PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctestlab.com

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:
07/30/12 - 08/10/12
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1207311071.A3L

FCC ID: **A3LSGHI437**

APPLICANT: **SAMSUNG ELECTRONICS CO., LTD.**

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SGH-I437

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	32.89	0.20	0.60	0.60
WCDMA/HSPA 850	826.40 - 846.60 MHz	22.93	0.27	0.40	0.40
GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	29.77	0.33	0.52	0.52
WCDMA/HSPA 1900	1852.4 - 1907.6 MHz	23.20	0.60	0.73	0.73
LTE Band 17	706.5 - 713.5 MHz	23.04	0.14	0.40	0.40
LTE Band 5 (Cell)	826.5 - 846.5 MHz	23.19	0.24	0.50	0.50
LTE Band 4 (AWS)	1712.5 - 1752.5 MHz	23.41	0.53	0.75	0.75
LTE Band 2 (PCS)	1852.5 - 1907.5 MHz	23.24	0.74	1.00	1.00
2.4 GHz WLAN	2412 - 2462 MHz	16.27	0.10	0.20	0.20
5.8 GHz WLAN	5745 - 5825 MHz	11.08	< 0.1	< 0.1	
5.2 GHz WLAN	5180 - 5240 MHz	10.93	< 0.1	< 0.1	
5.3 GHz WLAN	5260 - 5320 MHz	11.29	< 0.1	0.10	
5.5 GHz WLAN	5500 - 5700 MHz	10.99	< 0.1	0.11	
Bluetooth	2402 - 2480 MHz	8.63	N/A		
Simultaneous SAR per KDB 690783 D01:			0.84	1.20	1.20

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 subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
GSM/GPRS/EDGE 850	824.20 - 848.80 MHz
WCDMA/HSPA 850	826.40 - 846.60 MHz
GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz
WCDMA/HSPA 1900	1852.4 - 1907.6 MHz
LTE Band 17	706.5 - 713.5 MHz
LTE Band 5 (Cell)	826.5 - 846.5 MHz
LTE Band 4 (AWS)	1712.5 - 1752.5 MHz
LTE Band 2 (PCS)	1852.5 - 1907.5 MHz
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	2402 - 2480 MHz
NFC	13.56 MHz

1.2 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the standard battery and will be the only battery available from the manufacturer for this model. Therefore all SAR tests were performed with the standard battery which already integrates the NFC antenna. The device restricts the battery used to battery model: EB-L1H9KLA

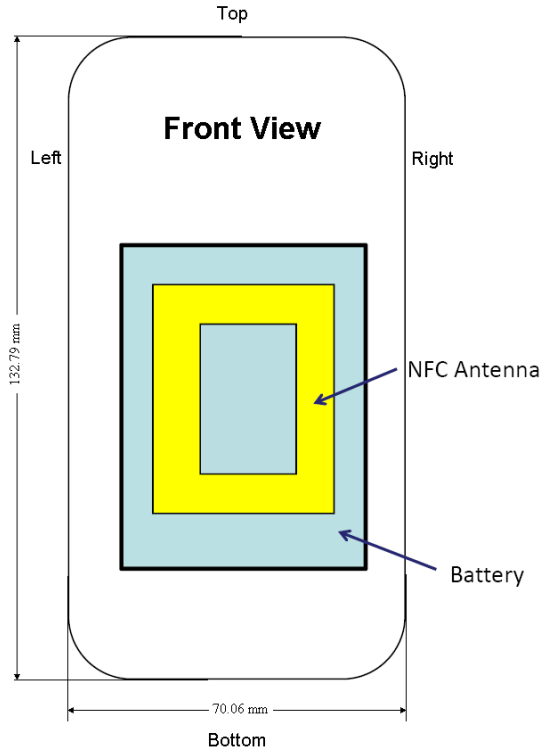

Figure 1-1
NFC Antenna Locations

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1.3 DUT Antenna Locations

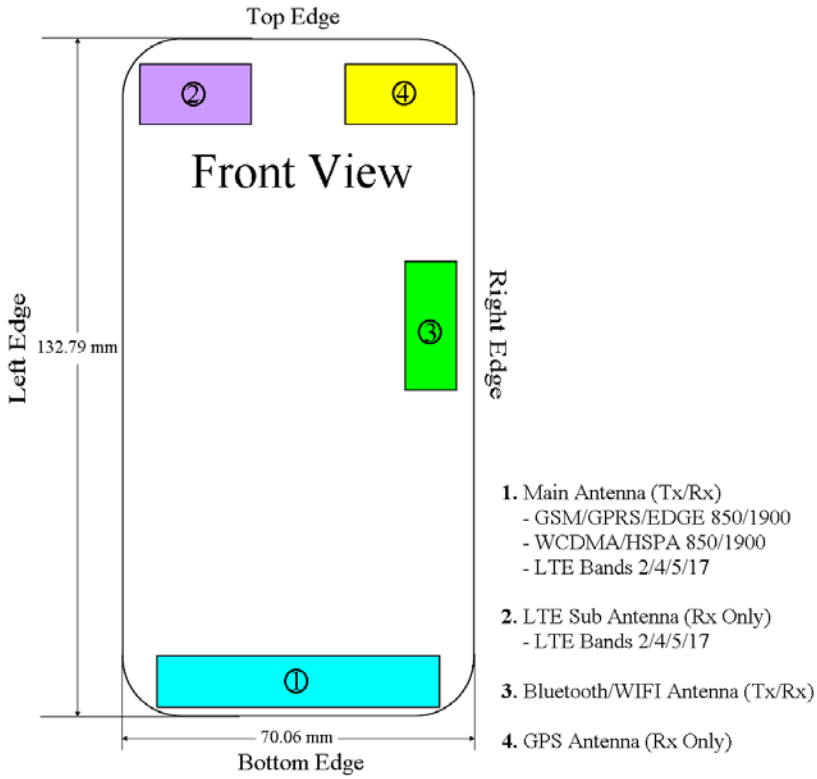

Figure 1-2
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
WCDMA 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
WCDMA 1900	Yes	Yes	No	Yes	Yes	Yes
LTE Band 17	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN	Yes	Yes	No	No	Yes	No

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.

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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 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 1-3
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.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configurations	Head	Body-Worn Accessory	Hot Spot	Note
		IEEE 1528, Supp C	Supplement C	FCC KDB 941225 D06 edges/sides	
1	GSM850/1900 Mhz Voice + Wifi 2.4GHz	Yes	10mm	N/A	
2	850/1900 WCDMA Voice + Wifi 2.4GHz	Yes	10mm	N/A	
3	850/1900 GPRS/EDGE Data + Wifi 2.4GHz	N/A	N/A	Yes	2G Hotspot
4	850/1900 WCDMA/HSPA Data + Wifi 2.4GHz	N/A	N/A	Yes	3G Hotspot
5	700/850/1750/1900 Mhz Band 17/5/4/2 LTE Data + Wifi 2.4GHz	Yes	10mm	Yes	4G Hotspot
6	GSM850/1900 Mhz Voice + Wifi 5GHz	Yes	10mm	N/A	
7	850/1900 WCDMA Voice + Wifi 5GHz	Yes	10mm	N/A	
8	850/1900 GPRS/EDGE Data + Wifi 5GHz	N/A	N/A	N/A	
9	850/1900 WCDMA/HSPA Data + Wifi 5GHz	N/A	N/A	N/A	
10	700/850/1750/1900 Mhz Band 17/5/4/2 LTE Data + Wifi 5GHz	N/A	N/A	N/A	

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 in KDB 941225 D06.

The separation between the main antenna and the Bluetooth and WLAN antennas is 43.9 mm. RF Conducted Power of Bluetooth Tx is 7.296 mW (Please refer to the EMC DSS Report for a full set of Bluetooth conducted powers).

2.4 GHz and 5 GHz WIFI and Bluetooth share the same antenna path and cannot transmit simultaneously.

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

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(B) Licensed Transmitter(s)

This model does not support Simultaneous Voice and Data for the licensed transmitter in any modes except in WCDMA that allows Multi-RAB transmissions that share voice and data operations on a single physical channel.

GSM/GPRS/EDGE DTM is not supported. Therefore GSM Voice cannot transmit simultaneously with GPRS/EDGE Data.

Simultaneous Voice and LTE data ("SVLTE") cannot transmit simultaneously since they utilize the same transmission path as illustrated in **Table 1-2**.

This device is only capable of QPSK HSUPA in the uplink, but is capable of HSPA+ in the downlink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01.

LTE SAR for the lower BWs was not tested since the maximum average output power of all channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and LTE SAR for the highest BW was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05.

1.6 Power Reduction for SAR

There is no power reduction for any band/mode implemented in this device for SAR purposes.

1.7 Serial Numbers for SAR Testing

Table 1-3
Serial numbers of devices used in SAR testing

Device Serial Number used for SAR Testing	Band/Mode
2	GSM/GPRS/EDGE 850/1900 + WCDMA/HSPA 850/1900
3	2.4 GHz WLAN
4	5 GHz WLAN
6	LTE Band 17 + LTE Band 4 (AWS)
7	LTE Band 2 (PCS) + LTE Band 5 (Cell)

1.8 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)

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2 LTE CHECKLIST PER KDB 941225 D05

KDB 941225 Pub LTE Information				
KDB 941225 Section	FCC ID	A3LSGHI437		
	Form Factor	Portable Handset		
1)	Frequency Range of each LTE transmission band	BAND2 : Tx (1850 ~ 1910MHz) BAND4 : Tx (1710 ~ 1755MHz) BAND5 : Tx (824 ~ 849MHz) BAND17 : Tx (704 ~ 716MHz)		
2)	Channel Bandwidths	BAND2 : 5MHz, 10MHz BAND4 : 5MHz,10Mhz,15MHz BAND5 : 5MHz,10MHz BAND17 : 5MHz,10MHz		
3)	Channel Numbers and Frequencies (MHz)	Low	Mid	High
	LTE Band 2 and BW 5MHz	1852.5MHz(18625)	1880MHz(18900)	1907.5MHz(19175)
	LTE Band2 and BW 10Mhz	1855MHz(18650)	1880MHz(18900)	1905MHz(19150)
	LTE Band4 and BW 5Mhz	1712.5Mhz(19975)	1732.5MHz(20175)	1752.5MHz(20375)
	LTE Band4 and BW 10Mhz	1715MHz(20000)	1732.5MHz(20175)	1750MHz(20350)
	LTE Band4 and BW 15Mhz	1717.5MHz(20025)	1732.5MHz(20175)	1747.5MHz(20325)
	LTE Band5 and BW 5Mhz	826.5MHz(20425)	836.5MHz(20525)	846.5MHz(20625)
	LTE Band5 and BW 10Mhz	829MHz(20450)	836.5MHz(20525)	844MHz(20600)
	LTE Band17 and BW 5Mhz	706.5MHz(23755)	710MHz(23790)	713.5MHz(23825)
	LTE Band17 and BW 10Mhz	709MHz(23780)	710MHz(23790)	711MHz(23800)
4)(a)	UE Category	3		
(b)	Modulations Supported in UL	QPSK, 16QAM		
	LTE Transmitter and Antenna Implementation	GSM/GPRS/EDGE, UMTS, and LTE Share the same transmission path		
5)	Description of LTE Tx and Ant. Implementation	1 Tx/Rx Antenna and 1 Rx Only Antenna		
6)	LTE Voice available?	No		
	Hotspot with LTE+WIFI	Yes		
	Hotspot with LTE+WIFI active with 1XVoice sessions?	No		
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/Band	RF Output Power	RF Exposure Configurations	
	850 MHz GSM/GPRS/EDGE	See Page 1		
	1900 MHz GSM/GPRS/EDGE	See Page 1		
	850 MHz UMTS	See Page 1		
	1900 MHz UMTS	See Page 1		
	2.4GHz Bluetooth	See Page 1		
	2.4GHz WI-FI	See Page 1		
	5GHz WI-FI	See Page 1		
11)	Simultaneous Tx Conditions (Voice and Data Configurations)	See Section 1.3		
12)	Power Reduction used for SAR Compliance?	No		
13)	Describe Power Reduction (LTE Modes)	N/A		
14)	SAR Test Plan	N/A		
15)	SAR test data, preliminary	N/A		

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3 INTRODUCTION

The FCC 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/m^3)
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	1750	1750	1900	1900	2450	2450	5200-5800	5200-5800
Tissue	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)										
Bactericide	0.1	0.1								
DGBE			47	31	44.92	29.44	7.99	26.7		
HEC	1	1								
NaCl	1.45	0.94	0.4	0.2	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	52.6	68.8	54.9	70.17	71.88	73.2	65.52	80

See next page for 750 MHz Tissue Composition

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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_2O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-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

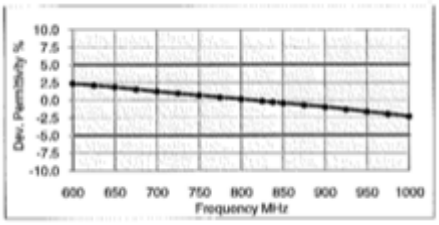
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	8-Jun-11

Additional Information

TSL Density	1.212 g/cm^3
TSL Heat-capacity	3.006 kJ/(kg*K)

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	HP-e'	HP-e"	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



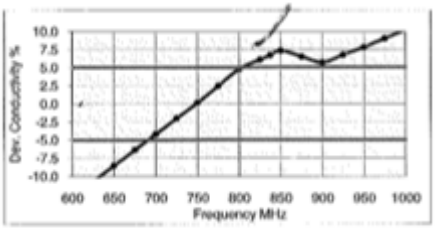


Figure 4-3
750MHz Body Tissue Equivalent Matter

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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

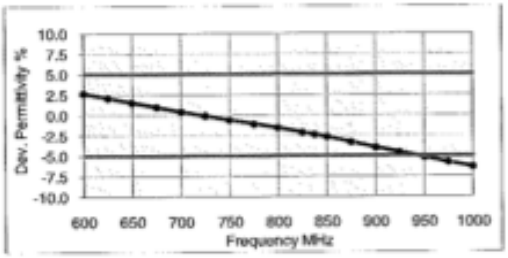
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	8-Jun-11

Additional Information

TSL Density	1.284 g/cm^3
TSL Heat-capacity	2.701 kJ/(kg*K)

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	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



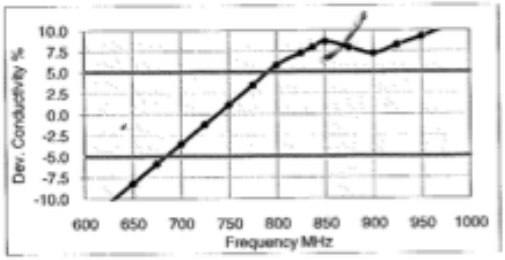


Figure 4-4
750MHz Head Tissue Equivalent Matter

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5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure:

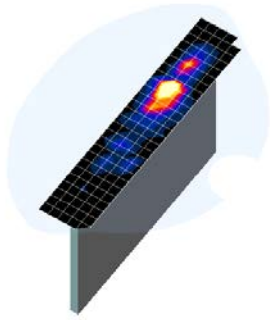

Figure 5-1
Sample SAR Area Scan

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.

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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 6-2). 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].

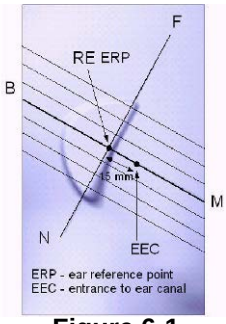

Figure 6-1
Close-Up Side view of ERP

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 than 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

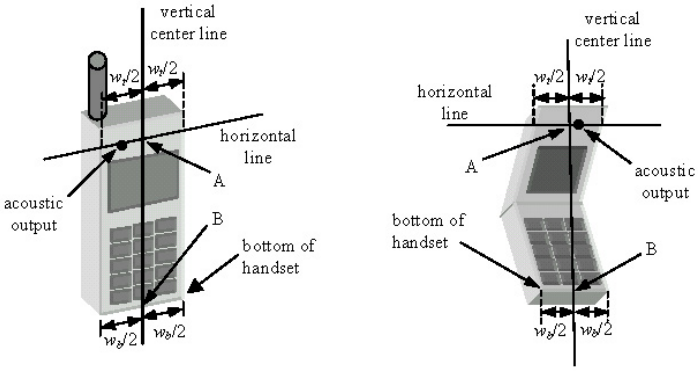

Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

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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 ε = 3 and loss tangent δ = 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 was 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 / 15º 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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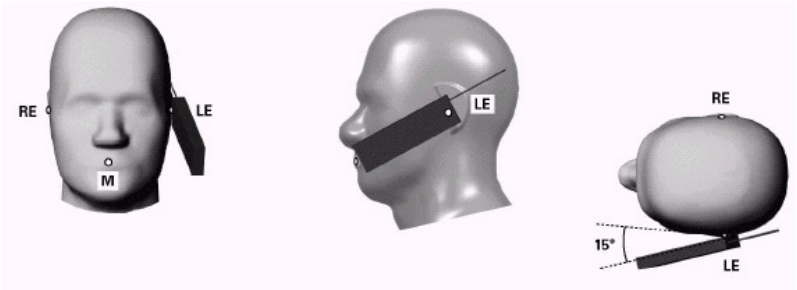

Figure 7-2 Front, Side and Top View of Ear/15º Tilt Position

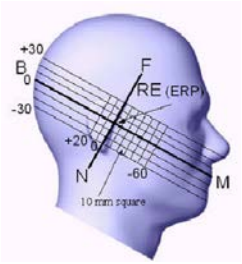

Figure 7-3
Side view w/ relevant markings

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 ½ 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.

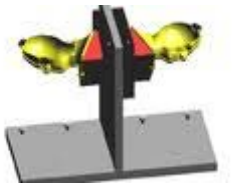

Figure 7-5 Twin SAM Chin20

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.

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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 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 x W ≥ 9 cm x 5 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.

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 FCC RF 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 *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (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 WCDMA

9.2.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1s”.

9.2.2 Head SAR Measurements for Handsets

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all “1s”. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

9.2.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”.

9.2.4 SAR Measurements for Handsets with Rel 5 HSDPA

Body SAR for HSDPA is not required for handsets with HSDPA capabilities when the maximum average output power of each RF channel with HSDPA active is less than 0.25 dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit. Otherwise, SAR is measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration measured in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that resulted in the highest SAR in 12.2 kbps RMC mode for that RF channel.

The H-set used in FRC for HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HSPDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the applicable H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the FRC for

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SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 2 ms to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors of βc=9 and βd=15, and power offset parameters of ΔACK= ΔNACK =5 and ΔCQI=2 is used. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the FRC.

9.2.5 SAR Measurements for Handsets with Rel 6 HSUPA

Body SAR for HSUPA is not required when the maximum average output of each RF channel with HSUPA/HSDPA active is less than 0.25 dB higher than as measured without HSUPA/HSDPA using 12.2 kbps RMC and maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise SAR is measured on the maximum output channel for the body exposure configuration produced highest SAR in 12.2 kbps RMC for that RF channel, using the additional procedures under "Release 6 HSPA data devices"

Head SAR for VOIP operations under HSPA is not required when maximum average output of each RF channel with HSPA is less than 0.25 dB higher than as measured using 12.2 kbps RMC. Otherwise SAR is measured using same HSPA configuration as used for body SAR.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

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 permanently implemented for this device by the manufacturer. 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 10.3 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

According to FCC KDB 941225 D05:

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a. Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
b. Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg.
c. Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
d. Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
e. Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
f. Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
g. Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
h. Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
i. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
j. Per Page 4, 4), A) I) and Page 5, 4), A)I, 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
k. Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths.

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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 then 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 RF CONDUCTED POWERS

10.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power				
		Voice	*GPRS/EDGE Data (GMSK)*		*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
Cellular	128	32.71	32.52	**30.91**	27.28	27.24
	190	32.89	32.63	**30.89**	27.16	27.18
	251	32.69	32.62	**30.92**	27.14	27.03
PCS	512	29.81	29.82	**28.34**	25.15	25.13
	661	29.77	29.76	**28.05**	25.01	25.01
	810	29.89	29.87	**28.22**	25.00	24.98

		Calculated Maximum Frame-Averaged Output Power				
		Voice	*GPRS/EDGE Data (GMSK)*		*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
Cellular	128	23.68	23.49	**24.89**	18.25	21.22
	190	23.86	23.60	**24.87**	18.13	21.16
	251	23.66	23.59	**24.90**	18.11	21.01
PCS	512	20.78	20.79	**22.32**	16.12	19.11
	661	20.74	20.73	**22.03**	15.98	18.99
	810	20.86	20.84	**22.20**	15.97	18.96

Note:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. The bolded GPRS/EDGE modes were required for SAR testing according to the highest frame averaged output power per KDB publication 941225 D03.
3. CS1 coding scheme was used in GPRS output power measurements and SAR Testing, as a condition where GMSK modulation was ensured. It was investigated that CS1 - CS4 settings do not have any impact on the output levels in the GPRS modes.
4. MCS7 coding scheme was used to measure the output powers for EDGE since It was investigated that choosing MCS7 coding scheme will ensure 8-PSK modulation, MCS levels that produce 8PSK modulation do not have an impact on output power.

GSM Class: B
GPRS Multislot class: 10 (max 2 Tx Uplink slots)
EDGE Multislot class: 10 (max 2 Tx Uplink slots)
DTM Multislot Class: N/A

Figure 10-1
Power Measurement Setup

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10.2 HSPA Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	22.91	22.93	22.76	23.27	23.20	23.12	-
99		12.2 kbps AMR	22.83	22.93	22.77	23.32	23.17	23.04	-
6	HSDPA	Subtest 1	21.84	21.97	21.91	22.24	22.17	22.07	0
6		Subtest 2	21.88	22.05	21.92	22.52	22.38	22.16	0
6		Subtest 3	21.47	21.58	21.41	21.88	22.00	21.65	0.5
6		Subtest 4	21.49	21.61	21.44	21.97	21.87	21.66	0.5
6	HSUPA	Subtest 1	21.95	21.97	22.03	22.24	22.28	21.71	0
6		Subtest 2	18.52	18.54	18.50	20.71	20.73	20.77	2
6		Subtest 3	19.95	20.03	20.05	21.53	21.44	21.20	1
6		Subtest 4	18.49	18.58	18.53	21.95	21.93	22.07	2
6		Subtest 5	21.46	21.43	21.65	21.98	22.17	21.78	0

WCDMA SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

It is expected by the manufacturer that MPR for some HSUPA subtests may be up to 1 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model. Detailed information is included in the operational description explaining how the MPR is applied for this model.

Figure 10-2
Power Measurement Setup

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10.3 LTE Conducted Powers

10.3.1 LTE Band 17

Table 10-1
LTE Band 17 Conducted Powers – 5 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
706.5	23755	5	QPSK	1	0	22.95	0	0
706.5	23755	5	QPSK	1	24	23.06	0	0
706.5	23755	5	QPSK	12	6	22.06	1	0-1
706.5	23755	5	QPSK	25	0	21.95	1	0-1
706.5	23755	5	16-QAM	1	0	22.12	1	0-1
706.5	23755	5	16-QAM	1	24	22.05	1	0-1
706.5	23755	5	16-QAM	12	6	21.03	2	0-2
706.5	23755	5	16-QAM	25	0	20.97	2	0-2
710.0	23790	5	QPSK	1	0	22.85	0	0
710.0	23790	5	QPSK	1	24	22.65	0	0
710.0	23790	5	QPSK	12	6	22.08	1	0-1
710.0	23790	5	QPSK	25	0	21.97	1	0-1
710.0	23790	5	16-QAM	1	0	22.35	1	0-1
710.0	23790	5	16-QAM	1	24	22.02	1	0-1
710.0	23790	5	16-QAM	12	6	21.08	2	0-2
710.0	23790	5	16-QAM	25	0	20.96	2	0-2
713.5	23825	5	QPSK	1	0	22.84	0	0
713.5	23825	5	QPSK	1	24	22.76	0	0
713.5	23825	5	QPSK	12	6	22.01	1	0-1
713.5	23825	5	QPSK	25	0	21.93	1	0-1
713.5	23825	5	16-QAM	1	0	22.13	1	0-1
713.5	23825	5	16-QAM	1	24	21.98	1	0-1
713.5	23825	5	16-QAM	12	6	21.03	2	0-2
713.5	23825	5	16-QAM	25	0	20.87	2	0-2

Table 10-2
LTE Band 17 Conducted Powers – 10 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
709	23780	10	QPSK	1	0	22.98	0	0
709	23780	10	QPSK	1	49	22.85	0	0
709	23780	10	QPSK	25	12	21.92	1	0-1
709	23780	10	QPSK	50	0	21.68	1	0-1
709	23780	10	16QAM	1	0	**21.67**	1	0-1
709	23780	10	16QAM	1	49	**21.96**	1	0-1
709	23780	10	16QAM	25	12	20.95	2	0-2
709	23780	10	16QAM	50	0	20.79	2	0-2
710.0	23790	10	QPSK	1	0	**23.04**	0	0
710.0	23790	10	QPSK	1	49	**22.94**	0	0
710.0	23790	10	QPSK	25	12	**21.93**	1	0-1
710.0	23790	10	QPSK	50	0	21.83	1	0-1
710.0	23790	10	16QAM	1	0	21.75	1	0-1
710.0	23790	10	16QAM	1	49	21.62	1	0-1
710.0	23790	10	16QAM	25	12	**20.99**	2	0-2
710.0	23790	10	16QAM	50	0	20.73	2	0-2
711	23800	10	QPSK	1	0	23.00	0	0
711	23800	10	QPSK	1	49	22.97	0	0
711	23800	10	QPSK	25	12	21.82	1	0-1
711	23800	10	QPSK	50	0	21.74	1	0-1
711	23800	10	16QAM	1	0	21.73	1	0-1
711	23800	10	16QAM	1	49	21.83	1	0-1
711	23800	10	16QAM	25	12	20.86	2	0-2
711	23800	10	16QAM	50	0	20.67	2	0-2

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10.3.2 LTE Band 5 (Cell)

Table 10-3
LTE Band 5 (Cell) Conducted Powers – 5 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
826.5	20425	5	QPSK	1	0	22.91	0	0
826.5	20425	5	QPSK	1	24	23.42	0	0
826.5	20425	5	QPSK	12	6	22.26	1	0-1
826.5	20425	5	QPSK	25	0	22.23	1	0-1
826.5	20425	5	16-QAM	1	0	22.18	1	0-1
826.5	20425	5	16-QAM	1	24	22.43	1	0-1
826.5	20425	5	16-QAM	12	6	21.25	2	0-2
826.5	20425	5	16-QAM	25	0	21.24	2	0-2
836.5	20525	5	QPSK	1	0	23.02	0	0
836.5	20525	5	QPSK	1	24	22.95	0	0
836.5	20525	5	QPSK	12	6	22.03	1	0-1
836.5	20525	5	QPSK	25	0	21.81	1	0-1
836.5	20525	5	16-QAM	1	0	21.71	1	0-1
836.5	20525	5	16-QAM	1	24	21.65	1	0-1
836.5	20525	5	16-QAM	12	6	20.83	2	0-2
836.5	20525	5	16-QAM	25	0	20.74	2	0-2
846.5	20625	5	QPSK	1	0	23.12	0	0
846.5	20625	5	QPSK	1	24	22.71	0	0
846.5	20625	5	QPSK	12	6	21.87	1	0-1
846.5	20625	5	QPSK	25	0	21.98	1	0-1
846.5	20625	5	16-QAM	1	0	22.43	1	0-1
846.5	20625	5	16-QAM	1	24	21.96	1	0-1
846.5	20625	5	16-QAM	12	6	21.13	2	0-2
846.5	20625	5	16-QAM	25	0	20.94	2	0-2

Table 10-4
LTE Band 5 (Cell) Conducted Powers – 10 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
829	20450	10	QPSK	1	0	**23.19**	0	0
829	20450	10	QPSK	1	49	**22.92**	0	0
829	20450	10	QPSK	25	12	22.32	1	0-1
829	20450	10	QPSK	50	0	22.22	1	0-1
829	20450	10	16QAM	1	0	21.73	1	0-1
829	20450	10	16QAM	1	49	21.71	1	0-1
829	20450	10	16QAM	25	12	21.16	2	0-2
829	20450	10	16QAM	50	0	21.23	2	0-2
836.5	20525	10	QPSK	1	0	23.18	0	0
836.5	20525	10	QPSK	1	49	22.76	0	0
836.5	20525	10	QPSK	25	12	**21.87**	1	0-1
836.5	20525	10	QPSK	50	0	21.83	1	0-1
836.5	20525	10	16QAM	1	0	**22.23**	1	0-1
836.5	20525	10	16QAM	1	49	**21.68**	1	0-1
836.5	20525	10	16QAM	25	12	**21.15**	2	0-2
836.5	20525	10	16QAM	50	0	20.76	2	0-2
844	20600	10	QPSK	1	0	23.04	0	0
844	20600	10	QPSK	1	49	22.85	0	0
844	20600	10	QPSK	25	12	21.97	1	0-1
844	20600	10	QPSK	50	0	21.93	1	0-1
844	20600	10	16QAM	1	0	21.51	1	0-1
844	20600	10	16QAM	1	49	21.68	1	0-1
844	20600	10	16QAM	25	12	20.90	2	0-2
844	20600	10	16QAM	50	0	20.87	2	0-2

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10.3.3 LTE Band 4 (AWS)

Table 10-5
LTE Band 4 (AWS) Conducted Powers – 5 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
1712.5	19975	5	QPSK	1	0	23.33	0	0
1712.5	19975	5	QPSK	1	24	23.32	0	0
1712.5	19975	5	QPSK	12	6	22.29	1	0-1
1712.5	19975	5	QPSK	25	0	22.28	1	0-1
1712.5	19975	5	16-QAM	1	0	22.50	1	0-1
1712.5	19975	5	16-QAM	1	24	22.48	1	0-1
1712.5	19975	5	16-QAM	12	6	21.46	2	0-2
1712.5	19975	5	16-QAM	25	0	21.25	2	0-2
1732.5	20175	5	QPSK	1	0	23.06	0	0
1732.5	20175	5	QPSK	1	24	23.23	0	0
1732.5	20175	5	QPSK	12	6	22.09	1	0-1
1732.5	20175	5	QPSK	25	0	22.04	1	0-1
1732.5	20175	5	16-QAM	1	0	22.39	1	0-1
1732.5	20175	5	16-QAM	1	24	22.44	1	0-1
1732.5	20175	5	16-QAM	12	6	21.06	2	0-2
1732.5	20175	5	16-QAM	25	0	20.87	2	0-2
1752.5	20375	5	QPSK	1	0	23.03	0	0
1752.5	20375	5	QPSK	1	24	22.62	0	0
1752.5	20375	5	QPSK	12	6	22.11	1	0-1
1752.5	20375	5	QPSK	25	0	22.30	1	0-1
1752.5	20375	5	16-QAM	1	0	22.11	1	0-1
1752.5	20375	5	16-QAM	1	24	22.40	1	0-1
1752.5	20375	5	16-QAM	12	6	21.43	2	0-2
1752.5	20375	5	16-QAM	25	0	21.04	2	0-2

Table 10-6
LTE Band 4 (AWS) Conducted Powers – 10 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
1715	20000	10	QPSK	1	0	23.32	0	0
1715	20000	10	QPSK	1	49	23.14	0	0
1715	20000	10	QPSK	25	12	22.18	1	0-1
1715	20000	10	QPSK	50	0	22.13	1	0-1
1715	20000	10	16QAM	1	0	22.35	1	0-1
1715	20000	10	16QAM	1	49	21.95	1	0-1
1715	20000	10	16QAM	25	12	21.37	2	0-2
1715	20000	10	16QAM	50	0	21.17	2	0-2
1732.5	20175	10	QPSK	1	0	23.01	0	0
1732.5	20175	10	QPSK	1	49	22.79	0	0
1732.5	20175	10	QPSK	25	12	21.92	1	0-1
1732.5	20175	10	QPSK	50	0	21.93	1	0-1
1732.5	20175	10	16QAM	1	0	21.93	1	0-1
1732.5	20175	10	16QAM	1	49	21.61	1	0-1
1732.5	20175	10	16QAM	25	12	20.92	2	0-2
1732.5	20175	10	16QAM	50	0	20.80	2	0-2
1750	20350	10	QPSK	1	0	23.31	0	0
1750	20350	10	QPSK	1	49	23.01	0	0
1750	20350	10	QPSK	25	12	21.97	1	0-1
1750	20350	10	QPSK	50	0	22.08	1	0-1
1750	20350	10	16QAM	1	0	21.78	1	0-1
1750	20350	10	16QAM	1	49	21.71	1	0-1
1750	20350	10	16QAM	25	12	20.87	2	0-2
1750	20350	10	16QAM	50	0	21.07	2	0-2

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Table 10-7
LTE Band 4 (AWS) Conducted Powers – 15 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
1717.5	20025	15	QPSK	1	0	**23.41**	0	0
1717.5	20025	15	QPSK	1	74	**23.31**	0	0
1717.5	20025	15	QPSK	36	18	22.24	1	0-1
1717.5	20025	15	QPSK	75	0	22.06	1	0-1
1717.5	20025	15	16QAM	1	0	22.14	1	0-1
1717.5	20025	15	16QAM	1	74	21.98	1	0-1
1717.5	20025	15	16QAM	36	18	20.94	2	0-2
1717.5	20025	15	16QAM	75	0	21.10	2	0-2
1732.5	20175	15	QPSK	1	0	22.91	0	0
1732.5	20175	15	QPSK	1	74	22.98	0	0
1732.5	20175	15	QPSK	36	18	**21.97**	1	0-1
1732.5	20175	15	QPSK	75	0	21.91	1	0-1
1732.5	20175	15	16QAM	1	0	**22.26**	1	0-1
1732.5	20175	15	16QAM	1	74	**22.20**	1	0-1
1732.5	20175	15	16QAM	36	18	**20.92**	2	0-2
1732.5	20175	15	16QAM	75	0	20.99	2	0-2
1747.5	20325	15	QPSK	1	0	23.28	0	0
1747.5	20325	15	QPSK	1	74	22.87	0	0
1747.5	20325	15	QPSK	36	18	21.97	1	0-1
1747.5	20325	15	QPSK	75	0	21.98	1	0-1
1747.5	20325	15	16QAM	1	0	22.01	1	0-1
1747.5	20325	15	16QAM	1	74	21.92	1	0-1
1747.5	20325	15	16QAM	36	18	20.94	2	0-2
1747.5	20325	15	16QAM	75	0	20.96	2	0-2

10.3.4 LTE Band 2 (PCS)

Table 10-8
LTE Band 2 (PCS) Conducted Powers –5 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
1852.5	18625	5	QPSK	1	0	23.17	0	0
1852.5	18625	5	QPSK	1	24	23.20	0	0
1852.5	18625	5	QPSK	12	6	22.11	1	0-1
1852.5	18625	5	QPSK	25	0	22.01	1	0-1
1852.5	18625	5	16-QAM	1	0	21.87	1	0-1
1852.5	18625	5	16-QAM	1	24	21.91	1	0-1
1852.5	18625	5	16-QAM	12	6	21.18	2	0-2
1852.5	18625	5	16-QAM	25	0	21.10	2	0-2
1880.0	18900	5	QPSK	1	0	23.09	0	0
1880.0	18900	5	QPSK	1	24	23.08	0	0
1880.0	18900	5	QPSK	12	6	21.94	1	0-1
1880.0	18900	5	QPSK	25	0	21.82	1	0-1
1880.0	18900	5	16-QAM	1	0	22.01	1	0-1
1880.0	18900	5	16-QAM	1	24	21.96	1	0-1
1880.0	18900	5	16-QAM	12	6	21.03	2	0-2
1880.0	18900	5	16-QAM	25	0	20.92	2	0-2
1907.5	19175	5	QPSK	1	0	23.31	0	0
1907.5	19175	5	QPSK	1	24	23.34	0	0
1907.5	19175	5	QPSK	12	6	21.92	1	0-1
1907.5	19175	5	QPSK	25	0	21.97	1	0-1
1907.5	19175	5	16-QAM	1	0	21.75	1	0-1
1907.5	19175	5	16-QAM	1	24	21.52	1	0-1
1907.5	19175	5	16-QAM	12	6	20.92	2	0-2
1907.5	19175	5	16-QAM	25	0	20.88	2	0-2

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Table 10-9
LTE Band 2 (PCS) Conducted Powers –10 MHz Bandwidth

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed by 3GPP [dB]
1855	18650	10	QPSK	1	0	**23.24**	0	0
1855	18650	10	QPSK	1	49	**23.13**	0	0
1855	18650	10	QPSK	25	12	22.30	1	0-1
1855	18650	10	QPSK	50	0	22.03	1	0-1
1855	18650	10	16QAM	1	0	**22.45**	1	0-1
1855	18650	10	16QAM	1	49	**22.47**	1	0-1
1855	18650	10	16QAM	25	12	21.23	2	0-2
1855	18650	10	16QAM	50	0	20.94	2	0-2
1880.0	18900	10	QPSK	1	0	23.07	0	0
1880.0	18900	10	QPSK	1	49	23.00	0	0
1880.0	18900	10	QPSK	25	12	**21.98**	1	0-1
1880.0	18900	10	QPSK	50	0	21.94	1	0-1
1880.0	18900	10	16QAM	1	0	22.26	1	0-1
1880.0	18900	10	16QAM	1	49	22.15	1	0-1
1880.0	18900	10	16QAM	25	12	**21.08**	2	0-2
1880.0	18900	10	16QAM	50	0	20.85	2	0-2
1905	19150	10	QPSK	1	0	23.19	0	0
1905	19150	10	QPSK	1	49	22.83	0	0
1905	19150	10	QPSK	25	12	22.23	1	0-1
1905	19150	10	QPSK	50	0	21.92	1	0-1
1905	19150	10	16QAM	1	0	22.38	1	0-1
1905	19150	10	16QAM	1	49	22.03	1	0-1
1905	19150	10	16QAM	25	12	21.31	2	0-2
1905	19150	10	16QAM	50	0	21.20	2	0-2

10.3.5 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

1) Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
2) Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg.
3) Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
4) Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocations were > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
5) Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
6) Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
7) Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
8) Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
9) Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
10) Per Page 4, 4), A) I) and Page 5, 4), A),I), 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
11) Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths

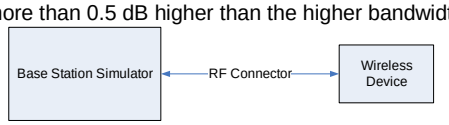

Figure 10-3
Power Measurement Setup

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10.4 WLAN Conducted Powers

Table 10-10
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 1	2	5.5	11
802.11b	2412	1	16.11	16.17	15.92	16.17
802.11b	2437	6	**16.27**	16.25	16.02	15.94
802.11b	2462	11	16.22	16.20	15.95	15.90

Table 10-11
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6	9	12	18	24	36	48	54
802.11g	2412	1	13.29	13.00	12.93	12.98	12.90	12.91	12.91	13.01
802.11g	2437	6	12.88	12.90	12.99	12.82	13.00	12.97	12.82	12.85
802.11g	2462	11	13.54	13.41	13.41	13.44	13.35	13.33	13.33	13.39

Table 10-12
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6.5	13	20	26	39	52	58	65
802.11n	2412	1	12.25	12.23	12.17	12.24	12.16	12.00	12.48	12.15
802.11n	2437	6	11.88	11.98	12.07	12.06	11.95	11.92	12.04	11.97
802.11n	2462	11	12.38	12.37	12.48	12.42	12.42	12.31	12.34	12.46

Table 10-13
IEEE 802.11a Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6	9	12	18	24	36	48	54
802.11a	**5180**	**36***	10.85	10.80	10.81	10.87	10.85	10.75	10.81	10.69
802.11a	5200	40	10.92	11.00	10.90	10.94	10.85	10.87	10.80	10.84
802.11a	5220	44	**10.93**	11.00	11.01	10.83	10.88	10.81	10.90	10.85
802.11a	**5240**	**48***	10.82	10.79	10.97	10.84	10.73	10.76	10.88	10.82
802.11a	**5260**	**52***	11.10	11.03	11.21	11.17	11.15	11.11	11.18	11.15
802.11a	5280	56	**11.29**	11.21	11.20	11.26	11.22	11.24	11.10	11.05
802.11a	5300	60	11.08	11.26	11.13	11.09	11.17	11.18	11.20	11.08
802.11a	**5320**	**64***	10.69	10.59	10.56	10.60	10.42	10.40	10.48	10.34
802.11a	5500	100	10.66	10.69	10.55	10.53	10.61	10.55	10.60	10.60
802.11a	**5520**	**104***	10.20	10.37	10.31	10.30	10.28	10.43	10.43	10.20
802.11a	5540	108	10.78	10.43	10.58	11.01	11.01	10.68	10.60	10.69
802.11a	5560	112	10.61	10.79	10.57	10.66	10.62	10.53	10.54	10.67
802.11a	**5580**	**116***	10.13	10.26	10.16	10.05	10.01	10.10	10.05	10.21
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	10.81	10.84	10.83	10.79	10.87	11.02	10.86	10.80
802.11a	**5680**	**136***	10.27	10.21	10.18	10.13	10.28	10.30	10.28	10.25
802.11a	5700	140	**10.99**	10.89	10.82	10.79	10.80	10.81	10.84	10.69
802.11a	**5745**	**149***	10.41	10.26	10.21	10.34	10.34	10.51	10.38	10.37
802.11a	5765	153	10.40	10.42	10.41	10.36	10.36	10.31	10.10	10.27
802.11a	**5785**	**157***	10.76	10.58	10.67	10.62	10.60	10.62	10.51	10.58
802.11a	**5805**	**161***	**11.08**	11.31	11.29	11.26	11.01	11.09	11.11	11.09
802.11a	5825	165	10.40	10.37	10.28	10.15	10.36	10.30	10.23	10.42

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 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 10-14
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps] 6.5	13	20	26	39	52	58	65
802.11n	**5180**	**36***	9.73	9.89	9.83	9.69	9.84	9.78	9.64	9.84
802.11n	5200	40	9.77	9.68	9.75	9.80	9.66	9.77	9.68	9.62
802.11n	5220	44	9.88	9.92	9.85	9.73	9.79	9.74	9.73	9.72
802.11n	**5240**	**48***	9.86	9.83	9.87	9.88	9.82	9.81	9.72	9.96
802.11n	**5260**	**52***	10.48	10.51	10.33	10.35	10.38	10.24	10.36	10.45
802.11n	5280	56	10.53	10.50	10.42	10.49	10.39	10.34	10.44	10.35
802.11n	5300	60	10.41	10.49	10.42	10.46	10.50	10.48	10.26	10.31
802.11n	**5320**	**64***	9.90	9.77	9.80	9.73	9.87	9.68	9.78	9.81
802.11n	5500	100	9.25	9.25	9.37	9.30	9.21	9.10	9.25	9.07
802.11n	**5520**	**104***	9.25	9.22	9.21	9.09	9.10	9.03	9.16	9.15
802.11n	5540	108	9.69	9.68	9.73	9.65	10.04	10.20	10.09	10.12
802.11n	5560	112	10.07	10.17	10.09	10.05	9.98	9.93	10.03	9.55
802.11n	**5580**	**116***	9.13	9.03	8.91	8.97	8.94	8.77	8.93	8.68
802.11n	5620	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	9.62	9.51	9.34	9.36	9.48	9.40	9.23	9.33
802.11n	**5680**	**136***	8.78	8.82	8.82	8.90	8.76	8.73	8.64	8.66
802.11n	5700	140	9.32	9.26	9.24	9.35	9.20	9.11	9.10	9.21
802.11n	**5745**	**149***	8.61	8.64	8.65	8.51	8.59	8.62	8.59	8.53
802.11n	5765	153	8.53	8.53	8.64	8.54	8.54	8.64	8.47	8.58
802.11n	**5785**	**157***	9.26	9.30	9.11	9.14	9.22	9.16	9.14	9.22
802.11n	**5805**	**161***	9.73	9.69	9.68	9.72	9.68	9.67	9.66	9.71
802.11n	5825	165	9.31	9.15	9.44	9.30	9.35	9.37	9.43	9.41

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. (*) – 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.

Table 10-15
IEEE 802.11n (40 MHz) Average RF Power

Mode	Freq	Channel	802.11n (40MHz Bandwidth) Conducted Power [dBm] Data Rate [Mbps]							
802.11n	5190	38	9.88	9.94	9.90	9.80	9.85	9.70	9.85	9.76
802.11n	5230	46	9.96	9.94	9.90	10.04	9.92	9.88	9.92	9.85
802.11n	5270	54	10.04	10.09	10.13	10.00	10.07	9.93	9.96	9.93
802.11n	5310	62	9.92	9.89	10.01	9.95	9.94	10.02	10.08	9.95
802.11n	5510	102	10.17	10.20	10.29	10.21	10.04	10.11	10.12	10.16
802.11n	5550	110	10.10	10.04	10.03	9.98	10.05	10.00	10.05	9.98
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	9.15	9.14	9.21	8.91	8.71	8.83	8.76	8.75
802.11n	5755	151	9.77	9.94	9.79	9.81	9.81	9.87	9.50	9.46
802.11n	5795	159	10.35	10.36	10.48	10.47	10.33	10.27	10.19	10.14

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 BandsWhen the adjacent channels are higher in power then the default channels, these "required channels" are considered instead of the default channels for SAR testing.
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) 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) 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.
- When 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, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.

Figure 10-4
Power Measurement Setup

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11 SYSTEM VERIFICATION

11.1 Tissue Verification

Table 11-1
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
8/7/2012	750H	23.2	680	0.860	42.37	0.885	42.273	-2.82%	0.23%
			695	0.882	42.06	0.886	42.193	-0.45%	-0.32%
			710	0.889	41.57	0.887	42.113	0.23%	-1.29%
			725	0.894	41.58	0.888	42.033	0.68%	-1.08%
			740	0.917	41.46	0.889	41.953	3.15%	-1.18%
			755	0.932	41.02	0.891	41.876	4.60%	-2.04%
8/2/2012	835H	24.9	820	0.907	41.65	0.898	41.571	1.00%	0.19%
			835	0.922	41.47	0.900	41.500	2.44%	-0.07%
			850	0.936	41.28	0.916	41.500	2.18%	-0.53%
8/6/2012	835H	23.7	820	0.891	40.25	0.898	41.571	-0.78%	-3.18%
			835	0.906	40.07	0.900	41.500	0.67%	-3.45%
			850	0.919	39.87	0.916	41.500	0.33%	-3.93%
8/6/2012	1750H	22.1	1710	1.312	39.87	1.348	40.136	-2.67%	-0.66%
			1750	1.339	39.71	1.370	40.100	-2.26%	-0.97%
			1790	1.398	39.83	1.394	40.020	0.29%	-0.47%
8/2/2012	1900H	21.3	1850	1.386	38.22	1.400	40.000	-1.00%	-4.45%
			1880	1.414	38.19	1.400	40.000	1.00%	-4.53%
			1910	1.440	38.11	1.400	40.000	2.86%	-4.73%
8/8/2012	2450H	24.2	2401	1.774	37.59	1.758	39.298	0.91%	-4.35%
			2450	1.827	37.41	1.800	39.200	1.50%	-4.57%
			2499	1.885	37.22	1.852	39.135	1.78%	-4.89%
8/8/2012	5200H-5800H	24.8	5200	4.576	37.11	4.660	36.000	-1.80%	3.08%
			5220	4.596	37.08	4.680	35.980	-1.79%	3.06%
			5280	4.652	36.90	4.740	35.920	-1.86%	2.73%
			5500	4.826	36.73	4.965	35.650	-2.80%	3.03%
			5700	5.052	36.34	5.170	35.400	-2.28%	2.66%
			5745	5.086	36.36	5.215	35.355	-2.47%	2.84%
			5800	5.136	36.21	5.270	35.300	-2.54%	2.58%
			5805	5.140	36.18	5.275	35.295	-2.56%	2.51%
8/2/2012	750B	23.2	680	0.918	54.19	0.956	56.069	-3.97%	-3.35%
			695	0.927	54.10	0.957	55.985	-3.13%	-3.37%
			710	0.948	53.99	0.958	55.901	-1.04%	-3.42%
			725	0.964	53.67	0.960	55.817	0.42%	-3.85%
			740	0.973	53.55	0.961	55.733	1.25%	-3.92%
			755	0.991	53.52	0.963	55.649	2.91%	-3.83%
7/30/2012	835B	22.9	820	0.960	55.08	0.969	55.284	-0.93%	-0.37%
			835	0.971	54.86	0.970	55.200	0.10%	-0.62%
			850	0.983	54.84	0.988	55.154	-0.51%	-0.57%
8/6/2012	835B	23.3	820	0.974	52.99	0.969	55.284	0.52%	-4.15%
			835	0.988	52.84	0.970	55.200	1.86%	-4.28%
			850	1.002	52.71	0.988	55.154	1.42%	-4.43%
7/30/2012	1750B	21.7	1710	1.414	53.48	1.460	53.540	-3.15%	-0.11%
			1750	1.453	53.02	1.490	53.430	-2.48%	-0.77%
			1790	1.515	53.08	1.510	53.330	0.33%	-0.47%
7/31/2012	1900B	21.1	1850	1.491	51.81	1.520	53.300	-1.91%	-2.80%
			1880	1.558	51.88	1.520	53.300	2.50%	-2.66%
			1910	1.571	51.74	1.520	53.300	3.36%	-2.93%
8/4/2012	1900B	22.4	1850	1.488	51.78	1.520	53.300	-2.11%	-2.85%
			1880	1.517	51.77	1.520	53.300	-0.20%	-2.87%
			1910	1.518	51.86	1.520	53.300	-0.13%	-2.70%
8/6/2012	2450B	23.9	2401	1.936	54.32	1.903	52.765	1.73%	2.95%
			2450	2.010	54.13	1.950	52.700	3.08%	2.71%
			2499	2.069	54.02	2.019	52.638	2.48%	2.63%
08/10/2012	5200B-5800B	24.3	5200	5.260	47.38	5.299	49.014	-0.74%	-3.33%
			5220	5.291	47.37	5.323	48.987	-0.60%	-3.30%
			5280	5.380	47.14	5.393	48.879	-0.24%	-3.56%
			5500	5.704	46.68	5.650	48.580	0.96%	-3.91%
			5700	6.009	46.05	5.880	48.275	2.19%	-4.61%
			5800	6.154	45.82	6.000	48.200	2.57%	-4.94%
			5805	6.152	45.81	6.005	48.166	2.45%	-4.89%

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Note: KDB Publication 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.
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 above since the DASY software rounds to three significant digits.

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). The dielectric and conductivities measured are within 10% and 5% respectively of the target parameters specified in Supplement C 01-01.

11.2 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):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{\left[\ln(b/a)\right]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r^{'}\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

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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11.3 Test System Verification

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

Table 11-2
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	08/07/2012	24.3	23.3	0.100	1003	3022	0.843	8.400	8.430	0.36%
835	Head	08/02/2012	24.9	23.7	0.100	4d119	3258	0.97	9.420	9.700	2.97%
835	Head	08/06/2012	24.2	23.8	0.100	4d119	3258	0.97	9.420	9.700	2.97%
1750	Head	08/06/2012	24.1	23.0	0.100	1051	3213	3.73	36.600	37.300	1.91%
1900	Head	08/02/2012	21.5	21.3	0.100	5d149	3287	4.03	39.300	40.300	2.54%
2450	Head	08/08/2012	23.9	22.8	0.100	797	3209	5.27	52.100	52.700	1.15%
5200	Head	08/08/2012	24.4	23.2	0.040	1057	3589	3.00	79.100	75.000	-5.18%
5500	Head	08/08/2012	24.3	23.2	0.040	1057	3589	3.18	84.900	79.500	-6.36%
5800	Head	08/08/2012	24.3	23.1	0.040	1057	3589	2.96	79.500	74.000	-6.92%
750	Body	08/02/2012	24.2	22.5	0.100	1003	3209	0.875	8.720	8.750	0.34%
835	Body	07/30/2012	24.1	23.4	0.100	4d119	3258	0.974	9.560	9.740	1.88%
835	Body	08/06/2012	24.3	23.4	0.100	4d119	3258	0.985	9.560	9.850	3.03%
1750	Body	07/30/2012	21.4	21.1	0.100	1051	3213	3.84	37.600	38.400	2.13%
1900	Body	07/31/2012	21.9	21.1	0.100	5d149	3287	4.13	39.300	41.300	5.09%
1900	Body	08/04/2012	22.9	22.4	0.100	5d149	3287	4.15	39.300	41.500	5.60%
2450	Body	08/06/2012	24.5	23.6	0.100	797	3209	5.53	50.800	55.300	8.86%
5200	Body	08/10/2012	24.6	23.9	0.100	1057	3589	7.56	73.400	75.600	3.00%
5500	Body	08/10/2012	24.6	23.8	0.100	1057	3589	7.95	78.900	79.500	0.76%
5800	Body	08/10/2012	24.5	23.8	0.100	1057	3589	7.14	74.300	71.400	-3.90%

Note: Per KDB Publication 865664, when a reference dipole is not defined within ±100MHz of the test frequency, the system verification may be conducted within ± 200 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.

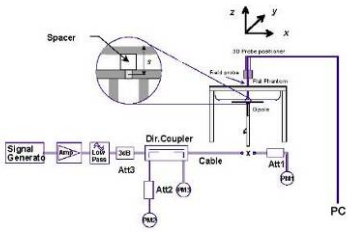

Figure 11-1
System Verification Setup Diagram

Figure 11-2
System Verification Setup Photo

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12 SAR DATA SUMMARY

12.1 Standalone Head SAR Data

Table 12-1
GSM 850 Head SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.							(W/kg)
836.60	190	GSM 850	32.89	0.01	Right	Cheek	2	0.157
836.60	190	GSM 850	32.89	0.01	Right	Tilt	2	0.090
836.60	190	GSM 850	32.89	-0.04	Left	Cheek	2	**0.199**
836.60	190	GSM 850	32.89	-0.04	Left	Tilt	2	0.092
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 12-2
WCDMA 850 Head SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.							(W/kg)
836.60	4183	WCDMA 850	22.93	0.10	Right	Cheek	2	0.199
836.60	4183	WCDMA 850	22.93	0.05	Right	Tilt	2	0.120
836.60	4183	WCDMA 850	22.93	0.09	Left	Cheek	2	**0.265**
836.60	4183	WCDMA 850	22.93	-0.12	Left	Tilt	2	0.131
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 12-3
GSM 1900 Head SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.							(W/kg)
1880.00	661	GSM 1900	29.77	0.00	Right	Cheek	2	**0.326**
1880.00	661	GSM 1900	29.77	-0.13	Right	Tilt	2	0.154
1880.00	661	GSM 1900	29.77	-0.13	Left	Cheek	2	0.299
1880.00	661	GSM 1900	29.77	0.00	Left	Tilt	2	0.147
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 12-4
WCDMA 1900 Head SAR Results

MEASUREMENT RESULTS								
FREQUENCY		Mode	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.							(W/kg)
1880.00	9400	WCDMA 1900	23.20	0.00	Right	Cheek	2	**0.602**
1880.00	9400	WCDMA 1900	23.20	-0.04	Right	Tilt	2	0.290
1880.00	9400	WCDMA 1900	23.20	0.08	Left	Cheek	2	0.526
1880.00	9400	WCDMA 1900	23.20	0.11	Left	Tilt	2	0.245
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 12-5
LTE Band 17 Head SAR Results

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
710.00	23790	Mid	LTE Band 17	10	21.93	0.11	1	Right	Cheek	QPSK	25	12	6	0.096
710.00	23790	Mid	LTE Band 17	10	23.04	-0.01	0	Right	Cheek	QPSK	1	0	6	0.133
710.00	23790	Mid	LTE Band 17	10	22.94	-0.01	0	Right	Cheek	QPSK	1	49	6	**0.139**
710.00	23790	Mid	LTE Band 17	10	20.99	0.15	2	Right	Cheek	16 QAM	25	12	6	0.077
709.00	23780	Low	LTE Band 17	10	21.67	0.17	1	Right	Cheek	16 QAM	1	0	6	0.087
709.00	23780	Low	LTE Band 17	10	21.96	0.05	1	Right	Cheek	16 QAM	1	49	6	0.093
710.00	23790	Mid	LTE Band 17	10	21.93	0.20	1	Right	Tilt	QPSK	25	12	6	0.064
710.00	23790	Mid	LTE Band 17	10	23.04	-0.14	0	Right	Tilt	QPSK	1	0	6	0.093
710.00	23790	Mid	LTE Band 17	10	22.94	0.00	0	Right	Tilt	QPSK	1	49	6	0.094
710.00	23790	Mid	LTE Band 17	10	20.99	-0.01	2	Right	Tilt	16 QAM	25	12	6	0.053
709.00	23780	Low	LTE Band 17	10	21.67	-0.20	1	Right	Tilt	16 QAM	1	0	6	0.057
709.00	23780	Low	LTE Band 17	10	21.96	-0.11	1	Right	Tilt	16 QAM	1	49	6	0.065
710.00	23790	Mid	LTE Band 17	10	21.93	-0.14	1	Left	Cheek	QPSK	25	12	6	0.090
710.00	23790	Mid	LTE Band 17	10	23.04	-0.10	0	Left	Cheek	QPSK	1	0	6	0.120
710.00	23790	Mid	LTE Band 17	10	22.94	-0.11	0	Left	Cheek	QPSK	1	49	6	0.137
710.00	23790	Mid	LTE Band 17	10	20.99	0.13	2	Left	Cheek	16 QAM	25	12	6	0.071
709.00	23780	Low	LTE Band 17	10	21.67	0.14	1	Left	Cheek	16 QAM	1	0	6	0.085
709.00	23780	Low	LTE Band 17	10	21.96	-0.13	1	Left	Cheek	16 QAM	1	49	6	0.092
710.00	23790	Mid	LTE Band 17	10	21.93	0.04	1	Left	Tilt	QPSK	25	12	6	0.063
710.00	23790	Mid	LTE Band 17	10	23.04	-0.07	0	Left	Tilt	QPSK	1	0	6	0.077
710.00	23790	Mid	LTE Band 17	10	22.94	0.05	0	Left	Tilt	QPSK	1	49	6	0.092
710.00	23790	Mid	LTE Band 17	10	20.99	0.10	2	Left	Tilt	16 QAM	25	12	6	0.048
709.00	23780	Low	LTE Band 17	10	21.67	-0.06	1	Left	Tilt	16 QAM	1	0	6	0.047
709.00	23780	Low	LTE Band 17	10	21.96	-0.16	1	Left	Tilt	16 QAM	1	49	6	0.052
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g)** averaged over 1 gram						

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the 16 QAM, 1 RB allocation configurations.

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Table 12-6
LTE Band 5 (Cell) Head SAR Results

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.16	1	Right	Cheek	QPSK	25	12	7	0.164
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	-0.02	0	Right	Cheek	QPSK	1	0	7	0.176
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	-0.18	0	Right	Cheek	QPSK	1	49	7	0.209
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	-0.04	2	Right	Cheek	16 QAM	25	12	7	0.130
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	-0.17	1	Right	Cheek	16 QAM	1	0	7	0.156
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	0.17	1	Right	Cheek	16 QAM	1	49	7	0.140
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.15	1	Right	Tilt	QPSK	25	12	7	0.092
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	0.20	0	Right	Tilt	QPSK	1	0	7	0.110
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	0.15	0	Right	Tilt	QPSK	1	49	7	0.114
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	0.06	2	Right	Tilt	16 QAM	25	12	7	0.070
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	-0.21	1	Right	Tilt	16 QAM	1	0	7	0.088
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	0.01	1	Right	Tilt	16 QAM	1	49	7	0.073
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	0.21	1	Left	Cheek	QPSK	25	12	7	0.202
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	0.09	0	Left	Cheek	QPSK	1	0	7	0.205
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	0.03	0	Left	Cheek	QPSK	1	49	7	**0.236**
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	0.16	2	Left	Cheek	16 QAM	25	12	7	0.166
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.01	1	Left	Cheek	16 QAM	1	0	7	0.177
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	0.12	1	Left	Cheek	16 QAM	1	49	7	0.178
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	0.05	1	Left	Tilt	QPSK	25	12	7	0.099
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	0.01	0	Left	Tilt	QPSK	1	0	7	0.109
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	0.12	0	Left	Tilt	QPSK	1	49	7	0.123
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	-0.01	2	Left	Tilt	16 QAM	25	12	7	0.100
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	-0.16	1	Left	Tilt	16 QAM	1	0	7	0.087
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	0.11	1	Left	Tilt	16 QAM	1	49	7	0.080
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g)** averaged over 1 gram						

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the QPSK 1 RB allocation configurations.

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Table 12-7
LTE Band 4 (AWS) Head SAR Results

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.16	1	Right	Cheek	QPSK	36	18	6	0.370
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	0.11	0	Right	Cheek	QPSK	1	0	6	0.394
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.05	0	Right	Cheek	QPSK	1	74	6	**0.525**
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	0.03	2	Right	Cheek	16 QAM	36	18	6	0.298
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	0.03	1	Right	Cheek	16 QAM	1	0	6	0.408
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.04	1	Right	Cheek	16 QAM	1	74	6	0.342
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.04	1	Right	Tilt	QPSK	36	18	6	0.142
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	-0.04	0	Right	Tilt	QPSK	1	0	6	0.161
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	0.04	0	Right	Tilt	QPSK	1	74	6	0.208
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	0.12	2	Right	Tilt	16 QAM	36	18	6	0.114
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	0.19	1	Right	Tilt	16 QAM	1	0	6	0.163
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.02	1	Right	Tilt	16 QAM	1	74	6	0.131
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.05	1	Left	Cheek	QPSK	36	18	6	0.164
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	0.13	0	Left	Cheek	QPSK	1	0	6	0.144
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.04	0	Left	Cheek	QPSK	1	74	6	0.198
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	0.02	2	Left	Cheek	16 QAM	36	18	6	0.129
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	0.07	1	Left	Cheek	16 QAM	1	0	6	0.180
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.02	1	Left	Cheek	16 QAM	1	74	6	0.146
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.03	1	Left	Tilt	QPSK	36	18	6	0.137
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	-0.01	0	Left	Tilt	QPSK	1	0	6	0.147
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.02	0	Left	Tilt	QPSK	1	74	6	0.189
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	0.08	2	Left	Tilt	16 QAM	36	18	6	0.119
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	-0.09	1	Left	Tilt	16 QAM	1	0	6	0.150
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.07	1	Left	Tilt	16 QAM	1	74	6	0.113
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g)** averaged over 1 gram						

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the QPSK, 1 RB allocation configurations.

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Table 12-8
LTE Band 2 (PCS) Head SAR Results

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.													(W/kg)
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	0.03	1	Right	Cheek	QPSK	25	12	7	0.437
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	0.13	0	Right	Cheek	QPSK	1	0	7	**0.744**
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	0.08	0	Right	Cheek	QPSK	1	49	7	0.539
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.12	2	Right	Cheek	16 QAM	25	12	7	0.349
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.04	1	Right	Cheek	16 QAM	1	0	7	0.429
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	0.13	1	Right	Cheek	16 QAM	1	49	7	0.440
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	0.11	1	Right	Tilt	QPSK	25	12	7	0.443
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	0.18	0	Right	Tilt	QPSK	1	0	7	0.731
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	-0.21	0	Right	Tilt	QPSK	1	49	7	0.575
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.20	2	Right	Tilt	16 QAM	25	12	7	0.155
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	-0.14	1	Right	Tilt	16 QAM	1	0	7	0.517
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	0.03	1	Right	Tilt	16 QAM	1	49	7	0.472
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	-0.07	1	Left	Cheek	QPSK	25	12	7	0.378
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	-0.01	0	Left	Cheek	QPSK	1	0	7	0.669
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	-0.11	0	Left	Cheek	QPSK	1	49	7	0.495
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.00	2	Left	Cheek	16 QAM	25	12	7	0.309
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.21	1	Left	Cheek	16 QAM	1	0	7	0.517
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.06	1	Left	Cheek	16 QAM	1	49	7	0.397
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	0.03	1	Left	Tilt	QPSK	25	12	7	0.179
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	0.14	0	Left	Tilt	QPSK	1	0	7	0.331
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	-0.04	0	Left	Tilt	QPSK	1	49	7	0.235
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.15	2	Left	Tilt	16 QAM	25	12	7	0.143
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	-0.09	1	Left	Tilt	16 QAM	1	0	7	0.253
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	0.07	1	Left	Tilt	16 QAM	1	49	7	0.195
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g)** averaged over 1 gram						

Note: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the QPSK, 1 RB allocation and 16 QAM, 1 RB allocation configurations.

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Table 12-9
2.4 GHz WLAN 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)
2437	6	IEEE 802.11b	DSSS	16.27	-0.02	Right	Cheek	3	1	0.091
2437	6	IEEE 802.11b	DSSS	16.27	0.03	Right	Tilt	3	1	0.020
2437	6	IEEE 802.11b	DSSS	16.27	0.06	Left	Cheek	3	1	**0.102**
2437	6	IEEE 802.11b	DSSS	16.27	0.04	Left	Tilt	3	1	0.030
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 12-10
5.8 GHz WLAN 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)
5805	161	IEEE 802.11a	OFDM	11.08	0.17	Right	Cheek	4	6	0.002
5805	161	IEEE 802.11a	OFDM	11.08	-0.12	Right	Tilt	4	6	**0.003**
5805	161	IEEE 802.11a	OFDM	11.08	0.19	Left	Cheek	4	6	0.000
5805	161	IEEE 802.11a	OFDM	11.08	0.00	Left	Tilt	4	6	0.000
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 12-11
5.2 GHz WLAN 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)
5220	44	IEEE 802.11a	OFDM	10.93	0.13	Right	Cheek	4	6	0.000
5220	44	IEEE 802.11a	OFDM	10.93	-0.13	Right	Tilt	4	6	**0.001**
5220	44	IEEE 802.11a	OFDM	10.93	0.12	Left	Cheek	4	6	0.000
5220	44	IEEE 802.11a	OFDM	10.93	0.00	Left	Tilt	4	6	0.000
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 12-12
5.3 GHz WLAN 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)
5280	56	IEEE 802.11a	OFDM	11.29	0.13	Right	Cheek	4	6	0.001
5280	56	IEEE 802.11a	OFDM	11.29	-0.14	Right	Tilt	4	6	0.001
5280	56	IEEE 802.11a	OFDM	11.29	0.11	Left	Cheek	4	6	**0.002**
5280	56	IEEE 802.11a	OFDM	11.29	0.00	Left	Tilt	4	6	0.000
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 12-13
5.5 - 5.7 GHz WLAN 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)
5700	140	IEEE 802.11a	OFDM	10.99	-0.18	Right	Cheek	4	6	0.001
5700	140	IEEE 802.11a	OFDM	10.99	0.16	Right	Tilt	4	6	**0.001**
5700	140	IEEE 802.11a	OFDM	10.99	0.16	Left	Cheek	4	6	0.000
5700	140	IEEE 802.11a	OFDM	10.99	0.00	Left	Tilt	4	6	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Head 1.6 W/kg (mW/g)** averaged over 1 gram				

12.2 Standalone Body-Worn SAR Data

Table 12-14
GSM/WCDMA Body-Worn SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Side	SAR (1g)
MHz	Ch.									(W/kg)
836.60	190	GSM 850	GSM	32.89	-0.07	1.0 cm	2	1	back	0.443
836.60	190	GSM 850	GPRS	30.89	-0.04	1.0 cm	2	2	back	0.601
836.60	4183	WCDMA 850	RMC	22.93	-0.02	1.0 cm	2	N/A	back	0.403
1880.00	661	GSM 1900	GSM	29.77	-0.05	1.0 cm	2	1	back	0.429
1880.00	661	GSM 1900	GPRS	28.05	-0.07	1.0 cm	2	2	back	0.517
1880.00	9400	WCDMA 1900	RMC	23.20	0.02	1.0 cm	2	N/A	back	0.726
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

Notes:

1. Per FCC Guidance, when the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required. Therefore, hotspot SAR data for the back side was considered to determine body-worn SAR compliance
2. GSM Tests were performed with headphones.

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Table 12-15
LTE Body-Worn SAR Results

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
710.00	23790	Mid	LTE Band 17	10	21.93	0.04	1	6	QPSK	25	12	1.0 cm	back	0.272
710.00	23790	Mid	LTE Band 17	10	23.04	-0.10	0	6	QPSK	1	0	1.0 cm	back	0.382
710.00	23790	Mid	LTE Band 17	10	22.94	-0.09	0	6	QPSK	1	49	1.0 cm	back	**0.402**
710.00	23790	Mid	LTE Band 17	10	20.99	0.06	2	6	16 QAM	25	12	1.0 cm	back	0.216
709.00	23780	Low	LTE Band 17	10	21.67	0.03	1	6	16 QAM	1	0	1.0 cm	back	0.290
709.00	23780	Low	LTE Band 17	10	21.96	-0.08	1	6	16 QAM	1	49	1.0 cm	back	0.289
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.03	1	7	QPSK	25	12	1.0 cm	back	0.357
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	-0.15	0	7	QPSK	1	0	1.0 cm	back	**0.499**
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	-0.04	0	7	QPSK	1	49	1.0 cm	back	0.424
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	-0.14	2	7	16 QAM	25	12	1.0 cm	back	0.289
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.17	1	7	16 QAM	1	0	1.0 cm	back	0.330
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	-0.01	1	7	16 QAM	1	49	1.0 cm	back	0.326
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	-0.08	1	6	QPSK	36	18	1.0 cm	back	0.435
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	-0.03	0	6	QPSK	1	0	1.0 cm	back	0.576
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.11	0	6	QPSK	1	74	1.0 cm	back	**0.746**
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	-0.02	2	6	16 QAM	36	18	1.0 cm	back	0.346
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	0.02	1	6	16 QAM	1	0	1.0 cm	back	0.461
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	-0.02	1	6	16 QAM	1	74	1.0 cm	back	0.466
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	-0.13	1	7	QPSK	25	12	1.0 cm	back	0.554
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	-0.02	0	7	QPSK	1	0	1.0 cm	back	**0.995**
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	0.05	0	7	QPSK	1	49	1.0 cm	back	0.738
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	-0.20	2	7	16 QAM	25	12	1.0 cm	back	0.437
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.17	1	7	16 QAM	1	0	1.0 cm	back	0.616
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.13	1	7	16 QAM	1	49	1.0 cm	back	0.615
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Body 1.6 W/kg (mW/g)** averaged over 1 gram						

Notes:

1. Per FCC Guidance, when the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required. Therefore, hotspot SAR data for the back side was considered to determine body-worn SAR compliance
2. Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore:
    a. For LTE Band 17, low channel was tested for the 16 QAM 1 RB allocation configurations.
    b. For LTE Band 5 (Cell), low channel was tested for the QPSK 1 RB allocation configurations.
    c. For LTE Band 4 (AWS) low channel was tested for the QPSK 1 RB allocation configurations.
    d. For LTE Band 2 (PCS) low channel was tested for the QPSK 1 RB allocation and 16 QAM 1 RB allocation configurations.

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Table 12-16
WLAN 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)
2437	6	IEEE 802.11b	DSSS	16.27	0.01	1.0 cm	3	1	back	0.203
5805	161	IEEE 802.11a	OFDM	11.08	0.13	1.0 cm	4	6	back	0.092
5220	44	IEEE 802.11a	OFDM	10.93	0.17	1.0 cm	4	6	back	0.066
5280	56	IEEE 802.11a	OFDM	11.29	-0.03	1.0 cm	4	6	back	0.104
5700	140	IEEE 802.11a	OFDM	10.99	0.05	1.0 cm	4	6	back	**0.112**
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: Per FCC Guidance, when the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required. Therefore, hotspot SAR data for the back side was considered to determine body-worn SAR compliance. 5 GHz WIFI tests were performed with headphones.

12.3 Standalone Wireless Router SAR Data

Table 12-17
GSM/WCDMA Hotspot SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Side	SAR (1g)
MHz	Ch.									(W/kg)
836.60	190	GSM 850	GPRS	30.89	-0.04	1.0 cm	2	2	back	**0.601**
836.60	190	GSM 850	GPRS	30.89	-0.01	1.0 cm	2	2	front	0.313
836.60	190	GSM 850	GPRS	30.89	0.08	1.0 cm	2	2	bottom	0.068
836.60	190	GSM 850	GPRS	30.89	0.03	1.0 cm	2	2	right	0.352
836.60	190	GSM 850	GPRS	30.89	-0.05	1.0 cm	2	2	left	0.467
836.60	4183	WCDMA 850	RMC	22.93	-0.02	1.0 cm	2	N/A	back	**0.403**
836.60	4183	WCDMA 850	RMC	22.93	0.01	1.0 cm	2	N/A	front	0.211
836.60	4183	WCDMA 850	RMC	22.93	0.05	1.0 cm	2	N/A	bottom	0.072
836.60	4183	WCDMA 850	RMC	22.93	0.06	1.0 cm	2	N/A	right	0.304
836.60	4183	WCDMA 850	RMC	22.93	0.10	1.0 cm	2	N/A	left	0.377
1880.00	661	GSM 1900	GPRS	28.05	-0.07	1.0 cm	2	2	back	**0.517**
1880.00	661	GSM 1900	GPRS	28.05	-0.04	1.0 cm	2	2	front	0.444
1880.00	661	GSM 1900	GPRS	28.05	0.02	1.0 cm	2	2	bottom	0.299
1880.00	661	GSM 1900	GPRS	28.05	0.03	1.0 cm	2	2	right	0.286
1880.00	661	GSM 1900	GPRS	28.05	-0.03	1.0 cm	2	2	left	0.125
1880.00	9400	WCDMA 1900	RMC	23.20	0.02	1.0 cm	2	N/A	back	**0.726**
1880.00	9400	WCDMA 1900	RMC	23.20	0.12	1.0 cm	2	N/A	front	0.637
1880.00	9400	WCDMA 1900	RMC	23.20	0.09	1.0 cm	2	N/A	bottom	0.471
1880.00	9400	WCDMA 1900	RMC	23.20	-0.02	1.0 cm	2	N/A	right	0.484
1880.00	9400	WCDMA 1900	RMC	23.20	0.08	1.0 cm	2	N/A	left	0.173
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 12-18
LTE Band 17 Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
710.00	23790	Mid	LTE Band 17	10	21.93	0.04	1	6	QPSK	25	12	1.0 cm	back	0.272
710.00	23790	Mid	LTE Band 17	10	23.04	-0.10	0	6	QPSK	1	0	1.0 cm	back	0.382
710.00	23790	Mid	LTE Band 17	10	22.94	-0.09	0	6	QPSK	1	49	1.0 cm	back	**0.402**
710.00	23790	Mid	LTE Band 17	10	20.99	0.06	2	6	16 QAM	25	12	1.0 cm	back	0.216
709.00	23780	Low	LTE Band 17	10	21.67	0.03	1	6	16 QAM	1	0	1.0 cm	back	0.290
709.00	23780	Low	LTE Band 17	10	21.96	-0.08	1	6	16 QAM	1	49	1.0 cm	back	0.289
710.00	23790	Mid	LTE Band 17	10	21.93	-0.07	1	6	QPSK	25	12	1.0 cm	front	0.119
710.00	23790	Mid	LTE Band 17	10	23.04	0.01	0	6	QPSK	1	0	1.0 cm	front	0.159
710.00	23790	Mid	LTE Band 17	10	22.94	0.03	0	6	QPSK	1	49	1.0 cm	front	0.171
710.00	23790	Mid	LTE Band 17	10	20.99	0.01	2	6	16 QAM	25	12	1.0 cm	front	0.118
709.00	23780	Low	LTE Band 17	10	21.67	-0.11	1	6	16 QAM	1	0	1.0 cm	front	0.118
709.00	23780	Low	LTE Band 17	10	21.96	0.01	1	6	16 QAM	1	49	1.0 cm	front	0.122
710.00	23790	Mid	LTE Band 17	10	21.93	0.00	1	6	QPSK	25	12	1.0 cm	bottom	0.031
710.00	23790	Mid	LTE Band 17	10	23.04	-0.04	0	6	QPSK	1	0	1.0 cm	bottom	0.038
710.00	23790	Mid	LTE Band 17	10	22.94	0.05	0	6	QPSK	1	49	1.0 cm	bottom	0.040
710.00	23790	Mid	LTE Band 17	10	20.99	-0.12	2	6	16 QAM	25	12	1.0 cm	bottom	0.024
709.00	23780	Low	LTE Band 17	10	21.67	0.02	1	6	16 QAM	1	0	1.0 cm	bottom	0.030
709.00	23780	Low	LTE Band 17	10	21.96	0.09	1	6	16 QAM	1	49	1.0 cm	bottom	0.029
710.00	23790	Mid	LTE Band 17	10	21.93	-0.05	1	6	QPSK	25	12	1.0 cm	right	0.105
710.00	23790	Mid	LTE Band 17	10	23.04	-0.02	0	6	QPSK	1	0	1.0 cm	right	0.142
710.00	23790	Mid	LTE Band 17	10	22.94	0.02	0	6	QPSK	1	49	1.0 cm	right	0.156
710.00	23790	Mid	LTE Band 17	10	20.99	-0.13	2	6	16 QAM	25	12	1.0 cm	right	0.084
709.00	23780	Low	LTE Band 17	10	21.67	0.07	1	6	16 QAM	1	0	1.0 cm	right	0.108
709.00	23780	Low	LTE Band 17	10	21.96	0.01	1	6	16 QAM	1	49	1.0 cm	right	0.109
710.00	23790	Mid	LTE Band 17	10	21.93	0.02	1	6	QPSK	25	12	1.0 cm	left	0.098
710.00	23790	Mid	LTE Band 17	10	23.04	-0.09	0	6	QPSK	1	0	1.0 cm	left	0.129
710.00	23790	Mid	LTE Band 17	10	22.94	0.01	0	6	QPSK	1	49	1.0 cm	left	0.140
710.00	23790	Mid	LTE Band 17	10	20.99	0.02	2	6	16 QAM	25	12	1.0 cm	left	0.098
709.00	23780	Low	LTE Band 17	10	21.67	0.09	1	6	16 QAM	1	0	1.0 cm	left	0.096
709.00	23780	Low	LTE Band 17	10	21.96	0.02	1	6	16 QAM	1	49	1.0 cm	left	0.101
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: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the 16 QAM 1 RB allocation configurations.

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Table 12-19
LTE Band 5 (Cell) Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.03	1	7	QPSK	25	12	1.0 cm	back	0.357
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	-0.15	0	7	QPSK	1	0	1.0 cm	back	**0.499**
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	-0.04	0	7	QPSK	1	49	1.0 cm	back	0.424
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	-0.14	2	7	16 QAM	25	12	1.0 cm	back	0.289
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.17	1	7	16 QAM	1	0	1.0 cm	back	0.330
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	-0.01	1	7	16 QAM	1	49	1.0 cm	back	0.326
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.02	1	7	QPSK	25	12	1.0 cm	front	0.218
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	0.08	0	7	QPSK	1	0	1.0 cm	front	0.260
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	-0.07	0	7	QPSK	1	49	1.0 cm	front	0.268
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	0.01	2	7	16 QAM	25	12	1.0 cm	front	0.179
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.02	1	7	16 QAM	1	0	1.0 cm	front	0.199
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	-0.12	1	7	16 QAM	1	49	1.0 cm	front	0.183
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.02	1	7	QPSK	25	12	1.0 cm	bottom	0.055
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	-0.07	0	7	QPSK	1	0	1.0 cm	bottom	0.051
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	0.07	0	7	QPSK	1	49	1.0 cm	bottom	0.060
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	-0.06	2	7	16 QAM	25	12	1.0 cm	bottom	0.045
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.12	0	7	16 QAM	1	0	1.0 cm	bottom	0.043
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	-0.10	0	7	16 QAM	1	49	1.0 cm	bottom	0.051
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	-0.04	1	7	QPSK	25	12	1.0 cm	right	0.253
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	-0.18	0	7	QPSK	1	0	1.0 cm	right	0.300
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	-0.17	0	7	QPSK	1	49	1.0 cm	right	0.293
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	0.15	2	7	16 QAM	25	12	1.0 cm	right	0.201
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.12	1	7	16 QAM	1	0	1.0 cm	right	0.222
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	-0.16	1	7	16 QAM	1	49	1.0 cm	right	0.208
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.87	0.01	1	7	QPSK	25	12	1.0 cm	left	0.309
829.00	20450	Low	LTE Band 5 (Cell)	10	23.19	-0.14	0	7	QPSK	1	0	1.0 cm	left	0.384
829.00	20450	Low	LTE Band 5 (Cell)	10	22.92	-0.03	0	7	QPSK	1	49	1.0 cm	left	0.352
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.15	-0.18	2	7	16 QAM	25	12	1.0 cm	left	0.232
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.23	0.18	1	7	16 QAM	1	0	1.0 cm	left	0.258
836.50	20525	Mid	LTE Band 5 (Cell)	10	21.68	-0.17	1	7	16 QAM	1	49	1.0 cm	left	0.270
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: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the QPSK 1 RB allocation configurations.

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Table 12-20
LTE Band 4 (AWS) Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	-0.08	1	6	QPSK	36	18	1.0 cm	back	0.435
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	-0.03	0	6	QPSK	1	0	1.0 cm	back	0.576
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.11	0	6	QPSK	1	74	1.0 cm	back	**0.746**
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	-0.02	2	6	16 QAM	36	18	1.0 cm	back	0.346
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	0.02	1	6	16 QAM	1	0	1.0 cm	back	0.461
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	-0.02	1	6	16 QAM	1	74	1.0 cm	back	0.466
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	-0.05	1	6	QPSK	36	18	1.0 cm	front	0.376
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	0.04	0	6	QPSK	1	0	1.0 cm	front	0.410
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.04	0	6	QPSK	1	74	1.0 cm	front	0.516
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	-0.01	2	6	16 QAM	36	18	1.0 cm	front	0.297
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	-0.03	1	6	16 QAM	1	0	1.0 cm	front	0.404
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.04	1	6	16 QAM	1	74	1.0 cm	front	0.336
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.04	1	6	QPSK	36	18	1.0 cm	bottom	0.139
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	-0.07	0	6	QPSK	1	0	1.0 cm	bottom	0.150
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	-0.19	0	6	QPSK	1	74	1.0 cm	bottom	0.179
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	0.03	2	6	16 QAM	36	18	1.0 cm	bottom	0.114
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	-0.19	1	6	16 QAM	1	0	1.0 cm	bottom	0.163
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	-0.16	1	6	16 QAM	1	74	1.0 cm	bottom	0.134
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.00	1	6	QPSK	36	18	1.0 cm	right	0.220
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	0.00	0	6	QPSK	1	0	1.0 cm	right	0.208
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	0.20	0	6	QPSK	1	74	1.0 cm	right	0.238
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	0.02	2	6	16 QAM	36	18	1.0 cm	right	0.188
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	-0.13	1	6	16 QAM	1	0	1.0 cm	right	0.243
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.00	1	6	16 QAM	1	74	1.0 cm	right	0.195
1732.50	20175	Mid	LTE Band 4 (AWS)	15	21.97	0.01	1	6	QPSK	36	18	1.0 cm	left	0.034
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.41	0.03	0	6	QPSK	1	0	1.0 cm	left	0.049
1717.50	20025	Low	LTE Band 4 (AWS)	15	23.31	0.04	0	6	QPSK	1	74	1.0 cm	left	0.045
1732.50	20175	Mid	LTE Band 4 (AWS)	15	20.92	-0.11	2	6	16 QAM	36	18	1.0 cm	left	0.027
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.26	0.12	1	6	16 QAM	1	0	1.0 cm	left	0.034
1732.50	20175	Mid	LTE Band 4 (AWS)	15	22.20	0.11	1	6	16 QAM	1	74	1.0 cm	left	0.032
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: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the QPSK 1 RB allocation configurations.

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Table 12-21
LTE Band 2 (PCS) Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.													(W/kg)
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	-0.13	1	7	QPSK	25	12	1.0 cm	back	0.554
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	-0.02	0	7	QPSK	1	0	1.0 cm	back	**0.995**
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	0.05	0	7	QPSK	1	49	1.0 cm	back	0.738
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	-0.20	2	7	16 QAM	25	12	1.0 cm	back	0.437
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.17	1	7	16 QAM	1	0	1.0 cm	back	0.616
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.13	1	7	16 QAM	1	49	1.0 cm	back	0.615
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	0.06	1	7	QPSK	25	12	1.0 cm	front	0.486
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	0.08	0	7	QPSK	1	0	1.0 cm	front	0.768
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	-0.07	0	7	QPSK	1	49	1.0 cm	front	0.566
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.21	2	7	16 QAM	25	12	1.0 cm	front	0.387
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.02	1	7	16 QAM	1	0	1.0 cm	front	0.557
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.01	1	7	16 QAM	1	49	1.0 cm	front	0.600
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	0.16	1	7	QPSK	25	12	1.0 cm	bottom	0.330
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	0.00	0	7	QPSK	1	0	1.0 cm	bottom	0.512
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	0.10	0	7	QPSK	1	49	1.0 cm	bottom	0.470
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.02	2	7	16 QAM	25	12	1.0 cm	bottom	0.259
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.12	1	7	16 QAM	1	0	1.0 cm	bottom	0.428
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.20	1	7	16 QAM	1	49	1.0 cm	bottom	0.434
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	-0.05	1	7	QPSK	25	12	1.0 cm	right	0.344
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	-0.02	0	7	QPSK	1	0	1.0 cm	right	0.682
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	0.07	0	7	QPSK	1	49	1.0 cm	right	0.475
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.12	2	7	16 QAM	25	12	1.0 cm	right	0.268
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	0.14	1	7	16 QAM	1	0	1.0 cm	right	0.377
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.12	1	7	16 QAM	1	49	1.0 cm	right	0.388
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.98	0.20	1	7	QPSK	25	12	1.0 cm	left	0.120
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.24	0.01	0	7	QPSK	1	0	1.0 cm	left	0.209
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.13	0.15	0	7	QPSK	1	49	1.0 cm	left	0.147
1880.00	18900	Mid	LTE Band 2 (PCS)	10	21.08	0.13	2	7	16 QAM	25	12	1.0 cm	left	0.097
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.45	-0.11	1	7	16 QAM	1	0	1.0 cm	left	0.120
1855.00	18650	Low	LTE Band 2 (PCS)	10	22.47	-0.16	1	7	16 QAM	1	49	1.0 cm	left	0.138
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: Per KDB 941225 D05, when the maximum average output power of 1 RB allocation is more than 0.5 dB higher than the 50% allocation, the highest output power for the 1 RB allocations is tested. Therefore, low channel was tested for the QPSK 1 RB allocation, and 16 QAM 1 RB allocation configurations.

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Table 12-22
WLAN Hotspot SAR Data

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)
2437	6	IEEE 802.11b	DSSS	16.27	0.01	1.0 cm	3	1	back	**0.203**
2437	6	IEEE 802.11b	DSSS	16.27	-0.14	1.0 cm	3	1	front	0.036
2437	6	IEEE 802.11b	DSSS	16.27	-0.01	1.0 cm	3	1	right	0.186
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**Body 1.6 W/kg (mW/g)** averaged over 1 gram				

12.4 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].
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. 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.
6. Per FCC/OET Bulletin 65 Supplement C 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).
7. 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.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR using headphones.
2. Per FCC guidance, GPRS Data Mode is additionally required for body-worn configuration. Per FCC Guidance, when the measured Hotspot SAR is less than <1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance
3. Justification for reduced test configurations per KDB Publication 941225 D03: The source-based time-averaged output power was evaluated for all multi-slot operations. The worst-case configuration was evaluated for SAR

WCDMA Notes:

1. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC Guidance, when the measured Hotspot SAR is less than <1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken

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with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance.

3. AWS WCDMA SAR was measured with a probe calibrated at 1750 MHz and is valid for measuring SAR from ± 50 MHz. The 1750MHz specific liquid was verified with specific probe calibration factors as required per FCC KDB Publication 450824 D01.

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 must be evaluated independently of position. General test procedures can be found in Section 9.3.3.
2. MPR is permanently implemented for this device by the manufacturer. 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 Guidance, when the measured Hotspot SAR is less than <1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance
5. LTE Band 4 (AWS) SAR was measured with a probe calibrated at 1750 MHz and is valid for measuring SAR from ± 50 MHz. The 1750MHz specific liquid was verified with specific probe calibration factors as required per FCC KDB Publication 450824 D01.

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) 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. When Hotspot is enabled, all 5 GHz bands are disabled.
4. WLAN transmission was verified using an uncalibrated spectrum analyzer.
5. When 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, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
6. Per FCC Guidance, when the measured Hotspot SAR is less than <1.2 W/kg for the same device orientation and device transmission configurations, separate body-worn accessory data taken with a headset cable is not required. Therefore, hotspot back side SAR data was considered to determine body-worn SAR compliance

Hotspot Notes:

1. Top Edge for the licensed transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
2. Top, Bottom, and Left Edges for the WLAN transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.3).
3. 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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13 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

13.1 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.

13.2 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 13-1
Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	Routine evaluation required	SAR not required: Unlicensed only ○ 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 SAR required: Licensed & Unlicensed 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
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 – Stand-alone SAR not required when ○ output ≤ $2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas ○ output ≤ P_{Ref} and antenna is ≥ 2.5 cm from other antennas ○ output ≤ P_{Ref} and antenna is < 2.5 cm from other antennas, each with either output power ≤ P_{Ref} or 1-g SAR < 1.2 W/kg Otherwise stand-alone SAR is required 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	

Figure 13-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

According to Figure 13-1 and Figure 13-2, simultaneous transmission analysis of SAR may be required for this device for the licensed and unlicensed transmitters. Possible simultaneous transmissions for this device are shown in the following tables.

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

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13.3 Head SAR Simultaneous Transmission Analysis

Table 13-1
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	WCDMA 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.157	0.091	0.248	Head SAR	Right Cheek	0.199	0.091	0.290
	Right Tilt	0.090	0.020	0.110		Right Tilt	0.120	0.020	0.140
	Left Cheek	0.199	0.102	**0.301**		Left Cheek	0.265	0.102	**0.367**
	Left Tilt	0.092	0.030	0.122		Left Tilt	0.131	0.030	0.161
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	WCDMA 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.326	0.091	**0.417**	Head SAR	Right Cheek	0.602	0.091	**0.693**
	Right Tilt	0.154	0.020	0.174		Right Tilt	0.290	0.020	0.310
	Left Cheek	0.299	0.102	0.401		Left Cheek	0.526	0.102	0.628
	Left Tilt	0.147	0.030	0.177		Left Tilt	0.245	0.030	0.275
Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.139	0.091	0.230	Head SAR	Right Cheek	0.209	0.091	0.300
	Right Tilt	0.094	0.020	0.114		Right Tilt	0.114	0.020	0.134
	Left Cheek	0.137	0.102	**0.239**		Left Cheek	0.236	0.102	**0.338**
	Left Tilt	0.092	0.030	0.122		Left Tilt	0.123	0.030	0.153
Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.525	0.091	**0.616**	Head SAR	Right Cheek	0.744	0.091	**0.835**
	Right Tilt	0.208	0.020	0.228		Right Tilt	0.731	0.020	0.751
	Left Cheek	0.198	0.102	0.300		Left Cheek	0.669	0.102	0.771
	Left Tilt	0.189	0.030	0.219		Left Tilt	0.331	0.030	0.361

Table 13-2
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	WCDMA 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.157	0.002	0.159	Head SAR	Right Cheek	0.199	0.002	0.201
	Right Tilt	0.090	0.003	0.093		Right Tilt	0.120	0.003	0.123
	Left Cheek	0.199	0.002	**0.201**		Left Cheek	0.265	0.002	**0.267**
	Left Tilt	0.092	0.000	0.092		Left Tilt	0.131	0.000	0.131
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	WCDMA 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.326	0.002	**0.328**	Head SAR	Right Cheek	0.602	0.002	**0.604**
	Right Tilt	0.154	0.003	0.157		Right Tilt	0.290	0.003	0.293
	Left Cheek	0.299	0.002	0.301		Left Cheek	0.526	0.002	0.528
	Left Tilt	0.147	0.000	0.147		Left Tilt	0.245	0.000	0.245

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13.4 Body-Worn Simultaneous Transmission Analysis

Table 13-3
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.443	0.203	0.646
Back Side	WCDMA 850	0.403	0.203	0.606
Back Side	GSM 1900	0.429	0.203	0.632
Back Side	WCDMA 1900	0.726	0.203	0.929
Back Side	LTE Band 17	0.402	0.203	0.605
Back Side	LTE Band 5 (Cell)	0.499	0.203	0.702
Back Side	LTE Band 4 (AWS)	0.746	0.203	0.949
Back Side	LTE Band 2 (PCS)	0.995	0.203	**1.198**

Table 13-4
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.443	0.112	0.555
Back Side	WCDMA 850	0.403	0.112	0.515
Back Side	GSM 1900	0.429	0.112	0.541
Back Side	WCDMA 1900	0.726	0.112	**0.838**

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13.5 Hotspot SAR Simultaneous Transmission Analysis

Table 13-5
Simultaneous Transmission Scenario (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.601	0.203	**0.804**
	Front	0.313	0.036	0.349
	Top	-	-	0.000
	Bottom	0.068	-	0.068
	Right	0.352	0.186	0.538
	Left	0.467	-	0.467

Simult Tx	Configuration	WCDMA 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.403	0.203	**0.606**
	Front	0.211	0.036	0.247
	Top	-	-	0.000
	Bottom	0.072	-	0.072
	Right	0.304	0.186	0.490
	Left	0.377	-	0.377

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.517	0.203	**0.720**
	Front	0.444	0.036	0.480
	Top	-	-	0.000
	Bottom	0.299	-	0.299
	Right	0.286	0.186	0.472
	Left	0.125	-	0.125

Simult Tx	Configuration	WCDMA 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.726	0.203	**0.929**
	Front	0.637	0.036	0.673
	Top	-	-	0.000
	Bottom	0.471	-	0.471
	Right	0.484	0.186	0.670
	Left	0.173	-	0.173

Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.402	0.203	**0.605**
	Front	0.171	0.036	0.207
	Top	-	-	0.000
	Bottom	0.040	-	0.040
	Right	0.156	0.186	0.342
	Left	0.140	-	0.140

Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.499	0.203	**0.702**
	Front	0.268	0.036	0.304
	Top	-	-	0.000
	Bottom	0.060	-	0.060
	Right	0.300	0.186	0.486
	Left	0.384	-	0.384

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.746	0.203	**0.949**
	Front	0.516	0.036	0.552
	Top	-	-	0.000
	Bottom	0.179	-	0.179
	Right	0.243	0.186	0.429
	Left	0.049	-	0.049

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.995	0.203	**1.198**
	Front	0.768	0.036	0.804
	Top	-	-	0.000
	Bottom	0.512	-	0.512
	Right	0.682	0.186	0.868
	Left	0.209	-	0.209

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR ("-"). The above tables represent a portable hotspot condition.

13.6 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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14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
SPEAG	D1750V2	1750 MHz SAR Dipole	4/24/2012	Annual	4/24/2013	1051
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	1/24/2012	Annual	1/24/2013	797
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/19/2012	Annual	1/19/2013	1057
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
SPEAG	D750V3	750 MHz Dipole	1/27/2012	Annual	1/27/2013	1003
SPEAG	D835V2	835 MHz SAR Dipole	4/20/2012	Annual	4/20/2013	4d119
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2012	Annual	5/22/2013	109892
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	1/18/2012	Annual	1/18/2013	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2012	Annual	2/15/2013	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/7/2012	Annual	5/7/2013	1334
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectic Assessment Kit	6/19/2012	Annual	6/19/2013	1070
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/25/2011	Annual	8/25/2012	100976
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	11/30/2011	Annual	11/30/2012	101699
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	3/5/2012	Annual	3/5/2013	102060
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Annual	10/7/2012	103962
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886430
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	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
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	4/24/2012	Annual	4/24/2013	3213
SPEAG	ES3DV3	SAR Probe	2/21/2012	Annual	2/21/2013	3258
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3287
SPEAG	EX3DV4	SAR Probe	1/27/2012	Annual	1/27/2013	3589
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
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 Tester	4/4/2012	Annual	4/4/2013	US41140256

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, 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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15 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	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.2	23.5	

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

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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	299
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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16 CONCLUSION

16.1 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

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PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

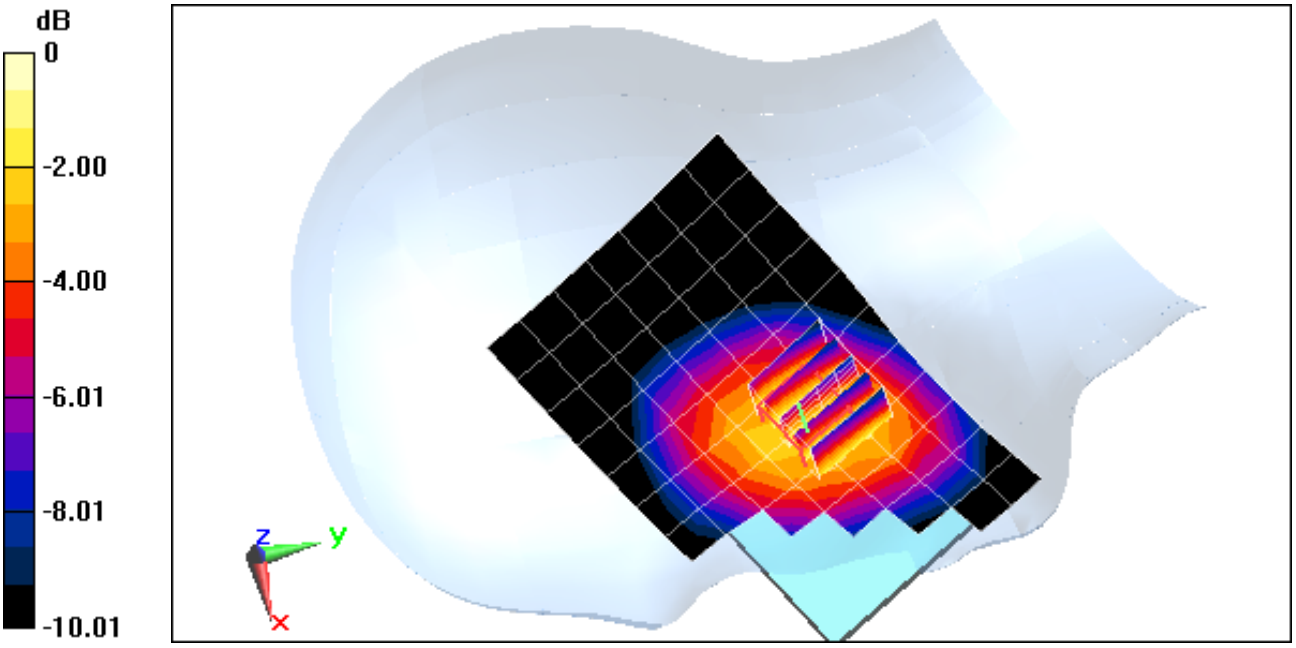
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Head Medium parameters used:
f = 710 MHz; σ = 0.889 mho/m; ε_r = 41.57; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.3°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 Band 17, Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.439 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.1840
SAR(1 g) = 0.139 mW/g; SAR(10 g) = 0.104 mW/g



0 dB = 0.150mW/g = -16.48 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

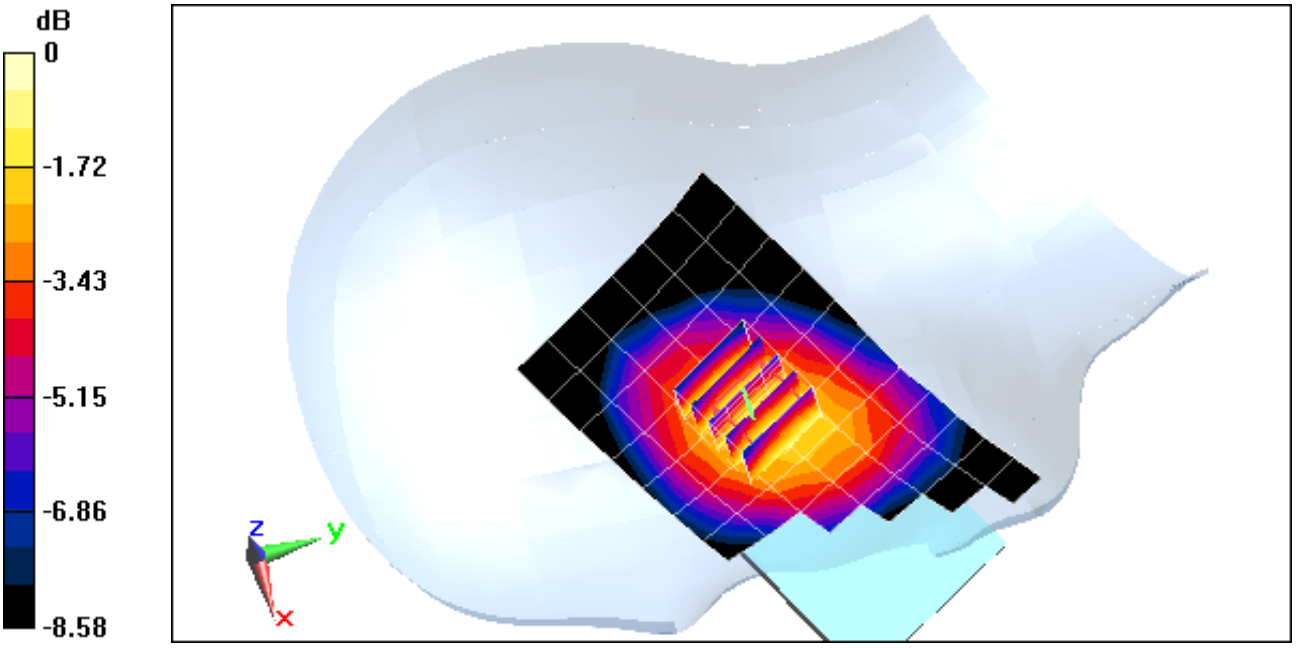
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Head Medium parameters used:
f = 710 MHz; σ = 0.889 mho/m; ε_r = 41.57; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.3°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 Band 17, Right Head, Tilt, Mid.ch,
10 MHz Bandwidth, QPSK,1 RB, 49 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.063 V/m; Power Drift = -0.00084 dB
Peak SAR (extrapolated) = 0.1130
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.075 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

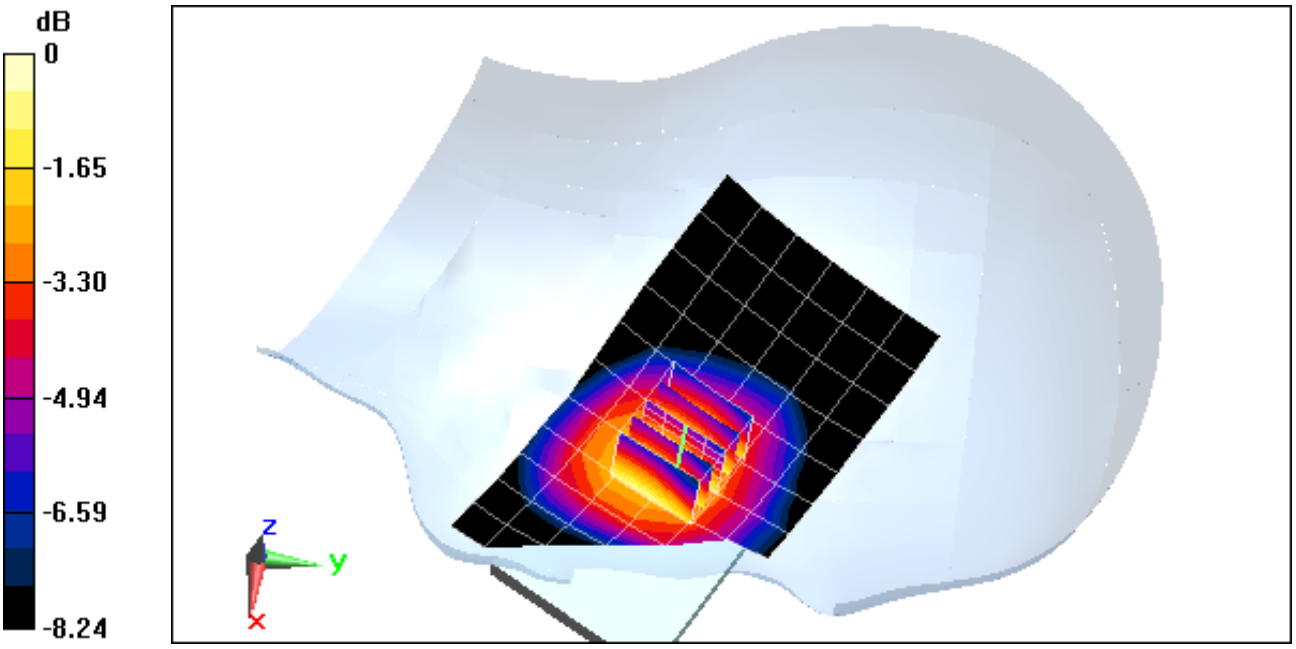
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Head Medium parameters used:
f = 710 MHz; σ = 0.889 mho/m; ε_r = 41.57; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.3°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 Band 17, Left Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.251 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.1600
SAR(1 g) = 0.137 mW/g; SAR(10 g) = 0.108 mW/g



0 dB = 0.140mW/g = -17.08 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

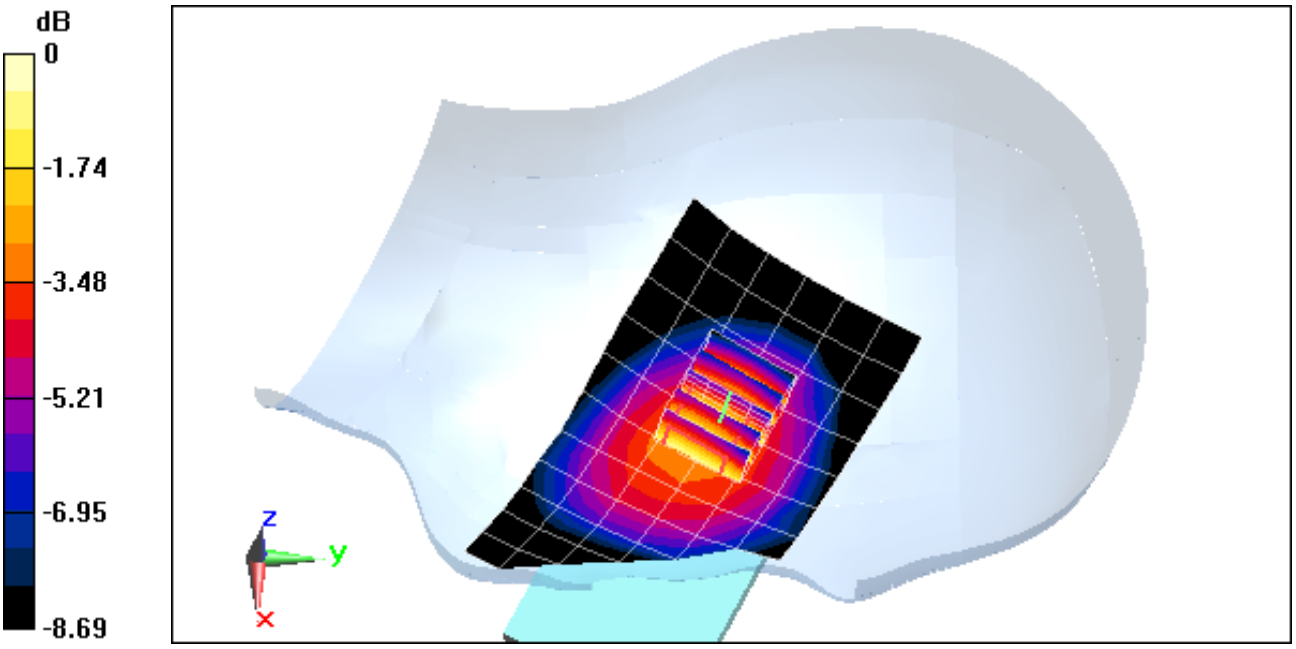
Communication System: LTE BAND 17;Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Head Medium Medium parameters used:
f = 710 MHz; σ = 0.889 mho/m; ε_r = 41.57; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.3°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 Band 17, Left Head, Tilt, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.765 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.1120
SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.073 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

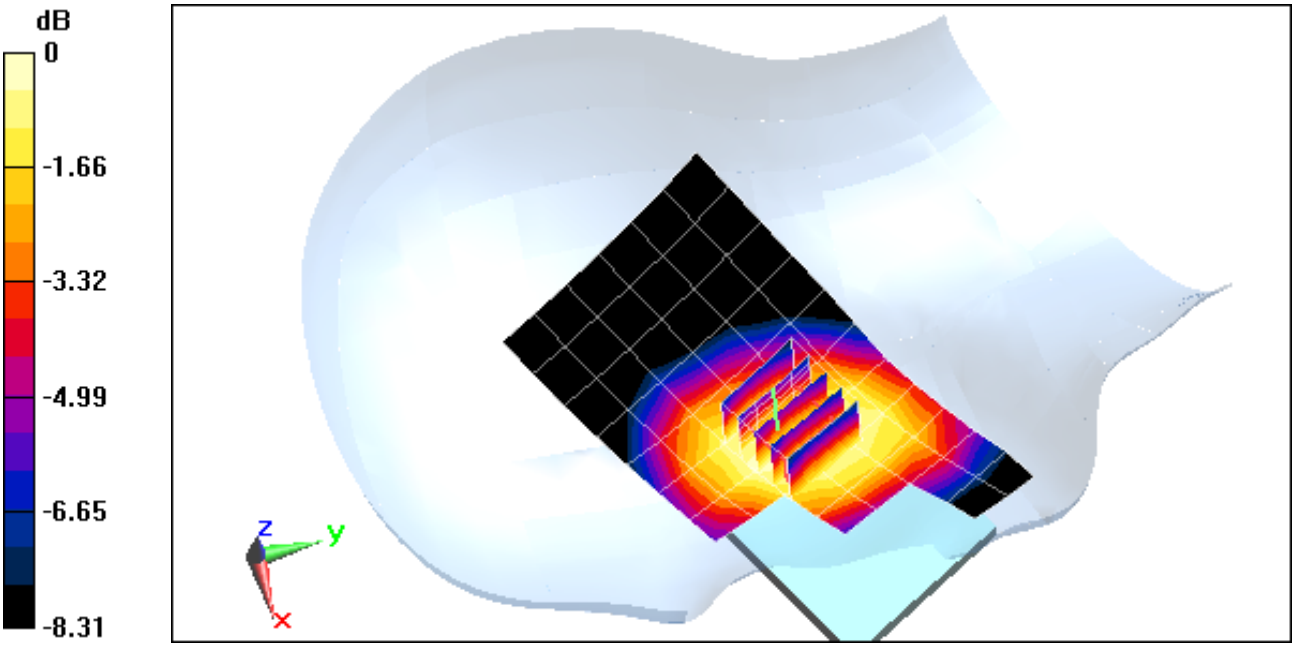
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.4 (4989)

Mode: GSM 850, Right Head, Cheek, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.539 V/m; Power Drift = 0.0059 dB
Peak SAR (extrapolated) = 0.1870
SAR(1 g) = 0.157 mW/g; SAR(10 g) = 0.121 mW/g



0 dB = 0.160mW/g = -15.92 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

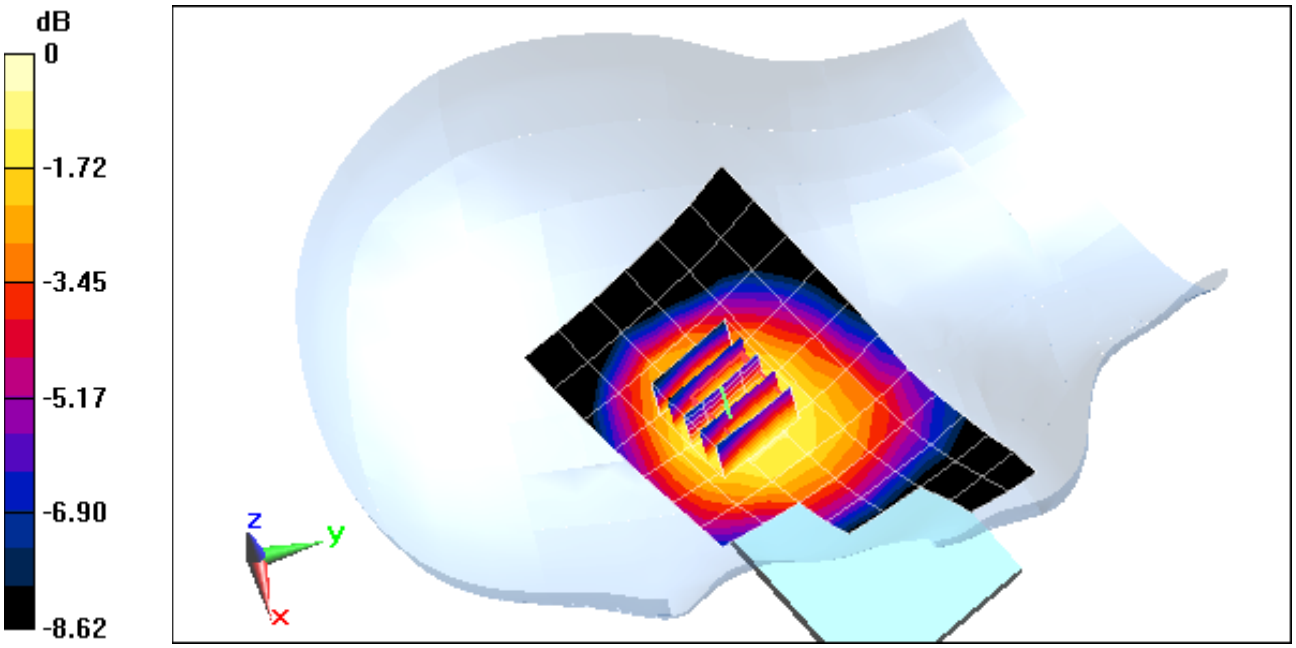
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.4 (4989)

Mode: GSM 850, Right Head, Tilt, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.070 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.1100
SAR(1 g) = 0.090 mW/g; SAR(10 g) = 0.069 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

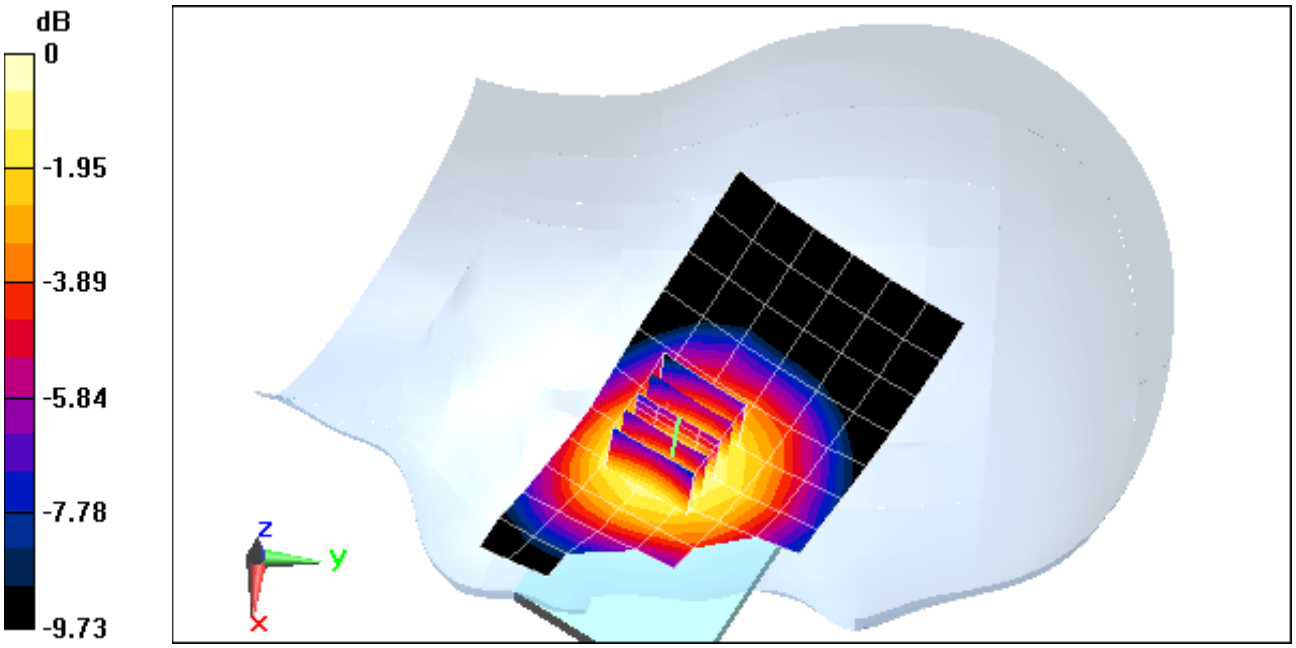
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.4 (4989)

Mode: GSM 850, Left Head, Cheek, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.350 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.2480
SAR(1 g) = 0.199 mW/g; SAR(10 g) = 0.152 mW/g



0 dB = 0.210mW/g = -13.56 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

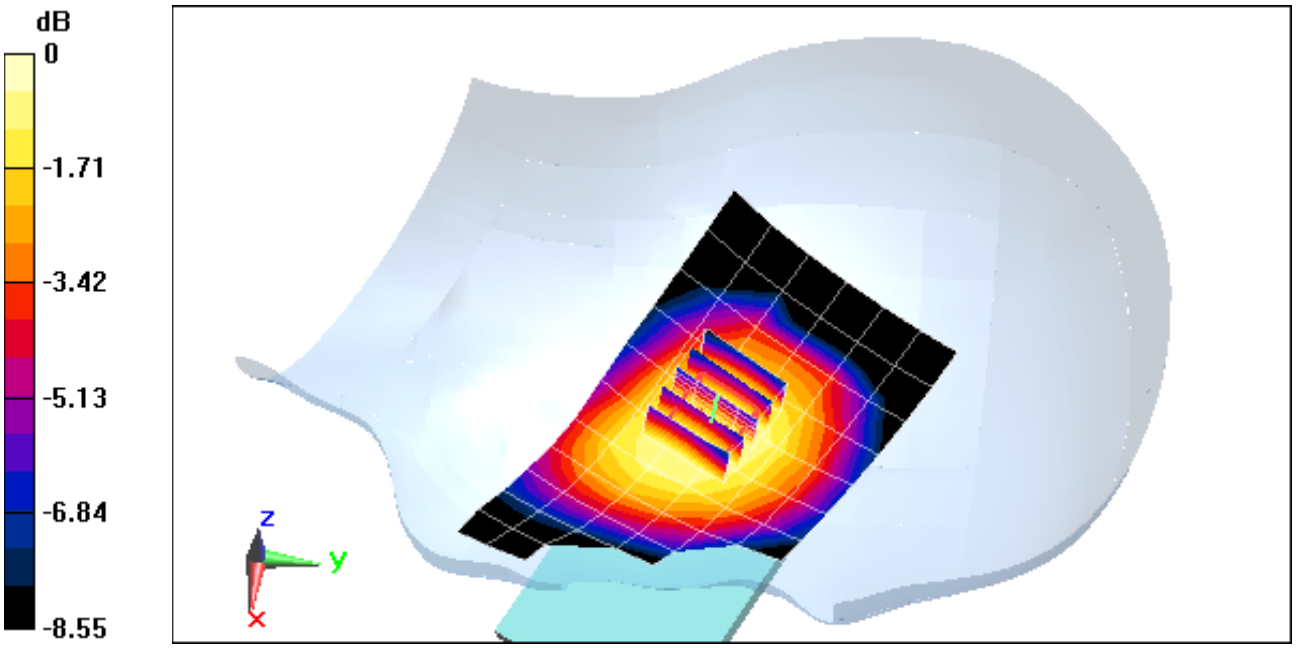
Communication System: GSM850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.4 (4989)

Mode: GSM 850, Left Head, Tilt, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.214 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.1110
SAR(1 g) = 0.092 mW/g; SAR(10 g) = 0.072 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

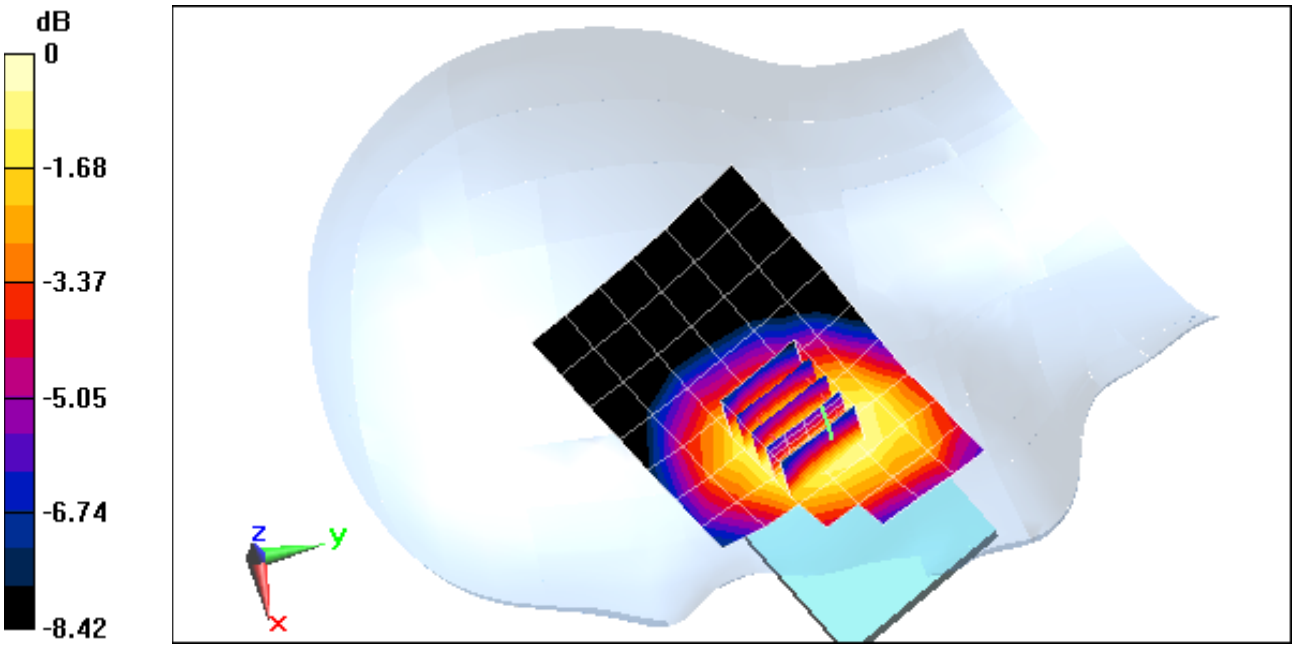
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Right Head, Cheek, Mid.ch

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.918 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.2450
SAR(1 g) = 0.199 mW/g; SAR(10 g) = 0.153 mW/g



0 dB = 0.210mW/g = -13.56 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

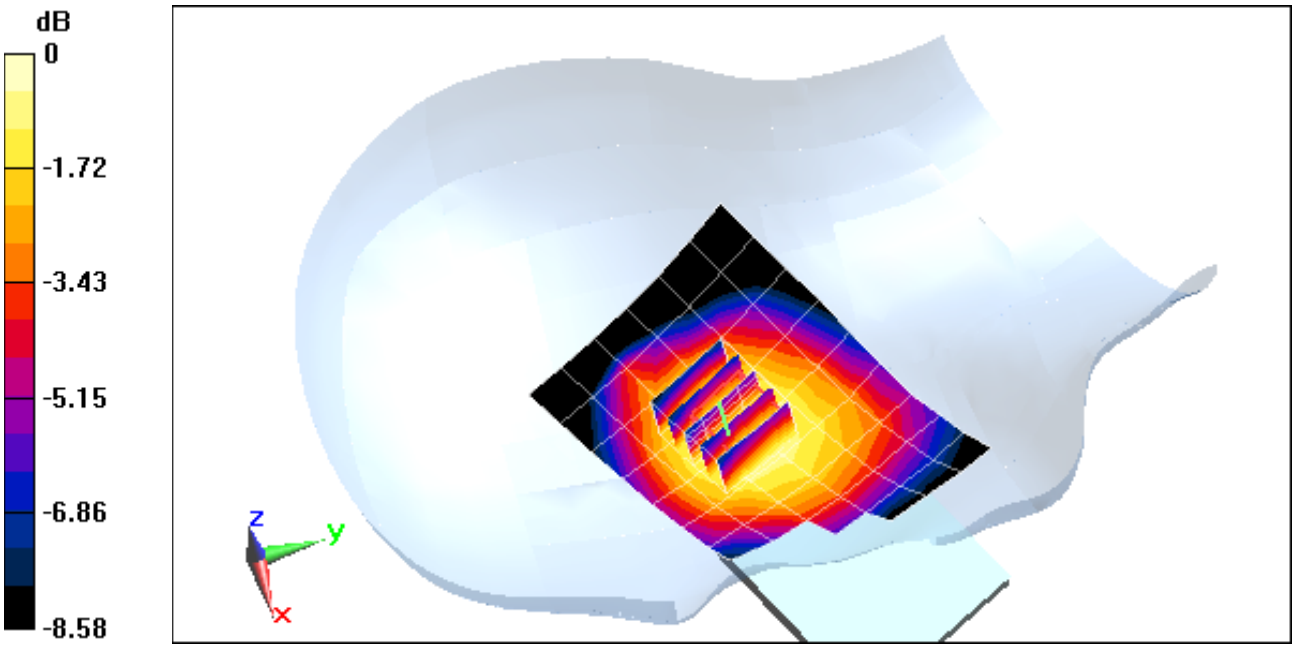
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Right Head, Tilt, Mid.ch

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.653 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.1470
SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.093 mW/g



0 dB = 0.130mW/g = -17.72 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

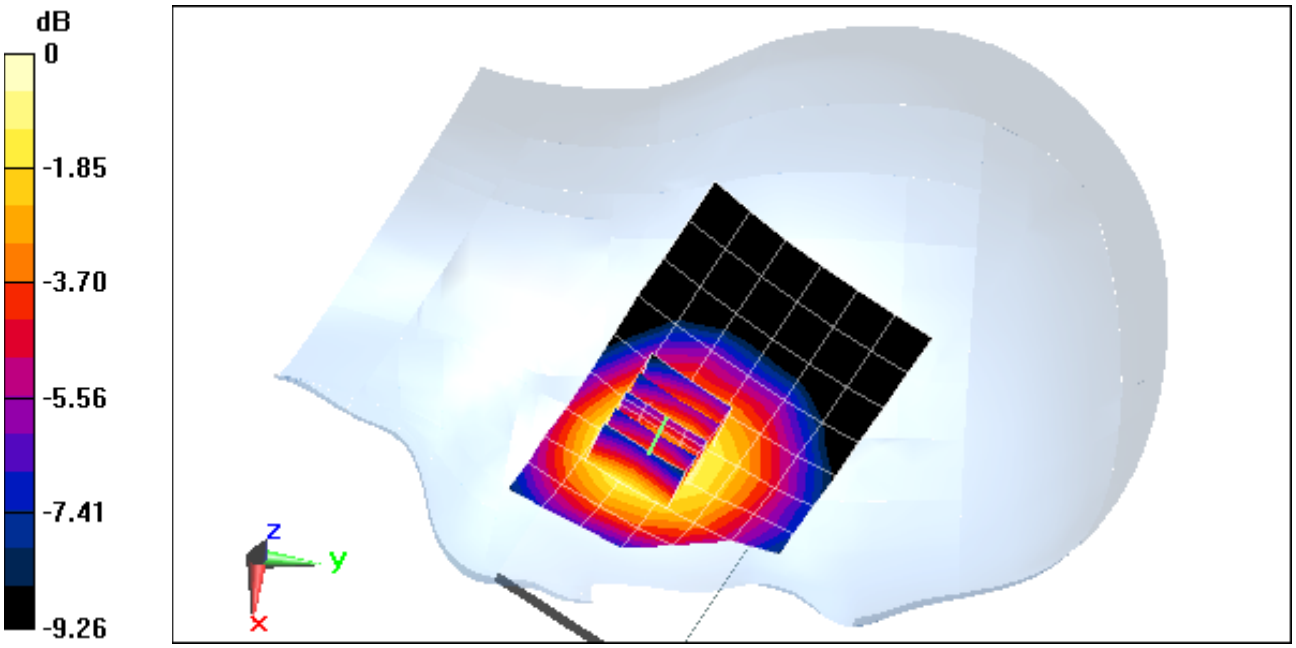
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Left Head, Cheek, Mid.ch

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.170 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.3280
SAR(1 g) = 0.265 mW/g; SAR(10 g) = 0.200 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

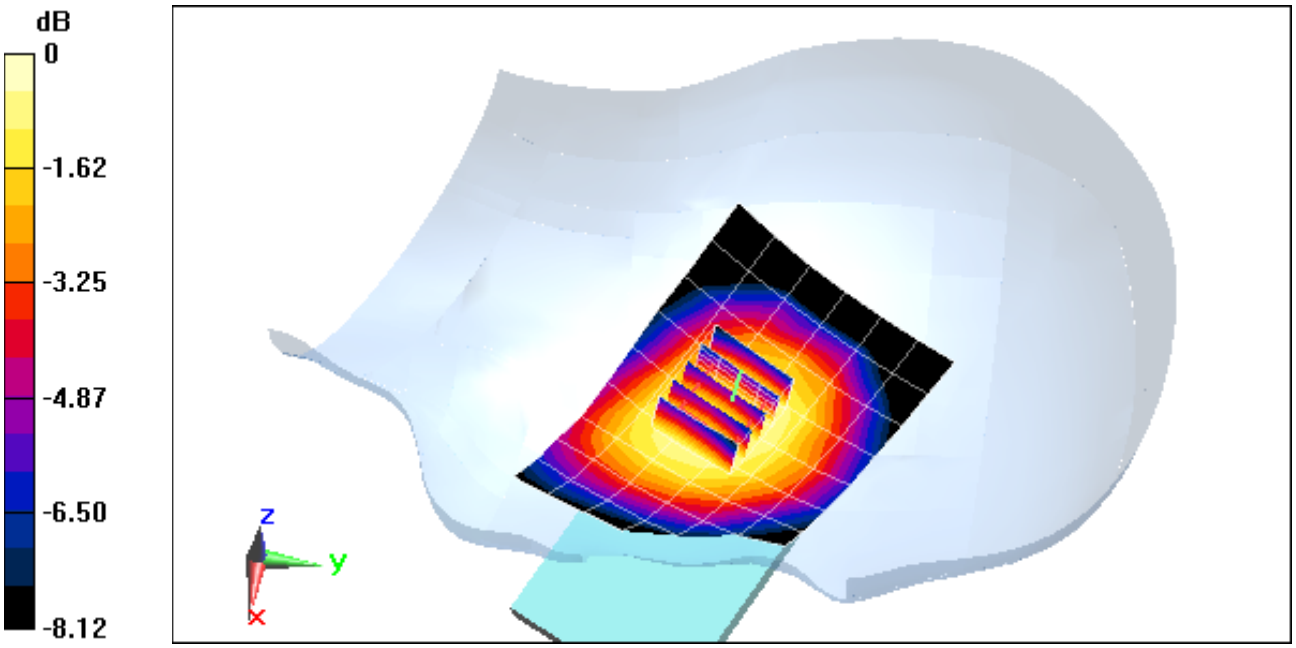
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.923 mho/m; ε_r = 41.45; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 24.9°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Left Head, Tilt, Mid.ch

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.346 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.1580
SAR(1 g) = 0.131 mW/g; SAR(10 g) = 0.103 mW/g



0 dB = 0.140mW/g = -17.08 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

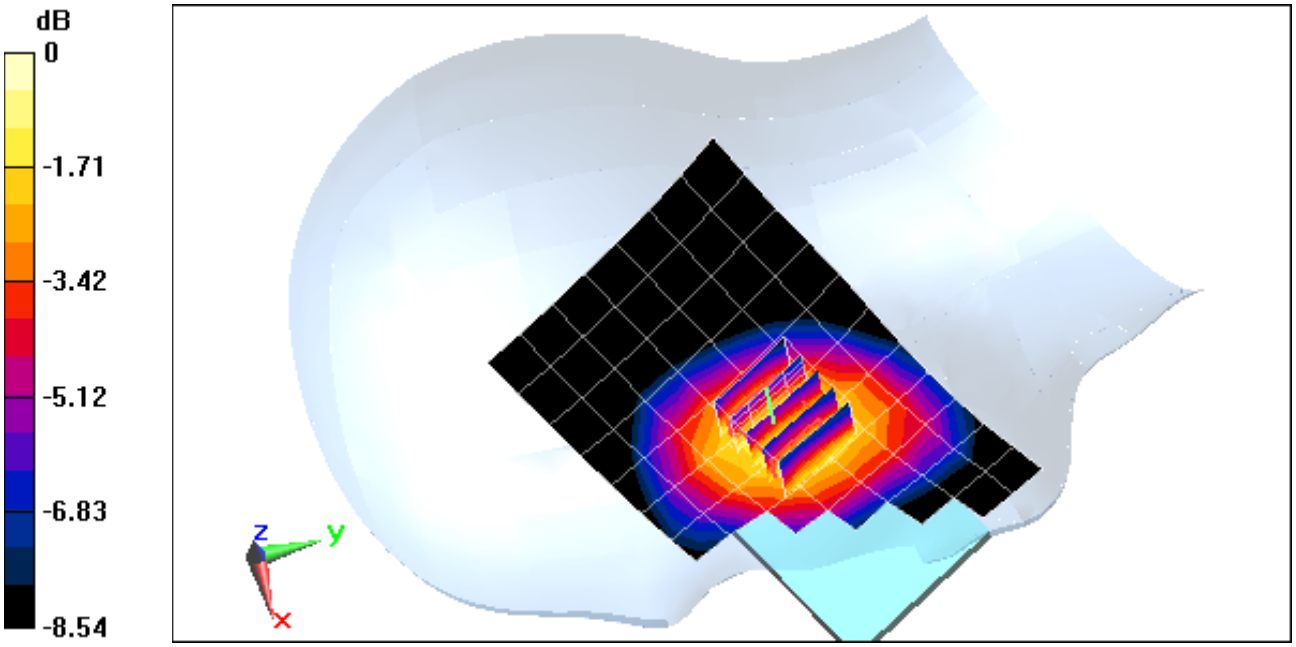
Communication System: LTE BAND 5; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 829 MHz; σ = 0.9 mho/m; ε_r = 40.142; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-06-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 5 (Cell), Right Head, Cheek, Low.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.402 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.2540
SAR(1 g) = 0.209 mW/g; SAR(10 g) = 0.159 mW/g



0 dB = 0.220mW/g = -13.15 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

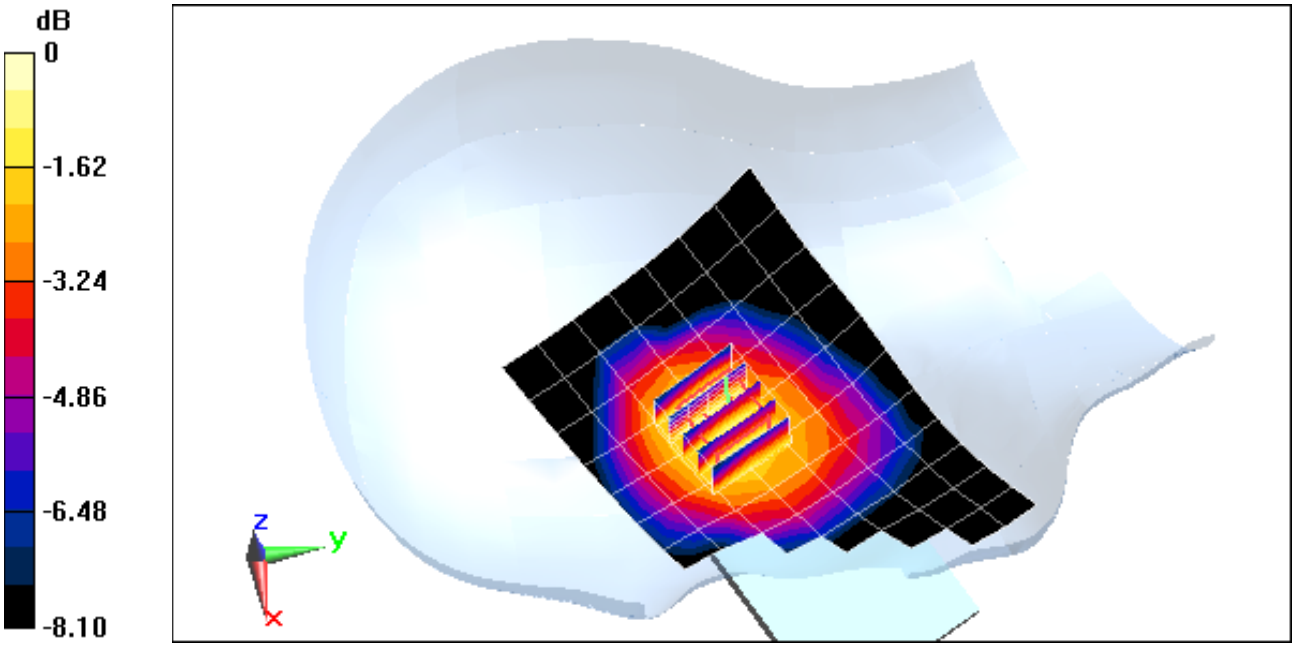
Communication System: LTE BAND 5; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 829 MHz; σ = 0.9 mho/m; ε_r = 40.142; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-06-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 5 (Cell), Right Head, Tilt, Low.ch,
10 MHz Bandwidth, QPSK,1 RB, 49 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.016 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.1450
SAR(1 g) = 0.114 mW/g; SAR(10 g) = 0.089 mW/g



0 dB = 0.120mW/g = -18.42 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

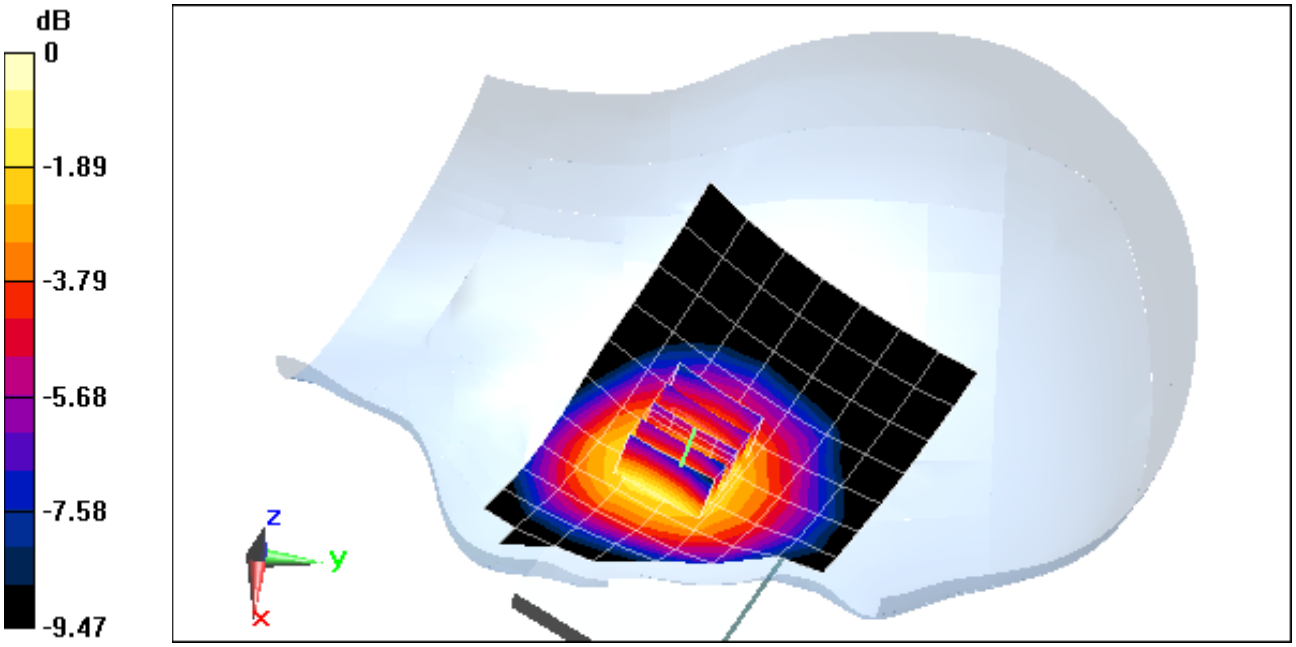
Communication System: LTE BAND 5; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 829 MHz; σ = 0.9 mho/m; ε_r = 40.142; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-06-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 5 (Cell), Left Head, Cheek, Low.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.832 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.3000
SAR(1 g) = 0.236 mW/g; SAR(10 g) = 0.179 mW/g



0 dB = 0.250mW/g = -12.04 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

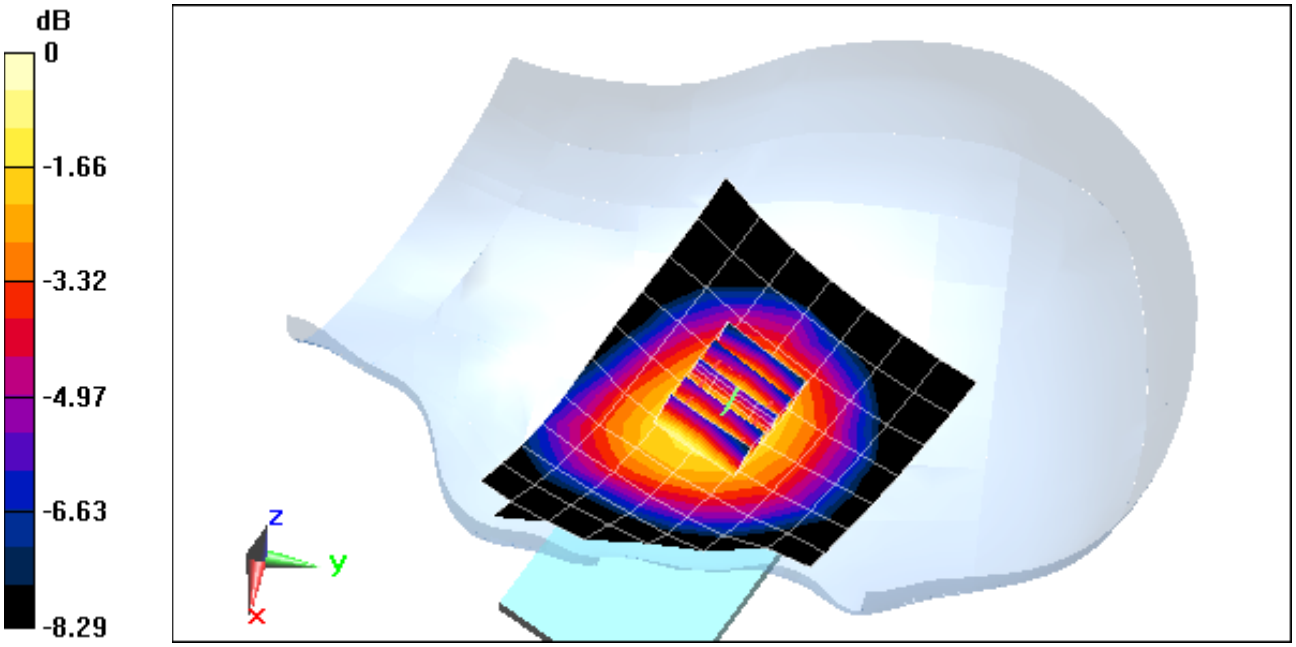
Communication System: LTE BAND 5; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 829 MHz; σ = 0.9 mho/m; ε_r = 40.142; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-06-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 5 (Cell), Left Head, Tilt, Low.ch,
10 MHz Bandwidith, QPSK,1 RB, 49 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.332 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.1550
SAR(1 g) = 0.123 mW/g; SAR(10 g) = 0.094 mW/g



0 dB = 0.130mW/g = -17.72 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

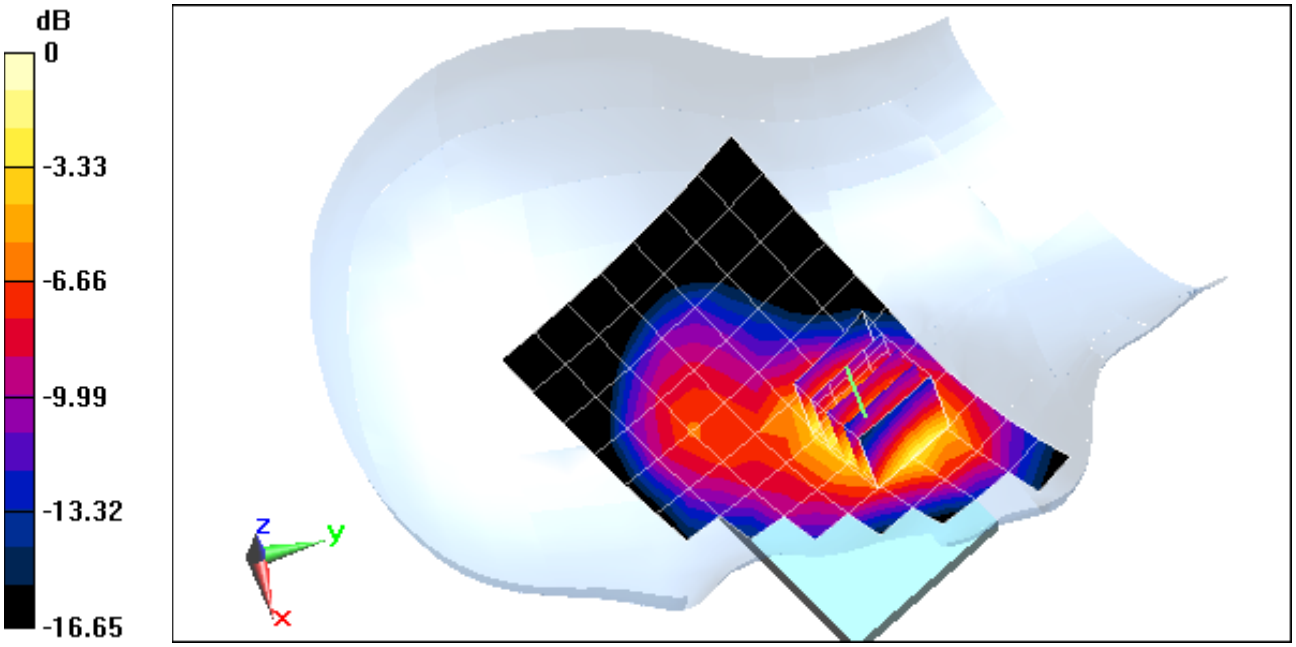
Communication System: LTE Band 4 (AWS); Frequency: 1717.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1717.5 MHz; σ = 1.317 mho/m; ε_r = 39.84; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-06-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.22, 5.22, 5.22); Calibrated: 4/24/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (0);SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 4 (AWS), Right Head, Cheek, Low ch,
15 MHz Bandwidth, QPSK, 1 RB, 74 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.993 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.8160
SAR(1 g) = 0.525 mW/g; SAR(10 g) = 0.325 mW/g



0 dB = 0.560mW/g = -5.04 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

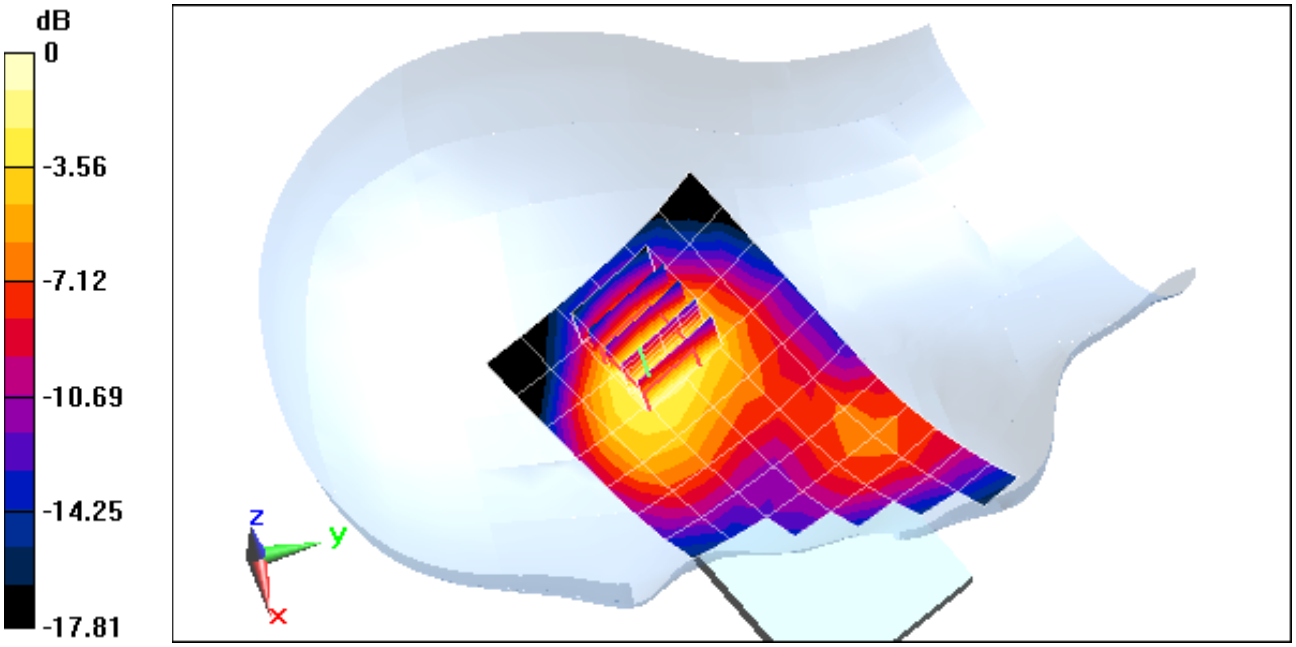
Communication System: LTE Band 4 (AWS); Frequency: 1717.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1717.5 MHz; σ = 1.317 mho/m; ε_r = 39.84; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-06-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.22, 5.22, 5.22); Calibrated: 4/24/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (0);SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 4 (AWS), Right Head, Tilt, Low.ch,
15 MHz Bandwidth, QPSK, 1 RB, 74 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.183 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.3150
SAR(1 g) = 0.208 mW/g; SAR(10 g) = 0.126 mW/g



0 dB = 0.220mW/g = -13.15 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

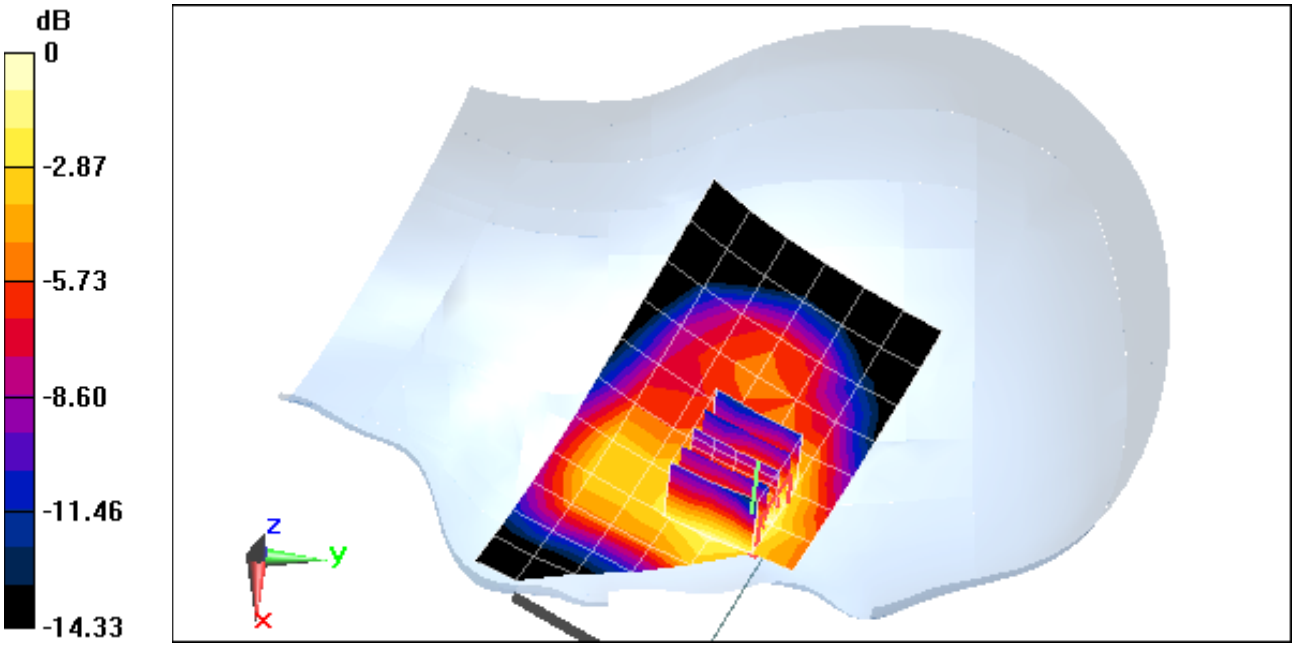
Communication System: LTE Band 4 (AWS); Frequency: 1717.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1717.5 MHz; σ = 1.317 mho/m; ε_r = 39.84; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-06-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.22, 5.22, 5.22); Calibrated: 4/24/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (0);SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 4 (AWS), Left Head, Cheek, Low ch,
15 MHz Bandwidth, QPSK, 1 RB, 74 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.446 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.2850
SAR(1 g) = 0.198 mW/g; SAR(10 g) = 0.130 mW/g



0 dB = 0.210mW/g = -13.56 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

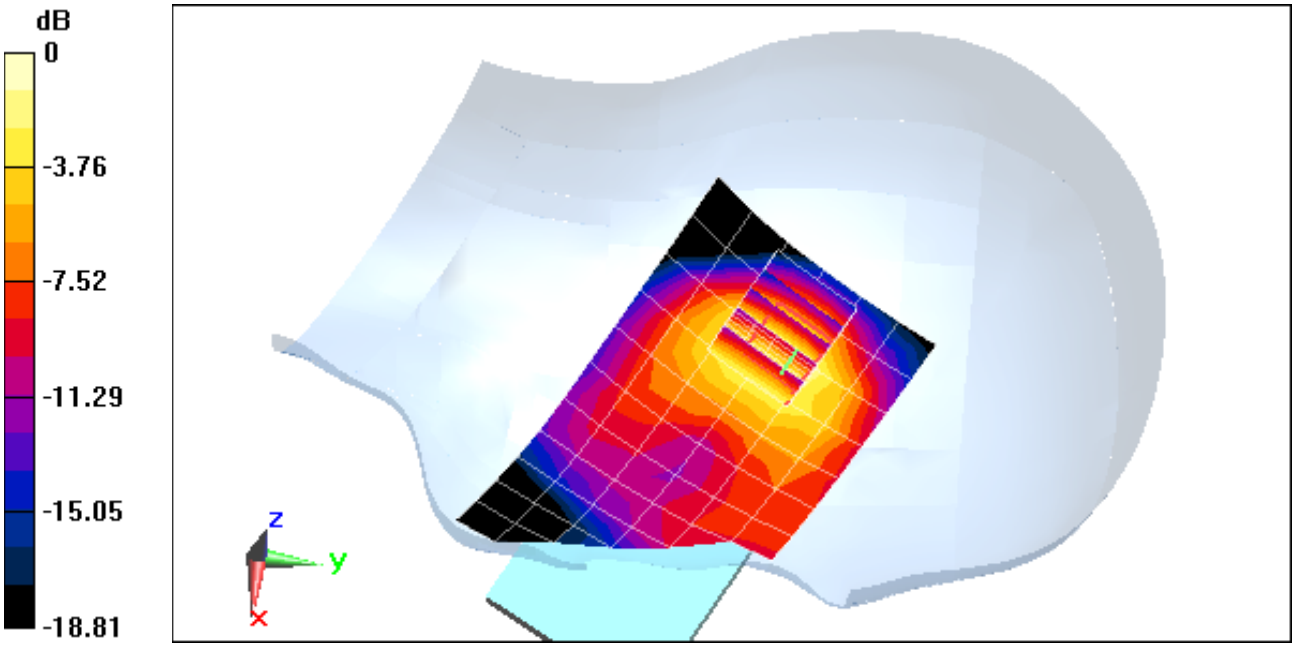
Communication System: LTE Band 4 (AWS); Frequency: 1717.5 MHz;Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1717.5 MHz; σ = 1.317 mho/m; ε_r = 39.84; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-06-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3213; ConvF(5.22, 5.22, 5.22); Calibrated: 4/24/2012
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (0);SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 4 (AWS), Left Head, Tilt, Low ch,
15 MHz Bandwidth, QPSK, 1 RB, 74 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.792 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.3000
SAR(1 g) = 0.189 mW/g; SAR(10 g) = 0.113 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

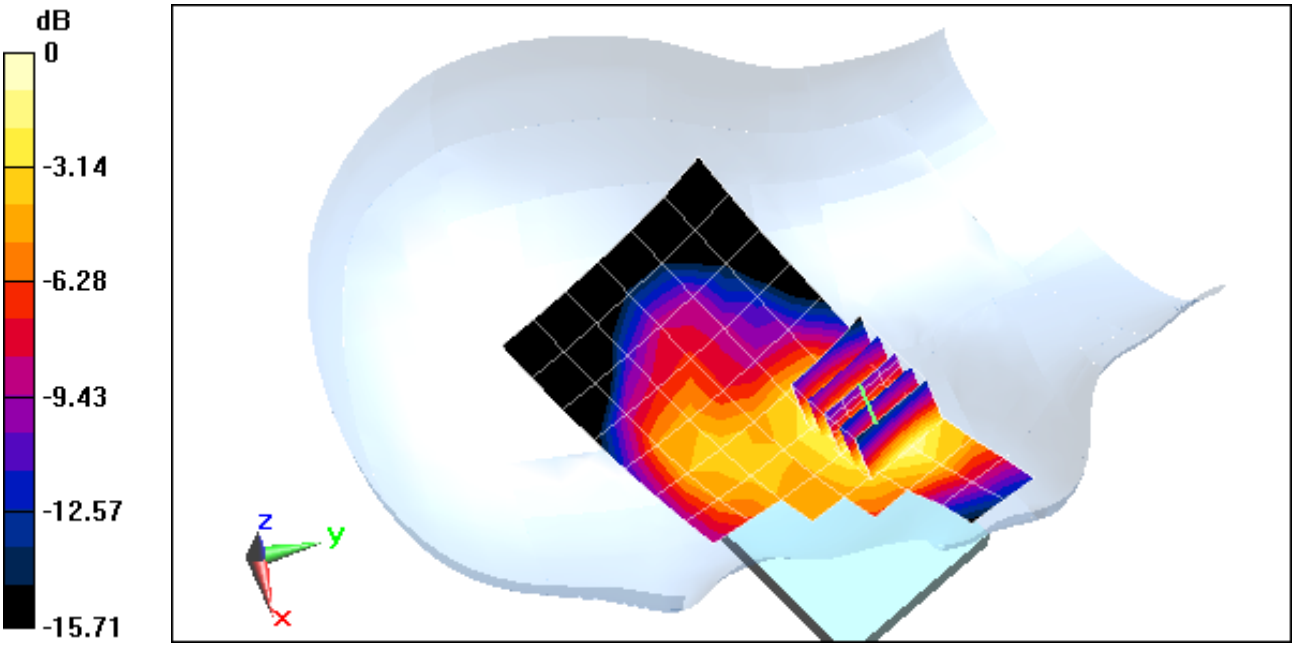
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: GSM 1900, Right Head, Cheek, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.030 V/m; Power Drift = -1.8e-006 dB
Peak SAR (extrapolated) = 0.5090
SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.201 mW/g



0 dB = 0.350mW/g = -9.12 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

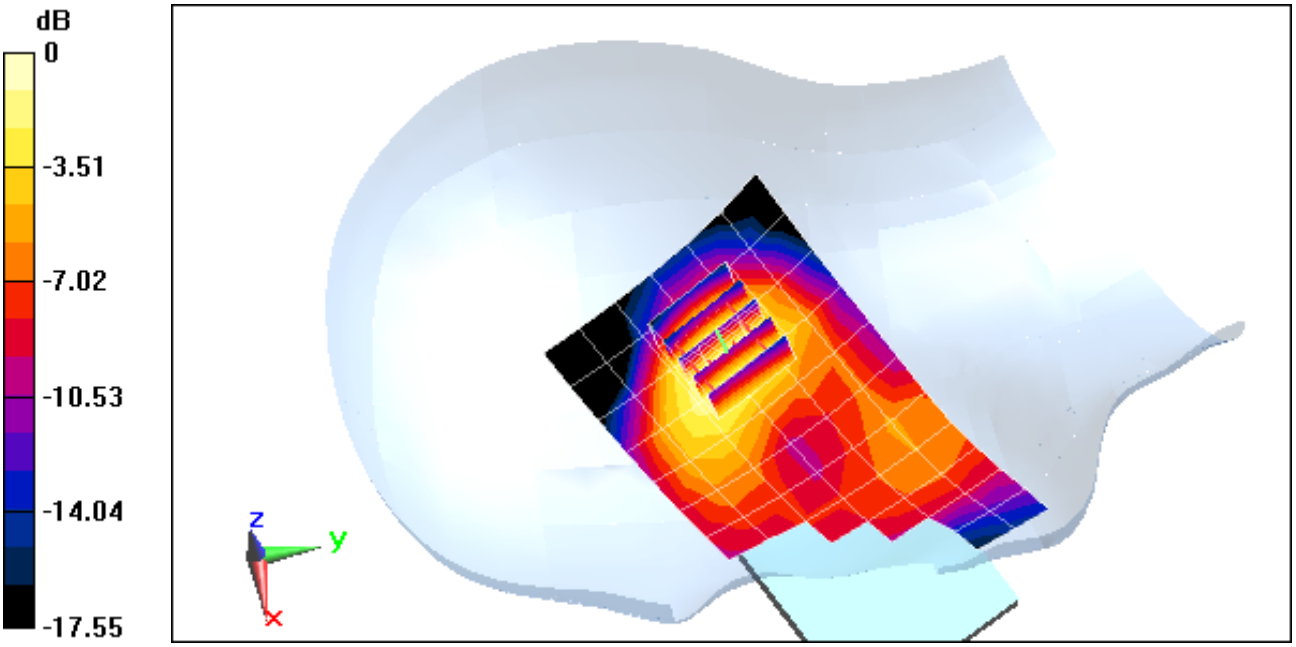
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: GSM 1900, Right Head, Tilt, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.508 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.2490
SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.090 mW/g



0 dB = 0.170mW/g = -15.39 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

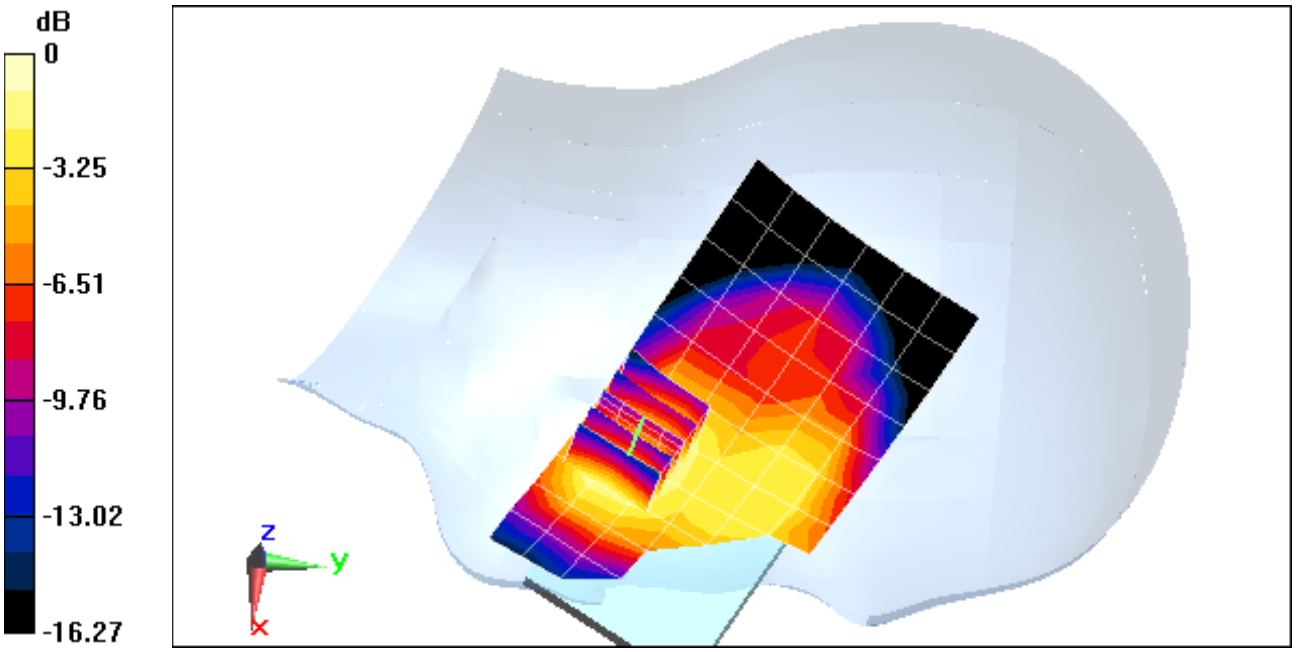
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: GSM 1900, Left Head, Cheek, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.180 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.4510
SAR(1 g) = 0.299 mW/g; SAR(10 g) = 0.190 mW/g



0 dB = 0.320mW/g = -9.90 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

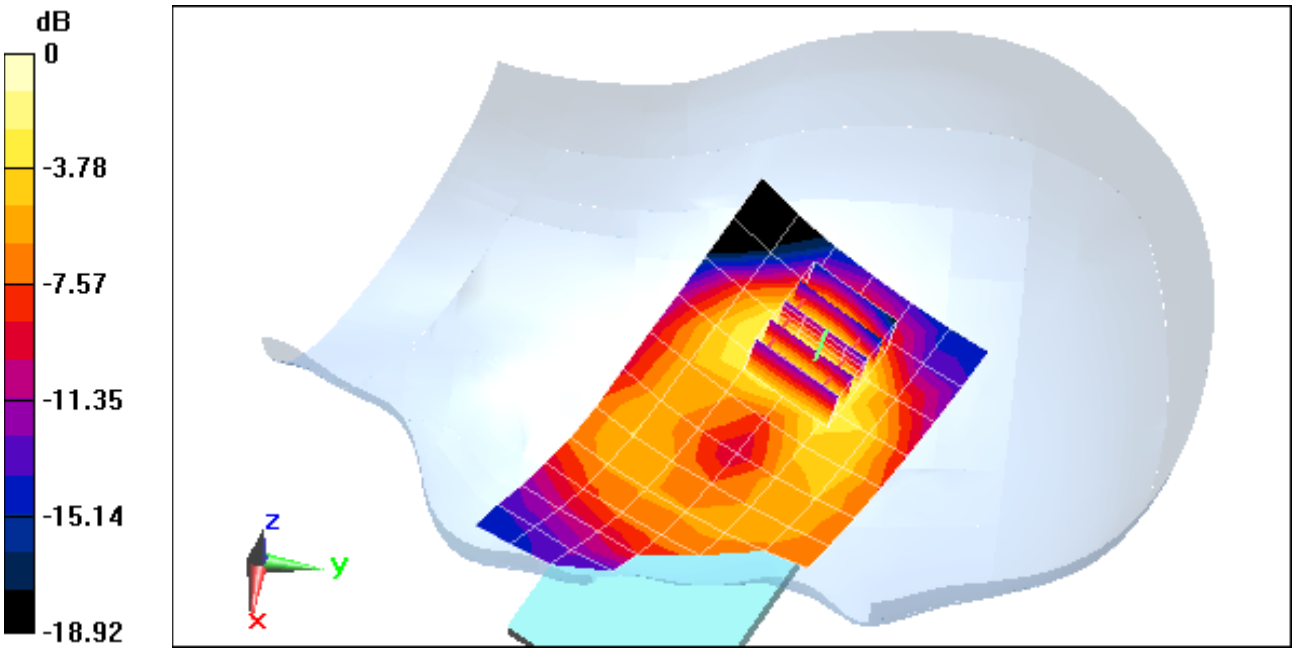
Communication System: GSM; Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: GSM 1900, Left Head, Tilt, Mid.ch

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.380 V/m; Power Drift = 0.0047 dB
Peak SAR (extrapolated) = 0.2400
SAR(1 g) = 0.147 mW/g; SAR(10 g) = 0.085 mW/g



0 dB = 0.160mW/g = -15.92 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

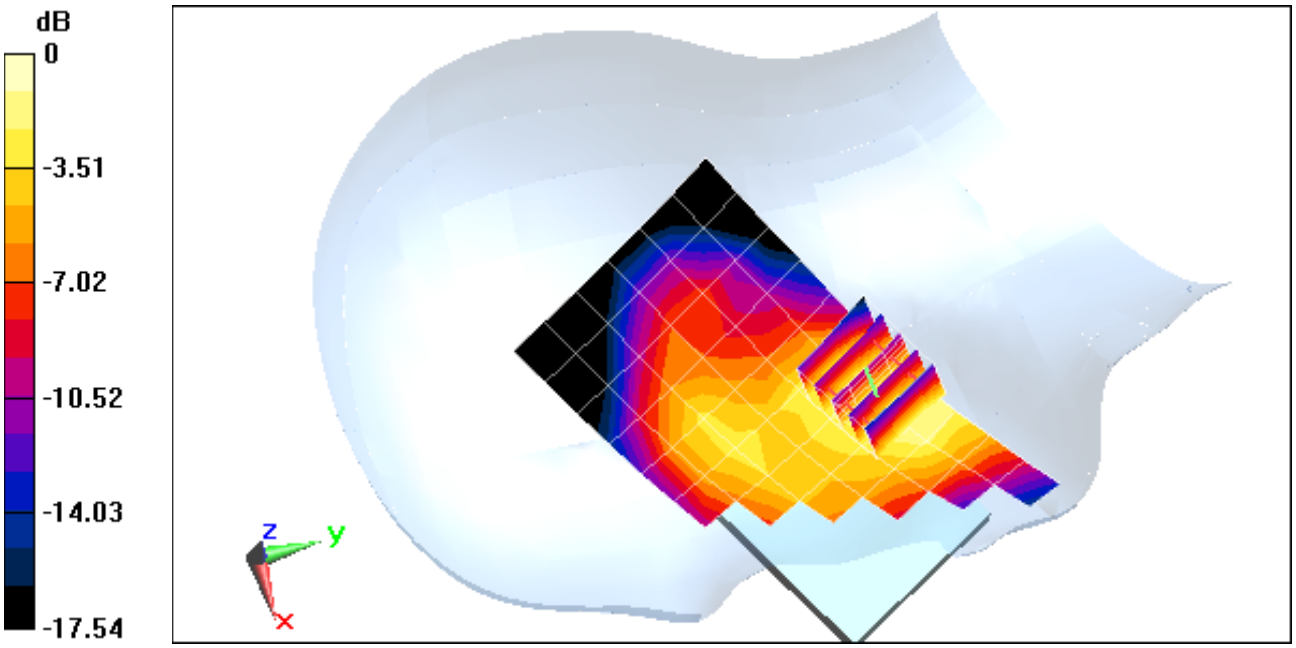
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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:WCDMA 1900, Right Head, Cheek, Mid.ch

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.340 V/m; Power Drift = 0.0047 dB
Peak SAR (extrapolated) = 0.9300
SAR(1 g) = 0.602 mW/g; SAR(10 g) = 0.373 mW/g



0 dB = 0.660mW/g = -3.61 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

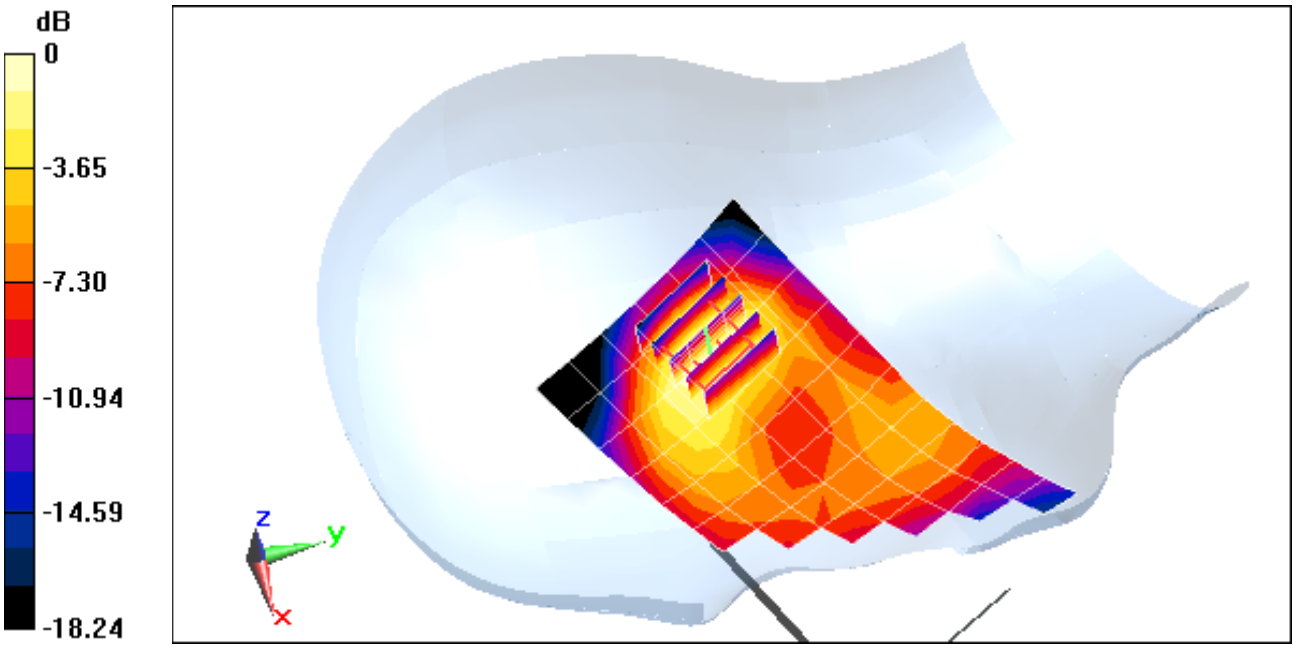
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: WCDMA 1900, Right Head, Tilt, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.156 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.4690
SAR(1 g) = 0.290 mW/g; SAR(10 g) = 0.170 mW/g



0 dB = 0.320mW/g = -9.90 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

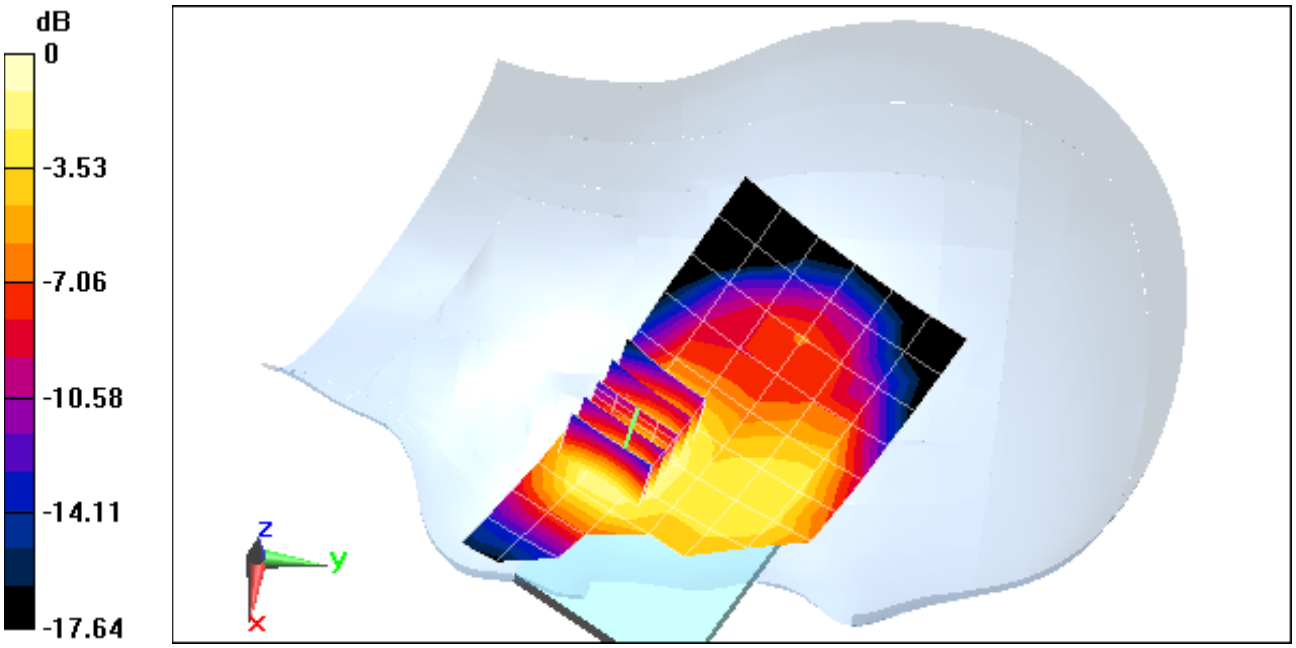
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: WCDMA 1900, Left Head, Cheek, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.177 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.7920
SAR(1 g) = 0.526 mW/g; SAR(10 g) = 0.336 mW/g



0 dB = 0.570mW/g = -4.88 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

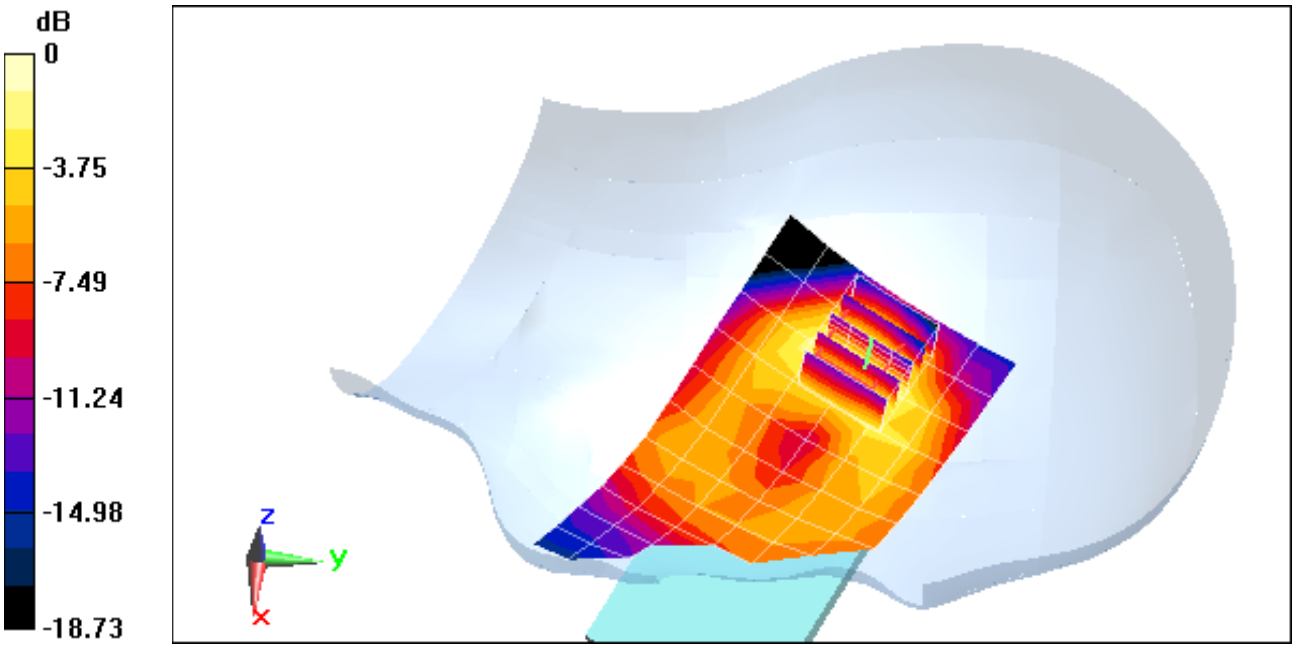
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.414 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: WCDMA 1900, Left Head, Tilt, Mid.ch

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.774 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.4000
SAR(1 g) = 0.245 mW/g; SAR(10 g) = 0.142 mW/g



0 dB = 0.270mW/g = -11.37 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

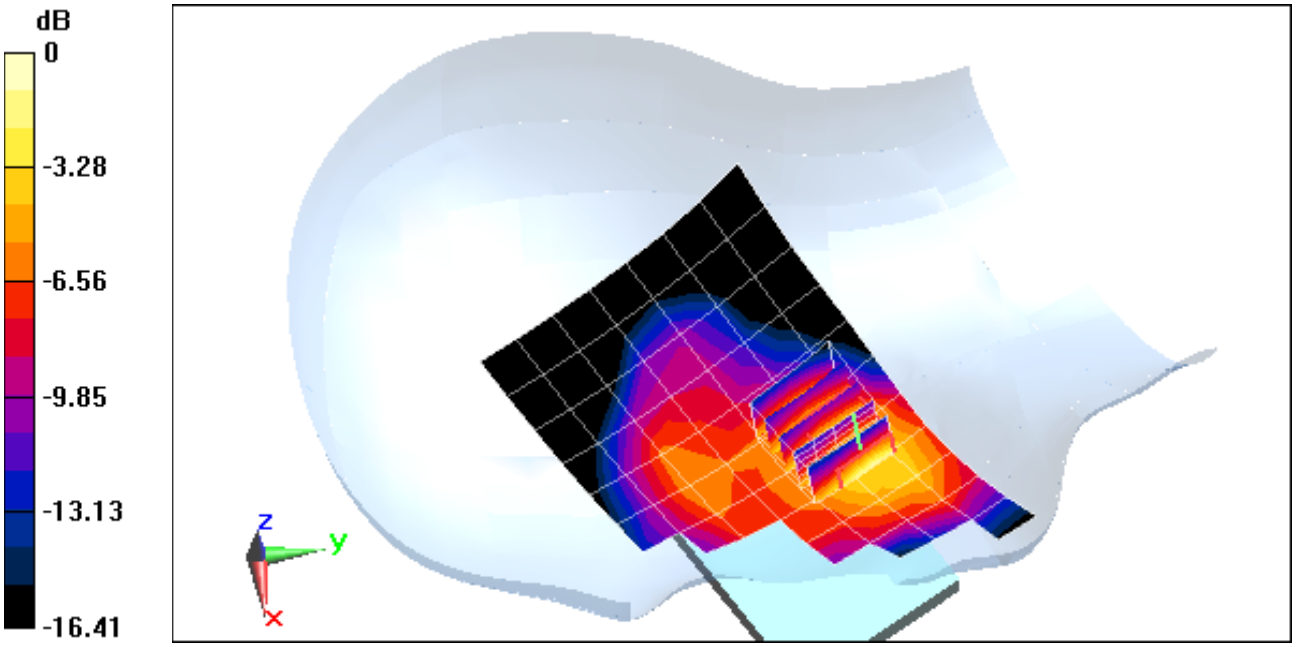
Communication System: LTE Band 2; Frequency: 1855 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1855 MHz; σ = 1.391 mho/m; ε_r = 38.215; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: LTE Band 2 (PCS), Right Head, Cheek, Low.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.644 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.1340
SAR(1 g) = 0.744 mW/g; SAR(10 g) = 0.450 mW/g



0 dB = 0.800mW/g = -1.94 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

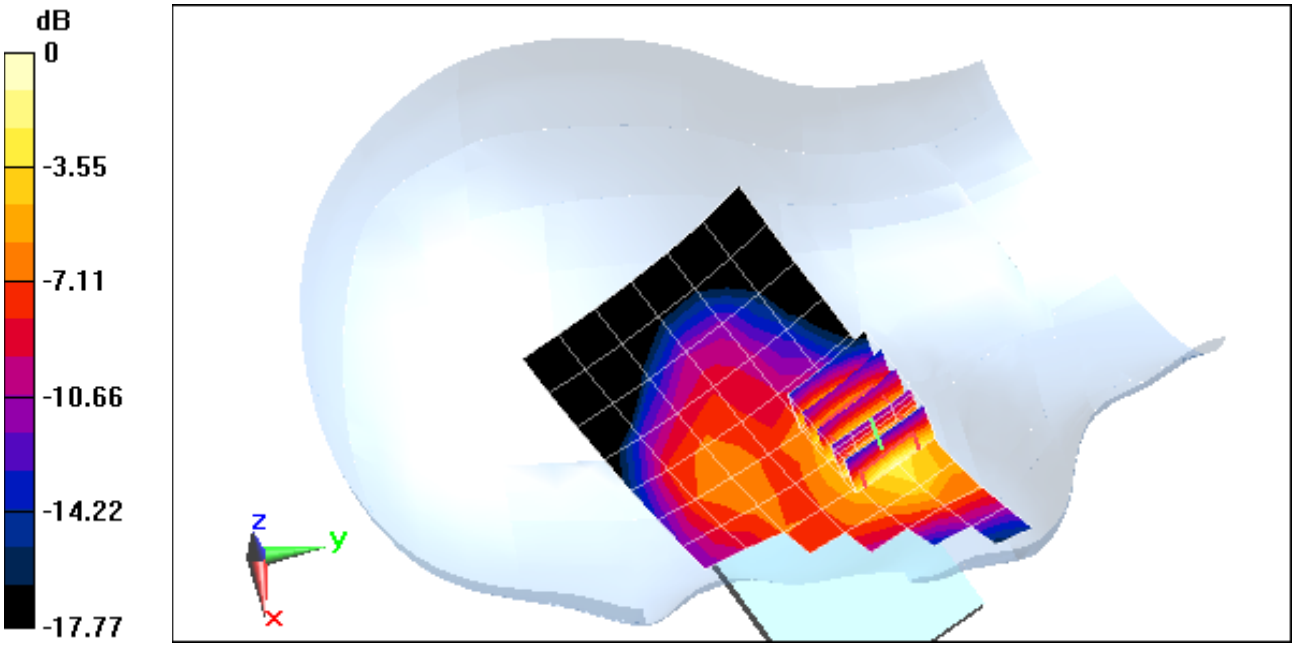
Communication System: LTE Band 2; Frequency: 1855 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1855 MHz; σ = 1.391 mho/m; ε_r = 38.215; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: LTE Band 2 (PCS), Right Head, Tilt, Low ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.210 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 1.1250
SAR(1 g) = 0.731 mW/g; SAR(10 g) = 0.441 mW/g



0 dB = 0.810mW/g = -1.83 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

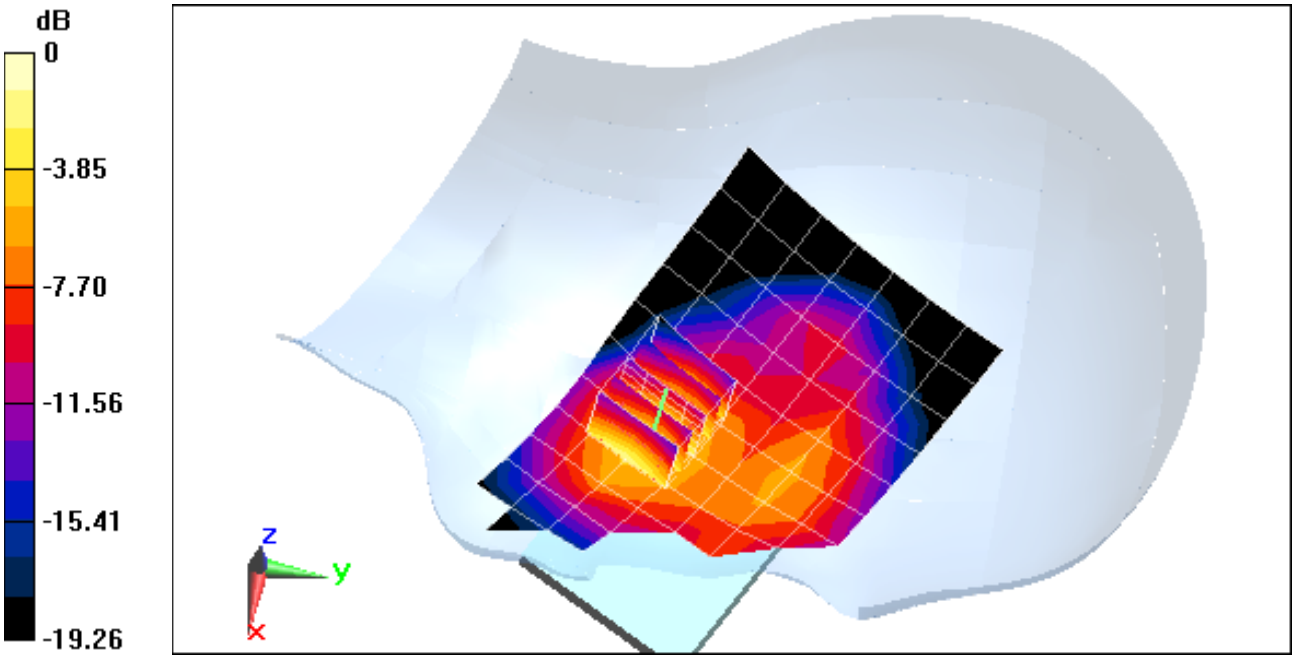
Communication System: LTE Band 2; Frequency: 1855 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1855 MHz; σ = 1.391 mho/m; ε_r = 38.215; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: LTE Band 2 (PCS), Left Head, Cheek, Low.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.837 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.0500
SAR(1 g) = 0.669 mW/g; SAR(10 g) = 0.402 mW/g



0 dB = 0.720mW/g = -2.85 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

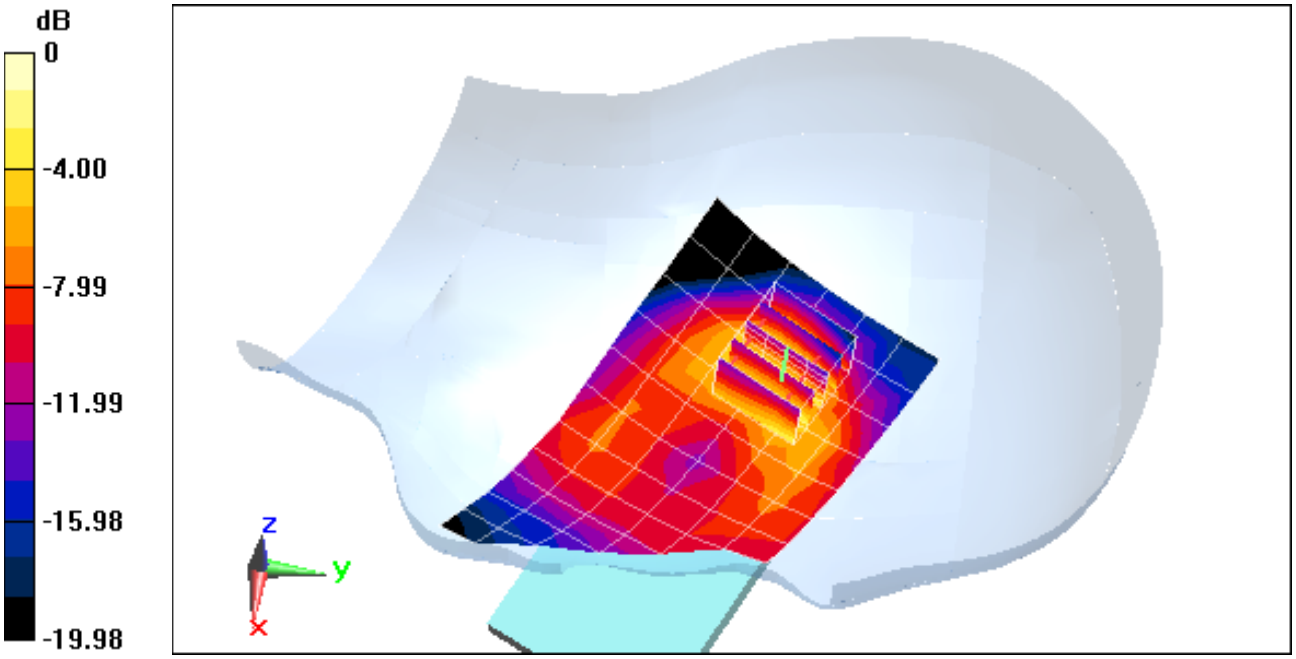
Communication System: LTE Band 2; Frequency: 1855 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1855 MHz; σ = 1.391 mho/m; ε_r = 38.215; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2012; Ambient Temp: 21.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012
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: LTE Band 2 (PCS), Left Head, Tilt, Low.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.663 V/m; Power Drift = 0.135 dB
Peak SAR (extrapolated) = 0.5820
SAR(1 g) = 0.331 mW/g; SAR(10 g) = 0.187 mW/g



0 dB = 0.370mW/g = -8.64 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 3

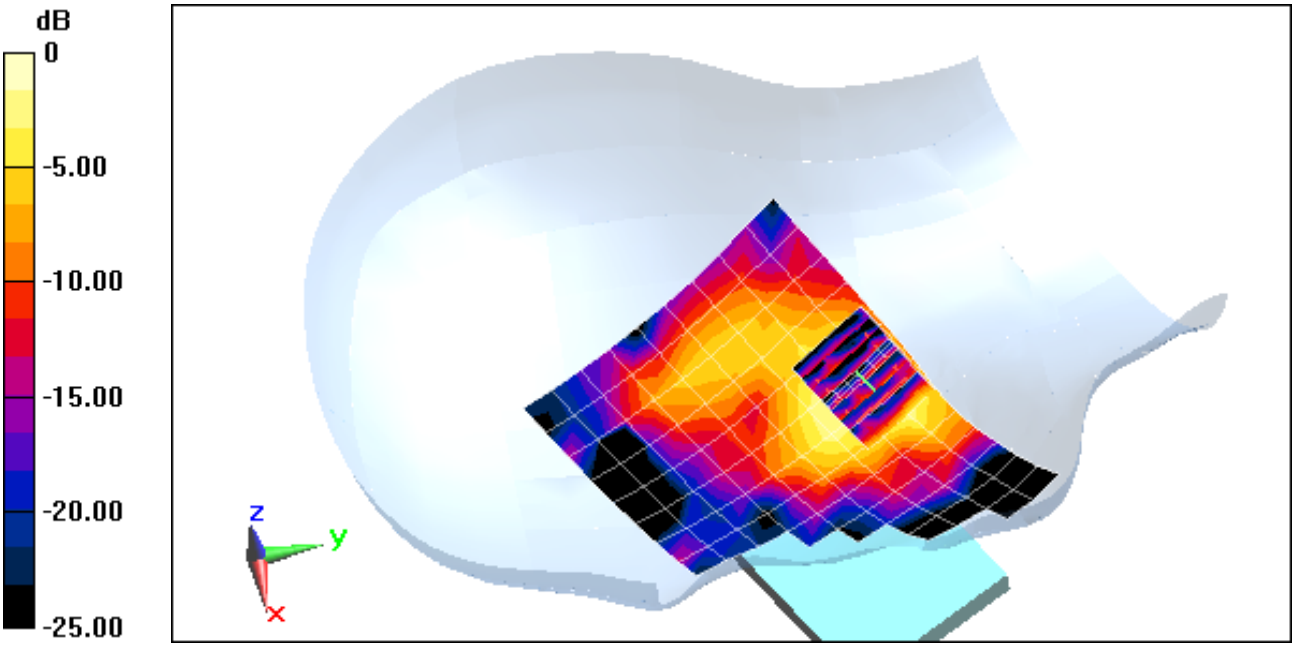
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.813 mho/m; ε_r = 37.458; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.8°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)

Mode: IEEE 802.11b, Right Head, Cheek, Ch 06, 1 Mbps

Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.478 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.2140
SAR(1 g) = 0.091 mW/g; SAR(10 g) = 0.040 mW/g



0 dB = 0.120mW/g = -18.42 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 3

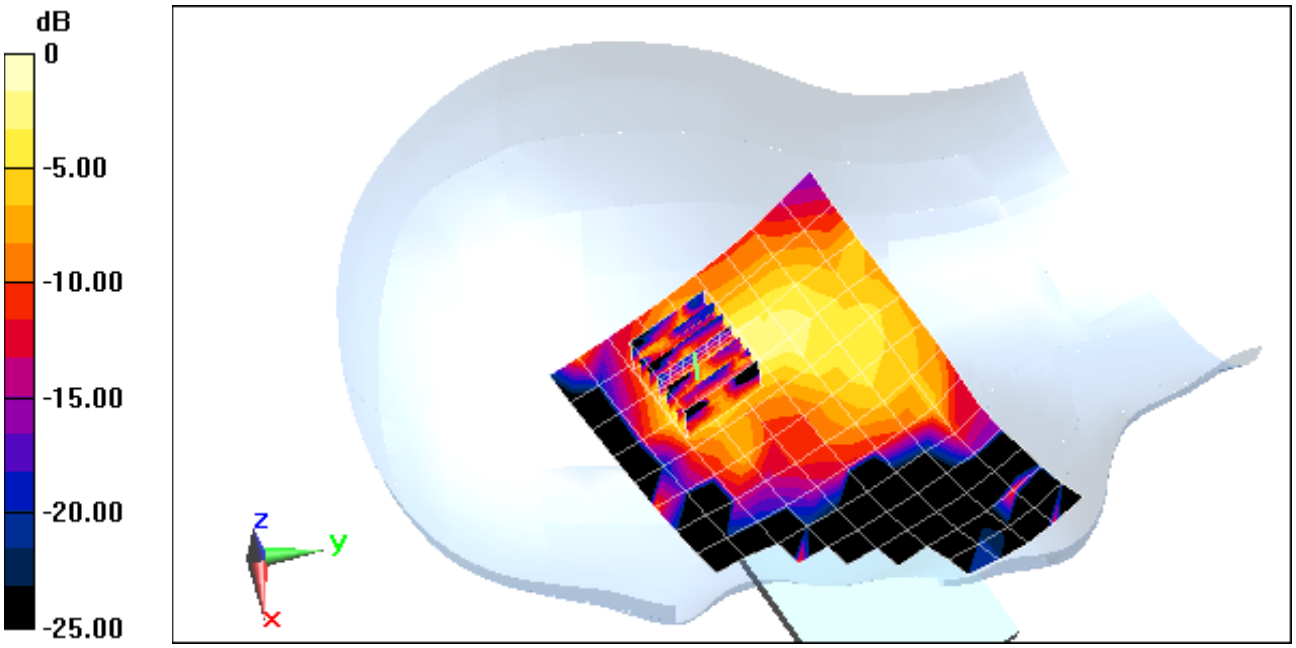
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.813 mho/m; ε_r = 37.458; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.8°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)

Mode: IEEE 802.11b, Right Head, Tilt, Ch 06, 1 Mbps

Area Scan (10x14x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.364 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.0340
SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.00869 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 3

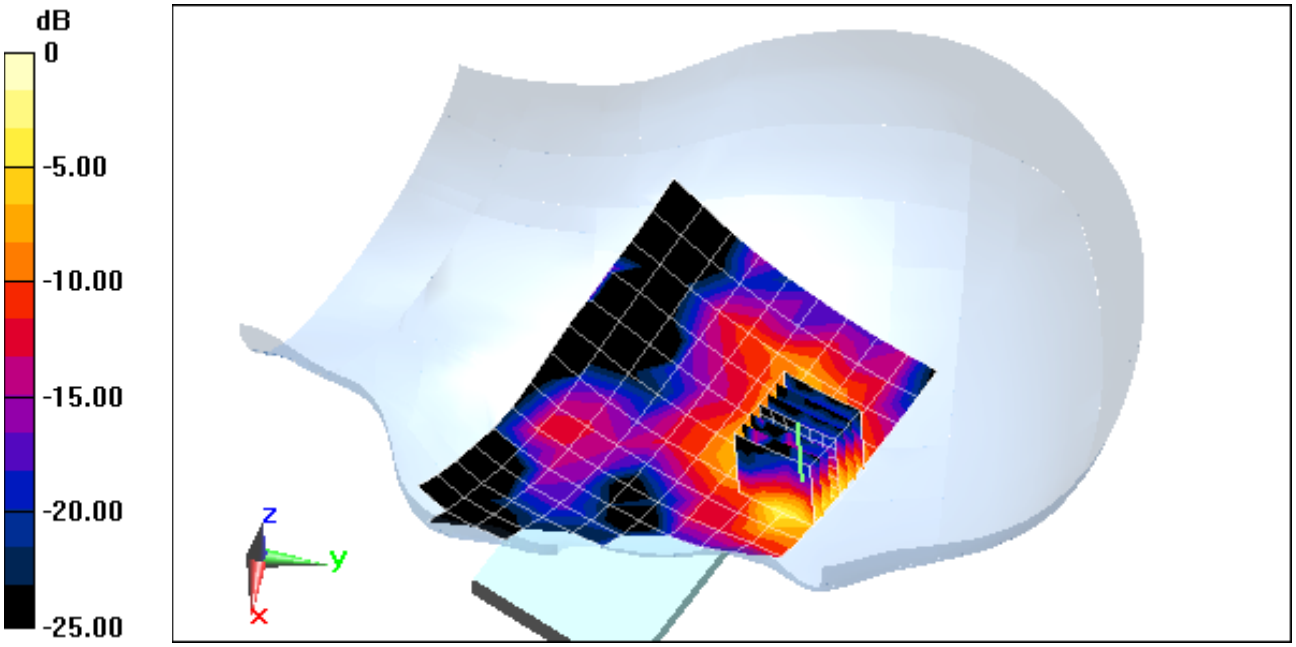
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.813 mho/m; ε_r = 37.458; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.8°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)

Mode: IEEE 802.11b, Left Head, Cheek, Ch 06, 1 Mbps

Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.263 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.2130
SAR(1 g) = 0.102 mW/g; SAR(10 g) = 0.044 mW/g



0 dB = 0.140mW/g = -17.08 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 3

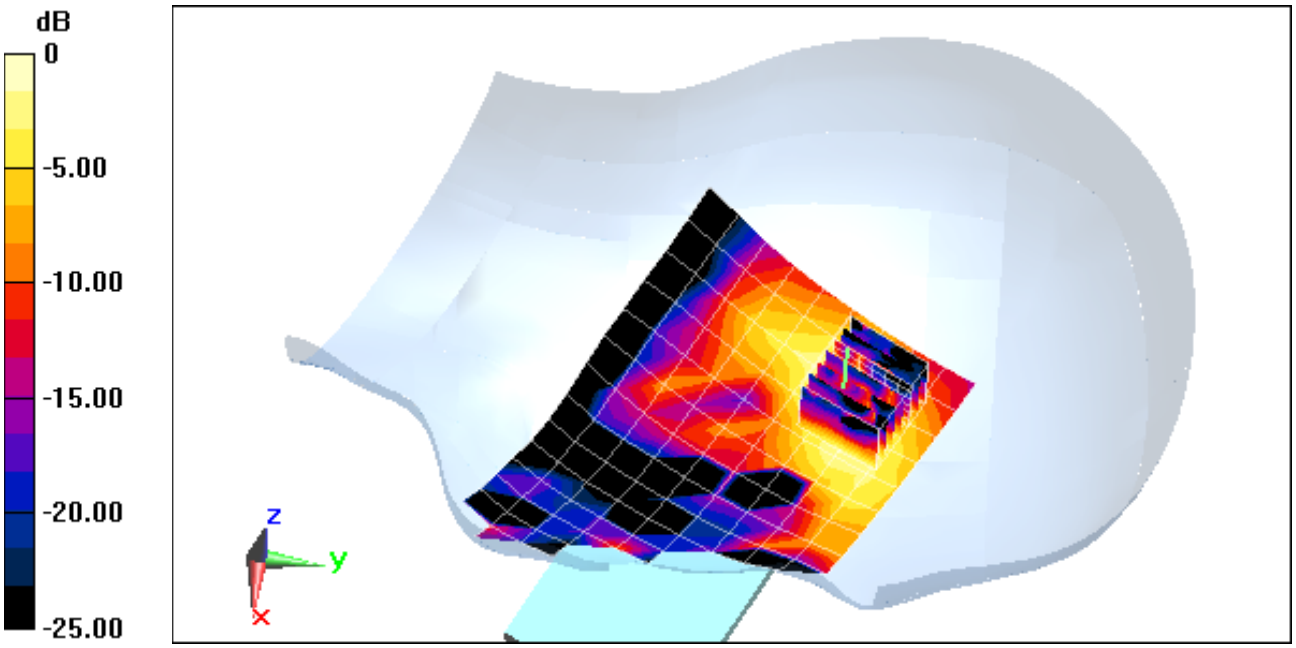
Communication System: IEEE 802.11b; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.813 mho/m; ε_r = 37.458; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-08-2012; Ambient Temp: 23.9°C; Tissue Temp: 22.8°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)

Mode: IEEE 802.11b, Left Head, Tilt, Ch 06, 1 Mbps

Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.346 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.0540
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.014 mW/g



0 dB = 0.040mW/g = -27.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 4

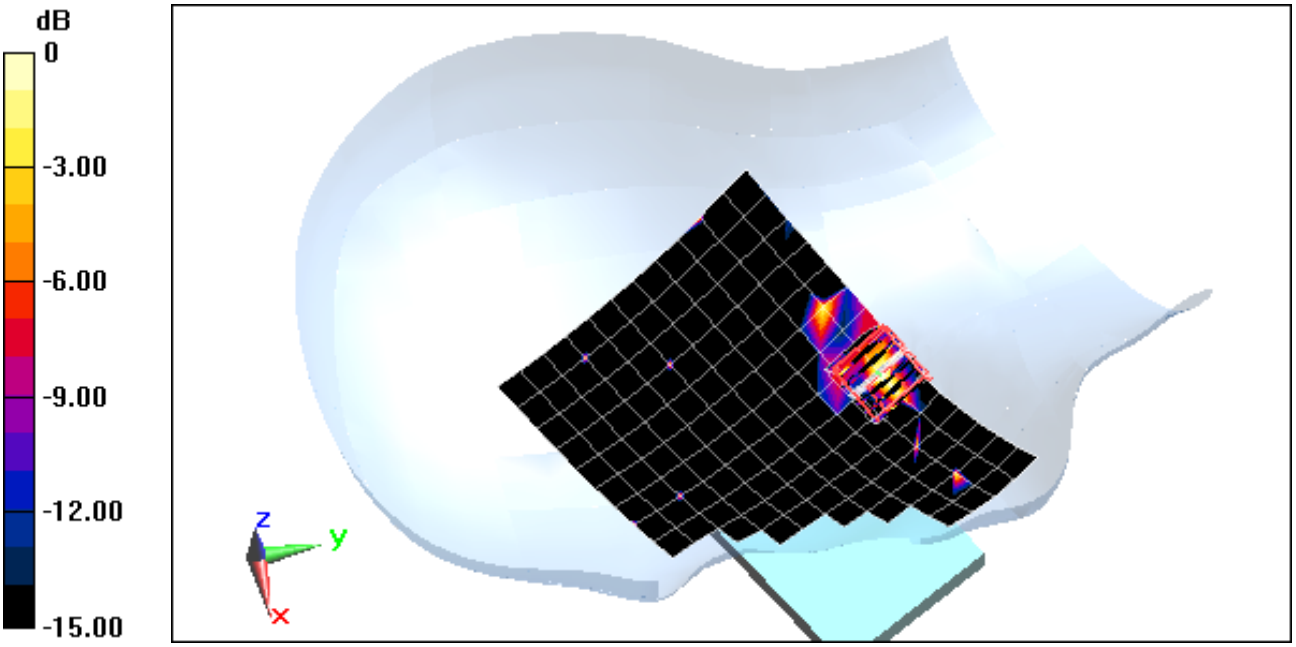
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5805 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5805 MHz; σ = 5.14 mho/m; ε_r = 36.18; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-08-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.1°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11a 5.8 GHz, Right Head, Cheek, Ch 161, 6 Mbps

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.491 V/m; Power Drift = 0.171 dB
Peak SAR (extrapolated) = 0.0880
SAR(1 g) = 0.00197 mW/g; SAR(10 g) = 0.000249 mW/g



0 dB = 0.040mW/g = -27.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 4

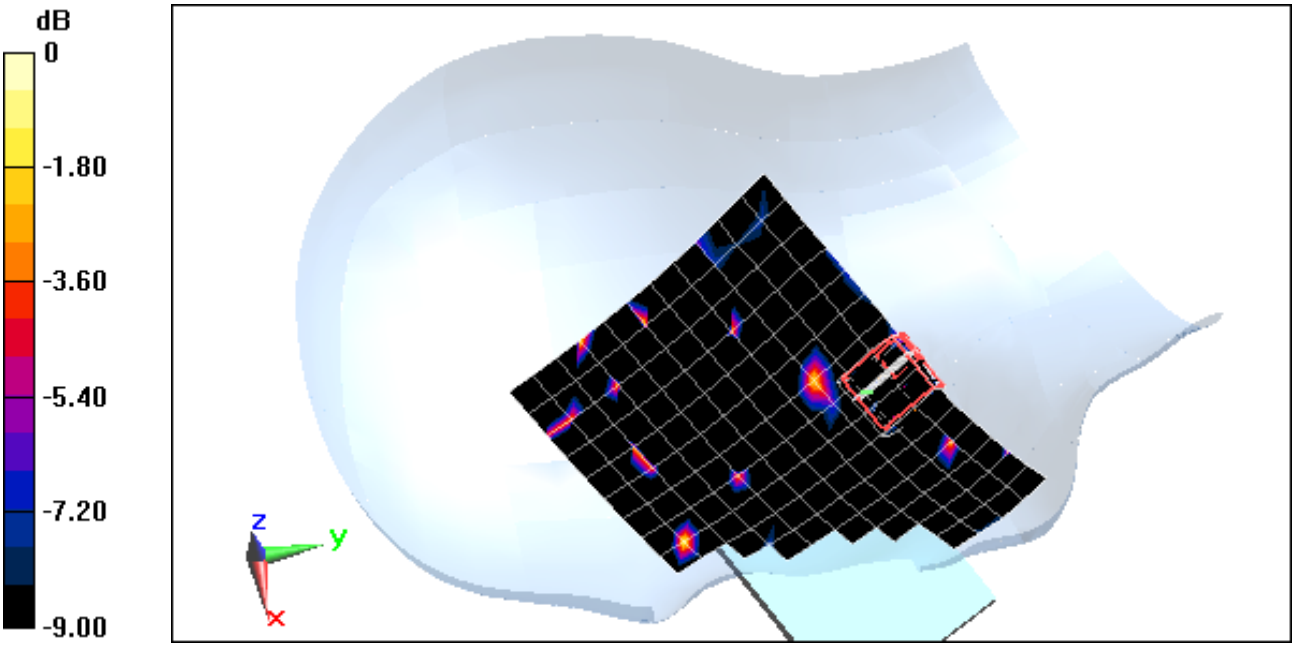
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5805 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5805 MHz; σ = 5.14 mho/m; ε_r = 36.18; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-08-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.1°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11a 5.8 GHz, Right Head, Tilt, Ch 161, 6 Mbps

Area Scan (12x16x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.103 V/m; Power Drift = -0.119 dB
Peak SAR (extrapolated) = 0.0940
SAR(1 g) = 0.00266 mW/g; SAR(10 g) = 0.000273 mW/g



0 dB = 0.040mW/g = -27.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 4

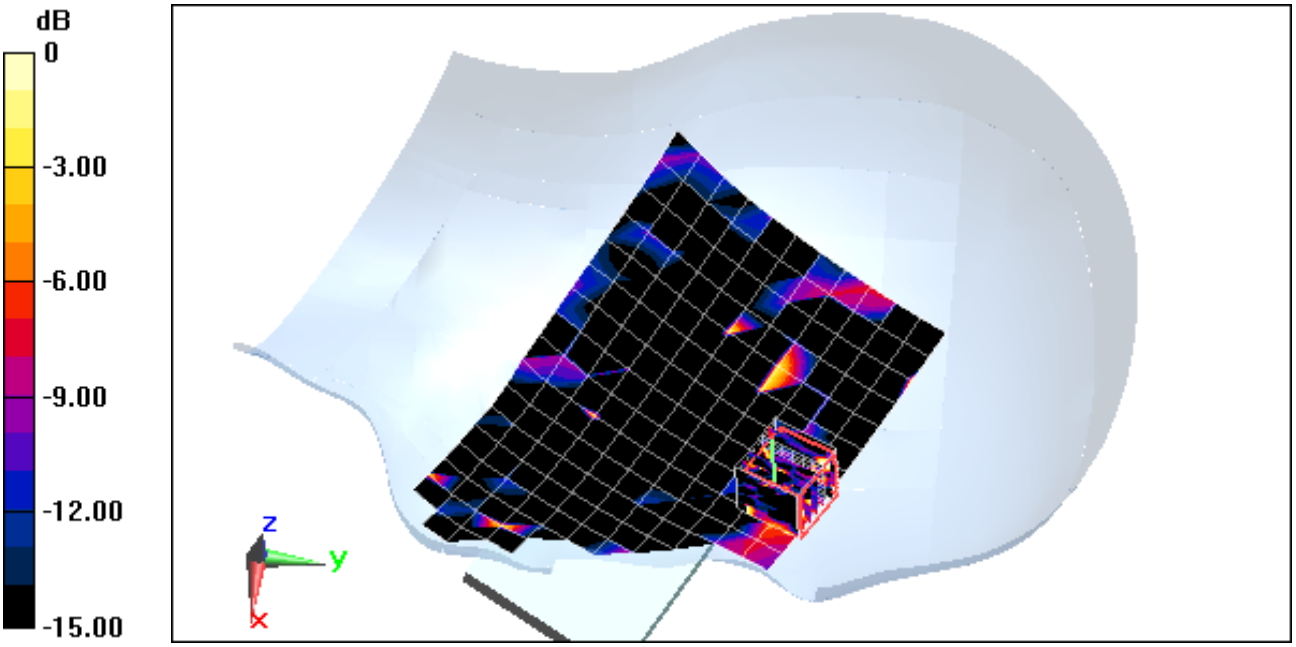
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5280 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5280 MHz; σ = 4.652 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-08-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.2°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11a, 5.3 GHz Left Head, Cheek, Ch 56, 6 Mbps

Area Scan (12x18x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.414 V/m; Power Drift = 0.113 dB
Peak SAR (extrapolated) = 0.0490
SAR(1 g) = 0.00172 mW/g; SAR(10 g) = 0.000212 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 4

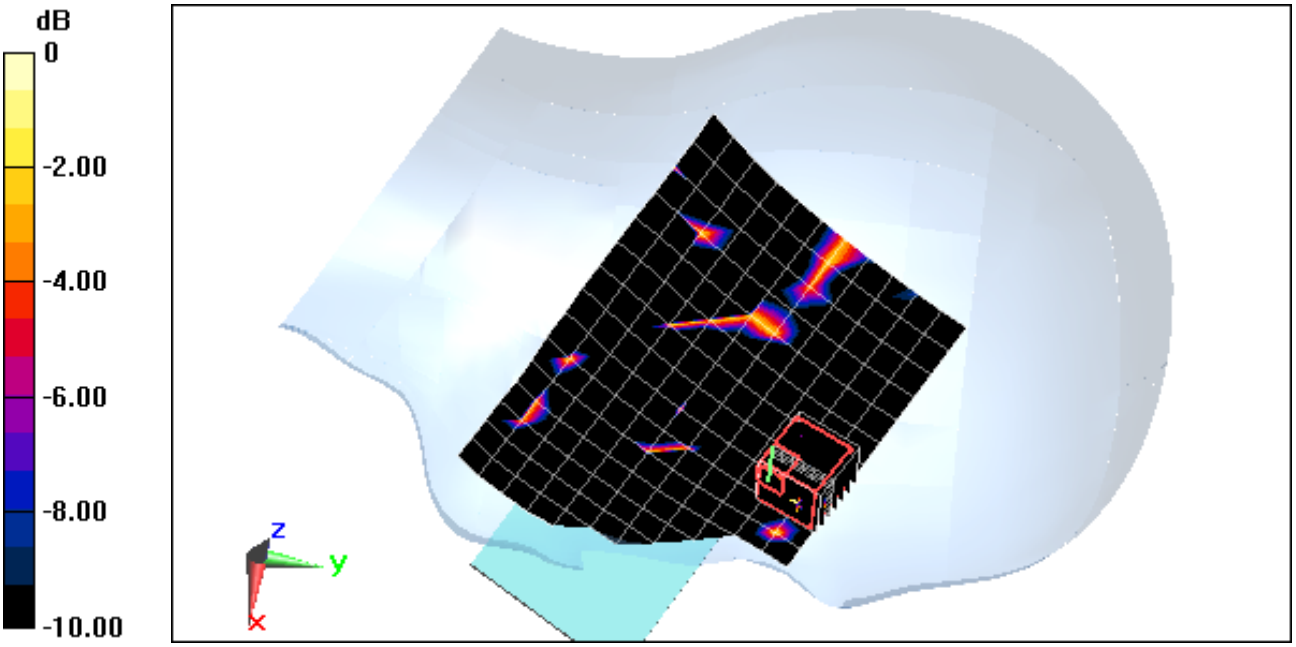
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5700 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5700 MHz; σ = 5.052 mho/m; ε_r = 36.34; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-08-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.1°C

Probe: EX3DV4 - SN3589; ConvF(4.04, 4.04, 4.04); 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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11a, 5.5 GHz Left Head, Tilt, Ch 140, 6 Mbps

Area Scan (12x18x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.078 V/m; Power Drift = 0.0 dB
Peak SAR (extrapolated) = 0.001040
SAR(1 g) = 1.93e-006 mW/g; SAR(10 g) = 8.58e-008 mW/g



0 dB = 0.040mW/g = -27.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

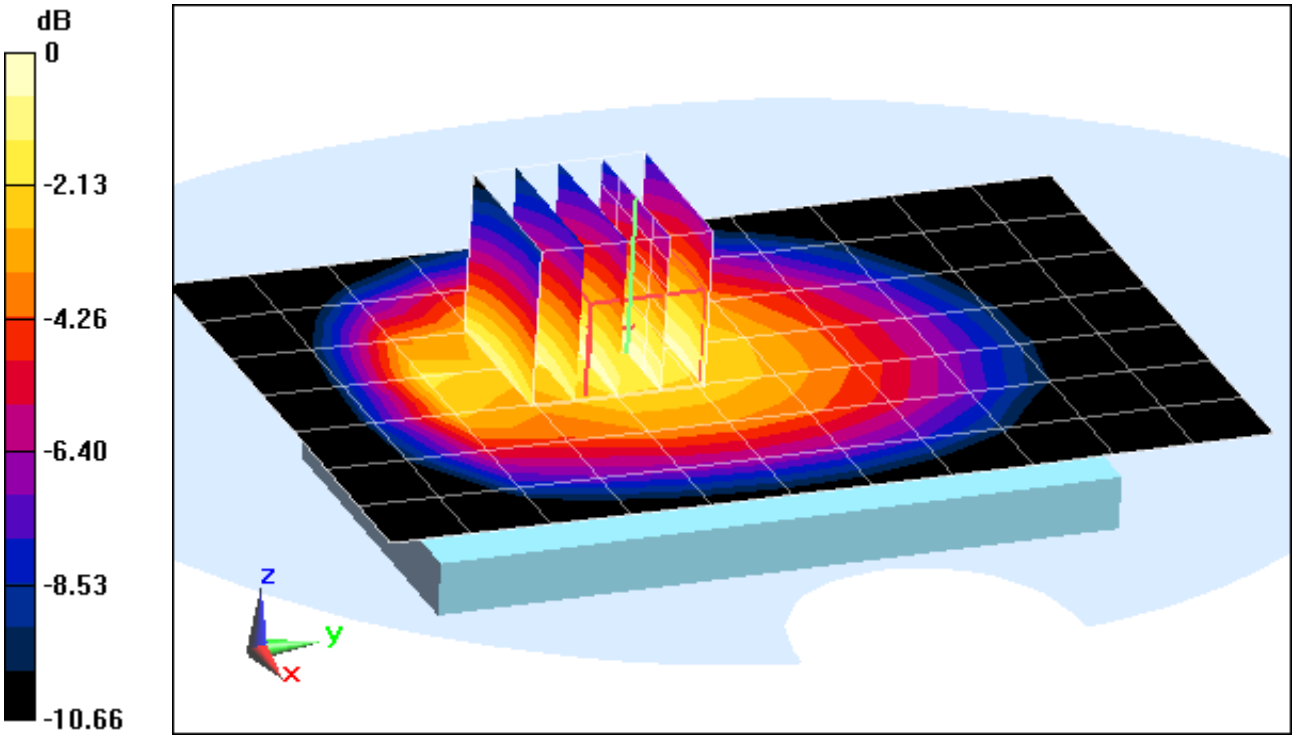
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used:
f = 710 MHz; σ = 0.948 mho/m; ε_r = 53.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-02-2012; Ambient Temp: 24.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (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)

Mode: LTE Band 17, Body SAR, Back side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.258 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.540 mW/g
SAR(1 g) = 0.402 mW/g; SAR(10 g) = 0.298 mW/g



0 dB = 0.421 mW/g = -7.51 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

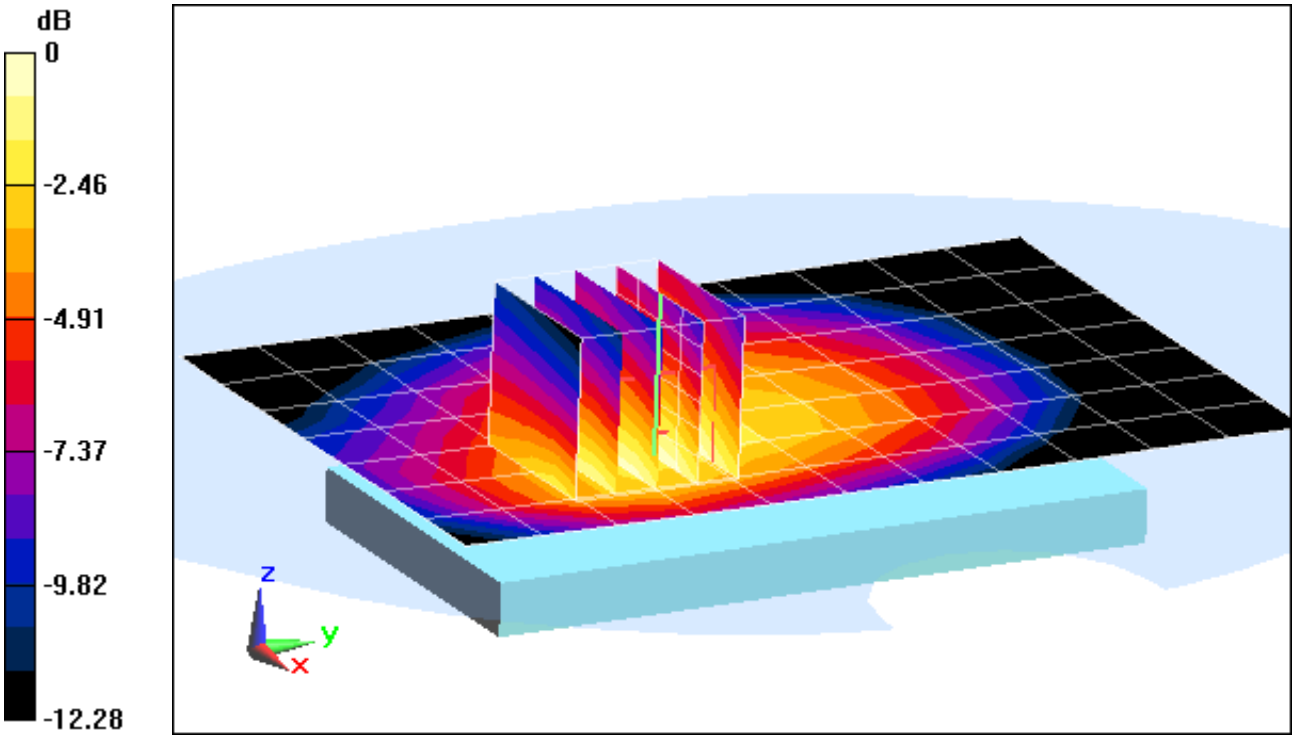
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used:
f = 710 MHz; σ = 0.948 mho/m; ε_r = 53.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-02-2012; Ambient Temp: 24.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (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)

Mode: LTE Band 17, Body SAR, Front side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.710 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.233 mW/g
SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.122 mW/g



0 dB = 0.182 mW/g = -14.80 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

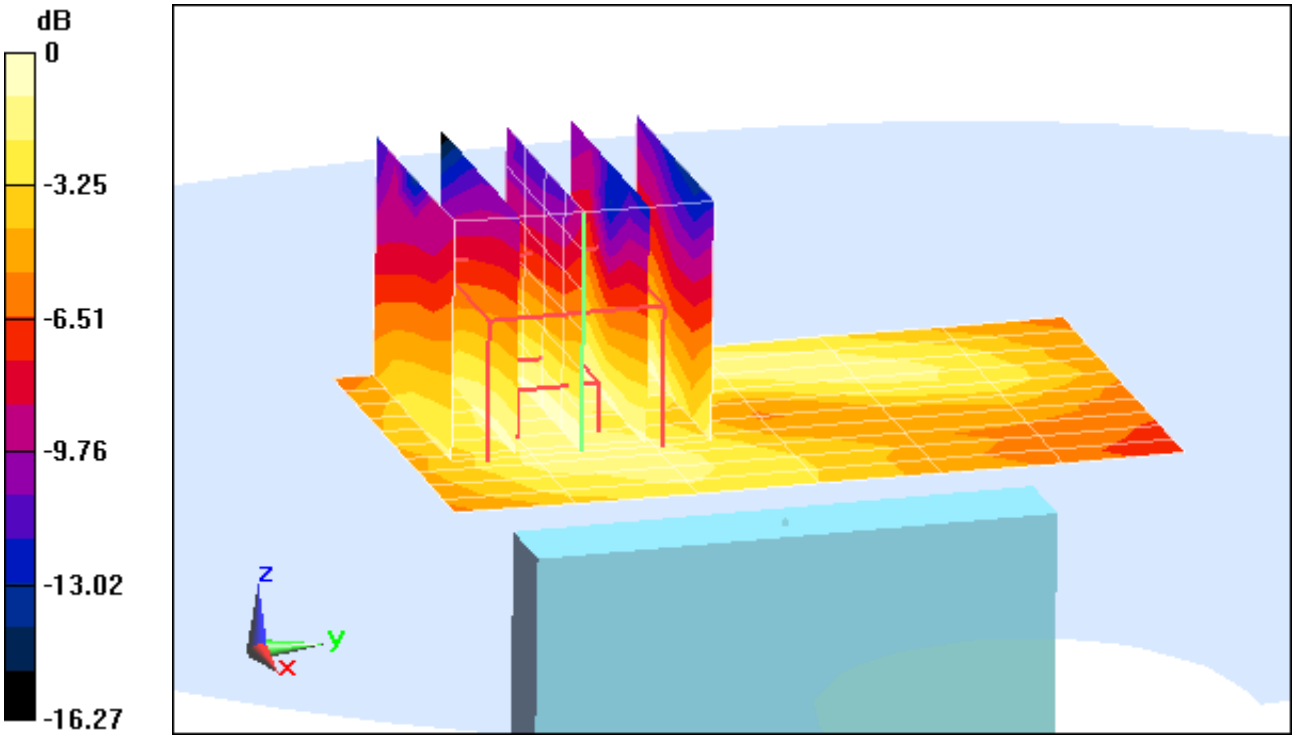
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used:
f = 710 MHz; σ = 0.948 mho/m; ε_r = 53.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-02-2012; Ambient Temp: 24.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (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)

Mode: LTE Band 17, Body SAR, Bottom Edge, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.612 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.068 mW/g
SAR(1 g) = 0.040 mW/g; SAR(10 g) = 0.025 mW/g



0 dB = 0.0436 mW/g = -27.21 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

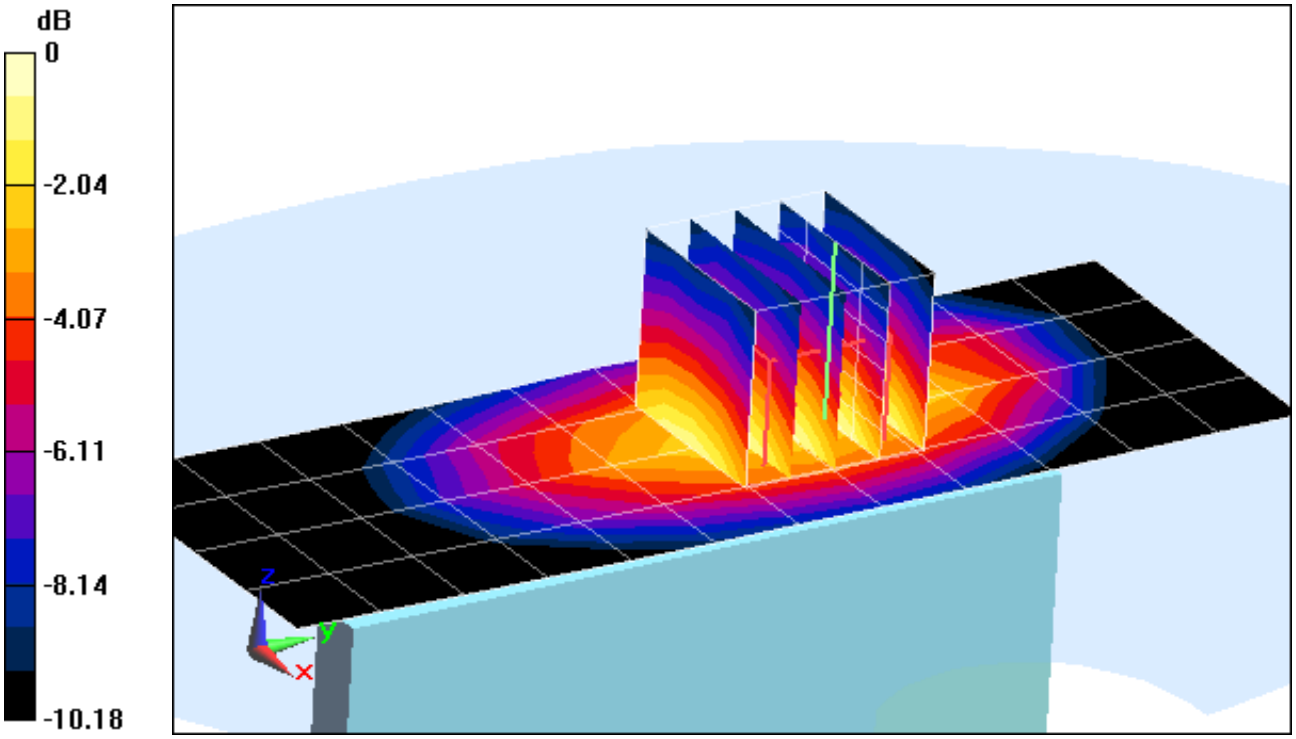
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used:
f = 710 MHz; σ = 0.948 mho/m; ε_r = 53.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-02-2012; Ambient Temp: 24.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (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)

Mode: LTE Band 17, Body SAR, Right Edge, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 49 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 = 13.400 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.224 mW/g
SAR(1 g) = 0.156 mW/g; SAR(10 g) = 0.106 mW/g



0 dB = 0.167 mW/g = -15.55 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 6

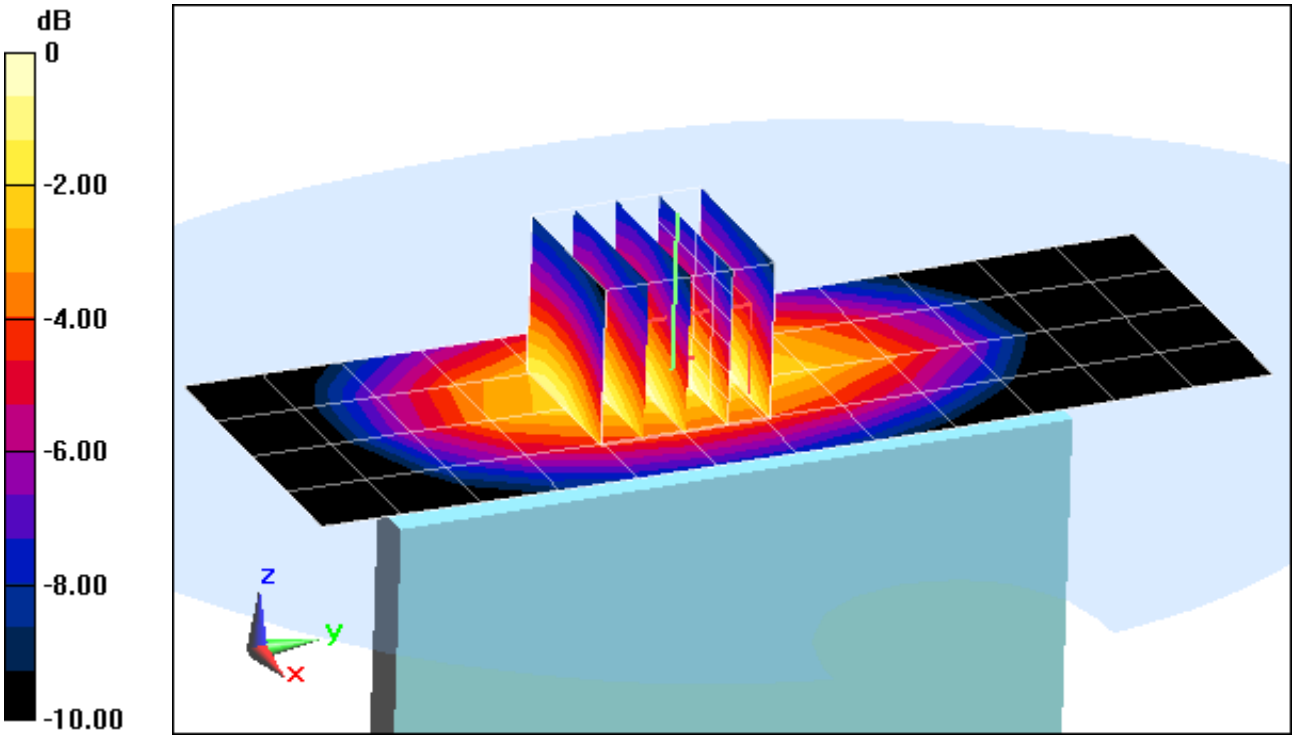
Communication System: LTE BAND 17; Frequency: 710 MHz;Duty Cycle: 1:1
Medium: 740 Body Medium parameters used:
f = 710 MHz; σ = 0.948 mho/m; ε_r = 53.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-02-2012; Ambient Temp: 24.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (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)

Mode: LTE Band 17, Body SAR, Left Edge, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 49 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 = 12.449 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.193 mW/g
SAR(1 g) = 0.140 mW/g; SAR(10 g) = 0.098 mW/g



0 dB = 0.147 mW/g = -16.65 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

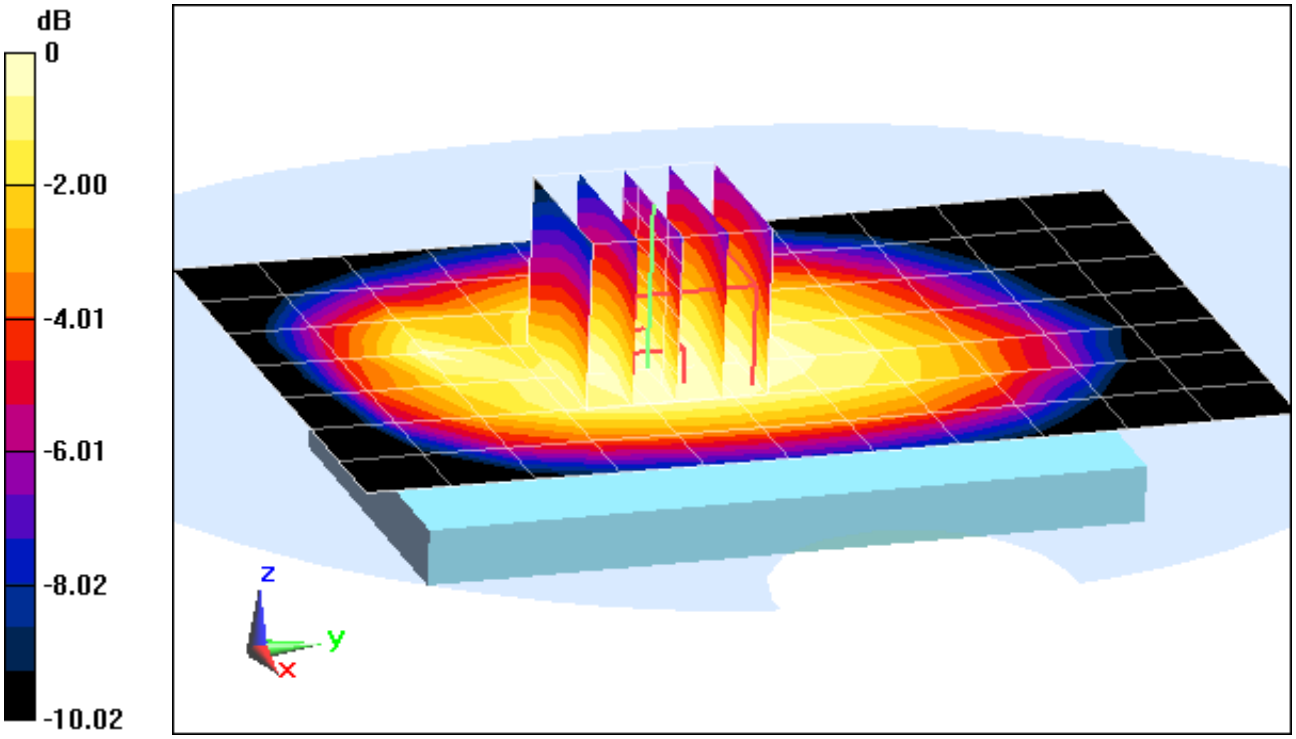
Communication System: GSM850 GPRS; 2 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 2 Tx Slots

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.995 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.737 mW/g
SAR(1 g) = 0.601 mW/g; SAR(10 g) = 0.467 mW/g



0 dB = 0.627 mW/g = -4.05 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

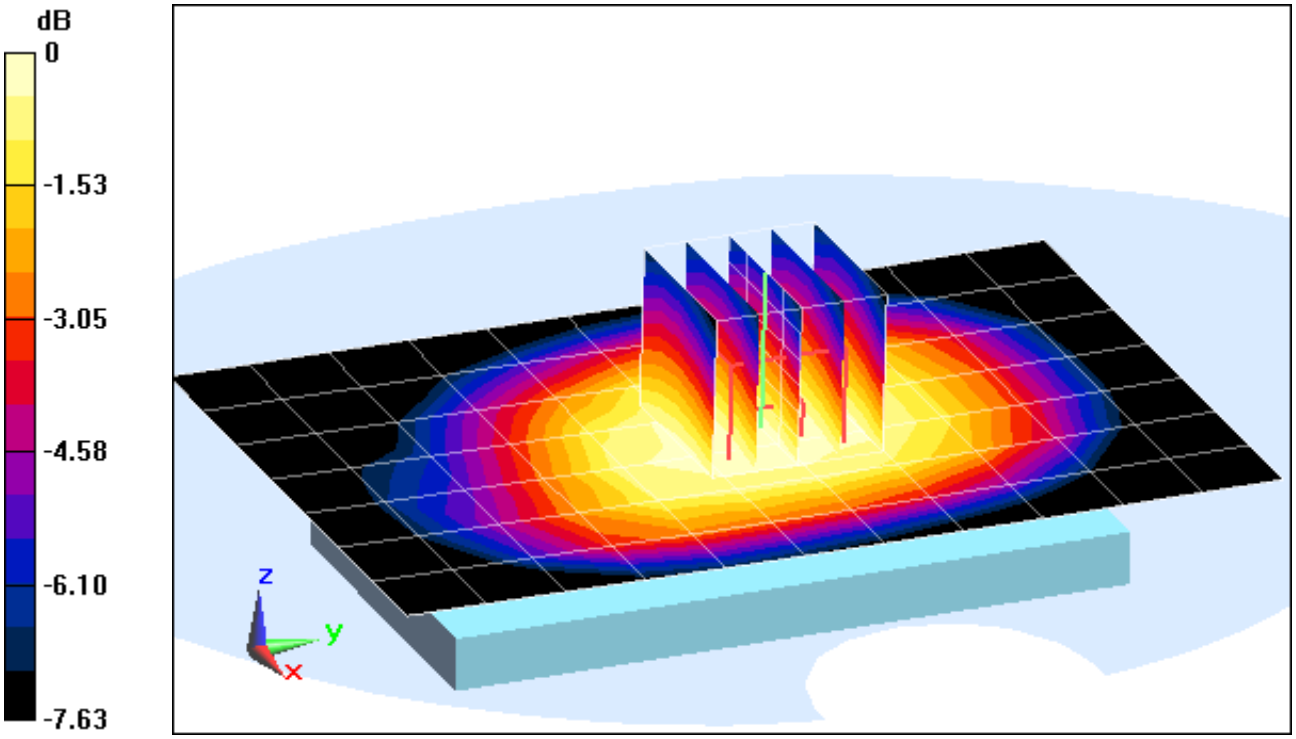
Communication System: GSM 850 GPRS; 2 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 850, Body SAR, Front side, Mid.ch, 2 Tx Slots

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.459 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.379 mW/g
SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.246 mW/g



0 dB = 0.327 mW/g = -9.71 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

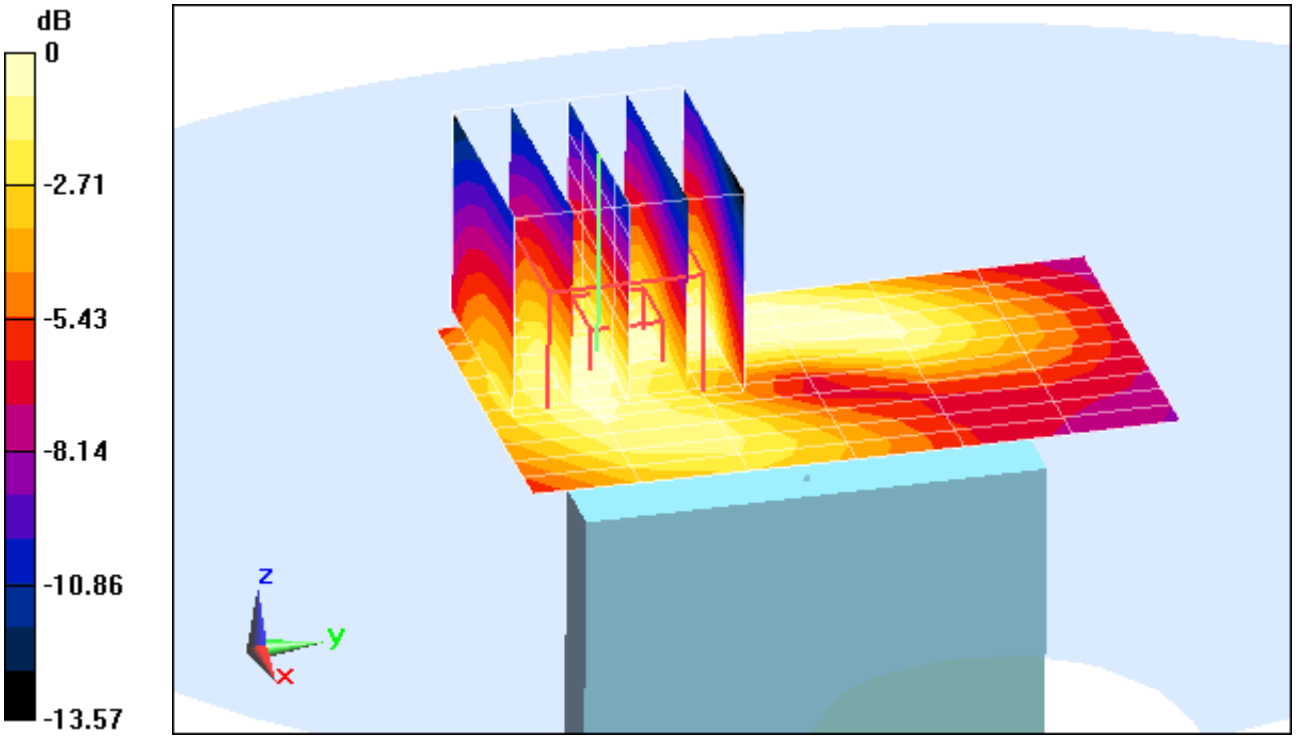
Communication System: GSM 850 GPRS; 2 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 850, Body SAR, Bottom Edge, Mid.ch, 2 Tx Slots

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.200 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.111 mW/g
SAR(1 g) = 0.068 mW/g; SAR(10 g) = 0.041 mW/g



0 dB = 0.0736 mW/g = -22.66 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

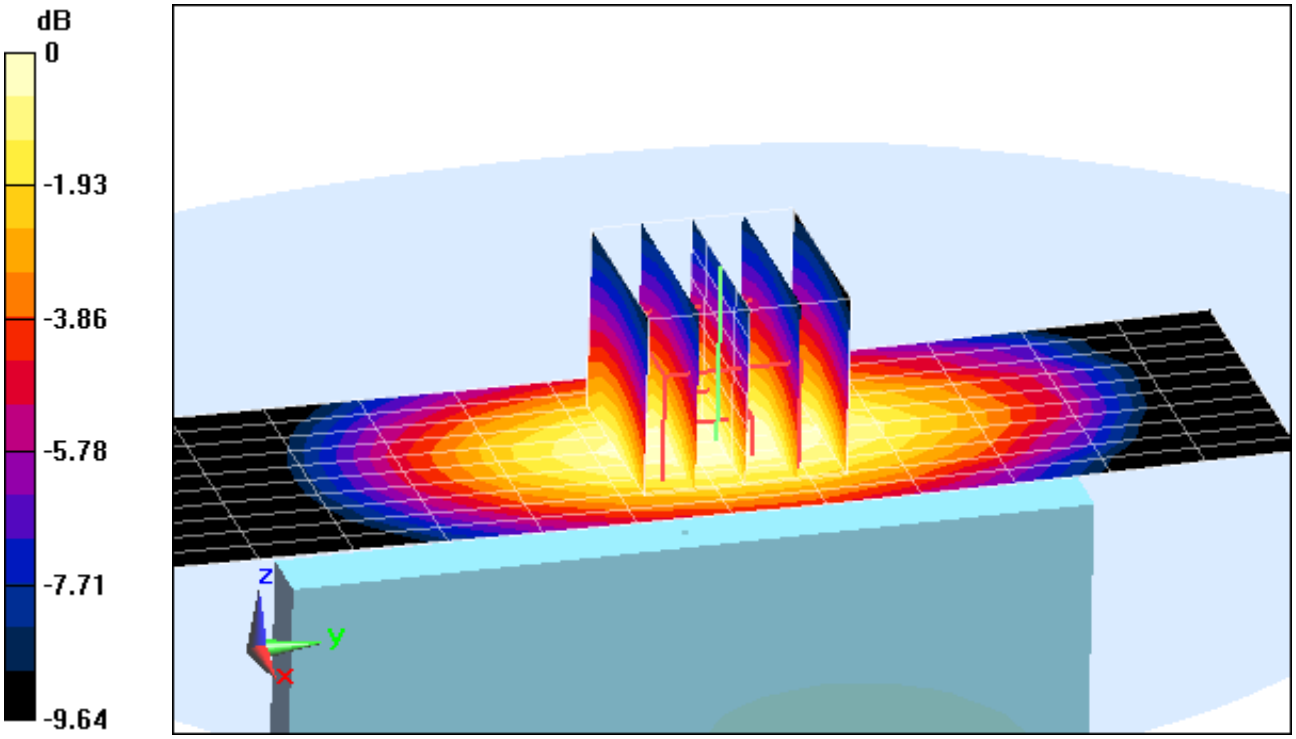
Communication System: GSM 850 GPRS; 2 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 850, Body SAR, Right Edge, Mid.ch, 2 Tx Slots

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.982 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.488 mW/g
SAR(1 g) = 0.352 mW/g; SAR(10 g) = 0.242 mW/g



0 dB = 0.377 mW/g = -8.47 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

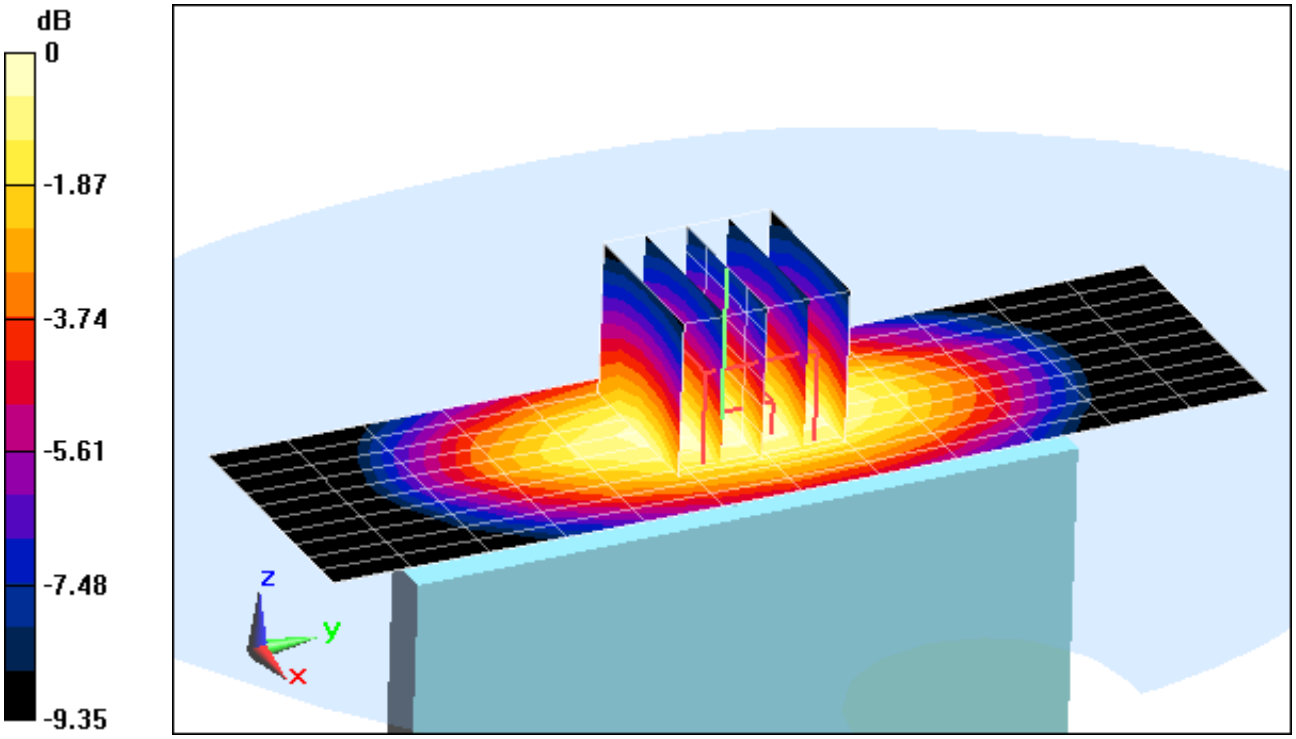
Communication System: GSM 850 GPRS; 2 Tx slots; Frequency: 836.6 MHz;Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: GPRS 850, Body SAR, Left Edge, Mid.ch, 2 Tx Slots

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.128 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.652 mW/g
SAR(1 g) = 0.467 mW/g; SAR(10 g) = 0.324 mW/g



0 dB = 0.496 mW/g = -6.09 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

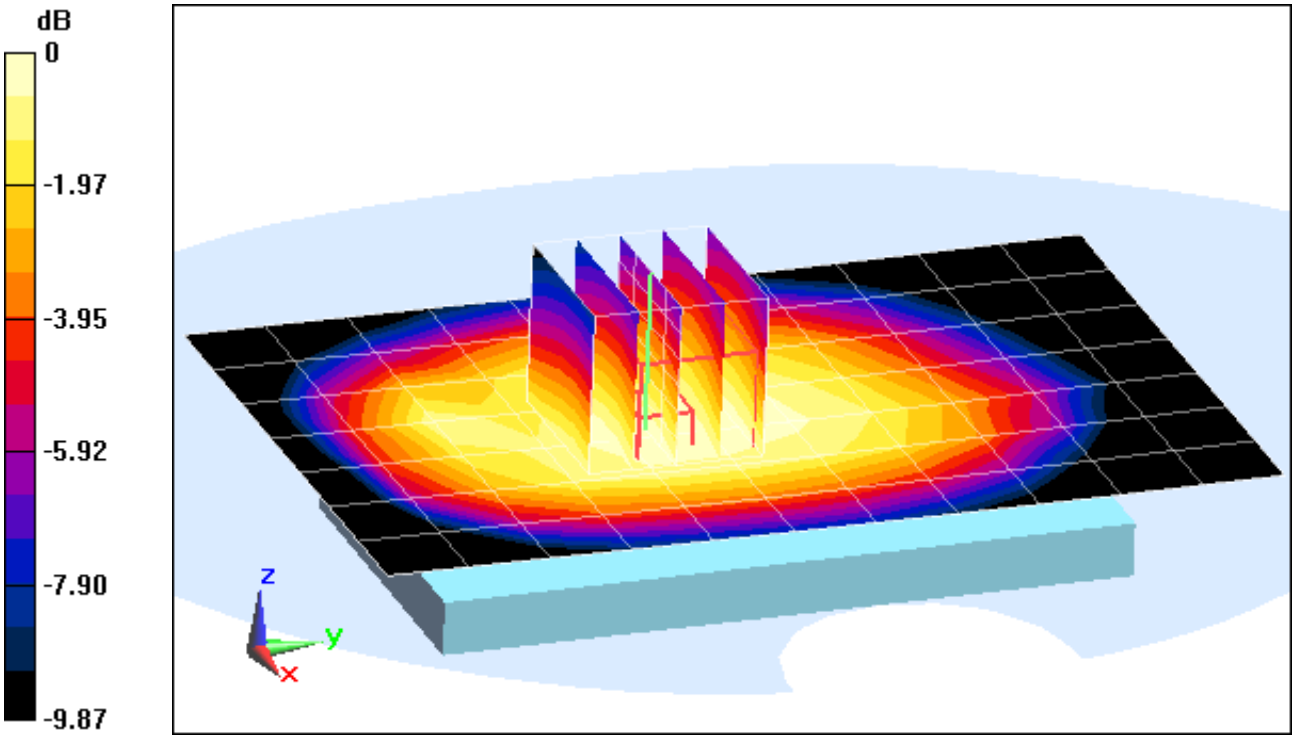
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Body SAR, Back side, Mid.ch

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.591 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.488 mW/g
SAR(1 g) = 0.403 mW/g; SAR(10 g) = 0.315 mW/g



0 dB = 0.420 mW/g = -7.54 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

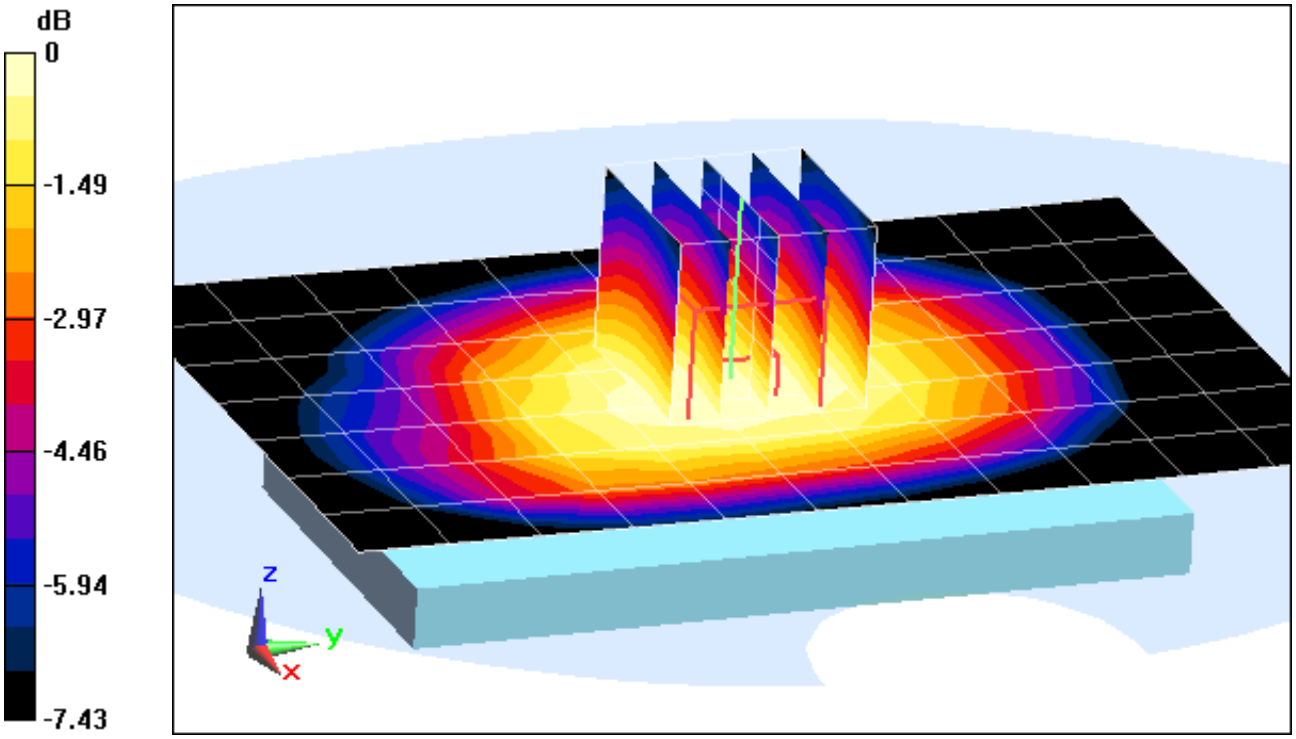
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Body SAR, Front side, Mid.ch

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.297 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.256 mW/g
SAR(1 g) = 0.211 mW/g; SAR(10 g) = 0.166 mW/g



0 dB = 0.220 mW/g = -13.15 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

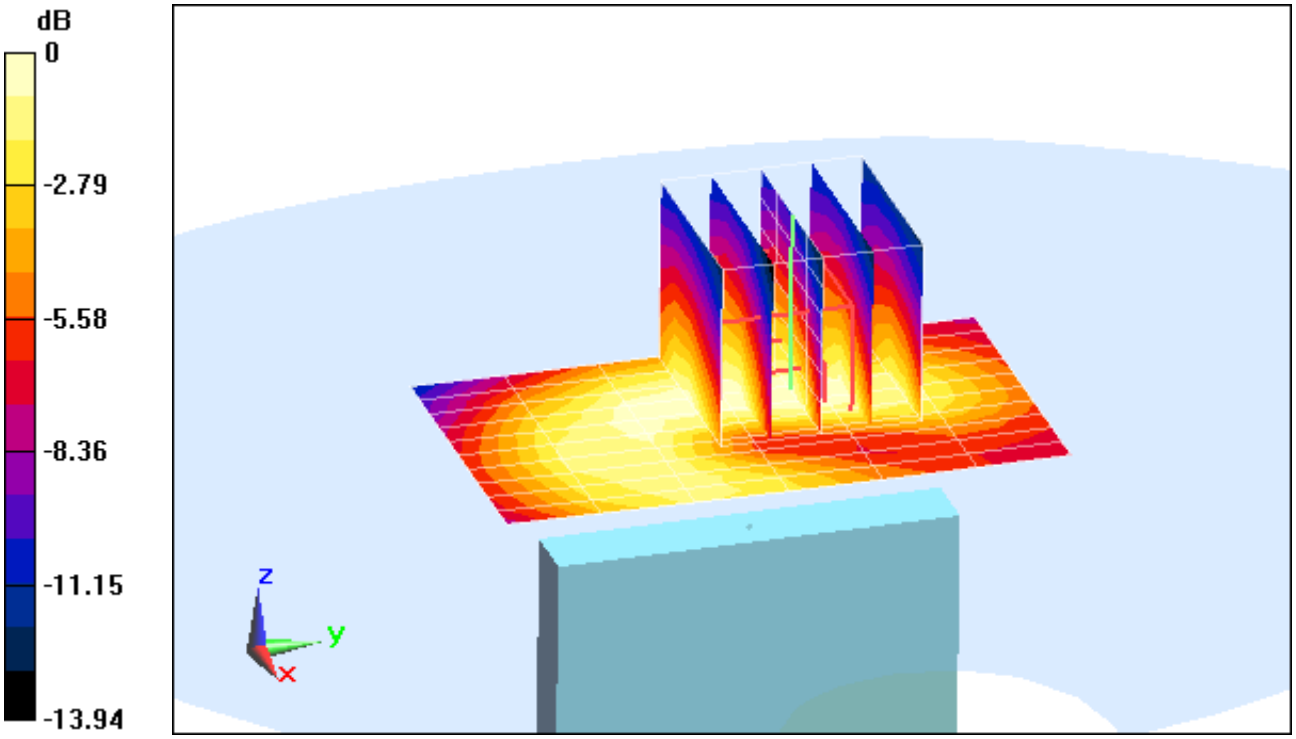
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Body SAR, Bottom Edge, Mid.ch

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.820 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.118 mW/g
SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.043 mW/g



0 dB = 0.0801 mW/g = -21.93 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

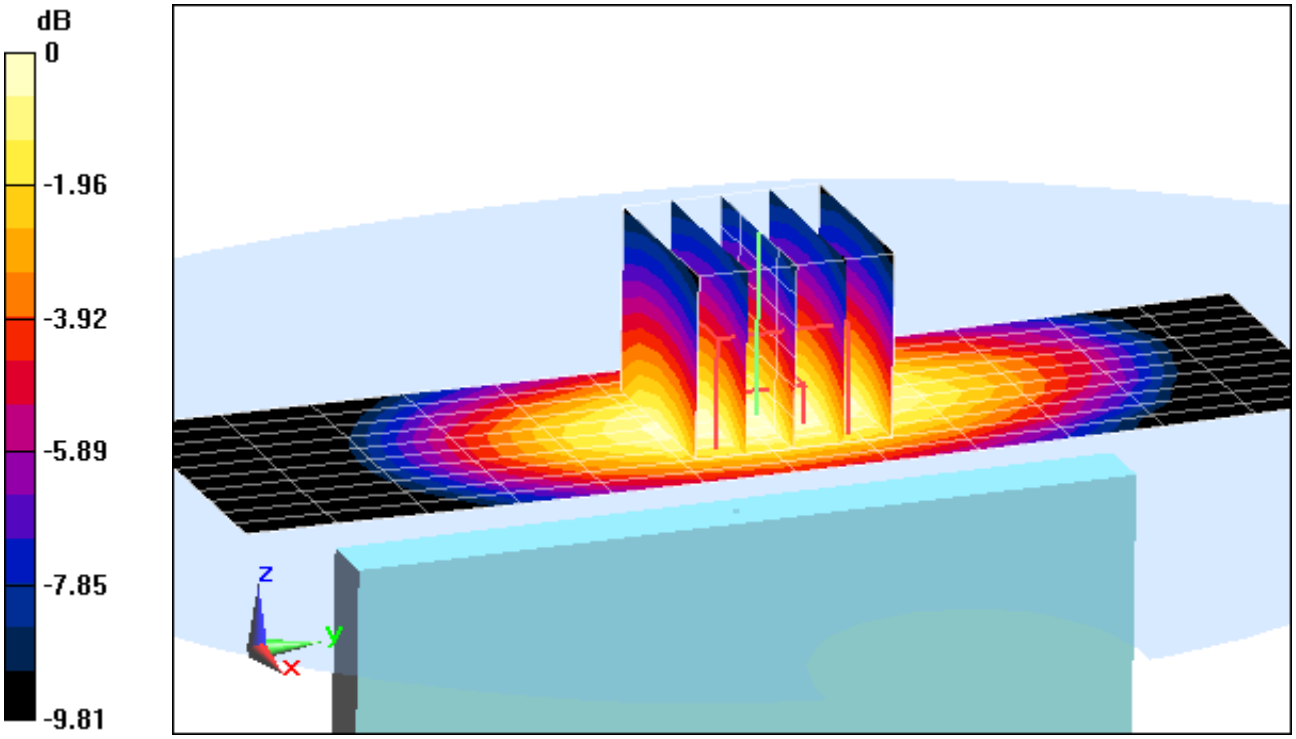
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section: Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Body SAR, Right Edge, Mid.ch

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.379 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.426 mW/g
SAR(1 g) = 0.304 mW/g; SAR(10 g) = 0.207 mW/g



0 dB = 0.326 mW/g = -9.74 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 2

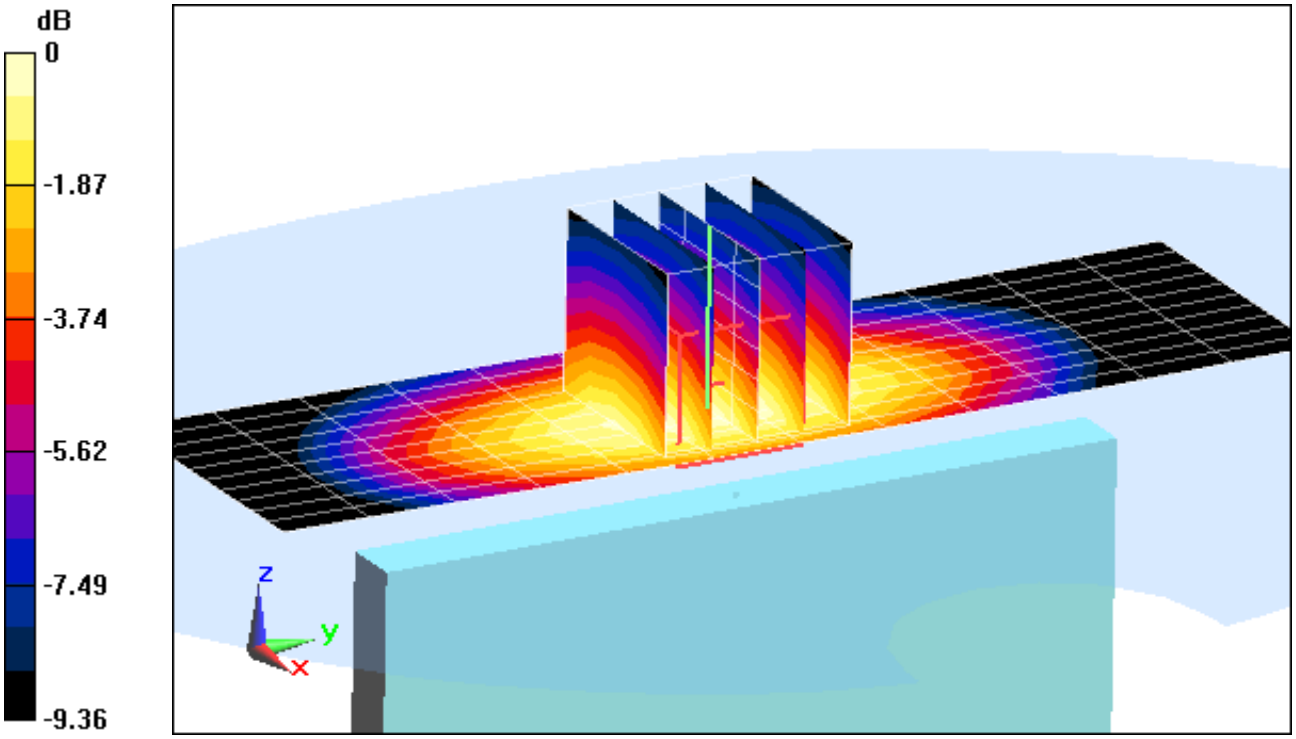
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.972 mho/m; ε_r = 54.858; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-30-2012; Ambient Temp: 24.1°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: WCDMA 850, Body SAR, Left Edge, Mid.ch

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.398 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.523 mW/g
SAR(1 g) = 0.377 mW/g; SAR(10 g) = 0.261 mW/g



0 dB = 0.404 mW/g = -7.87 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSGHI437; Type: Portable Handset; Serial: 7

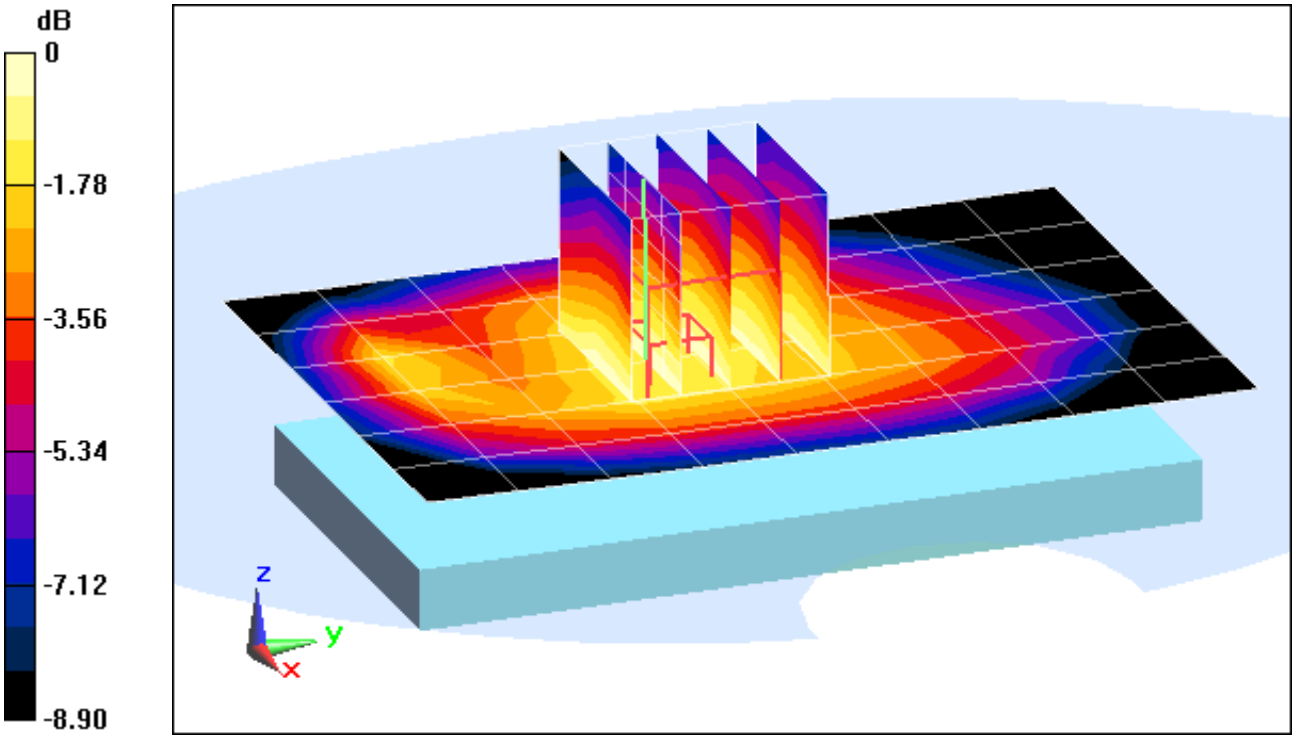
Communication System: LTE BAND 5; Frequency: 829 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 829 MHz; σ = 0.982 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-06-2012; Ambient Temp: 24.3°C; Tissue Temp: 23.4°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, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: LTE Band 5 (Cell), Body SAR, Back side, Low.ch
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.306 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.634 mW/g
SAR(1 g) = 0.499 mW/g; SAR(10 g) = 0.390 mW/g



0 dB = 0.520 mW/g = -5.68 dB mW/g