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SAR EVALUATION REPORT

Applicant Name:
Apple, Inc.
1 Infinite Loop
Cupertino, CA 95014

Date of Testing:
06/19/17 – 08/21/17
Test Site/Location:
PCTEST Lab, San Jose, CA, USA
Document Serial No.:
1C1706160002-61-01-R3.BCG

FCC ID: **BCG-A1861**

APPLICANT: **APPLE, INC.**

DUT Type: Watch
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: A1861
Additional Model: A1958

Equipment Class	Band & Mode	Tx Frequency	SAR	
			1 gm Head (W/kg)	10 gm Extremity (W/kg)
PCT	UMTS 850	826.40 - 846.60 MHz	0.14	< 0.1
PCT	UMTS 1750	1712.4 - 1752.6 MHz	0.52	0.34
PCT	UMTS 1900	1852.4 - 1907.6 MHz	0.42	0.28
PCT	LTE Band 12	699.7 - 715.3 MHz	0.11	< 0.1
PCT	LTE Band 17	706.5 - 713.5 MHz	N/A	
PCT	LTE Band 13	779.5 - 784.5 MHz	0.11	< 0.1
PCT	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.10	< 0.1
PCT	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.11	< 0.1
PCT	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.41	0.34
PCT	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.41	0.20
PCT	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	
PCT	LTE Band 41	2498.5 - 2687.5 MHz	0.34	0.17
DTS	2.4 GHz WLAN	2412 - 2472 MHz	0.17	< 0.1
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.13	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03:			0.69	0.43

Note: This revised Test Report (S/N: 1C1706160002-61-01-R3.BCG) 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 watch has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.8 of this report; for North American frequency bands only.

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

Randy Ortanez
President

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

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1 DEVICE UNDER TEST

1.1 Device Overview

Table 1-1
Summary EUT Bands/Modes

Band & Mode	Operating Modes	Tx Frequency
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 17	Voice/Data	706.5 - 713.5 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2472 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

1.2 Power Reduction for SAR

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

1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

Table 1-2
Summary Max Conducted Powers - UMTS Mode

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**24.5**	**23.5**	**23.5**
	Nominal	**23.5**	**22.5**	**22.5**
UMTS Band 4 (1750 MHz)	Maximum	**24.5**	**23.5**	**23.5**
	Nominal	**23.5**	**22.5**	**22.5**
UMTS Band 2 (1900 MHz)	Maximum	**24.5**	**23.5**	**23.5**
	Nominal	**23.5**	**22.5**	**22.5**

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Table 1-3
Summary Max Conducted Powers - LTE Mode

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 17	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 13	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 26 (Cell)	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 5 (Cell)	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 4 (AWS)	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 25 (PCS)	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 2 (PCS)	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 41	Maximum	**24.0**
	Nominal	**23.0**

Table 1-4
Summary Max Conducted Powers - WIFI Mode

Mode / Band		Modulated Average (dBm)			
		Ch. 1-10	Ch. 11	Ch. 12	Ch. 13
IEEE 802.11b (2.4 GHz)	Maximum	**19.5**	**19.5**	**19.5**	**18.0**
IEEE 802.11g (2.4 GHz)	Maximum	**19.5**	**17.5**	**15.5**	**8.0**
IEEE 802.11n (2.4 GHz)	Maximum	**19.5**	**17.5**	**15.5**	**8.0**

Table 1-5
Summary Max Conducted Powers - Bluetooth Mode

Mode / Band		Modulated Average (dBm)
Bluetooth BDR/LE (ePA)	Maximum	**19.0**
Bluetooth BDR/LE (iPA)	Maximum	**13.0**
Bluetooth EDR (ePA)	Maximum	**13.5**
Bluetooth EDR (iPA)	Maximum	**9.0**

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1.4 DUT Antenna Locations

A diagram showing the location of the device antennas can be found in Appendix F.

1.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in Appendix F.

1.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, 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 1-1 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 1-1
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 D01v06 4.3.2 procedures.

Table 1-6
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Extremity
1	UMTS + 2.4 GHz WI-FI	Yes	Yes
2	UMTS + 2.4 GHz Bluetooth	Yes	Yes
3	LTE + 2.4 GHz WI-FI	Yes	Yes
4	LTE + 2.4 GHz Bluetooth	Yes	Yes

1. 2.4 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. 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 scenario.
4. This device supports VoLTE and VoWIFI.

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1.7 Miscellaneous SAR Test Considerations

(A) Licensed Transmitter(s)

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 D01v03r01.

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 D05v02r04.

This device supports both LTE Band 12 and LTE Band 17. Since the supported frequency span for LTE Band 17 falls completely within the supported frequency span for LTE Band 12, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 12.

This device supports both LTE Band 2 and LTE Band 25. Since the supported frequency span for LTE Band 2 falls completely within the supported frequency span for LTE Band 25, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 25.

1.8 Guidance Applied

- FCC KDB Publication 941225 D01v03r01, D05v02r05 (3G/4G)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance, Wrist-worn Device Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

1.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 10.

1.10 Device Housing Types and Wristband Types

This device has three housing types that were all evaluated for SAR. The device can also be used with different wrist band accessories. All metallic wrist bands were tested, and the sport band non-metallic wrist band was tested fully for all required exposure conditions. Other non-metallic wrist-bands were checked to be similar or lower in SAR.

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2 LTE INFORMATION

LTE Information					
FCC ID	**BCG-A1861**				
Form Factor	Watch				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
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 13: 5 MHz	779.5 (23205)		782 (23230)	784.5 (23255)	
LTE Band 13: 10 MHz	N/A		782 (23230)	N/A	
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
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 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)	848.3 (27033)	
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)	847.5 (27025)	
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)	846.5 (27015)	
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)	844 (26990)	
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)	1754.3 (20393)	
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)	1753.5 (20385)	
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 25 (PCS): 1.4 MHz	1850.7 (26047)		1882.5 (26365)	1914.3 (26683)	
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)	1913.5 (26675)	
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)	1912.5 (26665)	
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)	1910 (26640)	
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)		1882.5 (26365)	1907.5 (26615)	
LTE Band 25 (PCS): 20 MHz	1860 (26140)		1882.5 (26365)	1905 (26590)	
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)	1909.3 (19193)	
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)	1908.5 (19185)	
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)	
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	1				
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				
LTE Release 10 Additional Information	This device does not support full CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 10 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

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3 INTRODUCTION

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

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4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04:

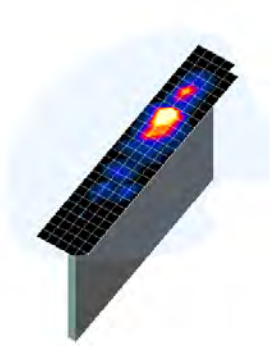

Figure 4-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (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.
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 D01v01r04 (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. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

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

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

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

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5 TEST CONFIGURATION POSITIONS

5.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. Additionally, a manufacturer provided low-loss foam was used to position the device for head SAR evaluations.

5.2 Positioning for Head

Devices that are designed to be worn on the wrist may operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. When next-to-mouth SAR evaluation is required, the device is positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. The device is evaluated with wrist bands strapped together to represent normal use conditions.

5.3 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. When extremity SAR evaluation is required, the device is evaluated with the back of the device touching the flat phantom, which is filled with body tissue-equivalent medium. The device was evaluated with Sport wristband unstrapped and touching the phantom. For Metal Loop and Metal Links wristbands, the device was evaluated with wristbands strapped and the distance between wristbands and the phantom was minimized to represent the spacing created by actual use conditions.

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6 RF EXPOSURE LIMITS

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

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

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

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

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7 FCC MEASUREMENT PROCEDURES

Power measurements for licensed transmitters are performed using a base station simulator under digital average power.

7.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, 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 D01v01r03.

7.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

7.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.”

The device is 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 are 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 is 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 deviates by more than 5%, the SAR test and drift measurements are repeated.

7.4 SAR Measurement Conditions for UMTS

7.4.1 Output Power Verification

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, 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.

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7.4.2 Head SAR Measurements

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

7.4.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s". The 3G SAR test reduction procedure is applied to other spreading codes and multiple $DPDCH_n$ configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or $DPDCH_n$, for the highest reported SAR configuration in 12.2 kbps RMC.

7.4.4 SAR Measurements with Rel 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

7.4.5 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

7.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r04 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

7.5.1 Spectrum Plots for RB Configurations

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

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7.5.2 MPR

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

7.5.3 A-MPR

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

7.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

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 for 1g SAR and ≤ 2.0 W/kg for 10g SAR, 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 for 1g SAR and >3.625 W/kg for 10g SAR, 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 for 1g SAR and < 2.0 W/kg for 10g SAR.
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 for 1g SAR and <3.625 W/kg for 10g SAR.

7.5.5 TDD

LTE TDD testing is performed using the SAR test guidance provided in FCC KDB 941225 D05v02r04. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05v02r04. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

7.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

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7.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

7.6.2 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is › 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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8 RF CONDUCTED POWERS

8.1 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	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.26	23.00	23.05	23.44	23.50	23.60	23.28	23.21	23.33	-
99		12.2 kbps AMR	23.02	23.00	23.05	23.00	23.19	23.11	23.15	23.00	23.00	-
6	HSDPA	Subtest 1	22.33	22.37	22.36	22.25	22.43	22.33	22.39	22.30	22.23	0
6		Subtest 2	22.34	22.40	22.35	22.24	22.39	22.30	22.37	22.31	22.20	0
6		Subtest 3	21.79	21.90	21.85	21.73	21.91	21.77	21.84	21.80	21.67	0.5
6		Subtest 4	21.80	21.88	21.84	21.76	21.91	21.78	21.83	21.78	21.66	0.5
6	HSUPA	Subtest 1	21.74	21.50	21.80	21.71	21.50	21.75	21.77	21.72	21.60	0
6		Subtest 2	21.22	21.24	21.23	21.10	21.25	21.11	21.14	21.11	21.10	2
6		Subtest 3	21.42	21.45	21.43	21.30	21.43	21.33	21.33	21.26	21.20	1
6		Subtest 4	21.33	21.39	21.40	21.27	21.44	21.27	21.31	21.28	21.16	2
6		Subtest 5	22.38	22.45	22.42	22.32	22.45	22.34	22.38	22.28	22.21	0

This device does not support DC-HSDPA.

The manufacturer has confirmed the HSPA Powers are operating within expected tolerances for the implementation in this model.

Figure 8-1
Power Measurement Setup

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8.2 LTE Conducted Powers

8.2.1 LTE Band 12

Table 8-1
LTE Band 12 Conducted Powers - 10 MHz Bandwidth

LTE Band 12 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23095 (707.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.29	0	0
	1	25	**22.38**		0
	1	49	22.31		0
	25	0	21.28	0-1	1
	25	12	**21.33**		1
	25	25	21.32		1
	50	0	21.30		1
16QAM	1	0	21.44	0-1	1
	1	25	21.53		1
	1	49	21.54		1
	25	0	20.28	0-2	2
	25	12	20.31		2
	25	25	20.31		2
	50	0	20.28		2

Note: LTE Band 12 at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 8-2
LTE Band 12 Conducted Powers - 5 MHz Bandwidth

LTE Band 12 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23035 (701.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23155 (713.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.10	22.28	22.34	0	0
	1	12	22.21	22.41	22.40		0
	1	24	22.17	22.44	22.47		0
	12	0	21.23	21.24	21.22	0-1	1
	12	6	21.25	21.34	21.29		1
	12	13	21.39	21.40	21.28		1
	25	0	21.30	21.26	21.22		1
16QAM	1	0	21.33	21.13	21.26	0-1	1
	1	12	21.36	21.28	21.33		1
	1	24	21.41	21.22	21.36		1
	12	0	20.36	20.33	20.27	0-2	2
	12	6	20.43	20.46	20.36		2
	12	13	20.39	20.48	20.34		2
	25	0	20.37	20.32	20.29		2

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Table 8-3
LTE Band 12 Conducted Powers - 3 MHz Bandwidth

LTE Band 12 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23025 (700.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23165 (714.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.22	22.09	22.13	0	0
	1	7	22.36	22.24	22.24		0
	1	14	22.24	22.33	22.21		0
	8	0	21.28	21.13	21.15	0-1	1
	8	4	21.33	21.22	21.20		1
	8	7	21.32	21.24	21.26		1
	15	0	21.27	21.18	21.23		1
16QAM	1	0	21.52	21.49	21.59	0-1	1
	1	7	21.73	21.66	21.68		1
	1	14	21.46	21.61	21.63		1
	8	0	20.37	20.19	20.30	0-2	2
	8	4	20.43	20.27	20.33		2
	8	7	20.39	20.26	20.34		2
	15	0	20.41	20.23	20.24		2

Table 8-4
LTE Band 12 Conducted Powers -1.4 MHz Bandwidth

LTE Band 12 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23017 (699.7 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23173 (715.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.29	22.32	22.26	0	0
	1	2	22.36	22.44	22.34		0
	1	5	22.20	22.38	22.32		0
	3	0	22.25	22.32	22.24		0
	3	2	22.31	22.41	22.36		0
	3	3	22.28	22.34	22.26		0
	6	0	21.22	21.29	21.24	0-1	1
16QAM	1	0	21.57	21.44	21.51	0-1	1
	1	2	21.63	21.53	21.56		1
	1	5	21.61	21.48	21.52		1
	3	0	21.16	21.23	21.33		1
	3	2	21.21	21.26	21.38		1
	3	3	21.14	21.25	21.35		1
	6	0	20.17	20.22	20.20	0-2	2

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8.2.2 LTE Band 13

Table 8-5
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

LTE Band 13 10 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.23	0	0
	1	25	**22.39**		0
	1	49	22.30		0
	25	0	21.27	0-1	1
	25	12	21.36		1
	25	25	**21.42**		1
	50	0	21.41		1
16QAM	1	0	21.33	0-1	1
	1	25	21.56		1
	1	49	21.53		1
	25	0	20.28	0-2	2
	25	12	20.33		2
	25	25	20.40		2
	50	0	20.43		2

Table 8-6
LTE Band 13 Conducted Powers - 5 MHz Bandwidth

LTE Band 13 5 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.56	0	0
	1	12	22.49		0
	1	24	22.41		0
	12	0	21.53	0-1	1
	12	6	21.48		1
	12	13	21.51		1
	25	0	21.52		1
16QAM	1	0	21.66	0-1	1
	1	12	21.67		1
	1	24	21.61		1
	12	0	20.58	0-2	2
	12	6	20.53		2
	12	13	20.52		2
	25	0	20.55		2

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

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8.2.3 LTE Band 5 (Cell)

Table 8-7
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20525 (836.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.48	0	0
	1	25	**22.61**		0
	1	49	22.51		0
	25	0	21.50	0-1	1
	25	12	**21.59**		1
	25	25	21.57		1
	50	0	21.54		1
16QAM	1	0	22.18	0-1	1
	1	25	22.15		1
	1	49	22.09		1
	25	0	20.56	0-2	2
	25	12	20.58		2
	25	25	20.52		2
	50	0	20.53		2

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 8-8
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20425 (826.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20625 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.74	22.88	22.74	0	0
	1	12	22.80	22.71	22.91		0
	1	24	22.78	22.84	22.97		0
	12	0	21.75	21.74	21.73	0-1	1
	12	6	21.77	21.73	21.79		1
	12	13	21.80	21.72	21.82		1
	25	0	21.76	21.74	21.75		1
16QAM	1	0	22.10	21.92	21.92	0-1	1
	1	12	22.07	21.88	21.99		1
	1	24	22.12	21.99	22.00		1
	12	0	20.77	20.66	20.71	0-2	2
	12	6	20.76	20.68	20.74		2
	12	13	20.75	20.69	20.77		2
	25	0	20.71	20.72	20.77		2

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Table 8-9
LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20415 (825.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20635 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.89	22.76	22.71	0	0
	1	7	22.87	22.81	22.81		0
	1	14	22.79	22.74	22.78		0
	8	0	21.76	21.68	21.70	0-1	1
	8	4	21.79	21.79	21.81		1
	8	7	21.81	21.78	21.79		1
	15	0	21.78	21.74	21.77		1
16QAM	1	0	21.85	22.30	22.08	0-1	1
	1	7	21.98	22.38	22.06		1
	1	14	21.89	22.30	22.09		1
	8	0	20.72	20.91	20.74	0-2	2
	8	4	20.73	20.87	20.79		2
	8	7	20.74	20.85	20.81		2
	15	0	20.77	20.76	20.76		2

Table 8-10
LTE Band 5 (Cell) Conducted Powers – 1.4 MHz Bandwidth

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20407 (824.7 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20643 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.76	22.88	22.71	0	0
	1	2	22.81	22.80	22.82		0
	1	5	22.79	22.79	22.65		0
	3	0	22.73	22.56	22.67		0
	3	2	22.77	22.73	22.71		0
	3	3	22.75	22.71	22.69		0
	6	0	21.77	21.70	21.75	0-1	1
16QAM	1	0	21.88	21.68	21.94	0-1	1
	1	2	21.91	21.69	22.10		1
	1	5	21.92	21.64	22.00		1
	3	0	21.79	21.70	21.61		1
	3	2	21.81	21.82	21.73		1
	3	3	21.74	21.80	21.63		1
	6	0	20.82	20.87	20.81	0-2	2

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8.2.4 LTE Band 26 (Cell)

Table 8-11
LTE Band 26 (Cell) Conducted Powers - 10 MHz Bandwidth

LTE Band 26 (Cell) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26740 (819.0 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 26990 (844.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.76	22.60	22.70	0	0
	1	25	22.83	22.76	22.74		0
	1	49	**22.88**	22.60	22.80		0
	25	0	21.80	21.77	21.51	0-1	1
	25	12	**21.84**	21.78	21.61		1
	25	25	21.82	21.69	21.63		1
	50	0	21.83	21.76	21.60		1
16QAM	1	0	22.31	21.91	21.79	0-1	1
	1	25	22.39	21.95	21.89		1
	1	49	22.40	21.91	21.74		1
	25	0	20.80	20.73	20.58	0-2	2
	25	12	20.87	20.81	20.65		2
	25	25	20.83	20.72	20.71		2
	50	0	20.82	20.76	20.65		2

Table 8-12
LTE Band 26 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26715 (816.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27015 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.88	22.73	22.63	0	0
	1	12	22.90	22.84	22.87		0
	1	24	22.90	22.83	22.91		0
	12	0	21.85	21.75	21.61	0-1	1
	12	6	21.88	21.77	21.65		1
	12	13	21.86	21.72	21.68		1
	25	0	21.87	21.74	21.63		1
16QAM	1	0	22.13	21.92	21.79	0-1	1
	1	12	22.23	21.94	21.89		1
	1	24	22.25	21.93	21.94		1
	12	0	20.75	20.71	20.61	0-2	2
	12	6	20.83	20.76	20.65		2
	12	13	20.82	20.70	20.67		2
	25	0	20.81	20.77	20.69		2

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Table 8-13
LTE Band 26 (Cell) Conducted Powers - 3 MHz Bandwidth

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26705 (815.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27025 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.85	22.86	22.69	0	0
	1	7	22.96	22.83	22.81		0
	1	14	22.85	22.74	22.83		0
	8	0	21.81	21.73	21.57	0-1	1
	8	4	21.83	21.79	21.66		1
	8	7	21.87	21.75	21.64		1
	15	0	21.83	21.75	21.63		1
16QAM	1	0	22.35	22.08	21.69	0-1	1
	1	7	22.40	22.11	21.83		1
	1	14	22.41	22.00	21.71		1
	8	0	20.90	20.78	20.57	0-2	2
	8	4	20.95	20.83	20.65		2
	8	7	20.97	20.77	20.66		2
	15	0	20.93	20.78	20.67		2

Table 8-14
LTE Band 26 (Cell) Conducted Powers -1.4 MHz Bandwidth

LTE Band 26 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26697 (814.7 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27033 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.85	22.85	22.64	0	0
	1	2	23.00	22.92	22.78		0
	1	5	22.95	22.89	22.65		0
	3	0	22.77	22.66	22.62		0
	3	2	22.86	22.80	22.67		0
	3	3	22.79	22.66	22.63		0
	6	0	21.80	21.75	21.62	0-1	1
16QAM	1	0	21.89	21.66	21.91	0-1	1
	1	2	22.00	21.76	21.93		1
	1	5	21.98	21.71	21.92		1
	3	0	21.86	21.81	21.50		1
	3	2	21.87	21.89	21.62		1
	3	3	21.78	21.85	21.54		1
	6	0	20.88	20.93	20.73	0-2	2

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8.2.5 LTE Band 4 (AWS)

Table 8-15
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	23.05	0	0
	1	50	22.92		0
	1	99	**23.31**		0
	50	0	21.96	0-1	1
	50	25	21.95		1
	50	50	**22.00**		1
	100	0	21.99		1
16QAM	1	0	22.31	0-1	1
	1	50	22.30		1
	1	99	22.50		1
	50	0	21.00	0-2	2
	50	25	20.99		2
	50	50	21.01		2
	100	0	21.03		2

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

Table 8-16
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.98	23.00	23.05	0	0
	1	36	22.92	22.89	23.03		0
	1	74	23.03	22.96	23.14		0
	36	0	21.90	21.88	21.92	0-1	1
	36	18	21.87	21.89	21.80		1
	36	37	21.84	21.87	21.84		1
	75	0	21.88	21.86	21.86		1
16QAM	1	0	22.16	22.55	22.44	0-1	1
	1	36	22.11	22.46	22.37		1
	1	74	22.23	22.43	22.49		1
	36	0	20.90	21.00	21.00	0-2	2
	36	18	20.88	20.90	20.88		2
	36	37	20.89	20.92	20.87		2
	75	0	20.92	20.94	20.88		2

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Table 8-17
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.18	22.87	22.96	0	0
	1	25	22.80	22.66	22.74		0
	1	49	22.79	22.83	22.86		0
	25	0	21.84	21.67	21.83	0-1	1
	25	12	21.83	21.70	21.80		1
	25	25	21.82	21.71	21.82		1
	50	0	21.81	21.71	21.83		1
16QAM	1	0	22.18	22.43	22.18	0-1	1
	1	25	22.10	22.37	21.98		1
	1	49	21.99	22.39	22.10		1
	25	0	20.85	20.72	20.87	0-2	2
	25	12	20.82	20.73	20.85		2
	25	25	20.87	20.74	20.84		2
	50	0	20.84	20.75	20.86		2

Table 8-18
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.94	22.60	22.81	0	0
	1	12	22.88	22.61	22.85		0
	1	24	22.89	22.66	22.88		0
	12	0	21.77	21.66	21.80	0-1	1
	12	6	21.78	21.67	21.82		1
	12	13	21.81	21.71	21.84		1
	25	0	21.77	21.67	21.79		1
16QAM	1	0	22.18	22.00	22.03	0-1	1
	1	12	22.17	21.96	22.16		1
	1	24	22.14	22.01	22.11		1
	12	0	20.75	20.67	20.81	0-2	2
	12	6	20.81	20.70	20.83		2
	12	13	20.79	20.72	20.85		2
	25	0	20.77	20.72	20.84		2

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Table 8-19
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.82	22.68	22.80	0	0
	1	7	22.87	22.78	22.92		0
	1	14	22.79	22.76	22.91		0
	8	0	21.78	21.66	21.75	0-1	1
	8	4	21.80	21.70	21.81		1
	8	7	21.78	21.71	21.82		1
	15	0	21.77	21.67	21.80		1
16QAM	1	0	22.32	22.00	21.92	0-1	1
	1	7	22.37	22.03	21.99		1
	1	14	22.36	22.01	21.93		1
	8	0	20.89	20.69	20.81	0-2	2
	8	4	20.88	20.72	20.82		2
	8	7	20.89	20.74	20.83		2
	15	0	20.86	20.71	20.85		2

Table 8-20
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.86	22.76	22.82	0	0
	1	2	22.92	22.76	22.90		0
	1	5	22.86	22.77	22.73		0
	3	0	22.77	22.67	22.78		0
	3	2	22.82	22.70	22.81		0
	3	3	22.79	22.65	22.75		0
	6	0	21.80	21.61	21.77	0-1	1
16QAM	1	0	21.85	21.59	22.00	0-1	1
	1	2	21.94	21.61	22.22		1
	1	5	21.85	21.60	22.05		1
	3	0	21.81	21.70	21.66		1
	3	2	21.83	21.76	21.75		1
	3	3	21.73	21.73	21.68		1
	6	0	20.86	20.82	20.87	0-2	2

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8.2.6 LTE Band 25 (PCS)

Table 8-21
LTE Band 25 (PCS) Conducted Powers - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26140 (1860.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26590 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.99	22.84	22.94	0	0
	1	50	22.72	22.71	22.73		0
	1	99	**23.13**	22.90	22.97		0
	50	0	21.89	21.79	21.77	0-1	1
	50	25	21.86	21.72	21.70		1
	50	50	**21.93**	21.77	21.76		1
	100	0	21.88	21.78	21.80		1
16QAM	1	0	22.54	22.15	22.03	0-1	1
	1	50	22.31	21.94	22.01		1
	1	99	22.50	22.00	22.09		1
	50	0	20.87	20.79	20.70	0-2	2
	50	25	20.74	20.75	20.66		2
	50	50	20.88	20.76	20.61		2
	100	0	20.81	20.73	20.73		2

Table 8-22
LTE Band 25 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26115 (1857.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26615 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.69	22.51	22.66	0	0
	1	36	22.96	22.49	22.55		0
	1	74	23.00	22.77	22.74		0
	36	0	21.62	21.54	21.59	0-1	1
	36	18	21.64	21.61	21.61		1
	36	37	21.74	21.58	21.69		1
	75	0	21.70	21.59	21.55		1
16QAM	1	0	21.84	21.86	21.78	0-1	1
	1	36	21.81	21.82	21.77		1
	1	74	22.23	22.00	22.23		1
	36	0	20.63	20.60	20.63	0-2	2
	36	18	20.67	20.56	20.62		2
	36	37	20.74	20.62	20.72		2
	75	0	20.73	20.56	20.65		2

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Table 8-23
LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.89	22.64	22.63	0	0
	1	25	22.65	22.44	22.55		0
	1	49	22.84	22.69	22.91		0
	25	0	21.78	21.58	21.62	0-1	1
	25	12	21.76	21.59	21.64		1
	25	25	21.80	21.66	21.67		1
	50	0	21.82	21.63	21.71		1
16QAM	1	0	21.82	21.77	22.02	0-1	1
	1	25	21.58	21.66	22.09		1
	1	49	21.88	21.83	22.22		1
	25	0	20.88	20.71	20.71	0-2	2
	25	12	20.86	20.66	20.72		2
	25	25	20.90	20.75	20.77		2
	50	0	20.91	20.65	20.70		2

Table 8-24
LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26065 (1852.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26665 (1912.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.62	22.54	22.71	0	0
	1	12	22.68	22.44	22.63		0
	1	24	22.73	22.61	22.73		0
	12	0	21.71	21.61	21.62	0-1	1
	12	6	21.70	21.56	21.61		1
	12	13	21.71	21.53	21.64		1
	25	0	21.69	21.55	21.62		1
16QAM	1	0	21.73	21.65	22.15	0-1	1
	1	12	21.74	21.55	22.21		1
	1	24	21.77	21.68	22.34		1
	12	0	20.76	20.66	20.71	0-2	2
	12	6	20.81	20.65	20.76		2
	12	13	20.77	20.61	20.73		2
	25	0	20.76	20.60	20.74		2

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Table 8-25
LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26055 (1851.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26675 (1913.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.84	22.63	22.63	0	0
	1	7	22.93	22.77	22.62		0
	1	14	22.91	22.69	22.59		0
	8	0	21.65	21.70	21.54	0-1	1
	8	4	21.69	21.73	21.61		1
	8	7	21.65	21.63	21.58		1
	15	0	21.70	21.69	21.55		1
16QAM	1	0	21.99	21.57	21.53	0-1	1
	1	7	22.16	21.67	21.78		1
	1	14	22.07	21.59	21.59		1
	8	0	20.79	20.70	20.52	0-2	2
	8	4	20.86	20.71	20.64		2
	8	7	20.82	20.68	20.57		2
	15	0	20.72	20.70	20.62		2

Table 8-26
LTE Band 25 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26047 (1850.7 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26683 (1914.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.52	22.77	22.47	0	0
	1	2	22.62	22.84	22.58		0
	1	5	22.69	22.89	22.68		0
	3	0	22.51	22.63	22.51		0
	3	2	22.59	22.69	22.59		0
	3	3	22.52	22.63	22.52		0
	6	0	21.58	21.59	21.55	0-1	1
16QAM	1	0	21.99	21.68	21.94	0-1	1
	1	2	22.00	21.75	22.03		1
	1	5	21.97	21.65	21.95		1
	3	0	21.83	21.84	21.83		1
	3	2	21.90	21.88	21.92		1
	3	3	21.87	21.85	21.81		1
	6	0	20.43	20.82	20.45	0-2	2

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8.2.7 LTE Band 41

Table 8-27
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	22.91	22.71	22.90	23.15	23.25	0	0
	1	50	22.81	22.77	22.77	22.93	22.95		0
	1	99	23.38	23.03	23.15	23.35	**23.39**		0
	50	0	21.75	21.63	21.61	21.87	21.97	0-1	1
	50	25	21.71	21.65	21.58	21.84	21.94		1
	50	50	21.91	21.72	21.76	21.82	**22.04**		1
	100	0	21.86	21.74	21.65	21.83	21.99		1
16QAM	1	0	21.71	21.91	21.93	22.11	22.06	0-1	1
	1	50	21.54	21.98	21.80	21.88	21.83		1
	1	99	22.06	22.25	22.20	22.27	22.09		1
	50	0	20.68	20.58	20.56	20.82	20.95	0-2	2
	50	25	20.62	20.65	20.53	20.84	20.93		2
	50	50	20.81	20.75	20.68	20.82	21.01		2
	100	0	20.84	20.73	20.67	20.80	20.99		2

Table 8-28
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	22.59	22.52	22.91	22.74	22.77	0	0
	1	36	22.66	22.61	22.89	22.71	22.82		0
	1	74	22.98	22.78	22.96	22.76	23.00		0
	36	0	21.76	21.63	21.66	21.79	21.98	0-1	1
	36	18	21.71	21.65	21.68	21.78	21.88		1
	36	37	21.81	21.72	21.71	21.77	21.92		1
	75	0	21.76	21.71	21.67	21.79	21.93		1
16QAM	1	0	21.66	21.24	21.84	22.00	22.00	0-1	1
	1	36	21.63	21.28	21.88	21.95	21.88		1
	1	74	21.90	21.47	21.96	21.99	22.03		1
	36	0	20.63	20.68	20.63	20.83	20.83	0-2	2
	36	18	20.60	20.67	20.68	20.85	20.83		2
	36	37	20.71	20.81	20.72	20.86	20.87		2
	75	0	20.72	20.77	20.66	20.78	20.89		2

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Table 8-29
LTE Band 41 Conducted Powers - 10 MHz Bandwidth

LTE Band 41 10 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	22.56	22.44	22.57	22.64	22.65	0	0
	1	25	22.64	22.68	22.62	22.70	22.85		0
	1	49	22.81	22.74	22.76	22.85	22.86		0
	25	0	21.76	21.56	21.56	21.73	21.78	0-1	1
	25	12	21.78	21.70	21.55	21.77	21.84		1
	25	25	21.83	21.73	21.66	21.75	21.88		1
	50	0	21.78	21.70	21.59	21.78	21.89		1
16QAM	1	0	21.73	21.44	21.48	21.47	21.74	0-1	1
	1	25	21.99	21.59	21.54	21.59	21.94		1
	1	49	21.97	21.71	21.56	21.67	21.96		1
	25	0	20.68	20.51	20.55	20.75	20.71	0-2	2
	25	12	20.68	20.65	20.58	20.78	20.82		2
	25	25	20.75	20.68	20.63	20.75	20.88		2
	50	0	20.70	20.65	20.56	20.77	20.81		2

Table 8-30
LTE Band 41 Conducted Powers - 5 MHz Bandwidth

LTE Band 41 5 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	22.81	22.56	22.55	22.76	22.81	0	0
	1	12	22.77	22.64	22.52	22.73	22.87		0
	1	24	22.88	22.72	22.59	22.76	22.91		0
	12	0	21.71	21.65	21.53	21.66	21.83	0-1	1
	12	6	21.74	21.64	21.55	21.68	21.85		1
	12	13	21.77	21.68	21.54	21.71	21.87		1
	25	0	21.73	21.64	21.53	21.73	21.85		1
16QAM	1	0	21.89	21.69	21.56	21.72	21.77	0-1	1
	1	12	21.84	21.82	21.62	21.75	21.91		1
	1	24	21.83	21.86	21.65	21.69	21.88		1
	12	0	20.67	20.56	20.58	20.68	20.83	0-2	2
	12	6	20.75	20.59	20.53	20.69	20.88		2
	12	13	20.77	20.60	20.54	20.72	20.91		2
	25	0	20.66	20.55	20.56	20.81	20.85		2

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8.3 WLAN Conducted Powers

Table 8-31
2.4GHz WLAN Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	19.42	19.01	19.35
2437	**6**	**19.47**	19.30	19.47
2457	10	19.21	19.25	19.45
2462	11	19.03	17.46	17.45

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- The bolded data rate and channel above were tested for SAR.

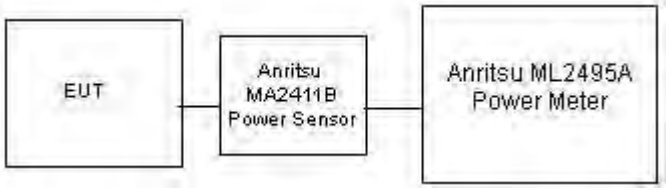

Figure 8-2
Power Measurement Setup

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8.4 Bluetooth Conducted Powers

Table 8-32
Bluetooth Average RF Power

Frequency [MHz]	Modulation	Power Scheme	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	ePA	0	16.78	47.643
2441	GFSK	ePA	**39**	**18.95**	78.524
2480	GFSK	ePA	78	16.95	49.545
2402	GFSK	iPA	0	12.81	19.099
2441	GFSK	iPA	**39**	**12.98**	19.861
2480	GFSK	iPA	78	12.30	16.982
2402	8PSK	ePA	0	13.36	21.677
2441	8PSK	ePA	39	13.46	22.182
2480	8PSK	ePA	78	13.45	22.131
2402	8PSK	iPA	0	8.60	7.244
2441	8PSK	iPA	39	8.81	7.603
2480	8PSK	iPA	78	8.78	7.551

Note: The bolded data rate and channel above were tested for SAR. Bluetooth was evaluated with a test mode with 100% transmission duty factor.

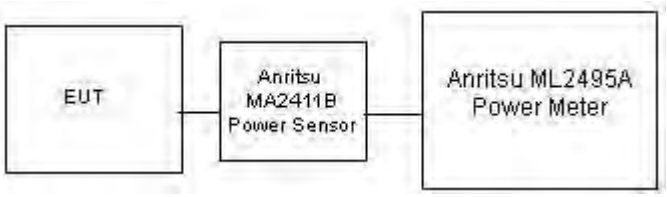

Figure 8-3
Power Measurement Setup

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9 SYSTEM VERIFICATION

9.1 Tissue Verification

Table 9-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
6/26/2017	750H	19.6	700	0.849	41.648	0.889	42.201	-4.50%	-1.31%
			710	0.855	41.471	0.890	42.149	-3.93%	-1.61%
			740	0.882	40.996	0.893	41.994	-1.23%	-2.38%
			755	0.897	40.806	0.894	41.916	0.34%	-2.65%
			770	0.909	40.535	0.895	41.838	1.56%	-3.11%
			785	0.926	40.388	0.896	41.760	3.35%	-3.29%
6/26/2017	850H	19.3	820	0.899	41.269	0.899	41.578	0.00%	-0.74%
			835	0.911	41.056	0.900	41.500	1.22%	-1.07%
			850	0.925	40.766	0.916	41.500	0.98%	-1.77%
7/10/2017	850H	20.4	820	0.911	42.448	0.899	41.578	1.33%	2.09%
			835	0.926	42.254	0.900	41.500	2.89%	1.82%
			850	0.941	42.055	0.916	41.500	2.73%	1.34%
8/18/2017	850H	18.8	800	0.901	43.343	0.897	41.682	0.45%	3.98%
			820	0.925	43.097	0.899	41.578	2.89%	3.65%
			835	0.933	42.866	0.900	41.500	3.67%	3.29%
			850	0.949	42.739	0.916	41.500	3.60%	2.99%
6/26/2017	1750H	21.8	1710	1.322	40.147	1.348	40.142	-1.93%	0.01%
			1750	1.357	39.986	1.371	40.079	-1.02%	-0.23%
			1790	1.394	39.726	1.394	40.016	0.00%	-0.72%
7/13/2017	1750H	21.6	1710	1.322	38.984	1.348	40.142	-1.93%	-2.88%
			1750	1.364	38.813	1.371	40.079	-0.51%	-3.16%
			1790	1.404	38.644	1.394	40.016	0.72%	-3.43%
6/22/2017	1900H	20.9	1850	1.389	39.160	1.400	40.000	-0.79%	-2.10%
			1880	1.398	38.822	1.400	40.000	-0.14%	-2.94%
			1910	1.459	38.610	1.400	40.000	4.21%	-3.48%
8/3/2017	1900H	22.6	1850	1.365	40.099	1.400	40.000	-2.50%	0.25%
			1880	1.398	40.008	1.400	40.000	-0.14%	0.02%
			1910	1.423	39.972	1.400	40.000	1.64%	-0.07%
6/28/2017	2450H	23.4	2400	1.783	39.617	1.756	39.289	1.54%	0.83%
			2450	1.838	39.444	1.800	39.200	2.11%	0.62%
			2500	1.900	39.292	1.855	39.136	2.43%	0.40%
7/3/2017	2450H	23.5	2400	1.821	39.751	1.756	39.289	3.70%	1.18%
			2450	1.877	39.507	1.800	39.200	4.28%	0.78%
			2500	1.938	39.329	1.855	39.136	4.47%	0.49%
7/12/2017	2450H	22.6	2400	1.825	39.770	1.756	39.289	3.93%	1.22%
			2450	1.875	39.584	1.800	39.200	4.17%	0.98%
			2500	1.935	39.377	1.855	39.136	4.31%	0.62%
6/28/2017	2600H	22.8	2600	2.017	38.071	1.964	39.009	2.70%	-2.40%
			2650	2.085	37.826	2.018	38.945	3.32%	-2.87%
			2700	2.129	37.640	2.073	38.882	2.70%	-3.19%
6/20/2017	750B	22.0	700	0.926	54.644	0.959	55.726	-3.44%	-1.94%
			710	0.933	54.642	0.960	55.687	-2.81%	-1.88%
			725	0.946	54.395	0.961	55.629	-1.56%	-2.22%
			740	0.962	54.230	0.963	55.570	-0.10%	-2.41%
			755	0.977	54.022	0.964	55.512	1.35%	-2.68%
6/22/2017	750B	22.2	725	0.964	54.782	0.961	55.629	0.31%	-1.52%
			740	0.966	54.467	0.963	55.570	0.31%	-1.98%
			755	0.983	54.500	0.964	55.512	1.97%	-1.82%
			770	1.007	54.233	0.965	55.453	4.35%	-2.20%
			785	1.014	53.923	0.966	55.395	4.97%	-2.66%
6/21/2017	850B	21.5	820	0.992	55.096	0.969	55.258	2.37%	-0.29%
			835	1.008	54.941	0.970	55.200	3.92%	-0.47%
			850	1.023	54.779	0.988	55.154	3.54%	-0.68%
7/4/2017	850B	21.1	820	0.990	54.633	0.969	55.258	2.17%	-1.13%
			835	1.005	54.476	0.970	55.200	3.61%	-1.31%
			850	1.020	54.315	0.988	55.154	3.24%	-1.52%
8/21/2017	850B	21.1	800	0.957	55.750	0.967	55.336	-1.03%	0.75%
			820	0.975	55.568	0.969	55.258	0.62%	0.56%
			835	0.998	55.281	0.970	55.200	2.89%	0.15%
			850	1.014	55.089	0.988	55.154	2.63%	-0.12%
7/3/2017	1750B	19.8	1710	1.483	52.768	1.463	53.537	1.37%	-1.44%
			1750	1.532	52.612	1.488	53.432	2.96%	-1.53%
			1790	1.578	52.438	1.514	53.326	4.23%	-1.67%
6/19/2017	1900B	21.5	1850	1.502	51.519	1.520	53.300	-1.18%	-3.34%
			1880	1.532	51.399	1.520	53.300	0.79%	-3.57%
			1910	1.564	51.306	1.520	53.300	2.89%	-3.74%
6/29/2017	2450B	21.9	2400	1.955	52.397	1.902	52.767	2.79%	-0.70%
			2450	2.023	52.166	1.950	52.700	3.74%	-1.01%
			2500	2.094	51.957	2.021	52.636	3.61%	-1.29%
7/6/2017	2450B	20.8	2400	1.971	50.978	1.902	52.767	3.63%	-3.39%
			2450	2.039	50.749	1.950	52.700	4.56%	-3.70%
			2500	2.101	50.611	2.021	52.636	3.96%	-3.85%
7/13/2017	2450B	22.7	2400	1.905	51.596	1.902	52.767	0.16%	-2.22%
			2450	1.967	51.397	1.950	52.700	0.87%	-2.47%
			2500	2.034	51.210	2.021	52.636	0.64%	-2.71%
6/21/2017	2600B	22.8	2600	2.164	51.094	2.163	52.509	0.05%	-2.69%
			2650	2.229	50.910	2.234	52.445	-0.22%	-2.93%
			2700	2.305	50.749	2.305	52.382	0.00%	-3.12%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

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9.2 Test System Verification

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

Table 9-2
System Verification Results - 1g

SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
CAL2	750	HEAD	06/26/2017	19.1	19.6	0.200	1097	3347	1.690	8.220	8.450	2.80%
CAL1	850	HEAD	06/26/2017	19.5	19.3	0.200	1009	7420	2.120	10.100	10.600	4.95%
CAL3	850	HEAD	07/10/2017	22.0	20.4	0.200	1010	3118	2.090	9.680	10.450	7.95%
CAL3	850	HEAD	08/18/2017	20.7	19.5	0.200	1010	3118	2.040	9.680	10.200	5.37%
CAL3	1750	HEAD	06/26/2017	20.9	21.8	0.100	1104	3118	3.570	36.000	35.700	-0.83%
CAL2	1750	HEAD	07/13/2017	21.5	21.6	0.100	1104	3347	3.430	36.000	34.300	-4.72%
CAL3	1900	HEAD	06/22/2017	20.7	20.9	0.100	5d181	3118	4.170	39.700	41.700	5.04%
CAL1	1900	HEAD	08/03/2017	20.3	21.9	0.100	5d181	7420	4.210	39.700	42.100	6.05%
CAL3	2450	HEAD	06/28/2017	21.5	22.5	0.100	921	3118	5.180	52.100	51.800	-0.58%
CAL3	2450	HEAD	07/03/2017	21.7	23.5	0.100	921	3118	5.270	52.100	52.700	1.15%
CAL4	2450	HEAD	07/12/2017	21.5	22.0	0.100	921	3329	5.220	52.100	52.200	0.19%
CAL4	2600	HEAD	06/28/2017	22.0	21.5	0.100	1069	3329	6.070	56.300	60.700	7.82%

Table 9-3
System Verification Results - 10g

SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{10g} (W/kg)	1 W Target SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	$Deviation_{10g}$ (%)
CAL2	750	BODY	06/20/2017	19.0	22.0	0.200	1097	3347	1.150	5.690	5.750	1.05%
CAL2	750	BODY	06/22/2017	19.3	20.2	0.200	1097	3347	1.140	5.690	5.700	0.18%
CAL1	850	BODY	06/21/2017	20.0	21.5	0.200	1009	7420	1.370	6.430	6.850	6.53%
CAL1	850	BODY	07/04/2017	21.8	21.5	0.200	1009	7420	1.370	6.430	6.850	6.53%
CAL4	850	BODY	08/21/2017	19.9	19.4	0.200	1010	3329	1.380	6.570	6.900	5.02%
CAL1	1750	BODY	07/03/2017	20.2	20.0	0.100	1104	7420	1.950	19.300	19.500	1.04%
CAL1	1900	BODY	06/19/2017	19.1	21.5	0.100	5d181	7420	2.040	20.900	20.400	-2.39%
CAL2	2450	BODY	06/29/2017	19.7	20.4	0.100	921	3347	2.260	24.000	22.600	-5.83%
CAL2	2450	BODY	07/06/2017	20.8	20.8	0.100	921	3347	2.390	24.000	23.900	-0.42%
CAL3	2450	BODY	07/13/2017	21.7	22.7	0.100	921	3118	2.450	24.000	24.500	2.08%
CAL4	2600	BODY	06/21/2017	20.0	20.9	0.100	1069	3329	2.440	25.000	24.400	-2.40%

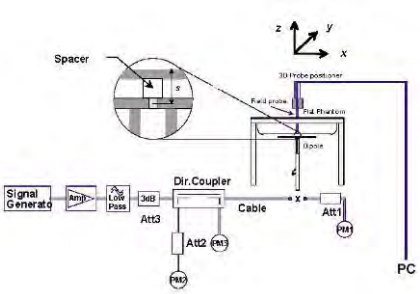

Figure 9-1
System Verification Setup Diagram

Figure 9-2
System Verification Setup Photo

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10 SAR DATA SUMMARY

10.1 Standalone Head SAR Data

Table 10-1
UMTS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	Aluminum	Metal Loop	24.5	23.00	0.00	10 mm	FH7TT00GJ78M	1:1	front	0.091	1.413	0.129	
836.60	4183	UMTS 850	RMC	Aluminum	Metal Links	24.5	23.00	0.05	10 mm	FH7TT00GJ78M	1:1	front	0.102	1.413	0.144	A1
836.60	4183	UMTS 850	RMC	Aluminum	Sport	24.5	23.00	0.07	10 mm	FH7TT009J78C	1:1	front	0.076	1.413	0.107	
836.60	4183	UMTS 850	RMC	Stainless Steel	Metal Loop	24.5	23.00	-0.05	10 mm	FH7TT003J79H	1:1	front	0.084	1.413	0.119	
836.60	4183	UMTS 850	RMC	Stainless Steel	Metal Links	24.5	23.00	0.00	10 mm	FH7TT003J79H	1:1	front	0.094	1.413	0.133	
836.60	4183	UMTS 850	RMC	Stainless Steel	Sport	24.5	23.00	0.02	10 mm	FH7TT003J79H	1:1	front	0.078	1.413	0.110	
836.60	4183	UMTS 850	RMC	Ceramic	Metal Loop	24.5	23.00	-0.12	10 mm	FH7TT001J79R	1:1	front	0.070	1.413	0.099	
836.60	4183	UMTS 850	RMC	Ceramic	Metal Links	24.5	23.00	-0.13	10 mm	FH7TT001J79R	1:1	front	0.094	1.413	0.133	
836.60	4183	UMTS 850	RMC	Ceramic	Sport	24.5	23.00	-0.03	10 mm	FH7TT003J79R	1:1	front	0.065	1.413	0.092	
1732.40	1412	UMTS 1750	RMC	Aluminum	Metal Loop	24.5	23.50	0.04	10 mm	FH7TT002J78X	1:1	front	0.389	1.259	0.490	
1732.40	1412	UMTS 1750	RMC	Aluminum	Metal Links	24.5	23.50	-0.02	10 mm	FH7TT002J78X	1:1	front	0.323	1.259	0.407	
1732.40	1412	UMTS 1750	RMC	Aluminum	Sport	24.5	23.50	-0.02	10 mm	FH7TT002J78X	1:1	front	0.191	1.259	0.240	
1732.40	1412	UMTS 1750	RMC	Stainless Steel	Metal Loop	24.5	23.50	0.07	10 mm	FH7TT004J79H	1:1	front	0.361	1.259	0.454	
1732.40	1412	UMTS 1750	RMC	Stainless Steel	Metal Links	24.5	23.50	-0.03	10 mm	FH7TT004J79H	1:1	front	0.305	1.259	0.384	
1732.40	1412	UMTS 1750	RMC	Stainless Steel	Sport	24.5	23.50	-0.06	10 mm	FH7TT004J79H	1:1	front	0.168	1.259	0.212	
1712.40	1312	UMTS 1750	RMC	Ceramic	Metal Loop	24.5	23.44	-0.03	10 mm	FH7TT001J79R	1:1	front	0.387	1.276	0.494	
1732.40	1412	UMTS 1750	RMC	Ceramic	Metal Loop	24.5	23.50	0.00	10 mm	FH7TT001J79R	1:1	front	0.412	1.259	**0.519**	A2
1752.60	1513	UMTS 1750	RMC	Ceramic	Metal Loop	24.5	23.60	-0.12	10 mm	FH7TT001J79R	1:1	front	0.404	1.230	0.497	
1732.40	1412	UMTS 1750	RMC	Ceramic	Metal Links	24.5	23.50	-0.02	10 mm	FH7TT001J79R	1:1	front	0.368	1.259	0.463	
1732.40	1412	UMTS 1750	RMC	Ceramic	Sport	24.5	23.50	-0.02	10 mm	FH7TT001J79R	1:1	front	0.206	1.259	0.259	
1880.00	9400	UMTS 1900	RMC	Aluminum	Metal Loop	24.5	23.21	-0.12	10 mm	FH7TT004J78X	1:1	front	0.315	1.346	0.424	A3
1880.00	9400	UMTS 1900	RMC	Aluminum	Metal Links	24.5	23.21	-0.09	10 mm	FH7TT004J78X	1:1	front	0.234	1.346	0.315	
1880.00	9400	UMTS 1900	RMC	Aluminum	Sport	24.5	23.21	-0.12	10 mm	FH7TT004J78X	1:1	front	0.182	1.346	0.245	
1880.00	9400	UMTS 1900	RMC	Stainless Steel	Metal Loop	24.5	23.21	-0.12	10 mm	FH7TT003J79H	1:1	front	0.274	1.346	0.369	
1880.00	9400	UMTS 1900	RMC	Stainless Steel	Metal Links	24.5	23.21	-0.12	10 mm	FH7TT003J79H	1:1	front	0.202	1.346	0.272	
1880.00	9400	UMTS 1900	RMC	Stainless Steel	Sport	24.5	23.21	-0.05	10 mm	FH7TT003J79H	1:1	front	0.196	1.346	0.264	
1880.00	9400	UMTS 1900	RMC	Ceramic	Metal Loop	24.5	23.21	-0.02	10 mm	FH7TT002J79R	1:1	front	0.306	1.346	0.412	
1880.00	9400	UMTS 1900	RMC	Ceramic	Metal Links	24.5	23.21	-0.11	10 mm	FH7TT002J79R	1:1	front	0.235	1.346	0.316	
1880.00	9400	UMTS 1900	RMC	Ceramic	Sport	24.5	23.21	-0.06	10 mm	FH7TT002J79R	1:1	front	0.247	1.346	0.332	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram						

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Table 10-2
LTE Band 12 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Loop	24.0	22.38	0.02	0	FH7TT002J78X	QPSK	1	25	10 mm	front	1:1	0.050	1.452	0.073	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Loop	23.0	21.33	0.04	1	FH7TT002J78X	QPSK	25	12	10 mm	front	1:1	0.040	1.469	0.059	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Links	24.0	22.38	-0.01	0	FH7TT00GJ78M	QPSK	1	25	10 mm	front	1:1	0.074	1.452	0.107	A4
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Links	23.0	21.33	0.05	1	FH7TT00GJ78M	QPSK	25	12	10 mm	front	1:1	0.060	1.469	0.088	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Sport	24.0	22.38	0.02	0	FH7TT004J78X	QPSK	1	25	10 mm	front	1:1	0.056	1.452	0.081	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Sport	23.0	21.33	0.05	1	FH7TT004J78X	QPSK	25	12	10 mm	front	1:1	0.046	1.469	0.068	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Loop	24.0	22.38	0.01	0	FH7TR06RJ796	QPSK	1	25	10 mm	front	1:1	0.060	1.452	0.087	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Loop	23.0	21.33	0.08	1	FH7TR06RJ796	QPSK	25	12	10 mm	front	1:1	0.048	1.469	0.071	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Links	24.0	22.38	0.03	0	FH7TR06CJ796	QPSK	1	25	10 mm	front	1:1	0.072	1.452	0.105	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Links	23.0	21.33	0.01	1	FH7TR06CJ796	QPSK	25	12	10 mm	front	1:1	0.059	1.469	0.087	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Sport	24.0	22.38	0.00	0	FH7TT003J79H	QPSK	1	25	10 mm	front	1:1	0.060	1.452	0.087	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Sport	23.0	21.33	0.03	1	FH7TT003J79H	QPSK	25	12	10 mm	front	1:1	0.050	1.469	0.073	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Loop	24.0	22.38	0.06	0	FH7TT002J79R	QPSK	1	25	10 mm	front	1:1	0.055	1.452	0.080	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Loop	23.0	21.33	0.11	1	FH7TT002J79R	QPSK	25	12	10 mm	front	1:1	0.045	1.469	0.066	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Links	24.0	22.38	0.01	0	FH7TT001J79R	QPSK	1	25	10 mm	front	1:1	0.060	1.452	0.087	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Links	23.0	21.33	0.07	1	FH7TT001J79R	QPSK	25	12	10 mm	front	1:1	0.049	1.469	0.072	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Sport	24.0	22.38	0.00	0	FH7TT003J79R	QPSK	1	25	10 mm	front	1:1	0.051	1.452	0.074	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Sport	23.0	21.33	0.09	1	FH7TT003J79R	QPSK	25	12	10 mm	front	1:1	0.042	1.469	0.062	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram												

Table 10-3
LTE Band 13 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Loop	24.0	22.39	-0.03	0	FH7TT009J78C	QPSK	1	25	10 mm	front	1:1	0.063	1.449	0.091	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Loop	23.0	21.42	-0.03	1	FH7TT009J78C	QPSK	25	25	10 mm	front	1:1	0.050	1.439	0.072	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Links	24.0	22.39	-0.07	0	FH7TT00GJ78M	QPSK	1	25	10 mm	front	1:1	0.079	1.449	0.114	A5
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Links	23.0	21.42	-0.02	1	FH7TT00GJ78M	QPSK	25	25	10 mm	front	1:1	0.063	1.439	0.091	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Sport	24.0	22.39	0.04	0	FH7TT00GJ78M	QPSK	1	25	10 mm	front	1:1	0.066	1.449	0.096	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Sport	23.0	21.42	0.00	1	FH7TT00GJ78M	QPSK	25	25	10 mm	front	1:1	0.055	1.439	0.079	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Loop	24.0	22.39	0.00	0	FH7TT004J79H	QPSK	1	25	10 mm	front	1:1	0.069	1.449	0.100	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Loop	23.0	21.42	0.10	1	FH7TT004J79H	QPSK	25	25	10 mm	front	1:1	0.050	1.439	0.072	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Links	24.0	22.39	0.00	0	FH7TR06CJ796	QPSK	1	25	10 mm	front	1:1	0.074	1.449	0.107	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Links	23.0	21.42	0.01	1	FH7TR06CJ796	QPSK	25	25	10 mm	front	1:1	0.061	1.439	0.088	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Sport	24.0	22.39	0.05	0	FH7TR06DJ796	QPSK	1	25	10 mm	front	1:1	0.079	1.449	0.114	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Sport	23.0	21.42	0.09	1	FH7TR06DJ796	QPSK	25	25	10 mm	front	1:1	0.063	1.439	0.091	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Loop	24.0	22.39	-0.01	0	FH7TT001J79R	QPSK	1	25	10 mm	front	1:1	0.064	1.449	0.093	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Loop	23.0	21.42	0.05	1	FH7TT001J79R	QPSK	25	25	10 mm	front	1:1	0.051	1.439	0.073	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Links	24.0	22.39	-0.03	0	FH7TT001J79R	QPSK	1	25	10 mm	front	1:1	0.074	1.449	0.107	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Links	23.0	21.42	-0.01	1	FH7TT001J79R	QPSK	25	25	10 mm	front	1:1	0.059	1.439	0.085	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Sport	24.0	22.39	-0.12	0	FH7TT002J79R	QPSK	1	25	10 mm	front	1:1	0.065	1.449	0.094	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Sport	23.0	21.42	0.03	1	FH7TT002J79R	QPSK	25	25	10 mm	front	1:1	0.053	1.439	0.076	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram												

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Table 10-4
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Loop	24.0	22.61	-0.09	0	FH7TT004J78X	QPSK	1	25	10 mm	front	1:1	0.069	1.377	0.095	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Loop	23.0	21.59	-0.06	1	FH7TT004J78X	QPSK	25	12	10 mm	front	1:1	0.054	1.384	0.075	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Links	24.0	22.61	-0.07	0	FH7TT002J78X	QPSK	1	25	10 mm	front	1:1	0.073	1.377	0.101	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Links	23.0	21.59	-0.01	1	FH7TT002J78X	QPSK	25	12	10 mm	front	1:1	0.058	1.384	0.080	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Sport	24.0	22.61	-0.07	0	FH7TT00GJ78M	QPSK	1	25	10 mm	front	1:1	0.074	1.377	0.102	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Sport	23.0	21.59	-0.04	1	FH7TT00GJ78M	QPSK	25	12	10 mm	front	1:1	0.056	1.384	0.078	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Loop	24.0	22.61	-0.06	0	FH7TR06RJ796	QPSK	1	25	10 mm	front	1:1	0.069	1.377	0.095	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Loop	23.0	21.59	-0.08	1	FH7TR06RJ796	QPSK	25	12	10 mm	front	1:1	0.055	1.384	0.076	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Links	24.0	22.61	-0.11	0	FH7TT003J79H	QPSK	1	25	10 mm	front	1:1	0.074	1.377	0.102	A6
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Links	23.0	21.59	-0.03	1	FH7TT003J79H	QPSK	25	12	10 mm	front	1:1	0.059	1.384	0.082	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Sport	24.0	22.61	-0.04	0	FH7TT004J79H	QPSK	1	25	10 mm	front	1:1	0.065	1.377	0.090	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Sport	23.0	21.59	0.00	1	FH7TT004J79H	QPSK	25	12	10 mm	front	1:1	0.052	1.384	0.072	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Loop	24.0	22.61	-0.03	0	FH7TT004J79R	QPSK	1	25	10 mm	front	1:1	0.056	1.377	0.077	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Loop	23.0	21.59	-0.04	1	FH7TT004J79R	QPSK	25	12	10 mm	front	1:1	0.043	1.384	0.060	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Links	24.0	22.61	-0.10	0	FH7TT002J79R	QPSK	1	25	10 mm	front	1:1	0.067	1.377	0.092	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Links	23.0	21.59	0.04	1	FH7TT002J79R	QPSK	25	12	10 mm	front	1:1	0.053	1.384	0.073	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Sport	24.0	22.61	-0.02	0	FH7TT003J79R	QPSK	1	25	10 mm	front	1:1	0.058	1.377	0.080	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Sport	23.0	21.59	0.00	1	FH7TT003J79R	QPSK	25	12	10 mm	front	1:1	0.046	1.384	0.064	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 10-5
LTE Band 26 (Cell) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Loop	24.0	22.88	-0.11	0	FH7TT009J78C	QPSK	1	49	10 mm	front	1:1	0.067	1.294	0.087	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Loop	23.0	21.84	-0.10	1	FH7TT009J78C	QPSK	25	12	10 mm	front	1:1	0.053	1.306	0.069	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Links	24.0	22.88	-0.05	0	FH7TT004J78X	QPSK	1	49	10 mm	front	1:1	0.071	1.294	0.092	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Links	23.0	21.84	-0.01	1	FH7TT004J78X	QPSK	25	12	10 mm	front	1:1	0.057	1.306	0.074	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Sport	24.0	22.88	-0.07	0	FH7TT00GJ78M	QPSK	1	49	10 mm	front	1:1	0.072	1.294	0.093	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Sport	23.0	21.84	-0.05	1	FH7TT00GJ78M	QPSK	25	12	10 mm	front	1:1	0.055	1.306	0.072	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Loop	24.0	22.88	-0.08	0	FH7TR06RJ796	QPSK	1	49	10 mm	front	1:1	0.067	1.294	0.087	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Loop	23.0	21.84	-0.07	1	FH7TR06RJ796	QPSK	25	12	10 mm	front	1:1	0.054	1.306	0.071	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Links	24.0	22.88	-0.05	0	FH7TR06RJ796	QPSK	1	49	10 mm	front	1:1	0.084	1.294	0.109	A7
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Links	23.0	21.84	-0.05	1	FH7TR06RJ796	QPSK	25	12	10 mm	front	1:1	0.068	1.306	0.089	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Sport	24.0	22.88	-0.03	0	FH7TT003J79H	QPSK	1	49	10 mm	front	1:1	0.064	1.294	0.083	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Sport	23.0	21.84	0.00	1	FH7TT003J79H	QPSK	25	12	10 mm	front	1:1	0.051	1.306	0.067	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Loop	24.0	22.88	-0.07	0	FH7TT002J79R	QPSK	1	49	10 mm	front	1:1	0.055	1.294	0.071	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Loop	23.0	21.84	-0.06	1	FH7TT002J79R	QPSK	25	12	10 mm	front	1:1	0.042	1.306	0.055	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Links	24.0	22.88	-0.11	0	FH7TT004J79R	QPSK	1	49	10 mm	front	1:1	0.065	1.294	0.084	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Links	23.0	21.84	0.05	1	FH7TT004J79R	QPSK	25	12	10 mm	front	1:1	0.052	1.306	0.068	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Sport	24.0	22.88	-0.04	0	FH7TT003J79R	QPSK	1	49	10 mm	front	1:1	0.056	1.294	0.072	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Sport	23.0	21.84	0.01	1	FH7TT003J79R	QPSK	25	12	10 mm	front	1:1	0.044	1.306	0.057	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 10-6
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Loop	24.0	23.31	-0.03	0	FH7TT009J78C	QPSK	1	99	10 mm	front	1:1	0.337	1.172	0.395	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Loop	23.0	22.00	-0.05	1	FH7TT009J78C	QPSK	50	50	10 mm	front	1:1	0.247	1.259	0.311	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Links	24.0	23.31	0.04	0	FH7TT002J78X	QPSK	1	99	10 mm	front	1:1	0.282	1.172	0.331	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Links	23.0	22.00	0.00	1	FH7TT002J78X	QPSK	50	50	10 mm	front	1:1	0.216	1.259	0.272	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Sport	24.0	23.31	-0.18	0	FH7TT004J78X	QPSK	1	99	10 mm	front	1:1	0.144	1.172	0.169	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Sport	23.0	22.00	-0.06	1	FH7TT004J78X	QPSK	50	50	10 mm	front	1:1	0.107	1.259	0.135	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Loop	24.0	23.31	-0.06	0	FH7TT004J79H	QPSK	1	99	10 mm	front	1:1	0.348	1.172	0.408	A8
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Loop	23.0	22.00	0.04	1	FH7TT004J79H	QPSK	50	50	10 mm	front	1:1	0.261	1.259	0.329	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Links	24.0	23.31	-0.05	0	FH7TR06CJ796	QPSK	1	99	10 mm	front	1:1	0.230	1.172	0.270	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Links	23.0	22.00	0.07	1	FH7TR06CJ796	QPSK	50	50	10 mm	front	1:1	0.173	1.259	0.218	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Sport	24.0	23.31	-0.10	0	FH7TT004J79H	QPSK	1	99	10 mm	front	1:1	0.130	1.172	0.152	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Sport	23.0	22.00	-0.04	1	FH7TT004J79H	QPSK	50	50	10 mm	front	1:1	0.094	1.259	0.118	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Loop	24.0	23.31	-0.02	0	FH7TT001J79R	QPSK	1	99	10 mm	front	1:1	0.343	1.172	0.402	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Loop	23.0	22.00	0.04	1	FH7TT001J79R	QPSK	50	50	10 mm	front	1:1	0.257	1.259	0.324	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Links	24.0	23.31	-0.02	0	FH7TT004J79R	QPSK	1	99	10 mm	front	1:1	0.258	1.172	0.302	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Links	23.0	22.00	-0.02	1	FH7TT004J79R	QPSK	50	50	10 mm	front	1:1	0.197	1.259	0.248	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Sport	24.0	23.31	-0.10	0	FH7TT003J79R	QPSK	1	99	10 mm	front	1:1	0.145	1.172	0.170	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Sport	23.0	22.00	-0.02	1	FH7TT003J79R	QPSK	50	50	10 mm	front	1:1	0.110	1.259	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 10-7
LTE Band 25 (PCS) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Loop	24.0	23.13	0.01	0	FH7TT004J78X	QPSK	1	99	10 mm	front	1:1	0.330	1.222	0.403	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Loop	23.0	21.93	0.02	1	FH7TT004J78X	QPSK	50	50	10 mm	front	1:1	0.249	1.279	0.318	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Links	24.0	23.13	-0.03	0	FH7TT009J78C	QPSK	1	99	10 mm	front	1:1	0.220	1.222	0.269	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Links	23.0	21.93	0.03	1	FH7TT009J78C	QPSK	50	50	10 mm	front	1:1	0.172	1.279	0.220	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Sport	24.0	23.13	-0.03	0	FH7TT00GJ78M	QPSK	1	99	10 mm	front	1:1	0.176	1.222	0.215	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Sport	23.0	21.93	-0.05	1	FH7TT00GJ78M	QPSK	50	50	10 mm	front	1:1	0.124	1.279	0.159	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Loop	24.0	23.13	-0.03	0	FH7TR06DJ796	QPSK	1	99	10 mm	front	1:1	0.259	1.222	0.316	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Loop	23.0	21.93	0.01	1	FH7TR06DJ796	QPSK	50	50	10 mm	front	1:1	0.206	1.279	0.263	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Links	24.0	23.13	0.06	0	FH7TR06RJ796	QPSK	1	99	10 mm	front	1:1	0.213	1.222	0.260	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Links	23.0	21.93	0.02	1	FH7TR06RJ796	QPSK	50	50	10 mm	front	1:1	0.162	1.279	0.207	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Sport	24.0	23.13	0.11	0	FH7TR06RJ796	QPSK	1	99	10 mm	front	1:1	0.166	1.222	0.203	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Sport	23.0	21.93	-0.01	1	FH7TR06RJ796	QPSK	50	50	10 mm	front	1:1	0.116	1.279	0.148	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Loop	24.0	23.13	-0.09	0	FH7TT004J79R	QPSK	1	99	10 mm	front	1:1	0.337	1.222	0.412	A9
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Loop	23.0	21.93	-0.03	1	FH7TT004J79R	QPSK	50	50	10 mm	front	1:1	0.254	1.279	0.325	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Links	24.0	23.13	-0.04	0	FH7TT002J79R	QPSK	1	99	10 mm	front	1:1	0.200	1.222	0.244	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Links	23.0	21.93	0.01	1	FH7TT002J79R	QPSK	50	50	10 mm	front	1:1	0.157	1.279	0.201	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Sport	24.0	23.13	-0.07	0	FH7TT003J79R	QPSK	1	99	10 mm	front	1:1	0.209	1.222	0.255	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Sport	23.0	21.93	-0.01	1	FH7TT003J79R	QPSK	50	50	10 mm	front	1:1	0.152	1.279	0.194	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 10-8
LTE Band 41 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Loop	24.0	23.39	-0.03	0	FH7TT004J78X	QPSK	1	99	10 mm	front	1:1.58	0.206	1.151	0.237	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Loop	23.0	22.04	0.03	1	FH7TT004J78X	QPSK	50	50	10 mm	front	1:1.58	0.152	1.247	0.190	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Links	24.0	23.39	-0.04	0	FH7TT009J78C	QPSK	1	99	10 mm	front	1:1.58	0.184	1.151	0.212	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Links	23.0	22.04	0.01	1	FH7TT009J78C	QPSK	50	50	10 mm	front	1:1.58	0.136	1.247	0.170	
2680.00	41490	High	LTE Band 41	20	Aluminum	Sport	24.0	23.39	0.08	0	FH7TT002J78X	QPSK	1	99	10 mm	front	1:1.58	0.238	1.151	0.274	
2680.00	41490	High	LTE Band 41	20	Aluminum	Sport	23.0	22.04	0.09	1	FH7TT002J78X	QPSK	50	50	10 mm	front	1:1.58	0.173	1.247	0.216	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Loop	24.0	23.39	-0.02	0	FH7TR06CJ796	QPSK	1	99	10 mm	front	1:1.58	0.273	1.151	0.314	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Loop	23.0	22.04	0.01	1	FH7TR06CJ796	QPSK	50	50	10 mm	front	1:1.58	0.198	1.247	0.247	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Links	24.0	23.39	-0.04	0	FH7TR06DJ796	QPSK	1	99	10 mm	front	1:1.58	0.264	1.151	0.304	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Links	23.0	22.04	0.01	1	FH7TR06DJ796	QPSK	50	50	10 mm	front	1:1.58	0.203	1.247	0.253	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Sport	24.0	23.39	-0.01	0	FH7TT004J79H	QPSK	1	99	10 mm	front	1:1.58	0.296	1.151	0.341	A10
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Sport	23.0	22.04	0.09	1	FH7TT004J79H	QPSK	50	50	10 mm	front	1:1.58	0.216	1.247	0.269	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Loop	24.0	23.39	0.03	0	FH7TT004J79R	QPSK	1	99	10 mm	front	1:1.58	0.247	1.151	0.284	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Loop	23.0	22.04	-0.02	1	FH7TT004J79R	QPSK	50	50	10 mm	front	1:1.58	0.183	1.247	0.228	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Links	24.0	23.39	-0.01	0	FH7TT002J79R	QPSK	1	99	10 mm	front	1:1.58	0.245	1.151	0.282	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Links	23.0	22.04	0.03	1	FH7TT002J79R	QPSK	50	50	10 mm	front	1:1.58	0.188	1.247	0.234	
2680.00	41490	High	LTE Band 41	20	Ceramic	Sport	24.0	23.39	-0.02	0	FH7TT003J79R	QPSK	1	99	10 mm	front	1:1.58	0.249	1.151	0.287	
2680.00	41490	High	LTE Band 41	20	Ceramic	Sport	23.0	22.04	0.04	1	FH7TT003J79R	QPSK	50	50	10 mm	front	1:1.58	0.180	1.247	0.224	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 10-9
2.4 GHz WLAN Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	Aluminum	Metal Loop	19.5	19.47	0.02	10 mm	FH7TT004J78X	1	front	98.2	0.119	1.007	1.018	0.122	
2437	6	802.11b	DSSS	22	Aluminum	Metal Links	19.5	19.47	-0.13	10 mm	FH7TT004J78X	1	front	98.2	0.115	1.007	1.018	0.118	
2437	6	802.11b	DSSS	22	Aluminum	Sport	19.5	19.47	0.00	10 mm	FH7TT004J78X	1	front	98.2	0.162	1.007	1.018	**0.166**	A11
2437	6	802.11b	DSSS	22	Stainless Steel	Metal Loop	19.5	19.47	0.02	10 mm	FH7TT004J79H	1	front	98.2	0.078	1.007	1.018	0.080	
2437	6	802.11b	DSSS	22	Stainless Steel	Metal Links	19.5	19.47	-0.03	10 mm	FH7TT004J79H	1	front	98.2	0.086	1.007	1.018	0.088	
2437	6	802.11b	DSSS	22	Stainless Steel	Sport	19.5	19.47	-0.05	10 mm	FH7TT004J79H	1	front	98.2	0.109	1.007	1.018	0.112	
2437	6	802.11b	DSSS	22	Ceramic	Metal Loop	19.5	19.47	-0.02	10 mm	FH7TT003J79R	1	front	98.2	0.078	1.007	1.018	0.080	
2437	6	802.11b	DSSS	22	Ceramic	Metal Links	19.5	19.47	0.08	10 mm	FH7TT003J79R	1	front	98.2	0.084	1.007	1.018	0.086	
2437	6	802.11b	DSSS	22	Ceramic	Sport	19.5	19.47	0.04	10 mm	FH7TT003J79R	1	front	98.2	0.120	1.007	1.018	0.123	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

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Table 10-10
Bluetooth (ePA) Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Loop	19.0	18.95	-0.01	10 mm	FH7TT00GJ78M	1	1:1	front	0.097	1.012	0.098	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Links	19.0	18.95	0.01	10 mm	FH7TT00GJ78M	1	1:1	front	0.095	1.012	0.096	
2441.00	39	Bluetooth	FHSS	Aluminum	Sport	19.0	18.95	0.09	10 mm	FH7TT00GJ78M	1	1:1	front	0.128	1.012	**0.130**	A12
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Loop	19.0	18.95	-0.21	10 mm	FH7TT004J79H	1	1:1	front	0.085	1.012	0.086	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Links	19.0	18.95	-0.16	10 mm	FH7TT004J79H	1	1:1	front	0.082	1.012	0.083	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Sport	19.0	18.95	-0.13	10 mm	FH7TT004J79H	1	1:1	front	0.105	1.012	0.106	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Loop	19.0	18.95	-0.14	10 mm	FH7TT001J79R	1	1:1	front	0.083	1.012	0.084	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Links	19.0	18.95	0.00	10 mm	FH7TT001J79R	1	1:1	front	0.082	1.012	0.083	
2441.00	39	Bluetooth	FHSS	Ceramic	Sport	19.0	18.95	-0.03	10 mm	FH7TT001J79R	1	1:1	front	0.115	1.012	0.116	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 10-11
Bluetooth (iPA) Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Loop	13.0	12.98	-0.10	10 mm	FH7TT00GJ78M	1	1:1	front	0.023	1.005	0.023	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Links	13.0	12.98	0.14	10 mm	FH7TT00GJ78M	1	1:1	front	0.022	1.005	0.022	
2441.00	39	Bluetooth	FHSS	Aluminum	Sport	13.0	12.98	0.04	10 mm	FH7TT00GJ78M	1	1:1	front	0.033	1.005	0.033	A13
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Loop	13.0	12.98	0.15	10 mm	FH7TT004J79H	1	1:1	front	0.016	1.005	0.016	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Links	13.0	12.98	0.18	10 mm	FH7TT004J79H	1	1:1	front	0.016	1.005	0.016	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Sport	13.0	12.98	0.11	10 mm	FH7TT004J79H	1	1:1	front	0.022	1.005	0.022	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Loop	13.0	12.98	0.13	10 mm	FH7TT001J79R	1	1:1	front	0.018	1.005	0.018	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Links	13.0	12.98	0.10	10 mm	FH7TT001J79R	1	1:1	front	0.017	1.005	0.017	
2441.00	39	Bluetooth	FHSS	Ceramic	Sport	13.0	12.98	-0.11	10 mm	FH7TT001J79R	1	1:1	front	0.025	1.005	0.025	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram								

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10.2 Standalone Extremity SAR Data

Table 10-12
UMTS Extremity SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	Aluminum	Metal Loop	24.5	23.00	0.15	0 mm	FH7TT009J78C	1:1	back	0.012	1.413	0.017	
836.60	4183	UMTS 850	RMC	Aluminum	Metal Links	24.5	23.00	0.15	0 mm	FH7TT002J78X	1:1	back	0.005	1.413	0.007	
836.60	4183	UMTS 850	RMC	Aluminum	Sport	24.5	23.00	0.11	0 mm	FH7TT009J78C	1:1	back	0.015	1.413	0.021	
836.60	4183	UMTS 850	RMC	Stainless Steel	Metal Loop	24.5	23.00	0.19	0 mm	FH7TT004J79H	1:1	back	0.015	1.413	0.021	
836.60	4183	UMTS 850	RMC	Stainless Steel	Metal Links	24.5	23.00	0.16	0 mm	FH7TR06CJ796	1:1	back	0.005	1.413	0.007	
836.60	4183	UMTS 850	RMC	Stainless Steel	Sport	24.5	23.00	0.18	0 mm	FH7TR06CJ796	1:1	back	0.016	1.413	0.023	
836.60	4183	UMTS 850	RMC	Ceramic	Metal Loop	24.5	23.00	0.14	0 mm	FH7TT002J79R	1:1	back	0.017	1.413	0.024	
836.60	4183	UMTS 850	RMC	Ceramic	Metal Links	24.5	23.00	0.15	0 mm	FH7TT002J79R	1:1	back	0.007	1.413	0.010	
836.60	4183	UMTS 850	RMC	Ceramic	Sport	24.5	23.00	0.17	0 mm	FH7TT004J79R	1:1	back	0.021	1.413	0.030	A14
1732.40	1412	UMTS 1750	RMC	Aluminum	Metal Loop	24.5	23.50	0.09	0 mm	FH7TT004J78X	1:1	back	0.168	1.259	0.212	
1732.40	1412	UMTS 1750	RMC	Aluminum	Metal Links	24.5	23.50	0.02	0 mm	FH7TT009J78C	1:1	back	0.101	1.259	0.127	
1732.40	1412	UMTS 1750	RMC	Aluminum	Sport	24.5	23.50	0.11	0 mm	FH7TT004J78X	1:1	back	0.105	1.259	0.132	
1732.40	1412	UMTS 1750	RMC	Stainless Steel	Metal Loop	24.5	23.50	-0.18	0 mm	FH7TT003J79H	1:1	back	0.177	1.259	0.223	
1732.40	1412	UMTS 1750	RMC	Stainless Steel	Metal Links	24.5	23.50	0.02	0 mm	FH7TT003J79H	1:1	back	0.105	1.259	0.132	
1732.40	1412	UMTS 1750	RMC	Stainless Steel	Sport	24.5	23.50	0.07	0 mm	FH7TR06CJ796	1:1	back	0.113	1.259	0.142	
1712.40	1312	UMTS 1750	RMC	Ceramic	Metal Loop	24.5	23.44	-0.13	0 mm	FH7TT001J79R	1:1	back	0.269	1.276	0.343	
1732.40	1412	UMTS 1750	RMC	Ceramic	Metal Loop	24.5	23.50	-0.11	0 mm	FH7TT001J79R	1:1	back	0.273	1.259	**0.344**	A15
1752.60	1513	UMTS 1750	RMC	Ceramic	Metal Loop	24.5	23.60	-0.02	0 mm	FH7TT001J79R	1:1	back	0.218	1.230	0.268	
1732.40	1412	UMTS 1750	RMC	Ceramic	Metal Links	24.5	23.50	0.01	0 mm	FH7TT001J79R	1:1	back	0.158	1.259	0.199	
1732.40	1412	UMTS 1750	RMC	Ceramic	Sport	24.5	23.50	0.04	0 mm	FH7TT004J79R	1:1	back	0.226	1.259	0.285	
1880.00	9400	UMTS 1900	RMC	Aluminum	Metal Loop	24.5	23.21	-0.04	0 mm	FH7TT002J78X	1:1	back	0.164	1.346	0.221	
1880.00	9400	UMTS 1900	RMC	Aluminum	Metal Links	24.5	23.21	-0.09	0 mm	FH7TT009J78C	1:1	back	0.081	1.346	0.109	
1880.00	9400	UMTS 1900	RMC	Aluminum	Sport	24.5	23.21	-0.01	0 mm	FH7TT009J78C	1:1	back	0.106	1.346	0.143	
1880.00	9400	UMTS 1900	RMC	Stainless Steel	Metal Loop	24.5	23.21	-0.02	0 mm	FH7TR06RJ796	1:1	back	0.071	1.346	0.096	
1880.00	9400	UMTS 1900	RMC	Stainless Steel	Metal Links	24.5	23.21	-0.02	0 mm	FH7TR06RJ796	1:1	back	0.057	1.346	0.077	
1880.00	9400	UMTS 1900	RMC	Stainless Steel	Sport	24.5	23.21	0.12	0 mm	FH7TR06RJ796	1:1	back	0.071	1.346	0.096	
1880.00	9400	UMTS 1900	RMC	Ceramic	Metal Loop	24.5	23.21	-0.09	0 mm	FH7TT002J79R	1:1	back	0.211	1.346	0.284	A16
1880.00	9400	UMTS 1900	RMC	Ceramic	Metal Links	24.5	23.21	0.02	0 mm	FH7TT003J79R	1:1	back	0.150	1.346	0.202	
1880.00	9400	UMTS 1900	RMC	Ceramic	Sport	24.5	23.21	0.07	0 mm	FH7TT003J79R	1:1	back	0.204	1.346	0.275	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Extremity 4.0 W/kg (mW/g) averaged over 10 grams						

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Table 10-13
LTE Band 12 Extremity SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Loop	24.0	22.38	0.19	0	FH7TT00GJ78M	QPSK	1	25	0 mm	back	1:1	0.010	1.452	0.015	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Loop	23.0	21.33	0.12	1	FH7TT00GJ78M	QPSK	25	12	0 mm	back	1:1	0.007	1.469	0.010	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Links	24.0	22.38	0.11	0	FH7TT004J78X	QPSK	1	25	0 mm	back	1:1	0.002	1.452	0.003	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Metal Links	23.0	21.33	0.19	1	FH7TT009J78C	QPSK	25	12	0 mm	back	1:1	0.002	1.469	0.003	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Sport	24.0	22.38	0.00	0	FH7TT009J78C	QPSK	1	25	0 mm	back	1:1	0.008	1.452	0.012	
707.50	23095	Mid	LTE Band 12	10	Aluminum	Sport	23.0	21.33	0.14	1	FH7TT009J78C	QPSK	25	12	0 mm	back	1:1	0.006	1.469	0.009	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Loop	24.0	22.38	0.11	0	FH7TT003J79H	QPSK	1	25	0 mm	back	1:1	0.010	1.452	0.015	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Loop	23.0	21.33	0.17	1	FH7TT003J79H	QPSK	25	12	0 mm	back	1:1	0.009	1.469	0.013	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Links	24.0	22.38	0.15	0	FH7TT003J79H	QPSK	1	25	0 mm	back	1:1	0.002	1.452	0.003	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Metal Links	23.0	21.33	0.16	1	FH7TT003J79H	QPSK	25	12	0 mm	back	1:1	0.002	1.469	0.003	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Sport	24.0	22.38	0.13	0	FH7TR06CJ796	QPSK	1	25	0 mm	back	1:1	0.008	1.452	0.012	
707.50	23095	Mid	LTE Band 12	10	Stainless Steel	Sport	23.0	21.33	0.10	1	FH7TR06CJ796	QPSK	25	12	0 mm	back	1:1	0.007	1.469	0.010	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Loop	24.0	22.38	0.12	0	FH7TT004J79R	QPSK	1	25	0 mm	back	1:1	0.014	1.452	0.020	A17
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Loop	23.0	21.33	0.11	1	FH7TT004J79R	QPSK	25	12	0 mm	back	1:1	0.011	1.469	0.016	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Links	24.0	22.38	0.15	0	FH7TT003J79R	QPSK	1	25	0 mm	back	1:1	0.010	1.452	0.015	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Metal Links	23.0	21.33	0.14	1	FH7TT003J79R	QPSK	25	12	0 mm	back	1:1	0.007	1.469	0.010	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Sport	24.0	22.38	0.16	0	FH7TT002J79R	QPSK	1	25	0 mm	back	1:1	0.010	1.452	0.015	
707.50	23095	Mid	LTE Band 12	10	Ceramic	Sport	23.0	21.33	0.16	1	FH7TT002J79R	QPSK	25	12	0 mm	back	1:1	0.007	1.469	0.010	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Extremity 4.0 W/kg (mW/g) averaged over 10 grams										

Table 10-14
LTE Band 13 Extremity SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Loop	24.0	22.39	0.14	0	FH7TT00GJ78M	QPSK	1	25	0 mm	back	1:1	0.013	1.449	0.019	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Loop	23.0	21.42	0.13	1	FH7TT00GJ78M	QPSK	25	25	0 mm	back	1:1	0.009	1.439	0.013	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Links	24.0	22.39	0.18	0	FH7TT002J78X	QPSK	1	25	0 mm	back	1:1	0.003	1.449	0.004	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Metal Links	23.0	21.42	0.12	1	FH7TT002J78X	QPSK	25	25	0 mm	back	1:1	0.002	1.439	0.003	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Sport	24.0	22.39	-0.16	0	FH7TT002J78X	QPSK	1	25	0 mm	back	1:1	0.010	1.449	0.014	
782.00	23230	Mid	LTE Band 13	10	Aluminum	Sport	23.0	21.42	0.12	1	FH7TT002J78X	QPSK	25	25	0 mm	back	1:1	0.008	1.439	0.012	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Loop	24.0	22.39	0.11	0	FH7TT003J79H	QPSK	1	25	0 mm	back	1:1	0.013	1.449	0.019	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Loop	23.0	21.42	0.15	1	FH7TT003J79H	QPSK	25	25	0 mm	back	1:1	0.011	1.439	0.016	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Links	24.0	22.39	0.18	0	FH7TT004J79H	QPSK	1	25	0 mm	back	1:1	0.003	1.449	0.004	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Metal Links	23.0	21.42	0.00	1	FH7TT004J79H	QPSK	25	25	0 mm	back	1:1	0.002	1.439	0.003	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Sport	24.0	22.39	0.15	0	FH7TR06DJ796	QPSK	1	25	0 mm	back	1:1	0.012	1.449	0.017	
782.00	23230	Mid	LTE Band 13	10	Stainless Steel	Sport	23.0	21.42	0.14	1	FH7TR06DJ796	QPSK	25	25	0 mm	back	1:1	0.009	1.439	0.013	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Loop	24.0	22.39	0.17	0	FH7TT003J79R	QPSK	1	25	0 mm	back	1:1	0.017	1.449	0.025	A18
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Loop	23.0	21.42	0.20	1	FH7TT003J79R	QPSK	25	25	0 mm	back	1:1	0.013	1.439	0.019	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Links	24.0	22.39	0.04	0	FH7TT001J79R	QPSK	1	25	0 mm	back	1:1	0.009	1.449	0.013	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Metal Links	23.0	21.42	0.17	1	FH7TT001J79R	QPSK	25	25	0 mm	back	1:1	0.007	1.439	0.010	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Sport	24.0	22.39	0.18	0	FH7TT002J79R	QPSK	1	25	0 mm	back	1:1	0.014	1.449	0.020	
782.00	23230	Mid	LTE Band 13	10	Ceramic	Sport	23.0	21.42	0.17	1	FH7TT002J79R	QPSK	25	25	0 mm	back	1:1	0.011	1.439	0.016	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Extremity 4.0 W/kg (mW/g) averaged over 10 grams										

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Table 10-15
LTE Band 5 (Cell) Extremity SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Loop	24.0	22.61	0.15	0	FH7TT00GJ78M	QPSK	1	25	0 mm	back	1:1	0.012	1.377	0.017	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Loop	23.0	21.59	0.11	1	FH7TT00GJ78M	QPSK	25	12	0 mm	back	1:1	0.009	1.384	0.012	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Links	24.0	22.61	0.11	0	FH7TT009J78C	QPSK	1	25	0 mm	back	1:1	0.005	1.377	0.007	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Metal Links	23.0	21.59	0.17	1	FH7TT009J78C	QPSK	25	12	0 mm	back	1:1	0.004	1.384	0.006	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Sport	24.0	22.61	0.14	0	FH7TT004J78X	QPSK	1	25	0 mm	back	1:1	0.012	1.377	0.017	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Aluminum	Sport	23.0	21.59	0.12	1	FH7TT004J78X	QPSK	25	12	0 mm	back	1:1	0.010	1.384	0.014	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Loop	24.0	22.61	0.16	0	FH7TR06RJ796	QPSK	1	25	0 mm	back	1:1	0.012	1.377	0.017	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Loop	23.0	21.59	0.18	1	FH7TR06RJ796	QPSK	25	12	0 mm	back	1:1	0.009	1.384	0.012	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Links	24.0	22.61	0.12	0	FH7TT003J79H	QPSK	1	25	0 mm	back	1:1	0.005	1.377	0.007	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Metal Links	23.0	21.59	0.19	1	FH7TT003J79H	QPSK	25	12	0 mm	back	1:1	0.004	1.384	0.006	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Sport	24.0	22.61	0.10	0	FH7TR06DJ796	QPSK	1	25	0 mm	back	1:1	0.014	1.377	0.019	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Stainless Steel	Sport	23.0	21.59	0.13	1	FH7TR06DJ796	QPSK	25	12	0 mm	back	1:1	0.011	1.384	0.015	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Loop	24.0	22.61	0.16	0	FH7TT001J79R	QPSK	1	25	0 mm	back	1:1	0.015	1.377	0.021	A19
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Loop	23.0	21.59	0.14	1	FH7TT001J79R	QPSK	25	12	0 mm	back	1:1	0.011	1.384	0.015	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Links	24.0	22.61	0.15	0	FH7TT003J79R	QPSK	1	25	0 mm	back	1:1	0.009	1.377	0.012	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Metal Links	23.0	21.59	0.13	1	FH7TT003J79R	QPSK	25	12	0 mm	back	1:1	0.006	1.384	0.008	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Sport	24.0	22.61	0.11	0	FH7TT002J79R	QPSK	1	25	0 mm	back	1:1	0.014	1.377	0.019	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Ceramic	Sport	23.0	21.59	0.16	1	FH7TT002J79R	QPSK	25	12	0 mm	back	1:1	0.011	1.384	0.015	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Extremity 4.0 W/kg (mW/g) averaged over 10 grams												

Table 10-16
LTE Band 26 (Cell) Extremity SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Loop	24.0	22.88	0.10	0	FH7TT009J78C	QPSK	1	49	0 mm	back	1:1	0.011	1.294	0.014	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Loop	23.0	21.84	0.11	1	FH7TT009J78C	QPSK	25	12	0 mm	back	1:1	0.008	1.306	0.010	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Links	24.0	22.88	0.18	0	FH7TT002J78X	QPSK	1	49	0 mm	back	1:1	0.005	1.294	0.006	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Metal Links	23.0	21.84	-0.10	1	FH7TT002J78X	QPSK	25	12	0 mm	back	1:1	0.004	1.306	0.005	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Sport	24.0	22.88	0.14	0	FH7TT00GJ78M	QPSK	1	49	0 mm	back	1:1	0.012	1.294	0.016	
819.00	26740	Low	LTE Band 26 (Cell)	10	Aluminum	Sport	23.0	21.84	0.18	1	FH7TT00GJ78M	QPSK	25	12	0 mm	back	1:1	0.009	1.306	0.012	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Loop	24.0	22.88	0.15	0	FH7TT003J79H	QPSK	1	49	0 mm	back	1:1	0.012	1.294	0.016	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Loop	23.0	21.84	0.10	1	FH7TT003J79H	QPSK	25	12	0 mm	back	1:1	0.009	1.306	0.012	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Links	24.0	22.88	0.10	0	FH7TR06CJ796	QPSK	1	49	0 mm	back	1:1	0.005	1.294	0.006	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Metal Links	23.0	21.84	0.12	1	FH7TR06CJ796	QPSK	25	12	0 mm	back	1:1	0.004	1.306	0.005	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Sport	24.0	22.88	0.15	0	FH7TT004J79H	QPSK	1	49	0 mm	back	1:1	0.013	1.294	0.017	
819.00	26740	Low	LTE Band 26 (Cell)	10	Stainless Steel	Sport	23.0	21.84	0.13	1	FH7TT004J79H	QPSK	25	12	0 mm	back	1:1	0.010	1.306	0.013	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Loop	24.0	22.88	0.14	0	FH7TT001J79R	QPSK	1	49	0 mm	back	1:1	0.014	1.294	0.018	A20
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Loop	23.0	21.84	0.14	1	FH7TT001J79R	QPSK	25	12	0 mm	back	1:1	0.011	1.306	0.014	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Links	24.0	22.88	0.12	0	FH7TT002J79R	QPSK	1	49	0 mm	back	1:1	0.009	1.294	0.012	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Metal Links	23.0	21.84	0.12	1	FH7TT002J79R	QPSK	25	12	0 mm	back	1:1	0.006	1.306	0.008	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Sport	24.0	22.88	0.15	0	FH7TT004J79R	QPSK	1	49	0 mm	back	1:1	0.014	1.294	0.018	
819.00	26740	Low	LTE Band 26 (Cell)	10	Ceramic	Sport	23.0	21.84	0.19	1	FH7TT004J79R	QPSK	25	12	0 mm	back	1:1	0.011	1.306	0.014	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Extremity 4.0 W/kg (mW/g) averaged over 10 grams												

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Table 10-17
LTE Band 4 (AWS) Extremity SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Loop	24.0	23.31	0.13	0	FH7TT002J78X	QPSK	1	99	0 mm	back	1:1	0.132	1.172	0.155	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Loop	23.0	22.00	-0.17	1	FH7TT002J78X	QPSK	50	50	0 mm	back	1:1	0.094	1.259	0.118	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Links	24.0	23.31	0.10	0	FH7TT009J78C	QPSK	1	99	0 mm	back	1:1	0.080	1.172	0.094	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Metal Links	23.0	22.00	0.15	1	FH7TT009J78C	QPSK	50	50	0 mm	back	1:1	0.060	1.259	0.076	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Sport	24.0	23.31	0.09	0	FH7TT00GJ78M	QPSK	1	99	0 mm	back	1:1	0.076	1.172	0.089	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Aluminum	Sport	23.0	22.00	0.12	1	FH7TT00GJ78M	QPSK	50	50	0 mm	back	1:1	0.055	1.259	0.069	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Loop	24.0	23.31	-0.08	0	FH7TR06RJ796	QPSK	1	99	0 mm	back	1:1	0.128	1.172	0.150	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Loop	23.0	22.00	-0.06	1	FH7TR06RJ796	QPSK	50	50	0 mm	back	1:1	0.091	1.259	0.115	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Links	24.0	23.31	-0.16	0	FH7TT004J79H	QPSK	1	99	0 mm	back	1:1	0.073	1.172	0.086	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Metal Links	23.0	22.00	0.09	1	FH7TT004J79H	QPSK	50	50	0 mm	back	1:1	0.054	1.259	0.068	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Sport	24.0	23.31	0.05	0	FH7TR06DJ796	QPSK	1	99	0 mm	back	1:1	0.082	1.172	0.096	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Stainless Steel	Sport	23.0	22.00	0.14	1	FH7TR06DJ796	QPSK	50	50	0 mm	back	1:1	0.063	1.259	0.079	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Loop	24.0	23.31	-0.05	0	FH7TT003J79R	QPSK	1	99	0 mm	back	1:1	0.292	1.172	0.342	A21
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Loop	23.0	22.00	0.00	1	FH7TT003J79R	QPSK	50	50	0 mm	back	1:1	0.223	1.259	0.281	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Links	24.0	23.31	0.01	0	FH7TT002J79R	QPSK	1	99	0 mm	back	1:1	0.156	1.172	0.183	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Metal Links	23.0	22.00	0.10	1	FH7TT002J79R	QPSK	50	50	0 mm	back	1:1	0.119	1.259	0.150	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Sport	24.0	23.31	0.07	0	FH7TT004J79R	QPSK	1	99	0 mm	back	1:1	0.165	1.172	0.193	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Ceramic	Sport	23.0	22.00	0.13	1	FH7TT004J79R	QPSK	50	50	0 mm	back	1:1	0.127	1.259	0.160	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Extremity 4.0 W/kg (mW/g) averaged over 10 grams											

Table 10-18
LTE Band 25 (PCS) Extremity SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Loop	24.0	23.13	-0.09	0	FH7TT004J78X	QPSK	1	99	0 mm	back	1:1	0.137	1.222	0.167	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Loop	23.0	21.93	0.02	1	FH7TT004J78X	QPSK	50	50	0 mm	back	1:1	0.102	1.279	0.130	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Links	24.0	23.13	-0.06	0	FH7TT00GJ78M	QPSK	1	99	0 mm	back	1:1	0.070	1.222	0.086	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Metal Links	23.0	21.93	0.03	1	FH7TT00GJ78M	QPSK	50	50	0 mm	back	1:1	0.052	1.279	0.067	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Sport	24.0	23.13	0.10	0	FH7TT009J78C	QPSK	1	99	0 mm	back	1:1	0.080	1.222	0.098	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Aluminum	Sport	23.0	21.93	0.06	1	FH7TT009J78C	QPSK	50	50	0 mm	back	1:1	0.060	1.279	0.077	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Loop	24.0	23.13	0.04	0	FH7TT003J79H	QPSK	1	99	0 mm	back	1:1	0.068	1.222	0.083	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Loop	23.0	21.93	0.07	1	FH7TT003J79H	QPSK	50	50	0 mm	back	1:1	0.054	1.279	0.069	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Links	24.0	23.13	0.03	0	FH7TT004J79H	QPSK	1	99	0 mm	back	1:1	0.048	1.222	0.059	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Metal Links	23.0	21.93	0.02	1	FH7TT004J79H	QPSK	50	50	0 mm	back	1:1	0.034	1.279	0.043	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Sport	24.0	23.13	0.06	0	FH7TR06RJ796	QPSK	1	99	0 mm	back	1:1	0.063	1.222	0.077	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Stainless Steel	Sport	23.0	21.93	0.09	1	FH7TR06RJ796	QPSK	50	50	0 mm	back	1:1	0.047	1.279	0.060	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Loop	24.0	23.13	-0.03	0	FH7TT001J79R	QPSK	1	99	0 mm	back	1:1	0.135	1.222	0.165	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Loop	23.0	21.93	-0.02	1	FH7TT001J79R	QPSK	50	50	0 mm	back	1:1	0.100	1.279	0.128	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Links	24.0	23.13	-0.03	0	FH7TT002J79R	QPSK	1	99	0 mm	back	1:1	0.101	1.222	0.123	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Metal Links	23.0	21.93	-0.02	1	FH7TT002J79R	QPSK	50	50	0 mm	back	1:1	0.076	1.279	0.097	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Sport	24.0	23.13	-0.01	0	FH7TT004J79R	QPSK	1	99	0 mm	back	1:1	0.165	1.222	0.202	A22
1860.00	26140	Low	LTE Band 25 (PCS)	20	Ceramic	Sport	23.0	21.93	0.03	1	FH7TT004J79R	QPSK	50	50	0 mm	back	1:1	0.122	1.279	0.156	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Extremity 4.0 W/kg (mW/g) averaged over 10 grams											

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Table 10-19
LTE Band 41 Extremity SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Loop	24.0	23.39	-0.04	0	FH7TT004J78X	QPSK	1	99	0 mm	back	1:1.58	0.128	1.151	0.147	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Loop	23.0	22.04	-0.02	1	FH7TT004J78X	QPSK	50	50	0 mm	back	1:1.58	0.056	1.247	0.070	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Links	24.0	23.39	-0.06	0	FH7TT009J78C	QPSK	1	99	0 mm	back	1:1.58	0.118	1.151	0.136	
2680.00	41490	High	LTE Band 41	20	Aluminum	Metal Links	23.0	22.04	-0.01	1	FH7TT009J78C	QPSK	50	50	0 mm	back	1:1.58	0.088	1.247	0.110	
2680.00	41490	High	LTE Band 41	20	Aluminum	Sport	24.0	23.39	0.12	0	FH7TT00GJ78M	QPSK	1	99	0 mm	back	1:1.58	0.147	1.151	0.169	A23
2680.00	41490	High	LTE Band 41	20	Aluminum	Sport	23.0	22.04	0.07	1	FH7TT00GJ78M	QPSK	50	50	0 mm	back	1:1.58	0.111	1.247	0.138	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Loop	24.0	23.39	-0.13	0	FH7TR06DJ796	QPSK	1	99	0 mm	back	1:1.58	0.047	1.151	0.054	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Loop	23.0	22.04	0.15	1	FH7TR06DJ796	QPSK	50	50	0 mm	back	1:1.58	0.036	1.247	0.045	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Links	24.0	23.39	0.11	0	FH7TR06RJ796	QPSK	1	99	0 mm	back	1:1.58	0.040	1.151	0.046	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Metal Links	23.0	22.04	0.10	1	FH7TR06RJ796	QPSK	50	50	0 mm	back	1:1.58	0.031	1.247	0.039	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Sport	24.0	23.39	0.19	0	FH7TT004J79H	QPSK	1	99	0 mm	back	1:1.58	0.060	1.151	0.069	
2680.00	41490	High	LTE Band 41	20	Stainless Steel	Sport	23.0	22.04	-0.03	1	FH7TT004J79H	QPSK	50	50	0 mm	back	1:1.58	0.046	1.247	0.057	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Loop	24.0	23.39	0.02	0	FH7TT002J79R	QPSK	1	99	0 mm	back	1:1.58	0.023	1.151	0.026	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Loop	23.0	22.04	0.11	1	FH7TT002J79R	QPSK	50	50	0 mm	back	1:1.58	0.018	1.247	0.022	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Links	24.0	23.39	0.21	0	FH7TT002J79R	QPSK	1	99	0 mm	back	1:1.58	0.022	1.151	0.025	
2680.00	41490	High	LTE Band 41	20	Ceramic	Metal Links	23.0	22.04	0.11	1	FH7TT002J79R	QPSK	50	50	0 mm	back	1:1.58	0.014	1.247	0.017	
2680.00	41490	High	LTE Band 41	20	Ceramic	Sport	24.0	23.39	0.18	0	FH7TT002J79R	QPSK	1	99	0 mm	back	1:1.58	0.036	1.151	0.041	
2680.00	41490	High	LTE Band 41	20	Ceramic	Sport	23.0	22.04	0.18	1	FH7TT002J79R	QPSK	50	50	0 mm	back	1:1.58	0.026	1.247	0.032	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Extremity 4.0 W/kg (mW/g) averaged over 10 grams										

Table 10-20
2.4 GHz WLAN Extremity SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (10g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	Aluminum	Metal Loop	19.5	19.47	0.13	0 mm	FH7TT009J78C	1	back	98.2	0.066	1.007	1.018	0.068	
2437	6	802.11b	DSSS	22	Aluminum	Metal Links	19.5	19.47	0.00	0 mm	FH7TT009J78C	1	back	98.2	0.051	1.007	1.018	0.052	
2437	6	802.11b	DSSS	22	Aluminum	Sport	19.5	19.47	0.04	0 mm	FH7TT009J78C	1	back	98.2	0.081	1.007	1.018	**0.083**	A24
2437	6	802.11b	DSSS	22	Stainless Steel	Metal Loop	19.5	19.47	-0.06	0 mm	FH7TT004J79H	1	back	98.2	0.023	1.007	1.018	0.024	
2437	6	802.11b	DSSS	22	Stainless Steel	Metal Links	19.5	19.47	0.12	0 mm	FH7TT004J79H	1	back	98.2	0.019	1.007	1.018	0.019	
2437	6	802.11b	DSSS	22	Stainless Steel	Sport	19.5	19.47	0.10	0 mm	FH7TT004J79H	1	back	98.2	0.033	1.007	1.018	0.034	
2437	6	802.11b	DSSS	22	Ceramic	Metal Loop	19.5	19.47	-0.21	0 mm	FH7TT004J79R	1	back	98.2	0.029	1.007	1.018	0.030	
2437	6	802.11b	DSSS	22	Ceramic	Metal Links	19.5	19.47	0.15	0 mm	FH7TT004J79R	1	back	98.2	0.028	1.007	1.018	0.029	
2437	6	802.11b	DSSS	22	Ceramic	Sport	19.5	19.47	0.15	0 mm	FH7TT004J79R	1	back	98.2	0.044	1.007	1.018	0.045	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Extremity 4.0 W/kg (mW/g) averaged over 10 grams								

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Table 10-21
Bluetooth (ePA) Extremity SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Loop	19.0	18.95	0.01	0 mm	FH7TT00GJ78M	1	1:1	back	0.051	1.012	0.052	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Links	19.0	18.95	0.04	0 mm	FH7TT00GJ78M	1	1:1	back	0.040	1.012	0.040	
2441.00	39	Bluetooth	FHSS	Aluminum	Sport	19.0	18.95	0.01	0 mm	FH7TT00GJ78M	1	1:1	back	0.069	1.012	**0.070**	A25
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Loop	19.0	18.95	0.07	0 mm	FH7TR06DJ796	1	1:1	back	0.037	1.012	0.037	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Links	19.0	18.95	0.06	0 mm	FH7TR06DJ796	1	1:1	back	0.025	1.012	0.025	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Sport	19.0	18.95	0.06	0 mm	FH7TR06DJ796	1	1:1	back	0.043	1.012	0.044	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Loop	19.0	18.95	0.09	0 mm	FH7TT001J79R	1	1:1	back	0.046	1.012	0.047	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Links	19.0	18.95	0.00	0 mm	FH7TT001J79R	1	1:1	back	0.026	1.012	0.026	
2441.00	39	Bluetooth	FHSS	Ceramic	Sport	19.0	18.95	-0.01	0 mm	FH7TT001J79R	1	1:1	back	0.057	1.012	0.058	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Extremity 4.0 W/kg (mW/g) averaged over 10 grams								

Table 10-22
Bluetooth (iPA) Extremity SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Housing Type	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.													(W/kg)		(W/kg)	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Loop	13.0	12.98	-0.04	0 mm	FH7TT004J78X	1	1:1	back	0.015	1.005	0.015	
2441.00	39	Bluetooth	FHSS	Aluminum	Metal Links	13.0	12.98	-0.19	0 mm	FH7TT004J78X	1	1:1	back	0.011	1.005	0.011	
2441.00	39	Bluetooth	FHSS	Aluminum	Sport	13.0	12.98	-0.07	0 mm	FH7TT004J78X	1	1:1	back	0.019	1.005	0.019	A26
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Loop	13.0	12.98	-0.14	0 mm	FH7TR06RJ796	1	1:1	back	0.007	1.005	0.007	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Metal Links	13.0	12.98	-0.10	0 mm	FH7TR06RJ796	1	1:1	back	0.005	1.005	0.005	
2441.00	39	Bluetooth	FHSS	Stainless Steel	Sport	13.0	12.98	0.05	0 mm	FH7TR06RJ796	1	1:1	back	0.009	1.005	0.009	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Loop	13.0	12.98	-0.07	0 mm	FH7TT001J79R	1	1:1	back	0.009	1.005	0.009	
2441.00	39	Bluetooth	FHSS	Ceramic	Metal Links	13.0	12.98	-0.14	0 mm	FH7TT001J79R	1	1:1	back	0.006	1.005	0.006	
2441.00	39	Bluetooth	FHSS	Ceramic	Sport	13.0	12.98	-0.15	0 mm	FH7TT001J79R	1	1:1	back	0.012	1.005	0.012	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Extremity 4.0 W/kg (mW/g) averaged over 10 grams								

10.3 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg for 1g SAR and 2.0 W/kg for 10g SAR.
7. This device has three housing types: Aluminum, Stainless Steel and Ceramic. The non-metallic wrist accessory, sport band, was evaluated for all exposure conditions. The available metallic wrist accessories, metal links band and metal loop band, were additionally evaluated.
8. This device is a portable wrist-worn device and does not support any other use conditions. Therefore the procedures in FCC KDB Publication 447498 D01v06 Section 6.2 have been applied for extremity and next to mouth (head) conditions.

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UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 7.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported (scaled) for LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g SAR and > 1.5 W/kg for 10g SAR, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.

WLAN/Bluetooth Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.6.2 for more information. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
2. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.
3. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.
4. To determine compliance, Bluetooth SAR was measured with internal power amplifier and external power amplifier. Bluetooth was evaluated with a test mode with 100% transmission duty factor.

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11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

11.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR or 10-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg or ≤4.0 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

11.3 Head SAR Simultaneous Transmission Analysis

For SAR summation, the highest reported SAR across all housing and wristband types was used as a conservative evaluation for the simultaneous transmission analysis.

Table 11-1
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Head at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	UMTS 850	0.144	0.166	0.310
	UMTS 1750	0.519	0.166	**0.685**
	UMTS 1900	0.424	0.166	0.590
	LTE Band 12	0.107	0.166	0.273
	LTE Band 13	0.114	0.166	0.280
	LTE Band 5 (Cell)	0.102	0.166	0.268
	LTE Band 26 (Cell)	0.109	0.166	0.275
	LTE Band 4 (AWS)	0.408	0.166	0.574
	LTE Band 25 (PCS)	0.412	0.166	0.578
	LTE Band 41	0.341	0.166	0.507

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Table 11-2
Simultaneous Transmission Scenario with Bluetooth (ePA) (Head at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth (ePA) SAR (W/kg)	Σ SAR (W/kg)
Head SAR	UMTS 850	0.144	0.130	0.274
	UMTS 1750	0.519	0.130	**0.649**
	UMTS 1900	0.424	0.130	0.554
	LTE Band 12	0.107	0.130	0.237
	LTE Band 13	0.114	0.130	0.244
	LTE Band 5 (Cell)	0.102	0.130	0.232
	LTE Band 26 (Cell)	0.109	0.130	0.239
	LTE Band 4 (AWS)	0.408	0.130	0.538
	LTE Band 25 (PCS)	0.412	0.130	0.542
	LTE Band 41	0.341	0.130	0.471

Table 11-3
Simultaneous Transmission Scenario with Bluetooth (iPA) (Head at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth (iPA) SAR (W/kg)	Σ SAR (W/kg)
Head SAR	UMTS 850	0.144	0.033	0.177
	UMTS 1750	0.519	0.033	**0.552**
	UMTS 1900	0.424	0.033	0.457
	LTE Band 12	0.107	0.033	0.140
	LTE Band 13	0.114	0.033	0.147
	LTE Band 5 (Cell)	0.102	0.033	0.135
	LTE Band 26 (Cell)	0.109	0.033	0.142
	LTE Band 4 (AWS)	0.408	0.033	0.441
	LTE Band 25 (PCS)	0.412	0.033	0.445
	LTE Band 41	0.341	0.033	0.374

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11.4 Extremity SAR Simultaneous Transmission Analysis

Table 11-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Extremity at 0.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	UMTS 850	0.030	0.083	0.113
	UMTS 1750	0.344	0.083	**0.427**
	UMTS 1900	0.284	0.083	0.367
	LTE Band 12	0.020	0.083	0.103
	LTE Band 13	0.025	0.083	0.108
	LTE Band 5 (Cell)	0.021	0.083	0.104
	LTE Band 26 (Cell)	0.018	0.083	0.101
	LTE Band 4 (AWS)	0.342	0.083	0.425
	LTE Band 25 (PCS)	0.202	0.083	0.285
	LTE Band 41	0.169	0.083	0.252

Table 11-5
Simultaneous Transmission Scenario with Bluetooth (ePA) (Extremity at 0.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth (ePA) SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	UMTS 850	0.030	0.070	0.100
	UMTS 1750	0.344	0.070	**0.414**
	UMTS 1900	0.284	0.070	0.354
	LTE Band 12	0.020	0.070	0.090
	LTE Band 13	0.025	0.070	0.095
	LTE Band 5 (Cell)	0.021	0.070	0.091
	LTE Band 26 (Cell)	0.018	0.070	0.088
	LTE Band 4 (AWS)	0.342	0.070	0.412
	LTE Band 25 (PCS)	0.202	0.070	0.272
	LTE Band 41	0.169	0.070	0.239

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Table 11-6
Simultaneous Transmission Scenario with Bluetooth (iPA) (Extremity at 0.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth (iPA) SAR (W/kg)	Σ SAR (W/kg)
Extremity SAR	UMTS 850	0.030	0.019	0.049
	UMTS 1750	0.344	0.019	**0.363**
	UMTS 1900	0.284	0.019	0.303
	LTE Band 12	0.020	0.019	0.039
	LTE Band 13	0.025	0.019	0.044
	LTE Band 5 (Cell)	0.021	0.019	0.040
	LTE Band 26 (Cell)	0.018	0.019	0.037
	LTE Band 4 (AWS)	0.342	0.019	0.361
	LTE Band 25 (PCS)	0.202	0.019	0.221
	LTE Band 41	0.169	0.019	0.188

11.5 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 D01v06.

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12 SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was not assessed for each frequency band since all measured SAR values are < 0.80 W/kg for 1g SAR and < 2.0 W/kg for 10g SAR.

12.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for 1g SAR and <3.75 W/kg for 10g SAR for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis was not required.

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13 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/22/2017	Annual	3/22/2018	MY45470194
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	E4438C	ESG Vector Signal Generator	3/23/2017	Annual	3/23/2018	MY47270002
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Agilent	N5182A	MXG Vector Signal Generator	10/27/2016	Annual	10/27/2017	MY47420603
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/19/2016	Annual	8/19/2017	MY40003841
Agilent	8753ES	S-Parameter Vector Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Agilent	E5515C	Wireless Communications Test Set	1/29/2016	Biennial	1/29/2018	GB46310798
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	1039008
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	8/18/2016	Annual	8/18/2017	1126066
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231538
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231535
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
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
Control Company	4352	Ultra Long Stem Thermometer	3/3/2017	Biennial	3/3/2019	170155534
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
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
Mitutoyo	CD-6"CSX	Digital Caliper	3/2/2016	Biennial	3/2/2018	13264162
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	4/11/2017	Annual	4/11/2018	836371/0079
Rohde & Schwarz	CMW500	Radio Communication Tester	10/20/2016	Annual	10/20/2017	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	5/4/2017	Annual	5/4/2018	112347
Rohde & Schwarz	CMW500	Radio Communication Tester	5/4/2017	Annual	5/4/2018	101699
Rohde & Schwarz	CMW500	Radio Communication Tester	10/13/2016	Annual	10/13/2017	102060
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/10/2017	Annual	2/10/2018	162125
Seekonk	NC-100	Torque Wrench (8" lb)	9/1/2016	Biennial	9/1/2018	21053
Seekonk	NC-100	Torque Wrench (8" lb)	8/30/2016	Biennial	8/30/2018	N/A
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/25/2016	Annual	8/25/2017	1041
SPEAG	D750V3	750 MHz SAR Dipole	9/19/2016	Annual	9/19/2017	1097
SPEAG	D850V2	850 MHz SAR Dipole	8/16/2016	Annual	8/16/2017	1009
SPEAG	D850V2	835 MHz SAR Dipole	9/19/2016	Annual	9/19/2017	1010
SPEAG	D1750V2	1750 MHz SAR Dipole	9/14/2016	Annual	9/14/2017	1104
SPEAG	D1900V2	1900 MHz SAR Dipole	9/19/2016	Annual	9/19/2017	5d181
SPEAG	D2450V2	2450 MHz SAR Dipole	9/13/2016	Annual	9/13/2017	921
SPEAG	D2600V2	2600 MHz SAR Dipole	9/13/2016	Annual	9/13/2017	1069
SPEAG	ES3DV3	SAR Probe	11/11/2016	Annual	11/11/2017	3347
SPEAG	EX3DV4	SAR Probe	11/15/2016	Annual	11/15/2017	7420
SPEAG	ES3DV3	SAR Probe	3/16/2017	Annual	3/16/2018	3118
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3329
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/15/2016	Annual	11/15/2017	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/21/2016	Annual	9/21/2017	1449
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2017	Annual	3/8/2018	1213
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/10/2017	Annual	3/10/2018	1403

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. Each equipment item was used solely within its respective calibration period.

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14 MEASUREMENT UNCERTAINTIES

a	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	Tol. (± %)	Prob. Dist.	Div.	c_i 1gm	c_i 10 gms	1gm u_i (± %)	10gms u_i (± %)	v_i
Measurement System								
Probe Calibration	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	2.0	R	1.73	1.0	1.0	1.2	1.2	∞
Linearity	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	0.25	R	1.73	1.0	1.0	0.1	0.1	∞
Readout Electronics	0.3	N	1	1.0	1.0	0.3	0.3	∞
Response Time	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions - Noise	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
RF Ambient Conditions - Reflections	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	6.7	R	1.73	1.0	1.0	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Test Sample Related								
Test Sample Positioning	2.7	N	1	1.0	1.0	2.7	2.7	35
Device Holder Uncertainty	1.67	N	1	1.0	1.0	1.7	1.7	5
Output Power Variation - SAR drift measurement	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
SAR Scaling	0.0	R	1.73	1.0	1.0	0.0	0.0	∞
Phantom & Tissue Parameters								
Phantom Uncertainty (Shape & Thickness tolerances)	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	4.2	N	1	0.78	0.71	3.3	3.0	10
Liquid Permittivity - measurement uncertainty	4.1	N	1	0.23	0.26	1.0	1.1	10
Liquid Conductivity - Temperature Uncertainty	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Unceritainty	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)		RSS				11.5	11.3	60
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2				23.0	22.6	

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15 CONCLUSION

15.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Innovation, Science, and Economic Development 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

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PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

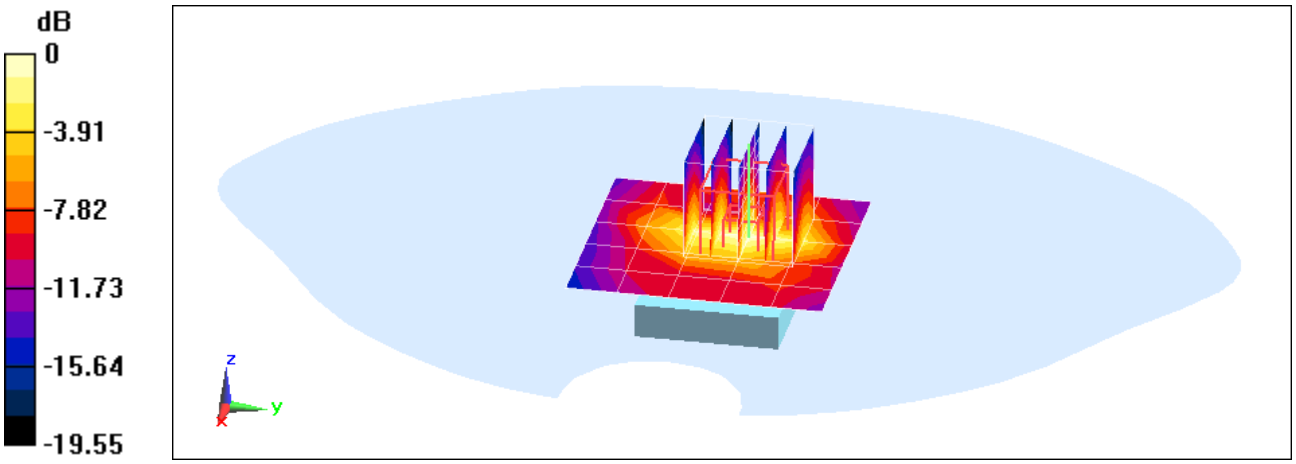
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.912 S/m; ε_r = 41.025; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 19.5°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7420; ConvF(10.1, 10.1, 10.1); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 850, Head SAR, Front side, Mid.ch, Aluminum, Metal Links Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.87 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.198 W/kg
SAR(1 g) = 0.102 W/kg



0 dB = 0.155 W/kg = -8.10 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R

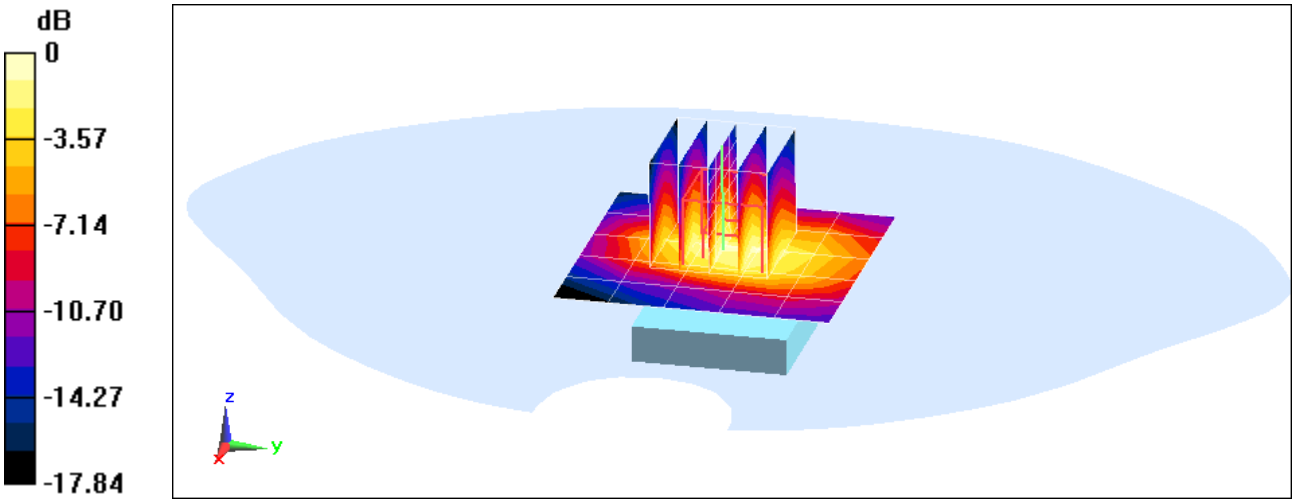
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.346 S/m; ε_r = 38.888; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.5°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3347; ConvF(5.43, 5.43, 5.43); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1750, Head SAR, Front side, Mid.ch, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.62 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.647 W/kg
SAR(1 g) = 0.412 W/kg



0 dB = 0.492 W/kg = -3.08 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J78X

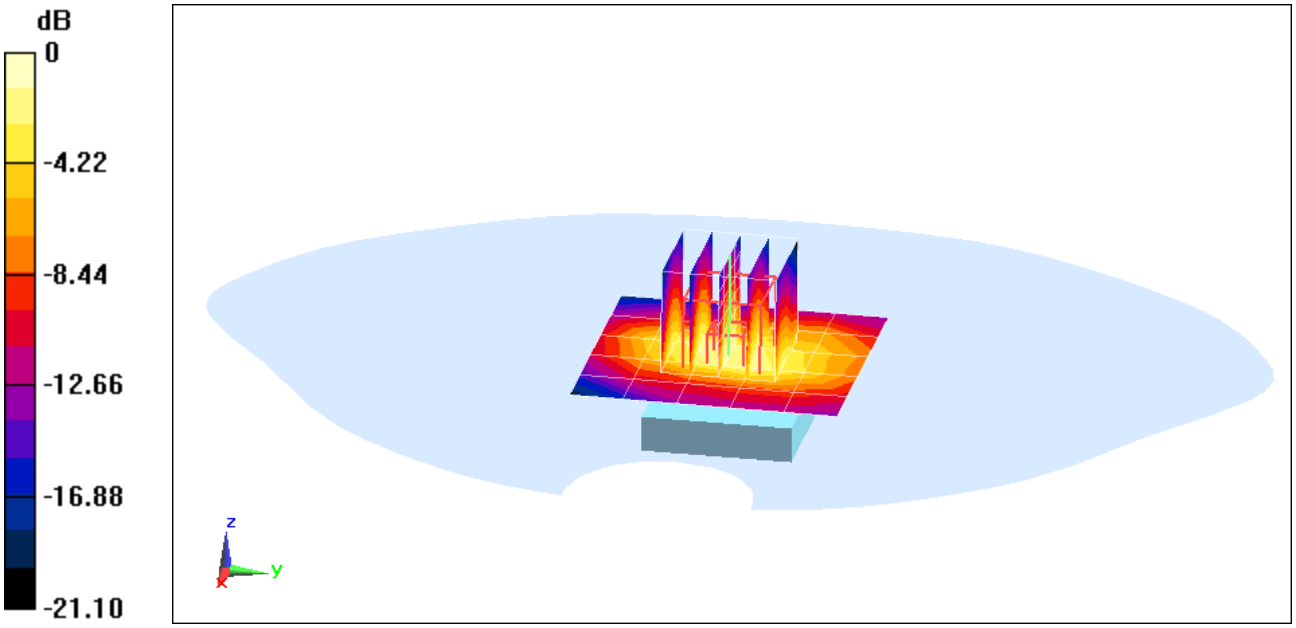
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.398 S/m; ε_r = 40.008; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 20.3°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7420; ConvF(8.17, 8.17, 8.17); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Head SAR, Front side, Mid.ch, Aluminum, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.62 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.547 W/kg
SAR(1 g) = 0.315 W/kg



0 dB = 0.454 W/kg = -3.43 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

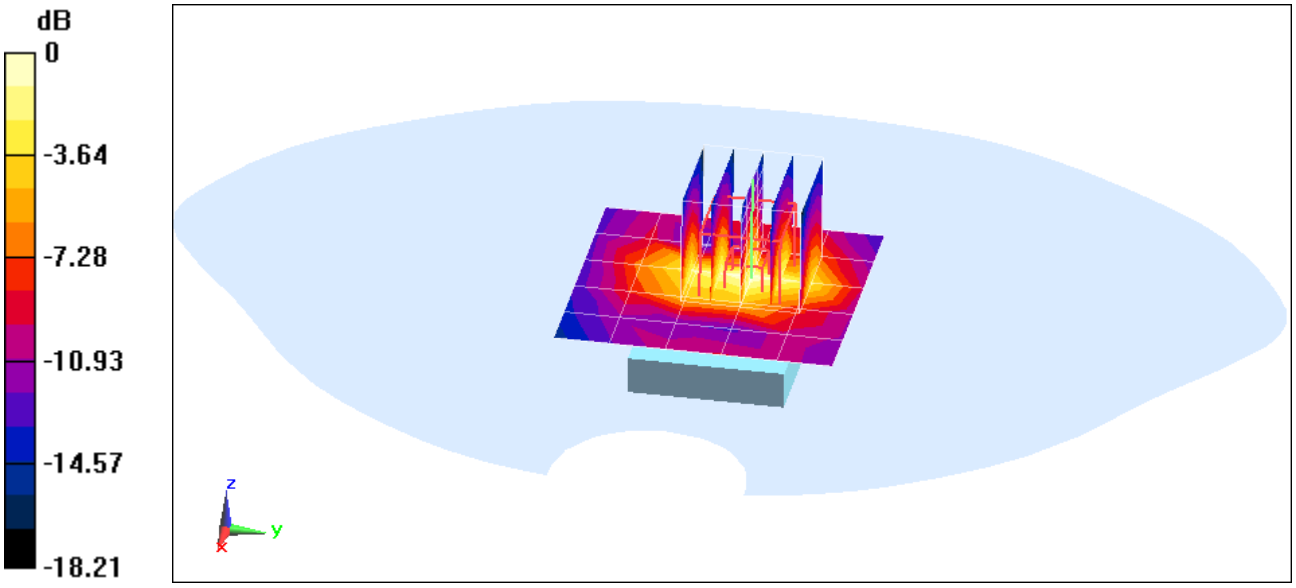
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.854 S/m; ε_r = 41.515; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 19.1°C; Tissue Temp: 19.6°C

Probe: ES3DV3 - SN3347; ConvF(6.75, 6.75, 6.75); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 12, Head SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Aluminum, Metal Links Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.853 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.144 W/kg
SAR(1 g) = 0.074 W/kg



0 dB = 0.0913 W/kg = -10.40 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

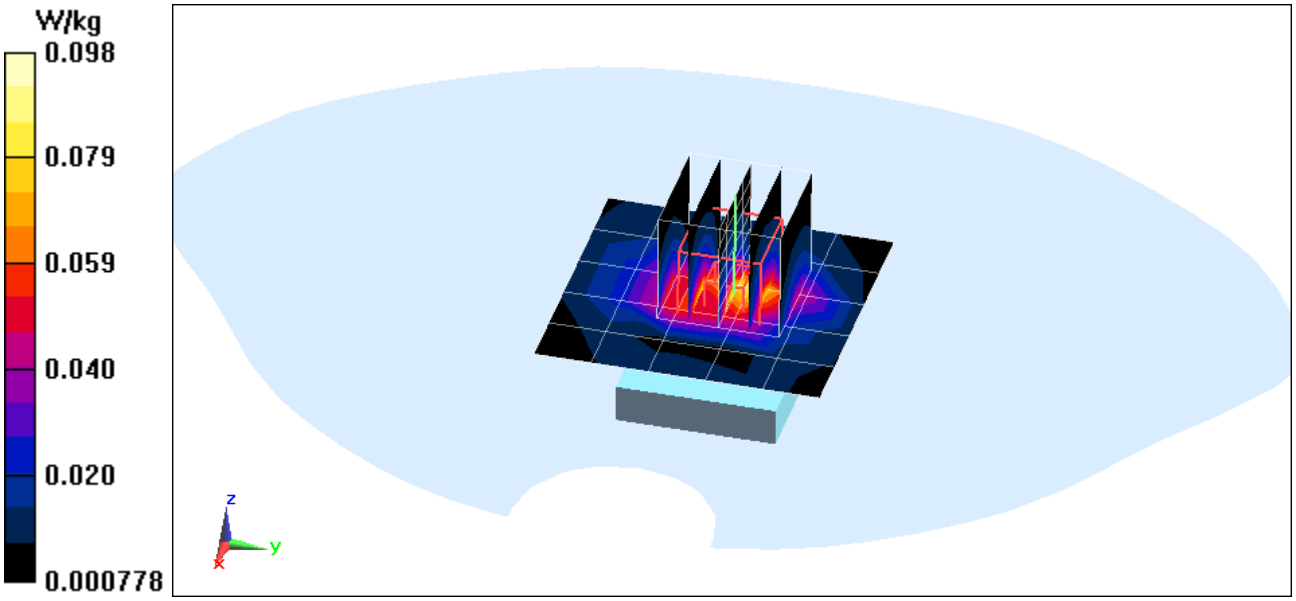
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.923 S/m; ε_r = 40.417; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 19.1°C; Tissue Temp: 19.6°C

Probe: ES3DV3 - SN3347; ConvF(6.75, 6.75, 6.75); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 13, Head SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Aluminum, Metal Links Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.867 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.155 W/kg
SAR(1 g) = 0.079 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT003J79H

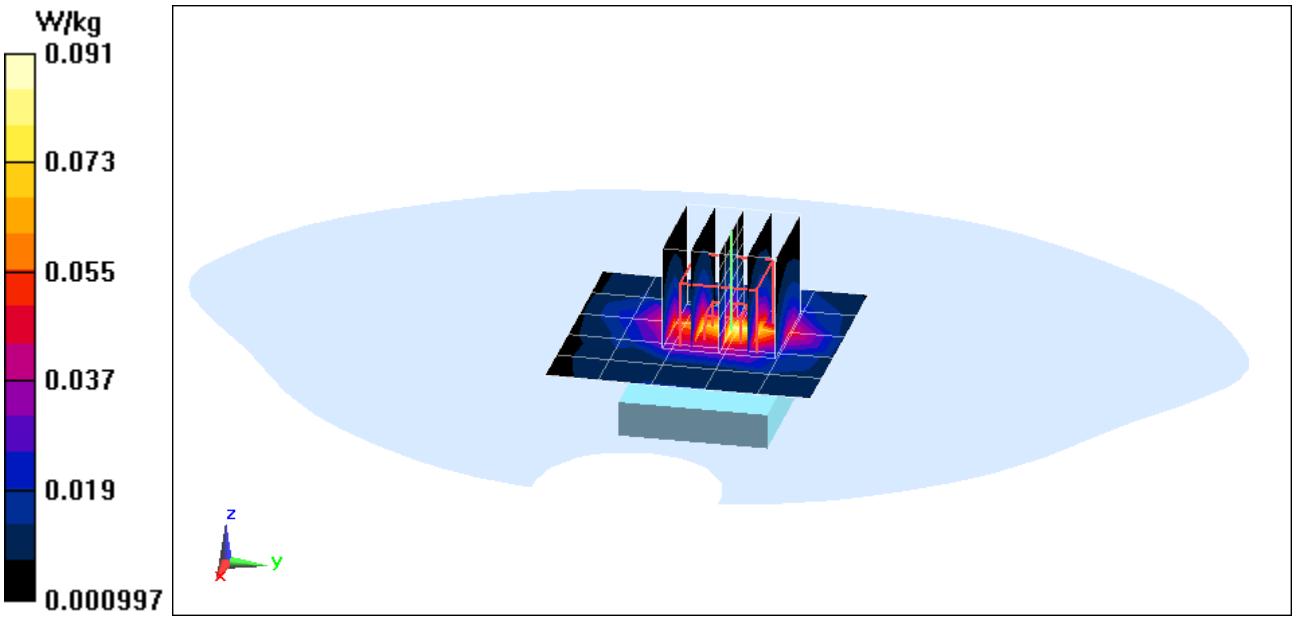
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.928 S/m; ε_r = 42.234; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-10-2017; Ambient Temp: 22.0°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3118; ConvF(6.32, 6.32, 6.32); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 5 (Cell.), Head SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Stainless Steel, Metal Links Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.453 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.140 W/kg
SAR(1 g) = 0.074 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TR06RJ796

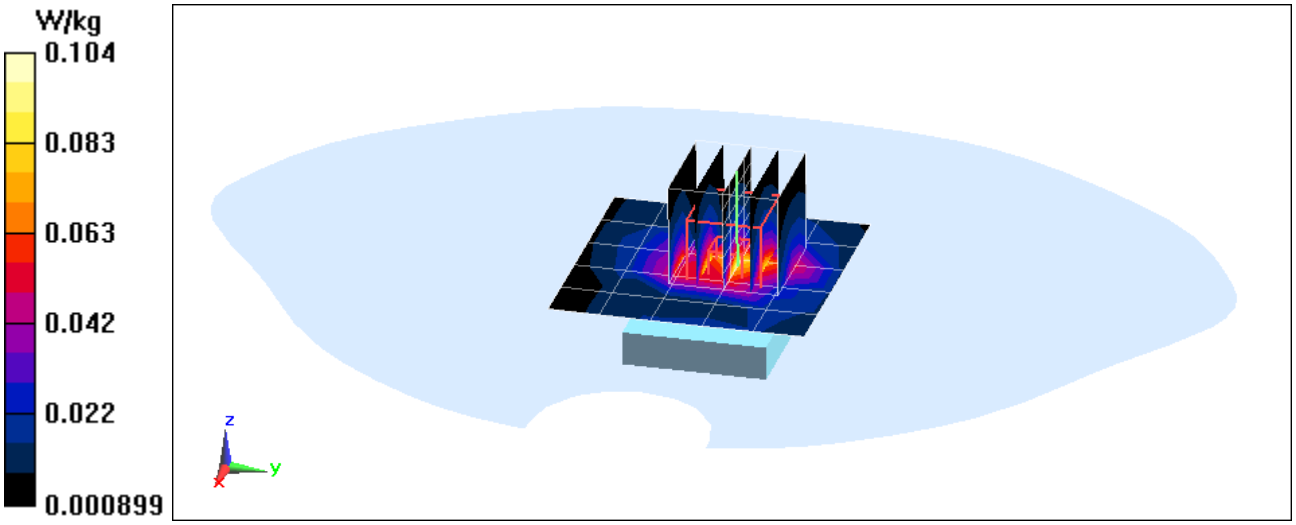
Communication System: UID 0, LTE Band 26; Frequency: 819 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used (interpolated):
f = 819 MHz; σ = 0.924 S/m; ε_r = 43.109; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-18-2017; Ambient Temp: 20.7°C; Tissue Temp: 19.5°C

Probe: ES3DV3 - SN3118; ConvF(6.32, 6.32, 6.32); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 26 (Cell.), Head SAR, Front side, Low.ch, 10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset, Stainless Steel, Metal Links Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.13 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.157 W/kg
SAR(1 g) = 0.084 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79H

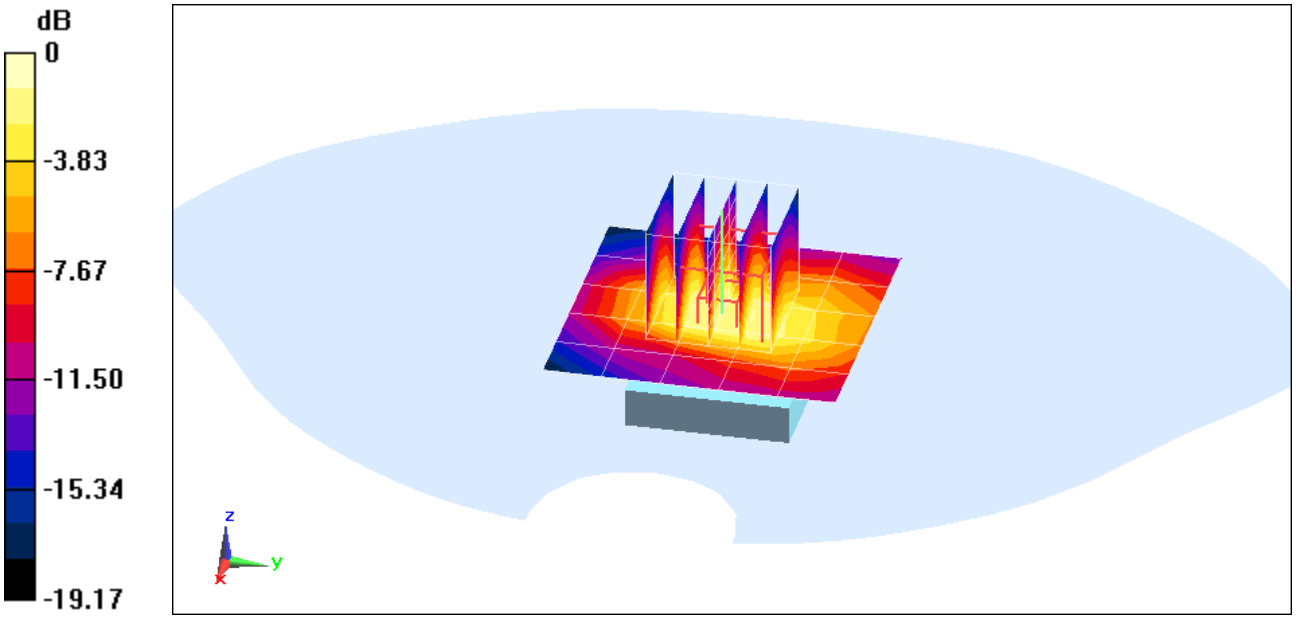
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.342 S/m; ε_r = 40.056; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 20.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3118; ConvF(5.21, 5.21, 5.21); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 4 (AWS), Head SAR, Front side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Stainless Steel, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.30 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.559 W/kg
SAR(1 g) = 0.348 W/kg



0 dB = 0.422 W/kg = -3.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R

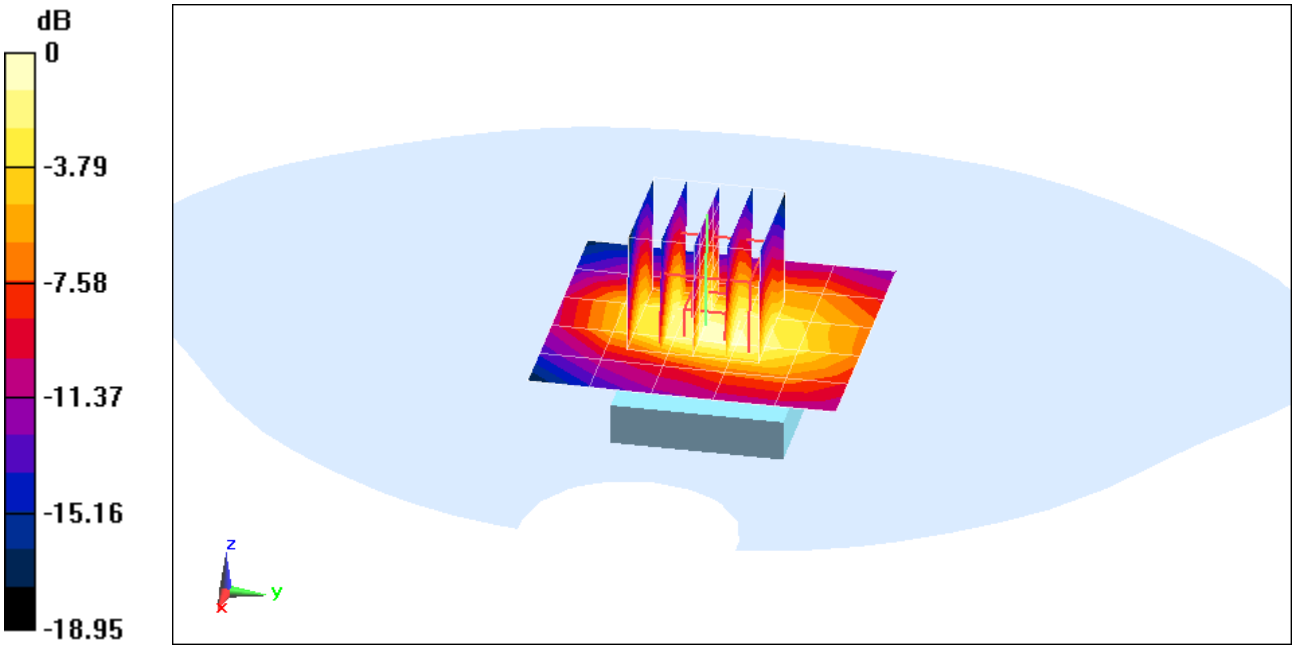
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1860 MHz; σ = 1.392 S/m; ε_r = 39.047; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-22-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3118; ConvF(5.05, 5.05, 5.05); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 25 (PCS), Head SAR, Front side, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.67 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.535 W/kg
SAR(1 g) = 0.337 W/kg



0 dB = 0.405 W/kg = -3.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79H

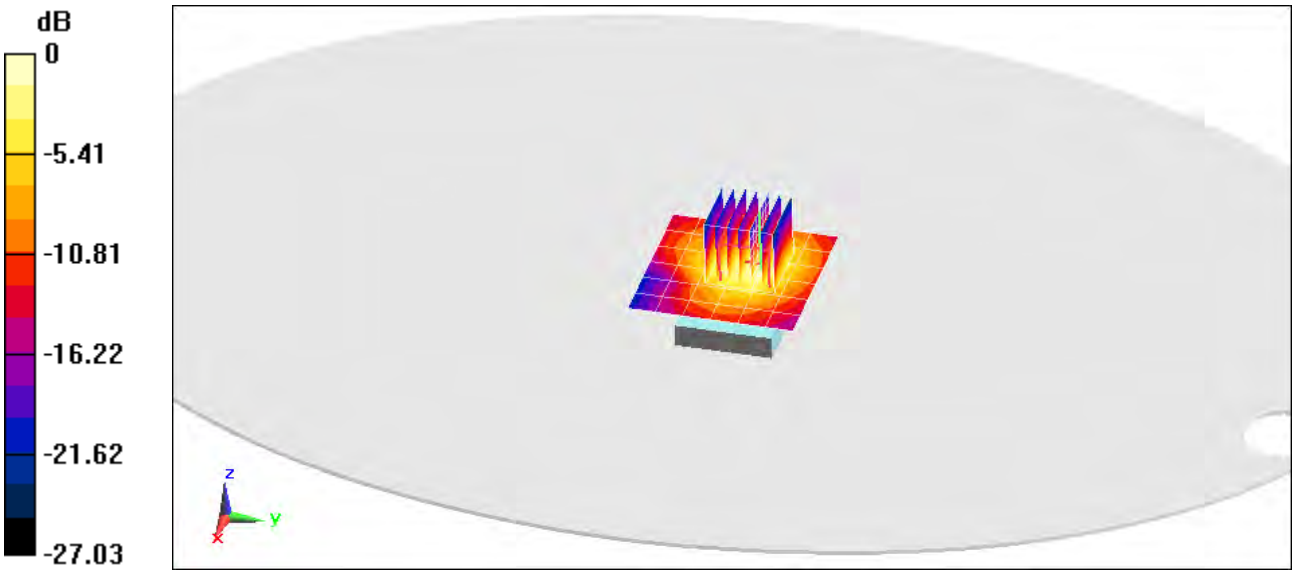
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Head Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.111 S/m; ε_r = 37.714; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3329; ConvF(4.54, 4.54, 4.54); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 41, Head SAR, Front side, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Stainless Steel, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.40 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.639 W/kg
SAR(1 g) = 0.296 W/kg



0 dB = 0.382 W/kg = -4.18 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J78X

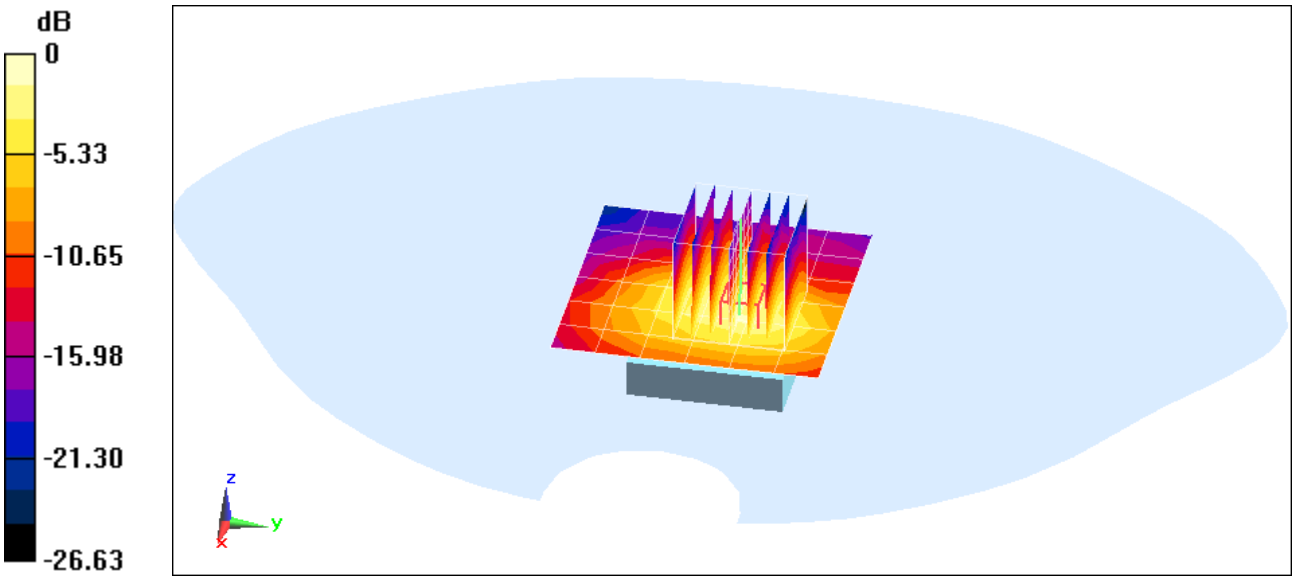
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.824 S/m; ε_r = 39.489; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3118; ConvF(4.37, 4.37, 4.37); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Head SAR, Ch 6, 1 Mbps, Front Side, Aluminum, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.12 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.325 W/kg
SAR(1 g) = 0.162 W/kg



0 dB = 0.207 W/kg = -6.84 dBW/kg

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

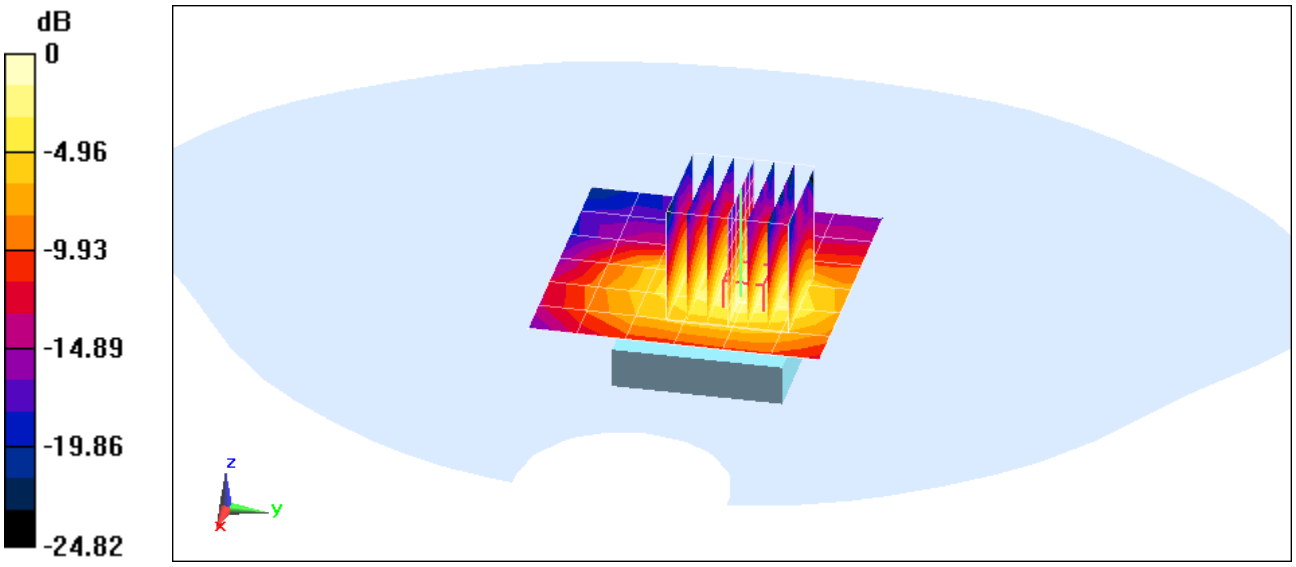
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.867 S/m; ε_r = 39.551; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3118; ConvF(4.37, 4.37, 4.37); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth (ePA), Head SAR, Ch 39, 1 Mbps, Front Side, Aluminum, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.906 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.262 W/kg
SAR(1 g) = 0.128 W/kg



0 dB = 0.165 W/kg = -7.83 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

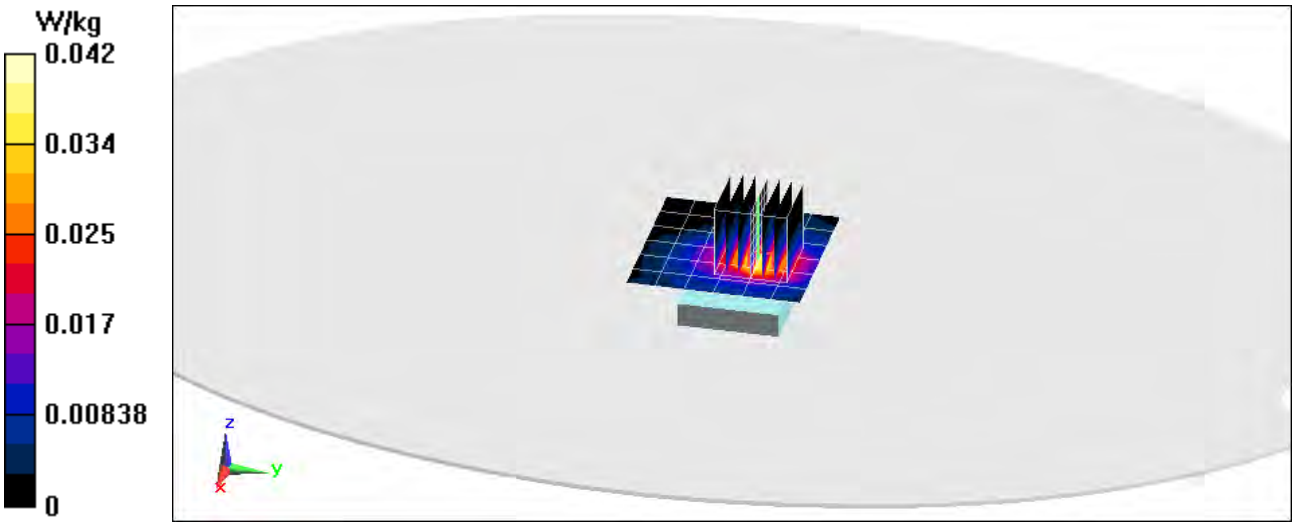
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.866 S/m; ε_r = 39.617; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-12-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3329; ConvF(4.71, 4.71, 4.71); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth (iPA), Head SAR, Ch 39, 1 Mbps, Front Side, Aluminum, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.467 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.0670 W/kg
SAR(1 g) = 0.033 W/kg



DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R

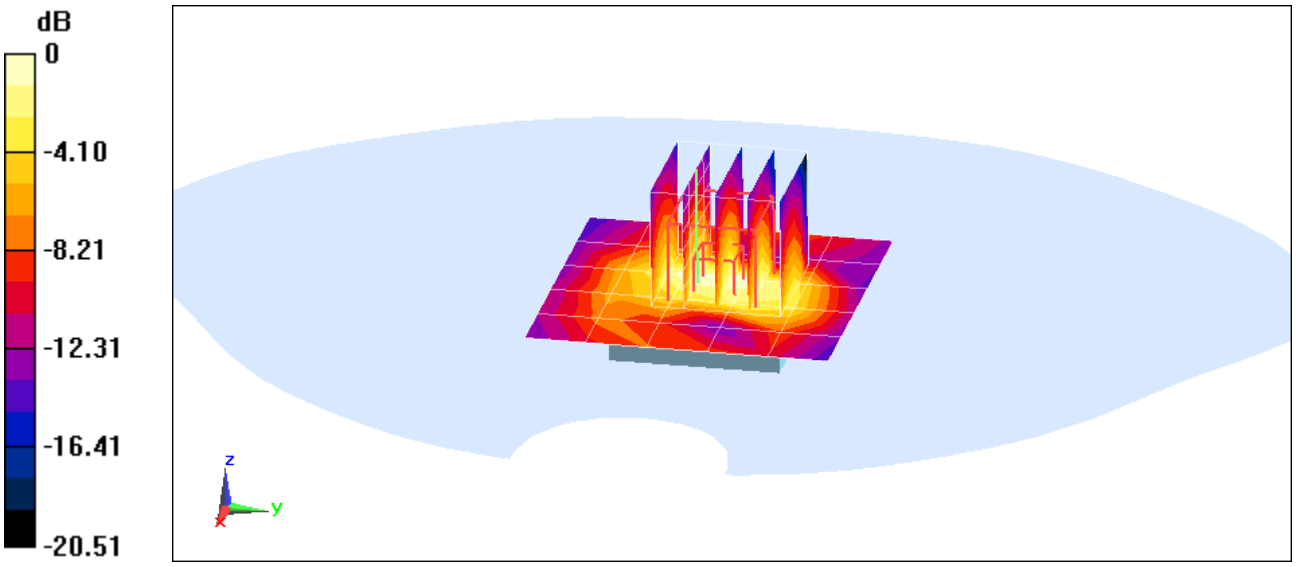
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.01 S/m; ε_r = 54.924; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(9.73, 9.73, 9.73); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 850, Extremity SAR, Back side, Mid.ch, Ceramic, Sport Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.525 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.0700 W/kg
SAR(10 g) = 0.021 W/kg



0 dB = 0.0555 W/kg = -12.56 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R

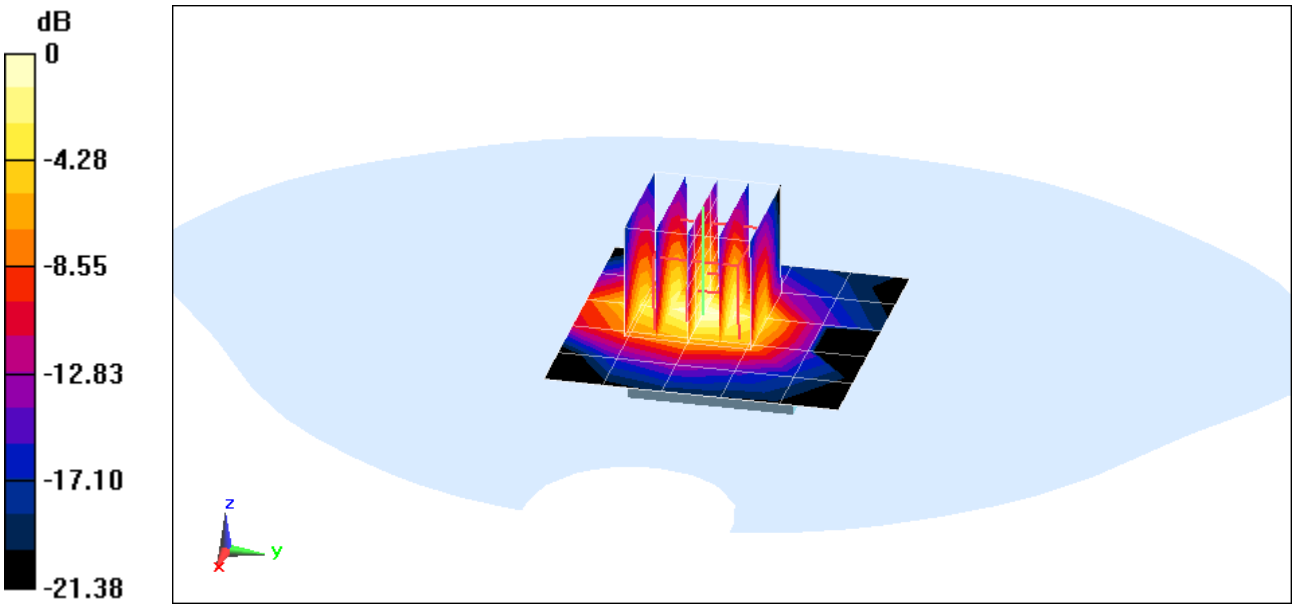
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.51 S/m; ε_r = 52.681; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-03-2017; Ambient Temp: 20.2°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7420; ConvF(8.05, 8.05, 8.05); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1750, Extremity SAR, Back side, Mid.ch, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.23 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.950 W/kg
SAR(10 g) = 0.273 W/kg



0 dB = 0.766 W/kg = -1.16 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT002J79R

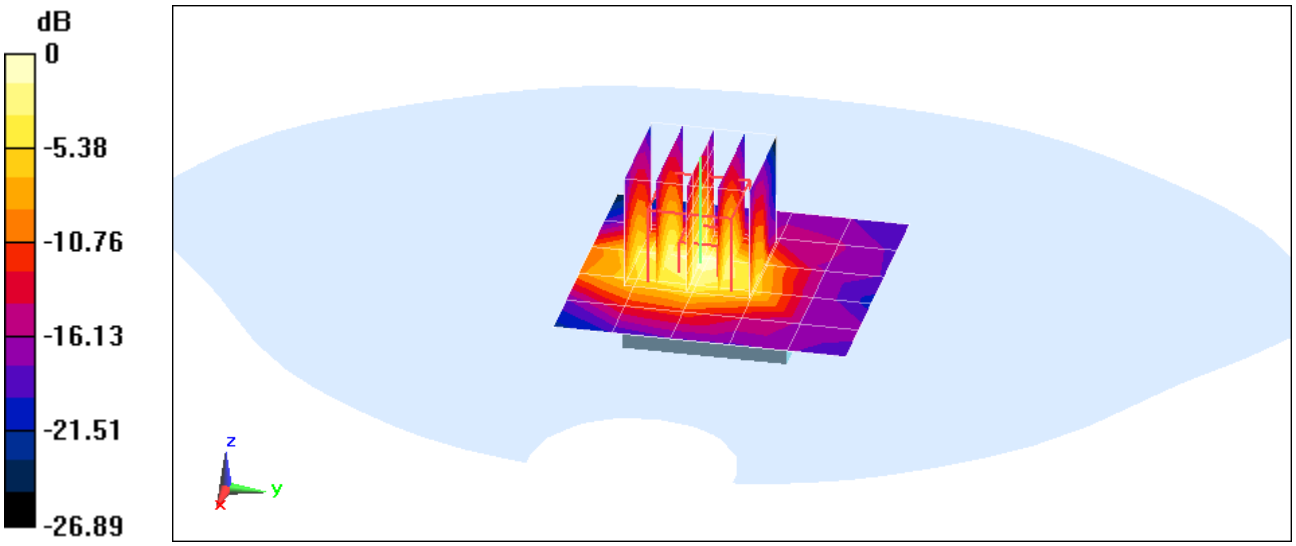
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.532 S/m; ε_r = 51.399; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-19-2017; Ambient Temp: 19.1°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(7.79, 7.79, 7.79); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Extremity SAR, Back side, Mid.ch, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.34 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.828 W/kg
SAR(10 g) = 0.211 W/kg



0 dB = 0.696 W/kg = -1.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R

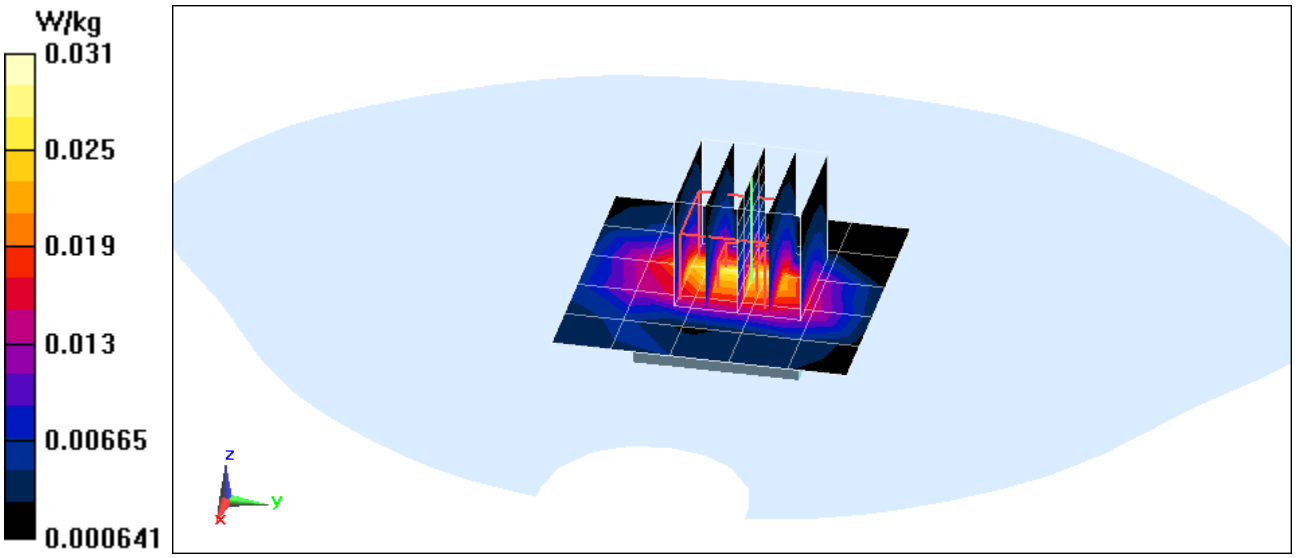
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.931 S/m; ε_r = 54.642; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-20-2017; Ambient Temp: 19.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3347; ConvF(6.47, 6.47, 6.47); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 12, Extremity SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.431 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.0420 W/kg
SAR(10 g) = 0.014 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT003J79R

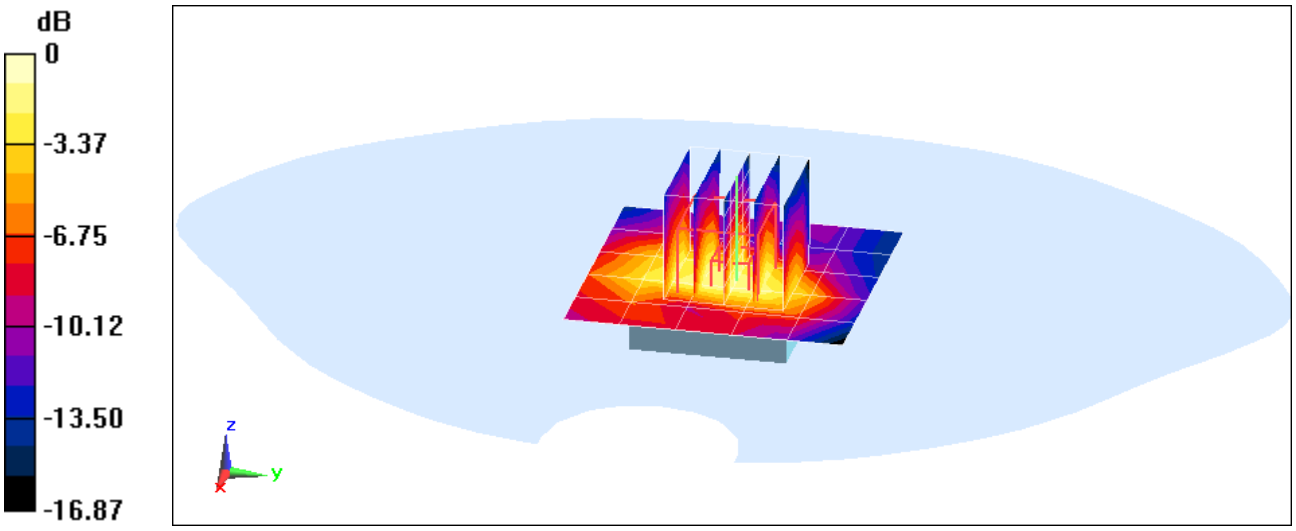
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 1.013 S/m; ε_r = 53.985; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-22-2017; Ambient Temp: 19.3°C; Tissue Temp: 20.2°C

Probe: ES3DV3 - SN3347; ConvF(6.47, 6.47, 6.47); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 13, Extremity SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.808 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.0540 W/kg
SAR(10 g) = 0.017 W/kg



0 dB = 0.0375 W/kg = -14.26 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R

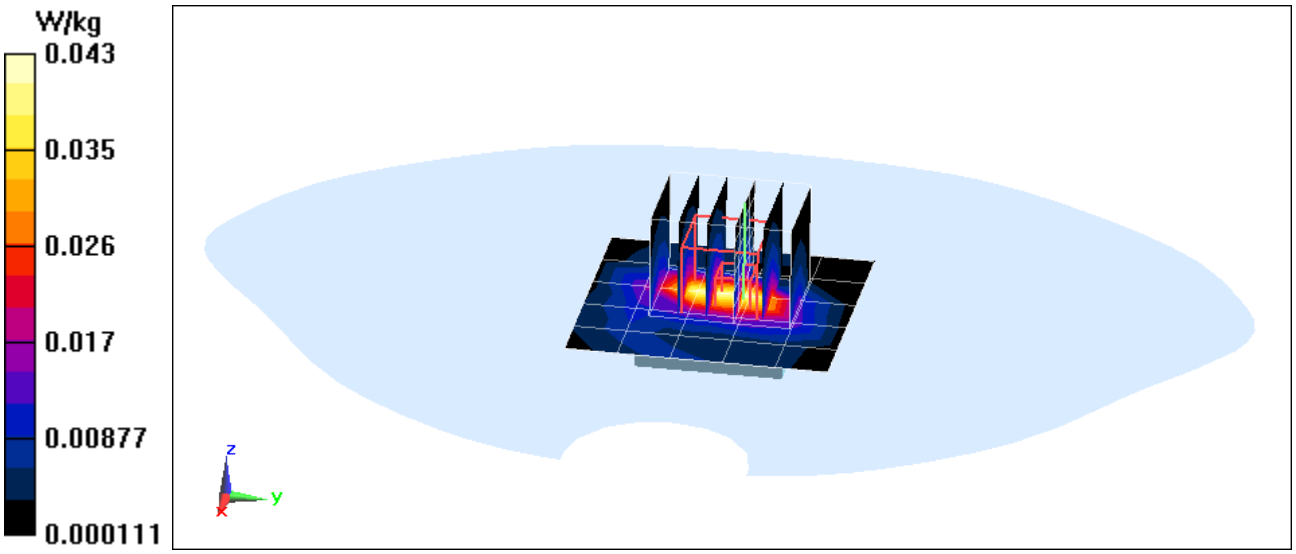
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 1.007 S/m; ε_r = 54.46; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-04-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(9.73, 9.73, 9.73); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 5 (Cell.), Extremity SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.737 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.0520 W/kg
SAR(10 g) = 0.015 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT001J79R

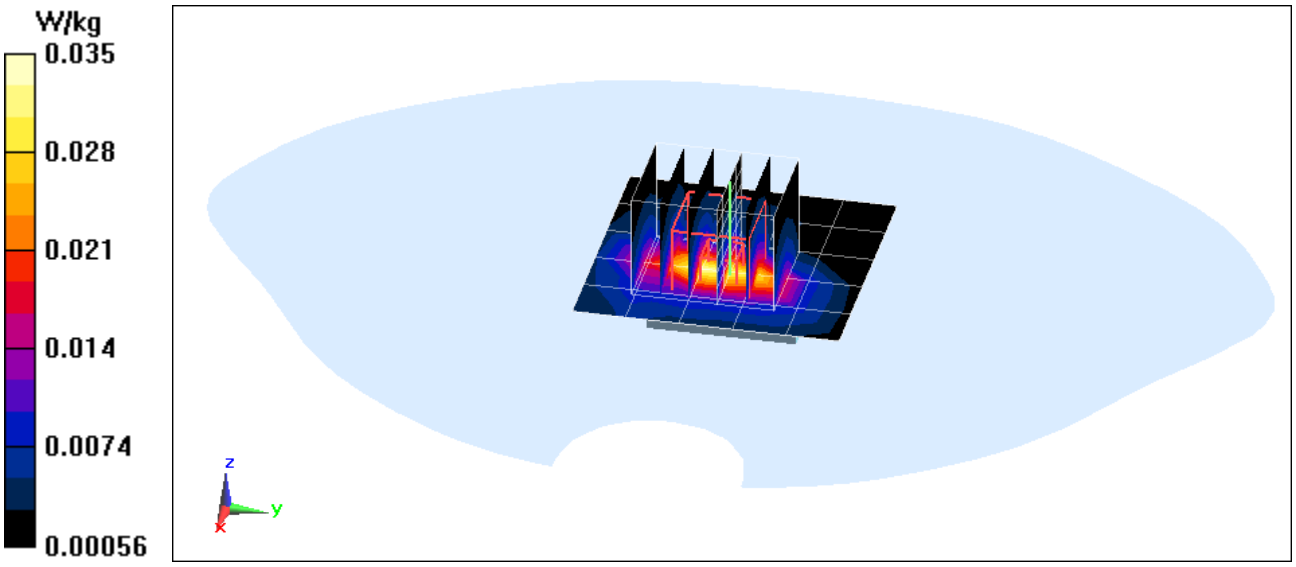
Communication System: UID 0, LTE Band 26; Frequency: 819 MHz; Duty Cycle: 1:1
Medium: 850 Body Medium parameters used (interpolated):
f = 819 MHz; σ = 0.974 S/m; ε_r = 55.577; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-21-2017; Ambient Temp: 19.9°C; Tissue Temp: 19.4°C

Probe: ES3DV3 - SN3329; ConvF(6.32, 6.32, 6.32); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 26 (Cell.), Extremity SAR, Back side, Low.ch, 10 MHz Bandwidth, QPSK, 1 RB,49 RB Offset, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.666 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.0500 W/kg
SAR(10 g) = 0.014 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT003J79R

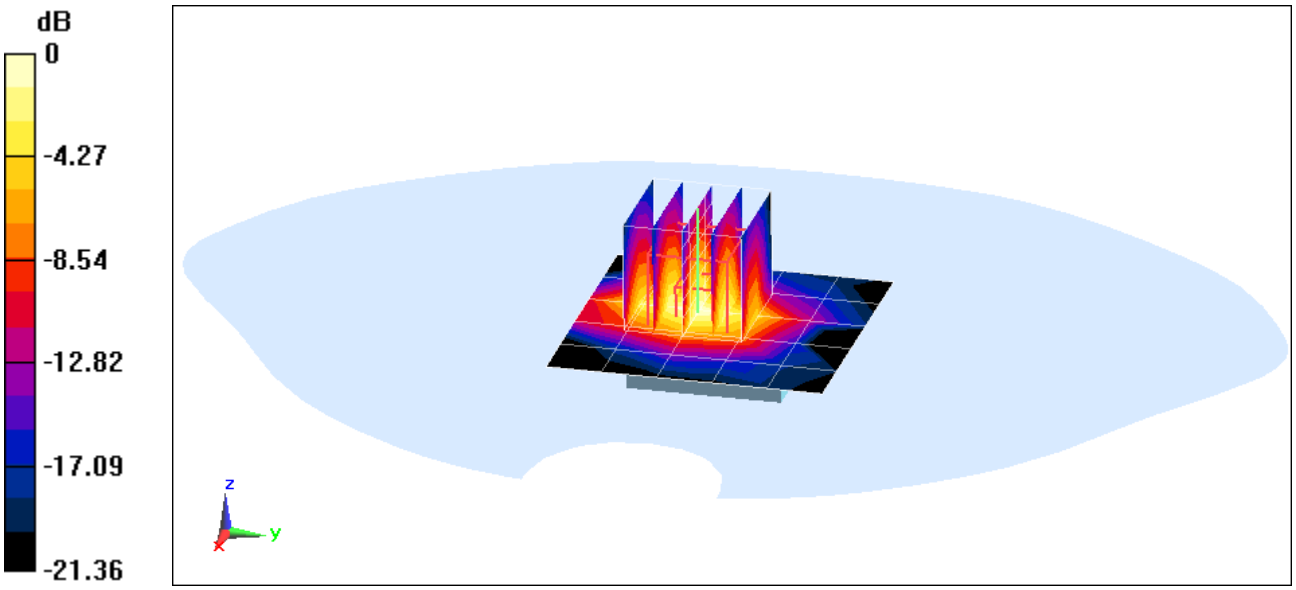
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.511 S/m; ε_r = 52.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-03-2017; Ambient Temp: 20.2°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7420; ConvF(8.05, 8.05, 8.05); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 4 (AWS), Extremity SAR, Back side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Ceramic, Metal Loop Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.59 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(10 g) = 0.292 W/kg



0 dB = 0.885 W/kg = -0.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J79R

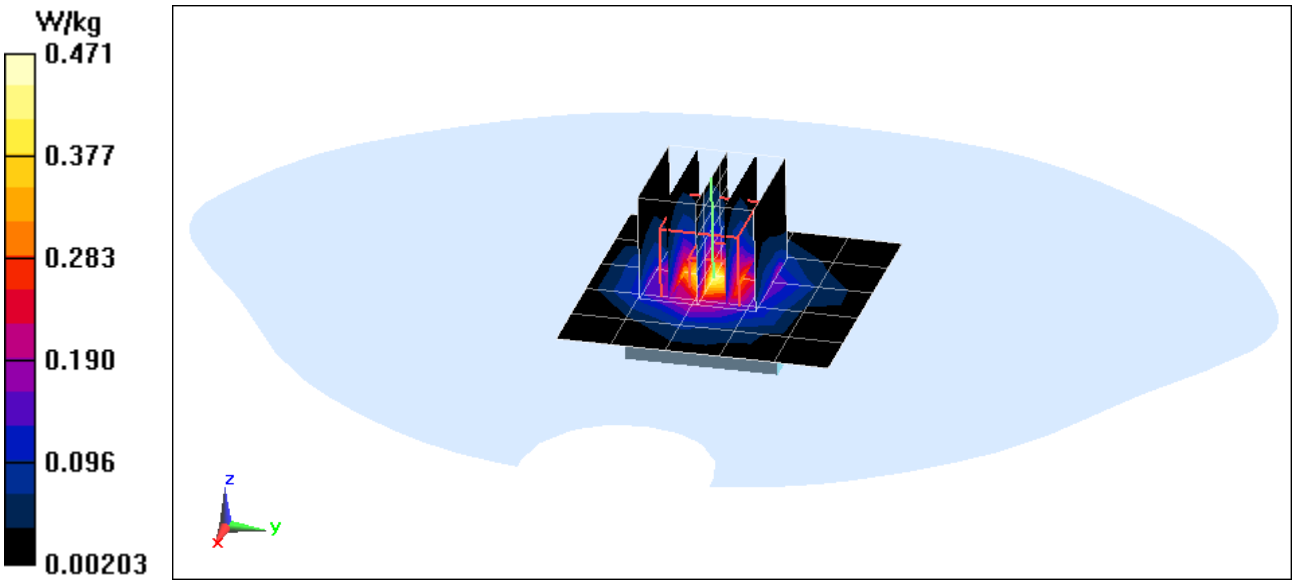
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1860 MHz; σ = 1.512 S/m; ε_r = 51.479; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-19-2017; Ambient Temp: 19.1°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(7.79, 7.79, 7.79); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 25 (PCS), Extremity SAR, Back side, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Ceramic, Sport Wristband

Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.72 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.550 W/kg
SAR(10 g) = 0.165 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

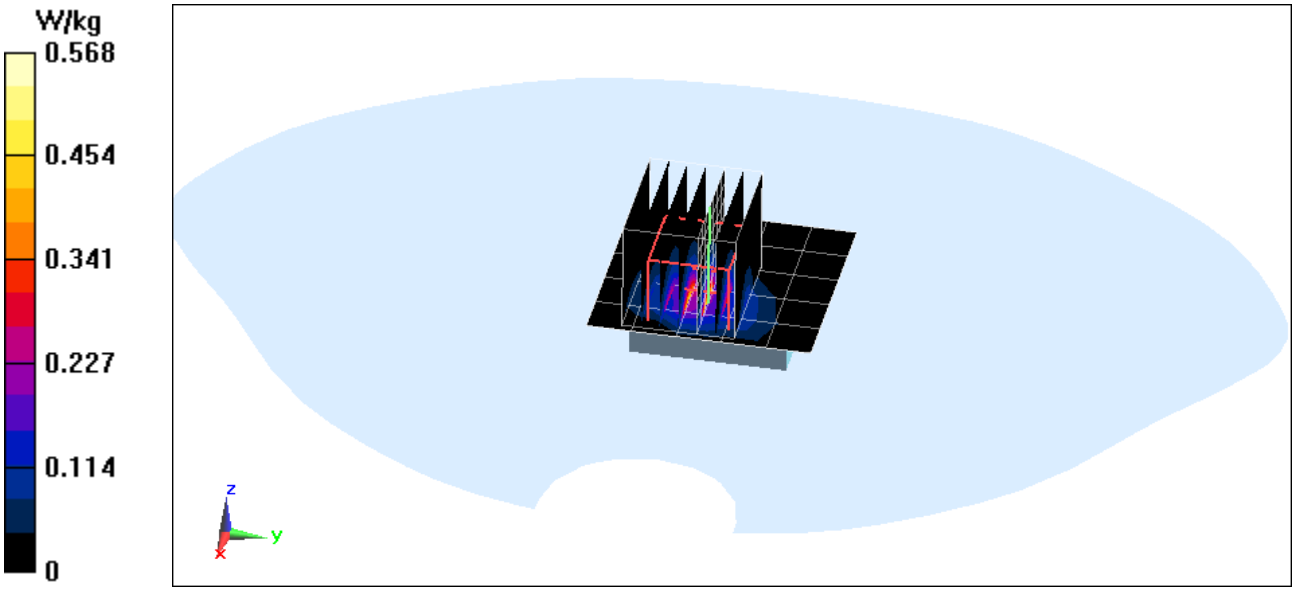
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.275 S/m; ε_r = 50.813; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3329; ConvF(4.34, 4.34, 4.34); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 41, Extremity SAR, Back side, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset, Aluminum, Sport Wristband

Area Scan (6x6x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.66 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.934 W/kg
SAR(10 g) = 0.147 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT009J78C

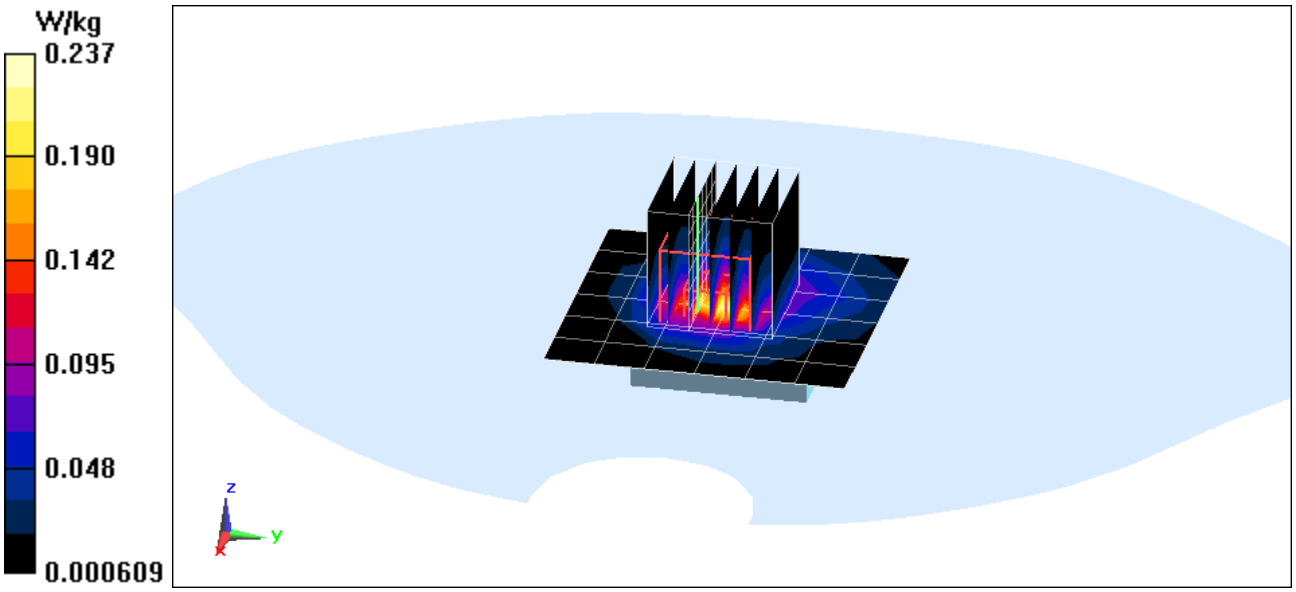
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 2.005 S/m; ε_r = 52.226; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-29-2017; Ambient Temp: 19.7°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3347; ConvF(4.53, 4.53, 4.53); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Extremity SAR, Ch 6, 1 Mbps, Back Side, Aluminum, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.31 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.376 W/kg
SAR(10 g) = 0.081 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: BCG-A1861; Type: Watch; Serial: FH7TT00GJ78M

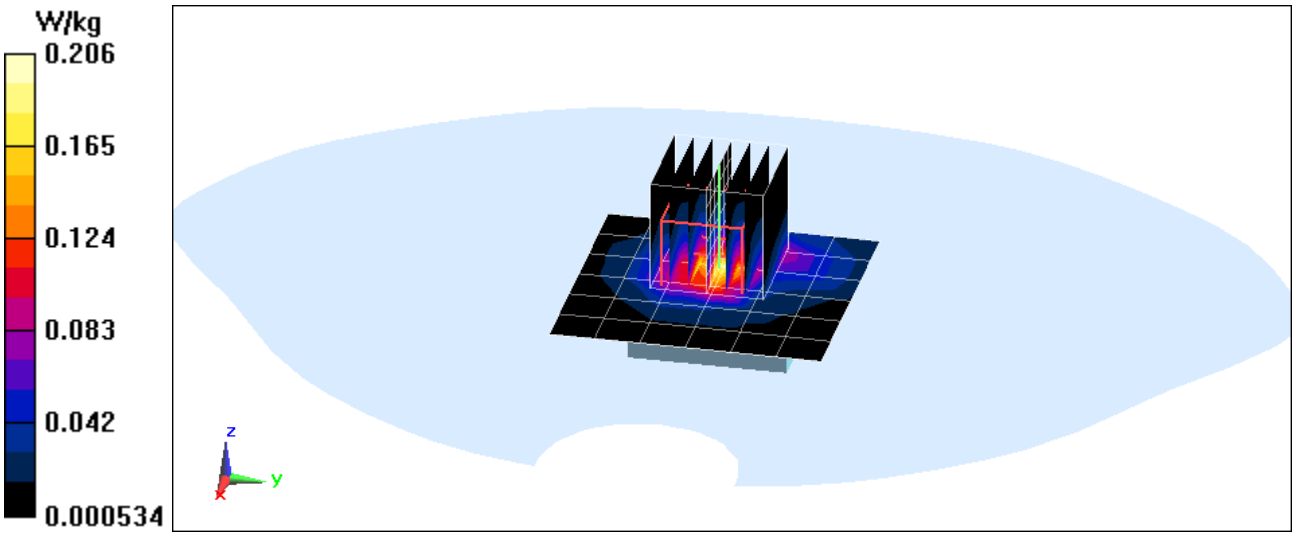
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 2.027 S/m; ε_r = 50.79; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-06-2017; Ambient Temp: 20.8°C; Tissue Temp: 20.8°C

Probe: ES3DV3 - SN3347; ConvF(4.53, 4.53, 4.53); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth (ePA), Extremity SAR, Ch 39, 1 Mbps, Back Side, Aluminum, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.705 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.304 W/kg
SAR(10 g) = 0.069 W/kg



DUT: BCG-A1861; Type: Watch; Serial: FH7TT004J78X

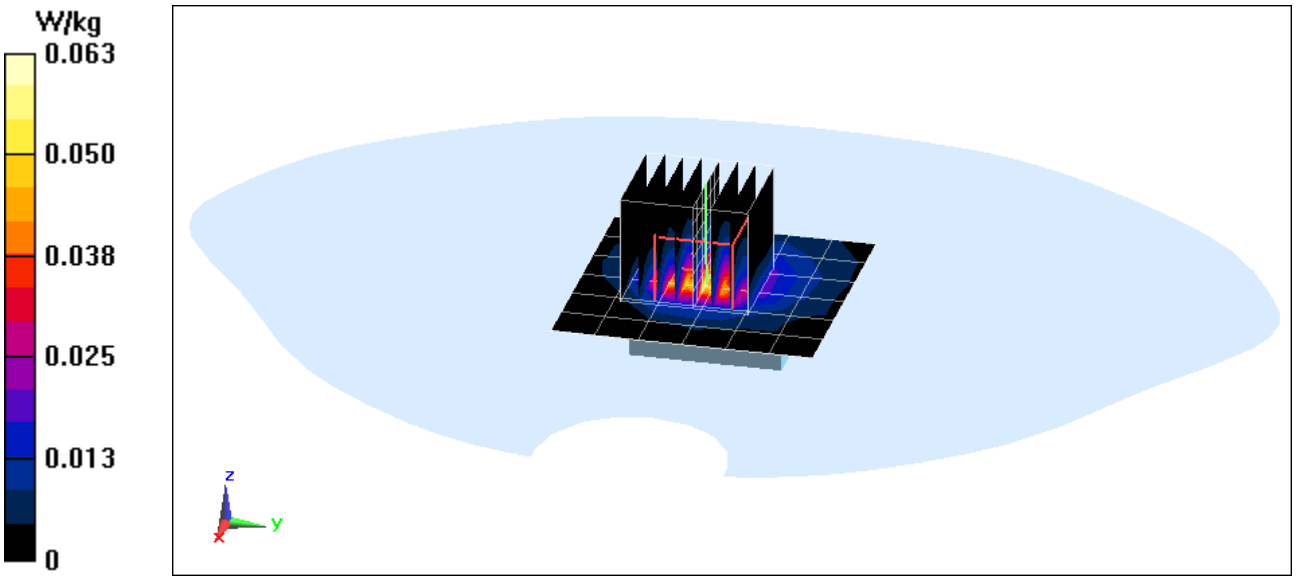
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.956 S/m; ε_r = 51.433; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3118; ConvF(4.29, 4.29, 4.29); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth (iPA), Extremity SAR, Ch 39, 1 Mbps, Back Side, Aluminum, Sport Wristband

Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.338 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.0950 W/kg
SAR(10 g) = 0.019 W/kg



APPENDIX B: SYSTEM VERIFICATION

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PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1097

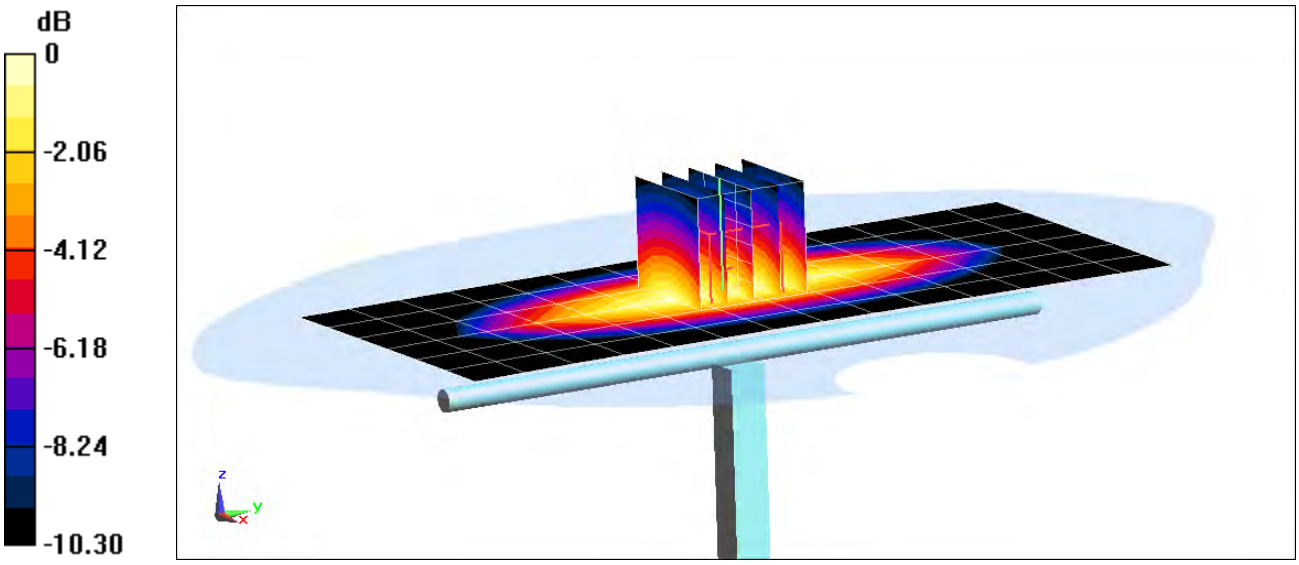
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; σ = 0.892 S/m; ε_r = 40.869; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-26-2017; Ambient Temp: 19.1°C; Tissue Temp: 19.6°C

Probe: ES3DV3 - SN3347; ConvF(6.75, 6.75, 6.75); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.48 W/kg
SAR(1 g) = 1.69 W/kg
Deviation(1 g) = 2.80%



0 dB = 1.98 W/kg = 2.97 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 850 MHz; Type: D850V2; Serial: 1009

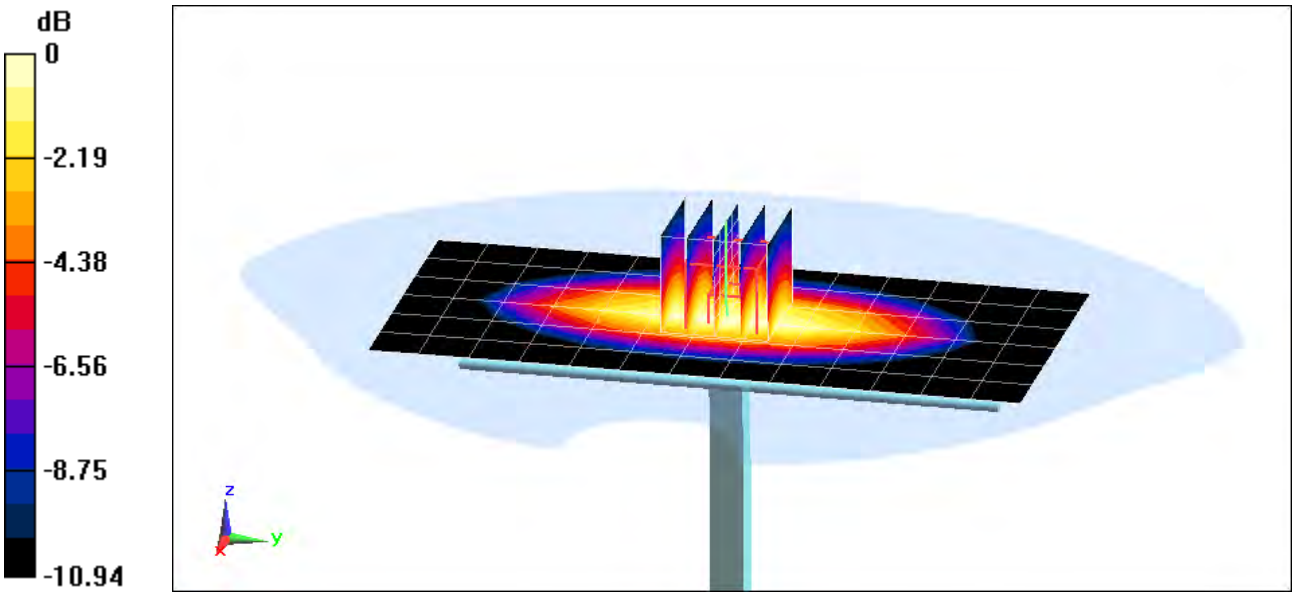
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used:
f = 850 MHz; σ = 0.925 S/m; ε_r = 40.766; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-26-2017; Ambient Temp: 19.5°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7420; ConvF(10.1, 10.1, 10.1); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

850 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.12 W/kg
Deviation(1 g) = 4.95%



0 dB = 2.85 W/kg = 4.55 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 850 MHz; Type: D850V2; Serial: 1010

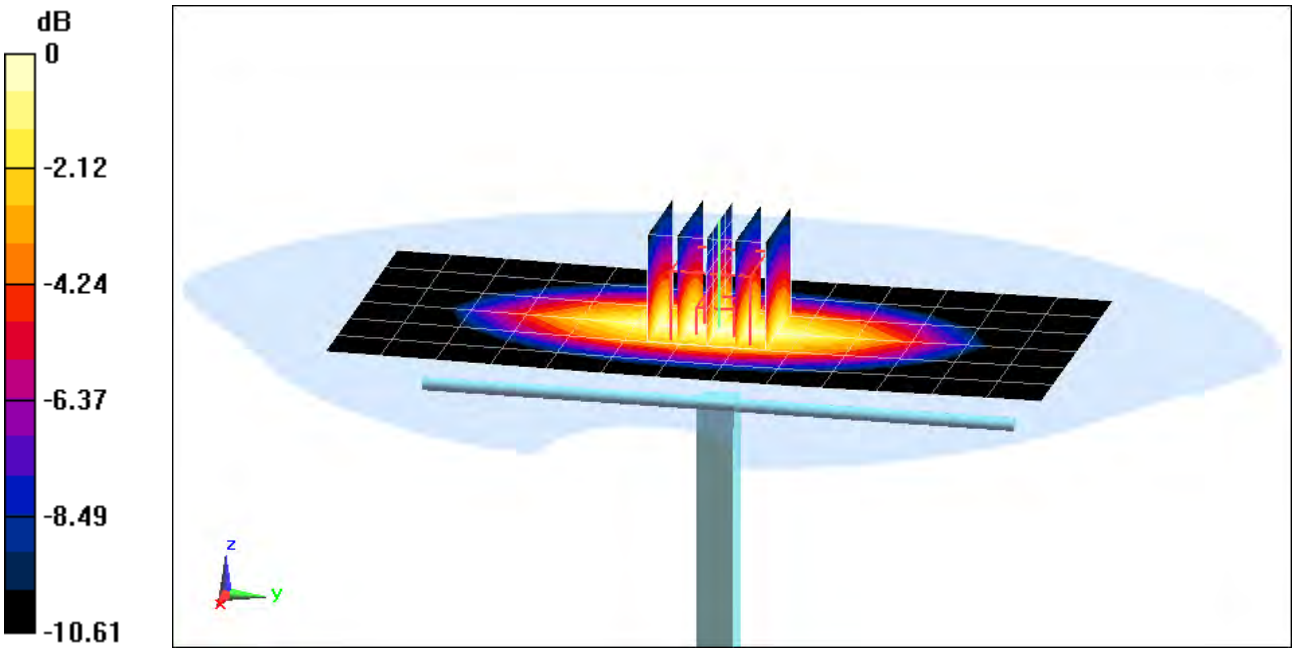
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Head Medium parameters used:
f = 850 MHz; σ = 0.941 S/m; ε_r = 42.055; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-10-2017; Ambient Temp: 22.0°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3118; ConvF(6.32, 6.32, 6.32); Calibrated: 3/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 3/8/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

850 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.09 W/kg
Deviation(1 g) = 7.95%



0 dB = 2.46 W/kg = 3.91 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1104

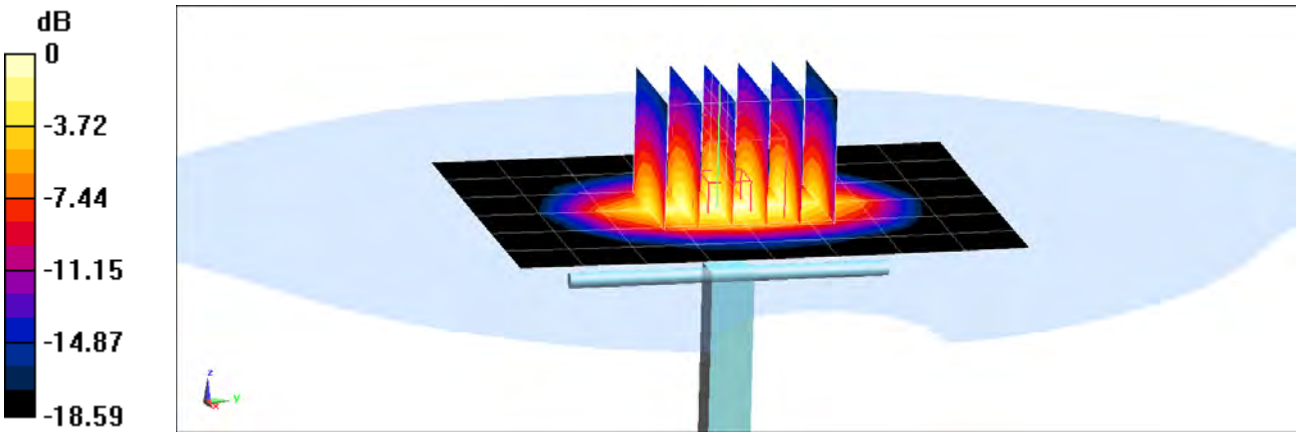
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.357 S/m; ε_r = 39.986; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2017; Ambient Temp: 20.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3118; ConvF(5.21, 5.21, 5.21); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.52 W/kg
SAR(1 g) = 3.57 W/kg
Deviation(1 g) = -0.83%



0 dB = 4.44 W/kg = 6.47 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1104

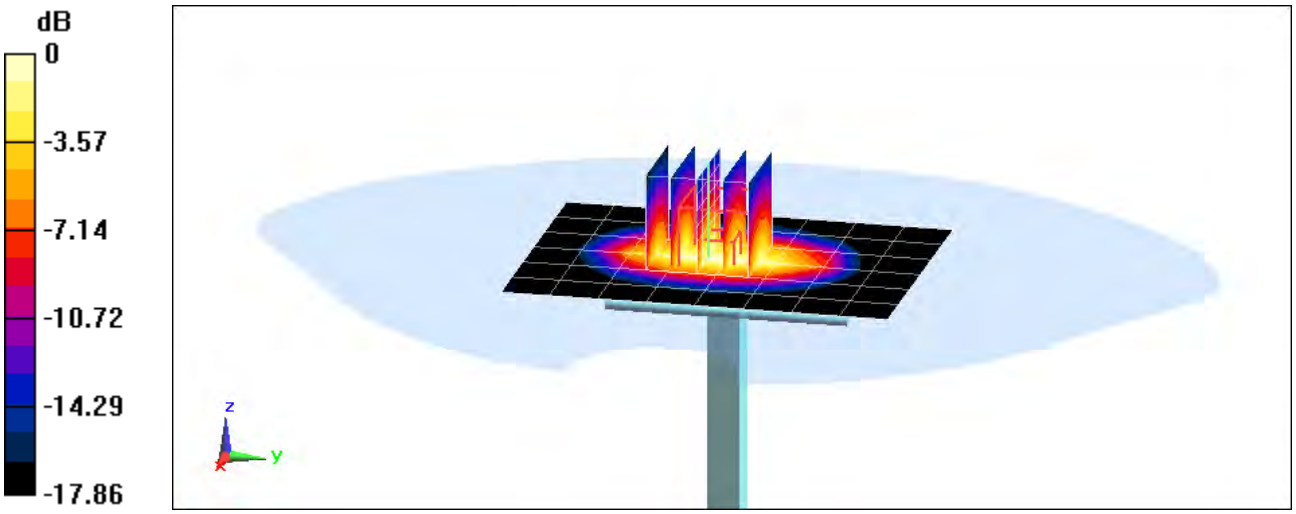
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.364 S/m; ε_r = 38.813; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.5°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3347; ConvF(5.43, 5.43, 5.43); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.21 W/kg
SAR(1 g) = 3.43 W/kg
Deviation(1 g) = -4.72%



0 dB = 4.27 W/kg = 6.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181

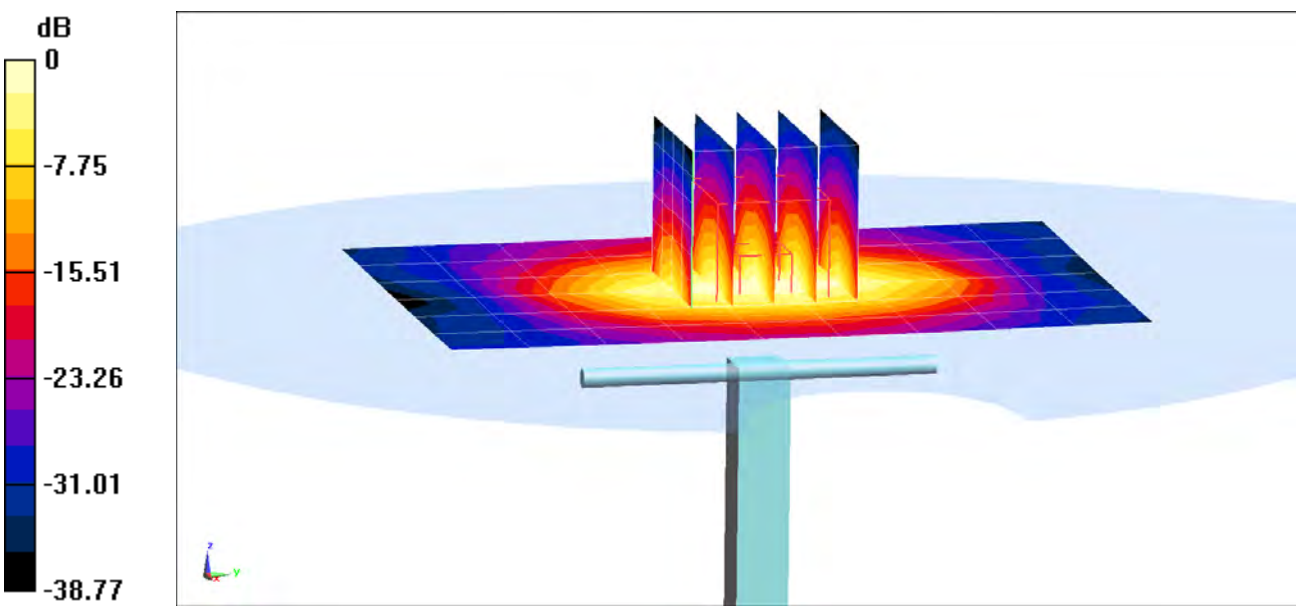
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.439 S/m; ε_r = 38.681; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-22-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3118; ConvF(5.05, 5.05, 5.05); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.93 W/kg
SAR(1 g) = 4.17 W/kg
Deviation(1 g) = 5.04%



0 dB = 5.57 W/kg = 7.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181

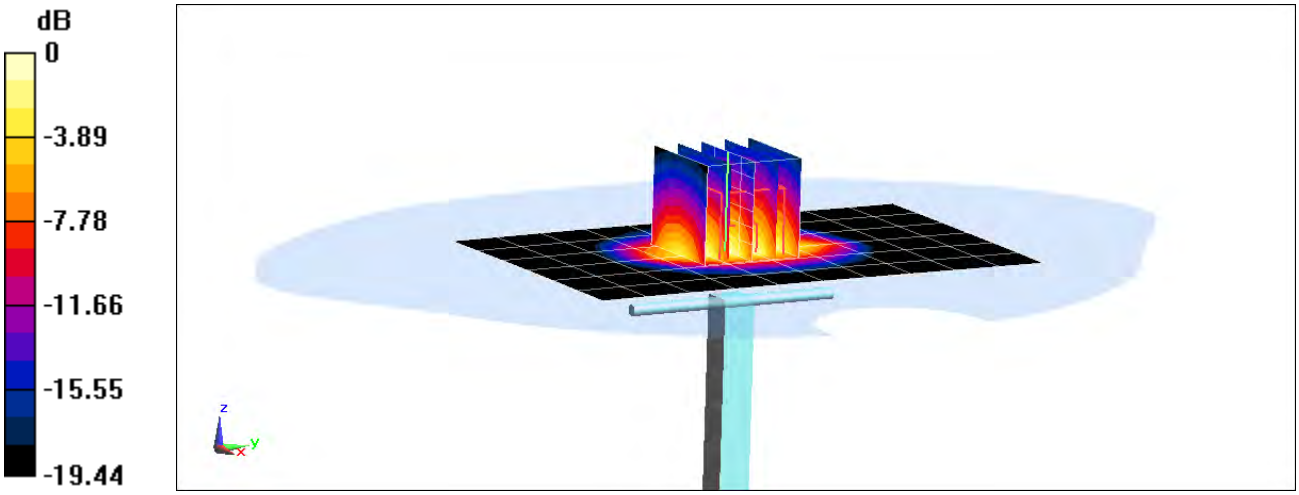
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.415 S/m; ε_r = 39.984; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 20.3°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7420; ConvF(8.17, 8.17, 8.17); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 09/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 8.20 W/kg
SAR(1 g) = 4.21 W/kg
Deviation(1 g) = 6.05%



0 dB = 6.64 W/kg = 8.22 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

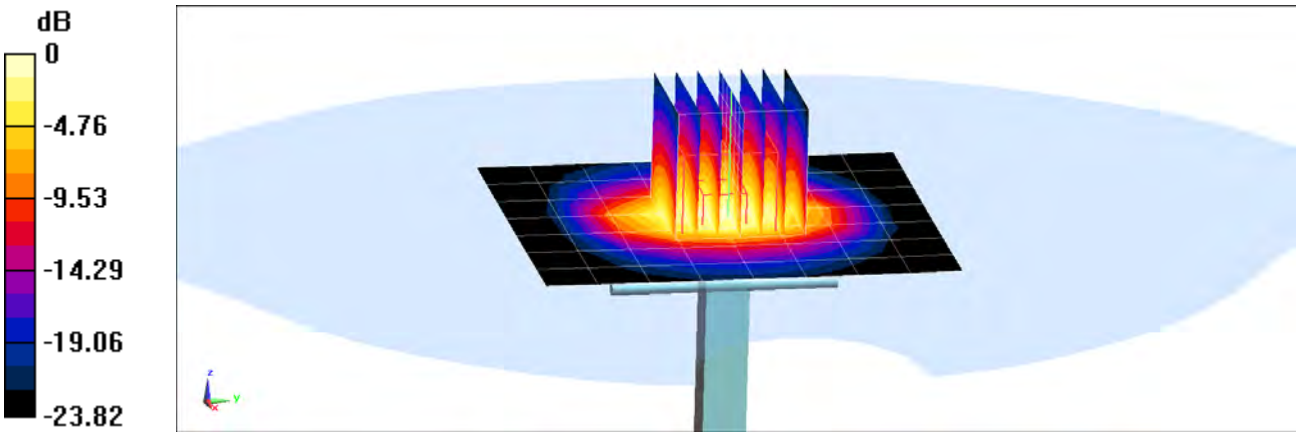
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.877 S/m; ε_r = 39.507; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3118; ConvF(4.37, 4.37, 4.37); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
SAR(1 g) = 5.27 W/kg
Deviation(1 g) = 1.15%



0 dB = 6.99 W/kg = 8.44 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

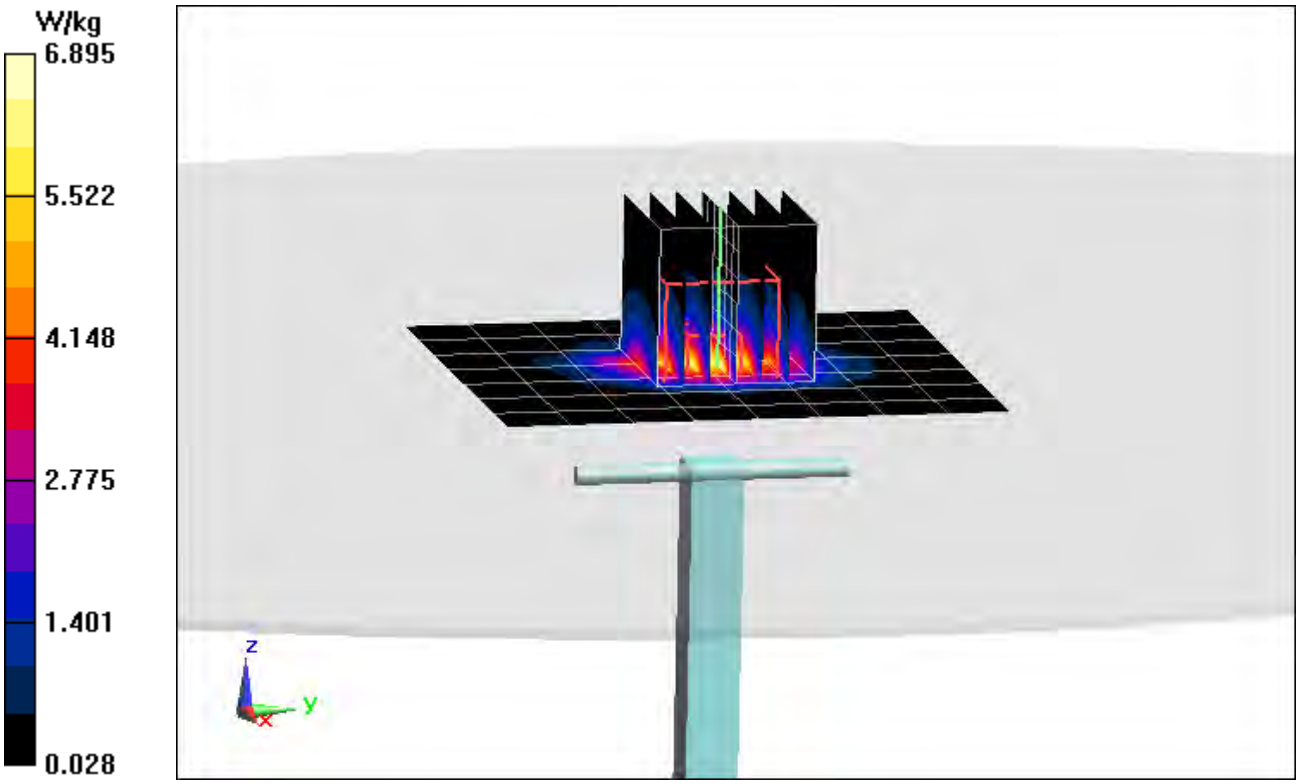
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.875 S/m; ε_r = 39.584; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-12-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3329; ConvF(4.71, 4.71, 4.71); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 03/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.22 W/kg
Deviation(1 g) = 0.19%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1069

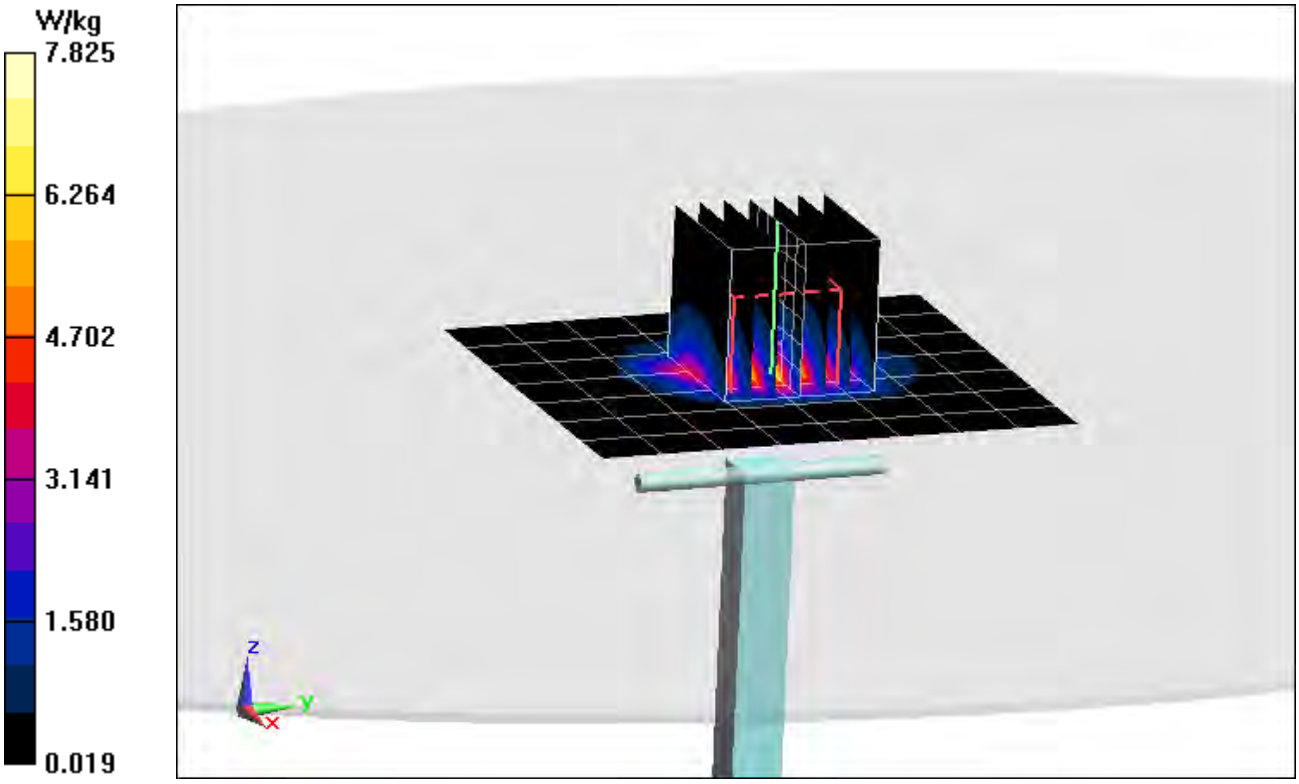
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Head Medium parameters used:
f = 2600 MHz; σ = 2.017 S/m; ε_r = 38.071; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3329; ConvF(4.54, 4.54, 4.54); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 03/10/2017
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2003
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 13.3 W/kg
SAR(1 g) = 6.07 W/kg
Deviation(1 g) = 7.82%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1097

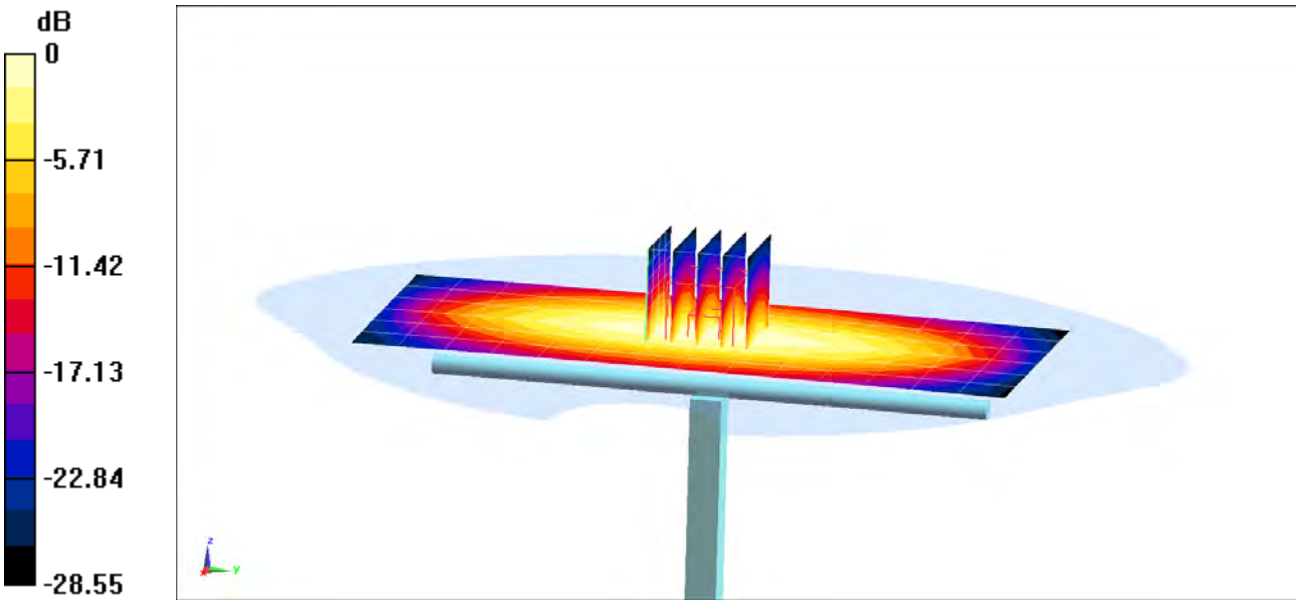
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.972 S/m; ε_r = 54.091; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-20-2017; Ambient Temp: 19.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3347; ConvF(6.47, 6.47, 6.47); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.51 W/kg
SAR(10 g) = 1.15 W/kg
Deviation(10 g) = 1.05%



0 dB = 2.01 W/kg = 3.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 850 MHz; Type: D850V2; Serial: 1009

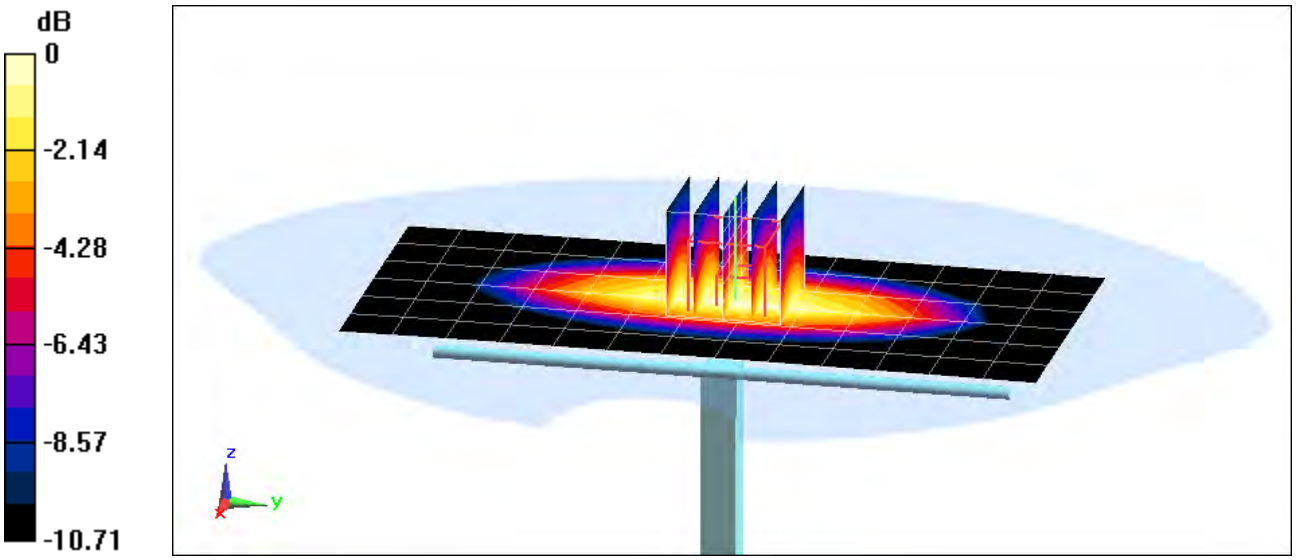
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Body Medium parameters used:
f = 850 MHz; σ = 1.023 S/m; ε_r = 54.779; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(9.73, 9.73, 9.73); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

850 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.20 W/kg
SAR(10 g) = 1.37 W/kg
Deviation(10 g) = 6.53%



0 dB = 2.82 W/kg = 4.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 850 MHz; Type: D850V2; Serial: 1010

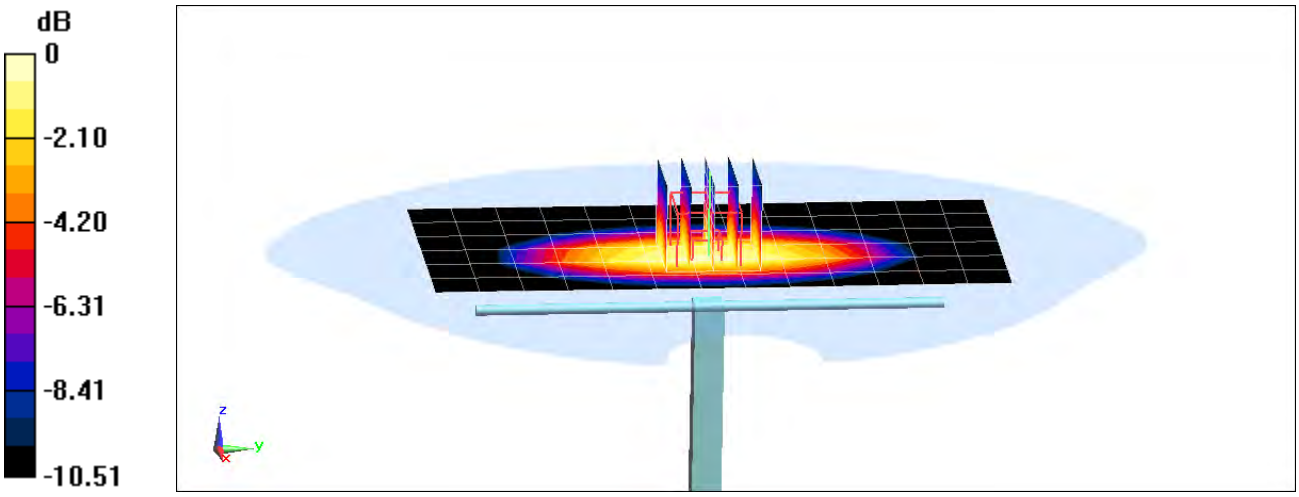
Communication System: UID 0, CW; Frequency: 850 MHz; Duty Cycle: 1:1
Medium: 850 Body Medium parameters used:
f = 850 MHz; σ = 1.014 S/m; ε_r = 55.089; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-21-2017; Ambient Temp: 19.9°C; Tissue Temp: 19.4°C

Probe: ES3DV3 - SN3329; ConvF(6.32, 6.32, 6.32); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 3/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

850 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.08 W/kg
SAR(10 g) = 1.38 W/kg
Deviation(10 g) = 5.02%



0 dB = 2.46 W/kg = 3.91 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1104

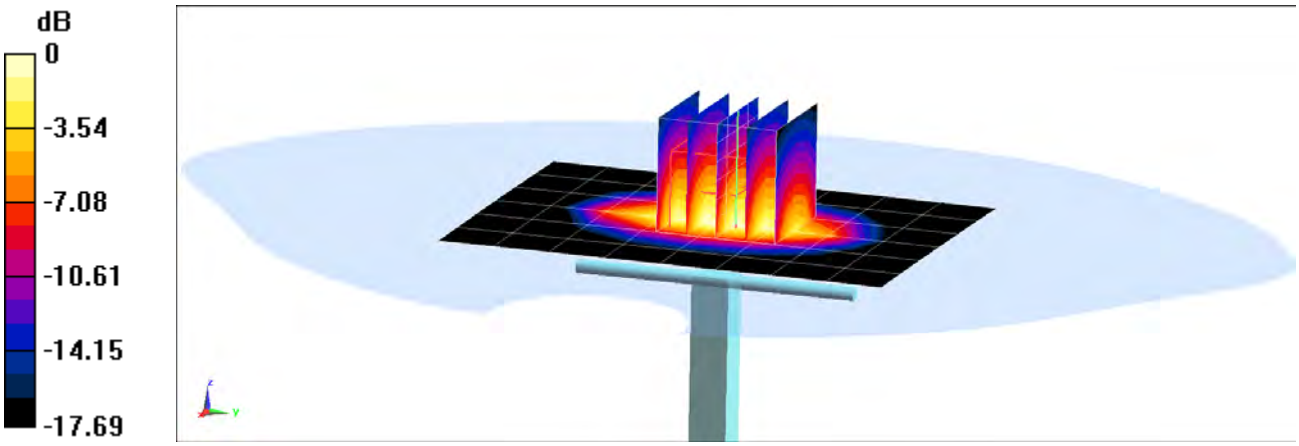
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.532 S/m; ε_r = 52.612; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2017; Ambient Temp: 20.2°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7420; ConvF(8.05, 8.05, 8.05); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.81 W/kg
SAR(10 g) = 1.95 W/kg
Deviation(10 g) = 1.04%



0 dB = 5.60 W/kg = 7.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d181

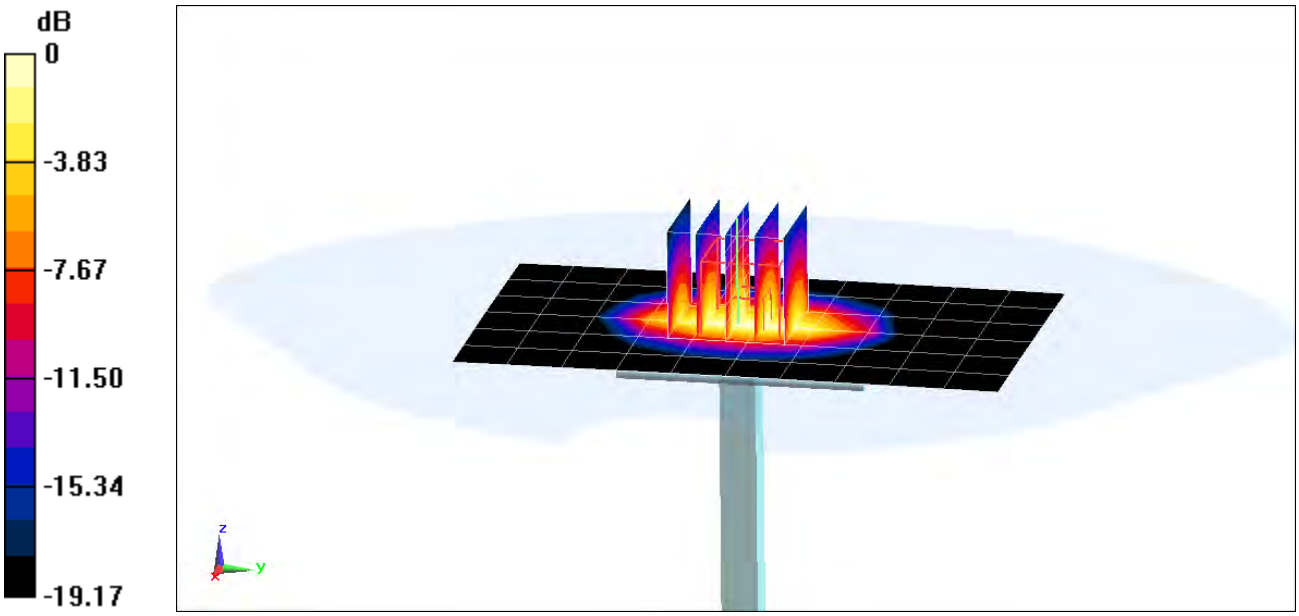
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.553 S/m; ε_r = 51.337; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-19-2017; Ambient Temp: 19.1°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7420; ConvF(7.79, 7.79, 7.79); Calibrated: 11/15/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1449; Calibrated: 9/21/2016
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1793
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.48 W/kg
SAR(10 g) = 2.04 W/kg
Deviation(10 g) = -2.39%



0 dB = 6.14 W/kg = 7.88 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

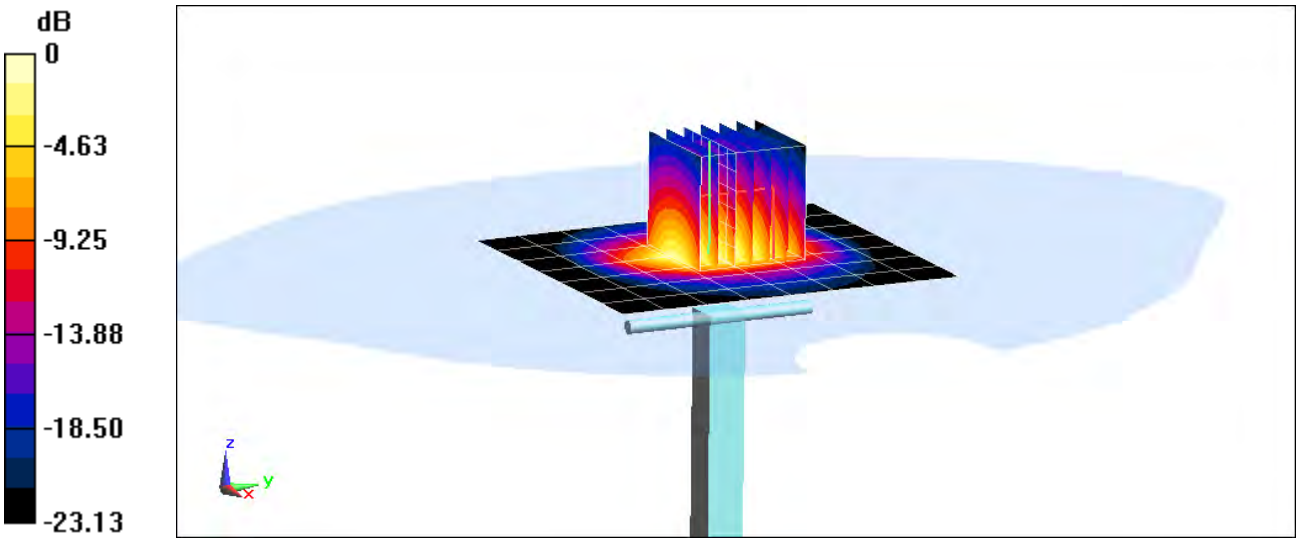
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.023 S/m; ε_r = 52.166; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-29-2017; Ambient Temp: 19.7°C; Tissue Temp: 20.4°C

Probe: ES3DV3 - SN3347; ConvF(4.53, 4.53, 4.53); Calibrated: 11/11/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 11/15/2016
Phantom: SAM with CRP; Type: SAM; Serial: TP:1792
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.8 W/kg
SAR(10 g) = 2.26 W/kg
Deviation(10 g) = -5.83%



0 dB = 6.60 W/kg = 8.20 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

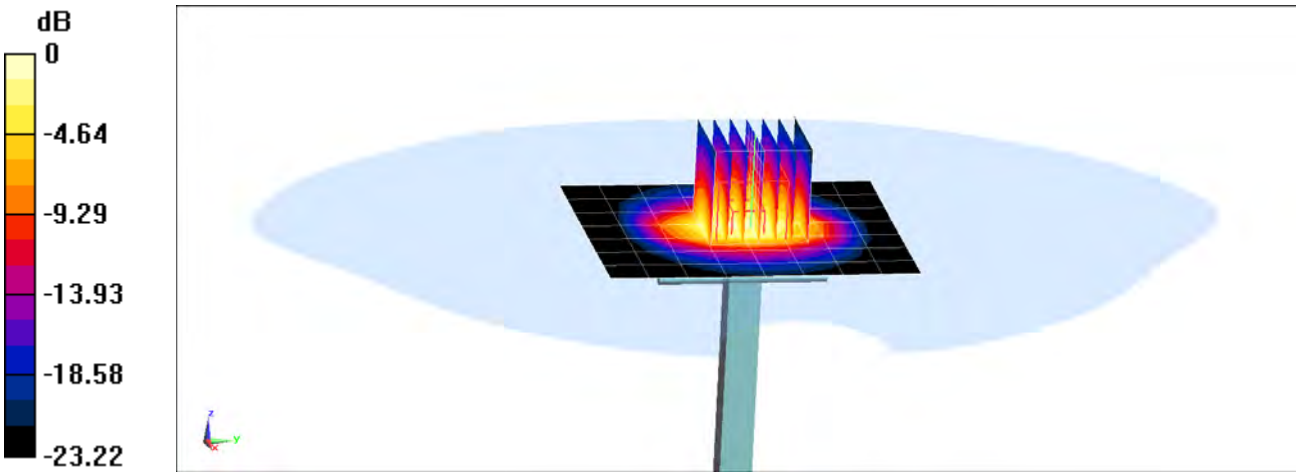
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.967 S/m; ε_r = 51.397; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-13-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3118; ConvF(4.29, 4.29, 4.29); Calibrated: 03/16/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 03/08/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1868
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.8 W/kg
SAR(10 g) = 2.45 W/kg
Deviation(10 g) = 2.08%



0 dB = 7.12 W/kg = 8.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1069

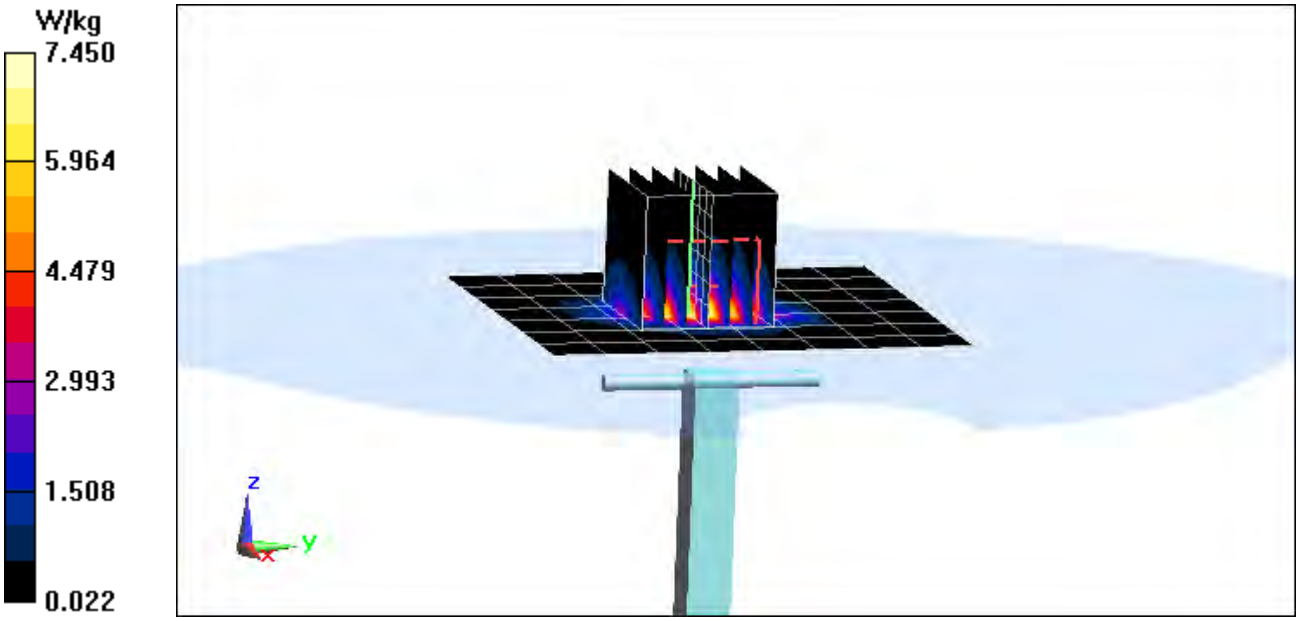
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; σ = 2.164 S/m; ε_r = 51.094; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-21-2017; Ambient Temp: 20.0°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3329; ConvF(4.34, 4.34, 4.34); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1403; Calibrated: 03/10/2017
Phantom: SAM with CRP v5.0; Type: QD000P40CD; Serial: TP:1873
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.7 W/kg
SAR(10 g) = 2.44 W/kg
Deviation(10 g) = -2.40%



APPENDIX C: PROBE CALIBRATION

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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 0108

Client **PC Test**

Certificate No: D750V3-1097_Sep16

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1097
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 19, 2016

BNV
09-28-2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: September 19, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	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	41.0 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.22 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.39 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	55.9 ± 6 %	0.97 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.63 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.69 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5 Ω - 0.9 jΩ
Return Loss	- 27.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.9 Ω - 2.4 jΩ
Return Loss	- 32.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.030 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	July 05, 2013

DASY5 Validation Report for Head TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097

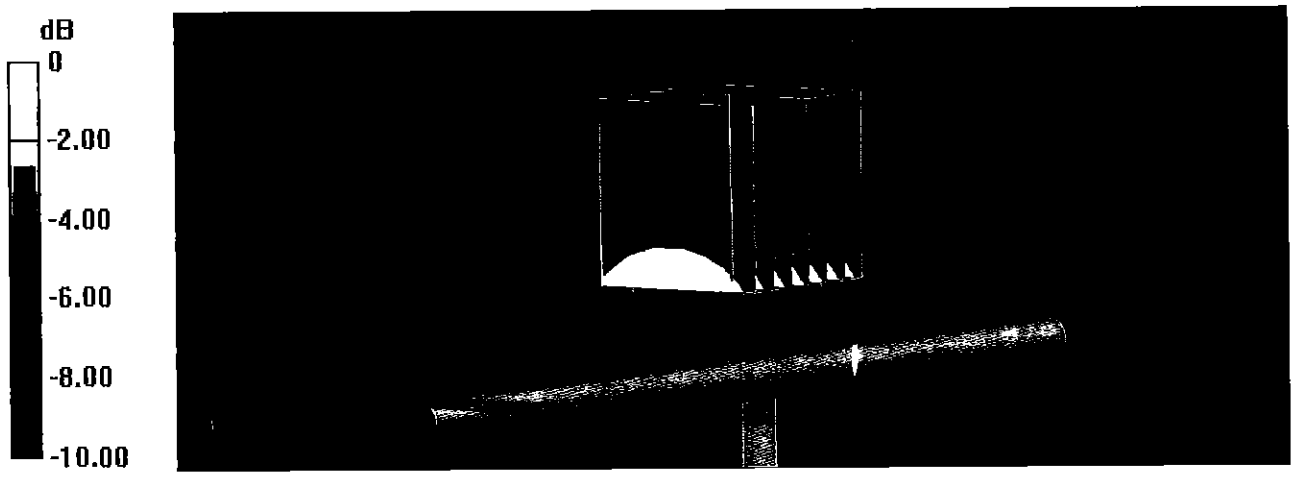
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

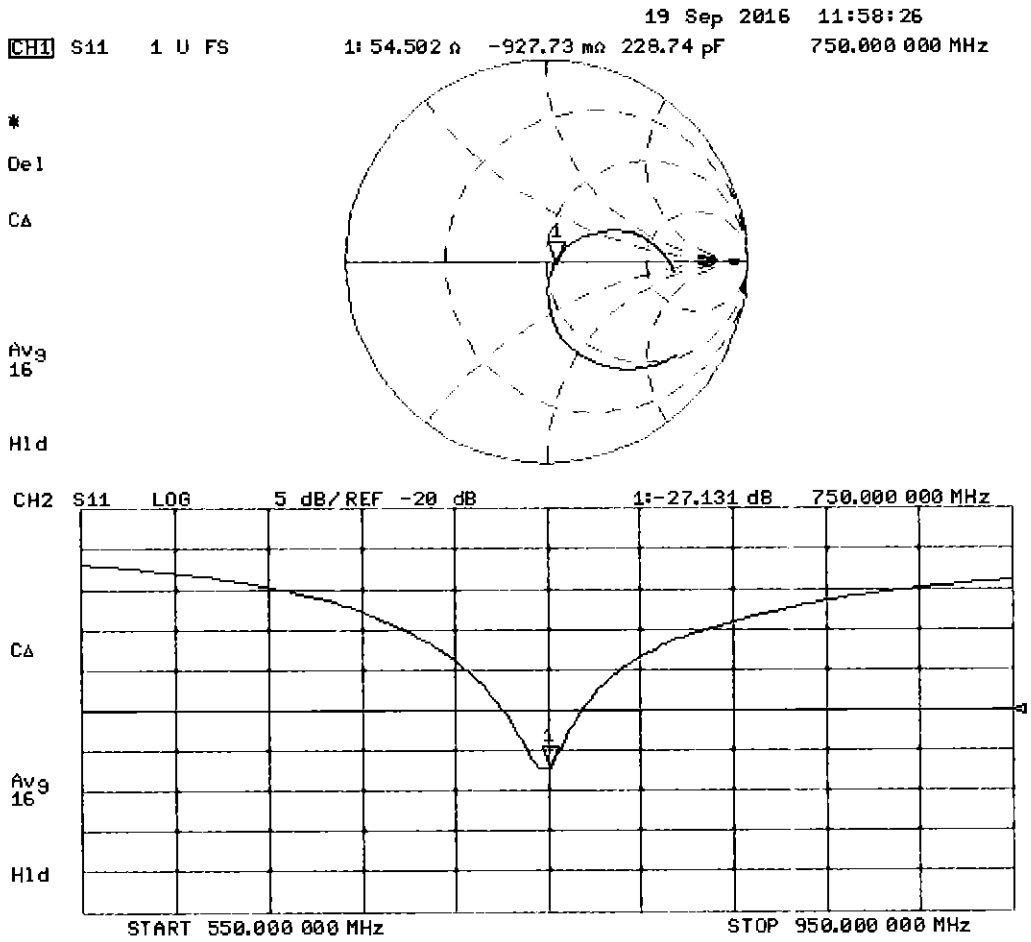
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.29 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.16 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1097

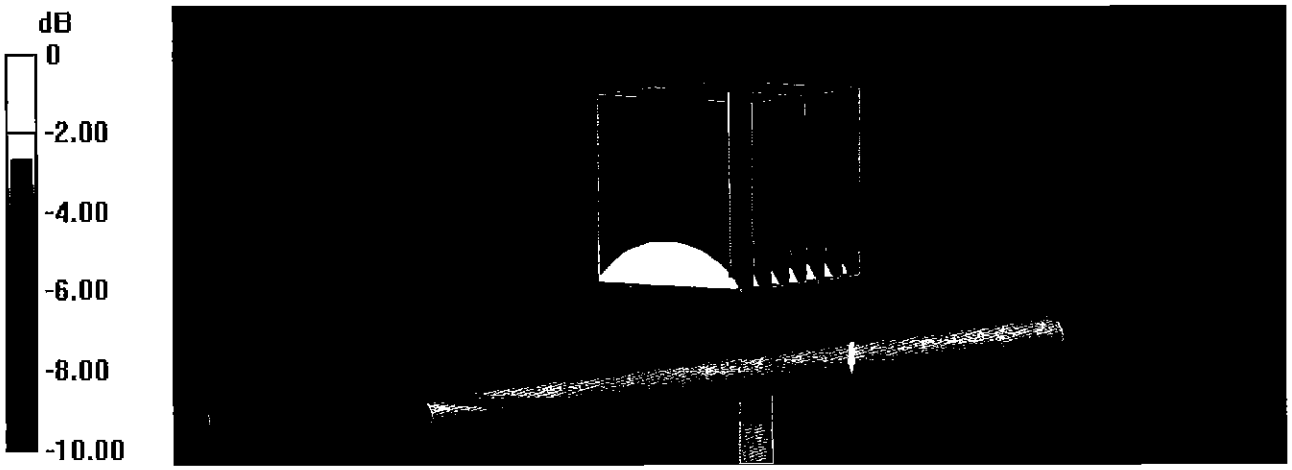
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.97 S/m; ε_r = 55.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

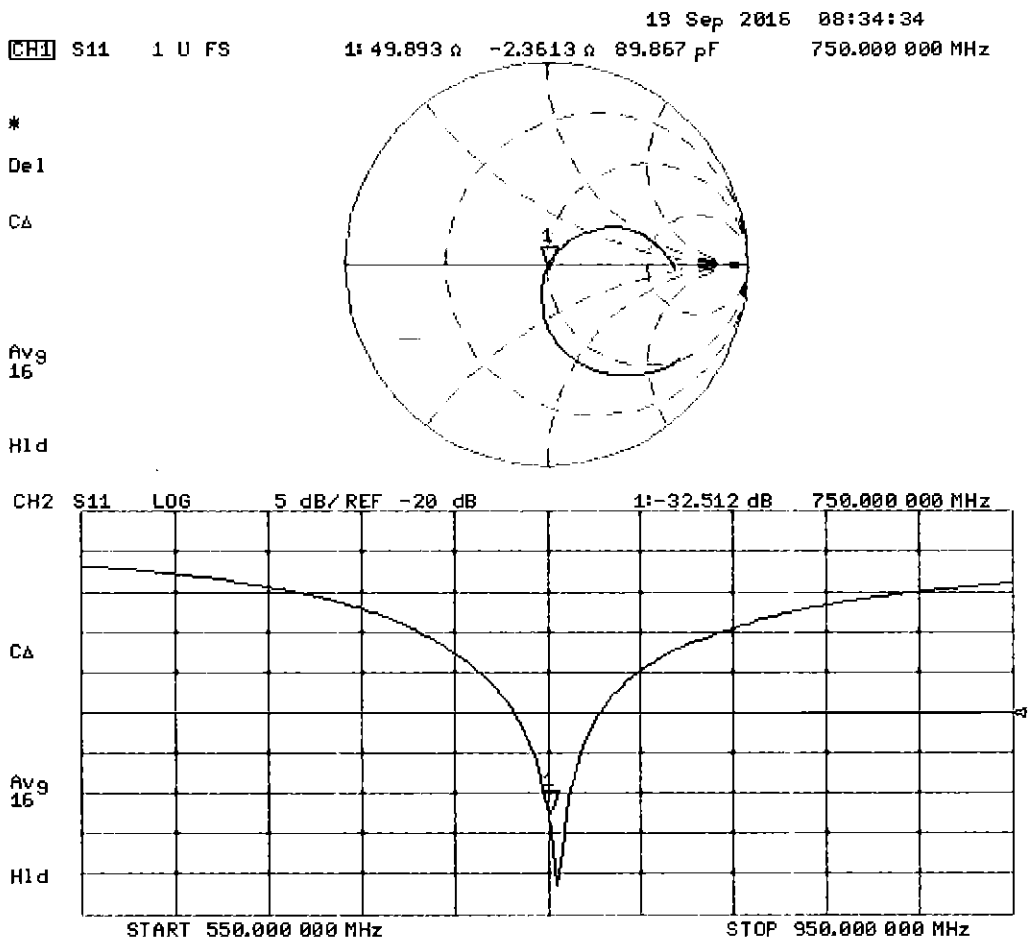
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.94 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.24 W/kg
SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.43 W/kg
Maximum value of SAR (measured) = 2.86 W/kg



0 dB = 2.86 W/kg = 4.56 dBW/kg

Impedance Measurement Plot for Body TSL



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

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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 0108

Client **PC Test**

Certificate No: D850V2-1009_Aug16

CALIBRATION CERTIFICATE

Object: D850V2 - SN: 1009

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

Calibration date: August 16, 2016

BN ✓
09-01-2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 22, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	850 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	0.92 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.1 ± 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	2.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**10.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.65 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.53 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	0.99 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.6 ± 6 %	1.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.53 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.87 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.64 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.43 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.6 Ω - 4.3 jΩ
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 Ω - 5.7 jΩ
Return Loss	- 23.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.432 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	September 04, 2012

DASY5 Validation Report for Head TSL

Date: 16.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1009

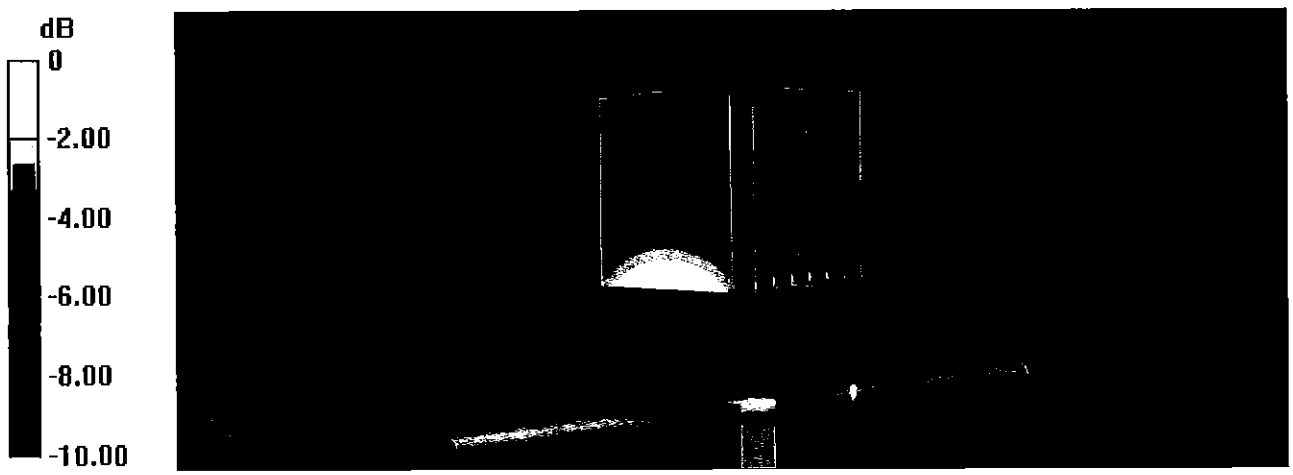
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; σ = 0.94 S/m; ε_r = 42.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.7, 9.7, 9.7); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

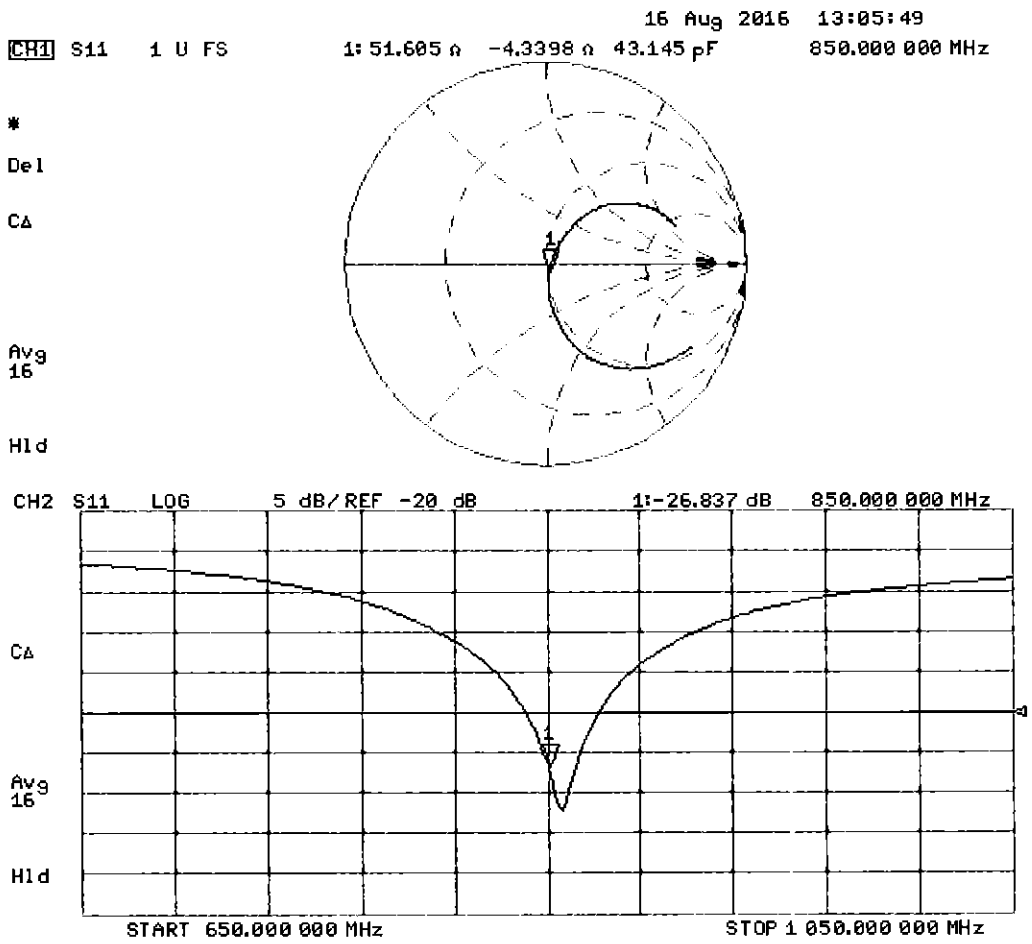
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.69 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.84 W/kg
SAR(1 g) = 2.56 W/kg; SAR(10 g) = 1.65 W/kg
Maximum value of SAR (measured) = 3.41 W/kg



0 dB = 3.41 W/kg = 5.33 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1009

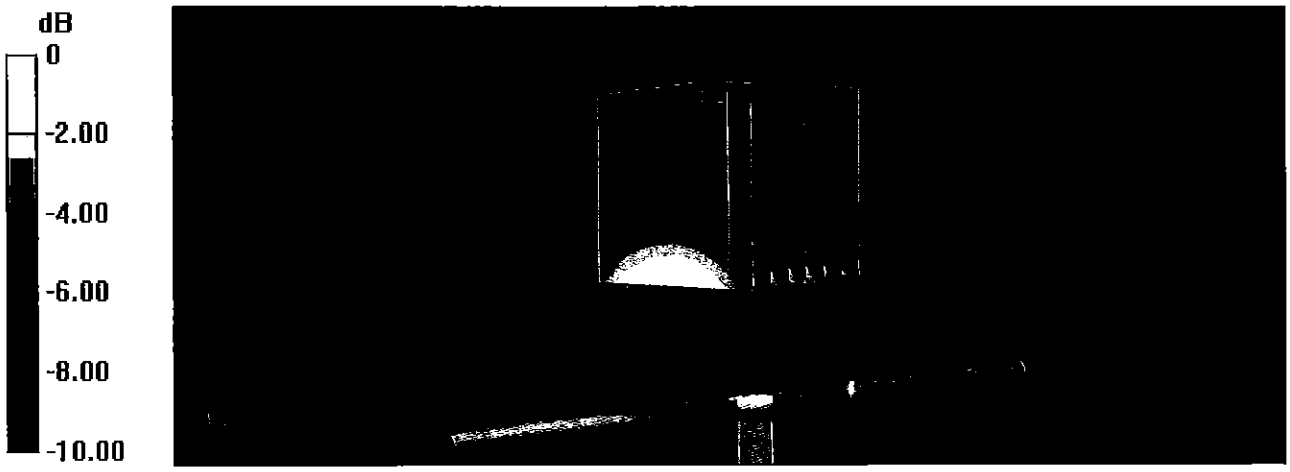
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; σ = 1.02 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

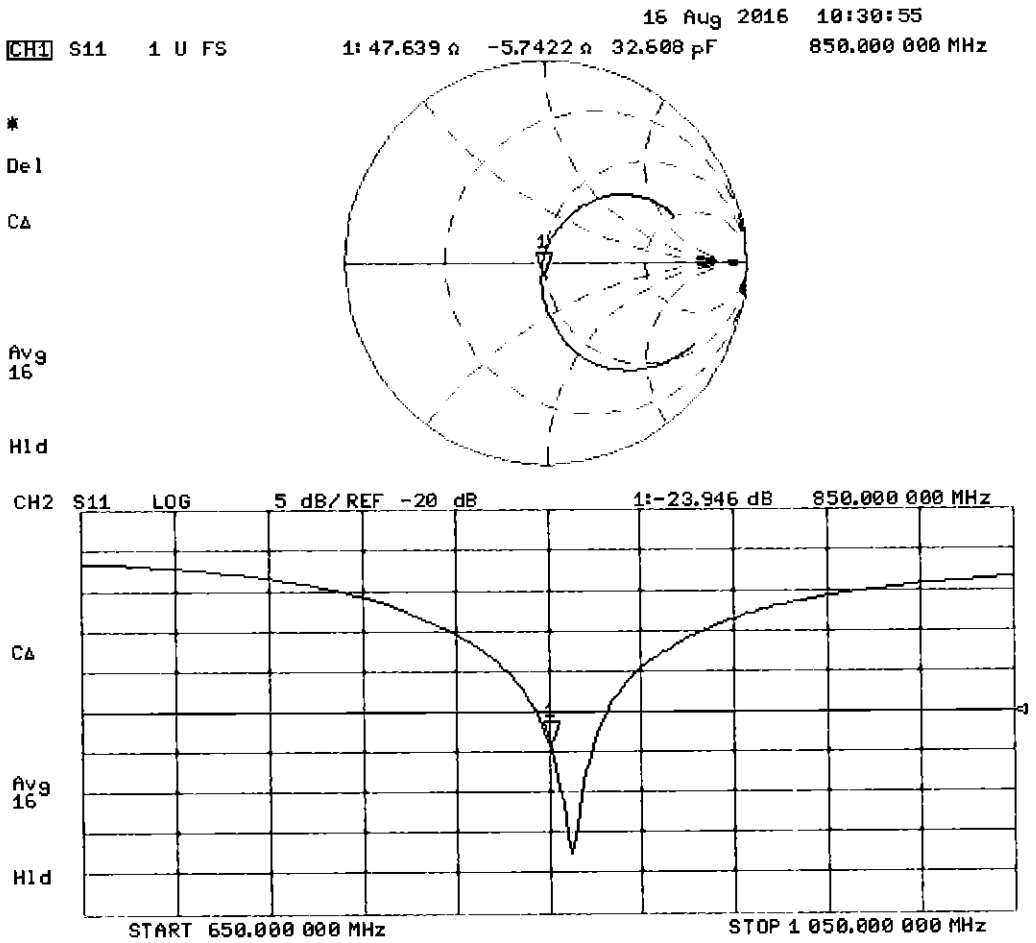
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.86 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.78 W/kg
SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.64 W/kg
Maximum value of SAR (measured) = 3.37 W/kg



0 dB = 3.37 W/kg = 5.28 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D850V2-1010_Sep16

CALIBRATION CERTIFICATE

Object	D850V2 - SN: 1010
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 19, 2016

BN 09-28-2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: September 20, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	850 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	0.92 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	0.95 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	2.49 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	1.61 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	0.99 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.6 ± 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	2.53 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**10.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.57 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω - 3.0 jΩ
Return Loss	- 30.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2 Ω - 4.9 jΩ
Return Loss	- 23.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.429 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	September 04, 2012

DASY5 Validation Report for Head TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1010

Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; σ = 0.95 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

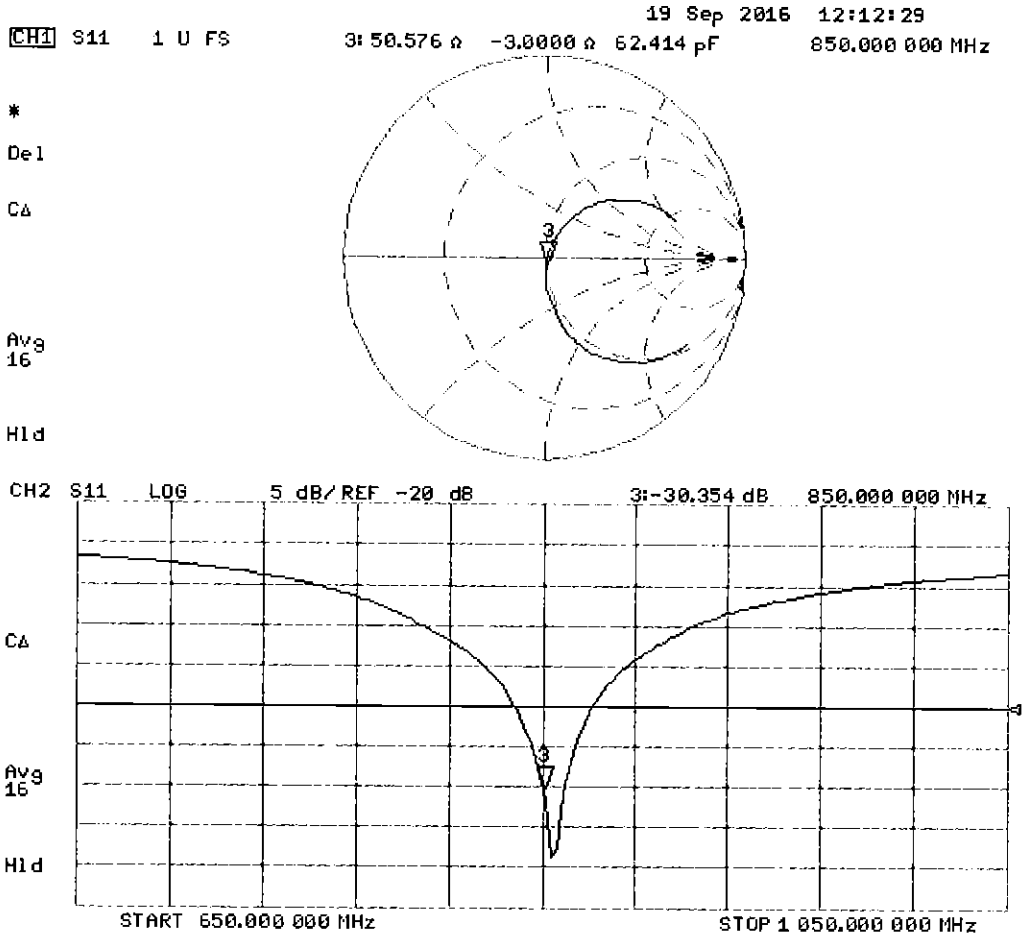
- Probe: EX3DV4 - SN7349; ConvF(9.7, 9.7, 9.7); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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 = 63.38 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.70 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 3.30 W/kg

0 dB = 3.30 W/kg = 5.19 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN: 1010

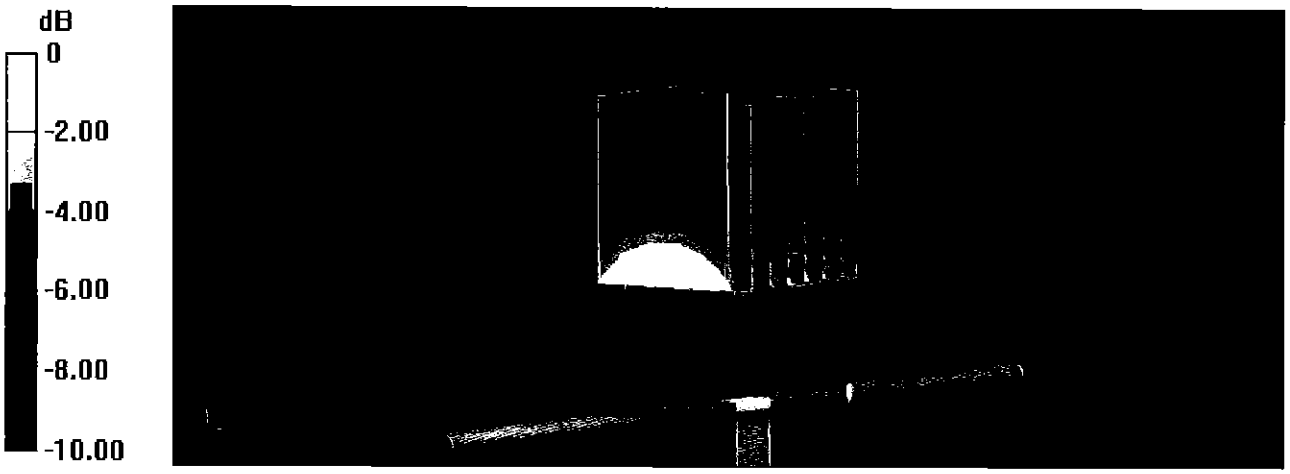
Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; σ = 1 S/m; ε_r = 55.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

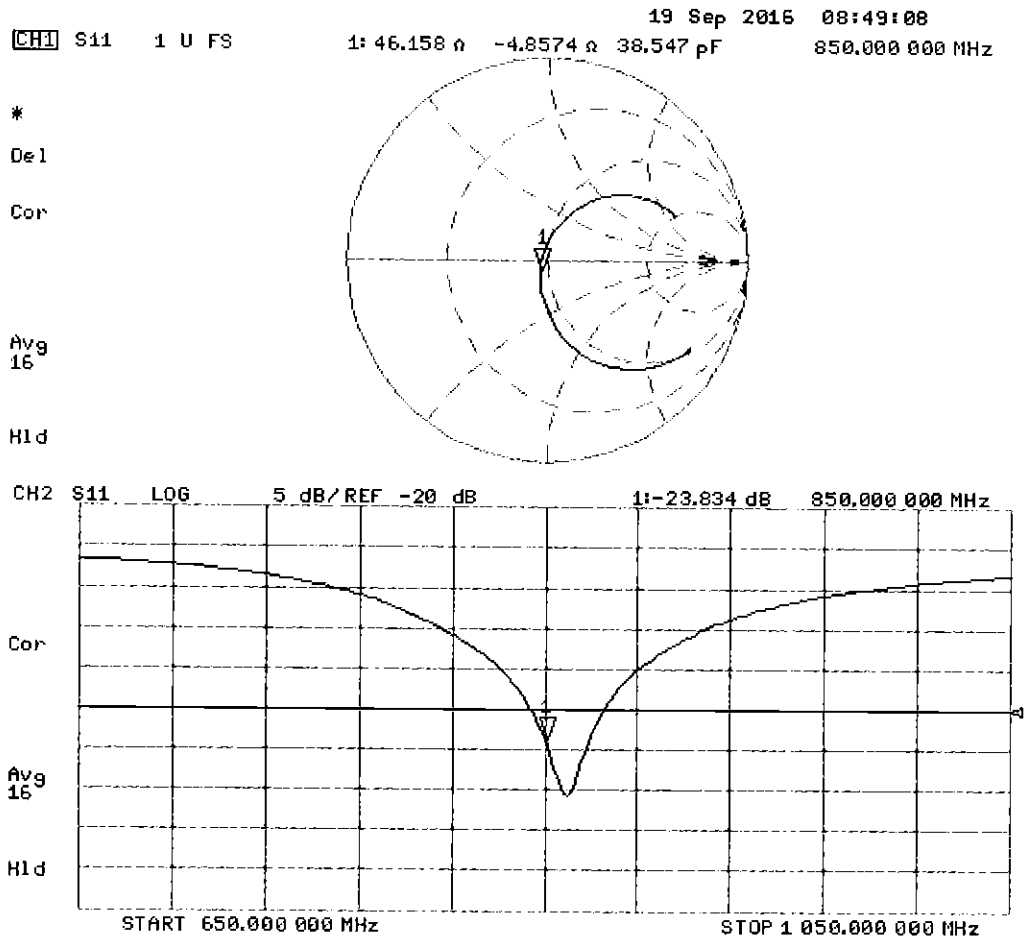
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.87 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.71 W/kg
SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.65 W/kg
Maximum value of SAR (measured) = 3.29 W/kg



0 dB = 3.29 W/kg = 5.17 dBW/kg

Impedance Measurement Plot for Body TSL



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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1750V2-1104_Sep16

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1104
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 14, 2016

BN ✓
09-28-2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: September 15, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 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	38.9 ± 6 %	1.37 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	9.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.80 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.1 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	54.2 ± 6 %	1.49 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	9.01 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**36.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.82 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.6 Ω + 0.0 jΩ
Return Loss	- 36.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 0.9 jΩ
Return Loss	- 28.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.216 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	May 16, 2013

DASY5 Validation Report for Head TSL

Date: 14.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1104

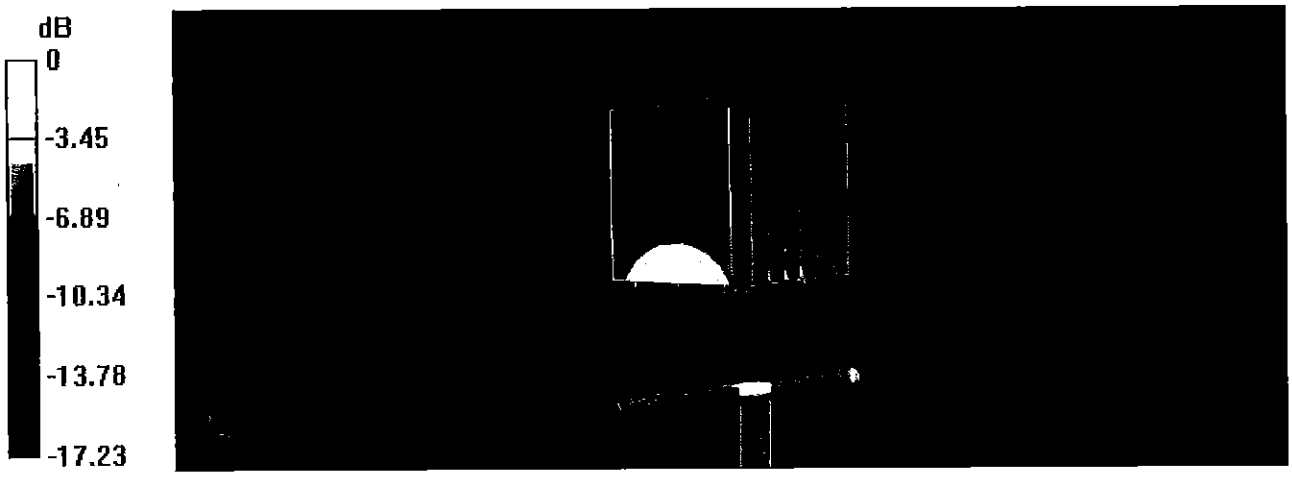
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

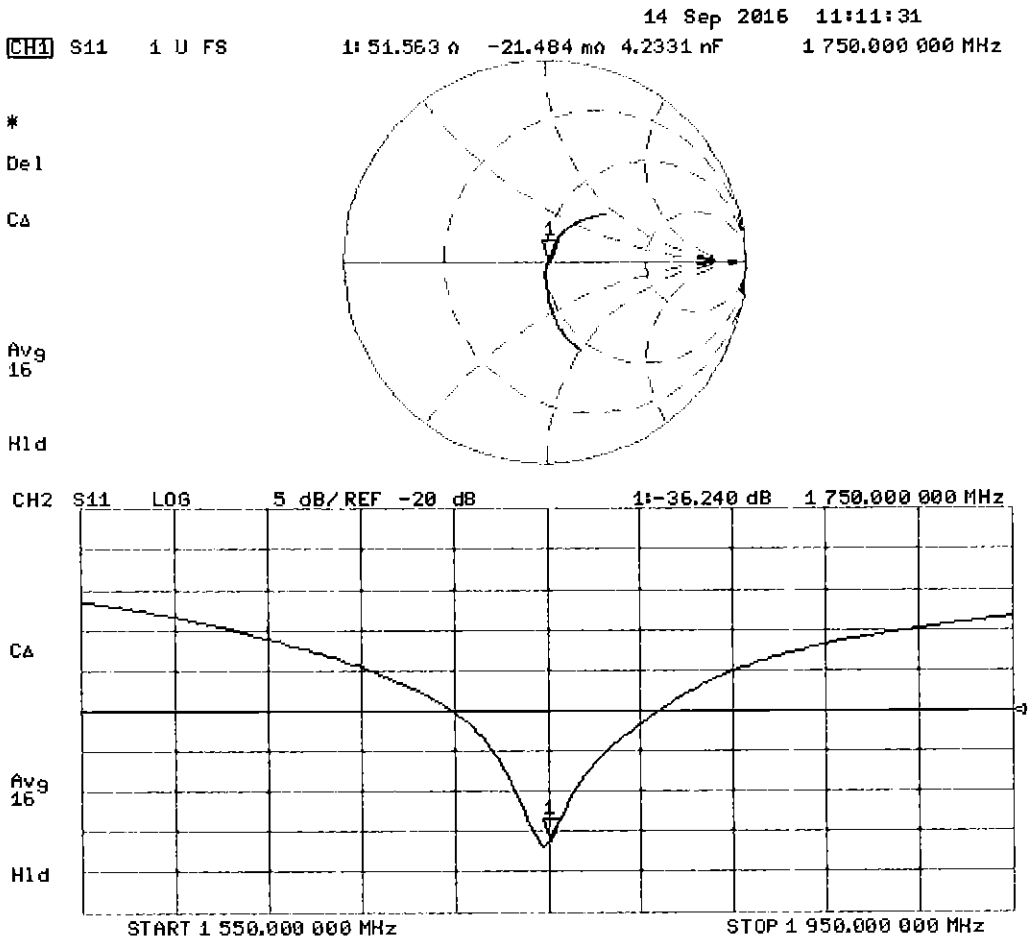
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.5 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.8 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1104

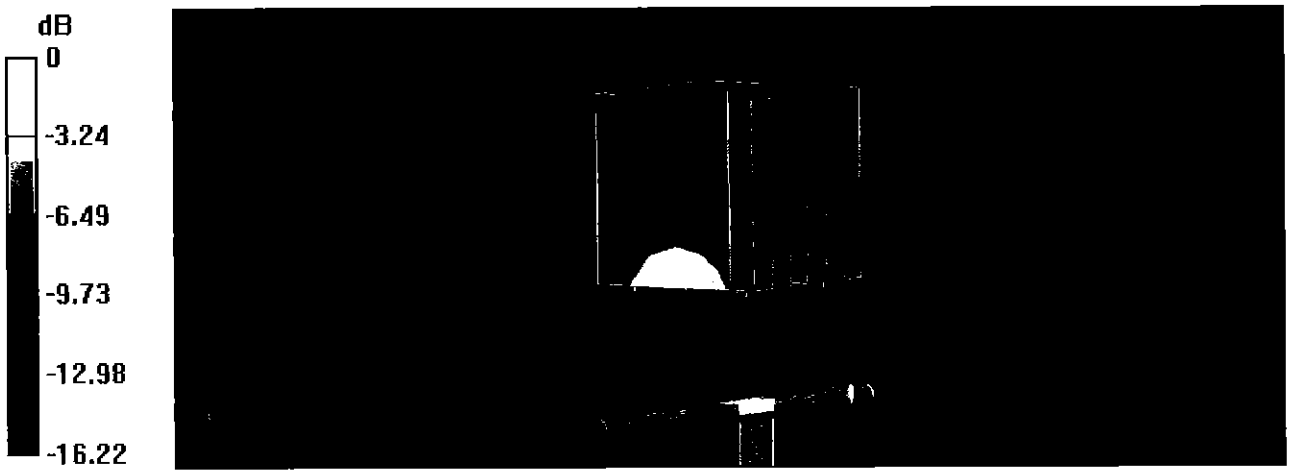
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.49 S/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

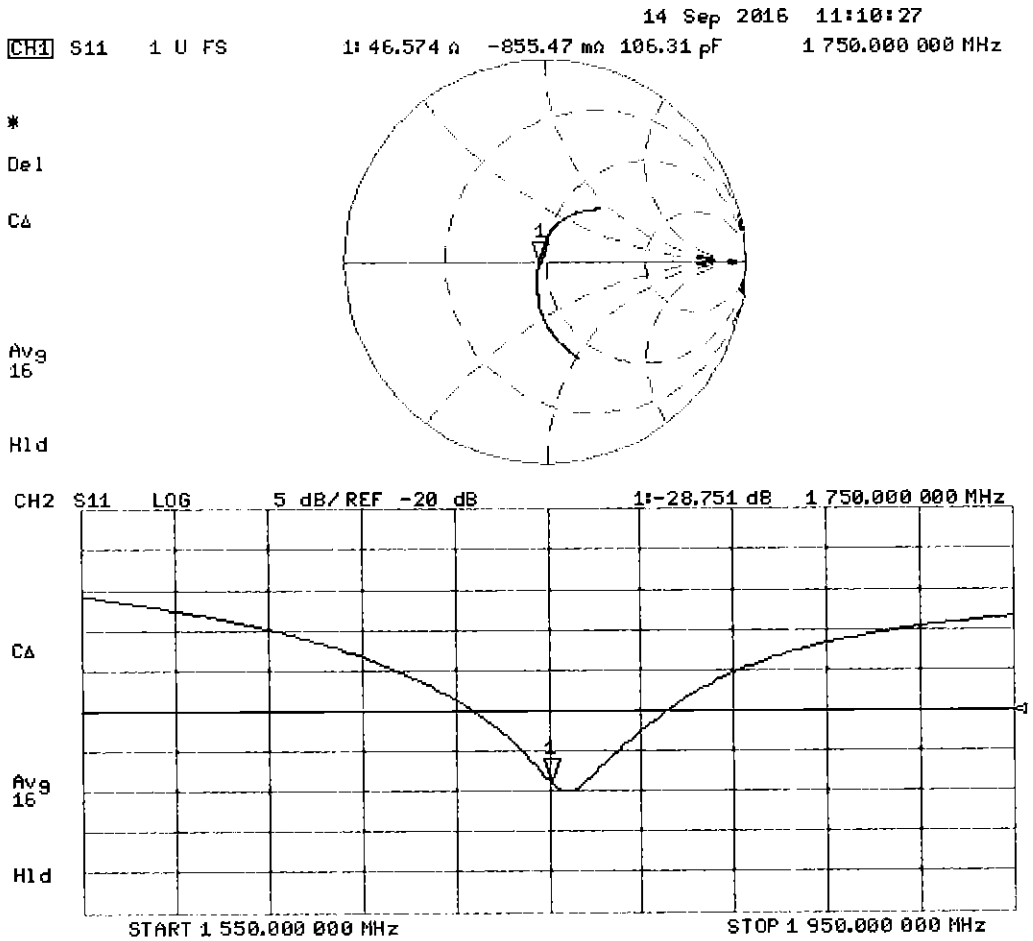
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.58 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.01 W/kg; SAR(10 g) = 4.82 W/kg
Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1900V2-5d181_Sep16

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d181
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 19, 2016

BNV
09-28-2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: September 19, 2016

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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	40.5 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 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	53.6 ± 6 %	1.49 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.71 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2 Ω + 4.7 jΩ
Return Loss	- 24.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω + 6.1 jΩ
Return Loss	- 24.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.204 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	August 23, 2013

DASY5 Validation Report for Head TSL

Date: 14.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181

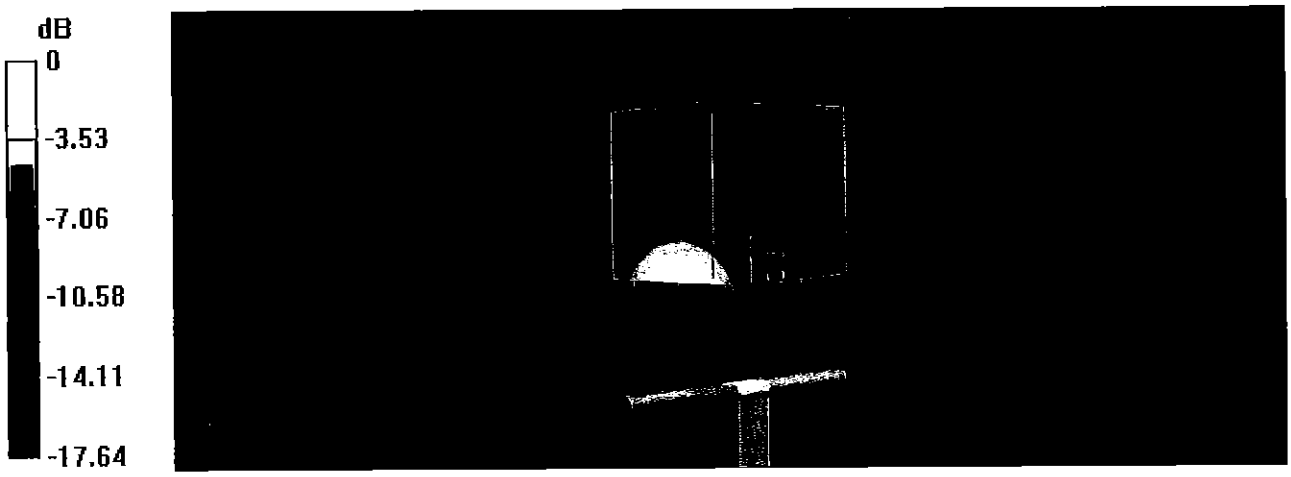
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.99, 7.99, 7.99); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

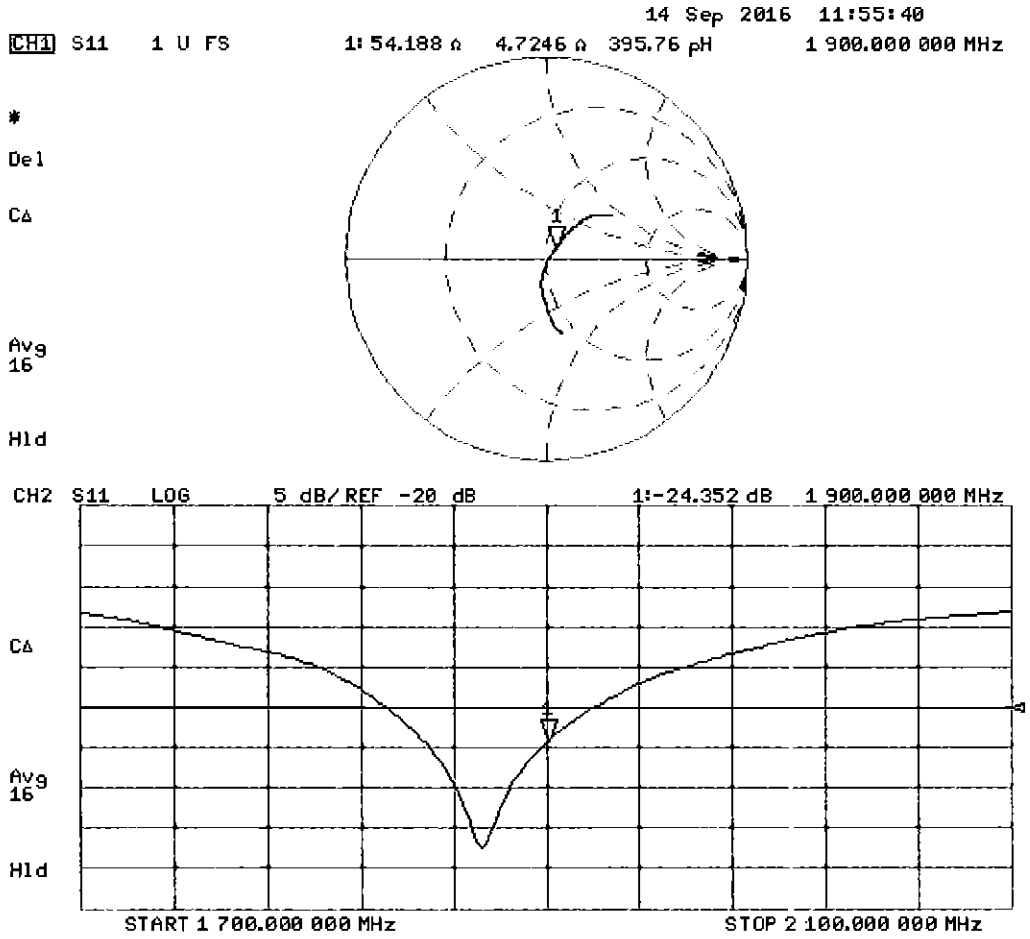
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.3 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 9.89 W/kg; SAR(10 g) = 5.21 W/kg
Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d181

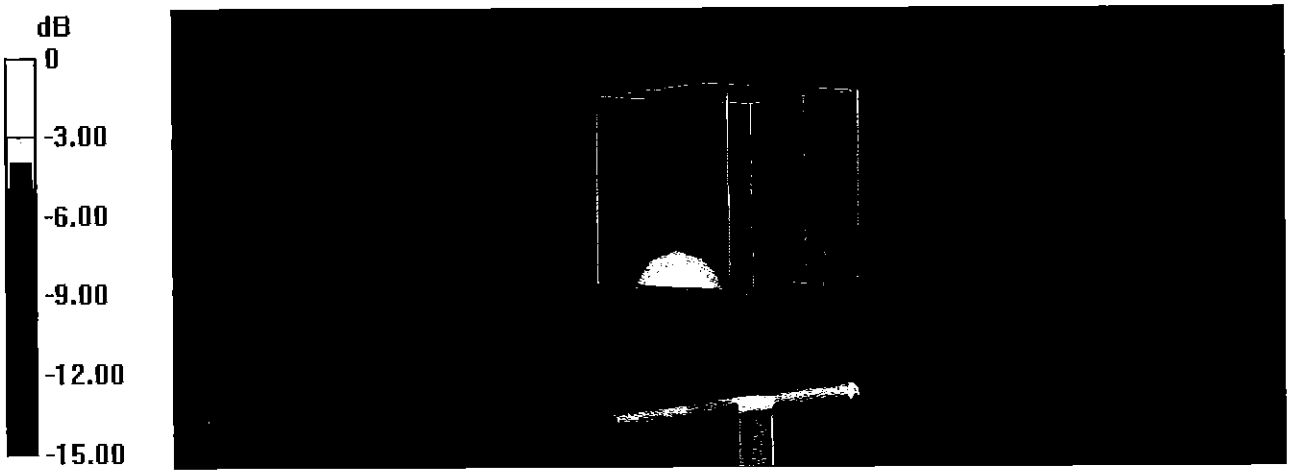
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.49 S/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

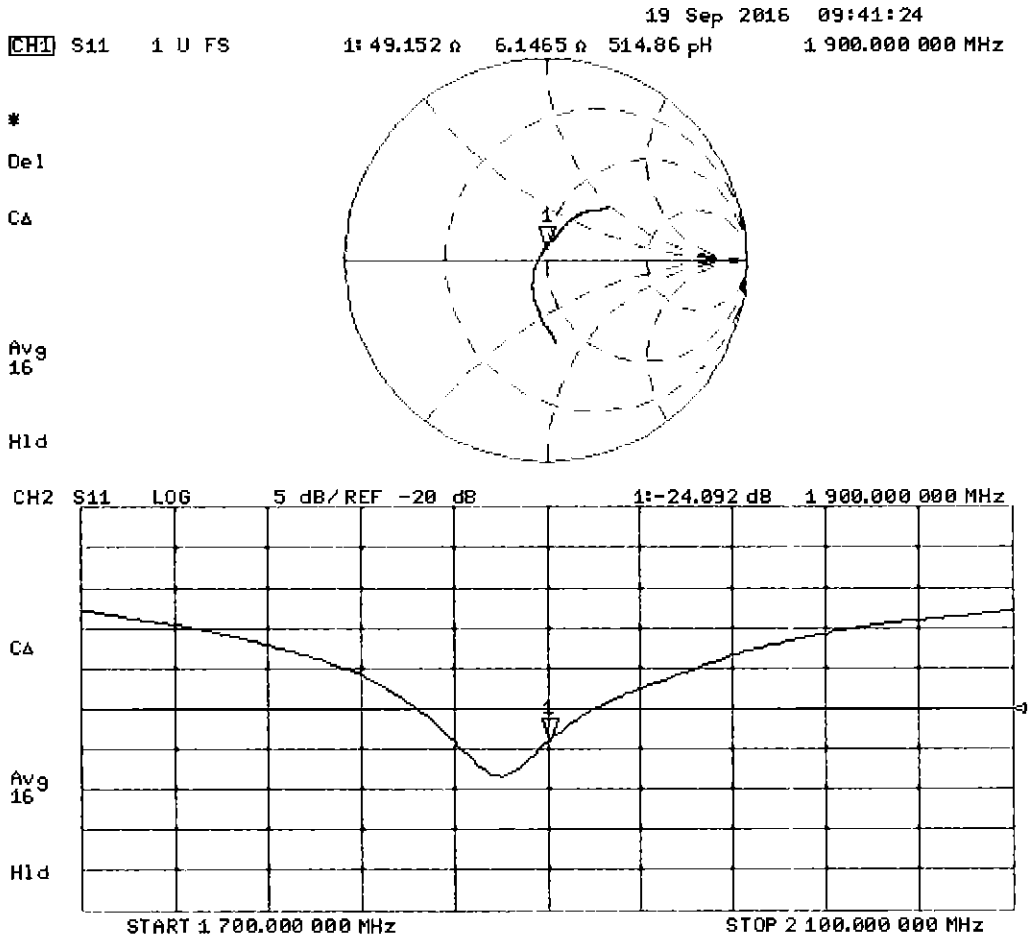
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.7 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.17 W/kg
Maximum value of SAR (measured) = 14.6 W/kg



0 dB = 14.6 W/kg = 11.64 dBW/kg

Impedance Measurement Plot for Body TSL



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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2450V2-921_Sep16

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:921
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 13, 2016

BN ✓
09-28-2016

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 NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	15-Jun-16 (No. EX3-7349_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: September 15, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.9 ± 6 %	1.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.6 ± 6 %	2.04 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.0 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.8 Ω + 3.0 jΩ
Return Loss	- 27.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω + 5.4 jΩ
Return Loss	- 25.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 26, 2013

DASY5 Validation Report for Head TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:921

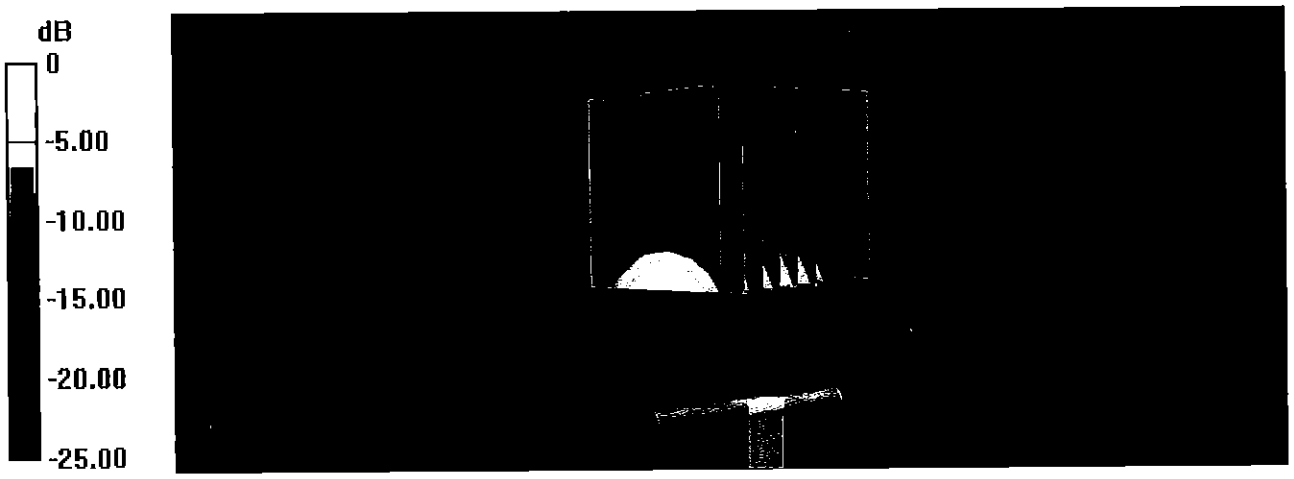
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

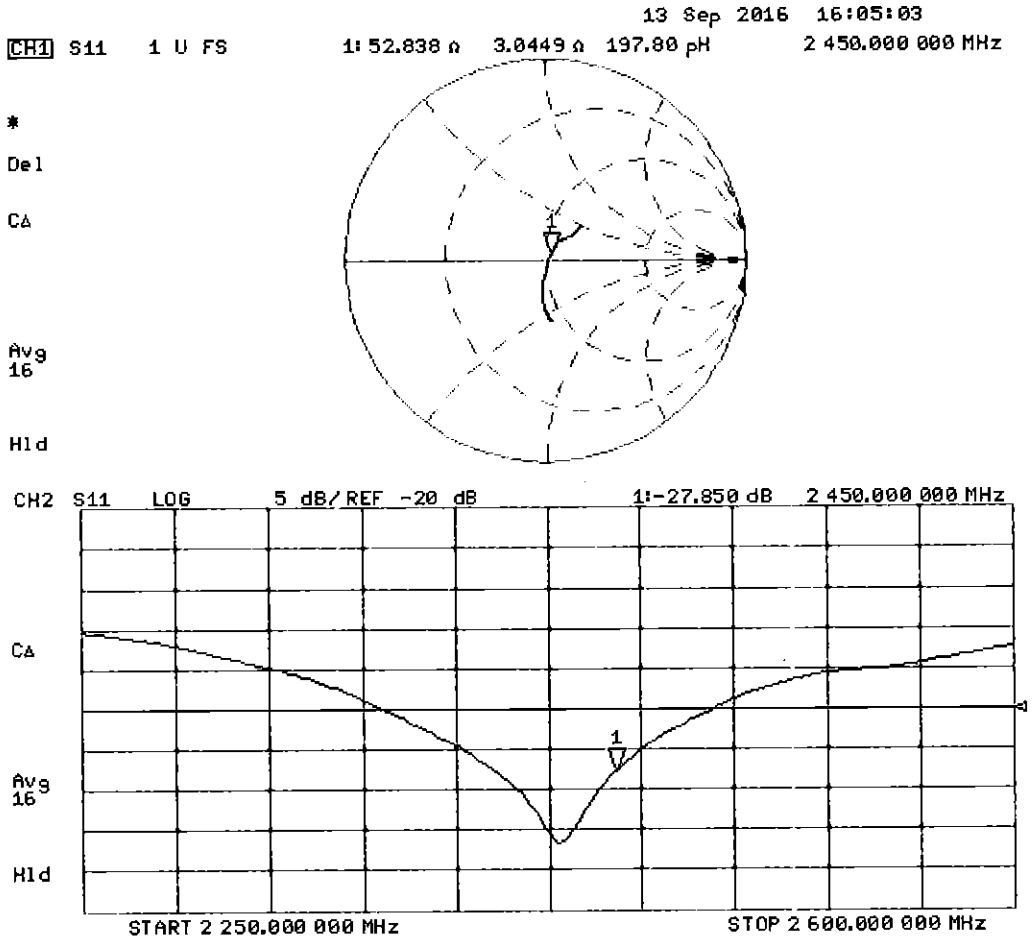
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.8 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.23 W/kg
Maximum value of SAR (measured) = 22.2 W/kg



0 dB = 22.2 W/kg = 13.46 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:921

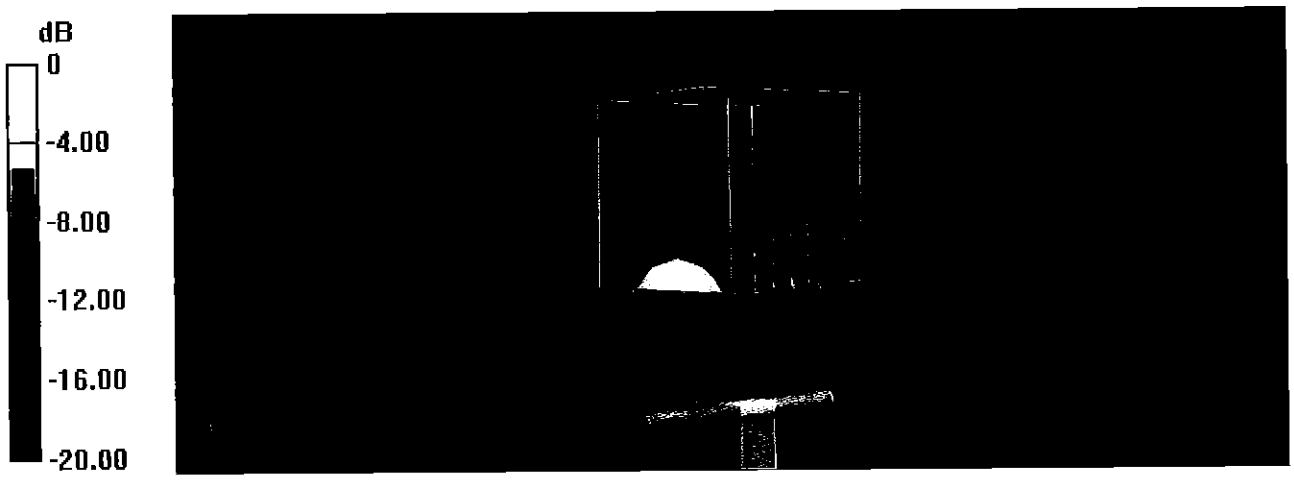
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.04 S/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

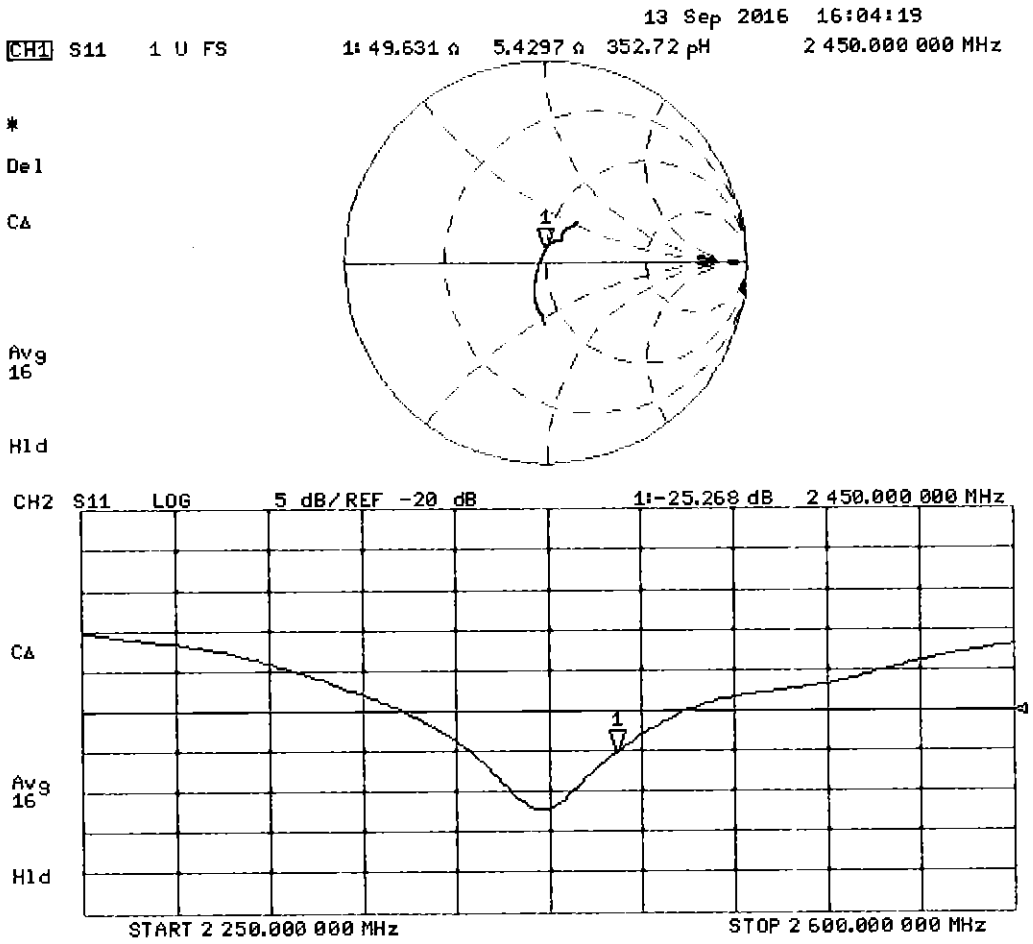
DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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 = 106.6 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 25.7 W/kg
SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.08 W/kg
Maximum value of SAR (measured) = 21.2 W/kg



0 dB = 21.2 W/kg = 13.26 dBW/kg

Impedance Measurement Plot for Body TSL