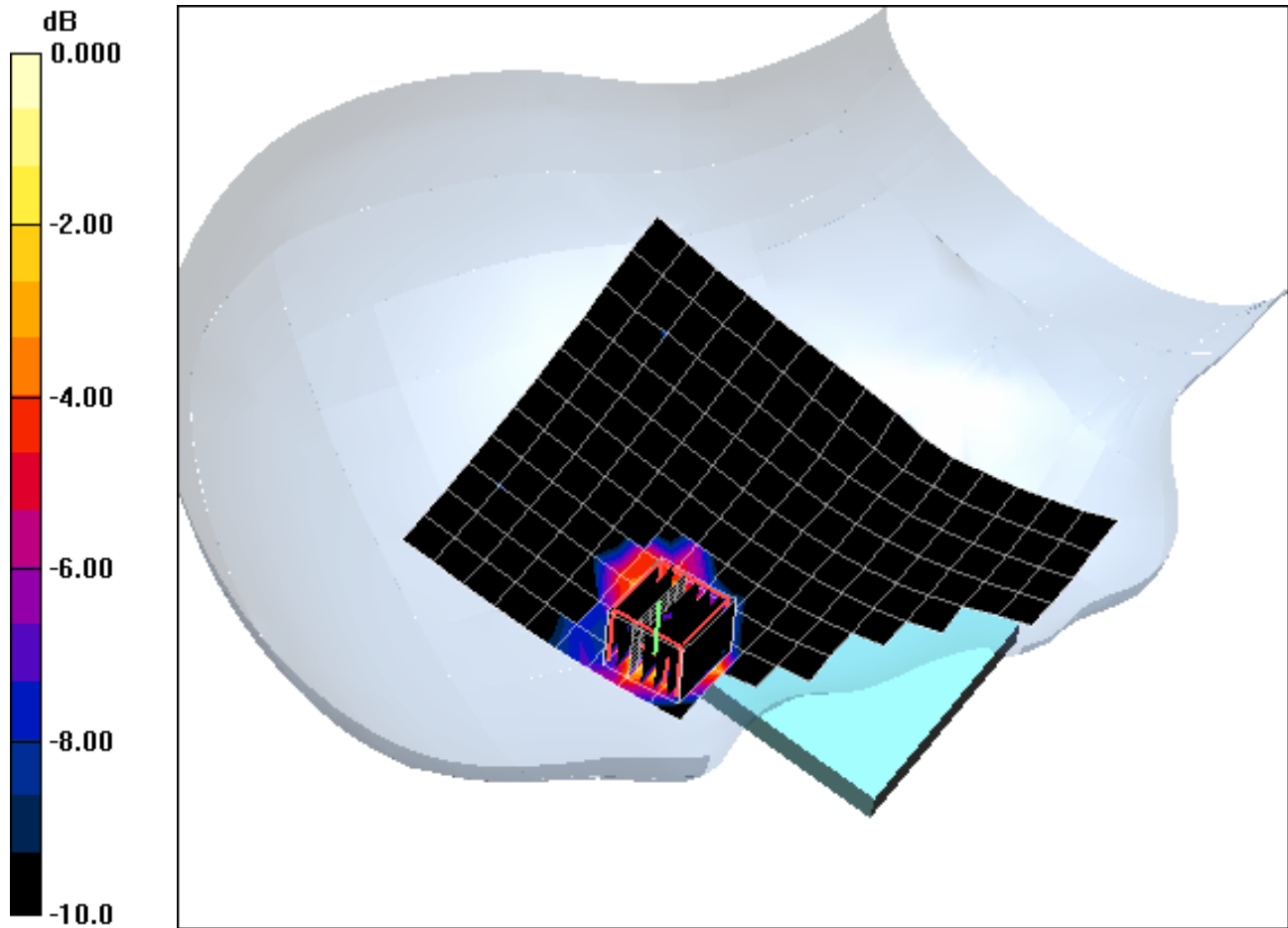
Area Scan (12x16x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Reference Value = 2.80 V/m; Power Drift = 0.118 dB

Peak SAR (extrapolated) = 0.700 W/kg

SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.015 mW/g



0 dB = 0.096mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #3

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5260 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5260 \text{ MHz}$; $\sigma = 4.527 \text{ mho/m}$; $\epsilon_r = 35.66$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 04-24-2012; Ambient Temp: 23.2 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3589; ConvF(4.36, 4.36, 4.36); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11a 5.3 GHz, Right Head, Tilt, Ch 52, 6 Mbps

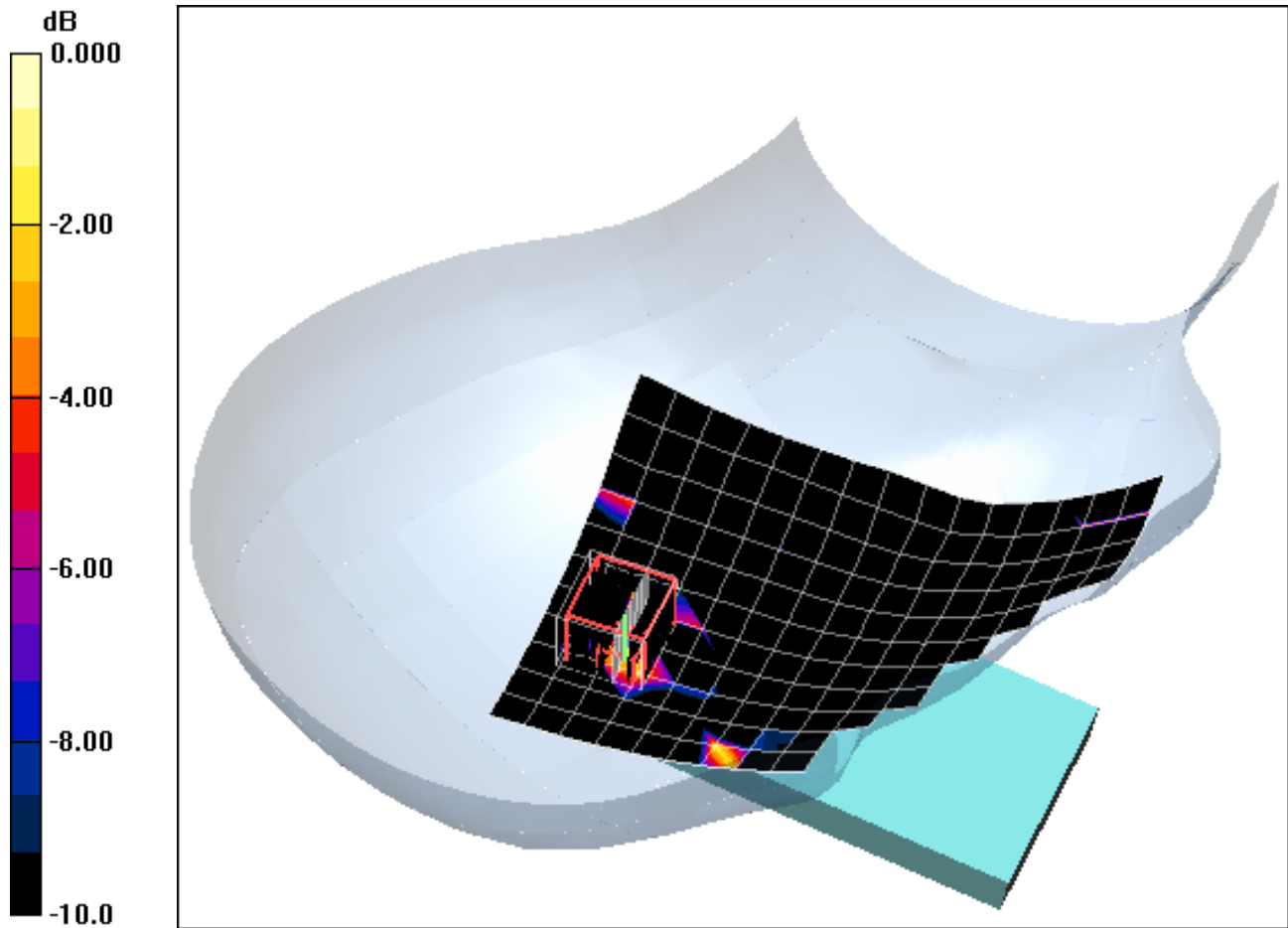
Area Scan (12x16x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Reference Value = 1.67 V/m; Power Drift = 0.147 dB

Peak SAR (extrapolated) = 0.182 W/kg

SAR(1 g) = 0.016 mW/g; SAR(10 g) = 0.0031 mW/g



0 dB = 0.042mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #3

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5240 \text{ MHz}$; $\sigma = 4.506 \text{ mho/m}$; $\epsilon_r = 35.67$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-24-2012; Ambient Temp: 23.2 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11a, 5.2 GHz Left Head, Touch, Ch 48, 6 Mbps

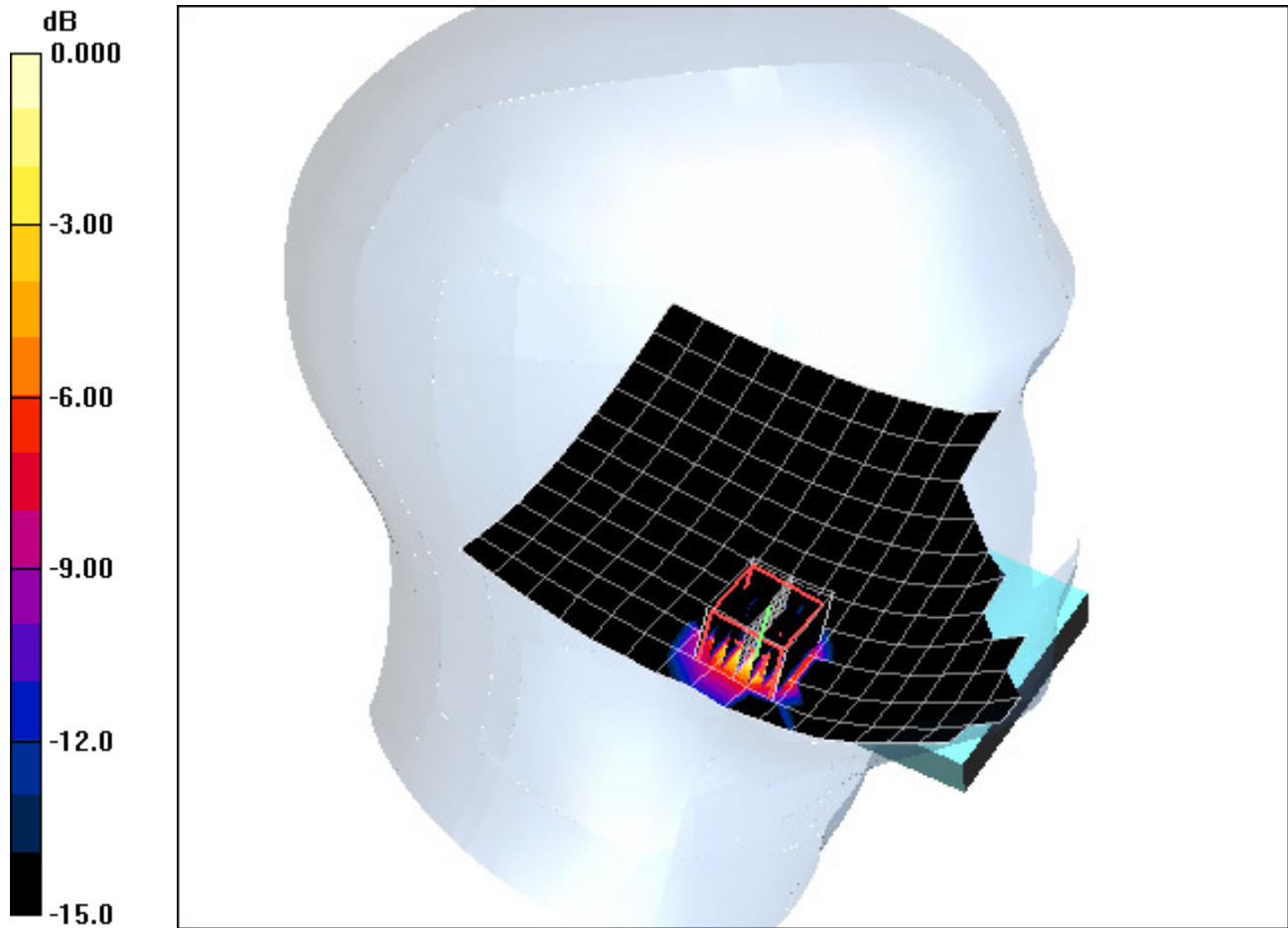
Area Scan (12x17x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Reference Value = 6.00 V/m; Power Drift = 0.190 dB

Peak SAR (extrapolated) = 0.638 W/kg

SAR(1 g) = 0.143 mW/g; SAR(10 g) = 0.042 mW/g



0 dB = 0.351mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR #3

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5240 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head Medium parameters used:

$f = 5240 \text{ MHz}$; $\sigma = 4.506 \text{ mho/m}$; $\epsilon_r = 35.67$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 04-24-2012; Ambient Temp: 23.2 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

Mode: IEEE 802.11a, 5.2 GHz Left Head, Tilt, Ch 48, 6 Mbps

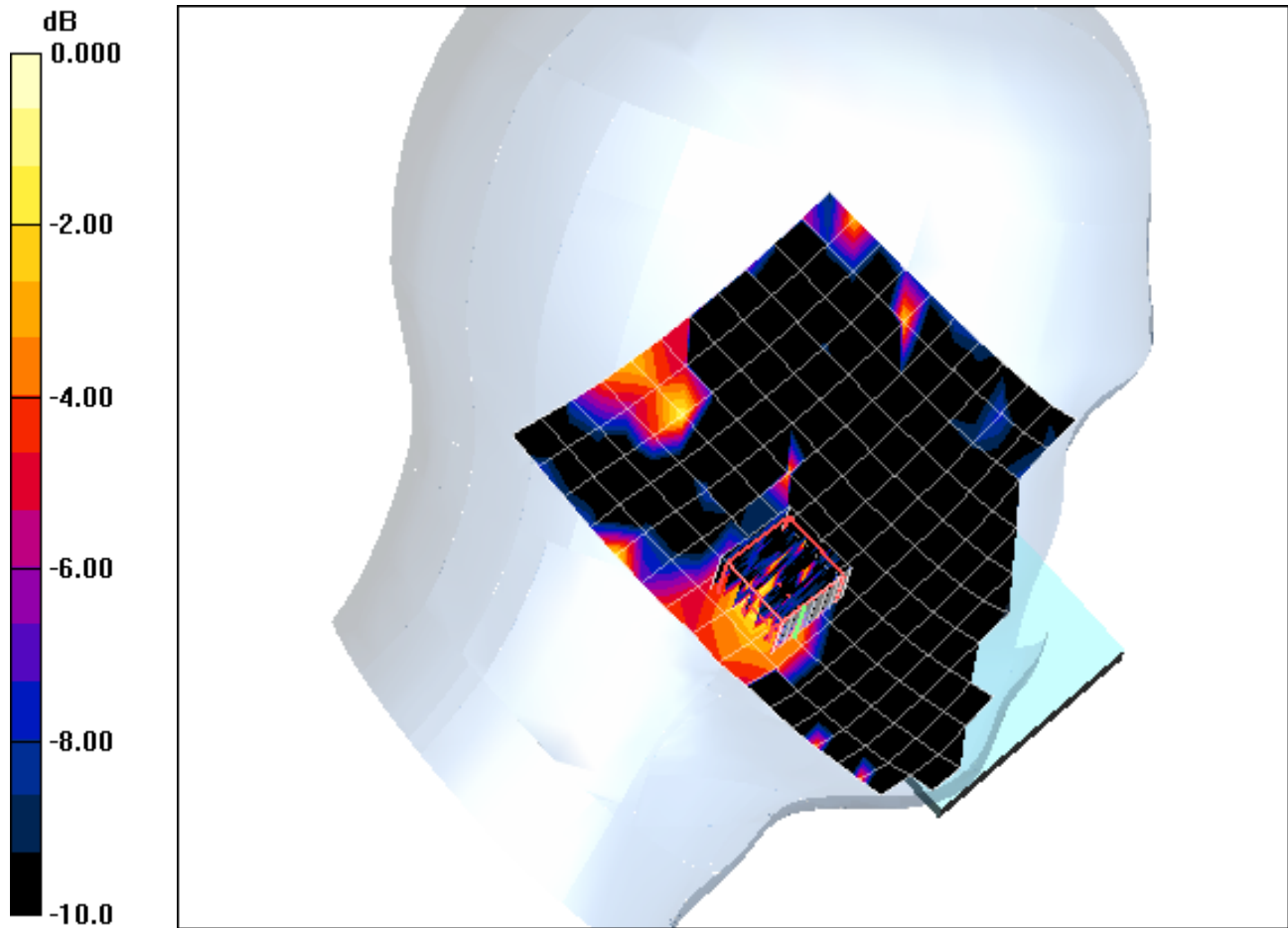
Area Scan (12x17x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Reference Value = 2.66 V/m; Power Drift = 0.142 dB

Peak SAR (extrapolated) = 0.331 W/kg

SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.010 mW/g



0 dB = 0.058mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.008 \text{ mho/m}$; $\epsilon_r = 53.104$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 22.4°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Body SAR, Back side, Mid.ch, QPSK, 1 RB, 0 RB Offset

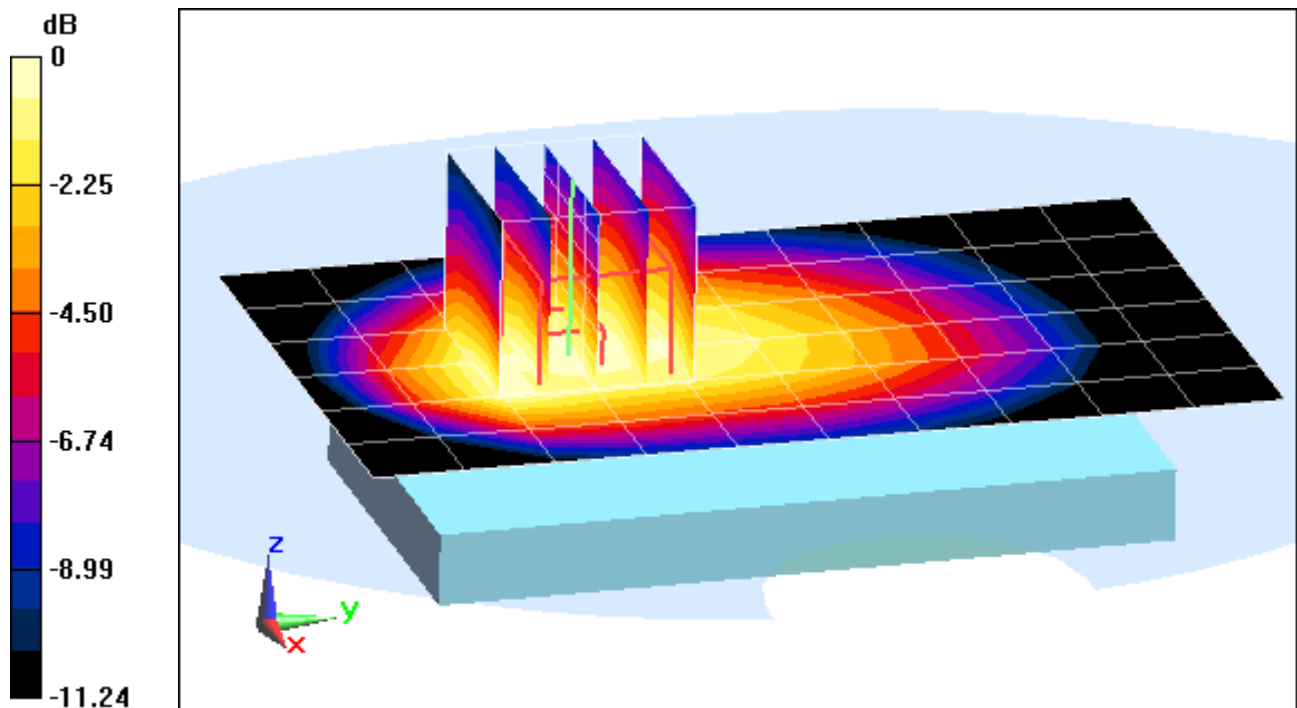
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.240 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.6080

SAR(1 g) = 0.424 mW/g; SAR(10 g) = 0.298 mW/g



0 dB = 0.450mW/g = -6.94 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.008 \text{ mho/m}$; $\epsilon_r = 53.104$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 22.4°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Body SAR, Front side, Mid.ch, QPSK, 1 RB, 0 RB Offset

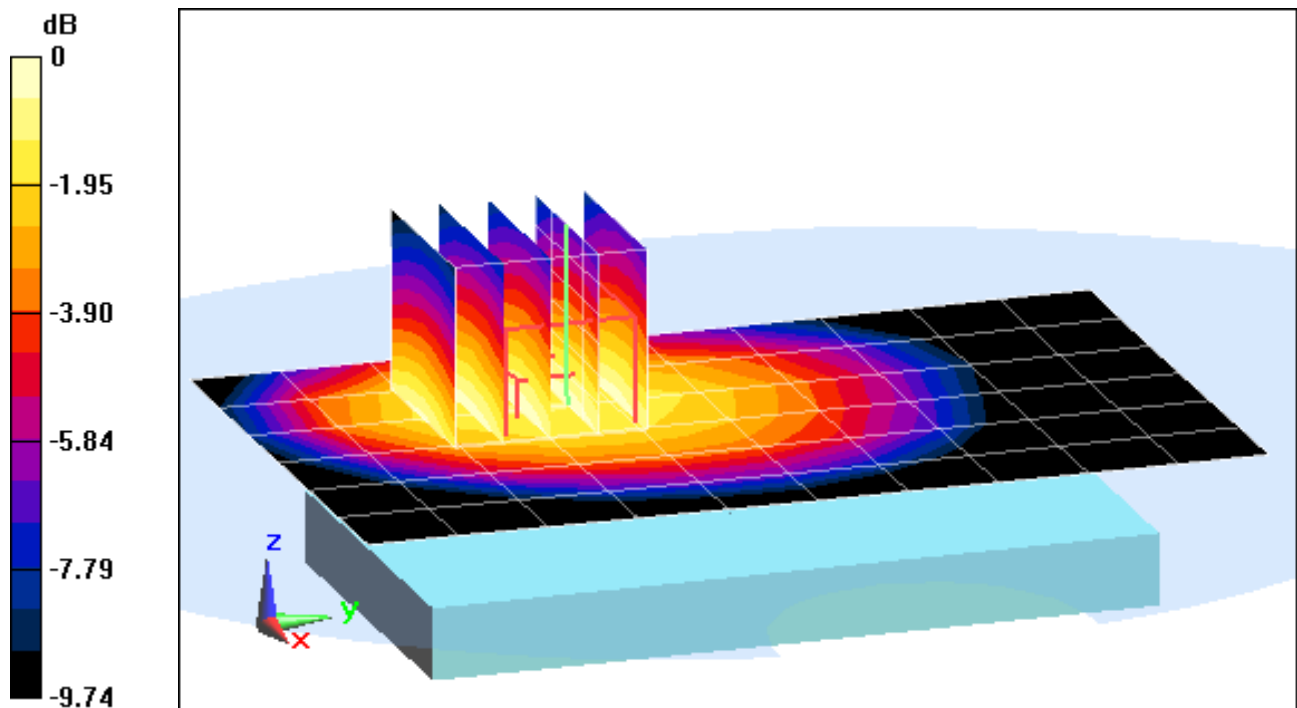
Area Scan (7x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.811 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.4710

SAR(1 g) = 0.367 mW/g; SAR(10 g) = 0.274 mW/g



0 dB = 0.380mW/g = -8.40 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.008 \text{ mho/m}$; $\epsilon_r = 53.104$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 22.4°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Body SAR, Bottom Edge, Mid.ch, QPSK, 1 RB, 49 RB Offset

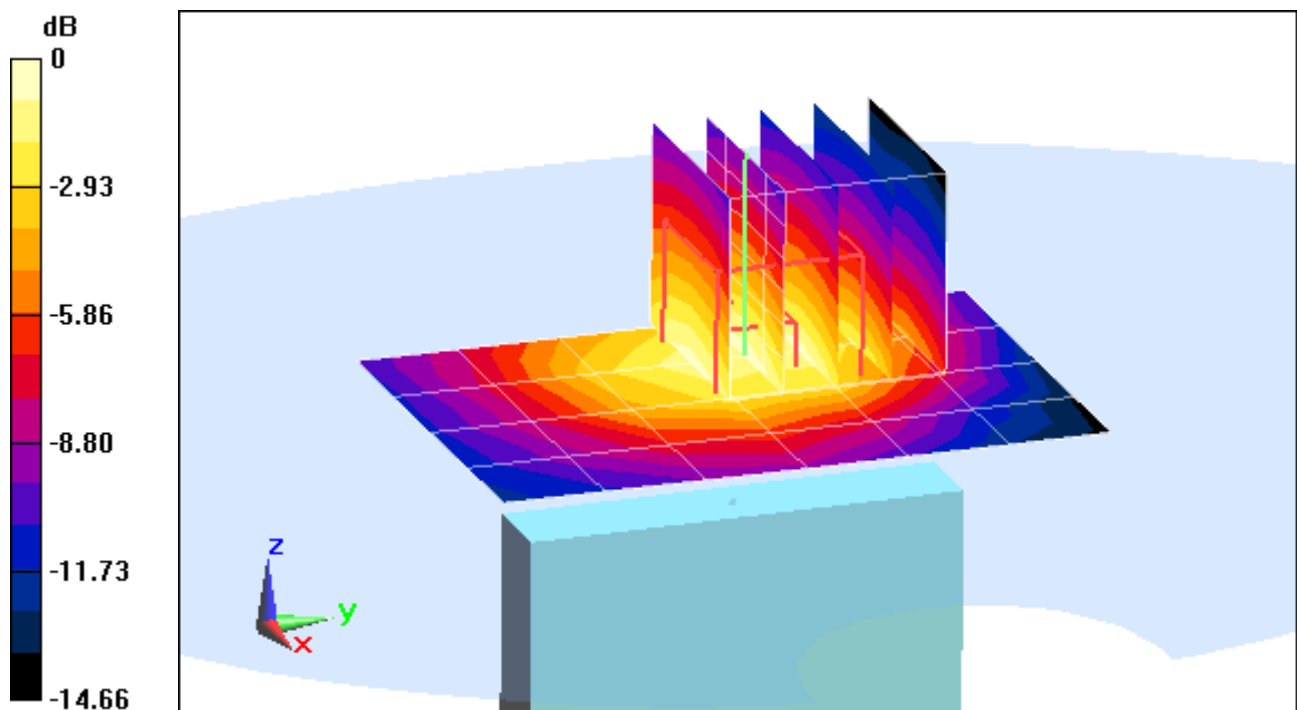
Area Scan (5x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 13.463 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.2720

SAR(1 g) = 0.174 mW/g; SAR(10 g) = 0.110 mW/g



0 dB = 0.190mW/g = -14.42 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: LTE RF; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.008 \text{ mho/m}$; $\epsilon_r = 53.104$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 22.4°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE, Body SAR, Left Edge, Mid.ch, QPSK, 1 RB, 0 RB Offset

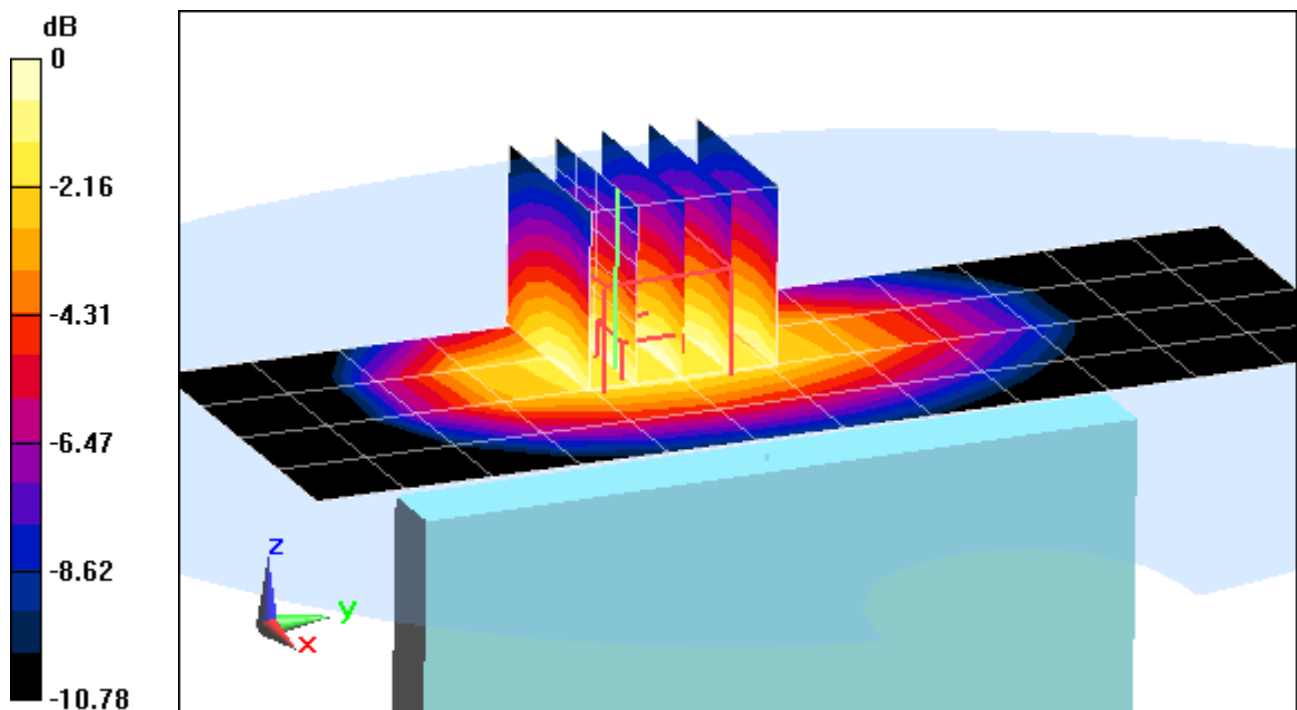
Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.156 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.6330

SAR(1 g) = 0.450 mW/g; SAR(10 g) = 0.309 mW/g



0 dB = 0.480mW/g = -6.38 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.988 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.2 °C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

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

Mode: Cell CDMA, Body SAR, Back side, Mid.ch

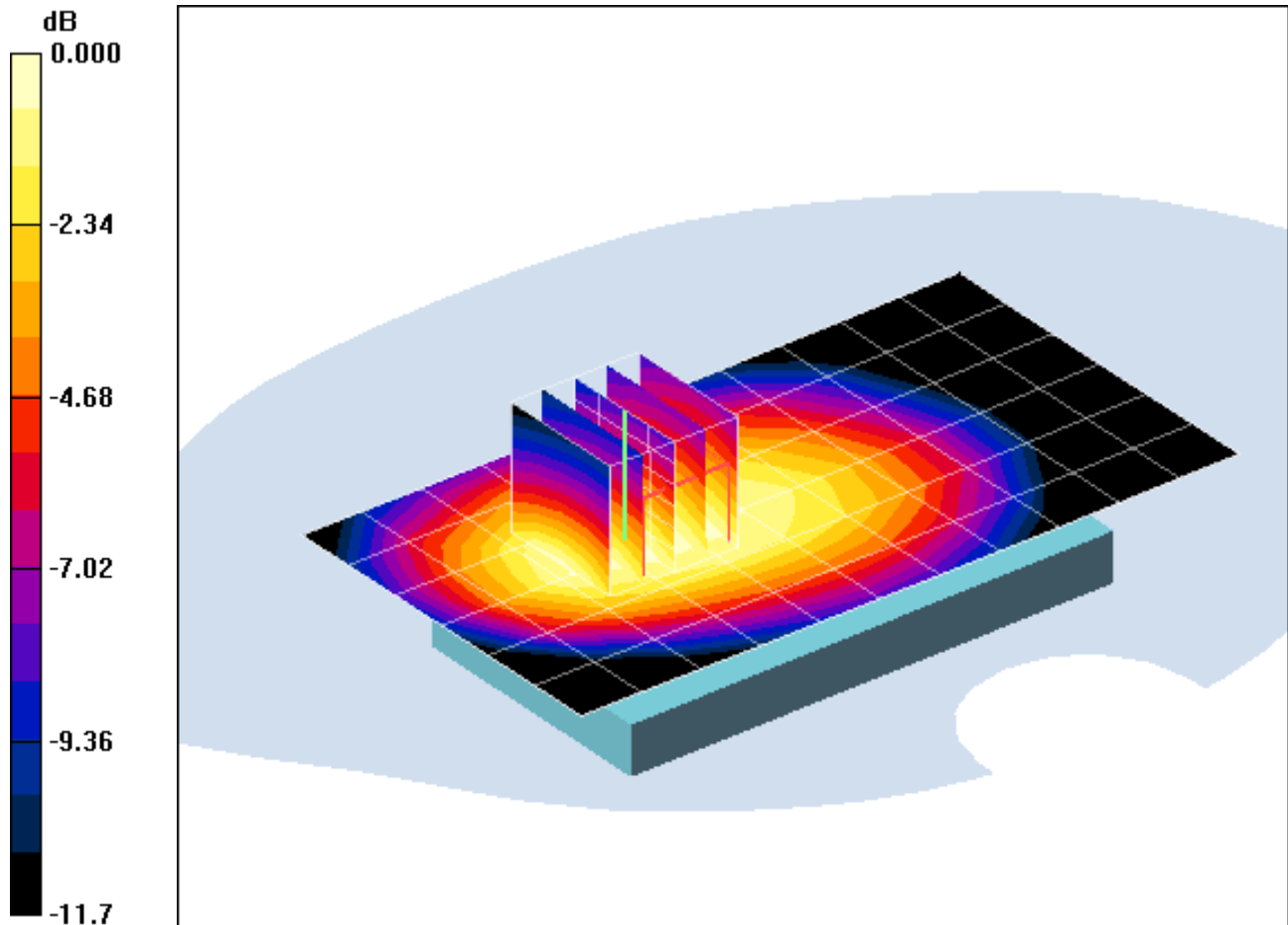
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 29.1 V/m; Power Drift = 0.031 dB

Peak SAR (extrapolated) = 1.05 W/kg

SAR(1 g) = 0.714 mW/g; SAR(10 g) = 0.516 mW/g



0 dB = 0.758mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.988 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.2 °C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

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

Mode: Cell CDMA, Body SAR, Front side, Mid.ch

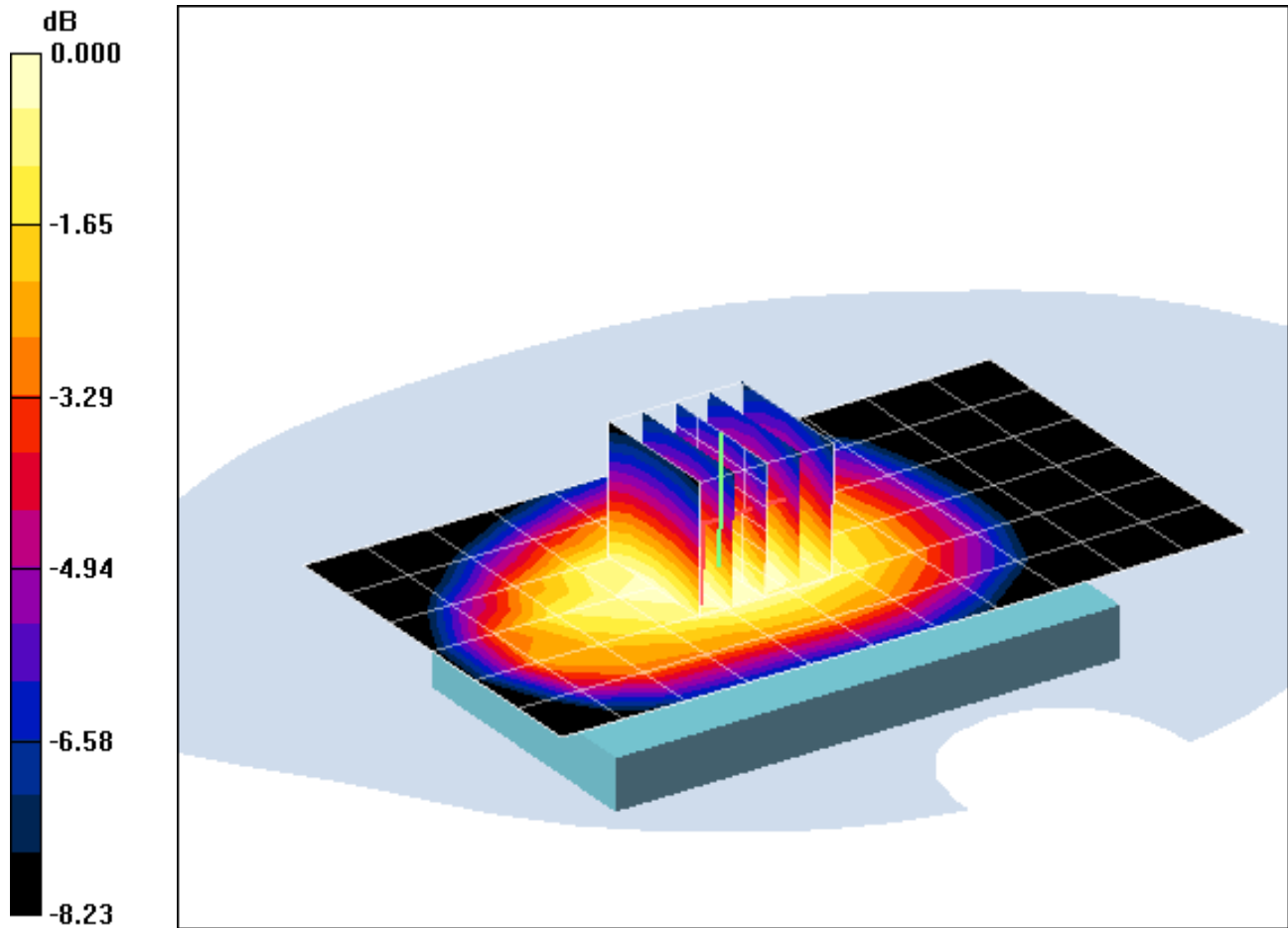
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 25.3 V/m; Power Drift = -0.006 dB

Peak SAR (extrapolated) = 0.653 W/kg

SAR(1 g) = 0.536 mW/g; SAR(10 g) = 0.413 mW/g



0 dB = 0.560mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.988 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.2 °C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

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

Mode: Cell CDMA, Body SAR, Bottom Edge, Mid.ch

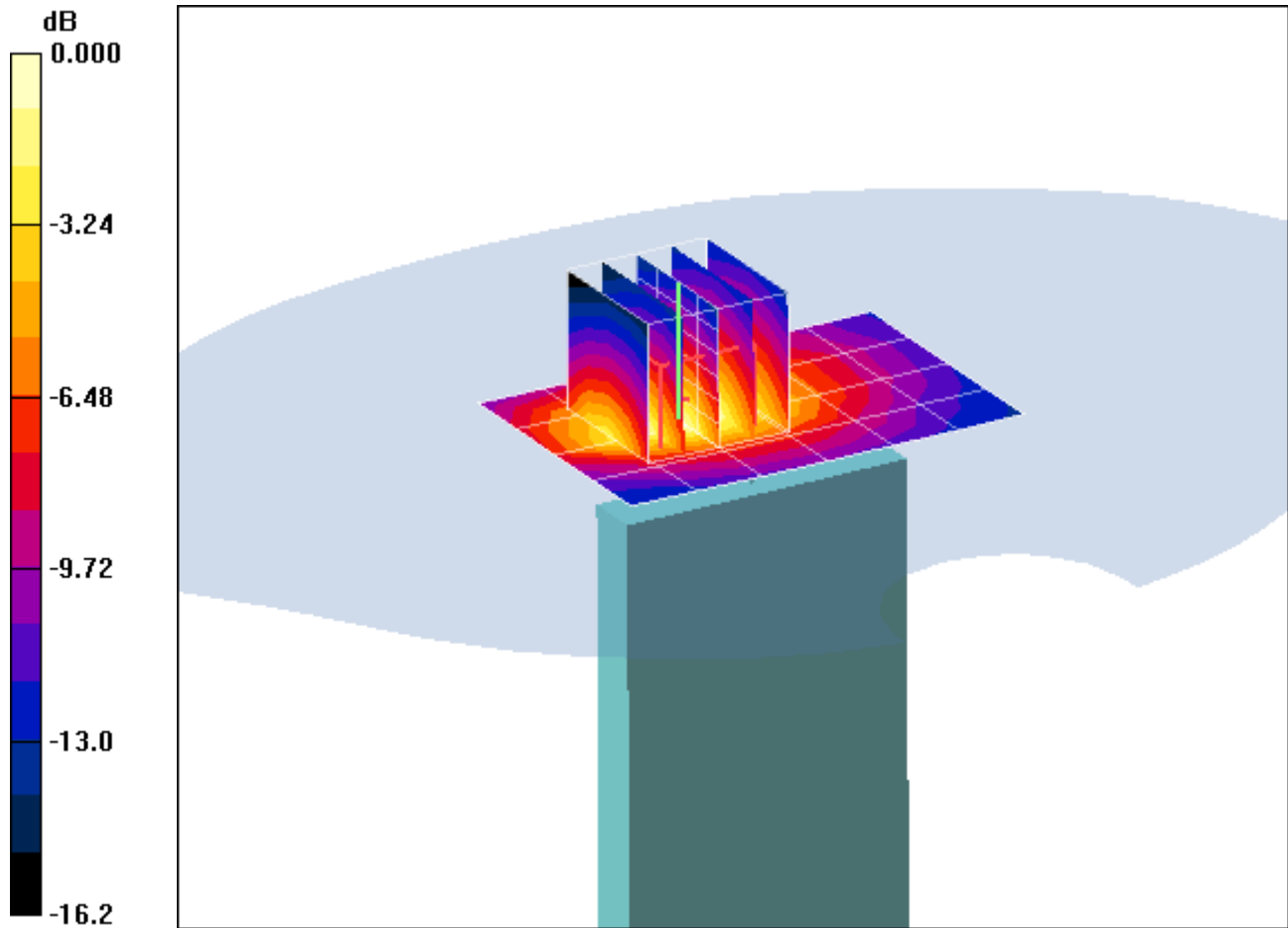
Area Scan (5x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.5 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 0.380 W/kg

SAR(1 g) = 0.192 mW/g; SAR(10 g) = 0.100 mW/g



0 dB = 0.218mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#1

Communication System: Cellular CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.988 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.2 °C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

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

Mode: Cell CDMA, Body SAR, Right Edge, Mid.ch

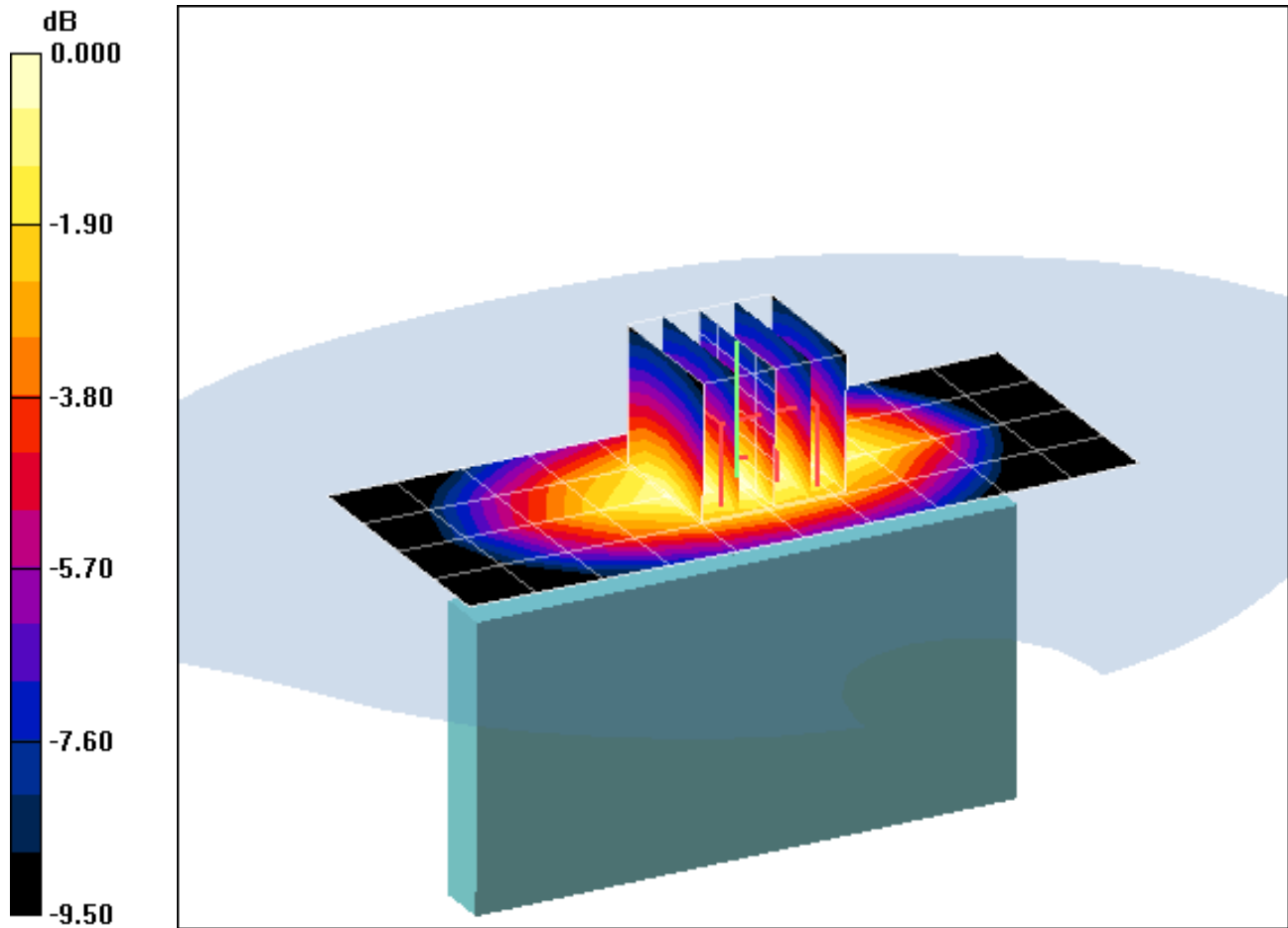
Area Scan (5x11x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 27.4 V/m; Power Drift = -0.015 dB

Peak SAR (extrapolated) = 0.837 W/kg

SAR(1 g) = 0.602 mW/g; SAR(10 g) = 0.417 mW/g



0 dB = 0.644mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 52.12$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2012; Ambient Temp: 21.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

PCS CDMA, Body SAR, Back side, Mid.ch

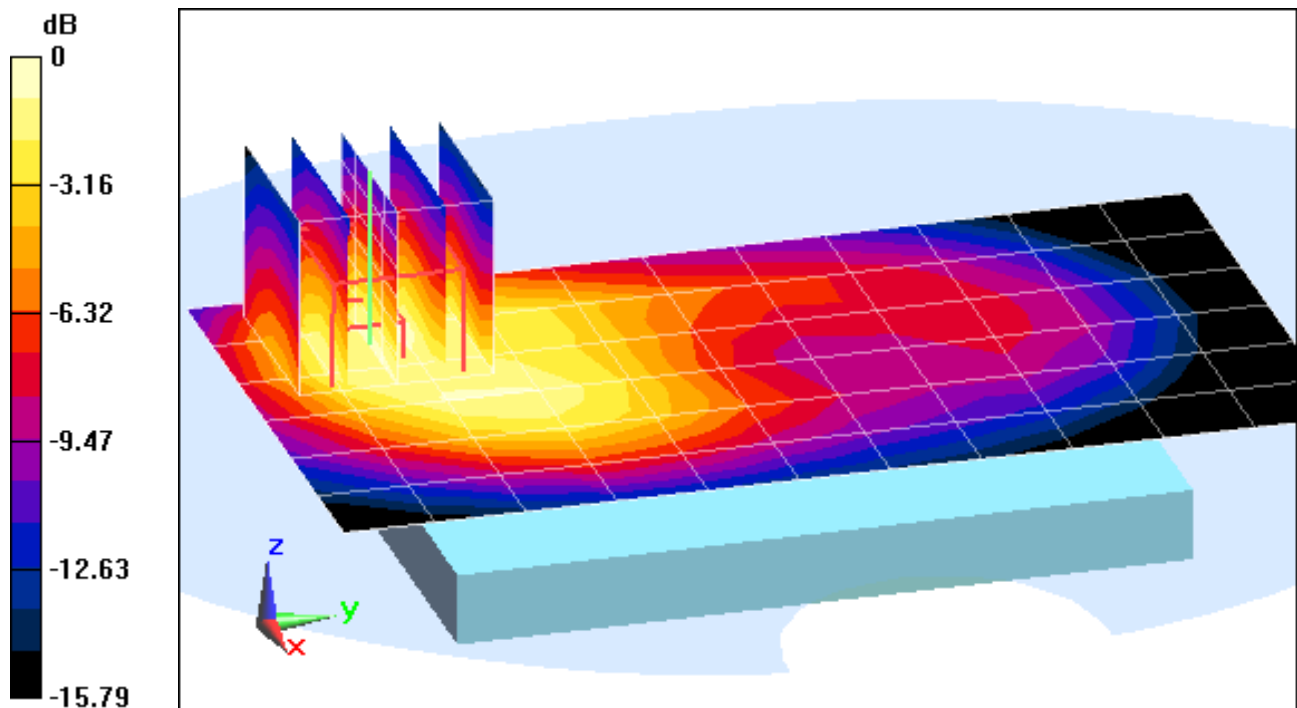
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.681 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.0250

SAR(1 g) = 0.653 mW/g; SAR(10 g) = 0.386 mW/g



0 dB = 0.730mW/g = -2.73 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 52.12$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2012; Ambient Temp: 21.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

PCS CDMA, Body SAR, Front side, Mid.ch

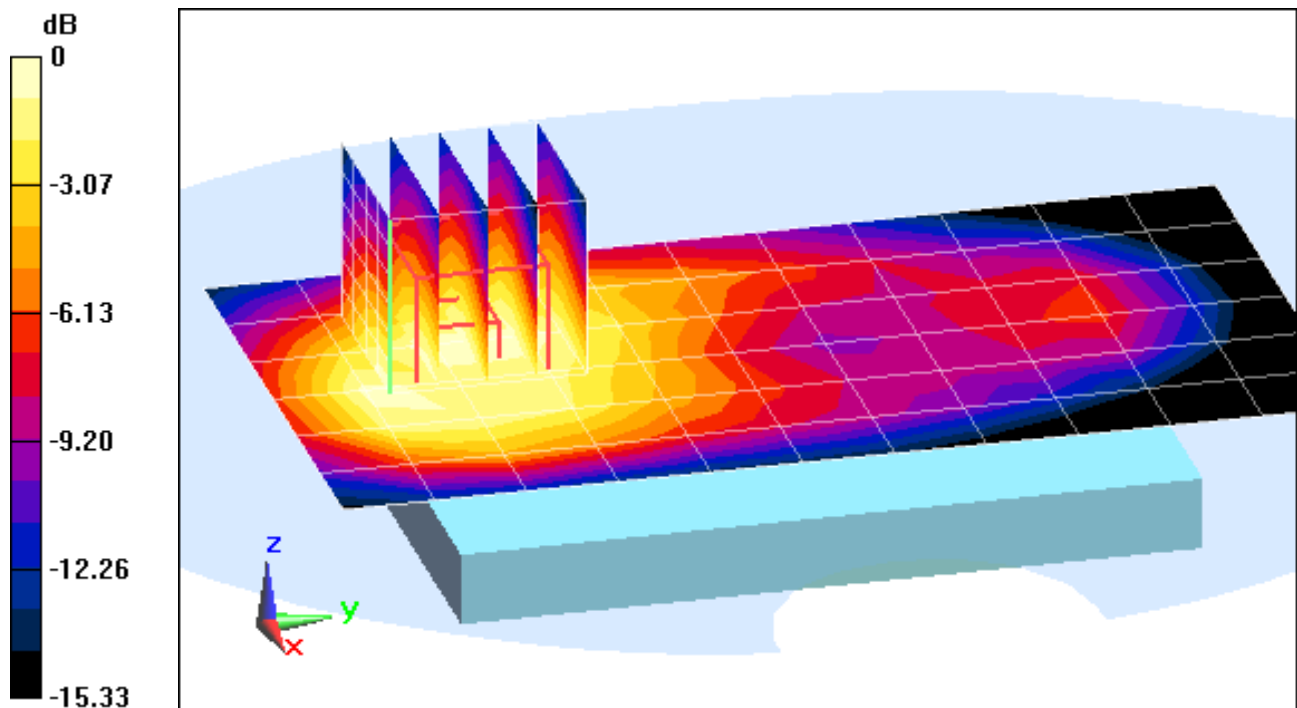
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.108 V/m; Power Drift = -0.0096 dB

Peak SAR (extrapolated) = 0.9690

SAR(1 g) = 0.622 mW/g; SAR(10 g) = 0.389 mW/g



0 dB = 0.680mW/g = -3.35 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 52.12$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2012; Ambient Temp: 21.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

PCS CDMA, Body SAR, Bottom Edge, Mid.ch

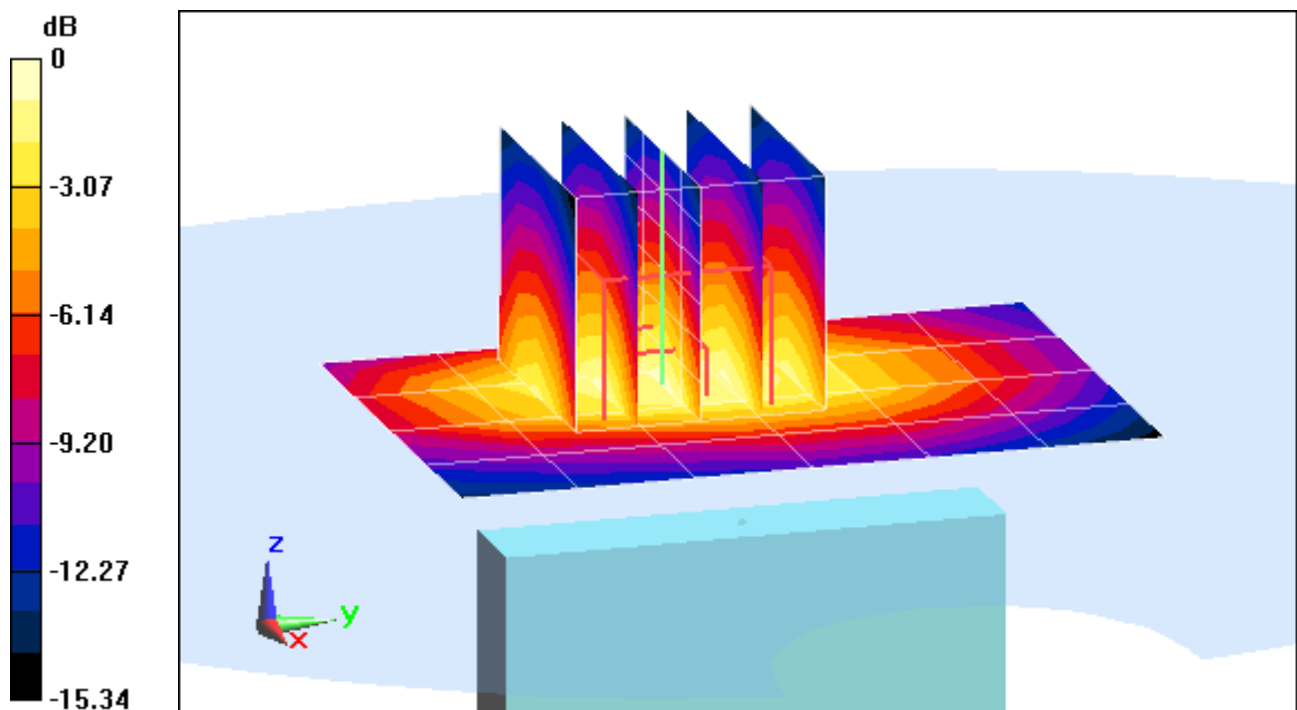
Area Scan (5x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.392 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.8880

SAR(1 g) = 0.547 mW/g; SAR(10 g) = 0.314 mW/g



0 dB = 0.610mW/g = -4.29 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 52.12$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2012; Ambient Temp: 21.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

PCS CDMA, Body SAR, Right Edge, Mid.ch

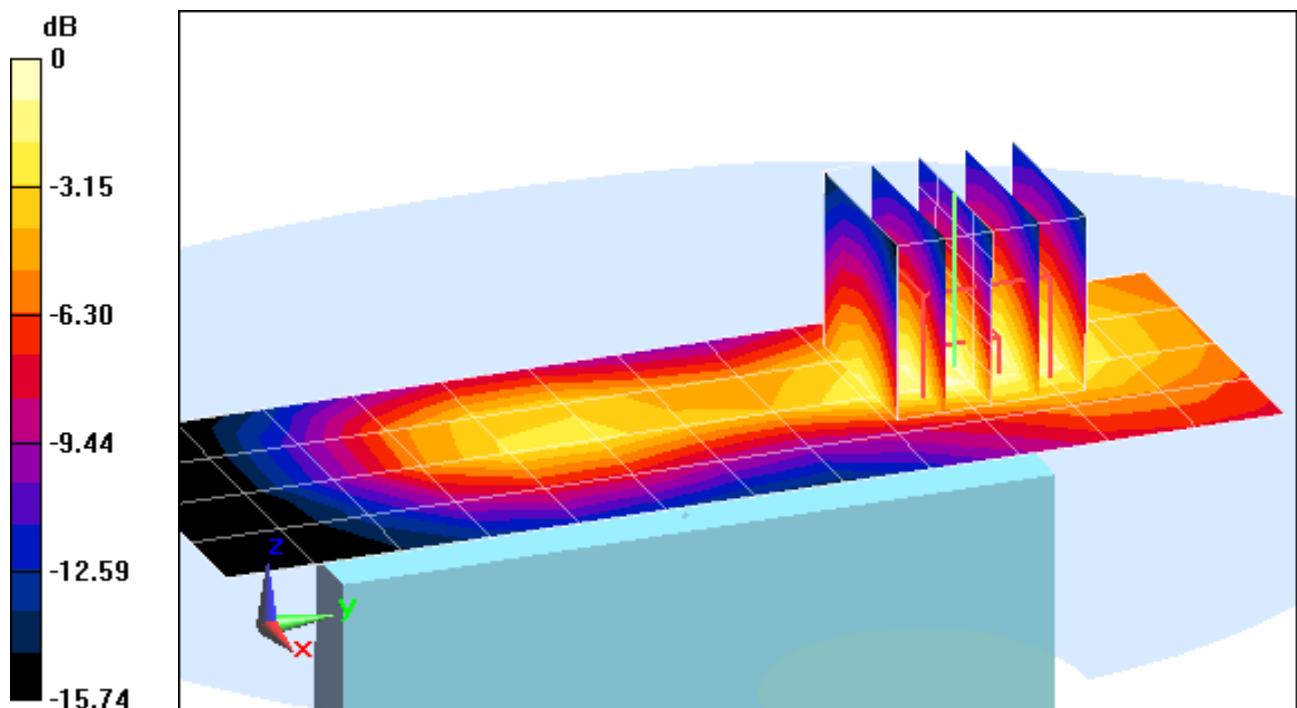
Area Scan (5x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.455 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.4080

SAR(1 g) = 0.257 mW/g; SAR(10 g) = 0.151 mW/g



0 dB = 0.280mW/g = -11.06 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: 99000023090468

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 2.002 \text{ mho/m}$; $\epsilon_r = 50.522$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 01, 1 Mbps, Back Side

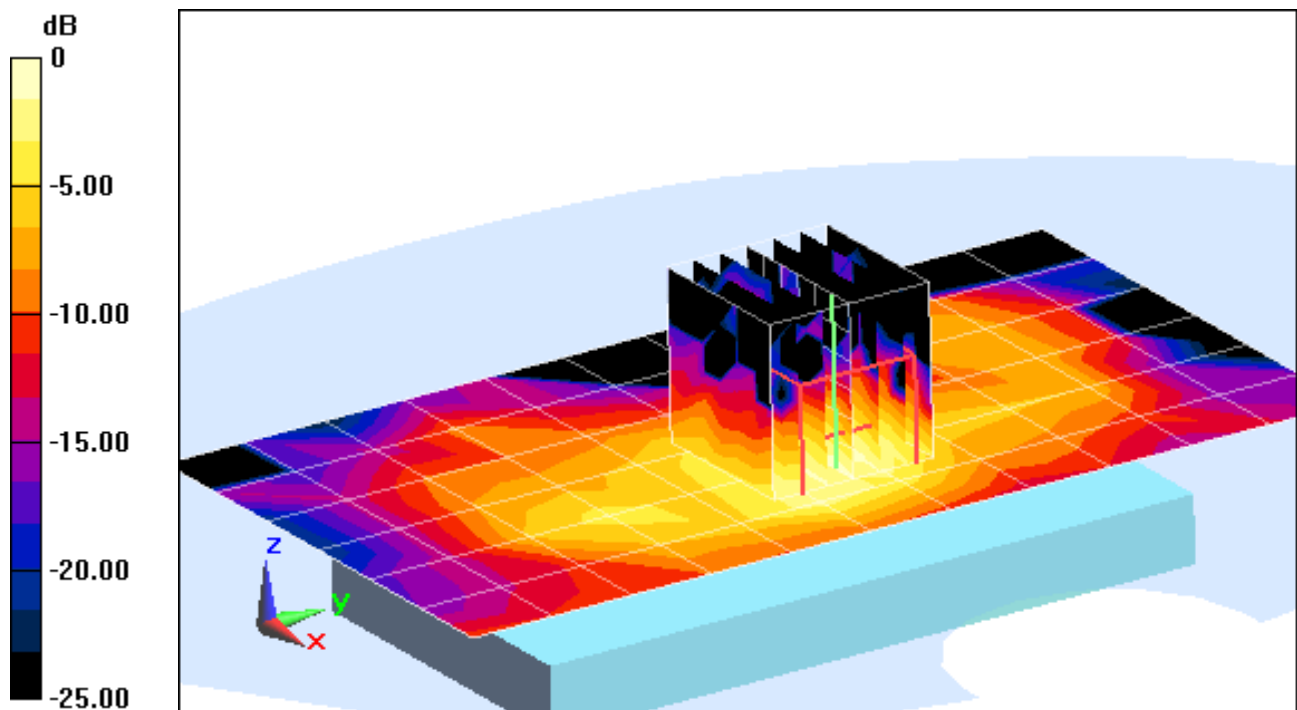
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 0.185 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.4060

SAR(1 g) = 0.066 mW/g; SAR(10 g) = 0.0078 mW/g



0 dB = 0.020mW/g = -33.98 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: 99000023090468

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 2.002 \text{ mho/m}$; $\epsilon_r = 50.522$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 01, 1 Mbps, Front Side

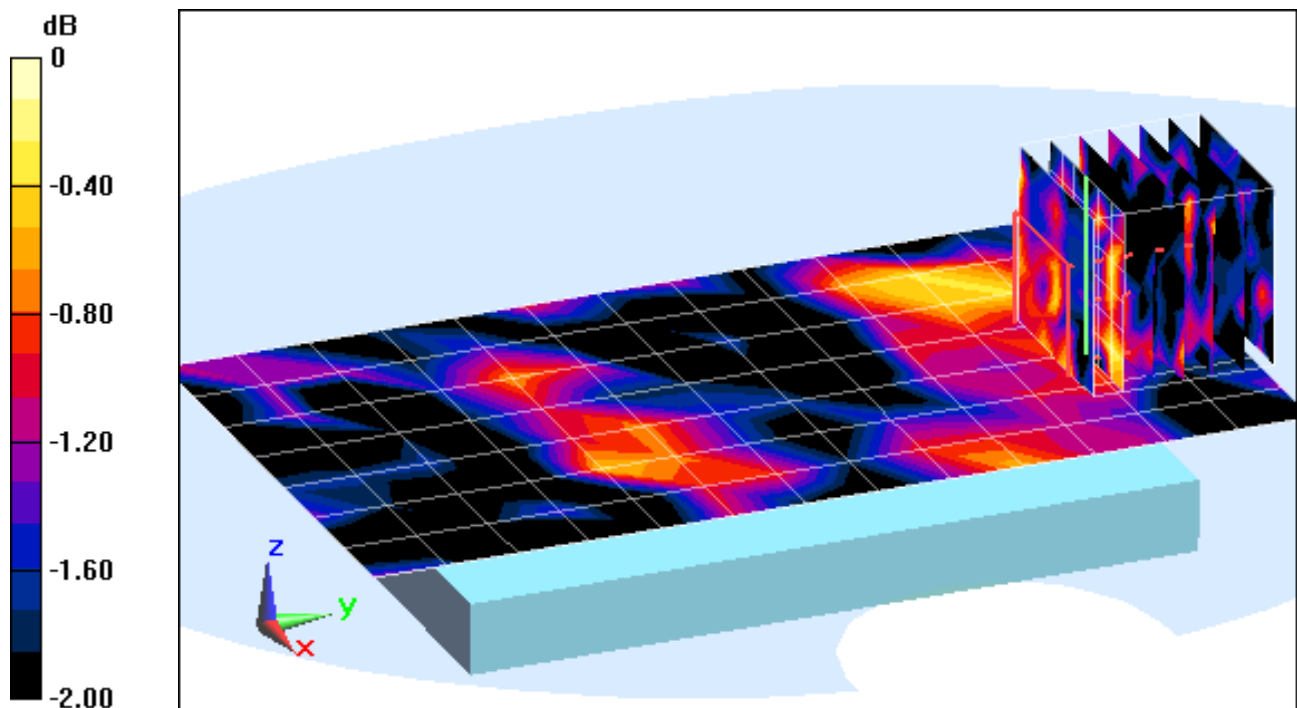
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 1.794 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.0150

SAR(1 g) = 0.0061 mW/g; SAR(10 g) = 0.00272 mW/g



0 dB = 0.0079mW/g = -42.05 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: 99000023090468

Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2412 \text{ MHz}$; $\sigma = 2.002 \text{ mho/m}$; $\epsilon_r = 50.522$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b, Body SAR, Ch 1, 1 Mbps, Left Edge

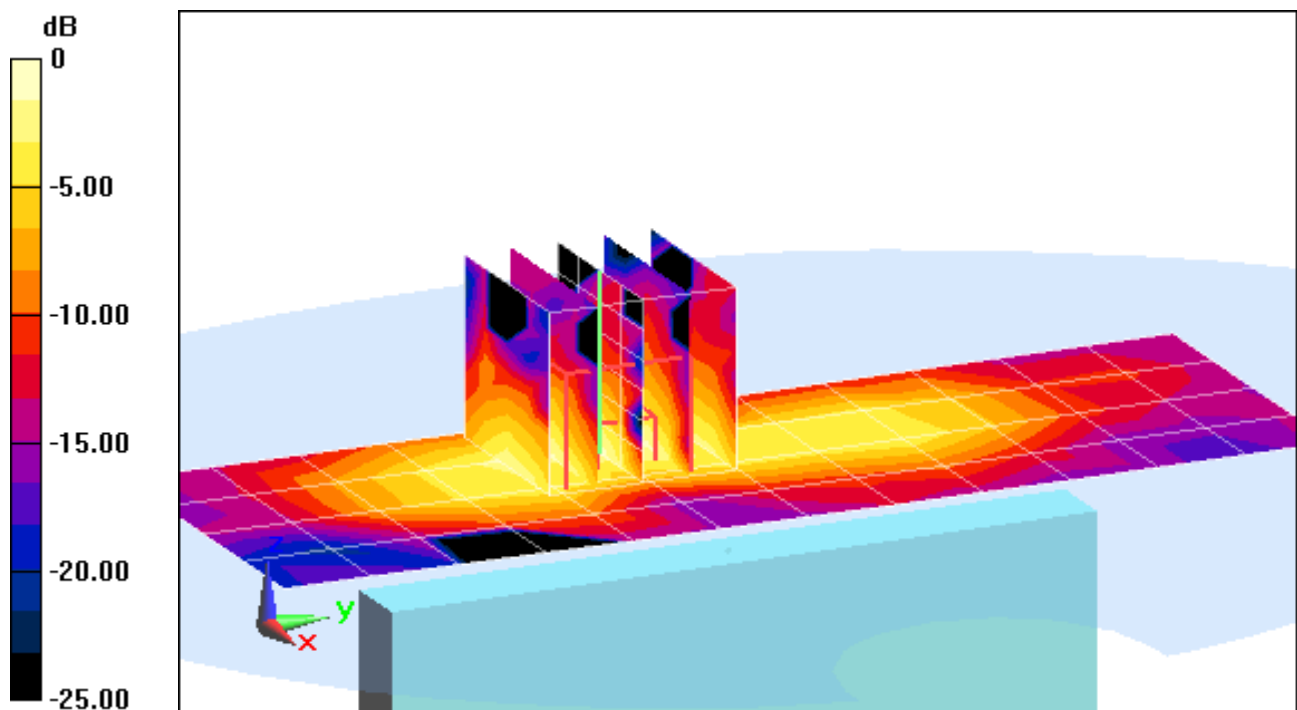
Area Scan (5x13x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.241 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.0550

SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.00921 mW/g



0 dB = 0.030mW/g = -30.46 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSCHI200; Type: Portable Handset; Serial: SAR#3

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5260 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5260 \text{ MHz}$; $\sigma = 5.34 \text{ mho/m}$; $\epsilon_r = 48.14$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.6°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3589; ConvF(3.72, 3.72, 3.72); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11a, 5.3 GHz, Body SAR, Ch 52, 6 Mbps, Back Side

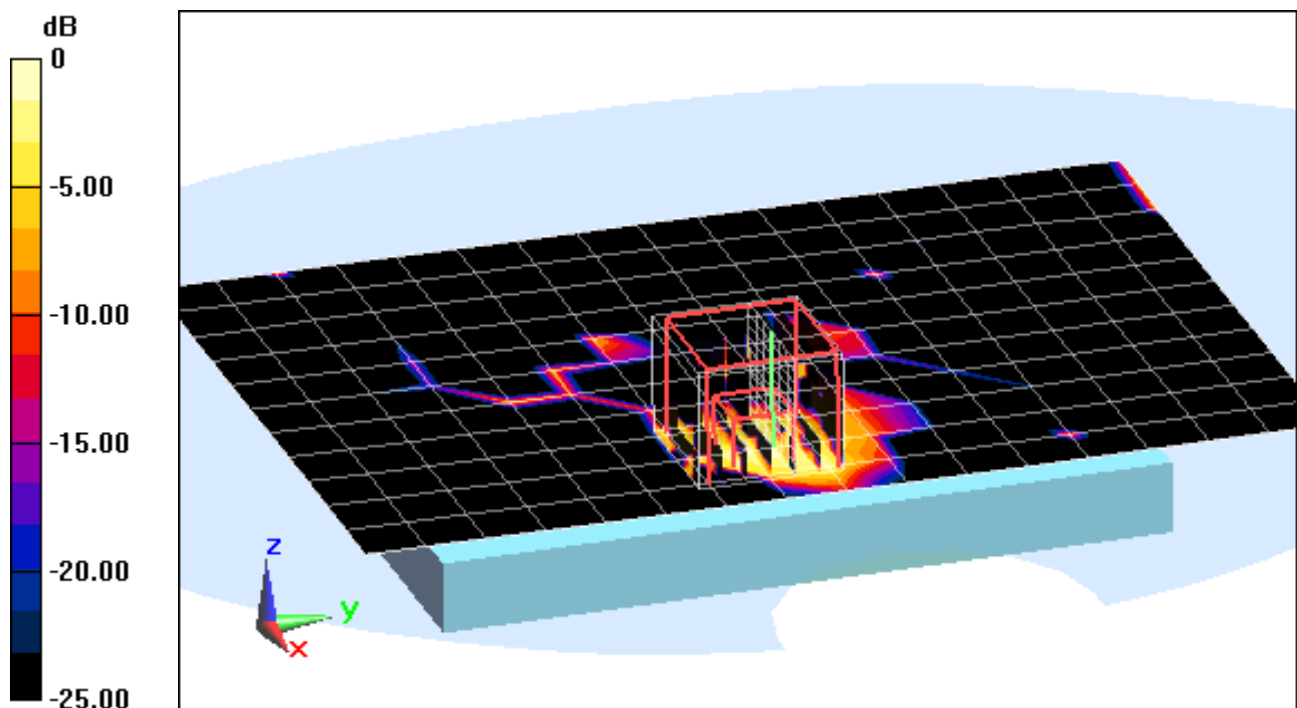
Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.565 V/m; Power Drift = 0.147 dB

Peak SAR (extrapolated) = 0.8170

SAR(1 g) = 0.056 mW/g; SAR(10 g) = 0.00878 mW/g



0 dB = 0.100mW/g = -20.00 dB mW/g

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used:

$f = 750 \text{ MHz}$; $\sigma = 0.851 \text{ mho/m}$; $\epsilon_r = 43.49$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 05-07-2012; Ambient Temp: 24.7°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(6.27, 6.27, 6.27); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/19/2012

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

750MHz System Verification

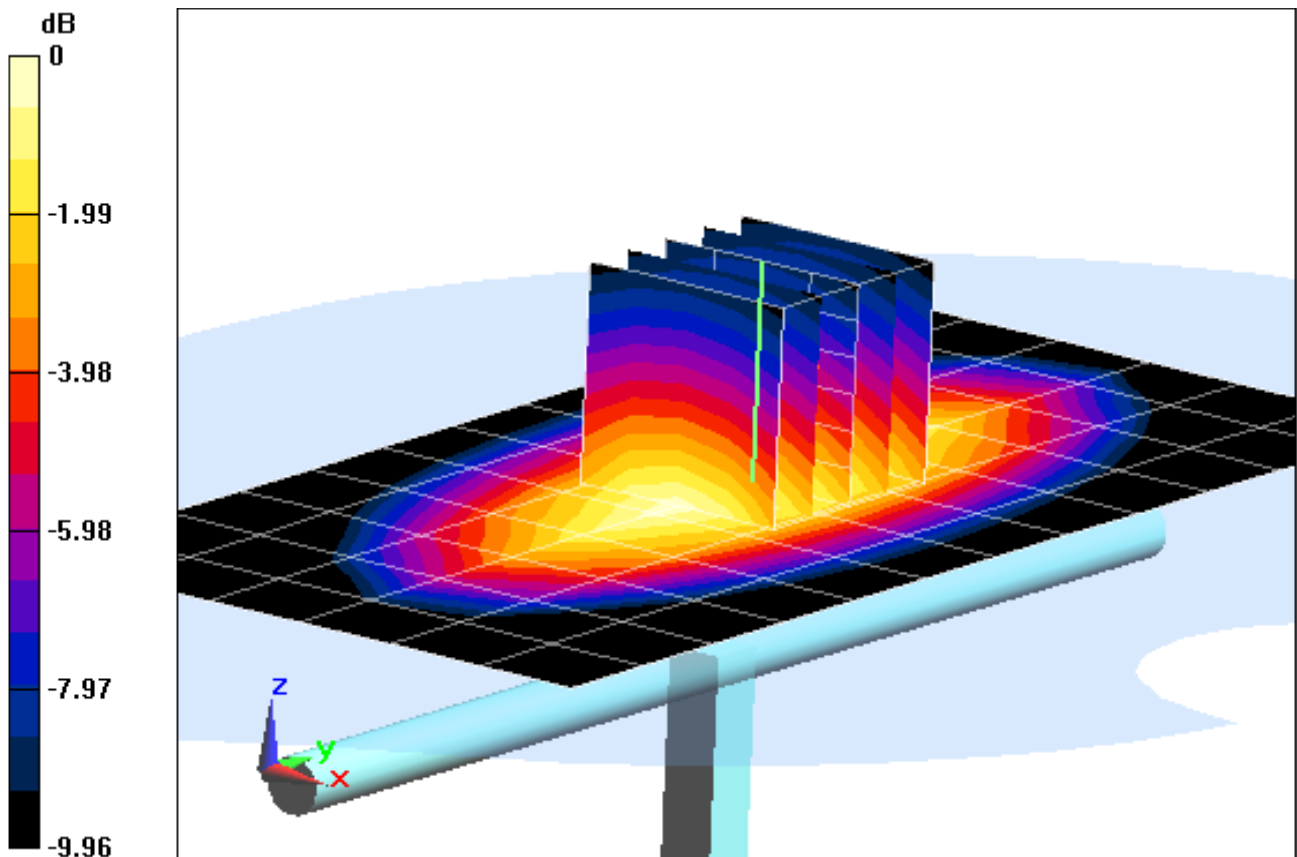
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 0.812 mW/g; SAR(10 g) = 0.542 mW/g

Deviation = -3.33 %



0 dB = 0.870mW/g = -1.21 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used:

$f = 750 \text{ MHz}$; $\sigma = 0.851 \text{ mho/m}$; $\epsilon_r = 43.49$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 05-07-2012; Ambient Temp: 24.7°C; Tissue Temp: 22.9°C

Probe: ES3DV2 - SN3022; ConvF(6.27, 6.27, 6.27); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 4/19/2012

Phantom: SAM with CRP; Type: SAM; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

750MHz System Verification

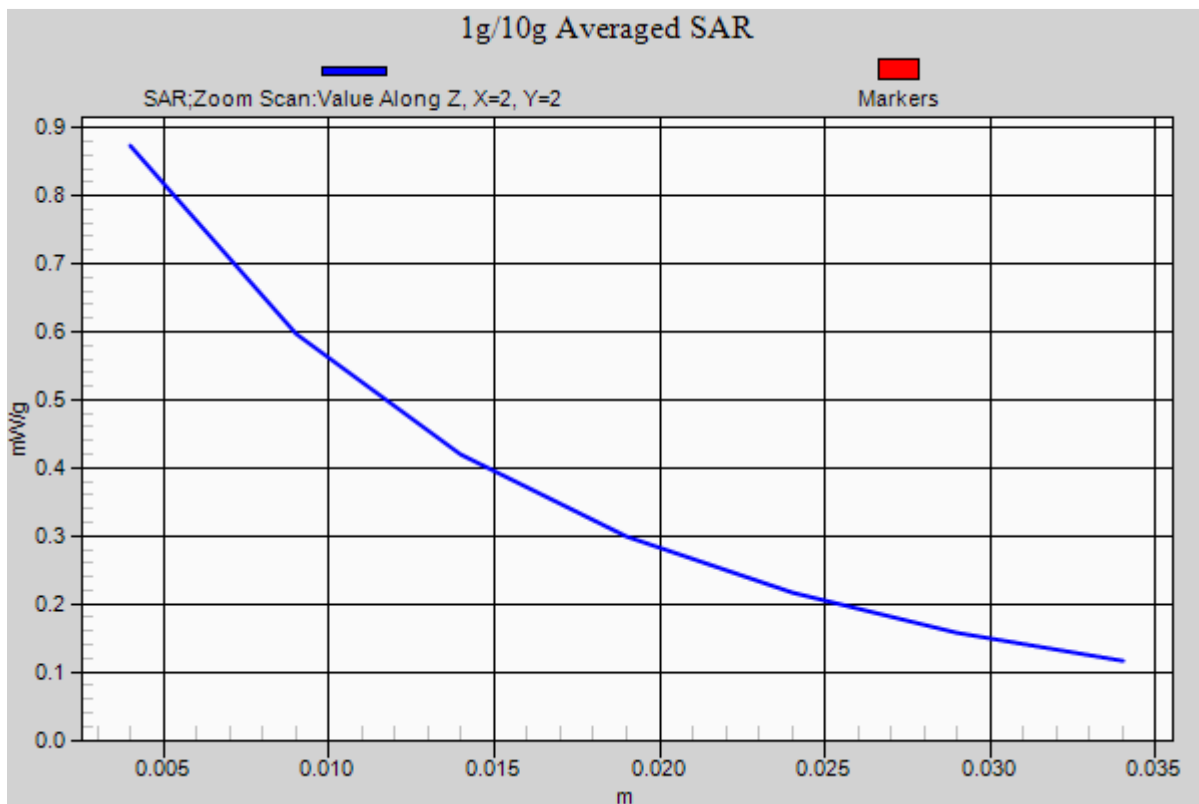
Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 0.812 mW/g; SAR(10 g) = 0.542 mW/g

Deviation = -3.33 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d133

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 40.64$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-23-2012; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(8.07, 8.07, 8.07); Calibrated: 7/27/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

835 MHz System Verification

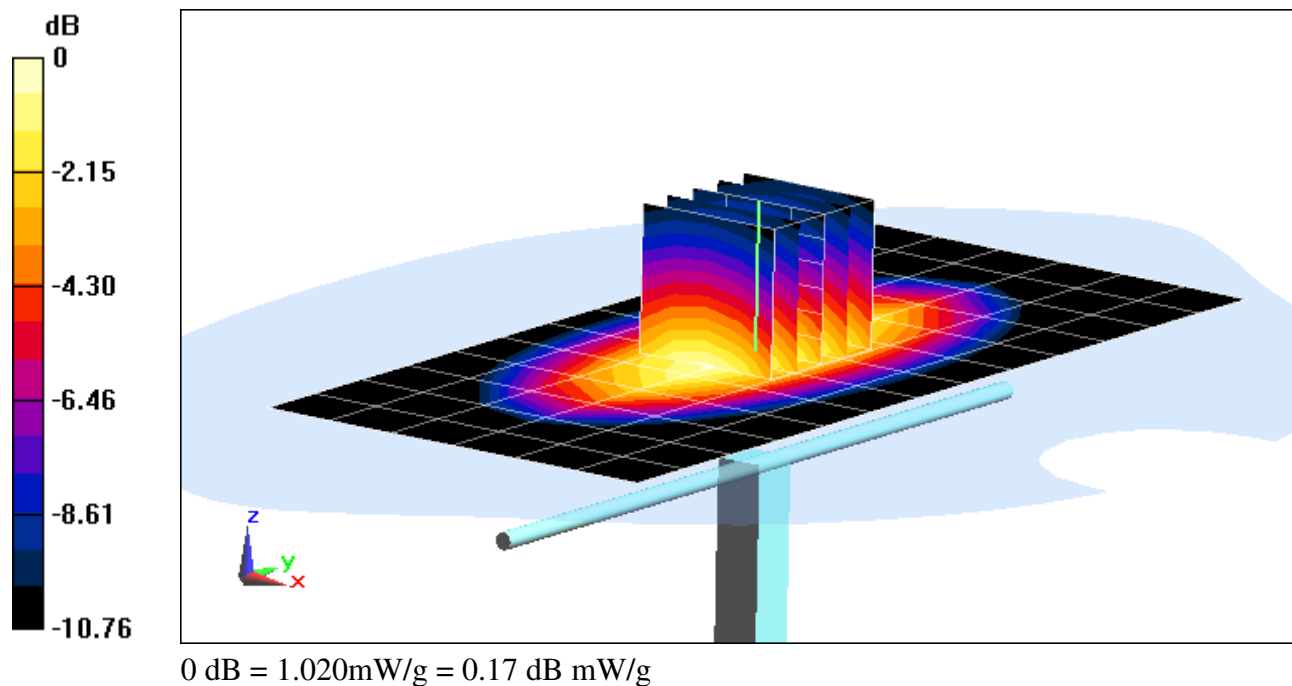
Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 0.942 mW/g; SAR(10 g) = 0.613 mW/g

Deviation = -0.32 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d133

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 40.64$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-23-2012; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3561; ConvF(8.07, 8.07, 8.07); Calibrated: 7/27/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/20/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

835 MHz System Verification

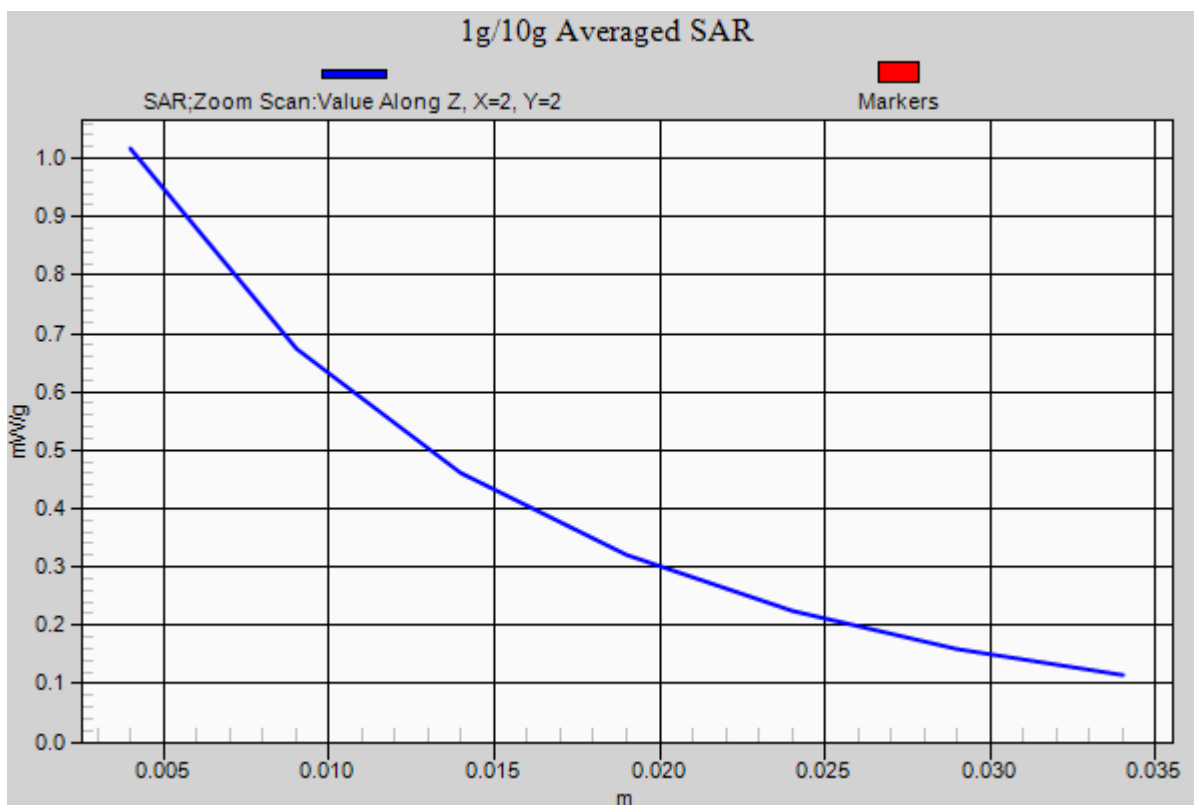
Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 0.942 mW/g; SAR(10 g) = 0.613 mW/g

Deviation = -0.32 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.388 \text{ mho/m}$; $\epsilon_r = 39.493$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-27-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3288; ConvF(5.16, 5.16, 5.16); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (0);SEMCAD X Version 14.6.4 (4989)

1900 MHz System Verification

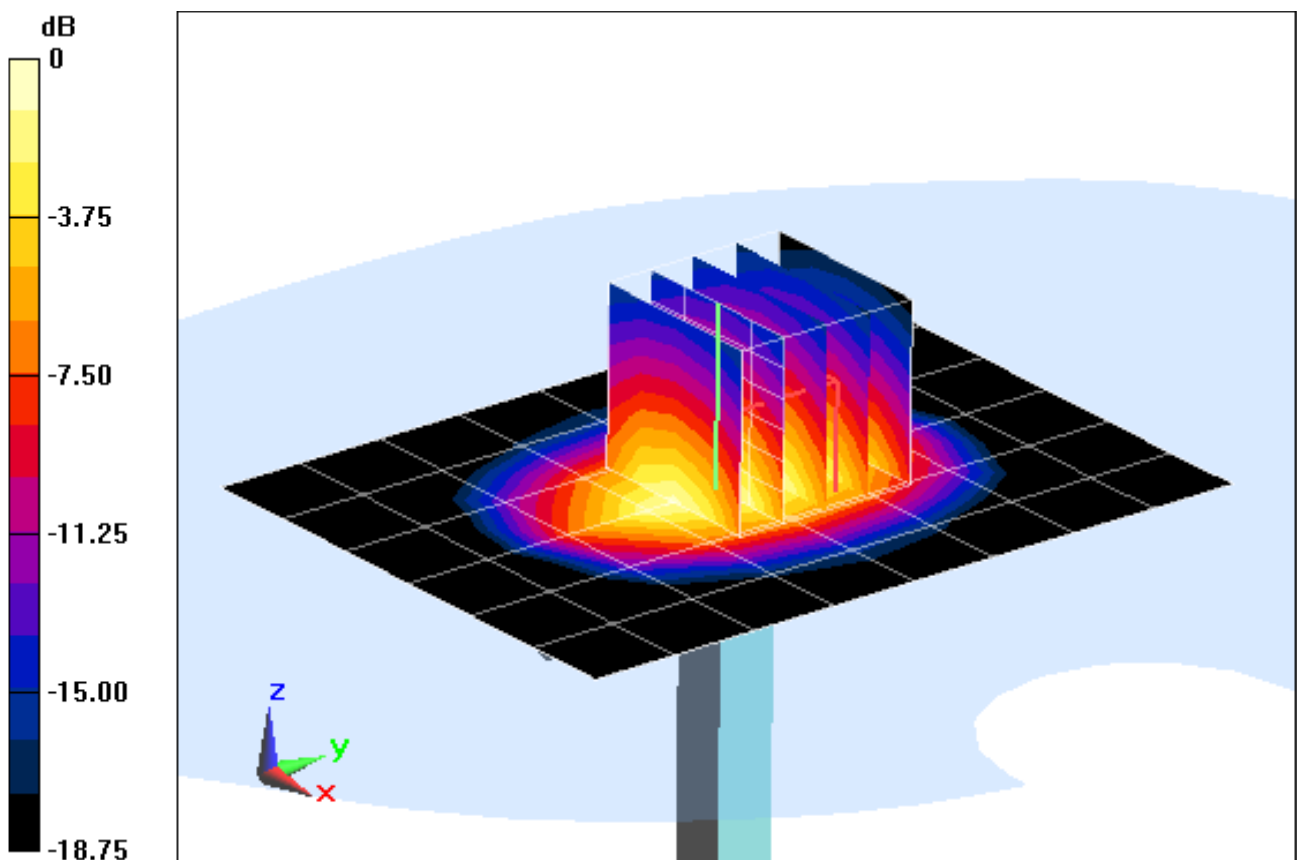
Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 3.88 mW/g; SAR(10 g) = 2.02 mW/g

Deviation = -1.27%



0 dB = 4.320mW/g = 12.71 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.388 \text{ mho/m}$; $\epsilon_r = 39.493$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-27-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3288; ConvF(5.16, 5.16, 5.16); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM 5.0 front; Type: SAM v5.0; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

1900 MHz System Verification

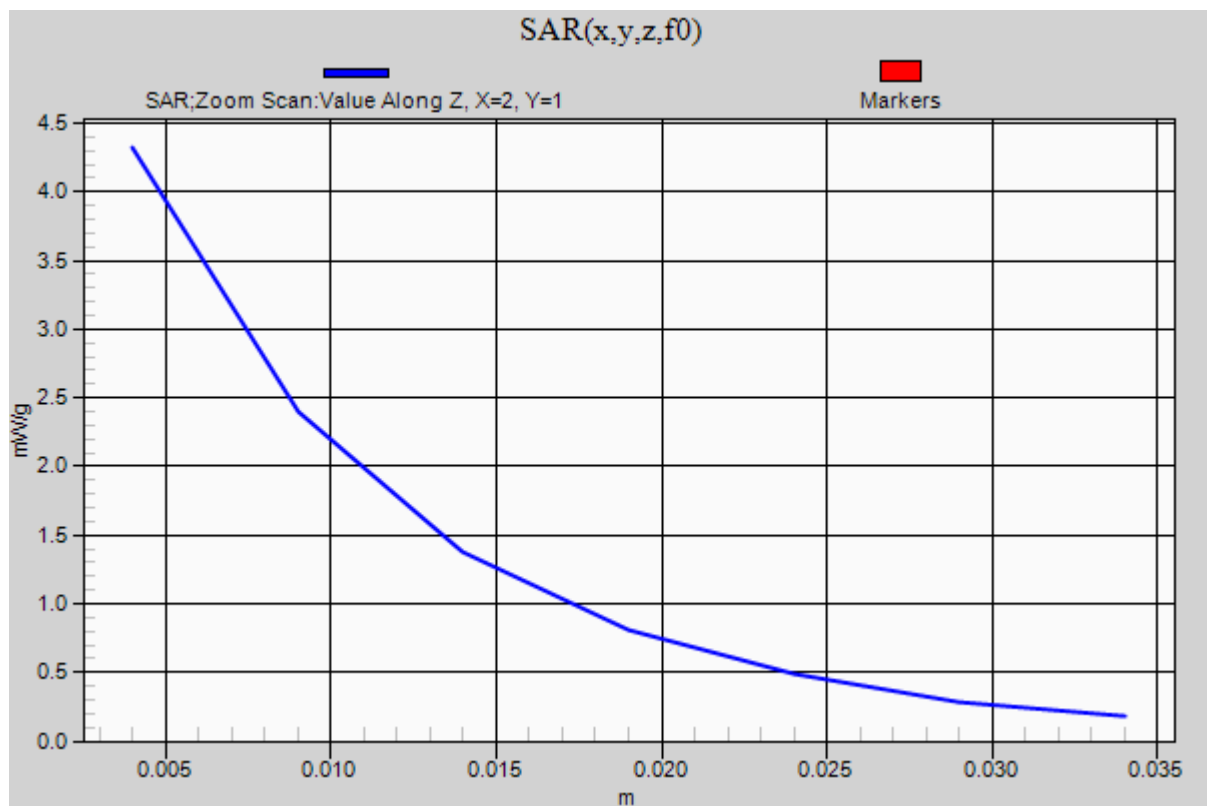
Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 3.88 mW/g; SAR(10 g) = 2.02 mW/g

Deviation = -1.27%



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 719

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.79 \text{ mho/m}$; $\epsilon_r = 37.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-08-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(4.46, 4.46, 4.46); Calibrated: 3/16/2012

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

2450MHz System Verification

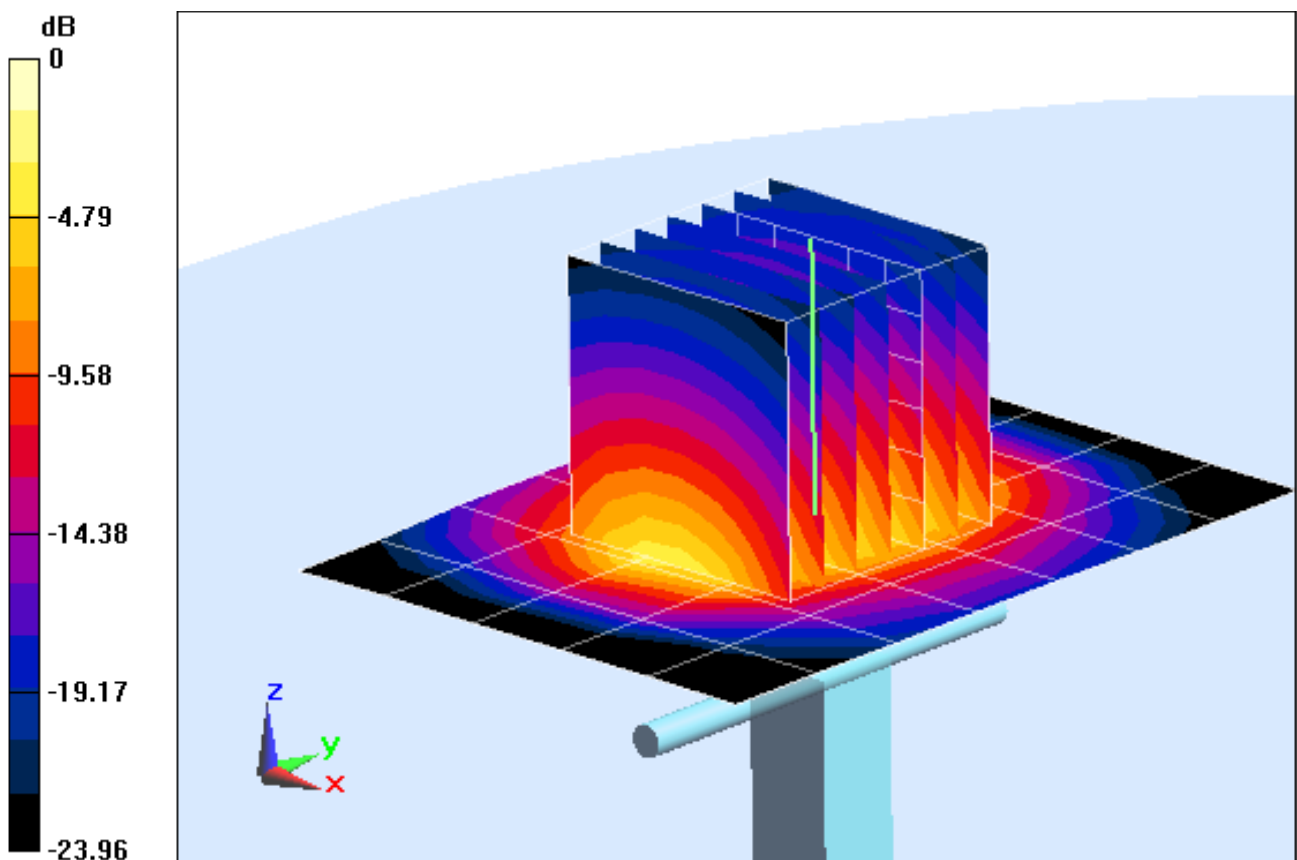
Area Scan (6x8x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 5.16 mW/g; SAR(10 g) = 2.35 mW/g

Deviation = -4.09 %



0 dB = 6.700mW/g = 16.52 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 719

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.79 \text{ mho/m}$; $\epsilon_r = 37.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-08-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(4.46, 4.46, 4.46); Calibrated: 3/16/2012

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

2450MHz System Verification

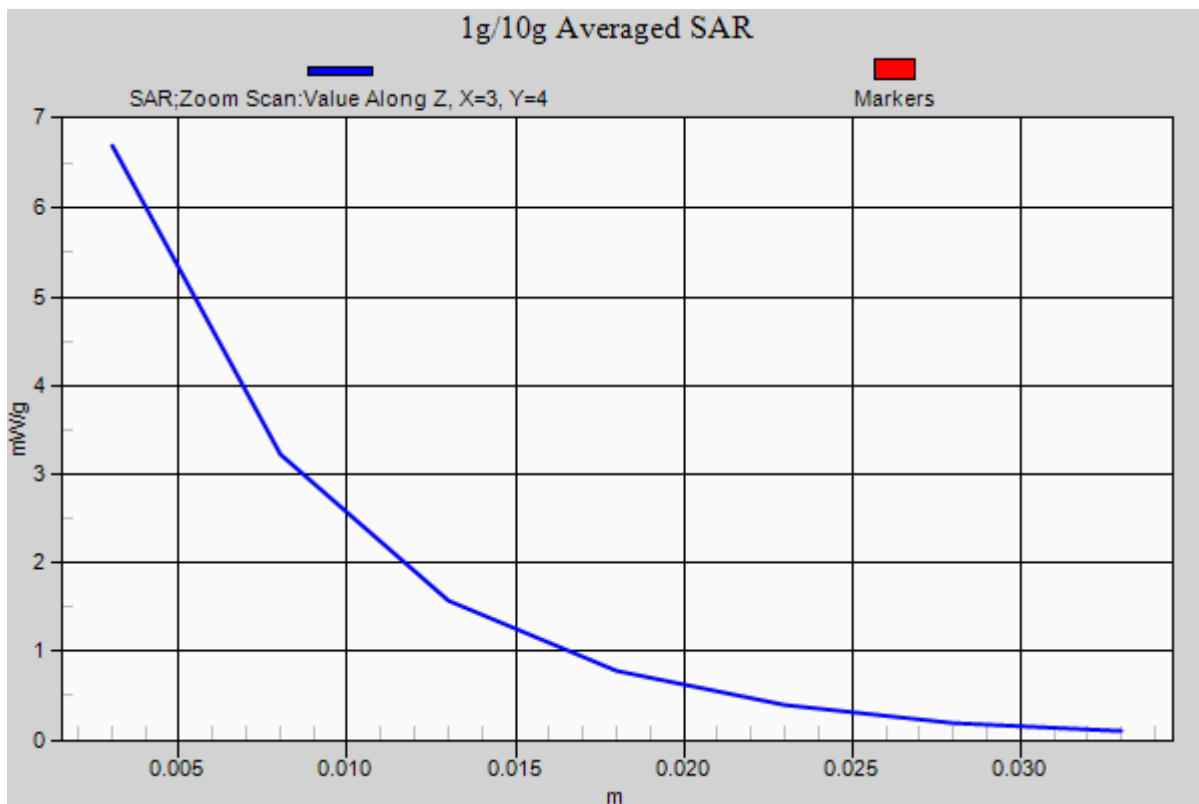
Area Scan (6x8x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 5.16 mW/g; SAR(10 g) = 2.35 mW/g

Deviation = -4.09 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 4.481 \text{ mho/m}$; $\epsilon_r = 35.71$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5200MHz System Verification

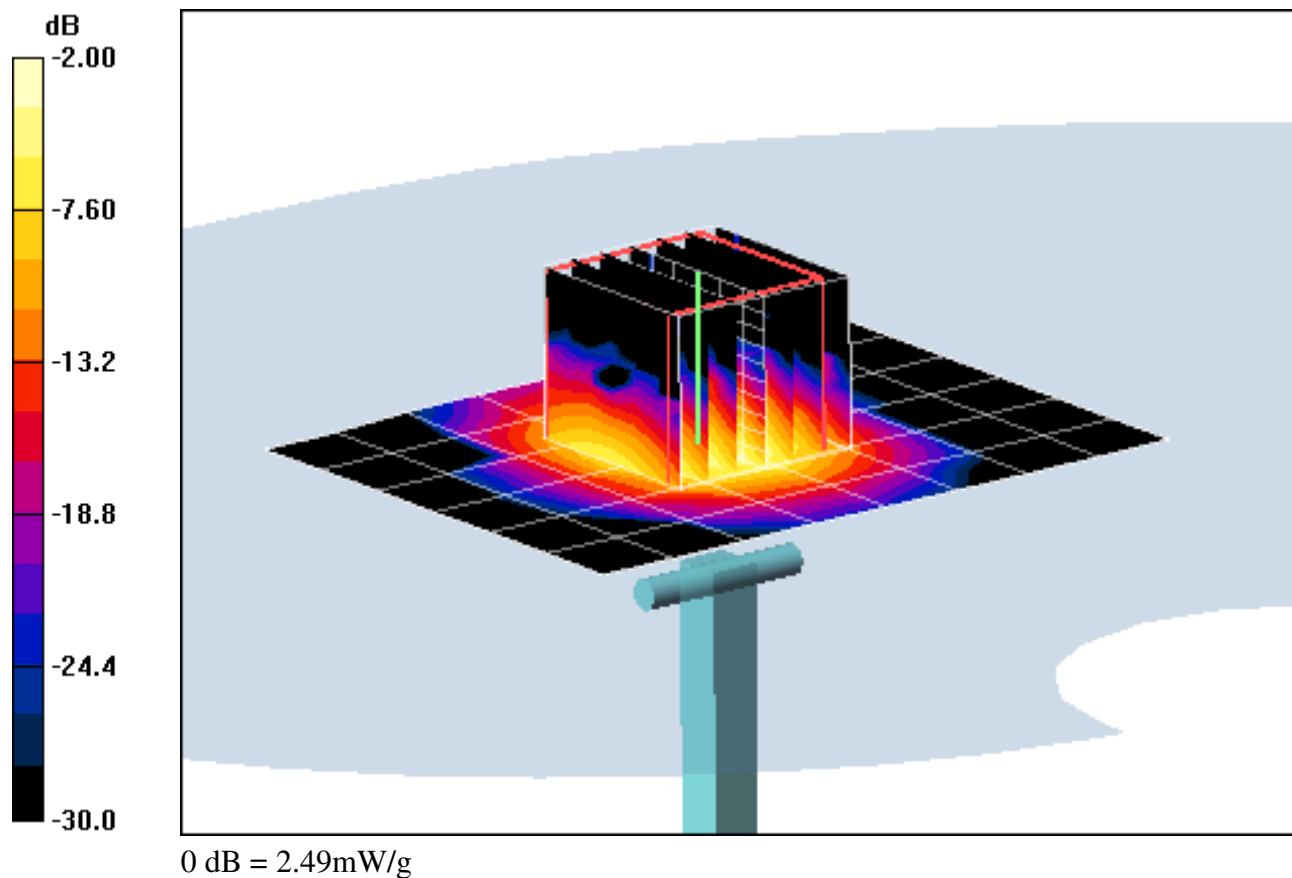
Area Scan (7x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Input Power = 12.0 dBm (16 mW)

SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.350 mW/g

Deviation = 0.35 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 4.481 \text{ mho/m}$; $\epsilon_r = 35.71$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2 °C; Tissue Temp: 21.6 °C

Probe: EX3DV4 - SN3589; ConvF(4.59, 4.59, 4.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5200MHz System Verification

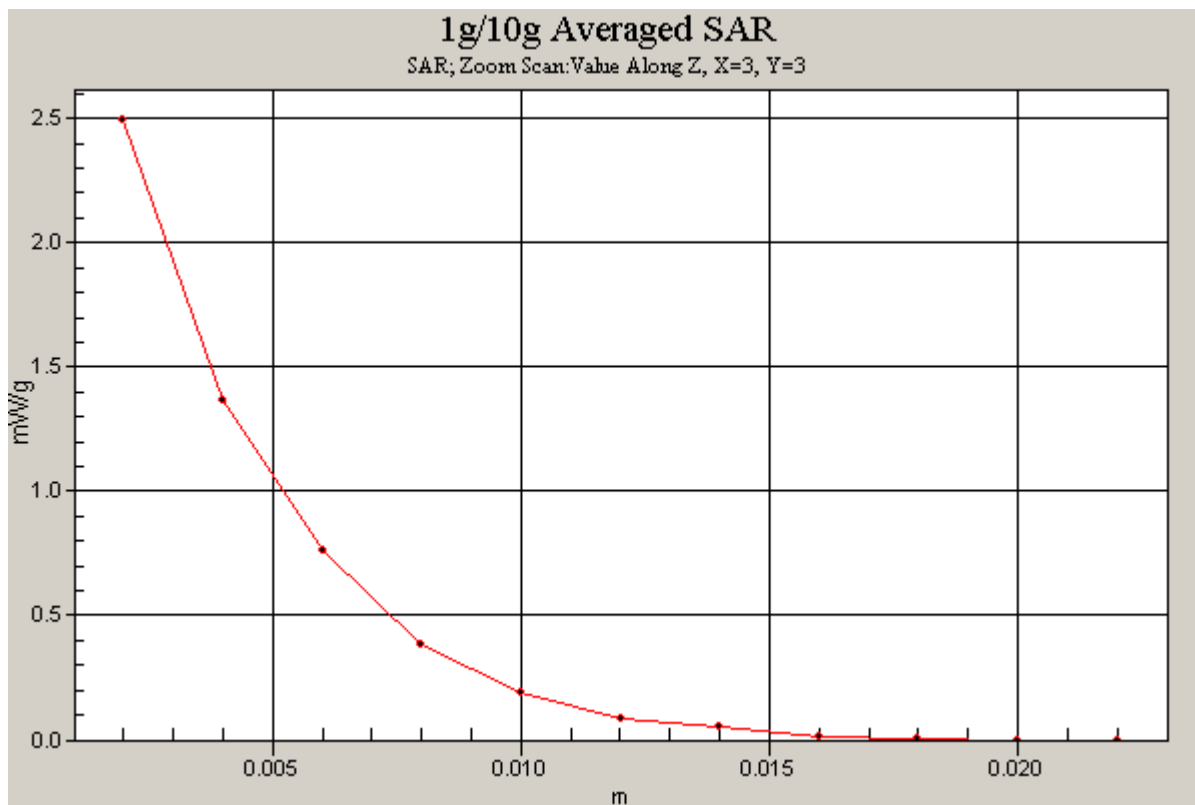
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.0 dBm (16 mW)

SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.350 mW/g

Deviation = 0.35 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 4.737 \text{ mho/m}$; $\epsilon_r = 35.37$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.5 °C; Tissue Temp: 21.7 °C

Probe: EX3DV4 - SN3589; ConvF(4.33, 4.33, 4.33); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5500MHz System Verification

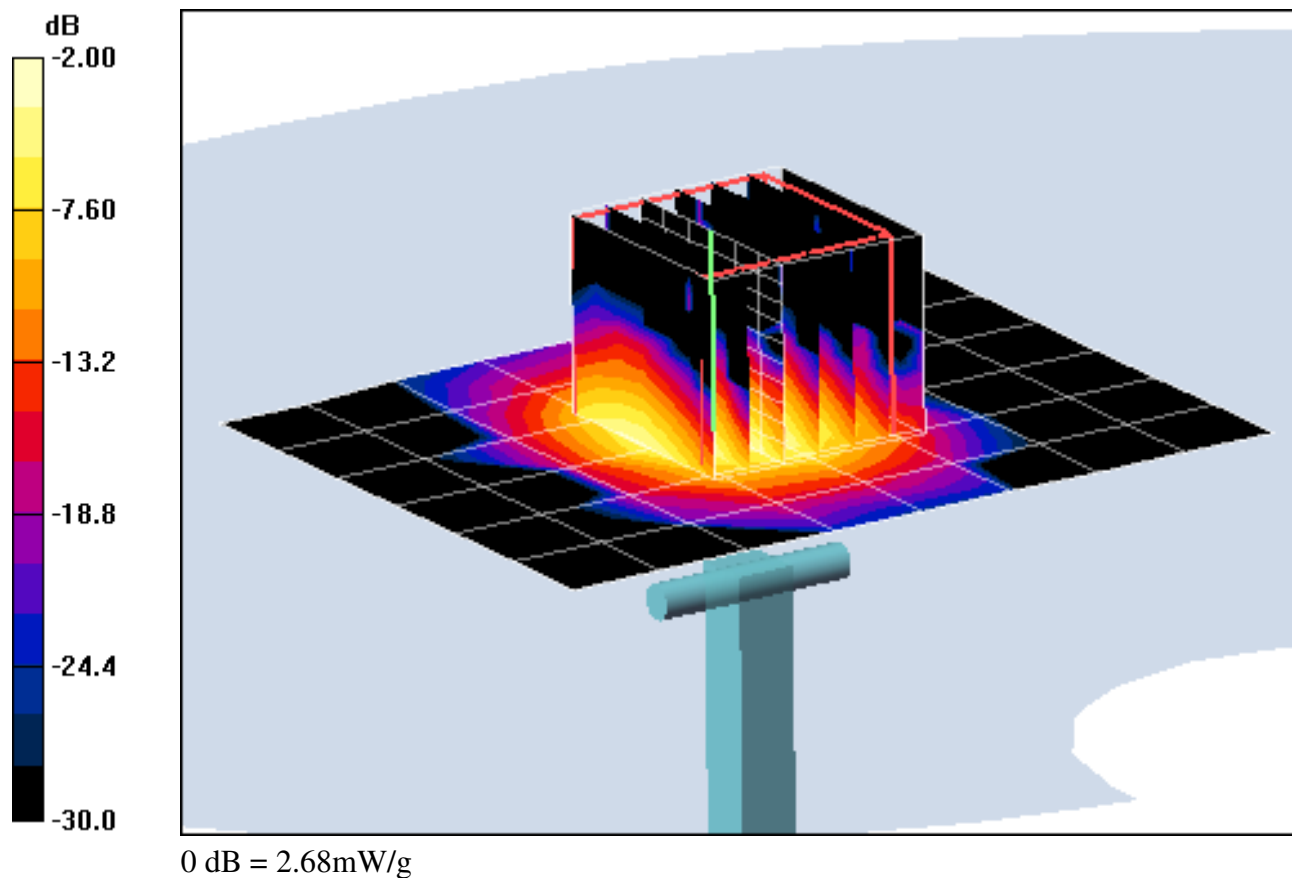
Area Scan (7x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Input Power = 12.0 dBm (16 mW)

SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.349 mW/g

Deviation = -0.62 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 4.737 \text{ mho/m}$; $\epsilon_r = 35.37$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.5 °C; Tissue Temp: 21.7 °C

Probe: EX3DV4 - SN3589; ConvF(4.33, 4.33, 4.33); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5500MHz System Verification

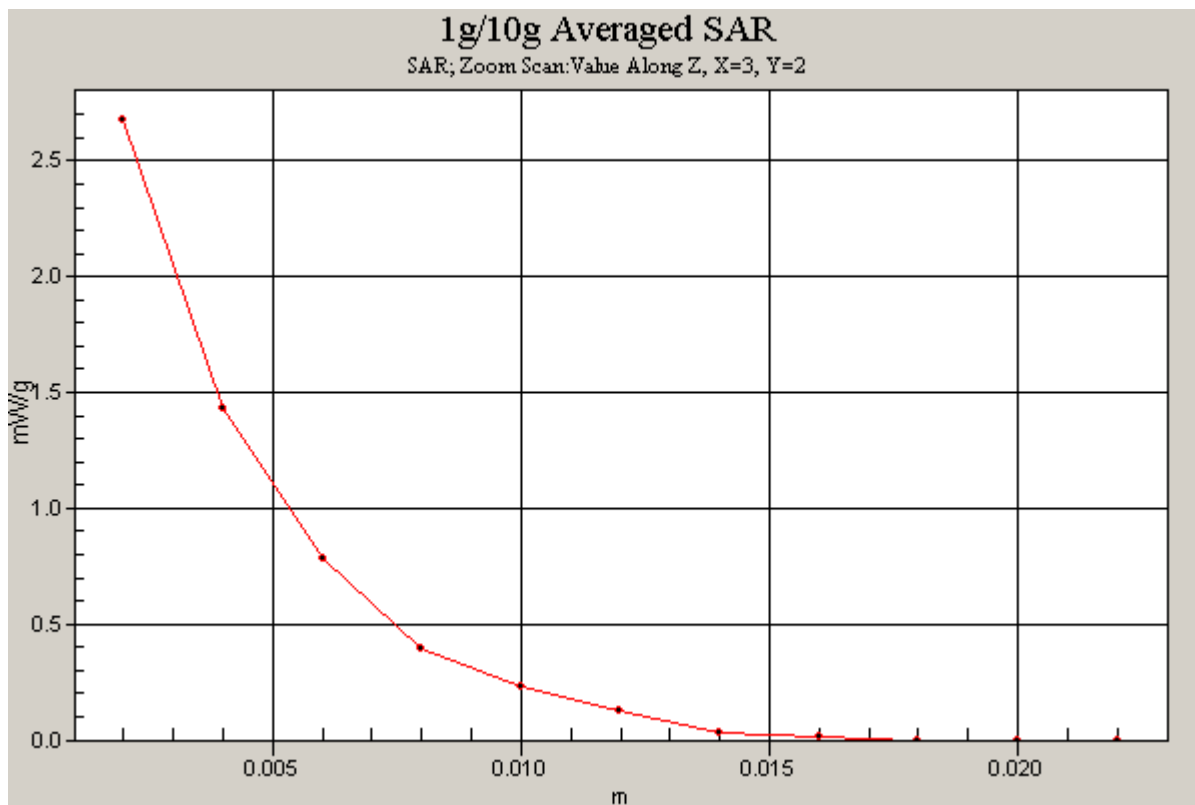
Area Scan (7x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Input Power = 12.0 dBm (16 mW)

SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.349 mW/g

Deviation = -0.62 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.029 \text{ mho/m}$; $\epsilon_r = 34.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.8 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5800MHz System Verification

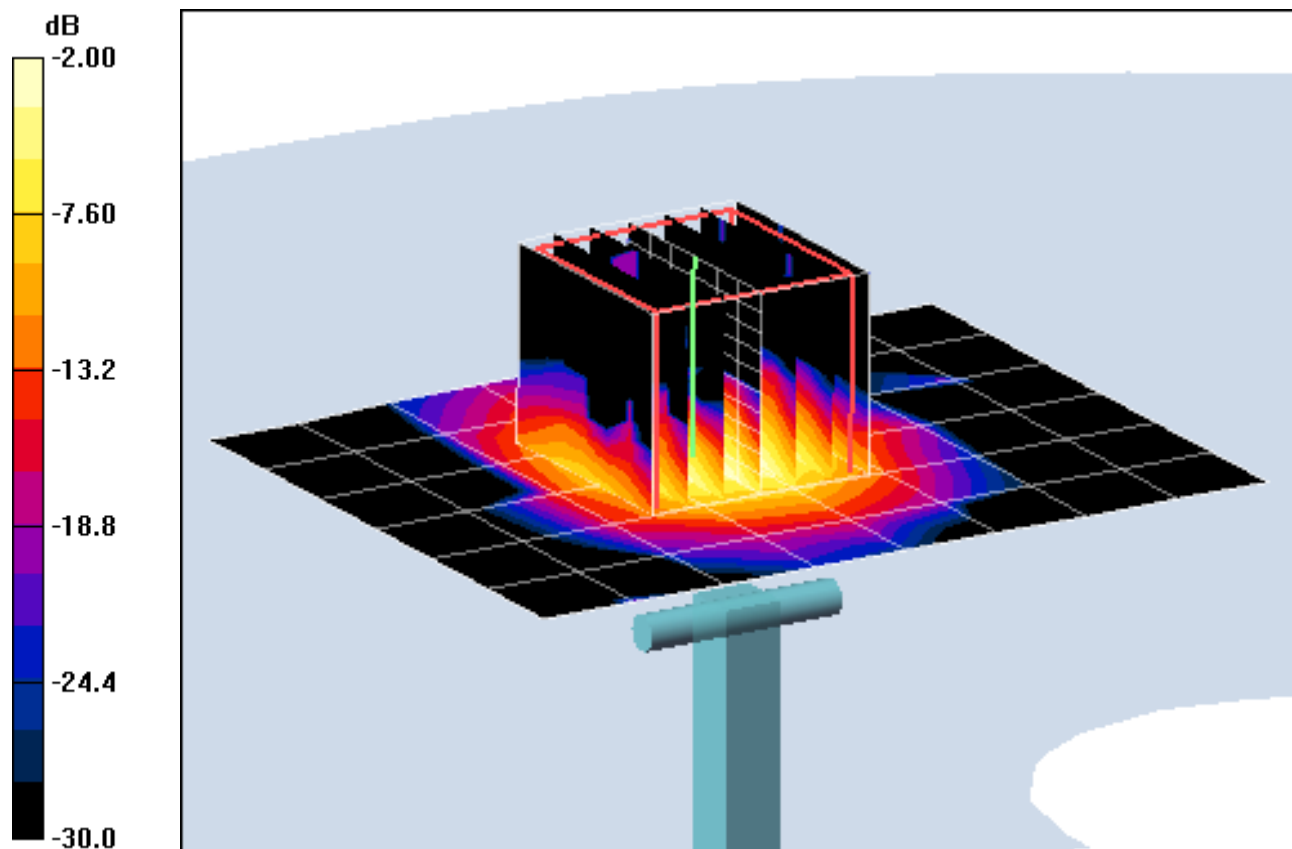
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.0 dBm (16 mW)

SAR(1 g) = 1.3 mW/g; SAR(10 g) = 0.349 mW/g

Deviation = 2.20 %



0 dB = 2.79mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.029 \text{ mho/m}$; $\epsilon_r = 34.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.8 °C; Tissue Temp: 21.9 °C

Probe: EX3DV4 - SN3589; ConvF(4.05, 4.05, 4.05); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5800MHz System Verification

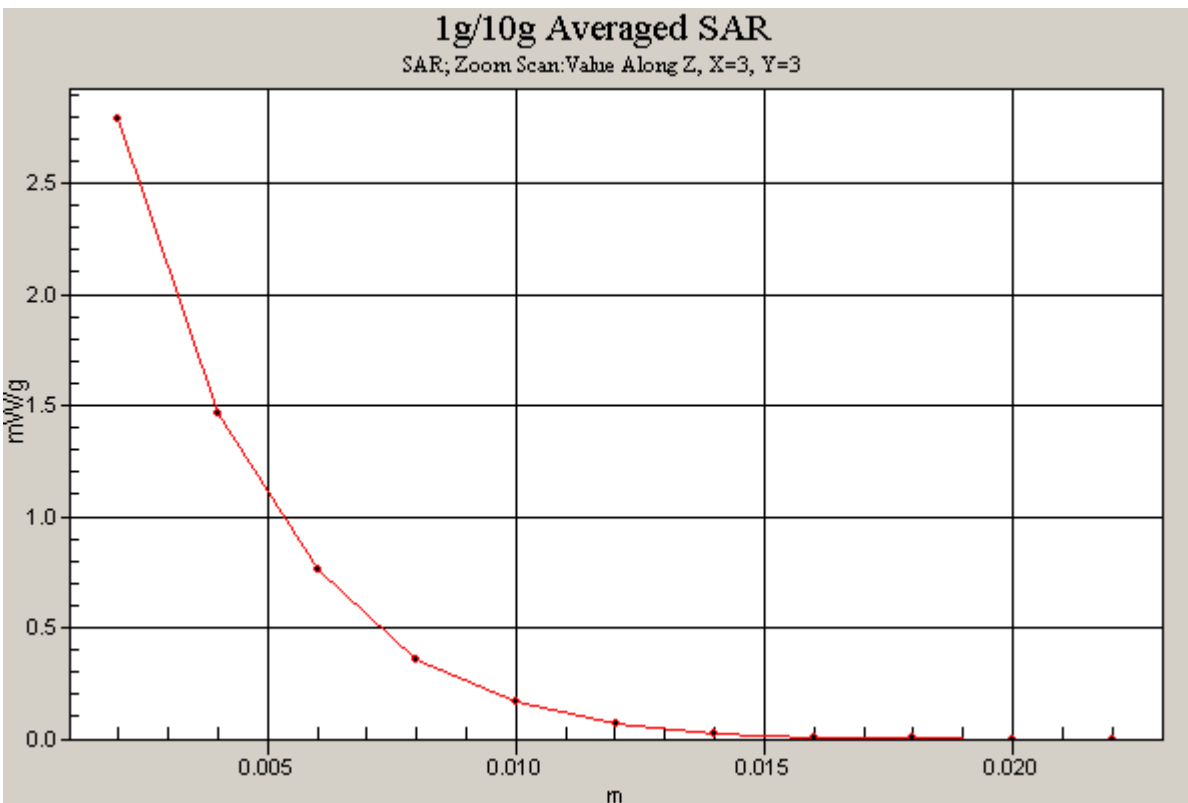
Area Scan (7x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x11)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Input Power = 12.0 dBm (16 mW)

SAR(1 g) = 1.3 mW/g; SAR(10 g) = 0.349 mW/g

Deviation = 2.20 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used:

$f = 750 \text{ MHz}$; $\sigma = 0.981 \text{ mho/m}$; $\epsilon_r = 53.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 22.4°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

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

750MHz System Verification

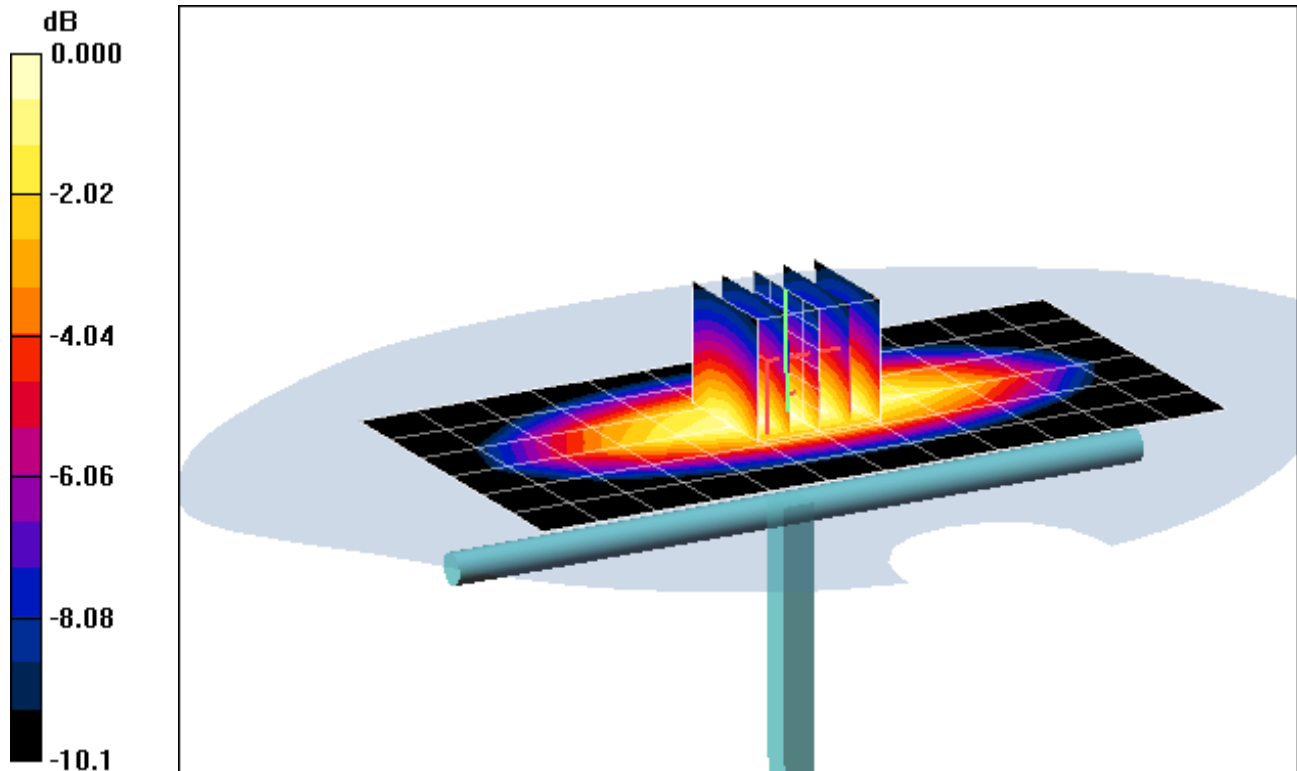
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power: 20.0 dBm (100mW)

SAR(1 g) = 0.869 mW/g; SAR(10 g) = 0.580 mW/g

Deviation: -0.34 %



0 dB = 0.936mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used:

$f = 750 \text{ MHz}$; $\sigma = 0.981 \text{ mho/m}$; $\epsilon_r = 53.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 22.4°C

Probe: ES3DV2 - SN3022; ConvF(6.11, 6.11, 6.11); Calibrated: 8/25/2011

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

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

750MHz System Verification

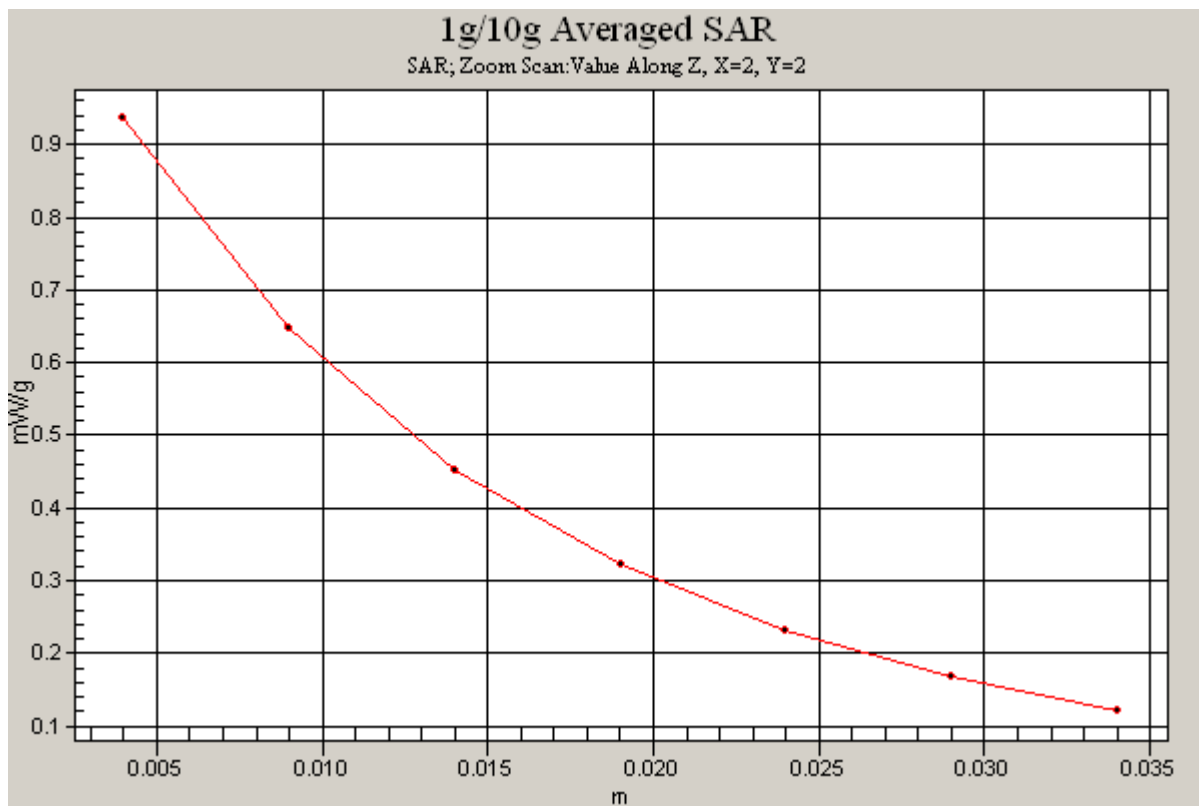
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power: 20.0 dBm (100mW)

SAR(1 g) = 0.869 mW/g; SAR(10 g) = 0.580 mW/g

Deviation: -0.34 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.987 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-25-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

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

835MHz System Verification

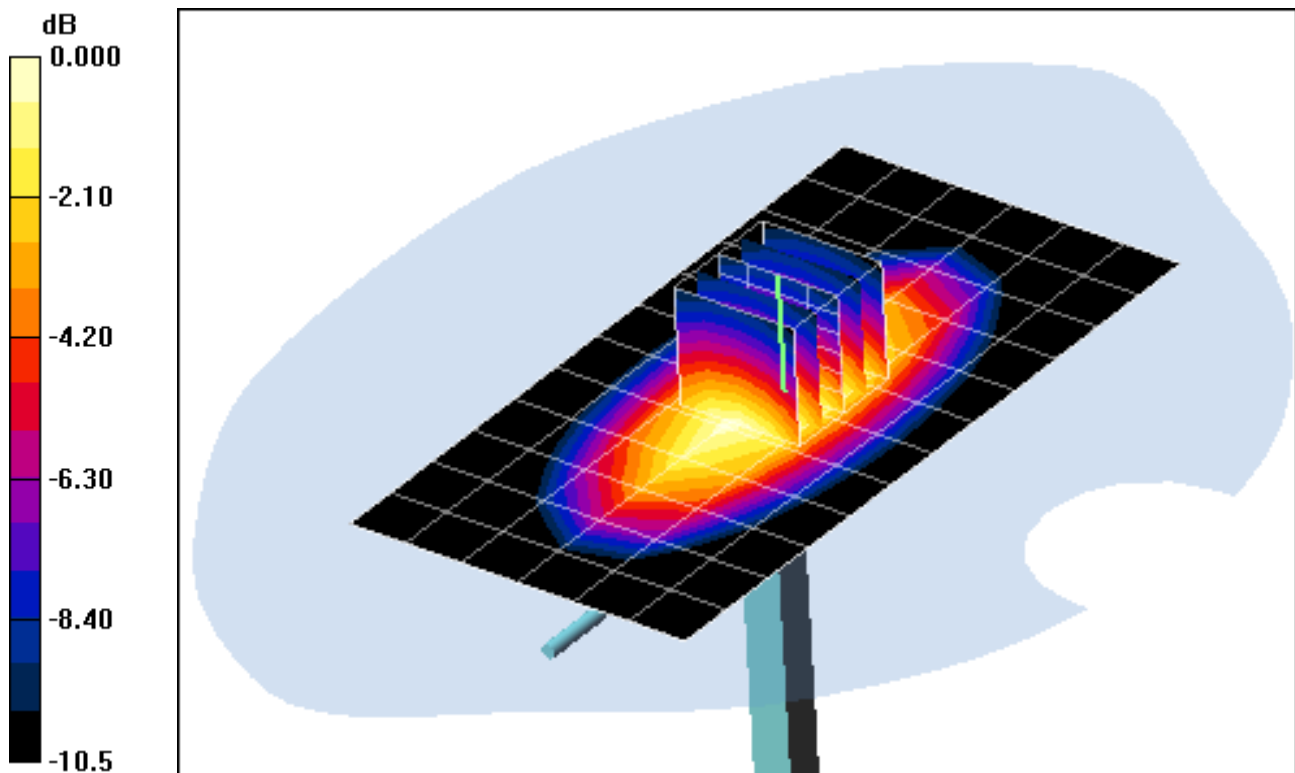
Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power: 20.0 dBm (100mW)

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.668 mW/g

Deviation: 5.59%



0 dB = 1.09mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d026

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.987 \text{ mho/m}$; $\epsilon_r = 52.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-25-2012; Ambient Temp: 23.7°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

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

835MHz System Verification

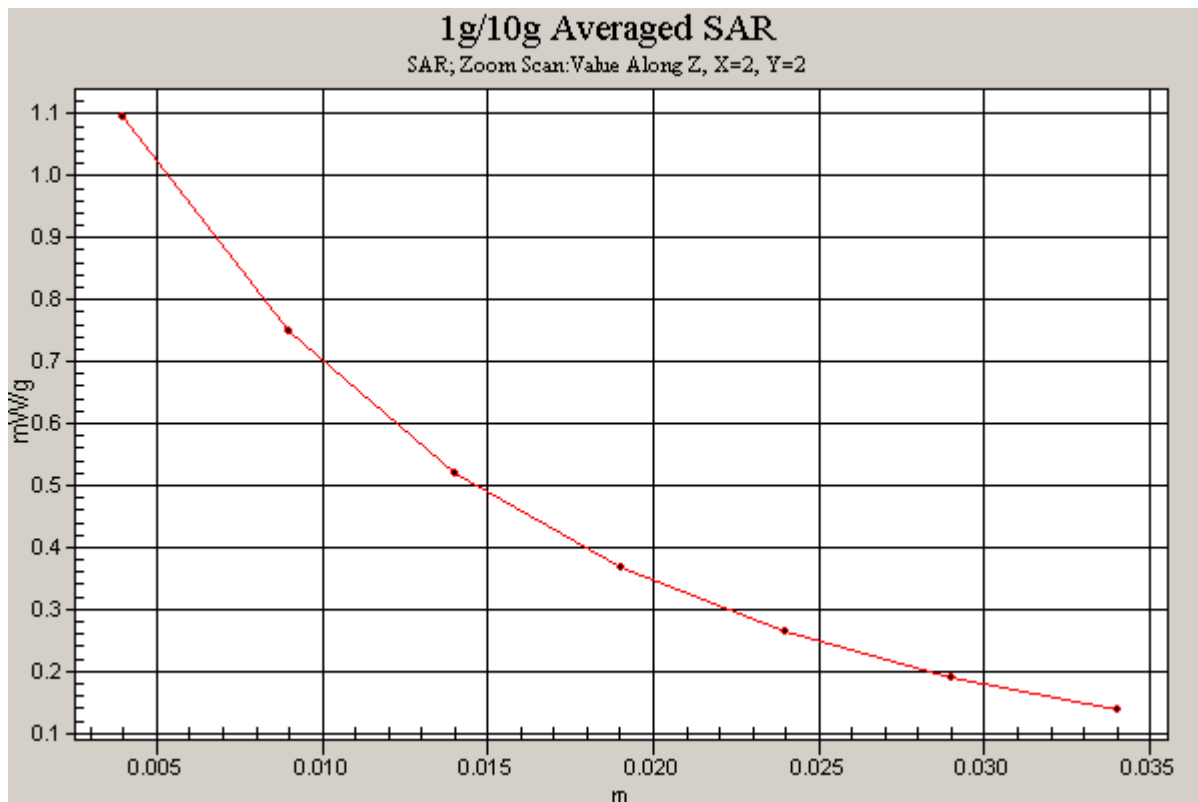
Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.668 mW/g

Deviation: 5.59%



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.527 \text{ mho/m}$; $\epsilon_r = 52.073$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2012; Ambient Temp: 21.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

1900 MHz System Verification

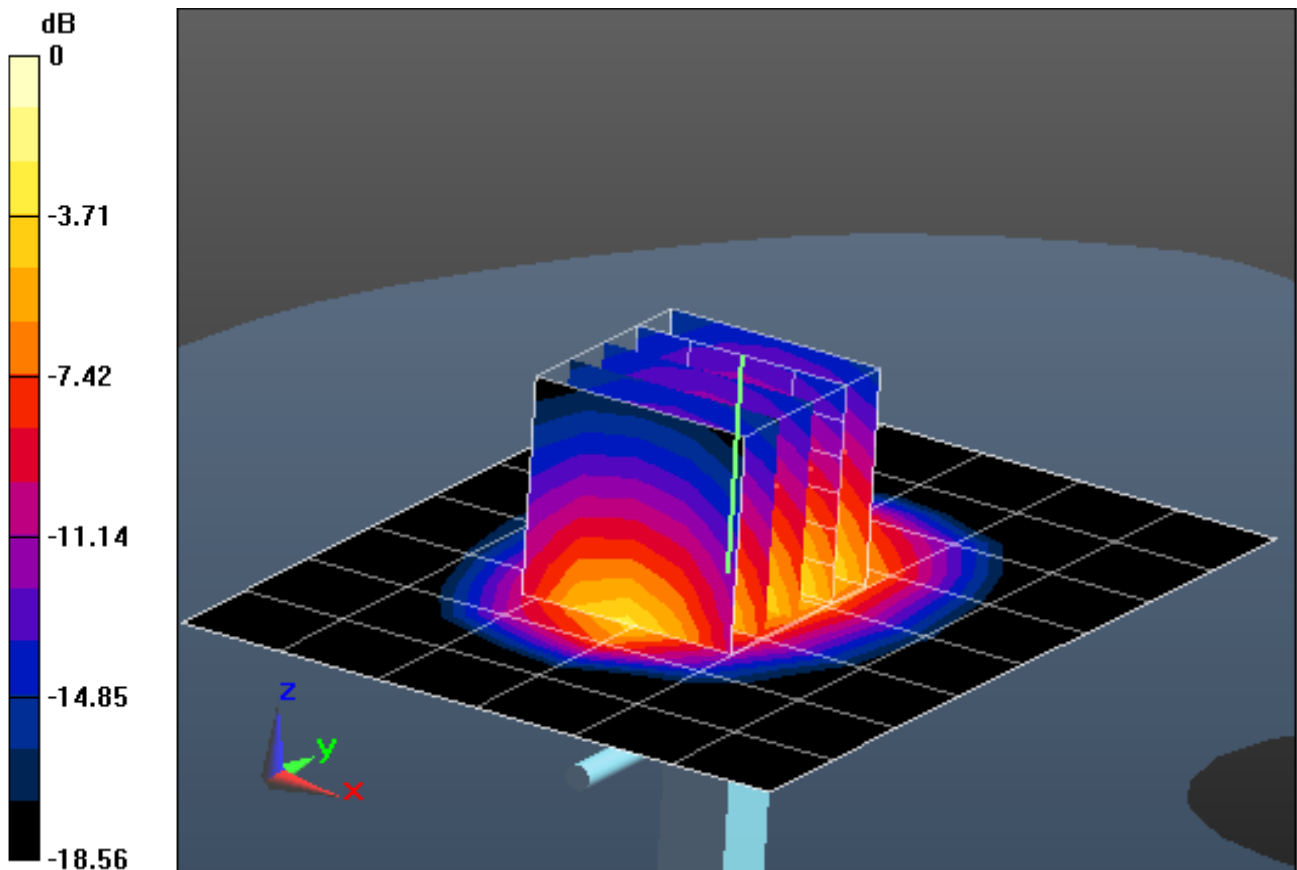
Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 3.92 mW/g; SAR(10 g) = 2.05 mW/g

Deviation = - 0.25 %



0 dB = 4.370mW/g = 12.81 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.527 \text{ mho/m}$; $\epsilon_r = 52.073$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-23-2012; Ambient Temp: 21.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE3 Sn455; Calibrated: 11/9/2011

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (0); SEMCAD X Version 14.6.4 (4989)

1900 MHz System Verification

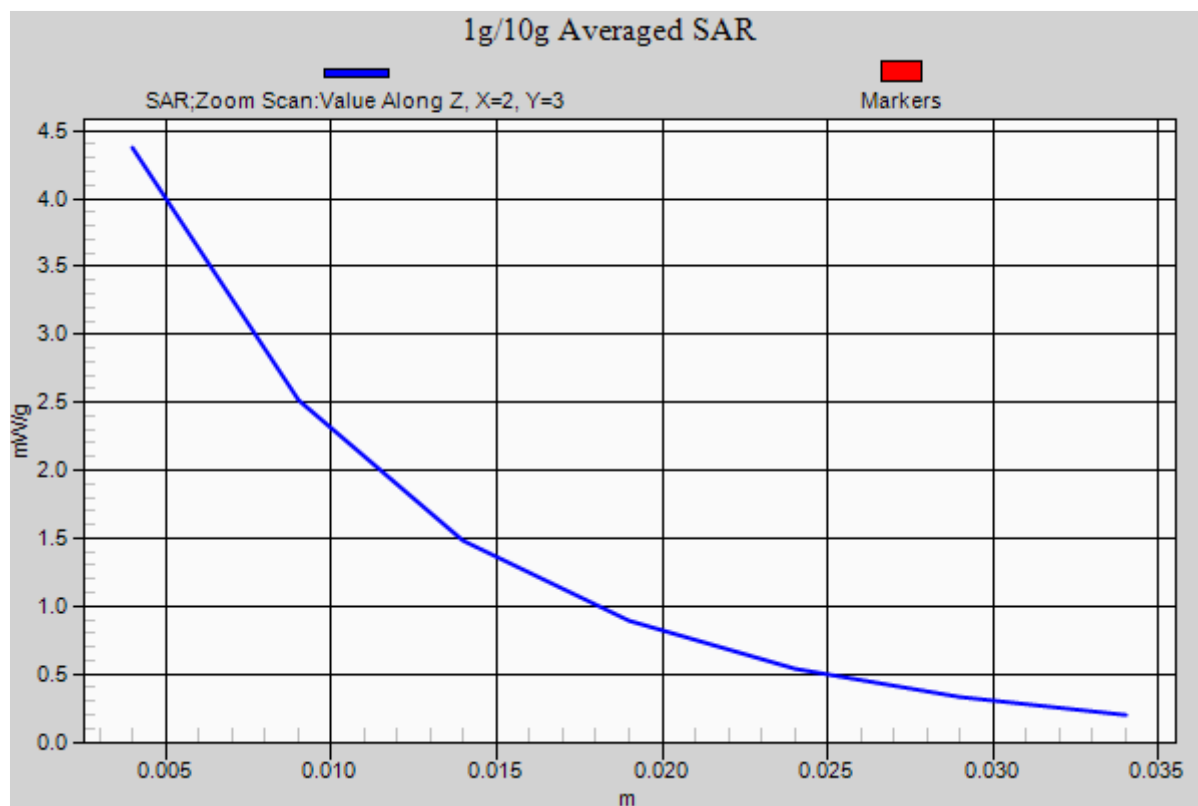
Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 3.92 mW/g; SAR(10 g) = 2.05 mW/g

Deviation = - 0.25 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.02 \text{ mho/m}$; $\epsilon_r = 50.15$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

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

2450MHz System Verification

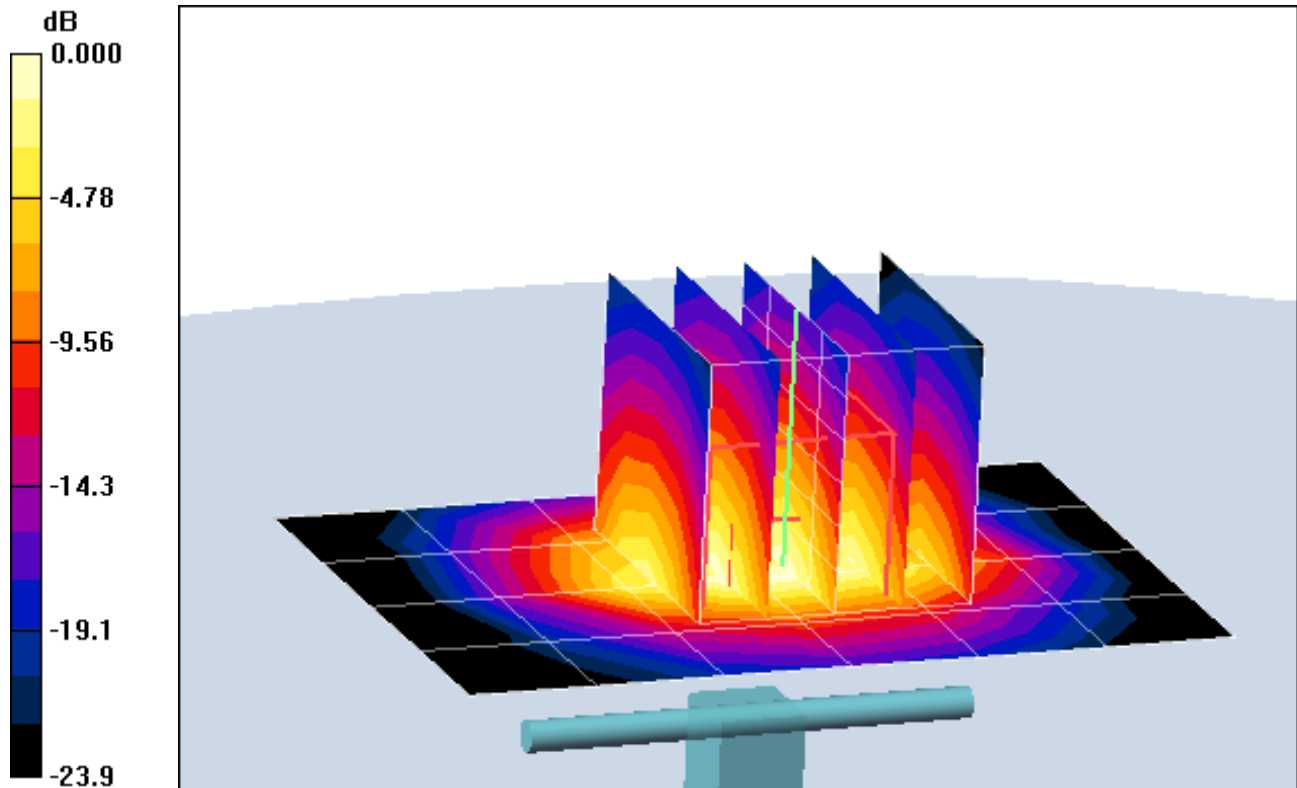
Area Scan (5x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 5.3 mW/g; SAR(10 g) = 2.41 mW/g

Deviation = 3.31 %



0 dB = 6.87mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.02 \text{ mho/m}$; $\epsilon_r = 50.15$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-24-2012; Ambient Temp: 23.2°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(4.01, 4.01, 4.01); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/19/2011

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

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

2450MHz System Verification

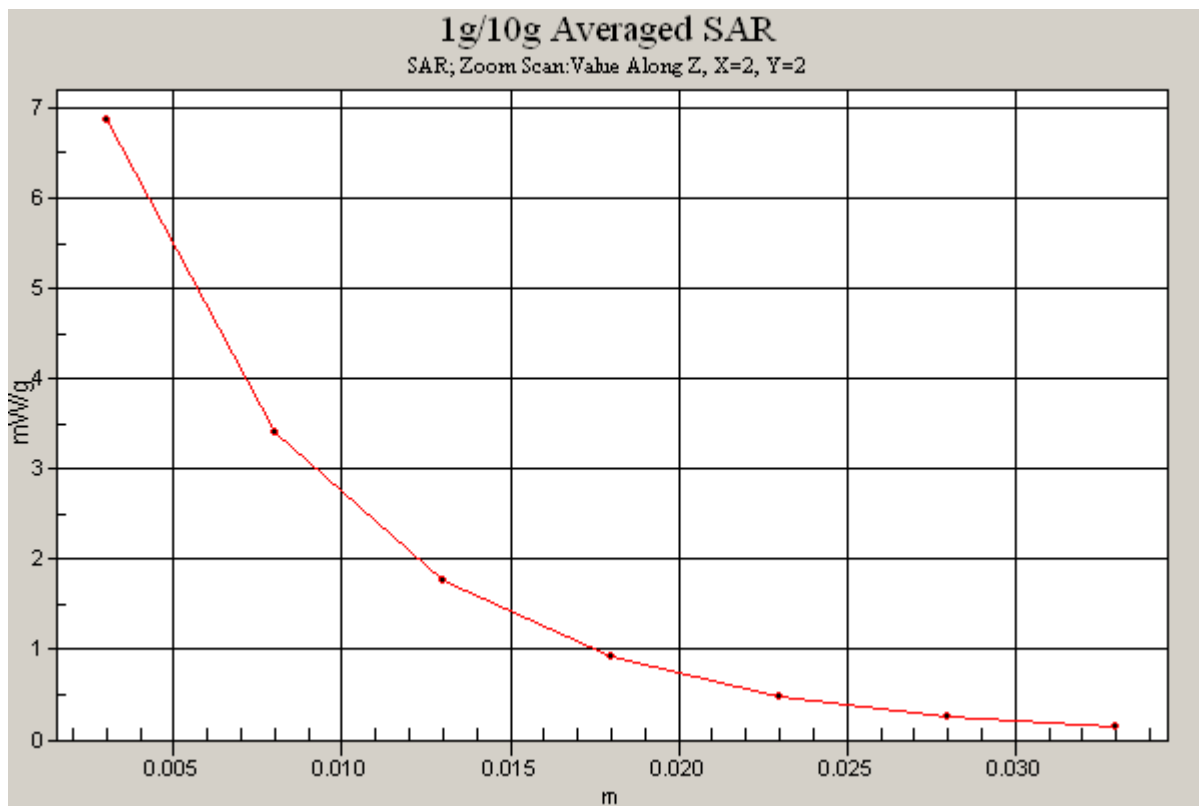
Area Scan (5x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

SAR(1 g) = 5.3 mW/g; SAR(10 g) = 2.41 mW/g

Deviation = 3.31 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 5.225 \text{ mho/m}$; $\epsilon = 47.92$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.6 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5200MHz System Verification

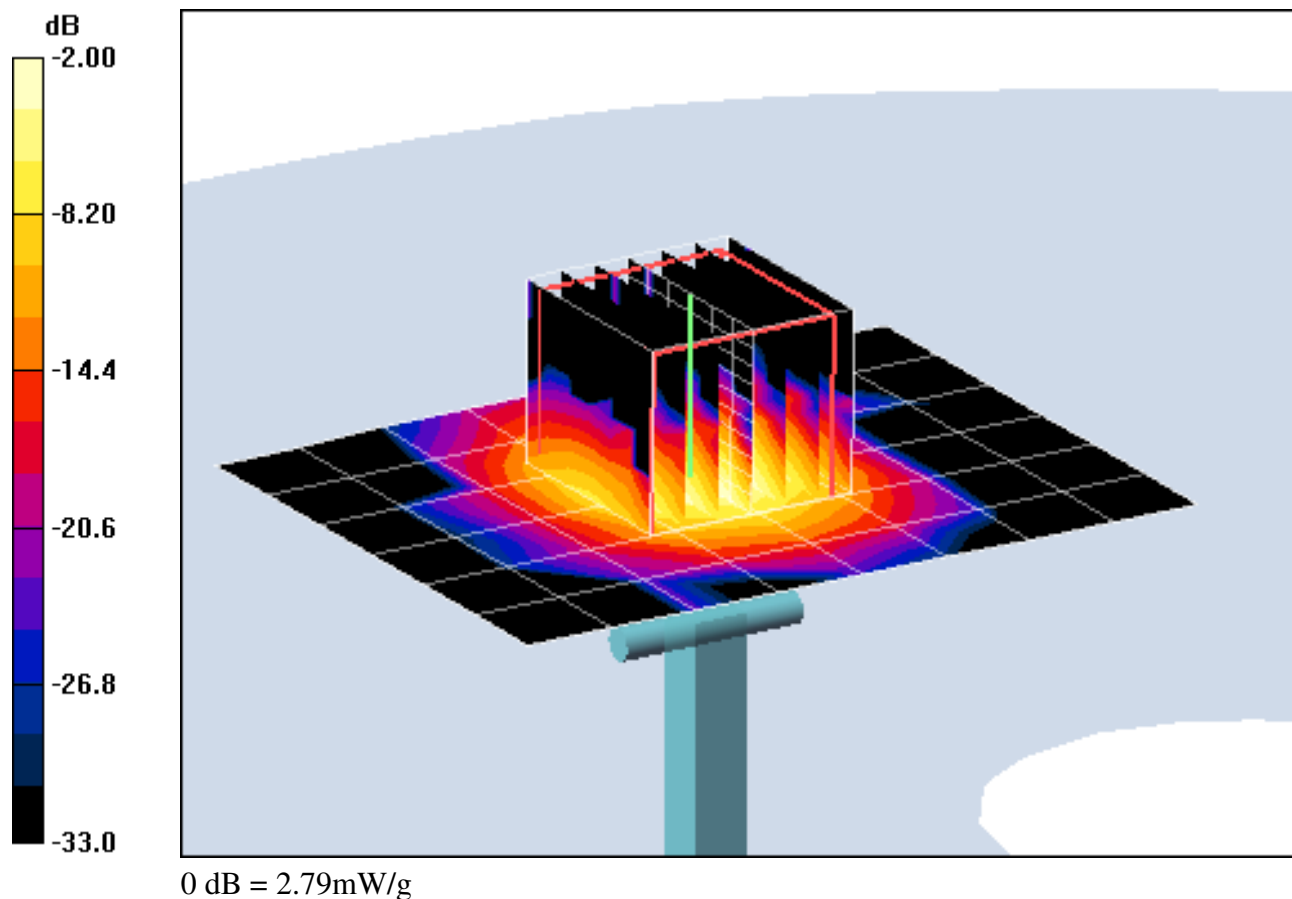
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.4 dBm (17.4 mW)

SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.347 mW/g

Deviation = 3.35 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 5.225 \text{ mho/m}$; $\epsilon_r = 47.92$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.6 °C; Tissue Temp: 22.1 °C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5200MHz System Verification

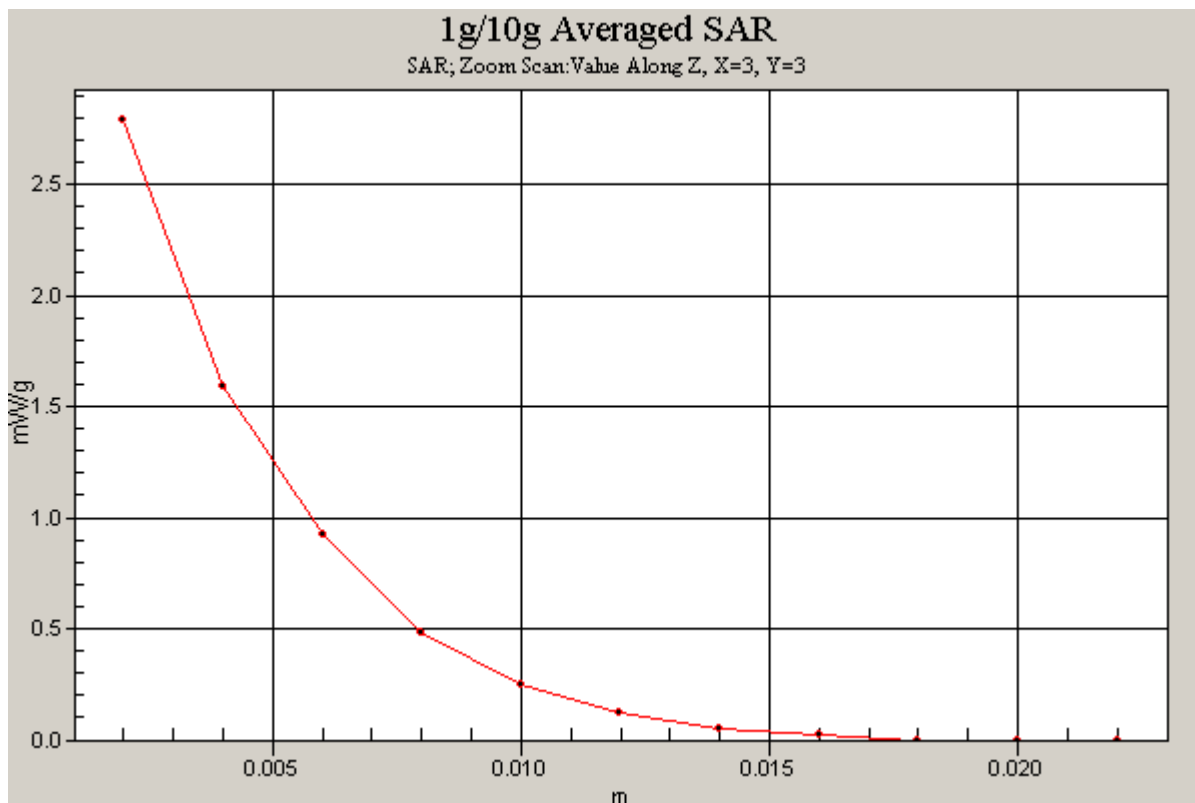
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.4 dBm (17.4 mW)

SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.347 mW/g

Deviation = 3.35 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.648 \text{ mho/m}$; $\epsilon_r = 47.85$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5500MHz System Verification

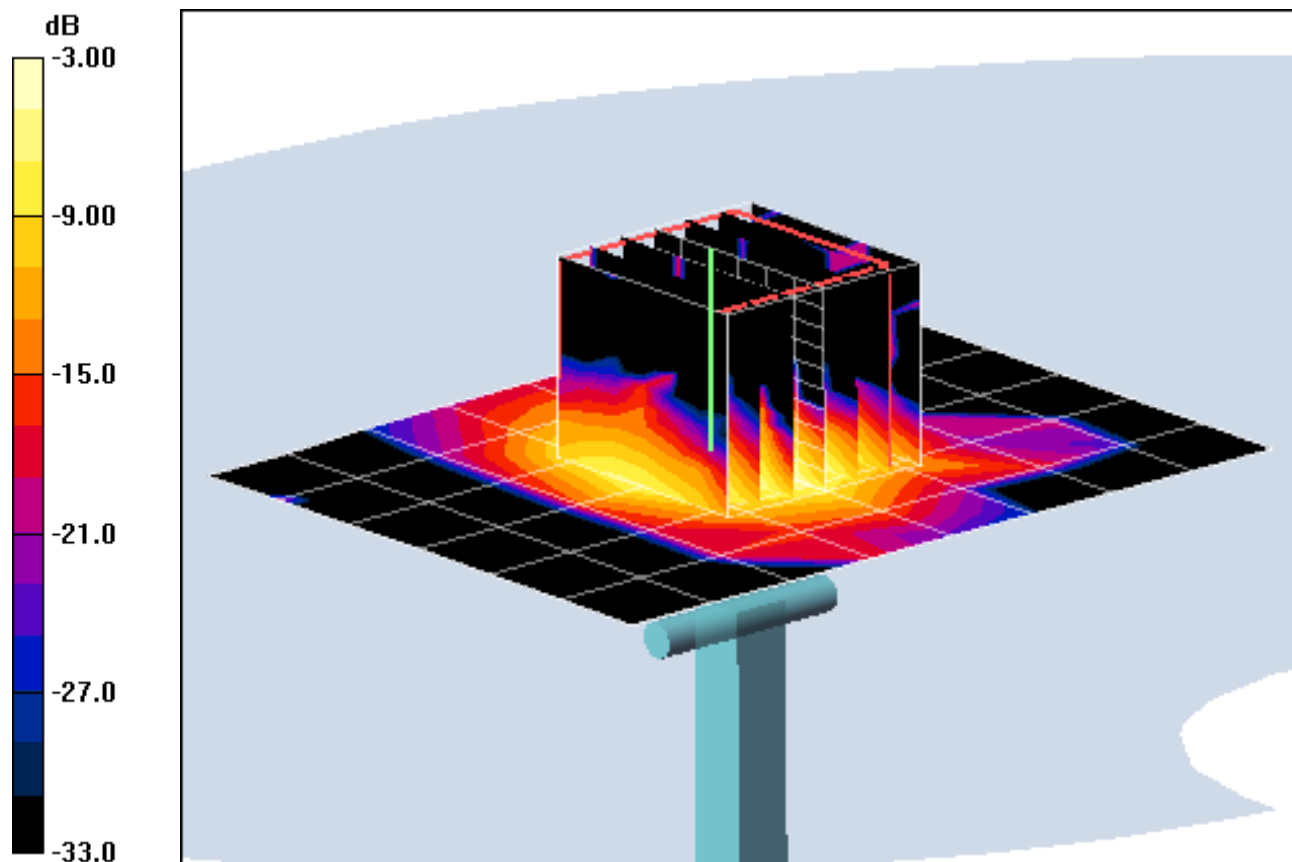
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.4 dBm (17.4 mW)

SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.344 mW/g

Deviation = -3.85 %



0 dB = 2.67mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.648 \text{ mho/m}$; $\epsilon_r = 47.85$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.7 °C; Tissue Temp: 22.3 °C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5500MHz System Verification

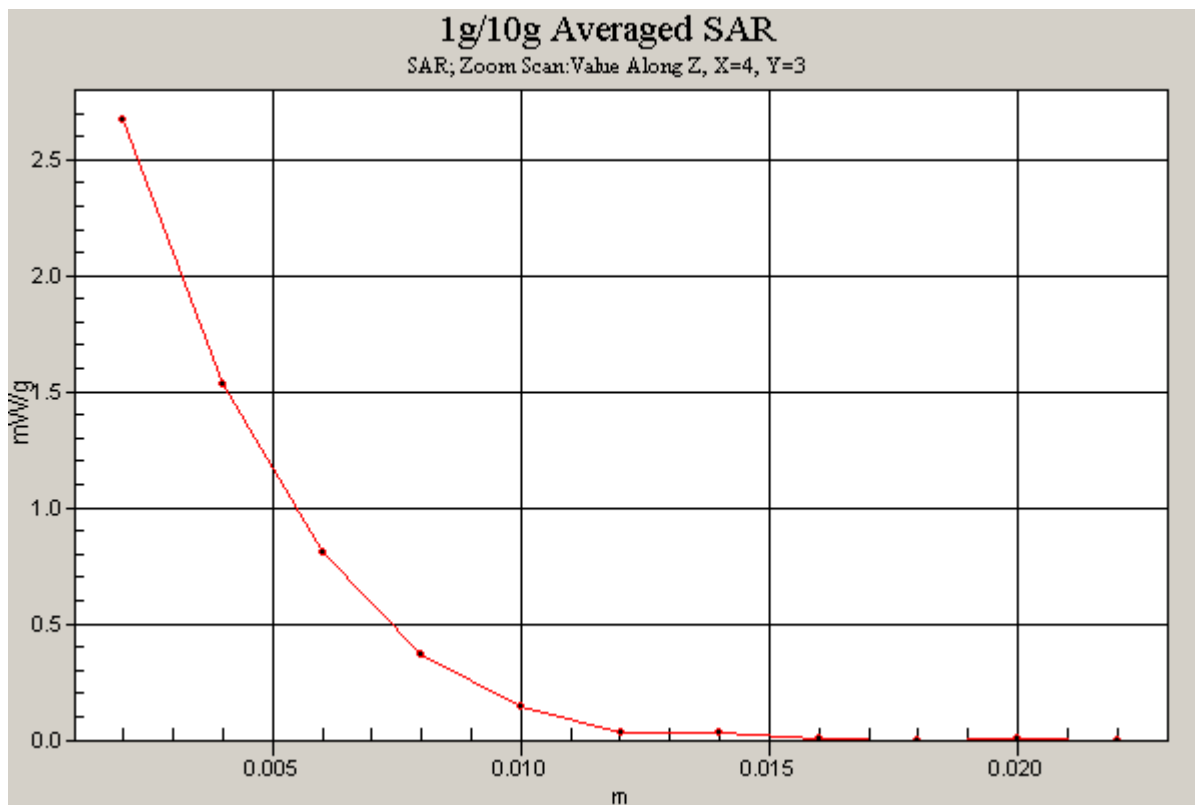
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.4 dBm (17.4 mW)

SAR(1 g) = 1.32 mW/g; SAR(10 g) = 0.344 mW/g

Deviation = -3.85 %



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.976 \text{ mho/m}$; $\epsilon_r = 46.66$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.8 °C; Tissue Temp: 22.6 °C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5800MHz System Verification

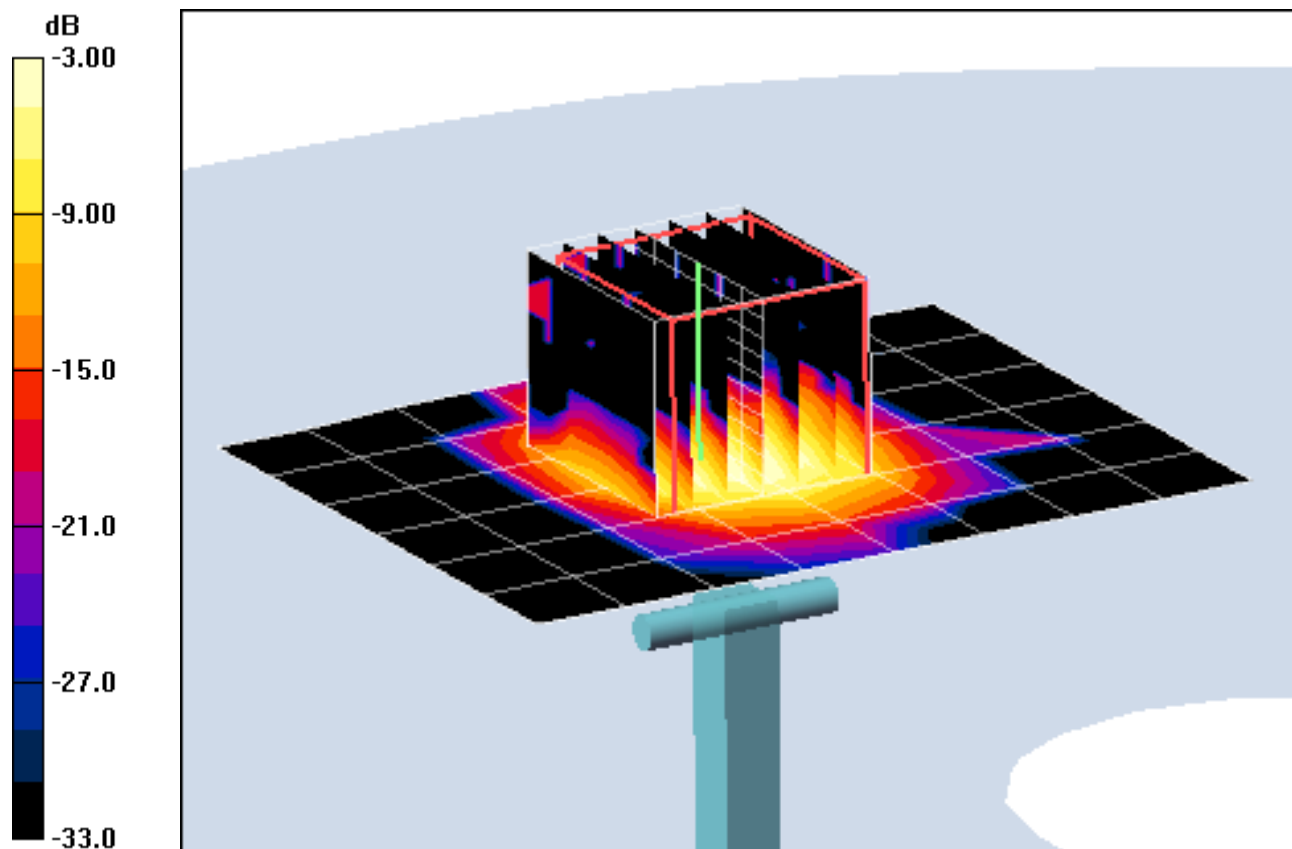
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.4 dBm (17.4 mW)

SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.320 mW/g

Deviation = -4.09 %



0 dB = 2.69mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.976 \text{ mho/m}$; $\epsilon_r = 46.66$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-25-2012; Ambient Temp: 23.8 °C; Tissue Temp: 22.6 °C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

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

5800MHz System Verification

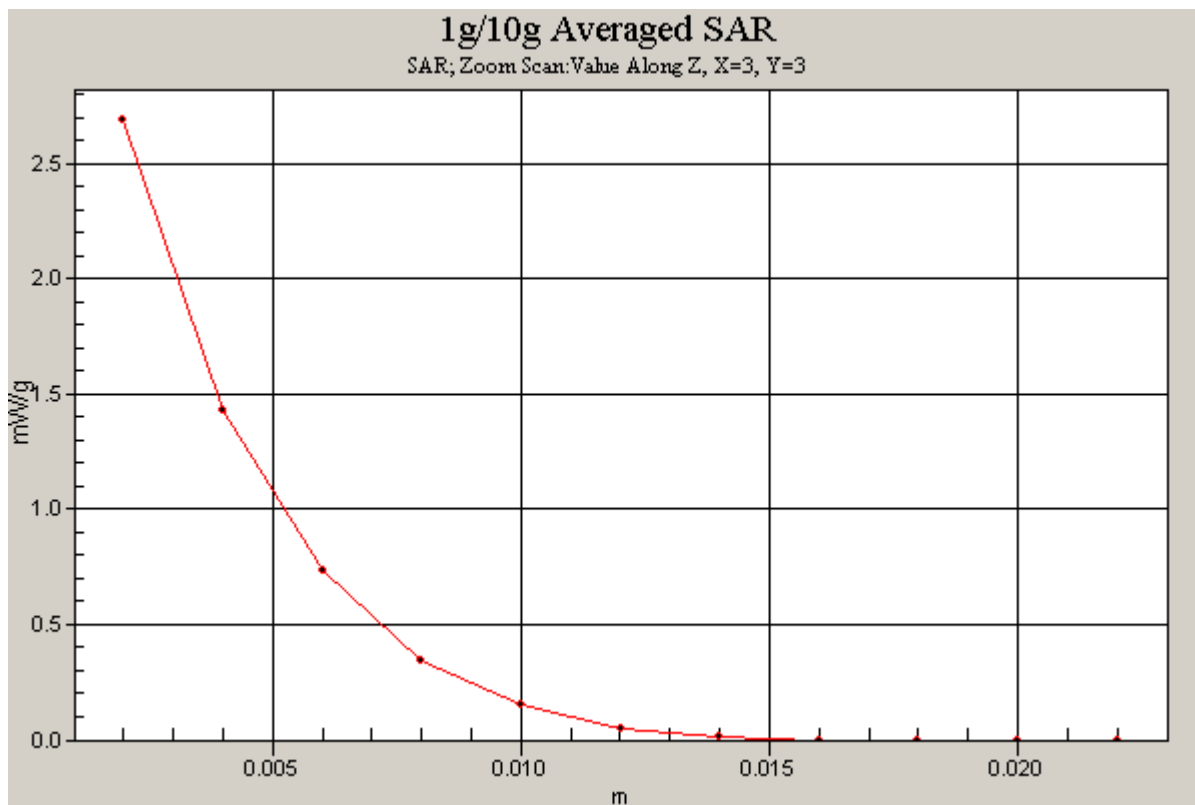
Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x11)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 12.4 dBm (17.4 mW)

SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.320 mW/g

Deviation = -4.09 %g



APPENDIX C: PROBE CALIBRATION



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1900V2-5d149_Feb12**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d149**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **February 22, 2012**

✓ KOK
 4/11/12

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Israe El-Naouq	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 23, 2012

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.4 $\pm$ 6 %	1.40 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.80 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.7 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.0 $\pm$ 6 %	1.56 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	39.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.23 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.7 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.4 \Omega + 5.5 j\Omega$
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.0 \Omega + 6.7 j\Omega$
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d149

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

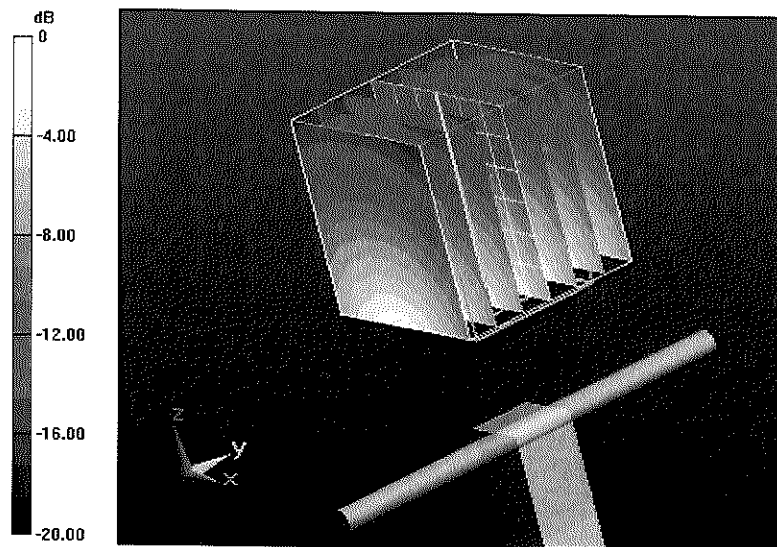
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.685 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.4710

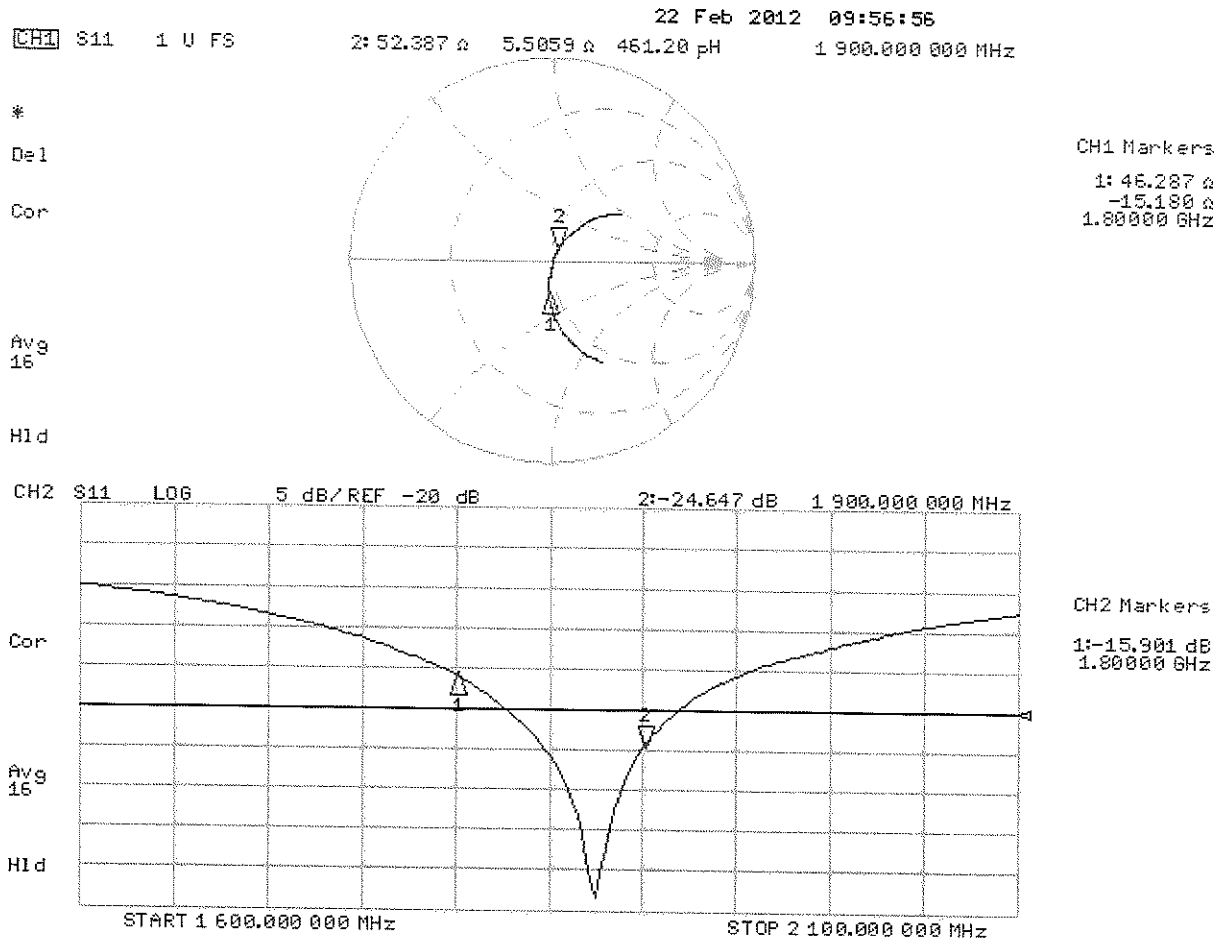
SAR(1 g) = 9.8 mW/g; SAR(10 g) = 5.18 mW/g

Maximum value of SAR (measured) = 12.114 mW/g



0 dB = 12.110mW/g = 21.66 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d149

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 53$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

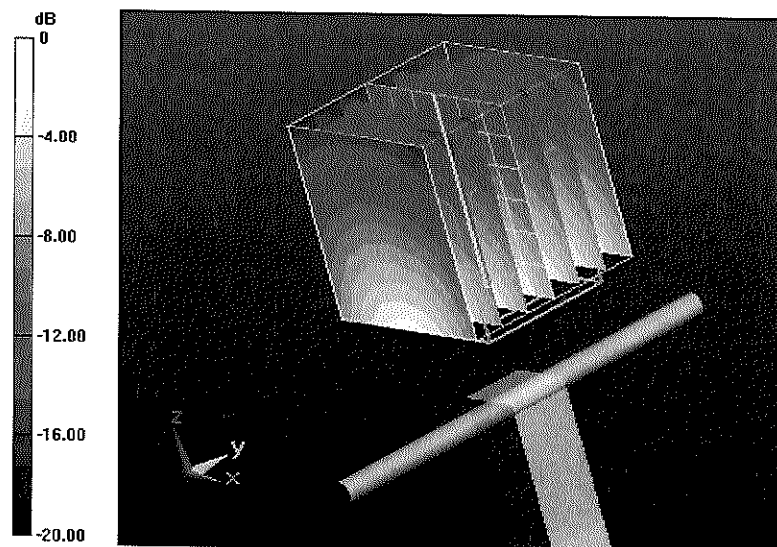
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.047 V/m; Power Drift = 0.0017 dB

Peak SAR (extrapolated) = 18.1310

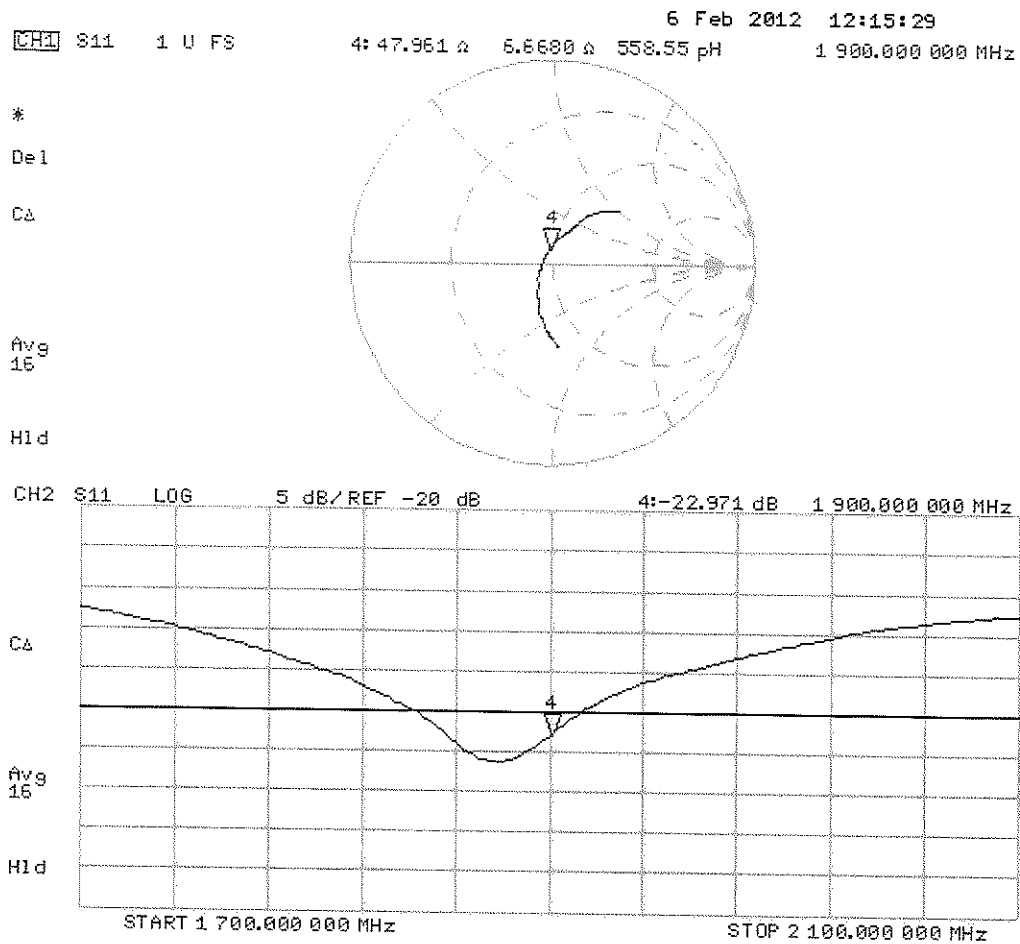
SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.23 mW/g

Maximum value of SAR (measured) = 12.672 mW/g



0 dB = 12.670mW/g = 22.06 dB mW/g

Impedance Measurement Plot for Body TSL





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Client **PC Test**

Certificate No: **D2450V2-719_Aug11**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 719**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **August 19, 2011**

✓ KOK
9/6/11

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by: **Claudio Leubler** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: August 22, 2011

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.4 $\pm$ 6 %	1.85 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.8 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.2 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.8 $\pm$ 6 %	2.02 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	51.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.07 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.1 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.2 \Omega + 3.6 j\Omega$
Return Loss	- 26.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$49.6 \Omega + 4.3 j\Omega$
Return Loss	- 27.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 10, 2002

DASY5 Validation Report for Head TSL

Date: 18.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

~~DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 719~~

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

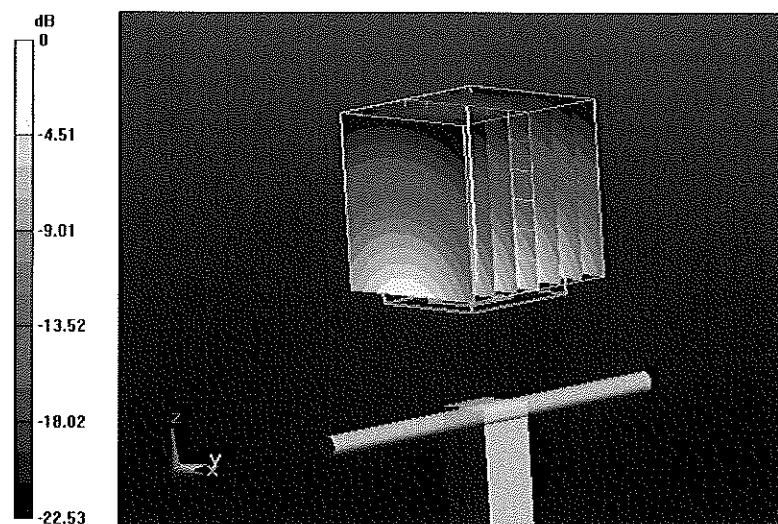
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 101.4 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 28.234 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.35 mW/g

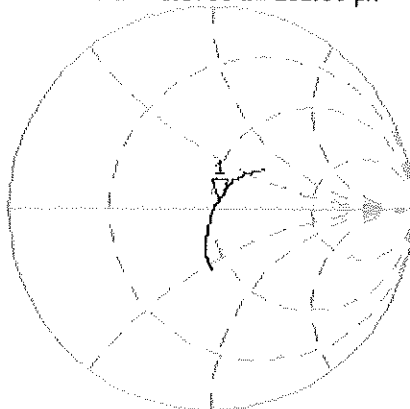
Maximum value of SAR (measured) = 17.657 mW/g



Impedance Measurement Plot for Head TSL

18 Aug 2011 10:43:30
 CH1 S11 1 U FS 1:53.248 n 3.5703 n 231.93 pF 2 450.000 000 MHz

*
 Del
 CA



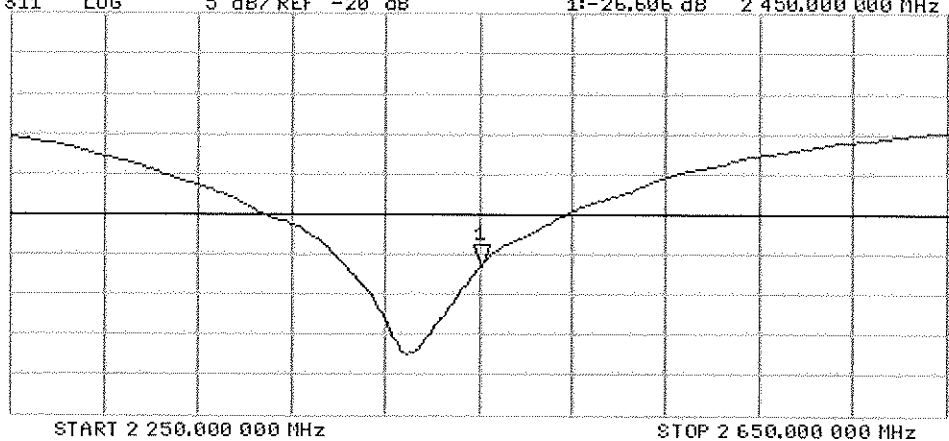
Avg
 16
 H1 d

CH2 S11 LOG 5 dB/REF -20 dB 1:-26.606 dB 2 450.000 000 MHz

CA

Avg
 16

H1 d



DASY5 Validation Report for Body TSL

Date: 19.08.2011

Test Laboratory: SPEAG, Zurich, Switzerland

~~DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 719~~

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.02$ mho/m; $\epsilon_r = 51.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

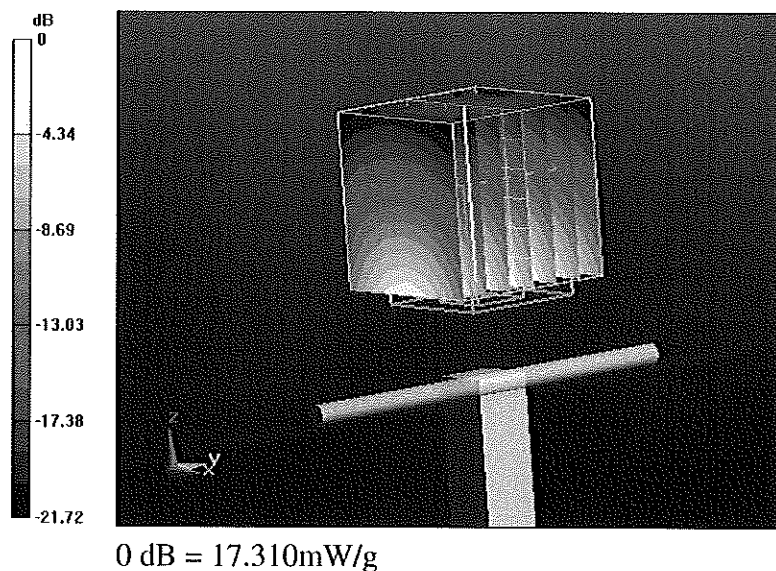
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.948 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.876 W/kg

SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.07 mW/g

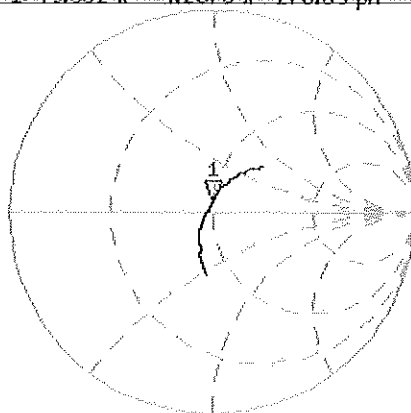
Maximum value of SAR (measured) = 17.309 mW/g



Impedance Measurement Plot for Body TSL

18 Aug 2011 10:49:46
 [CH1] S11 1 U FS 1:49.582 α 4.2578 α 276.59 μ H 2 450.000 000 MHz

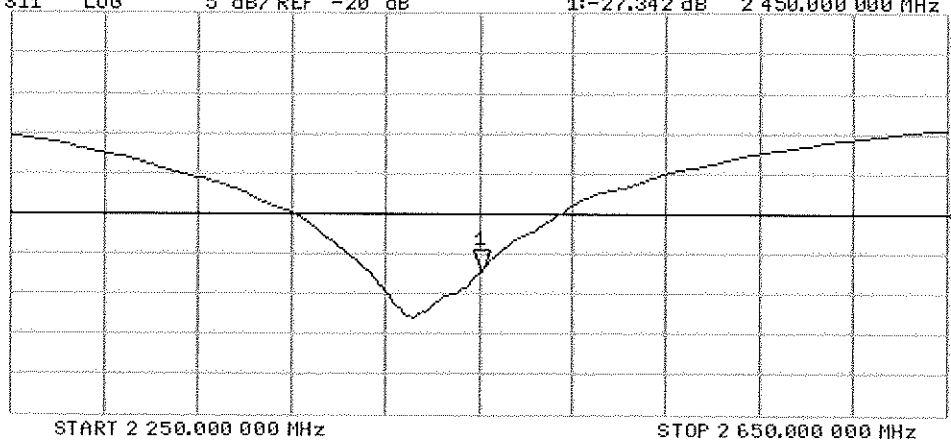
*
 De l
 CA



Avg
 16
 H1 d

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.342 dB 2 450.000 000 MHz

CA
 Avg
 16
 H1 d





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Client **PC Test**

Certificate No: **D5GHzV2-1057_Jan12**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1057**

Calibration procedure(s) **QA CAL-22.v1**
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: **January 19, 2012**

✓ KOK
2/6/12

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe EX3DV4	SN: 3503	30-Dec-11 (No. EX3-3503_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 19, 2012

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Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz $\pm$ 1 MHz 5500 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	36.3 $\pm$ 6 %	4.60 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.90 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	79.1 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.6 mW / g $\pm$ 16.5 % (k=2)

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	35.8 $\pm$ 6 %	4.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.49 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	84.9 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.42 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.2 mW / g $\pm$ 16.5 % (k=2)

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	5.22 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.95 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	79.5 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.6 mW / g ± 16.5 % (k=2)

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	49.2 ± 6 %	5.46 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.33 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	73.4 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.05 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.6 mW / g ± 17.6 % (k=2)

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.7 ± 6 %	5.86 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.87 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	78.9 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.19 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.9 mW / g ± 17.6 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.2 ± 6 %	6.28 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	74.3 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.06 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.6 mW / g ± 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.6 Ω - 8.0 j Ω
Return Loss	- 21.9 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	51.5 Ω - 3.8 j Ω
Return Loss	- 27.8 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	52.4 Ω - 3.9 j Ω
Return Loss	- 27.0 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.6 Ω - 5.7 j Ω
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	49.9 Ω - 2.7 j Ω
Return Loss	- 31.4 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	48.1 Ω - 3.3 j Ω
Return Loss	- 28.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1057

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: $f = 5200$ MHz; $\sigma = 4.6$ mho/m; $\epsilon_r = 36.3$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 4.9$ mho/m; $\epsilon_r = 35.8$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 5.22$ mho/m; $\epsilon_r = 35.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.590 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 29.4530

SAR(1 g) = 7.9 mW/g; SAR(10 g) = 2.26 mW/g

Maximum value of SAR (measured) = 18.158 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.129 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.6870

SAR(1 g) = 8.49 mW/g; SAR(10 g) = 2.42 mW/g

Maximum value of SAR (measured) = 20.088 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

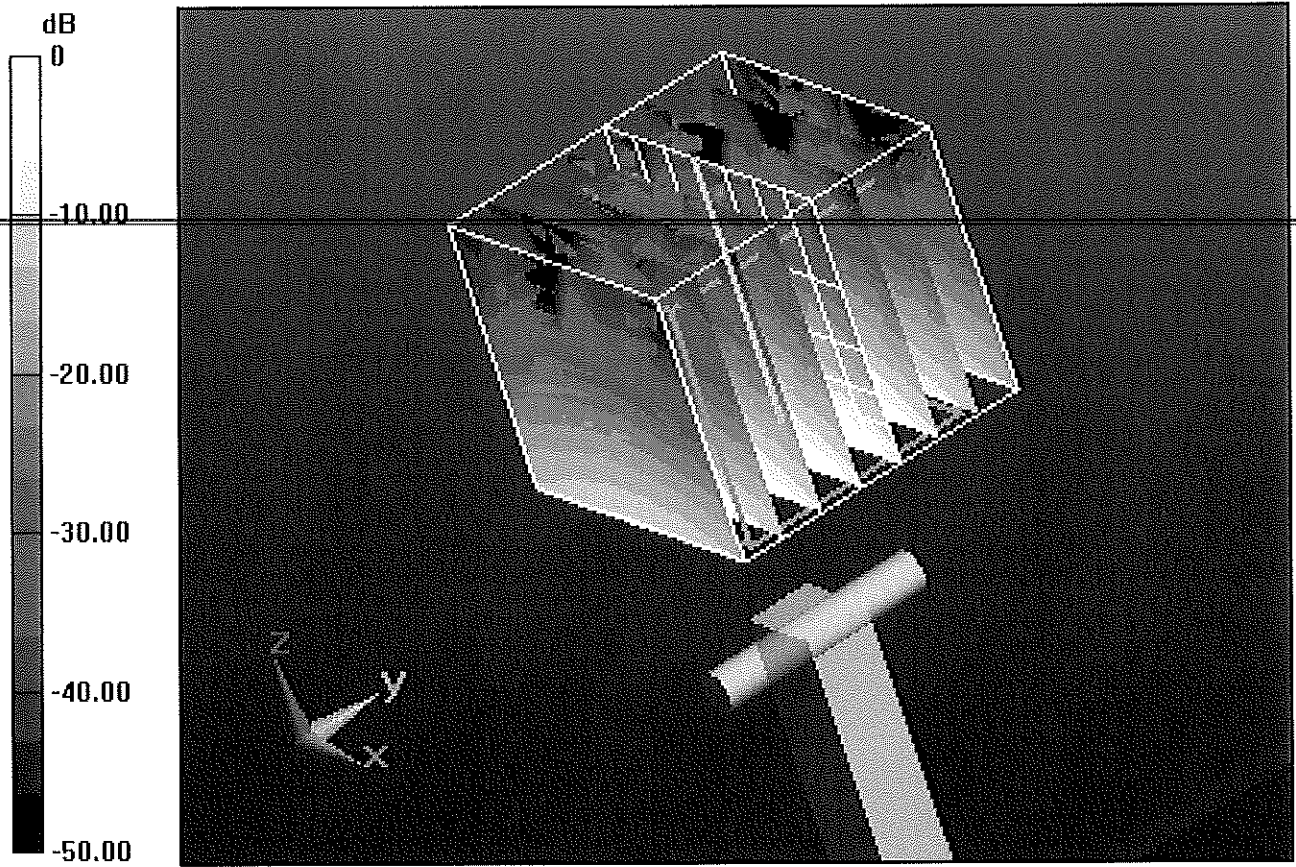
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 60.728 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.3080

SAR(1 g) = 7.95 mW/g; SAR(10 g) = 2.26 mW/g

Maximum value of SAR (measured) = 19.277 mW/g



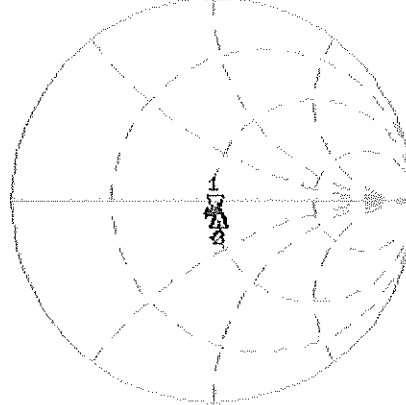
0 dB = 19.280mW/g = 25.70 dB mW/g

Impedance Measurement Plot for Head TSL

19 Jan 2012 10:41:39

[CH1] S11 1 U FS 1: 49.551 Ω 0.0020 Ω 3.9249 pF 5 200.000 000 MHz

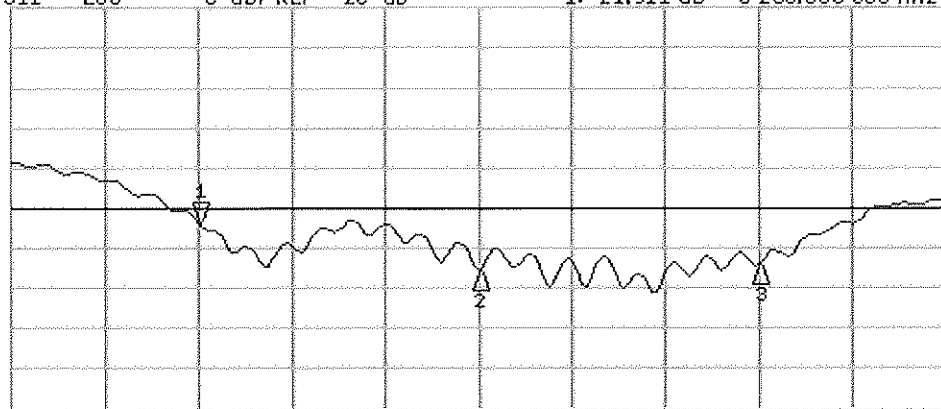
*
De1
Cor
Avg
16
H1d



CH1 Markers
2: 51.461 Ω
-3.8457 Ω
5.50000 GHz
3: 52.420 Ω
-3.9121 Ω
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -21.911 dB 5 200.000 000 MHz

Cor
Avg
16
H1d



CH2 Markers
2: -27.845 dB
5.50000 GHz
3: -26.962 dB
5.80000 GHz

START 5 000.000 000 MHz

STOP 6 000.000 000 MHz

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1057

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: $f = 5200$ MHz; $\sigma = 5.46$ mho/m; $\epsilon_r = 49.2$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 5.86$ mho/m; $\epsilon_r = 48.7$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 6.28$ mho/m; $\epsilon_r = 48.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.280 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 28.9110

SAR(1 g) = 7.33 mW/g; SAR(10 g) = 2.05 mW/g

Maximum value of SAR (measured) = 17.276 mW/g

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.884 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 33.5680

SAR(1 g) = 7.87 mW/g; SAR(10 g) = 2.19 mW/g

Maximum value of SAR (measured) = 19.055 mW/g

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

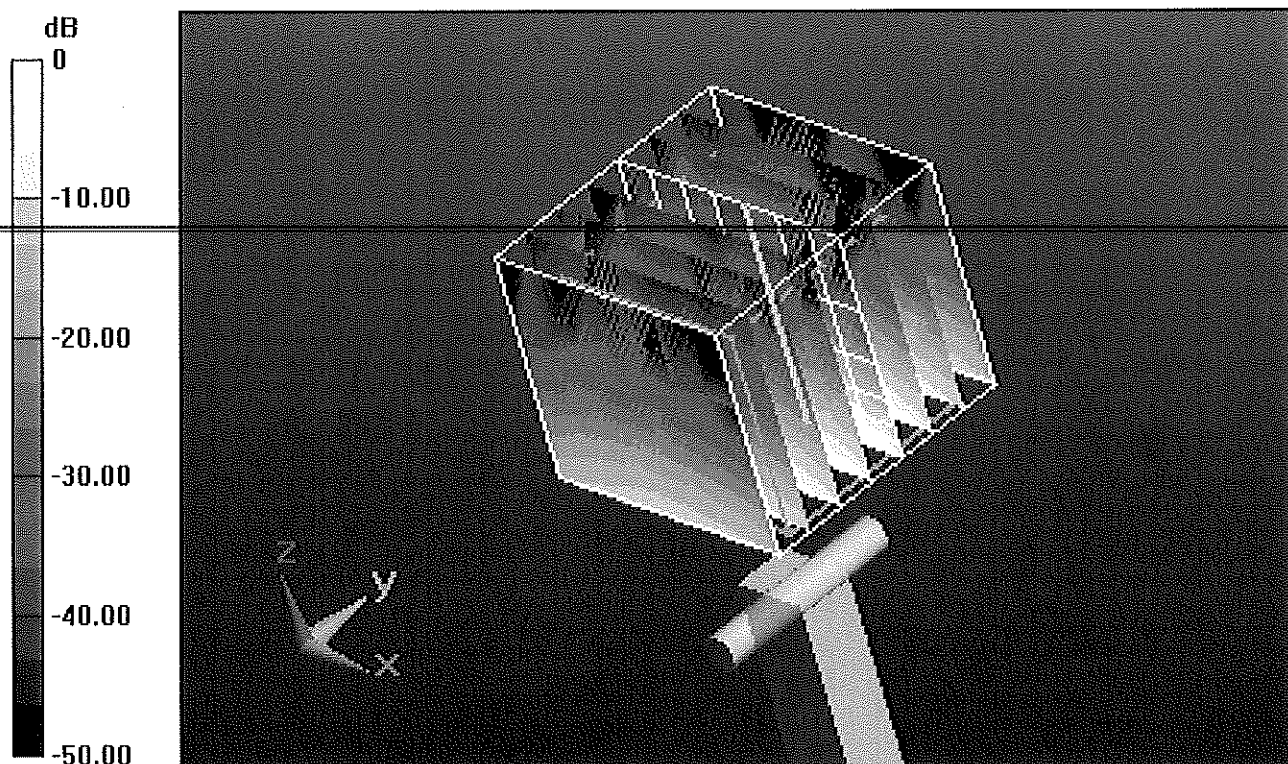
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 54.430 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 34.4850

SAR(1 g) = 7.42 mW/g; SAR(10 g) = 2.06 mW/g

Maximum value of SAR (measured) = 18.495 mW/g



0 dB = 18.500mW/g = 25.34 dB mW/g

Impedance Measurement Plot for Body TSL

18 Jan 2012 11:08:23

[CH1] S11 1 U FS 1: 50.562 Ω -5.2162 Ω 5.3538 pF 5.200.000.000 MHz

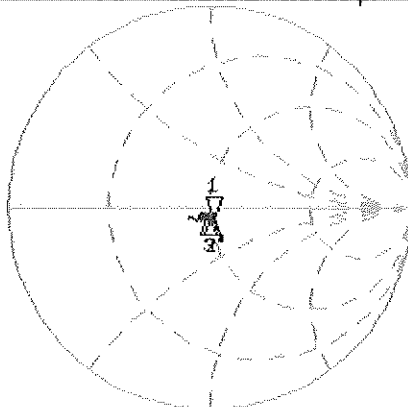
*

Del

Cor

Avg
16

H1d



CH1 Markers

2: 49.947 Ω

-2.6934 Ω

5.50000 GHz

3: 48.137 Ω

-3.3438 Ω

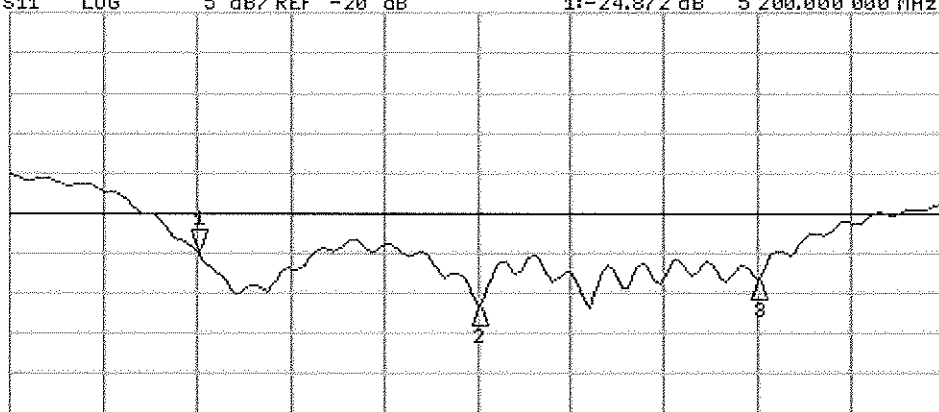
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1:-24.872 dB 5.200.000.000 MHz

Cor

Avg
16

H1d



CH2 Markers

2: -31.393 dB

5.50000 GHz

3: -28.173 dB

5.80000 GHz

START 5.000.000.000 MHz

STOP 6.000.000.000 MHz