PCTEST ENGINEERING LABORATORY, INC.

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

SAR EVALUATION REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
01/02/17 - 02/20/17
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1701030006-01-R1.A3L

FCC ID: **A3LSMG950F**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: SM-G950F
Additional Model(s): SM-G950FD, SM-G950X

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.37	0.61	0.95
PCE	UMTS 850	826.40 - 846.60 MHz	0.38	0.54	0.78
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.30	0.75	0.66
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.18	0.43	0.91
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.33	0.37	1.09
PCE	LTE Band 12	699.7 - 715.3 MHz	0.10	0.20	0.31
PCE	LTE Band 17	706.5 - 713.5 MHz	N/A	N/A	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	0.17	0.24	0.40
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.34	0.45	0.80
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.24	0.38	0.56
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.26	0.57	1.09
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A	N/A
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.30	0.64	0.75
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A	N/A
PCE	LTE Band 41	2498.5 - 2687.5 MHz	0.10	0.24	0.52
DTS	2.4 GHz WLAN	2412 - 2472 MHz	0.44	0.11	0.24
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	N/A
NII	U-NII-2A	5260 - 5320 MHz	0.16	0.17	N/A
NII	U-NII-2C	5500 - 5720 MHz	< 0.1	0.16	N/A
NII	U-NII-3	5745 - 5825 MHz	0.15	0.26	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	< 0.1	< 0.1	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03:			1.53	1.15	1.55

Note: This revised Test Report (S/N: 1M1701030006-01-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.8 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

ACCREDITED
TESTING CERT#2041.01

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.

TABLE OF CONTENTS

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 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 66 (AWS)	Voice/Data	1710.7 - 1779.3 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
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	555 Hz - 8.3 kHz

1.2 Power Reduction for SAR

This device utilizes a single step power reduction mechanism for SAR compliance under portable hotspot conditions for some wireless modes and bands. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when hotspot is enabled. Detailed descriptions of the power reduction mechanism are included in the operational description.

This device uses an independent fixed level power reduction mechanism for WLAN operations during voice or VoIP held to ear scenarios. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR positions described in IEEE 1528-2013. Detailed descriptions of the power reduction mechanism are included in the operational description.

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum PCE Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**34.3**	**34.3**	**32.5**	**31.0**	**30.0**	**27.5**	**25.5**	**24.0**	**22.5**
	Nominal	**33.8**	**33.8**	**32.0**	**30.5**	**29.5**	**27.0**	**25.0**	**23.5**	**22.0**
GSM/GPRS/EDGE 1900	Maximum	**31.8**	**31.8**	**28.5**	**27.0**	**25.5**	**26.5**	**24.5**	**23.0**	**21.5**
	Nominal	**31.3**	**31.3**	**28.0**	**26.5**	**25.0**	**26.0**	**24.0**	**22.5**	**21.0**

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**25.0**	**24.7**	**24.5**
	Nominal	**24.5**	**24.2**	**24.0**
UMTS Band 4 (1750 MHz)	Maximum	**25.0**	**24.5**	**23.5**
	Nominal	**24.5**	**24.0**	**23.0**
UMTS Band 2 (1900 MHz)	Maximum	**25.0**	**25.0**	**25.0**
	Nominal	**24.5**	**24.5**	**24.5**

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 17	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 13	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 5 (Cell)	Maximum	**24.9**
	Nominal	**24.4**
LTE Band 26 (Cell)	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 66 (AWS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 4 (AWS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 25 (PCS)	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 2 (PCS)	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 41	Maximum	**24.5**
	Nominal	**24.0**

1.3.2 Reduced PCE Power – Hotspot Mode Activated

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 4 (1750 MHz)	Maximum	**22.0**	**21.5**	**21.0**
	Nominal	**21.5**	**21.0**	**20.5**
UMTS Band 2 (1900 MHz)	Maximum	**22.0**	**22.0**	**22.0**
	Nominal	**21.5**	**21.5**	**21.5**

Mode / Band		Modulated Average (dBm)
LTE Band 25 (PCS)	Maximum	**21.0**
	Nominal	**20.5**
LTE Band 2 (PCS)	Maximum	**21.0**
	Nominal	**20.5**

1.3.3 Maximum WLAN/BT Power

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11b (2.4 GHz)	Maximum	**20.5**	**19.5**	**18.5**
	Nominal	**20.0**	**19.0**	**18.0**
IEEE 802.11g (2.4 GHz)	Maximum	**18.5**	**13.5**	**13.5**
	Nominal	**18.0**	**13.0**	**13.0**
IEEE 802.11n (2.4 GHz)	Maximum	**15.5**	**13.5**	**13.5**
	Nominal	**15.0**	**13.0**	**13.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)
Bluetooth (1 Mbps)	Maximum	**14.0**
	Nominal	**13.5**
Bluetooth (EDR)	Maximum	**7.0**
	Nominal	**6.5**
Bluetooth LE (1 Mbps)	Maximum	**8.5**
	Nominal	**8.0**
Bluetooth LE (2 Mbps)	Maximum	**9.5**
	Nominal	**9.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**18.5**		
	Nominal	**18.0**		
IEEE 802.11n (5 GHz)	Maximum	**18.5**	**17.5**	
	Nominal	**18.0**	**17.0**	
IEEE 802.11ac (5 GHz)	Maximum	**18.5**	**17.5**	**15.5**
	Nominal	**18.0**	**17.0**	**15.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11g (2.4 GHz)	Maximum	**21.5**	**16.5**	**16.5**
	Nominal	**21.0**	**16.0**	**16.0**
IEEE 802.11n (2.4 GHz)	Maximum	**18.5**	**16.5**	**16.5**
	Nominal	**18.0**	**16.0**	**16.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**21.5**		
	Nominal	**21.0**		
IEEE 802.11n (5 GHz)	Maximum	**21.5**	**20.5**	
	Nominal	**21.0**	**20.0**	
IEEE 802.11ac (5 GHz)	Maximum	**21.5**	**20.5**	**18.5**
	Nominal	**21.0**	**20.0**	**18.0**

1.3.4 Maximum Output Powers During Operations with Simultaneous 2.4 GHz and 5 GHz WLAN

	# Tx	**5 GHz WIFI [dBm]**		**2.4 GHz WIFI [dBm]**		**802.11 Modes**
		Ant1	Ant2	Ant1	Ant2	
2.4 GHz + 5 GHz	2	A	-	-	B	2.4 GHz: b,g,n 5 GHz: a,n,ac
	2	-	A	B	-	
	2	A	-	B	-	
	2	-	A	-	B	
2.4 GHz + 5 GHz	3	A	A	B	-	2.4 GHz: b, g, n 5 GHz: n, ac, a (CDD +STBC only)
	3	A	A	-	B	
	3	A	-	B	B	2.4 GHz: n, g (CDD +STBC only) 5 GHz: a, n, ac
	3	-	A	B	B	
2.4 GHz + 5 GHz	4	A	A	B	B	2.4 GHz: n, g (CDD +STBC only) 5 GHz: n, ac, a (CDD +STBC only)

A = 13.0 dBm
B = 13.0 dBm
(Upper tolerance: target +0.5dB)

1.3.5 Reduced WLAN Power

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11b (2.4 GHz)	Maximum	**15.5**		
	Nominal	**15.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**15.5**	**13.5**	**13.5**
	Nominal	**15.0**	**13.0**	**13.0**
IEEE 802.11n (2.4 GHz)	Maximum	**15.5**	**13.5**	**13.5**
	Nominal	**15.0**	**13.0**	**13.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**13.5**		
	Nominal	**13.0**		
IEEE 802.11n (5 GHz)	Maximum	**13.5**	**13.5**	
	Nominal	**13.0**	**13.0**	
IEEE 802.11ac (5 GHz)	Maximum	**13.5**	**13.5**	**13.5**
	Nominal	**13.0**	**13.0**	**13.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11g/n (2.4 GHz)	Maximum	**18.5**	**16.5**	**16.5**
	Nominal	**18.0**	**16.0**	**16.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**16.5**		
	Nominal	**16.0**		
IEEE 802.11n (5 GHz)	Maximum	**16.5**	**16.5**	
	Nominal	**16.0**	**16.0**	
IEEE 802.11ac (5 GHz)	Maximum	**16.5**	**16.5**	**16.5**
	Nominal	**16.0**	**16.0**	**16.0**

1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. The overall diagonal dimension of the device is ≤160 mm and the diagonal display is ≤150 mm. A diagram showing the location of the device antennas can be found in Appendix F.

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 1750	Yes	Yes	No	Yes	No	Yes
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Yes	Yes	No	Yes	No	Yes
LTE Band 12	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 26 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 66 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 25 (PCS)	Yes	Yes	No	Yes	No	Yes
LTE Band 41	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN Ant 1	Yes	Yes	Yes	No	No	Yes
2.4 GHz WLAN Ant 2	Yes	Yes	Yes	No	No	Yes
Bluetooth	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-1, U-NII-2A, U-NII-2C and U-NII-3 operations are disabled. Therefore, U-NII-1, U-NII-2A, U-NII-2C, and U-NII-3 operations are not considered in this section.

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.

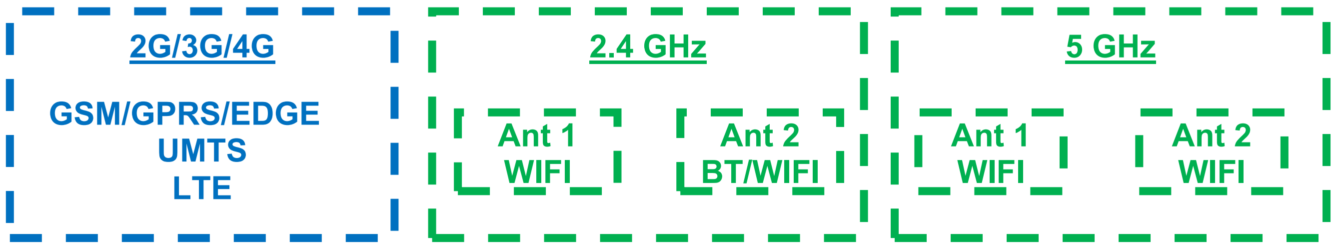


Figure 1-1
Simultaneous Transmission Paths

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 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Notes
1	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
2	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	
3	GSM voice + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	N/A	
4	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	^BT Tethering applications are considered.
5	GSM voice + 2.4 GHz WI-FI MIMO	Yes	Yes	N/A	
6	GSM voice + 5 GHz WI-FI MIMO	Yes	Yes	N/A	
7	GSM voice + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	
8	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	
9	UMTS + 5 GHz WI-FI	Yes	Yes	N/A	
10	UMTS + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	Yes	
11	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	^BT Tethering applications are considered.
12	UMTS + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	
13	UMTS + 5 GHz WI-FI MIMO	Yes	Yes	N/A	
14	UMTS + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	
15	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	
16	LTE + 5 GHz WI-FI	Yes	Yes	N/A	
17	LTE + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	N/A	
18	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	^BT Tethering applications are considered.
19	LTE + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	
20	LTE + 5 GHz WI-FI MIMO	Yes	Yes	N/A	
21	LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	
22	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	
23	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	N/A	
24	GPRS/EDGE + 2.4 GHz WI-FI + 5 GHz WI-FI	N/A	N/A	N/A	
25	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	Yes^	^BT Tethering applications are considered.
26	GPRS/EDGE + 2.4 GHz WI-FI MIMO	N/A	N/A	Yes	
27	GPRS/EDGE + 5 GHz WI-FI MIMO	N/A	N/A	N/A	
28	GPRS/EDGE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	N/A	N/A	N/A	

1. Bluetooth cannot transmit simultaneously with WLAN.
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 Hotspot scenario.
4. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5GHz Wireless Router is not supported, hence was not evaluated for wireless router conditions.
6. This device supports 2x2 MIMO Tx for WLAN. 802.11a/g/n/ac supports CDD and STBC and 802.11n/ac additionally supports SDM.
7. This device supports Bluetooth tethering for EDR packet only.
8. This device supports VOLTE.
9. This device supports VoWIFI.

1.7 Miscellaneous SAR Test Considerations

(A) WIFI/BT

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB Publication 248227 D01v02r02.

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A, U-NII-2C, and U-NII-3 WIFI, only 2.4 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02r01.

This device supports channel 1-13 for 2.4 GHz WLAN. However, due to the reduced output power for channels 12 and 13, channels 1, 6, and 11 were considered for SAR testing per KDB 248227 D01v02r02.

This device supports IEEE 802.11ac with the following features:
a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 2 Tx antenna output
d) 256 QAM is supported
e) TDWR and Band gap channels are supported

(B) Licensed Transmitter(s)

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

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 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 64QAM on the uplink and 256QAM on the downlink for LTE Operations. Conducted powers for 64QAM uplink configurations were measured per Section 5.1 of FCC KDB Publication 941225 D05v02r05. SAR was not required for 64QAM since the highest maximum output power for 64 QAM is ≤ ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg, per Section 5.2.4 of FCC KDB Publication 941225 D05v02r05.

This device supports LTE Carrier Aggregation (CA) in the downlink only. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

This device supports downlink 4x4 MIMO operations for LTE Bands 4 only. Per FCC Guidance, SAR for downlink 4x4 MIMO was not needed since the maximum average output power in 4x4 downlink MIMO mode was not > 0.25 dB higher than the maximum output power with downlink 4x4 MIMO inactive.

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 4 and LTE Band 66. Since the supported frequency span for LTE Band 4 falls completely within the supported frequency span for LTE Band 66, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE Band 66.

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

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)

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.

	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number
GSM/GPRS/EDGE 850	1EF5D	1EF5D	1EF5D
UMTS 850	1EC3B	1EC3B	1EC3B
UMTS 1750	0786A	0786A	0786A
GSM/GPRS/EDGE 1900	1EF5D	1EF5D	1EF5D
UMTS 1900	0792B	0786A	0786A
LTE Band 12	1F7F8	1F7EB	1F7EB
LTE Band 13	1F7F8	1F7FD	1F7FD
LTE Band 5 (Cell)	1F7FD	1F7FD	1F7FD
LTE Band 26 (Cell)	1F7FD	1F7FD	1F7FD
LTE Band 66 (AWS)	1F7FD	0786A	0786A
LTE Band 25 (PCS)	1F7FD	1F7FD	0786A
LTE Band 41	1F7F8	0786A	0786A
2.4 GHz WLAN	0786A	0786A	0786A
5 GHz WLAN	0786A	0786A	-
Bluetooth	0786A	1EF00	0786A

2 LTE INFORMATION

LTE Information					
FCC ID	**A3LSMG950F**				
Form Factor	Portable Handset				
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 66 (AWS) (1710.7 - 1779.3 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, 15 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 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 26 (Cell): 15 MHz	821.5 (26765)		831.5 (26865)		841.5 (26965)
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)		1779.3 (132665)
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)		1778.5 (132657)
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)		1777.5 (132647)
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)		1775 (132622)
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)		1772.5 (132597)
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)		1770 (132572)
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	6				
DL UE Category	16				
UL UE Category	5				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
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 Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Release 12 Additional Information	This device does not support full CA features on 3GPP Release 12. It supports carrier aggregation and downlink MIMO features as shown in Section 9, and Appendix G. All other uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC unless otherwise specified. The following LTE Release 12 Features are not supported: Relay, HetNet, Enhanced eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

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]

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

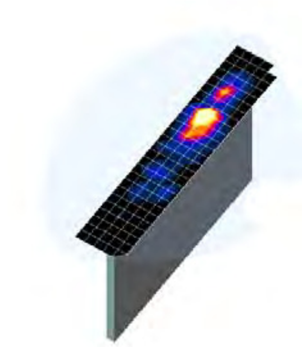


Figure 4-1
Sample SAR Area Scan

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) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
    a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
    b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
    c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

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*Δz_{zoom}(n-1)	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*Δz_{zoom}(n-1)	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*Δz_{zoom}(n-1)	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*Δz_{zoom}(n-1)	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*Δz_{zoom}(n-1)	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

Figure 5-2 shows the front, back and side views of the SAM Twin Phantom. The point "M" is the reference point for the center of the mouth, "LE" is the left ear reference point (ERP), and "RE" is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 5-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

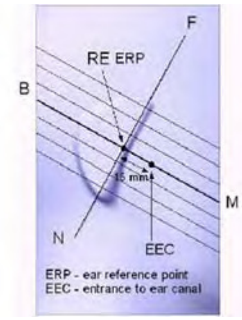


Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

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

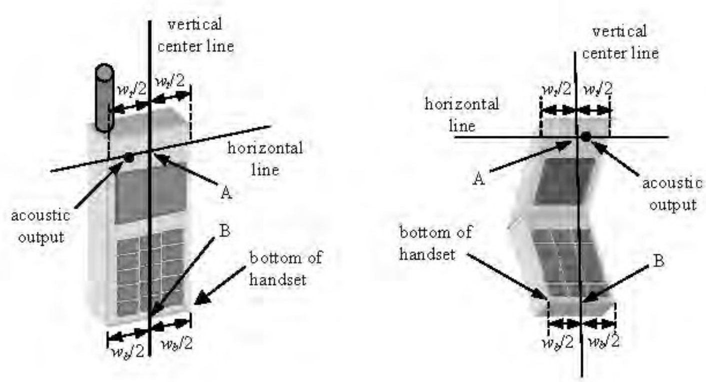


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

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

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

6.3 Positioning for Ear / 15º Tilt

With the test device aligned in the "Cheek Position":

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

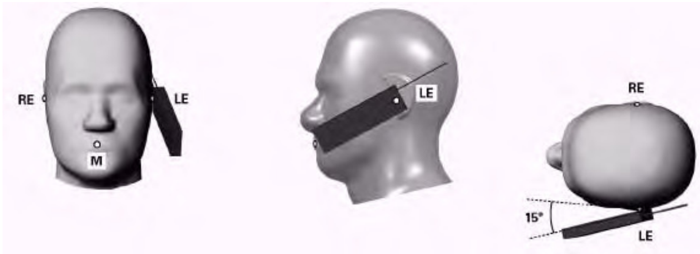


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

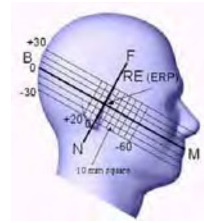


Figure 6-3
Side view w/ relevant markings

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

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones. Per IEEE 1528-2013, a rotated SAM phantom is necessary to allow probe access to such regions. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed from the table for emptying and cleaning.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

6.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

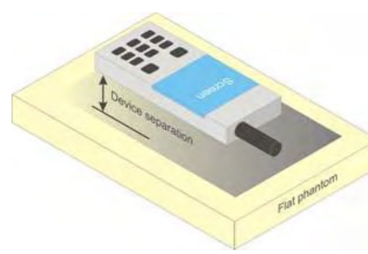


Figure 6-4
Sample Body-Worn Diagram

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

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

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v06, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

6.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 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.

8.2 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.

8.3 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.

8.4 SAR Measurement Conditions for UMTS

8.4.1 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.

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

8.4.3 Body SAR Measurements

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

8.4.4 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.

8.4.5 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.

8.5 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).

8.5.1 Spectrum Plots for RB Configurations

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

8.5.2 MPR

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

8.5.3 A-MPR

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

8.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 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, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

8.5.5 TDD

LTE TDD 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. 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, testing at the other channels was required for such test configurations

8.5.6 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. For every supported combination of downlink only carrier aggregation, additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

8.6 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.

8.6.1 General Device Setup

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

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.

8.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg.

8.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. Each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

8.6.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.

8.6.5 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.

8.6.6 OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.6.7 Initial Test Configuration Procedure

For OFDM, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order IEEE 802.11 mode. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 8.6.6).

8.6.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required.

8.6.9 MIMO SAR considerations

Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D01v06 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is <1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation.

9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

Table 9-1
Maximum Conducted Powers

Maximum Burst-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	33.48	33.57	31.71	30.00	**29.32**	26.36	24.34	23.03	22.04
	190	33.37	33.44	31.59	30.23	**29.23**	26.42	24.31	23.05	21.86
	251	33.18	33.17	31.45	29.81	**28.89**	26.09	24.03	22.76	21.54
GSM 1900	512	30.78	30.75	27.44	**26.10**	24.94	25.64	23.36	21.84	20.43
	661	30.66	30.71	27.43	**26.07**	24.85	25.70	23.48	22.03	20.45
	810	30.88	30.64	27.49	**26.28**	24.82	25.83	23.46	22.25	20.66

Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	24.45	24.54	25.69	25.74	**26.31**	17.33	18.32	18.77	19.03
	190	24.34	24.41	25.57	25.97	**26.22**	17.39	18.29	18.79	18.85
	251	24.15	24.14	25.43	25.55	**25.88**	17.06	18.01	18.50	18.53
GSM 1900	512	21.75	21.72	21.42	**21.84**	21.93	16.61	17.34	17.58	17.42
	661	21.63	21.68	21.41	**21.81**	21.84	16.67	17.46	17.77	17.44
	810	21.85	21.61	21.47	**22.02**	21.81	16.80	17.44	17.99	17.65
GSM 850	Frame Avg.Targets:	24.77	24.77	25.98	26.24	**26.49**	17.97	18.98	19.24	18.99
GSM 1900		22.27	22.27	21.98	**22.24**	21.99	16.97	17.98	18.24	17.99

Note:

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

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

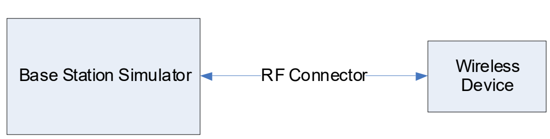


Figure 9-1
Power Measurement Setup

9.2 UMTS Conducted Powers

Table 9-2
Maximum 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	24.75	24.69	24.75	24.00	23.99	23.98	23.77	23.95	23.96	-
99		12.2 kbps AMR	24.77	23.78	24.75	23.94	23.96	23.95	23.79	23.93	23.92	-
6	HSDPA	Subtest 1	24.45	24.47	24.50	24.09	24.06	24.08	23.97	24.75	24.11	0
6		Subtest 2	23.55	23.56	23.61	22.94	22.82	22.95	22.65	23.18	22.85	0
6		Subtest 3	23.63	23.62	23.62	21.92	21.87	21.95	21.97	22.18	21.88	0.5
6		Subtest 4	22.73	22.75	22.74	22.01	22.05	21.97	21.73	22.28	21.98	0.5
6	HSUPA	Subtest 1	23.48	23.46	23.47	21.75	21.60	21.62	22.01	22.13	22.04	0
6		Subtest 2	21.81	21.79	21.84	19.18	19.04	19.08	19.55	19.54	19.52	2
6		Subtest 3	23.53	23.58	23.57	21.48	21.49	21.56	22.04	22.21	22.01	1
6		Subtest 4	21.97	21.96	21.90	19.01	19.09	19.05	19.48	19.81	19.51	2
6		Subtest 5	24.36	24.39	24.41	23.37	23.27	23.25	23.92	24.84	24.00	0

Table 9-3
Reduced – Conducted Powers – Hotspot Mode Active

3GPP Release Version	Mode	3GPP 34.121 Subtest	AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	21.05	21.03	21.06	21.18	21.25	21.22	-
99		12.2 kbps AMR	21.06	21.04	21.07	21.16	21.23	21.20	-
6	HSDPA	Subtest 1	21.23	21.15	21.17	21.20	21.48	21.11	0
6		Subtest 2	21.27	21.17	21.25	21.33	21.50	21.28	0
6		Subtest 3	21.29	21.22	21.25	21.32	21.49	21.25	0.5
6		Subtest 4	21.26	21.21	21.18	21.35	21.50	21.37	0.5
6	HSUPA	Subtest 1	20.48	20.39	20.45	20.48	21.18	20.46	0
6		Subtest 2	19.08	19.01	18.99	19.32	19.71	19.43	2
6		Subtest 3	20.44	20.47	20.50	20.49	21.22	20.50	1
6		Subtest 4	19.04	18.94	18.99	19.36	19.72	19.34	2
6		Subtest 5	21.00	20.98	20.96	21.23	21.78	21.24	0

This device does not support DC-HSDPA.

It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.

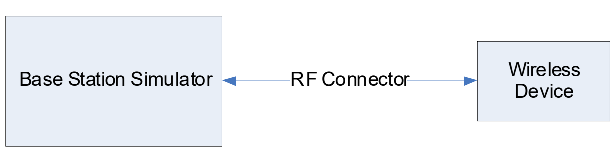


Figure 9-2
Power Measurement Setup

9.3 LTE Conducted Powers

9.3.1 LTE Band 12

Table 9-4
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	**22.76**	0	0
	1	25	22.73		0
	1	49	22.71		0
	25	0	**21.80**	0-1	1
	25	12	21.78		1
	25	25	21.76		1
	50	0	21.79		1
16QAM	1	0	21.50	0-1	1
	1	25	21.52		1
	1	49	21.51		1
	25	0	20.81	0-2	2
	25	12	20.75		2
	25	25	20.72		2
	50	0	20.79		2
64QAM	1	0	20.57	0-2	2
	1	25	20.70		2
	1	49	20.73		2
	25	0	19.37	0-3	3
	25	12	19.37		3
	25	25	19.34		3
	50	0	19.19		3

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 9-5
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	22.46	22.51	22.33	0	0
	1	12	22.56	22.36	22.44		0
	1	24	22.57	22.51	22.35		0
	12	0	21.56	21.41	21.32	0-1	1
	12	6	21.51	21.43	21.37		1
	12	13	21.60	21.50	21.38		1
	25	0	21.51	21.41	21.35		1
16QAM	1	0	21.53	21.35	21.35	0-1	1
	1	12	21.60	21.38	21.32		1
	1	24	21.64	21.60	21.48		1
	12	0	20.51	20.34	20.29	0-2	2
	12	6	20.55	20.30	20.32		2
	12	13	20.50	20.37	20.29		2
	25	0	20.46	20.31	20.37		2
64QAM	1	0	20.68	20.43	20.42	0-2	2
	1	12	20.62	20.49	20.41		2
	1	24	20.57	20.46	20.32		2
	12	0	19.33	19.30	19.24	0-3	3
	12	6	19.39	19.23	19.30		3
	12	13	19.42	19.23	19.32		3
	25	0	19.39	19.27	19.44		3

Table 9-6
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	22.54	22.35	22.28	0	0
	1	7	22.55	22.36	22.25		0
	1	14	22.49	22.32	22.22		0
	8	0	21.55	21.35	21.25	0-1	1
	8	4	21.52	21.37	21.27		1
	8	7	21.56	21.39	21.29		1
	15	0	21.57	21.39	21.30		1
16QAM	1	0	21.58	21.41	21.42	0-1	1
	1	7	21.65	21.33	21.45		1
	1	14	21.77	21.45	21.42		1
	8	0	20.50	20.53	20.28	0-2	2
	8	4	20.56	20.33	20.26		2
	8	7	20.57	20.31	20.23		2
	15	0	20.59	20.30	20.31		2
64QAM	1	0	20.64	20.43	20.20	0-2	2
	1	7	20.69	20.39	20.27		2
	1	14	20.50	20.35	20.24		2
	8	0	19.49	19.36	19.29	0-3	3
	8	4	19.42	19.28	19.22		3
	8	7	19.39	19.37	19.11		3
	15	0	19.31	19.30	19.24		3

Table 9-7
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	22.54	22.45	22.34	0	0
	1	2	22.63	22.37	22.33		0
	1	5	22.55	22.44	22.40		0
	3	0	22.51	22.29	22.36		0
	3	2	22.57	22.42	22.34		0
	3	3	22.55	22.35	22.33		0
	6	0	21.48	21.35	21.33	0-1	1
16QAM	1	0	21.69	21.41	21.35	0-1	1
	1	2	21.51	21.31	21.25		1
	1	5	21.68	21.47	21.22		1
	3	0	21.60	21.34	21.39		1
	3	2	21.53	21.40	21.50		1
	3	3	21.54	21.35	21.43		1
	6	0	20.53	20.34	20.32	0-2	2
64QAM	1	0	20.63	20.45	20.49	0-2	2
	1	2	20.55	20.43	20.34		2
	1	5	20.78	20.58	20.50		2
	3	0	20.63	20.40	20.25		2
	3	2	20.58	20.49	20.23		2
	3	3	20.52	20.37	20.32		2
	6	0	19.33	19.21	19.26	0-3	3

9.3.2 LTE Band 13

Table 9-8
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	**23.43**	0	0
	1	25	23.32		0
	1	49	23.32		0
	25	0	**22.38**	0-1	1
	25	12	22.36		1
	25	25	22.32		1
	50	0	22.37		1
16QAM	1	0	22.18	0-1	1
	1	25	22.17		1
	1	49	22.11		1
	25	0	21.42	0-2	2
	25	12	21.43		2
	25	25	21.39		2
	50	0	21.39		2
64QAM	1	0	21.43	0-2	2
	1	25	21.23		2
	1	49	21.33		2
	25	0	20.26	0-3	3
	25	12	20.30		3
	25	25	20.36		3
	50	0	20.23		3

Table 9-9
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	23.19	0	0
	1	12	23.29		0
	1	24	23.33		0
	12	0	22.20	0-1	1
	12	6	22.18		1
	12	13	22.16		1
	25	0	22.12		1
16QAM	1	0	21.82	0-1	1
	1	12	21.86		1
	1	24	21.75		1
	12	0	21.10	0-2	2
	12	6	21.04		2
	12	13	21.22		2
	25	0	21.03		2
64QAM	1	0	20.80	0-2	2
	1	12	20.78		2
	1	24	20.84		2
	12	0	20.00	0-3	3
	12	6	20.11		3
	12	13	20.09		3
	25	0	20.06		3

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.

9.3.3 LTE Band 5 (Cell)

Table 9-10
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	**24.05**	0	0
	1	25	23.85		0
	1	49	23.83		0
	25	0	**22.90**	0-1	1
	25	12	22.89		1
	25	25	22.86		1
	50	0	22.86		1
16QAM	1	0	22.87	0-1	1
	1	25	22.82		1
	1	49	22.81		1
	25	0	21.97	0-2	2
	25	12	21.95		2
	25	25	21.94		2
	50	0	21.89		2
64QAM	1	0	21.86	0-2	2
	1	25	21.98		2
	1	49	21.88		2
	25	0	20.70	0-3	3
	25	12	20.65		3
	25	25	20.61		3
	50	0	20.76		3

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 9-11
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	23.88	23.78	23.44	0	0
	1	12	23.85	23.81	23.48		0
	1	24	23.86	23.80	23.50		0
	12	0	22.88	22.66	22.37	0-1	1
	12	6	22.82	22.64	22.41		1
	12	13	22.84	22.65	22.37		1
	25	0	22.81	22.64	22.31		1
16QAM	1	0	22.84	22.68	22.30	0-1	1
	1	12	22.77	22.62	22.50		1
	1	24	22.76	22.66	22.38		1
	12	0	21.82	21.72	21.34	0-2	2
	12	6	21.80	21.70	21.25		2
	12	13	21.75	21.65	21.49		2
	25	0	21.83	21.74	21.44		2
64QAM	1	0	21.80	21.43	21.30	0-2	2
	1	12	21.81	21.56	21.33		2
	1	24	21.78	21.65	21.49		2
	12	0	20.80	20.61	20.28	0-3	3
	12	6	20.76	20.53	20.25		3
	12	13	20.73	20.56	20.18		3
	25	0	20.80	20.65	20.30		3

Table 9-12
LTE Band 5 (Cell) Conducted Powers - 3 MHz Bandwidth

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.77	23.66	23.48	0	0
	1	7	23.81	23.65	23.56		0
	1	14	23.83	23.68	23.45		0
	8	0	22.78	22.66	22.36	0-1	1
	8	4	22.81	22.71	22.31		1
	8	7	22.83	22.66	22.36		1
	15	0	22.79	22.71	22.38		1
16QAM	1	0	22.75	22.84	22.42	0-1	1
	1	7	22.73	22.85	22.50		1
	1	14	22.87	22.83	22.49		1
	8	0	21.88	21.79	21.32	0-2	2
	8	4	21.79	21.68	21.35		2
	8	7	21.87	21.69	21.42		2
	15	0	21.90	21.76	21.37		2
64QAM	1	0	21.70	21.84	21.48	0-2	2
	1	7	21.68	21.88	21.49		2
	1	14	21.77	21.73	21.38		2
	8	0	20.78	20.70	20.38	0-3	3
	8	4	20.79	20.61	20.23		3
	8	7	20.73	20.60	20.29		3
	15	0	20.71	20.57	20.23		3

Table 9-13
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	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.85	23.78	23.39	0	0
	1	2	23.91	23.75	23.49		0
	1	5	23.84	23.70	23.37		0
	3	0	23.81	23.64	23.32		0
	3	2	23.79	23.67	23.29		0
	3	3	23.88	23.68	23.28		0
	6	0	22.83	22.68	22.29	0-1	1
16QAM	1	0	22.67	22.73	22.34	0-1	1
	1	2	22.56	22.88	22.32		1
	1	5	22.78	22.73	22.51		1
	3	0	22.72	22.67	22.45		1
	3	2	22.63	22.82	22.34		1
	3	3	22.85	22.78	22.29		1
	6	0	21.82	21.65	21.28	0-2	2
64QAM	1	0	21.78	21.78	21.45	0-2	2
	1	2	21.90	21.70	21.47		2
	1	5	21.81	21.77	21.33		2
	3	0	21.74	21.78	21.40		2
	3	2	21.81	21.76	21.34		2
	3	3	21.83	21.75	21.23		2
	6	0	20.81	20.54	20.27	0-3	3

9.3.4 LTE Band 26 (Cell)

Table 9-14
LTE Band 26 (Cell) Conducted Powers - 15 MHz Bandwidth

LTE Band 26 (Cell) 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 26865 (831.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.92**	0	0
	1	36	22.84		0
	1	74	22.76		0
	36	0	**21.86**	0-1	1
	36	18	21.85		1
	36	37	21.76		1
	75	0	21.81		1
16QAM	1	0	21.86	0-1	1
	1	36	21.75		1
	1	74	21.69		1
	36	0	20.78	0-2	2
	36	18	20.77		2
	36	37	20.73		2
	75	0	20.76		2
64QAM	1	0	20.65	0-2	2
	1	36	20.66		2
	1	74	20.64		2
	36	0	19.58	0-3	3
	36	18	19.51		3
	36	37	19.58		3
	75	0	19.49		3

Note: LTE Band 26 (Cell) at 15 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 9-15
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]
QPSK	1	0	22.44	22.60	22.28	0	0
	1	25	22.46	22.61	22.28		0
	1	49	22.31	22.50	22.25		0
	25	0	21.47	21.55	21.26	0-1	1
	25	12	21.40	21.56	21.25		1
	25	25	21.37	21.49	21.24		1
	50	0	21.49	21.58	21.22		1
16QAM	1	0	21.65	21.61	21.52	0-1	1
	1	25	21.77	21.72	21.55		1
	1	49	21.80	21.56	21.53		1
	25	0	20.50	20.53	20.28	0-2	2
	25	12	20.45	20.59	20.27		2
	25	25	20.34	20.46	20.24		2
	50	0	20.46	20.46	20.32		2
64QAM	1	0	20.58	20.51	20.27	0-2	2
	1	25	20.45	20.52	20.46		2
	1	49	20.46	20.58	20.33		2
	25	0	19.41	19.42	19.18	0-3	3
	25	12	19.37	19.55	19.14		3
	25	25	19.43	19.45	19.17		3
	50	0	19.46	19.38	19.15		3

Table 9-16
LTE Band 26 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26715 (816.5 MHz)	26865 (831.5 MHz)	27015 (846.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.57	22.57	22.25	0	0
	1	12	22.61	22.65	22.22		0
	1	24	22.52	22.61	22.27		0
	12	0	21.44	21.58	21.12	0-1	1
	12	6	21.53	21.57	21.15		1
	12	13	21.49	21.51	21.05		1
	25	0	21.48	21.50	21.23		1
16QAM	1	0	21.45	21.53	21.13	0-1	1
	1	12	21.49	21.44	21.18		1
	1	24	21.47	21.57	21.16		1
	12	0	20.52	20.52	20.08	0-2	2
	12	6	20.46	20.51	20.14		2
	12	13	20.44	20.50	20.05		2
	25	0	20.40	20.48	20.08		2
64QAM	1	0	20.43	20.61	20.22	0-2	2
	1	12	20.40	20.51	20.19		2
	1	24	20.37	20.54	20.11		2
	12	0	19.41	19.44	19.14	0-3	3
	12	6	19.45	19.43	19.09		3
	12	13	19.54	19.45	19.05		3
	25	0	19.44	19.45	19.12		3

Table 9-17
LTE Band 26 (Cell) Conducted Powers - 3 MHz Bandwidth

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26705 (815.5 MHz)	26865 (831.5 MHz)	27025 (847.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.54	22.52	22.13	0	0
	1	7	22.49	22.61	22.18		0
	1	14	22.44	22.57	22.08		0
	8	0	21.48	21.49	21.08	0-1	1
	8	4	21.47	21.52	21.04		1
	8	7	21.46	21.55	21.04		1
	15	0	21.46	21.50	21.11		1
16QAM	1	0	21.53	21.84	21.22	0-1	1
	1	7	21.48	21.81	21.15		1
	1	14	21.57	21.82	21.17		1
	8	0	20.52	20.60	20.05	0-2	2
	8	4	20.48	20.50	20.15		2
	8	7	20.44	20.45	20.14		2
	15	0	20.46	20.44	20.10		2
64QAM	1	0	20.51	20.53	20.20	0-2	2
	1	7	20.61	20.59	20.18		2
	1	14	20.48	20.67	20.14		2
	8	0	19.38	19.52	19.11	0-3	3
	8	4	19.43	19.44	19.10		3
	8	7	19.47	19.53	19.14		3
	15	0	19.46	19.45	19.08		3

Table 9-18
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	22.52	22.59	22.22	0	0
	1	2	22.61	22.66	22.27		0
	1	5	22.59	22.73	22.29		0
	3	0	22.52	22.60	22.20		0
	3	2	22.53	22.61	22.18		0
	3	3	22.55	22.64	22.17		0
	6	0	21.51	21.54	21.11	0-1	1
16QAM	1	0	21.48	21.68	21.19	0-1	1
	1	2	21.49	21.47	21.27		1
	1	5	21.63	21.45	21.12		1
	3	0	21.52	21.62	21.11		1
	3	2	21.46	21.55	21.12		1
	3	3	21.49	21.52	21.13		1
	6	0	20.42	20.44	20.17	0-2	2
64QAM	1	0	20.44	20.77	20.19	0-2	2
	1	2	20.54	20.63	20.16		2
	1	5	20.58	20.65	20.18		2
	3	0	20.57	20.73	20.14		2
	3	2	20.36	20.64	20.19		2
	3	3	20.44	20.69	20.09		2
	6	0	19.37	19.47	19.01	0-3	3

9.3.5 LTE Band 66 (AWS)

Table 9-19
LTE Band 66 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132072 (1720.0 MHz)	132322 (1745.0 MHz)	132572 (1770.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.75	**22.83**	22.69	0	0
	1	50	22.72	22.80	22.62		0
	1	99	22.66	22.77	22.60		0
	50	0	21.82	21.95	21.48	0-1	1
	50	25	21.83	**21.97**	21.50		1
	50	50	21.81	21.94	21.49		1
	100	0	21.87	21.92	21.48		1
16QAM	1	0	22.02	22.09	21.52	0-1	1
	1	50	21.77	22.26	21.56		1
	1	99	21.91	22.06	21.50		1
	50	0	20.88	20.90	20.55	0-2	2
	50	25	20.87	20.94	20.52		2
	50	50	20.89	20.91	20.53		2
	100	0	20.95	20.98	20.57		2
64QAM	1	0	20.74	20.74	20.39	0-2	2
	1	50	20.66	20.82	20.43		2
	1	99	20.64	20.72	20.43		2
	50	0	19.82	19.88	19.47	0-3	3
	50	25	19.81	19.85	19.37		3
	50	50	19.75	19.77	19.32		3
	100	0	19.78	19.84	19.43		3

Table 9-20
LTE Band 66 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.81	22.77	22.29	0	0
	1	36	22.69	22.71	22.24		0
	1	74	22.68	22.79	22.13		0
	36	0	21.72	21.70	21.26	0-1	1
	36	18	21.71	21.75	21.18		1
	36	37	21.65	21.69	21.15		1
	75	0	21.68	21.61	21.20		1
16QAM	1	0	21.57	21.44	21.19	0-1	1
	1	36	21.40	21.41	21.01		1
	1	74	21.43	21.42	21.05		1
	36	0	20.73	20.67	20.23	0-2	2
	36	18	20.66	20.69	20.21		2
	36	37	20.73	20.63	20.23		2
	75	0	20.77	20.70	20.21		2
64QAM	1	0	20.80	20.86	20.35	0-2	2
	1	36	20.68	20.78	20.40		2
	1	74	20.73	20.85	20.21		2
	36	0	19.86	19.90	19.42	0-3	3
	36	18	19.85	19.87	19.36		3
	36	37	19.84	19.86	19.36		3
	75	0	19.81	19.98	19.33		3

Table 9-21
LTE Band 66 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.88	22.83	22.29	0	0
	1	25	22.77	22.80	22.22		0
	1	49	22.87	22.82	22.24		0
	25	0	21.80	21.68	21.18	0-1	1
	25	12	21.72	21.75	21.17		1
	25	25	21.72	21.79	21.25		1
	50	0	21.78	21.65	21.12		1
16QAM	1	0	21.43	21.57	21.00	0-1	1
	1	25	21.45	21.58	21.09		1
	1	49	21.45	21.54	21.03		1
	25	0	20.76	20.67	20.15	0-2	2
	25	12	20.75	20.76	20.14		2
	25	25	20.73	20.73	20.12		2
	50	0	20.74	20.75	20.19		2
64QAM	1	0	20.73	20.77	20.34	0-2	2
	1	25	20.75	20.32	20.27		2
	1	49	20.76	20.20	20.30		2
	25	0	19.81	19.37	19.19	0-3	3
	25	12	19.82	19.35	19.20		3
	25	25	19.77	19.30	19.17		3
	50	0	19.79	19.32	19.19		3

Table 9-22
LTE Band 66 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.99	22.86	22.17	0	0
	1	12	22.82	22.79	22.21		0
	1	24	22.85	22.78	22.18		0
	12	0	21.75	21.62	21.07	0-1	1
	12	6	21.76	21.63	21.13		1
	12	13	21.73	21.71	21.09		1
	25	0	21.80	21.64	21.05		1
16QAM	1	0	21.58	21.42	20.87	0-1	1
	1	12	21.54	21.51	20.94		1
	1	24	21.51	21.43	20.89		1
	12	0	20.81	20.65	20.05	0-2	2
	12	6	20.77	20.63	20.13		2
	12	13	20.69	20.59	20.08		2
	25	0	20.73	20.61	20.04		2
64QAM	1	0	20.75	20.67	20.07	0-2	2
	1	12	20.78	20.73	20.05		2
	1	24	20.75	20.70	20.10		2
	12	0	19.70	19.83	19.04	0-3	3
	12	6	19.74	19.79	19.08		3
	12	13	19.69	19.80	19.07		3
	25	0	19.76	19.70	19.11		3

Table 9-23
LTE Band 66 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131987 (1711.5 MHz)	132322 (1745.0 MHz)	132657 (1778.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.99	22.85	22.24	0	0
	1	7	22.96	22.84	22.20		0
	1	14	23.00	22.79	22.28		0
	8	0	21.92	21.78	21.15	0-1	1
	8	4	21.83	21.70	21.13		1
	8	7	21.84	21.72	21.10		1
	15	0	21.82	21.74	21.12		1
16QAM	1	0	21.68	21.73	20.93	0-1	1
	1	7	21.66	21.75	20.82		1
	1	14	21.71	21.62	20.85		1
	8	0	20.73	20.61	20.05	0-2	2
	8	4	20.78	20.62	20.07		2
	8	7	20.77	20.66	20.20		2
	15	0	20.80	20.73	20.15		2
64QAM	1	0	20.77	20.80	20.06	0-2	2
	1	7	20.84	20.75	20.07		2
	1	14	20.78	20.78	20.08		2
	8	0	19.78	19.79	19.08	0-3	3
	8	4	19.82	19.73	19.06		3
	8	7	19.79	19.75	19.08		3
	15	0	19.79	19.82	19.10		3

Table 9-24
LTE Band 66 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid-High	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131979 (1710.7 MHz)	132208 (1733.6 MHz)	132436 (1756.4 MHz)	132665 (1779.3 MHz)		
			Conducted Power [dBm]					
QPSK	1	0	22.97	22.63	22.67	22.05	0	0
	1	2	23.01	22.56	22.71	22.07		0
	1	5	22.95	22.54	22.65	22.06		0
	3	0	22.88	22.53	22.68	22.07		0
	3	2	22.90	22.57	22.64	22.05		0
	3	3	22.92	22.50	22.62	22.02		0
	6	0	21.90	21.53	21.62	21.03	0-1	1
16QAM	1	0	21.67	21.41	21.58	20.95	0-1	1
	1	2	21.63	21.46	21.45	20.81		1
	1	5	21.75	21.43	21.45	20.78		1
	3	0	21.77	21.54	21.59	20.91		1
	3	2	21.83	21.58	21.63	21.00		1
	3	3	21.85	21.50	21.72	20.99		1
	6	0	20.81	20.58	20.64	20.07	0-2	2
64QAM	1	0	20.85	20.63	20.73	20.05	0-2	2
	1	2	20.86	20.57	20.74	20.11		2
	1	5	20.83	20.61	20.75	20.12		2
	3	0	20.85	20.59	20.71	20.06		2
	3	2	20.81	20.56	20.73	20.11		2
	3	3	20.82	20.55	20.75	20.09		2
	6	0	19.81	19.53	19.65	19.06	0-3	3

Per FCC KDB Publication 447498 D01v06 Section 4.1g), 4 channels are required for LTE Band 66 with 1.4 MHz Bandwidth.

9.3.6 LTE Band 25 (PCS)

Table 9-25
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	22.66	22.76	**22.83**	0	0
	1	50	22.64	22.72	22.82		0
	1	99	22.59	22.67	22.68		0
	50	0	21.73	21.69	**21.90**	0-1	1
	50	25	21.69	21.71	21.89		1
	50	50	21.71	21.67	21.88		1
	100	0	21.68	21.66	21.86		1
16QAM	1	0	21.81	21.83	21.95	0-1	1
	1	50	21.76	21.80	21.88		1
	1	99	21.74	21.76	21.89		1
	50	0	20.78	20.82	20.98	0-2	2
	50	25	20.72	20.73	20.97		2
	50	50	20.71	20.70	20.94		2
	100	0	20.78	20.72	20.99		2
64QAM	1	0	21.24	21.05	21.25	0-2	2
	1	50	21.07	21.11	21.21		2
	1	99	21.05	21.07	21.39		2
	50	0	20.24	20.15	20.22	0-3	3
	50	25	20.13	20.12	20.19		3
	50	50	20.15	20.12	20.18		3
	100	0	20.19	20.10	20.20		3

Table 9-26
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	23.12	23.09	23.17	0	0
	1	36	23.07	23.10	23.15		0
	1	74	23.10	23.09	23.24		0
	36	0	22.04	22.00	22.05	0-1	1
	36	18	22.01	21.98	22.06		1
	36	37	22.00	21.98	22.09		1
	75	0	22.05	21.97	22.08		1
16QAM	1	0	21.97	21.91	21.90	0-1	1
	1	36	21.99	21.89	22.05		1
	1	74	22.00	21.90	21.99		1
	36	0	21.07	21.03	21.11	0-2	2
	36	18	21.08	21.03	21.09		2
	36	37	21.04	21.03	21.12		2
	75	0	21.08	21.03	21.13		2
64QAM	1	0	21.06	21.00	21.12	0-2	2
	1	36	21.05	21.05	21.11		2
	1	74	21.02	20.96	20.95		2
	36	0	20.07	20.05	20.14	0-3	3
	36	18	20.04	20.06	20.10		3
	36	37	20.06	20.02	20.14		3
	75	0	20.05	19.95	20.04		3

Table 9-27
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	23.26	23.15	23.09	0	0
	1	25	23.22	23.04	23.09		0
	1	49	23.19	23.05	23.09		0
	25	0	22.17	22.00	22.00	0-1	1
	25	12	22.16	21.97	22.01		1
	25	25	22.13	22.00	21.97		1
	50	0	22.13	21.97	22.00		1
16QAM	1	0	22.07	21.89	21.92	0-1	1
	1	25	22.04	21.89	21.88		1
	1	49	22.08	21.98	21.95		1
	25	0	21.19	21.02	21.00	0-2	2
	25	12	21.18	21.02	21.00		2
	25	25	21.14	21.02	21.04		2
	50	0	21.17	21.09	21.08		2
64QAM	1	0	21.28	21.02	21.05	0-2	2
	1	25	21.15	20.93	21.11		2
	1	49	21.20	21.01	21.08		2
	25	0	20.16	20.04	20.02	0-3	3
	25	12	20.15	20.04	20.06		3
	25	25	20.13	20.01	20.05		3
	50	0	20.12	20.03	20.01		3

Table 9-28
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	23.12	23.05	23.07	0	0
	1	12	23.08	23.04	23.04		0
	1	24	23.11	23.03	23.02		0
	12	0	22.07	22.01	21.92	0-1	1
	12	6	22.11	21.91	21.90		1
	12	13	22.04	21.91	21.96		1
	25	0	22.04	21.92	21.91		1
16QAM	1	0	22.02	21.84	21.81	0-1	1
	1	12	22.03	21.83	21.91		1
	1	24	21.98	21.84	21.97		1
	12	0	21.00	20.97	21.00	0-2	2
	12	6	21.03	21.03	20.96		2
	12	13	21.03	20.97	20.97		2
	25	0	21.04	20.99	20.92		2
64QAM	1	0	21.00	20.85	20.98	0-2	2
	1	12	21.09	20.94	20.92		2
	1	24	21.02	20.92	20.91		2
	12	0	19.99	19.91	19.90	0-3	3
	12	6	20.05	19.94	19.91		3
	12	13	20.02	19.96	19.95		3
	25	0	20.05	20.01	19.93		3

Table 9-29
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	23.15	23.05	23.03	0	0
	1	7	23.13	23.03	23.00		0
	1	14	23.15	23.05	23.06		0
	8	0	22.10	21.93	21.90	0-1	1
	8	4	22.05	21.93	21.89		1
	8	7	22.00	21.97	21.84		1
	15	0	22.04	21.93	21.82		1
16QAM	1	0	22.13	21.96	21.95	0-1	1
	1	7	21.94	21.78	21.82		1
	1	14	21.91	21.84	21.74		1
	8	0	21.03	20.94	20.86	0-2	2
	8	4	21.09	20.88	20.91		2
	8	7	21.03	20.91	20.85		2
	15	0	21.06	20.96	20.96		2
64QAM	1	0	21.28	20.92	20.91	0-2	2
	1	7	21.11	21.00	20.93		2
	1	14	21.21	21.07	20.95		2
	8	0	20.01	19.90	19.90	0-3	3
	8	4	20.10	19.92	19.90		3
	8	7	20.02	19.88	19.90		3
	15	0	20.10	19.96	19.90		3

Table 9-30
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	23.12	22.93	22.90	0	0
	1	2	23.13	22.95	22.97		0
	1	5	23.02	22.96	22.89		0
	3	0	23.00	22.95	22.95		0
	3	2	23.05	22.94	22.87		0
	3	3	23.03	22.90	22.88		0
	6	0	22.01	21.85	21.83	0-1	1
16QAM	1	0	21.85	21.71	21.75	0-1	1
	1	2	21.89	21.69	21.65		1
	1	5	21.77	21.74	21.63		1
	3	0	21.93	21.75	21.81		1
	3	2	22.05	21.81	21.82		1
	3	3	22.04	21.80	21.72		1
	6	0	21.02	20.83	20.85	0-2	2
64QAM	1	0	21.03	20.88	20.84	0-2	2
	1	2	21.12	20.87	20.85		2
	1	5	21.11	20.85	20.83		2
	3	0	20.95	20.73	20.80		2
	3	2	21.00	20.85	20.72		2
	3	3	20.95	20.77	20.75		2
	6	0	19.95	19.72	19.82	0-3	3

Table 9-31
Reduced LTE Band 25 (PCS) Conducted Powers - 20 MHz Bandwidth – Hotspot Mode Active

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	19.66	19.71	20.00	0	0
	1	50	19.65	19.69	19.98		0
	1	99	19.61	19.67	**20.08**		0
	50	0	19.75	19.72	19.96	0-1	0
	50	25	19.73	19.69	19.96		0
	50	50	19.73	19.68	**19.97**		0
	100	0	19.76	19.70	19.89		0
16QAM	1	0	19.85	19.81	19.90	0-1	0
	1	50	19.79	19.74	19.87		0
	1	99	19.81	19.76	19.85		0
	50	0	19.76	19.67	19.98	0-2	0
	50	25	19.74	19.71	19.97		0
	50	50	19.75	19.71	19.95		0
	100	0	19.79	19.74	19.96		0
64QAM	1	0	19.92	20.05	20.17	0-2	0
	1	50	20.03	20.08	20.10		0
	1	99	19.87	20.03	20.13		0
	50	0	20.05	19.97	20.21	0-3	0
	50	25	20.05	19.92	20.22		0
	50	50	20.05	19.93	20.20		0
	100	0	20.08	20.00	20.24		0

Table 9-32
Reduced LTE Band 25 (PCS) Conducted Powers - 15 MHz Bandwidth – Hotspot Mode Active

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	20.09	20.03	20.10	0	0
	1	36	20.09	20.03	20.10		0
	1	74	20.02	20.04	20.14		0
	36	0	20.04	19.90	20.05	0-1	0
	36	18	19.95	19.99	20.06		0
	36	37	19.97	19.96	20.06		0
	75	0	20.01	19.95	20.07		0
16QAM	1	0	19.85	19.98	19.91	0-1	0
	1	36	19.75	19.80	19.88		0
	1	74	19.84	19.89	20.05		0
	36	0	19.99	19.97	20.10	0-2	0
	36	18	20.00	19.94	20.10		0
	36	37	19.95	19.96	20.07		0
	75	0	20.01	19.95	20.08		0
64QAM	1	0	20.04	19.97	20.17	0-2	0
	1	36	20.14	20.12	20.00		0
	1	74	19.96	19.91	20.10		0
	36	0	20.05	20.01	20.12	0-3	0
	36	18	20.00	19.95	20.09		0
	36	37	20.01	19.98	20.11		0
	75	0	19.98	20.00	20.08		0

Table 9-33
Reduced LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth – Hotspot Mode Active

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	20.27	20.05	20.11	0	0
	1	25	20.21	20.08	20.13		0
	1	49	20.17	20.05	20.22		0
	25	0	20.11	20.00	20.06	0-1	0
	25	12	20.10	20.01	20.11		0
	25	25	20.10	19.98	20.05		0
	50	0	20.11	20.00	20.09		0
16QAM	1	0	20.14	19.92	19.93	0-1	0
	1	25	20.07	19.86	19.94		0
	1	49	19.92	19.73	19.90		0
	25	0	20.13	19.99	20.01	0-2	0
	25	12	20.14	20.02	20.08		0
	25	25	20.12	19.97	20.11		0
	50	0	20.20	20.02	20.14		0
64QAM	1	0	20.07	20.00	20.06	0-2	0
	1	25	20.12	19.95	19.94		0
	1	49	20.21	19.89	19.91		0
	25	0	20.16	20.01	20.08	0-3	0
	25	12	20.15	20.01	20.12		0
	25	25	20.13	20.00	20.10		0
	50	0	20.16	20.01	20.06		0

Table 9-34
Reduced LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth – Hotspot Mode Active

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	20.09	19.97	20.00	0	0
	1	12	20.05	20.05	20.05		0
	1	24	20.02	20.00	20.02		0
	12	0	20.04	19.95	19.93	0-1	0
	12	6	20.05	20.00	19.95		0
	12	13	20.09	19.97	19.99		0
	25	0	20.07	19.94	19.94		0
16QAM	1	0	20.06	19.91	20.00	0-1	0
	1	12	20.15	19.85	20.01		0
	1	24	20.08	19.79	20.06		0
	12	0	20.03	19.91	20.03	0-2	0
	12	6	20.06	19.92	20.00		0
	12	13	20.06	19.89	19.93		0
	25	0	20.05	19.94	19.97		0
64QAM	1	0	20.17	19.83	19.93	0-2	0
	1	12	19.95	19.93	19.78		0
	1	24	20.05	19.77	19.85		0
	12	0	20.08	19.95	19.93	0-3	0
	12	6	20.10	19.92	19.90		0
	12	13	20.05	19.91	19.93		0
	25	0	20.08	19.96	19.93		0

Table 9-35
Reduced LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth – Hotspot Mode Active

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	20.15	20.05	19.99	0	0
	1	7	20.09	20.06	20.00		0
	1	14	20.15	20.00	20.01		0
	8	0	20.14	19.94	19.92	0-1	0
	8	4	20.08	19.93	19.91		0
	8	7	20.10	19.94	19.90		0
	15	0	20.08	19.93	19.90		0
16QAM	1	0	20.01	19.94	19.85	0-1	0
	1	7	19.90	19.83	19.75		0
	1	14	19.93	19.83	19.78		0
	8	0	20.01	19.90	19.91	0-2	0
	8	4	20.01	19.94	19.92		0
	8	7	20.05	19.89	19.89		0
	15	0	20.08	19.94	19.91		0
64QAM	1	0	20.09	19.91	19.96	0-2	0
	1	7	20.06	19.98	20.06		0
	1	14	20.04	20.03	19.93		0
	8	0	20.03	19.93	19.89	0-3	0
	8	4	20.04	19.94	19.90		0
	8	7	20.07	19.92	19.91		0
	15	0	20.04	19.98	19.91		0

Table 9-36
Reduced LTE Band 25 (PCS) Conducted Powers – 1.4 MHz Bandwidth – Hotspot Mode Active

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	20.05	19.94	19.83	0	0
	1	2	20.05	19.95	19.94		0
	1	5	20.09	20.00	19.96		0
	3	0	20.06	19.97	19.87		0
	3	2	20.08	19.92	19.89		0
	3	3	20.03	19.85	19.84		0
	6	0	20.04	19.93	19.85	0-1	0
16QAM	1	0	20.02	19.81	19.69	0-1	0
	1	2	20.04	19.71	19.68		0
	1	5	19.91	19.80	19.75		0
	3	0	19.96	20.01	19.88		0
	3	2	20.01	19.92	19.84		0
	3	3	20.06	19.90	19.77		0
	6	0	20.02	19.84	19.82	0-2	0
64QAM	1	0	20.07	19.97	19.91	0-2	0
	1	2	20.09	19.99	19.80		0
	1	5	20.16	19.95	19.97		0
	3	0	20.01	19.88	19.83		0
	3	2	20.00	19.94	19.91		0
	3	3	20.04	19.88	19.97		0
	6	0	20.01	19.90	19.92	0-3	0

9.3.7 LTE Band 41

Table 9-37
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.17	23.47	23.62	**23.91**	23.41	0	0
	1	50	23.23	23.52	23.67	23.88	23.45		0
	1	99	23.25	23.55	23.71	23.87	23.46		0
	50	0	22.23	22.53	22.81	**22.98**	22.58	0-1	1
	50	25	22.24	22.57	22.82	22.96	22.56		1
	50	50	22.26	22.56	22.85	22.95	22.60		1
	100	0	22.24	22.53	22.81	22.94	22.57		1
16QAM	1	0	21.87	22.53	22.82	22.81	22.50	0-1	1
	1	50	21.89	22.57	22.87	22.79	22.47		1
	1	99	21.91	22.60	22.89	22.80	22.39		1
	50	0	21.42	21.67	21.92	22.13	21.71	0-2	2
	50	25	21.46	21.67	21.93	22.12	21.70		2
	50	50	21.46	21.74	21.97	22.16	21.69		2
	100	0	21.37	21.71	21.98	22.11	21.68		2
64QAM	1	0	21.32	21.50	21.45	21.35	21.73	0-2	2
	1	50	21.23	21.42	21.41	21.42	21.62		2
	1	99	21.18	21.41	21.41	21.36	21.61		2
	50	0	20.32	20.55	20.48	20.45	20.65	0-3	3
	50	25	20.34	20.50	20.54	20.41	20.71		3
	50	50	20.35	20.48	20.54	20.43	20.72		3
	100	0	20.32	20.51	20.52	20.43	20.73		3

Table 9-38
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.87	23.33	23.75	23.82	23.27	0	0
	1	36	22.97	23.36	23.79	23.80	23.28		0
	1	74	23.08	23.34	23.77	23.81	23.25		0
	36	0	21.71	22.07	22.58	22.63	22.09	0-1	1
	36	18	21.72	22.08	22.56	22.61	22.15		1
	36	37	21.76	22.06	22.57	22.62	22.14		1
	75	0	21.72	22.07	22.55	22.63	22.16		1
16QAM	1	0	21.52	21.83	22.59	22.64	22.16	0-1	1
	1	36	21.55	21.81	22.58	22.61	22.17		1
	1	74	21.60	21.82	22.60	22.63	22.18		1
	36	0	20.82	21.15	21.63	21.74	21.28	0-2	2
	36	18	20.86	21.16	21.66	21.72	21.25		2
	36	37	20.88	21.14	21.70	21.73	21.24		2
	75	0	20.80	21.12	21.69	21.74	21.23		2
64QAM	1	0	21.30	21.67	22.08	22.23	21.79	0-2	2
	1	36	21.33	21.62	22.00	22.21	21.73		2
	1	74	21.39	21.64	22.01	22.22	21.71		2
	36	0	20.05	20.61	20.70	20.74	20.21	0-3	3
	36	18	20.12	20.60	20.72	20.72	20.28		3
	36	37	20.17	20.59	20.71	20.73	20.25		3
	75	0	20.16	20.52	20.62	20.61	20.22		3

Table 9-39
LTE Band 41 Conducted Powers - 10 MHz Bandwidth

LTE Band 41 10 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.01	23.43	23.77	23.79	23.32	0	0
	1	25	23.03	23.42	23.73	23.75	23.31		0
	1	49	23.05	23.40	23.68	23.72	23.30		0
	25	0	21.89	22.30	22.65	22.65	22.21	0-1	1
	25	12	21.92	22.28	22.64	22.60	22.24		1
	25	25	21.93	22.27	22.63	22.61	22.21		1
	50	0	21.92	22.30	22.65	22.58	22.17		1
16QAM	1	0	21.53	21.80	22.10	22.13	21.77	0-1	1
	1	25	21.57	21.82	22.02	22.11	21.75		1
	1	49	21.59	21.70	22.09	22.09	21.76		1
	25	0	21.03	21.37	21.60	21.68	21.30	0-2	2
	25	12	21.04	21.32	21.62	21.64	21.25		2
	25	25	21.02	21.33	21.63	21.66	21.23		2
	50	0	21.16	21.45	21.71	21.74	21.37		2
64QAM	1	0	21.08	21.42	21.66	21.70	21.44	0-2	2
	1	25	21.16	21.41	21.69	21.72	21.42		2
	1	49	21.13	21.44	21.63	21.78	21.38		2
	25	0	20.11	20.48	20.78	20.84	20.37	0-3	3
	25	12	20.16	20.49	20.77	20.83	20.39		3
	25	25	20.17	20.50	20.72	20.80	20.37		3
	50	0	20.02	20.35	20.68	20.72	20.25		3

Table 9-40
LTE Band 41 Conducted Powers - 5 MHz Bandwidth

LTE Band 41 5 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.17	23.52	23.77	23.84	23.33	0	0
	1	12	23.21	23.60	23.68	23.75	23.35		0
	1	24	23.25	23.56	23.74	23.83	23.36		0
	12	0	22.01	22.32	22.43	22.53	22.14	0-1	1
	12	6	21.99	22.34	22.48	22.52	22.13		1
	12	13	21.98	22.32	22.51	22.49	22.15		1
	25	0	21.97	22.33	22.45	22.50	22.19		1
16QAM	1	0	21.70	22.12	22.19	22.20	21.88	0-1	1
	1	12	21.72	22.02	22.10	22.17	21.93		1
	1	24	21.71	22.05	22.11	22.13	21.84		1
	12	0	21.11	21.45	21.50	21.58	21.19	0-2	2
	12	6	21.09	21.40	21.56	21.61	21.24		2
	12	13	21.13	21.42	21.57	21.62	21.22		2
	25	0	20.95	21.32	21.48	21.55	21.08		2
64QAM	1	0	21.27	21.71	21.79	21.99	21.48	0-2	2
	1	12	21.30	21.72	21.81	21.89	21.43		2
	1	24	21.32	21.73	21.80	21.88	21.39		2
	12	0	19.95	20.35	20.52	20.54	20.11	0-3	3
	12	6	19.96	20.31	20.49	20.56	20.09		3
	12	13	20.01	20.37	20.53	20.57	20.07		3
	25	0	20.11	20.47	20.67	20.69	20.23		3

9.3.8 LTE Carrier Aggregation Conducted Powers

Table 9-41
Two Component Carrier Maximum Conducted Powers

PCC									SCC				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with DL CA Active (dBm)	LTE Tx Power with DL CA not Active (dBm)
LTE B2	10	18650	1855	QPSK	1	0	650	1935	LTE B12	10	5095	737.5	23.44	23.26
LTE B4	1.4	19957	1710.7	QPSK	1	2	1957	2110.7	LTE B12	10	5095	737.5	22.77	23.01
LTE B4	5	19975	1712.5	QPSK	1	0	1975	2112.5	LTE B17	10	5790	740	22.73	22.99
LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	LTE B2	20	900	1960	22.67	22.76
LTE B66	1.4	131979	1710.7	QPSK	1	2	66443	2110.7	LTE B12	10	5095	737.5	23.01	23.01
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B17	10	5790	740	23.08	22.99
LTE B12	5	23035	701.5	QPSK	1	24	5035	731.5	LTE B12	10	5110	739	22.30	22.57
LTE B41	20	41490	2680	QPSK	1	0	41490	2680	LTE B41	20	41292	2660.2	23.63	23.91
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B66	20	66584	2124.8	22.57	22.99
LTE B12	5	23035	701.5	QPSK	1	24	5035	731.5	LTE B12	5	5515	743.5	22.42	22.57
LTE B41	20	41490	2680	QPSK	1	0	41490	2680	LTE B41	5	39675	2498.5	23.55	23.91
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B66	5	67311	2197.5	22.53	22.99
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B66	15	66560	2122.4	22.67	22.99

Table 9-42
Three Component Carrier Maximum Conducted Powers

PCC									SCC 1				SCC 2				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with DL CA Active (dBm)	LTE Tx Power with DL CA not Active (dBm)
LTE B4	5	19975	1712.5	QPSK	1	0	1975	2112.5	LTE B12	5	5095	737.5	LTE B12	5	5020	730	22.41	22.99
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B12	10	5095	737.5	LTE B66	20	66584	2124.8	22.23	22.99
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B66	10	66536	2120	LTE B17	10	5120	740	22.29	22.99
LTE B41	20	41490	2680	QPSK	1	0	41490	2680	LTE B41	20	41292	2660.2	LTE B41	20	41094	2640.4	23.30	23.91
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B66	5	67311	2197.5	LTE B12	10	5095	737.5	22.55	22.99
LTE B66	5	131997	1712.5	QPSK	1	0	66461	2112.5	LTE B66	5	67311	2197.5	LTE B17	10	5120	740	22.76	22.99

Table 9-43
Two Component Carrier Reduced Conducted Powers – Hotspot Mode Active

PCC									SCC				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with DL CA Active (dBm)	LTE Tx Power with DL CA not Active (dBm)
LTE B2	10	18650	1855	QPSK	1	0	650	1935	LTE B12	10	5095	737.5	20.19	20.27
LTE B2	10	18650	1855	QPSK	1	0	650	1935	LTE B41	20	40620	2593	20.13	20.27

Notes:

1. The device only supports downlink Carrier Aggregation. Uplink Carrier Aggregation is not supported. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.
2. All control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
3. For downlink carrier aggregation combinations, PCC uplink channel was selected based on section C)3)b)ii) of KBD 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intraband CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component

carriers. All selected downlink channels remained fully within the downlink transmission band of the respective component carrier.

4. Since the supported frequency span for LTE B2/4 falls completely within the supported frequency span for LTE B25/66, LTE B2/4 have the same target power as LTE B25/66, and LTE B2/4 share the same transmission path as LTE B25/66, the configuration with the highest conducted power from LTE B25/66 was used to assess LTE CA combinations with LTE B2/4.

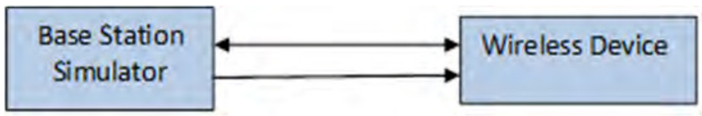


Figure 9-3
Power Measurement Setup

9.4 WLAN Conducted Powers

Table 9-44
2.4 GHz WLAN Maximum Average RF Power – Antenna 1

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11b	802.11g
2412	1	**20.48**	17.91
2437	6	19.58	18.22
2462	11	20.33	17.83

Table 9-45
2.4 GHz WLAN Maximum Average RF Power – Antenna 2

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11b	802.11g
2412	1	20.19	17.85
2437	6	19.97	17.84
2462	11	**20.32**	17.85

Table 9-46
5 GHz WLAN Maximum Average RF Power – Antenna 1

Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
5180	36	17.68	17.65	17.75
5200	40	17.59	17.68	17.84
5220	44	17.61	17.62	17.59
5240	48	17.71	17.73	17.75
5260	52	**17.72**	17.67	17.64
5280	56	17.70	17.64	17.73
5300	60	17.57	17.73	17.64
5320	64	17.64	17.65	17.63
5500	100	17.52	17.65	17.67
5600	120	17.63	17.68	17.70
5620	124	**17.65**	17.58	17.73
5720	144	17.58	17.54	17.55
5745	149	**17.47**	17.43	17.52
5785	157	17.46	17.45	17.29
5825	165	17.40	17.31	17.35

Table 9-47
5 GHz WLAN Maximum Average RF Power – Antenna 2

Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
5180	36	18.05	18.11	18.06
5200	40	18.19	18.19	18.15
5220	44	18.18	18.33	18.31
5240	48	18.29	18.32	18.18
5260	52	17.88	18.08	17.84
5280	56	**18.28**	18.15	17.92
5300	60	18.19	18.28	18.04
5320	64	18.23	18.27	18.10
5500	100	**18.44**	18.45	18.39
5600	120	18.41	18.46	18.18
5620	124	18.35	18.47	18.38
5720	144	18.13	18.19	18.23
5745	149	18.39	18.26	17.98
5785	157	**18.43**	18.19	18.27
5825	165	18.05	18.01	18.02

Table 9-48
2.4 GHz WLAN Reduced Average RF Power – Antenna 1

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	14.60	15.14	14.94
2437	6	15.06	15.22	15.15
2462	11	**15.50**	14.95	14.94

Table 9-49
2.4 GHz WLAN Reduced Average RF Power – Antenna 2

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	15.40	15.04	14.93
2437	6	14.60	15.17	15.07
2462	11	**15.49**	15.08	14.95

Table 9-50
5 GHz WLAN Reduced Average RF Power – Antenna 1

5GHz (80MHz) Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11ac
5210	42	12.78
5290	58	**13.09**
5530	106	12.91
5610	122	12.92
5690	138	**12.95**
5775	155	**12.80**

Table 9-51
5 GHz WLAN Reduced Average RF Power – Antenna 2

5GHz (80MHz) Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11ac
5210	42	12.98
5290	58	**12.96**
5530	106	**13.11**
5610	122	12.86
5690	138	12.85
5775	155	**13.39**

Table 9-52
Maximum Output Powers During Operations with Simultaneous 2.4 GHz and 5 GHz WLAN

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]	
		802.11n	
		ANT1	ANT2
2412	1	13.43	12.91
2437	6	**13.49**	**12.95**
2462	11	13.18	12.71
Freq [MHz]	**Channel**	**5GHz (80MHz) Conducted Power [dBm]**	
		802.11ac	
		ANT1	**ANT2**
5210	42	12.78	12.98
5290	58	**13.09**	**12.96**
5530	106	**12.91**	**13.11**
5610	122	12.92	12.86
5690	138	12.95	12.85
5775	155	**12.80**	**13.39**

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.

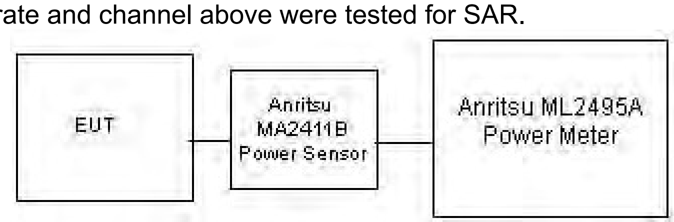


Figure 9-4
Power Measurement Setup for Bandwidths < 50 MHz

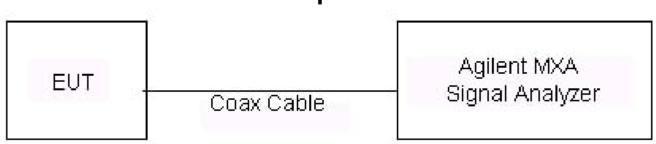


Figure 9-5
Power Measurement Setup for Bandwidths > 50 MHz

9.5 Bluetooth Conducted Powers and Duty Cycle Calculation

Table 9-53
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power [dBm]	Avg Conducted Power [mW]
2402	1.0	0	12.89	19.457
2441	1.0	39	**13.73**	23.605
2480	1.0	78	12.32	17.069
2402	2.0	0	6.06	4.040
2441	2.0	39	**6.63**	4.605
2480	2.0	78	5.71	3.724
2402	3.0	0	6.32	4.283
2441	3.0	39	6.78	4.767
2480	3.0	78	5.84	3.840

Note: The bolded data rate and channel above were tested for SAR.

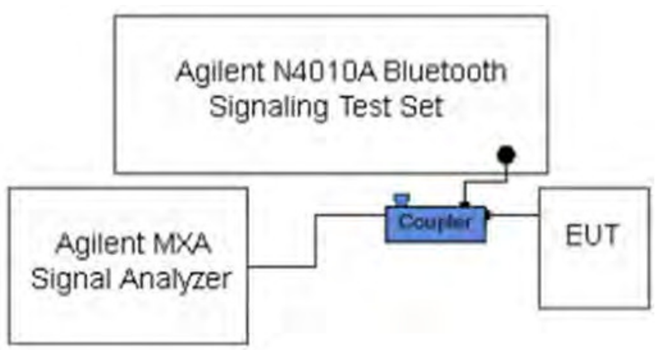


Figure 9-6
Power Measurement Setup

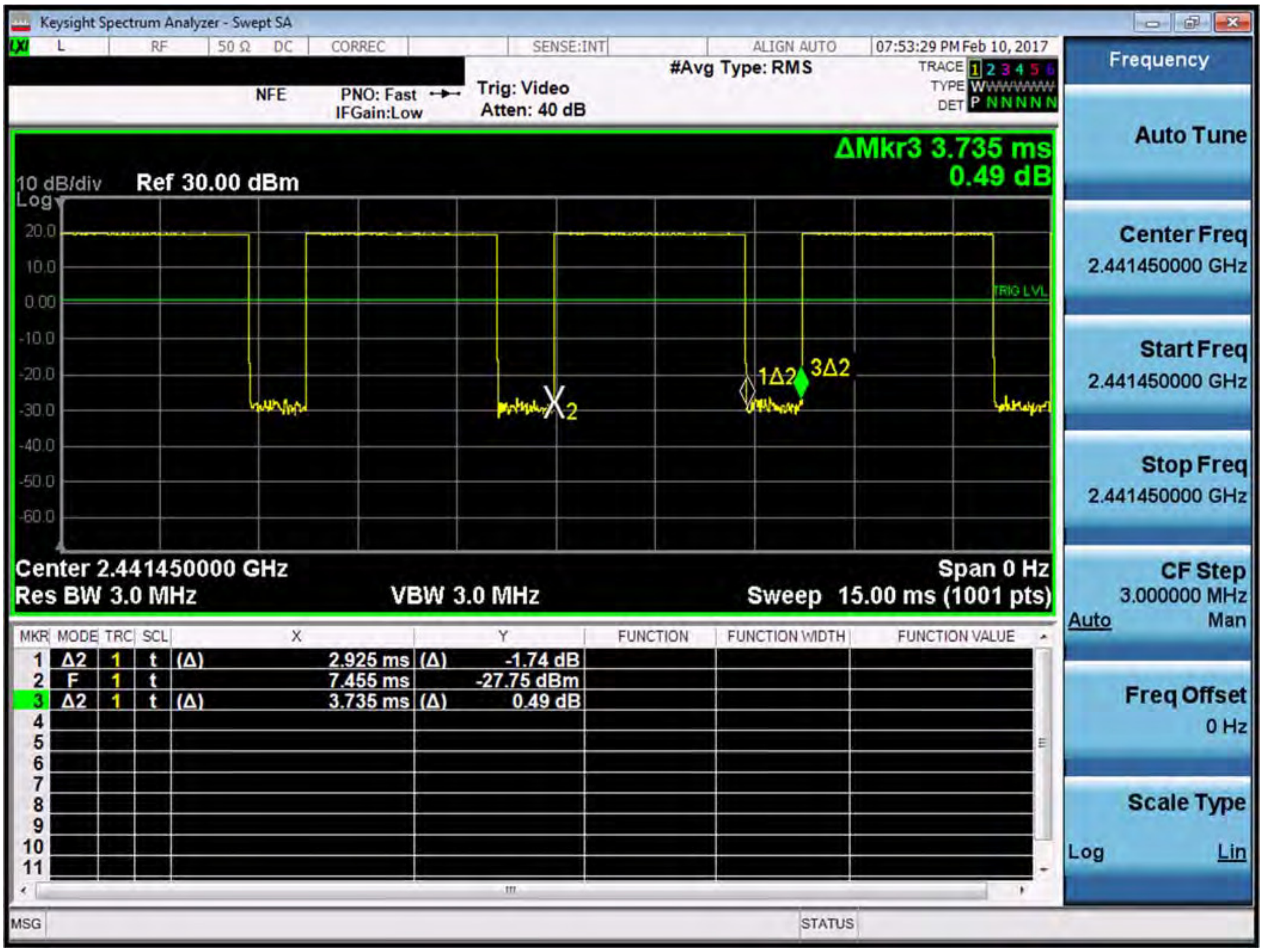


Figure 9-7
Bluetooth Transmission Plot

Equation 9-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.925\ ms}{3.735\ ms} * 100\% = 78.3\%$$

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Head Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
1/11/2017	750H	24.0	700	0.858	42.940	0.889	42.201	-3.49%	1.75%
			710	0.869	42.779	0.890	42.149	-2.36%	1.49%
			740	0.895	42.392	0.893	41.994	0.22%	0.95%
			755	0.910	42.109	0.894	41.916	1.79%	0.46%
			770	0.926	41.907	0.895	41.838	3.46%	0.16%
			785	0.940	41.708	0.896	41.760	4.91%	-0.12%
1/9/2017	835H	20.7	820	0.896	41.795	0.899	41.578	-0.33%	0.52%
			835	0.911	41.612	0.900	41.500	1.22%	0.27%
			850	0.925	41.418	0.916	41.500	0.98%	-0.20%
1/12/2017	1750H	23.6	1710	1.306	39.371	1.348	40.142	-3.12%	-1.92%
			1750	1.342	39.159	1.371	40.079	-2.12%	-2.30%
			1790	1.387	39.017	1.394	40.016	-0.50%	-2.50%
1/20/2017	1750H	23.0	1710	1.374	38.911	1.348	40.142	1.93%	-3.07%
			1750	1.415	38.753	1.371	40.079	3.21%	-3.31%
			1790	1.450	38.547	1.394	40.016	4.02%	-3.67%
1/2/2017	1900H	22.3	1850	1.393	40.423	1.400	40.000	-0.50%	1.06%
			1880	1.426	40.280	1.400	40.000	1.86%	0.70%
			1910	1.464	40.179	1.400	40.000	4.57%	0.45%
2/2/2017	1900H	22.7	1850	1.381	39.325	1.400	40.000	-1.36%	-1.69%
			1880	1.416	39.273	1.400	40.000	1.14%	-1.82%
			1910	1.442	39.135	1.400	40.000	3.00%	-2.16%
1/22/2017	2450H	24.0	2400	1.814	38.386	1.756	39.289	3.30%	-2.30%
			2450	1.869	38.155	1.800	39.200	3.83%	-2.67%
			2500	1.931	37.926	1.855	39.136	4.10%	-3.09%
1/7/2017	2600H	24.0	2600	2.035	39.750	1.964	39.009	3.62%	1.90%
			2650	2.105	39.665	2.018	38.945	4.31%	1.85%
			2700	2.148	39.377	2.073	38.882	3.62%	1.27%
01/23/2017	5250H-5750H	20.3	5240	4.554	34.993	4.696	35.940	-3.02%	-2.63%
			5260	4.590	34.983	4.717	35.917	-2.69%	-2.60%
			5280	4.598	34.958	4.737	35.894	-2.93%	-2.61%
			5300	4.613	34.928	4.758	35.871	-3.05%	-2.63%
			5520	4.831	34.614	4.983	35.620	-3.05%	-2.82%
			5540	4.852	34.604	5.004	35.597	-3.04%	-2.79%
			5600	4.914	34.502	5.065	35.529	-2.98%	-2.89%
			5680	4.990	34.446	5.147	35.437	-3.05%	-2.80%
			5700	5.014	34.373	5.168	35.414	-2.98%	-2.94%
			5745	5.070	34.326	5.214	35.363	-2.76%	-2.93%
			5765	5.085	34.297	5.234	35.340	-2.85%	-2.95%
			5785	5.101	34.275	5.255	35.317	-2.93%	-2.95%

Table 10-2
Measured Body Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
1/6/2017	750B	24.0	700	0.912	54.463	0.959	55.726	-4.90%	-2.27%
			710	0.921	54.360	0.960	55.687	-4.06%	-2.38%
			725	0.935	54.216	0.961	55.629	-2.71%	-2.54%
			740	0.948	54.071	0.963	55.570	-1.56%	-2.70%
			755	0.962	53.903	0.964	55.512	-0.21%	-2.90%
1/9/2017	750B	21.4	740	0.948	55.911	0.963	55.570	-1.56%	0.61%
			755	0.962	55.711	0.964	55.512	-0.21%	0.36%
			770	0.976	55.517	0.965	55.453	1.14%	0.12%
			785	0.990	55.345	0.966	55.395	2.48%	-0.09%
1/14/2017	835B	20.7	820	0.988	54.753	0.969	55.258	1.96%	-0.91%
			835	1.000	54.577	0.970	55.200	3.09%	-1.13%
			850	1.014	54.472	0.988	55.154	2.63%	-1.24%
1/7/2017	1750B	22.0	1710	1.421	51.494	1.463	53.537	-2.87%	-3.82%
			1750	1.463	51.348	1.488	53.432	-1.68%	-3.90%
			1790	1.517	51.220	1.514	53.326	0.20%	-3.95%
1/23/2017	1750B	22.0	1710	1.464	51.733	1.463	53.537	0.07%	-3.37%
			1750	1.506	51.573	1.488	53.432	1.21%	-3.48%
			1790	1.550	51.401	1.514	53.326	2.38%	-3.61%
1/31/2017	1750B	21.0	1710	1.478	51.483	1.463	53.537	1.03%	-3.84%
			1750	1.519	51.330	1.488	53.432	2.08%	-3.93%
			1790	1.568	51.140	1.514	53.326	3.57%	-4.10%
1/4/2017	1900B	23.5	1850	1.490	52.446	1.520	53.300	-1.97%	-1.60%
			1880	1.525	52.359	1.520	53.300	0.33%	-1.77%
			1910	1.556	52.278	1.520	53.300	2.37%	-1.92%
2/6/2017	1900B	23.0	1850	1.483	52.043	1.520	53.300	-2.43%	-2.36%
			1880	1.517	51.960	1.520	53.300	-0.20%	-2.51%
			1910	1.553	51.906	1.520	53.300	2.17%	-2.62%
1/17/2017	2450B	22.6	2400	1.966	51.398	1.902	52.767	3.36%	-2.59%
			2450	2.036	51.192	1.950	52.700	4.41%	-2.86%
			2500	2.099	50.988	2.021	52.636	3.86%	-3.13%
1/21/2017	2450B	21.9	2400	1.964	51.507	1.902	52.767	3.26%	-2.39%
			2450	2.028	51.322	1.950	52.700	4.00%	-2.61%
			2500	2.101	51.080	2.021	52.636	3.96%	-2.96%
1/24/2017	2450B	23.0	2400	1.908	51.547	1.902	52.767	0.32%	-2.31%
			2450	1.973	51.355	1.950	52.700	1.18%	-2.55%
			2500	2.043	51.151	2.021	52.636	1.09%	-2.82%
2/20/2017	2600B	22.3	2600	2.255	51.721	2.163	52.509	4.25%	-1.50%
			2650	2.331	51.542	2.234	52.445	4.34%	-1.72%
			2700	2.397	51.317	2.305	52.382	3.99%	-2.03%
01/22/2017	5250B-5750B	21.9	5240	5.489	47.916	5.346	48.960	2.67%	-2.13%
			5260	5.515	47.894	5.369	48.933	2.72%	-2.12%
			5280	5.551	47.844	5.393	48.906	2.93%	-2.17%
			5500	5.831	47.495	5.650	48.607	3.20%	-2.29%
			5600	5.972	47.325	5.766	48.471	3.57%	-2.36%
			5620	5.997	47.282	5.790	48.444	3.58%	-2.40%
			5745	6.172	47.057	5.936	48.275	3.98%	-2.52%
			5765	6.196	47.001	5.959	48.248	3.98%	-2.58%
			5785	6.232	47.029	5.982	48.220	4.18%	-2.47%

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 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

10.2 Test System Verification

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

Table 10-3
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
I	750	HEAD	01/11/2017	23.8	23.8	0.200	1161	3209	1.580	8.170	7.900	-3.30%
H	835	HEAD	01/09/2017	22.2	21.1	0.200	4d133	3319	1.850	9.320	9.250	-0.75%
I	1750	HEAD	01/12/2017	23.6	23.0	0.100	1148	3209	3.700	36.200	37.000	2.21%
I	1750	HEAD	01/20/2017	23.5	23.0	0.100	1148	3209	3.510	36.200	35.100	-3.04%
G	1900	HEAD	01/02/2017	24.3	22.3	0.100	5d149	3287	4.130	40.100	41.300	2.99%
I	1900	HEAD	02/02/2017	22.7	22.7	0.100	5d080	3209	3.870	39.300	38.700	-1.53%
G	2450	HEAD	01/22/2017	23.2	22.5	0.100	981	3287	5.640	52.800	56.400	6.82%
G	2600	HEAD	01/07/2017	23.0	22.8	0.100	1126	3287	5.930	56.300	59.300	5.33%
J	5250	HEAD	01/23/2017	20.9	20.3	0.050	1191	7357	3.880	78.900	77.600	-1.65%
J	5600	HEAD	01/23/2017	20.9	20.3	0.050	1191	7357	4.120	83.600	82.400	-1.44%
J	5750	HEAD	01/23/2017	20.9	20.3	0.050	1191	7357	3.910	79.100	78.200	-1.14%
F	750	BODY	01/06/2017	21.8	22.0	0.200	1161	3332	1.620	8.430	8.100	-3.91%
F	750	BODY	01/09/2017	23.3	21.4	0.200	1054	3332	1.680	8.560	8.400	-1.87%
H	835	BODY	01/14/2017	22.6	21.5	0.200	4d133	3319	2.010	9.500	10.050	5.79%
I	1750	BODY	01/07/2017	23.0	22.0	0.100	1008	3209	3.770	37.300	37.700	1.07%
I	1750	BODY	01/23/2017	23.6	23.0	0.100	1148	3209	3.930	37.100	39.300	5.93%
E	1750	BODY	01/31/2017	24.5	22.0	0.100	1148	7406	3.570	37.100	35.700	-3.77%
K	1900	BODY	01/04/2017	24.0	23.5	0.100	5d149	7409	4.220	39.900	42.200	5.76%
J	1900	BODY	02/06/2017	22.7	22.8	0.100	5d149	3334	4.190	39.900	41.900	5.01%
E	2450	BODY	01/17/2017	24.2	22.6	0.100	981	7406	5.090	50.800	50.900	0.20%
E	2450	BODY	01/21/2017	23.5	21.9	0.100	981	7406	4.920	50.800	49.200	-3.15%
E	2450	BODY	01/24/2017	24.0	23.0	0.100	981	7406	4.940	50.800	49.400	-2.76%
E	2600	BODY	02/20/2017	22.5	22.0	0.100	1071	7406	5.600	54.200	56.000	3.32%
D	5250	BODY	01/22/2017	21.9	21.4	0.050	1237	3914	3.490	74.800	69.800	-6.68%
D	5600	BODY	01/22/2017	21.9	21.4	0.050	1237	3914	3.950	77.000	79.000	2.60%
D	5750	BODY	01/22/2017	21.9	21.4	0.050	1237	3914	3.430	75.400	68.600	-9.02%

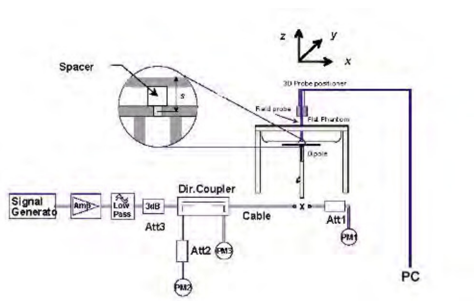


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS													
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	34.3	33.37	0.02	Right	Cheek	1EF5D	1:8.3	0.295	1.239	0.366	A1
836.60	190	GSM 850	GSM	34.3	33.37	-0.07	Right	Tilt	1EF5D	1:8.3	0.103	1.239	0.128	
836.60	190	GSM 850	GSM	34.3	33.37	-0.01	Left	Cheek	1EF5D	1:8.3	0.225	1.239	0.279	
836.60	190	GSM 850	GSM	34.3	33.37	0.01	Left	Tilt	1EF5D	1:8.3	0.095	1.239	0.118	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-2
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Ant State	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.0	24.69	-0.01	Right	Cheek	1	1EC3B	1:1	0.351	1.074	0.377	A2
836.60	4183	UMTS 850	RMC	25.0	24.69	0.04	Right	Tilt	1	1EC3B	1:1	0.132	1.074	0.142	
836.60	4183	UMTS 850	RMC	25.0	24.69	0.06	Left	Cheek	1	1EC3B	1:1	0.287	1.074	0.308	
836.60	4183	UMTS 850	RMC	25.0	24.69	0.06	Left	Tilt	1	1EC3B	1:1	0.130	1.074	0.140	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-3
UMTS 1750 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	25.0	23.99	0.06	Right	Cheek	0786A	1:1	0.148	1.262	0.187	
1732.40	1412	UMTS 1750	RMC	25.0	23.99	0.03	Right	Tilt	0786A	1:1	0.103	1.262	0.130	
1732.40	1412	UMTS 1750	RMC	25.0	23.99	0.01	Left	Cheek	0786A	1:1	0.240	1.262	0.303	A3
1732.40	1412	UMTS 1750	RMC	25.0	23.99	-0.01	Left	Tilt	0786A	1:1	0.103	1.262	0.130	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
GSM 1900 Head SAR

MEASUREMENT RESULTS													
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	31.8	30.66	-0.15	Right	Cheek	1EF5D	1:8.3	0.081	1.300	0.105	
1880.00	661	GSM 1900	GSM	31.8	30.66	-0.17	Right	Tilt	1EF5D	1:8.3	0.042	1.300	0.055	
1880.00	661	GSM 1900	GSM	31.8	30.66	0.18	Left	Cheek	1EF5D	1:8.3	0.140	1.300	0.182	A4
1880.00	661	GSM 1900	GSM	31.8	30.66	0.14	Left	Tilt	1EF5D	1:8.3	0.037	1.300	0.048	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	25.0	23.95	0.18	Right	Cheek	0792B	1:1	0.184	1.274	0.234	
1880.00	9400	UMTS 1900	RMC	25.0	23.95	0.03	Right	Tilt	0792B	1:1	0.091	1.274	0.116	
1880.00	9400	UMTS 1900	RMC	25.0	23.95	0.07	Left	Cheek	0792B	1:1	0.260	1.274	0.331	A5
1880.00	9400	UMTS 1900	RMC	25.0	23.95	0.02	Left	Tilt	0792B	1:1	0.064	1.274	0.082	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-6
LTE Band 12 Head SAR

MEASUREMENT RESULTS																		
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	-0.11	0	Right	Cheek	QPSK	1	0	1F7F8	1:1	0.080	1.242	0.099	A6
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.05	1	Right	Cheek	QPSK	25	0	1F7F8	1:1	0.059	1.230	0.073	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	-0.06	0	Right	Tilt	QPSK	1	0	1F7F8	1:1	0.044	1.242	0.055	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.10	1	Right	Tilt	QPSK	25	0	1F7F8	1:1	0.033	1.230	0.041	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	0.14	0	Left	Cheek	QPSK	1	0	1F7F8	1:1	0.051	1.242	0.063	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.19	1	Left	Cheek	QPSK	25	0	1F7F8	1:1	0.037	1.230	0.046	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	-0.01	0	Left	Tilt	QPSK	1	0	1F7F8	1:1	0.057	1.242	0.071	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.03	1	Left	Tilt	QPSK	25	0	1F7F8	1:1	0.041	1.230	0.050	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-7
LTE Band 13 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.05	0	Right	Cheek	QPSK	1	0	1F7F8	1:1	0.148	1.140	0.169	A7
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.16	1	Right	Cheek	QPSK	25	0	1F7F8	1:1	0.122	1.153	0.141	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.14	0	Right	Tilt	QPSK	1	0	1F7F8	1:1	0.062	1.140	0.071	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.16	1	Right	Tilt	QPSK	25	0	1F7F8	1:1	0.056	1.153	0.065	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.03	0	Left	Cheek	QPSK	1	0	1F7F8	1:1	0.100	1.140	0.114	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.09	1	Left	Cheek	QPSK	25	0	1F7F8	1:1	0.077	1.153	0.089	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.17	0	Left	Tilt	QPSK	1	0	1F7F8	1:1	0.059	1.140	0.067	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.18	1	Left	Tilt	QPSK	25	0	1F7F8	1:1	0.039	1.153	0.045	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-8
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Ant State	Modulation	RB Size	RB Offset	Device Serial Number	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	24.9	24.05	0.02	0	Right	Cheek	1	QPSK	1	0	1F7FD	1:1	0.283	1.216	0.344	A8
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.03	1	Right	Cheek	1	QPSK	25	0	1F7FD	1:1	0.215	1.259	0.271	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.03	0	Right	Tilt	1	QPSK	1	0	1F7FD	1:1	0.115	1.216	0.140	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.01	1	Right	Tilt	1	QPSK	25	0	1F7FD	1:1	0.070	1.259	0.088	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	0.07	0	Left	Cheek	1	QPSK	1	0	1F7FD	1:1	0.226	1.216	0.275	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.06	1	Left	Cheek	1	QPSK	25	0	1F7FD	1:1	0.174	1.259	0.219	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.02	0	Left	Tilt	1	QPSK	1	0	1F7FD	1:1	0.122	1.216	0.148	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.01	1	Left	Tilt	1	QPSK	25	0	1F7FD	1:1	0.090	1.259	0.113	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-9
LTE Band 26 (Cell) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	0.07	0	Right	Cheek	QPSK	1	0	1F7FD	1:1	0.188	1.282	0.241	A9
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	0.06	1	Right	Cheek	QPSK	36	0	1F7FD	1:1	0.165	1.300	0.215	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	-0.02	0	Right	Tilt	QPSK	1	0	1F7FD	1:1	0.074	1.282	0.095	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	-0.11	1	Right	Tilt	QPSK	36	0	1F7FD	1:1	0.063	1.300	0.082	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	0.01	0	Left	Cheek	QPSK	1	0	1F7FD	1:1	0.139	1.282	0.178	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	0.12	1	Left	Cheek	QPSK	36	0	1F7FD	1:1	0.119	1.300	0.155	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	0.12	0	Left	Tilt	QPSK	1	0	1F7FD	1:1	0.062	1.282	0.079	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	0.12	1	Left	Tilt	QPSK	36	0	1F7FD	1:1	0.053	1.300	0.069	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-10
LTE Band 66 (AWS) Head SAR

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	0.02	0	Right	Cheek	QPSK	1	0	1F7FD	1:1	0.129	1.167	0.151	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.05	1	Right	Cheek	QPSK	50	25	1F7FD	1:1	0.092	1.130	0.104	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	0.05	0	Right	Tilt	QPSK	1	0	1F7FD	1:1	0.068	1.167	0.079	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.11	1	Right	Tilt	QPSK	50	25	1F7FD	1:1	0.053	1.130	0.060	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	0.08	0	Left	Cheek	QPSK	1	0	1F7FD	1:1	0.224	1.167	0.261	A10
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.06	1	Left	Cheek	QPSK	50	25	1F7FD	1:1	0.160	1.130	0.181	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	0.09	0	Left	Tilt	QPSK	1	0	1F7FD	1:1	0.069	1.167	0.081	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.07	1	Left	Tilt	QPSK	50	25	1F7FD	1:1	0.052	1.130	0.059	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Head 1.6 W/kg (mW/g) averaged over 1 gram

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

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
1905.00	26590	High	LTE Band 25 (PCS)	20	24.0	22.83	0.14	0	Right	Cheek	QPSK	1	0	1F7FD	1:1	0.179	1.309	0.234	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.0	21.90	-0.16	1	Right	Cheek	QPSK	50	0	1F7FD	1:1	0.143	1.288	0.184	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.0	22.83	-0.10	0	Right	Tilt	QPSK	1	0	1F7FD	1:1	0.087	1.309	0.114	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.0	21.90	0.02	1	Right	Tilt	QPSK	50	0	1F7FD	1:1	0.068	1.288	0.088	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.0	22.83	0.00	0	Left	Cheek	QPSK	1	0	1F7FD	1:1	0.232	1.309	0.304	A11
1905.00	26590	High	LTE Band 25 (PCS)	20	23.0	21.90	0.00	1	Left	Cheek	QPSK	50	0	1F7FD	1:1	0.186	1.288	0.240	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.0	22.83	-0.20	0	Left	Tilt	QPSK	1	0	1F7FD	1:1	0.076	1.309	0.099	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.0	21.90	0.14	1	Left	Tilt	QPSK	50	0	1F7FD	1:1	0.059	1.288	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

Table 11-12
LTE Band 41 Head SAR

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.06	0	Right	Cheek	QPSK	1	0	1F7F8	1:1.58	0.062	1.146	0.071	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.03	1	Right	Cheek	QPSK	50	0	1F7F8	1:1.58	0.037	1.127	0.042	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.05	0	Right	Tilt	QPSK	1	0	1F7F8	1:1.58	0.058	1.146	0.066	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.13	1	Right	Tilt	QPSK	50	0	1F7F8	1:1.58	0.044	1.127	0.050	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.12	0	Left	Cheek	QPSK	1	0	1F7F8	1:1.58	0.089	1.146	0.102	A12
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.06	1	Left	Cheek	QPSK	50	0	1F7F8	1:1.58	0.071	1.127	0.080	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.17	0	Left	Tilt	QPSK	1	0	1F7F8	1:1.58	0.040	1.146	0.046	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	-0.10	1	Left	Tilt	QPSK	50	0	1F7F8	1:1.58	0.034	1.127	0.038	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	Head 1.6 W/kg (mW/g) averaged over 1 gram

Table 11-13
DTS Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	15.5	15.50	0.07	Right	Cheek	1	0786A	1	99.6	0.436	0.442	1.000	1.004	0.444	A13
2462	11	802.11b	DSSS	22	15.5	15.50	-0.01	Right	Tilt	1	0786A	1	99.6	0.373	0.321	1.000	1.004	0.322	
2462	11	802.11b	DSSS	22	15.5	15.50	0.14	Left	Cheek	1	0786A	1	99.6	0.156	-	1.000	1.004	-	
2462	11	802.11b	DSSS	22	15.5	15.50	0.15	Left	Tilt	1	0786A	1	99.6	0.151	-	1.000	1.004	-	
2462	11	802.11b	DSSS	22	15.5	15.49	0.07	Right	Cheek	2	0786A	1	99.9	0.448	0.405	1.002	1.001	0.406	
2462	11	802.11b	DSSS	22	15.5	15.49	0.14	Right	Tilt	2	0786A	1	99.9	0.286	0.261	1.002	1.001	0.262	
2462	11	802.11b	DSSS	22	15.5	15.49	-0.17	Left	Cheek	2	0786A	1	99.9	0.219	-	1.002	1.001	-	
2462	11	802.11b	DSSS	22	15.5	15.49	-0.03	Left	Tilt	2	0786A	1	99.9	0.131	-	1.002	1.001	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-14
NII Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5290	58	802.11ac	OFDM	80	13.5	13.09	0.18	Right	Cheek	1	0786A	29.3	98.0	0.073	-	1.099	1.020	-	
5290	58	802.11ac	OFDM	80	13.5	13.09	0.12	Right	Tilt	1	0786A	29.3	98.0	0.047	-	1.099	1.020	-	
5290	58	802.11ac	OFDM	80	13.5	13.09	0.19	Left	Cheek	1	0786A	29.3	98.0	0.074	0.022	1.099	1.020	0.025	
5290	58	802.11ac	OFDM	80	13.5	13.09	0.18	Left	Tilt	1	0786A	29.3	98.0	0.052	-	1.099	1.020	-	
5290	58	802.11ac	OFDM	80	13.5	12.96	0.17	Right	Cheek	2	0786A	29.3	98.8	0.389	-	1.132	1.012	-	
5290	58	802.11ac	OFDM	80	13.5	12.96	0.19	Right	Tilt	2	0786A	29.3	98.8	0.438	-	1.132	1.012	-	
5290	58	802.11ac	OFDM	80	13.5	12.96	0.13	Left	Cheek	2	0786A	29.3	98.8	0.438	0.140	1.132	1.012	0.160	
5290	58	802.11ac	OFDM	80	13.5	12.96	0.11	Left	Tilt	2	0786A	29.3	98.8	0.242	-	1.132	1.012	-	
5690	138	802.11ac	OFDM	80	13.5	12.95	0.13	Right	Cheek	1	0786A	29.3	98.0	0.088	-	1.135	1.020	-	
5690	138	802.11ac	OFDM	80	13.5	12.95	0.10	Right	Tilt	1	0786A	29.3	98.0	0.081	-	1.135	1.020	-	
5690	138	802.11ac	OFDM	80	13.5	12.95	0.12	Left	Cheek	1	0786A	29.3	98.0	0.082	-	1.135	1.020	-	
5690	138	802.11ac	OFDM	80	13.5	12.95	0.13	Left	Tilt	1	0786A	29.3	98.0	0.156	0.017	1.135	1.020	0.020	
5530	106	802.11ac	OFDM	80	13.5	13.11	0.13	Right	Cheek	2	0786A	29.3	98.8	0.096	-	1.094	1.012	-	
5530	106	802.11ac	OFDM	80	13.5	13.11	0.12	Right	Tilt	2	0786A	29.3	98.8	0.102	0.062	1.094	1.012	0.069	
5530	106	802.11ac	OFDM	80	13.5	13.11	0.16	Left	Cheek	2	0786A	29.3	98.8	0.084	-	1.094	1.012	-	
5530	106	802.11ac	OFDM	80	13.5	13.11	0.17	Left	Tilt	2	0786A	29.3	98.8	0.066	-	1.094	1.012	-	
5775	155	802.11ac	OFDM	80	13.5	12.80	0.13	Right	Cheek	1	0786A	29.3	98.0	0.077	0.115	1.175	1.020	0.138	
5775	155	802.11ac	OFDM	80	13.5	12.80	0.11	Right	Tilt	1	0786A	29.3	98.0	0.067	-	1.175	1.020	-	
5775	155	802.11ac	OFDM	80	13.5	12.80	0.12	Left	Cheek	1	0786A	29.3	98.0	0.064	-	1.175	1.020	-	
5775	155	802.11ac	OFDM	80	13.5	12.80	0.10	Left	Tilt	1	0786A	29.3	98.0	0.051	-	1.175	1.020	-	
5775	155	802.11ac	OFDM	80	13.5	13.39	0.14	Right	Cheek	2	0786A	29.3	98.8	0.279	0.148	1.026	1.012	0.154	A14
5775	155	802.11ac	OFDM	80	13.5	13.39	0.16	Right	Tilt	2	0786A	29.3	98.8	0.205	-	1.026	1.012	-	
5775	155	802.11ac	OFDM	80	13.5	13.39	0.16	Left	Cheek	2	0786A	29.3	98.8	0.136	-	1.026	1.012	-	
5775	155	802.11ac	OFDM	80	13.5	13.39	0.11	Left	Tilt	2	0786A	29.3	98.8	0.093	-	1.026	1.012	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-15
Bluetooth Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441.00	39	Bluetooth	FHSS	7.0	6.63	0.16	Right	Cheek	0786A	2	78.3	0.029	1.089	1.277	0.040	A15
2441.00	39	Bluetooth	FHSS	7.0	6.63	0.09	Right	Tilt	0786A	2	78.3	0.019	1.089	1.277	0.026	
2441.00	39	Bluetooth	FHSS	7.0	6.63	0.19	Left	Cheek	0786A	2	78.3	0.012	1.089	1.277	0.017	
2441.00	39	Bluetooth	FHSS	7.0	6.63	0.13	Left	Tilt	0786A	2	78.3	0.006	1.089	1.277	0.008	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram								

11.2 Standalone Body-Worn SAR Data

Table 11-16
GSM/UMTS Body-Worn SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Ant State	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	34.3	33.37	-0.04	15 mm	N/A	1EF5D	1	1:8.3	back	0.490	1.239	0.607	A16
836.60	4183	UMTS 850	RMC	25.0	24.69	0.02	15 mm	1	1EC3B	N/A	1:1	back	0.505	1.074	0.542	A18
1732.40	1412	UMTS 1750	RMC	25.0	23.99	-0.01	15 mm	N/A	0786A	N/A	1:1	back	0.591	1.262	0.746	A20
1880.00	661	GSM 1900	GSM	31.8	30.66	-0.06	15 mm	N/A	1EF5D	1	1:8.3	back	0.332	1.300	0.432	A22
1880.00	9400	UMTS 1900	RMC	25.0	23.95	0.06	15 mm	N/A	0786A	N/A	1:1	back	0.287	1.274	0.366	A24
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-17
LTE Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Ant State	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	23.7	22.76	0.05	0	N/A	1F7EB	QPSK	1	0	15 mm	back	1:1	0.163	1.242	0.202	A26
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.02	1	N/A	1F7EB	QPSK	25	0	15 mm	back	1:1	0.128	1.230	0.157	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.02	0	N/A	1F7FD	QPSK	1	0	15 mm	back	1:1	0.212	1.140	0.242	A28
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	-0.02	1	N/A	1F7FD	QPSK	25	0	15 mm	back	1:1	0.179	1.153	0.206	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.02	0	1	1F7FD	QPSK	1	0	15 mm	back	1:1	0.369	1.216	0.449	A30
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	-0.07	1	1	1F7FD	QPSK	25	0	15 mm	back	1:1	0.307	1.259	0.387	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	-0.01	0	N/A	1F7FD	QPSK	1	0	15 mm	back	1:1	0.294	1.282	0.377	A32
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	-0.02	1	N/A	1F7FD	QPSK	36	0	15 mm	back	1:1	0.242	1.300	0.315	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	-0.13	0	N/A	0786A	QPSK	1	0	15 mm	back	1:1	0.484	1.167	0.565	A34
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.05	1	N/A	0786A	QPSK	50	25	15 mm	back	1:1	0.353	1.130	0.399	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.0	22.83	0.10	0	N/A	1F7FD	QPSK	1	0	15 mm	back	1:1	0.487	1.309	0.637	A36
1905.00	26590	High	LTE Band 25 (PCS)	20	23.0	21.90	0.00	1	N/A	1F7FD	QPSK	50	0	15 mm	back	1:1	0.378	1.288	0.487	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.04	0	N/A	0786A	QPSK	1	0	15 mm	back	1:1.58	0.213	1.146	0.244	A38
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.06	1	N/A	0786A	QPSK	50	0	15 mm	back	1:1.58	0.176	1.127	0.198	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-18
DTS Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	20.5	20.48	0.09	15 mm	1	0786A	1	back	99.6	0.147	0.105	1.005	1.004	0.106	A40
2462	11	802.11b	DSSS	22	20.5	20.32	0.11	15 mm	2	0786A	1	back	99.9	0.109	0.078	1.042	1.001	0.081	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-19
DTS MIMO Operations with Simultaneous 2.4 GHz and 5 GHz WLAN Body-worn SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Ant 1 Conducted Power [dBm]	Ant 2 Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														W/kg	(W/kg)			(W/kg)	
2437	6	802.11n	OFDM	20	13.5	13.49	12.95	0.12	15 mm	MIMO	0786A	13	back	97.8	0.061	0.041	1.135	1.022	0.048	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

DTS MIMO was additionally evaluated at the maximum allowed output power for operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 5GHz WIFI was not transmitting during the above evaluations

Table 11-20
NII Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	18.5	17.72	-0.17	15 mm	1	0786A	6	back	99.0	0.228	0.118	1.197	1.010	0.143	
5280	56	802.11a	OFDM	20	18.5	18.28	0.16	15 mm	2	0786A	6	back	99.3	0.312	0.156	1.052	1.007	0.165	
5620	124	802.11a	OFDM	20	18.5	17.65	0.21	15 mm	1	0786A	6	back	99.0	0.153	0.064	1.216	1.010	0.079	
5500	100	802.11a	OFDM	20	18.5	18.44	0.00	15 mm	2	0786A	6	back	99.3	0.297	0.154	1.014	1.007	0.157	
5745	149	802.11a	OFDM	20	18.5	17.47	0.08	15 mm	1	0786A	6	back	99.0	0.212	0.112	1.268	1.010	0.143	
5785	157	802.11a	OFDM	20	18.5	18.43	0.03	15 mm	2	0786A	6	back	99.3	0.538	0.254	1.016	1.007	**0.260**	A42
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-21
NII MIMO Operations with Simultaneous 2.4 GHz and 5 GHz WLAN Body-worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Ant 1 Conducted Power [dBm]	Ant 2 Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														W/kg	(W/kg)			(W/kg)	
5290	58	802.11ac	OFDM	80	13.5	13.09	12.96	0.16	15 mm	MIMO	0786A	58.5	back	97.5	0.071	0.023	1.132	1.026	0.027	
5530	106	802.11ac	OFDM	80	13.5	12.91	13.11	0.18	15 mm	MIMO	0786A	58.5	back	97.5	0.065	0.023	1.146	1.026	0.027	
5775	155	802.11ac	OFDM	80	13.5	12.80	13.39	0.13	15 mm	MIMO	0786A	58.5	back	97.5	0.180	0.059	1.175	1.026	0.071	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

NII MIMO was additionally evaluated at the maximum allowed output power for operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 2.4 GHz WIFI was not transmitting during the above evaluations

Table 11-22
Bluetooth Body-Worn SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	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)	
2441	39	Bluetooth	FHSS	14.0	13.73	-0.10	15 mm	1EF00	1	back	78.3	0.016	1.064	1.277	**0.022**	A43
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

11.3 Standalone Hotspot SAR Data

Table 11-23
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Ant State	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
824.20	128	GSM 850	GPRS	30.0	29.32	-0.02	10 mm	N/A	1EF5D	4	1:2.076	back	0.561	1.169	0.656	
836.60	190	GSM 850	GPRS	30.0	29.23	-0.03	10 mm	N/A	1EF5D	4	1:2.076	back	0.683	1.194	0.816	
848.80	251	GSM 850	GPRS	30.0	28.89	-0.05	10 mm	N/A	1EF5D	4	1:2.076	back	0.736	1.291	0.950	A17
836.60	190	GSM 850	GPRS	30.0	29.23	-0.04	10 mm	N/A	1EF5D	4	1:2.076	front	0.619	1.194	0.739	
836.60	190	GSM 850	GPRS	30.0	29.23	0.01	10 mm	N/A	1EF5D	4	1:2.076	bottom	0.395	1.194	0.472	
836.60	190	GSM 850	GPRS	30.0	29.23	-0.06	10 mm	N/A	1EF5D	4	1:2.076	right	0.588	1.194	0.702	
836.60	190	GSM 850	GPRS	30.0	29.23	0.00	10 mm	N/A	1EF5D	4	1:2.076	left	0.162	1.194	0.193	
836.60	4183	UMTS 850	RMC	25.0	24.69	-0.05	10 mm	1	1EC3B	N/A	1:1	back	0.730	1.074	0.784	A19
836.60	4183	UMTS 850	RMC	25.0	24.69	-0.02	10 mm	1	1EC3B	N/A	1:1	front	0.612	1.074	0.657	
836.60	4183	UMTS 850	RMC	25.0	24.69	-0.01	10 mm	1	1EC3B	N/A	1:1	bottom	0.345	1.074	0.371	
836.60	4183	UMTS 850	RMC	25.0	24.69	0.02	10 mm	1	1EC3B	N/A	1:1	right	0.546	1.074	0.586	
836.60	4183	UMTS 850	RMC	25.0	24.69	0.02	10 mm	1	1EC3B	N/A	1:1	left	0.197	1.074	0.212	
1732.40	1412	UMTS 1750	RMC	22.0	21.03	0.01	10 mm	N/A	0786A	N/A	1:1	back	0.470	1.250	0.588	
1732.40	1412	UMTS 1750	RMC	22.0	21.03	-0.02	10 mm	N/A	0786A	N/A	1:1	front	0.412	1.250	0.515	
1732.40	1412	UMTS 1750	RMC	22.0	21.03	0.06	10 mm	N/A	0786A	N/A	1:1	bottom	0.529	1.250	0.661	A21
1732.40	1412	UMTS 1750	RMC	22.0	21.03	-0.04	10 mm	N/A	0786A	N/A	1:1	left	0.224	1.250	0.280	
1880.00	661	GSM 1900	GPRS	27.0	26.07	0.07	10 mm	N/A	1EF5D	3	1:2.76	back	0.485	1.239	0.601	
1880.00	661	GSM 1900	GPRS	27.0	26.07	0.09	10 mm	N/A	1EF5D	3	1:2.76	front	0.415	1.239	0.514	
1850.20	512	GSM 1900	GPRS	27.0	26.10	-0.03	10 mm	N/A	1EF5D	3	1:2.76	bottom	0.737	1.230	0.907	A23
1880.00	661	GSM 1900	GPRS	27.0	26.07	-0.02	10 mm	N/A	1EF5D	3	1:2.76	bottom	0.681	1.239	0.844	
1909.80	810	GSM 1900	GPRS	27.0	26.28	0.00	10 mm	N/A	1EF5D	3	1:2.76	bottom	0.630	1.180	0.743	
1880.00	661	GSM 1900	GPRS	27.0	26.07	0.15	10 mm	N/A	1EF5D	3	1:2.76	left	0.155	1.239	0.192	
1880.00	9400	UMTS 1900	RMC	22.0	21.25	-0.05	10 mm	N/A	0786A	N/A	1:1	back	0.512	1.189	0.609	
1880.00	9400	UMTS 1900	RMC	22.0	21.25	0.02	10 mm	N/A	0786A	N/A	1:1	front	0.474	1.189	0.564	
1852.40	9262	UMTS 1900	RMC	22.0	21.18	-0.01	10 mm	N/A	0786A	N/A	1:1	bottom	0.829	1.208	1.001	
1880.00	9400	UMTS 1900	RMC	22.0	21.25	-0.10	10 mm	N/A	0786A	N/A	1:1	bottom	0.919	1.189	**1.093**	A25
1907.60	9538	UMTS 1900	RMC	22.0	21.22	-0.11	10 mm	N/A	0786A	N/A	1:1	bottom	0.811	1.197	0.971	
1880.00	9400	UMTS 1900	RMC	22.0	21.25	-0.03	10 mm	N/A	0786A	N/A	1:1	left	0.218	1.189	0.259	
1880.00	9400	UMTS 1900	RMC	22.0	21.25	-0.08	10 mm	N/A	0786A	N/A	1:1	bottom	0.919	1.189	**1.093**	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry represents variability data

Table 11-24
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	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	23.7	22.76	-0.08	0	1F7EB	QPSK	1	0	10 mm	back	1:1	0.248	1.242	0.308	A27
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	-0.04	1	1F7EB	QPSK	25	0	10 mm	back	1:1	0.191	1.230	0.235	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	-0.12	0	1F7EB	QPSK	1	0	10 mm	front	1:1	0.212	1.242	0.263	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.06	1	1F7EB	QPSK	25	0	10 mm	front	1:1	0.163	1.230	0.200	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	0.00	0	1F7EB	QPSK	1	0	10 mm	bottom	1:1	0.134	1.242	0.166	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	0.10	1	1F7EB	QPSK	25	0	10 mm	bottom	1:1	0.102	1.230	0.125	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	0.19	0	1F7EB	QPSK	1	0	10 mm	right	1:1	0.150	1.242	0.186	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	-0.02	1	1F7EB	QPSK	25	0	10 mm	right	1:1	0.126	1.230	0.155	
707.50	23095	Mid	LTE Band 12	10	23.7	22.76	-0.02	0	1F7EB	QPSK	1	0	10 mm	left	1:1	0.047	1.242	0.058	
707.50	23095	Mid	LTE Band 12	10	22.7	21.80	-0.03	1	1F7EB	QPSK	25	0	10 mm	left	1:1	0.039	1.230	0.048	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-25
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	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	24.0	23.43	0.08	0	1F7FD	QPSK	1	0	10 mm	back	1:1	0.347	1.140	0.396	A29
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.02	1	1F7FD	QPSK	25	0	10 mm	back	1:1	0.268	1.153	0.309	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.03	0	1F7FD	QPSK	1	0	10 mm	front	1:1	0.299	1.140	0.341	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.05	1	1F7FD	QPSK	25	0	10 mm	front	1:1	0.227	1.153	0.262	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	-0.02	0	1F7FD	QPSK	1	0	10 mm	bottom	1:1	0.183	1.140	0.209	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.01	1	1F7FD	QPSK	25	0	10 mm	bottom	1:1	0.126	1.153	0.145	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.20	0	1F7FD	QPSK	1	0	10 mm	right	1:1	0.173	1.140	0.197	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	-0.02	1	1F7FD	QPSK	25	0	10 mm	right	1:1	0.144	1.153	0.166	
782.00	23230	Mid	LTE Band 13	10	24.0	23.43	0.02	0	1F7FD	QPSK	1	0	10 mm	left	1:1	0.075	1.140	0.086	
782.00	23230	Mid	LTE Band 13	10	23.0	22.38	0.02	1	1F7FD	QPSK	25	0	10 mm	left	1:1	0.075	1.153	0.086	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-26
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Ant State	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	24.9	24.05	-0.02	0	1	1F7FD	QPSK	1	0	10 mm	back	1:1	0.656	1.216	0.798	A31
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	-0.07	1	1	1F7FD	QPSK	25	0	10 mm	back	1:1	0.525	1.259	0.661	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.07	0	1	1F7FD	QPSK	1	0	10 mm	front	1:1	0.530	1.216	0.644	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.07	1	1	1F7FD	QPSK	25	0	10 mm	front	1:1	0.420	1.259	0.529	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.05	0	1	1F7FD	QPSK	1	0	10 mm	bottom	1:1	0.296	1.216	0.360	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.01	1	1	1F7FD	QPSK	25	0	10 mm	bottom	1:1	0.233	1.259	0.293	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.03	0	1	1F7FD	QPSK	1	0	10 mm	right	1:1	0.387	1.216	0.471	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.03	1	1	1F7FD	QPSK	25	0	10 mm	right	1:1	0.320	1.259	0.403	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.9	24.05	-0.05	0	1	1F7FD	QPSK	1	0	10 mm	left	1:1	0.109	1.216	0.133	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.9	22.90	0.07	1	1	1F7FD	QPSK	25	0	10 mm	left	1:1	0.091	1.259	0.115	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-27
LTE Band 26 (Cell) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	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)	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	0.01	0	1F7FD	QPSK	1	0	10 mm	back	1:1	0.436	1.282	0.559	A33
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	-0.09	1	1F7FD	QPSK	36	0	10 mm	back	1:1	0.347	1.300	0.451	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	-0.02	0	1F7FD	QPSK	1	0	10 mm	front	1:1	0.386	1.282	0.495	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	-0.08	1	1F7FD	QPSK	36	0	10 mm	front	1:1	0.314	1.300	0.408	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	0.00	0	1F7FD	QPSK	1	0	10 mm	bottom	1:1	0.221	1.282	0.283	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	0.00	1	1F7FD	QPSK	36	0	10 mm	bottom	1:1	0.177	1.300	0.230	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	-0.05	0	1F7FD	QPSK	1	0	10 mm	right	1:1	0.261	1.282	0.335	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	-0.05	1	1F7FD	QPSK	36	0	10 mm	right	1:1	0.231	1.300	0.300	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.92	0.06	0	1F7FD	QPSK	1	0	10 mm	left	1:1	0.102	1.282	0.131	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.0	21.86	0.06	1	1F7FD	QPSK	36	0	10 mm	left	1:1	0.093	1.300	0.121	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-28
LTE Band 66 (AWS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	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)	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.5	22.75	0.10	0	0786A	QPSK	1	0	10 mm	back	1:1	0.706	1.189	0.839	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	-0.03	0	0786A	QPSK	1	0	10 mm	back	1:1	0.799	1.167	0.932	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	22.69	-0.10	0	0786A	QPSK	1	0	10 mm	back	1:1	0.827	1.205	0.997	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.07	1	0786A	QPSK	50	25	10 mm	back	1:1	0.582	1.130	0.658	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.92	0.12	1	0786A	QPSK	100	0	10 mm	back	1:1	0.595	1.143	0.680	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	-0.06	0	0786A	QPSK	1	0	10 mm	front	1:1	0.663	1.167	0.774	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	-0.10	1	0786A	QPSK	50	25	10 mm	front	1:1	0.528	1.130	0.597	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.5	22.75	-0.11	0	0786A	QPSK	1	0	10 mm	bottom	1:1	0.737	1.189	0.876	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	0.04	0	0786A	QPSK	1	0	10 mm	bottom	1:1	0.833	1.167	0.972	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	22.69	-0.01	0	0786A	QPSK	1	0	10 mm	bottom	1:1	0.907	1.205	**1.093**	A35
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	0.00	1	0786A	QPSK	50	25	10 mm	bottom	1:1	0.685	1.130	0.774	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.92	0.12	1	0786A	QPSK	100	0	10 mm	bottom	1:1	0.715	1.143	0.817	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.5	22.83	0.09	0	0786A	QPSK	1	0	10 mm	left	1:1	0.329	1.167	0.384	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.5	21.97	-0.06	1	0786A	QPSK	50	25	10 mm	left	1:1	0.230	1.130	0.260	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.5	22.69	-0.07	0	0786A	QPSK	1	0	10 mm	bottom	1:1	0.892	1.205	1.075	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Note: Blue entry represents variability data

Table 11-29
LTE Band 25 (PCS) Hotspot SAR

MEASUREMENT RESULTS																		
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	20.08	0.00	0	0786A	QPSK	1	99	10 mm	back	1:1	0.437	1.236	0.540	
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	19.97	0.02	0	0786A	QPSK	50	50	10 mm	back	1:1	0.425	1.268	0.539	
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	20.08	0.02	0	0786A	QPSK	1	99	10 mm	front	1:1	0.424	1.236	0.524	
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	19.97	0.04	0	0786A	QPSK	50	50	10 mm	front	1:1	0.415	1.268	0.526	
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	20.08	0.03	0	0786A	QPSK	1	99	10 mm	bottom	1:1	0.589	1.236	0.728	
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	19.97	0.02	0	0786A	QPSK	50	50	10 mm	bottom	1:1	0.594	1.268	0.753	A37
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	20.08	0.12	0	0786A	QPSK	1	99	10 mm	left	1:1	0.127	1.236	0.157	
1905.00	26590	High	LTE Band 25 (PCS)	20	21.0	19.97	-0.09	0	0786A	QPSK	50	50	10 mm	left	1:1	0.123	1.268	0.156	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-30
LTE Band 41 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.06	0	0786A	QPSK	1	0	10 mm	back	1:1.58	0.385	1.146	0.441	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	-0.03	1	0786A	QPSK	50	0	10 mm	back	1:1.58	0.327	1.127	0.369	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.02	0	0786A	QPSK	1	0	10 mm	front	1:1.58	0.295	1.146	0.338	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.00	1	0786A	QPSK	50	0	10 mm	front	1:1.58	0.254	1.127	0.286	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	0.09	0	0786A	QPSK	1	0	10 mm	bottom	1:1.58	0.454	1.146	0.520	A39
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.14	1	0786A	QPSK	50	0	10 mm	bottom	1:1.58	0.377	1.127	0.425	
2636.50	41055	Mid-High	LTE Band 41	20	24.5	23.91	-0.01	0	0786A	QPSK	1	0	10 mm	left	1:1.58	0.223	1.146	0.256	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.98	0.05	1	0786A	QPSK	50	0	10 mm	left	1:1.58	0.188	1.127	0.212	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-31
WLAN Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	20.5	20.48	0.07	10 mm	1	0786A	1	back	99.6	0.360	-	1.005	1.004	-	
2412	1	802.11b	DSSS	22	20.5	20.48	0.14	10 mm	1	0786A	1	front	99.6	0.252	-	1.005	1.004	-	
2412	1	802.11b	DSSS	22	20.5	20.48	0.09	10 mm	1	0786A	1	top	99.6	0.370	0.242	1.005	1.004	0.244	A41
2412	1	802.11b	DSSS	22	20.5	20.48	0.05	10 mm	1	0786A	1	left	99.6	0.129	-	1.005	1.004	-	
2462	11	802.11b	DSSS	22	20.5	20.32	-0.05	10 mm	2	0786A	1	back	99.9	0.295	0.201	1.042	1.001	0.210	
2462	11	802.11b	DSSS	22	20.5	20.32	0.19	10 mm	2	0786A	1	front	99.9	0.200	-	1.042	1.001	-	
2462	11	802.11b	DSSS	22	20.5	20.32	0.10	10 mm	2	0786A	1	top	99.9	0.117	-	1.042	1.001	-	
2462	11	802.11b	DSSS	22	20.5	20.32	0.17	10 mm	2	0786A	1	left	99.9	0.134	-	1.042	1.001	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-32
Bluetooth Hotspot SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	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)	
2441	39	Bluetooth	FHSS	7.0	6.63	-0.18	10 mm	0786A	2	back	78.3	0.018	1.089	1.277	0.025	A44
2441	39	Bluetooth	FHSS	7.0	6.63	0.11	10 mm	0786A	2	front	78.3	0.013	1.089	1.277	0.018	
2441	39	Bluetooth	FHSS	7.0	6.63	0.12	10 mm	0786A	2	top	78.3	0.007	1.089	1.277	0.010	
2441	39	Bluetooth	FHSS	7.0	6.63	0.11	10 mm	0786A	2	left	78.3	0.009	1.089	1.277	0.013	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram								

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and 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. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).

10. This device supports dynamic antenna tuning for some bands. Per FCC Guidance, SAR was measured according to the normally required SAR measurement configurations with the tuner active. The auto-tune state determined by the device was verified before and after each SAR measurement and is listed in the tables above. Please see Section 14 for supplemental data.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. Per FCC KDB Publication 447498 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 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.

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 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 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. 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, 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.
6. Per KDB Publication 941225 D05Av01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain 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 8.6.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 8.6.6 for more information.
4. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06 by either evaluating the sum of the 1g SAR values of each antenna transmitting independently or making a SAR measurement with both antennas transmitting simultaneously. Please see Section 12 for complete analysis.
5. 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.
6. 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.

Bluetooth Notes:

1. Body Worn Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 9.5 for the time-domain plot and calculation for the duty factor of the device.
2. Head and Hotspot Bluetooth SAR was evaluated for BT EDR tethering applications.
3. Head and Hotspot Bluetooth SAR were measured with the device connected to a call box with hopping disabled with 2DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 9.5 for the time-domain plot and calculation for the duty factor of the device.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 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.

12.2 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 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 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.

12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM 850	0.366	0.444	0.406	0.810	0.772	1.216
	UMTS 850	0.377	0.444	0.406	0.821	0.783	**1.227**
	UMTS 1750	0.303	0.444	0.406	0.747	0.709	1.153
	GSM 1900	0.182	0.444	0.406	0.626	0.588	1.032
	UMTS 1900	0.331	0.444	0.406	0.775	0.737	1.181
	LTE Band 12	0.099	0.444	0.406	0.543	0.505	0.949
	LTE Band 13	0.169	0.444	0.406	0.613	0.575	1.019
	LTE Band 5 (Cell)	0.344	0.444	0.406	0.788	0.750	1.194
	LTE Band 26 (Cell)	0.241	0.444	0.406	0.685	0.647	1.091
	LTE Band 66 (AWS)	0.261	0.444	0.406	0.705	0.667	1.111
	LTE Band 25 (PCS)	0.304	0.444	0.406	0.748	0.710	1.154
	LTE Band 41	0.102	0.444	0.406	0.546	0.508	0.952

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM 850	0.366	0.138	0.160	0.504	0.526	0.664
	UMTS 850	0.377	0.138	0.160	0.515	0.537	**0.675**
	UMTS 1750	0.303	0.138	0.160	0.441	0.463	0.601
	GSM 1900	0.182	0.138	0.160	0.320	0.342	0.480
	UMTS 1900	0.331	0.138	0.160	0.469	0.491	0.629
	LTE Band 12	0.099	0.138	0.160	0.237	0.259	0.397
	LTE Band 13	0.169	0.138	0.160	0.307	0.329	0.467
	LTE Band 5 (Cell)	0.344	0.138	0.160	0.482	0.504	0.642
	LTE Band 26 (Cell)	0.241	0.138	0.160	0.379	0.401	0.539
	LTE Band 66 (AWS)	0.261	0.138	0.160	0.399	0.421	0.559
	LTE Band 25 (PCS)	0.304	0.138	0.160	0.442	0.464	0.602
	LTE Band 41	0.102	0.138	0.160	0.240	0.262	0.400

Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz and 5 GHz WLAN 4 Tx (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Head SAR	GSM 850	0.366	0.444	0.406	0.138	0.160	1.514
	UMTS 850	0.377	0.444	0.406	0.138	0.160	**1.525**
	UMTS 1750	0.303	0.444	0.406	0.138	0.160	1.451
	GSM 1900	0.182	0.444	0.406	0.138	0.160	1.330
	UMTS 1900	0.331	0.444	0.406	0.138	0.160	1.479
	LTE Band 12	0.099	0.444	0.406	0.138	0.160	1.247
	LTE Band 13	0.169	0.444	0.406	0.138	0.160	1.317
	LTE Band 5 (Cell)	0.344	0.444	0.406	0.138	0.160	1.492
	LTE Band 26 (Cell)	0.241	0.444	0.406	0.138	0.160	1.389
	LTE Band 66 (AWS)	0.261	0.444	0.406	0.138	0.160	1.409
	LTE Band 25 (PCS)	0.304	0.444	0.406	0.138	0.160	1.452
	LTE Band 41	0.102	0.444	0.406	0.138	0.160	1.250

Table 12-4
Simultaneous Transmission Scenario with Bluetooth (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM 850	0.366	0.040	0.406
	UMTS 850	0.377	0.040	**0.417**
	UMTS 1750	0.303	0.040	0.343
	GSM 1900	0.182	0.040	0.222
	UMTS 1900	0.331	0.040	0.371
	LTE Band 12	0.099	0.040	0.139
	LTE Band 13	0.169	0.040	0.209
	LTE Band 5 (Cell)	0.344	0.040	0.384
	LTE Band 26 (Cell)	0.241	0.040	0.281
	LTE Band 66 (AWS)	0.261	0.040	0.301
	LTE Band 25 (PCS)	0.304	0.040	0.344
	LTE Band 41	0.102	0.040	0.142

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-5
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.607	0.106	0.081	0.713	0.688	0.794
	UMTS 850	0.542	0.106	0.081	0.648	0.623	0.729
	UMTS 1750	0.746	0.106	0.081	0.852	0.827	**0.933**
	GSM 1900	0.432	0.106	0.081	0.538	0.513	0.619
	UMTS 1900	0.366	0.106	0.081	0.472	0.447	0.553
	LTE Band 12	0.202	0.106	0.081	0.308	0.283	0.389
	LTE Band 13	0.242	0.106	0.081	0.348	0.323	0.429
	LTE Band 5 (Cell)	0.449	0.106	0.081	0.555	0.530	0.636
	LTE Band 26 (Cell)	0.377	0.106	0.081	0.483	0.458	0.564
	LTE Band 66 (AWS)	0.565	0.106	0.081	0.671	0.646	0.752
	LTE Band 25 (PCS)	0.637	0.106	0.081	0.743	0.718	0.824
	LTE Band 41	0.244	0.106	0.081	0.350	0.325	0.431

Table 12-6
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.607	0.143	0.260	0.750	0.867	1.010
	UMTS 850	0.542	0.143	0.260	0.685	0.802	0.945
	UMTS 1750	0.746	0.143	0.260	0.889	1.006	**1.149**
	GSM 1900	0.432	0.143	0.260	0.575	0.692	0.835
	UMTS 1900	0.366	0.143	0.260	0.509	0.626	0.769
	LTE Band 12	0.202	0.143	0.260	0.345	0.462	0.605
	LTE Band 13	0.242	0.143	0.260	0.385	0.502	0.645
	LTE Band 5 (Cell)	0.449	0.143	0.260	0.592	0.709	0.852
	LTE Band 26 (Cell)	0.377	0.143	0.260	0.520	0.637	0.780
	LTE Band 66 (AWS)	0.565	0.143	0.260	0.708	0.825	0.968
	LTE Band 25 (PCS)	0.637	0.143	0.260	0.780	0.897	1.040
	LTE Band 41	0.244	0.143	0.260	0.387	0.504	0.647

Table 12-7
Simultaneous Transmission Scenario with 2.4 GHz and 5 GHz WLAN 4 Tx (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.607	0.048	0.071	0.655	0.678	0.726
	UMTS 850	0.542	0.048	0.071	0.590	0.613	0.661
	UMTS 1750	0.746	0.048	0.071	0.794	0.817	**0.865**
	GSM 1900	0.432	0.048	0.071	0.480	0.503	0.551
	UMTS 1900	0.366	0.048	0.071	0.414	0.437	0.485
	LTE Band 12	0.202	0.048	0.071	0.250	0.273	0.321
	LTE Band 13	0.242	0.048	0.071	0.290	0.313	0.361
	LTE Band 5 (Cell)	0.449	0.048	0.071	0.497	0.520	0.568
	LTE Band 26 (Cell)	0.377	0.048	0.071	0.425	0.448	0.496
	LTE Band 66 (AWS)	0.565	0.048	0.071	0.613	0.636	0.684
	LTE Band 25 (PCS)	0.637	0.048	0.071	0.685	0.708	0.756
	LTE Band 41	0.244	0.048	0.071	0.292	0.315	0.363

Table 12-8
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM 850	0.607	0.022	0.629
	UMTS 850	0.542	0.022	0.564
	UMTS 1750	0.746	0.022	**0.768**
	GSM 1900	0.432	0.022	0.454
	UMTS 1900	0.366	0.022	0.388
	LTE Band 12	0.202	0.022	0.224
	LTE Band 13	0.242	0.022	0.264
	LTE Band 5 (Cell)	0.449	0.022	0.471
	LTE Band 26 (Cell)	0.377	0.022	0.399
	LTE Band 66 (AWS)	0.565	0.022	0.587
	LTE Band 25 (PCS)	0.637	0.022	0.659
	LTE Band 41	0.244	0.022	0.266

12.5 Hotspot SAR Simultaneous Transmission Analysis

Table 12-9
Simultaneous Transmission Scenario (2.4 GHz Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	GPRS 850	0.950	0.244	0.210	1.194	1.160	1.404
	UMTS 850	0.784	0.244	0.210	1.028	0.994	1.238
	UMTS 1750	0.661	0.244	0.210	0.905	0.871	1.115
	GPRS 1900	0.907	0.244	0.210	1.151	1.117	1.361
	UMTS 1900	1.093	0.244	0.210	1.337	1.303	**1.547**
	LTE Band 12	0.308	0.244	0.210	0.552	0.518	0.762
	LTE Band 13	0.396	0.244	0.210	0.640	0.606	0.850
	LTE Band 5 (Cell)	0.798	0.244	0.210	1.042	1.008	1.252
	LTE Band 26 (Cell)	0.559	0.244	0.210	0.803	0.769	1.013
	LTE Band 66 (AWS)	1.093	0.244	0.210	1.337	1.303	**1.547**
	LTE Band 25 (PCS)	0.753	0.244	0.210	0.997	0.963	1.207
	LTE Band 41	0.520	0.244	0.210	0.764	0.730	0.974

Table 12-10
Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.950	0.025	0.975
	UMTS 850	0.784	0.025	0.809
	UMTS 1750	0.661	0.025	0.686
	GPRS 1900	0.907	0.025	0.932
	UMTS 1900	1.093	0.025	**1.118**
	LTE Band 12	0.308	0.025	0.333
	LTE Band 13	0.396	0.025	0.421
	LTE Band 5 (Cell)	0.798	0.025	0.823
	LTE Band 26 (Cell)	0.559	0.025	0.584
	LTE Band 66 (AWS)	1.093	0.025	**1.118**
	LTE Band 25 (PCS)	0.753	0.025	0.778
	LTE Band 41	0.520	0.025	0.545

12.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013 Section 6.3.4.1.2.

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

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

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1770.00	132572	LTE Band 66 (AWS), 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	bottom	10 mm	0.907	0.892	1.02	N/A	N/A	N/A	N/A
1900	1880.00	9400	UMTS 1900	RMC	bottom	10 mm	0.919	0.919	1.00	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram							

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

14 ADDITIONAL TUNER TESTING PER FCC GUIDANCE

The following test procedures were followed to demonstrate that the SAR results in Section 11 represented the appropriate SAR test conditions. For bands with dynamic tuning implemented, SAR was measured according to the required FCC SAR test procedures with the dynamic tuner active to allow the device to automatically tune to the antenna state for the respective RF exposure test configurations. Additional single point SAR time-sweep measurements were evaluated for other tuner states to determine that the other tuner configurations would result in equivalent or lower SAR values. The additional tuner hardware has no influence to the antenna characteristics, other than impedance matching.

To evaluate all of the tuner states, the 25 tuner states were divided evenly among band, mode and exposure combinations so that at least one single point SAR measurement was measured among the configurations. Single point time-sweep measurements were performed at the peak SAR location determined by the zoom scan of the configuration with the highest reported SAR for each combination. While inserting and removing the USB cable between single point SAR measurements, the device was ensured to capture the same physical point SAR that generated the highest SAR. The SAR probe remained stationary at the same position throughout the entire series of single point measurements for each combination

The operational description contains more information about the design and implementation of the dynamic antenna tuning.

Table 14-1
Supplemental Head SAR Data

Supplemental Head SAR Data			
LTE Band 5		UMTS 850	
QPSK, 10MHz Bandwidth, 1 RB, 0 RB Offset		RMC	
Test Position	Right Cheek	Test Position	Right Cheek
Frequency (MHz)	836.5	Frequency (MHz)	836.6
Channel	20525	Channel	4183
Measured 1g SAR (W/kg)	0.283	Measured 1g SAR (W/kg)	0.351
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 1)	0.326	Auto-tune (State 1)	0.424
Default (State 1)	0.329	Default (State 1)	0.425
State 1	0.329	State 2	0.374
State 5	0.327	State 6	0.422
State 9	0.262	State 10	0.371
State 13	0.214	State 14	0.359
State 19	0.117	State 18	0.219
State 21	0.069	State 20	0.281
State 25	0.066	State 22	0.084

Table 14-2
Supplemental Body SAR Data

Supplemental Body SAR Data			
LTE Band 5		UMTS 850	
QPSK, 10MHz Bandwidth, 1 RB, 0 RB Offset		RMC	
Test Position	Back Side	Test Position	Back Side
Spacing	10 mm	Spacing	10 mm
Frequency (MHz)	836.5	Frequency (MHz)	836.6
Channel	20525	Channel	4183
Measured 1g SAR (W/kg)	0.656	Measured 1g SAR (W/kg)	0.730
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 1)	0.693	Auto-tune (State 1)	0.838
Default (State 1)	0.706	Default (State 1)	0.827
State 3	0.695	State 4	0.832
State 7	0.504	State 8	0.670
State 11	0.454	State 12	0.786
State 15	0.479	State 16	0.672
State 17	0.380	State 20	0.608
State 21	0.172	State 22	0.353
State 23	0.479	State 24	0.672

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/2/2016	Annual	3/2/2017	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	3/2/2016	Annual	3/2/2017	JP38020182
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	10/5/2016	Annual	10/5/2017	GB42230325
Agilent	E4438C	ESG Vector Signal Generator	2/27/2016	Annual	2/27/2017	MY45091346
Agilent	E4432B	ESG-D Series Signal Generator	3/5/2016	Annual	3/5/2017	US40053896
Agilent	N9020A	MXA Signal Analyzer	10/28/2016	Annual	10/28/2017	US46470561
Agilent	N5182A	MXG Vector Signal Generator	2/27/2016	Annual	2/27/2017	MY47420651
Agilent	8753ES	S-Parameter Network Analyzer	3/3/2016	Annual	3/3/2017	US39170122
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/19/2016	Annual	8/19/2017	MY40003841
Agilent	E5515C	Wireless Communications Test Set	5/16/2015	Biennial	5/16/2017	GB43304447
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB44450273
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Anritsu	ML2496A	Power Meter	2/28/2016	Annual	2/28/2017	1306009
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	1039008
Anritsu	MA2411B	Pulse Power Sensor	8/18/2016	Annual	8/18/2017	1126066
Anritsu	MA2411B	Pulse Power Sensor	8/18/2016	Annual	8/18/2017	1207470
Anritsu	MT8820C	Radio Communication Analyzer	4/14/2016	Annual	4/14/2017	6201240328
Anritsu	MA24106A	USB Power Sensor	3/4/2016	Annual	3/4/2017	1344555
Anritsu	MA24106A	USB Power Sensor	3/4/2016	Annual	3/4/2017	1344556
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	4040	Digital Thermometer	3/15/2015	Biennial	3/15/2017	150194929
Control Company	4353	Long Stem Thermometer	3/5/2015	Biennial	3/5/2017	150149565
Control Company	4352	Ultra Long Stem Thermometer	3/8/2016	Biennial	3/8/2018	160261701
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
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mitutoyo	CD-6"CSX	Digital Caliper	3/2/2016	Biennial	3/2/2018	13264162
Mitutoyo	CD-6"CSX	Digital Caliper	3/2/2016	Biennial	3/2/2018	13264165
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	5/21/2015	Biennial	5/21/2017	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	3/29/2016	Annual	3/29/2017	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	12/12/2016	Annual	12/12/2017	833855/0010
Rohde & Schwarz	CMW500	Radio Communication Tester	3/25/2016	Annual	3/25/2017	128633
Rohde & Schwarz	CMW500	Radio Communication Tester	4/13/2016	Annual	4/13/2017	140148
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	7/20/2016	Annual	7/20/2017	132885
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	8/30/2016	Biennial	8/30/2018	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2016	Annual	5/10/2017	1070
SPEAG	DAK-12	Dielectric Assessment Kit (10MHz - 3GHz)	3/1/2016	Annual	3/1/2017	1102
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	7/19/2016	Annual	7/19/2017	1039
SPEAG	D750V3	750 MHz SAR Dipole	7/13/2016	Annual	7/13/2017	1161
SPEAG	D835V2	835 MHz SAR Dipole	7/14/2016	Annual	7/14/2017	4d133
SPEAG	D1750V2	SAR Dipole	5/9/2016	Annual	5/9/2017	1148
SPEAG	D1900V2	1900 MHz SAR Dipole	7/15/2016	Annual	7/15/2017	5d149
SPEAG	D1900V2	1900 MHz SAR Dipole	7/8/2016	Annual	7/8/2017	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	7/25/2016	Annual	7/25/2017	981
SPEAG	D2600V2	2600 MHz SAR Dipole	7/25/2016	Annual	7/25/2017	1126
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/21/2016	Annual	9/21/2017	1191
SPEAG	D750V3	750 MHz Dipole	3/16/2016	Annual	3/16/2017	1054
SPEAG	D1765V2	1765 MHz SAR Dipole	5/11/2016	Annual	5/11/2017	1008
SPEAG	D2600V2	2600 MHz SAR Dipole	9/13/2016	Annual	9/13/2017	1071
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/2/2016	Annual	8/2/2017	1237
SPEAG	ES3DV3	SAR Probe	3/18/2016	Annual	3/18/2017	3209
SPEAG	ES3DV3	SAR Probe	3/18/2016	Annual	3/18/2017	3319
SPEAG	ES3DV3	SAR Probe	9/19/2016	Annual	9/19/2017	3287
SPEAG	EX3DV4	SAR Probe	4/19/2016	Annual	4/19/2017	7357
SPEAG	ES3DV3	SAR Probe	8/25/2016	Annual	8/25/2017	3332
SPEAG	EX3DV4	SAR Probe	4/19/2016	Annual	4/19/2017	7406
SPEAG	EX3DV4	SAR Probe	5/17/2016	Annual	5/17/2017	7409
SPEAG	ES3DV3	SAR Probe	11/15/2016	Annual	11/15/2017	3334
SPEAG	EX3DV4	SAR Probe	2/22/2016	Annual	2/22/2017	3914
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/22/2016	Annual	8/22/2017	1364
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/14/2016	Annual	3/14/2017	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/14/2016	Annual	9/14/2017	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/19/2016	Annual	2/19/2017	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/15/2016	Annual	9/15/2017	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/14/2016	Annual	4/14/2017	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/11/2016	Annual	5/11/2017	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/11/2016	Annual	11/11/2017	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/18/2016	Annual	2/18/2017	1272

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. equipment were used solely during its calibration period.

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	

17 CONCLUSION

17.1 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]

18 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] IEEE Standards Coordinating Committee 39 –Standards Coordinating Committee 34 – IEEE Std. 1528-2013, IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

[6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 1 -124.

[9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[13] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[15] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[19] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[20] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.

[21] Innovation, Science, Economic Development Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 5, March 2015.

[22] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2015

[23] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07

[24] SAR Measurement Guidance for IEEE 802.11 Transmitters, KDB Publication 248227 D01

[25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D03-D04

[26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04

[27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02

[28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02

[29] Anexo à Resolução No. 533, de 10 de Septembro de 2009.

[30] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF5D

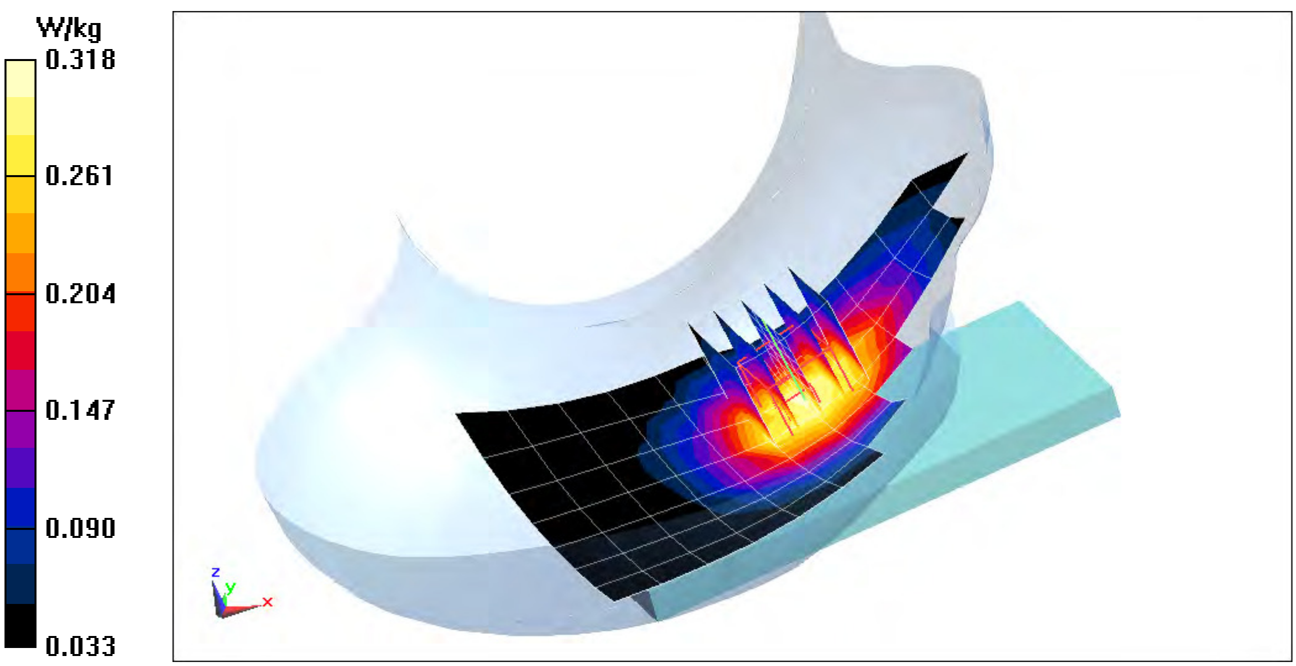
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.912 S/m; ε_r = 41.591; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-09-2017; Ambient Temp: 22.2°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(6.16, 6.16, 6.16); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GSM 850, Right Head, Cheek, Mid.ch

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.78 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.365 W/kg
SAR(1 g) = 0.295 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EC3B

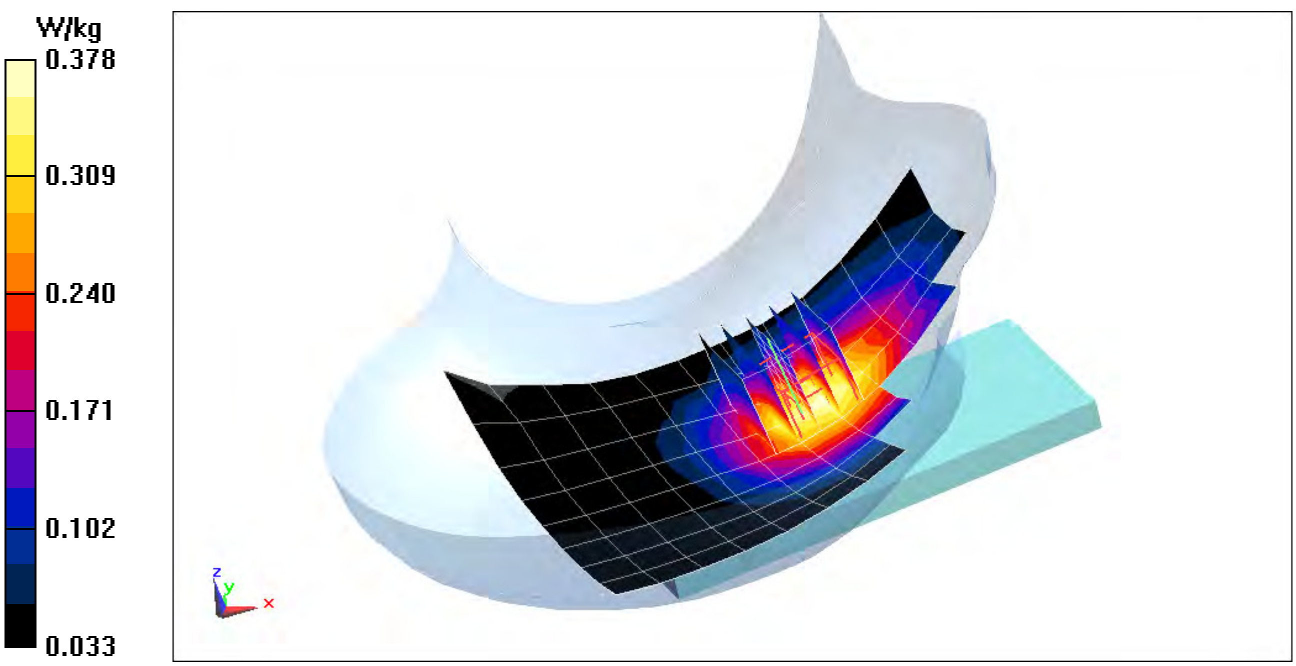
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.912 S/m; ε_r = 41.591; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-09-2017; Ambient Temp: 22.2°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(6.16, 6.16, 6.16); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 850, Right Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.47 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.430 W/kg
SAR(1 g) = 0.351 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

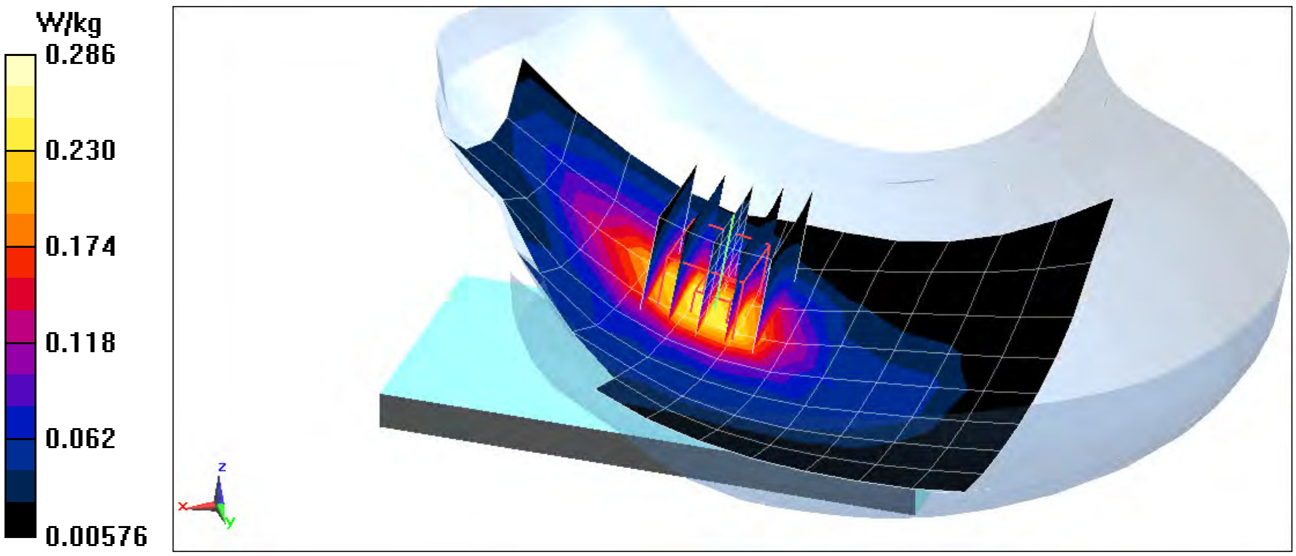
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.397 S/m; ε_r = 38.823; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-20-2017; Ambient Temp: 23.5°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(5.28, 5.28, 5.28); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1750, Left Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.92 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.370 W/kg
SAR(1 g) = 0.240 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF5D

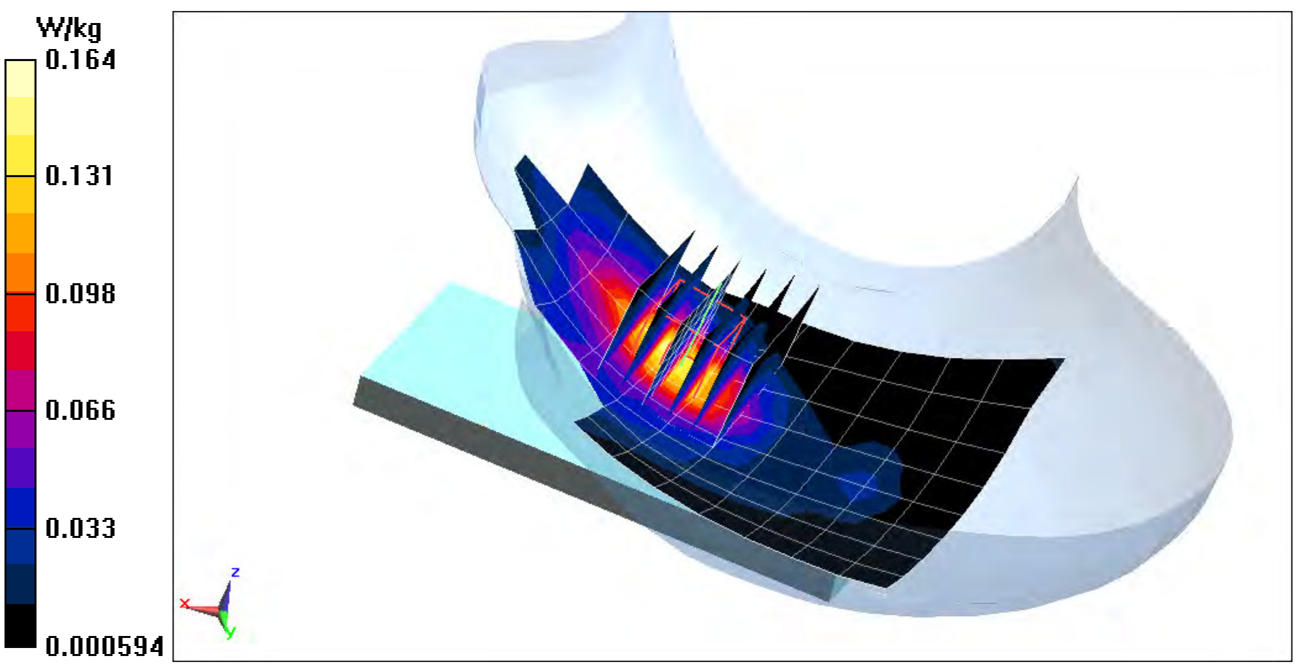
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.426 S/m; ε_r = 40.28; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-02-2017; Ambient Temp: 24.3°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.27, 5.27, 5.27); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.22 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.217 W/kg
SAR(1 g) = 0.140 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0792B

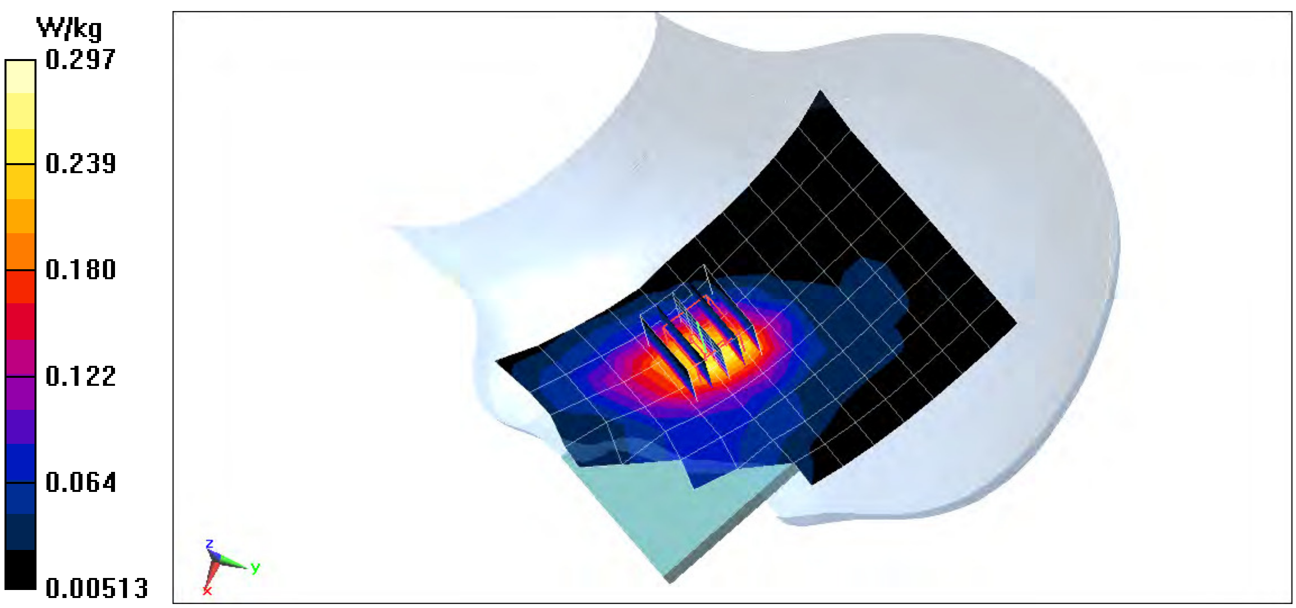
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.416 S/m; ε_r = 39.273; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-02-2017; Ambient Temp: 22.7°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3209; ConvF(5.14, 5.14, 5.14); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.14 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.404 W/kg
SAR(1 g) = 0.260 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7F8

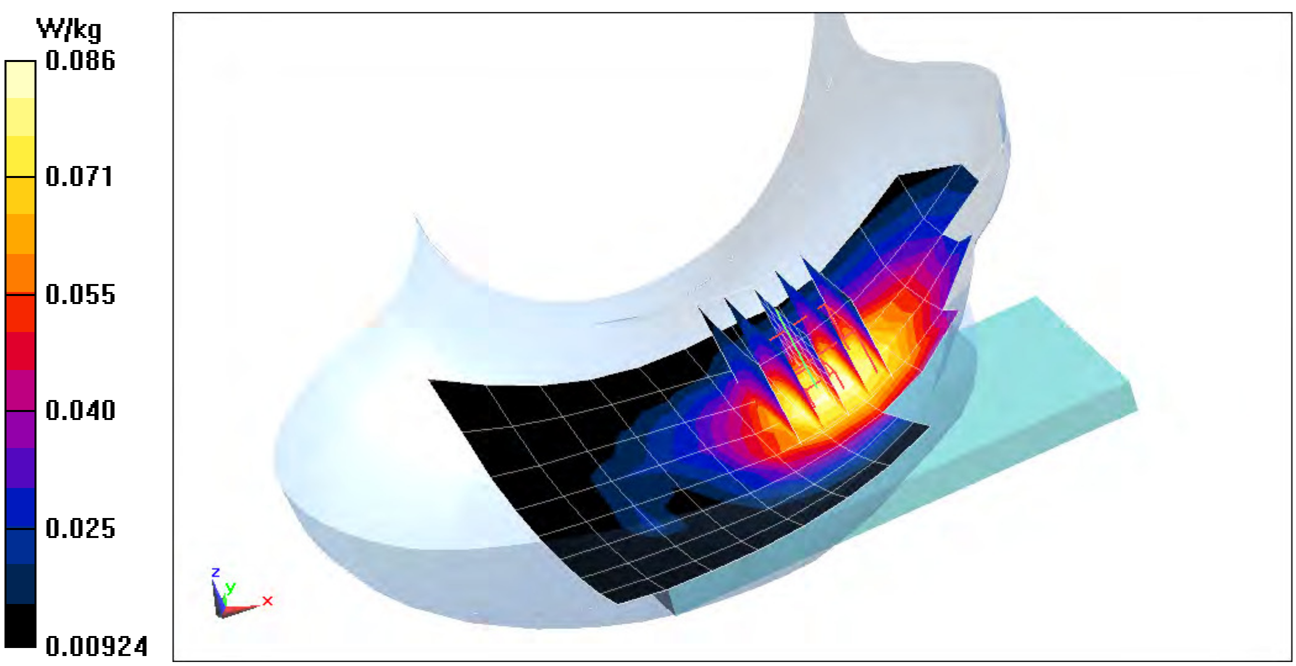
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.866 S/m; ε_r = 42.819; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-11-2017; Ambient Temp: 23.8°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3209; ConvF(6.6, 6.6, 6.6); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Right; Type: SAM; Serial: 1757
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 12, Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.58 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.100 W/kg
SAR(1 g) = 0.080 W/kg



DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7F8

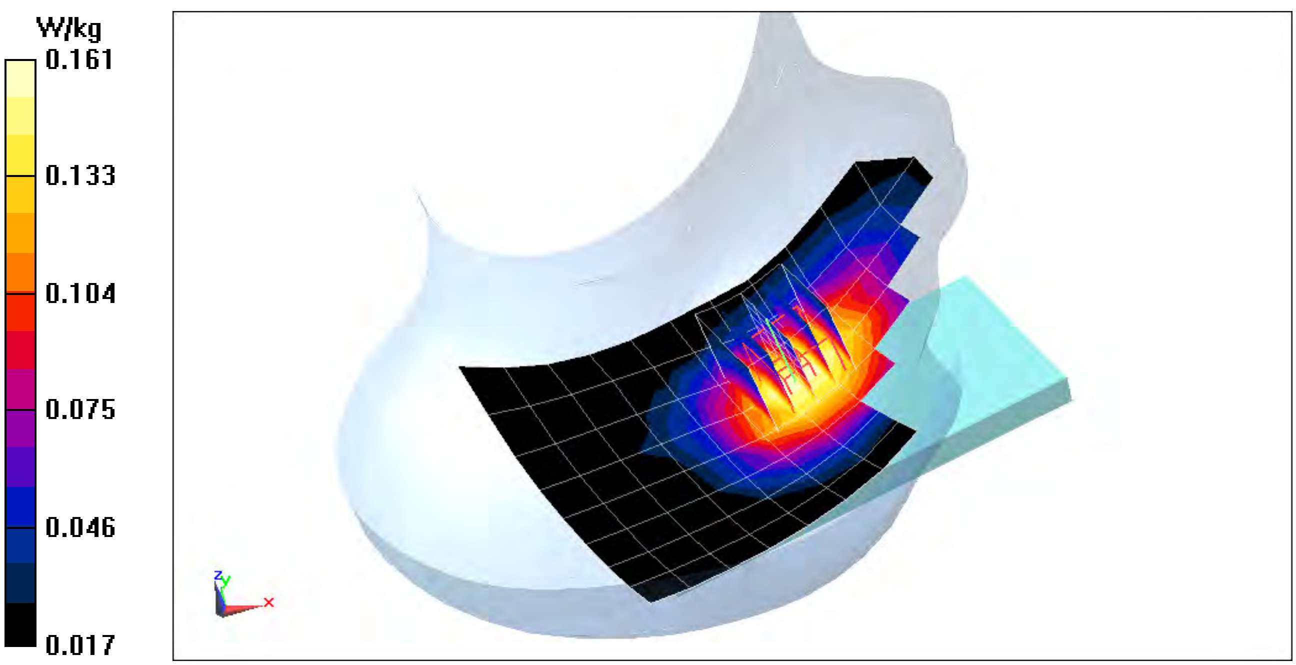
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.937 S/m; ε_r = 41.748; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-11-2017; Ambient Temp: 23.8°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3209; ConvF(6.6, 6.6, 6.6); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Right; Type: SAM; Serial: 1757
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 13, Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.69 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.148 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

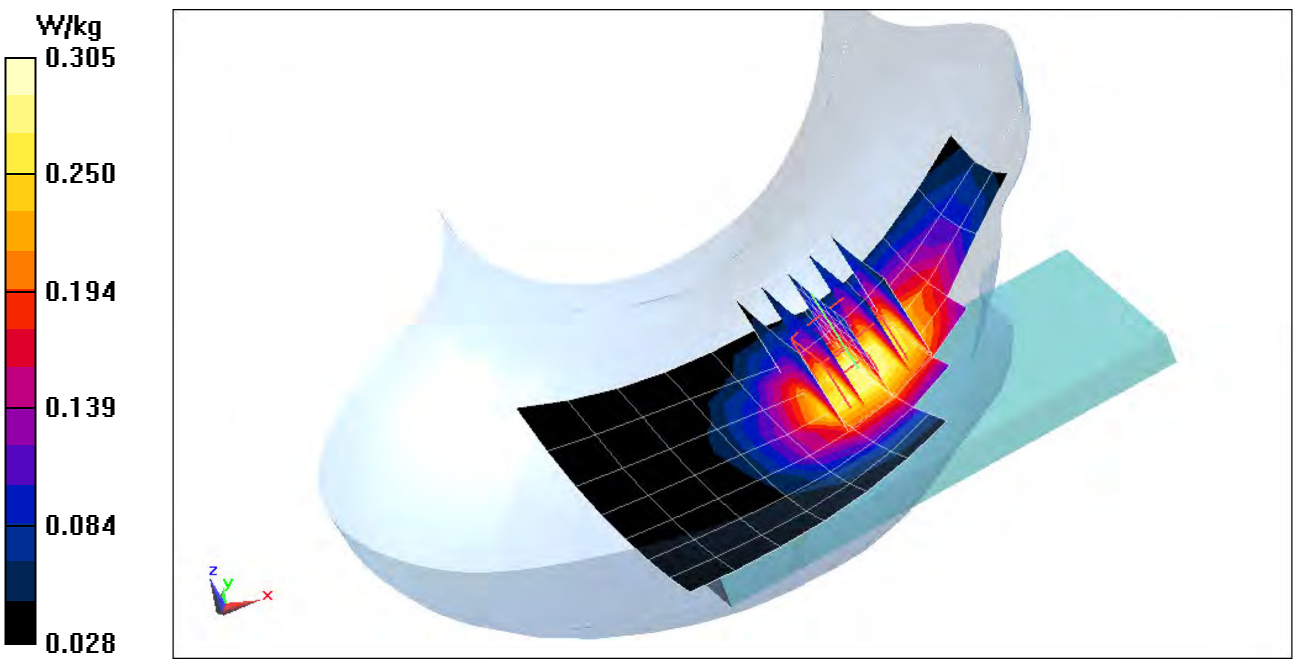
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.912 S/m; ε_r = 41.593; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-09-2017; Ambient Temp: 22.2°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(6.16, 6.16, 6.16); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 5 (Cell.), Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.16 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.352 W/kg
SAR(1 g) = 0.283 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

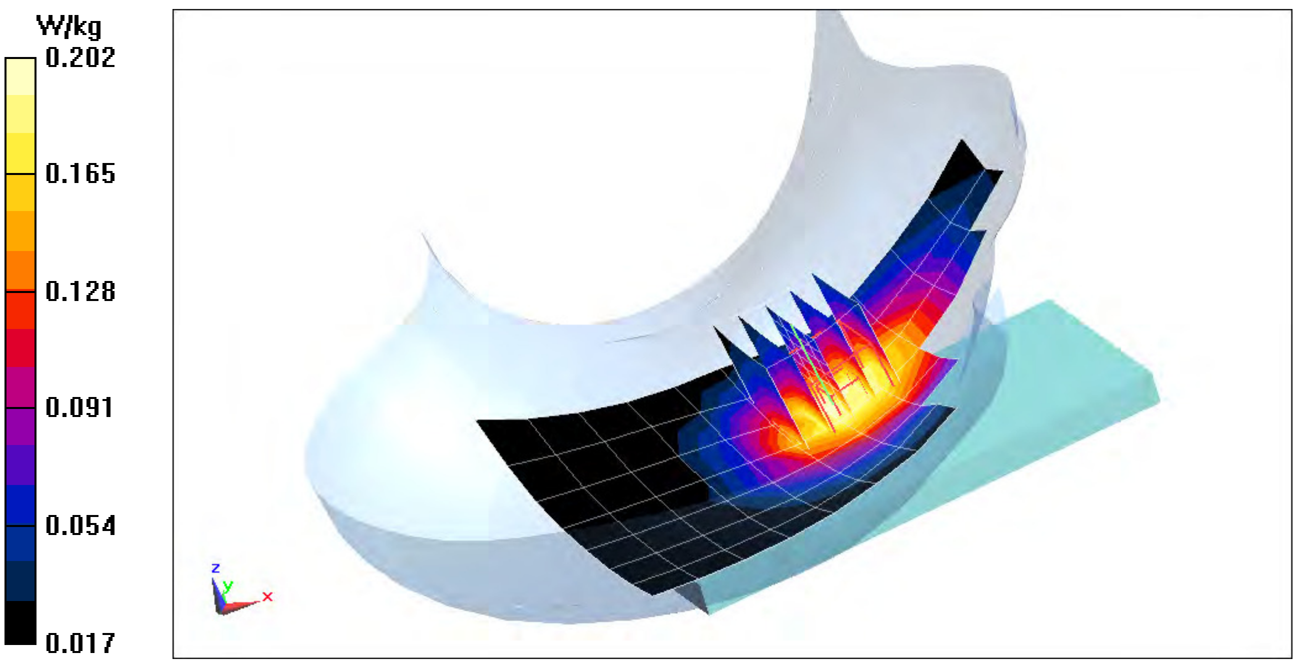
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.908 S/m; ε_r = 41.655; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-09-2017; Ambient Temp: 22.2°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(6.16, 6.16, 6.16); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 26 (Cell.), Right Head, Cheek, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.71 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.232 W/kg
SAR(1 g) = 0.188 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

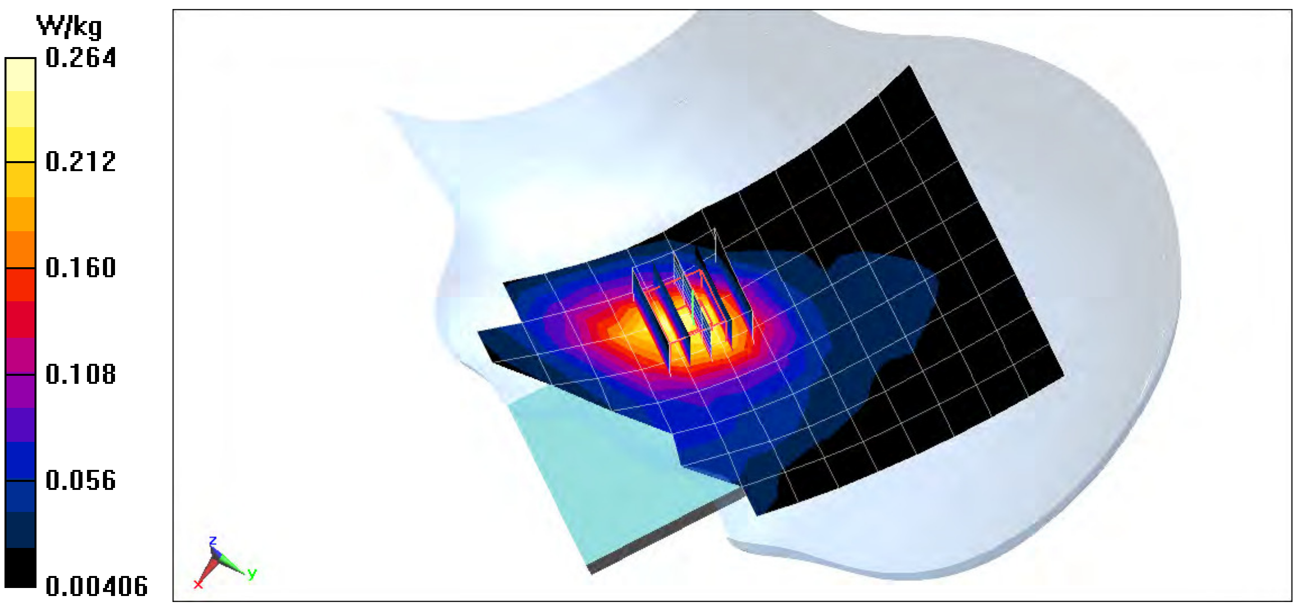
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1745 MHz; $\sigma = 1.338$ S/m; $\varepsilon_r = 39.186$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 01-12-2017; Ambient Temp: 23.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(5.28, 5.28, 5.28); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 66 (AWS), Left Head, Cheek, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.44 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.341 W/kg
SAR(1 g) = 0.224 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

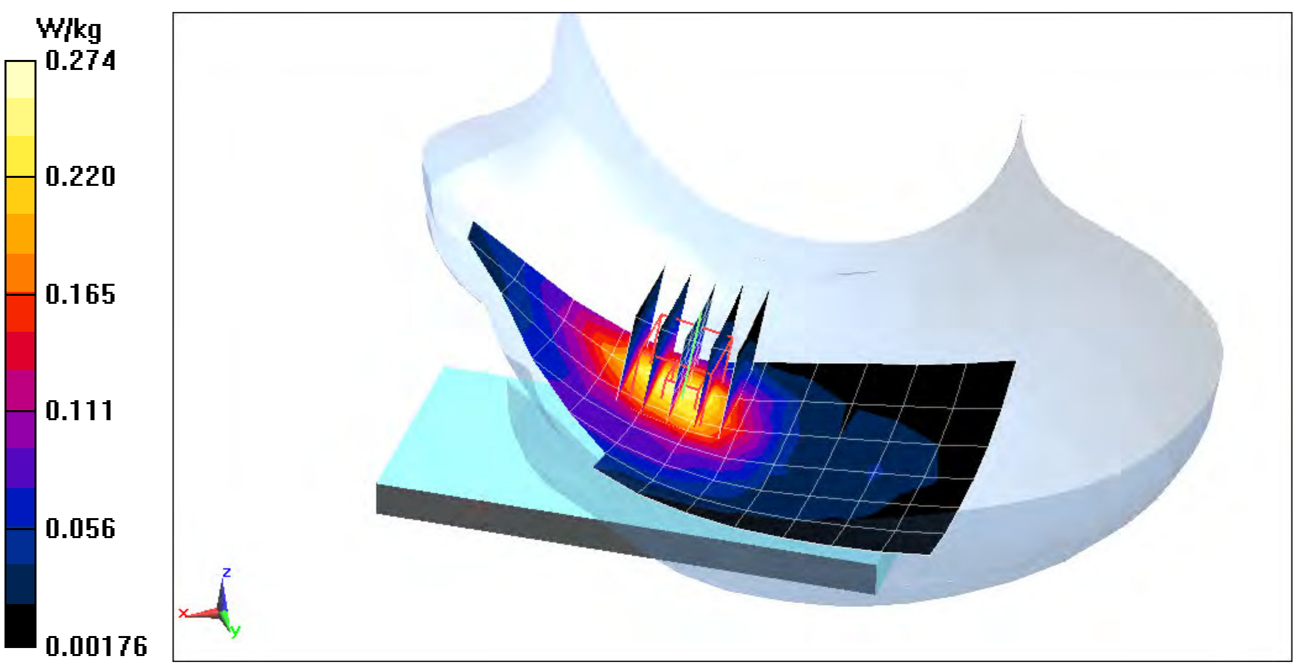
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.458 S/m; ε_r = 40.196; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-02-2017; Ambient Temp: 24.3°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.27, 5.27, 5.27); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 25 (PCS), Left Head, Cheek, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.99 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.361 W/kg
SAR(1 g) = 0.232 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7F8

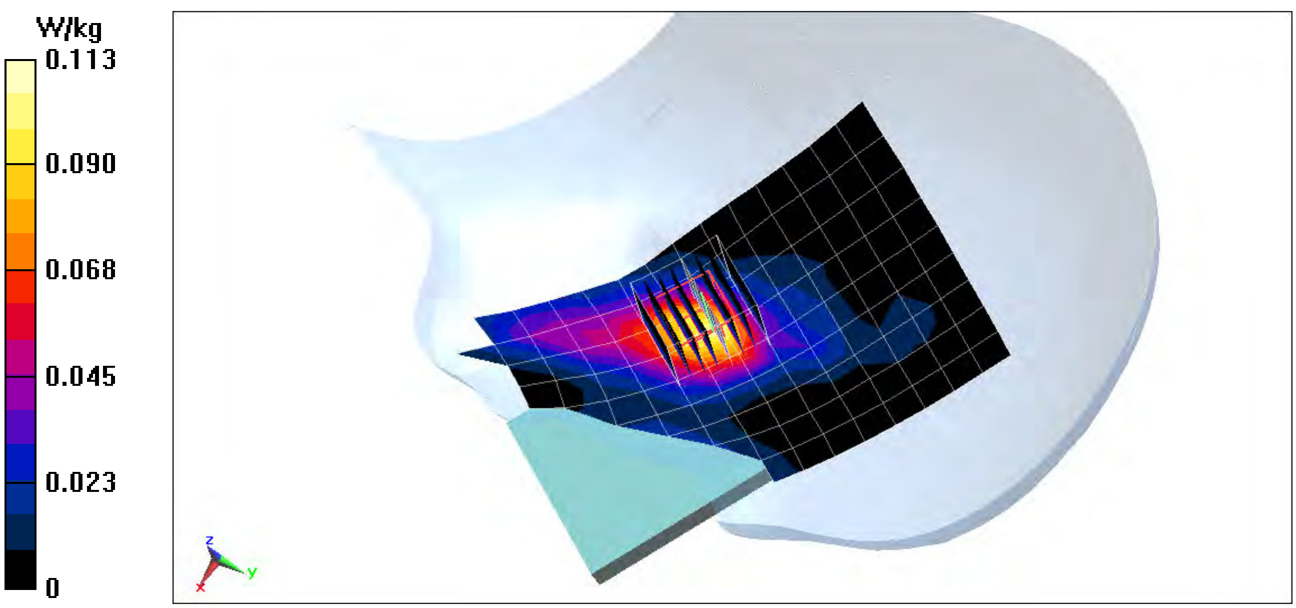
Communication System: UID 0, LTE Band 41; Frequency: 2636.5 MHz; Duty Cycle: 1:1.58
Medium: 2600 Head Medium parameters used (interpolated):
f = 2636.5 MHz; σ = 2.086 S/m; ε_r = 39.688; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-07-2017; Ambient Temp: 23.0°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(4.41, 4.41, 4.41); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 41, Left Head, Cheek, Mid-High.ch, QPSK, 20 MHz Bandwidth, 1 RB, 0 RB Offset

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.429 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.165 W/kg
SAR(1 g) = 0.089 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

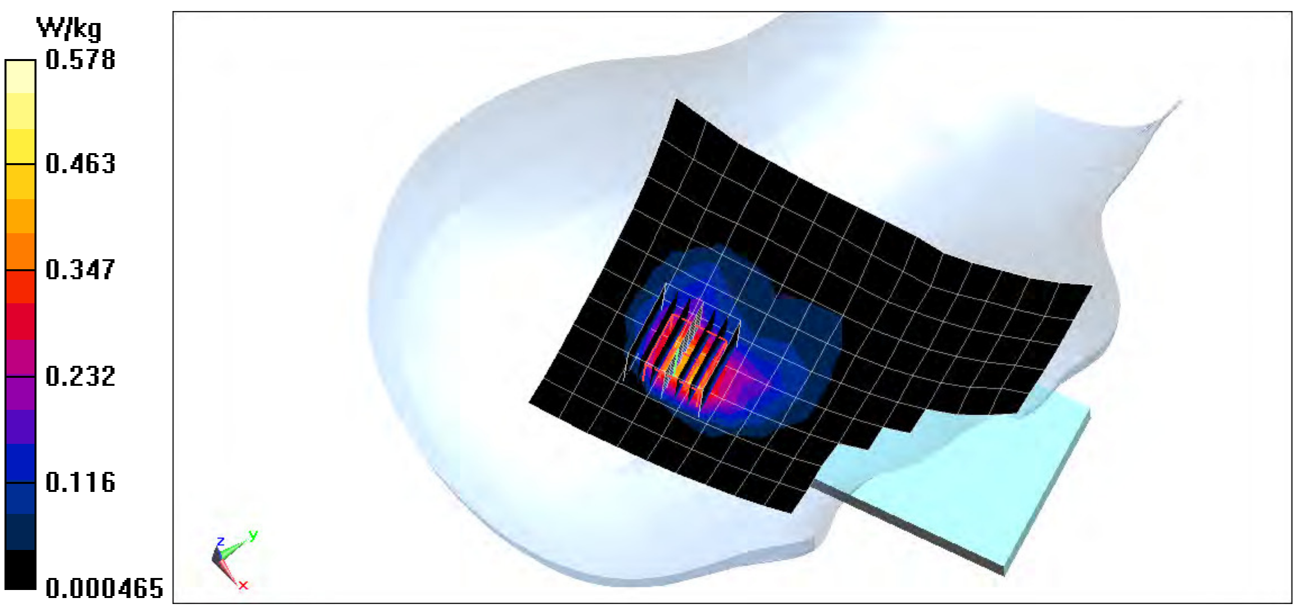
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.884 S/m; ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-22-2017; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3287; ConvF(4.54, 4.54, 4.54); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Right Head, Cheek, Ch 11, 1 Mbps, Antenna 1

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.24 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.990 W/kg
SAR(1 g) = 0.442 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

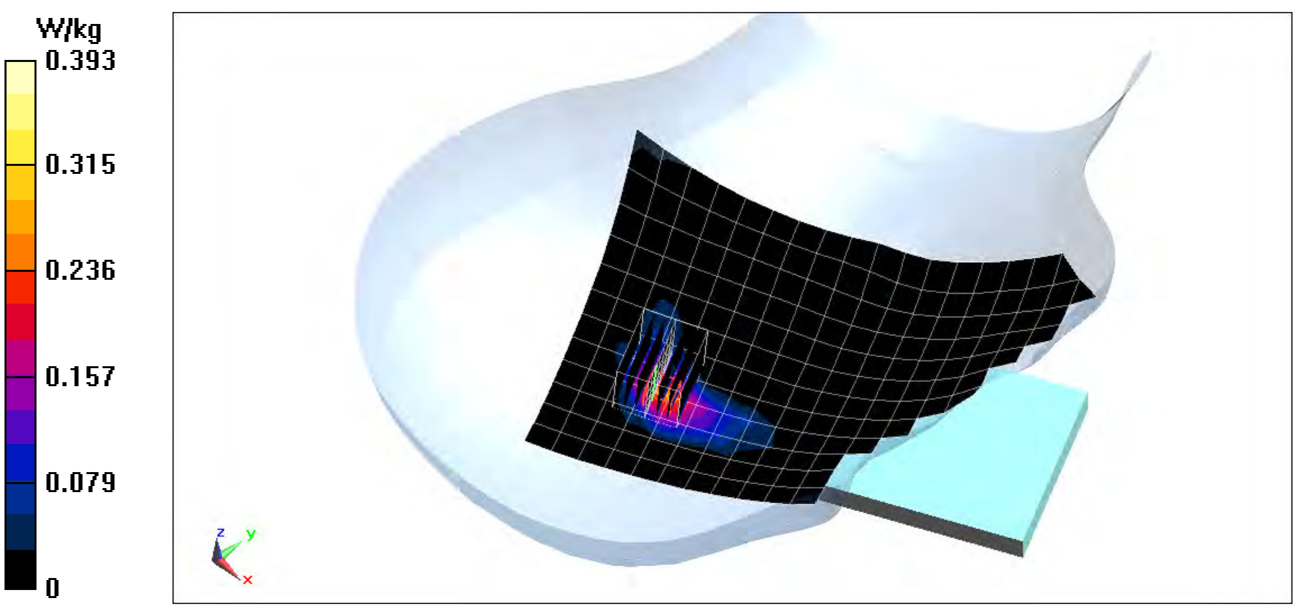
Communication System: UID 0, 802.11ac 5.2-5.8 GHz Band; Frequency: 5775 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used (interpolated):
f = 5775 MHz; σ = 5.093 S/m; ε_r = 34.286; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-23-2017; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7357; ConvF(4.65, 4.65, 4.65); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/19/2016
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11ac, U-NII-3, 80 MHz Bandwidth, Right Head, Cheek, Ch 155, 29.3 Mbps , Antenna 2

Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 1.678 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.638 W/kg
SAR(1 g) = 0.148 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

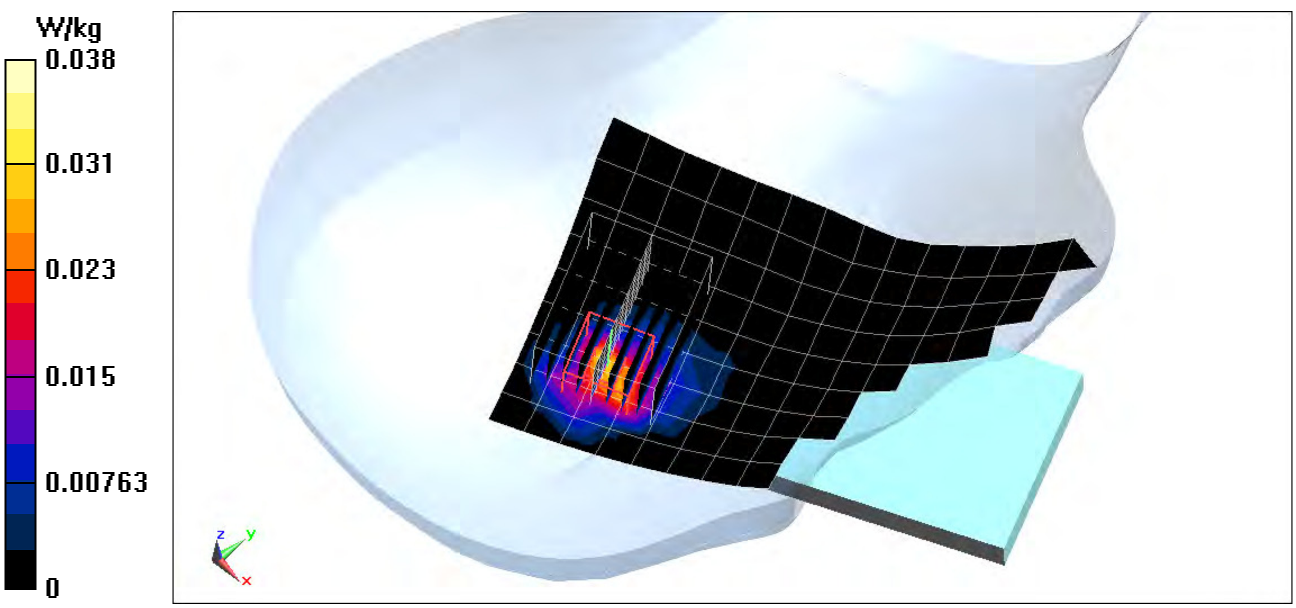
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.277
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.859 S/m; ε_r = 38.197; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01-22-2017; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3287; ConvF(4.54, 4.54, 4.54); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth, Right Head, Cheek, Ch 39, 2Mbps

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (11x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.047 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.0660 W/kg
SAR(1 g) = 0.029 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF5D

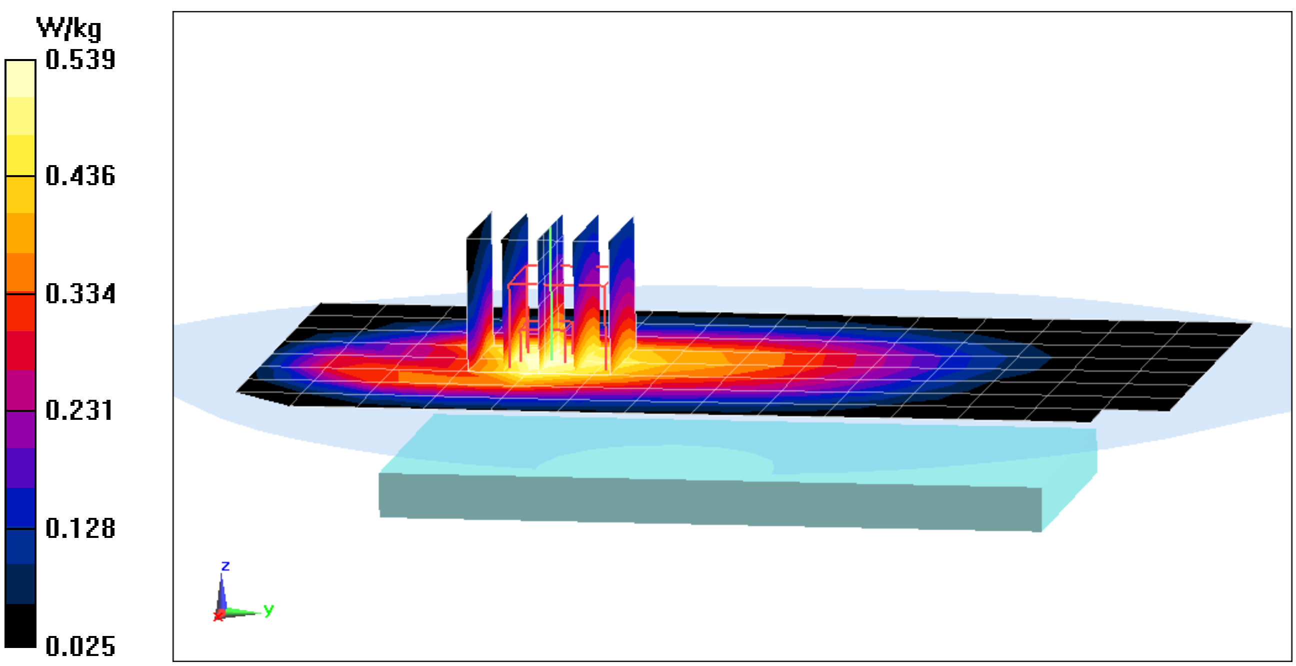
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 54.566; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.94 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.640 W/kg
SAR(1 g) = 0.490 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF5D

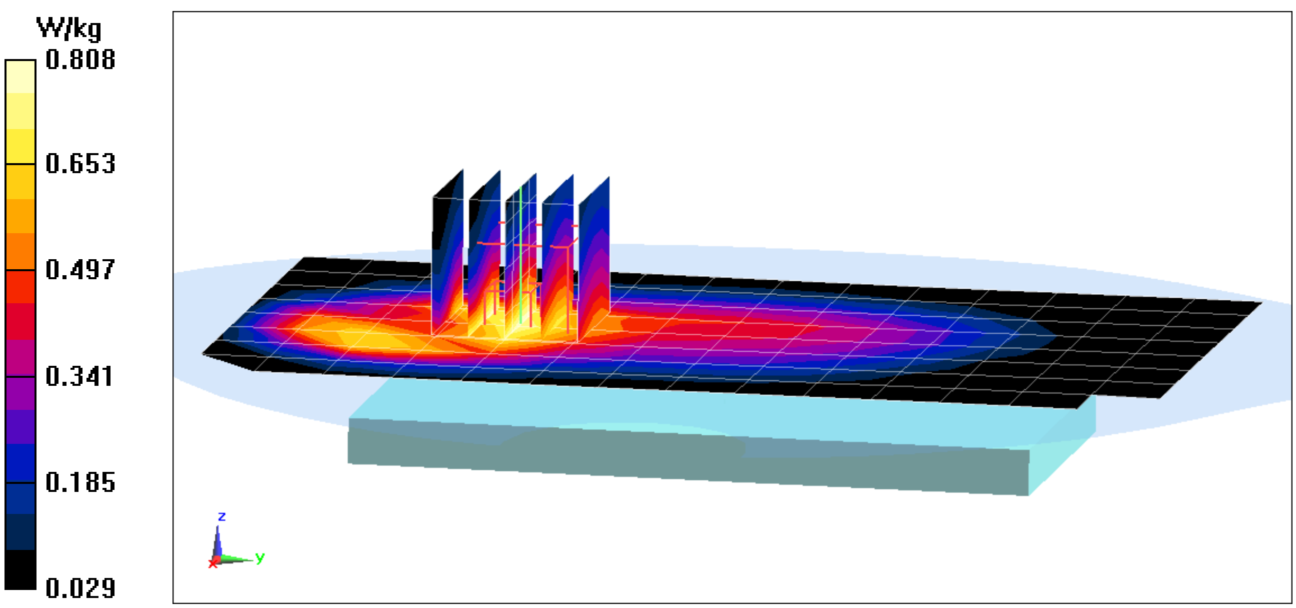
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 848.8 MHz; Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 848.8 MHz; σ = 1.013 S/m; ε_r = 54.48; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 850, Body SAR, Back side, High.ch, 4 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.94 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.992 W/kg
SAR(1 g) = 0.736 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EC3B

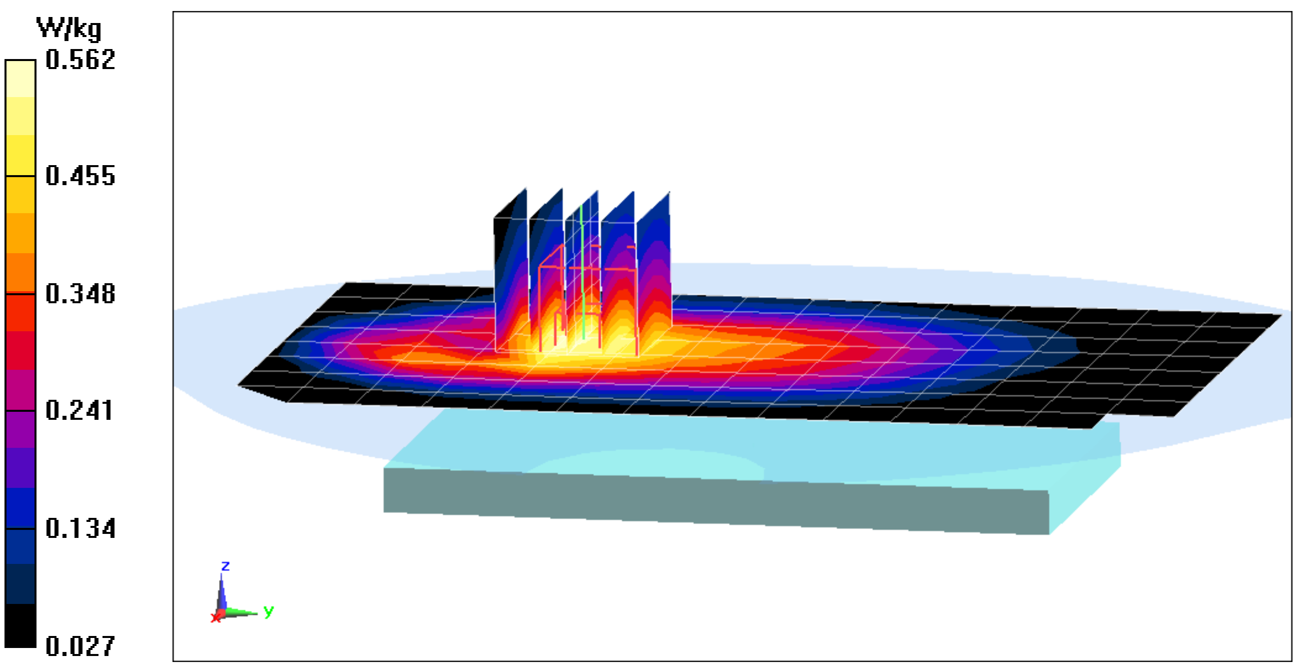
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 54.566; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.39 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.662 W/kg
SAR(1 g) = 0.505 W/kg



DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EC3B

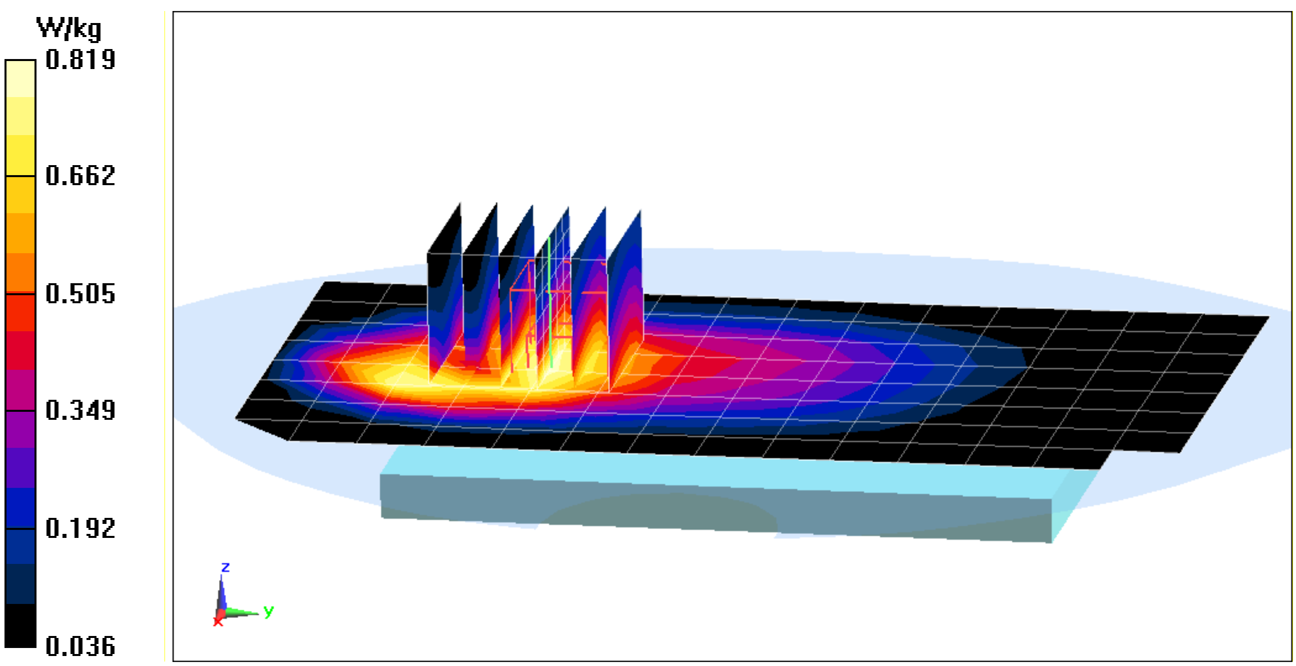
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 54.566; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.27 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.730 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

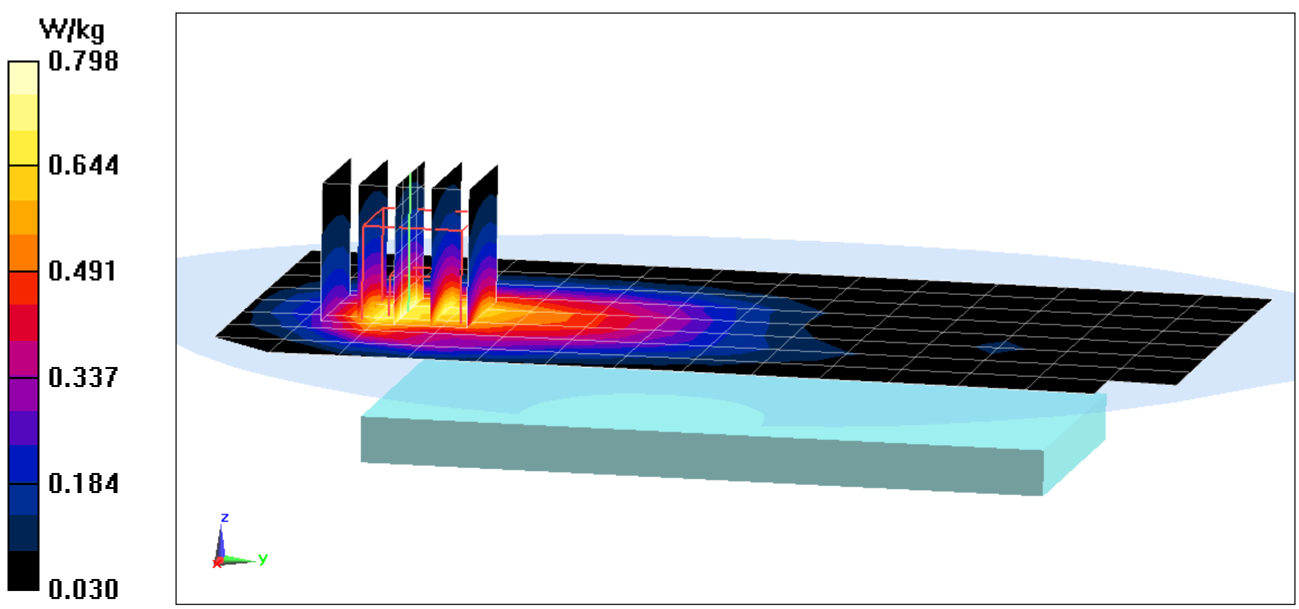
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.501 S/m; ε_r = 51.397; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-31-2017; Ambient Temp: 24.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.58 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.919 W/kg
SAR(1 g) = 0.591 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

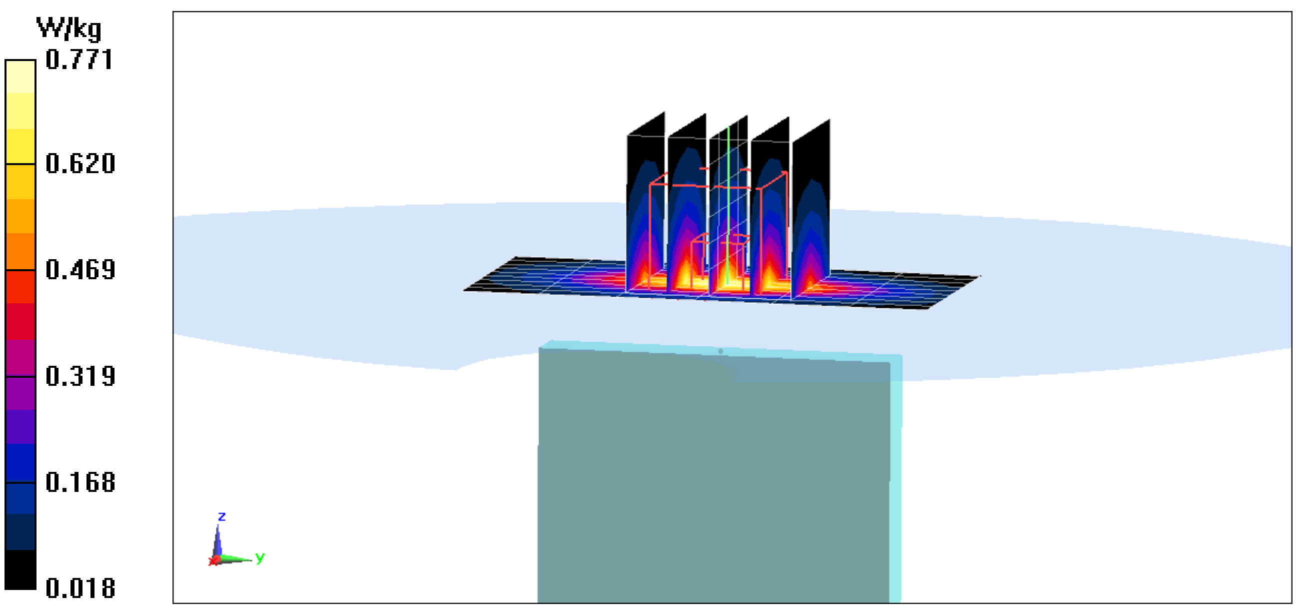
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.501 S/m; ε_r = 51.397; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-31-2017; Ambient Temp: 24.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1750, Body SAR, Bottom Edge, Mid.ch

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.77 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.897 W/kg
SAR(1 g) = 0.529 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF5D

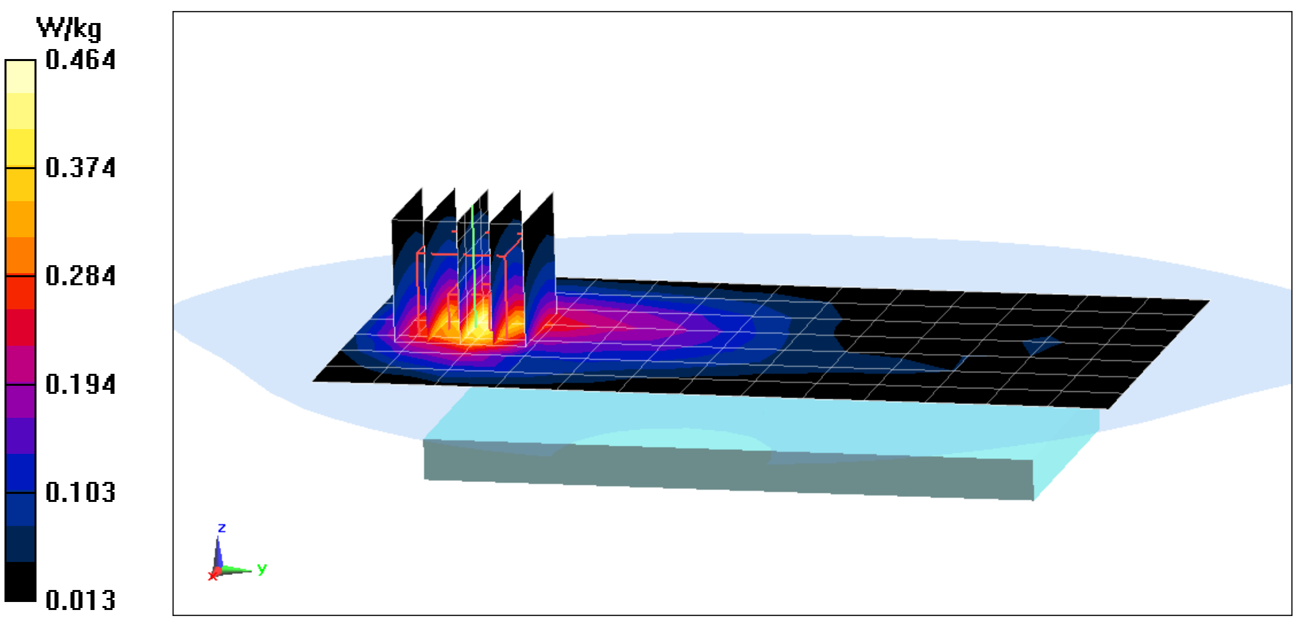
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.525 S/m; ε_r = 52.359; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-04-2017; Ambient Temp: 24.0°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN7409; ConvF(7.47, 7.47, 7.47); Calibrated: 5/17/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/11/2016
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.39 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.537 W/kg
SAR(1 g) = 0.332 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF5D

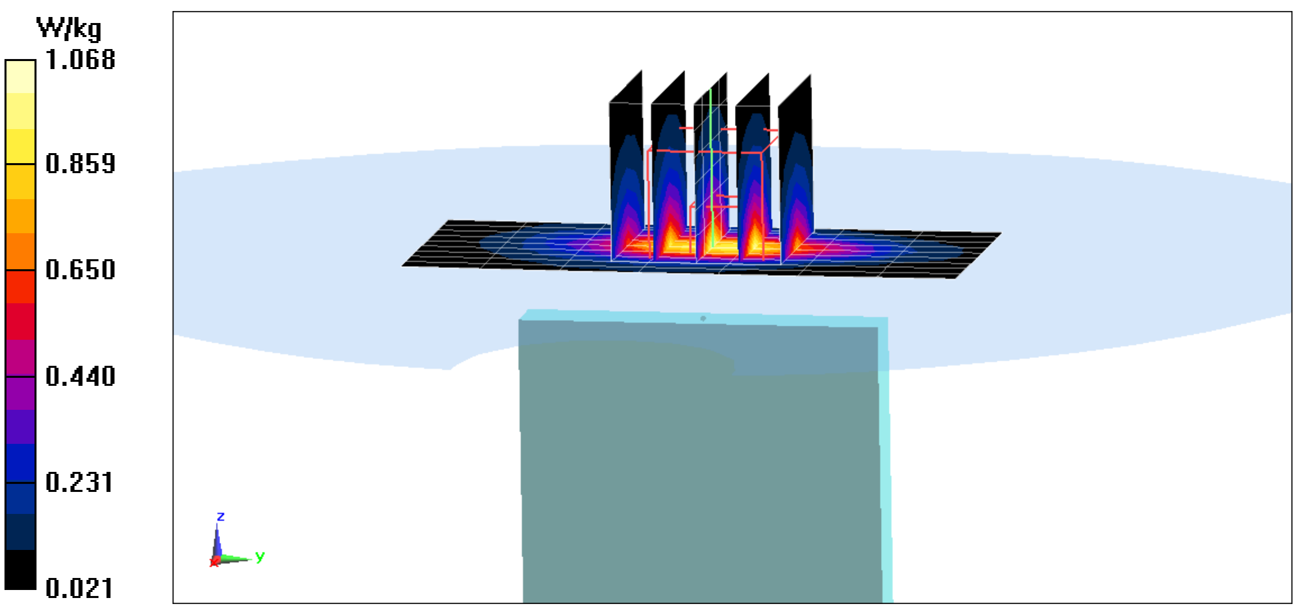
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1850.2 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body, Medium parameters used (interpolated):
f = 1850.2 MHz; σ = 1.49 S/m; ε_r = 52.445; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-04-2017; Ambient Temp: 24.0°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN7409; ConvF(7.47, 7.47, 7.47); Calibrated: 5/17/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/11/2016
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 1900, Body SAR, Bottom Edge, Low.ch, 3 Tx Slots

Area Scan (10x8x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.34 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.737 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

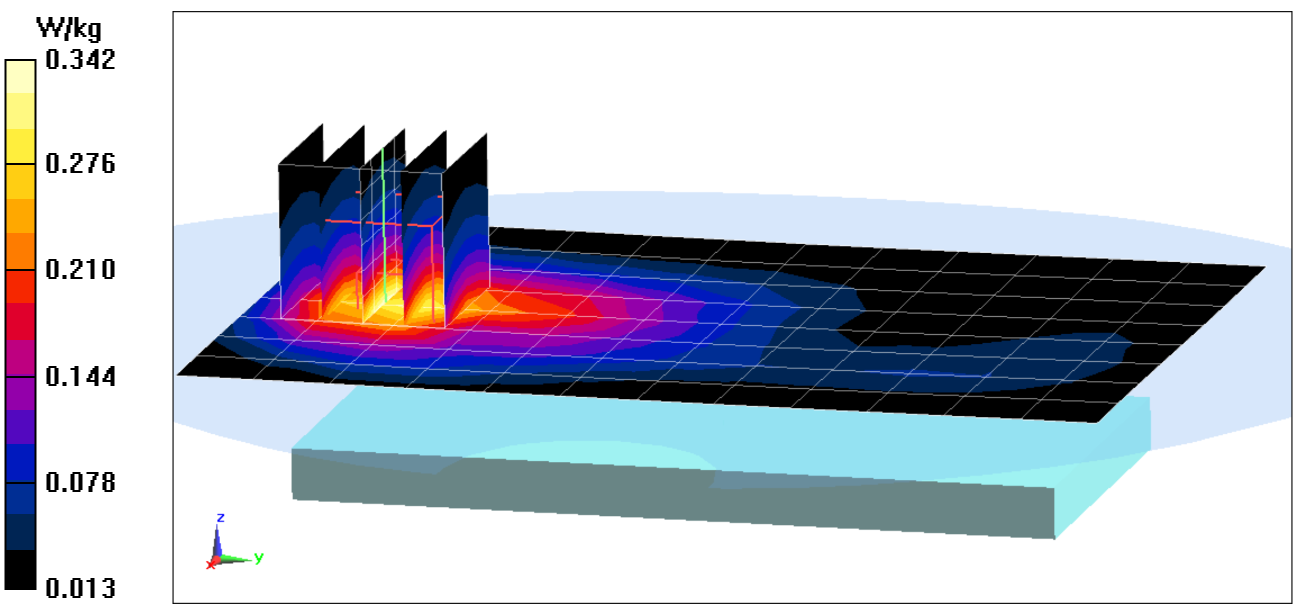
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.517 S/m; ε_r = 51.96; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-06-2017; Ambient Temp: 22.7°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3334; ConvF(4.91, 4.91, 4.91); Calibrated: 11/15/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 11/11/2016
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.67 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.441 W/kg
SAR(1 g) = 0.287 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

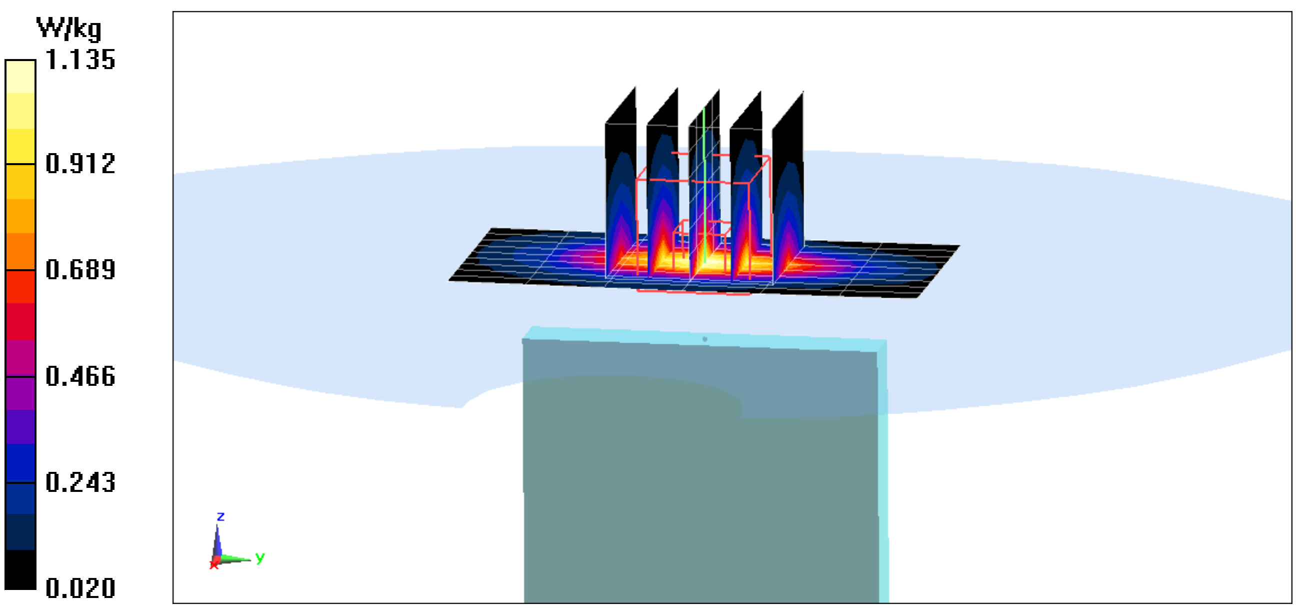
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.517 S/m; ε_r = 51.96; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-06-2017; Ambient Temp: 22.7°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3334; ConvF(4.91, 4.91, 4.91); Calibrated: 11/15/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 11/11/2016
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.63 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.919 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7EB

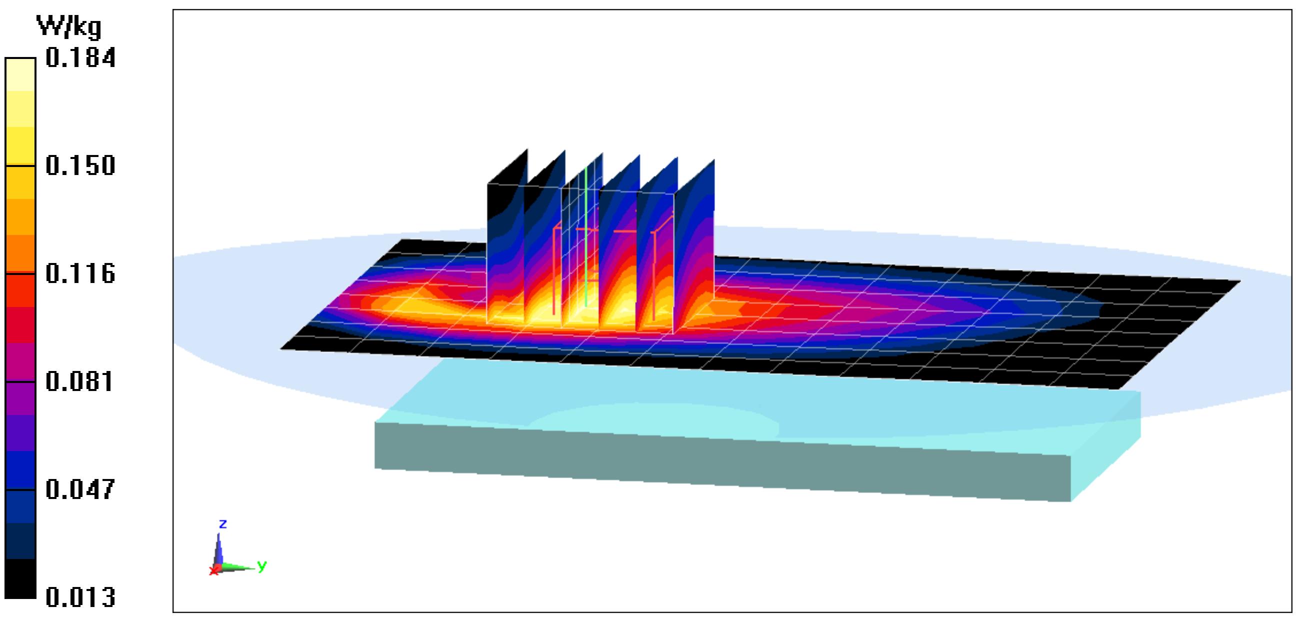
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.919 S/m; ε_r = 54.386; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-06-2017; Ambient Temp: 21.8°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3332; ConvF(6.7, 6.7, 6.7); Calibrated: 8/25/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/15/2016
Phantom: SAM Left; Type: SAM; Serial: 1688
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.87 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.226 W/kg
SAR(1 g) = 0.163 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7EB

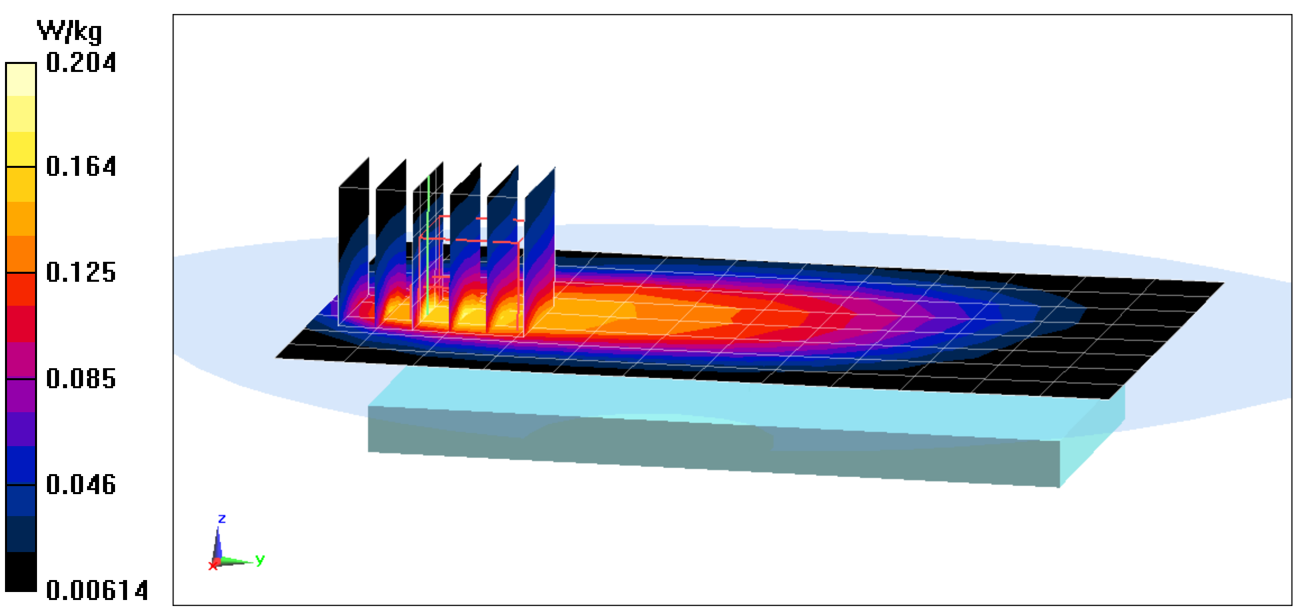
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.919 S/m; ε_r = 54.386; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-06-2017; Ambient Temp: 21.8°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3332; ConvF(6.7, 6.7, 6.7); Calibrated: 8/25/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/15/2016
Phantom: SAM Left; Type: SAM; Serial: 1688
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.13 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.425 W/kg
SAR(1 g) = 0.248 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

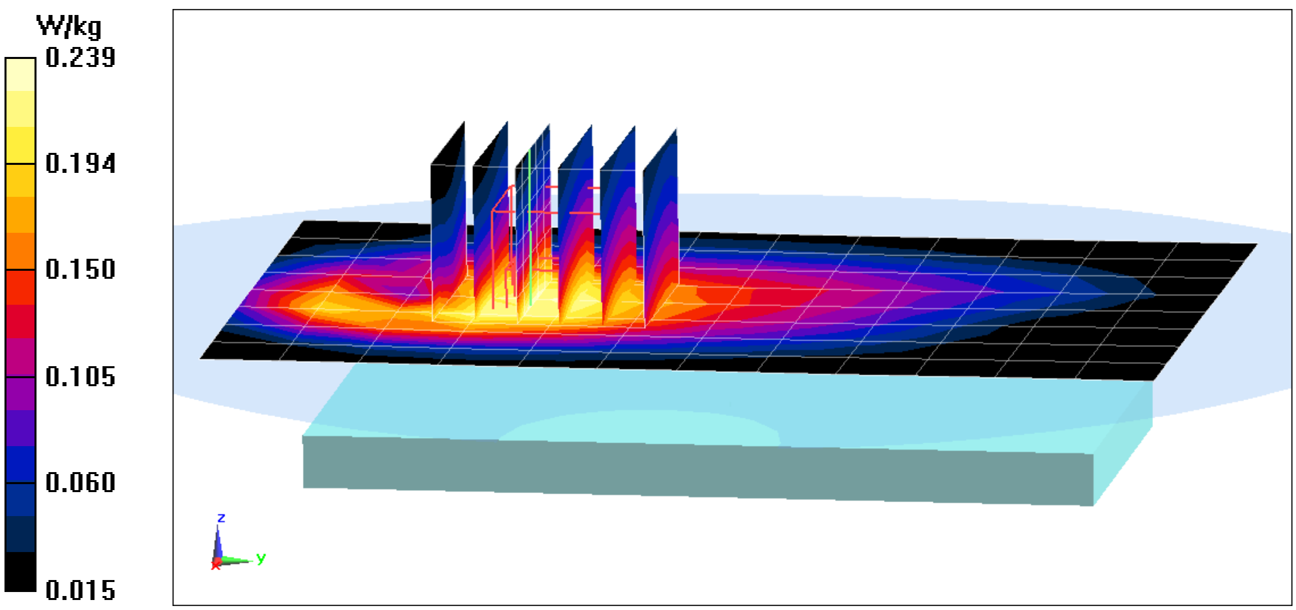
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.987 S/m; ε_r = 55.379; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-09-2017; Ambient Temp: 23.3°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3332; ConvF(6.7, 6.7, 6.7); Calibrated: 8/25/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/15/2016
Phantom: SAM Left; Type: SAM; Serial: 1688
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 13, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.21 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.294 W/kg
SAR(1 g) = 0.212 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

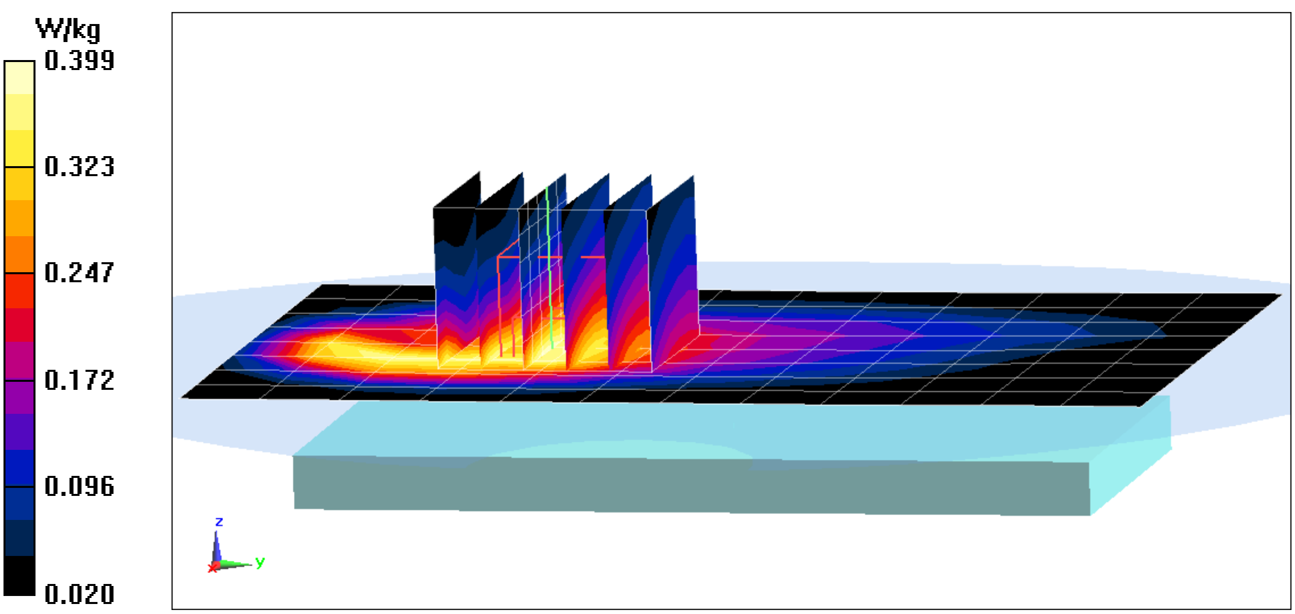
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.987 S/m; ε_r = 55.379; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-09-2017; Ambient Temp: 23.3°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3332; ConvF(6.7, 6.7, 6.7); Calibrated: 8/25/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/15/2016
Phantom: SAM Left; Type: SAM; Serial: 1688
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 13, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.37 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.516 W/kg
SAR(1 g) = 0.347 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

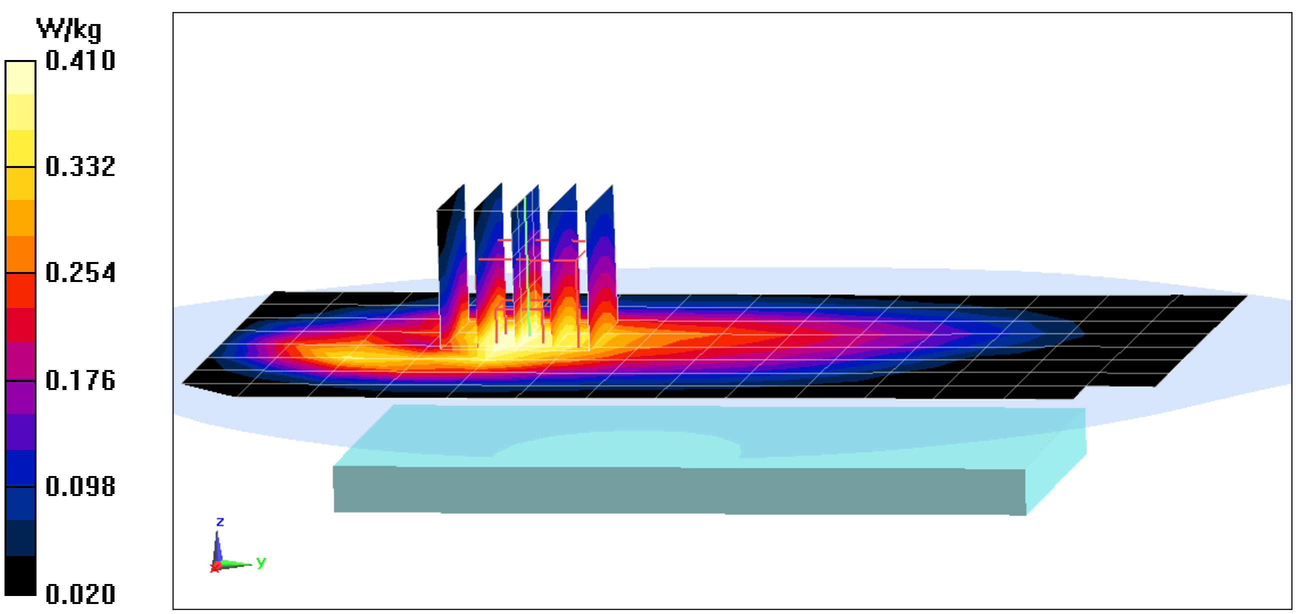
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 1.001 S/m; ε_r = 54.566; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.98 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.487 W/kg
SAR(1 g) = 0.369 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

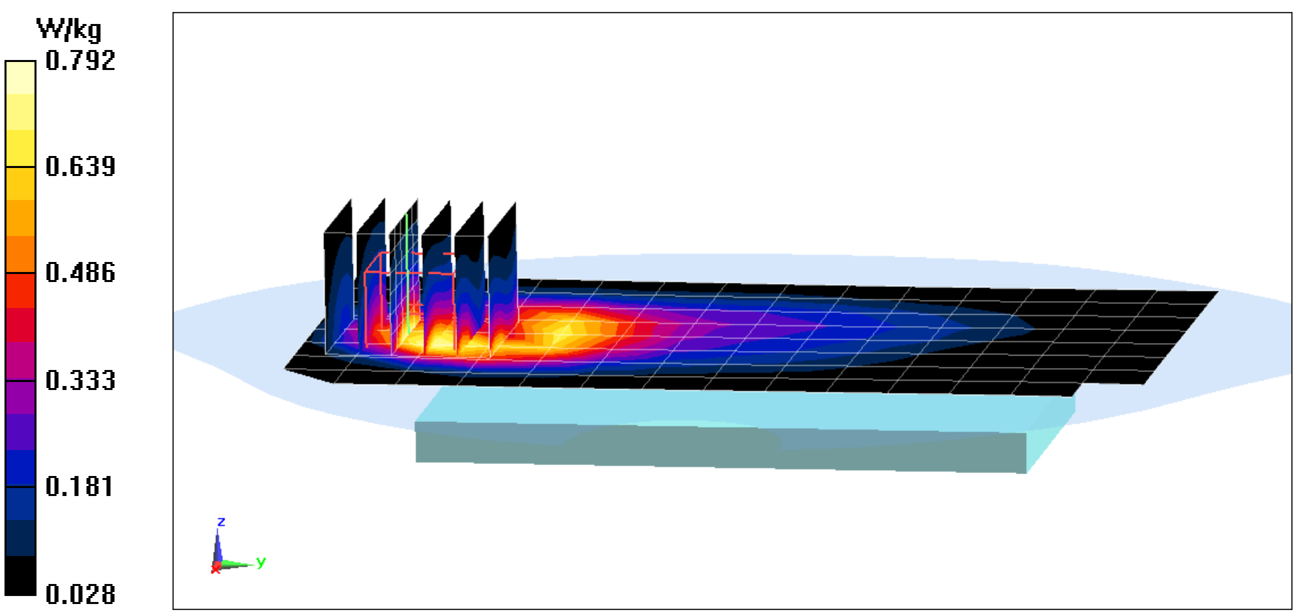
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 1.001 S/m; ε_r = 54.566; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.26 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.656 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

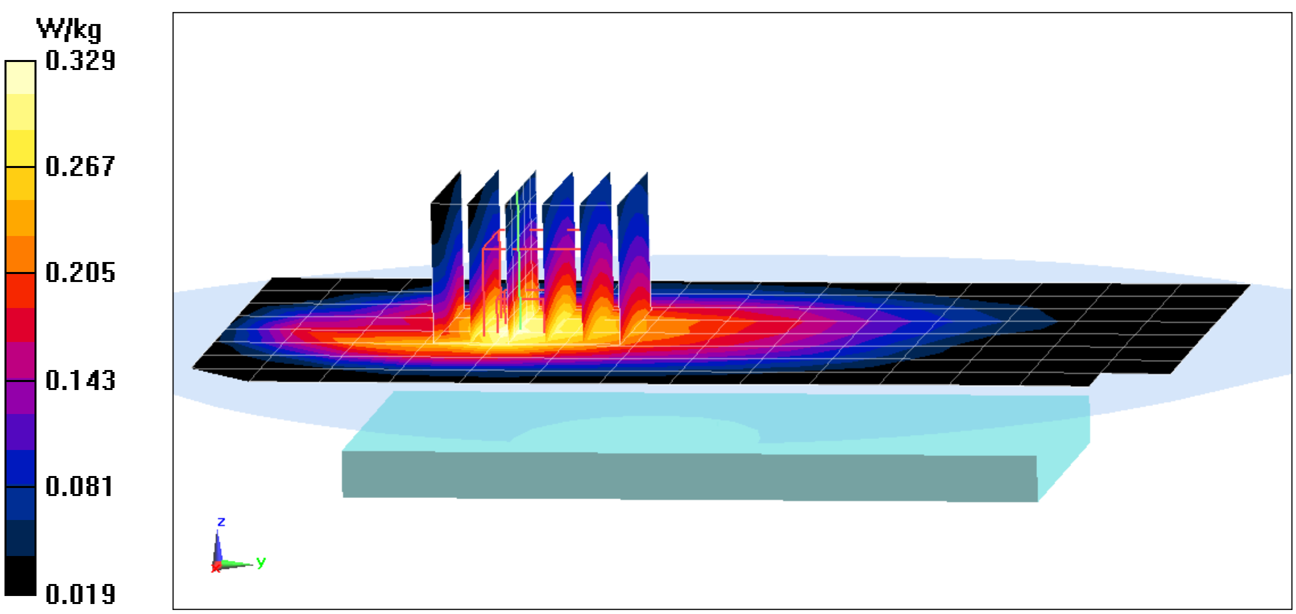
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.997 S/m; ε_r = 54.618; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 26 (Cell.), Body SAR, Back side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.70 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.395 W/kg
SAR(1 g) = 0.294 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

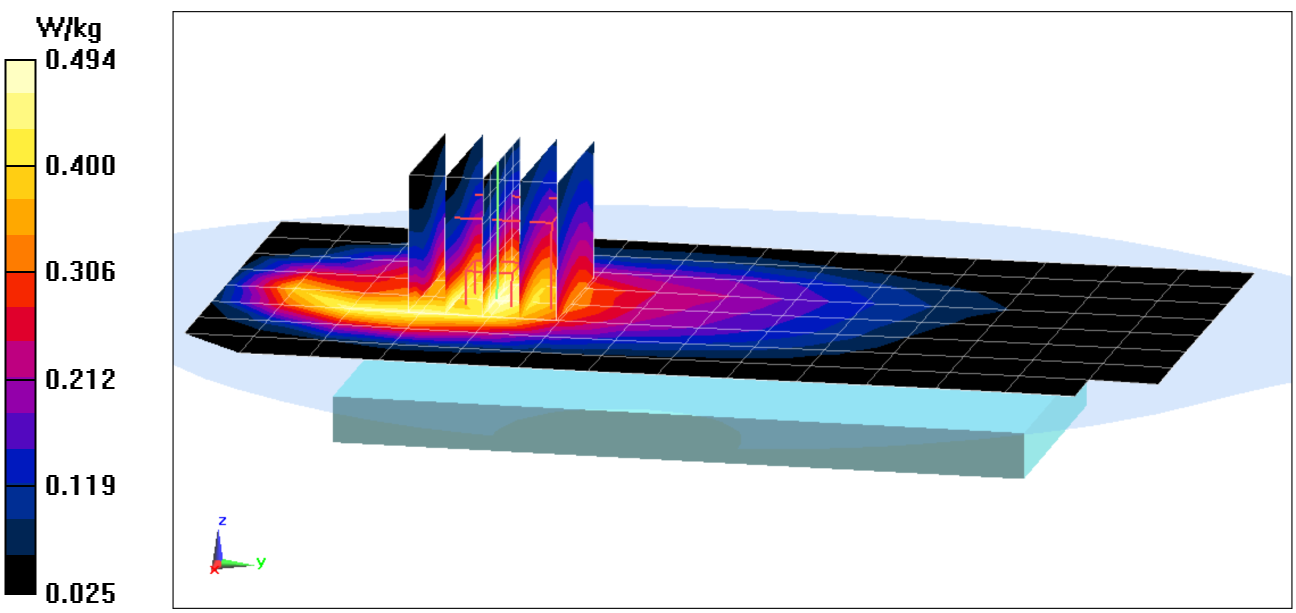
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.997 S/m; ε_r = 54.618; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 26 (Cell.), Body SAR, Back side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.85 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.634 W/kg
SAR(1 g) = 0.436 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

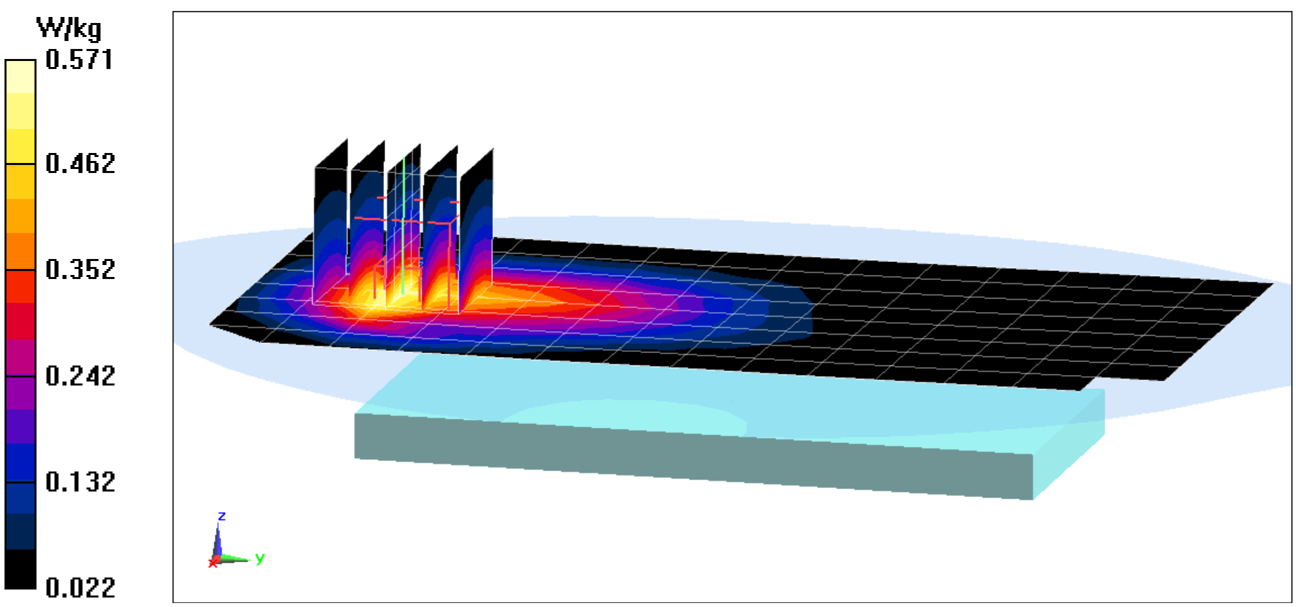
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1745 MHz; σ = 1.458 S/m; ε_r = 51.366; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-07-2017; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.99, 4.99, 4.99); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 66 (AWS), Body SAR, Back side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.69 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.723 W/kg
SAR(1 g) = 0.484 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

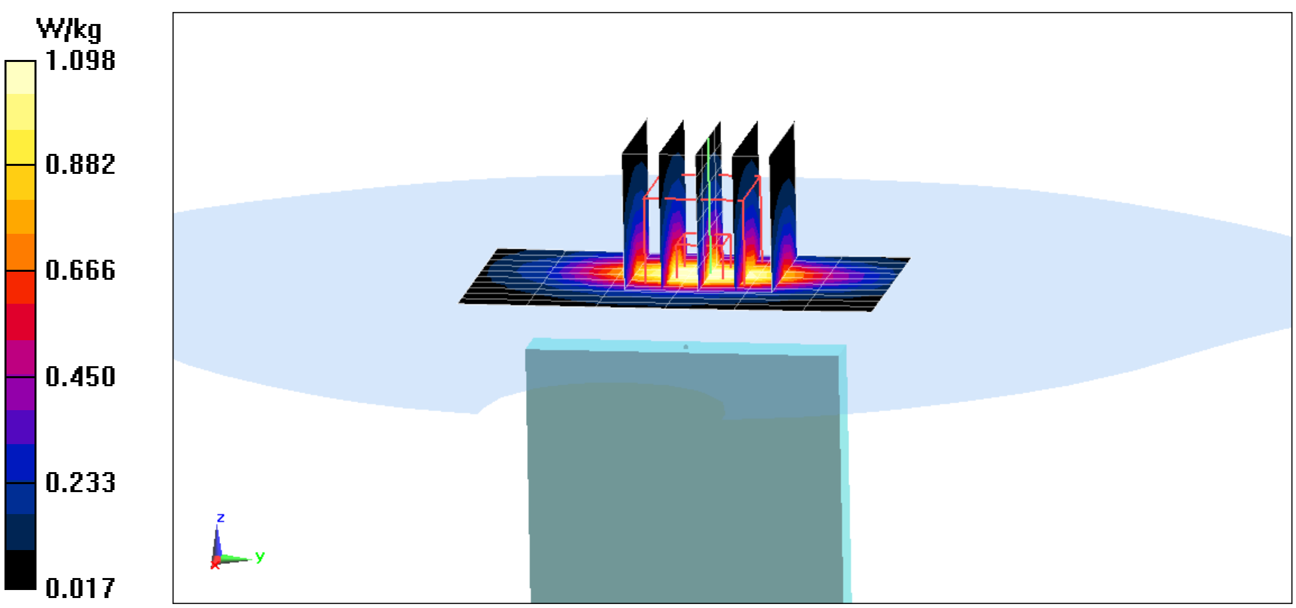
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.528 S/m; ε_r = 51.487; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-23-2017; Ambient Temp: 23.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(4.99, 4.99, 4.99); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 66 (AWS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.82 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.907 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1F7FD

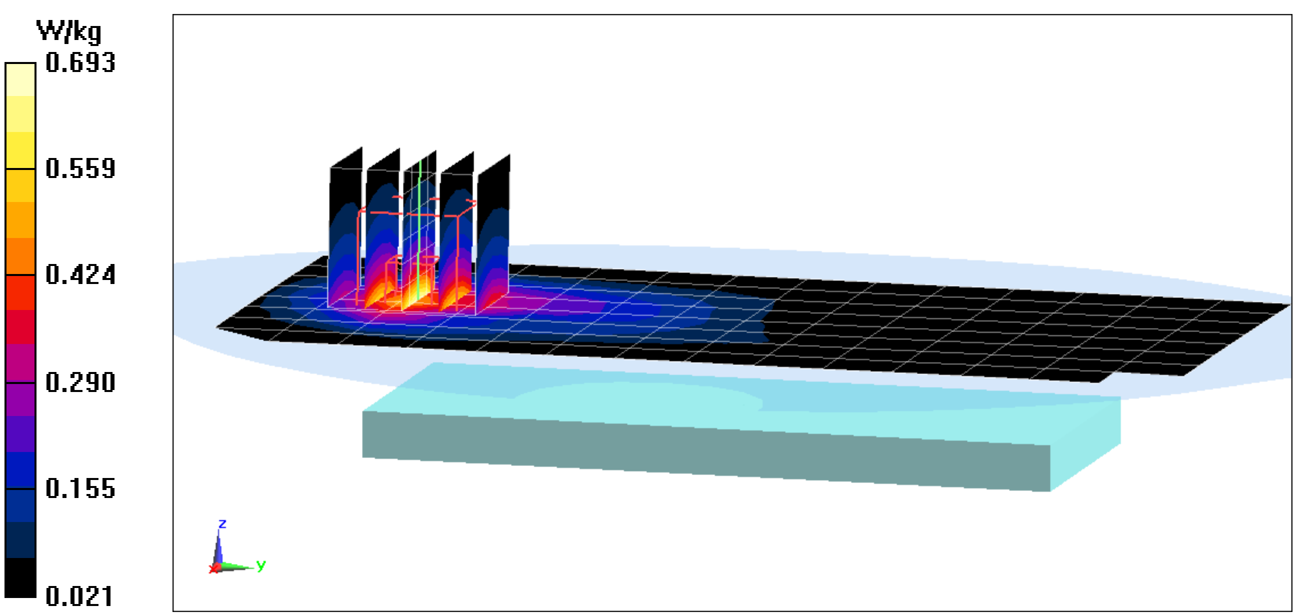
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.551 S/m; ε_r = 52.292; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-04-2017; Ambient Temp: 24.0°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN7409; ConvF(7.47, 7.47, 7.47); Calibrated: 5/17/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/11/2016
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 25 (PCS), Body SAR, Back side, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.20 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.805 W/kg
SAR(1 g) = 0.487 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

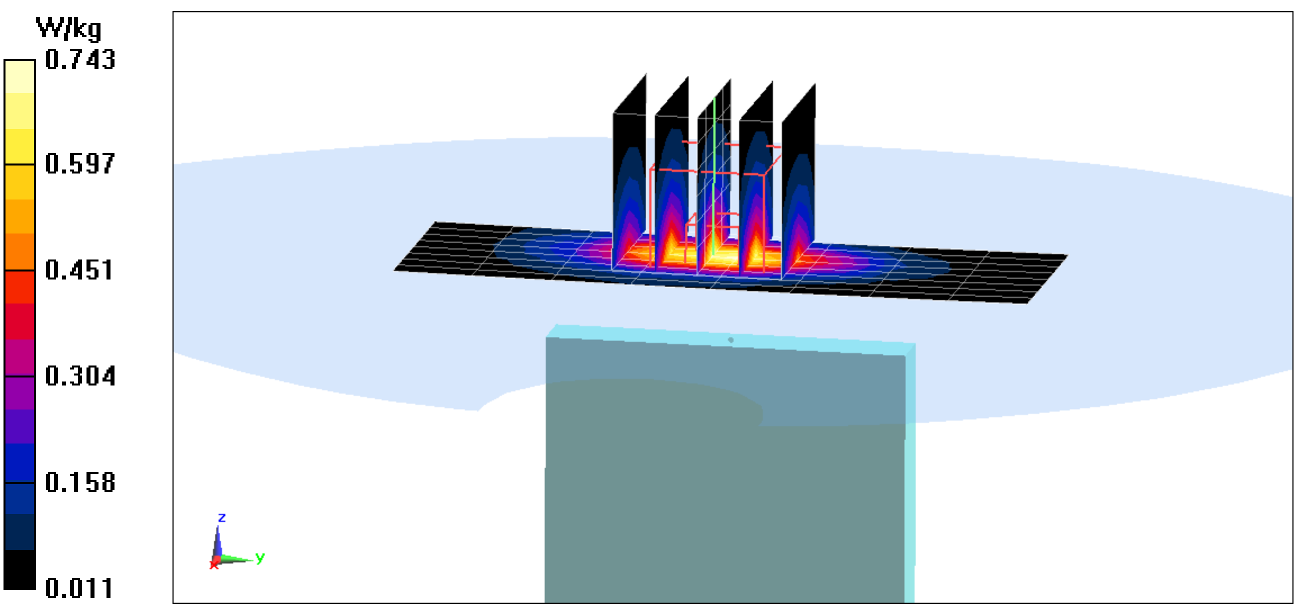
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.547 S/m; ε_r = 51.915; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-06-2017; Ambient Temp: 22.7°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3334; ConvF(4.91, 4.91, 4.91); Calibrated: 11/15/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 11/11/2016
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 25 (PCS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 50 RB, 50 RB Offset

Area Scan (9x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.09 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.594 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG480F; Type: Portable Handset; Serial: 0786A

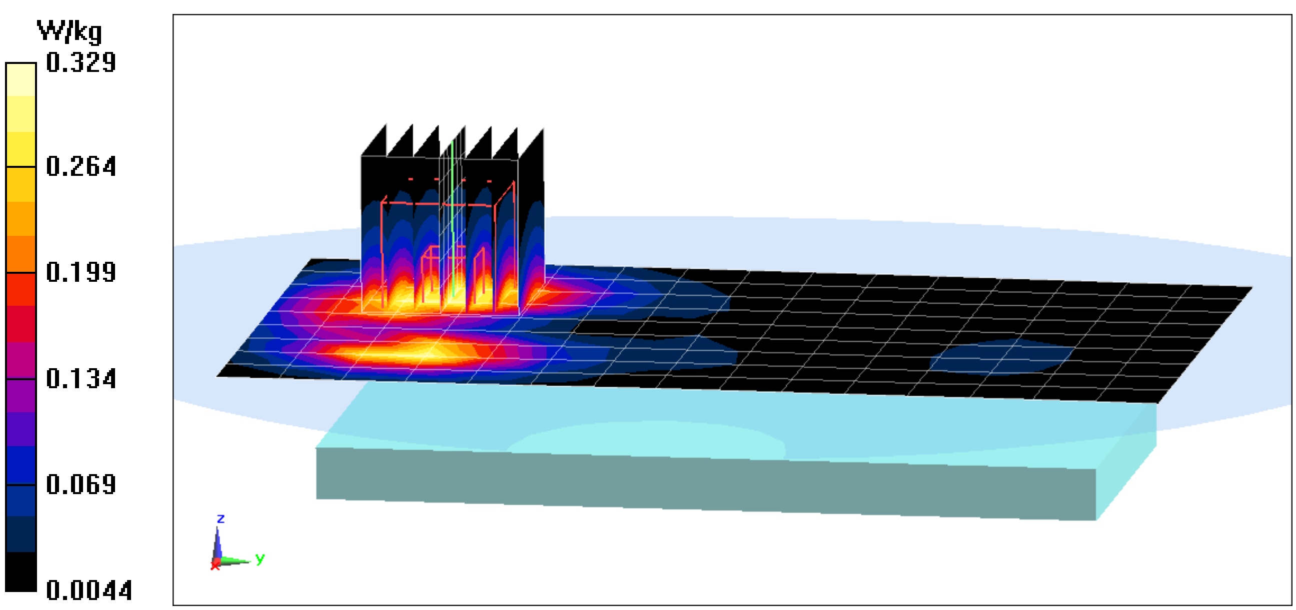
Communication System: UID 0, LTE Band 41; Frequency: 2636.5 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used (interpolated):
f = 2636.5 MHz; σ = 2.31 S/m; ε_r = 51.59; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-20-2017; Ambient Temp: 22.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(6.94, 6.94, 6.94); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 41, Body SAR, Back side, Mid-High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.917 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.407 W/kg
SAR(1 g) = 0.213 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG480F; Type: Portable Handset; Serial: 0786A

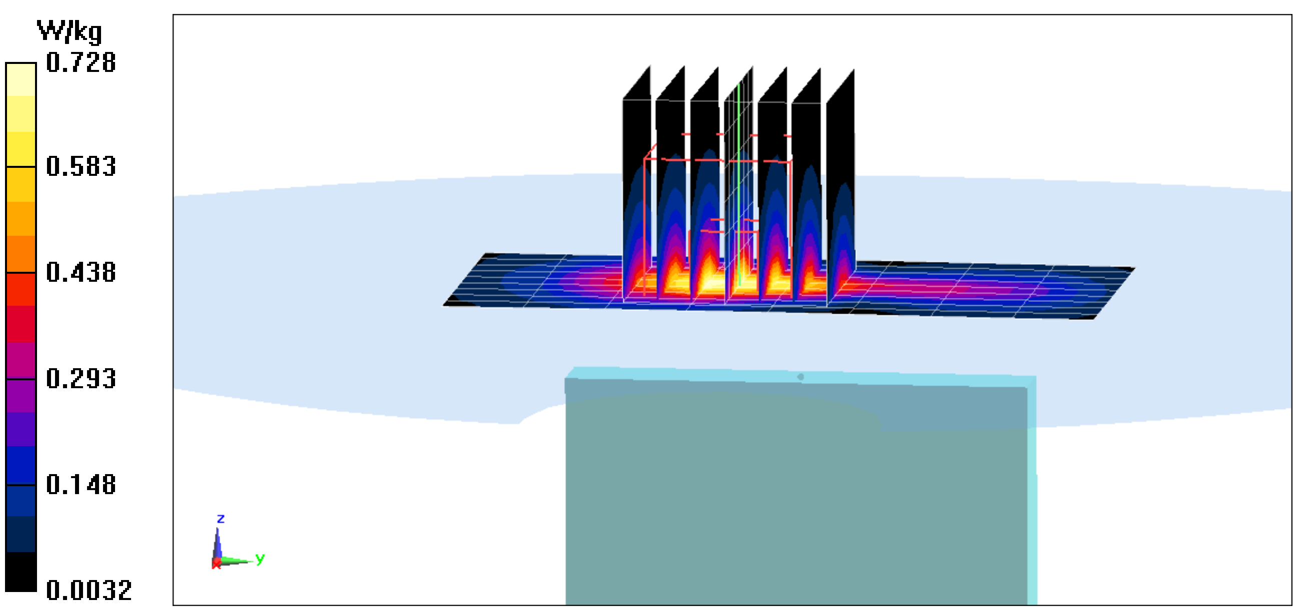
Communication System: UID 0, LTE Band 41; Frequency: 2636.5 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used (interpolated):
f = 2636.5 MHz; σ = 2.31 S/m; ε_r = 51.59; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-20-2017; Ambient Temp: 22.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(6.94, 6.94, 6.94); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 41, Body SAR, Bottom Edge, Mid-High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.57 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.929 W/kg
SAR(1 g) = 0.454 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

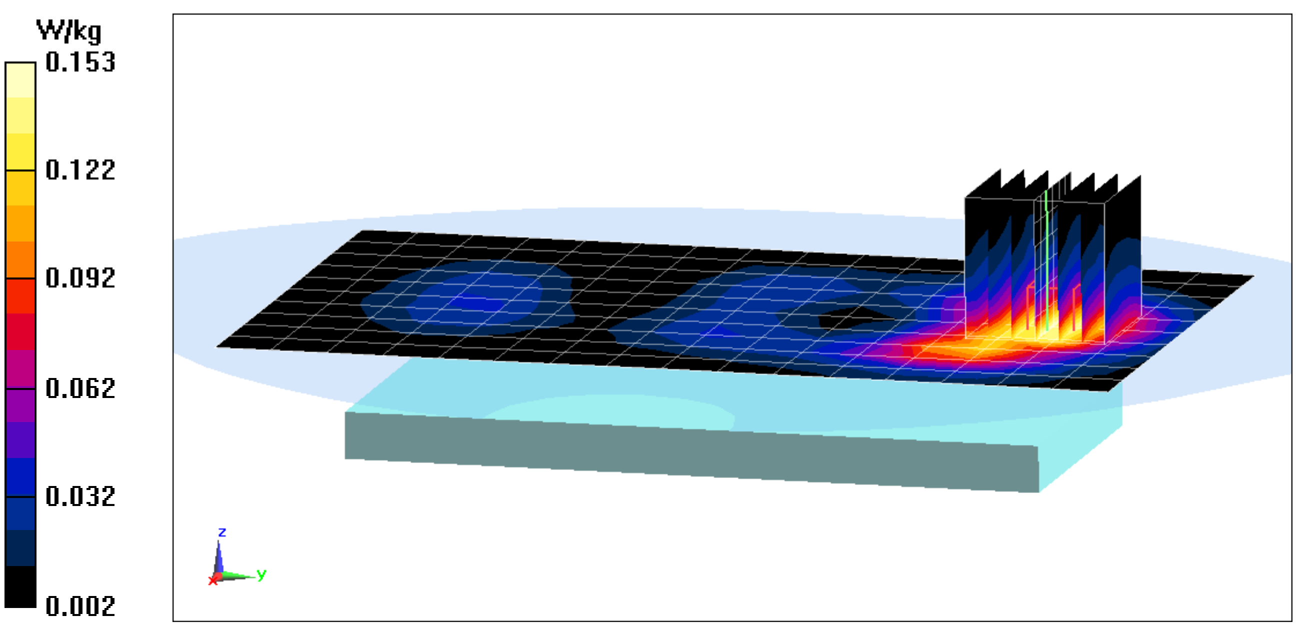
Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.979 S/m; ε_r = 51.463; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-21-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 01, 1 Mbps, Back Side, Antenna 1

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.580 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.187 W/kg
SAR(1 g) = 0.105 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

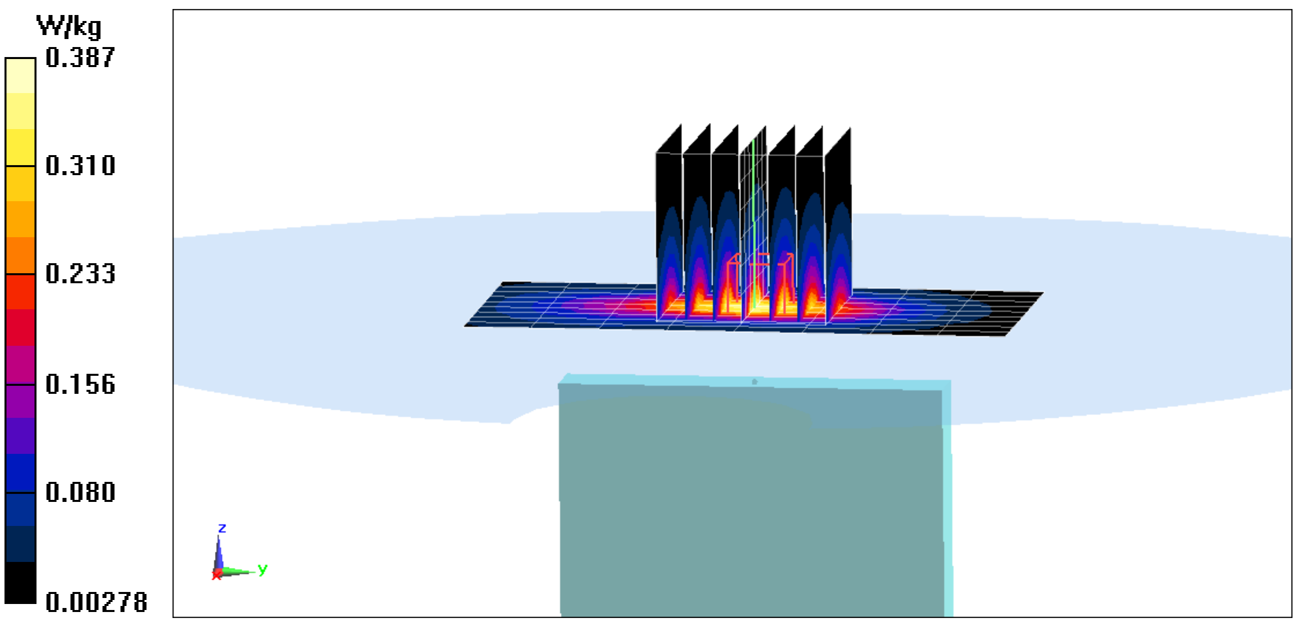
Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.979 S/m; ε_r = 51.463; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 01, 1 Mbps, Top Edge, Antenna 1

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.49 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.474 W/kg
SAR(1 g) = 0.242 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

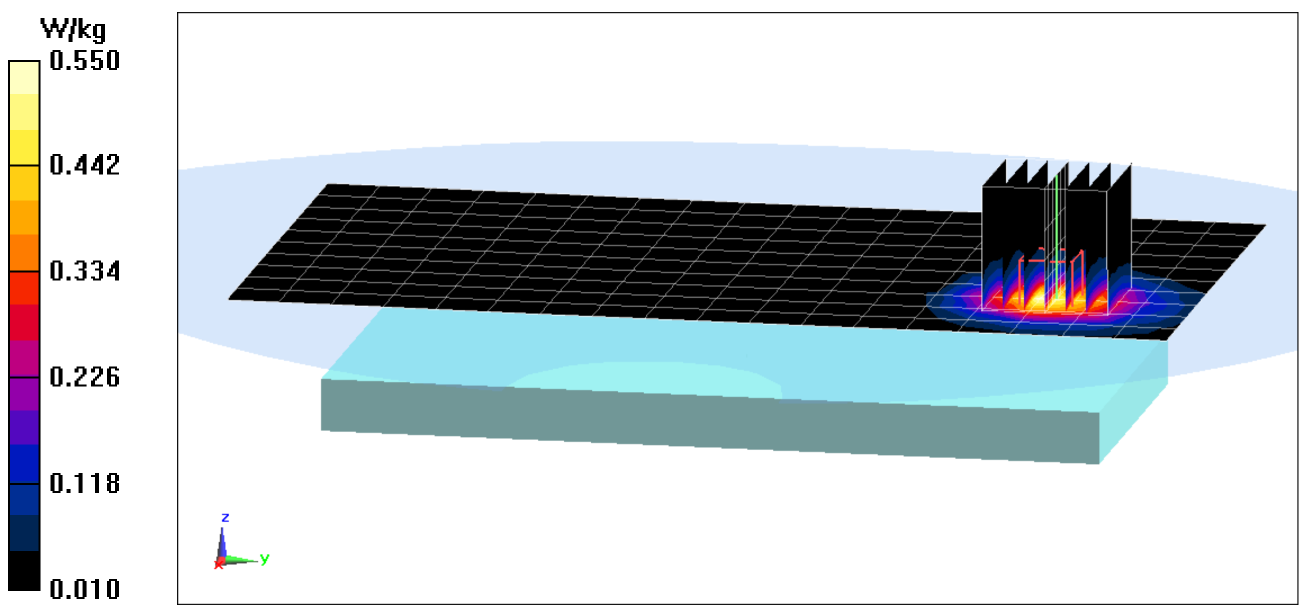
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5785 MHz; σ = 6.232 S/m; ε_r = 47.029; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-22-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3914; ConvF(3.86, 3.86, 3.86); Calibrated: 2/22/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/18/2016
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a, UNII-3, 20 MHz Bandwidth, Body SAR, Ch 157, 6 Mbps, Back Side, Antenna 2

Area Scan (11x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 6.691 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.906 W/kg
SAR(1 g) = 0.254 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMG950F; Type: Portable Handset; Serial: 1EF00

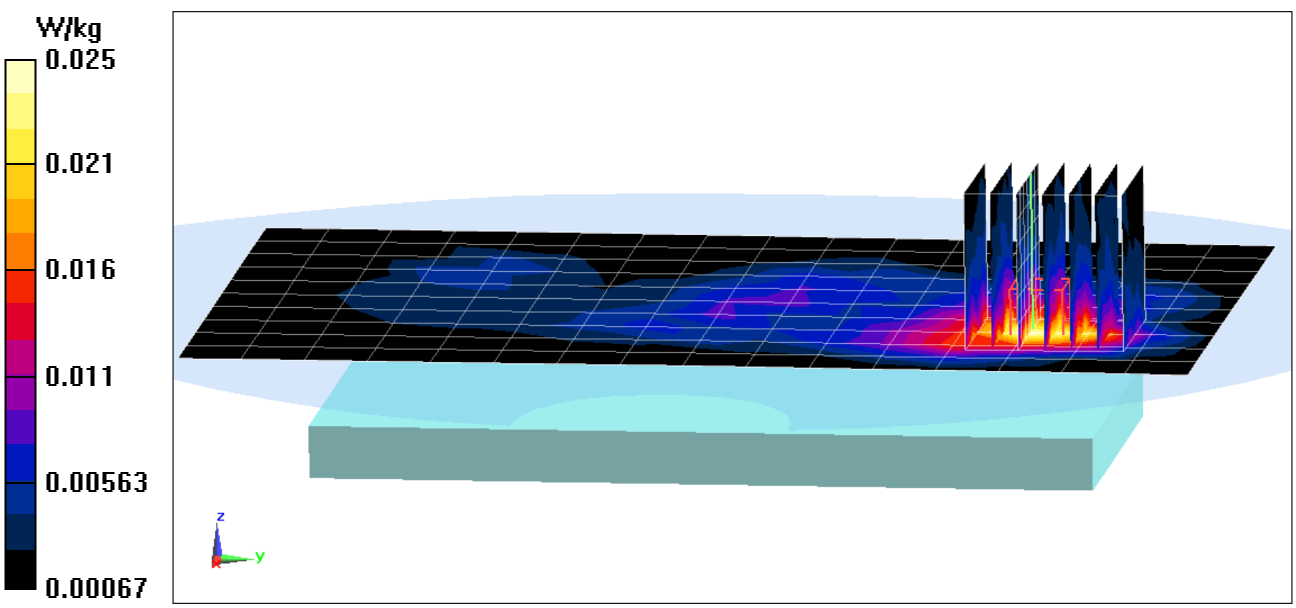
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.277
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 2.023 S/m; ε_r = 51.229; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-17-2017; Ambient Temp: 24.2°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Back Side

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.151 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.0310 W/kg
SAR(1 g) = 0.016 W/kg



DUT: A3LSMG950F; Type: Portable Handset; Serial: 0786A

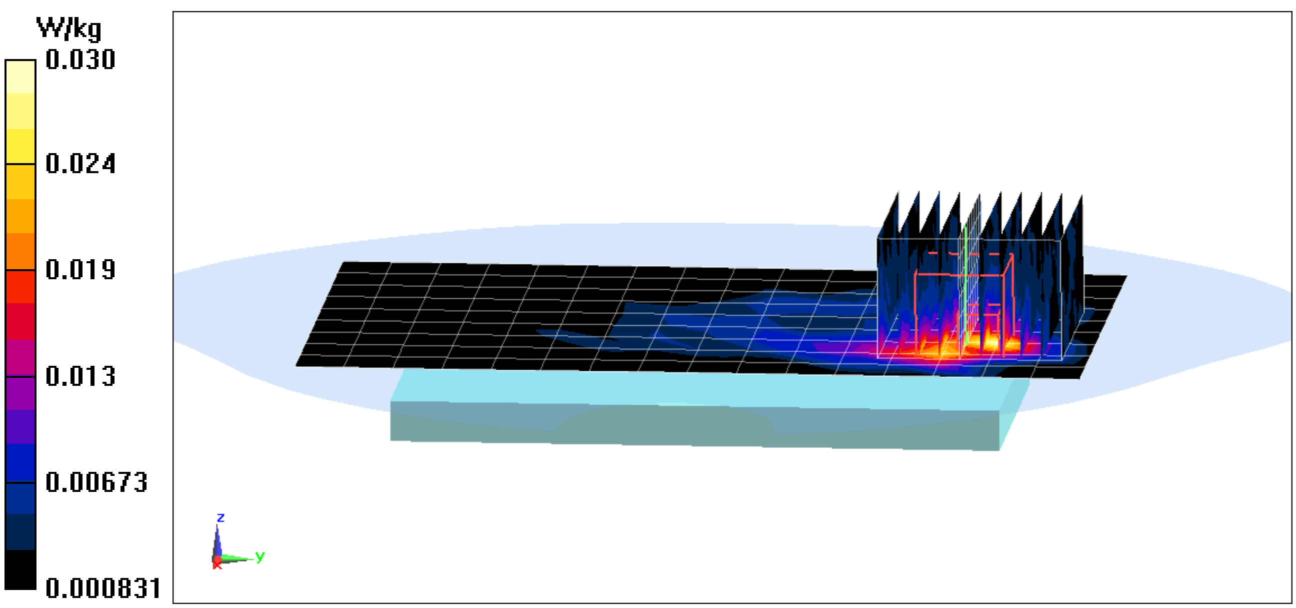
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.277
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.961 S/m; ε_r = 51.39; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-24-2017; Ambient Temp: 24.0°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Bluetooth, Body SAR, Ch 39, 2 Mbps, Back Side

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (11x10x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.331 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.0380 W/kg
SAR(1 g) = 0.018 W/kg



APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1161

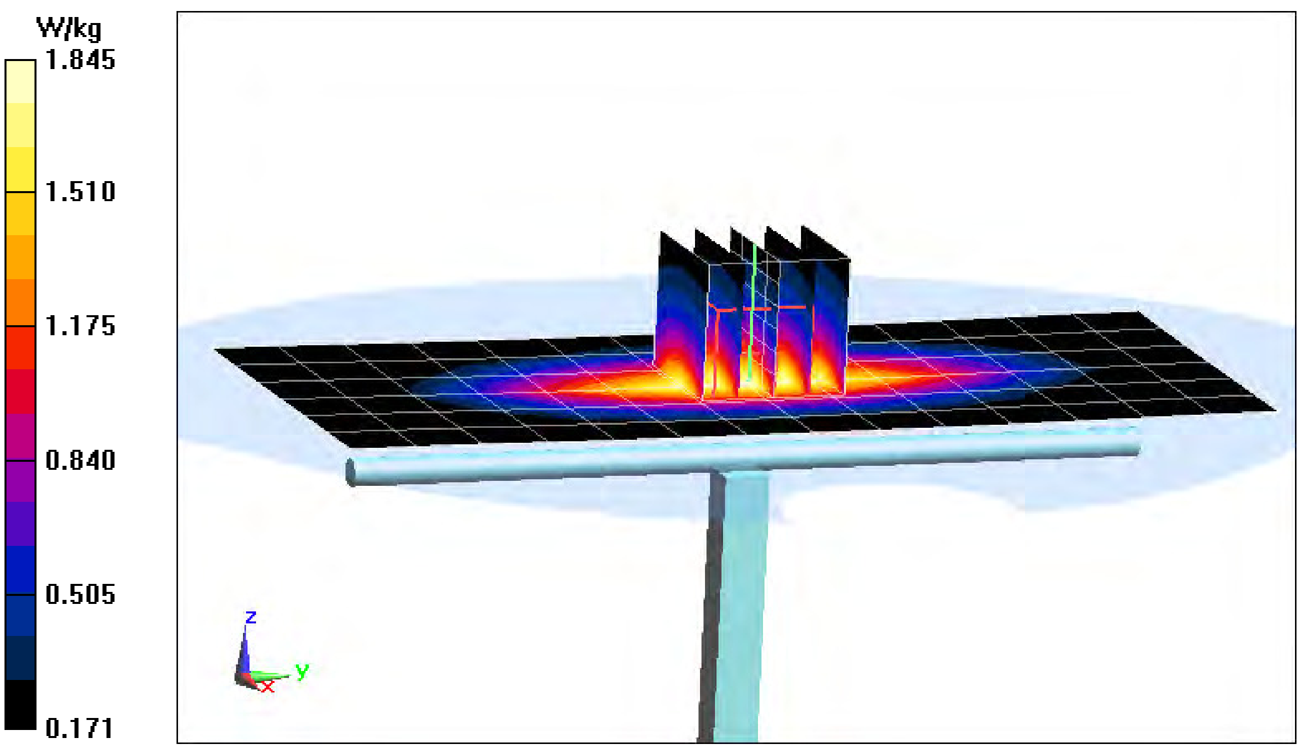
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; σ = 0.905 S/m; ε_r = 42.203; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-11-2017; Ambient Temp: 23.8°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3209; ConvF(6.6, 6.6, 6.6); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Right; Type: SAM; Serial: 1757
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) = 2.29 W/kg
SAR(1 g) = 1.58 W/kg
Deviation(1 g) = -3.30%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d133

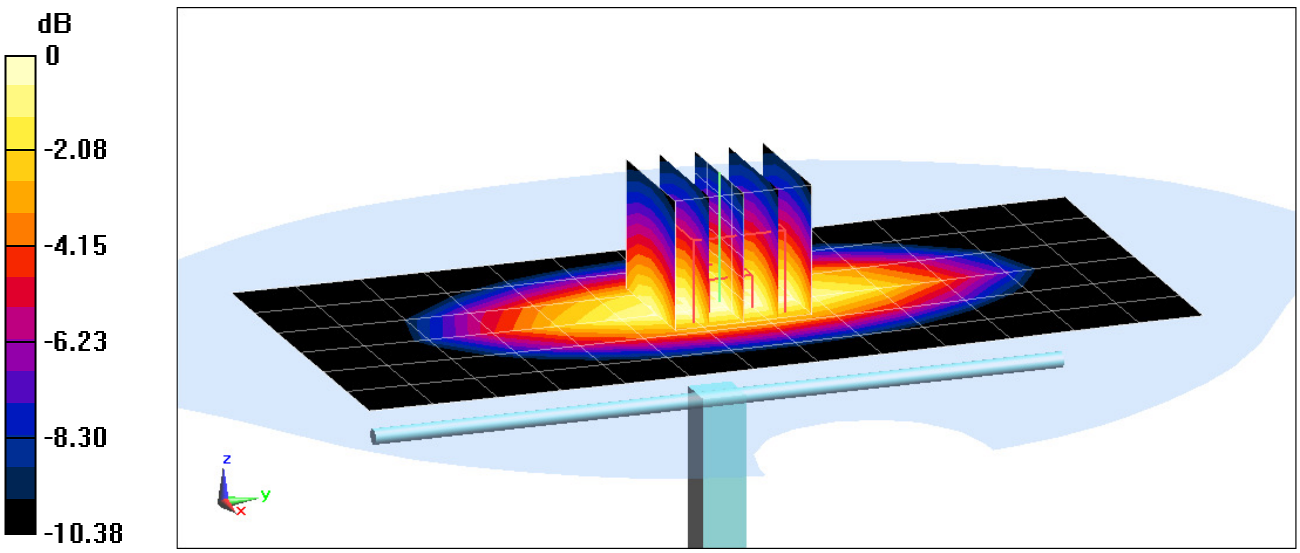
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.911 S/m; ε_r = 41.612; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-09-2017; Ambient Temp: 22.2°C; Tissue Temp: 21.1°C

Probe: ES3DV3 - SN3319; ConvF(6.16, 6.16, 6.16); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 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) = 2.63 W/kg
SAR(1 g) = 1.85 W/kg
Deviation(1 g) = -0.75%



0 dB = 2.15 W/kg = 3.32 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148

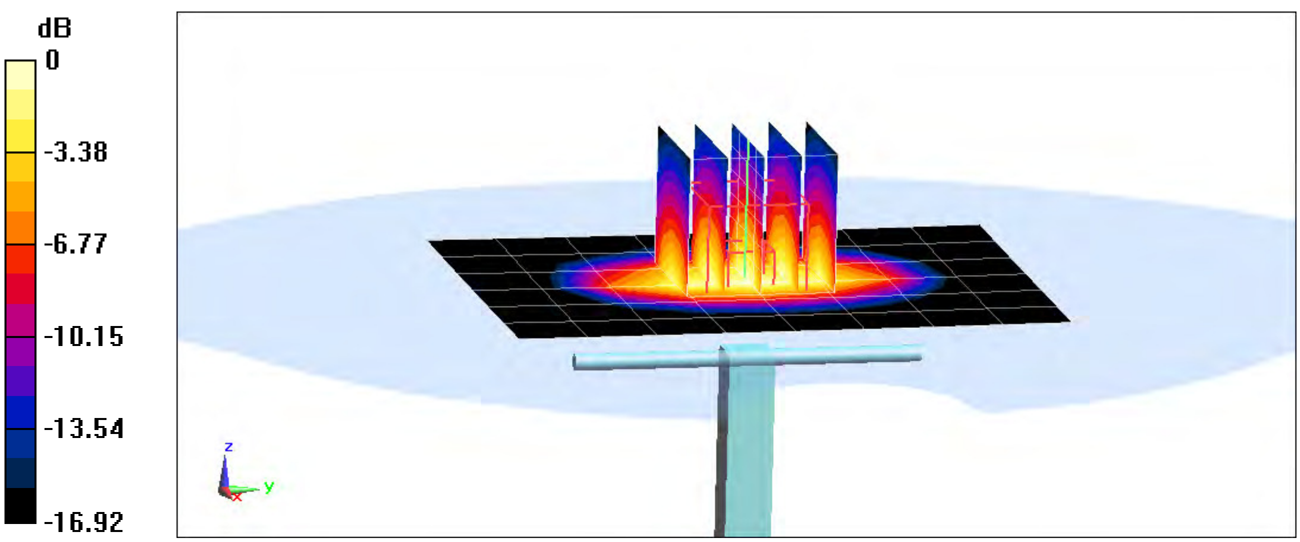
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.415 S/m; ε_r = 38.753; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-20-2017; Ambient Temp: 23.5°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(5.28, 5.28, 5.28); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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) = 6.26 W/kg
SAR(1 g) = 3.51 W/kg
Deviation(1 g) = -3.04%



0 dB = 4.39 W/kg = 6.42 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

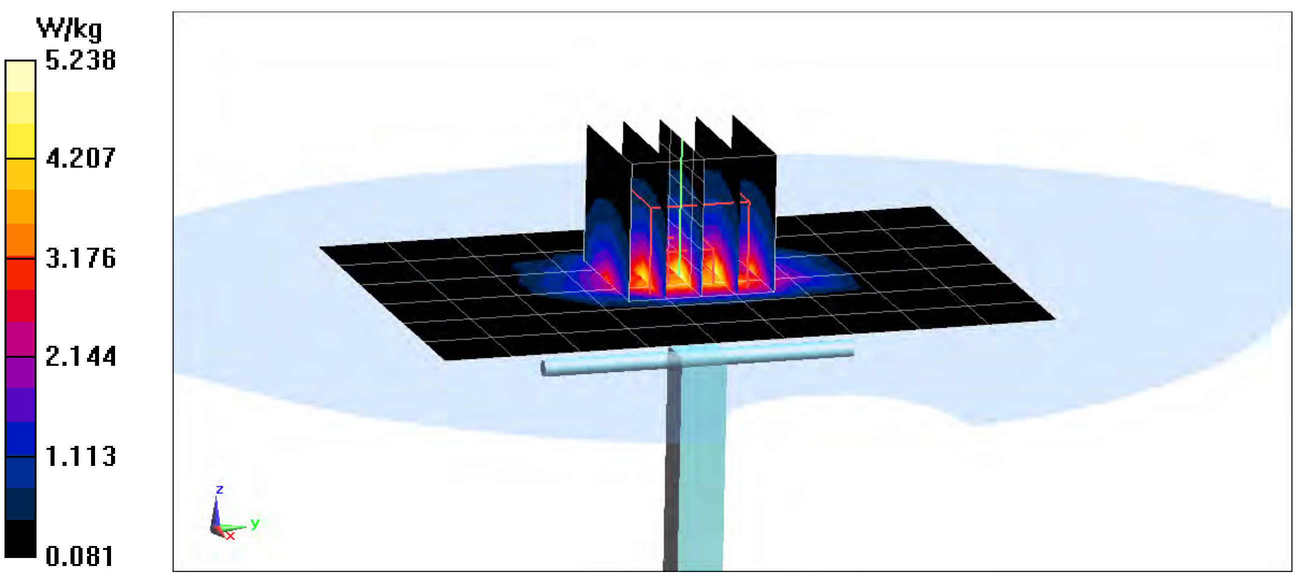
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
$f = 1900$ MHz; $\sigma = 1.451$ S/m; $\varepsilon_r = 40.213$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-02-2017; Ambient Temp: 24.3°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3287; ConvF(5.27, 5.27, 5.27); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
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) = 7.44 W/kg
SAR(1 g) = 4.13 W/kg
Deviation(1 g) = 2.99%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

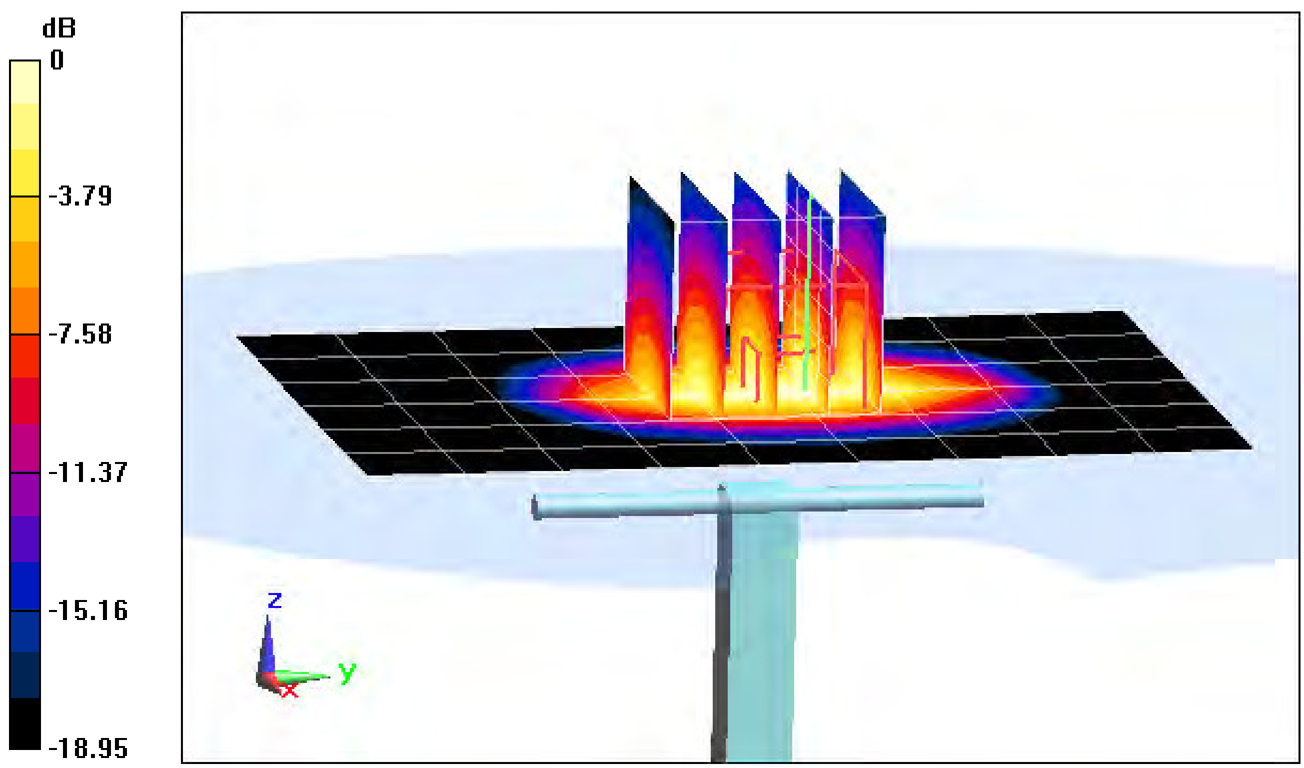
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.433 S/m; ε_r = 39.181; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-02-2017; Ambient Temp: 22.7°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3209; ConvF(5.14, 5.14, 5.14); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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) = 7.21 W/kg
SAR(1 g) = 3.87 W/kg
Deviation(1 g) = -1.53%



0 dB = 4.84 W/kg = 6.85 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

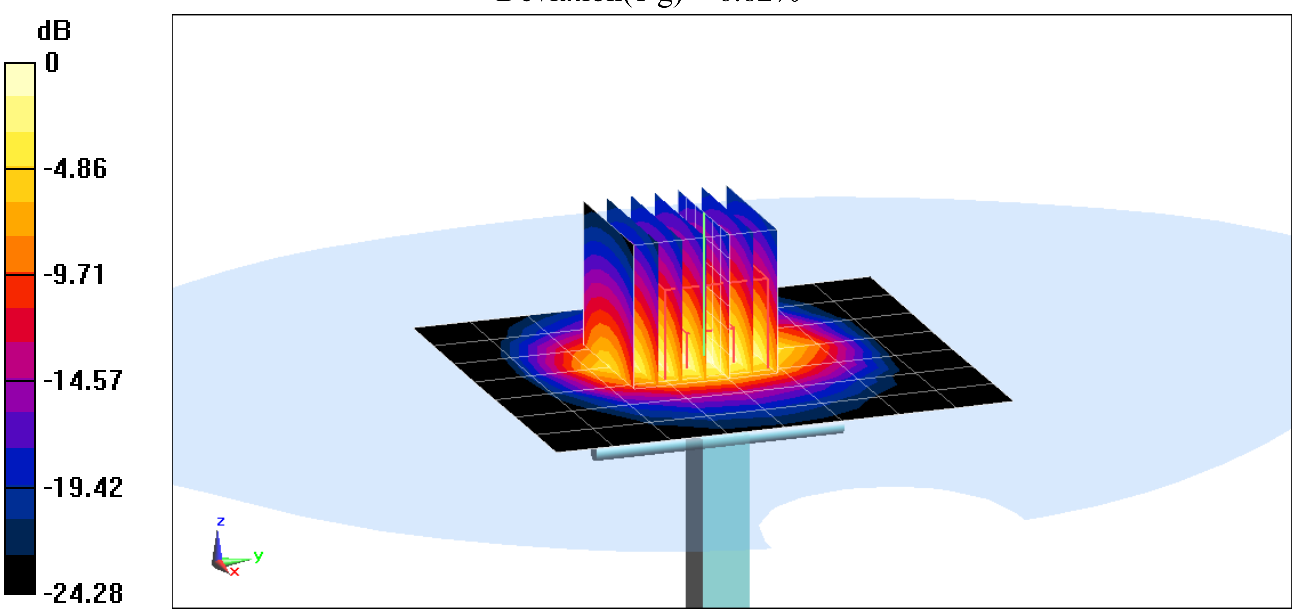
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.869 S/m; ε_r = 38.155; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-22-2017; Ambient Temp: 23.2°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3287; ConvF(4.54, 4.54, 4.54); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification 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) = 11.9 W/kg
SAR(1 g) = 5.64 W/kg
Deviation(1 g) = 6.82%



0 dB = 7.52 W/kg = 8.76 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1126

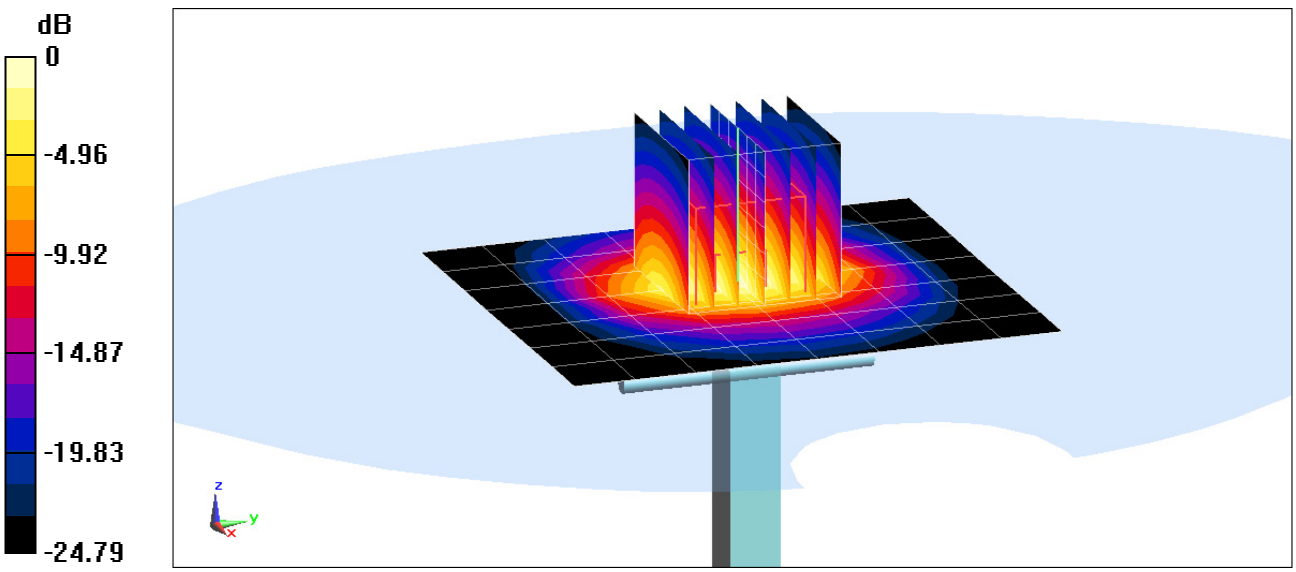
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Head Medium parameters used:
f = 2600 MHz; σ = 2.035 S/m; ε_r = 39.75; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2017; Ambient Temp: 23.0°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3287; ConvF(4.41, 4.41, 4.41); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Front; Type: SAM; Serial: 1686
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) = 13.5 W/kg
SAR(1 g) = 5.93 W/kg
Deviation(1 g) = 5.33%



0 dB = 7.97 W/kg = 9.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

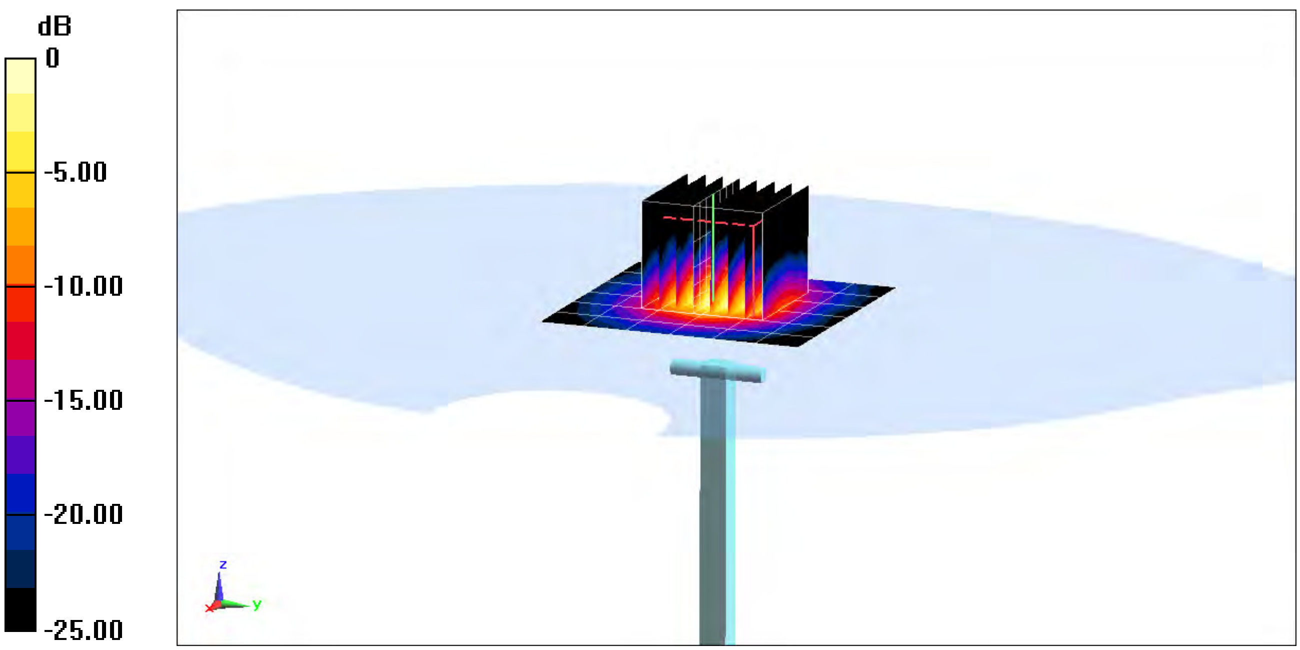
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used (interpolated):
f = 5250 MHz; $\sigma = 4.572$ S/m; $\varepsilon_r = 34.988$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-23-2017; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7357; ConvF(5.1, 5.1, 5.1); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/19/2016
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 3.88 W/kg
Deviation(1 g) = -1.65%



0 dB = 9.08 W/kg = 9.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

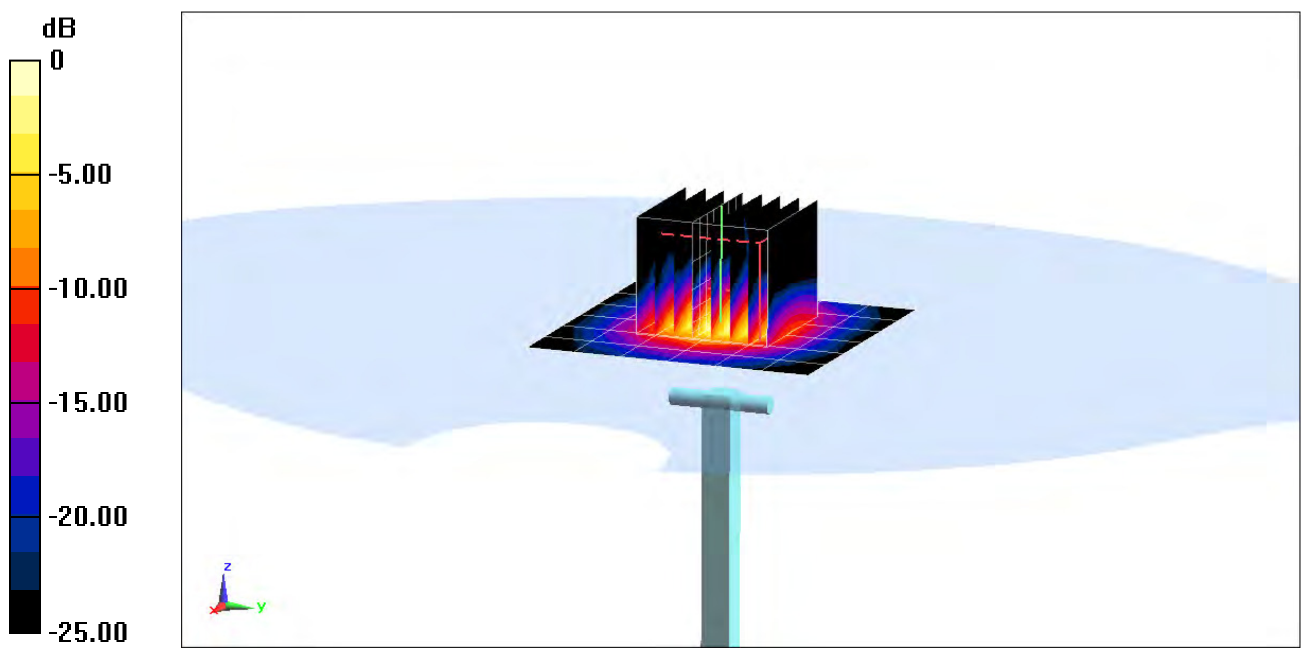
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.914 S/m; ε_r = 34.502; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-23-2017; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7357; ConvF(4.41, 4.41, 4.41); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/19/2016
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 4.12 W/kg
Deviation(1 g) = -1.44%



0 dB = 10.1 W/kg = 10.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1191

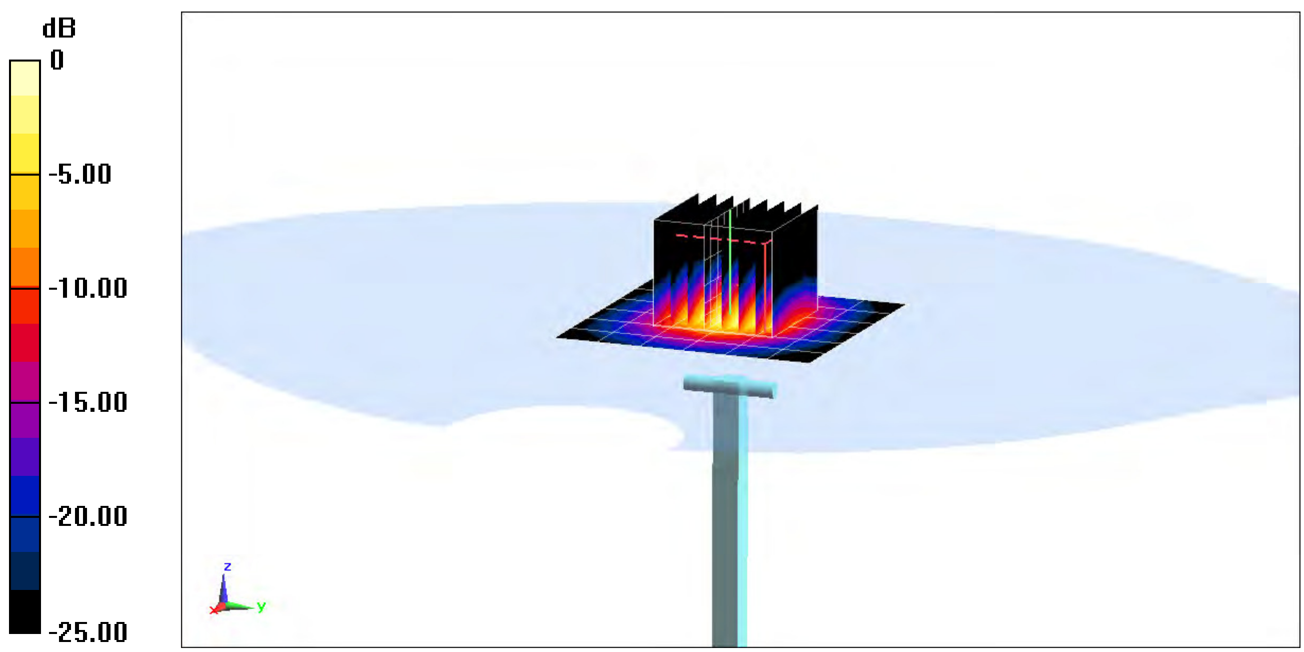
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.074 S/m; ε_r = 34.319; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-23-2017; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7357; ConvF(4.65, 4.65, 4.65); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/19/2016
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 3.91 W/kg
Deviation(1 g) = -1.14%



0 dB = 9.67 W/kg = 9.85 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1161

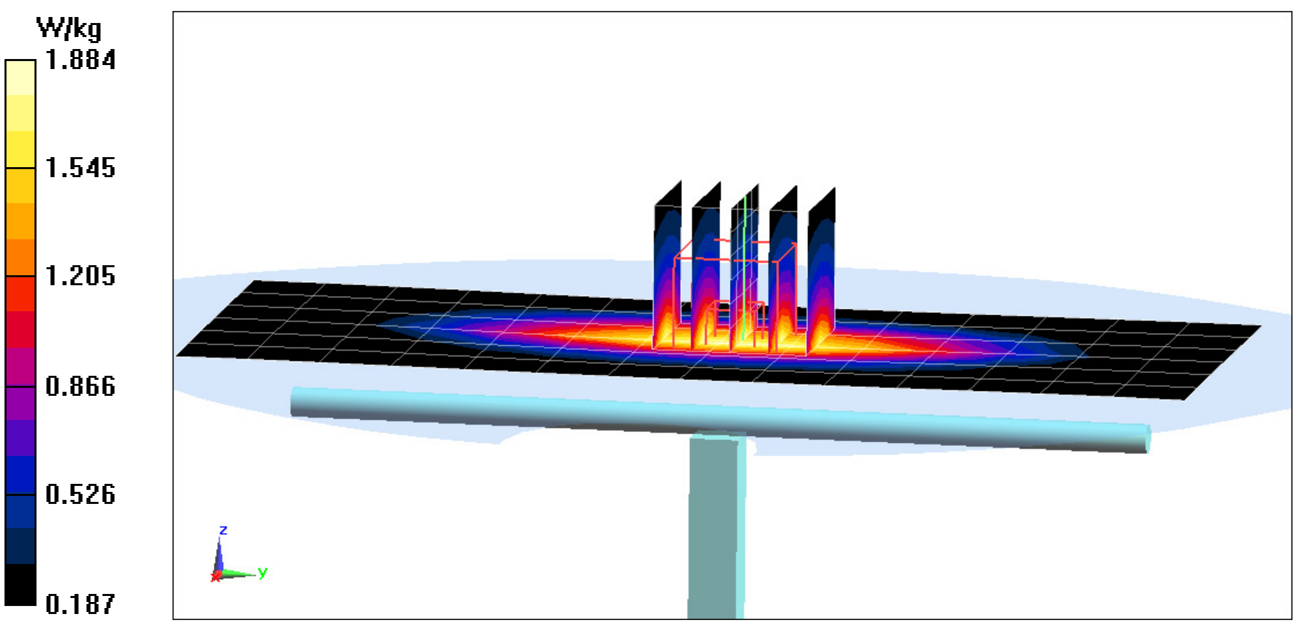
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.957 S/m; ε_r = 53.959; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-06-2017; Ambient Temp: 21.8°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3332; ConvF(6.7, 6.7, 6.7); Calibrated: 8/25/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/15/2016
Phantom: SAM Left; Type: SAM; Serial: 1688
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) = 2.40 W/kg
SAR(1 g) = 1.62 W/kg
Deviation(1 g) = -3.91%



PCTEST ENGINEERING LABORATORY, INC.

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

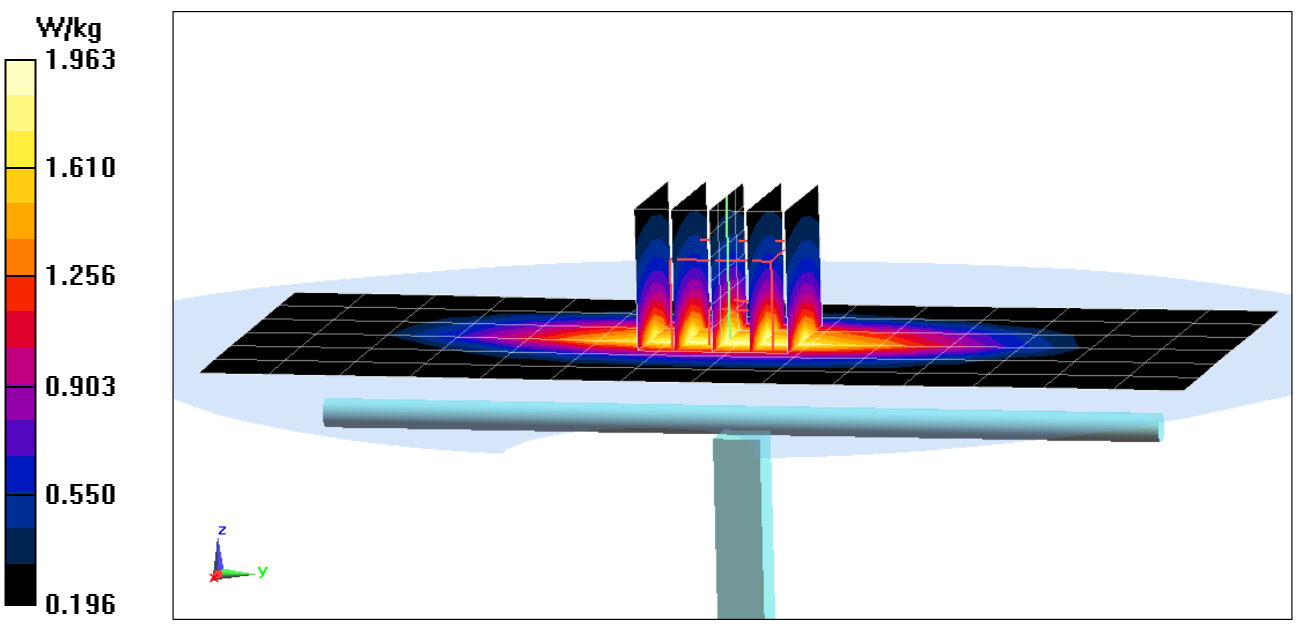
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.957 S/m; ε_r = 55.778; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-09-2017; Ambient Temp: 23.3°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3332; ConvF(6.7, 6.7, 6.7); Calibrated: 8/25/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/15/2016
Phantom: SAM Left; Type: SAM; Serial: 1688
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) = 2.46 W/kg
SAR(1 g) = 1.68 W/kg
Deviation(1 g) = -1.87%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d133

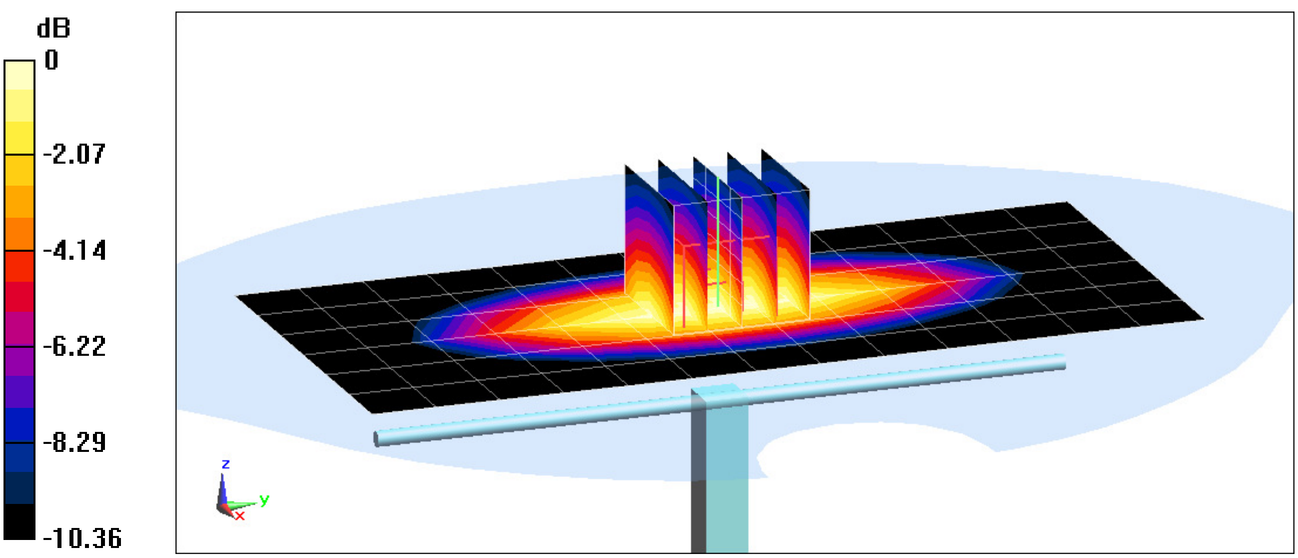
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 1 S/m; ε_r = 54.577; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-14-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.04, 6.04, 6.04); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/14/2016
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 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) = 2.97 W/kg
SAR(1 g) = 2.01 W/kg
Deviation(1 g) = 5.79%



0 dB = 2.36 W/kg = 3.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

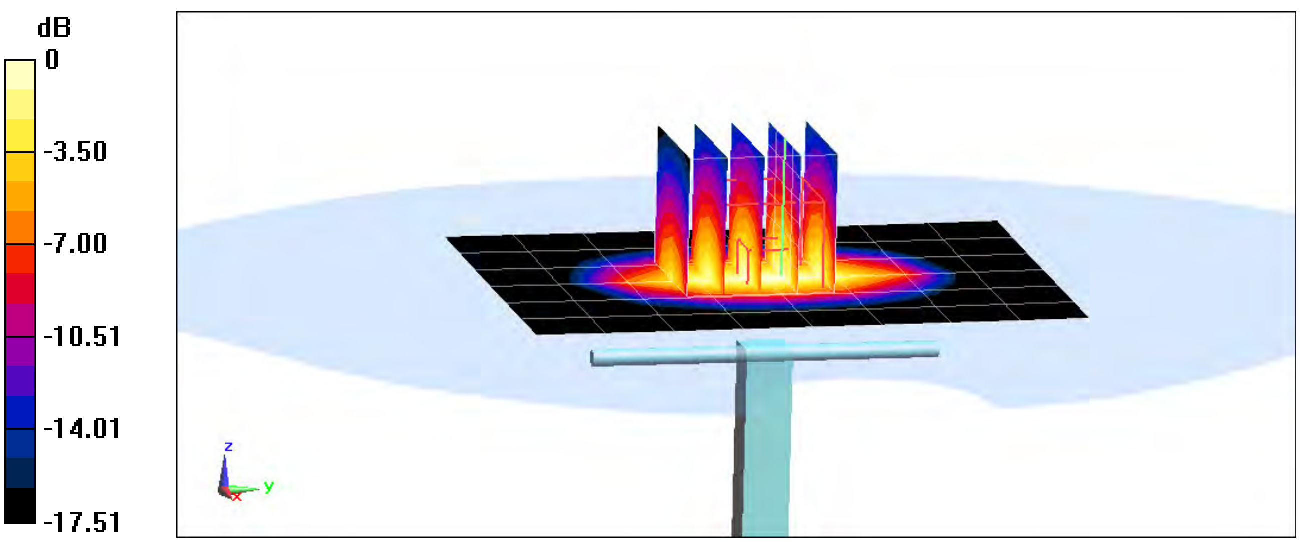
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.463 S/m; ε_r = 51.348; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-07-2017; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3209; ConvF(4.99, 4.99, 4.99); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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) = 6.64 W/kg
SAR(1 g) = 3.77 W/kg
Deviation(1 g) = 1.07%



0 dB = 4.66 W/kg = 6.68 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148

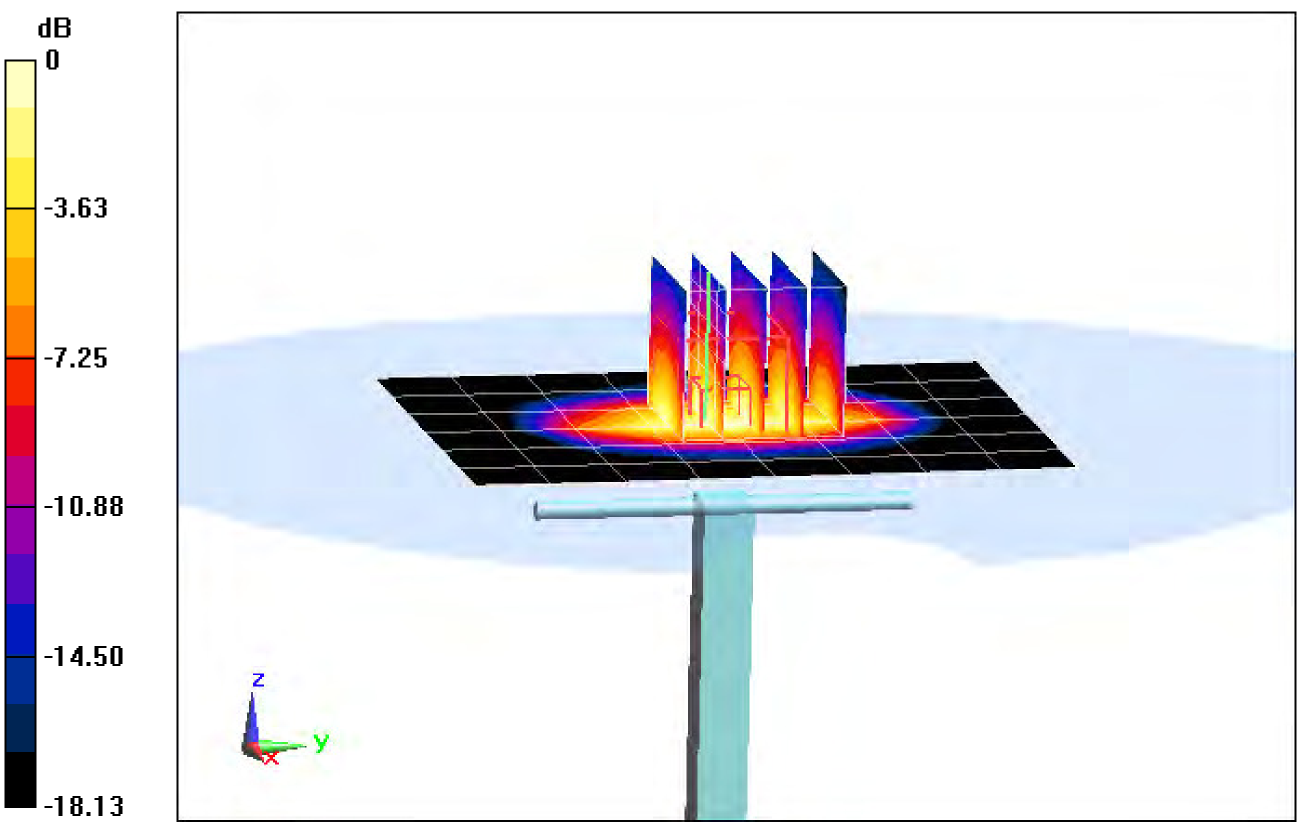
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.506 S/m; ε_r = 51.573; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-23-2017; Ambient Temp: 23.6°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3209; ConvF(4.99, 4.99, 4.99); Calibrated: 3/18/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1364; Calibrated: 8/22/2016
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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) = 6.96 W/kg
SAR(1 g) = 3.93 W/kg
Deviation(1 g) = 5.93%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148

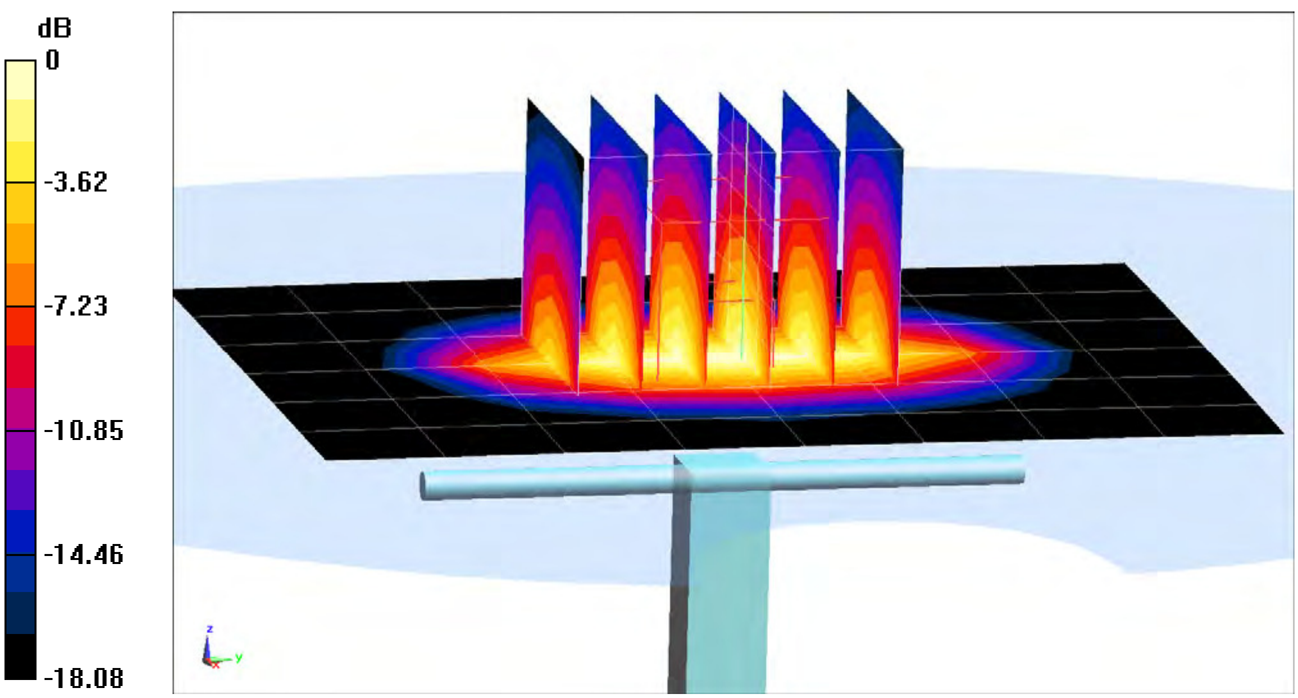
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.519 S/m; ε_r = 51.33; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-31-2017; Ambient Temp: 24.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.78, 7.78, 7.78); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
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) = 6.41 W/kg
SAR(1 g) = 3.57 W/kg
Deviation(1 g) = -3.77%



0 dB = 5.42 W/kg = 7.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

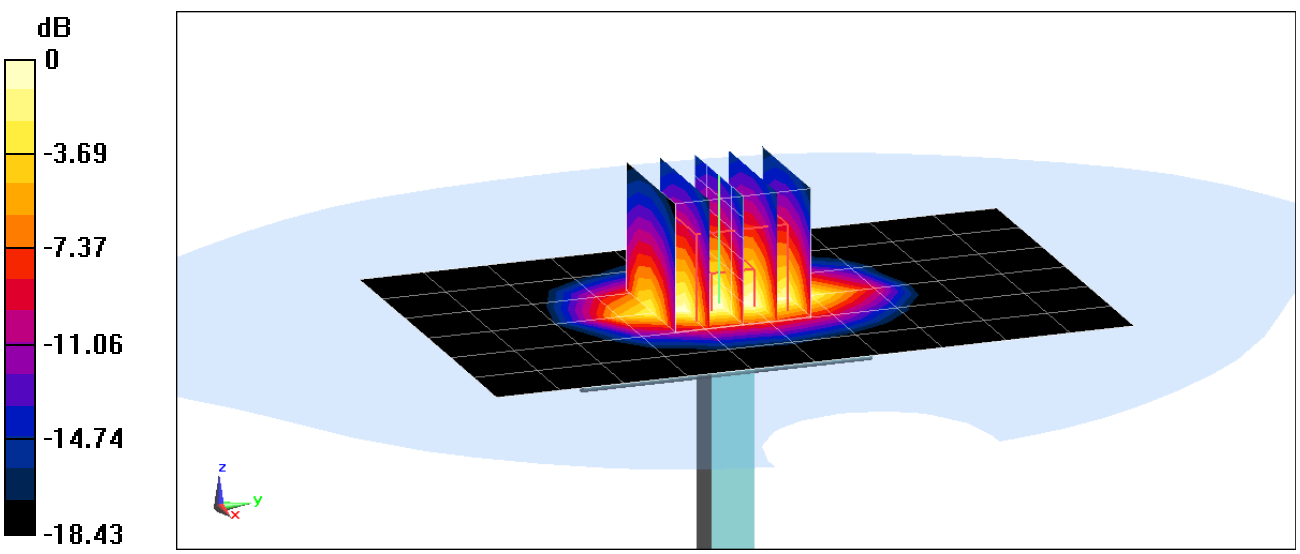
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.546 S/m; ε_r = 52.305; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-04-2017; Ambient Temp: 24.0°C; Tissue Temp: 23.5°C

Probe: EX3DV4 - SN7409; ConvF(7.47, 7.47, 7.47); Calibrated: 5/17/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/11/2016
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
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) = 7.77 W/kg
SAR(1 g) = 4.22 W/kg
Deviation(1 g) = 5.76%



0 dB = 6.54 W/kg = 8.16 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

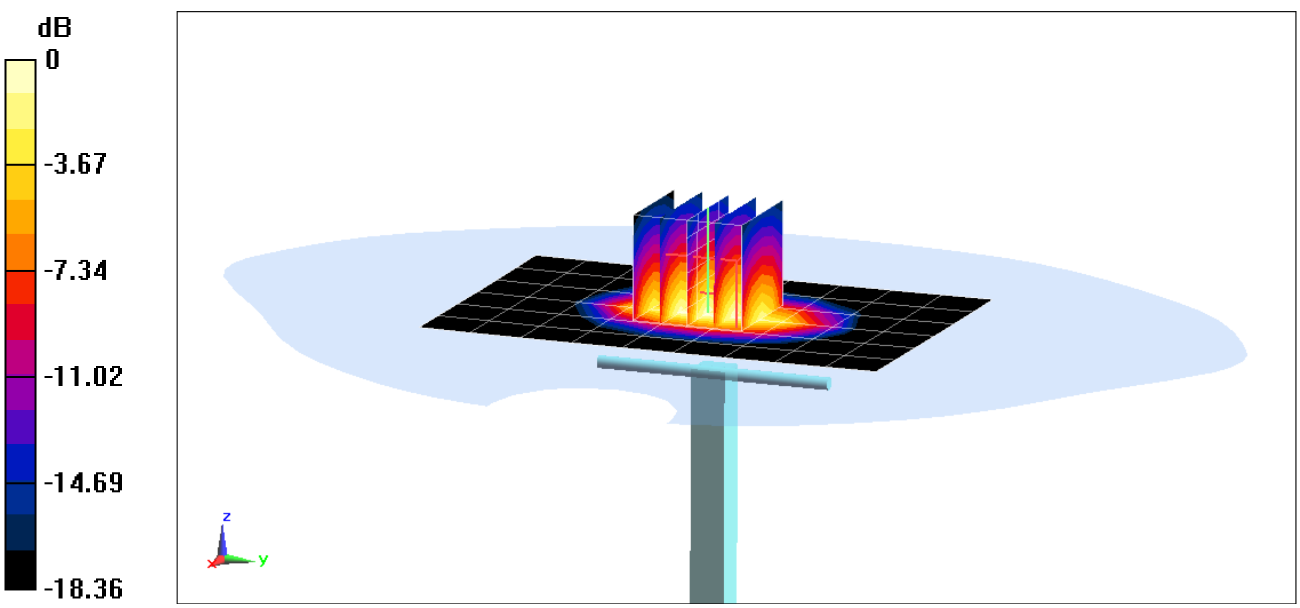
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.541 S/m; ε_r = 51.924; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-06-2017; Ambient Temp: 22.7°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3334; ConvF(4.91, 4.91, 4.91); Calibrated: 11/15/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 11/11/2016
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
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) = 7.60 W/kg
SAR(1 g) = 4.19 W/kg
Deviation(1 g) = 5.01%



0 dB = 5.32 W/kg = 7.26 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 981

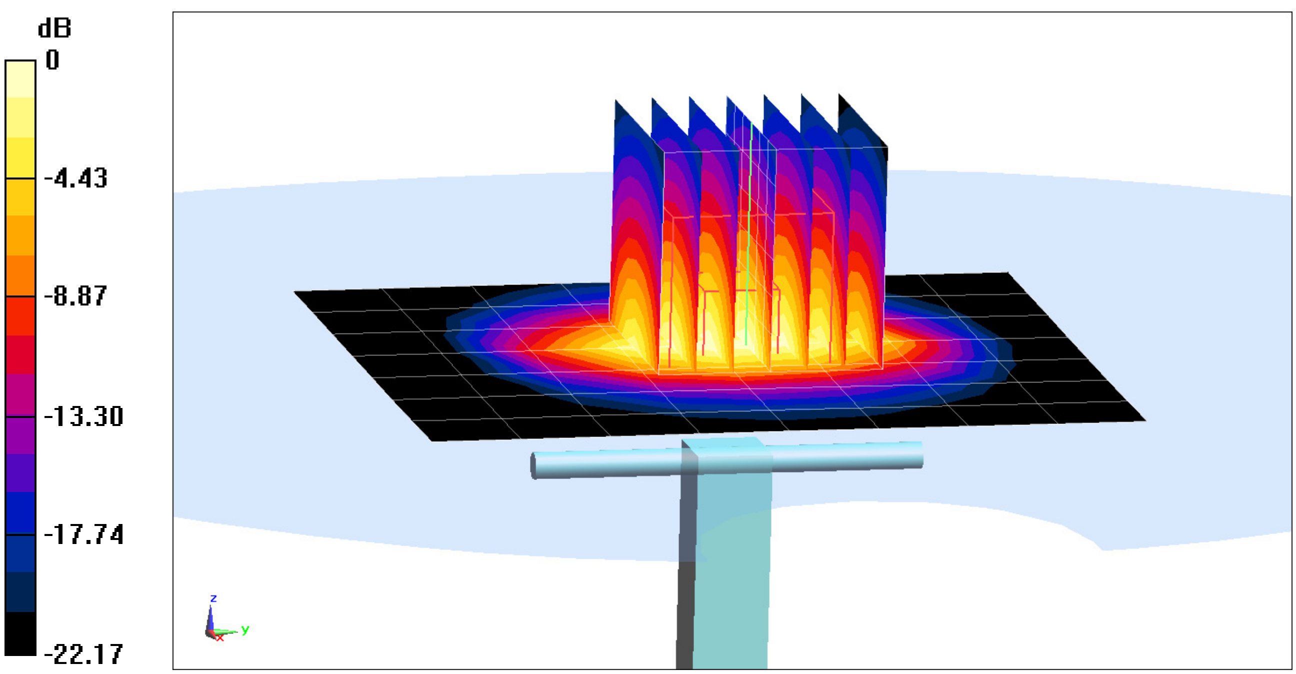
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.028 S/m; ε_r = 51.322; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 4/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/14/2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
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) = 10.2 W/kg
SAR(1 g) = 4.92 W/kg
Deviation(1 g) = -3.15%



0 dB = 8.21 W/kg = 9.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1071

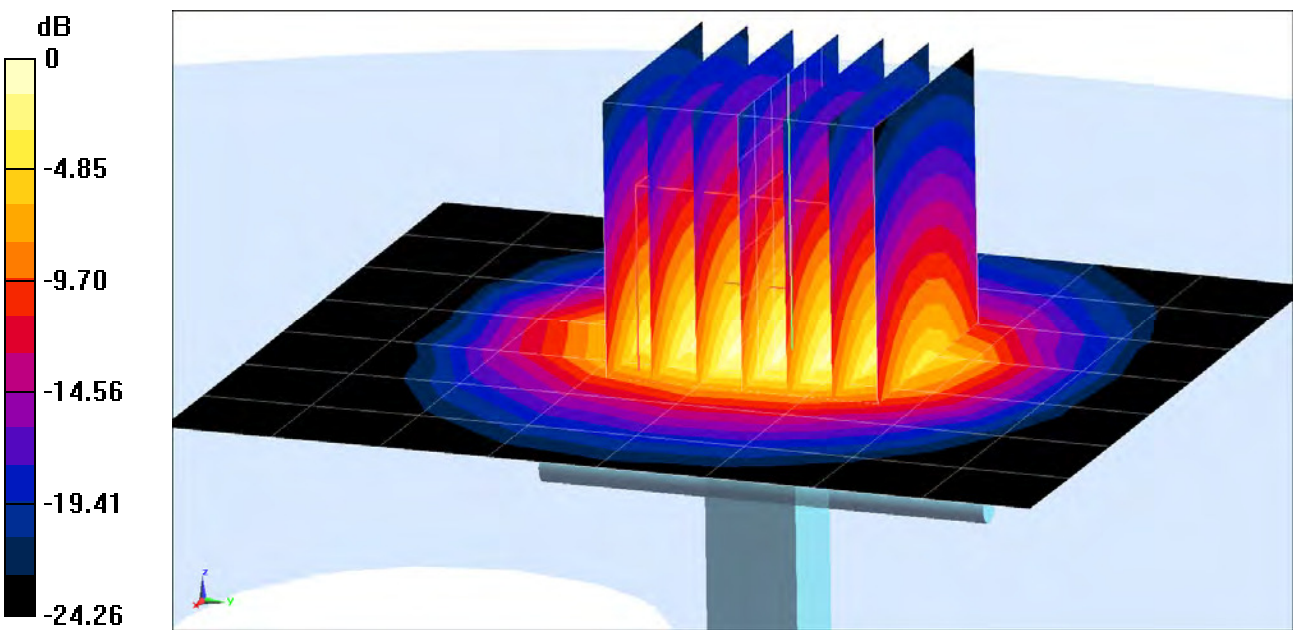
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; $\sigma = 2.255$ S/m; $\varepsilon_r = 51.721$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-20-2017; Ambient Temp: 22.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(6.94, 6.94, 6.94); Calibrated: 19.04.2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 14.04.2016
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
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
Reference Value = 53.37 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 12.4 W/kg
SAR(1 g) = 5.6 W/kg
Deviation(1 g) = 3.32%



0 dB = 9.66 W/kg = 9.85 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1237

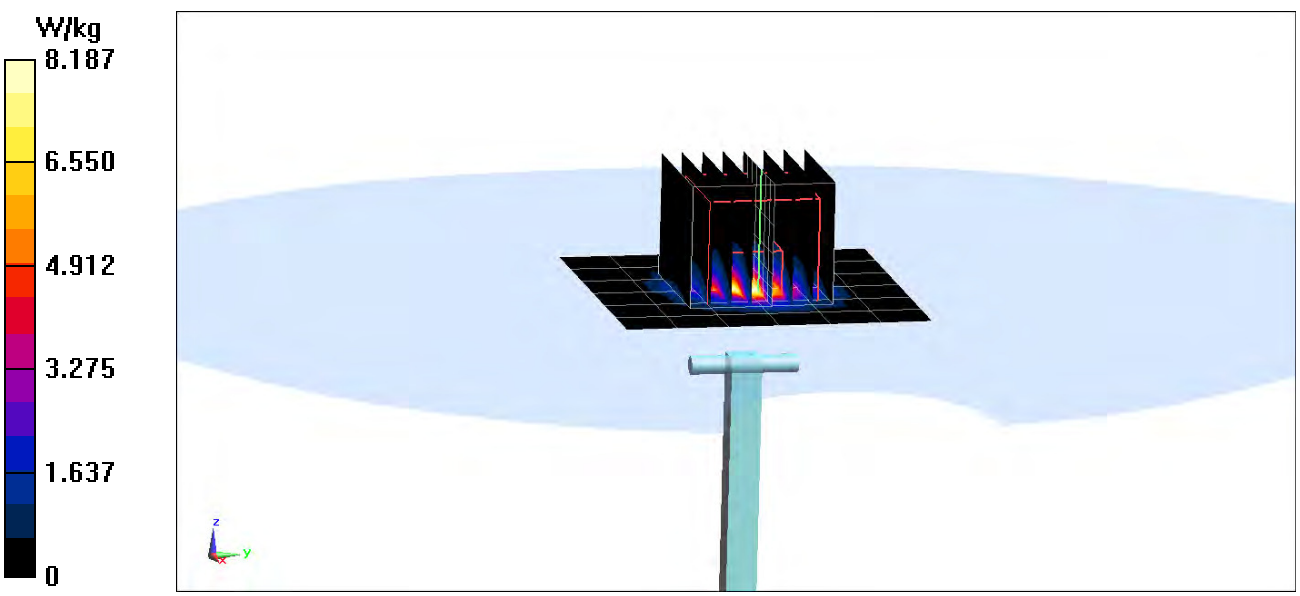
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.502 S/m; ε_r = 47.905; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-22-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3914; ConvF(4.32, 4.32, 4.32); Calibrated: 2/22/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/18/2016
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 14.3 W/kg
SAR(1 g) = 3.49 W/kg
Deviation(1 g) =-6.68%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1237

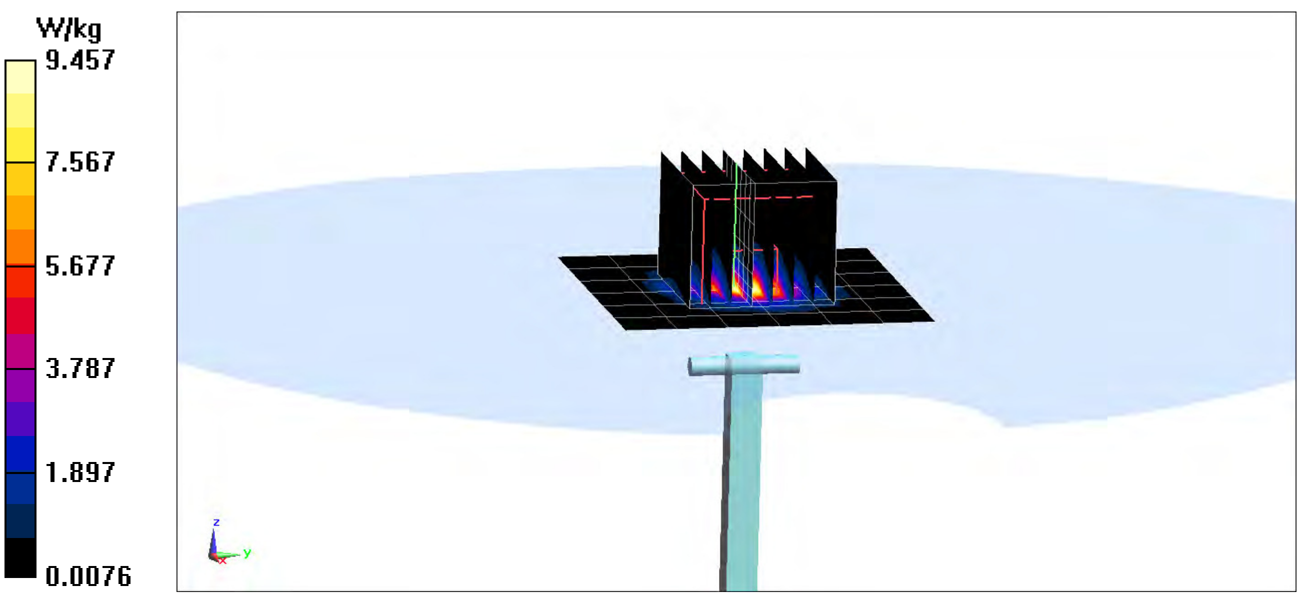
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.972 S/m; ε_r = 47.325; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-22-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3914; ConvF(3.63, 3.63, 3.63); Calibrated: 2/22/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/18/2016
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 3.95 W/kg
Deviation(1 g) =2.60%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1237

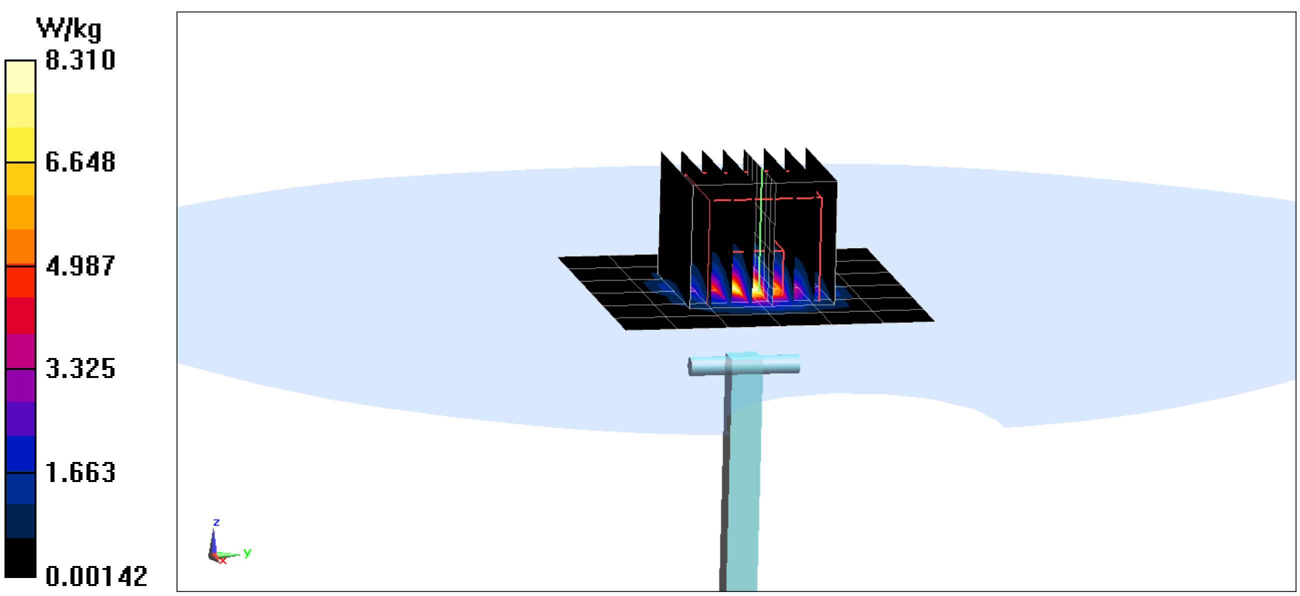
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.178 S/m; ε_r = 47.043; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-22-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3914; ConvF(3.86, 3.86, 3.86); Calibrated: 2/22/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/18/2016
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 14.8 W/kg
SAR(1 g) = 3.43 W/kg
Deviation(1 g) = -9.02%



APPENDIX C: PROBE CALIBRATION

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: **D750V3-1161_Jul16**

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1161

√PM 8/9/16

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

Calibration date: July 13, 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: July 13, 2016

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	40.9 ± 6 %	0.91 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	2.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.17 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 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	55.1 ± 6 %	0.99 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	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.43 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.53 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	55.6 Ω - 0.9 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.2 Ω - 4.0 jΩ
Return Loss	- 28.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 19, 2015

DASY5 Validation Report for Head TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1161

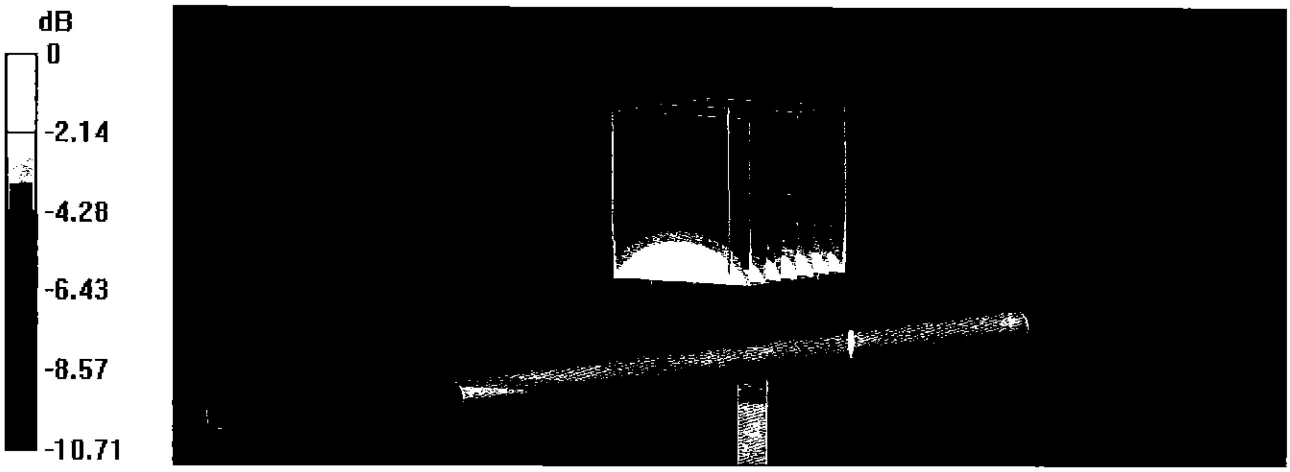
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(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)

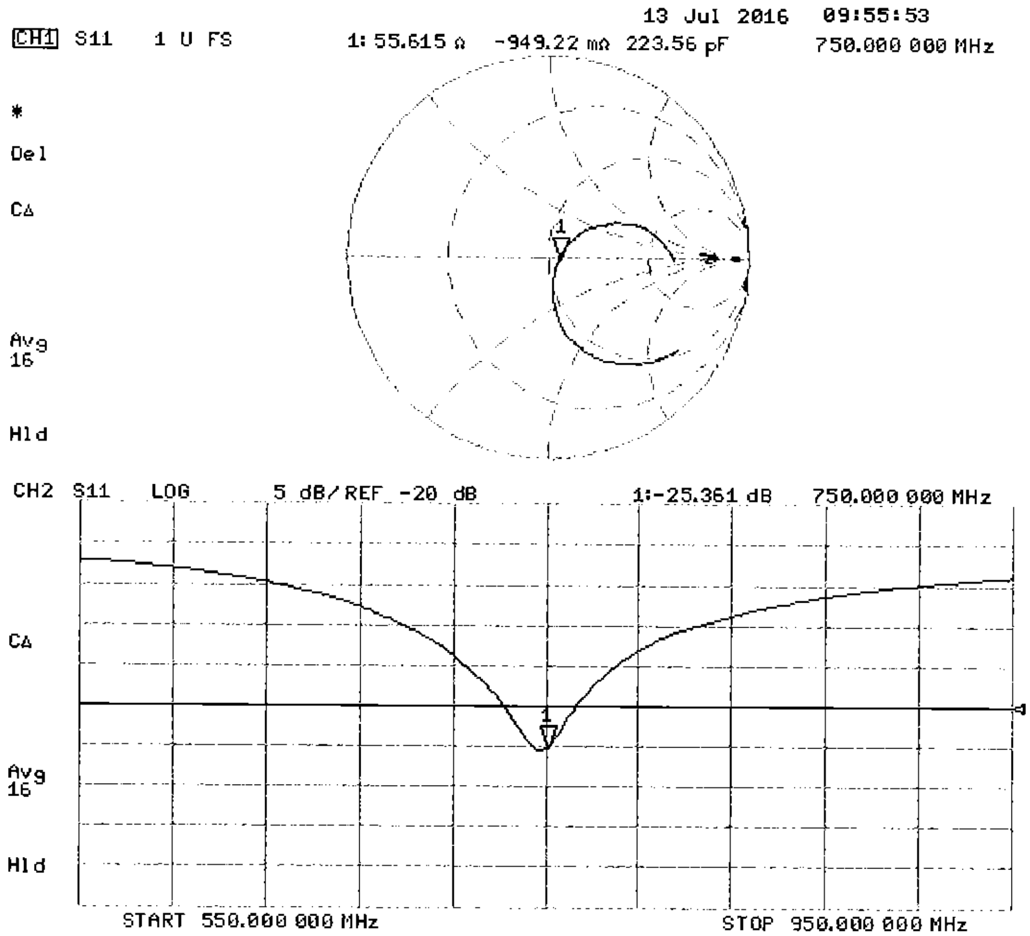
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.07 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 2.09 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: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

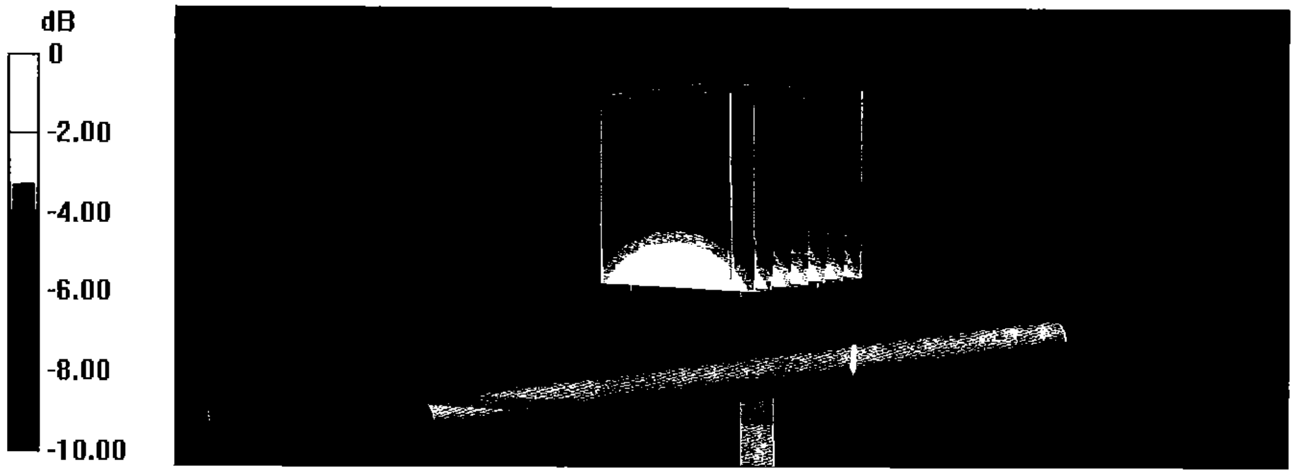
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1161

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.99$ S/m; $\varepsilon_r = 55.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

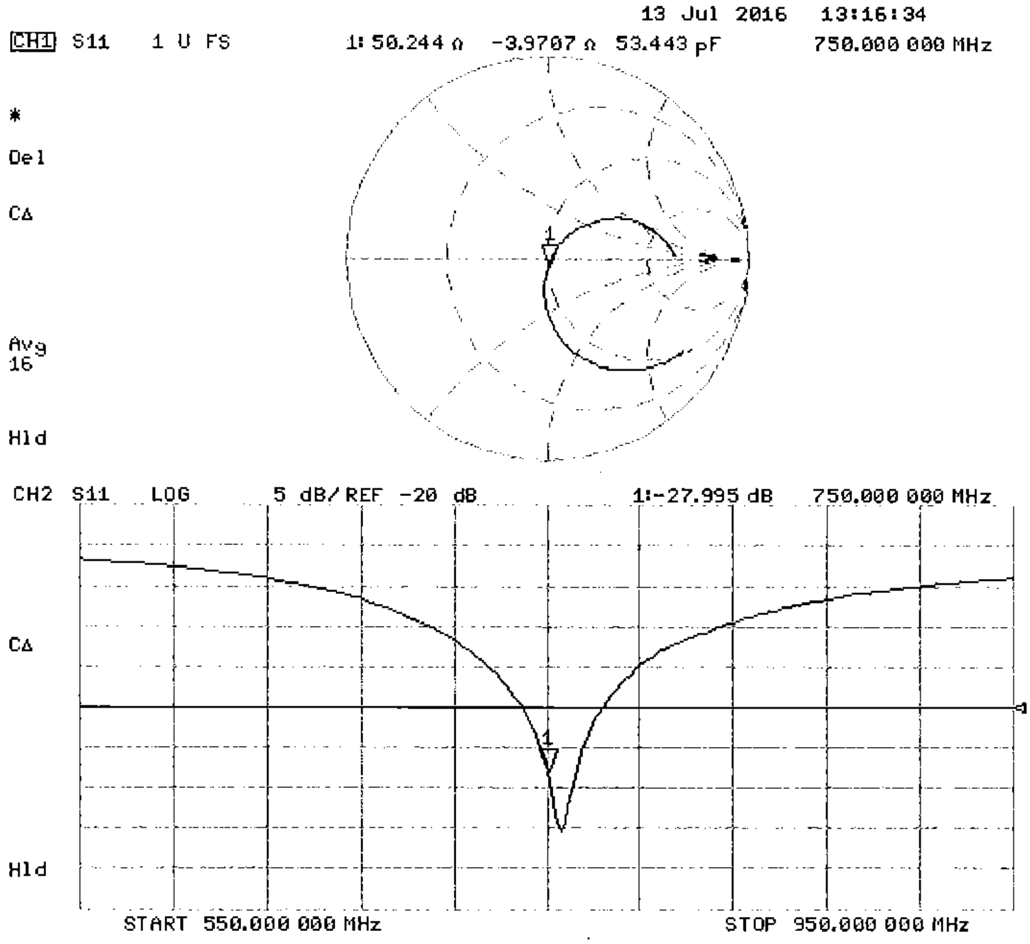
- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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 = 56.33 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



0 dB = 2.87 W/kg = 4.58 dBW/kg

Impedance Measurement Plot for Body TSL



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: D835V2-4d133_Jul16

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d133
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 14, 2016

BN ✓ 07/27/2016

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: July 14, 2016

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	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 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	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.32 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.10 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.50 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.20 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	50.5 Ω - 5.1 jΩ
Return Loss	- 25.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 7.5 jΩ
Return Loss	- 21.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 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 22, 2011

DASY5 Validation Report for Head TSL

Date: 14.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d133

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

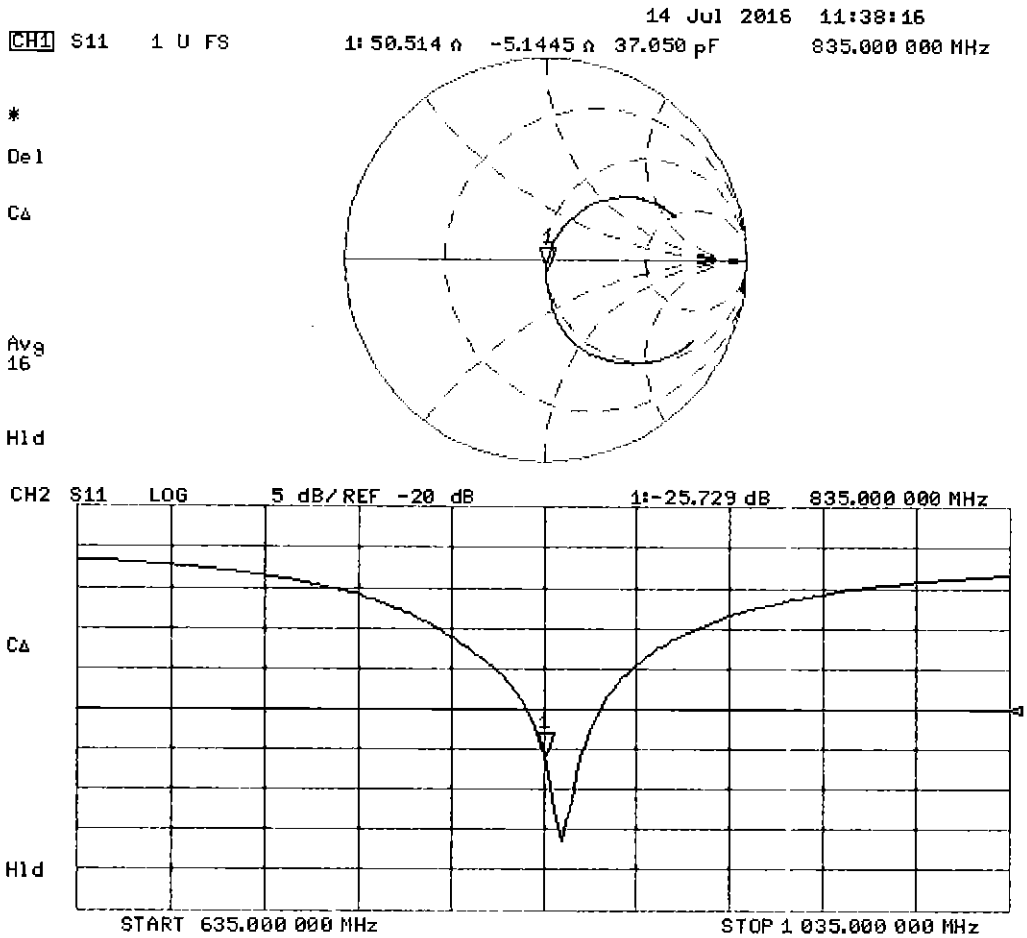
- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.36 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.57 W/kg
Maximum value of SAR (measured) = 3.23 W/kg

0 dB = 3.23 W/kg = 5.09 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d133

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 1.01$ S/m; $\varepsilon_r = 54.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

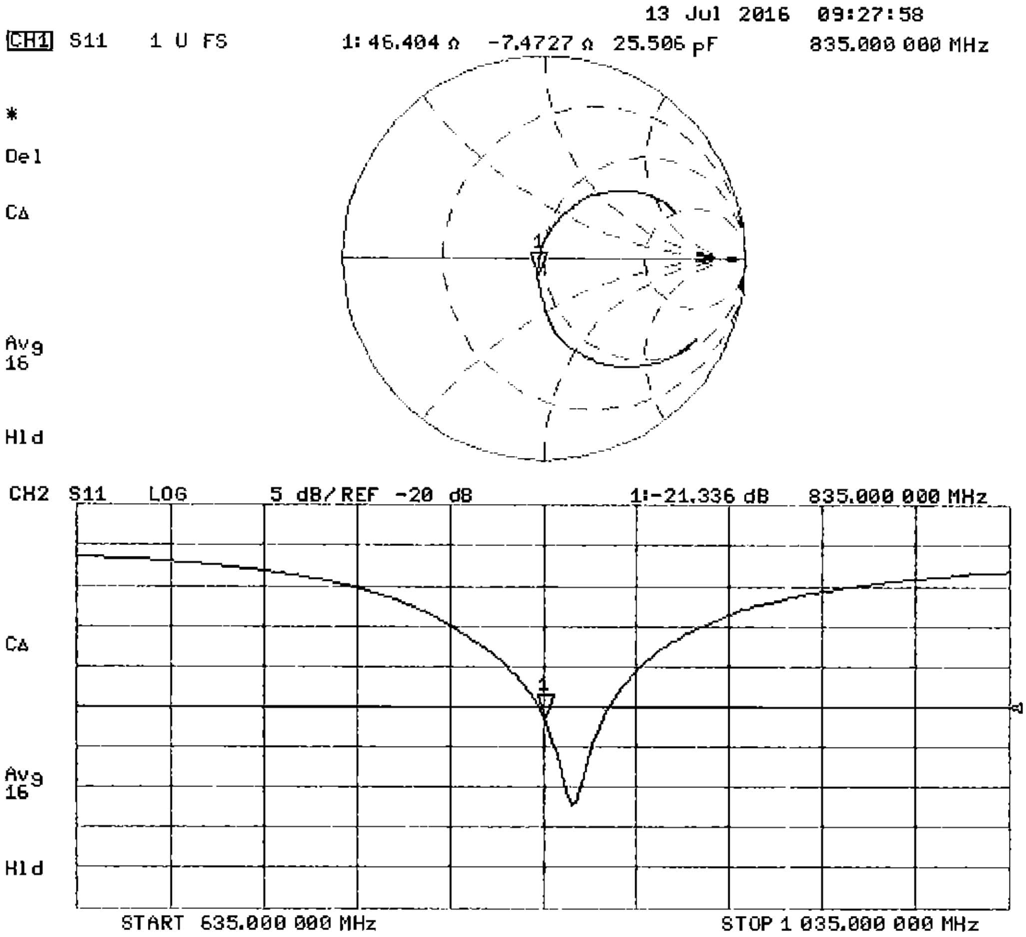
- Probe: EX3DV4 - SN7349; ConvF(9.73, 9.73, 9.73); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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 = 59.93 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 3.24 W/kg

0 dB = 3.24 W/kg = 5.11 dBW/kg

Impedance Measurement Plot for Body TSL



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: D1750V2-1148_May16

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1148
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 09, 2016

BN✓ 5/17/2016

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	31-Dec-15 (No. EX3-7349_Dec15)	Dec-16
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:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 11, 2016

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	39.7 ± 6 %	1.36 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	9.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.78 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	53.8 ± 6 %	1.50 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	9.30 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.7 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	49.9 Ω - 0.7 jΩ
Return Loss	- 43.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.2 Ω - 1.4 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.221 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 30, 2014

DASY5 Validation Report for Head TSL

Date: 09.05.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1148

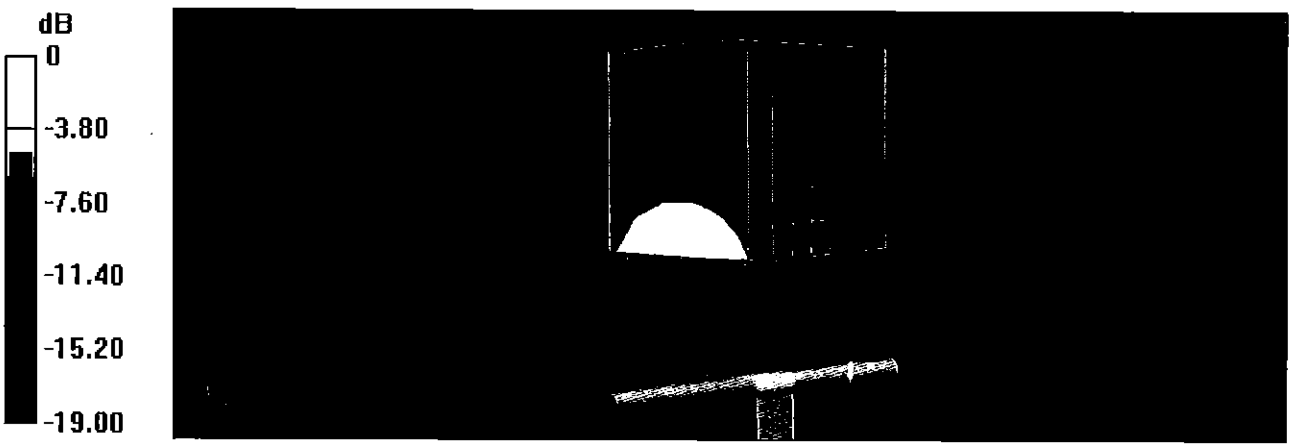
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.54, 8.54, 8.54); Calibrated: 31.12.2015;
- 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)

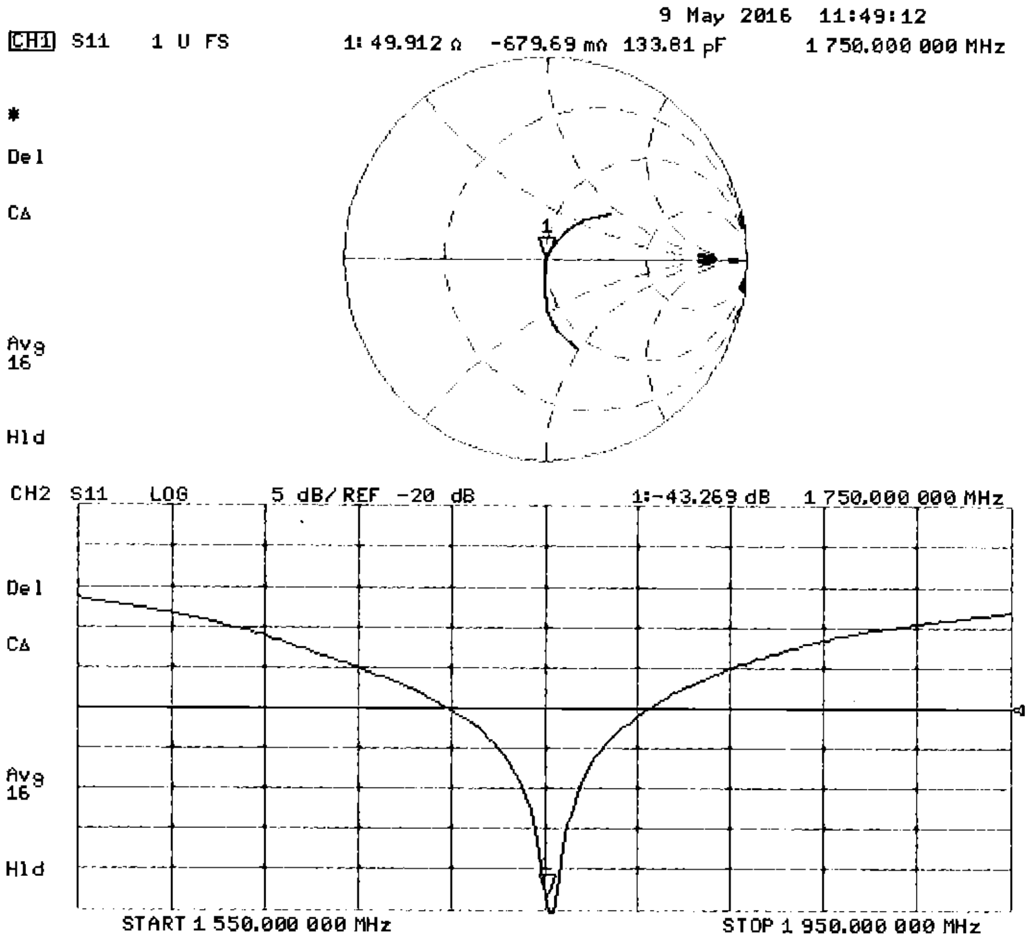
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.5 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.03 W/kg; SAR(10 g) = 4.78 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 09.05.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1148

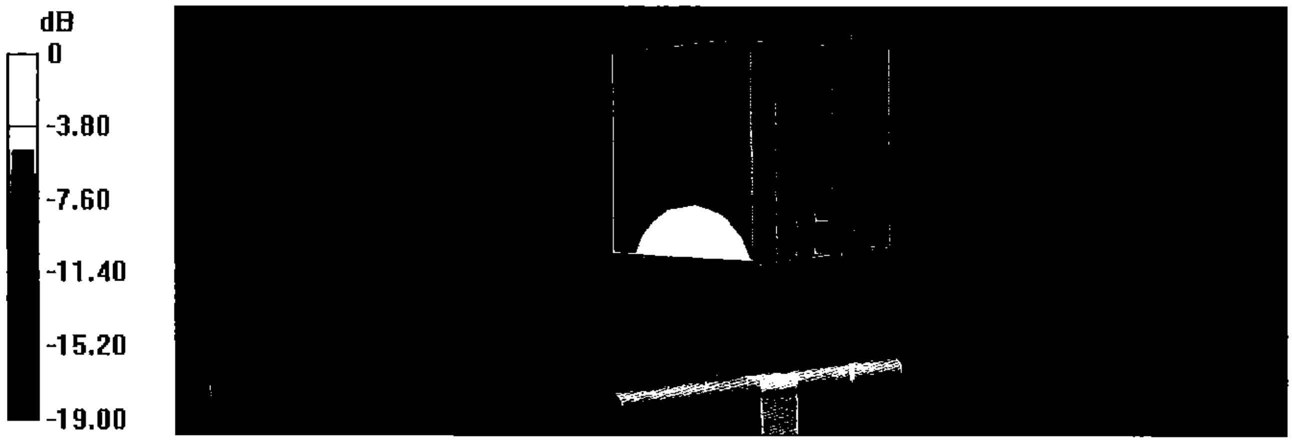
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.5 S/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 31.12.2015;
- 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)

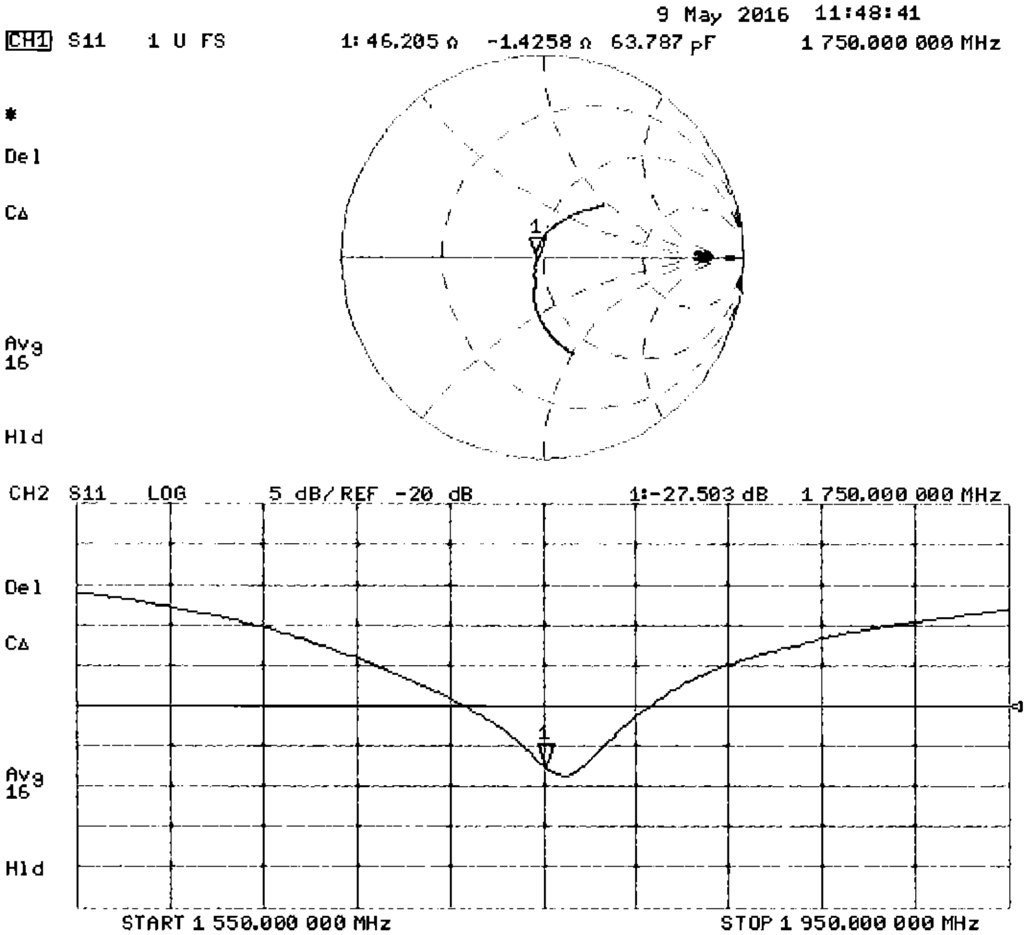
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.0 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.3 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

Impedance Measurement Plot for Body TSL



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: **D1900V2-5d149_Jul16**

CALIBRATION CERTIFICATE

Object D1900V2 - SN:5d149

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

Calibration date: July 15, 2016

BNV 07/27/2016

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: July 19, 2016

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	39.8 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.96 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.7 ± 6 %	1.51 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	9.95 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.28 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 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	52.4 Ω + 5.5 jΩ
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω + 7.0 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 15.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d149

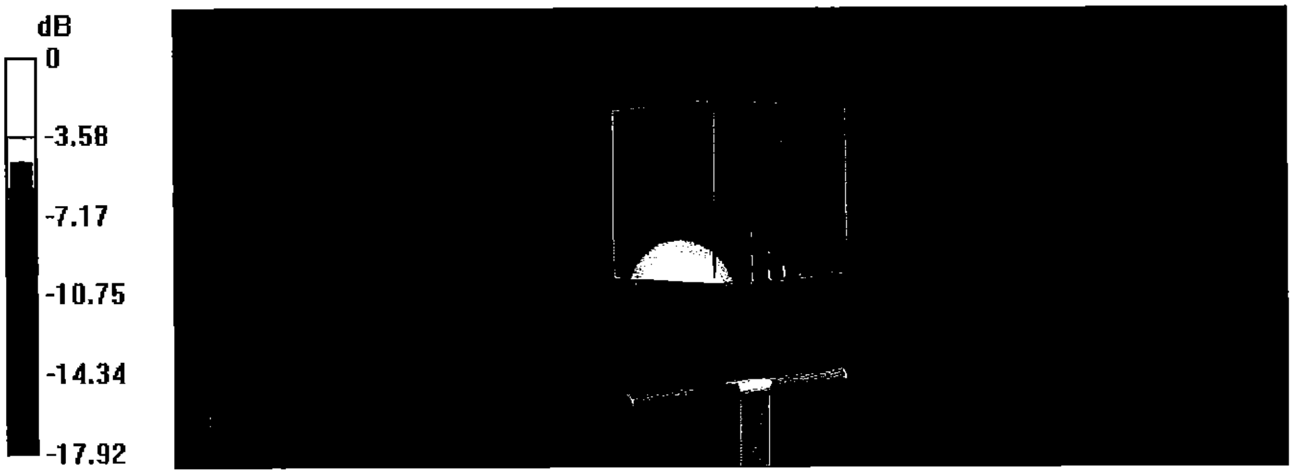
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

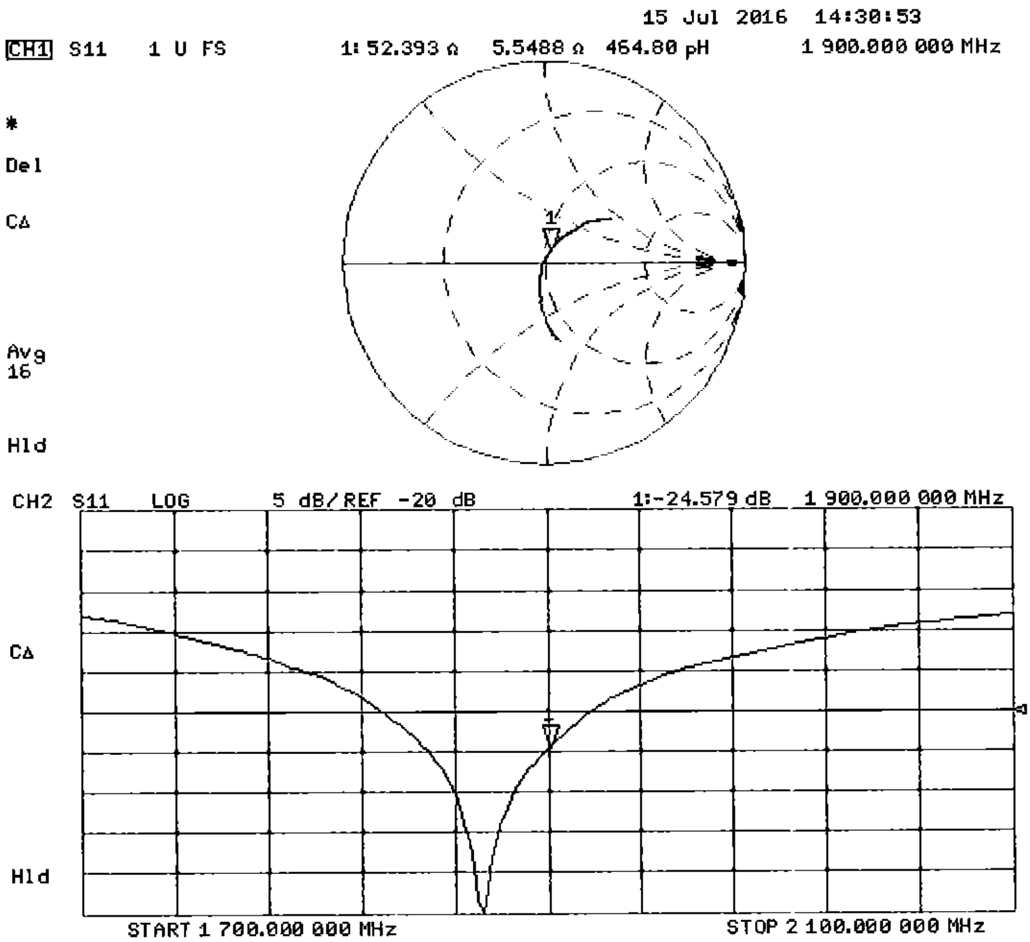
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.5 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 9.96 W/kg; SAR(10 g) = 5.23 W/kg
Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d149

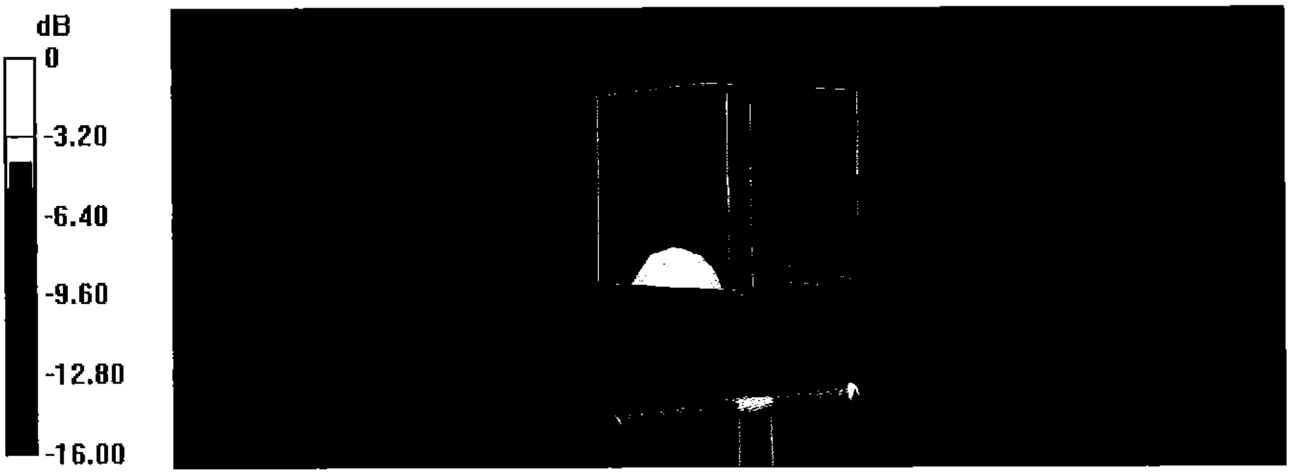
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.51$ S/m; $\varepsilon_r = 52.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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(1222); SEMCAD X 14.6.10(7372)

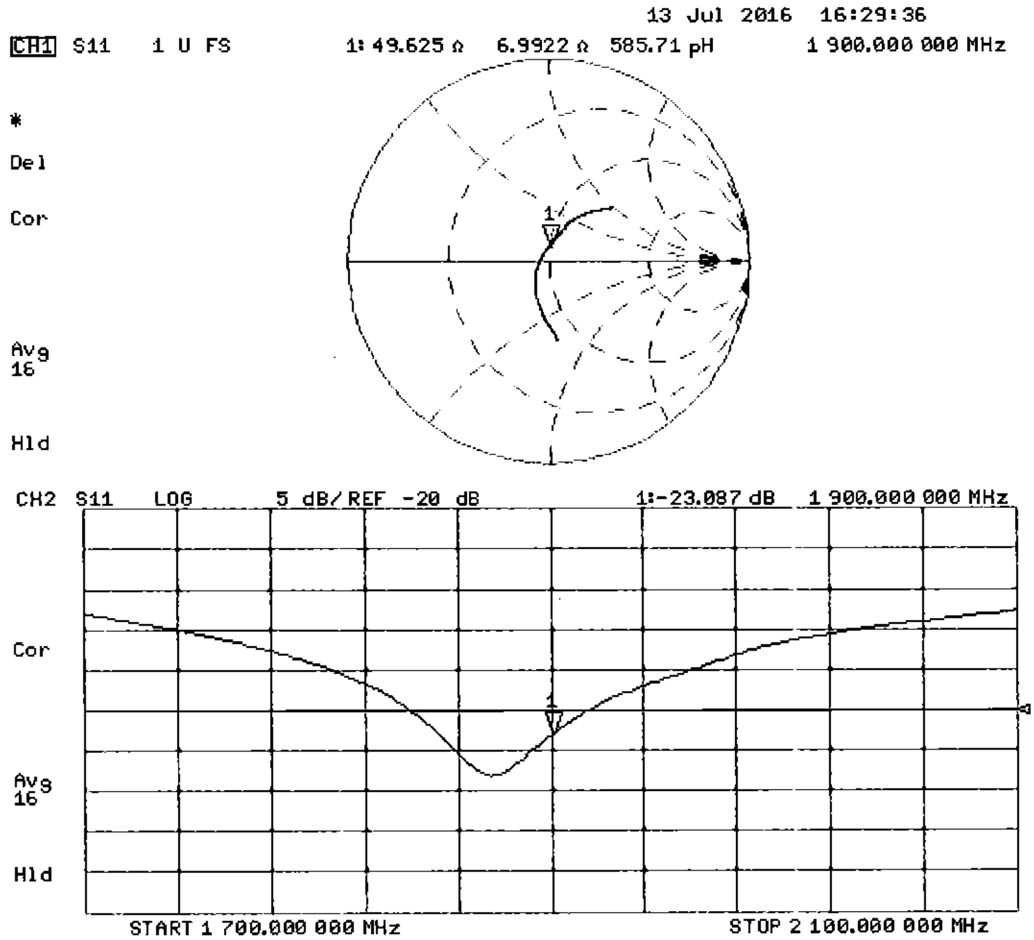
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.9 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.28 W/kg
Maximum value of SAR (measured) = 14.9 W/kg



0 dB = 14.9 W/kg = 11.73 dBW/kg

Impedance Measurement Plot for Body TSL



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: **D1900V2-5d080_Jul16**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d080
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 08, 2016

BN ✓
7/16/2016

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: July 13, 2016

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	39.8 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.5 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.7 ± 6 %	1.51 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	9.75 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 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	52.1 Ω + 5.3 jΩ
Return Loss	- 25.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 Ω + 6.8 jΩ
Return Loss	- 22.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 28, 2006

DASY5 Validation Report for Head TSL

Date: 08.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080

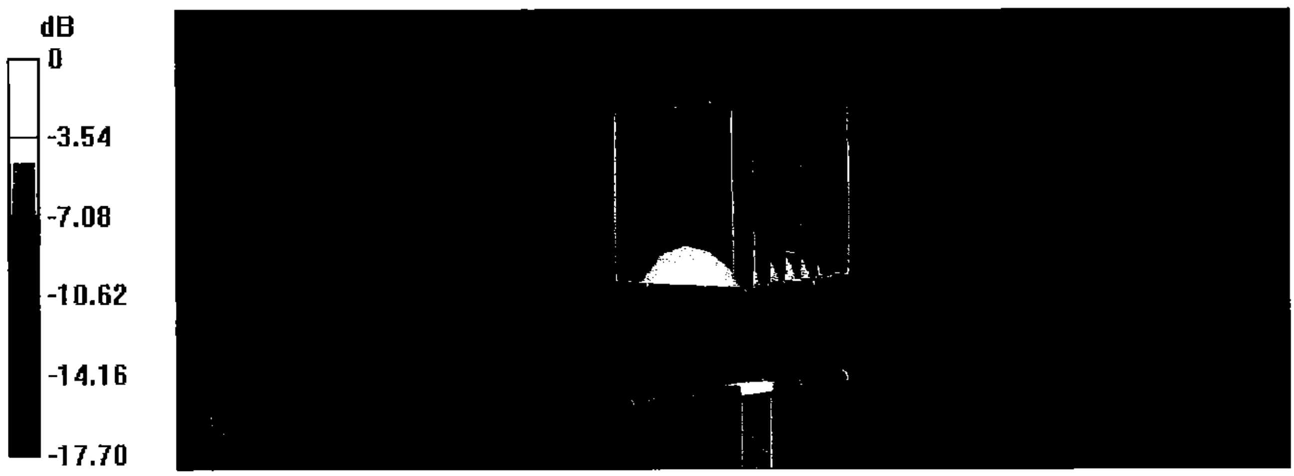
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

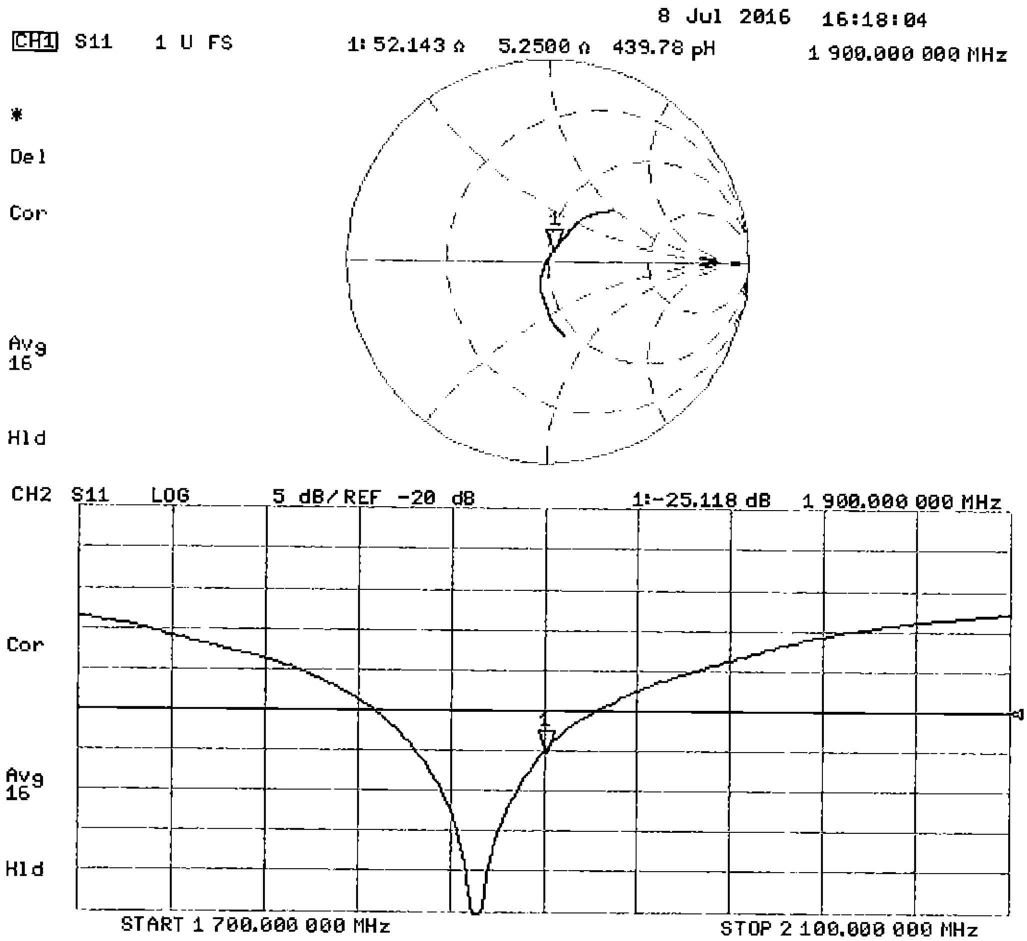
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.6 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 9.76 W/kg; SAR(10 g) = 5.1 W/kg
Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080

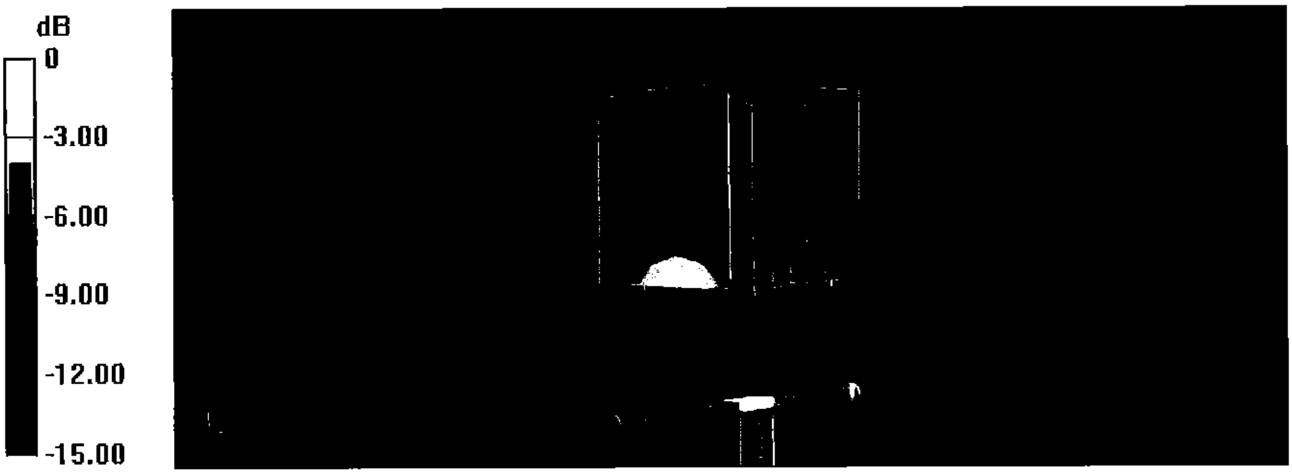
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.51 S/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(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)

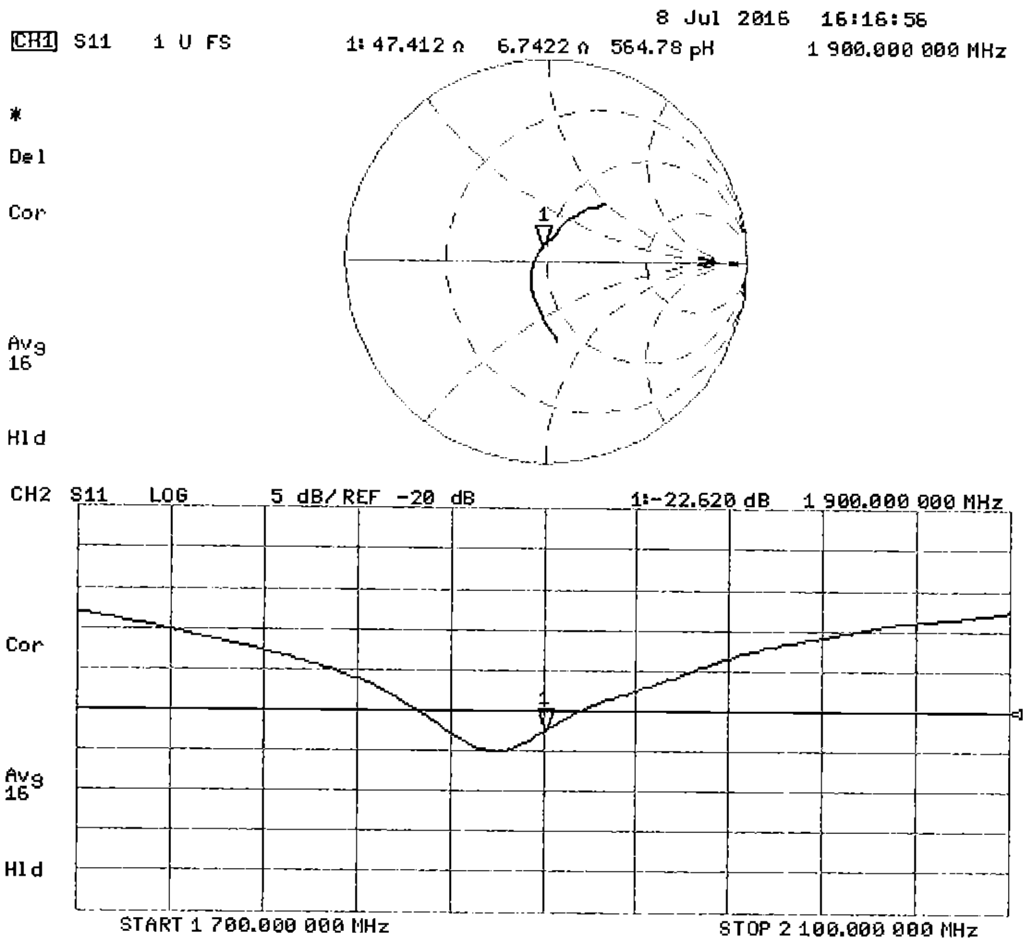
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.1 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.75 W/kg; SAR(10 g) = 5.17 W/kg
Maximum value of SAR (measured) = 14.7 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
C 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: **D2450V2-981_Jul16**

CALIBRATION CERTIFICATE

Object: D2450V2 - SN:981

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

VPM
8/9/16

Calibration date: July 25, 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:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 27, 2016

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	38.0 ± 6 %	1.86 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	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.7 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	51.8 ± 6 %	2.03 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	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.04 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.8 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	53.2 Ω + 3.4 jΩ
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.2 Ω + 4.5 jΩ
Return Loss	- 27.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2014

DASY5 Validation Report for Head TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:981

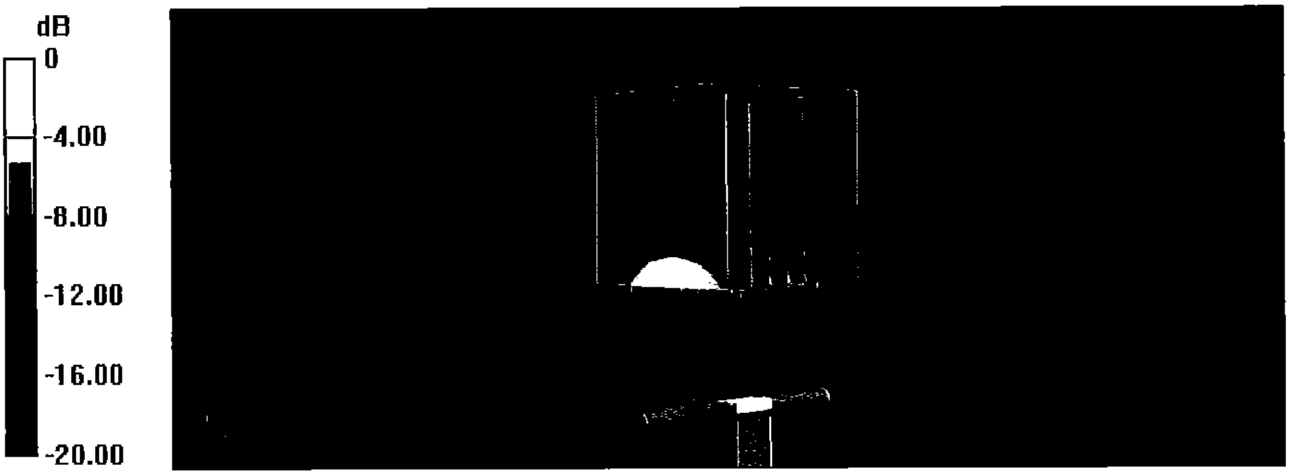
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 38; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

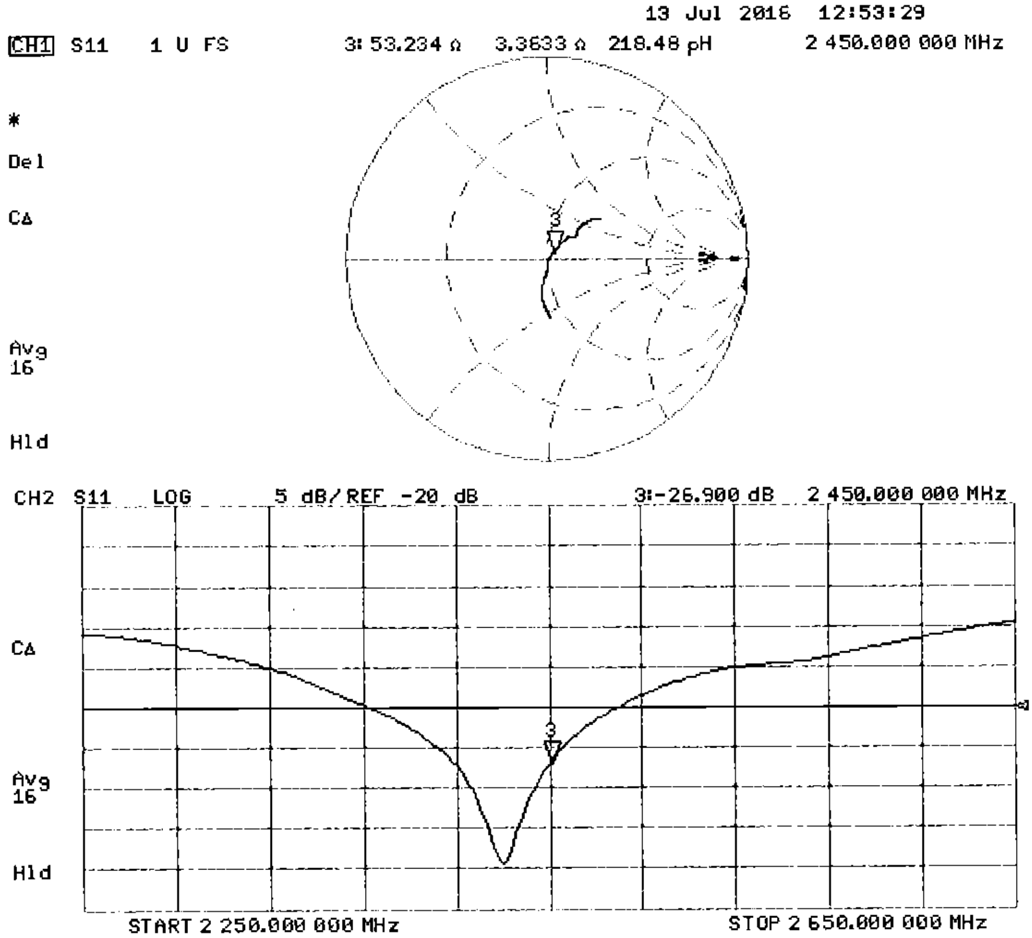
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.8 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.26 W/kg
Maximum value of SAR (measured) = 22.5 W/kg



0 dB = 22.5 W/kg = 13.52 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:981

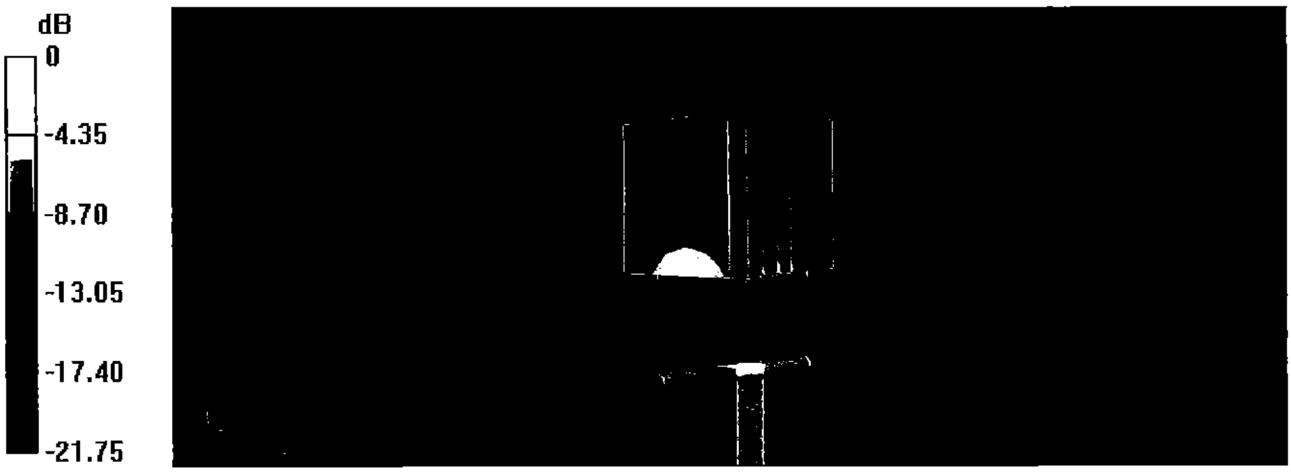
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

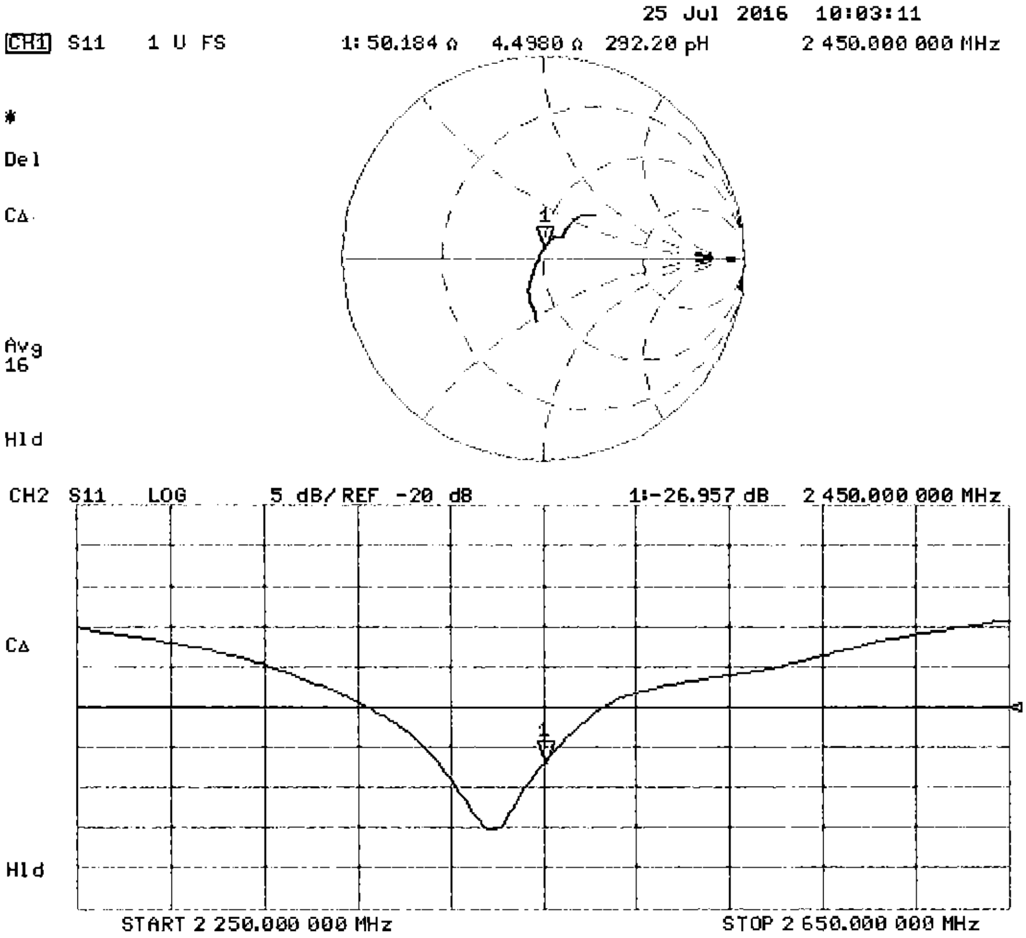
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.1 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.0 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.04 W/kg
Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg

Impedance Measurement Plot for Body TSL



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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
C 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: **D2600V2-1126_Jul16**

CALIBRATION CERTIFICATE

Object D2600V2 - SN: 1126

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

√PM 8/9/16

Calibration date: July 25, 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:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 26, 2016

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

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	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.5 ± 6 %	2.02 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 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	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.4 ± 6 %	2.20 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**54.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.3 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	48.0 Ω - 7.4 jΩ
Return Loss	- 22.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.4 Ω - 6.2 jΩ
Return Loss	- 21.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.152 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 22, 2015

DASY5 Validation Report for Head TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1126

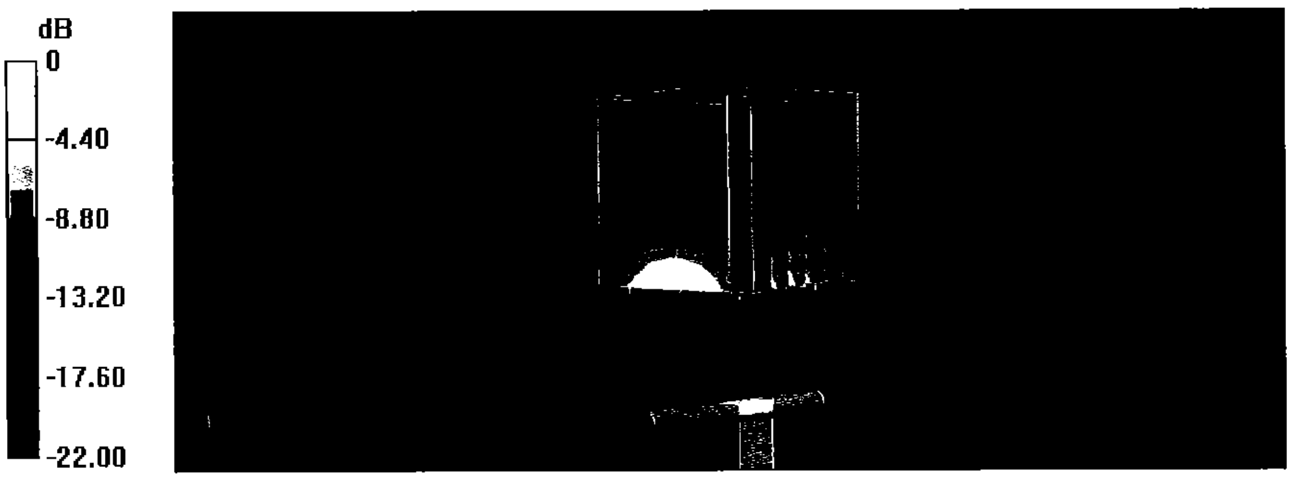
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; $\sigma = 2.02$ S/m; $\varepsilon_r = 37.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.56, 7.56, 7.56); 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)

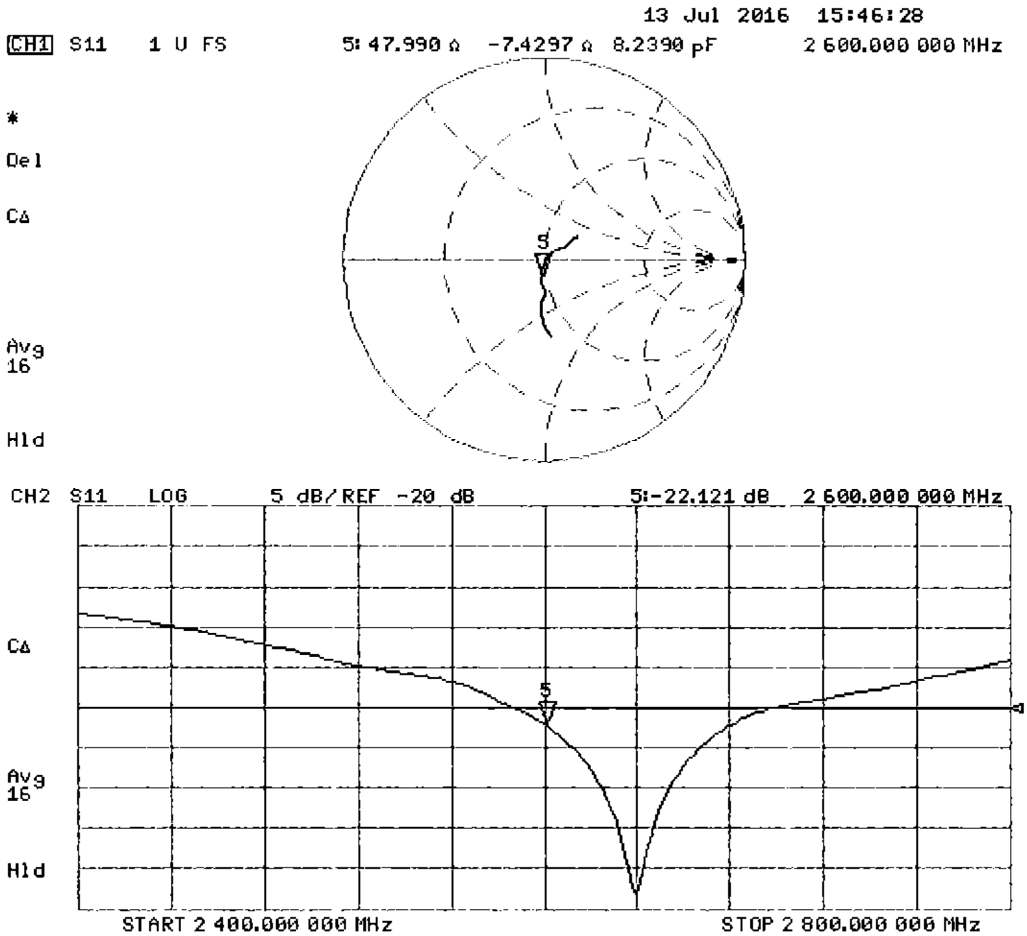
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.2 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.36 W/kg
Maximum value of SAR (measured) = 24.6 W/kg



0 dB = 24.6 W/kg = 13.91 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: D2600V2 - SN:1126

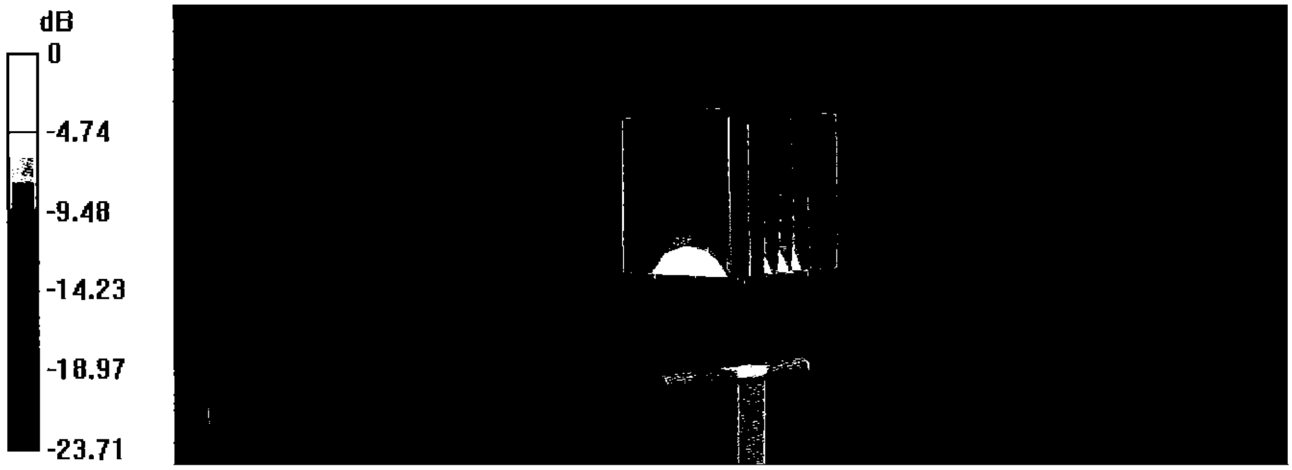
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.2 S/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.48, 7.48, 7.48); 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)

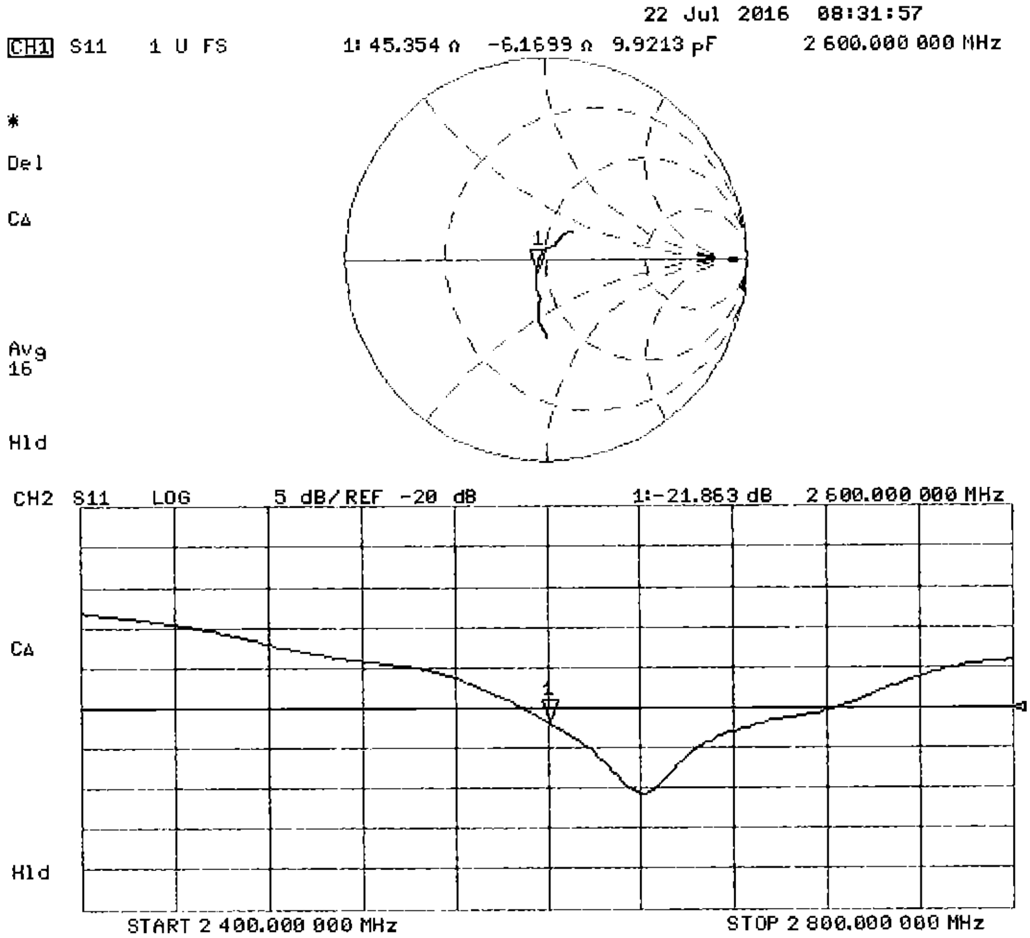
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.5 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 28.5 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.12 W/kg
Maximum value of SAR (measured) = 23.0 W/kg



0 dB = 23.0 W/kg = 13.62 dBW/kg

Impedance Measurement Plot for Body TSL



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: **D5GHzV2-1191_Sep16**

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN:1191

Calibration procedure(s): QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BNV
09-28-2016

Calibration date: September 21, 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: 3503	30-Jun-16 (No. EX3-3503_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:	Leif Klysner	Laboratory Technician	Leif Klysner
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2016

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

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 62209-2, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.59 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	4.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.6 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.8 ± 6 %	5.08 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.27 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.4 ± 6 %	5.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.74 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	6.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

((

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	55.7 Ω - 4.3 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	58.3 Ω - 3.2 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	58.1 Ω + 4.8 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	56.1 Ω - 3.7 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.9 Ω - 1.7 jΩ
Return Loss	- 21.7 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	59.5 Ω + 6.9 jΩ
Return Loss	- 19.4 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 28, 2003

DASY5 Validation Report for Head TSL

Date: 21.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.59 S/m; ε_r = 34.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.93 S/m; ε_r = 34; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 5.08 S/m; ε_r = 33.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

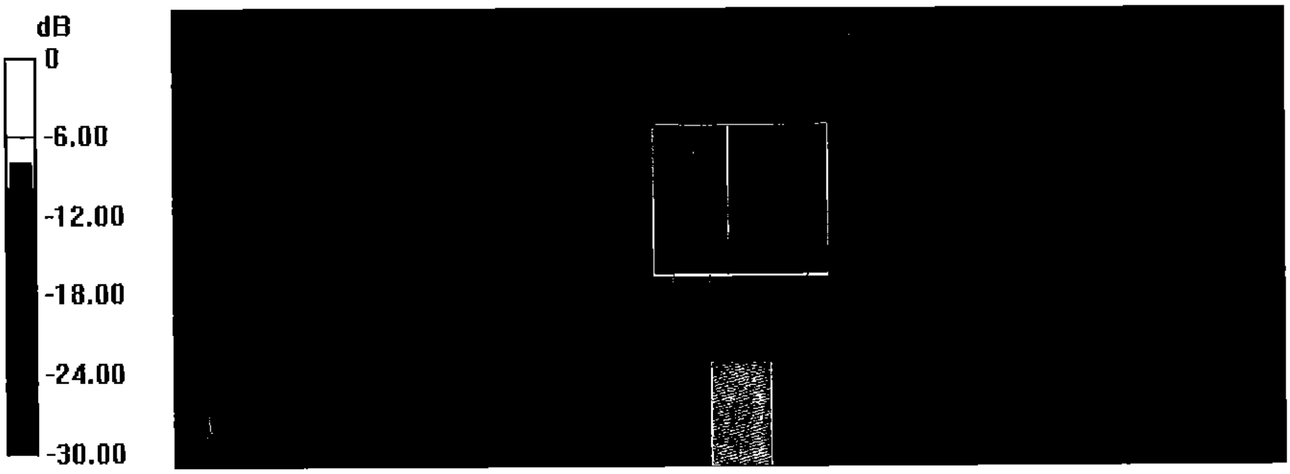
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.42, 5.42, 5.42); Calibrated: 30.06.2016, ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016;
- 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=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 68.49 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 18.2 W/kg

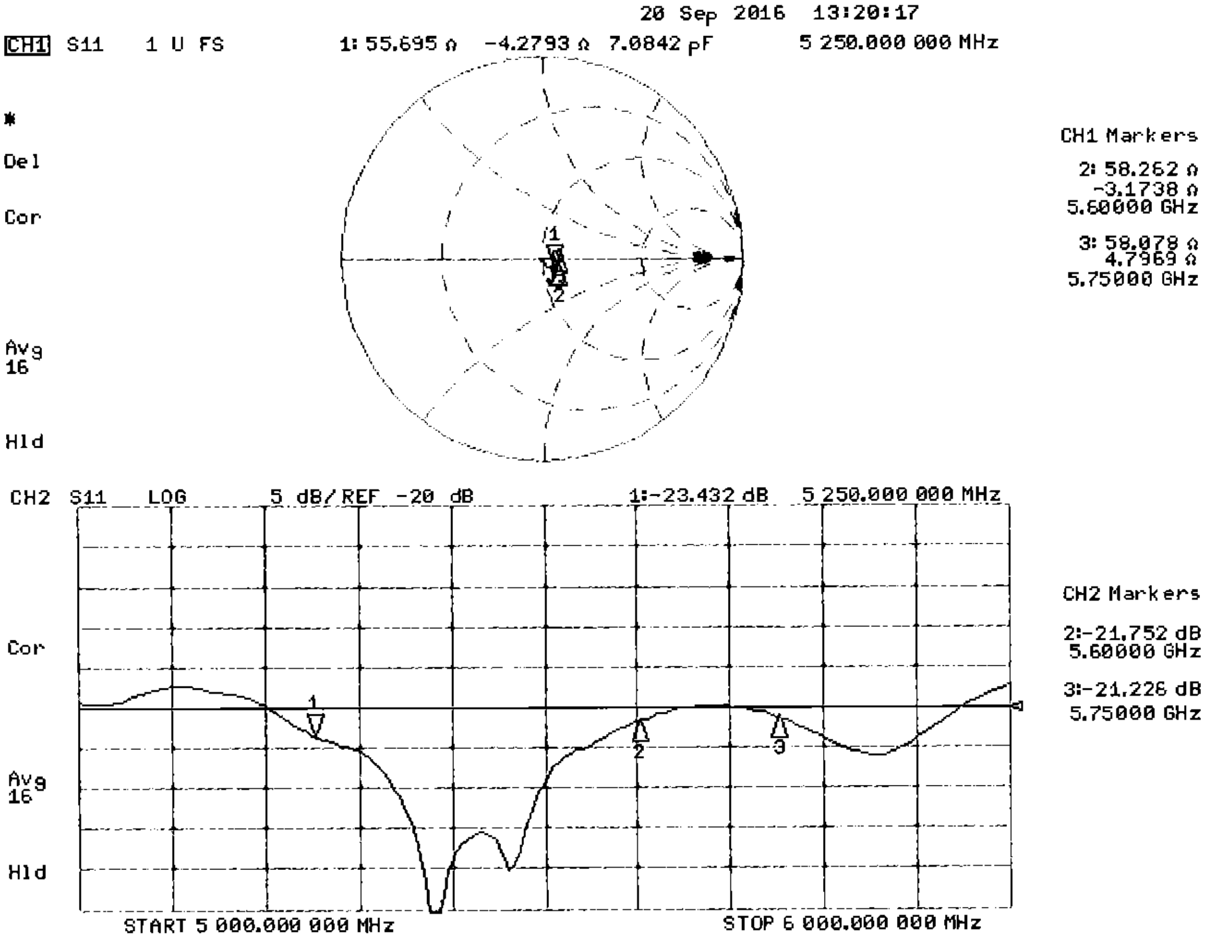
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.34 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.15 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.3 W/kg
SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.27 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 18.2 W/kg = 12.60 dBW/kg

Impedance Measurement Plot for Head TSL



((

DASY5 Validation Report for Body TSL

Date: 20.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1191

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.52 S/m; ε_r = 47.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 6 S/m; ε_r = 46.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 6.21 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

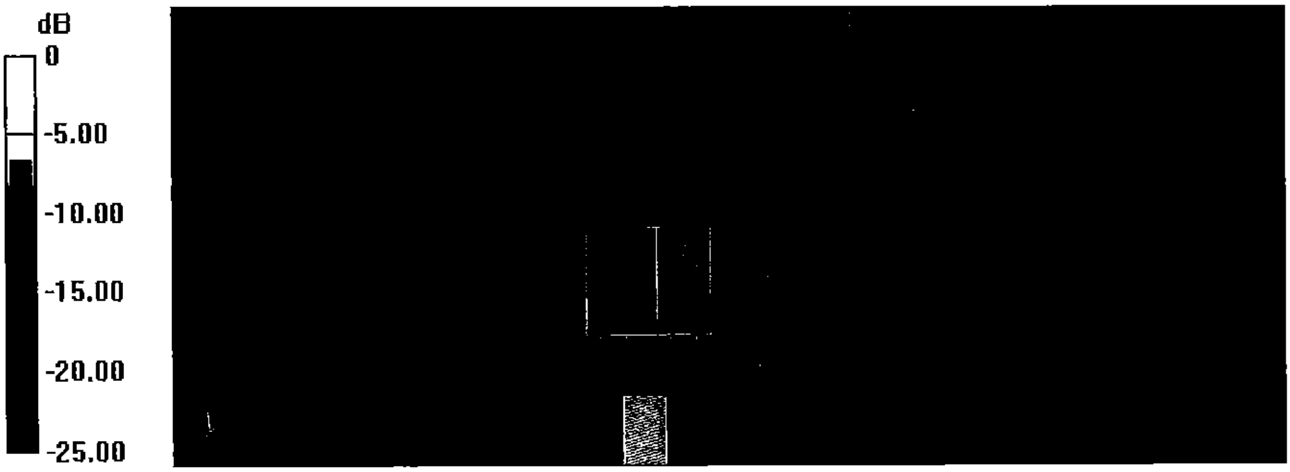
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.3, 4.3, 4.3); Calibrated: 30.06.2016;
- 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=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.49 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 17.7 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.85 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.24 W/kg
Maximum value of SAR (measured) = 18.8 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.21 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.5 W/kg



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

Impedance Measurement Plot for Body TSL