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

SAR EVALUATION REPORT

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

Date of Testing:
08/30/13 - 09/09/13
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1309031729-R1.A3L

FCC ID: **A3LSPHL720T**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SPH-L720T

Equipment Class	Band & Mode	Tx Frequency	Measured Conducted Power [dBm]	SAR		
				1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	32.78	0.28	0.53	0.78
PCE	UMTS 850	826.40 - 846.60 MHz	22.53	0.20	0.35	0.35
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	29.62	0.29	0.39	0.42
PCE	UMTS 1900	1852.4 - 1907.6 MHz	22.54	0.84	1.03	1.03
PCE	CDMA/EVDO BC10 (§90S)	817.90 - 823.10 MHz	24.97	0.50	0.74	0.70
PCE	CDMA/EVDO BC0 (§22H)	824.70 - 848.31 MHz	24.89	0.51	0.75	0.74
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	24.70	0.78	1.09	1.01
PCE	LTE Band 26	814.7 - 848.3 MHz	24.32	0.29	0.47	0.47
PCE	LTE Band 25 (PCS)	1851.5 - 1913.5 MHz	23.00	0.65	0.77	0.77
PCE	LTE Band 41	2501 - 2685 MHz	24.35	0.28	0.54	0.54
DTS	2.4 GHz WLAN	2412 - 2462 MHz	16.48	0.40	0.22	0.22
DTS	5.8 GHz WLAN	5745 - 5825 MHz	13.29	0.13	0.10	0.17
NII	5.2 GHz WLAN	5180 - 5240 MHz	12.91	0.39	0.42	
NII	5.3 GHz WLAN	5260 - 5320 MHz	12.49	0.40	0.43	
NII	5.5 GHz WLAN	5500 - 5700 MHz	13.34	0.13	0.19	
DSS/DTS	Bluetooth	2402 - 2480 MHz	9.26	N/A		
Simultaneous SAR per KDB 690783 D01v01r02:				1.24	1.52	1.25

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: 0Y1309031729-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.9 of this report; for North American frequency bands only.

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

Randy Ortanez
President

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
CDMA/EVDO BC10 (§90S)	Voice/Data	817.90 - 823.10 MHz
CDMA/EVDO BC0 (§22H)	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 26	Data	814.7 - 848.3 MHz
LTE Band 25 (PCS)	Data	1851.5 - 1913.5 MHz
LTE Band 41	Data	2501 - 2685 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
Ant+	Data	2402 - 2480 MHz

1.2 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05r01.

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.0**	**33.0**	**31.5**	**30.0**	**28.5**	**26.5**	**26.0**	**22.0**	**21.5**
	Nominal	**32.5**	**32.5**	**31.0**	**29.5**	**28.0**	**26.0**	**25.5**	**21.5**	**21.0**
GSM/GPRS/EDGE 1900	Maximum	**30.0**	**30.0**	**27.5**	**26.0**	**24.5**	**26.0**	**24.5**	**20.0**	**19.0**
	Nominal	**29.5**	**29.5**	**27.0**	**25.5**	**24.0**	**25.5**	**24.0**	**19.5**	**18.5**

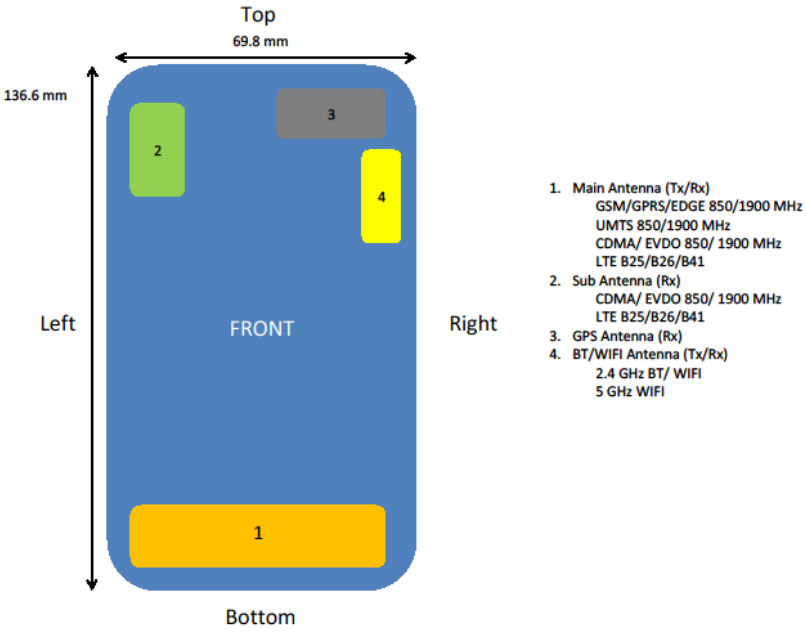
Mode / Band		Modulated Average (dBm)		
		3GPP RMC Rel 99	*3GPP HSDPA Rel 5*	*3GPP HSUPA Rel 6*
UMTS Band 5 (850 MHz)	Maximum	**23.0**	**22.0**	**22.0**
	Nominal	**22.5**	**21.5**	**21.5**
UMTS Band 2 (1900 MHz)	Maximum	**23.0**	**22.0**	**22.0**
	Nominal	**22.5**	**21.5**	**21.5**

Mode / Band		Modulated Average (dBm)
CDMA/EVDO BC10 (§90S)	Maximum	**25.0**
	Nominal	**24.5**
CDMA/EVDO BC0 (§22H)	Maximum	**25.0**
	Nominal	**24.5**
PCS CDMA/EVDO	Maximum	**25.0**
	Nominal	**24.5**

Mode / Band		Modulated Average (dBm)
LTE Band 26	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 25 (PCS)	Maximum	**23.0**
	Nominal	**22.5**
LTE Band 41	Maximum	**24.5**
	Nominal	**24.0**

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	**16.5**
	Nominal	**16.0**
IEEE 802.11g (2.4 GHz)	Maximum	**13.5**
	Nominal	**13.0**
IEEE 802.11n (2.4 GHz)	Maximum	**12.5**
	Nominal	**12.0**
IEEE 802.11a (5 GHz)	Maximum	**13.5**
	Nominal	**13.0**
IEEE 802.11n 20 MHz BW (5 GHz)	Maximum	**12.5**
	Nominal	**12.0**
IEEE 802.11n 40 MHz BW (5 GHz)	Maximum	**11.5**
	Nominal	**11.0**
IEEE 802.11ac (5 GHz)	Maximum	**10.5**
	Nominal	**10.0**
Bluetooth (1 Mbps)	Maximum	**9.5**
	Nominal	**9.0**
Bluetooth (2,3 Mbps)	Maximum	**8.0**
	Nominal	**7.5**
Bluetooth LE	Maximum	**8.5**
	Nominal	**8.0**

1.3 DUT Antenna Locations



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

Figure 1-1
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
UMTS 1900	Yes	Yes	No	Yes	Yes	Yes
EVDO BC10 (§90S)	Yes	Yes	No	Yes	Yes	Yes
EVDO BC0 (§22H)	Yes	Yes	No	Yes	Yes	Yes
PCS EVDO	Yes	Yes	No	Yes	Yes	Yes
LTE Band 26	Yes	Yes	No	Yes	Yes	Yes
LTE Band 25 (PCS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 41	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	Yes	No
5.8 GHz WLAN	Yes	Yes	Yes	No	Yes	No

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01r01 guidance, page 2.

1.4 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the specialized battery. The SAR tests were performed with the specialized battery (model: B600BU).

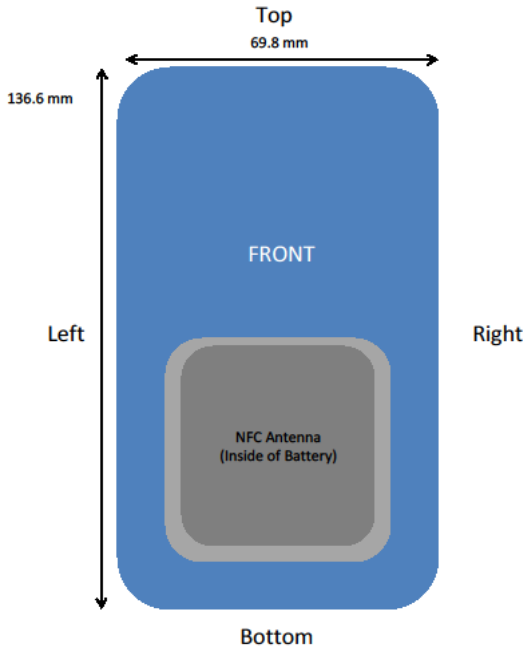


Figure 1-2
NFC Antenna Locations

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01r01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Figure 1-3
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05r01 procedures.

Table 1-2
Simultaneous Transmission Scenarios

Ref.	Simultaneous Transmit Configurations	Head	Body-Worn Accessory	Hot Spot	Note
		IEEE 1528, Supp C	Supplement C	FCC KDB 941225 D06 edges/sides	
1	1X CDMA 850/1900 Voice + 2.4 GHz WIFI	Yes	Yes	N/A	
2	1X CDMA 850/1900 Voice + 5 GHz WIFI	Yes	Yes	N/A	
3	1X CDMA 850/1900 Voice + Bluetooth	N/A	Yes	N/A	
4	GSM 850/1900 Voice + 2.4 GHz WIFI	Yes	Yes	N/A	
5	GSM 850/1900 Voice + 5 GHz WIFI	Yes	Yes	N/A	
6	GSM 850/1900 Voice + Bluetooth	N/A	Yes	N/A	
7	UMTS 850/1900 Voice + 2.4 GHz WIFI	Yes	Yes	N/A	
8	UMTS 850/1900 Voice + 5 GHz WIFI	Yes	Yes	N/A	
9	UMTS 850/1900 Voice + Bluetooth	N/A	Yes	N/A	
10	1x CDMA 850 Data/EVDO 850 Data + 2.4 GHz WIFI	Yes	Yes	Yes	
11	1x CDMA 850 Data/EVDO 850 Data + 5.8 GHz WIFI	Yes	Yes	Yes	
12	1x CDMA 1900 Data/EVDO 1900 Data + 2.4 GHz WIFI	Yes	Yes	Yes	
13	1x CDMA 1900 Data/EVDO 1900 Data + 5.8 GHz WIFI	Yes	Yes	Yes	
14	1x CDMA 850 Data/EVDO 850 Data + Bluetooth	N/A	Yes	N/A	
15	1x CDMA 1900 Data/EVDO 1900 Data + Bluetooth	N/A	Yes	N/A	
16	GPRS/EDGE 850/ 1900 Data + 2.4 GHz WIFI	N/A	N/A	Yes	
17	GPRS/EDGE 850 / 1900 Data + 5.8 GHz WIFI	N/A	N/A	Yes	
18	UMTS 850/ 1900 Data + 2.4 GHz WIFI	Yes	Yes	Yes	
19	UMTS 850/ 1900 Data + 5.8 GHz WIFI	Yes	Yes	Yes	
20	LTE B25/ B26/ B41 Data + 2.4 GHz WIFI	Yes	Yes	Yes	
21	LTE B25/ B26/B41 Data + 5.8 GHz WIFI	Yes	Yes	Yes	
22	LTE B25/ B26/ B41 Data + Bluetooth	N/A	Yes	N/A	
23	All Voice +LTE	N/A	N/A	N/A	Not supported by HW
24	All Voice + LTE + WIFI	N/A	N/A	N/A	Not supported by HW
25	All Data + 5.2 - 5.7 GHz WIFI	N/A	N/A	N/A	Not supported by SW

Notes:

1. **CDMA and EVDO share the same antenna path and cannot transmit simultaneously. (Non-SVDO)**
2. **Bluetooth and WLAN share the same antenna path and cannot transmit simultaneously.**
3. **5 GHz hotspot is only supported for the 5.8 GHz Band; therefore, all other 5 GHz bands were not evaluated for hotspot conditions.**
4. **Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no new simultaneous transmission scenarios involving WIFI direct.**

1.6 SAR Test Exclusions Applied

(A) WIFI/BT

2.4 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v01r01. 5 GHz hotspot is only supported for the 5.8 GHz Band; therefore, all other 5 GHz bands were not evaluated for hotspot conditions.

Per FCC KDB 447498 D01v05r01, the SAR exclusion threshold for distances <50mm is defined by the following equation:

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, Bluetooth SAR was not required; [(9/10)* √2.441] = 1.4 < 3.0. Per KDB Publication 447498 D01v05r01, the maximum power of the channel was rounded to the nearest mW before calculation.

Based on the maximum conducted power of Bluetooth LE (rounded to the nearest mW) and the antenna to user separation distance, Bluetooth SAR was not required; [(7/10)* √2.440] = 1.1< 3.0. Per KDB Publication 447498 D01v05r01, the maximum power of the channel was rounded to the nearest mW before calculation.

Based on the maximum conducted power of Ant+ (rounded to the nearest mW) and the antenna to user separation distance, ANT+ SAR was not required; [(1/10)* √2.441] = 0.2< 3.0. Per KDB Publication 447498 D01v05r01, the maximum power of the channel was rounded to the nearest mW before calculation.

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

This device supports IEEE 802.11ac with the following features:

a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 1 Tx antenna output
d) 256 QAM is supported
e) No new 5 GHz channels

Per April 2013 TCB Workshop notes, full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.

(B) Licensed Transmitter(s)

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

When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v02r02.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r02.

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.

1.7 Power Reduction for SAR

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

1.8 Wireless Charging Battery Cover

This DUT may be used with a standard battery cover or with an optional wireless charging battery cover. Per FCC KDB Publication 648474 D04v01r01, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the highest reported SAR for each wireless technology, frequency band, operating mode, and exposure condition. Since reported SAR did not exceed 1.2 W/kg, additional testing with the wireless charging battery cover was not required.

1.9 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB Publication 941225 D01-D06 (2G/3G/4G, 1x Advanced and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r01 (General SAR Guidance)
- FCC KDB Publication 865664 D01-D02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D03-D04 (Wireless Charging Cover)
- April 2013 TCB Workshop Notes (IEEE 802.11ac)

1.10 Device Serial Numbers

Several samples were used with identical hardware to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

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	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
GSM/GPRS/EDGE 850	309-6	309-6	309-6
UMTS 850	309-4	309-4	309-4
GSM/GPRS/EDGE 1900	309-5	309-6	309-6
UMTS 1900	309-3	309-3	309-3
CDMA/EVDO BC10 (§90S)	309-7	309-7	309-7
CDMA/EVDO BC0 (§22H)	309-7	309-7	309-7
PCS CDMA/EVDO	309-8	309-8	309-8
LTE Band 26	309-10	309-10	309-10
LTE Band 25 (PCS)	309-9	309-9	309-9
LTE Band 41	309-11	309-11	309-11
2.4 GHz WLAN	309-2	309-2	309-2
5 GHz WLAN	309-2	309-2	309-2

2 LTE INFORMATION

LTE Information					
FCC ID	**A3LSPHL720T**				
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 26 (814.7 - 848.3 MHz)				
	LTE Band 25 (PCS) (1851.5 - 1913.5 MHz)				
	LTE Band 41 (2501 - 2685 MHz)				
Channel Bandwidths	LTE Band 26: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 25 (PCS): 3 MHz, 5 MHz, 10 MHz				
	LTE Band 41: 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 26: 1.4 MHz	814.7 (26697)		831.5 (26865)		848.3 (27033)
LTE Band 26: 3 MHz	815.5 (26705)		831.5 (26865)		847.5 (27025)
LTE Band 26: 5 MHz	816.5 (26715)		831.5 (26865)		846.5 (27015)
LTE Band 26: 10 MHz	819 (26740)		831.5 (26865)		844 (26990)
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)		1913.5 (26675)
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)		1912.5 (26665)
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)		1910 (26640)
LTE Band 41: 10 MHz	2501 (39700)	2547 (40160)	2593 (40620)	2639 (41080)	2685 (41540)
LTE Band 41: 15 MHz	2503.5 (39725)	2548.3 (41073)	2593 (40620)	2637.8 (41068)	2682.5 (41515)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	3				
Modulations Supported in UL	QPSK, 16QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r01 (See Table 4-1).

2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.

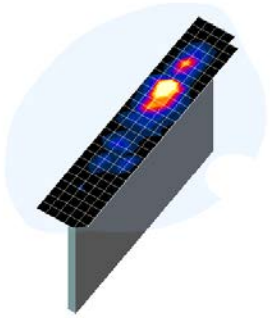

Figure 4-1
Sample SAR Area Scan

3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r01 (See Table 4-1). On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

   a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r01

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

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

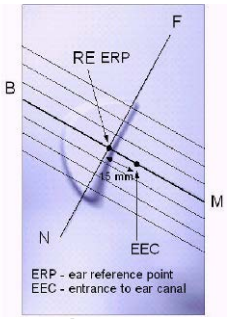

Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Figure 5-3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at 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.

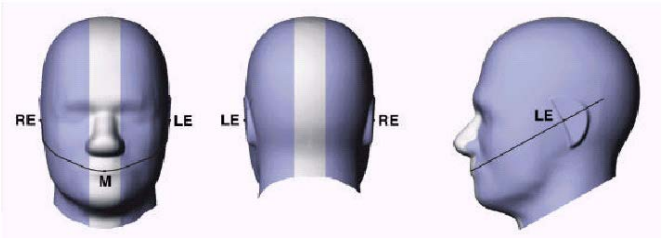

Figure 5-2
Front, back and side view of SAM Twin Phantom

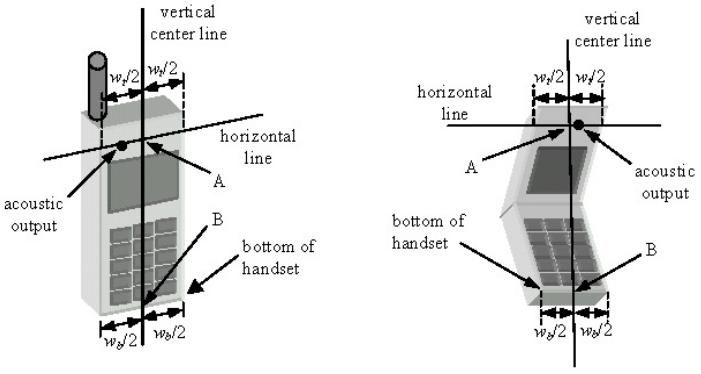

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

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

6.2 Positioning for Cheek

1. The test device was positioned with the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

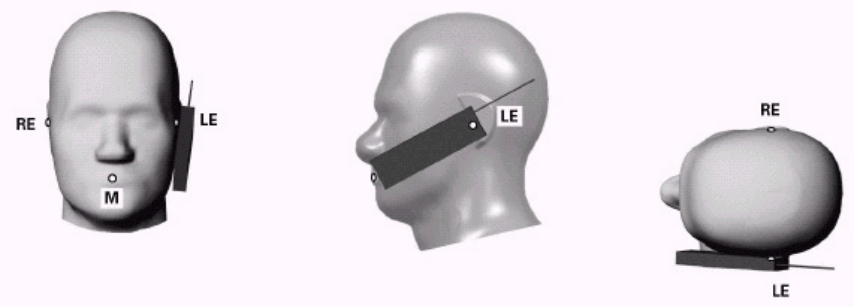

Figure 6-1 Front, Side and Top View of Cheek Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 6-2).

6.3 Positioning for Ear / 15º Tilt

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

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6-2).

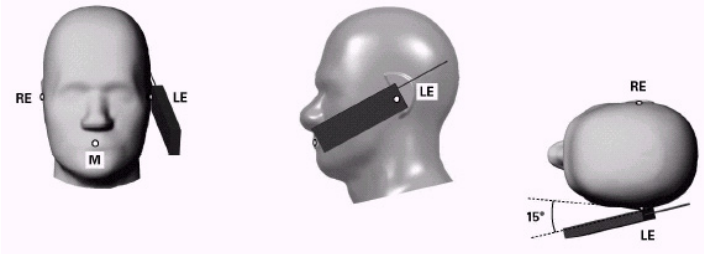

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

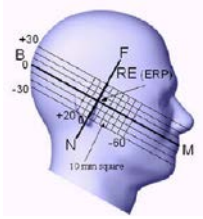

Figure 6-3
Side view w/ relevant markings

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

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

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

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

Figure 6-4 Twin SAM Chin20

6.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-5). Per FCC KDB Publication 648474 D04v01r01, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v05r01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

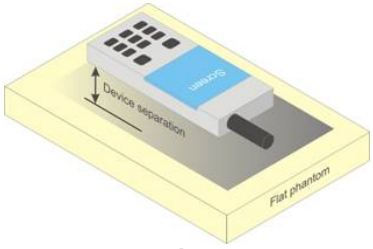

Figure 6-5
Sample Body-Worn Diagram

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

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

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v05r01 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v05r01, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

6.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v01r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05r01 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

Table 7-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	4.0	20

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

8 FCC MEASUREMENT PROCEDURES

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05r01, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

8.2 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02r02 October 2007.

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

8.3 SAR Measurement Conditions for CDMA2000

The following procedures were performed according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02r02, October 2007.

8.3.1 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 8-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH_0 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 8-2 was applied.

Table 8-1
Parameters for Max. Power for RC1

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

Table 8-2
Parameters for Max. Power for RC3

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

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

8.3.2 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 FCC KDB Publication 941225 D02v02r02. 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 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 is required for 1x advanced when 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.

8.3.3 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 using EVDO Rev. A to support compliance for VoIP operations. See Section 8.3.5 for EVDO Rev. A configuration parameters.

8.3.4 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 SCH_0 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.

8.3.5 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.

8.3.6 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. 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.

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 ¼ 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.

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

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

8.4.2 Head SAR Measurements for Handsets

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

8.4.3 Body SAR Measurements

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

8.4.4 SAR Measurements for Handsets with Rel 5 HSDPA

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

The H-set used in FRC for HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HSPDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the applicable H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the FRC for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 2 ms to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors of βc=9 and βd=15, and power offset parameters of ΔACK= ΔNACK =5 and ΔCQI=2 is used. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the FRC.

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

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 8$ ($A_{hs} = 30/15$) with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 7$ ($A_{hs} = 24/15$) with $\beta_{hs} = 24/15 * \beta_c$.
Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Figure 8-1
Table C.10.1.4 of TS 234.121-1

8.4.5 SAR Measurements for Handsets with Rel 6 HSUPA

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

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

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

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

8.5 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02r02 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

8.5.1 Spectrum Plots for RB Configurations

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

8.5.2 MPR

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

8.5.3 A-MPR

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

8.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r01:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
    i. The required channel and offset combination with the highest maximum output power is required for SAR.
    ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
    iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

8.5.5 TDD

LTE TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225. SAR testing was performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

8.6 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n /ac transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v01r02 for more details.

8.6.1 General Device Setup

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

8.6.2 Frequency Channel Configurations [27]

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

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

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

9 RF CONDUCTED POWERS

9.1 CDMA Conducted Powers

Band	Channel	Rule Part	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)
Cellular	564	90S	820.1	24.91	24.97	24.93	24.95	24.97	24.89	24.87
Cellular	1013	22H	824.7	24.84	24.90	24.83	24.81	24.84	24.82	24.81
	384	22H	836.52	24.83	24.86	24.83	24.82	24.89	24.85	24.73
	777	22H	848.31	24.86	24.89	24.89	24.86	24.87	24.83	24.81
PCS	25	24E	1851.25	24.65	24.66	24.57	24.66	24.62	24.57	24.56
	600	24E	1880	24.63	24.66	24.65	24.70	24.70	24.62	24.60
	1175	24E	1908.75	24.66	24.62	24.71	24.66	24.63	24.61	24.58

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

For FCC Rule Part 90S,

1. Per FCC KDB Publication 447498 D01v05r01 4.1.6, only one channel is required since the device operates within the transmission range of 817.90 – 823.10 MHz.

Per KDB Publication 941225 D01v02r02:

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. Ev-Do 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. Hotspot SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. If the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, then Rev. A SAR is not required. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for that RF channel in Rev. 0. SAR is not required for 1x RTT for Ev-Do hotspot devices when the maximum average output of each channel is less than ¼ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0
4. Head SAR was additionally evaluated with EVDO Rev. A to determine compliance for held-to-ear VoIP operations.
5. 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 8.3.2 for 1x Advanced test set up.

Figure 9-1
Power Measurement Setup

9.2 GSM Conducted Powers

		Maximum Burst-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	32.81	32.77	31.30	**29.76**	27.65	26.21	25.85	21.66	21.22
	190	32.78	32.80	31.26	**29.78**	27.66	25.95	25.58	21.46	20.81
	251	32.66	32.65	31.05	**29.48**	28.01	25.88	25.60	21.43	20.75
GSM 1900	512	29.42	29.51	27.24	**25.73**	24.30	25.53	24.23	19.87	18.52
	661	29.62	29.68	27.02	**25.63**	24.12	25.41	24.03	19.77	18.55
	810	29.81	29.59	27.27	**25.88**	24.26	25.43	24.11	19.92	18.65
		Calculated Maximum Frame-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	23.78	23.74	25.28	**25.50**	24.64	17.18	19.83	17.40	18.21
	190	23.75	23.77	25.24	**25.52**	24.65	16.92	19.56	17.20	17.80
	251	23.63	23.62	25.03	**25.22**	25.00	16.85	19.58	17.17	17.74
GSM 1900	512	20.39	20.48	21.22	**21.47**	21.29	16.50	18.21	15.61	15.51
	661	20.59	20.65	21.00	**21.37**	21.11	16.38	18.01	15.51	15.54
	810	20.78	20.56	21.25	**21.62**	21.25	16.40	18.09	15.66	15.64

Notes:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. The bolded GPRS modes were selected for SAR testing according to the highest frame-averaged output power table according to KDB 941225 D03v01.
3. GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
4. EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

GSM Class: B
GPRS Multislot class: 33 (Max 4 Tx uplink slots)
EDGE Multislot class: 33 (Max 4 Tx uplink slots)
DTM Multislot Class: N/A

Figure 9-2
Power Measurement Setup

9.3 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	22.61	22.53	22.55	22.43	22.52	22.54	-
99		12.2 kbps AMR	22.48	22.49	22.57	22.30	22.44	22.38	-
6	HSDPA	Subtest 1	21.40	21.46	21.51	21.21	21.43	21.43	0
6		Subtest 2	21.47	21.52	21.66	21.32	21.49	21.50	0
6		Subtest 3	21.08	20.96	21.06	20.89	21.01	20.95	0.5
6		Subtest 4	21.01	20.91	21.05	20.85	20.93	20.88	0.5
6	HSUPA	Subtest 1	21.89	21.80	21.97	20.95	21.25	21.32	0
6		Subtest 2	20.41	20.32	20.44	20.27	19.95	20.44	2
6		Subtest 3	20.47	20.13	20.46	19.92	20.27	19.95	1
6		Subtest 4	20.64	20.52	20.68	20.70	20.78	20.82	2
6		Subtest 5	21.76	21.72	22.00	20.88	21.16	21.30	0

UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02r02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

This device does not support DC-HSDPA.

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

Figure 9-3
Power Measurement Setup

9.4 LTE Conducted Powers

9.4.1 LTE Band 26

Table 9-1
LTE Band 26 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	819	26740	10	QPSK	1	0	24.16	0	0
	819	26740	10	QPSK	1	25	24.13	0	0
	819	26740	10	QPSK	1	49	24.10	0	0
	819	26740	10	QPSK	25	0	23.03	1	0-1
	819	26740	10	QPSK	25	12	23.04	1	0-1
	819	26740	10	QPSK	25	25	23.02	1	0-1
	819	26740	10	QPSK	50	0	22.96	1	0-1
	819	26740	10	16QAM	1	0	23.06	1	0-1
	819	26740	10	16QAM	1	25	23.04	1	0-1
	819	26740	10	16QAM	1	49	22.95	1	0-1
	819	26740	10	16QAM	25	0	22.01	2	0-2
	819	26740	10	16QAM	25	12	22.02	2	0-2
	819	26740	10	16QAM	25	25	22.05	2	0-2
	819	26740	10	16QAM	50	0	22.02	2	0-2
Mid	831.5	26865	10	QPSK	1	0	24.25	0	0
	831.5	26865	10	QPSK	1	25	24.22	0	0
	831.5	26865	10	QPSK	1	49	**24.32**	0	0
	831.5	26865	10	QPSK	25	0	23.01	1	0-1
	831.5	26865	10	QPSK	25	12	23.02	1	0-1
	831.5	26865	10	QPSK	25	25	**23.23**	1	0-1
	831.5	26865	10	QPSK	50	0	23.07	1	0-1
	831.5	26865	10	16QAM	1	0	23.11	1	0-1
	831.5	26865	10	16QAM	1	25	23.03	1	0-1
	831.5	26865	10	16QAM	1	49	23.16	1	0-1
	831.5	26865	10	16QAM	25	0	22.10	2	0-2
	831.5	26865	10	16QAM	25	12	22.01	2	0-2
	831.5	26865	10	16QAM	25	25	22.14	2	0-2
	831.5	26865	10	16QAM	50	0	22.02	2	0-2
High	844	26990	10	QPSK	1	0	24.14	0	0
	844	26990	10	QPSK	1	25	24.12	0	0
	844	26990	10	QPSK	1	49	23.97	0	0
	844	26990	10	QPSK	25	0	23.08	1	0-1
	844	26990	10	QPSK	25	12	23.19	1	0-1
	844	26990	10	QPSK	25	25	23.13	1	0-1
	844	26990	10	QPSK	50	0	23.04	1	0-1
	844	26990	10	16QAM	1	0	22.85	1	0-1
	844	26990	10	16QAM	1	25	23.00	1	0-1
	844	26990	10	16QAM	1	49	22.81	1	0-1
	844	26990	10	16QAM	25	0	22.12	2	0-2
	844	26990	10	16QAM	25	12	22.22	2	0-2
	844	26990	10	16QAM	25	25	22.16	2	0-2
	844	26990	10	16QAM	50	0	22.01	2	0-2

Table 9-2
LTE Band 26 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	816.5	26715	5	QPSK	1	0	24.17	0	0
	816.5	26715	5	QPSK	1	12	24.23	0	0
	816.5	26715	5	QPSK	1	24	24.27	0	0
	816.5	26715	5	QPSK	12	0	23.28	1	0-1
	816.5	26715	5	QPSK	12	6	23.28	1	0-1
	816.5	26715	5	QPSK	12	13	23.16	1	0-1
	816.5	26715	5	QPSK	25	0	23.20	1	0-1
	816.5	26715	5	16-QAM	1	0	22.89	1	0-1
	816.5	26715	5	16-QAM	1	12	22.96	1	0-1
	816.5	26715	5	16-QAM	1	24	23.05	1	0-1
	816.5	26715	5	16-QAM	12	0	22.42	2	0-2
	816.5	26715	5	16-QAM	12	6	22.41	2	0-2
	816.5	26715	5	16-QAM	12	13	22.19	2	0-2
	816.5	26715	5	16-QAM	25	0	22.06	2	0-2
Mid	831.5	26865	5	QPSK	1	0	24.16	0	0
	831.5	26865	5	QPSK	1	12	24.07	0	0
	831.5	26865	5	QPSK	1	24	24.23	0	0
	831.5	26865	5	QPSK	12	0	23.12	1	0-1
	831.5	26865	5	QPSK	12	6	23.11	1	0-1
	831.5	26865	5	QPSK	12	13	23.21	1	0-1
	831.5	26865	5	QPSK	25	0	23.05	1	0-1
	831.5	26865	5	16-QAM	1	0	23.10	1	0-1
	831.5	26865	5	16-QAM	1	12	23.00	1	0-1
	831.5	26865	5	16-QAM	1	24	23.20	1	0-1
	831.5	26865	5	16-QAM	12	0	22.11	2	0-2
	831.5	26865	5	16-QAM	12	6	22.09	2	0-2
	831.5	26865	5	16-QAM	12	13	22.17	2	0-2
	831.5	26865	5	16-QAM	25	0	21.94	2	0-2
High	846.5	27015	5	QPSK	1	0	24.33	0	0
	846.5	27015	5	QPSK	1	12	24.33	0	0
	846.5	27015	5	QPSK	1	24	24.03	0	0
	846.5	27015	5	QPSK	12	0	23.33	1	0-1
	846.5	27015	5	QPSK	12	6	23.30	1	0-1
	846.5	27015	5	QPSK	12	13	23.06	1	0-1
	846.5	27015	5	QPSK	25	0	23.09	1	0-1
	846.5	27015	5	16-QAM	1	0	23.31	1	0-1
	846.5	27015	5	16-QAM	1	12	23.36	1	0-1
	846.5	27015	5	16-QAM	1	24	23.06	1	0-1
	846.5	27015	5	16-QAM	12	0	22.27	2	0-2
	846.5	27015	5	16-QAM	12	6	22.20	2	0-2
	846.5	27015	5	16-QAM	12	13	22.03	2	0-2
	846.5	27015	5	16-QAM	25	0	22.00	2	0-2

Table 9-3
LTE Band 26 Conducted Powers - 3 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	815.5	26705	3	QPSK	1	0	24.15	0	0
	815.5	26705	3	QPSK	1	7	24.18	0	0
	815.5	26705	3	QPSK	1	14	24.13	0	0
	815.5	26705	3	QPSK	8	0	23.25	1	0-1
	815.5	26705	3	QPSK	8	4	23.31	1	0-1
	815.5	26705	3	QPSK	8	7	23.28	1	0-1
	815.5	26705	3	QPSK	15	0	23.17	1	0-1
	815.5	26705	3	16-QAM	1	0	23.45	1	0-1
	815.5	26705	3	16-QAM	1	7	23.44	1	0-1
	815.5	26705	3	16-QAM	1	14	23.44	1	0-1
	815.5	26705	3	16-QAM	8	0	22.13	2	0-2
	815.5	26705	3	16-QAM	8	4	22.14	2	0-2
	815.5	26705	3	16-QAM	8	7	22.20	2	0-2
	815.5	26705	3	16-QAM	15	0	22.25	2	0-2
Mid	831.5	26865	3	QPSK	1	0	24.13	0	0
	831.5	26865	3	QPSK	1	7	24.12	0	0
	831.5	26865	3	QPSK	1	14	24.22	0	0
	831.5	26865	3	QPSK	8	0	23.10	1	0-1
	831.5	26865	3	QPSK	8	4	23.11	1	0-1
	831.5	26865	3	QPSK	8	7	23.26	1	0-1
	831.5	26865	3	QPSK	15	0	23.13	1	0-1
	831.5	26865	3	16-QAM	1	0	23.05	1	0-1
	831.5	26865	3	16-QAM	1	7	23.02	1	0-1
	831.5	26865	3	16-QAM	1	14	23.14	1	0-1
	831.5	26865	3	16-QAM	8	0	21.98	2	0-2
	831.5	26865	3	16-QAM	8	4	21.95	2	0-2
	831.5	26865	3	16-QAM	8	7	22.04	2	0-2
	831.5	26865	3	16-QAM	15	0	22.11	2	0-2
High	847.5	27025	3	QPSK	1	0	24.41	0	0
	847.5	27025	3	QPSK	1	7	24.24	0	0
	847.5	27025	3	QPSK	1	14	23.95	0	0
	847.5	27025	3	QPSK	8	0	23.34	1	0-1
	847.5	27025	3	QPSK	8	4	23.24	1	0-1
	847.5	27025	3	QPSK	8	7	23.14	1	0-1
	847.5	27025	3	QPSK	15	0	23.20	1	0-1
	847.5	27025	3	16-QAM	1	0	23.12	1	0-1
	847.5	27025	3	16-QAM	1	7	22.98	1	0-1
	847.5	27025	3	16-QAM	1	14	22.73	1	0-1
	847.5	27025	3	16-QAM	8	0	22.39	2	0-2
	847.5	27025	3	16-QAM	8	4	22.25	2	0-2
	847.5	27025	3	16-QAM	8	7	22.18	2	0-2
	847.5	27025	3	16-QAM	15	0	22.22	2	0-2

Table 9-4
LTE Band 26 Conducted Powers -1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	814.7	26697	1.4	QPSK	1	0	24.24	0	0
	814.7	26697	1.4	QPSK	1	2	24.23	0	0
	814.7	26697	1.4	QPSK	1	5	24.26	0	0
	814.7	26697	1.4	QPSK	3	0	24.17	0	0
	814.7	26697	1.4	QPSK	3	2	24.19	0	0
	814.7	26697	1.4	QPSK	3	3	24.16	0	0
	814.7	26697	1.4	QPSK	6	0	23.29	1	0-1
	814.7	26697	1.4	16-QAM	1	0	22.91	1	0-1
	814.7	26697	1.4	16-QAM	1	2	22.95	1	0-1
	814.7	26697	1.4	16-QAM	1	5	23.02	1	0-1
	814.7	26697	1.4	16-QAM	3	0	23.20	1	0-1
	814.7	26697	1.4	16-QAM	3	2	23.21	1	0-1
	814.7	26697	1.4	16-QAM	3	3	23.22	1	0-1
	814.7	26697	1.4	16-QAM	6	0	22.10	2	0-2
Mid	831.5	26865	1.4	QPSK	1	0	24.15	0	0
	831.5	26865	1.4	QPSK	1	2	24.20	0	0
	831.5	26865	1.4	QPSK	1	5	24.26	0	0
	831.5	26865	1.4	QPSK	3	0	24.12	0	0
	831.5	26865	1.4	QPSK	3	2	24.16	0	0
	831.5	26865	1.4	QPSK	3	3	24.17	0	0
	831.5	26865	1.4	QPSK	6	0	23.19	1	0-1
	831.5	26865	1.4	16-QAM	1	0	23.01	1	0-1
	831.5	26865	1.4	16-QAM	1	2	23.00	1	0-1
	831.5	26865	1.4	16-QAM	1	5	23.10	1	0-1
	831.5	26865	1.4	16-QAM	3	0	23.25	1	0-1
	831.5	26865	1.4	16-QAM	3	2	23.24	1	0-1
	831.5	26865	1.4	16-QAM	3	3	23.22	1	0-1
	831.5	26865	1.4	16-QAM	6	0	22.10	2	0-2
High	848.3	27033	1.4	QPSK	1	0	24.17	0	0
	848.3	27033	1.4	QPSK	1	2	24.14	0	0
	848.3	27033	1.4	QPSK	1	5	24.03	0	0
	848.3	27033	1.4	QPSK	3	0	24.14	0	0
	848.3	27033	1.4	QPSK	3	2	24.10	0	0
	848.3	27033	1.4	QPSK	3	3	24.10	0	0
	848.3	27033	1.4	QPSK	6	0	23.15	1	0-1
	848.3	27033	1.4	16-QAM	1	0	23.03	1	0-1
	848.3	27033	1.4	16-QAM	1	2	22.99	1	0-1
	848.3	27033	1.4	16-QAM	1	5	22.89	1	0-1
	848.3	27033	1.4	16-QAM	3	0	23.20	1	0-1
	848.3	27033	1.4	16-QAM	3	2	23.12	1	0-1
	848.3	27033	1.4	16-QAM	3	3	23.09	1	0-1
	848.3	27033	1.4	16-QAM	6	0	22.00	2	0-2

9.4.2 LTE Band 25 (PCS)

Table 9-5
LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1855	26090	10	QPSK	1	0	22.86	0	0
	1855	26090	10	QPSK	1	25	22.99	0	0
	1855	26090	10	QPSK	1	49	**23.00**	0	0
	1855	26090	10	QPSK	25	0	21.70	1	0-1
	1855	26090	10	QPSK	25	12	21.90	1	0-1
	1855	26090	10	QPSK	25	25	**21.92**	1	0-1
	1855	26090	10	QPSK	50	0	21.79	1	0-1
	1855	26090	10	16QAM	1	0	21.61	1	0-1
	1855	26090	10	16QAM	1	25	21.77	1	0-1
	1855	26090	10	16QAM	1	49	22.00	1	0-1
	1855	26090	10	16QAM	25	0	20.77	2	0-2
	1855	26090	10	16QAM	25	12	20.89	2	0-2
	1855	26090	10	16QAM	25	25	20.96	2	0-2
	1855	26090	10	16QAM	50	0	20.77	2	0-2
Mid	1882.5	26365	10	QPSK	1	0	22.94	0	0
	1882.5	26365	10	QPSK	1	25	22.99	0	0
	1882.5	26365	10	QPSK	1	49	22.86	0	0
	1882.5	26365	10	QPSK	25	0	21.83	1	0-1
	1882.5	26365	10	QPSK	25	12	21.85	1	0-1
	1882.5	26365	10	QPSK	25	25	21.84	1	0-1
	1882.5	26365	10	QPSK	50	0	21.76	1	0-1
	1882.5	26365	10	16QAM	1	0	21.71	1	0-1
	1882.5	26365	10	16QAM	1	25	21.73	1	0-1
	1882.5	26365	10	16QAM	1	49	21.54	1	0-1
	1882.5	26365	10	16QAM	25	0	20.96	2	0-2
	1882.5	26365	10	16QAM	25	12	20.95	2	0-2
	1882.5	26365	10	16QAM	25	25	20.92	2	0-2
	1882.5	26365	10	16QAM	50	0	20.85	2	0-2
High	1910	26640	10	QPSK	1	0	22.83	0	0
	1910	26640	10	QPSK	1	25	22.98	0	0
	1910	26640	10	QPSK	1	49	22.92	0	0
	1910	26640	10	QPSK	25	0	21.60	1	0-1
	1910	26640	10	QPSK	25	12	21.79	1	0-1
	1910	26640	10	QPSK	25	25	21.74	1	0-1
	1910	26640	10	QPSK	50	0	21.69	1	0-1
	1910	26640	10	16QAM	1	0	21.57	1	0-1
	1910	26640	10	16QAM	1	25	21.66	1	0-1
	1910	26640	10	16QAM	1	49	21.65	1	0-1
	1910	26640	10	16QAM	25	0	20.77	2	0-2
	1910	26640	10	16QAM	25	12	20.85	2	0-2
	1910	26640	10	16QAM	25	25	20.81	2	0-2
	1910	26640	10	16QAM	50	0	20.70	2	0-2

Table 9-6
LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1852.5	26065	5	QPSK	1	0	22.85	0	0
	1852.5	26065	5	QPSK	1	12	22.93	0	0
	1852.5	26065	5	QPSK	1	24	23.00	0	0
	1852.5	26065	5	QPSK	12	0	21.88	1	0-1
	1852.5	26065	5	QPSK	12	6	21.89	1	0-1
	1852.5	26065	5	QPSK	12	13	21.99	1	0-1
	1852.5	26065	5	QPSK	25	0	21.90	1	0-1
	1852.5	26065	5	16-QAM	1	0	21.74	1	0-1
	1852.5	26065	5	16-QAM	1	12	21.83	1	0-1
	1852.5	26065	5	16-QAM	1	24	21.91	1	0-1
	1852.5	26065	5	16-QAM	12	0	20.92	2	0-2
	1852.5	26065	5	16-QAM	12	6	20.96	2	0-2
	1852.5	26065	5	16-QAM	12	13	20.96	2	0-2
	1852.5	26065	5	16-QAM	25	0	20.90	2	0-2
Mid	1882.5	26365	5	QPSK	1	0	22.93	0	0
	1882.5	26365	5	QPSK	1	12	23.00	0	0
	1882.5	26365	5	QPSK	1	24	22.99	0	0
	1882.5	26365	5	QPSK	12	0	21.92	1	0-1
	1882.5	26365	5	QPSK	12	6	21.92	1	0-1
	1882.5	26365	5	QPSK	12	13	21.98	1	0-1
	1882.5	26365	5	QPSK	25	0	21.99	1	0-1
	1882.5	26365	5	16-QAM	1	0	21.96	1	0-1
	1882.5	26365	5	16-QAM	1	12	21.93	1	0-1
	1882.5	26365	5	16-QAM	1	24	21.97	1	0-1
	1882.5	26365	5	16-QAM	12	0	20.87	2	0-2
	1882.5	26365	5	16-QAM	12	6	20.98	2	0-2
	1882.5	26365	5	16-QAM	12	13	20.89	2	0-2
	1882.5	26365	5	16-QAM	25	0	20.97	2	0-2
High	1912.5	26665	5	QPSK	1	0	23.00	0	0
	1912.5	26665	5	QPSK	1	12	23.00	0	0
	1912.5	26665	5	QPSK	1	24	22.97	0	0
	1912.5	26665	5	QPSK	12	0	21.98	1	0-1
	1912.5	26665	5	QPSK	12	6	22.00	1	0-1
	1912.5	26665	5	QPSK	12	13	21.95	1	0-1
	1912.5	26665	5	QPSK	25	0	21.96	1	0-1
	1912.5	26665	5	16-QAM	1	0	21.94	1	0-1
	1912.5	26665	5	16-QAM	1	12	21.93	1	0-1
	1912.5	26665	5	16-QAM	1	24	21.93	1	0-1
	1912.5	26665	5	16-QAM	12	0	20.82	2	0-2
	1912.5	26665	5	16-QAM	12	6	20.81	2	0-2
	1912.5	26665	5	16-QAM	12	13	20.91	2	0-2
	1912.5	26665	5	16-QAM	25	0	20.86	2	0-2

Table 9-7
LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1851.5	26055	3	QPSK	1	0	22.91	0	0
	1851.5	26055	3	QPSK	1	7	22.89	0	0
	1851.5	26055	3	QPSK	1	14	22.93	0	0
	1851.5	26055	3	QPSK	8	0	21.83	1	0-1
	1851.5	26055	3	QPSK	8	4	21.86	1	0-1
	1851.5	26055	3	QPSK	8	7	21.81	1	0-1
	1851.5	26055	3	QPSK	15	0	21.81	1	0-1
	1851.5	26055	3	16-QAM	1	0	21.81	1	0-1
	1851.5	26055	3	16-QAM	1	7	21.73	1	0-1
	1851.5	26055	3	16-QAM	1	14	21.81	1	0-1
	1851.5	26055	3	16-QAM	8	0	20.67	2	0-2
	1851.5	26055	3	16-QAM	8	4	20.72	2	0-2
	1851.5	26055	3	16-QAM	8	7	20.68	2	0-2
	1851.5	26055	3	16-QAM	15	0	20.79	2	0-2
Mid	1882.5	26365	3	QPSK	1	0	23.00	0	0
	1882.5	26365	3	QPSK	1	7	22.92	0	0
	1882.5	26365	3	QPSK	1	14	22.96	0	0
	1882.5	26365	3	QPSK	8	0	21.99	1	0-1
	1882.5	26365	3	QPSK	8	4	21.93	1	0-1
	1882.5	26365	3	QPSK	8	7	21.94	1	0-1
	1882.5	26365	3	QPSK	15	0	21.93	1	0-1
	1882.5	26365	3	16-QAM	1	0	21.91	1	0-1
	1882.5	26365	3	16-QAM	1	7	21.90	1	0-1
	1882.5	26365	3	16-QAM	1	14	21.89	1	0-1
	1882.5	26365	3	16-QAM	8	0	20.85	2	0-2
	1882.5	26365	3	16-QAM	8	4	20.86	2	0-2
	1882.5	26365	3	16-QAM	8	7	20.84	2	0-2
	1882.5	26365	3	16-QAM	15	0	20.93	2	0-2
High	1913.5	26675	3	QPSK	1	0	22.96	0	0
	1913.5	26675	3	QPSK	1	7	22.96	0	0
	1913.5	26675	3	QPSK	1	14	22.94	0	0
	1913.5	26675	3	QPSK	8	0	22.00	1	0-1
	1913.5	26675	3	QPSK	8	4	21.98	1	0-1
	1913.5	26675	3	QPSK	8	7	21.85	1	0-1
	1913.5	26675	3	QPSK	15	0	21.99	1	0-1
	1913.5	26675	3	16-QAM	1	0	21.82	1	0-1
	1913.5	26675	3	16-QAM	1	7	21.83	1	0-1
	1913.5	26675	3	16-QAM	1	14	21.78	1	0-1
	1913.5	26675	3	16-QAM	8	0	20.86	2	0-2
	1913.5	26675	3	16-QAM	8	4	20.78	2	0-2
	1913.5	26675	3	16-QAM	8	7	20.67	2	0-2
	1913.5	26675	3	16-QAM	15	0	21.00	2	0-2

9.4.3 LTE Band 41

Table 9-8
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	2506	39750	20	QPSK	1	0	23.94	0	0
	2506	39750	20	QPSK	1	50	24.00	0	0
	2506	39750	20	QPSK	1	99	23.75	0	0
	2506	39750	20	QPSK	50	0	22.88	1	0-1
	2506	39750	20	QPSK	50	25	22.83	1	0-1
	2506	39750	20	QPSK	50	50	22.80	1	0-1
	2506	39750	20	QPSK	100	0	22.82	1	0-1
	2506	39750	20	16QAM	1	0	22.77	1	0-1
	2506	39750	20	16QAM	1	50	22.70	1	0-1
	2506	39750	20	16QAM	1	99	22.78	1	0-1
	2506	39750	20	16QAM	50	0	21.79	2	0-2
	2506	39750	20	16QAM	50	25	21.72	2	0-2
	2506	39750	20	16QAM	50	50	21.72	2	0-2
	2506	39750	20	16QAM	100	0	21.88	2	0-2
Low Mid	2549.5	40185	20	QPSK	1	0	24.14	0	0
	2549.5	40185	20	QPSK	1	50	24.15	0	0
	2549.5	40185	20	QPSK	1	99	24.12	0	0
	2549.5	40185	20	QPSK	50	0	22.76	1	0-1
	2549.5	40185	20	QPSK	50	25	22.70	1	0-1
	2549.5	40185	20	QPSK	50	50	22.76	1	0-1
	2549.5	40185	20	QPSK	100	0	22.72	1	0-1
	2549.5	40185	20	16-QAM	1	0	23.15	1	0-1
	2549.5	40185	20	16-QAM	1	50	23.17	1	0-1
	2549.5	40185	20	16-QAM	1	99	23.06	1	0-1
	2549.5	40185	20	16-QAM	50	0	21.74	2	0-2
	2549.5	40185	20	16-QAM	50	25	21.64	2	0-2
	2549.5	40185	20	16-QAM	50	50	21.61	2	0-2
	2549.5	40185	20	16-QAM	100	0	21.78	2	0-2
Mid	2593	40620	20	QPSK	1	0	24.10	0	0
	2593	40620	20	QPSK	1	50	24.12	0	0
	2593	40620	20	QPSK	1	99	23.99	0	0
	2593	40620	20	QPSK	50	0	22.76	1	0-1
	2593	40620	20	QPSK	50	25	22.80	1	0-1
	2593	40620	20	QPSK	50	50	22.77	1	0-1
	2593	40620	20	QPSK	100	0	22.81	1	0-1
	2593	40620	20	16-QAM	1	0	23.19	1	0-1
	2593	40620	20	16-QAM	1	50	23.12	1	0-1
	2593	40620	20	16-QAM	1	99	23.14	1	0-1
	2593	40620	20	16-QAM	50	0	21.81	2	0-2
	2593	40620	20	16-QAM	50	25	21.74	2	0-2
	2593	40620	20	16-QAM	50	50	21.70	2	0-2
	2593	40620	20	16-QAM	100	0	21.75	2	0-2
Mid High	2636.5	41055	20	QPSK	1	0	23.72	0	0
	2636.5	41055	20	QPSK	1	50	23.94	0	0
	2636.5	41055	20	QPSK	1	99	23.98	0	0
	2636.5	41055	20	QPSK	50	0	22.70	1	0-1
	2636.5	41055	20	QPSK	50	25	22.71	1	0-1
	2636.5	41055	20	QPSK	50	50	22.65	1	0-1
	2636.5	41055	20	QPSK	100	0	22.60	1	0-1
	2636.5	41055	20	16-QAM	1	0	22.59	1	0-1
	2636.5	41055	20	16-QAM	1	50	22.66	1	0-1
	2636.5	41055	20	16-QAM	1	99	22.78	1	0-1
	2636.5	41055	20	16-QAM	50	0	21.58	2	0-2
	2636.5	41055	20	16-QAM	50	25	21.57	2	0-2
	2636.5	41055	20	16-QAM	50	50	21.60	2	0-2
	2636.5	41055	20	16-QAM	100	0	21.77	2	0-2
High	2680	41490	20	QPSK	1	0	23.99	0	0
	2680	41490	20	QPSK	1	50	**24.35**	0	0
	2680	41490	20	QPSK	1	99	24.31	0	0
	2680	41490	20	QPSK	50	0	22.87	1	0-1
	2680	41490	20	QPSK	50	25	23.00	1	0-1
	2680	41490	20	QPSK	50	50	**23.04**	1	0-1
	2680	41490	20	QPSK	100	0	23.02	1	0-1
	2680	41490	20	16-QAM	1	0	23.15	1	0-1
	2680	41490	20	16-QAM	1	50	23.23	1	0-1
	2680	41490	20	16-QAM	1	99	23.22	1	0-1
	2680	41490	20	16-QAM	50	0	21.89	2	0-2
	2680	41490	20	16-QAM	50	25	21.95	2	0-2
	2680	41490	20	16-QAM	50	50	22.01	2	0-2
	2680	41490	20	16-QAM	100	0	21.90	2	0-2

Table 9-9
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	2503.5	39725	15	QPSK	1	0	24.13	0	0
	2503.5	39725	15	QPSK	1	36	24.11	0	0
	2503.5	39725	15	QPSK	1	74	24.14	0	0
	2503.5	39725	15	QPSK	36	0	22.84	1	0-1
	2503.5	39725	15	QPSK	36	18	22.78	1	0-1
	2503.5	39725	15	QPSK	36	37	22.78	1	0-1
	2503.5	39725	15	QPSK	75	0	22.69	1	0-1
	2503.5	39725	15	16QAM	1	0	23.22	1	0-1
	2503.5	39725	15	16QAM	1	36	23.26	1	0-1
	2503.5	39725	15	16QAM	1	74	23.27	1	0-1
	2503.5	39725	15	16QAM	36	0	21.93	2	0-2
	2503.5	39725	15	16QAM	36	18	21.84	2	0-2
	2503.5	39725	15	16QAM	36	37	21.94	2	0-2
	2503.5	39725	15	16QAM	75	0	21.72	2	0-2
Low Mid	2548.3	40173	15	QPSK	1	0	24.26	0	0
	2548.3	40173	15	QPSK	1	36	24.22	0	0
	2548.3	40173	15	QPSK	1	74	24.13	0	0
	2548.3	40173	15	QPSK	36	0	22.75	1	0-1
	2548.3	40173	15	QPSK	36	18	22.85	1	0-1
	2548.3	40173	15	QPSK	36	37	22.70	1	0-1
	2548.3	40173	15	QPSK	75	0	22.74	1	0-1
	2548.3	40173	15	16-QAM	1	0	23.45	1	0-1
	2548.3	40173	15	16-QAM	1	36	23.40	1	0-1
	2548.3	40173	15	16-QAM	1	74	23.17	1	0-1
	2548.3	40173	15	16-QAM	36	0	21.74	2	0-2
	2548.3	40173	15	16-QAM	36	18	21.72	2	0-2
	2548.3	40173	15	16-QAM	36	37	21.68	2	0-2
	2548.3	40173	15	16-QAM	75	0	21.85	2	0-2
Mid	2593	40620	15	QPSK	1	0	23.89	0	0
	2593	40620	15	QPSK	1	36	23.94	0	0
	2593	40620	15	QPSK	1	74	24.00	0	0
	2593	40620	15	QPSK	36	0	22.55	1	0-1
	2593	40620	15	QPSK	36	18	22.53	1	0-1
	2593	40620	15	QPSK	36	37	22.51	1	0-1
	2593	40620	15	QPSK	75	0	22.53	1	0-1
	2593	40620	15	16-QAM	1	0	22.85	1	0-1
	2593	40620	15	16-QAM	1	36	22.93	1	0-1
	2593	40620	15	16-QAM	1	74	23.00	1	0-1
	2593	40620	15	16-QAM	36	0	21.65	2	0-2
	2593	40620	15	16-QAM	36	18	21.64	2	0-2
	2593	40620	15	16-QAM	36	37	21.59	2	0-2
	2593	40620	15	16-QAM	75	0	21.51	2	0-2
Mid High	2637.8	41068	15	QPSK	1	0	24.00	0	0
	2637.8	41068	15	QPSK	1	36	24.08	0	0
	2637.8	41068	15	QPSK	1	74	24.22	0	0
	2637.8	41068	15	QPSK	36	0	22.68	1	0-1
	2637.8	41068	15	QPSK	36	18	22.65	1	0-1
	2637.8	41068	15	QPSK	36	37	22.65	1	0-1
	2637.8	41068	15	QPSK	75	0	22.55	1	0-1
	2637.8	41068	15	16-QAM	1	0	23.18	1	0-1
	2637.8	41068	15	16-QAM	1	36	23.26	1	0-1
	2637.8	41068	15	16-QAM	1	74	23.22	1	0-1
	2637.8	41068	15	16-QAM	36	0	21.63	2	0-2
	2637.8	41068	15	16-QAM	36	18	21.55	2	0-2
	2637.8	41068	15	16-QAM	36	37	21.55	2	0-2
	2637.8	41068	15	16-QAM	75	0	21.52	2	0-2
High	2682.5	41515	15	QPSK	1	0	24.40	0	0
	2682.5	41515	15	QPSK	1	36	24.30	0	0
	2682.5	41515	15	QPSK	1	74	24.31	0	0
	2682.5	41515	15	QPSK	36	0	22.99	1	0-1
	2682.5	41515	15	QPSK	36	18	23.01	1	0-1
	2682.5	41515	15	QPSK	36	37	23.09	1	0-1
	2682.5	41515	15	QPSK	75	0	23.01	1	0-1
	2682.5	41515	15	16-QAM	1	0	23.40	1	0-1
	2682.5	41515	15	16-QAM	1	36	23.44	1	0-1
	2682.5	41515	15	16-QAM	1	74	23.35	1	0-1
	2682.5	41515	15	16-QAM	36	0	22.04	2	0-2
	2682.5	41515	15	16-QAM	36	18	22.05	2	0-2
	2682.5	41515	15	16-QAM	36	37	22.03	2	0-2
	2682.5	41515	15	16-QAM	75	0	21.90	2	0-2

Table 9-10
LTE Band 41 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	2501	39700	10	QPSK	1	0	24.11	0	0
	2501	39700	10	QPSK	1	25	24.17	0	0
	2501	39700	10	QPSK	1	49	23.99	0	0
	2501	39700	10	QPSK	25	0	22.90	1	0-1
	2501	39700	10	QPSK	25	12	23.08	1	0-1
	2501	39700	10	QPSK	25	25	23.10	1	0-1
	2501	39700	10	QPSK	50	0	22.89	1	0-1
	2501	39700	10	16QAM	1	0	23.33	1	0-1
	2501	39700	10	16QAM	1	25	23.30	1	0-1
	2501	39700	10	16QAM	1	49	23.26	1	0-1
	2501	39700	10	16QAM	25	0	21.86	2	0-2
	2501	39700	10	16QAM	25	12	22.05	2	0-2
	2501	39700	10	16QAM	25	25	21.84	2	0-2
	2501	39700	10	16QAM	50	0	21.78	2	0-2
Low Mid	2547	40160	10	QPSK	1	0	24.30	0	0
	2547	40160	10	QPSK	1	25	24.21	0	0
	2547	40160	10	QPSK	1	49	24.13	0	0
	2547	40160	10	QPSK	25	0	22.94	1	0-1
	2547	40160	10	QPSK	25	12	22.98	1	0-1
	2547	40160	10	QPSK	25	25	23.00	1	0-1
	2547	40160	10	QPSK	50	0	22.89	1	0-1
	2547	40160	10	16-QAM	1	0	23.30	1	0-1
	2547	40160	10	16-QAM	1	25	23.29	1	0-1
	2547	40160	10	16-QAM	1	49	23.25	1	0-1
	2547	40160	10	16-QAM	25	0	22.01	2	0-2
	2547	40160	10	16-QAM	25	12	21.92	2	0-2
	2547	40160	10	16-QAM	25	25	21.99	2	0-2
	2547	40160	10	16-QAM	50	0	21.86	2	0-2
Mid	2593	40620	10	QPSK	1	0	23.90	0	0
	2593	40620	10	QPSK	1	25	23.98	0	0
	2593	40620	10	QPSK	1	49	23.92	0	0
	2593	40620	10	QPSK	25	0	22.54	1	0-1
	2593	40620	10	QPSK	25	12	22.69	1	0-1
	2593	40620	10	QPSK	25	25	22.70	1	0-1
	2593	40620	10	QPSK	50	0	22.59	1	0-1
	2593	40620	10	16-QAM	1	0	23.00	1	0-1
	2593	40620	10	16-QAM	1	25	23.05	1	0-1
	2593	40620	10	16-QAM	1	49	22.91	1	0-1
	2593	40620	10	16-QAM	25	0	21.71	2	0-2
	2593	40620	10	16-QAM	25	12	21.67	2	0-2
	2593	40620	10	16-QAM	25	25	21.62	2	0-2
	2593	40620	10	16-QAM	50	0	21.53	2	0-2
Mid High	2639	41080	10	QPSK	1	0	24.11	0	0
	2639	41080	10	QPSK	1	25	24.07	0	0
	2639	41080	10	QPSK	1	49	24.22	0	0
	2639	41080	10	QPSK	25	0	22.85	1	0-1
	2639	41080	10	QPSK	25	12	22.81	1	0-1
	2639	41080	10	QPSK	25	25	22.84	1	0-1
	2639	41080	10	QPSK	50	0	22.70	1	0-1
	2639	41080	10	16-QAM	1	0	23.22	1	0-1
	2639	41080	10	16-QAM	1	25	23.26	1	0-1
	2639	41080	10	16-QAM	1	49	23.27	1	0-1
	2639	41080	10	16-QAM	25	0	21.89	2	0-2
	2639	41080	10	16-QAM	25	12	21.87	2	0-2
	2639	41080	10	16-QAM	25	25	21.97	2	0-2
	2639	41080	10	16-QAM	50	0	21.78	2	0-2
High	2685	41540	10	QPSK	1	0	24.13	0	0
	2685	41540	10	QPSK	1	25	24.11	0	0
	2685	41540	10	QPSK	1	49	24.08	0	0
	2685	41540	10	QPSK	25	0	23.11	1	0-1
	2685	41540	10	QPSK	25	12	23.12	1	0-1
	2685	41540	10	QPSK	25	25	23.23	1	0-1
	2685	41540	10	QPSK	50	0	23.13	1	0-1
	2685	41540	10	16-QAM	1	0	22.80	1	0-1
	2685	41540	10	16-QAM	1	25	22.82	1	0-1
	2685	41540	10	16-QAM	1	49	22.80	1	0-1
	2685	41540	10	16-QAM	25	0	22.10	2	0-2
	2685	41540	10	16-QAM	25	12	21.99	2	0-2
	2685	41540	10	16-QAM	25	25	22.11	2	0-2
	2685	41540	10	16-QAM	50	0	21.99	2	0-2

9.5 WLAN Conducted Powers

Table 9-11
IEEE 802.11b Average RF Power

Mode	Freq	Channel	802.11b (2.4 GHz) Conducted Power [dBm]			
			Data Rate [Mbps]			
	[MHz]		1	2	5.5	11
802.11b	2412	1*	**16.48**	15.80	15.86	15.88
802.11b	2437	6*	15.84	15.14	15.30	15.27
802.11b	2462	11*	16.30	15.76	15.80	15.83

Table 9-12
IEEE 802.11g Average RF Power

Mode	Freq	Channel	802.11g (2.4 GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11g	2412	1	13.17	13.13	13.19	13.18	13.15	13.04	13.23	13.04
802.11g	2437	6	12.67	12.65	12.73	12.78	12.70	12.58	12.85	12.54
802.11g	2462	11	13.06	13.11	13.10	13.08	13.05	12.99	13.20	12.98

Table 9-13
IEEE 802.11n Average RF Power

Mode	Freq	Channel	802.11n (2.4 GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	2412	1	12.11	12.14	12.06	12.04	12.07	12.11	12.20	12.24
802.11n	2437	6	11.64	11.66	11.66	11.58	11.59	11.52	11.68	11.54
802.11n	2462	11	11.98	12.03	11.92	11.88	11.96	11.87	11.98	11.90

Table 9-14
IEEE 802.11a Average RF Power

Mode	Freq	Channel	802.11a (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11a	5180	36*	12.80	12.94	12.95	12.97	12.98	12.90	13.01	12.75
802.11a	5200	40	**12.91**	12.92	12.93	12.92	12.79	12.88	13.02	12.73
802.11a	5220	44	12.85	12.89	12.89	12.83	12.82	12.80	12.91	12.72
802.11a	5240	48*	12.66	12.73	12.89	12.78	12.83	12.68	12.87	12.60
802.11a	5260	52*	**12.49**	12.54	12.56	12.55	12.56	12.46	12.61	12.36
802.11a	5280	56	12.35	12.49	12.53	12.44	12.41	12.41	12.50	12.22
802.11a	5300	60	12.29	12.27	12.43	12.35	12.26	12.17	12.45	12.06
802.11a	5320	64*	12.20	12.32	12.33	12.27	12.31	12.35	12.45	12.15
802.11a	5500	100	**13.34**	13.38	13.44	13.42	13.42	13.34	13.45	13.31
802.11a	5520	104*	13.33	13.39	13.43	13.41	13.36	13.27	13.49	13.25
802.11a	5540	108	13.27	13.28	13.22	13.24	13.25	13.09	13.31	13.11
802.11a	5560	112	13.13	13.19	13.23	13.26	13.17	13.16	13.30	13.15
802.11a	5580	116*	13.07	13.09	13.18	13.21	13.19	13.16	13.29	13.03
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	12.89	13.01	12.94	12.95	12.95	12.86	13.03	12.88
802.11a	5680	136*	12.82	12.94	12.90	12.99	12.78	12.85	13.06	12.70
802.11a	5700	140	12.85	12.83	12.86	12.79	12.91	12.73	12.94	12.69
802.11a	5745	149*	**13.29**	13.27	13.33	13.27	13.37	13.25	13.49	13.24
802.11a	5765	153	13.23	13.34	13.37	13.41	13.30	13.25	13.44	13.15
802.11a	5785	157*	13.13	13.27	13.22	13.27	13.15	13.17	13.25	13.06
802.11a	5805	161*	13.23	13.09	13.24	13.22	13.12	13.13	13.23	13.07
802.11a	5825	165	13.01	13.22	13.14	13.09	13.02	13.07	13.19	13.03

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

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these "required channels" are considered for SAR testing instead of the default channels.

Table 9-15
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	12.05	12.10	12.13	12.12	12.16	12.06	12.06	12.17
802.11n	5200	40	12.02	12.04	12.04	11.99	11.81	11.99	12.11	12.05
802.11n	5220	44	11.95	11.90	11.90	11.99	11.96	12.01	11.99	12.03
802.11n	5240	48	11.97	11.90	11.97	11.91	11.93	11.89	11.97	11.93
802.11n	5260	52	11.61	11.63	11.67	11.60	11.52	11.74	11.69	11.65
802.11n	5280	56	11.55	11.50	11.55	11.55	11.60	11.51	11.60	11.63
802.11n	5300	60	11.34	11.39	11.54	11.43	11.49	11.49	11.54	11.43
802.11n	5320	64	11.39	11.38	11.51	11.49	11.38	11.39	11.48	11.48
802.11n	5500	100	12.49	12.41	12.48	12.50	12.49	12.49	12.45	12.46
802.11n	5520	104	12.46	12.44	12.37	12.41	12.50	12.40	12.44	12.45
802.11n	5540	108	12.34	12.31	12.48	12.35	12.39	12.35	12.47	12.39
802.11n	5560	112	12.28	12.32	12.33	12.34	12.30	12.37	12.31	12.36
802.11n	5580	116	12.23	12.22	12.17	12.30	12.34	12.23	12.22	12.31
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	11.95	12.00	11.99	11.98	11.98	12.04	12.00	12.06
802.11n	5680	136	11.90	11.96	11.99	11.91	11.95	11.94	11.99	11.96
802.11n	5700	140	11.77	11.96	11.86	11.83	11.86	11.83	11.90	11.96
802.11n	5745	149	12.47	12.41	12.38	12.50	12.45	12.48	12.50	12.48
802.11n	5765	153	12.16	12.39	12.45	12.40	12.36	12.38	12.47	12.46
802.11n	5785	157	12.36	12.42	12.32	12.28	12.46	12.31	12.41	12.41
802.11n	5805	161	12.33	12.25	12.21	12.28	12.33	12.28	12.31	12.31
802.11n	5825	165	12.09	12.13	12.09	12.27	12.22	12.26	12.16	12.28

Table 9-16
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	10.99	10.80	10.95	10.90	10.85	10.82	10.83	10.91
802.11n	5230	46	10.70	10.75	10.76	10.78	10.74	10.59	10.70	10.87
802.11n	5270	54	10.84	10.69	10.70	10.68	10.79	10.77	10.82	10.87
802.11n	5310	62	10.63	10.56	10.68	10.61	10.70	10.63	10.78	10.71
802.11n	5510	102	11.21	11.09	11.04	11.04	11.06	11.07	11.12	11.15
802.11n	5550	110	10.94	11.03	10.96	11.01	10.88	10.97	11.07	11.03
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	10.51	10.55	10.60	10.56	10.61	10.74	10.68	10.65
802.11n	5755	151	10.46	10.57	10.49	10.51	10.53	10.52	10.48	10.54
802.11n	5795	159	10.41	10.31	10.36	10.40	10.39	10.44	10.45	10.28

Table 9-17
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
802.11ac	5210	42	**10.37**	10.40	10.39	10.40	10.34	10.41	10.45	10.39	10.35	10.42
802.11ac	5290	58	**10.28**	10.26	10.33	10.26	10.31	10.18	10.21	10.30	10.26	10.29
802.11ac	5530	106	**10.30**	10.42	10.50	10.33	10.49	10.44	10.47	10.44	10.45	10.49
802.11ac	5775	155	**10.28**	10.24	10.38	10.24	10.36	10.19	10.29	10.37	10.24	10.31

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

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- Full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.

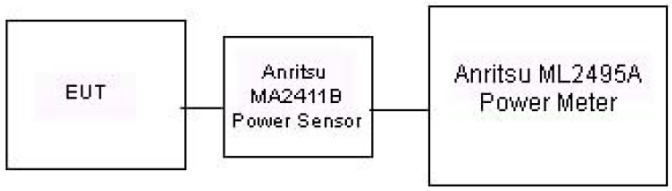

Figure 9-4
Power Measurement Setup < 50MHz Bandwidth

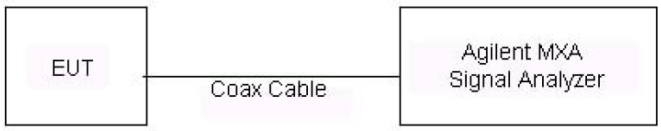

Figure 9-5
Power Measurement Setup > 50MHz Bandwidth

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
09/06/2013	835H	22.5	820	0.919	43.325	0.898	41.571	2.34%	4.22%
			835	0.935	43.170	0.900	41.500	3.89%	4.02%
			850	0.957	43.026	0.916	41.500	4.48%	3.68%
09/05/2013	1900H	23.1	1850	1.404	41.024	1.400	40.000	0.29%	2.56%
			1880	1.434	40.964	1.400	40.000	2.43%	2.41%
			1910	1.466	40.876	1.400	40.000	4.71%	2.19%
09/07/2013	2450H	23.5	2401	1.755	37.883	1.758	39.298	-0.17%	-3.60%
			2450	1.814	37.695	1.800	39.200	0.78%	-3.84%
			2499	1.873	37.528	1.852	39.135	1.13%	-4.11%
09/09/2013	2600H	23.8	2600	2.017	38.706	1.960	39.000	2.91%	-0.75%
			2650	2.075	38.523	2.015	38.938	2.98%	-1.07%
			2700	2.135	38.329	2.070	38.875	3.14%	-1.40%
08/30/2013	5200H-5800H	23.5	5200	4.535	35.117	4.660	36.000	-2.68%	-2.45%
			5220	4.586	35.059	4.680	35.980	-2.01%	-2.56%
			5260	4.646	34.914	4.720	35.940	-1.57%	-2.85%
			5280	4.661	34.751	4.740	35.920	-1.67%	-3.25%
			5300	4.664	34.813	4.760	35.900	-2.02%	-3.03%
			5500	4.922	34.329	4.965	35.650	-0.87%	-3.71%
			5520	4.964	34.295	4.986	35.620	-0.44%	-3.72%
			5540	4.989	34.236	5.007	35.590	-0.36%	-3.80%
			5745	5.262	33.915	5.215	35.355	0.90%	-4.07%
			5765	5.286	33.860	5.235	35.335	0.97%	-4.17%
			5785	5.296	33.827	5.255	35.315	0.78%	-4.21%
			5800	5.317	33.808	5.270	35.300	0.89%	-4.23%
09/03/2013	835B	22.6	820	0.998	54.934	0.969	55.258	2.99%	-0.59%
			835	1.016	54.761	0.970	55.200	4.74%	-0.80%
			850	1.030	54.629	0.988	55.154	4.25%	-0.95%
09/03/2013	1900B	22.6	1850	1.447	51.924	1.520	53.300	-4.80%	-2.58%
			1880	1.478	51.820	1.520	53.300	-2.76%	-2.78%
			1910	1.514	51.703	1.520	53.300	-0.39%	-3.00%
09/07/2013	1900B	22.8	1850	1.474	53.479	1.520	53.300	-3.03%	0.34%
			1880	1.508	53.392	1.520	53.300	-0.79%	0.17%
			1910	1.543	53.323	1.520	53.300	1.51%	0.04%
09/04/2013	2450B	22.2	2401	1.970	52.296	1.903	52.765	3.52%	-0.89%
			2450	2.036	52.070	1.950	52.700	4.41%	-1.20%
			2499	2.103	51.867	2.019	52.638	4.16%	-1.46%
09/04/2013	2600B	22.2	2600	2.243	51.468	2.163	52.509	3.70%	-1.98%
			2650	2.300	51.302	2.234	52.445	2.95%	-2.18%
			2700	2.368	51.087	2.304	52.381	2.78%	-2.47%
09/03/2013	5200B-5800B	22.4	5200	5.269	50.562	5.299	49.014	-0.57%	3.16%
			5220	5.280	50.540	5.323	48.987	-0.81%	3.17%
			5260	5.364	50.503	5.369	48.906	-0.09%	3.27%
			5280	5.406	50.433	5.393	48.879	0.24%	3.18%
			5300	5.418	50.323	5.416	48.851	0.04%	3.01%
			5500	5.716	49.975	5.650	48.580	1.17%	2.87%
			5520	5.747	49.839	5.673	48.553	1.30%	2.65%
			5540	5.778	49.739	5.696	48.526	1.44%	2.50%
			5745	6.130	49.338	5.936	48.248	3.27%	2.26%
			5765	6.117	49.324	5.959	48.220	2.65%	2.29%
			5785	6.178	49.269	5.982	48.242	3.28%	2.13%
			5800	6.189	49.082	6.000	48.200	3.15%	1.83%

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

10.2 Test System Verification

Prior to SAR assessment, the system is verified to ±10% of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in Appendix E.

Table 10-2
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
G	835	HEAD	09/06/2013	24.4	22.5	0.100	4d119	3209	0.954	9.680	9.540	-1.45%
F	1900	HEAD	09/05/2013	22.9	23.1	0.100	5d148	3213	4.050	39.700	40.500	2.02%
A	2450	HEAD	09/07/2013	23.6	22.8	0.100	882	3589	5.250	51.700	52.500	1.55%
C	2600	HEAD	09/09/2013	23.0	23.5	0.100	1004	3263	5.930	58.200	59.300	1.89%
A	5200	HEAD	08/30/2013	22.8	21.6	0.100	1057	3589	7.260	75.900	72.600	-4.35%
A	5300	HEAD	08/30/2013	22.8	21.6	0.100	1057	3589	7.900	76.900	79.000	2.73%
A	5500	HEAD	08/30/2013	22.8	21.6	0.100	1057	3589	7.610	80.100	76.100	-4.99%
A	5800	HEAD	08/30/2013	22.9	21.7	0.100	1057	3589	7.630	76.100	76.300	0.26%
G	835	BODY	09/03/2013	24.3	22.6	0.100	4d119	3209	0.996	9.540	9.960	4.40%
D	1900	BODY	09/03/2013	23.3	22.8	0.100	5d148	3288	4.110	40.800	41.100	0.74%
D	1900	BODY	09/07/2013	24.0	22.8	0.100	5d148	3288	4.000	40.800	40.000	-1.96%
C	2450	BODY	09/04/2013	22.3	20.8	0.100	882	3263	5.200	49.900	52.000	4.21%
C	2600	BODY	09/04/2013	22.3	20.6	0.100	1004	3263	5.610	57.500	56.100	-2.43%
E	5200	BODY	09/03/2013	24.1	22.9	0.100	1120	3920	7.230	76.600	72.300	-5.61%
E	5300	BODY	09/03/2013	24.1	22.9	0.100	1120	3920	7.180	76.800	71.800	-6.51%
E	5500	BODY	09/03/2013	24.1	23.0	0.100	1120	3920	8.270	79.800	82.700	3.63%
E	5800	BODY	09/03/2013	23.9	23.0	0.100	1120	3920	7.560	75.500	75.600	0.13%

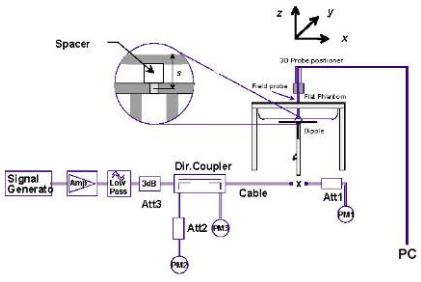

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.0	32.78	0.01	Right	Cheek	Standard	309-6	1:8.3	0.226	1.052	0.238	
836.60	190	GSM 850	GSM	33.0	32.78	-0.03	Right	Tilt	Standard	309-6	1:8.3	0.140	1.052	0.147	
836.60	190	GSM 850	GSM	33.0	32.78	-0.05	Left	Cheek	Standard	309-6	1:8.3	0.267	1.052	0.281	A1
836.60	190	GSM 850	GSM	33.0	32.78	-0.01	Left	Cheek	Wireless Charging	309-6	1:8.3	0.256	1.052	0.269	
836.60	190	GSM 850	GSM	33.0	32.78	-0.02	Left	Tilt	Standard	309-6	1:8.3	0.129	1.052	0.136	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-2
UMTS 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.03	Right	Cheek	Standard	309-4	1:1	0.147	1.114	0.164	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.06	Right	Tilt	Standard	309-4	1:1	0.095	1.114	0.106	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.08	Left	Cheek	Standard	309-4	1:1	0.164	1.114	0.183	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.01	Left	Cheek	Wireless Charging	309-4	1:1	0.176	1.114	0.196	A2
836.60	4183	UMTS 850	RMC	23.0	22.53	0.01	Left	Tilt	Standard	309-4	1:1	0.087	1.114	0.097	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-3
GSM 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.0	29.62	0.00	Right	Cheek	Standard	309-5	1:8.3	0.139	1.091	0.152	
1880.00	661	GSM 1900	GSM	30.0	29.62	-0.18	Right	Tilt	Standard	309-5	1:8.3	0.101	1.091	0.110	
1880.00	661	GSM 1900	GSM	30.0	29.62	-0.07	Left	Cheek	Standard	309-5	1:8.3	0.254	1.091	0.277	
1880.00	661	GSM 1900	GSM	30.0	29.62	0.07	Left	Cheek	Wireless Charging	309-5	1:8.3	0.265	1.091	0.289	A3
1880.00	661	GSM 1900	GSM	30.0	29.62	-0.05	Left	Tilt	Standard	309-5	1:8.3	0.092	1.091	0.100	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-4
UMTS 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	0.11	Right	Cheek	Standard	309-3	1:1	0.377	1.117	0.421	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	0.00	Right	Tilt	Standard	309-3	1:1	0.294	1.117	0.328	
1852.40	9262	UMTS 1900	RMC	23.0	22.43	0.04	Left	Cheek	Standard	309-3	1:1	0.733	1.140	**0.836**	A4
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.03	Left	Cheek	Standard	309-3	1:1	0.719	1.117	0.803	
1907.60	9538	UMTS 1900	RMC	23.0	22.54	0.04	Left	Cheek	Standard	309-3	1:1	0.673	1.112	0.748	
1852.40	9262	UMTS 1900	RMC	23.0	22.43	0.07	Left	Cheek	Wireless Charging	309-3	1:1	0.575	1.140	0.656	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	0.10	Left	Tilt	Standard	309-3	1:1	0.254	1.117	0.284	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-5
CDMA BC10 (§90S) Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.0	24.97	0.03	Right	Cheek	Standard	309-7	1:1	0.404	1.007	0.407	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.0	24.97	-0.11	Right	Tilt	Standard	309-7	1:1	0.290	1.007	0.292	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.0	24.97	-0.09	Left	Cheek	Standard	309-7	1:1	0.498	1.007	0.501	A5
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.0	24.97	0.03	Left	Cheek	Wireless Charging	309-7	1:1	0.481	1.007	0.484	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.0	24.97	0.00	Left	Tilt	Standard	309-7	1:1	0.299	1.007	0.301	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.0	24.87	0.03	Right	Cheek	Standard	309-7	1:1	0.392	1.030	0.404	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.0	24.87	0.03	Right	Tilt	Standard	309-7	1:1	0.251	1.030	0.259	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.0	24.87	-0.14	Left	Cheek	Standard	309-7	1:1	0.423	1.030	0.436	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.0	24.87	0.08	Left	Cheek	Wireless Charging	309-7	1:1	0.488	1.030	0.503	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.0	24.87	-0.05	Left	Tilt	Standard	309-7	1:1	0.274	1.030	0.282	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-6
CDMA BC0 (§22H) Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.0	24.86	0.08	Right	Cheek	Standard	309-7	1:1	0.383	1.033	0.396	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.0	24.86	-0.03	Right	Tilt	Standard	309-7	1:1	0.253	1.033	0.261	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.0	24.86	-0.10	Left	Cheek	Standard	309-7	1:1	0.493	1.033	0.509	A6
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.0	24.86	0.00	Left	Cheek	Wireless Charging	309-7	1:1	0.441	1.033	0.456	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.0	24.86	-0.14	Left	Tilt	Standard	309-7	1:1	0.250	1.033	0.258	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.0	24.73	0.03	Right	Cheek	Standard	309-7	1:1	0.388	1.064	0.413	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.0	24.73	0.00	Right	Tilt	Standard	309-7	1:1	0.248	1.064	0.264	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.0	24.73	-0.06	Left	Cheek	Standard	309-7	1:1	0.438	1.064	0.466	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.0	24.73	0.04	Left	Cheek	Wireless Charging	309-7	1:1	0.458	1.064	0.487	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.0	24.73	0.08	Left	Tilt	Standard	309-7	1:1	0.250	1.064	0.266	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-7
PCS CDMA Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.66	0.05	Right	Cheek	Standard	309-8	1:1	0.336	1.081	0.363	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.66	-0.03	Right	Tilt	Standard	309-8	1:1	0.254	1.081	0.275	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.66	-0.13	Left	Cheek	Standard	309-8	1:1	0.724	1.081	0.783	A7
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.66	-0.02	Left	Cheek	Wireless Charging	309-8	1:1	0.652	1.081	0.705	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.66	-0.03	Left	Tilt	Standard	309-8	1:1	0.248	1.081	0.268	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.60	0.10	Right	Cheek	Standard	309-8	1:1	0.313	1.096	0.343	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.60	0.14	Right	Tilt	Standard	309-8	1:1	0.241	1.096	0.264	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.60	0.13	Left	Cheek	Standard	309-8	1:1	0.607	1.096	0.665	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.60	0.04	Left	Cheek	Wireless Charging	309-8	1:1	0.597	1.096	0.654	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.60	0.00	Left	Tilt	Standard	309-8	1:1	0.215	1.096	0.236	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-8
LTE Band 26 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	-0.03	0	Right	Cheek	QPSK	1	49	309-10	1:1	0.233	1.042	0.243	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	0.04	1	Right	Cheek	QPSK	25	25	309-10	1:1	0.184	1.064	0.196	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	-0.03	0	Right	Tilt	QPSK	1	49	309-10	1:1	0.164	1.042	0.171	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	-0.01	1	Right	Tilt	QPSK	25	25	309-10	1:1	0.133	1.064	0.142	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	-0.01	0	Left	Cheek	QPSK	1	49	309-10	1:1	0.280	1.042	0.292	A8
831.50	26865	Mid	LTE Band 26	10	Wireless Charging	24.5	24.32	0.01	0	Left	Cheek	QPSK	1	49	309-10	1:1	0.269	1.042	0.280	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	0.08	1	Left	Cheek	QPSK	25	25	309-10	1:1	0.231	1.064	0.246	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	0.14	0	Left	Tilt	QPSK	1	49	309-10	1:1	0.145	1.042	0.151	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	0.00	1	Left	Tilt	QPSK	25	25	309-10	1:1	0.133	1.064	0.142	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Head 1.6 W/kg (mW/g) averaged over 1 gram					

Table 11-9
LTE Band 25 (PCS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	0.12	0	Right	Cheek	QPSK	1	49	309-9	1:1	0.389	1.000	0.389	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	0.02	1	Right	Cheek	QPSK	25	25	309-9	1:1	0.298	1.019	0.304	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	-0.12	0	Right	Tilt	QPSK	1	49	309-9	1:1	0.279	1.000	0.279	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	0.04	1	Right	Tilt	QPSK	25	25	309-9	1:1	0.204	1.019	0.208	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	0.15	0	Left	Cheek	QPSK	1	49	309-9	1:1	0.646	1.000	0.646	A9
1855.00	26090	Low	LTE Band 25 (PCS)	10	Wireless Charging	23.0	23.00	0.04	0	Left	Cheek	QPSK	1	49	309-9	1:1	0.644	1.000	0.644	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	-0.06	1	Left	Cheek	QPSK	25	25	309-9	1:1	0.478	1.019	0.487	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	0.05	0	Left	Tilt	QPSK	1	49	309-9	1:1	0.214	1.000	0.214	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	0.16	1	Left	Tilt	QPSK	25	25	309-9	1:1	0.166	1.019	0.169	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Head 1.6 W/kg (mW/g) averaged over 1 gram					

Table 11-10
LTE Band 41 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.07	0	Right	Cheek	QPSK	1	50	309-11	1:1.58	0.166	1.035	0.172	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	-0.01	1	Right	Cheek	QPSK	50	50	309-11	1:1.58	0.135	1.112	0.150	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.14	0	Right	Tilt	QPSK	1	50	309-11	1:1.58	0.186	1.035	0.193	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.12	1	Right	Tilt	QPSK	50	50	309-11	1:1.58	0.148	1.112	0.165	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.14	0	Left	Cheek	QPSK	1	50	309-11	1:1.58	0.269	1.035	0.278	A10
2680.00	41490	High	LTE Band 41	20	Wireless Charging	24.5	24.35	0.15	0	Left	Cheek	QPSK	1	50	309-11	1:1.58	0.227	1.035	0.235	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	-0.01	1	Left	Cheek	QPSK	50	50	309-11	1:1.58	0.217	1.112	0.241	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.03	0	Left	Tilt	QPSK	1	50	309-11	1:1.58	0.151	1.035	0.156	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.04	1	Left	Tilt	QPSK	50	50	309-11	1:1.58	0.119	1.112	0.132	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Head 1.6 W/kg (mW/g) averaged over 1 gram					

Table 11-11
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.															
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.11	Right	Cheek	Standard	309-2	1	1:1	0.137	1.005	0.138	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.00	Right	Tilt	Standard	309-2	1	1:1	0.098	1.005	0.098	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.13	Left	Cheek	Standard	309-2	1	1:1	0.394	1.005	**0.396**	A11
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.15	Left	Cheek	Wireless Charging	309-2	1	1:1	0.110	1.005	0.111	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.06	Left	Tilt	Standard	309-2	1	1:1	0.153	1.005	0.154	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.00	Right	Cheek	Standard	309-2	6	1:1	0.000	1.050	0.000	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.07	Right	Tilt	Standard	309-2	6	1:1	0.001	1.050	0.001	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	-0.06	Left	Cheek	Standard	309-2	6	1:1	0.125	1.050	0.131	A12
5775	155	IEEE 802.11ac	OFDM	10.5	10.28	0.04	Left	Cheek	Standard	309-2	29.3	1:1	0.036	1.052	0.038	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.08	Left	Tilt	Standard	309-2	6	1:1	0.028	1.050	0.029	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Head 1.6 W/kg (mW/g) averaged over 1 gram			

Table 11-12
NII Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Battery Cover	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.05	Right	Cheek	Standard	309-2	6	1:1	0.025	1.146	0.029	
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.08	Right	Tilt	Standard	309-2	6	1:1	0.032	1.146	0.037	
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.01	Left	Cheek	Standard	309-2	6	1:1	0.344	1.146	0.394	A13
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.02	Left	Cheek	Wireless Charging	309-2	6	1:1	0.316	1.146	0.362	
5210	42	IEEE 802.11ac	OFDM	10.5	10.37	0.09	Left	Cheek	Standard	309-2	29.3	1:1	0.152	1.030	0.157	
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.02	Left	Tilt	Standard	309-2	6	1:1	0.074	1.146	0.085	
5260	52	IEEE 802.11a	OFDM	13.5	12.49	0.04	Right	Cheek	Standard	309-2	6	1:1	0.021	1.262	0.027	
5260	52	IEEE 802.11a	OFDM	13.5	12.49	0.01	Right	Tilt	Standard	309-2	6	1:1	0.030	1.262	0.038	
5260	52	IEEE 802.11a	OFDM	13.5	12.49	0.05	Left	Cheek	Standard	309-2	6	1:1	0.316	1.262	**0.399**	
5290	58	IEEE 802.11ac	OFDM	10.5	10.28	0.08	Left	Cheek	Standard	309-2	29.3	1:1	0.133	1.052	0.140	
5260	52	IEEE 802.11a	OFDM	13.5	12.49	0.02	Left	Tilt	Standard	309-2	6	1:1	0.065	1.262	0.082	
5500	100	IEEE 802.11a	OFDM	13.5	13.34	0.06	Right	Cheek	Standard	309-2	6	1:1	0.000	1.038	0.000	
5500	100	IEEE 802.11a	OFDM	13.5	13.34	0.06	Right	Tilt	Standard	309-2	6	1:1	0.001	1.038	0.001	
5500	100	IEEE 802.11a	OFDM	13.5	13.34	0.02	Left	Cheek	Standard	309-2	6	1:1	0.124	1.038	0.129	
5530	106	IEEE 802.11ac	OFDM	10.5	10.30	0.02	Left	Cheek	Standard	309-2	29.3	1:1	0.064	1.047	0.067	
5500	100	IEEE 802.11a	OFDM	13.5	13.34	0.02	Left	Tilt	Standard	309-2	6	1:1	0.015	1.038	0.016	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Head 1.6 W/kg (mW/g) averaged over 1 gram**									

11.2 Standalone Body-Worn SAR Data

Table 11-13
GSM/UMTS/CDMA Body-Worn SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Battery Cover	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.0	32.78	-0.01	10 mm	Standard	309-6	1	1:8.3	back	0.506	1.052	0.532	A14
836.60	190	GSM 850	GSM	33.0	32.78	0.01	10 mm	Wireless Charging	309-6	1	1:8.3	back	0.405	1.052	0.426	
836.60	4183	UMTS 850	RMC	23.0	22.53	-0.01	10 mm	Standard	309-4	N/A	1:1	back	0.312	1.114	0.348	A16
836.60	4183	UMTS 850	RMC	23.0	22.53	-0.03	10 mm	Wireless Charging	309-4	N/A	1:1	back	0.196	1.114	0.218	
1880.00	661	GSM 1900	GSM	30.0	29.62	-0.05	10 mm	Standard	309-6	1	1:8.3	back	0.361	1.091	0.394	A17
1880.00	661	GSM 1900	GSM	30.0	29.62	0.12	10 mm	Wireless Charging	309-6	1	1:8.3	back	0.298	1.091	0.325	
1852.40	9262	UMTS 1900	RMC	23.0	22.43	0.00	10 mm	Standard	309-3	N/A	1:1	back	0.856	1.140	0.976	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.03	10 mm	Standard	309-3	N/A	1:1	back	0.924	1.117	1.032	A19
1907.60	9538	UMTS 1900	RMC	23.0	22.54	-0.01	10 mm	Standard	309-3	N/A	1:1	back	0.898	1.112	0.999	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.10	10 mm	Wireless Charging	309-3	N/A	1:1	back	0.745	1.117	0.832	
820.10	564	CDMA BC10 (§90S)	TDSO / SO32	25.0	24.97	-0.06	10 mm	Standard	309-7	N/A	1:1	back	0.734	1.007	0.739	A22
820.10	564	CDMA BC10 (§90S)	TDSO / SO32	25.0	24.97	-0.03	10 mm	Wireless Charging	309-7	N/A	1:1	back	0.535	1.007	0.539	
836.52	384	CDMA BC0 (§22H)	TDSO / SO32	25.0	24.89	-0.07	10 mm	Standard	309-7	N/A	1:1	back	0.726	1.026	0.745	A24
836.52	384	CDMA BC0 (§22H)	TDSO / SO32	25.0	24.89	0.05	10 mm	Wireless Charging	309-7	N/A	1:1	back	0.651	1.026	0.668	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.62	-0.03	10 mm	Standard	309-8	N/A	1:1	back	0.995	1.091	**1.086**	A26
1880.00	600	PCS CDMA	TDSO / SO32	25.0	24.70	-0.08	10 mm	Standard	309-8	N/A	1:1	back	0.987	1.072	1.058	
1908.75	1175	PCS CDMA	TDSO / SO32	25.0	24.63	0.02	10 mm	Standard	309-8	N/A	1:1	back	0.977	1.089	1.064	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.62	-0.04	10 mm	Wireless Charging	309-8	N/A	1:1	back	0.754	1.091	0.823	
1851.25	25	PCS CDMA	TDSO / SO32	25.0	24.62	-0.09	10 mm	Standard	309-8	N/A	1:1	back	0.972	1.091	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: Blue entries represent variability data.

Table 11-14
LTE Body-Worn SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	0.03	0	309-10	QPSK	1	49	10 mm	back	1:1	0.449	1.042	0.468	A28
831.50	26865	Mid	LTE Band 26	10	Wireless Charging	24.5	24.32	0.03	0	309-10	QPSK	1	49	10 mm	back	1:1	0.382	1.042	0.398	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	0.09	1	309-10	QPSK	25	25	10 mm	back	1:1	0.334	1.064	0.355	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	-0.08	0	309-9	QPSK	1	49	10 mm	back	1:1	0.718	1.000	0.718	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Wireless Charging	23.0	23.00	-0.16	0	309-9	QPSK	1	49	10 mm	back	1:1	0.769	1.000	0.769	A29
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	-0.03	1	309-9	QPSK	25	25	10 mm	back	1:1	0.585	1.019	0.596	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	-0.04	0	309-11	QPSK	1	50	10 mm	back	1:1.58	0.518	1.035	0.536	A30
2680.00	41490	High	LTE Band 41	20	Wireless Charging	24.5	24.35	-0.02	0	309-11	QPSK	1	50	10 mm	back	1:1.58	0.400	1.035	0.414	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.06	1	309-11	QPSK	50	50	10 mm	back	1:1.58	0.387	1.112	0.430	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-15
DTS Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Battery Cover	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.															
2412	1	IEEE 802.11b	DSSS	16.5	16.48	-0.01	10 mm	Standard	309-2	1	back	1:1	0.214	1.005	**0.215**	A31
2412	1	IEEE 802.11b	DSSS	16.5	16.48	-0.01	10 mm	Wireless Charging	309-2	1	back	1:1	0.042	1.005	0.042	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.20	10 mm	Standard	309-2	6	back	1:1	0.091	1.050	0.096	A30
5775	155	IEEE 802.11ac	OFDM	10.5	10.28	0.04	10 mm	Standard	309-2	29.3	back	1:1	0.076	1.052	0.080	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-16
NII Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Battery Cover	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.															
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.12	10 mm	Standard	309-2	6	back	1:1	0.368	1.146	0.422	A32
5200	40	IEEE 802.11a	OFDM	13.5	12.91	0.20	10 mm	Wireless Charging	309-2	6	back	1:1	0.203	1.146	0.233	
5210	42	IEEE 802.11ac	OFDM	10.5	10.37	0.04	10 mm	Standard	309-2	29.3	back	1:1	0.160	1.030	0.165	
5260	52	IEEE 802.11a	OFDM	13.5	12.49	0.19	10 mm	Standard	309-2	6	back	1:1	0.344	1.262	**0.434**	
5290	58	IEEE 802.11ac	OFDM	10.5	10.28	0.04	10 mm	Standard	309-2	29.3	back	1:1	0.167	1.052	0.176	
5500	100	IEEE 802.11a	OFDM	13.5	13.34	0.01	10 mm	Standard	309-2	6	back	1:1	0.181	1.038	0.188	
5530	106	IEEE 802.11ac	OFDM	10.5	10.30	0.07	10 mm	Standard	309-2	29.3	back	1:1	0.075	1.047	0.079	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram							

11.3 Standalone Wireless Router SAR Data

Table 11-17
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Battery Cover	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	30.0	29.78	-0.04	10 mm	Standard	309-6	3	1:2.76	back	0.742	1.052	0.781	A15
836.60	190	GSM 850	GPRS	30.0	29.78	-0.03	10 mm	Wireless Charging	309-6	3	1:2.76	back	0.633	1.052	0.666	
836.60	190	GSM 850	GPRS	30.0	29.78	0.02	10 mm	Standard	309-6	3	1:2.76	front	0.632	1.052	0.665	
836.60	190	GSM 850	GPRS	30.0	29.78	-0.08	10 mm	Standard	309-6	3	1:2.76	bottom	0.123	1.052	0.129	
836.60	190	GSM 850	GPRS	30.0	29.78	-0.09	10 mm	Standard	309-6	3	1:2.76	right	0.372	1.052	0.391	
836.60	190	GSM 850	GPRS	30.0	29.78	-0.05	10 mm	Standard	309-6	3	1:2.76	left	0.441	1.052	0.464	
836.60	4183	UMTS 850	RMC	23.0	22.53	-0.01	10 mm	Standard	309-4	N/A	1:1	back	0.312	1.114	0.348	A16
836.60	4183	UMTS 850	RMC	23.0	22.53	-0.03	10 mm	Wireless Charging	309-4	N/A	1:1	back	0.196	1.114	0.218	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.00	10 mm	Standard	309-4	N/A	1:1	front	0.282	1.114	0.314	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.03	10 mm	Standard	309-4	N/A	1:1	bottom	0.063	1.114	0.070	
836.60	4183	UMTS 850	RMC	23.0	22.53	0.10	10 mm	Standard	309-4	N/A	1:1	right	0.201	1.114	0.224	
836.60	4183	UMTS 850	RMC	23.0	22.53	-0.03	10 mm	Standard	309-4	N/A	1:1	left	0.220	1.114	0.245	
1880.00	661	GSM 1900	GPRS	26.0	25.63	0.08	10 mm	Standard	309-6	3	1:2.76	back	0.386	1.089	0.420	A18
1880.00	661	GSM 1900	GPRS	26.0	25.63	-0.06	10 mm	Wireless Charging	309-6	3	1:2.76	back	0.303	1.089	0.330	
1880.00	661	GSM 1900	GPRS	26.0	25.63	0.04	10 mm	Standard	309-6	3	1:2.76	front	0.294	1.089	0.320	
1880.00	661	GSM 1900	GPRS	26.0	25.63	-0.05	10 mm	Standard	309-6	3	1:2.76	bottom	0.248	1.089	0.270	
1880.00	661	GSM 1900	GPRS	26.0	25.63	0.06	10 mm	Standard	309-6	3	1:2.76	right	0.026	1.089	0.028	
1880.00	661	GSM 1900	GPRS	26.0	25.63	0.09	10 mm	Standard	309-6	3	1:2.76	left	0.157	1.089	0.171	
1852.40	9262	UMTS 1900	RMC	23.0	22.43	0.00	10 mm	Standard	309-3	N/A	1:1	back	0.856	1.140	0.976	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.03	10 mm	Standard	309-3	N/A	1:1	back	0.924	1.117	**1.032**	A19
1907.60	9538	UMTS 1900	RMC	23.0	22.54	-0.01	10 mm	Standard	309-3	N/A	1:1	back	0.898	1.112	0.999	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.10	10 mm	Wireless Charging	309-3	N/A	1:1	back	0.745	1.117	0.832	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.05	10 mm	Standard	309-3	N/A	1:1	front	0.695	1.117	0.776	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.08	10 mm	Standard	309-3	N/A	1:1	bottom	0.595	1.117	0.665	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	0.08	10 mm	Standard	309-3	N/A	1:1	right	0.059	1.117	0.066	
1880.00	9400	UMTS 1900	RMC	23.0	22.52	-0.02	10 mm	Standard	309-3	N/A	1:1	left	0.350	1.117	0.391	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-18
CDMA Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Battery Cover	Device Serial Number	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.0	24.89	-0.16	10 mm	Standard	309-7	1:1	back	0.618	1.026	0.634	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.0	24.89	0.08	10 mm	Standard	309-7	1:1	front	0.678	1.026	0.696	A23
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.0	24.89	-0.06	10 mm	Wireless Charging	309-7	1:1	front	0.537	1.026	0.551	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.0	24.89	-0.09	10 mm	Standard	309-7	1:1	bottom	0.142	1.026	0.146	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.0	24.89	0.06	10 mm	Standard	309-7	1:1	right	0.348	1.026	0.357	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.0	24.89	-0.05	10 mm	Standard	309-7	1:1	left	0.444	1.026	0.456	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.0	24.85	0.08	10 mm	Standard	309-7	1:1	back	0.684	1.035	0.708	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.0	24.85	-0.15	10 mm	Standard	309-7	1:1	front	0.714	1.035	0.739	A25
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.0	24.85	-0.06	10 mm	Wireless Charging	309-7	1:1	front	0.663	1.035	0.686	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.0	24.85	0.06	10 mm	Standard	309-7	1:1	bottom	0.149	1.035	0.154	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.0	24.85	-0.07	10 mm	Standard	309-7	1:1	right	0.423	1.035	0.438	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.0	24.85	-0.08	10 mm	Standard	309-7	1:1	left	0.587	1.035	0.608	
1851.25	25	PCS CDMA	EVDO Rev. 0	25.0	24.57	0.01	10 mm	Standard	309-8	1:1	back	0.917	1.104	1.012	A25
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.62	-0.11	10 mm	Standard	309-8	1:1	back	0.884	1.091	0.964	
1908.75	1175	PCS CDMA	EVDO Rev. 0	25.0	24.61	-0.04	10 mm	Standard	309-8	1:1	back	0.888	1.094	0.971	
1851.25	25	PCS CDMA	EVDO Rev. 0	25.0	24.57	-0.04	10 mm	Wireless Charging	309-8	1:1	back	0.823	1.104	0.909	
1851.25	25	PCS CDMA	EVDO Rev. 0	25.0	24.57	0.08	10 mm	Standard	309-8	1:1	front	0.850	1.104	0.938	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.62	0.03	10 mm	Standard	309-8	1:1	front	0.807	1.091	0.880	
1908.75	1175	PCS CDMA	EVDO Rev. 0	25.0	24.61	0.17	10 mm	Standard	309-8	1:1	front	0.816	1.094	0.893	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.62	-0.02	10 mm	Standard	309-8	1:1	bottom	0.567	1.091	0.619	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.62	0.05	10 mm	Standard	309-8	1:1	right	0.050	1.091	0.055	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.62	-0.03	10 mm	Standard	309-8	1:1	left	0.390	1.091	0.425	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-19
LTE Band 26 Hotspot SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	0.03	0	309-10	QPSK	1	49	10 mm	back	1:1	0.449	1.042	0.468	A26
831.50	26865	Mid	LTE Band 26	10	Wireless Charging	24.5	24.32	0.03	0	309-10	QPSK	1	49	10 mm	back	1:1	0.382	1.042	0.398	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	0.09	1	309-10	QPSK	25	25	10 mm	back	1:1	0.334	1.064	0.355	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	0.03	0	309-10	QPSK	1	49	10 mm	front	1:1	0.404	1.042	0.421	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	-0.03	1	309-10	QPSK	25	25	10 mm	front	1:1	0.310	1.064	0.330	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	0.01	0	309-10	QPSK	1	49	10 mm	bottom	1:1	0.077	1.042	0.080	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	-0.06	1	309-10	QPSK	25	25	10 mm	bottom	1:1	0.059	1.064	0.063	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	0.01	0	309-10	QPSK	1	49	10 mm	right	1:1	0.266	1.042	0.277	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	-0.02	1	309-10	QPSK	25	25	10 mm	right	1:1	0.192	1.064	0.204	
831.50	26865	Mid	LTE Band 26	10	Standard	24.5	24.32	-0.03	0	309-10	QPSK	1	49	10 mm	left	1:1	0.245	1.042	0.255	
831.50	26865	Mid	LTE Band 26	10	Standard	23.5	23.23	0.00	1	309-10	QPSK	25	25	10 mm	left	1:1	0.170	1.064	0.181	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-20
LTE Band 25 (PCS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	-0.08	0	309-9	QPSK	1	49	10 mm	back	1:1	0.718	1.000	0.718	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Wireless Charging	23.0	23.00	-0.16	0	309-9	QPSK	1	49	10 mm	back	1:1	0.769	1.000	0.769	A27
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	-0.03	1	309-9	QPSK	25	25	10 mm	back	1:1	0.585	1.019	0.596	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	0.03	0	309-9	QPSK	1	49	10 mm	front	1:1	0.585	1.000	0.585	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	0.07	1	309-9	QPSK	25	25	10 mm	front	1:1	0.443	1.019	0.451	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	-0.08	0	309-9	QPSK	1	49	10 mm	bottom	1:1	0.541	1.000	0.541	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	-0.03	1	309-9	QPSK	25	25	10 mm	bottom	1:1	0.407	1.019	0.415	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	0.03	0	309-9	QPSK	1	49	10 mm	right	1:1	0.277	1.000	0.277	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	0.03	1	309-9	QPSK	25	25	10 mm	right	1:1	0.217	1.019	0.221	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	23.0	23.00	0.00	0	309-9	QPSK	1	49	10 mm	left	1:1	0.276	1.000	0.276	
1855.00	26090	Low	LTE Band 25 (PCS)	10	Standard	22.0	21.92	0.02	1	309-9	QPSK	25	25	10 mm	left	1:1	0.211	1.019	0.215	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-21
LTE Band 41 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Battery Cover	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	-0.04	0	309-11	QPSK	1	50	10 mm	back	1:1.58	0.518	1.035	0.536	A28
2680.00	41490	High	LTE Band 41	20	Wireless Charging	24.5	24.35	-0.02	0	309-11	QPSK	1	50	10 mm	back	1:1.58	0.400	1.035	0.414	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.06	1	309-11	QPSK	50	50	10 mm	back	1:1.58	0.387	1.112	0.430	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.00	0	309-11	QPSK	1	50	10 mm	front	1:1.58	0.361	1.035	0.374	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.02	1	309-11	QPSK	50	50	10 mm	front	1:1.58	0.295	1.112	0.328	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	-0.06	0	309-11	QPSK	1	50	10 mm	bottom	1:1.58	0.234	1.035	0.242	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	-0.01	1	309-11	QPSK	50	50	10 mm	bottom	1:1.58	0.196	1.112	0.218	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.03	0	309-11	QPSK	1	50	10 mm	right	1:1.58	0.146	1.035	0.151	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.04	1	309-11	QPSK	50	50	10 mm	right	1:1.58	0.118	1.112	0.131	
2680.00	41490	High	LTE Band 41	20	Standard	24.5	24.35	0.00	0	309-11	QPSK	1	50	10 mm	left	1:1.58	0.266	1.035	0.275	
2680.00	41490	High	LTE Band 41	20	Standard	23.5	23.04	0.04	1	309-11	QPSK	50	50	10 mm	left	1:1.58	0.217	1.112	0.241	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-22
WLAN Hotspot SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Battery Cover	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	-0.01	10 mm	Standard	309-2	1	back	1:1	0.214	1.005	**0.215**	A31
2412	1	IEEE 802.11b	DSSS	16.5	16.48	-0.01	10 mm	Wireless Charging	309-2	1	back	1:1	0.042	1.005	0.042	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.04	10 mm	Standard	309-2	1	front	1:1	0.055	1.005	0.055	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	0.13	10 mm	Standard	309-2	1	top	1:1	0.034	1.005	0.034	
2412	1	IEEE 802.11b	DSSS	16.5	16.48	-0.07	10 mm	Standard	309-2	1	right	1:1	0.151	1.005	0.152	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.20	10 mm	Standard	309-2	6	back	1:1	0.091	1.050	0.096	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	-0.07	10 mm	Wireless Charging	309-2	6	back	1:1	0.162	1.050	0.170	A31
5775	155	IEEE 802.11ac	OFDM	10.5	10.28	0.04	10 mm	Standard	309-2	29.3	back	1:1	0.076	1.052	0.080	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.05	10 mm	Standard	309-2	6	front	1:1	0.010	1.050	0.011	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.00	10 mm	Standard	309-2	6	top	1:1	0.020	1.050	0.021	
5745	149	IEEE 802.11a	OFDM	13.5	13.29	0.04	10 mm	Standard	309-2	6	right	1:1	0.076	1.050	0.080	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g) averaged over 1 gram**									

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC/OET Bulletin 65, Supplement C [June 2001] and FCC KDB Publication 447498 D01v05r01.
2. Batteries are fully charged at the beginning of the SAR measurements. A specialized battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05r01.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r01, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01 v01r01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v01r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. This DUT may be used with a standard battery cover or with an optional wireless charging battery cover. Per FCC KDB Publication 648474 D04v01r01, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the highest reported SAR for each wireless technology, frequency band, operating mode, and exposure condition. No other additional testing with the wireless charging battery cover was not required since all reported SAR were under 1.2 W/kg.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D03v01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR for hotspot SAR.
3. Per FCC KDB Publication 447498 D01v05r01, since the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg, testing at the other channels is not required for such test configuration(s). Since the maximum output power variation across the required test channels is ≤ ½ dB, only middle channel was the default channel tested.

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v02r02.
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, per FCC KDB Publication 941225 D01v02r02.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01 procedures for data devices. Since the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, then EVDO Rev. A SAR is not required. SAR is not required for 1x RTT for Ev-Do hotspot devices when the maximum average output of each channel is less than ¼ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0.
4. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.
5. Per FCC KDB Publication 447498 D01v05r01, when the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is > 0.8 W/kg, testing at the other channels was required for such test configuration(s). Since the maximum output power variation across the required test channels is ≤ ½ dB, only middle channel was the default channel tested.

UMTS Notes:

1. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02r02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05r01, when the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is > 0.8 W/kg, testing at the other channels was required for such test configuration(s). Since the maximum output power variation across the required test channels is ≤ ½ dB, only middle channel was the default channel tested.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r01. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
4. Per FCC KDB Publication 447498 D01v05r01, since the reported (scaled) LTE Band 41 SAR measured at the highest output power channel for each test configuration is ≤ 0.6 W/kg, testing at the other channels is not required for such test configuration(s).
5. TDD LTE was tested using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. Per April 2013 TCB Workshop notes, full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
4. 5 GHz hotspot is only supported for the 5.8 GHz Band; therefore, all other 5 GHz bands were not evaluated for hotspot conditions.
5. WIFI transmission was verified using an uncalibrated spectrum analyzer.
6. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other default channels was not required.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r01 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/ac and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r01 IV.C.1.iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05 4.3.2 2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth	2441	9.50	10	**0.187**

Note: Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. Per KDB Publication 447498 D01v05r01, the maximum power of the channel was rounded to the nearest mW before calculation.

12.3 Head SAR Simultaneous Transmission Analysis

Table 12-2
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.238	0.138	0.376
	Right Tilt	0.147	0.098	0.245
	Left Cheek	0.281	0.396	0.677
	Left Tilt	0.136	0.154	0.290

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.164	0.138	0.302
	Right Tilt	0.106	0.098	0.204
	Left Cheek	0.196	0.396	0.592
	Left Tilt	0.097	0.154	0.251

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.152	0.138	0.290
	Right Tilt	0.110	0.098	0.208
	Left Cheek	0.289	0.396	0.685
	Left Tilt	0.100	0.154	0.254

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.421	0.138	0.559
	Right Tilt	0.328	0.098	0.426
	Left Cheek	0.836	0.396	1.232
	Left Tilt	0.284	0.154	0.438

Simult Tx	Configuration	CDMA BC10 (§90S) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.407	0.138	0.545
	Right Tilt	0.292	0.098	0.390
	Left Cheek	0.501	0.396	0.897
	Left Tilt	0.301	0.154	0.455

Simult Tx	Configuration	EVDO BC10 (§90S) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.404	0.138	0.542
	Right Tilt	0.259	0.098	0.357
	Left Cheek	0.503	0.396	0.899
	Left Tilt	0.282	0.154	0.436

Simult Tx	Configuration	CDMA BC0 (§22H) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.396	0.138	0.534
	Right Tilt	0.261	0.098	0.359
	Left Cheek	0.509	0.396	0.905
	Left Tilt	0.258	0.154	0.412

Simult Tx	Configuration	EVDO BC0 (§22H) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.413	0.138	0.551
	Right Tilt	0.264	0.098	0.362
	Left Cheek	0.487	0.396	0.883
	Left Tilt	0.266	0.154	0.420

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.363	0.138	0.501
	Right Tilt	0.275	0.098	0.373
	Left Cheek	0.783	0.396	1.179
	Left Tilt	0.268	0.154	0.422

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.343	0.138	0.481
	Right Tilt	0.264	0.098	0.362
	Left Cheek	0.665	0.396	1.061
	Left Tilt	0.236	0.154	0.390

Simult Tx	Configuration	LTE Band 26 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.243	0.138	0.381
	Right Tilt	0.171	0.098	0.269
	Left Cheek	0.292	0.396	0.688
	Left Tilt	0.151	0.154	0.305

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.389	0.138	0.527
	Right Tilt	0.279	0.098	0.377
	Left Cheek	0.646	0.396	1.042
	Left Tilt	0.214	0.154	0.368

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.172	0.138	0.310
	Right Tilt	0.193	0.098	0.291
	Left Cheek	0.278	0.396	0.674
	Left Tilt	0.156	0.154	0.310

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.238	0.029	0.267
	Right Tilt	0.147	0.038	0.185
	Left Cheek	0.281	0.399	0.680
	Left Tilt	0.136	0.085	0.221

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.164	0.029	0.193
	Right Tilt	0.106	0.038	0.144
	Left Cheek	0.196	0.399	0.595
	Left Tilt	0.097	0.085	0.182

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.152	0.029	0.181
	Right Tilt	0.110	0.038	0.148
	Left Cheek	0.289	0.399	0.688
	Left Tilt	0.100	0.085	0.185

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.421	0.029	0.450
	Right Tilt	0.328	0.038	0.366
	Left Cheek	0.836	0.399	1.235
	Left Tilt	0.284	0.085	0.369

Simult Tx	Configuration	CDMA BC10 (§90S) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.407	0.029	0.436
	Right Tilt	0.292	0.038	0.330
	Left Cheek	0.501	0.399	0.900
	Left Tilt	0.301	0.085	0.386

Simult Tx	Configuration	EVDO BC10 (§90S) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.404	0.029	0.433
	Right Tilt	0.259	0.038	0.297
	Left Cheek	0.503	0.399	0.902
	Left Tilt	0.282	0.085	0.367

Simult Tx	Configuration	CDMA BC0 (§22H) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.396	0.029	0.425
	Right Tilt	0.261	0.038	0.299
	Left Cheek	0.509	0.399	0.908
	Left Tilt	0.258	0.085	0.343

Simult Tx	Configuration	EVDO BC0 (§22H) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.413	0.029	0.442
	Right Tilt	0.264	0.038	0.302
	Left Cheek	0.487	0.399	0.886
	Left Tilt	0.266	0.085	0.351

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.363	0.029	0.392
	Right Tilt	0.275	0.038	0.313
	Left Cheek	0.783	0.399	1.182
	Left Tilt	0.268	0.085	0.353

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.343	0.029	0.372
	Right Tilt	0.264	0.038	0.302
	Left Cheek	0.665	0.399	1.064
	Left Tilt	0.236	0.085	0.321

Simult Tx	Configuration	LTE Band 26 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.243	0.029	0.272
	Right Tilt	0.171	0.038	0.209
	Left Cheek	0.292	0.399	0.691
	Left Tilt	0.151	0.085	0.236

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.389	0.029	0.418
	Right Tilt	0.279	0.038	0.317
	Left Cheek	0.646	0.399	1.045
	Left Tilt	0.214	0.085	0.299

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.172	0.029	0.201
	Right Tilt	0.193	0.038	0.231
	Left Cheek	0.278	0.399	0.677
	Left Tilt	0.156	0.085	0.241

The worst case 5 GHz WLAN reported SAR for each head configuration was used for SAR summation, regardless of whether the WLAN channel has WIFI Hotspot capability. Therefore, the summations above represent the absolute worst cases for simultaneous transmission with 5 GHz WLAN.

12.4 Body-Worn Simultaneous Transmission Analysis

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

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.532	0.215	0.747
Back Side	UMTS 850	0.348	0.215	0.563
Back Side	GSM 1900	0.394	0.215	0.609
Back Side	UMTS 1900	1.032	0.215	1.247
Back Side	CDMA BC10 (§90S)	0.739	0.215	0.954
Back Side	CDMA BC0 (§22H)	0.745	0.215	0.960
Back Side	PCS CDMA	1.086	0.215	1.301
Back Side	LTE Band 26	0.468	0.215	0.683
Back Side	LTE Band 25 (PCS)	0.769	0.215	0.984
Back Side	LTE Band 41	0.536	0.215	0.751

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

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.532	0.434	0.966
Back Side	UMTS 850	0.348	0.434	0.782
Back Side	GSM 1900	0.394	0.434	0.828
Back Side	UMTS 1900	1.032	0.434	1.466
Back Side	CDMA BC10 (§90S)	0.739	0.434	1.173
Back Side	CDMA BC0 (§22H)	0.745	0.434	1.179
Back Side	PCS CDMA	1.086	0.434	**1.520**
Back Side	LTE Band 26	0.468	0.434	0.902
Back Side	LTE Band 25 (PCS)	0.769	0.434	1.203
Back Side	LTE Band 41	0.536	0.434	0.970

The worst case 5 GHz WLAN reported SAR for each body-worn configuration was used for SAR summation, regardless of whether the WLAN channel has WIFI Hotspot capability. Therefore, the summations above represent the absolute worst cases for simultaneous transmission with 5 GHz WLAN.

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

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.532	0.187	0.719
Back Side	UMTS 850	0.348	0.187	0.535
Back Side	GSM 1900	0.394	0.187	0.581
Back Side	UMTS 1900	1.032	0.187	1.219
Back Side	CDMA BC10 (§90S)	0.739	0.187	0.926
Back Side	CDMA BC0 (§22H)	0.745	0.187	0.932
Back Side	PCS CDMA	1.086	0.187	1.273
Back Side	LTE Band 26	0.468	0.187	0.655
Back Side	LTE Band 25 (PCS)	0.769	0.187	0.956
Back Side	LTE Band 41	0.536	0.187	0.723

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

12.5 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v01r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

Table 12-7
Simultaneous Transmission Scenario (2.4 GHz Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.781	0.215	0.996
	Front	0.665	0.055	0.720
	Top	-	0.034	0.034
	Bottom	0.129	-	0.129
	Right	0.391	0.152	0.543
	Left	0.464	-	0.464

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.348	0.215	0.563
	Front	0.314	0.055	0.369
	Top	-	0.034	0.034
	Bottom	0.070	-	0.070
	Right	0.224	0.152	0.376
	Left	0.245	-	0.245

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.420	0.215	0.635
	Front	0.320	0.055	0.375
	Top	-	0.034	0.034
	Bottom	0.270	-	0.270
	Right	0.028	0.152	0.180
	Left	0.171	-	0.171

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.032	0.215	1.247
	Front	0.776	0.055	0.831
	Top	-	0.034	0.034
	Bottom	0.665	-	0.665
	Right	0.066	0.152	0.218
	Left	0.391	-	0.391

Simult Tx	Configuration	EVDO BC10 (§90S) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.634	0.215	0.849
	Front	0.696	0.055	0.751
	Top	-	0.034	0.034
	Bottom	0.146	-	0.146
	Right	0.357	0.152	0.509
	Left	0.456	-	0.456

Simult Tx	Configuration	EVDO BC0 (§22H) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.708	0.215	0.923
	Front	0.739	0.055	0.794
	Top	-	0.034	0.034
	Bottom	0.154	-	0.154
	Right	0.438	0.152	0.590
	Left	0.608	-	0.608

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.012	0.215	1.227
	Front	0.938	0.055	0.993
	Top	-	0.034	0.034
	Bottom	0.619	-	0.619
	Right	0.055	0.152	0.207
	Left	0.425	-	0.425

Simult Tx	Configuration	LTE Band 26 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.468	0.215	0.683
	Front	0.421	0.055	0.476
	Top	-	0.034	0.034
	Bottom	0.080	-	0.080
	Right	0.277	0.152	0.429
	Left	0.255	-	0.255

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.769	0.215	0.984
	Front	0.585	0.055	0.640
	Top	-	0.034	0.034
	Bottom	0.541	-	0.541
	Right	0.277	0.152	0.429
	Left	0.276	-	0.276

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.536	0.215	0.751
	Front	0.374	0.055	0.429
	Top	-	0.034	0.034
	Bottom	0.242	-	0.242
	Right	0.151	0.152	0.303
	Left	0.275	-	0.275

Table 12-8
Simultaneous Transmission Scenario (5.8 GHz Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.781	0.170	0.951
	Front	0.665	0.011	0.676
	Top	-	0.021	0.021
	Bottom	0.129	-	0.129
	Right	0.391	0.080	0.471
	Left	0.464	-	0.464

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.348	0.170	0.518
	Front	0.314	0.011	0.325
	Top	-	0.021	0.021
	Bottom	0.070	-	0.070
	Right	0.224	0.080	0.304
	Left	0.245	-	0.245

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.420	0.170	0.590
	Front	0.320	0.011	0.331
	Top	-	0.021	0.021
	Bottom	0.270	-	0.270
	Right	0.028	0.080	0.108
	Left	0.171	-	0.171

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.032	0.170	1.202
	Front	0.776	0.011	0.787
	Top	-	0.021	0.021
	Bottom	0.665	-	0.665
	Right	0.066	0.080	0.146
	Left	0.391	-	0.391

Simult Tx	Configuration	EVDO BC10 (§90S) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.634	0.170	0.804
	Front	0.696	0.011	0.707
	Top	-	0.021	0.021
	Bottom	0.146	-	0.146
	Right	0.357	0.080	0.437
	Left	0.456	-	0.456

Simult Tx	Configuration	EVDO BC0 (§22H) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.708	0.170	0.878
	Front	0.739	0.011	0.750
	Top	-	0.021	0.021
	Bottom	0.154	-	0.154
	Right	0.438	0.080	0.518
	Left	0.608	-	0.608

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.012	0.170	1.182
	Front	0.938	0.011	0.949
	Top	-	0.021	0.021
	Bottom	0.619	-	0.619
	Right	0.055	0.080	0.135
	Left	0.425	-	0.425

Simult Tx	Configuration	LTE Band 26 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.468	0.170	0.638
	Front	0.421	0.011	0.432
	Top	-	0.021	0.021
	Bottom	0.080	-	0.080
	Right	0.277	0.080	0.357
	Left	0.255	-	0.255

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.769	0.170	0.939
	Front	0.585	0.011	0.596
	Top	-	0.021	0.021
	Bottom	0.541	-	0.541
	Right	0.277	0.080	0.357
	Left	0.276	-	0.276

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.536	0.170	0.706
	Front	0.374	0.011	0.385
	Top	-	0.021	0.021
	Bottom	0.242	-	0.242
	Right	0.151	0.080	0.231
	Left	0.275	-	0.275

12.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05r01.

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

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

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1900	1851.25	25	PCS CDMA	TDSO / SO32	back	10 mm	0.995	0.972	1.02	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram						

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01r01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/10/2012	Annual	10/10/2013	1833460
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/16/2013	Annual	4/16/2014	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/16/2013	Annual	4/16/2014	JP38020182
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	4/17/2013	Annual	4/17/2014	3629U00687
SPEAG	D1900V2	1900 MHz SAR Dipole	2/6/2013	Annual	2/6/2014	5d148
SPEAG	D2450V2	2450 MHz SAR Dipole	2/11/2013	Annual	2/11/2014	882
SPEAG	D2600V2	2600 MHz SAR Dipole	5/2/2013	Annual	5/2/2014	1004
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/11/2013	Annual	1/11/2014	1057
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/14/2013	Annual	2/14/2014	1120
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
SPEAG	D835V2	835 MHz SAR Dipole	4/25/2013	Annual	4/25/2014	4d119
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	5/3/2013	Annual	5/3/2014	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	8/9/2013	Annual	8/9/2014	109892
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/19/2012	Annual	9/19/2013	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/17/2013	Annual	1/17/2014	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/6/2013	Annual	2/6/2014	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2013	Annual	3/8/2014	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/22/2013	Annual	4/22/2014	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/13/2013	Annual	5/13/2014	859
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	12/11/2012	Annual	12/11/2013	1091
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/14/2013	Annual	5/14/2014	1070
Agilent	85070C	Dielectric Probe Kit	2/14/2013	Annual	2/14/2014	MY44300633
Rohde & Schwarz	NRVD	Dual Channel Power Meter	10/12/2012	Biennial	10/12/2014	101695
VWR	23226-658	Long Stem Thermometer	3/30/2012	Biennial	3/30/2014	122179874
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	9/26/2012	Annual	9/26/2013	108798
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886430
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Anritsu	ML2496A	Power Meter	11/28/2012	Annual	11/28/2013	1138001
Anritsu	MA2481A	Power Sensor	2/14/2013	Annual	2/14/2014	5318
Anritsu	MA2411B	Pulse Power Sensor	12/4/2012	Annual	12/4/2013	1207364
Anritsu	MA2411B	Pulse Power Sensor	12/5/2012	Annual	12/5/2013	1126066
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	MT8820C	Radio Communication Analyzer	6/28/2013	Annual	6/28/2014	6201240328
Anritsu	MT8820C	Radio Communication Tester	11/6/2012	Annual	11/6/2013	6200901190
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/17/2013	Annual	4/17/2014	B010177
SPEAG	ES3DV3	SAR Probe	9/20/2012	Annual	9/20/2013	3288
SPEAG	EX3DV4	SAR Probe	1/17/2013	Annual	1/17/2014	3589
SPEAG	EX3DV4	SAR Probe	2/27/2013	Annual	2/27/2014	3920
SPEAG	ES3DV3	SAR Probe	3/15/2013	Annual	3/15/2014	3209
SPEAG	ES3DV3	SAR Probe	4/29/2013	Annual	4/29/2014	3213
SPEAG	ES3DV3	SAR Probe	5/16/2013	Annual	5/16/2014	3263
Rohde & Schwarz	SME06	Signal Generator	10/11/2012	Annual	10/11/2013	832026
Rohde & Schwarz	SMIQ03B	Signal Generator	4/17/2013	Annual	4/17/2014	DE27259
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Fisher Scientific	15-077-960	Thermometer	11/6/2012	Biennial	11/6/2014	122640025
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Gigatronics	8651A	Universal Power Meter	10/10/2012	Annual	10/10/2013	8650319
Anritsu	MA2481D	Universal Sensor	12/17/2012	Annual	12/17/2013	1204419
Anritsu	MA2481D	Universal Sensor	12/17/2012	Annual	12/17/2013	1204343
Anritsu	MA24106A	USB Power Sensor	12/6/2012	Annual	12/6/2013	1248508
Anritsu	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244524
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859323
Agilent	E5515C	Wireless Communications Test Set	9/24/2012	Annual	9/24/2013	GB43163447
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561

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

15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz:

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

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

Applicable for frequencies up to 6 GHz:

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

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

16 CONCLUSION

16.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-6

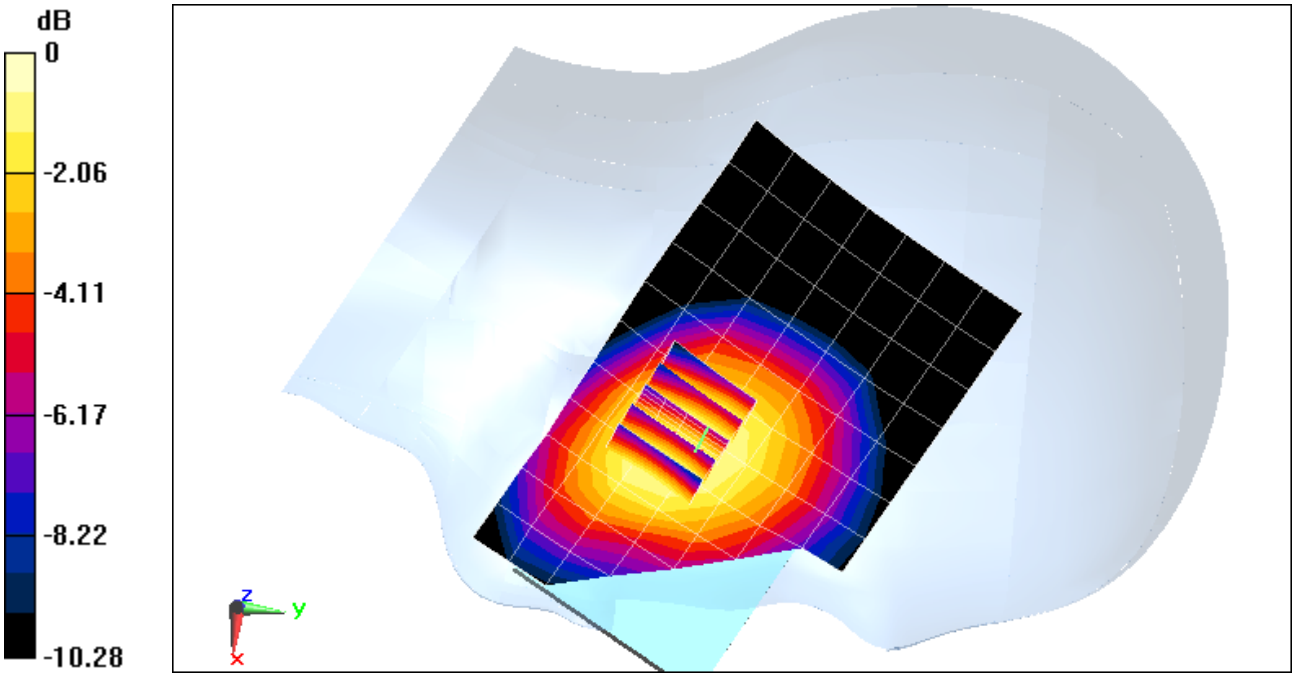
Communication System: GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.937 S/m; ε_r = 43.155; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-06-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.259 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.333 W/kg
SAR(1 g) = 0.267 W/kg



0 dB = 0.277 W/kg = -5.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-4

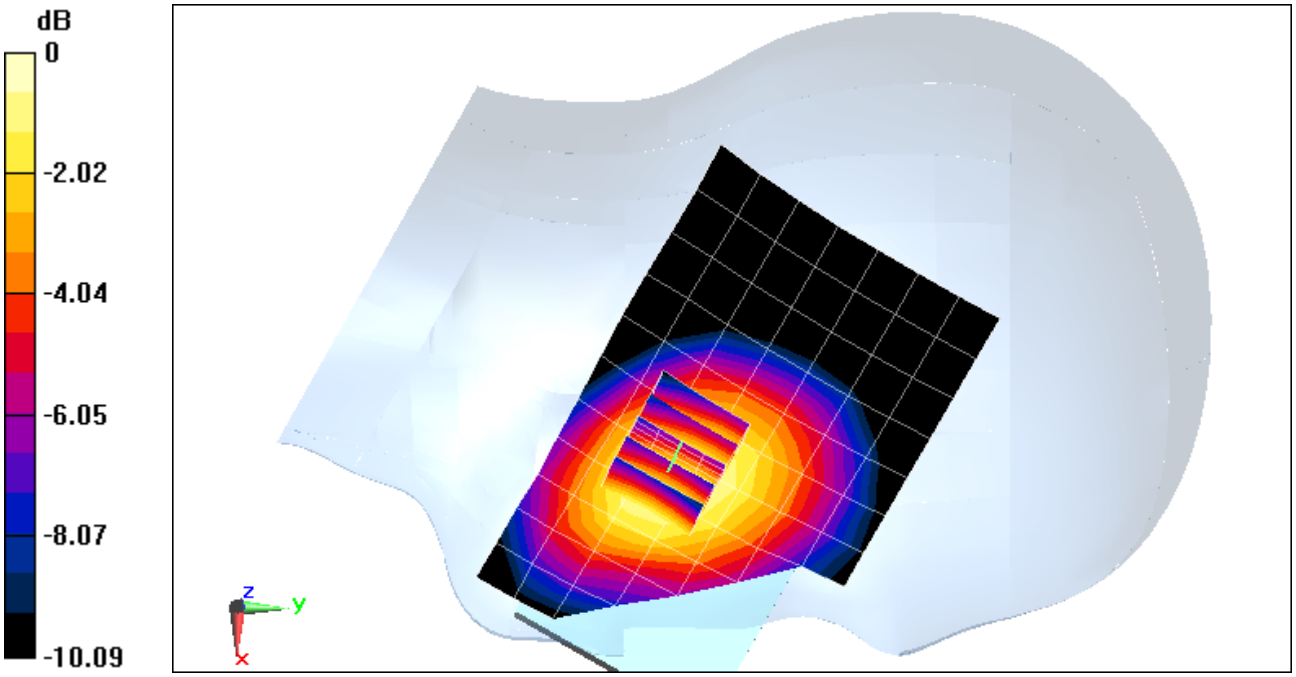
Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.937$ S/m; $\varepsilon_r = 43.155$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 09-06-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: UMTS 850, Left Head, Cheek, Mid.ch, Wireless Charging Cover

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.962 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.227 W/kg
SAR(1 g) = 0.176 W/kg



0 dB = 0.185 W/kg = -7.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-5

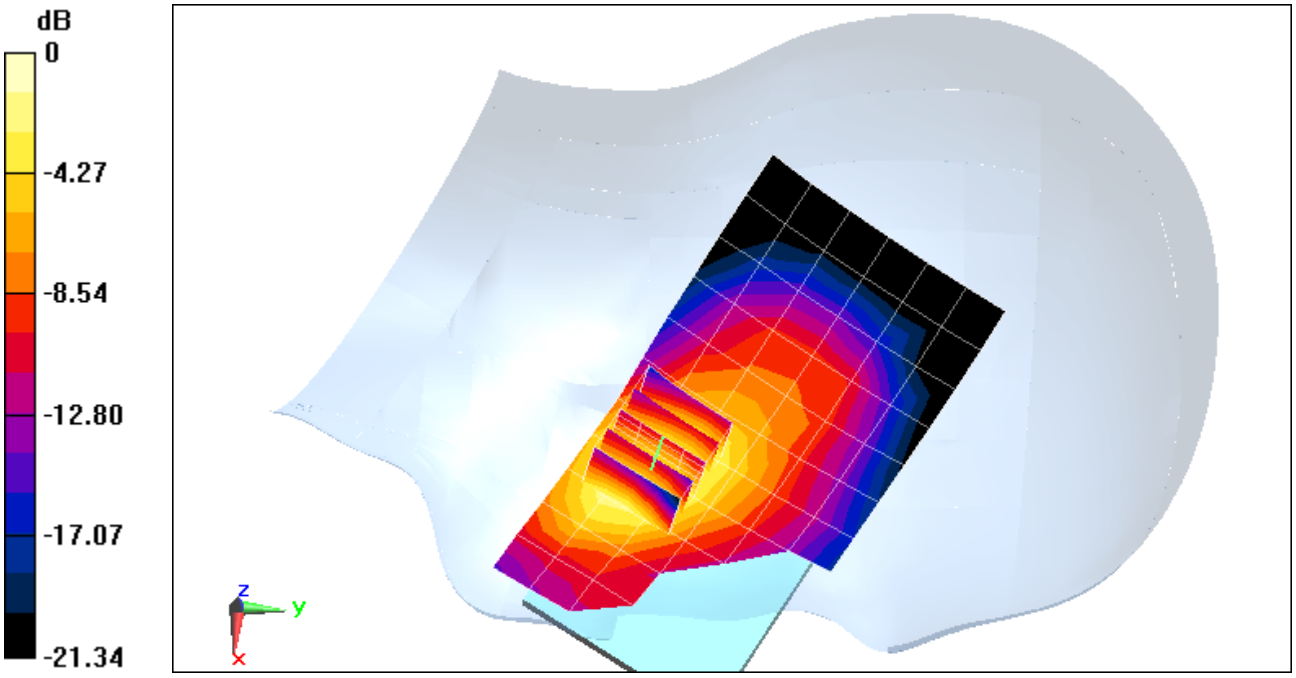
Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head, Medium parameters used:
f = 1880 MHz; σ = 1.434 S/m; ε_r = 40.964; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-05-2013; Ambient Temp: 22.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(5.08, 5.08, 5.08); Calibrated: 4/29/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/22/2013
Phantom: SAM Front; Type: QD000P40CD; Serial: 1717
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: GSM 1900, Left Head, Cheek, Mid.ch, Wireless Charging Cover

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.232 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.418 W/kg
SAR(1 g) = 0.265 W/kg



0 dB = 0.291 W/kg = -5.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-3

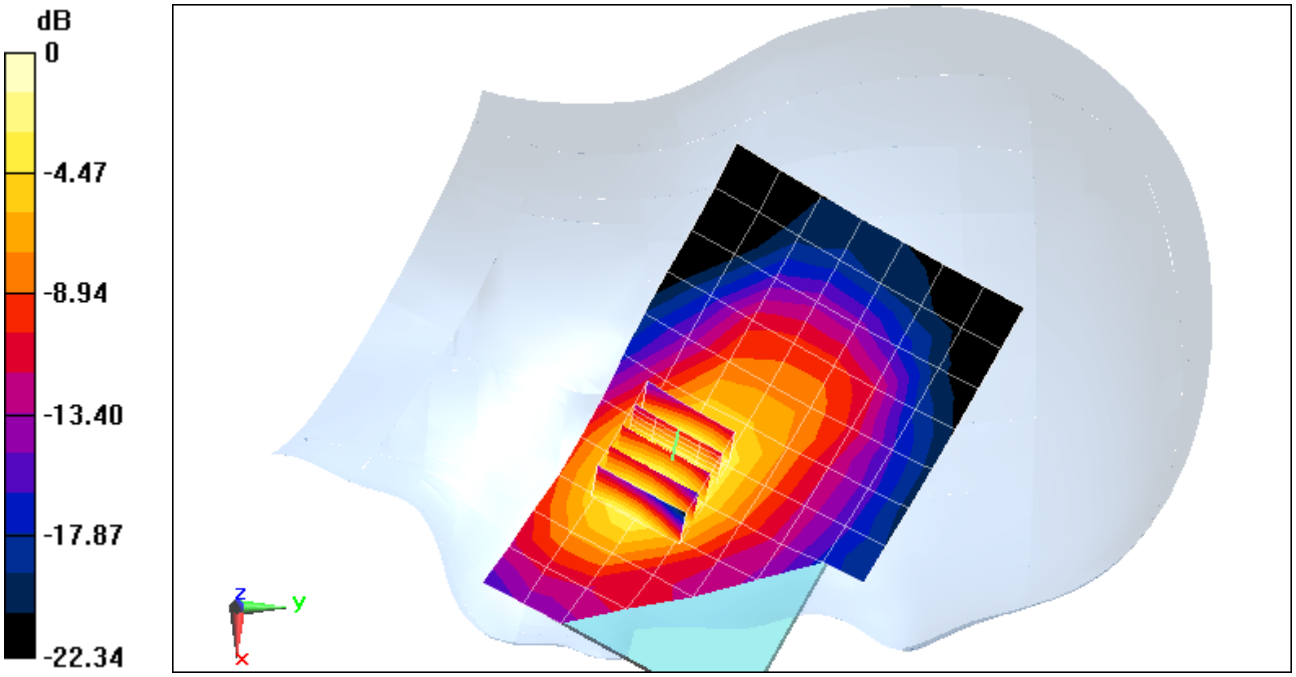
Communication System: UMTS; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1852.4 MHz; σ = 1.406 S/m; ε_r = 41.019; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-05-2013; Ambient Temp: 22.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(5.08, 5.08, 5.08); Calibrated: 4/29/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/22/2013
Phantom: SAM Front; Type: QD000P40CD; Serial: 1717
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: UMTS 1900, Left Head, Cheek, Low.ch, Standard Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.822 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.733 W/kg



0 dB = 0.783 W/kg = -1.06 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-7

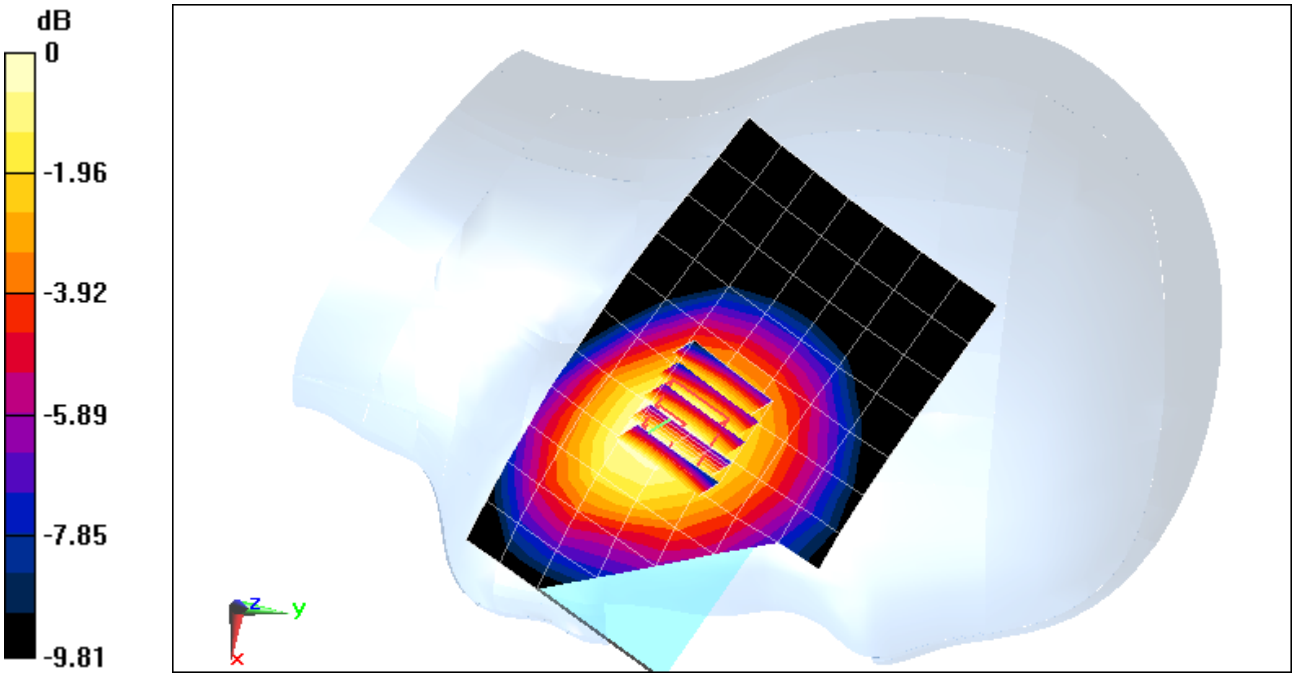
Communication System: CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.919$ S/m; $\varepsilon_r = 43.324$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 09-06-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: Cell. CDMA (§90S), Left Head, Cheek, Mid.ch, Standard Cover

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.014 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.634 W/kg
SAR(1 g) = 0.498 W/kg



0 dB = 0.519 W/kg = -2.85 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-7

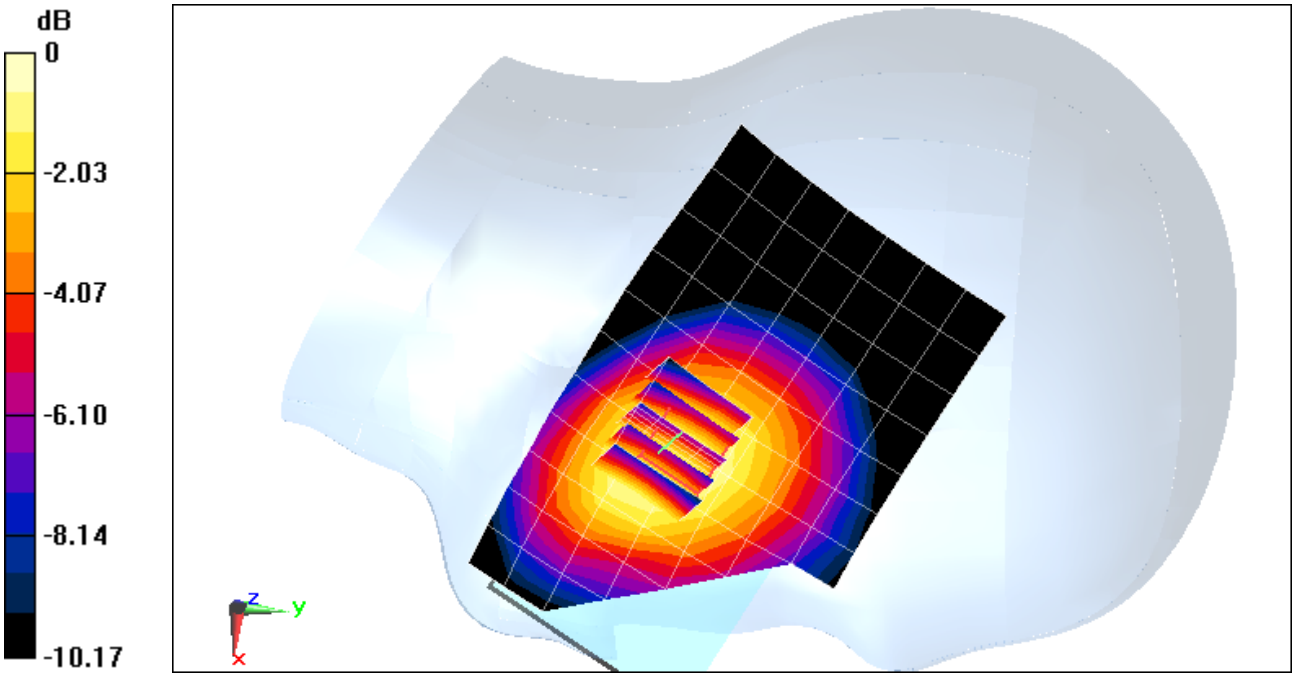
Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.937 S/m; ε_r = 43.155; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-06-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: Cell. CDMA (§22H), Left Head, Cheek, Mid.ch, Standard Cover

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.652 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.627 W/kg
SAR(1 g) = 0.493 W/kg



0 dB = 0.517 W/kg = -2.87 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-8

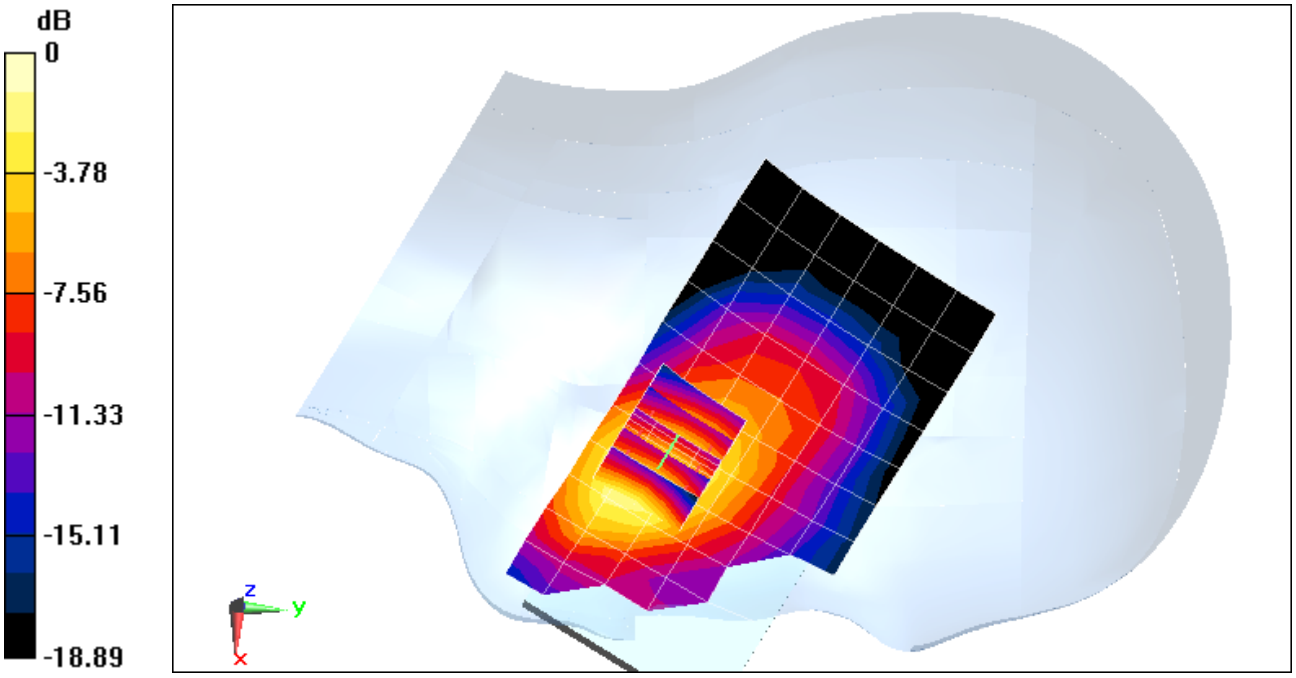
Communication System: CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used:
f = 1880 MHz; σ = 1.434 S/m; ε_r = 40.964; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-05-2013; Ambient Temp: 22.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(5.08, 5.08, 5.08); Calibrated: 4/29/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/22/2013
Phantom: SAM Front; Type: QD000P40CD; Serial: 1717
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: PCS CDMA, Left Head, Cheek, Mid.ch, Standard Cover

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.728 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.724 W/kg



0 dB = 0.795 W/kg = -1.00 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-10

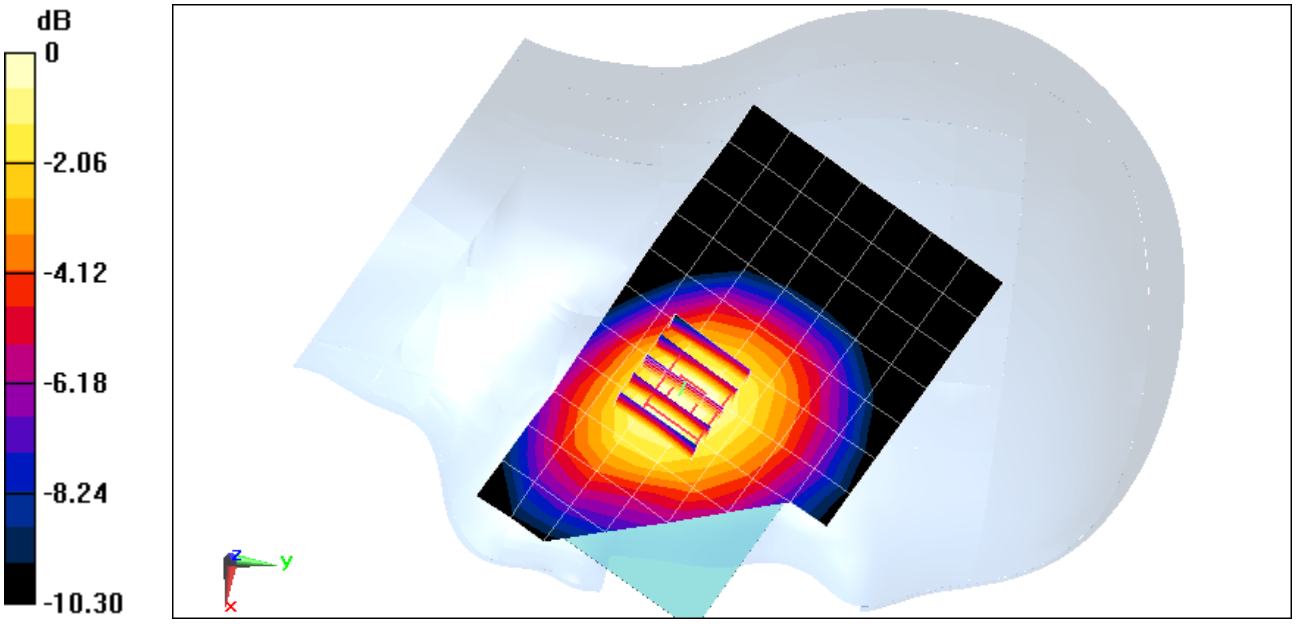
Communication System: LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used (interpolated):
$f = 831.5$ MHz; $\sigma = 0.931$ S/m; $\varepsilon_r = 43.206$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 09-06-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 26, Left Head, Cheek, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 49 RB Offset, Standard Cover

Area Scan (8x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.880 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.280 W/kg



0 dB = 0.295 W/kg = -5.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-9

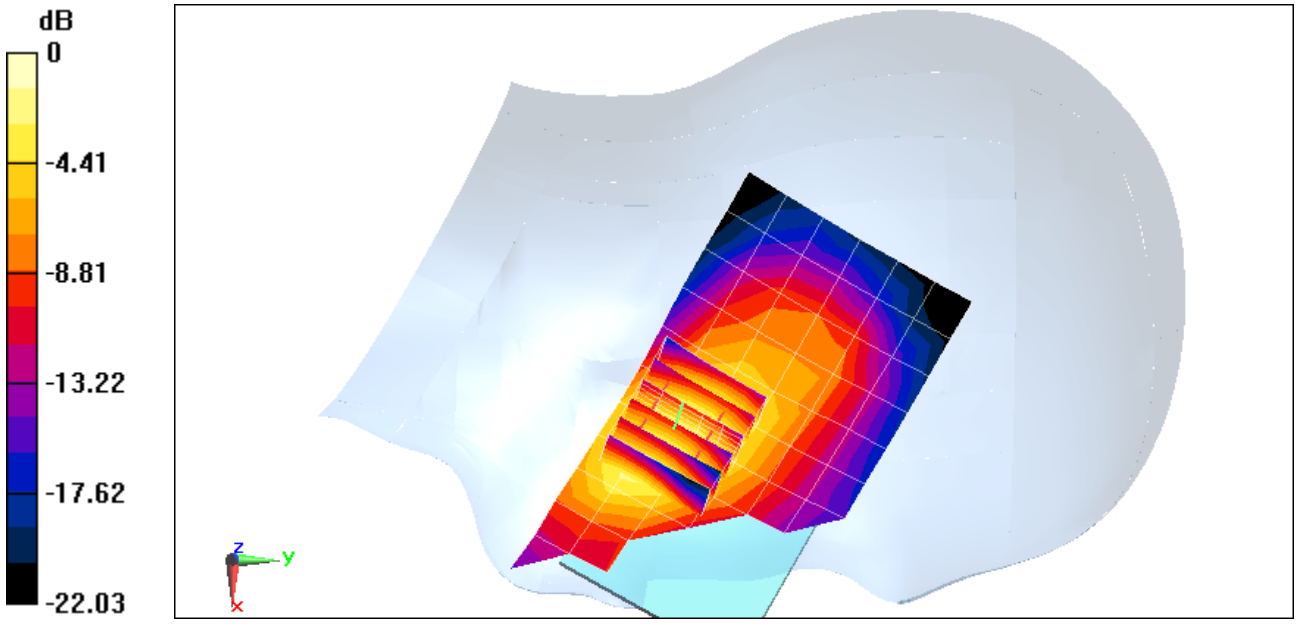
Communication System: LTE Band 25 (PCS); Frequency: 1855 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1855 MHz; σ = 1.409 S/m; ε_r = 41.014; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-05-2013; Ambient Temp: 22.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(5.08, 5.08, 5.08); Calibrated: 4/29/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/22/2013
Phantom: SAM Front; Type: QD000P40CD; Serial: 1717
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 25 (PCS), Left Head, Cheek, QPSK
10 MHz Bandwidth, Low.ch, 1 RB, 49 Offset, Standard Cover

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.142 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.993 W/kg
SAR(1 g) = 0.646 W/kg



0 dB = 0.700 W/kg = -1.55 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-11

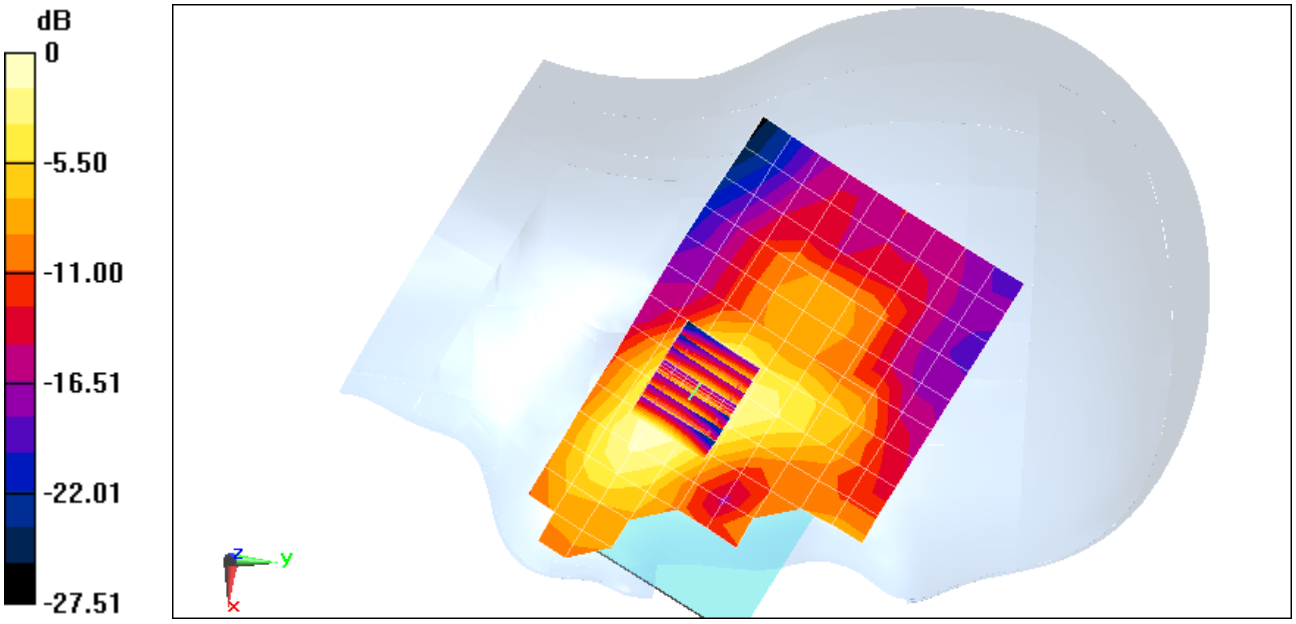
Communication System: LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Head, Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.111 S/m; ε_r = 38.407; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-09-2013; Ambient Temp: 23.0°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3263; ConvF(4.31, 4.31, 4.31); Calibrated: 5/16/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/13/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 41, Left Head, Cheek, High.ch, QPSK
20 Mhz Bandwidth, 1 RB, 50 RB Offset, Standard Cover

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.531 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.538 W/kg
SAR(1 g) = 0.269 W/kg



0 dB = 0.342 W/kg = -4.66 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

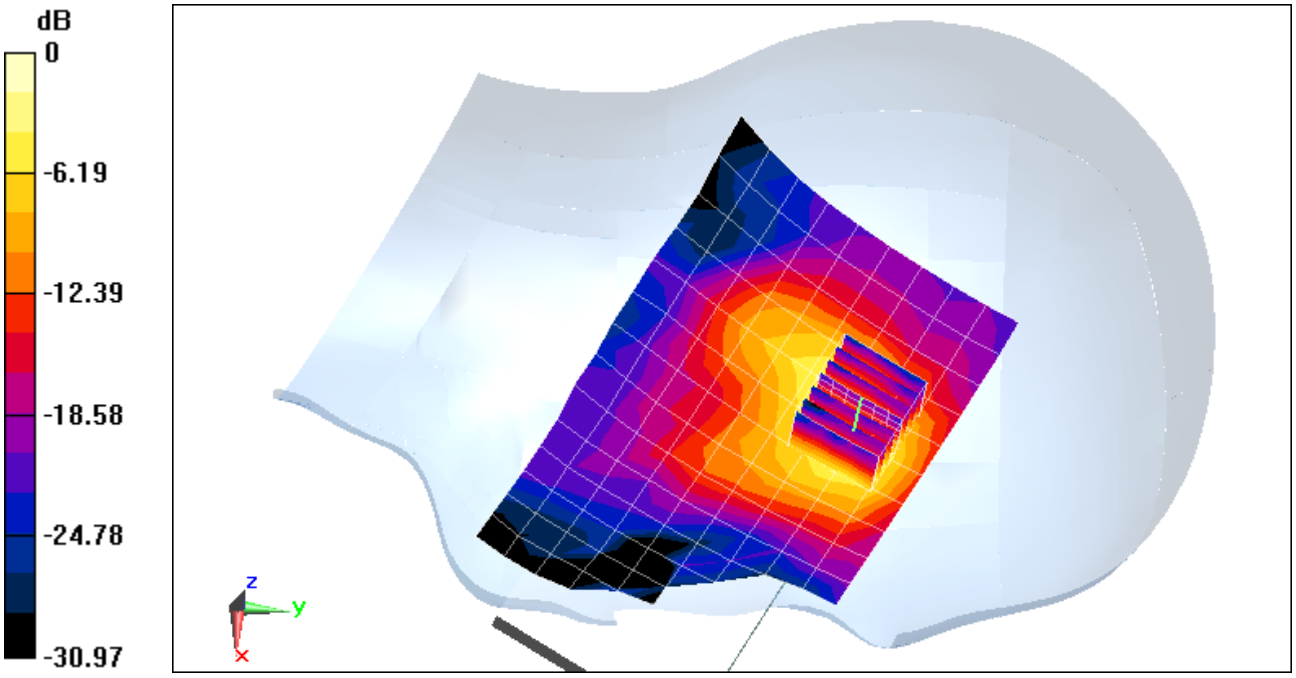
Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Head, Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.768 S/m; ε_r = 37.841; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-07-2013; Ambient Temp: 23.6°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3589; ConvF(6.37, 6.37, 6.37); Calibrated: 1/17/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11b, Left Head, Cheek, Ch 01, 1 Mbps, Standard Cover

Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.839 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.394 W/kg



0 dB = 0.539 W/kg = -2.68 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

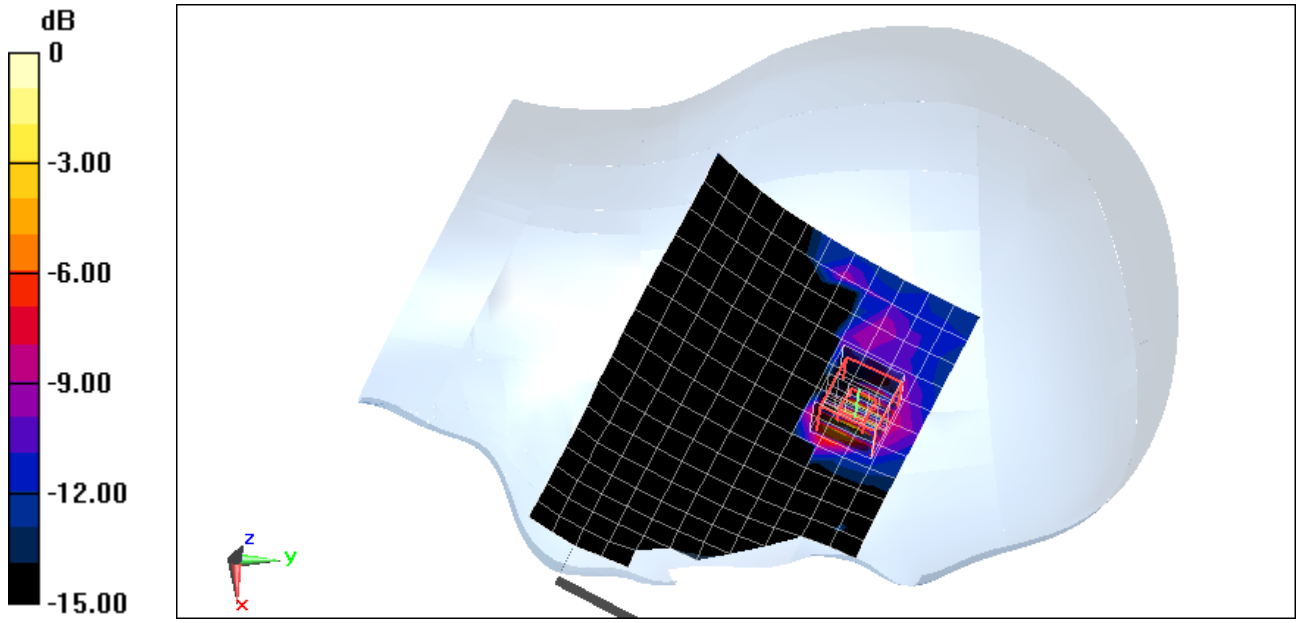
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5745 MHz; σ = 5.262 S/m; ε_r = 33.915; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-30-2013; Ambient Temp: 22.9°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3589; ConvF(3.85, 3.85, 3.85); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.8 GHz Left Head, Cheek, Ch 149, 6 Mbps, Standard Cover

Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Reference Value = 5.427 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.641 W/kg
SAR(1 g) = 0.125 W/kg



0 dB = 0.394 W/kg = -4.05 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

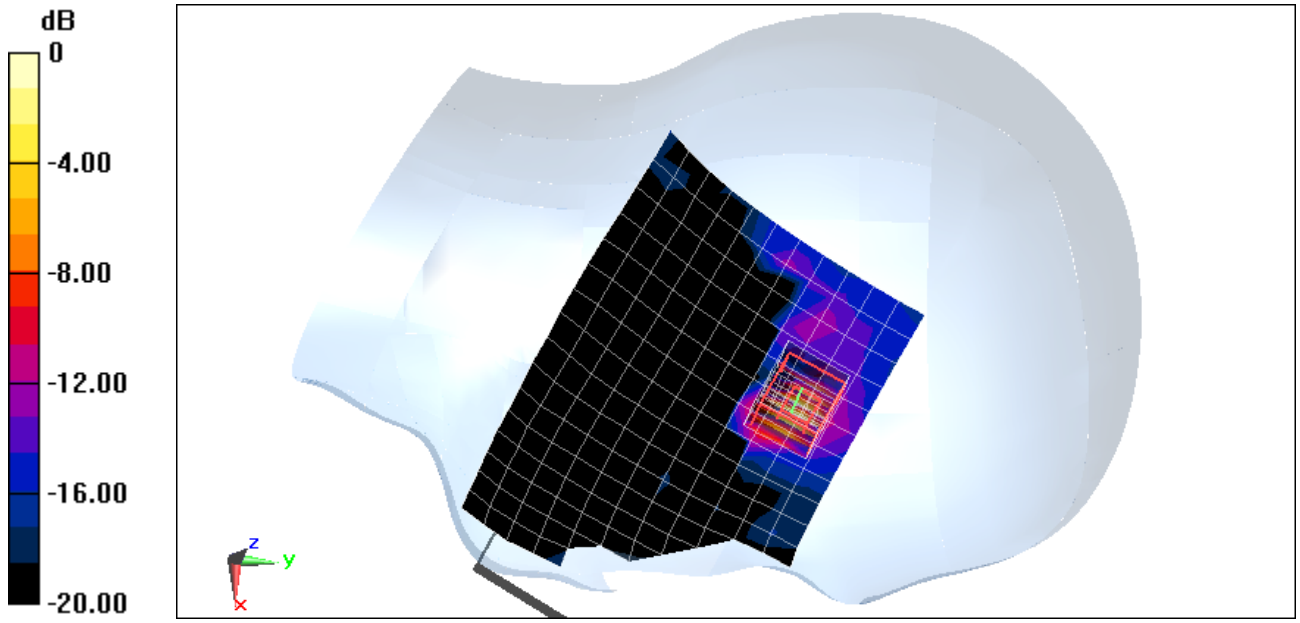
Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5200 MHz; σ = 4.535 S/m; ε_r = 35.117; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-30-2013; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3589; ConvF(4.48, 4.48, 4.48); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.2 GHz Left Head, Cheek, Ch 40, 6 Mbps, Standard Cover

Area Scan (12x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Reference Value = 8.856 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.344 W/kg



0 dB = 0.856 W/kg = -0.68 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-6

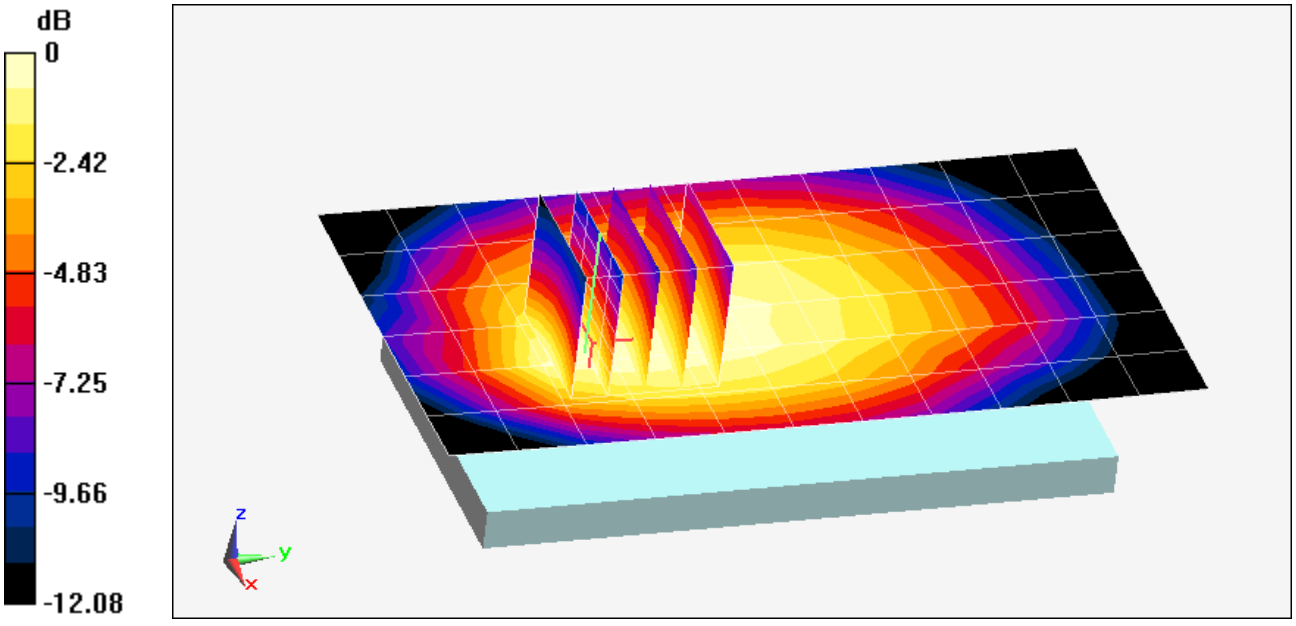
Communication System: GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.017 S/m; ε_r = 54.747; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.264 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.699 W/kg
SAR(1 g) = 0.506 W/kg



0 dB = 0.541 W/kg = -2.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-6

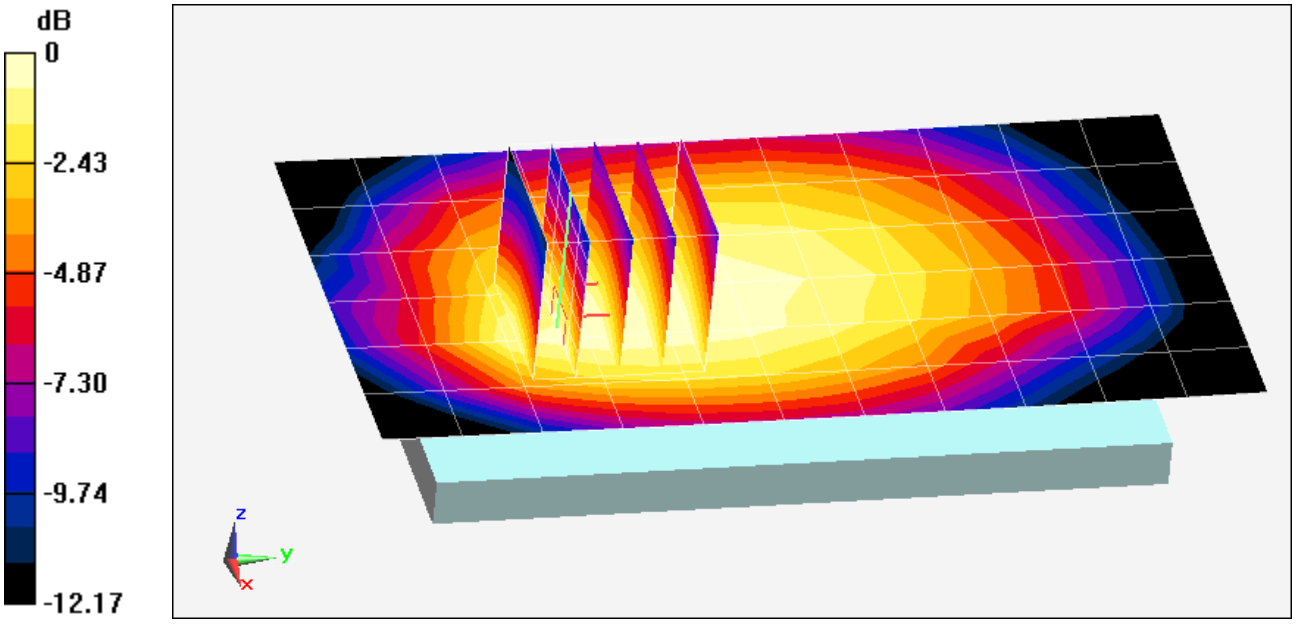
Communication System: GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body, Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 1.017$ S/m; $\varepsilon_r = 54.747$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 3 Tx Slots, Standard Cover

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.850 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.742 W/kg



0 dB = 0.791 W/kg = -1.02 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-4

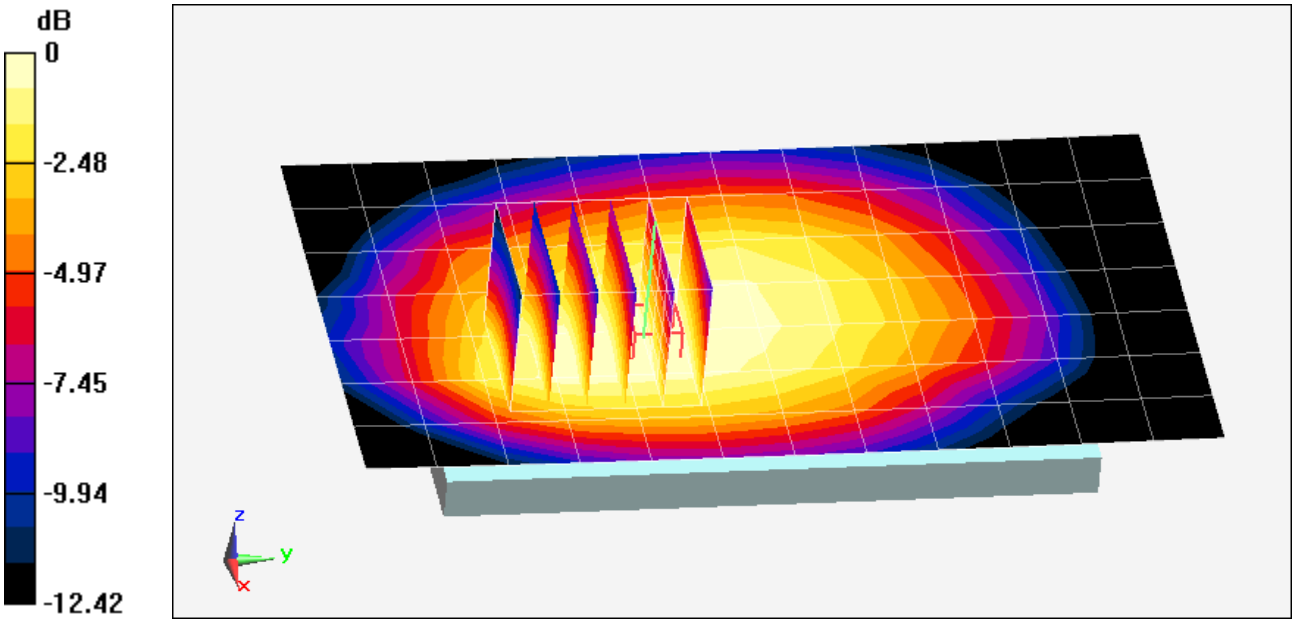
Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.017 S/m; ε_r = 54.747; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.111 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.419 W/kg
SAR(1 g) = 0.312 W/kg



0 dB = 0.326 W/kg = -4.87 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-6

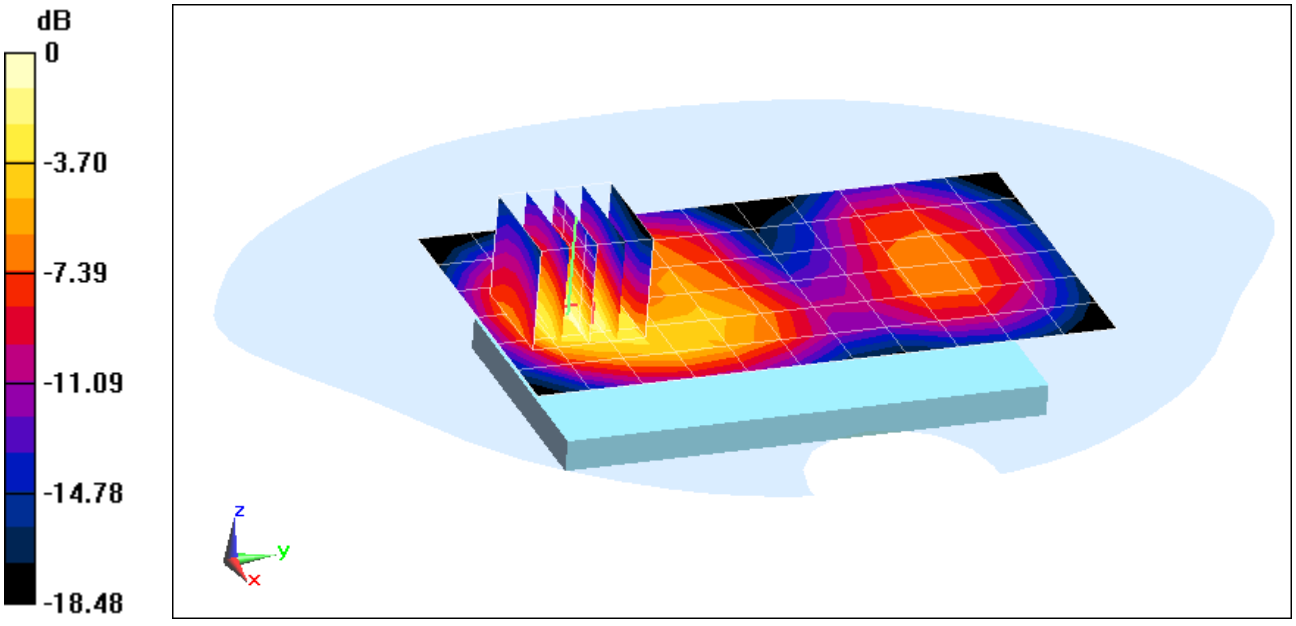
Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; σ = 1.478 S/m; ε_r = 51.82; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.963 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.636 W/kg
SAR(1 g) = 0.361 W/kg



0 dB = 0.414 W/kg = -3.83 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-6

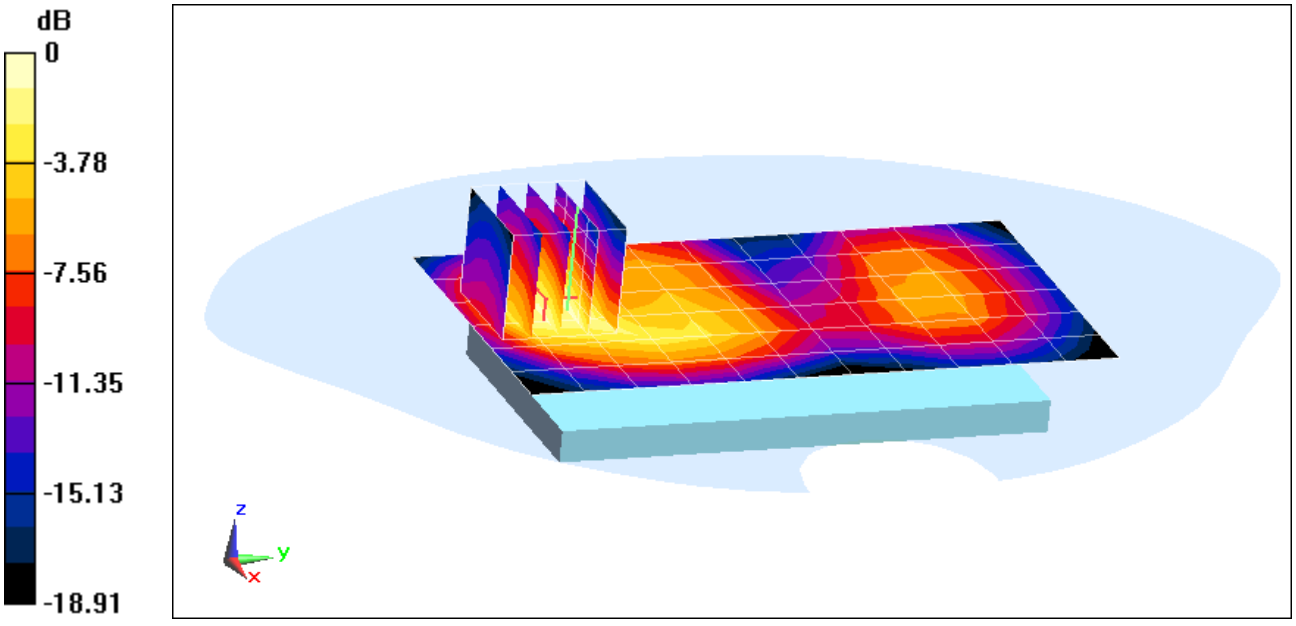
Communication System: GSM GPRS; 3 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; σ = 1.478 S/m; ε_r = 51.82; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 3 Tx Slots, Standard Cover

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.040 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.688 W/kg
SAR(1 g) = 0.386 W/kg



0 dB = 0.411 W/kg = -3.86 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-3

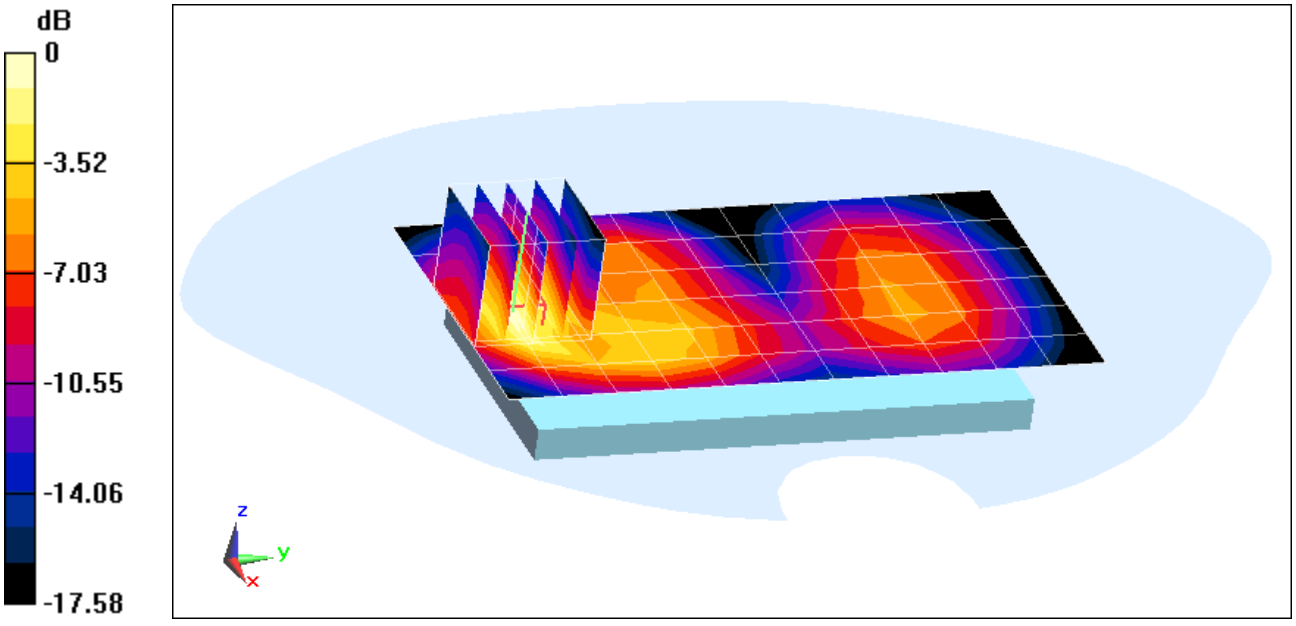
Communication System: UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; σ = 1.478 S/m; ε_r = 51.82; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.737 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 0.924 W/kg



0 dB = 1.03 W/kg = 0.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-7

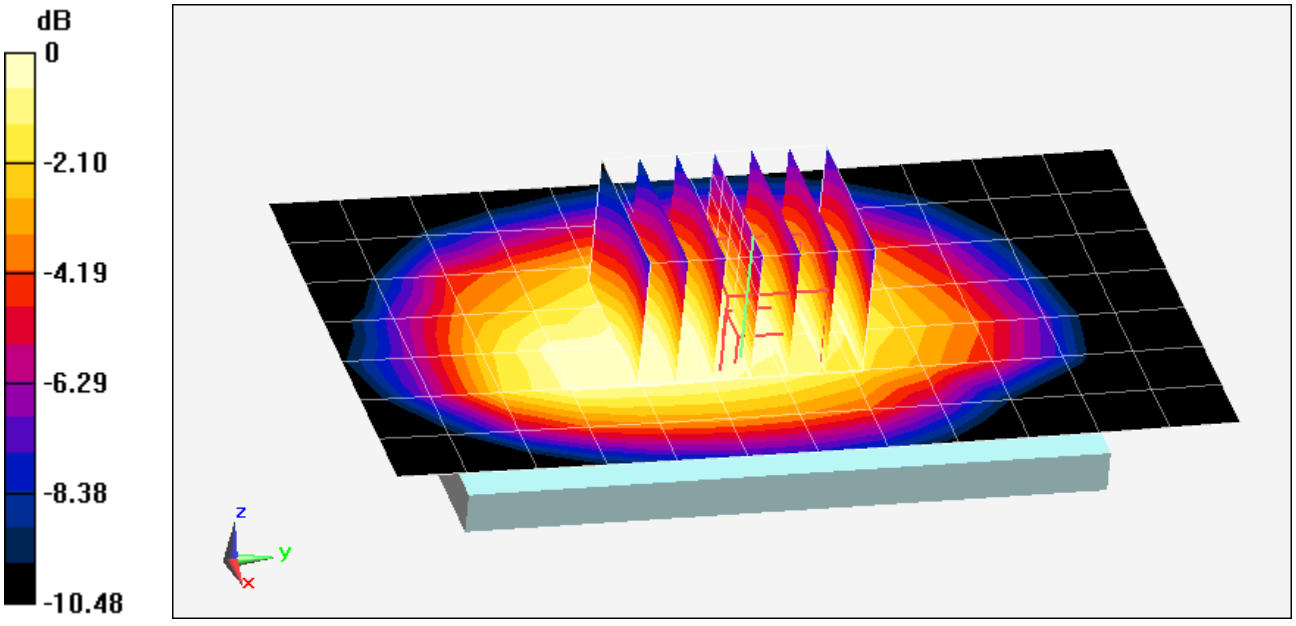
Communication System: CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.998 S/m; ε_r = 54.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: Cell. CDMA (§90S), Body SAR, Back side, Mid.ch, Standard Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.782 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.918 W/kg
SAR(1 g) = 0.734 W/kg



0 dB = 0.763 W/kg = -1.17 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-7

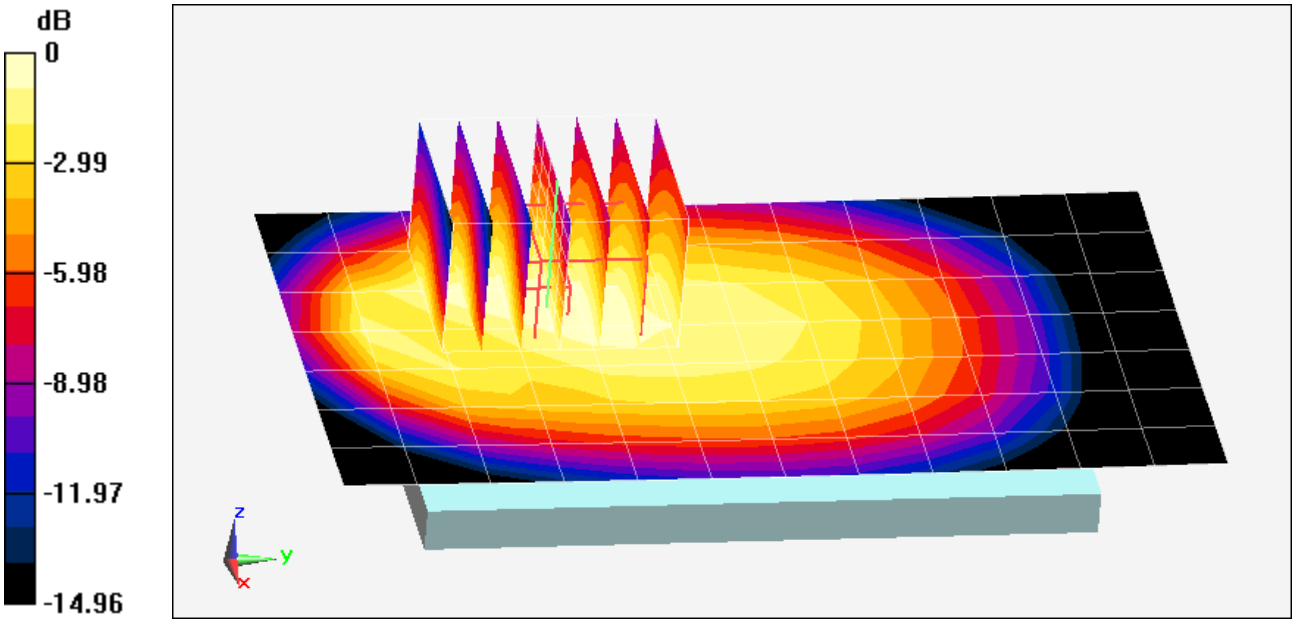
Communication System: CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.998 S/m; ε_r = 54.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: Cell. EVDO (§90S), Body SAR, Front side, Mid.ch, Standard Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.556 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.936 W/kg
SAR(1 g) = 0.678 W/kg



0 dB = 0.715 W/kg = -1.46 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-7

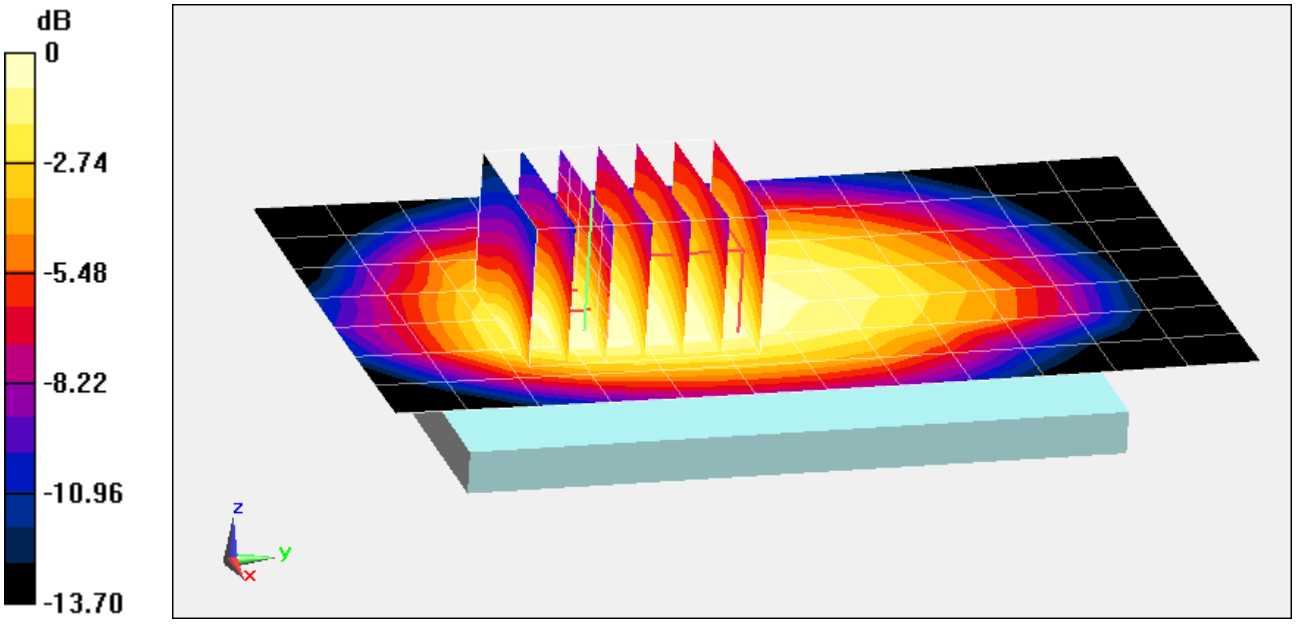
Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1.017 S/m; ε_r = 54.748; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: Cell. CDMA (§22H), Body SAR, Back side, Mid.ch, Standard Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.509 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.726 W/kg



0 dB = 0.770 W/kg = -1.14 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-7

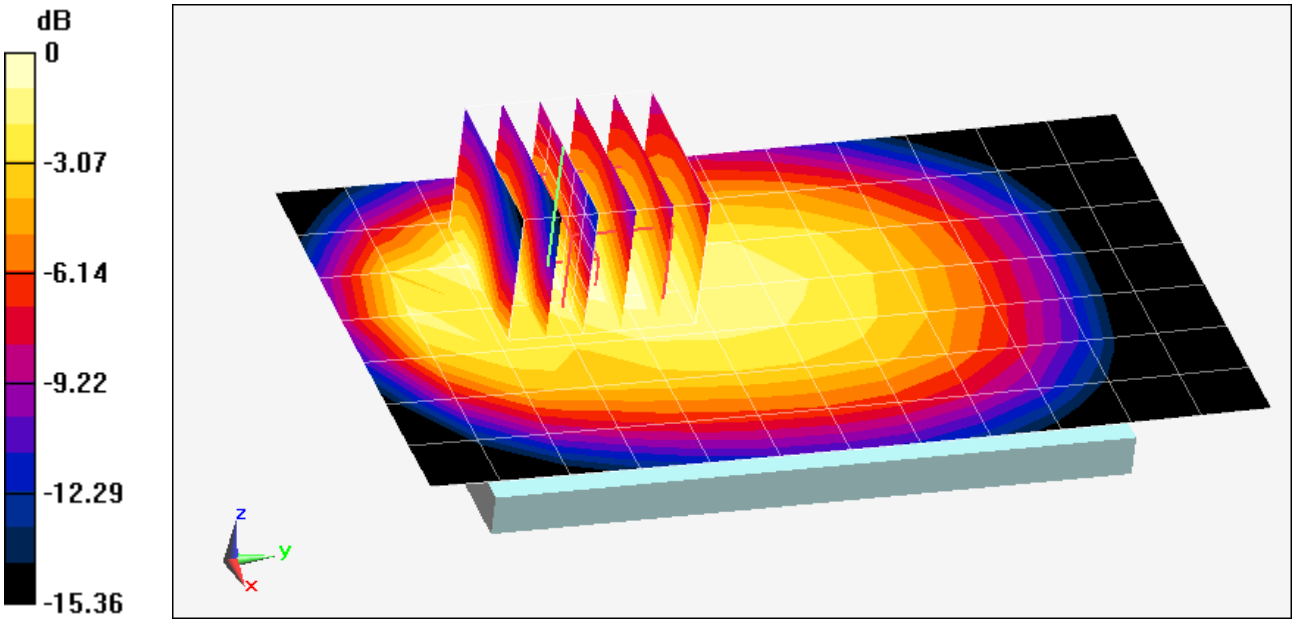
Communication System: CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
f = 836.52 MHz; σ = 1.017 S/m; ε_r = 54.748; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: Cell. EVDO (§22H), Body SAR, Front side, Mid.ch, Standard Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.453 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.714 W/kg



0 dB = 0.762 W/kg = -1.18 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-8

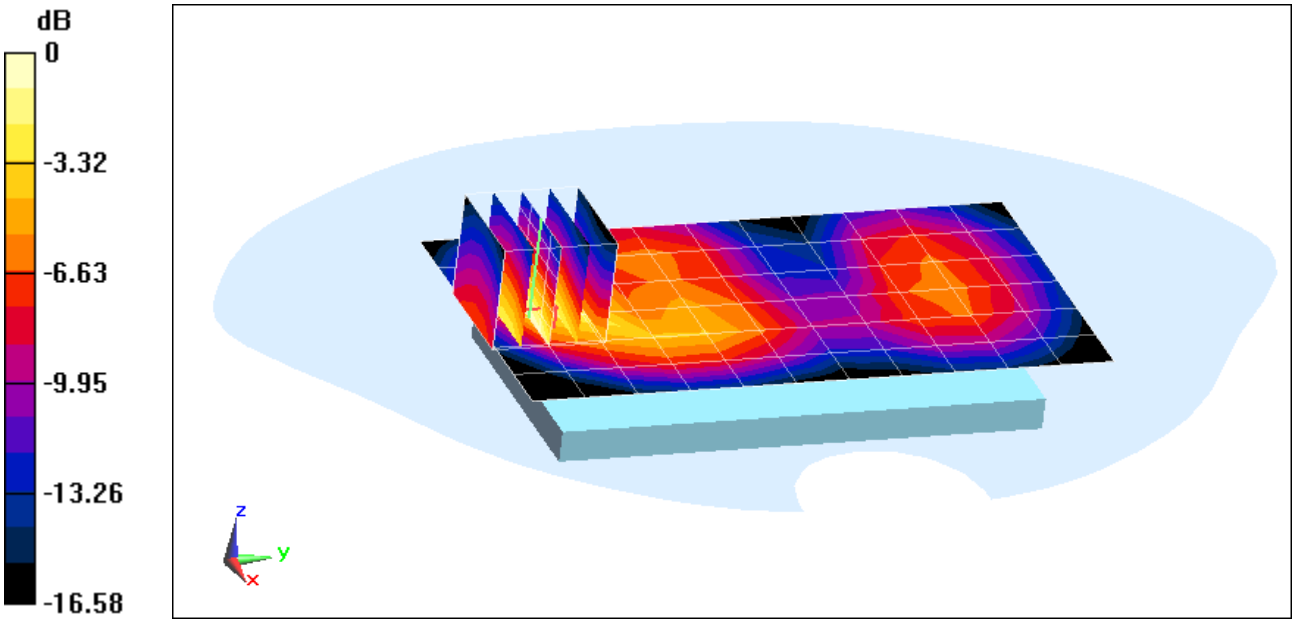
Communication System: CDMA; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1851.25 MHz; σ = 1.448 S/m; ε_r = 51.92; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: PCS CDMA, Body SAR, Back side, Low.ch, Standard Cover

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.594 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 0.995 W/kg



0 dB = 1.13 W/kg = 0.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-8

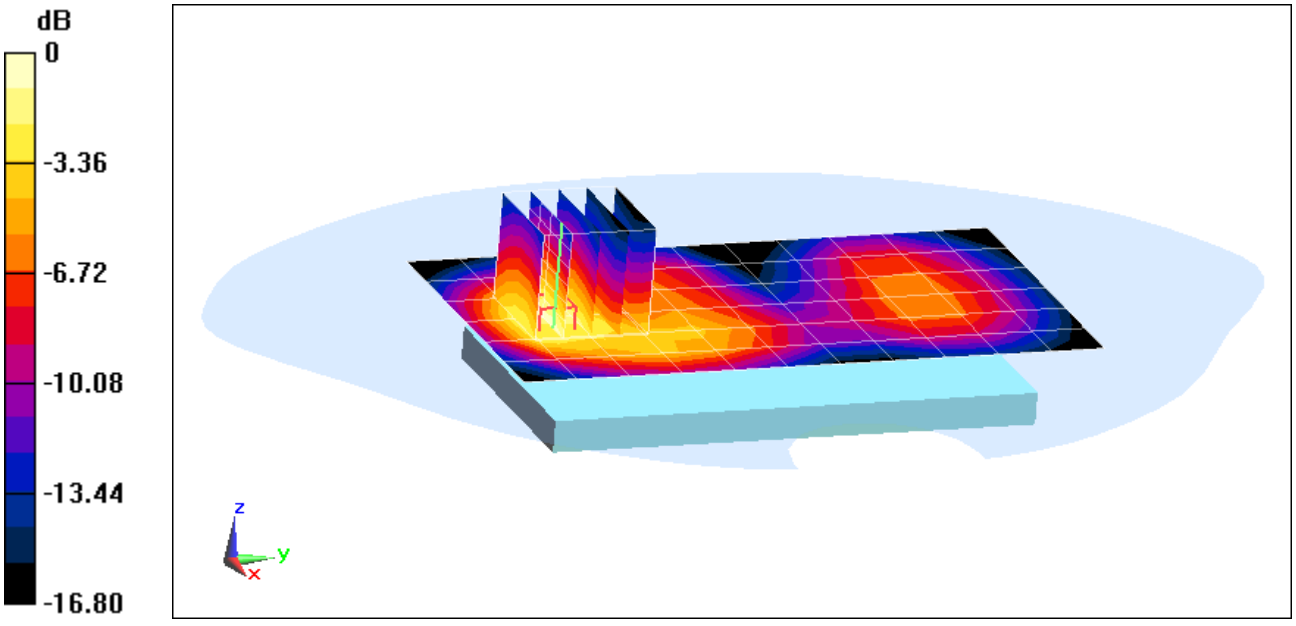
Communication System: CDMA; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1851.25 MHz; σ = 1.448 S/m; ε_r = 51.92; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: PCS EVDO, Body SAR, Back side, Low.ch, Standard Cover

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.779 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 0.917 W/kg



0 dB = 1.02 W/kg = 0.09 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-10

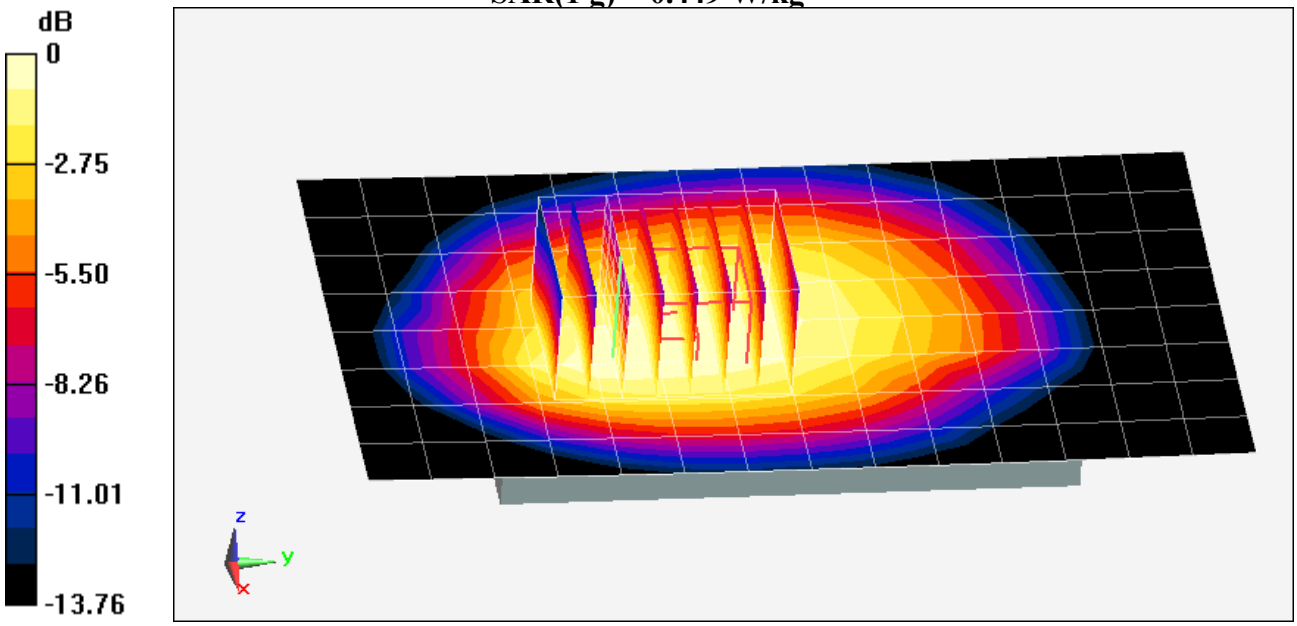
Communication System: LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used (interpolated):
$f = 831.5$ MHz; $\sigma = 1.012$ S/m; $\varepsilon_r = 54.801$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 26, Body SAR, Back side, Mid.ch, QPSK, 10 MHz Bandwidth, 1RB, 49 Offset, Standard Cover

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.897 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.627 W/kg
SAR(1 g) = 0.449 W/kg



0 dB = 0.474 W/kg = -3.24 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-9

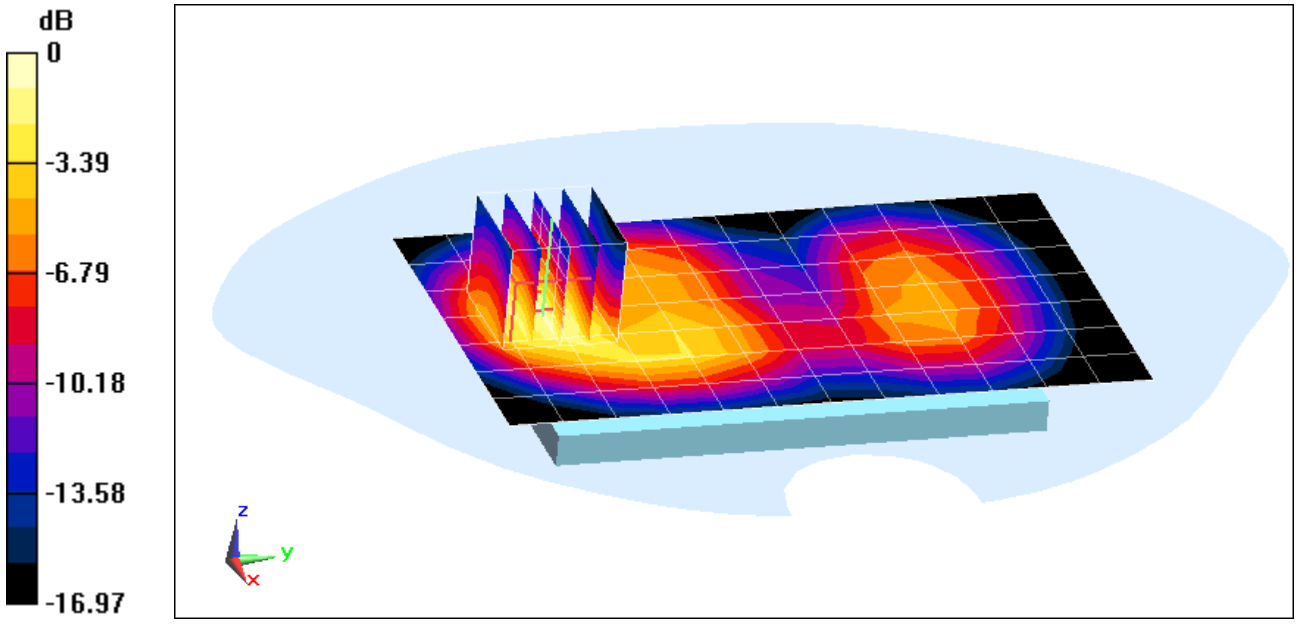
Communication System: LTE Band 25 (PCS); Frequency: 1855 MHz; Duty Cycle: 1:1
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1855 MHz; σ = 1.452 S/m; ε_r = 51.907; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 25 (PCS), Body SAR, Back side, Low.ch, QPSK 10MHz Bandwidth, 1 RB, 49 RB Offset, Wireless Charging Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.362 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.769 W/kg



0 dB = 0.856 W/kg = -0.68 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-11

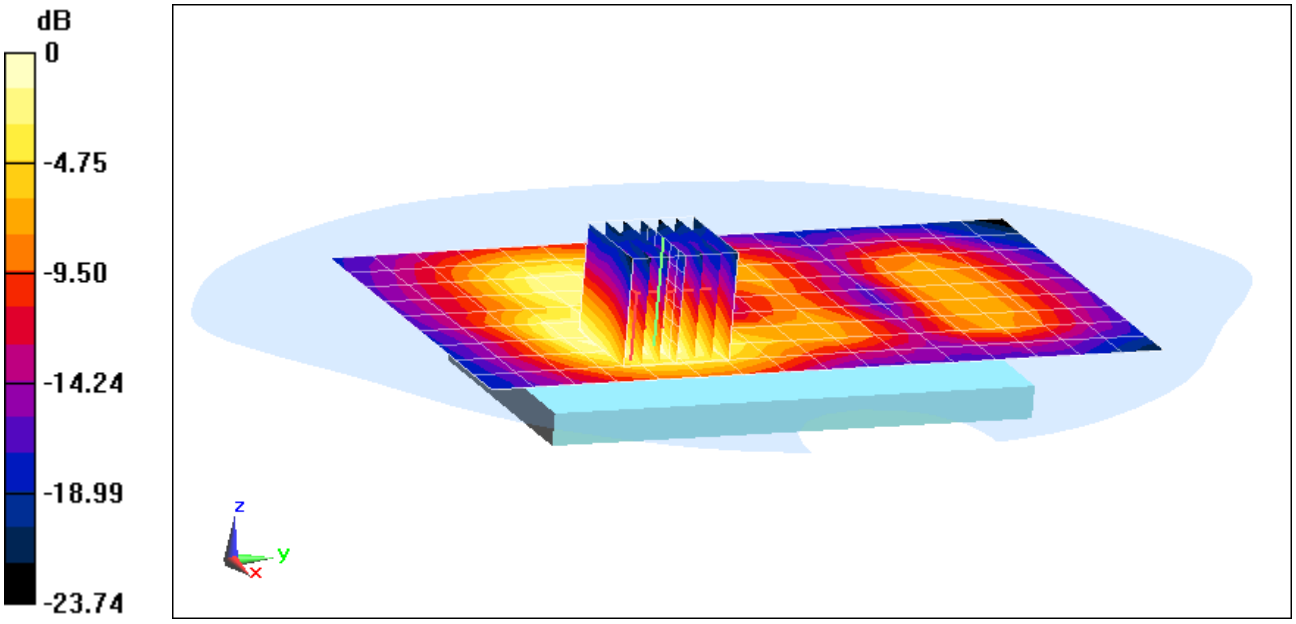
Communication System: LTE TDD41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body, Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.341 S/m; ε_r = 51.173; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-04-2013; Ambient Temp: 22.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3263; ConvF(4.14, 4.14, 4.14); Calibrated: 5/16/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/13/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 41, Body SAR, Back side, High.ch, QPSK
20MHz Bandwidth, 1 RB, 50 RB Offset, Standard Cover

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.374 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.518 W/kg



0 dB = 0.666 W/kg = -1.77 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

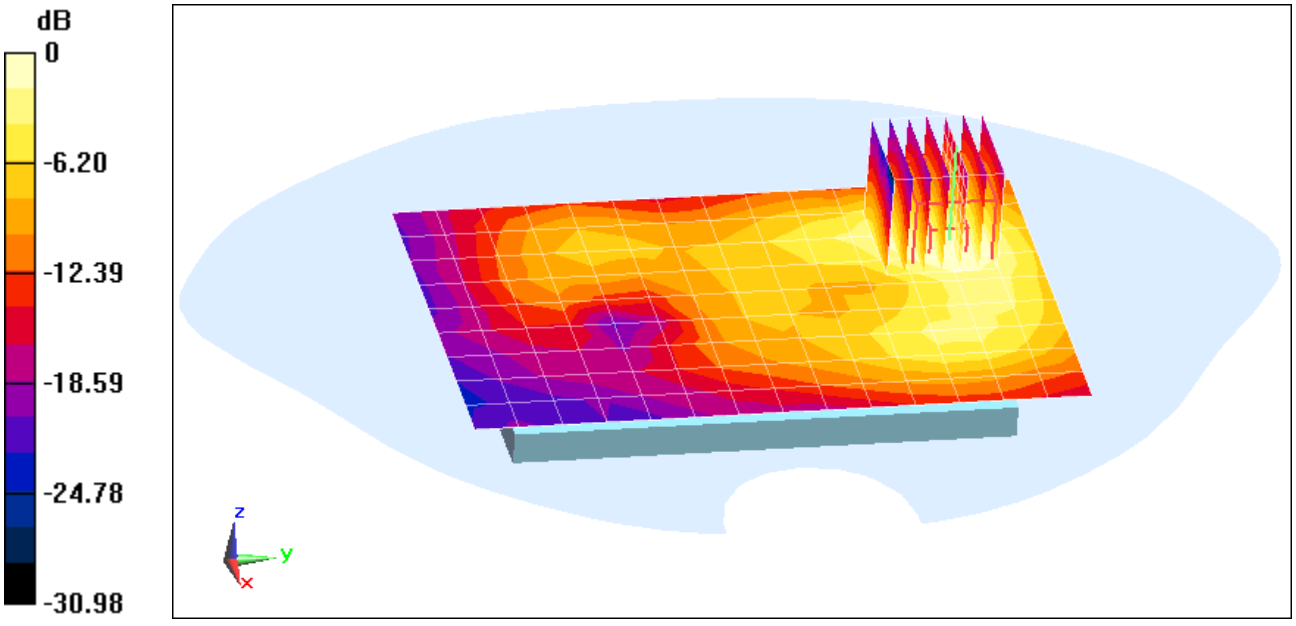
Communication System: IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body, Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.985 S/m; ε_r = 52.245; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-04-2013; Ambient Temp: 22.3°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3263; ConvF(4.33, 4.33, 4.33); Calibrated: 5/16/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/13/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.225 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.444 W/kg
SAR(1 g) = 0.214 W/kg



0 dB = 0.274 W/kg = -5.62 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

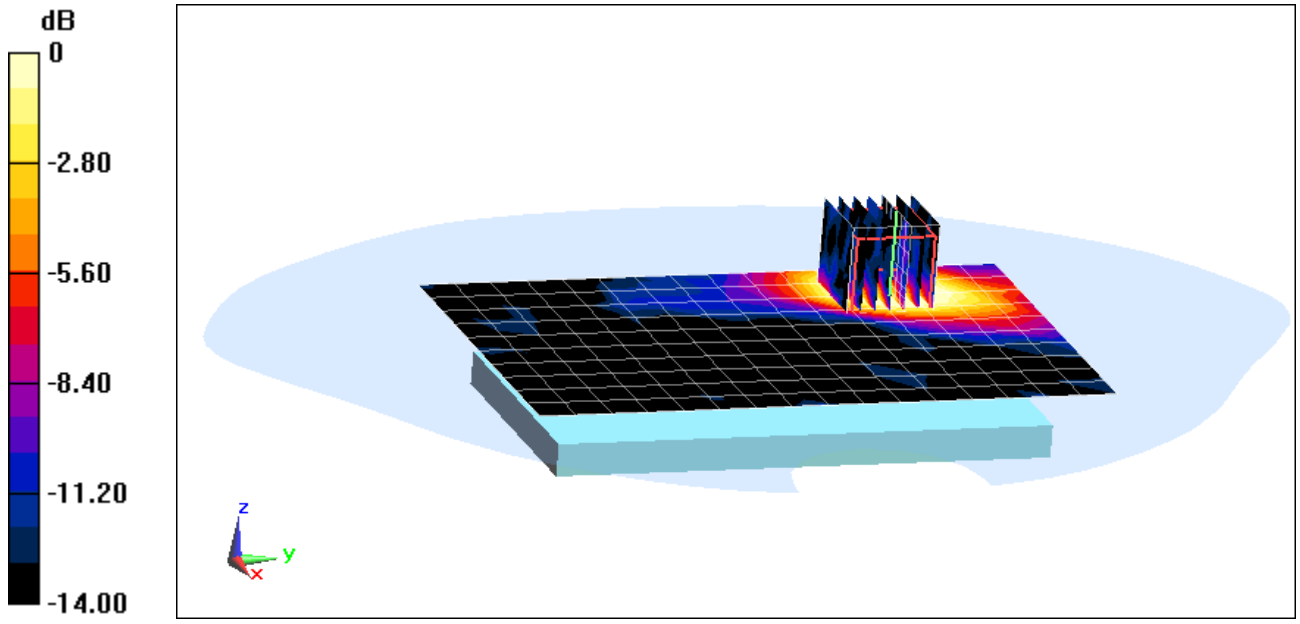
Communication System: IEEE 802.11a; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5745 MHz; σ = 6.13 S/m; ε_r = 49.338; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3920; ConvF(3.91, 3.91, 3.91); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

Area Scan (11x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Reference Value = 3.961 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 0.368 W/kg
SAR(1 g) = 0.091 W/kg



0 dB = 0.206 W/kg = -6.86 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

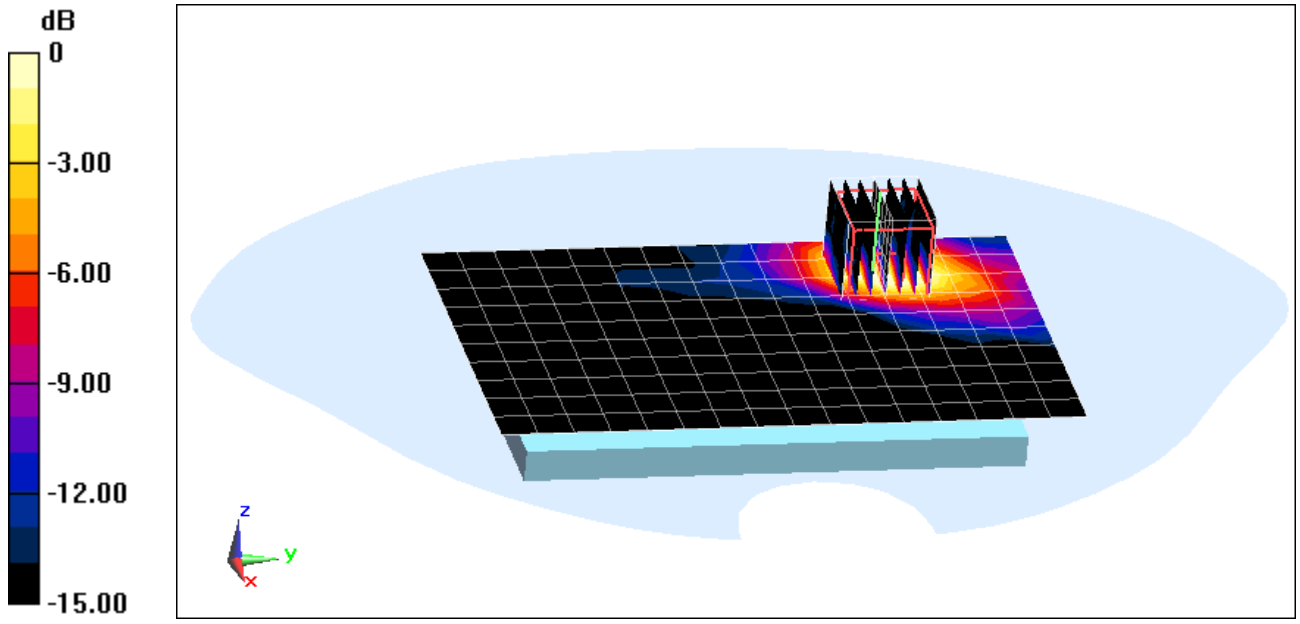
Communication System: IEEE 802.11a; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5745 MHz; σ = 6.13 S/m; ε_r = 49.338; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3920; ConvF(3.91, 3.91, 3.91); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 149,
6 Mbps, Back Side, Wireless Charging Cover

Area Scan (11x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm. Graded Ratio: 1.4
Reference Value = 5.301 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.611 W/kg
SAR(1 g) = 0.162 W/kg



0 dB = 0.363 W/kg = -4.40 dBW/kg

DUT: A3LSPHL720T; Type: Portable Handset; Serial: 309-2

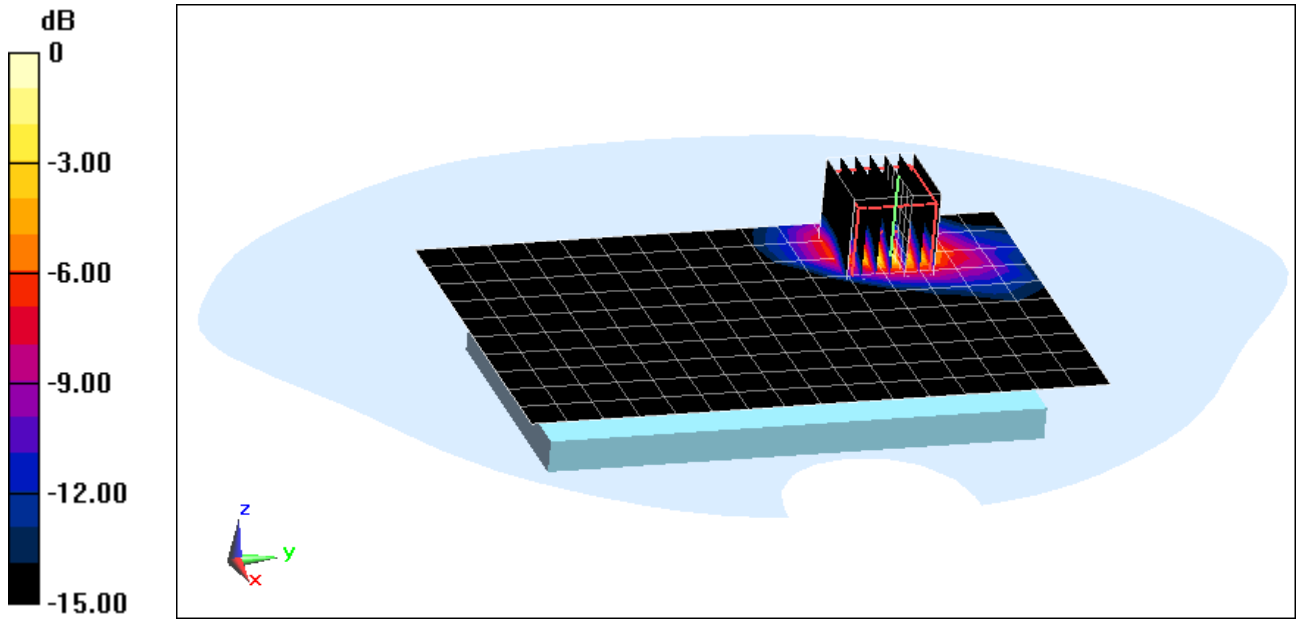
Communication System: IEEE 802.11a; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5200 MHz; σ = 5.269 S/m; ε_r = 50.562; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3920; ConvF(4.23, 4.23, 4.23); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.2 GHz, Body SAR, Ch 40,
6 Mbps, Back Side, Standard Cover

Area Scan (11x17x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Reference Value = 8.596 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.368 W/kg



0 dB = 0.786 W/kg = -1.05 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

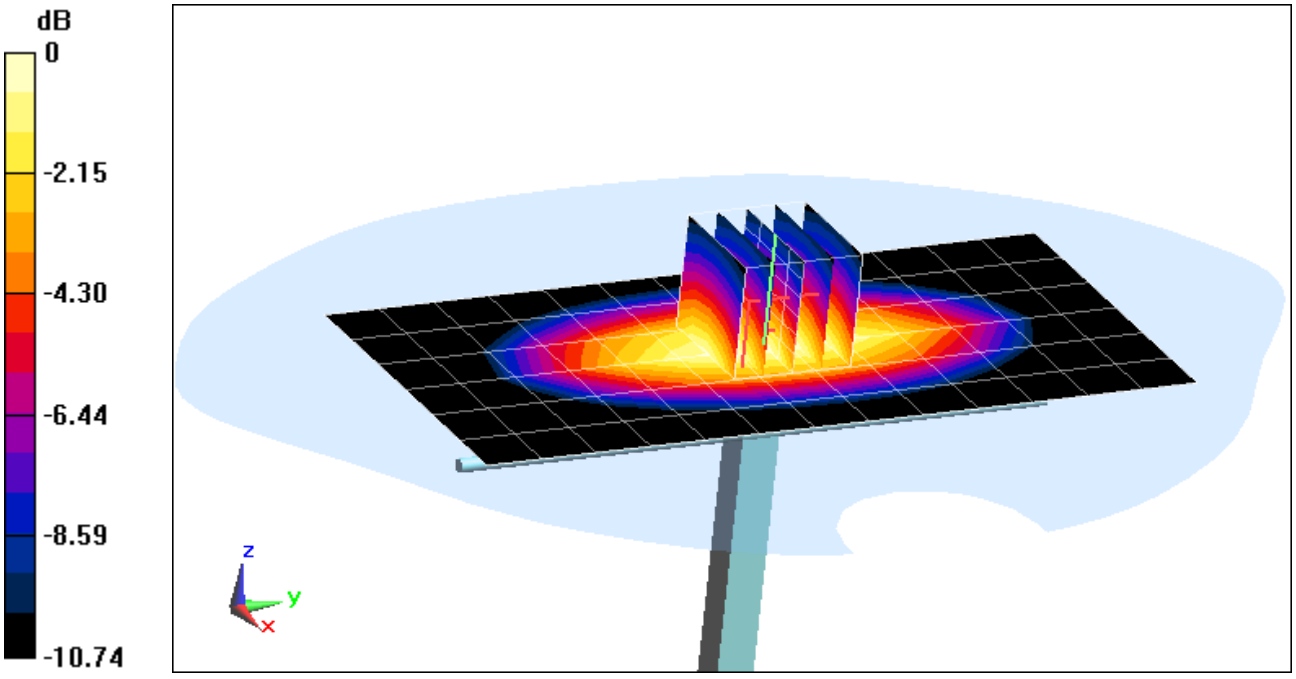
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head, Medium parameters used:
f = 835 MHz; σ = 0.935 S/m; ε_r = 43.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-06-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.954 W/kg
Deviation = -1.45%



0 dB = 1.03 W/kg = 0.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

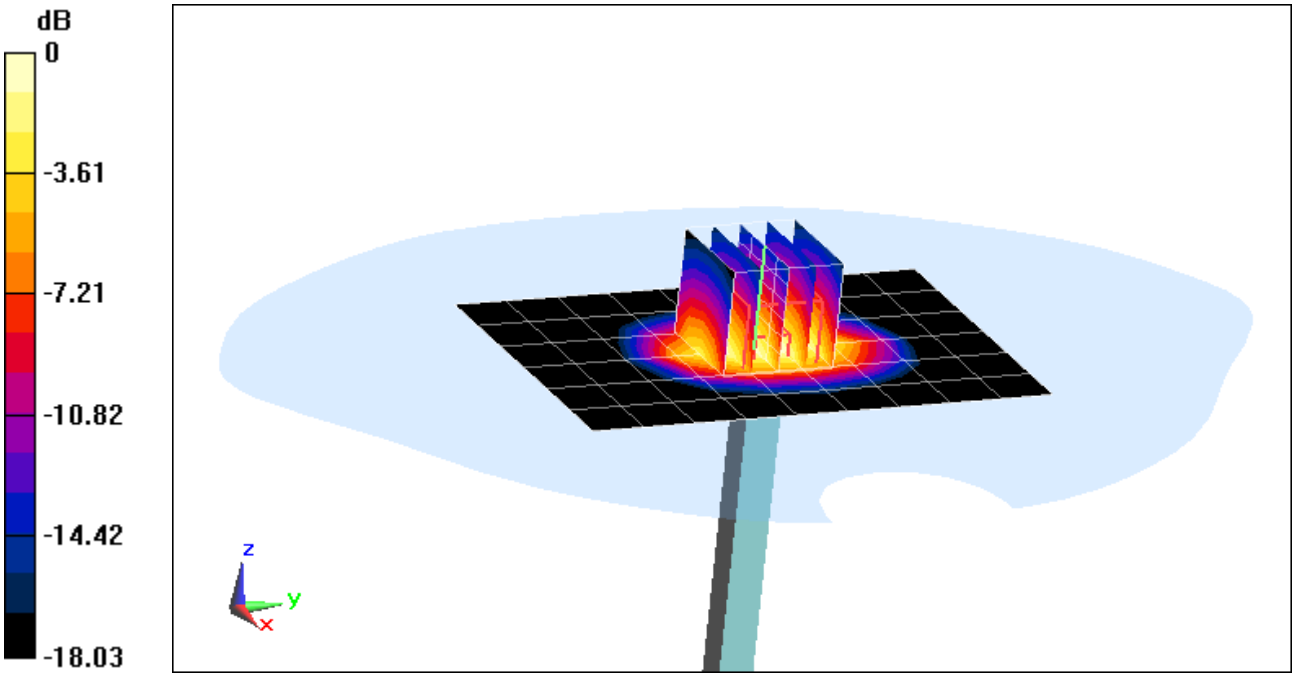
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head, Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.455 S/m; ε_r = 40.905; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-05-2013; Ambient Temp: 22.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(5.08, 5.08, 5.08); Calibrated: 4/29/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 4/22/2013
Phantom: SAM Front; Type: QD000P40CD; Serial: 1717
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.59 W/kg
SAR(1 g) = 4.05 W/kg
Deviation = 2.02%



0 dB = 4.50 W/kg = 6.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 2450 MHz; Type: D2450V2; Serial: 882

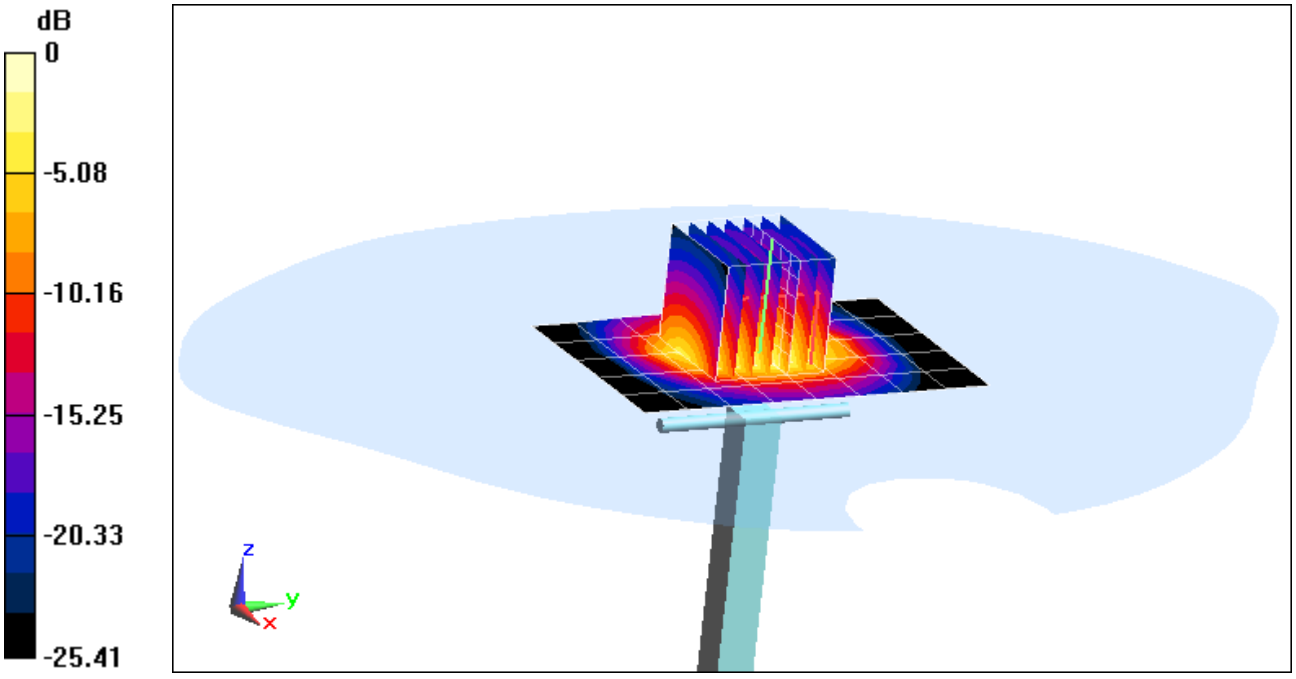
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head, Medium parameters used:
f = 2450 MHz; σ = 1.814 S/m; ε_r = 37.695; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-07-2013; Ambient Temp: 23.6°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3589; ConvF(6.37, 6.37, 6.37); Calibrated: 1/17/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

2450 MHz System Verification

Area Scan (6x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.3 W/kg
SAR(1 g) = 5.25 W/kg
Deviation = 1.55%



0 dB = 6.82 W/kg = 8.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 2600 MHz; Type: D2600V2; Serial: 1004

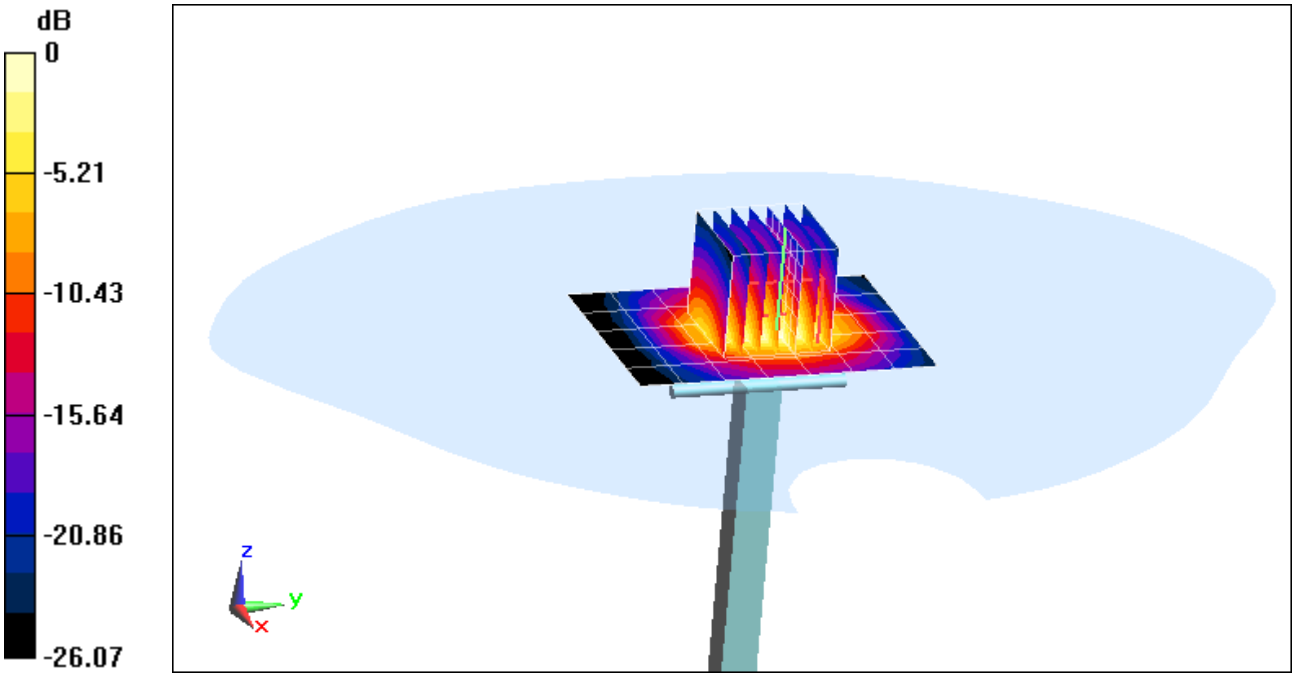
Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Head, Medium parameters used:
f = 2600 MHz; σ = 2.017 S/m; ε_r = 39.706; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2013; Ambient Temp: 23.0°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3263; ConvF(4.31, 4.31, 4.31); Calibrated: 5/16/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/13/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

2600 MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 13.7 W/kg
SAR(1 g) = 5.93 W/kg
Deviation = 1.89%



0 dB = 7.80 W/kg = 8.92 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

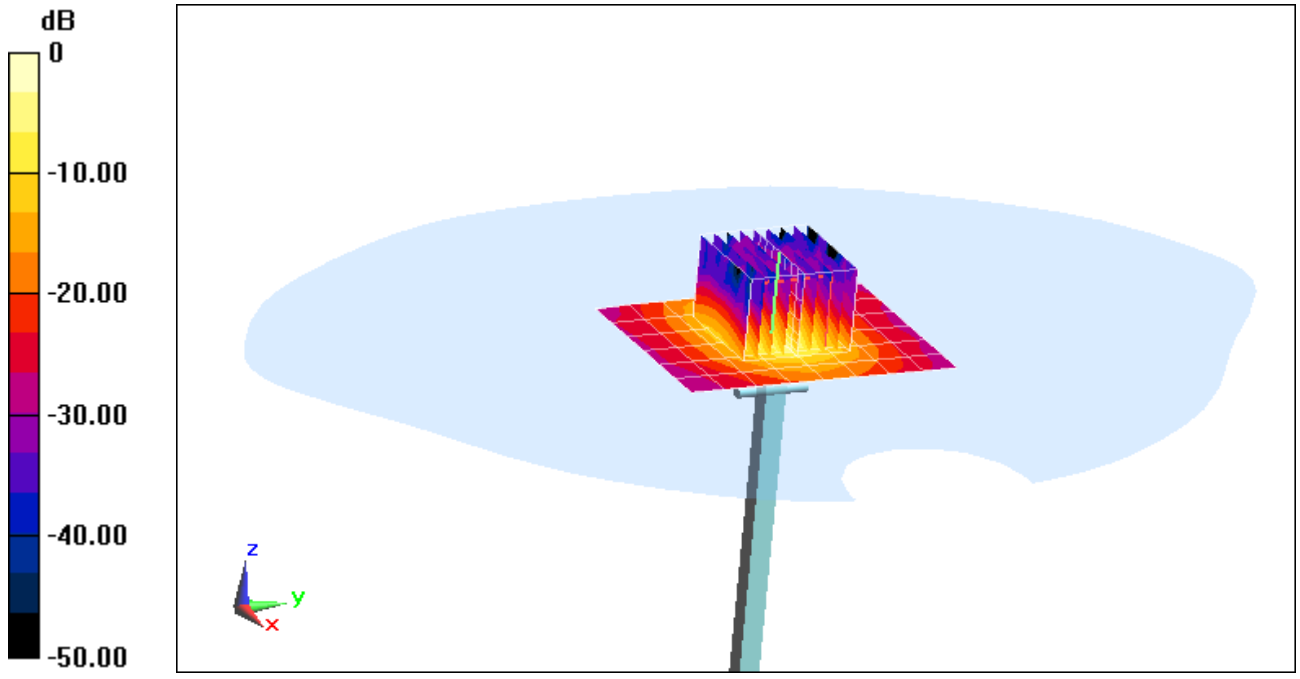
Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5200 MHz; σ = 4.535 S/m; ε_r = 35.117; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-30-2013; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3589; ConvF(4.48, 4.48, 4.48); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5200 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 7.26 W/kg
Deviation = -4.35%



0 dB = 17.7 W/kg = 12.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

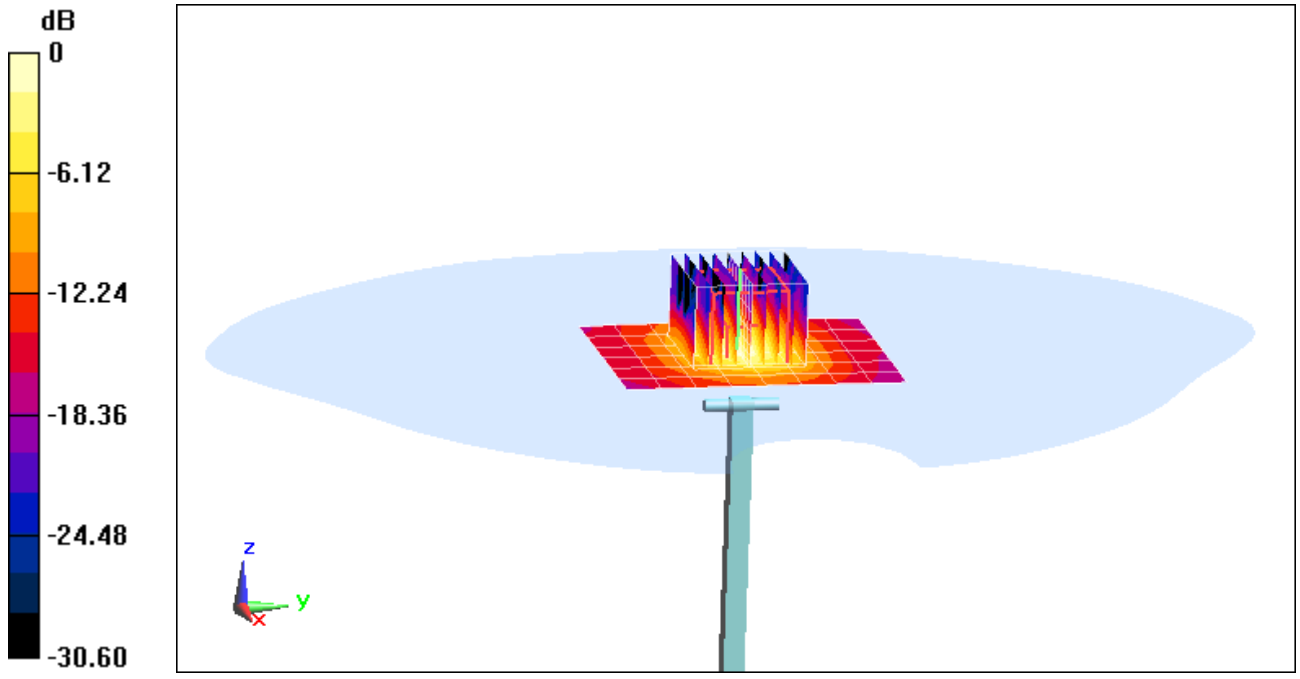
Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5300 MHz; σ = 4.664 S/m; ε_r = 34.813; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-30-2013; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3589; ConvF(4.27, 4.27, 4.27); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.5 W/kg
SAR(1 g) = 7.9 W/kg
Deviation = 2.73%



0 dB = 17.1 W/kg = 12.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

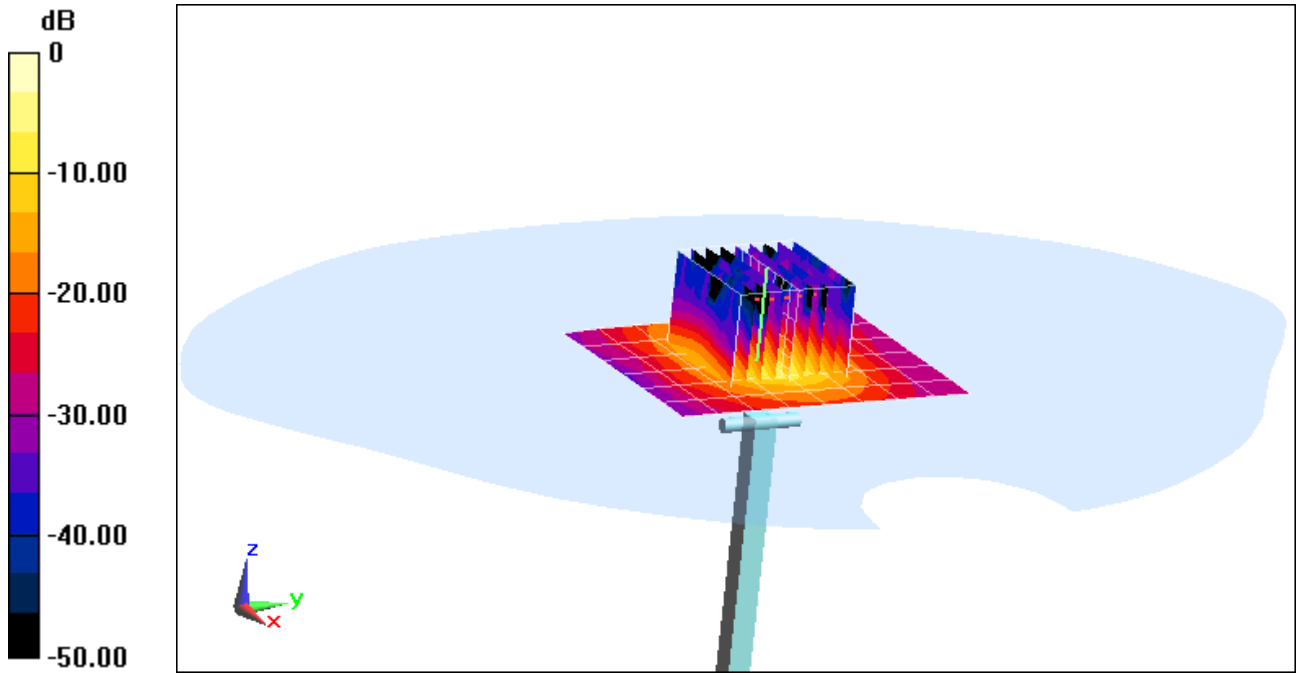
Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5500 MHz; σ = 4.922 S/m; ε_r = 34.329; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-30-2013; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN3589; ConvF(4.14, 4.14, 4.14); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5500 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 34.0 W/kg
SAR(1 g) = 7.61 W/kg
Deviation = -4.99%



0 dB = 20.0 W/kg = 13.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

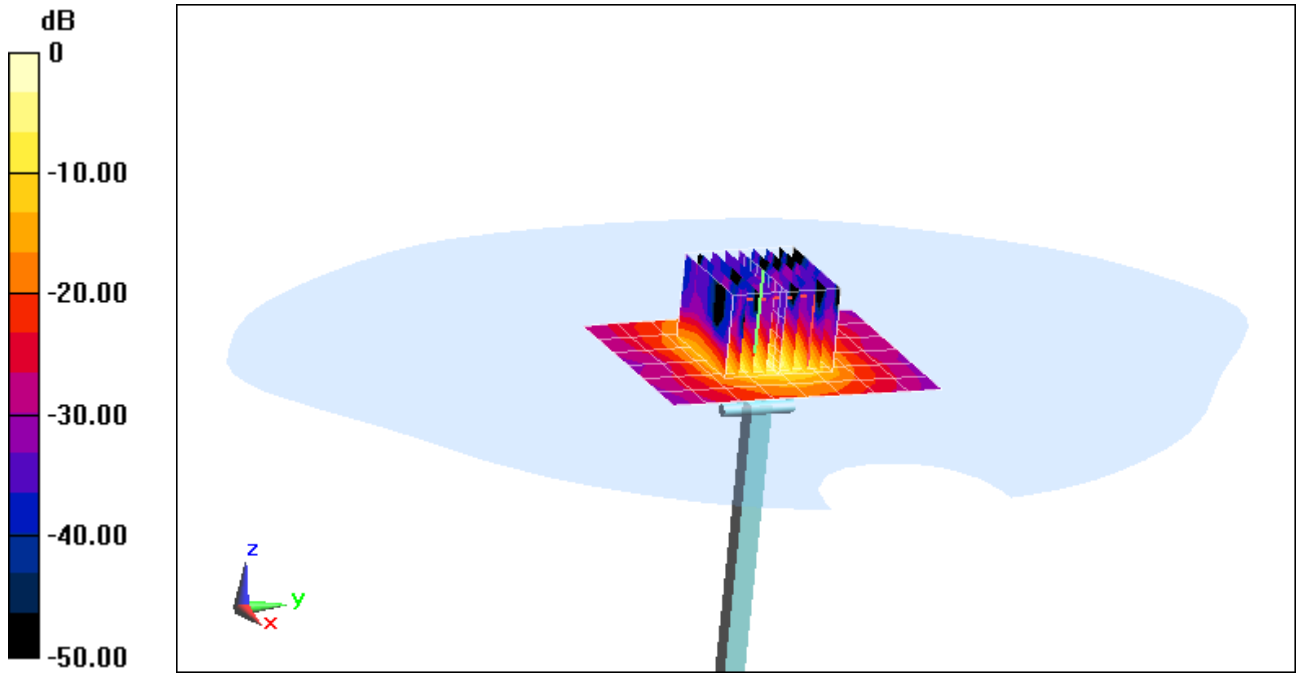
Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head, Medium parameters used:
f = 5800 MHz; σ = 5.317 S/m; ε_r = 33.808; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-30-2013; Ambient Temp: 22.9°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3589; ConvF(3.85, 3.85, 3.85); Calibrated: 1/17/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/17/2013
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 36.5 W/kg
SAR(1 g) = 7.63 W/kg
Deviation = 0.26%



0 dB = 20.5 W/kg = 13.12 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

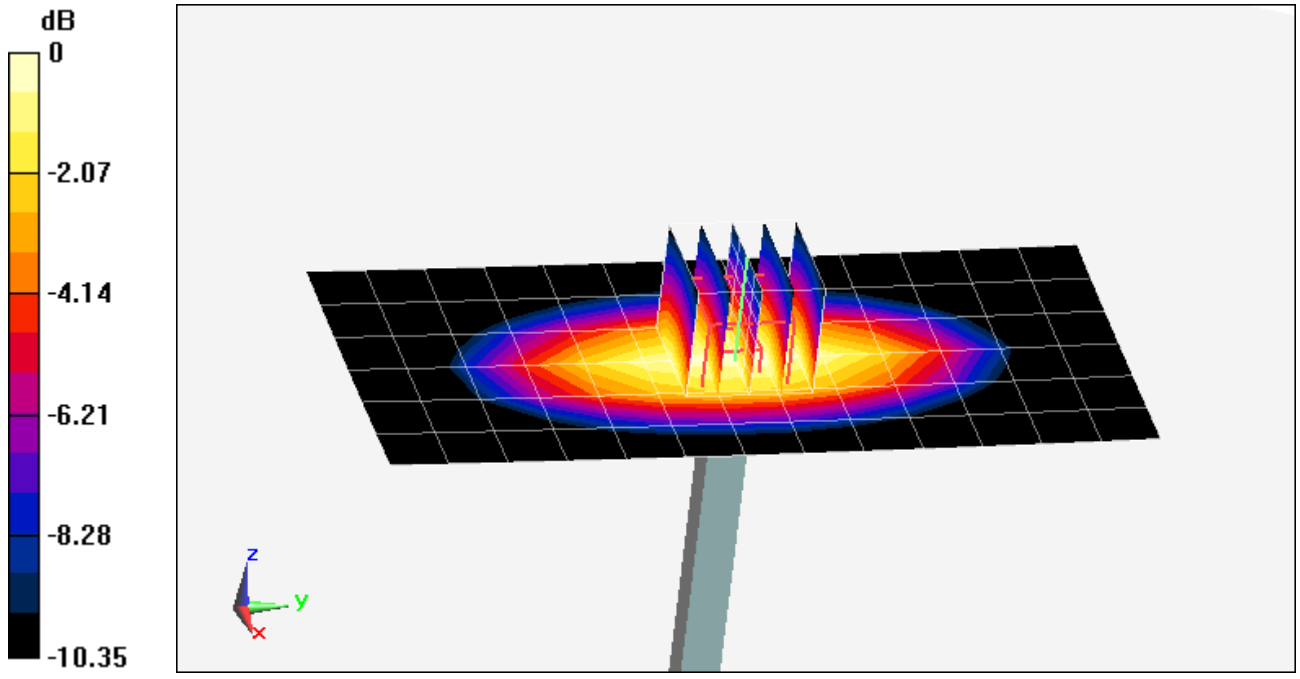
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body, Medium parameters used:
f = 835 MHz; σ = 1.016 S/m; ε_r = 54.761; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-03-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.996 W/kg
Deviation = 4.40%



0 dB = 1.08 W/kg = 0.33 dBW/kg

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

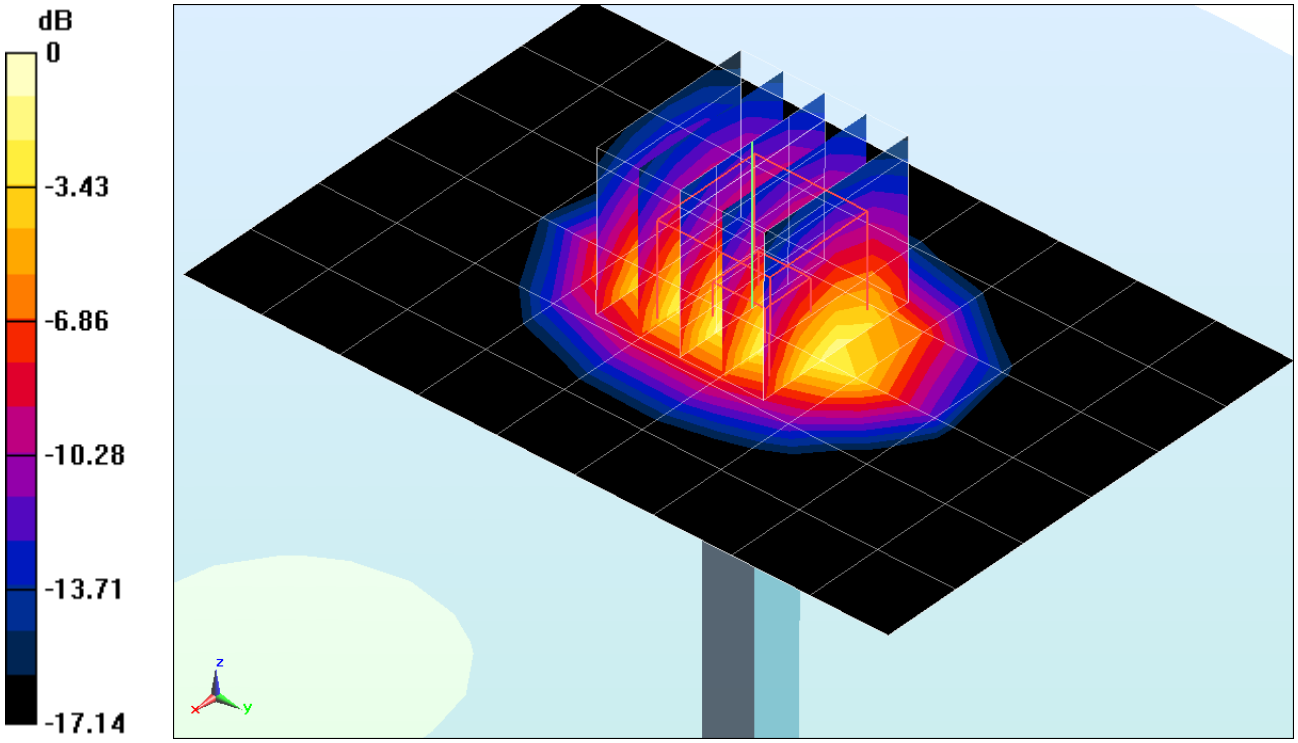
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.531 S/m; ε_r = 53.346; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-07-2013; Ambient Temp: 24.0°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3288; ConvF(4.89, 4.89, 4.89); Calibrated: 9/20/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/19/2012
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.07 W/kg
SAR(1 g) = 4 W/kg
Deviation = -1.96%



0 dB = 4.49 W/kg = 6.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882

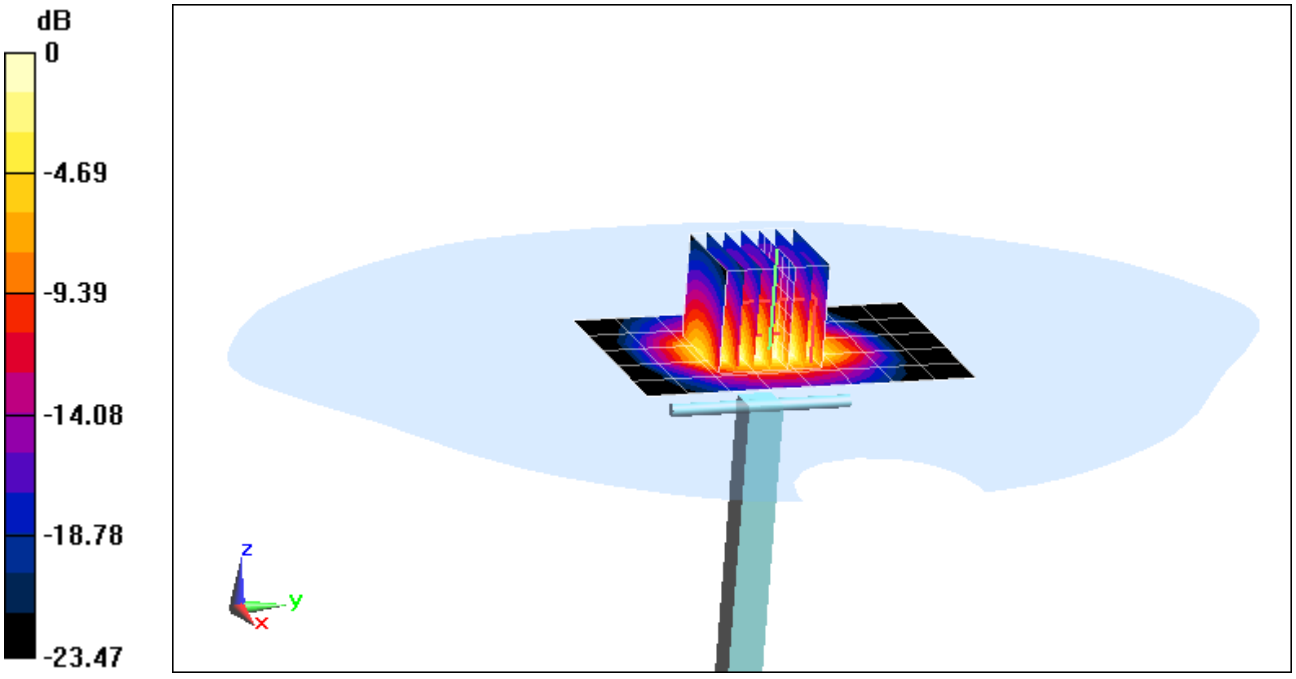
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body, Medium parameters used:
f = 2450 MHz; σ = 2.036 S/m; ε_r = 52.07; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-04-2013; Ambient Temp: 22.3°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3263; ConvF(4.33, 4.33, 4.33); Calibrated: 5/16/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/13/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

2450 MHz System Verification

Area Scan (6x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 11.8 W/kg
SAR(1 g) = 5.2 W/kg
Deviation = 4.21%



0 dB = 6.75 W/kg = 8.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

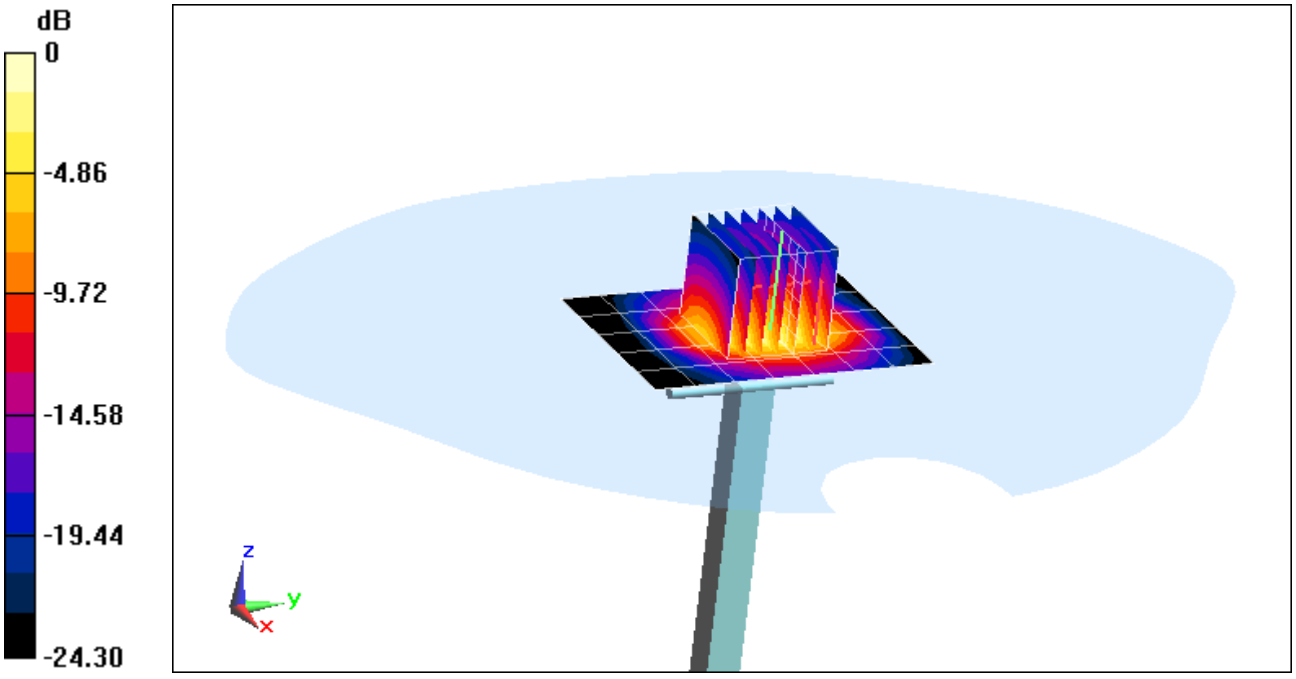
Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body, Medium parameters used:
f = 2600 MHz; σ = 2.243 S/m; ε_r = 51.468; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-04-2013; Ambient Temp: 22.3°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3263; ConvF(4.14, 4.14, 4.14); Calibrated: 5/16/2013;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/13/2013
Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

2600 MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 13.3 W/kg
SAR(1 g) = 5.61 W/kg
Deviation = -2.43%



0 dB = 7.41 W/kg = 8.70 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1120

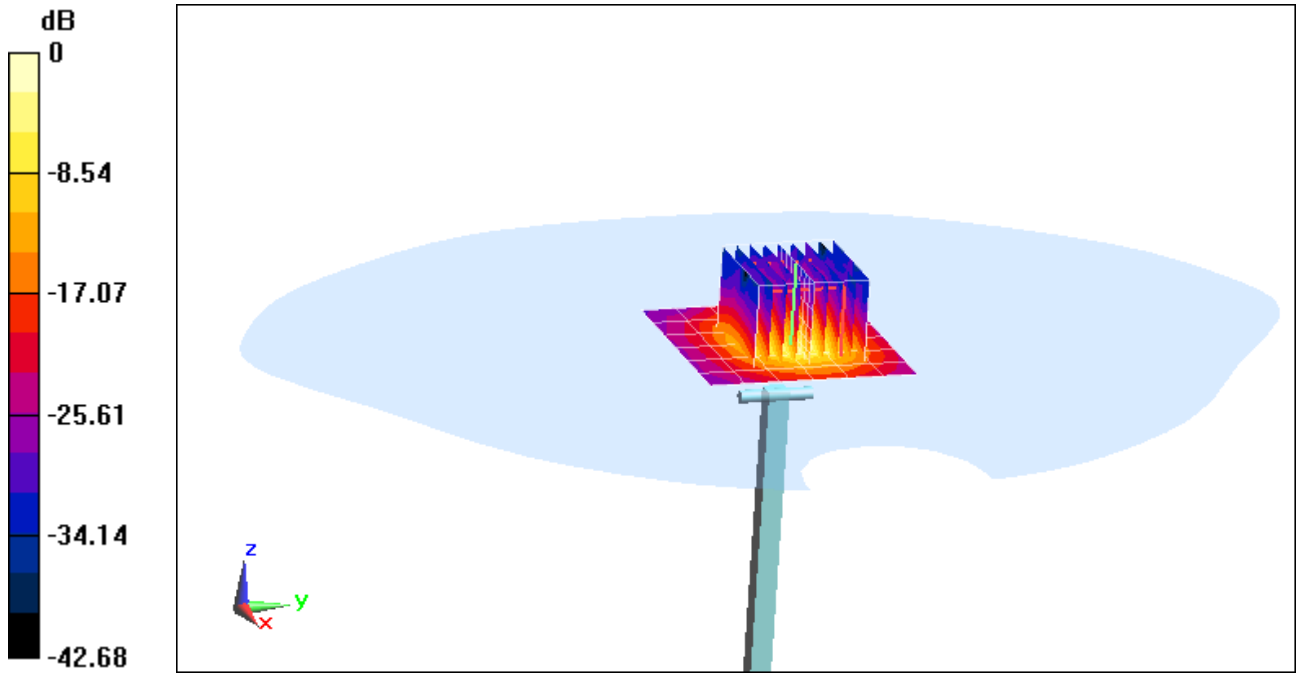
Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5200 MHz; σ = 5.269 S/m; ε_r = 50.562; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3920; ConvF(4.23, 4.23, 4.23); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

5200 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 26.7 W/kg
SAR(1 g) = 7.23 W/kg
Deviation = -5.61%



0 dB = 17.8 W/kg = 12.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1120

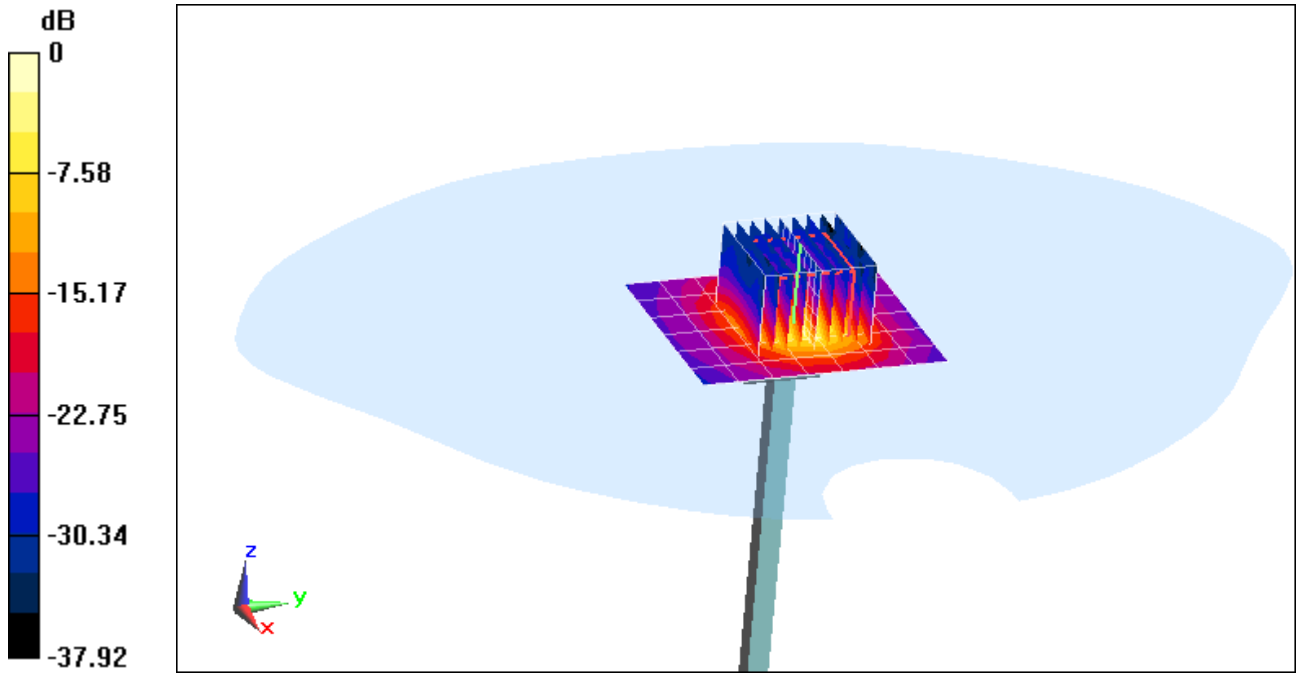
Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5300 MHz; σ = 5.418 S/m; ε_r = 50.323; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3920; ConvF(4.13, 4.13, 4.13); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 7.18 W/kg
Deviation = -6.51%



0 dB = 17.7 W/kg = 12.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1120

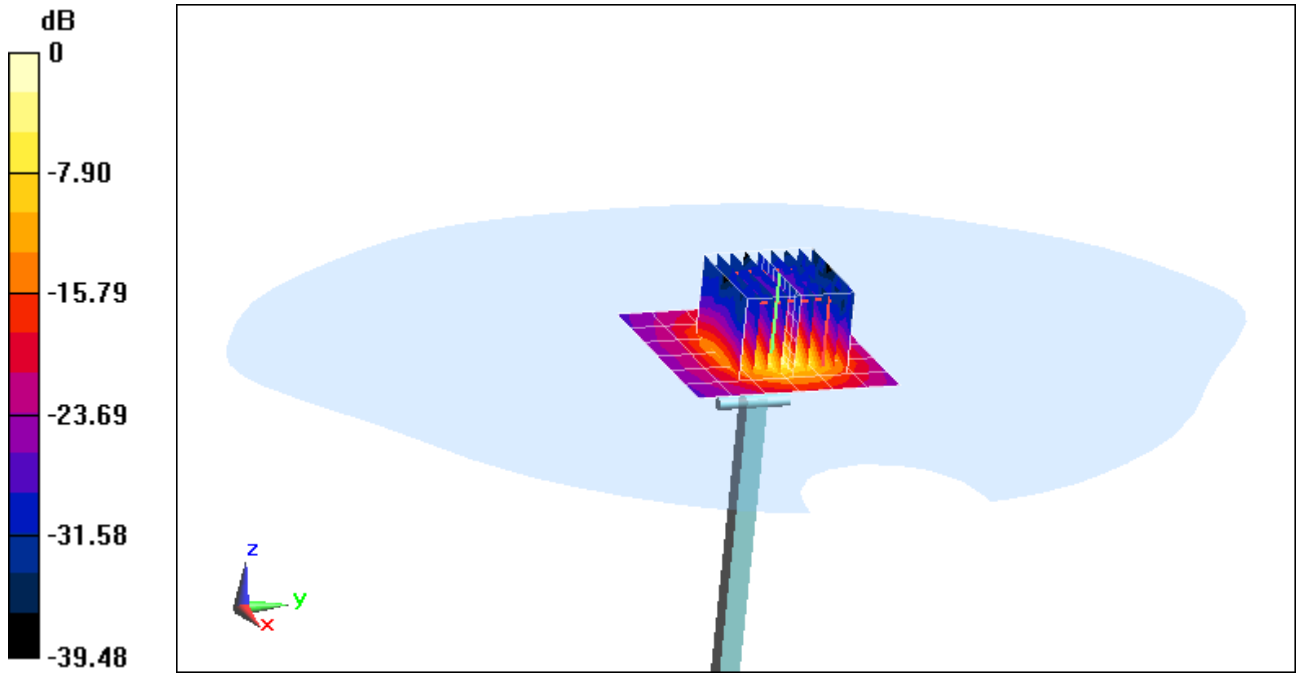
Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5500 MHz; σ = 5.716 S/m; ε_r = 49.975; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 24.1°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3920; ConvF(3.63, 3.63, 3.63); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

5500 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.5 W/kg
SAR(1 g) = 8.27 W/kg
Deviation = 3.63%



0 dB = 21.0 W/kg = 13.22 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1120

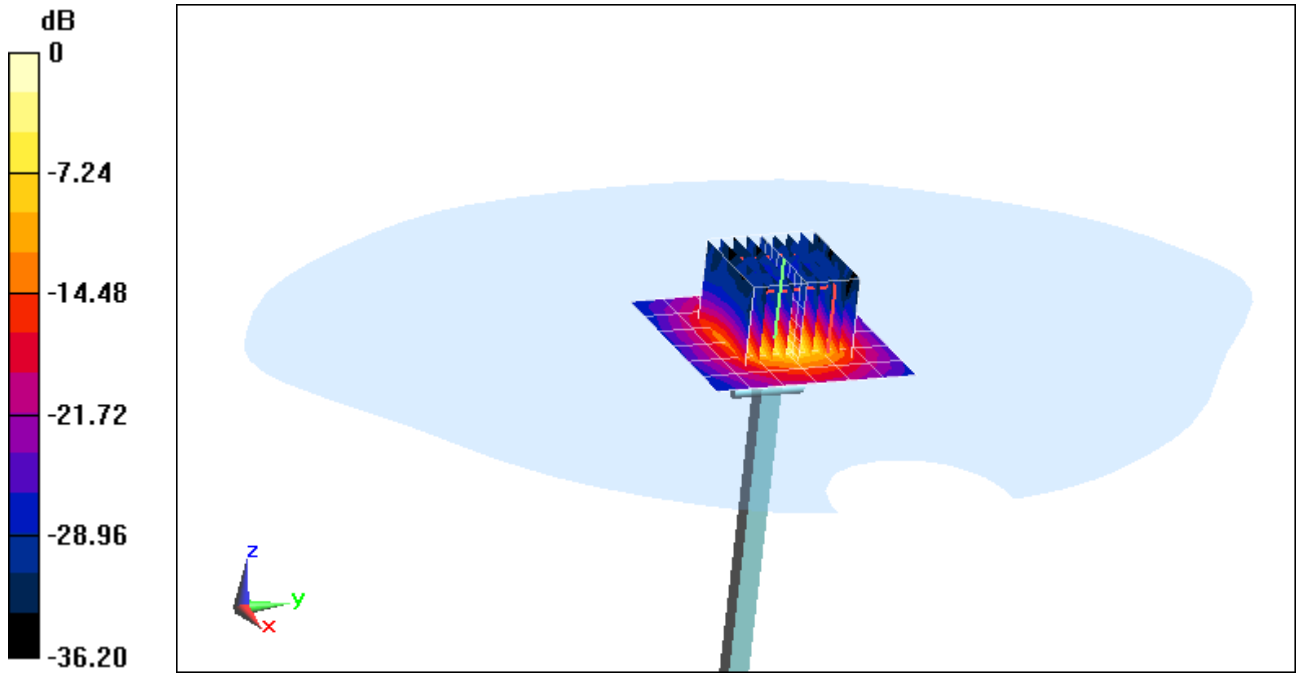
Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body, Medium parameters used:
f = 5800 MHz; σ = 6.189 S/m; ε_r = 49.082; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-03-2013; Ambient Temp: 23.9°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN3920; ConvF(3.91, 3.91, 3.91); Calibrated: 2/27/2013;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

5800 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm, Graded Ratio: 1.4
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 33.5 W/kg
SAR(1 g) = 7.56 W/kg
Deviation = 0.13%



0 dB = 19.6 W/kg = 12.92 dBW/kg

APPENDIX C: PROBE CALIBRATION

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D835V2-4d119_Apr13

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d119
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 25, 2013

✓ KOK 5/8/13

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 909	11-Sep-12 (No. DAE4-909_Sep12)	Sep-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 26, 2013

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.51 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.68 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.30 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.0 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.54 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.31 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 4.7 jΩ
Return Loss	- 26.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8 Ω - 6.3 jΩ
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 25.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d119

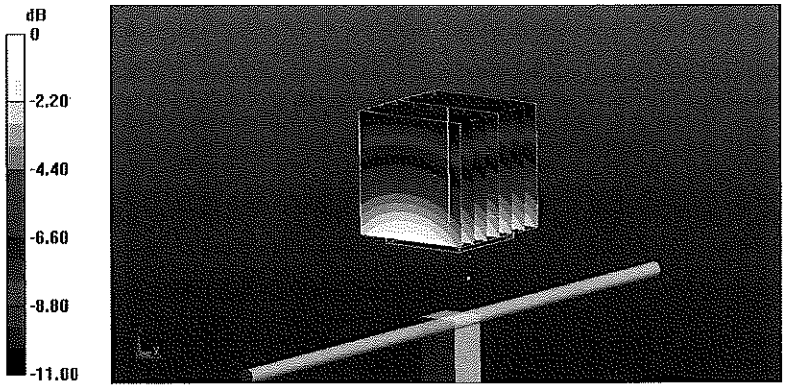
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.05, 6.05, 6.05); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 11.09.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

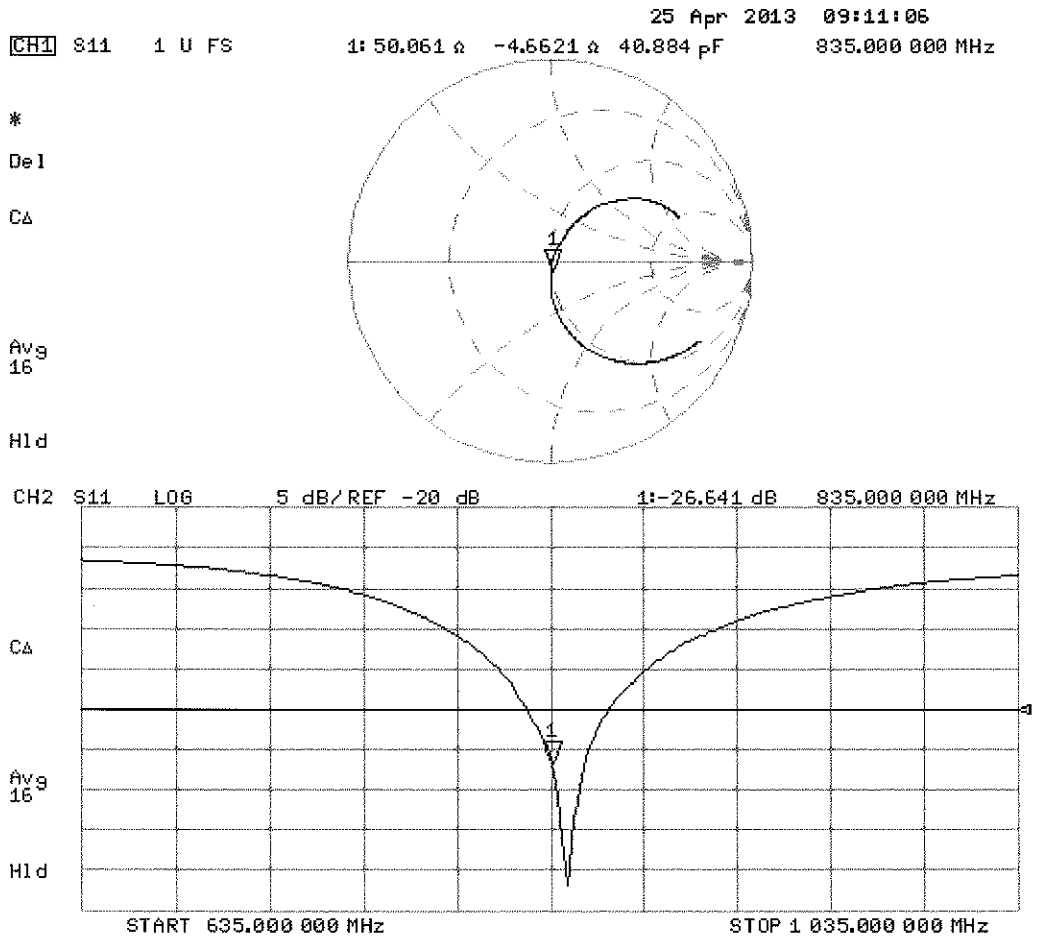
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.387 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.86 W/kg
SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 2.93 W/kg



0 dB = 2.93 W/kg = 4.67 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d119

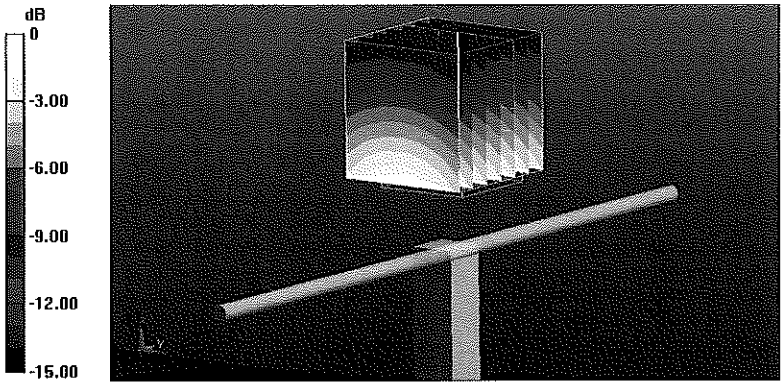
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 11.09.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

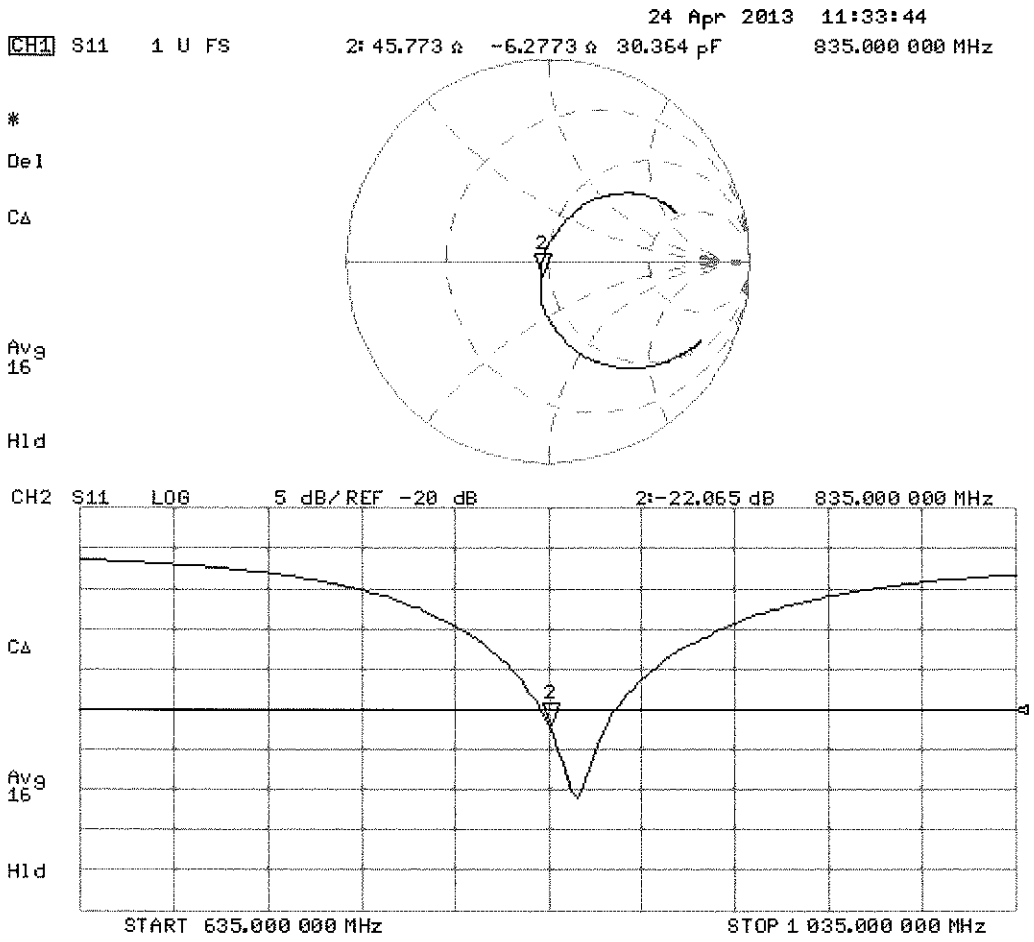
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.178 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 2.89 W/kg



0 dB = 2.89 W/kg = 4.61 dBW/kg

Impedance Measurement Plot for Body TSL



Calibration Laboratory of
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Accreditation No.: SCS 108

Client PC Test

Certificate No: D1900V2-5d148_Feb13

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d148

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: February 06, 2013

KOK 2/21/13

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 6, 2013

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.4 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.8 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.9 ± 6 %	1.53 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.7 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω + 5.9 jΩ
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω + 6.3 jΩ
Return Loss	- 23.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 06.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d148

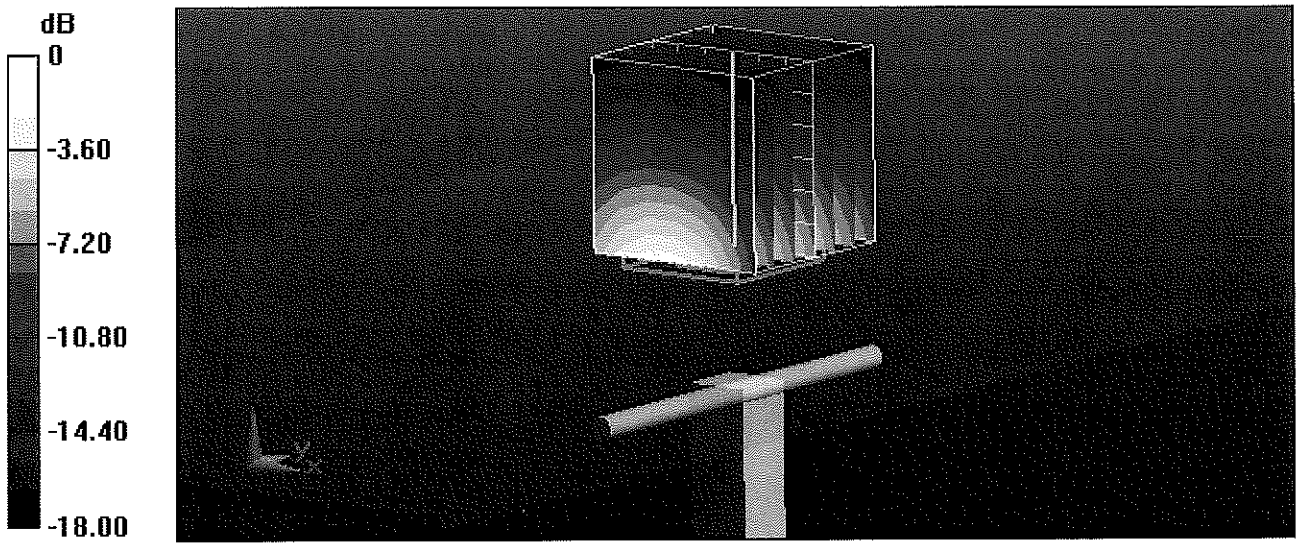
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

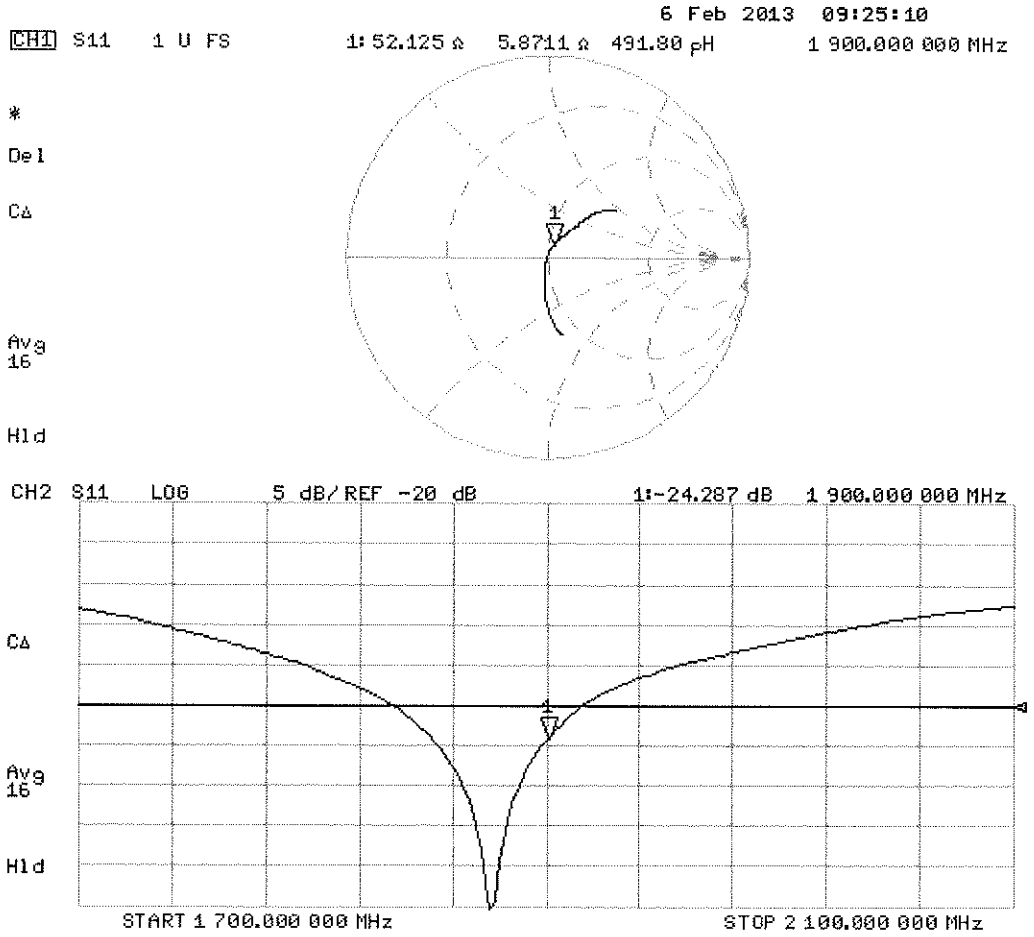
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.534 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.18 W/kg
Maximum value of SAR (measured) = 12.1 W/kg



0 dB = 12.1 W/kg = 10.83 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d148

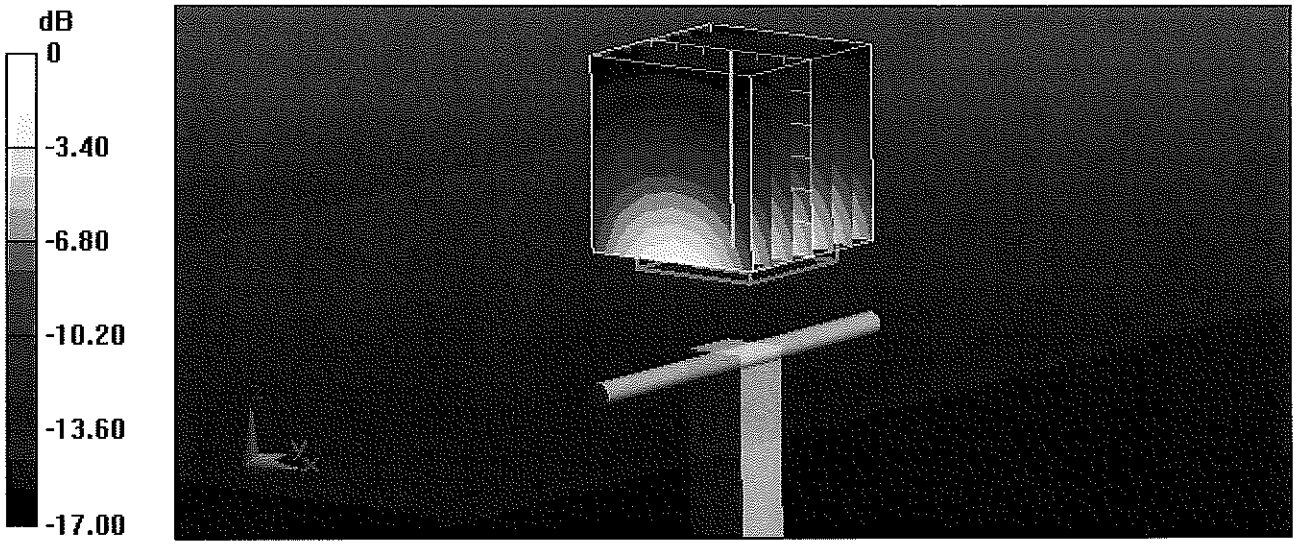
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

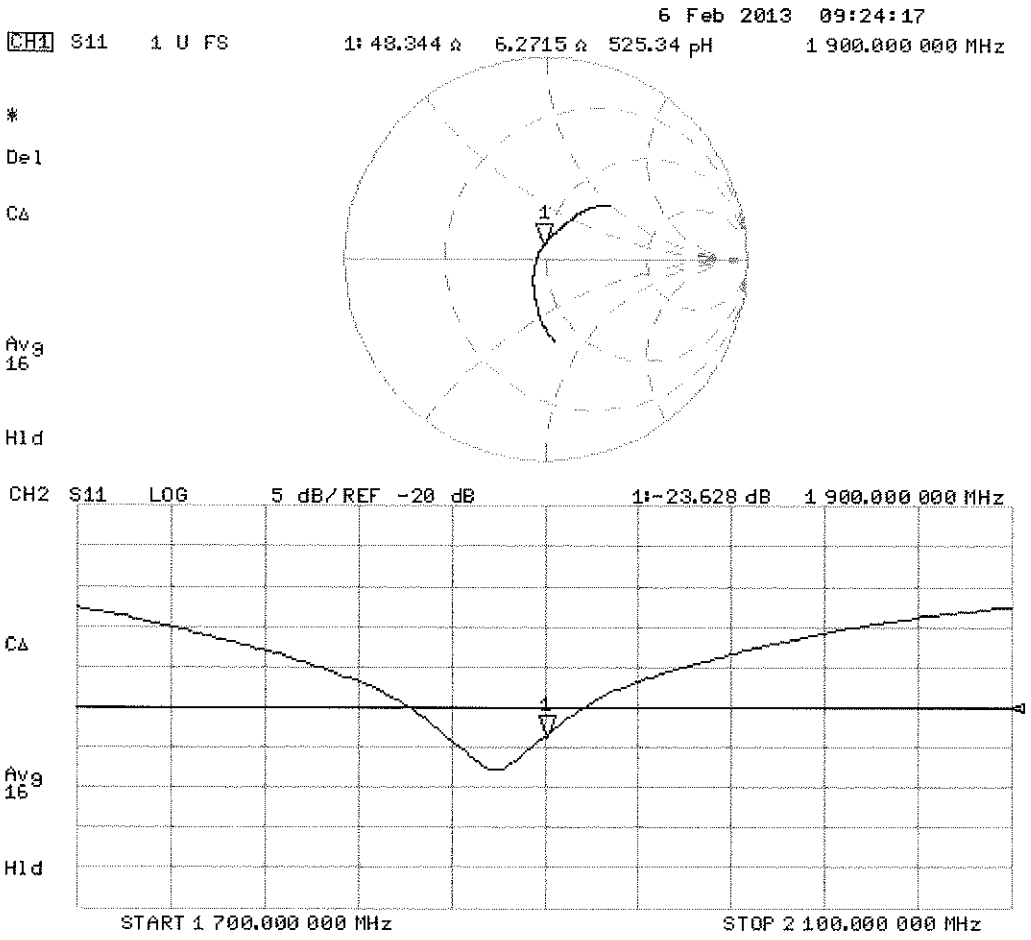
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.534 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.45 W/kg
Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 13.1 W/kg = 11.17 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D2450V2-882_Feb13

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 882

Calibration procedure(s) QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: February 11, 2013

✓ KOK 2/21/13

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 11, 2013

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.9 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	2.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**49.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.91 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.3 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.6 Ω - 0.4 jΩ
Return Loss	- 29.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.5 Ω + 1.2 jΩ
Return Loss	- 37.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2011

DASY5 Validation Report for Head TSL

Date: 11.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 882

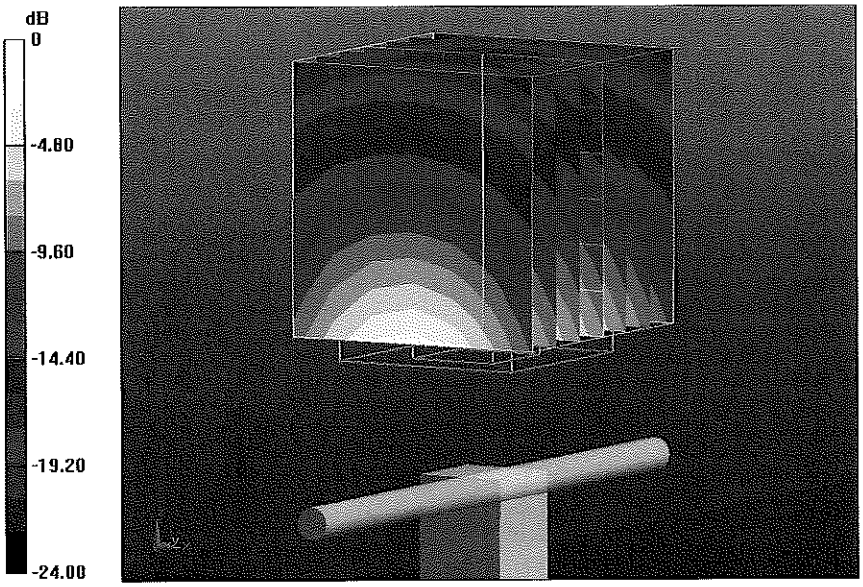
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

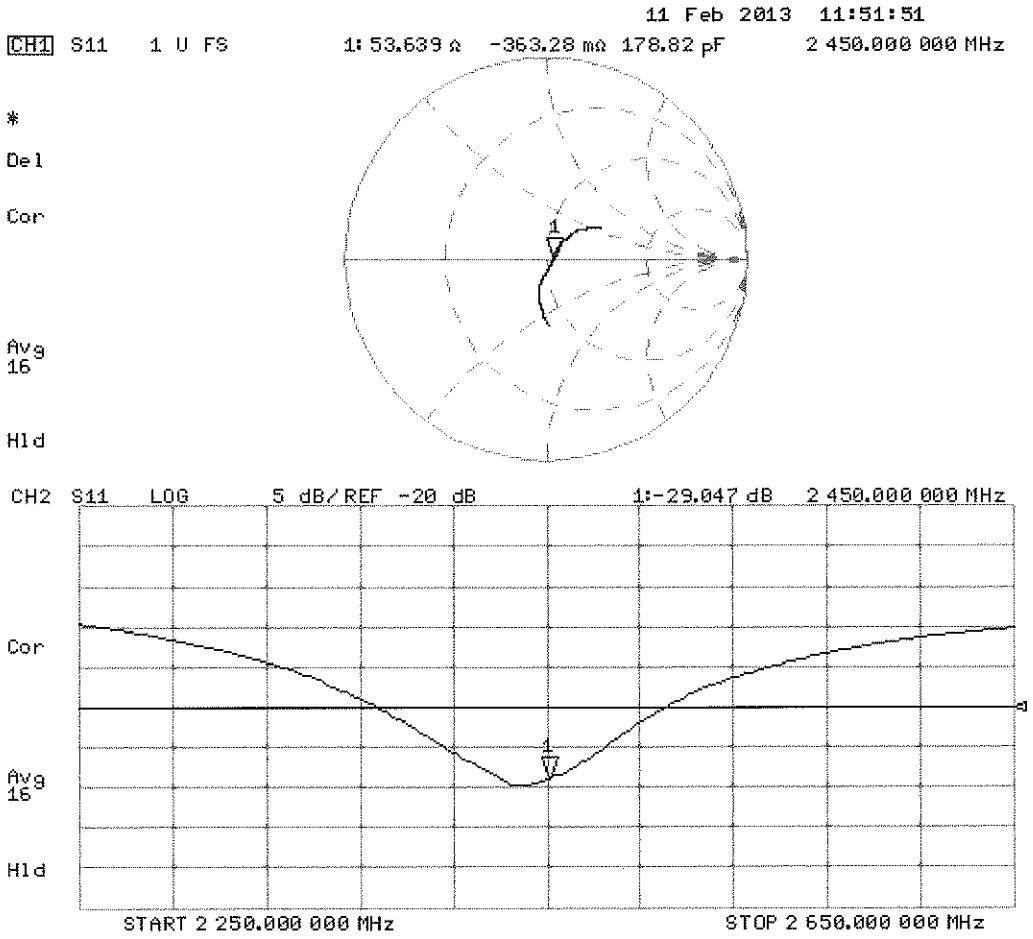
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.806 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.07 W/kg
Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 882

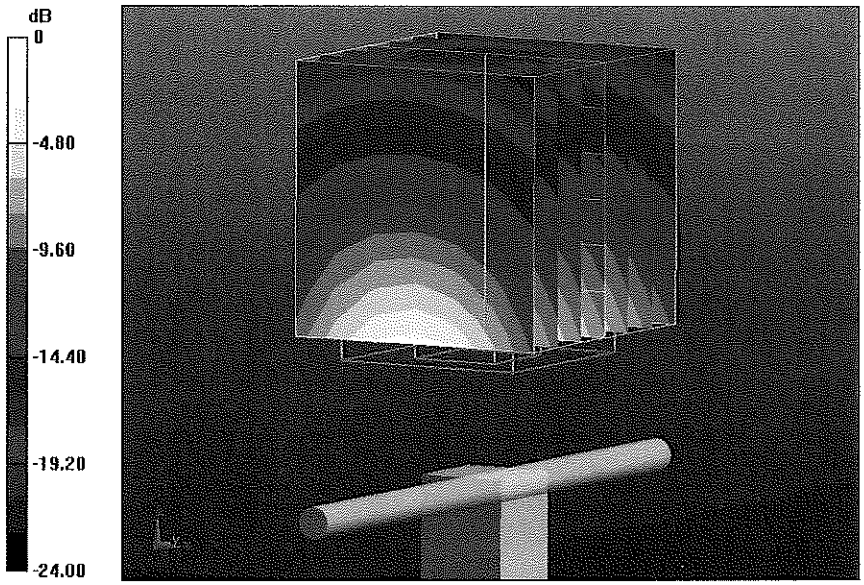
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 S/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

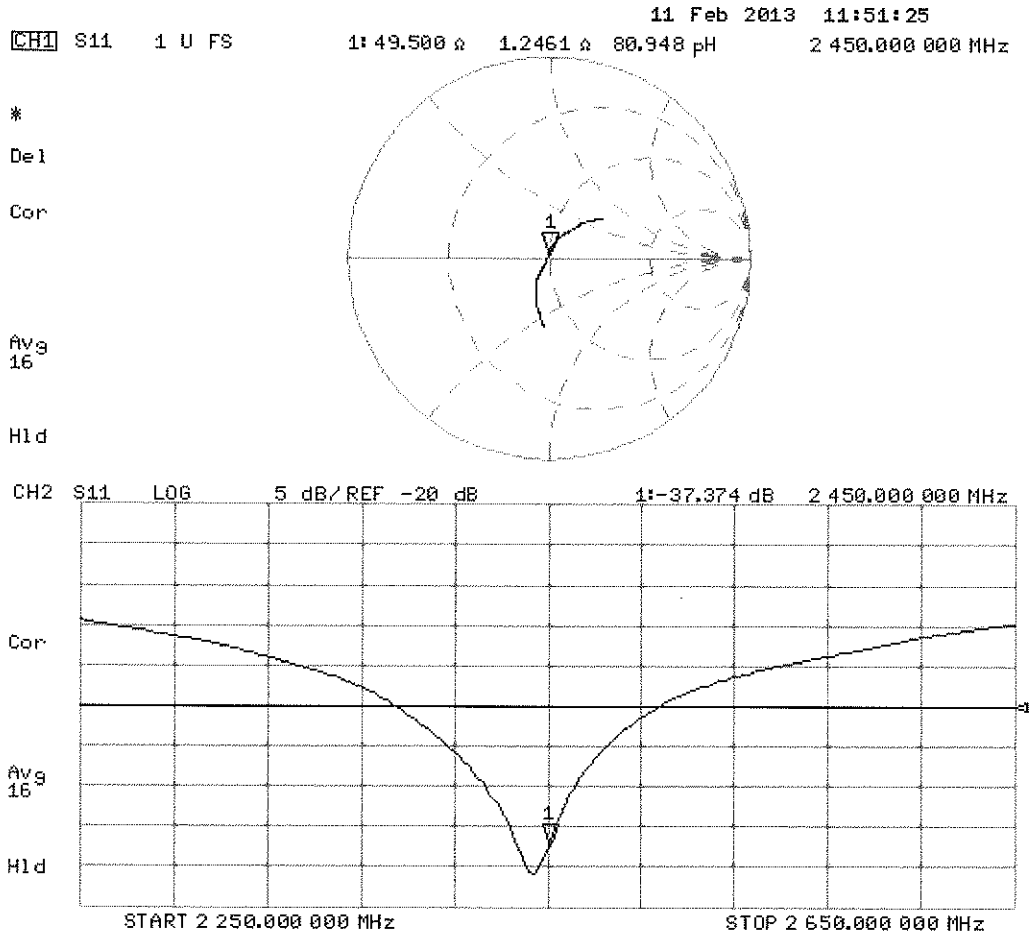
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.474 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 27.1 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.91 W/kg
Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 16.9 W/kg = 12.28 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D2600V2-1004_May13

CALIBRATION CERTIFICATE

Object D2600V2 - SN: 1004

Calibration procedure(s) QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: May 02, 2013

✓ ok 5/8/13

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
DAE4	SN: 909	11-Sep-12 (No. DAE4-909_Sep12)	Sep-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 2, 2013

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.2 ± 6 %	1.99 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**58.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**26.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.8 ± 6 %	2.20 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.6 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**57.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**25.5 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.0 Ω - 4.3 jΩ
Return Loss	- 27.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 2.9 jΩ
Return Loss	- 26.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 23, 2006

DASY5 Validation Report for Head TSL

Date: 02.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004

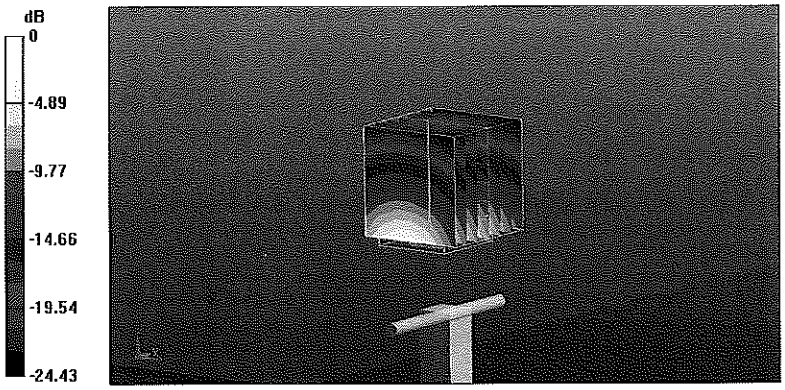
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 1.99 S/m; ε_r = 37.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

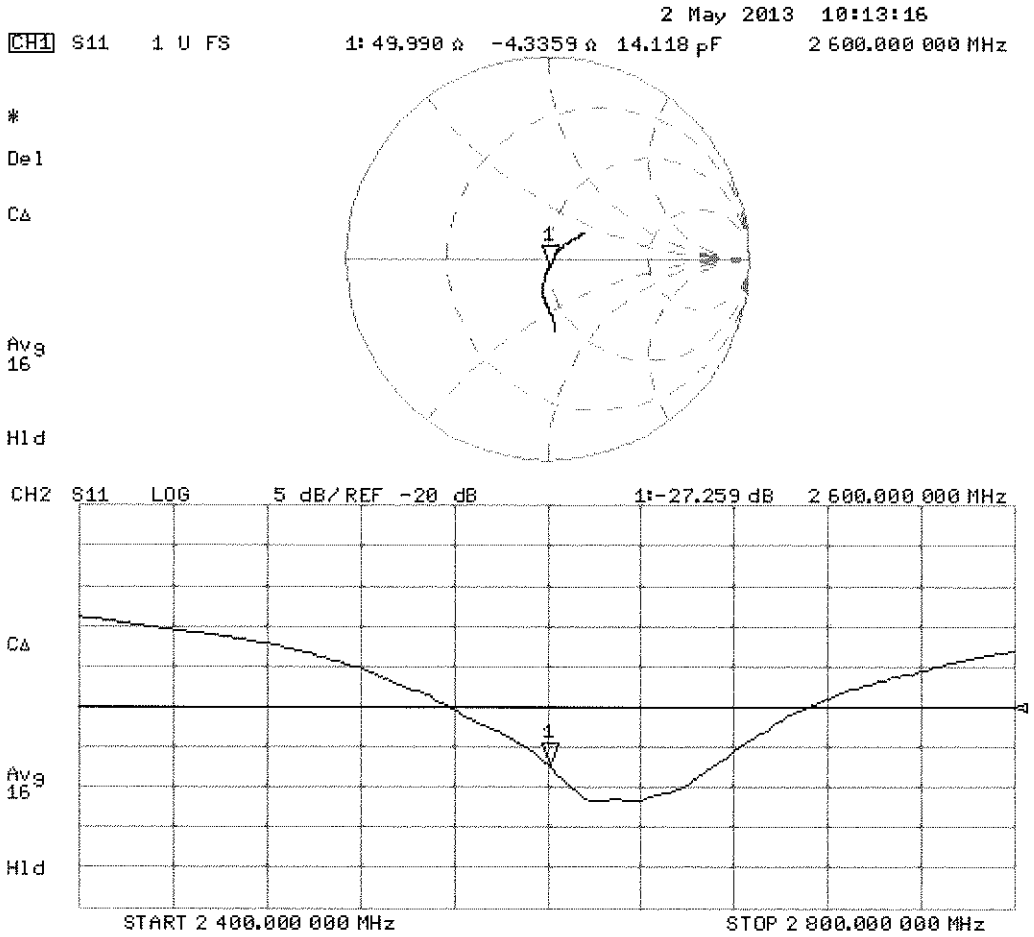
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.3 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.57 W/kg
Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004

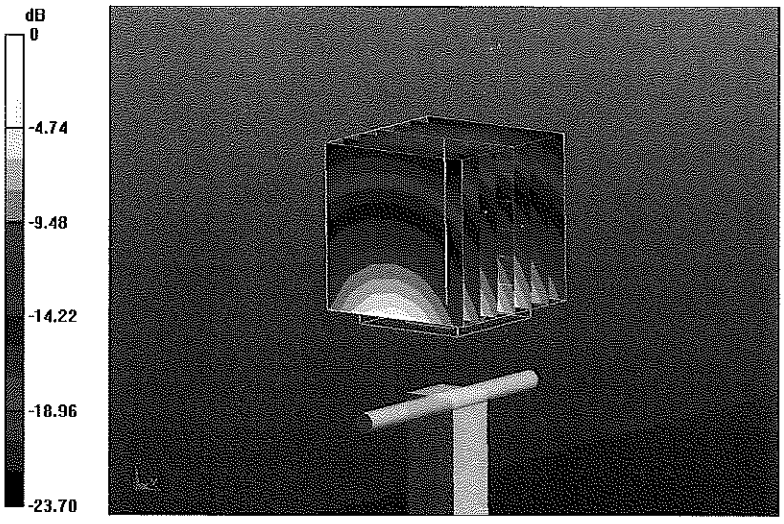
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.2 S/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.32, 4.32, 4.32); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn909; Calibrated: 11.09.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

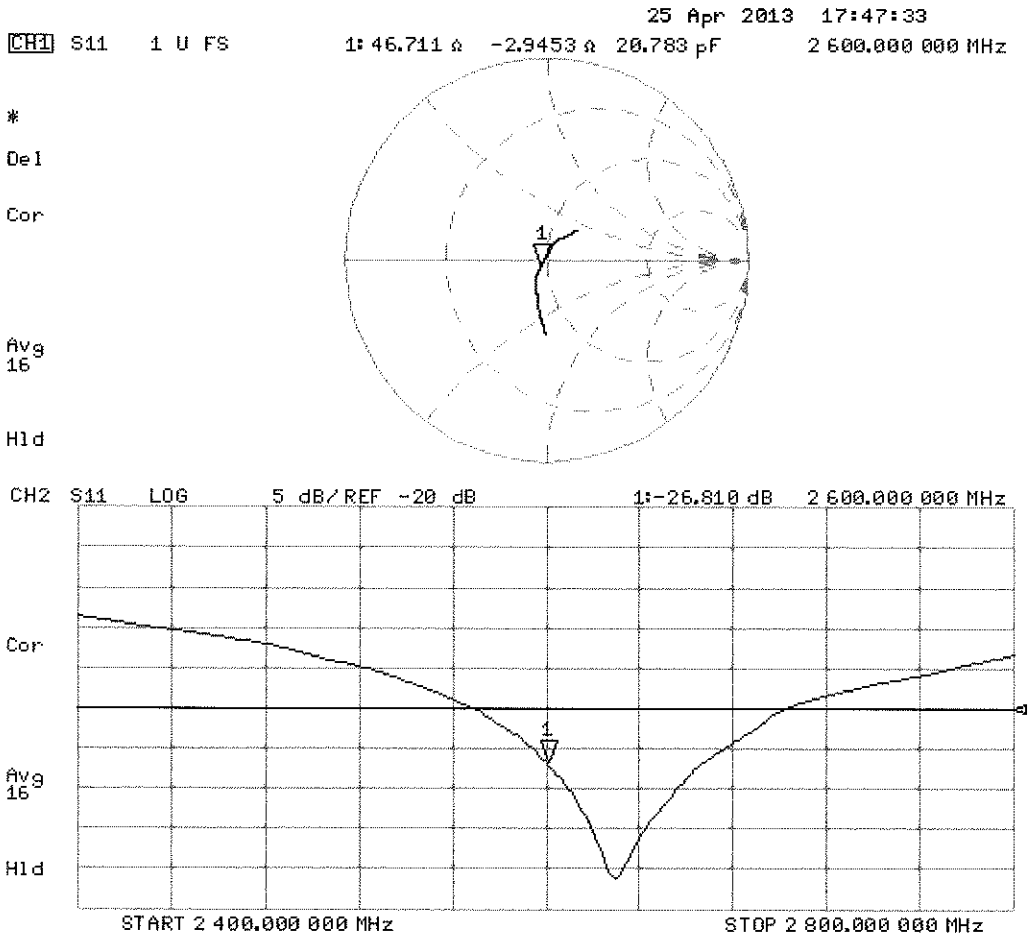
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.605 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.0 W/kg
SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.43 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D5GHzV2-1057_Jan13

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1057
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	January 11, 2013

KOK 1/29/13

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe EX3DV4	SN: 3503	28-Dec-12 (No. EX3-3503_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 11, 2013

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010

b) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5500 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	4.50 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.66 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**75.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-----	-----

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**76.9 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.9 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.79 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.5 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.1 ± 6 %	4.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.8 ± 6 %	5.09 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	-----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.69 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**76.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.42 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.55 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.81 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**80.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.3 ± 6 %	5.94 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**80.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.57 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 W/kg ± 19.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	50.5 Ω - 9.8 jΩ
Return Loss	- 20.3 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	48.5 Ω - 4.5 jΩ
Return Loss	- 26.4 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.6 Ω - 5.8 jΩ
Return Loss	- 24.8 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	53.9 Ω - 3.8 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	52.5 Ω - 4.4 jΩ
Return Loss	- 26.1 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.3 Ω - 7.9 jΩ
Return Loss	- 22.0 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	48.7 Ω - 3.2 jΩ
Return Loss	- 29.2 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.2 Ω - 4.8 jΩ
Return Loss	- 26.2 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	53.6 Ω - 2.1 jΩ
Return Loss	- 27.9 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	53.3 Ω - 2.9 jΩ
Return Loss	- 27.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006