



SAR EVALUATION REPORT

Applicant Name:

Samsung Electronics, Co. Ltd.
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Yeongtong-gu, Suwon-si
Gyeonggi-do 443-742, Korea

Date of Testing:

09/09/14 - 10/16/14

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

OY1409121882-R4.A3L

FCC ID:

A3LSMN915V

APPLICANT:

SAMSUNG ELECTRONICS, CO. LTD.

DUT Type:

Portable Handset

Application Type:

Certification

FCC Rule Part(s):

CFR §2.1093

Model(s):

SM-N915V

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)	10 gm Extremity (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.19	0.53	1.06	2.78
PCE	UMTS 850	826.40 - 846.60 MHz	0.16	0.40	0.50	1.60
PCE	Cell. CDMA/EVDO	824.70 - 848.31 MHz	0.24	0.31	0.70	1.81
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.27	0.95	2.32
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.13	0.27	0.94	2.62
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	0.18	0.35	0.76	2.49
PCE	LTE Band 13	779.5 - 784.5 MHz	0.18	0.54	0.69	2.29
PCE	LTE Band 4 (AWS)	1712.5 - 1752.5 MHz	0.17	0.42	0.95	2.91
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.21	0.16	0.16	1.07
DTS	5.8 GHz WLAN	5745 - 5825 MHz	0.46	0.12	0.12	0.19
NII	5.2 GHz WLAN	5180 - 5240 MHz	0.21	< 0.1		0.30
NII	5.3 GHz WLAN	5260 - 5320 MHz	0.22	< 0.1		0.29
NII	5.5 GHz WLAN	5500 - 5700 MHz	0.59	0.13		0.43
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A			
Simultaneous SAR per KDB 690783 D01v01r03:			1.07	0.72	1.11	3.26

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.

Note: This revised Test Report (S/N: OY1409121882-R4.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.

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
Cell. CDMA/EVDO	Voice/Data	824.70 - 848.31 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 4 (AWS)	Voice/Data	1712.5 - 1752.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR

The device utilizes power reduction under some portable hotspot and proximity sensor for SAR compliance. There is power reduction for CDMA/EVDO 850/1900, UMTS Band 2, LTE Band 4. There is no power reduction for GSM/GPRS/EDGE 850/1900, UMTS Band 5, LTE Band 13, and WLAN modes. The reduced powers were confirmed via conducted power measurements at the RF port (See Section 9). Detailed description of the hotspot power reduction and proximity sensor mechanism is included in the operational description.

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum Power

Mode / Band	Voice (dBm)	Burst Average GMSK (dBm)					Burst Average 8-PSK (dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
GSM/GPRS/EDGE 850	Maximum	33.5	33.5	31.5	30.0	28.5	27.5	27.0	23.0	22.0
	Nominal	33.0	33.0	31.0	29.5	28.0	27.0	26.5	22.5	21.5
GSM/GPRS/EDGE 1900	Maximum	30.0	30.0	29.0	27.0	26.0	26.5	26.0	21.5	20.5
	Nominal	29.5	29.5	28.5	26.5	25.5	26.0	25.5	21.0	20.0

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA
		Rel 99	Rel 5	Rel 6
UMTS Band 5 (850 MHz)	Maximum	23.5	23.5	23.5
	Nominal	23.0	23.0	23.0
UMTS Band 2 (1900 MHz)	Maximum	23.0	23.0	23.0
	Nominal	22.5	22.5	22.5

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Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	25.0
	Nominal	24.5
PCS CDMA/EVDO	Maximum	25.0
	Nominal	24.5

Mode / Band		Modulated Average (dBm)
LTE Band 13	Maximum	25.0
	Nominal	24.5
LTE Band 4 (AWS)	Maximum	23.5
	Nominal	23.0

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz) - SISO	Maximum	15.5
	Nominal	15.0
IEEE 802.11g (2.4 GHz) - SISO	Maximum	14.5
	Nominal	14.0
IEEE 802.11n (2.4 GHz) - SISO	Maximum	13.5
	Nominal	13.0
IEEE 802.11n (2.4 GHz) - MIMO	Maximum	16.5
	Nominal	16.0
IEEE 802.11a (5 GHz) - SISO	Maximum	12.5
	Nominal	12.0
IEEE 802.11n/ac 20 MHz (5 GHz) - SISO	Maximum	12.5
	Nominal	12.0
IEEE 802.11n/ac 20 MHz (5 GHz) - MIMO	Maximum	15.5
	Nominal	15.0
IEEE 802.11n/ac 40 MHz (5 GHz) - SISO	Maximum	9.5
	Nominal	9.0
IEEE 802.11n/ac 40 MHz (5 GHz) - MIMO	Maximum	12.5
	Nominal	12.0
IEEE 802.11ac 80 MHz (5 GHz) - SISO	Maximum	10.5
	Nominal	10.0
IEEE 802.11ac 80 MHz (5 GHz) - MIMO	Maximum	13.5
	Nominal	13.0
Bluetooth	Maximum	9.0
	Nominal	8.5
Bluetooth LE	Maximum	4.5
	Nominal	4.0

1.3.2 Reduced Power

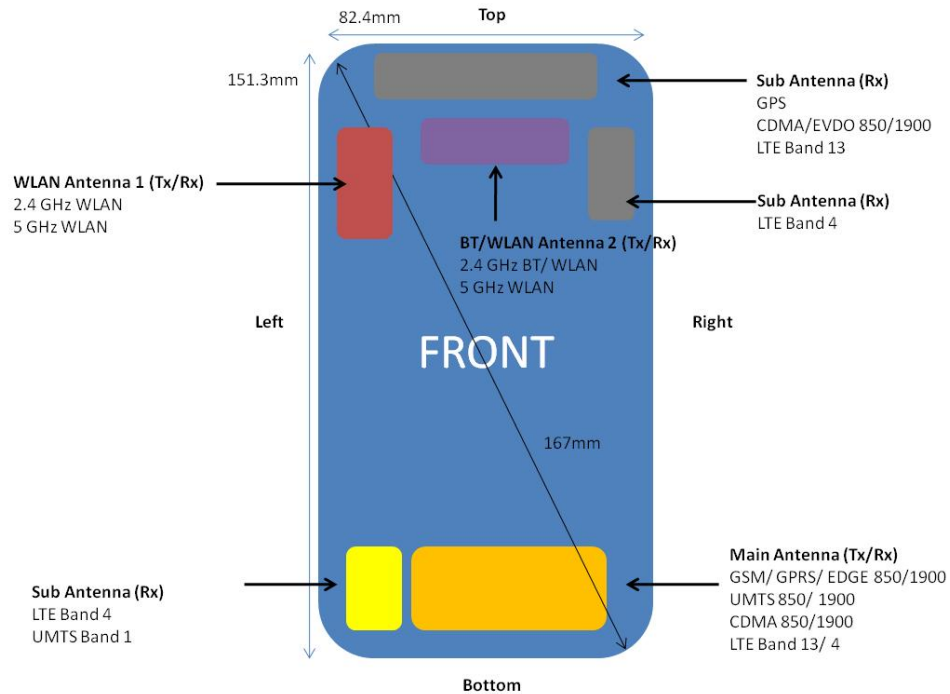
Mode / Band		Modulated Average (dBm)		
Cell. CDMA/EVDO	Maximum	24.5		
	Nominal	24.0		
PCS CDMA/EVDO	Maximum	23.0		
	Nominal	22.5		

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6
UMTS Band 2 (1900 MHz)	Maximum	22.0	21.5	21.5
	Nominal	21.5	21.0	21.0

Mode / Band		Modulated Average (dBm)		
LTE Band 4 (AWS)	Maximum	22.5		
	Nominal	22.0		

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1.4 DUT Antenna Locations



Note: Exact antenna dimensions and separation distances are shown in the Technical Description. Since the diagonal dimension of this device is >160 mm and <200 mm, it is considered a "phablet."

Figure 1-1
DUT Antenna Locations

Table 1-1
Sides for SAR Testing for Mobile Hotspot and Extremity Exposure Conditions

Sides for SAR Testing							
Mode	Exposure Condition	Back	Front	Top	Bottom	Right	Left
GPRS 850	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
Cell. EVDO	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
UMTS 1900	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
PCS EVDO	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Hotspot/ Extremity	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN Ant 1 & MIMO	Hotspot/ Extremity	Yes	Yes	Yes	No	No	Yes
2.4 GHz WLAN Ant 2	Hotspot/ Extremity	Yes	Yes	Yes	No	No	No
5 GHz DTS WLAN Ant 1 & MIMO	Hotspot/ Extremity	Yes	Yes	Yes	No	No	Yes
5 GHz DTS WLAN Ant 2	Hotspot/ Extremity	Yes	Yes	Yes	No	No	No
5 GHz NII WLAN Ant 1 & MIMO	Extremity	Yes	Yes	Yes	No	No	Yes
5 GHz NII WLAN Ant 2	Extremity	Yes	Yes	Yes	No	No	No

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR or Extremity SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01 guidance, page 2 and FCC KDB 648474 D04v01r01. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, 5 GHz NII WLAN operations are disabled.

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1.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the specialized battery. The SAR tests were performed with the specialized battery (model: EB-BN915BBZ).

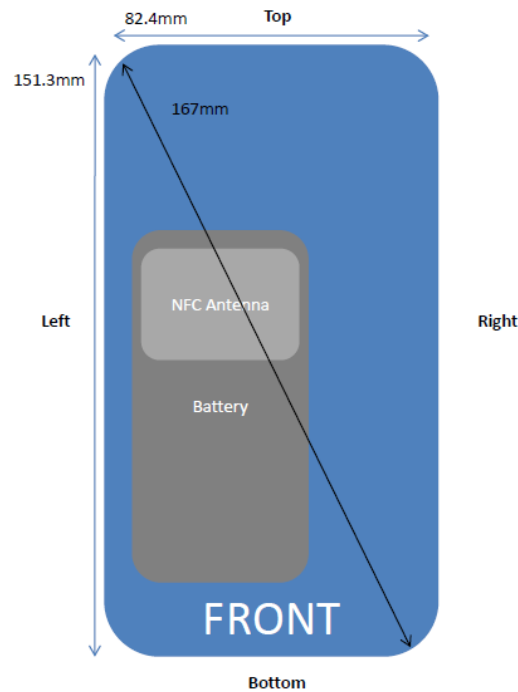


Figure 1-2
NFC Antenna Locations

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1.6 Simultaneous Transmission Capabilities

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

Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



Figure 1-3
Simultaneous Transmission Paths

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

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Extremity	Notes
1	1x CDMA voice + 2.4 GHz Wi-Fi	Yes	Yes	N/A	Yes	
2	1x CDMA voice + 5 GHz Wi-Fi	Yes	Yes	N/A	Yes	
3	1x CDMA voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
4	GSM voice + 2.4 GHz Wi-Fi	Yes	Yes	N/A	Yes	
5	GSM voice + 5 GHz Wi-Fi	Yes	Yes	N/A	Yes	
6	GSM voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
7	UMTS + 2.4 GHz Wi-Fi	Yes	Yes	Yes	Yes	
8	UMTS + 5 GHz Wi-Fi	Yes	Yes	Yes	Yes	
9	UMTS + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
10	LTE + 2.4 GHz Wi-Fi	Yes	Yes	Yes	Yes	
11	LTE + 5 GHz Wi-Fi	Yes	Yes	Yes	Yes	
12	LTE + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
13	CDMA/EVDO data + 2.4 GHz Wi-Fi	Yes*	Yes*	Yes	Yes	*Pre-installed VOIP applications are considered
14	CDMA/EVDO data + 5 GHz Wi-Fi	Yes*	Yes*	Yes	Yes	*Pre-installed VOIP applications are considered
15	CDMA/EVDO data + 2.4 GHz Bluetooth	N/A	Yes*	N/A	Yes	*Pre-installed VOIP applications are considered
16	GPRS/EDGE + 2.4 GHz Wi-Fi	N/A	N/A	Yes	Yes	
17	GPRS/EDGE + 5 GHz Wi-Fi	N/A	N/A	Yes	Yes	
18	1x CDMA voice + CDMA/EVDO data	N/A	N/A	N/A	N/A	Not supported by HW
19	CDMA/EVDO data + LTE	N/A	N/A	N/A	N/A	Not supported by HW
20	1x CDMA voice + LTE	N/A	N/A	N/A	N/A	Not supported by HW
21	1x CDMA voice + LTE + 2.4 GHz Wi-Fi	N/A	N/A	N/A	N/A	Not supported by HW
22	1x CDMA voice + LTE + 5 GHz Wi-Fi	N/A	N/A	N/A	N/A	Not supported by HW

- 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
- All licensed modes share the same antenna path and cannot transmit simultaneously.
- 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.
- Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
- 5 GHz Wireless Router is only supported for the 5.8 GHz Band by S/W, therefore 5.2-5.7 GHz Bands were not evaluated for wireless router conditions.
- This device supports 2x2 MIMO Tx for WLAN 802.11n/ac. Each WLAN antenna can transmit independently or together when operating with MIMO.
- This device supports VoLTE.

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1.7 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5.2-5.7 GHz WIFI, only 2.4 GHz and 5.8 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v01.

Per FCC KDB 447498 D01v05, the 1g SAR exclusion threshold for distances <50mm is defined by the following equation:

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, body-worn Bluetooth SAR was not required; $[(8/15) * \sqrt{2.480}] = 0.8 < 3.0$. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

Per FCC KDB 447498 D01v05, the 10g SAR exclusion threshold for distances <50mm is defined by the following equation:

$$\frac{\text{Max Power of Channel (mW)}}{\text{Test Separation Dist (mm)}} * \sqrt{\text{Frequency(GHz)}} \leq 7.5$$

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, extremity Bluetooth SAR was not required; $[(8/5) * \sqrt{2.480}] = 2.5 < 7.5$. Per KDB Publication 447498 D01v05, 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) 2 Tx antenna output
- d) 256 QAM is supported
- e) No new 5 GHz channels

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(B) Licensed Transmitter(s)

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

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

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

1.8 Wireless Charging Cover

This DUT may be used with a standard battery cover or with an optional wireless charging battery cover. Per FCC KDB Publication 648474 D03, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the configuration with the highest measured 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

- IEEE 1528-2003
- FCC KDB Publication 941225 D01v02, D03v01, D02v02r02, D05v02r03, D06v01r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r03, D02v01r01 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D03-D04 (Phablet Procedures, Wireless Charging Cover)
- April 2013 TCB Workshop Notes (IEEE 802.11ac)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)

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1.10 Device Serial Numbers

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

	Head Serial Number	Body-Worn Serial Number	Wireless Router Serial Number	Extremity Serial Number
GSM/GPRS/EDGE 850	F38B8	F38B8	F38B8	F38B8
UMTS 850	F38B8	F38B8	F38B8	F38B8
Cell. CDMA/EVDO Max	F3805	F3805	-	F38C9
Cell CDMA/EVDO - Reduced	F38CB	-	F38CB	F38CB
GSM/GPRS/EDGE 1900	F38B8	F38B8	F38B8	F38B8
UMTS 1900 - Max	F38B8	F38B8	-	F38B8
UMTS 1900 - Reduced	-	-	F38AB	F38AB
PCS CDMA/EVDO - Max	F38C9	F38C9	-	F38C9
PCS CDMA/EVDO - Reduced	F38D5	-	F38D5	F38D5
LTE Band 13	F38E6	F38E6	F38E6	F38E6
LTE Band 4 (AWS) - Max	F38E6	F38E6	-	F38E6
LTE Band 4 (AWS) - Reduced	-	-	F38AB	F38AB
2.4 GHz WLAN	0809-12	0809-09	0809-09	0809-09
5 GHz WLAN - DTS	0809-12	0809-14	0809-14	0809-14
5 GHz WLAN - NII	0809-12	0809-14	-	0809-14

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2 LTE INFORMATION

LTE Information			
FCC ID	A3LSMN915V		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 13 (779.5 - 784.5 MHz)		
	LTE Band 4 (AWS) (1712.5 - 1752.5 MHz)		
Channel Bandwidths	LTE Band 13: 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 13: 5 MHz	779.5 (23205)	782 (23230)	784.5 (23255)
LTE Band 13: 10 MHz	782 (23230)	782 (23230)	782 (23230)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
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		

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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 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

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/m³)
- E = Total RMS electric field strength (V/m)

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

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DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

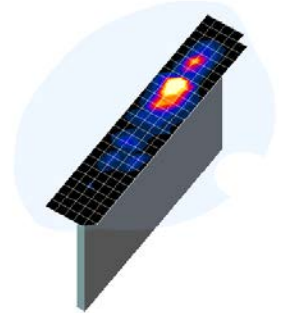


Figure 4-1
Sample SAR Area
Scan

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

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

*Also compliant to IEEE 1528-2013 Table 6

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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), also called the Reference Pivoting Line, is not perpendicular to the reference plane (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].

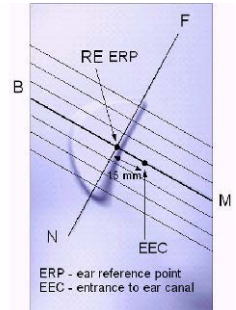


Figure 5-1
Close-Up Side view
of ERP

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 acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 5-3). The acoustic output was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



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

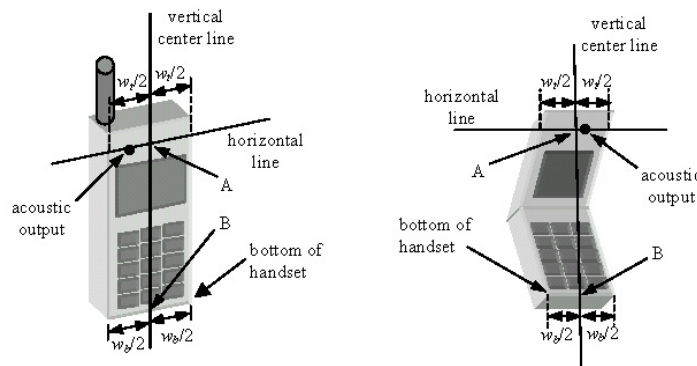


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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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 $\epsilon = 3$ and loss tangent $\delta = 0.02$.

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.

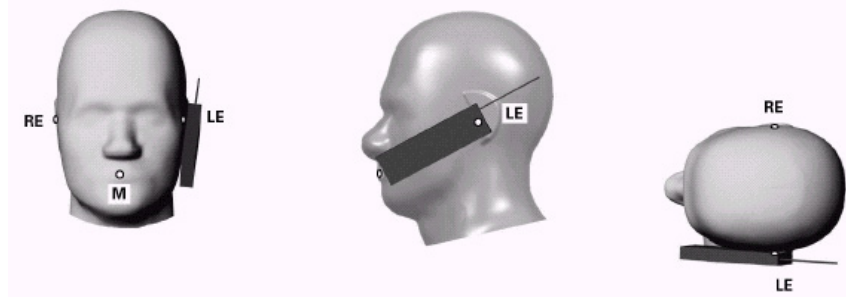


Figure 6-1 Front, Side and Top View of Cheek Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the reference plane.
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the 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 / 15° Tilt

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

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

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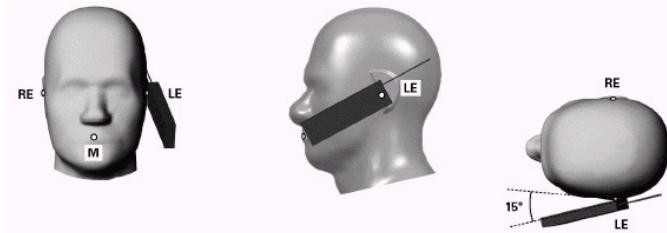


Figure 6-2 Front, Side and Top View of Ear/15° Tilt Position

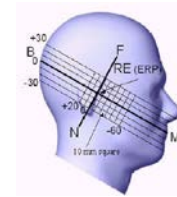


Figure 6-3 Side view w/ relevant markings

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

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

6.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04v01, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v05 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

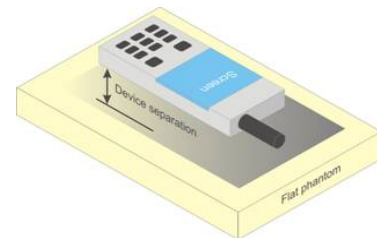


Figure 6-4 Sample Body-Worn Diagram

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

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Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v01 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time. The device utilizes power reduction under some portable hotspot conditions for SAR compliance.

There is power reduction for CDMA/EVDO 850/1900, UMTS band 2, and LTE Band 4. There is no power reduction for GSM/GPRS/EDGE 850/1900, UMTS Band 5, LTE Band 13, and WLAN modes. The reduced powers were confirmed via conducted power measurements at the RF port (See Section 9). Detailed descriptions of the hotspot power reduction and proximity sensor mechanism are included in the operational description.

6.7 Extremity Exposure Configurations

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

For smart phones with a display diagonal dimension $> 15.0 \text{ cm}$ or an overall diagonal dimension $> 16.0 \text{ cm}$ that provide similar mobile web access and multimedia support found in mini-tablets or UMPC minitables that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04 v01r01DR04 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna $\leq 25 \text{ mm}$ from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required.

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6.8 Additional Test Positions due to Proximity Conditions

This device uses a sensor to reduce voice and data powers in extremity (hand-held) use conditions.

When the sensor detects a user is touching the device on or near to the antenna the device reduces the maximum allowed output power. However, the proximity sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, an additional exposure condition is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level.

FCC KDB 616217 D04 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional exposure conditions. Since the sensor activation distance for the front side of the device is 5 mm, a conservative distance of 4 mm was tested for SAR on the front side at maximum power. Since the sensor activation distance for the bottom edge of the device is 7 mm, a conservative distance of 6 mm was tested for SAR on the bottom edge at maximum power. Sensor triggering distance summary data is included in Appendix G.

The proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.

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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 <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (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.

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8.1 Measured and Reported SAR

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

8.2 Procedures Used to Establish RF Signal for SAR

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

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

8.3 SAR Measurement Conditions for CDMA2000

The following procedures were performed according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, 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 SCH₀ and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH₀ data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 8-2 was applied.

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Table 8-1
Parameters for Max. Power for RC1

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

Table 8-2
Parameters for Max. Power for RC3

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

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

8.3.2 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 $\frac{1}{4}$ 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 8.3.4 for EVDO Rev. A configuration parameters.

8.3.3 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 $\frac{1}{4}$ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCH_n) with FCH at full rate and SCH₀ enabled at 9600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts. Body SAR was measured using TDSO / SO32 with power control bits in the “All Up”

Body SAR in RC1 is not required when the maximum average output of each channel is less than $\frac{1}{4}$ 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.

8.3.4 Handsets with EVDO

For handsets with Ev-Do capabilities, when the maximum average output of each channel in Rev. 0 is less than $\frac{1}{4}$ 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 $\frac{1}{4}$ 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.

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8.3.5 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 1/4 dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0. Otherwise, CDMA “Body-SAR Measurement” procedures for “CDMA 2000 1x Handsets” were applied.

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.

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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 $\beta_c=9$ and $\beta_d=15$, and power offset parameters of $\Delta_{ACK} = \Delta_{NACK} = 5$ and $\Delta_{CQI}=2$ 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} (Note 1, 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: $\Delta_{ACK}, \Delta_{NACK}$ 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 $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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 $\leq 75\%$ 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	$\beta_{hs}^{(1)}$	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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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: $\Delta_{ACK}, \Delta_{NACK}$ 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 $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. 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.

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8.5 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

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 $\frac{1}{2}$ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

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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 [24]

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

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

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

8.6.3 MIMO SAR considerations

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

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9 RF CONDUCTED POWERS

9.1 CDMA2000 Conducted Powers

Table 9-1
Maximum Average RF Output Powers

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	22H	824.7	24.64	24.63	24.60	24.65	24.69	24.68
	384	22H	836.52	24.74	24.69	24.69	24.70	24.74	24.73
	777	22H	848.31	24.56	24.55	24.52	24.54	24.56	24.51
PCS	25	24E	1851.25	24.70	24.69	24.70	24.67	24.69	24.68
	600	24E	1880	24.60	24.61	24.67	24.64	24.66	24.64
	1175	24E	1908.75	24.58	24.51	24.59	24.60	24.61	24.59

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

Table 9-2
Reduced Average RF Output Powers

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	22H	824.7	24.34	24.33	24.30	24.30	24.45	24.38
	384	22H	836.52	24.44	24.39	24.35	24.38	24.48	24.46
	777	22H	848.31	24.36	24.35	24.33	24.39	24.43	24.40
PCS	25	24E	1851.25	22.37	22.36	22.36	22.37	22.41	22.36
	600	24E	1880	22.39	22.40	22.39	22.42	22.48	22.39
	1175	24E	1908.75	22.40	22.38	22.37	22.35	22.50	22.46

Per KDB Publication 941225 D01v02:

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 and Extremity 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.
4. Head SAR was additionally evaluated with EVDO Rev. A to determine compliance for held-to-ear VoIP operations.



Figure 9-1
Power Measurement Setup

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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	33.10	33.11	31.40	29.45	28.20	27.32	26.74	22.63	21.82
	190	33.49	33.50	31.44	29.59	28.23	27.36	26.80	22.73	21.92
	251	33.47	33.44	31.50	29.48	28.38	27.32	26.75	22.72	21.89
GSM 1900	512	29.68	29.69	28.78	26.90	25.70	26.26	25.96	21.37	20.03
	661	29.62	29.63	28.75	26.66	25.52	26.02	25.75	21.33	19.82
	810	29.61	29.62	28.86	26.79	25.77	26.16	25.85	21.48	20.10
		Calculated Maximum Frame-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	24.07	24.08	25.38	25.19	25.19	18.29	20.72	18.37	18.81
	190	24.46	24.47	25.42	25.33	25.22	18.33	20.78	18.47	18.91
	251	24.44	24.41	25.48	25.22	25.37	18.29	20.73	18.46	18.88
GSM 1900	512	20.65	20.66	22.76	22.64	22.69	17.23	19.94	17.11	17.02
	661	20.59	20.60	22.73	22.40	22.51	16.99	19.73	17.07	16.81
	810	20.58	20.59	22.84	22.53	22.76	17.13	19.83	17.22	17.09
GSM 850	Frame Avg.Targets:	23.97	23.97	24.98	25.24	24.99	17.97	20.48	18.24	18.49
GSM 1900		20.47	20.47	22.48	22.24	22.49	16.97	19.48	16.74	16.99

Note:

- Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
- The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot and extremity SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
- GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
- EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

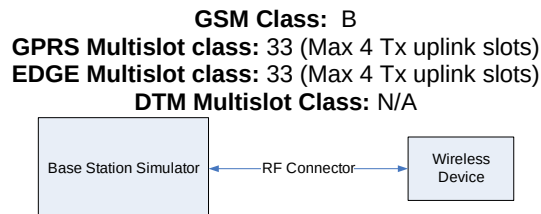


Figure 9-2
Power Measurement Setup

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9.3 UMTS Conducted Powers

Table 9-3
Maximum Average RF Output Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.16	23.10	23.02	22.90	22.95	22.99	-
99		12.2 kbps AMR	23.22	23.12	22.94	22.74	22.43	22.62	-
6	HSDPA	Subtest 1	22.23	22.35	22.25	21.70	21.68	21.79	0
6		Subtest 2	22.34	22.29	22.32	21.81	21.66	21.78	0
6		Subtest 3	21.86	21.85	21.81	21.22	21.27	21.35	0.5
6		Subtest 4	21.78	21.86	21.84	21.26	21.18	21.27	0.5
6	HSUPA	Subtest 1	22.33	22.05	22.23	21.43	21.23	21.27	0
6		Subtest 2	21.21	21.01	21.03	20.62	20.75	20.87	2
6		Subtest 3	21.37	21.24	21.27	20.46	20.36	20.39	1
6		Subtest 4	21.44	21.77	21.39	21.23	21.05	21.12	2
6		Subtest 5	22.32	22.22	22.28	21.76	21.68	21.84	0

Table 9-4
Reduced Average RF Output Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	PCS Band [dBm]			3GPP MPR [dB]
			9262	9400	9538	
99	WCDMA	12.2 kbps RMC	21.48	21.99	21.24	-
99		12.2 kbps AMR	21.42	22.00	21.29	-
6	HSDPA	Subtest 1	20.18	20.66	19.86	0
6		Subtest 2	20.17	20.69	19.90	0
6		Subtest 3	19.62	20.12	19.47	0.5
6		Subtest 4	19.68	20.13	19.44	0.5
6	HSUPA	Subtest 1	20.17	19.94	19.71	0
6		Subtest 2	19.26	19.02	18.54	2
6		Subtest 3	19.04	18.76	18.83	1
6		Subtest 4	19.15	18.97	18.66	2
6		Subtest 5	20.27	20.01	19.92	0

UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

This device does not support DC-HSDPA.

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



Figure 9-3
Power Measurement Setup

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9.4 LTE Conducted Powers

9.4.1 LTE Band 13

Table 9-5
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	10	QPSK	1	0	24.44	0	0
	782.0	23230	10	QPSK	1	25	24.62	0	0
	782.0	23230	10	QPSK	1	49	24.50	0	0
	782.0	23230	10	QPSK	25	0	23.39	0-1	1
	782.0	23230	10	QPSK	25	12	23.44	0-1	1
	782.0	23230	10	QPSK	25	25	23.57	0-1	1
	782.0	23230	10	QPSK	50	0	23.56	0-1	1
	782.0	23230	10	16QAM	1	0	23.74	0-1	1
	782.0	23230	10	16QAM	1	25	23.98	0-1	1
	782.0	23230	10	16QAM	1	49	23.87	0-1	1
	782.0	23230	10	16QAM	25	0	22.41	0-2	2
	782.0	23230	10	16QAM	25	12	22.55	0-2	2
	782.0	23230	10	16QAM	25	25	22.58	0-2	2
	782.0	23230	10	16QAM	50	0	22.64	0-2	2

Table 9-6
LTE Band 13 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	5	QPSK	1	0	24.49	0	0
	782.0	23230	5	QPSK	1	12	24.68	0	0
	782.0	23230	5	QPSK	1	24	24.77	0	0
	782.0	23230	5	QPSK	12	0	23.37	0-1	1
	782.0	23230	5	QPSK	12	6	23.54	0-1	1
	782.0	23230	5	QPSK	12	13	23.50	0-1	1
	782.0	23230	5	QPSK	25	0	23.36	0-1	1
	782.0	23230	5	16-QAM	1	0	23.31	0-1	1
	782.0	23230	5	16-QAM	1	12	23.59	0-1	1
	782.0	23230	5	16-QAM	1	24	23.62	0-1	1
	782.0	23230	5	16-QAM	12	0	22.35	0-2	2
	782.0	23230	5	16-QAM	12	6	22.51	0-2	2
	782.0	23230	5	16-QAM	12	13	22.46	0-2	2
	782.0	23230	5	16-QAM	25	0	22.40	0-2	2

Note: LTE Band 13 at 5 MHz bandwidths do not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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9.4.2 LTE Band 4 (AWS)

Table 9-7
Maximum LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	23.40	0	0
	1732.5	20175	20	QPSK	1	50	23.41	0	0
	1732.5	20175	20	QPSK	1	99	23.40	0	0
	1732.5	20175	20	QPSK	50	0	22.49	0-1	1
	1732.5	20175	20	QPSK	50	25	22.50	0-1	1
	1732.5	20175	20	QPSK	50	50	22.49	0-1	1
	1732.5	20175	20	QPSK	100	0	22.47	0-1	1
	1732.5	20175	20	16QAM	1	0	22.49	0-1	1
	1732.5	20175	20	16QAM	1	50	22.47	0-1	1
	1732.5	20175	20	16QAM	1	99	22.48	0-1	1
	1732.5	20175	20	16QAM	50	0	21.49	0-2	2
	1732.5	20175	20	16QAM	50	25	21.50	0-2	2
	1732.5	20175	20	16QAM	50	50	21.50	0-2	2
	1732.5	20175	20	16QAM	100	0	21.48	0-2	2

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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Table 9-8
Maximum LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	23.10	0	0
	1717.5	20025	15	QPSK	1	36	22.97	0	0
	1717.5	20025	15	QPSK	1	74	23.05	0	0
	1717.5	20025	15	QPSK	36	0	21.94	0-1	1
	1717.5	20025	15	QPSK	36	18	22.03	0-1	1
	1717.5	20025	15	QPSK	36	37	22.07	0-1	1
	1717.5	20025	15	QPSK	75	0	22.13	0-1	1
	1717.5	20025	15	16QAM	1	0	22.15	0-1	1
	1717.5	20025	15	16QAM	1	36	21.97	0-1	1
	1717.5	20025	15	16QAM	1	74	22.01	0-1	1
	1717.5	20025	15	16QAM	36	0	20.99	0-2	2
	1717.5	20025	15	16QAM	36	18	21.03	0-2	2
Mid	1717.5	20025	15	16QAM	36	37	21.02	0-2	2
	1717.5	20025	15	16QAM	75	0	21.11	0-2	2
	1732.5	20175	15	QPSK	1	0	23.14	0	0
	1732.5	20175	15	QPSK	1	36	23.11	0	0
	1732.5	20175	15	QPSK	1	74	22.99	0	0
	1732.5	20175	15	QPSK	36	0	22.06	0-1	1
	1732.5	20175	15	QPSK	36	18	22.09	0-1	1
	1732.5	20175	15	QPSK	36	37	22.03	0-1	1
	1732.5	20175	15	QPSK	75	0	22.13	0-1	1
	1732.5	20175	15	16QAM	1	0	22.10	0-1	1
	1732.5	20175	15	16QAM	1	36	22.01	0-1	1
	1732.5	20175	15	16QAM	1	74	21.99	0-1	1
High	1732.5	20175	15	16QAM	36	0	21.02	0-2	2
	1732.5	20175	15	16QAM	36	18	21.01	0-2	2
	1732.5	20175	15	16QAM	36	37	21.03	0-2	2
	1732.5	20175	15	16QAM	75	0	21.12	0-2	2
	1747.5	20325	15	QPSK	1	0	23.13	0	0
	1747.5	20325	15	QPSK	1	36	23.06	0	0
	1747.5	20325	15	QPSK	1	74	23.09	0	0
	1747.5	20325	15	QPSK	36	0	21.99	0-1	1
	1747.5	20325	15	QPSK	36	18	21.89	0-1	1
	1747.5	20325	15	QPSK	36	37	21.86	0-1	1
	1747.5	20325	15	QPSK	75	0	21.93	0-1	1
	1747.5	20325	15	16QAM	1	0	22.11	0-1	1
	1747.5	20325	15	16QAM	1	36	22.04	0-1	1
	1747.5	20325	15	16QAM	1	74	22.04	0-1	1
	1747.5	20325	15	16QAM	36	0	21.00	0-2	2
	1747.5	20325	15	16QAM	36	18	20.89	0-2	2
	1747.5	20325	15	16QAM	36	37	20.86	0-2	2
	1747.5	20325	15	16QAM	75	0	20.95	0-2	2

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Table 9-9
Maximum LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	23.15	0	0
	1715	20000	10	QPSK	1	25	23.01	0	0
	1715	20000	10	QPSK	1	49	23.09	0	0
	1715	20000	10	QPSK	25	0	21.90	0-1	1
	1715	20000	10	QPSK	25	12	21.86	0-1	1
	1715	20000	10	QPSK	25	25	21.96	0-1	1
	1715	20000	10	QPSK	50	0	22.07	0-1	1
	1715	20000	10	16QAM	1	0	22.09	0-1	1
	1715	20000	10	16QAM	1	25	21.92	0-1	1
	1715	20000	10	16QAM	1	49	22.03	0-1	1
	1715	20000	10	16QAM	25	0	20.89	0-2	2
	1715	20000	10	16QAM	25	12	20.87	0-2	2
Mid	1715	20000	10	16QAM	25	25	20.98	0-2	2
	1715	20000	10	16QAM	50	0	21.03	0-2	2
	1732.5	20175	10	QPSK	1	0	23.18	0	0
	1732.5	20175	10	QPSK	1	25	23.14	0	0
	1732.5	20175	10	QPSK	1	49	23.03	0	0
	1732.5	20175	10	QPSK	25	0	22.03	0-1	1
	1732.5	20175	10	QPSK	25	12	21.96	0-1	1
	1732.5	20175	10	QPSK	25	25	21.96	0-1	1
	1732.5	20175	10	QPSK	50	0	22.09	0-1	1
	1732.5	20175	10	16QAM	1	0	22.12	0-1	1
	1732.5	20175	10	16QAM	1	25	22.07	0-1	1
	1732.5	20175	10	16QAM	1	49	21.96	0-1	1
High	1732.5	20175	10	16QAM	25	0	21.07	0-2	2
	1732.5	20175	10	16QAM	25	12	21.07	0-2	2
	1732.5	20175	10	16QAM	25	25	21.02	0-2	2
	1732.5	20175	10	16QAM	50	0	21.10	0-2	2
	1750	20350	10	QPSK	1	0	23.09	0	0
	1750	20350	10	QPSK	1	25	22.99	0	0
	1750	20350	10	QPSK	1	49	23.11	0	0
	1750	20350	10	QPSK	25	0	21.88	0-1	1
	1750	20350	10	QPSK	25	12	21.81	0-1	1
	1750	20350	10	QPSK	25	25	21.87	0-1	1
	1750	20350	10	QPSK	50	0	21.99	0-1	1
	1750	20350	10	16QAM	1	0	22.03	0-1	1
	1750	20350	10	16QAM	1	25	21.93	0-1	1
	1750	20350	10	16QAM	1	49	22.06	0-1	1
	1750	20350	10	16QAM	25	0	20.95	0-2	2
	1750	20350	10	16QAM	25	12	20.90	0-2	2
	1750	20350	10	16QAM	25	25	20.96	0-2	2
	1750	20350	10	16QAM	50	0	20.99	0-2	2

Table 9-10
Maximum LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	23.13	0	0
	1712.5	19975	5	QPSK	1	12	23.02	0	0
	1712.5	19975	5	QPSK	1	24	23.02	0	0
	1712.5	19975	5	QPSK	12	0	21.97	0-1	1
	1712.5	19975	5	QPSK	12	6	21.91	0-1	1
	1712.5	19975	5	QPSK	12	13	21.86	0-1	1
	1712.5	19975	5	QPSK	25	0	21.97	0-1	1
	1712.5	19975	5	16-QAM	1	0	22.04	0-1	1
	1712.5	19975	5	16-QAM	1	12	21.93	0-1	1
	1712.5	19975	5	16-QAM	1	24	21.94	0-1	1
	1712.5	19975	5	16-QAM	12	0	20.94	0-2	2
	1712.5	19975	5	16-QAM	12	6	20.86	0-2	2
Mid	1712.5	19975	5	16-QAM	12	13	20.90	0-2	2
	1712.5	19975	5	16-QAM	25	0	20.99	0-2	2
	1732.5	20175	5	QPSK	1	0	23.13	0	0
	1732.5	20175	5	QPSK	1	12	23.08	0	0
	1732.5	20175	5	QPSK	1	24	23.13	0	0
	1732.5	20175	5	QPSK	12	0	22.01	0-1	1
	1732.5	20175	5	QPSK	12	6	22.00	0-1	1
	1732.5	20175	5	QPSK	12	13	21.97	0-1	1
	1732.5	20175	5	QPSK	25	0	21.95	0-1	1
	1732.5	20175	5	16-QAM	1	0	22.08	0-1	1
	1732.5	20175	5	16-QAM	1	12	22.05	0-1	1
	1732.5	20175	5	16-QAM	1	24	22.08	0-1	1
High	1732.5	20175	5	16-QAM	12	0	20.96	0-2	2
	1732.5	20175	5	16-QAM	12	6	20.97	0-2	2
	1732.5	20175	5	16-QAM	12	13	20.98	0-2	2
	1732.5	20175	5	16-QAM	25	0	21.03	0-2	2
	1752.5	20375	5	QPSK	1	0	23.04	0	0
	1752.5	20375	5	QPSK	1	12	23.02	0	0
	1752.5	20375	5	QPSK	1	24	23.16	0	0
	1752.5	20375	5	QPSK	12	0	21.90	0-1	1
	1752.5	20375	5	QPSK	12	6	21.90	0-1	1
	1752.5	20375	5	QPSK	12	13	21.90	0-1	1
	1752.5	20375	5	QPSK	25	0	21.88	0-1	1
	1752.5	20375	5	16-QAM	1	0	21.98	0-1	1
	1752.5	20375	5	16-QAM	1	12	21.87	0-1	1
	1752.5	20375	5	16-QAM	1	24	22.03	0-1	1
	1752.5	20375	5	16-QAM	12	0	20.89	0-2	2
	1752.5	20375	5	16-QAM	12	6	20.92	0-2	2
	1752.5	20375	5	16-QAM	12	13	20.91	0-2	2
	1752.5	20375	5	16-QAM	25	0	20.93	0-2	2

Table 9-11
Reduced LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	22.47	0	0
	1732.5	20175	20	QPSK	1	50	22.31	0	0
	1732.5	20175	20	QPSK	1	99	22.11	0	0
	1732.5	20175	20	QPSK	50	0	21.11	0-1	1
	1732.5	20175	20	QPSK	50	25	21.12	0-1	1
	1732.5	20175	20	QPSK	50	50	21.04	0-1	1
	1732.5	20175	20	QPSK	100	0	21.06	0-1	1
	1732.5	20175	20	16QAM	1	0	21.29	0-1	1
	1732.5	20175	20	16QAM	1	50	21.20	0-1	1
	1732.5	20175	20	16QAM	1	99	21.00	0-1	1
	1732.5	20175	20	16QAM	50	0	20.17	0-2	2
	1732.5	20175	20	16QAM	50	25	20.11	0-2	2
	1732.5	20175	20	16QAM	50	50	20.07	0-2	2
	1732.5	20175	20	16QAM	100	0	20.09	0-2	2

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

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Table 9-12
Reduced LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	22.26	0	0
	1717.5	20025	15	QPSK	1	36	22.31	0	0
	1717.5	20025	15	QPSK	1	74	22.03	0	0
	1717.5	20025	15	QPSK	36	0	21.20	0-1	1
	1717.5	20025	15	QPSK	36	18	21.04	0-1	1
	1717.5	20025	15	QPSK	36	37	21.15	0-1	1
	1717.5	20025	15	QPSK	75	0	21.10	0-1	1
	1717.5	20025	15	16QAM	1	0	21.30	0-1	1
	1717.5	20025	15	16QAM	1	36	20.98	0-1	1
	1717.5	20025	15	16QAM	1	74	20.89	0-1	1
	1717.5	20025	15	16QAM	36	0	20.12	0-2	2
	1717.5	20025	15	16QAM	36	18	20.04	0-2	2
Mid	1717.5	20025	15	16QAM	36	37	20.12	0-2	2
	1717.5	20025	15	16QAM	75	0	20.20	0-2	2
	1732.5	20175	15	QPSK	1	0	22.41	0	0
	1732.5	20175	15	QPSK	1	36	22.35	0	0
	1732.5	20175	15	QPSK	1	74	22.01	0	0
	1732.5	20175	15	QPSK	36	0	21.18	0-1	1
	1732.5	20175	15	QPSK	36	18	21.03	0-1	1
	1732.5	20175	15	QPSK	36	37	20.98	0-1	1
	1732.5	20175	15	QPSK	75	0	21.14	0-1	1
	1732.5	20175	15	16QAM	1	0	21.20	0-1	1
	1732.5	20175	15	16QAM	1	36	21.16	0-1	1
	1732.5	20175	15	16QAM	1	74	20.97	0-1	1
High	1732.5	20175	15	16QAM	36	0	20.18	0-2	2
	1732.5	20175	15	16QAM	36	18	20.02	0-2	2
	1732.5	20175	15	16QAM	36	37	20.02	0-2	2
	1732.5	20175	15	16QAM	75	0	20.19	0-2	2
	1747.5	20325	15	QPSK	1	0	22.32	0	0
	1747.5	20325	15	QPSK	1	36	22.48	0	0
	1747.5	20325	15	QPSK	1	74	21.99	0	0
	1747.5	20325	15	QPSK	36	0	21.20	0-1	1
	1747.5	20325	15	QPSK	36	18	21.16	0-1	1
	1747.5	20325	15	QPSK	36	37	21.17	0-1	1
	1747.5	20325	15	QPSK	75	0	21.07	0-1	1
	1747.5	20325	15	16QAM	1	0	21.29	0-1	1
	1747.5	20325	15	16QAM	1	36	21.08	0-1	1
	1747.5	20325	15	16QAM	1	74	21.06	0-1	1
	1747.5	20325	15	16QAM	36	0	20.01	0-2	2
	1747.5	20325	15	16QAM	36	18	19.95	0-2	2
	1747.5	20325	15	16QAM	36	37	20.20	0-2	2
	1747.5	20325	15	16QAM	75	0	20.37	0-2	2

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Table 9-13
Reduced LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	22.39	0	0
	1715	20000	10	QPSK	1	25	22.39	0	0
	1715	20000	10	QPSK	1	49	21.99	0	0
	1715	20000	10	QPSK	25	0	21.11	0-1	1
	1715	20000	10	QPSK	25	12	20.91	0-1	1
	1715	20000	10	QPSK	25	25	21.13	0-1	1
	1715	20000	10	QPSK	50	0	20.96	0-1	1
	1715	20000	10	16QAM	1	0	21.37	0-1	1
	1715	20000	10	16QAM	1	25	21.25	0-1	1
	1715	20000	10	16QAM	1	49	20.93	0-1	1
	1715	20000	10	16QAM	25	0	20.38	0-2	2
	1715	20000	10	16QAM	25	12	20.24	0-2	2
Mid	1715	20000	10	16QAM	25	25	20.10	0-2	2
	1715	20000	10	16QAM	50	0	20.20	0-2	2
	1732.5	20175	10	QPSK	1	0	22.42	0	0
	1732.5	20175	10	QPSK	1	25	22.38	0	0
	1732.5	20175	10	QPSK	1	49	22.02	0	0
	1732.5	20175	10	QPSK	25	0	21.17	0-1	1
	1732.5	20175	10	QPSK	25	12	21.07	0-1	1
	1732.5	20175	10	QPSK	25	25	20.99	0-1	1
	1732.5	20175	10	QPSK	50	0	21.10	0-1	1
	1732.5	20175	10	16QAM	1	0	21.22	0-1	1
	1732.5	20175	10	16QAM	1	25	21.16	0-1	1
	1732.5	20175	10	16QAM	1	49	20.90	0-1	1
High	1732.5	20175	10	16QAM	25	0	20.22	0-2	2
	1732.5	20175	10	16QAM	25	12	20.06	0-2	2
	1732.5	20175	10	16QAM	25	25	20.01	0-2	2
	1732.5	20175	10	16QAM	50	0	20.29	0-2	2
	1750	20350	10	QPSK	1	0	22.25	0	0
	1750	20350	10	QPSK	1	25	22.35	0	0
	1750	20350	10	QPSK	1	49	21.85	0	0
	1750	20350	10	QPSK	25	0	21.36	0-1	1
	1750	20350	10	QPSK	25	12	20.91	0-1	1
	1750	20350	10	QPSK	25	25	20.87	0-1	1
	1750	20350	10	QPSK	50	0	21.12	0-1	1
	1750	20350	10	16QAM	1	0	21.37	0-1	1
	1750	20350	10	16QAM	1	25	21.00	0-1	1
	1750	20350	10	16QAM	1	49	20.79	0-1	1
	1750	20350	10	16QAM	25	0	20.42	0-2	2
	1750	20350	10	16QAM	25	12	19.88	0-2	2
	1750	20350	10	16QAM	25	25	19.90	0-2	2
	1750	20350	10	16QAM	50	0	20.35	0-2	2

Table 9-14
Reduced LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	22.47	0	0
	1712.5	19975	5	QPSK	1	12	22.40	0	0
	1712.5	19975	5	QPSK	1	24	22.03	0	0
	1712.5	19975	5	QPSK	12	0	21.30	0-1	1
	1712.5	19975	5	QPSK	12	6	21.32	0-1	1
	1712.5	19975	5	QPSK	12	13	21.27	0-1	1
	1712.5	19975	5	QPSK	25	0	20.91	0-1	1
	1712.5	19975	5	16-QAM	1	0	21.15	0-1	1
	1712.5	19975	5	16-QAM	1	12	21.20	0-1	1
	1712.5	19975	5	16-QAM	1	24	20.80	0-1	1
	1712.5	19975	5	16-QAM	12	0	20.28	0-2	2
	1712.5	19975	5	16-QAM	12	6	19.83	0-2	2
	1712.5	19975	5	16-QAM	12	13	20.07	0-2	2
Mid	1732.5	20175	5	QPSK	1	0	22.41	0	0
	1732.5	20175	5	QPSK	1	12	22.36	0	0
	1732.5	20175	5	QPSK	1	24	22.09	0	0
	1732.5	20175	5	QPSK	12	0	21.19	0-1	1
	1732.5	20175	5	QPSK	12	6	21.13	0-1	1
	1732.5	20175	5	QPSK	12	13	21.09	0-1	1
	1732.5	20175	5	QPSK	25	0	21.06	0-1	1
	1732.5	20175	5	16-QAM	1	0	21.28	0-1	1
	1732.5	20175	5	16-QAM	1	12	21.19	0-1	1
	1732.5	20175	5	16-QAM	1	24	20.85	0-1	1
	1732.5	20175	5	16-QAM	12	0	20.29	0-2	2
	1732.5	20175	5	16-QAM	12	6	19.99	0-2	2
	1732.5	20175	5	16-QAM	12	13	20.06	0-2	2
High	1752.5	20375	5	QPSK	1	0	22.35	0	0
	1752.5	20375	5	QPSK	1	12	22.23	0	0
	1752.5	20375	5	QPSK	1	24	21.89	0	0
	1752.5	20375	5	QPSK	12	0	21.35	0-1	1
	1752.5	20375	5	QPSK	12	6	21.33	0-1	1
	1752.5	20375	5	QPSK	12	13	21.15	0-1	1
	1752.5	20375	5	QPSK	25	0	21.21	0-1	1
	1752.5	20375	5	16-QAM	1	0	21.18	0-1	1
	1752.5	20375	5	16-QAM	1	12	21.05	0-1	1
	1752.5	20375	5	16-QAM	1	24	21.04	0-1	1
	1752.5	20375	5	16-QAM	12	0	20.49	0-2	2
	1752.5	20375	5	16-QAM	12	6	20.17	0-2	2
	1752.5	20375	5	16-QAM	12	13	19.87	0-2	2
	1752.5	20375	5	16-QAM	25	0	20.22	0-2	2

9.5 WLAN Conducted Powers

Table 9-15
SISO IEEE 802.11b Average RF Power- Antenna 1

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	14.75	15.09	15.12	15.13
802.11b	2437	6*	14.88	15.25	15.27	15.24
802.11b	2462	11*	15.19	15.39	15.43	15.42

Table 9-16
SISO IEEE 802.11b Average RF Power- Antenna 2

Mode	Freq [MHz]	Channel	802.11b Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	14.04	14.20	14.19	14.17
802.11b	2437	6*	14.71	14.92	14.82	14.87
802.11b	2462	11*	14.72	14.82	14.87	14.93

Table 9-17
SISO IEEE 802.11g Average RF Power- Antenna 1

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	14.20	14.23	14.20	14.14	14.31	14.24	14.17	14.03
802.11g	2437	6	14.41	14.49	14.41	14.37	14.48	14.42	14.33	14.18
802.11g	2462	11	14.41	14.41	14.45	14.27	14.48	14.41	14.43	14.19

Table 9-18
SISO IEEE 802.11g Average RF Power- Antenna 2

Mode	Freq [MHz]	Channel	802.11g Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	14.03	13.94	14.05	13.93	14.12	14.05	14.29	14.08
802.11g	2437	6	14.39	14.31	14.40	14.29	14.43	14.42	14.49	14.44
802.11g	2462	11	13.62	13.58	13.66	13.51	13.62	13.61	13.87	13.66

Table 9-19
SISO IEEE 802.11n Average RF Power- Antenna 1

Mode	Freq [MHz]	Channel	802.11n (2.4GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	2412	1	12.91	12.96	13.01	13.18	13.17	13.27	13.31	13.33
802.11n	2437	6	13.09	13.11	13.23	13.37	13.29	13.43	13.49	13.47
802.11n	2462	11	13.26	13.27	13.33	13.48	13.47	13.47	13.49	13.46

Table 9-20
SISO IEEE 802.11n Average RF Power- Antenna 2

Mode	Freq [MHz]	Channel	802.11n (2.4GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	2412	1	12.77	12.81	12.83	13.08	13.04	13.26	13.18	13.19
802.11n	2437	6	13.34	13.47	13.36	13.43	13.47	13.49	13.47	13.48
802.11n	2462	11	13.24	13.29	13.29	13.47	13.42	13.45	13.49	13.40

Table 9-21
MIMO IEEE 802.11n Average RF Power

802.11n (2.4 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			13
802.11n	2412	1*	15.85
802.11n	2437	6*	16.23
802.11n	2462	11*	16.26

Table 9-22
SISO IEEE 802.11a Average RF Power-Antenna 1

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	11.98	11.91	11.98	11.89	12.08	12.05	12.16	11.94
802.11a	5200	40	12.11	12.05	12.12	11.95	12.25	12.21	12.26	12.04
802.11a	5220	44	12.16	12.13	12.21	12.04	12.23	12.25	12.37	12.13
802.11a	5240	48*	12.40	12.30	12.39	12.33	12.42	12.44	12.49	12.30
802.11a	5260	52*	11.96	11.92	11.91	11.84	12.17	12.09	12.14	12.07
802.11a	5280	56	12.21	12.16	12.17	12.00	12.39	12.33	12.43	12.32
802.11a	5300	60	12.38	12.41	12.34	12.22	12.45	12.48	12.49	12.46
802.11a	5320	64*	12.32	12.30	12.28	12.14	12.46	12.49	12.49	12.46
802.11a	5500	100	12.07	12.06	12.09	12.06	12.29	12.17	12.28	12.06
802.11a	5520	104*	12.01	12.05	11.98	12.03	12.26	12.05	12.30	12.05
802.11a	5540	108	11.98	11.90	12.03	11.92	12.22	12.13	12.27	12.02
802.11a	5560	112	12.01	12.00	12.06	11.99	12.25	12.09	12.29	12.03
802.11a	5580	116*	12.03	12.06	12.08	12.01	12.28	12.17	12.19	11.98
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	11.71	11.71	11.68	11.68	11.88	11.79	11.91	11.69
802.11a	5680	136*	11.57	11.60	11.63	11.59	11.80	11.72	11.81	11.59
802.11a	5700	140	11.67	11.62	11.69	11.62	11.92	11.82	11.89	11.62
802.11a	5745	149*	12.03	12.08	12.01	11.98	12.16	12.11	12.27	11.97
802.11a	5765	153	11.95	11.97	11.93	11.89	12.08	12.07	12.16	11.88
802.11a	5785	157*	11.92	11.99	11.93	11.90	11.97	12.01	12.17	11.84
802.11a	5805	161	11.84	11.91	11.78	11.83	12.05	11.97	12.04	11.87
802.11a	5825	165*	11.87	11.93	11.88	11.81	11.99	11.92	12.02	11.79

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.

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Table 9-23
SISO IEEE 802.11a Average RF Power-Antenna 2

Mode	Freq [MHz]	Channel	802.11a Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	12.13	12.23	12.19	12.08	12.34	12.29	12.37	12.29
802.11a	5200	40	12.09	12.24	12.17	12.04	12.23	12.30	12.37	12.31
802.11a	5220	44	12.01	12.15	12.05	11.89	12.18	12.19	12.26	12.22
802.11a	5240	48*	11.95	12.06	12.02	11.91	12.17	12.11	12.20	12.11
802.11a	5260	52*	11.62	11.61	11.64	11.61	11.83	11.69	11.86	11.73
802.11a	5280	56	11.59	11.65	11.55	11.50	11.80	11.65	11.84	11.64
802.11a	5300	60	11.41	11.41	11.43	11.35	11.64	11.46	11.56	11.53
802.11a	5320	64*	11.40	11.38	11.36	11.34	11.65	11.47	11.56	11.58
802.11a	5500	100	11.65	11.72	11.64	11.64	11.88	11.87	12.08	11.83
802.11a	5520	104*	11.79	11.85	11.77	11.81	12.01	12.01	12.26	11.91
802.11a	5540	108	11.73	11.77	11.69	11.77	11.95	11.96	12.22	11.90
802.11a	5560	112	11.74	11.80	11.78	11.69	11.94	11.88	12.21	11.93
802.11a	5580	116*	11.82	11.88	11.86	11.83	12.13	11.98	12.29	12.05
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	12.01	12.08	11.99	11.95	12.23	12.26	12.30	12.20
802.11a	5680	136*	12.04	12.11	12.00	12.01	12.21	12.28	12.27	12.25
802.11a	5700	140	12.06	12.09	12.10	12.02	12.29	12.22	12.29	12.25
802.11a	5745	149*	12.11	11.91	12.03	11.95	12.21	12.09	12.35	12.06
802.11a	5765	153	12.04	11.90	11.89	11.93	12.20	12.02	12.27	12.06
802.11a	5785	157*	12.21	12.01	12.21	12.04	12.25	12.16	12.47	12.12
802.11a	5805	161	12.26	12.02	12.18	12.07	12.43	12.26	12.46	12.20
802.11a	5825	165*	12.33	12.14	12.18	12.18	12.49	12.30	12.49	12.23

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.

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Table 9-24
SISO IEEE 802.11n Average RF Power – 20 MHz Bandwidth- Antenna 1

Mode	Freq [MHz]	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	11.83	11.77	11.85	12.31	12.37	12.27	12.31	12.32
802.11n	5200	40	11.85	11.84	11.86	12.32	12.33	12.32	12.36	12.25
802.11n	5220	44	12.02	11.91	12.09	12.49	12.46	12.47	12.47	12.43
802.11n	5240	48	12.09	11.99	12.11	12.47	12.47	12.48	12.44	12.49
802.11n	5260	52	12.08	12.06	12.11	12.35	12.41	12.46	12.45	12.48
802.11n	5280	56	12.09	12.07	12.12	12.29	12.35	12.48	12.41	12.46
802.11n	5300	60	12.04	12.00	12.01	12.35	12.35	12.49	12.40	12.41
802.11n	5320	64	12.16	12.21	12.22	12.44	12.49	12.49	12.44	12.47
802.11n	5500	100	11.85	11.78	11.77	12.11	12.07	12.06	12.05	12.03
802.11n	5520	104	11.92	11.81	11.82	12.22	12.13	12.09	12.07	12.09
802.11n	5540	108	12.14	12.06	12.08	12.27	12.28	12.30	12.29	12.24
802.11n	5560	112	12.15	12.08	12.09	12.29	12.26	12.30	12.28	12.28
802.11n	5580	116	12.09	12.07	12.00	12.28	12.22	12.31	12.29	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	12.27	12.16	12.22	12.24	12.30	12.28	12.29	12.19
802.11n	5680	136	12.29	12.24	12.16	12.26	12.31	12.31	12.30	12.28
802.11n	5700	140	12.31	12.17	12.16	12.29	12.29	12.27	12.26	12.30
802.11n	5745	149	11.99	11.33	11.29	11.58	11.53	11.58	11.47	11.10
802.11n	5765	153	11.86	11.23	11.19	11.44	11.34	11.49	11.34	11.02
802.11n	5785	157	11.78	11.19	11.04	11.37	11.31	11.38	11.24	10.94
802.11n	5805	161	11.74	11.12	11.05	11.30	11.31	11.37	11.23	10.91
802.11n	5825	165	11.81	11.21	11.17	11.44	11.36	11.46	11.24	10.90

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Table 9-25
SISO IEEE 802.11n Average RF Power – 20 MHz Bandwidth- Antenna 2

Mode	Freq [MHz]	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	12.04	12.11	12.04	12.31	12.22	12.25	12.33	12.37
802.11n	5200	40	11.97	12.01	12.01	12.21	12.16	12.11	12.33	12.26
802.11n	5220	44	12.03	12.10	12.10	12.24	12.18	12.24	12.26	12.37
802.11n	5240	48	11.81	11.84	11.80	12.01	12.07	12.06	12.09	12.11
802.11n	5260	52	11.51	11.42	11.64	11.65	11.73	11.74	11.71	11.77
802.11n	5280	56	11.41	11.32	11.45	11.52	11.55	11.70	11.61	11.66
802.11n	5300	60	11.38	11.34	11.45	11.53	11.57	11.63	11.61	11.65
802.11n	5320	64	11.29	11.26	11.42	11.43	11.52	11.46	11.50	11.59
802.11n	5500	100	11.62	11.56	11.48	11.74	11.77	11.83	11.87	11.93
802.11n	5520	104	11.63	11.56	11.48	11.70	11.74	11.83	11.90	12.01
802.11n	5540	108	11.67	11.65	11.59	11.86	11.77	11.93	11.92	11.96
802.11n	5560	112	11.57	11.47	11.43	11.72	11.70	11.80	11.78	11.89
802.11n	5580	116	11.67	11.62	11.49	11.79	11.89	11.95	11.92	11.98
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	11.81	11.74	11.66	11.96	11.89	11.99	12.10	12.08
802.11n	5680	136	11.89	11.81	11.73	11.92	12.06	12.11	12.12	12.19
802.11n	5700	140	11.93	11.86	11.84	12.05	12.09	12.09	12.12	12.18
802.11n	5745	149	11.96	12.08	11.94	12.11	12.19	12.22	12.31	12.17
802.11n	5765	153	11.92	12.05	11.90	12.05	12.13	12.18	12.23	12.14
802.11n	5785	157	12.02	12.15	11.92	12.17	12.23	12.27	12.42	12.18
802.11n	5805	161	12.17	12.33	12.12	12.39	12.39	12.45	12.49	12.35
802.11n	5825	165	12.22	12.36	12.24	12.31	12.38	12.44	12.44	12.47

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Table 9-26
MIMO IEEE 802.11n Average RF Power – 20 MHz Bandwidth

802.11n (5 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			13
802.11n	5180	36*	14.95
802.11n	5200	40	14.92
802.11n	5220	44	15.04
802.11n	5240	48*	14.96
802.11n	5260	52*	14.81
802.11n	5280	56	14.77
802.11n	5300	60	14.73
802.11n	5320	64*	14.76
802.11n	5500	100	14.75
802.11n	5520	104*	14.79
802.11n	5540	108	14.92
802.11n	5560	112	14.88
802.11n	5580	116*	14.90
802.11n	5600	120	N/A
802.11n	5620	124	N/A
802.11n	5640	128	N/A
802.11n	5660	132	15.06
802.11n	5680	136*	15.10
802.11n	5700	140	15.13
802.11n	5745	149*	14.93
802.11n	5765	153	14.90
802.11n	5785	157*	14.91
802.11n	5805	161	14.97
802.11n	5825	165*	15.03

Table 9-27
SISO IEEE 802.11n Average RF Power – 40 MHz Bandwidth- Antenna 1

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	8.85	8.69	8.91	8.95	8.96	9.03	9.08	8.91
802.11n	5230	46	9.01	8.78	9.04	9.09	9.19	9.20	9.22	9.09
802.11n	5270	54	9.17	9.22	9.14	9.03	8.85	9.16	9.39	9.38
802.11n	5310	62	9.42	9.47	9.46	9.27	9.08	9.44	9.42	9.48
802.11n	5510	102	9.19	9.17	9.13	9.17	9.46	9.32	9.15	9.33
802.11n	5550	110	8.91	8.81	8.91	8.91	9.21	9.01	8.87	9.04
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	8.83	8.79	8.72	8.79	9.07	9.00	8.84	8.98
802.11n	5755	151	8.73	8.63	8.67	8.89	8.83	8.82	8.84	8.81
802.11n	5795	159	8.67	8.48	8.57	8.78	8.78	8.78	8.76	8.78

Table 9-28
SISO IEEE 802.11n Average RF Power – 40 MHz Bandwidth- Antenna 2

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	8.78	9.30	8.27	9.02	8.26	8.40	8.38	8.26
802.11n	5230	46	8.53	8.99	8.66	8.09	8.79	8.62	9.04	8.90
802.11n	5270	54	8.93	9.27	8.77	8.61	9.24	8.72	8.80	8.72
802.11n	5310	62	8.99	8.74	9.18	8.53	9.30	8.49	9.45	9.26
802.11n	5510	102	9.17	9.38	9.49	9.46	9.08	9.44	9.45	9.06
802.11n	5550	110	9.29	9.27	9.40	9.46	9.06	9.46	9.46	9.42
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	9.47	9.48	9.31	9.49	9.47	9.14	9.13	9.44
802.11n	5755	151	8.58	8.98	8.51	8.97	8.44	8.74	8.06	8.51
802.11n	5795	159	8.64	8.71	8.36	8.62	8.67	8.16	8.79	8.30

Table 9-29
MIMO IEEE 802.11n Average RF Power – 40 MHz Bandwidth

802.11n (5 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
			27
802.11n	5190	38	11.83
802.11n	5230	46	11.79
802.11n	5270	54	12.06
802.11n	5310	62	12.22
802.11n	5510	102	12.19
802.11n	5550	110	12.11
802.11n	5590	118	N/A
802.11n	5630	126	N/A
802.11n	5670	134	12.17
802.11n	5755	151	11.67
802.11n	5795	159	11.67

Table 9-30
SISO IEEE 802.11ac Average RF Power – 80 MHz Bandwidth- Antenna 1

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	10.18	10.21	10.21	10.40	10.16	10.19	10.25	10.30	10.35	10.28
802.11ac	5290	58	9.69	9.74	9.78	9.83	9.72	9.77	9.83	9.86	9.88	9.79
802.11ac	5530	106	10.31	10.24	10.33	10.31	10.37	10.42	10.49	10.29	10.38	10.44
802.11ac	5775	155	9.89	9.86	9.94	10.11	10.03	9.93	10.03	10.11	9.84	9.91

Table 9-31
SISO IEEE 802.11ac Average RF Power – 80 MHz Bandwidth- Antenna 2

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	10.15	10.28	10.09	9.92	9.96	10.33	9.91	9.95	9.90	10.30
802.11ac	5290	58	9.67	9.81	9.44	9.31	9.38	9.79	9.84	9.50	9.30	9.89
802.11ac	5530	106	9.73	9.77	9.50	9.46	9.71	9.69	9.42	9.39	9.45	9.38
802.11ac	5775	155	10.06	10.21	10.22	9.93	10.17	10.21	9.71	9.98	9.87	9.71

Table 9-32
MIMO IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

802.11ac (5 GHz) Conducted Power [dBm]			
Mode	Freq [MHz]	Channel	Data Rate [Mbps]
802.11ac	5210	42	58.5
802.11ac	5290	58	13.18
802.11ac	5530	106	12.69
802.11ac	5775	155	13.04
802.11ac			12.99

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

- For 2.4 GHz SISO operations, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 SISO modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz SISO operations, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 SISO modes (including 802.11n 20 MHz and 40 MHz) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- Full SAR tests for all SISO IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac in SISO mode was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
- For MIMO 2.4 GHz and 5 GHz operations, the highest average RF output power channel for the lowest data rate for IEEE 802.11n (20 MHz bandwidth) was selected for SAR evaluation. Other IEEE 802.11 modes and bandwidths were not investigated for MIMO operations since the maximum allowed output power (including tolerance) was not higher for these modes.
- The individual spectra for each 2x2 MIMO WIFI Antenna were summed mathematically in linear power units for the MIMO output power measurements.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg, the reported 1g averaged SAR is <0.8 W/kg, or the reported 10g averaged SAR is <2.0 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.

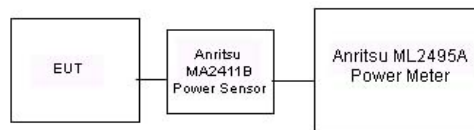


Figure 9-4
Power Measurement Setup for Bandwidths < 50 MHz

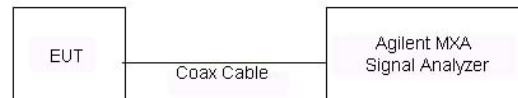


Figure 9-5
Power Measurement Setup for Bandwidths > 50 MHz

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Head 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
09/18/2014	750H	22.6	725	0.886	40.700	0.891	42.071	-0.56%	-3.26%
			740	0.899	40.444	0.893	41.994	0.67%	-3.69%
			755	0.910	40.227	0.894	41.916	1.79%	-4.03%
			770	0.923	40.010	0.895	41.838	3.13%	-4.37%
			785	0.938	39.808	0.896	41.760	4.69%	-4.67%
09/15/2014	835H	22.5	820	0.911	41.766	0.899	41.578	1.33%	0.45%
			835	0.925	41.591	0.900	41.500	2.78%	0.22%
			850	0.939	41.408	0.916	41.500	2.51%	-0.22%
09/17/2014	1750H	22.8	1710	1.318	39.693	1.348	40.142	-2.23%	-1.12%
			1750	1.357	39.498	1.371	40.079	-1.02%	-1.45%
			1790	1.397	39.314	1.394	40.016	0.22%	-1.75%
09/15/2014	1900H	22.8	1850	1.362	40.187	1.400	40.000	-2.71%	0.47%
			1880	1.394	40.036	1.400	40.000	-0.43%	0.09%
			1910	1.427	39.931	1.400	40.000	1.93%	-0.17%
09/15/2014	2450H	23.4	2401	1.756	39.846	1.756	39.287	0.00%	1.42%
			2450	1.815	39.696	1.800	39.200	0.83%	1.27%
			2499	1.866	39.504	1.853	39.138	0.70%	0.94%
09/15/2014	5200H-5800H	21.9	5180	4.601	35.664	4.635	36.009	-0.73%	-0.96%
			5200	4.616	35.605	4.655	35.986	-0.84%	-1.06%
			5220	4.649	35.550	4.676	35.963	-0.58%	-1.15%
			5240	4.672	35.546	4.696	35.940	-0.51%	-1.10%
			5260	4.697	35.545	4.717	35.917	-0.42%	-1.04%
			5280	4.705	35.527	4.737	35.894	-0.68%	-1.02%
			5300	4.718	35.464	4.758	35.871	-0.84%	-1.13%
			5320	4.745	35.419	4.778	35.849	-0.69%	-1.20%
			5500	4.930	35.172	4.963	35.643	-0.66%	-1.32%
			5520	4.945	35.181	4.983	35.620	-0.76%	-1.23%
			5540	4.959	35.148	5.004	35.597	-0.90%	-1.26%
			5580	4.993	35.065	5.045	35.551	-1.03%	-1.37%
			5600	5.028	35.015	5.065	35.529	-0.73%	-1.45%
			5700	5.122	34.879	5.168	35.414	-0.89%	-1.51%
			5745	5.199	34.834	5.214	35.363	-0.29%	-1.50%
			5765	5.201	34.824	5.234	35.340	-0.63%	-1.46%
			5785	5.214	34.821	5.255	35.317	-0.78%	-1.40%
			5800	5.218	34.764	5.270	35.300	-0.99%	-1.52%
			5805	5.226	34.753	5.275	35.294	-0.93%	-1.53%
			5825	5.256	34.705	5.296	35.271	-0.76%	-1.60%

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Table 10-2
Measured Body 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
09/17/2014	750B	22.4	725	0.949	54.067	0.961	55.629	-1.25%	-2.81%
			740	0.962	53.869	0.963	55.570	-0.10%	-3.06%
			755	0.976	53.716	0.964	55.512	1.24%	-3.24%
			770	0.991	53.532	0.965	55.453	2.69%	-3.46%
			785	1.006	53.352	0.966	55.395	4.14%	-3.69%
10/16/2014	750B	22.7	725	0.953	55.992	0.961	55.629	-0.83%	0.65%
			740	0.968	55.808	0.963	55.570	0.52%	0.43%
			755	0.982	55.634	0.964	55.512	1.87%	0.22%
			770	0.997	55.494	0.965	55.453	3.32%	0.07%
			785	1.010	55.283	0.966	55.395	4.55%	-0.20%
09/15/2014	835B	22.5	820	0.992	53.401	0.969	55.258	2.37%	-3.36%
			835	1.007	53.246	0.970	55.200	3.81%	-3.54%
			850	1.022	53.060	0.988	55.154	3.44%	-3.80%
10/13/2014	835B	21.5	820	0.984	53.963	0.969	55.258	1.55%	-2.34%
			835	0.999	53.775	0.970	55.200	2.99%	-2.58%
			850	1.014	53.672	0.988	55.154	2.63%	-2.69%
10/15/2014	835B	20.6	820	0.938	54.163	0.969	55.258	-3.20%	-1.98%
			835	0.952	54.062	0.970	55.200	-1.86%	-2.06%
			850	0.969	53.907	0.988	55.154	-1.92%	-2.26%
10/01/2014	1750B	22.5	1710	1.437	51.964	1.463	53.537	-1.78%	-2.94%
			1750	1.481	51.764	1.488	53.432	-0.47%	-3.12%
			1790	1.526	51.636	1.514	53.326	0.79%	-3.17%
10/15/2014	1750B	22.8	1710	1.417	51.331	1.463	53.537	-3.14%	-4.12%
			1750	1.473	51.282	1.488	53.432	-1.01%	-4.02%
			1790	1.508	51.140	1.514	53.326	-0.40%	-4.10%
09/15/2014	1900B	22.1	1850	1.488	51.542	1.520	53.300	-2.11%	-3.30%
			1880	1.523	51.404	1.520	53.300	0.20%	-3.56%
			1910	1.561	51.316	1.520	53.300	2.70%	-3.72%
09/18/2014	1900B	23.8	1850	1.445	53.082	1.520	53.300	-4.93%	-0.41%
			1880	1.479	52.988	1.520	53.300	-2.70%	-0.59%
			1910	1.511	52.896	1.520	53.300	-0.59%	-0.76%
09/29/2014	1900B	23.7	1850	1.518	51.602	1.520	53.300	-0.13%	-3.19%
			1880	1.552	51.481	1.520	53.300	2.11%	-3.41%
			1910	1.589	51.369	1.520	53.300	4.54%	-3.62%
10/14/2014	1900B	22.7	1850	1.526	52.622	1.520	53.300	0.39%	-1.27%
			1880	1.560	52.528	1.520	53.300	2.63%	-1.45%
			1910	1.594	52.415	1.520	53.300	4.87%	-1.66%
09/09/2014	2450B	22.8	2401	1.895	50.955	1.903	52.765	-0.42%	-3.43%
			2450	1.966	50.772	1.950	52.700	0.82%	-3.66%
			2499	2.029	50.594	2.019	52.638	0.50%	-3.88%
10/14/2014	2450B	24.3	2401	1.892	51.818	1.903	52.765	-0.58%	-1.79%
			2450	1.956	51.649	1.950	52.700	0.31%	-1.99%
			2499	2.022	51.474	2.019	52.638	0.15%	-2.21%
09/09/2014	5200B-5800B	23.3	5180	5.120	48.059	5.276	49.041	-2.96%	-2.00%
			5200	5.137	48.028	5.299	49.014	-3.06%	-2.01%
			5220	5.179	47.907	5.323	48.987	-2.71%	-2.20%
			5240	5.217	47.897	5.346	48.960	-2.41%	-2.17%
			5260	5.248	47.886	5.369	48.933	-2.25%	-2.14%
			5280	5.267	47.866	5.393	48.906	-2.34%	-2.13%
			5300	5.288	47.796	5.416	48.879	-2.36%	-2.22%
			5320	5.328	47.702	5.439	48.851	-2.04%	-2.35%
			5500	5.585	47.304	5.650	48.607	-1.15%	-2.68%
			5520	5.628	47.252	5.673	48.580	-0.79%	-2.73%
			5540	5.647	47.226	5.696	48.553	-0.86%	-2.73%
			5600	5.743	47.072	5.766	48.471	-0.40%	-2.89%
			5700	5.894	46.838	5.883	48.336	0.19%	-3.10%
			5745	5.971	46.743	5.936	48.275	0.59%	-3.17%
			5765	6.004	46.724	5.959	48.248	0.76%	-3.16%
			5785	6.022	46.693	5.982	48.220	0.67%	-3.17%
			5800	6.026	46.631	6.000	48.200	0.43%	-3.26%
			5805	6.039	46.602	6.006	48.193	0.55%	-3.30%
			5825	6.077	46.581	6.029	48.166	0.80%	-3.29%

The above measured tissue parameters were used in the DASy software. The DASy software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

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10.2 Test System Verification

Prior to SAR assessment, the system is verified to $\pm 10\%$ 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 10-3
System Verification Results - 1g

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} (%)
D	750	HEAD	09/18/2014	24.3	23.6	0.100	1003	3263	0.860	8.370	8.600	2.75%
D	835	HEAD	09/15/2014	23.4	22.5	0.100	4d119	3263	0.961	9.220	9.610	4.23%
G	1750	HEAD	09/17/2014	24.0	23.0	0.100	1008	3258	3.430	36.900	34.300	-7.05%
K	1900	HEAD	09/15/2014	23.4	22.8	0.100	5d141	3287	4.110	40.100	41.100	2.49%
G	2450	HEAD	09/15/2014	24.4	23.6	0.100	797	3258	5.360	51.800	53.600	3.47%
E	5200	HEAD	09/15/2014	22.7	22.1	0.100	1057	3914	7.640	78.000	76.400	-2.05%
E	5300	HEAD	09/15/2014	22.7	22.1	0.100	1057	3914	7.980	83.000	79.800	-3.86%
E	5500	HEAD	09/15/2014	22.8	22.1	0.100	1057	3914	8.110	84.300	81.100	-3.80%
E	5600	HEAD	09/15/2014	22.8	22.2	0.100	1057	3914	8.320	83.500	83.200	-0.36%
E	5800	HEAD	09/15/2014	22.8	22.1	0.100	1057	3914	7.350	79.300	73.500	-7.31%
I	750	BODY	09/17/2014	23.9	22.4	0.100	1003	3209	0.920	8.770	9.200	4.90%
D	835	BODY	09/15/2014	22.4	22.5	0.100	4d119	3263	0.960	9.340	9.600	2.78%
J	835	BODY	10/13/2014	23.2	21.7	0.100	4d119	3022	1.000	9.340	10.000	7.07%
G	1750	BODY	10/01/2014	24.4	22.5	0.100	1008	3258	3.550	37.600	35.500	-5.59%
K	1900	BODY	09/15/2014	23.4	22.2	0.100	5d141	3287	4.320	40.600	43.200	6.40%
K	1900	BODY	09/18/2014	24.5	23.8	0.100	5d141	3287	4.070	40.600	40.700	0.25%
K	1900	BODY	09/29/2014	22.9	22.5	0.100	5d141	3287	4.210	40.600	42.100	3.69%
G	2450	BODY	09/09/2014	22.2	23.2	0.100	797	3258	5.130	49.400	51.300	3.85%
I	5200	BODY	09/09/2014	24.1	23.2	0.100	1057	3589	7.960	75.300	79.600	5.71%
I	5300	BODY	09/09/2014	24.2	23.3	0.100	1057	3589	8.130	77.400	81.300	5.04%
I	5500	BODY	09/09/2014	24.2	23.4	0.100	1057	3589	7.390	79.100	73.900	-6.57%
I	5600	BODY	09/09/2014	24.1	23.3	0.100	1057	3589	7.710	80.200	77.100	-3.87%
I	5800	BODY	09/09/2014	24.1	23.3	0.100	1057	3589	7.110	74.300	71.100	-4.31%

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Table 10-4
System Verification Results - 10g

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 SAR10g (W/kg)	1 W Target SAR10g (W/kg)	1 W Normalized SAR10g (W/kg)	Deviation _{10g} (%)
J	750	BODY	10/16/2014	22.9	22.7	0.100	1003	3022	0.613	5.780	6.130	6.06%
J	835	BODY	10/13/2014	23.2	21.7	0.100	4d119	3022	0.661	6.150	6.610	7.48%
C	835	BODY	10/15/2014	21.4	20.6	0.100	4d132	3213	0.606	6.300	6.060	-3.81%
G	1750	BODY	10/15/2014	24.4	22.6	0.100	1008	3258	1.880	20.100	18.800	-6.47%
D	1900	BODY	10/14/2014	24.9	23.1	0.100	5d141	3263	2.200	21.600	22.000	1.85%
B	2450	BODY	10/14/2014	23.1	23.8	0.100	882	3318	2.200	23.100	22.000	-4.76%
I	5200	BODY	09/09/2014	24.1	23.2	0.100	1057	3589	2.240	21.000	22.400	6.67%
I	5300	BODY	09/09/2014	24.2	23.3	0.100	1057	3589	2.270	21.500	22.700	5.58%
I	5500	BODY	09/09/2014	24.2	23.4	0.100	1057	3589	2.060	22.000	20.600	-6.36%
I	5600	BODY	09/09/2014	24.1	23.3	0.100	1057	3589	2.140	22.200	21.400	-3.60%
I	5800	BODY	09/09/2014	24.1	23.3	0.100	1057	3589	1.960	20.400	19.600	-3.92%

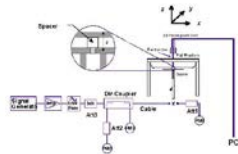


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

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11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

**Table 11-1
GSM 850 Head SAR**

MEASUREMENT RESULTS															
FREQUENCY		Model/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	33.49	-0.01	Right	Cheek	Standard	F38B8	1:8.3	0.185	1.002	0.185	
836.60	190	GSM 850	GSM	33.5	33.49	-0.01	Right	Cheek	Wireless Charging	F38B8	1:8.3	0.193	1.002	0.193	A1
836.60	190	GSM 850	GSM	33.5	33.49	-0.02	Right	Tilt	Standard	F38B8	1:8.3	0.092	1.002	0.092	
836.60	190	GSM 850	GSM	33.5	33.49	0.02	Left	Cheek	Standard	F38B8	1:8.3	0.153	1.002	0.153	
836.60	190	GSM 850	GSM	33.5	33.49	0.19	Left	Tilt	Standard	F38B8	1:8.3	0.083	1.002	0.083	
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	Cover Type	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	23.5	23.10	0.02	Right	Cheek	Standard	F38B8	1:1	0.136	1.096	0.149	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.01	Right	Cheek	Wireless Charging	F38B8	1:1	0.144	1.096	0.158	A2
836.60	4183	UMTS 850	RMC	23.5	23.10	0.13	Right	Tilt	Standard	F38B8	1:1	0.069	1.096	0.076	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.03	Left	Cheek	Standard	F38B8	1:1	0.096	1.096	0.105	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.10	Left	Tilt	Standard	F38B8	1:1	0.056	1.096	0.061	
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
CDMA 850 Head SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.69	0.06	Right	Cheek	Standard	F3805	1:1	0.202	1.074	0.217	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.69	0.18	Right	Cheek	Wireless Charging	F3805	1:1	0.219	1.074	0.235	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.69	0.00	Right	Tilt	Standard	F3805	1:1	0.097	1.074	0.104	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.69	0.07	Left	Cheek	Standard	F3805	1:1	0.134	1.074	0.144	
836.52	384	Cell. CDMA	RC3 / SO55	25.0	24.69	0.06	Left	Tilt	Standard	F3805	1:1	0.079	1.074	0.085	
836.52	384	Cell. CDMA	EVDO Rev. A	24.5	24.46	0.00	Right	Cheek	Standard	F38CB	1:1	0.070	1.009	0.071	
836.52	384	Cell. CDMA	EVDO Rev. A	24.5	24.46	0.16	Right	Tilt	Standard	F38CB	1:1	0.028	1.009	0.028	
836.52	384	Cell. CDMA	EVDO Rev. A	24.5	24.46	0.10	Left	Cheek	Standard	F38CB	1:1	0.062	1.009	0.063	
836.52	384	Cell. CDMA	EVDO Rev. A	24.5	24.46	0.09	Left	Tilt	Standard	F38CB	1:1	0.023	1.009	0.023	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.73	0.07	Right	Cheek	Standard	F3805	1:1	0.195	1.064	0.207	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.73	-0.03	Right	Cheek	Wireless Charging	F3805	1:1	0.221	1.064	0.235	A3
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.73	0.03	Right	Tilt	Standard	F3805	1:1	0.101	1.064	0.107	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.73	0.00	Left	Cheek	Standard	F3805	1:1	0.144	1.064	0.153	
836.52	384	Cell. CDMA	EVDO Rev. A	25.0	24.73	0.14	Left	Tilt	Standard	F3805	1:1	0.084	1.064	0.089	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

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Table 11-4
GSM 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	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	F38B8	1:8.3	0.053	1.091	0.058	
1880.00	661	GSM 1900	GSM	30.0	29.62	0.07	Right	Tilt	Standard	F38B8	1:8.3	0.031	1.091	0.034	
1880.00	661	GSM 1900	GSM	30.0	29.62	-0.16	Left	Cheek	Standard	F38B8	1:8.3	0.076	1.091	0.083	A4
1880.00	661	GSM 1900	GSM	30.0	29.62	0.16	Left	Cheek	Wireless Charging	F38B8	1:8.3	0.069	1.091	0.075	
1880.00	661	GSM 1900	GSM	30.0	29.62	0.09	Left	Tilt	Standard	F38B8	1:8.3	0.029	1.091	0.032	
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
UMTS 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	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	22.95	0.05	Right	Cheek	Standard	F38B8	1:1	0.105	1.012	0.106	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.06	Right	Tilt	Standard	F38B8	1:1	0.056	1.012	0.057	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.04	Left	Cheek	Standard	F38B8	1:1	0.125	1.012	0.127	A5
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.09	Left	Cheek	Wireless Charging	F38B8	1:1	0.112	1.012	0.113	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.03	Left	Tilt	Standard	F38B8	1:1	0.046	1.012	0.047	
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 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	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	24.61	-0.02	Right	Cheek	Standard	F38C9	1:1	0.160	1.094	0.175	A6
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.61	-0.05	Right	Cheek	Wireless Charging	F38C9	1:1	0.142	1.094	0.155	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.61	0.14	Right	Tilt	Standard	F38C9	1:1	0.061	1.094	0.067	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.61	0.10	Left	Cheek	Standard	F38C9	1:1	0.136	1.094	0.149	
1880.00	600	PCS CDMA	RC3 / SO55	25.0	24.61	-0.09	Left	Tilt	Standard	F38C9	1:1	0.053	1.094	0.058	
1880.00	600	PCS CDMA	EVDO Rev. A	23.0	22.39	0.12	Right	Cheek	Standard	F38D5	1:1	0.091	1.151	0.105	
1880.00	600	PCS CDMA	EVDO Rev. A	23.0	22.39	0.01	Right	Tilt	Standard	F38D5	1:1	0.045	1.151	0.052	
1880.00	600	PCS CDMA	EVDO Rev. A	23.0	22.39	-0.03	Left	Cheek	Standard	F38D5	1:1	0.069	1.151	0.079	
1880.00	600	PCS CDMA	EVDO Rev. A	23.0	22.39	-0.15	Left	Tilt	Standard	F38D5	1:1	0.032	1.151	0.037	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.64	0.00	Right	Cheek	Standard	F38C9	1:1	0.155	1.086	0.168	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.64	-0.06	Right	Cheek	Wireless Charging	F38C9	1:1	0.153	1.086	0.166	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.64	-0.01	Right	Tilt	Standard	F38C9	1:1	0.062	1.086	0.067	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.64	0.18	Left	Cheek	Standard	F38C9	1:1	0.143	1.086	0.155	
1880.00	600	PCS CDMA	EVDO Rev. A	25.0	24.64	-0.01	Left	Tilt	Standard	F38C9	1:1	0.052	1.086	0.056	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

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Table 11-7
LTE Band 13 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Cover Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.07	0	Right	Cheek	Standard	QPSK	1	25	F38E6	1:1	0.169	1.091	0.184	A7
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.07	0	Right	Cheek	Wireless Charging	QPSK	1	25	F38E6	1:1	0.165	1.091	0.180	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	0.04	1	Right	Cheek	Standard	QPSK	25	25	F38E6	1:1	0.132	1.104	0.146	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.00	0	Right	Tilt	Standard	QPSK	1	25	F38E6	1:1	0.081	1.091	0.088	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	-0.03	1	Right	Tilt	Standard	QPSK	25	25	F38E6	1:1	0.065	1.104	0.072	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.07	0	Left	Cheek	Standard	QPSK	1	25	F38E6	1:1	0.144	1.091	0.157	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	0.05	1	Left	Cheek	Standard	QPSK	25	25	F38E6	1:1	0.112	1.104	0.124	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.06	0	Left	Tilt	Standard	QPSK	1	25	F38E6	1:1	0.072	1.091	0.079	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	0.09	1	Left	Tilt	Standard	QPSK	25	25	F38E6	1:1	0.057	1.104	0.063	
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 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Cover Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR [1g]	Scaling Factor	Scaled SAR [1g]	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	0.03	0	Right	Cheek	Standard	QPSK	1	50	F38E6	1:1	0.165	1.021	0.168	A8
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	-0.09	0	Right	Cheek	Wireless Charging	QPSK	1	50	F38E6	1:1	0.165	1.021	0.168	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.50	0.04	1	Right	Cheek	Standard	QPSK	50	25	F38E6	1:1	0.127	1.000	0.127	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	0.10	0	Right	Tilt	Standard	QPSK	1	50	F38E6	1:1	0.110	1.021	0.112	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.50	0.05	1	Right	Tilt	Standard	QPSK	50	25	F38E6	1:1	0.088	1.000	0.088	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	0.11	0	Left	Cheek	Standard	QPSK	1	50	F38E6	1:1	0.163	1.021	0.166	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.50	-0.07	1	Left	Cheek	Standard	QPSK	50	25	F38E6	1:1	0.138	1.000	0.138	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	-0.04	0	Left	Tilt	Standard	QPSK	1	50	F38E6	1:1	0.126	1.021	0.129	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.50	0.04	1	Left	Tilt	Standard	QPSK	50	25	F38E6	1:1	0.109	1.000	0.109	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT												Head								
Spatial Peak												1.6 W/kg (mW/g)								
Uncontrolled Exposure/General Population												averaged over 1 gram								

Table 11-9
DTS Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Cover Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.03	Right	Cheek	1	Standard	0809-12	1	1:1	0.021	1.074	0.023	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.04	Right	Tilt	1	Standard	0809-12	1	1:1	0.013	1.074	0.014	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.02	Left	Cheek	1	Standard	0809-12	1	1:1	0.008	1.074	0.009	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.01	Left	Tilt	1	Standard	0809-12	1	1:1	0.007	1.074	0.008	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	-0.13	Right	Cheek	2	Standard	0809-12	1	1:1	0.178	1.197	0.213	A9
2462	11	IEEE 802.11b	DSSS	15.5	14.72	-0.14	Right	Cheek	2	Wireless Charging	0809-12	1	1:1	0.129	1.197	0.154	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.13	Right	Tilt	2	Standard	0809-12	1	1:1	0.055	1.197	0.066	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.02	Left	Cheek	2	Standard	0809-12	1	1:1	0.041	1.197	0.049	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.20	Left	Tilt	2	Standard	0809-12	1	1:1	0.029	1.197	0.035	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.09	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.162	1.057	0.171	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.00	Right	Cheek	MIMO	Wireless Charging	0809-12	13	1:1	0.097	1.057	0.103	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.04	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.035	1.057	0.037	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.05	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.028	1.057	0.030	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.03	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.016	1.057	0.017	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.00	Right	Cheek	1	Standard	0809-12	6	1:1	0.000	1.114	0.000	
5775	155	IEEE 802.11ac	OFDM	10.5	9.89	0.00	Right	Cheek	1	Standard	0809-12	29.3	1:1	0.000	1.151	0.000	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.00	Right	Tilt	1	Standard	0809-12	6	1:1	0.000	1.114	0.000	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.00	Left	Cheek	1	Standard	0809-12	6	1:1	0.000	1.114	0.000	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.00	Left	Tilt	1	Standard	0809-12	6	1:1	0.000	1.114	0.000	
5745	149	IEEE 802.11a	OFDM	12.5	12.11	0.06	Right	Cheek	2	Standard	0809-12	6	1:1	0.415	1.094	0.454	
5805	161	IEEE 802.11a	OFDM	12.5	12.26	0.02	Right	Cheek	2	Standard	0809-12	6	1:1	0.437	1.057	0.462	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.13	Right	Cheek	2	Standard	0809-12	6	1:1	0.401	1.040	0.417	
5775	155	IEEE 802.11ac	OFDM	10.5	10.06	0.07	Right	Cheek	2	Standard	0809-12	29.3	1:1	0.223	1.107	0.247	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.08	Right	Tilt	2	Standard	0809-12	6	1:1	0.225	1.040	0.234	
5745	149	IEEE 802.11a	OFDM	12.5	12.11	0.12	Left	Cheek	2	Standard	0809-12	6	1:1	0.334	1.094	0.365	
5805	161	IEEE 802.11a	OFDM	12.5	12.26	0.08	Left	Cheek	2	Standard	0809-12	6	1:1	0.340	1.057	0.359	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.07	Left	Cheek	2	Standard	0809-12	6	1:1	0.324	1.040	0.337	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	-0.06	Left	Tilt	2	Standard	0809-12	6	1:1	0.174	1.040	0.181	
5745	149	IEEE 802.11n	OFDM	15.5	14.93	0.06	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.555	1.140	0.633	
5805	161	IEEE 802.11n	OFDM	15.5	14.97	0.05	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.535	1.130	0.605	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.08	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.548	1.114	0.610	
5745	149	IEEE 802.11n	OFDM	15.5	14.93	-0.08	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.354	1.140	0.404	
5805	161	IEEE 802.11n	OFDM	15.5	14.97	0.04	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.329	1.130	0.372	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.01	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.317	1.114	0.353	
5745	149	IEEE 802.11n	OFDM	15.5	14.93	0.09	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.625	1.140	0.713	
5745	149	IEEE 802.11n	OFDM	15.5	14.93	-0.01	Left	Cheek	MIMO	Wireless Charging	0809-12	13	1:1	0.793	1.140	0.904	A10
5805	161	IEEE 802.11n	OFDM	15.5	14.97	0.13	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.597	1.130	0.675	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.12	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.586	1.114	0.653	
5745	149	IEEE 802.11n	OFDM	15.5	14.93	0.13	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.366	1.140	0.417	
5805	161	IEEE 802.11n	OFDM	15.5	14.97	0.07	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.344	1.130	0.389	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.01	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.327	1.114	0.364	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram										

**Table 11-10
NII Head SAR**

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Cover Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																	
5240	48	IEEE 802.11a	OFDM	12.5	12.40	-0.07	Right	Cheek	1	Standard	0809-12	6	1:1	0.002	1.023	0.002		
5210	42	IEEE 802.11ac	OFDM	10.5	10.18	0.00	Right	Cheek	1	Standard	0809-12	29.3	1:1	0.000	1.076	0.000		
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.00	Right	Tilt	1	Standard	0809-12	6	1:1	0.000	1.023	0.000		
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.00	Left	Cheek	1	Standard	0809-12	6	1:1	0.000	1.023	0.000		
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.00	Left	Tilt	1	Standard	0809-12	6	1:1	0.000	1.023	0.000		
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.00	Right	Cheek	1	Standard	0809-12	6	1:1	0.000	1.028	0.000		
5290	58	IEEE 802.11ac	OFDM	10.5	9.69	0.00	Right	Cheek	1	Standard	0809-12	29.3	1:1	0.000	1.205	0.000		
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.00	Right	Tilt	1	Standard	0809-12	6	1:1	0.000	1.028	0.000		
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.00	Left	Cheek	1	Standard	0809-12	6	1:1	0.000	1.028	0.000		
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.00	Left	Tilt	1	Standard	0809-12	6	1:1	0.000	1.028	0.000		
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.00	Right	Cheek	1	Standard	0809-12	6	1:1	0.000	1.104	0.000		
5530	106	IEEE 802.11ac	OFDM	10.5	10.31	0.00	Right	Cheek	1	Standard	0809-12	29.3	1:1	0.000	1.045	0.000		
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.00	Right	Tilt	1	Standard	0809-12	6	1:1	0.000	1.104	0.000		
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.00	Left	Cheek	1	Standard	0809-12	6	1:1	0.000	1.104	0.000		
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.00	Left	Tilt	1	Standard	0809-12	6	1:1	0.000	1.104	0.000		
5180	36	IEEE 802.11a	OFDM	12.5	12.13	-0.04	Right	Cheek	2	Standard	0809-12	6	1:1	0.189	1.089	0.206		
5210	42	IEEE 802.11ac	OFDM	10.5	10.15	-0.01	Right	Cheek	2	Standard	0809-12	29.3	1:1	0.109	1.084	0.118		
5180	36	IEEE 802.11a	OFDM	12.5	12.13	0.07	Right	Tilt	2	Standard	0809-12	6	1:1	0.140	1.089	0.152		
5180	36	IEEE 802.11a	OFDM	12.5	12.13	0.02	Left	Cheek	2	Standard	0809-12	6	1:1	0.159	1.089	0.173		
5180	36	IEEE 802.11a	OFDM	12.5	12.13	0.08	Left	Tilt	2	Standard	0809-12	6	1:1	0.100	1.089	0.109		
5260	52	IEEE 802.11a	OFDM	12.5	11.62	0.20	Right	Cheek	2	Standard	0809-12	6	1:1	0.181	1.225	0.222		
5290	58	IEEE 802.11ac	OFDM	10.5	9.67	0.12	Right	Cheek	2	Standard	0809-12	29.3	1:1	0.090	1.211	0.109		
5260	52	IEEE 802.11a	OFDM	12.5	11.62	0.12	Right	Tilt	2	Standard	0809-12	6	1:1	0.118	1.225	0.145		
5260	52	IEEE 802.11a	OFDM	12.5	11.62	0.12	Left	Cheek	2	Standard	0809-12	6	1:1	0.144	1.225	0.176		
5260	52	IEEE 802.11a	OFDM	12.5	11.62	0.06	Left	Tilt	2	Standard	0809-12	6	1:1	0.089	1.225	0.109		
5520	104	IEEE 802.11a	OFDM	12.5	11.79	-0.01	Right	Cheek	2	Standard	0809-12	6	1:1	0.242	1.178	0.285		
5580	116	IEEE 802.11a	OFDM	12.5	11.82	0.17	Right	Cheek	2	Standard	0809-12	6	1:1	0.330	1.169	0.386		
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.03	Right	Cheek	2	Standard	0809-12	6	1:1	0.456	1.107	0.505		
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.02	Right	Cheek	2	Wireless Charging	0809-12	6	1:1	0.536	1.107	0.593	A11	
5530	106	IEEE 802.11ac	OFDM	10.5	9.73	0.02	Right	Cheek	2	Standard	0809-12	29.3	1:1	0.133	1.194	0.159		
5520	104	IEEE 802.11a	OFDM	12.5	11.79	0.04	Right	Tilt	2	Standard	0809-12	6	1:1	0.170	1.178	0.200		
5580	116	IEEE 802.11a	OFDM	12.5	11.82	0.17	Right	Tilt	2	Standard	0809-12	6	1:1	0.206	1.169	0.241		
5700	140	IEEE 802.11a	OFDM	12.5	12.06	-0.07	Right	Tilt	2	Standard	0809-12	6	1:1	0.299	1.107	0.331		
5520	104	IEEE 802.11a	OFDM	12.5	11.79	-0.10	Left	Cheek	2	Standard	0809-12	6	1:1	0.253	1.178	0.298		
5580	116	IEEE 802.11a	OFDM	12.5	11.82	0.16	Left	Cheek	2	Standard	0809-12	6	1:1	0.299	1.169	0.350		
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.06	Left	Cheek	2	Standard	0809-12	6	1:1	0.402	1.107	0.445		
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.08	Left	Tilt	2	Standard	0809-12	6	1:1	0.236	1.107	0.261		
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.09	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.244	1.112	0.271		
5220	44	IEEE 802.11n	OFDM	15.5	15.04	-0.04	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.167	1.112	0.186		
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.01	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.208	1.112	0.231		
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.02	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.147	1.112	0.163		
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.04	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.217	1.172	0.254		
5260	52	IEEE 802.11n	OFDM	15.5	14.81	-0.04	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.147	1.172	0.172		
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.12	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.202	1.172	0.237		
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.06	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.132	1.172	0.155		
5540	108	IEEE 802.11n	OFDM	15.5	14.92	-0.17	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.333	1.143	0.381		
5580	116	IEEE 802.11n	OFDM	15.5	14.90	0.09	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.370	1.148	0.425		
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.13	Right	Cheek	MIMO	Standard	0809-12	13	1:1	0.497	1.089	0.541		
5540	108	IEEE 802.11n	OFDM	15.5	14.92	0.02	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.217	1.143	0.248		
5580	116	IEEE 802.11n	OFDM	15.5	14.90	-0.08	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.242	1.148	0.278		
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.09	Right	Tilt	MIMO	Standard	0809-12	13	1:1	0.312	1.089	0.340		
5540	108	IEEE 802.11n	OFDM	15.5	14.92	0.07	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.349	1.143	0.399		
5580	116	IEEE 802.11n	OFDM	15.5	14.90	0.16	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.373	1.148	0.428		
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.06	Left	Cheek	MIMO	Standard	0809-12	13	1:1	0.504	1.089	0.549		
5540	108	IEEE 802.11n	OFDM	15.5	14.92	-0.04	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.193	1.143	0.221		
5580	116	IEEE 802.11n	OFDM	15.5	14.90	0.02	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.229	1.148	0.263		
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.04	Left	Tilt	MIMO	Standard	0809-12	13	1:1	0.308	1.089	0.335		
ANSI / IEEE C95.1 1992 - SAFETY LIMIT							Head											
Spatial Peak							1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population							averaged over 1 gram											

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Document S/N: OY1409121882-R4.A3L	Test Dates: 09/09/14 - 10/16/14	DUT Type: Portable Handset		Page 54 of 98

11.2 Standalone Body-Worn SAR Data

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

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	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	33.5	33.49	-0.02	10 mm	Standard	F38B8	1	1:8.3	back	0.527	1.002	0.528	A12
836.60	190	GSM 850	GSM	33.5	33.49	-0.01	10 mm	Wireless Charging	F38B8	1	1:8.3	back	0.500	1.002	0.501	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.02	10 mm	Standard	F38B8	N/A	1:1	back	0.358	1.096	0.392	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.09	10 mm	Wireless Charging	F38B8	N/A	1:1	back	0.368	1.096	0.403	A14
836.52	384	Cell. CDMA	TDSD / SO32	25.0	24.70	0.00	15 mm	Standard	F3805	N/A	1:1	back	0.291	1.072	0.312	A16
836.52	384	Cell. CDMA	TDSD / SO32	25.0	24.70	-0.03	15 mm	Wireless Charging	F3805	N/A	1:1	back	0.282	1.072	0.302	
1880.00	661	GSM 1900	GSM	30.0	29.62	-0.08	10 mm	Standard	F38B8	1	1:8.3	back	0.245	1.091	0.267	A18
1880.00	661	GSM 1900	GSM	30.0	29.62	0.06	10 mm	Wireless Charging	F38B8	1	1:8.3	back	0.219	1.091	0.239	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.05	15 mm	Standard	F38B8	N/A	1:1	back	0.262	1.012	0.265	A20
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.01	15 mm	Wireless Charging	F38B8	N/A	1:1	back	0.221	1.012	0.224	
1880.00	600	PCS CDMA	TDSD / SO32	25.0	24.64	-0.03	15 mm	Standard	F38C9	N/A	1:1	back	0.322	1.086	0.350	A22
1880.00	600	PCS CDMA	TDSD / SO32	25.0	24.64	0.03	15 mm	Wireless Charging	F38C9	N/A	1:1	back	0.254	1.086	0.276	
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 11-12
LTE Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Cover Type	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.																			
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.01	0	Standard	F38E6	QPSK	1	25	10 mm	back	1:1	0.498	1.091	0.543	A24
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.00	0	Wireless Charging	F38E6	QPSK	1	25	10 mm	back	1:1	0.456	1.091	0.497	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	0.01	1	Standard	F38E6	QPSK	25	25	10 mm	back	1:1	0.384	1.104	0.424	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	0.02	0	Standard	F38E6	QPSK	1	50	15 mm	back	1:1	0.413	1.021	0.422	A26
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	23.41	-0.07	0	Wireless Charging	F38E6	QPSK	1	50	15 mm	back	1:1	0.376	1.021	0.384	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.50	-0.09	1	Standard	F38E6	QPSK	50	25	15 mm	back	1:1	0.327	1.000	0.327	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-13
DTS Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.09	10 mm	1	Standard	0809-09	1	back	1:1	0.153	1.074	0.164	A28
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.05	10 mm	1	Wireless Charging	0809-09	1	back	1:1	0.141	1.074	0.151	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.11	10 mm	2	Standard	0809-09	1	back	1:1	0.100	1.197	0.120	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.16	10 mm	MIMO	Standard	0809-09	13	back	1:1	0.153	1.057	0.162	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.10	10 mm	MIMO	Wireless Charging	0809-09	13	back	1:1	0.119	1.057	0.126	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.05	10 mm	1	Standard	0809-14	6	back	1:1	0.043	1.114	0.048	
5775	155	IEEE 802.11ac	OFDM	10.5	9.89	0.03	10 mm	1	Standard	0809-14	29.3	back	1:1	0.025	1.151	0.029	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.05	10 mm	2	Standard	0809-14	6	back	1:1	0.111	1.040	0.115	
5775	155	IEEE 802.11ac	OFDM	10.5	10.06	-0.18	10 mm	2	Standard	0809-14	29.3	back	1:1	0.066	1.107	0.073	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.04	10 mm	MIMO	Standard	0809-14	13	back	1:1	0.157	1.114	0.175	A29
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.01	10 mm	MIMO	Wireless Charging	0809-14	13	back	1:1	0.140	1.114	0.156	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 11-14
NII Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.06	10 mm	1	Standard	0809-14	6	back	1:1	0.044	1.023	0.045	
5210	42	IEEE 802.11ac	OFDM	10.5	10.18	0.09	10 mm	1	Standard	0809-14	29.3	back	1:1	0.024	1.076	0.026	
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.03	10 mm	1	Standard	0809-14	6	back	1:1	0.060	1.028	0.062	
5290	58	IEEE 802.11ac	OFDM	10.5	9.69	0.04	10 mm	1	Standard	0809-14	29.3	back	1:1	0.027	1.205	0.033	
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.08	10 mm	1	Standard	0809-14	6	back	1:1	0.080	1.104	0.088	
5530	106	IEEE 802.11ac	OFDM	10.5	10.31	0.03	10 mm	1	Standard	0809-14	29.3	back	1:1	0.047	1.045	0.049	
5180	36	IEEE 802.11a	OFDM	12.5	12.13	0.04	10 mm	2	Standard	0809-14	6	back	1:1	0.064	1.089	0.070	
5210	42	IEEE 802.11ac	OFDM	10.5	10.15	0.01	10 mm	2	Standard	0809-14	29.3	back	1:1	0.036	1.084	0.039	
5260	52	IEEE 802.11a	OFDM	12.5	11.62	0.01	10 mm	2	Standard	0809-14	6	back	1:1	0.052	1.225	0.064	
5290	58	IEEE 802.11ac	OFDM	10.5	9.67	0.05	10 mm	2	Standard	0809-14	29.3	back	1:1	0.028	1.211	0.034	
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.03	10 mm	2	Standard	0809-14	6	back	1:1	0.118	1.107	0.131	A30
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.04	10 mm	2	Wireless Charging	0809-14	6	back	1:1	0.110	1.107	0.122	
5530	106	IEEE 802.11ac	OFDM	10.5	9.73	0.09	10 mm	2	Standard	0809-14	29.3	back	1:1	0.039	1.194	0.047	
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.07	10 mm	MIMO	Standard	0809-14	13	back	1:1	0.072	1.112	0.080	
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.02	10 mm	MIMO	Standard	0809-14	13	back	1:1	0.069	1.172	0.081	
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.06	10 mm	MIMO	Standard	0809-14	13	back	1:1	0.115	1.089	0.125	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT							Body										
Spatial Peak							1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population							averaged over 1 gram										

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11.3 Standalone Wireless Router SAR Data

Table 11-15
GPRS/UMTS/CDMA Hotspot SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)	(W/kg)		
824.20	128	GSM 850	GPRS	30.0	29.45	0.10	10 mm	Standard	F38B8	3	1:2.76	back	0.684	1.135	0.776	
836.60	190	GSM 850	GPRS	30.0	29.59	0.00	10 mm	Standard	F38B8	3	1:2.76	back	0.762	1.099	0.837	
848.80	251	GSM 850	GPRS	30.0	29.48	-0.11	10 mm	Standard	F38B8	3	1:2.76	back	0.688	1.127	0.775	
824.20	128	GSM 850	GPRS	30.0	29.45	-0.16	10 mm	Standard	F38B8	3	1:2.76	front	0.823	1.135	0.934	
836.60	190	GSM 850	GPRS	30.0	29.59	-0.04	10 mm	Standard	F38B8	3	1:2.76	front	0.964	1.099	1.059	A13
836.60	190	GSM 850	GPRS	30.0	29.59	0.09	10 mm	Wireless Charging	F38B8	3	1:2.76	front	0.775	1.099	0.852	
848.80	251	GSM 850	GPRS	30.0	29.48	0.12	10 mm	Standard	F38B8	3	1:2.76	front	0.872	1.127	0.983	
836.60	190	GSM 850	GPRS	30.0	29.59	-0.14	10 mm	Standard	F38B8	3	1:2.76	bottom	0.527	1.099	0.579	
836.60	190	GSM 850	GPRS	30.0	29.59	0.16	10 mm	Standard	F38B8	3	1:2.76	right	0.326	1.099	0.358	
836.60	190	GSM 850	GPRS	30.0	29.59	0.04	10 mm	Standard	F38B8	3	1:2.76	left	0.138	1.099	0.152	
836.60	190	GSM 850	GPRS	30.0	29.59	-0.13	10 mm	Standard	F38B8	3	1:2.76	front	0.836	1.099	0.919	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.02	10 mm	Standard	F38B8	N/A	1:1	back	0.358	1.096	0.392	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.05	10 mm	Standard	F38B8	N/A	1:1	front	0.448	1.096	0.491	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.00	10 mm	Wireless Charging	F38B8	N/A	1:1	front	0.459	1.096	0.503	A15
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.02	10 mm	Standard	F38B8	N/A	1:1	bottom	0.321	1.096	0.352	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.05	10 mm	Standard	F38B8	N/A	1:1	right	0.156	1.096	0.171	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.10	10 mm	Standard	F38B8	N/A	1:1	left	0.067	1.096	0.073	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	-0.07	10 mm	Standard	F38CB	N/A	1:1	back	0.583	1.005	0.586	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	0.00	10 mm	Standard	F38CB	N/A	1:1	front	0.666	1.005	0.669	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	0.08	10 mm	Wireless Charging	F38CB	N/A	1:1	front	0.698	1.005	0.701	A17
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	-0.11	10 mm	Standard	F38CB	N/A	1:1	bottom	0.460	1.005	0.462	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	0.04	10 mm	Standard	F38CB	N/A	1:1	right	0.272	1.005	0.273	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	0.10	10 mm	Standard	F38CB	N/A	1:1	left	0.131	1.005	0.132	
1880.00	661	GSM 1900	GPRS	26.0	25.52	0.04	10 mm	Standard	F38B8	4	1:2.076	back	0.327	1.117	0.365	
1880.00	661	GSM 1900	GPRS	26.0	25.52	0.03	10 mm	Standard	F38B8	4	1:2.076	front	0.583	1.117	0.651	
1850.20	512	GSM 1900	GPRS	26.0	25.70	-0.05	10 mm	Standard	F38B8	4	1:2.076	bottom	0.797	1.072	0.854	
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.11	10 mm	Standard	F38B8	4	1:2.076	bottom	0.847	1.117	0.946	A19
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.18	10 mm	Wireless Charging	F38B8	4	1:2.076	bottom	0.801	1.117	0.895	
1909.80	810	GSM 1900	GPRS	26.0	25.77	-0.14	10 mm	Standard	F38B8	4	1:2.076	bottom	0.845	1.054	0.891	
1880.00	661	GSM 1900	GPRS	26.0	25.52	0.09	10 mm	Standard	F38B8	4	1:2.076	right	0.095	1.117	0.106	
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.10	10 mm	Standard	F38B8	4	1:2.076	left	0.143	1.117	0.160	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	0.07	10 mm	Standard	F38AB	N/A	1:1	back	0.422	1.002	0.423	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	0.07	10 mm	Standard	F38AB	N/A	1:1	front	0.629	1.002	0.630	
1852.40	9262	UMTS 1900	RMC	22.0	21.48	0.05	10 mm	Standard	F38AB	N/A	1:1	bottom	0.783	1.127	0.882	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	0.12	10 mm	Standard	F38AB	N/A	1:1	bottom	0.876	1.002	0.878	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	-0.04	10 mm	Wireless Charging	F38AB	N/A	1:1	bottom	0.936	1.002	0.938	A21
1907.60	9538	UMTS 1900	RMC	22.0	21.24	0.20	10 mm	Standard	F38AB	N/A	1:1	bottom	0.746	1.191	0.888	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	-0.05	10 mm	Standard	F38AB	N/A	1:1	right	0.113	1.002	0.113	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	0.05	10 mm	Standard	F38AB	N/A	1:1	left	0.172	1.002	0.172	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	-0.01	10 mm	Wireless Charging	F38AB	N/A	1:1	bottom	0.924	1.002	0.926	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.02	10 mm	Standard	F38D5	N/A	1:1	back	0.336	1.127	0.379	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.10	10 mm	Standard	F38D5	N/A	1:1	front	0.508	1.127	0.573	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.07	10 mm	Standard	F38D5	N/A	1:1	bottom	0.638	1.127	0.719	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.06	10 mm	Wireless Charging	F38D5	N/A	1:1	bottom	0.671	1.127	0.756	A23
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.03	10 mm	Standard	F38D5	N/A	1:1	right	0.105	1.127	0.118	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	-0.01	10 mm	Standard	F38D5	N/A	1:1	left	0.115	1.127	0.130	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak							Body 1.6 W/kg (mW/g) averaged over 1 gram									
Uncontrolled Exposure/General Population																

Blue entry represents variability testing.

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Table 11-16
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Cover Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.01	0	Standard	F38E6	QPSK	1	25	10 mm	back	1:1	0.498	1.091	0.543	A25
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	0.01	1	Standard	F38E6	QPSK	25	25	10 mm	back	1:1	0.384	1.104	0.424	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	-0.03	0	Standard	F38E6	QPSK	1	25	10 mm	front	1:1	0.630	1.091	0.687	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.01	0	Wireless Charging	F38E6	QPSK	1	25	10 mm	front	1:1	0.543	1.091	0.592	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	-0.03	1	Standard	F38E6	QPSK	25	25	10 mm	front	1:1	0.449	1.104	0.496	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	0.00	0	Standard	F38E6	QPSK	1	25	10 mm	bottom	1:1	0.417	1.091	0.455	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	-0.02	1	Standard	F38E6	QPSK	25	25	10 mm	bottom	1:1	0.314	1.104	0.347	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	-0.12	0	Standard	F38E6	QPSK	1	25	10 mm	right	1:1	0.274	1.091	0.299	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	0.00	1	Standard	F38E6	QPSK	25	25	10 mm	right	1:1	0.199	1.104	0.220	
782.00	23230	Mid	LTE Band 13	10	25.0	24.62	-0.16	0	Standard	F38E6	QPSK	1	25	10 mm	left	1:1	0.177	1.091	0.193	
782.00	23230	Mid	LTE Band 13	10	24.0	23.57	-0.20	1	Standard	F38E6	QPSK	25	25	10 mm	left	1:1	0.134	1.104	0.148	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak										Body 1.6 W/kg (mW/g) averaged over 1 gram										
Uncontrolled Exposure/General Population																				

Table 11-17
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Cover Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	-0.03	0	Standard	F38AB	QPSK	1	0	10 mm	back	1:1	0.590	1.007	0.594	A27
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	21.12	-0.03	1	Standard	F38AB	QPSK	50	25	10 mm	back	1:1	0.455	1.091	0.496	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	0.00	0	Standard	F38AB	QPSK	1	0	10 mm	front	1:1	0.715	1.007	0.720	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	21.12	0.01	1	Standard	F38AB	QPSK	50	25	10 mm	front	1:1	0.552	1.091	0.602	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	-0.05	0	Standard	F38AB	QPSK	1	0	10 mm	bottom	1:1	0.933	1.007	0.940	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	-0.04	0	Wireless Charging	F38AB	QPSK	1	0	10 mm	bottom	1:1	0.939	1.007	0.946	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	21.12	0.00	1	Standard	F38AB	QPSK	50	25	10 mm	bottom	1:1	0.727	1.091	0.793	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	21.06	0.01	1	Standard	F38AB	QPSK	100	0	10 mm	bottom	1:1	0.740	1.107	0.819	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	0.01	0	Standard	F38AB	QPSK	1	0	10 mm	right	1:1	0.102	1.007	0.103	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	21.12	-0.05	1	Standard	F38AB	QPSK	50	25	10 mm	right	1:1	0.067	1.091	0.073	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	-0.11	0	Standard	F38AB	QPSK	1	0	10 mm	left	1:1	0.216	1.007	0.218	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	21.12	-0.01	1	Standard	F38AB	QPSK	50	25	10 mm	left	1:1	0.165	1.091	0.180	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	22.47	-0.04	0	Wireless Charging	F38AB	QPSK	1	0	10 mm	bottom	1:1	0.936	1.007	0.943	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body												
Spatial Peak								1.6 W/kg (mW/g)												
Uncontrolled Exposure/General Population								averaged over 1 gram												

Blue entry represents variability testing.

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Table 11-18
WLAN Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.09	10 mm	1	Standard	0809-09	1	back	1:1	0.153	1.074	0.164	A28
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.05	10 mm	1	Wireless Charging	0809-09	1	back	1:1	0.141	1.074	0.151	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.04	10 mm	1	Standard	0809-09	1	front	1:1	0.006	1.074	0.006	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	-0.08	10 mm	1	Standard	0809-09	1	top	1:1	0.010	1.074	0.011	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.13	10 mm	1	Standard	0809-09	1	left	1:1	0.039	1.074	0.042	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.11	10 mm	2	Standard	0809-09	1	back	1:1	0.100	1.197	0.120	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.08	10 mm	2	Standard	0809-09	1	front	1:1	0.017	1.197	0.020	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.03	10 mm	2	Standard	0809-09	1	top	1:1	0.011	1.197	0.013	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.16	10 mm	MIMO	Standard	0809-09	13	back	1:1	0.153	1.057	0.162	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.10	10 mm	MIMO	Wireless Charging	0809-09	13	back	1:1	0.119	1.057	0.126	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.02	10 mm	MIMO	Standard	0809-09	13	front	1:1	0.010	1.057	0.011	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.01	10 mm	MIMO	Standard	0809-09	13	top	1:1	0.022	1.057	0.023	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.02	10 mm	MIMO	Standard	0809-09	13	left	1:1	0.037	1.057	0.039	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.05	10 mm	1	Standard	0809-14	6	back	1:1	0.043	1.114	0.048	
5775	155	IEEE 802.11ac	OFDM	10.5	9.89	0.03	10 mm	1	Standard	0809-14	29.3	back	1:1	0.025	1.151	0.029	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.00	10 mm	1	Standard	0809-14	6	front	1:1	0.004	1.114	0.004	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.09	10 mm	1	Standard	0809-14	6	top	1:1	0.015	1.114	0.017	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.02	10 mm	1	Standard	0809-14	6	left	1:1	0.005	1.114	0.006	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.05	10 mm	2	Standard	0809-14	6	back	1:1	0.111	1.040	0.115	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	-0.18	10 mm	2	Wireless Charging	0809-14	6	back	1:1	0.097	1.040	0.101	
5775	155	IEEE 802.11ac	OFDM	10.5	10.06	0.11	10 mm	2	Standard	0809-14	29.3	back	1:1	0.066	1.107	0.073	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.02	10 mm	2	Standard	0809-14	6	front	1:1	0.028	1.040	0.029	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.08	10 mm	2	Standard	0809-14	6	top	1:1	0.063	1.040	0.066	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.04	10 mm	MIMO	Standard	0809-14	13	back	1:1	0.157	1.114	0.175	A29
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.10	10 mm	MIMO	Wireless Charging	0809-14	13	back	1:1	0.140	1.114	0.156	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.07	10 mm	MIMO	Standard	0809-14	13	front	1:1	0.047	1.114	0.052	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.18	10 mm	MIMO	Standard	0809-14	13	top	1:1	0.110	1.114	0.123	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.08	10 mm	MIMO	Standard	0809-14	13	left	1:1	0.060	1.114	0.067	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak							Body 1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population							averaged over 1 gram										

11.4 Standalone Extremity SAR Data

Table 11-19
GPRS/UMTS/CDMA Extremity SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (10g) (W/kg)	Scaling Factor	Scaled SAR (10g) (W/kg)	Plot #
MHz	Ch.															
824.20	128	GSM 850	GPRS	30.0	29.45	-0.05	0 mm	Standard	F38B8	3	1:2.76	back	1.900	1.135	2.157	
836.60	190	GSM 850	GPRS	30.0	29.59	0.08	0 mm	Standard	F38B8	3	1:2.76	back	1.920	1.099	2.110	
848.80	251	GSM 850	GPRS	30.0	29.48	-0.13	0 mm	Standard	F38B8	3	1:2.76	back	1.940	1.127	2.186	
824.20	128	GSM 850	GPRS	30.0	29.45	0.03	0 mm	Standard	F38B8	3	1:2.76	front	2.320	1.135	2.633	
824.20	128	GSM 850	GPRS	30.0	29.45	-0.02	0 mm	Wireless Charging	F38B8	3	1:2.76	front	2.450	1.135	2.781	A31
836.60	190	GSM 850	GPRS	30.0	29.59	0.09	0 mm	Standard	F38B8	3	1:2.76	front	2.150	1.099	2.363	
848.80	251	GSM 850	GPRS	30.0	29.48	0.09	0 mm	Standard	F38B8	3	1:2.76	front	2.070	1.127	2.333	
836.60	190	GSM 850	GPRS	30.0	29.59	-0.12	0 mm	Standard	F38B8	3	1:2.76	bottom	1.330	1.099	1.462	
836.60	190	GSM 850	GPRS	30.0	29.59	-0.01	0 mm	Standard	F38B8	3	1:2.76	right	0.224	1.099	0.246	
836.60	190	GSM 850	GPRS	30.0	29.59	-0.02	0 mm	Standard	F38B8	3	1:2.76	left	0.472	1.099	0.519	
824.20	128	GSM 850	GPRS	30.0	29.45	0.06	0 mm	Wireless Charging	F38B8	3	1:2.76	front	2.110	1.135	2.395	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.12	0 mm	Standard	F38B8	N/A	1:1	back	1.190	1.096	1.304	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.01	0 mm	Standard	F38B8	N/A	1:1	front	1.460	1.096	1.600	A32
836.60	4183	UMTS 850	RMC	23.5	23.10	0.01	0 mm	Wireless Charging	F38B8	N/A	1:1	front	1.440	1.096	1.578	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.08	0 mm	Standard	F38B8	N/A	1:1	bottom	0.997	1.096	1.093	
836.60	4183	UMTS 850	RMC	23.5	23.10	-0.05	0 mm	Standard	F38B8	N/A	1:1	right	0.112	1.096	0.123	
836.60	4183	UMTS 850	RMC	23.5	23.10	0.03	0 mm	Standard	F38B8	N/A	1:1	left	0.226	1.096	0.248	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.74	-0.05	0 mm	Standard	F38C9	N/A	1:1	back	1.690	1.062	1.795	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.74	0.00	4 mm	Standard	F38C9	N/A	1:1	front	1.090	1.062	1.158	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.74	0.03	6 mm	Standard	F38C9	N/A	1:1	bottom	0.222	1.062	0.236	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.74	-0.16	0 mm	Standard	F38C9	N/A	1:1	right	0.166	1.062	0.176	
836.52	384	Cell. CDMA	EVDO Rev. 0	25.0	24.74	0.11	0 mm	Standard	F38C9	N/A	1:1	left	0.289	1.062	0.307	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	-0.13	0 mm	Standard	F38CB	N/A	1:1	front	1.800	1.005	1.809	A33
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	-0.05	0 mm	Wireless Charging	F38CB	N/A	1:1	front	1.710	1.005	1.719	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.5	24.48	0.03	0 mm	Standard	F38CB	N/A	1:1	bottom	1.080	1.005	1.085	
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.05	0 mm	Standard	F38B8	4	1:2.076	back	1.190	1.117	1.329	
1850.20	512	GSM 1900	GPRS	26.0	25.70	0.05	0 mm	Standard	F38B8	4	1:2.076	front	2.160	1.072	2.316	A34
1850.20	512	GSM 1900	GPRS	26.0	25.70	0.00	0 mm	Wireless Charging	F38B8	4	1:2.076	front	2.150	1.072	2.305	
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.05	0 mm	Standard	F38B8	4	1:2.076	front	1.820	1.117	2.033	
1909.80	810	GSM 1900	GPRS	26.0	25.77	0.04	0 mm	Standard	F38B8	4	1:2.076	front	2.130	1.054	2.245	
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.09	0 mm	Standard	F38B8	4	1:2.076	bottom	1.430	1.117	1.597	
1880.00	661	GSM 1900	GPRS	26.0	25.52	-0.08	0 mm	Standard	F38B8	4	1:2.076	right	0.162	1.117	0.181	
1880.00	661	GSM 1900	GPRS	26.0	25.52	0.17	0 mm	Standard	F38B8	4	1:2.076	left	0.269	1.117	0.300	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	0.00	0 mm	Standard	F38B8	N/A	1:1	back	1.670	1.012	1.690	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	-0.09	4 mm	Standard	F38B8	N/A	1:1	front	1.260	1.012	1.275	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	-0.11	6 mm	Standard	F38B8	N/A	1:1	bottom	0.908	1.012	0.919	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	-0.04	0 mm	Standard	F38B8	N/A	1:1	right	0.233	1.012	0.236	
1880.00	9400	UMTS 1900	RMC	23.0	22.95	-0.03	0 mm	Standard	F38B8	N/A	1:1	left	0.340	1.012	0.344	
1852.40	9262	UMTS 1900	RMC	22.0	21.48	0.01	0 mm	Standard	F38AB	N/A	1:1	front	2.050	1.127	2.310	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	-0.01	0 mm	Standard	F38AB	N/A	1:1	front	2.480	1.002	2.485	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	0.05	0 mm	Wireless Charging	F38AB	N/A	1:1	front	2.600	1.002	2.605	
1907.60	9538	UMTS 1900	RMC	22.0	21.24	0.01	0 mm	Standard	F38AB	N/A	1:1	front	1.850	1.191	2.203	
1852.40	9262	UMTS 1900	RMC	22.0	21.48	-0.15	0 mm	Standard	F38AB	N/A	1:1	bottom	1.890	1.127	2.130	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	-0.13	0 mm	Standard	F38AB	N/A	1:1	bottom	2.360	1.002	2.365	
1907.60	9538	UMTS 1900	RMC	22.0	21.24	-0.15	0 mm	Standard	F38AB	N/A	1:1	bottom	1.810	1.191	2.156	
1880.00	9400	UMTS 1900	RMC	22.0	21.99	0.09	0 mm	Wireless Charging	F38AB	N/A	1:1	front	2.610	1.002	2.615	A35
1851.25	25	PCS CDMA	EVDO Rev. 0	25.0	24.69	0.02	0 mm	Standard	F38C9	N/A	1:1	back	1.980	1.074	2.127	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.66	-0.02	0 mm	Standard	F38C9	N/A	1:1	back	2.020	1.081	2.184	
1908.75	1175	PCS CDMA	EVDO Rev. 0	25.0	24.61	-0.06	0 mm	Standard	F38C9	N/A	1:1	back	1.730	1.094	1.893	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.66	-0.09	4 mm	Standard	F38C9	N/A	1:1	front	1.230	1.081	1.330	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.66	0.06	6 mm	Standard	F38C9	N/A	1:1	bottom	1.160	1.081	1.254	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.66	0.09	0 mm	Standard	F38C9	N/A	1:1	right	0.306	1.081	0.331	
1880.00	600	PCS CDMA	EVDO Rev. 0	25.0	24.66	-0.08	0 mm	Standard	F38C9	N/A	1:1	left	0.433	1.081	0.468	
1851.25	25	PCS CDMA	EVDO Rev. 0	23.0	22.41	0.03	0 mm	Standard	F38D5	N/A	1:1	front	2.060	1.146	2.361	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.00	0 mm	Standard	F38D5	N/A	1:1	front	2.090	1.127	2.355	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.07	0 mm	Wireless Charging	F38D5	N/A	1:1	front	2.210	1.127	2.491	A36
1908.75	1175	PCS CDMA	EVDO Rev. 0	23.0	22.50	0.00	0 mm	Standard	F38D5	N/A	1:1	front	1.850	1.122	2.076	
1851.25	25	PCS CDMA	EVDO Rev. 0	23.0	22.41	-0.01	0 mm	Standard	F38D5	N/A	1:1	bottom	2.030	1.146	2.326	
1880.00	600	PCS CDMA	EVDO Rev. 0	23.0	22.48	0.00	0 mm	Standard	F38D5	N/A	1:1	bottom	2.000	1.127	2.254	
1908.75	1175	PCS CDMA	EVDO Rev. 0	23.0	22.50	-0.06	0 mm	Standard	F38D5	N/A	1:1	bottom	1.750	1.122	1.964	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Hand 4.0 W/kg (mW/g) averaged over 10 grams								

Blue entry represents variability testing.

FCC ID: A3LSMN915V		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: OY1409121882-R4.A3L	Test Dates: 09/09/14 - 10/16/14	DUT Type: Portable Handset		Page 60 of 98

Table 11-20
LTE Extremity SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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 (10g) (W/kg)	Scaling Factor	Scaled SAR (10g) (W/kg)	Plot #	
MHz	Ch.																			
782.00	23230	Mid	LTE Band 13	10	Standard	25.0	24.62	0.03	0	F38E6	QPSK	1	25	0 mm	back	1:1	1.510	1.091	1.647	A3
782.00	23230	Mid	LTE Band 13	10	Standard	24.0	23.57	0.08	1	F38E6	QPSK	25	25	0 mm	back	1:1	1.150	1.104	1.270	
782.00	23230	Mid	LTE Band 13	10	Standard	25.0	24.62	0.04	0	F38E6	QPSK	1	25	0 mm	front	1:1	2.000	1.091	2.182	
782.00	23230	Mid	LTE Band 13	10	Wireless Charging	25.0	24.62	-0.05	0	F38E6	QPSK	1	25	0 mm	front	1:1	2.100	1.091	2.291	
782.00	23230	Mid	LTE Band 13	10	Standard	24.0	23.57	0.07	1	F38E6	QPSK	25	25	0 mm	front	1:1	1.570	1.104	1.733	
782.00	23230	Mid	LTE Band 13	10	Standard	24.0	23.56	-0.11	1	F38E6	QPSK	50	0	0 mm	front	1:1	1.540	1.107	1.705	
782.00	23230	Mid	LTE Band 13	10	Standard	25.0	24.62	0.03	0	F38E6	QPSK	1	25	0 mm	bottom	1:1	1.090	1.091	1.189	
782.00	23230	Mid	LTE Band 13	10	Standard	24.0	23.57	0.05	1	F38E6	QPSK	25	25	0 mm	bottom	1:1	0.840	1.104	0.927	
782.00	23230	Mid	LTE Band 13	10	Standard	25.0	24.62	0.18	0	F38E6	QPSK	1	25	0 mm	right	1:1	0.165	1.091	0.180	
782.00	23230	Mid	LTE Band 13	10	Standard	24.0	23.57	0.12	1	F38E6	QPSK	25	25	0 mm	right	1:1	0.129	1.104	0.142	
782.00	23230	Mid	LTE Band 13	10	Standard	25.0	24.62	0.19	0	F38E6	QPSK	1	25	0 mm	left	1:1	0.293	1.091	0.320	
782.00	23230	Mid	LTE Band 13	10	Standard	24.0	23.57	0.11	1	F38E6	QPSK	25	25	0 mm	left	1:1	0.217	1.104	0.240	
782.00	23230	Mid	LTE Band 13	10	Wireless Charging	25.0	24.62	-0.13	0	F38E6	QPSK	1	25	0 mm	front	1:1	1.910	1.091	2.084	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.5	23.41	0.02	0	F38E6	QPSK	1	50	0 mm	back	1:1	2.060	1.021	2.103	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.50	0.04	1	F38E6	QPSK	50	25	0 mm	back	1:1	1.690	1.000	1.690	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.47	0.08	1	F38E6	QPSK	100	0	0 mm	back	1:1	1.690	1.007	1.702	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.5	23.41	-0.02	0	F38E6	QPSK	1	50	4 mm	front	1:1	1.880	1.021	1.919	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.50	0.00	1	F38E6	QPSK	50	25	4 mm	front	1:1	1.560	1.000	1.560	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.5	23.41	-0.01	0	F38E6	QPSK	1	50	6 mm	bottom	1:1	1.170	1.021	1.195	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.50	-0.03	1	F38E6	QPSK	50	25	6 mm	bottom	1:1	0.961	1.000	0.961	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.5	23.41	0.03	0	F38E6	QPSK	1	50	0 mm	right	1:1	0.231	1.021	0.236	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.50	0.02	1	F38E6	QPSK	50	25	0 mm	right	1:1	0.186	1.000	0.186	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.5	23.41	-0.04	0	F38E6	QPSK	1	50	0 mm	left	1:1	0.456	1.021	0.466	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.50	-0.02	1	F38E6	QPSK	50	25	0 mm	left	1:1	0.354	1.000	0.354	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.47	-0.03	0	F38AB	QPSK	1	0	0 mm	front	1:1	2.470	1.007	2.487	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	21.5	21.12	0.06	1	F38AB	QPSK	50	25	0 mm	front	1:1	1.910	1.091	2.084	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	21.5	21.06	-0.01	1	F38AB	QPSK	100	0	0 mm	front	1:1	1.920	1.107	2.125	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.47	-0.01	0	F38AB	QPSK	1	0	0 mm	bottom	1:1	2.840	1.007	2.860	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging	22.5	22.47	-0.03	0	F38AB	QPSK	1	0	0 mm	bottom	1:1	2.780	1.007	2.799	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	21.5	21.12	0.00	1	F38AB	QPSK	50	25	0 mm	bottom	1:1	2.200	1.091	2.400	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	21.5	21.06	0.05	1	F38AB	QPSK	100	0	0 mm	bottom	1:1	2.220	1.107	2.458	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.5	22.47	0.00	0	F38AB	QPSK	1	0	0 mm	bottom	1:1	2.890	1.007	2.910	A38
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak										Hand 4.0 W/kg (mW/g) averaged over 10 grams										
Uncontrolled Exposure/General Population																				

Blue entry represents variability testing.

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Table 11-21
WLAN Extremity SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power (dBm)	Conducted Power (dBm)	Power Drift (dB)	Spacing	Antenna Config.	Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Scaled SAR (10g) (W/kg)	Pilot
MHz	Ch.																
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.06	0 mm	1	Standard	0809-09	1	back	1:1	1.000	1.074	1.074	A39
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.05	0 mm	1	Wireless Charging	0809-09	1	back	1:1	0.775	1.074	0.832	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	-0.11	0 mm	1	Standard	0809-09	1	front	1:1	0.021	1.074	0.023	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.04	0 mm	1	Standard	0809-09	1	top	1:1	0.024	1.074	0.026	
2462	11	IEEE 802.11b	DSSS	15.5	15.19	0.07	0 mm	1	Standard	0809-09	1	left	1:1	0.307	1.074	0.330	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.15	0 mm	2	Standard	0809-09	1	back	1:1	0.371	1.197	0.444	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	-0.01	0 mm	2	Standard	0809-09	1	front	1:1	0.109	1.197	0.130	
2462	11	IEEE 802.11b	DSSS	15.5	14.72	0.10	0 mm	2	Standard	0809-09	1	top	1:1	0.051	1.197	0.061	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.09	0 mm	MIMO	Standard	0809-09	13	back	1:1	0.358	1.057	0.378	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	0.09	0 mm	MIMO	Wireless Charging	0809-09	13	back	1:1	0.524	1.057	0.554	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	-0.01	0 mm	MIMO	Standard	0809-09	13	front	1:1	0.069	1.057	0.073	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	-0.12	0 mm	MIMO	Standard	0809-09	13	top	1:1	0.032	1.057	0.034	
2462	11	IEEE 802.11n	OFDM	16.5	16.26	-0.08	0 mm	MIMO	Standard	0809-09	13	left	1:1	0.206	1.057	0.218	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.03	0 mm	1	Standard	0809-14	6	back	1:1	0.116	1.114	0.129	
5775	155	IEEE 802.11ac	OFDM	10.5	9.89	0.07	0 mm	1	Standard	0809-14	29.3	back	1:1	0.073	1.151	0.084	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.02	0 mm	1	Standard	0809-14	6	front	1:1	0.007	1.114	0.008	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.00	0 mm	1	Standard	0809-14	6	top	1:1	0.002	1.114	0.002	
5745	149	IEEE 802.11a	OFDM	12.5	12.03	0.07	0 mm	1	Standard	0809-14	6	left	1:1	0.012	1.114	0.013	
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.09	0 mm	1	Standard	0809-14	6	back	1:1	0.136	1.023	0.139	
5210	42	IEEE 802.11ac	OFDM	10.5	10.18	0.06	0 mm	1	Standard	0809-14	29.3	back	1:1	0.081	1.076	0.087	
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.00	0 mm	1	Standard	0809-14	6	front	1:1	0.006	1.023	0.006	
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.03	0 mm	1	Standard	0809-14	6	top	1:1	0.002	1.023	0.002	
5240	48	IEEE 802.11a	OFDM	12.5	12.40	0.12	0 mm	1	Standard	0809-14	6	left	1:1	0.009	1.023	0.009	
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.08	0 mm	1	Standard	0809-14	6	back	1:1	0.150	1.028	0.154	
5290	58	IEEE 802.11ac	OFDM	10.5	9.69	0.13	0 mm	1	Standard	0809-14	29.3	back	1:1	0.074	1.205	0.089	
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.06	0 mm	1	Standard	0809-14	6	front	1:1	0.020	1.028	0.021	
5300	60	IEEE 802.11a	OFDM	12.5	12.38	-0.20	0 mm	1	Standard	0809-14	6	top	1:1	0.000	1.028	0.000	
5300	60	IEEE 802.11a	OFDM	12.5	12.38	0.04	0 mm	1	Standard	0809-14	6	left	1:1	0.011	1.028	0.011	
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.00	0 mm	1	Standard	0809-14	6	back	1:1	0.172	1.104	0.190	
5530	106	IEEE 802.11ac	OFDM	10.5	10.31	0.09	0 mm	1	Standard	0809-14	29.3	back	1:1	0.011	1.045	0.011	
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.01	0 mm	1	Standard	0809-14	6	front	1:1	0.006	1.104	0.007	
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.00	0 mm	1	Standard	0809-14	6	top	1:1	0.000	1.104	0.000	
5500	100	IEEE 802.11a	OFDM	12.5	12.07	0.09	0 mm	1	Standard	0809-14	6	left	1:1	0.016	1.104	0.018	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.04	0 mm	2	Standard	0809-14	6	back	1:1	0.181	1.040	0.188	
5775	155	IEEE 802.11ac	OFDM	10.5	10.06	0.02	0 mm	2	Standard	0809-14	29.3	back	1:1	0.102	1.107	0.113	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.01	0 mm	2	Standard	0809-14	6	front	1:1	0.163	1.040	0.170	
5825	165	IEEE 802.11a	OFDM	12.5	12.33	0.07	0 mm	2	Standard	0809-14	6	top	1:1	0.110	1.040	0.114	
5180	36	IEEE 802.11a	OFDM	12.5	12.13	0.01	0 mm	2	Standard	0809-14	6	back	1:1	0.279	1.089	0.304	
5210	42	IEEE 802.11ac	OFDM	10.5	10.15	0.00	0 mm	2	Standard	0809-14	29.3	back	1:1	0.095	1.084	0.103	
5180	36	IEEE 802.11a	OFDM	12.5	12.13	0.15	0 mm	2	Standard	0809-14	6	front	1:1	0.081	1.089	0.088	
5180	36	IEEE 802.11a	OFDM	12.5	12.13	-0.15	0 mm	2	Standard	0809-14	6	top	1:1	0.068	1.089	0.074	
5260	52	IEEE 802.11a	OFDM	12.5	11.62	-0.14	0 mm	2	Standard	0809-14	6	back	1:1	0.240	1.225	0.294	
5290	58	IEEE 802.11ac	OFDM	10.5	9.67	0.08	0 mm	2	Standard	0809-14	29.3	back	1:1	0.106	1.211	0.128	
5260	52	IEEE 802.11a	OFDM	12.5	11.62	-0.05	0 mm	2	Standard	0809-14	6	front	1:1	0.116	1.225	0.142	
5260	52	IEEE 802.11a	OFDM	12.5	11.62	-0.03	0 mm	2	Standard	0809-14	6	top	1:1	0.052	1.225	0.064	
5700	140	IEEE 802.11a	OFDM	12.5	12.06	-0.08	0 mm	2	Standard	0809-14	6	back	1:1	0.334	1.107	0.370	
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.05	0 mm	2	Wireless Charging	0809-14	6	back	1:1	0.386	1.107	0.427	
5530	106	IEEE 802.11ac	OFDM	10.5	9.73	0.08	0 mm	2	Standard	0809-14	29.3	back	1:1	0.145	1.194	0.173	
5700	140	IEEE 802.11a	OFDM	12.5	12.06	0.01	0 mm	2	Standard	0809-14	6	front	1:1	0.210	1.107	0.232	
5700	140	IEEE 802.11a	OFDM	12.5	12.06	-0.13	0 mm	2	Standard	0809-14	6	top	1:1	0.180	1.107	0.199	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.03	0 mm	MIMO	Standard	0809-14	13	back	1:1	0.371	1.114	0.413	A40
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.12	0 mm	MIMO	Standard	0809-14	13	front	1:1	0.272	1.114	0.303	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.19	0 mm	MIMO	Standard	0809-14	13	top	1:1	0.150	1.114	0.167	
5825	165	IEEE 802.11n	OFDM	15.5	15.03	0.06	0 mm	MIMO	Standard	0809-14	13	left	1:1	0.017	1.114	0.019	
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.01	0 mm	MIMO	Standard	0809-14	13	back	1:1	0.375	1.112	0.417	
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.06	0 mm	MIMO	Standard	0809-14	13	front	1:1	0.125	1.112	0.139	
5220	44	IEEE 802.11n	OFDM	15.5	15.04	-0.08	0 mm	MIMO	Standard	0809-14	13	top	1:1	0.069	1.112	0.077	
5220	44	IEEE 802.11n	OFDM	15.5	15.04	0.15	0 mm	MIMO	Standard	0809-14	13	left	1:1	0.025	1.112	0.028	
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.20	0 mm	MIMO	Standard	0809-14	13	back	1:1	0.347	1.172	0.407	
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.05	0 mm	MIMO	Standard	0809-14	13	front	1:1	0.130	1.172	0.152	
5260	52	IEEE 802.11n	OFDM	15.5	14.81	-0.09	0 mm	MIMO	Standard	0809-14	13	top	1:1	0.066	1.172	0.077	
5260	52	IEEE 802.11n	OFDM	15.5	14.81	0.03	0 mm	MIMO	Standard	0809-14	13	left	1:1	0.028	1.172	0.033	
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.01	0 mm	MIMO	Standard	0809-14	13	back	1:1	0.404	1.089	0.440	A41
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.09	0 mm	MIMO	Wireless Charging	0809-14	13	back	1:1	0.350	1.089	0.381	
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.12	0 mm	MIMO	Standard	0809-14	13	front	1:1	0.214	1.089	0.233	
5700	140	IEEE 802.11n	OFDM	15.5	15.13	-0.02	0 mm	MIMO	Standard	0809-14	13	top	1:1	0.221	1.089	0.241	
5700	140	IEEE 802.11n	OFDM	15.5	15.13	0.01	0 mm	MIMO	Standard	0809-14	13	left	1:1	0.035	1.089	0.038	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Hand							
Spatial Peak										4.0 W/kg (mW/g)							
Uncontrolled Exposure/General Population										averaged over 10 grams							

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11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, and FCC KDB Publication 447498 D01v05.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 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. A test separation distance of 10 mm for body-worn SAR was also used for GSM 850/1900, UMTS 850, LTE Bands 13, and 2.4/5 GHz WLAN as it is more conservative.
7. Per FCC KDB Publication 648474 D04v01, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01 v01, variability SAR tests were performed when the measured 1 gram SAR results for a frequency band were greater than 0.8 W/kg or when the measured 10 gram SAR results for a frequency band were greater than 2.0 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 D06v01, 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 device utilizes power reduction for CDMA/EVDO 850/1900, UMTS 1900, LTE Band 4 under some portable hotspot and proximity sensor for SAR compliance. Therefore, these wireless router configurations were tested at reduced output power levels.
11. Per FCC KDB Publication 648474 D03, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the configuration with the highest measured SAR for each wireless technology, frequency band, operating mode, and exposure condition. Since reported 1 gram SAR did not exceed 1.2 W/kg, additional testing with the wireless charging battery cover was not required.
12. Extremity SAR was additionally evaluated at maximum output power with distances of 4mm for front side and 6mm for bottom edge due to proximity sensor considerations. (See Section 6.8 for more information).

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D03v01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot and extremity SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (1g) or ≤ 2 W/kg (10g), then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.

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UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (1g) or ≤ 2 W/kg (10g), then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v02.
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 D01v02.
3. CDMA Wireless Router and Extremity 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, EVDO Rev. A SAR is not required. SAR is not required for 1x RTT for Ev-Do hotspot and extremity devices when the maximum average output of each channel is less than $\frac{1}{4}$ dB higher than that measured in Subtype 0/1 Physical Layer configurations for Rev. 0.
4. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg (1g) or ≤ 2 W/kg (10g), then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.
5. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.

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.
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. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

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WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI SISO operations: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other SISO IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for SISO 5 GHz WIFI operations: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE SISO 802.11 modes (including 802.11n 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. Per April 2013 TCB Workshop notes, full SISO SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac SISO was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
4. When Hotspot is enabled, 5.2-5.7 GHz bands are disabled. Therefore no 5.2 – 5.7 GHz WIFI Wireless Router SAR Data was required.
5. Per KDB 248227, SAR for MIMO was measured with both transmitting simultaneously and was evaluated in dependently of SISO operation. For 2.4 GHz MIMO, 802.11n 20 MHz BW was evaluated. For 5 GHz MIMO, 802.11n 20 MHz BW was evaluated.
6. WIFI transmission was verified using an uncalibrated spectrum analyzer.
7. When the maximum extrapolated peak 1g 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, 1g SAR testing on other default channels was required. Testing on other default channels was not required for 10 g Extremity SAR, since the reported 10g averaged SAR is <2.0 W/kg.

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12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/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 D01v05 IV.C.1.iii and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g or 10g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is ≤ 1.6 W/kg or ≤ 4.0 W/kg respectively. 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 or 10g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated 1g SAR} = \frac{\sqrt{f(\text{GHz})}}{7.5} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

$$\text{Estimated 10g SAR} = \frac{\sqrt{f(\text{GHz})}}{18.75} * \frac{(\text{Max Power of channel, mW})}{\text{Min. Separation Distance, mm}}$$

Table 12-1
Estimated SAR

Mode	Configuration	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
		[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth	Back Side	2480	9.00	15	0.112 (1g)
Bluetooth	Touching* (Back Side, Front Side, Top Edge)	2480	9.00	5	0.134 (10g)

Notes:

1. Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.
2. (*) – Per FCC KDB Publication 447498, when the test separation distance is < 5 mm, a distance of 5 mm is applied to determine estimated SAR.

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12.3 Head SAR Simultaneous Transmission Analysis

Table 12-2
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 1 (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.193	0.023	0.216	Head SAR	Right Cheek	0.158	0.023	0.181
	Right Tilt	0.092	0.014	0.106		Right Tilt	0.076	0.014	0.090
	Left Cheek	0.153	0.009	0.162		Left Cheek	0.105	0.009	0.114
	Left Tilt	0.083	0.008	0.091		Left Tilt	0.061	0.008	0.069
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.235	0.023	0.258	Head SAR	Right Cheek	0.071	0.023	0.094
	Right Tilt	0.104	0.014	0.118		Right Tilt	0.028	0.014	0.042
	Left Cheek	0.144	0.009	0.153		Left Cheek	0.063	0.009	0.072
	Left Tilt	0.085	0.008	0.093		Left Tilt	0.023	0.008	0.031
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.058	0.023	0.081	Head SAR	Right Cheek	0.106	0.023	0.129
	Right Tilt	0.034	0.014	0.048		Right Tilt	0.057	0.014	0.071
	Left Cheek	0.083	0.009	0.092		Left Cheek	0.127	0.009	0.136
	Left Tilt	0.032	0.008	0.040		Left Tilt	0.047	0.008	0.055
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.175	0.023	0.198	Head SAR	Right Cheek	0.105	0.023	0.128
	Right Tilt	0.067	0.014	0.081		Right Tilt	0.052	0.014	0.066
	Left Cheek	0.149	0.009	0.158		Left Cheek	0.079	0.009	0.088
	Left Tilt	0.058	0.008	0.066		Left Tilt	0.037	0.008	0.045
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.184	0.023	0.207	Head SAR	Right Cheek	0.168	0.023	0.191
	Right Tilt	0.088	0.014	0.102		Right Tilt	0.112	0.014	0.126
	Left Cheek	0.157	0.009	0.166		Left Cheek	0.166	0.009	0.175
	Left Tilt	0.079	0.008	0.087		Left Tilt	0.129	0.008	0.137

Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 2 (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.193	0.213	0.406	Head SAR	Right Cheek	0.158	0.213	0.371
	Right Tilt	0.092	0.066	0.158		Right Tilt	0.076	0.066	0.142
	Left Cheek	0.153	0.049	0.202		Left Cheek	0.105	0.049	0.154
	Left Tilt	0.083	0.035	0.118		Left Tilt	0.061	0.035	0.096
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.235	0.213	0.448	Head SAR	Right Cheek	0.071	0.213	0.284
	Right Tilt	0.104	0.066	0.170		Right Tilt	0.028	0.066	0.094
	Left Cheek	0.144	0.049	0.193		Left Cheek	0.063	0.049	0.112
	Left Tilt	0.085	0.035	0.120		Left Tilt	0.023	0.035	0.058
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.058	0.213	0.271	Head SAR	Right Cheek	0.106	0.213	0.319
	Right Tilt	0.034	0.066	0.100		Right Tilt	0.057	0.066	0.123
	Left Cheek	0.083	0.049	0.132		Left Cheek	0.127	0.049	0.176
	Left Tilt	0.032	0.035	0.067		Left Tilt	0.047	0.035	0.082
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.175	0.213	0.388	Head SAR	Right Cheek	0.105	0.213	0.318
	Right Tilt	0.067	0.066	0.133		Right Tilt	0.052	0.066	0.118
	Left Cheek	0.149	0.049	0.198		Left Cheek	0.079	0.049	0.128
	Left Tilt	0.058	0.035	0.093		Left Tilt	0.037	0.035	0.072
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.184	0.213	0.397	Head SAR	Right Cheek	0.168	0.213	0.381
	Right Tilt	0.088	0.066	0.154		Right Tilt	0.112	0.066	0.178
	Left Cheek	0.157	0.049	0.206		Left Cheek	0.166	0.049	0.215
	Left Tilt	0.079	0.035	0.114		Left Tilt	0.129	0.035	0.164

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Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.193	0.171	0.364	Head SAR	Right Cheek	0.158	0.171	0.329
	Right Tilt	0.092	0.037	0.129		Right Tilt	0.076	0.037	0.113
	Left Cheek	0.153	0.030	0.183		Left Cheek	0.105	0.030	0.135
	Left Tilt	0.083	0.017	0.100		Left Tilt	0.061	0.017	0.078
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.235	0.171	0.406	Head SAR	Right Cheek	0.071	0.171	0.242
	Right Tilt	0.104	0.037	0.141		Right Tilt	0.028	0.037	0.065
	Left Cheek	0.144	0.030	0.174		Left Cheek	0.063	0.030	0.093
	Left Tilt	0.085	0.017	0.102		Left Tilt	0.023	0.017	0.040
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.058	0.171	0.229	Head SAR	Right Cheek	0.106	0.171	0.277
	Right Tilt	0.034	0.037	0.071		Right Tilt	0.057	0.037	0.094
	Left Cheek	0.083	0.030	0.113		Left Cheek	0.127	0.030	0.157
	Left Tilt	0.032	0.017	0.049		Left Tilt	0.047	0.017	0.064
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.175	0.171	0.346	Head SAR	Right Cheek	0.105	0.171	0.276
	Right Tilt	0.067	0.037	0.104		Right Tilt	0.052	0.037	0.089
	Left Cheek	0.149	0.030	0.179		Left Cheek	0.079	0.030	0.109
	Left Tilt	0.058	0.017	0.075		Left Tilt	0.037	0.017	0.054
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.184	0.171	0.355	Head SAR	Right Cheek	0.168	0.171	0.339
	Right Tilt	0.088	0.037	0.125		Right Tilt	0.112	0.037	0.149
	Left Cheek	0.157	0.030	0.187		Left Cheek	0.166	0.030	0.196
	Left Tilt	0.079	0.017	0.096		Left Tilt	0.129	0.017	0.146

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Table 12-5
Simultaneous Transmission Scenario with 5 GHz WLAN Ant 1 (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.193	0.002	0.195	Head SAR	Right Cheek	0.158	0.002	0.160
	Right Tilt	0.092	0.000	0.092		Right Tilt	0.076	0.000	0.076
	Left Cheek	0.153	0.000	0.153		Left Cheek	0.105	0.000	0.105
	Left Tilt	0.083	0.000	0.083		Left Tilt	0.061	0.000	0.061
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.235	0.002	0.237	Head SAR	Right Cheek	0.071	0.002	0.073
	Right Tilt	0.104	0.000	0.104		Right Tilt	0.028	0.000	0.028
	Left Cheek	0.144	0.000	0.144		Left Cheek	0.063	0.000	0.063
	Left Tilt	0.085	0.000	0.085		Left Tilt	0.023	0.000	0.023
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.058	0.002	0.060	Head SAR	Right Cheek	0.106	0.002	0.108
	Right Tilt	0.034	0.000	0.034		Right Tilt	0.057	0.000	0.057
	Left Cheek	0.083	0.000	0.083		Left Cheek	0.127	0.000	0.127
	Left Tilt	0.032	0.000	0.032		Left Tilt	0.047	0.000	0.047
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.175	0.002	0.177	Head SAR	Right Cheek	0.105	0.002	0.107
	Right Tilt	0.067	0.000	0.067		Right Tilt	0.052	0.000	0.052
	Left Cheek	0.149	0.000	0.149		Left Cheek	0.079	0.000	0.079
	Left Tilt	0.058	0.000	0.058		Left Tilt	0.037	0.000	0.037
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.184	0.002	0.186	Head SAR	Right Cheek	0.168	0.002	0.170
	Right Tilt	0.088	0.000	0.088		Right Tilt	0.112	0.000	0.112
	Left Cheek	0.157	0.000	0.157		Left Cheek	0.166	0.000	0.166
	Left Tilt	0.079	0.000	0.079		Left Tilt	0.129	0.000	0.129

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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Table 12-6
Simultaneous Transmission Scenario with 5 GHz WLAN Ant 2 (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.193	0.593	0.786	Head SAR	Right Cheek	0.158	0.593	0.751
	Right Tilt	0.092	0.331	0.423		Right Tilt	0.076	0.331	0.407
	Left Cheek	0.153	0.445	0.598		Left Cheek	0.105	0.445	0.550
	Left Tilt	0.083	0.261	0.344		Left Tilt	0.061	0.261	0.322
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.235	0.593	0.828	Head SAR	Right Cheek	0.071	0.593	0.664
	Right Tilt	0.104	0.331	0.435		Right Tilt	0.028	0.331	0.359
	Left Cheek	0.144	0.445	0.589		Left Cheek	0.063	0.445	0.508
	Left Tilt	0.085	0.261	0.346		Left Tilt	0.023	0.261	0.284
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.058	0.593	0.651	Head SAR	Right Cheek	0.106	0.593	0.699
	Right Tilt	0.034	0.331	0.365		Right Tilt	0.057	0.331	0.388
	Left Cheek	0.083	0.445	0.528		Left Cheek	0.127	0.445	0.572
	Left Tilt	0.032	0.261	0.293		Left Tilt	0.047	0.261	0.308
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.175	0.593	0.768	Head SAR	Right Cheek	0.105	0.593	0.698
	Right Tilt	0.067	0.331	0.398		Right Tilt	0.052	0.331	0.383
	Left Cheek	0.149	0.445	0.594		Left Cheek	0.079	0.445	0.524
	Left Tilt	0.058	0.261	0.319		Left Tilt	0.037	0.261	0.298
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.184	0.593	0.777	Head SAR	Right Cheek	0.168	0.593	0.761
	Right Tilt	0.088	0.331	0.419		Right Tilt	0.112	0.331	0.443
	Left Cheek	0.157	0.445	0.602		Left Cheek	0.166	0.445	0.611
	Left Tilt	0.079	0.261	0.340		Left Tilt	0.129	0.261	0.390

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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Table 12-7
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.193	0.633	0.826	Head SAR	Right Cheek	0.158	0.633	0.791
	Right Tilt	0.092	0.404	0.496		Right Tilt	0.076	0.404	0.480
	Left Cheek	0.153	0.904	1.057		Left Cheek	0.105	0.904	1.009
	Left Tilt	0.083	0.417	0.500		Left Tilt	0.061	0.417	0.478
Simult Tx	Configuration	Cell. CDMA SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.235	0.633	0.868	Head SAR	Right Cheek	0.071	0.633	0.704
	Right Tilt	0.104	0.404	0.508		Right Tilt	0.028	0.404	0.432
	Left Cheek	0.144	0.904	1.048		Left Cheek	0.063	0.904	0.967
	Left Tilt	0.085	0.417	0.502		Left Tilt	0.023	0.417	0.440
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.058	0.633	0.691	Head SAR	Right Cheek	0.106	0.633	0.739
	Right Tilt	0.034	0.404	0.438		Right Tilt	0.057	0.404	0.461
	Left Cheek	0.083	0.904	0.987		Left Cheek	0.127	0.904	1.031
	Left Tilt	0.032	0.417	0.449		Left Tilt	0.047	0.417	0.464
Simult Tx	Configuration	PCS CDMA SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.175	0.633	0.808	Head SAR	Right Cheek	0.105	0.633	0.738
	Right Tilt	0.067	0.404	0.471		Right Tilt	0.052	0.404	0.456
	Left Cheek	0.149	0.904	1.053		Left Cheek	0.079	0.904	0.983
	Left Tilt	0.058	0.417	0.475		Left Tilt	0.037	0.417	0.454
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.184	0.633	0.817	Head SAR	Right Cheek	0.168	0.633	0.801
	Right Tilt	0.088	0.404	0.492		Right Tilt	0.112	0.404	0.516
	Left Cheek	0.157	0.904	1.061		Left Cheek	0.166	0.904	1.070
	Left Tilt	0.079	0.417	0.496		Left Tilt	0.129	0.417	0.546

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

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12.4 Body-Worn Simultaneous Transmission Analysis

Note:

1. For SAR summation for body-worn back side at 15 mm, GSM 850/1900, UMTS 850 and LTE Band 13 SAR values for 1.0 cm were used since the 1.0 cm test distance was more conservative. "<" denotes that the 1.0 cm GSM 850/1900, UMTS 850, and LTE Band 13 SAR values were used for summation purposes.
2. For SAR summations for body-worn back side at 15 mm, WLAN SAR values for 1.0 cm were used since the 1.0 cm test distance for WLAN was more conservative. "<" denotes that the 1.0 cm WLAN SAR values were used for summation purposes.

Table 12-8

Simultaneous Transmission Scenario with 2.4 GHz Ant 1 WLAN (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	<0.164	<0.692
Back Side	UMTS 850	<0.403	<0.164	<0.567
Back Side	Cell. CDMA	0.312	<0.164	<0.476
Back Side	GSM 1900	<0.267	<0.164	<0.431
Back Side	UMTS 1900	0.265	<0.164	<0.429
Back Side	PCS CDMA	0.350	<0.164	<0.514
Back Side	LTE Band 13	<0.543	<0.164	<0.707
Back Side	LTE Band 4 (AWS)	0.422	<0.164	<0.586

Table 12-9

Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 2 (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	<0.120	<0.648
Back Side	UMTS 850	<0.403	<0.120	<0.523
Back Side	Cell. CDMA	0.312	<0.120	<0.432
Back Side	GSM 1900	<0.267	<0.120	<0.387
Back Side	UMTS 1900	0.265	<0.120	<0.385
Back Side	PCS CDMA	0.350	<0.120	<0.470
Back Side	LTE Band 13	<0.543	<0.120	<0.663
Back Side	LTE Band 4 (AWS)	0.422	<0.120	<0.542

Table 12-10

Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	<0.162	<0.690
Back Side	UMTS 850	<0.403	<0.162	<0.565
Back Side	Cell. CDMA	0.312	<0.162	<0.474
Back Side	GSM 1900	<0.267	<0.162	<0.429
Back Side	UMTS 1900	0.265	<0.162	<0.427
Back Side	PCS CDMA	0.350	<0.162	<0.512
Back Side	LTE Band 13	<0.543	<0.162	<0.705
Back Side	LTE Band 4 (AWS)	0.422	<0.162	<0.584

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Table 12-11
Simultaneous Transmission Scenario with 5 GHz WLAN Ant 1 (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	<0.088	<0.616
Back Side	UMTS 850	<0.403	<0.088	<0.491
Back Side	Cell. CDMA	0.312	<0.088	<0.400
Back Side	GSM 1900	<0.267	<0.088	<0.355
Back Side	UMTS 1900	0.265	<0.088	<0.353
Back Side	PCS CDMA	0.350	<0.088	<0.438
Back Side	LTE Band 13	<0.543	<0.088	<0.631
Back Side	LTE Band 4 (AWS)	0.422	<0.088	<0.510

Table 12-12
Simultaneous Transmission Scenario with 5 GHz WLAN Ant 2 (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	<0.131	<0.659
Back Side	UMTS 850	<0.403	<0.131	<0.534
Back Side	Cell. CDMA	0.312	<0.131	<0.443
Back Side	GSM 1900	<0.267	<0.131	<0.398
Back Side	UMTS 1900	0.265	<0.131	<0.396
Back Side	PCS CDMA	0.350	<0.131	<0.481
Back Side	LTE Band 13	<0.543	<0.131	<0.674
Back Side	LTE Band 4 (AWS)	0.422	<0.131	<0.553

Table 12-13
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	<0.175	<0.703
Back Side	UMTS 850	<0.403	<0.175	<0.578
Back Side	Cell. CDMA	0.312	<0.175	<0.487
Back Side	GSM 1900	<0.267	<0.175	<0.442
Back Side	UMTS 1900	0.265	<0.175	<0.440
Back Side	PCS CDMA	0.350	<0.175	<0.525
Back Side	LTE Band 13	<0.543	<0.175	<0.718
Back Side	LTE Band 4 (AWS)	0.422	<0.175	<0.597

Table 12-14
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.5 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	<0.528	0.112	<0.640
Back Side	UMTS 850	<0.403	0.112	<0.515
Back Side	Cell. CDMA	0.312	0.112	0.424
Back Side	GSM 1900	<0.267	0.112	<0.379
Back Side	UMTS 1900	0.265	0.112	0.377
Back Side	PCS CDMA	0.350	0.112	0.462
Back Side	LTE Band 13	<0.543	0.112	<0.655
Back Side	LTE Band 4 (AWS)	0.422	0.112	0.534

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.

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12.5 Hotspot SAR Simultaneous Transmission Analysis

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

Table 12-15
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.837	0.164	1.001	Body SAR	Back	0.392	0.164	0.556
	Front	1.059	0.006	1.065		Front	0.503	0.006	0.509
	Top	-	0.011	0.011		Top	-	0.011	0.011
	Bottom	0.579	-	0.579		Bottom	0.352	-	0.352
	Right	0.358	-	0.358		Right	0.171	-	0.171
	Left	0.152	0.042	0.194		Left	0.073	0.042	0.115
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.586	0.164	0.750	Body SAR	Back	0.365	0.164	0.529
	Front	0.701	0.006	0.707		Front	0.651	0.006	0.657
	Top	-	0.011	0.011		Top	-	0.011	0.011
	Bottom	0.462	-	0.462		Bottom	0.946	-	0.946
	Right	0.273	-	0.273		Right	0.106	-	0.106
	Left	0.132	0.042	0.174		Left	0.160	0.042	0.202
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.423	0.164	0.587	Body SAR	Back	0.379	0.164	0.543
	Front	0.630	0.006	0.636		Front	0.573	0.006	0.579
	Top	-	0.011	0.011		Top	-	0.011	0.011
	Bottom	0.938	-	0.938		Bottom	0.756	-	0.756
	Right	0.113	-	0.113		Right	0.118	-	0.118
	Left	0.172	0.042	0.214		Left	0.130	0.042	0.172
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.543	0.164	0.707	Body SAR	Back	0.594	0.164	0.758
	Front	0.687	0.006	0.693		Front	0.720	0.006	0.726
	Top	-	0.011	0.011		Top	-	0.011	0.011
	Bottom	0.455	-	0.455		Bottom	0.946	-	0.946
	Right	0.299	-	0.299		Right	0.103	-	0.103
	Left	0.193	0.042	0.235		Left	0.218	0.042	0.260

Table 12-16
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 2 (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.837	0.120	0.957	Body SAR	Back	0.392	0.120	0.512
	Front	1.059	0.020	1.079		Front	0.503	0.020	0.523
	Top	-	0.013	0.013		Top	-	0.013	0.013
	Bottom	0.579	-	0.579		Bottom	0.352	-	0.352
	Right	0.358	-	0.358		Right	0.171	-	0.171
	Left	0.152	-	0.152		Left	0.073	-	0.073
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.586	0.120	0.706	Body SAR	Back	0.365	0.120	0.485
	Front	0.701	0.020	0.721		Front	0.651	0.020	0.671
	Top	-	0.013	0.013		Top	-	0.013	0.013
	Bottom	0.462	-	0.462		Bottom	0.946	-	0.946
	Right	0.273	-	0.273		Right	0.106	-	0.106
	Left	0.132	-	0.132		Left	0.160	-	0.160
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.423	0.120	0.543	Body SAR	Back	0.379	0.120	0.499
	Front	0.630	0.020	0.650		Front	0.573	0.020	0.593
	Top	-	0.013	0.013		Top	-	0.013	0.013
	Bottom	0.938	-	0.938		Bottom	0.756	-	0.756
	Right	0.113	-	0.113		Right	0.118	-	0.118
	Left	0.172	-	0.172		Left	0.130	-	0.130
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.543	0.120	0.663	Body SAR	Back	0.594	0.120	0.714
	Front	0.687	0.020	0.707		Front	0.720	0.020	0.740
	Top	-	0.013	0.013		Top	-	0.013	0.013
	Bottom	0.455	-	0.455		Bottom	0.946	-	0.946
	Right	0.299	-	0.299		Right	0.103	-	0.103
	Left	0.193	-	0.193		Left	0.218	-	0.218

Table 12-17
Simultaneous Transmission Scenario - 2.4 GHz WLAN MIMO (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.837	0.162	0.999	Body SAR	Back	0.392	0.162	0.554
	Front	1.059	0.011	1.070		Front	0.503	0.011	0.514
	Top	-	0.023	0.023		Top	-	0.023	0.023
	Bottom	0.579	-	0.579		Bottom	0.352	-	0.352
	Right	0.358	-	0.358		Right	0.171	-	0.171
	Left	0.152	0.039	0.191		Left	0.073	0.039	0.112
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.586	0.162	0.748	Body SAR	Back	0.365	0.162	0.527
	Front	0.701	0.011	0.712		Front	0.651	0.011	0.662
	Top	-	0.023	0.023		Top	-	0.023	0.023
	Bottom	0.462	-	0.462		Bottom	0.946	-	0.946
	Right	0.273	-	0.273		Right	0.106	-	0.106
	Left	0.132	0.039	0.171		Left	0.160	0.039	0.199
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.423	0.162	0.585	Body SAR	Back	0.379	0.162	0.541
	Front	0.630	0.011	0.641		Front	0.573	0.011	0.584
	Top	-	0.023	0.023		Top	-	0.023	0.023
	Bottom	0.938	-	0.938		Bottom	0.756	-	0.756
	Right	0.113	-	0.113		Right	0.118	-	0.118
	Left	0.172	0.039	0.211		Left	0.130	0.039	0.169
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.543	0.162	0.705	Body SAR	Back	0.594	0.162	0.756
	Front	0.687	0.011	0.698		Front	0.720	0.011	0.731
	Top	-	0.023	0.023		Top	-	0.023	0.023
	Bottom	0.455	-	0.455		Bottom	0.946	-	0.946
	Right	0.299	-	0.299		Right	0.103	-	0.103
	Left	0.193	0.039	0.232		Left	0.218	0.039	0.257

Table 12-18
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.837	0.048	0.885	Body SAR	Back	0.392	0.048	0.440
	Front	1.059	0.004	1.063		Front	0.503	0.004	0.507
	Top	-	0.017	0.017		Top	-	0.017	0.017
	Bottom	0.579	-	0.579		Bottom	0.352	-	0.352
	Right	0.358	-	0.358		Right	0.171	-	0.171
	Left	0.152	0.006	0.158		Left	0.073	0.006	0.079
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.586	0.048	0.634	Body SAR	Back	0.365	0.048	0.413
	Front	0.701	0.004	0.705		Front	0.651	0.004	0.655
	Top	-	0.017	0.017		Top	-	0.017	0.017
	Bottom	0.462	-	0.462		Bottom	0.946	-	0.946
	Right	0.273	-	0.273		Right	0.106	-	0.106
	Left	0.132	0.006	0.138		Left	0.160	0.006	0.166
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.423	0.048	0.471	Body SAR	Back	0.379	0.048	0.427
	Front	0.630	0.004	0.634		Front	0.573	0.004	0.577
	Top	-	0.017	0.017		Top	-	0.017	0.017
	Bottom	0.938	-	0.938		Bottom	0.756	-	0.756
	Right	0.113	-	0.113		Right	0.118	-	0.118
	Left	0.172	0.006	0.178		Left	0.130	0.006	0.136
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.543	0.048	0.591	Body SAR	Back	0.594	0.048	0.642
	Front	0.687	0.004	0.691		Front	0.720	0.004	0.724
	Top	-	0.017	0.017		Top	-	0.017	0.017
	Bottom	0.455	-	0.455		Bottom	0.946	-	0.946
	Right	0.299	-	0.299		Right	0.103	-	0.103
	Left	0.193	0.006	0.199		Left	0.218	0.006	0.224

Table 12-19
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 2 (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.837	0.115	0.952	Body SAR	Back	0.392	0.115	0.507
	Front	1.059	0.029	1.088		Front	0.503	0.029	0.532
	Top	-	0.066	0.066		Top	-	0.066	0.066
	Bottom	0.579	-	0.579		Bottom	0.352	-	0.352
	Right	0.358	-	0.358		Right	0.171	-	0.171
	Left	0.152	-	0.152		Left	0.073	-	0.073
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.586	0.115	0.701	Body SAR	Back	0.365	0.115	0.480
	Front	0.701	0.029	0.730		Front	0.651	0.029	0.680
	Top	-	0.066	0.066		Top	-	0.066	0.066
	Bottom	0.462	-	0.462		Bottom	0.946	-	0.946
	Right	0.273	-	0.273		Right	0.106	-	0.106
	Left	0.132	-	0.132		Left	0.160	-	0.160
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.423	0.115	0.538	Body SAR	Back	0.379	0.115	0.494
	Front	0.630	0.029	0.659		Front	0.573	0.029	0.602
	Top	-	0.066	0.066		Top	-	0.066	0.066
	Bottom	0.938	-	0.938		Bottom	0.756	-	0.756
	Right	0.113	-	0.113		Right	0.118	-	0.118
	Left	0.172	-	0.172		Left	0.130	-	0.130
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.543	0.115	0.658	Body SAR	Back	0.594	0.115	0.709
	Front	0.687	0.029	0.716		Front	0.720	0.029	0.749
	Top	-	0.066	0.066		Top	-	0.066	0.066
	Bottom	0.455	-	0.455		Bottom	0.946	-	0.946
	Right	0.299	-	0.299		Right	0.103	-	0.103
	Left	0.193	-	0.193		Left	0.218	-	0.218

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Table 12-20
Simultaneous Transmission Scenario - 5 GHz WLAN MIMO (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.837	0.175	1.012	Body SAR	Back	0.392	0.175	0.567
	Front	1.059	0.052	1.111		Front	0.503	0.052	0.555
	Top	-	0.123	0.123		Top	-	0.123	0.123
	Bottom	0.579	-	0.579		Bottom	0.352	-	0.352
	Right	0.358	-	0.358		Right	0.171	-	0.171
	Left	0.152	0.067	0.219		Left	0.073	0.067	0.140
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.586	0.175	0.761	Body SAR	Back	0.365	0.175	0.540
	Front	0.701	0.052	0.753		Front	0.651	0.052	0.703
	Top	-	0.123	0.123		Top	-	0.123	0.123
	Bottom	0.462	-	0.462		Bottom	0.946	-	0.946
	Right	0.273	-	0.273		Right	0.106	-	0.106
	Left	0.132	0.067	0.199		Left	0.160	0.067	0.227
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.423	0.175	0.598	Body SAR	Back	0.379	0.175	0.554
	Front	0.630	0.052	0.682		Front	0.573	0.052	0.625
	Top	-	0.123	0.123		Top	-	0.123	0.123
	Bottom	0.938	-	0.938		Bottom	0.756	-	0.756
	Right	0.113	-	0.113		Right	0.118	-	0.118
	Left	0.172	0.067	0.239		Left	0.130	0.067	0.197
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.543	0.175	0.718	Body SAR	Back	0.594	0.175	0.769
	Front	0.687	0.052	0.739		Front	0.720	0.052	0.772
	Top	-	0.123	0.123		Top	-	0.123	0.123
	Bottom	0.455	-	0.455		Bottom	0.946	-	0.946
	Right	0.299	-	0.299		Right	0.103	-	0.103
	Left	0.193	0.067	0.260		Left	0.218	0.067	0.285

12.6 Extremity SAR Simultaneous Transmission Analysis

1. Per FCC KDB Publication 648474 D04 Handset SAR v01r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR (“-”).
2. For SAR summations for extremity front side at 4 mm, GPRS 850/1900, UMTS 850, LTE Band 13, and WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance was more conservative. “<” denotes that the 0.0 cm GPRS 850/1900, UMTS 850, LTE Band 13, and WLAN values were used for summation purposes.
3. For SAR summations for extremity bottom edge at 6 mm, GPRS 850/1900, UMTS 850, LTE Band 13, and WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance was more conservative. “<” denotes that the 0.0 cm GPRS 850/1900, UMTS 850, and LTE Band 13 SAR values were used for summation purposes.

Table 12-21
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 1 (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	1.074	3.260	Extremity SAR	Back	1.304	1.074	2.378
	Front	2.781	0.023	2.804		Front	1.600	0.023	1.623
	Top	-	0.026	0.026		Top	-	0.026	0.026
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	0.330	0.849		Left	0.248	0.330	0.578
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	1.074	2.869	Extremity SAR	Back	1.329	1.074	2.403
	Front	1.809	0.023	1.832		Front	2.316	0.023	2.339
	Top	-	0.026	0.026		Top	-	0.026	0.026
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	0.330	0.637		Left	0.300	0.330	0.630
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	1.074	2.764	Extremity SAR	Back	2.184	1.074	3.258
	Front	2.615	0.023	2.638		Front	2.491	0.023	2.514
	Top	-	0.026	0.026		Top	-	0.026	0.026
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	0.330	0.674		Left	0.468	0.330	0.798
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	1.074	2.721	Extremity SAR	Back	2.103	1.074	3.177
	Front	2.291	0.023	2.314		Front	2.487	0.023	2.510
	Top	-	0.026	0.026		Top	-	0.026	0.026
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	0.330	0.650		Left	0.466	0.330	0.796

Table 12-22
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 2 (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	0.444	2.630	Extremity SAR	Back	1.304	0.444	1.748
	Front	2.781	0.130	2.911		Front	1.600	0.130	1.730
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	-	0.519		Left	0.248	-	0.248
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	0.444	2.239	Extremity SAR	Back	1.329	0.444	1.773
	Front	1.809	0.130	1.939		Front	2.316	0.130	2.446
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	-	0.307		Left	0.300	-	0.300
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	0.444	2.134	Extremity SAR	Back	2.184	0.444	2.628
	Front	2.615	0.130	2.745		Front	2.491	0.130	2.621
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	-	0.344		Left	0.468	-	0.468
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	0.444	2.091	Extremity SAR	Back	2.103	0.444	2.547
	Front	2.291	0.130	2.421		Front	2.487	0.130	2.617
	Top	-	0.061	0.061		Top	-	0.061	0.061
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	-	0.320		Left	0.466	-	0.466

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Table 12-23
Simultaneous Transmission Scenario - 2.4 GHz WLAN MIMO (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	0.554	2.740	Extremity SAR	Back	1.304	0.554	1.858
	Front	2.781	0.073	2.854		Front	1.600	0.073	1.673
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	0.218	0.737		Left	0.248	0.218	0.466
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	0.554	2.349	Extremity SAR	Back	1.329	0.554	1.883
	Front	1.809	0.073	1.882		Front	2.316	0.073	2.389
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	0.218	0.525		Left	0.300	0.218	0.518
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	0.554	2.244	Extremity SAR	Back	2.184	0.554	2.738
	Front	2.615	0.073	2.688		Front	2.491	0.073	2.564
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	0.218	0.562		Left	0.468	0.218	0.686
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	0.554	2.201	Extremity SAR	Back	2.103	0.554	2.657
	Front	2.291	0.073	2.364		Front	2.487	0.073	2.560
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	0.218	0.538		Left	0.466	0.218	0.684

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Table 12-24
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 1 (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	0.190	2.376	Extremity SAR	Back	1.304	0.190	1.494
	Front	2.781	0.021	2.802		Front	1.600	0.021	1.621
	Top	-	0.002	0.002		Top	-	0.002	0.002
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	0.018	0.537		Left	0.248	0.018	0.266
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	0.190	1.985	Extremity SAR	Back	1.329	0.190	1.519
	Front	1.809	0.021	1.830		Front	2.316	0.021	2.337
	Top	-	0.002	0.002		Top	-	0.002	0.002
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	0.018	0.325		Left	0.300	0.018	0.318
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	0.190	1.880	Extremity SAR	Back	2.184	0.190	2.374
	Front	2.615	0.021	2.636		Front	2.491	0.021	2.512
	Top	-	0.002	0.002		Top	-	0.002	0.002
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	0.018	0.362		Left	0.468	0.018	0.486
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	0.190	1.837	Extremity SAR	Back	2.103	0.190	2.293
	Front	2.291	0.021	2.312		Front	2.487	0.021	2.508
	Top	-	0.002	0.002		Top	-	0.002	0.002
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	0.018	0.338		Left	0.466	0.018	0.484

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Table 12-25
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 2 (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	0.427	2.613	Extremity SAR	Back	1.304	0.427	1.731
	Front	2.781	0.232	3.013		Front	1.600	0.232	1.832
	Top	-	0.199	0.199		Top	-	0.199	0.199
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	-	0.519		Left	0.248	-	0.248
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	0.427	2.222	Extremity SAR	Back	1.329	0.427	1.756
	Front	1.809	0.232	2.041		Front	2.316	0.232	2.548
	Top	-	0.199	0.199		Top	-	0.199	0.199
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	-	0.307		Left	0.300	-	0.300
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	0.427	2.117	Extremity SAR	Back	2.184	0.427	2.611
	Front	2.615	0.232	2.847		Front	2.491	0.232	2.723
	Top	-	0.199	0.199		Top	-	0.199	0.199
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	-	0.344		Left	0.468	-	0.468
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	0.427	2.074	Extremity SAR	Back	2.103	0.427	2.530
	Front	2.291	0.232	2.523		Front	2.487	0.232	2.719
	Top	-	0.199	0.199		Top	-	0.199	0.199
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	-	0.320		Left	0.466	-	0.466

Table 12-26
Simultaneous Transmission Scenario - 5 GHz WLAN MIMO (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	0.440	2.626	Extremity SAR	Back	1.304	0.440	1.744
	Front	2.781	0.303	3.084		Front	1.600	0.303	1.903
	Top	-	0.241	0.241		Top	-	0.241	0.241
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	0.038	0.557		Left	0.248	0.038	0.286
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	0.440	2.235	Extremity SAR	Back	1.329	0.440	1.769
	Front	1.809	0.303	2.112		Front	2.316	0.303	2.619
	Top	-	0.241	0.241		Top	-	0.241	0.241
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	0.038	0.345		Left	0.300	0.038	0.338
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	0.440	2.130	Extremity SAR	Back	2.184	0.440	2.624
	Front	2.615	0.303	2.918		Front	2.491	0.303	2.794
	Top	-	0.241	0.241		Top	-	0.241	0.241
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	0.038	0.382		Left	0.468	0.038	0.506
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	0.440	2.087	Extremity SAR	Back	2.103	0.440	2.543
	Front	2.291	0.303	2.594		Front	2.487	0.303	2.790
	Top	-	0.241	0.241		Top	-	0.241	0.241
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	0.038	0.358		Left	0.466	0.038	0.504

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Table 12-27
Simultaneous Transmission Scenario - Bluetooth (Extremity at 0.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	2.186	0.134	2.320	Extremity SAR	Back	1.304	0.134	1.438
	Front	2.781	0.134	2.915		Front	1.600	0.134	1.734
	Top	-	0.134	0.134		Top	-	0.134	0.134
	Bottom	1.462	-	1.462		Bottom	1.093	-	1.093
	Right	0.246	-	0.246		Right	0.123	-	0.123
	Left	0.519	-	0.519		Left	0.248	-	0.248
Simult Tx	Configuration	Cell. EVDO SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.795	0.134	1.929	Extremity SAR	Back	1.329	0.134	1.463
	Front	1.809	0.134	1.943		Front	2.316	0.134	2.450
	Top	-	0.134	0.134		Top	-	0.134	0.134
	Bottom	1.085	-	1.085		Bottom	1.597	-	1.597
	Right	0.176	-	0.176		Right	0.181	-	0.181
	Left	0.307	-	0.307		Left	0.300	-	0.300
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	PCS EVDO SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.690	0.134	1.824	Extremity SAR	Back	2.184	0.134	2.318
	Front	2.615	0.134	2.749		Front	2.491	0.134	2.625
	Top	-	0.134	0.134		Top	-	0.134	0.134
	Bottom	2.365	-	2.365		Bottom	2.326	-	2.326
	Right	0.236	-	0.236		Right	0.331	-	0.331
	Left	0.344	-	0.344		Left	0.468	-	0.468
Simult Tx	Configuration	LTE Band 13 SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	Back	1.647	0.134	1.781	Extremity SAR	Back	2.103	0.134	2.237
	Front	2.291	0.134	2.425		Front	2.487	0.134	2.621
	Top	-	0.134	0.134		Top	-	0.134	0.134
	Bottom	1.189	-	1.189		Bottom	2.910	-	2.910
	Right	0.180	-	0.180		Right	0.236	-	0.236
	Left	0.320	-	0.320		Left	0.466	-	0.466

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Table 12-28
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 1 (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.023	<2.804
Front Side	UMTS 850	<1.600	<0.023	<1.623
Front Side	Cell. CDMA	1.158	<0.023	<1.181
Front Side	GSM 1900	<2.316	<0.023	<2.339
Front Side	UMTS 1900	1.275	<0.023	<1.298
Front Side	PCS CDMA	1.330	<0.023	<1.353
Front Side	LTE Band 13	<2.291	<0.023	<2.314
Front Side	LTE Band 4 (AWS)	1.919	<0.023	<1.942

Table 12-29
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 2 (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.130	<2.911
Front Side	UMTS 850	<1.600	<0.130	<1.730
Front Side	Cell. CDMA	1.158	<0.130	<1.288
Front Side	GSM 1900	<2.316	<0.130	<2.446
Front Side	UMTS 1900	1.275	<0.130	<1.405
Front Side	PCS CDMA	1.330	<0.130	<1.460
Front Side	LTE Band 13	<2.291	<0.130	<2.421
Front Side	LTE Band 4 (AWS)	1.919	<0.130	<2.049

Table 12-30
Simultaneous Transmission Scenario - 2.4 GHz WLAN MIMO (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.073	<2.854
Front Side	UMTS 850	<1.600	<0.073	<1.673
Front Side	Cell. CDMA	1.158	<0.073	<1.231
Front Side	GSM 1900	<2.316	<0.073	<2.389
Front Side	UMTS 1900	1.275	<0.073	<1.348
Front Side	PCS CDMA	1.330	<0.073	<1.403
Front Side	LTE Band 13	<2.291	<0.073	<2.364
Front Side	LTE Band 4 (AWS)	1.919	<0.073	<1.992

Table 12-31
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 1 (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.021	<2.802
Front Side	UMTS 850	<1.600	<0.021	<1.621
Front Side	Cell. CDMA	1.158	<0.021	<1.179
Front Side	GSM 1900	<2.316	<0.021	<2.337
Front Side	UMTS 1900	1.275	<0.021	<1.296
Front Side	PCS CDMA	1.330	<0.021	<1.351
Front Side	LTE Band 13	<2.291	<0.021	<2.312
Front Side	LTE Band 4 (AWS)	1.919	<0.021	<1.940

Table 12-32
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 2 (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.232	<3.013
Front Side	UMTS 850	<1.600	<0.232	<1.832
Front Side	Cell. CDMA	1.158	<0.232	<1.390
Front Side	GSM 1900	<2.316	<0.232	<2.548
Front Side	UMTS 1900	1.275	<0.232	<1.507
Front Side	PCS CDMA	1.330	<0.232	<1.562
Front Side	LTE Band 13	<2.291	<0.232	<2.523
Front Side	LTE Band 4 (AWS)	1.919	<0.232	<2.151

Table 12-33
Simultaneous Transmission Scenario - 5 GHz WLAN MIMO (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.303	<3.084
Front Side	UMTS 850	<1.600	<0.303	<1.903
Front Side	Cell. CDMA	1.158	<0.303	<1.461
Front Side	GSM 1900	<2.316	<0.303	<2.619
Front Side	UMTS 1900	1.275	<0.303	<1.578
Front Side	PCS CDMA	1.330	<0.303	<1.633
Front Side	LTE Band 13	<2.291	<0.303	<2.594
Front Side	LTE Band 4 (AWS)	1.919	<0.303	<2.222

Table 12-34
Simultaneous Transmission Scenario - Bluetooth (Front at 0.4 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Front Side	GSM 850	<2.781	<0.134	<2.915
Front Side	UMTS 850	<1.600	<0.134	<1.734
Front Side	Cell. CDMA	1.158	<0.134	<1.292
Front Side	GSM 1900	<2.316	<0.134	<2.450
Front Side	UMTS 1900	1.275	<0.134	<1.409
Front Side	PCS CDMA	1.330	<0.134	<1.464
Front Side	LTE Band 13	<2.291	<0.134	<2.425
Front Side	LTE Band 4 (AWS)	1.919	<0.134	<2.053

Table 12-35
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 1 (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

Table 12-36
Simultaneous Transmission Scenario - 2.4 GHz WLAN Ant 2 (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

Table 12-37
Simultaneous Transmission Scenario - 2.4 GHz WLAN MIMO (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

Table 12-38
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 1 (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

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Table 12-39
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 2 (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

Table 12-40
Simultaneous Transmission Scenario - 5 GHz WLAN MIMO (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

Table 12-41
Simultaneous Transmission Scenario - Bluetooth (Bottom at 0.6 cm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Bottom Edge	GSM 850	<1.462	-	<1.462
Bottom Edge	UMTS 850	<1.093	-	<1.093
Bottom Edge	Cell. CDMA	0.236	-	0.236
Bottom Edge	GSM 1900	<1.597	-	<1.597
Bottom Edge	UMTS 1900	0.919	-	0.919
Bottom Edge	PCS CDMA	1.254	-	1.254
Bottom Edge	LTE Band 13	<1.189	-	<1.189
Bottom Edge	LTE Band 4 (AWS)	1.195	-	1.195

12.7 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05 and IEEE 1528-2013 Section 6.3.4.1.2.

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13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

- 1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
- 2) A second repeated measurement was performed 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 ($\sim 10\%$ 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
- 5) 10 g Extremity SAR measurement variability analysis applies a factor of 2.5 to the procedures outlined above.

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Cover Type	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	3rd Repeated SAR (1g)
	MHz	Ch.							(W/kg)	(W/kg)		(W/kg)	(W/kg)
835	836.60	190	GSM 850	GPRS	3	front	Standard	10 mm	0.964	0.836	1.15	N/A	N/A
1900	1880.00	9400	UMTS 1900	RMC	N/A	bottom	Wireless Charging	10 mm	0.936	0.924	1.01	N/A	N/A
1750	1732.50	20175	LTE Band 4 (AWS)	QPSK, 1 RB, 0 RB Offset	N/A	bottom	Wireless Charging	10 mm	0.939	0.936	1.00	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					

Table 13-2
Extremity SAR Measurement Variability Results

BODY VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Cover Type	Spacing	Measured SAR (10g)	1st Repeated SAR (10g)	Ratio	2nd Repeated SAR (10g)	3rd Repeated SAR (10g)
	MHz	Ch.							(W/kg)	(W/kg)		(W/kg)	(W/kg)
835	824.20	128	GSM 850	GPRS	3	front	Wireless Charging	0 mm	2.450	2.110	1.16	N/A	N/A
1900	1880.00	9400	UMTS 1900	RMC	N/A	front	Wireless Charging	0 mm	2.600	2.610	1.00	N/A	N/A
750	782.00	23230	LTE Band 13	QPSK, 1 RB, 25 RB Offset	N/A	front	Wireless Charging	0 mm	2.100	1.910	1.10	N/A	N/A
1750	1732.50	20175	LTE Band 4 (AWS)	QPSK, 1 RB, 0 RB Offset	N/A	bottom	Standard	0 mm	2.840	2.890	1.02	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Hand 4.0 W/kg (mW/g) averaged over 10 grams					

13.2 Measurement Uncertainty

The measured 1g SAR was < 1.5 W/kg or 10g SAR was < 3.75 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

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14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/15/2014	Annual	4/15/2015	MY45470194
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	4/15/2014	Annual	4/15/2015	3629U00687
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
SPEAG	D1765V2	1765 MHz SAR Dipole	5/7/2014	Annual	5/7/2015	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	4/9/2014	Annual	4/9/2015	5d141
SPEAG	D2450V2	2450 MHz SAR Dipole	1/21/2014	Annual	1/21/2015	797
SPEAG	D2450V2	2450 MHz SAR Dipole	2/24/2014	Annual	2/24/2015	882
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/27/2014	Annual	1/27/2015	1057
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
SPEAG	D750V3	750 MHz Dipole	1/20/2014	Annual	1/20/2015	1003
SPEAG	D835V2	835 MHz SAR Dipole	4/7/2014	Annual	4/7/2015	4d119
SPEAG	D835V2	835 MHz SAR Dipole	7/10/2014	Annual	7/10/2015	4d132
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433972
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	4/24/2014	Annual	4/24/2015	836371/0079
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	11/19/2013	Annual	11/19/2014	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/19/2013	Annual	11/19/2014	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/22/2014	Annual	1/22/2015	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/26/2014	Annual	2/26/2015	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/17/2014	Annual	3/17/2015	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/18/2013	Annual	11/18/2014	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/14/2014	Annual	5/14/2015	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/12/2014	Annual	8/12/2015	1322
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	5/6/2014	Annual	5/6/2015	1070
Mitutoyo	CD-6"CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264162
Fisher Scientific	15-077-960	Digital Thermometer	12/4/2013	Biennial	12/4/2015	130764551
Fisher Scientific	15-077-960	Digital Thermometer	12/4/2013	Biennial	12/4/2015	130764558
Agilent	E4438C	ESG Vector Signal Generator	3/31/2014	Annual	3/31/2015	MY42082659
Fisher Scientific	15-078J	Long Stem Thermometer	1/7/2013	Biennial	1/7/2015	130018204
Fisher Scientific	15-078J	Long Stem Thermometer	1/7/2013	Biennial	1/7/2015	130018243
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
Mini-Circuits	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
Agilent	N5182A	MXG Vector Signal Generator	4/15/2014	Annual	4/15/2015	MY47420800
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Anritsu	ML2495A	Power Meter	10/31/2013	Annual	10/31/2014	1039008
Anritsu	MA2411B	Pulse Power Sensor	2/3/2014	Annual	2/3/2015	1339018
Anritsu	MA2411B	Pulse Power Sensor	3/25/2014	Annual	3/25/2015	1207470
Anritsu	MT8820C	Radio Communication Analyzer	12/12/2013	Annual	12/12/2014	6200901190
Rohde & Schwarz	CMW500	Radio Communication Tester	12/9/2013	Annual	12/9/2014	109366
Rohde & Schwarz	CMW500	Radio Communication Tester	2/20/2014	Annual	2/20/2015	128633
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/16/2014	Annual	4/16/2015	8010177
SPEAG	ES3DV3	SAR Probe	11/20/2013	Annual	11/20/2014	3287
SPEAG	EX3DV4	SAR Probe	10/23/2013	Annual	10/23/2014	3914
SPEAG	EX3DV4	SAR Probe	1/29/2014	Annual	1/29/2015	3589
SPEAG	ES3DV3	SAR Probe	2/25/2014	Annual	2/25/2015	3258
SPEAG	ES3DV3	SAR Probe	3/19/2014	Annual	3/19/2015	3209
SPEAG	ES3DV3	SAR Probe	3/19/2014	Annual	3/19/2015	3318
SPEAG	ES3DV3	SAR Probe	4/11/2014	Annual	4/11/2015	3213
SPEAG	ES3DV3	SAR Probe	5/15/2014	Annual	5/15/2015	3263
SPEAG	ES3DV2	SAR Probe	8/19/2014	Annual	8/19/2015	3022
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTECH	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M155A00-009
Agilent	8753ES	S-Parameter Network Analyzer	5/22/2014	Annual	5/22/2015	US39170118
Fisher Scientific	S97611	Thermometer	4/12/2013	Biennial	4/12/2015	130219303
Fisher Scientific	S97611	Thermometer	4/12/2013	Biennial	4/12/2015	130219304
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Anritsu	MA24106A	USB Power Sensor	12/18/2013	Annual	12/18/2014	1344555
Anritsu	MA24106A	USB Power Sensor	12/18/2013	Annual	12/18/2014	1344556
VWR	36934-158	Wall-Mounted Thermometer	8/8/2013	Biennial	8/8/2015	130477877
VWR	36934-158	Wall-Mounted Thermometer	8/8/2013	Biennial	8/8/2015	130477866
Agilent	E5515C	Wireless Communications Test Set	3/18/2014	Annual	3/18/2015	GB46110872
Agilent	E5515C	Wireless Communications Test Set	3/19/2014	Annual	3/19/2015	GB45360985

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.

All calibrated equipments are used within their calibration period.

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15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz:

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

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

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Applicable for frequencies up to 6 GHz:

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

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

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16 CONCLUSION

16.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

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

$f = 836.6 \text{ MHz}$; $\sigma = 0.926 \text{ S/m}$; $\epsilon_r = 41.571$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.23, 6.23, 6.23); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GSM 850, Right Head, Cheek, Mid.ch, Wireless Charging Cover

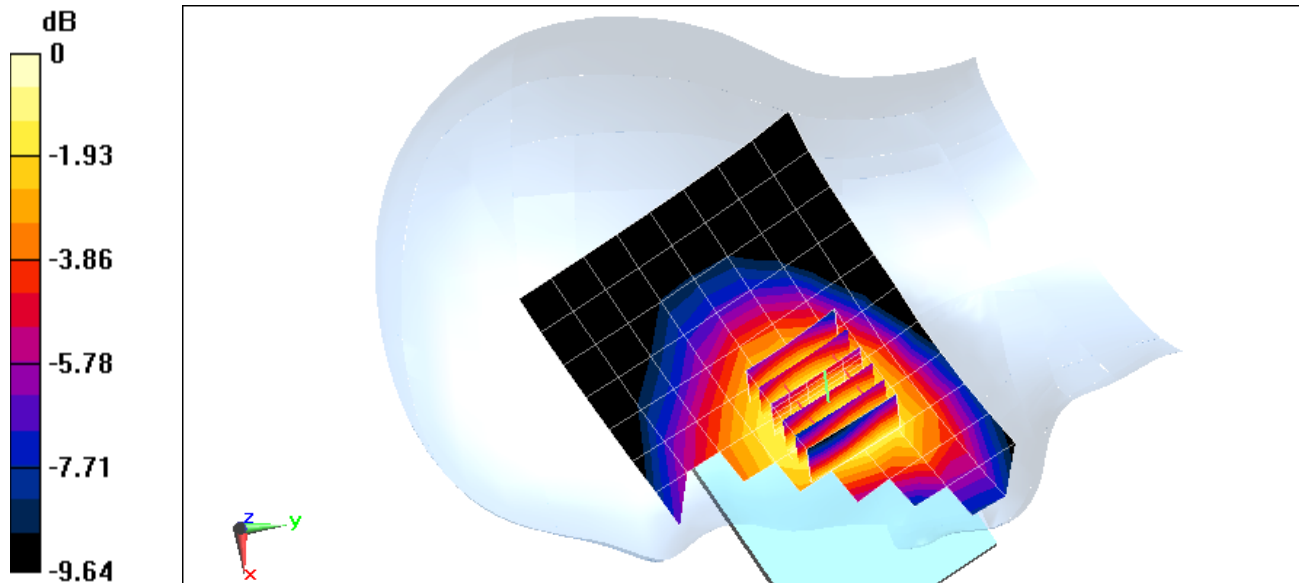
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.77 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.228 W/kg

SAR(1 g) = 0.193 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

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

$f = 836.6 \text{ MHz}$; $\sigma = 0.926 \text{ S/m}$; $\epsilon_r = 41.571$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.23, 6.23, 6.23); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

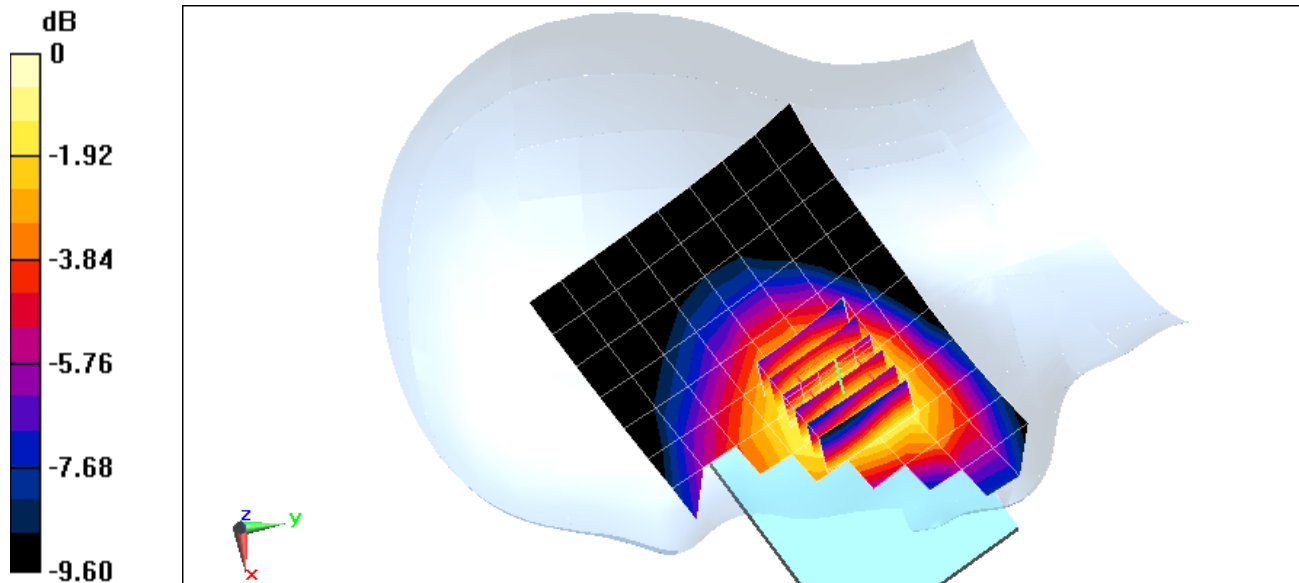
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.76 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.168 W/kg

SAR(1 g) = 0.144 W/kg



0 dB = 0.153 W/kg = -8.15 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F3805

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

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

$f = 836.52 \text{ MHz}$; $\sigma = 0.926 \text{ S/m}$; $\epsilon_r = 41.572$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.23, 6.23, 6.23); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. EVDO, Right Head, Cheek, Mid.ch, Wireless Charging Cover

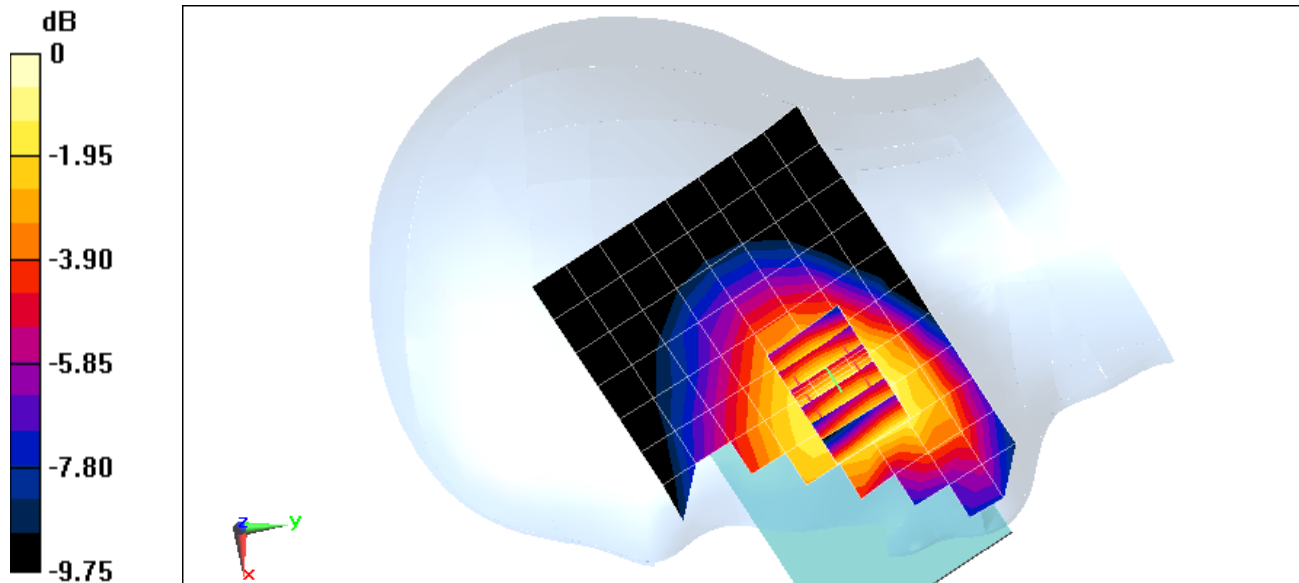
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 16.26 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.262 W/kg

SAR(1 g) = 0.221 W/kg



0 dB = 0.235 W/kg = -6.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Head, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.394 \text{ S/m}$; $\epsilon_r = 40.036$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(5.08, 5.08, 5.08); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

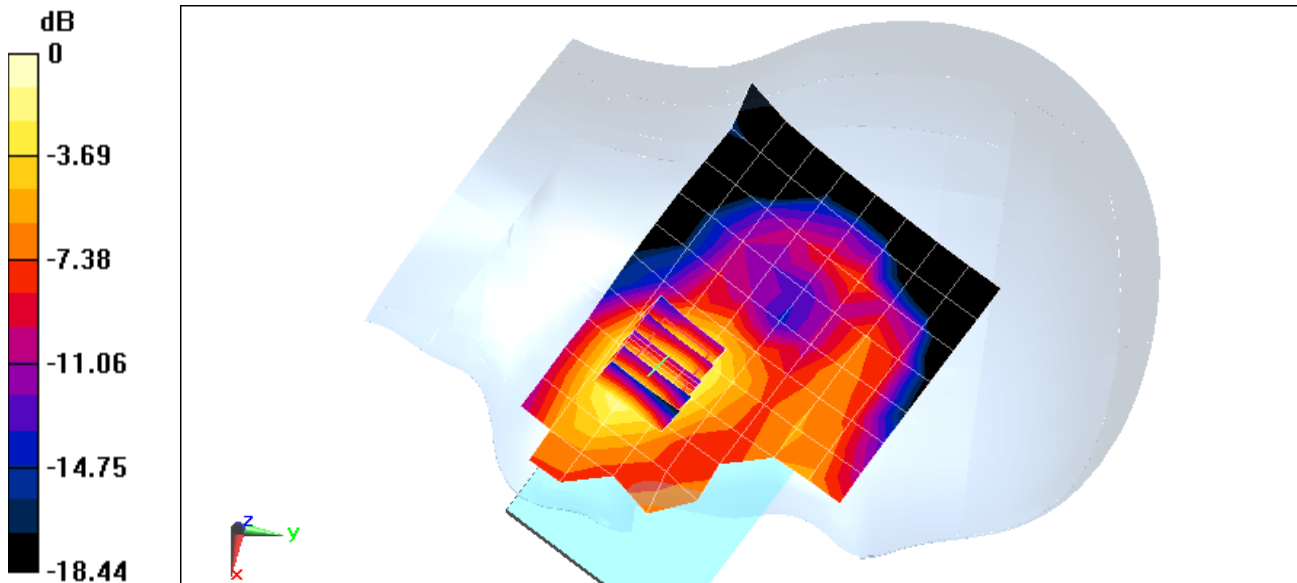
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 7.758 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 0.118 W/kg

SAR(1 g) = 0.076 W/kg



0 dB = 0.0905 W/kg = -10.43 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.394 \text{ S/m}$; $\epsilon_r = 40.036$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(5.08, 5.08, 5.08); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

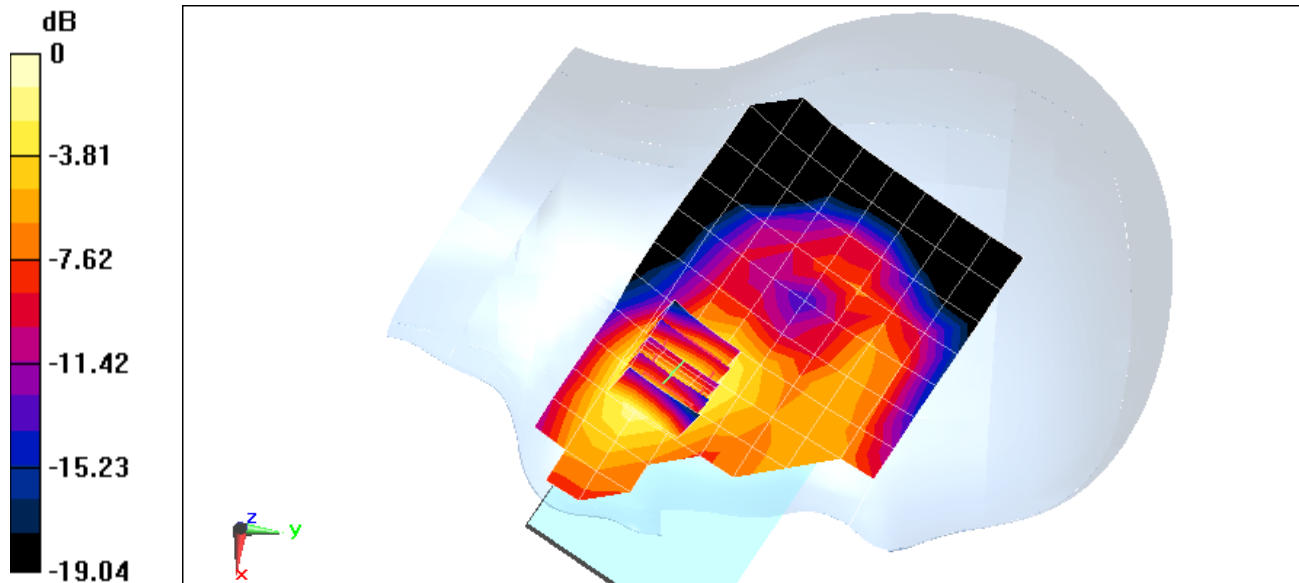
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 9.825 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.190 W/kg

SAR(1 g) = 0.125 W/kg



0 dB = 0.148 W/kg = -8.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38C9

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.394 \text{ S/m}$; $\epsilon_r = 40.036$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(5.08, 5.08, 5.08); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

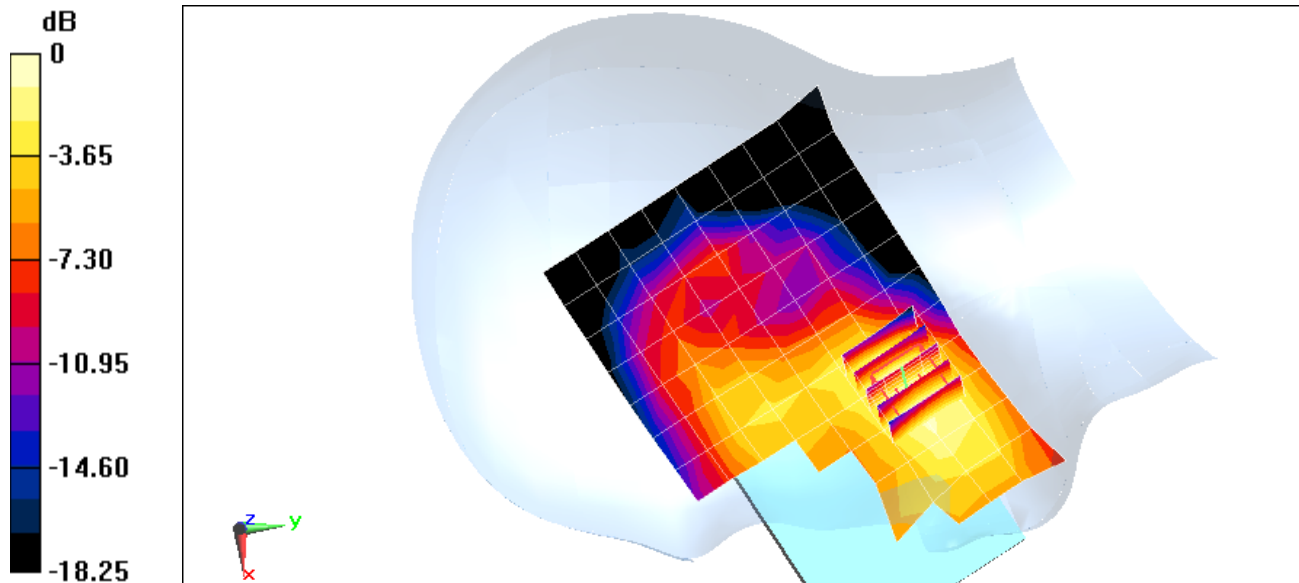
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 10.86 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.237 W/kg

SAR(1 g) = 0.160 W/kg



0 dB = 0.189 W/kg = -7.24 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38E6

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Head, Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 0.935 \text{ S/m}$; $\epsilon_r = 39.848$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-18-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3263; ConvF(6.42, 6.42, 6.42); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Standard Cover**

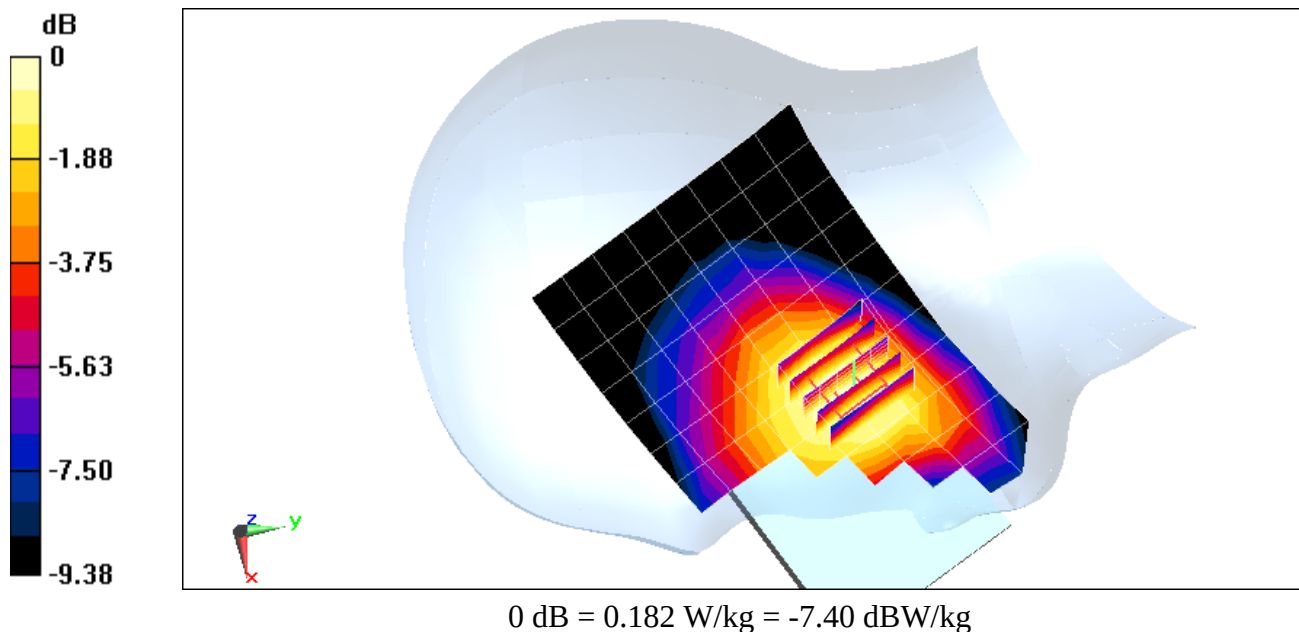
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.25 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.206 W/kg

SAR(1 g) = 0.169 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38E6

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Head, Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.34 \text{ S/m}$; $\epsilon_r = 39.583$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-17-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(5.19, 5.19, 5.19); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Right Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset, Standard Cover**

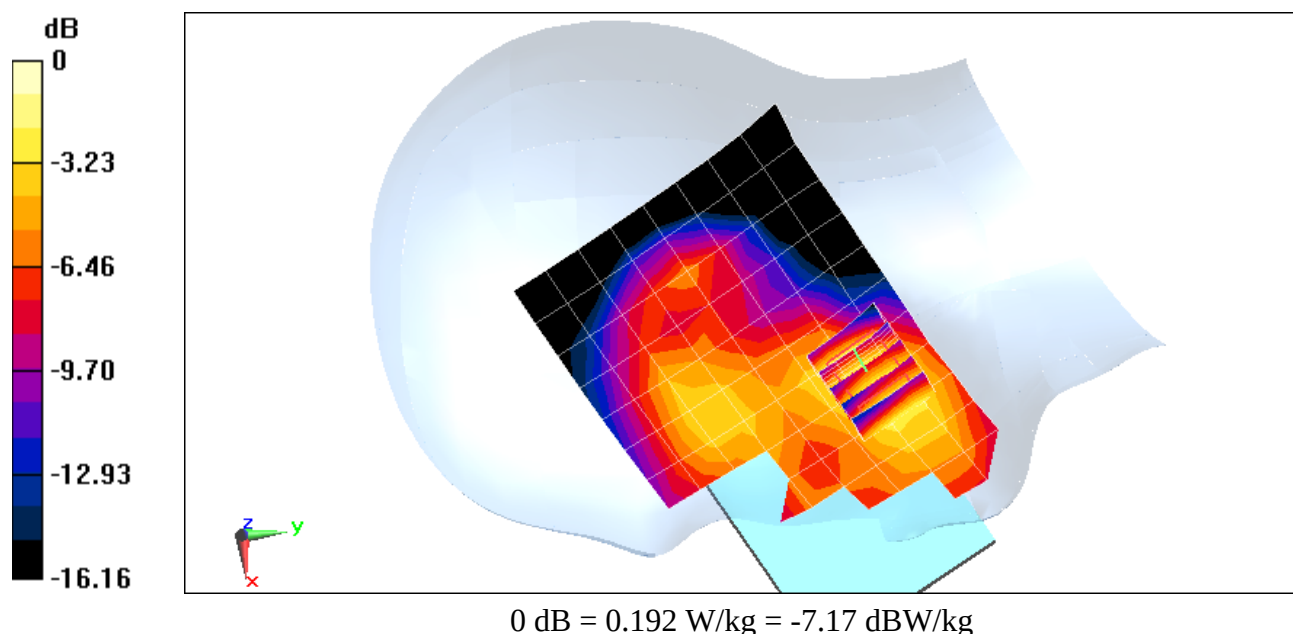
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 12.05 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.244 W/kg

SAR(1 g) = 0.165 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915A; Type: Portable Handset; Serial: 0809-12

Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Head, Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$; $\sigma = 1.827 \text{ S/m}$; $\epsilon_r = 39.649$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-15-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3258; ConvF(4.52, 4.52, 4.52); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11b, Right Head, Cheek, Ch 11, 1 Mbps, Antenna 2,
Standard Cover**

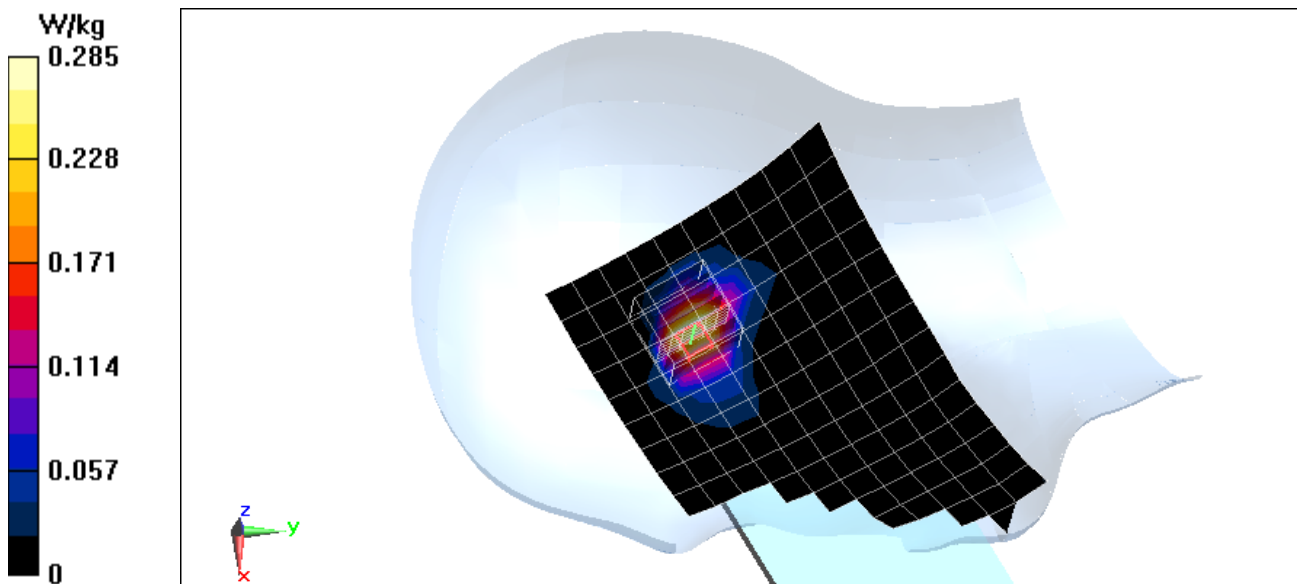
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.146 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.465 W/kg

SAR(1 g) = 0.178 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-12

Communication System: UID 0, IEEE 802.11n; Frequency: 5745 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5745 \text{ MHz}$; $\sigma = 5.199 \text{ S/m}$; $\epsilon_r = 34.834$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 09-15-2014; Ambient Temp: 22.8°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11n, 5.8 GHz, Left Head, Cheek, Ch 149, 13 Mbps, MIMO,
Wireless Charging Cover**

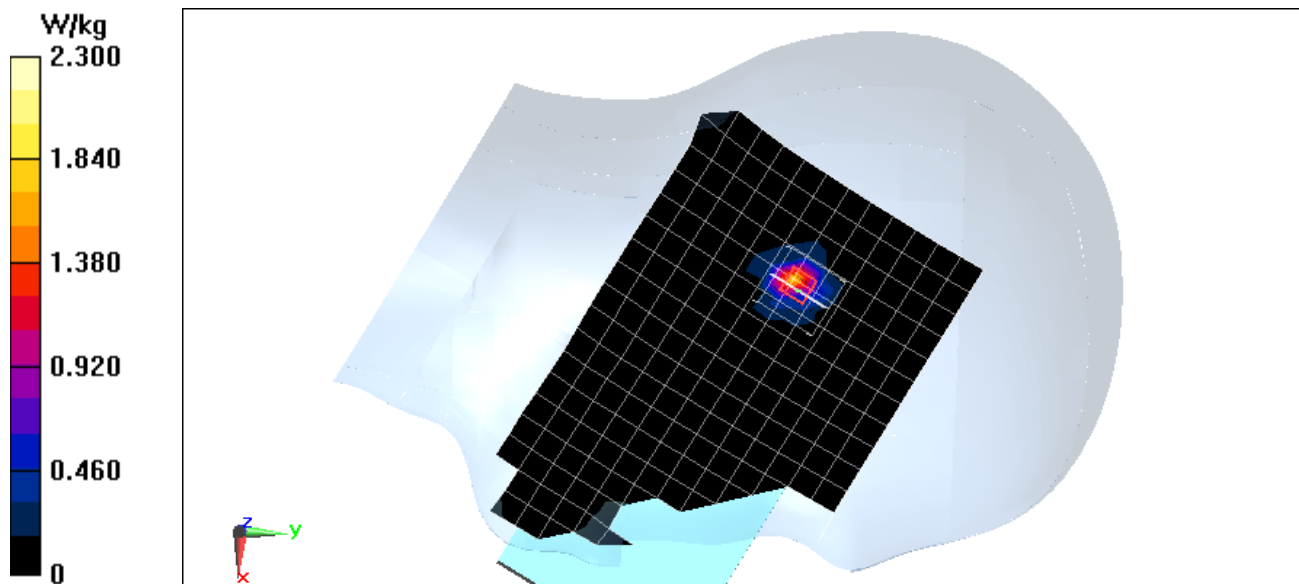
Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 14.49 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 4.89 W/kg

SAR(1 g) = 0.793 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-12

Communication System: UID 0, IEEE 802.11a; Frequency: 5700 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5700 \text{ MHz}$; $\sigma = 5.122 \text{ S/m}$; $\epsilon_r = 34.879$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 09-15-2014; Ambient Temp: 22.8°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN3914; ConvF(4.37, 4.37, 4.37); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11a, 5.5-5.7 GHz, Right Head, Cheek, Ch 140, 6 Mbps, Antenna 2,
Wireless Charging Cover**

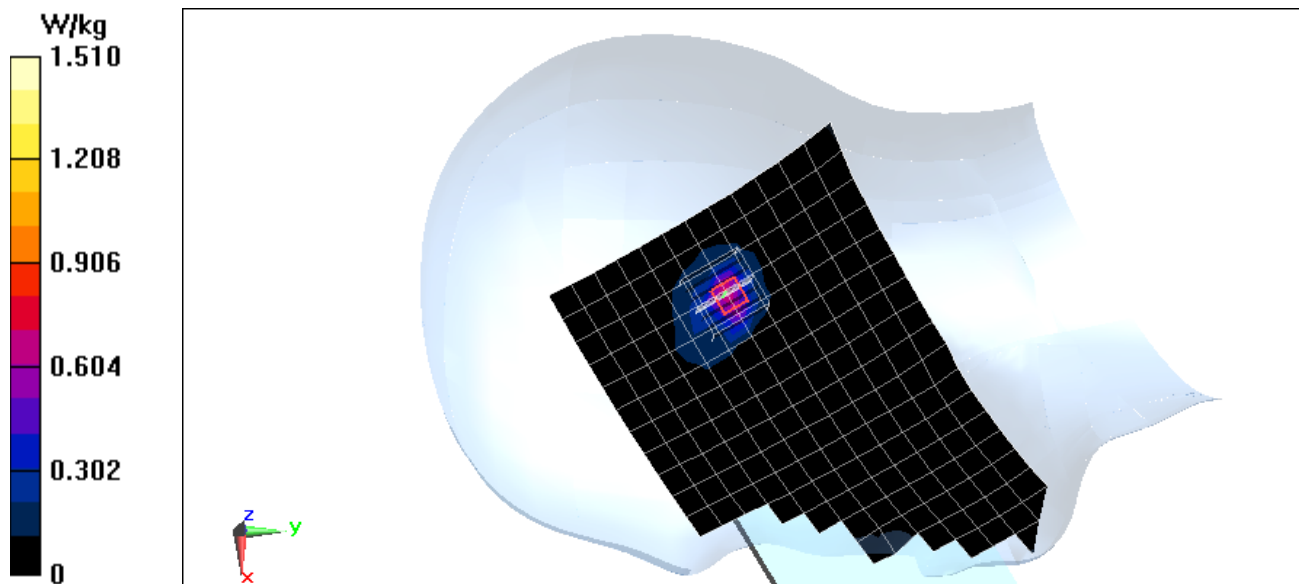
Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 9.765 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.15 W/kg

SAR(1 g) = 0.536 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 1.009 \text{ S/m}$; $\epsilon_r = 53.226$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.16, 6.16, 6.16); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

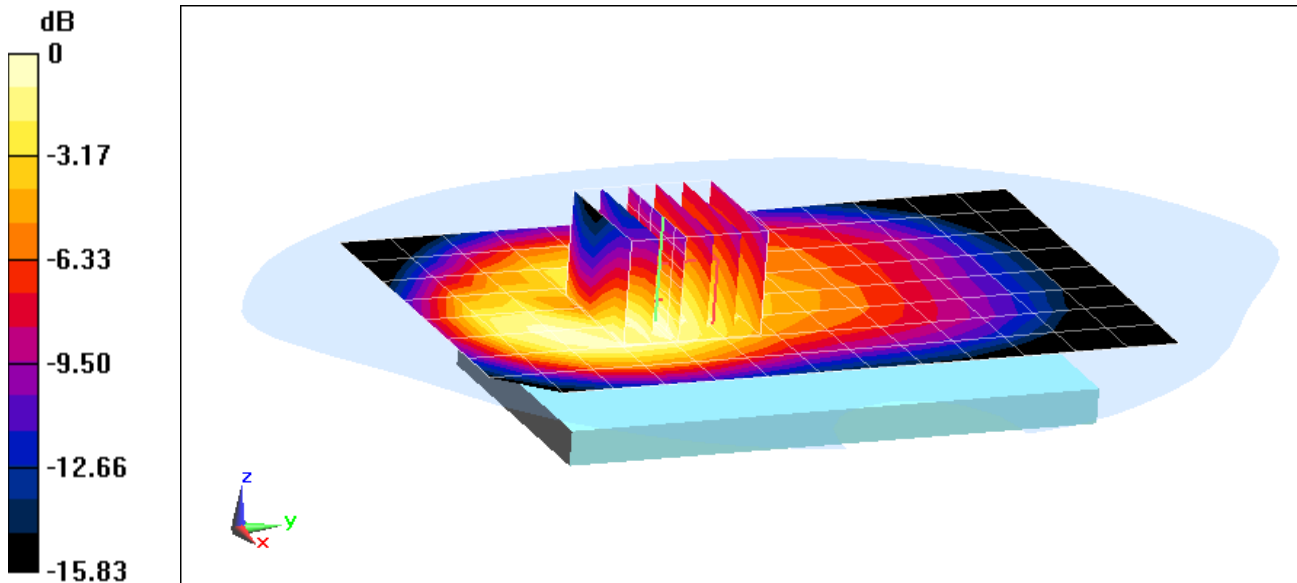
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 23.96 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.811 W/kg

SAR(1 g) = 0.527 W/kg



0 dB = 0.608 W/kg = -2.16 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 1.009 \text{ S/m}$; $\epsilon_r = 53.226$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.16, 6.16, 6.16); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

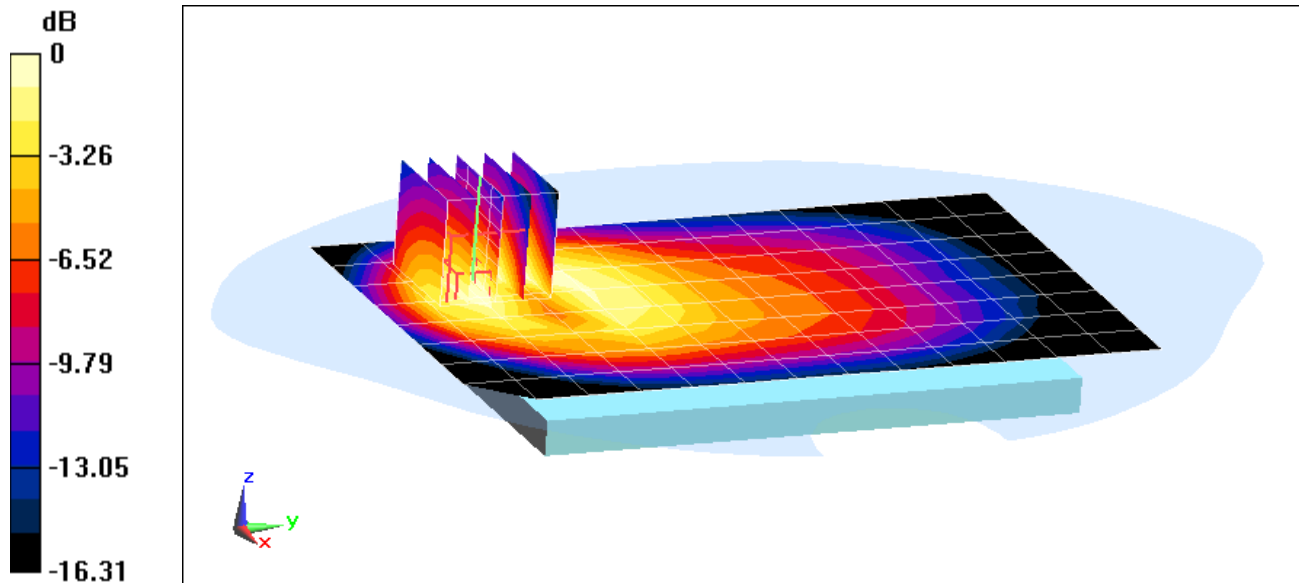
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 31.91 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.66 W/kg

SAR(1 g) = 0.964 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 1.009 \text{ S/m}$; $\epsilon_r = 53.226$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.16, 6.16, 6.16); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

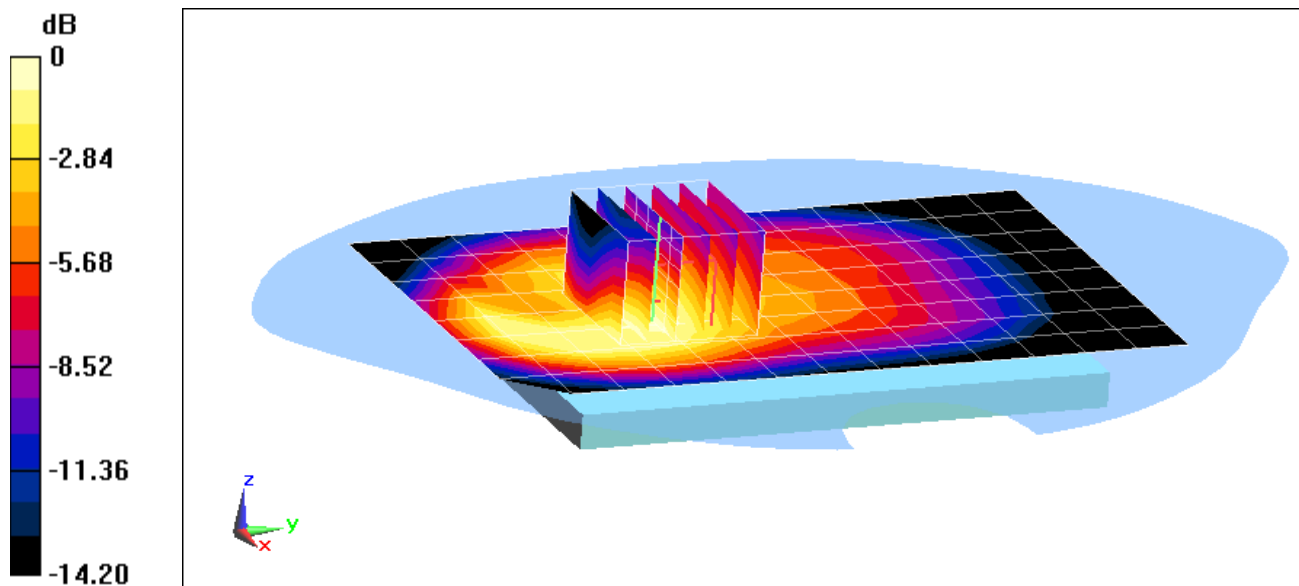
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (8x11x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.66 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.534 W/kg

SAR(1 g) = 0.368 W/kg



0 dB = 0.425 W/kg = -3.72 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 1.009 \text{ S/m}$; $\epsilon_r = 53.226$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.16, 6.16, 6.16); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 850, Body SAR, Front side, Mid.ch, Wireless Charging Cover

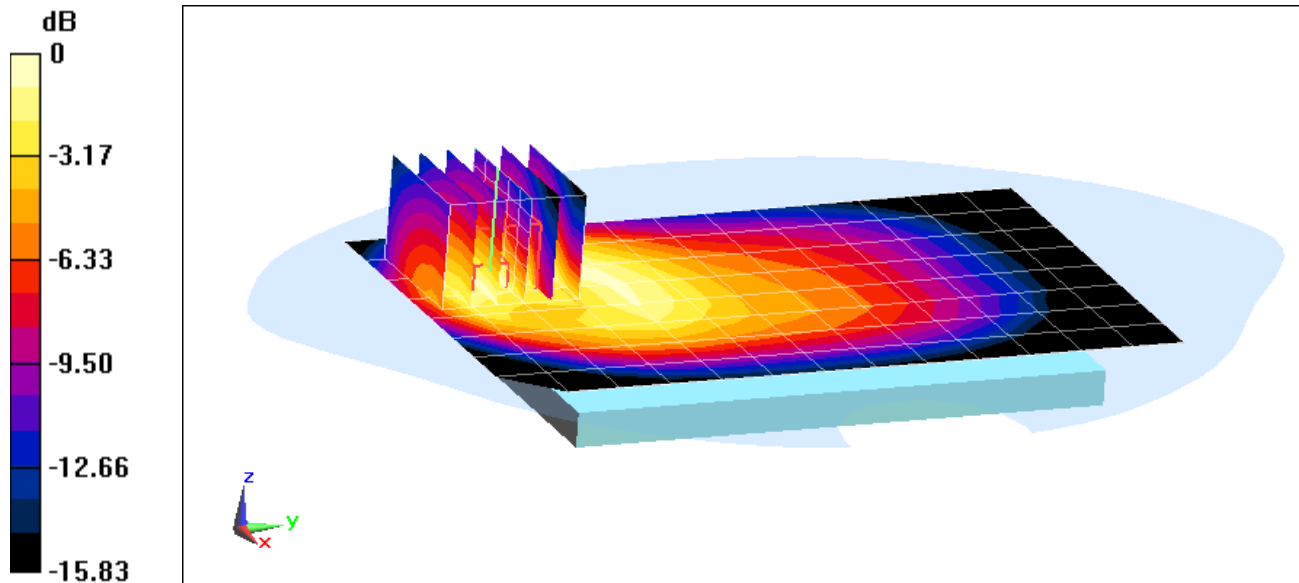
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 22.28 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.787 W/kg

SAR(1 g) = 0.459 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F3805

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.001 \text{ S/m}$; $\epsilon_r = 53.765$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-13-2014; Ambient Temp: 23.2°C; Tissue Temp: 21.7°C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. CDMA, Body SAR, Back side, Mid.ch, Standard Cover

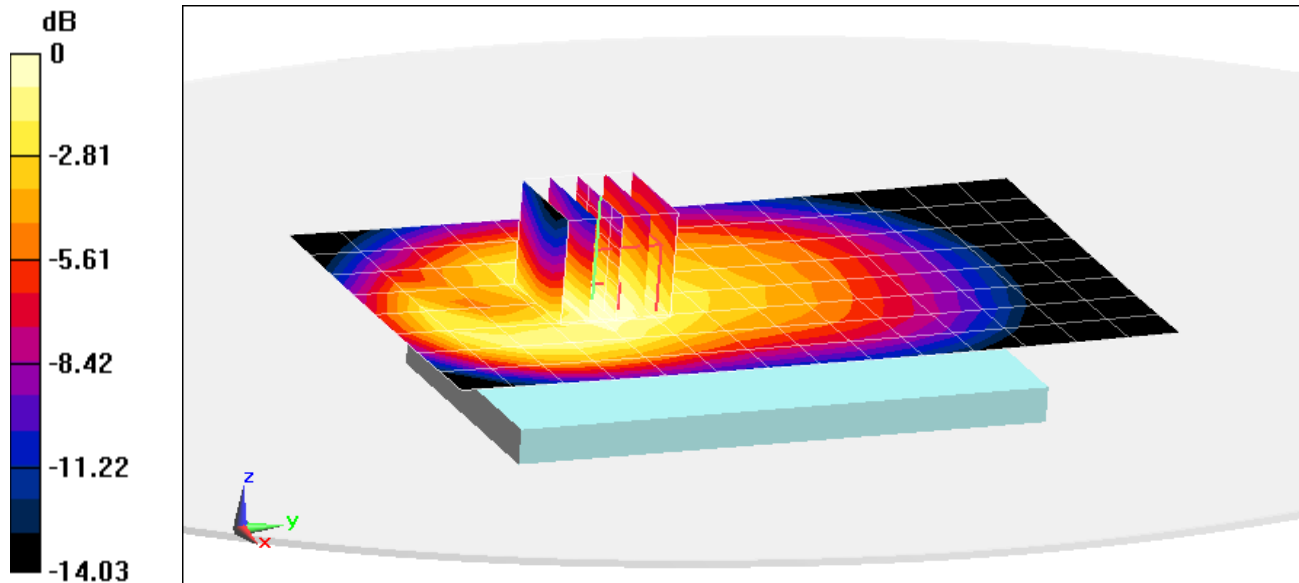
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.69 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.401 W/kg

SAR(1 g) = 0.291 W/kg



0 dB = 0.330 W/kg = -4.81 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38CB

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 1.009 \text{ S/m}$; $\epsilon_r = 53.227$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.16, 6.16, 6.16); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. EVDO, Body SAR, Front side, Mid.ch, Wireless Charging Cover

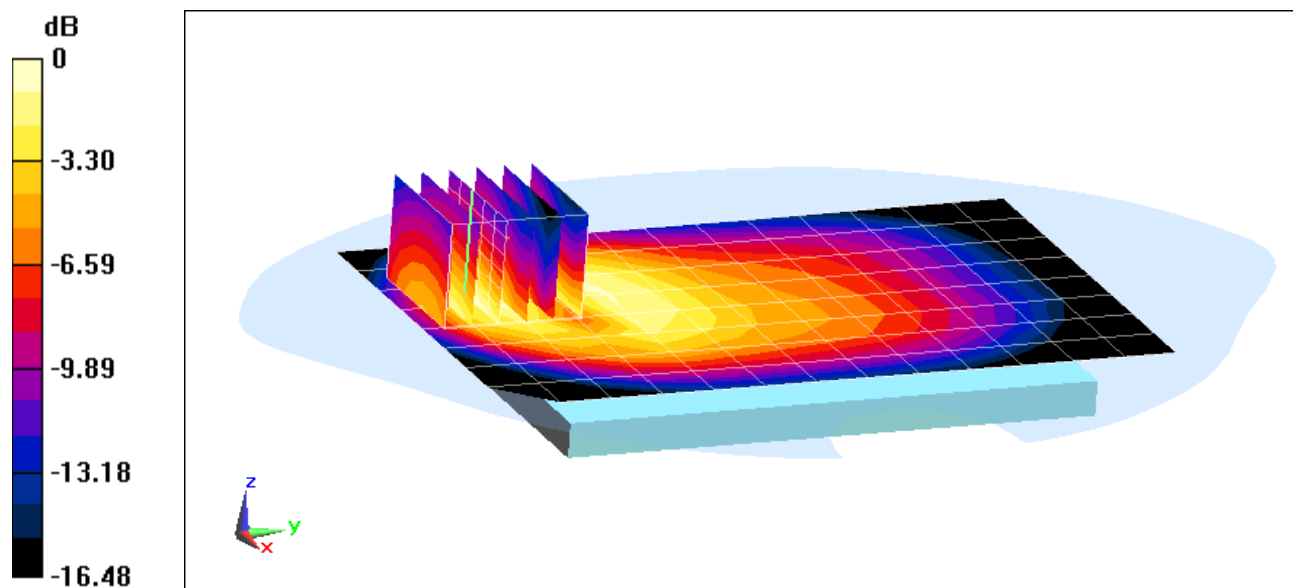
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.82 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.698 W/kg



0 dB = 0.854 W/kg = -0.69 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.523 \text{ S/m}$; $\epsilon_r = 51.404$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

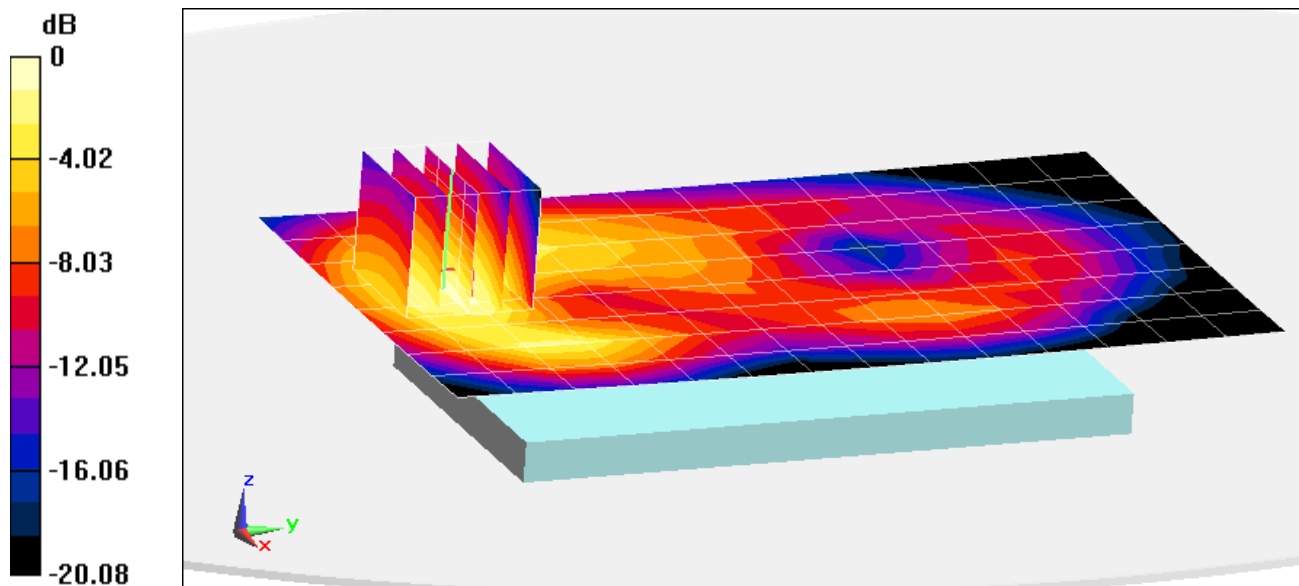
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 13.16 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.389 W/kg

SAR(1 g) = 0.245 W/kg



0 dB = 0.297 W/kg = -5.27 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.523 \text{ S/m}$; $\epsilon_r = 51.404$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 1900, Body SAR, Bottom Edge, Mid.ch, 4 Tx Slots, Standard Cover

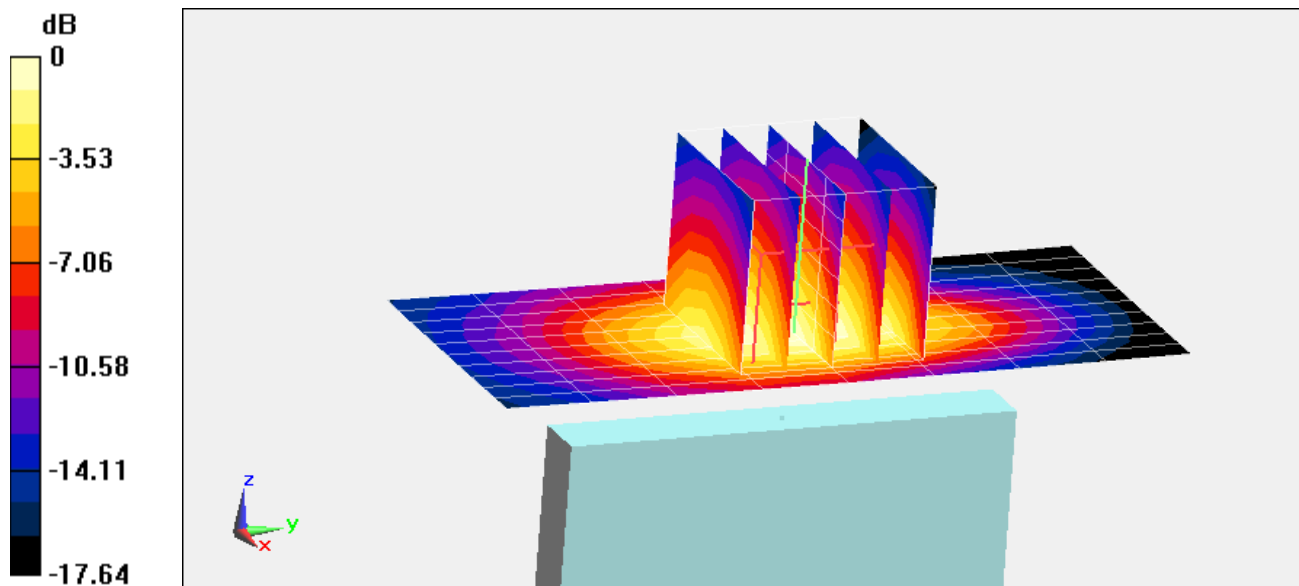
Area Scan (11x9x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 25.19 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.38 W/kg

SAR(1 g) = 0.847 W/kg



0 dB = 1.04 W/kg = 0.17 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.552 \text{ S/m}$; $\epsilon_r = 51.481$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-29-2014; Ambient Temp: 22.9°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

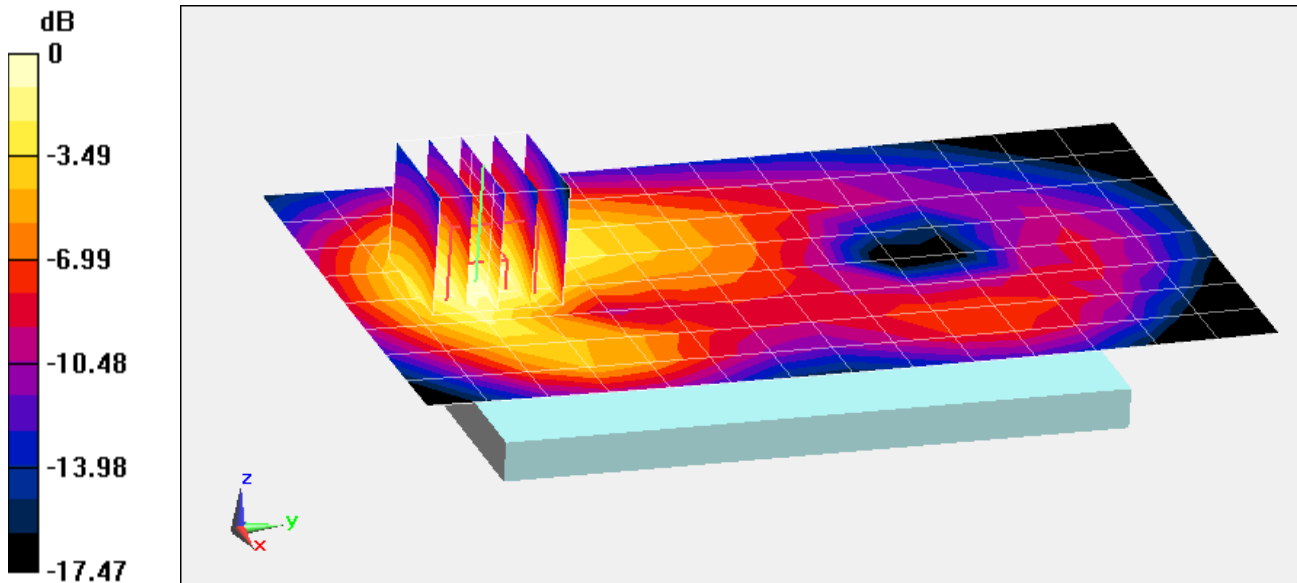
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 13.25 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.410 W/kg

SAR(1 g) = 0.262 W/kg



0 dB = 0.313 W/kg = -5.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38AB

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.552 \text{ S/m}$; $\epsilon_r = 51.481$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-29-2014; Ambient Temp: 22.9°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Body SAR, Bottom Edge, Mid.ch, Wireless Charging Cover

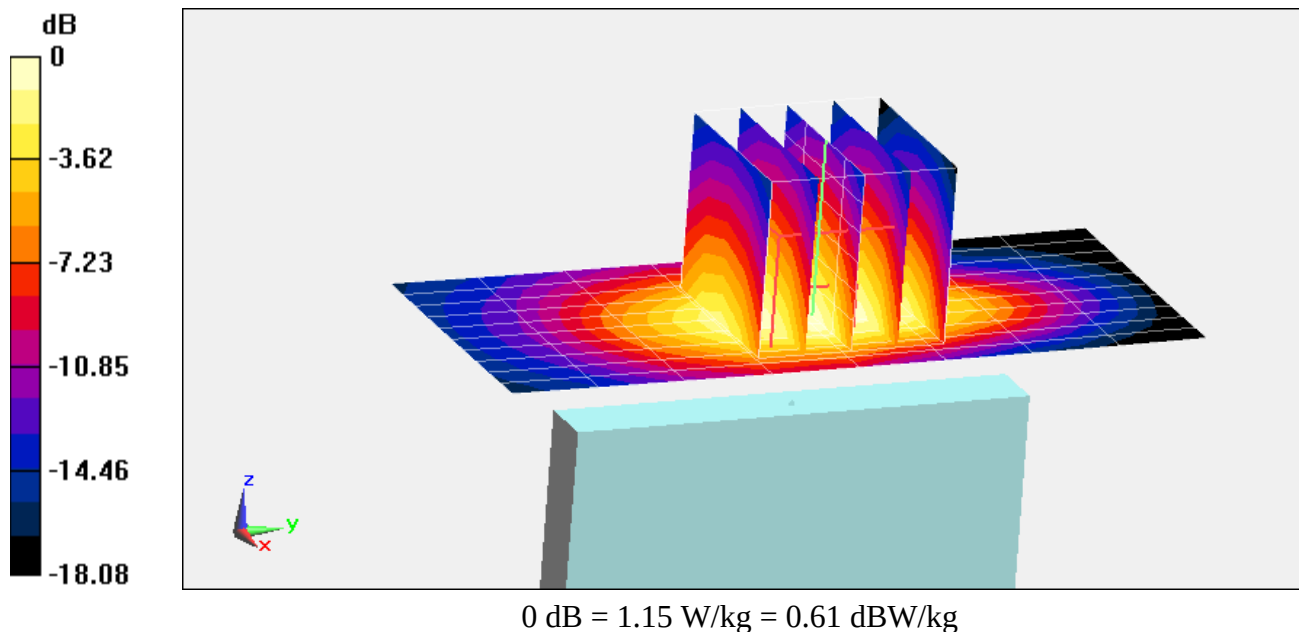
Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 26.14 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.936 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38C9

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.479 \text{ S/m}$; $\epsilon_r = 52.988$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-18-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS CDMA, Body SAR, Back Side, Mid.ch, Standard Cover

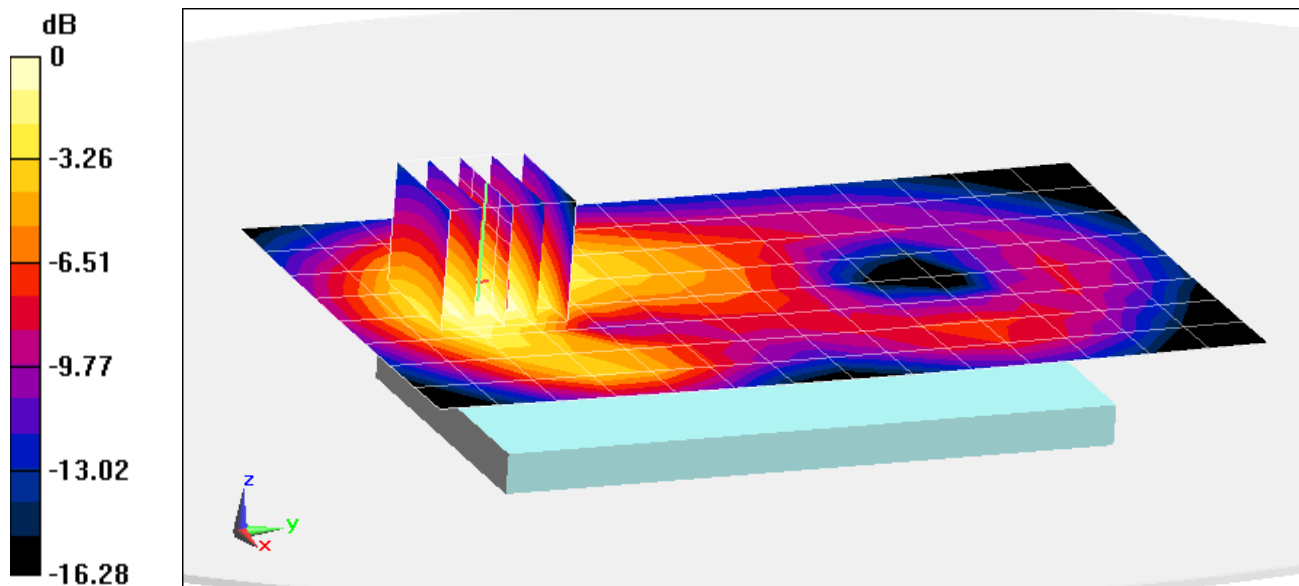
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 14.86 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.488 W/kg

SAR(1 g) = 0.322 W/kg



0 dB = 0.379 W/kg = -4.21 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38D5

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.479 \text{ S/m}$; $\epsilon_r = 52.988$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-18-2014; Ambient Temp: 24.5°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS EVDO, Body SAR, Bottom Edge, Mid.ch, Wireless Charging Cover

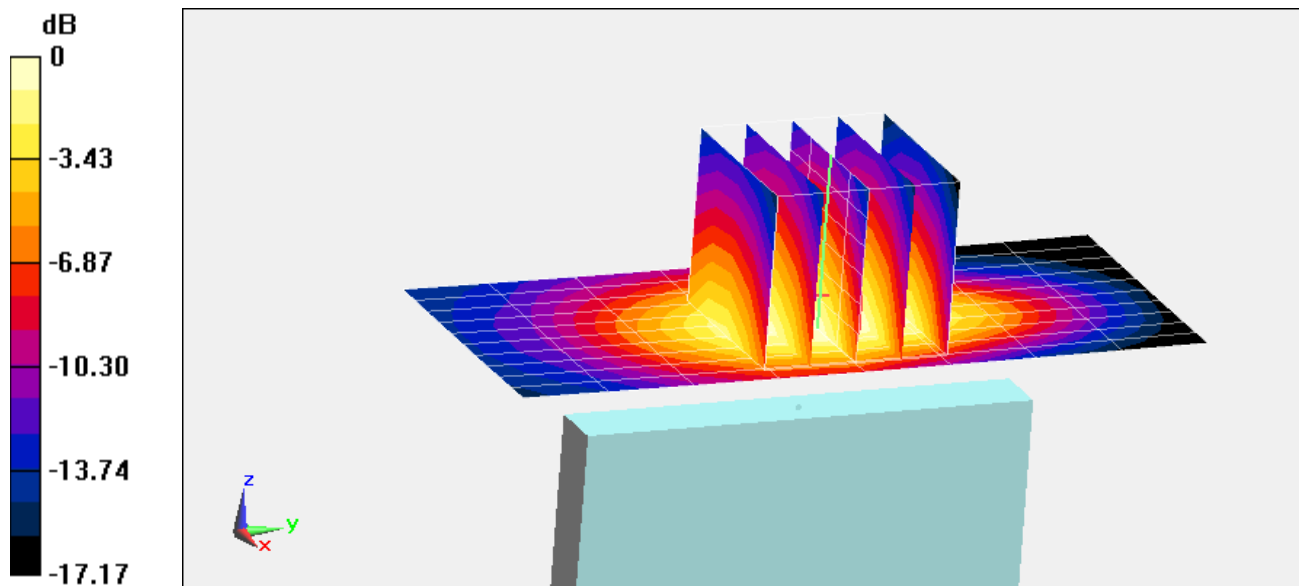
Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 22.58 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.671 W/kg



0 dB = 0.797 W/kg = -0.99 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38E6

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.003 \text{ S/m}$; $\epsilon_r = 53.388$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-17-2014; Ambient Temp: 23.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3209; ConvF(6.16, 6.16, 6.16); Calibrated: 3/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Standard Cover**

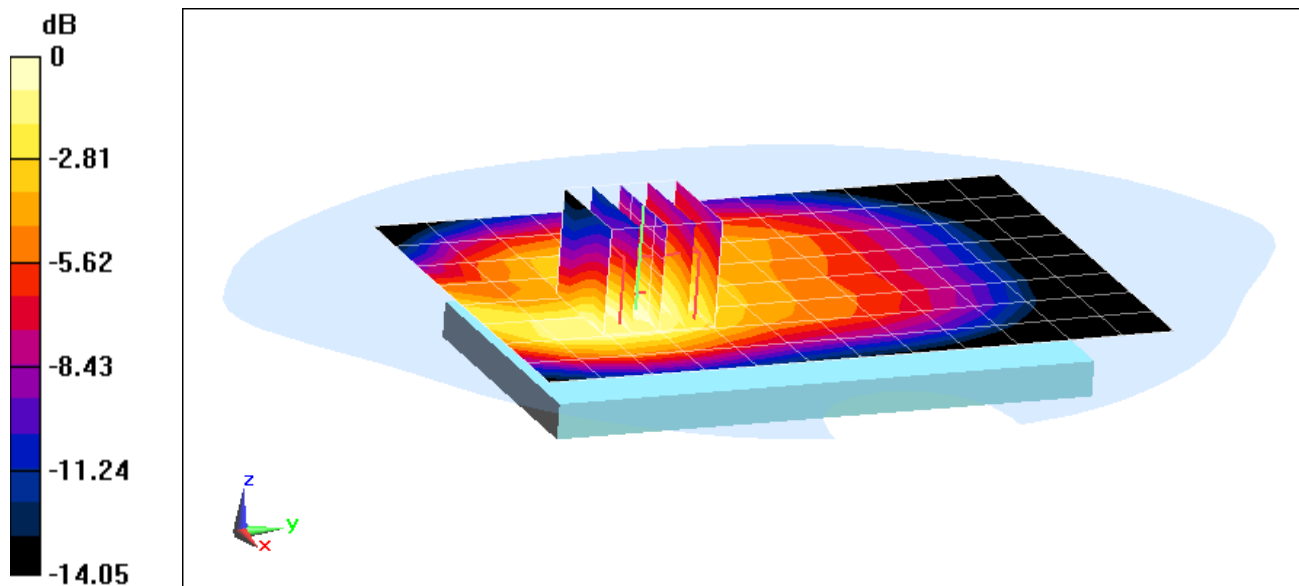
Area Scan (9x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 23.36 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.732 W/kg

SAR(1 g) = 0.498 W/kg



0 dB = 0.568 W/kg = -2.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38E6

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.003 \text{ S/m}$; $\epsilon_r = 53.388$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-17-2014; Ambient Temp: 23.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3209; ConvF(6.16, 6.16, 6.16); Calibrated: 3/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Body SAR, Front side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Standard Cover**

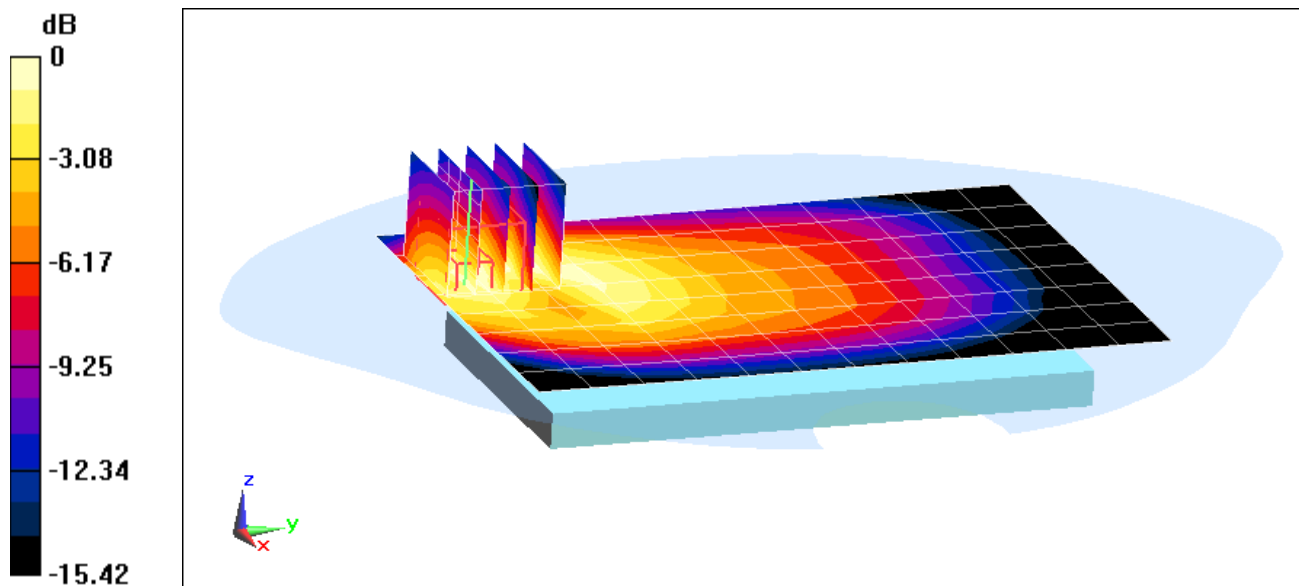
Area Scan (9x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 26.17 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.630 W/kg



0 dB = 0.771 W/kg = -1.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38E6

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.462 \text{ S/m}$; $\epsilon_r = 51.852$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-01-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(4.83, 4.83, 4.83); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset, Standard Cover**

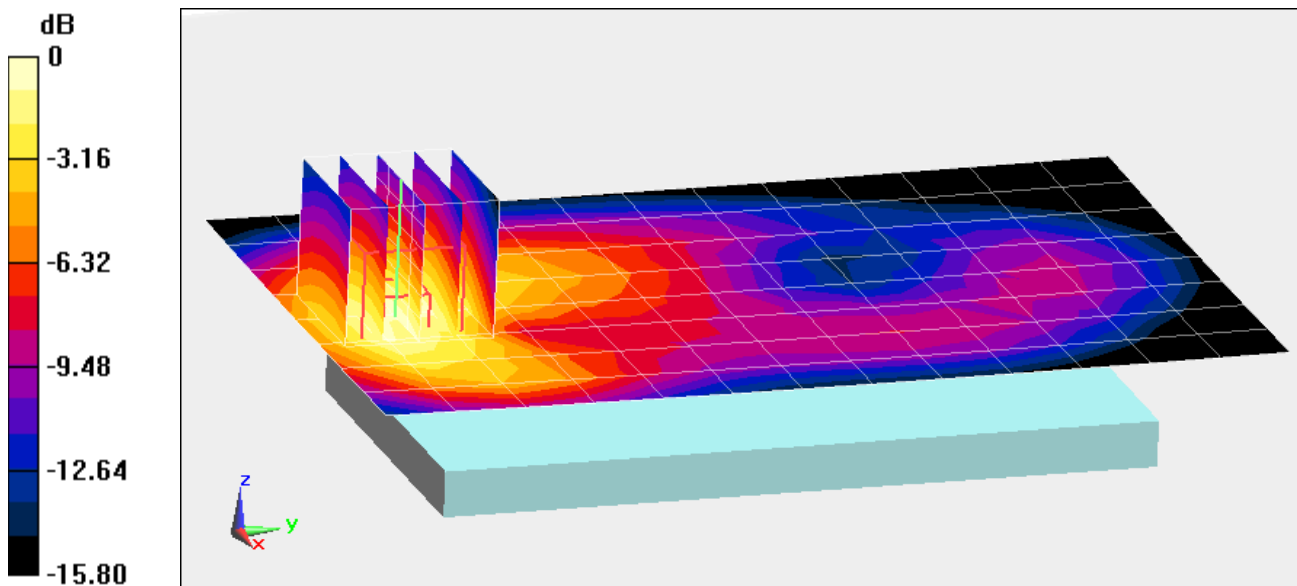
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.69 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.617 W/kg

SAR(1 g) = 0.413 W/kg



0 dB = 0.487 W/kg = -3.12 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38AB

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.462 \text{ S/m}$; $\epsilon_r = 51.852$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-01-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(4.83, 4.83, 4.83); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset, Wireless Charging Cover**

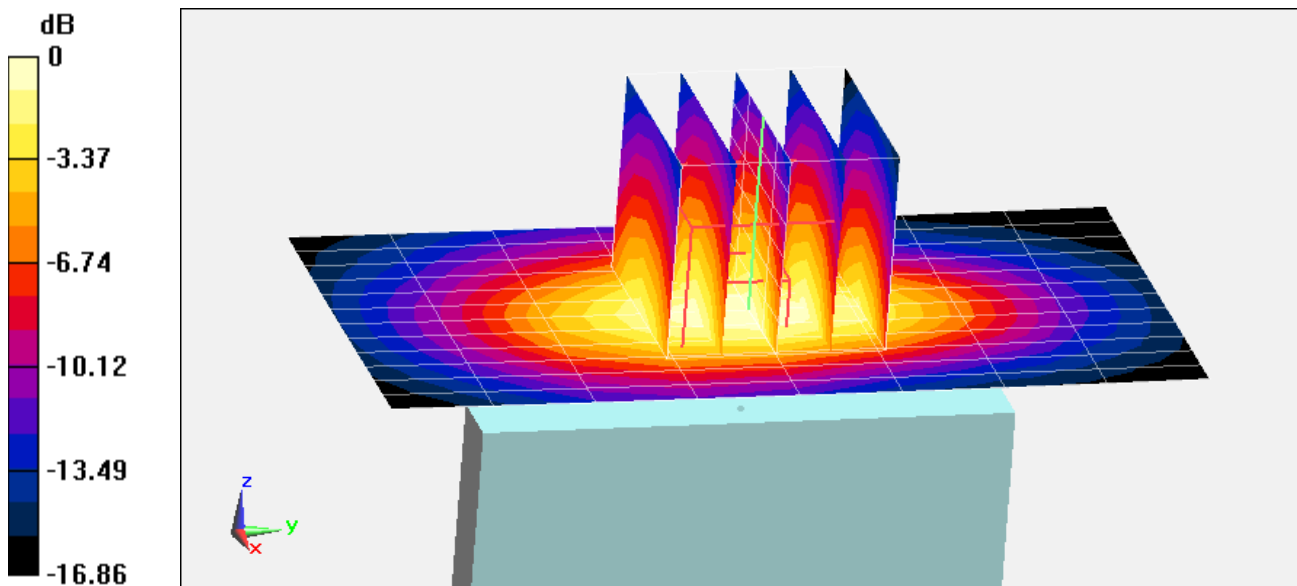
Area Scan (13x9x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 27.47 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 0.939 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-09

Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Body, Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$; $\sigma = 1.981 \text{ S/m}$; $\epsilon_r = 50.728$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 22.2°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11b, Body SAR, Ch 11, 1 Mbps, Back Side,
Antenna 1, Standard Cover**

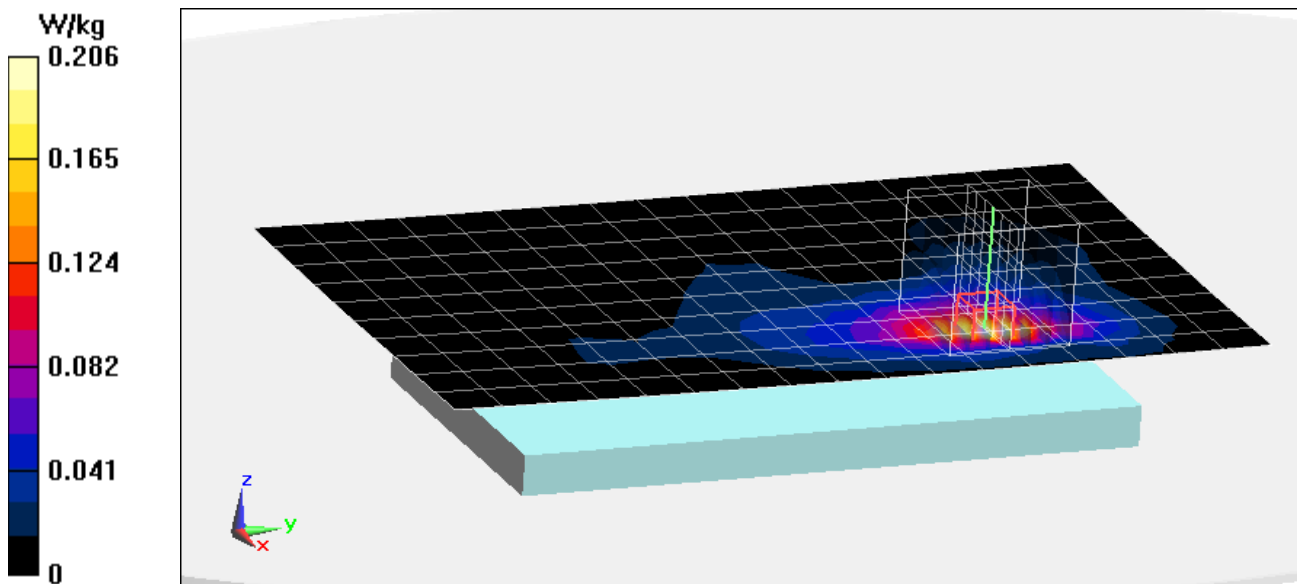
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.570 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.336 W/kg

SAR(1 g) = 0.153 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-14

Communication System: UID 0, IEEE 802.11n; Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5825 \text{ MHz}$; $\sigma = 6.077 \text{ S/m}$; $\epsilon_r = 46.581$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.97, 3.97, 3.97); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n, 5.8 GHz, Body SAR, Ch 165, 13 Mbps, Back Side, MIMO, Standard Cover

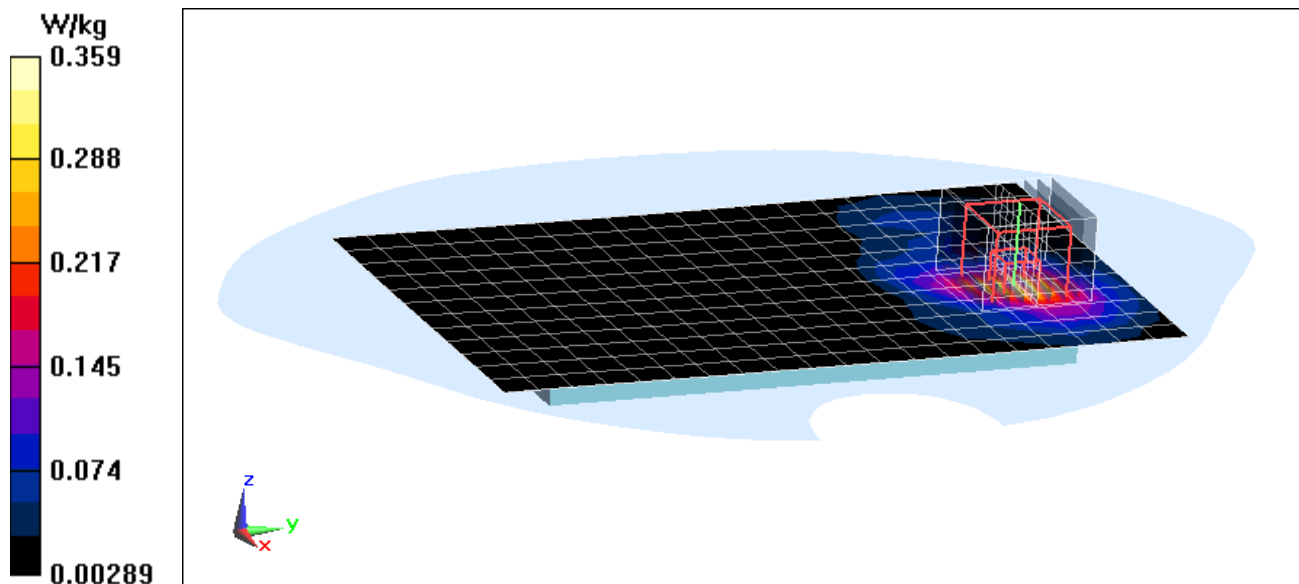
Area Scan (13x21x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 4.854 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.706 W/kg

SAR(1 g) = 0.157 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-14

Communication System: UID 0, IEEE 802.11a; Frequency: 5700 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5700 \text{ MHz}$; $\sigma = 5.894 \text{ S/m}$; $\epsilon_r = 46.838$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11a, 5.5 - 5.7 GHz, Body SAR, Ch 140, 6 Mbps, Back Side,
Antenna 2, Standard Cover**

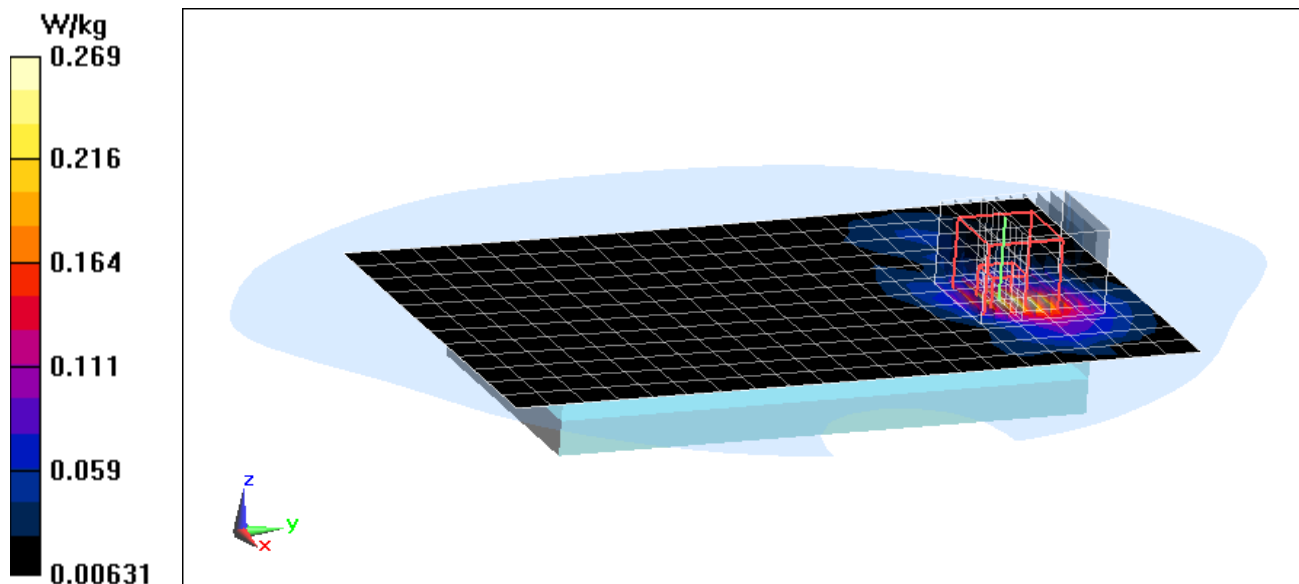
Area Scan (13x21x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (9x10x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 3.917 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.469 W/kg

SAR(1 g) = 0.118 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM850 GPRS; 3 Tx slots; Frequency: 824.2 MHz; Duty Cycle: 1:2.76

Medium: 835 Body, Medium parameters used (interpolated):

$f = 824.2 \text{ MHz}$; $\sigma = 0.988 \text{ S/m}$; $\epsilon_r = 53.91$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-13-2014; Ambient Temp: 23.2°C; Tissue Temp: 21.7°C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 850, Hand SAR, Front side, Low.ch, 3 Tx Slots. Wireless Charging Cover

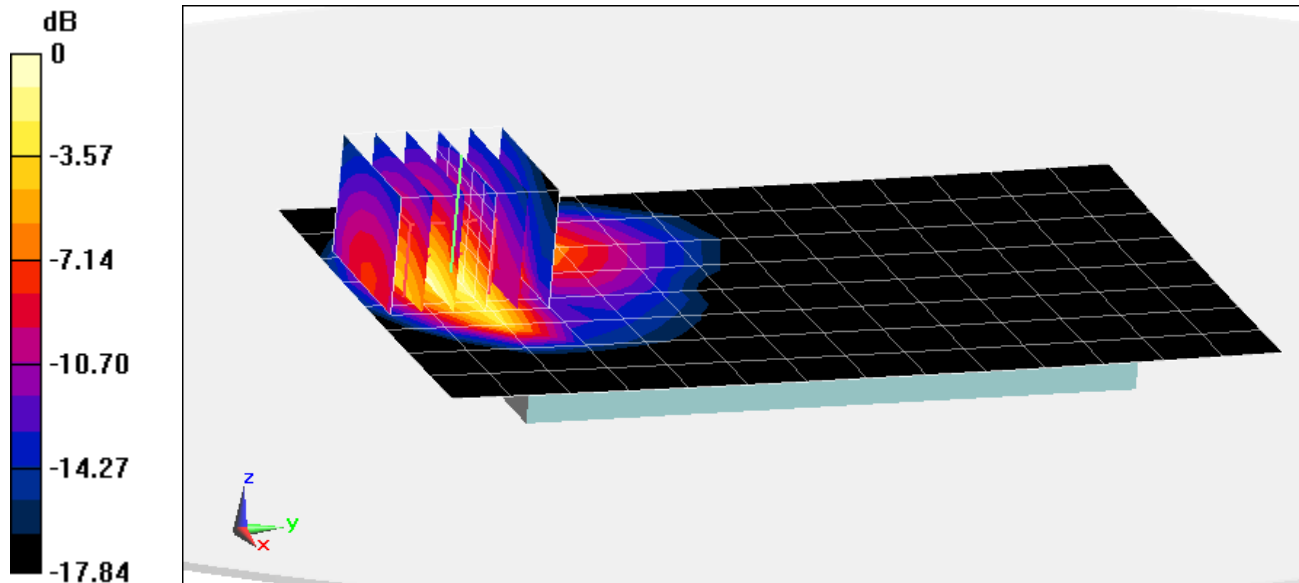
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 63.31 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 10.8 W/kg

SAR(10 g) = 2.45 W/kg



0 dB = 5.97 W/kg = 7.76 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 1.001 \text{ S/m}$; $\epsilon_r = 53.764$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-13-2014; Ambient Temp: 23.2°C; Tissue Temp: 21.7°C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 850, Hand SAR, Front side, Mid.ch, Standard Cover

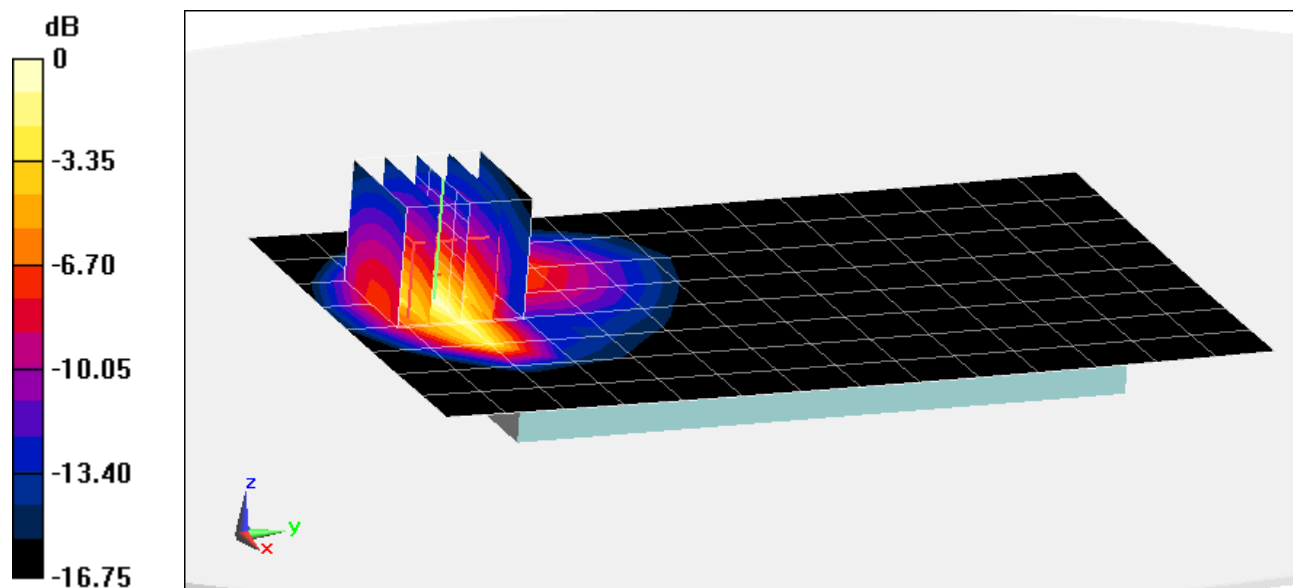
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 59.88 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 6.41 W/kg

SAR(10 g) = 1.46 W/kg



0 dB = 4.05 W/kg = 6.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38CB

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used (interpolated):

$f = 836.52 \text{ MHz}$; $\sigma = 0.954 \text{ S/m}$; $\epsilon_r = 54.046$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-15-2014; Ambient Temp: 21.4°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3213; ConvF(6.18, 6.18, 6.18); Calibrated: 4/11/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 11/18/2013

Phantom: Sub TWIN SAM; Type: QD000P40CC; Serial: TP-1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. EVDO, Hand SAR, Front side, Mid.ch, Standard Cover

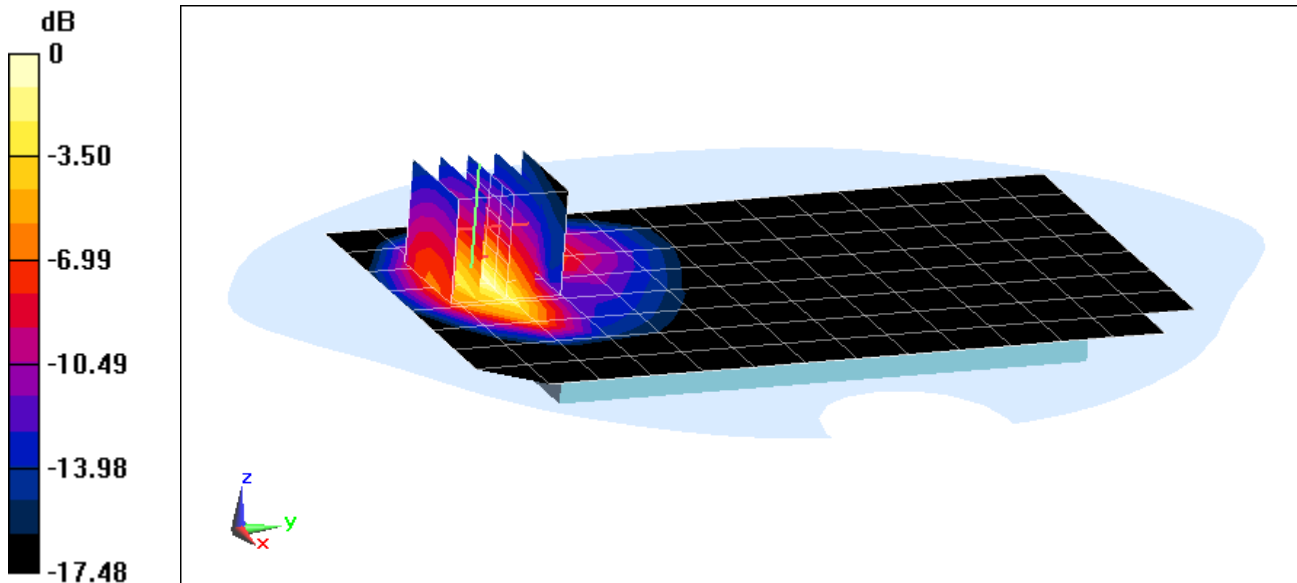
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 63.64 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 8.22 W/kg

SAR(10 g) = 1.8 W/kg



0 dB = 5.15 W/kg = 7.12 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38B8

Communication System: UID 0, GSM1900 GPRS; 4 Tx slots; Frequency: 1850.2 MHz; Duty Cycle: 1:2.076

Medium: 1900 Body, Medium parameters used (interpolated):

$f = 1850.2 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 52.621$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-14-2014; Ambient Temp: 24.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3263; ConvF(4.78, 4.78, 4.78); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 1900, Hand SAR, Front side, Low.ch, 4 Tx Slots, Standard Cover

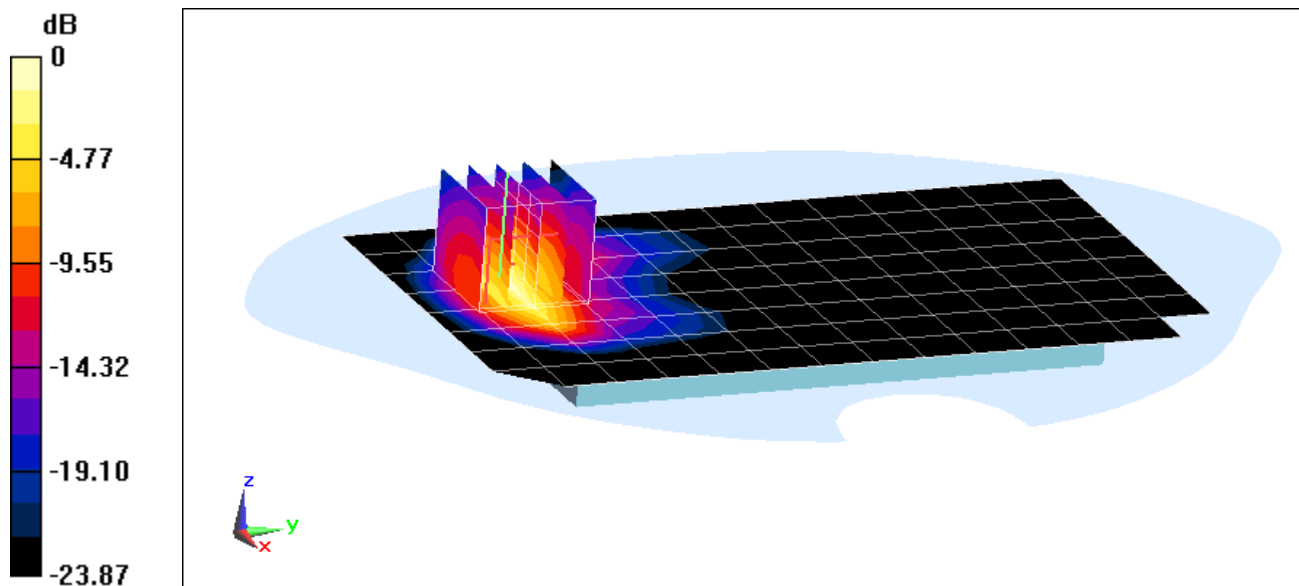
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 60.28 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 10.2 W/kg

SAR(10 g) = 2.16 W/kg



0 dB = 6.95 W/kg = 8.42 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38AB

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.56 \text{ S/m}$; $\epsilon_r = 52.528$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-14-2014; Ambient Temp: 24.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3263; ConvF(4.78, 4.78, 4.78); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Hand SAR, Front side, Mid.ch, Wireless Charging Cover

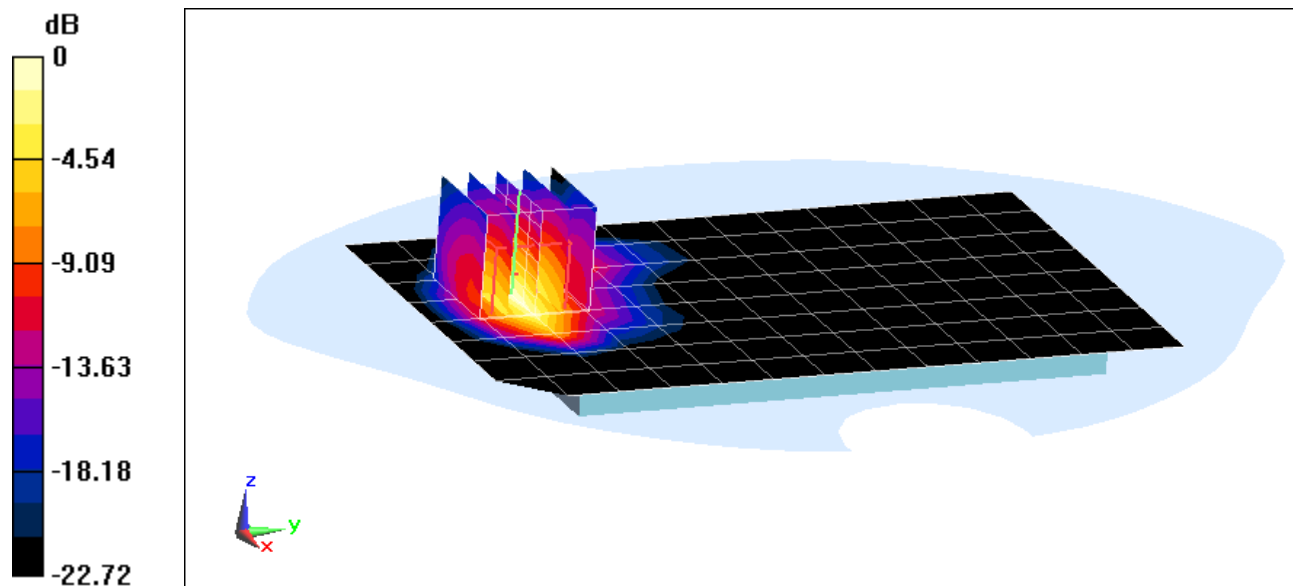
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 66.31 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 12.4 W/kg

SAR(10 g) = 2.61 W/kg



0 dB = 7.85 W/kg = 8.95 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38D5

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.56 \text{ S/m}$; $\epsilon_r = 52.528$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-14-2014; Ambient Temp: 24.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3263; ConvF(4.78, 4.78, 4.78); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS EVDO, Hand SAR, Front side, Mid.ch, Wireless Charging Cover

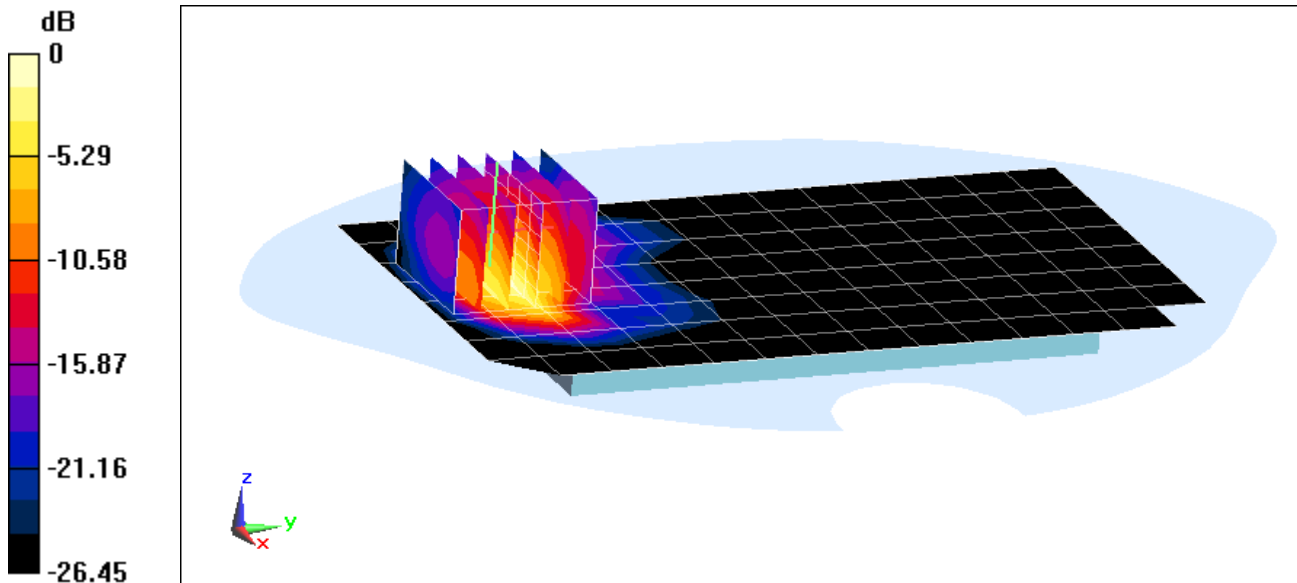
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 60.82 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 10.5 W/kg

SAR(10 g) = 2.21 W/kg



0 dB = 7.04 W/kg = 8.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38E6

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 782 \text{ MHz}$; $\sigma = 1.007 \text{ S/m}$; $\epsilon_r = 55.325$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-16-2014; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(6.02, 6.02, 6.02); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Hand SAR, Front side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Wireless Charging Cover**

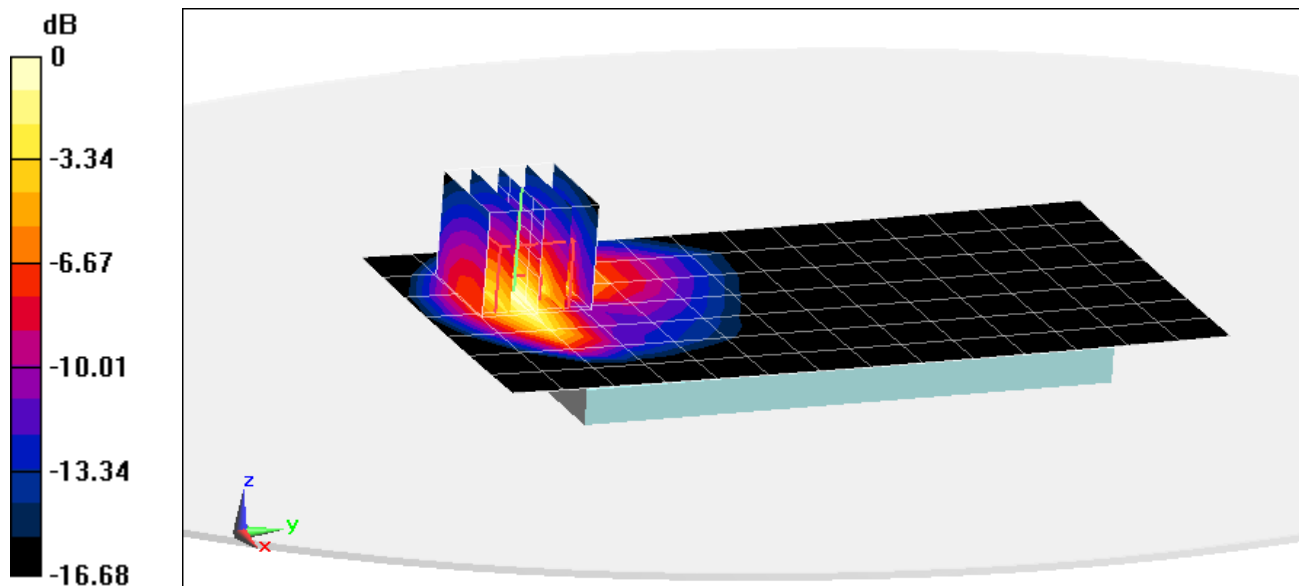
Area Scan (8x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 68.72 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 9.17 W/kg

SAR(10 g) = 2.1 W/kg



0 dB = 5.85 W/kg = 7.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: F38AB

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.449 \text{ S/m}$; $\epsilon_r = 51.303$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-15-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3258; ConvF(4.83, 4.83, 4.83); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Hand SAR, Bottom Edge, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset, Standard Cover**

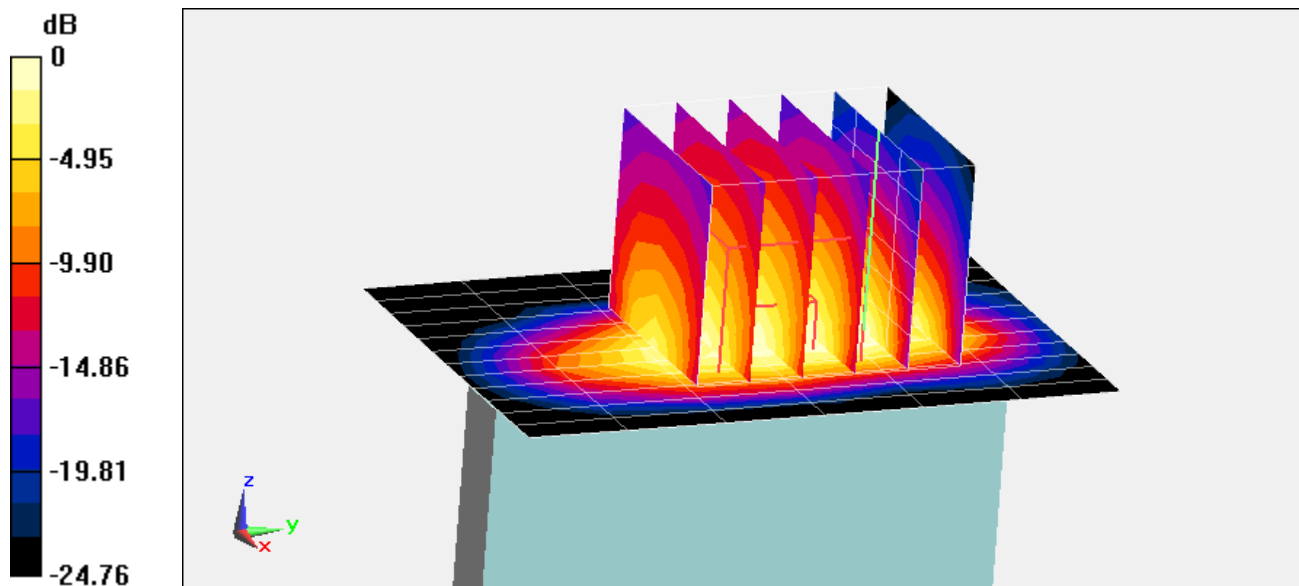
Area Scan (13x7x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 70.68 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 12.8 W/kg

SAR(10 g) = 2.89 W/kg



0 dB = 8.43 W/kg = 9.26 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-09

Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: 2450 Body, Medium parameters used (interpolated):

$f = 2462 \text{ MHz}$; $\sigma = 1.972 \text{ S/m}$; $\epsilon_r = 51.606$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-14-2014; Ambient Temp: 23.1°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3318; ConvF(4.15, 4.15, 4.15); Calibrated: 3/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 6/19/2014

Phantom: Main Twin Sam; Type: QD000P40CC; Serial: TP: 1375

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11b, Hand SAR, Ch 11, 1 Mbps, Back Side,
Antenna 1, Standard Cover**

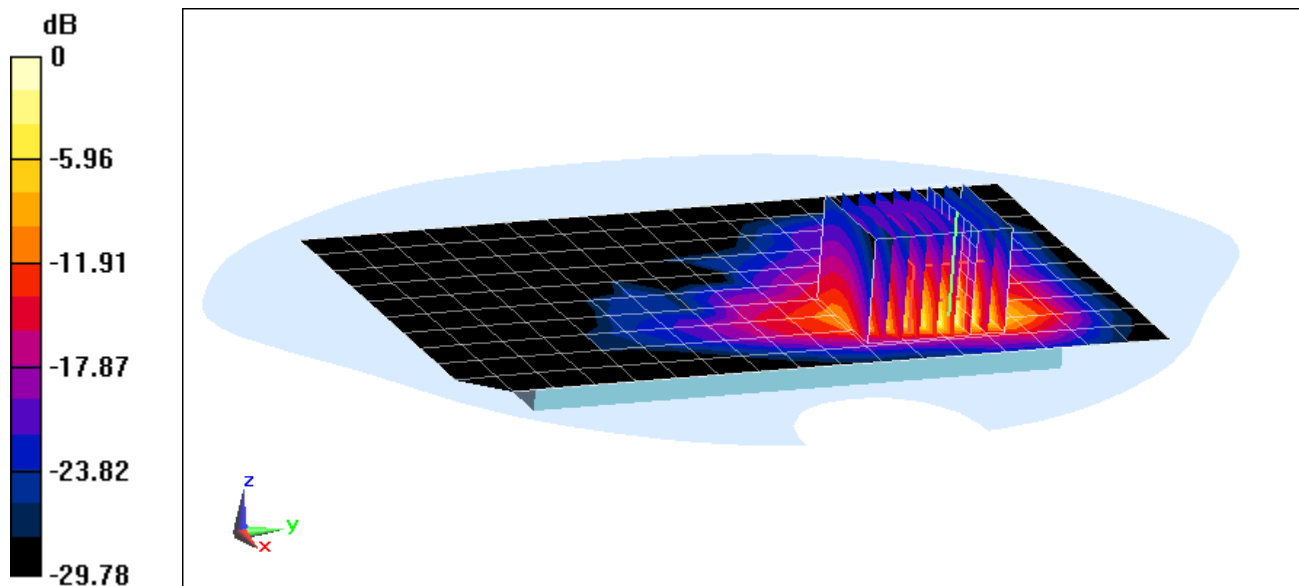
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (8x9x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 30.52 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 11.0 W/kg

SAR(10 g) = 1 W/kg



0 dB = 4.71 W/kg = 6.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-14

Communication System: UID 0, IEEE 802.11n; Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5825 \text{ MHz}$; $\sigma = 6.077 \text{ S/m}$; $\epsilon_r = 46.581$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.97, 3.97, 3.97); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n, 5.8 GHz, Hand SAR, Ch 165, 13 Mbps, Back Side, MIMO, Standard Cover

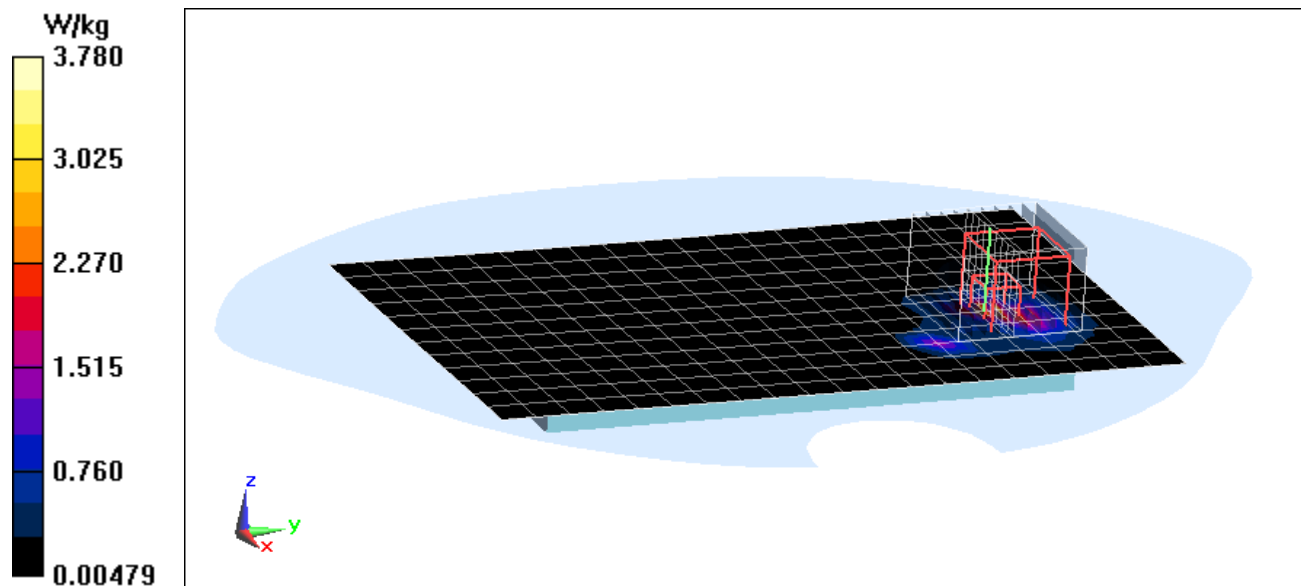
Area Scan (13x21x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (10x10x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 11.97 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 10.8 W/kg

SAR(10 g) = 0.371 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN915V; Type: Portable Handset; Serial: 0809-14

Communication System: UID 0, IEEE 802.11n; Frequency: 5700 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5700 \text{ MHz}$; $\sigma = 5.894 \text{ S/m}$; $\epsilon_r = 46.838$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11n, 5.5 - 5.7 GHz, Hand SAR, Ch 140, 13 Mbps, Back Side, MIMO, Standard Cover

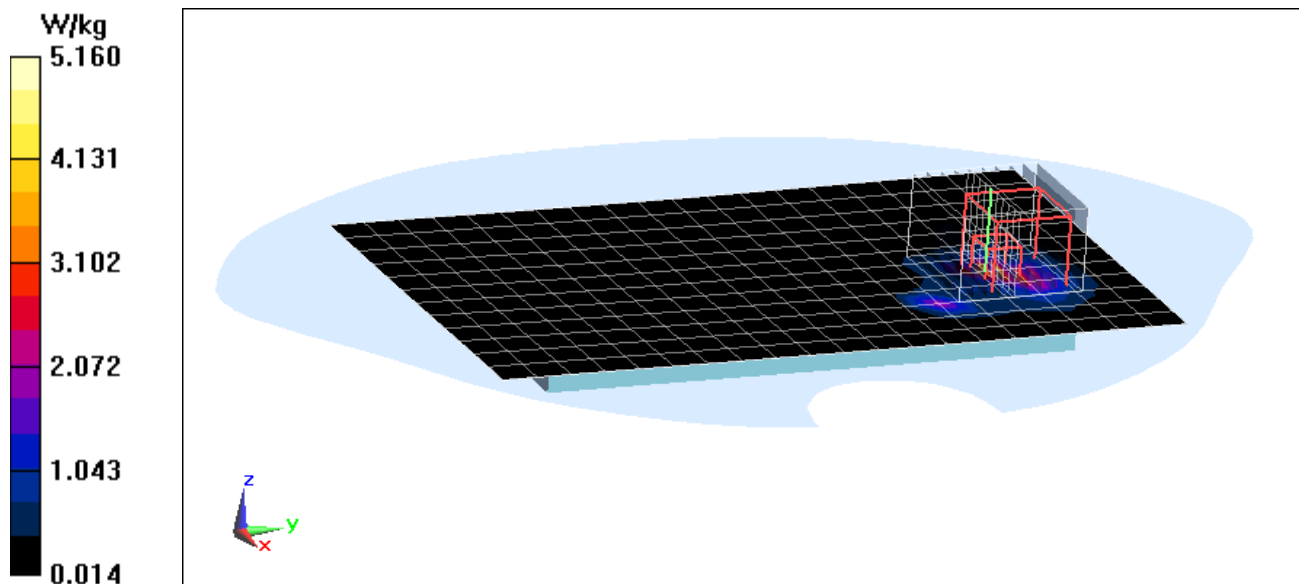
Area Scan (13x21x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (9x10x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 12.78 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 13.7 W/kg

SAR(10 g) = 0.404 W/kg



APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Head, Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.906 \text{ S/m}$; $\epsilon_r = 40.299$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-18-2014; Ambient Temp: 24.3°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3263; ConvF(6.42, 6.42, 6.42); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

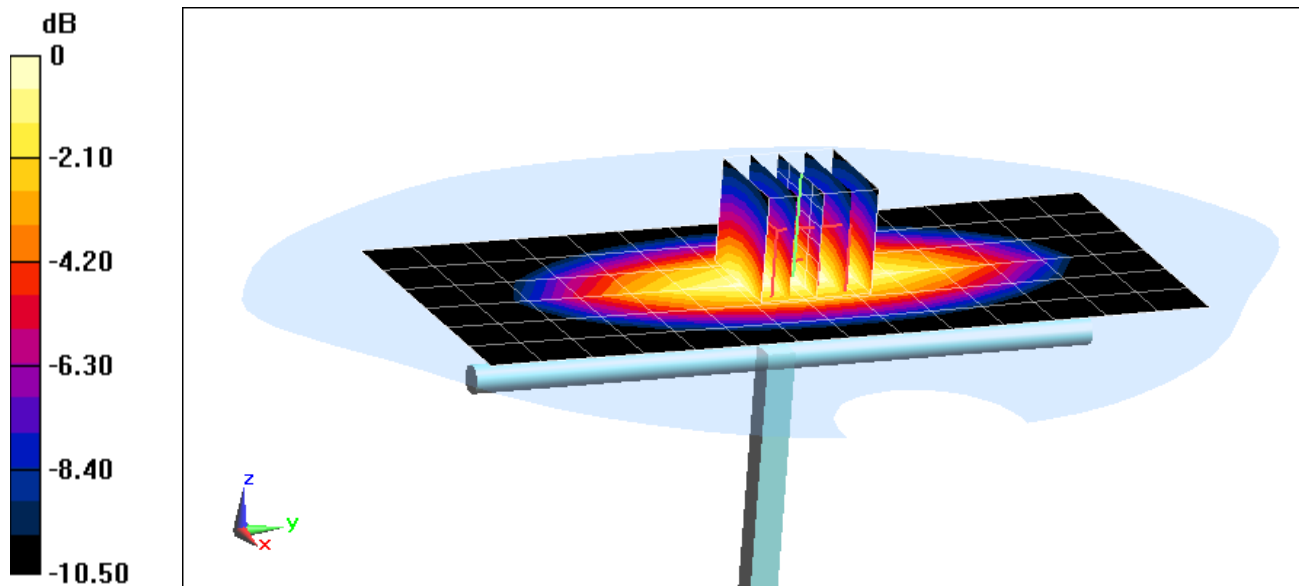
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.860 W/kg

Deviation(1 g) = 2.75%



0 dB = 1.01 W/kg = 0.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head, Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.925 \text{ S/m}$; $\epsilon_r = 41.591$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.23, 6.23, 6.23); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

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

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

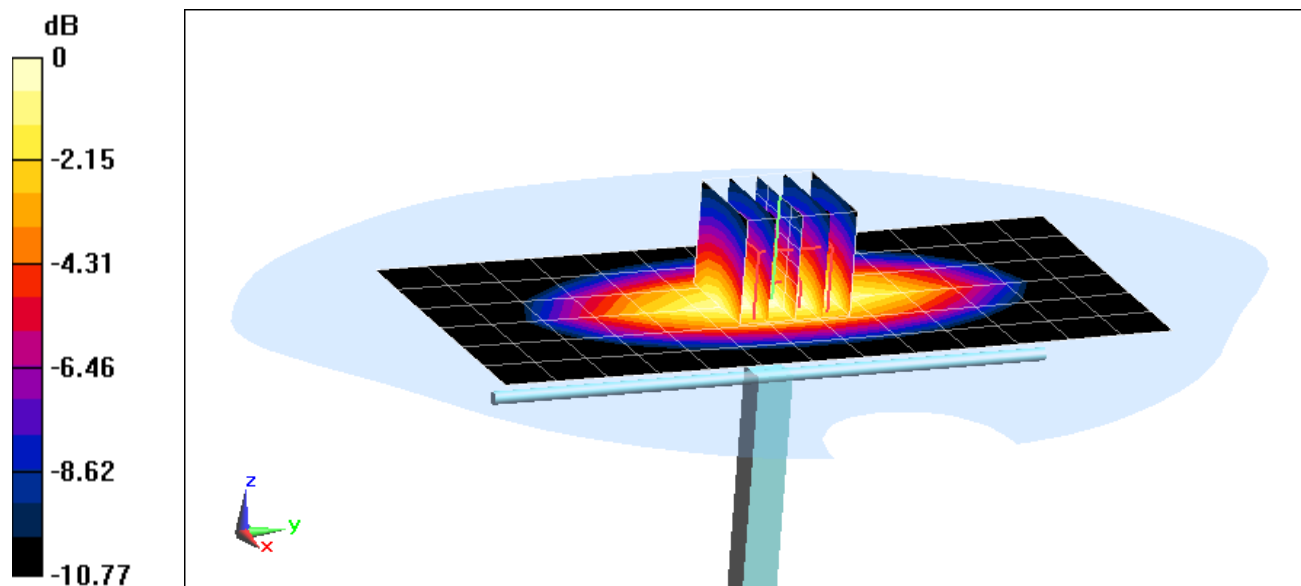
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.961 W/kg

Deviation(1 g) = 4.23%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Head, Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.357 \text{ S/m}$; $\epsilon_r = 39.498$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-17-2014; Ambient Temp: 24.0°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3258; ConvF(5.19, 5.19, 5.19); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

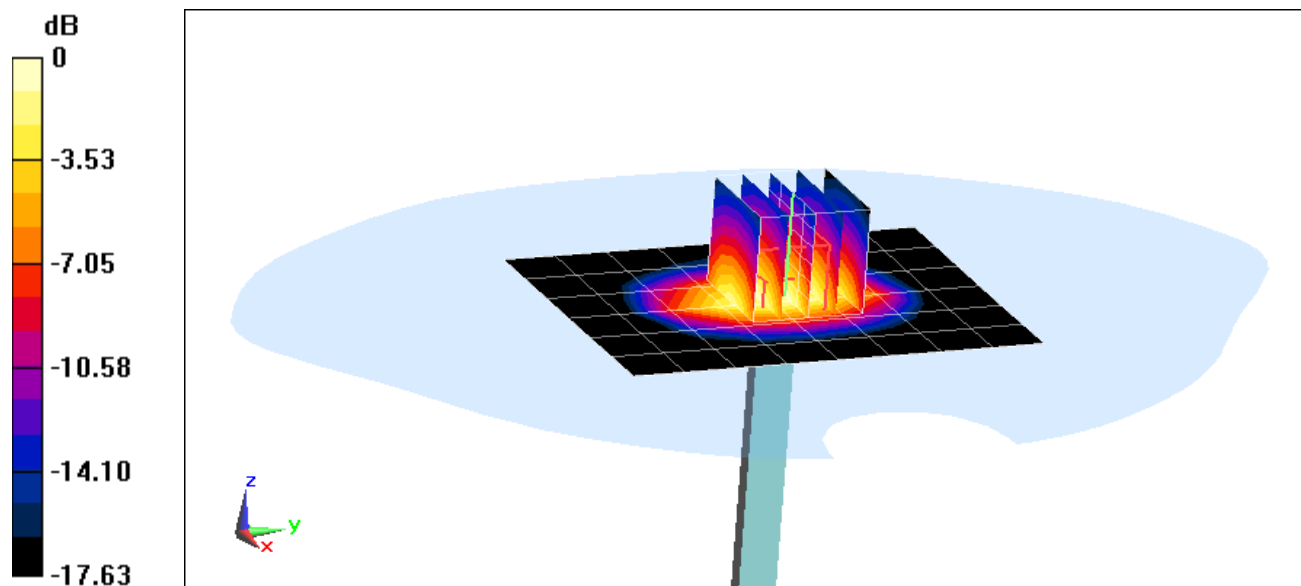
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.27 W/kg

SAR(1 g) = 3.43 W/kg

Deviation (1 g) = -7.05%



0 dB = 4.29 W/kg = 6.32 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head, Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.416 \text{ S/m}$; $\epsilon_r = 39.966$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(5.08, 5.08, 5.08); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1797

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

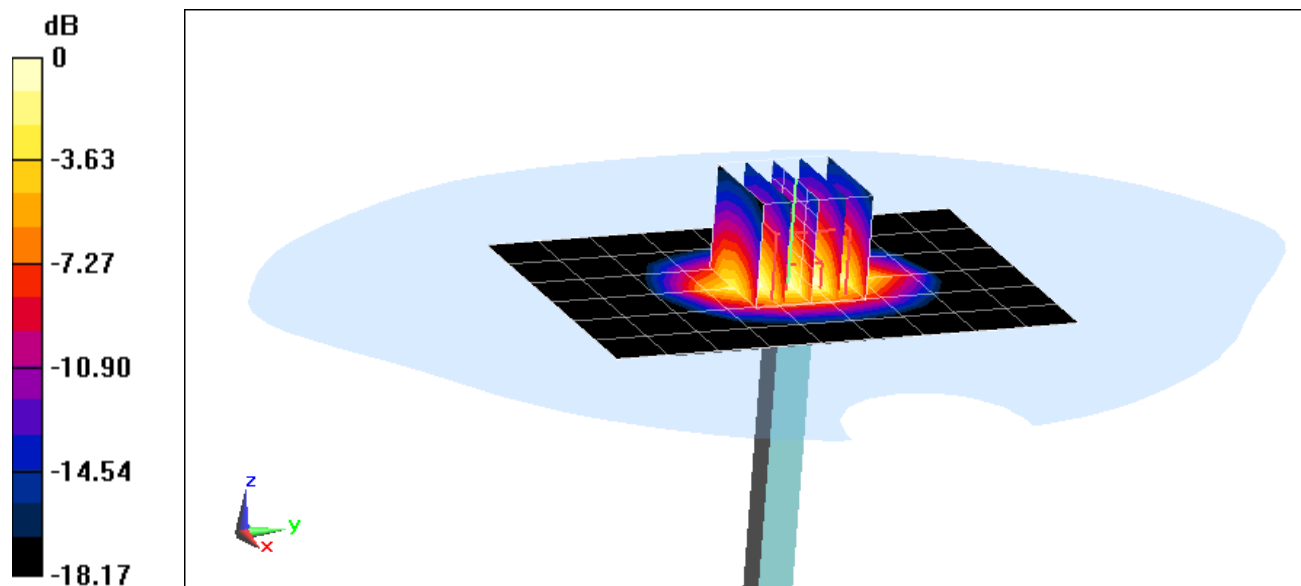
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.40 W/kg

SAR(1 g) = 4.11 W/kg

Deviation(1 g) = 2.49%



0 dB = 5.18 W/kg = 7.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Head, Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.815 \text{ S/m}$; $\epsilon_r = 39.696$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 24.4°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3258; ConvF(4.52, 4.52, 4.52); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

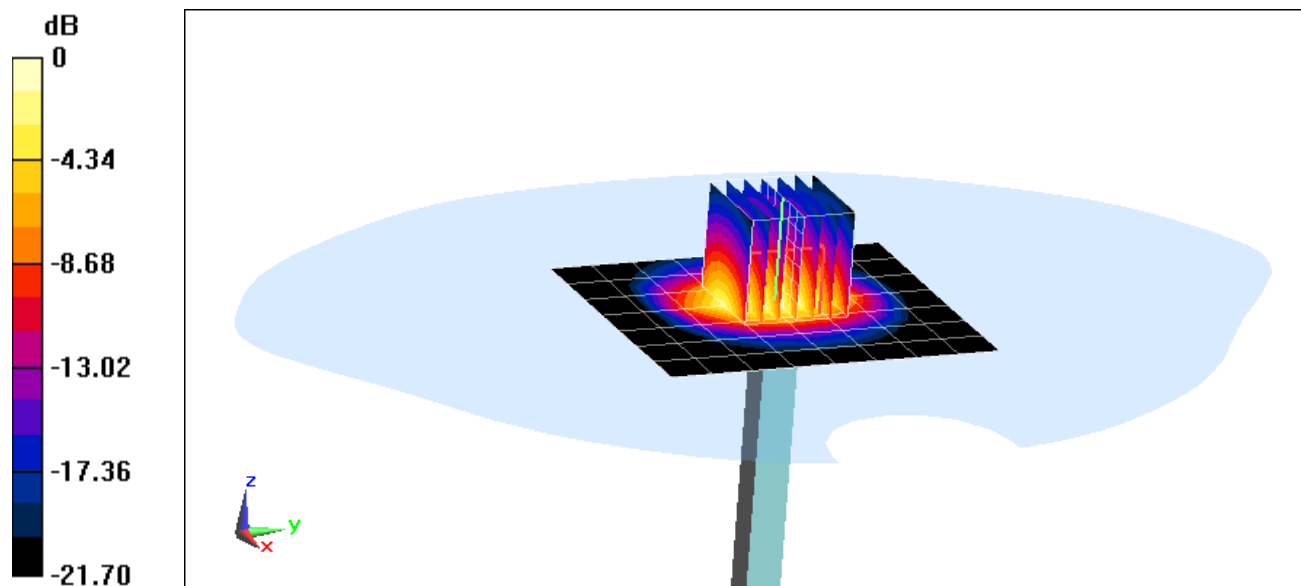
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 10.9 W/kg

SAR(1 g) = 5.36 W/kg

Deviation(1 g) = 3.47%



0 dB = 6.97 W/kg = 8.43 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 4.616 \text{ S/m}$; $\epsilon_r = 35.605$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3914; ConvF(4.99, 4.99, 4.99); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5200 MHz System Verification

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm

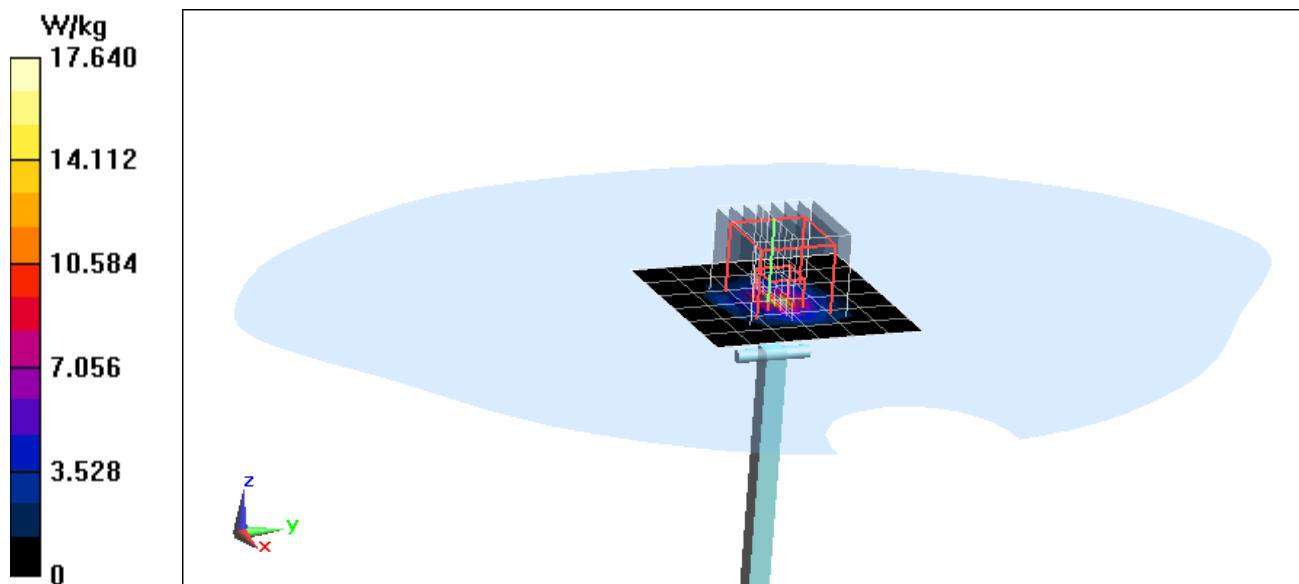
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 32.3 W/kg

SAR(1 g) = 7.64 W/kg

Deviation(1 g) = -2.05%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 4.718 \text{ S/m}$; $\epsilon_r = 35.464$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3914; ConvF(4.82, 4.82, 4.82); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

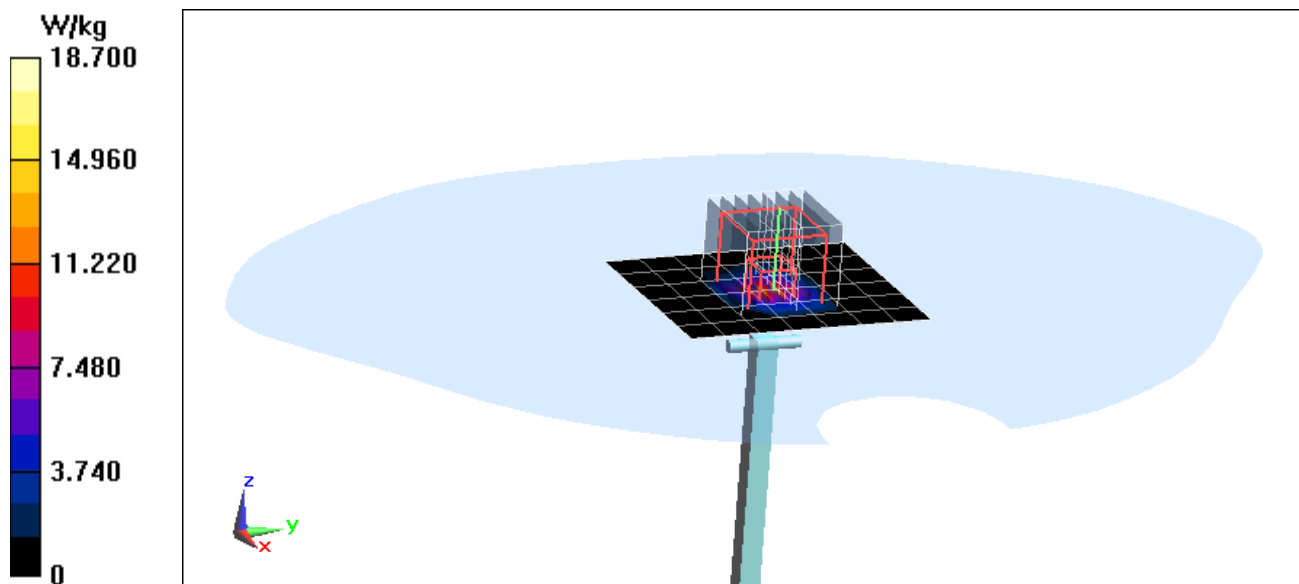
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 34.8 W/kg

SAR(1 g) = 7.98 W/kg

Deviation(1 g) = -3.86%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 4.93 \text{ S/m}$; $\epsilon_r = 35.172$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.8°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3914; ConvF(4.55, 4.55, 4.55); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5500 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

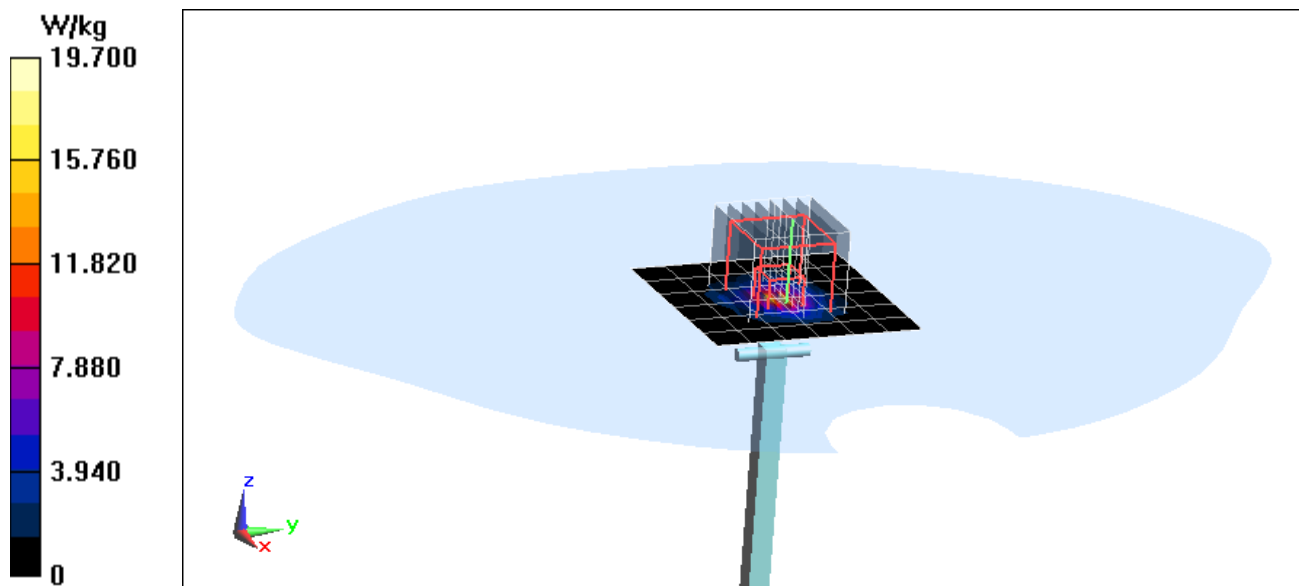
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 36.5 W/kg

SAR(1 g) = 8.11 W/kg

Deviation(1 g) = -3.80%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 5.028 \text{ S/m}$; $\epsilon_r = 35.015$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.8°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN3914; ConvF(4.37, 4.37, 4.37); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

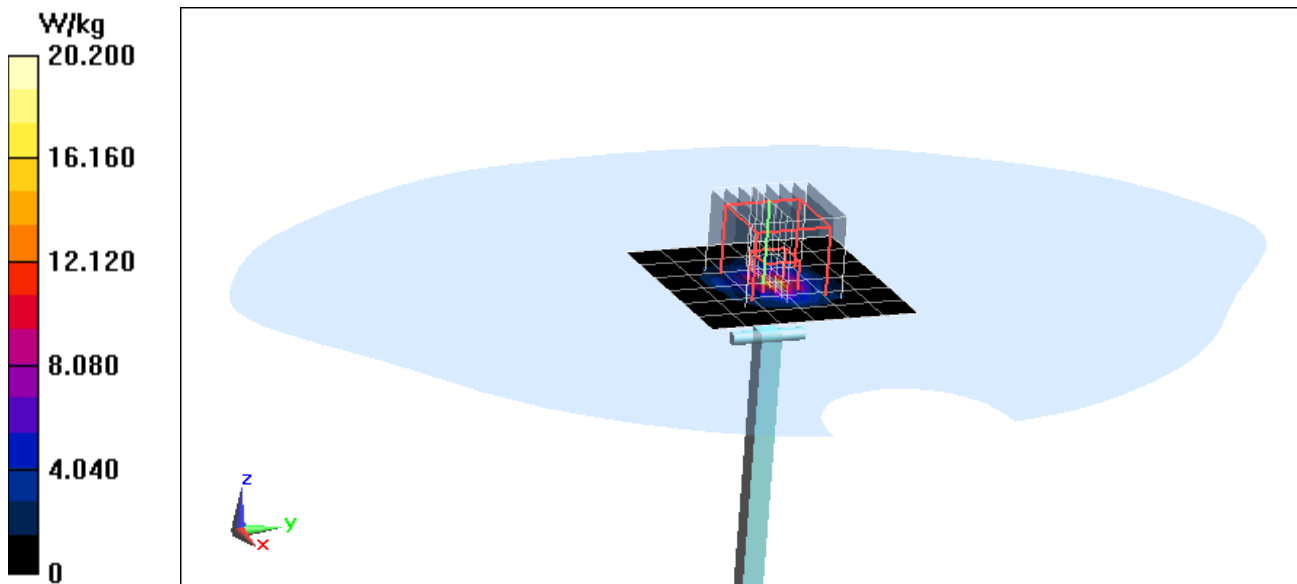
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 37.6 W/kg

SAR(1 g) = 8.32 W/kg

Deviation(1 g) = -0.36%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head, Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.218 \text{ S/m}$; $\epsilon_r = 34.764$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 22.8°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN3914; ConvF(4.52, 4.52, 4.52); Calibrated: 10/23/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/19/2013

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

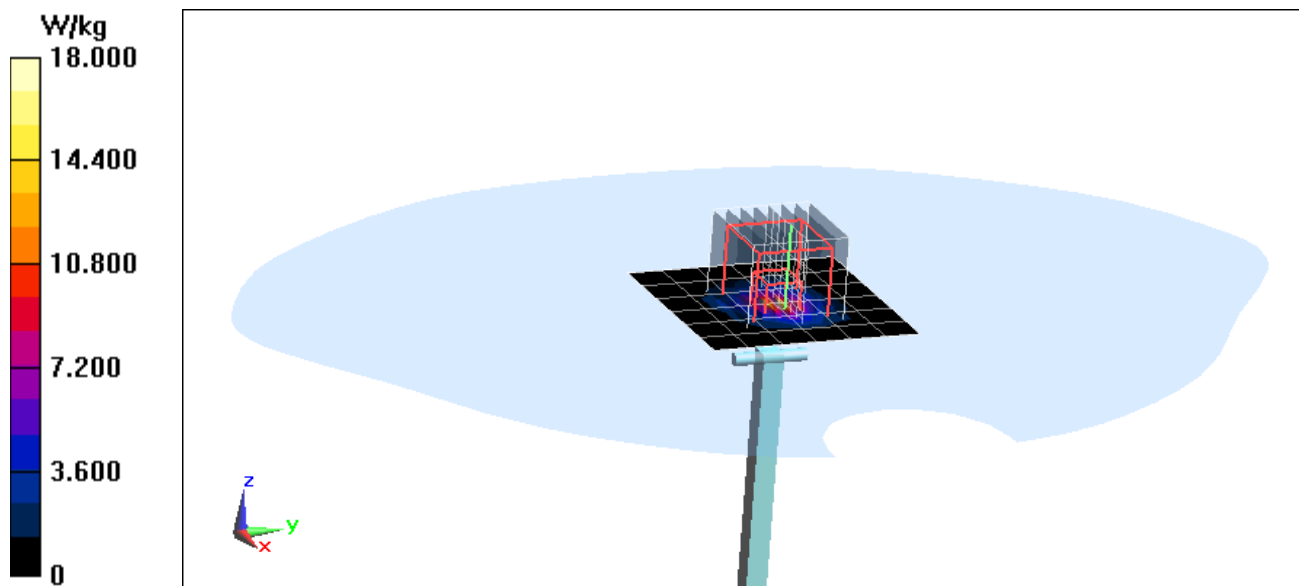
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 34.9 W/kg

SAR(1 g) = 7.35 W/kg

Deviation(1 g) = -7.31%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.971 \text{ S/m}$; $\epsilon_r = 53.767$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-17-2014; Ambient Temp: 23.9°C; Tissue Temp: 22.4°C

Probe: ES3DV3 - SN3209; ConvF(6.16, 6.16, 6.16); Calibrated: 3/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM front; Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

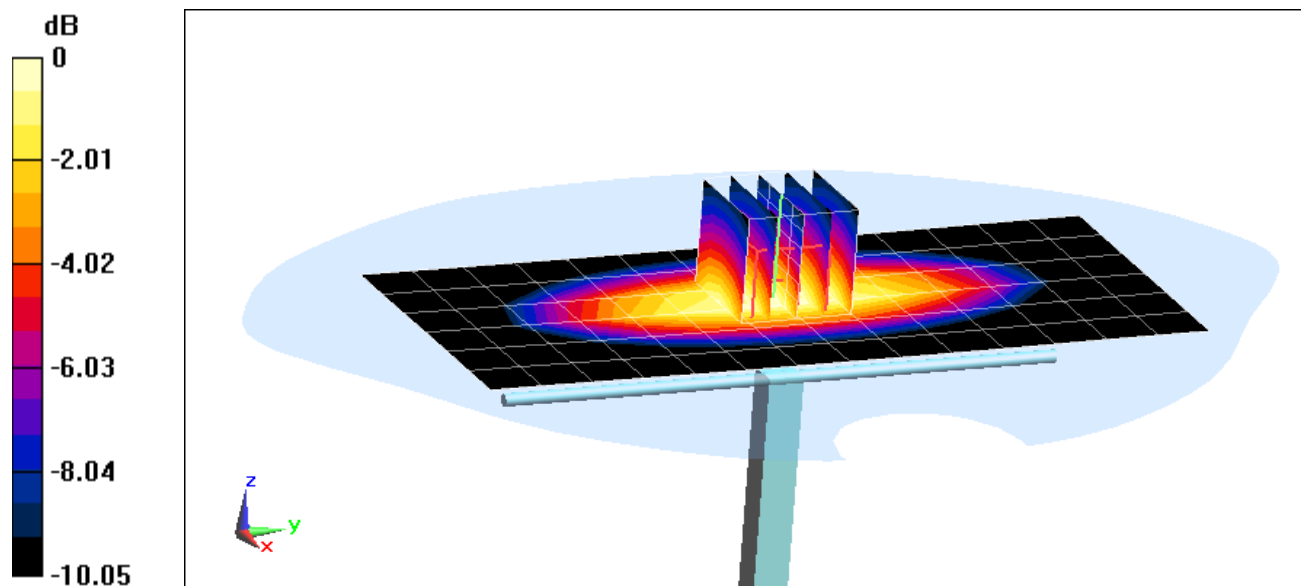
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.920 W/kg

Deviation(1 g) = 4.90%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body, Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.977 \text{ S/m}$; $\epsilon_r = 55.692$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-16-2014; Ambient Temp: 22.9°C; Tissue Temp: 22.7°C

Probe: ES3DV2 - SN3022; ConvF(6.02, 6.02, 6.02); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

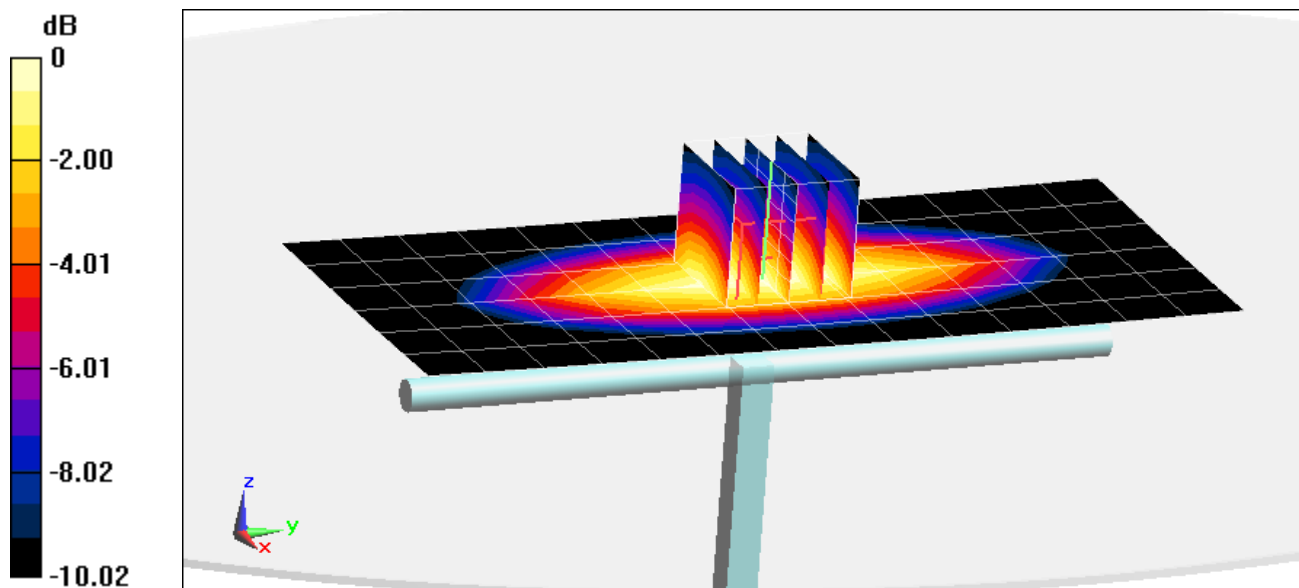
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.34 W/kg

SAR(10 g) = 0.613 W/kg

Deviation = 6.06%



0 dB = 1.07 W/kg = 0.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 1.007 \text{ S/m}$; $\epsilon_r = 53.246$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-15-2014; Ambient Temp: 22.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3263; ConvF(6.16, 6.16, 6.16); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

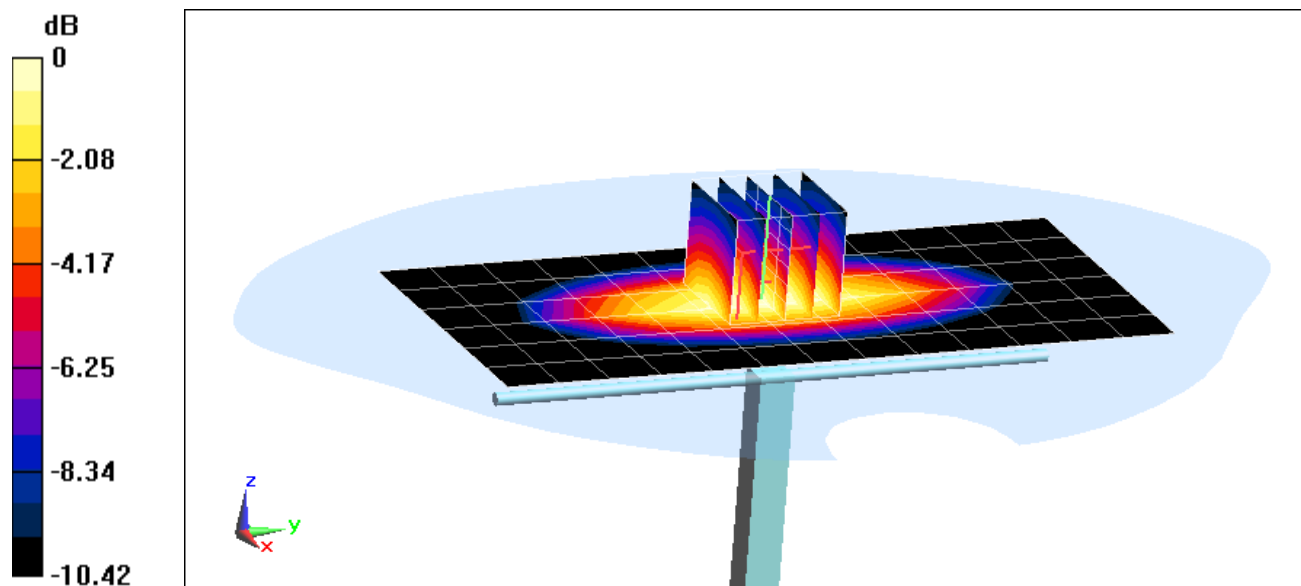
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.42 W/kg

SAR(1 g) = 0.960 W/kg

Deviation(1 g) = 2.78%



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

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.999 \text{ S/m}$; $\epsilon_r = 53.775$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-13-2014; Ambient Temp: 23.2°C; Tissue Temp: 21.7°C

Probe: ES3DV2 - SN3022; ConvF(5.98, 5.98, 5.98); Calibrated: 8/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/12/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1226

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

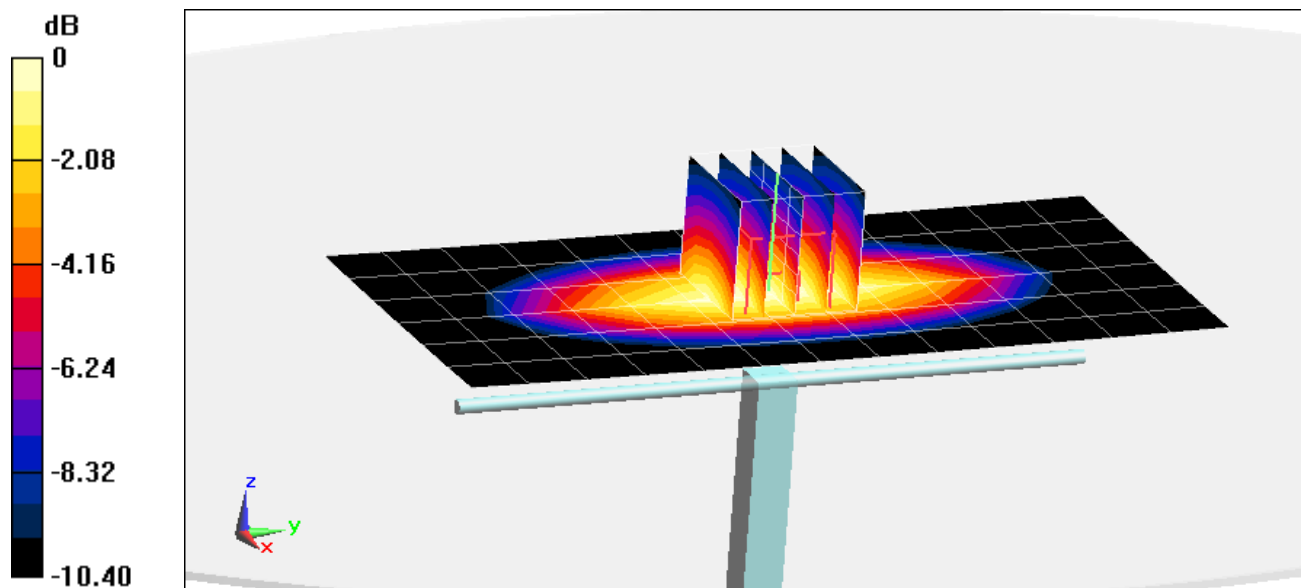
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 1 W/kg; SAR(10 g) = 0.661 W/kg

Deviation(1 g) = 7.07%; Deviation(10 g) = 7.48%



0 dB = 1.17 W/kg = 0.68 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body, Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.952 \text{ S/m}$; $\epsilon_r = 54.062$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-15-2014; Ambient Temp: 21.4°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3213; ConvF(6.18, 6.18, 6.18); Calibrated: 4/11/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 11/18/2013

Phantom: Sub TWIN SAM; Type: QD000P40CC; Serial: TP-1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

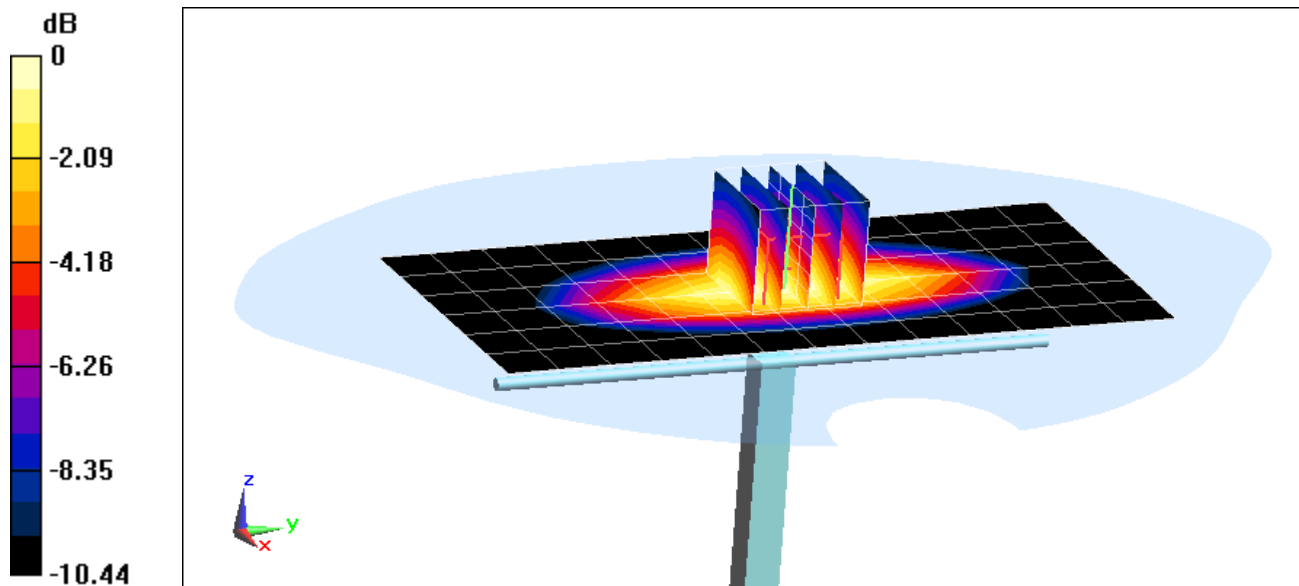
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.36 W/kg

SAR(10 g) = 0.606 W/kg

Deviation = -3.81%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.481 \text{ S/m}$; $\epsilon_r = 51.764$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-01-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3258; ConvF(4.83, 4.83, 4.83); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: Eli v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

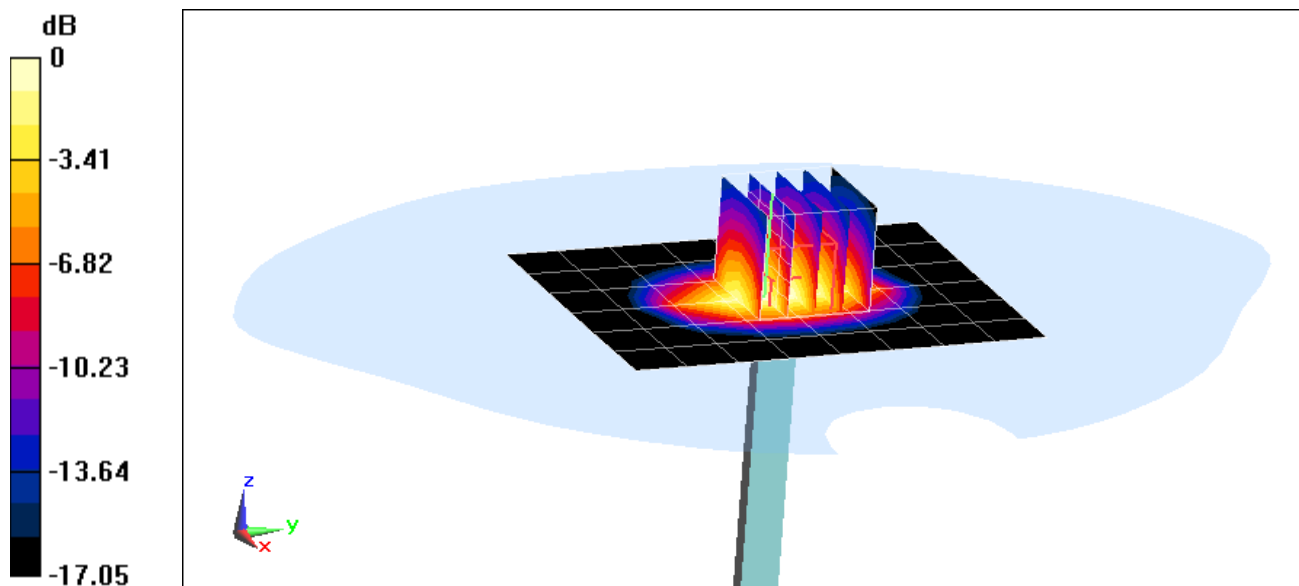
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.05 W/kg

SAR(1 g) = 3.55 W/kg

Deviation(1 g) = -5.59%



0 dB = 4.53 W/kg = 6.56 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body, Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.473 \text{ S/m}$; $\epsilon_r = 51.282$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-15-2014; Ambient Temp: 24.4°C; Tissue Temp: 22.6°C

Probe: ES3DV3 - SN3258; ConvF(4.83, 4.83, 4.83); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

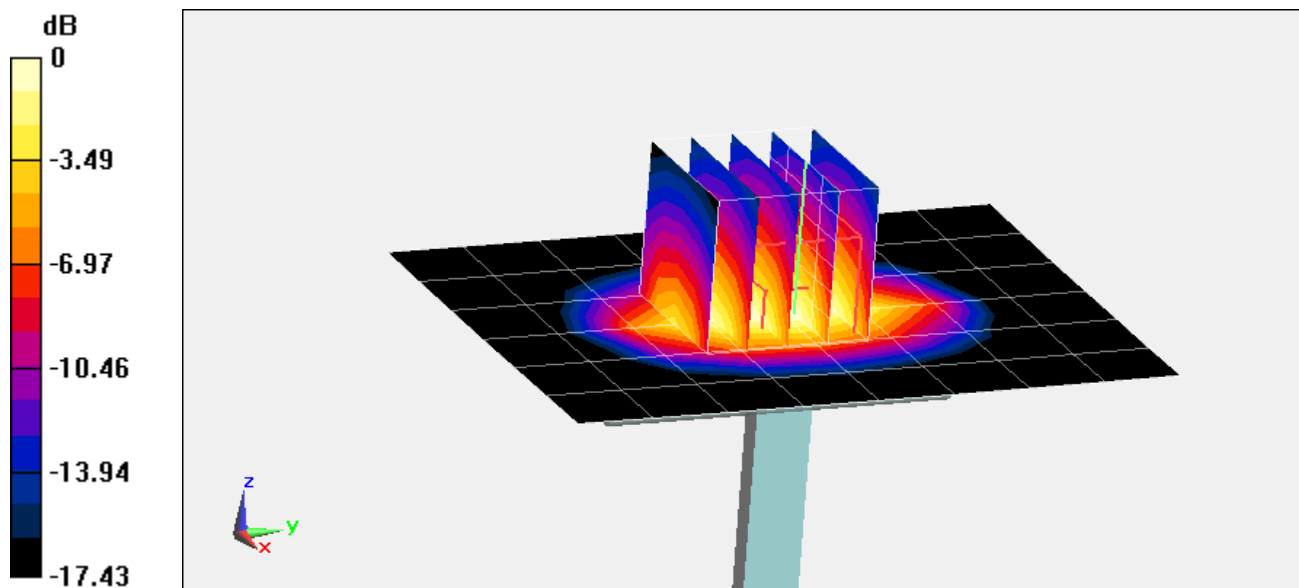
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.02 W/kg

SAR(10 g) = 1.88 W/kg

Deviation = -6.47%



0 dB = 4.35 W/kg = 6.38 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.548 \text{ S/m}$; $\epsilon_r = 51.345$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-15-2014; Ambient Temp: 23.4°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3287; ConvF(4.67, 4.67, 4.67); Calibrated: 11/20/2013;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1408; Calibrated: 11/19/2013

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

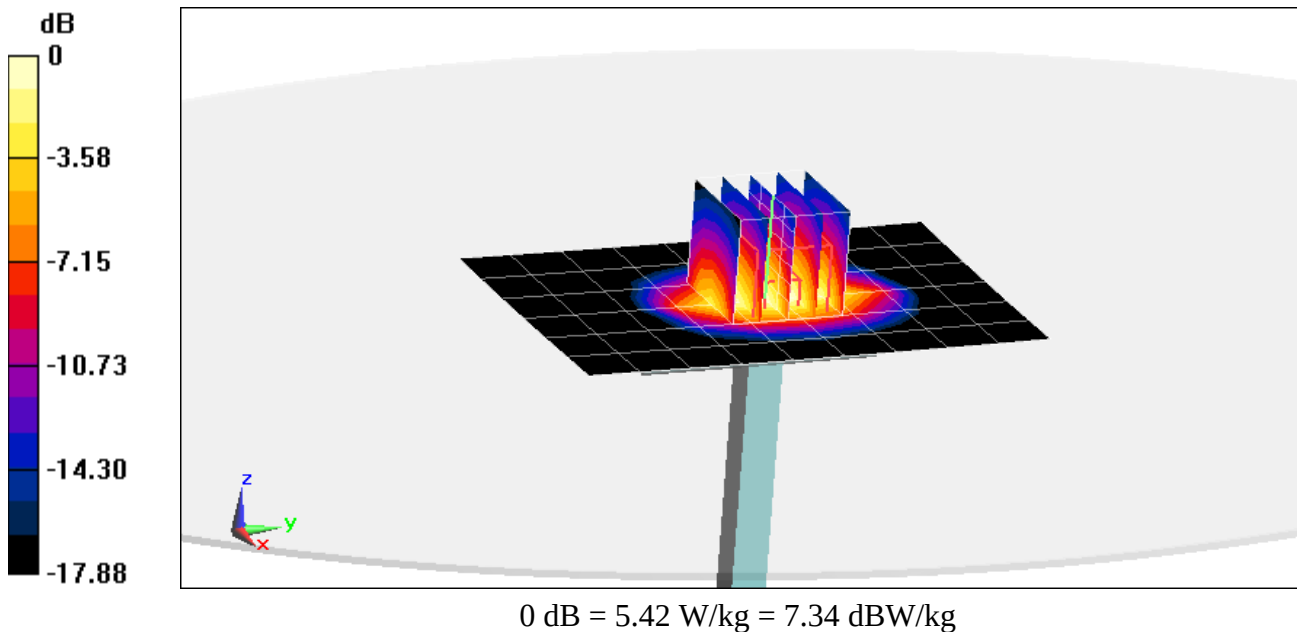
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.75 W/kg

SAR(1 g) = 4.32 W/kg

Deviation(1 g) = 6.40%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body, Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.583 \text{ S/m}$; $\epsilon_r = 52.453$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-14-2014; Ambient Temp: 24.9°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3263; ConvF(4.78, 4.78, 4.78); Calibrated: 5/15/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 5/14/2014

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

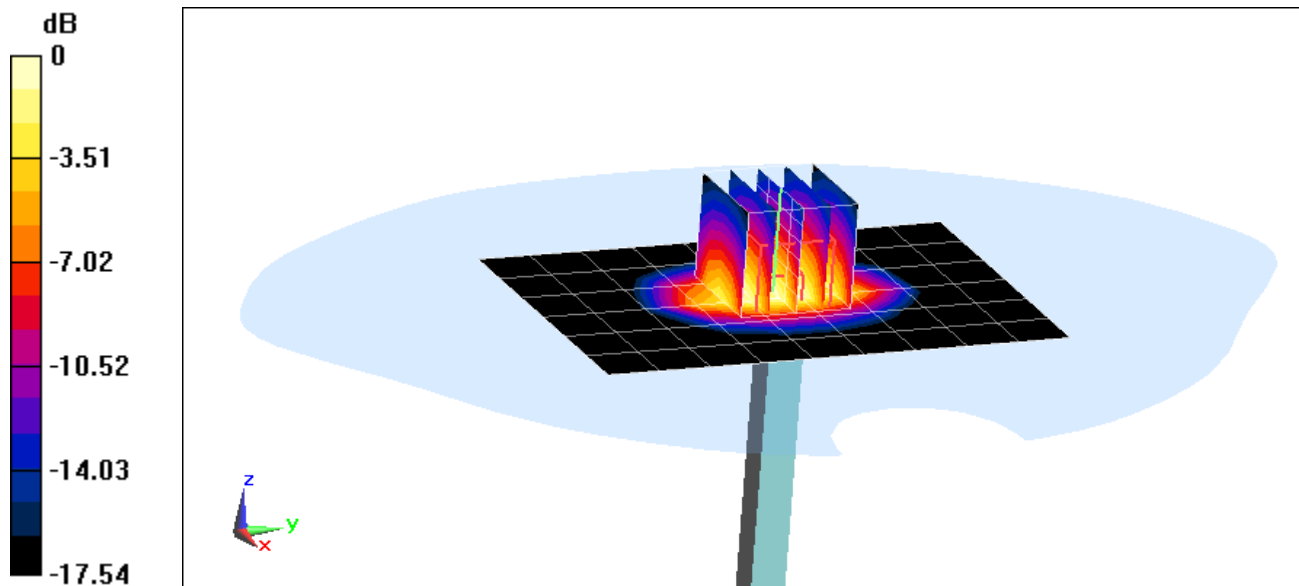
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.58 W/kg

SAR(10 g) = 2.2 W/kg

Deviation = 1.85%



0 dB = 5.37 W/kg = 7.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body, Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.966 \text{ S/m}$; $\epsilon_r = 50.772$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 22.2°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3258; ConvF(4.14, 4.14, 4.14); Calibrated: 2/25/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn665; Calibrated: 2/26/2014

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

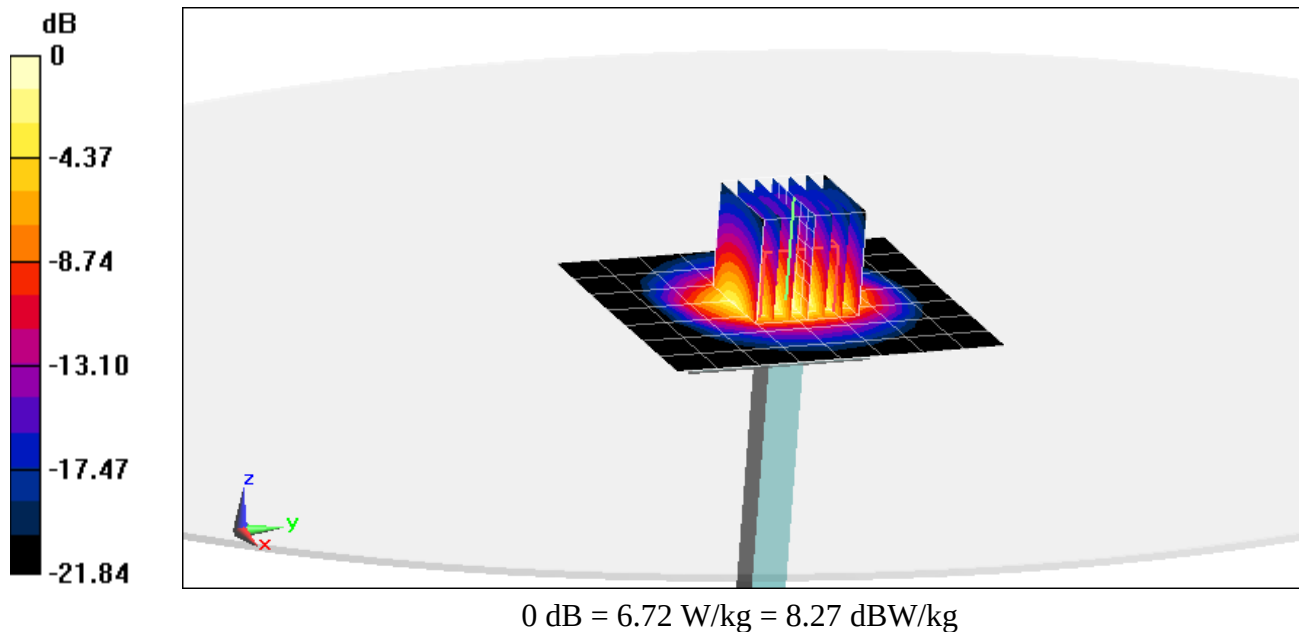
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 10.8 W/kg

SAR(1 g) = 5.13 W/kg

Deviation(1 g) = 3.85%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body, Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.956 \text{ S/m}$; $\epsilon_r = 51.649$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-14-2014; Ambient Temp: 23.1°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3318; ConvF(4.15, 4.15, 4.15); Calibrated: 3/19/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 6/19/2014

Phantom: Main Twin Sam; Type: QD000P40CC; Serial: TP: 1375

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

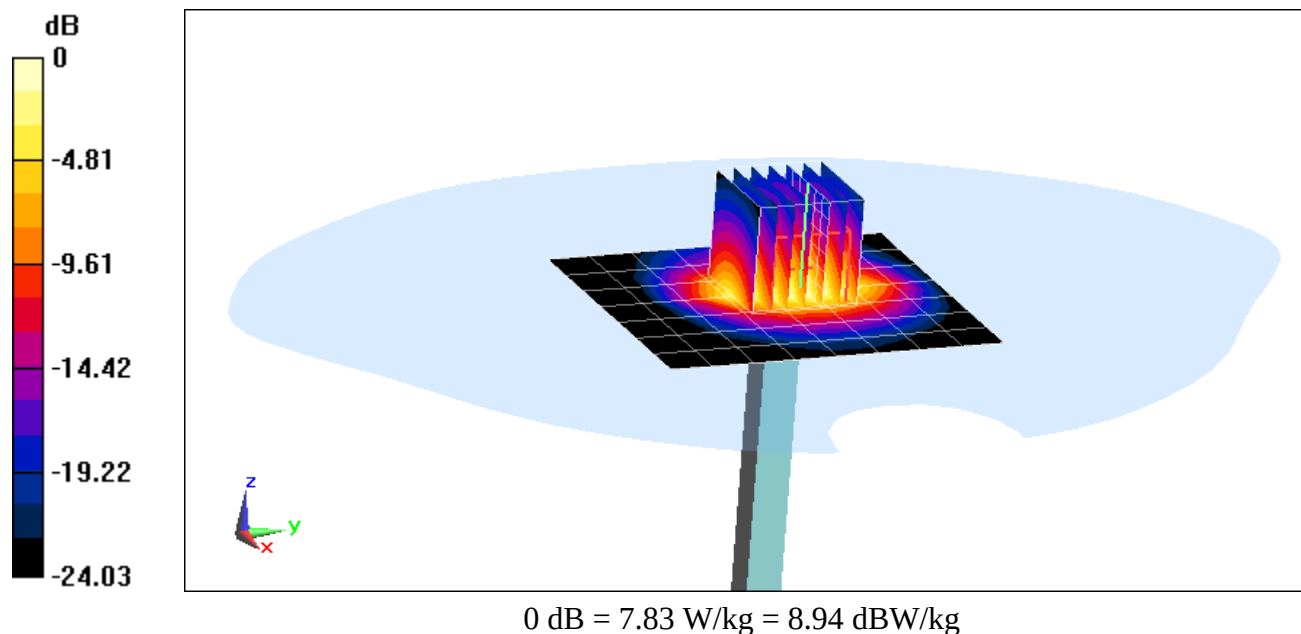
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 12.1 W/kg

SAR(10 g) = 2.2 W/kg

Deviation = -4.76%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 5.137 \text{ S/m}$; $\epsilon_r = 48.028$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.2°C

Probe: EX3DV4 - SN3589; ConvF(4.19, 4.19, 4.19); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5200 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm

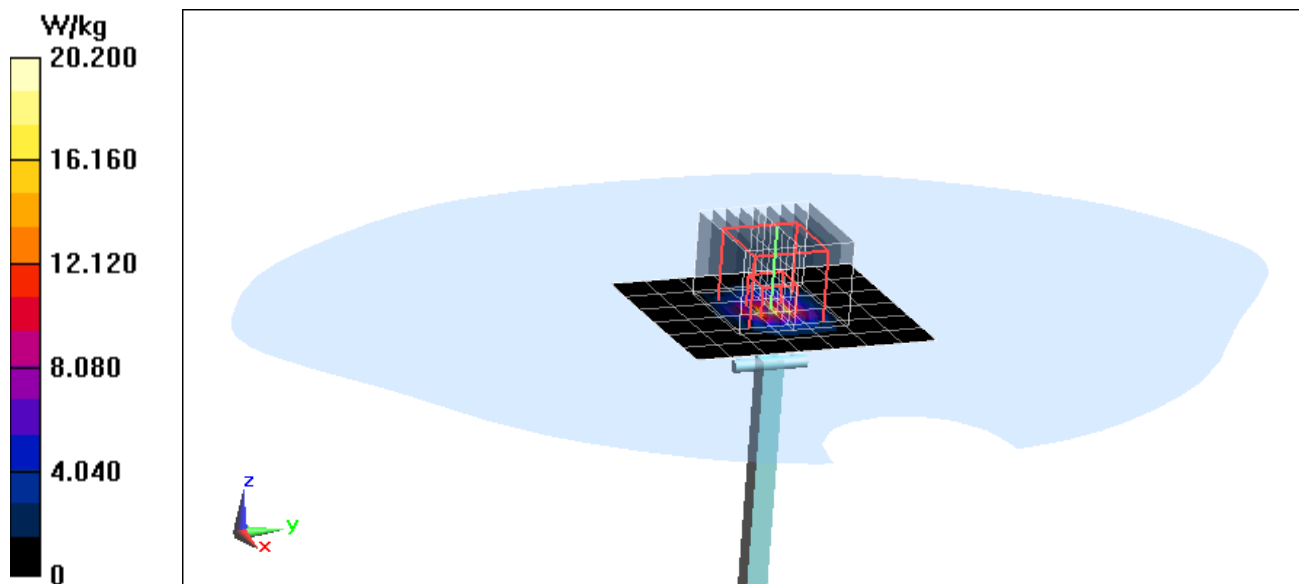
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 33.6 W/kg

SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.24 W/kg

Deviation(1 g) = 5.71%; Deviation(10 g) = 6.67%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 5.288 \text{ S/m}$; $\epsilon_r = 47.796$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.2°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.98, 3.98, 3.98); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm

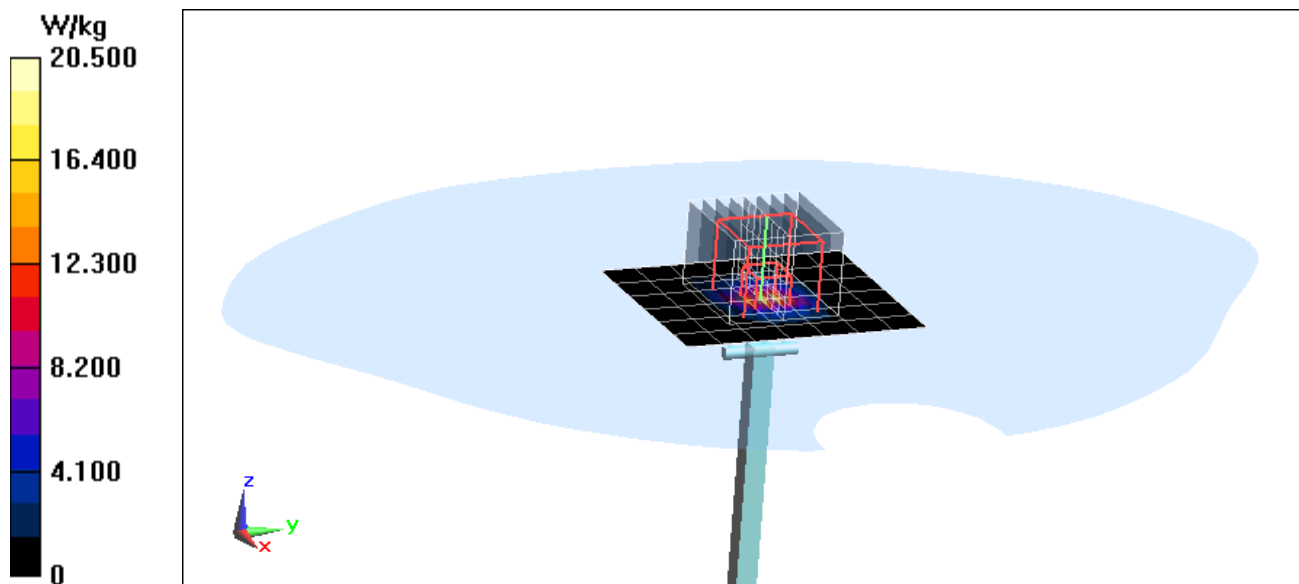
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 35.8 W/kg

SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.27 W/kg

Deviation(1 g) = 5.04%; Deviation(10 g) = 5.58%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.585 \text{ S/m}$; $\epsilon_r = 47.304$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.2°C; Tissue Temp: 23.4°C

Probe: EX3DV4 - SN3589; ConvF(3.76, 3.76, 3.76); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5500 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm

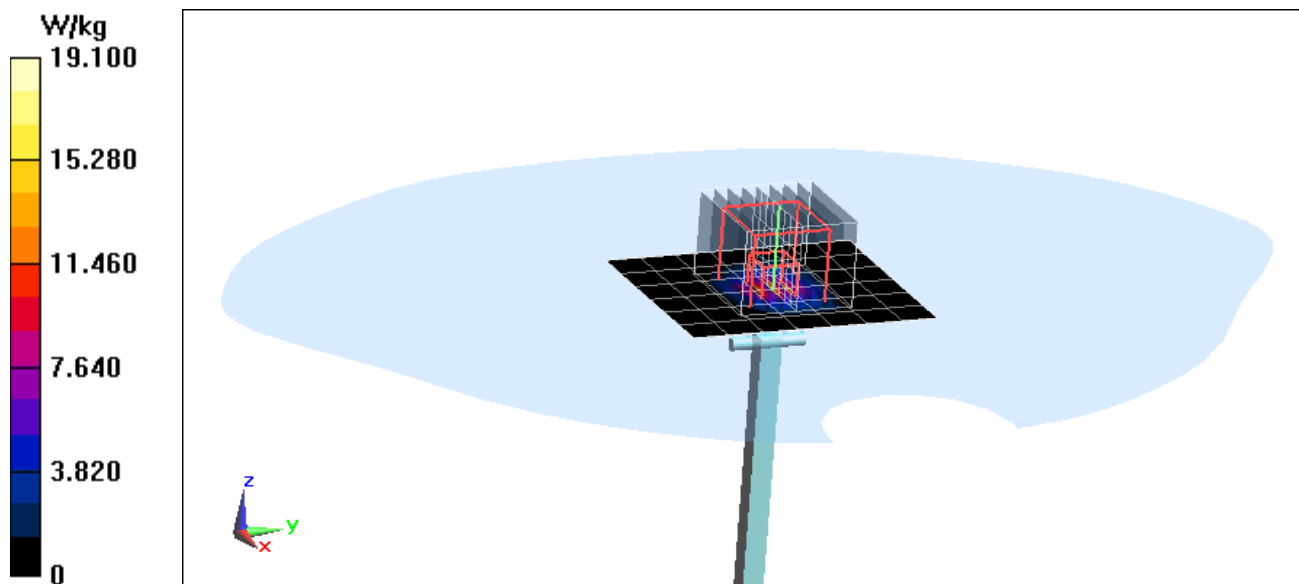
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 33.2 W/kg

SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.06 W/kg

Deviation(1 g) = -6.57%; Deviation(10 g) = -6.36%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 5.743 \text{ S/m}$; $\epsilon_r = 47.072$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x8x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

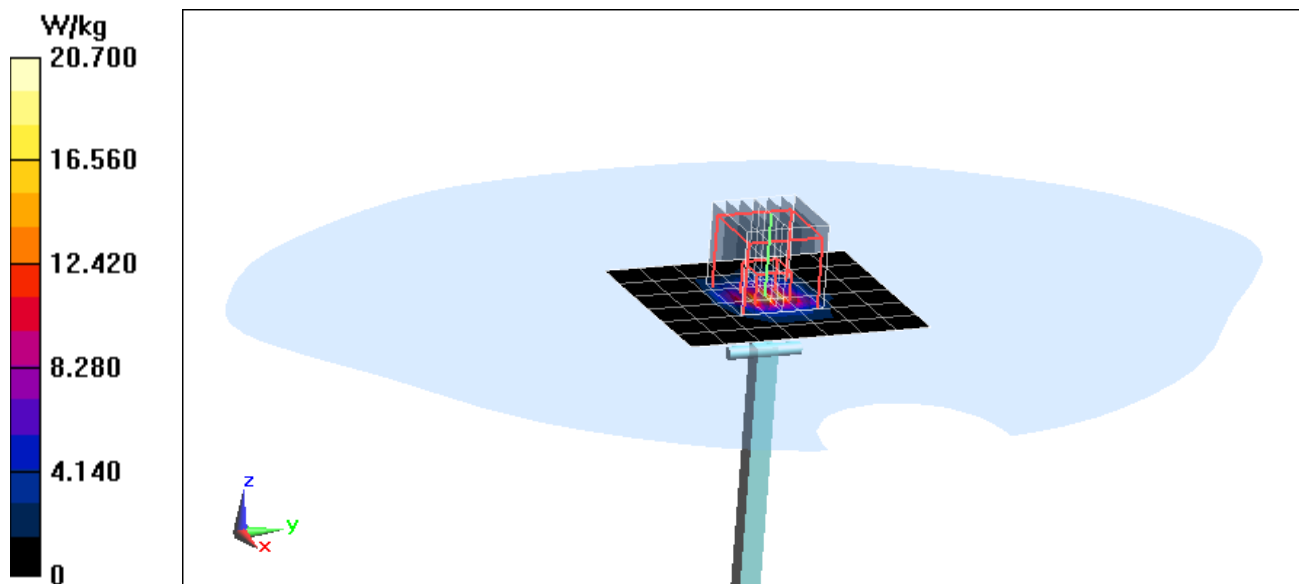
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 38.8 W/kg

SAR(1 g) = 7.71 W/kg; SAR(10 g) = 2.14 W/kg

Deviation(1 g) = -3.87%; Deviation(10 g) = -3.60%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body, Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 6.026 \text{ S/m}$; $\epsilon_r = 46.631$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-09-2014; Ambient Temp: 24.1°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN3589; ConvF(3.97, 3.97, 3.97); Calibrated: 1/29/2014;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/17/2014

Phantom: SAM Right; Type: SAM; Serial: 1757

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x8x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

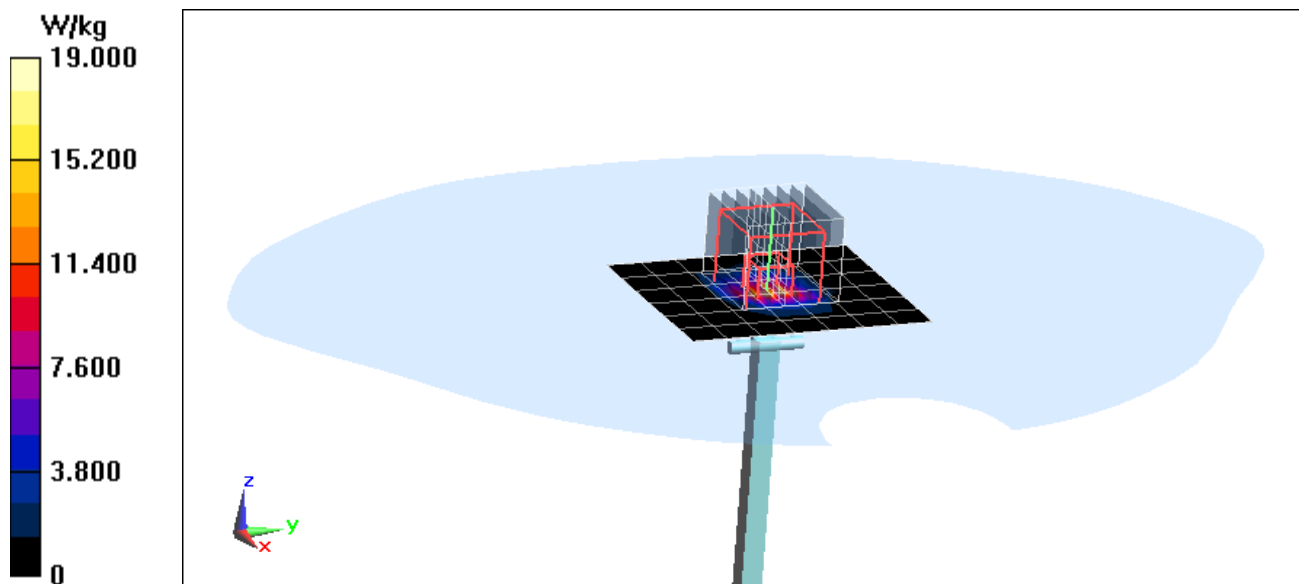
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 34.5 W/kg

SAR(1 g) = 7.11 W/kg; SAR(10 g) = 1.96 W/kg

Deviation(1 g) = -4.31%; Deviation(10 g) = -3.92%



APPENDIX C: PROBE CALIBRATION



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D750V3-1003_Jan14**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1003**

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

Calibration date: **January 20, 2014**

CC
21/14 ✓

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 $(22 \pm 3)^{\circ}\text{C}$ 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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
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	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Calibrated by: **Israe El-Naouq** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Israe El-Naouq
Katja Pokovic

Issued: January 21, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

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:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- 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	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.8 $\pm$ 6 %	0.92 mho/m $\pm$ 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	2.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.37 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.46 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.0 $\pm$ 6 %	0.98 mho/m $\pm$ 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	2.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.77 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.78 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.7 Ω - 0.2 j Ω
Return Loss	- 27.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.5 Ω - 2.6 j Ω
Return Loss	- 31.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.043 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	January 21, 2009

DASY5 Validation Report for Head TSL

Date: 20.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1003

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750$ MHz; $\sigma = 0.92$ S/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.37, 6.37, 6.37); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

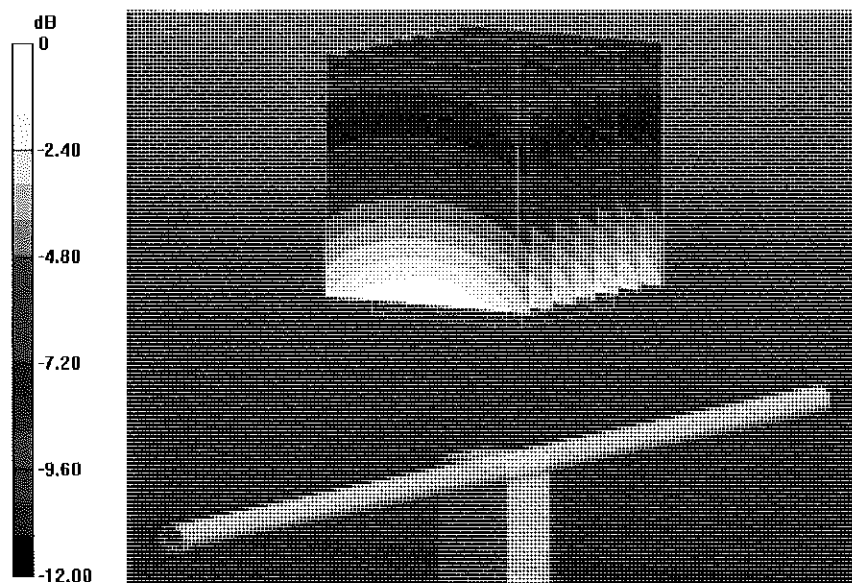
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.711 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.27 W/kg

SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.4 W/kg

Maximum value of SAR (measured) = 2.51 W/kg

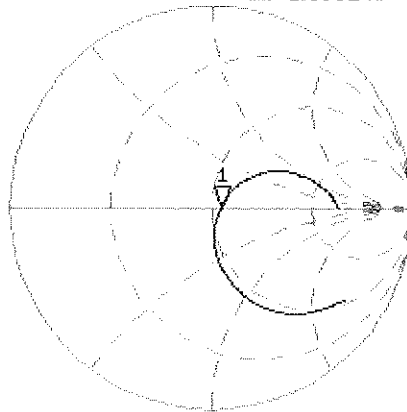


0 dB = 2.51 W/kg = 4.00 dBW/kg

Impedance Measurement Plot for Head TSL

20 Jan 2014 16:36:06
 CH1 S11 1 U FS 1: 54.678 Ω -156.25 m Ω 1.3581 nF 750.000 000 MHz

*
 Del
 CA



Avg
 16

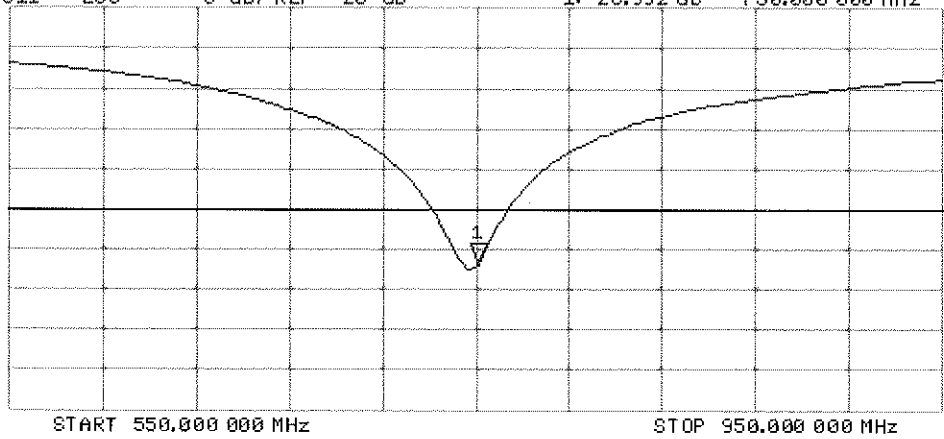
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1: -26.992 dB 750.000 000 MHz

CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 20.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1003

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.98 \text{ S/m}$; $\epsilon_r = 54$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.13, 6.13, 6.13); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

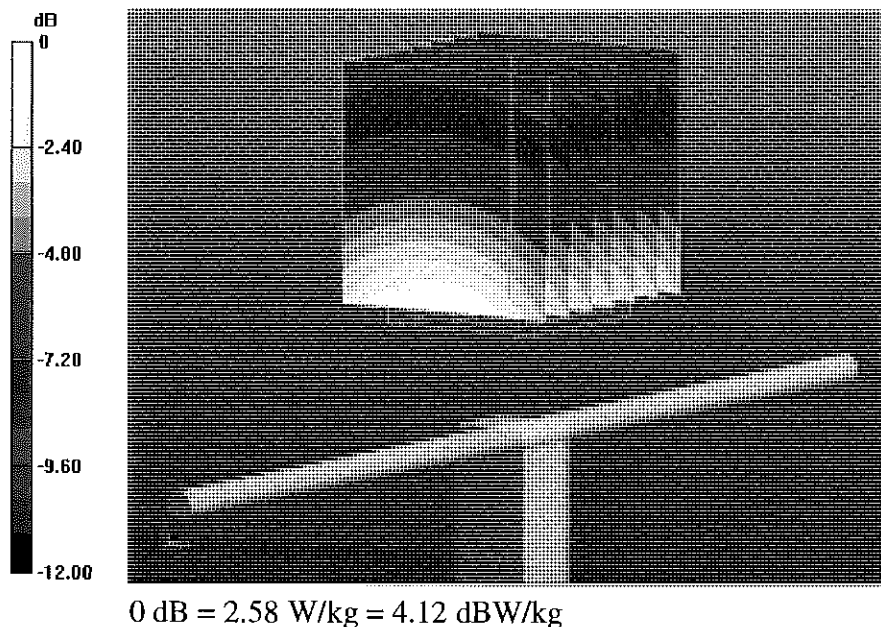
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 53.082 V/m; Power Drift = 0.03 dB

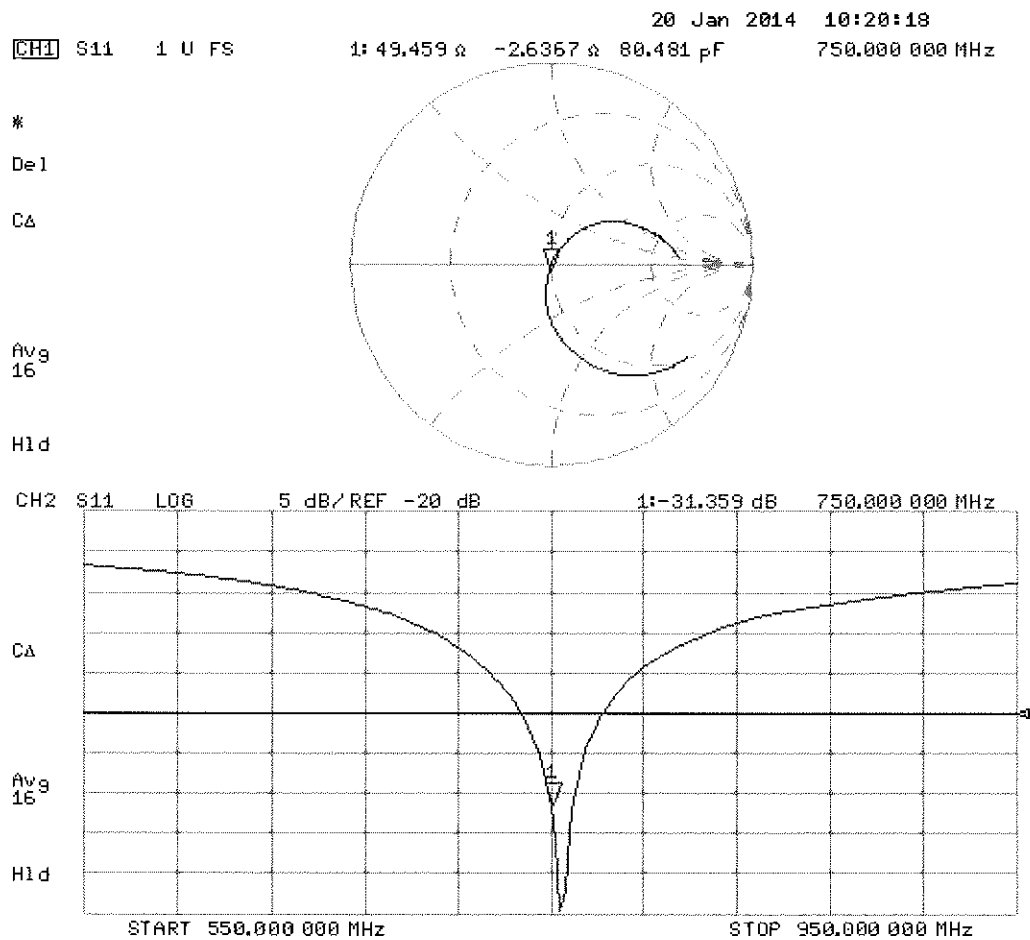
Peak SAR (extrapolated) = 3.31 W/kg

SAR(1 g) = 2.24 W/kg; SAR(10 g) = 1.47 W/kg

Maximum value of SAR (measured) = 2.58 W/kg



Impedance Measurement Plot for Body TSL





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D835V2-4d119_Apr14**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d119**

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

CCV
4/25/14

Calibration date: **April 07, 2014**

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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: April 9, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

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	V52.8.7
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 $\pm$ 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 $\pm$ 0.2) °C	41.6 $\pm$ 6 %	0.94 mho/m $\pm$ 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	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.22 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.97 W/kg $\pm$ 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 $\pm$ 0.2) °C	53.6 $\pm$ 6 %	1.02 mho/m $\pm$ 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	2.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.34 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.15 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.2 Ω - 1.6 j Ω
Return Loss	- 34.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 4.5 j Ω
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 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: 07.04.2014

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; $\sigma = 0.94$ S/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

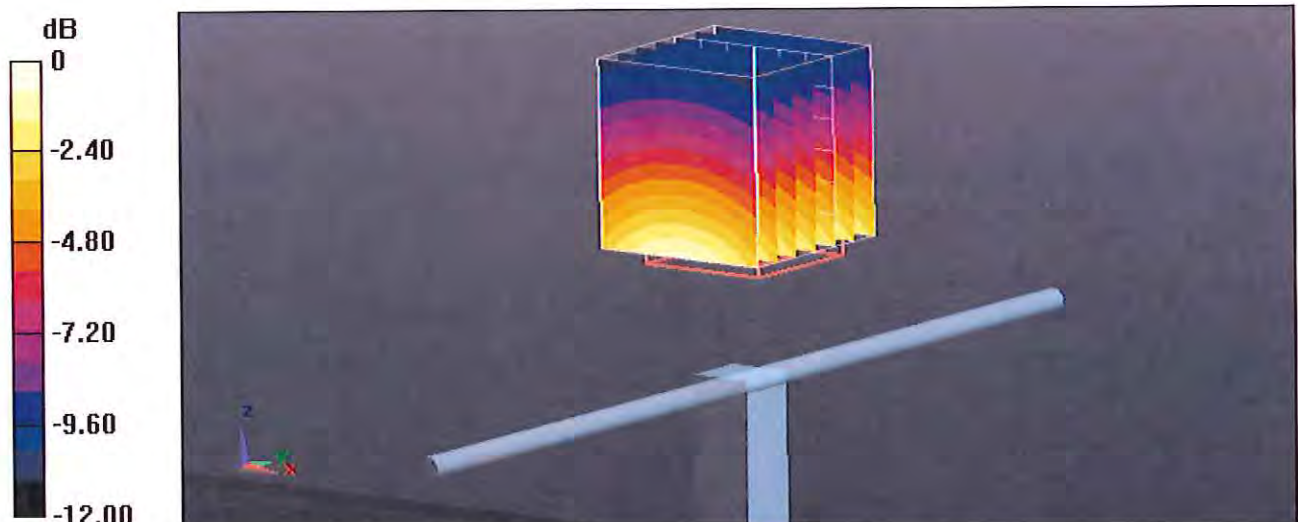
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.289 V/m; Power Drift = 0.01 dB

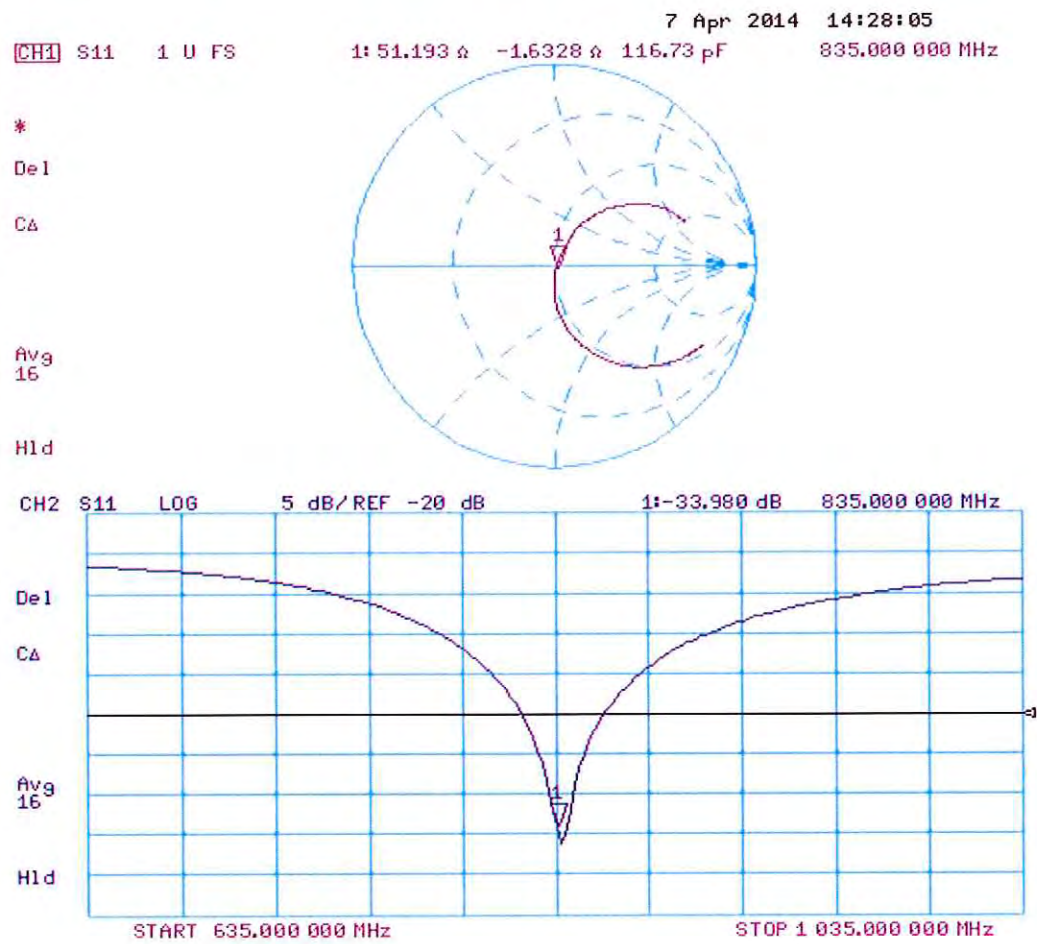
Peak SAR (extrapolated) = 3.59 W/kg

SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.53 W/kg

Maximum value of SAR (measured) = 2.80 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.04.2014

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; $\sigma = 1.02$ S/m; $\epsilon_r = 53.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

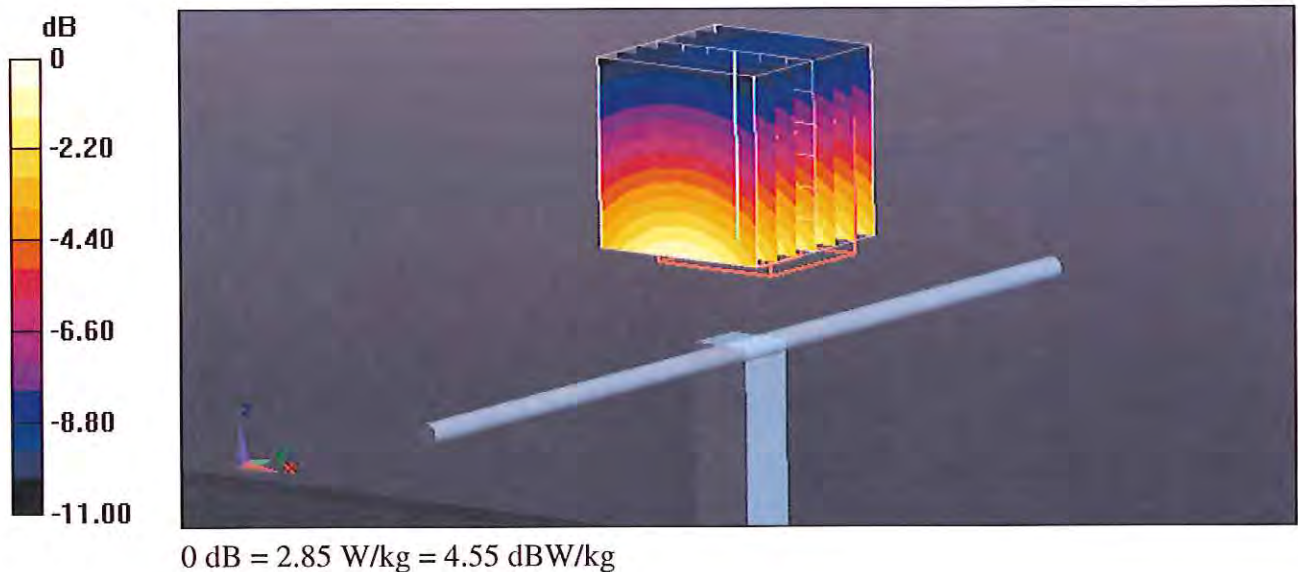
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.594 V/m; Power Drift = -0.01 dB

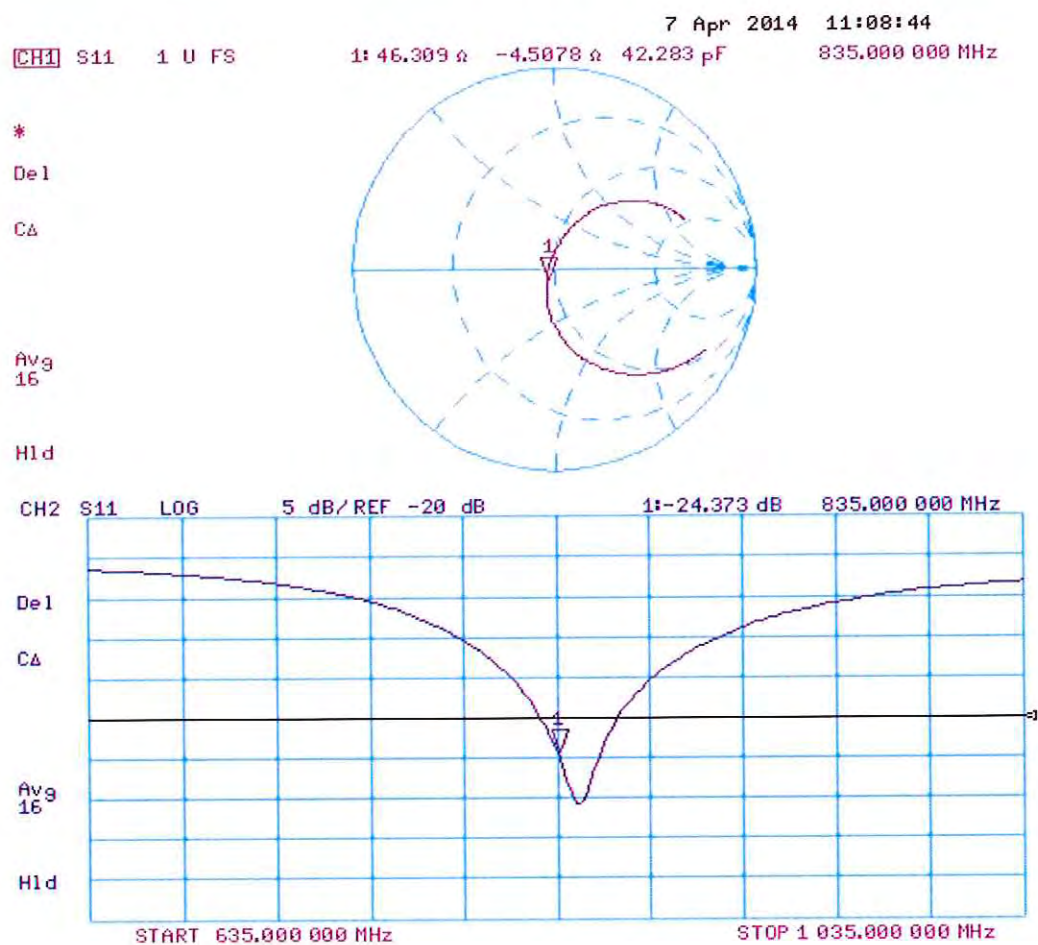
Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 2.85 W/kg



Impedance Measurement Plot for Body TSL





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1765V2-1008_May14**

CALIBRATION CERTIFICATE

Object **D1765V2 - SN: 1008**

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

CCV
6/2/14

Calibration date: **May 07, 2014**

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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	30-Apr-14 (No. DAE4-601_Apr14)	Apr-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Calibrated by: **Name** **Function**
Jeton Kastrati **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: May 12, 2014

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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:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.5 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.2 $\pm$ 6 %	1.48 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.02 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.1 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.7 Ω - 6.1 j Ω
Return Loss	- 23.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.7 Ω - 6.4 j Ω
Return Loss	- 20.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.211 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, 2005

DASY5 Validation Report for Head TSL

Date: 07.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN: 1008

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

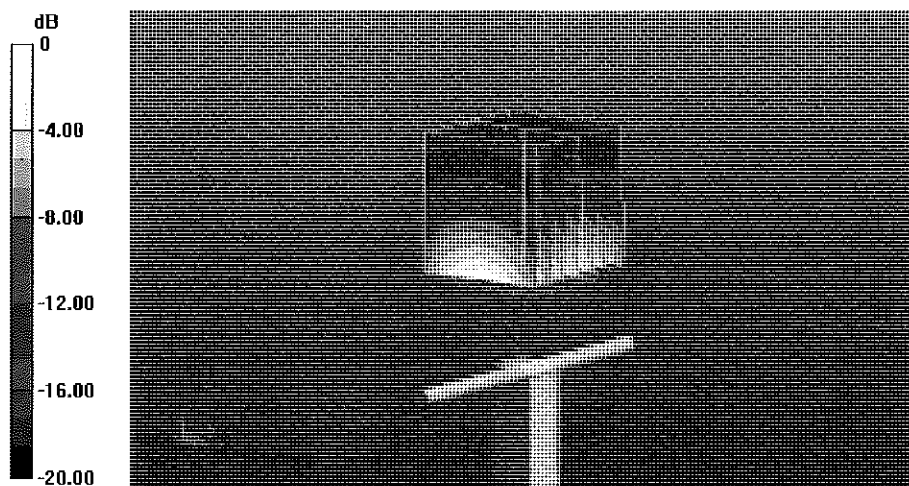
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.06 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.7 W/kg

SAR(1 g) = 9.23 W/kg; SAR(10 g) = 4.87 W/kg

Maximum value of SAR (measured) = 11.7 W/kg

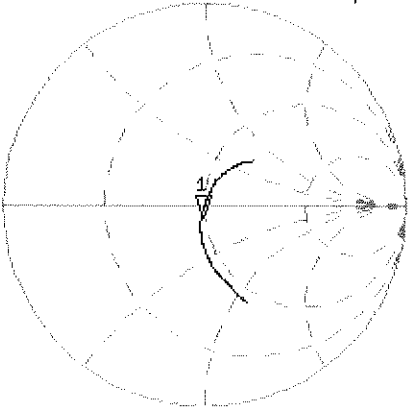


0 dB = 11.7 W/kg = 10.68 dBW/kg

Impedance Measurement Plot for Head TSL

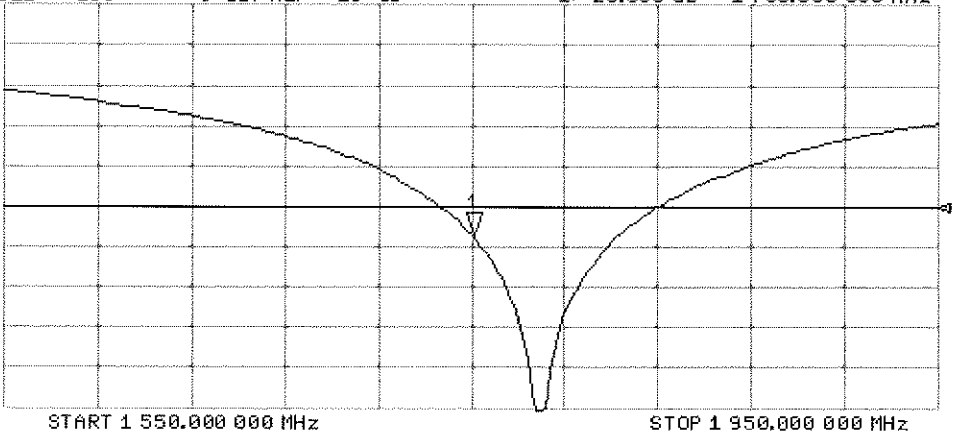
7 May 2014 09:22:36
[CH1] S11 1 U FS 1: 47.709 Ω -6.0566 Ω 15.016 pF 1 750.000 000 MHz

*
De1
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-23.588 dB 1 750.000 000 MHz

CA
Avg
16
H1d



DASY5 Validation Report for Body TSL

Date: 07.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN: 1008

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.48$ S/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

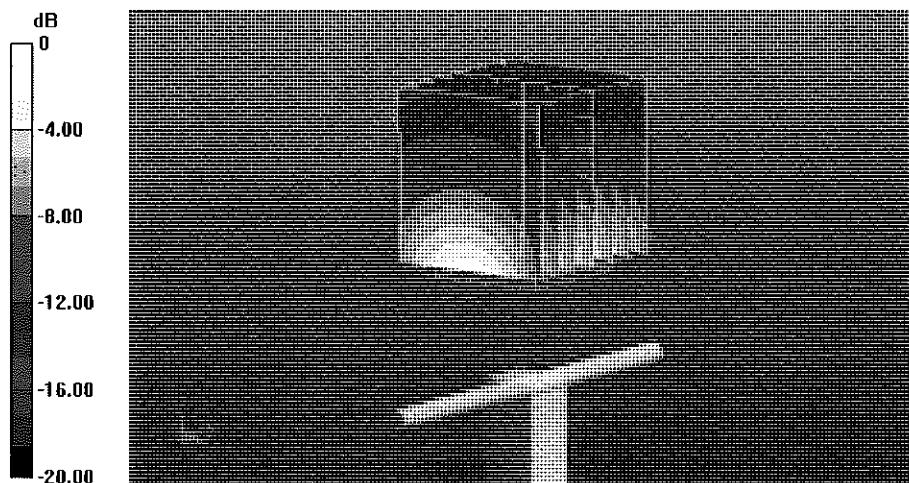
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.01 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 16.3 W/kg

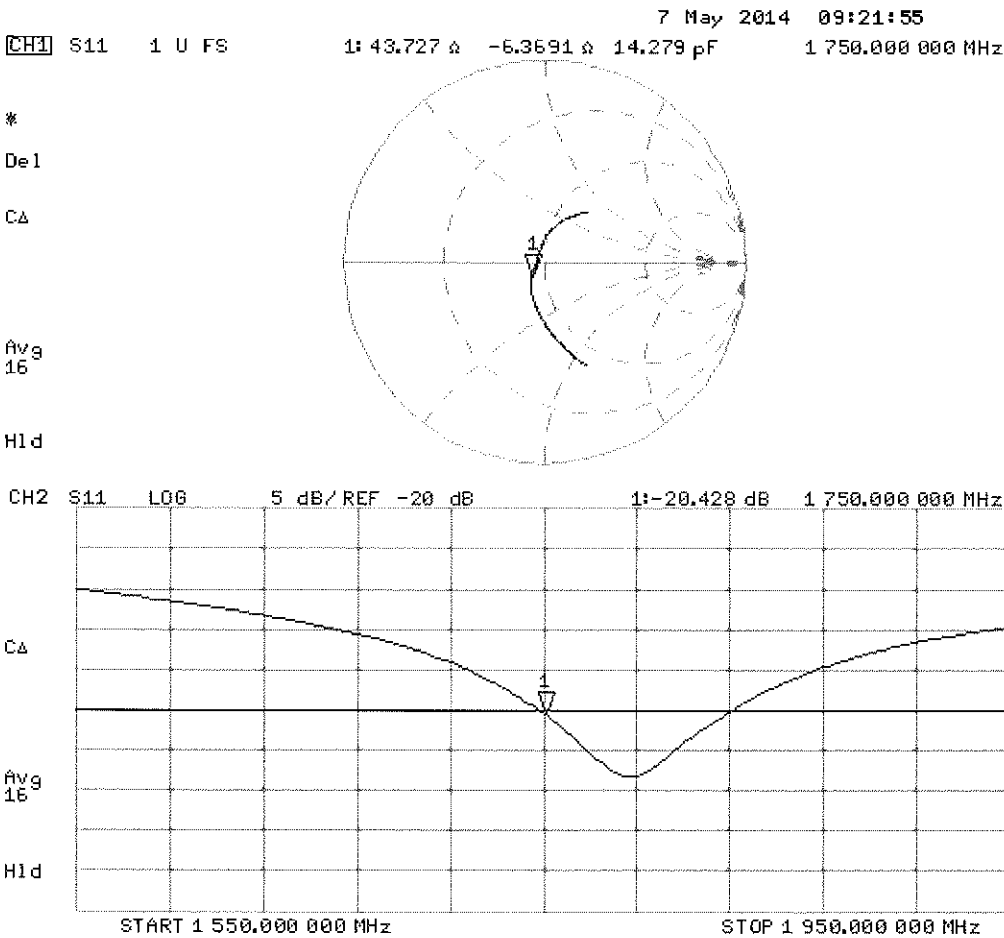
SAR(1 g) = 9.41 W/kg; SAR(10 g) = 5.02 W/kg

Maximum value of SAR (measured) = 11.8 W/kg



0 dB = 11.8 W/kg = 10.72 dBW/kg

Impedance Measurement Plot for Body TSL





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1900V2-5d141_Apr14**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d141**

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

Calibration date: **April 09, 2014**

✓
KOK
5/7/14

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 $(22 \pm 3)^{\circ}\text{C}$ 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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Calibrated by: **Name** Claudio Leubler **Function** Laboratory Technician

Approved by: **Name** Katja Pokovic **Function** Technical Manager

Signature

Issued: April 9, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

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:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- 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	V52.8.7
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 $\pm$ 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 $\pm$ 0.2) °C	39.1 $\pm$ 6 %	1.36 mho/m $\pm$ 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	9.91 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg $\pm$ 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 $\pm$ 0.2) °C	52.4 $\pm$ 6 %	1.52 mho/m $\pm$ 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	10.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.6 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.8 \Omega + 5.5 j\Omega$
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.8 \Omega + 6.3 j\Omega$
Return Loss	- 23.7 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: 09.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d141

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

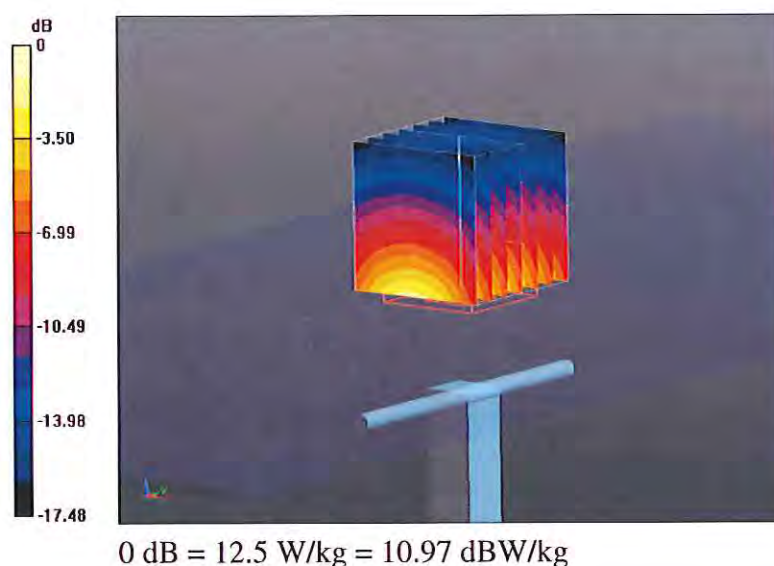
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.080 V/m; Power Drift = 0.01 dB

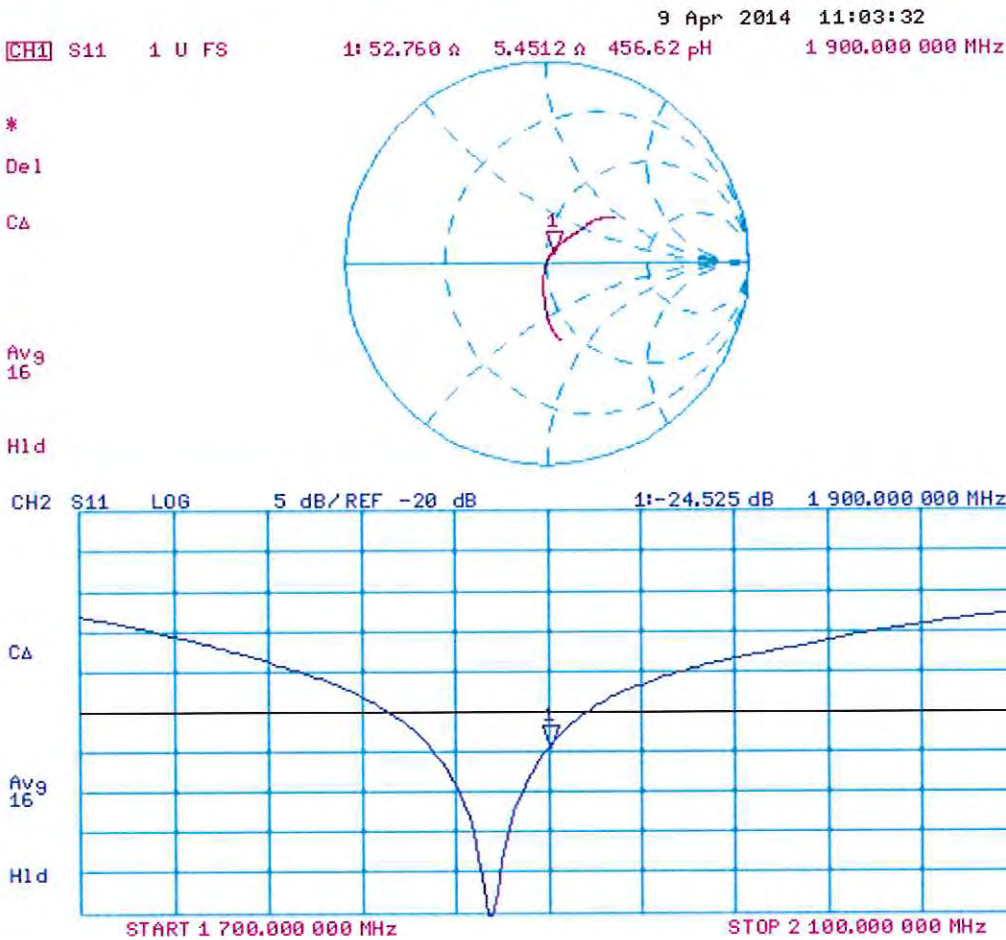
Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 9.91 W/kg; SAR(10 g) = 5.17 W/kg

Maximum value of SAR (measured) = 12.5 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 09.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d141

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ S/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

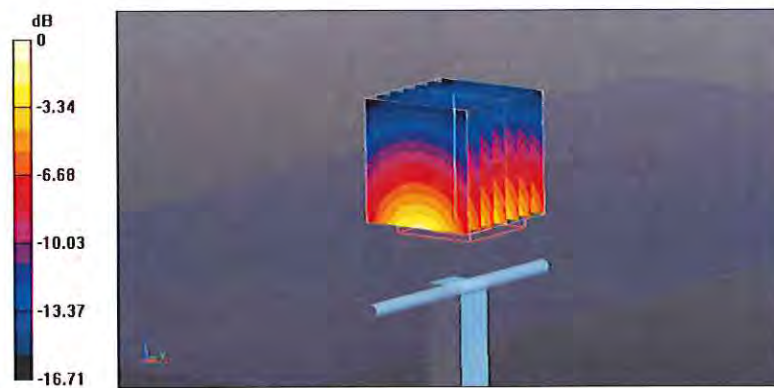
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.820 V/m; Power Drift = -0.01 dB

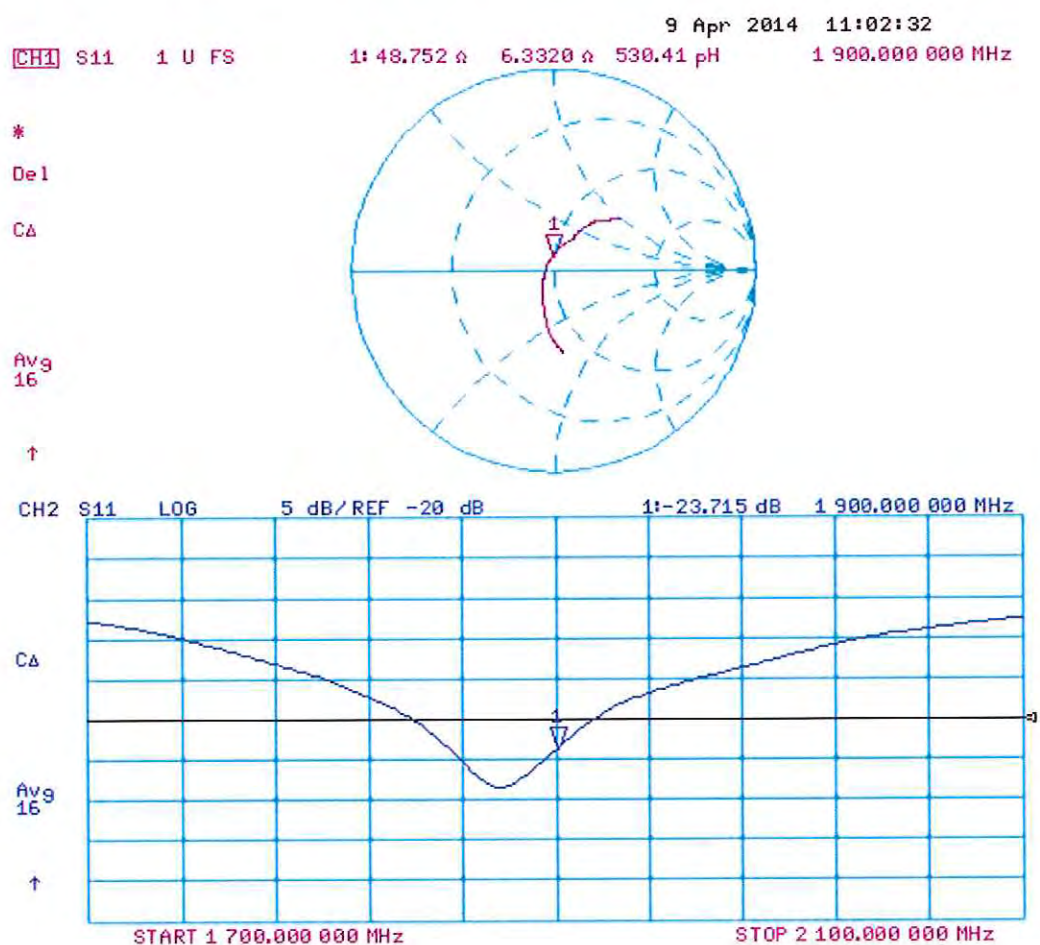
Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.41 W/kg

Maximum value of SAR (measured) = 12.9 W/kg



Impedance Measurement Plot for Body TSL





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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D2450V2-797_Jan14**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 797**

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

Calibration date: **January 21, 2014**

CC ✓
2/5/14

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 $(22 \pm 3)^{\circ}\text{C}$ 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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
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	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: January 21, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Accreditation No.: **SCS 108**

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Multilateral Agreement for the recognition of calibration certificates

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:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- 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	V52.8.7
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 $\pm$ 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 $\pm$ 0.2) °C	38.7 $\pm$ 6 %	1.86 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (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	51.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.3 W/kg $\pm$ 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 $\pm$ 0.2) °C	51.3 $\pm$ 6 %	2.04 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	49.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.86 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.1 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.5 \Omega + 3.2 j\Omega$
Return Loss	- 26.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.0 \Omega + 4.9 j\Omega$
Return Loss	- 26.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 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	January 24, 2006

DASY5 Validation Report for Head TSL

Date: 21.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 797

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.86$ S/m; $\epsilon_r = 38.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

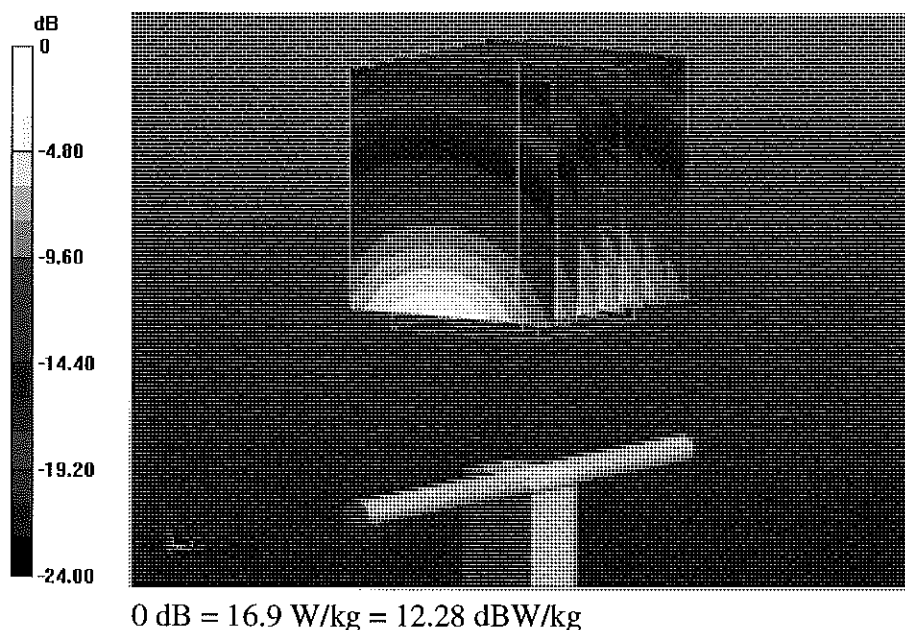
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.151 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 27.5 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.13 W/kg

Maximum value of SAR (measured) = 16.9 W/kg



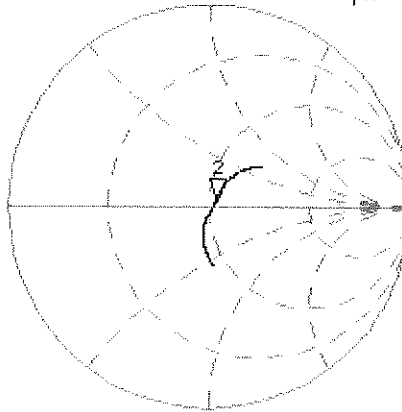
Impedance Measurement Plot for Head TSL

21 Jan 2014 11:31:52
 [CH1] S11 1 U FS 2: 53.512 $\angle$ 3.2285 $\angle$ 209.73 μ H 2 450.000 000 MHz

*
 Del
 CA

Avg
 16

H1d

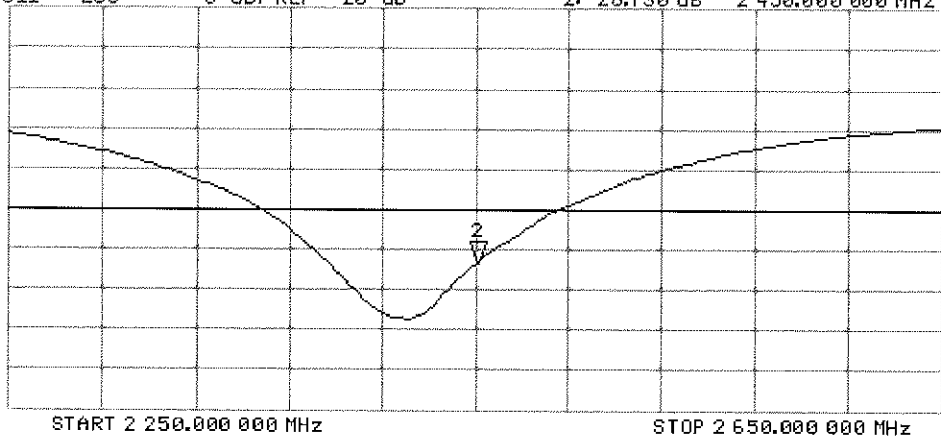


CH2 S11 LOG 5 dB/REF -20 dB 2:-26.730 dB 2 450.000 000 MHz

CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 21.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 797

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.04$ S/m; $\epsilon_r = 51.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

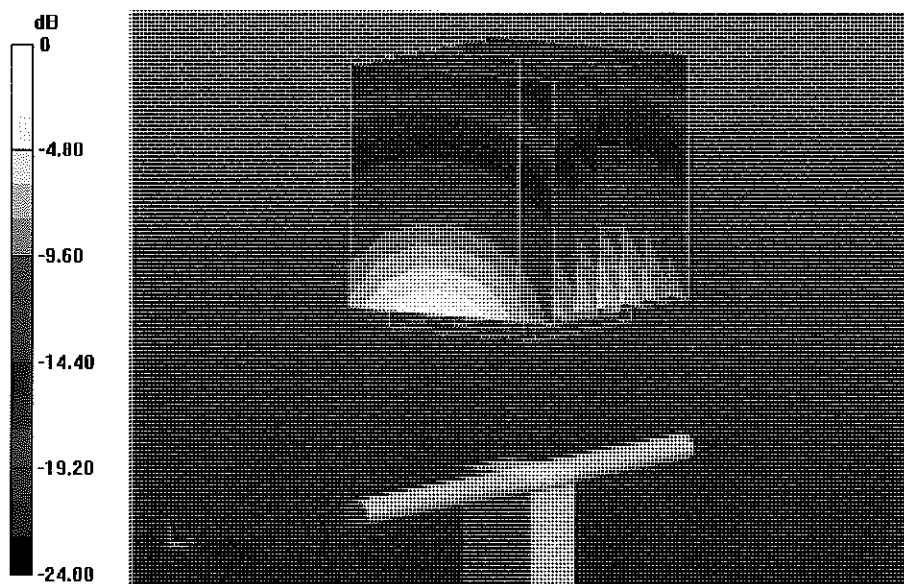
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.709 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 26.4 W/kg

SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.86 W/kg

Maximum value of SAR (measured) = 16.8 W/kg



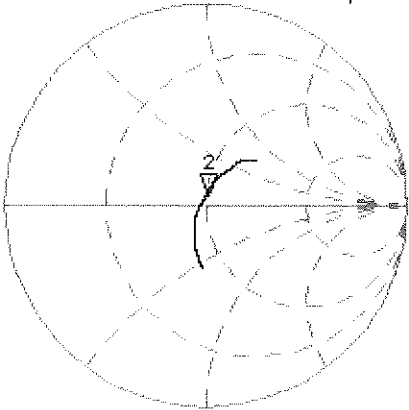
0 dB = 16.8 W/kg = 12.25 dBW/kg

Impedance Measurement Plot for Body TSL

21 Jan 2014 11:31:29

CH1 S11 1 U FS 2: 49.994 Ω 4.9258 Ω 319.98 μH 2 450.000 000 MHz

*
Del
CA



Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 2:-26.162 dB 2 450.000 000 MHz

CA
Avg
16
H1d

