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

SAR EVALUATION REPORT

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

Date of Testing:
09/03/13 – 09/16/13
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1309041797-R1.A3L

FCC ID: **A3LSMN900W8**

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

DUT Type: Portable Handset
Application Type: Class II Permissive Change
FCC Rule Part(s): CFR §2.1093
Model(s): SM-N900W8
Permissive Change(s): See FCC Change Document
Date of Original Certification: September 11, 2013

Equipment Class	Band & Mode	Tx Frequency	Measured Conducted Power [dBm]	SAR		
				1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	32.96	0.23	0.40	0.56
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	30.50	0.24	0.86	1.08
PCE	UMTS 850	826.40 - 846.60 MHz	23.69	0.21	0.37	0.37
PCE	UMTS 1750	1712.4 - 1752.5 MHz	22.93	0.23	0.95	0.95
PCE	UMTS 1900	1852.4 - 1907.6 MHz	22.82	0.25	1.01	1.01
PCE	LTE Band 17	706.5 - 713.5 MHz	24.00	0.15	0.41	0.41
PCE	LTE Band 5 (Cell)	826.5 - 846.5 MHz	23.48	0.18	0.34	0.34
PCE	LTE Band 4 (AWS)	1712.5 - 1752.5 MHz	22.93	0.31	1.02	1.02
PCE	LTE Band 2 (PCS)	1852.5 - 1907.5 MHz	22.34	0.24	1.01	1.01

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

Note: The table above shows licensed transmitter SAR Test data evaluated for the current test report. Please refer to RF Exposure Technical Report S/N 0Y1307261454.A3L for original compliance evaluation.

Note: This revised Test Report (S/N: 0Y1309041797-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

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

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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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
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.5 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	826.5 - 846.5 MHz
LTE Band 4 (AWS)	Data	1712.5 - 1752.5 MHz
LTE Band 2 (PCS)	Data	1852.5 - 1907.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
Ant+	Data	2402 - 2480 MHz

1.2 Nominal and Maximum Output Power Specifications

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

Mode / Band		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**	**32.0**	**30.5**	**29.5**	**27.5**	**26.0**	**24.5**	**23.5**
	Nominal	**33.0**	**33.0**	**31.5**	**30.0**	**29.0**	**27.0**	**25.5**	**24.0**	**23.0**
GSM/GPRS/EDGE 1900	Maximum	**30.5**	**30.5**	**28.3**	**26.5**	**25.3**	**27.0**	**26.0**	**24.5**	**23.5**
	Nominal	**30.0**	**30.0**	**27.8**	**26.0**	**24.8**	**26.5**	**25.5**	**24.0**	**23.0**

Mode / Band		Modulated Average (dBm)			
		3GPP RMC	*3GPP HSDPA*	*3GPP HSUPA*	*3GPP DC-HSDPA*
UMTS Band 5 (850 MHz)	Maximum	**24.0**	**23.0**	**22.7**	**23.0**
	Nominal	**23.5**	**22.5**	**22.2**	**22.5**
UMTS Band 4 (1750 MHz)	Maximum	**23.0**	**22.4**	**22.3**	**22.0**
	Nominal	**22.5**	**21.9**	**21.8**	**21.5**
UMTS Band 2 (1900 MHz)	Maximum	**23.0**	**22.8**	**22.7**	**23.0**
	Nominal	**22.5**	**22.3**	**22.2**	**22.5**

Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	**24.3**
	Nominal	**23.8**
LTE Band 5 (Cell)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 4 (AWS)	Maximum	**23.0**
	Nominal	**22.5**
LTE Band 2 (PCS)	Maximum	**22.5**
	Nominal	**22.0**

1.3 DUT Antenna Locations

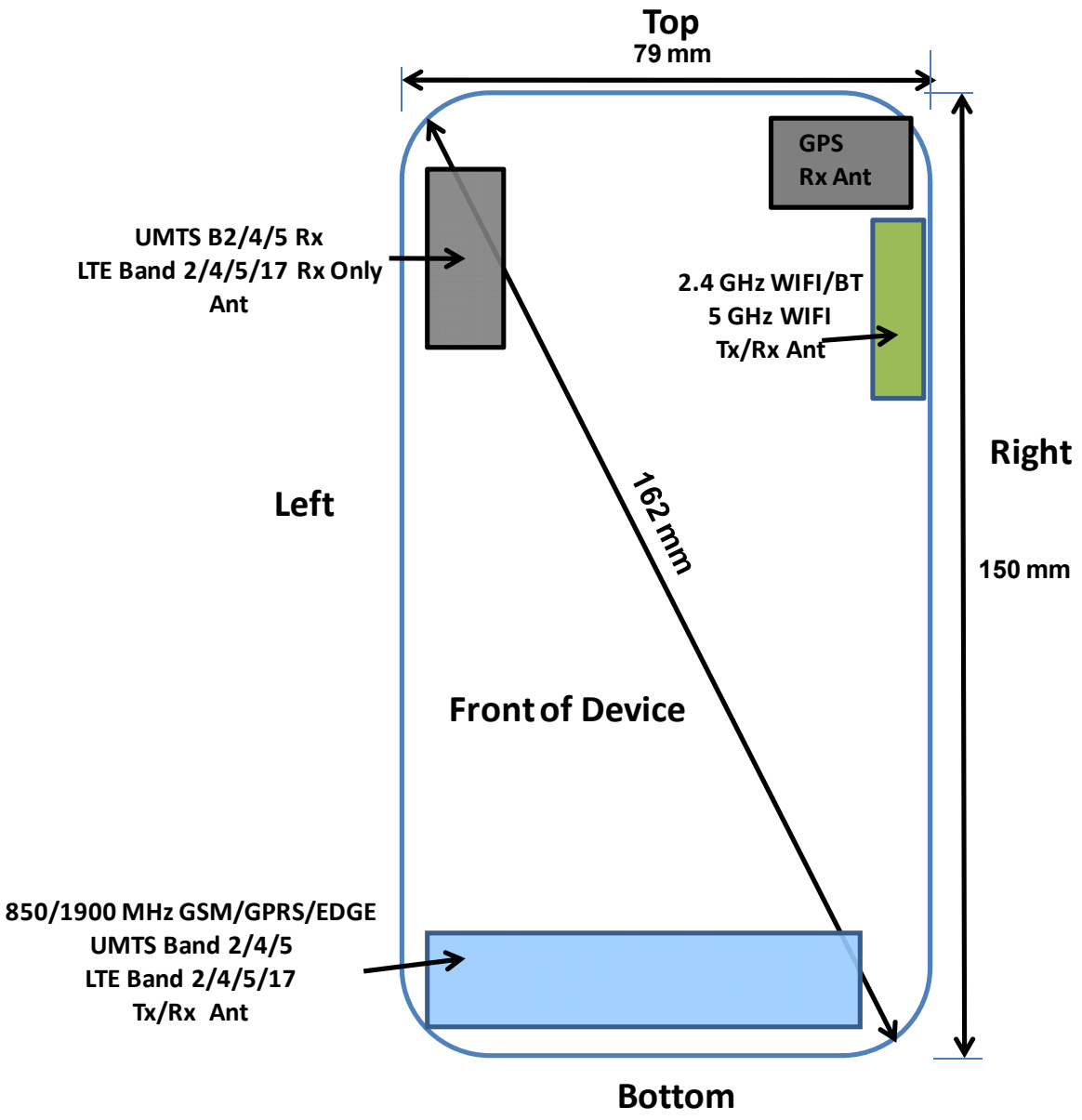

Figure 1-1
DUT Antenna Locations

Note:

1. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC Filing.
2. Because the diagonal distance of this device is >160 mm, it is considered as a "phablet".

Table 1-1
Wireless Router Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 1750	Yes	Yes	No	Yes	Yes	Yes
UMTS 1900	Yes	Yes	No	Yes	Yes	Yes
LTE Band 17	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	Yes	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01r01. Additional edges may be included for SAR testing in this report, although the actual transmitting antenna distances from edges may be greater than 2.5 cm.

1.4 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the battery. The SAR tests were performed with the battery model: B800BU.

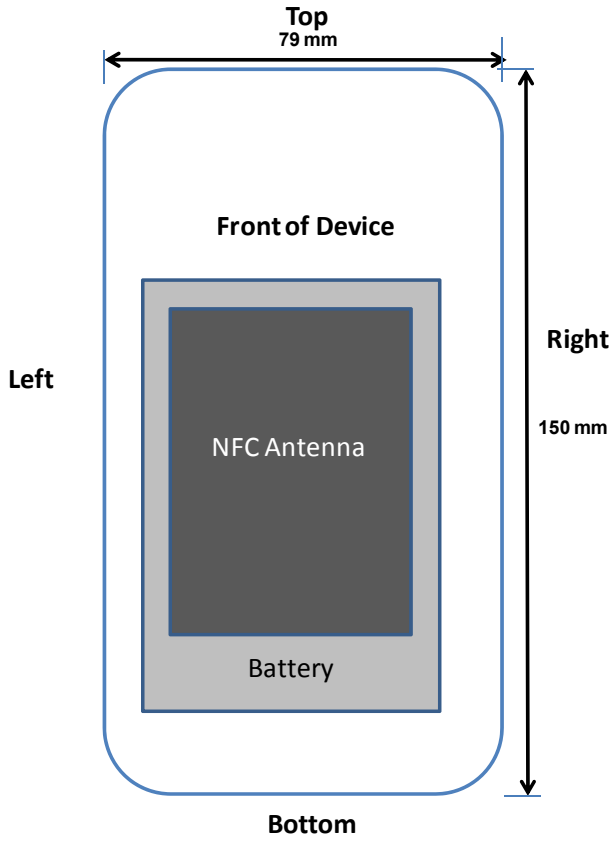

Figure 1-2
NFC Antenna Locations

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v05r01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Figure 1-3
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05r01 3) procedures.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configurations	Head	Body-Worn Accessory	Hot Spot	Extremity	Note
		IEEE 1528, Supp C	Supp C	FCC KDB 941225 D06 edges/sides	FCC KDB 648474 D04 edges/sides	
1	GSM 850/1900 MHz Voice + WiFi 2.4GHz	Yes	Yes	N/A	Yes	2.4 GHz Client only
2	UMTS Band 2/4/5 Voice + WiFi 2.4GHz	Yes	Yes	N/A	Yes	2.4 GHz Client only
3	GPRS 850/1900 MHz Data + WiFi 2.4GHz	N/A	N/A	Yes	Yes	2G Hotspot
4	UMTS Band 2/4/5 Data + WiFi 2.4GHz	Yes	Yes	Yes	Yes	3G Hotspot
5	LTE Band 2/4/5/17 Data + WiFi 2.4 GHz	Yes*	Yes*	Yes	Yes	4G Hotspot
6	GSM 850/1900 MHz Voice + WIFI 5 GHz	Yes	Yes	N/A	Yes	5 GHz Client only
7	UMTS Band 2/4/5 MHz Voice + WiFi 5GHz	Yes	Yes	N/A	Yes	5 GHz Client only
8	GPRS 850/1900 MHz Data + WiFi 5.8 GHz	N/A	N/A	Yes	Yes	2G Hotspot
9	UMTS Band 2/4/5 Data + WiFi 5.8 GHz	Yes	Yes	Yes	Yes	3G Hotspot
10	LTE Band 2/4/5/17 Data + WiFi 5.8 GHz	Yes*	Yes*	Yes	Yes	4G Hotspot
11	GSM 850/1900 MHz Voice + 2.4GHz Bluetooth	N/A	Yes	N/A	Yes	
12	UMTS Band 2/4/5 Voice + 2.4GHz Bluetooth	N/A	Yes	N/A	Yes	
13	LTE Band 2/4/5/17 Data + 2.4 GHz Bluetooth	N/A	Yes*	N/A	Yes	
14	GPRS 850/1900 MHz Data + WiFi 5.2-5.7 GHz	N/A	N/A	N/A	N/A	Not supported by S/W
15	UMTS Band 2/4/5 Data + WiFi 5.2-5.7 GHz	N/A	N/A	N/A	N/A	Not supported by S/W
16	LTE Band 2/4/5/17 Data + WiFi 5.2-5.7 GHz	N/A	N/A	N/A	N/A	Not supported by S/W
17	All Voice + LTE	N/A	N/A	N/A	N/A	Not supported by H/W
18	All Voice + WiFi + LTE	N/A	N/A	N/A	N/A	Not supported by H/W

Notes:
1. 2.4 GHz WLAN, 2.4 GHz Bluetooth, and 5 GHz WLAN share the same antenna path and cannot transmit simultaneously
2. 5 GHz Hotspot is only supported for the 5.8 GHz Band by S/W, therefore all other 5 GHz bands were not evaluated for hotspot condtitions.

1. (*) = for VOIP 3rd party applications possibly installed and used by the end-user
2. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
3. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there is no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.

1.6 SAR Test Exclusions Applied

(A) WIFI/BT

Per the FCC change document for this device, the 2.4 GHz WLAN/Bluetooth and 5 GHz WLAN modes remain the same as the original certified device. Therefore, no additional SAR evaluations were required for these bands/modes.

(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 D01v02r02.

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

Per FCC KDB Publication 648474 D03-D04, this device is considered a "phablet" since its diagonal distance is greater than 160 mm but less than 200 mm. Therefore hand SAR tests are required. Hand SAR was not evaluated for licensed transmitter since Hotspot SAR was < 1.2 W/kg.

1.7 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 D04v01r01, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the highest reported SAR for each wireless technology, frequency band, operating mode, and exposure condition. No other additional test with wireless charging cover was required since all reported SAR were less than 1.2 W/kg.

1.8 Power Reduction for SAR

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

1.9 Guidance Applied

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

1.10 Device Serial Numbers

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

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Mode/Band	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
GSM/GPRS/EDGE 850	21F0A	21F0A	21F0A
GSM/GPRS/EDGE 1900	21F0A	21F0A	21F0A
UMTS 850	21F0A	21F0A	21F0A
UMTS 1750	21F2F	21F2F	21F2F
UMTS 1900	21F20	21F20	21F20
LTE Band 17	21FB4	21FB4	21FB4
LTE Band 5 (Cell)	21FB4	21FB4	21FB4
LTE Band 4 (AWS)	21F36	21F36	21F36
LTE Band 2 (PCS)	21F20	21F20	21F20

2 LTE INFORMATION

LTE Information			
FCC ID	**A3LSMN900W8**		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 17 (706.5 - 713.5 MHz)		
	LTE Band 5 (Cell) (826.5 - 846.5 MHz)		
	LTE Band 4 (AWS) (1712.5 - 1752.5 MHz)		
	LTE Band 2 (PCS) (1852.5 - 1907.5 MHz)		
Channel Bandwidths	LTE Band 17: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 2 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 17: 5 MHz	706.5 (23755)	710 (23790)	713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)	710 (23790)	711 (23800)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)	836.5 (20525)	844 (20600)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 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)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	1880 (18900)	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)	1880 (18900)	1900 (19100)
UE Category	4		
Modulations Supported in UL	QPSK, 16QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES		
A-MPR (Additional MPR) disabled for SAR Testing?	YES		

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

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

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

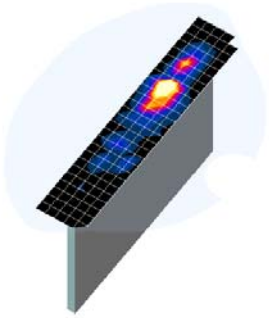

Figure 4-1
Sample SAR Area Scan

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

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

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

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

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

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

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

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

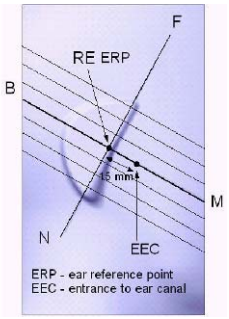

Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

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

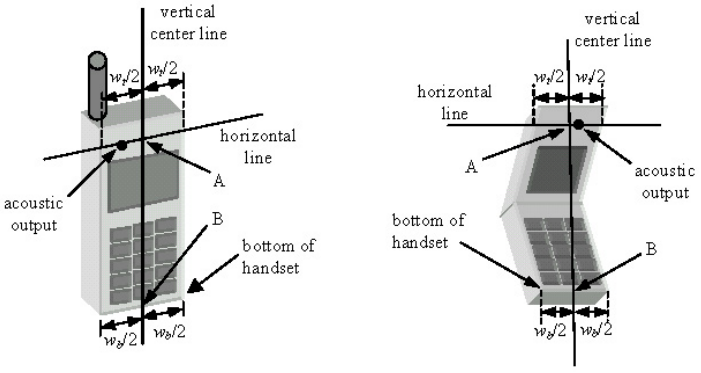

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

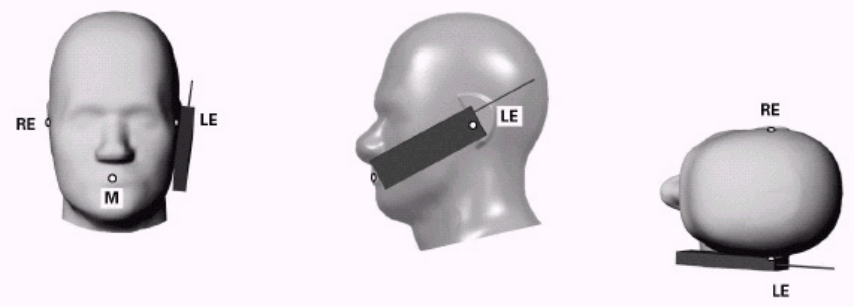

Figure 6-1 Front, Side and Top View of Cheek Position

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

6.3 Positioning for Ear / 15º Tilt

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

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

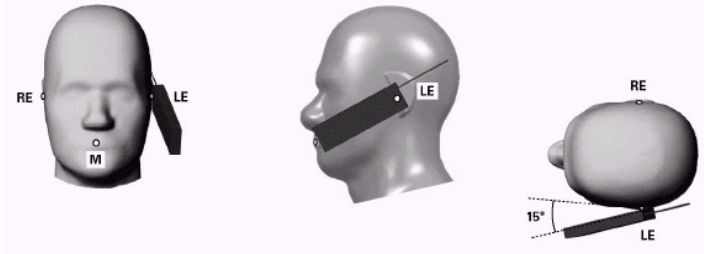

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

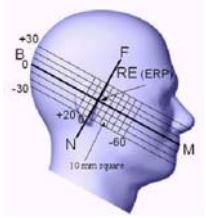

Figure 6-3
Side view w/ relevant markings

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

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

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r01. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

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

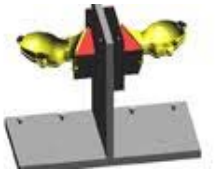

Figure 6-4 Twin SAM Chin20

6.5 Body-Worn Accessory Configurations

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

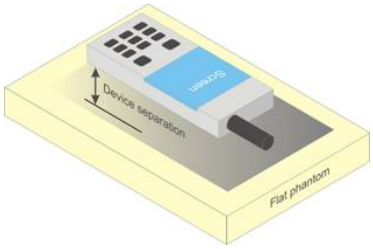

Figure 6-5
Sample Body-Worn Diagram

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

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

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 44798 D01v05r01 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC minitablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r01 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 <=25 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. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g SAR > 1.2 W/kg.

6.7 Wireless Router Configurations

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

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

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v02r02 “SAR Measurement Procedures for 3G Devices” v02, October 2007.

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

8.3 SAR Measurement Conditions for UMTS

8.3.1 Output Power Verification

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

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

8.3.2 Head SAR Measurements for Handsets

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

8.3.3 Body SAR Measurements

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

8.3.4 SAR Measurements for Handsets with Rel 5 HSDPA

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

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

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

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.

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 Δ_{NACK} = 8 (A_{hs} = 30/15) with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 7 (A_{hs} = 24/15) with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

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

8.3.5 SAR Measurements for Handsets with Rel 6 HSUPA

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

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

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

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

8.3.6 SAR Measurement Conditions for DC-HSDPA

SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion. DC-HSDPA uplink maximum output power measurements using the four Rel. 5 HSDPA subtests in Table C.10.1.4 of TS 234.121-1 is required. When the maximum average output power of each RF channel with DC-HSDPA active is ≤ ¼ dB higher than that measured using 12.2 kbps RMC, or the maximum reported SAR for 12.2 kbps RMC is ≤ 75% of the SAR limit, SAR evaluation for DC-HSDPA is not required.

8.4 SAR Measurement Conditions for LTE

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

8.4.1 Spectrum Plots for RB Configurations

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

8.4.2 MPR

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

8.4.3 A-MPR

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

8.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r02:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.

ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

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

9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power								
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**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	33.07	33.11	31.36	29.30	**28.37**	27.19	25.47	23.40	22.39
	190	32.96	33.01	31.35	29.55	**28.35**	27.26	25.51	23.62	22.38
	251	33.01	33.05	31.30	29.51	**28.33**	27.21	25.47	23.47	22.36
GSM 1900	512	30.45	30.44	27.77	25.76	**24.82**	26.36	25.33	23.63	22.53
	661	30.47	30.45	27.93	25.81	**24.93**	26.32	25.25	23.67	22.69
	810	30.50	30.49	27.78	25.93	**24.78**	26.34	25.23	23.68	22.64
		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	24.04	24.08	25.34	25.04	**25.36**	18.16	19.45	19.14	19.38
	190	23.93	23.98	25.33	25.29	**25.34**	18.23	19.49	19.36	19.37
	251	23.98	24.02	25.28	25.25	**25.32**	18.18	19.45	19.21	19.35
GSM 1900	512	21.42	21.41	21.75	21.50	**21.81**	17.33	19.31	19.37	19.52
	661	21.44	21.42	21.91	21.55	**21.92**	17.29	19.23	19.41	19.68
	810	21.47	21.46	21.76	21.67	**21.77**	17.31	19.21	19.42	19.63

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

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

Figure 9-1
Power Measurement Setup

9.2 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	1312	1412	1862	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.75	23.69	23.87	22.79	22.93	22.78	22.79	22.82	22.80	-
99		12.2 kbps AMR	23.73	23.70	23.86	22.71	22.88	22.75	22.72	22.78	22.74	-
6	HSDPA	Subtest 1	22.24	22.18	22.22	21.91	21.93	21.76	22.34	22.38	22.30	0
6		Subtest 2	22.28	22.20	22.28	21.90	22.08	21.91	22.33	22.31	22.39	0
6		Subtest 3	21.82	21.83	21.84	21.49	21.69	21.47	21.76	21.86	21.83	0.5
6		Subtest 4	21.66	21.60	21.69	21.31	21.36	21.18	21.75	21.76	21.84	0.5
6	HSUPA	Subtest 1	21.81	21.84	21.91	21.94	21.96	21.79	21.83	22.17	22.23	0
6		Subtest 2	21.12	21.03	21.08	20.50	20.44	20.30	20.45	20.69	20.49	2
6		Subtest 3	20.34	20.22	20.35	19.62	19.67	19.56	20.02	20.05	19.99	1
6		Subtest 4	21.65	21.63	21.41	20.66	20.89	20.56	20.90	20.85	20.83	2
6		Subtest 5	21.88	21.77	21.78	21.72	21.74	21.57	21.85	22.08	22.25	0
8	DC-HSDPA	Subtest 1	22.17	22.11	22.15	21.91	21.85	21.72	22.34	22.39	22.36	0
8		Subtest 2	22.26	22.15	22.10	22.00	21.98	21.82	22.40	22.29	22.43	0
8		Subtest 3	21.65	21.47	21.54	21.45	21.50	21.31	21.87	21.93	22.00	0.5
8		Subtest 4	21.62	21.49	21.54	21.41	21.46	21.28	21.79	21.92	22.01	0.5

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

DC-HSDPA considerations

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12 (QPSK) was confirmed to be used during DC-HSDPA measurements
- Measured maximum output powers for DC-HSDPA were not greater than 1/4 dB higher than the WCDMA 12.2 kbps RMC maximum output, as a result, SAR is not required for DC-HSDPA
- The DUT supports UE category 24 for HSDPA.

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

Figure 9-2
Power Measurement Setup

9.3 LTE Conducted Powers

9.3.1 LTE Band 17

Table 9-1
LTE Band 17 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	710.0	23790	10	QPSK	1	0	23.79	0	0
	710.0	23790	10	QPSK	1	25	**24.00**	0	0
	710.0	23790	10	QPSK	1	49	23.87	0	0
	710.0	23790	10	QPSK	25	0	22.65	1	0-1
	710.0	23790	10	QPSK	25	12	**22.66**	1	0-1
	710.0	23790	10	QPSK	25	25	22.63	1	0-1
	710.0	23790	10	QPSK	50	0	22.51	1	0-1
	710.0	23790	10	16QAM	1	0	22.53	1	0-1
	710.0	23790	10	16QAM	1	25	22.90	1	0-1
	710.0	23790	10	16QAM	1	49	22.75	1	0-1
	710.0	23790	10	16QAM	25	0	21.67	2	0-2
	710.0	23790	10	16QAM	25	12	21.68	2	0-2
	710.0	23790	10	16QAM	25	25	21.65	2	0-2
	710.0	23790	10	16QAM	50	0	21.50	2	0-2

Note: LTE Band 17 at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, 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.

Table 9-2
LTE Band 17 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	710.0	23790	5	QPSK	1	0	23.86	0	0
	710.0	23790	5	QPSK	1	12	23.96	0	0
	710.0	23790	5	QPSK	1	24	23.83	0	0
	710.0	23790	5	QPSK	12	0	22.67	1	0-1
	710.0	23790	5	QPSK	12	6	22.82	1	0-1
	710.0	23790	5	QPSK	12	13	22.78	1	0-1
	710.0	23790	5	QPSK	25	0	22.62	1	0-1
	710.0	23790	5	16-QAM	1	0	22.51	1	0-1
	710.0	23790	5	16-QAM	1	12	22.70	1	0-1
	710.0	23790	5	16-QAM	1	24	22.54	1	0-1
	710.0	23790	5	16-QAM	12	0	21.77	2	0-2
	710.0	23790	5	16-QAM	12	6	21.89	2	0-2
	710.0	23790	5	16-QAM	12	13	21.82	2	0-2
	710.0	23790	5	16-QAM	25	0	21.69	2	0-2

Note: LTE Band 17 at 5 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, 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.

9.3.2 LTE Band 5 (Cell)

Table 9-3
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	836.5	20525	10	QPSK	1	0	**23.48**	0	0
	836.5	20525	10	QPSK	1	25	23.46	0	0
	836.5	20525	10	QPSK	1	49	23.45	0	0
	836.5	20525	10	QPSK	25	0	22.21	1	0-1
	836.5	20525	10	QPSK	25	12	**22.24**	1	0-1
	836.5	20525	10	QPSK	25	25	22.23	1	0-1
	836.5	20525	10	QPSK	50	0	22.19	1	0-1
	836.5	20525	10	16QAM	1	0	22.48	1	0-1
	836.5	20525	10	16QAM	1	25	22.43	1	0-1
	836.5	20525	10	16QAM	1	49	22.45	1	0-1
	836.5	20525	10	16QAM	25	0	21.12	2	0-2
	836.5	20525	10	16QAM	25	12	21.16	2	0-2
	836.5	20525	10	16QAM	25	25	21.15	2	0-2

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, 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.

Table 9-4
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	826.5	20425	5	QPSK	1	0	23.35	0	0
	826.5	20425	5	QPSK	1	12	23.38	0	0
	826.5	20425	5	QPSK	1	24	23.29	0	0
	826.5	20425	5	QPSK	12	0	22.24	1	0-1
	826.5	20425	5	QPSK	12	6	22.16	1	0-1
	826.5	20425	5	QPSK	12	13	22.26	1	0-1
	826.5	20425	5	QPSK	25	0	22.15	1	0-1
	826.5	20425	5	16-QAM	1	0	22.49	1	0-1
	826.5	20425	5	16-QAM	1	12	22.50	1	0-1
	826.5	20425	5	16-QAM	1	24	22.48	1	0-1
	826.5	20425	5	16-QAM	12	0	21.36	2	0-2
	826.5	20425	5	16-QAM	12	6	21.30	2	0-2
	826.5	20425	5	16-QAM	12	13	21.34	2	0-2
	826.5	20425	5	16-QAM	25	0	21.18	2	0-2
Mid	836.5	20525	5	QPSK	1	0	23.40	0	0
	836.5	20525	5	QPSK	1	12	23.38	0	0
	836.5	20525	5	QPSK	1	24	23.42	0	0
	836.5	20525	5	QPSK	12	0	22.31	1	0-1
	836.5	20525	5	QPSK	12	6	22.30	1	0-1
	836.5	20525	5	QPSK	12	13	22.28	1	0-1
	836.5	20525	5	QPSK	25	0	22.20	1	0-1
	836.5	20525	5	16-QAM	1	0	22.13	1	0-1
	836.5	20525	5	16-QAM	1	12	22.15	1	0-1
	836.5	20525	5	16-QAM	1	24	22.19	1	0-1
	836.5	20525	5	16-QAM	12	0	21.32	2	0-2
	836.5	20525	5	16-QAM	12	6	21.31	2	0-2
	836.5	20525	5	16-QAM	12	13	21.33	2	0-2
	836.5	20525	5	16-QAM	25	0	21.08	2	0-2
High	846.5	20625	5	QPSK	1	0	23.21	0	0
	846.5	20625	5	QPSK	1	12	23.30	0	0
	846.5	20625	5	QPSK	1	24	23.24	0	0
	846.5	20625	5	QPSK	12	0	22.18	1	0-1
	846.5	20625	5	QPSK	12	6	22.17	1	0-1
	846.5	20625	5	QPSK	12	13	22.14	1	0-1
	846.5	20625	5	QPSK	25	0	22.08	1	0-1
	846.5	20625	5	16-QAM	1	0	22.34	1	0-1
	846.5	20625	5	16-QAM	1	12	22.37	1	0-1
	846.5	20625	5	16-QAM	1	24	22.38	1	0-1
	846.5	20625	5	16-QAM	12	0	21.14	2	0-2
	846.5	20625	5	16-QAM	12	6	21.19	2	0-2
	846.5	20625	5	16-QAM	12	13	21.14	2	0-2
	846.5	20625	5	16-QAM	25	0	21.07	2	0-2

9.3.3 LTE Band 4 (AWS)

Table 9-5
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	1732.5	20175	20	QPSK	1	0	**22.93**	0	0
	1732.5	20175	20	QPSK	1	50	22.89	0	0
	1732.5	20175	20	QPSK	1	99	22.80	0	0
	1732.5	20175	20	QPSK	50	0	21.66	1	0-1
	1732.5	20175	20	QPSK	50	25	21.63	1	0-1
	1732.5	20175	20	QPSK	50	50	**21.75**	1	0-1
	1732.5	20175	20	QPSK	100	0	21.70	1	0-1
	1732.5	20175	20	16QAM	1	0	21.99	1	0-1
	1732.5	20175	20	16QAM	1	50	21.90	1	0-1
	1732.5	20175	20	16QAM	1	99	21.82	1	0-1
	1732.5	20175	20	16QAM	50	0	20.71	2	0-2
	1732.5	20175	20	16QAM	50	25	20.65	2	0-2
	1732.5	20175	20	16QAM	50	50	20.74	2	0-2
	1732.5	20175	20	16QAM	100	0	20.75	2	0-2

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, 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.

Table 9-6
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1717.5	20025	15	QPSK	1	0	23.00	0	0
	1717.5	20025	15	QPSK	1	36	22.83	0	0
	1717.5	20025	15	QPSK	1	74	22.79	0	0
	1717.5	20025	15	QPSK	36	0	21.82	1	0-1
	1717.5	20025	15	QPSK	36	18	21.81	1	0-1
	1717.5	20025	15	QPSK	36	37	21.78	1	0-1
	1717.5	20025	15	QPSK	75	0	21.80	1	0-1
	1717.5	20025	15	16QAM	1	0	21.93	1	0-1
	1717.5	20025	15	16QAM	1	36	21.96	1	0-1
	1717.5	20025	15	16QAM	1	74	21.94	1	0-1
	1717.5	20025	15	16QAM	36	0	20.91	2	0-2
	1717.5	20025	15	16QAM	36	18	20.87	2	0-2
	1717.5	20025	15	16QAM	36	37	20.85	2	0-2
	1717.5	20025	15	16QAM	75	0	20.84	2	0-2
Mid	1732.5	20175	15	QPSK	1	0	22.91	0	0
	1732.5	20175	15	QPSK	1	36	22.76	0	0
	1732.5	20175	15	QPSK	1	74	22.73	0	0
	1732.5	20175	15	QPSK	36	0	21.76	1	0-1
	1732.5	20175	15	QPSK	36	18	21.73	1	0-1
	1732.5	20175	15	QPSK	36	37	21.78	1	0-1
	1732.5	20175	15	QPSK	75	0	21.80	1	0-1
	1732.5	20175	15	16QAM	1	0	22.00	1	0-1
	1732.5	20175	15	16QAM	1	36	21.95	1	0-1
	1732.5	20175	15	16QAM	1	74	21.98	1	0-1
	1732.5	20175	15	16QAM	36	0	20.81	2	0-2
	1732.5	20175	15	16QAM	36	18	20.79	2	0-2
	1732.5	20175	15	16QAM	36	37	20.84	2	0-2
	1732.5	20175	15	16QAM	75	0	20.85	2	0-2
High	1747.5	20325	15	QPSK	1	0	22.84	0	0
	1747.5	20325	15	QPSK	1	36	22.77	0	0
	1747.5	20325	15	QPSK	1	74	22.62	0	0
	1747.5	20325	15	QPSK	36	0	21.72	1	0-1
	1747.5	20325	15	QPSK	36	18	21.65	1	0-1
	1747.5	20325	15	QPSK	36	37	21.60	1	0-1
	1747.5	20325	15	QPSK	75	0	21.63	1	0-1
	1747.5	20325	15	16QAM	1	0	21.67	1	0-1
	1747.5	20325	15	16QAM	1	36	21.64	1	0-1
	1747.5	20325	15	16QAM	1	74	21.47	1	0-1
	1747.5	20325	15	16QAM	36	0	20.71	2	0-2
	1747.5	20325	15	16QAM	36	18	20.65	2	0-2
	1747.5	20325	15	16QAM	36	37	20.58	2	0-2
	1747.5	20325	15	16QAM	75	0	20.70	2	0-2

Table 9-7
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1715	20000	10	QPSK	1	0	22.68	0	0
	1715	20000	10	QPSK	1	25	22.70	0	0
	1715	20000	10	QPSK	1	49	22.67	0	0
	1715	20000	10	QPSK	25	0	21.77	1	0-1
	1715	20000	10	QPSK	25	12	21.80	1	0-1
	1715	20000	10	QPSK	25	25	21.77	1	0-1
	1715	20000	10	QPSK	50	0	21.75	1	0-1
	1715	20000	10	16QAM	1	0	21.97	1	0-1
	1715	20000	10	16QAM	1	25	21.99	1	0-1
	1715	20000	10	16QAM	1	49	21.98	1	0-1
	1715	20000	10	16QAM	25	0	20.78	2	0-2
	1715	20000	10	16QAM	25	12	20.79	2	0-2
	1715	20000	10	16QAM	25	25	20.76	2	0-2
	1715	20000	10	16QAM	50	0	20.78	2	0-2
Mid	1732.5	20175	10	QPSK	1	0	22.83	0	0
	1732.5	20175	10	QPSK	1	25	22.77	0	0
	1732.5	20175	10	QPSK	1	49	22.72	0	0
	1732.5	20175	10	QPSK	25	0	21.67	1	0-1
	1732.5	20175	10	QPSK	25	12	21.66	1	0-1
	1732.5	20175	10	QPSK	25	25	21.76	1	0-1
	1732.5	20175	10	QPSK	50	0	21.64	1	0-1
	1732.5	20175	10	16QAM	1	0	21.98	1	0-1
	1732.5	20175	10	16QAM	1	25	21.96	1	0-1
	1732.5	20175	10	16QAM	1	49	21.93	1	0-1
	1732.5	20175	10	16QAM	25	0	20.62	2	0-2
	1732.5	20175	10	16QAM	25	12	20.71	2	0-2
	1732.5	20175	10	16QAM	25	25	20.73	2	0-2
	1732.5	20175	10	16QAM	50	0	20.66	2	0-2
High	1750	20350	10	QPSK	1	0	22.66	0	0
	1750	20350	10	QPSK	1	25	22.57	0	0
	1750	20350	10	QPSK	1	49	22.48	0	0
	1750	20350	10	QPSK	25	0	21.65	1	0-1
	1750	20350	10	QPSK	25	12	21.59	1	0-1
	1750	20350	10	QPSK	25	25	21.63	1	0-1
	1750	20350	10	QPSK	50	0	21.59	1	0-1
	1750	20350	10	16QAM	1	0	21.41	1	0-1
	1750	20350	10	16QAM	1	25	21.34	1	0-1
	1750	20350	10	16QAM	1	49	21.29	1	0-1
	1750	20350	10	16QAM	25	0	20.66	2	0-2
	1750	20350	10	16QAM	25	12	20.63	2	0-2
	1750	20350	10	16QAM	25	25	20.61	2	0-2
	1750	20350	10	16QAM	50	0	20.61	2	0-2

Table 9-8
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1712.5	19975	5	QPSK	1	0	22.68	0	0
	1712.5	19975	5	QPSK	1	12	22.71	0	0
	1712.5	19975	5	QPSK	1	24	22.77	0	0
	1712.5	19975	5	QPSK	12	0	21.81	1	0-1
	1712.5	19975	5	QPSK	12	6	21.83	1	0-1
	1712.5	19975	5	QPSK	12	13	21.87	1	0-1
	1712.5	19975	5	QPSK	25	0	21.78	1	0-1
	1712.5	19975	5	16-QAM	1	0	21.52	1	0-1
	1712.5	19975	5	16-QAM	1	12	21.56	1	0-1
	1712.5	19975	5	16-QAM	1	24	21.65	1	0-1
	1712.5	19975	5	16-QAM	12	0	20.87	2	0-2
	1712.5	19975	5	16-QAM	12	6	20.93	2	0-2
	1712.5	19975	5	16-QAM	12	13	20.97	2	0-2
	1712.5	19975	5	16-QAM	25	0	20.75	2	0-2
Mid	1732.5	20175	5	QPSK	1	0	22.61	0	0
	1732.5	20175	5	QPSK	1	12	22.67	0	0
	1732.5	20175	5	QPSK	1	24	22.70	0	0
	1732.5	20175	5	QPSK	12	0	21.69	1	0-1
	1732.5	20175	5	QPSK	12	6	21.70	1	0-1
	1732.5	20175	5	QPSK	12	13	21.73	1	0-1
	1732.5	20175	5	QPSK	25	0	21.59	1	0-1
	1732.5	20175	5	16-QAM	1	0	21.42	1	0-1
	1732.5	20175	5	16-QAM	1	12	21.52	1	0-1
	1732.5	20175	5	16-QAM	1	24	21.44	1	0-1
	1732.5	20175	5	16-QAM	12	0	20.78	2	0-2
	1732.5	20175	5	16-QAM	12	6	20.82	2	0-2
	1732.5	20175	5	16-QAM	12	13	20.88	2	0-2
	1732.5	20175	5	16-QAM	25	0	20.61	2	0-2
High	1752.5	20375	5	QPSK	1	0	22.69	0	0
	1752.5	20375	5	QPSK	1	12	22.73	0	0
	1752.5	20375	5	QPSK	1	24	22.62	0	0
	1752.5	20375	5	QPSK	12	0	21.74	1	0-1
	1752.5	20375	5	QPSK	12	6	21.73	1	0-1
	1752.5	20375	5	QPSK	12	13	21.62	1	0-1
	1752.5	20375	5	QPSK	25	0	21.62	1	0-1
	1752.5	20375	5	16-QAM	1	0	21.60	1	0-1
	1752.5	20375	5	16-QAM	1	12	21.57	1	0-1
	1752.5	20375	5	16-QAM	1	24	21.48	1	0-1
	1752.5	20375	5	16-QAM	12	0	20.74	2	0-2
	1752.5	20375	5	16-QAM	12	6	20.76	2	0-2
	1752.5	20375	5	16-QAM	12	13	20.65	2	0-2
	1752.5	20375	5	16-QAM	25	0	20.62	2	0-2

9.3.4 LTE Band 2 (PCS)

Table 9-9
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1860	18700	20	QPSK	1	0	22.31	0	0
	1860	18700	20	QPSK	1	50	22.07	0	0
	1860	18700	20	QPSK	1	99	22.20	0	0
	1860	18700	20	QPSK	50	0	20.94	1	0-1
	1860	18700	20	QPSK	50	25	20.79	1	0-1
	1860	18700	20	QPSK	50	50	20.80	1	0-1
	1860	18700	20	QPSK	100	0	20.96	1	0-1
	1860	18700	20	16QAM	1	0	20.94	1	0-1
	1860	18700	20	16QAM	1	50	21.02	1	0-1
	1860	18700	20	16QAM	1	99	21.09	1	0-1
	1860	18700	20	16QAM	50	0	20.06	2	0-2
	1860	18700	20	16QAM	50	25	19.87	2	0-2
	1860	18700	20	16QAM	50	50	19.90	2	0-2
	1860	18700	20	16QAM	100	0	20.02	2	0-2
Mid	1880.0	18900	20	QPSK	1	0	**22.34**	0	0
	1880.0	18900	20	QPSK	1	50	22.17	0	0
	1880.0	18900	20	QPSK	1	99	22.22	0	0
	1880.0	18900	20	QPSK	50	0	21.03	1	0-1
	1880.0	18900	20	QPSK	50	25	20.98	1	0-1
	1880.0	18900	20	QPSK	50	50	21.00	1	0-1
	1880.0	18900	20	QPSK	100	0	21.03	1	0-1
	1880.0	18900	20	16QAM	1	0	21.45	1	0-1
	1880.0	18900	20	16QAM	1	50	21.37	1	0-1
	1880.0	18900	20	16QAM	1	99	21.42	1	0-1
	1880.0	18900	20	16QAM	50	0	20.07	2	0-2
	1880.0	18900	20	16QAM	50	25	20.04	2	0-2
	1880.0	18900	20	16QAM	50	50	19.98	2	0-2
	1880.0	18900	20	16QAM	100	0	20.08	2	0-2
High	1900	19100	20	QPSK	1	0	22.25	0	0
	1900	19100	20	QPSK	1	50	22.09	0	0
	1900	19100	20	QPSK	1	99	22.01	0	0
	1900	19100	20	QPSK	50	0	**21.18**	1	0-1
	1900	19100	20	QPSK	50	25	20.96	1	0-1
	1900	19100	20	QPSK	50	50	21.05	1	0-1
	1900	19100	20	QPSK	100	0	21.02	1	0-1
	1900	19100	20	16QAM	1	0	21.23	1	0-1
	1900	19100	20	16QAM	1	50	21.50	1	0-1
	1900	19100	20	16QAM	1	99	21.48	1	0-1
	1900	19100	20	16QAM	50	0	20.12	2	0-2
	1900	19100	20	16QAM	50	25	20.07	2	0-2
	1900	19100	20	16QAM	50	50	20.09	2	0-2
	1900	19100	20	16QAM	100	0	20.15	2	0-2

Table 9-10
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1857.5	18675	15	QPSK	1	0	22.43	0	0
	1857.5	18675	15	QPSK	1	36	22.38	0	0
	1857.5	18675	15	QPSK	1	74	22.35	0	0
	1857.5	18675	15	QPSK	36	0	21.21	1	0-1
	1857.5	18675	15	QPSK	36	18	21.23	1	0-1
	1857.5	18675	15	QPSK	36	37	21.19	1	0-1
	1857.5	18675	15	QPSK	75	0	21.19	1	0-1
	1857.5	18675	15	16QAM	1	0	21.39	1	0-1
	1857.5	18675	15	16QAM	1	36	21.40	1	0-1
	1857.5	18675	15	16QAM	1	74	21.38	1	0-1
	1857.5	18675	15	16QAM	36	0	20.33	2	0-2
	1857.5	18675	15	16QAM	36	18	20.29	2	0-2
	1857.5	18675	15	16QAM	36	37	20.30	2	0-2
	1857.5	18675	15	16QAM	75	0	20.26	2	0-2
Mid	1880.0	18900	15	QPSK	1	0	22.43	0	0
	1880.0	18900	15	QPSK	1	36	22.47	0	0
	1880.0	18900	15	QPSK	1	74	22.48	0	0
	1880.0	18900	15	QPSK	36	0	21.16	1	0-1
	1880.0	18900	15	QPSK	36	18	21.23	1	0-1
	1880.0	18900	15	QPSK	36	37	21.22	1	0-1
	1880.0	18900	15	QPSK	75	0	21.24	1	0-1
	1880.0	18900	15	16QAM	1	0	21.41	1	0-1
	1880.0	18900	15	16QAM	1	36	21.42	1	0-1
	1880.0	18900	15	16QAM	1	74	21.47	1	0-1
	1880.0	18900	15	16QAM	36	0	20.26	2	0-2
	1880.0	18900	15	16QAM	36	18	20.32	2	0-2
	1880.0	18900	15	16QAM	36	37	20.21	2	0-2
	1880.0	18900	15	16QAM	75	0	20.31	2	0-2
High	1902.5	19125	15	QPSK	1	0	22.48	0	0
	1902.5	19125	15	QPSK	1	36	22.47	0	0
	1902.5	19125	15	QPSK	1	74	22.40	0	0
	1902.5	19125	15	QPSK	36	0	21.35	1	0-1
	1902.5	19125	15	QPSK	36	18	21.37	1	0-1
	1902.5	19125	15	QPSK	36	37	21.36	1	0-1
	1902.5	19125	15	QPSK	75	0	21.30	1	0-1
	1902.5	19125	15	16QAM	1	0	21.50	1	0-1
	1902.5	19125	15	16QAM	1	36	21.42	1	0-1
	1902.5	19125	15	16QAM	1	74	21.45	1	0-1
	1902.5	19125	15	16QAM	36	0	20.36	2	0-2
	1902.5	19125	15	16QAM	36	18	20.42	2	0-2
	1902.5	19125	15	16QAM	36	37	20.38	2	0-2
	1902.5	19125	15	16QAM	75	0	20.34	2	0-2

Table 9-11
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1855	18650	10	QPSK	1	0	22.37	0	0
	1855	18650	10	QPSK	1	25	22.34	0	0
	1855	18650	10	QPSK	1	49	22.40	0	0
	1855	18650	10	QPSK	25	0	21.24	1	0-1
	1855	18650	10	QPSK	25	12	21.23	1	0-1
	1855	18650	10	QPSK	25	25	21.24	1	0-1
	1855	18650	10	QPSK	50	0	21.19	1	0-1
	1855	18650	10	16QAM	1	0	21.43	1	0-1
	1855	18650	10	16QAM	1	25	21.38	1	0-1
	1855	18650	10	16QAM	1	49	21.42	1	0-1
	1855	18650	10	16QAM	25	0	20.25	2	0-2
	1855	18650	10	16QAM	25	12	20.32	2	0-2
	1855	18650	10	16QAM	25	25	20.30	2	0-2
	1855	18650	10	16QAM	50	0	20.23	2	0-2
Mid	1880.0	18900	10	QPSK	1	0	22.45	0	0
	1880.0	18900	10	QPSK	1	25	22.43	0	0
	1880.0	18900	10	QPSK	1	49	22.44	0	0
	1880.0	18900	10	QPSK	25	0	21.22	1	0-1
	1880.0	18900	10	QPSK	25	12	21.30	1	0-1
	1880.0	18900	10	QPSK	25	25	21.21	1	0-1
	1880.0	18900	10	QPSK	50	0	21.22	1	0-1
	1880.0	18900	10	16QAM	1	0	21.40	1	0-1
	1880.0	18900	10	16QAM	1	25	21.45	1	0-1
	1880.0	18900	10	16QAM	1	49	21.44	1	0-1
	1880.0	18900	10	16QAM	25	0	20.29	2	0-2
	1880.0	18900	10	16QAM	25	12	20.34	2	0-2
	1880.0	18900	10	16QAM	25	25	20.26	2	0-2
	1880.0	18900	10	16QAM	50	0	20.30	2	0-2
High	1905	19150	10	QPSK	1	0	22.39	0	0
	1905	19150	10	QPSK	1	25	22.45	0	0
	1905	19150	10	QPSK	1	49	22.35	0	0
	1905	19150	10	QPSK	25	0	21.38	1	0-1
	1905	19150	10	QPSK	25	12	21.39	1	0-1
	1905	19150	10	QPSK	25	25	21.42	1	0-1
	1905	19150	10	QPSK	50	0	21.32	1	0-1
	1905	19150	10	16QAM	1	0	21.48	1	0-1
	1905	19150	10	16QAM	1	25	21.43	1	0-1
	1905	19150	10	16QAM	1	49	21.44	1	0-1
	1905	19150	10	16QAM	25	0	20.37	2	0-2
	1905	19150	10	16QAM	25	12	20.41	2	0-2
	1905	19150	10	16QAM	25	25	20.43	2	0-2
	1905	19150	10	16QAM	50	0	20.29	2	0-2

Table 9-12
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1852.5	18625	5	QPSK	1	0	22.44	0	0
	1852.5	18625	5	QPSK	1	12	22.32	0	0
	1852.5	18625	5	QPSK	1	24	22.42	0	0
	1852.5	18625	5	QPSK	12	0	21.31	1	0-1
	1852.5	18625	5	QPSK	12	6	21.28	1	0-1
	1852.5	18625	5	QPSK	12	13	21.26	1	0-1
	1852.5	18625	5	QPSK	25	0	21.19	1	0-1
	1852.5	18625	5	16-QAM	1	0	21.42	1	0-1
	1852.5	18625	5	16-QAM	1	12	21.36	1	0-1
	1852.5	18625	5	16-QAM	1	24	21.44	1	0-1
	1852.5	18625	5	16-QAM	12	0	20.39	2	0-2
	1852.5	18625	5	16-QAM	12	6	20.37	2	0-2
	1852.5	18625	5	16-QAM	12	13	20.36	2	0-2
	1852.5	18625	5	16-QAM	25	0	20.25	2	0-2
Mid	1880.0	18900	5	QPSK	1	0	22.48	0	0
	1880.0	18900	5	QPSK	1	12	22.44	0	0
	1880.0	18900	5	QPSK	1	24	22.34	0	0
	1880.0	18900	5	QPSK	12	0	21.39	1	0-1
	1880.0	18900	5	QPSK	12	6	21.35	1	0-1
	1880.0	18900	5	QPSK	12	13	21.34	1	0-1
	1880.0	18900	5	QPSK	25	0	21.30	1	0-1
	1880.0	18900	5	16-QAM	1	0	21.42	1	0-1
	1880.0	18900	5	16-QAM	1	12	21.46	1	0-1
	1880.0	18900	5	16-QAM	1	24	21.33	1	0-1
	1880.0	18900	5	16-QAM	12	0	20.45	2	0-2
	1880.0	18900	5	16-QAM	12	6	20.44	2	0-2
	1880.0	18900	5	16-QAM	12	13	20.43	2	0-2
	1880.0	18900	5	16-QAM	25	0	20.39	2	0-2
High	1907.5	19175	5	QPSK	1	0	22.39	0	0
	1907.5	19175	5	QPSK	1	12	22.42	0	0
	1907.5	19175	5	QPSK	1	24	22.35	0	0
	1907.5	19175	5	QPSK	12	0	21.43	1	0-1
	1907.5	19175	5	QPSK	12	6	21.40	1	0-1
	1907.5	19175	5	QPSK	12	13	21.33	1	0-1
	1907.5	19175	5	QPSK	25	0	21.35	1	0-1
	1907.5	19175	5	16-QAM	1	0	21.48	1	0-1
	1907.5	19175	5	16-QAM	1	12	21.42	1	0-1
	1907.5	19175	5	16-QAM	1	24	21.35	1	0-1
	1907.5	19175	5	16-QAM	12	0	20.47	2	0-2
	1907.5	19175	5	16-QAM	12	6	20.45	2	0-2
	1907.5	19175	5	16-QAM	12	13	20.47	2	0-2
	1907.5	19175	5	16-QAM	25	0	20.41	2	0-2

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
09/03/2013	750H	22.3	710	0.882	42.819	0.887	42.113	-0.56%	1.68%
			725	0.897	42.564	0.888	42.033	1.01%	1.26%
			740	0.908	42.350	0.889	41.953	2.14%	0.95%
			755	0.922	42.223	0.891	41.876	3.48%	0.83%
09/09/2013	835H	23.1	820	0.925	43.002	0.898	41.571	3.01%	3.44%
			835	0.939	42.776	0.900	41.500	4.33%	3.07%
			850	0.953	42.614	0.916	41.500	4.04%	2.68%
09/11/2013	835H	23.8	820	0.893	41.422	0.898	41.571	-0.56%	-0.36%
			835	0.908	41.264	0.900	41.500	0.89%	-0.57%
			850	0.922	41.162	0.916	41.500	0.66%	-0.81%
09/12/2013	1750H	22.7	1710	1.327	41.264	1.348	40.136	-1.56%	2.81%
			1750	1.367	41.060	1.370	40.100	-0.22%	2.39%
			1790	1.407	40.745	1.394	40.020	0.93%	1.81%
09/12/2013	1900H	23.7	1850	1.345	41.152	1.400	40.000	-3.93%	2.88%
			1880	1.374	41.054	1.400	40.000	-1.86%	2.64%
			1910	1.406	40.885	1.400	40.000	0.43%	2.21%
09/16/2013	1900H	23.2	1850	1.384	39.861	1.400	40.000	-1.14%	-0.35%
			1880	1.416	39.648	1.400	40.000	1.14%	-0.88%
			1910	1.451	39.508	1.400	40.000	3.64%	-1.23%
09/06/2013	750B	22.9	710	0.934	56.370	0.960	55.687	-2.71%	1.23%
			725	0.954	56.224	0.961	55.629	-0.73%	1.07%
			740	0.966	56.188	0.963	55.570	0.31%	1.11%
			755	0.978	56.032	0.964	55.512	1.45%	0.94%
09/03/2013	835B	22.6	820	0.998	54.934	0.969	55.258	2.99%	-0.59%
			835	1.016	54.761	0.970	55.200	4.74%	-0.80%
			850	1.030	54.629	0.988	55.154	4.25%	-0.95%
09/09/2013	835B	22.8	820	0.969	56.262	0.969	55.258	0.00%	1.82%
			835	0.992	56.205	0.970	55.200	2.27%	1.82%
			850	1.015	55.919	0.988	55.154	2.73%	1.39%
09/10/2013	1750B	22.9	1710	1.400	52.539	1.460	53.540	-4.11%	-1.87%
			1750	1.444	52.430	1.490	53.430	-3.09%	-1.87%
			1790	1.497	52.225	1.510	53.330	-0.86%	-2.07%
09/13/2013	1750B	23.7	1710	1.451	51.903	1.460	53.540	-0.62%	-3.06%
			1750	1.494	51.725	1.490	53.430	0.27%	-3.19%
			1790	1.532	51.573	1.510	53.330	1.46%	-3.29%
09/10/2013	1900B	23.1	1850	1.458	52.637	1.520	53.300	-4.08%	-1.24%
			1880	1.495	52.555	1.520	53.300	-1.64%	-1.40%
			1910	1.526	52.463	1.520	53.300	0.39%	-1.57%
09/13/2013	1900B	23.3	1850	1.458	52.406	1.520	53.300	-4.08%	-1.68%
			1880	1.488	52.288	1.520	53.300	-2.11%	-1.90%
			1910	1.515	52.171	1.520	53.300	-0.33%	-2.12%
09/16/2013	1900B	22.1	1850	1.502	52.747	1.520	53.300	-1.18%	-1.04%
			1880	1.540	52.554	1.520	53.300	1.32%	-1.40%
			1910	1.569	52.472	1.520	53.300	3.22%	-1.55%

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

10.2 Test System Verification

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

Table 10-2
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
B	750	HEAD	09/03/2013	23.0	22.3	0.100	1054	3287	0.853	8.500	8.530	0.35%
G	835	HEAD	09/09/2013	24.0	23.1	0.100	4d119	3209	0.951	9.680	9.510	-1.76%
E	835	HEAD	09/11/2013	23.5	23.8	0.100	4d119	3920	0.980	9.680	9.800	1.24%
B	1750	HEAD	09/12/2013	23.0	22.7	0.100	1008	3287	3.840	36.800	38.400	4.35%
F	1900	HEAD	09/12/2013	23.7	23.7	0.100	5d148	3213	3.880	39.700	38.800	-2.27%
G	1900	HEAD	09/16/2013	24.5	23.4	0.100	5d148	3209	3.960	39.700	39.600	-0.25%
E	750	BODY	09/06/2013	23.9	22.7	0.100	1003	3920	0.846	8.830	8.460	-4.19%
G	835	BODY	09/03/2013	24.3	22.6	0.100	4d119	3209	0.996	9.540	9.960	4.40%
G	835	BODY	09/09/2013	24.0	22.8	0.100	4d119	3209	0.945	9.540	9.450	-0.94%
B	1750	BODY	09/10/2013	23.3	22.9	0.100	1008	3287	3.830	38.200	38.300	0.26%
B	1750	BODY	09/13/2013	23.5	23.7	0.100	1008	3287	3.770	38.200	37.700	-1.31%
D	1900	BODY	09/10/2013	24.5	23.1	0.100	5d148	3022	4.180	40.800	41.800	2.45%
D	1900	BODY	09/13/2013	24.5	23.1	0.100	5d148	3022	4.100	40.800	41.000	0.49%
D	1900	BODY	09/16/2013	22.7	22.3	0.100	5d148	3022	4.290	40.800	42.900	5.15%

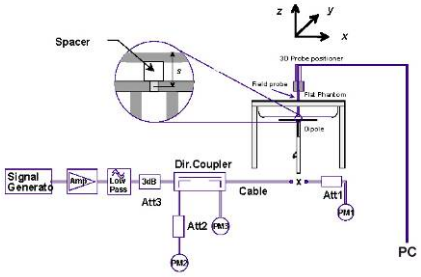

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back 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	32.96	0.14	Right	Cheek	Standard	21F0A	1:8.3	0.142	1.132	0.161	
836.60	190	GSM 850	GSM	33.5	32.96	-0.21	Right	Tilt	Standard	21F0A	1:8.3	0.100	1.132	0.113	
836.60	190	GSM 850	GSM	33.5	32.96	0.04	Left	Cheek	Standard	21F0A	1:8.3	0.202	1.132	0.229	A1
836.60	190	GSM 850	GSM	33.5	32.96	0.03	Left	Cheek	Wireless Charging Cover	21F0A	1:8.3	0.193	1.132	0.218	
836.60	190	GSM 850	GSM	33.5	32.96	0.11	Left	Tilt	Standard	21F0A	1:8.3	0.122	1.132	0.138	
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
GSM 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back 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	30.5	30.47	0.03	Right	Cheek	Standard	21F0A	1:8.3	0.122	1.007	0.123	
1880.00	661	GSM 1900	GSM	30.5	30.47	-0.04	Right	Tilt	Standard	21F0A	1:8.3	0.120	1.007	0.121	
1880.00	661	GSM 1900	GSM	30.5	30.47	-0.05	Left	Cheek	Standard	21F0A	1:8.3	0.235	1.007	0.237	A2
1880.00	661	GSM 1900	GSM	30.5	30.47	-0.05	Left	Cheek	Wireless Charging Cover	21F0A	1:8.3	0.205	1.007	0.206	
1880.00	661	GSM 1900	GSM	30.5	30.47	0.02	Left	Tilt	Standard	21F0A	1:8.3	0.094	1.007	0.095	
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
UMTS 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back 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	24.0	23.69	-0.01	Right	Cheek	Standard	21F0A	1:1	0.140	1.074	0.150	
836.60	4183	UMTS 850	RMC	24.0	23.69	0.00	Right	Tilt	Standard	21F0A	1:1	0.105	1.074	0.113	
836.60	4183	UMTS 850	RMC	24.0	23.69	0.00	Left	Cheek	Standard	21F0A	1:1	0.197	1.074	0.212	A3
836.60	4183	UMTS 850	RMC	24.0	23.69	-0.02	Left	Cheek	Wireless Charging Cover	21F0A	1:1	0.195	1.074	0.209	
836.60	4183	UMTS 850	RMC	24.0	23.69	0.06	Left	Tilt	Standard	21F0A	1:1	0.101	1.074	0.108	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-4
UMTS 1750 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.08	Right	Cheek	Standard	21F2F	1:1	0.129	1.016	0.131	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	-0.04	Right	Tilt	Standard	21F2F	1:1	0.128	1.016	0.130	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	-0.02	Left	Cheek	Standard	21F2F	1:1	0.229	1.016	0.233	A4
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.00	Left	Cheek	Wireless Charging Cover	21F2F	1:1	0.217	1.016	0.220	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.03	Left	Tilt	Standard	21F2F	1:1	0.103	1.016	0.105	
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	Back 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	22.82	0.02	Right	Cheek	Standard	21F20	1:1	0.144	1.042	0.150	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.02	Right	Tilt	Standard	21F20	1:1	0.165	1.042	0.172	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.05	Left	Cheek	Standard	21F20	1:1	0.241	1.042	0.251	A5
1880.00	9400	UMTS 1900	RMC	23.0	22.82	0.02	Left	Cheek	Wireless Charging Cover	21F20	1:1	0.229	1.042	0.239	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.02	Left	Tilt	Standard	21F20	1:1	0.101	1.042	0.105	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-6
LTE Band 17 Head SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	-0.06	0	Right	Cheek	QPSK	1	25	21FB4	1:1	0.098	1.072	0.105	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.13	1	Right	Cheek	QPSK	25	12	21FB4	1:1	0.080	1.159	0.093	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	-0.02	0	Right	Tilt	QPSK	1	25	21FB4	1:1	0.063	1.072	0.068	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	-0.19	1	Right	Tilt	QPSK	25	12	21FB4	1:1	0.050	1.159	0.058	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	0.03	0	Left	Cheek	QPSK	1	25	21FB4	1:1	0.136	1.072	0.146	
710.00	23790	Mid	LTE Band 17	10	Wireless Charging Cover	24.3	24.00	-0.14	0	Left	Cheek	QPSK	1	25	21FB4	1:1	0.138	1.072	0.148	A6
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.00	1	Left	Cheek	QPSK	25	12	21FB4	1:1	0.096	1.159	0.111	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	-0.01	0	Left	Tilt	QPSK	1	25	21FB4	1:1	0.082	1.072	0.088	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.01	1	Left	Tilt	QPSK	25	12	21FB4	1:1	0.053	1.159	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 11-7
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	0.10	0	Right	Cheek	QPSK	1	0	21FB4	1:1	0.123	1.005	0.124	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	0.03	1	Right	Cheek	QPSK	25	12	21FB4	1:1	0.094	1.062	0.100	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	0.01	0	Right	Tilt	QPSK	1	0	21FB4	1:1	0.085	1.005	0.085	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	0.10	1	Right	Tilt	QPSK	25	12	21FB4	1:1	0.062	1.062	0.066	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	0.11	0	Left	Cheek	QPSK	1	0	21FB4	1:1	0.168	1.005	0.169	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Wireless Charging Cover	23.5	23.48	-0.03	0	Left	Cheek	QPSK	1	0	21FB4	1:1	0.178	1.005	0.179	A7
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	0.10	1	Left	Cheek	QPSK	25	12	21FB4	1:1	0.130	1.062	0.138	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	-0.06	0	Left	Tilt	QPSK	1	0	21FB4	1:1	0.102	1.005	0.103	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	-0.06	1	Left	Tilt	QPSK	25	12	21FB4	1:1	0.075	1.062	0.080	
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]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	-0.04	0	Right	Cheek	QPSK	1	0	21F36	1:1	0.173	1.016	0.176	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.00	1	Right	Cheek	QPSK	50	50	21F36	1:1	0.111	1.059	0.118	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.08	0	Right	Tilt	QPSK	1	0	21F36	1:1	0.172	1.016	0.175	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.06	1	Right	Tilt	QPSK	50	50	21F36	1:1	0.115	1.059	0.122	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	-0.13	0	Left	Cheek	QPSK	1	0	21F36	1:1	0.291	1.016	0.296	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging Cover	23.0	22.93	0.07	0	Left	Cheek	QPSK	1	0	21F36	1:1	0.301	1.016	**0.306**	A8
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.04	1	Left	Cheek	QPSK	50	50	21F36	1:1	0.209	1.059	0.221	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.05	0	Left	Tilt	QPSK	1	0	21F36	1:1	0.152	1.016	0.154	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.08	1	Left	Tilt	QPSK	50	50	21F36	1:1	0.104	1.059	0.110	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-9
LTE Band 2 (PCS) Head SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.16	0	Right	Cheek	QPSK	1	0	21F20	1:1	0.145	1.038	0.151	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.00	1	Right	Cheek	QPSK	50	0	21F20	1:1	0.103	1.076	0.111	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.05	0	Right	Tilt	QPSK	1	0	21F20	1:1	0.129	1.038	0.134	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.14	1	Right	Tilt	QPSK	50	0	21F20	1:1	0.102	1.076	0.110	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	0.07	0	Left	Cheek	QPSK	1	0	21F20	1:1	0.223	1.038	0.231	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Wireless Charging Cover	22.5	22.34	0.12	0	Left	Cheek	QPSK	1	0	21F20	1:1	0.227	1.038	0.236	A9
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	-0.02	1	Left	Cheek	QPSK	50	0	21F20	1:1	0.186	1.076	0.200	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.04	0	Left	Tilt	QPSK	1	0	21F20	1:1	0.089	1.038	0.092	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.00	1	Left	Tilt	QPSK	50	0	21F20	1:1	0.076	1.076	0.082	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

11.2 Standalone Body-Worn SAR Data

Table 11-10
GSM/UMTS Body-Worn SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back 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	32.96	-0.02	10 mm	Standard	21F0A	1	1:8.3	back	0.353	1.132	0.400	A10
836.60	190	GSM 850	GSM	33.5	32.96	0.02	10 mm	Wireless Charging Cover	21F0A	1	1:8.3	back	0.272	1.132	0.308	
1850.20	512	GSM 1900	GSM	30.5	30.45	-0.06	10 mm	Standard	21F0A	1	1:8.3	back	0.801	1.012	0.811	
1880.00	661	GSM 1900	GSM	30.5	30.47	-0.04	10 mm	Standard	21F0A	1	1:8.3	back	0.858	1.007	0.864	A12
1909.80	810	GSM 1900	GSM	30.5	30.50	-0.03	10 mm	Standard	21F0A	1	1:8.3	back	0.786	1.000	0.786	
1880.00	661	GSM 1900	GSM	30.5	30.47	0.01	10 mm	Wireless Charging Cover	21F0A	1	1:8.3	back	0.644	1.007	0.649	
836.60	4183	UMTS 850	RMC	24.0	23.69	0.00	10 mm	Standard	21F0A	N/A	1:1	back	0.345	1.074	0.371	A14
836.60	4183	UMTS 850	RMC	24.0	23.69	-0.14	10 mm	Wireless Charging Cover	21F0A	N/A	1:1	back	0.260	1.074	0.279	
1712.40	1312	UMTS 1750	RMC	23.0	22.79	0.20	10 mm	Standard	21F2F	N/A	1:1	back	0.902	1.050	0.947	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.09	10 mm	Standard	21F2F	N/A	1:1	back	0.917	1.016	0.932	A15
1752.50	1862	UMTS 1750	RMC	23.0	22.78	0.20	10 mm	Standard	21F2F	N/A	1:1	back	0.844	1.052	0.888	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.18	10 mm	Wireless Charging Cover	21F2F	N/A	1:1	back	0.836	1.016	0.849	
1852.40	9262	UMTS 1900	RMC	23.0	22.79	-0.01	10 mm	Standard	21F20	N/A	1:1	back	0.899	1.050	0.944	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	0.01	10 mm	Standard	21F20	N/A	1:1	back	0.968	1.042	1.009	A16
1907.60	9538	UMTS 1900	RMC	23.0	22.80	0.03	10 mm	Standard	21F20	N/A	1:1	back	0.950	1.047	0.995	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	0.18	10 mm	Wireless Charging Cover	21F20	N/A	1:1	back	0.828	1.042	0.863	
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 11-11
LTE Body-Worn SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Back 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 (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	0.00	0	21FB4	QPSK	1	25	10 mm	back	1:1	0.379	1.072	0.406	A17
710.00	23790	Mid	LTE Band 17	10	Wireless Charging Cover	24.3	24.00	-0.02	0	21FB4	QPSK	1	25	10 mm	back	1:1	0.304	1.072	0.326	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.06	1	21FB4	QPSK	25	12	10 mm	back	1:1	0.288	1.159	0.334	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	-0.05	0	21FB4	QPSK	1	0	10 mm	back	1:1	0.341	1.005	0.343	A18
836.50	20525	Mid	LTE Band 5 (Cell)	10	Wireless Charging Cover	23.5	23.48	0.01	0	21FB4	QPSK	1	0	10 mm	back	1:1	0.231	1.005	0.232	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	-0.01	1	21FB4	QPSK	25	12	10 mm	back	1:1	0.256	1.062	0.272	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.06	0	21F36	QPSK	1	0	10 mm	back	1:1	0.999	1.016	**1.015**	A19
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging Cover	23.0	22.93	0.11	0	21F36	QPSK	1	0	10 mm	back	1:1	0.712	1.016	0.723	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.10	1	21F36	QPSK	50	50	10 mm	back	1:1	0.748	1.059	0.792	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.70	0.02	1	21F36	QPSK	100	0	10 mm	back	1:1	0.749	1.072	0.803	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.21	0	21F36	QPSK	1	0	10 mm	back	1:1	0.977	1.016	0.993	
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	22.5	22.31	0.02	0	21F20	QPSK	1	0	10 mm	back	1:1	0.837	1.045	0.875	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.04	0	21F20	QPSK	1	0	10 mm	back	1:1	0.932	1.038	0.967	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	22.5	22.25	-0.08	0	21F20	QPSK	1	0	10 mm	back	1:1	0.950	1.059	1.006	A20
1900.00	19100	High	LTE Band 2 (PCS)	20	Wireless Charging Cover	22.5	22.25	-0.06	0	21F20	QPSK	1	0	10 mm	back	1:1	0.775	1.059	0.821	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	-0.01	1	21F20	QPSK	50	0	10 mm	back	1:1	0.741	1.076	0.797	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.03	0.01	1	21F20	QPSK	100	0	10 mm	back	1:1	0.723	1.114	0.805	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Note: Blue entry represents variability test data.

11.3 Standalone Wireless Router SAR Data

Table 11-12
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back 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)	
836.60	190	GSM 850	GPRS	29.5	28.35	-0.04	10 mm	Standard	21F0A	4	1:2.076	back	0.338	1.303	0.440	
836.60	190	GSM 850	GPRS	29.5	28.35	0.02	10 mm	Standard	21F0A	4	1:2.076	front	0.263	1.303	0.343	
836.60	190	GSM 850	GPRS	29.5	28.35	-0.09	10 mm	Standard	21F0A	4	1:2.076	bottom	0.338	1.303	0.440	
836.60	190	GSM 850	GPRS	29.5	28.35	0.03	10 mm	Standard	21F0A	4	1:2.076	right	0.432	1.303	0.563	A11
836.60	190	GSM 850	GPRS	29.5	28.35	0.05	10 mm	Wireless Charging Cover	21F0A	4	1:2.076	right	0.425	1.303	0.554	
836.60	190	GSM 850	GPRS	29.5	28.35	0.05	10 mm	Standard	21F0A	4	1:2.076	left	0.231	1.303	0.301	
1850.20	512	GSM 1900	GPRS	25.3	24.82	0.19	10 mm	Standard	21F0A	4	1:2.076	back	0.891	1.117	0.995	
1880.00	661	GSM 1900	GPRS	25.3	24.93	-0.01	10 mm	Standard	21F0A	4	1:2.076	back	0.991	1.089	**1.079**	A13
1909.80	810	GSM 1900	GPRS	25.3	24.78	-0.03	10 mm	Standard	21F0A	4	1:2.076	back	0.931	1.127	1.049	
1880.00	661	GSM 1900	GPRS	25.3	24.93	0.04	10 mm	Wireless Charging Cover	21F0A	4	1:2.076	back	0.803	1.089	0.874	
1850.20	512	GSM 1900	GPRS	25.3	24.82	-0.02	10 mm	Standard	21F0A	4	1:2.076	front	0.668	1.117	0.746	
1880.00	661	GSM 1900	GPRS	25.3	24.93	-0.03	10 mm	Standard	21F0A	4	1:2.076	front	0.742	1.089	0.808	
1909.80	810	GSM 1900	GPRS	25.3	24.78	-0.01	10 mm	Standard	21F0A	4	1:2.076	front	0.645	1.127	0.727	
1880.00	661	GSM 1900	GPRS	25.3	24.93	-0.01	10 mm	Standard	21F0A	4	1:2.076	bottom	0.510	1.089	0.555	
1880.00	661	GSM 1900	GPRS	25.3	24.93	-0.05	10 mm	Standard	21F0A	4	1:2.076	right	0.076	1.089	0.083	
1880.00	661	GSM 1900	GPRS	25.3	24.93	-0.06	10 mm	Standard	21F0A	4	1:2.076	left	0.265	1.089	0.289	
1880.00	661	GSM 1900	GPRS	25.3	24.93	0.02	10 mm	Standard	21F0A	4	1:2.076	back	0.979	1.089	1.066	
836.60	4183	UMTS 850	RMC	24.0	23.69	0.00	10 mm	Standard	21F0A	N/A	1:1	back	0.345	1.074	0.371	A14
836.60	4183	UMTS 850	RMC	24.0	23.69	-0.14	10 mm	Wireless Charging Cover	21F0A	N/A	1:1	back	0.260	1.074	0.279	
836.60	4183	UMTS 850	RMC	24.0	23.69	-0.04	10 mm	Standard	21F0A	N/A	1:1	front	0.312	1.074	0.335	
836.60	4183	UMTS 850	RMC	24.0	23.69	-0.01	10 mm	Standard	21F0A	N/A	1:1	bottom	0.191	1.074	0.205	
836.60	4183	UMTS 850	RMC	24.0	23.69	-0.02	10 mm	Standard	21F0A	N/A	1:1	right	0.184	1.074	0.198	
836.60	4183	UMTS 850	RMC	24.0	23.69	0.01	10 mm	Standard	21F0A	N/A	1:1	left	0.319	1.074	0.343	
1712.40	1312	UMTS 1750	RMC	23.0	22.79	0.20	10 mm	Standard	21F2F	N/A	1:1	back	0.902	1.050	0.947	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.09	10 mm	Standard	21F2F	N/A	1:1	back	0.917	1.016	0.932	A15
1752.50	1862	UMTS 1750	RMC	23.0	22.78	0.20	10 mm	Standard	21F2F	N/A	1:1	back	0.844	1.052	0.888	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.18	10 mm	Wireless Charging Cover	21F2F	N/A	1:1	back	0.836	1.016	0.849	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.04	10 mm	Standard	21F2F	N/A	1:1	front	0.700	1.016	0.711	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	-0.04	10 mm	Standard	21F2F	N/A	1:1	bottom	0.596	1.016	0.606	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	-0.18	10 mm	Standard	21F2F	N/A	1:1	right	0.067	1.016	0.068	
1732.40	1412	UMTS 1750	RMC	23.0	22.93	0.02	10 mm	Standard	21F2F	N/A	1:1	left	0.186	1.016	0.189	
1852.40	9262	UMTS 1900	RMC	23.0	22.79	-0.01	10 mm	Standard	21F20	N/A	1:1	back	0.899	1.050	0.944	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	0.01	10 mm	Standard	21F20	N/A	1:1	back	0.968	1.042	1.009	A16
1907.60	9538	UMTS 1900	RMC	23.0	22.80	0.03	10 mm	Standard	21F20	N/A	1:1	back	0.950	1.047	0.995	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.01	10 mm	Wireless Charging Cover	21F20	N/A	1:1	back	0.828	1.042	0.863	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.05	10 mm	Standard	21F20	N/A	1:1	front	0.754	1.042	0.786	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.06	10 mm	Standard	21F20	N/A	1:1	bottom	0.617	1.042	0.643	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.02	10 mm	Standard	21F20	N/A	1:1	right	0.102	1.042	0.106	
1880.00	9400	UMTS 1900	RMC	23.0	22.82	-0.02	10 mm	Standard	21F20	N/A	1:1	left	0.229	1.042	0.239	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note: Blue entry represents variability test data.

Table 11-13
LTE Band 17 Hotspot SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Back 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 (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	0.00	0	21FB4	QPSK	1	25	10 mm	back	1:1	0.379	1.072	0.406	A17
710.00	23790	Mid	LTE Band 17	10	Wireless Charging Cover	24.3	24.00	-0.02	0	21FB4	QPSK	1	25	10 mm	back	1:1	0.304	1.072	0.326	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.06	1	21FB4	QPSK	25	12	10 mm	back	1:1	0.288	1.159	0.334	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	0.02	0	21FB4	QPSK	1	25	10 mm	front	1:1	0.303	1.072	0.325	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.00	1	21FB4	QPSK	25	12	10 mm	front	1:1	0.237	1.159	0.275	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	-0.04	0	21FB4	QPSK	1	25	10 mm	bottom	1:1	0.149	1.072	0.160	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	-0.07	1	21FB4	QPSK	25	12	10 mm	bottom	1:1	0.110	1.159	0.127	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	0.01	0	21FB4	QPSK	1	25	10 mm	right	1:1	0.215	1.072	0.230	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.04	1	21FB4	QPSK	25	12	10 mm	right	1:1	0.161	1.159	0.187	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	24.00	-0.01	0	21FB4	QPSK	1	25	10 mm	left	1:1	0.364	1.072	0.390	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.66	0.03	1	21FB4	QPSK	25	12	10 mm	left	1:1	0.275	1.159	0.319	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Body 1.6 W/kg (mW/g) averaged over 1 gram					

Table 11-14
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Back 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 (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	-0.05	0	21FB4	QPSK	1	0	10 mm	back	1:1	0.341	1.005	0.343	A18
836.50	20525	Mid	LTE Band 5 (Cell)	10	Wireless Charging Cover	23.5	23.48	0.01	0	21FB4	QPSK	1	0	10 mm	back	1:1	0.231	1.005	0.232	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	-0.01	1	21FB4	QPSK	25	12	10 mm	back	1:1	0.256	1.062	0.272	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	-0.01	0	21FB4	QPSK	1	0	10 mm	front	1:1	0.286	1.005	0.287	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	-0.02	1	21FB4	QPSK	25	12	10 mm	front	1:1	0.227	1.062	0.241	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	0.05	0	21FB4	QPSK	1	0	10 mm	bottom	1:1	0.171	1.005	0.172	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	-0.03	1	21FB4	QPSK	25	12	10 mm	bottom	1:1	0.141	1.062	0.150	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	-0.06	0	21FB4	QPSK	1	0	10 mm	right	1:1	0.262	1.005	0.263	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	-0.06	1	21FB4	QPSK	25	12	10 mm	right	1:1	0.189	1.062	0.201	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.48	0.00	0	21FB4	QPSK	1	0	10 mm	left	1:1	0.274	1.005	0.275	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.24	0.00	1	21FB4	QPSK	25	12	10 mm	left	1:1	0.215	1.062	0.228	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Body 1.6 W/kg (mW/g) averaged over 1 gram					

Table 11-15
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Back 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 (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.06	0	21F36	QPSK	1	0	10 mm	back	1:1	0.999	1.016	1.015	A19
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging Cover	23.0	22.93	0.11	0	21F36	QPSK	1	0	10 mm	back	1:1	0.712	1.016	0.723	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.10	1	21F36	QPSK	50	50	10 mm	back	1:1	0.748	1.059	0.792	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.70	0.02	1	21F36	QPSK	100	0	10 mm	back	1:1	0.749	1.072	0.803	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.02	0	21F36	QPSK	1	0	10 mm	front	1:1	0.691	1.016	0.702	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.08	1	21F36	QPSK	50	50	10 mm	front	1:1	0.549	1.059	0.581	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.00	0	21F36	QPSK	1	0	10 mm	bottom	1:1	0.641	1.016	0.651	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.02	1	21F36	QPSK	50	50	10 mm	bottom	1:1	0.491	1.059	0.520	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.02	0	21F36	QPSK	1	0	10 mm	right	1:1	0.081	1.016	0.082	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	-0.15	1	21F36	QPSK	50	50	10 mm	right	1:1	0.060	1.059	0.064	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.02	0	21F36	QPSK	1	0	10 mm	left	1:1	0.228	1.016	0.232	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.75	0.08	1	21F36	QPSK	50	50	10 mm	left	1:1	0.173	1.059	0.183	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	22.93	0.21	0	21F36	QPSK	1	0	10 mm	back	1:1	0.977	1.016	0.993	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry represents variability test data.

Table 11-16
LTE Band 2 (PCS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Back 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 (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	22.5	22.31	0.02	0	21F20	QPSK	1	0	10 mm	back	1:1	0.837	1.045	0.875	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.04	0	21F20	QPSK	1	0	10 mm	back	1:1	0.932	1.038	0.967	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	22.5	22.25	-0.08	0	21F20	QPSK	1	0	10 mm	back	1:1	0.950	1.059	1.006	A20
1900.00	19100	High	LTE Band 2 (PCS)	20	Wireless Charging Cover	22.5	22.25	-0.06	0	21F20	QPSK	1	0	10 mm	back	1:1	0.775	1.059	0.821	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	-0.01	1	21F20	QPSK	50	0	10 mm	back	1:1	0.741	1.076	0.797	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.03	0.01	1	21F20	QPSK	100	0	10 mm	back	1:1	0.723	1.114	0.805	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	0.04	0	21F20	QPSK	1	0	10 mm	front	1:1	0.591	1.038	0.613	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.02	1	21F20	QPSK	50	0	10 mm	front	1:1	0.465	1.076	0.500	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.05	0	21F20	QPSK	1	0	10 mm	bottom	1:1	0.597	1.038	0.620	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.04	1	21F20	QPSK	50	0	10 mm	bottom	1:1	0.462	1.076	0.497	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	-0.03	0	21F20	QPSK	1	0	10 mm	right	1:1	0.087	1.038	0.090	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	-0.02	1	21F20	QPSK	50	0	10 mm	right	1:1	0.069	1.076	0.074	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.34	0.02	0	21F20	QPSK	1	0	10 mm	left	1:1	0.206	1.038	0.214	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.00	1	21F20	QPSK	50	0	10 mm	left	1:1	0.164	1.076	0.176	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram									

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, FCC/OET Bulletin 65, Supplement C [June 2001] and FCC KDB Publication 447498 D01v05r01.
2. Batteries are fully charged at the beginning of the SAR measurements. Battery with NFC antenna was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05r01.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r01, 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 SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v01r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r01, this device is considered a "phablet" since the diagonal distance is greater than 160 mm but less than 200 mm. Hand SAR tests are not required for licensed transmitter because Hotspot SAR was < 1.2 W/kg.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D03v01r01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR for hotspot SAR.
3. Per FCC KDB Publication 447498 D01v05r01, when the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg, testing at the other channels was not required for such test configuration(s).

UMTS Notes:

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

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r02. The general test procedures used for testing can be found in Section 8.4.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

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

12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r01 IV.C.1.iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg.

12.3 Head SAR Simultaneous Transmission Analysis

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.161	0.111	0.272
	Right Tilt	0.113	0.096	0.209
	Left Cheek	0.229	0.281	**0.510**
	Left Tilt	0.138	0.151	0.289

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.123	0.111	0.234
	Right Tilt	0.121	0.096	0.217
	Left Cheek	0.237	0.281	**0.518**
	Left Tilt	0.095	0.151	0.246

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.111	0.261
	Right Tilt	0.113	0.096	0.209
	Left Cheek	0.212	0.281	**0.493**
	Left Tilt	0.108	0.151	0.259

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.131	0.111	0.242
	Right Tilt	0.130	0.096	0.226
	Left Cheek	0.233	0.281	**0.514**
	Left Tilt	0.105	0.151	0.256

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.111	0.261
	Right Tilt	0.172	0.096	0.268
	Left Cheek	0.251	0.281	**0.532**
	Left Tilt	0.105	0.151	0.256

Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.105	0.111	0.216
	Right Tilt	0.068	0.096	0.164
	Left Cheek	0.148	0.281	**0.429**
	Left Tilt	0.088	0.151	0.239

Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.124	0.111	0.235
	Right Tilt	0.085	0.096	0.181
	Left Cheek	0.179	0.281	**0.460**
	Left Tilt	0.103	0.151	0.254

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.176	0.111	0.287
	Right Tilt	0.175	0.096	0.271
	Left Cheek	0.306	0.281	**0.587**
	Left Tilt	0.154	0.151	0.305

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.151	0.111	0.262
	Right Tilt	0.134	0.096	0.230
	Left Cheek	0.236	0.281	**0.517**
	Left Tilt	0.092	0.151	0.243

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.161	0.158	0.319	Head SAR	Right Cheek	0.123	0.158	0.281
	Right Tilt	0.113	0.155	0.268		Right Tilt	0.121	0.155	0.276
	Left Cheek	0.229	0.455	**0.684**		Left Cheek	0.237	0.455	**0.692**
	Left Tilt	0.138	0.342	0.480		Left Tilt	0.095	0.342	0.437
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.158	0.308	Head SAR	Right Cheek	0.131	0.158	0.289
	Right Tilt	0.113	0.155	0.268		Right Tilt	0.130	0.155	0.285
	Left Cheek	0.212	0.455	**0.667**		Left Cheek	0.233	0.455	**0.688**
	Left Tilt	0.108	0.342	0.450		Left Tilt	0.105	0.342	0.447
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.150	0.158	0.308	Head SAR	Right Cheek	0.105	0.158	0.263
	Right Tilt	0.172	0.155	0.327		Right Tilt	0.068	0.155	0.223
	Left Cheek	0.251	0.455	**0.706**		Left Cheek	0.148	0.455	**0.603**
	Left Tilt	0.105	0.342	0.447		Left Tilt	0.088	0.342	0.430
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.124	0.158	0.282	Head SAR	Right Cheek	0.176	0.158	0.334
	Right Tilt	0.085	0.155	0.240		Right Tilt	0.175	0.155	0.330
	Left Cheek	0.179	0.455	**0.634**		Left Cheek	0.306	0.455	**0.761**
	Left Tilt	0.103	0.342	0.445		Left Tilt	0.154	0.342	0.496
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Head SAR	Right Cheek	0.151	0.158	0.309					
	Right Tilt	0.134	0.155	0.289					
	Left Cheek	0.236	0.455	**0.691**					
	Left Tilt	0.092	0.342	0.434					

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

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.400	0.145	0.545
Back Side	GSM 1900	0.864	0.145	1.009
Back Side	UMTS 850	0.371	0.145	0.516
Back Side	UMTS 1750	0.947	0.145	1.092
Back Side	UMTS 1900	1.009	0.145	1.154
Back Side	LTE Band 17	0.406	0.145	0.551
Back Side	LTE Band 5 (Cell)	0.343	0.145	0.488
Back Side	LTE Band 4 (AWS)	1.015	0.145	1.160
Back Side	LTE Band 2 (PCS)	1.006	0.145	1.151

Table 12-4
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.400	0.160	0.560
Back Side	GSM 1900	0.864	0.160	1.024
Back Side	UMTS 850	0.371	0.160	0.531
Back Side	UMTS 1750	0.947	0.160	1.107
Back Side	UMTS 1900	1.009	0.160	1.169
Back Side	LTE Band 17	0.406	0.160	0.566
Back Side	LTE Band 5 (Cell)	0.343	0.160	0.503
Back Side	LTE Band 4 (AWS)	1.015	0.160	1.175
Back Side	LTE Band 2 (PCS)	1.006	0.160	1.166

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

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

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.400	0.208	0.608
Back Side	GSM 1900	0.864	0.208	1.072
Back Side	UMTS 850	0.371	0.208	0.579
Back Side	UMTS 1750	0.947	0.208	1.155
Back Side	UMTS 1900	1.009	0.208	**1.217**
Back Side	LTE Band 17	0.406	0.208	0.614
Back Side	LTE Band 5 (Cell)	0.343	0.208	0.551
Back Side	LTE Band 4 (AWS)	1.015	0.208	1.223
Back Side	LTE Band 2 (PCS)	1.006	0.208	1.214

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498 D01v05r01. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.5 Hotspot SAR Simultaneous Transmission Analysis

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

Table 12-6
Simultaneous Transmission Scenario (2.4 GHz Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.440	0.145	0.585	Body SAR	Back	1.079	0.145	**1.224**
	Front	0.343	0.049	0.392		Front	0.808	0.049	0.857
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.440	-	0.440		Bottom	0.555	-	0.555
	Right	0.563	0.084	**0.647**		Right	0.083	0.084	0.167
	Left	0.301	-	0.301		Left	0.289	-	0.289
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.371	0.145	**0.516**	Body SAR	Back	0.947	0.145	**1.092**
	Front	0.335	0.049	0.384		Front	0.711	0.049	0.760
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.205	-	0.205		Bottom	0.606	-	0.606
	Right	0.198	0.084	0.282		Right	0.068	0.084	0.152
	Left	0.343	-	0.343		Left	0.189	-	0.189

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.009	0.145	**1.154**	Body SAR	Back	0.406	0.145	**0.551**
	Front	0.786	0.049	0.835		Front	0.325	0.049	0.374
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.643	-	0.643		Bottom	0.160	-	0.160
	Right	0.106	0.084	0.190		Right	0.230	0.084	0.314
	Left	0.239	-	0.239		Left	0.390	-	0.390
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.343	0.145	**0.488**	Body SAR	Back	1.015	0.145	**1.160**
	Front	0.287	0.049	0.336		Front	0.702	0.049	0.751
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.172	-	0.172		Bottom	0.651	-	0.651
	Right	0.263	0.084	0.347		Right	0.082	0.084	0.166
	Left	0.275	-	0.275		Left	0.232	-	0.232
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Body SAR	Back	1.006	0.145	**1.151**					
	Front	0.613	0.049	0.662					
	Top	-	0.034	0.034					
	Bottom	0.620	-	0.620					
	Right	0.090	0.084	0.174					
	Left	0.214	-	0.214					

Table 12-7
Simultaneous Transmission Scenario (5.8 GHz Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.440	0.123	0.563	Body SAR	Back	1.079	0.123	**1.202**
	Front	0.343	0.033	0.376		Front	0.808	0.033	0.841
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.440	-	0.440		Bottom	0.555	-	0.555
	Right	0.563	0.067	**0.630**		Right	0.083	0.067	0.150
	Left	0.301	-	0.301		Left	0.289	-	0.289
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.371	0.123	**0.494**	Body SAR	Back	0.947	0.123	**1.070**
	Front	0.335	0.033	0.368		Front	0.711	0.033	0.744
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.205	-	0.205		Bottom	0.606	-	0.606
	Right	0.198	0.067	0.265		Right	0.068	0.067	0.135
	Left	0.343	-	0.343		Left	0.189	-	0.189

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.009	0.123	**1.132**	Body SAR	Back	0.406	0.123	**0.529**
	Front	0.786	0.033	0.819		Front	0.325	0.033	0.358
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.643	-	0.643		Bottom	0.160	-	0.160
	Right	0.106	0.067	0.173		Right	0.230	0.067	0.297
	Left	0.239	-	0.239		Left	0.390	-	0.390
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.343	0.123	**0.466**	Body SAR	Back	1.015	0.123	**1.138**
	Front	0.287	0.033	0.320		Front	0.702	0.033	0.735
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.172	-	0.172		Bottom	0.651	-	0.651
	Right	0.263	0.067	0.330		Right	0.082	0.067	0.149
	Left	0.275	-	0.275		Left	0.232	-	0.232
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Body SAR	Back	1.006	0.123	**1.129**					
	Front	0.613	0.033	0.646					
	Top	-	0.081	0.081					
	Bottom	0.620	-	0.620					
	Right	0.090	0.067	0.157					
	Left	0.214	-	0.214					

12.6 Simultaneous Transmission Conclusion

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

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

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

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
1750	1732.50	20175	LTE Band 4 (AWS)	QPSK, 1 RB, 0 RB Offset	N/A	back	10 mm	0.999	0.977	1.02	N/A	N/A	N/A	N/A
1900	1880.00	661	GSM 1900	GPRS	4	back	10 mm	0.991	0.979	1.01	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram							

13.2 Measurement Uncertainty

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

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/16/2013	Annual	4/16/2014	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/16/2013	Annual	4/16/2014	JP38020182
Agilent	8648D	(9kHz-4GHz) Signal Generator	4/17/2013	Annual	4/17/2014	3629U00687
Agilent	85070C	Dielectric Probe Kit	2/14/2013	Annual	2/14/2014	MY44300633
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Agilent	E5515C	Wireless Communications Test Set	9/24/2012	Annual	9/24/2013	GB43163447
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Anritsu	ML2438A	Power Meter	12/4/2012	Annual	12/4/2013	1070030
Anritsu	MA2481A	Power Sensor	2/14/2013	Annual	2/14/2014	5821
Anritsu	MA2481A	Power Sensor	2/14/2013	Annual	2/14/2014	2400
Anritsu	MA2411B	Pulse Power Sensor	12/4/2012	Annual	12/4/2013	1207364
Anritsu	MA2411B	Pulse Power Sensor	12/5/2012	Annual	12/5/2013	1126066
Anritsu	MT8820C	Radio Communication Analyzer	6/28/2013	Annual	6/28/2014	6201240328
Anritsu	MT8820C	Radio Communication Tester	11/6/2012	Annual	11/6/2013	6200901190
Anritsu	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244515
Anritsu	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244512
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Gigatronics	8651A	Universal Power Meter	10/10/2012	Annual	10/10/2013	8650319
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	5/3/2013	Annual	5/3/2014	836371/0079
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	2/8/2013	Annual	2/8/2014	101699
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Rohde & Schwarz	SME06	Signal Generator	10/11/2012	Annual	10/11/2013	832026
Rohde & Schwarz	SMIQ03B	Signal Generator	4/17/2013	Annual	4/17/2014	DE27259
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	D1765V2	1765 MHz SAR Dipole	5/14/2013	Annual	5/14/2014	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	2/6/2013	Annual	2/6/2014	5d148
SPEAG	D750V3	750 MHz Dipole	3/18/2013	Annual	3/18/2014	1054
SPEAG	D750V3	750 MHz Dipole	1/7/2013	Annual	1/7/2014	1003
SPEAG	D835V2	835 MHz SAR Dipole	4/25/2013	Annual	4/25/2014	4d119
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/21/2013	Annual	8/21/2013	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/22/2013	Annual	4/22/2014	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/13/2012	Annual	11/13/2013	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/6/2013	Annual	2/6/2014	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2013	Annual	3/8/2014	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	12/11/2012	Annual	12/11/2013	1091
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/14/2013	Annual	5/14/2014	1070
SPEAG	ES3DV2	SAR Probe	8/22/2013	Annual	8/22/2014	3022
SPEAG	ES3DV3	SAR Probe	4/29/2013	Annual	4/29/2014	3213
SPEAG	ES3DV3	SAR Probe	11/15/2012	Annual	11/15/2013	3287
SPEAG	EX3DV4	SAR Probe	2/27/2013	Annual	2/27/2014	3920
SPEAG	ES3DV3	SAR Probe	3/15/2013	Annual	3/15/2014	3209
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/17/2013	Annual	4/17/2014	B010177
VWR	23226-658	Long Stem Thermometer	3/30/2012	Biennial	3/30/2014	122179874
VWR	23226-658	Long Stem Thermometer	5/16/2012	Biennial	5/16/2014	122295544
VWR	23226-658	Long Stem Thermometer	6/27/2012	Biennial	6/27/2014	122363923
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886414
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886441
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859323
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859332

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

15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

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

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

Applicable for frequencies up to 6 GHz.

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

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

16 CONCLUSION

16.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F0A

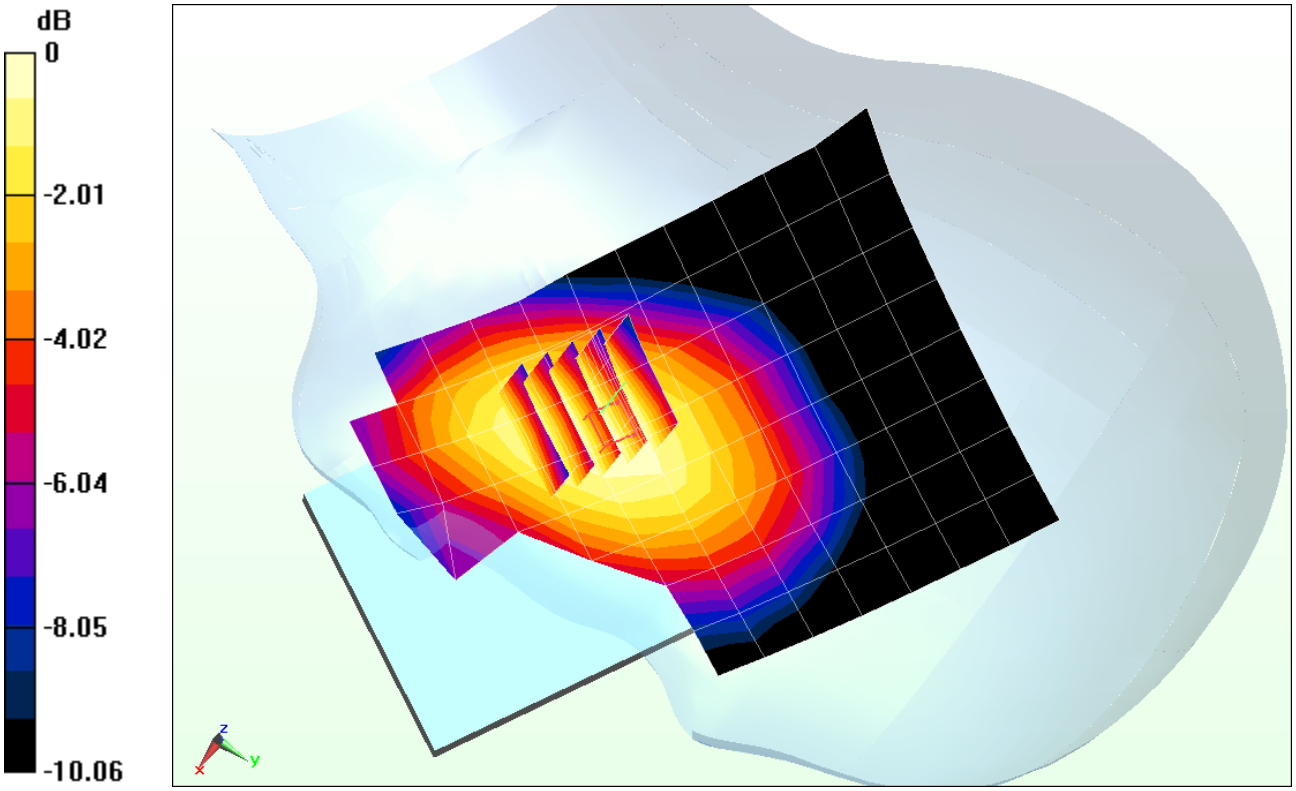
Communication System: GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.909 S/m; ε_r = 41.253; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-11-2013; Ambient Temp: 23.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(9.58, 9.58, 9.58); Calibrated: 2/27/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

Mode: GSM 850, Left Head, Cheek, Mid.ch, 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 = 14.506 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.257 W/kg
SAR(1 g) = 0.202 W/kg



0 dB = 0.210 W/kg = -6.78 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F0A

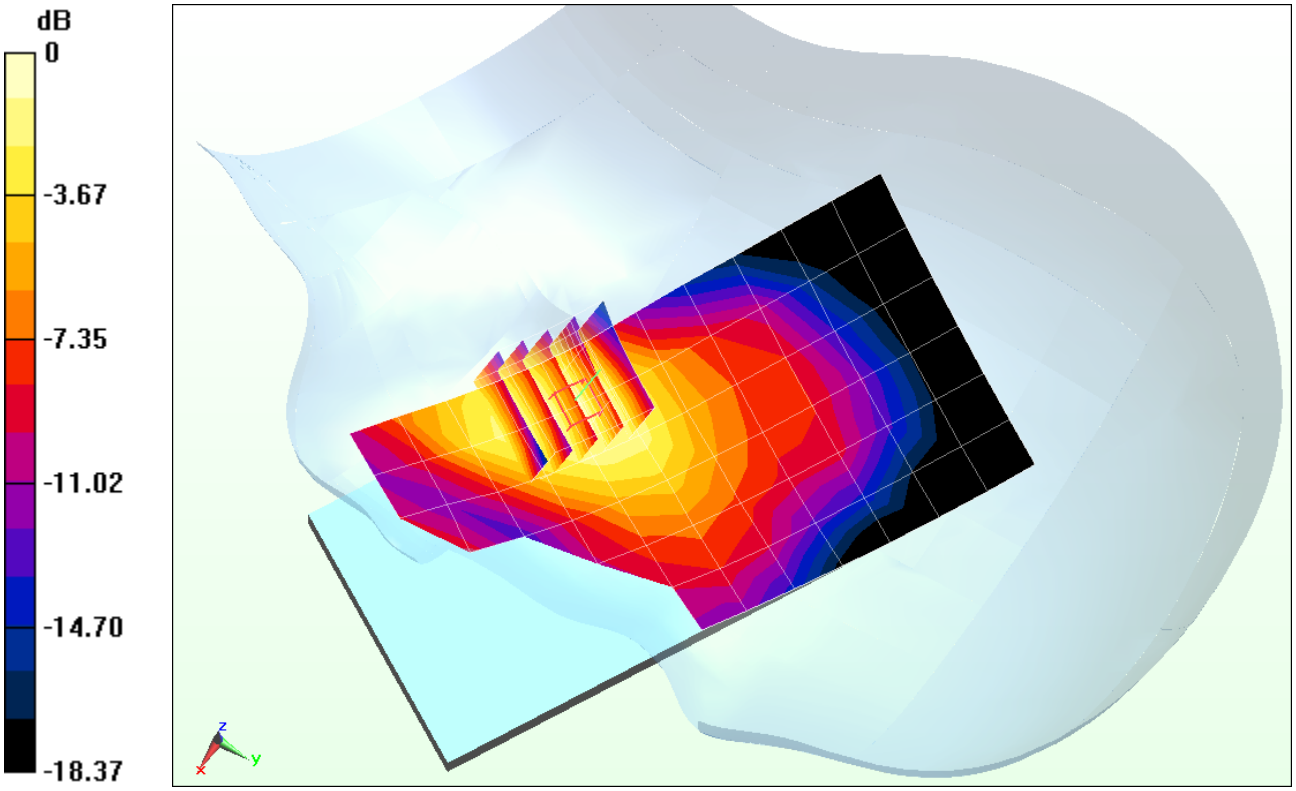
Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.374 S/m; ε_r = 41.054; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-12-2013; Ambient Temp: 23.7°C; Tissue Temp: 23.7°C

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

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

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.800 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.359 W/kg
SAR(1 g) = 0.235 W/kg



0 dB = 0.253 W/kg = -5.97 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 210FA

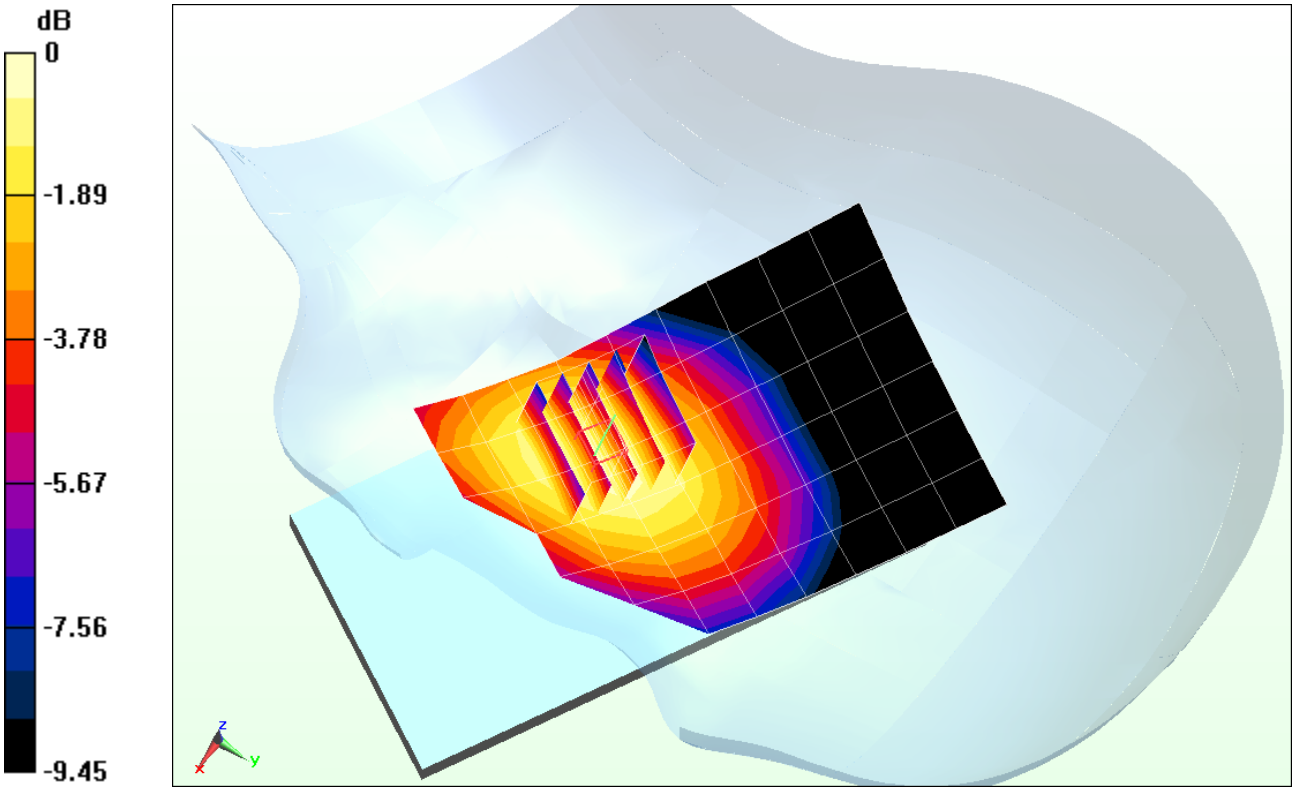
Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.94 S/m; ε_r = 42.759; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-09-2013; Ambient Temp: 24.0°C; Tissue Temp: 23.1°C

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

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

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.162 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.197 W/kg



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

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F2F

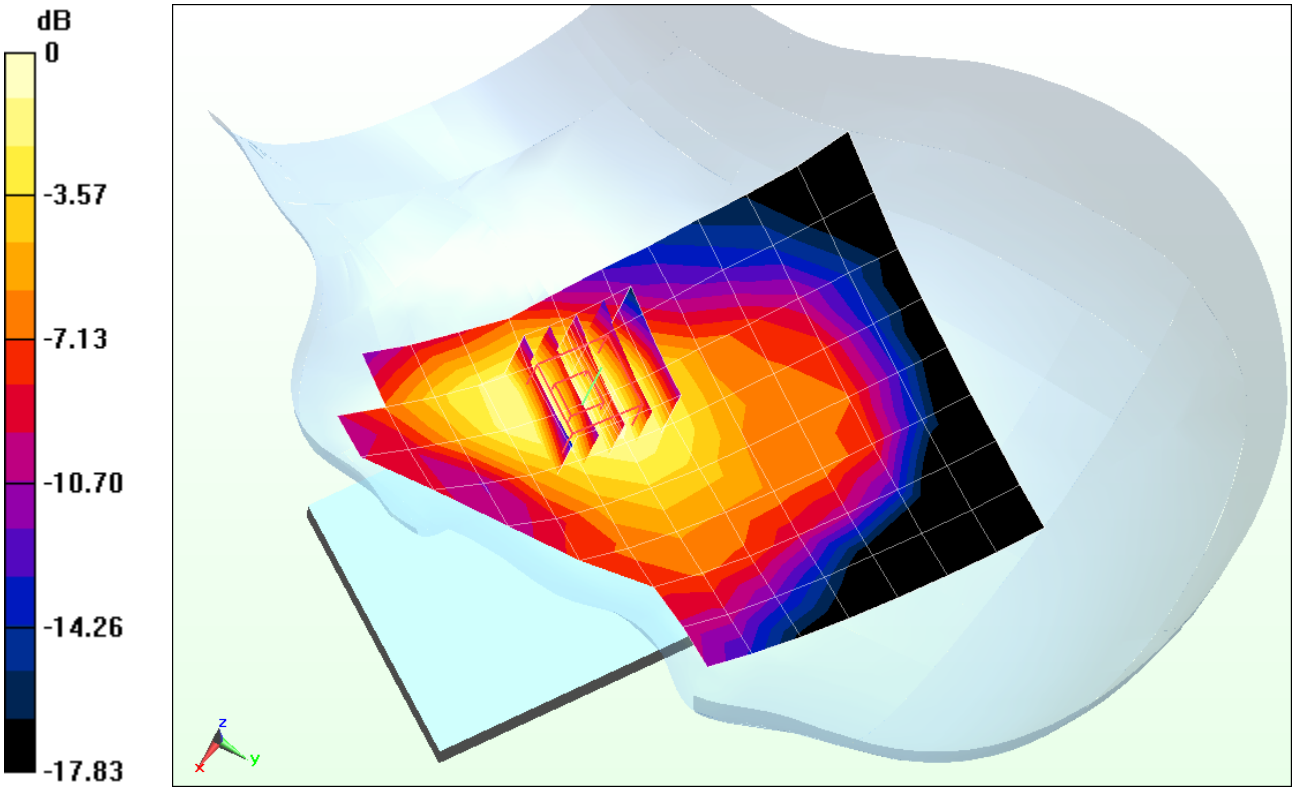
Communication System: AWS UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
$f = 1732.4$ MHz; $\sigma = 1.349$ S/m; $\varepsilon_r = 41.15$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 09-12-2013; Ambient Temp: 23.0°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.16, 5.16, 5.16); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

Mode: UMTS 1750, Left Head, Cheek, Mid.ch, 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 = 13.416 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.333 W/kg
SAR(1 g) = 0.229 W/kg



0 dB = 0.245 W/kg = -6.11 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F20

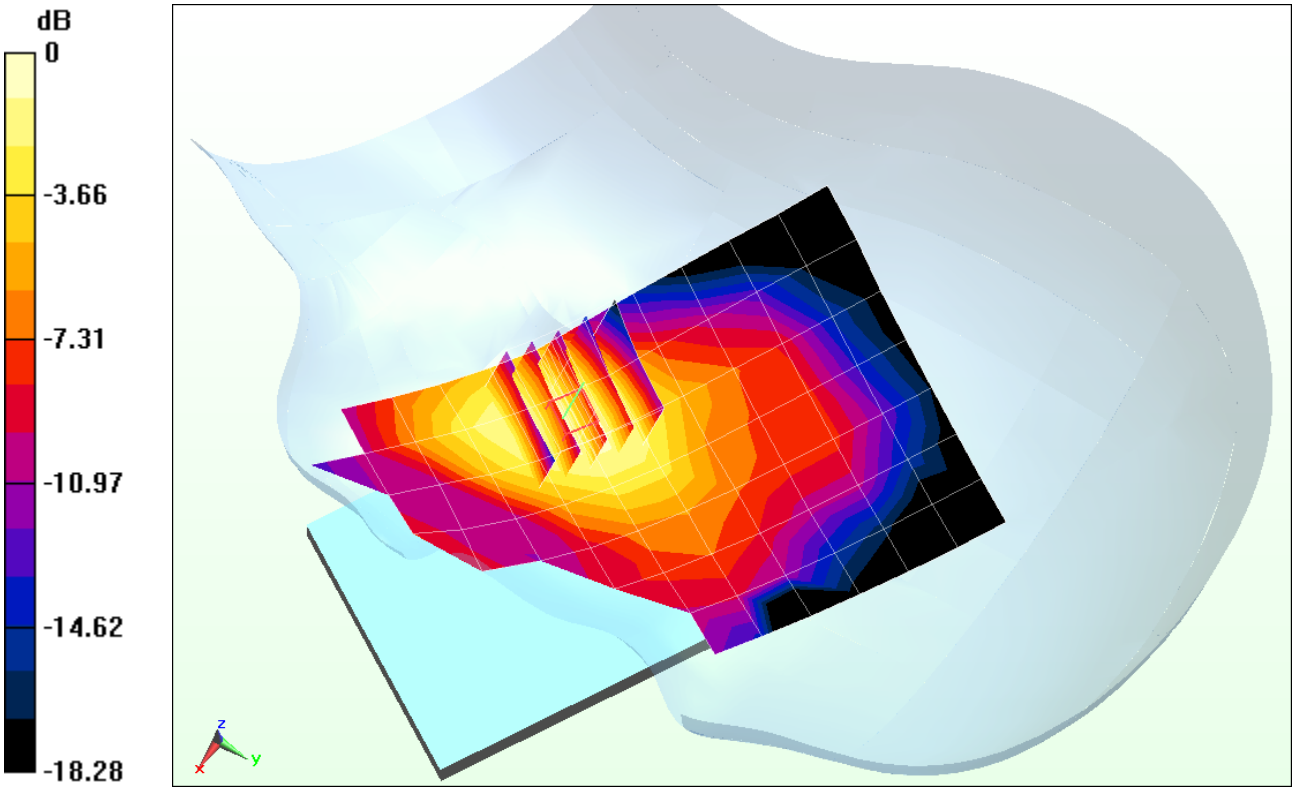
Communication System: UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.374 S/m; ε_r = 41.054; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-12-2013; Ambient Temp: 23.7°C; Tissue Temp: 23.7°C

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

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.167 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.358 W/kg
SAR(1 g) = 0.241 W/kg



0 dB = 0.258 W/kg = -5.88 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21FB4

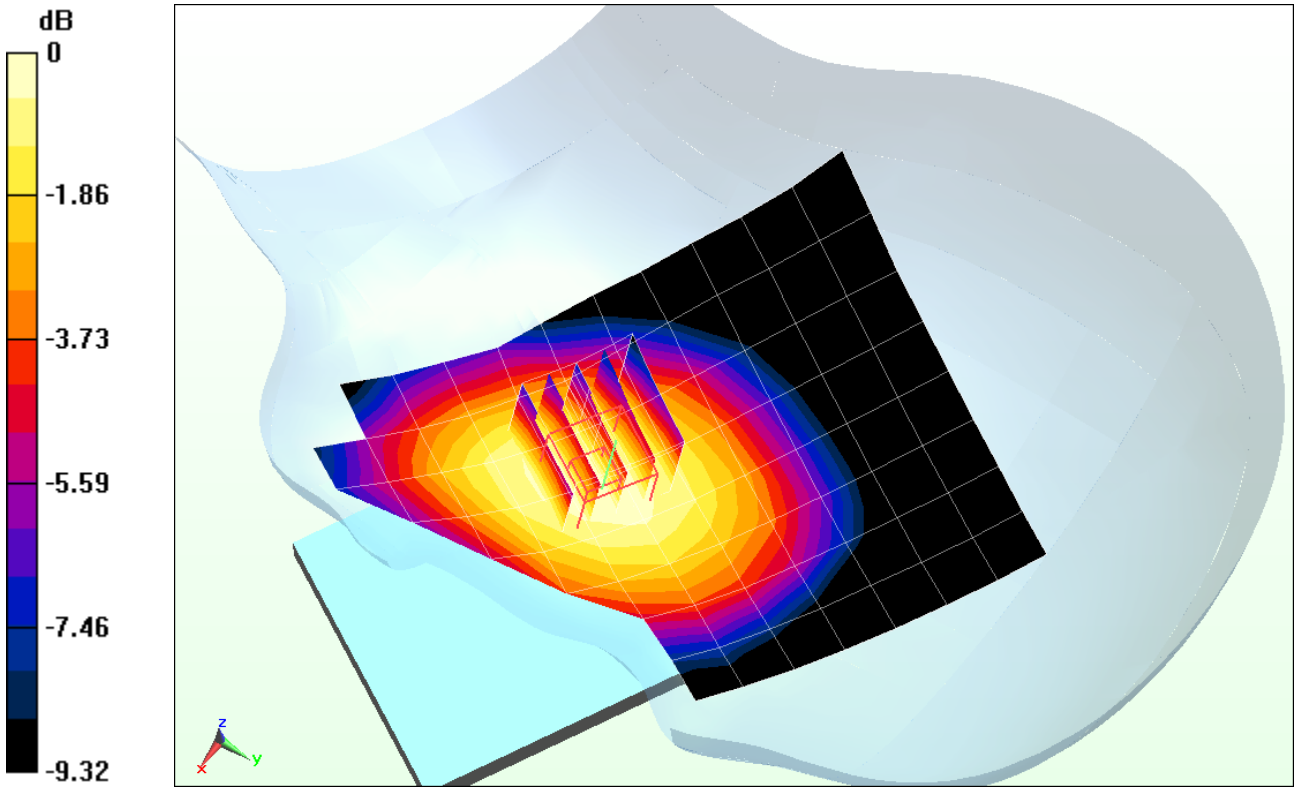
Communication System: LTE BAND 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used:
f = 710 MHz; σ = 0.882 S/m; ε_r = 42.819; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-03-2013; Ambient Temp: 23.0°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(6.4, 6.4, 6.4); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 17, Left Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Wireless Charging 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 = 13.343 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.162 W/kg
SAR(1 g) = 0.138 W/kg



0 dB = 0.144 W/kg = -8.42 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21FB4

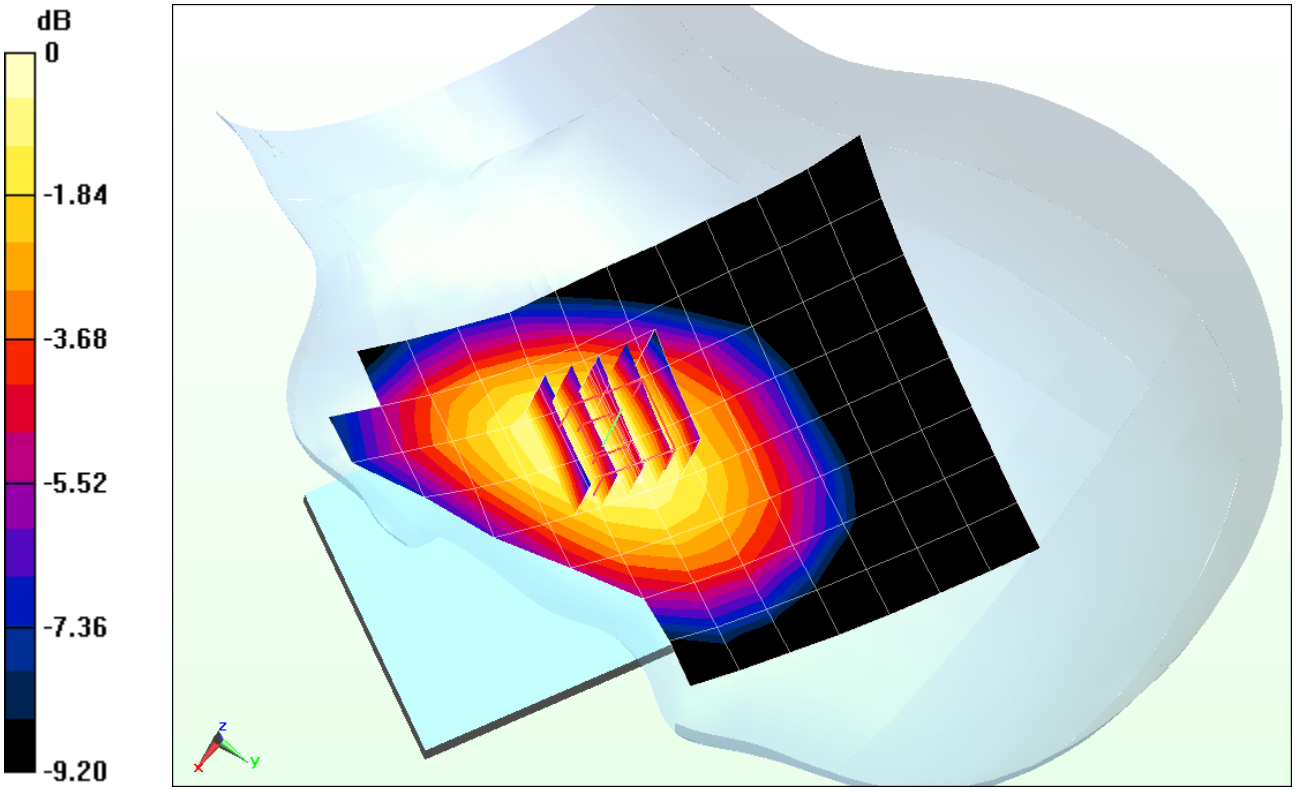
Communication System: LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.909$ S/m; $\varepsilon_r = 41.254$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 09-11-2013; Ambient Temp: 23.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(9.58, 9.58, 9.58); Calibrated: 2/27/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 5 (Cell.), Left Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset, Wireless Charging 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 = 13.637 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.227 W/kg
SAR(1 g) = 0.178 W/kg



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

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F36

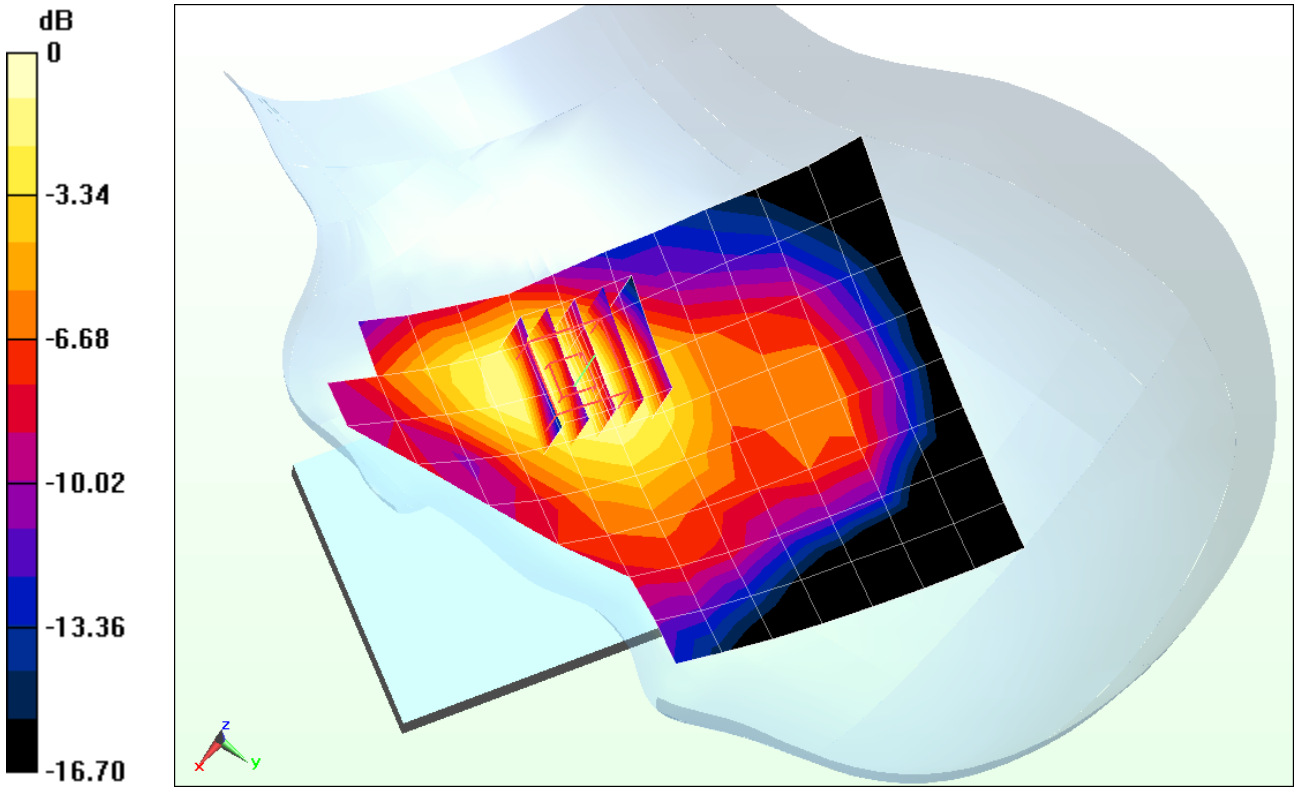
Communication System: LTE RF; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.35 S/m; ε_r = 41.149; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-12-2013; Ambient Temp: 23.0°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.16, 5.16, 5.16); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset, Wireless Charging 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 = 16.083 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.433 W/kg
SAR(1 g) = 0.301 W/kg



0 dB = 0.319 W/kg = -4.96 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F20

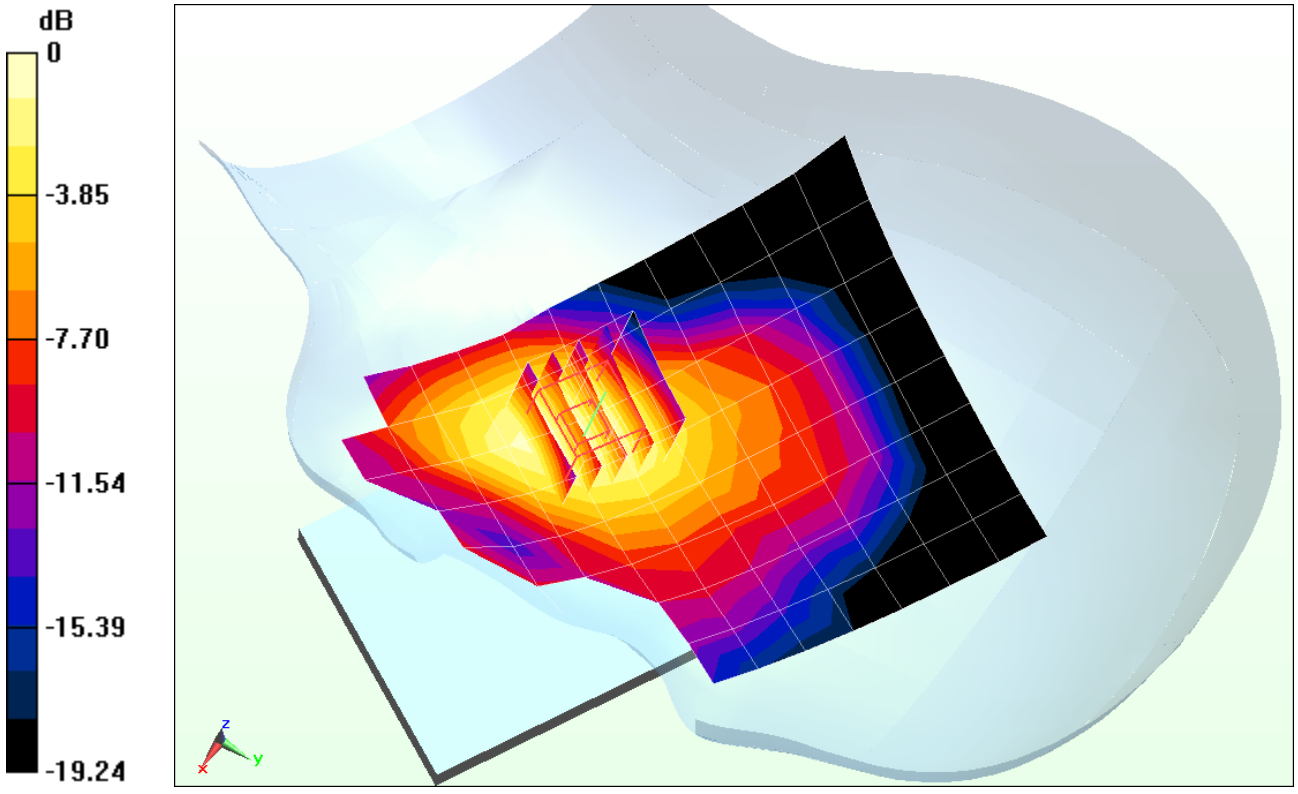
Communication System: LTE Band 2 (PCS); Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.416 S/m; ε_r = 39.648; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09-16-2013; Ambient Temp: 24.5°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3209; ConvF(5.21, 5.21, 5.21); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 2 (PCS), Left Head, Cheek, Mid.ch, QPSK,
20 MHz Bandwidth, 1 RB, 0 RB Offset, Wireless Charging 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 = 14.141 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.342 W/kg
SAR(1 g) = 0.227 W/kg



0 dB = 0.243 W/kg = -6.14 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F0A

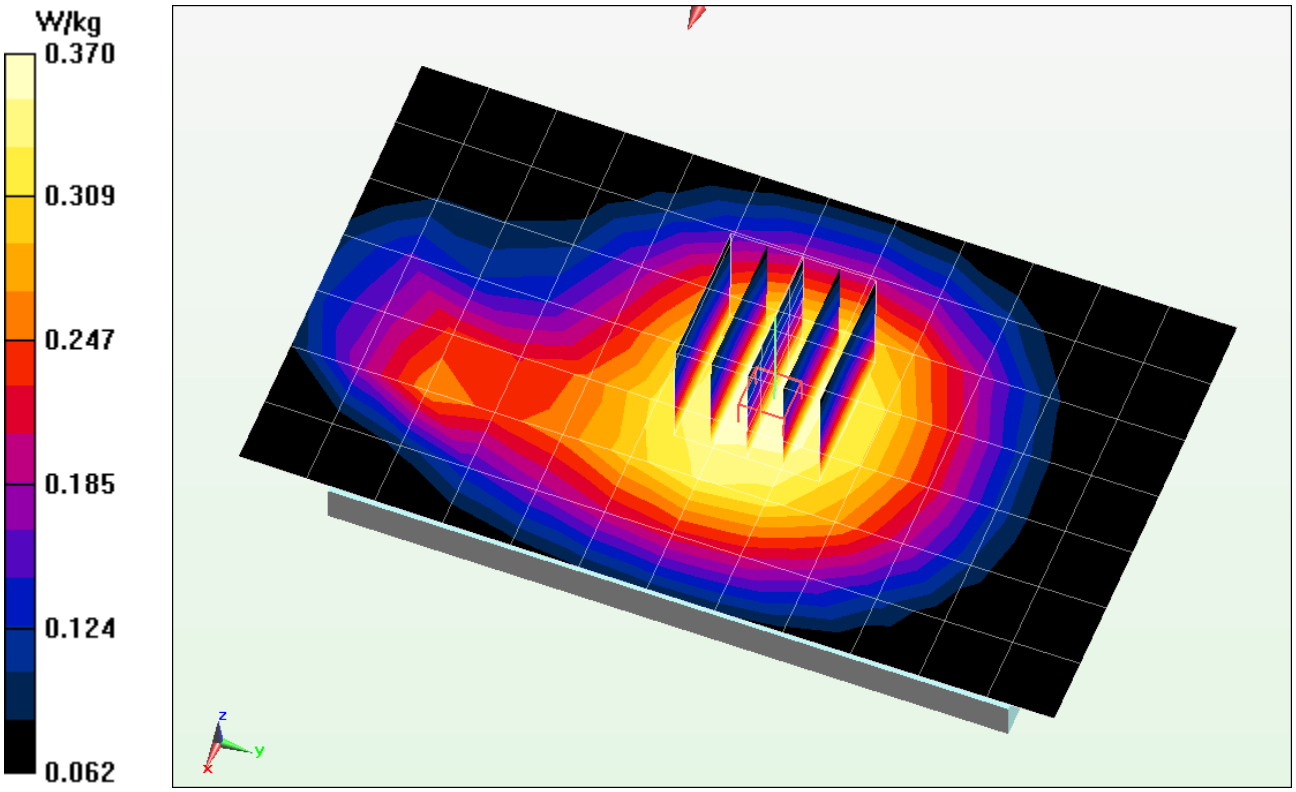
Communication System: GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body; Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.994$ S/m; $\varepsilon_r = 56.174$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

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

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

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.342 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.437 W/kg
SAR(1 g) = 0.353 W/kg



DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F0A

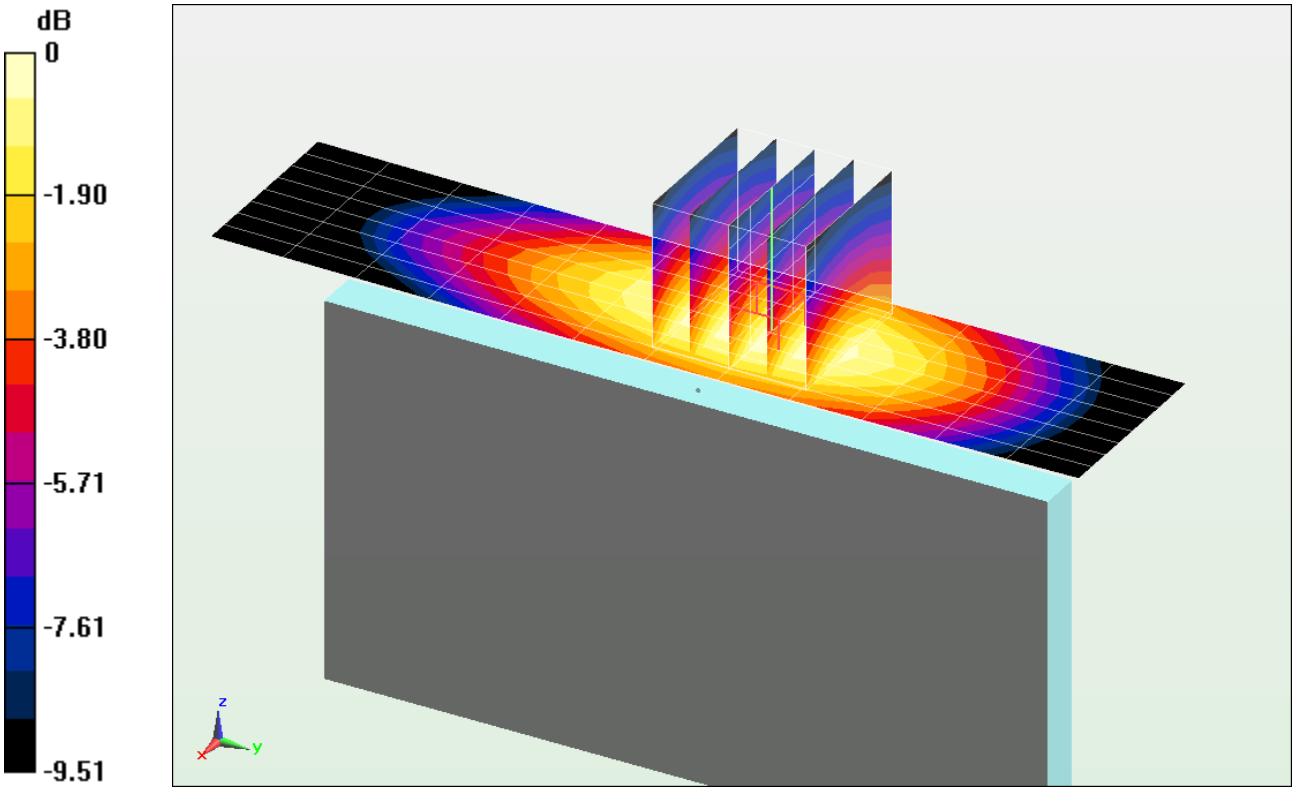
Communication System: GSM GPRS; 4 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.076
Medium: 835 Body; Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.994$ S/m; $\varepsilon_r = 56.174$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

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

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

Mode: GPRS 850, Body SAR, Right Edge, Mid.ch, 4 Tx Slots, Standard Cover

Area Scan (9x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.965 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.605 W/kg
SAR(1 g) = 0.432 W/kg



0 dB = 0.462 W/kg = -3.35 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F0A

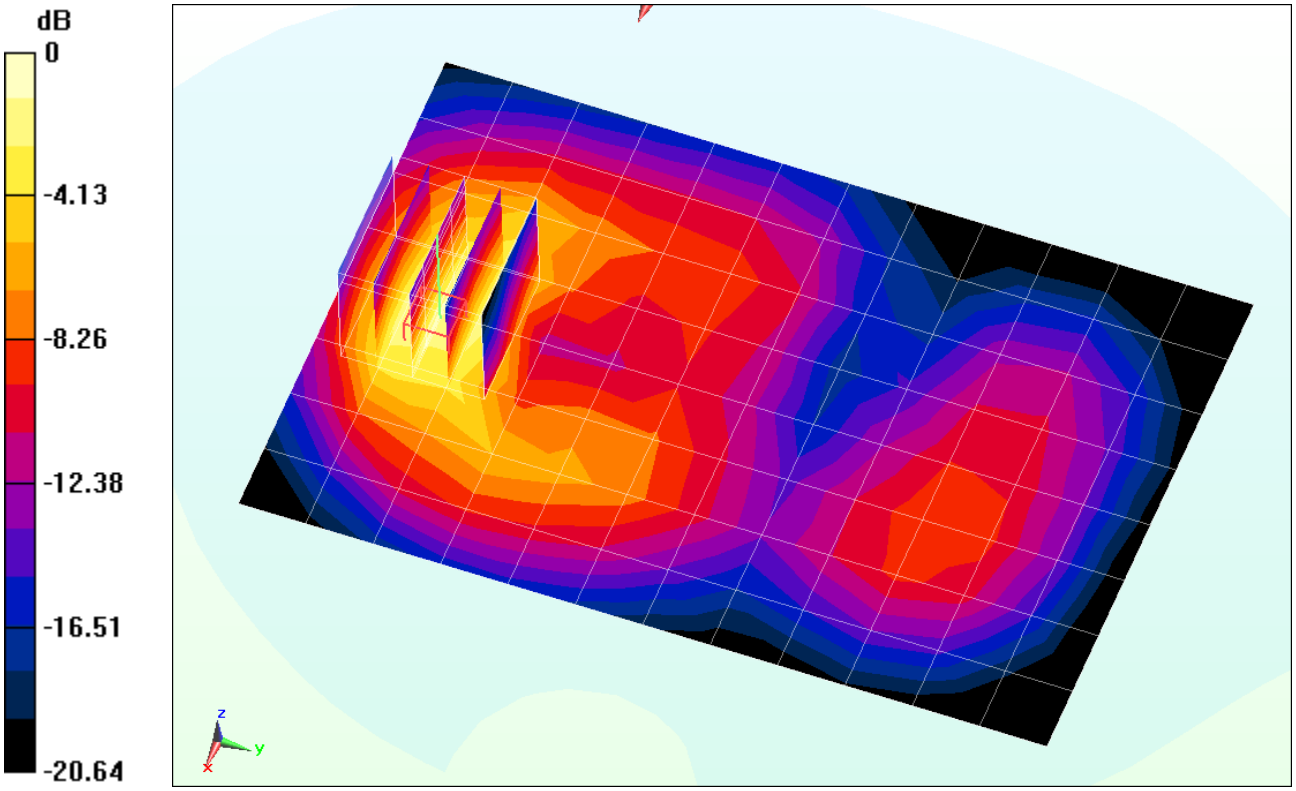
Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.495 S/m; ε_r = 52.555; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2013; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/22/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.103 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.858 W/kg



0 dB = 0.953 W/kg = -0.21 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F0A

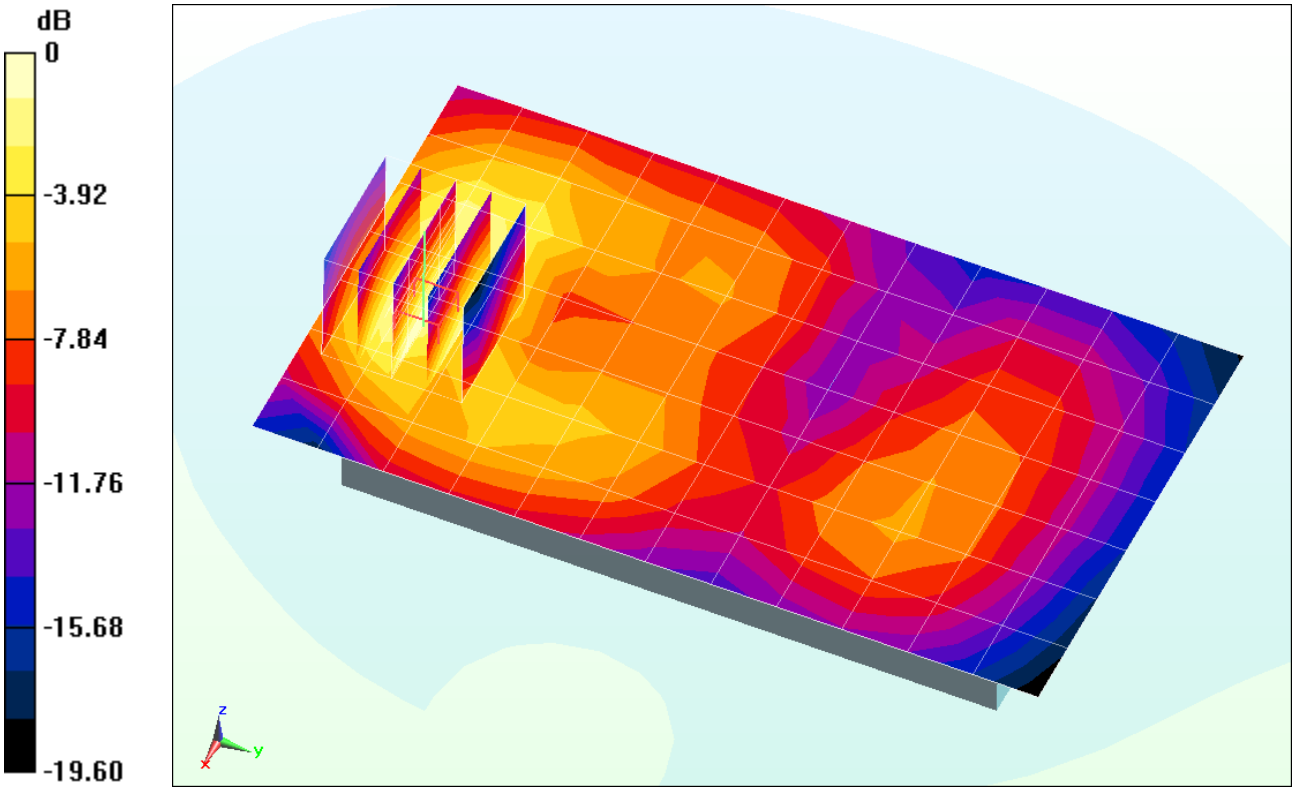
Communication System: GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.495 S/m; ε_r = 52.555; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2013; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/22/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 4 Tx Slots, Standard Cover

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.236 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.991 W/kg



0 dB = 0.802 W/kg = -0.96 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 210FA

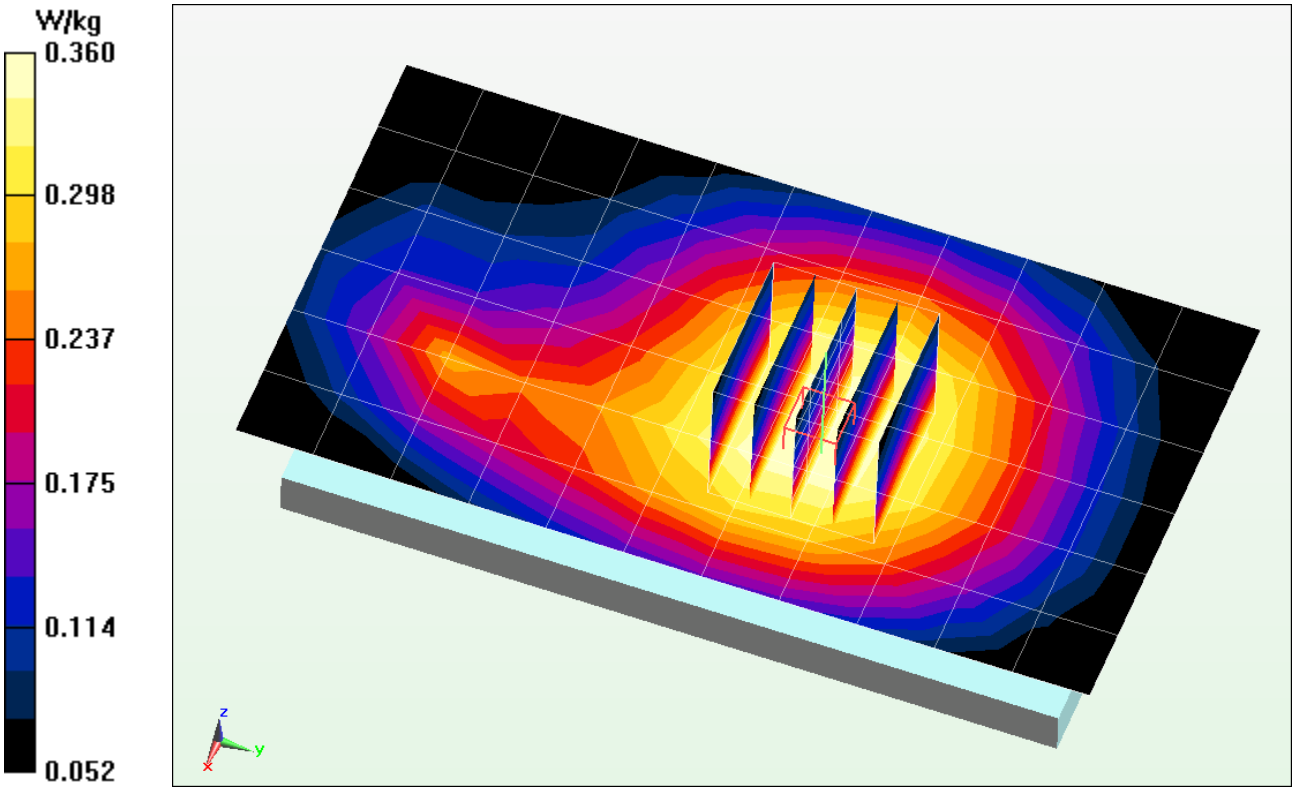
Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.994 S/m; ε_r = 56.174; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

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

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

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

Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.209 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.427 W/kg
SAR(1 g) = 0.345 W/kg



DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F2F

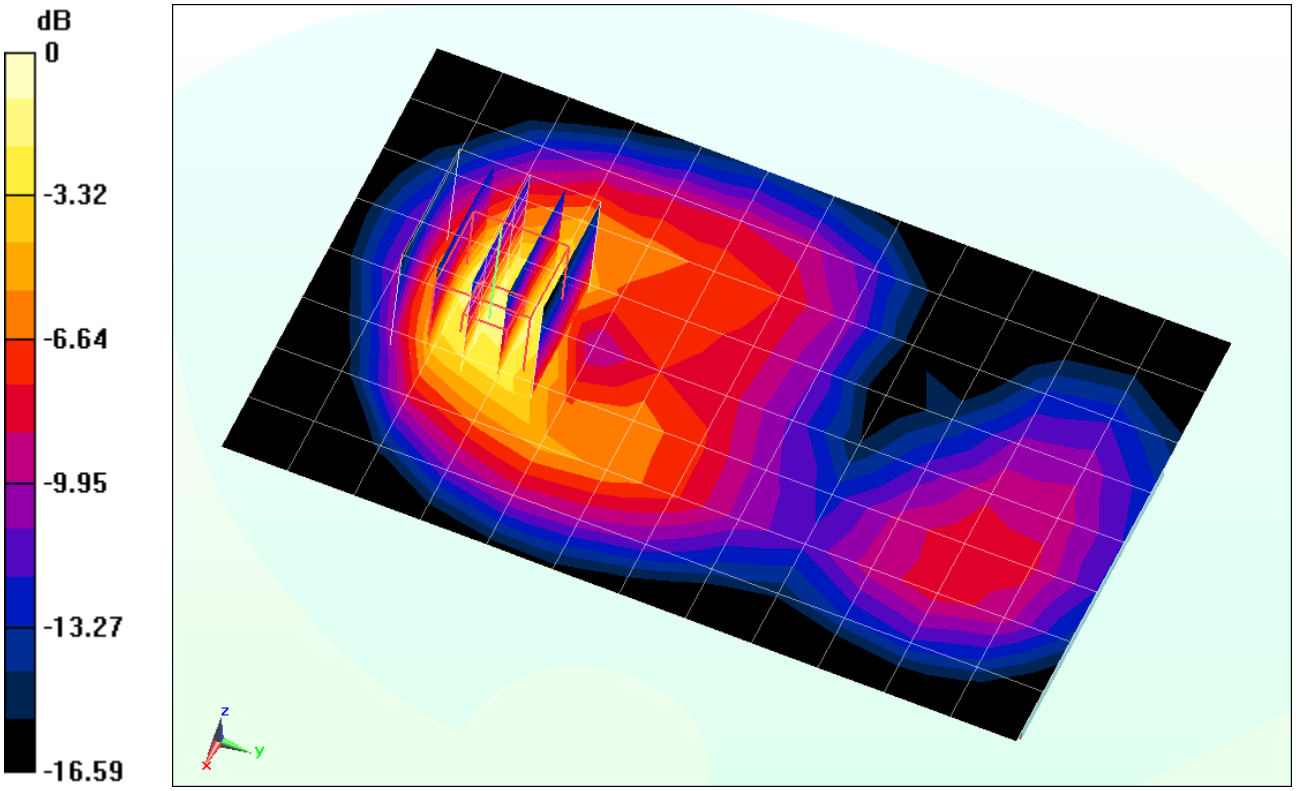
Communication System: AWS UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.425 S/m; ε_r = 52.478; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3287; ConvF(4.86, 4.86, 4.86); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

Mode: UMTS 1750, Body SAR, Back side, Mid.ch, Standard Cover

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.538 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.60 W/kg
SAR(1 g) = 0.917 W/kg



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

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F20

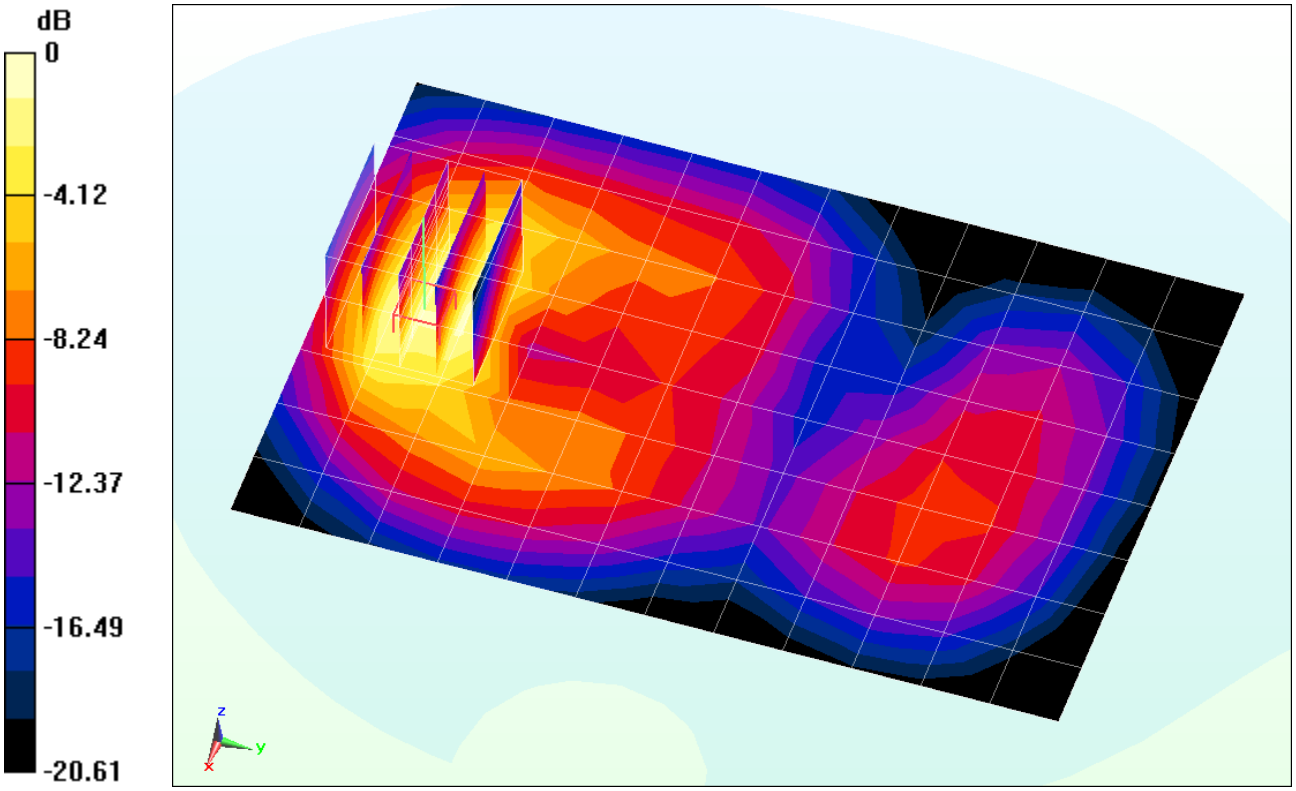
Communication System: UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.488 S/m; ε_r = 52.288; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-13-2013; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/22/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.975 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.968 W/kg



0 dB = 1.05 W/kg = 0.21 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21FB4

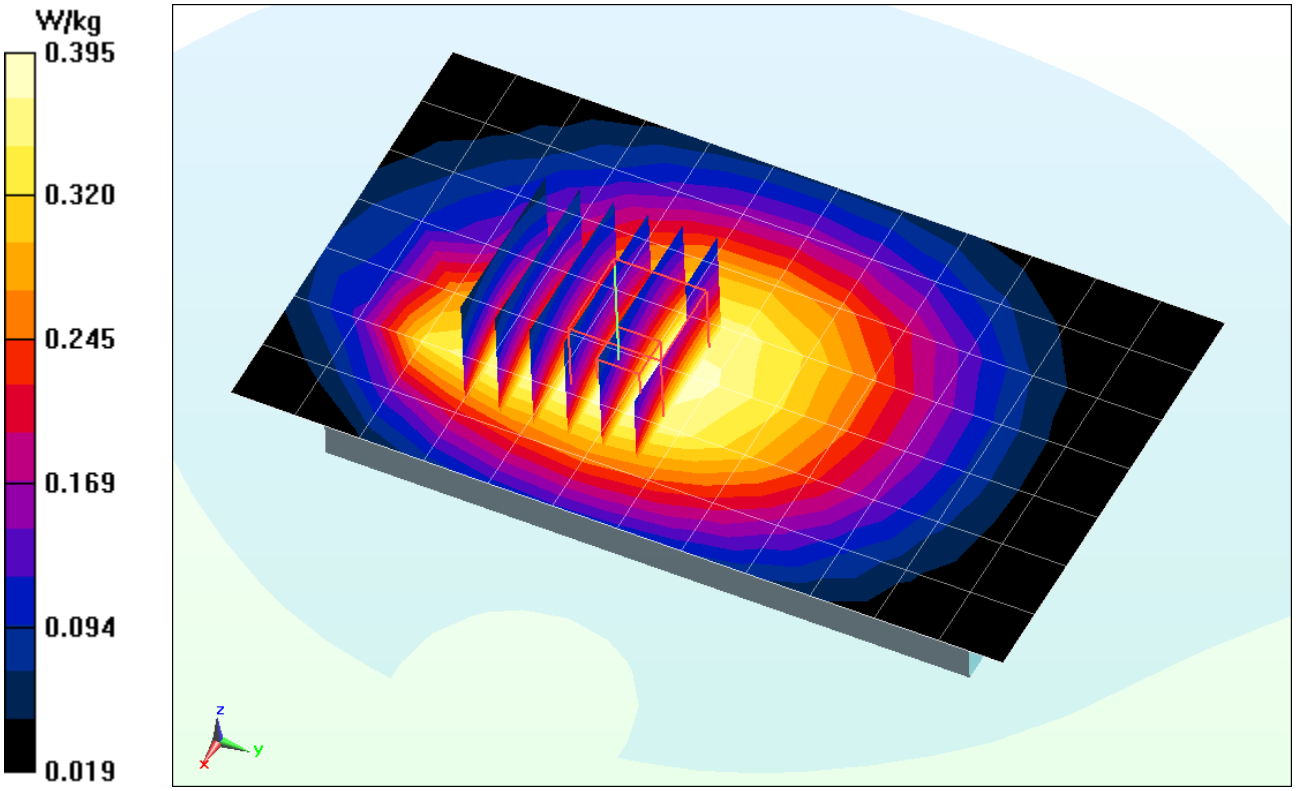
Communication System: LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used:
f = 710 MHz; σ = 0.934 S/m; ε_r = 56.37; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-06-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3920; ConvF(9.57, 9.57, 9.57); Calibrated: 2/27/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x9x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.631 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.525 W/kg
SAR(1 g) = 0.379 W/kg



DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21FB4

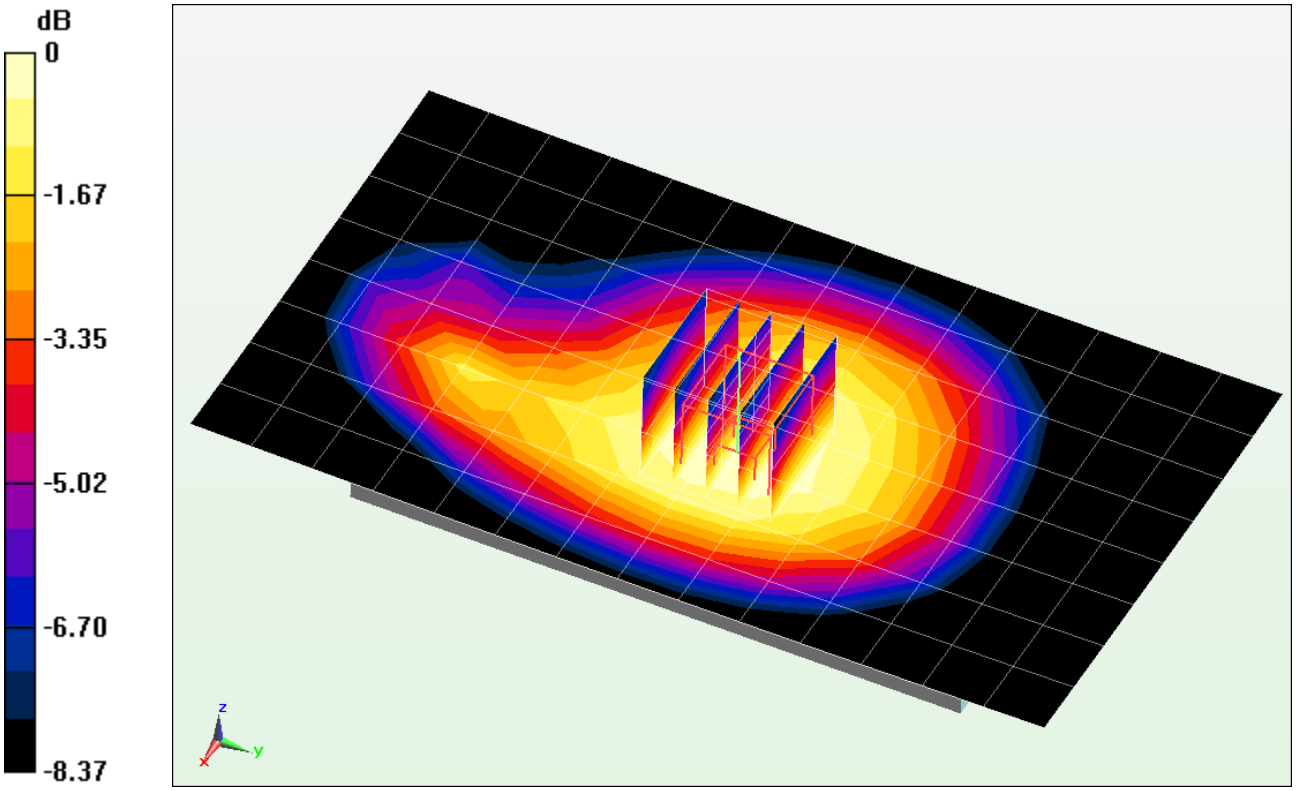
Communication System: LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 1.017$ S/m; $\varepsilon_r = 54.748$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

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

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

Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset, Standard Cover

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.153 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.431 W/kg
SAR(1 g) = 0.341 W/kg



0 dB = 0.357 W/kg = -4.47 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F36

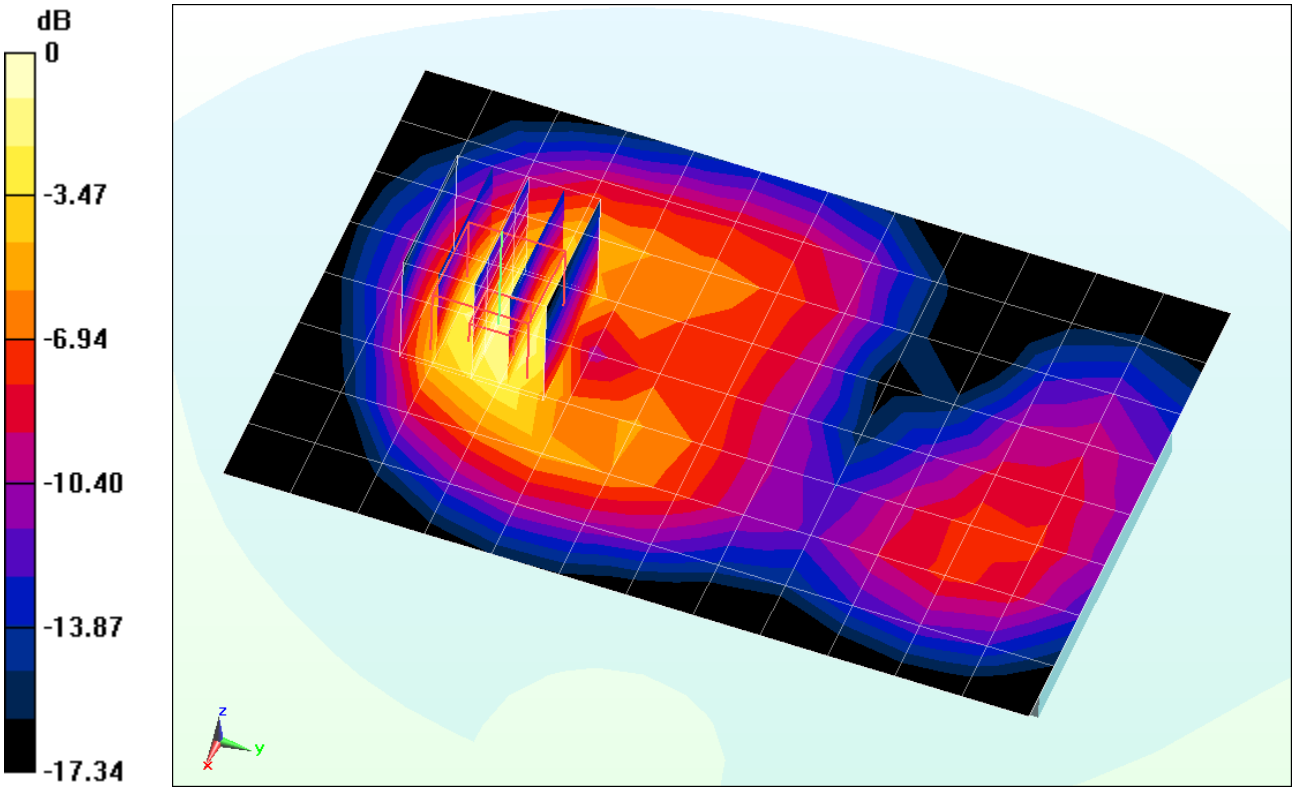
Communication System: LTE RF; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.425 S/m; ε_r = 52.478; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2013; Ambient Temp: 23.3°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3287; ConvF(4.86, 4.86, 4.86); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset, Standard Cover

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.557 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 0.999 W/kg



0 dB = 1.11 W/kg = 0.45 dBW/kg

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 21F20

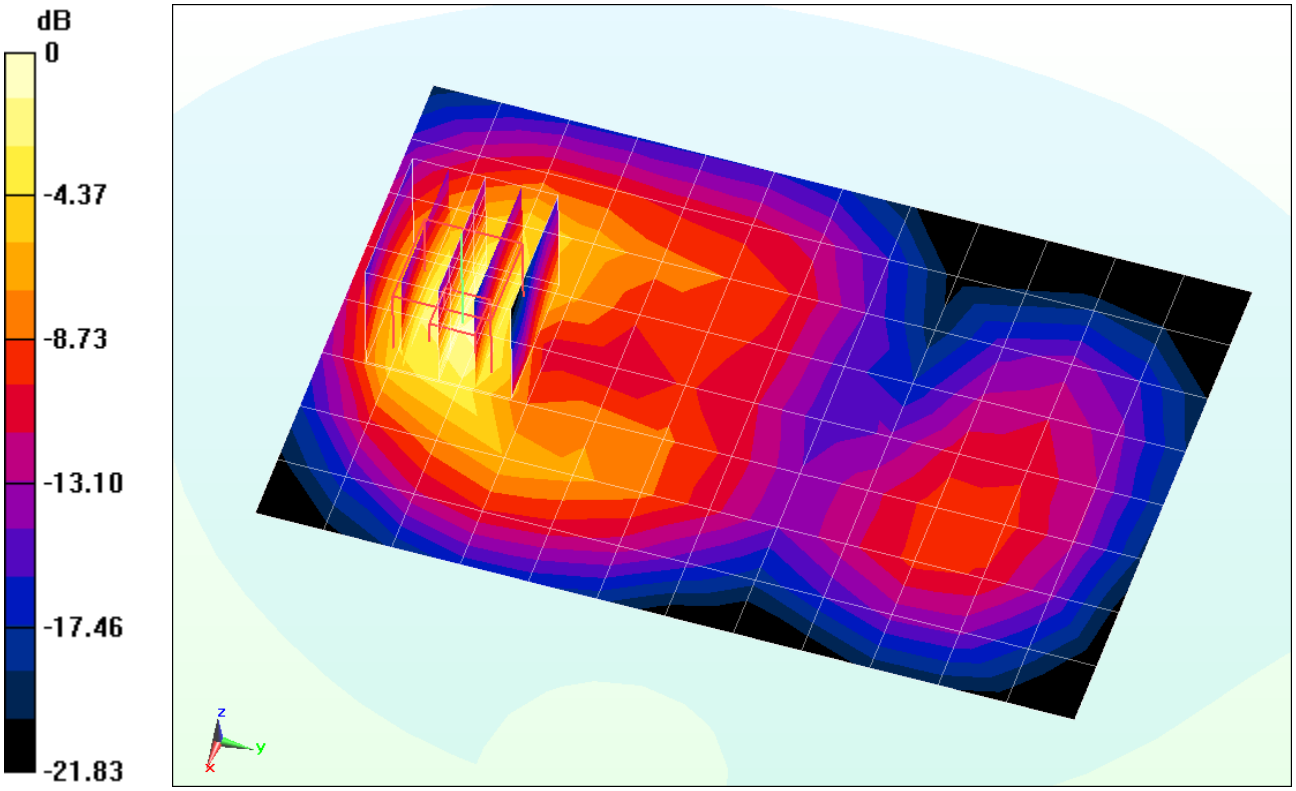
Communication System: LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used:
f = 1900 MHz; σ = 1.506 S/m; ε_r = 52.21; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-13-2013; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/22/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.036 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 0.950 W/kg



0 dB = 1.07 W/kg = 0.29 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1054

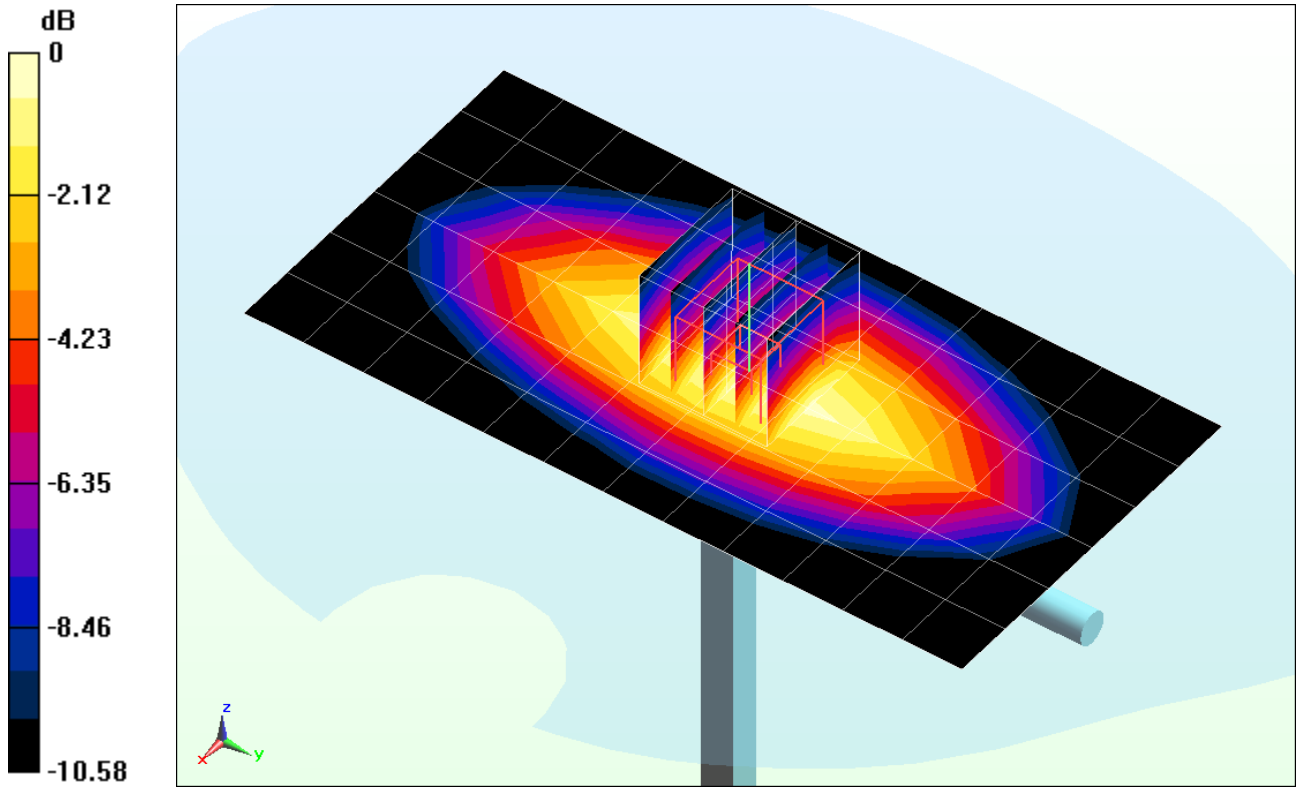
Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.917 S/m; ε_r = 42.265; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-03-2013; Ambient Temp: 23.0°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(6.4, 6.4, 6.4); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

750MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.853 W/kg
Deviation = 0.35%



0 dB = 0.924 W/kg = -0.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

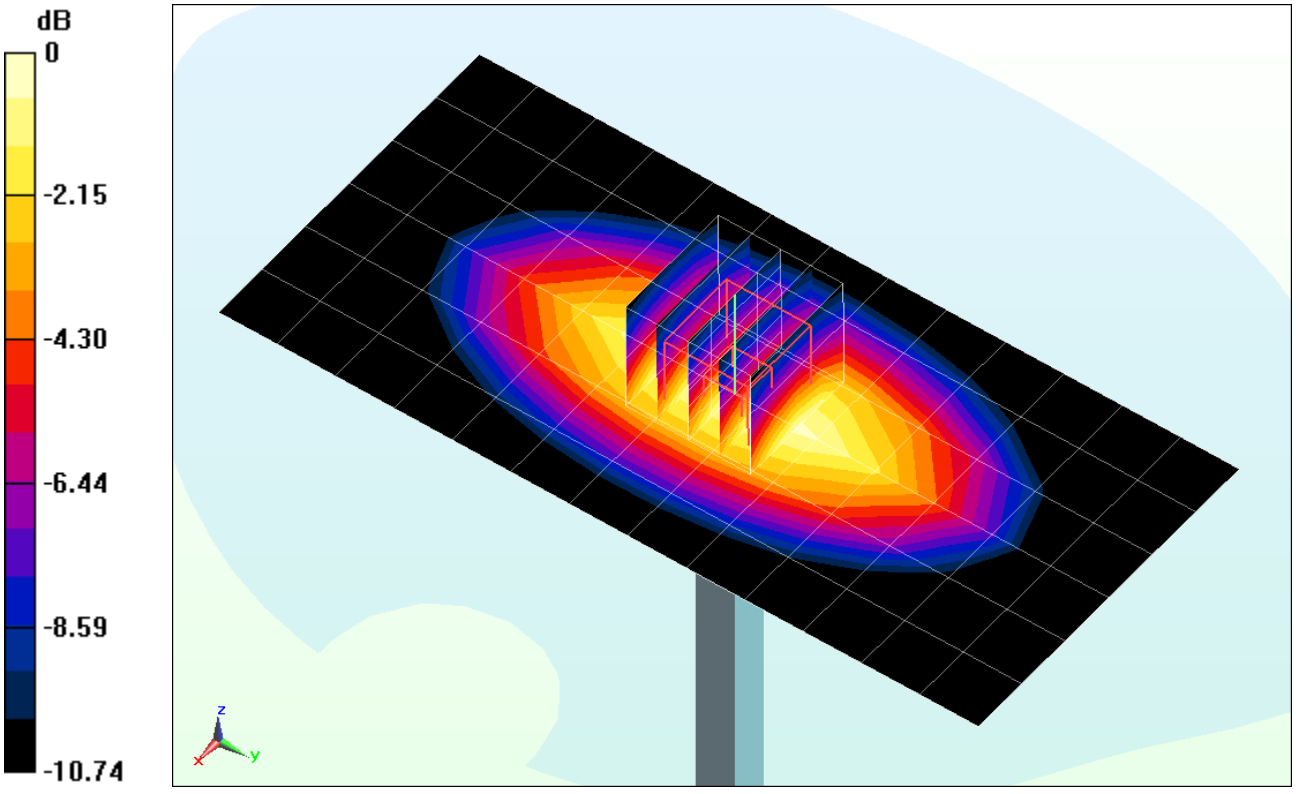
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.939 S/m; ε_r = 42.776; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-09-2013; Ambient Temp: 24.0°C; Tissue Temp: 23.1°C

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

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.951 W/kg
Deviation = -1.76%



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

PCTEST ENGINEERING LABORATORY, INC.

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

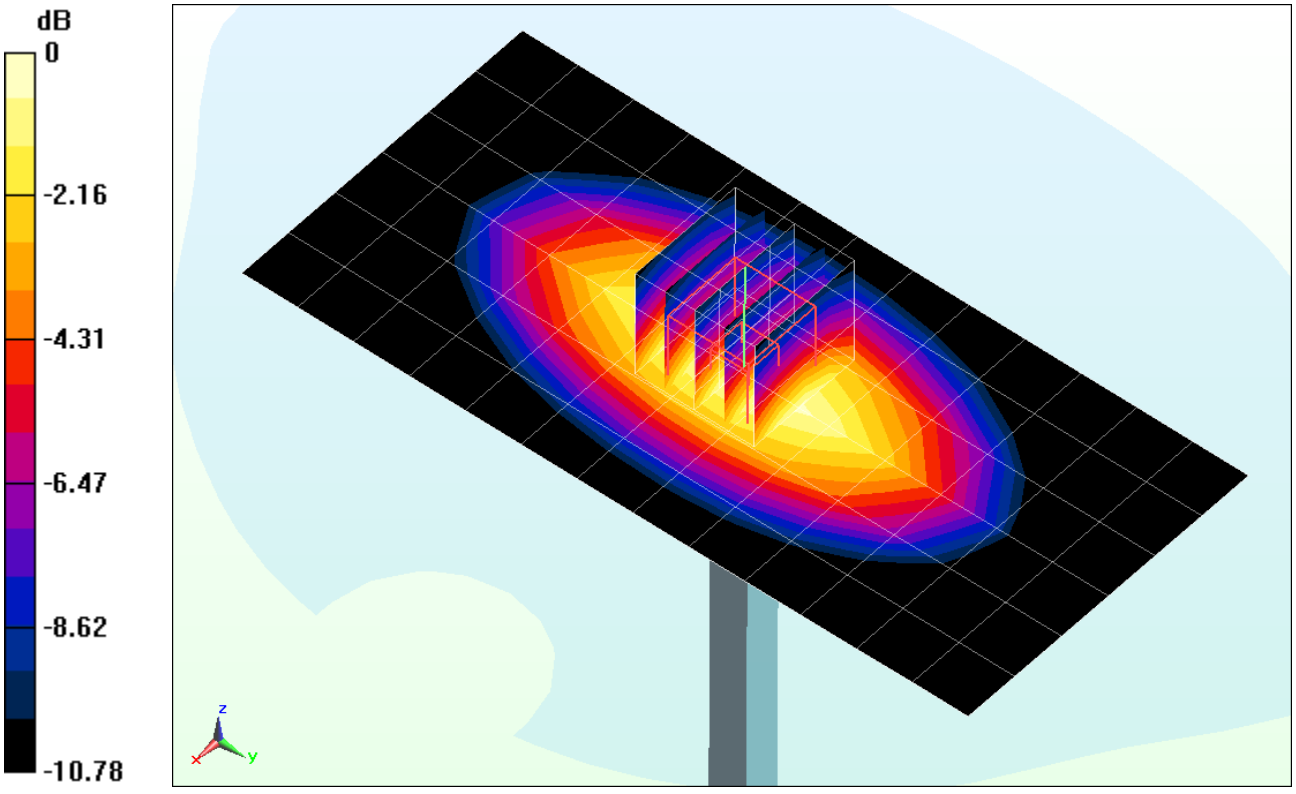
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.908 S/m; ε_r = 41.264; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-11-2013; Ambient Temp: 23.5°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(9.58, 9.58, 9.58); Calibrated: 2/27/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 0.980 W/kg
Deviation = 1.24%



0 dB = 1.06 W/kg = 0.25 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

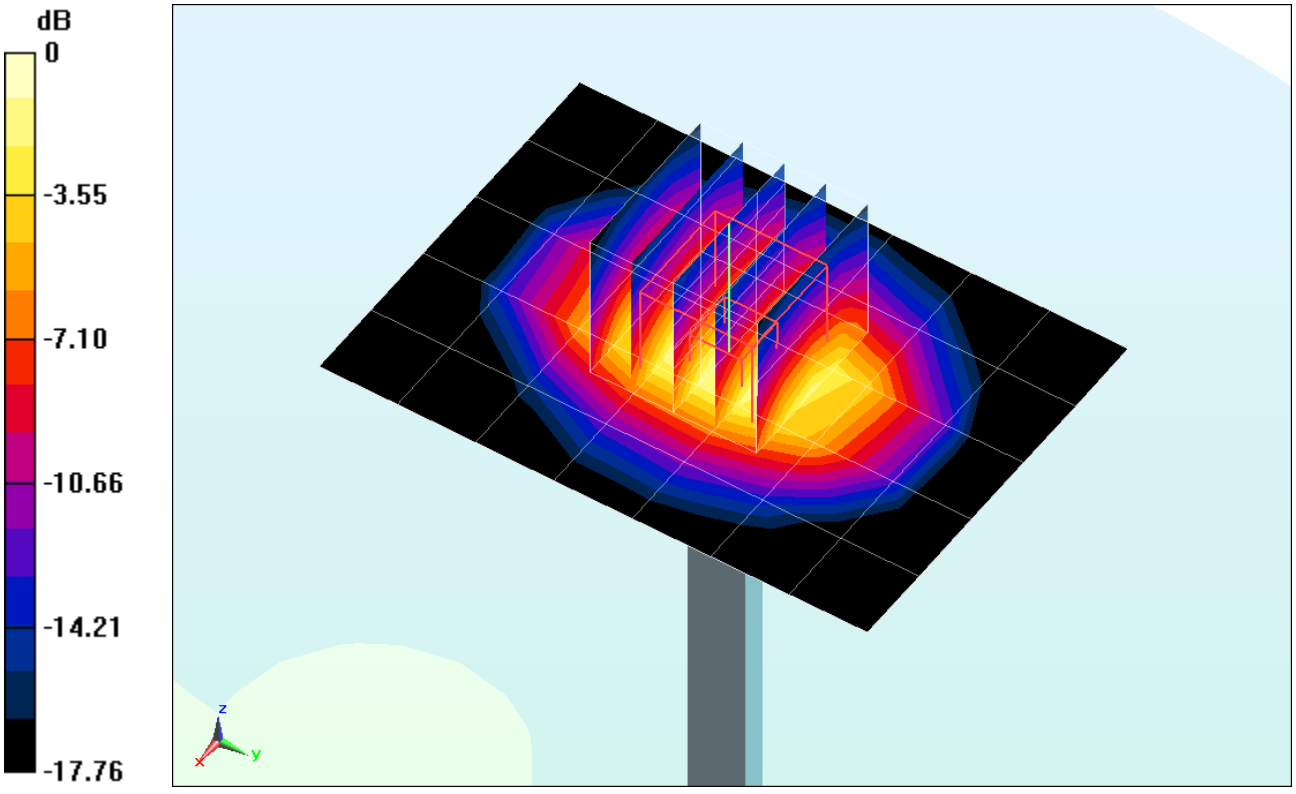
Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used:
f = 1750 MHz; σ = 1.367 S/m; ε_r = 41.06; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-12-2013; Ambient Temp: 23.0°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3287; ConvF(5.16, 5.16, 5.16); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

1750 MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.10 W/kg
SAR(1 g) = 3.84 W/kg
Deviation = 4.35%



0 dB = 4.33 W/kg = 6.36 dBW/kg

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

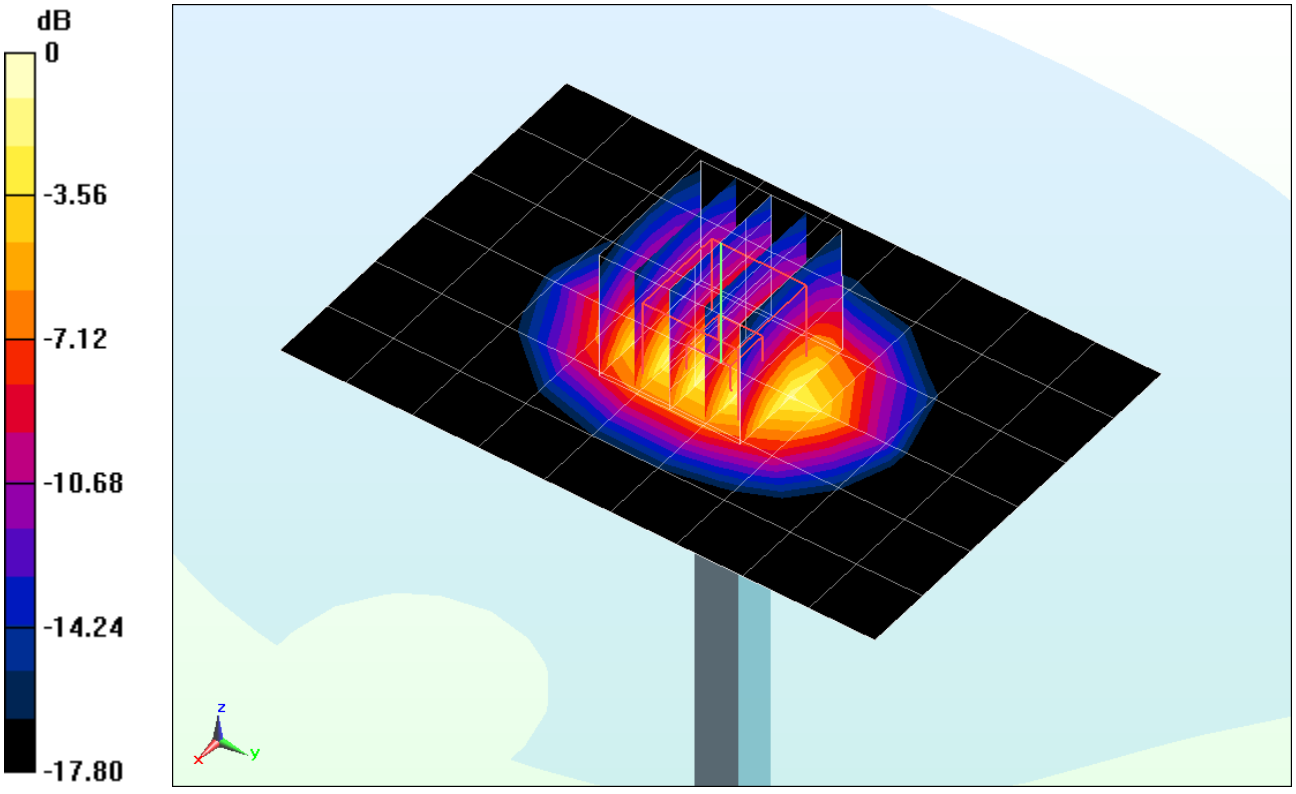
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.395 S/m; ε_r = 40.941; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-12-2013; Ambient Temp: 23.7°C; Tissue Temp: 23.7°C

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

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.23 W/kg
SAR(1 g) = 3.88 W/kg
Deviation = -2.27%



0 dB = 4.36 W/kg = 6.39 dBW/kg

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

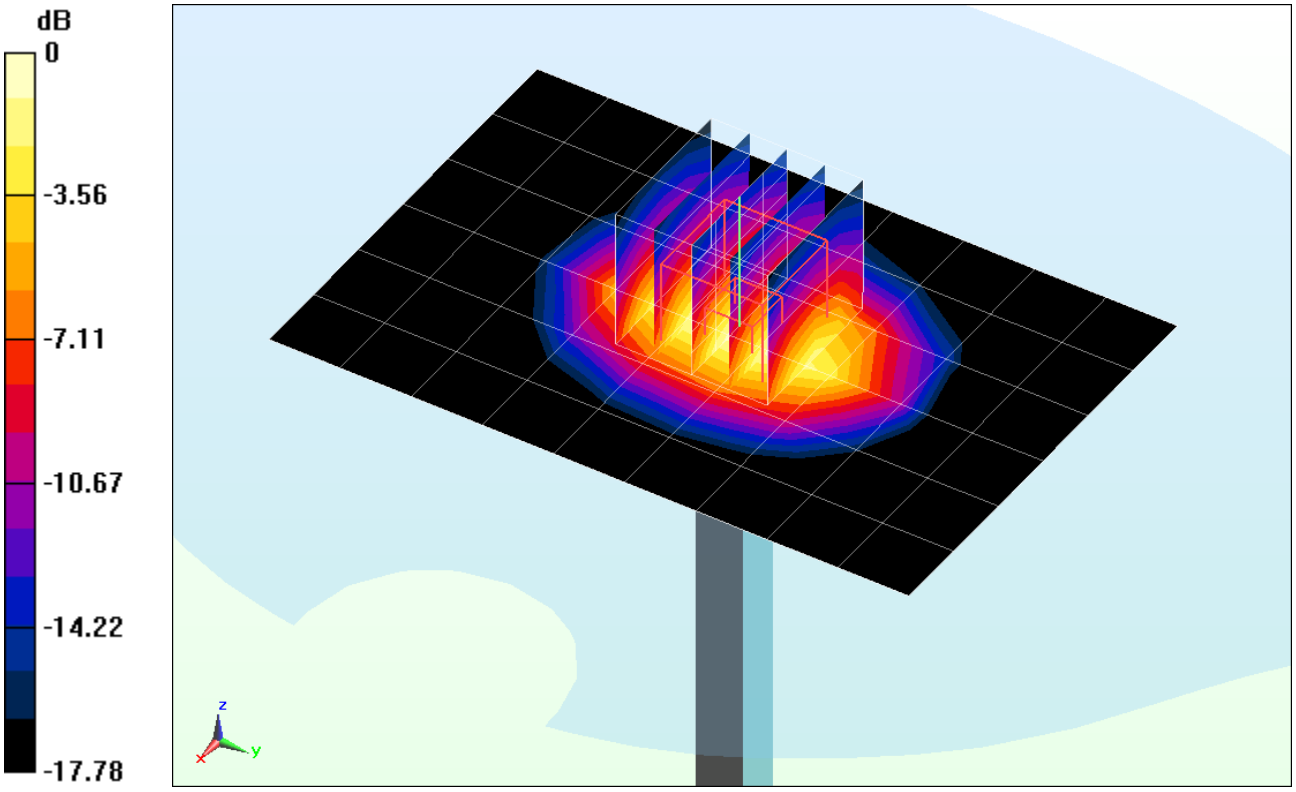
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.439 S/m; ε_r = 39.555; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-16-2013; Ambient Temp: 24.5°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3209; ConvF(5.21, 5.21, 5.21); Calibrated: 3/15/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 3/8/2013
Phantom: SAM Right; Type: QD000P40CD; Serial: 1686
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.30 W/kg
SAR(1 g) = 3.96 W/kg
Deviation = -0.25%



0 dB = 4.46 W/kg = 6.49 dBW/kg

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1003

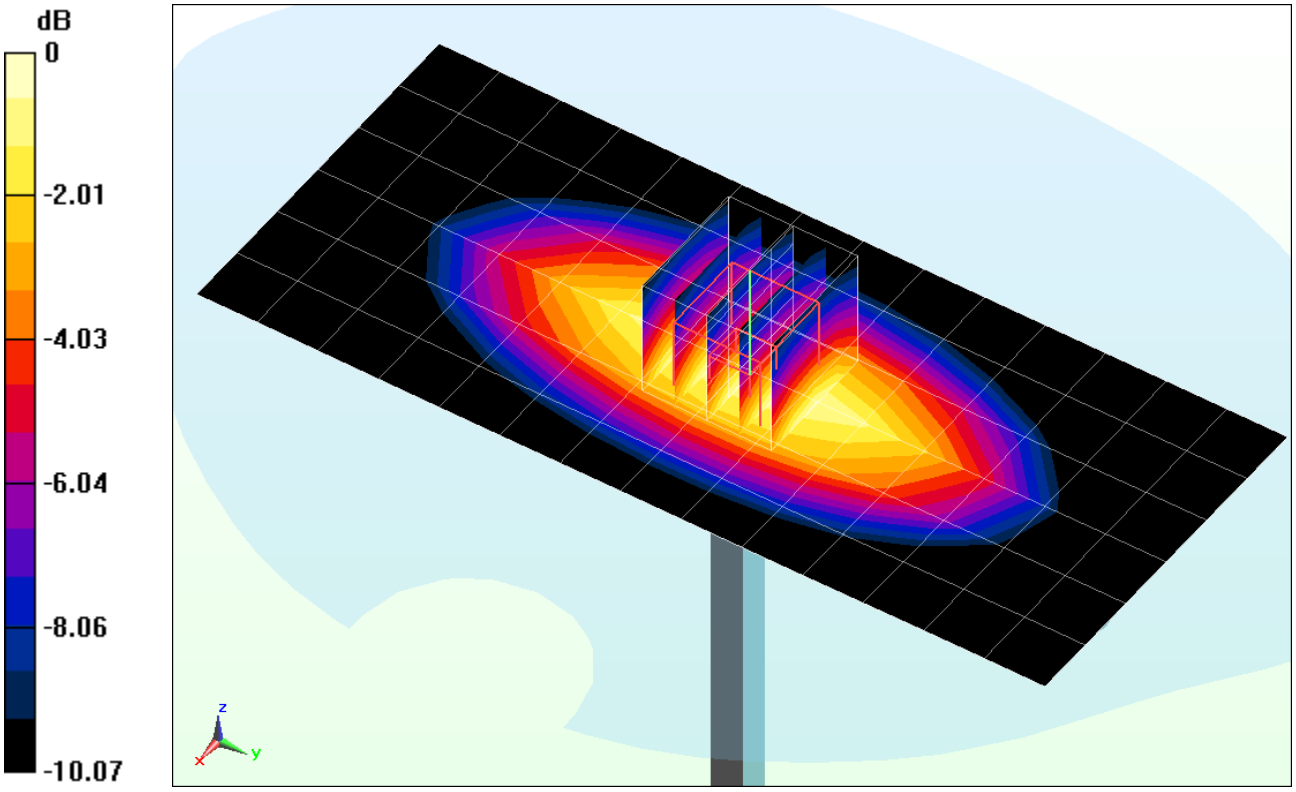
Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.974 S/m; ε_r = 56.084; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-06-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3920; ConvF(9.57, 9.57, 9.57); Calibrated: 2/27/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn649; Calibrated: 2/6/2013
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.846 W/kg
Deviation = -4.19%



0 dB = 0.952 W/kg = -0.21 dBW/kg

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

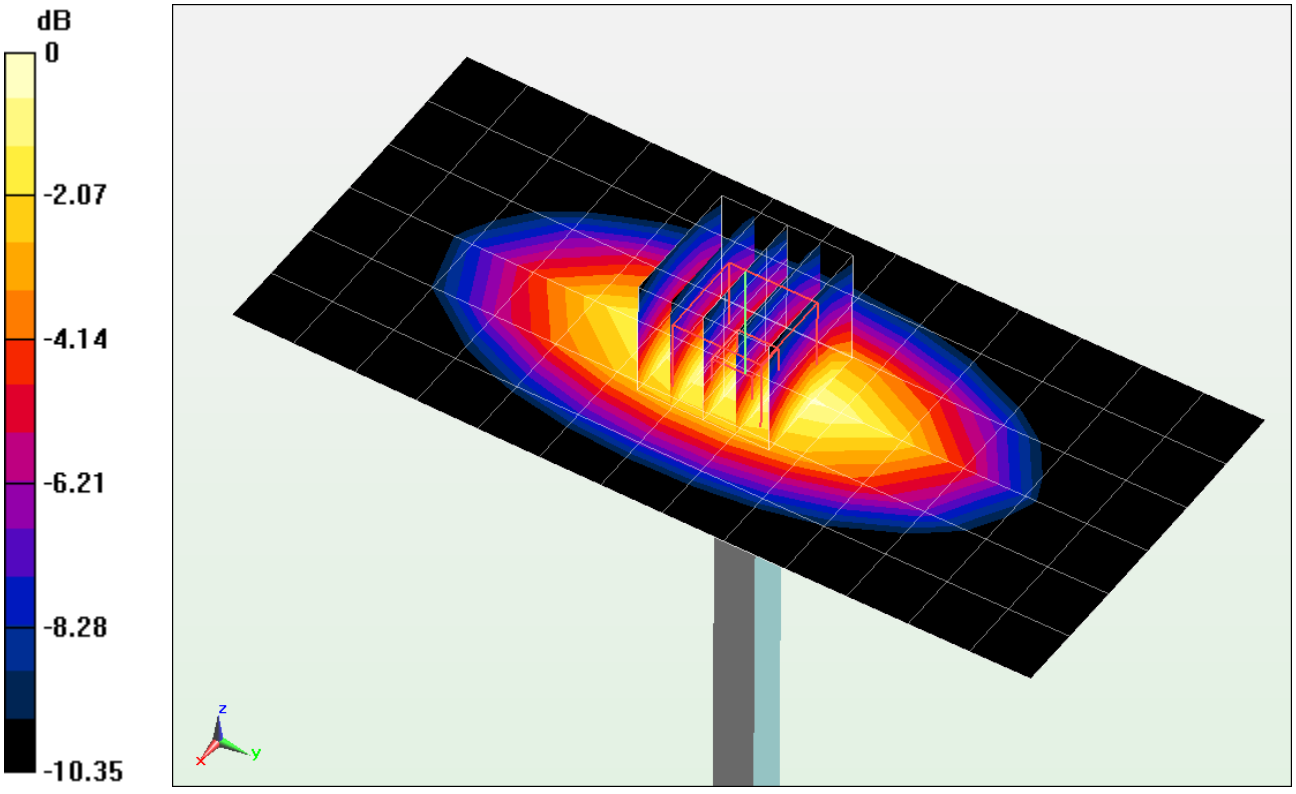
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used:
f = 835 MHz; σ = 1.016 S/m; ε_r = 54.761; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

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

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

835 MHz System Verification

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



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

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

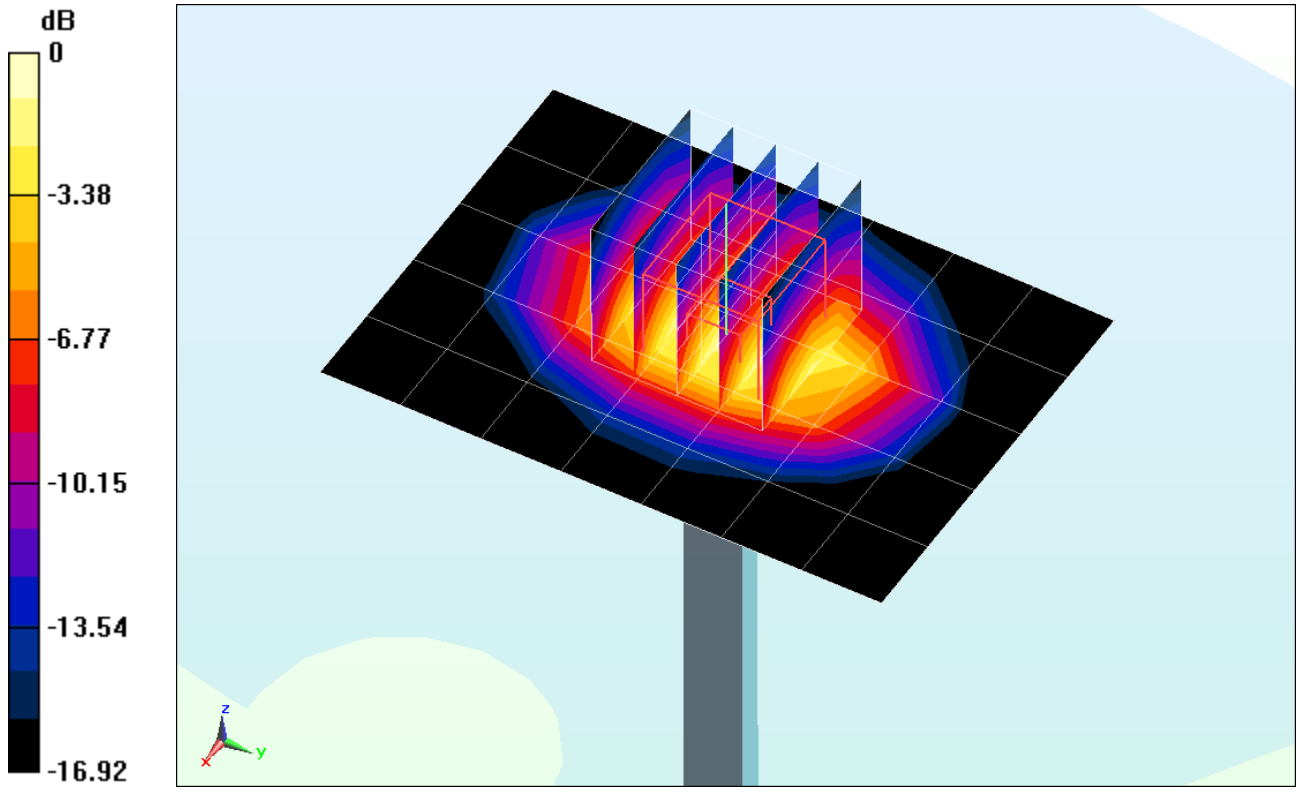
Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; σ = 1.494 S/m; ε_r = 51.725; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-13-2013; Ambient Temp: 23.5°C; Tissue Temp: 23.7°C

Probe: ES3DV3 - SN3287; ConvF(4.86, 4.86, 4.86); Calibrated: 11/15/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 11/13/2012
Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626
Measurement SW: DASY4, Version 4.7 (80);SEMCAD X Version 14.6.10 (7164)

1750 MHz System Verification

Area Scan (6x8x1): 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) = 6.78 W/kg
SAR(1 g) = 3.77 W/kg
Deviation = -1.31%



0 dB = 4.22 W/kg = 6.25 dBW/kg

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

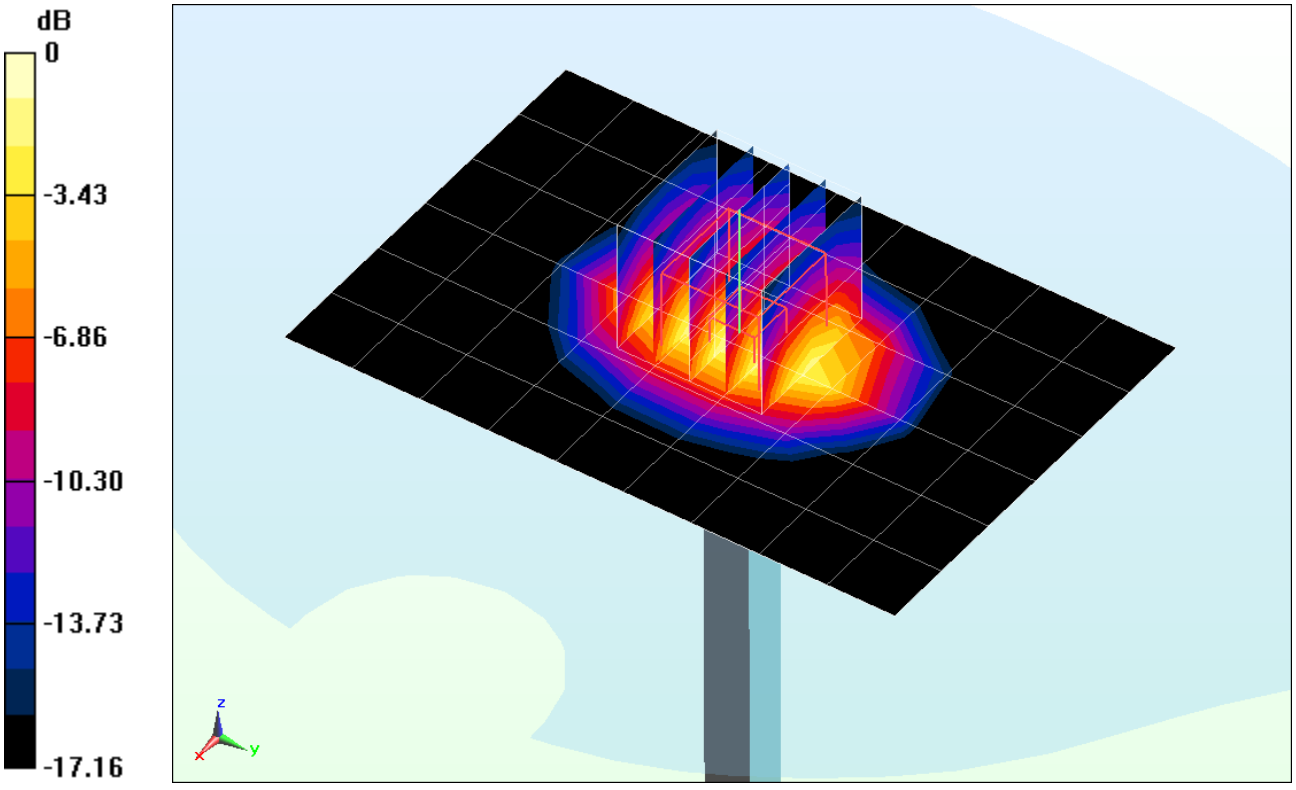
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.559 S/m; ε_r = 52.499; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-16-2013; Ambient Temp: 22.7°C; Tissue Temp: 22.3°C

Probe: ES3DV2 - SN3022; ConvF(4.49, 4.49, 4.49); Calibrated: 8/22/2013;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 8/21/2013
Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Input Power = 20.0 dBm (100 mW)
Peak SAR (extrapolated) = 7.66 W/kg
SAR(1 g) = 4.29 W/kg
Deviation = 5.15%



0 dB = 4.81 W/kg = 6.82 dBW/kg

APPENDIX C: PROBE CALIBRATION

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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: D750V3-1054_Mar13

CALIBRATION CERTIFICATE

Object D750V3 - SN: 1054

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

Calibration date: March 18, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: March 18, 2013

80880

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 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 ± 0.2) °C	41.1 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.50 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.55 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.72 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.75 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.4 Ω - 0.9 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.7 Ω - 2.7 jΩ
Return Loss	- 31.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 08, 2011

DASY5 Validation Report for Head TSL

Date: 18.03.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1054

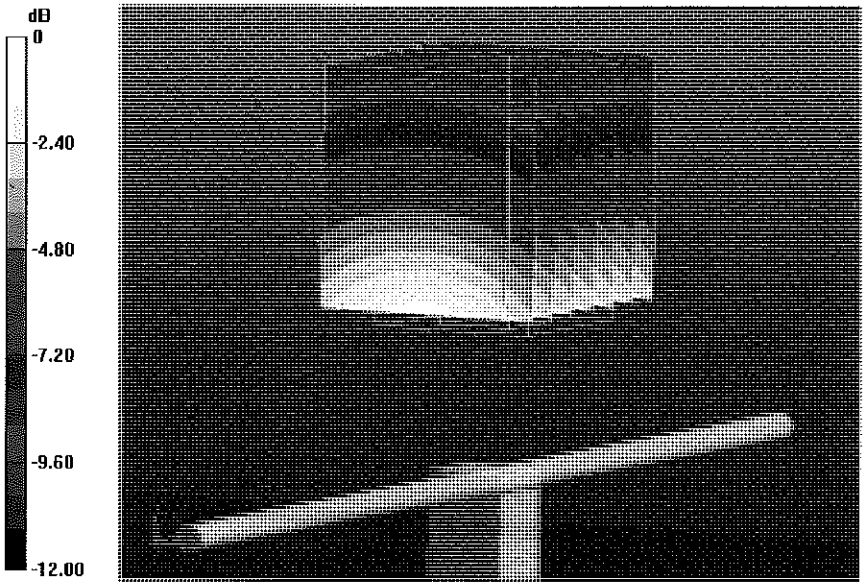
Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.92 S/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

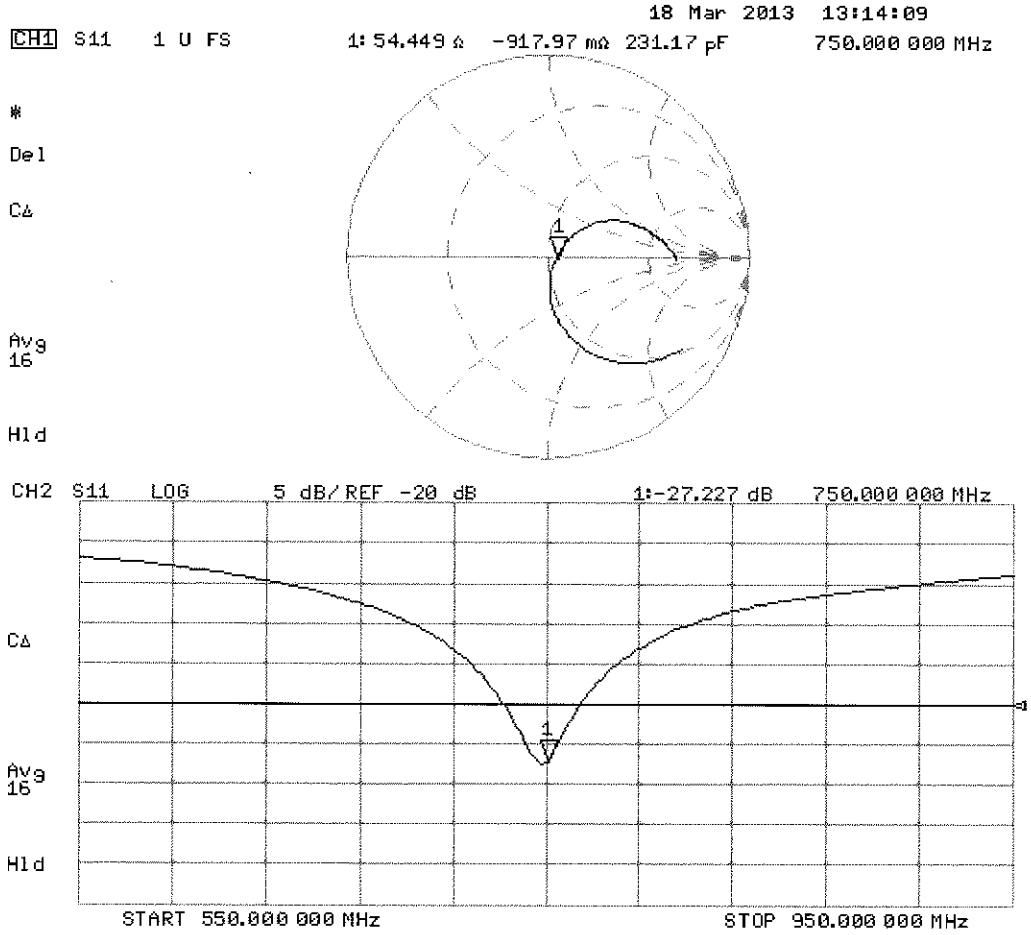
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.772 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.33 W/kg
SAR(1 g) = 2.19 W/kg; SAR(10 g) = 1.42 W/kg
Maximum value of SAR (measured) = 2.55 W/kg



0 dB = 2.55 W/kg = 4.07 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.03.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1054

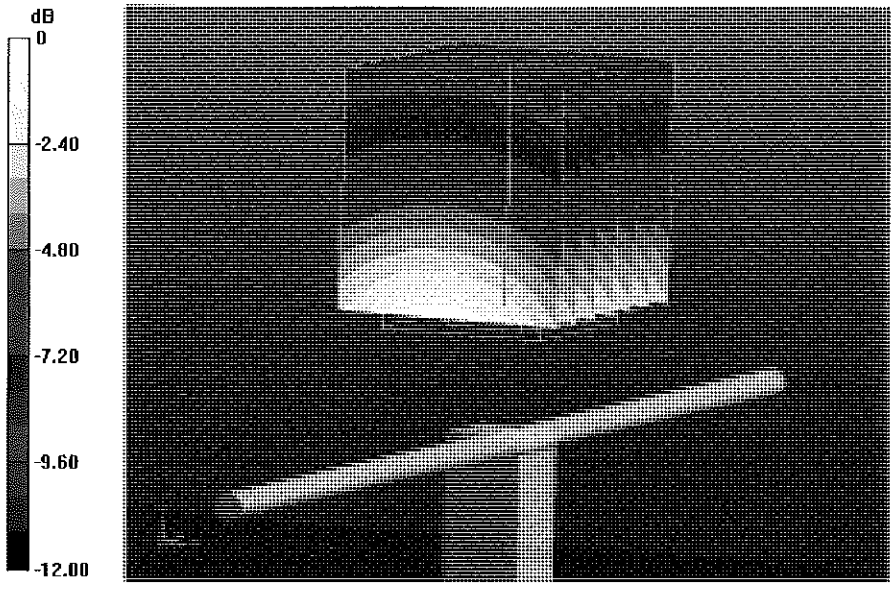
Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 1 S/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.11, 6.11, 6.11); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

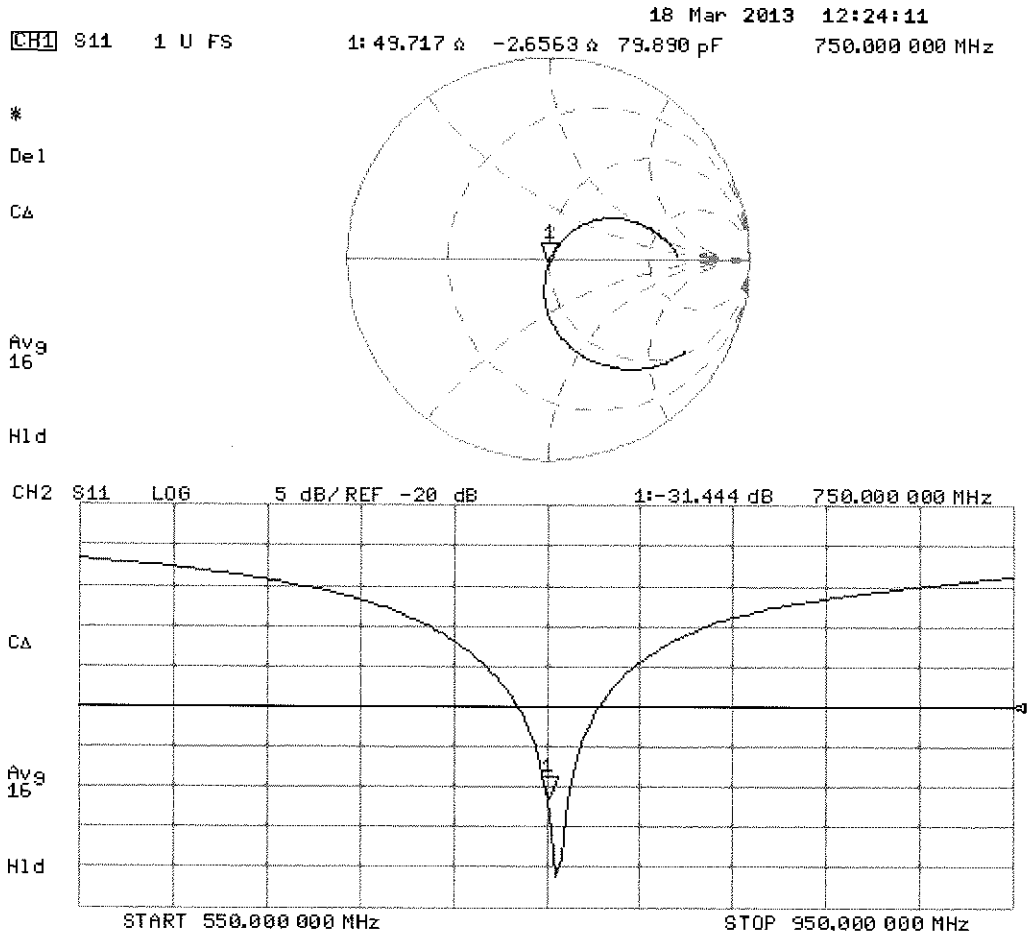
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.772 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.32 W/kg
SAR(1 g) = 2.26 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (measured) = 2.61 W/kg



0 dB = 2.61 W/kg = 4.17 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D835V2-4d119_Apr13

CALIBRATION CERTIFICATE

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

✓ KOK 5/8/13

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: April 26, 2013

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

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

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

Body TSL parameters

The following parameters and calculations were applied.

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

SAR result with Body TSL

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

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

Appendix

Antenna Parameters with Head TSL

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

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 25.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

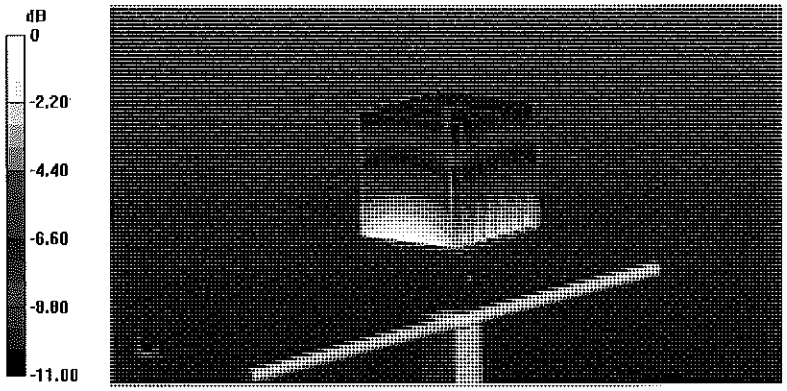
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

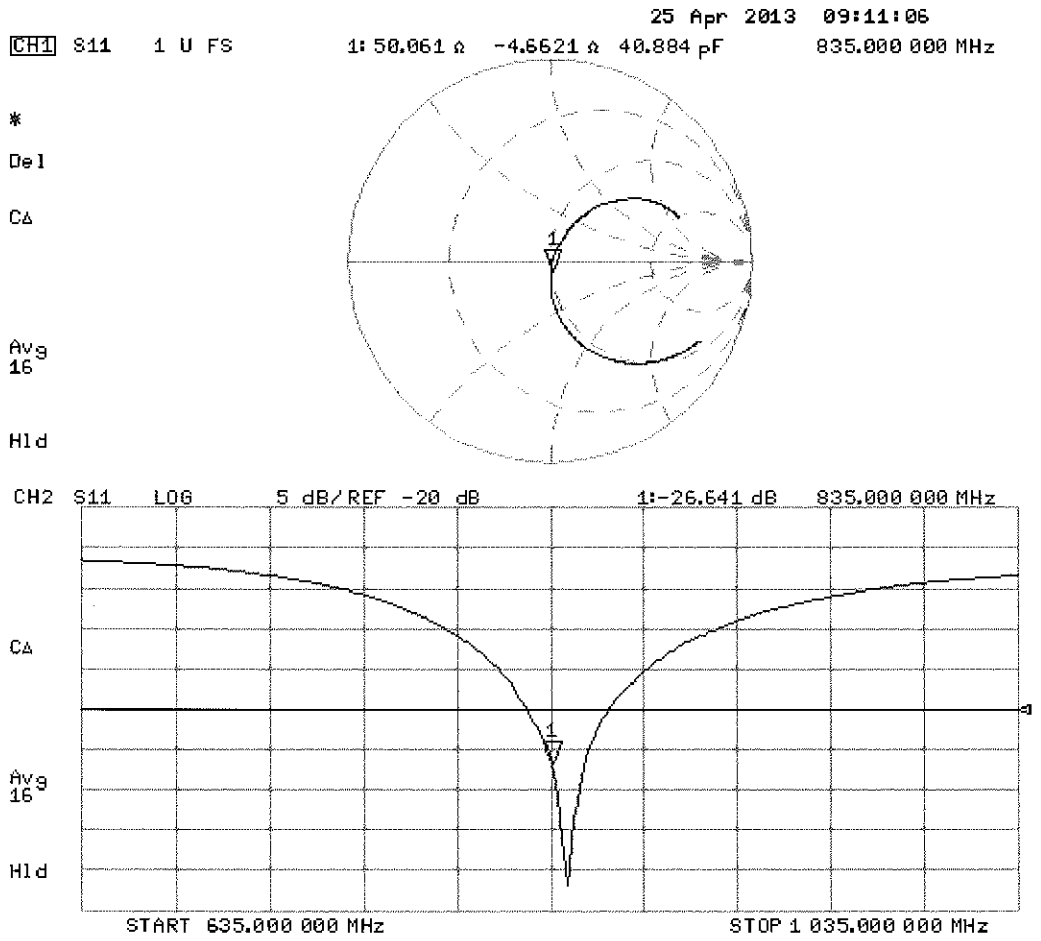
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

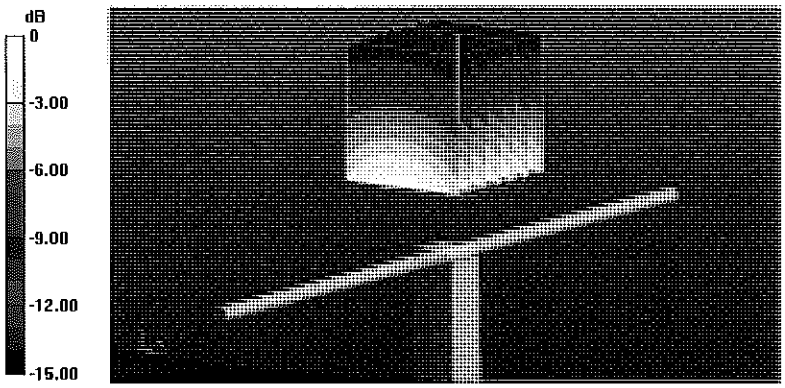
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

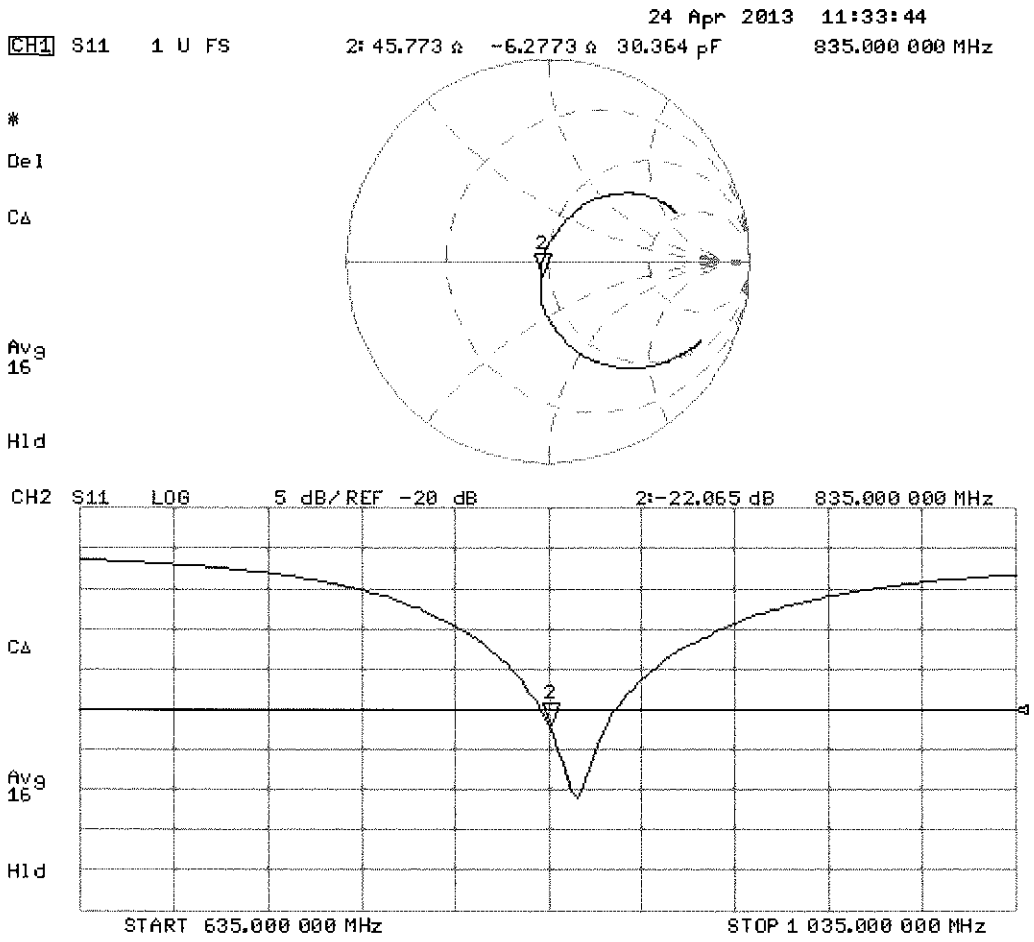
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D1765V2-1008_May13

CALIBRATION CERTIFICATE

Object D1765V2 - SN: 1008

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

Calibration date: May 14, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

	Name	Function	Signature
Calibrated by:	Jeton Kastrat	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 15, 2013

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Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 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 ± 0.2) °C	39.1 ± 6 %	1.33 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.6 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.7 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.53 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**38.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.4 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.3 Ω - 6.4 jΩ
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.8 Ω - 6.1 jΩ
Return Loss	- 20.6 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: 14.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN: 1008

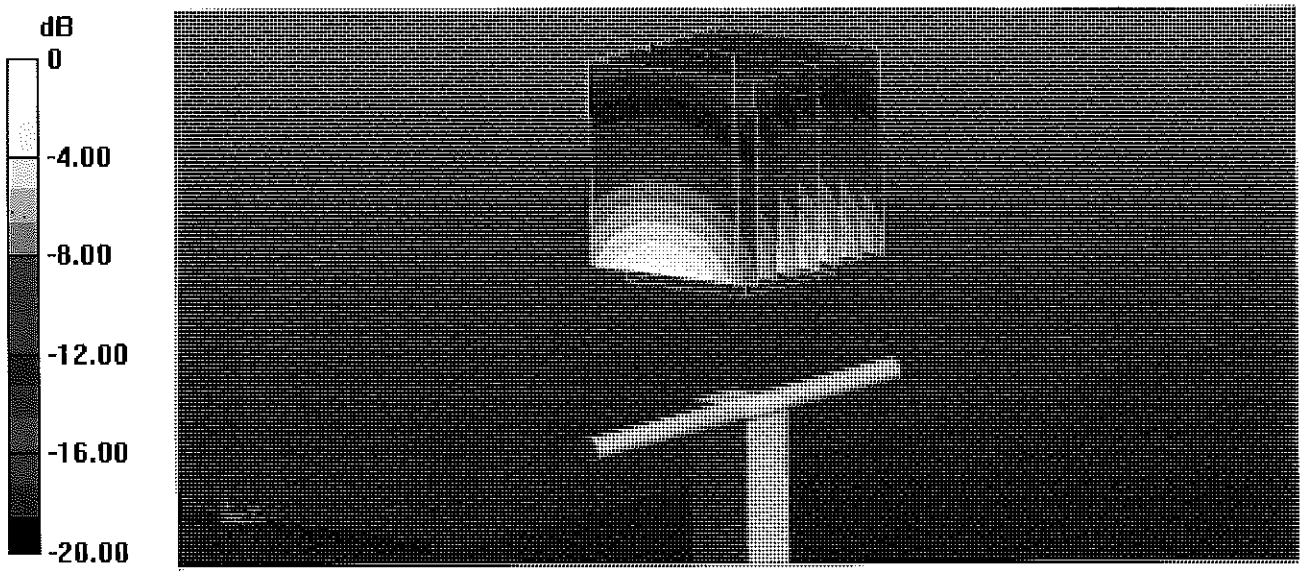
Communication System: UID 0 - CW ; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.33 S/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.18, 5.18, 5.18); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

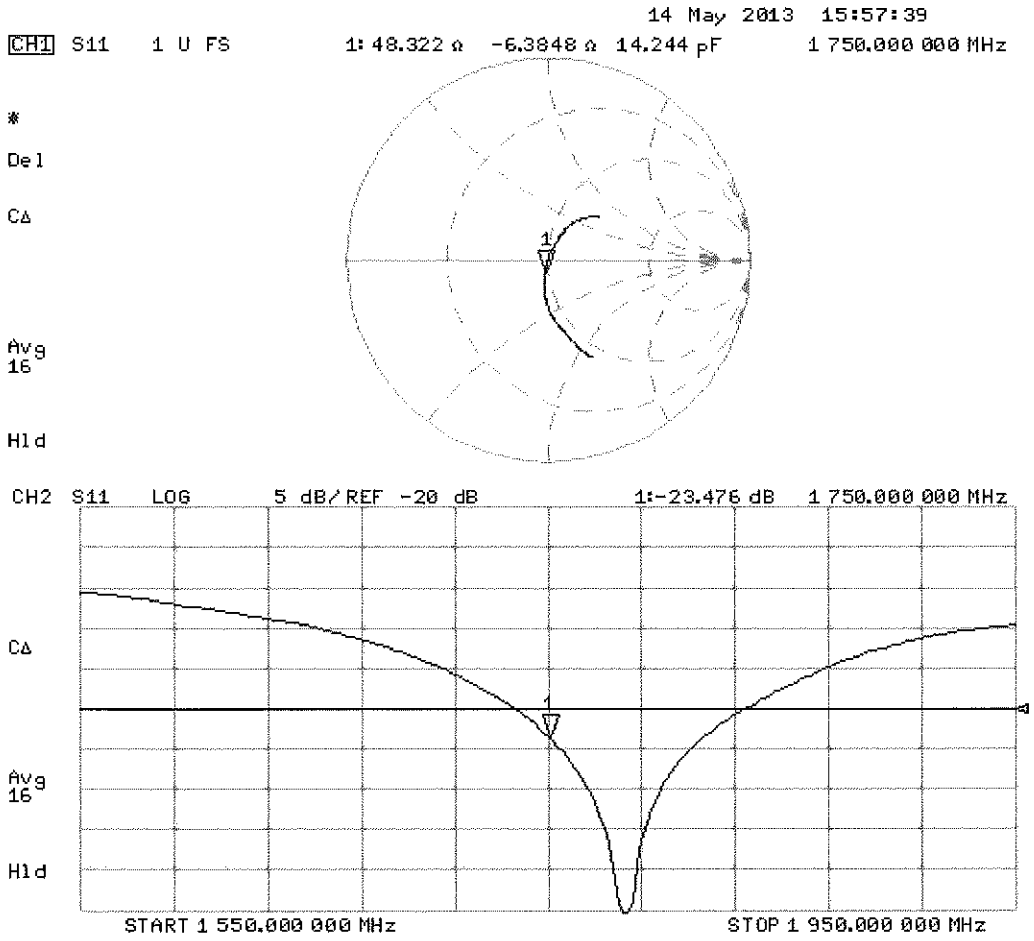
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.430 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.09 W/kg; SAR(10 g) = 4.85 W/kg
Maximum value of SAR (measured) = 11.3 W/kg



0 dB = 11.3 W/kg = 10.53 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN: 1008

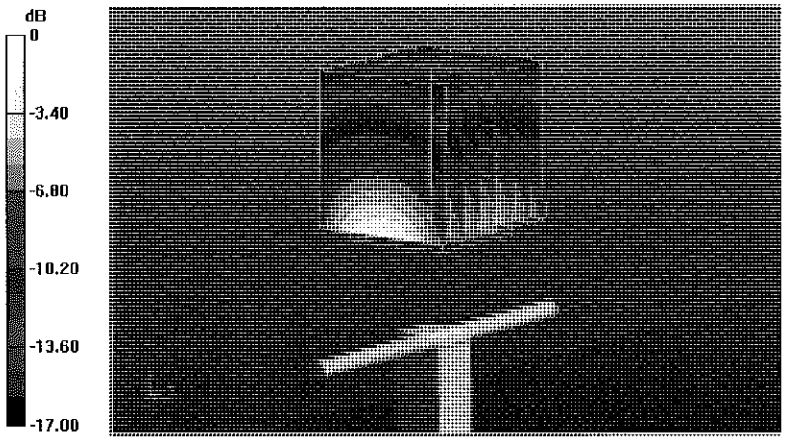
Communication System: UID 0 - CW ; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.83, 4.83, 4.83); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

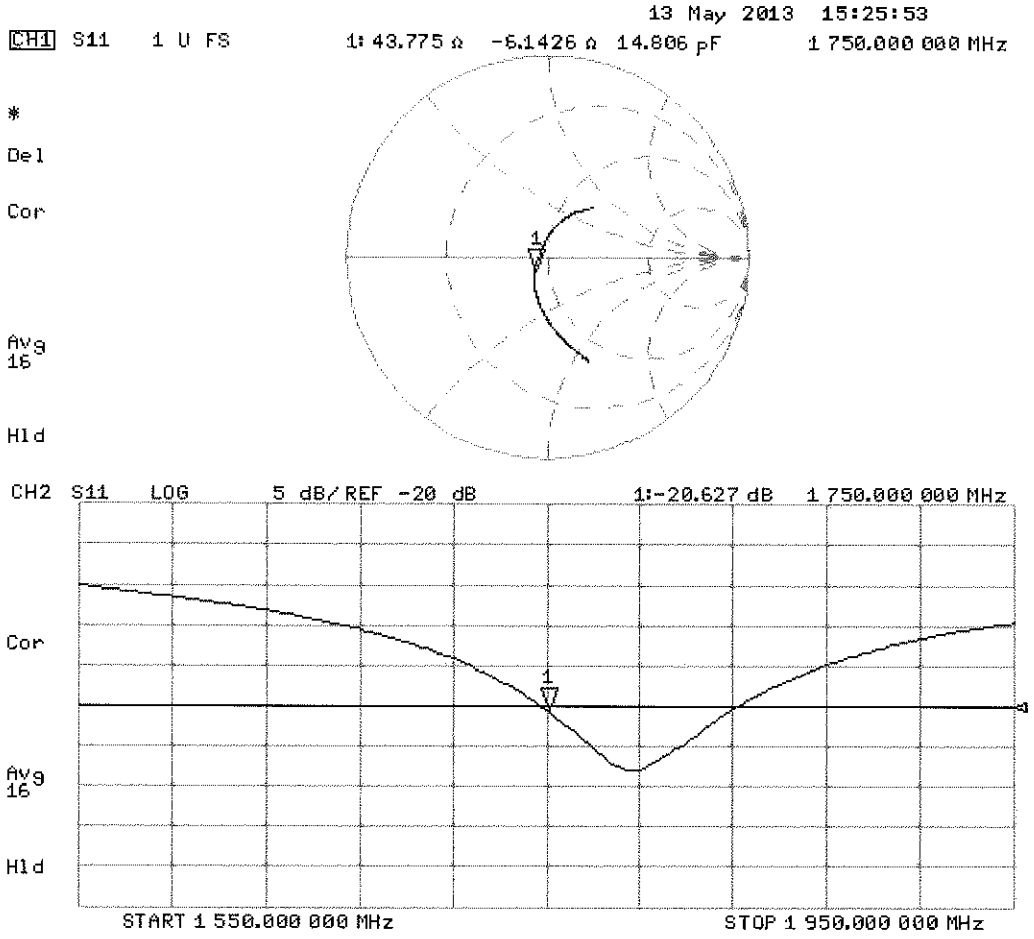
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.430 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.53 W/kg; SAR(10 g) = 5.1 W/kg
Maximum value of SAR (measured) = 12.0 W/kg



0 dB = 12.0 W/kg = 10.79 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client PC Test

Certificate No: D1900V2-5d148_Feb13

CALIBRATION CERTIFICATE

Object: D1900V2 - SN: 5d148

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

Calibration date: February 06, 2013

OK 2/21/13

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: February 6, 2013

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

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

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

Body TSL parameters

The following parameters and calculations were applied.

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

SAR result with Body TSL

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

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

Appendix

Antenna Parameters with Head TSL

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

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 06.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

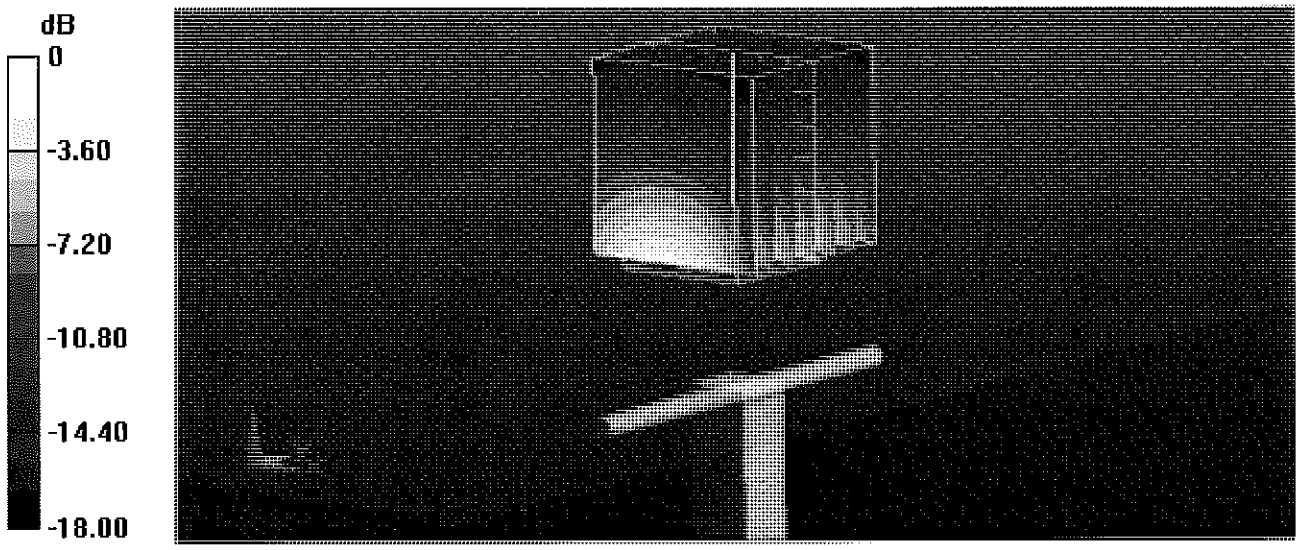
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

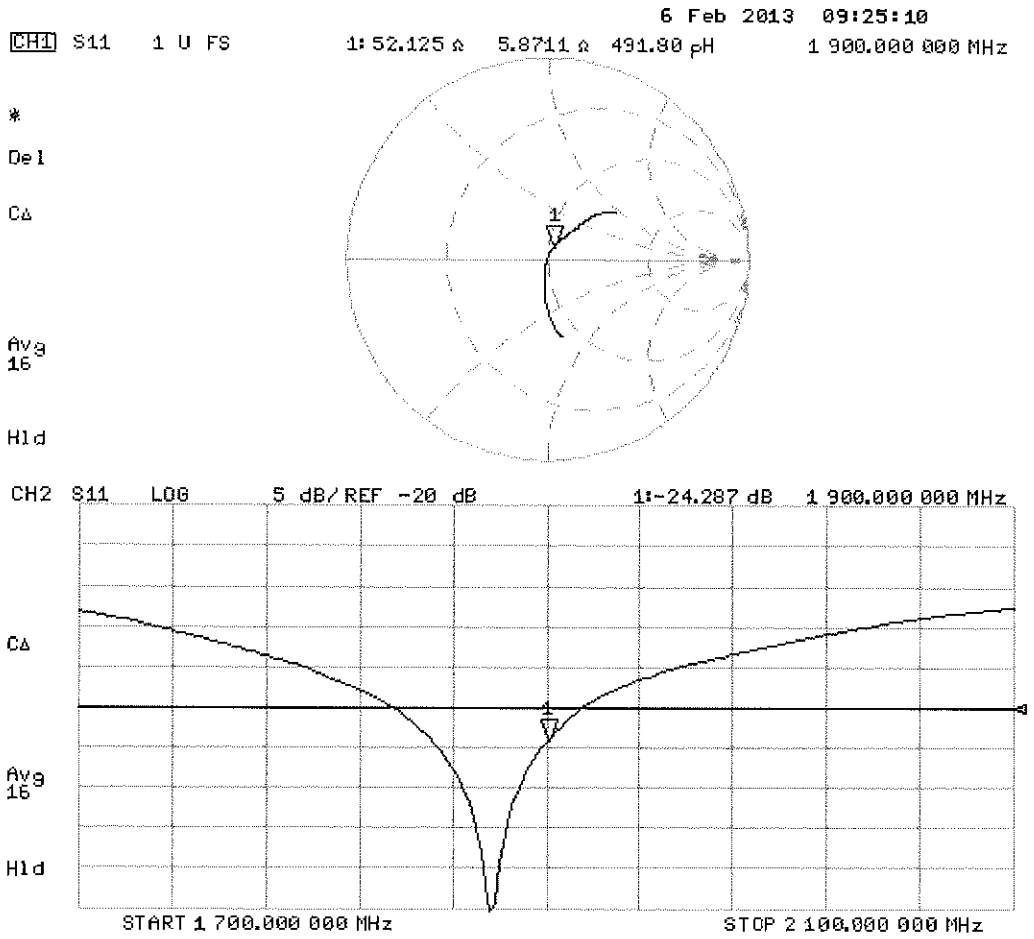
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

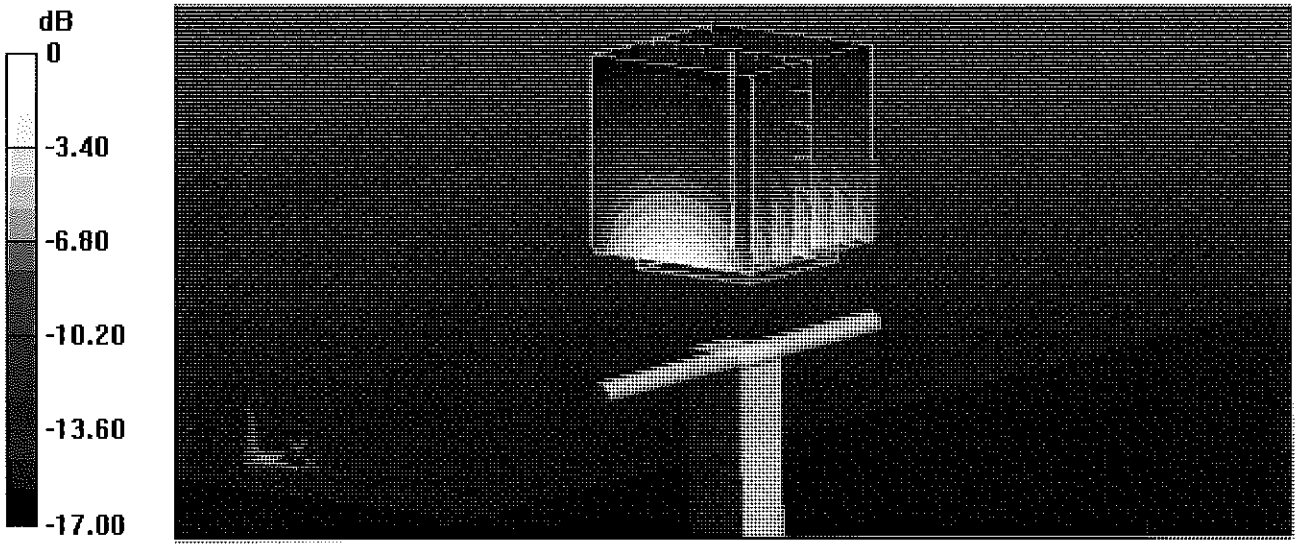
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.53 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

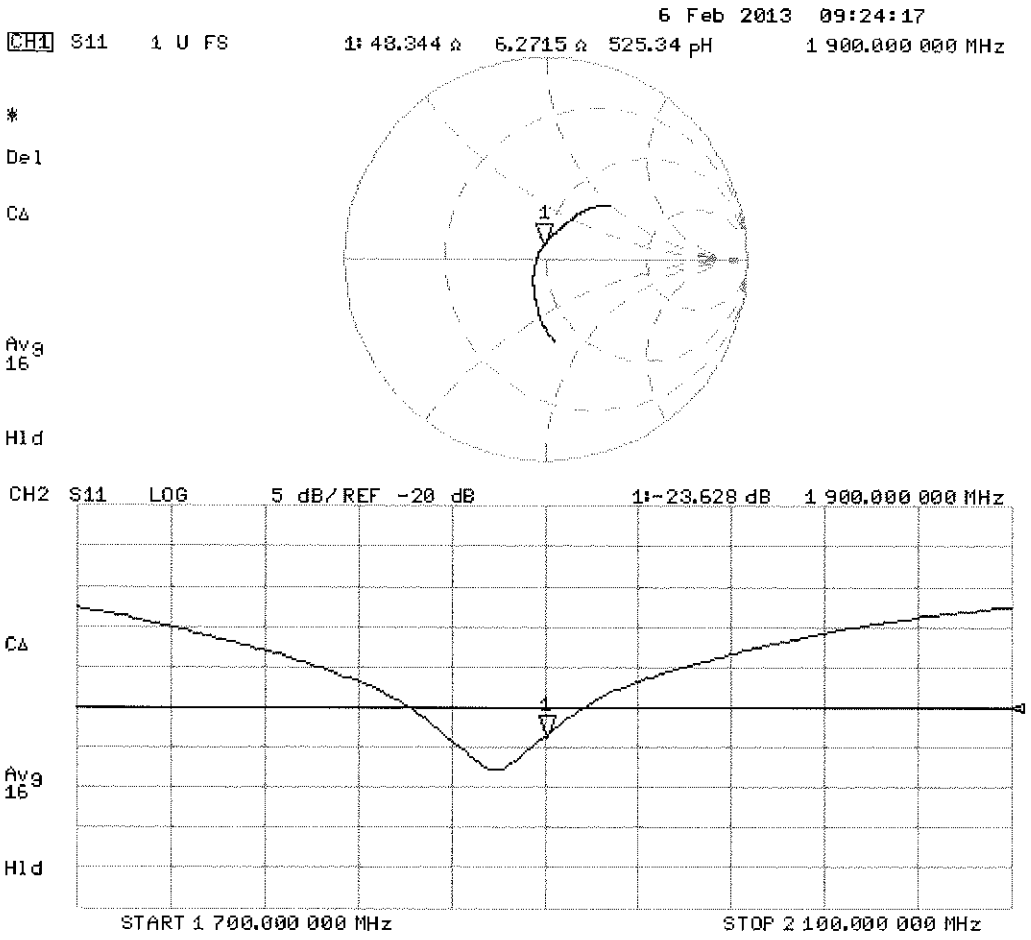
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: D750V3-1003_Jan13

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 07, 2013

OK 1/25/13

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: January 8, 2013

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.4
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 ± 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 ± 0.2) °C	41.4 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.46 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.51 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.8 ± 6 %	0.97 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.83 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.87 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.1 Ω - 0.2 jΩ
Return Loss	- 24.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω - 3.5 jΩ
Return Loss	- 29.1 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: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1003

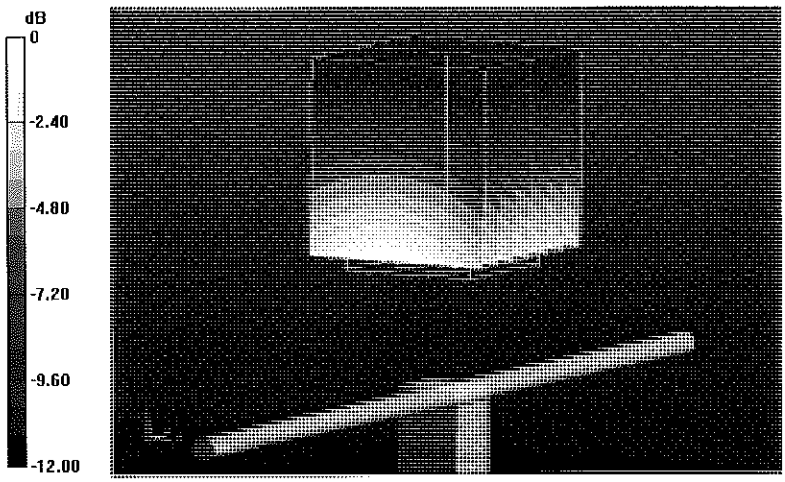
Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.89 S/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

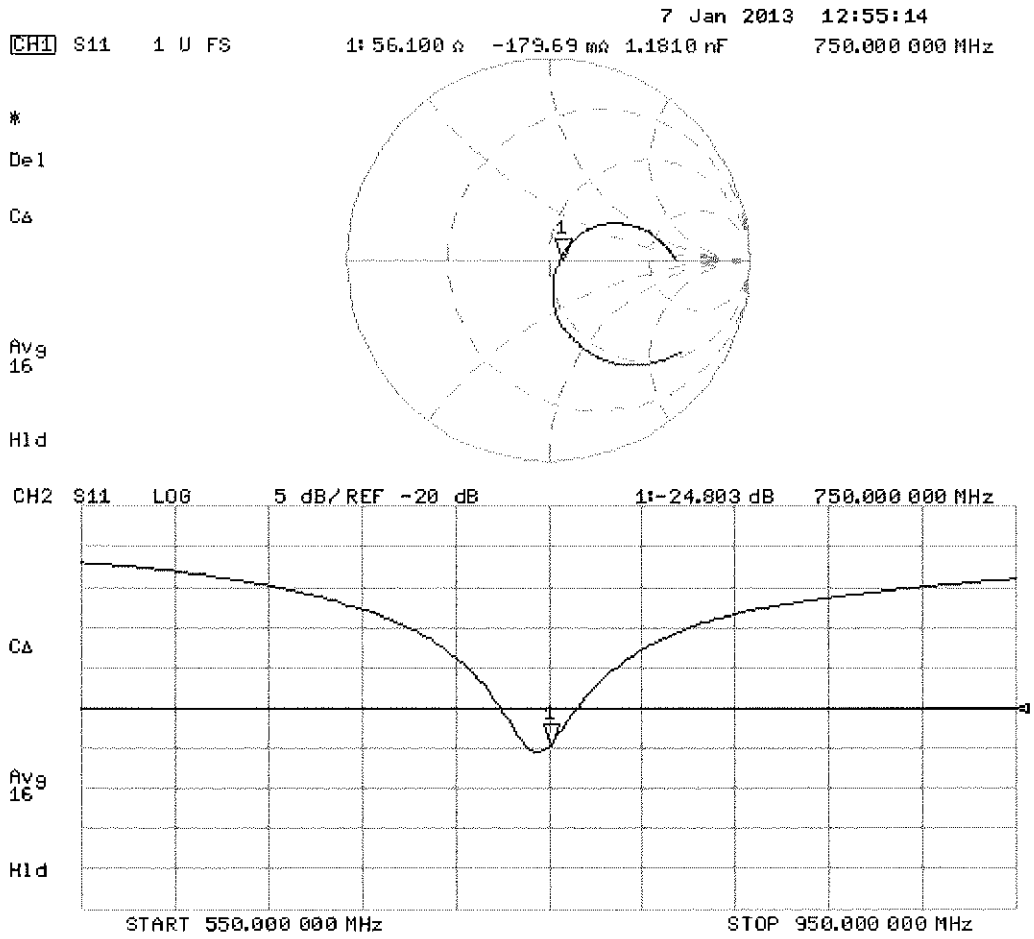
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.114 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.24 W/kg
SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.47 W/kg



0 dB = 2.47 W/kg = 3.93 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1003

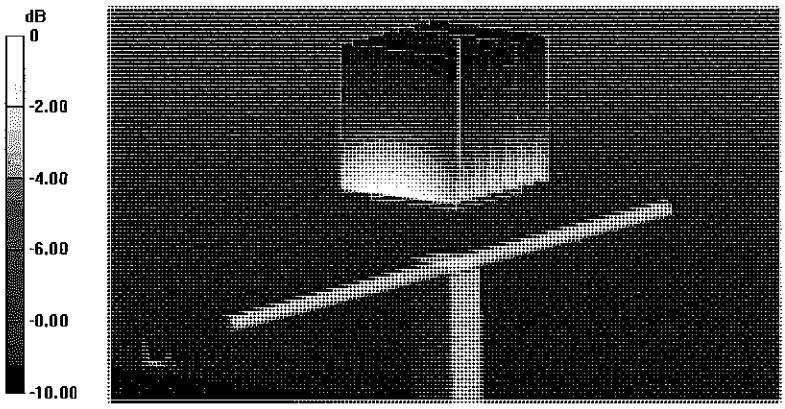
Communication System: CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.97 S/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.11, 6.11, 6.11); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

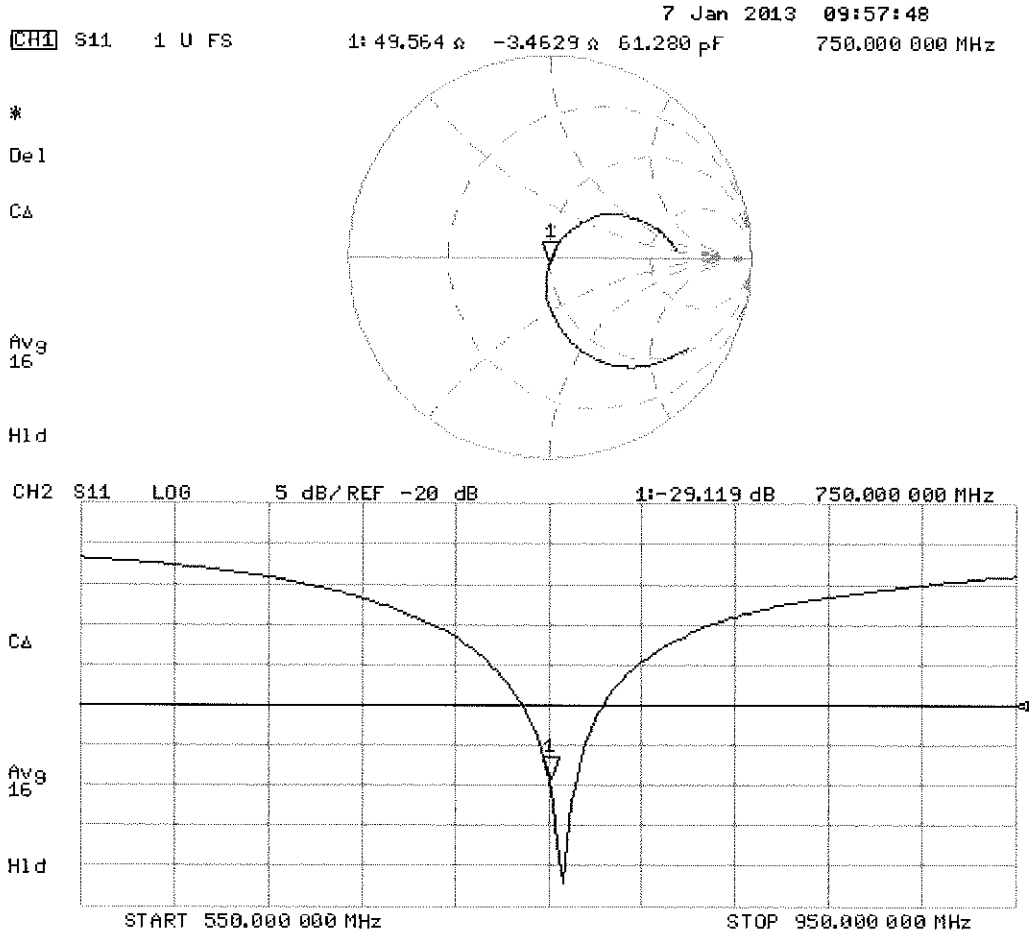
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.114 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.25 W/kg
SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (measured) = 2.57 W/kg



0 dB = 2.57 W/kg = 4.10 dBW/kg

Impedance Measurement Plot for Body TSL



Calibration Laboratory of
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Engineering AG
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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: ES3-3287_Nov12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3287

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: November 15, 2012

√ KOK 11/20/12

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 E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: November 16, 2012

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z*: *A, B, C* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3287

Manufactured: June 7, 2010
Calibrated: November 15, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.31	1.25	1.25	± 10.1 %
DCP (mV)[B]	102.9	103.6	101.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.0	0.0	1.0	116.8	±3.5 %
			Y	0.0	0.0	1.0	118.5	
			Z	0.0	0.0	1.0	154.1	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.40	6.40	6.40	0.20	2.54	± 12.0 %
835	41.5	0.90	6.17	6.17	6.17	0.34	1.68	± 12.0 %
1750	40.1	1.37	5.16	5.16	5.16	0.63	1.30	± 12.0 %
1900	40.0	1.40	4.96	4.96	4.96	0.48	1.55	± 12.0 %
2450	39.2	1.80	4.30	4.30	4.30	0.79	1.31	± 12.0 %
2600	39.0	1.96	4.19	4.19	4.19	0.80	1.31	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

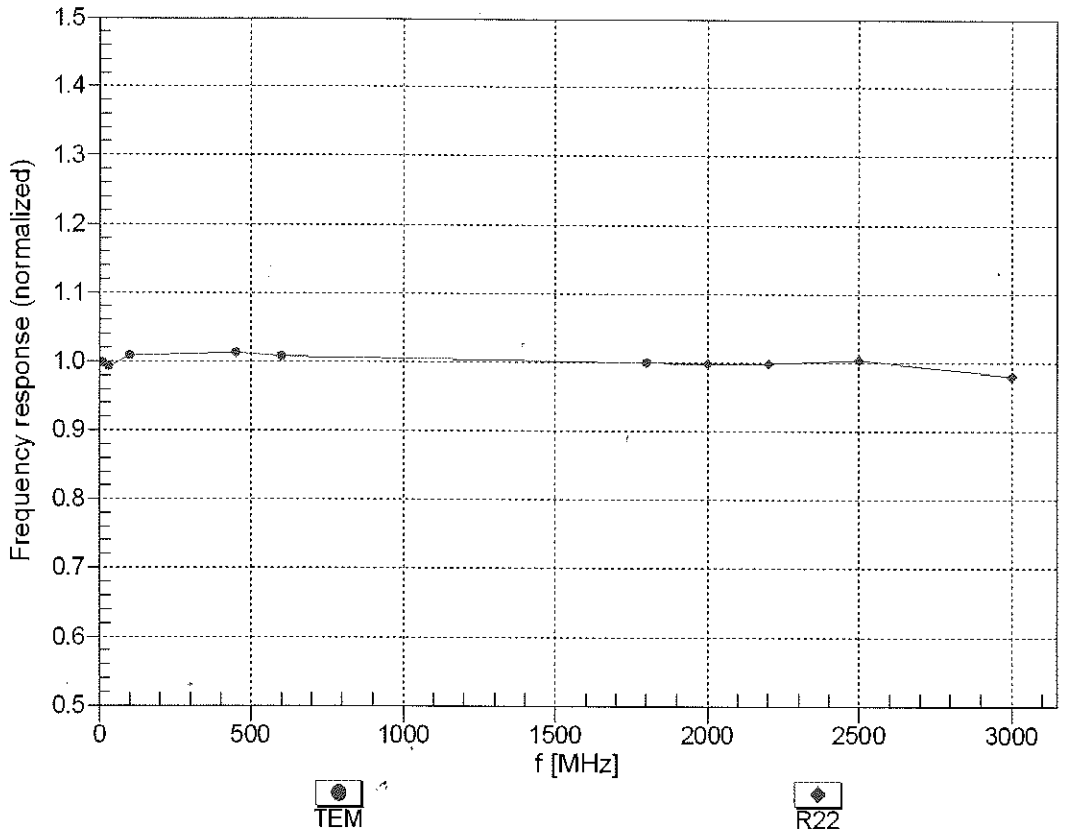
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.14	6.14	6.14	0.28	2.06	± 12.0 %
835	55.2	0.97	6.06	6.06	6.06	0.42	1.63	± 12.0 %
1750	53.4	1.49	4.86	4.86	4.86	0.43	1.64	± 12.0 %
1900	53.3	1.52	4.69	4.69	4.69	0.56	1.54	± 12.0 %
2450	52.7	1.95	4.29	4.29	4.29	0.80	1.02	± 12.0 %
2600	52.5	2.16	4.12	4.12	4.12	0.64	0.92	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

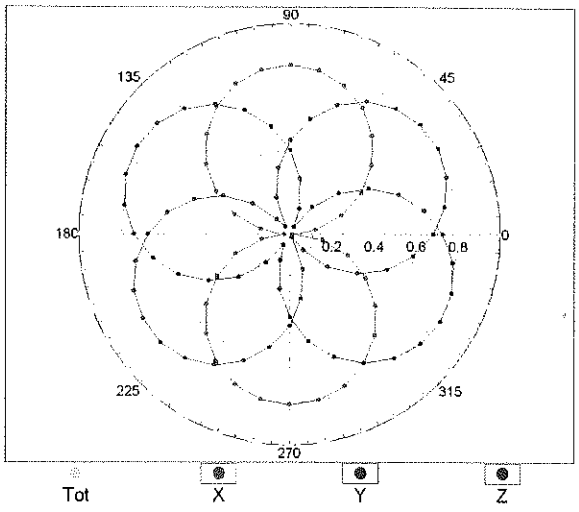
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



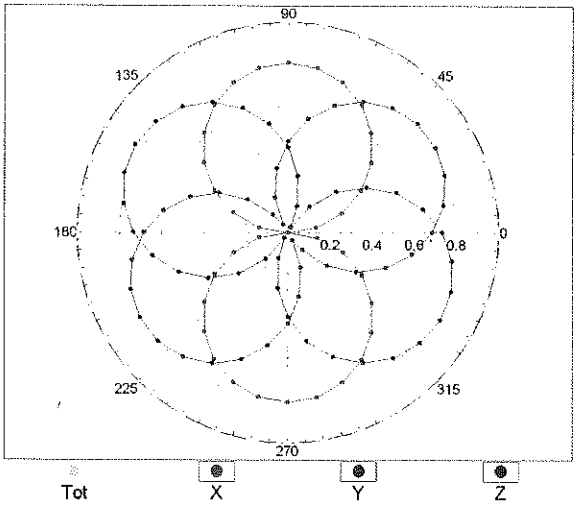
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

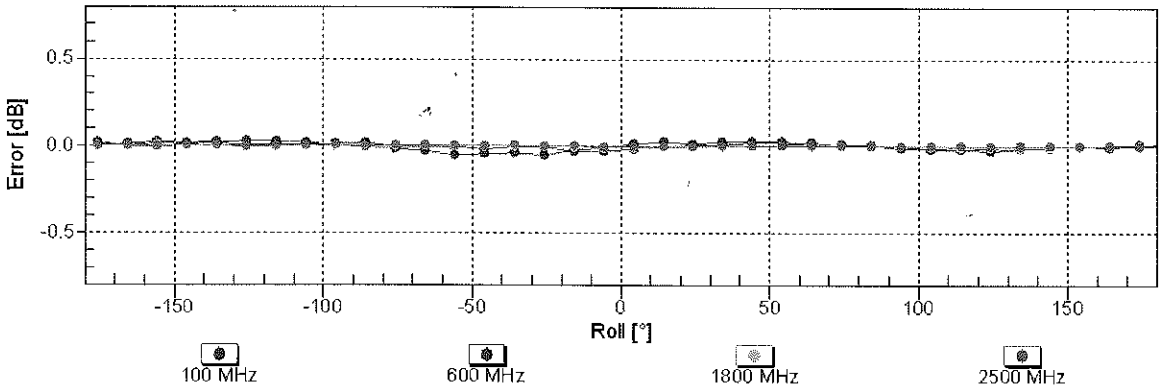
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



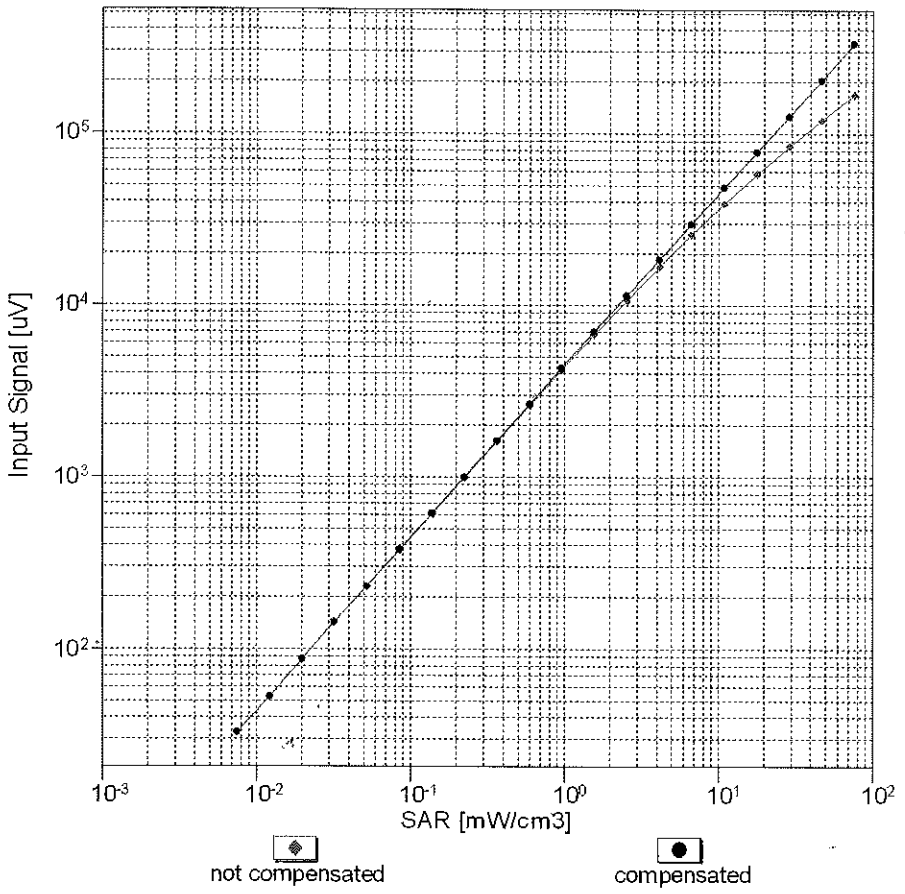
f=1800 MHz,R22

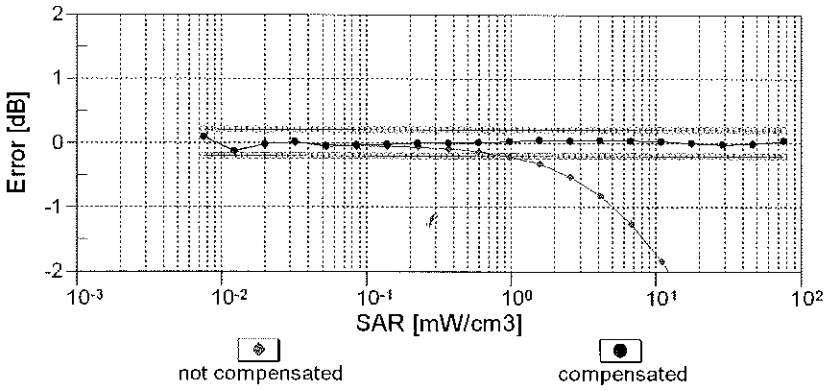




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

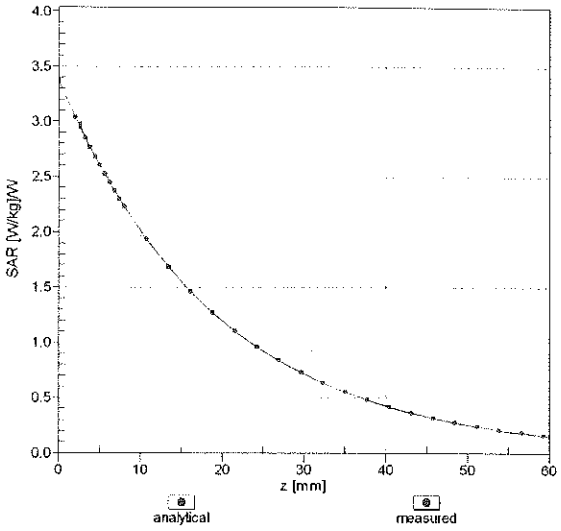




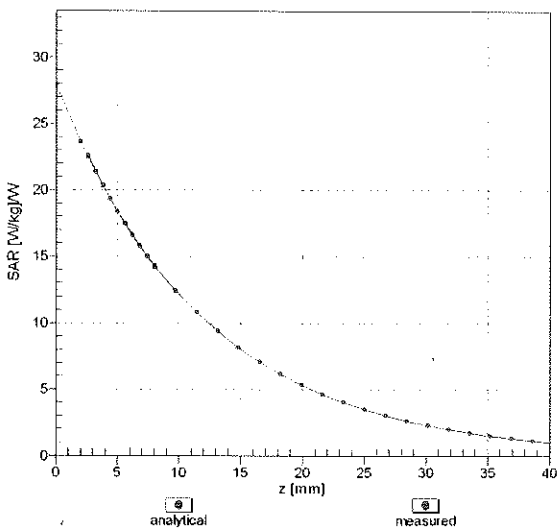
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

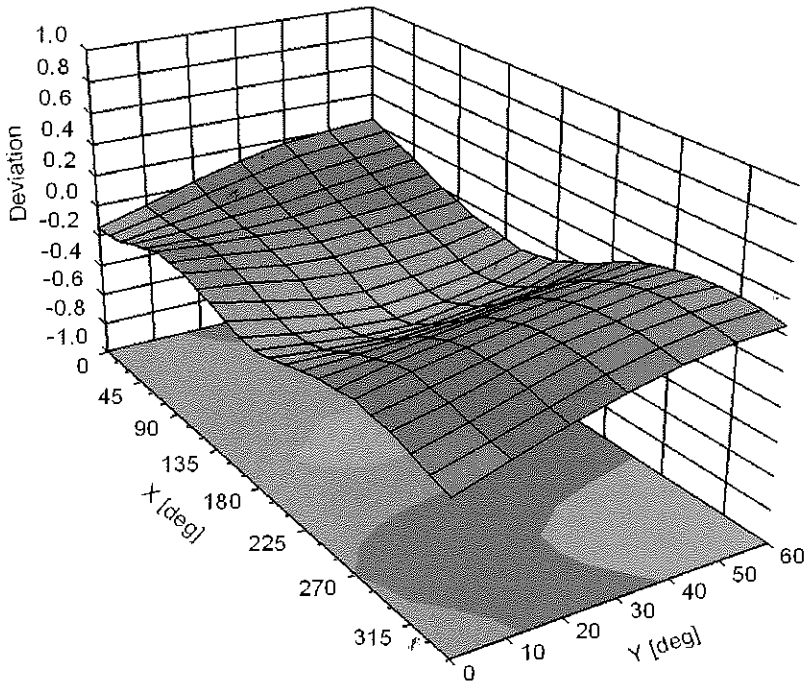


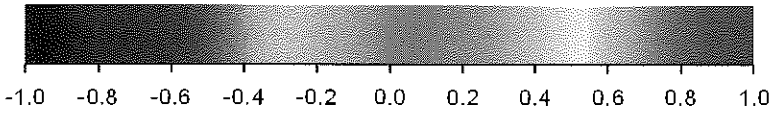
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-15.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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

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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: ES3-3209_Mar13

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3209

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: March 15, 2013

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 E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: March 15, 2013

80244

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

S Schweizerischer Kalibrierdienst
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3209

Manufactured: October 14, 2008
Calibrated: March 15, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.35	1.33	1.14	± 10.1 %
DCP (mV)[B]	99.2	97.8	98.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	163.6	±3.5 %
		Y	0.0	0.0	1.0		170.3	
		Z	0.0	0.0	1.0		158.7	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.74	6.74	6.74	0.76	1.18	± 12.0 %
835	41.5	0.90	6.46	6.46	6.46	0.31	1.81	± 12.0 %
1750	40.1	1.37	5.39	5.39	5.39	0.80	1.21	± 12.0 %
1900	40.0	1.40	5.21	5.21	5.21	0.78	1.26	± 12.0 %
2450	39.2	1.80	4.57	4.57	4.57	0.65	1.43	± 12.0 %
2600	39.0	1.96	4.43	4.43	4.43	0.75	1.36	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

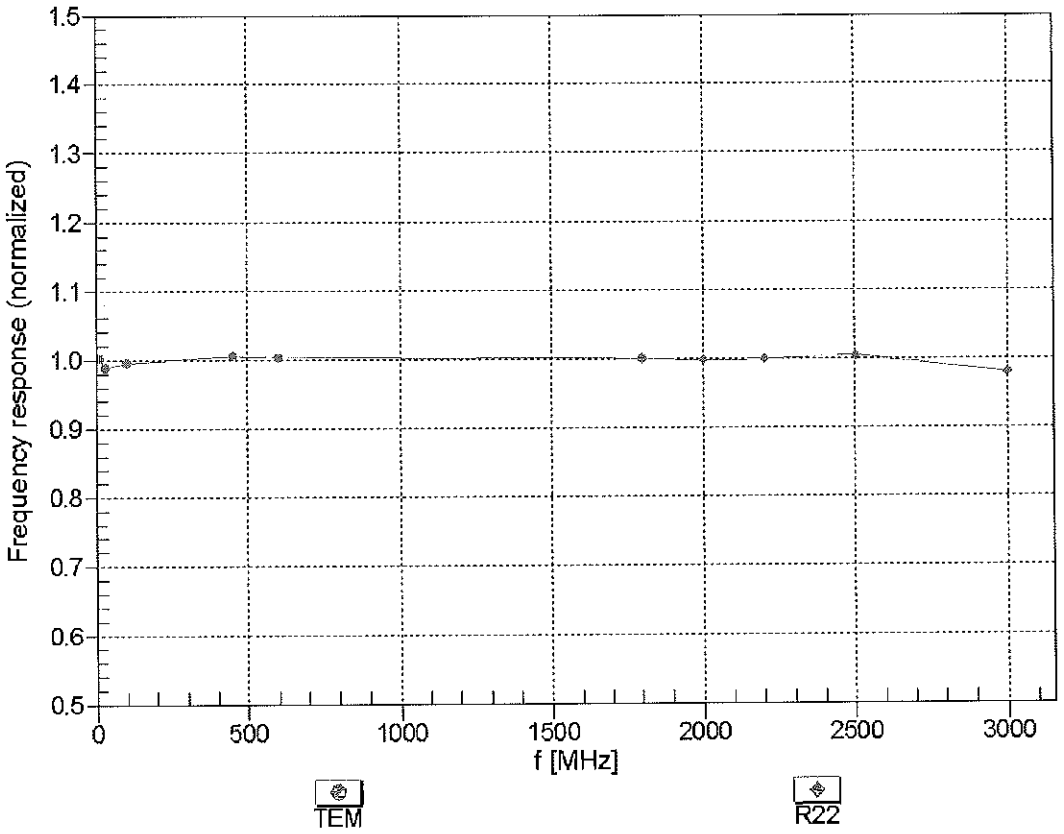
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.38	6.38	6.38	0.80	1.16	± 12.0 %
835	55.2	0.97	6.28	6.28	6.28	0.52	1.45	± 12.0 %
1750	53.4	1.49	5.03	5.03	5.03	0.58	1.45	± 12.0 %
1900	53.3	1.52	4.77	4.77	4.77	0.70	1.36	± 12.0 %
2450	52.7	1.95	4.34	4.34	4.34	0.80	1.15	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.80	1.00	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

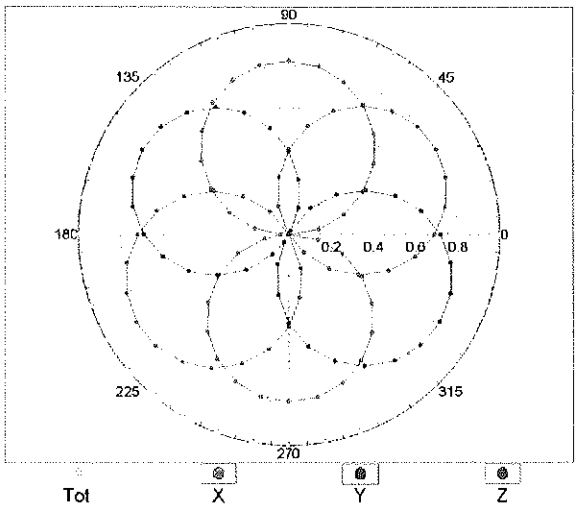
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



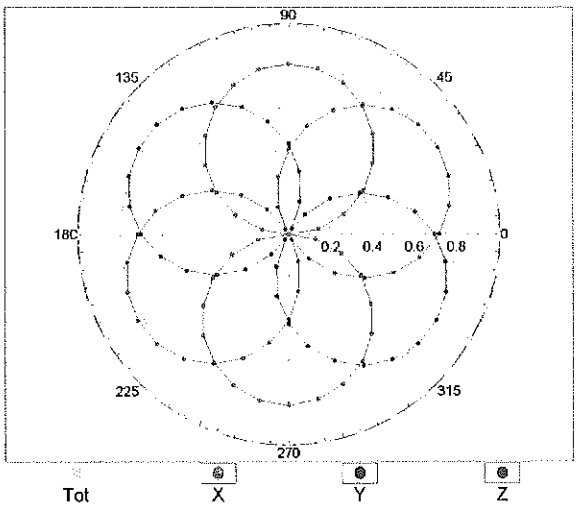
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

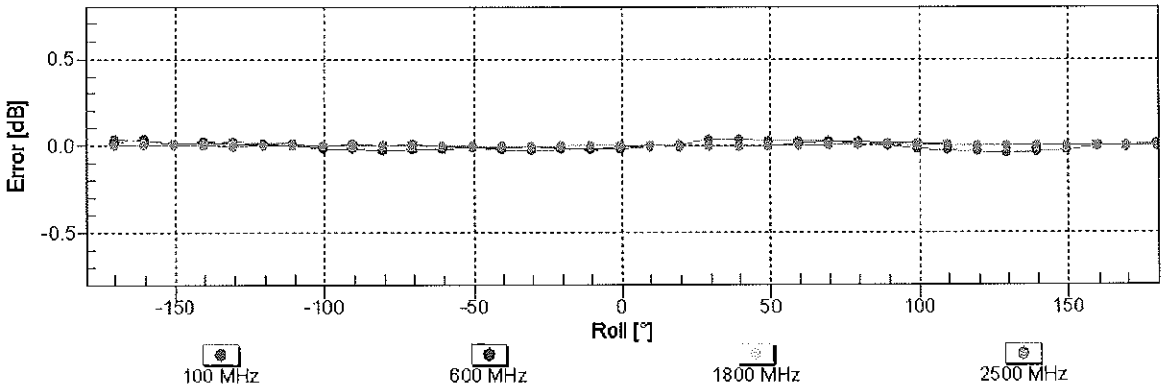
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



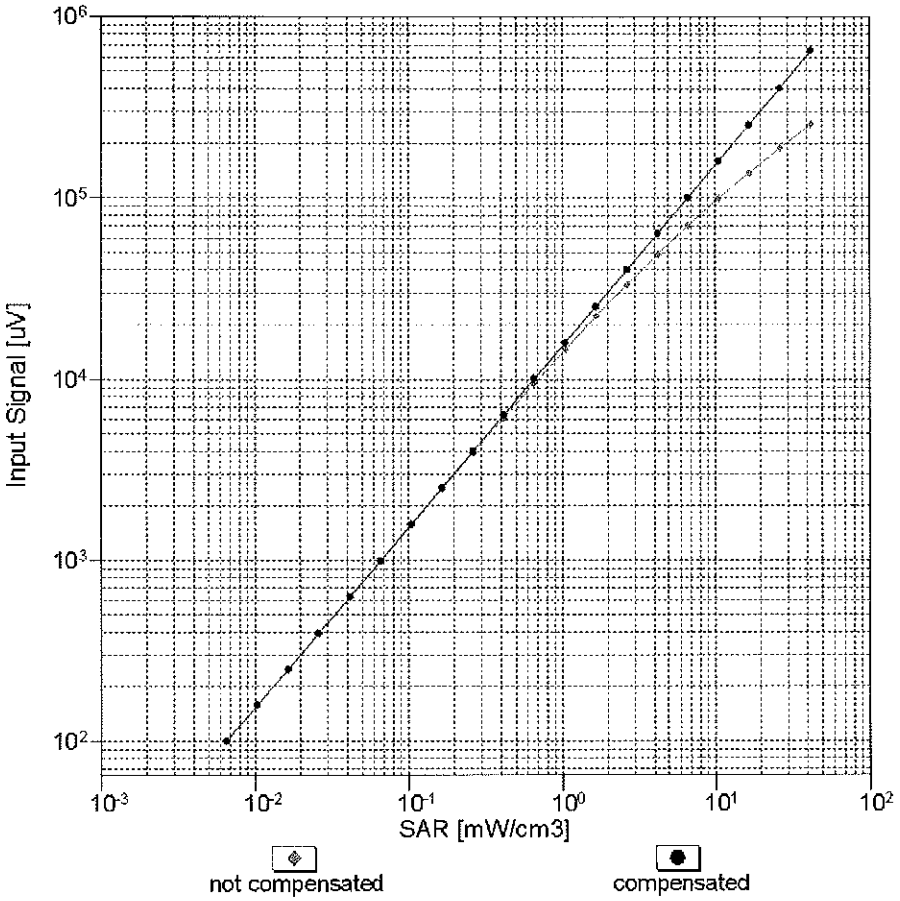
f=1800 MHz,R22

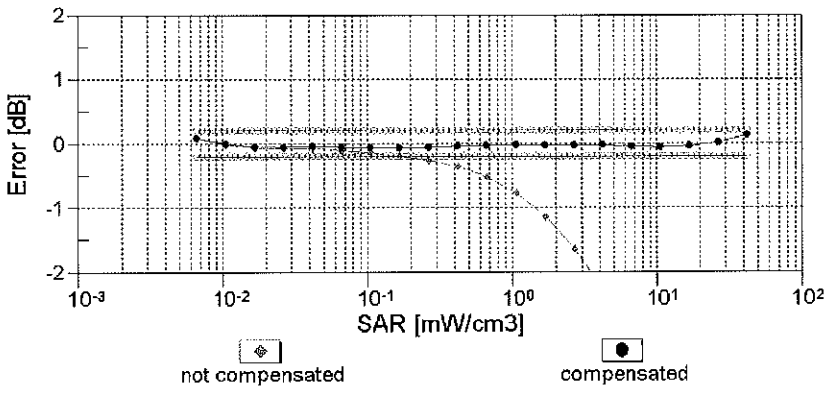




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

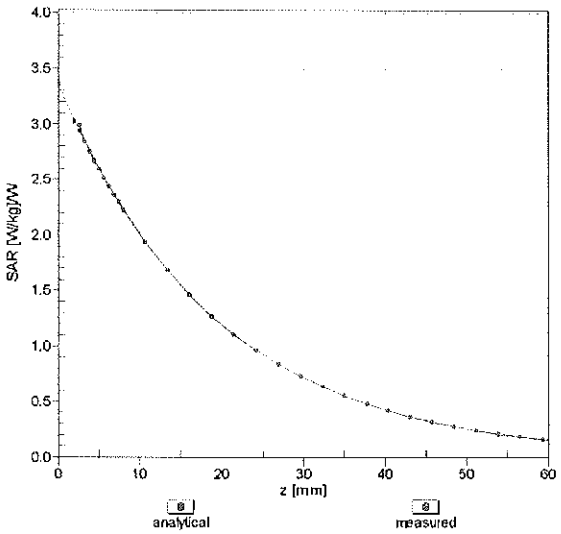




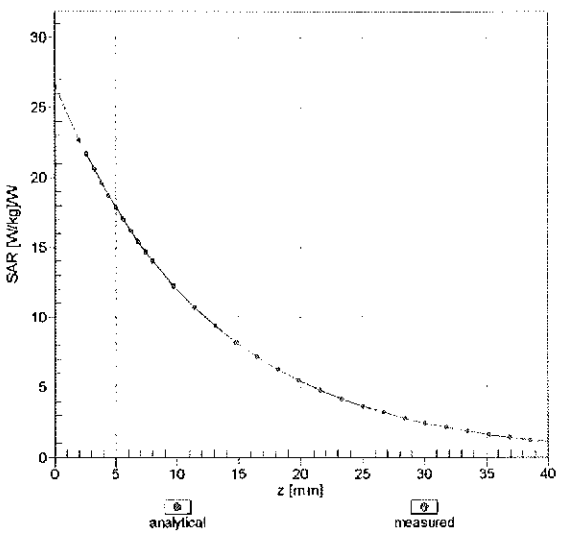
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

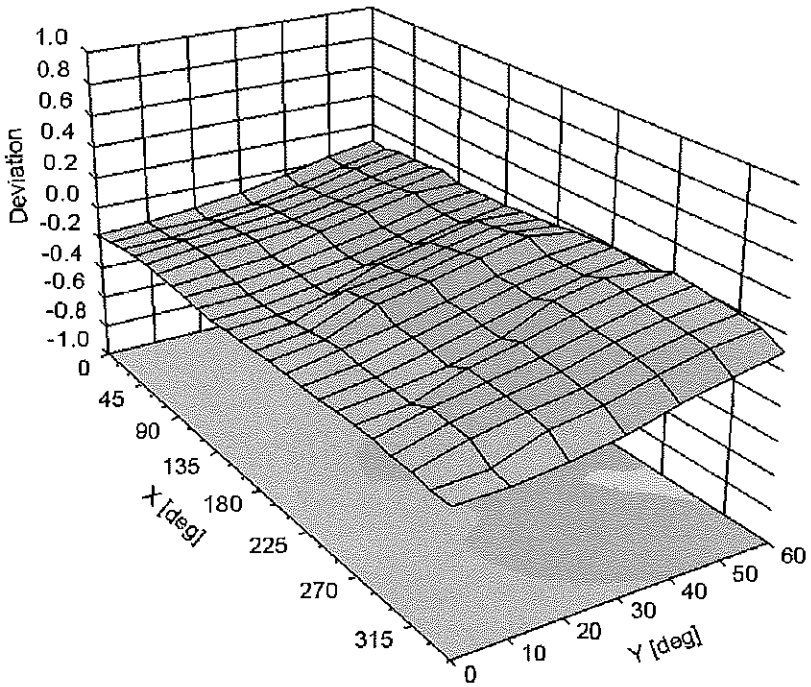


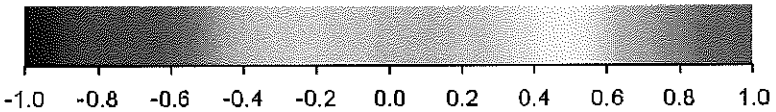
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-40.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client **PC Test**

Certificate No: EX3-3920_Feb13/2

CALIBRATION CERTIFICATE (Replacement of No: EX3-3920_Feb13)

Object	EX3DV4 - SN:3920
Calibration procedure(s)	QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	February 27, 2013

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%.

✓ OK 3/22/13

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: March 5, 2013

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3920

Manufactured: December 18, 2012
Calibrated: February 27, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.34	0.50	0.50	± 10.1 %
DCP (mV)[B]	101.2	101.0	99.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	134.3	±3.3 %
		Y	0.0	0.0	1.0		164.7	
		Z	0.0	0.0	1.0		161.4	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.86	9.86	9.86	0.19	1.39	± 12.0 %
835	41.5	0.90	9.58	9.58	9.58	0.77	0.54	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.57	0.69	± 12.0 %
1900	40.0	1.40	7.73	7.73	7.73	0.54	0.73	± 12.0 %
2450	39.2	1.80	7.04	7.04	7.04	0.40	0.82	± 12.0 %
2600	39.0	1.96	6.80	6.80	6.80	0.49	0.76	± 12.0 %
5200	36.0	4.66	4.87	4.87	4.87	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.73	4.73	4.73	0.37	1.80	± 13.1 %
5500	35.6	4.96	4.52	4.52	4.52	0.39	1.80	± 13.1 %
5600	35.5	5.07	4.17	4.17	4.17	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.02	4.02	4.02	0.45	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

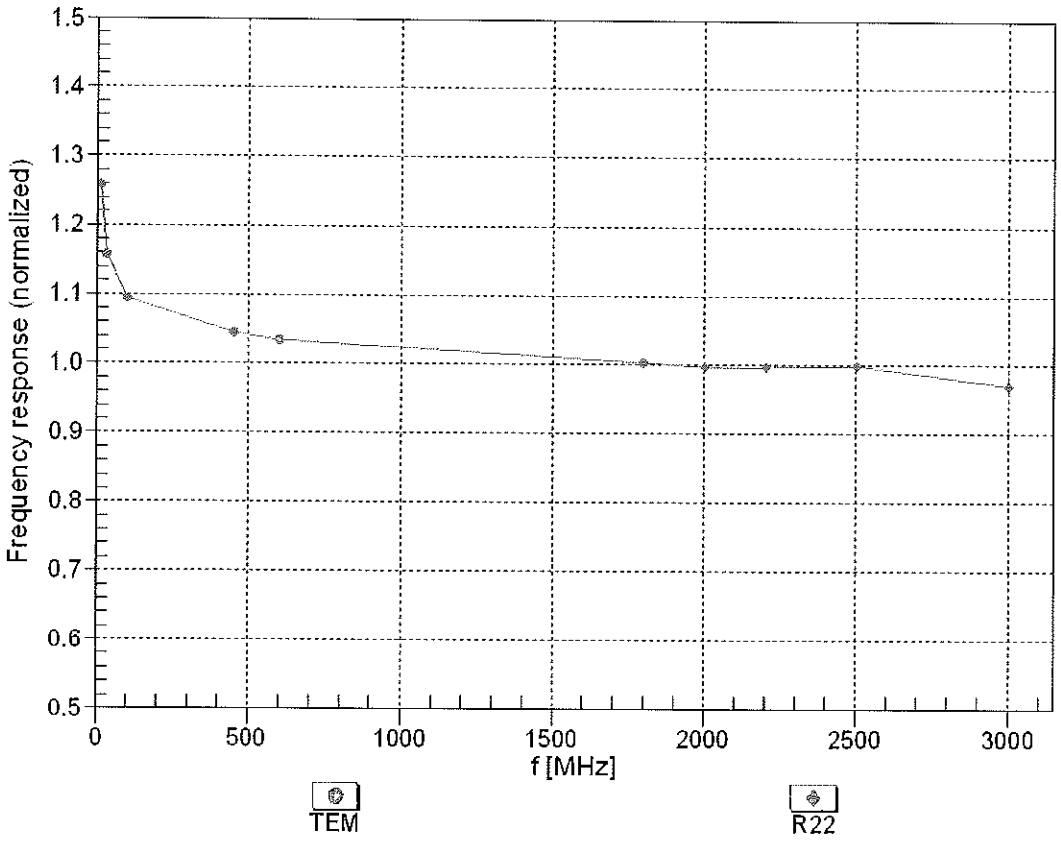
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.57	9.57	9.57	0.43	0.83	± 12.0 %
835	55.2	0.97	9.42	9.42	9.42	0.36	0.98	± 12.0 %
1750	53.4	1.49	7.59	7.59	7.59	0.43	0.78	± 12.0 %
1900	53.3	1.52	7.38	7.38	7.38	0.33	0.91	± 12.0 %
2450	52.7	1.95	7.07	7.07	7.07	0.80	0.55	± 12.0 %
2600	52.5	2.16	6.73	6.73	6.73	0.80	0.56	± 12.0 %
5200	49.0	5.30	4.23	4.23	4.23	0.51	1.90	± 13.1 %
5300	48.9	5.42	4.13	4.13	4.13	0.49	1.90	± 13.1 %
5500	48.6	5.65	3.63	3.63	3.63	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.62	3.62	3.62	0.49	1.90	± 13.1 %
5800	48.2	6.00	3.91	3.91	3.91	0.54	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

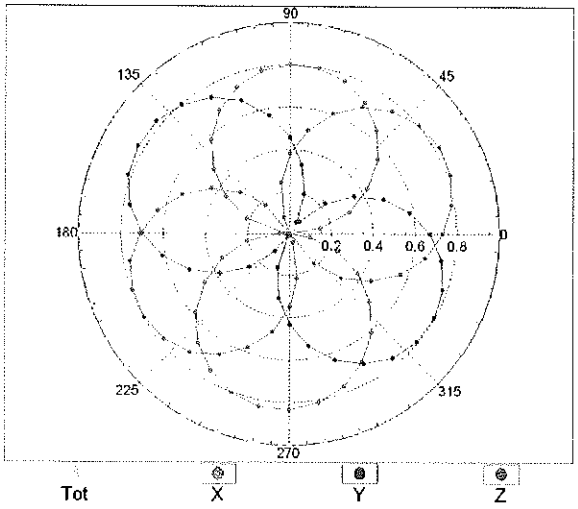
(TEM-Cell:ifi110 EXX, Waveguide: R22)



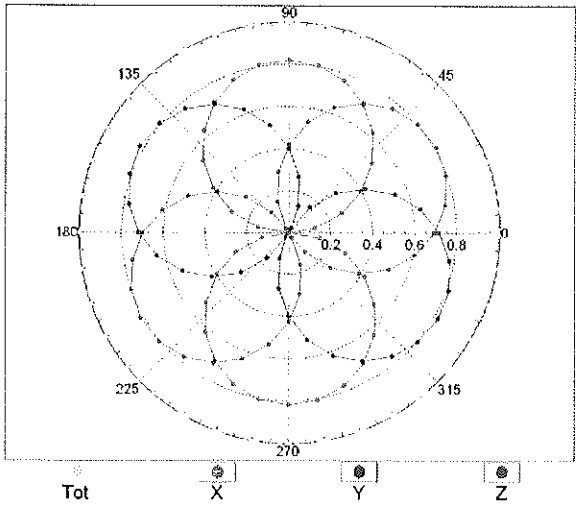
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

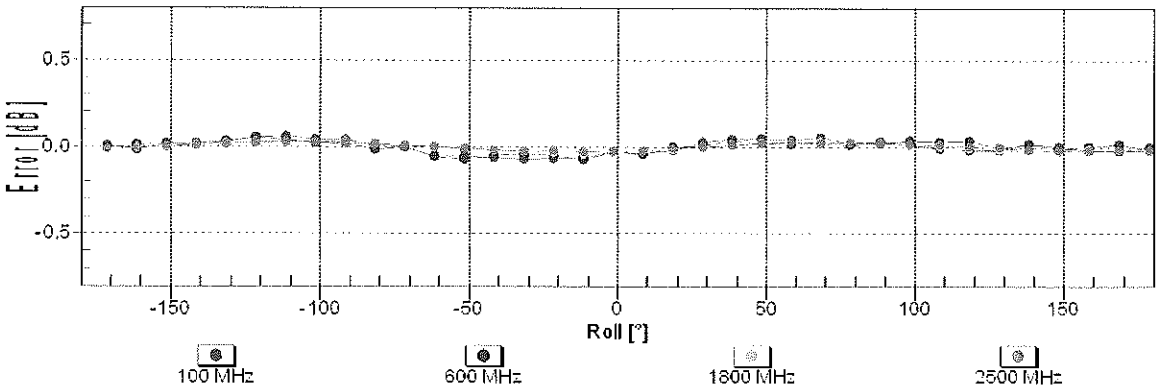
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



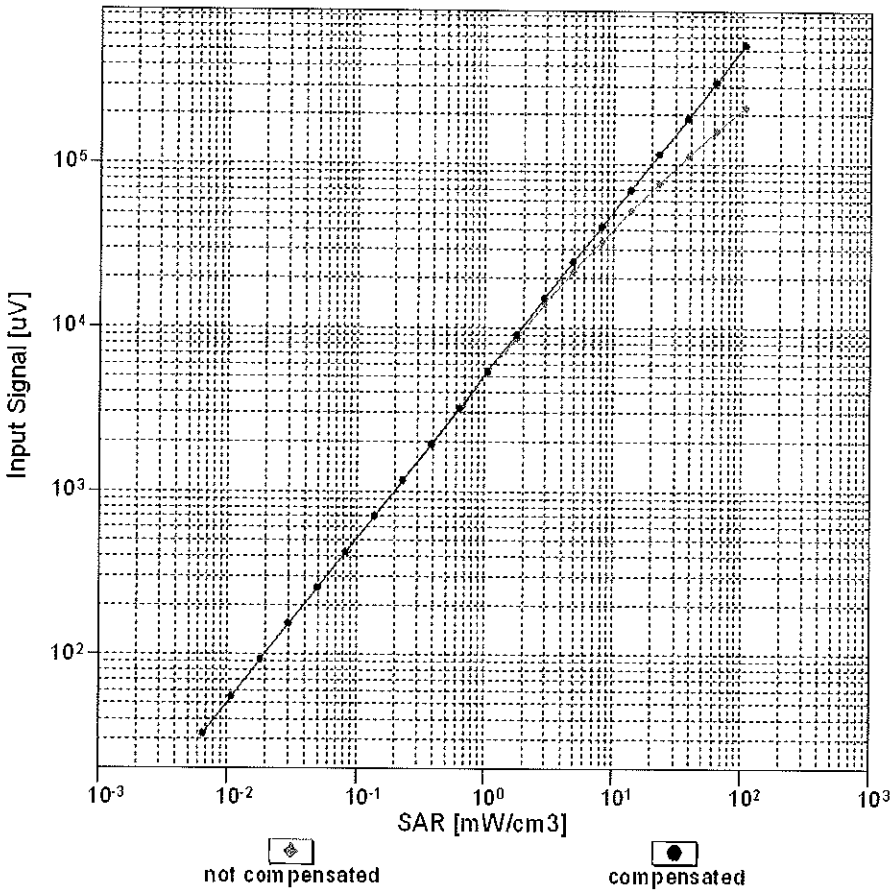
f=1800 MHz,R22

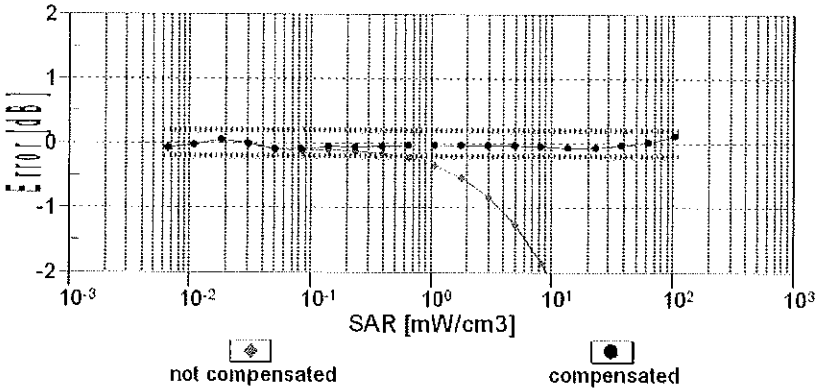




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

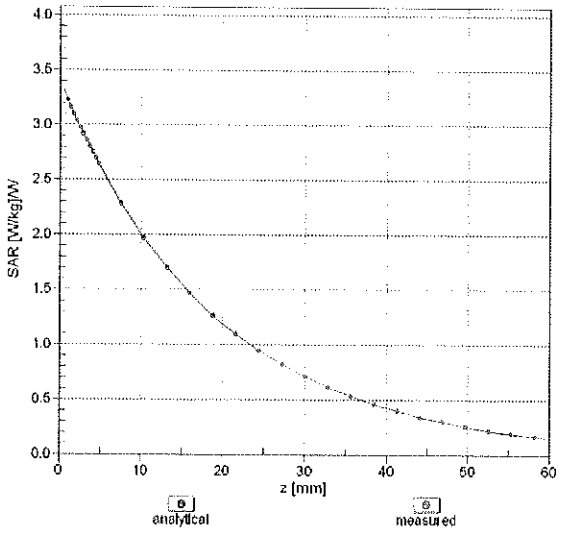




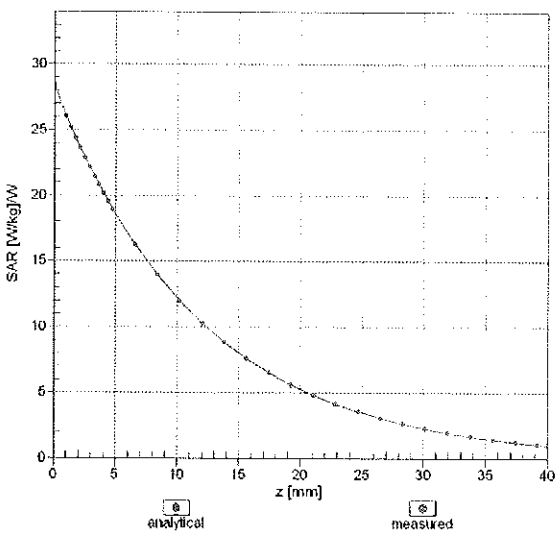
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

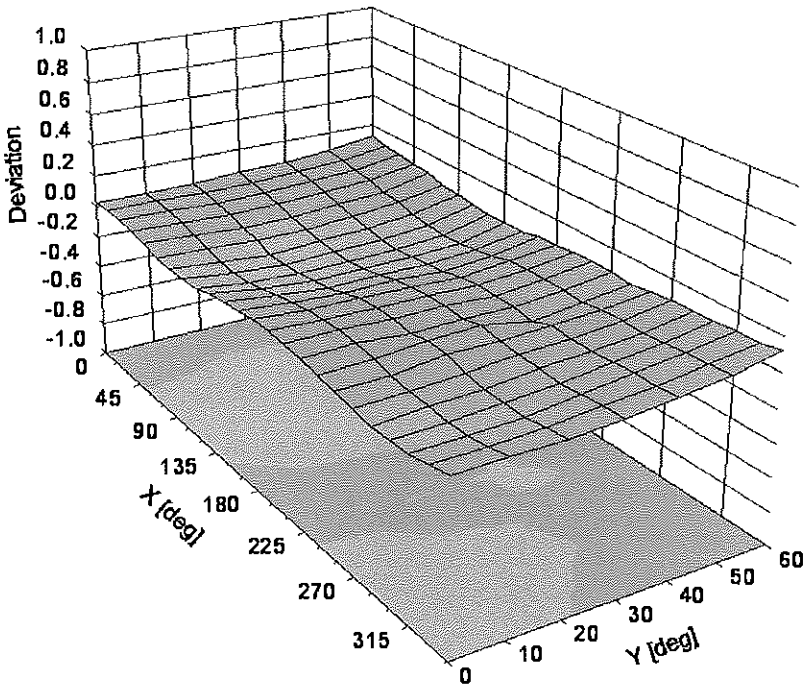


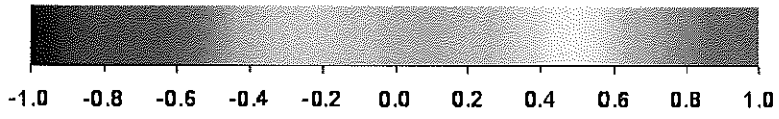
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-21.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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Accreditation No.: SCS 108

Client PC Test

Certificate No: ES3-3213_Apr13

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3213

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 29, 2013

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 E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 29, 2013

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

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \le 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3213

Manufactured: October 14, 2008
Calibrated: April 29, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.47	1.36	1.33	± 10.1 %
DCP (mV)[B]	103.0	100.8	100.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	171.2	±2.7 %
		Y	0.0	0.0	1.0		172.4	
		Z	0.0	0.0	1.0		169.5	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.54	6.54	6.54	0.45	1.49	± 12.0 %
835	41.5	0.90	6.30	6.30	6.30	0.31	1.77	± 12.0 %
1450	40.5	1.20	5.41	5.41	5.41	0.26	2.35	± 12.0 %
1750	40.1	1.37	5.22	5.22	5.22	0.79	1.18	± 12.0 %
1900	40.0	1.40	5.08	5.08	5.08	0.80	1.20	± 12.0 %
2450	39.2	1.80	4.49	4.49	4.49	0.79	1.28	± 12.0 %
2600	39.0	1.96	4.36	4.36	4.36	0.79	1.24	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

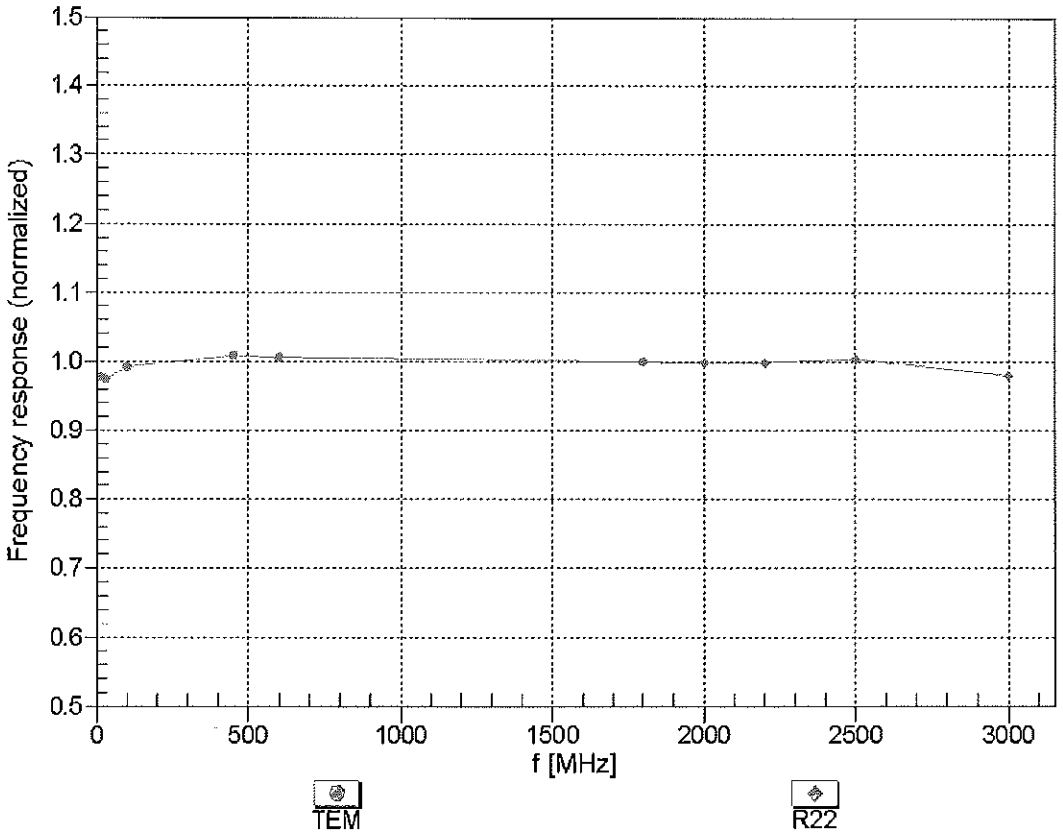
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.32	6.32	6.32	0.44	1.54	± 12.0 %
835	55.2	0.97	6.25	6.25	6.25	0.37	1.77	± 12.0 %
1450	54.0	1.30	5.28	5.28	5.28	0.57	1.42	± 12.0 %
1750	53.4	1.49	4.95	4.95	4.95	0.66	1.34	± 12.0 %
1900	53.3	1.52	4.73	4.73	4.73	0.55	1.51	± 12.0 %
2450	52.7	1.95	4.29	4.29	4.29	0.65	1.18	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.60	0.87	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

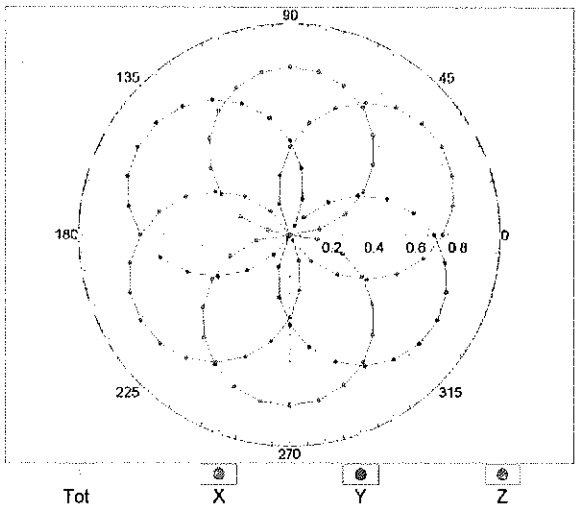
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



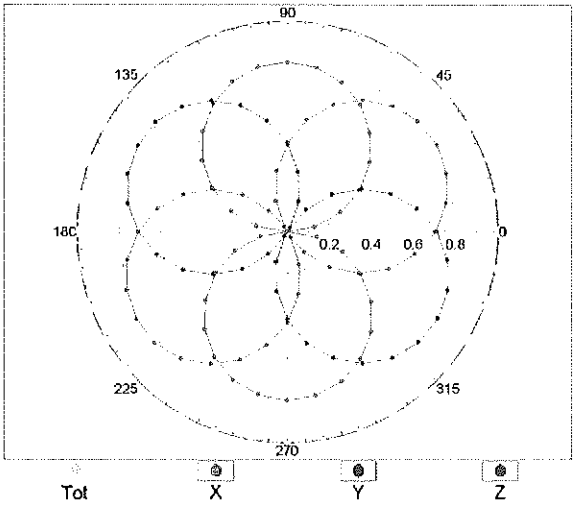
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

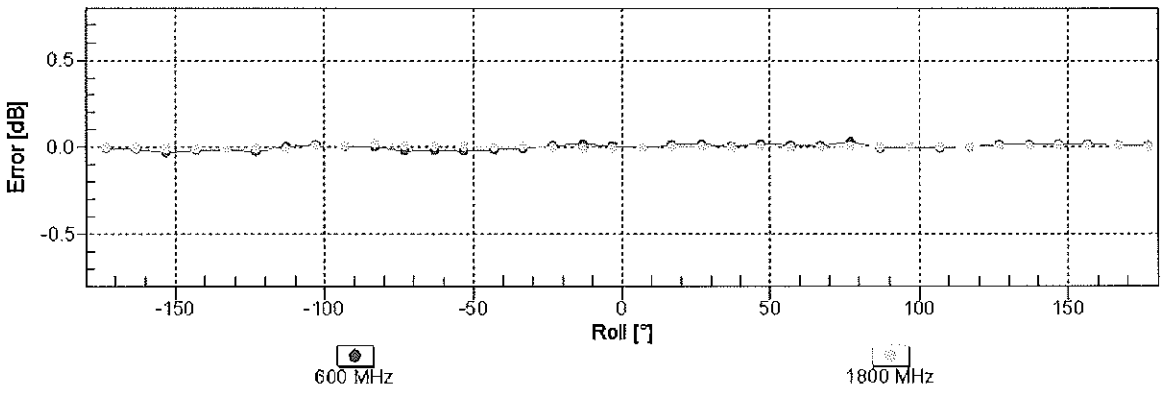
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



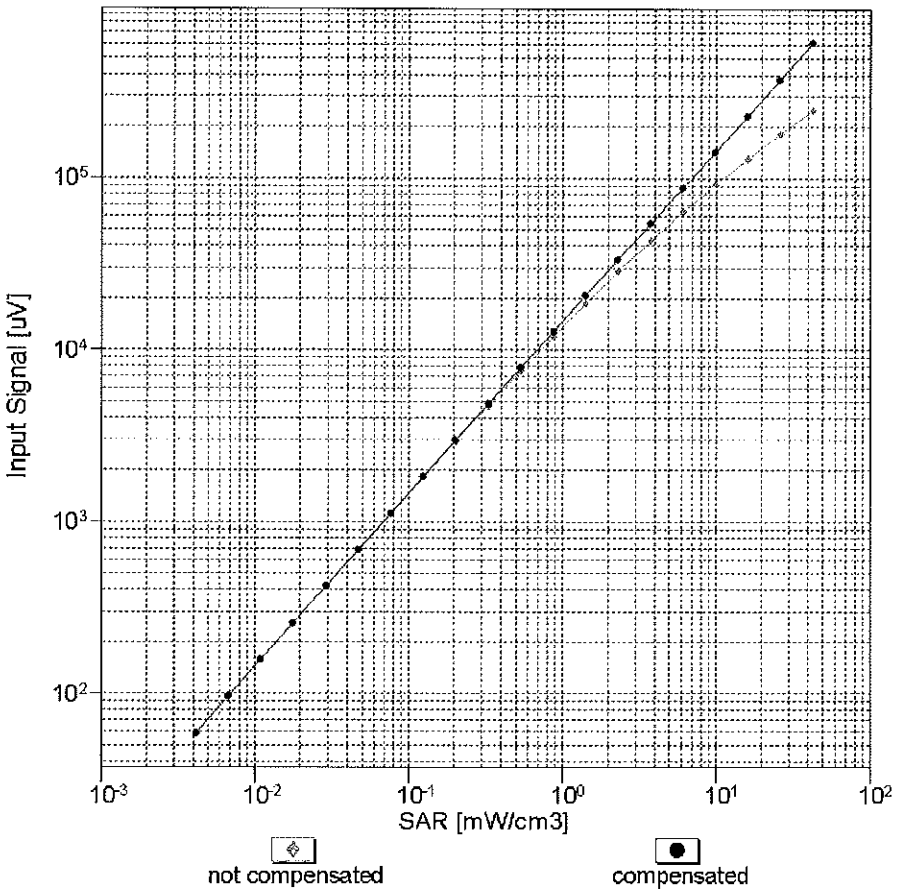
f=1800 MHz,R22

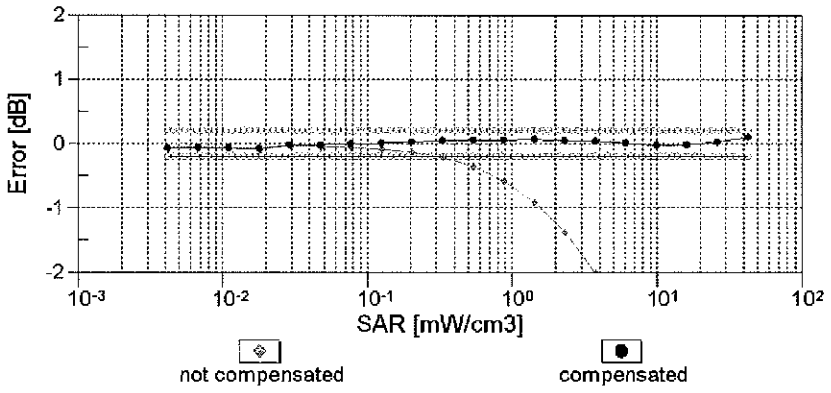




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

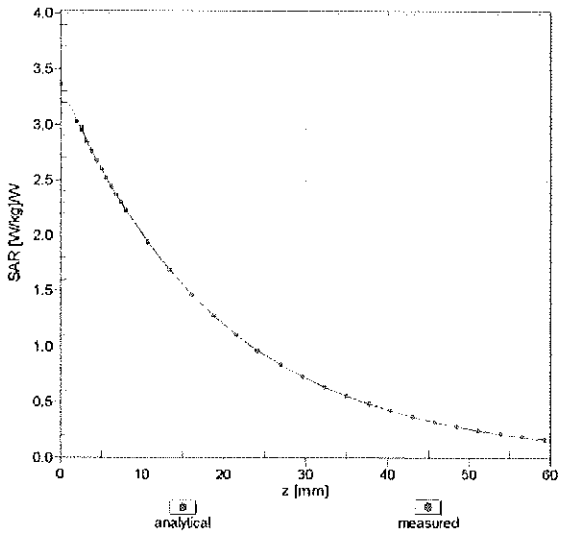




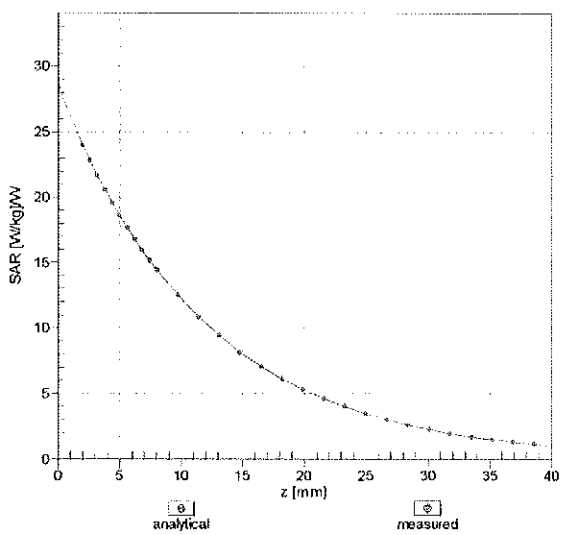
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

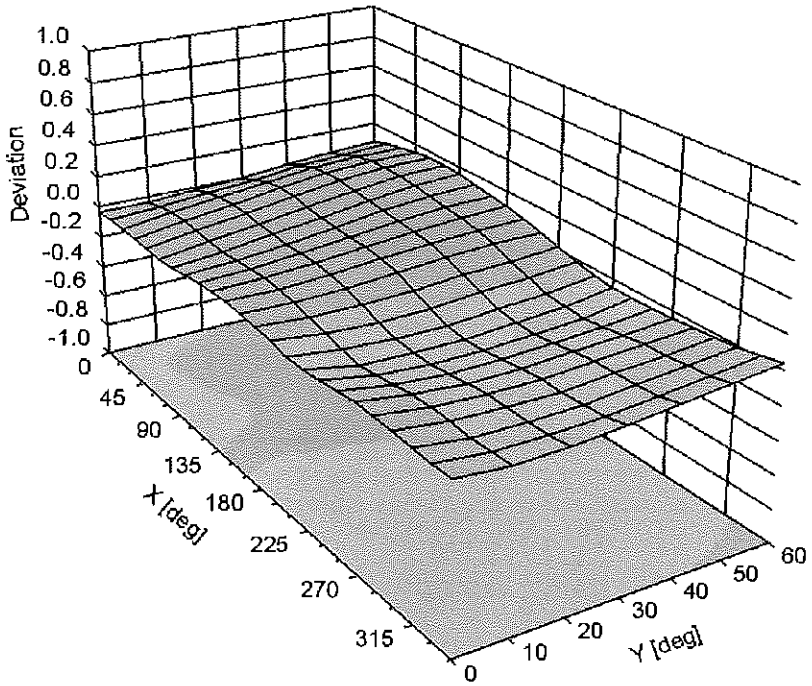


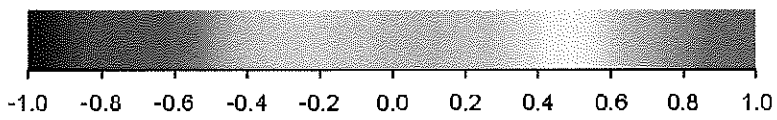
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3213

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-33.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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: ES3-3022_Aug13

CALIBRATION CERTIFICATE

Object: ES3DV2 - SN:3022

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: August 22, 2013

UCC
9/13/13

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 23, 2013

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV2

SN:3022

Manufactured: April 15, 2003
Calibrated: August 22, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.00	1.04	0.99	± 10.1 %
DCP (mV)[B]	100.7	97.4	99.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	178.6	±3.0 %
		Y	0.0	0.0	1.0		141.9	
		Z	0.0	0.0	1.0		134.7	

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%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.21	6.21	6.21	0.19	2.37	± 12.0 %
835	41.5	0.90	6.09	6.09	6.09	0.30	1.70	± 12.0 %
1750	40.1	1.37	5.19	5.19	5.19	0.65	1.23	± 12.0 %
1900	40.0	1.40	5.03	5.03	5.03	0.51	1.43	± 12.0 %
2450	39.2	1.80	4.36	4.36	4.36	0.51	1.51	± 12.0 %
2600	39.0	1.96	4.16	4.16	4.16	0.74	1.29	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

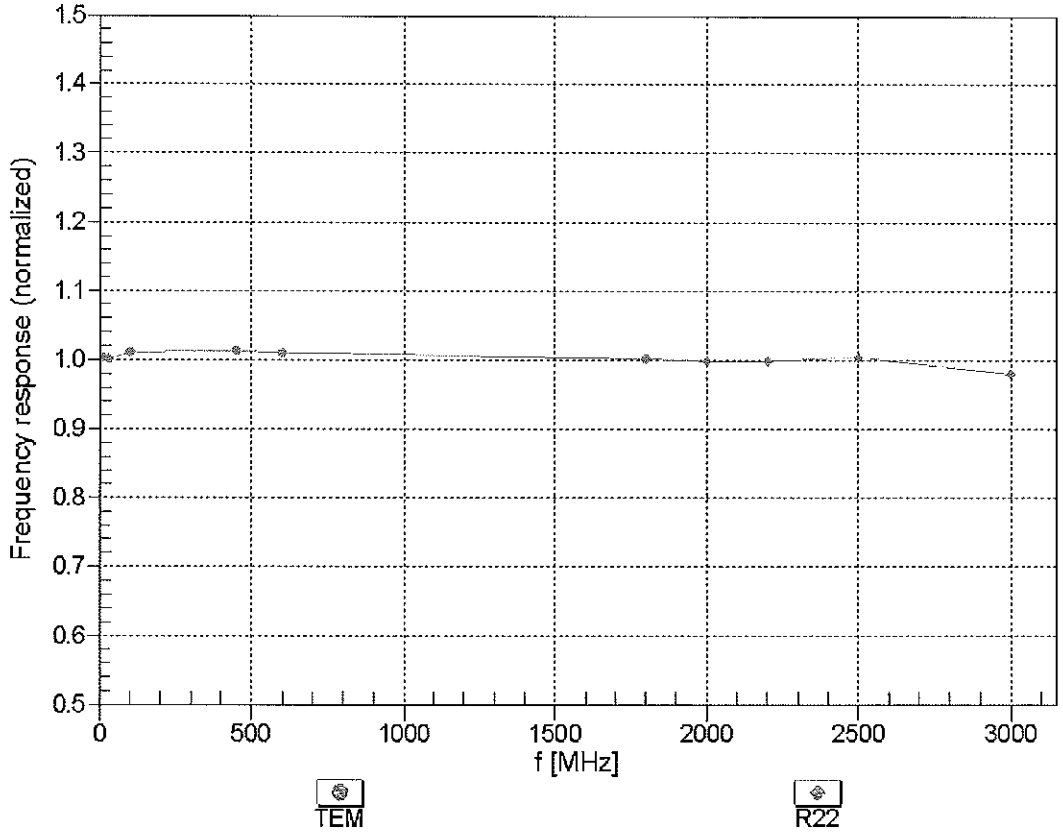
DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	5.92	5.92	5.92	0.24	1.99	± 12.0 %
835	55.2	0.97	5.91	5.91	5.91	0.29	1.85	± 12.0 %
1750	53.4	1.49	4.75	4.75	4.75	0.52	1.52	± 12.0 %
1900	53.3	1.52	4.49	4.49	4.49	0.49	1.56	± 12.0 %
2450	52.7	1.95	4.01	4.01	4.01	0.70	1.02	± 12.0 %
2600	52.5	2.16	3.85	3.85	3.85	0.58	0.90	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

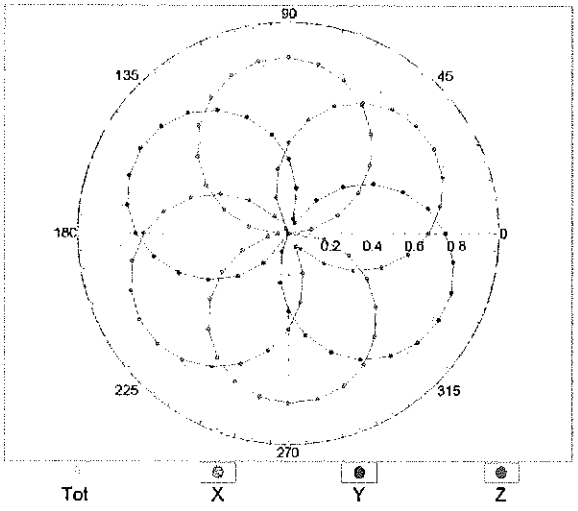
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



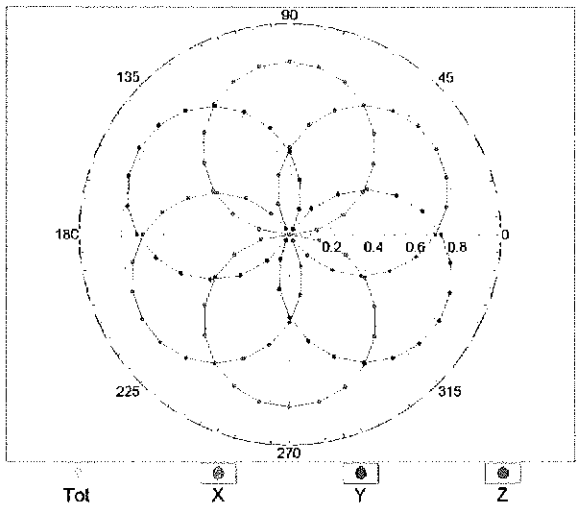
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

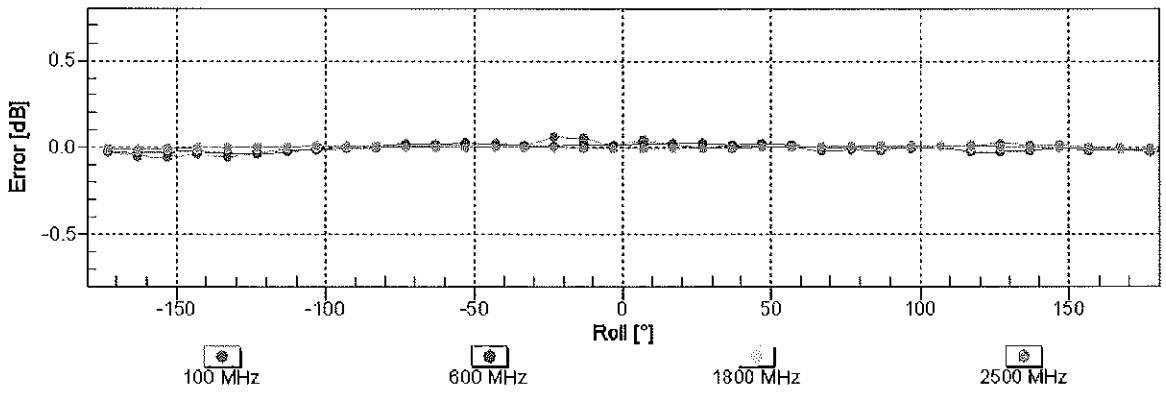
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



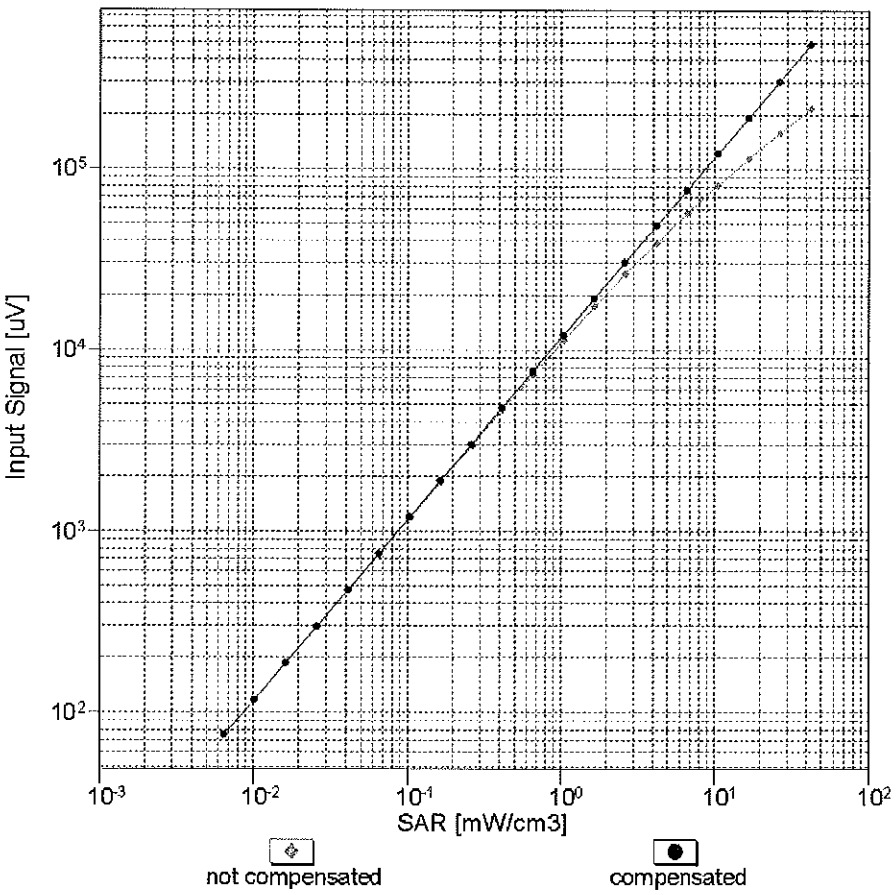
f=1800 MHz,R22

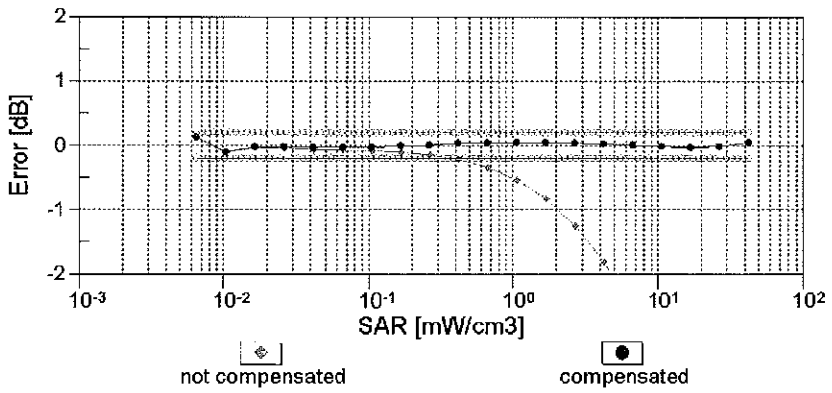




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

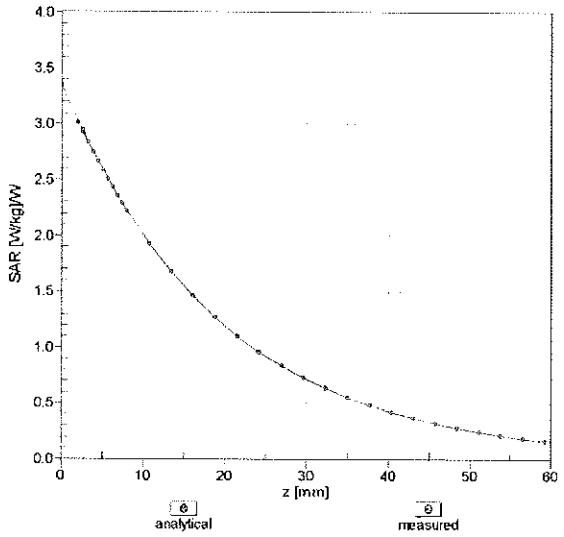




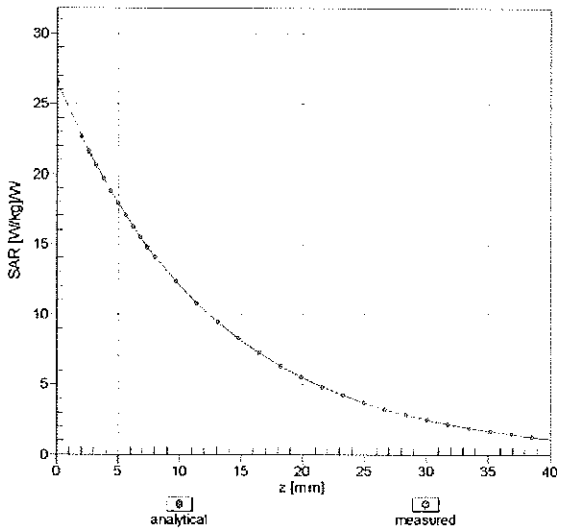
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

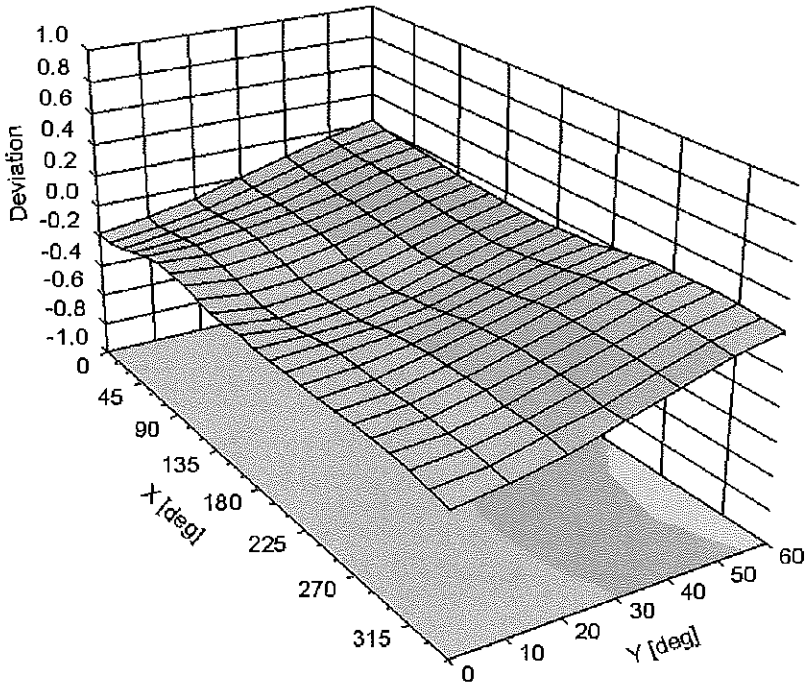


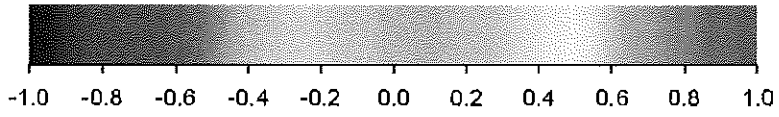
f = 1750 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-83.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

APPENDIX D: SAR TISSUE SPECIFICATIONS

APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{\left[\ln(b/a)\right]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

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

Table D-I
Composition of the Tissue Equivalent Matter

Frequency (MHz)	750	750	835	835	1750	1750	1900	1900
Tissue	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)								
Bactericide	See Pp. 2-3		0.1	0.1				
DGBE					47	31	44.92	29.44
HEC			1	1				
NaCl			1.45	0.94	0.4	0.2	0.18	0.39
Sucrose			57	44.9				
Water			40.45	53.06	52.6	68.8	54.9	70.17

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

H_2O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1 – 0.7% Relevant for safety; Refer to the respective Safety Data Sheet*.

Figure D-1
Composition of 750 MHz Head and Body Tissue Equivalent Matter

Note: 750MHz liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

Measurement Certificate / Material Test

Item Name	**Body Tissue Simulating Liquid (MSL750)**
Product No.	SL AAM 075 AA (Charge: 111130-3)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

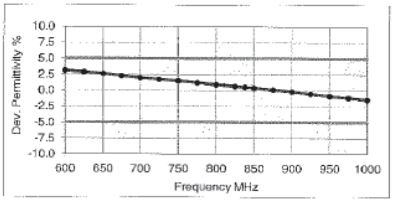
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	7-Dec-11

Additional Information

TSL Density	1.212 g/cm^3
TSL Heat-capacity	3.006 kJ/(kg*K)

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	57.9	25.01	0.83	56.1	0.95	3.1	-12.3
625	57.6	24.66	0.86	56.0	0.95	2.9	-10.1
650	57.4	24.31	0.88	55.9	0.96	2.6	-8.0
675	57.1	24.02	0.90	55.8	0.96	2.3	-5.8
700	56.8	23.74	0.92	55.7	0.96	2.0	-3.7
725	56.6	23.50	0.95	55.6	0.96	1.7	-1.5
750	56.4	23.26	0.97	55.5	0.96	1.5	0.8
775	56.1	23.06	0.99	55.4	0.97	1.2	3.0
800	55.8	22.86	1.02	55.3	0.97	0.9	5.2
825	55.6	22.72	1.04	55.2	0.98	0.6	6.6
838	55.5	22.64	1.05	55.2	0.98	0.5	7.3
850	55.4	22.57	1.07	55.2	0.99	0.4	8.0
875	55.1	22.44	1.09	55.1	1.02	0.1	7.2
900	54.9	22.31	1.12	55.0	1.05	-0.2	6.4
925	54.7	22.20	1.14	55.0	1.08	-0.5	7.5
950	54.5	22.09	1.17	54.9	1.08	-0.9	8.5
975	54.3	21.99	1.19	54.9	1.09	-1.2	9.7
1000	54.1	21.89	1.22	54.8	1.10	-1.4	10.9



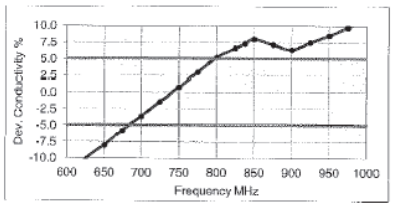


Figure D-2
750MHz Body Tissue Equivalent Matter

Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HSL 750)**
Product No.	SL AAH 075 (Charge: 111208-2)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

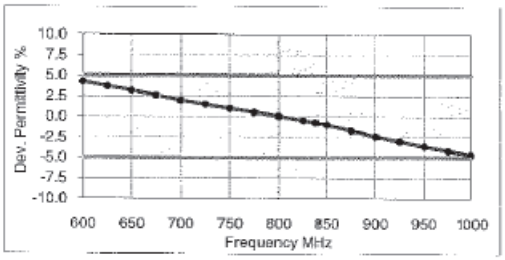
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	14-Dec-11

Additional Information

TSL Density	1.284 g/cm^3
TSL Heat-capacity	2.701 kJ/(kg*K)

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	44.5	22.77	0.76	42.7	0.88	4.2	-13.8
625	44.2	22.50	0.78	42.6	0.88	3.7	-11.5
650	43.8	22.24	0.80	42.5	0.89	3.1	-9.2
675	43.4	22.03	0.83	42.3	0.89	2.5	-6.8
700	43.0	21.82	0.85	42.2	0.89	1.9	-4.5
725	42.7	21.64	0.87	42.1	0.89	1.4	-2.1
750	42.3	21.45	0.89	41.9	0.89	1.0	0.2
775	42.0	21.28	0.92	41.8	0.90	0.5	2.4
800	41.7	21.11	0.94	41.7	0.90	0.0	4.7
825	41.4	20.97	0.96	41.6	0.91	-0.5	6.1
838	41.2	20.90	0.97	41.5	0.91	-0.7	6.8
850	41.1	20.83	0.98	41.5	0.92	-1.0	7.5
875	40.8	20.69	1.01	41.5	0.94	-1.7	6.8
900	40.5	20.55	1.03	41.5	0.97	-2.4	6.1
925	40.2	20.45	1.05	41.5	0.98	-3.0	7.1
950	39.9	20.34	1.08	41.4	0.99	-3.6	8.1
975	39.7	20.24	1.10	41.4	1.00	-4.2	9.3
1000	39.4	20.14	1.12	41.3	1.01	-4.7	10.4



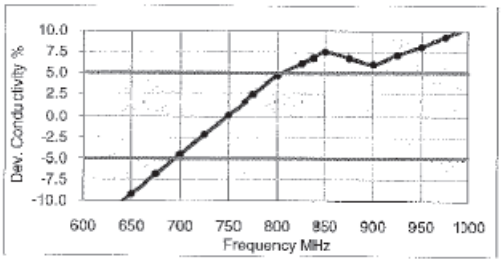


Figure D-3
750MHz Head Tissue Equivalent Matter

APPENDIX E: SAR SYSTEM VALIDATION

APPENDIX E: SAR SYSTEM VALIDATION

Per FCC KDB 865664 D02v01r01, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2003 and FCC KDB 865664 D01v01r01. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table E-I
SAR System Validation Summary

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE TYPE	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
							(σ)	(ε_r)	SENSI-TIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
B	750	1/30/2013	3287	ES3DV3	750	Head	0.894	40.58	PASS	PASS	PASS	N/A	N/A	N/A
G	835	3/27/2013	3209	ES3DV3	835	Head	0.925	41.29	PASS	PASS	PASS	GMSK	PASS	N/A
E	835	3/12/2013	3920	EX3DV4	835	Head	0.943	41.71	PASS	PASS	PASS	GMSK	PASS	N/A
B	1750	1/23/2013	3287	ES3DV3	1750	Head	1.402	38.84	PASS	PASS	PASS	N/A	N/A	N/A
F	1900	5/9/2013	3213	ES3DV3	1900	Head	1.464	39.97	PASS	PASS	PASS	GMSK	PASS	N/A
G	1900	3/27/2013	3209	ES3DV3	1900	Head	1.449	39.10	PASS	PASS	PASS	GMSK	PASS	N/A
E	750	3/28/2013	3920	EX3DV4	750	Body	0.974	55.21	PASS	PASS	PASS	N/A	N/A	N/A
G	835	3/26/2013	3209	ES3DV3	835	Body	1.006	54.42	PASS	PASS	PASS	GMSK	PASS	N/A
B	1750	1/28/2013	3287	ES3DV3	1750	Body	1.524	52.77	PASS	PASS	PASS	N/A	N/A	N/A
D	1900	9/10/2013	3022	ES3DV3	1900	Body	1.516	52.49	PASS	PASS	PASS	GMSK	PASS	N/A

NOTE: All measurements were performed using probes calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r01. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664.