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:
Samsung Electronics, Co. Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do 443-742, Korea

Date of Testing:
07/31/14 - 08/11/14
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1407251481-R1.A3L

FCC ID: **A3LSWDSC02G**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SC-02G

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	UMTS 850	826.40 - 846.60 MHz	0.33	0.57	0.57
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.35	0.58	0.94
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.25	0.28	0.41
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.69	0.38	0.38
DTS	5.8 GHz WLAN	5745 - 5825 MHz	0.21	< 0.1	
NII	5.2 GHz WLAN	5180 - 5240 MHz	0.20	0.10	
NII	5.3 GHz WLAN	5260 - 5320 MHz	0.22	0.10	
NII	5.5 GHz WLAN	5500 - 5700 MHz	0.32	0.11	
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A		
Simultaneous SAR per KDB 690783 D01v01r03:			0.99	0.96	1.32

Note: This revised Test Report (S/N: 0Y1407251481-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

The SAR Tick is an initiative of the Mobile Manufacturers Forum (MMF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MMF. Further details can be obtained by emailing: sartick@mmfai.info.

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
UMTS 850	Voice/Data	826.40 - 846.60 MHz
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 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
ANT+	Data	2402 - 2480 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		Modulated Average		
		3GPP Rel 99	*3GPP Rel 5*	*3GPP Rel 6*
		WCDMA	*HSDPA*	*HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**24.0**	**22.5**	**22.5**
	Nominal	**23.5**	**22.0**	**22.0**

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.5**	**33.5**	**31.5**	**30.5**	**29.5**	**27.5**	**27.5**	**24.0**	**23.0**
	Nominal	**33.0**	**33.0**	**31.0**	**30.0**	**29.0**	**27.0**	**27.0**	**23.5**	**22.5**
GSM/GPRS/EDGE 1900	Maximum	**30.5**	**30.5**	**29.0**	**26.5**	**25.5**	**27.0**	**24.5**	**23.5**	**22.5**
	Nominal	**30.0**	**30.0**	**28.5**	**26.0**	**25.0**	**26.5**	**24.0**	**23.0**	**22.0**

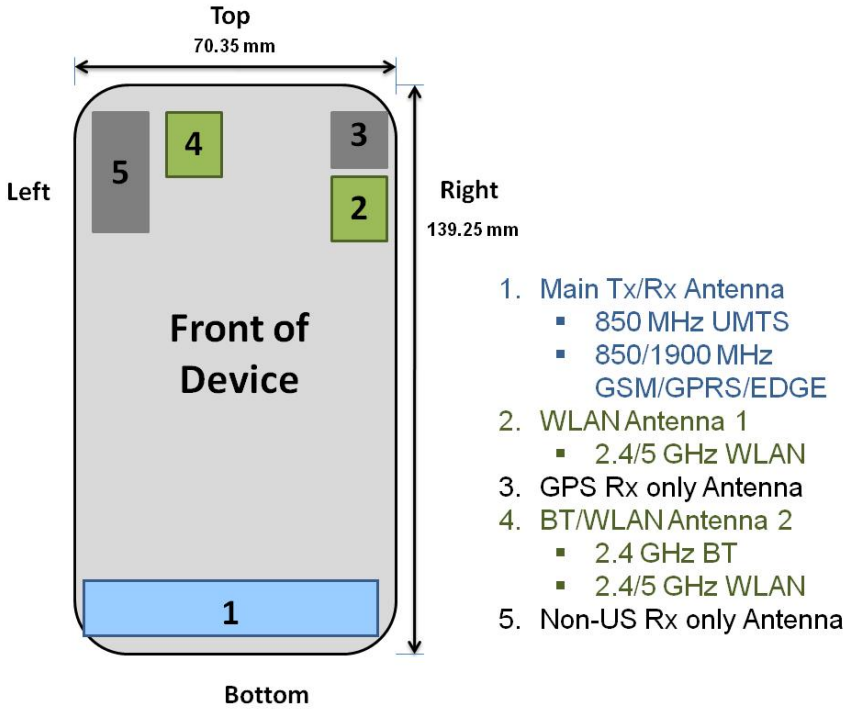
SISO WLAN:

Mode / Band	Antenna		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	1	Maximum	**17.5**
		Nominal	**17.0**
IEEE 802.11b (2.4 GHz)	2	Maximum	**15.0**
		Nominal	**14.5**
IEEE 802.11g (2.4 GHz)	1, 2	Maximum	**13.5**
		Nominal	**13.0**
IEEE 802.11n (2.4 GHz)	1, 2	Maximum	**12.5**
		Nominal	**12.0**
IEEE 802.11a (5 GHz)	1, 2	Maximum	**11.5**
		Nominal	**11.0**
IEEE 802.11n (5 GHz, 20 MHz Bandwidth)	1, 2	Maximum	**11.5**
		Nominal	**11.0**
IEEE 802.11n (5 GHz, 40 MHz Bandwidth)	1, 2	Maximum	**10.5**
		Nominal	**10.0**
IEEE 802.11ac (5 GHz)	1, 2	Maximum	**10.5**
		Nominal	**10.0**
Bluetooth	2	Maximum	**9.0**
		Nominal	**8.5**
Bluetooth LE	2	Maximum	**6.5**
		Nominal	**6.0**

MIMO WLAN:

Mode / Band		Modulated Average (dBm)
IEEE 802.11n (2.4 GHz)	Maximum	**15.0**
	Nominal	**14.5**
IEEE 802.11n (5 GHz, 20 MHz Bandwidth)	Maximum	**14.5**
	Nominal	**14.0**
IEEE 802.11n (5 GHz, 40 MHz Bandwidth)	Maximum	**12.0**
	Nominal	**11.5**
IEEE 802.11ac (5 GHz, 20 MHz Bandwidth)	Maximum	**13.5**
	Nominal	**13.0**
IEEE 802.11ac (5 GHz, 40 MHz Bandwidth)	Maximum	**12.0**
	Nominal	**11.5**
IEEE 802.11ac (5 GHz, 80 MHz Bandwidth)	Maximum	**13.5**
	Nominal	**13.0**

1.3 DUT Antenna Locations



Note: Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC Filing.

Figure 1-1
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN Antenna 1	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN Antenna 2	Yes	Yes	Yes	No	No	Yes
2.4 GHz WLAN MIMO	Yes	Yes	Yes	No	Yes	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01 guidance, page 2. The distances between the transmit antennas and the edges of the device are included in the filing. When 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 specialized battery. The SAR tests were performed with the specialized battery (model: EB-BG870BBD).

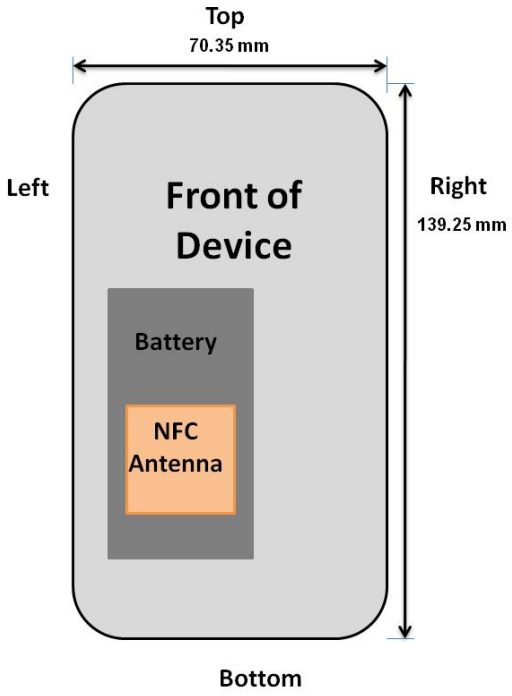


Figure 1-2
NFC Antenna Locations

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.
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 Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Notes
1	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
2	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	
3	GSM voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	
4	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	
5	UMTS + 5 GHz WI-FI	Yes	Yes	N/A	
6	UMTS + 2.4 GHz Bluetooth	N/A	Yes	N/A	
7	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	
8	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	N/A	Not supported by SW

1. All licensed modes share the same antenna path and cannot transmit simultaneously.
2. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
3. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
4. When wireless router mode is enabled, all 5GHz bands are disabled.
5. This device supports 2 × 2 MIMO Tx for WLAN 802.11n/ac. Each WLAN antenna can transmit independently or together when operating with MIMO.

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 D01v05, the 1g 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 (rounded to the nearest mW) and the antenna to user separation distance, body-worn Bluetooth SAR was not required; [(8/10)* √2.480] = 1.3 < 3.0. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

This device supports IEEE 802.11ac with the following features:
a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 2 Tx antenna output
d) 256 QAM is supported
e) No new 5 GHz channels

(B) Licensed Transmitter(s)

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.

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

- IEEE 1528-2003
- FCC KDB Publication 941225 D01v02, D03v01, D06v01r01 (2G/3G and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r03, D02v01r01 (SAR Measurements up to 6 GHz)
- April 2013 TCB Workshop Notes (IEEE 802.11ac)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)

1.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. 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.

	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
UMTS 850	FL-279-B	FL-279-B	FL-279-B
GSM/GPRS/EDGE 850	FL-279-B	FL-279-B	FL-279-B
GSM/GPRS/EDGE 1900	FL-279-B	FL-279-B	FL-279-B
2.4 GHz WLAN Antenna 1	FL-279-B	FL-279-B	FL-279-B
2.4 GHz WLAN Antenna 2	FL-279-E	FL-279-E	FL-279-E
2.4 GHz WLAN MIMO	FL-279-B	FL-279-B	FL-279-B
5 GHz WLAN Antenna 1	FL-279-A	FL-279-B	-
5 GHz WLAN Antenna 2	FL-279-A	FL-279-B	-
5 GHz WLAN MIMO	FL-279-A	FL-279-B	-

2 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 [22]. 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.

2.1 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 2-1).

Equation 2-1
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]

3 DOSIMETRIC ASSESSMENT

3.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01 and IEEE 1528-2013:

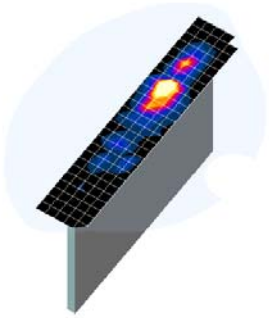


Figure 3-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01 (See Table 3-1) and IEEE 1528-2013.
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.
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 3-1) and IEEE 1528-2013. 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. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 3-1. 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 3-1
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

*Also compliant to IEEE 1528-2013 Table 6

4 DEFINITION OF REFERENCE POINTS

4.1 EAR REFERENCE POINT

Figure 4-2 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 4-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 4-1). 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].

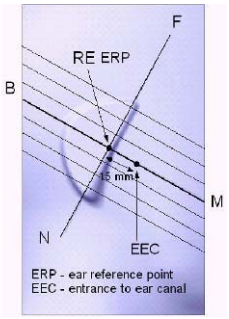


Figure 4-1
Close-Up Side view of ERP

4.2 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 acoustic output located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Figure 4-3). The acoustic output 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 its 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.

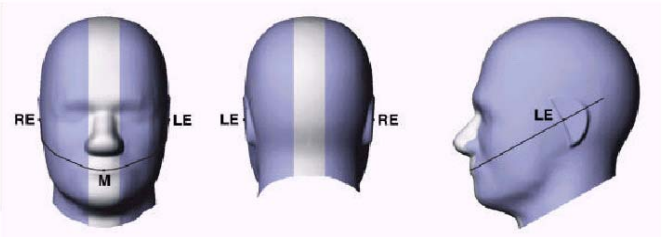


Figure 4-2
Front, back and side view of SAM Twin Phantom

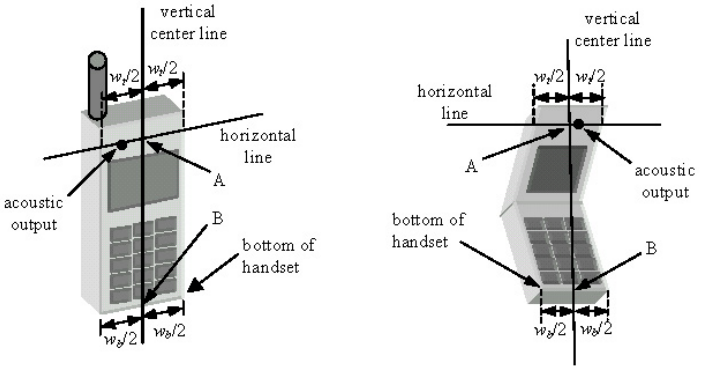


Figure 4-3
Handset Vertical Center & Horizontal Line Reference Points

5 TEST CONFIGURATION POSITIONS FOR HANDSETS

5.1 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.

5.2 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 5-1), 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.

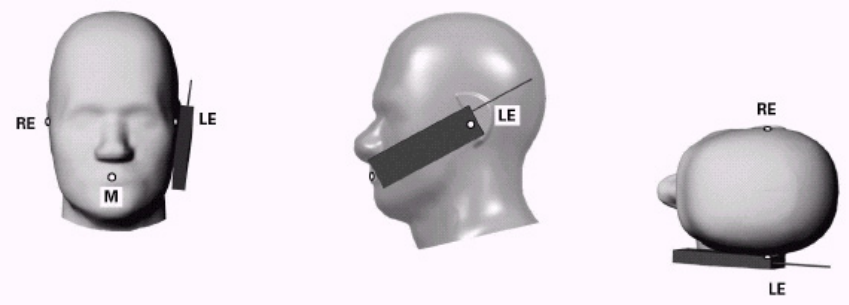


Figure 5-1 Front, Side and Top View of Cheek Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the 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 5-2).

5.3 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. In this situation, 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 5-2).

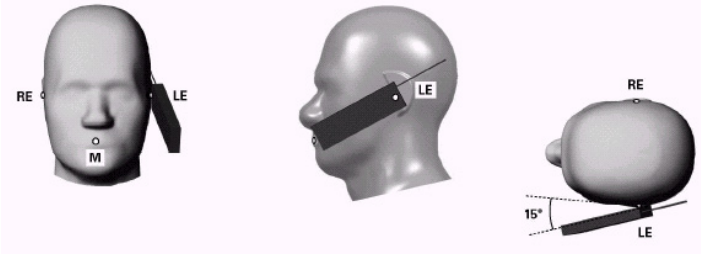


Figure 5-2 Front, Side and Top View of Ear/15º Tilt Position

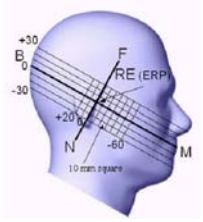


Figure 5-3
Side view w/ relevant markings

5.4 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. Per IEEE 1528-2013, a rotated SAM phantom is necessary to allow probe access to such regions. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed from the table for emptying and cleaning.

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.

5.5 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 5-4). Per FCC KDB Publication 648474 D04v01, 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 D01v05 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.

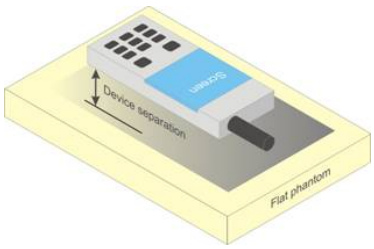


Figure 5-4
Sample Body-Worn Diagram

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.

5.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 44798 D01v05 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v05, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

5.7 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.

6 RF EXPOSURE LIMITS

6.1 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.

6.2 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 6-1
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)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	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.

7 FCC MEASUREMENT PROCEDURES

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

7.1 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.

7.2 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.

7.3 SAR Measurement Conditions for UMTS

7.3.1 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.

7.3.2 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.

7.3.3 Body SAR Measurements

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

7.3.4 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.

Sub-Test	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1, Note 2)*	CM (dB) *(Note 3)*	MPR (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 *(Note 4)*	15/15 *(Note 4)*	64	12/15 *(Note 4)*	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

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: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 8$ ($A_{hs} = 30/15$) with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 7$ ($A_{hs} = 24/15$) with $\beta_{hs} = 24/15 * \beta_c$.
Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Figure 7-1
Table C.10.1.4 of TS 234.121-1

7.3.5 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-DPCCH 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.

7.4 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n/ac 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.

7.4.1 General Device Setup

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

7.4.2 Frequency Channel Configurations [24]

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 higher than 0.25 dB or more than the 802.11a mode. 802.11ac SAR was evaluated for highest 802.11a configuration in each 5 GHz band and each exposure condition. 802.11ac modes were additionally evaluated for SAR if the output power for the respective mode was more than 0.25 dB higher than powers of 802.11a modes.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg and 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.

7.4.3 MIMO SAR considerations

Per KDB 248227, SAR for MIMO was measured with both transmitting simultaneously and was evaluated independently of SISO operation. For 2.4 and 5 GHz MIMO, 802.11n 20 MHz bandwidth was evaluated. Other IEEE 802.11 modes and bandwidths were not investigated for MIMO operations since the maximum allowed output power (including tolerance) was not higher for these modes.

8 RF CONDUCTED POWERS

8.1 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**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	33.03	33.38	31.14	29.57	**28.65**	27.22	25.75	23.93	22.89
	190	32.97	33.34	31.36	29.56	**28.60**	27.07	25.65	23.84	22.90
	251	33.32	33.25	31.23	29.71	**28.75**	27.10	25.67	23.85	22.88
GSM 1900	512	30.50	30.50	**28.80**	26.24	25.21	25.32	24.20	23.42	22.14
	661	30.40	30.42	**28.79**	26.17	24.95	25.11	23.99	23.29	21.92
	810	30.49	30.50	**29.00**	26.37	25.37	25.32	24.40	23.50	22.34
		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**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	24.00	24.35	25.12	25.31	**25.64**	18.19	19.73	19.67	19.88
	190	23.94	24.31	25.34	25.30	**25.59**	18.04	19.63	19.58	19.89
	251	24.29	24.22	25.21	25.45	**25.74**	18.07	19.65	19.59	19.87
GSM 1900	512	21.47	21.47	**22.78**	21.98	22.20	16.29	18.18	19.16	19.13
	661	21.37	21.39	**22.77**	21.91	21.94	16.08	17.97	19.03	18.91
	810	21.46	21.47	**22.98**	22.11	22.36	16.29	18.38	19.24	19.33
GSM 850	**Frame Avg.Targets:**	23.97	23.97	24.98	25.74	**25.99**	17.97	20.98	19.24	19.49
GSM 1900		20.97	20.97	**22.48**	21.74	21.99	17.47	17.98	18.74	18.99

Note:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. Per October 2013 TCB Workshop Notes, the configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. 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.
4. 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.

GSM Class: B
GPRS Multislot class: 12 (Max 4 Tx uplink slots)
EDGE Multislot class: 12 (Max 4 Tx uplink slots)
DTM Multislot Class: N/A

Figure 8-1
Power Measurement Setup

8.2 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	24.00	23.90	23.95	-
99		12.2 kbps AMR	23.54	23.97	23.86	-
6	HSDPA	Subtest 1	22.28	22.27	22.32	0
6		Subtest 2	22.25	22.23	22.33	0
6		Subtest 3	21.87	21.89	21.89	0.5
6		Subtest 4	21.80	21.86	21.94	0.5
6	HSUPA	Subtest 1	21.94	21.93	21.60	0
6		Subtest 2	21.27	21.37	21.41	2
6		Subtest 3	20.69	20.82	20.94	1
6		Subtest 4	21.31	21.83	21.61	2
6		Subtest 5	21.93	21.77	21.53	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 HSPA 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 8-2
Power Measurement Setup

8.3 WLAN Conducted Powers

Table 8-1
SISO IEEE 802.11b Average RF Power Antenna 1

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	**17.15**	17.38	17.39	17.39
802.11b	2437	6*	17.07	17.20	17.28	17.32
802.11b	2462	11*	17.15	17.39	17.38	17.38

Table 8-2
SISO IEEE 802.11b Average RF Power Antenna 2

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	14.62	14.80	14.91	14.80
802.11b	2437	6*	14.32	14.55	14.55	14.61
802.11b	2462	11*	**14.90**	14.99	14.95	14.98

Table 8-3
SISO IEEE 802.11g Average RF Power Antenna 1

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	12.50	12.15	12.21	12.20	12.40	12.37	12.59	12.35
802.11g	2437	6	13.20	12.75	12.94	12.93	13.13	13.05	13.28	13.10
802.11g	2462	11	12.80	12.45	12.48	12.43	12.74	12.57	12.91	12.64

Table 8-4
SISO IEEE 802.11g Average RF Power Antenna 2

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	12.76	12.44	12.62	12.57	12.63	12.49	12.52	12.43
802.11g	2437	6	12.82	12.48	12.65	12.60	12.68	12.56	12.59	12.55
802.11g	2462	11	12.15	11.85	12.00	12.01	11.96	11.88	11.86	11.87

Table 8-5
SISO IEEE 802.11n Average RF Power Antenna 1

Mode	Freq [MHz]	Channel	802.11n (2.4GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	2412	1	11.50	11.15	11.15	11.50	11.45	11.45	11.50	11.44
802.11n	2437	6	12.05	11.67	11.63	12.01	12.00	12.02	12.01	11.99
802.11n	2462	11	11.75	11.41	11.43	11.72	11.71	11.60	11.77	11.65

Table 8-6
SISO IEEE 802.11n Average RF Power Antenna 2

Mode	Freq [MHz]	Channel	802.11n (2.4GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	2412	1	11.60	11.59	11.45	11.74	11.62	11.51	11.36	11.36
802.11n	2437	6	11.85	11.78	11.70	11.99	11.84	11.77	11.54	11.66
802.11n	2462	11	11.07	11.00	10.98	11.22	11.05	10.95	10.86	10.83

Table 8-7
MIMO IEEE 802.11n Average RF Power

802.11n (2.4 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			13
802.11n	2412	1	14.56
802.11n	2437	6	**14.96**
802.11n	2462	11	14.43

Table 8-8
SISO IEEE 802.11a Average RF Power Antenna 1

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	10.65	10.57	10.63	10.53	10.84	10.84	11.08	10.75
802.11a	5200	40	10.51	10.43	10.45	10.40	10.72	10.63	10.92	10.65
802.11a	5220	44	**11.23**	11.13	11.15	11.10	11.39	11.44	11.45	11.37
802.11a	5240	48*	11.18	11.12	11.13	11.10	11.34	11.34	11.45	11.34
802.11a	5260	52*	**11.06**	11.05	11.03	11.03	11.25	11.12	11.30	11.11
802.11a	5280	56	10.77	10.78	10.74	10.77	10.91	10.79	11.03	10.83
802.11a	5300	60	10.88	10.85	10.80	10.83	11.08	10.92	11.08	10.88
802.11a	5320	64*	10.79	10.72	10.83	10.78	11.02	10.87	11.01	10.77
802.11a	5500	100	**11.16**	11.05	11.17	11.09	11.36	11.35	11.30	11.16
802.11a	5520	104*	11.05	10.96	11.06	10.99	11.26	11.22	11.19	11.05
802.11a	5540	108	11.10	10.98	11.06	11.00	11.25	11.31	11.24	11.12
802.11a	5560	112	11.02	10.90	11.02	10.98	11.22	11.18	11.19	10.95
802.11a	5580	116*	11.07	10.95	11.15	11.01	11.28	11.26	11.22	11.03
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	10.87	10.74	10.93	10.82	11.01	11.05	11.01	10.82
802.11a	5680	136*	10.86	10.73	10.93	10.80	11.05	11.09	10.99	10.84
802.11a	5700	140	10.71	10.53	10.69	10.63	10.91	10.82	10.84	10.70
802.11a	5745	149*	10.50	10.53	10.50	10.40	10.70	10.65	10.71	10.31
802.11a	5765	153	10.38	10.47	10.39	10.27	10.56	10.59	10.62	10.18
802.11a	5785	157*	**11.37**	11.43	11.39	11.29	11.45	11.44	11.44	11.25
802.11a	5805	161	11.29	11.33	11.38	11.20	11.45	11.42	11.45	11.10
802.11a	5825	165*	11.27	11.31	11.29	11.17	11.43	11.38	11.49	11.13

Table 8-9
SISO IEEE 802.11a Average RF Power Antenna 2

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	**11.41**	11.40	11.39	11.45	11.24	11.31	11.45	11.39
802.11a	5200	40	11.19	11.14	11.18	11.20	11.06	11.16	11.26	11.18
802.11a	5220	44	11.15	11.23	11.18	11.17	10.96	11.11	11.26	11.04
802.11a	5240	48*	11.26	11.29	11.24	11.34	11.09	11.07	11.31	11.22
802.11a	5260	52*	10.97	10.68	10.71	10.61	10.72	10.29	10.27	10.09
802.11a	5280	56	10.96	10.58	10.64	10.66	10.68	10.34	10.30	10.15
802.11a	5300	60	11.06	10.72	10.79	10.65	10.87	10.33	10.30	10.14
802.11a	5320	64*	**11.27**	10.97	11.02	10.88	11.02	10.57	10.54	10.34
802.11a	5500	100	**11.42**	11.45	11.38	11.37	11.44	11.37	11.31	11.36
802.11a	5520	104*	11.32	11.35	11.25	11.28	11.35	11.25	11.25	11.27
802.11a	5540	108	11.39	11.42	11.35	11.25	11.43	11.28	11.23	11.34
802.11a	5560	112	11.41	11.43	11.36	11.33	11.43	11.35	11.31	11.38
802.11a	5580	116*	11.38	11.37	11.38	11.34	11.34	11.30	11.35	11.32
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	11.38	11.38	11.41	11.26	11.41	11.33	11.30	11.26
802.11a	5680	136*	11.41	11.41	11.36	11.38	11.47	11.28	11.30	11.37
802.11a	5700	140	11.39	11.39	11.42	11.32	11.40	11.34	11.27	11.30
802.11a	5745	149*	**11.46**	11.44	11.32	11.20	11.30	11.42	11.44	11.42
802.11a	5765	153	11.43	11.45	11.28	11.24	11.28	11.37	11.38	11.35
802.11a	5785	157*	11.39	11.39	11.26	11.15	11.18	11.39	11.36	11.37
802.11a	5805	161	11.37	11.28	11.21	11.19	11.20	11.36	11.34	11.37
802.11a	5825	165*	11.36	11.42	11.22	11.12	11.17	11.32	11.32	11.24

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 8-10
SISO IEEE 802.11n Average RF Power – 20 MHz Bandwidth Antenna 1

Mode	Freq [MHz]	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	10.53	10.50	10.42	10.86	10.98	10.85	10.88	10.78
802.11n	5200	40	10.40	10.44	10.31	10.78	10.77	10.69	10.74	10.60
802.11n	5220	44	11.04	11.04	10.92	11.35	11.45	11.32	11.36	11.35
802.11n	5240	48	11.02	10.93	10.89	11.42	11.43	11.41	11.32	11.30
802.11n	5260	52	10.84	10.85	10.81	11.17	11.17	11.20	11.25	11.25
802.11n	5280	56	10.73	10.70	10.77	11.08	11.01	11.10	11.11	11.07
802.11n	5300	60	10.72	10.80	10.68	11.00	11.06	11.07	11.21	11.09
802.11n	5320	64	10.68	10.66	10.64	11.03	11.04	10.99	11.05	11.09
802.11n	5500	100	10.90	10.99	10.90	11.26	11.32	11.35	11.35	11.39
802.11n	5520	104	10.92	10.93	10.94	11.36	11.34	11.40	11.35	11.32
802.11n	5540	108	11.00	11.09	10.99	11.37	11.40	11.40	11.33	11.35
802.11n	5560	112	10.89	10.99	10.81	11.32	11.33	11.33	11.31	11.35
802.11n	5580	116	11.04	11.13	11.11	11.40	11.40	11.39	11.38	11.39
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	10.72	10.84	10.66	11.12	11.17	11.15	11.22	11.22
802.11n	5680	136	10.71	10.78	10.70	11.04	11.06	11.16	11.14	11.24
802.11n	5700	140	10.61	10.71	10.64	10.98	11.02	11.03	11.15	11.06
802.11n	5745	149	10.50	10.25	10.20	10.71	10.58	10.60	10.68	10.76
802.11n	5765	153	11.20	10.92	10.87	11.46	11.21	11.35	11.45	11.46
802.11n	5785	157	11.24	11.01	10.96	11.43	11.28	11.30	11.48	11.49
802.11n	5805	161	11.16	10.84	10.78	11.33	11.22	11.33	11.37	11.37
802.11n	5825	165	11.21	10.90	10.86	11.46	11.28	11.36	11.41	11.45

Table 8-11
SISO IEEE 802.11n Average RF Power – 20 MHz Bandwidth Antenna 2

Mode	Freq [MHz]	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	11.24	11.21	11.18	11.23	11.31	11.09	11.24	11.23
802.11n	5200	40	11.25	11.26	11.20	11.25	11.31	11.07	11.20	11.19
802.11n	5220	44	11.31	11.23	11.22	11.31	11.29	11.16	11.33	11.33
802.11n	5240	48	11.41	11.40	11.36	11.40	11.45	11.27	11.40	11.32
802.11n	5260	52	10.83	10.63	10.67	10.97	10.83	10.95	10.64	10.67
802.11n	5280	56	10.78	10.49	10.66	10.98	10.79	10.93	10.62	10.63
802.11n	5300	60	10.92	10.73	10.78	11.03	10.93	11.07	10.70	10.75
802.11n	5320	64	11.05	10.85	10.94	11.10	11.10	11.14	10.87	10.88
802.11n	5500	100	11.27	10.87	10.91	11.14	11.18	10.99	11.05	11.05
802.11n	5520	104	11.23	10.83	10.86	11.10	11.18	10.89	11.03	10.99
802.11n	5540	108	11.23	10.82	10.91	11.15	11.18	11.01	11.07	11.05
802.11n	5560	112	11.29	10.84	10.95	11.12	11.18	10.99	11.06	11.07
802.11n	5580	116	11.12	10.70	10.81	11.00	10.98	10.80	10.87	10.92
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	11.16	10.79	10.84	11.06	11.02	10.88	10.95	10.97
802.11n	5680	136	11.06	10.67	10.66	10.91	11.03	10.85	10.88	10.77
802.11n	5700	140	11.13	10.74	10.78	10.95	11.06	10.85	10.88	10.97
802.11n	5745	149	11.21	10.82	10.73	10.79	10.88	10.94	10.87	10.83
802.11n	5765	153	11.09	10.73	10.61	10.76	10.82	10.89	10.71	10.65
802.11n	5785	157	10.91	10.53	10.48	10.52	10.62	10.65	10.62	10.51
802.11n	5805	161	10.94	10.55	10.51	10.52	10.61	10.74	10.62	10.53
802.11n	5825	165	10.77	10.41	10.26	10.42	10.48	10.51	10.47	10.42

Table 8-12
MIMO IEEE 802.11n Average RF Power – 20 MHz Bandwidth

802.11n (5 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			13
802.11n	5180	36	13.91
802.11n	5200	40	13.86
802.11n	5220	44	14.19
802.11n	5240	48	**14.23**
802.11n	5260	52	13.85
802.11n	5280	56	13.77
802.11n	5300	60	13.83
802.11n	5320	64	**13.88**
802.11n	5500	100	14.10
802.11n	5520	104	14.09
802.11n	5540	108	**14.13**
802.11n	5560	112	14.10
802.11n	5580	116	14.09
802.11n	5600	120	N/A
802.11n	5620	124	N/A
802.11n	5640	128	N/A
802.11n	5660	132	13.96
802.11n	5680	136	13.90
802.11n	5700	140	13.89
802.11n	5745	149	13.88
802.11n	5765	153	**14.16**
802.11n	5785	157	14.09
802.11n	5805	161	14.06
802.11n	5825	165	14.01

Table 8-13
SISO IEEE 802.11n Average RF Power – 40 MHz Bandwidth Antenna 1

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	9.91	9.89	9.92	10.00	10.02	9.93	9.94	9.98
802.11n	5230	46	9.70	9.74	9.69	9.79	9.77	9.65	9.79	9.73
802.11n	5270	54	10.10	10.21	10.11	10.22	10.44	10.30	10.32	10.26
802.11n	5310	62	10.08	10.22	10.12	10.23	10.39	10.23	10.34	10.26
802.11n	5510	102	10.33	10.42	10.44	10.43	10.49	10.48	10.47	10.48
802.11n	5550	110	10.39	10.40	10.45	10.49	10.45	10.41	10.43	10.46
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	9.83	9.87	9.98	9.85	10.04	9.91	9.93	9.92
802.11n	5755	151	10.24	10.24	10.27	10.44	10.34	10.42	10.32	10.40
802.11n	5795	159	10.08	10.03	10.09	10.27	10.15	10.25	10.12	10.22

Table 8-14
SISO IEEE 802.11n Average RF Power – 40 MHz Bandwidth Antenna 2

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	9.35	9.46	9.42	9.45	9.46	9.13	9.22	9.07
802.11n	5230	46	9.31	9.42	9.41	9.39	9.36	9.18	9.17	9.03
802.11n	5270	54	9.75	10.26	9.87	9.84	9.97	9.75	9.38	9.36
802.11n	5310	62	9.81	10.28	9.96	9.92	10.07	9.79	9.44	9.50
802.11n	5510	102	9.48	10.23	10.27	10.24	10.19	9.94	9.85	9.89
802.11n	5550	110	9.57	10.37	10.39	10.30	10.31	10.10	9.91	9.98
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	9.17	9.90	9.98	9.84	9.86	9.67	9.60	9.62
802.11n	5755	151	9.73	10.27	10.24	10.18	10.09	9.81	9.72	9.51
802.11n	5795	159	9.39	9.85	9.85	9.82	9.73	9.53	9.43	9.14

Table 8-15
MIMO IEEE 802.11n Average RF Power – 40 MHz Bandwidth

802.11n (5 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			27
802.11n	5190	38	11.39
802.11n	5230	46	11.28
802.11n	5270	54	11.85
802.11n	5310	62	11.80
802.11n	5510	102	11.34
802.11n	5550	110	11.41
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11n	5670	134	11.51
802.11n	5755	151	11.41
802.11n	5795	159	11.39

Table 8-16
SISO IEEE 802.11ac Average RF Power – 80 MHz Bandwidth Antenna 1

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	**10.10**	10.10	10.11	10.30	10.30	10.31	10.31	10.30	10.31	10.30
802.11ac	5290	58	**9.70**	9.50	9.60	9.87	9.93	9.90	9.91	9.81	9.82	9.89
802.11ac	5530	106	**10.00**	9.84	9.94	10.18	10.20	10.17	10.18	10.16	10.10	10.24
802.11ac	5775	155	**9.85**	9.75	9.72	10.05	10.00	9.95	10.00	9.98	10.00	10.00

Table 8-17
SISO IEEE 802.11ac Average RF Power – 80 MHz Bandwidth Antenna 2

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	**10.40**	9.65	9.63	9.62	9.91	9.93	9.82	9.74	9.62	9.62
802.11ac	5290	58	**9.95**	9.53	9.29	9.48	9.84	9.71	9.61	9.61	9.38	9.28
802.11ac	5530	106	**10.01**	9.92	9.86	9.81	9.83	9.79	9.89	9.76	9.69	9.45
802.11ac	5775	155	**9.94**	9.91	9.88	9.82	9.79	9.67	9.73	9.54	9.51	9.66

Table 8-18
MIMO IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

802.11n (5 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			58.5
802.11ac	5210	42	13.26
802.11ac	5290	58	12.84
802.11ac	5530	106	13.02
802.11ac	5775	155	12.91

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 FCC/TCB Meeting Notes:

- For 2.4 GHz SISO operations, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 SISO 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 SISO operations, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 SISO 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.
- Full SAR tests for all SISO IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac in SISO mode was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
- For MIMO 2.4 GHz and 5 GHz operations, the highest average RF output power channel for the lowest data rate for IEEE 802.11n (20 MHz bandwidth) was selected for SAR evaluation. Other IEEE 802.11 modes and bandwidths were not investigated for MIMO operations since the maximum allowed output power (including tolerance) was not higher for these modes.
- The individual spectra for each 2 × 2 MIMO WIFI Antenna were summed mathematically in linear power units for the MIMO output power measurements.
- 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.

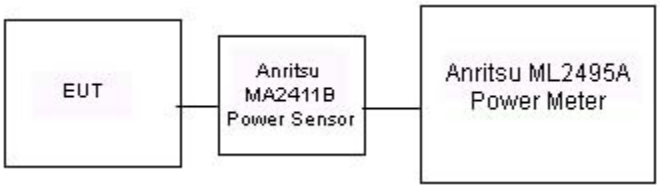


Figure 8-3
Power Measurement Setup for Bandwidths < 50 MHz

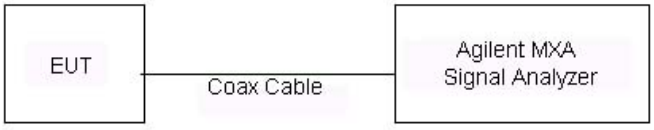


Figure 8-4
Power Measurement Setup for Bandwidths > 50 MHz

9 SYSTEM VERIFICATION

9.1 Tissue Verification

Table 9-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
8/4/2014	835H	22.7	820	0.890	40.343	0.899	41.578	-1.00%	-2.97%
			835	0.904	40.118	0.900	41.500	0.44%	-3.33%
			850	0.917	39.920	0.916	41.500	0.11%	-3.81%
8/5/2014	1900H	20.4	1850	1.378	39.898	1.400	40.000	-1.57%	-0.25%
			1880	1.410	39.795	1.400	40.000	0.71%	-0.51%
			1910	1.441	39.656	1.400	40.000	2.93%	-0.86%
8/11/2014	2450H	22.8	2401	1.807	39.822	1.756	39.287	2.90%	1.36%
			2450	1.866	39.666	1.800	39.200	3.67%	1.19%
			2499	1.923	39.488	1.853	39.138	3.78%	0.89%
08/07/2014	5200H-5800H	22.8	5180	4.547	36.525	4.635	36.009	-1.90%	1.43%
			5200	4.558	36.460	4.655	35.986	-2.08%	1.32%
			5220	4.587	36.387	4.676	35.963	-1.90%	1.18%
			5240	4.621	36.403	4.696	35.940	-1.60%	1.29%
			5260	4.652	36.426	4.717	35.917	-1.38%	1.42%
			5280	4.655	36.419	4.737	35.894	-1.73%	1.46%
			5300	4.666	36.343	4.758	35.871	-1.93%	1.32%
			5320	4.675	36.291	4.778	35.849	-2.16%	1.23%
			5500	4.879	36.105	4.963	35.643	-1.69%	1.30%
			5520	4.908	36.076	4.983	35.620	-1.51%	1.28%
			5540	4.918	36.071	5.004	35.597	-1.72%	1.33%
			5560	4.921	36.010	5.024	35.574	-2.05%	1.23%
			5580	4.936	35.988	5.045	35.551	-2.16%	1.23%
			5600	4.966	35.933	5.065	35.529	-1.95%	1.14%
			5660	5.042	35.914	5.127	35.460	-1.66%	1.28%
			5745	5.144	35.756	5.214	35.363	-1.34%	1.11%
			5765	5.162	35.773	5.234	35.340	-1.38%	1.23%
			5785	5.172	35.769	5.255	35.317	-1.58%	1.28%
			5800	5.176	35.724	5.270	35.300	-1.78%	1.20%
			5805	5.186	35.708	5.275	35.294	-1.69%	1.17%
8/4/2014	835B	22.5	820	0.995	53.601	0.969	55.258	2.68%	-3.00%
			835	1.008	53.452	0.970	55.200	3.92%	-3.17%
			850	1.023	53.274	0.988	55.154	3.54%	-3.41%
7/31/2014	1900B	23.2	1850	1.492	51.114	1.520	53.300	-1.84%	-4.10%
			1880	1.525	50.885	1.520	53.300	0.33%	-4.53%
			1910	1.563	50.779	1.520	53.300	2.83%	-4.73%
8/11/2014	2450B	22.5	2401	1.880	52.108	1.903	52.765	-1.21%	-1.25%
			2450	1.943	51.913	1.950	52.700	-0.36%	-1.49%
			2499	2.011	51.733	2.019	52.638	-0.40%	-1.72%
08/04/2014	5200B-5800B	23.8	5180	5.298	47.438	5.276	49.041	0.42%	-3.27%
			5200	5.324	47.372	5.299	49.014	0.47%	-3.35%
			5220	5.363	47.450	5.323	48.987	0.75%	-3.14%
			5240	5.361	47.485	5.346	48.960	0.28%	-3.01%
			5260	5.388	47.486	5.369	48.933	0.35%	-2.96%
			5280	5.417	47.423	5.393	48.906	0.45%	-3.03%
			5300	5.433	47.369	5.416	48.879	0.31%	-3.09%
			5320	5.468	47.322	5.439	48.851	0.53%	-3.13%
			5500	5.657	47.216	5.650	48.607	0.12%	-2.86%
			5520	5.674	47.137	5.673	48.580	0.02%	-2.97%
			5540	5.710	47.030	5.696	48.553	0.25%	-3.14%
			5745	5.934	46.697	5.936	48.275	-0.03%	-3.27%
			5765	5.949	46.515	5.959	48.248	-0.17%	-3.59%
			5785	5.968	46.374	5.982	48.220	-0.23%	-3.83%
			5800	6.015	46.324	6.000	48.200	0.25%	-3.89%

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 KDB Publication 865664 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

9.2 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 result summary can be found in Appendix E.

Table 9-2
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
J	835	HEAD	08/04/2014	24.4	22.7	0.100	4d119	3332	0.968	9.220	9.680	4.99%
C	1900	HEAD	08/05/2014	22.3	20.4	0.100	5d148	3213	3.970	40.700	39.700	-2.46%
H	2450	HEAD	08/11/2014	22.2	22.8	0.100	797	3319	5.310	51.800	53.100	2.51%
E	5200	HEAD	08/07/2014	24.1	22.9	0.100	1057	3914	7.520	78.000	75.200	-3.59%
E	5300	HEAD	08/07/2014	24.1	22.8	0.100	1057	3914	8.080	83.000	80.800	-2.65%
E	5500	HEAD	08/07/2014	24.5	23.0	0.100	1057	3914	7.860	84.300	78.600	-6.76%
E	5600	HEAD	08/07/2014	24.5	23.0	0.100	1057	3914	8.370	83.500	83.700	0.24%
E	5800	HEAD	08/07/2014	24.5	23.0	0.100	1057	3914	7.430	79.300	74.300	-6.31%
J	835	BODY	08/04/2014	23.2	22.5	0.100	4d119	3332	1.010	9.340	10.100	8.14%
B	1900	BODY	07/31/2014	24.0	23.2	0.100	5d148	3288	4.210	39.300	42.100	7.12%
H	2450	BODY	08/11/2014	23.2	22.5	0.100	797	3319	4.860	49.400	48.600	-1.62%
A	5200	BODY	08/04/2014	24.5	23.9	0.100	1007	3920	7.380	72.600	73.800	1.65%
A	5300	BODY	08/04/2014	24.5	23.9	0.100	1007	3920	7.650	74.700	76.500	2.41%
A	5500	BODY	08/04/2014	24.5	23.9	0.100	1007	3920	7.710	75.900	77.100	1.58%
A	5800	BODY	08/04/2014	24.5	23.9	0.100	1007	3920	7.140	72.900	71.400	-2.06%

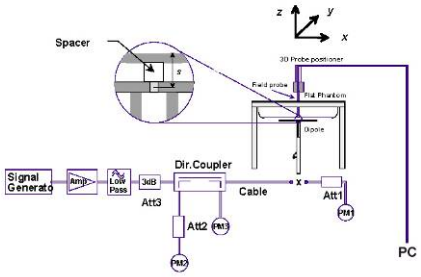


Figure 9-1
System Verification Setup Diagram

Figure 9-2
System Verification Setup Photo

10 SAR DATA SUMMARY

10.1 Standalone Head SAR Data

Table 10-1
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	24.0	23.90	-0.01	Right	Cheek	FL-279-B	1:1	0.325	1.023	0.332	A1
836.60	4183	UMTS 850	RMC	24.0	23.90	0.08	Right	Tilt	FL-279-B	1:1	0.183	1.023	0.187	
836.60	4183	UMTS 850	RMC	24.0	23.90	0.07	Left	Cheek	FL-279-B	1:1	0.322	1.023	0.329	
836.60	4183	UMTS 850	RMC	24.0	23.90	0.13	Left	Tilt	FL-279-B	1:1	0.176	1.023	0.180	
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 10-2
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	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	32.97	0.04	Right	Cheek	FL-279-B	1:8.3	0.307	1.130	**0.347**	A2
836.60	190	GSM 850	GSM	33.5	32.97	0.01	Right	Tilt	FL-279-B	1:8.3	0.172	1.130	0.194	
836.60	190	GSM 850	GSM	33.5	32.97	0.12	Left	Cheek	FL-279-B	1:8.3	0.290	1.130	0.328	
836.60	190	GSM 850	GSM	33.5	32.97	0.10	Left	Tilt	FL-279-B	1:8.3	0.177	1.130	0.200	
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 10-3
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	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.5	30.40	-0.04	Right	Cheek	FL-279-B	1:8.3	0.242	1.023	0.248	A3
1880.00	661	GSM 1900	GSM	30.5	30.40	0.06	Right	Tilt	FL-279-B	1:8.3	0.165	1.023	0.169	
1880.00	661	GSM 1900	GSM	30.5	30.40	-0.21	Left	Cheek	FL-279-B	1:8.3	0.198	1.023	0.203	
1880.00	661	GSM 1900	GSM	30.5	30.40	-0.01	Left	Tilt	FL-279-B	1:8.3	0.152	1.023	0.155	
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 10-4
DTS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	0.05	Right	Cheek	1	FL-279-B	1	1:1	0.175	1.084	0.190	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	0.17	Right	Tilt	1	FL-279-B	1	1:1	0.136	1.084	0.147	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	-0.03	Left	Cheek	1	FL-279-B	1	1:1	0.466	1.084	0.505	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	0.13	Left	Tilt	1	FL-279-B	1	1:1	0.241	1.084	0.261	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	-0.01	Right	Cheek	2	FL-279-E	1	1:1	0.632	1.023	0.647	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	-0.12	Right	Tilt	2	FL-279-E	1	1:1	0.678	1.023	**0.694**	A4
2462	11	IEEE 802.11b	DSSS	15.0	14.90	0.11	Left	Cheek	2	FL-279-E	1	1:1	0.475	1.023	0.486	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	0.03	Left	Tilt	2	FL-279-E	1	1:1	0.493	1.023	0.504	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.07	Right	Cheek	MIMO	FL-279-B	13	1:1	0.218	1.009	0.220	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.11	Right	Tilt	MIMO	FL-279-B	13	1:1	0.151	1.009	0.152	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.07	Left	Cheek	MIMO	FL-279-B	13	1:1	0.526	1.009	0.531	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.19	Left	Tilt	MIMO	FL-279-B	13	1:1	0.276	1.009	0.278	
5785	157	IEEE 802.11a	OFDM	11.5	11.37	-0.07	Right	Cheek	1	FL-279-A	6	1:1	0.074	1.030	0.076	
5785	157	IEEE 802.11a	OFDM	11.5	11.37	-0.17	Right	Tilt	1	FL-279-A	6	1:1	0.048	1.030	0.049	
5745	149	IEEE 802.11a	OFDM	11.5	10.50	-0.01	Left	Cheek	1	FL-279-A	6	1:1	0.121	1.259	0.152	
5785	157	IEEE 802.11a	OFDM	11.5	11.37	0.09	Left	Cheek	1	FL-279-A	6	1:1	0.151	1.030	0.156	
5805	161	IEEE 802.11a	OFDM	11.5	11.29	0.04	Left	Cheek	1	FL-279-A	6	1:1	0.144	1.050	0.151	
5775	155	IEEE 802.11ac	OFDM	10.5	9.85	-0.07	Left	Cheek	1	FL-279-A	29.3	1:1	0.110	1.161	0.128	
5785	157	IEEE 802.11a	OFDM	11.5	11.37	0.05	Left	Tilt	1	FL-279-A	6	1:1	0.069	1.030	0.071	
5745	149	IEEE 802.11a	OFDM	11.5	11.46	0.10	Right	Cheek	2	FL-279-A	6	1:1	0.162	1.009	0.163	
5745	149	IEEE 802.11a	OFDM	11.5	11.46	0.07	Right	Tilt	2	FL-279-A	6	1:1	0.110	1.009	0.111	
5745	149	IEEE 802.11a	OFDM	11.5	11.46	0.08	Left	Cheek	2	FL-279-A	6	1:1	0.207	1.009	0.209	
5775	155	IEEE 802.11ac	OFDM	10.5	9.94	-0.17	Left	Cheek	2	FL-279-A	29.3	1:1	0.142	1.138	0.162	
5745	149	IEEE 802.11a	OFDM	11.5	11.46	-0.04	Left	Tilt	2	FL-279-A	6	1:1	0.128	1.009	0.129	
5765	153	IEEE 802.11n	OFDM	14.5	14.16	0.04	Right	Cheek	MIMO	FL-279-A	13	1:1	0.214	1.081	0.231	A5
5785	157	IEEE 802.11n	OFDM	14.5	14.09	0.02	Right	Cheek	MIMO	FL-279-A	13	1:1	0.212	1.099	0.233	
5805	161	IEEE 802.11n	OFDM	14.5	14.06	-0.16	Right	Cheek	MIMO	FL-279-A	13	1:1	0.208	1.107	0.230	
5765	153	IEEE 802.11n	OFDM	14.5	14.16	0.19	Right	Tilt	MIMO	FL-279-A	13	1:1	0.126	1.081	0.136	
5765	153	IEEE 802.11n	OFDM	14.5	14.16	0.16	Left	Cheek	MIMO	FL-279-A	13	1:1	0.162	1.081	0.175	
5765	153	IEEE 802.11n	OFDM	14.5	14.16	0.09	Left	Tilt	MIMO	FL-279-A	13	1:1	0.151	1.081	0.163	
5785	157	IEEE 802.11n	OFDM	14.5	14.09	0.12	Left	Tilt	MIMO	FL-279-A	13	1:1	0.153	1.099	0.168	
5805	161	IEEE 802.11n	OFDM	14.5	14.06	0.03	Left	Tilt	MIMO	FL-279-A	13	1:1	0.148	1.107	0.164	
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 10-5
NII Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Cover Type	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	11.5	11.23	-0.18	Right	Cheek	1	Standard	FL-279-A	6	1:1	0.027	1.064	0.029	
5220	44	IEEE 802.11a	OFDM	11.5	11.23	-0.12	Right	Tilt	1	Standard	FL-279-A	6	1:1	0.015	1.064	0.016	
5220	44	IEEE 802.11a	OFDM	11.5	11.23	0.08	Left	Cheek	1	Standard	FL-279-A	6	1:1	0.188	1.064	0.200	
5210	42	IEEE 802.11ac	OFDM	10.5	10.10	0.13	Left	Cheek	1	Standard	FL-279-A	29.3	1:1	0.155	1.096	0.170	
5220	44	IEEE 802.11a	OFDM	11.5	11.23	0.16	Left	Tilt	1	Standard	FL-279-A	6	1:1	0.041	1.064	0.044	
5260	52	IEEE 802.11a	OFDM	11.5	11.06	0.04	Right	Cheek	1	Standard	FL-279-A	6	1:1	0.030	1.107	0.033	
5260	52	IEEE 802.11a	OFDM	11.5	11.06	-0.16	Right	Tilt	1	Standard	FL-279-A	6	1:1	0.013	1.107	0.014	
5260	52	IEEE 802.11a	OFDM	11.5	11.06	0.07	Left	Cheek	1	Standard	FL-279-A	6	1:1	0.186	1.107	0.206	
5290	58	IEEE 802.11ac	OFDM	10.5	9.70	-0.10	Left	Cheek	1	Standard	FL-279-A	29.3	1:1	0.131	1.202	0.157	
5260	52	IEEE 802.11a	OFDM	11.5	11.06	-0.04	Left	Tilt	1	Standard	FL-279-A	6	1:1	0.047	1.107	0.052	
5500	100	IEEE 802.11a	OFDM	11.5	11.16	-0.09	Right	Cheek	1	Standard	FL-279-A	6	1:1	0.042	1.081	0.045	
5500	100	IEEE 802.11a	OFDM	11.5	11.16	0.11	Right	Tilt	1	Standard	FL-279-A	6	1:1	0.028	1.081	0.030	
5500	100	IEEE 802.11a	OFDM	11.5	11.16	0.10	Left	Cheek	1	Standard	FL-279-A	6	1:1	0.187	1.081	0.202	
5580	116	IEEE 802.11a	OFDM	11.5	11.07	0.02	Left	Cheek	1	Standard	FL-279-A	6	1:1	0.195	1.104	0.215	
5660	132	IEEE 802.11a	OFDM	11.5	10.87	-0.05	Left	Cheek	1	Standard	FL-279-A	6	1:1	0.183	1.156	0.212	
5530	106	IEEE 802.11ac	OFDM	10.5	10.00	0.02	Left	Cheek	1	Standard	FL-279-A	29.3	1:1	0.156	1.122	0.175	
5500	100	IEEE 802.11a	OFDM	11.5	11.16	0.10	Left	Tilt	1	Standard	FL-279-A	6	1:1	0.053	1.081	0.057	
5180	36	IEEE 802.11a	OFDM	11.5	11.41	0.04	Right	Cheek	2	Standard	FL-279-A	6	1:1	0.108	1.021	0.110	
5180	36	IEEE 802.11a	OFDM	11.5	11.41	-0.10	Right	Tilt	2	Standard	FL-279-A	6	1:1	0.080	1.021	0.082	
5180	36	IEEE 802.11a	OFDM	11.5	11.41	0.12	Left	Cheek	2	Standard	FL-279-A	6	1:1	0.128	1.021	0.131	
5210	42	IEEE 802.11ac	OFDM	10.5	10.40	-0.01	Left	Cheek	2	Standard	FL-279-A	29.3	1:1	0.105	1.023	0.107	
5180	36	IEEE 802.11a	OFDM	11.5	11.41	-0.14	Left	Tilt	2	Standard	FL-279-A	6	1:1	0.095	1.021	0.097	
5320	64	IEEE 802.11a	OFDM	11.5	11.27	0.00	Right	Cheek	2	Standard	FL-279-A	6	1:1	0.183	1.054	0.193	
5320	64	IEEE 802.11a	OFDM	11.5	11.27	0.15	Right	Tilt	2	Standard	FL-279-A	6	1:1	0.133	1.054	0.140	
5320	64	IEEE 802.11a	OFDM	11.5	11.27	0.14	Left	Cheek	2	Standard	FL-279-A	6	1:1	0.207	1.054	0.218	
5290	58	IEEE 802.11ac	OFDM	10.5	9.95	-0.06	Left	Cheek	2	Standard	FL-279-A	29.3	1:1	0.134	1.135	0.152	
5320	64	IEEE 802.11a	OFDM	11.5	11.27	-0.13	Left	Tilt	2	Standard	FL-279-A	6	1:1	0.157	1.054	0.165	
5500	100	IEEE 802.11a	OFDM	11.5	11.42	0.18	Right	Cheek	2	Standard	FL-279-A	6	1:1	0.270	1.019	0.275	
5500	100	IEEE 802.11a	OFDM	11.5	11.42	-0.04	Right	Tilt	2	Standard	FL-279-A	6	1:1	0.202	1.019	0.206	
5500	100	IEEE 802.11a	OFDM	11.5	11.42	0.05	Left	Cheek	2	Standard	FL-279-A	6	1:1	0.311	1.019	**0.317**	A6
5530	106	IEEE 802.11ac	OFDM	10.5	10.01	-0.06	Left	Cheek	2	Standard	FL-279-A	29.3	1:1	0.215	1.119	0.241	
5500	100	IEEE 802.11a	OFDM	11.5	11.42	0.00	Left	Tilt	2	Standard	FL-279-A	6	1:1	0.220	1.019	0.224	
5240	48	IEEE 802.11n	OFDM	14.5	14.23	0.10	Right	Cheek	MIMO	Standard	FL-279-A	13	1:1	0.172	1.064	0.183	
5240	48	IEEE 802.11n	OFDM	14.5	14.23	0.05	Right	Tilt	MIMO	Standard	FL-279-A	13	1:1	0.133	1.064	0.142	
5240	48	IEEE 802.11n	OFDM	14.5	14.23	0.04	Left	Cheek	MIMO	Standard	FL-279-A	13	1:1	0.309	1.064	0.329	
5240	48	IEEE 802.11n	OFDM	14.5	14.23	0.03	Left	Tilt	MIMO	Standard	FL-279-A	13	1:1	0.158	1.064	0.168	
5320	64	IEEE 802.11n	OFDM	14.5	13.88	0.00	Right	Cheek	MIMO	Standard	FL-279-A	13	1:1	0.211	1.153	0.243	
5320	64	IEEE 802.11n	OFDM	14.5	13.88	0.14	Right	Tilt	MIMO	Standard	FL-279-A	13	1:1	0.153	1.153	0.176	
5320	64	IEEE 802.11n	OFDM	14.5	13.88	0.16	Left	Cheek	MIMO	Standard	FL-279-A	13	1:1	0.241	1.153	0.278	
5320	64	IEEE 802.11n	OFDM	14.5	13.88	0.17	Left	Tilt	MIMO	Standard	FL-279-A	13	1:1	0.170	1.153	0.196	
5540	108	IEEE 802.11n	OFDM	14.5	14.13	0.05	Right	Cheek	MIMO	Standard	FL-279-A	13	1:1	0.291	1.089	0.317	
5540	108	IEEE 802.11n	OFDM	14.5	14.13	0.17	Right	Tilt	MIMO	Standard	FL-279-A	13	1:1	0.204	1.089	0.222	
5540	108	IEEE 802.11n	OFDM	14.5	14.13	0.15	Left	Cheek	MIMO	Standard	FL-279-A	13	1:1	0.289	1.089	0.315	
5540	108	IEEE 802.11n	OFDM	14.5	14.13	-0.03	Left	Tilt	MIMO	Standard	FL-279-A	13	1:1	0.219	1.089	0.238	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram							

10.2 Standalone Body-Worn SAR Data

Table 10-6
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	4183	UMTS 850	RMC	24.0	23.90	-0.05	10 mm	FL-279-B	N/A	1:1	back	0.556	1.023	0.569	A7
836.60	190	GSM 850	GSM	33.5	32.97	-0.10	10 mm	FL-279-B	1	1:8.3	back	0.515	1.130	**0.582**	A8
1880.00	661	GSM 1900	GSM	30.5	30.40	-0.06	10 mm	FL-279-B	1	1:8.3	back	0.269	1.023	0.275	A10
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 10-7
DTS Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	0.07	10 mm	1	FL-279-B	1	back	1:1	0.112	1.084	0.121	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	0.05	10 mm	2	FL-279-E	1	back	1:1	0.369	1.023	**0.377**	A12
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.07	10 mm	MIMO	FL-279-B	13	back	1:1	0.145	1.009	0.146	
5785	157	IEEE 802.11a	OFDM	11.5	11.37	0.05	10 mm	1	FL-279-B	6	back	1:1	0.045	1.030	0.046	
5775	155	IEEE 802.11ac	OFDM	10.5	9.85	0.20	10 mm	1	FL-279-B	29.3	back	1:1	0.045	1.161	0.052	
5745	149	IEEE 802.11a	OFDM	11.5	11.46	0.18	10 mm	2	FL-279-B	6	back	1:1	0.053	1.009	0.053	A13
5775	155	IEEE 802.11ac	OFDM	10.5	9.94	0.11	10 mm	2	FL-279-B	29.3	back	1:1	0.013	1.138	0.015	
5765	153	IEEE 802.11n	OFDM	14.5	14.16	0.16	10 mm	MIMO	FL-279-B	13	back	1:1	0.042	1.081	0.045	
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 10-8
NII Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
5220	44	IEEE 802.11a	OFDM	11.5	11.23	0.00	10 mm	1	FL-279-B	6	back	1:1	0.089	1.064	0.095	
5210	42	IEEE 802.11ac	OFDM	10.5	10.10	0.02	10 mm	1	FL-279-B	29.3	back	1:1	0.081	1.096	0.089	
5260	52	IEEE 802.11a	OFDM	11.5	11.06	0.01	10 mm	1	FL-279-B	6	back	1:1	0.090	1.107	0.100	
5290	58	IEEE 802.11ac	OFDM	10.5	9.70	0.18	10 mm	1	FL-279-B	29.3	back	1:1	0.081	1.202	0.097	
5500	100	IEEE 802.11a	OFDM	11.5	11.16	-0.20	10 mm	1	FL-279-B	6	back	1:1	0.098	1.081	**0.106**	A14
5530	106	IEEE 802.11ac	OFDM	10.5	10.00	0.02	10 mm	1	FL-279-B	29.3	back	1:1	0.094	1.122	0.105	
5180	36	IEEE 802.11a	OFDM	11.5	11.41	-0.11	10 mm	2	FL-279-B	6	back	1:1	0.034	1.021	0.035	
5210	42	IEEE 802.11ac	OFDM	10.5	10.40	-0.11	10 mm	2	FL-279-B	29.3	back	1:1	0.028	1.023	0.029	
5320	64	IEEE 802.11a	OFDM	11.5	11.27	0.16	10 mm	2	FL-279-B	6	back	1:1	0.052	1.054	0.055	
5290	58	IEEE 802.11ac	OFDM	10.5	9.95	-0.12	10 mm	2	FL-279-B	29.3	back	1:1	0.029	1.135	0.033	
5500	100	IEEE 802.11a	OFDM	11.5	11.42	-0.01	10 mm	2	FL-279-B	6	back	1:1	0.054	1.019	0.055	
5530	106	IEEE 802.11ac	OFDM	10.5	10.01	0.04	10 mm	2	FL-279-B	29.3	back	1:1	0.037	1.119	0.041	
5240	48	IEEE 802.11n	OFDM	14.5	14.23	0.06	10 mm	MIMO	FL-279-B	13	back	1:1	0.080	1.064	0.085	
5320	64	IEEE 802.11n	OFDM	14.5	13.88	0.12	10 mm	MIMO	FL-279-B	13	back	1:1	0.097	1.153	0.112	
5540	108	IEEE 802.11n	OFDM	14.5	14.13	0.16	10 mm	MIMO	FL-279-B	13	back	1:1	0.050	1.089	0.054	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Body 1.6 W/kg (mW/g) averaged over 1 gram**							

10.3 Standalone Wireless Router SAR Data

Table 10-9
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 GPRS Slots	Duty Cycle	Side	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.														
836.60	4183	UMTS 850	RMC	24.0	23.90	-0.05	10 mm	FL-279-B	N/A	1:1	back	0.556	1.023	0.569	A7
836.60	4183	UMTS 850	RMC	24.0	23.90	0.00	10 mm	FL-279-B	N/A	1:1	front	0.411	1.023	0.420	
836.60	4183	UMTS 850	RMC	24.0	23.90	0.01	10 mm	FL-279-B	N/A	1:1	bottom	0.086	1.023	0.088	
836.60	4183	UMTS 850	RMC	24.0	23.90	0.06	10 mm	FL-279-B	N/A	1:1	right	0.301	1.023	0.308	
836.60	4183	UMTS 850	RMC	24.0	23.90	0.00	10 mm	FL-279-B	N/A	1:1	left	0.299	1.023	0.306	
824.20	128	GSM 850	GPRS	29.5	28.65	-0.09	10 mm	FL-279-B	4	1:2.076	back	0.669	1.216	0.814	
836.60	190	GSM 850	GPRS	29.5	28.60	-0.03	10 mm	FL-279-B	4	1:2.076	back	0.718	1.230	0.883	
848.80	251	GSM 850	GPRS	29.5	28.75	0.05	10 mm	FL-279-B	4	1:2.076	back	0.793	1.189	**0.943**	A9
836.60	190	GSM 850	GPRS	29.5	28.60	0.06	10 mm	FL-279-B	4	1:2.076	front	0.509	1.230	0.626	
836.60	190	GSM 850	GPRS	29.5	28.60	0.10	10 mm	FL-279-B	4	1:2.076	bottom	0.108	1.230	0.133	
836.60	190	GSM 850	GPRS	29.5	28.60	-0.12	10 mm	FL-279-B	4	1:2.076	right	0.368	1.230	0.453	
836.60	190	GSM 850	GPRS	29.5	28.60	0.18	10 mm	FL-279-B	4	1:2.076	left	0.350	1.230	0.431	
1880.00	661	GSM 1900	GPRS	29.0	28.79	-0.01	10 mm	FL-279-B	2	1:4.15	back	0.389	1.050	0.408	
1880.00	661	GSM 1900	GPRS	29.0	28.79	0.07	10 mm	FL-279-B	2	1:4.15	front	0.393	1.050	0.413	A11
1880.00	661	GSM 1900	GPRS	29.0	28.79	-0.03	10 mm	FL-279-B	2	1:4.15	bottom	0.328	1.050	0.344	
1880.00	661	GSM 1900	GPRS	29.0	28.79	-0.12	10 mm	FL-279-B	2	1:4.15	right	0.354	1.050	0.372	
1880.00	661	GSM 1900	GPRS	29.0	28.79	0.18	10 mm	FL-279-B	2	1:4.15	left	0.169	1.050	0.177	
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 10-10
WLAN Hotspot SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.															
2412	1	IEEE 802.11b	DSSS	17.5	17.15	0.07	10 mm	1	FL-279-B	1	back	1:1	0.112	1.084	0.121	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	-0.01	10 mm	1	FL-279-B	1	front	1:1	0.074	1.084	0.080	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	-0.17	10 mm	1	FL-279-B	1	top	1:1	0.048	1.084	0.052	
2412	1	IEEE 802.11b	DSSS	17.5	17.15	0.06	10 mm	1	FL-279-B	1	right	1:1	0.055	1.084	0.060	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	0.05	10 mm	2	FL-279-E	1	back	1:1	0.369	1.023	**0.377**	A12
2462	11	IEEE 802.11b	DSSS	15.0	14.90	0.07	10 mm	2	FL-279-E	1	front	1:1	0.271	1.023	0.277	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	-0.16	10 mm	2	FL-279-E	1	top	1:1	0.169	1.023	0.173	
2462	11	IEEE 802.11b	DSSS	15.0	14.90	0.03	10 mm	2	FL-279-E	1	left	1:1	0.108	1.023	0.110	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.07	10 mm	MIMO	FL-279-B	13	back	1:1	0.145	1.009	0.146	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.05	10 mm	MIMO	FL-279-B	13	front	1:1	0.084	1.009	0.085	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.09	10 mm	MIMO	FL-279-B	13	top	1:1	0.055	1.009	0.055	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.13	10 mm	MIMO	FL-279-B	13	right	1:1	0.076	1.009	0.077	
2437	6	IEEE 802.11n	OFDM	15.0	14.96	0.18	10 mm	MIMO	FL-279-B	13	left	1:1	0.008	1.009	0.008	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

10.4 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, and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements. A specialized battery with NFC antenna 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 Publication 648474 D04v01, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01 v01, variability SAR tests were not required since the measured SAR results for all frequency bands were less than 0.8 W/kg. Please see Section 12 for more information.
9. 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 5.7 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 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
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 was used.

UMTS Notes:

1. UMTS mode in 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 was used.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI SISO operations: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other SISO 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 October 2012 FCC/TCB Meeting Notes for SISO 5 GHz WIFI operations: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE SISO 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. Per April 2013 TCB Workshop notes, full SISO SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac SISO was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
4. When Hotspot is enabled, all 5 GHz bands are disabled. Therefore no 5 GHz WIFI Wireless Router SAR Data was required.
5. Per KDB 248227, SAR for MIMO was measured with both antennas transmitting simultaneously and was evaluated independently of SISO operation. For 2.4 GHz MIMO, 802.11n 20 MHz bandwidth was evaluated. For 5 GHz MIMO, 802.11n 20 MHz bandwidth was evaluated.
6. WIFI transmission was verified using an uncalibrated spectrum analyzer.
7. 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 default channels was required.

11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 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/ac and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

11.2 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 and IEEE 1528-2013 Section 6.3.4.1.2, 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 11-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth	2480	9.00	10	0.168

Note: Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

11.3 Head SAR Simultaneous Transmission Analysis

Table 11-2
Simultaneous Transmission Scenario with 2.4 GHz WLAN Antenna 1 (Held to Ear)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.332	0.190	0.522
	Right Tilt	0.187	0.147	0.334
	Left Cheek	0.329	0.505	**0.834**
	Left Tilt	0.180	0.261	0.441

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.347	0.190	0.537
	Right Tilt	0.194	0.147	0.341
	Left Cheek	0.328	0.505	**0.833**
	Left Tilt	0.200	0.261	0.461

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.248	0.190	0.438
	Right Tilt	0.169	0.147	0.316
	Left Cheek	0.203	0.505	**0.708**
	Left Tilt	0.155	0.261	0.416

Table 11-3
Simultaneous Transmission Scenario with 2.4 GHz WLAN Antenna 2 (Held to Ear)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.332	0.647	**0.979**	Head SAR	Right Cheek	0.347	0.647	**0.994**
	Right Tilt	0.187	0.694	0.881		Right Tilt	0.194	0.694	0.888
	Left Cheek	0.329	0.486	0.815		Left Cheek	0.328	0.486	0.814
	Left Tilt	0.180	0.504	0.684		Left Tilt	0.200	0.504	0.704

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.248	0.647	**0.895**
	Right Tilt	0.169	0.694	0.863
	Left Cheek	0.203	0.486	0.689
	Left Tilt	0.155	0.504	0.659

Table 11-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Held to Ear)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.332	0.220	0.552	Head SAR	Right Cheek	0.347	0.220	0.567
	Right Tilt	0.187	0.152	0.339		Right Tilt	0.194	0.152	0.346
	Left Cheek	0.329	0.531	**0.860**		Left Cheek	0.328	0.531	**0.859**
	Left Tilt	0.180	0.278	0.458		Left Tilt	0.200	0.278	0.478

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.248	0.220	0.468
	Right Tilt	0.169	0.152	0.321
	Left Cheek	0.203	0.531	**0.734**
	Left Tilt	0.155	0.278	0.433

Table 11-5
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Held to Ear)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.332	0.076	0.408	Head SAR	Right Cheek	0.347	0.076	0.423
	Right Tilt	0.187	0.049	0.236		Right Tilt	0.194	0.049	0.243
	Left Cheek	0.329	0.215	**0.544**		Left Cheek	0.328	0.215	**0.543**
	Left Tilt	0.180	0.071	0.251		Left Tilt	0.200	0.071	0.271

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.248	0.076	0.324
	Right Tilt	0.169	0.049	0.218
	Left Cheek	0.203	0.215	**0.418**
	Left Tilt	0.155	0.071	0.226

Table 11-6
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 2 (Held to Ear)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.332	0.275	0.607	Head SAR	Right Cheek	0.347	0.275	0.622
	Right Tilt	0.187	0.206	0.393		Right Tilt	0.194	0.206	0.400
	Left Cheek	0.329	0.317	**0.646**		Left Cheek	0.328	0.317	**0.645**
	Left Tilt	0.180	0.224	0.404		Left Tilt	0.200	0.224	0.424

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.248	0.275	**0.523**
	Right Tilt	0.169	0.206	0.375
	Left Cheek	0.203	0.317	0.520
	Left Tilt	0.155	0.224	0.379

Table 11-7
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Held to Ear)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.332	0.317	0.649	Head SAR	Right Cheek	0.347	0.317	**0.664**
	Right Tilt	0.187	0.222	0.409		Right Tilt	0.194	0.222	0.416
	Left Cheek	0.329	0.329	**0.658**		Left Cheek	0.328	0.329	0.657
	Left Tilt	0.180	0.239	0.419		Left Tilt	0.200	0.239	0.439

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.248	0.317	**0.565**
	Right Tilt	0.169	0.222	0.391
	Left Cheek	0.203	0.329	0.532
	Left Tilt	0.155	0.239	0.394

11.4 Body-Worn Simultaneous Transmission Analysis

Table 11-8
Simultaneous Transmission Scenario with 2.4 GHz WLAN Antenna 1 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.121	0.690
Back Side	GSM 850	0.582	0.121	0.703
Back Side	GSM 1900	0.275	0.121	0.396

Table 11-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN Antenna 2 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.377	0.946
Back Side	GSM 850	0.582	0.377	0.959
Back Side	GSM 1900	0.275	0.377	0.652

Table 11-10
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.146	0.715
Back Side	GSM 850	0.582	0.146	0.728
Back Side	GSM 1900	0.275	0.146	0.421

Table 11-11
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.106	0.675
Back Side	GSM 850	0.582	0.106	0.688
Back Side	GSM 1900	0.275	0.106	0.381

Table 11-12
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 2 (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.055	0.624
Back Side	GSM 850	0.582	0.055	0.637
Back Side	GSM 1900	0.275	0.055	0.330

Table 11-13
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.112	0.681
Back Side	GSM 850	0.582	0.112	0.694
Back Side	GSM 1900	0.275	0.112	0.387

Table 11-14
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	UMTS 850	0.569	0.168	0.737
Back Side	GSM 850	0.582	0.168	0.750
Back Side	GSM 1900	0.275	0.168	0.443

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.

11.5 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 11-15
Simultaneous Transmission Scenario (2.4 GHz Antenna 1 at 1.0 cm)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.569	0.121	**0.690**	Body SAR	Back	0.943	0.121	**1.064**
	Front	0.420	0.080	0.500		Front	0.626	0.080	0.706
	Top	-	0.052	0.052		Top	-	0.052	0.052
	Bottom	0.088	-	0.088		Bottom	0.133	-	0.133
	Right	0.308	0.060	0.368		Right	0.453	0.060	0.513
	Left	0.306	-	0.306		Left	0.431	-	0.431

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.408	0.121	**0.529**
	Front	0.413	0.080	0.493
	Top	-	0.052	0.052
	Bottom	0.344	-	0.344
	Right	0.372	0.060	0.432
	Left	0.177	-	0.177

Table 11-16
Simultaneous Transmission Scenario (2.4 GHz WLAN Antenna 2 at 1.0 cm)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.569	0.377	**0.946**	Body SAR	Back	0.943	0.377	**1.320**
	Front	0.420	0.277	0.697		Front	0.626	0.277	0.903
	Top	-	0.173	0.173		Top	-	0.173	0.173
	Bottom	0.088	-	0.088		Bottom	0.133	-	0.133
	Right	0.308	-	0.308		Right	0.453	-	0.453
	Left	0.306	0.110	0.416		Left	0.431	0.110	0.541

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.408	0.377	**0.785**
	Front	0.413	0.277	0.690
	Top	-	0.173	0.173
	Bottom	0.344	-	0.344
	Right	0.372	-	0.372
	Left	0.177	0.110	0.287

Table 11-17
Simultaneous Transmission Scenario (2.4 GHz WLAN MIMO at 1.0 cm)

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.569	0.146	**0.715**	Body SAR	Back	0.943	0.146	**1.089**
	Front	0.420	0.085	0.505		Front	0.626	0.085	0.711
	Top	-	0.055	0.055		Top	-	0.055	0.055
	Bottom	0.088	-	0.088		Bottom	0.133	-	0.133
	Right	0.308	0.077	0.385		Right	0.453	0.077	0.530
	Left	0.306	0.008	0.314		Left	0.431	0.008	0.439

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.408	0.146	**0.554**
	Front	0.413	0.085	0.498
	Top	-	0.055	0.055
	Bottom	0.344	-	0.344
	Right	0.372	0.077	0.449
	Left	0.177	0.008	0.185

11.6 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 and IEEE 1528-2013 Section 6.3.4.1.2.

12 SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was not required since all measured SAR values were < 0.8 W/kg.

12.2 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.

13 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Anritsu	MA24106A	USB Power Sensor	12/18/2013	Annual	12/18/2014	1344545
Anritsu	MA24106A	USB Power Sensor	12/18/2013	Annual	12/18/2014	1344559
Anritsu	MT8820C	Radio Communication Analyzer	12/12/2013	Annual	12/12/2014	6201300731
Anritsu	MA24106A	USB Power Sensor	5/14/2014	Annual	5/14/2015	1248508
Anritsu	MA2411B	Pulse Power Sensor	11/14/2013	Annual	11/14/2014	1126066
Anritsu	MA24106A	USB Power Sensor	5/15/2014	Annual	5/15/2015	1244512
Anritsu	MT8820C	Radio Communication Analyzer	12/12/2013	Annual	12/12/2014	6200901190
Anritsu	MA24106A	USB Power Sensor	5/14/2014	Annual	5/14/2015	1244515
Anritsu	ML2495A	Power Meter	10/31/2013	Annual	10/31/2014	1039008
Anritsu	MA2411B	Pulse Power Sensor	3/25/2014	Annual	3/25/2015	1207470
Anritsu	MA24106A	USB Power Sensor	1/3/2014	Annual	1/3/2015	1349509
Anritsu	MA24106A	USB Power Sensor	1/3/2014	Annual	1/3/2015	1349514
Anritsu	MA2411B	Pulse Power Sensor	2/3/2014	Annual	2/3/2015	1339018
Anritsu	MA24106A	USB Power Sensor	1/3/2014	Annual	1/3/2015	1344554
Anritsu	ML2469A	Power Meter	3/14/2014	Annual	3/14/2015	1306009
Anritsu	MA24106A	USB Power Sensor	5/14/2014	Annual	5/14/2015	1231538
Anritsu	MA2481A	Power Sensor	10/30/2013	Annual	10/30/2014	5605
Anritsu	MT8820C	Radio Communication Analyzer	5/6/2014	Annual	5/6/2015	6201144419
Anritsu	MA24106A	USB Power Sensor	1/3/2014	Annual	1/3/2015	1344557
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
Control Company	61220-416	Long-Stem Thermometer	4/29/2014	Biennial	4/29/2016	111331323
Control Company	36934-158	Wall-Mounted Thermometer	4/29/2014	Biennial	4/29/2016	122014488
Fisher Scientific	S97611	Thermometer	4/12/2013	Biennial	4/12/2015	130219304
Fisher Scientific	S407993	Long Stem Thermometer	11/4/2013	Biennial	11/4/2015	130671801
Fisher Scientific	S407993	Long Stem Thermometer	11/4/2013	Biennial	11/4/2015	130671821
Fisher Scientific	S407993	Long Stem Thermometer	11/4/2013	Biennial	11/4/2015	130671826
Fisher Scientific	S97611	Thermometer	4/12/2013	Biennial	4/12/2015	130219303
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/30/2013	Annual	10/30/2014	1833460
Gigatronics	8651A	Universal Power Meter	10/30/2013	Annual	10/30/2014	8650319
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	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
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
Mitutoyo	CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264162
Mitutoyo	CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264165
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	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	4/15/2014	Annual	4/15/2015	102060
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Rohde & Schwarz	SME06	Signal Generator	10/30/2013	Annual	10/30/2014	832026
Rohde & Schwarz	NRVD	Dual Channel Power Meter	10/12/2012	Biennial	10/12/2014	101695
Rohde & Schwarz	NRVS	Single Channel Power Meter	10/31/2013	Annual	10/31/2014	835360/0079
Rohde & Schwarz	CMU200	Base Station Simulator	6/6/2014	Annual	6/6/2015	109892
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	N/A
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	22313
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/16/2014	Annual	4/16/2015	B010177
VWR	36934-158	Wall-Mounted Thermometer	8/8/2013	Biennial	8/8/2015	130477877
VWR	36934-158	Wall-Mounted Thermometer	8/8/2013	Biennial	8/8/2015	130477866

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.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/6/2014	Annual	5/6/2015	1070
SPEAG	DAK-3.5	Dielectric Assessment Kit	11/13/2013	Annual	11/13/2014	1091
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/18/2013	Annual	8/18/2014	1008
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/18/2013	Annual	8/18/2014	1009
SPEAG	D835V2	835 MHz SAR Dipole	4/7/2014	Annual	4/7/2015	4d119
SPEAG	D1900V2	1900 MHz SAR Dipole	2/27/2014	Annual	2/27/2015	5d148
SPEAG	D2450V2	2450 MHz SAR Dipole	1/21/2014	Annual	1/21/2015	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/27/2014	Annual	1/27/2015	1057
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/23/2013	Annual	9/23/2014	1007
SPEAG	ES3DV3	SAR Probe	11/25/2013	Annual	11/25/2014	3332
SPEAG	ES3DV3	SAR Probe	4/11/2014	Annual	4/11/2015	3213
SPEAG	ES3DV3	SAR Probe	4/17/2014	Annual	4/17/2015	3319
SPEAG	EX3DV4	SAR Probe	10/23/2013	Annual	10/23/2014	3914
SPEAG	ES3DV3	SAR Probe	9/23/2013	Annual	9/23/2014	3288
SPEAG	EX3DV4	SAR Probe	12/18/2013	Annual	12/18/2014	3920
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/18/2013	Annual	11/18/2014	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/17/2014	Annual	3/17/2015	1364
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2014	Annual	4/11/2015	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/19/2013	Annual	11/19/2014	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2013	Annual	9/17/2014	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/12/2013	Annual	12/12/2014	649
Agilent	N5182A	MXG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY47420651
Agilent	E4438C	ESG Vector Signal Generator	4/25/2014	Annual	4/25/2015	MY42082385
Agilent	N5182A	MXG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY47420800
Agilent	8753ES	S-Parameter Network Analyzer	10/29/2013	Annual	10/29/2014	US39170122
Agilent	E5515C	Wireless Communications Test Set	3/28/2014	Annual	3/28/2015	GB42230325
Agilent	E4438C	ESG Vector Signal Generator	4/1/2014	Annual	4/1/2015	MY47270002
Agilent	E5515C	Wireless Communications Test Set	9/24/2012	Biennial	9/24/2014	GB43163447
Agilent	8753ES	S-Parameter Network Analyzer	5/22/2014	Annual	5/22/2015	US39170118
Agilent	E4438C	ESG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY45090700
Agilent	E4438C	ESG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY45091346
Agilent	E4438C	ESG Vector Signal Generator	3/31/2014	Annual	3/31/2015	MY42082659
Agilent	8648D	(9kHz-4GHz) Signal Generator	4/15/2014	Annual	4/15/2015	3629U00687
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/15/2014	Annual	4/15/2015	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433978
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433977
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433976
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433975
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971

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.

14 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

15 CONCLUSION

15.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

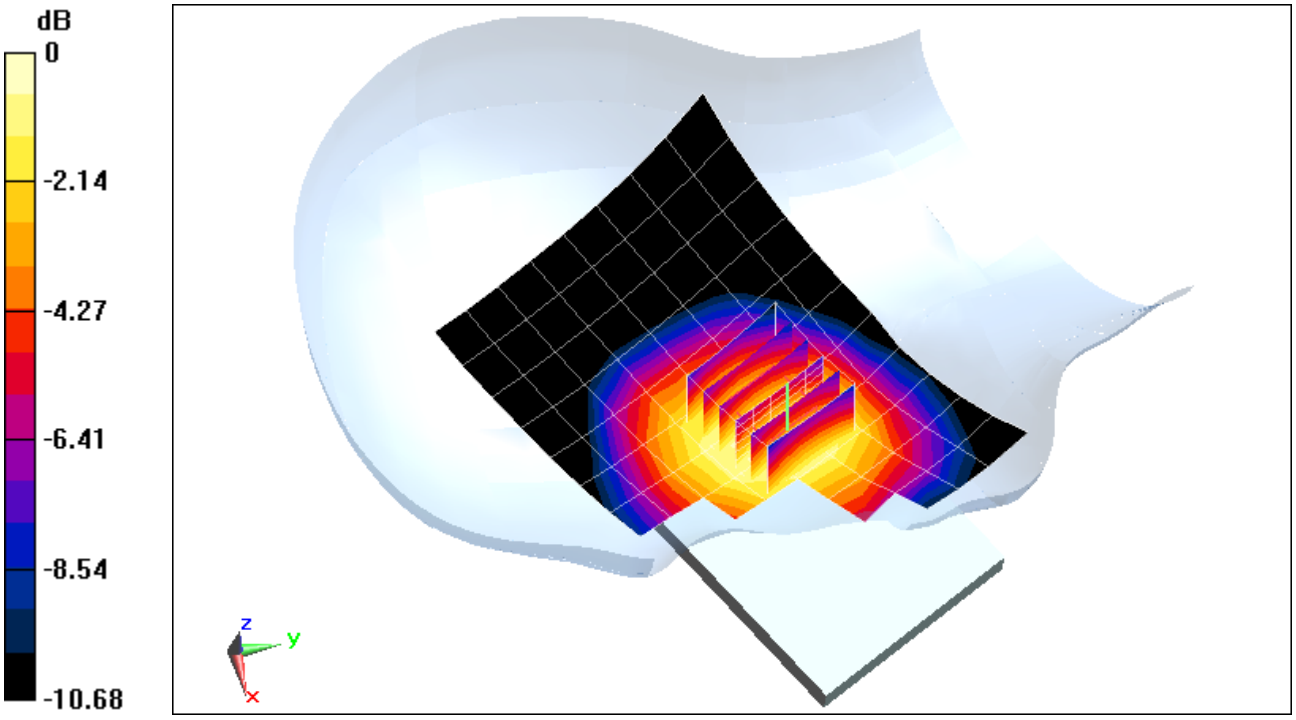
Communication System: UID 0, UMTS; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.905 S/m; ε_r = 40.097; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-04-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3332; ConvF(6.29, 6.29, 6.29); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.52 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.406 W/kg
SAR(1 g) = 0.325 W/kg



0 dB = 0.356 W/kg = -4.49 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

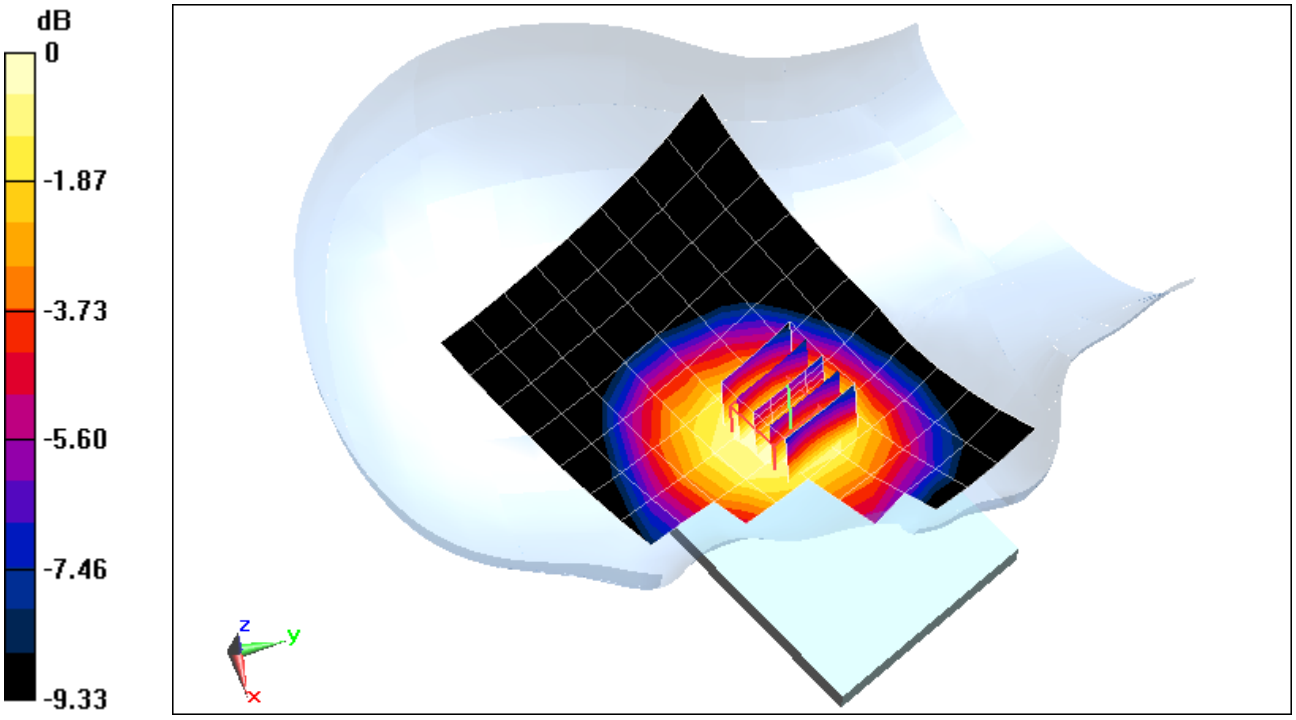
Communication System: UID 0, GSM; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.905$ S/m; $\varepsilon_r = 40.097$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 08-04-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3332; ConvF(6.29, 6.29, 6.29); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.35 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.384 W/kg
SAR(1 g) = 0.307 W/kg



0 dB = 0.335 W/kg = -4.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

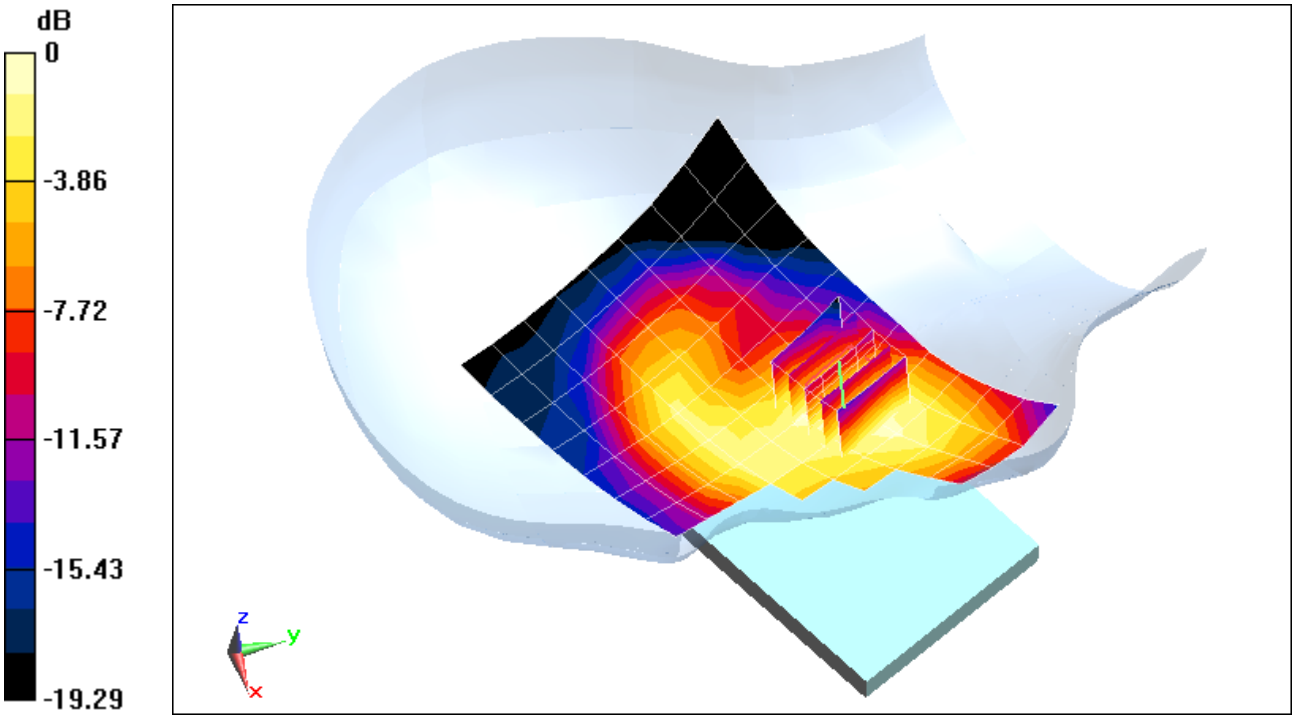
Communication System: UID 0, GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.41 S/m; ε_r = 39.795; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-05-2014; Ambient Temp: 22.3°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3213; ConvF(4.99, 4.99, 4.99); Calibrated: 4/11/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 3/17/2014
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Mode: GSM 1900, Right Head, Cheek, Mid.ch

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.74 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.368 W/kg
SAR(1 g) = 0.242 W/kg



0 dB = 0.275 W/kg = -5.61 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-E

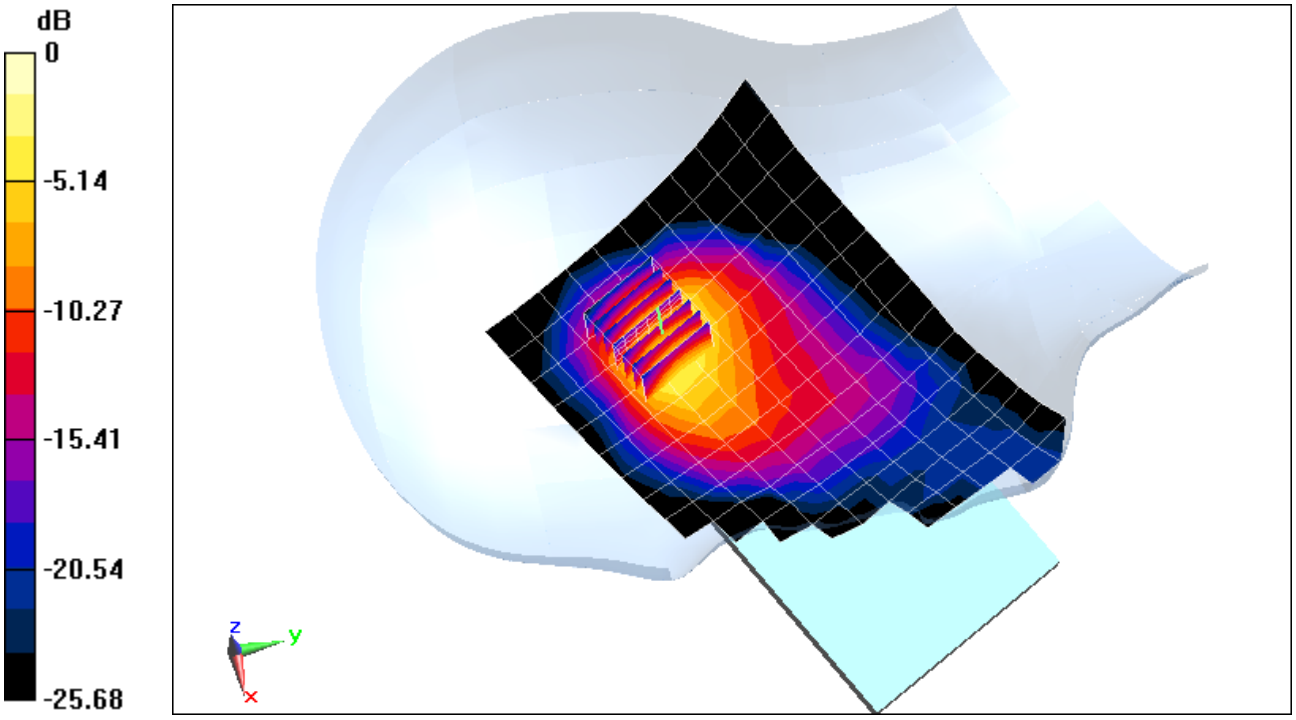
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.88 S/m; ε_r = 39.622; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-11-2014; Ambient Temp: 22.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.45, 4.45, 4.45); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: SAM; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b Antenna 2, Right Head, Tilt, Ch 11, 1 Mbps

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.29 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.678 W/kg



0 dB = 0.864 W/kg = -0.63 dBW/kg

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-A

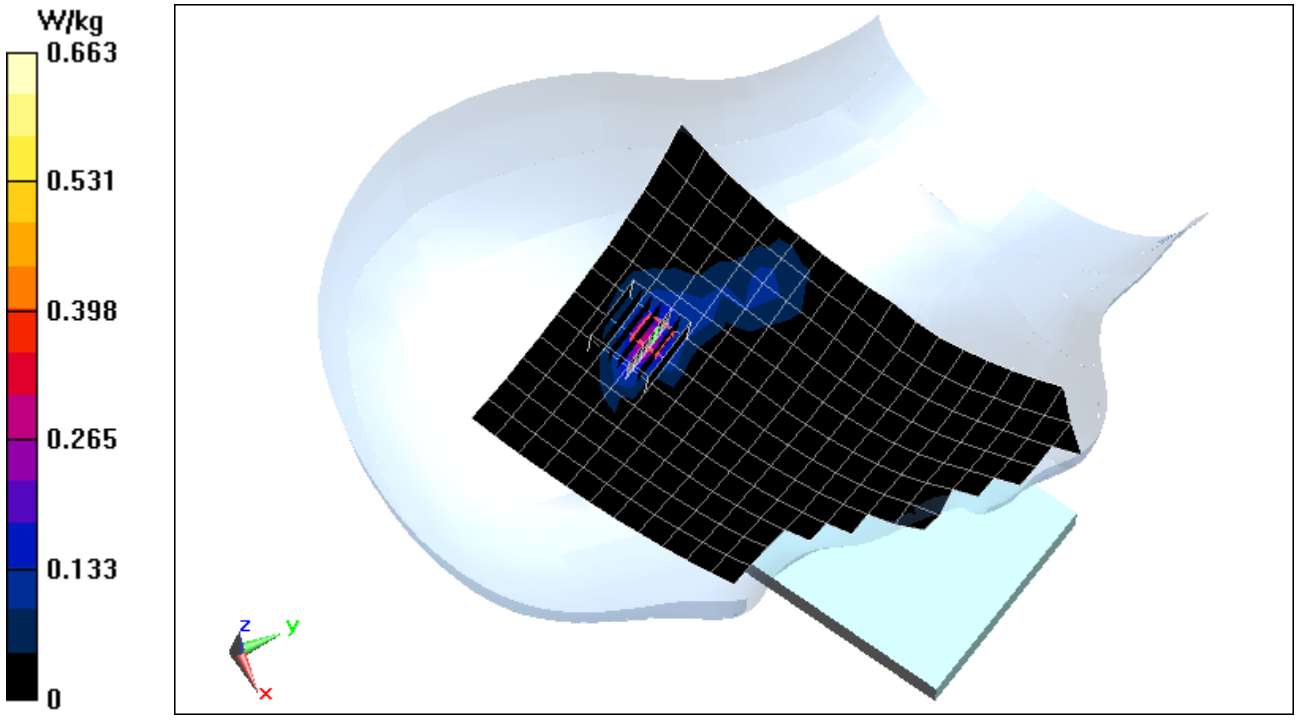
Communication System: UID 0, IEEE 802.11n; Frequency: 5765 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5765 MHz; σ = 5.162 S/m; ε_r = 35.773; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-07-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n MIMO, 5.8 GHz, Right Head, Cheek, Ch 153, 13 Mbps

Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 6.912 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.11 W/kg
SAR(1 g) = 0.214 W/kg



DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-A

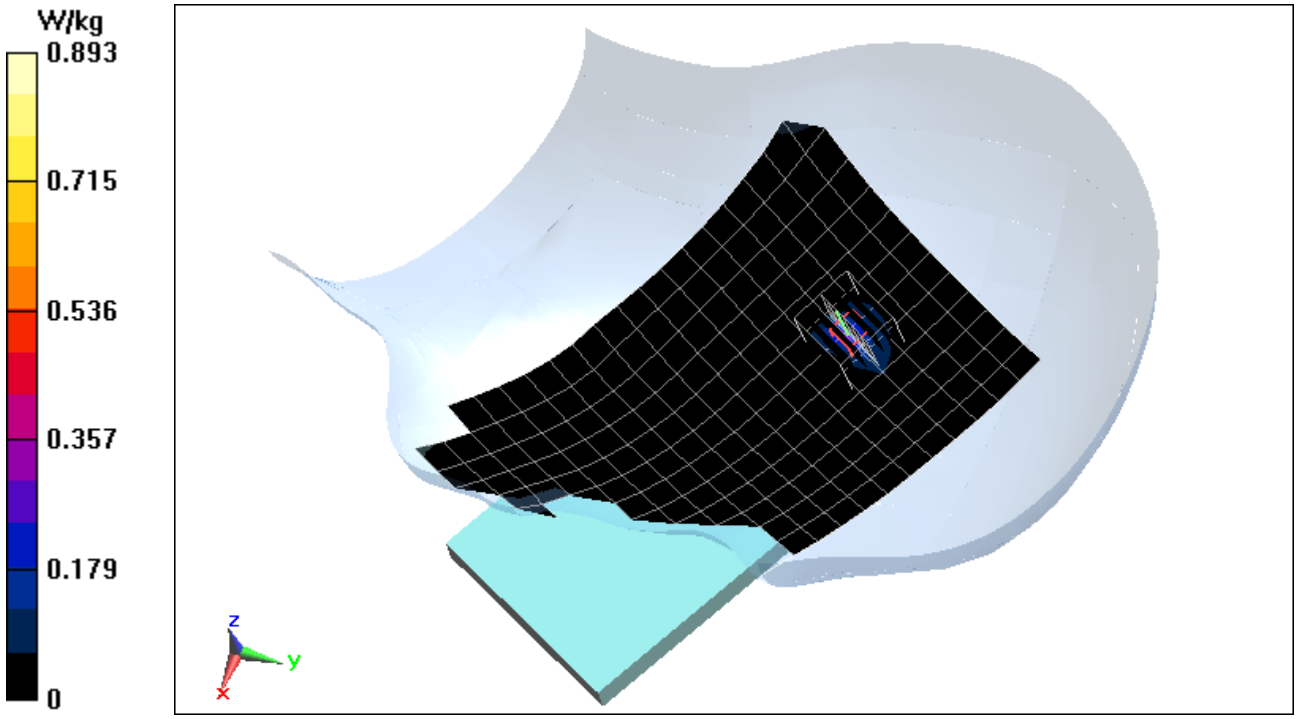
Communication System: UID 0, IEEE 802.11a; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5500 MHz; σ = 4.879 S/m; ε_r = 36.105; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-07-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3914; ConvF(4.55, 4.55, 4.55); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a Antenna 2, 5.5 GHz, Left Head, Cheek, Ch 100, 6 Mbps

Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.122 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.36 W/kg
SAR(1 g) = 0.311 W/kg



DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

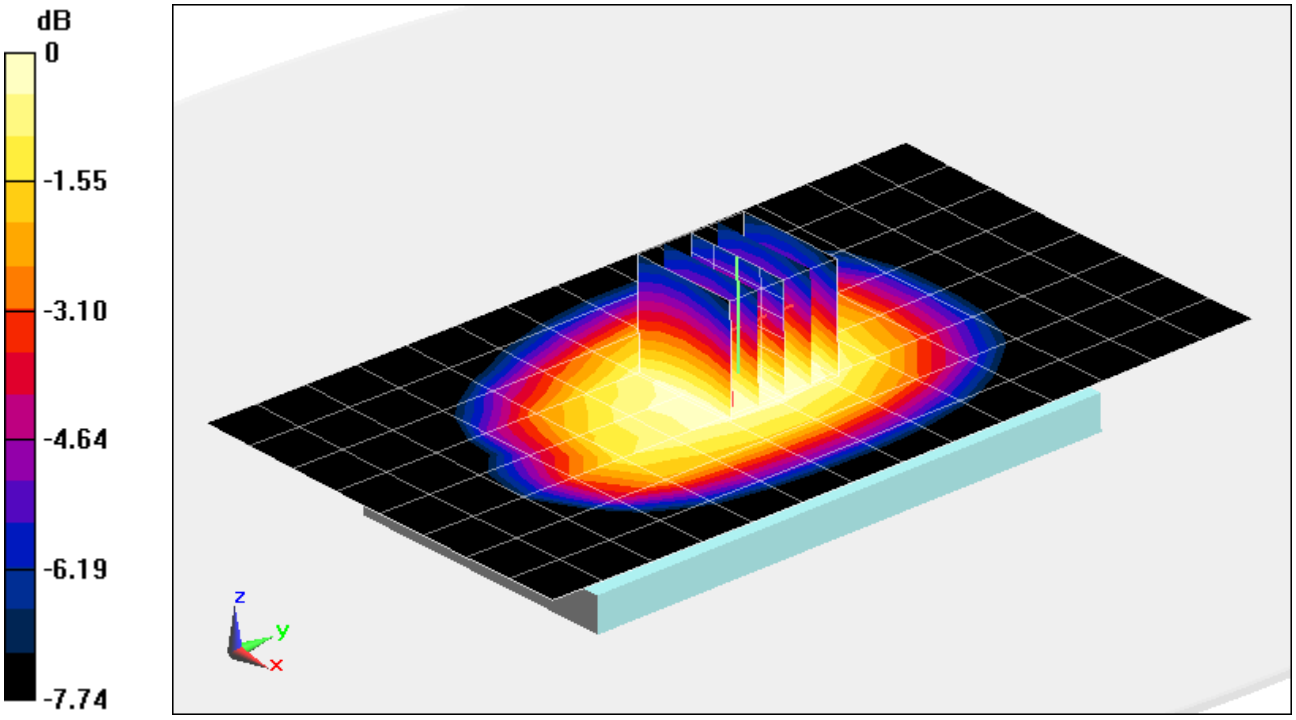
Communication System: UID 0, UMTS; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.01 S/m; ε_r = 53.433; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(6.08, 6.08, 6.08); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.37 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.693 W/kg
SAR(1 g) = 0.556 W/kg



0 dB = 0.606 W/kg = -2.18 dBW/kg

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

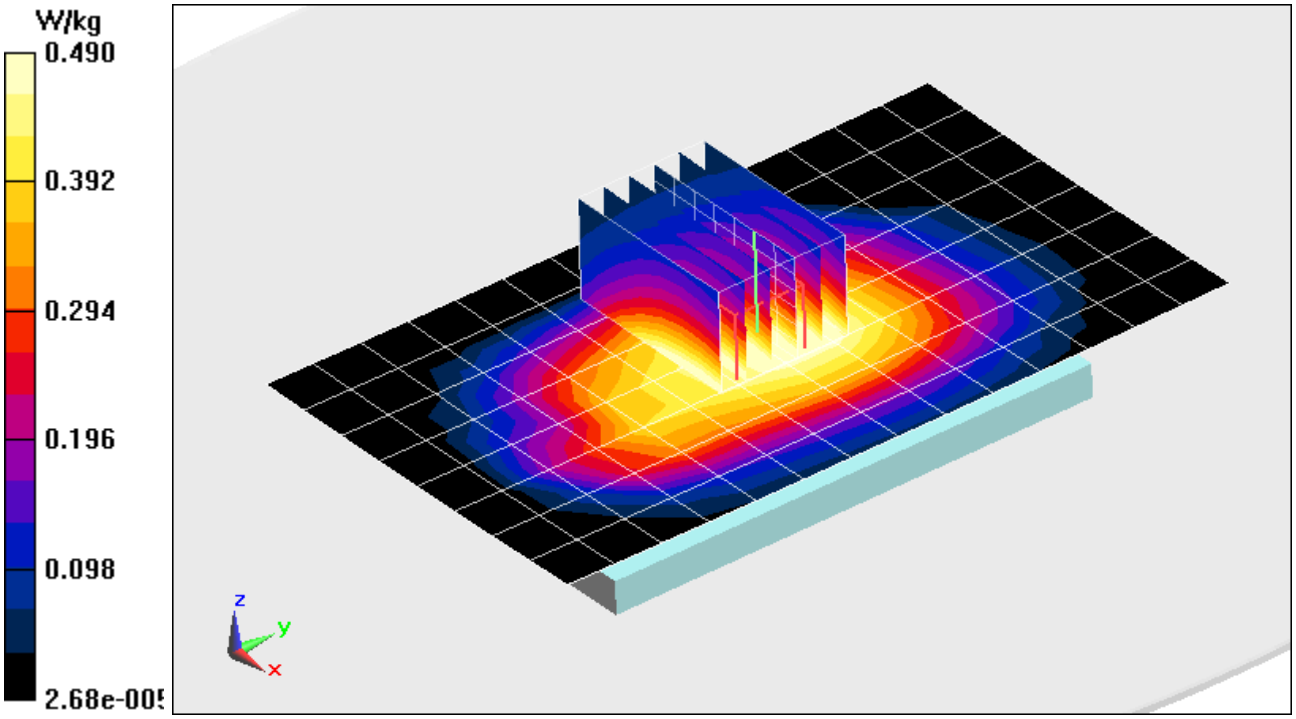
Communication System: UID 0, GSM; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 1.01$ S/m; $\varepsilon_r = 53.433$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(6.08, 6.08, 6.08); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (8x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.53 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.645 W/kg
SAR(1 g) = 0.515 W/kg



DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

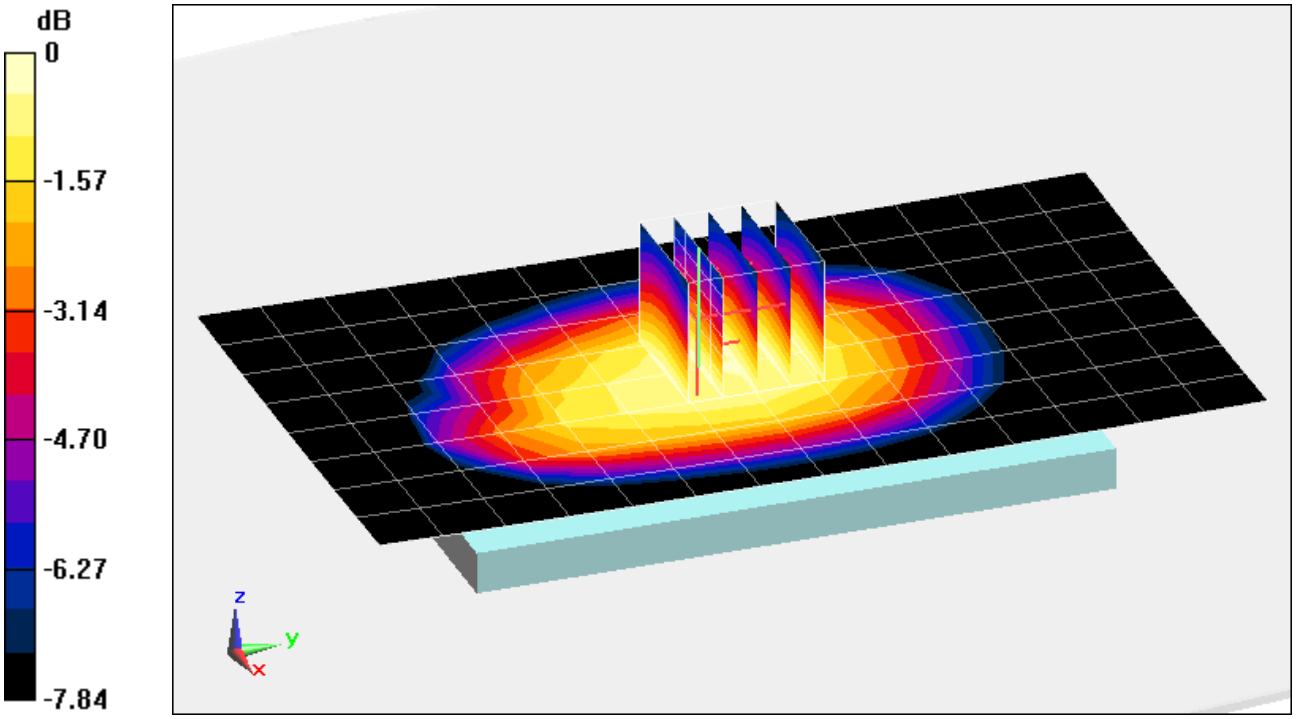
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 848.8 MHz;Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
$f = 848.8$ MHz; $\sigma = 1.022$ S/m; $\varepsilon_r = 53.288$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(6.08, 6.08, 6.08); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 850, Body SAR, Back side, High.ch, 4 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.77 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.992 W/kg
SAR(1 g) = 0.793 W/kg



0 dB = 0.869 W/kg = -0.61 dBW/kg

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

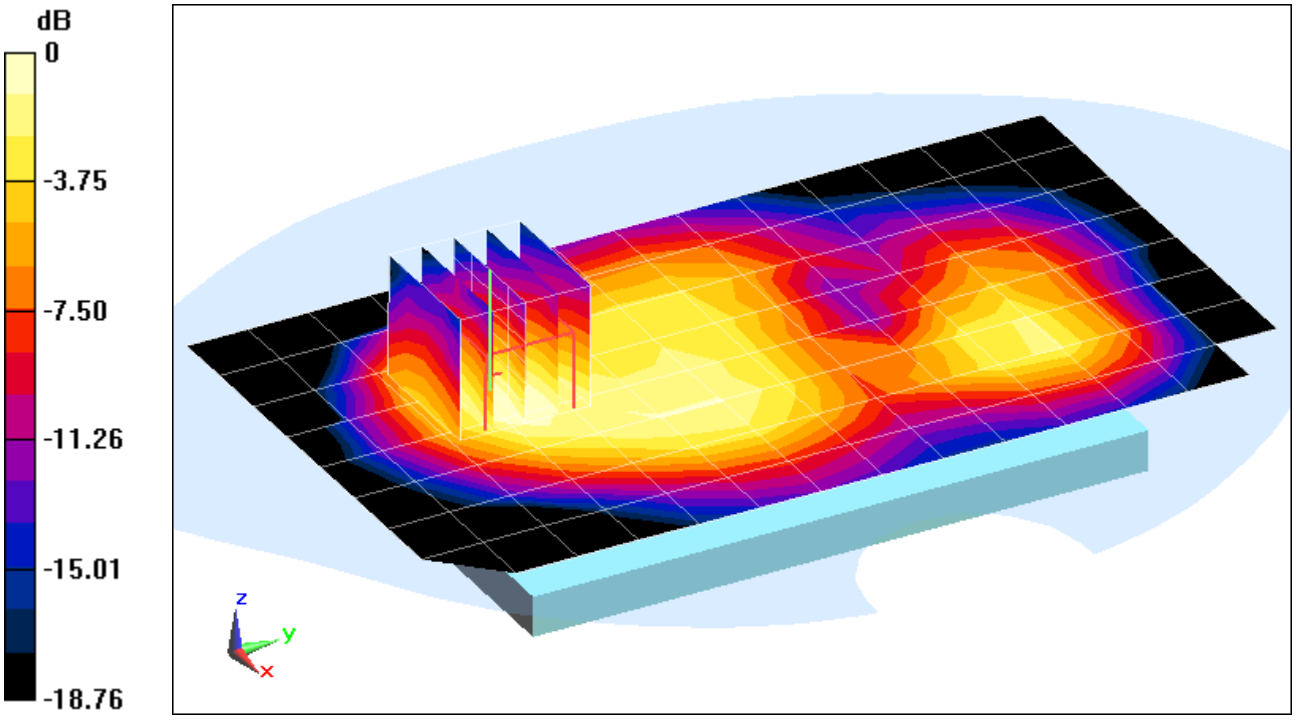
Communication System: UID 0, GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.525 S/m; ε_r = 50.885; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/23/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/17/2013
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.02 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.438 W/kg
SAR(1 g) = 0.269 W/kg



0 dB = 0.321 W/kg = -4.93 dBW/kg

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

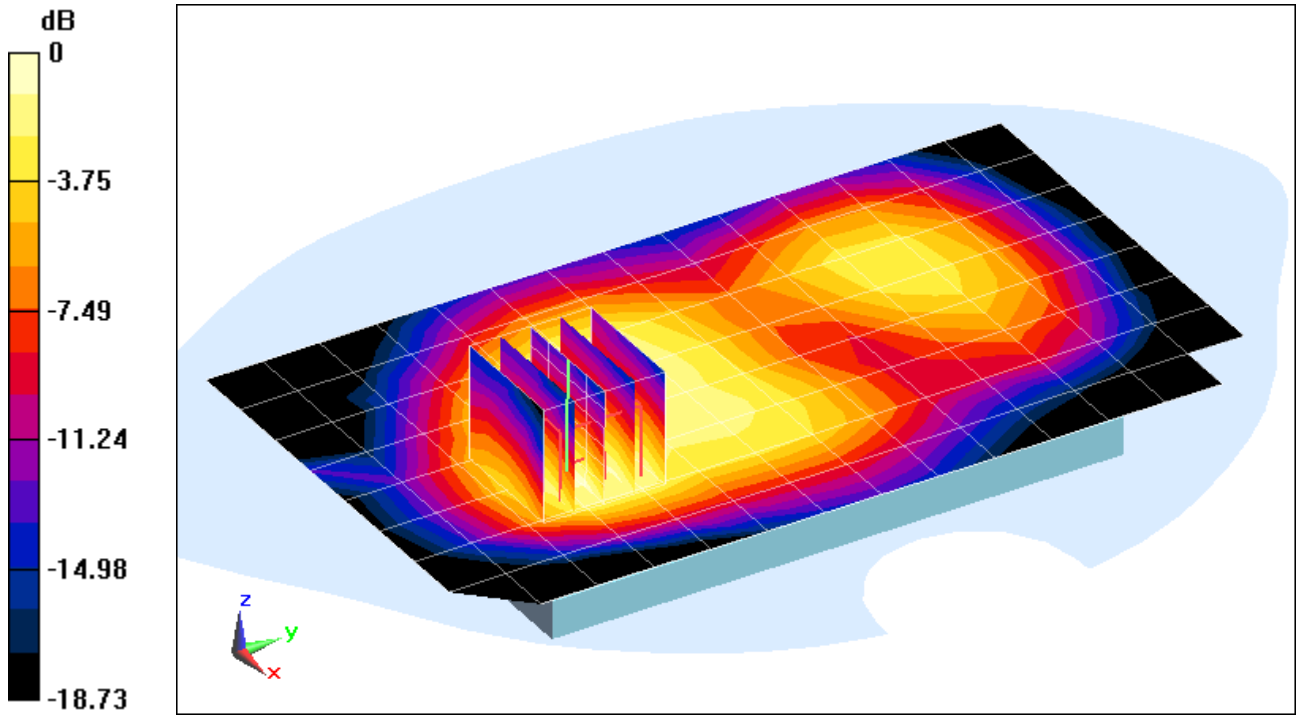
Communication System: UID 0, GSM1900 GPRS; 2 Tx slots; Frequency: 1880 MHz;Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.525 S/m; ε_r = 50.885; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/23/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/17/2013
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.45 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.675 W/kg
SAR(1 g) = 0.393 W/kg



0 dB = 0.475 W/kg = -3.23 dBW/kg

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-E

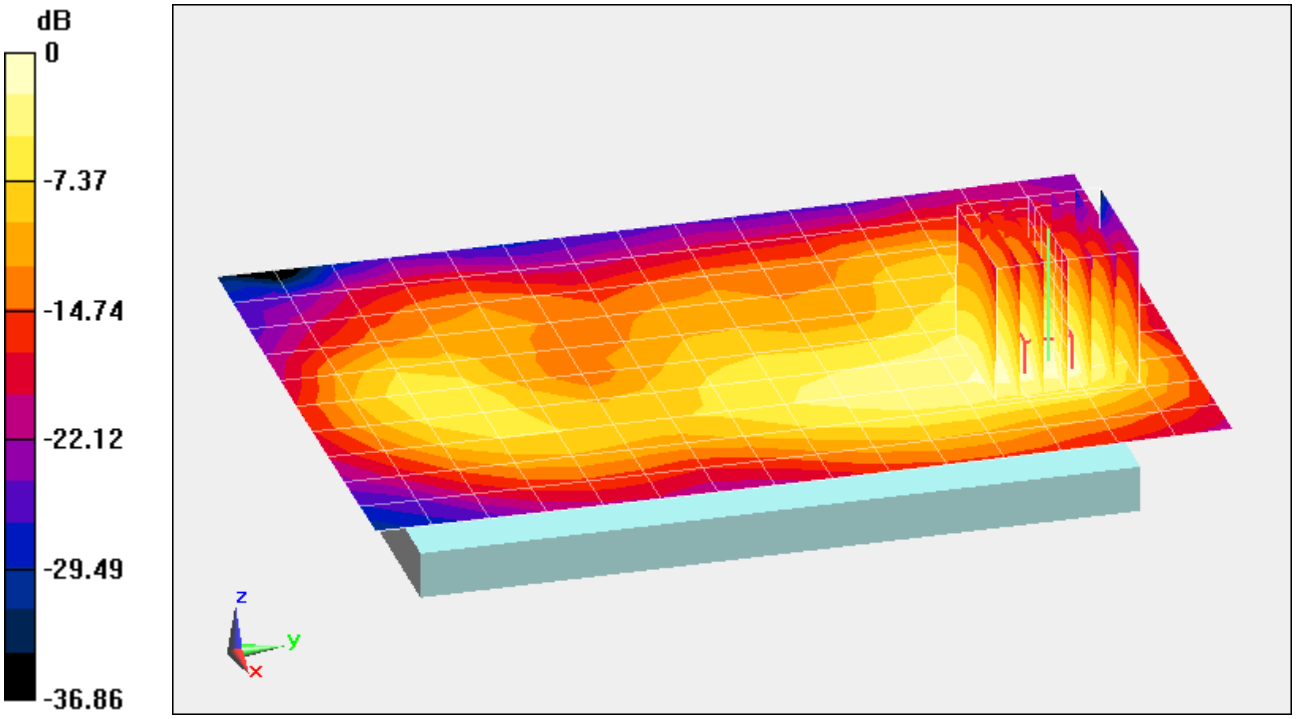
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.96 S/m; ε_r = 51.869; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-11-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.24, 4.24, 4.24); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b Antenna 2, Body SAR, Ch 11, 1 Mbps, Back Side

Area Scan (11x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.14 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.753 W/kg
SAR(1 g) = 0.369 W/kg



0 dB = 0.479 W/kg = -3.20 dBW/kg

DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

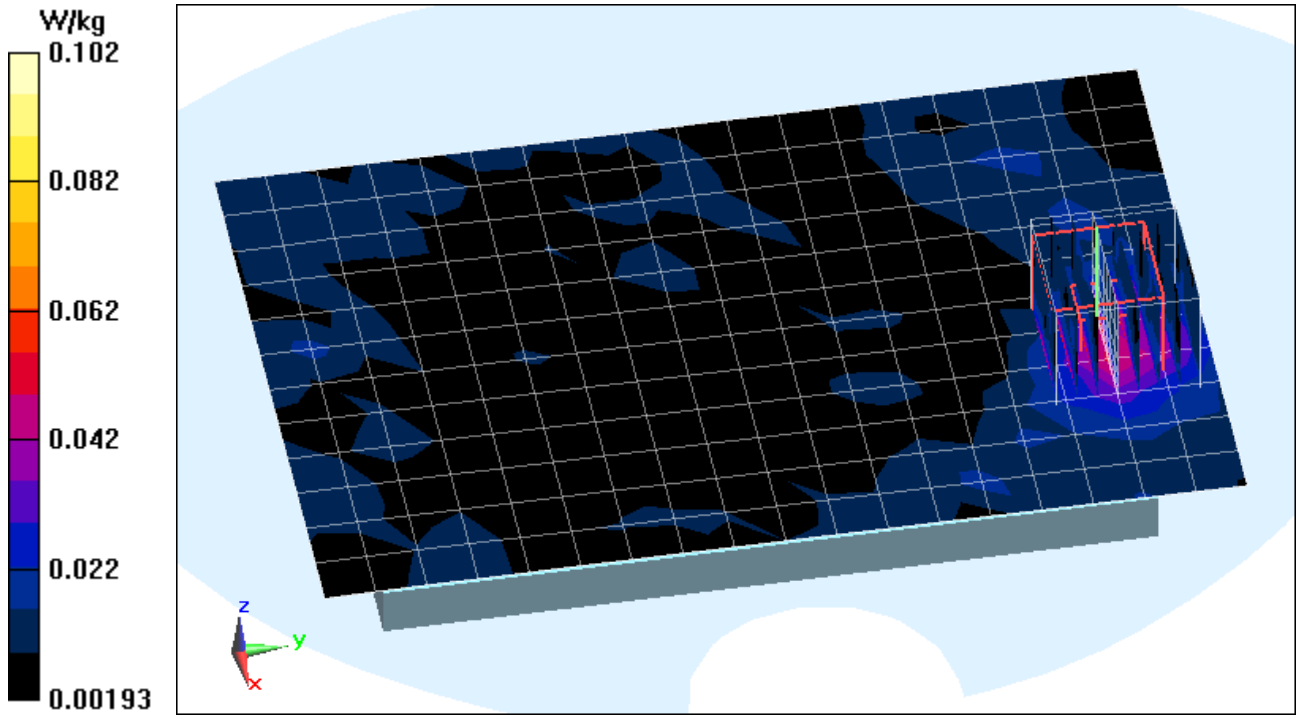
Communication System: UID 0, IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5745 MHz; σ = 5.934 S/m; ε_r = 46.697; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.9°C

Probe: EX3DV4 - SN3920; ConvF(4, 4, 4); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a Antenna 2, 5.8 GHz, Body SAR, Ch 149, 6 Mbps, Back Side

Area Scan (13x19x1): 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 = 2.762 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.179 W/kg
SAR(1 g) = 0.053 W/kg



DUT: A3LSWDSC02G; Type: Portable Handset; Serial: FL-279-B

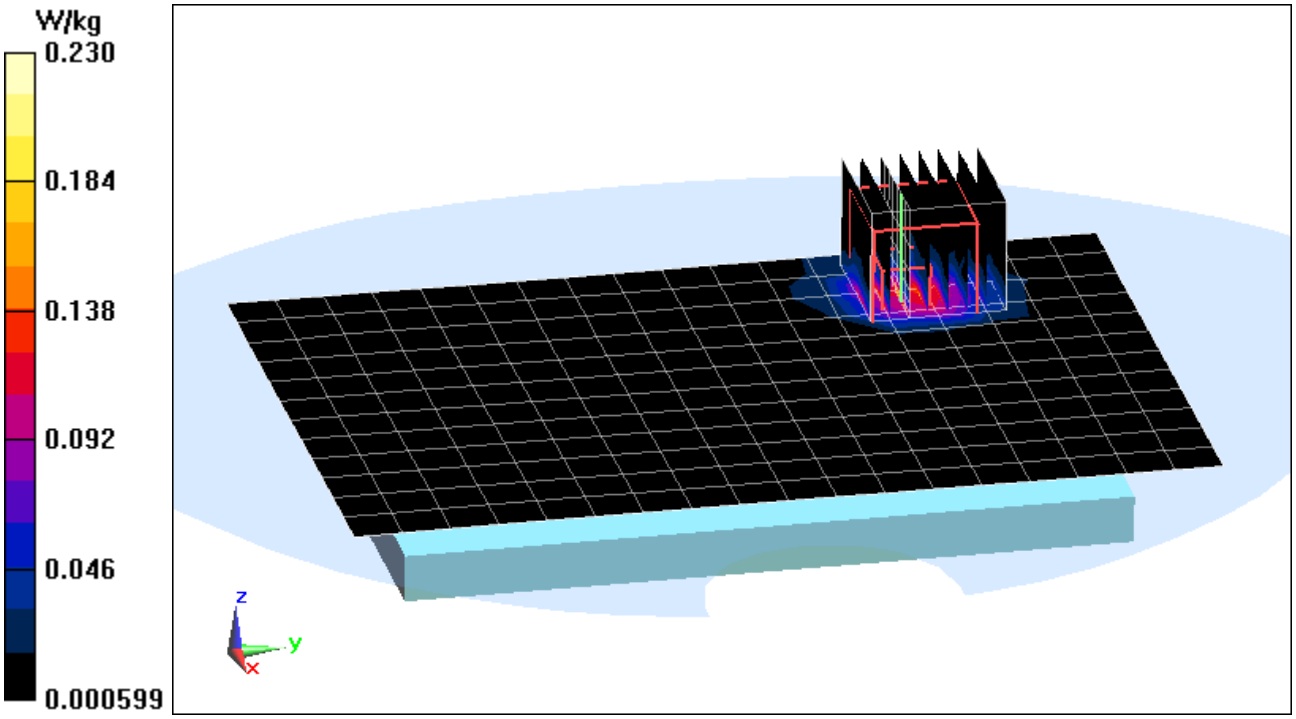
Communication System: UID 0, IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5500 MHz; σ = 5.657 S/m; ε_r = 47.216; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.9°C

Probe: EX3DV4 - SN3920; ConvF(3.8, 3.8, 3.8); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a Antenna 1, 5.5 GHz, Body SAR, Ch 100, 6 Mbps, Back Side

Area Scan (13x19x1): 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 = 4.483 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 0.407 W/kg
SAR(1 g) = 0.098 W/kg



APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d119

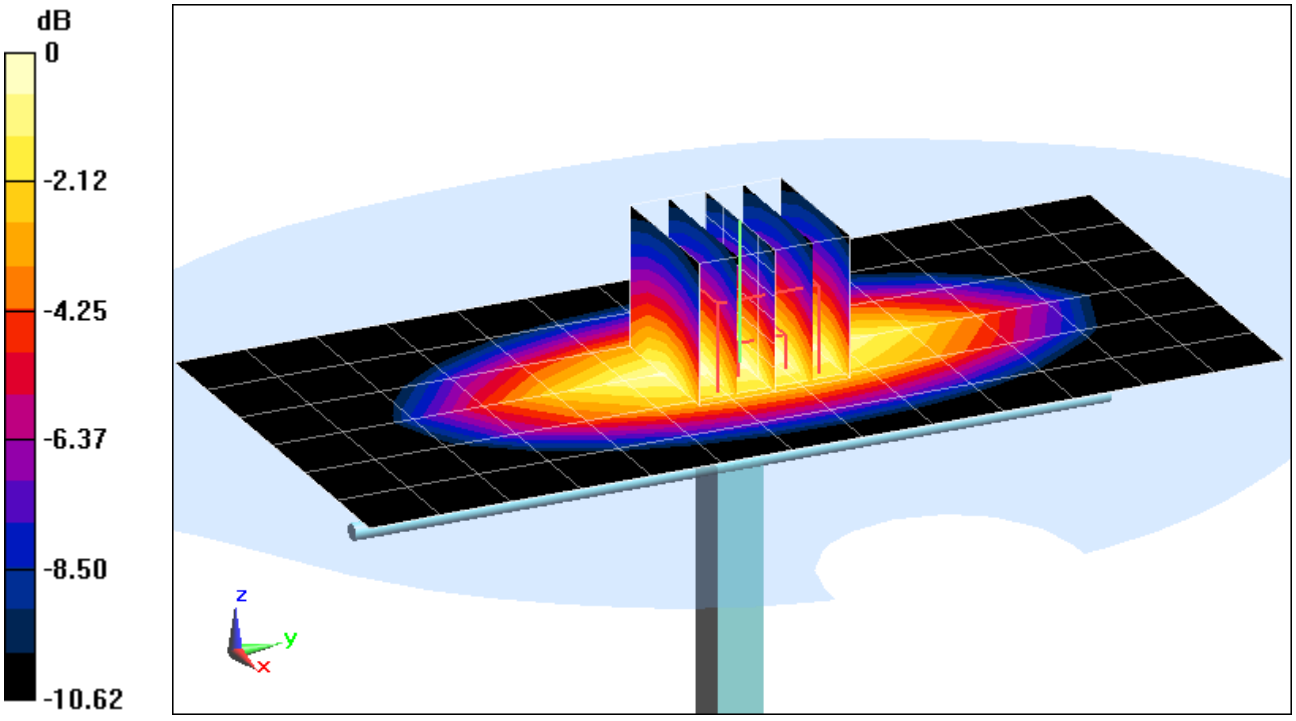
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.904 S/m; ε_r = 40.118; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-04-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3332; ConvF(6.29, 6.29, 6.29); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.968 W/kg
Deviation(1 g): 4.99%



0 dB = 1.14 W/kg = 0.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d148

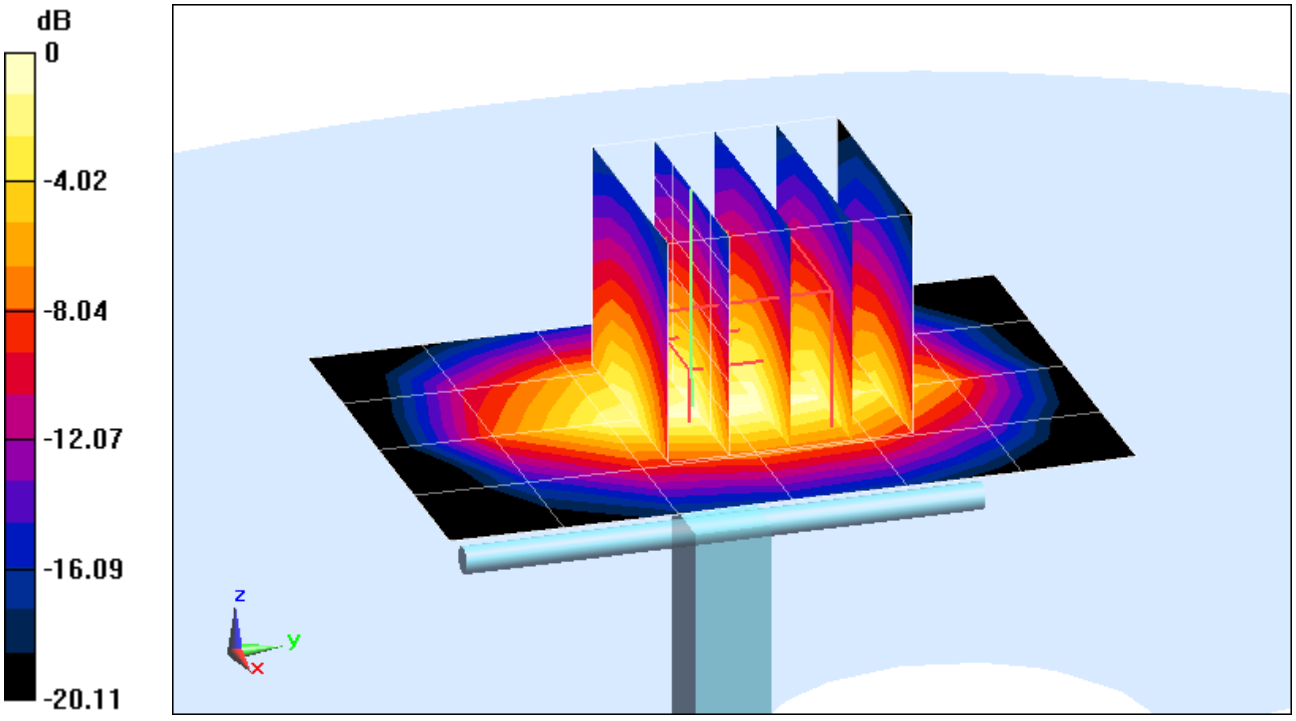
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.431 S/m; ε_r = 39.702; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2014; Ambient Temp: 22.3°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3213; ConvF(4.99, 4.99, 4.99); Calibrated: 4/11/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 3/17/2014
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.48 W/kg
SAR(1 g) = 3.97 W/kg
Deviation(1 g): -2.46%



0 dB = 5.04 W/kg = 7.02 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 797

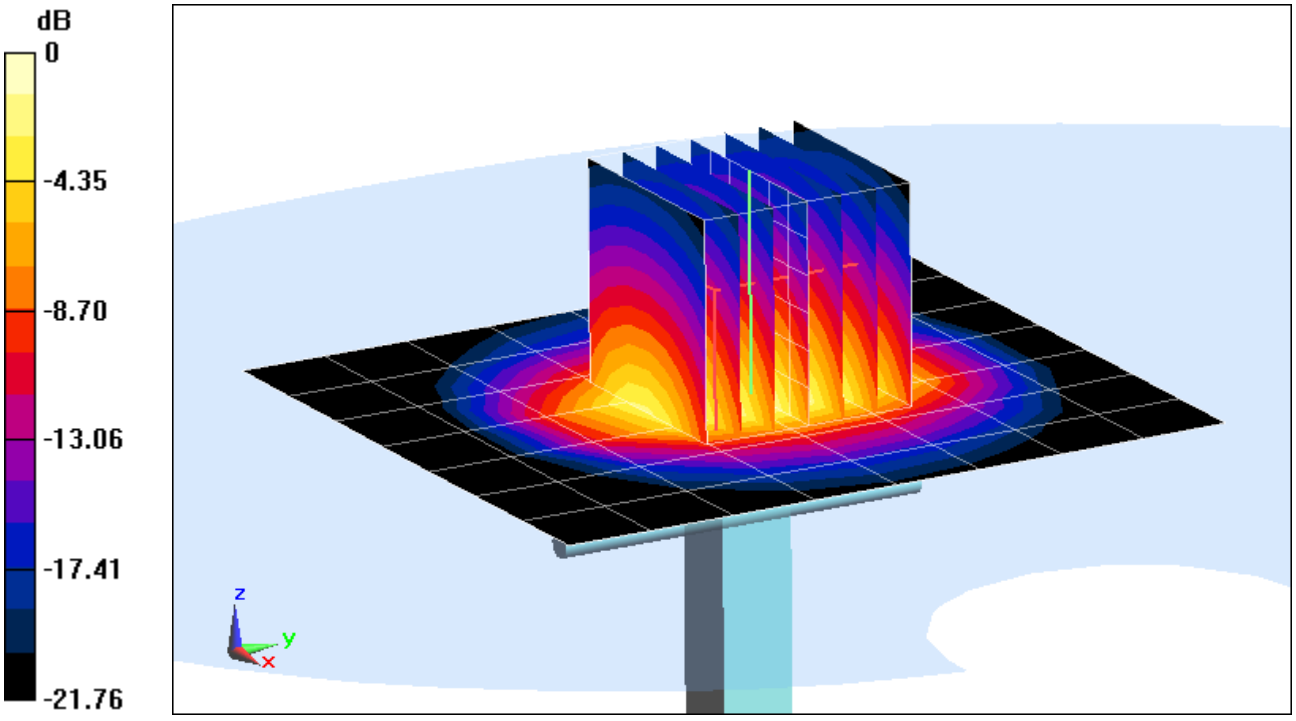
Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.866 S/m; ε_r = 39.666; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-11-2014; Ambient Temp: 22.2°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3319; ConvF(4.45, 4.45, 4.45); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: SAM; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 10.8 W/kg
SAR(1 g) = 5.31 W/kg
Deviation(1 g): 2.51%



0 dB = 6.93 W/kg = 8.41 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

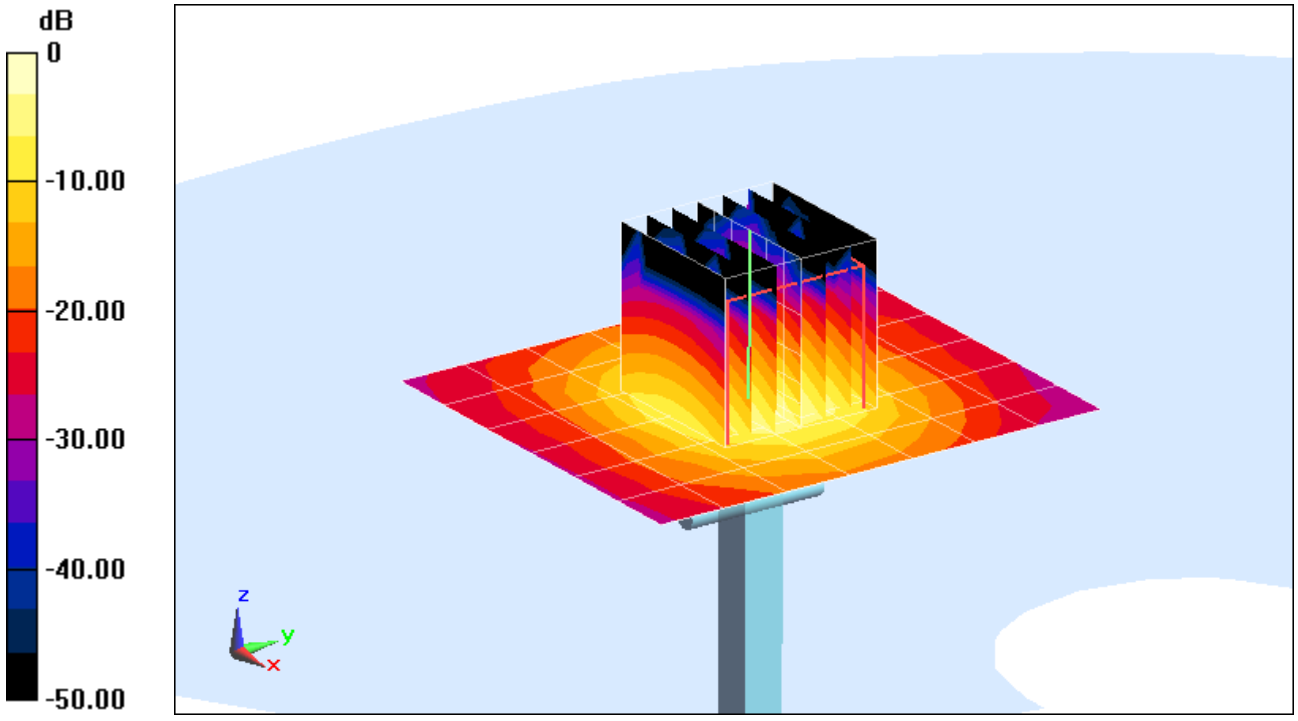
Communication System: UID 0, CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5200 MHz; σ = 4.558 S/m; ε_r = 36.46; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2014; Ambient Temp: 24.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3914; ConvF(4.99, 4.99, 4.99); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5200 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 7.52 W/kg
Deviation(1 g): -3.59%



0 dB = 19.1 W/kg = 12.81 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 5300 MHz; Type: D5GHzV2; Serial: 1057

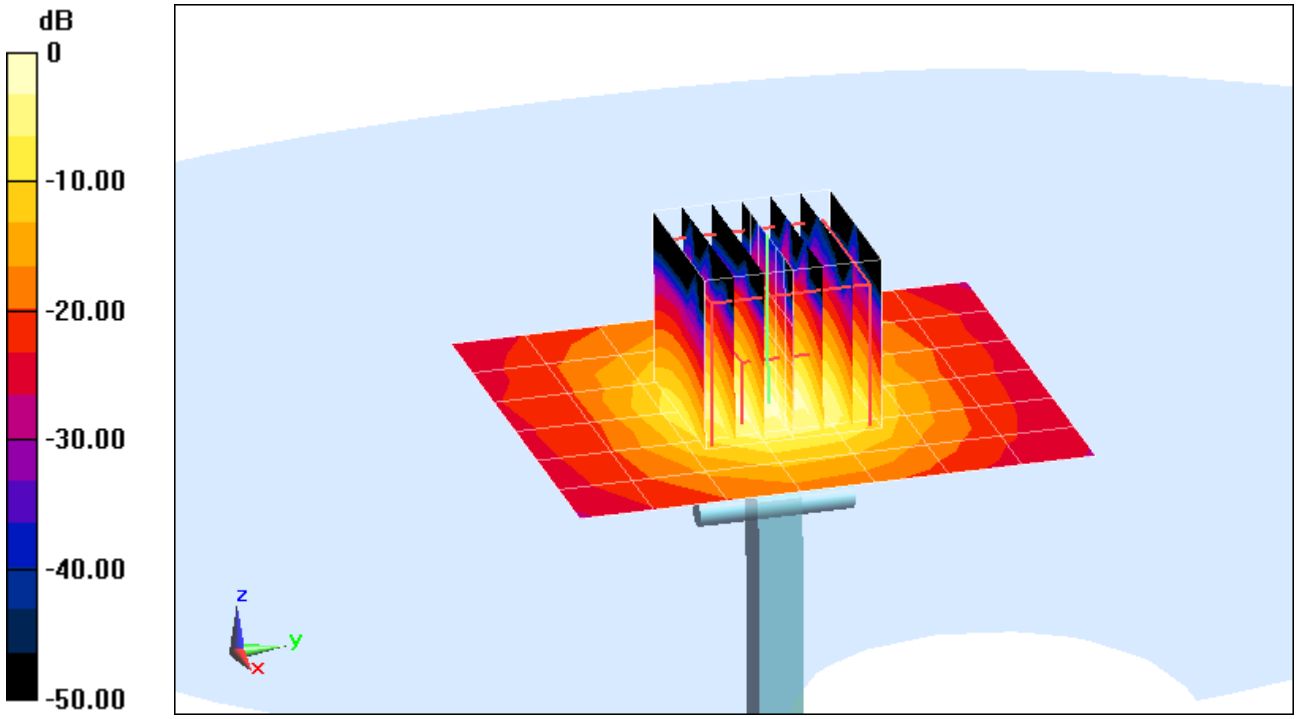
Communication System: UID 0, CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5300 MHz; σ = 4.666 S/m; ε_r = 36.343; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2014; Ambient Temp: 24.1°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3914; ConvF(4.82, 4.82, 4.82); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 35.5 W/kg
SAR(1 g) = 8.08 W/kg
Deviation(1 g): -2.65%



0 dB = 20.9 W/kg = 13.20 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

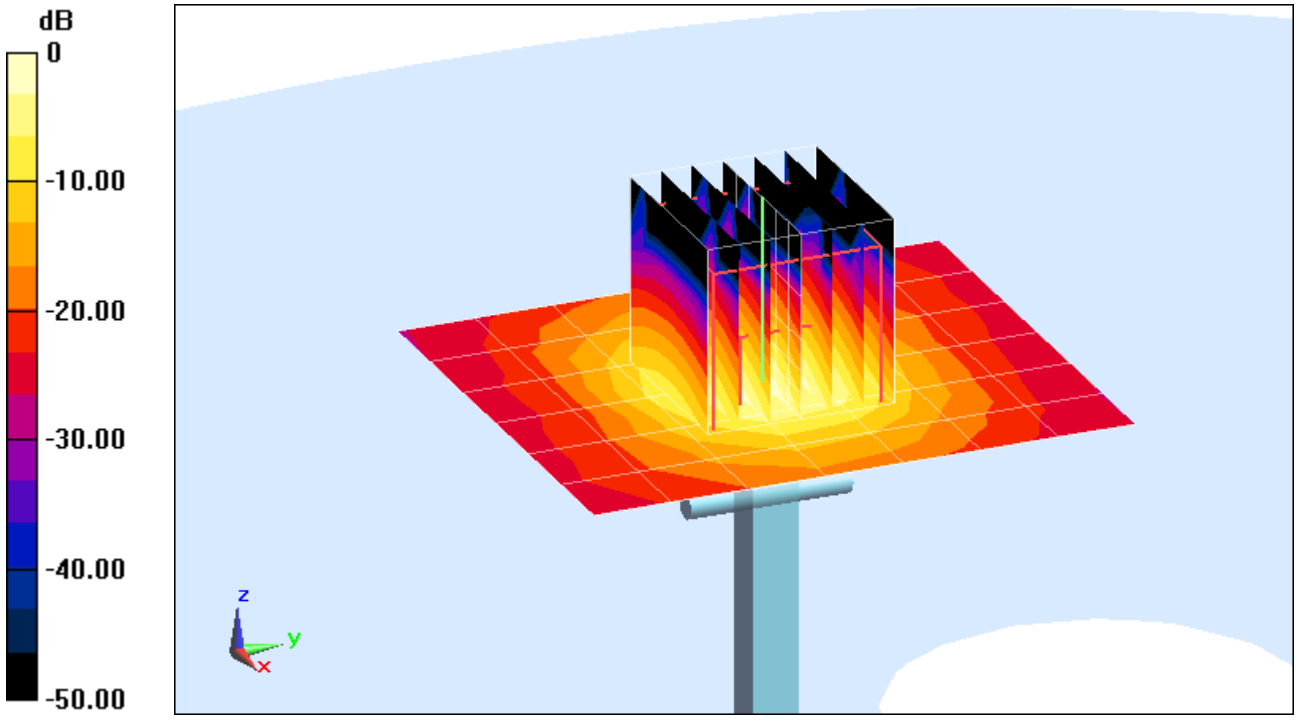
Communication System: UID 0, CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5500 MHz; σ = 4.879 S/m; ε_r = 36.105; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3914; ConvF(4.55, 4.55, 4.55); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5500 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.3 W/kg
SAR(1 g) = 7.86 W/kg
Deviation(1 g): -6.76%



0 dB = 20.3 W/kg = 13.07 dBW/kg

DUT: SAR Dipole 5600 MHz; Type: D5GHzV2; Serial: 1057

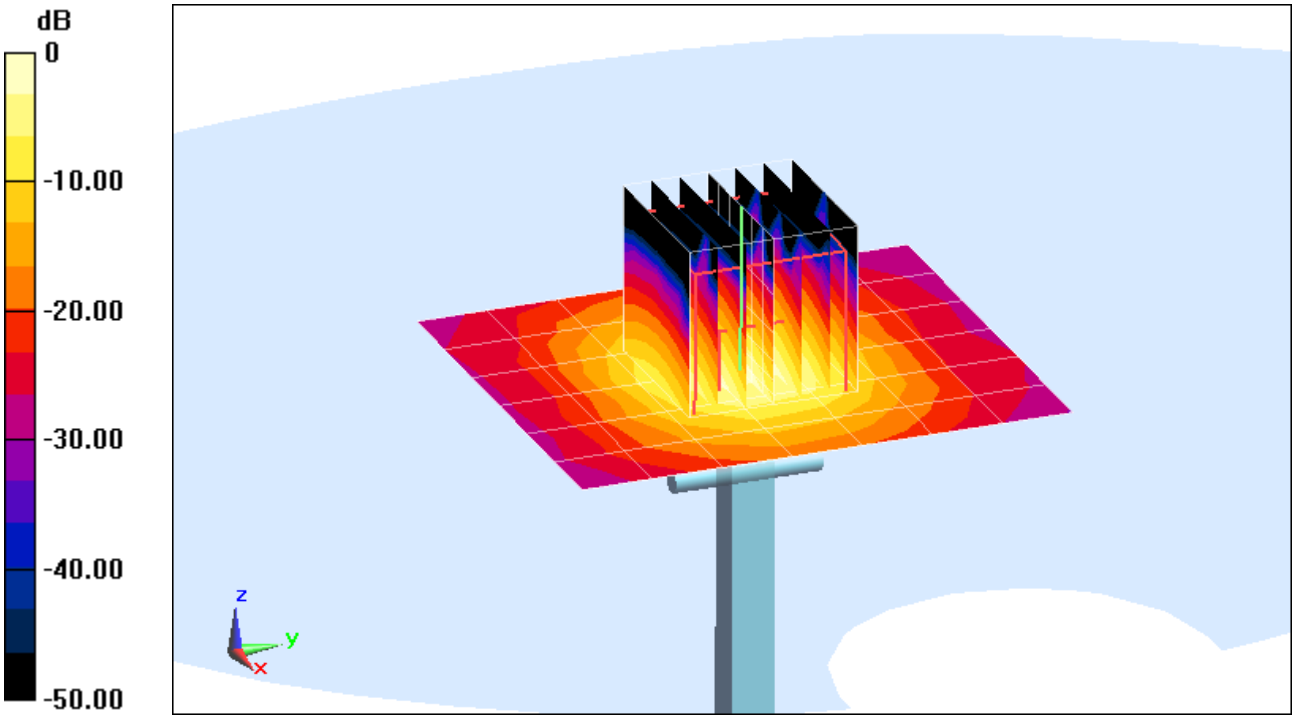
Communication System: UID 0, CW; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.966 S/m; ε_r = 35.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3914; ConvF(4.37, 4.37, 4.37); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 37.7 W/kg
SAR(1 g) = 8.37 W/kg
Deviation(1 g): 0.24%



0 dB = 21.8 W/kg = 13.38 dBW/kg

DUT: SAR Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

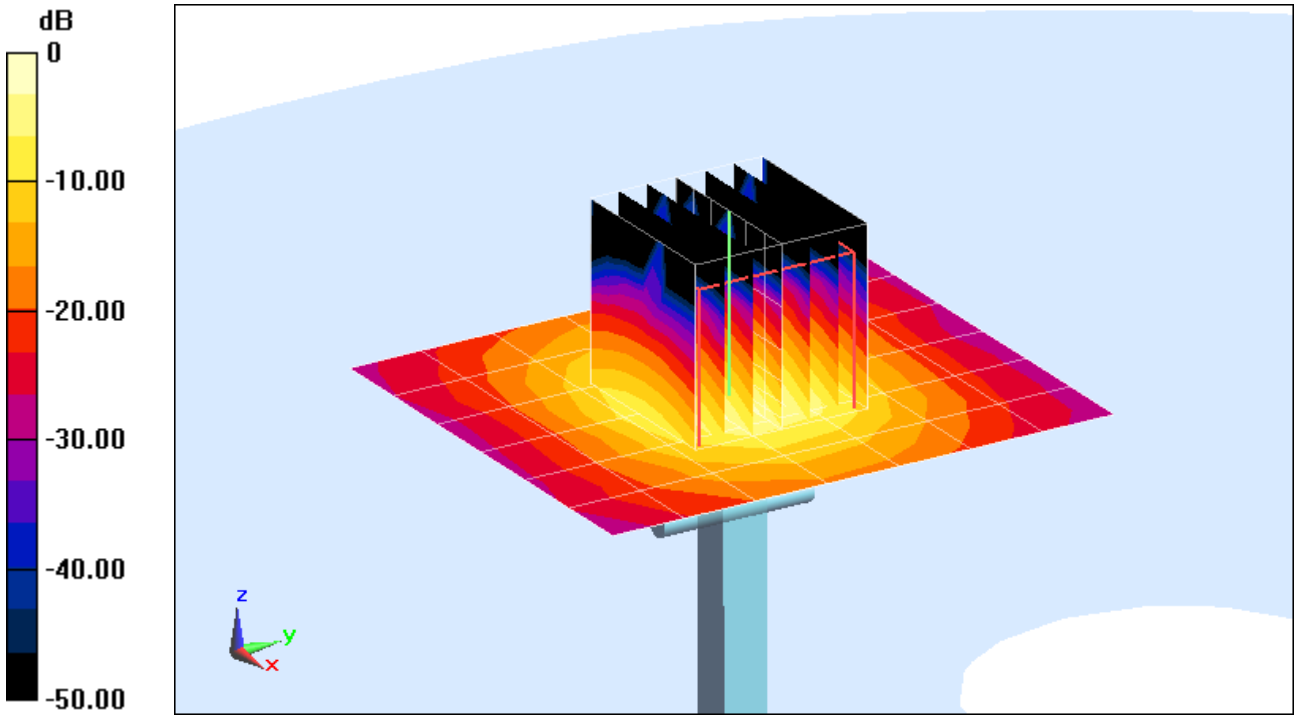
Communication System: UID 0, CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5800 MHz; σ = 5.176 S/m; ε_r = 35.724; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/19/2013
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.9 W/kg
SAR(1 g) = 7.43 W/kg
Deviation(1 g): -6.31%



0 dB = 19.7 W/kg = 12.94 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d119

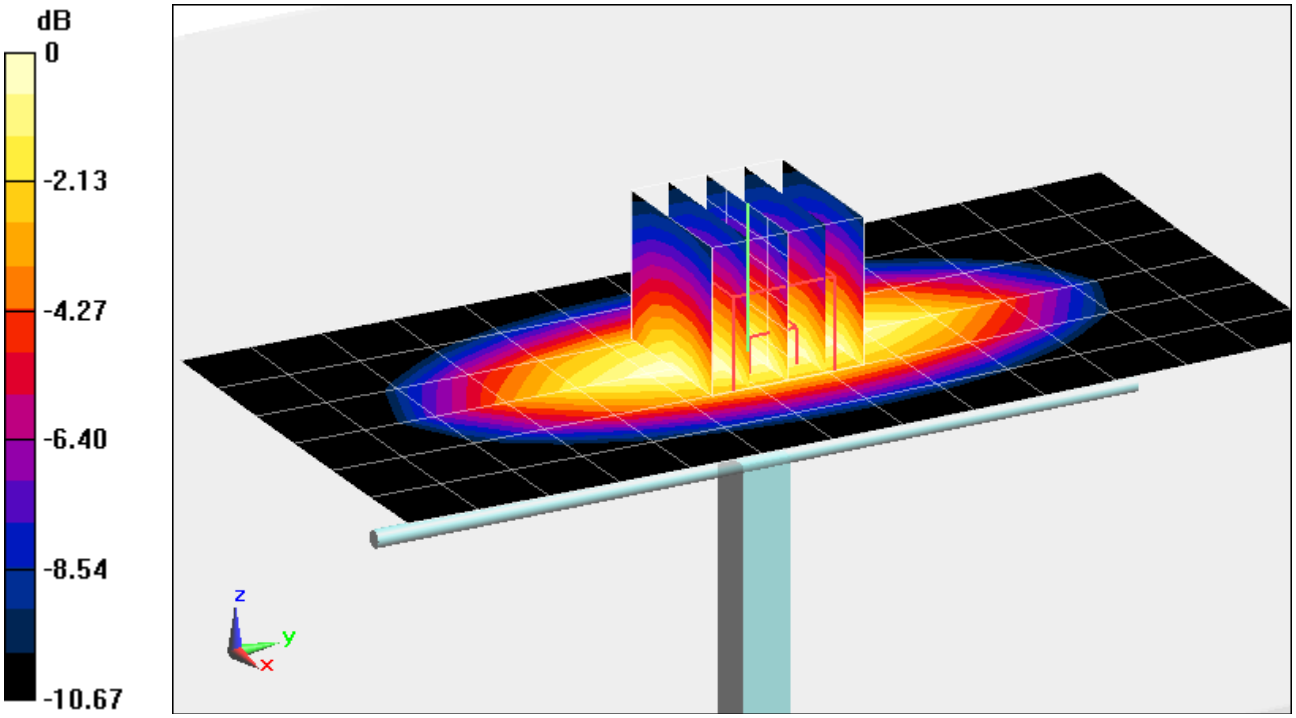
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 1.008 S/m; ε_r = 53.452; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-04-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3332; ConvF(6.08, 6.08, 6.08); Calibrated: 11/25/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 11/18/2013
Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 1.01 W/kg
Deviation(1 g): 8.14%



0 dB = 1.14 W/kg = 0.57 dBW/kg

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d148

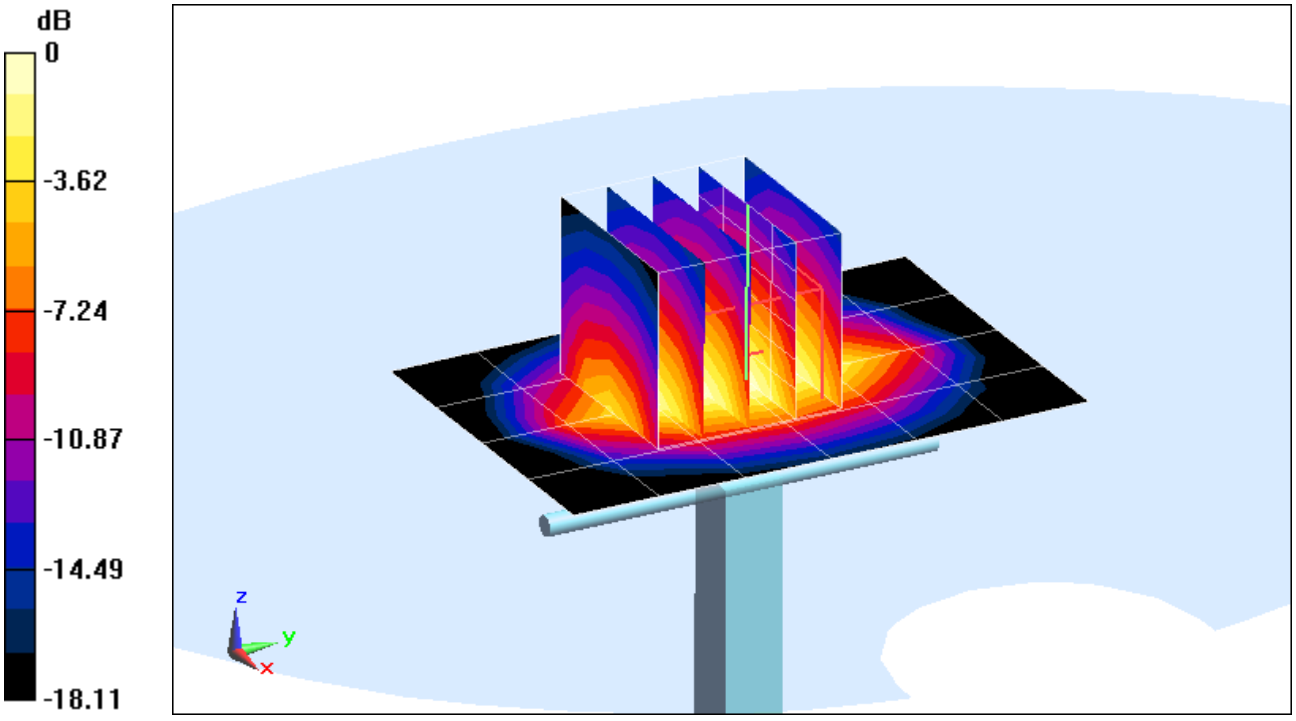
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.55 S/m; ε_r = 50.814; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/23/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/17/2013
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.24 W/kg
SAR(1 g) = 4.21 W/kg
Deviation(1 g): 7.12%



0 dB = 5.22 W/kg = 7.18 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 797

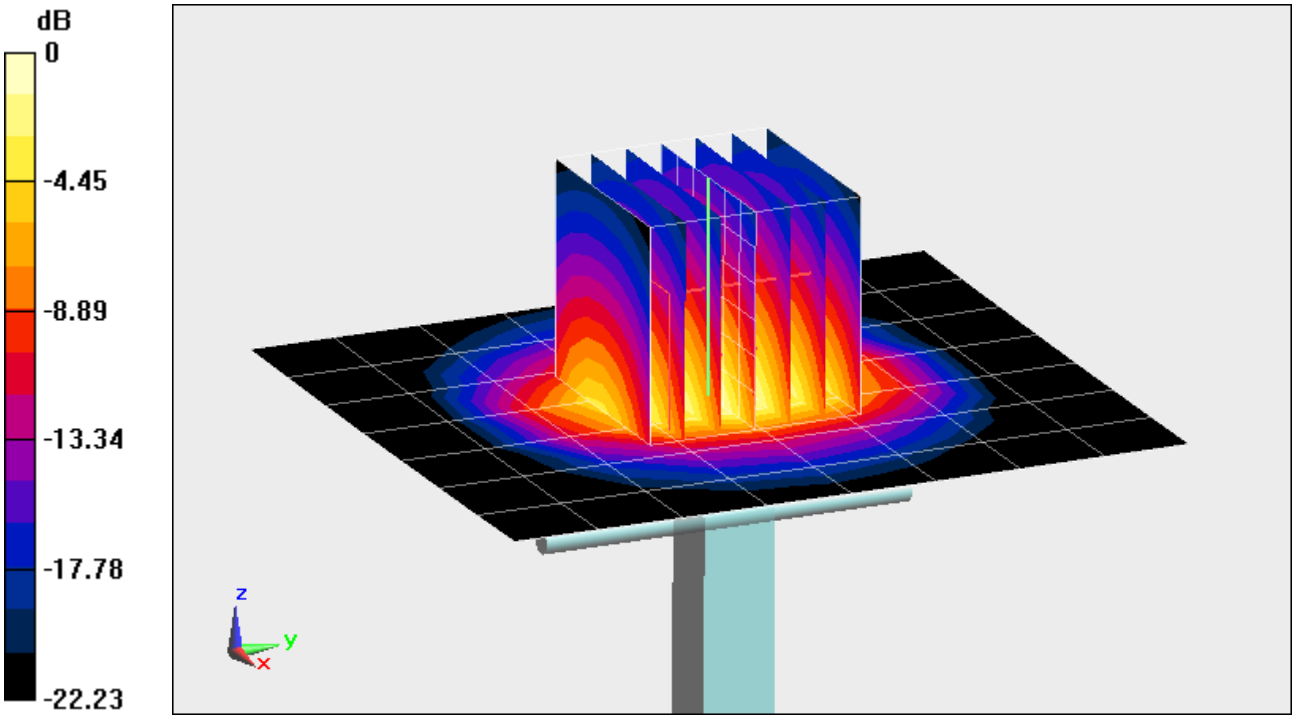
Communication System: UID 0, CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.943 S/m; ε_r = 51.913; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-11-2014; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.24, 4.24, 4.24); Calibrated: 4/17/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 4/11/2014
Phantom: ELI left; Type: QDOVA002AA; Serial: TP:1202
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power: 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 10.2 W/kg
SAR(1 g) = 4.86 W/kg
Deviation(1 g): -1.62%



0 dB = 6.37 W/kg = 8.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 5200 MHz; Type: D5GHzV2; Serial: 1007

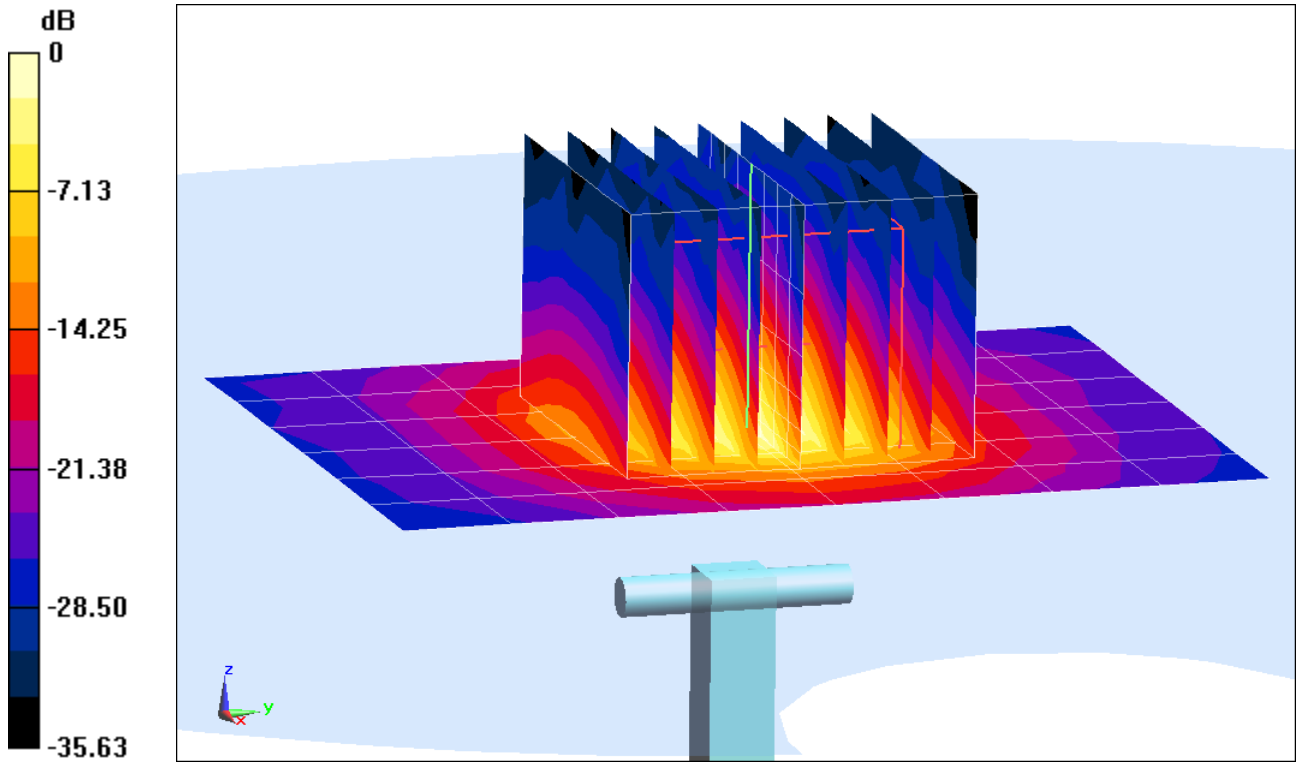
Communication System: UID 0, CW; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5200 MHz; σ = 5.324 S/m; ε_r = 47.372; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.9°C

Probe: EX3DV4 - SN3920; ConvF(4.23, 4.23, 4.23); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7331)

5200 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 27.0 W/kg
SAR(1 g) = 7.38 W/kg
Deviation = 1.65%



0 dB = 18.2 W/kg = 12.60 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 5300 MHz; Type: D5GHzV2; Serial: 1007

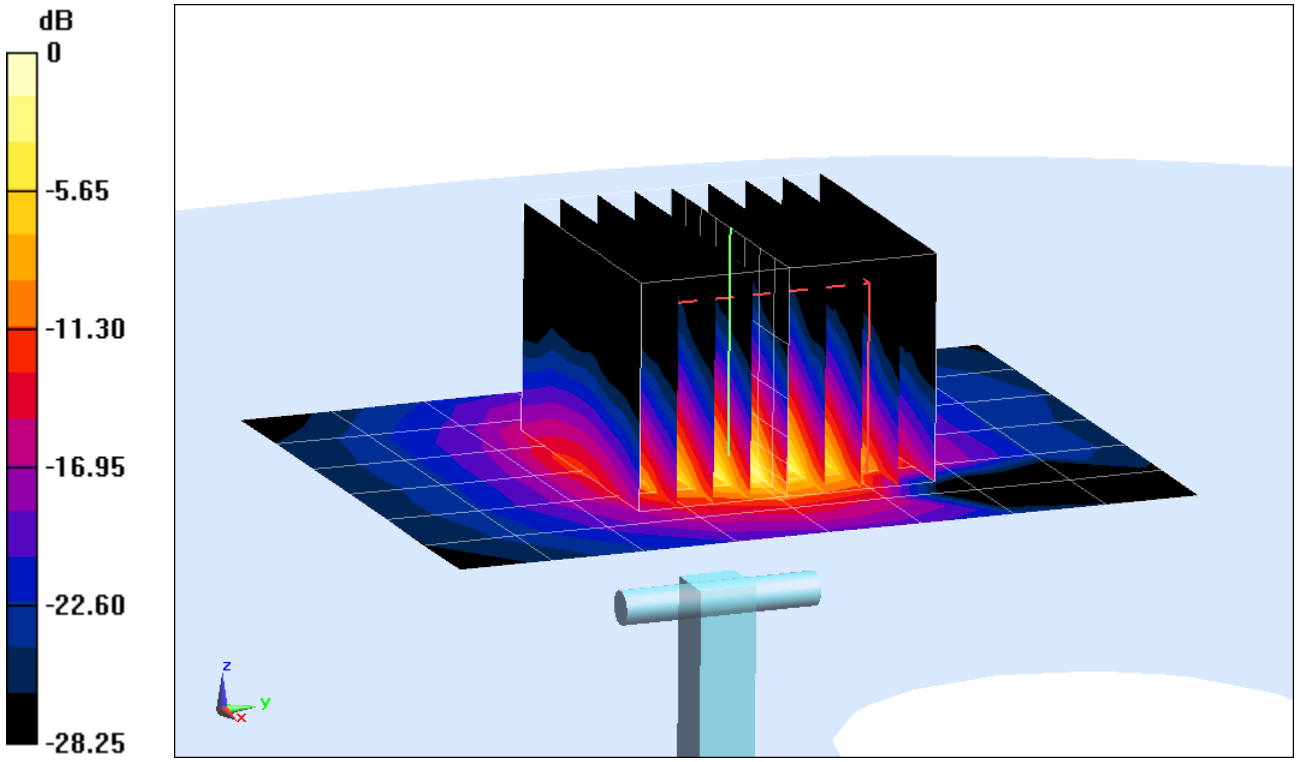
Communication System: UID 0, CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5300 MHz; σ = 5.433 S/m; ε_r = 47.369; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.9°C

Probe: EX3DV4 - SN3920; ConvF(4.11, 4.11, 4.11); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 29.2 W/kg
SAR(1 g) = 7.65 W/kg
Deviation = 2.41%



0 dB = 18.7 W/kg = 12.72 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 5500 MHz; Type: D5GHzV2; Serial: 1007

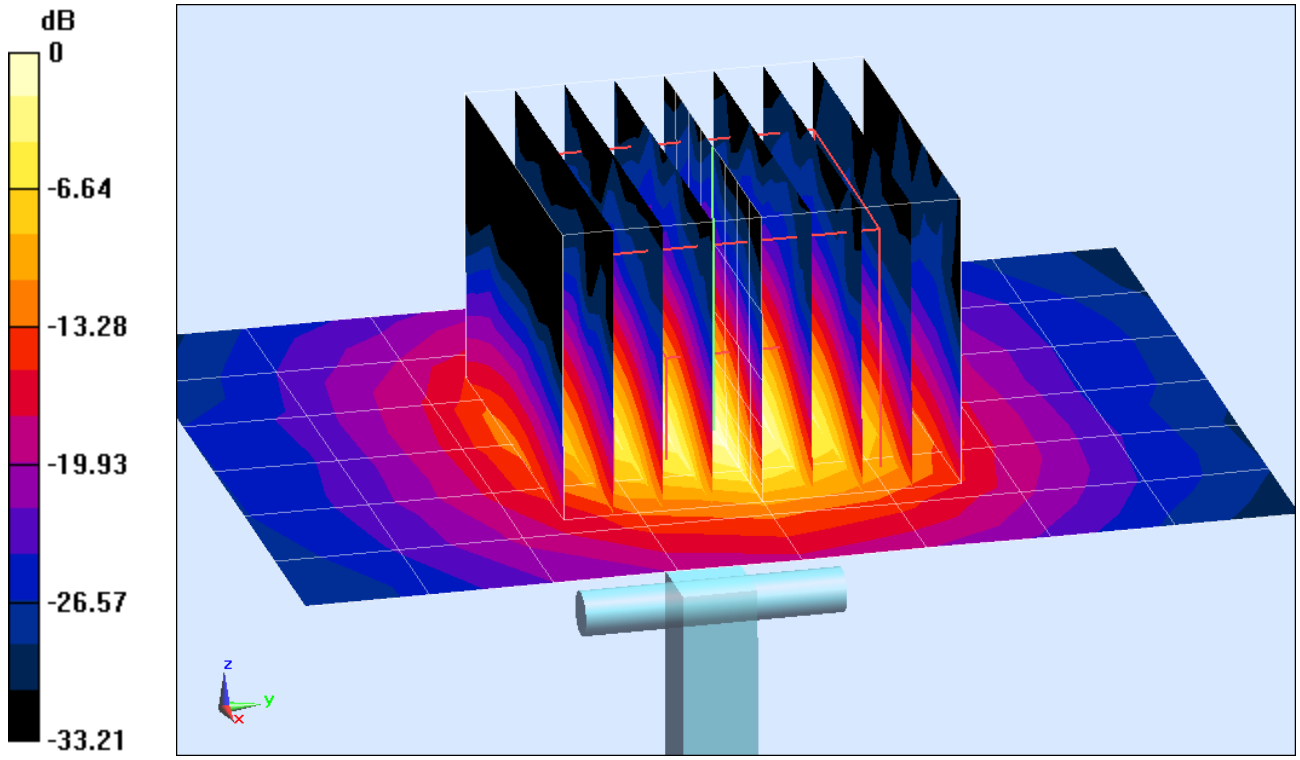
Communication System: UID 0, CW; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5500 MHz; σ = 5.657 S/m; ε_r = 47.216; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.9°C

Probe: EX3DV4 - SN3920; ConvF(3.8, 3.8, 3.8); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7331)

5500 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 30.4 W/kg
SAR(1 g) = 7.71 W/kg
Deviation = 1.58%



0 dB = 19.5 W/kg = 12.90 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 5800 MHz; Type: D5GHzV2; Serial: 1007

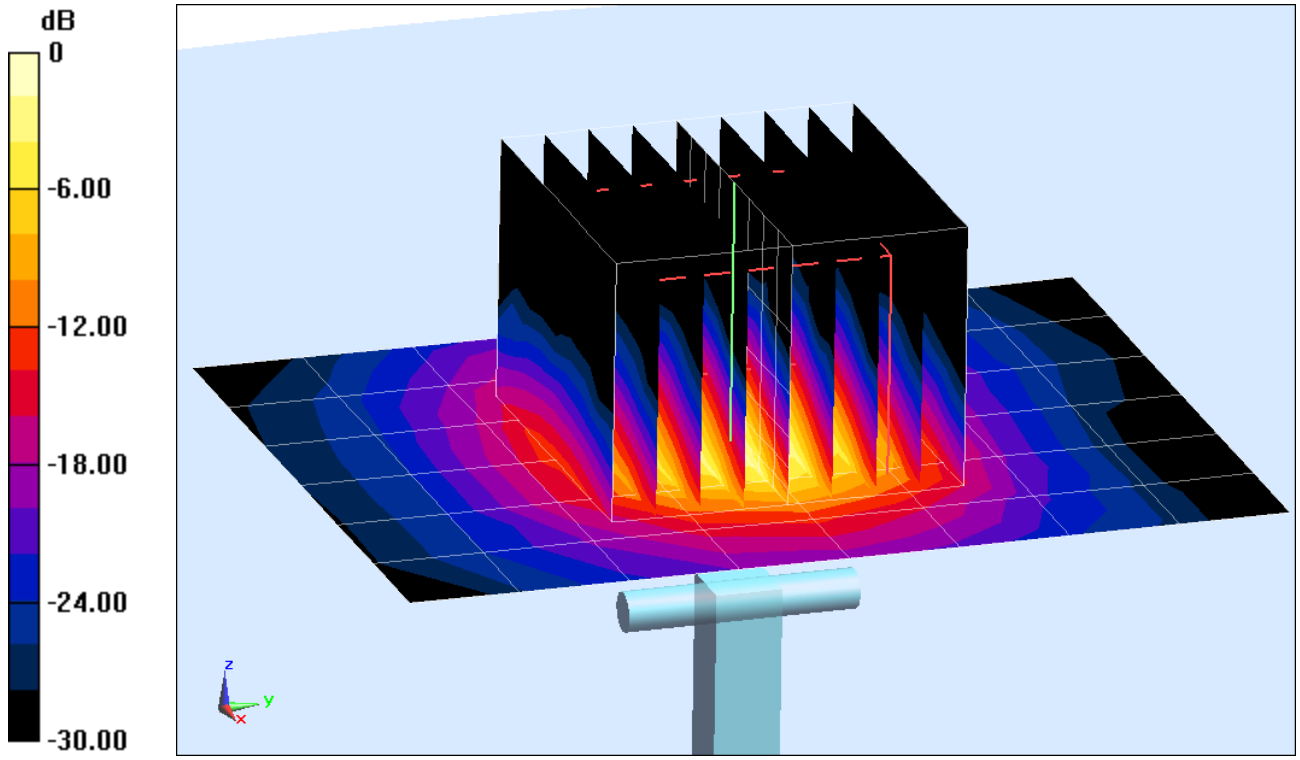
Communication System: UID 0, CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5800 MHz; σ = 6.015 S/m; ε_r = 46.324; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.9°C

Probe: EX3DV4 - SN3920; ConvF(4, 4, 4); Calibrated: 12/18/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 12/12/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.14 W/kg
Deviation = -2.06%



0 dB = 18.3 W/kg = 12.62 dBW/kg