PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctestlab.com

SAR EVALUATION REPORT

Applicant Name:
LG Electronics MobileComm U.S.A., Inc.
1000 Sylvan Avenue,
Englewood Cliffs, NJ 07632
USA

Date of Testing:
01/05/13 - 01/15/13
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1301020025.ZNF

FCC ID: **ZNFE980**

APPLICANT: **LG ELECTRONICS MOBILECOMM U.S.A., INC.**

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): LG-E980, E980, LGE980

Equipment Class	Band & Mode	Tx Frequency	Measured Conducted Power [dBm]	SAR		
				1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	33.62	0.37	0.43	0.53
PCE	UMTS 850	826.40 - 846.60 MHz	23.55	0.15	0.27	0.35
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	30.39	0.18	1.29	1.29
PCE	UMTS 1900	1852.4 - 1907.6 MHz	23.54	0.14	0.85	0.85
PCE	LTE Band 17	706.5 - 713.5 MHz	23.65	0.19	0.36	0.50
PCE	LTE Band 5 (Cell)	826.5 - 846.5 MHz	23.69	0.16	0.30	0.36
PCE	LTE Band 4 (AWS)	1712.5 - 1752.5 MHz	23.70	0.24	0.36	0.42
PCE	LTE Band 2 (PCS)	1852.5 - 1907.5 MHz	23.70	0.24	1.08	1.08
DTS	2.4 GHz WLAN	2412 - 2462 MHz	16.85	< 0.1	< 0.1	< 0.1
DTS	5.8 GHz WLAN	5745 - 5825 MHz	14.89	< 0.1	0.20	
UNII	5.2 GHz WLAN	5180 - 5240 MHz	14.86	< 0.1	< 0.1	
UNII	5.3 GHz WLAN	5260 - 5320 MHz	14.80	< 0.1	< 0.1	
UNII	5.5 GHz WLAN	5500 - 5700 MHz	14.26	< 0.1	0.19	
DSS/DTS	Bluetooth	2402 - 2480 MHz	11.12	N/A		
Simultaneous SAR per KDB 690783 D01v01r02:				0.41	1.58	1.32

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 Section 1.8 of this report; 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.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

TABLE OF CONTENTS

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	826.5 - 846.5 MHz
LTE Band 4 (AWS)	Data	1712.5 - 1752.5 MHz
LTE Band 2 (PCS)	Data	1852.5 - 1907.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

1.2 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

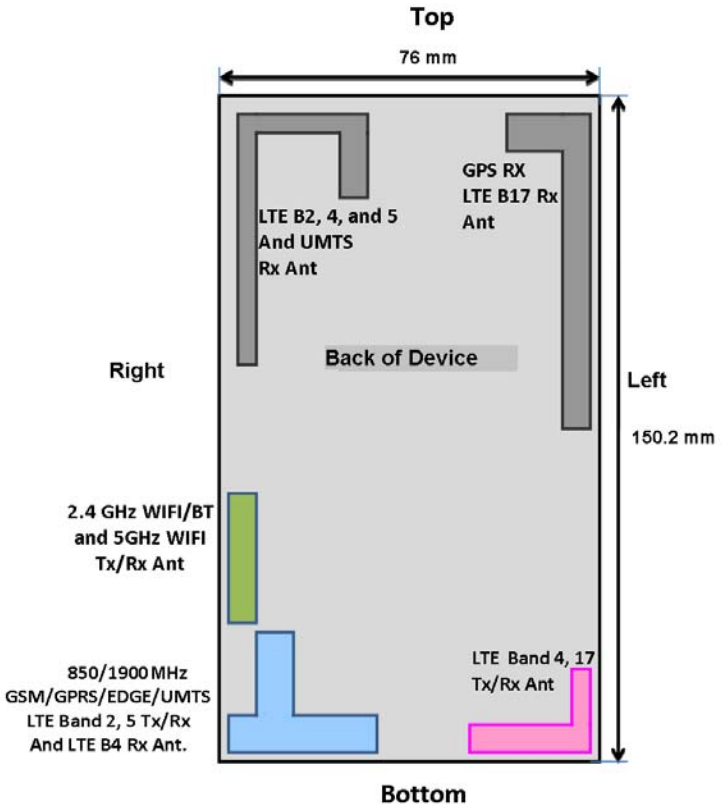
Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*1 TX Slots*	*2 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.7**	**33.7**	**31.7**	**27.7**	**27.7**
	Nominal	**33.2**	**33.2**	**31.2**	**27.2**	**27.2**
GSM/GPRS/EDGE 1900	Maximum	**30.7**	**30.7**	**28.7**	**26.7**	**26.7**
	Nominal	**30.2**	**30.2**	**28.2**	**26.2**	**26.2**

Mode / Band		Modulated Average		
		3GPP RMC	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**23.7**	**23.7**	**23.7**
	Nominal	**23.2**	**23.2**	**23.2**
UMTS Band 2 (1900 MHz)	Maximum	**23.7**	**23.7**	**23.7**
	Nominal	**23.2**	**23.2**	**23.2**

Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 5 (Cell)	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 4 (AWS)	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 2 (PCS)	Maximum	**23.7**
	Nominal	**23.2**

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	**18.1**
	Nominal	**17.0**
IEEE 802.11g (2.4 GHz)	Maximum	**14.1**
	Nominal	**13.0**
IEEE 802.11n (2.4 GHz)	Maximum	**13.1**
	Nominal	**12.0**
IEEE 802.11a (5 GHz)	Maximum	**15.1**
	Nominal	**14.0**
IEEE 802.11n (5GHz 20 MHz) UNII - 1/2/3	Maximum	**14.1**
	Nominal	**13.0**
IEEE 802.11n (5GHz 20 MHz) ISM (Ch149 - Ch165)	Maximum	**13.1**
	Nominal	**12.0**
IEEE 802.11n (5 GHz 40 MHz) UNII - 1/2/3	Maximum	**14.1**
	Nominal	**13.0**
IEEE 802.11n (5GHz 40 MHz) ISM (Ch151 - Ch159)	Maximum	**13.4**
	Nominal	**12.3**
Bluetooth	Maximum	**11.5**
	Nominal	**10.5**

1.3 DUT Antenna Locations



Note: Specific antenna dimensions and separation distances are shown in the antenna distance document.

Figure 1-1
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	No
UMTS 850	Yes	Yes	No	Yes	Yes	No
GPRS 1900	Yes	Yes	No	Yes	Yes	No
UMTS 1900	Yes	Yes	No	Yes	Yes	No
LTE Band 17	Yes	Yes	No	Yes	No	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	No
LTE Band 4 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	Yes	No
2.4 GHz WLAN	Yes	Yes	No	Yes	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 D06v01 guidance, page 2. The antenna document shows the distances between the transmit antennas and the edges of the device. When the wireless router mode is enabled, all 5 GHz bands are disabled. Therefore 5 GHz WIFI is not considered in this section.

1.4 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the back cover. The SAR tests were performed with the standard back cover.

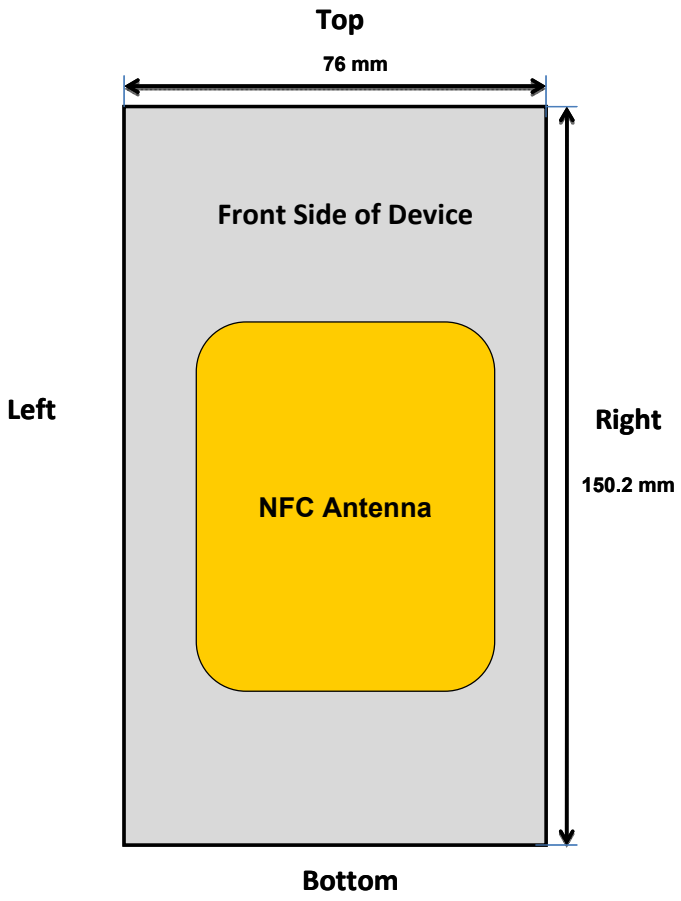


Figure 1-2
NFC Antenna Locations

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-3 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.

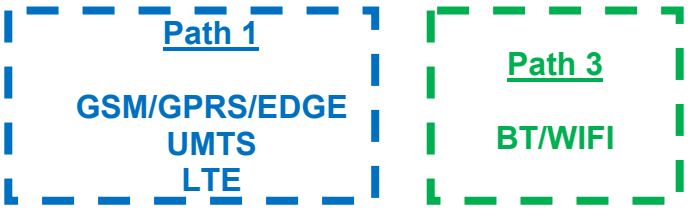


Figure 1-3
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05 3) procedures.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable TX Configration	Head SAR	Body Worn SAR	Hotspot SAR	Note
1	GSM 850 Voice + WiFi 2.4Ghz	yes	yes	N/A	GSM voice + WiFi 2.4Ghz
2	GSM 1900 Voice + WiFi 2.4Ghz	yes	yes	N/A	
3	GSM 850 Voice + WiFi 5Ghz	yes	yes	N/A	GSM voice + WiFi 5Ghz
4	GSM 1900 Voice + WiFi 5Ghz	yes	yes	N/A	
5	GSM 850 GPRS/EDGE + WiFi 2.4Ghz	yes	yes	yes	GPRS/EDGE + WiFi 2.4Ghz
6	GSM 1900 GPRS/EDGE + WiFi 2.4Ghz	yes	yes	yes	
7	GSM 850 GPRS/EDGE + WiFi 5Ghz	no	no	no	WiFi 5G is not supported Hotspot and WiFi Direct
8	GSM 1900 GPRS/EDGE + WiFi 5Ghz	no	no	no	
9	UMTS 850 + WiFi 2.4Ghz	yes	yes	yes	UMTS + WiFi 2.4Ghz
10	UMTS 1900 + WiFi 2.4Ghz	yes	yes	yes	
11	UMTS 850 + WiFi 5Ghz	yes	yes	no	UMTS + WiFi 5Ghz
12	UMTS 1900 + WiFi 5Ghz	yes	yes	no	
13	GSM 850 Voice + 2.4 GHz Bluetooth	no	yes	no	2G/3G + 2.4 GHz Bluetooth
14	GSM 1900 Voice + 2.4 GHz Bluetooth	no	yes	no	
15	GSM 850 GPRS/EDGE + 2.4 GHz Bluetooth	no	yes	no	
16	GSM 1900 GPRS/EDGE + 2.4 GHz Bluetooth	no	yes	no	
17	UMTS 850 + 2.4 GHz Bluetooth	no	yes	no	
18	UMTS 1900 + 2.4 GHz Bluetooth	no	yes	no	
19	LTE B2 + 2.4Ghz Bluetooth	no	yes	no	LTE + 2.4GHz Bluetooth
20	LTE B4 + 2.4 GHz Bluetooth	no	yes	no	
21	LTE B5 + 2.4 GHz Bluetooth	no	yes	no	
22	LTE B17 + 2.4 GHz Bluetooth	no	yes	no	
23	LTE B2 + WiFi 2.4Ghz	yes	yes	yes	LTE + WiFi 2.4Ghz
24	LTE B4 + WiFi 2.4Ghz	yes	yes	yes	
25	LTE B5 + WiFi 2.4Ghz	yes	yes	yes	
26	LTE B17 + WiFi 2.4Ghz	yes	yes	yes	
27	LTE B2 + WiFi 5Ghz	no	no	no	WiFi 5G is not supported Hotspot and WiFi Direct
28	LTE B4 + WiFi 5Ghz	no	no	no	
29	LTE B5 + WiFi 5Ghz	no	no	no	
30	LTE B17 + WiFi 5Ghz	no	no	no	

1. WiFi 2.4Ghz is supported Hotspot&WiFi-Direct, WiFi 5Ghz is not supported Hotspot&WiFi-Direct.
2. LTE, UMTS data, GPRS/EDGE is supported Hotspot.
3. VoIP is supported in LTE, WCDMA, GSM (e.g. 3rd part VoIP and VoLTE)
4. Bluetooth and WiFi can not transmit simultaneous because they operate on same antenna path.

1.6 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 according to FCC KDB 941225 D06v01.

Per FCC KDB 447498 D01 v05, the SAR exclusion threshold for distances <50mm is defined by the following equation:

$$\frac{Max\ Power\ of\ Channel\ (mW)}{Test\ Separation\ Dist\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Based on the maximum conducted power of Bluetooth and the antenna to use separation distance, Bluetooth SAR was not required; [(14/10)* √2.441] = 2.2< 3.0.

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

(B) Licensed Transmitter(s)

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

GSM/GPRS/EDGE DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v02.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02.

1.7 Power Reduction for SAR

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

1.8 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB Publication 941225 D01-D06 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05 (General SAR Guidance)
- FCC KDB Publication 865664 D01-D02 (SAR Measurements up to 6 GHz)

1.9 Device Serial Numbers

Several samples were used with identical hardware to support SAR testing. All samples have the same physical, mechanical and thermal characteristics and are electrically identical.

	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
GSM/GPRS/EDGE 850	211KPPB263112	211KPPB263112	211KPPB263112
UMTS 850	211KPPB263112	211KPPB263112	211KPPB263112
GSM/GPRS/EDGE 1900	211KPPB263112	211KPPB263112	211KPPB263112
UMTS 1900	211KPSL263118	211KPSL263118	211KPSL263118
LTE Band 17	211KPDT263122	211KPDT263122	211KPDT263122
LTE Band 5 (Cell)	211KPDT263122	211KPDT263122	211KPDT263122
LTE Band 4 (AWS)	211KPMZ263122	211KPDT263122	211KPDT263122
LTE Band 2 (PCS)	211KPDT263122	211KPMZ263122	211KPMZ263122
2.4 GHz WLAN	211KPKN263125	211KPMZ263122	211KPMZ263122
5 GHz WLAN	211KPDT263122	211KPDT263122	-

2 LTE INFORMATION

LTE Information			
FCC ID	**ZNFE980**		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	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)		
Channel Bandwidths	LTE Band 17: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 5 MHz, 10 MHz		
	LTE Band 2 (PCS): 5 MHz, 10 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 17: 5 MHz	706.5 (23755)	710 (23790)	713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)	710 (23790)	711 (23800)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)	836.5 (20525)	844 (20600)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
UE Category	3		
Modulations Supported in UL	QPSK, 16QAM		
LTE Transmitter and Antenna Implementation	2 Tx/Rx antennas and 2 Rx only antennas for LTE		
Description of LTE Tx and Ant. Implementation	GSM/UMTS/LTE share the same transmitter		
Hotspot with LTE+WIFI	YES		
Hotspot with LTE+WIFI active with 1XVoice sessions?	NO		
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		
Conducted power Table provided for 1RB (low, mid, and high offsets), 50% RB (low, mid, and high offsets), 100% RB	YES		

3 INTRODUCTION

The FCC and Industry Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 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]

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01 (See Table 4-1).

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 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.

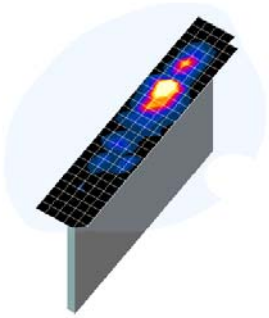


Figure 4-1
Sample SAR Area Scan

3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01 (See Table 4-1). On the 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.

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
			$\Delta z_{zoom}(n)$	$\Delta z_{zoom}(1)$*	$\Delta z_{zoom}(n>1)$*	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 22

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

Figure 5-2 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 5-1. 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 5-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

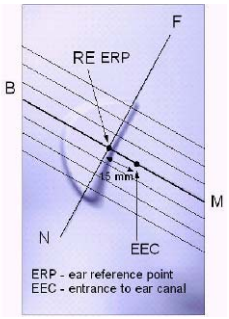


Figure 5-1
Close-Up Side view of ERP

5.2 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 5-3). 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 5-2
Front, back and side view of SAM Twin Phantom

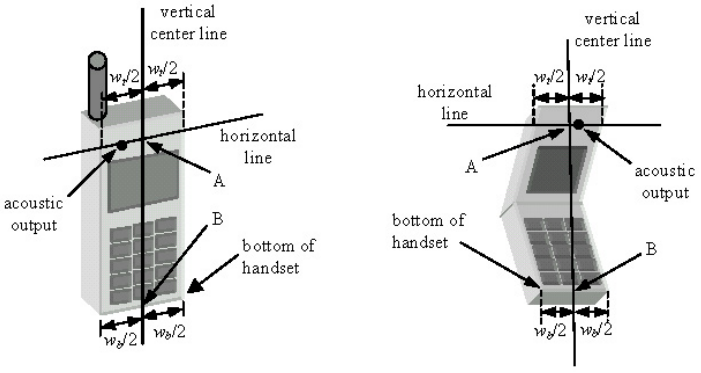


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

6.2 Positioning for Cheek

1. The test device was positioned with the device 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 6-1), 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.

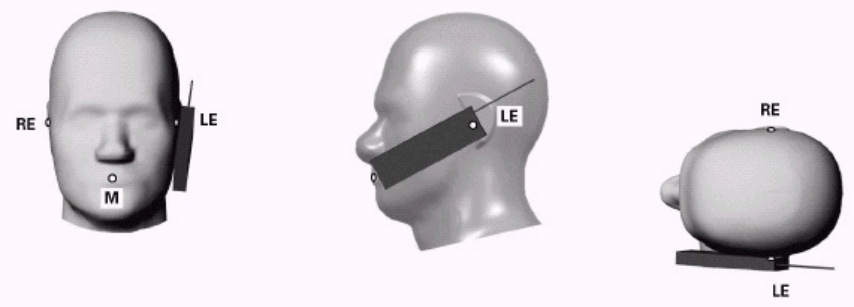


Figure 6-1 Front, Side and Top View of Cheek Position

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 device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 6-2).

6.3 Positioning for Ear / 15º Tilt

With the test device aligned in the “Cheek 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 15degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched 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 6-2).

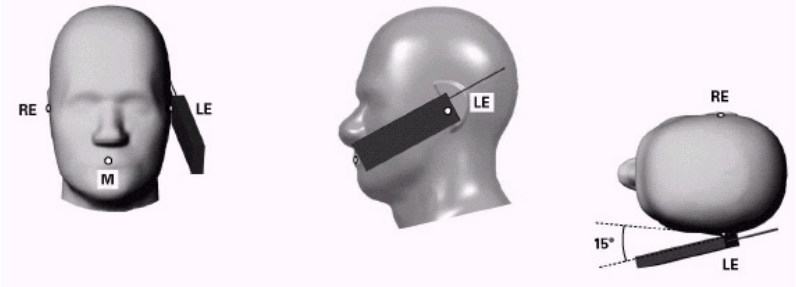


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

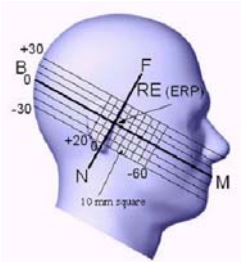


Figure 6-3
Side view w/ relevant markings

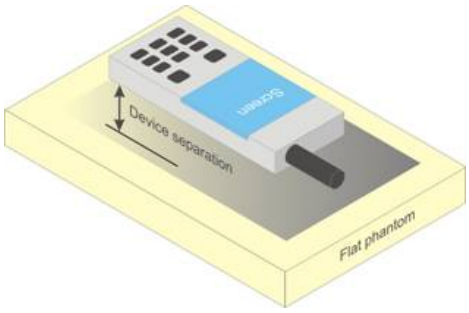


Figure 6-4
Sample Body-Worn Diagram

6.4 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 FCC KDB Publication 648474 D04_v01. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

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 6-5 Twin SAM Chin20

6.5 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 6-4). Per FCC KDB Publication 648474 D04_v01, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01_v05 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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.

6.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v01 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 containing transmitting antennas within 2.5 cm of their edges, 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 due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7 RF EXPOSURE LIMITS

7.1 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.

7.2 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 7-1
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.

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

8.2 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.

8.3 SAR Measurement Conditions for UMTS

8.3.1 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".

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121 (release 5), using the appropriate RMC with TPC (transmit power control) set to all "1s" or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

8.3.2 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.

8.3.3 Body SAR Measurements

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

8.3.4 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 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.

8.3.5 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.

8.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02 publication. Please see notes after the tabulated 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.

8.4.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

8.4.2 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.

8.4.3 A-MPR

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

8.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

8.5 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 D01v01r02 for more details.

8.5.1 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.

8.5.2 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.

9 RF CONDUCTED POWERS

9.1 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**
GSM 850	128	33.52	33.57	**31.45**	27.25	27.42
	190	33.62	33.67	**31.47**	27.09	27.19
	251	33.69	33.51	**31.49**	27.05	27.20
GSM 1900	512	30.27	30.29	**28.54**	25.97	25.98
	661	30.39	30.61	**28.52**	26.18	26.17
	810	30.32	30.55	**28.53**	26.16	26.17

		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**
GSM 850	128	24.49	24.54	**25.43**	18.22	21.40
	190	24.59	24.64	**25.45**	18.06	21.17
	251	24.66	24.48	**25.47**	18.02	21.18
GSM 1900	512	21.24	21.26	**22.52**	16.94	19.96
	661	21.36	21.58	**22.50**	17.15	20.15
	810	21.29	21.52	**22.51**	17.13	20.15

Note: 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.

The bolded GPRS modes were selected for SAR testing according to the highest frame-averaged output power table according to KDB 941225 D03v01.

GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.

EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

This device does not support evolved EDGE (eEDGE).

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 9-1
Power Measurement Setup

9.2 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.45	23.55	23.52	23.54	23.47	23.41	-
99		12.2 kbps AMR	23.36	23.41	23.34	23.37	23.31	23.29	-
6	HSDPA	Subtest 1	23.46	23.50	23.35	23.42	23.40	23.34	0
6		Subtest 2	23.06	23.05	22.91	23.18	23.29	23.23	0
6		Subtest 3	23.01	22.91	22.75	23.18	23.20	23.20	0.5
6		Subtest 4	22.97	22.84	22.82	23.18	23.19	23.17	0.5
6	HSUPA	Subtest 1	23.03	23.00	22.78	23.28	22.71	22.67	0
6		Subtest 2	22.13	22.06	21.90	22.05	21.95	22.04	2
6		Subtest 3	22.02	22.30	22.23	22.43	22.09	22.33	1
6		Subtest 4	22.07	22.10	22.01	22.12	22.11	21.99	2
6		Subtest 5	23.35	22.89	22.87	22.92	23.28	22.31	0

UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. 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.

This device does not support DC-HSDPA.

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.

Figure 9-2
Power Measurement Setup

9.3 LTE Conducted Powers

9.3.1 LTE Band 17

Table 9-1
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 per 3GPP [dB]
Mid	710.0	23790	10	QPSK	1	0	23.55	0	0
	710.0	23790	10	QPSK	1	25	**23.65**	0	0
	710.0	23790	10	QPSK	1	49	23.56	0	0
	710.0	23790	10	QPSK	25	0	22.53	1	0-1
	710.0	23790	10	QPSK	25	12	22.50	1	0-1
	710.0	23790	10	QPSK	25	25	**22.59**	1	0-1
	710.0	23790	10	QPSK	50	0	22.44	1	0-1
	710.0	23790	10	16QAM	1	0	22.38	1	0-1
	710.0	23790	10	16QAM	1	25	22.39	1	0-1
	710.0	23790	10	16QAM	1	49	22.30	1	0-1
	710.0	23790	10	16QAM	25	0	21.62	2	0-2
	710.0	23790	10	16QAM	25	12	21.63	2	0-2
	710.0	23790	10	16QAM	25	25	21.69	2	0-2
	710.0	23790	10	16QAM	50	0	21.47	2	0-2

Note: LTE Band 17 at 10 MHz Bandwidth does not support three non-overlapping channels. Per KDB 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the mid channel of the group of overlapping channels should be selected for testing.

Table 9-2
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 per 3GPP [dB]
Mid	710.0	23790	5	QPSK	1	0	23.63	0	0
	710.0	23790	5	QPSK	1	12	23.64	0	0
	710.0	23790	5	QPSK	1	24	23.70	0	0
	710.0	23790	5	QPSK	12	0	22.66	1	0-1
	710.0	23790	5	QPSK	12	6	22.70	1	0-1
	710.0	23790	5	QPSK	12	13	22.70	1	0-1
	710.0	23790	5	QPSK	25	0	22.53	1	0-1
	710.0	23790	5	16-QAM	1	0	22.24	1	0-1
	710.0	23790	5	16-QAM	1	12	22.27	1	0-1
	710.0	23790	5	16-QAM	1	24	22.40	1	0-1
	710.0	23790	5	16-QAM	12	0	21.60	2	0-2
	710.0	23790	5	16-QAM	12	6	21.70	2	0-2
	710.0	23790	5	16-QAM	12	13	21.69	2	0-2
	710.0	23790	5	16-QAM	25	0	21.51	2	0-2

Note: LTE Band 17 at 5 MHz Bandwidth does not support three non-overlapping channels. Per KDB 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the mid channel of the group of overlapping channels should be selected for testing.

9.3.2 LTE Band 5 (Cell)

Table 9-3
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 per 3GPP [dB]
Mid	836.5	20525	10	QPSK	1	0	23.55	0	0
	836.5	20525	10	QPSK	1	25	**23.69**	0	0
	836.5	20525	10	QPSK	1	49	23.63	0	0
	836.5	20525	10	QPSK	25	0	22.34	1	0-1
	836.5	20525	10	QPSK	25	12	22.37	1	0-1
	836.5	20525	10	QPSK	25	25	**22.39**	1	0-1
	836.5	20525	10	QPSK	50	0	22.35	1	0-1
	836.5	20525	10	16QAM	1	0	22.22	1	0-1
	836.5	20525	10	16QAM	1	25	22.38	1	0-1
	836.5	20525	10	16QAM	1	49	22.31	1	0-1
	836.5	20525	10	16QAM	25	0	21.46	2	0-2
	836.5	20525	10	16QAM	25	12	21.52	2	0-2
	836.5	20525	10	16QAM	25	25	21.56	2	0-2
	836.5	20525	10	16QAM	50	0	21.30	2	0-2

Note: LTE Band 5 at 10 MHz Bandwidth does not support three non-overlapping channels. Per KDB 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the mid channel of the group of overlapping channels should be selected for testing.

Table 9-4
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 per 3GPP [dB]
Low	826.5	20425	5	QPSK	1	0	23.62	0	0
	826.5	20425	5	QPSK	1	12	23.70	0	0
	826.5	20425	5	QPSK	1	24	23.54	0	0
	826.5	20425	5	QPSK	12	0	22.61	1	0-1
	826.5	20425	5	QPSK	12	6	22.61	1	0-1
	826.5	20425	5	QPSK	12	13	22.55	1	0-1
	826.5	20425	5	QPSK	25	0	22.48	1	0-1
	826.5	20425	5	16-QAM	1	0	22.64	1	0-1
	826.5	20425	5	16-QAM	1	12	22.68	1	0-1
	826.5	20425	5	16-QAM	1	24	22.67	1	0-1
	826.5	20425	5	16-QAM	12	0	21.67	2	0-2
	826.5	20425	5	16-QAM	12	6	21.62	2	0-2
	826.5	20425	5	16-QAM	12	13	21.57	2	0-2
	826.5	20425	5	16-QAM	25	0	21.56	2	0-2
Mid	836.5	20525	5	QPSK	1	0	23.68	0	0
	836.5	20525	5	QPSK	1	12	23.70	0	0
	836.5	20525	5	QPSK	1	24	23.69	0	0
	836.5	20525	5	QPSK	12	0	22.46	1	0-1
	836.5	20525	5	QPSK	12	6	22.55	1	0-1
	836.5	20525	5	QPSK	12	13	22.69	1	0-1
	836.5	20525	5	QPSK	25	0	22.50	1	0-1
	836.5	20525	5	16-QAM	1	0	22.65	1	0-1
	836.5	20525	5	16-QAM	1	12	22.64	1	0-1
	836.5	20525	5	16-QAM	1	24	22.54	1	0-1
	836.5	20525	5	16-QAM	12	0	21.45	2	0-2
	836.5	20525	5	16-QAM	12	6	21.48	2	0-2
	836.5	20525	5	16-QAM	12	13	21.63	2	0-2
	836.5	20525	5	16-QAM	25	0	21.44	2	0-2
High	846.5	20625	5	QPSK	1	0	23.62	0	0
	846.5	20625	5	QPSK	1	12	23.42	0	0
	846.5	20625	5	QPSK	1	24	23.37	0	0
	846.5	20625	5	QPSK	12	0	22.47	1	0-1
	846.5	20625	5	QPSK	12	6	22.40	1	0-1
	846.5	20625	5	QPSK	12	13	22.45	1	0-1
	846.5	20625	5	QPSK	25	0	22.40	1	0-1
	846.5	20625	5	16-QAM	1	0	22.70	1	0-1
	846.5	20625	5	16-QAM	1	12	22.65	1	0-1
	846.5	20625	5	16-QAM	1	24	22.60	1	0-1
	846.5	20625	5	16-QAM	12	0	21.57	2	0-2
	846.5	20625	5	16-QAM	12	6	21.50	2	0-2
	846.5	20625	5	16-QAM	12	13	21.51	2	0-2
	846.5	20625	5	16-QAM	25	0	21.38	2	0-2

9.3.3 LTE Band 4 (AWS)

Table 9-5
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 per 3GPP [dB]
Low	1715	20000	10	QPSK	1	0	23.67	0	0
	1715	20000	10	QPSK	1	25	23.70	0	0
	1715	20000	10	QPSK	1	49	23.69	0	0
	1715	20000	10	QPSK	25	0	22.54	1	0-1
	1715	20000	10	QPSK	25	12	22.57	1	0-1
	1715	20000	10	QPSK	25	25	22.59	1	0-1
	1715	20000	10	QPSK	50	0	22.47	1	0-1
	1715	20000	10	16QAM	1	0	22.69	1	0-1
	1715	20000	10	16QAM	1	25	22.70	1	0-1
	1715	20000	10	16QAM	1	49	22.68	1	0-1
	1715	20000	10	16QAM	25	0	21.63	2	0-2
	1715	20000	10	16QAM	25	12	21.52	2	0-2
	1715	20000	10	16QAM	25	25	21.58	2	0-2
	1715	20000	10	16QAM	50	0	21.49	2	0-2
Mid	1732.5	20175	10	QPSK	1	0	23.68	0	0
	1732.5	20175	10	QPSK	1	25	23.67	0	0
	1732.5	20175	10	QPSK	1	49	**23.70**	0	0
	1732.5	20175	10	QPSK	25	0	22.64	1	0-1
	1732.5	20175	10	QPSK	25	12	**22.70**	1	0-1
	1732.5	20175	10	QPSK	25	25	22.61	1	0-1
	1732.5	20175	10	QPSK	50	0	22.52	1	0-1
	1732.5	20175	10	16QAM	1	0	22.63	1	0-1
	1732.5	20175	10	16QAM	1	25	22.70	1	0-1
	1732.5	20175	10	16QAM	1	49	22.67	1	0-1
	1732.5	20175	10	16QAM	25	0	21.60	2	0-2
	1732.5	20175	10	16QAM	25	12	21.60	2	0-2
	1732.5	20175	10	16QAM	25	25	21.52	2	0-2
	1732.5	20175	10	16QAM	50	0	21.59	2	0-2
High	1750	20350	10	QPSK	1	0	23.70	0	0
	1750	20350	10	QPSK	1	25	23.70	0	0
	1750	20350	10	QPSK	1	49	23.63	0	0
	1750	20350	10	QPSK	25	0	22.55	1	0-1
	1750	20350	10	QPSK	25	12	22.53	1	0-1
	1750	20350	10	QPSK	25	25	22.46	1	0-1
	1750	20350	10	QPSK	50	0	22.33	1	0-1
	1750	20350	10	16QAM	1	0	22.65	1	0-1
	1750	20350	10	16QAM	1	25	22.54	1	0-1
	1750	20350	10	16QAM	1	49	22.51	1	0-1
	1750	20350	10	16QAM	25	0	21.46	2	0-2
	1750	20350	10	16QAM	25	12	21.60	2	0-2
	1750	20350	10	16QAM	25	25	21.53	2	0-2
	1750	20350	10	16QAM	50	0	21.48	2	0-2

Table 9-6
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 per 3GPP [dB]
Low	1712.5	19975	5	QPSK	1	0	23.65	0	0
	1712.5	19975	5	QPSK	1	12	23.60	0	0
	1712.5	19975	5	QPSK	1	24	23.61	0	0
	1712.5	19975	5	QPSK	12	0	22.58	1	0-1
	1712.5	19975	5	QPSK	12	6	22.44	1	0-1
	1712.5	19975	5	QPSK	12	13	22.48	1	0-1
	1712.5	19975	5	QPSK	25	0	22.26	1	0-1
	1712.5	19975	5	16-QAM	1	0	22.53	1	0-1
	1712.5	19975	5	16-QAM	1	12	22.50	1	0-1
	1712.5	19975	5	16-QAM	1	24	22.43	1	0-1
	1712.5	19975	5	16-QAM	12	0	21.53	2	0-2
	1712.5	19975	5	16-QAM	12	6	21.59	2	0-2
	1712.5	19975	5	16-QAM	12	13	21.55	2	0-2
	1712.5	19975	5	16-QAM	25	0	21.38	2	0-2
Mid	1732.5	20175	5	QPSK	1	0	23.70	0	0
	1732.5	20175	5	QPSK	1	12	23.69	0	0
	1732.5	20175	5	QPSK	1	24	23.65	0	0
	1732.5	20175	5	QPSK	12	0	22.56	1	0-1
	1732.5	20175	5	QPSK	12	6	22.58	1	0-1
	1732.5	20175	5	QPSK	12	13	22.67	1	0-1
	1732.5	20175	5	QPSK	25	0	22.61	1	0-1
	1732.5	20175	5	16-QAM	1	0	22.45	1	0-1
	1732.5	20175	5	16-QAM	1	12	22.38	1	0-1
	1732.5	20175	5	16-QAM	1	24	22.31	1	0-1
	1732.5	20175	5	16-QAM	12	0	21.68	2	0-2
	1732.5	20175	5	16-QAM	12	6	21.67	2	0-2
	1732.5	20175	5	16-QAM	12	13	21.58	2	0-2
	1732.5	20175	5	16-QAM	25	0	21.61	2	0-2
High	1752.5	20375	5	QPSK	1	0	23.42	0	0
	1752.5	20375	5	QPSK	1	12	23.34	0	0
	1752.5	20375	5	QPSK	1	24	23.31	0	0
	1752.5	20375	5	QPSK	12	0	22.46	1	0-1
	1752.5	20375	5	QPSK	12	6	22.36	1	0-1
	1752.5	20375	5	QPSK	12	13	22.40	1	0-1
	1752.5	20375	5	QPSK	25	0	22.32	1	0-1
	1752.5	20375	5	16-QAM	1	0	22.70	1	0-1
	1752.5	20375	5	16-QAM	1	12	22.65	1	0-1
	1752.5	20375	5	16-QAM	1	24	22.57	1	0-1
	1752.5	20375	5	16-QAM	12	0	21.51	2	0-2
	1752.5	20375	5	16-QAM	12	6	21.46	2	0-2
	1752.5	20375	5	16-QAM	12	13	21.50	2	0-2
	1752.5	20375	5	16-QAM	25	0	21.46	2	0-2

9.3.4 LTE Band 2 (PCS)

Table 9-7
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 per 3GPP [dB]
Low	1855	18650	10	QPSK	1	0	23.29	0	0
	1855	18650	10	QPSK	1	25	23.52	0	0
	1855	18650	10	QPSK	1	49	**23.56**	0	0
	1855	18650	10	QPSK	25	0	22.04	1	0-1
	1855	18650	10	QPSK	25	12	22.16	1	0-1
	1855	18650	10	QPSK	25	25	22.26	1	0-1
	1855	18650	10	QPSK	50	0	22.03	1	0-1
	1855	18650	10	16QAM	1	0	21.93	1	0-1
	1855	18650	10	16QAM	1	25	22.19	1	0-1
	1855	18650	10	16QAM	1	49	22.11	1	0-1
	1855	18650	10	16QAM	25	0	21.08	2	0-2
	1855	18650	10	16QAM	25	12	21.12	2	0-2
	1855	18650	10	16QAM	25	25	21.29	2	0-2
	1855	18650	10	16QAM	50	0	21.00	2	0-2
Mid	1880.0	18900	10	QPSK	1	0	23.63	0	0
	1880.0	18900	10	QPSK	1	25	**23.70**	0	0
	1880.0	18900	10	QPSK	1	49	23.55	0	0
	1880.0	18900	10	QPSK	25	0	**22.65**	1	0-1
	1880.0	18900	10	QPSK	25	12	22.60	1	0-1
	1880.0	18900	10	QPSK	25	25	22.63	1	0-1
	1880.0	18900	10	QPSK	50	0	**22.48**	1	0-1
	1880.0	18900	10	16QAM	1	0	22.41	1	0-1
	1880.0	18900	10	16QAM	1	25	22.51	1	0-1
	1880.0	18900	10	16QAM	1	49	22.39	1	0-1
	1880.0	18900	10	16QAM	25	0	21.68	2	0-2
	1880.0	18900	10	16QAM	25	12	21.58	2	0-2
	1880.0	18900	10	16QAM	25	25	21.52	2	0-2
	1880.0	18900	10	16QAM	50	0	21.38	2	0-2
High	1905	19150	10	QPSK	1	0	**23.51**	0	0
	1905	19150	10	QPSK	1	25	23.45	0	0
	1905	19150	10	QPSK	1	49	23.16	0	0
	1905	19150	10	QPSK	25	0	22.18	1	0-1
	1905	19150	10	QPSK	25	12	22.15	1	0-1
	1905	19150	10	QPSK	25	25	22.19	1	0-1
	1905	19150	10	QPSK	50	0	22.10	1	0-1
	1905	19150	10	16QAM	1	0	22.15	1	0-1
	1905	19150	10	16QAM	1	25	22.06	1	0-1
	1905	19150	10	16QAM	1	49	22.08	1	0-1
	1905	19150	10	16QAM	25	0	21.15	2	0-2
	1905	19150	10	16QAM	25	12	21.18	2	0-2
	1905	19150	10	16QAM	25	25	21.22	2	0-2
	1905	19150	10	16QAM	50	0	21.02	2	0-2

Table 9-8
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 per 3GPP [dB]
Low	1852.5	18625	5	QPSK	1	0	23.24	0	0
	1852.5	18625	5	QPSK	1	12	23.32	0	0
	1852.5	18625	5	QPSK	1	24	23.43	0	0
	1852.5	18625	5	QPSK	12	0	22.15	1	0-1
	1852.5	18625	5	QPSK	12	6	22.12	1	0-1
	1852.5	18625	5	QPSK	12	13	22.23	1	0-1
	1852.5	18625	5	QPSK	25	0	22.00	1	0-1
	1852.5	18625	5	16-QAM	1	0	22.26	1	0-1
	1852.5	18625	5	16-QAM	1	12	22.38	1	0-1
	1852.5	18625	5	16-QAM	1	24	22.47	1	0-1
	1852.5	18625	5	16-QAM	12	0	21.07	2	0-2
	1852.5	18625	5	16-QAM	12	6	21.11	2	0-2
	1852.5	18625	5	16-QAM	12	13	21.22	2	0-2
	1852.5	18625	5	16-QAM	25	0	20.96	2	0-2
Mid	1880.0	18900	5	QPSK	1	0	23.68	0	0
	1880.0	18900	5	QPSK	1	12	23.65	0	0
	1880.0	18900	5	QPSK	1	24	23.60	0	0
	1880.0	18900	5	QPSK	12	0	22.64	1	0-1
	1880.0	18900	5	QPSK	12	6	22.62	1	0-1
	1880.0	18900	5	QPSK	12	13	22.61	1	0-1
	1880.0	18900	5	QPSK	25	0	22.49	1	0-1
	1880.0	18900	5	16-QAM	1	0	22.58	1	0-1
	1880.0	18900	5	16-QAM	1	12	22.55	1	0-1
	1880.0	18900	5	16-QAM	1	24	22.57	1	0-1
	1880.0	18900	5	16-QAM	12	0	21.54	2	0-2
	1880.0	18900	5	16-QAM	12	6	21.50	2	0-2
	1880.0	18900	5	16-QAM	12	13	21.54	2	0-2
	1880.0	18900	5	16-QAM	25	0	21.49	2	0-2
High	1907.5	19175	5	QPSK	1	0	23.30	0	0
	1907.5	19175	5	QPSK	1	12	23.26	0	0
	1907.5	19175	5	QPSK	1	24	23.11	0	0
	1907.5	19175	5	QPSK	12	0	22.37	1	0-1
	1907.5	19175	5	QPSK	12	6	22.31	1	0-1
	1907.5	19175	5	QPSK	12	13	22.12	1	0-1
	1907.5	19175	5	QPSK	25	0	22.12	1	0-1
	1907.5	19175	5	16-QAM	1	0	22.46	1	0-1
	1907.5	19175	5	16-QAM	1	12	22.44	1	0-1
	1907.5	19175	5	16-QAM	1	24	22.19	1	0-1
	1907.5	19175	5	16-QAM	12	0	21.40	2	0-2
	1907.5	19175	5	16-QAM	12	6	21.33	2	0-2
	1907.5	19175	5	16-QAM	12	13	21.20	2	0-2
	1907.5	19175	5	16-QAM	25	0	21.18	2	0-2

9.4 WLAN Conducted Powers

Table 9-9
IEEE 802.11b Average RF Power

Mode	Freq	Channel	802.11b (2.4 GHz) Conducted Power [dBm]			
			Data Rate [Mbps]			
	[MHz]		1	2	5.5	11
802.11b	2412	1*	16.57	16.64	16.66	16.67
802.11b	2437	6*	**16.85**	16.91	16.98	16.96
802.11b	2462	11*	16.33	16.19	16.29	16.34

Table 9-10
IEEE 802.11g Average RF Power

Mode	Freq	Channel	802.11g (2.4 GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11g	2412	1	13.62	13.62	13.18	13.19	13.60	13.55	13.18	13.55
802.11g	2437	6	13.97	13.87	13.87	13.77	13.70	13.82	13.75	13.81
802.11g	2462	11	13.23	13.16	13.22	13.19	13.12	13.32	13.19	13.17

Table 9-11
IEEE 802.11n Average RF Power

Mode	Freq	Channel	802.11n (2.4 GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	2412	1	12.65	12.60	12.65	12.07	12.65	12.55	12.52	12.57
802.11n	2437	6	12.85	12.71	12.74	12.70	12.67	12.66	12.72	12.54
802.11n	2462	11	12.12	12.16	12.17	12.16	12.14	12.09	12.07	12.09

Table 9-12
IEEE 802.11a Average RF Power

Mode	Freq	Channel	802.11a (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11a	5180	36*	14.69	14.78	14.79	14.76	14.72	14.72	14.64	14.65
802.11a	5200	40	14.70	14.69	14.65	14.68	14.68	14.67	14.46	14.74
802.11a	5220	44	**14.86**	14.84	14.85	14.87	14.86	14.78	14.85	14.71
802.11a	5240	48*	14.80	14.77	14.83	14.90	14.87	14.81	14.60	14.91
802.11a	5260	52*	**14.80**	14.86	14.82	14.93	14.94	14.85	14.71	14.83
802.11a	5280	56	14.80	14.94	14.89	14.95	15.01	14.92	14.79	14.86
802.11a	5300	60	13.97	13.91	13.97	13.92	13.88	13.82	13.81	13.81
802.11a	5320	64*	13.93	13.87	13.83	13.96	13.92	13.97	13.94	13.91
802.11a	5500	100	13.99	13.91	13.98	14.00	13.90	14.02	13.87	13.82
802.11a	5520	104*	14.06	14.09	14.12	14.03	14.06	14.08	14.02	14.05
802.11a	5540	108	13.98	14.07	13.89	14.01	14.02	13.96	13.66	13.85
802.11a	5560	112	14.07	14.02	13.90	14.04	14.06	13.85	13.58	13.91
802.11a	5580	116*	14.08	14.10	14.07	14.07	14.07	13.87	13.94	13.97
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	14.21	14.24	14.25	14.25	14.26	13.95	14.04	14.12
802.11a	5680	136*	**14.26**	14.32	14.25	14.24	14.28	14.05	14.07	14.11
802.11a	5700	140	13.18	13.27	13.24	13.22	13.27	13.12	13.05	13.09
802.11a	5745	149*	12.63	12.68	12.75	12.65	12.68	12.61	12.52	12.51
802.11a	5765	153	13.73	13.70	13.68	13.72	13.75	13.74	13.67	13.59
802.11a	5785	157*	14.82	14.86	14.75	14.83	14.74	14.73	14.82	14.67
802.11a	5805	161*	**14.89**	14.42	14.84	14.83	14.82	14.76	14.66	14.70
802.11a	5825	165	14.84	14.92	14.91	14.88	14.94	14.81	14.81	14.75

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 D01v01r02. When the adjacent channels are higher in power then the default channels, these “required channels” are considered for SAR testing instead of the default channels.

Table 9-13
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	5180	36	12.70	13.52	13.39	13.34	13.39	13.61	13.46	13.39
802.11n	5200	40	12.67	13.51	13.41	13.42	13.45	13.41	13.33	13.42
802.11n	5220	44	12.90	13.53	13.40	13.51	13.56	13.52	13.39	13.39
802.11n	5240	48	12.75	13.54	13.37	13.55	13.59	13.44	13.49	13.47
802.11n	5260	52	12.90	13.59	13.56	13.56	13.65	13.52	13.47	13.54
802.11n	5280	56	13.73	13.68	13.72	13.67	13.57	13.48	13.70	13.55
802.11n	5300	60	13.81	13.78	13.79	13.65	13.52	13.69	13.62	13.39
802.11n	5320	64	13.84	13.82	13.75	13.79	13.63	13.65	13.73	13.44
802.11n	5500	100	12.67	12.64	12.61	12.59	12.63	12.53	12.54	12.09
802.11n	5520	104	12.81	12.73	12.64	12.47	12.59	12.54	12.45	12.20
802.11n	5540	108	13.54	13.76	13.72	13.56	13.69	13.61	13.58	13.31
802.11n	5560	112	13.75	13.90	13.77	13.61	13.51	13.54	13.64	13.16
802.11n	5580	116	12.35	13.84	13.89	13.72	13.58	13.57	13.63	13.28
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
802.11n	5660	132	12.83	12.85	12.75	12.75	12.44	12.60	12.71	12.12
802.11n	5680	136	12.85	12.90	12.81	12.67	12.45	12.67	12.83	12.20
802.11n	5700	140	11.92	11.74	11.82	11.62	11.48	11.64	11.64	11.17
802.11n	5745	149	11.45	11.25	11.23	11.11	11.01	11.16	11.11	10.69
802.11n	5765	153	12.53	12.39	12.38	12.47	12.15	12.29	12.25	11.84
802.11n	5785	157	12.61	12.39	12.41	12.67	12.08	12.23	12.26	11.95
802.11n	5805	161	12.59	12.45	12.37	12.48	12.12	12.29	12.45	11.71
802.11n	5825	165	12.67	12.46	12.45	12.40	12.25	12.27	12.31	11.73

Table 9-14
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38	13.22	13.22	12.71	13.03	13.02	12.97	12.45	11.73
802.11n	5230	46	13.35	12.96	12.76	13.13	13.15	13.07	12.54	12.02
802.11n	5270	54	13.72	13.67	13.53	13.58	13.56	13.45	13.57	13.61
802.11n	5310	62	12.77	12.70	12.67	12.64	12.63	12.67	12.54	12.68
802.11n	5510	102	13.41	12.95	12.84	13.29	13.21	13.16	12.42	11.98
802.11n	5550	110	13.49	12.94	12.91	13.28	13.30	13.32	12.68	12.03
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	13.62	13.28	13.31	13.52	13.44	13.44	12.87	12.22
802.11n	5755	151	13.23	12.83	12.60	13.26	12.93	12.92	12.55	11.76
802.11n	5795	159	13.33	12.92	12.65	12.83	13.11	13.01	12.43	11.90

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 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 20 MHz and 40 MHz) 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 reported 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.
- The bolded data rate and channel above were tested for SAR.

Figure 9-3
Power Measurement Setup

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
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
01/14/2013	750H	24.5	710	0.877	42.50	0.887	42.113	-1.13%	0.92%
			740	0.894	42.42	0.889	41.953	0.56%	1.11%
			755	0.912	42.34	0.891	41.876	2.36%	1.11%
01/07/2013	835H	20.5	820	0.882	42.46	0.898	41.571	-1.78%	2.14%
			835	0.908	42.24	0.900	41.500	0.89%	1.78%
			850	0.925	42.12	0.916	41.500	0.98%	1.49%
01/11/2013	835H	22.5	820	0.870	41.57	0.898	41.571	-3.12%	0.00%
			835	0.878	41.49	0.900	41.500	-2.44%	-0.02%
			850	0.896	41.21	0.916	41.500	-2.18%	-0.70%
01/15/2013	835H	23.1	820	0.904	41.42	0.898	41.571	0.67%	-0.36%
			835	0.917	41.31	0.900	41.500	1.89%	-0.46%
			850	0.934	41.11	0.916	41.500	1.97%	-0.94%
01/09/2013	1750H	21.0	1710	1.361	39.99	1.348	40.136	0.96%	-0.36%
			1750	1.399	39.68	1.370	40.100	2.12%	-1.05%
			1790	1.450	39.45	1.394	40.020	4.02%	-1.42%
01/14/2013	1900H	23.2	1850	1.389	38.78	1.400	40.000	-0.79%	-3.05%
			1880	1.416	38.96	1.400	40.000	1.14%	-2.60%
			1910	1.452	38.81	1.400	40.000	3.71%	-2.97%
01/09/2013	2450H	24.2	2401	1.798	37.84	1.758	39.298	2.28%	-3.71%
			2450	1.852	37.68	1.800	39.200	2.89%	-3.88%
			2499	1.907	37.45	1.852	39.135	2.97%	-4.31%
01/10/2013	5200 - 5800H	23.5	5200	4.651	35.86	4.660	36.000	-0.19%	-0.39%
			5220	4.668	35.71	4.680	35.980	-0.26%	-0.75%
			5260	4.764	35.34	4.720	35.940	0.93%	-1.67%
			5300	4.869	35.42	4.760	35.900	2.29%	-1.34%
			5600	5.117	34.82	5.070	35.500	0.93%	-1.92%
			5680	5.308	34.42	5.150	35.420	3.07%	-2.82%
			5800	5.447	34.09	5.270	35.300	3.36%	-3.43%
			5805	5.454	34.09	5.275	35.295	3.39%	-3.41%
01/07/2013	750B	22.2	710	0.929	54.72	0.960	55.687	-3.23%	-1.74%
			740	0.955	54.42	0.963	55.570	-0.83%	-2.07%
			755	0.971	54.29	0.964	55.512	0.73%	-2.20%
01/08/2013	850B	22.6	820	0.944	53.09	0.969	55.258	-2.58%	-3.92%
			835	0.957	52.95	0.970	55.200	-1.34%	-4.08%
			850	0.972	52.83	0.988	55.154	-1.62%	-4.21%
01/05/2013	1750B	22.7	1710	1.485	53.21	1.460	53.540	1.71%	-0.62%
			1750	1.531	53.06	1.490	53.430	2.75%	-0.69%
			1790	1.575	52.92	1.510	53.330	4.30%	-0.77%
01/07/2013	1900B	22.4	1850	1.462	51.01	1.520	53.300	-3.82%	-4.30%
			1880	1.497	51.06	1.520	53.300	-1.51%	-4.20%
			1910	1.532	50.85	1.520	53.300	0.79%	-4.60%
01/14/2013	1900B	21.8	1850	1.511	52.62	1.520	53.300	-0.59%	-1.28%
			1880	1.582	52.41	1.520	53.300	4.08%	-1.67%
			1910	1.588	52.08	1.520	53.300	4.47%	-2.29%
01/08/2013	2450B	20.4	2401	1.873	51.19	1.903	52.765	-1.58%	-2.98%
			2450	1.938	51.17	1.950	52.700	-0.62%	-2.90%
			2499	1.986	50.90	2.019	52.638	-1.63%	-3.30%
01/08/2013	5200 - 5800B	23.2	5200	5.192	49.10	5.299	49.014	-2.02%	0.18%
			5220	5.217	48.96	5.323	48.987	-1.99%	-0.06%
			5260	5.298	48.78	5.369	48.906	-1.32%	-0.26%
			5300	5.377	48.78	5.416	48.851	-0.72%	-0.15%
			5600	5.795	48.08	5.766	48.444	0.50%	-0.75%
			5680	5.951	47.89	5.860	48.336	1.55%	-0.92%
			5800	6.130	47.54	6.000	48.200	2.17%	-1.37%
			5805	6.146	47.55	6.005	48.166	2.35%	-1.28%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per IEEE 1528 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the ta29 ble above due to significant digit rounding in the software.

10.2 Test System Verification

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

Full system validation status and results can be found in Appendix E.

Table 10-2
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}	Deviation (%)
750	HEAD	01/14/2013	23.8	23.4	0.100	1054	3288	0.834	8.520	8.340	-2.11%
835	HEAD	01/07/2013	23.4	21.5	0.090	4d047	3288	0.858	9.410	9.533	1.31%
835	HEAD	01/11/2013	23.9	22.3	0.100	4d133	3288	0.885	9.450	8.850	-6.35%
835	HEAD	01/15/2013	23.7	23.3	0.100	4d026	3209	0.937	9.390	9.370	-0.21%
1750	HEAD	01/09/2013	24.3	21.2	0.100	1051	3263	3.670	36.600	36.700	0.27%
1900	HEAD	01/14/2013	24.6	22.9	0.100	5d148	3213	4.020	40.500	40.200	-0.74%
2450	HEAD	01/09/2013	24.4	22.6	0.040	719	3022	2.150	52.700	53.750	1.99%
5200	HEAD	01/10/2013	23.3	22.3	0.100	1007	3561	8.120	79.800	81.200	1.75%
5300	HEAD	01/10/2013	23.4	22.3	0.100	1007	3561	7.890	83.100	78.900	-5.05%
5600	HEAD	01/10/2013	23.6	22.7	0.100	1007	3561	7.940	84.500	79.400	-6.04%
5800	HEAD	01/10/2013	23.6	22.8	0.100	1007	3561	7.760	79.800	77.600	-2.76%
750	BODY	01/07/2013	24.5	22.6	0.100	1054	3209	0.925	8.840	9.250	4.64%
835	BODY	01/08/2013	24.6	23.0	0.100	4d026	3209	0.915	9.580	9.150	-4.49%
1750	BODY	01/05/2013	23.2	22.9	0.100	1008	3209	3.880	37.400	38.800	3.74%
1900	BODY	01/07/2013	22.2	21.2	0.100	5d149	3213	4.120	39.300	41.200	4.83%
1900	BODY	01/14/2013	23.8	22.7	0.100	5d148	3263	4.170	39.100	41.700	6.65%
2450	BODY	01/08/2013	24.4	21.1	0.100	882	3263	4.720	50.300	47.200	-6.16%
5200	BODY	01/08/2013	24.0	22.4	0.100	1007	3561	7.300	73.300	73.000	-0.41%
5300	BODY	01/08/2013	24.1	22.5	0.100	1007	3561	7.500	75.600	75.000	-0.79%
5600	BODY	01/08/2013	24.4	22.8	0.100	1007	3561	8.550	80.000	85.500	6.88%
5800	BODY	01/08/2013	24.5	22.8	0.100	1007	3561	7.600	74.300	76.000	2.29%

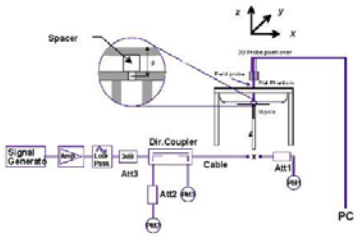


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.62	-0.06	Right	Cheek	211KPPB263112	1	1:8.3	0.218	1.019	0.222	
836.60	190	GSM 850	GSM	33.7	33.62	-0.06	Right	Tilt	211KPPB263112	1	1:8.3	0.137	1.019	0.140	
836.60	190	GSM 850	GSM	33.7	33.62	0.01	Left	Cheek	211KPPB263112	1	1:8.3	0.190	1.019	0.194	
836.60	190	GSM 850	GSM	33.7	33.62	0.01	Left	Tilt	211KPPB263112	1	1:8.3	0.097	1.019	0.099	
836.60	190	GSM 850	GPRS	31.7	31.47	0.13	Right	Cheek	211KPPB263112	2	1:4.15	0.346	1.054	**0.365**	A1
836.60	190	GSM 850	GPRS	31.7	31.47	-0.03	Right	Tilt	211KPPB263112	2	1:4.15	0.207	1.054	0.218	
836.60	190	GSM 850	GPRS	31.7	31.47	0.03	Left	Cheek	211KPPB263112	2	1:4.15	0.207	1.054	0.218	
836.60	190	GSM 850	GPRS	31.7	31.47	0.06	Left	Tilt	211KPPB263112	2	1:4.15	0.119	1.054	0.125	
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 11-2
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	23.7	23.55	0.04	Right	Cheek	211KPPB263112	1:1	0.144	1.035	0.149	A2
836.60	4183	UMTS 850	RMC	23.7	23.55	0.10	Right	Tilt	211KPPB263112	1:1	0.092	1.035	0.095	
836.60	4183	UMTS 850	RMC	23.7	23.55	0.12	Left	Cheek	211KPPB263112	1:1	0.136	1.035	0.141	
836.60	4183	UMTS 850	RMC	23.7	23.55	0.16	Left	Tilt	211KPPB263112	1:1	0.080	1.035	0.082	
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 11-3
GSM 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.70	30.39	0.02	Right	Cheek	211KPPB263112	1	1:8.3	0.134	1.074	0.144	
1880.00	661	GSM 1900	GSM	30.70	30.39	-0.03	Right	Tilt	211KPPB263112	1	1:8.3	0.083	1.074	0.090	
1880.00	661	GSM 1900	GSM	30.70	30.39	0.15	Left	Cheek	211KPPB263112	1	1:8.3	0.088	1.074	0.095	
1880.00	661	GSM 1900	GSM	30.70	30.39	0.21	Left	Tilt	211KPPB263112	1	1:8.3	0.097	1.074	0.104	
1880.00	661	GSM 1900	GPRS	28.70	28.52	-0.04	Right	Cheek	211KPPB263112	2	1:4.15	0.170	1.042	0.177	A3
1880.00	661	GSM 1900	GPRS	28.70	28.52	0.11	Right	Tilt	211KPPB263112	2	1:4.15	0.073	1.042	0.076	
1880.00	661	GSM 1900	GPRS	28.70	28.52	0.14	Left	Cheek	211KPPB263112	2	1:4.15	0.098	1.042	0.102	
1880.00	661	GSM 1900	GPRS	28.70	28.52	0.17	Left	Tilt	211KPPB263112	2	1:4.15	0.084	1.042	0.087	
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 11-4
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.													
1880.00	9400	UMTS 1900	RMC	23.7	23.47	0.05	Right	Cheek	211KPSL263118	1:1	0.128	1.054	0.135	A4
1880.00	9400	UMTS 1900	RMC	23.7	23.47	0.15	Right	Tilt	211KPSL263118	1:1	0.070	1.054	0.074	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	-0.04	Left	Cheek	211KPSL263118	1:1	0.061	1.054	0.064	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	-0.20	Left	Tilt	211KPSL263118	1:1	0.068	1.054	0.072	
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 11-5
LTE Band 17 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	0.10	0	Right	Cheek	QPSK	1	25	211KPDT263122	1:1	0.137	1.012	0.139	
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.02	1	Right	Cheek	QPSK	25	25	211KPDT263122	1:1	0.098	1.026	0.100	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	-0.15	0	Right	Tilt	QPSK	1	25	211KPDT263122	1:1	0.090	1.012	0.091	
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.09	1	Right	Tilt	QPSK	25	25	211KPDT263122	1:1	0.064	1.026	0.066	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	0.21	0	Left	Cheek	QPSK	1	25	211KPDT263122	1:1	0.183	1.012	0.185	A5
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.02	1	Left	Cheek	QPSK	25	25	211KPDT263122	1:1	0.118	1.026	0.121	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	0.05	0	Left	Tilt	QPSK	1	25	211KPDT263122	1:1	0.094	1.012	0.095	
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	-0.02	1	Left	Tilt	QPSK	25	25	211KPDT263122	1:1	0.060	1.026	0.062	
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 11-6
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	-0.09	0	Right	Cheek	QPSK	1	25	211KPDT263122	1:1	0.155	1.002	0.155	A6
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	0.01	1	Right	Cheek	QPSK	25	25	211KPDT263122	1:1	0.122	1.074	0.131	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	0.15	0	Right	Tilt	QPSK	1	25	211KPDT263122	1:1	0.085	1.002	0.086	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	-0.03	1	Right	Tilt	QPSK	25	25	211KPDT263122	1:1	0.071	1.074	0.076	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	0.06	0	Left	Cheek	QPSK	1	25	211KPDT263122	1:1	0.154	1.002	0.154	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	0.15	1	Left	Cheek	QPSK	25	25	211KPDT263122	1:1	0.122	1.074	0.131	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	0.09	0	Left	Tilt	QPSK	1	25	211KPDT263122	1:1	0.094	1.002	0.094	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	0.09	1	Left	Tilt	QPSK	25	25	211KPDT263122	1:1	0.073	1.074	0.078	
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 11-7
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	0.19	0	Right	Cheek	QPSK	1	49	211KPMZ263122	1:1	0.120	1.000	0.120	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.00	1	Right	Cheek	QPSK	25	12	211KPMZ263122	1:1	0.099	1.000	0.099	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	0.08	0	Right	Tilt	QPSK	1	49	211KPMZ263122	1:1	0.131	1.000	0.131	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.00	1	Right	Tilt	QPSK	25	12	211KPMZ263122	1:1	0.109	1.000	0.109	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	-0.01	0	Left	Cheek	QPSK	1	49	211KPMZ263122	1:1	0.238	1.000	0.238	A7
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.08	1	Left	Cheek	QPSK	25	12	211KPMZ263122	1:1	0.210	1.000	0.210	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	-0.03	0	Left	Tilt	QPSK	1	49	211KPMZ263122	1:1	0.122	1.000	0.122	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	-0.10	1	Left	Tilt	QPSK	25	12	211KPMZ263122	1:1	0.104	1.000	0.104	
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 11-8
LTE Band 2 (PCS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.05	0	Right	Cheek	QPSK	1	25	211KPDT263122	1:1	0.237	1.000	0.237	A8
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.15	1	Right	Cheek	QPSK	25	0	211KPDT263122	1:1	0.166	1.012	0.168	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.08	0	Right	Tilt	QPSK	1	25	211KPDT263122	1:1	0.126	1.000	0.126	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.06	1	Right	Tilt	QPSK	25	0	211KPDT263122	1:1	0.088	1.012	0.089	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.08	0	Left	Cheek	QPSK	1	25	211KPDT263122	1:1	0.125	1.000	0.125	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.08	1	Left	Cheek	QPSK	25	0	211KPDT263122	1:1	0.087	1.012	0.088	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.07	0	Left	Tilt	QPSK	1	25	211KPDT263122	1:1	0.121	1.000	0.121	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.05	1	Left	Tilt	QPSK	25	0	211KPDT263122	1:1	0.086	1.012	0.087	
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 11-9
DTS Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.01	Right	Cheek	211KPKN263125	1	1:1	0.036	1.334	0.048	A9
2437	6	IEEE 802.11b	DSSS	18.1	16.85	-0.06	Right	Tilt	211KPKN263125	1	1:1	0.021	1.334	0.029	
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.18	Left	Cheek	211KPKN263125	1	1:1	0.034	1.334	0.045	
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.12	Left	Tilt	211KPKN263125	1	1:1	0.036	1.334	0.048	
5805	161	IEEE 802.11a	OFDM	15.1	14.89	0.20	Right	Touch	211KPDT263122	6	1:1	0.003	1.050	0.004	
5805	161	IEEE 802.11a	OFDM	15.1	14.89	0.17	Right	Tilt	211KPDT263122	6	1:1	0.006	1.050	0.006	A10
5805	161	IEEE 802.11a	OFDM	15.1	14.89	0.18	Left	Touch	211KPDT263122	6	1:1	0.002	1.050	0.002	
5805	161	IEEE 802.11a	OFDM	15.1	14.89	0.16	Left	Tilt	211KPDT263122	6	1:1	0.002	1.050	0.002	
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 11-10
NII Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
5220	44	IEEE 802.11a	OFDM	15.1	14.86	-0.19	Right	Touch	211KPDT263122	6	1:1	0.001	1.057	0.001	
5220	44	IEEE 802.11a	OFDM	15.1	14.86	-0.21	Right	Tilt	211KPDT263122	6	1:1	0.001	1.057	0.002	
5220	44	IEEE 802.11a	OFDM	15.1	14.86	-0.12	Left	Touch	211KPDT263122	6	1:1	0.001	1.057	0.001	
5220	44	IEEE 802.11a	OFDM	15.1	14.86	0.12	Left	Tilt	211KPDT263122	6	1:1	0.003	1.057	0.003	
5260	52	IEEE 802.11a	OFDM	15.1	14.80	0.15	Right	Touch	211KPDT263122	6	1:1	0.003	1.072	0.003	
5260	52	IEEE 802.11a	OFDM	15.1	14.80	-0.11	Right	Tilt	211KPDT263122	6	1:1	0.000	1.072	0.000	
5260	52	IEEE 802.11a	OFDM	15.1	14.80	-0.17	Left	Touch	211KPDT263122	6	1:1	0.007	1.072	0.007	A11
5260	52	IEEE 802.11a	OFDM	15.1	14.80	0.18	Left	Tilt	211KPDT263122	6	1:1	0.001	1.072	0.001	
5680	136	IEEE 802.11a	OFDM	15.1	14.26	0.14	Right	Touch	211KPDT263122	6	1:1	0.004	1.213	0.005	
5680	136	IEEE 802.11a	OFDM	15.1	14.26	0.11	Right	Tilt	211KPDT263122	6	1:1	0.000	1.213	0.000	
5680	136	IEEE 802.11a	OFDM	15.1	14.26	-0.15	Left	Touch	211KPDT263122	6	1:1	0.006	1.213	0.007	
5680	136	IEEE 802.11a	OFDM	15.1	14.26	-0.01	Left	Tilt	211KPDT263122	6	1:1	0.005	1.213	0.006	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

11.2 Standalone Body-Worn SAR Data

Table 11-11
GSM/UMTS/ Body-Worn SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.62	-0.18	10 mm	211KPPB263112	1	1:8.3	back	0.358	1.019	0.365	
836.60	190	GSM 850	GPRS	31.7	31.47	-0.11	10 mm	211KPPB263112	2	1:4.15	back	0.409	1.054	0.431	A12
836.60	4183	UMTS 850	RMC	23.7	23.55	0.01	10 mm	211KPPB263112	N/A	1:1	back	0.265	1.035	0.274	A14
1850.20	512	GSM 1900	GSM	30.7	30.27	-0.05	10 mm	211KPPB263112	1	1:8.3	back	0.904	1.104	0.998	
1880.00	661	GSM 1900	GSM	30.7	30.39	-0.03	10 mm	211KPPB263112	1	1:8.3	back	0.984	1.074	1.057	
1909.80	810	GSM 1900	GSM	30.7	30.32	-0.07	10 mm	211KPPB263112	1	1:8.3	back	0.836	1.091	0.912	
1850.20	512	GSM 1900	GPRS	28.7	28.54	0.03	10 mm	211KPPB263112	2	1:4.15	back	1.210	1.038	1.256	
1880.00	661	GSM 1900	GPRS	28.7	28.52	-0.01	10 mm	211KPPB263112	2	1:4.15	back	1.240	1.042	1.292	A16
1909.80	810	GSM 1900	GPRS	28.7	28.53	-0.07	10 mm	211KPPB263112	2	1:4.15	back	1.040	1.040	1.082	
1880.00	661	GSM 1900	GPRS	28.7	28.52	0.11	10 mm	211KPPB263112	2	1:4.15	back*	1.180	1.042	1.230	
1880.00	661	GSM 1900	GPRS	28.7	28.52	0.11	10 mm	211KPPB263112	2	1:4.15	back	1.160	1.042	1.209	
1852.40	9262	UMTS 1900	RMC	23.7	23.54	-0.11	10 mm	211KPSL263118	N/A	1:1	back	0.799	1.038	0.829	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	-0.08	10 mm	211KPSL263118	N/A	1:1	back	0.804	1.054	0.847	A17
1907.60	9538	UMTS 1900	RMC	23.7	23.41	0.18	10 mm	211KPSL263118	N/A	1:1	back	0.570	1.068	0.609	
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:

1. (*) represents a headset cable was connected during testing.
2. Variability test data was highlighted as blue entry.

Table 11-12
LTE Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	-0.02	0	211KPDT263122	QPSK	1	25	10 mm	back	1:1	0.356	1.012	0.360	A18
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.07	1	211KPDT263122	QPSK	25	25	10 mm	back	1:1	0.253	1.026	0.260	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	0.00	0	211KPDT263122	QPSK	1	25	10 mm	back	1:1	0.303	1.002	0.304	A20
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	-0.06	1	211KPDT263122	QPSK	25	25	10 mm	back	1:1	0.224	1.074	0.241	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	-0.04	0	211KPDT263122	QPSK	1	49	10 mm	back	1:1	0.364	1.000	0.364	A22
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.01	1	211KPDT263122	QPSK	25	12	10 mm	back	1:1	0.318	1.000	0.318	
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.7	23.56	-0.04	0	211KPMZ263122	QPSK	1	49	10 mm	back	1:1	0.561	1.033	0.580	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.06	0	211KPMZ263122	QPSK	1	25	10 mm	back	1:1	0.845	1.000	0.845	
1905.00	19150	High	LTE Band 2 (PCS)	10	23.7	23.51	-0.06	0	211KPMZ263122	QPSK	1	0	10 mm	back	1:1	1.030	1.045	1.076	A24
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	-0.03	1	211KPMZ263122	QPSK	25	0	10 mm	back	1:1	0.761	1.012	0.770	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.48	-0.03	1	211KPMZ263122	QPSK	50	0	10 mm	back	1:1	0.699	1.052	0.735	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-13
DTS Body-Worn SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.13	10 mm	211KPMZ263122	1	back	1:1	0.021	1.334	0.027	A25
5805	161	IEEE 802.11a	OFDM	15.1	14.89	0.15	10 mm	211KPDT263122	6	back	1:1	0.193	1.050	**0.203**	A26
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-14
NII Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
5220	44	IEEE 802.11a	OFDM	15.1	14.86	0.20	10 mm	211KPDT263122	6	back	1:1	0.049	1.057	0.052	
5260	52	IEEE 802.11a	OFDM	15.1	14.80	0.11	10 mm	211KPDT263122	6	back	1:1	0.081	1.072	0.086	
5680	136	IEEE 802.11a	OFDM	15.1	14.26	-0.10	10 mm	211KPDT263122	6	back	1:1	0.153	1.213	**0.186**	A27
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

11.3 Standalone Wireless Router SAR Data

Table 11-15
GPRS/UMTS/ Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	31.7	31.47	-0.11	10 mm	211KPPB263112	2	1:4.15	back	0.409	1.054	0.431	
836.60	190	GSM 850	GPRS	31.7	31.47	-0.02	10 mm	211KPPB263112	2	1:4.15	front	0.261	1.054	0.275	
836.60	190	GSM 850	GPRS	31.7	31.47	-0.06	10 mm	211KPPB263112	2	1:4.15	bottom	0.275	1.054	0.290	
836.60	190	GSM 850	GPRS	31.7	31.47	-0.03	10 mm	211KPPB263112	2	1:4.15	right	0.498	1.054	0.525	A13
836.60	4183	UMTS 850	RMC	23.7	23.55	0.01	10 mm	211KPPB263112	N/A	1:1	back	0.265	1.035	0.274	
836.60	4183	UMTS 850	RMC	23.7	23.55	0.05	10 mm	211KPPB263112	N/A	1:1	front	0.188	1.035	0.195	
836.60	4183	UMTS 850	RMC	23.7	23.55	-0.05	10 mm	211KPPB263112	N/A	1:1	bottom	0.164	1.035	0.170	
836.60	4183	UMTS 850	RMC	23.7	23.55	0.00	10 mm	211KPPB263112	N/A	1:1	right	0.336	1.035	0.348	A15
1850.20	512	GSM 1900	GPRS	28.7	28.54	0.03	10 mm	211KPPB263112	2	1:4.15	back	1.210	1.038	1.256	
1880.00	661	GSM 1900	GPRS	28.7	28.52	-0.01	10 mm	211KPPB263112	2	1:4.15	back	1.240	1.042	**1.292**	A16
1909.80	810	GSM 1900	GPRS	28.7	28.53	-0.07	10 mm	211KPPB263112	2	1:4.15	back	1.040	1.040	1.082	
1880.00	661	GSM 1900	GPRS	28.7	28.52	0.21	10 mm	211KPPB263112	2	1:4.15	front	0.418	1.042	0.436	
1850.20	512	GSM 1900	GPRS	28.7	28.54	-0.04	10 mm	211KPPB263112	2	1:4.15	bottom	0.842	1.038	0.874	
1880.00	661	GSM 1900	GPRS	28.7	28.52	-0.05	10 mm	211KPPB263112	2	1:4.15	bottom	0.897	1.042	0.935	
1909.80	810	GSM 1900	GPRS	28.7	28.53	-0.07	10 mm	211KPPB263112	2	1:4.15	bottom	0.740	1.040	0.770	
1880.00	661	GSM 1900	GPRS	28.7	28.52	0.08	10 mm	211KPPB263112	2	1:4.15	right	0.162	1.042	0.169	
1880.00	661	GSM 1900	GPRS	28.7	28.52	0.11	10 mm	211KPPB263112	2	1:4.15	back	1.160	1.042	1.209	
1852.40	9262	UMTS 1900	RMC	23.7	23.54	-0.11	10 mm	211KPSL263118	N/A	1:1	back	0.799	1.038	0.829	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	-0.08	10 mm	211KPSL263118	N/A	1:1	back	0.804	1.054	0.847	A17
1907.60	9538	UMTS 1900	RMC	23.7	23.41	0.18	10 mm	211KPSL263118	N/A	1:1	back	0.570	1.068	0.609	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	0.07	10 mm	211KPSL263118	N/A	1:1	front	0.307	1.054	0.324	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	0.00	10 mm	211KPSL263118	N/A	1:1	bottom	0.550	1.054	0.580	
1880.00	9400	UMTS 1900	RMC	23.7	23.47	0.01	10 mm	211KPSL263118	N/A	1:1	right	0.141	1.054	0.149	
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: Variability test data was highlighted as blue entry.

Table 11-16
LTE Band 17 Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.	High														(W/kg)		(W/kg)	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	-0.02	0	211KPDT263122	QPSK	1	25	10 mm	back	1:1	0.356	1.012	0.360	
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.07	1	211KPDT263122	QPSK	25	25	10 mm	back	1:1	0.253	1.026	0.260	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	-0.05	0	211KPDT263122	QPSK	1	25	10 mm	front	1:1	0.214	1.012	0.217	
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.10	1	211KPDT263122	QPSK	25	25	10 mm	front	1:1	0.152	1.026	0.156	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	0.00	0	211KPDT263122	QPSK	1	25	10 mm	bottom	1:1	0.268	1.012	0.271	
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	0.11	1	211KPDT263122	QPSK	25	25	10 mm	bottom	1:1	0.196	1.026	0.201	
710.00	23790	Mid	LTE Band 17	10	23.7	23.65	-0.06	0	211KPDT263122	QPSK	1	25	10 mm	left	1:1	0.491	1.012	0.497	A19
710.00	23790	Mid	LTE Band 17	10	22.7	22.59	-0.03	1	211KPDT263122	QPSK	25	25	10 mm	left	1:1	0.343	1.026	0.352	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									**Body 1.6 W/kg (mW/g) averaged over 1 gram**										

Table 11-17
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	0.00	0	211KPDT263122	QPSK	1	25	10 mm	back	1:1	0.303	1.002	0.304	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	-0.06	1	211KPDT263122	QPSK	25	25	10 mm	back	1:1	0.224	1.074	0.241	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	-0.02	0	211KPDT263122	QPSK	1	25	10 mm	front	1:1	0.212	1.002	0.212	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	0.05	1	211KPDT263122	QPSK	25	25	10 mm	front	1:1	0.160	1.074	0.172	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	0.01	0	211KPDT263122	QPSK	1	25	10 mm	bottom	1:1	0.198	1.002	0.198	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	0.01	1	211KPDT263122	QPSK	25	25	10 mm	bottom	1:1	0.153	1.074	0.164	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.7	23.69	-0.01	0	211KPDT263122	QPSK	1	25	10 mm	right	1:1	0.355	1.002	0.356	A21
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.7	22.39	-0.01	1	211KPDT263122	QPSK	25	25	10 mm	right	1:1	0.264	1.074	0.284	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

Table 11-18
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	-0.04	0	211KPDT263122	QPSK	1	49	10 mm	back	1:1	0.364	1.000	0.364	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.01	1	211KPDT263122	QPSK	25	12	10 mm	back	1:1	0.318	1.000	0.318	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	0.07	0	211KPDT263122	QPSK	1	49	10 mm	front	1:1	0.298	1.000	0.298	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.14	1	211KPDT263122	QPSK	25	12	10 mm	front	1:1	0.252	1.000	0.252	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	-0.08	0	211KPDT263122	QPSK	1	49	10 mm	bottom	1:1	0.156	1.000	0.156	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.02	1	211KPDT263122	QPSK	25	12	10 mm	bottom	1:1	0.124	1.000	0.124	
1732.50	20175	Mid	LTE Band 4 (AWS)	10	23.7	23.70	0.13	0	211KPDT263122	QPSK	1	49	10 mm	left	1:1	0.417	1.000	0.417	A23
1732.50	20175	Mid	LTE Band 4 (AWS)	10	22.7	22.70	0.02	1	211KPDT263122	QPSK	25	12	10 mm	left	1:1	0.339	1.000	0.339	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

Table 11-19
LTE Band 2 (PCS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1855.00	18650	Low	LTE Band 2 (PCS)	10	23.7	23.56	-0.04	0	211KPMZ263122	QPSK	1	49	10 mm	back	1:1	0.561	1.033	0.580	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.06	0	211KPMZ263122	QPSK	1	25	10 mm	back	1:1	0.845	1.000	0.845	
1905.00	19150	High	LTE Band 2 (PCS)	10	23.7	23.51	-0.06	0	211KPMZ263122	QPSK	1	0	10 mm	back	1:1	1.030	1.045	1.076	A24
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	-0.03	1	211KPMZ263122	QPSK	25	0	10 mm	back	1:1	0.761	1.012	0.770	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.48	-0.03	1	211KPMZ263122	QPSK	50	0	10 mm	back	1:1	0.699	1.052	0.735	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	-0.06	0	211KPMZ263122	QPSK	1	25	10 mm	front	1:1	0.305	1.000	0.305	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.06	1	211KPMZ263122	QPSK	25	0	10 mm	front	1:1	0.276	1.012	0.279	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	-0.04	0	211KPMZ263122	QPSK	1	25	10 mm	bottom	1:1	0.615	1.000	0.615	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.01	1	211KPMZ263122	QPSK	25	0	10 mm	bottom	1:1	0.477	1.012	0.483	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	23.7	23.70	0.14	0	211KPMZ263122	QPSK	1	25	10 mm	right	1:1	0.220	1.000	0.220	
1880.00	18900	Mid	LTE Band 2 (PCS)	10	22.7	22.65	0.04	1	211KPMZ263122	QPSK	25	0	10 mm	right	1:1	0.135	1.012	0.137	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Body 1.6 W/kg (mW/g) averaged over 1 gram

Table 11-20
WLAN Hotspot SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.13	10 mm	211KPMZ263122	1	back	1:1	0.021	1.334	**0.027**	A25
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.02	10 mm	211KPMZ263122	1	front	1:1	0.002	1.334	0.003	
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.05	10 mm	211KPMZ263122	1	bottom	1:1	0.000	1.334	0.000	
2437	6	IEEE 802.11b	DSSS	18.1	16.85	0.04	10 mm	211KPMZ263122	1	right	1:1	0.010	1.334	0.013	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram							

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC/OET Bulletin 65, Supplement C [June 2001] and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. 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.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB 865664 D01 v01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
8. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.6 for more details).

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D03v01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR.
3. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
4. Per FCC KDB Publication 648474 D04v01, SAR evaluation is required using a headset cable if standalone reported SAR was > 1.2 W/kg. Therefore, additional SAR evaluations using a headset cable were tested with the highest SAR configuration.

UMTS Notes:

1. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. 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 KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3. Per FCC KDB Publication 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was < 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02. Implementation of the general test procedures can be found in Section 8.4.4.
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 KDB Publication 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was < 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 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 D01v01r02 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 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. When Hotspot is enabled, all 5 GHz bands are disabled. Therefore no 5 GHz WIFI Wireless Router SAR Data was required.
4. WIFI transmission was verified using an uncalibrated spectrum analyzer.
5. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other default channels was not required.
6. Per FCC KDB Publication 648474 D04v01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was < 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05 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.

12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05 IV.C.1.iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05 4.3.2 2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{7.5} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth	2441	11.50	10	**0.292**

Note: Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission.

12.3 Head SAR Simultaneous Transmission Analysis

Table 12-2
Simultaneous Transmission Scenario with 2.4 GHz WLAN (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	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.222	0.048	0.270	Head SAR	Right Cheek	0.149	0.048	0.197
	Right Tilt	0.140	0.029	0.169		Right Tilt	0.095	0.029	0.124
	Left Cheek	0.194	0.045	0.239		Left Cheek	0.141	0.045	0.186
	Left Tilt	0.099	0.048	0.147		Left Tilt	0.082	0.048	0.130
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.144	0.048	0.192	Head SAR	Right Cheek	0.135	0.048	0.183
	Right Tilt	0.090	0.029	0.119		Right Tilt	0.074	0.029	0.103
	Left Cheek	0.095	0.045	0.140		Left Cheek	0.064	0.045	0.109
	Left Tilt	0.104	0.048	0.152		Left Tilt	0.072	0.048	0.120
Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.365	0.048	**0.413**	Head SAR	Right Cheek	0.177	0.048	0.225
	Right Tilt	0.218	0.029	0.247		Right Tilt	0.076	0.029	0.105
	Left Cheek	0.218	0.045	0.263		Left Cheek	0.102	0.045	0.147
	Left Tilt	0.125	0.048	0.173		Left Tilt	0.087	0.048	0.135
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	0.048	0.187	Head SAR	Right Cheek	0.155	0.048	0.203
	Right Tilt	0.091	0.029	0.120		Right Tilt	0.086	0.029	0.115
	Left Cheek	0.185	0.045	0.230		Left Cheek	0.154	0.045	0.199
	Left Tilt	0.095	0.048	0.143		Left Tilt	0.094	0.048	0.142
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	0.120	0.048	0.168	Head SAR	Right Cheek	0.237	0.048	0.285
	Right Tilt	0.131	0.029	0.160		Right Tilt	0.126	0.029	0.155
	Left Cheek	0.238	0.045	0.283		Left Cheek	0.125	0.045	0.170
	Left Tilt	0.122	0.048	0.170		Left Tilt	0.121	0.048	0.169

Table 12-3
Simultaneous Transmission Scenario with 5 GHz WLAN (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.222	0.005	0.227	Head SAR	Right Cheek	0.149	0.005	0.154
	Right Tilt	0.140	0.006	0.146		Right Tilt	0.095	0.006	0.101
	Left Cheek	0.194	0.007	0.201		Left Cheek	0.141	0.007	0.148
	Left Tilt	0.099	0.006	0.105		Left Tilt	0.082	0.006	0.088
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.144	0.005	0.149	Head SAR	Right Cheek	0.135	0.005	0.140
	Right Tilt	0.090	0.006	0.096		Right Tilt	0.074	0.006	0.080
	Left Cheek	0.095	0.007	0.102		Left Cheek	0.064	0.007	0.071
	Left Tilt	0.104	0.006	0.110		Left Tilt	0.072	0.006	0.078

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.365	0.027	0.392
Back Side	UMTS 850	0.274	0.027	0.301
Back Side	GSM 1900	1.057	0.027	1.084
Back Side	UMTS 1900	0.847	0.027	0.874
Back Side	GPRS 850	0.431	0.027	0.458
Back Side	GPRS 1900	1.292	0.027	1.319
Back Side	LTE Band 17	0.360	0.027	0.387
Back Side	LTE Band 5 (Cell)	0.304	0.027	0.331
Back Side	LTE Band 4 (AWS)	0.364	0.027	0.391
Back Side	LTE Band 2 (PCS)	1.076	0.027	1.103

Table 12-5
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	2G/3G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.365	0.203	0.568
Back Side	UMTS 850	0.274	0.203	0.477
Back Side	GSM 1900	1.057	0.203	1.260
Back Side	UMTS 1900	0.847	0.203	1.050

Table 12-6
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.365	0.292	0.657
Back Side	UMTS 850	0.274	0.292	0.566
Back Side	GSM 1900	1.057	0.292	1.349
Back Side	UMTS 1900	0.847	0.292	1.139
Back Side	GPRS 850	0.431	0.292	0.723
Back Side	GPRS 1900	1.292	0.292	**1.584**
Back Side	LTE Band 17	0.360	0.292	0.652
Back Side	LTE Band 5 (Cell)	0.304	0.292	0.596
Back Side	LTE Band 4 (AWS)	0.364	0.292	0.656
Back Side	LTE Band 2 (PCS)	1.076	0.292	1.368

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.5 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

Table 12-7
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)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.431	0.027	0.458	Body SAR	Back	0.274	0.027	0.301
	Front	0.275	0.003	0.278		Front	0.195	0.003	0.198
	Top	-	-	0.000		Top	-	-	0.000
	Bottom	0.290	0.000	0.290		Bottom	0.170	0.000	0.170
	Right	0.525	0.013	0.538		Right	0.348	0.013	0.361
	Left	-	-	0.000		Left	-	-	0.000
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.292	0.027	**1.319**	Body SAR	Back	0.847	0.027	0.874
	Front	0.436	0.003	0.439		Front	0.324	0.003	0.327
	Top	-	-	0.000		Top	-	-	0.000
	Bottom	0.935	0.000	0.935		Bottom	0.580	0.000	0.580
	Right	0.169	0.013	0.182		Right	0.149	0.013	0.162
	Left	-	-	0.000		Left	-	-	0.000

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)
Body SAR	Back	0.360	0.027	0.387	Body SAR	Back	0.304	0.027	0.331
	Front	0.217	0.003	0.220		Front	0.212	0.003	0.215
	Top	-	-	0.000		Top	-	-	0.000
	Bottom	0.271	0.000	0.271		Bottom	0.198	0.000	0.198
	Right	-	0.013	0.013		Right	0.356	0.013	0.369
	Left	0.497	-	0.497		Left	-	-	0.000
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)
Body SAR	Back	0.364	0.027	0.391	Body SAR	Back	1.076	0.027	1.103
	Front	0.298	0.003	0.301		Front	0.305	0.003	0.308
	Top	-	-	0.000		Top	-	-	0.000
	Bottom	0.156	0.000	0.156		Bottom	0.615	0.000	0.615
	Right	-	0.013	0.013		Right	0.220	0.013	0.233
	Left	0.417	-	0.417		Left	-	-	0.000

12.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05.

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1900	1880.00	661	GSM 1900	GPRS	2	back	10 mm	1.240	1.160	1.1	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram							

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2012	Annual	10/10/2013	3613A00315
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Agilent	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244515
Agilent	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244512
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	N/A	N/A	N/A	21910
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Anritsu	ML2496A	Power Meter	11/28/2012	Annual	11/28/2013	1138001
Anritsu	ML2438A	Power Meter	12/4/2012	Annual	12/4/2013	1070030
Anritsu	MA2411B	Power Sensor	3/5/2012	Annual	3/5/2013	846215
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	MA2411B	Pulse Power Sensor	12/4/2012	Annual	12/4/2013	1207364
Anritsu	MA2411B	Pulse Power Sensor	12/5/2012	Annual	12/5/2013	1126066
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	MT8820C	Radio Communication Tester	11/6/2012	Annual	11/6/2013	6200901190
Anritsu	MA24106A	USB Power Sensor	8/22/2012	Annual	8/22/2013	1231538
Anritsu	MA24106A	USB Power Sensor	8/22/2012	Annual	8/22/2013	1231535
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/10/2012	Annual	10/10/2013	1833460
Gigatronics	8651A	Universal Power Meter	10/10/2012	Annual	10/10/2013	8650319
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
Intelligent Weighing	PD-3000	Electronic Balance	6/29/2012	Annual	6/29/2013	120405017
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
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	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
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
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2012	Annual	5/22/2013	109892
Rohde & Schwarz	NRVD	Dual Channel Power Meter	10/12/2012	Biennial	10/12/2014	101695
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	3/5/2012	Annual	3/5/2013	102060
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	9/26/2012	Annual	9/26/2013	108798
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
Rohde & Schwarz	SME06	Signal Generator	10/11/2012	Annual	10/11/2013	832026
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	D1750V2	1750 MHz SAR Dipole	4/24/2012	Annual	4/24/2013	1051
SPEAG	D1765V2	1765 MHz SAR Dipole	5/18/2012	Annual	5/18/2013	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	2/8/2012	Annual	2/8/2013	5d148
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	2/7/2012	Annual	2/7/2013	882
SPEAG	D2450V2	2450 MHz SAR Dipole	8/23/2012	Annual	8/23/2013	719
SPEAG	D5GHzV2	5 GHz SAR Dipole	10/30/2012	Annual	10/30/2013	1007
SPEAG	D750V3	750 MHz Dipole	2/9/2012	Annual	2/9/2013	1054
SPEAG	D835V2	835 MHz SAR Dipole	1/25/2012	Annual	1/25/2013	4d047
SPEAG	D835V2	835 MHz SAR Dipole	2/17/2012	Annual	2/17/2013	4d133
SPEAG	D835V2	835 MHz SAR Dipole	8/23/2012	Annual	8/23/2013	4d026
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/20/2012	Annual	2/20/2013	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/19/2012	Annual	4/19/2013	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/7/2012	Annual	5/7/2013	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/24/2012	Annual	8/24/2013	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/19/2012	Annual	9/19/2013	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/13/2012	Annual	11/13/2013	1333
SPEAG	DAK-3.5	Dielectic Assessment Kit	6/19/2012	Annual	6/19/2013	1070
SPEAG	DAK-3.5	Dielectric Assessment Kit	12/11/2012	Annual	12/11/2013	1091
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	5/18/2012	Annual	5/18/2013	3263
SPEAG	EX3DV4	SAR Probe	7/26/2012	Annual	7/26/2013	3561
SPEAG	ES3DV2	SAR Probe	8/28/2012	Annual	8/28/2013	3022
SPEAG	ES3DV3	SAR Probe	9/20/2012	Annual	9/20/2013	3288
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	23226-658	Long Stem Thermometer	3/30/2012	Biennial	3/30/2014	122179874
VWR	23226-658	Long Stem Thermometer	5/16/2012	Biennial	5/16/2014	122295544
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886414
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886441

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.

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

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

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]

17 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.

[6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.

[7] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[8] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. -124.

[10] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[12] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[13] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[14] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[15] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[16] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[17] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[19] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.

[23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.

[24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009

[25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002

[26] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07

[27] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227 D01v01r02

[28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D02-D04

[29] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04

[30] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02

[31] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02

[32] Anexo à Resolução No. 533, de 10 de Septembro de 2009.

[33] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

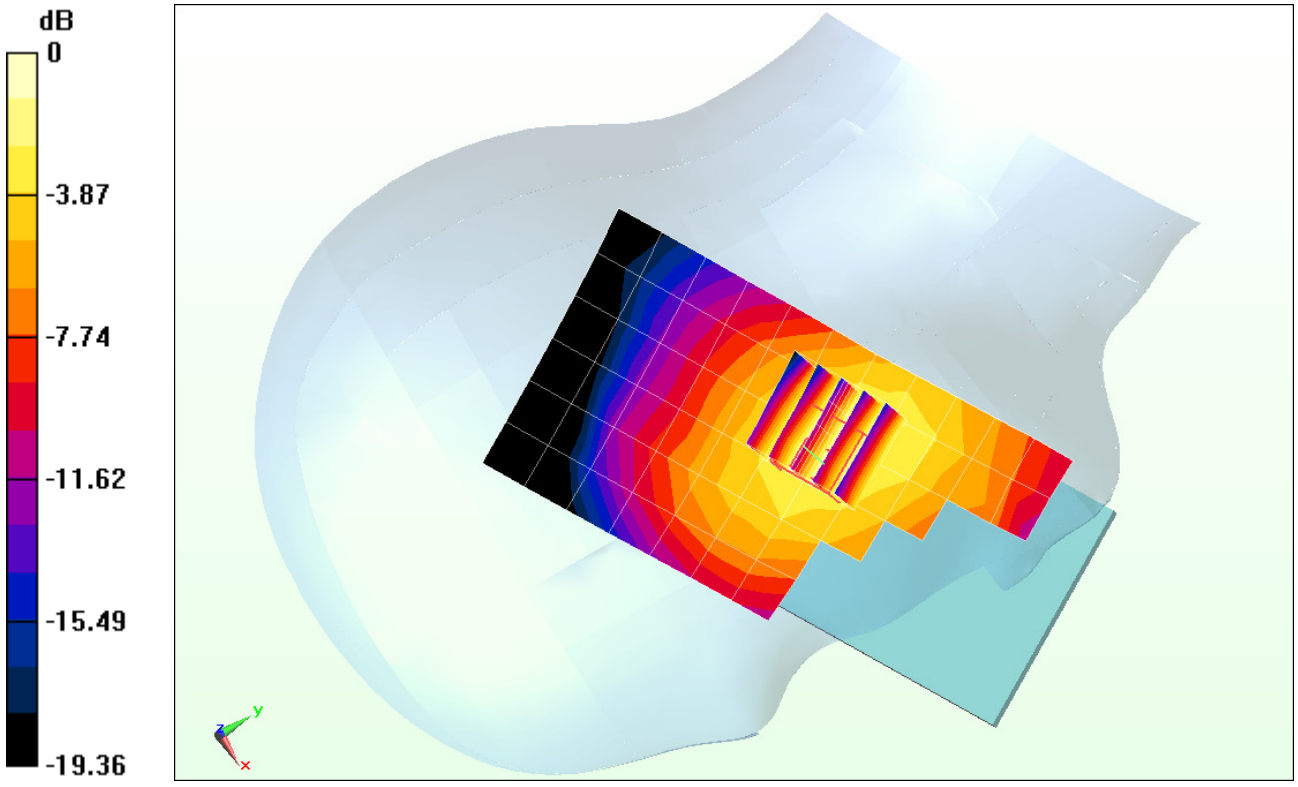
Communication System: GSM850 GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.919 S/m; ε_r = 41.289; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-15-2013; Ambient Temp: 23.7°C; Tissue Temp: 23.3°C

Probe: ES3DV3 - SN3209; ConvF(6.22, 6.22, 6.22); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: GPRS 850, Right Head, Cheek, Mid.ch, 2 Tx Slots

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.953 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.414 W/kg
SAR(1 g) = 0.346 W/kg; SAR(10 g) = 0.269 W/kg



0 dB = 0.360 W/kg = -4.44 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

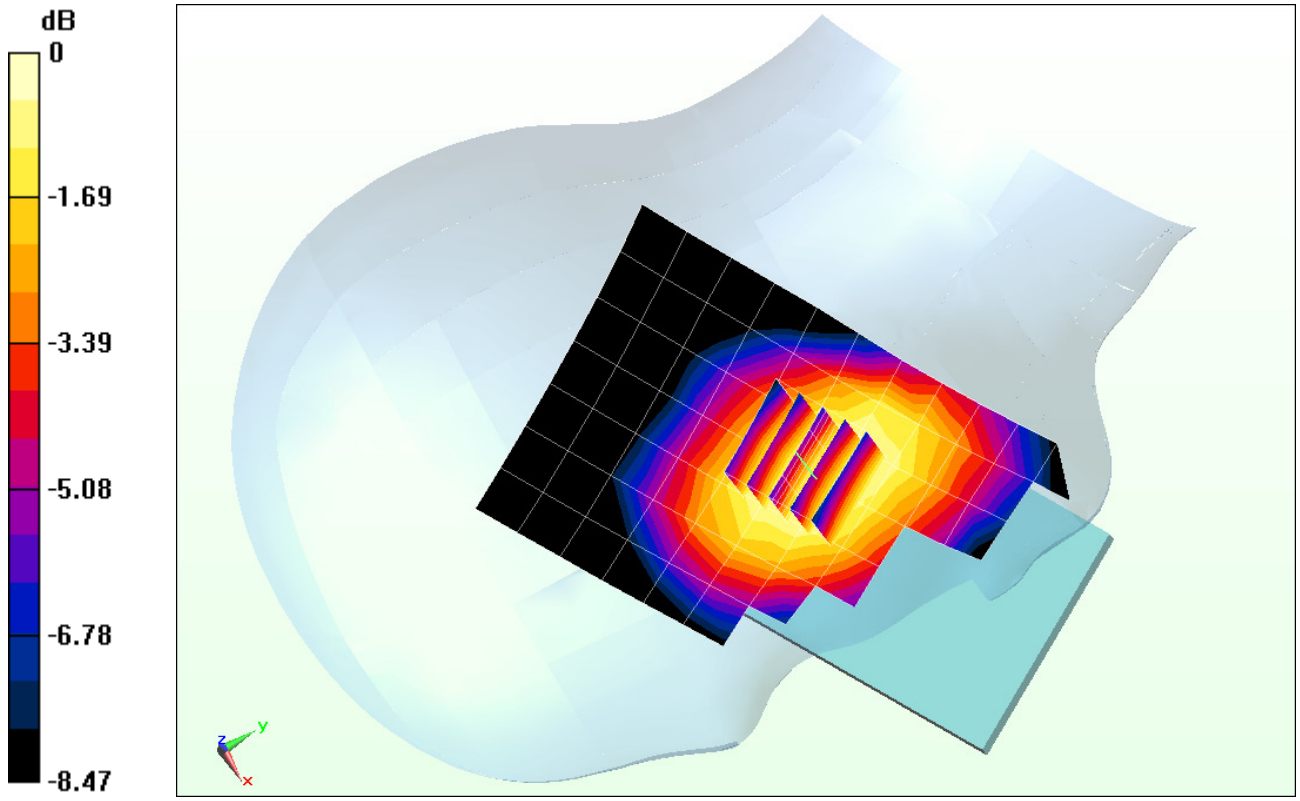
Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.88 S/m; ε_r = 41.46; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-11-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3288; ConvF(6.41, 6.41, 6.41); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.067 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.173 W/kg
SAR(1 g) = 0.144 W/kg



0 dB = 0.152 W/kg = -8.18 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

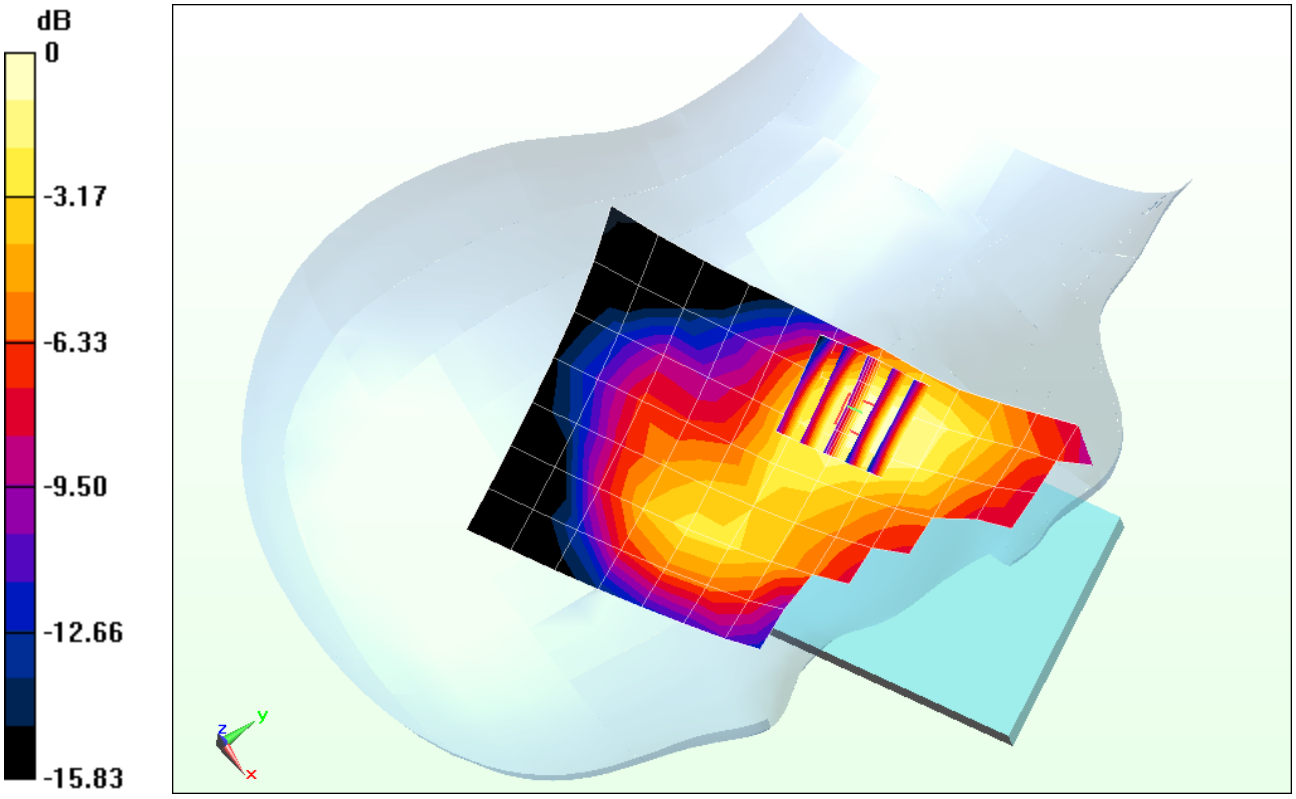
Communication System: GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.416 S/m; ε_r = 38.96; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-14-2013; Ambient Temp: 24.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: GPRS 1900, Right Head, Cheek, Mid.ch, 2 Tx slots

Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.065 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.263 W/kg
SAR(1 g) = 0.170 W/kg



0 dB = 0.183 W/kg = -7.38 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPSL263118

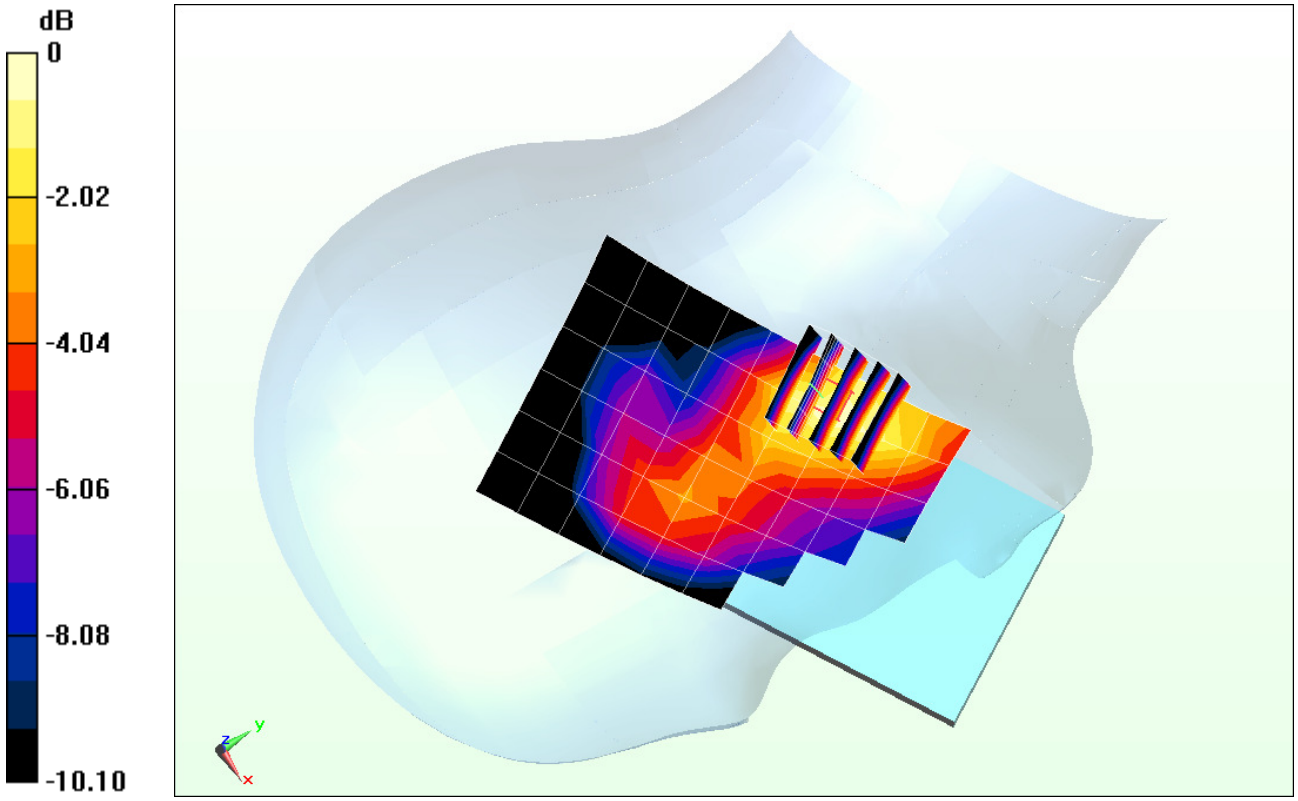
Communication System: UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.416 S/m; ε_r = 38.96; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-14-2013; Ambient Temp: 24.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: UMTS 1900, 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 = 9.621 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.201 W/kg
SAR(1 g) = 0.128 W/kg



0 dB = 0.134 W/kg = -8.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

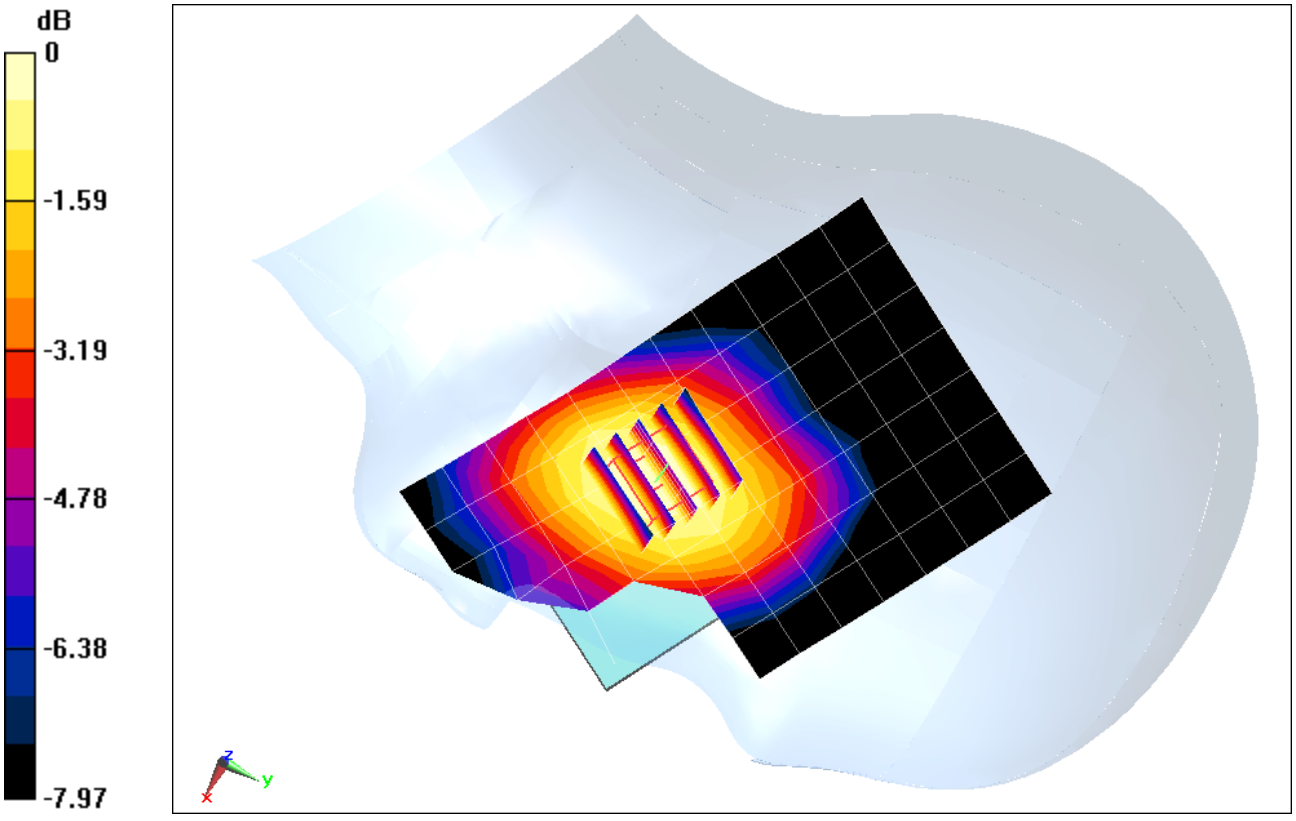
Communication System: LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used:
f = 710 MHz; σ = 0.877 S/m; ε_r = 42.5; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-14-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3288; ConvF(6.67, 6.67, 6.67); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 17, Left Head, Cheek, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 25 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 = 14.955 V/m; Power Drift = 0.21 dB
Peak SAR (extrapolated) = 0.225 W/kg
SAR(1 g) = 0.183 W/kg; SAR(10 g) = 0.144 W/kg



0 dB = 0.191 W/kg = -7.19 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

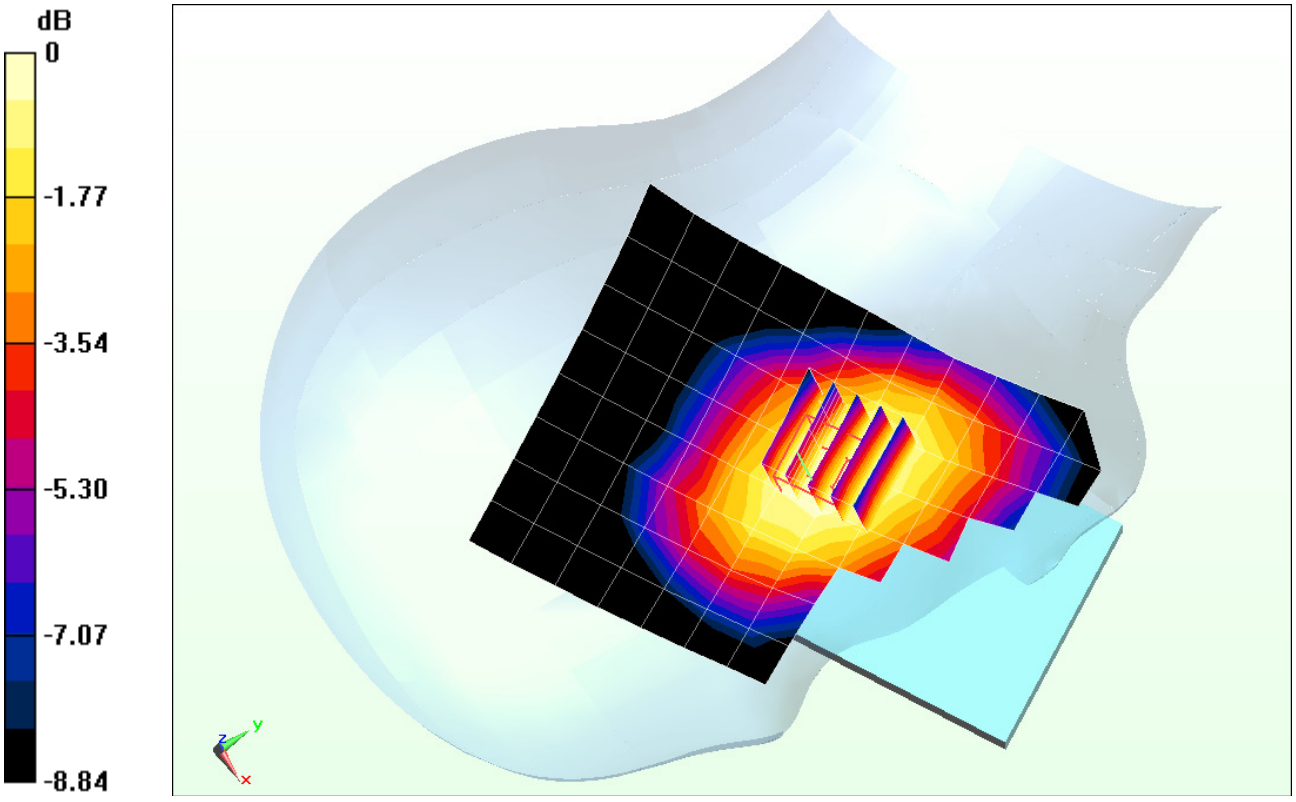
Communication System: LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.91 S/m; ε_r = 42.228; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-07-2013; Ambient Temp: 23.4°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3288; ConvF(6.41, 6.41, 6.41); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 5 (Cell.), Right Head, Cheek, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 25 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.273 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.189 W/kg
SAR(1 g) = 0.155 W/kg; SAR(10 g) = 0.121 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPMZ263122

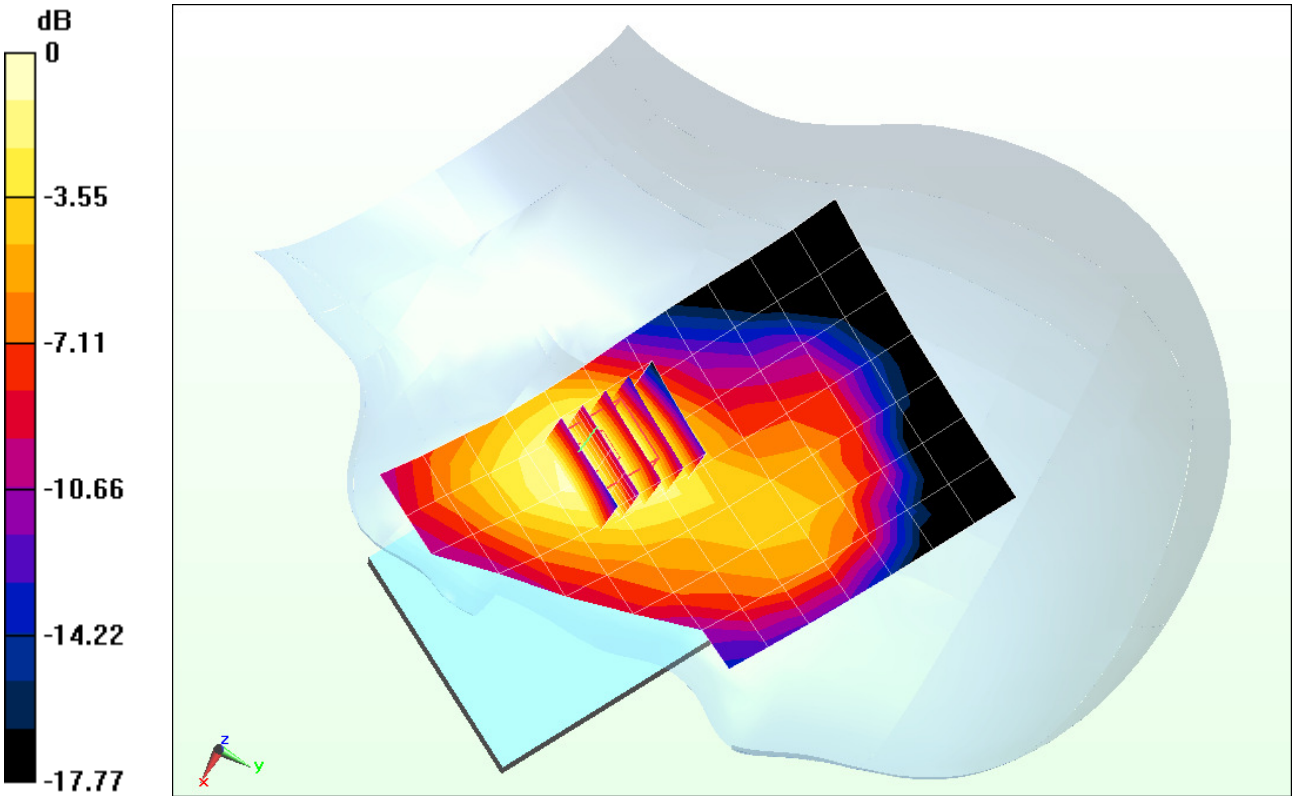
Communication System: LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.382 S/m; ε_r = 39.816; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-09-2013; Ambient Temp: 24.3°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3263; ConvF(5.3, 5.3, 5.3); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch, QPSK, 10 MHz Bandwidth, 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 = 14.718 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.238 W/kg; SAR(10 g) = 0.154 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

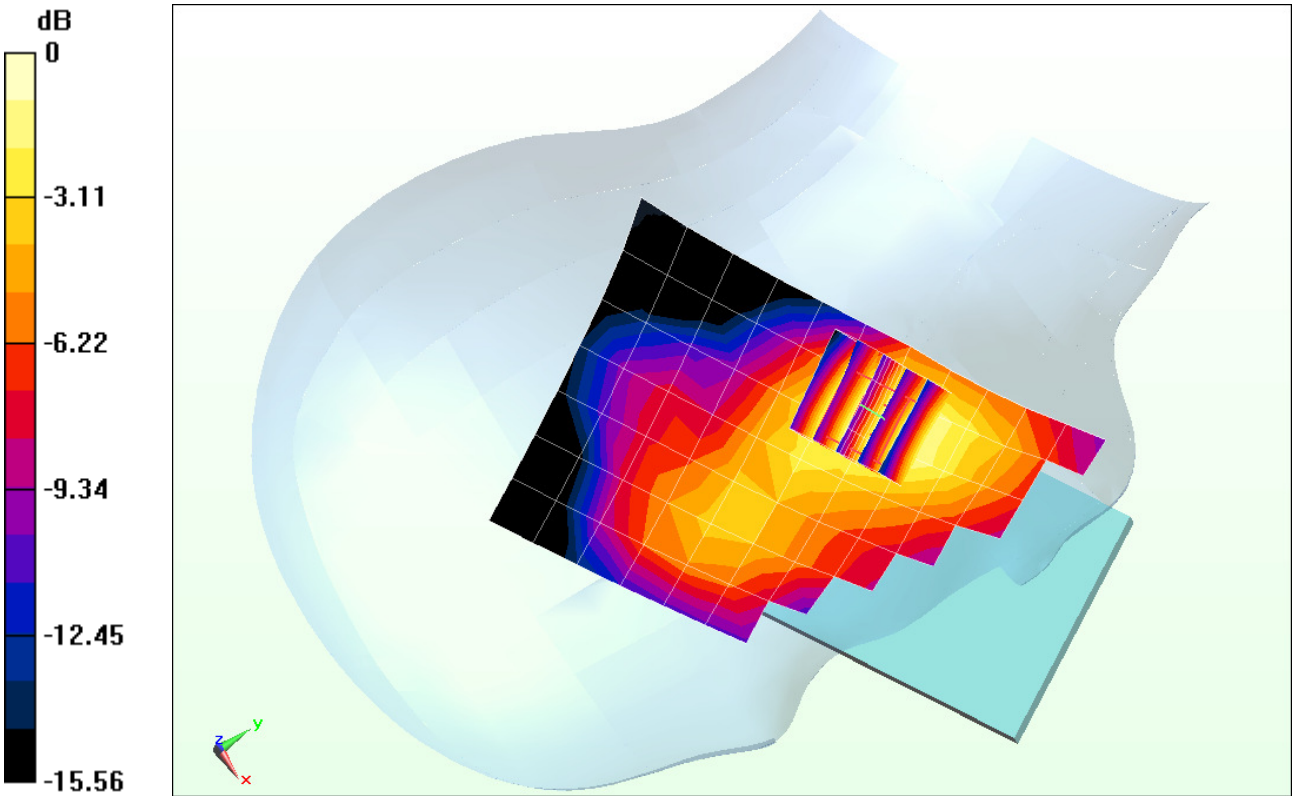
Communication System: LTE Band 2; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.416 S/m; ε_r = 38.96; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-14-2013; Ambient Temp: 24.6°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3213; ConvF(5.02, 5.02, 5.02); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 2 (PCS), Right Head, Cheek, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 25 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 = 0.547 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.378 W/kg
SAR(1 g) = 0.237 W/kg; SAR(10 g) = 0.147 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPKN263125

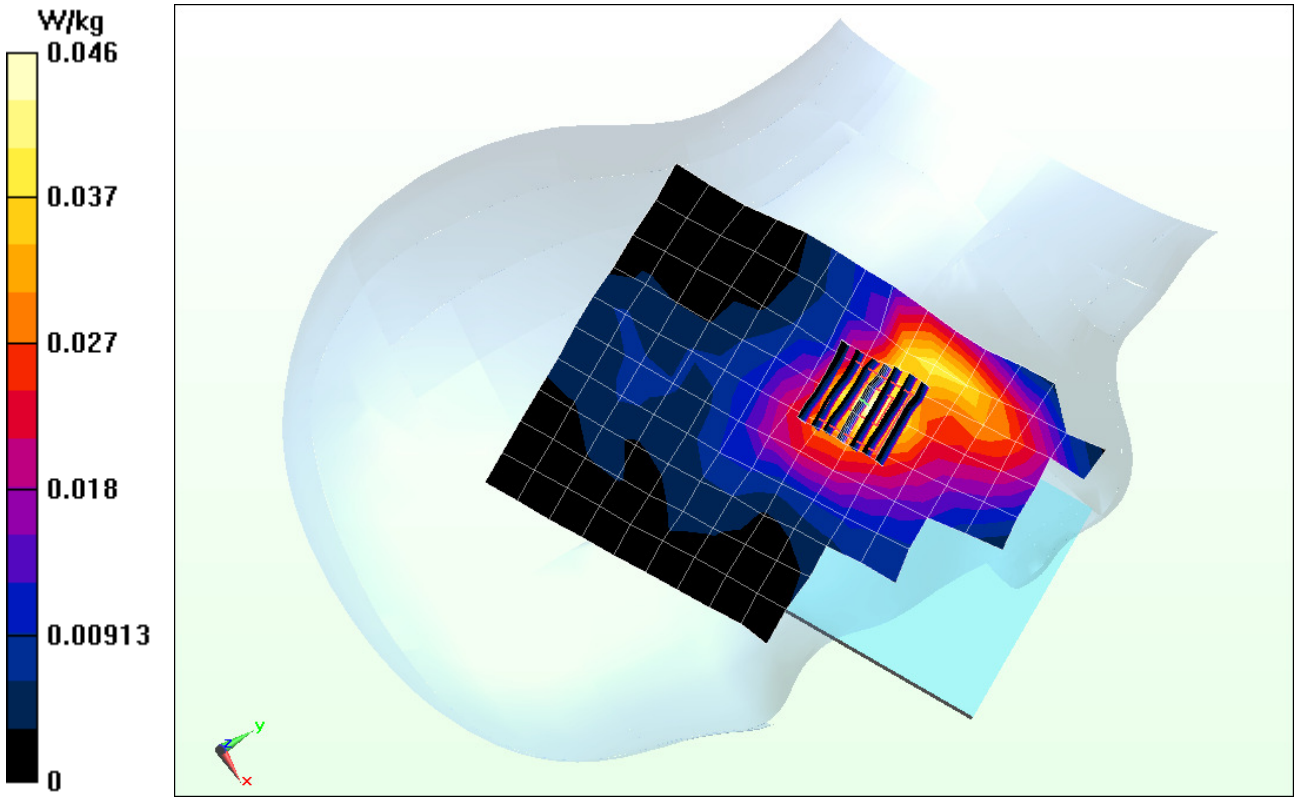
Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.838 S/m; ε_r = 37.722; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-09-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.6°C

Probe: ES3DV2 - SN3022; ConvF(4.23, 4.23, 4.23); Calibrated: 8/28/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.835 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.0690 W/kg
SAR(1 g) = 0.036 W/kg; SAR(10 g) = 0.019 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

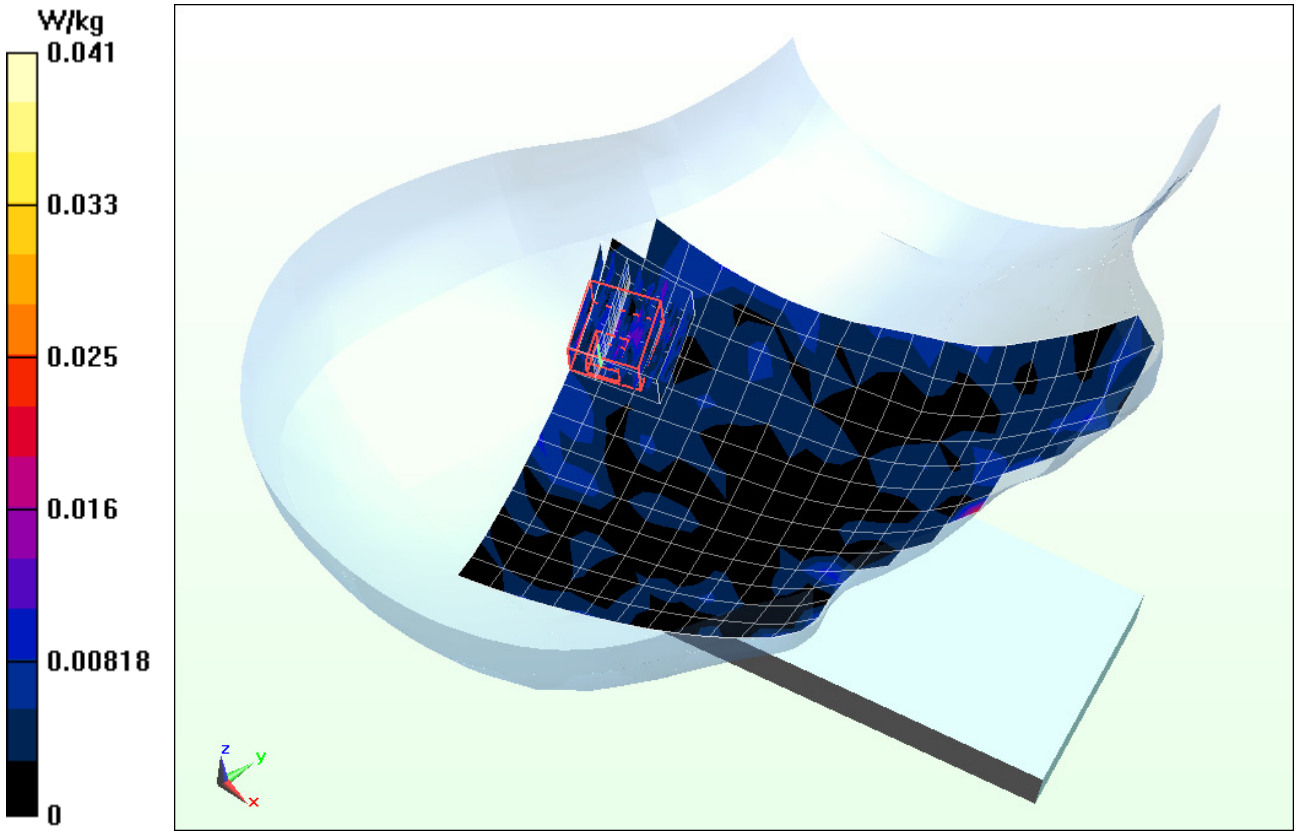
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5805 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head; Medium parameters used:
f = 5805 MHz; σ = 5.454 S/m; ε_r = 34.09; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-10-2013; Ambient Temp: 23.6°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3561; ConvF(3.92, 3.92, 3.92); Calibrated: 7/26/2012;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (14x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 0.434 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.00619 W/kg; SAR(10 g) = 0.00323 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

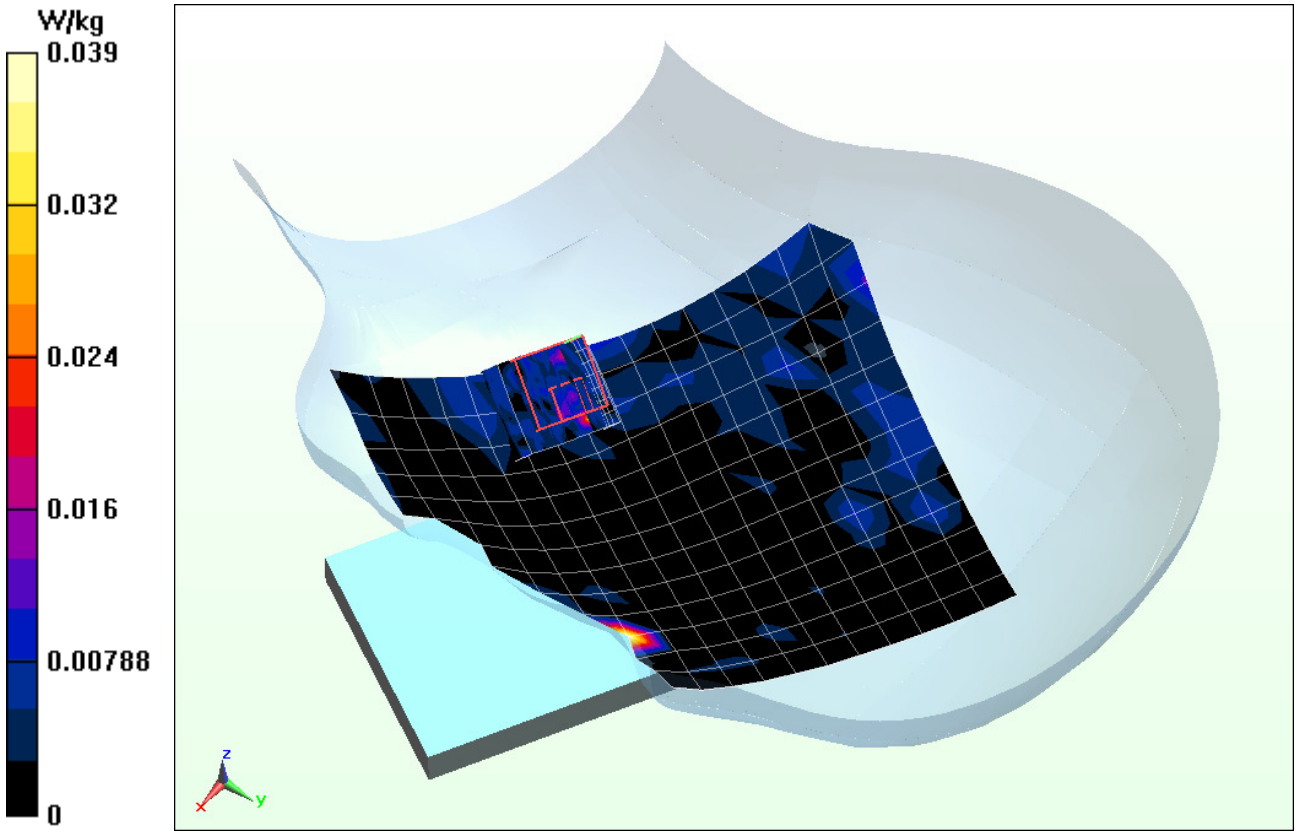
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5260 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head; Medium parameters used:
f = 5260 MHz; σ = 4.764 S/m; ε_r = 35.34; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-10-2013; Ambient Temp: 23.4°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN3561; ConvF(4.16, 4.16, 4.16); Calibrated: 7/26/2012;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a, 5.3 GHz Left Head, Cheek, Ch 52, 6 Mbps

Area Scan (14x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 1.103 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.00656 W/kg; SAR(10 g) = 0.00253 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

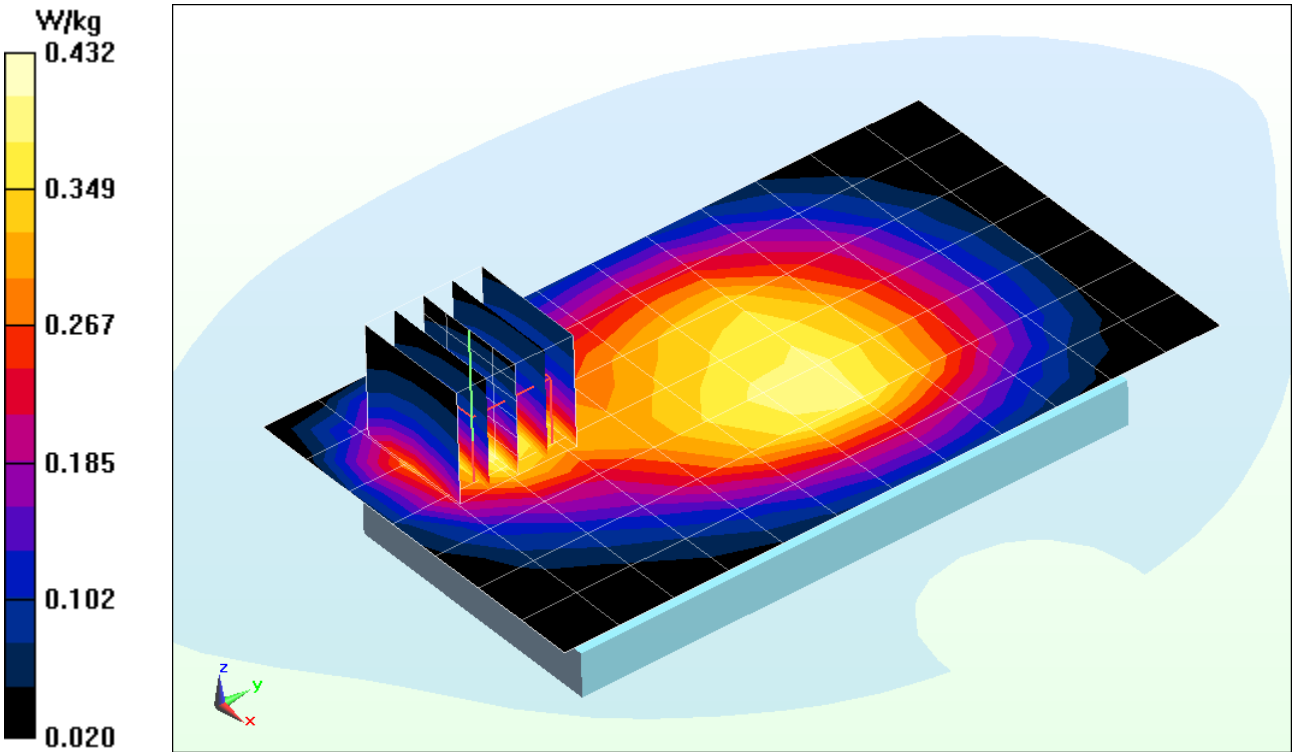
Communication System: GSM850 GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.959 S/m; ε_r = 52.937; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(6.13, 6.13, 6.13); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.150 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.637 W/kg
SAR(1 g) = 0.409 W/kg; SAR(10 g) = 0.263 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

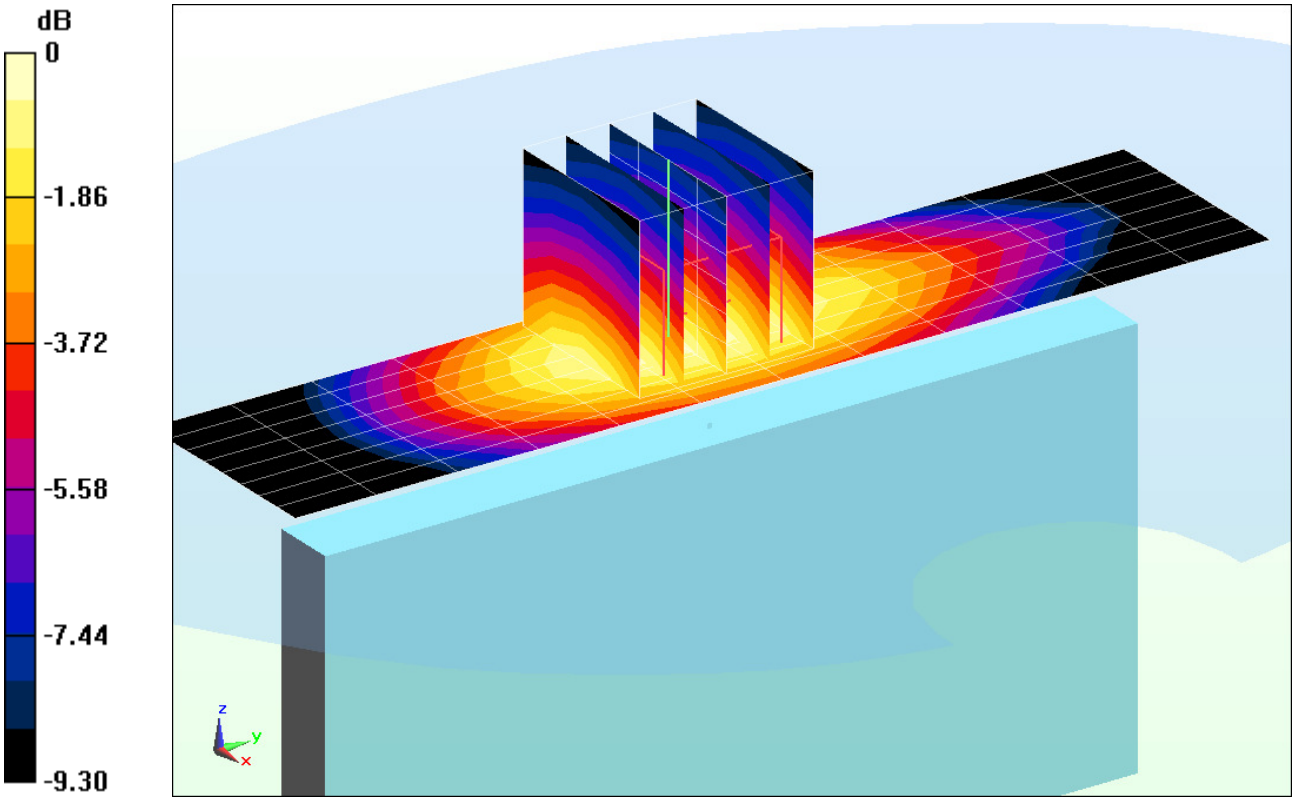
Communication System: GSM 850 GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.959 S/m; ε_r = 52.937; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(6.13, 6.13, 6.13); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (9x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.217 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.683 W/kg
SAR(1 g) = 0.498 W/kg; SAR(10 g) = 0.343 W/kg



0 dB = 0.536 W/kg = -2.71 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

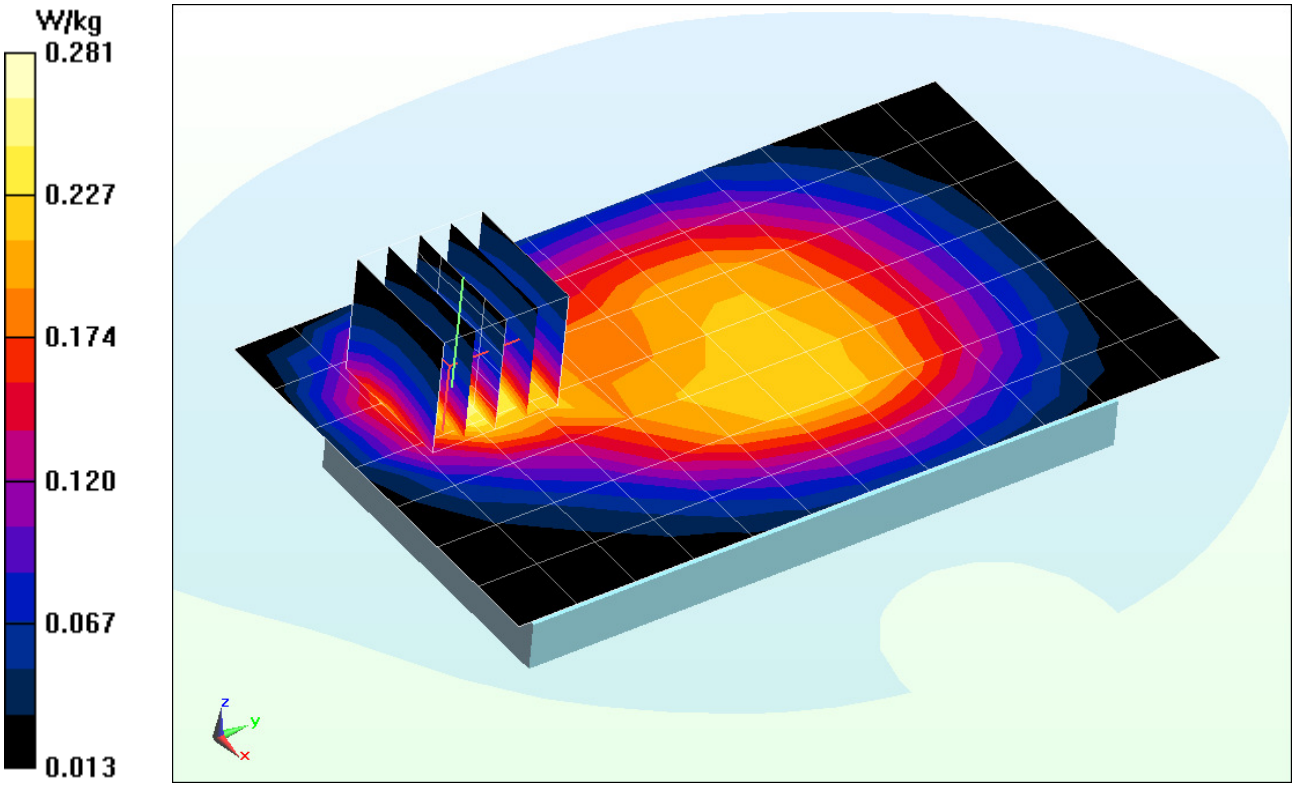
Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.959 S/m; ε_r = 52.937; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(6.13, 6.13, 6.13); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.544 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.412 W/kg
SAR(1 g) = 0.265 W/kg; SAR(10 g) = 0.169 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

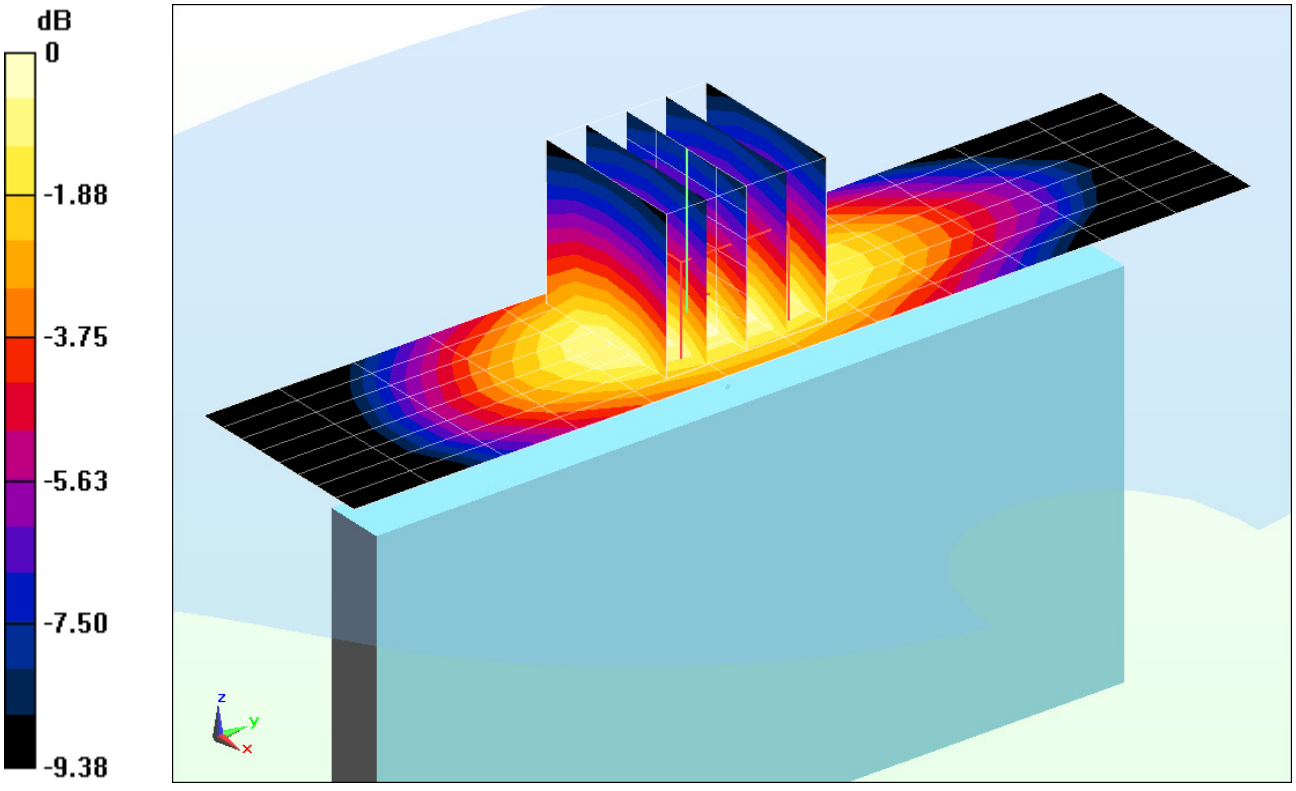
Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.959 S/m; ε_r = 52.937; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(6.13, 6.13, 6.13); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

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

Area Scan (9x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.740 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.456 W/kg
SAR(1 g) = 0.336 W/kg; SAR(10 g) = 0.232 W/kg



0 dB = 0.362 W/kg = -4.41 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPPB263112

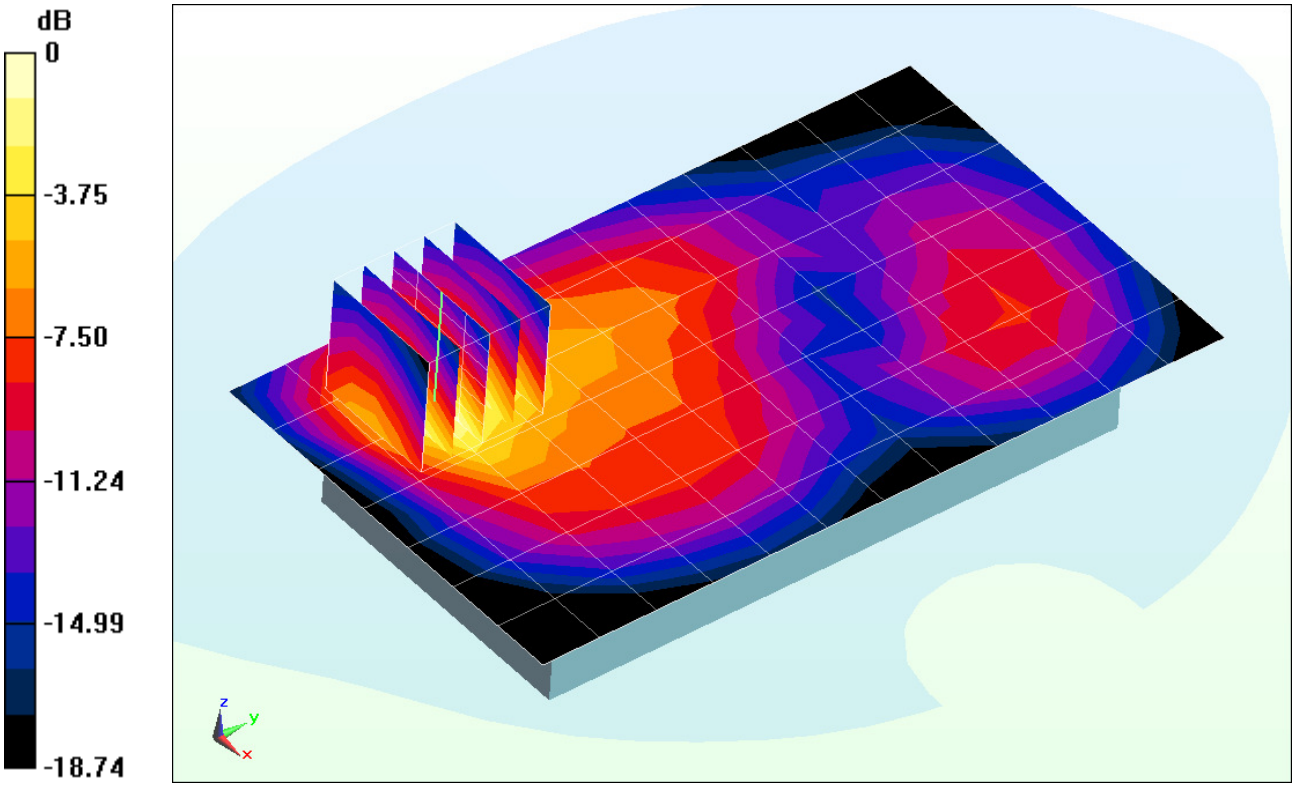
Communication System: GSM GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.582 S/m; ε_r = 52.41; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3263; ConvF(4.76, 4.76, 4.76); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (5);SEMCAD X Version 14.6.8 (7028)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 2 Tx Slots

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.333 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.19 W/kg
SAR(1 g) = 1.24 W/kg



0 dB = 1.37 W/kg = 1.37 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPSL263118

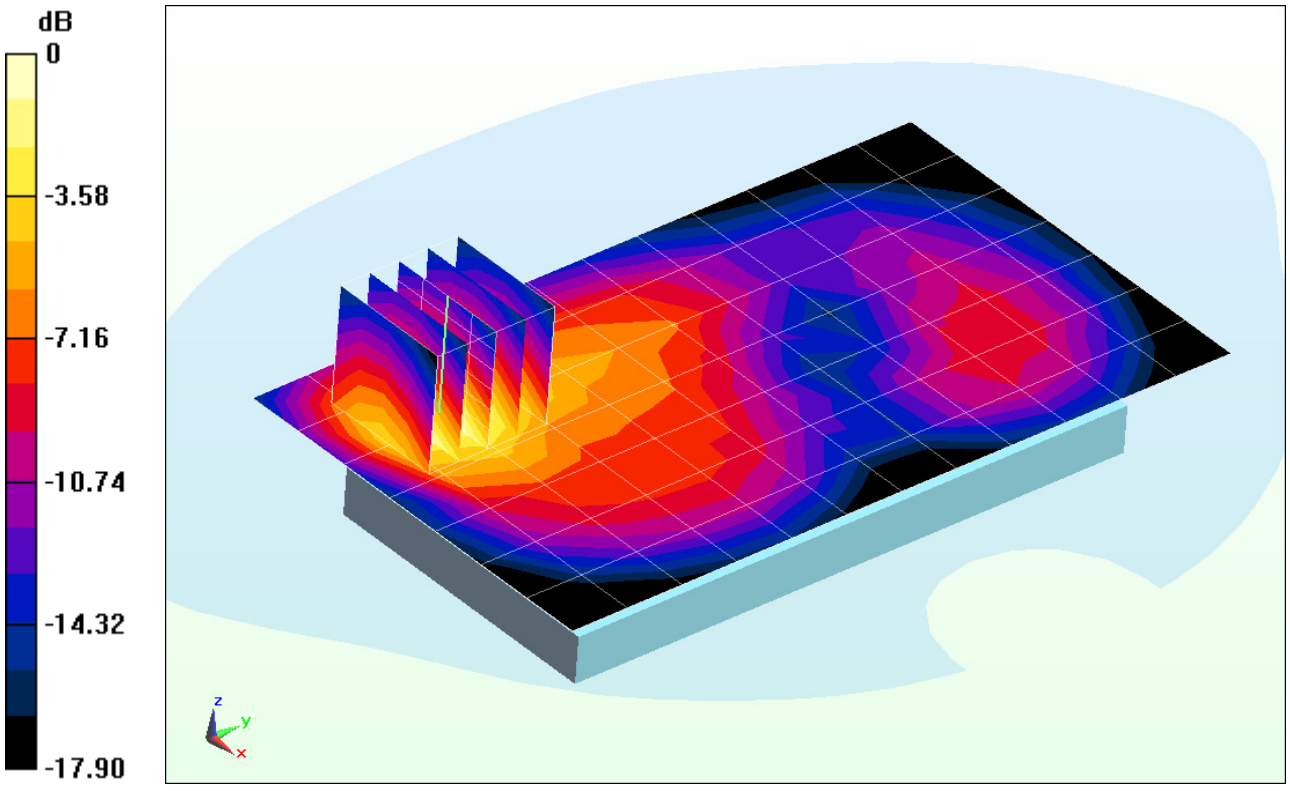
Communication System: UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.582 S/m; ε_r = 52.41; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3263; ConvF(4.76, 4.76, 4.76); Calibrated: 5/18/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (5);SEMCAD X Version 14.6.8 (7028)

Mode: UMTS 1900, Body SAR, Back side, Mid.ch

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.500 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.804 W/kg



0 dB = 0.873 W/kg = -0.59 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

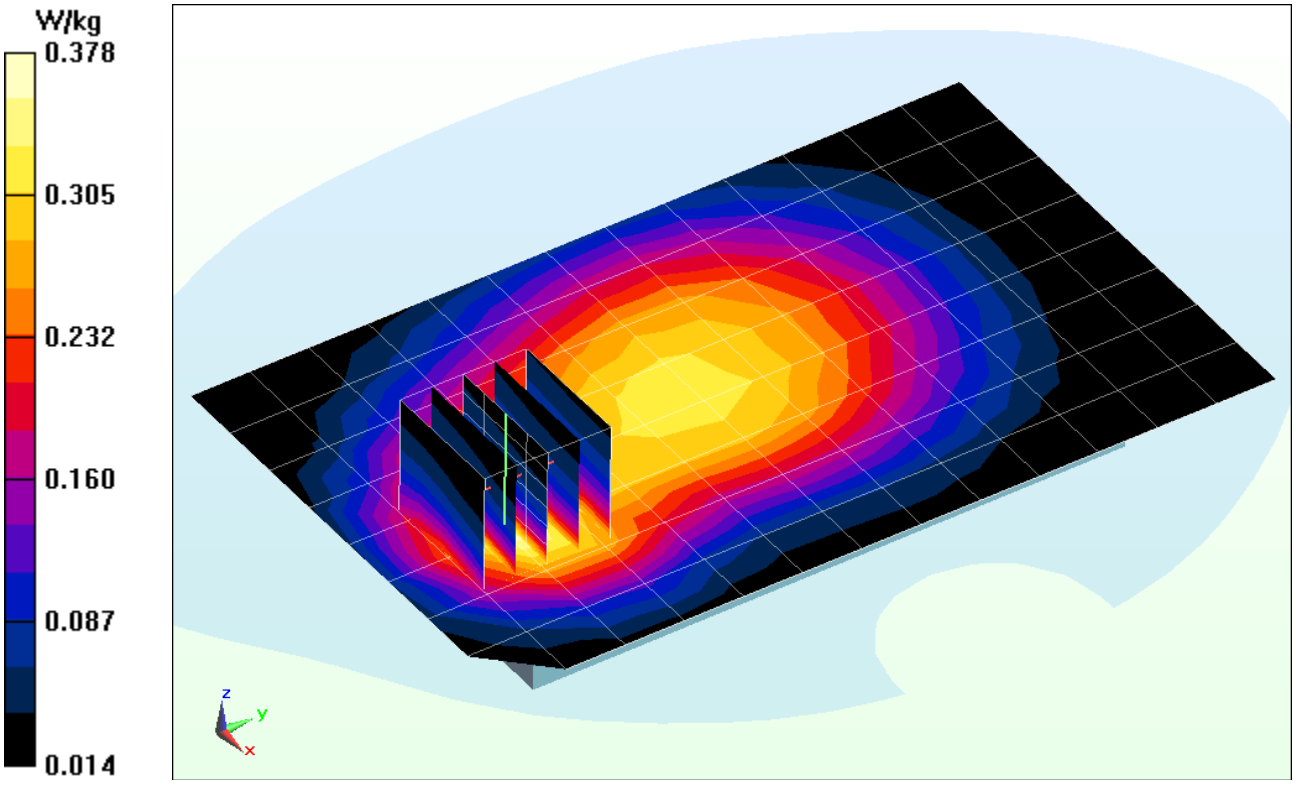
Communication System: LTE BAND 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used:
f = 710 MHz; σ = 0.929 S/m; ε_r = 54.72; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2013; Ambient Temp: 24.5°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 17, Body SAR, Back side, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 25 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.417 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.648 W/kg
SAR(1 g) = 0.356 W/kg; SAR(10 g) = 0.213 W/kg



DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

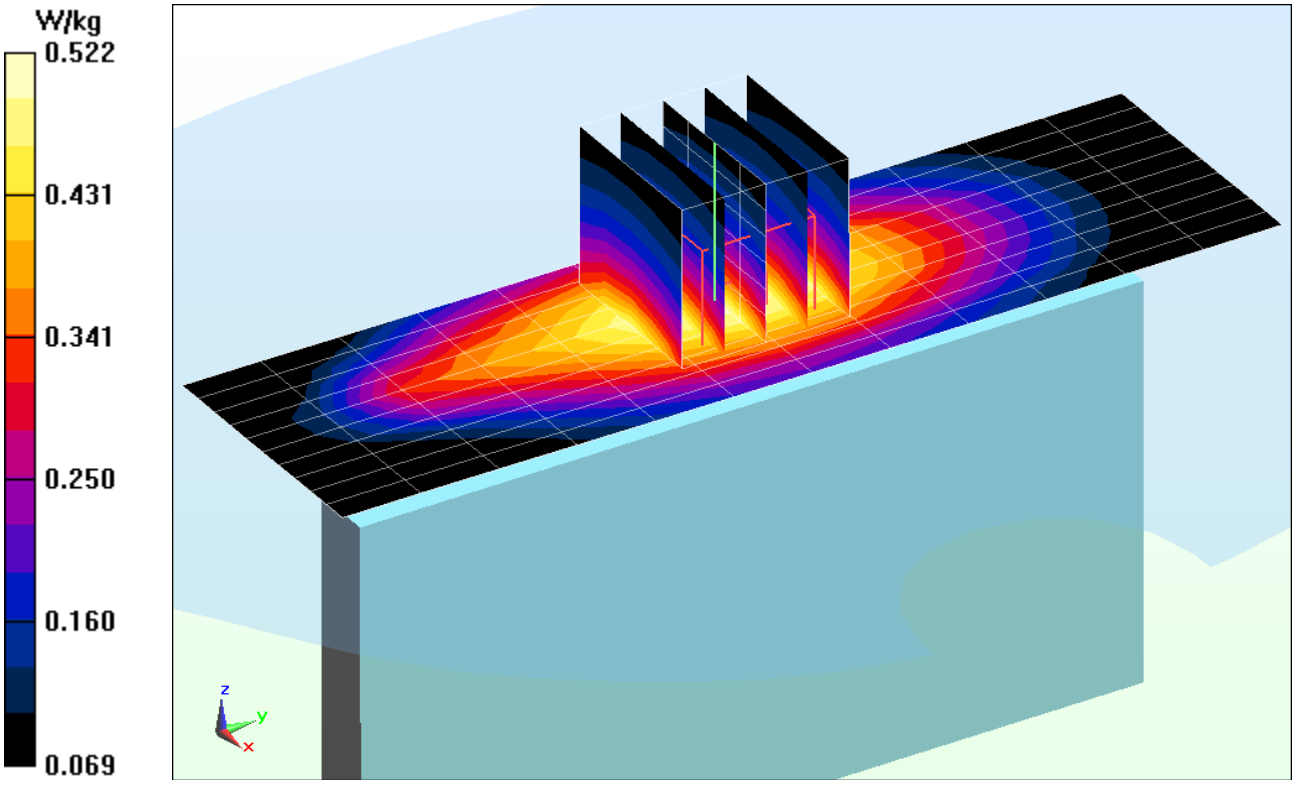
Communication System: LTE BAND 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used:
f = 710 MHz; σ = 0.929 S/m; ε_r = 54.72; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2013; Ambient Temp: 24.5°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.23, 6.23, 6.23); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 17, Body SAR, Left Edge, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 25 RB Offset

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.071 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.668 W/kg
SAR(1 g) = 0.491 W/kg; SAR(10 g) = 0.348 W/kg



DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

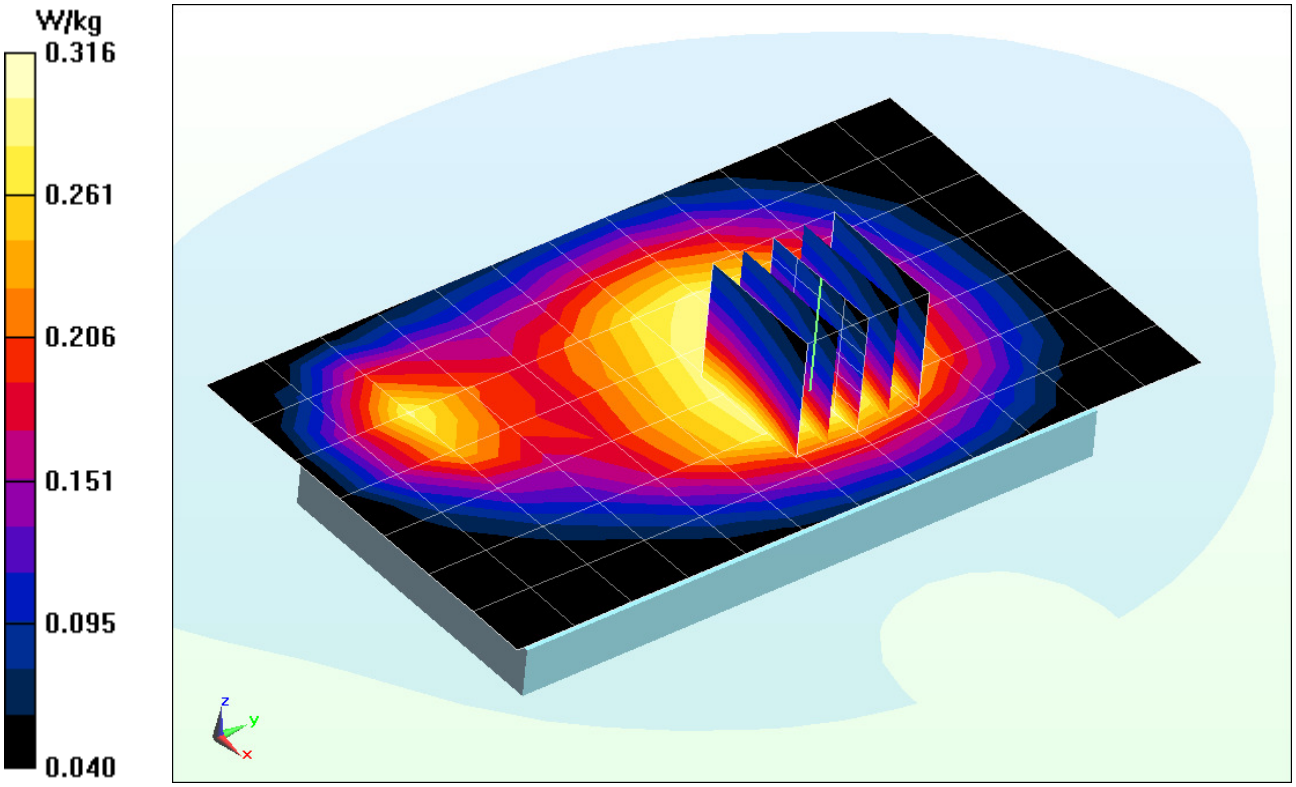
Communication System: LTE BAND 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.959 S/m; ε_r = 52.938; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(6.13, 6.13, 6.13); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 5 (Cell), Body SAR, Back side, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 25 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 = 18.444 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.375 W/kg
SAR(1 g) = 0.303 W/kg; SAR(10 g) = 0.234 W/kg



DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

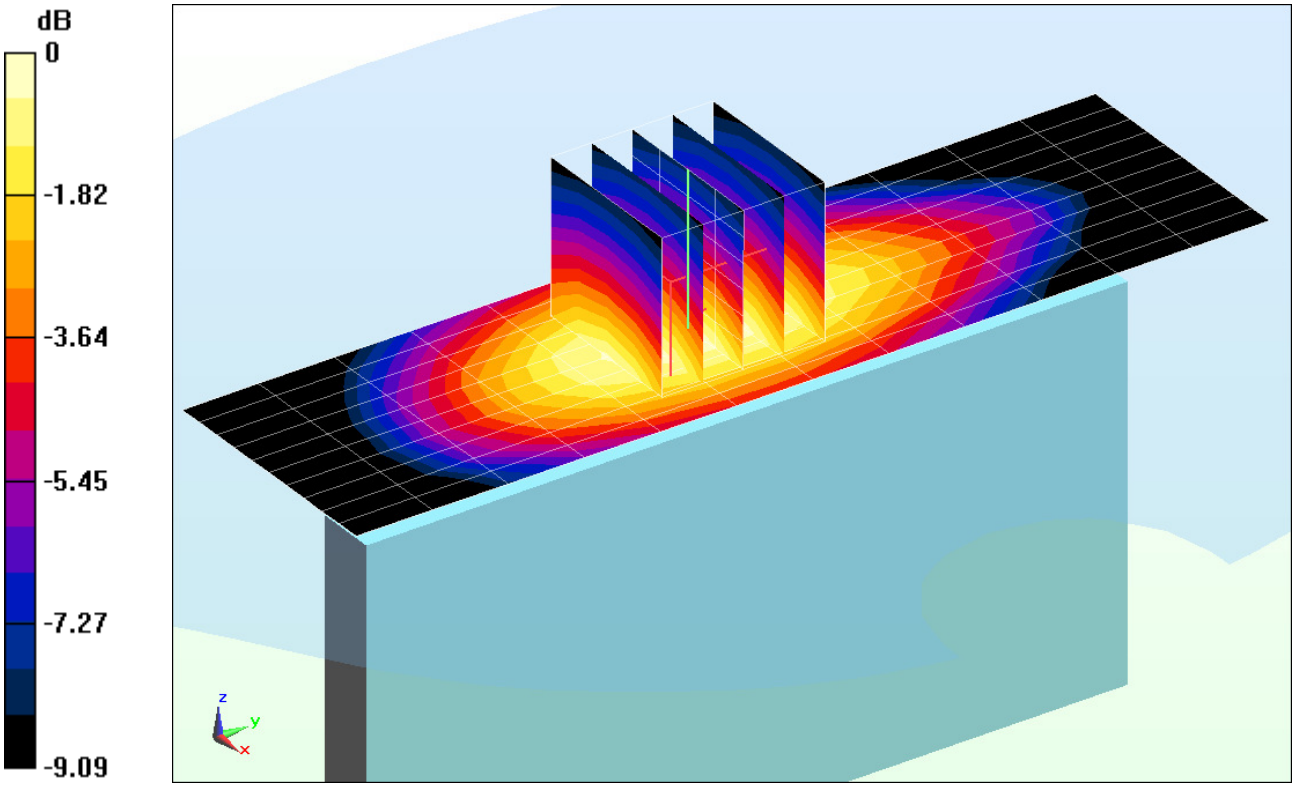
Communication System: LTE BAND 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.959 S/m; ε_r = 52.938; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(6.13, 6.13, 6.13); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 5 (Cell), Body SAR, Right Edge, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 25 RB Offset

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.194 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.480 W/kg
SAR(1 g) = 0.355 W/kg; SAR(10 g) = 0.248 W/kg



0 dB = 0.381 W/kg = -4.19 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

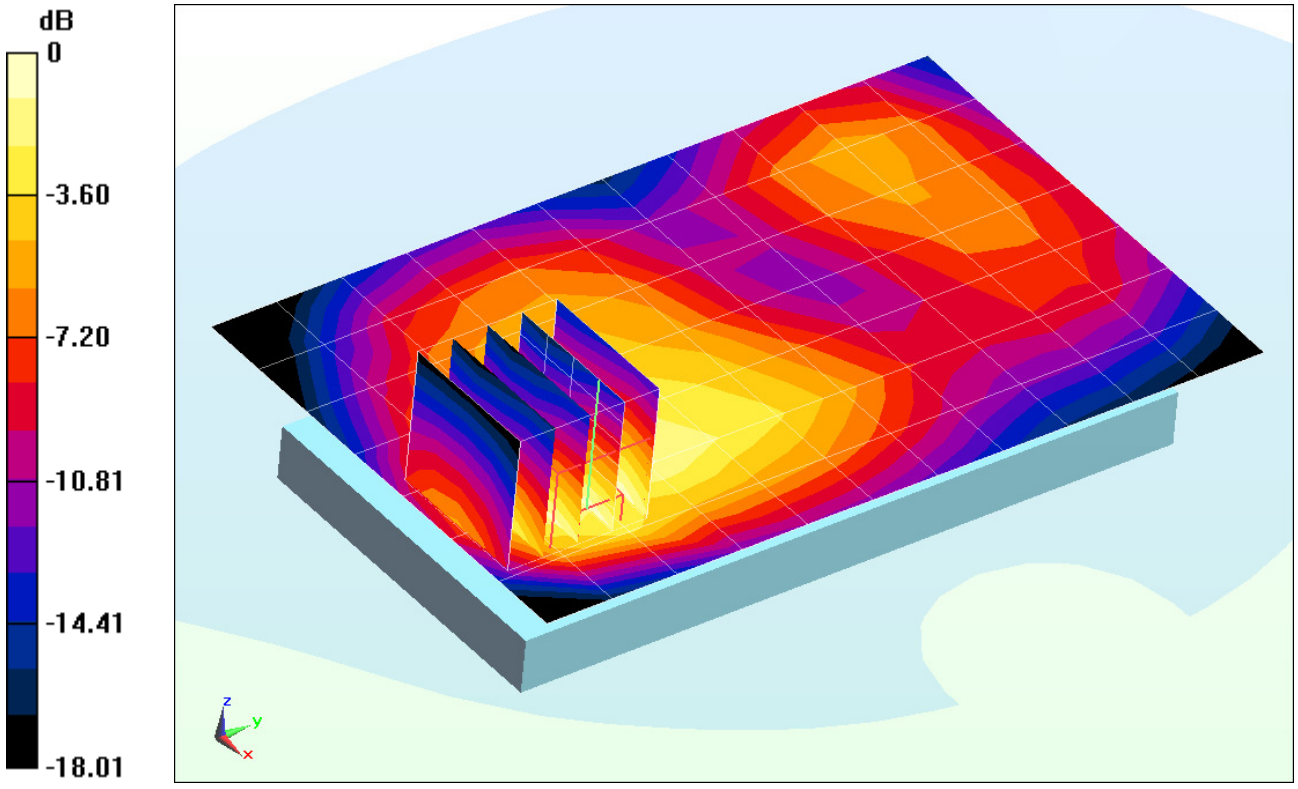
Communication System: LTE RF; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.511 S/m; ε_r = 53.126; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2013; Ambient Temp: 23.2°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3209; ConvF(4.83, 4.83, 4.83); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch, QPSK, 10 MHz Bandwidth, 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 = 16.516 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.681 W/kg
SAR(1 g) = 0.364 W/kg; SAR(10 g) = 0.210 W/kg



0 dB = 0.409 W/kg = -3.88 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

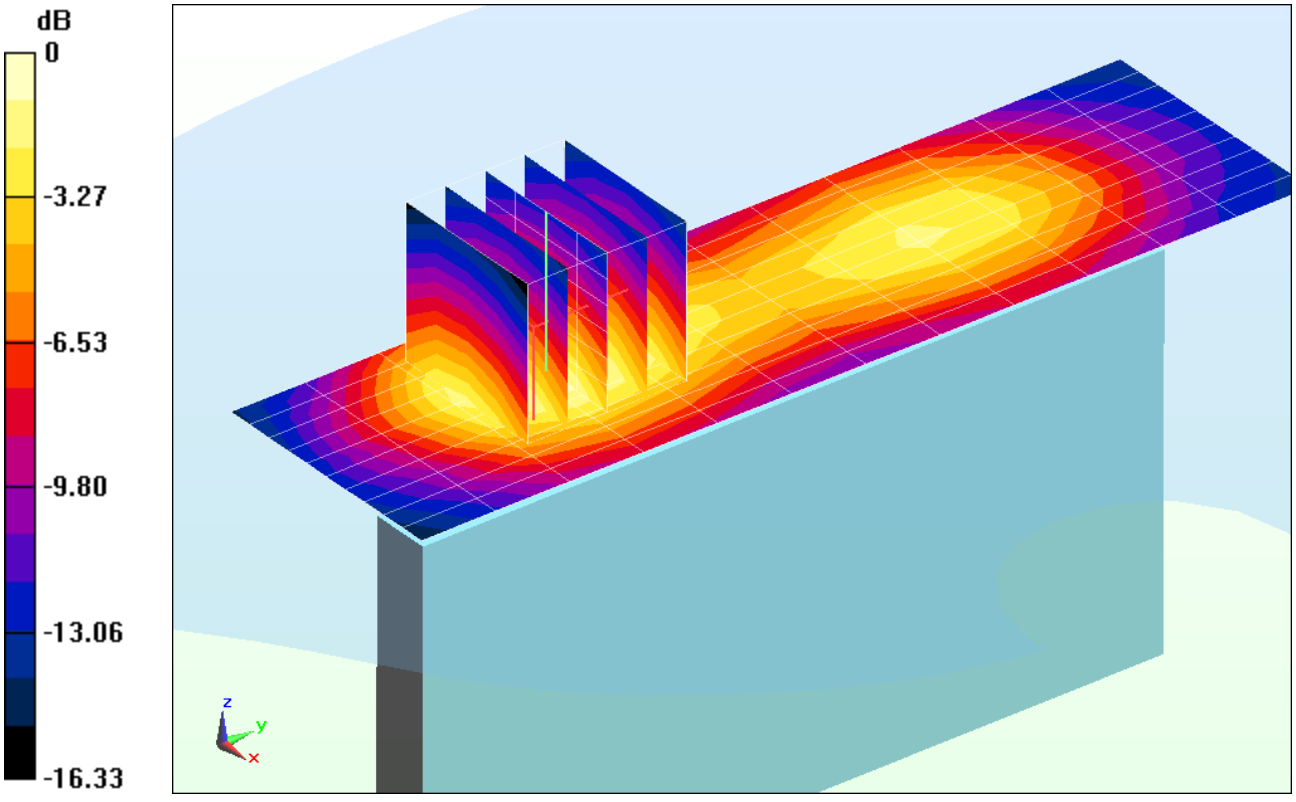
Communication System: LTE RF; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.511 S/m; ε_r = 53.126; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-05-2013; Ambient Temp: 23.2°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3209; ConvF(4.83, 4.83, 4.83); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/20/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 4 (AWS), Body SAR, Left Edge, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 49 RB Offset

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.534 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.678 W/kg
SAR(1 g) = 0.417 W/kg; SAR(10 g) = 0.244 W/kg



0 dB = 0.457 W/kg = -3.40 dBW/kg

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPMZ263122

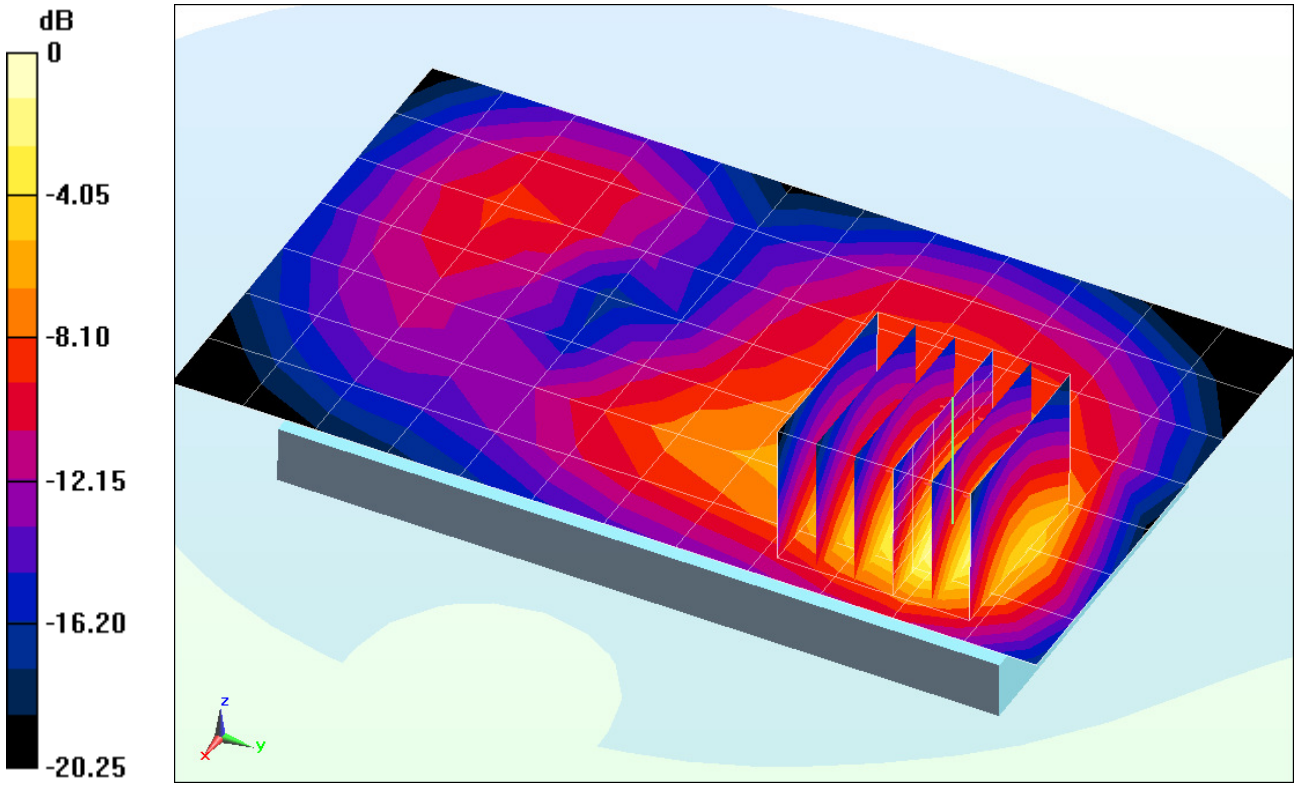
Communication System: LTE Band 2 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.526 S/m; ε_r = 50.885; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2013; Ambient Temp: 22.2°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(4.5, 4.5, 4.5); Calibrated: 4/24/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: LTE Band 2 (PCS), Body SAR, Back side, High.ch, QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.682 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.554 W/kg



0 dB = 1.12 W/kg = 0.49 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPMZ263122

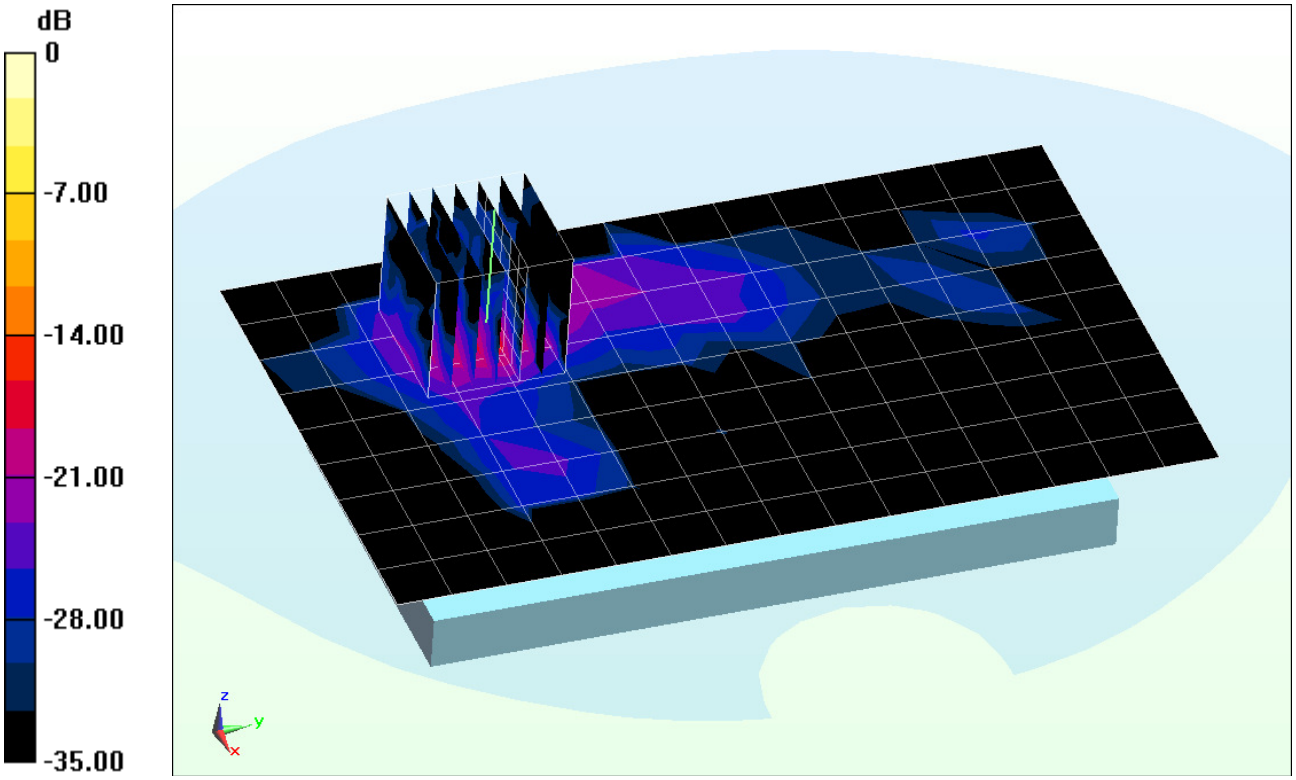
Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.921 S/m; ε_r = 51.175; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.4°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3263; ConvF(4.35, 4.35, 4.35); Calibrated: 5/18/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 5/7/2012
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Back Side

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.616 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.0440 W/kg
SAR(1 g) = 0.0205 W/kg



0 dB = 0.900 W/kg = -0.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

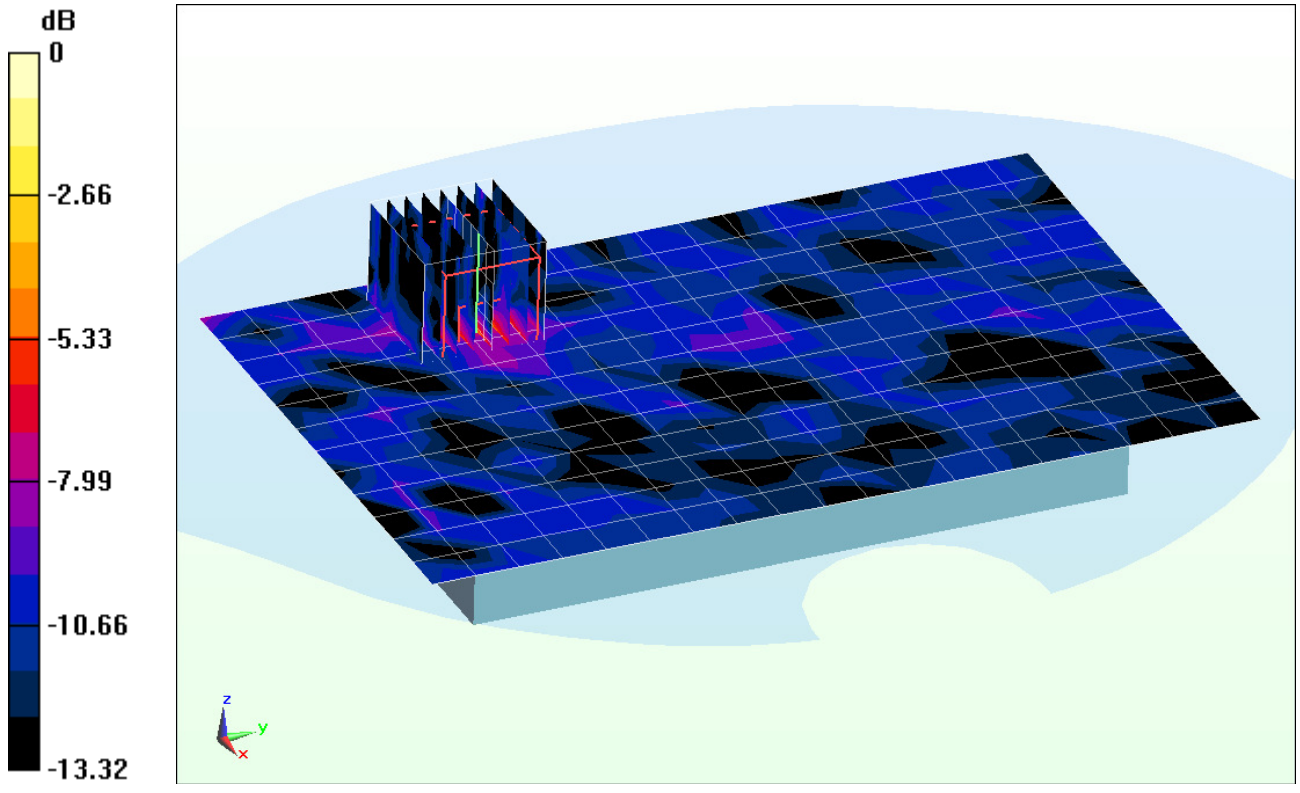
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5805 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5805 MHz; σ = 6.146 S/m; ε_r = 47.55; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.5°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3561; ConvF(3.42, 3.42, 3.42); Calibrated: 7/26/2012;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 161, 6 Mbps, Back Side

Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 4.949 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.625 W/kg
SAR(1 g) = 0.193 W/kg; SAR(10 g) = 0.097 W/kg



0 dB = 0.397 W/kg = -4.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFE980; Type: Portable Handset; Serial: 211KPDT263122

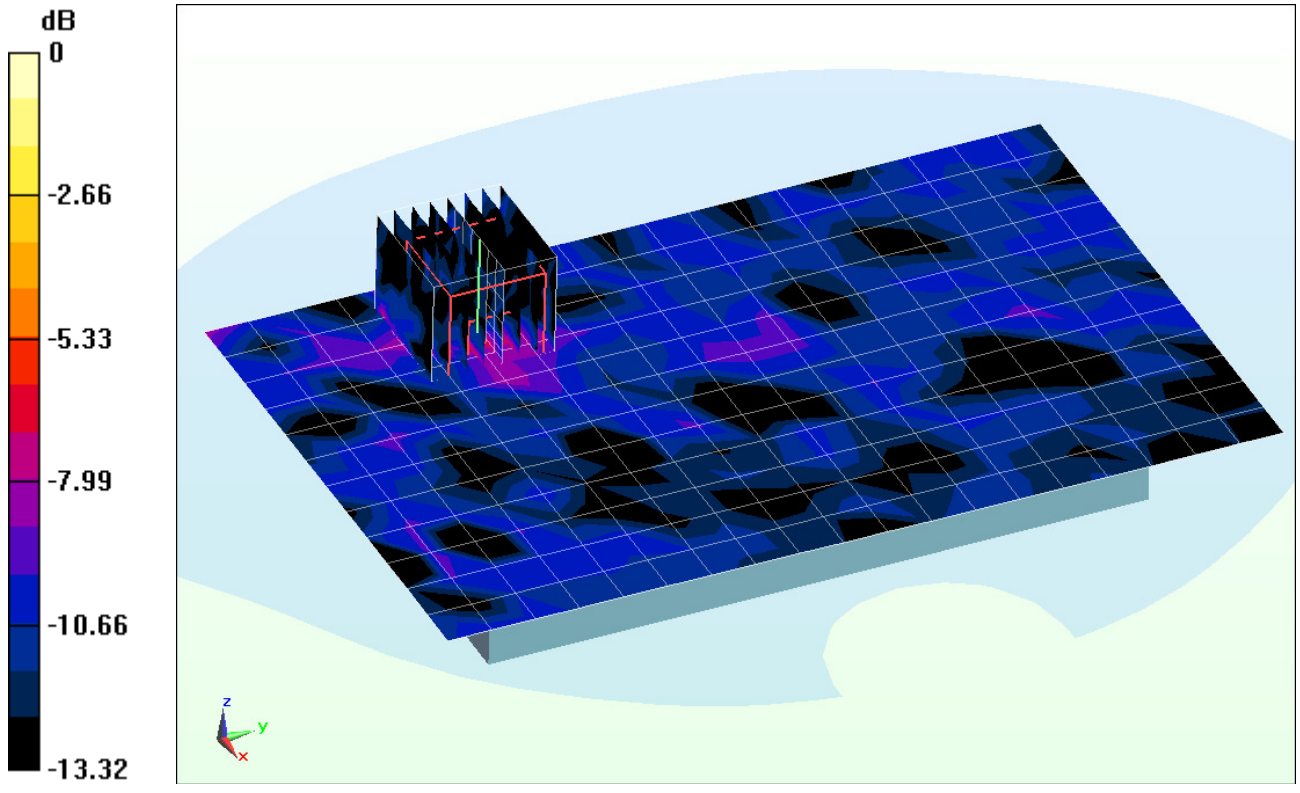
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5680 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5680 MHz; σ = 5.951 S/m; ε_r = 47.89; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-08-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3561; ConvF(3.17, 3.17, 3.17); Calibrated: 7/26/2012;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/24/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.8 (7028)

Mode: IEEE 802.11a, 5.5 - 5.7 GHz, Body SAR, Ch 136, 6 Mbps, Back Side

Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 5.434 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.153 W/kg; SAR(10 g) = 0.074 W/kg



0 dB = 0.397 W/kg = -4.01 dBW/kg