



SAR EVALUATION REPORT

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

Date of Testing:
 05/28/12 - 07/12/12, 08/07/12 – 08/08/12
Test Site/Location:
 PCTEST Lab, Columbia, MD, USA
Document Serial No.:
 0Y1205290744-R3.ZNF

FCC ID: ZNFLS860

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): LS860, LG-LS860, LGLS860

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
Cell. CDMA/EVDO - FCC Rule Part 90S	817.90 - 823.10 MHz	25.17	0.38	0.69	0.73
Cell. CDMA/EVDO - FCC Rule Part 22H	824.70 - 848.31 MHz	25.44	0.33	0.63	0.77
PCS CDMA/EVDO - FCC Rule Part 24E	1851.25 - 1908.75 MHz	25.11	0.90	1.13	1.09
LTE Band 25 - FCC Rule Part 24E	1852.5 - 1912.5 MHz	23.39	1.19	1.05	1.05
2.4 GHz WLAN - FCC Rule Part 15C	2412 - 2462 MHz	15.18	0.01	0.09	0.09
Bluetooth - FCC Rule Part 15C	2402 - 2480 MHz	8.16	N/A		
Simultaneous SAR per KDB 690783 D01:			1.53	1.41	1.41

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

Note: This revised Test Report (S/N: 0Y1205290744-R3.ZNF) supersedes and replaces the previously issued test report on the same subject EUT 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 FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

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

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


 Randy Ortanez
 President



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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
Cell. CDMA/EVDO - FCC Rule Part 90S	817.90 - 823.10 MHz
Cell. CDMA/EVDO - FCC Rule Part 22H	824.70 - 848.31 MHz
PCS CDMA/EVDO - FCC Rule Part 24E	1851.25 - 1908.75 MHz
LTE Band 25 - FCC Rule Part 24E	1852.5 - 1912.5 MHz
2.4 GHz WLAN - FCC Rule Part 15C	2412 - 2462 MHz
Bluetooth - FCC Rule Part 15C	2402 - 2480 MHz
NFC - FCC Rule Part 15C	13.56 MHz

1.2 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the standard battery cover and will be the only battery cover available from the manufacturer for this model. Therefore all SAR tests were performed with the standard battery cover which already integrates the NFC antenna.

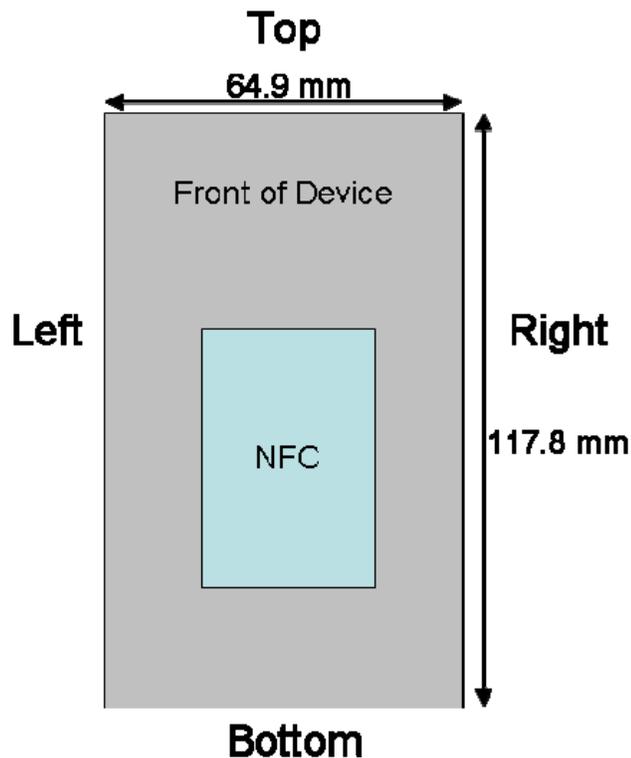


Figure 1-1
NFC Antenna Locations

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1.3 DUT Antenna Locations

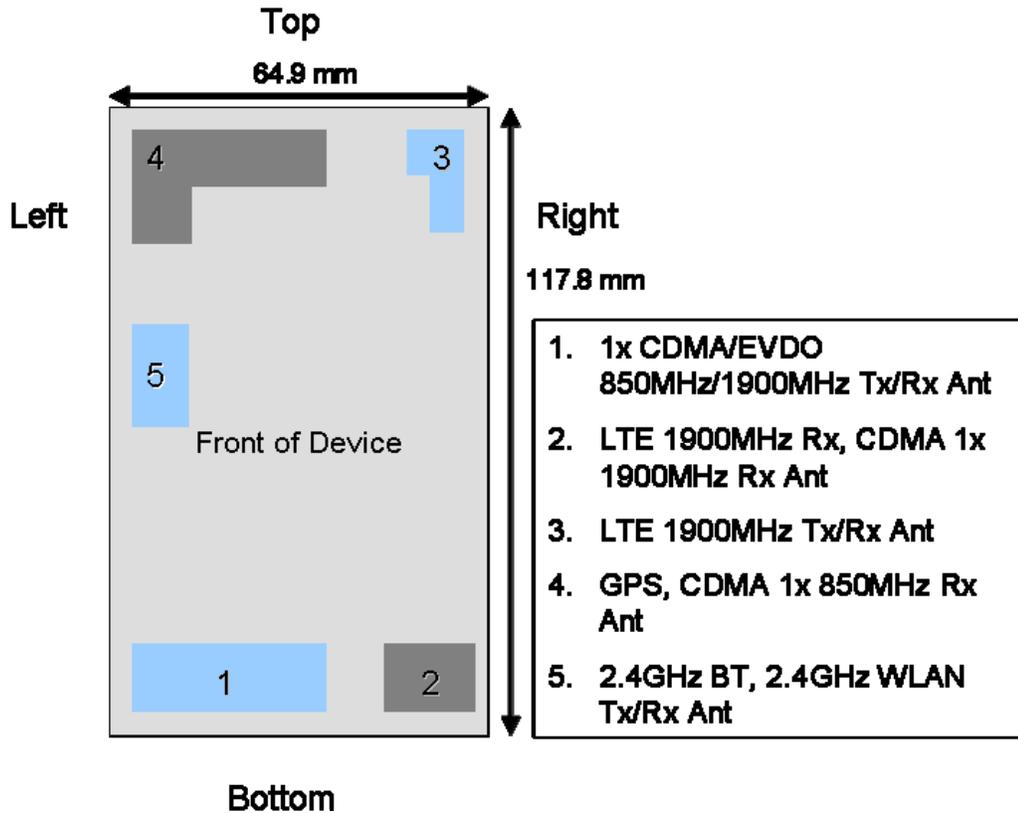


Figure 1-2
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
Cell. CDMA/EVDO – FCC Rule Part 90S	Yes	Yes	No	Yes	No	Yes
Cell. CDMA/EVDO – FCC Rule Part 22H	Yes	Yes	No	Yes	No	Yes
PCS CDMA/EVDO – FCC Rule Part 24E	Yes	Yes	No	Yes	No	Yes
LTE Band 25 – FCC Rule Part 24E	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN – FCC Rule Part 15C	Yes	Yes	No	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06 guidance, page 2. The antenna document shows the distances between the transmit antennas and the edges of the device.

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1.4 Power Reduction for SAR

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

1.5 Simultaneous Transmission Capabilities

According to KDB 648474, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



Figure 1-3
Simultaneous Transmission Paths

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

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**Table 1-2
Simultaneous Transmission Scenarios**

No.	Capable TX Configuration	Head SAR	Body SAR	Hotspot SAR	Note
1	Cell CDMA (FCC Rule Part 22H) Voice + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	No	
2	PCS CDMA (FCC Rule Part 24E) Voice + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	No	
3	Cell CDMA (FCC Rule Part 90S) Voice + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	No	
4	Cell CDMA (FCC Rule Part 22H) 1xData + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	CDMA Hotspot
5	PCS CDMA (FCC Rule Part 24E) 1xData + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	CDMA Hotspot
6	Cell CDMA (FCC Rule Part 90S) 1xData + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	CDMA Hotspot
7	LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	LTE Hotspot
8	Cell CDMA (FCC Rule Part 22H) Voice + LTE B25 (FCC Rule Part 24E) Data	Yes	Yes	No	SVLTE
9	PCS CDMA (FCC Rule Part 24E) Voice + LTE B25 (FCC Rule Part 24E) Data	Yes	Yes	No	SVLTE
10	Cell CDMA (FCC Rule Part 90S) Voice + LTE B25 (FCC Rule Part 24E) Data	Yes	Yes	No	SVLTE
11	Cell CDMA (FCC Rule Part 22H) Voice + LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
12	PCS CDMA (FCC Rule Part 24E) Voice + LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
13	Cell CDMA (FCC Rule Part 90S) Voice + LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
14	Cell EVDO (FCC Rule Part 22H) + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	VoIP
15	PCS EVDO (FCC Rule Part 24E) + 2.4 GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	VoIP
16	Cell EVDO (FCC Rule Part 90S) + 2.4 GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	VoIP

* Simultaneous transmission between BT and WiFi is not supported.
 * Simultaneous transmission between CDMA 1xdata/EVDO and LTE data is not supported.
 * SVLTE is supported only. (SVDO is not supported.)
 * 1x Advanced capability for Cell CDMA (FCC Rule Part 22H), PCS CDMA (FCC Rule Part 24E) and Cell CDMA (FCC Rule Part 90S) is supported.
 * VoIP is supported.
 * Maximum output power will be used for SAR compliance. If necessary, power reduction will be used for SAR compliance.

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1.6 SAR Test Exclusions Applied

(A) WIFI/BT

RF Conducted Power of Bluetooth Tx is 6.549 mW (Please refer to the EMC DSS Report for a full set of Bluetooth conducted powers).

The separation distance between the CDMA/EVDO antenna and the Bluetooth/WLAN antenna is 49.26 mm. The separation distance between the LTE antenna and the Bluetooth/WLAN antenna is 51.04 mm.

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

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

(B) Licensed Transmitter(s)

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

1.7 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB 941225 (2G/3G/4G and Hotspot)
- FCC KDB 248227 (802.11)
- FCC KDB 648474 (Simultaneous)
- April 2012 TCB/FCC Workshop (Simultaneous)
- October 2011 TCB/FCC Workshop (1x Advanced)

1.8 Samples Used for SAR Testing

Several samples with the same physical, mechanical and thermal characteristics which are within operational tolerances expected for production units were used to facilitate SAR testing.

	Cell. CDMA/EVDO	Cell. CDMA/EVDO	PCS CDMA/EVDO	LTE Band 25 (PCS)	2.4 GHz WLAN
FCC Rule Part	90S	22H	24E	24E	15C
Head	SAR#2	SAR#2	SAR#2	SAR#3	SAR#4
Body-Worn/Hotspot	SAR#2	SAR#2	SAR#2	SAR#2	SAR#4

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LTE CHECKLIST PER KDB 941225 D05

#	Description	Parameter
1	Identify the operating frequency range of each LTE transmission band used by the device	1852.5 to 1912.5 MHz
2	Identify the channel bandwidths used in each frequency band; 1.4, 3, 5, 10, 15, 20 MHz etc	Band 25 : 5MHz , 10MHz
3	Identify the high, middle and low (H, M, L) channel numbers and frequencies in each LTE frequency band	<p>LTE Band 25</p> <p>1) Low channel</p> <ul style="list-style-type: none"> - Bandwidth: 5MHz Ch No.: 26065 Frequency: 1852.5MHz - Bandwidth: 10MHz Ch No.: 26090 Frequency: 1855.0MHz <p>2) Middle channel</p> <ul style="list-style-type: none"> - Bandwidth: 5MHz Ch No.: 26365 Frequency: 1882.5MHz - Bandwidth: 10MHz Ch No.: 26365 Frequency: 1882.5MHz <p>3) High channel</p> <ul style="list-style-type: none"> - Bandwidth: 5MHz Ch No.: 26665 Frequency: 1912.5MHz - Bandwidth: 10MHz Ch No.: 26640 Frequency: 1910.0MHz
4	Specify the UE category and uplink modulations used	UE Category: 3 Uplink modulation: QPSK, 16QAM
5	Descriptions of the LTE transmitter and antenna implementation & identify whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc	The LTE and CDMA/EVDO do not share same antenna paths.
6	Identify the LTE voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions etc	* Exposure conditions See Section 1.
7	Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design: a) only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards b) A-MPR (additional MPR) must be disabled	MPR is permanently implemented when power reduction is not enabled. For details, please see the conducted power table in Section 10.

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8	Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and UL modulation used in each frequency band: a) with 1 RB allocated at the upper edge of a channel b) with 1 RB allocated at the lower edge of a channel c) using 50% RB allocation centered within a channel d) using 100% RB allocation	Please see the conducted power table in Section 10.
9	Identify all other U.S. wireless operating modes (3G, Wi-Fi, WiMax, Bluetooth etc), device/exposure configurations (head and body, antenna and handset flip-cover or slide positions, antenna diversity conditions etc.) and frequency bands used for these modes	* Supported band & Exposure conditions See Page 1.
10	Include the maximum average conducted output power measured for the other wireless modes and frequency bands	Please find the conducted power table in Section 10.
11	Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)	* Simultaneous transmission conditions See Section 1.5.
12	When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup	See Section 11.
13	Include descriptions of the test equipment, test software, built-in test firmware etc. required to support testing the device when power reduction is applied to one or more transmitters/antennas for simultaneous voice/data transmission	See Section 11.
14	When appropriate, include a SAR test plan proposal with respect to the above	See Section 11.
15	If applicable, include preliminary SAR test data and/or supporting information in laboratory testing inquiries to address specific issues and concerns or for requesting further test reduction considerations appropriate for the device; for example, simultaneous transmission configurations	See Section 11.

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3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m^3)
- E = Total RMS electric field strength (V/m)

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

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4 SAR MEASUREMENT SETUP

4.1 Automated SAR Measurement System

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



Figure 4-1
SAR Measurement System



Figure 4-2
Near-Field Probe

Table 4-1
Composition of the Tissue Equivalent Matter

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

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5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head interface and the horizontal grid resolution was 15mm and 15mm for frequencies < 3 GHz in the x and y directions respectively. When applicable, for frequencies above 3 GHz, a 10 mm by 10 mm resolution was used.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring at least 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

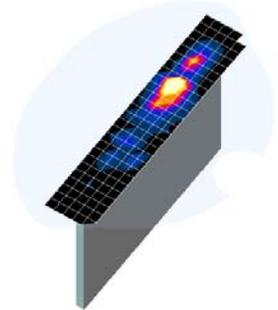


Figure 5-1
Sample SAR Area Scan

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DEFINITION OF REFERENCE POINTS

6.1 EAR REFERENCE POINT

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

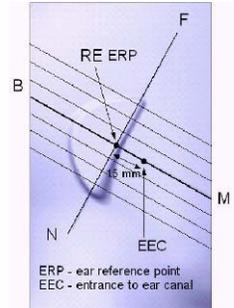


Figure 6-1
Close-Up Side view
of ERP

6.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 6-3). The “test device reference point” was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at 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 6-2
Front, back and side view of SAM Twin Phantom

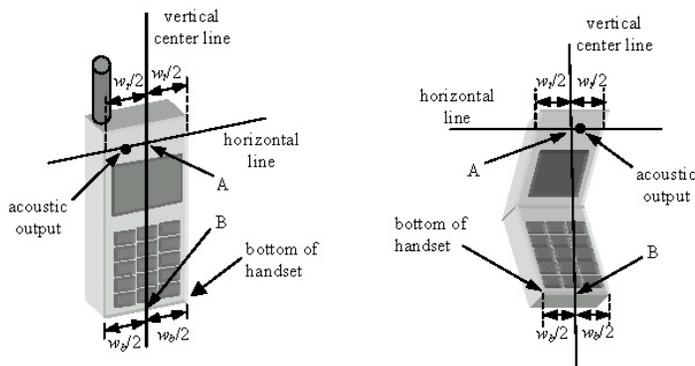


Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

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7 TEST CONFIGURATION POSITIONS FOR HANDSETS

7.1 Device Holder

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

7.2 Positioning for Cheek

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

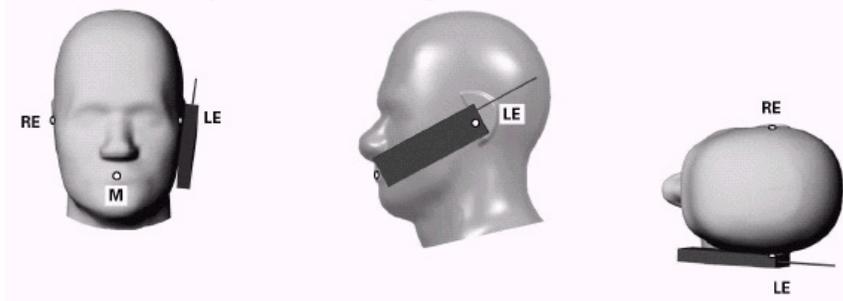


Figure 7-1 Front, Side and Top View of Cheek Position

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

7.3 Positioning for Ear / 15° Tilt

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

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

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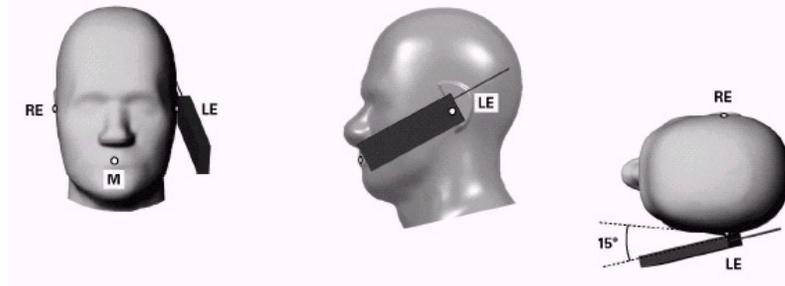


Figure 7-2 Front, Side and Top View of Ear/15° Tilt Position

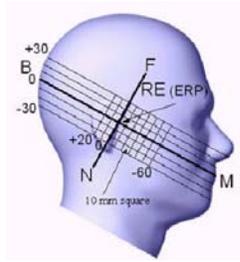


Figure 7-3 Side view w/ relevant markings



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

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

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

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document publication 648474. The SAR required in these regions of SAM should be measured using a flat phantom. **Rectangular shaped phones** should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell. **Clam-shell phones** should be positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone is unfolded and extended beyond the phantom side wall. The lower half of the phone is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the phone in the cheek touching position using SAM. Any case with substantial variation in separation distance along the lower edge of a clam shell is discussed with the FCC for best-to-use methodology.

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

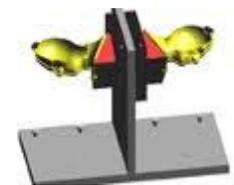


Figure 7-5 Twin SAM Chin20

7.5 Body-Worn Accessory Configurations

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

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Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

7.6 Wireless Router Configurations

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

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

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8 FCC RF EXPOSURE LIMITS

8.1 Uncontrolled Environment

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

8.2 Controlled Environment

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

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

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

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

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9 FCC MEASUREMENT PROCEDURES

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

9.1 Procedures Used to Establish RF Signal for SAR

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

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

9.2 SAR Measurement Conditions for CDMA2000

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

9.2.1 Output Power Verification

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

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

Table 9-1
Parameters for Max. Power for RC1

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

Table 9-2
Parameters for Max. Power for RC3

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

9.2.2 CDMA2000 1x Advanced

This device additionally supports 1x Advanced. Conducted powers were measured using SO75 with RC8 on the uplink and RC11 on the downlink per Oct 2011 TCB Workshop notes. Smart blanking was disabled for all measurements. The EUT was configured with forward power control Mode 000 and reverse power control at 400 bps. Conducted powers were measured on an Agilent 8960 Series 10

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Wireless Communications Test Set, Model E5515C using the CDMA2000 1x Advanced application, Option E1962B-410.

Based on the maximum output power measured for 1x Advanced, SAR would have to be evaluated for 1x advanced if the maximum output for 1x Advanced is more than 0.25 dB higher than the maximum measured for 1x. Also, if the measured SAR in any 1x mode exposure conditions (head, body etc.) is larger than 1.2 W/kg, the highest of those configurations above 1.2 W/kg for each exposure condition in 1x Advanced has to be repeated. All measured SAR in 1x mode higher than 1.5 W/kg must be repeated for 1x Advanced.

9.2.3 Head SAR Measurements

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3. Head SAR was additionally evaluated for EVDO Rev A to determine VoIP compliance. See Section 6.2.5 for EVDO Rev A configuration parameters.

9.2.4 Body SAR Measurements

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

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

9.2.5 Handsets with EVDO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for EV-DO is not required. Otherwise, SAR for Rev. 0 is measured on the maximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the maximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots would be configured in the downlink for both Rev. 0 and Rev. A.

9.2.6 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 per KDB Publication 941225 D01 procedures for “1x Ev-Do data Devices”. SAR for Subtype 2 Physical layer configurations is not required for Rev. A when the maximum average output of each RF channels is less than that measured in Subtype 0/1 Physical layer configurations.

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Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for the RF channels in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. AT power control should be in “All Bits Up” conditions for TAP/ETAP

SAR is not required for 1x RTT for Ev-Do devices that also support 1x RTT voice and/or data operations, when the maximum average output of each channel is less than 1/4 dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0. Otherwise, CDMA “Body-SAR Measurement” procedures for “CDMA 2000 1x Handsets” were applied.

9.3 SAR Measurement Conditions for LTE

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

9.3.1 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1. See Section 10.2 for MPR targets.

9.3.2 A-MPR

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

9.3.3 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

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

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allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.

- i. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required.
- j. Per Page 4, 4), A) I) and Page 5, 4), A)I), 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
- k. Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths.

9.4 SAR Testing with 802.11 Transmitters

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

9.4.1 General Device Setup

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

9.4.2 Frequency Channel Configurations [27]

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

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

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10 RF CONDUCTED POWERS

10.1 CDMA Conducted Powers

Band	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC	MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cell. CDMA/EVDO - FCC Rule Part 90S	564	820.1	25.07	25.17	25.12	25.03	25.15	25.12	25.11
Cell. CDMA/EVDO - FCC Rule Part 22H	1013	824.7	25.46	25.50	25.49	25.46	25.47	25.42	25.41
	384	836.52	25.43	25.44	25.48	25.31	25.42	25.40	25.32
	777	848.31	25.46	25.48	25.50	25.42	25.49	25.39	25.19
PCS CDMA/EVDO - FCC Rule Part 24E	25	1851.25	25.14	24.97	25.20	25.03	24.95	25.02	24.96
	600	1880	25.07	25.00	25.18	24.98	24.91	24.98	24.97
	1175	1908.75	24.90	24.87	25.03	24.87	24.90	25.11	25.07

Note: RC1 is only applicable for IS-95 compatibility. For FCC Rule Part 90S, Per FCC KDB Publication 447498 6) c), only one channel is required since the device operates within the transmission range of 817.90 – 823.10 MHz.

Per KDB Publication 941225 D01:

1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. EVDO and TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.
3. According to FCC KDB 941225, EVDO SAR (Hotspot) is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. When the maximum output power of Rev. A for each channel is greater than the Rev.0 power, Rev. A must additionally be tested using the highest output channel for the configuration that resulted in the highest SAR for Rev.0.
4. CDMA 1x-RTT SAR was additionally required to be evaluated for Hotspot exposure conditions to support simultaneous capabilities per Table 1-2.

1x Advanced Considerations per October 2011 TCB Workshop

1. CDMA 1X Advanced technology was not required for SAR since the maximum output powers for 1x Advanced was not more than 0.25 dB higher than the maximum measured powers for 1x and the measured SAR in any 1x mode exposure conditions was not greater than 1.2 W/kg. See Section 9.2.2 for 1x Advanced test set up.

VoIP Testing per FCC KDB 447498

1. Head and Body-worn SAR were additionally tested with EVDO Rev. A to support SAR compliance for VoIP over EVDO.



Figure 10-1
Power Measurement Setup

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10.2 LTE Conducted Powers

10.2.1 LTE Band 25 - FCC Rule Part 24E

Table 10-1
LTE Band 25 - FCC Rule Part 24E Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1852.5	26065	5	QPSK	1	0	23.28	0	0
	1852.5	26065	5	QPSK	1	24	23.34	0	0
	1852.5	26065	5	QPSK	12	6	22.38	1	0-1
	1852.5	26065	5	QPSK	25	0	22.29	1	0-1
	1852.5	26065	5	16-QAM	1	0	22.69	1	0-1
	1852.5	26065	5	16-QAM	1	24	22.86	1	0-1
	1852.5	26065	5	16-QAM	12	6	21.52	2	0-2
Mid	1882.5	26365	5	QPSK	1	0	23.34	0	0
	1882.5	26365	5	QPSK	1	24	23.45	0	0
	1882.5	26365	5	QPSK	12	6	22.53	1	0-1
	1882.5	26365	5	QPSK	25	0	22.28	1	0-1
	1882.5	26365	5	16-QAM	1	0	22.46	1	0-1
	1882.5	26365	5	16-QAM	1	24	22.41	1	0-1
	1882.5	26365	5	16-QAM	12	6	21.58	2	0-2
High	1912.5	26665	5	QPSK	1	0	23.68	0	0
	1912.5	26665	5	QPSK	1	24	23.35	0	0
	1912.5	26665	5	QPSK	12	6	22.43	1	0-1
	1912.5	26665	5	QPSK	25	0	22.47	1	0-1
	1912.5	26665	5	16-QAM	1	0	22.67	1	0-1
	1912.5	26665	5	16-QAM	1	24	22.42	1	0-1
	1912.5	26665	5	16-QAM	12	6	21.62	2	0-2
1912.5	26665	5	16-QAM	25	0	21.76	2	0-2	

Table 10-2
LTE Band 25 - FCC Rule Part 24E Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1855	26090	10	QPSK	1	0	23.33	0	0
	1855	26090	10	QPSK	1	49	23.28	0	0
	1855	26090	10	QPSK	25	12	22.21	1	0-1
	1855	26090	10	QPSK	50	0	22.24	1	0-1
	1855	26090	10	16QAM	1	0	22.30	1	0-1
	1855	26090	10	16QAM	1	49	22.24	1	0-1
	1855	26090	10	16QAM	25	12	21.33	2	0-2
Mid	1882.5	26365	10	QPSK	1	0	23.38	0	0
	1882.5	26365	10	QPSK	1	49	23.36	0	0
	1882.5	26365	10	QPSK	25	12	22.37	1	0-1
	1882.5	26365	10	QPSK	50	0	22.33	1	0-1
	1882.5	26365	10	16QAM	1	0	22.57	1	0-1
	1882.5	26365	10	16QAM	1	49	22.37	1	0-1
	1882.5	26365	10	16QAM	25	12	21.47	2	0-2
High	1910	26640	10	QPSK	1	0	23.39	0	0
	1910	26640	10	QPSK	1	49	23.34	0	0
	1910	26640	10	QPSK	25	12	22.44	1	0-1
	1910	26640	10	QPSK	50	0	22.56	1	0-1
	1910	26640	10	16QAM	1	0	22.32	1	0-1
	1910	26640	10	16QAM	1	49	22.35	1	0-1
	1910	26640	10	16QAM	25	12	21.63	2	0-2
1910	26640	10	16QAM	50	0	21.43	2	0-2	

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10.2.2 Required RB Size and RB Offsets for SAR Testing

General test procedures for LTE can be found in Section 9.3.3. According to FCC KDB Publication 941225 D05:

- 1) The maximum output power across high, mid., and low channels is < 0.5 dB, therefore Mid channel is tested for QPSK 50% RB. Low and high channel SAR tests are required for QPSK, 50% RB allocation when the SAR is > 0.8 W/kg.
- 2) The average output power of QPSK 1 RB configurations was more than 0.5 dB higher than QPSK with 50% RB, therefore High channel (highest output power) was tested for QPSK 1 RB configurations. Low and Mid channel SAR tests were not required since the SAR was <1.45 W/kg for all configurations.
- 3) The average output power of 16 QAM 50% RB is not more than 0.5 dB higher than QPSK, therefore the channel of the highest SAR measured with QPSK 50% RB was tested for 16 QAM 50 % RB. SAR tests for other channels were not required since the SAR was <1.45 W/kg for all configurations.
- 4) The average output power of 16 QAM 1 RB configurations was more than 0.5 dB higher than 16 QAM with 50% RB, therefore mid channel (highest output power) was tested for 16 QAM 1 RB configurations. Low and High channel SAR tests were not required since the SAR was <1.45 W/kg for all configurations.
- 5) 100% RB Allocation SAR was not required to be tested since the 50% RB SAR was not > 1.45 W/kg.
- 6) The bolded powers are tested for SAR.

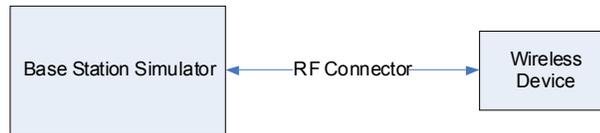


Figure 10-2
Power Measurement Setup

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10.3 2.4 GHz WLAN - FCC Rule Part 15C Conducted Powers

Table 10-3
IEEE 802.11b Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	1	13.91
		2	13.61
		5.5	13.56
		11	13.65
2437	6	1	15.10
		2	15.35
		5.5	14.09
2462	11	1	15.18
		2	15.15
		5.5	14.27
		11	15.25

Table 10-4
IEEE 802.11g Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	6	14.50
		9	12.74
		12	12.67
		18	10.45
		24	14.56
		36	12.81
2437	6	48	11.72
		54	13.55
		6	14.65
		9	14.02
		12	10.68
		18	12.36
2462	11	24	14.48
		36	13.15
		48	13.95
		54	13.60
		6	14.58
		9	14.08
		12	13.20
		18	10.61
2462	11	24	14.83
		36	12.83
		48	13.34
		54	13.67

Table 10-5
IEEE 802.11n Average RF Power

Freq [MHz]	Channel	Data Rate [Mbps]	Average Power (dBm)
2412	1	6.5/7.2	11.20
		13/14.40	13.05
		19.5/21.70	12.27
		26/28.90	11.81
		29/43.3	11.88
2437	6	52/57.80	10.99
		58.50/65	13.56
		65/72.2	13.41
		6.5/7.2	10.13
		13/14.40	13.39
2462	11	19.5/21.70	12.08
		26/28.90	11.48
		29/43.3	11.49
		52/57.80	12.87
		58.50/65	13.51
2462	11	65/72.2	13.64
		6.5/7.2	12.47
		13/14.40	12.74
		19.5/21.70	10.96
		26/28.90	11.09
2462	11	29/43.3	11.44
		52/57.80	12.56
		58.50/65	10.22
		65/72.2	11.48

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

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.

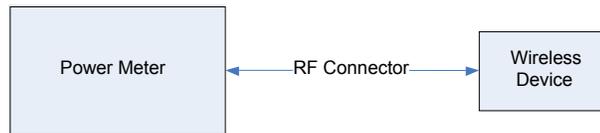


Figure 10-3
Power Measurement Setup

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11 LTE POWER REDUCTION

11.1 Introduction to LTE Power Reduction

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

**Table 11-1
SVLTE Power Reduction Scheme**

Mode	CDMA Current Voice Power for BC0, BC1 & BC 10	LTE Max. Power for B25
SVLTE	$P < 18 \text{ dBm}$	23.0 dBm (Limited)
	$P \geq 18 \text{ dBm}$	19.0 dBm (Limited)

11.2 SVLTE SAR Testing Procedures

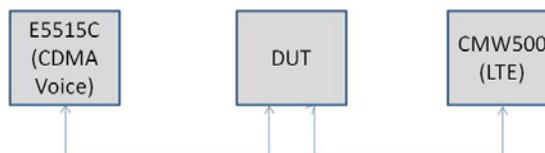
SAR Testing was performed at maximum power for both CDMA and LTE transmitters for compliance, however the device will never operate in this condition due to reduced power levels in accordance with the various SVLTE simultaneous transmission scenarios. Simultaneous transmission summations were evaluated with maximum power SAR values since they are more conservative.

Simultaneous transmission SAR compliance can also be evaluated through SAR testing of maximum and reduced power samples reflecting the power levels and scenarios of Table 11-1 above.

11.3 Output Power Verification

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

The power reduction targets and threshold level described in **Table 11-1** were confirmed. Please see results in Table 11-2 to Table 11-22.



**Figure 11-1
SVLTE Conducted Test Setup Diagram**

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Table 11-2
SVLTE Power Reduction Verification Results
Low Ch. Cell. CDMA - FCC Rule Part 22H, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1013 (Low)	24	19.64	19.66	19.68	19.62	19.61	19.60	19.63	19.62
	23	19.59	19.65	19.60	19.55	19.62	19.58	19.53	19.63
	22	19.63	19.69	19.62	19.65	19.65	19.55	19.65	19.64
	21	19.62	19.58	19.54	19.68	19.55	19.54	19.59	19.57
	20	19.55	19.63	19.64	19.55	19.60	19.67	19.66	19.57
	19	19.54	19.56	19.55	19.65	19.65	19.55	19.53	19.65
	18	19.60	19.59	19.58	19.62	19.69	19.59	19.56	19.66
	17	23.68	23.56	22.52	22.51	22.53	22.51	21.61	21.58
	16	23.61	23.51	22.55	22.55	22.62	22.57	21.54	21.57
	15	23.66	23.57	22.55	22.54	22.58	22.59	21.69	21.60
	14	23.65	23.52	22.56	22.68	22.57	22.58	21.59	21.51
	13	23.53	23.65	22.58	22.68	22.63	22.69	21.62	21.59
	12	23.56	23.55	22.61	22.63	22.66	22.63	21.52	21.53
11	23.67	23.63	22.54	22.53	22.62	22.51	21.62	21.54	

Table 11-3
SVLTE Power Reduction Verification Results
Mid Ch. Cell. CDMA - FCC Rule Part 22H, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
384 (Mid)	24	19.60	19.63	19.57	19.62	19.68	19.64	19.61	19.55
	23	19.58	19.63	19.65	19.56	19.53	19.62	19.65	19.55
	22	19.58	19.67	19.55	19.62	19.59	19.58	19.64	19.63
	21	19.54	19.55	19.64	19.68	19.61	19.65	19.67	19.60
	20	19.67	19.62	19.70	19.65	19.64	19.58	19.65	19.55
	19	19.60	19.59	19.57	19.63	19.69	19.67	19.53	19.63
	18	19.56	19.58	19.56	19.59	19.60	19.63	19.58	19.65
	17	23.53	23.55	22.52	22.64	22.59	22.51	21.51	21.53
	16	23.61	23.58	22.58	22.68	22.51	22.60	21.61	21.64
	15	23.52	23.64	22.59	22.62	22.59	22.69	21.62	21.55
	14	23.57	23.55	22.58	22.52	22.55	22.53	21.62	21.60
	13	23.69	23.57	22.61	22.58	22.63	22.67	21.67	21.63
	12	23.61	23.64	22.59	22.69	22.65	22.51	21.63	21.64
11	23.69	23.56	22.53	22.53	22.55	22.65	21.59	21.65	

Table 11-4
SVLTE Power Reduction Verification Results
High Ch. Cell. CDMA - FCC Rule Part 22H, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
777 (High)	24	19.58	19.54	19.59	19.59	19.64	19.53	19.61	19.57
	23	19.59	19.68	19.68	19.61	19.66	19.58	19.57	19.59
	22	19.68	19.64	19.57	19.60	19.55	19.69	19.53	19.58
	21	19.55	19.59	19.56	19.54	19.64	19.55	19.67	19.61
	20	19.56	19.59	19.69	19.54	19.62	19.58	19.66	19.59
	19	19.60	19.66	19.56	19.69	19.68	19.56	19.59	19.53
	18	19.65	19.64	19.57	19.61	19.67	19.59	19.60	19.56
	17	23.60	23.60	22.54	22.57	22.55	22.55	21.54	21.69
	16	23.57	23.51	22.58	22.61	22.55	22.61	21.53	21.53
	15	23.60	23.67	22.67	22.66	22.53	22.59	21.68	21.54
	14	23.60	23.65	22.55	22.60	22.61	22.60	21.53	21.56
	13	23.61	23.58	22.62	22.56	22.62	22.62	21.51	21.60
	12	23.62	23.58	22.63	22.69	22.58	22.60	21.54	21.65
11	23.65	23.52	22.53	22.53	22.54	22.57	21.60	21.54	

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Table 11-5
SVLTE Power Reduction Verification Results
Low Ch. PCS CDMA - FCC Rule Part 24E, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
25 (Low)	24	19.59	19.61	19.55	19.63	19.60	19.54	19.66	19.62
	23	19.67	19.63	19.55	19.64	19.64	19.68	19.63	19.63
	22	19.62	19.57	19.64	19.56	19.68	19.56	19.55	19.60
	21	19.65	19.59	19.59	19.66	19.56	19.57	19.59	19.62
	20	19.64	19.68	19.65	19.62	19.65	19.60	19.58	19.59
	19	19.57	19.62	19.61	19.65	19.60	19.63	19.64	19.64
	18	19.66	19.61	19.63	19.60	19.63	19.56	19.61	19.56
	17	23.56	23.62	22.61	22.55	22.64	22.64	21.66	21.66
	16	23.68	23.60	22.57	22.65	22.64	22.56	21.63	21.55
	15	23.60	23.54	22.55	22.55	22.60	22.59	21.58	21.59
	14	23.62	23.67	22.64	22.67	22.58	22.63	21.53	21.55
	13	23.56	23.52	22.58	22.63	22.59	22.68	21.63	21.60
12	23.53	23.56	22.68	22.66	22.62	22.60	21.53	21.53	
11	23.53	23.66	22.60	22.68	22.66	22.69	21.55	21.65	

Table 11-6
SVLTE Power Reduction Verification Results
Mid Ch. PCS CDMA - FCC Rule Part 24E, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
600 (Mid)	24	19.66	19.57	19.59	19.63	19.62	19.58	19.60	19.62
	23	19.57	19.64	19.59	19.60	19.60	19.64	19.67	19.57
	22	19.60	19.65	19.55	19.60	19.64	19.65	19.66	19.59
	21	19.62	19.58	19.55	19.66	19.65	19.66	19.62	19.63
	20	19.57	19.66	19.58	19.64	19.55	19.65	19.58	19.59
	19	19.67	19.59	19.62	19.57	19.65	19.62	19.67	19.59
	18	19.60	19.62	19.61	19.57	19.67	19.58	19.58	19.65
	17	23.62	23.59	22.62	22.66	22.56	22.64	21.62	21.64
	16	23.59	23.58	22.66	22.57	22.64	22.67	21.56	21.66
	15	23.66	23.65	22.51	22.67	22.54	22.66	21.64	21.53
	14	23.65	23.67	22.65	22.69	22.67	22.54	21.60	21.58
	13	23.61	23.63	22.57	22.59	22.57	22.66	21.58	21.60
12	23.66	23.53	22.62	22.57	22.61	22.58	21.62	21.66	
11	23.66	23.65	22.66	22.52	22.63	22.60	21.63	21.53	

Table 11-7
SVLTE Power Reduction Verification Results
High Ch. PCS CDMA - FCC Rule Part 24E, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1175 (High)	24	19.55	19.58	19.68	19.56	19.64	19.69	19.63	19.61
	23	19.64	19.58	19.62	19.66	19.66	19.65	19.65	19.58
	22	19.68	19.58	19.61	19.68	19.66	19.56	19.53	19.61
	21	19.65	19.64	19.62	19.64	19.54	19.63	19.63	19.56
	20	19.58	19.59	19.63	19.57	19.54	19.59	19.60	19.54
	19	19.55	19.63	19.56	19.67	19.68	19.64	19.55	19.56
	18	19.55	19.64	19.53	19.57	19.65	19.64	19.58	19.59
	17	23.69	23.60	22.62	22.62	22.63	22.62	21.56	21.60
	16	23.61	23.60	22.65	22.64	22.53	22.65	21.55	21.64
	15	23.64	23.69	22.61	22.59	22.69	22.64	21.53	21.53
	14	23.61	23.55	22.64	22.60	22.51	22.56	21.59	21.64
	13	23.55	23.57	22.64	22.62	22.52	22.63	21.53	21.68
12	23.57	23.64	22.54	22.54	22.67	22.68	21.56	21.56	
11	23.65	23.57	22.57	22.66	22.56	22.54	21.59	21.65	

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Table 11-8
SVLTE Power Reduction Verification Results
Mid Ch. Cell. CDMA - FCC Rule Part 90S, Low Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26090 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
564 (MID)	24	19.56	19.57	19.61	19.57	19.61	19.60	19.60	19.57
	23	19.56	19.59	19.58	19.56	19.64	19.56	19.62	19.57
	22	19.61	19.57	19.57	19.60	19.56	19.60	19.58	19.56
	21	19.56	19.63	19.56	19.58	19.58	19.60	19.57	19.57
	20	19.54	19.57	19.63	19.64	19.63	19.61	19.54	19.64
	19	19.56	19.57	19.56	19.59	19.61	19.62	19.60	19.59
	18	19.57	19.60	19.59	19.59	19.61	19.57	19.55	19.63
	17	23.55	23.59	22.63	22.60	22.63	22.65	21.64	21.69
	16	23.55	23.61	22.64	22.69	22.67	22.54	21.58	21.55
	15	23.54	23.62	22.60	22.61	22.62	22.54	21.60	21.68
	14	23.61	23.61	22.52	22.63	22.53	22.52	21.63	21.61
	13	23.63	23.68	22.54	22.54	22.64	22.54	21.67	21.67
12	23.62	23.65	22.57	22.55	22.69	22.63	21.62	21.61	
11	23.55	23.53	22.59	22.55	22.68	22.65	21.54	21.68	

Table 11-9
SVLTE Power Reduction Verification Results
Low Ch. Cell. CDMA - FCC Rule Part 22H, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1013 (Low)	24	19.58	19.59	19.62	19.53	19.64	19.59	19.67	19.67
	23	19.56	19.65	19.59	19.52	19.57	19.64	19.60	19.64
	22	19.52	19.54	19.59	19.64	19.60	19.55	19.54	19.55
	21	19.64	19.64	19.66	19.55	19.59	19.53	19.66	19.65
	20	19.59	19.55	19.54	19.53	19.56	19.64	19.62	19.60
	19	19.66	19.54	19.56	19.60	19.55	19.56	19.60	19.60
	18	19.64	19.60	19.54	19.55	19.65	19.53	19.57	19.59
	17	23.56	23.59	22.54	22.59	22.67	22.58	21.69	21.62
	16	23.64	23.57	22.57	22.69	22.57	22.60	21.62	21.52
	15	23.66	23.56	22.57	22.54	22.68	22.61	21.51	21.65
	14	23.52	23.52	22.55	22.64	22.68	22.57	21.68	21.59
	13	23.57	23.51	22.61	22.59	22.63	22.61	21.65	21.56
12	23.54	23.56	22.61	22.56	22.56	22.52	21.60	21.66	
11	23.55	23.63	22.56	22.60	22.61	22.60	21.66	21.61	

Table 11-10
SVLTE Power Reduction Verification Results
Mid Ch. Cell. CDMA - FCC Rule Part 22H, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
384 (Mid)	24	19.58	19.55	19.56	19.64	19.59	19.63	19.64	19.58
	23	19.56	19.56	19.62	19.59	19.64	19.59	19.64	19.59
	22	19.58	19.57	19.60	19.55	19.58	19.55	19.60	19.64
	21	19.65	19.61	19.60	19.57	19.58	19.60	19.58	19.61
	20	19.55	19.62	19.59	19.62	19.56	19.63	19.59	19.59
	19	19.57	19.65	19.58	19.63	19.55	19.59	19.62	19.59
	18	19.57	19.57	19.56	19.61	19.62	19.58	19.59	19.58
	17	23.57	23.52	22.67	22.60	22.55	22.68	21.65	21.68
	16	23.68	23.53	22.60	22.56	22.66	22.67	21.69	21.58
	15	23.62	23.64	22.61	22.64	22.55	22.55	21.59	21.52
	14	23.59	23.55	22.66	22.67	22.58	22.57	21.65	21.67
	13	23.60	23.67	22.55	22.55	22.60	22.63	21.57	21.51
12	23.68	23.60	22.58	22.67	22.56	22.60	21.62	21.59	
11	23.65	23.66	22.55	22.64	22.52	22.63	21.68	21.62	

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Table 11-11
SVLTE Power Reduction Verification Results
High Ch. Cell. CDMA - FCC Rule Part 22H, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
777 (High)	24	19.66	19.55	19.66	19.66	19.56	19.57	19.57	19.54
	23	19.56	19.61	19.57	19.56	19.62	19.57	19.65	19.65
	22	19.63	19.64	19.55	19.56	19.67	19.67	19.58	19.61
	21	19.60	19.59	19.63	19.57	19.59	19.58	19.63	19.59
	20	19.56	19.69	19.66	19.55	19.61	19.66	19.67	19.66
	19	19.63	19.66	19.65	19.56	19.55	19.64	19.55	19.58
	18	19.62	19.62	19.66	19.67	19.67	19.59	19.58	19.69
	17	23.57	23.68	22.56	22.60	22.62	22.58	21.63	21.57
	16	23.55	23.59	22.61	22.66	22.52	22.61	21.52	21.52
	15	23.59	23.65	22.63	22.62	22.53	22.65	21.64	21.68
	14	23.60	23.54	22.68	22.54	22.53	22.61	21.67	21.65
	13	23.55	23.61	22.58	22.63	22.63	22.56	21.63	21.53
12	23.53	23.63	22.54	22.62	22.64	22.59	21.62	21.68	
11	23.54	23.66	22.55	22.60	22.67	22.63	21.63	21.53	

Table 11-12
SVLTE Power Reduction Verification Results
Low Ch. PCS CDMA - FCC Rule Part 24E, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
25 (Low)	24	19.66	19.53	19.62	19.63	19.57	19.59	19.66	19.55
	23	19.59	19.54	19.67	19.62	19.57	19.67	19.58	19.67
	22	19.57	19.57	19.67	19.58	19.58	19.55	19.60	19.63
	21	19.54	19.56	19.57	19.53	19.56	19.67	19.61	19.56
	20	19.57	19.57	19.68	19.54	19.59	19.65	19.57	19.57
	19	19.60	19.57	19.54	19.65	19.56	19.55	19.68	19.65
	18	19.63	19.57	19.64	19.61	19.60	19.61	19.62	19.59
	17	23.57	23.64	22.58	22.63	22.68	22.51	21.62	21.58
	16	23.64	23.54	22.68	22.62	22.55	22.65	21.52	21.58
	15	23.52	23.61	22.67	22.59	22.60	22.68	21.67	21.56
	14	23.57	23.61	22.61	22.61	22.61	22.59	21.52	21.52
	13	23.52	23.58	22.55	22.61	22.64	22.58	21.61	21.56
12	23.63	23.60	22.69	22.57	22.65	22.54	21.69	21.54	
11	23.53	23.67	22.62	22.57	22.61	22.52	21.56	21.57	

Table 11-13
SVLTE Power Reduction Verification Results
Mid Ch. PCS CDMA - FCC Rule Part 24E, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
600 (Mid)	24	19.60	19.56	19.67	19.61	19.66	19.55	19.63	19.65
	23	19.58	19.56	19.66	19.56	19.63	19.62	19.61	19.65
	22	19.57	19.61	19.64	19.67	19.55	19.60	19.57	19.64
	21	19.66	19.56	19.65	19.57	19.57	19.66	19.66	19.58
	20	19.60	19.57	19.64	19.61	19.56	19.62	19.57	19.63
	19	19.61	19.56	19.56	19.64	19.57	19.55	19.60	19.61
	18	19.56	19.60	19.62	19.66	19.67	19.56	19.64	19.59
	17	23.60	23.67	22.57	22.57	22.57	22.68	21.59	21.67
	16	23.55	23.61	22.55	22.59	22.59	22.56	21.68	21.65
	15	23.59	23.56	22.67	22.54	22.57	22.54	21.53	21.64
	14	23.54	23.63	22.52	22.53	22.67	22.65	21.65	21.58
	13	23.53	23.65	22.67	22.54	22.53	22.67	21.64	21.51
12	23.66	23.67	22.64	22.53	22.56	22.59	21.56	21.68	
11	23.53	23.65	22.55	22.62	22.58	22.51	21.67	21.54	

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Table 11-14
SVLTE Power Reduction Verification Results
High Ch. PCS CDMA - FCC Rule Part 24E, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1175 (High)	24	19.69	19.64	19.58	19.54	19.57	19.67	19.64	19.60
	23	19.58	19.64	19.54	19.67	19.55	19.56	19.69	19.54
	22	19.63	19.56	19.53	19.68	19.56	19.63	19.53	19.56
	21	19.53	19.59	19.56	19.60	19.60	19.62	19.61	19.55
	20	19.65	19.55	19.60	19.54	19.58	19.62	19.53	19.59
	19	19.63	19.69	19.64	19.62	19.58	19.65	19.58	19.56
	18	19.63	19.60	19.58	19.56	19.61	19.55	19.67	19.58
	17	23.53	23.53	22.61	22.67	22.55	22.61	21.67	21.56
	16	23.57	23.67	22.68	22.66	22.58	22.58	21.67	21.57
	15	23.68	23.58	22.65	22.55	22.61	22.65	21.54	21.61
	14	23.63	23.61	22.54	22.67	22.58	22.68	21.54	21.69
	13	23.67	23.65	22.56	22.54	22.57	22.51	21.69	21.58
12	23.54	23.57	22.54	22.55	22.53	22.68	21.68	21.55	
11	23.62	23.54	22.61	22.57	22.57	22.66	21.65	21.64	

Table 11-15
SVLTE Power Reduction Verification Results
Mid Ch. Cell. CDMA - FCC Rule Part 90S, Mid Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26365 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
564 (MID)	24	19.58	19.60	19.56	19.56	19.61	19.63	19.56	19.55
	23	19.56	19.55	19.60	19.60	19.55	19.61	19.56	19.55
	22	19.59	19.62	19.57	19.57	19.62	19.62	19.62	19.54
	21	19.56	19.59	19.58	19.57	19.57	19.56	19.56	19.60
	20	19.58	19.62	19.56	19.59	19.57	19.63	19.55	19.54
	19	19.62	19.56	19.54	19.62	19.55	19.59	19.58	19.56
	18	19.63	19.56	19.59	19.60	19.60	19.55	19.64	19.59
	17	23.54	23.58	22.56	22.63	22.58	22.65	21.59	21.67
	16	23.52	23.56	22.62	22.55	22.55	22.65	21.62	21.52
	15	23.51	23.52	22.51	22.64	22.57	22.54	21.61	21.61
	14	23.57	23.63	22.56	22.53	22.60	22.59	21.52	21.56
	13	23.53	23.60	22.63	22.54	22.55	22.57	21.59	21.66
12	23.66	23.64	22.60	22.66	22.60	22.54	21.68	21.51	
11	23.60	23.66	22.54	22.58	22.53	22.59	21.61	21.63	

Table 11-16
SVLTE Power Reduction Verification Results
Low Ch. Cell. CDMA - FCC Rule Part 22H, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1013 (Low)	24	19.66	19.57	19.66	19.68	19.66	19.54	19.65	19.66
	23	19.69	19.59	19.53	19.55	19.66	19.51	19.53	19.67
	22	19.53	19.51	19.56	19.56	19.56	19.54	19.69	19.52
	21	19.66	19.62	19.55	19.52	19.56	19.69	19.57	19.63
	20	19.68	19.68	19.55	19.59	19.61	19.53	19.59	19.58
	19	19.62	19.60	19.53	19.64	19.59	19.58	19.52	19.62
	18	19.52	19.51	19.56	19.67	19.62	19.60	19.51	19.53
	17	23.55	23.52	22.51	22.53	22.54	22.54	21.61	21.58
	16	23.62	23.69	22.66	22.66	22.64	22.60	21.51	21.60
	15	23.62	23.55	22.58	22.53	22.67	22.66	21.52	21.65
	14	23.67	23.53	22.55	22.62	22.53	22.57	21.53	21.61
	13	23.60	23.57	22.65	22.63	22.66	22.57	21.58	21.51
12	23.52	23.60	22.66	22.57	22.63	22.64	21.64	21.54	
11	23.59	23.68	22.52	22.66	22.63	22.61	21.59	21.53	

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Table 11-17
SVLTE Power Reduction Verification Results
Mid Ch. Cell. CDMA - FCC Rule Part 22H, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
384 (Mid)	24	19.66	19.62	19.61	19.61	19.60	19.61	19.56	19.66
	23	19.57	19.57	19.54	19.61	19.55	19.60	19.60	19.54
	22	19.55	19.66	19.65	19.56	19.53	19.58	19.66	19.62
	21	19.64	19.54	19.57	19.56	19.53	19.56	19.51	19.53
	20	19.52	19.62	19.58	19.51	19.65	19.55	19.65	19.54
	19	19.61	19.59	19.54	19.54	19.51	19.51	19.53	19.65
	18	19.57	19.64	19.60	19.65	19.51	19.65	19.57	19.61
	17	23.52	23.61	22.53	22.67	22.68	22.64	21.56	21.64
	16	23.59	23.68	22.64	22.65	22.55	22.52	21.66	21.58
	15	23.67	23.63	22.57	22.60	22.60	22.60	21.55	21.56
	14	23.67	23.64	22.61	22.53	22.69	22.59	21.67	21.60
	13	23.55	23.61	22.60	22.54	22.64	22.61	21.65	21.60
12	23.66	23.68	22.60	22.68	22.60	22.55	21.51	21.60	
11	23.52	23.68	22.55	22.62	22.63	22.67	21.53	21.62	

Table 11-18
SVLTE Power Reduction Verification Results
High Ch. Cell. CDMA - FCC Rule Part 22H, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
777 (High)	24	19.55	19.66	19.58	19.56	19.52	19.64	19.65	19.66
	23	19.63	19.60	19.63	19.55	19.64	19.56	19.58	19.61
	22	19.63	19.60	19.65	19.60	19.64	19.65	19.58	19.56
	21	19.64	19.61	19.60	19.54	19.54	19.58	19.58	19.63
	20	19.66	19.56	19.53	19.61	19.62	19.66	19.58	19.55
	19	19.62	19.55	19.57	19.59	19.65	19.61	19.59	19.57
	18	19.64	19.66	19.61	19.56	19.51	19.54	19.66	19.64
	17	23.59	23.69	22.62	22.56	22.54	22.53	21.55	21.64
	16	23.65	23.65	22.53	22.51	22.55	22.52	21.51	21.69
	15	23.66	23.57	22.61	22.67	22.65	22.60	21.63	21.51
	14	23.65	23.64	22.57	22.67	22.59	22.65	21.61	21.54
	13	23.57	23.62	22.59	22.53	22.65	22.53	21.58	21.67
12	23.66	23.58	22.54	22.68	22.52	22.65	21.57	21.52	
11	23.54	23.56	22.60	22.65	22.61	22.67	21.61	21.57	

Table 11-19
SVLTE Power Reduction Verification Results
Low Ch. PCS CDMA - FCC Rule Part 24E, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
25 (Low)	24	19.62	19.62	19.67	19.54	19.63	19.59	19.55	19.59
	23	19.64	19.66	19.64	19.66	19.53	19.62	19.54	19.59
	22	19.58	19.60	19.60	19.68	19.68	19.54	19.59	19.61
	21	19.60	19.54	19.60	19.58	19.54	19.63	19.53	19.67
	20	19.62	19.56	19.68	19.62	19.57	19.65	19.57	19.65
	19	19.66	19.62	19.54	19.54	19.58	19.56	19.62	19.60
	18	19.68	19.65	19.61	19.65	19.66	19.60	19.61	19.63
	17	23.51	23.54	22.54	22.66	22.55	22.64	21.61	21.53
	16	23.68	23.54	22.56	22.59	22.67	22.63	21.54	21.54
	15	23.65	23.61	22.52	22.65	22.58	22.60	21.53	21.67
	14	23.52	23.54	22.68	22.65	22.59	22.56	21.66	21.52
	13	23.65	23.67	22.57	22.57	22.57	22.56	21.63	21.69
12	23.65	23.62	22.58	22.51	22.56	22.66	21.59	21.52	
11	23.55	23.59	22.63	22.66	22.56	22.62	21.59	21.57	

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Table 11-20
SVLTE Power Reduction Verification Results
Mid Ch. PCS CDMA - FCC Rule Part 24E, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
600 (Mid)	24	19.63	19.56	19.54	19.58	19.57	19.60	19.58	19.53
	23	19.63	19.57	19.67	19.69	19.52	19.54	19.54	19.62
	22	19.55	19.65	19.63	19.52	19.56	19.54	19.59	19.53
	21	19.69	19.59	19.57	19.61	19.64	19.53	19.57	19.63
	20	19.53	19.56	19.64	19.59	19.66	19.64	19.68	19.62
	19	19.68	19.60	19.55	19.59	19.54	19.54	19.62	19.63
	18	19.55	19.68	19.58	19.66	19.59	19.58	19.69	19.67
	17	23.66	23.57	22.68	22.58	22.67	22.67	21.52	21.65
	16	23.60	23.57	22.63	22.66	22.57	22.55	21.61	21.54
	15	23.67	23.59	22.69	22.66	22.55	22.63	21.68	21.66
	14	23.57	23.62	22.68	22.64	22.58	22.53	21.57	21.53
	13	23.54	23.53	22.54	22.61	22.52	22.66	21.68	21.54
12	23.62	23.65	22.60	22.64	22.60	22.54	21.62	21.55	
11	23.53	23.56	22.68	22.58	22.52	22.60	21.68	21.56	

Table 11-21
SVLTE Power Reduction Verification Results
High Ch. PCS CDMA - FCC Rule Part 24E, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
1175 (High)	24	19.53	19.52	19.69	19.58	19.69	19.64	19.68	19.53
	23	19.59	19.69	19.53	19.64	19.66	19.55	19.62	19.68
	22	19.70	19.69	19.68	19.62	19.53	19.59	19.70	19.58
	21	19.64	19.65	19.68	19.55	19.56	19.58	19.59	19.58
	20	19.54	19.56	19.54	19.62	19.60	19.53	19.63	19.62
	19	19.63	19.55	19.60	19.60	19.65	19.54	19.60	19.68
	18	19.59	19.61	19.52	19.56	19.65	19.63	19.69	19.55
	17	23.51	23.65	22.55	22.52	22.60	22.55	21.56	21.61
	16	23.54	23.69	22.68	22.60	22.63	22.56	21.56	21.61
	15	23.60	23.68	22.69	22.60	22.62	22.61	21.57	21.65
	14	23.61	23.53	22.67	22.59	22.55	22.66	21.67	21.55
	13	23.66	23.63	22.61	22.61	22.59	22.63	21.55	21.66
12	23.58	23.67	22.51	22.60	22.58	22.61	21.53	21.61	
11	23.59	23.60	22.57	22.64	22.53	22.55	21.62	21.64	

Table 11-22
SVLTE Power Reduction Verification Results
Mid Ch. Cell. CDMA - FCC Rule Part 90S, High Ch. LTE Band 25 - FCC Rule Part 24E

CDMA Voice Channel	CDMA Voice Tx(dBm)	LTE Band 25, Ch.26640 Conducted Power (dBm)							
		QPSK 1 RB 0 RB Offset	QPSK 1 RB 49 RB Offset	QPSK 25 RB 12 RB Offset	QPSK 50 RB 0 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 49 RB Offset	16QAM 25 RB 12 RB Offset	16QAM 50 RB 0 RB Offset
564 (MID)	24	19.57	19.63	19.54	19.58	19.65	19.56	19.65	19.65
	23	19.65	19.61	19.59	19.56	19.59	19.59	19.63	19.66
	22	19.59	19.62	19.56	19.64	19.57	19.61	19.64	19.57
	21	19.58	19.64	19.63	19.57	19.55	19.63	19.55	19.56
	20	19.62	19.63	19.56	19.55	19.60	19.64	19.58	19.56
	19	19.59	19.64	19.62	19.55	19.54	19.59	19.55	19.64
	18	19.56	19.55	19.62	19.57	19.65	19.60	19.62	19.61
	17	23.65	23.67	22.67	22.53	22.68	22.58	21.52	21.67
	16	23.61	23.64	22.60	22.52	22.68	22.58	21.59	21.65
	15	23.55	23.61	22.68	22.51	22.66	22.56	21.52	21.53
	14	23.65	23.56	22.64	22.68	22.58	22.54	21.60	21.52
	13	23.67	23.61	22.68	22.64	22.53	22.53	21.57	21.65
12	23.67	23.53	22.63	22.60	22.58	22.65	21.68	21.53	
11	23.52	23.59	22.65	22.60	22.62	22.52	21.55	21.59	

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12 SYSTEM VERIFICATION

12.1 Tissue Verification

**Table 12-1
Measured Tissue Properties**

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C')	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
05/29/2012	835H	23.4	820	0.911	42.23	0.898	41.571	1.45%	1.59%
			835	0.925	42.05	0.900	41.500	2.78%	1.33%
			850	0.941	41.88	0.916	41.500	2.73%	0.92%
08/07/2012	835H	23.7	820	0.891	40.25	0.898	41.571	-0.78%	-3.18%
			835	0.906	40.07	0.900	41.500	0.67%	-3.45%
			850	0.919	39.87	0.916	41.500	0.33%	-3.93%
06/01/2012	1900H	23.1	1850	1.357	38.94	1.400	40.000	-3.07%	-2.65%
			1880	1.389	38.82	1.400	40.000	-0.79%	-2.95%
			1910	1.419	38.72	1.400	40.000	1.36%	-3.20%
06/05/2012	1900H	22.2	1850	1.399	38.65	1.400	40.000	-0.07%	-3.38%
			1880	1.425	38.60	1.400	40.000	1.79%	-3.50%
			1910	1.459	38.48	1.400	40.000	4.21%	-3.80%
08/07/2012	1900H	22.1	1850	1.347	39.41	1.400	40.000	-3.79%	-1.48%
			1880	1.404	39.41	1.400	40.000	0.29%	-1.48%
			1910	1.434	39.13	1.400	40.000	2.43%	-2.17%
05/30/2012	2450H	23.5	2401	1.793	38.29	1.758	39.298	1.99%	-2.57%
			2450	1.848	38.12	1.800	39.200	2.67%	-2.76%
			2499	1.902	37.88	1.852	39.135	2.70%	-3.21%
05/28/2012	835B	22.9	820	0.977	53.11	0.97	55.28	0.83%	-3.93%
			835	0.995	52.97	0.97	55.20	2.58%	-4.04%
			850	1.017	52.41	0.99	55.15	2.94%	-4.98%
05/31/2012	835B	22.9	820	0.984	53.70	0.97	55.28	1.55%	-2.87%
			835	0.997	53.66	0.97	55.20	2.78%	-2.79%
			850	1.013	53.50	0.99	55.15	2.53%	-3.00%
07/12/2012	835B	22.2	820	0.983	54.08	0.969	55.284	1.44%	-2.18%
			835	0.988	53.62	0.970	55.200	1.86%	-2.86%
			850	1.000	53.77	0.988	55.154	1.21%	-2.51%
08/07/2012	835B	23.3	820	0.974	52.99	0.969	55.284	0.52%	-4.15%
			835	0.988	52.84	0.970	55.200	1.86%	-4.28%
			850	1.002	52.71	0.988	55.154	1.42%	-4.43%
05/30/2012	1900B	23.1	1850	1.446	52.52	1.52	53.30	-4.87%	-1.46%
			1880	1.479	52.48	1.52	53.30	-2.70%	-1.54%
			1910	1.511	52.42	1.52	53.30	-0.59%	-1.65%
06/03/2012	1900B	23.4	1850	1.477	51.74	1.52	53.30	-2.83%	-2.93%
			1880	1.508	51.66	1.52	53.30	-0.79%	-3.08%
			1910	1.542	51.57	1.52	53.30	1.45%	-3.25%
07/09/2012	1900B	24.9	1850	1.462	51.95	1.520	53.300	-3.82%	-2.53%
			1880	1.489	51.86	1.520	53.300	-2.04%	-2.70%
			1910	1.520	51.77	1.520	53.300	0.00%	-2.87%
07/12/2012	1900B	22.5	1850	1.457	52.40	1.520	53.300	-4.14%	-1.69%
			1880	1.502	52.43	1.520	53.300	-1.18%	-1.63%
			1910	1.528	52.10	1.520	53.300	0.53%	-2.25%
08/08/2012	1900B	22.4	1850	1.521	52.29	1.520	53.300	0.07%	-1.89%
			1880	1.539	51.99	1.520	53.300	1.25%	-2.46%
			1910	1.554	52.01	1.520	53.300	2.24%	-2.42%
05/30/2012	2450B	24.3	2401	1.932	55.04	1.903	52.765	1.52%	4.31%
			2450	1.997	54.92	1.950	52.700	2.41%	4.21%
			2499	2.062	54.72	2.019	52.638	2.13%	3.96%
07/12/2012	2450B	22.3	2401	1.945	52.03	1.903	52.765	2.21%	-1.39%
			2450	1.989	51.73	1.950	52.700	2.00%	-1.84%
			2499	2.067	51.33	2.019	52.638	2.38%	-2.48%

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The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

12.2 Measurement Procedure for Tissue verification

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

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

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

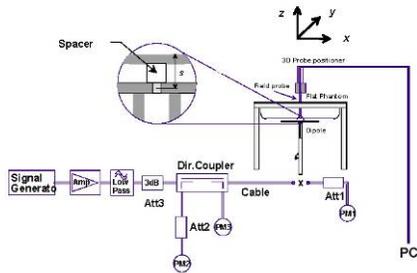
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12.3 Test System Verification

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

**Table 12-2
System Verification Results**

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation (%)
835	Head	05/29/2012	21.8	21.4	0.100	4d119	3258	1	9.420	10.000	6.16%
835	Head	08/07/2012	24.2	23.8	0.100	4d119	3258	0.97	9.420	9.700	2.97%
1900	Head	06/01/2012	23.0	21.4	0.100	5d080	3022	4.07	39.900	40.700	2.01%
1900	Head	06/05/2012	22.8	21.4	0.100	5d080	3209	4.1	39.900	41.000	2.76%
1900	Head	08/07/2012	23.8	22.3	0.100	5d149	3287	4.05	39.300	40.500	3.05%
2450	Head	05/30/2012	24.9	24.2	0.040	719	3022	2.02	53.800	50.500	-6.13%
835	Body	05/28/2012	23.0	22.6	0.100	4d119	3258	1.02	9.560	10.200	6.69%
835	Body	05/31/2012	22.7	22.0	0.100	4d119	3258	1.02	9.560	10.200	6.69%
835	Body	07/12/2012	23.3	23.1	0.100	4d047	3287	0.969	9.410	9.690	2.98%
835	Body	08/07/2012	24.8	24.2	0.100	4d119	3258	0.985	9.560	9.850	3.03%
1900	Body	05/30/2012	24.1	22.9	0.100	5d149	3288	3.93	39.300	39.300	0.00%
1900	Body	06/03/2012	24.2	23.6	0.100	5d080	3022	4.2	40.900	42.000	2.69%
1900	Body	07/09/2012	23.7	24.8	0.100	5d080	3022	4.23	40.900	42.300	3.42%
1900	Body	07/12/2012	23.0	22.7	0.100	5d149	3288	3.91	39.300	39.100	-0.51%
1900	Body	08/08/2012	23.7	22.8	0.100	5d149	3287	4.11	39.300	41.100	4.58%
2450	Body	05/30/2012	24.8	23.4	0.040	719	3022	1.91	51.300	47.750	-6.92%
2450	Body	07/12/2012	23.1	22.9	0.100	882	3213	5.39	50.300	53.900	7.16%



**Figure 12-1
System Verification Setup Diagram**



**Figure 12-2
System Verification Setup Photo**

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13 SAR DATA SUMMARY

13.1 Standalone Head SAR Data

Table 13-1
Cell. CDMA - FCC Rule Part 90S Head SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Service	Device Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.17	-0.11	Right	Cheek	SO55	SAR#2	0.262
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.17	-0.06	Right	Tilt	SO55	SAR#2	0.194
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.17	-0.04	Left	Cheek	SO55	SAR#2	0.341
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.17	0.04	Left	Tilt	SO55	SAR#2	0.221
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.11	-0.01	Right	Cheek	EVDO Rev. A	SAR#2	0.258
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.11	0.13	Right	Tilt	EVDO Rev. A	SAR#2	0.202
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.11	-0.05	Left	Cheek	EVDO Rev. A	SAR#2	0.378
820.10	564	Cell. CDMA - FCC Rule Part 90S	25.11	0.17	Left	Tilt	EVDO Rev. A	SAR#2	0.256
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram			

Table 13-2
Cell. CDMA - FCC Rule Part 22H Head SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Service	Device Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.44	0.05	Right	Cheek	SO55	SAR#2	0.214
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.44	-0.09	Right	Tilt	SO55	SAR#2	0.151
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.44	-0.01	Left	Cheek	SO55	SAR#2	0.266
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.44	0.14	Left	Tilt	SO55	SAR#2	0.178
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.32	0.09	Right	Cheek	EVDO Rev. A	SAR#2	0.230
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.32	-0.06	Right	Tilt	EVDO Rev. A	SAR#2	0.191
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.32	0.00	Left	Cheek	EVDO Rev. A	SAR#2	0.329
836.52	384	Cell. CDMA - FCC Rule Part 22H	25.32	0.20	Left	Tilt	EVDO Rev. A	SAR#2	0.217
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram			

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**Table 13-3
PCS CDMA - FCC Rule Part 24E Head SAR Results**

MEASUREMENT RESULTS									
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Service	Device Serial Number	SAR (1g)
MHz	Ch.								(W/kg)
1880.00	600	PCS CDMA - FCC Rule Part 24E	25.00	-0.12	Right	Cheek	SO55	SAR#2	0.439
1880.00	600	PCS CDMA - FCC Rule Part 24E	25.00	0.10	Right	Tilt	SO55	SAR#2	0.163
1880.00	600	PCS CDMA - FCC Rule Part 24E	25.00	0.03	Left	Cheek	SO55	SAR#2	0.578
1880.00	600	PCS CDMA - FCC Rule Part 24E	25.00	-0.19	Left	Tilt	SO55	SAR#2	0.269
1880.00	600	PCS CDMA - FCC Rule Part 24E	24.97	-0.02	Right	Cheek	EVDO Rev. A	SAR#2	0.533
1880.00	600	PCS CDMA - FCC Rule Part 24E	24.97	0.00	Right	Tilt	EVDO Rev. A	SAR#2	0.248
1851.25	25	PCS CDMA - FCC Rule Part 24E	24.96	0.01	Left	Cheek	EVDO Rev. A	SAR#2	0.821
1880.00	600	PCS CDMA - FCC Rule Part 24E	24.97	0.02	Left	Cheek	EVDO Rev. A	SAR#2	0.858
1908.75	1175	PCS CDMA - FCC Rule Part 24E	25.07	-0.13	Left	Cheek	EVDO Rev. A	SAR#2	0.898
1880.00	600	PCS CDMA - FCC Rule Part 24E	24.97	0.04	Left	Tilt	EVDO Rev. A	SAR#2	0.273
ANSI / IEEE C95.1 1992 - SAFETY LIMIT					Head				
Spatial Peak					1.6 W/kg (mW/g)				
Uncontrolled Exposure/General Population					averaged over 1 gram				

**Table 13-4
LTE Band 25 - FCC Rule Part 24E Head SAR Results**

MEASUREMENT RESULTS														
FREQUENCY		Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)	
MHz	Ch.												(W/kg)	
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.04	1	Right	Cheek	QPSK	25	12	SAR#3	0.597
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	-0.13	0	Right	Cheek	QPSK	1	0	SAR#3	0.914
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.19	0	Right	Cheek	QPSK	1	49	SAR#3	0.841
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	-0.19	2	Right	Cheek	16 QAM	25	12	SAR#3	0.498
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	0.11	1	Right	Cheek	16 QAM	1	0	SAR#3	0.666
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.01	1	Right	Cheek	16 QAM	1	49	SAR#3	0.627
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.03	1	Right	Tilt	QPSK	25	12	SAR#3	0.747
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	0.00	0	Right	Tilt	QPSK	1	0	SAR#3	1.050
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.03	0	Right	Tilt	QPSK	1	49	SAR#3	0.991
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	0.02	2	Right	Tilt	16 QAM	25	12	SAR#3	0.622
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	0.00	1	Right	Tilt	16 QAM	1	0	SAR#3	0.837
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.09	1	Right	Tilt	16 QAM	1	49	SAR#3	0.751
1855.00	26090	Low	LTE Band 25 - FCC Rule Part 24E	10	22.21	0.06	1	Left	Cheek	QPSK	25	12	SAR#3	0.779
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.08	1	Left	Cheek	QPSK	25	12	SAR#3	0.928
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	22.44	0.13	1	Left	Cheek	QPSK	25	12	SAR#3	0.946
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	-0.10	0	Left	Cheek	QPSK	1	0	SAR#3	1.190
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.01	0	Left	Cheek	QPSK	1	49	SAR#3	0.987
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	21.47	0.03	2	Left	Cheek	16 QAM	25	12	SAR#3	0.774
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	0.01	1	Left	Cheek	16 QAM	1	0	SAR#3	0.958
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.02	1	Left	Cheek	16 QAM	1	49	SAR#3	0.950
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.01	1	Left	Tilt	QPSK	25	12	SAR#3	0.783
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	0.04	0	Left	Tilt	QPSK	1	0	SAR#3	1.060
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.03	0	Left	Tilt	QPSK	1	49	SAR#3	0.925
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	-0.12	2	Left	Tilt	16 QAM	25	12	SAR#3	0.636
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	-0.01	1	Left	Tilt	16 QAM	1	0	SAR#3	0.822
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.02	1	Left	Tilt	16 QAM	1	49	SAR#3	0.791
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Head						
Spatial Peak								1.6 W/kg (mW/g)						
Uncontrolled Exposure/General Population								averaged over 1 gram						

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**Table 13-5
2.4 GHz WLAN - FCC Rule Part 15C Head SAR Results**

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
2462	11	IEEE 802.11b	DSSS	15.18	0.15	Right	Cheek	SAR#4	1	0.006
2462	11	IEEE 802.11b	DSSS	15.18	0.14	Right	Tilt	SAR#4	1	0.002
2462	11	IEEE 802.11b	DSSS	15.18	-0.16	Left	Cheek	SAR#4	1	0.003
2462	11	IEEE 802.11b	DSSS	15.18	0.05	Left	Tilt	SAR#4	1	0.003
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram				

13.2 Standalone Body-Worn SAR Data

**Table 13-6
CDMA Body-Worn SAR Results**

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)	
MHz	Ch.								(W/kg)	
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.15	0.09	1.0 cm	SAR#2	back	0.694	
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. A	25.11	-0.03	1.0 cm	SAR#2	back	0.685	
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.42	-0.13	1.0 cm	SAR#2	back	0.569	
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. A	25.32	-0.14	1.0 cm	SAR#2	back	0.632	
1851.25	25	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.95	0.03	1.0 cm	SAR#2	back	0.823	
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.91	-0.04	1.0 cm	SAR#2	back	0.869	
1908.75	1175	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.90	-0.04	1.0 cm	SAR#2	back	0.959	
1851.25	25	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	24.96	0.05	1.0 cm	SAR#2	back	1.130	
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	24.97	-0.05	1.0 cm	SAR#2	back	1.030	
1908.75	1175	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	25.07	0.00	1.0 cm	SAR#2	back	1.060	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note:

1. For CDMA 1x mode, hotspot back side SAR Data (tested without headphones) was used for supporting body-worn accessory compliance per FCC KDB Publication 941225 D06. CDMA 1x-RTT SAR was required to be evaluated for Hotspot exposure conditions to support simultaneous capabilities per Table 1-2.
2. EVDO Rev. A tests were performed with headphones.

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**Table 13-7
LTE Body-Worn SAR Results**

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.	(W/kg)												
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.15	1	SAR#2	QPSK	25	12	1.0 cm	back	0.752
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	-0.13	0	SAR#2	QPSK	1	0	1.0 cm	back	1.050
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.08	0	SAR#2	QPSK	1	49	1.0 cm	back	0.920
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	0.15	2	SAR#2	16 QAM	25	12	1.0 cm	back	0.707
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	-0.02	1	SAR#2	16 QAM	1	0	1.0 cm	back	0.955
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.21	1	SAR#2	16 QAM	1	49	1.0 cm	back	0.860
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body						
Spatial Peak								1.6 W/kg (mW/g)						
Uncontrolled Exposure/General Population								averaged over 1 gram						

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

**Table 13-8
WLAN Body-Worn SAR Results**

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2462	11	IEEE 802.11b	DSSS	15.18	-0.02	1.0 cm	SAR#4	1	back	0.089
ANSI / IEEE C95.1 1992 - SAFETY LIMIT						Body				
Spatial Peak						1.6 W/kg (mW/g)				
Uncontrolled Exposure/General Population						averaged over 1 gram				

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

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13.3 Standalone Wireless Router SAR Data

**Table 13-9
CDMA/EVDO Hotspot SAR Data**

MEASUREMENT RESULTS									
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.								(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.15	0.09	1.0 cm	SAR#2	back	0.694
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.15	0.04	1.0 cm	SAR#2	front	0.356
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.15	0.00	1.0 cm	SAR#2	bottom	0.311
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.15	-0.13	1.0 cm	SAR#2	left	0.591
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.12	-0.12	1.0 cm	SAR#2	back	0.733
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.12	-0.01	1.0 cm	SAR#2	front	0.384
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.12	0.03	1.0 cm	SAR#2	bottom	0.385
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.12	0.08	1.0 cm	SAR#2	left	0.689
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.42	-0.13	1.0 cm	SAR#2	back	0.569
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.42	-0.09	1.0 cm	SAR#2	front	0.358
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.42	-0.13	1.0 cm	SAR#2	bottom	0.380
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.42	-0.03	1.0 cm	SAR#2	left	0.535
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.40	-0.12	1.0 cm	SAR#2	back	0.671
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.40	-0.08	1.0 cm	SAR#2	front	0.376
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.40	0.10	1.0 cm	SAR#2	bottom	0.374
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.40	-0.08	1.0 cm	SAR#2	left	0.772
1851.25	25	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.95	0.03	1.0 cm	SAR#2	back	0.823
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.91	-0.04	1.0 cm	SAR#2	back	0.869
1908.75	1175	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.90	-0.04	1.0 cm	SAR#2	back	0.959
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.91	0.01	1.0 cm	SAR#2	front	0.497
1851.25	25	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.95	0.07	1.0 cm	SAR#2	bottom	1.090
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.91	0.05	1.0 cm	SAR#2	bottom	0.978
1908.75	1175	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.90	0.12	1.0 cm	SAR#2	bottom	0.845
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	24.91	-0.16	1.0 cm	SAR#2	left	0.262
1851.25	25	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.02	0.03	1.0 cm	SAR#2	back	0.973
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	24.98	-0.10	1.0 cm	SAR#2	back	0.957
1908.75	1175	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.11	-0.10	1.0 cm	SAR#2	back	1.090
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	24.98	0.02	1.0 cm	SAR#2	front	0.581
1851.25	25	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.02	-0.21	1.0 cm	SAR#2	bottom	0.988
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	24.98	-0.12	1.0 cm	SAR#2	bottom	0.845
1908.75	1175	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.11	0.06	1.0 cm	SAR#2	bottom	0.766
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	24.98	0.04	1.0 cm	SAR#2	left	0.242
ANSI / IEEE C95.1 1992 - SAFETY LIMIT						Body			
Spatial Peak						1.6 W/kg (mW/g)			
Uncontrolled Exposure/General Population						averaged over 1 gram			

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Table 13-10
LTE Band 25 - FCC Rule Part 24E Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY			Mode	Bandwidth [MHz]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g) (W/kg)
MHz	Ch.	High												
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.15	1	SAR#2	QPSK	25	12	1.0 cm	back	0.752
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	-0.13	0	SAR#2	QPSK	1	0	1.0 cm	back	1.050
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.08	0	SAR#2	QPSK	1	49	1.0 cm	back	0.920
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	0.15	2	SAR#2	16 QAM	25	12	1.0 cm	back	0.707
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	-0.02	1	SAR#2	16 QAM	1	0	1.0 cm	back	0.955
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.21	1	SAR#2	16 QAM	1	49	1.0 cm	back	0.860
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.06	1	SAR#2	QPSK	25	12	1.0 cm	front	0.360
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	0.07	0	SAR#2	QPSK	1	0	1.0 cm	front	0.586
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.11	0	SAR#2	QPSK	1	49	1.0 cm	front	0.539
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	0.08	2	SAR#2	16 QAM	25	12	1.0 cm	front	0.304
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	-0.14	1	SAR#2	16 QAM	1	0	1.0 cm	front	0.419
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.09	1	SAR#2	16 QAM	1	49	1.0 cm	front	0.411
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.12	1	SAR#2	QPSK	25	12	1.0 cm	top	0.355
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	-0.13	0	SAR#2	QPSK	1	0	1.0 cm	top	0.506
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	-0.19	0	SAR#2	QPSK	1	49	1.0 cm	top	0.478
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	-0.07	2	SAR#2	16 QAM	25	12	1.0 cm	top	0.288
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	-0.16	1	SAR#2	16 QAM	1	0	1.0 cm	top	0.443
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	-0.12	1	SAR#2	16 QAM	1	49	1.0 cm	top	0.396
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.01	1	SAR#2	QPSK	25	12	1.0 cm	right	0.368
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.39	-0.06	0	SAR#2	QPSK	1	0	1.0 cm	right	0.509
1910.00	26640	High	LTE Band 25 - FCC Rule Part 24E	10	23.34	0.04	0	SAR#2	QPSK	1	49	1.0 cm	right	0.451
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	21.47	0.09	2	SAR#2	16 QAM	25	12	1.0 cm	right	0.323
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.57	-0.02	1	SAR#2	16 QAM	1	0	1.0 cm	right	0.419
1882.50	26365	Mid	LTE Band 25 - FCC Rule Part 24E	10	22.37	0.04	1	SAR#2	16 QAM	1	49	1.0 cm	right	0.379
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body						
Spatial Peak								1.6 W/kg (mW/g)						
Uncontrolled Exposure/General Population								averaged over 1 gram						

Table 13-11
WLAN Hotspot SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g) (W/kg)
MHz	Ch.									
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.18	-0.02	1.0 cm	SAR#4	1	back	0.089
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.18	0.18	1.0 cm	SAR#4	1	front	0.001
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.18	0.10	1.0 cm	SAR#4	1	left	0.036
ANSI / IEEE C95.1 1992 - SAFETY LIMIT							Body			
Spatial Peak							1.6 W/kg (mW/g)			
Uncontrolled Exposure/General Population							averaged over 1 gram			

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13.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. Batteries are fully charged for all readings. The standard battery was used.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. Per FCC/OET Bulletin 65 Supplement C and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
7. Per FCC KDB Publication 941225 D06, when the same wireless modes and device transmission configurations are required for body-worn accessory and hotspot mode at the same test distance, it is not necessary to additionally test body-worn accessory SAR for the same device orientation. Therefore, the CDMA 1x RTT, WLAN and LTE hotspot data for the back side configuration additionally shows body-worn compliance at the same distance.

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per KDB Publication 941225 D01.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. TDSO / SO32 FCH+SCH and EvDO SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.
3. According to FCC KDB 941225 D01 publication, EVDO SAR (Hotspot) is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. Rev. A was not tested since the maximum output power of Rev. A for each channel was not greater than the Rev. 0 power. CDMA 1x- RTT SAR was required to be evaluated for Hotspot exposure conditions to support simultaneous capabilities per Table 1-2.
4. CDMA 1X Advanced technology was not required for SAR since the maximum output powers for 1x Advanced was not more than 0.25 dB higher than the maximum measured powers for 1x and the measured SAR in any 1x mode exposure conditions was not greater than 1.2 W/kg. See Section 9.2.2 for 1x Advanced test set up.
5. Head and Body-worn SAR were additionally tested with EVDO Rev. A to support SAR compliance for VoIP over EVDO.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication and were evaluated independently for each position. General test procedures can be found in Section 9.3.3.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.

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WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. WLAN transmission was verified using an uncalibrated spectrum analyzer.
3. SAR testing on channels other than maximum output channel was not required since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was <1.6 W/kg and the 1g averaged SAR was <0.8 W/kg.

Hotspot Notes:

1. Top and Right Edges for the CDMA/EVDO transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
2. Bottom and Left Edges for the LTE transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
3. Top, Bottom, and Right Edges for the WLAN transmitter were not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
4. During SAR Testing for the Wireless Router conditions per KDB 941225 D06, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 7.6.)

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14 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

14.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” FCC KDB Publication 648474 are applicable to handsets with built-in unlicensed transmitters such as 802.11b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter. Guidance from the April 2012 TCB/FCC Workshop was also considered for the volumetric SAR assessment.

14.2 FCC Power Tables & Conditions

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

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

Figure 14-1
Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	<u>Routine evaluation required</u>	SAR not required: <u>Unlicensed only</u>
Unlicensed Transmitters	<p><u>When there is no simultaneous transmission –</u></p> <ul style="list-style-type: none"> output $\leq 60/f$: SAR not required output $> 60/f$: stand-alone SAR required <p><u>When there is simultaneous transmission –</u></p> <p><u>Stand-alone SAR not required when</u></p> <ul style="list-style-type: none"> output $\leq 2 \cdot P_{Ref}$ and antenna is ≥ 5.0 cm from other antennas output $\leq P_{Ref}$ and antenna is ≥ 2.5 cm from other antennas output $\leq P_{Ref}$ and antenna is < 2.5 cm from other antennas, each with either output power $\leq P_{Ref}$ or 1-g SAR < 1.2 W/kg <p><u>Otherwise stand-alone SAR is required</u></p> <p><u>When stand-alone SAR is required</u></p> <ul style="list-style-type: none"> test SAR on highest output channel for each wireless mode and exposure condition if SAR for highest output channel is $> 50\%$ of SAR limit, evaluate all channels according to normal procedures 	<ul style="list-style-type: none"> when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas <p><u>Licensed & Unlicensed</u></p> <ul style="list-style-type: none"> when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 <p>SAR required:</p> <p><u>Licensed & Unlicensed</u></p> <p>antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition</p> <p>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</p>

Figure 14-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

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14.3 Simultaneous Transmission Capabilities

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

Per KDB Publication 648474, standalone Bluetooth SAR tests were not required. Standalone SAR tests for WLAN were required. See Section 1.6(A) for more information.

**Table 14-1
Simultaneous Transmission Scenario**

No.	Capable TX Configuration	Head SAR	Body SAR	Hotspot SAR	Note
1	Cell CDMA (FCC Rule Part 22H) Voice + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	No	
2	PCS CDMA (FCC Rule Part 24E) Voice + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	No	
3	Cell CDMA (FCC Rule Part 90S) Voice + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	No	
4	Cell CDMA (FCC Rule Part 22H) 1xData + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	CDMA Hotspot
5	PCS CDMA (FCC Rule Part 24E) 1xData + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	CDMA Hotspot
6	Cell CDMA (FCC Rule Part 90S) 1xData + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	CDMA Hotspot
7	LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	No	No	Yes	LTE Hotspot
8	Cell CDMA (FCC Rule Part 22H) Voice + LTE B25 (FCC Rule Part 24E) Data	Yes	Yes	No	SVLTE
9	PCS CDMA (FCC Rule Part 24E) Voice + LTE B25 (FCC Rule Part 24E) Data	Yes	Yes	No	SVLTE
10	Cell CDMA (FCC Rule Part 90S) Voice + LTE B25 (FCC Rule Part 24E) Data	Yes	Yes	No	SVLTE
11	Cell CDMA (FCC Rule Part 22H) Voice + LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
12	PCS CDMA (FCC Rule Part 24E) Voice + LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
13	Cell CDMA (FCC Rule Part 90S) Voice + LTE B25 (FCC Rule Part 24E) Data + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	WiFi Hotspot (SVLTE)
14	Cell EVDO (FCC Rule Part 22H) + 2.4GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	VoIP
15	PCS EVDO (FCC Rule Part 24E) + 2.4 GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	VoIP
16	Cell EVDO (FCC Rule Part 90S) + 2.4 GHz WiFi (FCC Rule Part 15C) Data	Yes	Yes	Yes	VoIP

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14.4 Head SAR Simultaneous Transmission Analysis

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

Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLS		
	1	2	3	1+2	1+3	1+2+3	1+2	1+3	2+3
Right Cheek	0.262	0.914	0.006	1.176	0.268	1.182	N/A	N/A	N/A
Right Tilt	0.194	1.050	0.002	1.244	0.196	1.246	N/A	N/A	N/A
Left Cheek	0.341	1.190	0.003	1.531	0.344	1.534	N/A	N/A	N/A
Left Tilt	0.221	1.060	0.003	1.281	0.224	1.284	N/A	N/A	N/A
Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLS		
	1	2	3	1+2	1+3	1+2+3	1+2	1+3	2+3
Right Cheek	0.214	0.914	0.006	1.128	0.220	1.134	N/A	N/A	N/A
Right Tilt	0.151	1.050	0.002	1.201	0.153	1.203	N/A	N/A	N/A
Left Cheek	0.266	1.190	0.003	1.456	0.269	1.459	N/A	N/A	N/A
Left Tilt	0.178	1.060	0.003	1.238	0.181	1.241	N/A	N/A	N/A
Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLS		
	1	2	3	1+2	1+3	1+2+3	1+2	1+3	2+3
Right Cheek	0.439	0.914	0.006	1.353	0.445	1.359	N/A	N/A	N/A
Right Tilt	0.163	1.050	0.002	1.213	0.165	1.215	N/A	N/A	N/A
Left Cheek	0.578	1.190	0.003	See Note	0.581	See Note	0.27	0.18	0.17
Left Tilt	0.269	1.060	0.003	1.329	0.272	1.332	N/A	N/A	N/A

Notes:

- No evaluation was performed to determine the aggregate 1-g SAR in this configuration as the SPLSR between each antenna pair was below 0.3 per FCC KDB Publication 648474 D01. See Section 14.7 for detailed SPLSR analysis.

Table 14-3
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx	Configuration	Cell. EVDO Rev.A - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO Rev.A - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.258	0.006	0.264	Head SAR	Right Cheek	0.230	0.006	0.236
	Right Tilt	0.202	0.002	0.204		Right Tilt	0.191	0.002	0.193
	Left Cheek	0.378	0.003	0.381		Left Cheek	0.329	0.003	0.332
	Left Tilt	0.256	0.003	0.259		Left Tilt	0.217	0.003	0.220
Simult Tx	Configuration	PCS EVDO Rev.A - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)					
Head SAR	Right Cheek	0.538	0.006	0.544					
	Right Tilt	0.248	0.002	0.250					
	Left Cheek	0.898	0.003	0.901					
	Left Tilt	0.273	0.003	0.276					

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14.5 Body-Worn Simultaneous Transmission Analysis

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

Configuration	Mode	CDMA SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)			SPLS			Simultaneous Transmission SAR (W/kg)
		1	2	3	1+2	1+3	1+2+3	1+2	1+3	2+3	
Back Side	Cell. CDMA - FCC Rule Part 90S	0.694	1.050	0.089	See Note 1	0.783	See Note 2	0.20	0.12	See Note 2	1.22
Back Side	Cell. CDMA - FCC Rule Part 22H	0.569	1.050	0.089	See Note 1	0.658	See Note 2	0.21	0.12	See Note 2	1.18
Back Side	PCS CDMA - FCC Rule Part 24E	0.959	1.050	0.089	See Note 1	1.048	See Note 2	0.29	0.21	See Note 2	1.41

Notes:

1. No evaluation was performed to determine the aggregate 1-g SAR in this configuration as the SPLSR between each antenna pair was below 0.3 per FCC KDB Publication 648474 D01. See Section 14.7 for detailed SPLSR analysis.
2. Since the SPLSR in this configuration was not below 0.3 per FCC KDB Publication 648474 D01, further analysis was performed to determine that aggregate volumetric SAR evaluation was less than 1.6 W/kg. See Section 14.8 for detailed volumetric evaluation analysis.

Table 14-5
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Configuration	Mode	EVDO Rev. A SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Back Side	Cell. CDMA - FCC Rule Part 90S	0.685	0.089	0.774
Back Side	Cell. CDMA - FCC Rule Part 22H	0.632	0.089	0.721
Back Side	PCS CDMA - FCC Rule Part 24E	1.130	0.089	1.219

14.6 Hotspot SAR Simultaneous Transmission Analysis

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

Simult Tx	Configuration	Cell. CDMA/EVDO - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.733	0.089	0.822
	Front	0.384	0.001	0.385
	Top	-	-	0.000
	Bottom	0.385	-	0.385
	Right	-	-	0.000
	Left	0.689	0.036	0.725
Simult Tx	Configuration	Cell. CDMA/EVDO - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.671	0.089	0.760
	Front	0.376	0.001	0.377
	Top	-	-	0.000
	Bottom	0.374	-	0.374
	Right	-	-	0.000
	Left	0.772	0.036	0.808

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Simult Tx	Configuration	PCS CDMA/EVDO - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.090	0.089	1.179
	Front	0.581	0.001	0.582
	Top	-	-	0.000
	Bottom	0.988	-	0.988
	Right	-	-	0.000
	Left	0.242	0.036	0.278

Simult Tx	Configuration	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.050	0.089	1.139
	Front	0.586	0.001	0.587
	Top	0.506	-	0.506
	Bottom	-	-	0.000
	Right	0.509	-	0.509
	Left	0.137	0.036	0.173

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

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

Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	Simultaneous Transmission SAR (W/kg)
	1	2	3	1+2+3	1+2+3
Back	0.694	1.050	0.089	See Note 2	1.22
Front	0.356	0.586	0.001	0.943	N/A
Top	-	0.506	-	0.506	N/A
Bottom	0.311	-	-	0.311	N/A
Right	-	0.509	-	0.509	N/A
Left	0.591	-	0.036	0.627	N/A

Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	Simultaneous Transmission SAR (W/kg)
	1	2	3	1+2+3	1+2+3
Back	0.569	1.050	0.089	See Note 2	1.18
Front	0.358	0.586	0.001	0.945	N/A
Top	-	0.506	-	0.506	N/A
Bottom	0.380	-	-	0.380	N/A
Right	-	0.509	-	0.509	N/A
Left	0.535	-	0.036	0.571	N/A

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Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	LTE Band 25 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	Simultaneous Transmission SAR (W/kg)
	1	2	3		
Back	0.959	1.050	0.089	See Note 2	1.41
Front	0.497	0.586	0.001	1.084	N/A
Top	-	0.506	-	0.506	N/A
Bottom	1.090	-	-	1.090	N/A
Right	-	0.509	-	0.509	N/A
Left	0.262	-	0.036	0.298	N/A

Notes:

1. Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR (“-“). The above tables represent a portable hotspot condition potentially simultaneously operating with a voice call.
2. Since the aggregate 1-g SAR was not less than 1.6 W/kg and SPLSR in this configuration was not below 0.3 per FCC KDB Publication 648474 D01, further analysis was performed to determine that aggregate volumetric SAR evaluation was less than 1.6 W/kg. See Section 14.8 for detailed volumetric evaluation analysis.

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14.7 SAR to Peak Locations Spacing Ratio (SPLSR) Evaluation Analysis

Per FCC KDB Publication 648474 D01, when the sum of the standalone transmitters is more than 1.6 W/kg, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. Based on the on the 1-g SAR limit and a separation distance of 5 cm, when the SAR peak to location ratio for each pair of antennas is < 0.3, simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

$$\text{Distance}_{\text{Tx1-Tx2}} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

14.7.1 Left Cheek

The sum of the standalone SAR values was above 1.6 W/kg for the held-to-ear voice call with PCS CDMA – FCC Rule Part 24E potentially operating with LTE Band 25 (PCS) Data and PCS CDMA – FCC Rule Part 24E potentially operating with LTE Band 25 (PCS) Hotspot for the left cheek configuration.

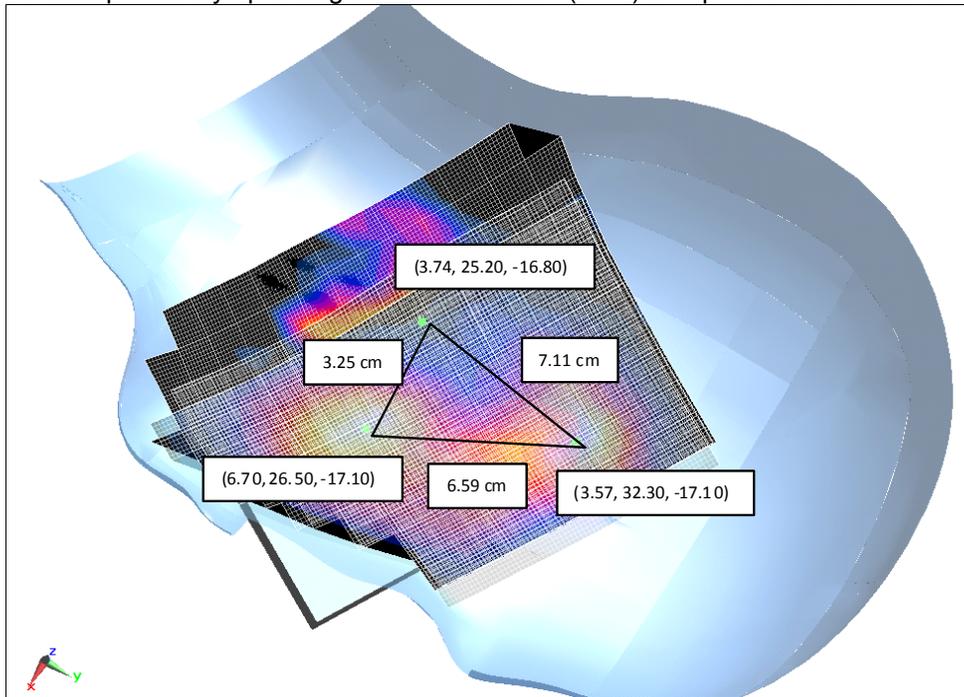


Figure 14-3
Peak SAR Location Plot of PCS CDMA, LTE Band 25 and 2.4 GHz WLAN

Table 14-8
Peak SAR Locations for Left Cheek (PCS CDMA – FCC Rule Part 24E, LTE Band 25 – FCC Rule Part 24E, 2.4 GHz WLAN – FCC Rule Part 15C)

Mode/Band	x (cm)	y (cm)	z (cm)
PCS CDMA – FCC Rule Part 24E	6.70	26.50	-17.10
2.4 GHz WLAN - FCC Rule Part 15C	3.74	25.20	-16.80
LTE Band 25 - FCC Rule Part 24E	3.57	32.30	-17.10

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**Table 14-9
SAR Sum to Peak Location Separation Ratio Calculation**

Antenna Pair		Standalone 1g SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (cm)	SPLS Ratio
Ant "a"	Ant "b"	a	b	a+b	Da-b	(a+b) / (Da-b)
PCS CDMA – FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	0.578	0.003	0.581	3.25	0.18
PCS CDMA – FCC Rule Part 24E	LTE Band 25 - FCC Rule Part 24E	0.578	1.190	1.768	6.59	0.27
2.4 GHz WLAN - FCC Rule Part 15C	LTE Band 25 - FCC Rule Part 24E	0.003	1.190	1.193	7.11	0.17

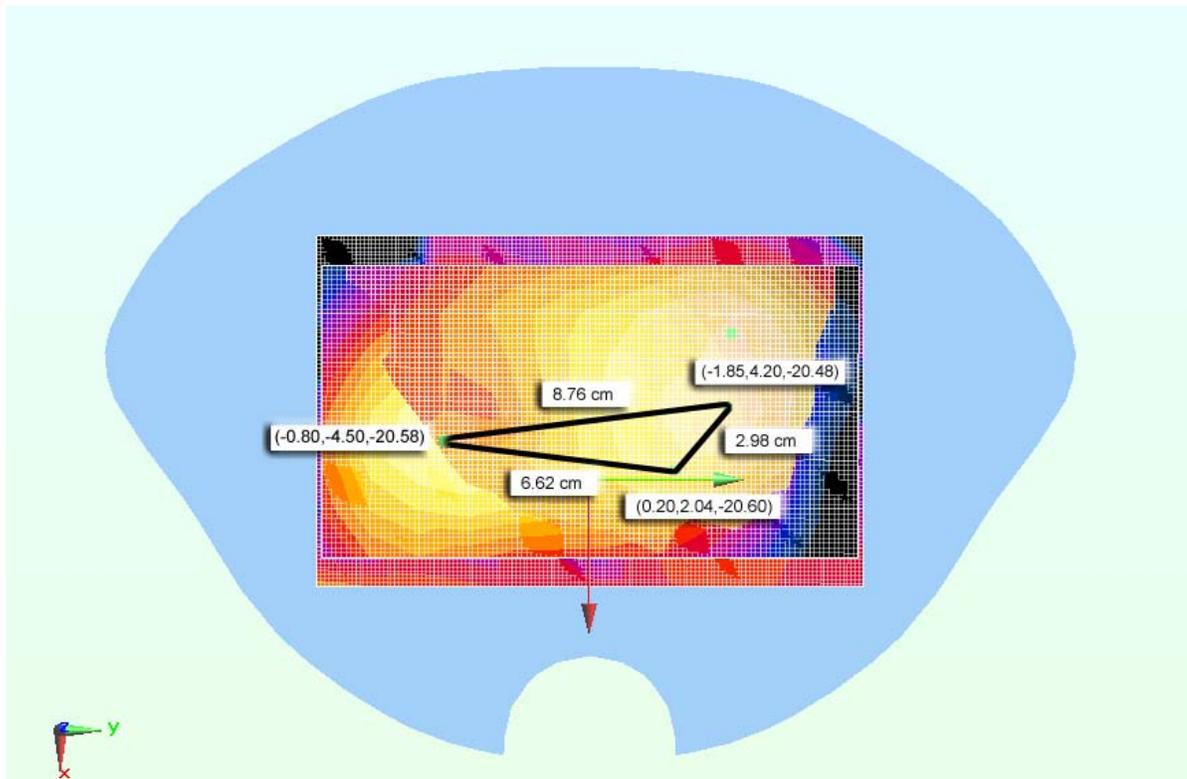
Note:

For a PCS CDMA – FCC Rule Part 24E Voice call held-to-ear potentially operating with LTE Band 25, the SPLSR between each transmitter pair was less than 0.3. Therefore, no volumetric simultaneous transmission SAR is required.

14.7.2 Back Side

The sum of the standalone SAR values was above 1.6 W/kg for body-worn and hotspot configurations with the following transmissions:

1. Voice call with Cell. CDMA - FCC Rule Part 90S potentially operating with LTE Band 25 – FCC Rule Part 24E Data/Hotspot
2. Voice call with Cell. CDMA - FCC Rule Part 22H potentially operating with LTE Band 25 – FCC Rule Part 24E Data/Hotspot
3. Voice call with PCS CDMA – FCC Rule Part 24E potentially operating with LTE Band 25 – FCC Rule Part 24E Data/Hotspot



**Figure 14-4
Peak SAR Location Plot of Cell. CDMA - FCC Rule Part 90S, LTE Band 25 – FCC Rule Part 24E and
2.4 GHz WLAN - FCC Rule Part 15C**

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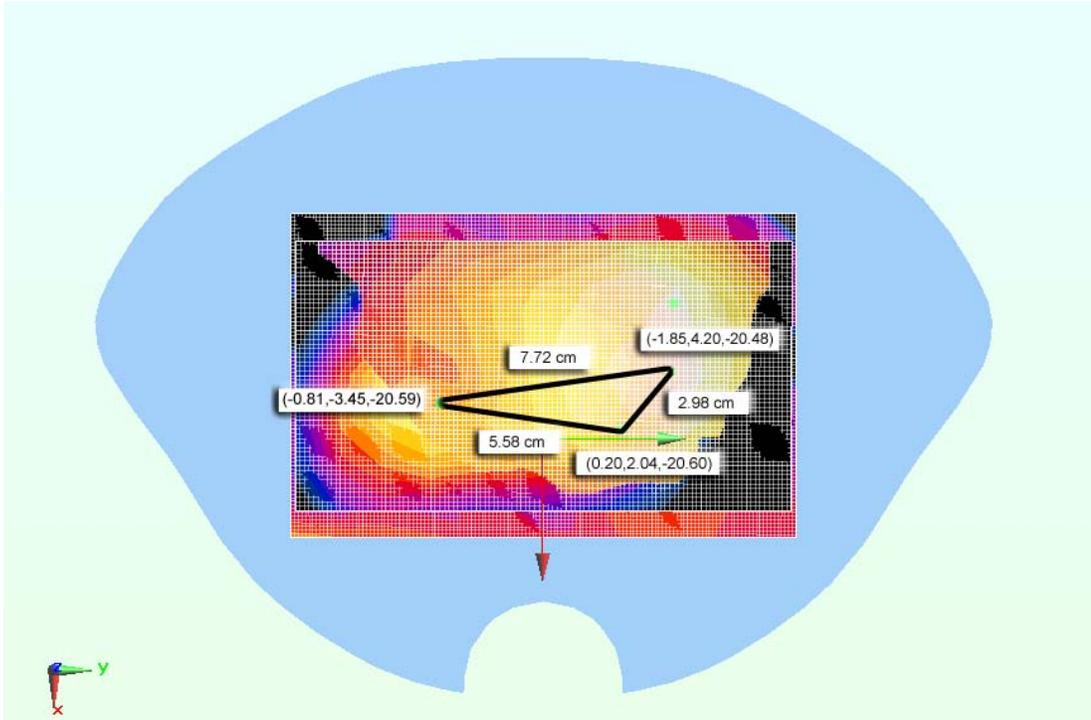


Figure 14-5
Peak SAR Location Plot of Cell. CDMA - FCC Rule Part 22H, LTE Band 25 – FCC Rule Part 24E and 2.4 GHz WLAN - FCC Rule Part 15C

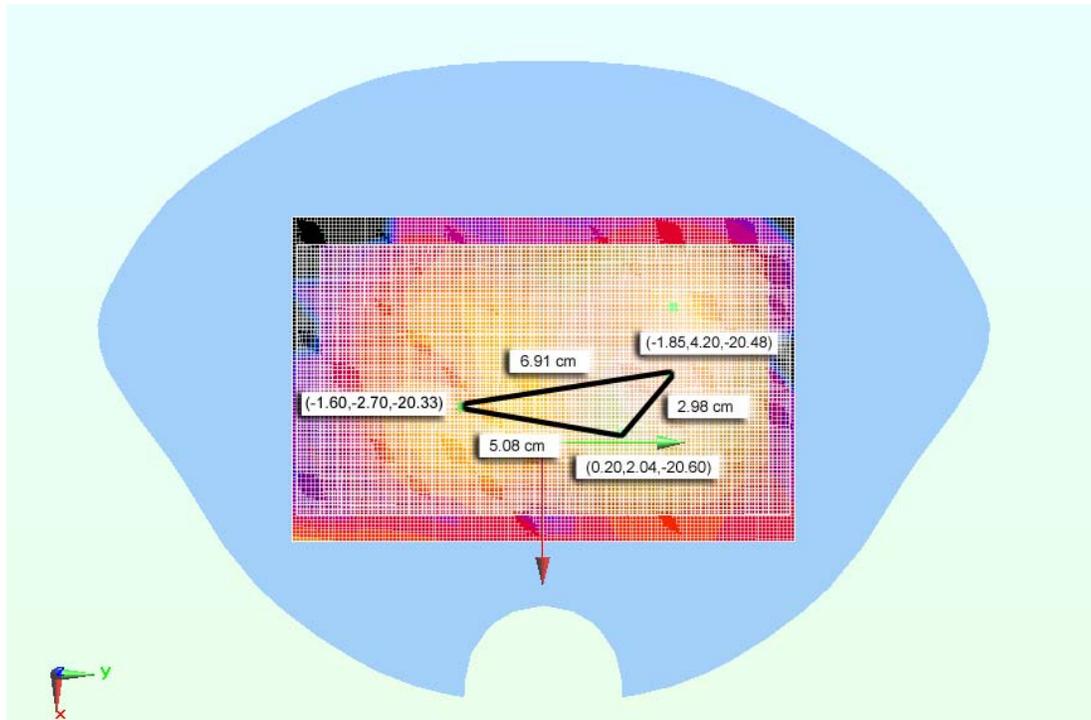


Figure 14-6
Peak SAR Location Plot of PCS CDMA – FCC Rule Part 24E, LTE Band 25 – FCC Rule Part 24E and 2.4 GHz WLAN - FCC Rule Part 15C

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Table 14-10
Peak SAR Locations for Back Side
(Cell. CDMA – FCC Rule Part 90S, LTE Band 25 – FCC Rule Part 24E
and 2.4 GHz WLAN - FCC Rule Part 15C)

Mode/Band	x (cm)	y (cm)	z (cm)
Cell. CDMA - FCC Rule Part 90S	-0.80	-4.50	-20.58
LTE Band 25 – FCC Rule Part 24E	-1.85	4.20	-20.48
2.4 GHz WLAN - FCC Rule Part 15C	0.20	2.04	-20.60

Table 14-11
Peak SAR Locations for Back Side
(Cell. CDMA – FCC Rule Part 22H, LTE Band 25 – FCC Rule Part 24E
and 2.4 GHz WLAN - FCC Rule Part 15C)

Mode/Band	x (cm)	y (cm)	z (cm)
Cell. CDMA - FCC Rule Part 22H	-0.81	-3.45	-20.59
LTE Band 25 – FCC Rule Part 24E	-1.85	4.20	-20.48
2.4 GHz WLAN - FCC Rule Part 15C	0.20	2.04	-20.60

Table 14-12
Peak SAR Locations for Back Side
(PCS CDMA – FCC Rule Part 24E, LTE Band 25 – FCC Rule Part 24E
and 2.4 GHz WLAN - FCC Rule Part 15C)

Mode/Band	x (cm)	y (cm)	z (cm)
PCS CDMA – FCC Rule Part 24E	-1.60	-2.70	-20.33
LTE Band 25 – FCC Rule Part 24E	-1.85	4.20	-20.48
2.4 GHz WLAN - FCC Rule Part 15C	0.20	2.04	-20.60

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Table 14-13
SAR Sum to Peak Location Separation Ratio Calculation for Cell. CDMA – FCC Rule Part 90S,
LTE Band 25 – FCC Rule Part 24E and 2.4 GHz WLAN - FCC Rule Part 15C

Antenna Pair		Standalone 1g SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (cm)	SPLS Ratio
Ant "a"	Ant "b"	a	b	a+b	Da-b	(a+b) / (Da-b)
Cell. CDMA - FCC Rule Part 90S	LTE Band 25 – FCC Rule Part 24E	0.694	1.05	1.744	8.76	0.20
Cell. CDMA - FCC Rule Part 90S	2.4 GHz WLAN - FCC Rule Part 15C	0.694	0.08886	0.78286	6.62	0.12
2.4 GHz WLAN - FCC Rule Part 15C	LTE Band 25 – FCC Rule Part 24E	0.0886	1.05	1.1386	2.98	See Note 1

Table 14-14
SAR Sum to Peak Location Separation Ratio Calculation for Cell. CDMA – FCC Rule Part 22H,
LTE Band 25 – FCC Rule Part 24E and 2.4 GHz WLAN - FCC Rule Part 15C

Antenna Pair		Standalone 1g SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (cm)	SPLS Ratio
Ant "a"	Ant "b"	a	b	a+b	Da-b	(a+b) / (Da-b)
Cell. CDMA - FCC Rule Part 22H	LTE Band 25 – FCC Rule Part 24E	0.569	1.05	1.619	7.72	0.21
LTE Band 25 – FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	0.569	0.0886	0.6576	5.58	0.12
2.4 GHz WLAN - FCC Rule Part 15C	LTE Band 25 – FCC Rule Part 24E	0.0886	1.05	1.1386	2.98	See Note 1

Table 14-15
SAR Sum to Peak Location Separation Ratio Calculation for PCS CDMA – FCC Rule Part 24E,
LTE Band 25 – FCC Rule Part 24E and 2.4 GHz WLAN - FCC Rule Part 15C

Antenna Pair		Standalone 1g SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (cm)	SPLS Ratio
Ant "a"	Ant "b"	a	b	a+b	Da-b	(a+b) / (Da-b)
PCS CDMA – FCC Rule Part 24E	LTE Band 25 – FCC Rule Part 24E	0.959	1.05	2.009	6.91	0.29
LTE Band 25 – FCC Rule Part 24E	2.4 GHz WLAN - FCC Rule Part 15C	0.959	0.0886	1.0476	5.08	0.21
2.4 GHz WLAN - FCC Rule Part 15C	LTE Band 25 – FCC Rule Part 24E	0.0886	1.05	1.1386	2.98	See Note 1

Notes:

1. When considering a voice call potentially simultaneously operating with LTE Band 25 Hotspot, the SPLSR for each ratio pair is not less than 0.3. Please see Section 14.8 for simultaneous SAR evaluation details.
2. For a body-worn voice call with simultaneous LTE data transmission, the SPLSR between each transmitter pair was less than 0.3. Therefore, no simultaneous SAR evaluation is required.

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14.8 Simultaneous SAR Evaluation Analysis

Per KDB Publication 648474, when the sum of the transmitters potentially operating simultaneously is greater than 1.6 W/kg and the sum to peak SAR location separation ratio between any pair of transmitters is more than 0.3, SAR tests are required for simultaneous transmission to determine the aggregate 1-g SAR. When required, each transmitter should be tested for simultaneous transmission in the configuration, channel and operating mode that resulted in the highest SAR during the stand-alone evaluation.

Simultaneous Transmission SAR was required for the back side configuration when evaluating:

- A) Cell. CDMA – FCC Rule Part 90S potentially operating with LTE Band 25 (PCS) – FCC Rule Part 24E hotspot
- B) Cell. CDMA – FCC Rule Part 22H potentially operating with LTE Band 25 (PCS) – FCC Rule Part 24E hotspot
- C) PCS CDMA – FCC Rule Part 24E potentially operating with LTE Band 25 (PCS) – FCC Rule Part 24E hotspot

Table 14-16
Simultaneous Transmission SAR Analysis

	Configuration	Mode	Standalone 1g SAR (W/kg)	Plot Number	Volume Scan 1g SAR for Simult Tx (W/kg)	Plot Number	Multi-Band 1g SAR (W/kg)	Plot Number
A	Back Side	Cell. CDMA - FCC Rule Part 90S	0.694	A21	0.753	A43	1.21	A48
	Back Side	LTE Band 25 - FCC Rule Part 24E	1.050	A36	0.869	A46		
	Back Side	2.4 GHz WLAN - FCC Rule Part 15C	0.089	A40	0.096	A47		
B	Back Side	Cell. CDMA - FCC Rule Part 22H	0.569	A26	0.688	A44	1.18	A49
	Back Side	LTE Band 25 - FCC Rule Part 24E	1.050	A36	0.869	A46		
	Back Side	2.4 GHz WLAN - FCC Rule Part 15C	0.089	A40	0.096	A47		
C	Back Side	PCS CDMA - FCC Rule Part 24E	0.959	A31	1.070	A45	1.41	A50
	Back Side	LTE Band 25 - FCC Rule Part 24E	1.050	A36	0.869	A46		
	Back Side	2.4 GHz WLAN - FCC Rule Part 15C	0.089	A40	0.096	A47		

Test Notes:

1. Each antenna was evaluated independently using the channel/configuration that produced the highest measured SAR when the standalone SAR was tested.
2. LTE and CDMA SAR volume scans were evaluated with a resolution of $\Delta x=8\text{mm}$, $\Delta y=8\text{mm}$ and $\Delta z=5\text{mm}$ with a 13x19x7 (# of points) grid.
3. WLAN SAR volume scan was evaluated with a resolution of $\Delta x=5\text{mm}$, $\Delta y=5\text{mm}$ and $\Delta z=5\text{mm}$ with a 20x30x7 (# of points) grid.
4. DASY52.8(1) and SEMCAD X 14.6.5 multi-band combiner required scans to overlap but does not require measurement point resolutions within the volumes to be identical for interpolation and superposition..

14.9 Simultaneous Transmission Conclusion

Based on the simultaneous transmission analysis guidance described in KDB 648474 and the April 2012 TCB/FCC Workshop, the above simultaneous transmission SAR analyses indicate that the device operating in any of the simultaneous transmission scenarios will not exceed the SAR limit.

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15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85047A	S-Parameter Test Set	N/A			2904A00579
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A		N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	E5515C	Wireless Communications Test Set	2/14/2012	Annual	2/14/2013	GB43304447
Agilent	E5515C	Wireless Communications Test Set	2/14/2012	Annual	2/14/2013	GB43163447
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5318
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5442
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5821
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	8013
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	2400
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	ML2438A	Power Meter	10/13/2011	Annual	10/13/2012	1070030
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	1190013
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	98150041
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Anritsu	MT8820C	Radio Communication Tester	11/11/2011	Annual	11/11/2012	6200901190
COMTECH	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	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014497
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014488
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331322
Control Company	61220-416	Long-Stem Thermometer	2/15/2011	Biennial	2/15/2013	111331323
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
Intelligent Weighing	PD-3000	Electronic Balance	6/29/2012	Annual	6/29/2013	120405017
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	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
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
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
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2012	Annual	5/22/2013	109892
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/5/2011	Annual	8/5/2012	112347
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	8/25/2011	Annual	8/25/2012	100976
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	D1900V2	1900 MHz SAR Dipole	7/22/2011	Annual	7/22/2012	5d080
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/19/2011	Annual	8/19/2012	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/24/2012	Annual	1/24/2013	797
SPEAG	D2450V2	2450 MHz SAR Dipole	2/7/2012	Annual	2/7/2013	882
SPEAG	D835V2	835 MHz SAR Dipole	1/25/2012	Annual	1/25/2013	4d047
SPEAG	D835V2	835 MHz SAR Dipole	4/20/2012	Annual	4/20/2013	4d119
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/18/2012	Annual	1/18/2013	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2012	Annual	2/15/2013	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2012	Annual	4/12/2013	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/7/2012	Annual	5/7/2013	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/20/2012	Annual	2/20/2013	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/19/2012	Annual	4/19/2013	665
SPEAG	DAK-3.5	Dielectric Assessment Kit	6/19/2012	Annual	6/19/2013	1070
SPEAG	ES3DV2	SAR Probe	8/25/2011	Annual	8/25/2012	3022
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3288
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3287
SPEAG	ES3DV3	SAR Probe	2/21/2012	Annual	2/21/2013	3258
SPEAG	ES3DV3	SAR Probe	3/16/2012	Annual	3/16/2013	3209
SPEAG	ES3DV3	SAR Probe	4/24/2012	Annual	4/24/2013	3213
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886414
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886441

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

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16 MEASUREMENT UNCERTAINTIES

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k	
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i	
Measurement System										
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞	
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞	
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞	
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞	
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞	
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞	
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞	
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞	
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞	
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞	
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞	
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞	
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞	
Test Sample Related										
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287	
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞	
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞	
Phantom & Tissue Parameters										
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞	
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞	
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6	
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞	
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6	
Combined Standard Uncertainty (k=1)							RSS	12.1	11.7	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.2	23.5	

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

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17 CONCLUSION

17.1 Measurement Conclusion

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

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

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- [29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB Publication 450824
- [30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB Publication 616217
- [31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB Publication 865664
- [32] FCC Mobile Portable RF Exposure Procedure, KDB Publication 447498
- [33] FCC SAR Procedures for Dongle Transmitters, KDB Publication 447498
- [34] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [35] FCC SAR Test Considerations for LTE Handsets and Data Modems, KDB Publication 941225.
- [36] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.
- [37] FCC Hot Spot SAR v01, KDB Publication 941225 D06.

FCC ID: ZNFLS860	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1205290744-R3.ZNF	Test Dates: 05/28/12 - 07/12/12, 08/07/12 – 08/08/12	DUT Type: Portable Handset	Page 61 of 61	

APPENDIX A: SAR TEST DATA

APPENDIX B: SYSTEM VERIFICATION

APPENDIX C: PROBE CALIBRATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
 $f = 820.1 \text{ MHz}$; $\sigma = 0.911 \text{ mho/m}$; $\epsilon_r = 42.229$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 05-29-2012; Ambient Temp: 21.8 °C; Tissue Temp: 21.4 °C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403
Measurement SW: DASY4, V4.7 Build 80; SEMCAD X Version 14.6.5 (6469)

Mode: Cell. CDMA - FCC Rule Part 90S, Right Head, Cheek, Mid.ch

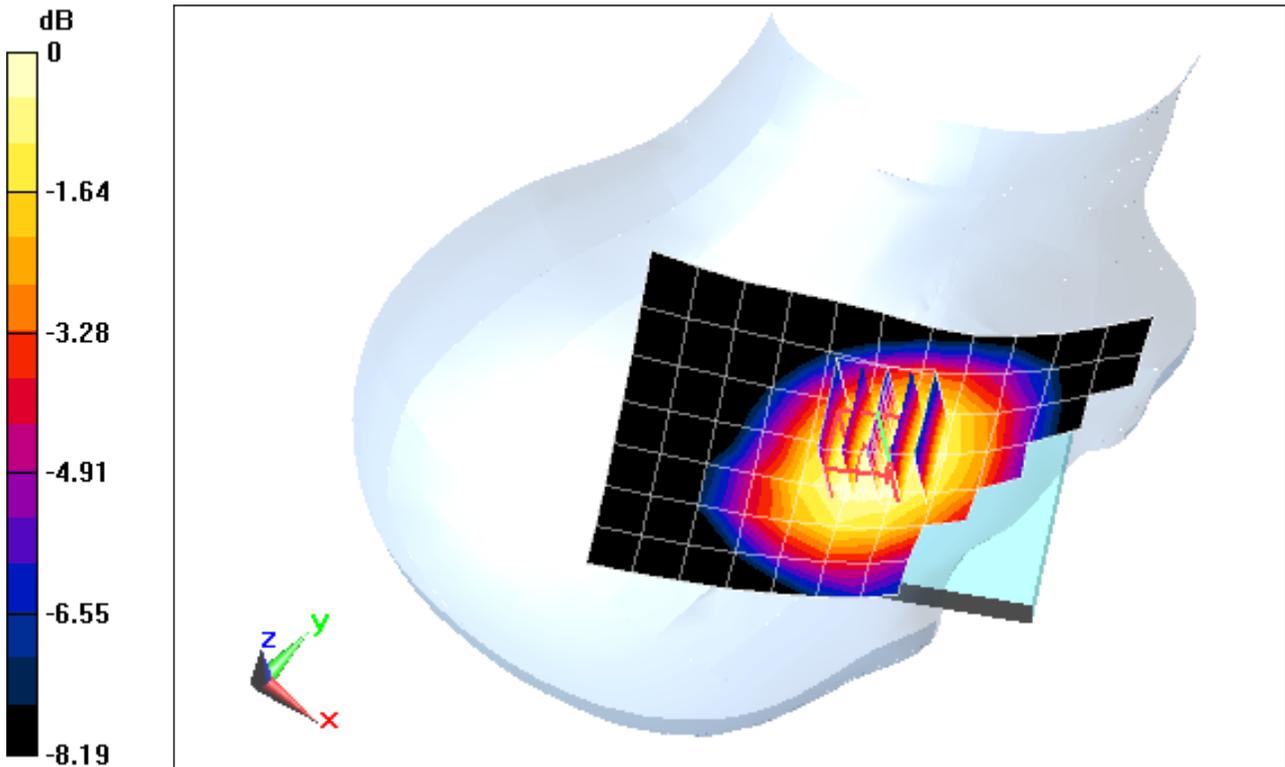
Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 18.096 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.304 mW/g

SAR(1 g) = 0.262 mW/g; SAR(10 g) = 0.206 mW/g



0 dB = 0.273 mW/g = -11.28 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$; $\sigma = 0.891 \text{ mho/m}$; $\epsilon_r = 40.249$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV. A - FCC Rule Part 90S, Right Head, Tilt, Mid.ch

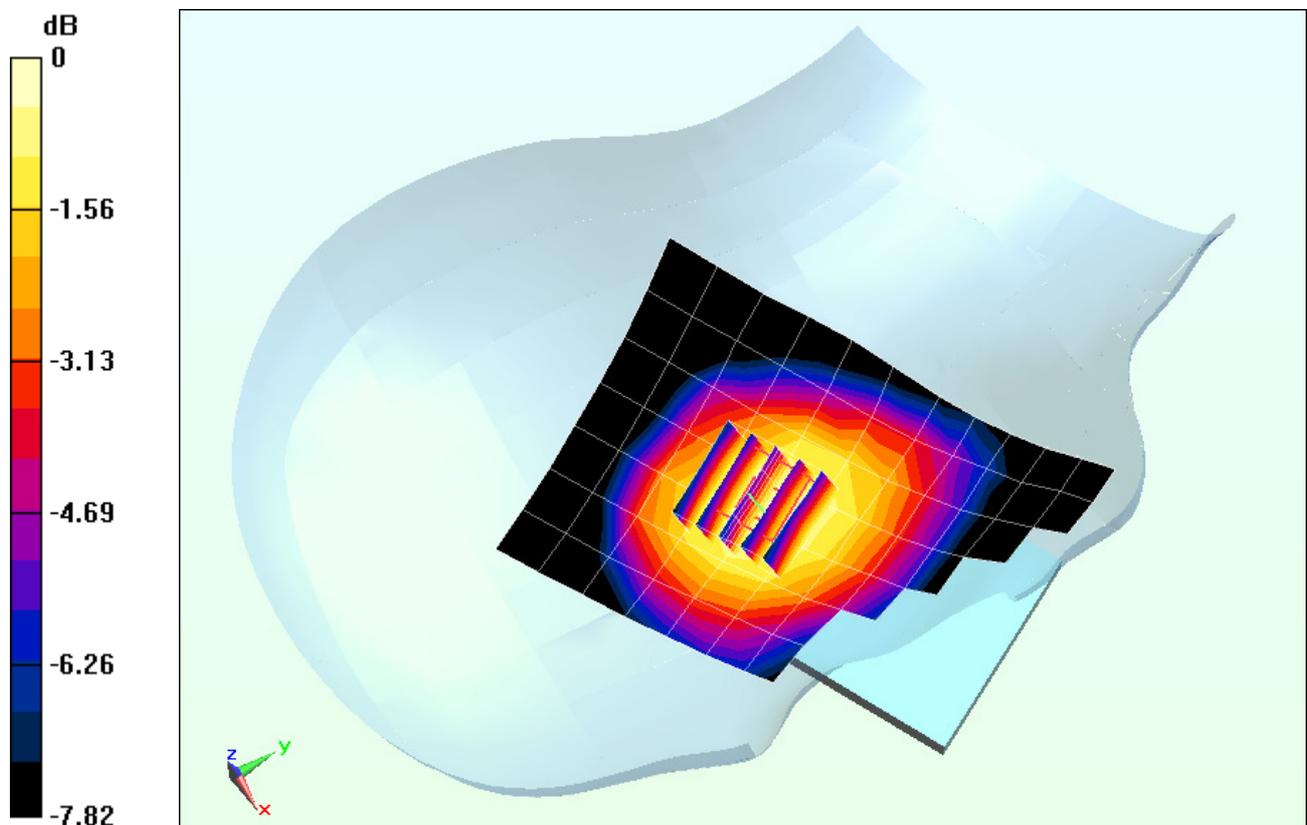
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.867 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.239 mW/g

SAR(1 g) = 0.202 mW/g; SAR(10 g) = 0.158 mW/g



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$; $\sigma = 0.891 \text{ mho/m}$; $\epsilon_r = 40.249$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV. A - FCC Rule Part 90S, Left Head, Cheek, Mid.ch

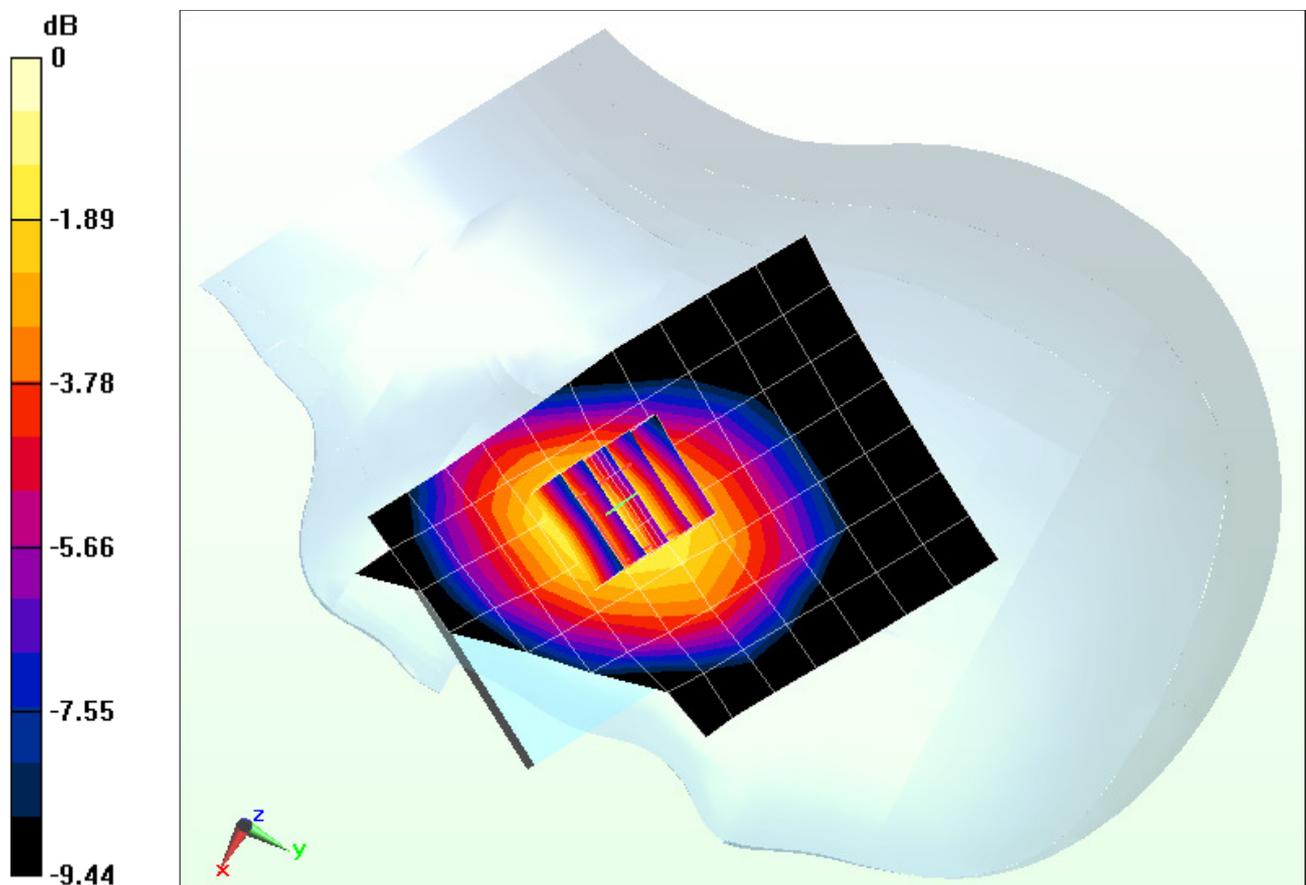
Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 21.898 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.489 mW/g

SAR(1 g) = 0.378 mW/g; SAR(10 g) = 0.281 mW/g



0 dB = 0.397 mW/g = -8.02 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

Communication System: Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 820.1 \text{ MHz}$; $\sigma = 0.891 \text{ mho/m}$; $\epsilon_r = 40.249$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV. A - FCC Rule Part 90S, Left Head, Tilt, Mid.ch

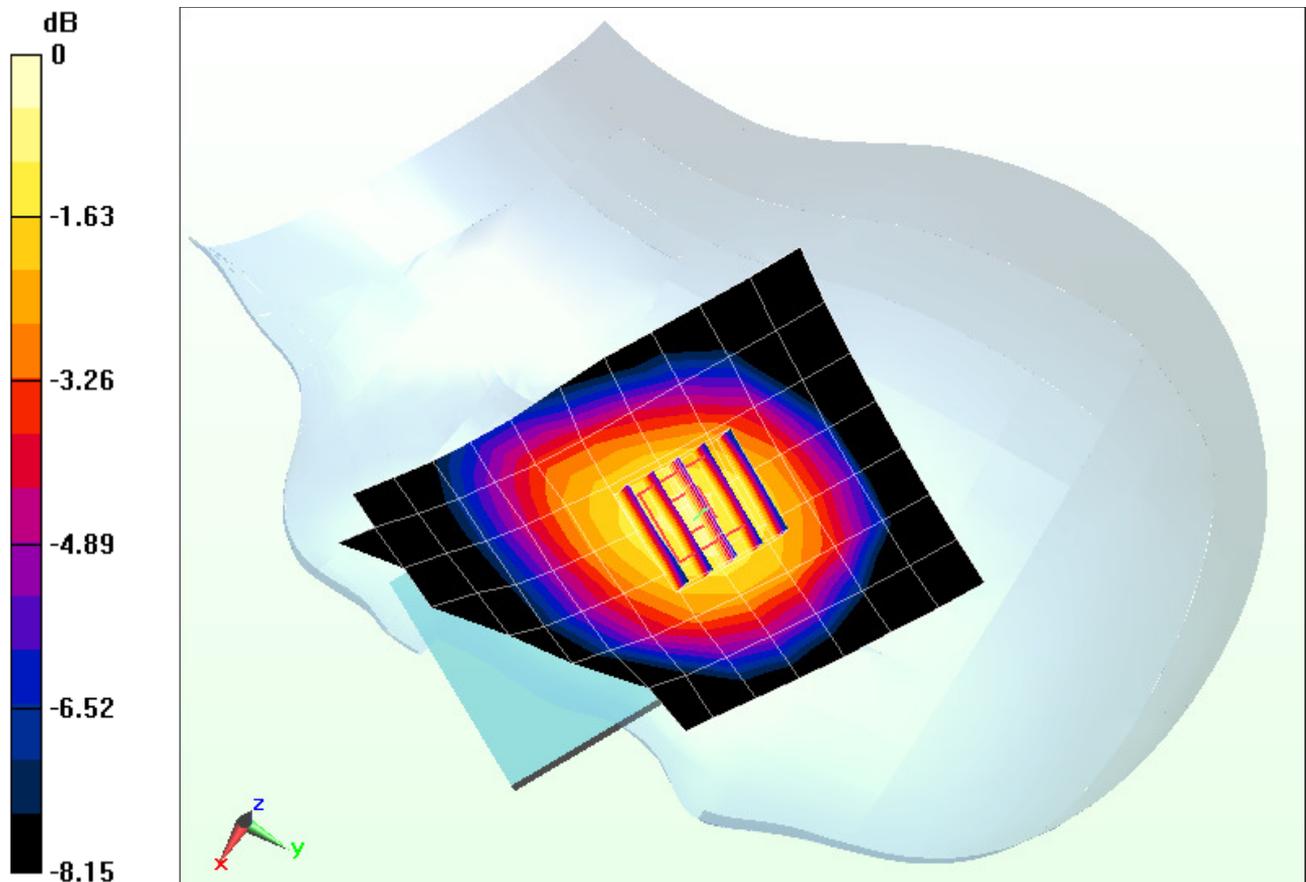
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 17.588 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.311 mW/g

SAR(1 g) = 0.256 mW/g; SAR(10 g) = 0.200 mW/g



0 dB = 0.265 mW/g = -11.54 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.907 \text{ mho/m}$; $\epsilon_r = 40.05$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV. A - FCC Rule Part 22H, Right Head, Cheek, Mid.ch

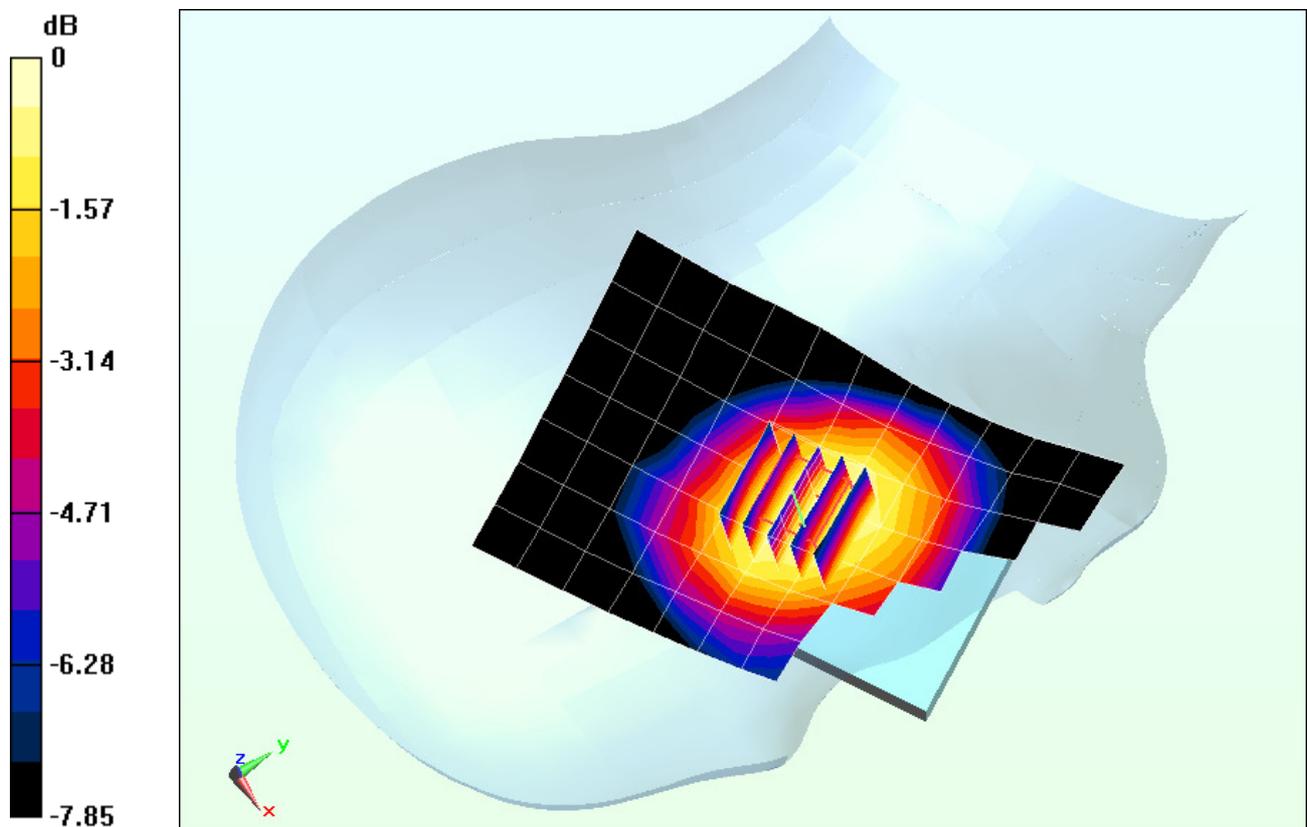
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.835 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.274 mW/g

SAR(1 g) = 0.230 mW/g; SAR(10 g) = 0.180 mW/g



0 dB = 0.239 mW/g = -12.43 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.907 \text{ mho/m}$; $\epsilon_r = 40.05$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV A - FCC Rule Part 22H, Right Head, Tilt, Mid.ch

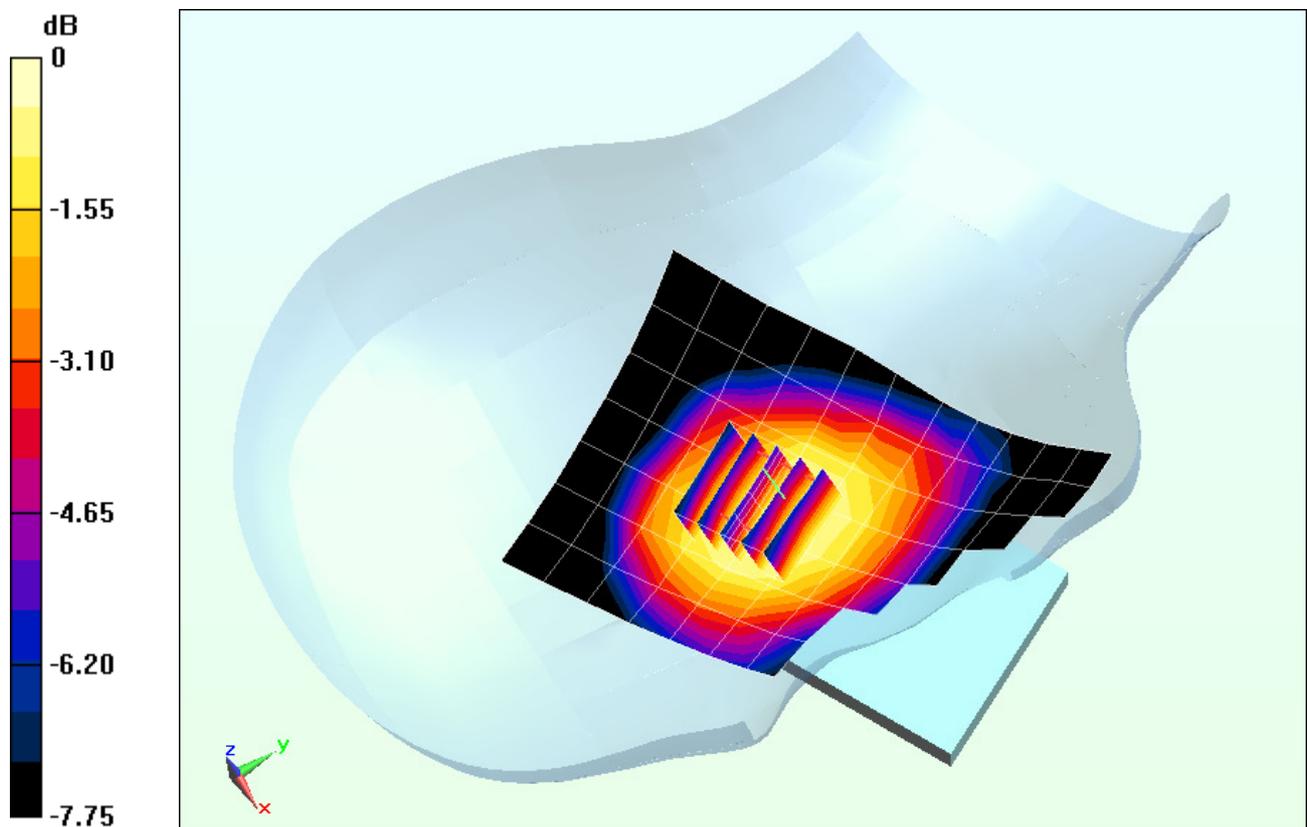
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.595 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.228 mW/g

SAR(1 g) = 0.191 mW/g; SAR(10 g) = 0.150 mW/g



0 dB = 0.197 mW/g = -14.11 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.907 \text{ mho/m}$; $\epsilon_r = 40.05$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV. A - FCC Rule Part 22H, Left Head, Cheek, Mid.ch

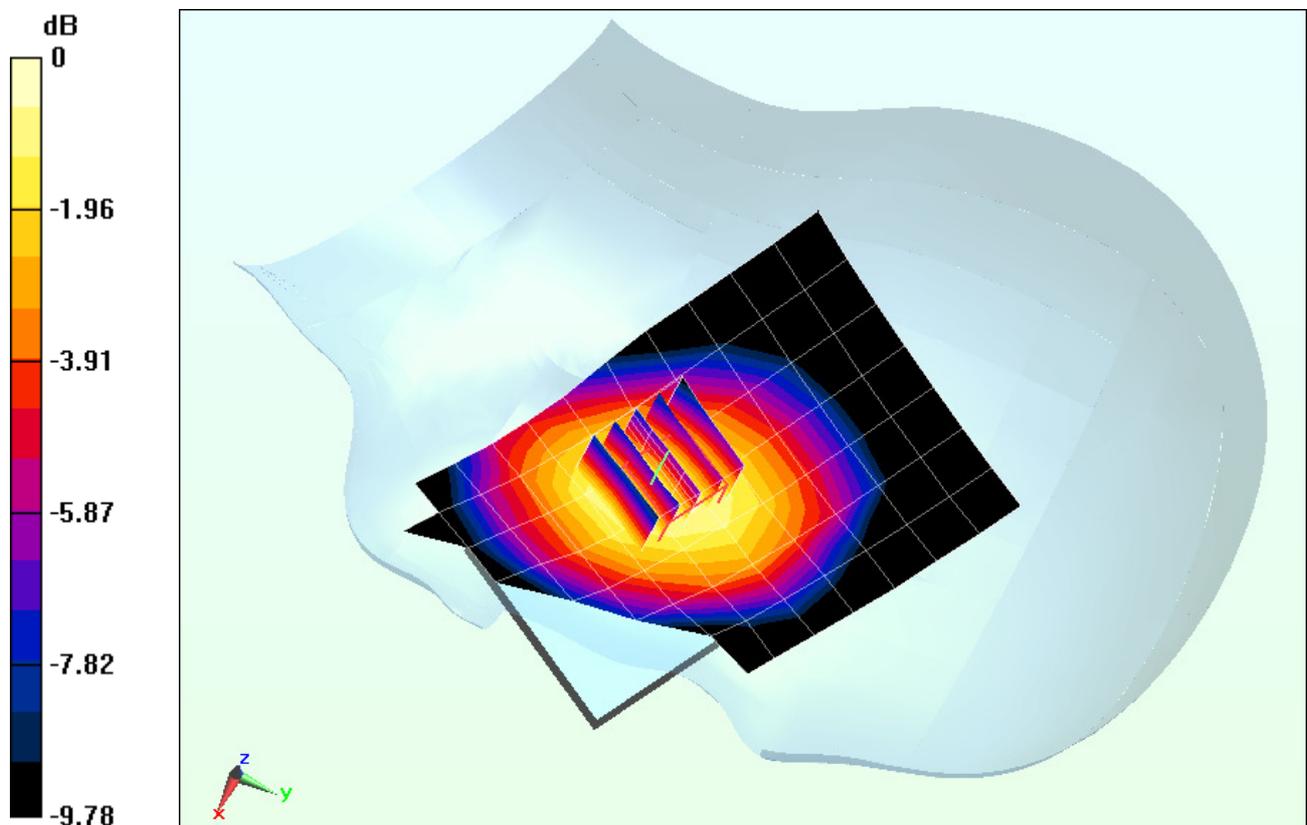
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 20.020 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.419 mW/g

SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.245 mW/g



0 dB = 0.345 mW/g = -9.24 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.907 \text{ mho/m}$; $\epsilon_r = 40.05$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3258; ConvF(6.01, 6.01, 6.01); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: Cellular EVDO REV. A - FCC Rule Part 22H, Left Head, Tilt, Mid.ch

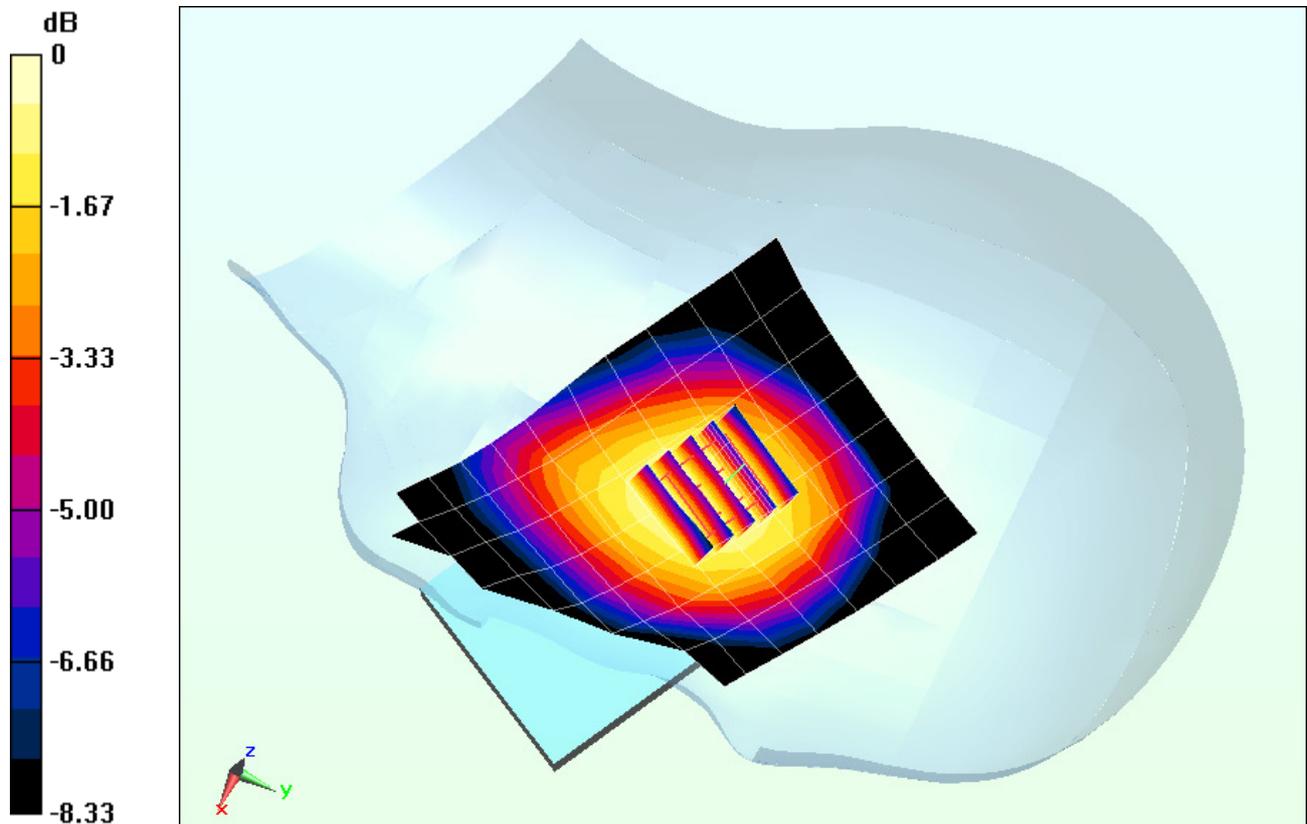
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.447 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 0.269 mW/g

SAR(1 g) = 0.217 mW/g; SAR(10 g) = 0.168 mW/g



0 dB = 0.228 mW/g = -12.84 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

Medium: 1900 Head; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.404 \text{ mho/m}$; $\epsilon_r = 39.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

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

Measurement SW: DASY52, Version 52.8 (1);SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. A - FCC Rule Part 24E, Right Head, Cheek, Mid.ch

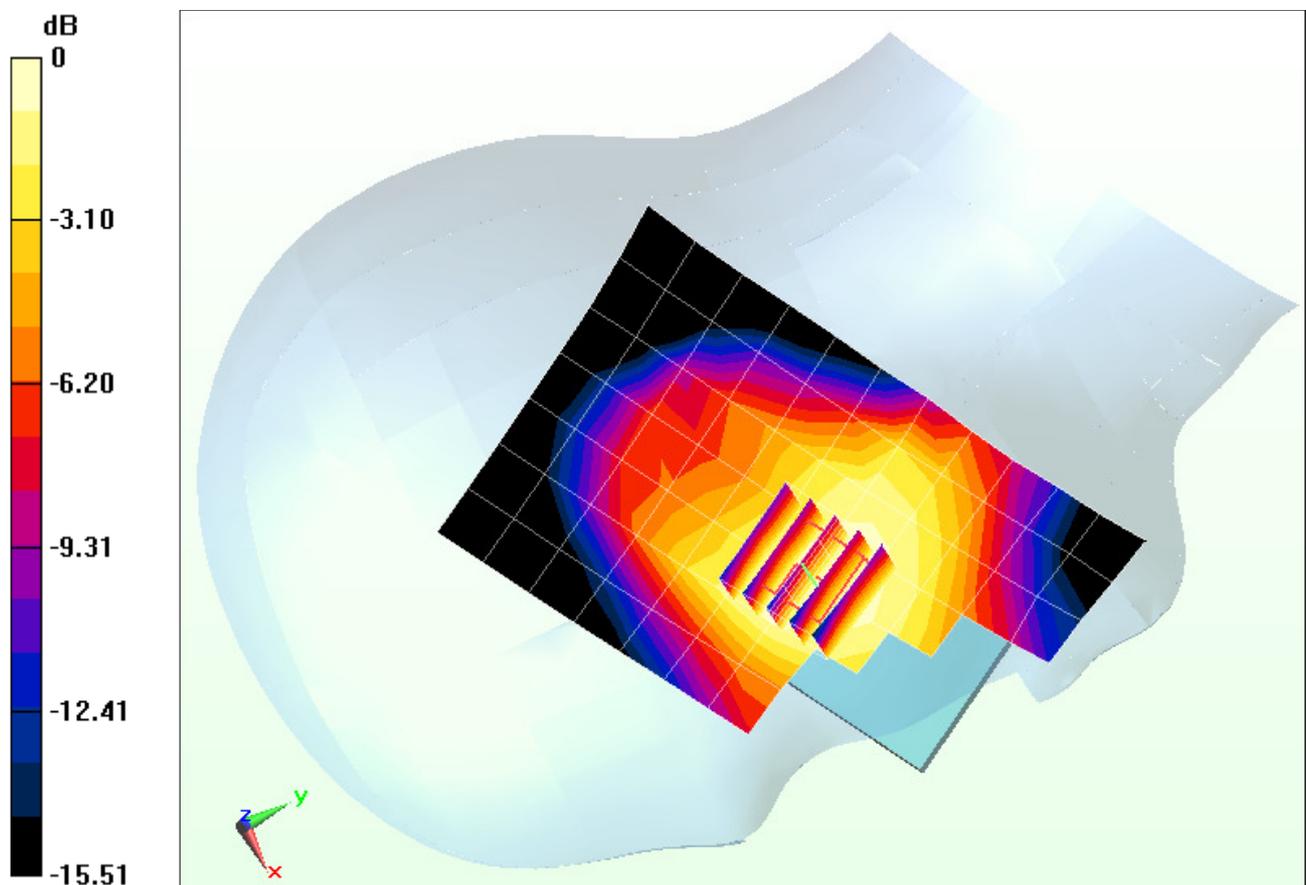
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 20.419 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.776 mW/g

SAR(1 g) = 0.533 mW/g; SAR(10 g) = 0.356 mW/g



0 dB = 0.559 mW/g = -5.05 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

$f = 1880 \text{ MHz}$; $\sigma = 1.404 \text{ mho/m}$; $\epsilon_r = 39.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-07-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev A - FCC Rule Part 24E, Right Head, Tilt, Mid.ch

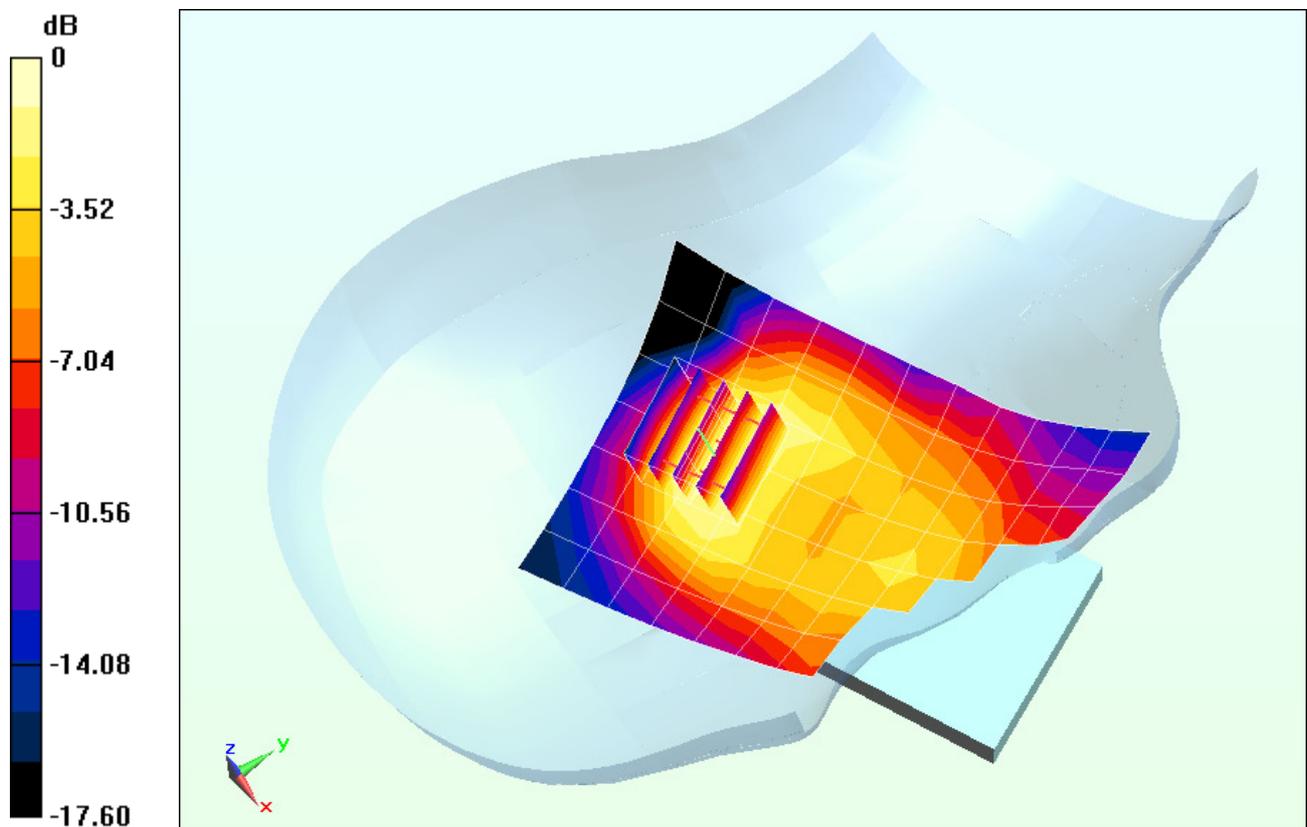
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 13.595 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.388 mW/g

SAR(1 g) = 0.248 mW/g; SAR(10 g) = 0.153 mW/g



0 dB = 0.274 mW/g = -11.24 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

Communication System: CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:

$f = 1908.75 \text{ MHz}$; $\sigma = 1.433 \text{ mho/m}$; $\epsilon_r = 39.142$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. A - FCC Rule Part 24E, Left Head, Cheek, High.ch

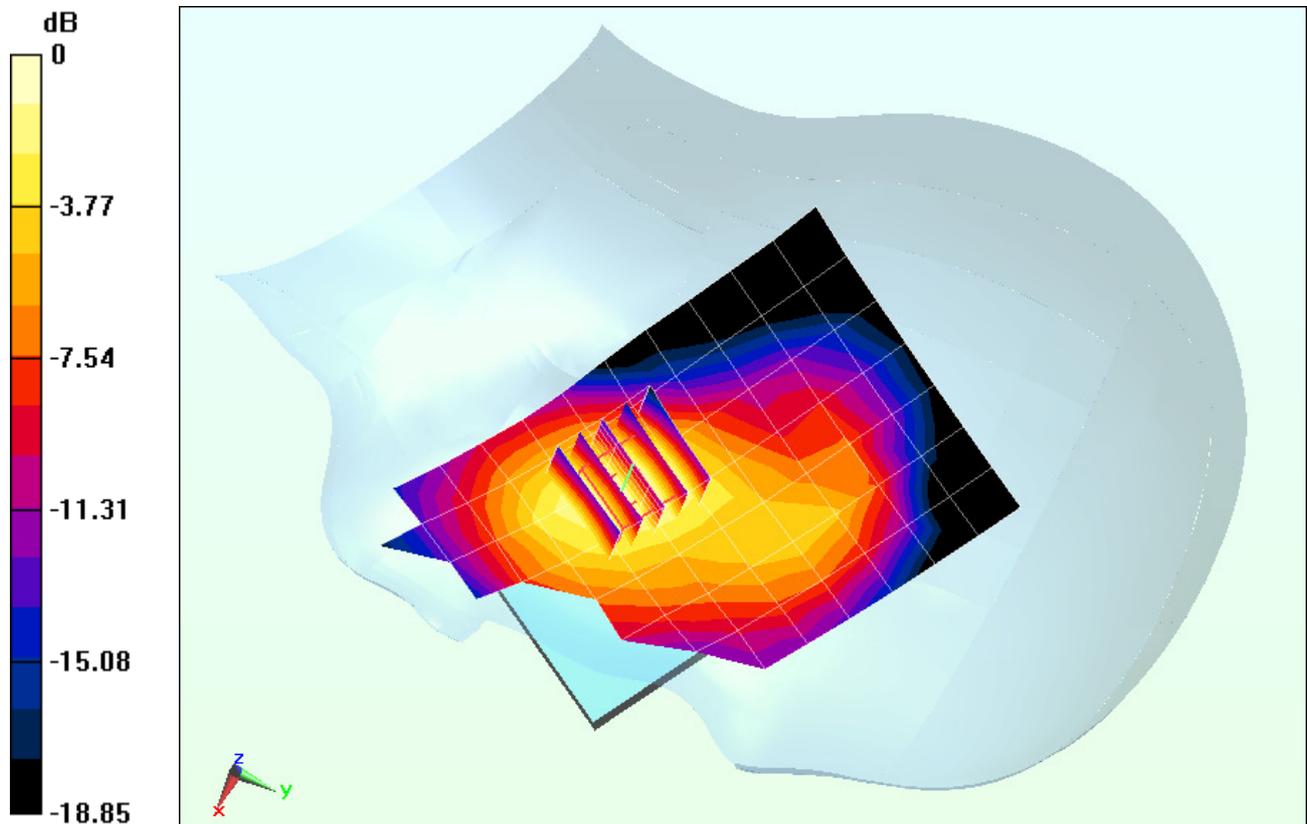
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 26.761 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.378 mW/g

SAR(1 g) = 0.898 mW/g; SAR(10 g) = 0.545 mW/g



0 dB = 0.981 mW/g = -0.17 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#2

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

$f = 1880 \text{ MHz}$; $\sigma = 1.404 \text{ mho/m}$; $\epsilon_r = 39.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-07-2012; Ambient Temp: 23.8°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.06, 5.06, 5.06); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: PCS EVDO Rev. A - FCC Rule Part 24E, Left Head, Tilt, Mid.ch

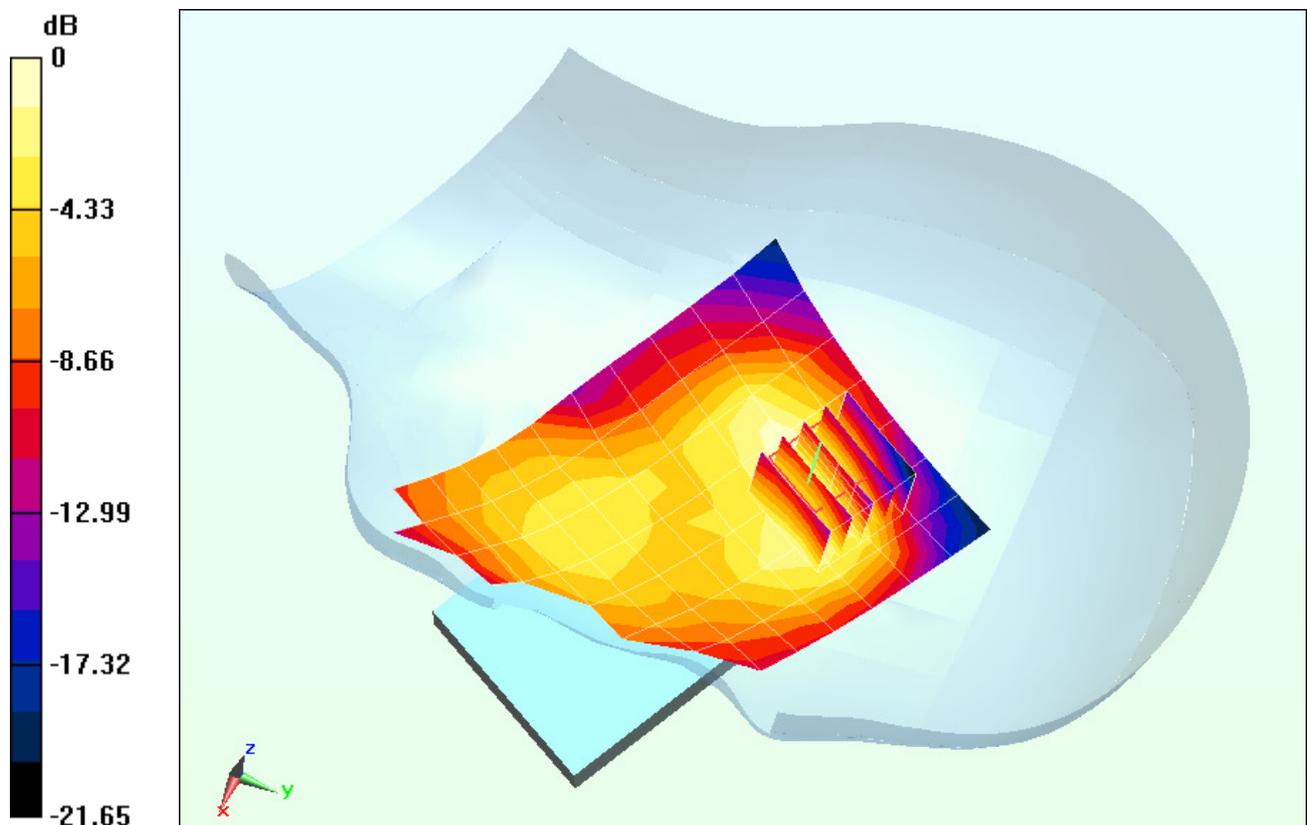
Area Scan (8x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 14.845 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.446 mW/g

SAR(1 g) = 0.273 mW/g; SAR(10 g) = 0.163 mW/g



0 dB = 0.282 mW/g = -11.00 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#3

Communication System: LTE B25 10 Mhz; Frequency: 1910 MHz;Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:

$f = 1910 \text{ MHz}$; $\sigma = 1.459 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 06-05-2012; Ambient Temp: 22.8°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3209; ConvF(5.15, 5.15, 5.15); Calibrated: 3/16/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

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

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

Measurement SW: DASY4, V4.7 Build 80; SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS), Right Head, Cheek, High.ch
10 MHz BW, QPSK, 1 RB, 0 RB Offset

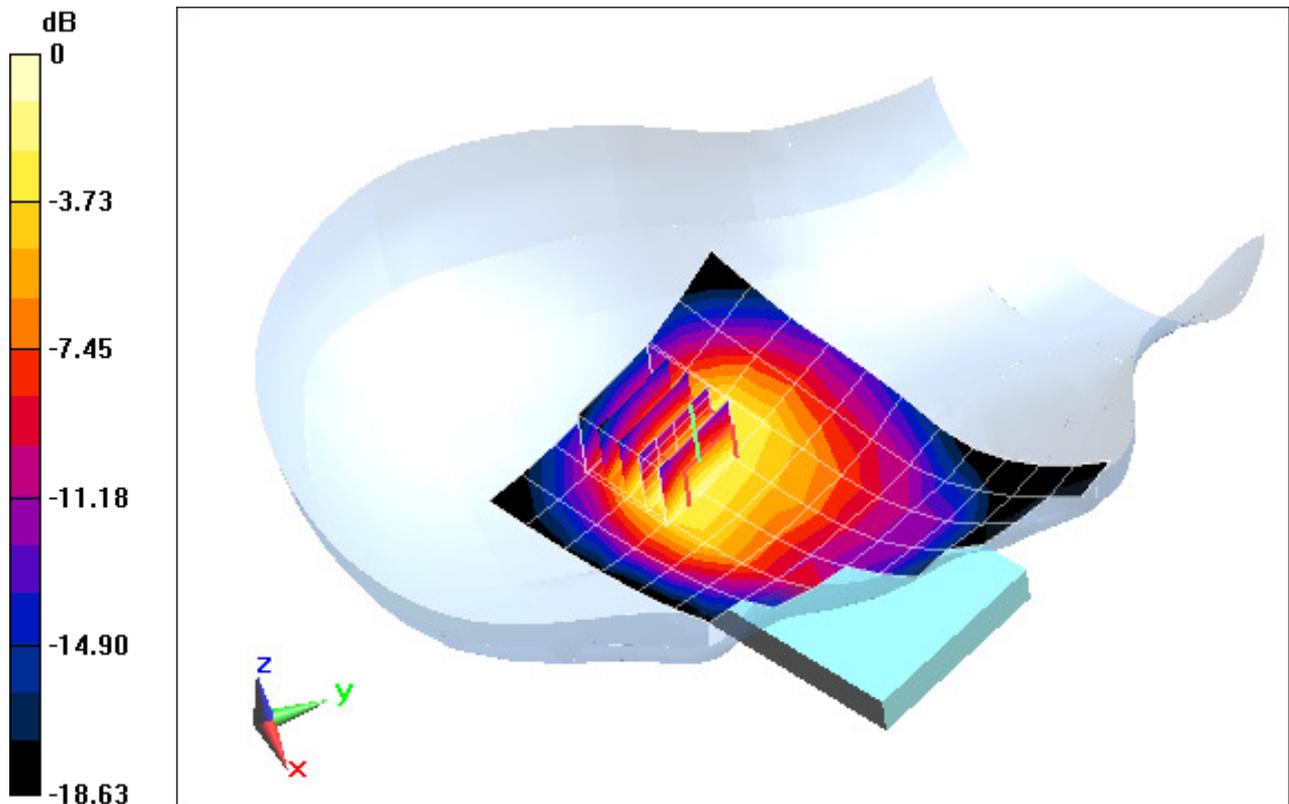
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 26.434 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.397 mW/g

SAR(1 g) = 0.914 mW/g; SAR(10 g) = 0.564 mW/g



0 dB = 0.968 mW/g = -0.28 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#3

Communication System: LTE B25 10 Mhz; Frequency: 1910 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:

$f = 1910 \text{ MHz}$; $\sigma = 1.459 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 06-05-2012; Ambient Temp: 22.8°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3209; ConvF(5.15, 5.15, 5.15); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS), Right Head, Tilt, High.ch
10 MHz BW, QPSK, 1 RB, 0 RB Offset

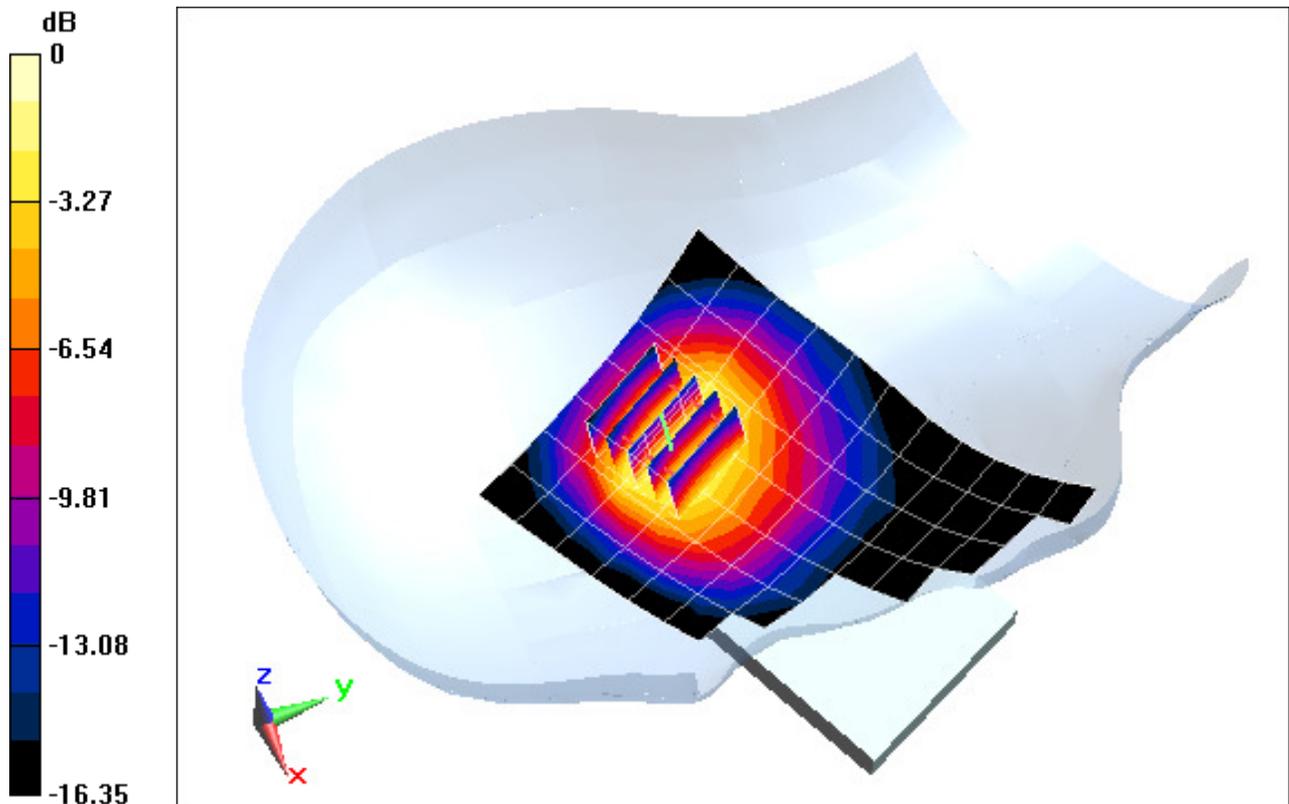
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 29.131 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 1.696 mW/g

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.621 mW/g



0 dB = 1.15 mW/g = 1.21 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#3

Communication System: LTE B25 10 MHz; Frequency: 1910 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:

$f = 1910 \text{ MHz}$; $\sigma = 1.459 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 06-05-2012; Ambient Temp: 22.8°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3209; ConvF(5.15, 5.15, 5.15); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS), Left Head, Cheek, High. Ch
10 MHz BW, QPSK, 1 RB, 0 RB Offset

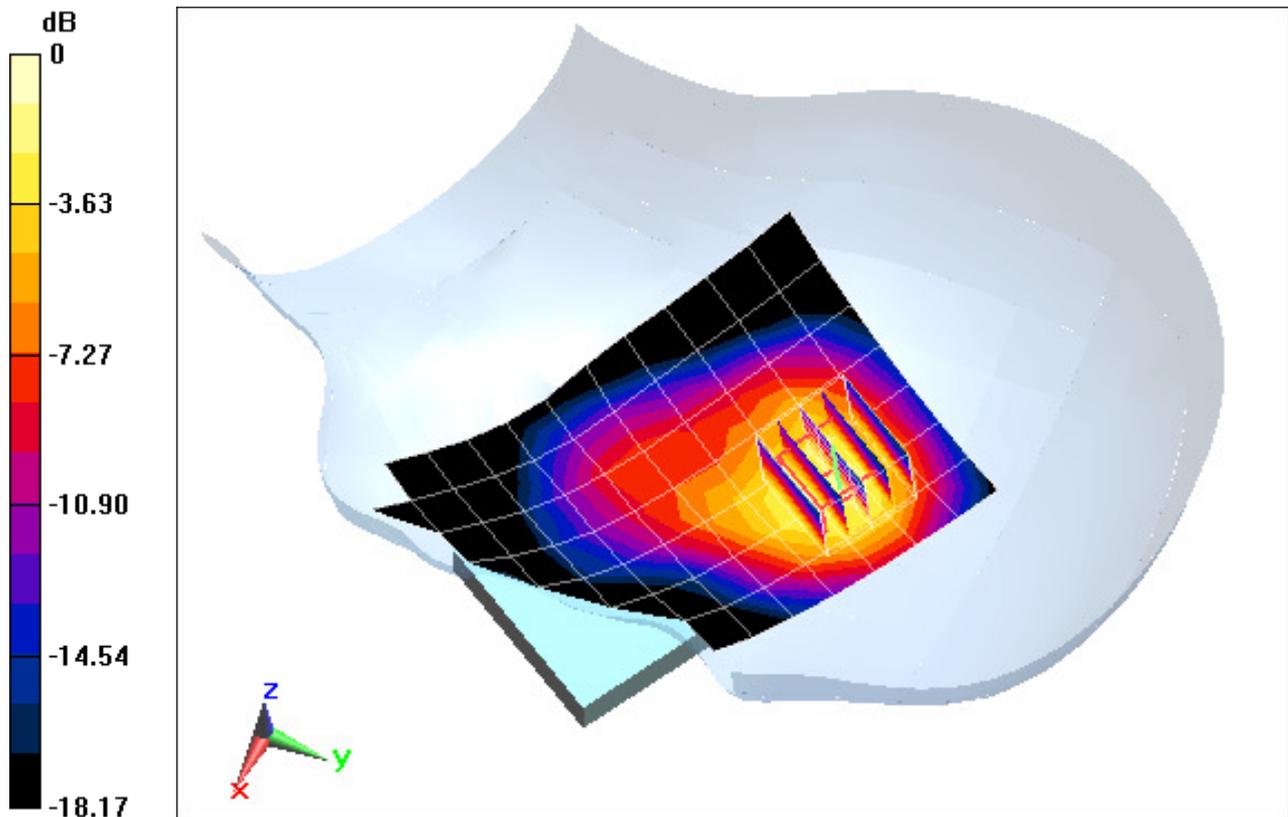
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 32.496 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 2.093 mW/g

SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.684 mW/g



0 dB = 1.31 mW/g = 2.35 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#3

Communication System: LTE B25 10 MHz; Frequency: 1910 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:

$f = 1910 \text{ MHz}$; $\sigma = 1.459 \text{ mho/m}$; $\epsilon_r = 38.48$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 06-05-2012; Ambient Temp: 22.8°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3209; ConvF(5.15, 5.15, 5.15); Calibrated: 3/16/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, V4.7 Build 80; SEMCAD X Version 14.6.5 (6469)

Mode: LTE Band 25 (PCS), Left Head, Tilt, High.ch
10 MHz BW, QPSK, 1 RB, 0 RB Offset

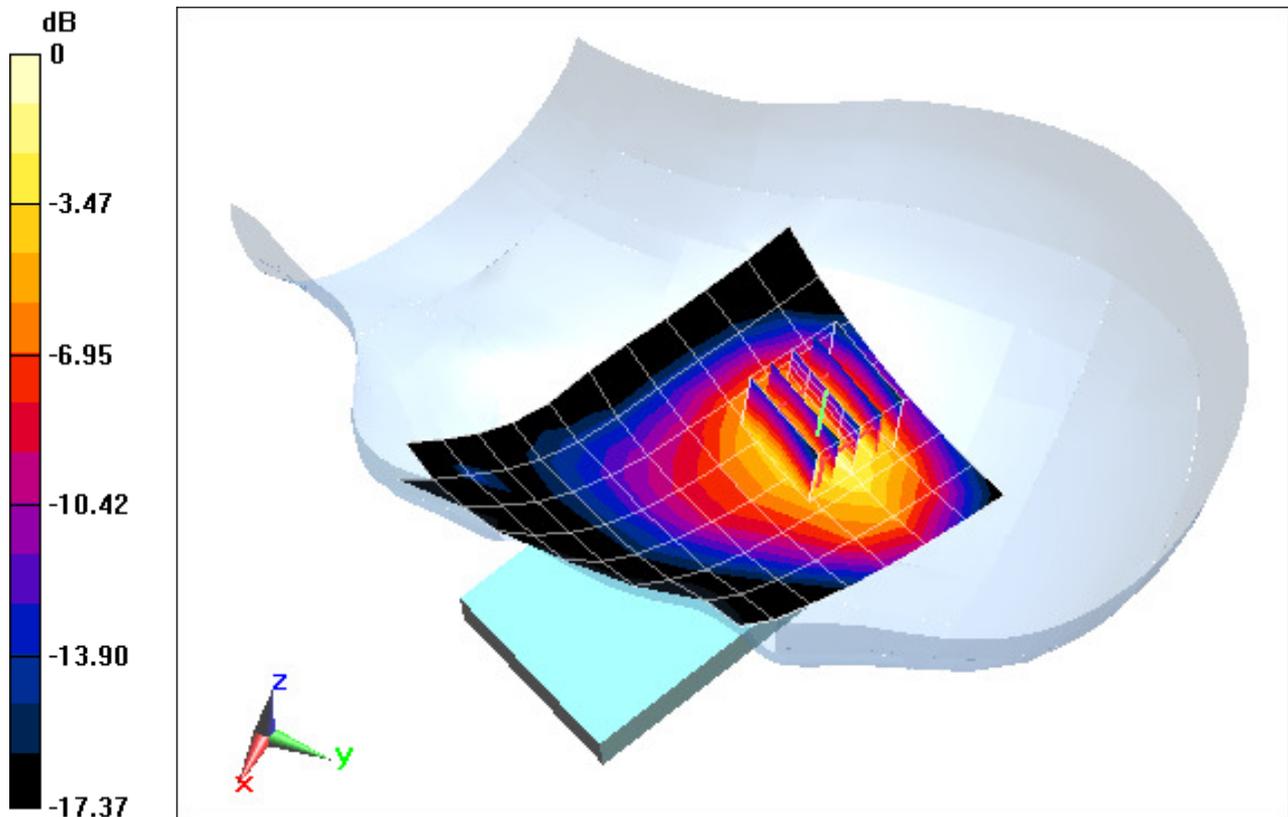
Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 29.920 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.690 mW/g

SAR(1 g) = 1.06 mW/g; SAR(10 g) = 0.621 mW/g



0 dB = 1.18 mW/g = 1.44 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#4

Communication System: IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$; $\sigma = 1.861 \text{ mho/m}$; $\epsilon_r = 38.061$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-30-2012; Ambient Temp: 24.9°C; Tissue Temp: 24.2°C

Probe: ES3DV2 - SN3022; ConvF(4.3, 4.3, 4.3); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

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

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

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

Mode: IEEE 802.11b - FCC Rule Part 15C, Right Head, Cheek, Ch 11, 1 Mbps

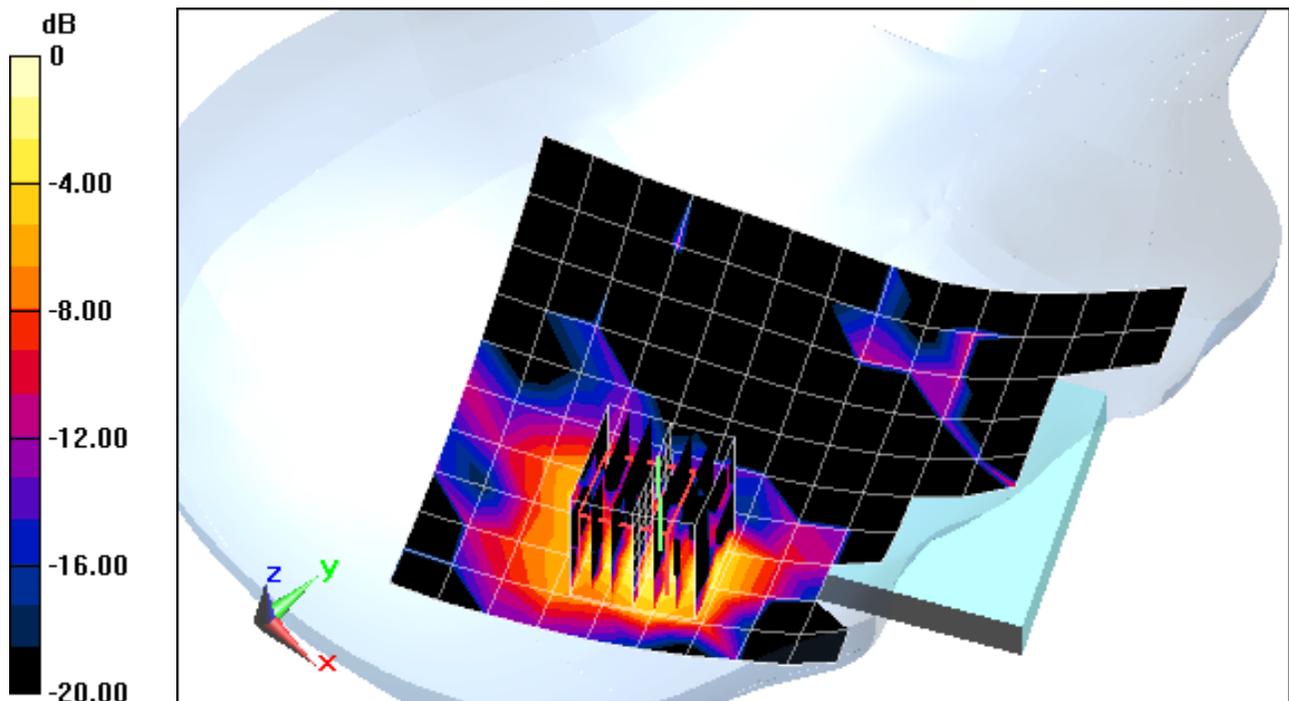
Area Scan (11x14x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 1.734 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.0250

SAR(1 g) = 0.00552 mW/g; SAR(10 g) = 0.0018 mW/g



0 dB = 0.0076mW/g = -42.38 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#4

Communication System: IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Head Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$; $\sigma = 1.861 \text{ mho/m}$; $\epsilon_r = 38.061$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 05-30-2012; Ambient Temp: 24.9°C; Tissue Temp: 24.2°C

Probe: ES3DV2 - SN3022; ConvF(4.3, 4.3, 4.3); Calibrated: 8/25/2011

Sensor-Surface: 3mm (Mechanical Surface Detection)

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

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

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

Mode: IEEE 802.11b - FCC Rule Part 15C, Right Head, Tilt, Ch 11, 1 Mbps

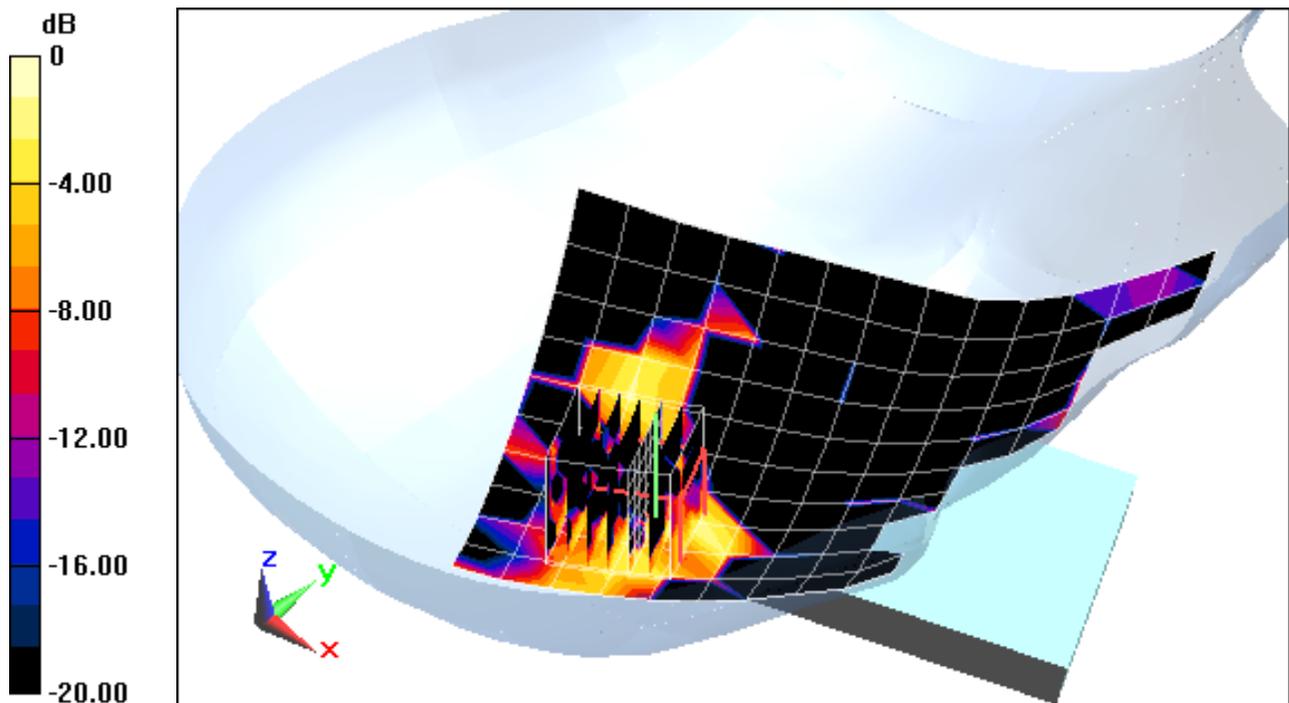
Area Scan (11x14x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 0.993 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.0120

SAR(1 g) = 0.00207 mW/g; SAR(10 g) = 0.000446 mW/g



0 dB = 0.0033mW/g = -49.63 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#4

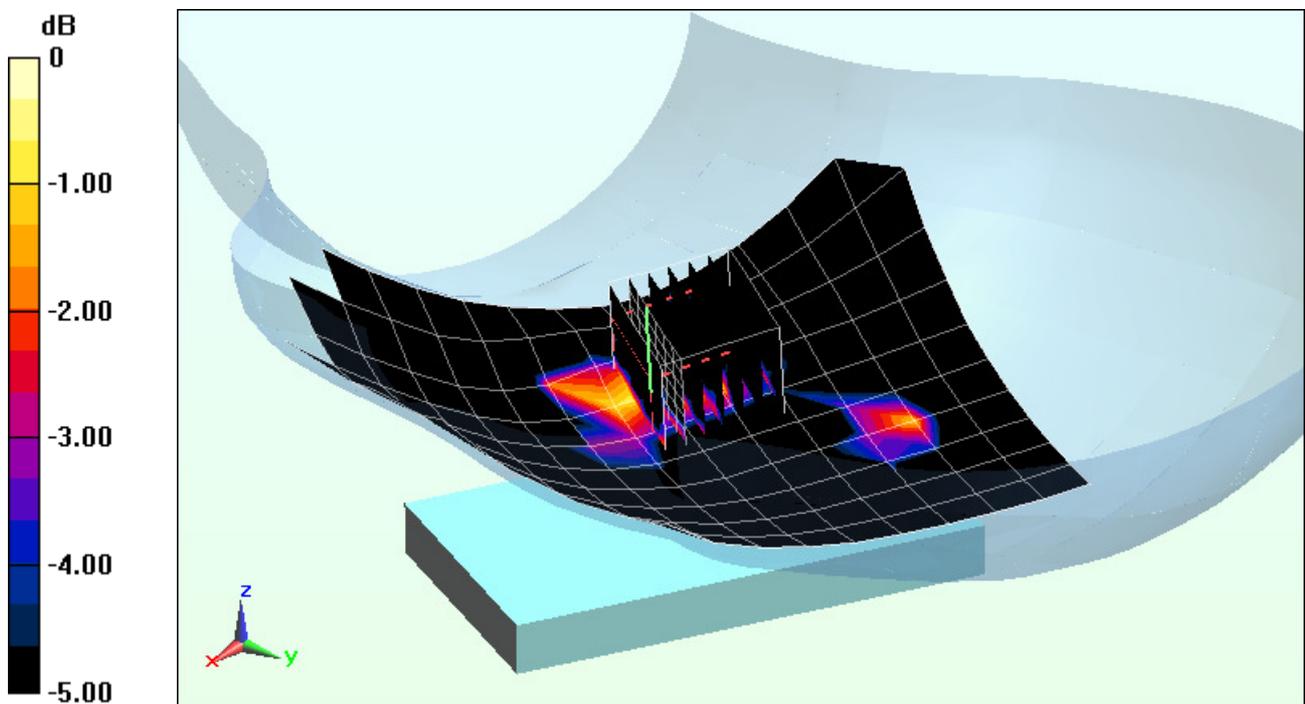
Communication System: IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
 $f = 2462 \text{ MHz}$; $\sigma = 1.861 \text{ mho/m}$; $\epsilon_r = 38.061$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 05-30-2012; Ambient Temp: 24.9 °C; Tissue Temp: 24.2 °C

Probe: ES3DV2 - SN3022; ConvF(4.3, 4.3, 4.3); Calibrated: 8/25/2011;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b - FCC Rule Part 15C, Left Head, Cheek, Ch 11, 1 Mbps

Area Scan (11x15x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 1.406 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.018 mW/g
SAR(1 g) = 0.00331 mW/g; SAR(10 g) = 0.00126 mW/g



0 dB = 0.00462 mW/g = -46.71 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFLS860; Type: Portable Handset; Serial: SAR#4

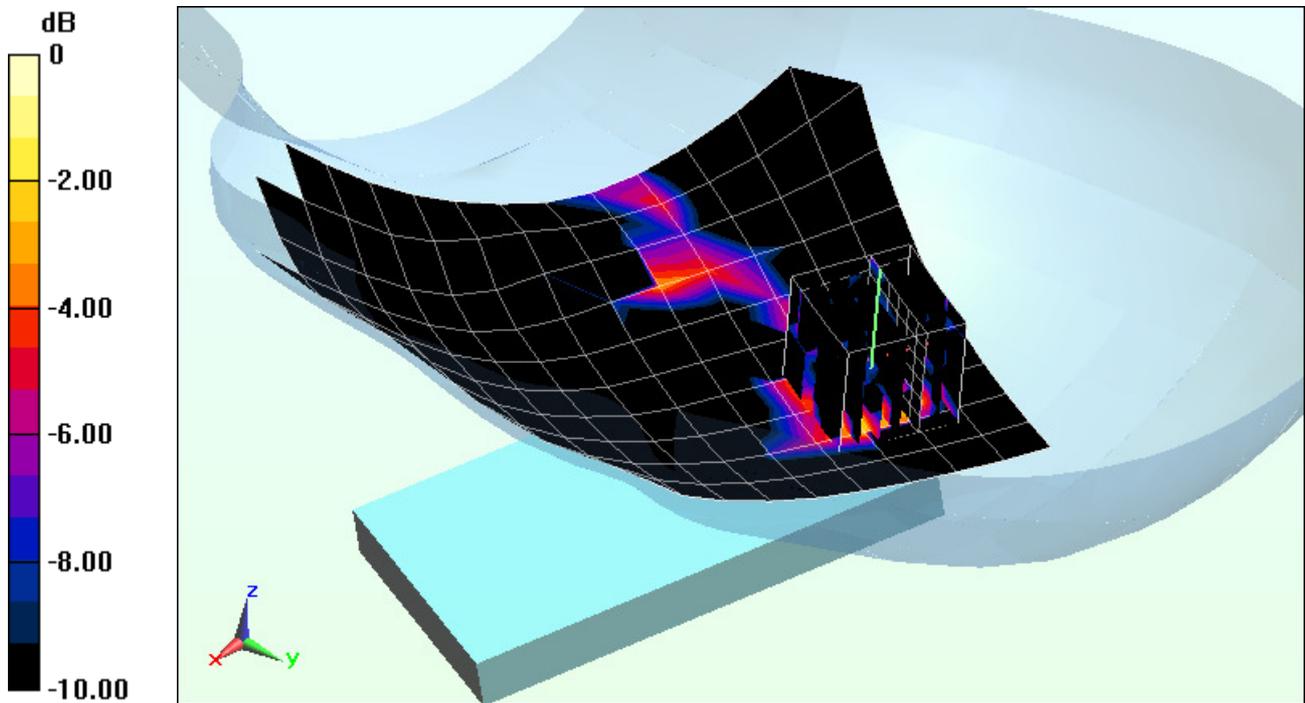
Communication System: IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
 $f = 2462 \text{ MHz}$; $\sigma = 1.861 \text{ mho/m}$; $\epsilon_r = 38.061$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 05-30-2012; Ambient Temp: 24.9 °C; Tissue Temp: 24.2 °C

Probe: ES3DV2 - SN3022; ConvF(4.3, 4.3, 4.3); Calibrated: 8/25/2011;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/19/2012
Phantom: SAM with CRP; Type: SAM; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.4 (4989)

Mode: IEEE 802.11b - FCC Rule Part 15C, Left Head, Tilt, Ch 11, 1 Mbps

Area Scan (11x15x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 1.442 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.00773 mW/g
SAR(1 g) = 0.00347 mW/g; SAR(10 g) = 0.00121 mW/g



0 dB = 0.00521 mW/g = -45.66 dB mW/g