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SAR EVALUATION REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
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Gyeonggi-do, 16677, Korea

Date of Testing:
05/26/16 - 06/06/16, 03/27/17 – 04/10/17
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1703270125-01.A3L

FCC ID: **A3LSMN935F**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SM-N935F
Additional Model(s): SM-N935FD

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)	10 gm Phablet (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.23	0.49	0.92	N/A
PCE	UMTS 850	826.40 - 846.60 MHz	0.19	0.45	0.72	N/A
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.34	0.51	0.67	1.69
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.12	0.52	1.00	N/A
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.27	0.48	0.77	1.43
PCE	LTE Band 12	699.7 - 715.3 MHz	< 0.1	0.15	0.30	N/A
PCE	LTE Band 17	706.5 - 713.5 MHz	N/A			
PCE	LTE Band 13	779.5 - 784.5 MHz	0.11	0.30	0.51	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.20	0.47	0.80	N/A
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.13	0.30	0.45	N/A
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.39	0.57	0.81	2.79
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.32	0.67	0.79	1.39
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.19	0.52	0.65	1.11
PCE	LTE Band 41	2498.5 - 2687.5 MHz	< 0.1	0.22	1.10	N/A
DTS	2.4 GHz WLAN	2412 - 2472 MHz	0.55	0.28	0.64	N/A
NII	U-NII-1	5180 - 5240 MHz	N/A			
NII	U-NII-2A	5260 - 5320 MHz	0.57	0.35	N/A	1.92
NII	U-NII-2C	5500 - 5720 MHz	0.64	0.11	N/A	0.98
NII	U-NII-3	5745 - 5825 MHz	0.64	< 0.1	0.17	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A			
Simultaneous SAR per KDB 690783 D01v01r03:			1.58	1.24	1.59	3.96

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

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

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1 DEVICE UNDER TEST

1.1 Device Overview

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	Data	699.7 - 715.3 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 13	Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Data	824.7 - 848.3 MHz
LTE Band 26 (Cell)	Data	814.7 - 848.3 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Data	1850.7 - 1909.3 MHz
LTE Band 25 (PCS)	Data	1850.7 - 1914.3 MHz
LTE Band 41	Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Data	2412 - 2472 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	555 Hz - 8.33 kHz

1.2 Power Reduction for SAR

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under portable hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions. 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.

The reduced powers for the power reduction mechanisms were confirmed via conducted power measurements at the RF port (See Section 9). Detailed descriptions of the mechanisms are included in the operational description.

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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	**34.0**	**34.0**	**32.0**	**30.8**	**29.6**	**28.0**	**25.5**	**24.5**	**23.5**
	Nominal	**33.5**	**33.5**	**31.5**	**30.3**	**29.1**	**27.5**	**25.0**	**24.0**	**23.0**
GSM/GPRS/EDGE 1900	Maximum	**30.5**	**30.5**	**28.0**	**26.5**	**25.0**	**25.0**	**23.0**	**21.8**	**20.6**
	Nominal	**30.0**	**30.0**	**27.5**	**26.0**	**24.5**	**24.5**	**22.5**	**21.3**	**20.1**

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

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 17	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 13	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 5 (Cell)	Maximum	**25.0**
	Nominal	**24.5**
LTE Band 26 (Cell)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 4 (AWS)	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 2 (PCS)	Maximum	**24.5**
	Nominal	**24.0**
LTE Band 25 (PCS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 41	Maximum	**23.5**
	Nominal	**23.0**

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1.3.2 Reduced PCE Power

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

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	21.5
	Nominal	21.0
LTE Band 2 (PCS)	Maximum	21.5
	Nominal	21.0
LTE Band 25 (PCS)	Maximum	20.5
	Nominal	20.0

1.3.3 Maximum WLAN/BT Power

2.4 GHz WLAN Antenna 1/ BT

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
IEEE 802.11b (2.4 GHz)		Ch 1-11	Ch 12	Ch 13
	Maximum	19.5	17.5	11.5
	Nominal	19.0	17.0	11.0
IEEE 802.11g (2.4 GHz)		Ch 1-11	Ch 12	Ch 13
	Maximum	16.5	14.5	8.5
	Nominal	16.0	14.0	8.0
IEEE 802.11n (2.4 GHz)		Ch 1-11	Ch 12	Ch 13
	Maximum	15.5	13.5	7.5
	Nominal	15.0	13.0	7.0
Bluetooth	Maximum	11.5		
	Nominal	11.0		
Bluetooth LE	Maximum	7.5		
	Nominal	7.0		

2.4 GHz WLAN Antenna 2

Mode / Band		Modulated Average - Single Tx Chain (dBm)			
IEEE 802.11b (2.4 GHz)		Ch 1-11		Ch 12	Ch 13
	Maximum	19.5		17.5	11.5
	Nominal	19.0		17.0	11.0
IEEE 802.11g (2.4 GHz)		Ch 1	Ch 2 - 11	Ch 12	Ch 13
	Maximum	16.0	16.5	14.5	8.5
	Nominal	15.5	16.0	14.0	8.0
IEEE 802.11n (2.4 GHz)		Ch 1	Ch 2 - 11	Ch 12	Ch 13
	Maximum	15.0	15.5	13.5	7.5
	Nominal	14.5	15.0	13.0	7.0

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5GHz WLAN Antenna 1

Mode / Band		Modulated Average - Single Tx Chain (dBm)					
		20 MHz Bandwidth		40 MHz Bandwidth		80 MHz Bandwidth	
IEEE 802.11a (5 GHz)		Ch 36	Ch 40 - 165				
	Maximum	**15.5**	**17.5**				
	Nominal	**15.0**	**17.0**				
IEEE 802.11n (5 GHz)		Ch 36 - 165		Ch 38	Ch 46 - 159		
	Maximum	**14.5**		**12.5**	**15.5**		
	Nominal	**14.0**		**12.0**	**15.0**		
IEEE 802.11ac (5 GHz)		Ch 36 - 165		Ch 38	Ch 46 - 159	Ch 42	Ch 58 - 155
	Maximum	**14.5**		**12.5**	**15.5**	**11.5**	**13.5**
	Nominal	**14.0**		**12.0**	**15.0**	**11.0**	**13.0**

5GHz WLAN Antenna 2

Mode / Band		Modulated Average - Single Tx Chain (dBm)				
		20 MHz Bandwidth		40 MHz Bandwidth		80 MHz Bandwidth
IEEE 802.11a (5 GHz)		Ch 36	Ch 40 - 165			
	Maximum	**17.0**	**17.5**			
	Nominal	**16.5**	**17.0**			
IEEE 802.11n (5 GHz)		Ch 36 - 165		Ch 38	Ch 46 - 159	
	Maximum	**14.5**		**14.0**	**15.5**	
	Nominal	**14.0**		**13.5**	**15.0**	
IEEE 802.11ac (5 GHz)		Ch 36 - 165		Ch 38	Ch 46 - 159	Ch 42 - 155
	Maximum	**14.5**		**14.0**	**15.5**	**13.5**
	Nominal	**14.0**		**13.5**	**15.0**	**13.0**

2.4/5GHz WLAN MIMO

Mode / Band		Modulated Average - MIMO (dBm)				
		20 MHz Bandwidth			40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11n (2.4 GHz)		Ch 1-11	Ch 12	Ch 13		
	Maximum	**17.5**	**15.5**	**9.5**		
	Nominal	**17.0**	**15.0**	**9.0**		
IEEE 802.11g (2.4 GHz)		Ch 1-11	Ch 12	Ch 13		
	Maximum	**17.5**	**15.5**	**9.5**		
	Nominal	**17.0**	**15.0**	**9.0**		
IEEE 802.11a (5 GHz)	Maximum	**17.5**				
	Nominal	**17.0**				
IEEE 802.11n (5 GHz)	Maximum	**17.5**			**15.5**	
	Nominal	**17.0**			**15.0**	
IEEE 802.11ac (5 GHz)	Maximum	**17.5**			**15.5**	**13.5**
	Nominal	**17.0**			**15.0**	**13.0**

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1.3.4 Reduced WLAN Power

2.4 GHz WLAN Antenna 1

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
IEEE 802.11b (2.4 GHz)		Ch 1-12		Ch13
	Maximum	**15.5**		**11.5**
	Nominal	**15.0**		**11.0**
IEEE 802.11g (2.4 GHz)		Ch 1-11	Ch 12	Ch 13
	Maximum	**15.5**	**14.5**	**8.5**
	Nominal	**15.0**	**14.0**	**8.0**
IEEE 802.11n (2.4 GHz)		Ch 1-11	Ch 12	Ch 13
	Maximum	**15.5**	**13.5**	**7.5**
	Nominal	**15.0**	**13.0**	**7.0**

2.4 GHz WLAN Antenna 2

Mode / Band		Modulated Average - Single Tx Chain (dBm)			
IEEE 802.11b (2.4 GHz)		Ch 1- 12		Ch 13	
	Maximum	**15.5**		**7.5**	
	Nominal	**15.0**		**7.0**	
IEEE 802.11g (2.4 GHz)		Ch 1 - 11		Ch 12	Ch 13
	Maximum	**15.5**		**14.5**	**8.5**
	Nominal	**15.0**		**14.0**	**8.0**
IEEE 802.11n (2.4 GHz)		Ch 1	Ch 2 - 11	Ch 12	Ch 13
	Maximum	**15.0**	**15.5**	**13.5**	**7.5**
	Nominal	**14.5**	**15.0**	**13.0**	**7.0**

5GHz WLAN Antenna 1

Mode / Band		Modulated Average - Single Tx Chain (dBm)				
		20 MHz Bandwidth	40 MHz Bandwidth		80 MHz Bandwidth	
IEEE 802.11a (5 GHz)		Ch 36 - 165				
	Maximum	**13.5**				
	Nominal	**13.0**				
IEEE 802.11n (5 GHz)		Ch 36 - 165	Ch 38	Ch 46 - 159		
	Maximum	**13.5**	**12.5**	**13.5**		
	Nominal	**13.0**	**12.0**	**13.0**		
IEEE 802.11ac (5 GHz)		Ch 36 - 165	Ch 38	Ch 46 - 159	Ch 42	Ch 58 - 155
	Maximum	**13.5**	**12.5**	**13.5**	**11.5**	**13.5**
	Nominal	**13.0**	**12.0**	**13.0**	**11.0**	**13.0**

5GHz WLAN Antenna 2

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**

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2.4/5GHz WLAN MIMO

Mode / Band		Modulated Average - MIMO (dBm)			
		20 MHz Bandwidth		40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11n (2.4 GHz)		Ch 1-12	Ch 13		
	Maximum	**15.5**	**9.5**		
	Nominal	**15.0**	**9.0**		
IEEE 802.11g (2.4 GHz)		Ch 1-12	Ch 13		
	Maximum	**15.5**	**9.5**		
	Nominal	**15.0**	**9.0**		
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**

1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. A diagram showing the location of the device antennas can be found in Appendix F. Since the diagonal dimension of this device is > 160 mm and <200 mm, it is considered a "phablet.".

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 4 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	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
5 GHz WLAN Ant 1	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN Ant 2	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. 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 operations are disabled.

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1.5 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the 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.

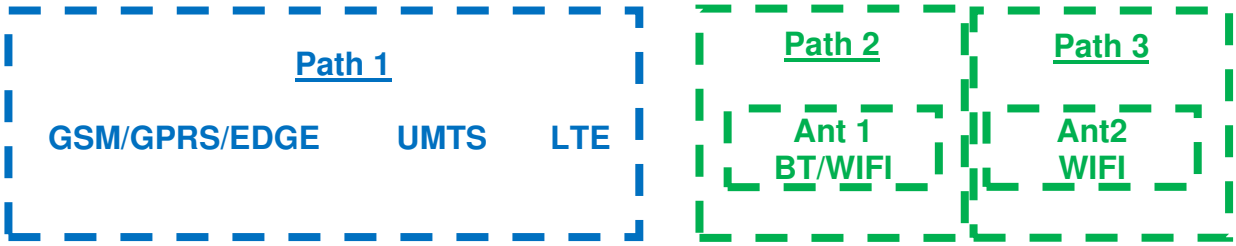


Figure 1-1
Simultaneous Transmission Paths

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	Phablet	Notes
1	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	Yes	
2	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
3	GSM voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
4	GSM voice + 2.4 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
5	GSM voice + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
6	GSM voice + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
7	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
8	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
9	UMTS + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
10	UMTS + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
11	UMTS + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
12	UMTS + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
13	LTE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
14	LTE + 5 GHz WI-FI	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
15	LTE + 2.4 GHz Bluetooth	N/A	Yes*	N/A	Yes	*-Pre-installed VOIP applications are considered.
16	LTE + 2.4 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
17	LTE + 5 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
18	LTE + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
19	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	Yes	
20	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	Yes	Yes	
21	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	N/A	Yes	
22	GPRS/EDGE + 2.4 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
23	GPRS/EDGE + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
24	GPRS/EDGE + 2.4 GHz WI-FI + 5 GHz WI-FI	N/A	N/A	Yes	Yes	

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1. All licensed modes share the same antenna path and cannot transmit simultaneously.
2. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
3. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
4. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII2A, and U-NII2C were not evaluated for wireless router conditions.
5. This device supports 2x2 MIMO Tx for WLAN 802.11n/ac. Each WLAN antenna can transmit independently or together when operating with MIMO.

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 WIFI, only 2.4 GHz and U-NII-3 WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02r01.

Per FCC KDB 447498 D01v06, the 1g SAR exclusion threshold for distances <50mm is defined by the following equation:

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, body-worn Bluetooth SAR was not required; [(14/15)* √2.480] = 1.5< 3.0. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

Per FCC KDB 447498 D01v06, the 10g SAR exclusion threshold for distances <50mm is defined by the following equation:

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, phablet Bluetooth SAR was not required; [(14/ 5)* √2.480] = 4.4< 7.5. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

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

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Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Because wireless router operations are not supported for U-NII-1, U-NII-2A & U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

(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 both LTE B17 and LTE B12. Since the supported frequency span for LTE B17 falls completely within the supported frequency span for LTE B12, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE B12.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

1.8 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, 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)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)
- 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	Phablet Serial Number
GSM/GPRS/EDGE 850	87763	85F64	85F64	-
UMTS 850	8424D	8424D	8424D	-
UMTS 1750	841E0	84162	841E0	84162/841E0
GSM/GPRS/EDGE 1900	84250	84102	84102	-
UMTS 1900	84250	84102	841E0	84102/841E0
LTE Band 12	84102	84102	84102	-
LTE Band 13	84102	98443	98443	-
LTE Band 5 (Cell)	8413C	85F64	85F64	-
LTE Band 26 (Cell)	8413C	841C3	841C3	-
LTE Band 4 (AWS)	84162	84162	841E0	84162/841E0
LTE Band 2 (PCS)	84250	84102	841E0	84102/841E0
LTE Band 25 (PCS)	84250	84102	841E0	84102/841E0
LTE Band 41	81462	84162	84162	-
2.4 GHz WLAN	05C3E	85F64	85F64	-
5 GHz WLAN	05C3E/04160	05C28	05C28	05C28

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2 LTE INFORMATION

LTE Information					
FCC ID	**A3LSMN935F**				
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 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 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 4 (AWS): 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 25 (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 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 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 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 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	9				
Modulations Supported in UL	QPSK, 16QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Release 10 Additional Information	This device does not support full CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 10 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

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3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

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4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

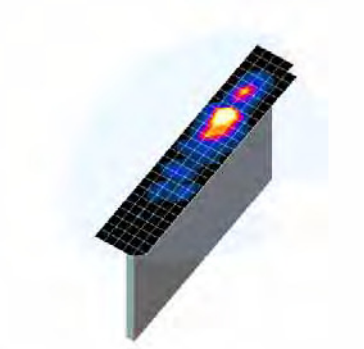


Figure 4-1
Sample SAR Area Scan

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

*Also compliant to IEEE 1528-2013 Table 6

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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].

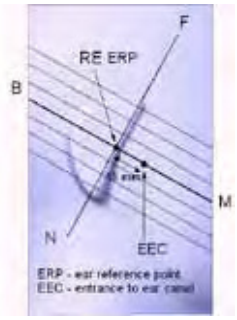


Figure 5-1
Close-Up Side view of ERP

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

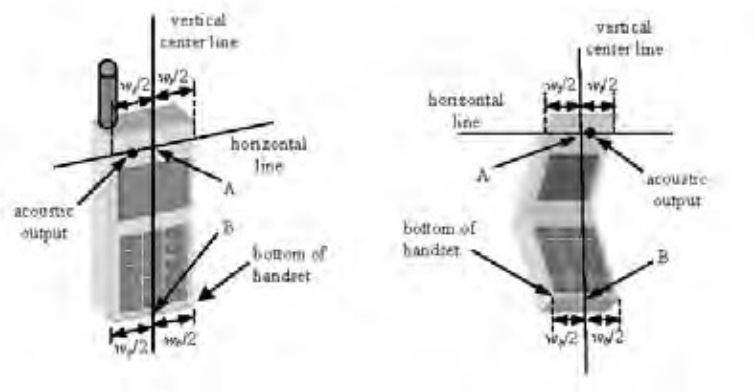


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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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).

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

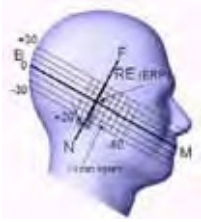


Figure 6-3
Side view w/ relevant markings

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.

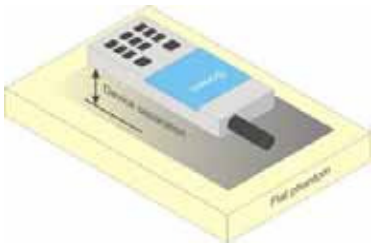


Figure 6-4
Sample Body-Worn Diagram

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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.

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6.8 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna <=25 mm from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g SAR > 1.2 W/kg.

6.9 Additional Test Positions due to Proximity Conditions

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

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

FCC KDB 616217 D04 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. Sensor Triggering distance summary data is included in Appendix G.

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

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7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

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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

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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.

8.4.6 SAR Measurement Conditions for DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

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).

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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 for LTE FDD bands and ≤0.6 W/kg for LTE TDD Band 41, 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 for LTE FDD bands and ≤0.6 W/kg for LTE TDD Band 41.

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.

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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. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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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. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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). When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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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. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

Maximum Burst-Averaged Output Power										
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	33.48	33.49	30.06	29.64	**28.77**	26.61	24.12	22.78	21.50
	190	33.45	33.50	30.11	29.75	**29.15**	26.70	24.43	22.96	21.74
	251	33.46	33.46	30.25	30.03	**29.19**	27.01	24.31	22.80	21.85
GSM 1900	512	29.45	29.44	26.75	**25.51**	24.23	23.98	22.10	20.84	19.79
	661	29.17	29.01	26.41	**24.92**	23.66	23.46	21.57	20.55	19.26
	810	29.39	29.53	26.86	**25.56**	24.23	23.77	22.04	20.76	19.75
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	24.46	24.04	25.38	**25.76**	17.58	18.10	18.52	18.49
	190	24.42	24.47	24.09	25.49	**26.14**	17.67	18.41	18.70	18.73
	251	24.43	24.43	24.23	25.77	**26.18**	17.98	18.29	18.54	18.84
GSM 1900	512	20.42	20.41	20.73	**21.25**	21.22	14.95	16.08	16.58	16.78
	661	20.14	19.98	20.39	**20.66**	20.65	14.43	15.55	16.29	16.25
	810	20.36	20.50	20.84	**21.30**	21.22	14.74	16.02	16.50	16.74
GSM 850	Frame Avg.Targets:	24.47	24.47	25.48	26.04	**26.09**	18.47	18.98	19.74	19.99
GSM 1900		20.97	20.97	21.48	**21.74**	21.49	15.47	16.48	17.04	17.09

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

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9.2 UMTS Conducted Powers

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	24.08	24.33	24.58	23.93	24.00	23.75	23.45	23.12	23.77	-
99		12.2 kbps AMR	24.12	24.30	24.63	23.93	23.94	23.83	23.42	23.09	23.74	-
6	HSDPA	Subtest 1	23.30	23.31	23.24	24.50	24.40	24.50	24.05	24.50	24.30	0
6		Subtest 2	22.47	22.47	22.39	23.52	23.35	23.77	23.07	23.39	23.35	0
6		Subtest 3	22.50	22.47	22.40	22.48	22.37	22.74	22.12	22.58	22.38	0.5
6		Subtest 4	21.52	21.50	21.53	22.50	22.36	22.74	22.11	22.52	22.34	0.5
6	HSUPA	Subtest 1	22.40	22.33	22.28	21.92	21.85	22.22	22.03	22.49	22.32	0
6		Subtest 2	20.44	20.41	20.35	19.75	19.57	19.92	19.75	20.25	20.03	2
6		Subtest 3	22.42	22.41	22.30	21.94	21.87	21.24	22.15	22.57	22.41	1
6		Subtest 4	20.47	20.41	20.35	19.59	19.54	19.91	19.75	20.22	20.04	2
6		Subtest 5	23.99	23.92	23.85	21.87	21.91	22.37	22.53	23.06	22.82	0
8	DC-HSDPA	Subtest 1	23.25	23.09	22.97	22.59	22.68	22.99	23.05	23.36	23.29	0
8		Subtest 2	22.15	22.37	22.33	23.08	23.23	23.40	23.48	23.13	23.35	0
8		Subtest 3	22.25	22.12	22.03	22.21	22.45	22.63	22.53	22.84	22.31	0.5
8		Subtest 4	22.18	22.16	22.11	22.30	22.26	22.61	22.09	22.38	22.39	0.5

Reduced Conducted Powers

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	20.87	21.17	20.81	20.63	20.25	21.02	-
99		12.2 kbps AMR	20.84	21.12	20.77	20.48	20.18	20.98	-
6	HSDPA	Subtest 1	20.97	21.18	20.74	20.52	20.05	20.73	0
6		Subtest 2	20.99	21.20	20.81	20.54	20.08	20.75	0
6		Subtest 3	20.96	21.19	20.76	20.57	20.11	20.72	0.5
6		Subtest 4	20.98	21.16	20.79	20.55	20.09	20.74	0.5
6	HSUPA	Subtest 1	20.29	20.45	20.13	19.75	19.53	19.79	0
6		Subtest 2	19.19	19.34	19.07	19.18	18.86	19.29	2
6		Subtest 3	20.32	20.43	20.09	19.84	19.47	19.86	1
6		Subtest 4	19.14	19.28	18.97	19.21	18.83	19.26	2
6		Subtest 5	20.93	21.21	20.84	20.47	20.06	20.71	0
8	DC-HSDPA	Subtest 1	21.09	20.98	20.81	20.00	19.88	20.46	0
8		Subtest 2	20.99	20.96	20.72	19.98	19.87	20.47	0
8		Subtest 3	21.00	20.92	20.77	20.02	19.88	20.46	0.5
8		Subtest 4	20.98	20.95	20.73	20.03	19.91	20.44	0.5

DC-HSDPA considerations

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12 (QPSK) was confirmed to be used during DC-HSDPA measurements
- The DUT supports UE category 24 for 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.

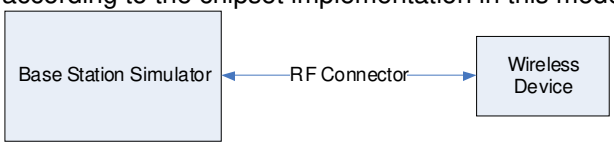


Figure 9-2
Power Measurement Setup

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9.3 LTE Conducted Powers

9.3.1 LTE Band 12

Table 9-1
LTE Band 12 Conducted Powers - 10 MHz Bandwidth

LTE Band 12 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23095 (707.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.63**	0	0
	1	25	22.53		0
	1	49	22.48		0
	25	0	**21.81**	0-1	1
	25	12	21.77		1
	25	25	21.78		1
	50	0	21.79		1
16QAM	1	0	21.82	0-1	1
	1	25	21.76		1
	1	49	21.73		1
	25	0	20.81	0-2	2
	25	12	20.79		2
	25	25	20.69		2
	50	0	20.80		2

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

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

LTE Band 12 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23035 (701.5 MHz) Conducted Power [dBm]	Mid Channel 23095 (707.5 MHz) Conducted Power [dBm]	High Channel 23155 (713.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.63	22.59	22.67	0	0
	1	12	22.59	22.52	22.62		0
	1	24	22.49	22.51	22.66		0
	12	0	21.71	21.65	21.66	0-1	1
	12	6	21.69	21.68	21.65		1
	12	13	21.69	21.67	21.60		1
	25	0	21.69	21.70	21.59		1
16QAM	1	0	21.68	21.74	21.57	0-1	1
	1	12	21.52	21.69	21.52		1
	1	24	21.53	21.70	21.56		1
	12	0	20.71	20.72	20.62	0-2	2
	12	6	20.67	20.73	20.66		2
	12	13	20.66	20.74	20.65		2
	25	0	20.67	20.76	20.67		2

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Table 9-3
LTE Band 12 Conducted Powers - 3 MHz Bandwidth

LTE Band 12 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23025 (700.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23165 (714.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.56	22.41	22.49	0	0
	1	7	22.45	22.39	22.46		0
	1	14	22.46	22.35	22.43		0
	8	0	21.58	21.60	21.63	0-1	1
	8	4	21.59	21.59	21.52		1
	8	7	21.57	21.61	21.54		1
	15	0	21.66	21.66	21.59		1
16QAM	1	0	21.56	21.75	21.65	0-1	1
	1	7	21.53	21.73	21.58		1
	1	14	21.45	21.71	21.64		1
	8	0	20.53	20.66	20.52	0-2	2
	8	4	20.58	20.62	20.50		2
	8	7	20.56	20.63	20.52		2
	15	0	20.69	20.65	20.60		2

Table 9-4
LTE Band 12 Conducted Powers – 1.4 MHz Bandwidth

LTE Band 12 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23017 (699.7 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23173 (715.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.65	22.65	22.57	0	0
	1	2	22.64	22.55	22.55		0
	1	5	22.64	22.57	22.52		0
	3	0	22.68	22.55	22.60		0
	3	2	22.69	22.54	22.60		0
	3	3	22.67	22.56	22.57		0
	6	0	21.73	21.61	21.58	0-1	1
16QAM	1	0	21.62	21.56	21.74	0-1	1
	1	2	21.59	21.53	21.75		1
	1	5	21.59	21.60	21.76		1
	3	0	21.52	21.56	21.56		1
	3	2	21.50	21.61	21.50		1
	3	3	21.52	21.63	21.55		1
	6	0	20.65	20.61	20.53	0-2	2

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9.3.2 LTE Band 13

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

LTE Band 13 10 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.37	0	0
	1	25	**22.42**		0
	1	49	22.02		0
	25	0	**20.92**	0-1	1
	25	12	20.80		1
	25	25	20.68		1
	50	0	20.80		1
16QAM	1	0	20.86	0-1	1
	1	25	20.96		1
	1	49	20.50		1
	25	0	20.88	0-2	1
	25	12	20.80		1
	25	25	20.62		1
	50	0	20.78		1

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

LTE Band 13 5 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.29	0	0
	1	12	22.26		0
	1	24	21.99		0
	12	0	20.80	0-1	1
	12	6	20.71		1
	12	13	20.65		1
	25	0	20.75		1
16QAM	1	0	20.95	0-1	1
	1	12	20.93		1
	1	24	20.69		1
	12	0	20.83	0-2	1
	12	6	20.73		1
	12	13	20.65		1
	25	0	20.70		1

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

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9.3.3 LTE Band 5 (Cell)

Table 9-7
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20525 (836.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**24.08**	0	0
	1	25	24.07		0
	1	49	24.03		0
	25	0	**22.67**	0-1	1
	25	12	22.57		1
	25	25	22.63		1
	50	0	22.65		1
16QAM	1	0	22.78	0-1	1
	1	25	22.71		1
	1	49	22.72		1
	25	0	22.62	0-2	1
	25	12	22.65		1
	25	25	22.64		1
	50	0	22.65		1

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

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20425 (826.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20625 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.88	23.97	24.03	0	0
	1	12	23.86	23.92	24.02		0
	1	24	23.87	23.85	23.95		0
	12	0	22.44	22.46	22.66	0-1	1
	12	6	22.43	22.42	22.58		1
	12	13	22.42	22.64	22.55		1
	25	0	22.47	22.53	22.57		1
16QAM	1	0	22.65	22.78	22.89	0-1	1
	1	12	22.68	22.68	22.91		1
	1	24	22.55	22.60	22.89		1
	12	0	22.43	22.64	22.61	0-2	1
	12	6	22.46	22.61	22.62		1
	12	13	22.44	22.61	22.58		1
	25	0	22.50	22.59	22.60		1

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

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20415 (825.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20635 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.91	23.78	23.93	0	0
	1	7	23.90	23.78	23.96		0
	1	14	23.88	23.79	23.95		0
	8	0	22.43	22.44	22.61	0-1	1
	8	4	22.42	22.45	22.58		1
	8	7	22.42	22.44	22.55		1
	15	0	22.45	22.48	22.55		1
16QAM	1	0	22.63	22.37	22.61	0-1	1
	1	7	22.52	22.34	22.69		1
	1	14	22.57	22.27	22.74		1
	8	0	22.39	22.48	22.54	0-2	1
	8	4	22.34	22.47	22.50		1
	8	7	22.35	22.48	22.47		1
	15	0	22.45	22.47	22.56		1

Table 9-10
LTE Band 5 (Cell) Conducted Powers - 1.4 MHz Bandwidth

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20407 (824.7 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20643 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.81	23.98	24.04	0	0
	1	2	23.80	23.96	23.97		0
	1	5	23.80	23.94	23.91		0
	3	0	23.99	24.09	24.19		0
	3	2	24.00	24.08	24.20		0
	3	3	23.98	24.07	24.16		0
	6	0	22.51	22.60	22.61	0-1	1
16QAM	1	0	22.34	22.61	22.63	0-1	1
	1	2	22.36	22.63	22.64		1
	1	5	22.31	22.70	22.59		1
	3	0	22.38	22.46	22.58		1
	3	2	22.34	22.40	22.55		1
	3	3	22.46	22.45	22.44		1
	6	0	22.42	22.55	22.65	0-2	1

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9.3.4 LTE Band 26 (Cell)

Table 9-11
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	**23.46**	0	0
	1	36	23.31		0
	1	74	23.28		0
	36	0	**22.30**	0-1	1
	36	18	22.23		1
	36	37	22.21		1
	75	0	22.29		1
16QAM	1	0	22.50	0-1	1
	1	36	22.48		1
	1	74	22.42		1
	36	0	21.33	0-2	2
	36	18	21.28		2
	36	37	21.24		2
	75	0	21.26		2

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 9-12
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	23.01	23.27	23.45	0	0
	1	25	23.03	23.19	23.48		0
	1	49	22.97	23.18	23.36		0
	25	0	22.01	22.23	22.47	0-1	1
	25	12	22.03	22.21	22.48		1
	25	25	22.00	22.18	22.45		1
	50	0	22.02	22.20	22.45		1
16QAM	1	0	22.07	22.27	22.37	0-1	1
	1	25	22.05	22.17	22.36		1
	1	49	22.09	22.24	22.31		1
	25	0	21.11	21.24	21.48	0-2	2
	25	12	21.10	21.23	21.48		2
	25	25	21.07	21.22	21.46		2
	50	0	21.12	21.28	21.47		2

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Table 9-13
LTE Band 26 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26715 (816.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27015 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.02	23.24	23.45	0	0
	1	12	22.98	23.10	23.43		0
	1	24	23.01	23.18	23.31		0
	12	0	22.03	22.22	22.42	0-1	1
	12	6	22.04	22.23	22.46		1
	12	13	22.03	22.22	22.34		1
	25	0	22.02	22.21	22.42		1
16QAM	1	0	22.06	22.23	22.48	0-1	1
	1	12	22.07	22.21	22.45		1
	1	24	22.05	22.30	22.39		1
	12	0	21.06	21.20	21.46	0-2	2
	12	6	21.04	21.27	21.50		2
	12	13	21.04	21.27	21.47		2
	25	0	21.01	21.28	21.44		2

Table 9-14
LTE Band 26 (Cell) Conducted Powers - 3 MHz Bandwidth

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26705 (815.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27025 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.09	23.23	23.45	0	0
	1	7	23.03	23.17	23.38		0
	1	14	23.02	23.18	23.34		0
	8	0	22.19	22.38	22.49	0-1	1
	8	4	22.21	22.36	22.48		1
	8	7	22.16	22.37	22.46		1
	15	0	22.18	22.39	22.50		1
16QAM	1	0	22.15	22.33	22.39	0-1	1
	1	7	22.14	22.45	22.45		1
	1	14	22.21	22.38	22.48		1
	8	0	21.09	21.38	21.47	0-2	2
	8	4	21.04	21.37	21.43		2
	8	7	21.07	21.39	21.43		2
	15	0	21.22	21.44	21.49		2

Table 9-15
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	23.06	23.37	23.44	0	0
	1	2	23.06	23.33	23.40		0
	1	5	23.03	23.40	23.37		0
	3	0	23.08	23.28	23.49		0
	3	2	23.15	23.29	23.50		0
	3	3	23.10	23.31	23.40		0
	6	0	22.11	22.32	22.34	0-1	1
16QAM	1	0	21.98	22.10	22.44	0-1	1
	1	2	21.91	22.04	22.49		1
	1	5	21.97	22.10	22.38		1
	3	0	21.99	22.18	22.43		1
	3	2	22.01	22.19	22.45		1
	3	3	22.02	22.22	22.44		1
	6	0	20.98	21.37	21.42	0-2	2

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9.3.5 LTE Band 4 (AWS)

Table 9-16
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**23.81**	0	0
	1	50	23.76		0
	1	99	23.74		0
	50	0	22.85	0-1	1
	50	25	**22.87**		1
	50	50	22.84		1
	100	0	22.85		1
16QAM	1	0	22.81	0-1	1
	1	50	22.79		1
	1	99	22.76		1
	50	0	21.79	0-2	2
	50	25	21.72		2
	50	50	21.74		2
	100	0	21.75		2

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

Table 9-17
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.01	24.14	23.93	0	0
	1	36	24.00	24.14	23.95		0
	1	74	24.02	24.12	23.92		0
	36	0	22.92	23.08	22.84	0-1	1
	36	18	22.90	23.07	22.83		1
	36	37	22.90	23.04	22.84		1
	75	0	22.91	23.06	22.87		1
16QAM	1	0	23.19	22.70	23.13	0-1	1
	1	36	22.87	23.17	22.93		1
	1	74	23.07	23.17	22.97		1
	36	0	21.84	21.91	21.73	0-2	2
	36	18	21.81	21.97	21.74		2
	36	37	21.79	21.97	21.75		2
	75	0	21.83	21.93	21.77		2

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Table 9-18
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.81	24.11	23.83	0	0
	1	25	23.80	24.04	23.79		0
	1	49	23.90	23.99	23.87		0
	25	0	22.90	23.06	22.83	0-1	1
	25	12	22.90	23.09	22.80		1
	25	25	22.89	23.08	22.83		1
	50	0	22.89	23.05	22.82		1
16QAM	1	0	22.91	23.20	22.79	0-1	1
	1	25	23.00	23.10	22.91		1
	1	49	22.87	23.17	22.99		1
	25	0	21.84	21.91	21.72	0-2	2
	25	12	21.79	21.91	21.76		2
	25	25	21.81	21.97	21.75		2
	50	0	21.83	21.93	21.76		2

Table 9-19
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.18	24.18	23.73	0	0
	1	12	24.10	24.17	23.66		0
	1	24	24.03	24.17	23.62		0
	12	0	22.93	23.08	22.85	0-1	1
	12	6	22.96	23.10	22.82		1
	12	13	22.94	23.12	22.80		1
	25	0	22.92	23.10	22.82		1
16QAM	1	0	22.97	23.20	22.85	0-1	1
	1	12	23.07	23.17	22.92		1
	1	24	23.18	22.97	22.87		1
	12	0	21.85	21.98	21.73	0-2	2
	12	6	21.82	21.97	21.73		2
	12	13	21.85	21.98	21.75		2
	25	0	21.88	22.00	21.76		2

Table 9-20
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.95	24.13	23.95	0	0
	1	7	23.92	24.11	23.82		0
	1	14	23.99	24.03	23.74		0
	8	0	22.92	23.05	22.80	0-1	1
	8	4	22.92	23.12	22.78		1
	8	7	22.89	23.07	22.79		1
	15	0	22.92	23.07	22.79		1
16QAM	1	0	23.08	23.15	22.98	0-1	1
	1	7	22.99	23.20	22.91		1
	1	14	22.96	23.11	22.79		1
	8	0	21.87	21.95	21.70	0-2	2
	8	4	21.88	21.94	21.73		2
	8	7	21.81	21.97	21.74		2
	15	0	21.85	22.03	21.77		2

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Table 9-21
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.96	24.16	23.84	0	0
	1	2	23.90	24.13	23.83		0
	1	5	24.01	24.11	23.86		0
	3	0	24.01	24.14	23.84		0
	3	2	23.97	24.14	23.85		0
	3	3	24.00	24.12	23.83		0
	6	0	22.94	23.13	22.80	0-1	1
16QAM	1	0	22.93	23.11	22.68	0-1	1
	1	2	22.91	23.11	22.60		1
	1	5	22.87	23.20	22.55		1
	3	0	23.05	23.11	22.89		1
	3	2	22.90	23.02	22.81		1
	3	3	23.11	23.17	22.74		1
	6	0	21.94	21.99	21.76	0-2	2

Table 9-22
LTE Band 4 (AWS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	19.84	0	0
	1	50	**19.85**		0
	1	99	19.79		0
	50	0	**19.86**	0-1	0
	50	25	19.83		0
	50	50	19.80		0
	100	0	19.84		0
16QAM	1	0	19.69	0-1	0
	1	50	19.76		0
	1	99	19.68		0
	50	0	19.89	0-2	0
	50	25	19.87		0
	50	50	19.85		0
	100	0	19.85		0

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

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Table 9-23
LTE Band 4 (AWS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.91	20.12	19.86	0	0
	1	36	19.87	20.14	19.80		0
	1	74	19.69	20.13	19.75		0
	36	0	19.81	20.08	19.77	0-1	0
	36	18	19.86	20.08	19.78		0
	36	37	19.72	20.06	19.74		0
	75	0	19.77	20.07	19.80		0
16QAM	1	0	19.62	20.08	19.67	0-1	0
	1	36	19.61	20.06	19.60		0
	1	74	19.66	19.93	19.64		0
	36	0	19.81	20.08	19.77	0-2	0
	36	18	19.79	20.05	19.74		0
	36	37	19.78	20.01	19.76		0
	75	0	19.82	20.04	19.75		0

Table 9-24
LTE Band 4 (AWS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.69	19.91	19.73	0	0
	1	25	19.81	19.83	19.81		0
	1	49	19.70	19.86	19.64		0
	25	0	19.66	20.06	19.86	0-1	0
	25	12	19.68	20.06	19.65		0
	25	25	19.68	20.05	19.69		0
	50	0	19.73	20.06	19.76		0
16QAM	1	0	19.89	19.98	19.71	0-1	0
	1	25	19.68	19.84	19.67		0
	1	49	19.79	19.81	19.67		0
	25	0	19.83	20.09	19.80	0-2	0
	25	12	19.86	20.11	19.75		0
	25	25	19.74	20.06	19.72		0
	50	0	19.78	20.11	19.70		0

Table 9-25
LTE Band 4 (AWS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.73	20.12	19.77	0	0
	1	12	19.78	19.90	19.74		0
	1	24	19.86	20.12	19.72		0
	12	0	19.99	20.14	19.71	0-1	0
	12	6	20.01	20.16	19.77		0
	12	13	19.98	20.14	19.75		0
	25	0	19.96	20.15	19.79		0
16QAM	1	0	19.60	19.91	19.73	0-1	0
	1	12	19.69	19.82	19.71		0
	1	24	19.61	19.73	19.75		0
	12	0	19.85	20.15	19.70	0-2	0
	12	6	19.75	20.14	19.72		0
	12	13	19.80	20.12	19.75		0
	25	0	19.97	20.11	19.73		0

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Table 9-26
LTE Band 4 (AWS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.83	19.94	19.78	0	0
	1	7	19.85	19.98	19.75		0
	1	14	19.83	19.93	19.74		0
	8	0	19.94	20.06	19.77	0-1	0
	8	4	19.92	20.08	19.80		0
	8	7	19.94	20.07	19.76		0
	15	0	20.03	20.12	19.83		0
16QAM	1	0	19.78	20.18	19.83	0-1	0
	1	7	19.80	20.22	19.82		0
	1	14	19.88	20.23	19.89		0
	8	0	19.81	20.05	19.79	0-2	0
	8	4	19.89	20.09	19.82		0
	8	7	19.86	20.08	19.78		0
	15	0	19.97	20.08	19.80		0

Table 9-27
LTE Band 4 (AWS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.98	20.17	19.75	0	0
	1	2	19.91	20.13	19.73		0
	1	5	19.93	20.13	19.76		0
	3	0	20.02	20.22	19.82		0
	3	2	20.06	20.29	19.79		0
	3	3	19.99	20.14	19.78		0
	6	0	19.97	20.16	19.81	0-1	0
16QAM	1	0	19.96	19.85	19.66	0-1	0
	1	2	19.95	19.83	19.66		0
	1	5	19.96	19.86	19.73		0
	3	0	20.02	20.03	19.60		0
	3	2	19.99	20.08	19.59		0
	3	3	20.04	20.05	19.61		0
	6	0	19.99	20.23	19.66	0-2	0

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9.3.6 LTE Band 2 (PCS)

Table 9-28
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

LTE Band 2 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18700 (1860.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19100 (1900.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.84	22.53	**23.21**	0	0
	1	50	22.76	22.58	23.15		0
	1	99	22.74	22.59	23.09		0
	50	0	21.91	21.67	**22.19**	0-1	1
	50	25	21.90	21.68	22.18		1
	50	50	21.92	21.72	22.13		1
	100	0	21.97	21.69	22.15		1
16QAM	1	0	21.98	21.62	22.50	0-1	1
	1	50	21.93	21.64	22.42		1
	1	99	21.91	21.68	22.39		1
	50	0	21.00	20.74	21.27	0-2	2
	50	25	20.96	20.71	21.21		2
	50	50	20.95	20.76	21.15		2
	100	0	20.96	20.75	21.16		2

Table 9-29
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 2 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18675 (1857.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19125 (1902.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.15	22.79	23.39	0	0
	1	36	23.09	22.80	23.41		0
	1	74	23.02	22.84	23.24		0
	36	0	22.06	21.77	22.36	0-1	1
	36	18	22.03	21.78	22.32		1
	36	37	21.99	21.77	22.31		1
	75	0	22.01	21.81	22.30		1
16QAM	1	0	22.02	21.79	22.49	0-1	1
	1	36	21.95	21.89	22.39		1
	1	74	22.05	21.85	22.28		1
	36	0	21.06	20.79	21.38	0-2	2
	36	18	21.01	20.75	21.34		2
	36	37	20.97	20.78	21.23		2
	75	0	21.01	20.80	21.32		2

Table 9-30
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 2 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18650 (1855.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19150 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.99	22.71	23.50	0	0
	1	25	23.06	22.68	23.41		0
	1	49	22.93	22.84	23.24		0
	25	0	22.02	21.76	22.36	0-1	1
	25	12	22.03	21.77	22.32		1
	25	25	21.98	21.80	22.31		1
	50	0	22.00	21.76	22.30		1
16QAM	1	0	22.25	21.65	22.50	0-1	1
	1	25	22.15	21.79	22.25		1
	1	49	22.06	21.88	22.14		1
	25	0	21.03	20.77	21.38	0-2	2
	25	12	21.05	20.75	21.34		2
	25	25	20.96	20.80	21.23		2
	50	0	21.01	20.76	21.32		2

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Table 9-31
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 2 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18625 (1852.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19175 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.16	23.06	23.22	0	0
	1	12	23.24	23.10	23.19		0
	1	24	23.23	22.81	23.18		0
	12	0	22.01	21.76	22.35	0-1	1
	12	6	22.01	21.74	22.33		1
	12	13	21.99	21.75	22.31		1
	25	0	22.03	21.73	22.34		1
16QAM	1	0	22.25	21.90	22.50	0-1	1
	1	12	22.01	21.89	22.31		1
	1	24	22.09	21.69	22.29		1
	12	0	21.02	20.71	21.33	0-2	2
	12	6	21.07	20.77	21.35		2
	12	13	21.02	20.74	21.33		2
	25	0	21.02	20.76	21.31		2

Table 9-32
LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 2 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.03	22.69	23.46	0	0
	1	7	23.05	22.69	23.45		0
	1	14	22.99	22.68	23.45		0
	8	0	22.03	21.78	22.37	0-1	1
	8	4	22.04	21.83	22.40		1
	8	7	22.07	21.76	22.37		1
	15	0	22.04	21.77	22.36		1
16QAM	1	0	22.02	21.80	22.49	0-1	1
	1	7	22.31	22.00	22.50		1
	1	14	22.12	21.95	22.50		1
	8	0	21.03	20.83	21.37	0-2	2
	8	4	21.04	20.82	21.36		2
	8	7	21.11	20.86	21.32		2
	15	0	21.08	20.82	21.37		2

Table 9-33
LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 2 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.97	22.78	23.47	0	0
	1	2	23.09	22.77	23.44		0
	1	5	23.06	22.81	23.46		0
	3	0	23.05	22.79	23.48		0
	3	2	23.05	22.80	23.43		0
	3	3	23.07	22.74	23.48		0
	6	0	22.05	21.77	22.39	0-1	1
16QAM	1	0	22.25	21.78	22.28	0-1	1
	1	2	22.02	21.60	22.43		1
	1	5	22.10	21.68	22.43		1
	3	0	22.07	21.86	22.48		1
	3	2	22.12	21.86	22.48		1
	3	3	22.10	21.74	22.50		1
	6	0	21.02	20.77	21.32	0-2	2

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Table 9-34
LTE Band 2 (PCS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 2 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18700 (1860.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19100 (1900.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.35	20.11	**20.51**	0	0
	1	50	20.19	20.04	20.48		0
	1	99	20.14	20.10	20.34		0
	50	0	20.21	20.00	**20.48**	0-1	0
	50	25	20.18	20.02	20.46		0
	50	50	20.12	20.03	20.41		0
	100	0	20.17	20.03	20.44		0
16QAM	1	0	20.26	20.00	20.40	0-1	0
	1	50	20.17	20.00	20.40		0
	1	99	20.03	19.91	20.30		0
	50	0	20.20	20.03	20.49	0-2	0
	50	25	20.17	20.04	20.46		0
	50	50	20.14	20.05	20.41		0
	100	0	20.17	20.01	20.41		0

Table 9-35
LTE Band 2 (PCS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 2 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18675 (1857.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19125 (1902.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.36	20.14	20.54	0	0
	1	36	20.35	20.07	20.49		0
	1	74	20.26	20.08	20.44		0
	36	0	20.29	20.09	20.45	0-1	0
	36	18	20.21	20.06	20.39		0
	36	37	20.18	20.05	20.40		0
	75	0	20.24	20.02	20.42		0
16QAM	1	0	20.33	20.01	20.59	0-1	0
	1	36	20.26	20.06	20.60		0
	1	74	20.29	20.08	20.53		0
	36	0	20.28	19.98	20.48	0-2	0
	36	18	20.22	20.00	20.42		0
	36	37	20.18	20.01	20.38		0
	75	0	20.19	20.02	20.44		0

Table 9-36
LTE Band 2 (PCS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 2 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18650 (1855.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19150 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.22	19.96	20.52	0	0
	1	25	20.16	20.00	20.50		0
	1	49	20.10	20.01	20.42		0
	25	0	20.23	19.98	20.53	0-1	0
	25	12	20.24	19.97	20.51		0
	25	25	20.18	19.99	20.47		0
	50	0	20.22	19.98	20.51		0
16QAM	1	0	20.33	19.95	20.52	0-1	0
	1	25	20.22	20.08	20.55		0
	1	49	20.21	20.01	20.51		0
	25	0	20.23	19.96	20.51	0-2	0
	25	12	20.21	19.97	20.49		0
	25	25	20.16	20.01	20.46		0
	50	0	20.32	19.97	20.46		0

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Table 9-37
LTE Band 2 (PCS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 2 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18625 (1852.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19175 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.19	19.92	20.52	0	0
	1	12	20.13	19.94	20.48		0
	1	24	20.12	19.89	20.47		0
	12	0	20.26	19.97	20.55	0-1	0
	12	6	20.24	19.96	20.54		0
	12	13	20.23	19.94	20.49		0
	25	0	20.26	19.96	20.53		0
16QAM	1	0	20.21	20.04	20.53	0-1	0
	1	12	20.21	19.84	20.46		0
	1	24	20.15	19.97	20.55		0
	12	0	20.18	19.94	20.51	0-2	0
	12	6	20.19	19.97	20.49		0
	12	13	20.17	19.96	20.50		0
	25	0	20.16	19.95	20.48		0

Table 9-38
LTE Band 2 (PCS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 2 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.19	19.91	20.59	0	0
	1	7	20.18	19.90	20.55		0
	1	14	20.20	19.88	20.57		0
	8	0	20.32	20.08	20.58	0-1	0
	8	4	20.31	20.08	20.60		0
	8	7	20.28	20.11	20.56		0
	15	0	20.35	20.07	20.62		0
16QAM	1	0	20.16	20.21	20.74	0-1	0
	1	7	20.07	20.21	20.68		0
	1	14	20.16	20.18	20.70		0
	8	0	20.27	20.14	20.56	0-2	0
	8	4	20.24	20.15	20.57		0
	8	7	20.23	20.16	20.53		0
	15	0	20.36	20.12	20.72		0

Table 9-39
LTE Band 2 (PCS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 2 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.32	20.12	20.51	0	0
	1	2	20.33	20.06	20.67		0
	1	5	20.40	20.12	20.53		0
	3	0	20.47	20.06	20.61		0
	3	2	20.51	20.04	20.63		0
	3	3	20.45	20.09	20.63		0
	6	0	20.47	20.13	20.65	0-1	0
16QAM	1	0	20.27	20.08	20.21	0-1	0
	1	2	20.21	20.05	20.27		0
	1	5	20.22	20.04	20.29		0
	3	0	20.26	20.08	20.42		0
	3	2	20.19	20.07	20.41		0
	3	3	20.24	20.05	20.43		0
	6	0	20.37	20.13	20.58	0-2	0

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9.3.7 LTE Band 25 (PCS)

Table 9-40
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	21.98	21.63	**22.30**	0	0
	1	50	21.90	21.59	22.21		0
	1	99	21.87	21.67	22.09		0
	50	0	20.98	20.82	**21.22**	0-1	1
	50	25	20.93	20.81	21.20		1
	50	50	20.90	20.86	21.13		1
	100	0	20.94	20.84	21.19		1
16QAM	1	0	21.23	20.68	21.43	0-1	1
	1	50	21.07	20.65	21.32		1
	1	99	21.11	20.67	21.26		1
	50	0	19.92	19.74	20.31	0-2	2
	50	25	19.88	19.77	20.17		2
	50	50	19.88	19.83	20.21		2
	100	0	19.87	19.82	20.30		2

Table 9-41
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	21.89	21.72	22.50	0	0
	1	36	21.90	21.74	22.47		0
	1	74	21.86	21.70	22.41		0
	36	0	21.10	20.92	21.39	0-1	1
	36	18	21.06	20.95	21.33		1
	36	37	21.03	20.98	21.30		1
	75	0	21.06	20.95	21.32		1
16QAM	1	0	21.07	21.05	21.50	0-1	1
	1	36	20.96	21.09	21.47		1
	1	74	20.89	21.03	21.45		1
	36	0	20.07	19.90	20.35	0-2	2
	36	18	20.00	19.88	20.32		2
	36	37	19.97	19.90	20.30		2
	75	0	20.00	19.91	20.30		2

Table 9-42
LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.12	21.74	22.46	0	0
	1	25	22.09	21.74	22.40		0
	1	49	22.01	21.75	22.39		0
	25	0	21.06	20.97	21.34	0-1	1
	25	12	21.03	20.94	21.32		1
	25	25	21.02	20.98	21.30		1
	50	0	21.01	20.96	21.30		1
16QAM	1	0	21.16	20.79	21.50	0-1	1
	1	25	21.10	20.79	21.47		1
	1	49	21.06	20.78	21.48		1
	25	0	20.00	19.86	20.32	0-2	2
	25	12	20.00	19.87	20.31		2
	25	25	19.97	19.87	20.25		2
	50	0	19.93	19.87	20.30		2

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Table 9-43
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	21.86	21.74	22.35	0	0
	1	12	21.87	21.75	22.28		0
	1	24	21.86	21.80	22.27		0
	12	0	21.01	20.91	21.24	0-1	1
	12	6	21.02	20.91	21.23		1
	12	13	21.01	20.94	21.25		1
	25	0	21.03	20.96	21.26		1
16QAM	1	0	21.05	20.87	21.28	0-1	1
	1	12	20.96	20.84	21.23		1
	1	24	20.98	20.87	21.29		1
	12	0	19.99	19.84	20.37	0-2	2
	12	6	19.96	19.91	20.25		2
	12	13	19.97	19.96	20.26		2
	25	0	19.93	19.89	20.33		2

Table 9-44
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	21.79	21.67	22.07	0	0
	1	7	21.79	21.72	22.09		0
	1	14	21.84	21.69	22.09		0
	8	0	20.86	20.87	21.16	0-1	1
	8	4	20.85	20.86	21.14		1
	8	7	20.85	20.86	21.14		1
	15	0	20.92	20.84	21.13		1
16QAM	1	0	20.89	21.02	20.85	0-1	1
	1	7	20.89	21.13	20.96		1
	1	14	20.90	21.05	21.03		1
	8	0	19.71	19.71	20.14	0-2	2
	8	4	19.75	19.72	20.12		2
	8	7	19.71	19.71	20.12		2
	15	0	19.82	19.76	20.10		2

Table 9-45
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	21.83	21.84	22.12	0	0
	1	2	21.76	21.80	22.05		0
	1	5	21.81	21.82	22.14		0
	3	0	21.81	21.79	22.15		0
	3	2	21.83	21.78	22.16		0
	3	3	21.81	21.80	22.19		0
	6	0	20.87	20.82	21.16	0-1	1
16QAM	1	0	20.75	20.99	21.18	0-1	1
	1	2	20.70	20.92	21.20		1
	1	5	20.71	20.79	21.15		1
	3	0	20.69	20.66	21.06		1
	3	2	20.73	20.75	21.05		1
	3	3	20.67	20.69	21.10		1
	6	0	19.68	19.65	20.10	0-2	2

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Table 9-46
LTE Band 25 (PCS) Reduced 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	19.47	19.33	**19.73**	0	0
	1	50	19.40	19.31	19.63		0
	1	99	19.36	19.28	19.55		0
	50	0	19.33	19.24	**19.65**	0-1	0
	50	25	19.29	19.22	19.62		0
	50	50	19.25	19.22	19.58		0
	100	0	19.26	19.21	19.61		0
16QAM	1	0	19.42	19.27	19.72	0-1	0
	1	50	19.35	19.21	19.62		0
	1	99	19.33	19.31	19.58		0
	50	0	19.34	19.18	19.65	0-2	0
	50	25	19.30	19.20	19.60		0
	50	50	19.29	19.21	19.57		0
	100	0	19.28	19.18	19.61		0

Table 9-47
LTE Band 25 (PCS) Reduced 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	19.32	19.15	19.55	0	0
	1	36	19.21	19.12	19.46		0
	1	74	19.15	19.22	19.41		0
	36	0	19.24	19.07	19.47	0-1	0
	36	18	19.19	19.08	19.46		0
	36	37	19.17	19.08	19.42		0
	75	0	19.20	19.08	19.46		0
16QAM	1	0	19.18	19.01	19.21	0-1	0
	1	36	19.00	19.00	19.16		0
	1	74	19.01	19.08	19.30		0
	36	0	19.23	18.99	19.49	0-2	0
	36	18	19.19	19.04	19.47		0
	36	37	19.18	19.09	19.45		0
	75	0	19.20	19.06	19.44		0

Table 9-48
LTE Band 25 (PCS) Reduced 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	19.25	19.06	19.51	0	0
	1	25	19.17	19.06	19.49		0
	1	49	19.15	19.08	19.45		0
	25	0	19.23	19.06	19.51	0-1	0
	25	12	19.22	19.07	19.47		0
	25	25	19.19	19.08	19.46		0
	50	0	19.23	19.01	19.50		0
16QAM	1	0	19.12	19.00	19.19	0-1	0
	1	25	19.02	19.04	19.26		0
	1	49	19.28	19.02	19.24		0
	25	0	19.22	19.02	19.51	0-2	0
	25	12	19.20	19.05	19.52		0
	25	25	19.21	19.07	19.50		0
	50	0	19.26	19.08	19.53		0

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Table 9-49
LTE Band 25 (PCS) Reduced 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	19.16	19.02	19.43	0	0
	1	12	19.19	19.08	19.38		0
	1	24	19.16	19.02	19.41		0
	12	0	19.24	19.04	19.46	0-1	0
	12	6	19.21	19.06	19.48		0
	12	13	19.20	19.05	19.46		0
	25	0	19.22	19.06	19.50		0
16QAM	1	0	19.13	19.13	19.39	0-1	0
	1	12	19.23	19.03	19.24		0
	1	24	19.02	19.00	19.45		0
	12	0	19.26	19.01	19.53	0-2	0
	12	6	19.25	19.19	19.55		0
	12	13	19.22	19.24	19.54		0
	25	0	19.21	19.16	19.50		0

Table 9-50
LTE Band 25 (PCS) Reduced 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	19.43	19.08	19.51	0	0
	1	7	19.37	19.09	19.48		0
	1	14	19.38	19.07	19.48		0
	8	0	19.42	19.26	19.61	0-1	0
	8	4	19.38	19.23	19.58		0
	8	7	19.39	19.18	19.59		0
	15	0	19.42	19.19	19.62		0
16QAM	1	0	19.72	19.24	19.48	0-1	0
	1	7	19.62	19.26	19.51		0
	1	14	19.62	19.21	19.47		0
	8	0	19.36	19.21	19.57	0-2	0
	8	4	19.38	19.19	19.53		0
	8	7	19.35	19.17	19.52		0
	15	0	19.45	19.20	19.62		0

Table 9-51
LTE Band 25 (PCS) Reduced 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	19.35	19.20	19.52	0	0
	1	2	19.37	19.19	19.53		0
	1	5	19.36	19.27	19.56		0
	3	0	19.38	19.12	19.51		0
	3	2	19.39	19.09	19.54		0
	3	3	19.38	19.10	19.54		0
	6	0	19.33	19.19	19.60	0-1	0
16QAM	1	0	19.39	18.99	19.36	0-1	0
	1	2	19.35	18.98	19.37		0
	1	5	19.38	19.01	19.34		0
	3	0	19.29	18.98	19.32		0
	3	2	19.33	18.98	19.31		0
	3	3	19.28	19.00	19.30		0
	6	0	19.32	19.28	19.48	0-2	0

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9.3.8 LTE Band 41

Table 9-52
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	22.86	**23.43**	22.50	22.39	22.90	0	0
	1	50	22.77	23.40	22.45	22.38	22.70		0
	1	99	22.72	23.36	22.44	22.39	22.66		0
	50	0	21.71	**22.33**	21.54	21.32	21.65	0-1	1
	50	25	21.66	22.30	21.49	21.30	21.64		1
	50	50	21.63	22.28	21.47	21.29	21.61		1
	100	0	21.67	22.30	21.48	21.29	21.63		1
16QAM	1	0	21.84	22.45	21.47	21.13	21.32	0-1	1
	1	50	21.80	22.40	21.44	21.16	21.30		1
	1	99	21.76	22.38	21.43	21.18	21.28		1
	50	0	20.78	21.39	20.57	20.41	20.68	0-2	2
	50	25	20.77	21.34	20.50	20.33	20.66		2
	50	50	20.74	21.33	20.45	20.34	20.67		2
	100	0	20.72	21.34	20.51	20.28	20.67		2

Table 9-53
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	23.31	22.87	22.90	22.86	23.10	0	0
	1	36	23.22	22.82	22.89	22.83	23.08		0
	1	74	23.10	22.77	22.82	22.80	23.00		0
	36	0	22.27	21.87	22.04	21.91	22.22	0-1	1
	36	18	22.24	21.88	22.00	21.89	22.20		1
	36	37	22.21	21.90	21.99	21.87	22.16		1
	75	0	22.24	21.89	22.04	21.88	22.19		1
16QAM	1	0	22.29	22.50	21.85	21.89	21.92	0-1	1
	1	36	22.19	22.49	21.83	21.90	21.89		1
	1	74	22.05	22.47	21.74	21.85	21.88		1
	36	0	21.24	21.50	21.03	20.86	21.30	0-2	2
	36	18	21.20	21.49	20.99	20.85	21.27		2
	36	37	21.18	21.45	21.00	20.87	21.26		2
	75	0	21.21	21.50	21.02	20.92	21.23		2

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Table 9-54
LTE Band 41 Conducted Powers - 10 MHz Bandwidth

LTE Band 41 10 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.35	23.03	23.01	22.82	23.24	0	0
	1	25	23.30	23.01	22.95	22.81	23.26		0
	1	49	23.24	23.00	22.89	22.79	23.20		0
	25	0	22.21	22.07	22.00	21.77	22.16	0-1	1
	25	12	22.19	22.00	21.99	21.85	22.17		1
	25	25	22.18	22.03	22.00	21.80	22.15		1
	50	0	22.17	22.02	21.97	21.78	22.12		1
16QAM	1	0	22.01	21.98	21.95	21.81	21.99	0-1	1
	1	25	21.98	21.89	21.92	21.79	21.88		1
	1	49	21.90	21.87	21.90	21.84	21.86		1
	25	0	21.23	21.16	21.09	20.80	21.20	0-2	2
	25	12	21.21	21.10	21.08	20.81	21.21		2
	25	25	21.18	21.11	21.06	20.79	21.19		2
	50	0	21.20	21.02	21.05	20.84	21.18		2

Table 9-55
LTE Band 41 Conducted Powers - 5 MHz Bandwidth

LTE Band 41 5 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.08	22.97	22.98	22.64	23.10	0	0
	1	12	23.00	22.93	22.96	22.65	23.04		0
	1	24	23.05	22.95	22.97	22.66	23.09		0
	12	0	22.22	22.07	21.98	21.81	22.15	0-1	1
	12	6	22.20	22.04	21.95	21.83	22.14		1
	12	13	22.21	22.07	22.00	21.82	22.15		1
	25	0	22.19	22.05	21.98	21.83	22.15		1
16QAM	1	0	22.07	21.83	21.86	21.67	21.92	0-1	1
	1	12	22.03	21.88	21.84	21.70	21.89		1
	1	24	22.06	21.85	21.88	21.66	21.95		1
	12	0	21.21	21.04	21.02	20.85	21.14	0-2	2
	12	6	21.16	21.02	20.99	20.82	21.12		2
	12	13	21.15	21.05	21.01	20.84	21.16		2
	25	0	21.19	21.03	21.00	20.86	21.15		2

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9.4 WLAN Conducted Powers

Table 9-56
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	18.45	16.27
2437	6	**18.55**	16.09
2462	11	18.44	16.01
2467	12	17.08	14.42
2472	13	11.36	8.33

Table 9-57
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	18.33	14.98
2437	6	19.15	16.39
2462	11	**19.21**	16.26
2467	12	16.95	13.55
2472	13	10.76	7.78

Table 9-58
2.4 GHz WLAN Maximum Average RF Power – MIMO

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]
		802.11n MIMO
2412	1	16.77
2437	6	**16.83**
2462	11	16.73
2467	12	15.31
2472	13	9.23

Table 9-59
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	**14.98**	14.70	15.20
2437	6	14.96	14.53	15.33
2462	11	14.72	15.16	15.06

Table 9-60
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	**15.22**	14.89	14.62
2437	6	14.90	14.75	15.19
2462	11	14.76	14.53	15.22

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Table 9-61
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	14.58	13.51	13.42
5200	40	17.07	13.55	13.50
5220	44	17.05	13.52	13.55
5240	48	17.17	13.55	13.64
5260	52	16.90	13.50	13.54
5280	56	**16.96**	13.66	13.64
5300	60	16.87	13.70	13.63
5320	64	16.91	13.64	13.74
5500	100	17.07	13.42	14.46
5600	120	16.76	14.28	14.27
5620	124	17.11	14.07	14.05
5720	144	**17.30**	13.87	13.74
5745	149	17.12	13.94	14.04
5785	157	16.93	13.83	13.71
5825	165	**17.13**	13.73	13.71

Table 9-62
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	16.34	14.49	14.44
5200	40	17.39	14.46	14.45
5220	44	17.42	14.49	14.43
5240	48	17.43	14.45	14.49
5260	52	**17.27**	14.14	14.32
5280	56	17.19	14.02	14.31
5300	60	17.26	13.99	14.08
5320	64	17.25	13.88	14.22
5500	100	**17.20**	13.64	13.94
5600	120	17.00	14.22	13.51
5620	124	17.12	14.30	14.26
5720	144	16.82	14.15	14.13
5745	149	16.66	13.71	13.54
5785	157	16.67	13.54	13.49
5825	165	**16.75**	13.55	13.55

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Table 9-63
5 GHz WLAN Maximum Average RF Power – 802.11a/n/ac MIMO

Freq [MHz]	Channel	Detector	5GHz (20MHz) Conducted Power [dBm]		
			802.11a	802.11n	802.11ac
5180	36	AVG	16.85	17.04	16.97
5200	40	AVG	16.92	17.04	17.01
5220	44	AVG	16.87	17.04	17.02
5240	48	AVG	16.66	17.03	17.10
5260	52	AVG	16.47	16.84	16.96
5280	56	AVG	17.11	16.85	17.00
5300	60	AVG	17.46	**16.86**	16.87
5320	64	AVG	17.30	16.77	17.00
5500	100	AVG	16.30	16.54	17.22
5600	120	AVG	16.31	**17.26**	16.92
5620	124	AVG	16.23	17.20	17.17
5720	144	AVG	16.67	17.02	16.95
5745	149	AVG	16.45	**16.84**	16.81
5785	157	AVG	16.41	16.70	16.61
5825	165	AVG	17.11	16.65	16.64

1. This device supports MIMO operations for IEEE 802.11a/g using Cyclic Delay Diversity (CDD) only. Antenna 1 and Antenna 2 will never transmit at the same time while operating in CDD mode (switched transmission only). Since IEEE 802.11n/ac MIMO modes additionally support Spatial Diversity Multiplexing, only IEEE 802.11n/ac modes were considered for MIMO SAR.

Table 9-64
5 GHz WLAN Reduced Average RF Power – Antenna 1

5GHz (80MHz) Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11ac
5210	42	11.09
5290	58	**13.14**
5530	106	12.61
5610	122	12.98
5690	138	**13.27**
5775	155	**13.25**

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Table 9-65
5 GHz WLAN Reduced Average RF Power – Antenna 2

5GHz (80MHz) Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11ac
5210	42	12.72
5290	58	**13.26**
5530	106	12.65
5610	122	**13.50**
5690	138	13.40
5775	155	**12.87**

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.

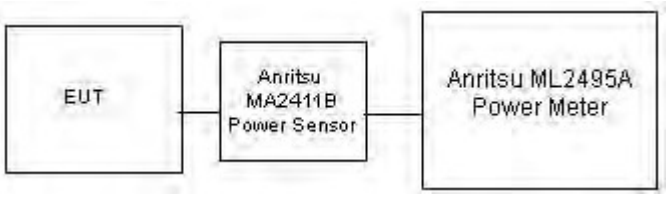


Figure 9-3
Power Measurement Setup for Bandwidths < 50 MHz

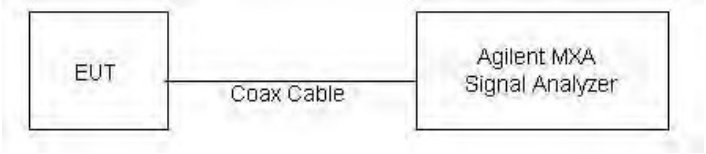


Figure 9-4
Power Measurement Setup for Bandwidths > 50 MHz

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Head Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	%dev σ	%dev ε
5/31/2016	750H	21.9	700	0.851	41.995	0.889	42.201	-4.27%	-0.49%
			710	0.859	41.886	0.890	42.149	-3.48%	-0.62%
			740	0.884	41.506	0.893	41.994	-1.01%	-1.16%
			755	0.898	41.278	0.894	41.916	0.45%	-1.52%
			770	0.912	41.057	0.895	41.838	1.90%	-1.87%
			785	0.925	40.855	0.896	41.760	3.24%	-2.17%
6/1/2016	835H	22.8	820	0.886	41.285	0.899	41.578	-1.45%	-0.70%
			835	0.900	41.083	0.900	41.500	0.00%	-1.00%
			850	0.915	40.862	0.916	41.500	-0.11%	-1.54%
3/27/2017	835H	20.6	820	0.870	40.343	0.899	41.578	-3.23%	-2.97%
			835	0.884	40.108	0.900	41.500	-1.78%	-3.35%
			850	0.898	39.965	0.916	41.500	-1.97%	-3.70%
6/1/2016	1750H	22.2	1710	1.327	39.409	1.348	40.142	-1.56%	-1.83%
			1750	1.366	39.201	1.371	40.079	-0.36%	-2.19%
			1790	1.402	39.078	1.394	40.016	0.57%	-2.34%
6/3/2016	1900H	22.2	1850	1.368	39.219	1.400	40.000	-2.29%	-1.95%
			1880	1.398	39.087	1.400	40.000	-0.14%	-2.28%
			1910	1.435	39.002	1.400	40.000	2.50%	-2.49%
5/31/2016	2450H-2600H	24.6	2400	1.776	41.040	1.756	39.289	1.14%	4.46%
			2450	1.829	40.801	1.800	39.200	1.61%	4.08%
			2500	1.888	40.633	1.855	39.136	1.78%	3.83%
			2550	1.946	40.452	1.909	39.073	1.94%	3.53%
			2600	2.001	40.227	1.964	39.009	1.88%	3.12%
			2650	2.064	40.046	2.018	38.945	2.28%	2.83%
			2700	2.127	39.855	2.073	38.882	2.60%	2.50%
06/06/2016	5250H-5800H	21.0	5240	4.623	35.114	4.696	35.940	-1.55%	-2.30%
			5260	4.642	35.063	4.717	35.917	-1.59%	-2.38%
			5280	4.662	35.027	4.737	35.894	-1.58%	-2.42%
			5300	4.682	35.004	4.758	35.871	-1.60%	-2.42%
			5600	4.989	34.615	5.065	35.529	-1.50%	-2.57%
			5680	5.070	34.484	5.147	35.437	-1.50%	-2.69%
			5700	5.097	34.485	5.168	35.414	-1.37%	-2.62%
			5745	5.141	34.401	5.214	35.363	-1.40%	-2.72%
			5765	5.162	34.365	5.234	35.340	-1.38%	-2.76%
			5785	5.194	34.315	5.255	35.317	-1.16%	-2.84%
04/06/2017	5250H-5800H	22.1	5240	4.582	35.522	4.696	35.940	-2.43%	-1.16%
			5260	4.602	35.445	4.717	35.917	-2.44%	-1.31%
			5280	4.615	35.374	4.737	35.894	-2.58%	-1.45%
			5300	4.616	35.343	4.758	35.871	-2.98%	-1.47%
			5600	4.915	34.990	5.065	35.529	-2.96%	-1.52%
			5620	4.957	34.989	5.086	35.506	-2.54%	-1.46%
			5745	5.061	34.842	5.214	35.363	-2.93%	-1.47%
			5765	5.077	34.839	5.234	35.340	-3.00%	-1.42%
			5785	5.102	34.740	5.255	35.317	-2.91%	-1.63%

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Table 10-2
Measured Body Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	%dev σ	%dev ε
6/6/2016	750B	21.6	700	0.928	55.191	0.959	55.726	-3.23%	-0.96%
			710	0.937	55.076	0.960	55.687	-2.40%	-1.10%
			740	0.965	54.772	0.963	55.570	0.21%	-1.44%
			755	0.980	54.630	0.964	55.512	1.66%	-1.59%
			770	0.995	54.477	0.965	55.453	3.11%	-1.76%
			785	1.010	54.308	0.966	55.395	4.55%	-1.96%
4/3/2017	750B	24.5	740	0.943	54.286	0.963	55.570	-2.08%	-2.31%
			755	0.956	54.145	0.964	55.512	-0.83%	-2.46%
			770	0.972	54.034	0.965	55.453	0.73%	-2.56%
			785	0.989	53.935	0.966	55.395	2.38%	-2.64%
6/2/2016	835B	20.7	820	0.985	53.642	0.969	55.258	1.65%	-2.92%
			835	1.000	53.494	0.970	55.200	3.09%	-3.09%
			850	1.014	53.331	0.988	55.154	2.63%	-3.31%
4/3/2017	835B	21.2	820	0.983	55.305	0.969	55.258	1.44%	0.09%
			835	0.994	55.071	0.970	55.200	2.47%	-0.23%
			850	1.012	54.977	0.988	55.154	2.43%	-0.32%
4/10/2017	835B	21.5	820	0.969	53.199	0.969	55.258	0.00%	-3.73%
			835	0.987	53.127	0.970	55.200	1.75%	-3.76%
			850	1.000	52.985	0.988	55.154	1.21%	-3.93%
6/1/2016	1750B	21.2	1710	1.459	51.806	1.463	53.537	-0.27%	-3.23%
			1750	1.502	51.718	1.488	53.432	0.94%	-3.21%
			1790	1.544	51.447	1.514	53.326	1.98%	-3.52%
6/2/2016	1900B	22.8	1850	1.508	52.099	1.520	53.300	-0.79%	-2.25%
			1880	1.543	52.019	1.520	53.300	1.51%	-2.40%
			1910	1.576	51.924	1.520	53.300	3.68%	-2.58%
5/31/2016	2450B-2600B	22.2	2400	1.946	51.651	1.902	52.767	2.31%	-2.11%
			2450	2.012	51.444	1.950	52.700	3.18%	-2.38%
			2500	2.082	51.240	2.021	52.636	3.02%	-2.65%
			2550	2.151	51.063	2.092	52.573	2.82%	-2.87%
			2600	2.216	50.857	2.163	52.509	2.45%	-3.15%
			2650	2.284	50.644	2.234	52.445	2.24%	-3.43%
			2700	2.353	50.452	2.305	52.382	2.08%	-3.68%
3/29/2017	2450B	22.1	2400	1.948	51.178	1.902	52.767	2.42%	-3.01%
			2450	2.011	50.977	1.950	52.700	3.13%	-3.27%
			2500	2.081	50.801	2.021	52.636	2.97%	-3.49%
05/30/2016	5200B-5800B	21.6	5240	5.503	47.084	5.346	48.960	2.94%	-3.83%
			5260	5.535	47.087	5.369	48.933	3.09%	-3.77%
			5280	5.555	47.102	5.393	48.906	3.00%	-3.69%
			5500	5.776	46.800	5.650	48.607	2.23%	-3.72%
			5600	5.962	46.533	5.766	48.471	3.40%	-4.00%
			5700	6.104	46.353	5.883	48.336	3.76%	-4.10%
			5745	6.134	46.295	5.936	48.275	3.34%	-4.10%
			5765	6.199	46.254	5.959	48.248	4.03%	-4.13%
			5825	6.296	46.120	6.029	48.166	4.43%	-4.25%

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.

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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
1g 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)	$Deviation_{1g}$ (%)
K	750	HEAD	05/31/2016	22.0	21.9	0.200	1046	3022	1.620	8.200	8.100	-1.22%
I	835	HEAD	06/01/2016	24.0	22.5	0.200	4d119	3333	1.860	9.140	9.300	1.75%
E	835	HEAD	03/27/2017	22.0	20.6	0.200	4d133	7406	1.840	9.320	9.200	-1.29%
E	1750	HEAD	06/01/2016	23.2	22.2	0.100	1051	7406	3.440	36.100	34.400	-4.71%
I	1900	HEAD	06/03/2016	23.0	22.2	0.100	5d141	3333	4.150	38.500	41.500	7.79%
K	2450	HEAD	05/31/2016	23.8	22.8	0.100	882	3022	5.340	50.500	53.400	5.74%
K	2600	HEAD	05/31/2016	23.8	22.8	0.100	1071	3022	5.810	55.900	58.100	3.94%
J	5250	HEAD	06/06/2016	20.5	20.8	0.050	1120	7357	3.840	78.700	76.800	-2.41%
K	5250	HEAD	04/06/2017	23.7	22.0	0.050	1237	7308	3.670	79.200	73.400	-7.32%
J	5600	HEAD	06/06/2016	20.5	20.8	0.050	1120	7357	4.250	82.300	85.000	3.28%
K	5600	HEAD	04/06/2017	23.7	22.0	0.050	1237	7308	3.900	83.300	78.000	-6.36%
J	5750	HEAD	06/06/2016	20.5	20.8	0.050	1120	7357	3.880	79.100	77.600	-1.90%
K	5750	HEAD	04/06/2017	23.7	22.0	0.050	1237	7308	3.680	81.500	73.600	-9.69%
G	750	BODY	06/06/2016	22.8	21.6	0.200	1054	3334	1.710	8.560	8.550	-0.12%
I	750	BODY	04/03/2017	24.5	23.1	0.200	1161	3213	1.590	8.430	7.950	-5.69%
J	835	BODY	06/02/2016	21.0	20.7	0.200	4d119	3318	1.980	9.140	9.900	8.32%
H	835	BODY	04/03/2017	21.6	21.2	0.200	4d133	3318	2.030	9.500	10.150	6.84%
H	835	BODY	04/10/2017	22.9	21.5	0.200	4d047	3318	1.940	9.570	9.700	1.36%
E	1750	BODY	06/01/2016	23.2	21.2	0.100	1051	7406	3.920	36.500	39.200	7.40%
H	1900	BODY	06/02/2016	22.0	22.5	0.100	5d141	3319	4.160	39.600	41.600	5.05%
G	2450	BODY	05/31/2016	22.0	22.0	0.100	882	3334	5.200	49.400	52.000	5.26%
E	2450	BODY	03/29/2017	23.5	22.1	0.100	981	7406	4.770	50.800	47.700	-6.10%
G	2600	BODY	05/31/2016	22.0	22.0	0.100	1071	3334	5.770	54.900	57.700	5.10%
D	5250	BODY	05/30/2016	22.8	21.6	0.050	1120	3914	3.780	75.600	75.600	0.00%
D	5600	BODY	05/30/2016	22.8	21.6	0.050	1120	3914	3.900	80.800	78.000	-3.47%
D	5750	BODY	05/30/2016	22.8	21.6	0.050	1120	3914	3.700	76.500	74.000	-3.27%

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Table 10-4
10g 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_{10g} (W/kg)	1 W Target SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	$Deviation_{10g}$ (%)
E	1750	BODY	06/01/2016	23.2	21.2	0.100	1051	7406	2.080	19.500	20.800	6.67%
H	1900	BODY	06/02/2016	22.0	22.5	0.100	5d141	3319	2.160	20.900	21.600	3.35%
D	5250	BODY	05/30/2016	22.8	21.6	0.050	1120	3914	1.070	21.200	21.400	0.94%
D	5600	BODY	05/30/2016	22.8	21.6	0.050	1120	3914	1.100	22.600	22.000	-2.65%
D	5750	BODY	05/30/2016	22.8	21.6	0.050	1120	3914	1.050	21.300	21.000	-1.41%

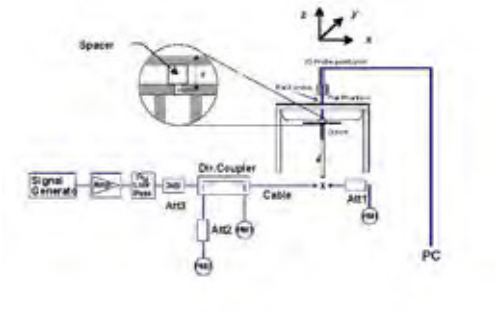


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

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11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		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	34.0	33.45	-0.01	Right	Cheek	87763	1:8.3	0.202	1.135	0.229	A1
836.60	190	GSM 850	GSM	34.0	33.45	0.05	Right	Tilt	87763	1:8.3	0.098	1.135	0.111	
836.60	190	GSM 850	GSM	34.0	33.45	-0.08	Left	Cheek	87763	1:8.3	0.108	1.135	0.123	
836.60	190	GSM 850	GSM	34.0	33.45	0.01	Left	Tilt	87763	1:8.3	0.082	1.135	0.093	
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	24.33	-0.02	Right	Cheek	1	8424D	1:1	0.164	1.167	0.191	A2
836.60	4183	UMTS 850	RMC	25.0	24.33	0.04	Right	Tilt	1	8424D	1:1	0.064	1.167	0.075	
836.60	4183	UMTS 850	RMC	25.0	24.33	0.05	Left	Cheek	1	8424D	1:1	0.111	1.167	0.130	
836.60	4183	UMTS 850	RMC	25.0	24.33	0.00	Left	Tilt	1	8424D	1:1	0.078	1.167	0.091	
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	24.5	24.00	0.03	Right	Cheek	841E0	1:1	0.168	1.122	0.188	
1732.40	1412	UMTS 1750	RMC	24.5	24.00	0.02	Right	Tilt	841E0	1:1	0.129	1.122	0.145	
1732.40	1412	UMTS 1750	RMC	24.5	24.00	0.03	Left	Cheek	841E0	1:1	0.303	1.122	0.340	A3
1732.40	1412	UMTS 1750	RMC	24.5	24.00	-0.01	Left	Tilt	841E0	1:1	0.118	1.122	0.132	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

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Table 11-4
GSM 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	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	30.5	29.17	0.11	Right	Cheek	84250	1:8.3	0.059	1.358	0.080	
1880.00	661	GSM 1900	GSM	30.5	29.17	-0.01	Right	Tilt	84250	1:8.3	0.049	1.358	0.067	
1880.00	661	GSM 1900	GSM	30.5	29.17	0.06	Left	Cheek	84250	1:8.3	0.090	1.358	0.122	A4
1880.00	661	GSM 1900	GSM	30.5	29.17	0.00	Left	Tilt	84250	1:8.3	0.035	1.358	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)	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	0.13	Right	Cheek	84250	1:1	0.159	1.183	0.188	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	-0.01	Right	Tilt	84250	1:1	0.113	1.183	0.134	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	0.02	Left	Cheek	84250	1:1	0.228	1.183	0.270	A5
1907.60	9538	UMTS 1900	RMC	24.5	23.77	0.02	Left	Tilt	84250	1:1	0.083	1.183	0.098	

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	23.5	22.63	-0.01	0	Right	Cheek	QPSK	1	0	84102	1:1	0.064	1.222	0.078	A6
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	0.16	1	Right	Cheek	QPSK	25	0	84102	1:1	0.050	1.172	0.059	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.10	0	Right	Tilt	QPSK	1	0	84102	1:1	0.033	1.222	0.040	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	-0.14	1	Right	Tilt	QPSK	25	0	84102	1:1	0.026	1.172	0.030	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.03	0	Left	Cheek	QPSK	1	0	84102	1:1	0.052	1.222	0.064	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	0.12	1	Left	Cheek	QPSK	25	0	84102	1:1	0.041	1.172	0.048	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.20	0	Left	Tilt	QPSK	1	0	84102	1:1	0.030	1.222	0.037	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	0.13	1	Left	Tilt	QPSK	25	0	84102	1:1	0.020	1.172	0.023	

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

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Table 11-7
LTE Band 13 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	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	23.5	22.42	0.03	0	Right	Cheek	QPSK	1	25	84102	1:1	0.089	1.282	0.114	A7
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	0.08	1	Right	Cheek	QPSK	25	0	84102	1:1	0.072	1.439	0.104	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.07	0	Right	Tilt	QPSK	1	25	84102	1:1	0.040	1.282	0.051	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	0.15	1	Right	Tilt	QPSK	25	0	84102	1:1	0.033	1.439	0.047	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.04	0	Left	Cheek	QPSK	1	25	84102	1:1	0.051	1.282	0.065	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	0.13	1	Left	Cheek	QPSK	25	0	84102	1:1	0.041	1.439	0.059	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.08	0	Left	Tilt	QPSK	1	25	84102	1:1	0.046	1.282	0.059	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	0.18	1	Left	Tilt	QPSK	25	0	84102	1:1	0.039	1.439	0.056	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Head 1.6 W/kg (mW/g) averaged over 1 gram			

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	25.0	24.08	0.14	0	Right	Cheek	1	QPSK	1	0	8413C	1:1	0.164	1.236	0.203	A8
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.06	1	Right	Cheek	1	QPSK	25	0	8413C	1:1	0.137	1.358	0.186	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	0.13	0	Right	Tilt	1	QPSK	1	0	8413C	1:1	0.054	1.236	0.067	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.07	1	Right	Tilt	1	QPSK	25	0	8413C	1:1	0.047	1.358	0.064	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.04	0	Left	Cheek	1	QPSK	1	0	8413C	1:1	0.109	1.236	0.135	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.10	1	Left	Cheek	1	QPSK	25	0	8413C	1:1	0.085	1.358	0.115	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	0.09	0	Left	Tilt	1	QPSK	1	0	8413C	1:1	0.090	1.236	0.111	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.07	1	Left	Tilt	1	QPSK	25	0	8413C	1:1	0.075	1.358	0.102	
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	23.5	23.46	0.01	0	Right	Cheek	QPSK	1	0	8413C	1:1	0.127	1.009	0.128	A9
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.02	1	Right	Cheek	QPSK	36	0	8413C	1:1	0.099	1.047	0.104	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	-0.07	0	Right	Tilt	QPSK	1	0	8413C	1:1	0.044	1.009	0.044	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.17	1	Right	Tilt	QPSK	36	0	8413C	1:1	0.036	1.047	0.038	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.09	0	Left	Cheek	QPSK	1	0	8413C	1:1	0.075	1.009	0.076	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.01	1	Left	Cheek	QPSK	36	0	8413C	1:1	0.057	1.047	0.060	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.05	0	Left	Tilt	QPSK	1	0	8413C	1:1	0.065	1.009	0.066	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.01	1	Left	Tilt	QPSK	36	0	8413C	1:1	0.051	1.047	0.053	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Head 1.6 W/kg (mW/g) averaged over 1 gram			

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Table 11-10
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	0.06	0	Right	Cheek	QPSK	1	0	84162	1:1	0.212	1.172	0.248	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	0.05	1	Right	Cheek	QPSK	50	25	84162	1:1	0.142	1.156	0.164	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	0.10	0	Right	Tilt	QPSK	1	0	84162	1:1	0.213	1.172	0.250	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	0.06	1	Right	Tilt	QPSK	50	25	84162	1:1	0.143	1.156	0.165	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	0.06	0	Left	Cheek	QPSK	1	0	84162	1:1	0.335	1.172	**0.393**	A10
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	0.02	1	Left	Cheek	QPSK	50	25	84162	1:1	0.254	1.156	0.294	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	0.07	0	Left	Tilt	QPSK	1	0	84162	1:1	0.151	1.172	0.177	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	0.03	1	Left	Tilt	QPSK	50	25	84162	1:1	0.114	1.156	0.132	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Head 1.6 W/kg (mW/g) averaged over 1 gram			

Table 11-11
LTE Band 2 (PCS) 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)	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.05	0	Right	Cheek	QPSK	1	0	84250	1:1	0.167	1.346	0.225	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	0.04	1	Right	Cheek	QPSK	50	0	84250	1:1	0.115	1.352	0.155	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	0.05	0	Right	Tilt	QPSK	1	0	84250	1:1	0.118	1.346	0.159	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	0.02	1	Right	Tilt	QPSK	50	0	84250	1:1	0.090	1.352	0.122	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.04	0	Left	Cheek	QPSK	1	0	84250	1:1	0.234	1.346	0.315	A11
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	0.05	1	Left	Cheek	QPSK	50	0	84250	1:1	0.176	1.352	0.238	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	0.05	0	Left	Tilt	QPSK	1	0	84250	1:1	0.072	1.346	0.097	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	0.11	1	Left	Tilt	QPSK	50	0	84250	1:1	0.056	1.352	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 25 (PCS) 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)	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	-0.01	0	Right	Cheek	QPSK	1	0	84250	1:1	0.098	1.318	0.129	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	0.03	1	Right	Cheek	QPSK	50	0	84250	1:1	0.084	1.343	0.113	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	-0.06	0	Right	Tilt	QPSK	1	0	84250	1:1	0.080	1.318	0.105	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	0.05	1	Right	Tilt	QPSK	50	0	84250	1:1	0.066	1.343	0.089	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	0.03	0	Left	Cheek	QPSK	1	0	84250	1:1	0.146	1.318	0.192	A12
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	0.02	1	Left	Cheek	QPSK	50	0	84250	1:1	0.119	1.343	0.160	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	0.13	0	Left	Tilt	QPSK	1	0	84250	1:1	0.049	1.318	0.065	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	-0.01	1	Left	Tilt	QPSK	50	0	84250	1:1	0.041	1.343	0.055	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Head 1.6 W/kg (mW/g) averaged over 1 gram			

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Table 11-13
LTE Band 41 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)	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	0.05	0	Right	Cheek	QPSK	1	0	84162	1:1.58	0.062	1.016	0.063	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	-0.08	1	Right	Cheek	QPSK	50	0	84162	1:1.58	0.048	1.040	0.050	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	0.13	0	Right	Tilt	QPSK	1	0	84162	1:1.58	0.055	1.016	0.056	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	-0.02	1	Right	Tilt	QPSK	50	0	84162	1:1.58	0.042	1.040	0.044	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	-0.13	0	Left	Cheek	QPSK	1	0	84162	1:1.58	0.079	1.016	0.080	A13
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	0.02	1	Left	Cheek	QPSK	50	0	84162	1:1.58	0.062	1.040	0.064	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	-0.01	0	Left	Tilt	QPSK	1	0	84162	1:1.58	0.021	1.016	0.021	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	0.13	1	Left	Tilt	QPSK	50	0	84162	1:1.58	0.017	1.040	0.018	
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
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)	
2412	1	802.11b	DSSS	22	15.5	14.98	0.06	Right	Cheek	1	05C3E	1	98.9	0.638	0.482	1.127	1.011	**0.549**	A14
2412	1	802.11b	DSSS	22	15.5	14.98	0.13	Right	Tilt	1	05C3E	1	98.9	0.491	0.354	1.127	1.011	0.403	
2412	1	802.11b	DSSS	22	15.5	14.98	-0.17	Left	Cheek	1	05C3E	1	98.9	0.270	-	1.127	1.011	-	
2412	1	802.11b	DSSS	22	15.5	14.98	0.01	Left	Tilt	1	05C3E	1	98.9	0.181	-	1.127	1.011	-	
2412	1	802.11b	DSSS	22	15.5	15.22	-0.15	Right	Cheek	2	05C3E	1	99.9	0.523	0.473	1.067	1.001	0.505	
2412	1	802.11b	DSSS	22	15.5	15.22	0.06	Right	Tilt	2	05C3E	1	99.9	0.457	0.344	1.067	1.001	0.367	
2412	1	802.11b	DSSS	22	15.5	15.22	0.13	Left	Cheek	2	05C3E	1	99.9	0.159	-	1.067	1.001	-	
2412	1	802.11b	DSSS	22	15.5	15.22	0.15	Left	Tilt	2	05C3E	1	99.9	0.184	-	1.067	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									

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Table 11-15
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	13.14	0.20	Right	Cheek	1	05C3E	29.3	94.0	0.319	-	1.086	1.063	-	
5290	58	802.11ac	OFDM	80	13.5	13.14	0.16	Right	Tilt	1	05C3E	29.3	94.0	0.281	-	1.086	1.063	-	
5290	58	802.11ac	OFDM	80	13.5	13.14	0.15	Left	Cheek	1	05C3E	29.3	94.0	0.594	0.171	1.086	1.063	0.197	
5290	58	802.11ac	OFDM	80	13.5	13.14	0.16	Left	Tilt	1	05C3E	29.3	94.0	0.305	-	1.086	1.063	-	
5290	58	802.11ac	OFDM	80	13.5	13.26	0.12	Right	Cheek	2	04160	29.3	94.1	0.956	0.504	1.057	1.063	0.566	
5290	58	802.11ac	OFDM	80	13.5	13.26	0.12	Right	Tilt	2	04160	29.3	94.1	0.718	0.454	1.057	1.063	0.510	
5290	58	802.11ac	OFDM	80	13.5	13.26	0.12	Left	Cheek	2	04160	29.3	94.1	0.695	-	1.057	1.063	-	
5290	58	802.11ac	OFDM	80	13.5	13.26	0.15	Left	Tilt	2	04160	29.3	94.1	0.445	-	1.057	1.063	-	
5690	138	802.11ac	OFDM	80	13.5	13.27	0.15	Right	Cheek	1	05C3E	29.3	94.0	0.296	-	1.054	1.063	-	
5690	138	802.11ac	OFDM	80	13.5	13.27	0.13	Right	Tilt	1	05C3E	29.3	94.0	0.284	-	1.054	1.063	-	
5690	138	802.11ac	OFDM	80	13.5	13.27	0.12	Left	Cheek	1	05C3E	29.3	94.0	1.085	0.290	1.054	1.063	0.325	
5690	138	802.11ac	OFDM	80	13.5	13.27	0.18	Left	Tilt	1	05C3E	29.3	94.0	0.680	-	1.054	1.063	-	
5610	122	802.11ac	OFDM	80	13.5	13.50	0.15	Right	Cheek	2	04160	29.3	94.1	1.152	0.600	1.000	1.063	0.638	A15
5610	122	802.11ac	OFDM	80	13.5	13.50	0.04	Right	Tilt	2	04160	29.3	94.1	0.904	-	1.000	1.063	-	
5610	122	802.11ac	OFDM	80	13.5	13.50	0.13	Left	Cheek	2	04160	29.3	94.1	0.963	0.593	1.000	1.063	0.630	
5610	122	802.11ac	OFDM	80	13.5	13.50	0.12	Left	Tilt	2	04160	29.3	94.1	0.622	-	1.000	1.063	-	
5775	155	802.11ac	OFDM	80	13.5	13.25	0.17	Right	Cheek	1	05C3E	29.3	94.0	0.273	-	1.059	1.063	-	
5775	155	802.11ac	OFDM	80	13.5	13.25	0.17	Right	Tilt	1	05C3E	29.3	94.0	0.211	-	1.059	1.063	-	
5775	155	802.11ac	OFDM	80	13.5	13.25	0.15	Left	Cheek	1	05C3E	29.3	94.0	0.836	0.216	1.059	1.063	0.243	
5775	155	802.11ac	OFDM	80	13.5	13.25	0.17	Left	Tilt	1	05C3E	29.3	94.0	0.566	-	1.059	1.063	-	
5775	155	802.11ac	OFDM	80	13.5	12.87	0.15	Right	Cheek	2	04160	29.3	94.1	0.762	-	1.156	1.063	-	
5775	155	802.11ac	OFDM	80	13.5	12.87	0.11	Right	Tilt	2	04160	29.3	94.1	0.811	0.521	1.156	1.063	0.640	
5775	155	802.11ac	OFDM	80	13.5	12.87	0.18	Left	Cheek	2	04160	29.3	94.1	0.803	0.507	1.156	1.063	0.623	
5775	155	802.11ac	OFDM	80	13.5	12.87	0.11	Left	Tilt	2	04160	29.3	94.1	0.721	-	1.156	1.063	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram											

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	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	34.0	33.45	-0.03	15 mm	N/A	85F64	1:8.3	back	0.433	1.135	0.491	A16
836.60	4183	UMTS 850	RMC	25.0	24.33	0.01	15 mm	1	8424D	1:1	back	0.385	1.167	0.449	A18
1732.40	1412	UMTS 1750	RMC	24.5	24.00	-0.01	15 mm	N/A	84162	1:1	back	0.452	1.122	0.507	A20
1880.00	661	GSM 1900	GSM	30.5	29.17	-0.03	15 mm	N/A	84102	1:8.3	back	0.383	1.358	0.520	A22
1907.60	9538	UMTS 1900	RMC	24.5	23.77	-0.01	15 mm	N/A	84102	1:1	back	0.403	1.183	0.477	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							

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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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.00	0	N/A	84102	QPSK	1	0	15 mm	back	1:1	0.124	1.222	0.152	A26
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	0.00	1	N/A	84102	QPSK	25	0	15 mm	back	1:1	0.101	1.172	0.118	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.01	0	N/A	98443	QPSK	1	25	15 mm	back	1:1	0.236	1.282	0.303	A28
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	-0.02	1	N/A	98443	QPSK	25	0	15 mm	back	1:1	0.169	1.439	0.243	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.03	0	1	85F64	QPSK	1	0	15 mm	back	1:1	0.381	1.236	0.471	A30
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.05	1	1	85F64	QPSK	25	0	15 mm	back	1:1	0.246	1.358	0.334	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.00	0	N/A	841C3	QPSK	1	0	15 mm	back	1:1	0.292	1.009	0.295	A32
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	-0.12	1	N/A	841C3	QPSK	36	0	15 mm	back	1:1	0.224	1.047	0.235	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	0.01	0	N/A	84162	QPSK	1	0	15 mm	back	1:1	0.490	1.172	0.574	A34
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	-0.03	1	N/A	84162	QPSK	50	25	15 mm	back	1:1	0.393	1.156	0.454	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.02	0	N/A	84102	QPSK	1	0	15 mm	back	1:1	0.499	1.346	**0.672**	A36
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	0.00	1	N/A	84102	QPSK	50	0	15 mm	back	1:1	0.388	1.352	0.525	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	-0.04	0	N/A	84102	QPSK	1	0	15 mm	back	1:1	0.392	1.318	0.517	A38
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	-0.04	1	N/A	84102	QPSK	50	0	15 mm	back	1:1	0.303	1.343	0.407	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	0.09	0	N/A	84162	QPSK	1	0	15 mm	back	1:1.58	0.220	1.016	0.224	A40
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	0.05	1	N/A	84162	QPSK	50	0	15 mm	back	1:1.58	0.172	1.040	0.179	
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 W/kg	SAR (1g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
2437	6	802.11b	DSSS	22	19.5	18.55	0.02	15 mm	1	85F64	1	back	98.9	0.305	0.223	1.245	1.011	**0.281**	A42
2462	11	802.11b	DSSS	22	19.5	19.21	0.10	15 mm	2	85F64	1	back	99.9	0.294	0.204	1.069	1.001	0.218	
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
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 W/kg	SAR (1g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
5280	56	802.11a	OFDM	20	17.5	16.96	0.12	15 mm	1	05C28	6	back	98.6	0.627	0.308	1.132	1.014	**0.354**	A44
5260	52	802.11a	OFDM	20	17.5	17.27	0.17	15 mm	2	05C28	6	back	98.6	0.151	0.075	1.054	1.014	0.080	
5720	144	802.11a	OFDM	20	17.5	17.30	0.07	15 mm	1	05C28	6	back	98.6	0.183	0.102	1.047	1.014	0.108	
5500	100	802.11a	OFDM	20	17.5	17.20	0.07	15 mm	2	05C28	6	back	98.6	0.096	0.055	1.072	1.014	0.060	
5825	165	802.11a	OFDM	20	17.5	17.13	0.13	15 mm	1	05C28	6	back	98.6	0.145	0.080	1.089	1.014	0.088	
5825	165	802.11a	OFDM	20	17.5	16.75	-0.12	15 mm	2	05C28	6	back	98.6	0.108	0.059	1.189	1.014	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											

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11.3 Standalone Hotspot SAR Data

Table 11-20
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	29.6	28.77	-0.02	10 mm	N/A	85F64	4	1:2.076	back	0.579	1.211	0.701	
836.60	190	GSM 850	GPRS	29.6	29.15	-0.01	10 mm	N/A	85F64	4	1:2.076	back	0.768	1.109	0.852	
848.80	251	GSM 850	GPRS	29.6	29.19	-0.02	10 mm	N/A	85F64	4	1:2.076	back	0.774	1.099	0.851	
824.20	128	GSM 850	GPRS	29.6	28.77	0.03	10 mm	N/A	85F64	4	1:2.076	front	0.656	1.211	0.794	
836.60	190	GSM 850	GPRS	29.6	29.15	-0.04	10 mm	N/A	85F64	4	1:2.076	front	0.753	1.109	0.835	
848.80	251	GSM 850	GPRS	29.6	29.19	-0.06	10 mm	N/A	85F64	4	1:2.076	front	0.836	1.099	0.919	
836.60	190	GSM 850	GPRS	29.6	29.15	-0.04	10 mm	N/A	85F64	4	1:2.076	bottom	0.418	1.109	0.464	
836.60	190	GSM 850	GPRS	29.6	29.15	0.15	10 mm	N/A	85F64	4	1:2.076	right	0.328	1.109	0.364	
836.60	190	GSM 850	GPRS	29.6	29.15	0.03	10 mm	N/A	85F64	4	1:2.076	left	0.079	1.109	0.088	
848.80	251	GSM 850	GPRS	29.6	29.19	-0.09	10 mm	N/A	85F64	4	1:2.076	front	0.841	1.099	0.924	A17
836.60	4183	UMTS 850	RMC	25.0	24.33	-0.01	10 mm	1	8424D	N/A	1:1	back	0.575	1.167	0.671	
836.60	4183	UMTS 850	RMC	25.0	24.33	-0.02	10 mm	1	8424D	N/A	1:1	front	0.617	1.167	0.720	A19
836.60	4183	UMTS 850	RMC	25.0	24.33	-0.05	10 mm	1	8424D	N/A	1:1	bottom	0.257	1.167	0.300	
836.60	4183	UMTS 850	RMC	25.0	24.33	0.02	10 mm	1	8424D	N/A	1:1	right	0.300	1.167	0.350	
836.60	4183	UMTS 850	RMC	25.0	24.33	-0.10	10 mm	1	8424D	N/A	1:1	left	0.043	1.167	0.050	
1732.40	1412	UMTS 1750	RMC	21.5	21.17	0.02	10 mm	N/A	841E0	N/A	1:1	back	0.495	1.079	0.534	
1732.40	1412	UMTS 1750	RMC	21.5	21.17	0.01	10 mm	N/A	841E0	N/A	1:1	front	0.475	1.079	0.513	
1732.40	1412	UMTS 1750	RMC	21.5	21.17	0.01	10 mm	N/A	841E0	N/A	1:1	bottom	0.618	1.079	0.667	A21
1732.40	1412	UMTS 1750	RMC	21.5	21.17	-0.01	10 mm	N/A	841E0	N/A	1:1	left	0.335	1.079	0.361	
1909.80	810	GSM 1900	GPRS	26.5	25.56	-0.03	10 mm	N/A	84102	3	1:2.76	back	0.463	1.242	0.575	
1909.80	810	GSM 1900	GPRS	26.5	25.56	0.03	10 mm	N/A	84102	3	1:2.76	front	0.428	1.242	0.532	
1850.20	512	GSM 1900	GPRS	26.5	25.51	-0.06	10 mm	N/A	84102	3	1:2.76	bottom	0.685	1.256	0.860	
1880.00	661	GSM 1900	GPRS	26.5	24.92	0.02	10 mm	N/A	84102	3	1:2.76	bottom	0.696	1.439	1.002	A23
1909.80	810	GSM 1900	GPRS	26.5	25.56	-0.01	10 mm	N/A	84102	3	1:2.76	bottom	0.659	1.242	0.818	
1909.80	810	GSM 1900	GPRS	26.5	25.56	-0.07	10 mm	N/A	84102	3	1:2.76	left	0.099	1.242	0.123	
1907.60	9538	UMTS 1900	RMC	21.5	21.02	0.01	10 mm	N/A	841E0	N/A	1:1	back	0.472	1.117	0.527	
1907.60	9538	UMTS 1900	RMC	21.5	21.02	0.02	10 mm	N/A	841E0	N/A	1:1	front	0.417	1.117	0.466	
1907.60	9538	UMTS 1900	RMC	21.5	21.02	-0.02	10 mm	N/A	841E0	N/A	1:1	bottom	0.693	1.117	0.774	A25
1907.60	9538	UMTS 1900	RMC	21.5	21.02	-0.03	10 mm	N/A	841E0	N/A	1:1	left	0.108	1.117	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				

Blue entry represents variability measurement

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Table 11-21
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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.00	0	84102	QPSK	1	0	10 mm	back	1:1	0.189	1.222	0.231	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	-0.01	1	84102	QPSK	25	0	10 mm	back	1:1	0.149	1.172	0.175	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	-0.06	0	84102	QPSK	1	0	10 mm	front	1:1	0.241	1.222	0.295	A27
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	-0.02	1	84102	QPSK	25	0	10 mm	front	1:1	0.192	1.172	0.225	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.02	0	84102	QPSK	1	0	10 mm	bottom	1:1	0.130	1.222	0.159	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	0.07	1	84102	QPSK	25	0	10 mm	bottom	1:1	0.105	1.172	0.123	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	-0.08	0	84102	QPSK	1	0	10 mm	right	1:1	0.121	1.222	0.148	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	-0.08	1	84102	QPSK	25	0	10 mm	right	1:1	0.096	1.172	0.113	
707.50	23095	Mid	LTE Band 12	10	23.5	22.63	0.20	0	84102	QPSK	1	0	10 mm	left	1:1	0.037	1.222	0.045	
707.50	23095	Mid	LTE Band 12	10	22.5	21.81	-0.03	1	84102	QPSK	25	0	10 mm	left	1:1	0.027	1.172	0.032	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-22
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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.01	0	98443	QPSK	1	25	10 mm	back	1:1	0.345	1.282	0.442	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	-0.01	1	98443	QPSK	25	0	10 mm	back	1:1	0.248	1.439	0.357	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.04	0	98443	QPSK	1	25	10 mm	front	1:1	0.401	1.282	0.514	A29
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	0.06	1	98443	QPSK	25	0	10 mm	front	1:1	0.281	1.439	0.404	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	-0.02	0	98443	QPSK	1	25	10 mm	bottom	1:1	0.200	1.282	0.256	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	-0.02	1	98443	QPSK	25	0	10 mm	bottom	1:1	0.136	1.439	0.196	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	-0.01	0	98443	QPSK	1	25	10 mm	right	1:1	0.156	1.282	0.200	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	0.00	1	98443	QPSK	25	0	10 mm	right	1:1	0.112	1.439	0.161	
782.00	23230	Mid	LTE Band 13	10	23.5	22.42	0.15	0	98443	QPSK	1	25	10 mm	left	1:1	0.060	1.282	0.077	
782.00	23230	Mid	LTE Band 13	10	22.5	20.92	-0.05	1	98443	QPSK	25	0	10 mm	left	1:1	0.039	1.439	0.056	
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 11-23
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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.04	0	1	85F64	QPSK	1	0	10 mm	back	1:1	0.530	1.236	0.655	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	-0.03	1	1	85F64	QPSK	25	0	10 mm	back	1:1	0.391	1.358	0.531	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.05	0	1	85F64	QPSK	1	0	10 mm	front	1:1	0.646	1.236	0.798	A31
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	-0.08	1	1	85F64	QPSK	25	0	10 mm	front	1:1	0.440	1.358	0.598	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.02	0	1	85F64	QPSK	1	0	10 mm	bottom	1:1	0.259	1.236	0.320	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.01	1	1	85F64	QPSK	25	0	10 mm	bottom	1:1	0.254	1.358	0.345	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.06	0	1	85F64	QPSK	1	0	10 mm	right	1:1	0.291	1.236	0.360	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.00	1	1	85F64	QPSK	25	0	10 mm	right	1:1	0.211	1.358	0.287	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.08	-0.15	0	1	85F64	QPSK	1	0	10 mm	left	1:1	0.072	1.236	0.089	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	22.67	0.13	1	1	85F64	QPSK	25	0	10 mm	left	1:1	0.052	1.358	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										

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Table 11-24
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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.13	0	841C3	QPSK	1	0	10 mm	back	1:1	0.418	1.009	0.422	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.03	1	841C3	QPSK	36	0	10 mm	back	1:1	0.349	1.047	0.365	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.02	0	841C3	QPSK	1	0	10 mm	front	1:1	0.443	1.009	0.447	A33
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.09	1	841C3	QPSK	36	0	10 mm	front	1:1	0.362	1.047	0.379	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.04	0	841C3	QPSK	1	0	10 mm	bottom	1:1	0.211	1.009	0.213	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	-0.03	1	841C3	QPSK	36	0	10 mm	bottom	1:1	0.161	1.047	0.169	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.07	0	841C3	QPSK	1	0	10 mm	right	1:1	0.229	1.009	0.231	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	-0.04	1	841C3	QPSK	36	0	10 mm	right	1:1	0.184	1.047	0.193	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.46	0.17	0	841C3	QPSK	1	0	10 mm	left	1:1	0.049	1.009	0.049	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	22.30	0.09	1	841C3	QPSK	36	0	10 mm	left	1:1	0.037	1.047	0.039	
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 4 (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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	-0.05	0	841E0	QPSK	1	50	10 mm	back	1:1	0.556	1.462	0.813	A35
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	-0.03	0	841E0	QPSK	50	0	10 mm	back	1:1	0.555	1.459	0.810	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.84	0.02	0	841E0	QPSK	100	0	10 mm	back	1:1	0.531	1.466	0.778	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	0.03	0	841E0	QPSK	1	50	10 mm	front	1:1	0.348	1.462	0.509	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	0.00	0	841E0	QPSK	50	0	10 mm	front	1:1	0.338	1.459	0.493	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	-0.06	0	841E0	QPSK	1	50	10 mm	bottom	1:1	0.471	1.462	0.689	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	-0.07	0	841E0	QPSK	50	0	10 mm	bottom	1:1	0.459	1.459	0.670	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	-0.04	0	841E0	QPSK	1	50	10 mm	left	1:1	0.355	1.462	0.519	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	0.01	0	841E0	QPSK	50	0	10 mm	left	1:1	0.349	1.459	0.509	
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 2 (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.																			
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	-0.02	0	841E0	QPSK	1	0	10 mm	back	1:1	0.436	1.256	0.548	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	-0.02	0	841E0	QPSK	50	0	10 mm	back	1:1	0.425	1.265	0.538	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	-0.04	0	841E0	QPSK	1	0	10 mm	front	1:1	0.456	1.256	0.573	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	0.06	0	841E0	QPSK	50	0	10 mm	front	1:1	0.455	1.265	0.576	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	0.02	0	841E0	QPSK	1	0	10 mm	bottom	1:1	0.630	1.256	0.791	A37
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	0.03	0	841E0	QPSK	50	0	10 mm	bottom	1:1	0.610	1.265	0.772	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	0.00	0	841E0	QPSK	1	0	10 mm	left	1:1	0.116	1.256	0.146	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	0.00	0	841E0	QPSK	50	0	10 mm	left	1:1	0.108	1.265	0.137	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Body 1.6 W/kg (mW/g) averaged over 1 gram				

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Table 11-27
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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	0.06	0	841E0	QPSK	1	0	10 mm	back	1:1	0.357	1.194	0.426	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	-0.07	0	841E0	QPSK	50	0	10 mm	back	1:1	0.356	1.216	0.433	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	0.01	0	841E0	QPSK	1	0	10 mm	front	1:1	0.380	1.194	0.454	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	0.08	0	841E0	QPSK	50	0	10 mm	front	1:1	0.379	1.216	0.461	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	-0.05	0	841E0	QPSK	1	0	10 mm	bottom	1:1	0.548	1.194	0.654	A39
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	-0.03	0	841E0	QPSK	50	0	10 mm	bottom	1:1	0.536	1.216	0.652	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	0.01	0	841E0	QPSK	1	0	10 mm	left	1:1	0.096	1.194	0.115	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	0.04	0	841E0	QPSK	50	0	10 mm	left	1:1	0.087	1.216	0.106	
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 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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	0.01	0	84162	QPSK	1	0	10 mm	back	1:1.58	0.440	1.016	0.447	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	0.04	1	84162	QPSK	50	0	10 mm	back	1:1.58	0.340	1.040	0.354	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	0.13	0	84162	QPSK	1	0	10 mm	front	1:1.58	0.369	1.016	0.375	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	0.07	1	84162	QPSK	50	0	10 mm	front	1:1.58	0.291	1.040	0.303	
2506.00	39750	Low	LTE Band 41	20	23.5	22.86	-0.20	0	84162	QPSK	1	0	10 mm	bottom	1:1.58	0.553	1.159	0.641	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	-0.07	0	84162	QPSK	1	0	10 mm	bottom	1:1.58	0.775	1.016	0.787	
2593.00	40620	Mid	LTE Band 41	20	23.5	22.50	-0.02	0	84162	QPSK	1	0	10 mm	bottom	1:1.58	0.871	1.259	**1.097**	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	22.39	-0.10	0	84162	QPSK	1	0	10 mm	bottom	1:1.58	0.834	1.291	1.077	
2680.00	41490	High	LTE Band 41	20	23.5	22.90	-0.05	0	84162	QPSK	1	0	10 mm	bottom	1:1.58	0.921	1.148	1.057	
2506.00	39750	Low	LTE Band 41	20	22.5	21.71	-0.03	1	84162	QPSK	50	0	10 mm	bottom	1:1.58	0.443	1.199	0.531	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	-0.01	1	84162	QPSK	50	0	10 mm	bottom	1:1.58	0.626	1.040	0.651	
2593.00	40620	Mid	LTE Band 41	20	22.5	21.54	-0.07	1	84162	QPSK	50	0	10 mm	bottom	1:1.58	0.704	1.247	0.878	
2636.50	41055	Mid-High	LTE Band 41	20	22.5	21.32	-0.05	1	84162	QPSK	50	0	10 mm	bottom	1:1.58	0.670	1.312	0.879	
2680.00	41490	High	LTE Band 41	20	22.5	21.65	0.01	1	84162	QPSK	50	0	10 mm	bottom	1:1.58	0.705	1.216	0.857	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.30	-0.01	1	84162	QPSK	100	0	10 mm	bottom	1:1.58	0.441	1.047	0.462	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.43	0.17	0	84162	QPSK	1	0	10 mm	left	1:1.58	0.215	1.016	0.218	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.33	0.04	1	84162	QPSK	50	0	10 mm	left	1:1.58	0.169	1.040	0.176	
2680.00	41490	High	LTE Band 41	20	23.5	22.90	-0.03	0	84162	QPSK	1	0	10 mm	bottom	1:1.58	0.936	1.148	1.075	A41
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Blue entry represents variability measurement

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Table 11-29
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 W/kg	SAR (1g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
2437	6	802.11b	DSSS	22	19.5	18.55	0.14	10 mm	1	85F64	1	back	98.9	0.853	0.505	1.245	1.011	**0.636**	
2437	6	802.11b	DSSS	22	19.5	18.55	0.10	10 mm	1	85F64	1	front	98.9	0.610	0.428	1.245	1.011	0.539	
2437	6	802.11b	DSSS	22	19.5	18.55	0.02	10 mm	1	85F64	1	top	98.9	0.460	-	1.245	1.011	-	
2437	6	802.11b	DSSS	22	19.5	18.55	0.11	10 mm	1	85F64	1	left	98.9	0.385	-	1.245	1.011	-	
2462	11	802.11b	DSSS	22	19.5	19.21	-0.05	10 mm	2	85F64	1	back	99.9	0.744	0.511	1.069	1.001	0.547	A43
2462	11	802.11b	DSSS	22	19.5	19.21	0.17	10 mm	2	85F64	1	front	99.9	0.290	0.222	1.069	1.001	0.238	
2462	11	802.11b	DSSS	22	19.5	19.21	0.08	10 mm	2	85F64	1	top	99.9	0.294	0.239	1.069	1.001	0.256	
2462	11	802.11b	DSSS	22	19.5	19.21	0.10	10 mm	2	85F64	1	left	99.9	0.272	-	1.069	1.001	-	
2437	6	802.11n	OFDM	20	17.5	16.83	0.15	10 mm	MIMO	85F64	13	back	98.5	0.131	0.102	1.178	1.015	0.122	
2437	6	802.11n	OFDM	20	17.5	16.83	-0.15	10 mm	MIMO	85F64	13	front	98.5	0.080	-	1.178	1.015	-	
2437	6	802.11n	OFDM	20	17.5	16.83	0.13	10 mm	MIMO	85F64	13	top	98.5	0.061	-	1.178	1.015	-	
2437	6	802.11n	OFDM	20	17.5	16.83	0.00	10 mm	MIMO	85F64	13	left	98.5	0.001	-	1.178	1.015	-	
5825	165	802.11a	OFDM	20	17.5	17.13	0.13	10 mm	1	05C28	6	back	98.6	0.255	-	1.089	1.014	-	
5825	165	802.11a	OFDM	20	17.5	17.13	-0.14	10 mm	1	05C28	6	front	98.6	0.259	0.158	1.089	1.014	**0.174**	A45
5825	165	802.11a	OFDM	20	17.5	17.13	0.18	10 mm	1	05C28	6	top	98.6	0.171	-	1.089	1.014	-	
5825	165	802.11a	OFDM	20	17.5	17.13	0.13	10 mm	1	05C28	6	left	98.6	0.075	-	1.089	1.014	-	
5825	165	802.11a	OFDM	20	17.5	16.75	0.18	10 mm	2	05C28	6	back	98.6	0.184	0.088	1.189	1.014	0.106	
5825	165	802.11a	OFDM	20	17.5	16.75	0.15	10 mm	2	05C28	6	front	98.6	0.159	-	1.189	1.014	-	
5825	165	802.11a	OFDM	20	17.5	16.75	0.14	10 mm	2	05C28	6	top	98.6	0.106	-	1.189	1.014	-	
5825	165	802.11a	OFDM	20	17.5	16.75	0.18	10 mm	2	05C28	6	left	98.6	0.049	-	1.189	1.014	-	
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 Standalone Phablet SAR Data

Table 11-30
UMTS Phablet SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.													
1732.40	1412	UMTS 1750	RMC	24.5	24.00	-0.06	7 mm	84162	1:1	back	0.662	1.122	0.743	
1732.40	1412	UMTS 1750	RMC	24.5	24.00	-0.09	5 mm	84162	1:1	front	0.898	1.122	1.008	
1732.40	1412	UMTS 1750	RMC	24.5	24.00	-0.03	9 mm	84162	1:1	bottom	0.701	1.122	0.787	
1732.40	1412	UMTS 1750	RMC	24.5	24.00	-0.01	0 mm	84162	1:1	left	1.020	1.122	1.144	
1732.40	1412	UMTS 1750	RMC	21.5	21.17	0.00	0 mm	841E0	1:1	back	1.540	1.079	1.662	
1732.40	1412	UMTS 1750	RMC	21.5	21.17	0.00	0 mm	841E0	1:1	front	1.570	1.079	1.694	A46
1732.40	1412	UMTS 1750	RMC	21.5	21.17	-0.04	0 mm	841E0	1:1	bottom	1.480	1.079	1.597	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	0.02	7 mm	84102	1:1	back	0.629	1.183	0.744	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	-0.07	5 mm	84102	1:1	front	0.942	1.183	1.114	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	0.00	9 mm	84102	1:1	bottom	0.747	1.183	0.884	
1907.60	9538	UMTS 1900	RMC	24.5	23.77	-0.01	0 mm	84102	1:1	left	0.728	1.183	0.861	
1907.60	9538	UMTS 1900	RMC	21.5	21.02	-0.07	0 mm	841E0	1:1	back	1.150	1.117	1.285	
1907.60	9538	UMTS 1900	RMC	21.5	21.02	0.03	0 mm	841E0	1:1	front	1.280	1.117	1.430	A47
1907.60	9538	UMTS 1900	RMC	21.5	21.02	-0.11	0 mm	841E0	1:1	bottom	0.974	1.117	1.088	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**											**Phablet** **4.0 W/kg (mW/g)** averaged over 10 grams			

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Table 11-31
LTE Phablet 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 (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																			
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	-0.03	0	84162	QPSK	1	0	7 mm	back	1:1	0.698	1.172	0.818	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	-0.01	1	84162	QPSK	50	25	7 mm	back	1:1	0.554	1.156	0.640	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	-0.08	0	84162	QPSK	1	0	5 mm	front	1:1	0.910	1.172	1.067	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	-0.06	1	84162	QPSK	50	25	5 mm	front	1:1	0.716	1.156	0.828	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	0.00	0	84162	QPSK	1	0	9 mm	bottom	1:1	0.744	1.172	0.872	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	0.00	1	84162	QPSK	50	25	9 mm	bottom	1:1	0.600	1.156	0.694	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.81	-0.01	0	84162	QPSK	1	0	0 mm	left	1:1	1.080	1.172	1.266	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.87	-0.02	1	84162	QPSK	50	25	0 mm	left	1:1	0.867	1.156	1.002	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	-0.04	0	841E0	QPSK	1	50	0 mm	back	1:1	1.700	1.462	2.485	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	-0.12	0	841E0	QPSK	50	0	0 mm	back	1:1	1.770	1.459	2.582	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.84	0.05	0	841E0	QPSK	100	0	0 mm	back	1:1	1.760	1.466	2.580	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	0.00	0	841E0	QPSK	1	50	0 mm	front	1:1	1.910	1.462	**2.792**	A48
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	0.08	0	841E0	QPSK	50	0	0 mm	front	1:1	1.770	1.459	2.582	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.84	-0.03	0	841E0	QPSK	100	0	0 mm	front	1:1	1.750	1.466	2.566	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.85	-0.14	0	841E0	QPSK	1	50	0 mm	bottom	1:1	1.760	1.462	2.573	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.86	-0.09	0	841E0	QPSK	50	0	0 mm	bottom	1:1	1.800	1.459	2.626	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	21.5	19.84	-0.04	0	841E0	QPSK	100	0	0 mm	bottom	1:1	1.770	1.466	2.595	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.02	0	84102	QPSK	1	0	7 mm	back	1:1	0.715	1.346	0.962	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	-0.04	1	84102	QPSK	50	0	7 mm	back	1:1	0.554	1.352	0.749	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.07	0	84102	QPSK	1	0	5 mm	front	1:1	0.886	1.346	1.193	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	0.01	1	84102	QPSK	50	0	5 mm	front	1:1	0.689	1.352	0.932	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.03	0	84102	QPSK	1	0	9 mm	bottom	1:1	0.732	1.346	0.985	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	-0.04	1	84102	QPSK	50	0	9 mm	bottom	1:1	0.578	1.352	0.781	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.5	23.21	-0.01	0	84102	QPSK	1	0	0 mm	left	1:1	0.790	1.346	1.063	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.5	22.19	-0.04	1	84102	QPSK	50	0	0 mm	left	1:1	0.590	1.352	0.798	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	0.05	0	841E0	QPSK	1	0	0 mm	back	1:1	1.100	1.256	1.382	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	0.08	0	841E0	QPSK	50	0	0 mm	back	1:1	1.090	1.265	1.379	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	0.09	0	841E0	QPSK	1	0	0 mm	front	1:1	1.110	1.256	1.394	A49
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	0.09	0	841E0	QPSK	50	0	0 mm	front	1:1	1.080	1.265	1.366	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.51	-0.02	0	841E0	QPSK	1	0	0 mm	bottom	1:1	0.903	1.256	1.134	
1900.00	19100	High	LTE Band 2 (PCS)	20	21.5	20.48	-0.07	0	841E0	QPSK	50	0	0 mm	bottom	1:1	0.901	1.265	1.140	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	-0.04	0	84102	QPSK	1	0	7 mm	back	1:1	0.559	1.318	0.737	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	-0.01	1	84102	QPSK	50	0	7mm	back	1:1	0.439	1.343	0.590	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	-0.02	0	84102	QPSK	1	0	5 mm	front	1:1	0.743	1.318	0.979	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	0.01	1	84102	QPSK	50	0	5 mm	front	1:1	0.576	1.343	0.774	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	0.00	0	84102	QPSK	1	0	9 mm	bottom	1:1	0.633	1.318	0.834	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	-0.03	1	84102	QPSK	50	0	9 mm	bottom	1:1	0.475	1.343	0.638	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.30	0.06	0	84102	QPSK	1	0	0 mm	left	1:1	0.565	1.318	0.745	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.22	-0.06	1	84102	QPSK	50	0	0 mm	left	1:1	0.445	1.343	0.598	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	0.08	0	841E0	QPSK	1	0	0 mm	back	1:1	0.928	1.194	1.108	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	-0.02	0	841E0	QPSK	50	0	0 mm	back	1:1	0.909	1.216	1.105	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	-0.04	0	841E0	QPSK	1	0	0 mm	front	1:1	0.929	1.194	1.109	A50
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	0.08	0	841E0	QPSK	50	0	0 mm	front	1:1	0.915	1.216	1.113	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.73	0.03	0	841E0	QPSK	1	0	0 mm	bottom	1:1	0.760	1.194	0.907	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.5	19.65	-0.06	0	841E0	QPSK	50	0	0 mm	bottom	1:1	0.737	1.216	0.896	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Phablet 4.0 W/kg (mW/g) averaged over 10 grams			

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Table 11-32
WLAN Phablet 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 (10g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5280	56	802.11a	OFDM	20	17.5	16.96	0.03	0 mm	1	05C28	6	back	98.6	29.092	1.670	1.132	1.014	1.917	A51
5280	56	802.11a	OFDM	20	17.5	16.96	-0.12	0 mm	1	05C28	6	front	98.6	2.128	0.349	1.132	1.014	0.401	
5280	56	802.11a	OFDM	20	17.5	16.96	0.19	0 mm	1	05C28	6	top	98.6	1.582	-	1.132	1.014	-	
5280	56	802.11a	OFDM	20	17.5	16.96	0.15	0 mm	1	05C28	6	left	98.6	2.063	-	1.132	1.014	-	
5260	52	802.11a	OFDM	20	17.5	17.27	0.06	0 mm	2	05C28	6	back	98.6	4.888	0.686	1.054	1.014	0.733	
5260	52	802.11a	OFDM	20	17.5	17.27	-0.11	0 mm	2	05C28	6	front	98.6	2.771	-	1.054	1.014	-	
5260	52	802.11a	OFDM	20	17.5	17.27	0.13	0 mm	2	05C28	6	top	98.6	1.541	-	1.054	1.014	-	
5260	52	802.11a	OFDM	20	17.5	17.27	0.14	0 mm	2	05C28	6	left	98.6	0.896	-	1.054	1.014	-	
5300	60	802.11n	OFDM	20	17.5	16.86	0.06	0 mm	MIMO	05C28	13	back	98.6	18.466	0.957	1.202	1.014	1.166	
5300	60	802.11n	OFDM	20	17.5	16.86	0.11	0 mm	MIMO	05C28	13	front	98.6	2.142	0.262	1.202	1.014	0.319	
5300	60	802.11n	OFDM	20	17.5	16.86	0.13	0 mm	MIMO	05C28	13	top	98.6	0.645	-	1.202	1.014	-	
5300	60	802.11n	OFDM	20	17.5	16.86	0.13	0 mm	MIMO	05C28	13	left	98.6	0.857	-	1.202	1.014	-	
5720	144	802.11a	OFDM	20	17.5	17.30	-0.02	0 mm	1	05C28	6	back	98.6	15.955	0.922	1.047	1.014	0.979	
5720	144	802.11a	OFDM	20	17.5	17.30	-0.06	0 mm	1	05C28	6	front	98.6	3.554	-	1.047	1.014	-	
5720	144	802.11a	OFDM	20	17.5	17.30	0.15	0 mm	1	05C28	6	top	98.6	2.265	-	1.047	1.014	-	
5720	144	802.11a	OFDM	20	17.5	17.30	0.13	0 mm	1	05C28	6	left	98.6	0.827	-	1.047	1.014	-	
5500	100	802.11a	OFDM	20	17.5	17.20	0.12	0 mm	2	05C28	6	back	98.6	5.165	0.805	1.072	1.014	0.875	
5500	100	802.11a	OFDM	20	17.5	17.20	0.13	0 mm	2	05C28	6	front	98.6	3.127	-	1.072	1.014	-	
5500	100	802.11a	OFDM	20	17.5	17.20	0.14	0 mm	2	05C28	6	top	98.6	1.244	-	1.072	1.014	-	
5500	100	802.11a	OFDM	20	17.5	17.20	0.14	0 mm	2	05C28	6	left	98.6	0.243	-	1.072	1.014	-	
5600	120	802.11n	OFDM	20	17.5	17.26	0.03	0 mm	MIMO	05C28	13	back	98.6	5.792	0.491	1.067	1.014	0.531	
5600	120	802.11n	OFDM	20	17.5	17.26	0.12	0 mm	MIMO	05C28	13	front	98.6	1.943	-	1.067	1.014	-	
5600	120	802.11n	OFDM	20	17.5	17.26	0.16	0 mm	MIMO	05C28	13	top	98.6	0.747	-	1.067	1.014	-	
5600	120	802.11n	OFDM	20	17.5	17.26	-0.20	0 mm	MIMO	05C28	13	left	98.6	0.482	-	1.067	1.014	-	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT	Phablet
Spatial Peak	4.0 W/kg (mW/g)
Uncontrolled Exposure/General Population	averaged over 10 grams

11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, 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 for 1g SAR and 2.0 W/kg for 10g SAR. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.

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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. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.
11. This device utilizes power reduction for some wireless modes and technologies, as outlined in Section 1.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.
12. 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.

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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.

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, MIMO SAR for 2.4 GHz Hotspot and 5 GHz Phablet exposure conditions were measured with both antennas transmitting simultaneously at the specified maximum output power in MIMO mode following the initial test configuration procedures. MIMO SAR for other bands/exposure conditions was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06. 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. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.
7. 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.
8. This device supports MIMO operations for IEEE 802.11a/g using Cyclic Delay Diversity (CDD) only. Antenna 1 and Antenna 2 will never transmit at the same time while operating in CDD mode (switched transmission only). Since IEEE 802.11n/ac MIMO modes additionally support Spatial Diversity Multiplexing, only IEEE 802.11n/ac modes were considered for MIMO SAR.

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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.

When standalone SAR is not required to be measured, per FCC KDB 447498 D01v06 4.3.2 b), the following equations must be used to estimate the standalone 1g and 10g SAR, respectively, for simultaneous transmission assessment involving that transmitter.

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

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)	Separation Distance (Phablet)	Estimated SAR (Phablet)
	[MHz]	[dBm]	[mm]	[W/kg]	[mm]	[W/kg]
Bluetooth	2480	11.50	15	0.196	5	0.235

Note: Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

(*) For test positions that were not required to be evaluated for WLAN SAR per FCC KDB Publication 248227, the worst case WLAN SAR result for the exposure was used for simultaneous transmission analysis.

Per FCC KDB Publication 648474 D04 Handset SAR v01r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR (“-“)

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12.3 Head SAR Simultaneous Transmission Analysis

Table 12-2
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	0.229	0.549	0.505	0.778	0.734	1.283
	UMTS 850	0.191	0.549	0.505	0.740	0.696	1.245
	UMTS 1750	0.340	0.549	0.505	0.889	0.845	1.394
	GSM 1900	0.122	0.549	0.505	0.671	0.627	1.176
	UMTS 1900	0.270	0.549	0.505	0.819	0.775	1.324
	LTE Band 12	0.078	0.549	0.505	0.627	0.583	1.132
	LTE Band 13	0.114	0.549	0.505	0.663	0.619	1.168
	LTE Band 5 (Cell)	0.203	0.549	0.505	0.752	0.708	1.257
	LTE Band 26 (Cell)	0.128	0.549	0.505	0.677	0.633	1.182
	LTE Band 4 (AWS)	0.393	0.549	0.505	0.942	0.898	**1.447**
	LTE Band 2 (PCS)	0.315	0.549	0.505	0.864	0.820	1.369
	LTE Band 25 (PCS)	0.192	0.549	0.505	0.741	0.697	1.246
	LTE Band 41	0.080	0.549	0.505	0.629	0.585	1.134

Table 12-3
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	0.229	0.325	0.640	0.554	0.869	1.194
	UMTS 850	0.191	0.325	0.640	0.516	0.831	1.156
	UMTS 1750	0.340	0.325	0.640	0.665	0.980	1.305
	GSM 1900	0.122	0.325	0.640	0.447	0.762	1.087
	UMTS 1900	0.270	0.325	0.640	0.595	0.910	1.235
	LTE Band 12	0.078	0.325	0.640	0.403	0.718	1.043
	LTE Band 13	0.114	0.325	0.640	0.439	0.754	1.079
	LTE Band 5 (Cell)	0.203	0.325	0.640	0.528	0.843	1.168
	LTE Band 26 (Cell)	0.128	0.325	0.640	0.453	0.768	1.093
	LTE Band 4 (AWS)	0.393	0.325	0.640	0.718	1.033	**1.358**
	LTE Band 2 (PCS)	0.315	0.325	0.640	0.640	0.955	1.280
	LTE Band 25 (PCS)	0.192	0.325	0.640	0.517	0.832	1.157
	LTE Band 41	0.080	0.325	0.640	0.405	0.720	1.045

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Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz Ant 1 and 5 GHz Ant 2 WLAN (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	GSM 850	0.229	0.549	0.640	1.418
	UMTS 850	0.191	0.549	0.640	1.380
	UMTS 1750	0.340	0.549	0.640	1.529
	GSM 1900	0.122	0.549	0.640	1.311
	UMTS 1900	0.270	0.549	0.640	1.459
	LTE Band 12	0.078	0.549	0.640	1.267
	LTE Band 13	0.114	0.549	0.640	1.303
	LTE Band 5 (Cell)	0.203	0.549	0.640	1.392
	LTE Band 26 (Cell)	0.128	0.549	0.640	1.317
	LTE Band 4 (AWS)	0.393	0.549	0.640	**1.582**
	LTE Band 2 (PCS)	0.315	0.549	0.640	1.504
	LTE Band 25 (PCS)	0.192	0.549	0.640	1.381
	LTE Band 41	0.080	0.549	0.640	1.269

Table 12-5
Simultaneous Transmission Scenario with 2.4 GHz Ant 2 and 5 GHz Ant 1 WLAN (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	GSM 850	0.229	0.505	0.325	1.059
	UMTS 850	0.191	0.505	0.325	1.021
	UMTS 1750	0.340	0.505	0.325	1.170
	GSM 1900	0.122	0.505	0.325	0.952
	UMTS 1900	0.270	0.505	0.325	1.100
	LTE Band 12	0.078	0.505	0.325	0.908
	LTE Band 13	0.114	0.505	0.325	0.944
	LTE Band 5 (Cell)	0.203	0.505	0.325	1.033
	LTE Band 26 (Cell)	0.128	0.505	0.325	0.958
	LTE Band 4 (AWS)	0.393	0.505	0.325	**1.223**
	LTE Band 2 (PCS)	0.315	0.505	0.325	1.145
	LTE Band 25 (PCS)	0.192	0.505	0.325	1.022
	LTE Band 41	0.080	0.505	0.325	0.910

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12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-6
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	0.491	0.281	0.218	0.772	0.709	0.990
	UMTS 850	0.449	0.281	0.218	0.730	0.667	0.948
	UMTS 1750	0.507	0.281	0.218	0.788	0.725	1.006
	GSM 1900	0.520	0.281	0.218	0.801	0.738	1.019
	UMTS 1900	0.477	0.281	0.218	0.758	0.695	0.976
	LTE Band 12	0.152	0.281	0.218	0.433	0.370	0.651
	LTE Band 13	0.303	0.281	0.218	0.584	0.521	0.802
	LTE Band 5 (Cell)	0.471	0.281	0.218	0.752	0.689	0.970
	LTE Band 26 (Cell)	0.295	0.281	0.218	0.576	0.513	0.794
	LTE Band 4 (AWS)	0.574	0.281	0.218	0.855	0.792	1.073
	LTE Band 2 (PCS)	0.672	0.281	0.218	0.953	0.890	**1.171**
	LTE Band 25 (PCS)	0.517	0.281	0.218	0.798	0.735	1.016
	LTE Band 41	0.224	0.281	0.218	0.505	0.442	0.723

Table 12-7
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	0.491	0.354	0.080	0.845	0.571	0.925
	UMTS 850	0.449	0.354	0.080	0.803	0.529	0.883
	UMTS 1750	0.507	0.354	0.080	0.861	0.587	0.941
	GSM 1900	0.520	0.354	0.080	0.874	0.600	0.954
	UMTS 1900	0.477	0.354	0.080	0.831	0.557	0.911
	LTE Band 12	0.152	0.354	0.080	0.506	0.232	0.586
	LTE Band 13	0.303	0.354	0.080	0.657	0.383	0.737
	LTE Band 5 (Cell)	0.471	0.354	0.080	0.825	0.551	0.905
	LTE Band 26 (Cell)	0.295	0.354	0.080	0.649	0.375	0.729
	LTE Band 4 (AWS)	0.574	0.354	0.080	0.928	0.654	1.008
	LTE Band 2 (PCS)	0.672	0.354	0.080	1.026	0.752	**1.106**
	LTE Band 25 (PCS)	0.517	0.354	0.080	0.871	0.597	0.951
	LTE Band 41	0.224	0.354	0.080	0.578	0.304	0.658

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Table 12-8
Simultaneous Transmission Scenario with 2.4 GHz Ant 1 and 5 GHz Ant 2 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)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body-Worn	GSM 850	0.491	0.281	0.080	0.852
	UMTS 850	0.449	0.281	0.080	0.810
	UMTS 1750	0.507	0.281	0.080	0.868
	GSM 1900	0.520	0.281	0.080	0.881
	UMTS 1900	0.477	0.281	0.080	0.838
	LTE Band 12	0.152	0.281	0.080	0.513
	LTE Band 13	0.303	0.281	0.080	0.664
	LTE Band 5 (Cell)	0.471	0.281	0.080	0.832
	LTE Band 26 (Cell)	0.295	0.281	0.080	0.656
	LTE Band 4 (AWS)	0.574	0.281	0.080	0.935
	LTE Band 2 (PCS)	0.672	0.281	0.080	**1.033**
	LTE Band 25 (PCS)	0.517	0.281	0.080	0.878
	LTE Band 41	0.224	0.281	0.080	0.585

Table 12-9
Simultaneous Transmission Scenario with 2.4 GHz Ant 2 and 5 GHz Ant 1 WLAN (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body-Worn	GSM 850	0.491	0.218	0.354	1.063
	UMTS 850	0.449	0.218	0.354	1.021
	UMTS 1750	0.507	0.218	0.354	1.079
	GSM 1900	0.520	0.218	0.354	1.092
	UMTS 1900	0.477	0.218	0.354	1.049
	LTE Band 12	0.152	0.218	0.354	0.724
	LTE Band 13	0.303	0.218	0.354	0.875
	LTE Band 5 (Cell)	0.471	0.218	0.354	1.043
	LTE Band 26 (Cell)	0.295	0.218	0.354	0.867
	LTE Band 4 (AWS)	0.574	0.218	0.354	1.146
	LTE Band 2 (PCS)	0.672	0.218	0.354	**1.244**
	LTE Band 25 (PCS)	0.517	0.218	0.354	1.089
	LTE Band 41	0.224	0.218	0.354	0.796

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Table 12-10
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	0.491	0.196	0.687
	UMTS 850	0.449	0.196	0.645
	UMTS 1750	0.507	0.196	0.703
	GSM 1900	0.520	0.196	0.716
	UMTS 1900	0.477	0.196	0.673
	LTE Band 12	0.152	0.196	0.348
	LTE Band 13	0.303	0.196	0.499
	LTE Band 5 (Cell)	0.471	0.196	0.667
	LTE Band 26 (Cell)	0.295	0.196	0.491
	LTE Band 4 (AWS)	0.574	0.196	0.770
	LTE Band 2 (PCS)	0.672	0.196	**0.868**
	LTE Band 25 (PCS)	0.517	0.196	0.713
	LTE Band 41	0.224	0.196	0.420

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

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12.5 Hotspot SAR Simultaneous Transmission Analysis

Table 12-11
Simultaneous Transmission Scenario with 2.4 GHz WLAN (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
Hotspot SAR	GPRS 850	0.924	0.636	0.547	**1.560**	1.471
	UMTS 850	0.720	0.636	0.547	1.356	1.267
	UMTS 1750	0.667	0.636	0.547	1.303	1.214
	GPRS 1900	1.002	0.636	0.547	See Table 12-12	1.549
	UMTS 1900	0.774	0.636	0.547	1.410	1.321
	LTE Band 12	0.295	0.636	0.547	0.931	0.842
	LTE Band 13	0.514	0.636	0.547	1.150	1.061
	LTE Band 5 (Cell)	0.798	0.636	0.547	1.434	1.345
	LTE Band 26 (Cell)	0.447	0.636	0.547	1.083	0.994
	LTE Band 4 (AWS)	0.813	0.636	0.547	1.449	1.360
	LTE Band 2 (PCS)	0.791	0.636	0.547	1.427	1.338
	LTE Band 25 (PCS)	0.654	0.636	0.547	1.290	1.201
	LTE Band 41	1.097	0.636	0.547	See Table 12-12	See Table 12-12

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.924	0.122	1.046
	UMTS 850	0.720	0.122	0.842
	UMTS 1750	0.667	0.122	0.789
	GPRS 1900	1.002	0.122	1.124
	UMTS 1900	0.774	0.122	0.896
	LTE Band 12	0.295	0.122	0.417
	LTE Band 13	0.514	0.122	0.636
	LTE Band 5 (Cell)	0.798	0.122	0.920
	LTE Band 26 (Cell)	0.447	0.122	0.569
	LTE Band 4 (AWS)	0.813	0.122	0.935
	LTE Band 2 (PCS)	0.791	0.122	0.913
	LTE Band 25 (PCS)	0.654	0.122	0.776
	LTE Band 41	1.097	0.122	**1.219**

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

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	Back	0.575	0.636	1.211
	Front	0.532	0.539	1.071
	Top	-	0.636*	0.636
	Bottom	1.002	-	1.002
	Left	0.123	0.636*	0.759

Simult Tx	Configuration	LTE Band 41 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
Hotspot SAR	Back	0.447	0.636	0.547	1.083	0.994
	Front	0.375	0.539	0.238	0.914	0.613
	Top	-	0.636*	0.256	0.636	0.256
	Bottom	1.097	-	-	1.097	1.097
	Left	0.218	0.636*	0.547*	0.854	0.765

Table 12-13
Simultaneous Transmission Scenario with 5 GHz WLAN (Hotspot at 1.0 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
Hotspot SAR	GPRS 850	0.924	0.174	0.106	1.098	1.030	1.204
	UMTS 850	0.720	0.174	0.106	0.894	0.826	1.000
	UMTS 1750	0.667	0.174	0.106	0.841	0.773	0.947
	GPRS 1900	1.002	0.174	0.106	1.176	1.108	1.282
	UMTS 1900	0.774	0.174	0.106	0.948	0.880	1.054
	LTE Band 12	0.295	0.174	0.106	0.469	0.401	0.575
	LTE Band 13	0.514	0.174	0.106	0.688	0.620	0.794
	LTE Band 5 (Cell)	0.798	0.174	0.106	0.972	0.904	1.078
	LTE Band 26 (Cell)	0.447	0.174	0.106	0.621	0.553	0.727
	LTE Band 4 (AWS)	0.813	0.174	0.106	0.987	0.919	1.093
	LTE Band 2 (PCS)	0.791	0.174	0.106	0.965	0.897	1.071
	LTE Band 25 (PCS)	0.654	0.174	0.106	0.828	0.760	0.934
	LTE Band 41	1.097	0.174	0.106	1.271	1.203	**1.377**

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Table 12-14
Simultaneous Transmission Scenario with 2.4 GHz Ant 1 and 5 GHz Ant 2 WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.924	0.636	0.106	See Table 12-15
	UMTS 850	0.720	0.636	0.106	1.462
	UMTS 1750	0.667	0.636	0.106	1.409
	GPRS 1900	1.002	0.636	0.106	See Table 12-15
	UMTS 1900	0.774	0.636	0.106	1.516
	LTE Band 12	0.295	0.636	0.106	1.037
	LTE Band 13	0.514	0.636	0.106	1.256
	LTE Band 5 (Cell)	0.798	0.636	0.106	1.540
	LTE Band 26 (Cell)	0.447	0.636	0.106	1.189
	LTE Band 4 (AWS)	0.813	0.636	0.106	**1.555**
	LTE Band 2 (PCS)	0.791	0.636	0.106	1.533
	LTE Band 25 (PCS)	0.654	0.636	0.106	1.396
	LTE Band 41	1.097	0.636	0.106	See Table 12-15

Table 12-15
Simultaneous Transmission Scenario with 2.4 GHz Ant 1 and 5 GHz Ant 2 WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.852	0.636	0.106	**1.594**
	Front	0.924	0.539	0.106*	1.569
	Top	-	0.636*	0.106*	0.742
	Bottom	0.464	-	-	0.464
	Right	0.364	-	-	0.364
	Left	0.088	0.636*	0.106*	0.830

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.575	0.636	0.106	**1.317**
	Front	0.532	0.539	0.106*	1.177
	Top	-	0.636*	0.106*	0.742
	Bottom	1.002	-	-	1.002
	Left	0.123	0.636*	0.106*	0.865

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.447	0.636	0.106	**1.189**
	Front	0.375	0.539	0.106*	1.020
	Top	-	0.636*	0.106*	0.742
	Bottom	1.097	-	-	1.097
	Left	0.218	0.636*	0.106*	0.960

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Table 12-16
Simultaneous Transmission Scenario with 2.4 GHz Ant 2 and 5 GHz Ant 1 WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.924	0.547	0.174	See Table 12-17
	UMTS 850	0.720	0.547	0.174	1.441
	UMTS 1750	0.667	0.547	0.174	1.388
	GPRS 1900	1.002	0.547	0.174	See Table 12-17
	UMTS 1900	0.774	0.547	0.174	1.495
	LTE Band 12	0.295	0.547	0.174	1.016
	LTE Band 13	0.514	0.547	0.174	1.235
	LTE Band 5 (Cell)	0.798	0.547	0.174	1.519
	LTE Band 26 (Cell)	0.447	0.547	0.174	1.168
	LTE Band 4 (AWS)	0.813	0.547	0.174	**1.534**
	LTE Band 2 (PCS)	0.791	0.547	0.174	1.512
	LTE Band 25 (PCS)	0.654	0.547	0.174	1.375
	LTE Band 41	1.097	0.547	0.174	See Table 12-17

Table 12-17
Simultaneous Transmission Scenario with 2.4 GHz Ant 2 and 5 GHz Ant 1 WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.852	0.547	0.174*	**1.573**
	Front	0.924	0.238	0.174	1.336
	Top	-	0.256	0.174*	0.430
	Bottom	0.464	-	-	0.464
	Right	0.364	-	-	0.364
	Left	0.088	0.547*	0.174*	0.809
Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.575	0.547	0.174*	**1.296**
	Front	0.532	0.238	0.174	0.944
	Top	-	0.256	0.174*	0.430
	Bottom	1.002	-	-	1.002
	Left	0.123	0.547*	0.174*	0.844
Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.447	0.547	0.174*	**1.168**
	Front	0.375	0.238	0.174	0.787
	Top	-	0.256	0.174*	0.430
	Bottom	1.097	-	-	1.097
	Left	0.218	0.547*	0.174*	0.939

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12.6 Phablet SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required if wireless router 1g SAR (scaled to the maximum output power, including tolerance) < 1.2 W/kg. Therefore no further analysis was required to for 2.4Ghz WLAN Phablet Simultaneous Transmission Analysis.

Table 12-18
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 1

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2			1	2	1+2
Phablet SAR	Back	1.662	1.917	**3.579**	Phablet SAR	Back	1.285	1.917	**3.202**
	Front	1.694	0.401	2.095		Front	1.430	0.401	1.831
	Top	-	1.917*	1.917		Top	-	1.917*	1.917
	Bottom	1.597	-	1.597		Bottom	1.088	-	1.088
	Left	1.144	1.917*	3.061		Left	0.861	1.917*	2.778

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Phablet SAR	Back	2.582	1.917	See Note 1	0.07
	Front	2.792	0.401	**3.193**	N/A
	Top	-	1.917*	1.917	N/A
	Bottom	2.626	-	2.626	N/A
	Left	1.266	1.917*	3.183	N/A

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.382	1.917	**3.299**
	Front	1.394	0.401	1.795
	Top	-	1.917*	1.917
	Bottom	1.140	-	1.140
	Left	1.063	1.917*	2.980

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.108	1.917	**3.025**
	Front	1.113	0.401	1.514
	Top	-	1.917*	1.917
	Bottom	0.907	-	0.907
	Left	0.745	1.917*	2.662

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Table 12-19
Simultaneous Transmission Scenario - 5 GHz WLAN Ant 2

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	UMTS 1750	1.694	0.875	2.569
	UMTS 1900	1.430	0.875	2.305
	LTE Band 4 (AWS)	2.792	0.875	**3.667**
	LTE Band 2 (PCS)	1.394	0.875	2.269
	LTE Band 25 (PCS)	1.113	0.875	1.988

Table 12-20
Simultaneous Transmission Scenario - 5 GHz WLAN MIMO

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	UMTS 1750	1.694	1.166	2.860
	UMTS 1900	1.430	1.166	2.596
	LTE Band 4 (AWS)	2.792	1.166	**3.958**
	LTE Band 2 (PCS)	1.394	1.166	2.560
	LTE Band 25 (PCS)	1.113	1.166	2.279

Table 12-21
Simultaneous Transmission Scenario - Bluetooth

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	UMTS 1750	1.694	0.235	1.929
	UMTS 1900	1.430	0.235	1.665
	LTE Band 4 (AWS)	2.792	0.235	**3.027**
	LTE Band 2 (PCS)	1.394	0.235	1.629
	LTE Band 25 (PCS)	1.113	0.235	1.348

Notes:
1. No evaluation was performed to determine the aggregate 10g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.10 per FCC KDB 447498 D01v06. See Section 12.7 for detailed SPLS ratio analysis.
2. For SAR summation, the highest reported SAR across all test distances was used as the most conservative evaluation for simultaneous transmission analysis for each device edge.

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12.7 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v06, when the sum of the standalone transmitters is more than 4 W/kg for 10g, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is

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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
5) When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
835	848.80	251	GSM 850	GPRS	4	front	10 mm	0.836	0.841	1.01	N/A	N/A	N/A	N/A
2600	2680.00	41490	LTE Band 41, 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	N/A	bottom	10 mm	0.921	0.936	1.02	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram						

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for 1g and <3.75 W/kg for 10g for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

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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 SAR Data

Supplemental Head SAR Data				Supplemental Body SAR Data			
LTE Band 5		UMTS 850		LTE Band 5		UMTS 850	
QPSK, 10MHz Bandwidth, 1 RB, 0 RB Offset		RMC		QPSK, 10MHz Bandwidth, 1 RB, 0 RB Offset		RMC	
Test Position	Right Cheek	Test Position	Right Cheek	Test Position	Front Side	Test Position	Front Side
				Spacing	10 mm	Spacing	10 mm
Frequency (MHz)	836.5	Frequency (MHz)	836.6	Frequency (MHz)	836.5	Frequency (MHz)	836.6
Channel	20525	Channel	4183	Channel	20525	Channel	4183
Measured 1g SAR (W/kg)	0.164	Measured 1g SAR (W/kg)	0.164	Measured 1g SAR (W/kg)	0.646	Measured 1g SAR (W/kg)	0.617
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 1)	0.223	Auto-tune (State 1)	0.250	Auto-tune (State 1)	0.896	Auto-tune (State 1)	0.810
Default (State 1)	0.223	Default (State 1)	0.245	Default (State 1)	0.896	Default (State 1)	0.792
State 1	0.223	State 2	0.246	State 2	0.895	State 3	0.792
State 5	0.135	State 6	0.156	State 4	0.865	State 7	0.642
State 9	0.220	State 10	0.254	State 8	0.862	State 11	0.682
State 13	0.085	State 12	0.158	State 12	0.882	State 15	0.794
State 19	0.151	State 14	0.094	State 16	0.900	State 17	0.793
State 21	0.156	State 18	0.245	State 20	0.887	State 21	0.656
State 25	0.221	State 22	0.094	State 24	0.883	State 23	0.581

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15 EQUIPMENT LIST

Equipment List for Test Period 05/26/16 – 06/06/16

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8753E	(30kHz-6GHz) Network Analyzer	3/2/2016	Annual	3/2/2017	JP38020182
Agilent	8753ES	S-Parameter Network Analyzer	11/4/2015	Annual	11/4/2016	US39170118
Agilent	E4432B	ESG-D Series Signal Generator	3/5/2016	Annual	3/5/2017	US40053896
Agilent	E4438C	ESG Vector Signal Generator	3/13/2015	Biennial	3/13/2017	MY42082659
Agilent	E5515C	Wireless Communications Test Set	11/4/2014	Biennial	11/4/2016	GB43193563
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/2/2016	Annual	3/2/2017	MY45470194
Agilent	N5182A	MXG Vector Signal Generator	3/5/2016	Annual	3/5/2017	MY47420800
Agilent	N9020A	MXA Signal Analyzer	11/5/2015	Annual	11/5/2016	US46470561
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433978
Anritsu	MA24106A	USB Power Sensor	3/4/2016	Annual	3/4/2017	1344557
Anritsu	MA24106A	USB Power Sensor	3/28/2016	Annual	3/28/2017	1344554
Anritsu	MA2411B	Pulse Power Sensor	12/7/2015	Annual	12/7/2016	1339018
Anritsu	MA2411B	Pulse Power Sensor	2/28/2016	Annual	2/28/2017	1207470
Anritsu	MA2481A	Power Sensor	3/3/2016	Annual	3/3/2017	5318
Anritsu	MA2481A	Power Sensor	3/3/2016	Annual	3/3/2017	2400
Anritsu	ML2438A	Power Meter	3/3/2016	Annual	3/3/2017	1070030
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	1039008
Anritsu	ML2496A	Power Meter	2/28/2016	Annual	2/28/2017	1306009
Anritsu	ML2496A	Power Meter	3/5/2016	Annual	3/5/2017	1351001
Anritsu	MT8820C	Radio Communication Analyzer	7/24/2015	Annual	7/24/2016	6200901190
Anritsu	MT8820C	Radio Communication Analyzer	9/1/2015	Annual	9/1/2016	6201144419
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Control Company	4040	Digital Thermometer	3/18/2015	Biennial	3/18/2017	150194896
Control Company	4352	Ultra Long Stem Thermometer	3/8/2016	Biennial	3/8/2018	160261701
Control Company	4353	Long Stem Thermometer	3/5/2015	Biennial	3/5/2017	150149565
Gigatronics	80701A	(0.05-18GHz) Power Sensor	11/4/2015	Annual	11/4/2016	1833460
Gigatronics	8651A	Universal Power Meter	11/4/2015	Annual	11/4/2016	8650319
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	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mitutoyo	CD-6"CSX	Digital Caliper	3/2/2016	Biennial	3/2/2018	13264162
Narda	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
Pasternack	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	3/29/2016	Annual	3/29/2017	836371/0079
Rohde & Schwarz	CMW500	Radio Communication Tester	4/27/2016	Annual	4/27/2017	101699
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
SPEAG	D750V3	750 MHz SAR Dipole	2/16/2016	Annual	2/16/2017	1046
SPEAG	D835V2	835 MHz SAR Dipole	4/14/2016	Annual	4/14/2017	4d119
SPEAG	D1750V2	1750 MHz SAR Dipole	4/13/2016	Annual	4/13/2017	1051
SPEAG	D1900V2	1900 MHz SAR Dipole	4/12/2016	Annual	4/12/2017	5d141
SPEAG	D2450V2	2450 MHz SAR Dipole	2/18/2016	Annual	2/18/2017	882
SPEAG	D2600V2	2600 MHz SAR Dipole	10/21/2015	Annual	10/21/2016	1071
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/25/2016	Annual	2/25/2017	1120
SPEAG	D750V3	750 MHz Dipole	3/16/2016	Annual	3/16/2017	1054
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/16/2015	Annual	9/16/2016	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/27/2015	Annual	10/27/2016	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/14/2016	Annual	4/14/2017	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/19/2016	Annual	2/19/2017	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/11/2015	Annual	11/11/2016	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/14/2016	Annual	3/14/2017	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/18/2016	Annual	2/18/2017	1272
SPEAG	DAK-12	Dielectric Assessment Kit (10MHz - 3GHz)	3/1/2016	Annual	3/1/2017	1102
SPEAG	DAK-3.5	Dielectric Assessment Kit	10/20/2015	Annual	10/20/2016	1091
SPEAG	ES3DV2	SAR Probe	8/26/2015	Annual	8/26/2016	3022
SPEAG	ES3DV3	SAR Probe	10/29/2015	Annual	10/29/2016	3333
SPEAG	EX3DV4	SAR Probe	4/19/2016	Annual	4/19/2017	7406
SPEAG	EX3DV4	SAR Probe	4/19/2016	Annual	4/19/2017	7357
SPEAG	ES3DV3	SAR Probe	11/17/2015	Annual	11/17/2016	3334
SPEAG	ES3DV3	SAR Probe	2/19/2016	Annual	2/19/2017	3318
SPEAG	ES3DV3	SAR Probe	3/18/2016	Annual	3/18/2017	3319
SPEAG	EX3DV4	SAR Probe	2/22/2016	Annual	2/22/2017	3914

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Equipment List for Test Period 03/27/17 – 04/10/17

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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	D835V2	835 MHz SAR Dipole	7/13/2016	Annual	7/13/2017	4d047
SPEAG	D2450V2	2450 MHz SAR Dipole	7/25/2016	Annual	7/25/2017	981
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/2/2016	Annual	8/2/2017	1237
SPEAG	EX3DV4	SAR Probe	7/21/2016	Annual	7/21/2017	7308
SPEAG	ES3DV3	SAR Probe	2/10/2017	Annual	2/10/2018	3213
SPEAG	ES3DV3	SAR Probe	2/10/2017	Annual	2/10/2018	3318
SPEAG	EX3DV4	SAR Probe	4/19/2016	Annual	4/19/2017	7406
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/11/2016	Annual	5/11/2017	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/14/2016	Annual	4/14/2017	1407
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	10/5/2016	Annual	10/5/2017	GB42230325
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2016	Annual	5/10/2017	1070
Agilent	N9020A	MXA Signal Analyzer	10/28/2016	Annual	10/28/2017	US46470561
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	1039008
Anritsu	MA2411B	Pulse Power Sensor	8/18/2016	Annual	8/18/2017	1207470
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	MT8820C	Radio Communication Analyzer	9/15/2016	Annual	9/15/2017	6200901190
Rohde & Schwarz	CMW500	Radio Communication tester	5/27/2016	Annual	5/27/2017	140144
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
Anritsu	MA24106A	USB Power Sensor	6/2/2016	Annual	6/2/2017	1231538
Anritsu	MA24106A	USB Power Sensor	6/2/2016	Annual	6/2/2017	1231535
Agilent	E5515C	Wireless Communications Test Set	5/22/2015	Biennial	5/22/2017	GB43304278
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	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

Note:

1. 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.
2. Each equipment item was used solely within its respective calibration period.

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16 MEASUREMENT UNCERTAINTIES

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

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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]

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APPENDIX A: SAR TEST DATA

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DUT: A3LSMN935F; Type: Portable Handset; Serial: 87763

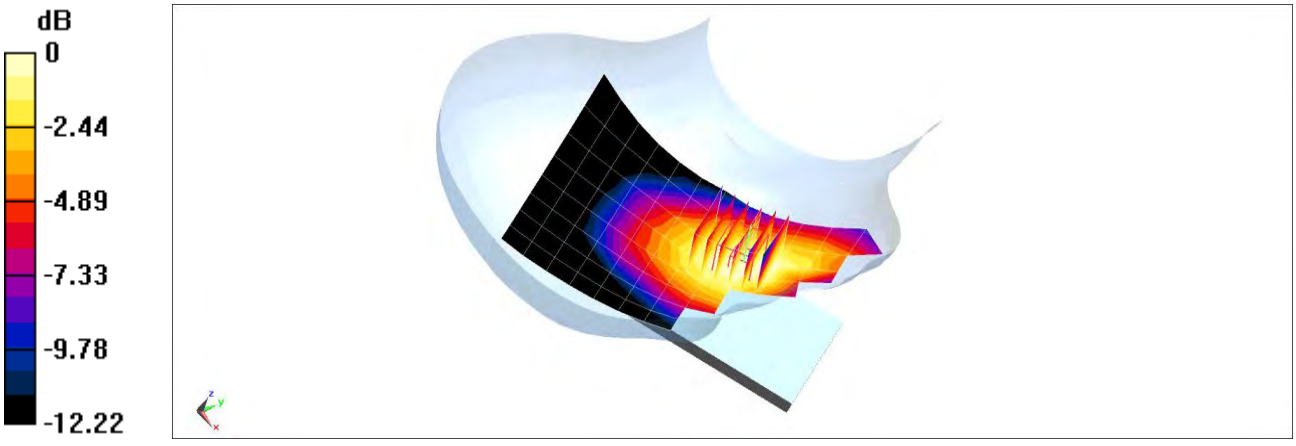
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.885 S/m; ε_r = 40.093; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-27-2017; Ambient Temp: 22.0°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7406; ConvF(9.83, 9.83, 9.83); Calibrated: 04/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 04/14/2016
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.45 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.244 W/kg
SAR(1 g) = 0.202 W/kg



0 dB = 0.231 W/kg = -6.36 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 8424D

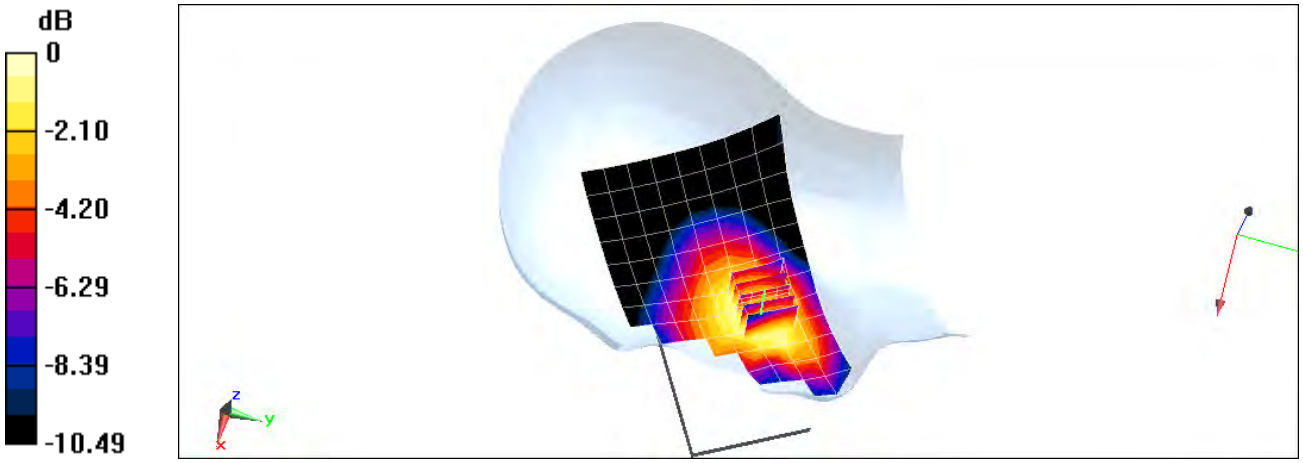
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.902 S/m; ε_r = 41.059; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 06-01-2016; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3333; ConvF(6.16, 6.16, 6.16); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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 = 13.96 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.203 W/kg
SAR(1 g) = 0.164 W/kg



0 dB = 0.178 W/kg = -7.50 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

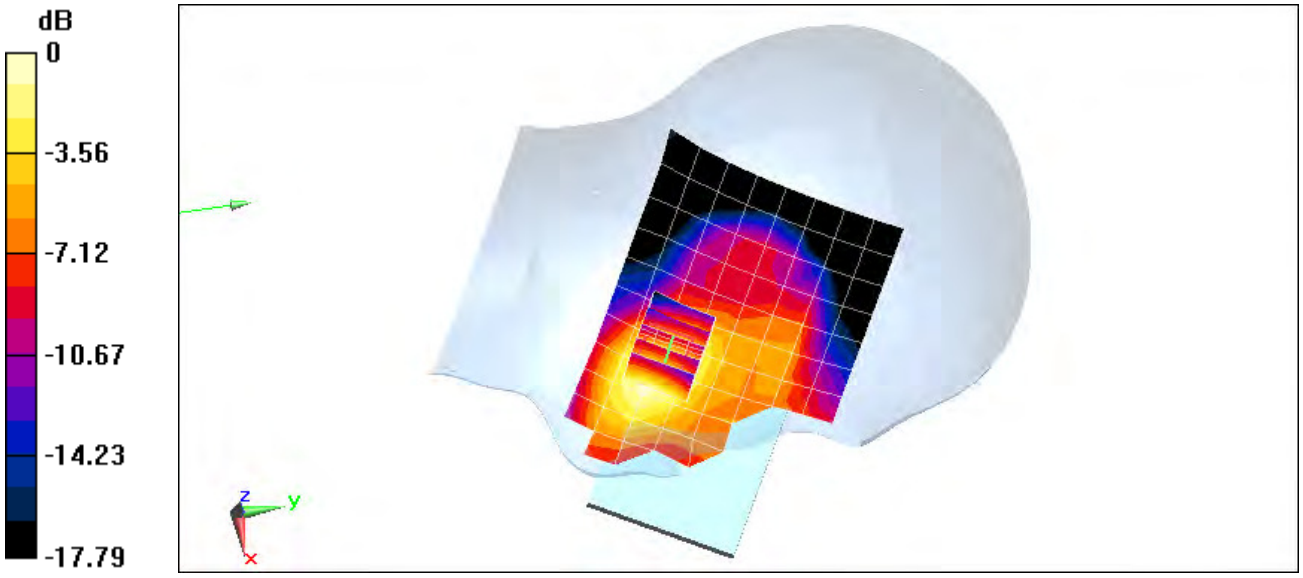
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.349 S/m; ε_r = 39.293; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(8.85, 8.85, 8.85); 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, 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 = 15.56 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.451 W/kg
SAR(1 g) = 0.303 W/kg



0 dB = 0.386 W/kg = -4.13 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84250

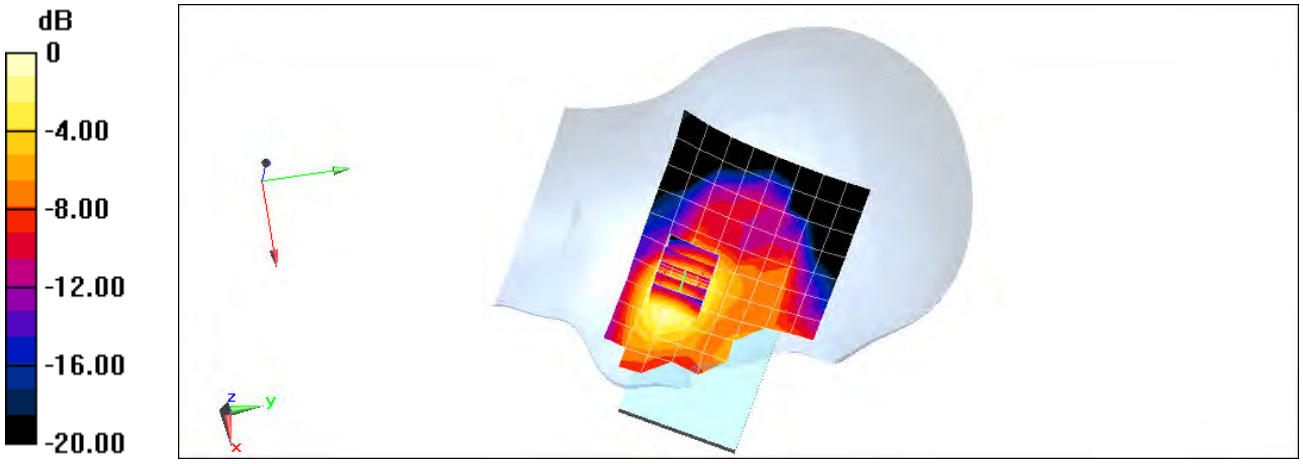
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.398 S/m; ε_r = 39.087; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-03-2016; Ambient Temp: 23.0°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3333; ConvF(5.03, 5.03, 5.03); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: 1757
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 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.401 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.136 W/kg
SAR(1 g) = 0.090 W/kg



0 dB = 0.103 W/kg = -9.87 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84250

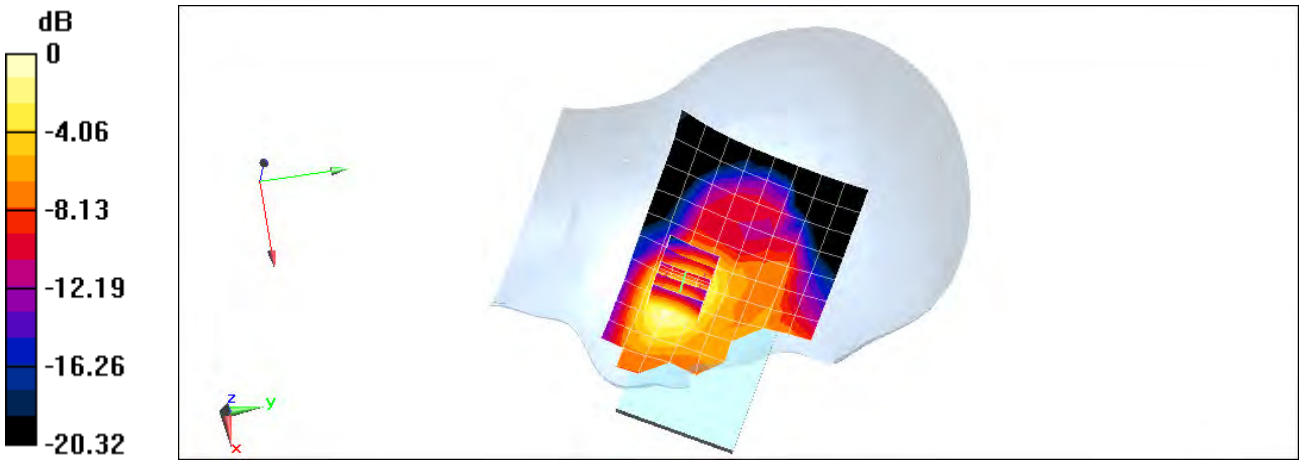
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.432 S/m; ε_r = 39.009; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-03-2016; Ambient Temp: 23.0°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3333; ConvF(5.03, 5.03, 5.03); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: 1757
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Left Head, Cheek, High.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 = 13.32 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.345 W/kg
SAR(1 g) = 0.228 W/kg



0 dB = 0.265 W/kg = -5.77 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

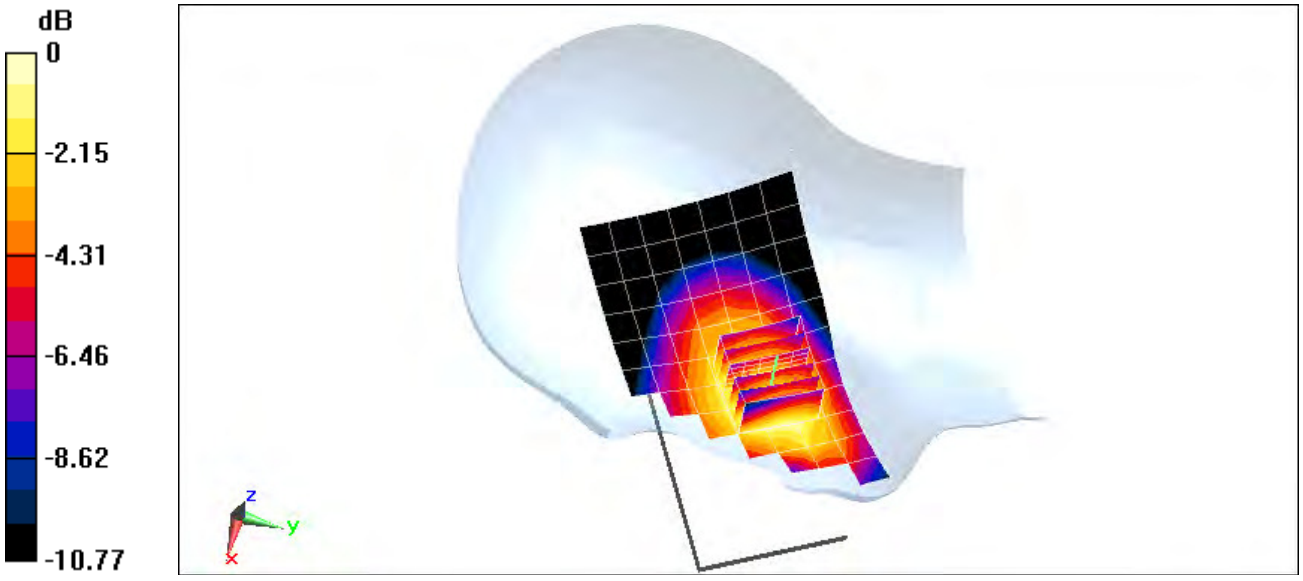
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.857 S/m; ε_r = 41.913; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 21.9°C

Probe: ES3DV2 - SN3022; ConvF(6.33, 6.33, 6.33); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: TP:7535
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 (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.208 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.0790 W/kg
SAR(1 g) = 0.064 W/kg



0 dB = 0.0695 W/kg = -11.58 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

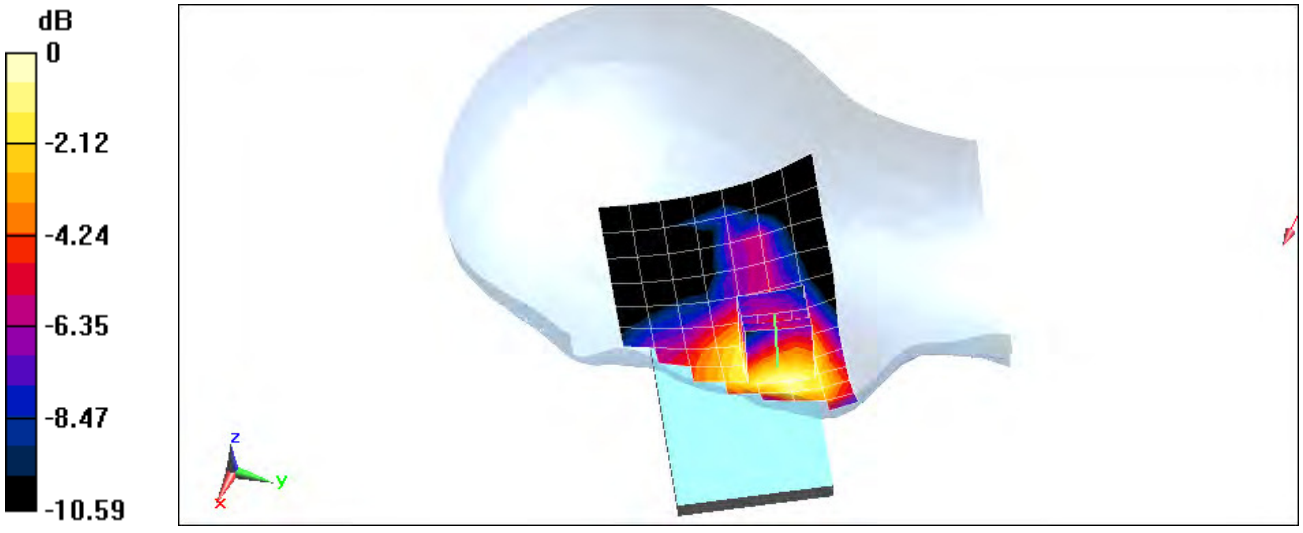
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.922 S/m; ε_r = 40.895; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 21.9°C

Probe: ES3DV2 - SN3022; ConvF(6.33, 6.33, 6.33); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.58 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.113 W/kg
SAR(1 g) = 0.089 W/kg



0 dB = 0.0974 W/kg = -10.11 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 8413C

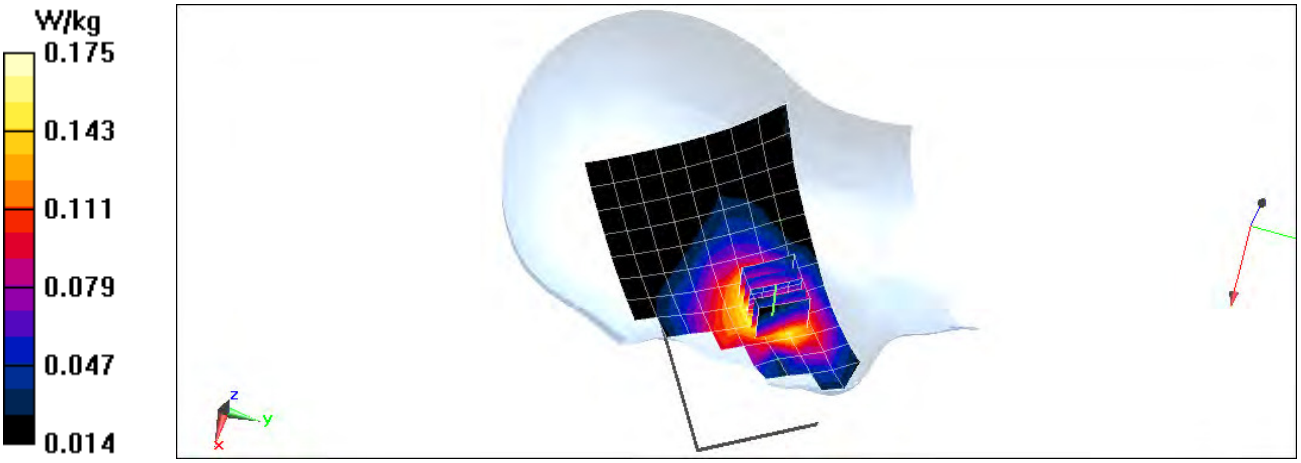
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.902$ S/m; $\varepsilon_r = 41.061$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 06-01-2016; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3333; ConvF(6.16, 6.16, 6.16); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
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 5 (Cell.), Right Head, Cheek, 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 = 14.43 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.199 W/kg
SAR(1 g) = 0.164 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 8413C

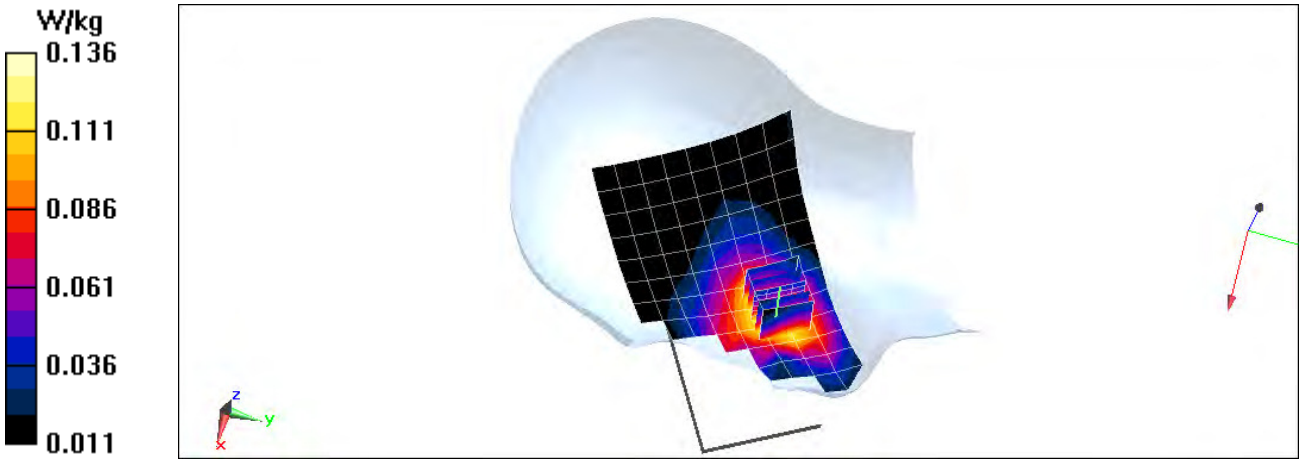
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.897 S/m; ε_r = 41.13; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 06-01-2016; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3333; ConvF(6.16, 6.16, 6.16); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
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 26 (Cell.), Right Head, Cheek, Mid.ch,
15 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 = 12.72 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.155 W/kg
SAR(1 g) = 0.127 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 84162

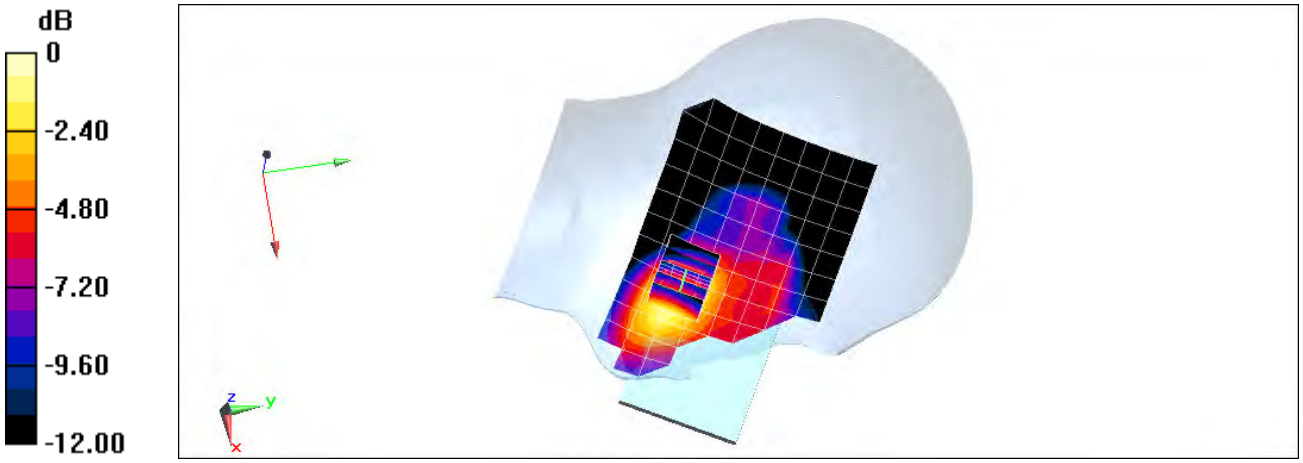
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.349 S/m; ε_r = 39.292; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(8.85, 8.85, 8.85); 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: LTE Band 4 (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 = 16.96 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.493 W/kg
SAR(1 g) = 0.335 W/kg



0 dB = 0.429 W/kg = -3.68 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84250

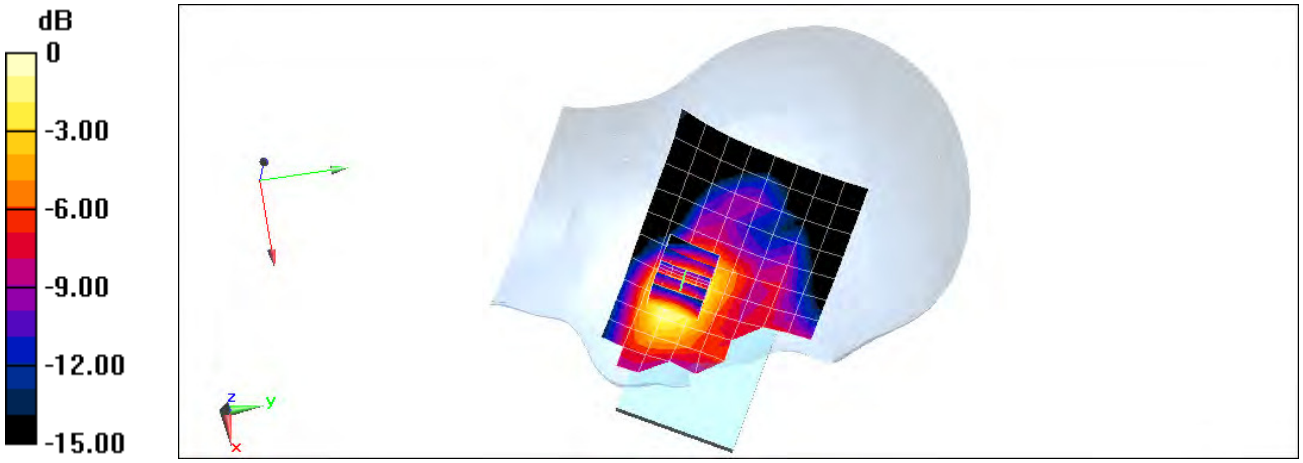
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.423 S/m; ε_r = 39.03; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-03-2016; Ambient Temp: 23.0°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3333; ConvF(5.03, 5.03, 5.03); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: 1757
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: LTE Band 2 (PCS), Left Head, Cheek, 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 = 14.39 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.353 W/kg
SAR(1 g) = 0.234 W/kg



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

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84250

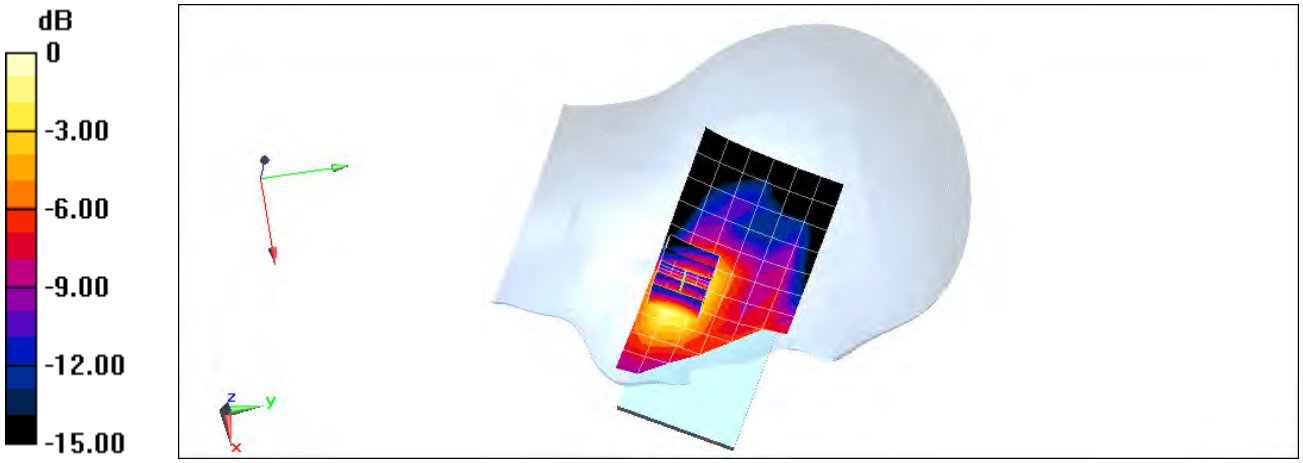
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.429 S/m; ε_r = 39.016; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-03-2016; Ambient Temp: 23.0°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3333; ConvF(5.03, 5.03, 5.03); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: 1757
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 = 11.45 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.226 W/kg
SAR(1 g) = 0.146 W/kg



0 dB = 0.175 W/kg = -7.57 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84162

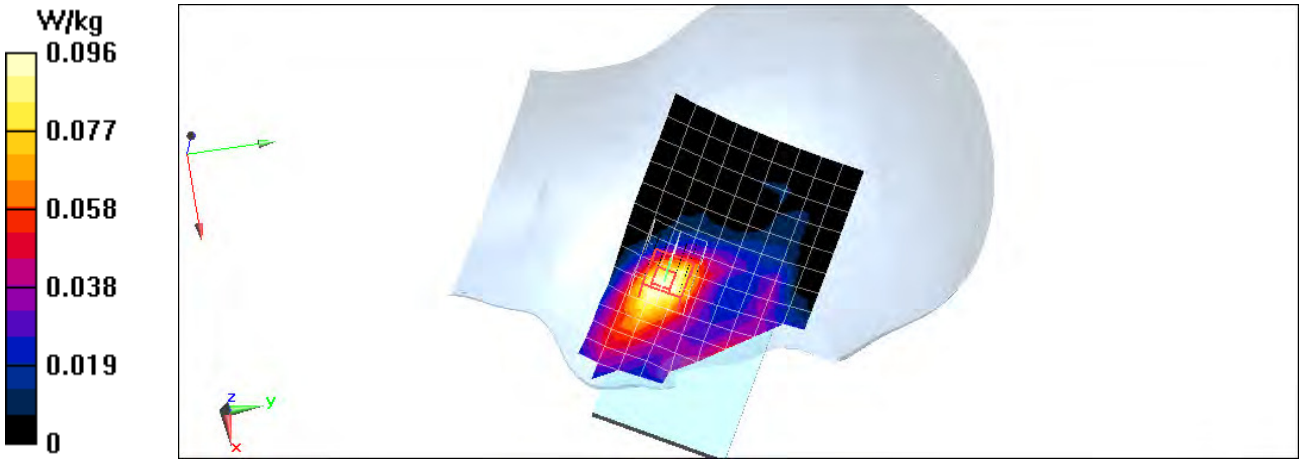
Communication System: UID 0, LTE Band 41; Frequency: 2549.5 MHz; Duty Cycle: 1:1.58
Medium: 2450 Head Medium parameters used:
f = 2549.5 MHz; σ = 1.946 S/m; ε_r = 40.452; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 05-31-2016; Ambient Temp: 23.8°C; Tissue Temp: 22.8°C

Probe: ES3DV2 - SN3022; ConvF(4.12, 4.12, 4.12); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
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 41, Left Head, Cheek, Low-Mid.ch, QPSK,
20 MHz Bandwidth, 1 RB, 0 RB Offset

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.677 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.143 W/kg
SAR(1 g) = 0.079 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 05C3E

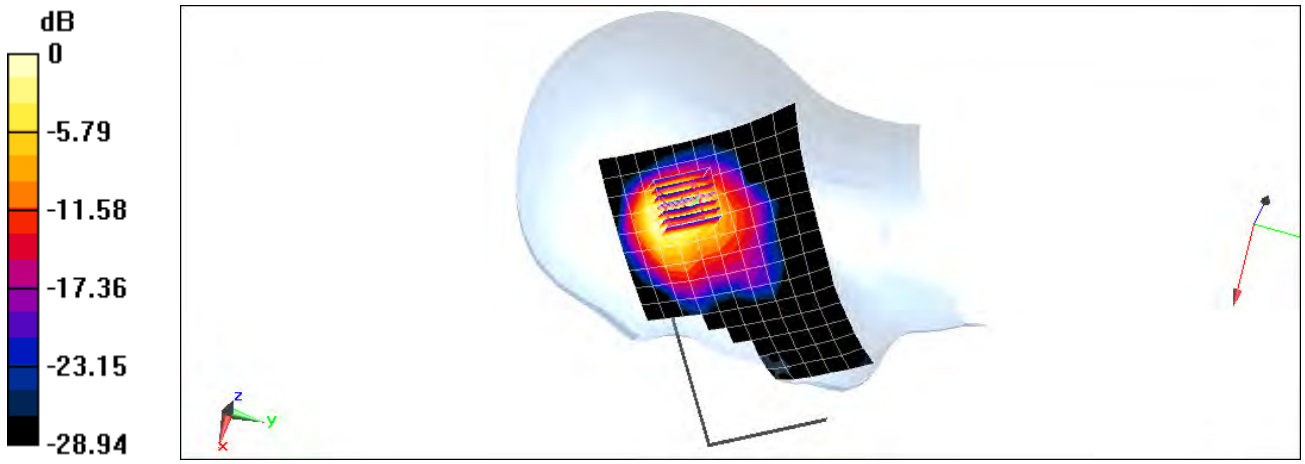
Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.789 S/m; ε_r = 40.983; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 05-31-2016; Ambient Temp: 23.8°C; Tissue Temp: 22.8°C

Probe: ES3DV2 - SN3022; ConvF(4.3, 4.3, 4.3); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
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 01, 1 Mbps, Antenna 1

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.59 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.482 W/kg



0 dB = 0.652 W/kg = -1.86 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 04160

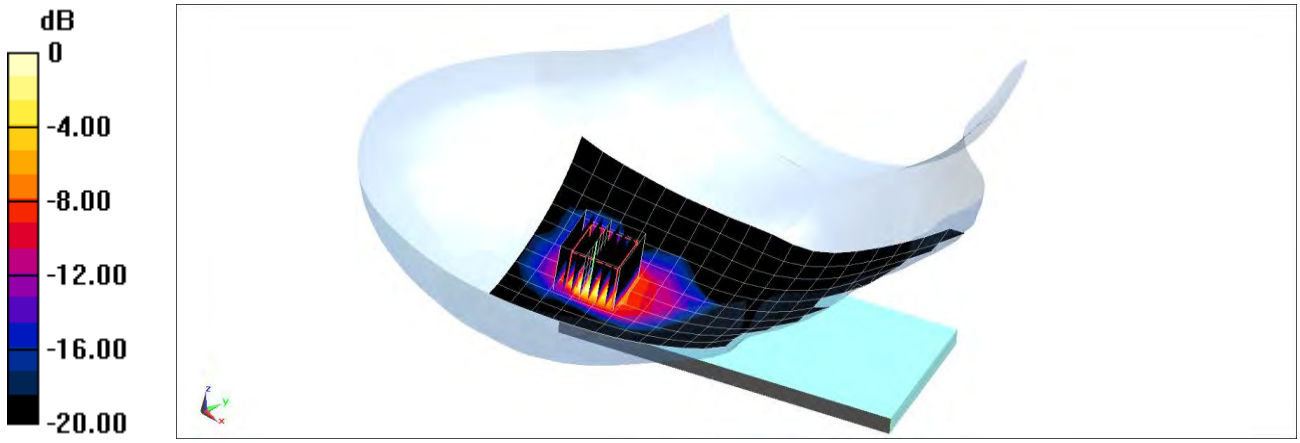
Communication System: UID 0, IEEE 802.11ac; Frequency: 5610 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5610 MHz; σ = 4.936 S/m; ε_r = 34.99; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 04-06-2017; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7308; ConvF(4.63, 4.63, 4.63); Calibrated: 7/21/2016;
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: IEEE 802.11ac, U-NII-2C, 80 MHz Bandwidth
Right Head, Cheek, Ch 122, 29.3 Mbps, Antenna 2

Area Scan (11x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 10.56 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 2.81 W/kg
SAR(1 g) = 0.600 W/kg



0 dB = 1.57 W/kg = 1.96 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 85F64

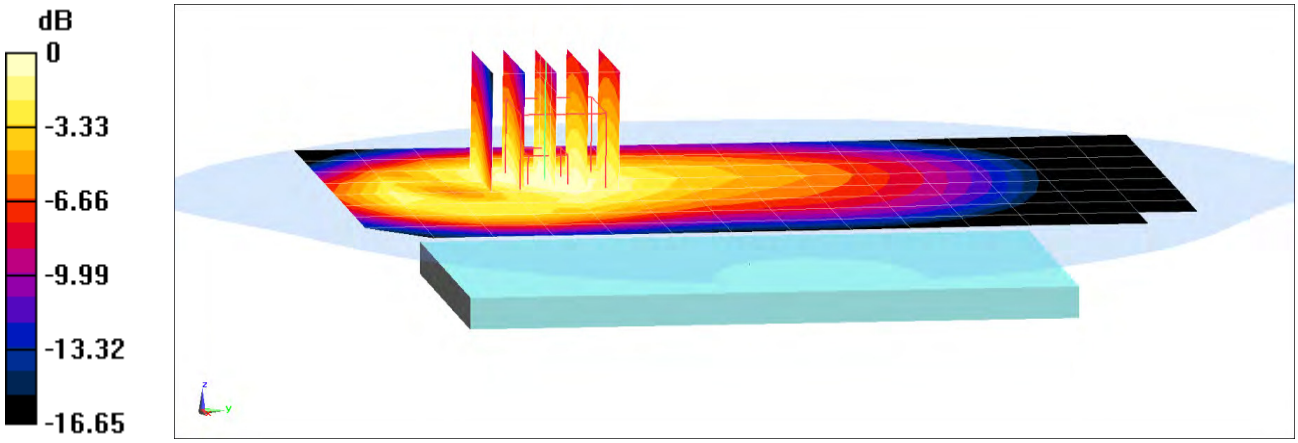
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.996 S/m; ε_r = 55.061; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2017; Ambient Temp: 21.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3318; ConvF(6.37, 6.37, 6.37); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
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 = 21.90 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.595 W/kg
SAR(1 g) = 0.433 W/kg



0 dB = 0.494 W/kg = -3.06 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 85F64

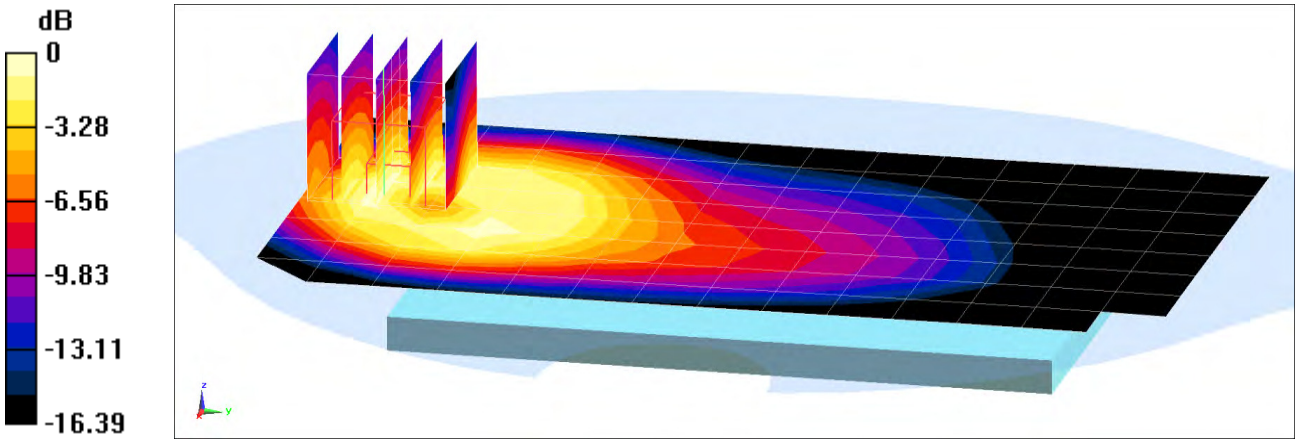
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 848.8 MHz; Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 848.8 MHz; σ = 0.999 S/m; ε_r = 52.996; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-10-2017; Ambient Temp: 22.9°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3318; ConvF(6.37, 6.37, 6.37); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
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, Front 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 = 30.76 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.841 W/kg



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

DUT: A3LSMN935F; Type: Portable Handset; Serial: 8424D

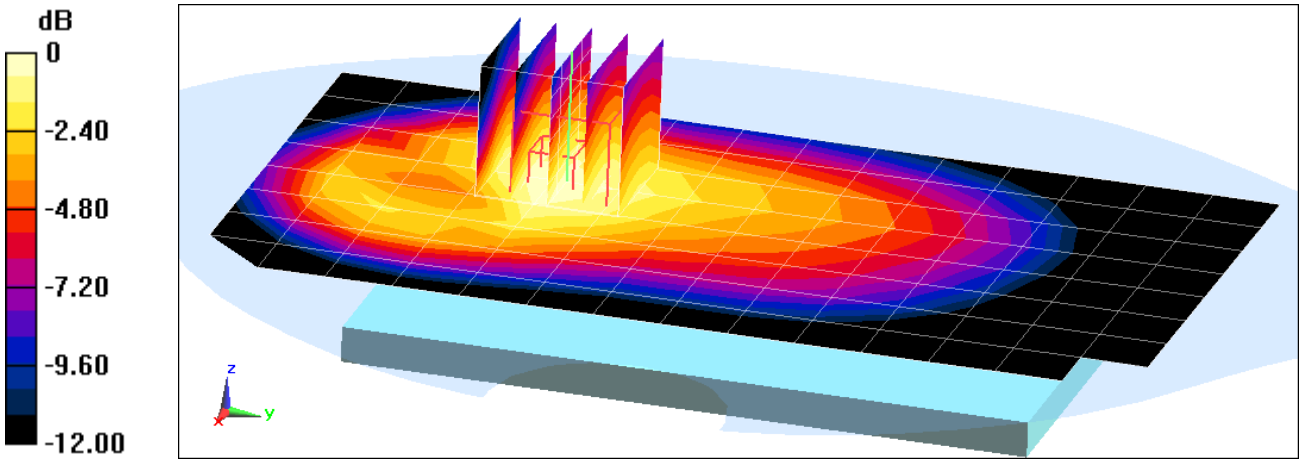
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 53.477; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3318; ConvF(6.11, 6.11, 6.11); Calibrated: 2/19/2016;
Sensor-Surface: 3mm (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: 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 = 20.45 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.518 W/kg
SAR(1 g) = 0.385 W/kg



0 dB = 0.430 W/kg = -3.67 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 8424D

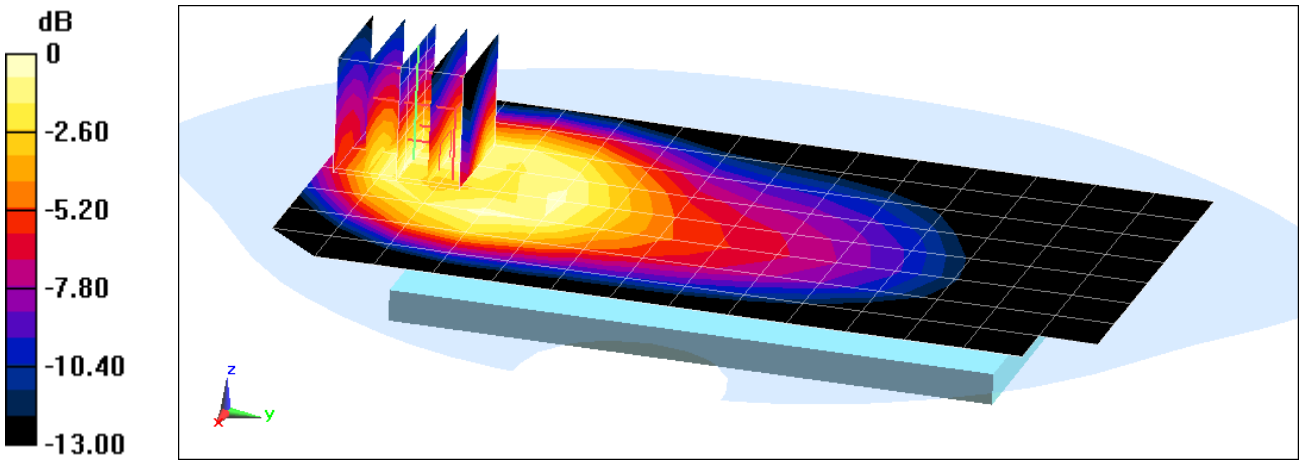
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 53.477; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3318; ConvF(6.11, 6.11, 6.11); Calibrated: 2/19/2016;
Sensor-Surface: 3mm (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: UMTS 850, Body SAR, Front 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 = 26.00 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.617 W/kg



0 dB = 0.721 W/kg = -1.42 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84162

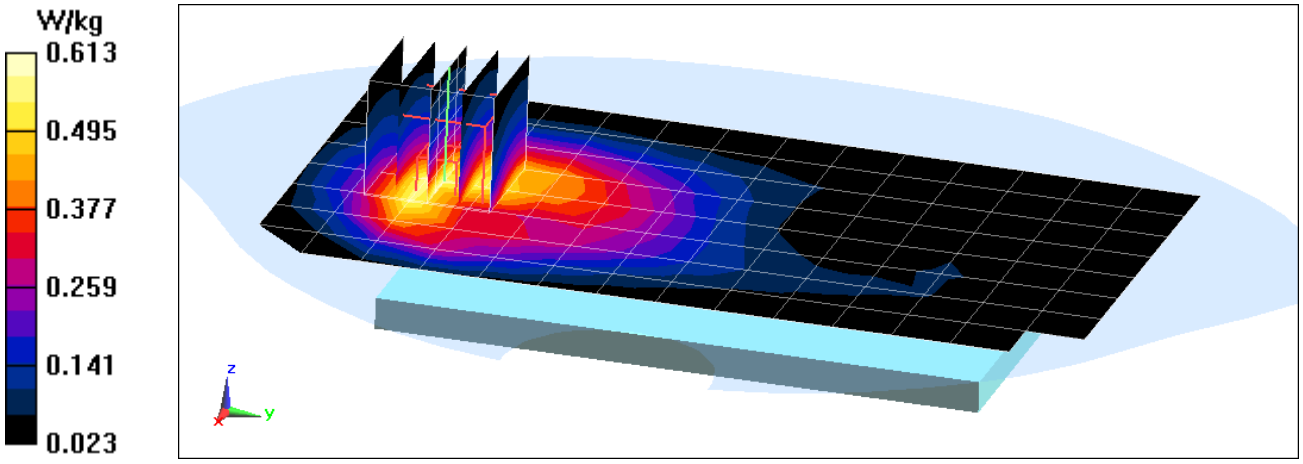
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.483 S/m; ε_r = 51.757; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 5.0 front; Type: QD000P40CD; Serial: TP:-1648
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 = 18.03 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.706 W/kg
SAR(1 g) = 0.452 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

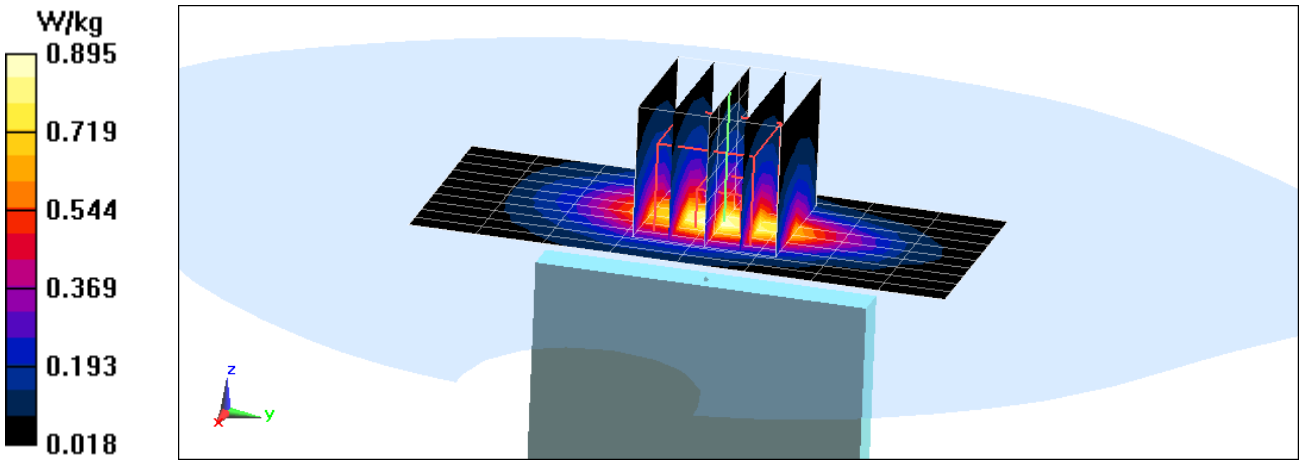
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.483 S/m; ε_r = 51.757; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 5.0 front; Type: QD000P40CD; Serial: TP:-1648
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 (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.43 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.618 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

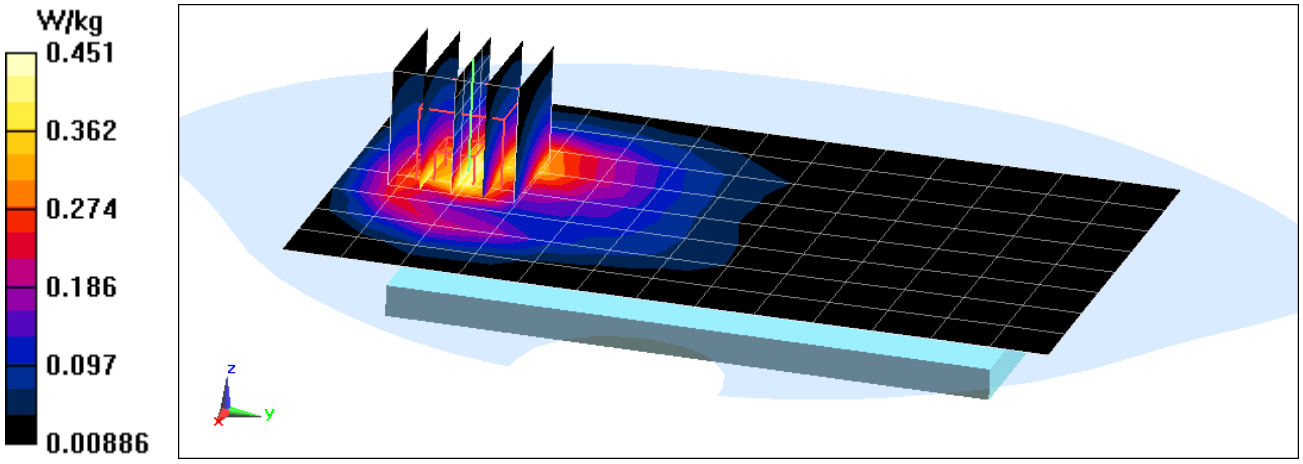
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.543 S/m; ε_r = 52.019; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 1900, Body SAR, Back side, Mid.ch

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.66 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.618 W/kg
SAR(1 g) = 0.383 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

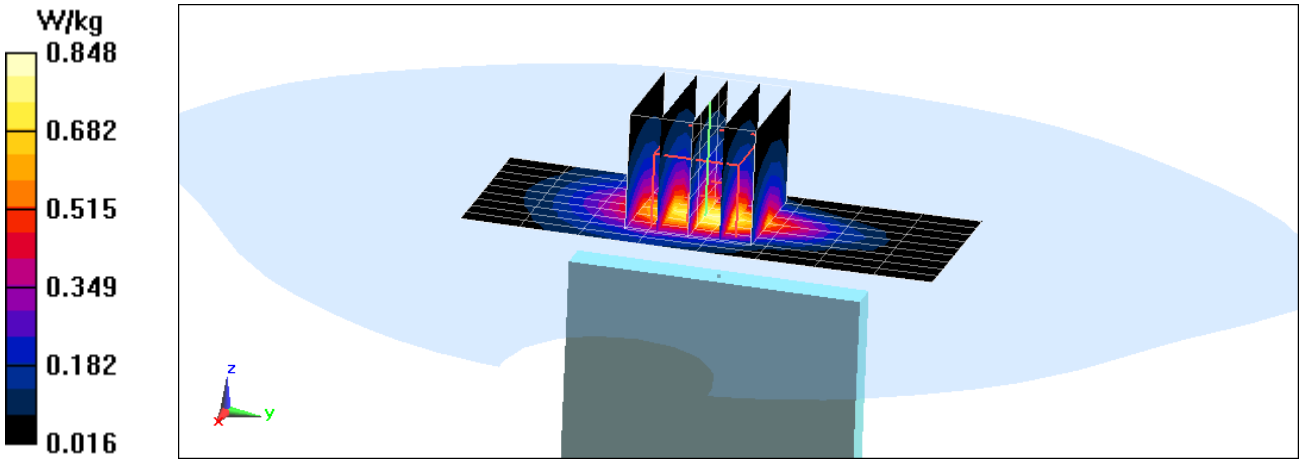
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body, Medium parameters used:
f = 1880 MHz; σ = 1.543 S/m; ε_r = 52.019; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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: GPRS 1900, Body SAR, Bottom Edge, Mid.ch, 3 Tx Slots

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.67 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.696 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

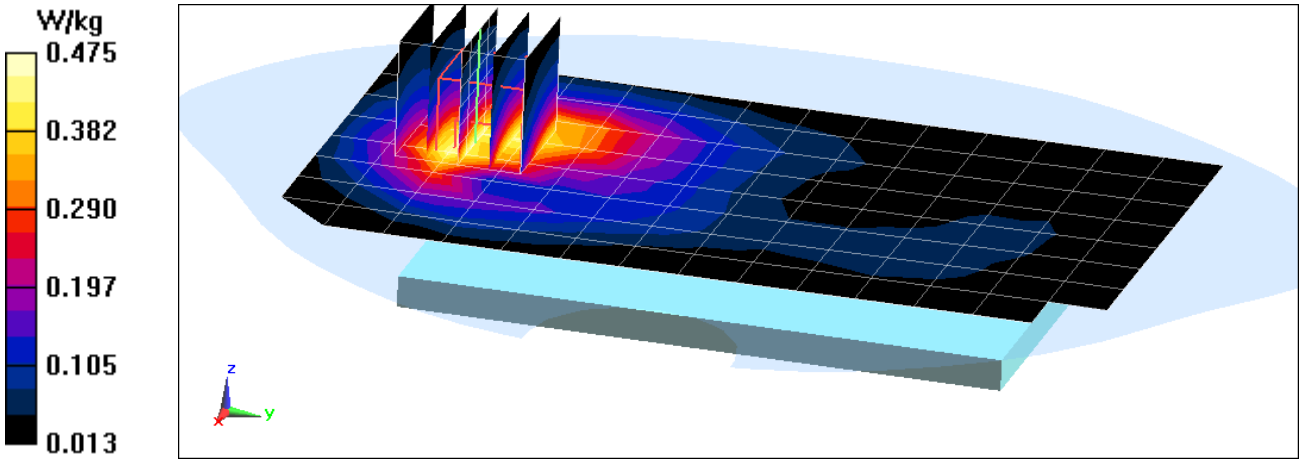
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.573 S/m; ε_r = 51.932; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 1900, Body SAR, Back side, High.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 = 16.97 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.618 W/kg
SAR(1 g) = 0.403 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

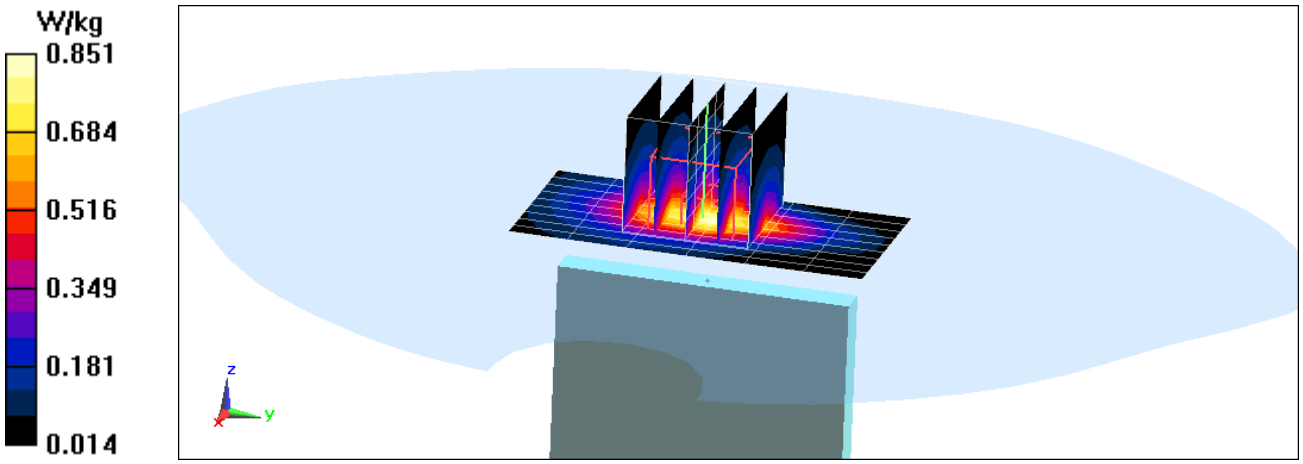
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.573 S/m; ε_r = 51.932; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 1900, Body SAR, Bottom Edge, High.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 = 22.55 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.693 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

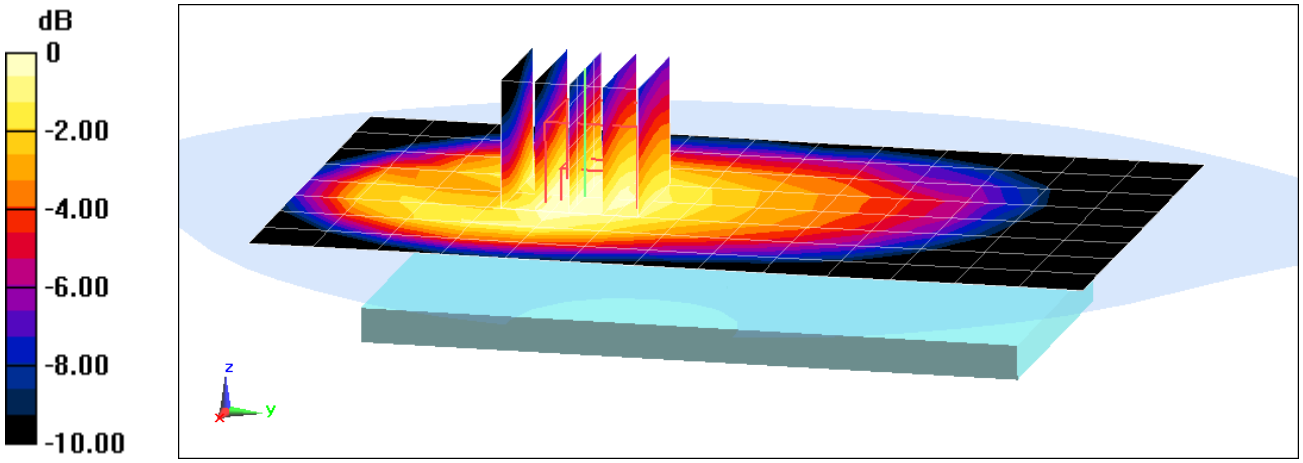
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.935 S/m; ε_r = 55.105; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-06-2016; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3334; ConvF(6.37, 6.37, 6.37); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
Phantom: SAM Front; Type: SAM; Serial: 1686
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 (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.99 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.168 W/kg
SAR(1 g) = 0.124 W/kg



0 dB = 0.139 W/kg = -8.57 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

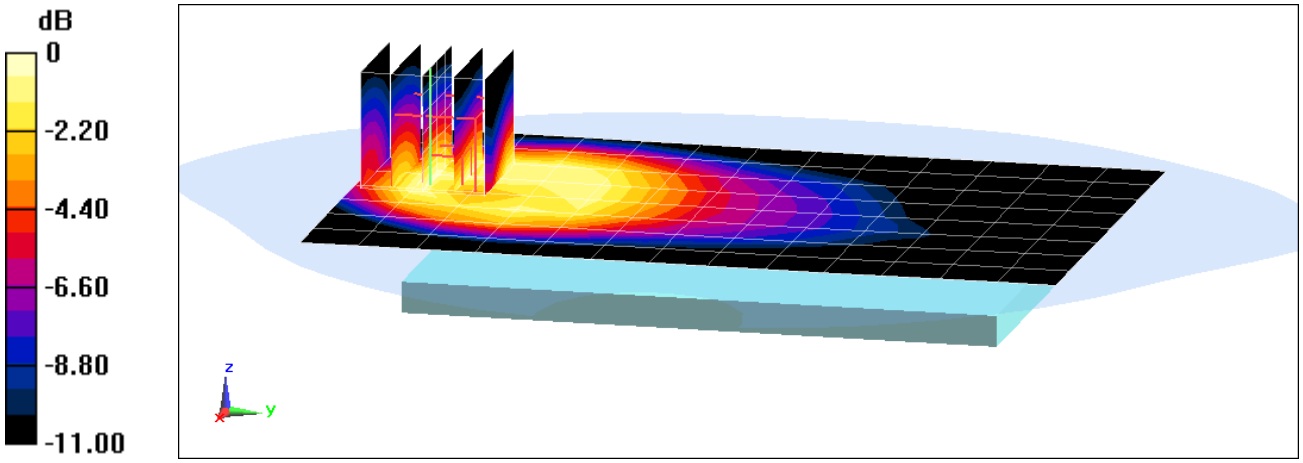
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.935 S/m; ε_r = 55.105; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-06-2016; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3334; ConvF(6.37, 6.37, 6.37); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.75 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.417 W/kg
SAR(1 g) = 0.241 W/kg



0 dB = 0.283 W/kg = -5.48 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 98443

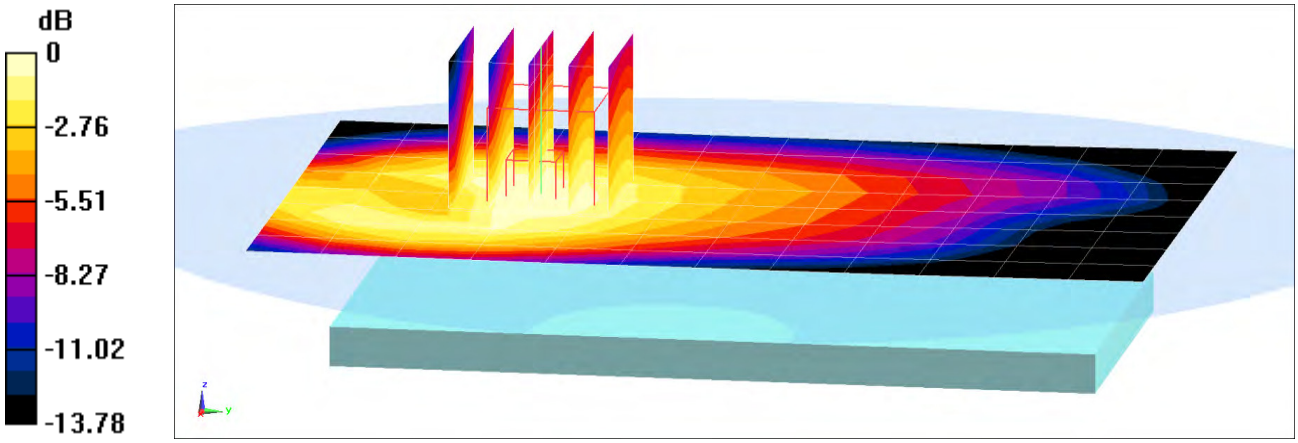
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.986 S/m; ε_r = 53.955; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2017; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(6.38, 6.38, 6.38); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
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 13, Body SAR, Back side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 16.13 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.323 W/kg
SAR(1 g) = 0.236 W/kg



0 dB = 0.263 W/kg = -5.80 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 98443

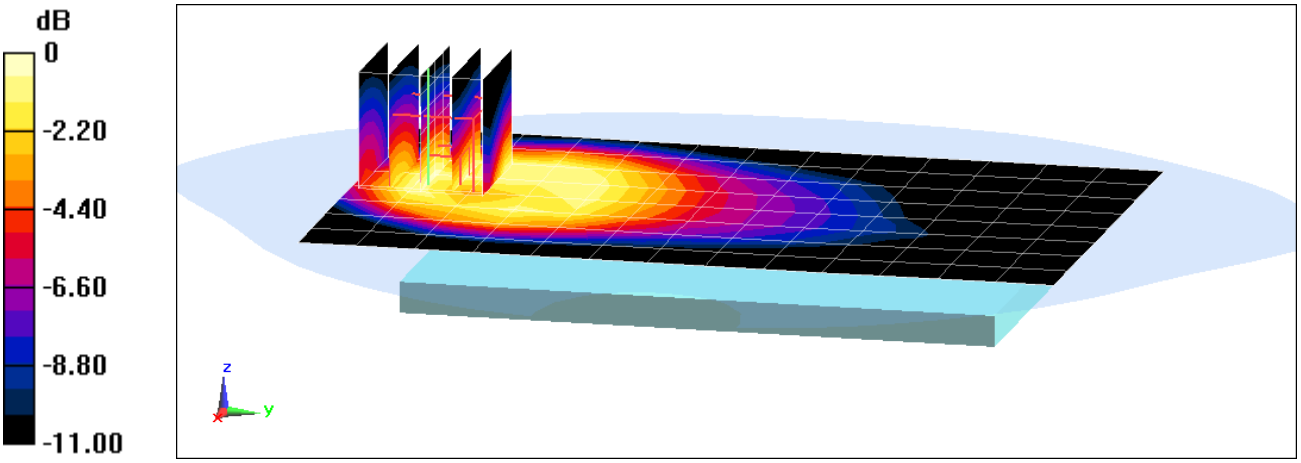
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.986 S/m; ε_r = 53.955; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-03-2017; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(6.38, 6.38, 6.38); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
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 13, Body SAR, Front side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 21.50 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.678 W/kg
SAR(1 g) = 0.401 W/kg



0 dB = 0.494 W/kg = -3.06 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 85F64

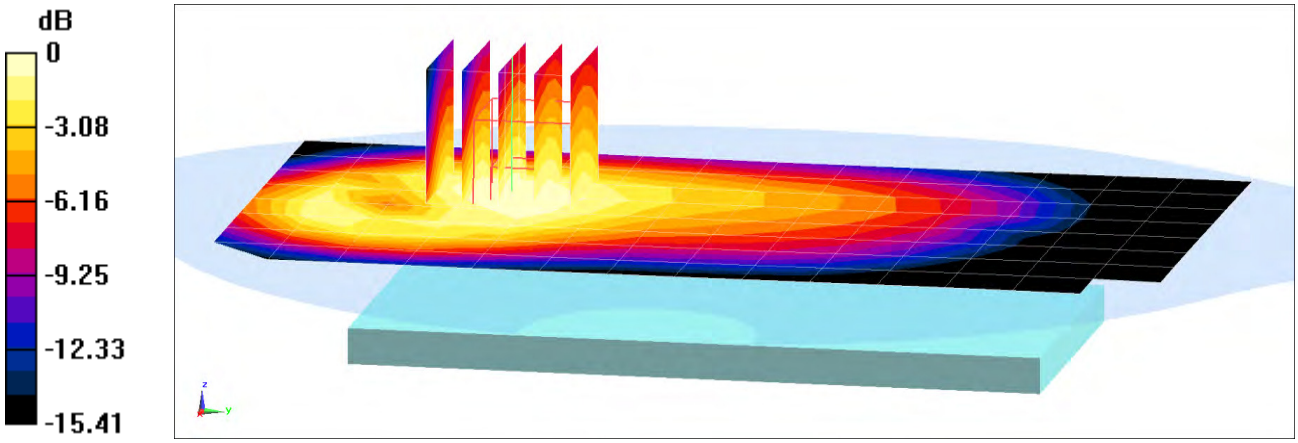
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.996$ S/m; $\varepsilon_r = 55.062$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2017; Ambient Temp: 21.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3318; ConvF(6.37, 6.37, 6.37); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
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 = 20.54 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.511 W/kg
SAR(1 g) = 0.381 W/kg



0 dB = 0.430 W/kg = -3.67 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 85F64

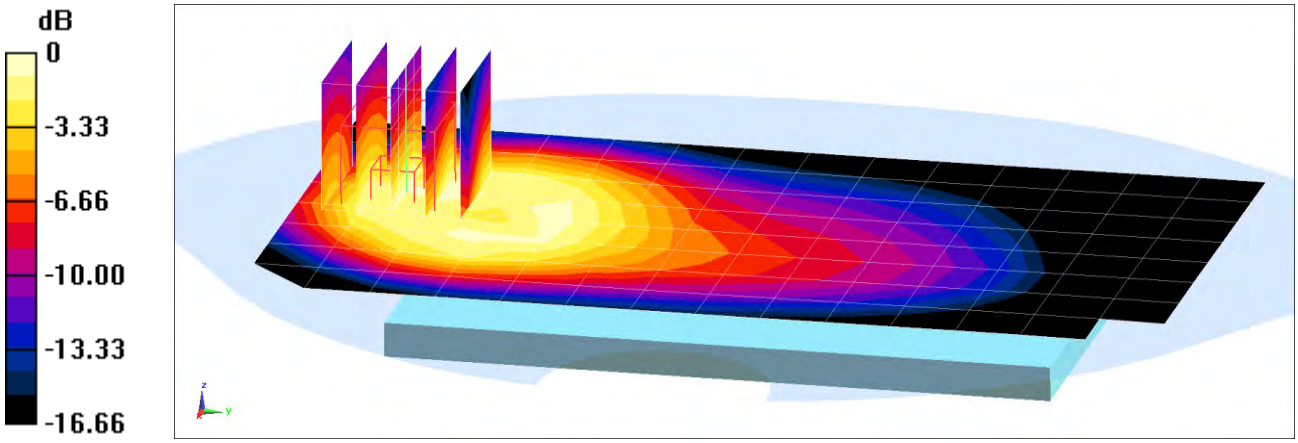
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.996$ S/m; $\varepsilon_r = 55.062$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-03-2017; Ambient Temp: 21.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3318; ConvF(6.37, 6.37, 6.37); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
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, Front 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 = 28.85 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.07 W/kg
SAR(1 g) = 0.646 W/kg



0 dB = 0.799 W/kg = -0.97 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841C3

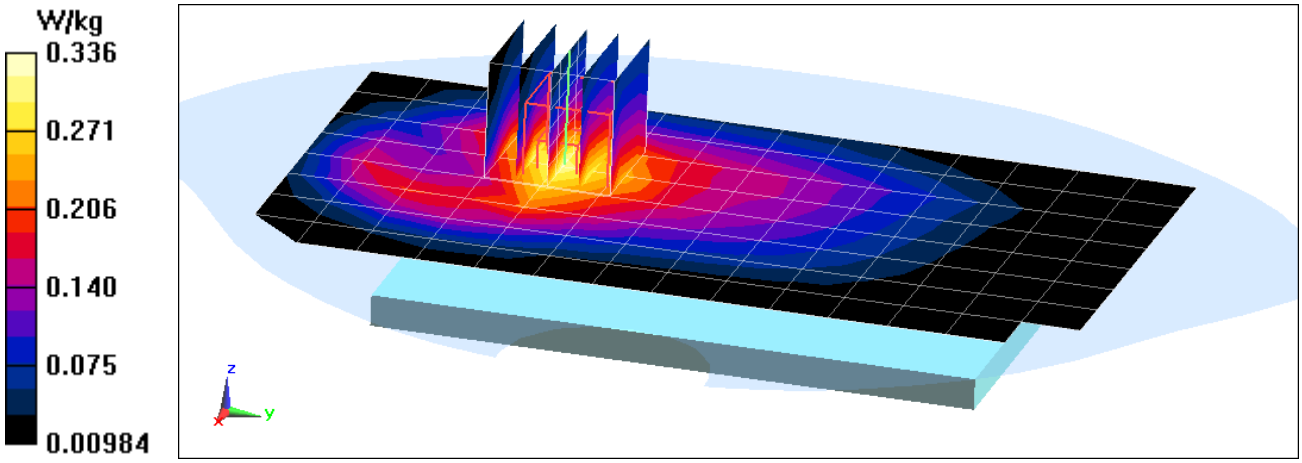
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.996 S/m; ε_r = 53.529; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3318; ConvF(6.11, 6.11, 6.11); Calibrated: 2/19/2016;
Sensor-Surface: 3mm (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: 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 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.51 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.395 W/kg
SAR(1 g) = 0.292 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 841C3

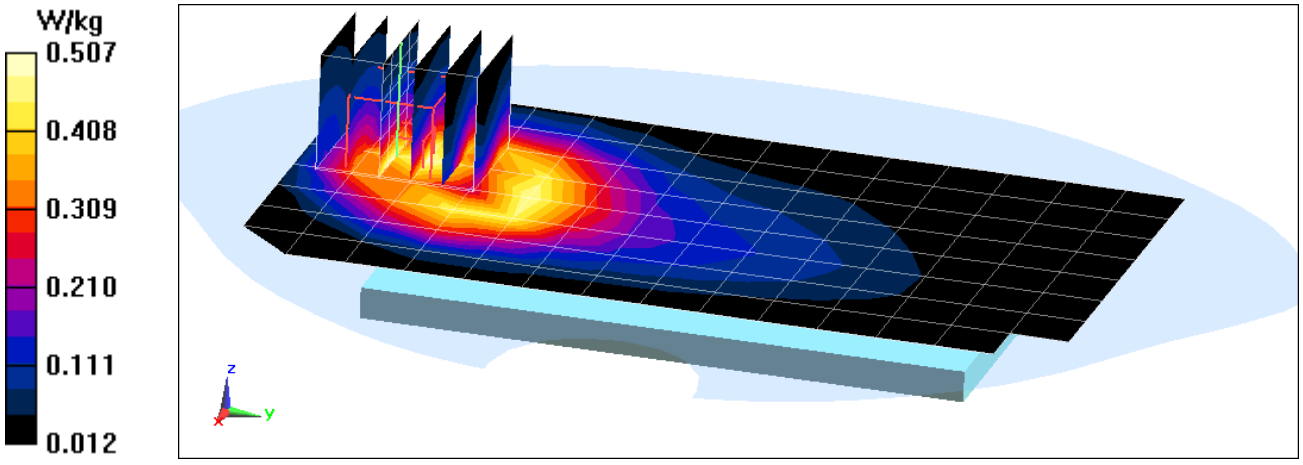
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.996 S/m; ε_r = 53.529; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3318; ConvF(6.11, 6.11, 6.11); Calibrated: 2/19/2016;
Sensor-Surface: 3mm (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: LTE Band 26 (Cell.), Body SAR, Front side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.36 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.746 W/kg
SAR(1 g) = 0.443 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 84162

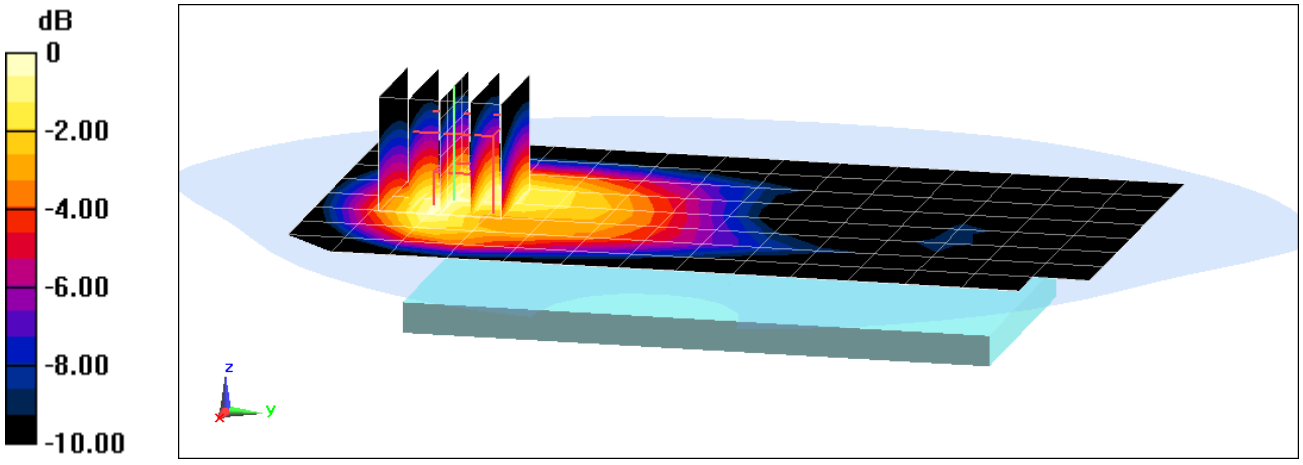
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.483 S/m; ε_r = 51.756; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 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 4 (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 = 18.82 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.758 W/kg
SAR(1 g) = 0.490 W/kg



0 dB = 0.665 W/kg = -1.77 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

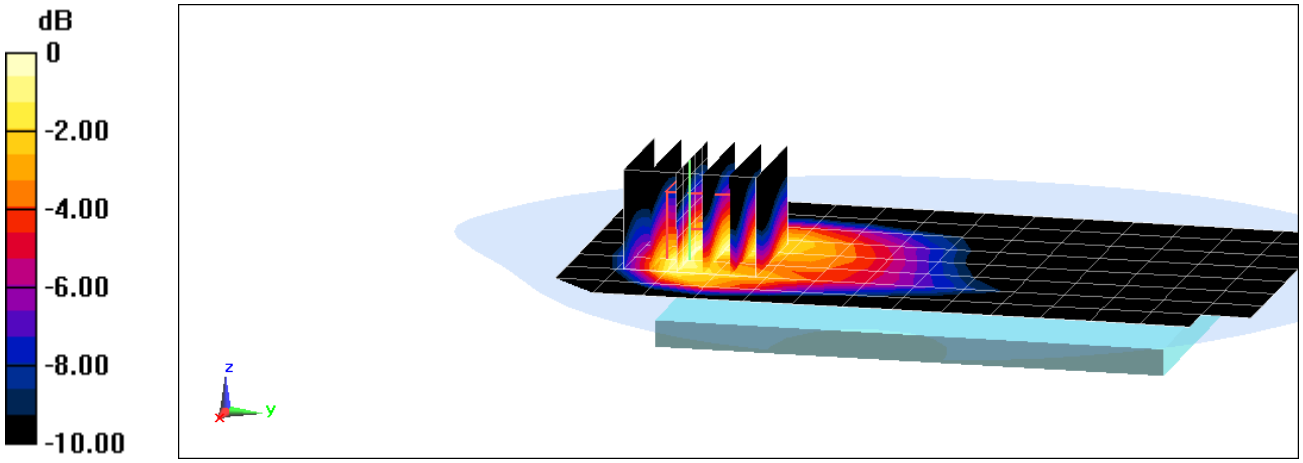
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
$f = 1732.5$ MHz; $\sigma = 1.483$ S/m; $\varepsilon_r = 51.756$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 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 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 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 = 20.00 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.902 W/kg
SAR(1 g) = 0.556 W/kg



0 dB = 0.758 W/kg = -1.20 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

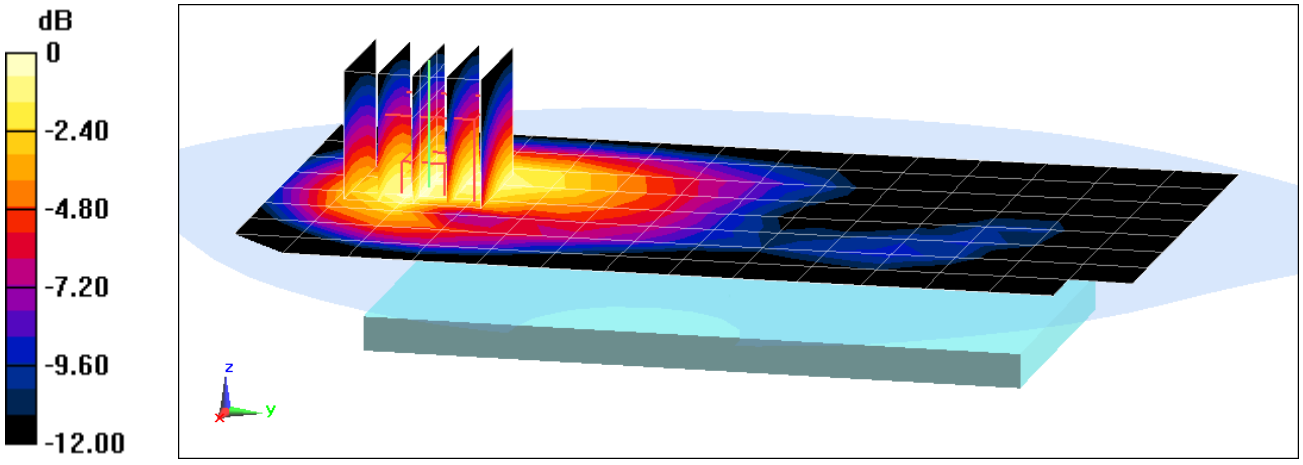
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.565 S/m; ε_r = 51.956; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 2 (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 = 18.95 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.775 W/kg
SAR(1 g) = 0.499 W/kg



0 dB = 0.590 W/kg = -2.29 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

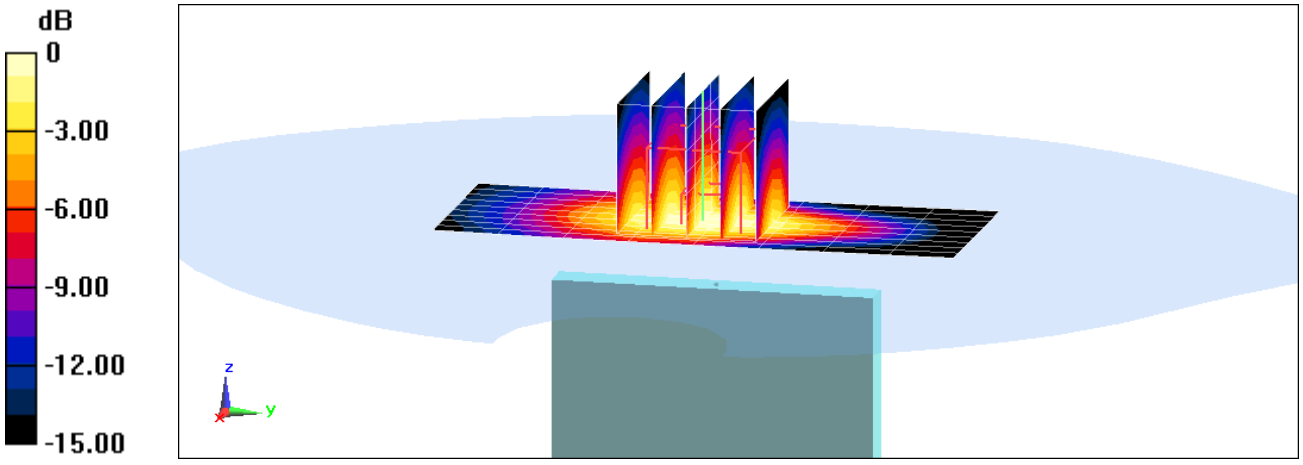
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.565 S/m; ε_r = 51.956; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 2 (PCS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.94 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.630 W/kg



0 dB = 0.764 W/kg = -1.17 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84102

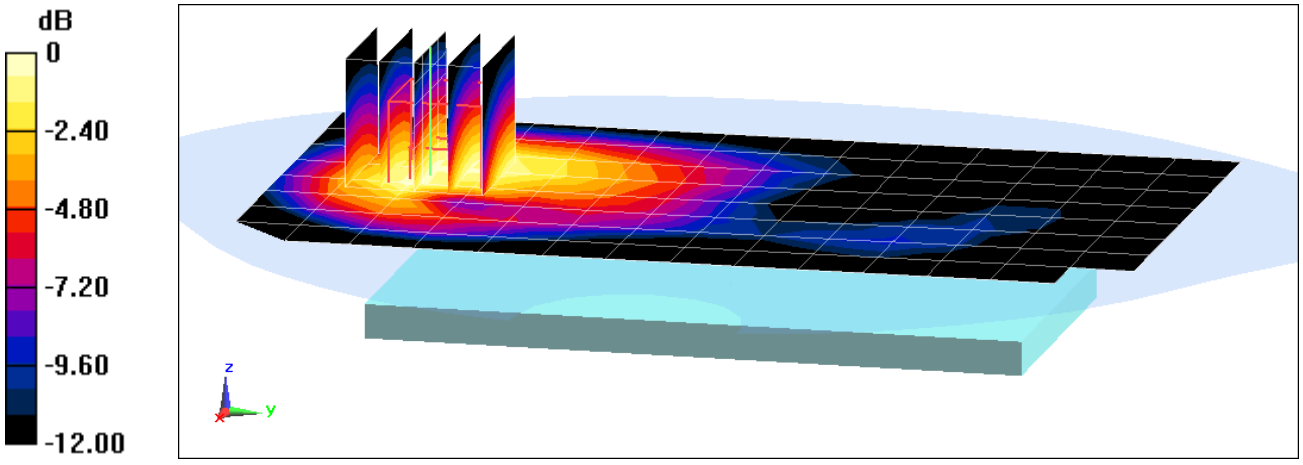
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.57 S/m; ε_r = 51.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 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 = 16.87 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.612 W/kg
SAR(1 g) = 0.392 W/kg



0 dB = 0.464 W/kg = -3.33 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

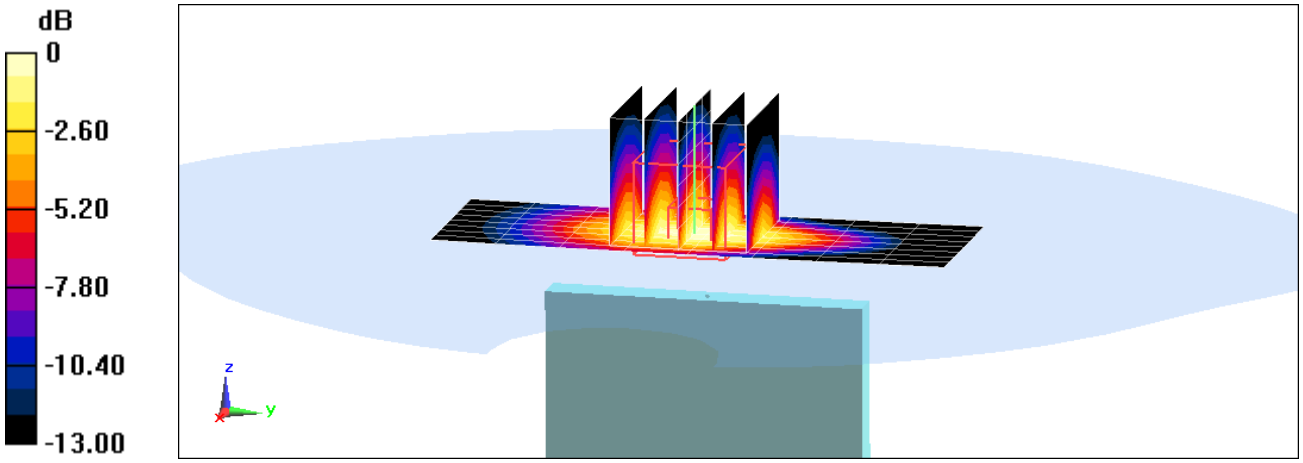
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.57 S/m; ε_r = 51.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 25 (PCS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 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 = 20.19 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.909 W/kg
SAR(1 g) = 0.548 W/kg



0 dB = 0.675 W/kg = -1.71 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84162

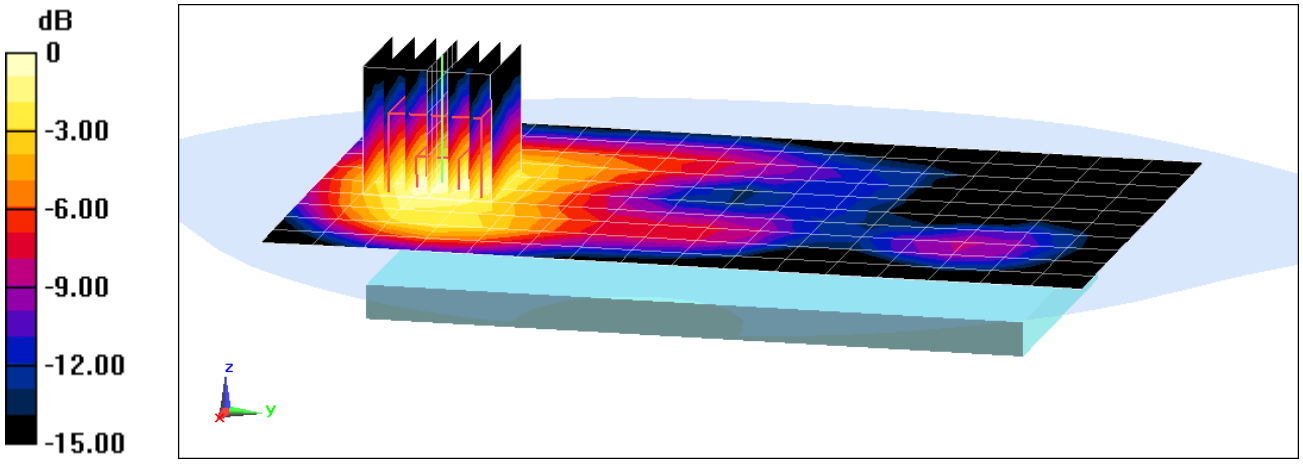
Communication System: UID 0, LTE Band 41; Frequency: 2549.5 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used:
f = 2549.5 MHz; σ = 2.151 S/m; ε_r = 51.063; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date:05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3334; ConvF(4.29, 4.29, 4.29); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
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, Body SAR, Back side, Low-Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.66 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.417 W/kg
SAR(1 g) = 0.220 W/kg



0 dB = 0.275 W/kg = -5.61 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 84162

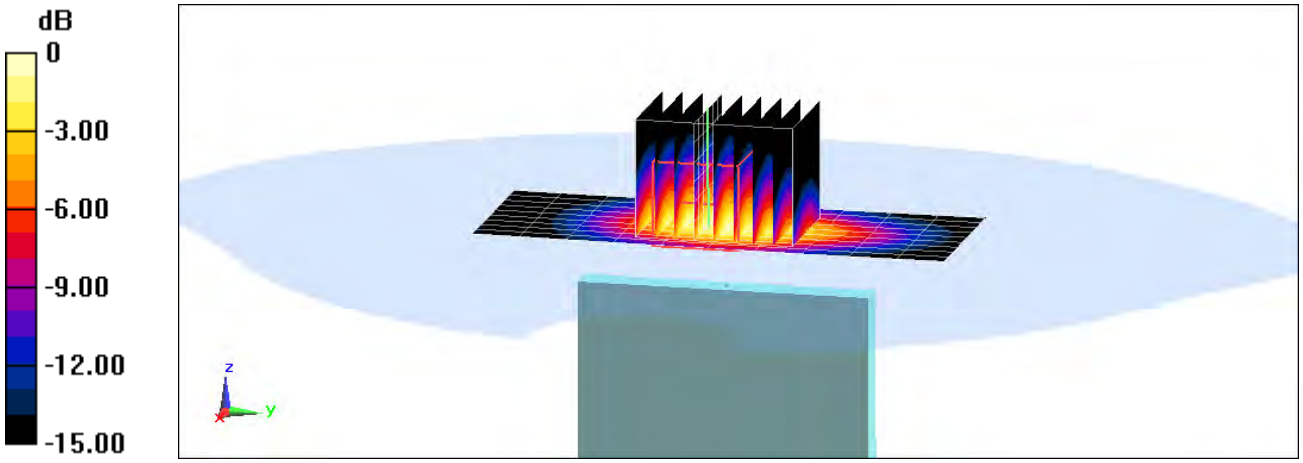
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body, Medium parameters used (interpolated):
$f = 2680$ MHz; $\sigma = 2.325$ S/m; $\varepsilon_r = 50.529$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3334; ConvF(4.29, 4.29, 4.29); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
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, Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (10x11x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.72 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.98 W/kg
SAR(1 g) = 0.936 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 85F64

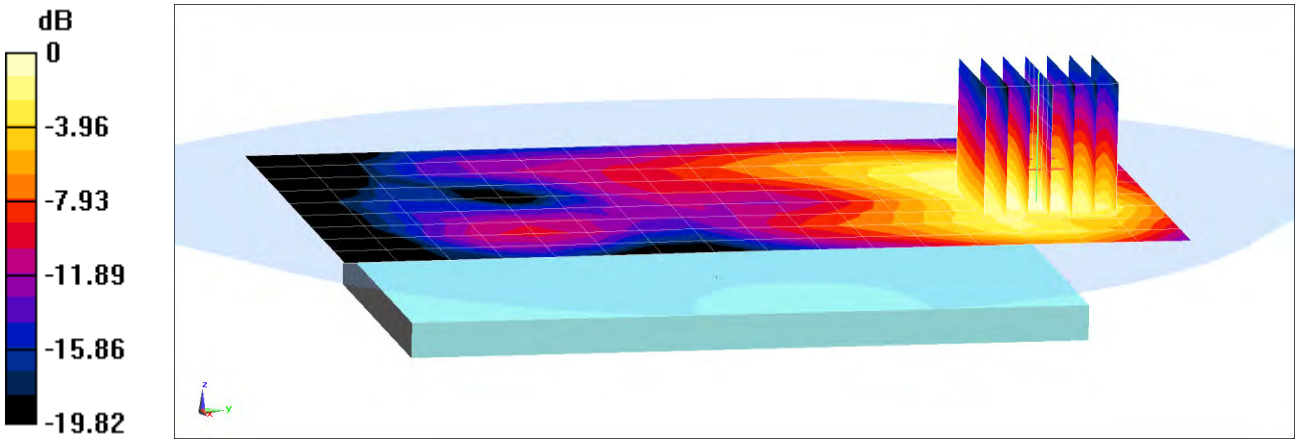
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.995 S/m; ε_r = 51.029; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-29-2017; Ambient Temp: 23.5°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 04/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 04/14/2016
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 06, 1 Mbps, Back Side, Antenna 1

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.21 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.423 W/kg
SAR(1 g) = 0.223 W/kg



0 dB = 0.347 W/kg = -4.60 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 85F64

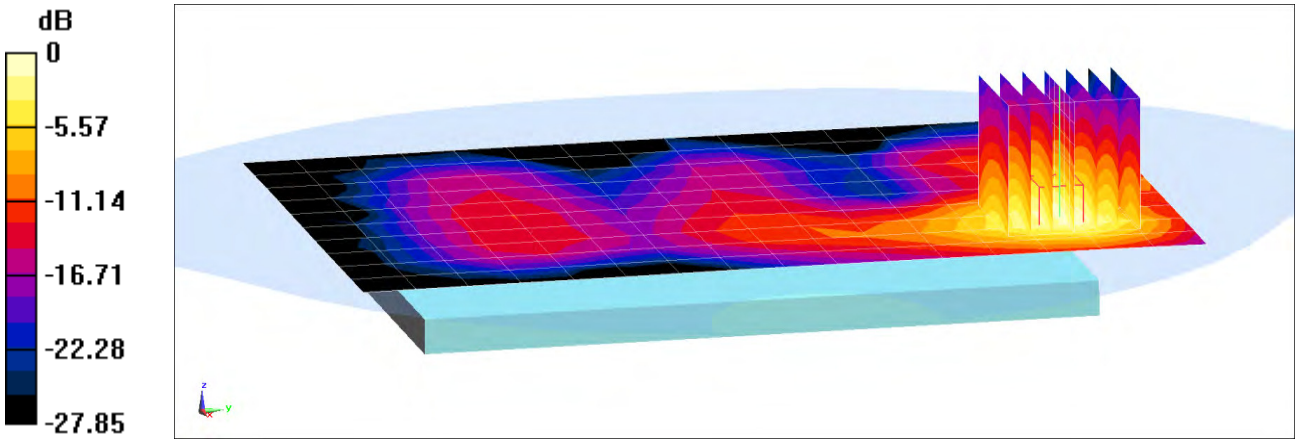
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.028 S/m; ε_r = 50.935; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-29-2017; Ambient Temp: 23.5°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 04/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 04/14/2016
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 11, 1 Mbps, Back Side, Antenna 2

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.075 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.511 W/kg



0 dB = 0.888 W/kg = -0.52 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 05C28

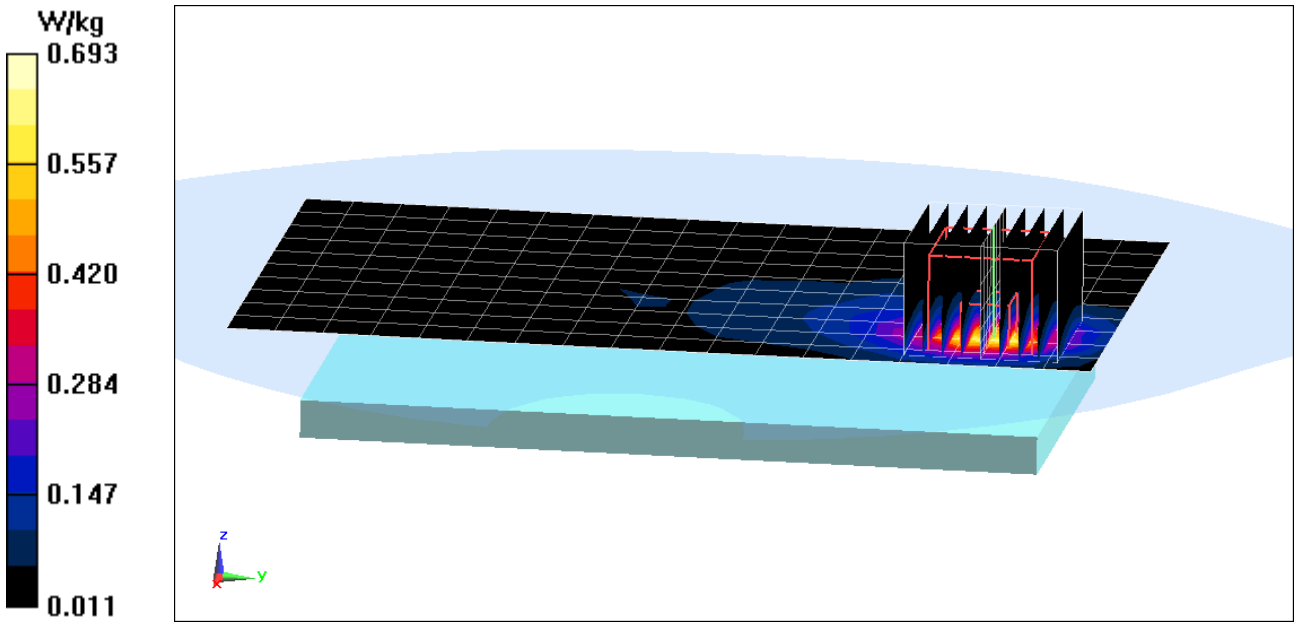
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5280 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5280 MHz; σ = 5.555 S/m; ε_r = 47.102; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 05-30-2016; Ambient Temp: 22.8°C; Tissue Temp: 21.6°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 v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a, UNII-2A, 20 MHz Bandwidth,
Body SAR, Ch 56, 6 Mbps, Back Side, Antenna 1

Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 7.580 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.308 W/kg



DUT: A3LSMN935F; Type: Portable Handset; Serial: 05C28

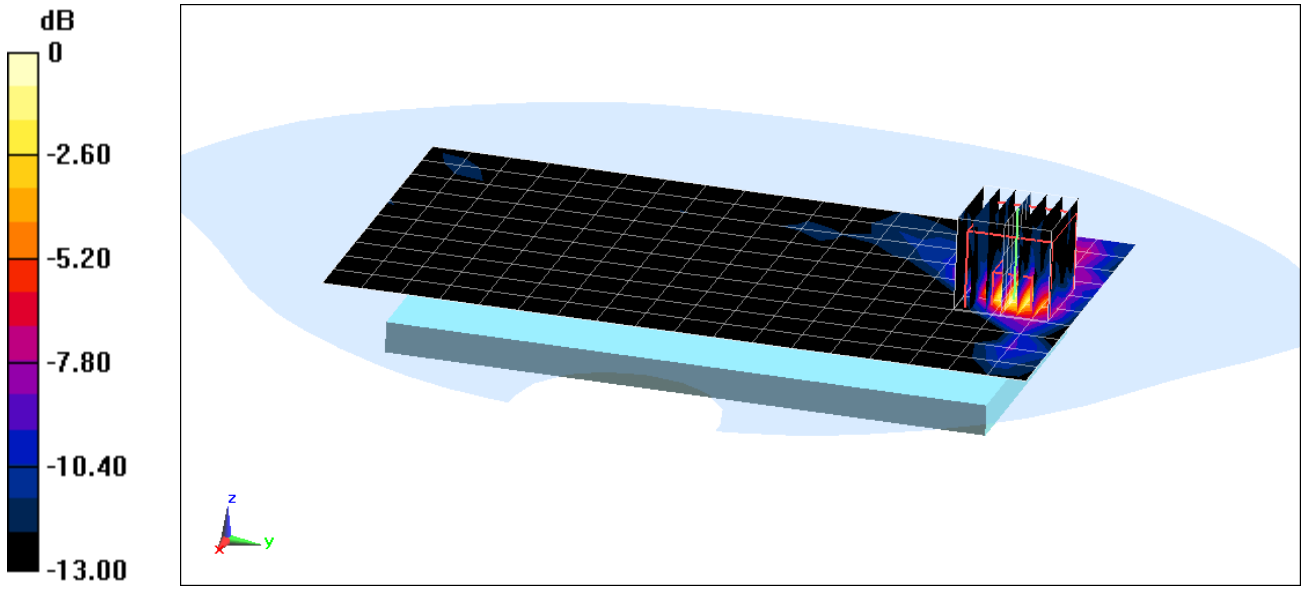
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5825 MHz; σ = 6.296 S/m; ε_r = 46.12; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-30-2016; Ambient Temp: 22.8°C; Tissue Temp: 21.6°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 v5.0 front; Type: QD000P40CD; Serial: TP-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 165, 6 Mbps, Front Side, Antenna 1

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 = 5.709 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.663 W/kg
SAR(1 g) = 0.158 W/kg



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

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

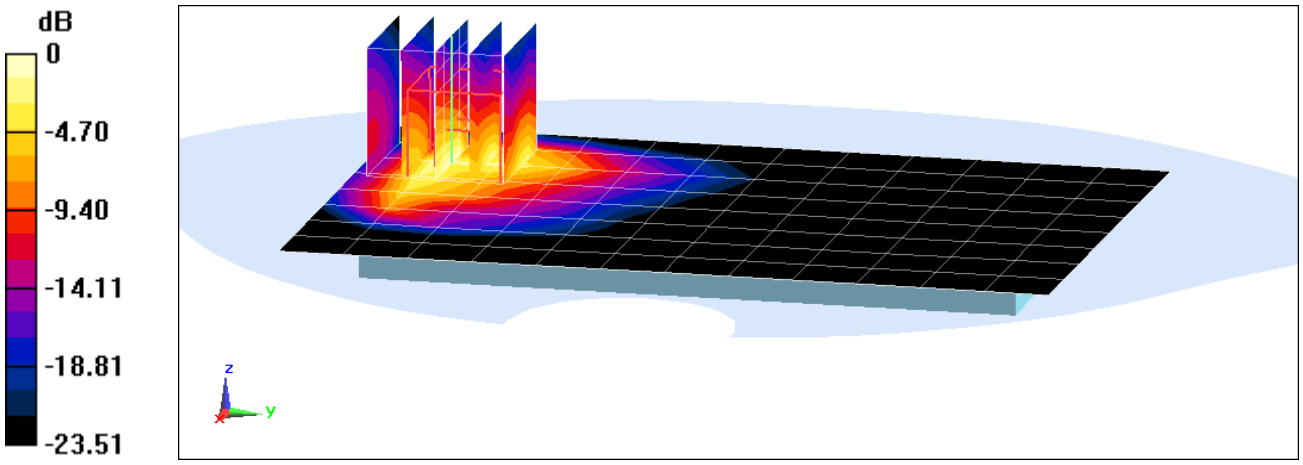
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.483 S/m; ε_r = 51.757; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1750, Phablet SAR, Front 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 = 51.68 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 9.34 W/kg
SAR(10 g) = 1.57 W/kg



0 dB = 6.90 W/kg = 8.39 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

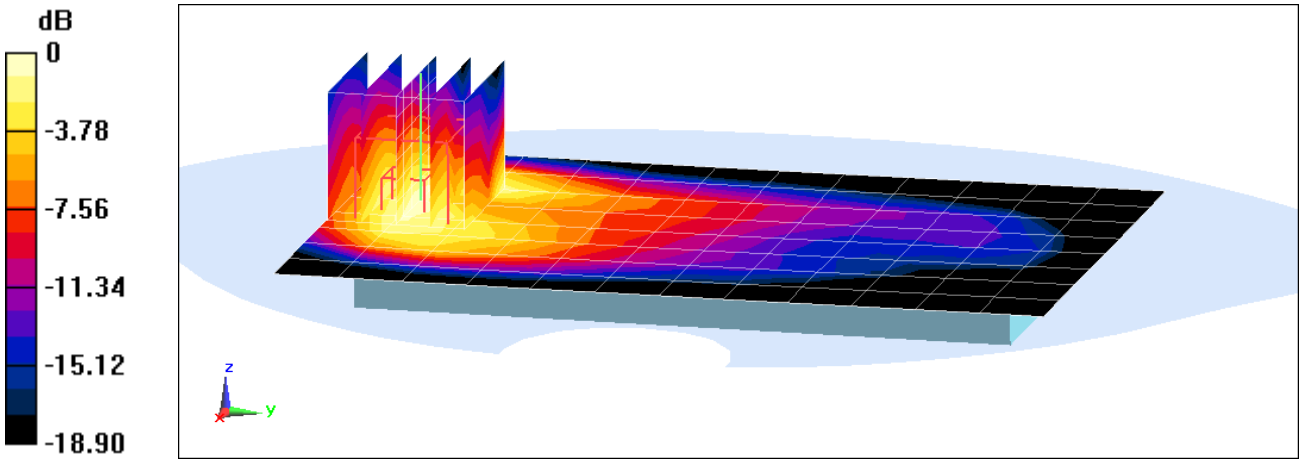
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
$f = 1907.6$ MHz; $\sigma = 1.573$ S/m; $\varepsilon_r = 51.932$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 1900, Phablet SAR, Front side, High.ch

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 41.75 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 6.27 W/kg
SAR(10 g) = 1.28 W/kg



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

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

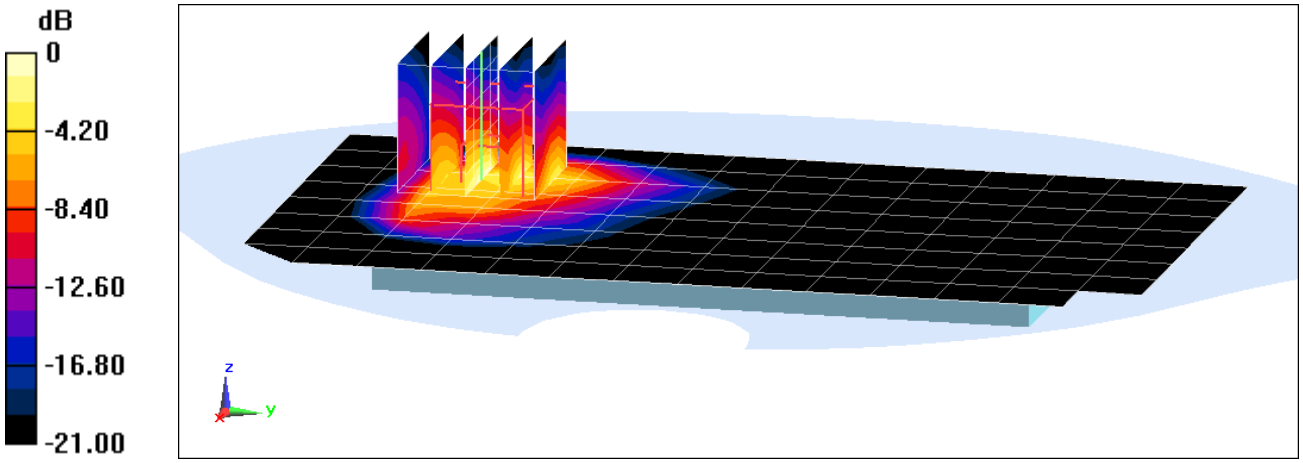
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.483 S/m; ε_r = 51.756; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 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 4 (AWS), Phablet SAR, Front side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 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 = 56.87 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 11.7 W/kg
SAR(10 g) = 1.91 W/kg



0 dB = 7.98 W/kg = 9.02 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

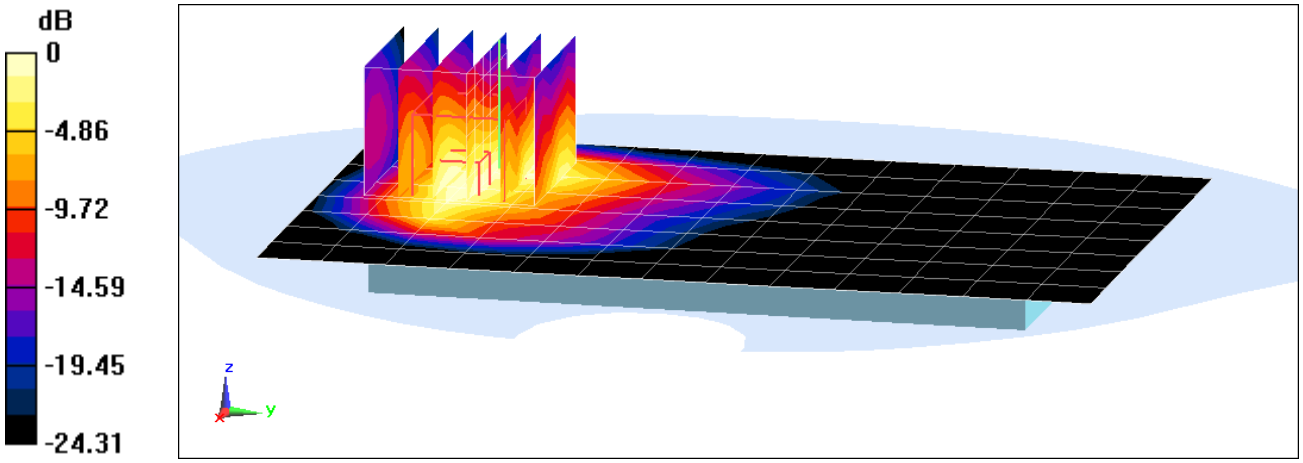
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.565 S/m; ε_r = 51.956; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 2 (PCS), Phablet SAR, Front side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.82 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 4.81 W/kg
SAR(10 g) = 1.11 W/kg



0 dB = 2.62 W/kg = 4.18 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 841E0

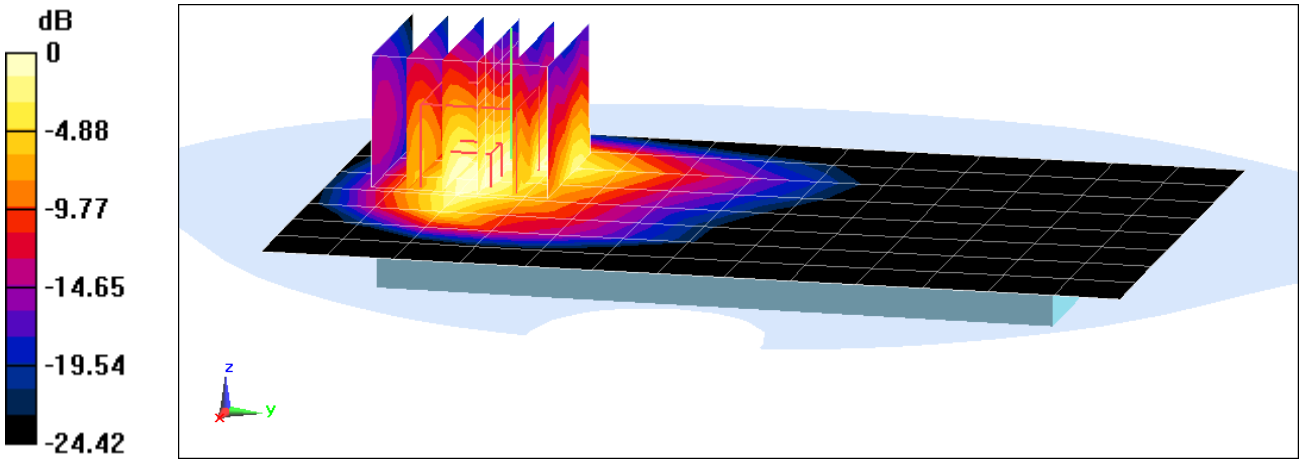
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.57 S/m; ε_r = 51.94; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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 25 (PCS), Phablet SAR, Front side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.85 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.98 W/kg
SAR(10 g) = 0.929 W/kg



0 dB = 2.16 W/kg = 3.34 dBW/kg

DUT: A3LSMN935F; Type: Portable Handset; Serial: 05C28

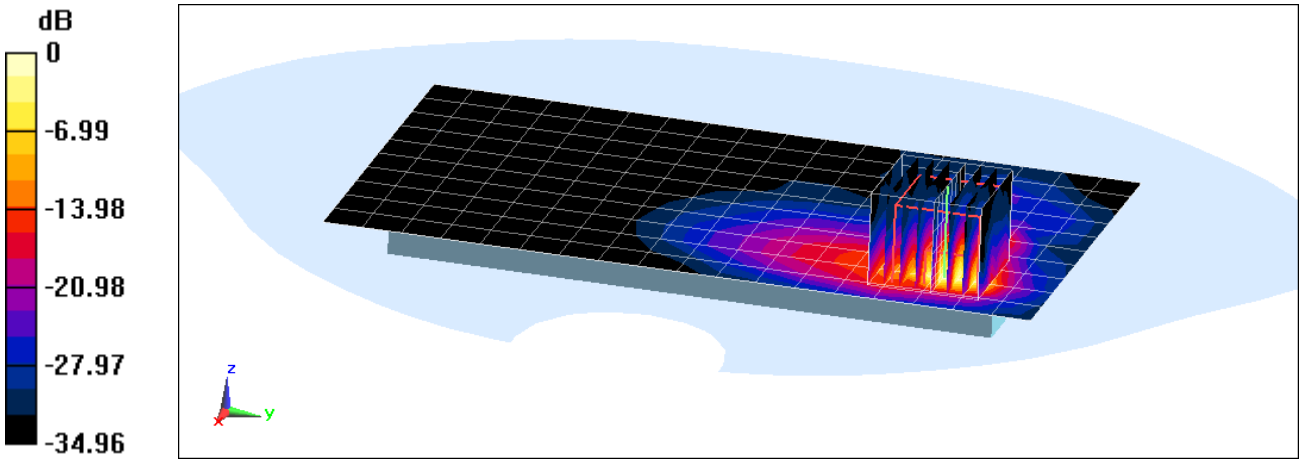
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5280 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5280 MHz; σ = 5.555 S/m; ε_r = 47.102; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 05-30-2016; Ambient Temp: 22.8°C; Tissue Temp: 21.6°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 v5.0 front; Type: QD000P40CD; Serial: TP-1646
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: IEEE 802.11a, UNII-2A, 20 MHz Bandwidth,
Phablet SAR, Ch 56, 6 Mbps, Back Side, Antenna 1

Area Scan (11x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 45.30 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 90.7 W/kg
SAR(10 g) = 1.67 W/kg



0 dB = 35.9 W/kg = 15.55 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

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PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1046

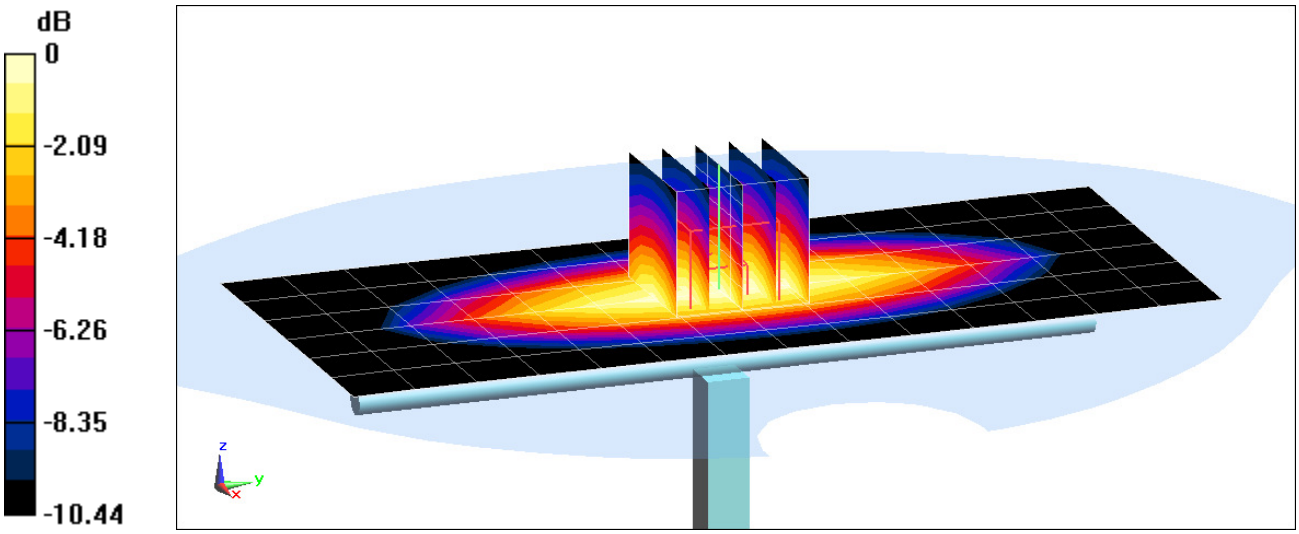
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
$f = 750$ MHz; $\sigma = 0.893$ S/m; $\varepsilon_r = 41.354$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 21.9°C

Probe: ES3DV2 - SN3022; ConvF(6.33, 6.33, 6.33); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: TP:7535
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) = 2.41 W/kg
SAR(1 g) = 1.62 W/kg
Deviation(1 g) = -1.22%



0 dB = 1.90 W/kg = 2.79 dBW/kg

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

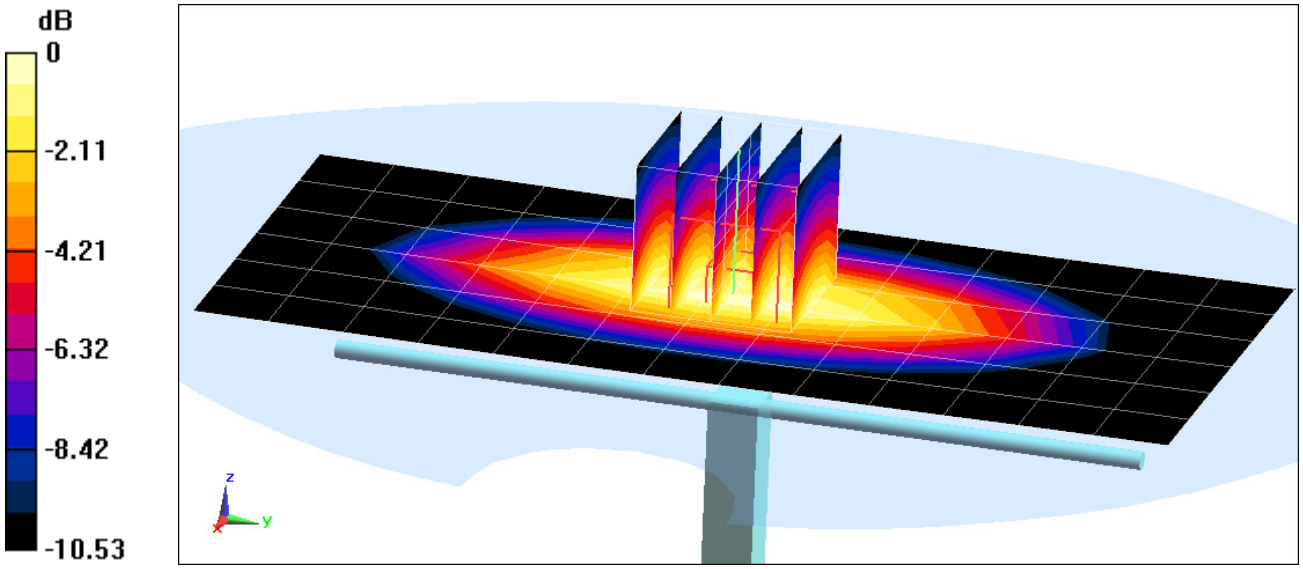
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.9 S/m; ε_r = 41.083; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-01-2016; Ambient Temp: 24.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3333; ConvF(6.16, 6.16, 6.16); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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) = 2.76 W/kg
SAR(1 g) = 1.86 W/kg
Deviation(1 g) = 1.75%



0 dB = 2.18 W/kg = 3.38 dBW/kg

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

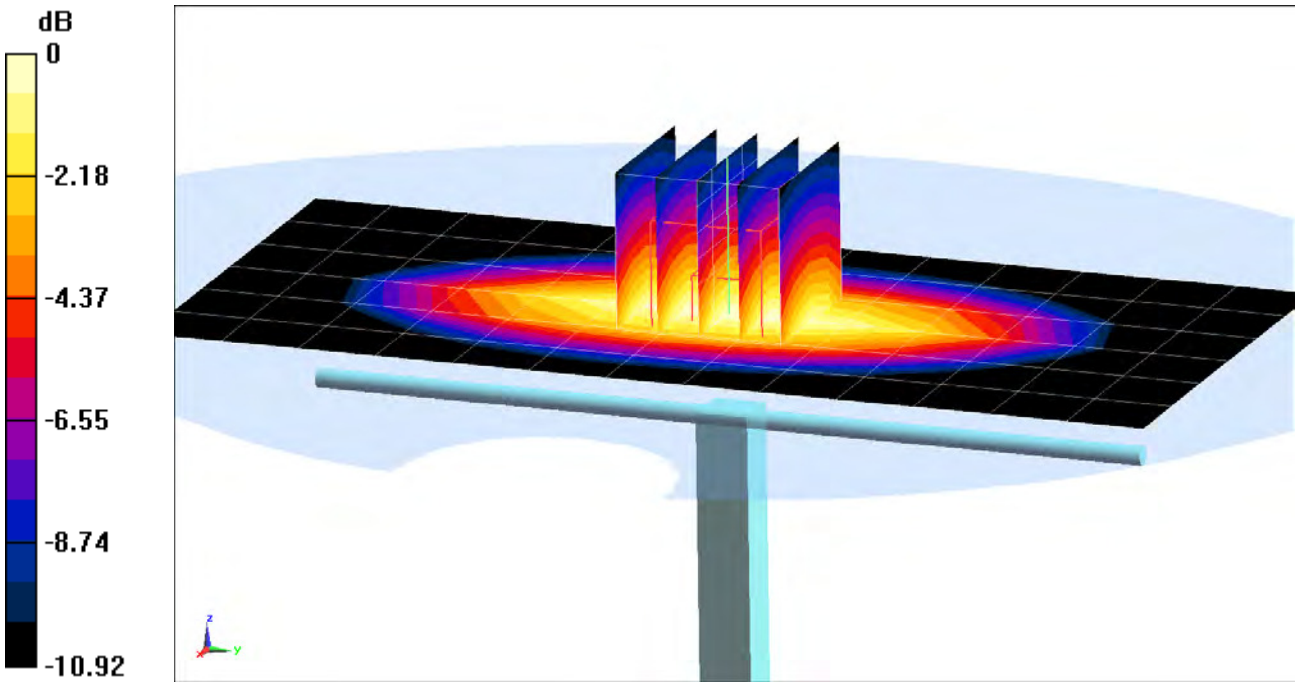
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.884 S/m; ε_r = 40.108; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-27-2017; Ambient Temp: 22.0°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7406; ConvF(9.83, 9.83, 9.83); Calibrated: 04/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 04/14/2016
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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) = 2.79 W/kg
SAR(1 g) = 1.84 W/kg
Deviation(1 g) = -1.29%



0 dB = 2.48 W/kg = 3.94 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

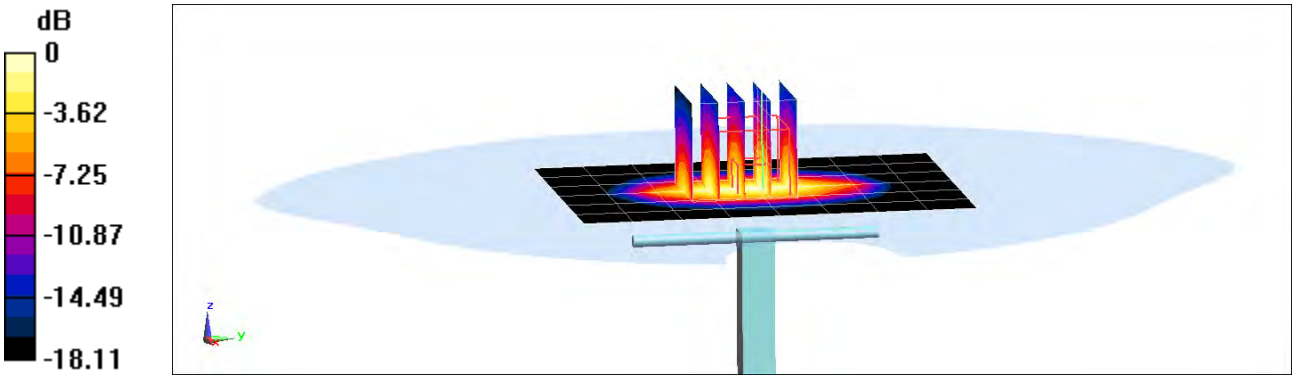
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.366 S/m; ε_r = 39.201; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(8.85, 8.85, 8.85); 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 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.32 W/kg
SAR(1 g) = 3.44 W/kg
Deviation(1 g) = -4.71%



0 dB = 5.22 W/kg = 7.18 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

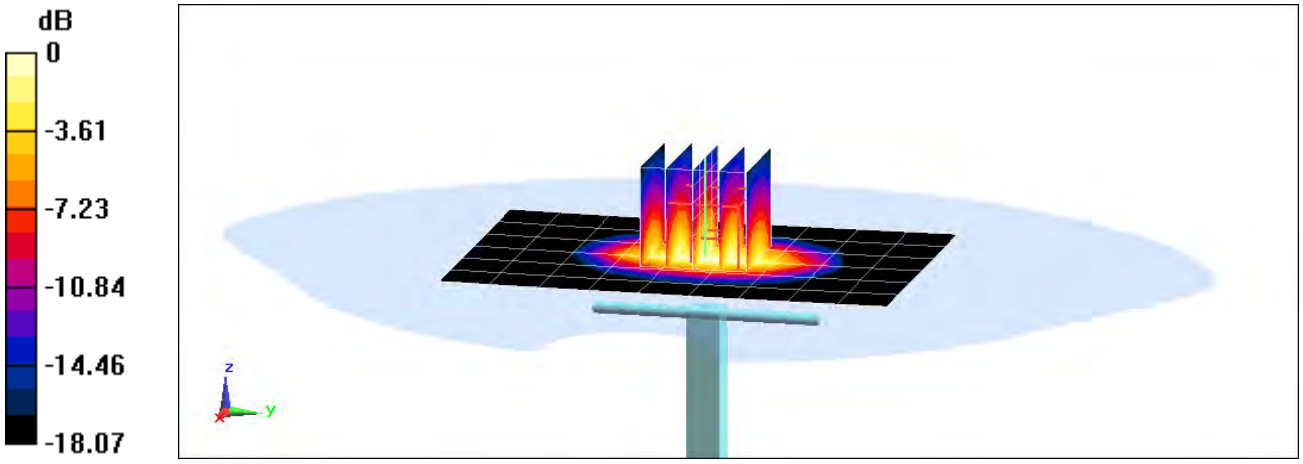
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.423 S/m; ε_r = 39.03; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-03-2016; Ambient Temp: 23.0°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3333; ConvF(5.03, 5.03, 5.03); Calibrated: 10/29/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 10/27/2015
Phantom: SAM Right; Type: QD000P40CD; Serial: 1757
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) = 7.53 W/kg
SAR(1 g) = 4.15 W/kg
Deviation(1 g) = 7.79%



0 dB = 5.26 W/kg = 7.21 dBW/kg

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

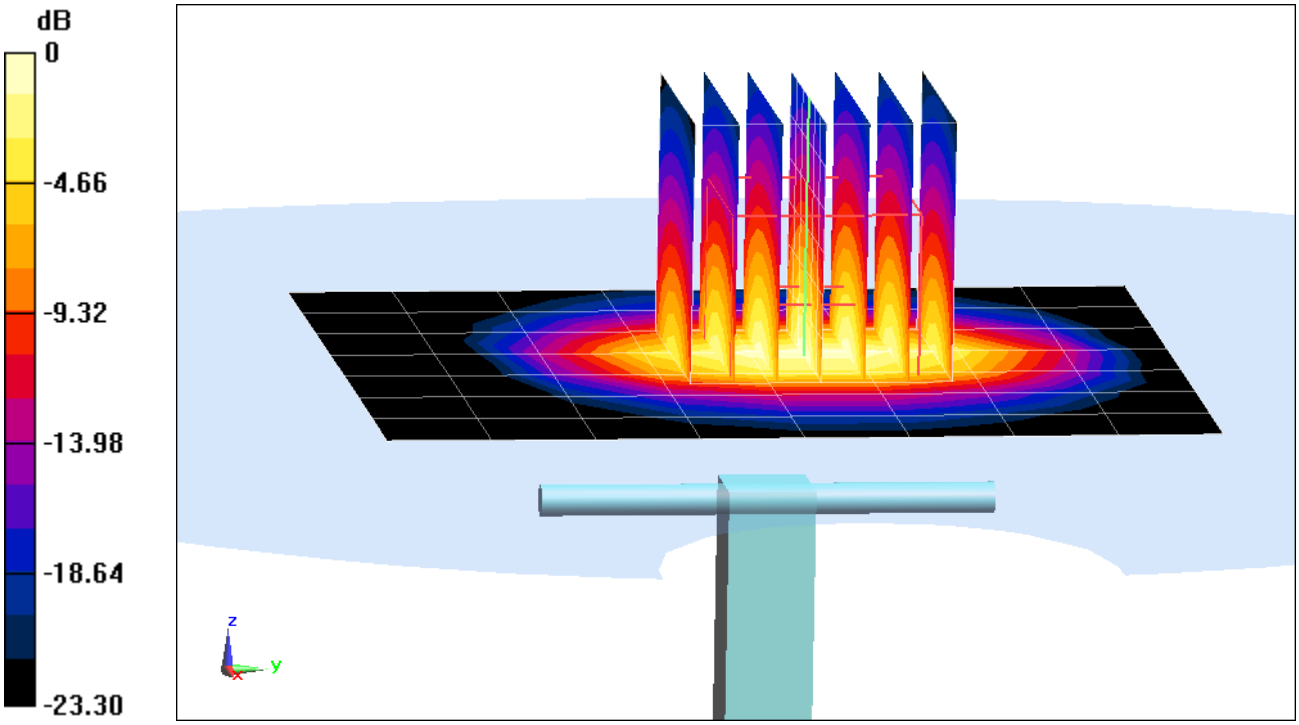
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.829 S/m; ε_r = 40.801; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-31-2016; Ambient Temp: 23.8°C; Tissue Temp: 22.8°C

Probe: ES3DV2 - SN3022; ConvF(4.3, 4.3, 4.3); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
SAR(1 g) = 5.34 W/kg
Deviation(1 g) = 5.74%



0 dB = 7.15 W/kg = 8.54 dBW/kg

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

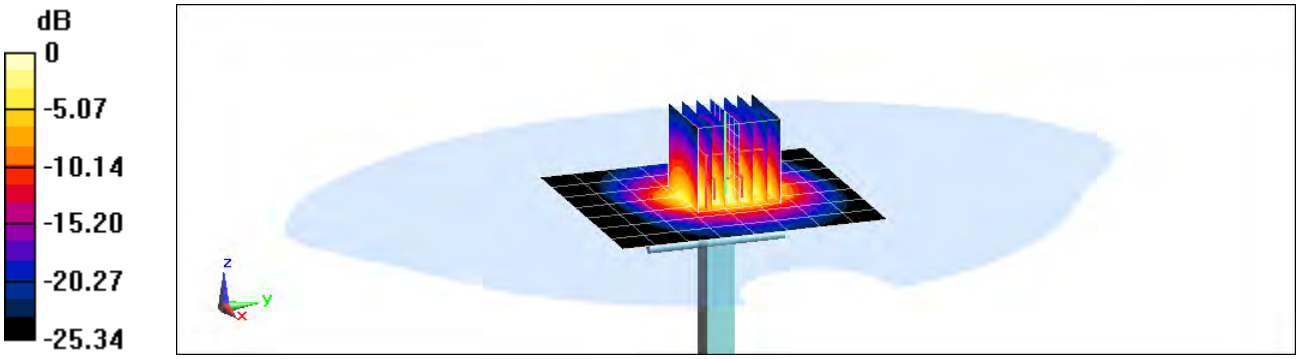
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; σ = 2.001 S/m; ε_r = 40.227; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-31-2016; Ambient Temp: 23.8°C; Tissue Temp: 22.8°C

Probe: ES3DV2 - SN3022; ConvF(4.12, 4.12, 4.12); Calibrated: 8/26/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/16/2015
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.9 W/kg
SAR(1 g) = 5.81 W/kg
Deviation(1 g) = 3.94%



0 dB = 7.84 W/kg = 8.94 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

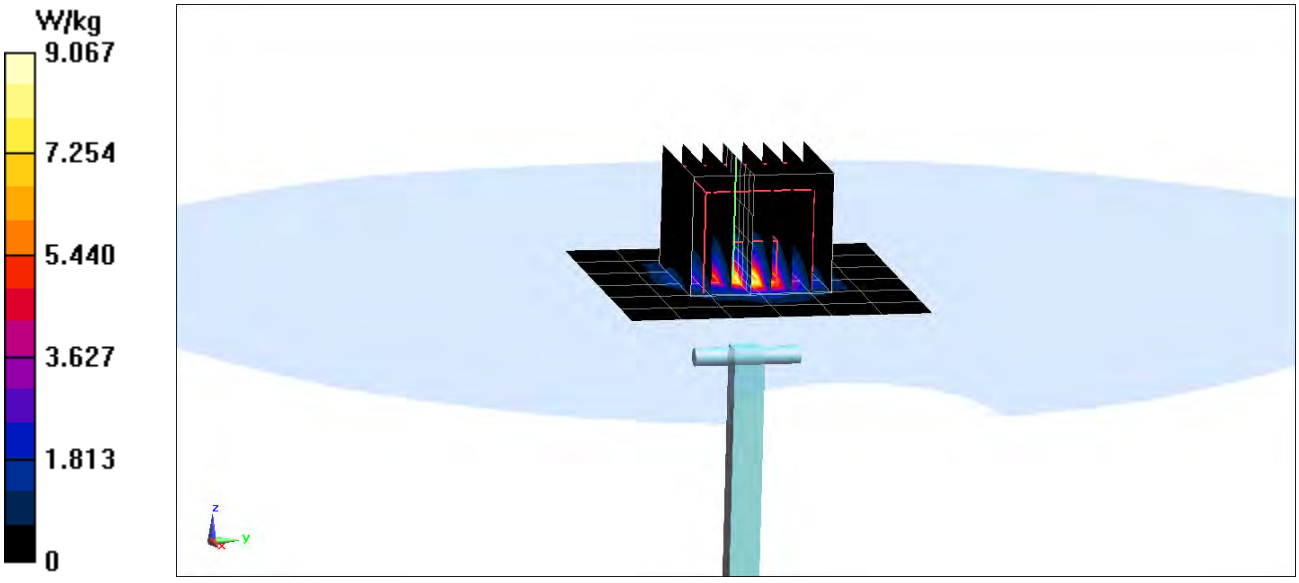
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used (interpolated):
f = 5250 MHz; σ = 4.633 S/m; ε_r = 35.088; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-06-2016; Ambient Temp: 20.5°C; Tissue Temp: 20.8°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) = 15.9 W/kg
SAR(1 g) = 3.84 W/kg
Deviation(1 g) = -2.41%



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

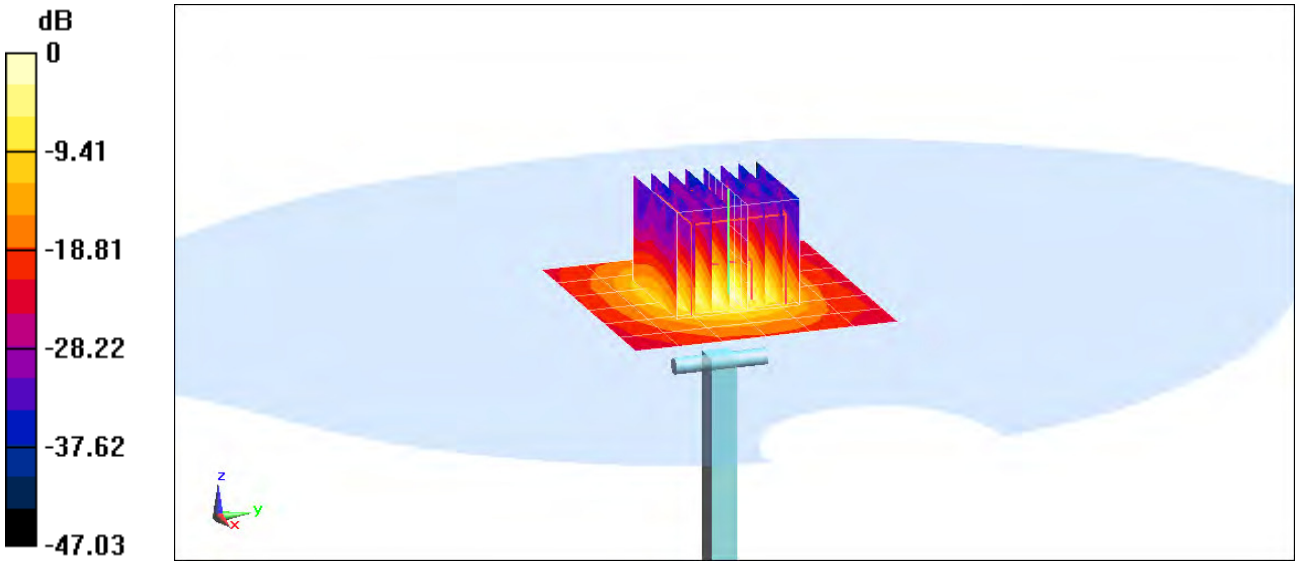
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
$f = 5250$ MHz; $\sigma = 4.592$ S/m; $\varepsilon_r = 35.483$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-06-2017; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7308; ConvF(5.21, 5.21, 5.21); Calibrated: 7/21/2016;
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)

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) = 15.9 W/kg
SAR(1 g) = 3.67 W/kg
Deviation(1 g) = -7.32%



0 dB = 9.12 W/kg = 9.60 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

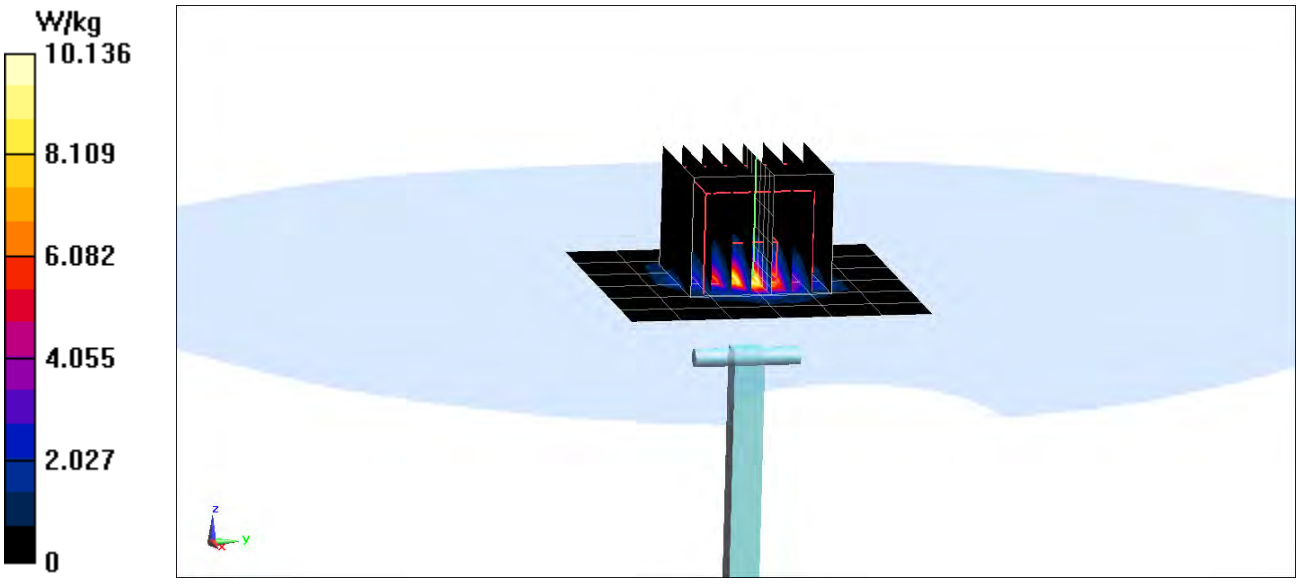
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.989 S/m; ε_r = 34.615; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-06-2016; Ambient Temp: 20.5°C; Tissue Temp: 20.8°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) = 17.6 W/kg
SAR(1 g) = 4.25 W/kg
Deviation(1 g) = 3.28%



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

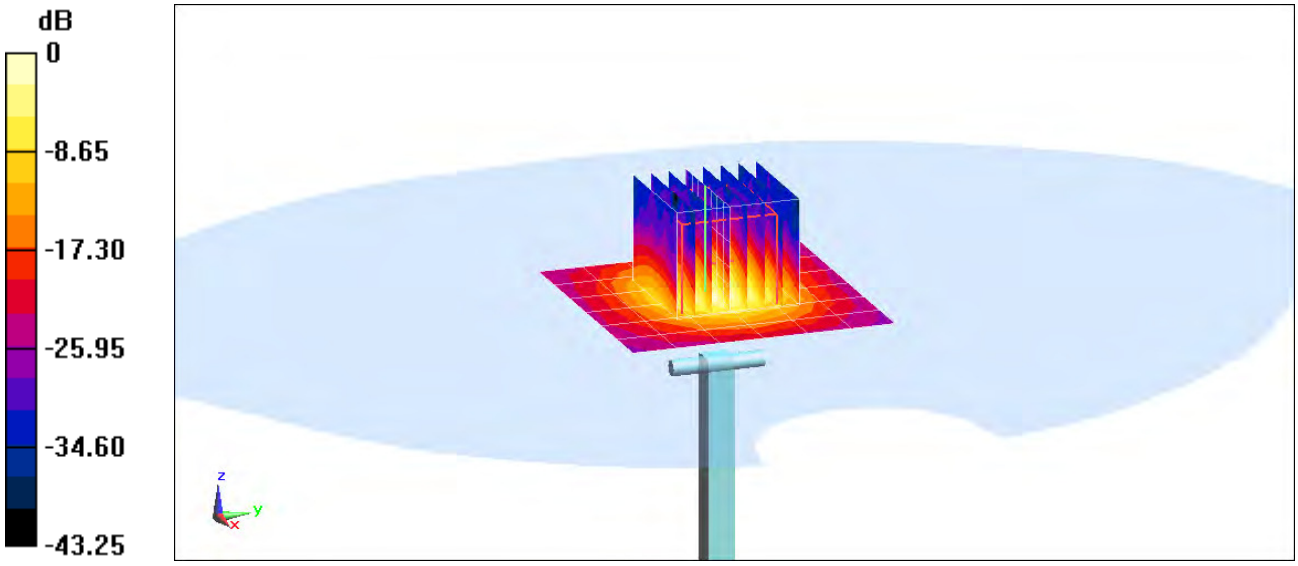
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.915 S/m; ε_r = 34.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-06-2017; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7308; ConvF(4.63, 4.63, 4.63); Calibrated: 7/21/2016;
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)

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) = 16.8 W/kg
SAR(1 g) = 3.9 W/kg
Deviation(1 g) = -6.36%



0 dB = 9.51 W/kg = 9.78 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

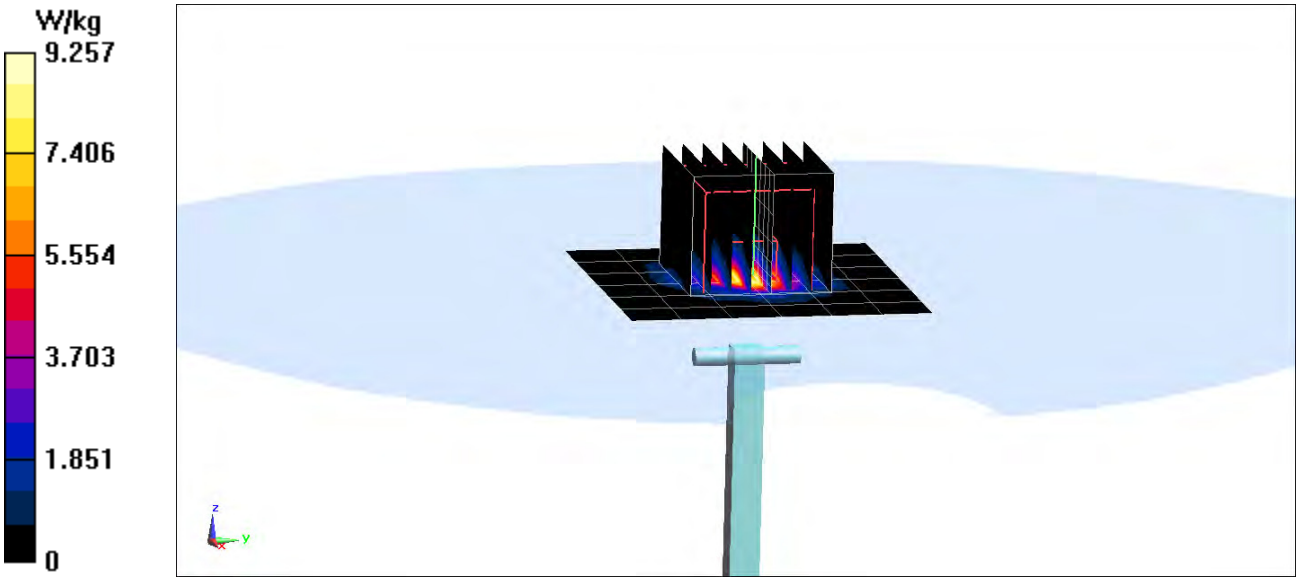
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.146 S/m; ε_r = 34.392; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-06-2016; Ambient Temp: 20.5°C; Tissue Temp: 20.8°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) = 16.4 W/kg
SAR(1 g) = 3.88 W/kg
Deviation(1 g) = -1.90%



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

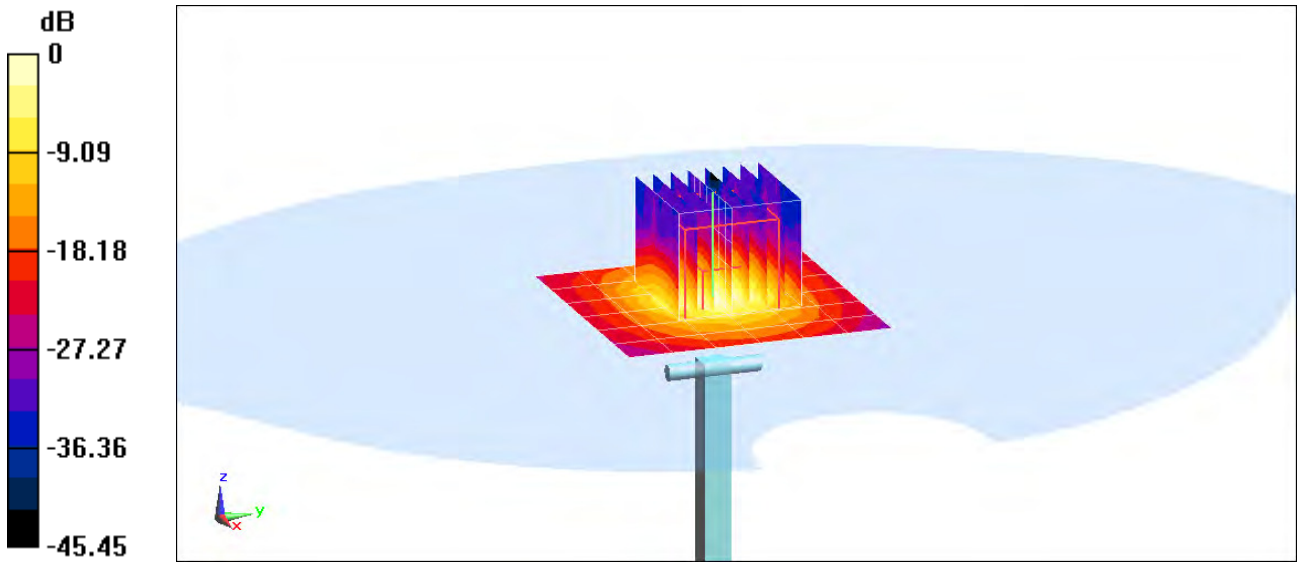
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
$f = 5750$ MHz; $\sigma = 5.065$ S/m; $\varepsilon_r = 34.841$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-06-2017; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7308; ConvF(4.86, 4.86, 4.86); Calibrated: 7/21/2016;
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)

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) = 3.68 W/kg
Deviation(1 g) = -9.69%



0 dB = 9.52 W/kg = 9.79 dBW/kg

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

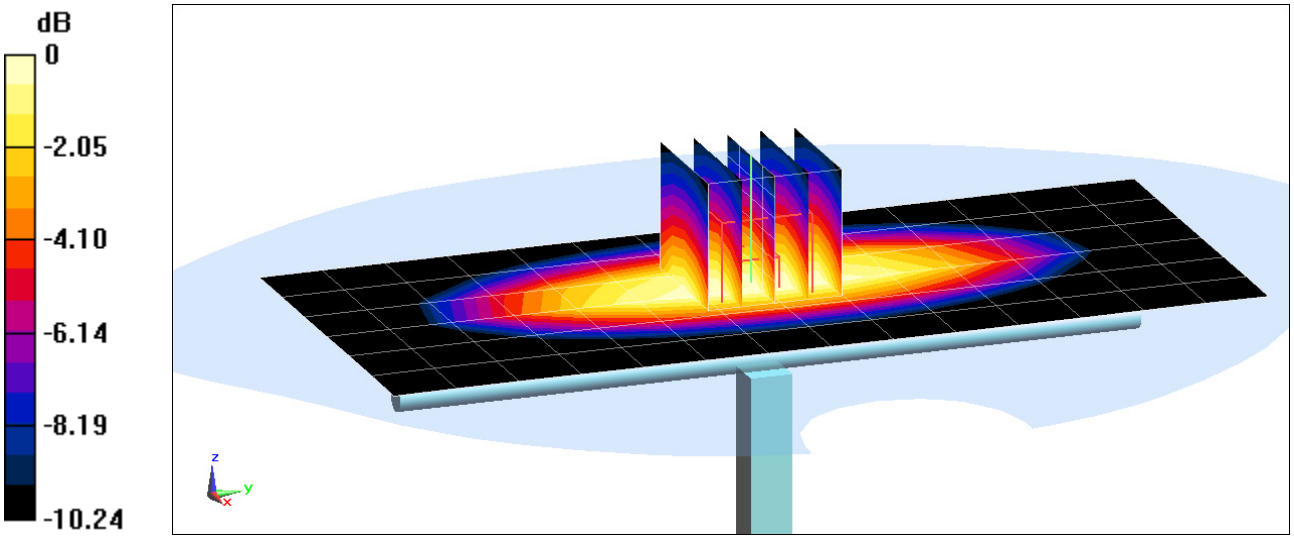
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.975 S/m; ε_r = 54.677; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-06-2016; Ambient Temp: 22.8°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3334; ConvF(6.37, 6.37, 6.37); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
Phantom: SAM Front; Type: SAM; Serial: 1686
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) = 2.52 W/kg
SAR(1 g) = 1.71 W/kg
Deviation(1 g) = -0.12%



0 dB = 2.01 W/kg = 3.03 dBW/kg

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

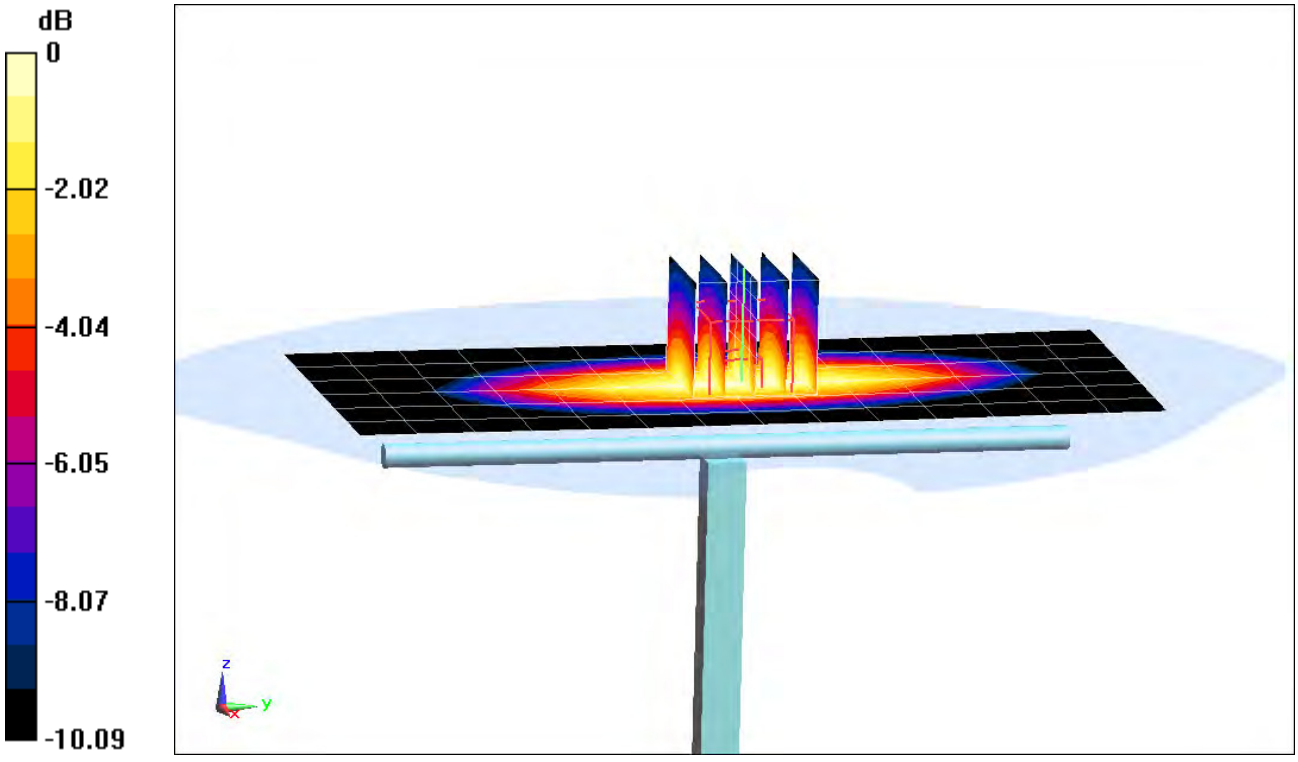
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.952 S/m; ε_r = 54.192; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2017; Ambient Temp: 24.5°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3213; ConvF(6.38, 6.38, 6.38); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
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) = 2.34 W/kg
SAR(1 g) = 1.59 W/kg
Deviation(1 g) = -5.69%



0 dB = 1.85 W/kg = 2.67 dBW/kg

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

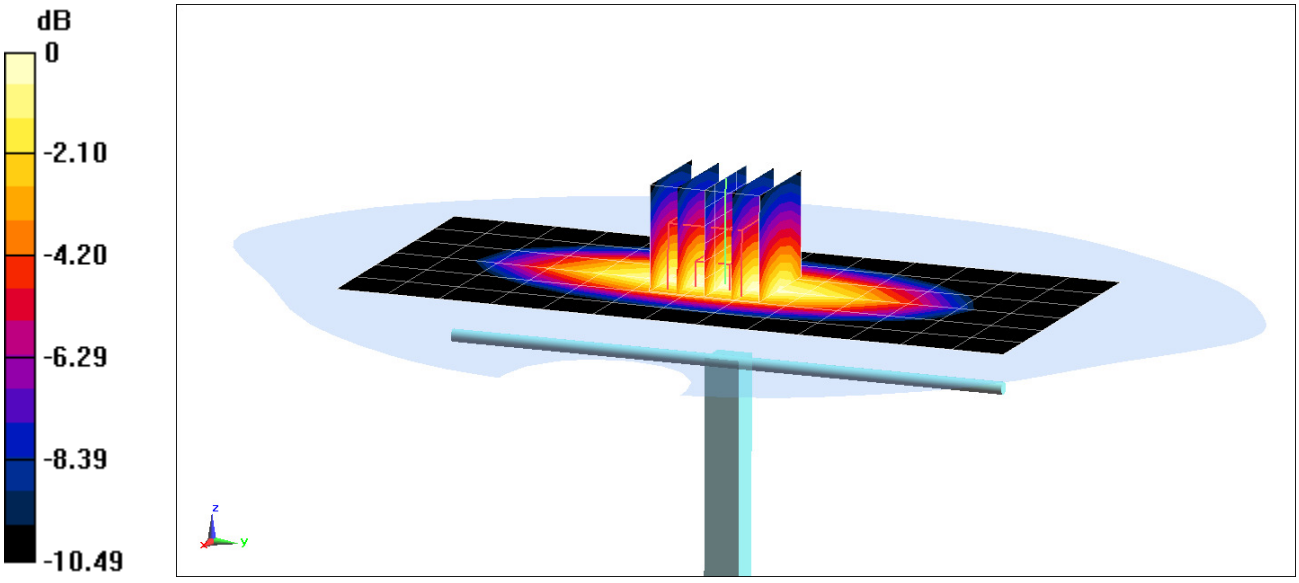
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 1 S/m; ε_r = 53.494; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-02-2016; Ambient Temp: 21.0°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3318; ConvF(6.11, 6.11, 6.11); Calibrated: 2/19/2016;
Sensor-Surface: 3mm (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)

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) = 2.88 W/kg
SAR(1 g) = 1.98 W/kg
Deviation(1 g) = 8.32%



0 dB = 2.30 W/kg = 3.62 dBW/kg

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

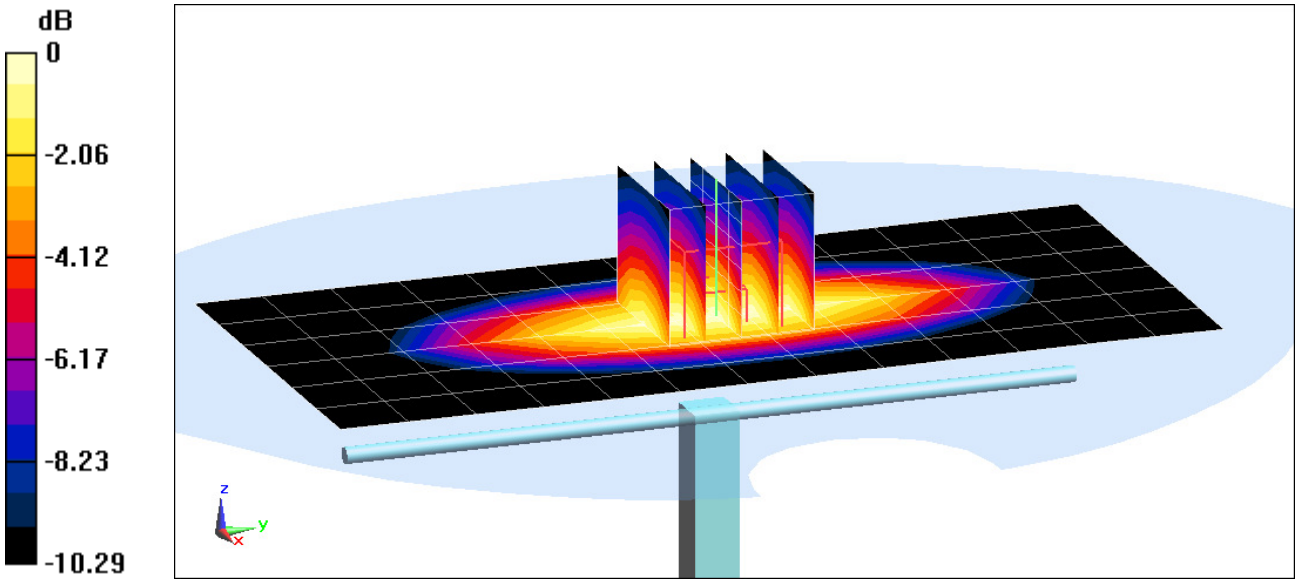
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.994 S/m; ε_r = 55.071; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2017; Ambient Temp: 21.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3318; ConvF(6.37, 6.37, 6.37); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
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) = 2.96 W/kg
SAR(1 g) = 2.03 W/kg
Deviation(1 g) = 6.84%



0 dB = 2.38 W/kg = 3.77 dBW/kg

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d047

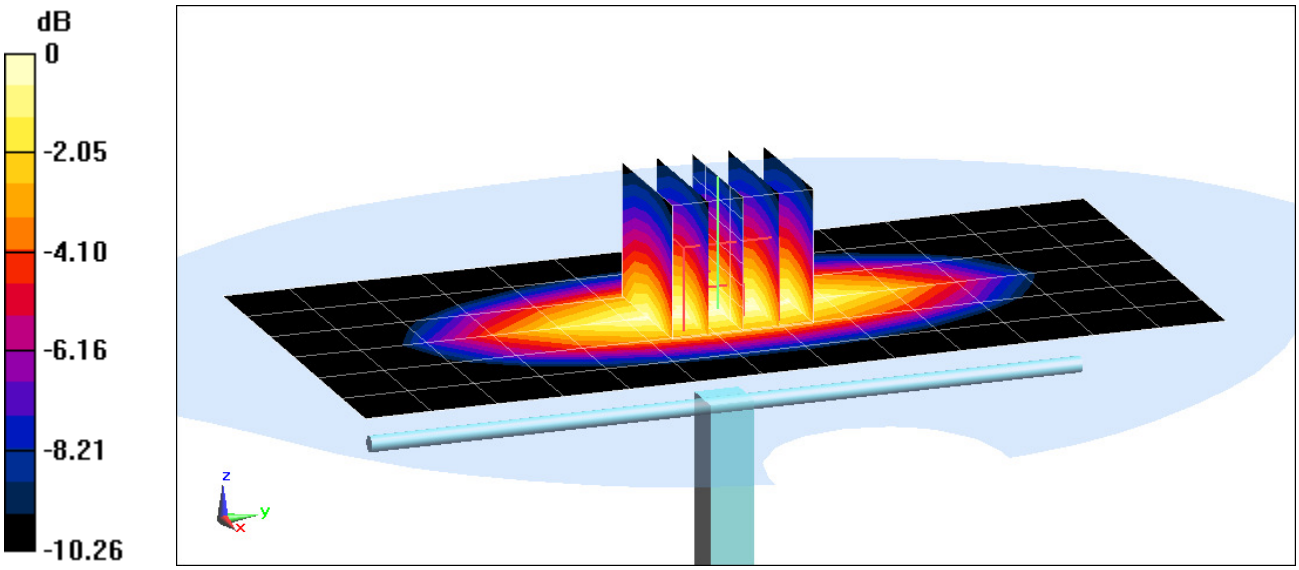
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.987 S/m; ε_r = 53.127; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-10-2017; Ambient Temp: 22.9°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3318; ConvF(6.37, 6.37, 6.37); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
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) = 2.81 W/kg
SAR(1 g) = 1.94 W/kg
Deviation(1 g) = 1.36%



0 dB = 2.26 W/kg = 3.54 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

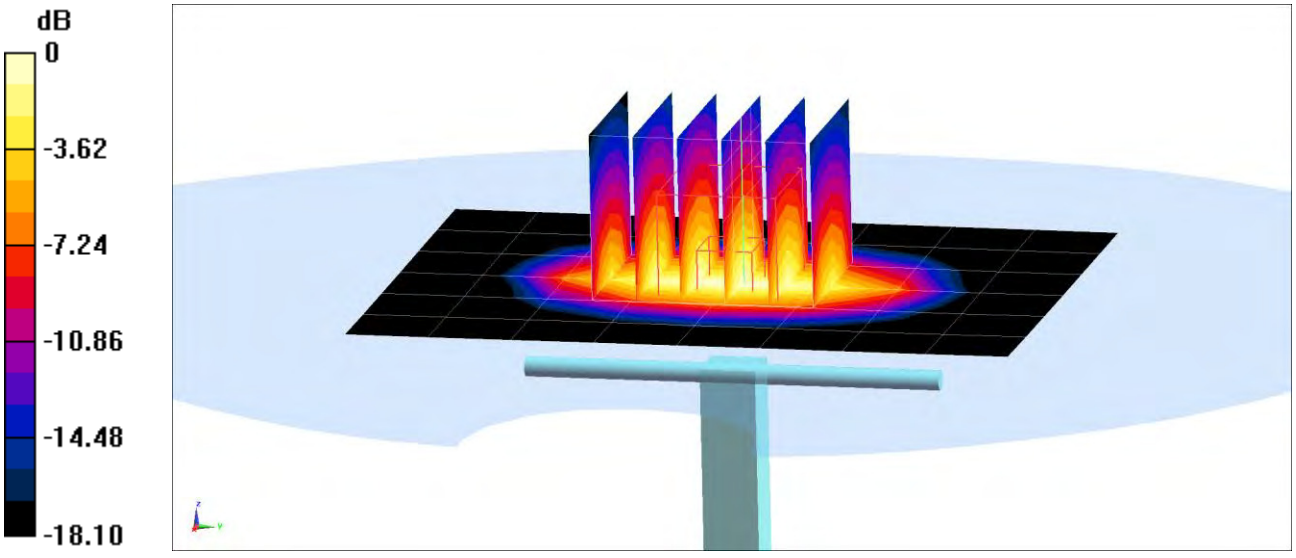
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.502 S/m; ε_r = 51.718; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-01-2016; Ambient Temp: 23.2°C; Tissue Temp: 21.2°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 5.0 front; Type: QD000P40CD; Serial: TP:-1648
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) = 6.93 W/kg
SAR(1 g) = 3.92 W/kg; SAR(10 g) = 2.08 W/kg
Deviation(1 g) = 7.40%; Deviation(10 g) = 6.67%



0 dB = 4.89 W/kg = 6.89 dBW/kg

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

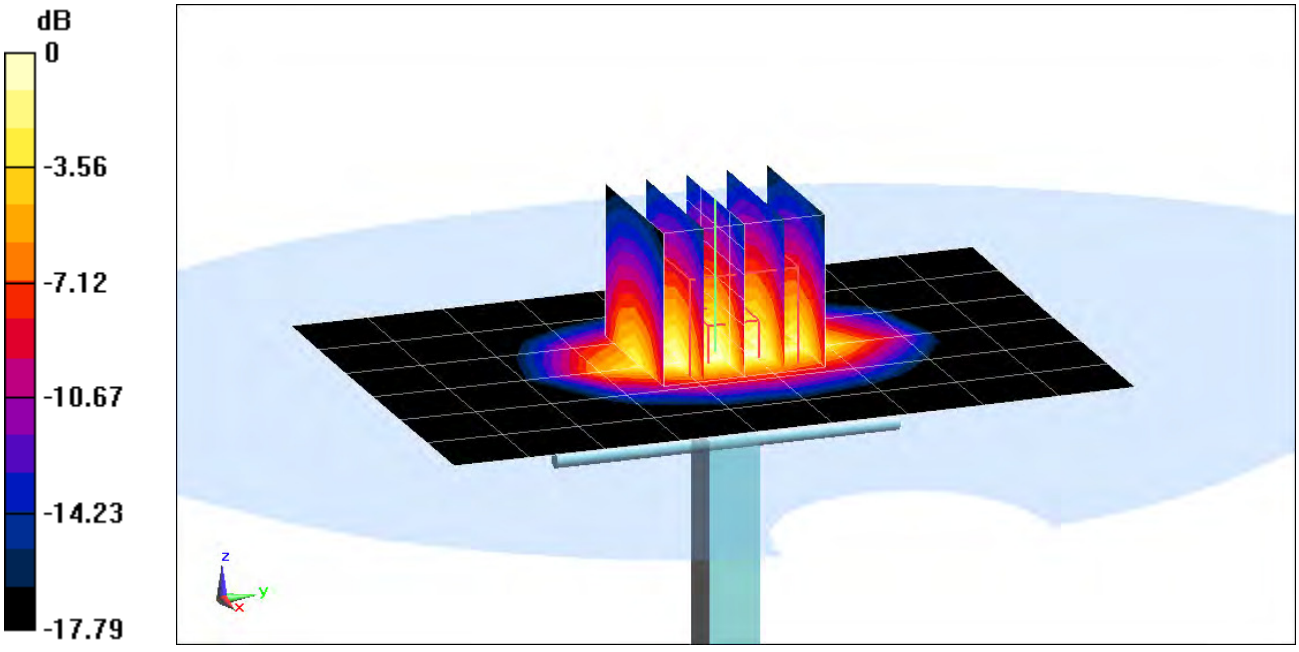
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.565 S/m; ε_r = 51.956; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-02-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3319; ConvF(4.7, 4.7, 4.7); 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)

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) = 7.51 W/kg
SAR(1 g) = 4.16 W/kg; SAR(10 g) = 2.16 W/kg
Deviation(1 g) = 5.05%; Deviation(10 g) = 3.35%



0 dB = 5.26 W/kg = 7.21 dBW/kg

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

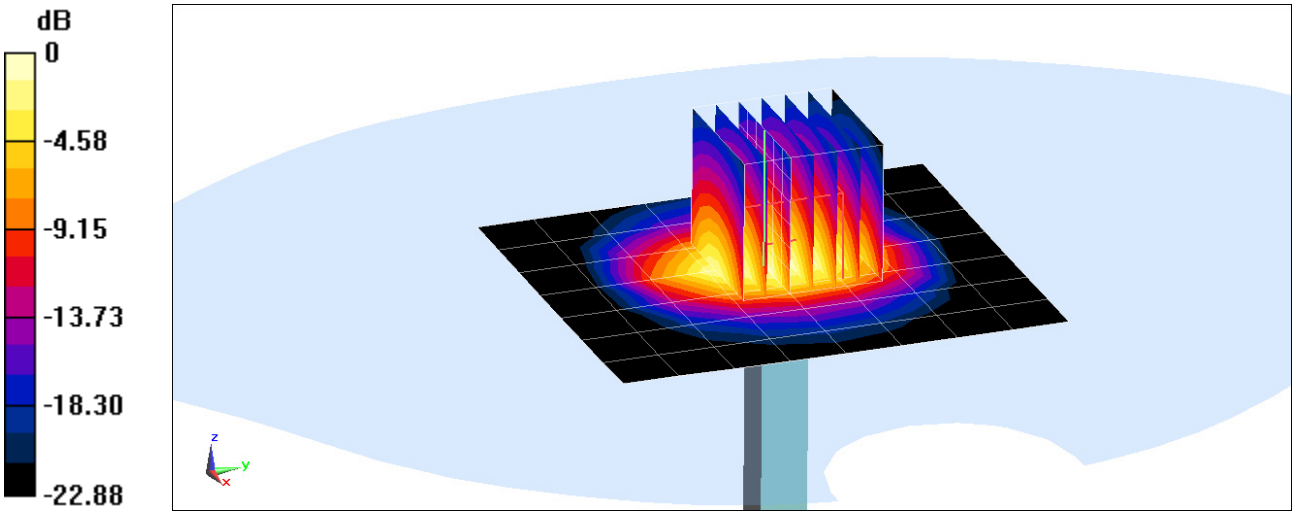
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.012 S/m; εr = 51.444; ρ = 1000 kg/m3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3334; ConvF(4.45, 4.45, 4.45); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
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) = 11.0 W/kg
SAR(1 g) = 5.2 W/kg
Deviation(1 g) = 5.26%



0 dB = 7.03 W/kg = 8.47 dBW/kg

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

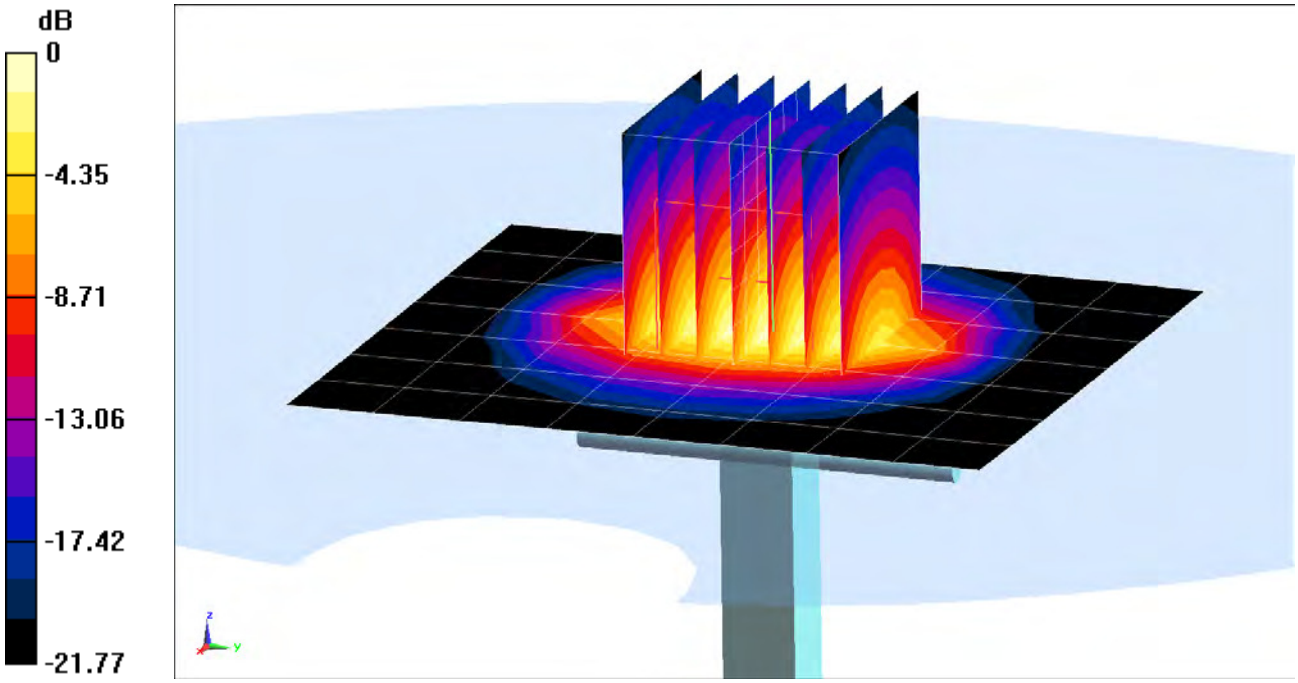
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.011 S/m; ε_r = 50.977; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-29-2017; Ambient Temp: 23.5°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(7.24, 7.24, 7.24); Calibrated: 04/19/2016;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 04/14/2016
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) = 9.77 W/kg
SAR(1 g) = 4.77 W/kg
Deviation(1 g) = -6.10%



0 dB = 7.95 W/kg = 9.00 dBW/kg

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

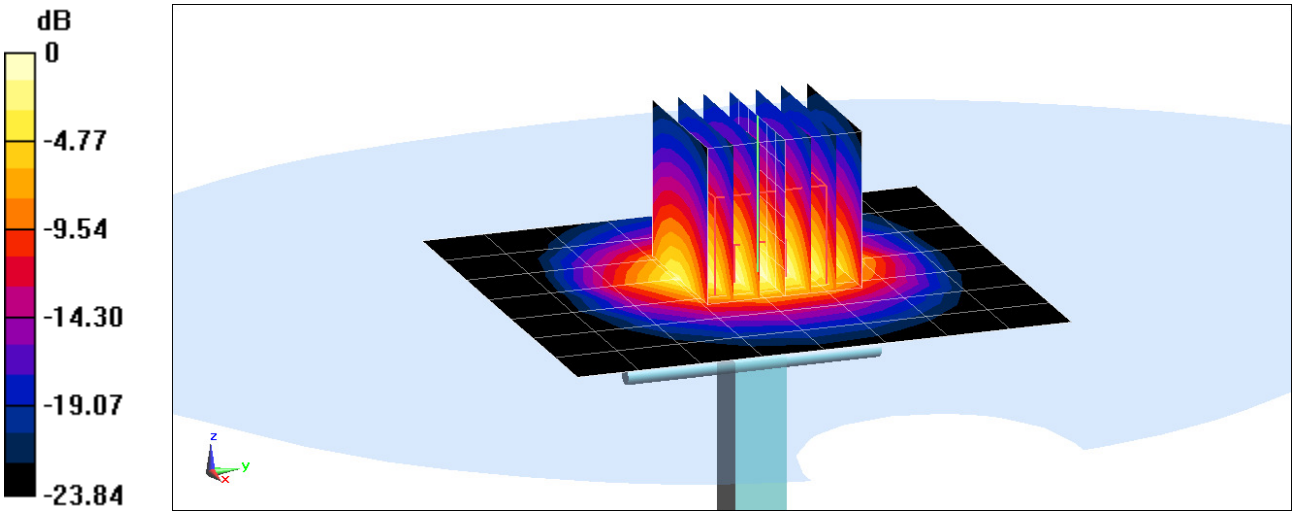
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; σ = 2.216 S/m; ε_r = 50.857; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-31-2016; Ambient Temp: 22.0°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3334; ConvF(4.29, 4.29, 4.29); Calibrated: 11/17/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 11/11/2015
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) = 12.4 W/kg
SAR(1 g) = 5.77 W/kg
Deviation(1 g) = 5.10%



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

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

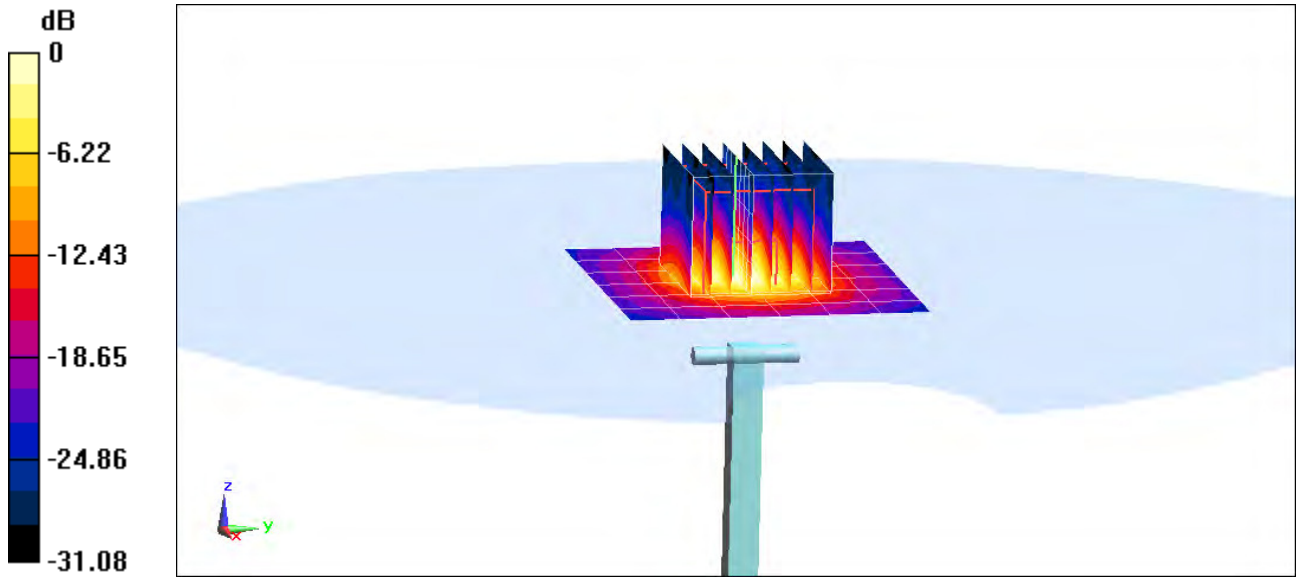
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.519 S/m; ε_r = 47.086; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-30-2016; Ambient Temp: 22.8ºC; Tissue Temp: 21.6ºC

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 v5.0 front; Type: QD000P40CD; Serial: TP-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) = 15.3 W/kg
SAR(1 g) = 3.78 W/kg; SAR(10 g) = 1.07 W/kg
Deviation(1 g) = 0.00%; Deviation(10 g) = 0.94%



0 dB = 8.67 W/kg = 9.38 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

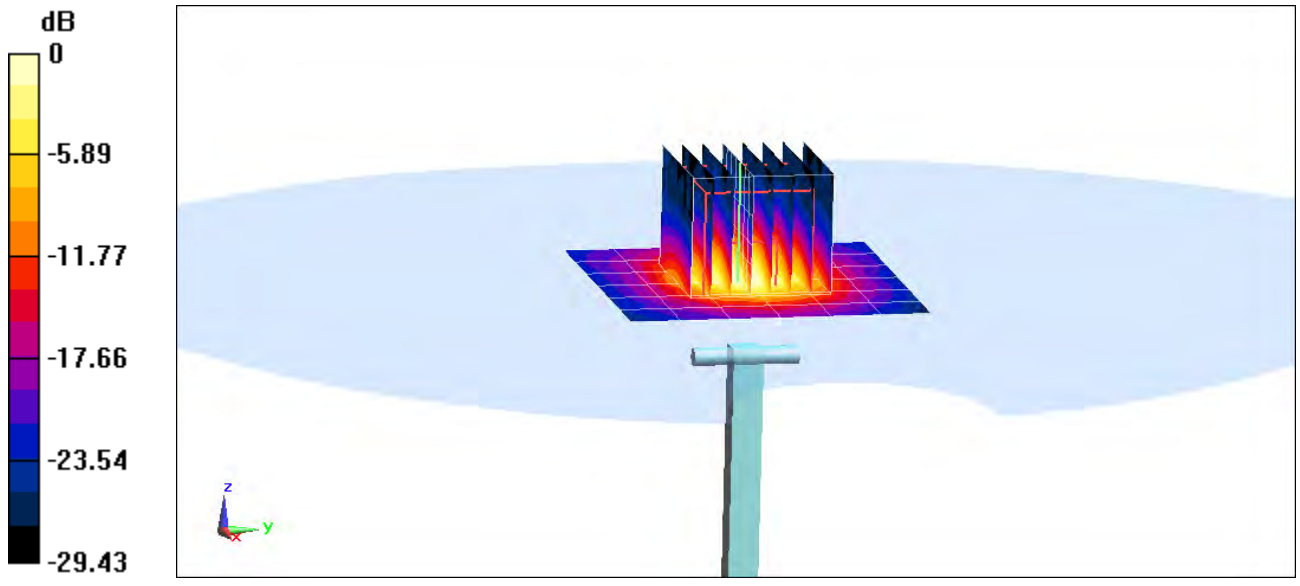
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.962 S/m; ε_r = 46.533; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-30-2016; Ambient Temp: 22.8ºC; Tissue Temp: 21.6ºC

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 v5.0 front; Type: QD000P40CD; Serial: TP-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) = 16.1 W/kg
SAR(1 g) = 3.90 W/kg; SAR(10 g) = 1.10 W/kg
Deviation(1 g) = -3.47%; Deviation(10 g) = -2.65%



0 dB = 9.13 W/kg = 9.60 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1120

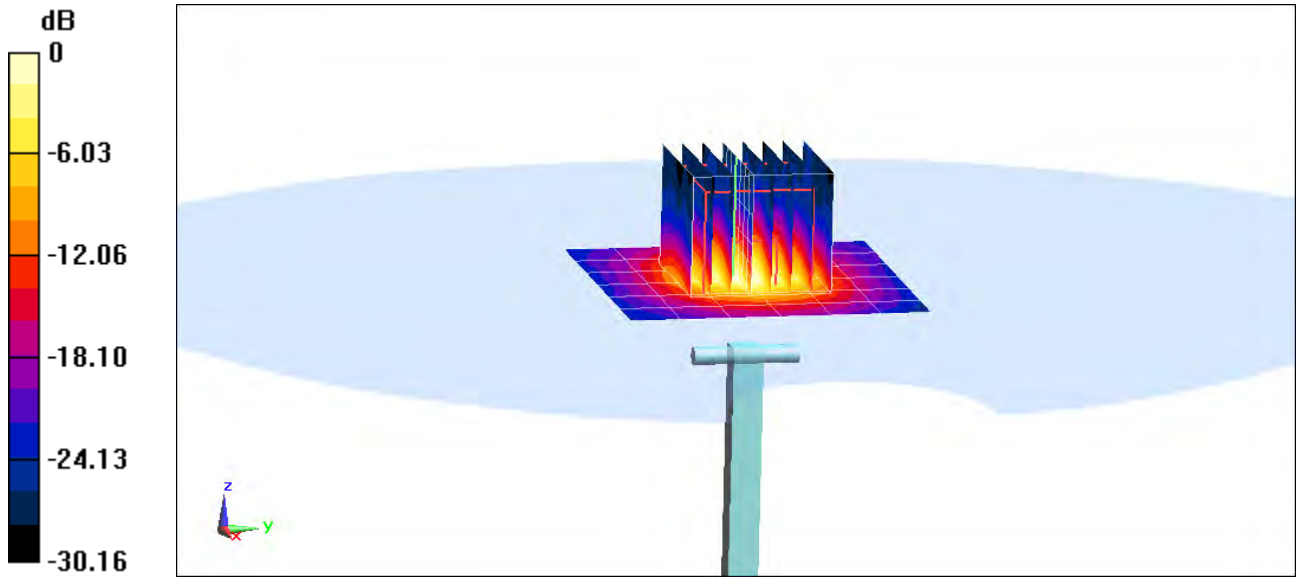
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.15 S/m; ε_r = 46.285; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 05-30-2016; Ambient Temp: 22.8ºC; Tissue Temp: 21.6ºC

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 v5.0 front; Type: QD000P40CD; Serial: TP-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) = 15.9 W/kg
SAR(1 g) = 3.70 W/kg; SAR(10 g) = 1.05 W/kg
Deviation(1 g) = -3.27%; Deviation(10 g) = -1.41%



0 dB = 8.80 W/kg = 9.44 dBW/kg

APPENDIX C: PROBE CALIBRATION

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1046_Feb16

CALIBRATION CERTIFICATE

Object D750V3 - SN:1046

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

Calibration date: February 16, 2016

BN ✓
3/1/2016

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 EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
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
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 17, 2016

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

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

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C Service suisse d'étalonnage
S Servizio svizzero di taratura
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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.8 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.20 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.36 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 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.77 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.80 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	56.7 Ω + 2.3 jΩ
Return Loss	- 23.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.7 Ω - 0.8 jΩ
Return Loss	- 34.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.037 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 02, 2011

DASY5 Validation Report for Head TSL

Date: 16.02.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1046

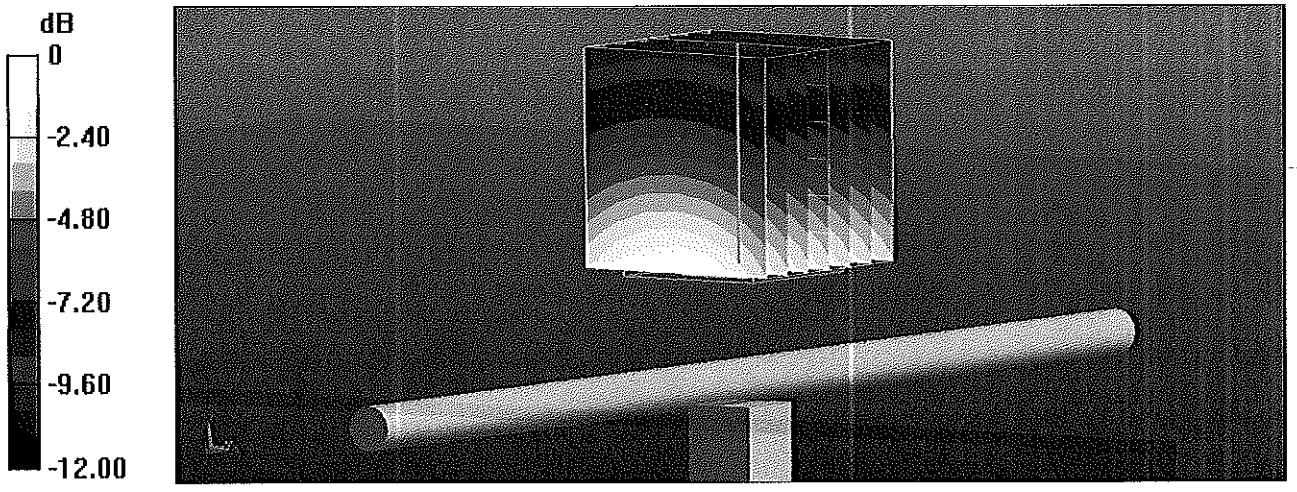
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 41.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.28, 10.28, 10.28); Calibrated: 31.12.2015;
- 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)

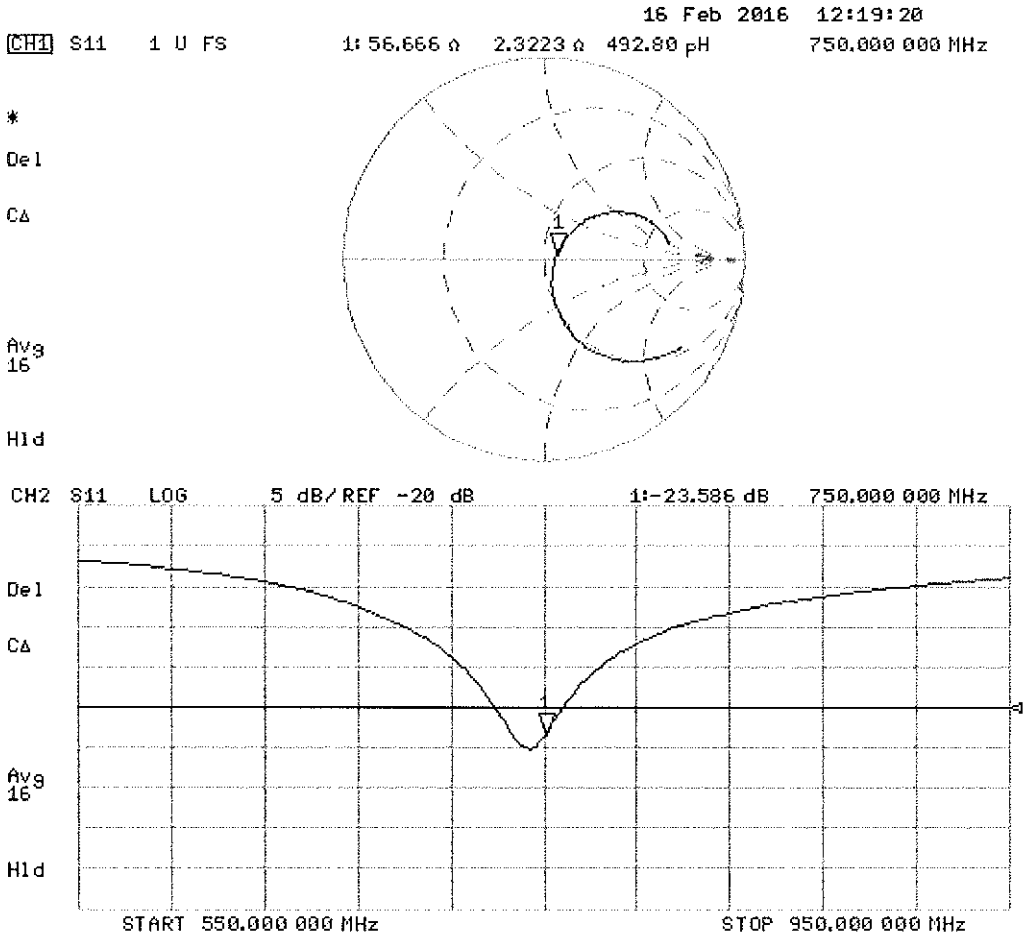
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.40 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.11 W/kg
SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.35 W/kg
Maximum value of SAR (measured) = 2.75 W/kg



0 dB = 2.75 W/kg = 4.39 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.02.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1046

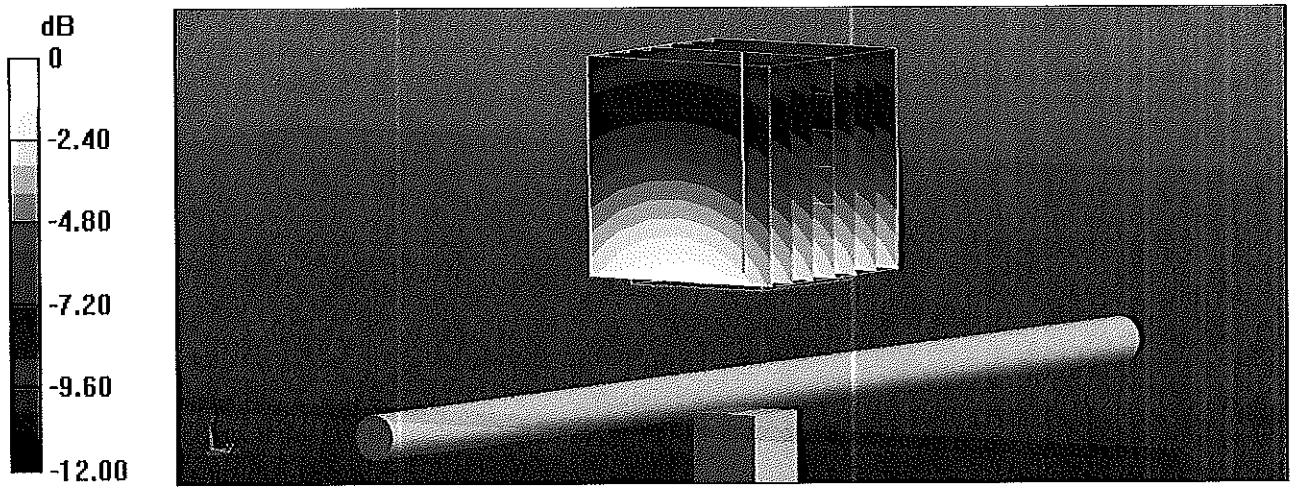
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.98 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2015;
- 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)

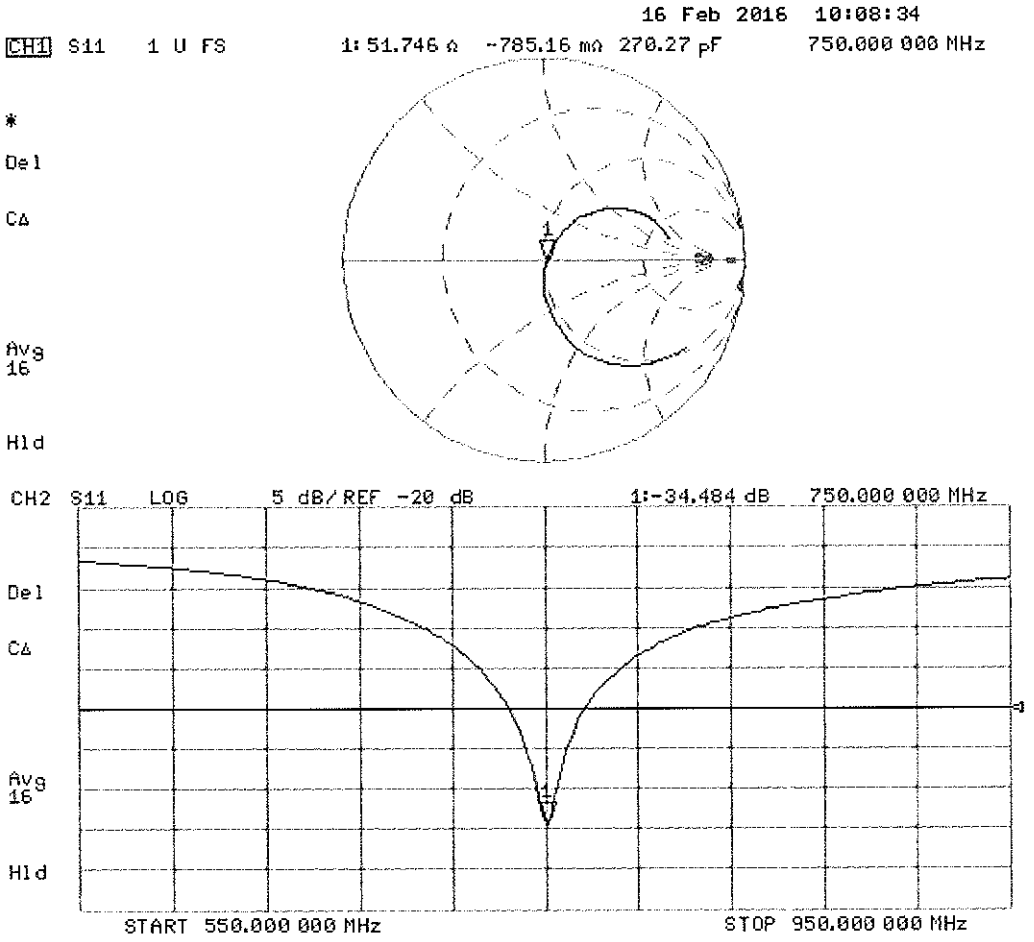
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.48 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.31 W/kg
SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.47 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d119_Apr16

CALIBRATION CERTIFICATE

PM ✓ 4/25/16

Object	D835V2 - SN: 4d119
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 14, 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: April 15, 2016

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

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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	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	41.7 ± 6 %	0.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.14 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.97 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	54.4 ± 6 %	1.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.14 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.04 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	50.8 Ω - 4.1 jΩ
Return Loss	- 27.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω - 6.1 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 14.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

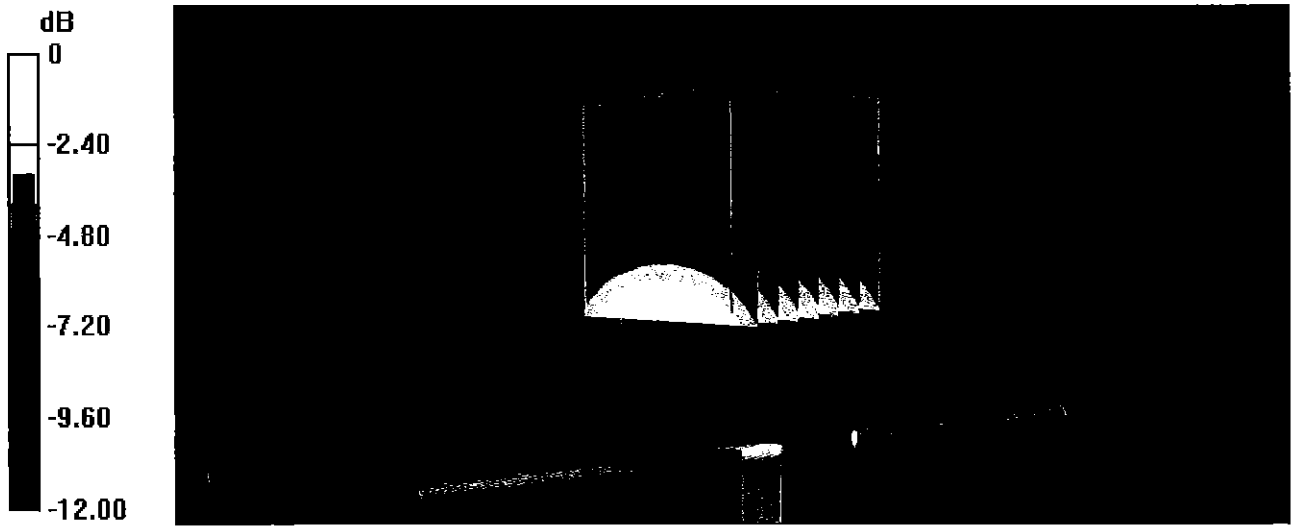
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.93 S/m; ε_r = 41.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.83, 9.83, 9.83); Calibrated: 31.12.2015;
- 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)

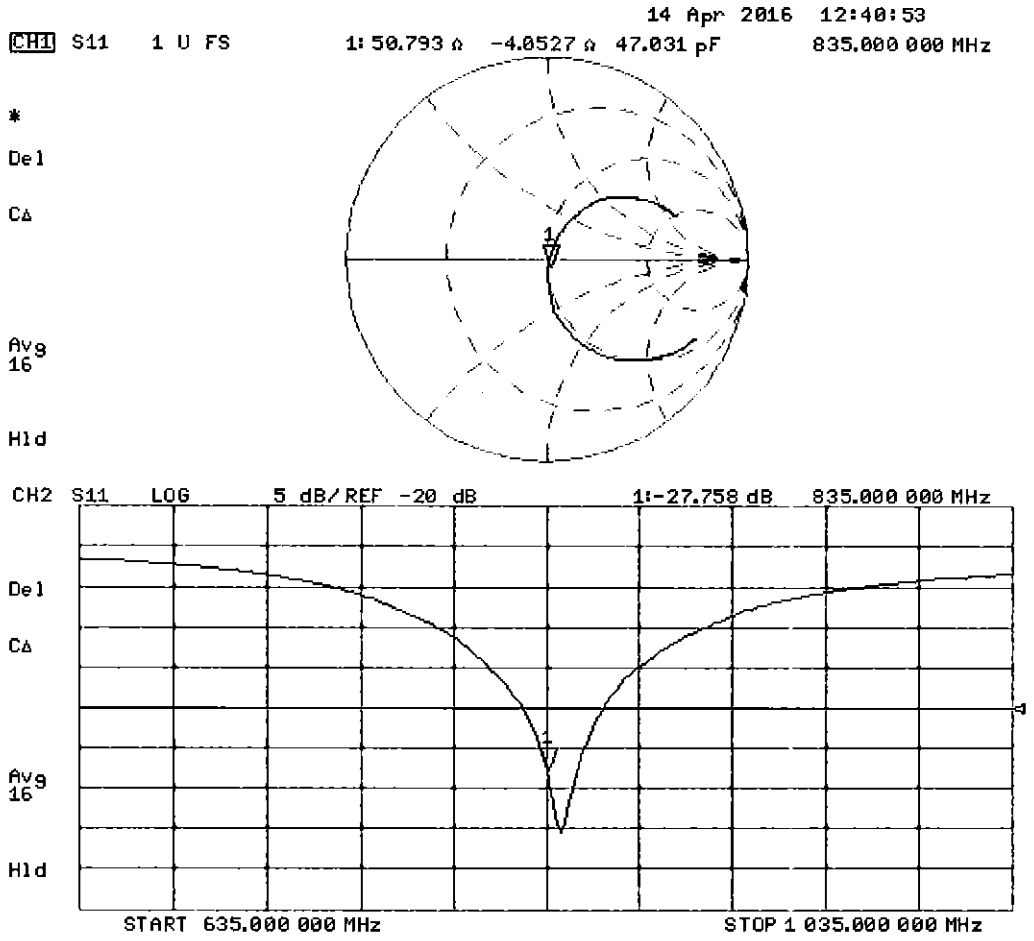
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.95 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.48 W/kg
SAR(1 g) = 2.34 W/kg; SAR(10 g) = 1.52 W/kg
Maximum value of SAR (measured) = 3.11 W/kg



0 dB = 3.11 W/kg = 4.93 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

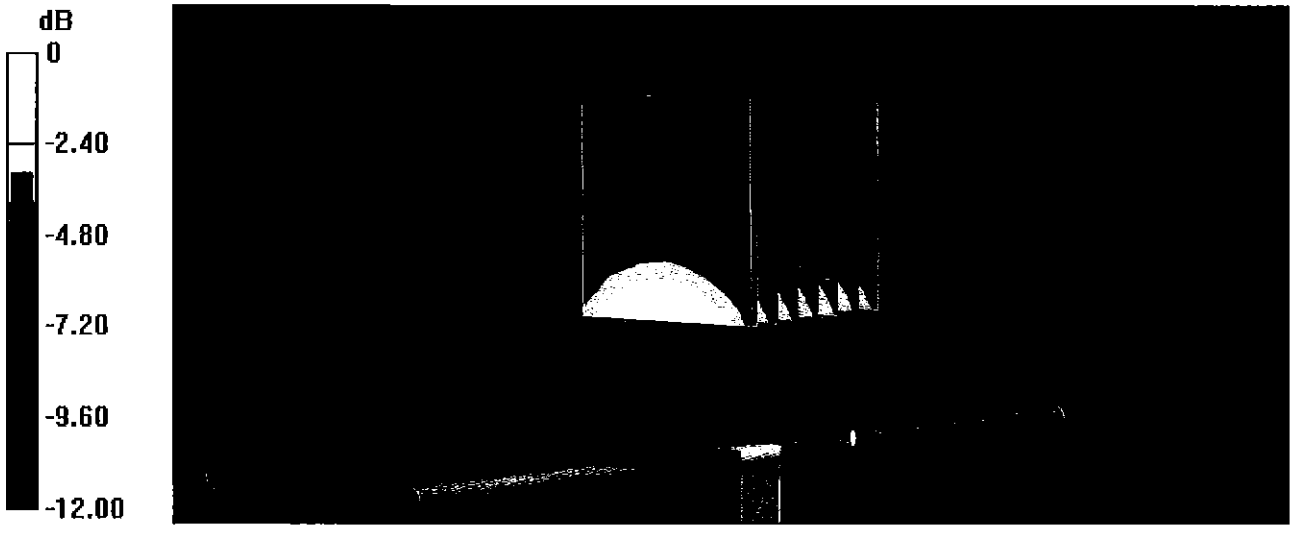
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.02 S/m; ε_r = 54.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.73, 9.73, 9.73); Calibrated: 31.12.2015;
- 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)

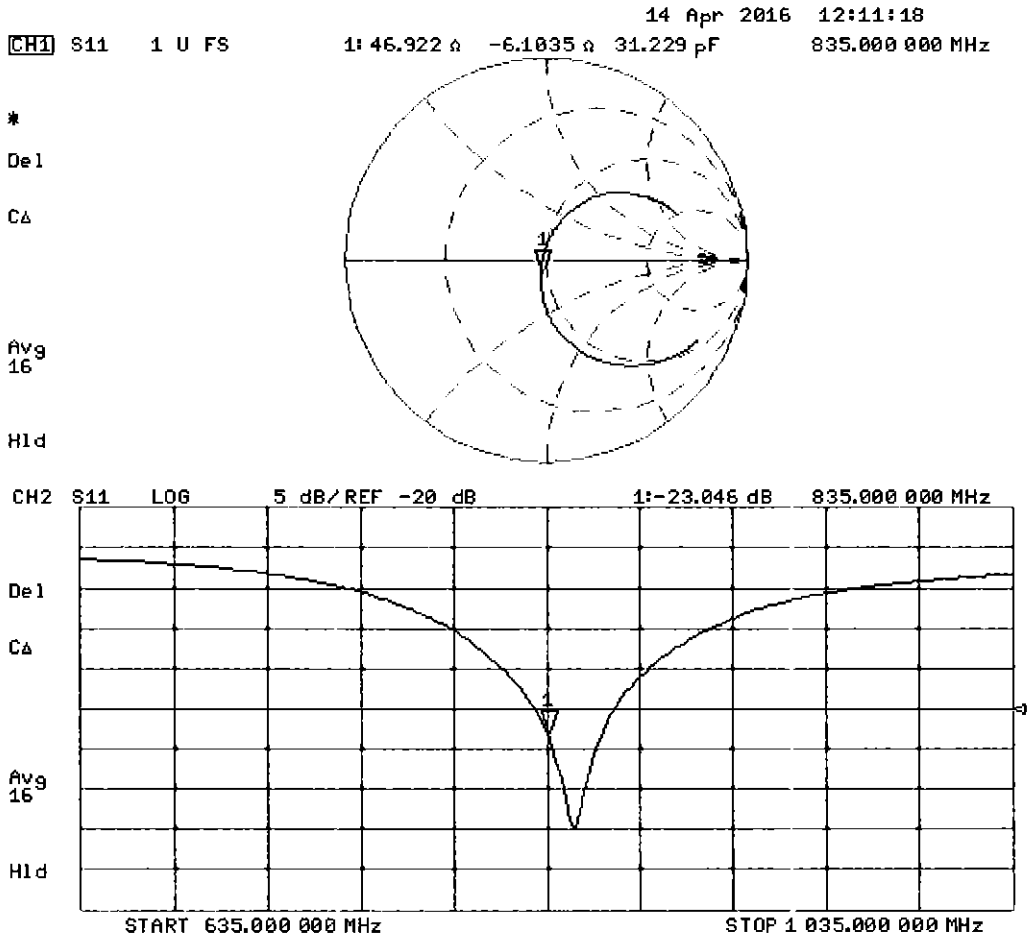
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.35 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.46 W/kg
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (measured) = 3.11 W/kg



0 dB = 3.11 W/kg = 4.93 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1750V2-1051_Apr16

CALIBRATION CERTIFICATE

PM ✓ 4/25/16

Object	D1750V2 - SN: 1051
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 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	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: April 15, 2016

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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	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	39.9 ± 6 %	1.35 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.75 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	52.8 ± 6 %	1.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**36.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.87 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.6 Ω + 0.9 jΩ
Return Loss	- 35.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω + 1.0 jΩ
Return Loss	- 32.6 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	February 19, 2010

DASY5 Validation Report for Head TSL

Date: 13.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1051

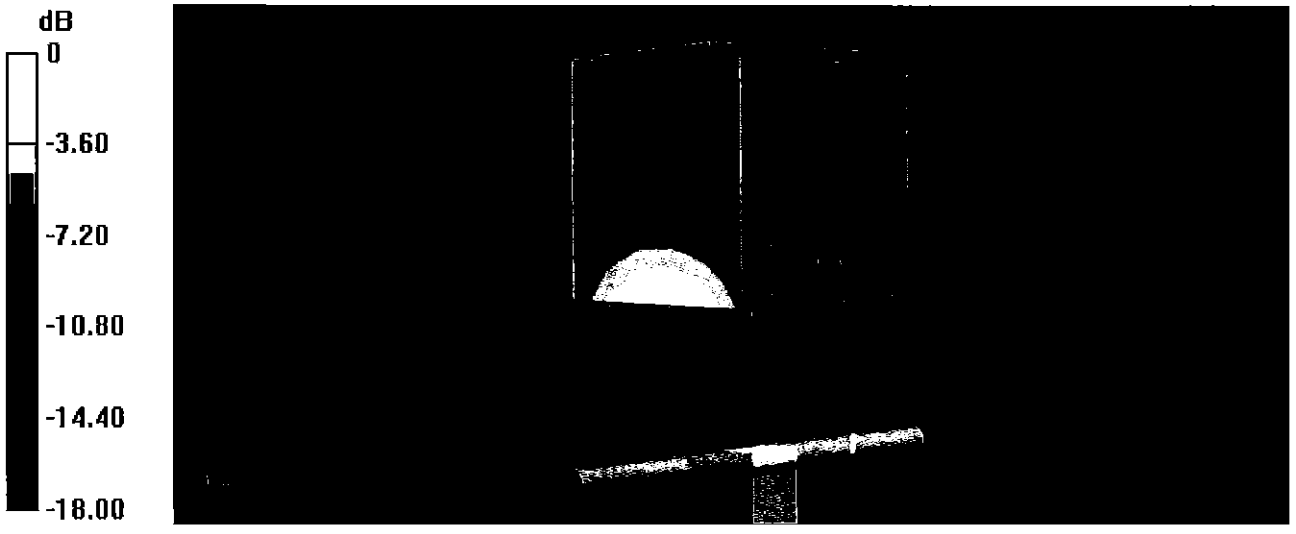
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.35 S/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

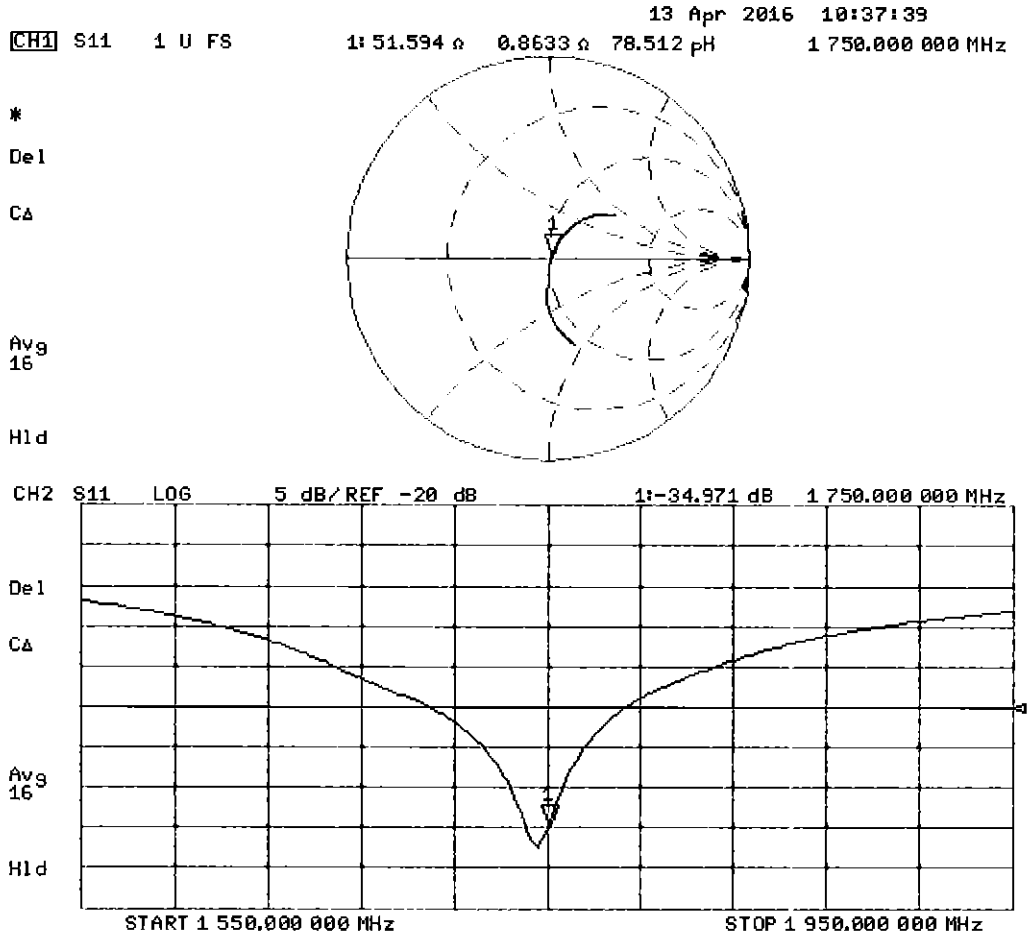
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.0 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 8.94 W/kg; SAR(10 g) = 4.75 W/kg
Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 13.5 W/kg = 11.30 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1051

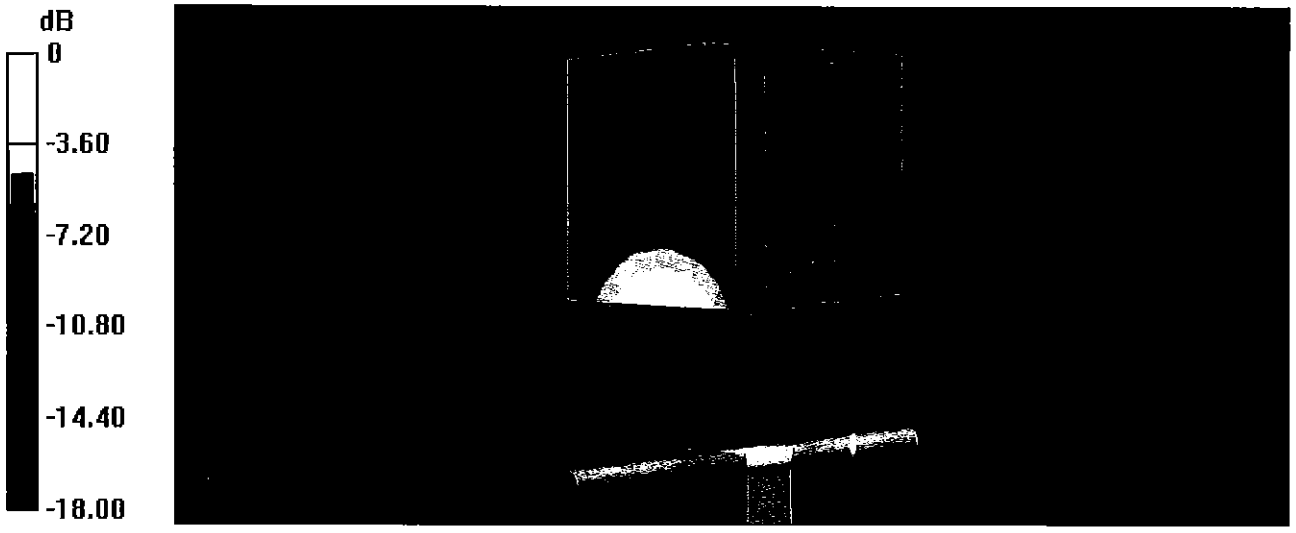
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.48 S/m; ε_r = 52.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

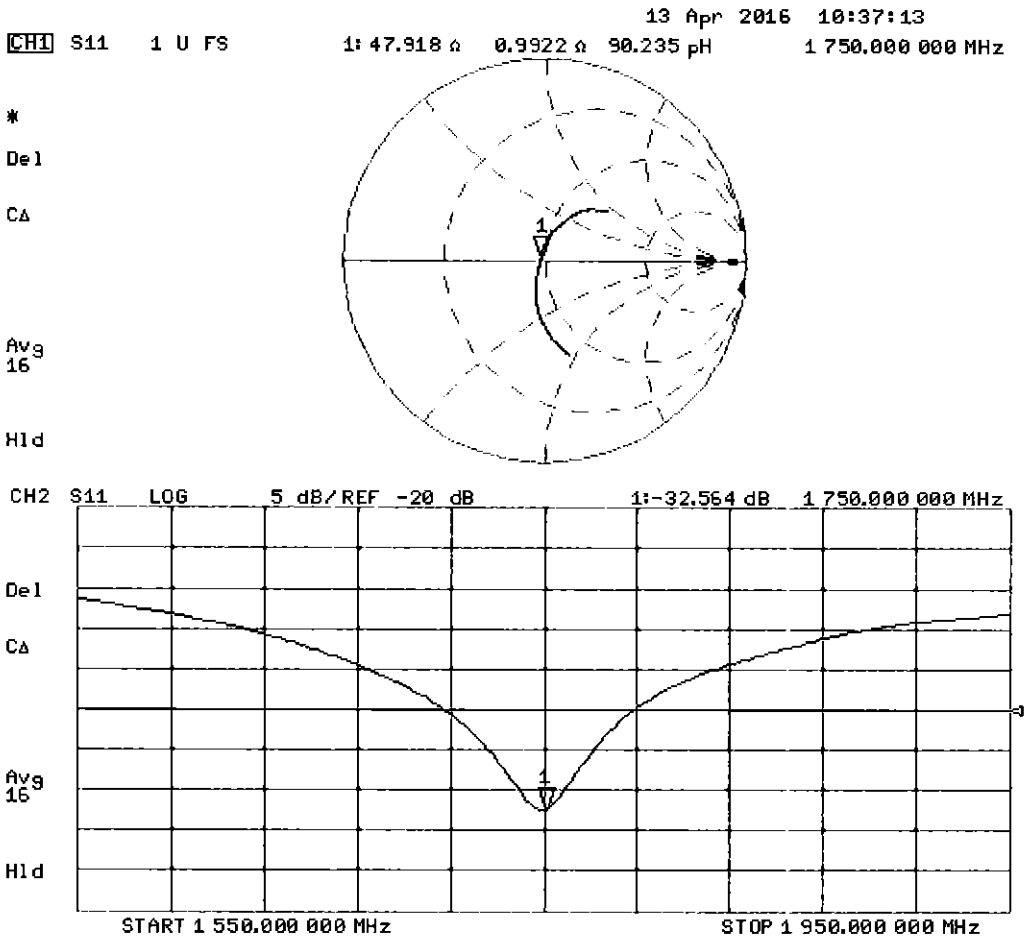
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.6 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.12 W/kg; SAR(10 g) = 4.87 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 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
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1900V2-5d141_Apr16

CALIBRATION CERTIFICATE

PM ✓ 4/25/16

Object	D1900V2 - SN:5d141
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 12, 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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 15, 2016

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.0 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.0 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	52.9 ± 6 %	1.49 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.80 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω + 6.3 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.9 Ω + 7.5 jΩ
Return Loss	- 22.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 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: 12.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d141

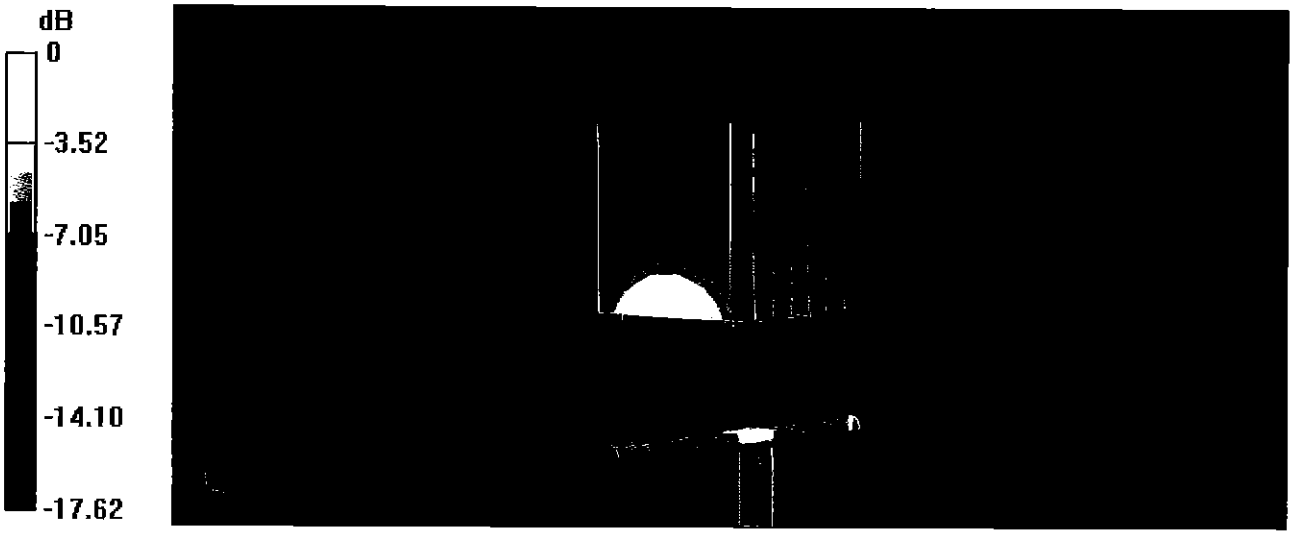
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 S/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); 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)

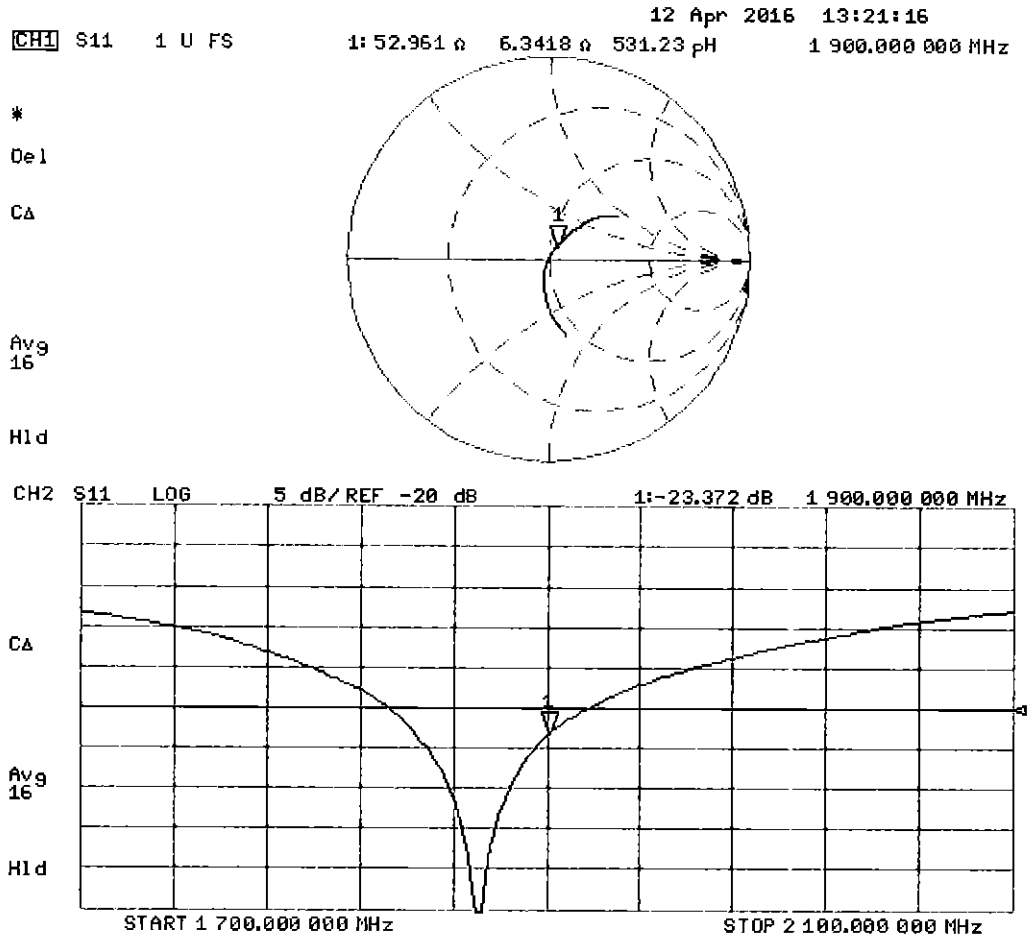
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.9 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.5 W/kg; SAR(10 g) = 4.97 W/kg
Maximum value of SAR (measured) = 14.2 W/kg



0 dB = 14.2 W/kg = 11.52 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d141

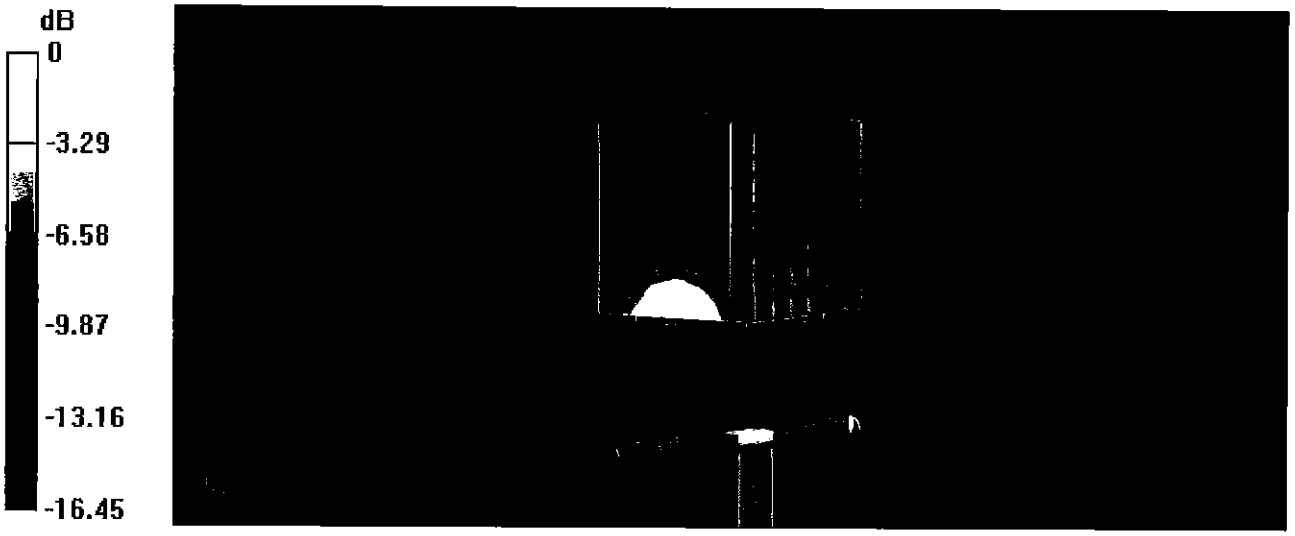
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.49 S/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); 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)

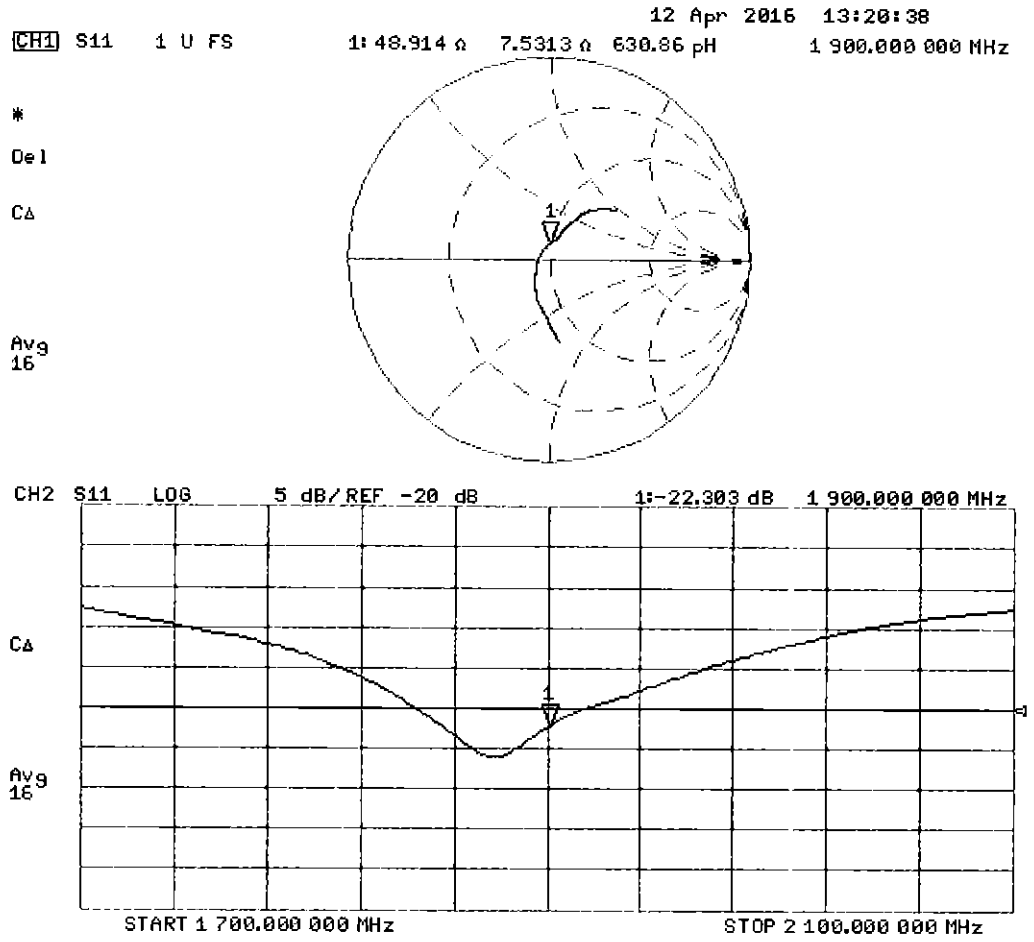
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.2 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.8 W/kg; SAR(10 g) = 5.2 W/kg
Maximum value of SAR (measured) = 14.8 W/kg



0 dB = 14.8 W/kg = 11.70 dBW/kg

Impedance Measurement Plot for Body TSL



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

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S Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client **PC Test** **Certificate No: D2450V2-882_Feb16**

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 882

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

BN ✓
03/01/2016

Calibration date: February 18, 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 EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
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
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	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: February 19, 2016

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	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	38.7 ± 6 %	1.84 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	12.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**50.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.92 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	2.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**49.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.1 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	52.5 Ω + 1.0 jΩ
Return Loss	- 31.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 3.5 jΩ
Return Loss	- 28.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2011

DASY5 Validation Report for Head TSL

Date: 18.02.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

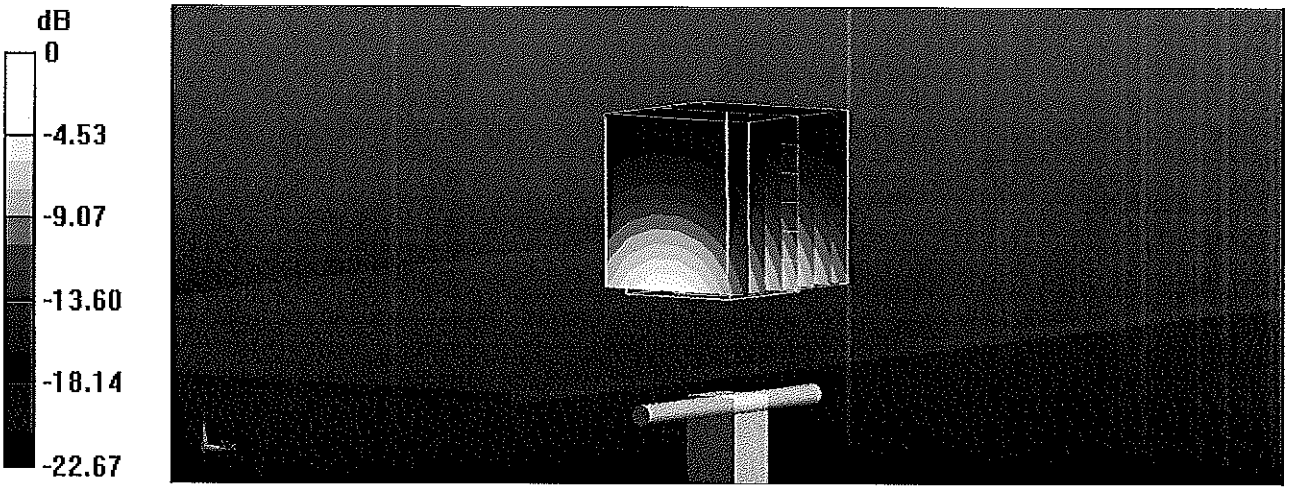
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.84 S/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.76, 7.76, 7.76); 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)

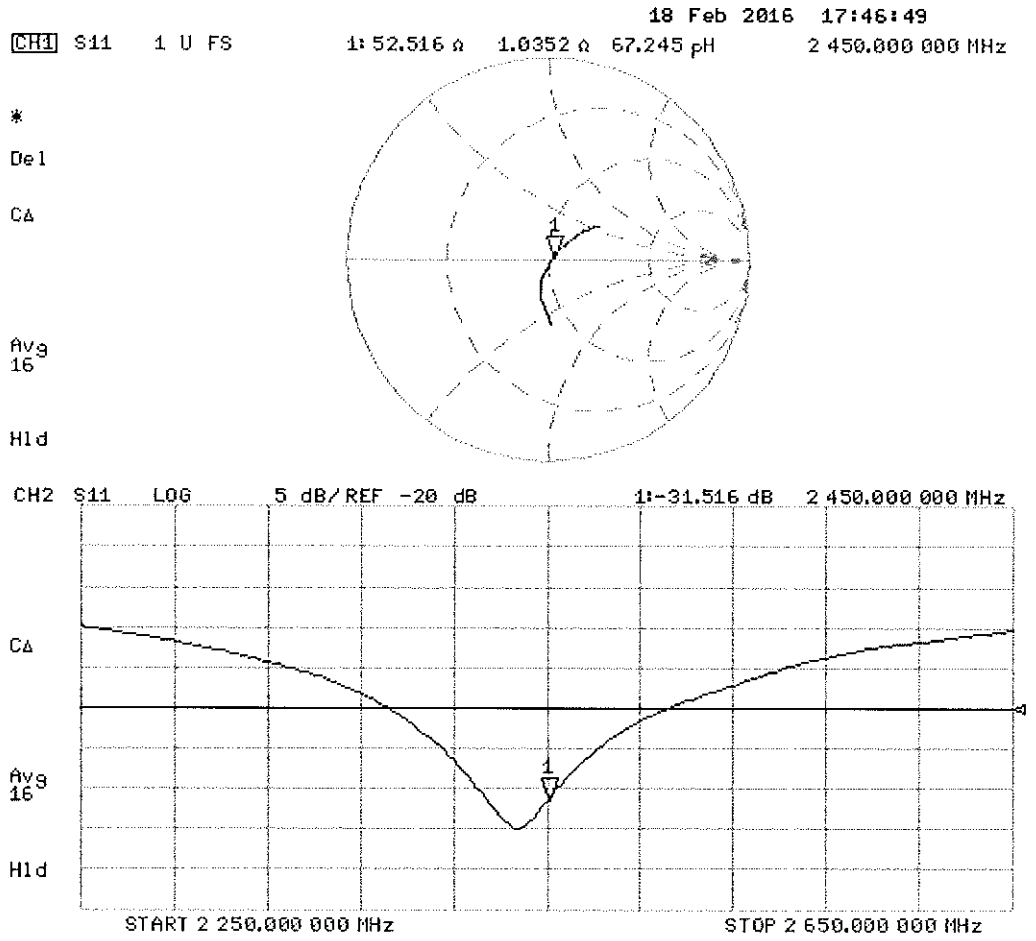
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 109.8 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 25.7 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.92 W/kg
Maximum value of SAR (measured) = 20.1 W/kg



0 dB = 20.1 W/kg = 13.03 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 18.02.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

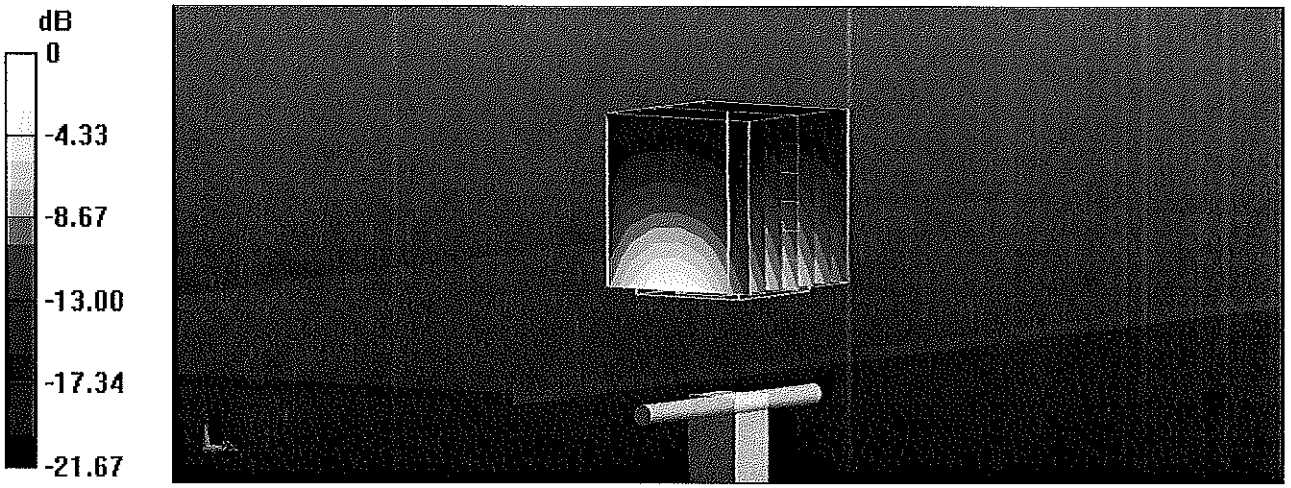
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2 S/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); 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)

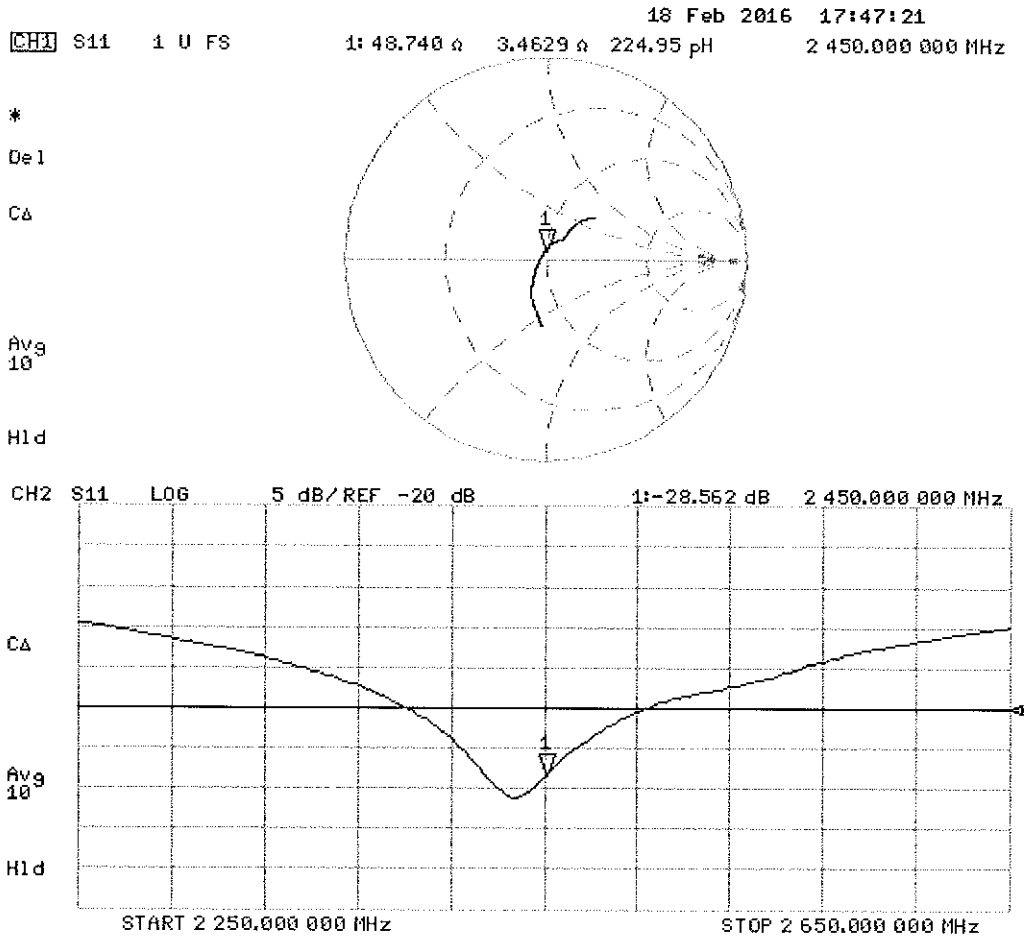
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.8 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 24.8 W/kg
SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.81 W/kg
Maximum value of SAR (measured) = 20.0 W/kg



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

Impedance Measurement Plot for Body TSL



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

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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2600V2-1071_Oct15

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1071
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	October 21, 2015

BN ✓
4/03/15

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 7349	30-Dec-14 (No. EX3-7349_Dec14)	Dec-15
DAE4	SN: 601	17-Aug-15 (No. DAE4-601_Aug15)	Aug-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (In house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

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

Issued: October 22, 2015

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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 tha 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 meesured 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 e 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	37.4 ± 6 %	2.02 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**55.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	2.18 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**54.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.5 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	49.4 Ω - 5.4 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.7 Ω - 4.6 jΩ
Return Loss	- 23.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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 17, 2013

DASY5 Validation Report for Head TSL

Date: 21.10.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

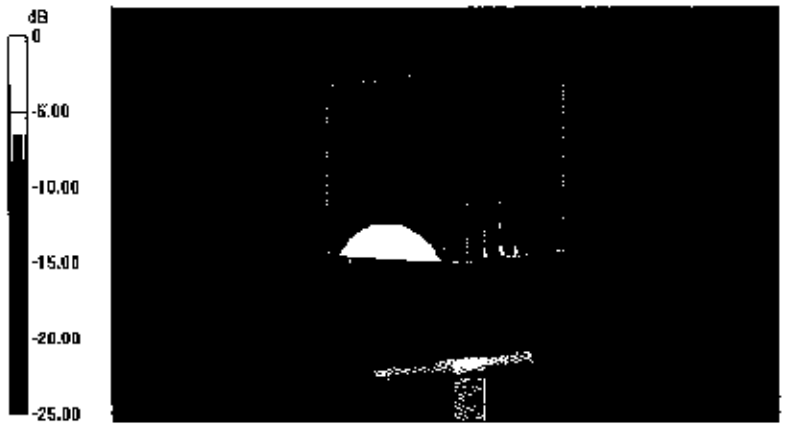
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.02 S/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.4, 7.4, 7.4); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

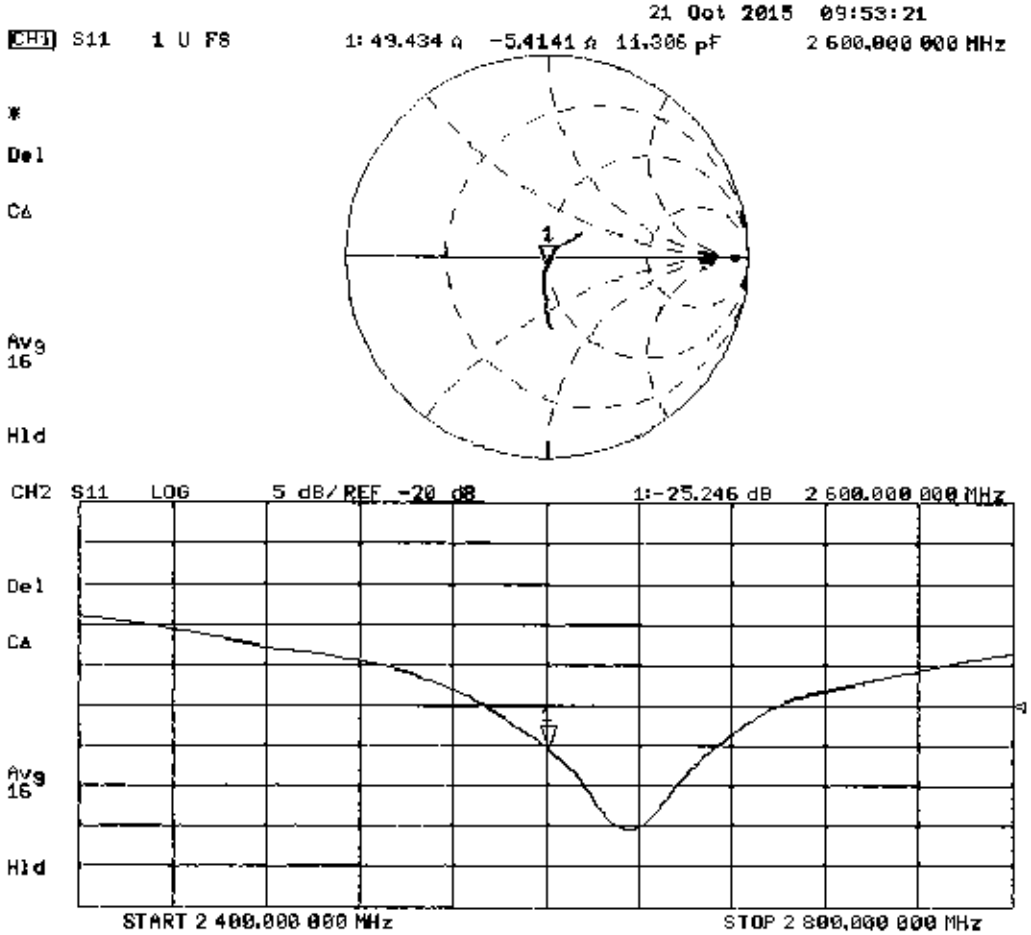
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.2 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 30.8 W/kg
SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.33 W/kg
Maximum value of SAR (measured) = 24.2 W/kg



0 dB = 24.2 W/kg = 13.84 dBW/kg

Impedance Measurement Plot for Head TSL



Date: 21.10.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.18 S/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.52, 7.52, 7.52); Calibrated: 30.12.2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

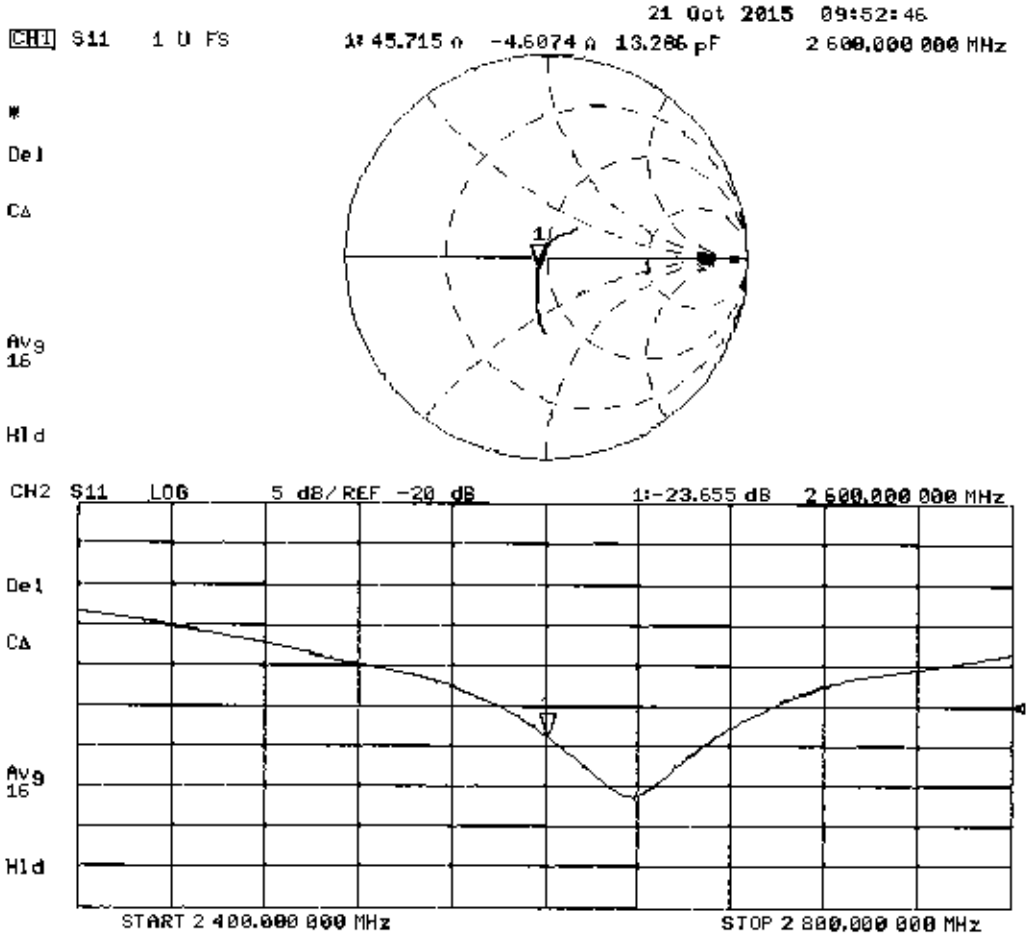
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 28.8 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.14 W/kg
Maximum value of SAR (measured) = 23.3 W/kg



0 dB = 23.3 W/kg = 13.67 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test** **Certificate No: D5GHzV2-1120_Feb16**

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN: 1120

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BN ✓
03/01/2016

Calibration date: February 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 EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe EX3DV4	SN: 3503	31-Dec-15 (No. EX3-3503_Dec15)	Dec-16
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	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: February 25, 2016

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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-2, "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	34.8 ± 6 %	4.56 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 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	34.3 ± 6 %	4.91 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	8.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.3 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 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	34.1 ± 6 %	5.07 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	7.98 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	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 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	47.1 ± 6 %	5.46 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	7.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.6 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)**

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	46.4 ± 6 %	5.94 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

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

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.6 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	46.2 ± 6 %	6.15 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	7.71 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 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	52.8 Ω - 1.3 jΩ
Return Loss	- 30.5 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.8 Ω - 1.0 jΩ
Return Loss	- 23.8 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.5 Ω + 4.2 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	51.7 Ω - 0.6 jΩ
Return Loss	- 34.9 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.8 Ω + 2.2 jΩ
Return Loss	- 21.5 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	53.9 Ω + 6.1 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.205 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 08, 2011

DASY5 Validation Report for Head TSL

Date: 25.02.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1120

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.56 S/m; ε_r = 34.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.91 S/m; ε_r = 34.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 5.07 S/m; ε_r = 34.1; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.53, 5.53, 5.53); Calibrated: 31.12.2015, ConvF(4.99, 4.99, 4.99); Calibrated: 31.12.2015, ConvF(4.95, 4.95, 4.95); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P50AA
- 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

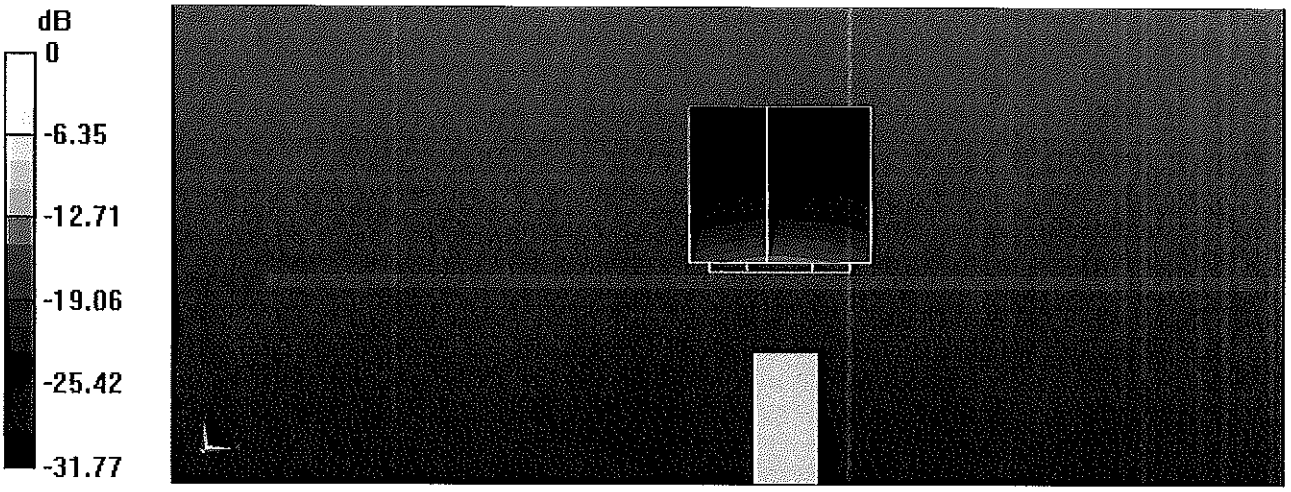
Reference Value = 73.31 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 7.93 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 18.4 W/kg

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 = 73.36 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 8.3 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 19.9 W/kg

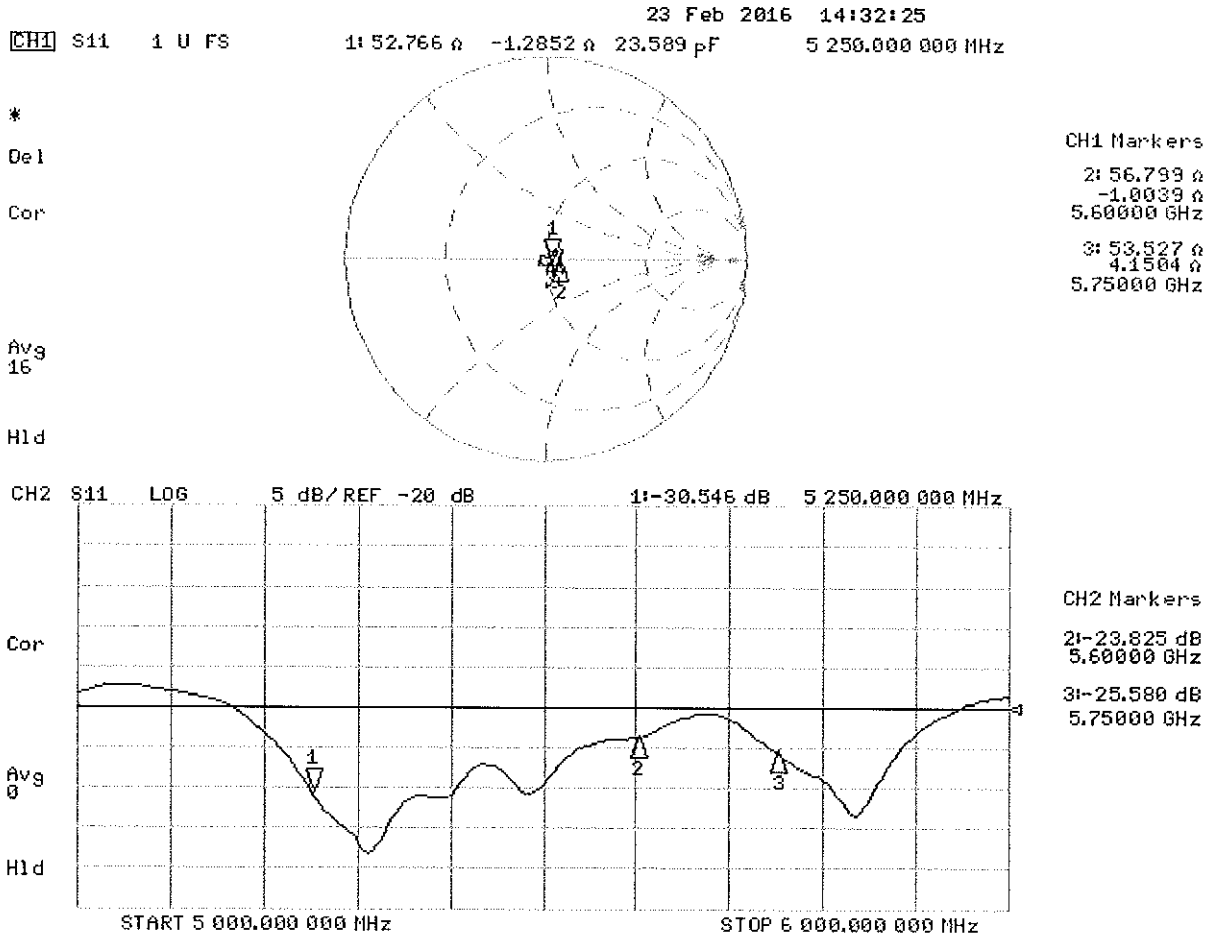
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 71.09 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 18.4 W/kg = 12.65 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 17.02.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1120

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.46 S/m; ε_r = 47.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.94 S/m; ε_r = 46.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 6.15 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

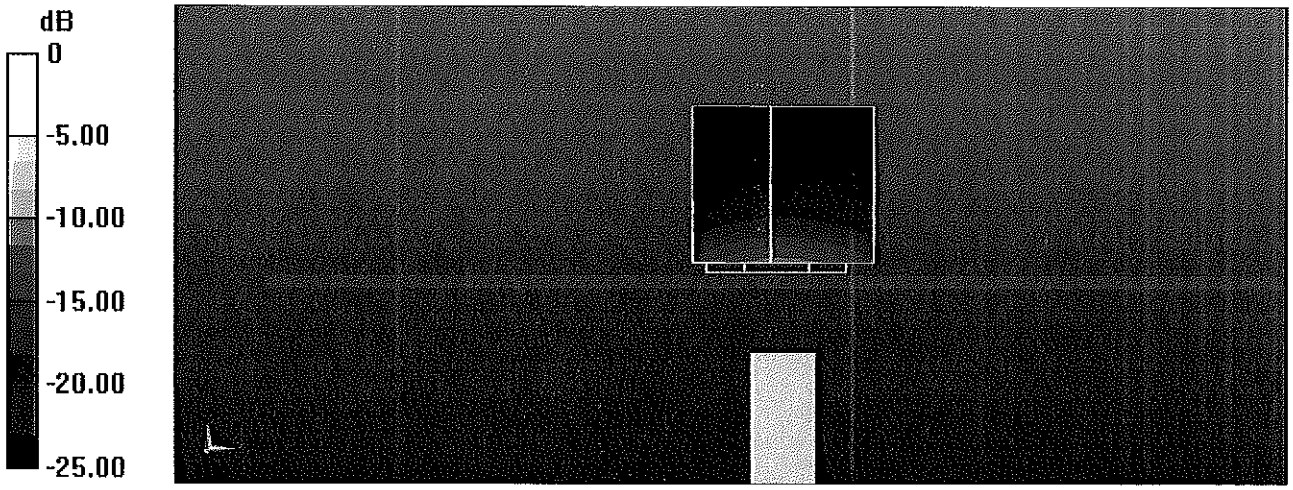
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 31.12.2015, ConvF(4.35, 4.35, 4.35); Calibrated: 31.12.2015, ConvF(4.3, 4.3, 4.3); 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=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 = 66.97 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.5 W/kg
SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

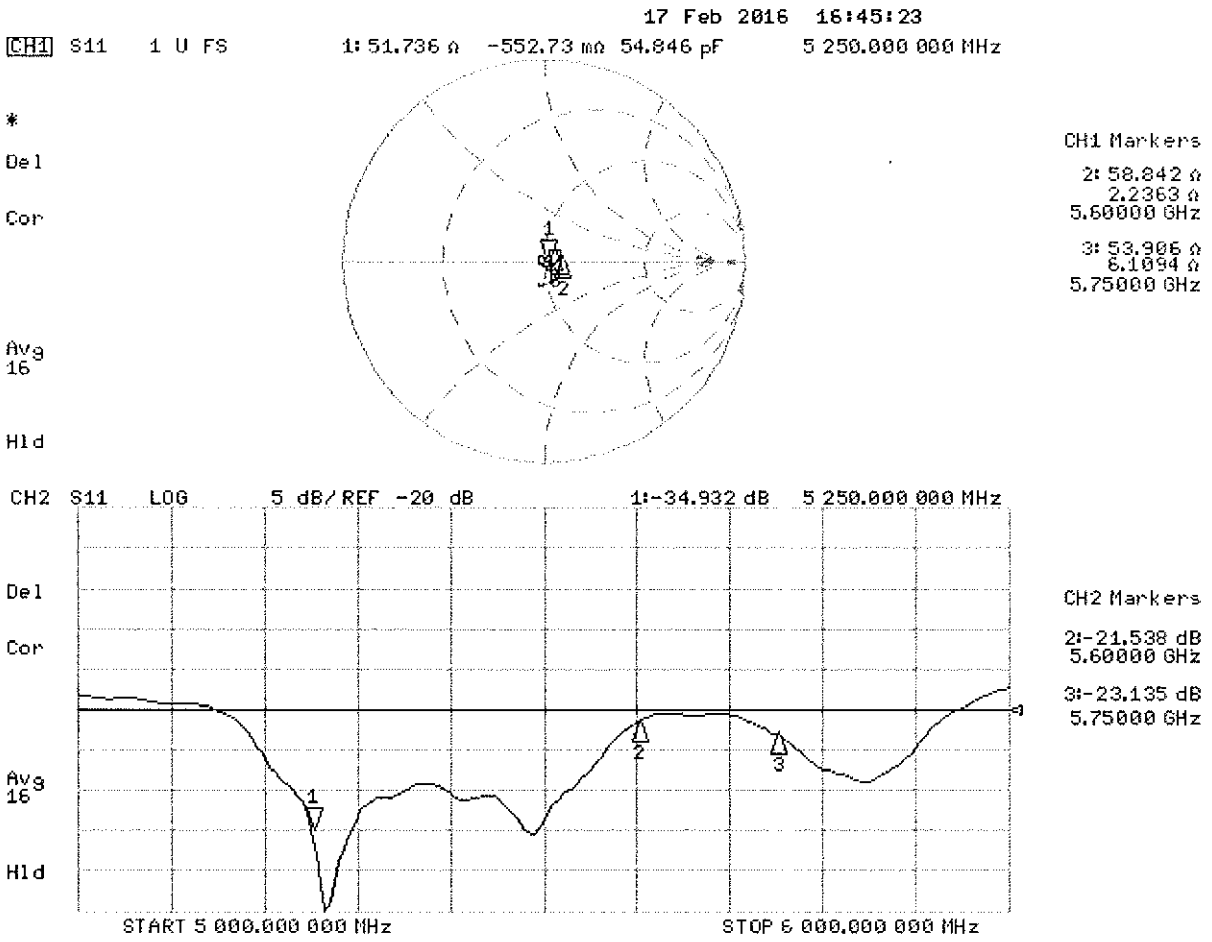
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.65 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 33.6 W/kg
SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 20.4 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 = 65.41 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 33.1 W/kg
SAR(1 g) = 7.71 W/kg; SAR(10 g) = 2.15 W/kg
Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client PC Test

Certificate No: D750V3-1054_Mar16

CALIBRATION CERTIFICATE

Object D750V3 - SN:1054

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

BN
03/30/2016

Calibration date: March 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 EPM-442A	GB37480704	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	US37292783	07-Oct-15 (No. 217-02222)	Oct-16
Power sensor HP 8481A	MY41092317	07-Oct-15 (No. 217-02223)	Oct-16
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
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
RF generator R&S SMT-06	100972	15-Jun-15 (in house check Jun-15)	In house check: Jun-18
Network Analyzer HP 8753E	US37390585 S4206	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: March 16, 2016

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

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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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.9 ± 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	**8.22 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	**5.41 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.7 ± 6 %	0.98 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	2.18 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.56 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.68 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2 Ω - 0.9 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.1 Ω - 2.3 jΩ
Return Loss	- 32.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 08, 2011

DASY5 Validation Report for Head TSL

Date: 16.03.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

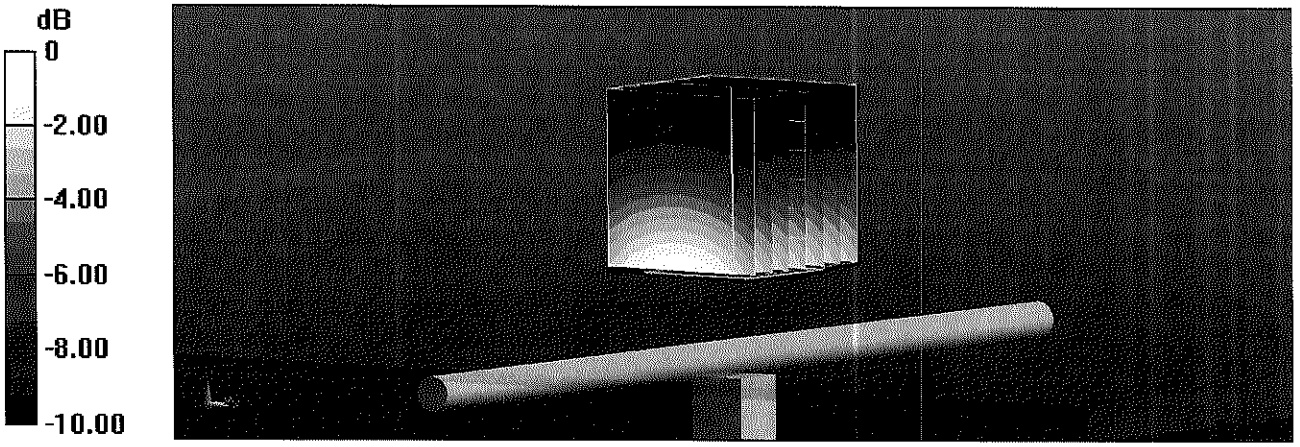
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 41.9; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.28, 10.28, 10.28); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P49AA
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

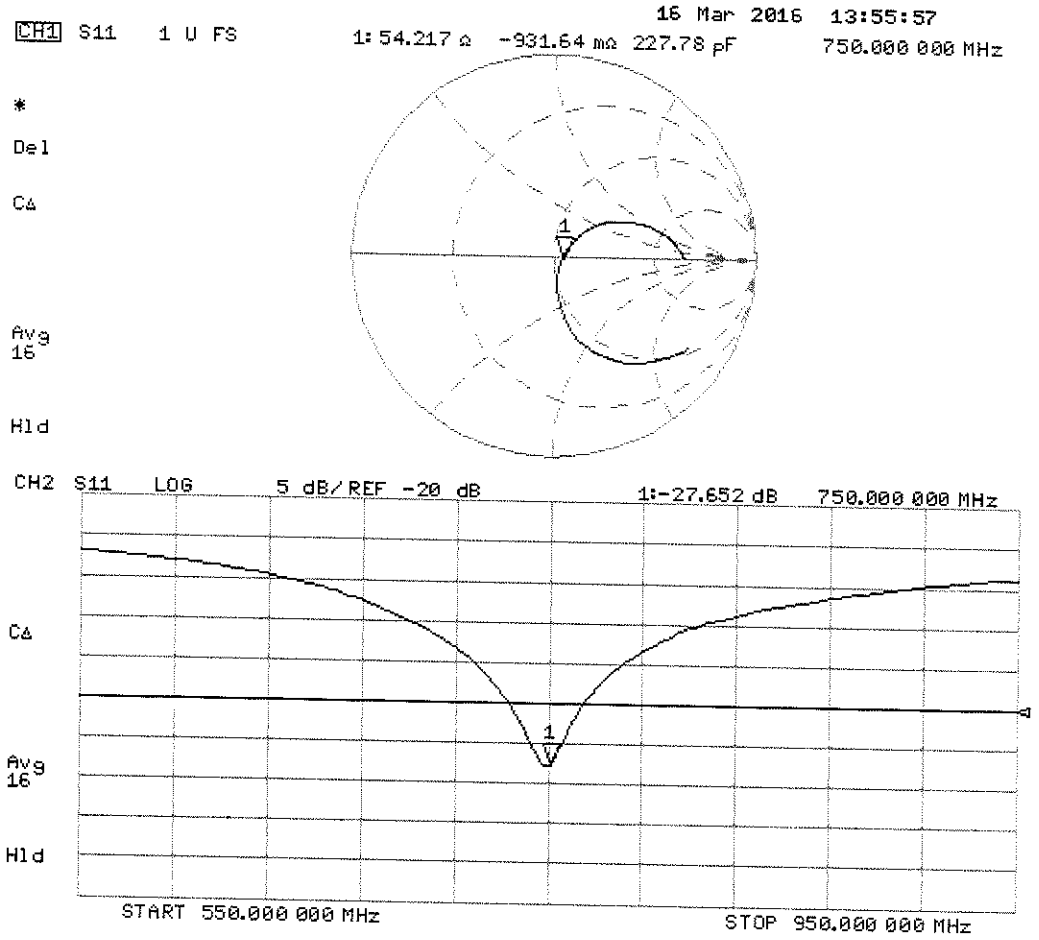
Dipole Calibration for Head Tissue EX-Probe/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.13 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.14 W/kg
SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 16.03.2016

Test Laboratory: SPEAG, Zurich, Switzerland

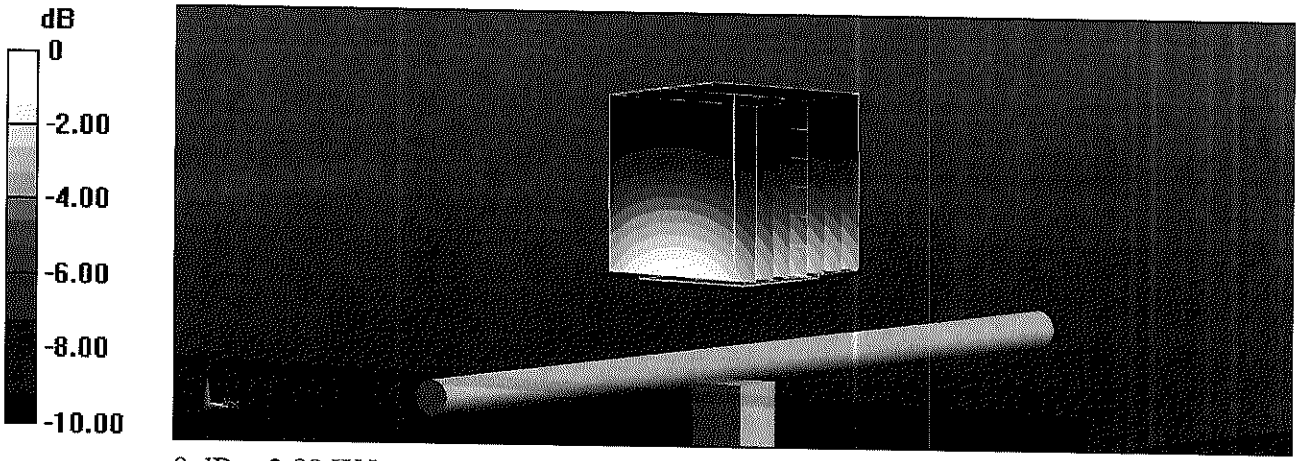
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1054

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.98 S/m; ε_r = 54.7; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

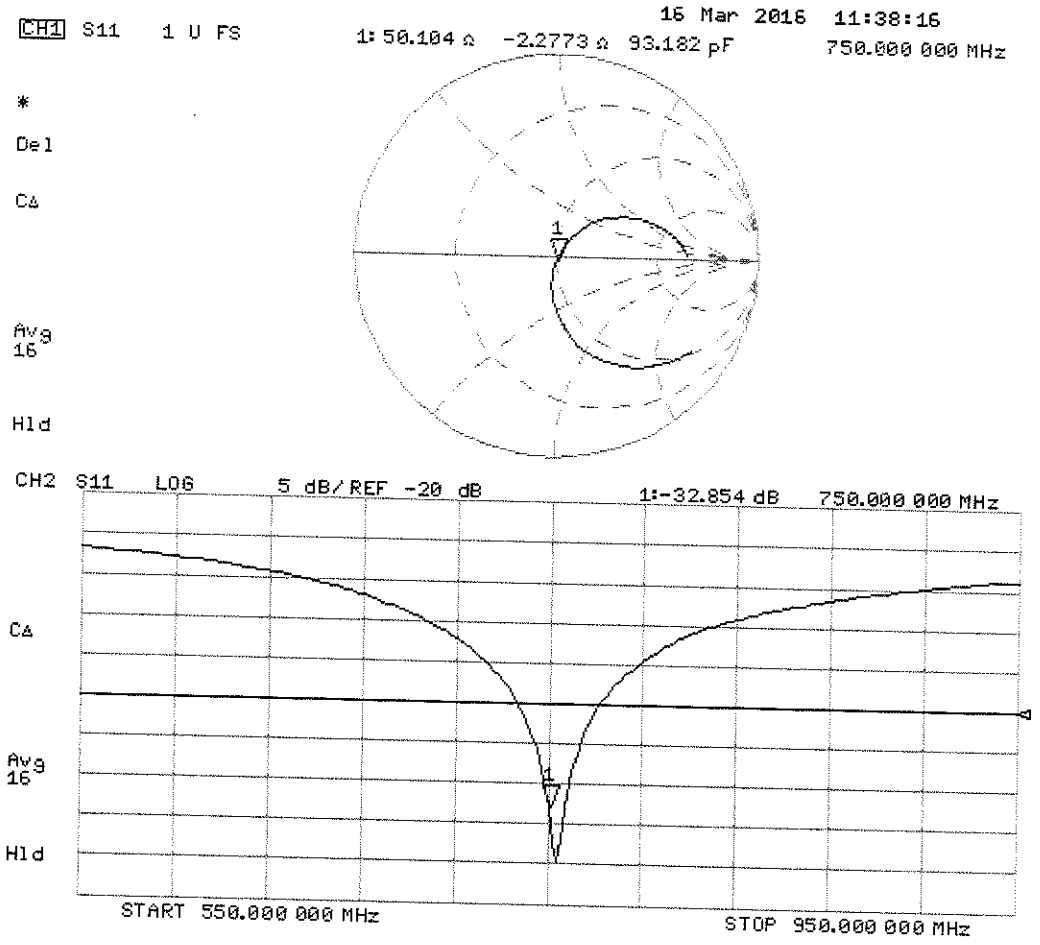
- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P49AA
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue EX-Probe/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.90 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.24 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.44 W/kg
Maximum value of SAR (measured) = 2.89 W/kg



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 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

VPH
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	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 27, 2016

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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	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

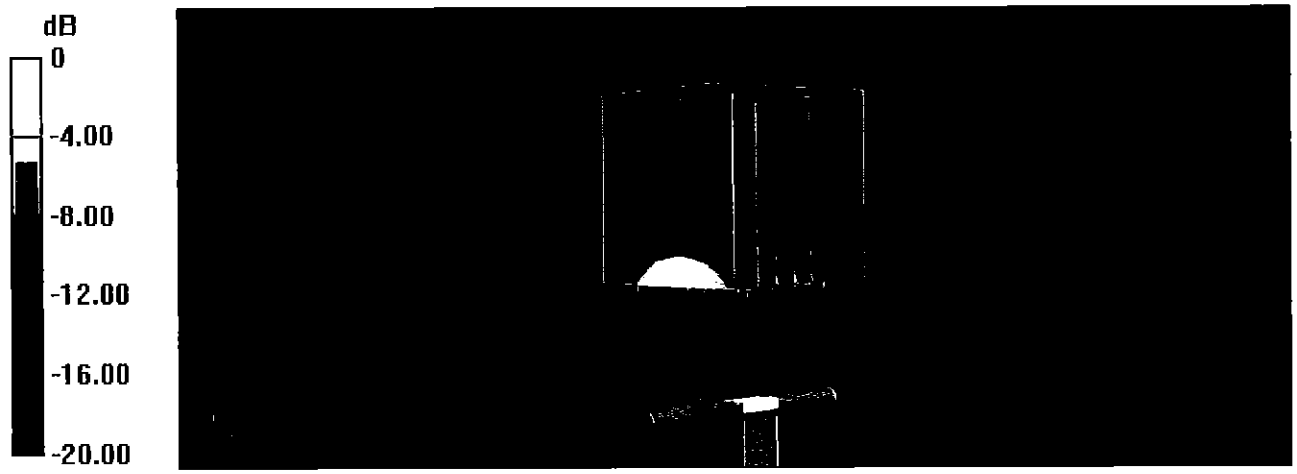
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 38; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

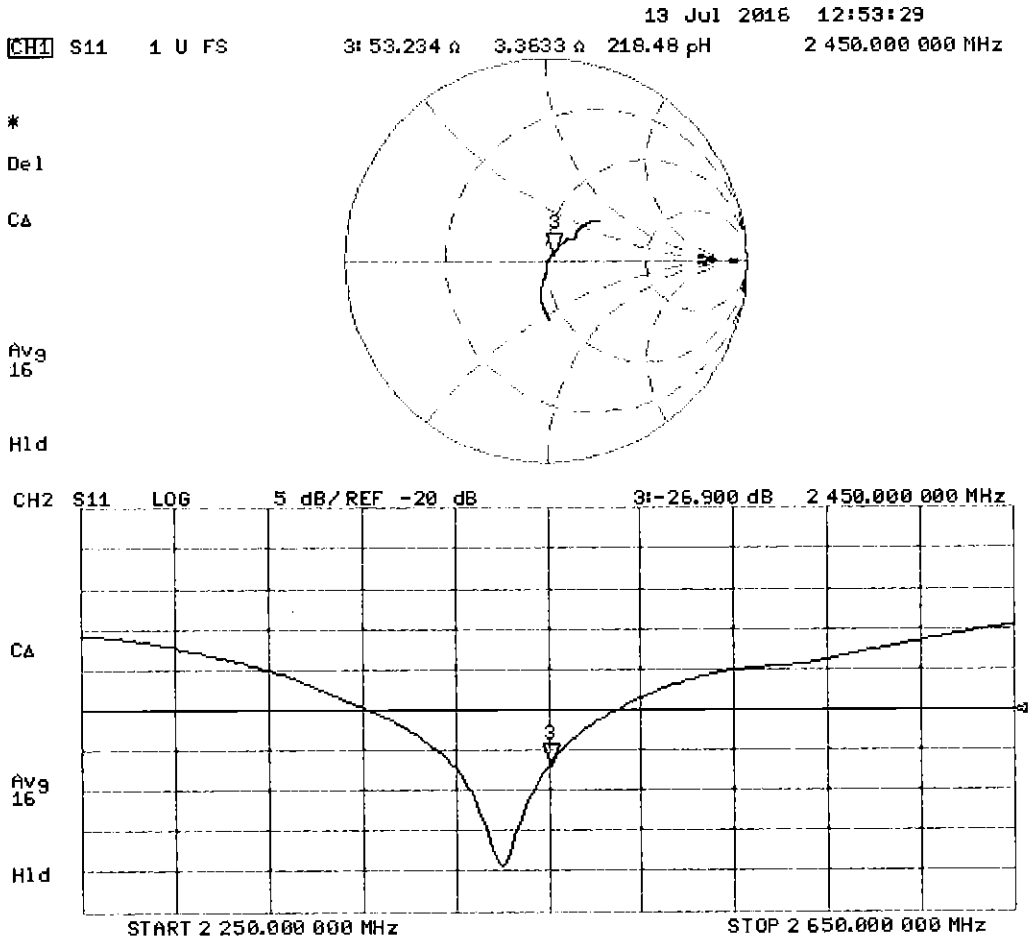
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

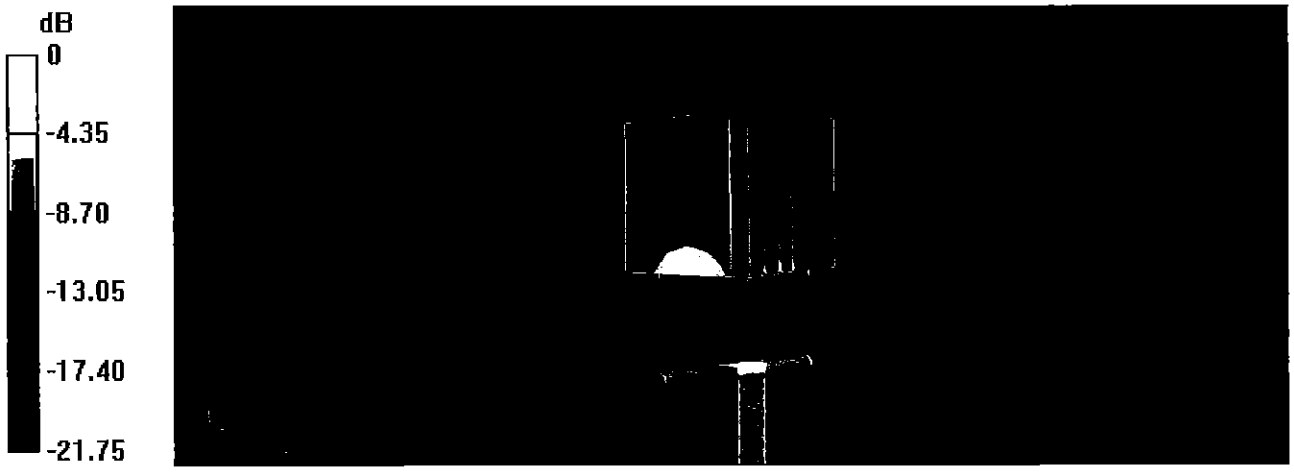
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

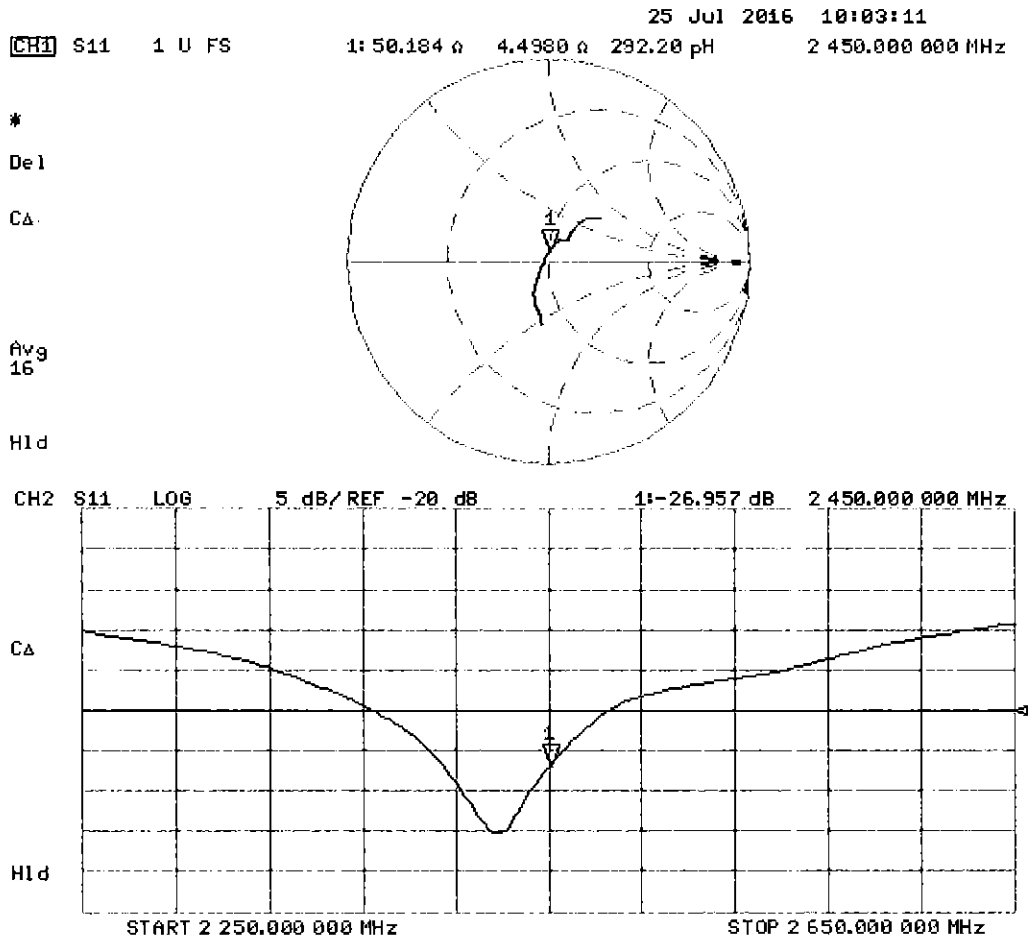
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1161_Jul16

CALIBRATION CERTIFICATE

Object D750V3 - SN:1161

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

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	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

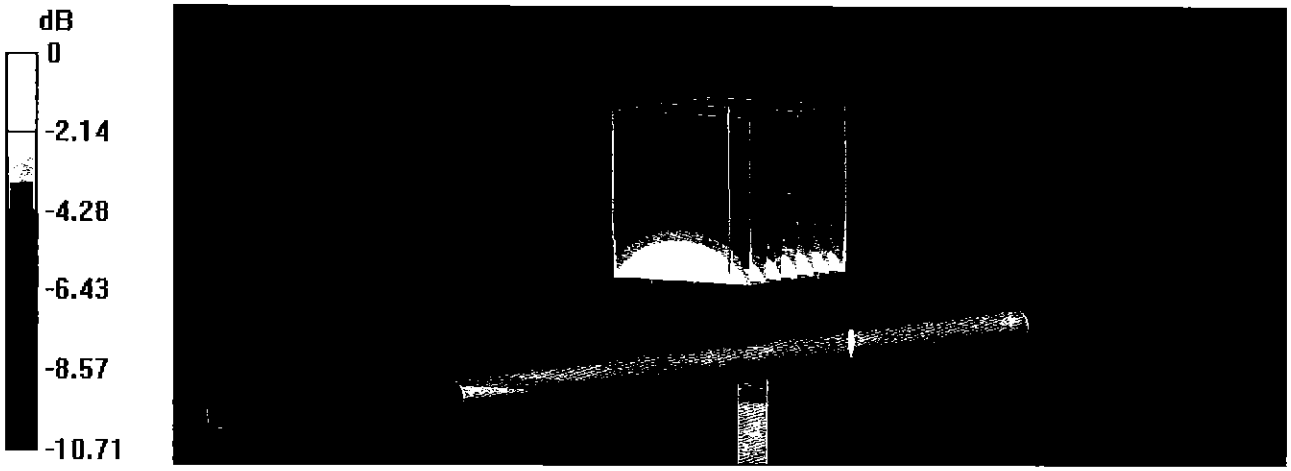
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

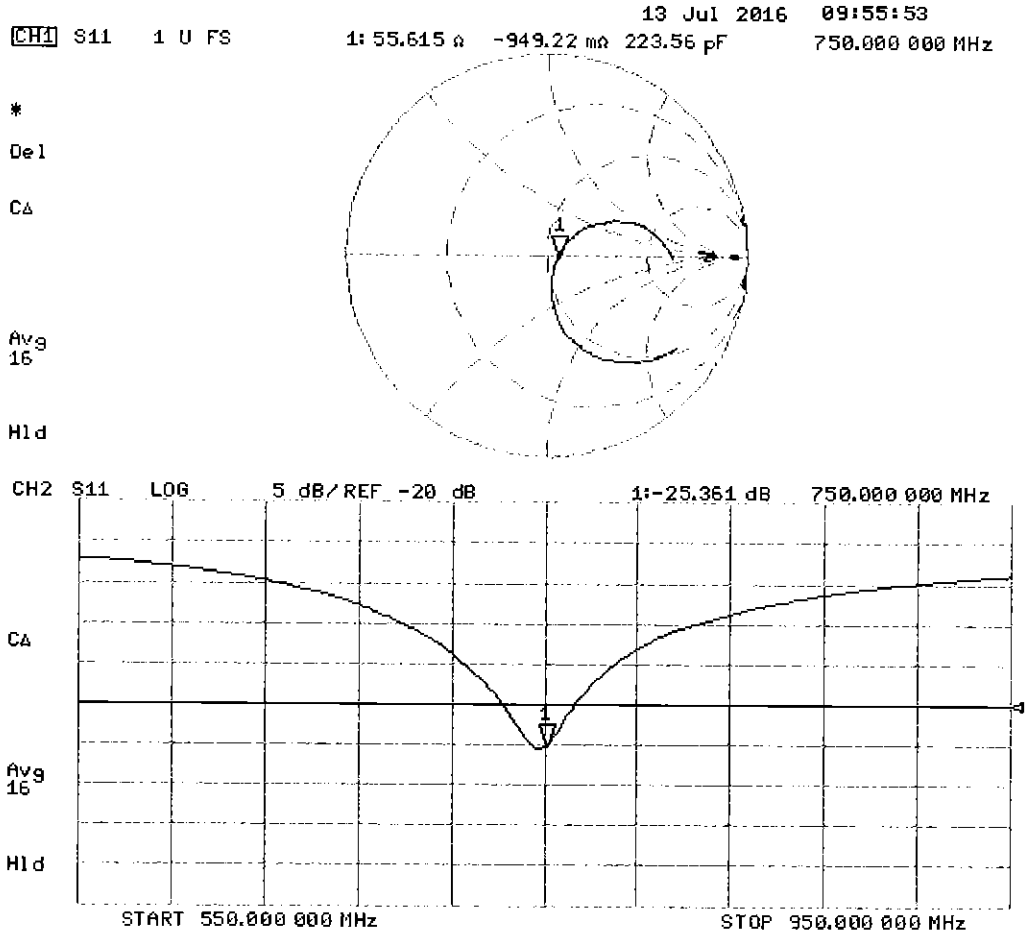
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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

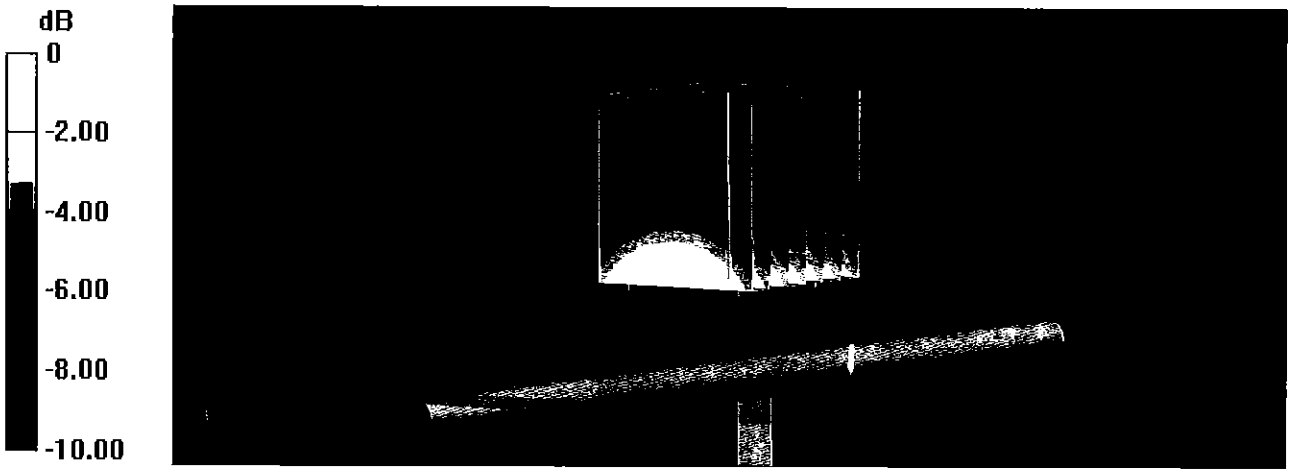
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 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)

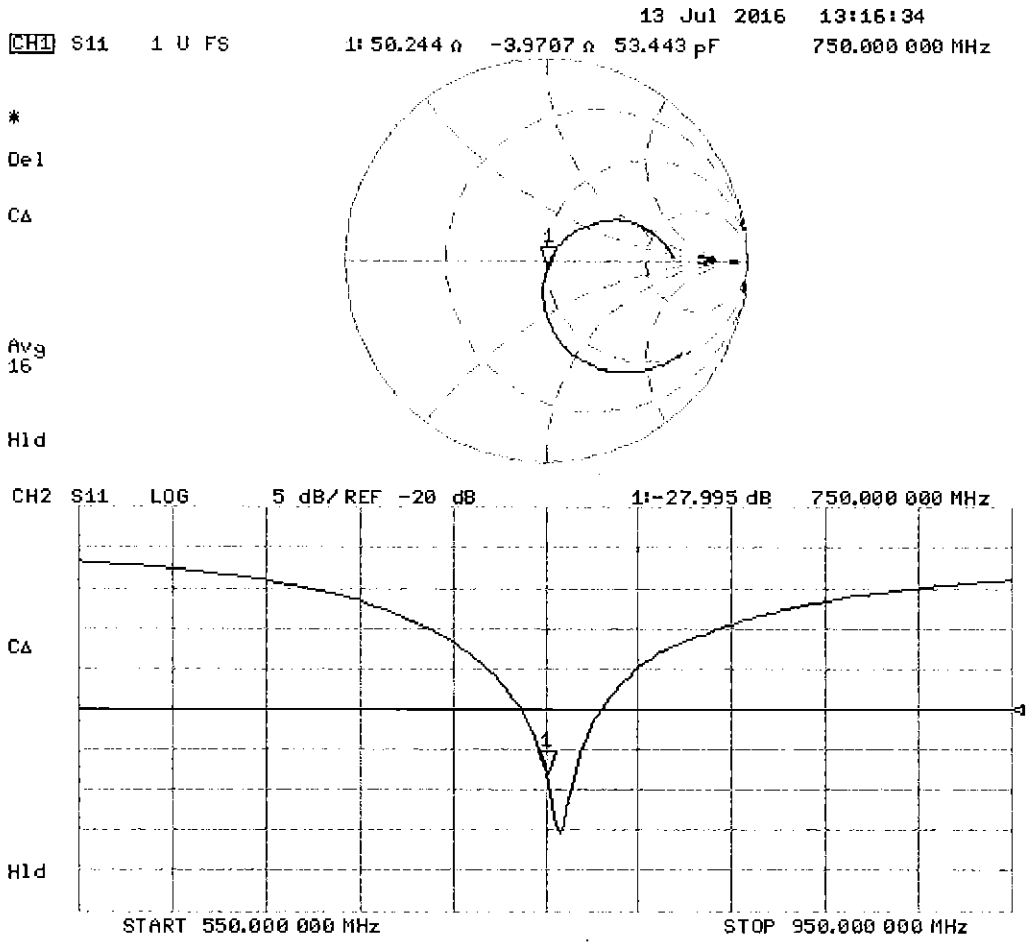
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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
S Servizio svizzero di taratura
S Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1237_Aug16**

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1237

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

vPT 8/9/16

Calibration date: August 02, 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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 4, 2016

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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-2, "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	34.4 ± 6 %	4.52 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.00 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

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

Head TSL parameters at 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	33.9 ± 6 %	4.86 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	8.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.3 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.9 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	33.7 ± 6 %	5.02 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	8.25 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.2 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	47.1 ± 6 %	5.42 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	7.54 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 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	46.5 ± 6 %	5.88 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	7.76 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	**21.5 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	46.2 ± 6 %	6.11 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	7.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 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	48.6 Ω - 2.5 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	50.9 Ω + 1.5 jΩ
Return Loss	- 35.3 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.8 Ω + 5.8 jΩ
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	47.0 Ω - 3.9 jΩ
Return Loss	- 25.9 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	51.5 Ω + 3.9 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	53.8 Ω + 0.3 jΩ
Return Loss	- 28.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 04, 2015

DASY5 Validation Report for Head TSL

Date: 02.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1237

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.52 S/m; ε_r = 34.4; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 4.86 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 5.02 S/m; ε_r = 33.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

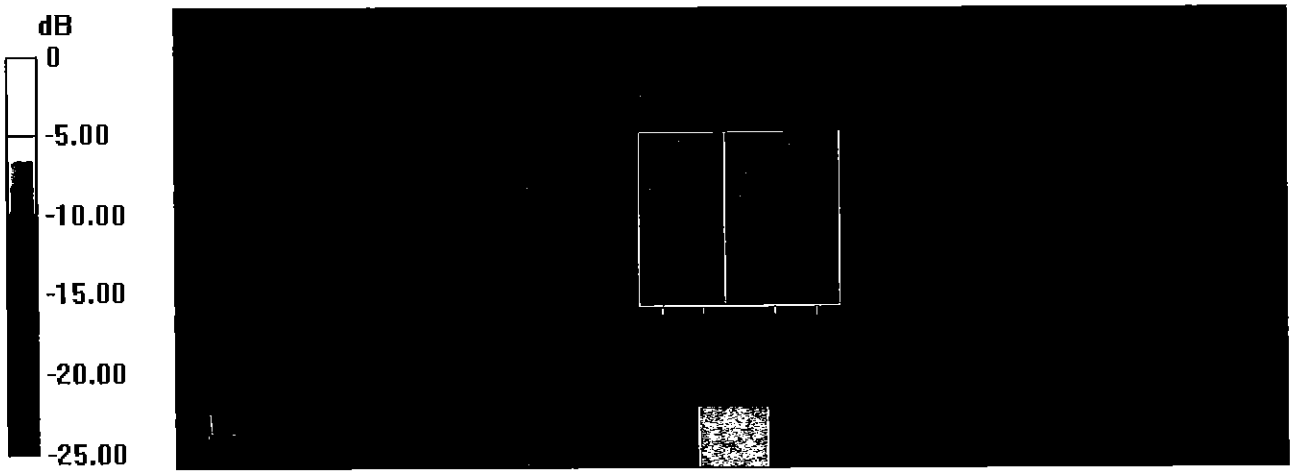
DASY52 Configuration:

- 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 = 74.10 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 29.5 W/kg
SAR(1 g) = 8 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

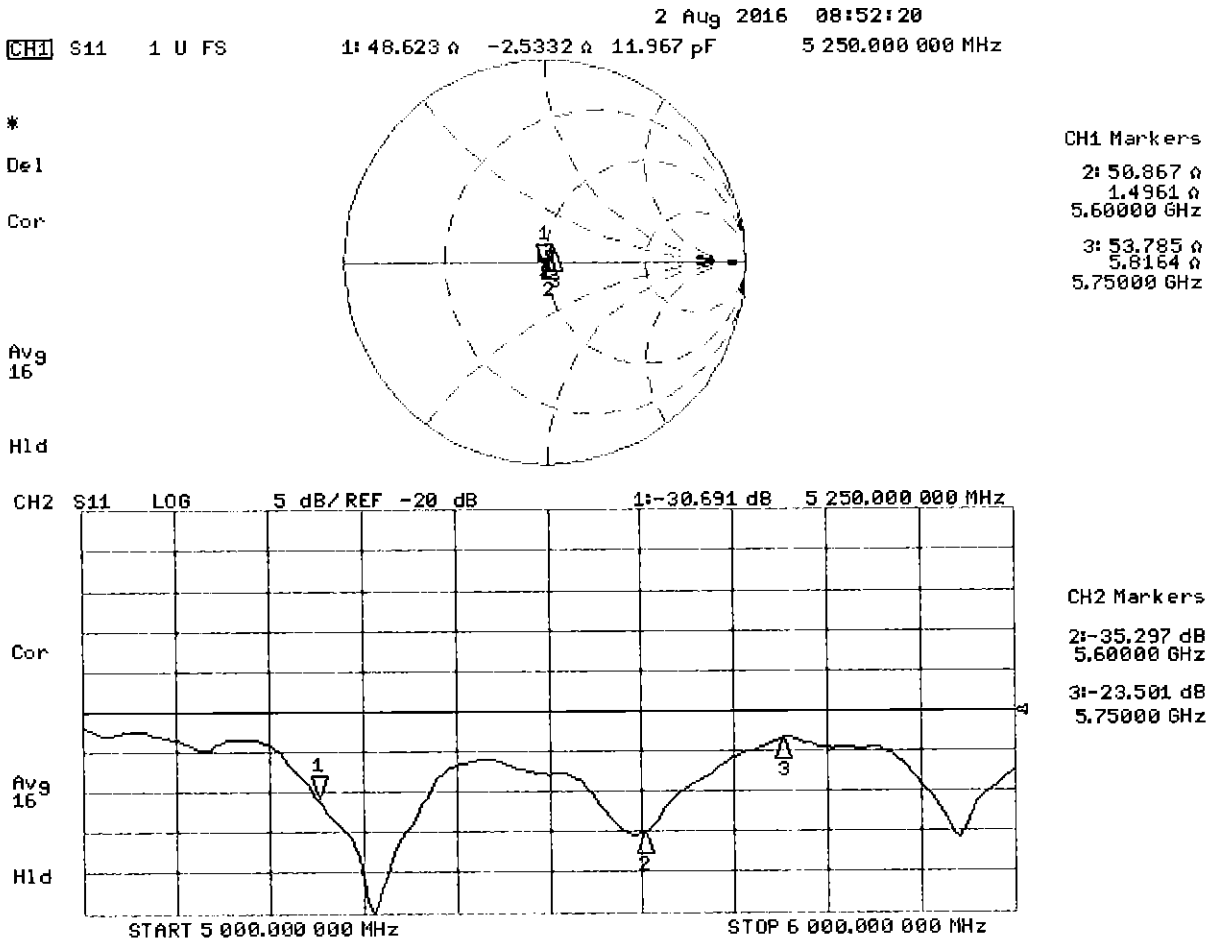
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 73.55 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.42 W/kg
Maximum value of SAR (measured) = 19.7 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 = 72.23 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 33.6 W/kg
SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 02.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1237

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.42 S/m; ε_r = 47.1; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 5.88 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 6.11 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

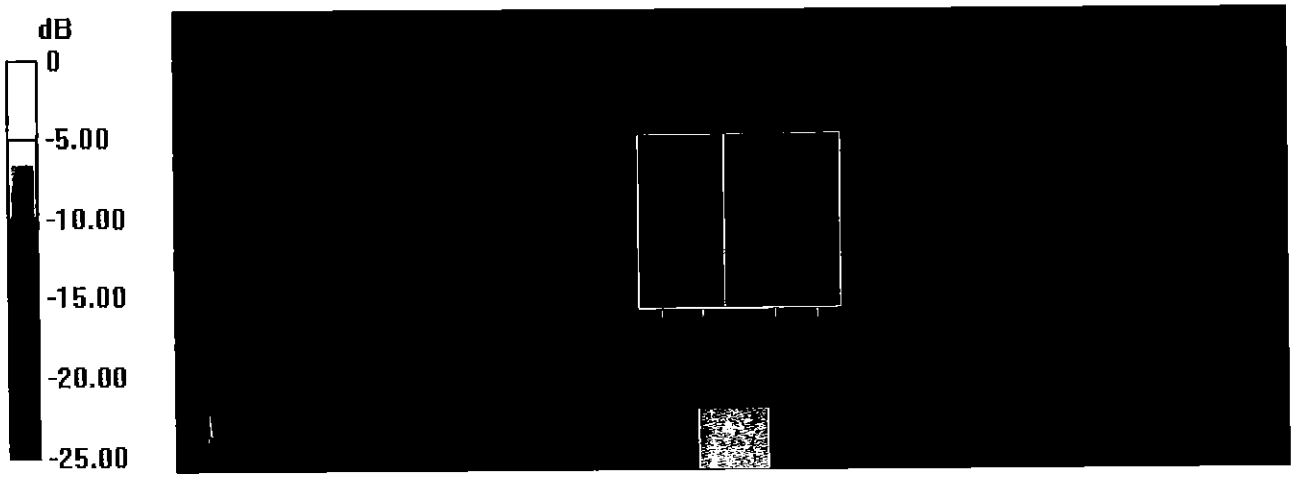
DASY52 Configuration:

- 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(1222); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body 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 = 67.19 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 28.4 W/kg
SAR(1 g) = 7.54 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 17.3 W/kg

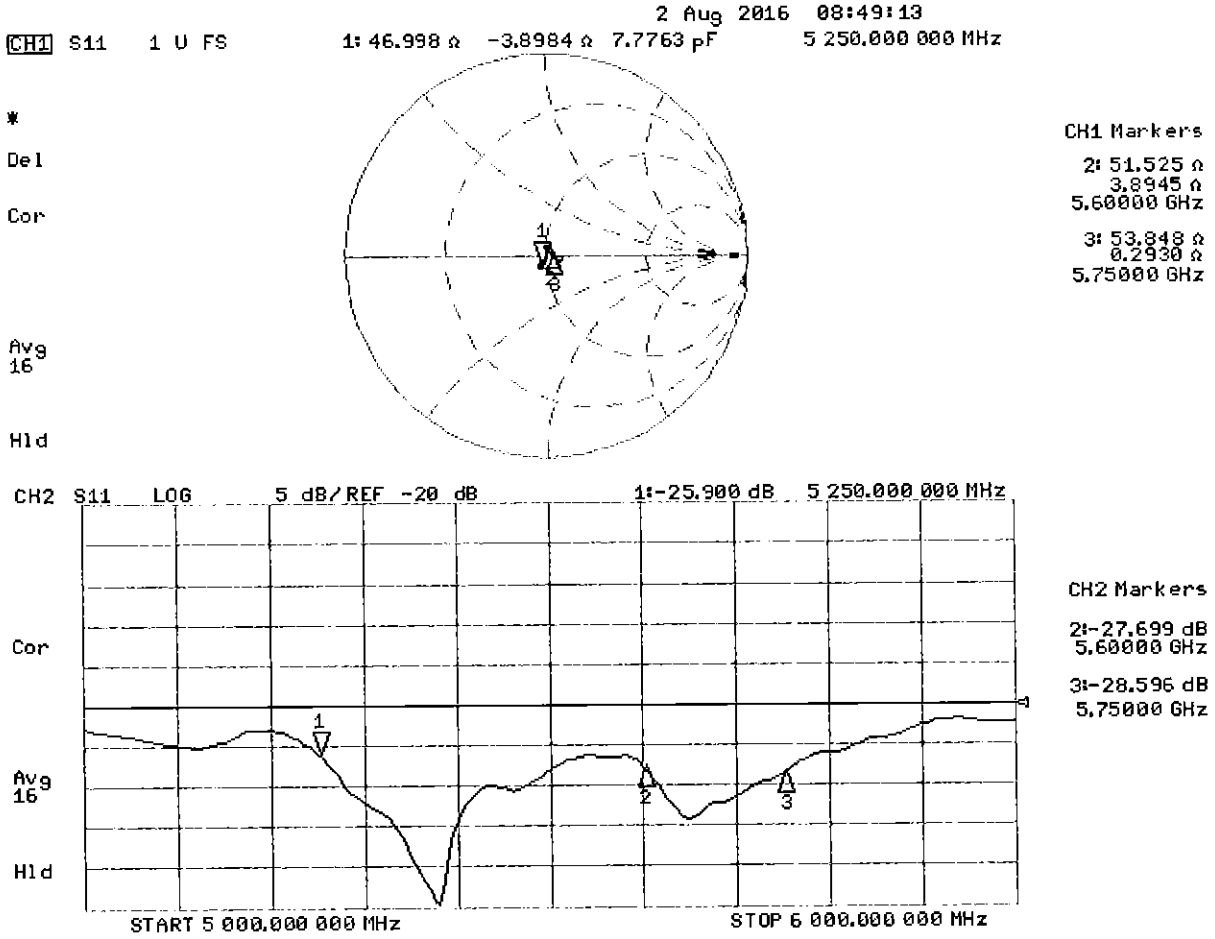
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.80 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 18.3 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 = 65.31 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.6 W/kg
SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 17.3 W/kg = 12.38 dBW/kg

Impedance Measurement Plot for Body TSL



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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

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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	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

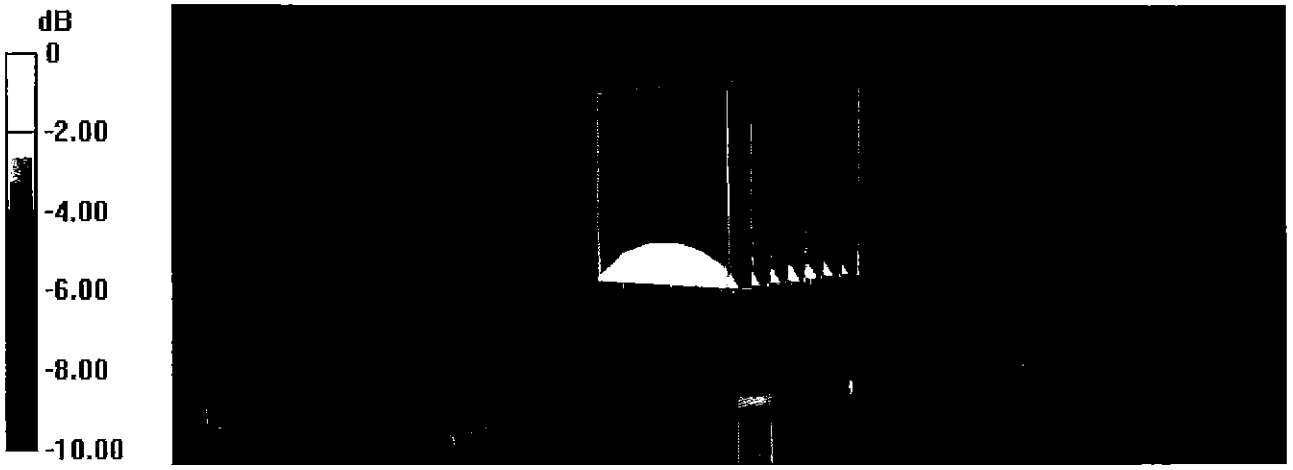
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

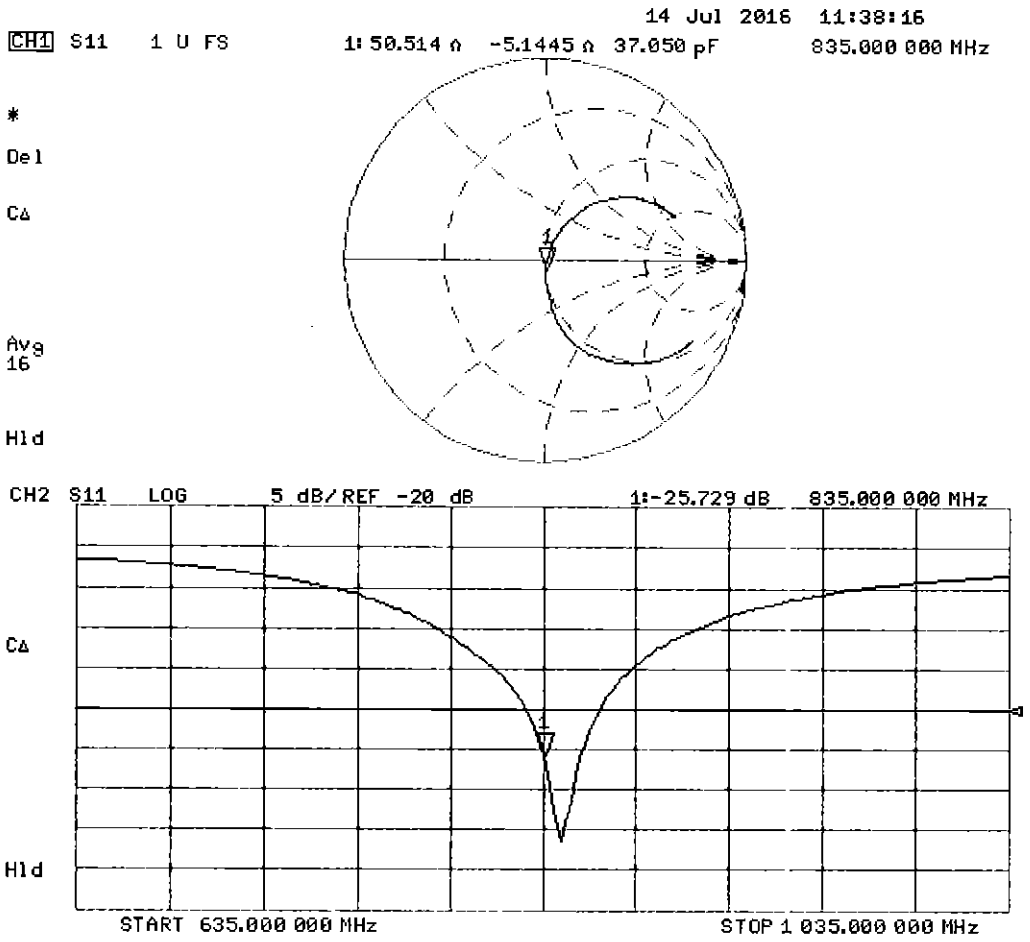
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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; σ = 1.01 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.73, 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)

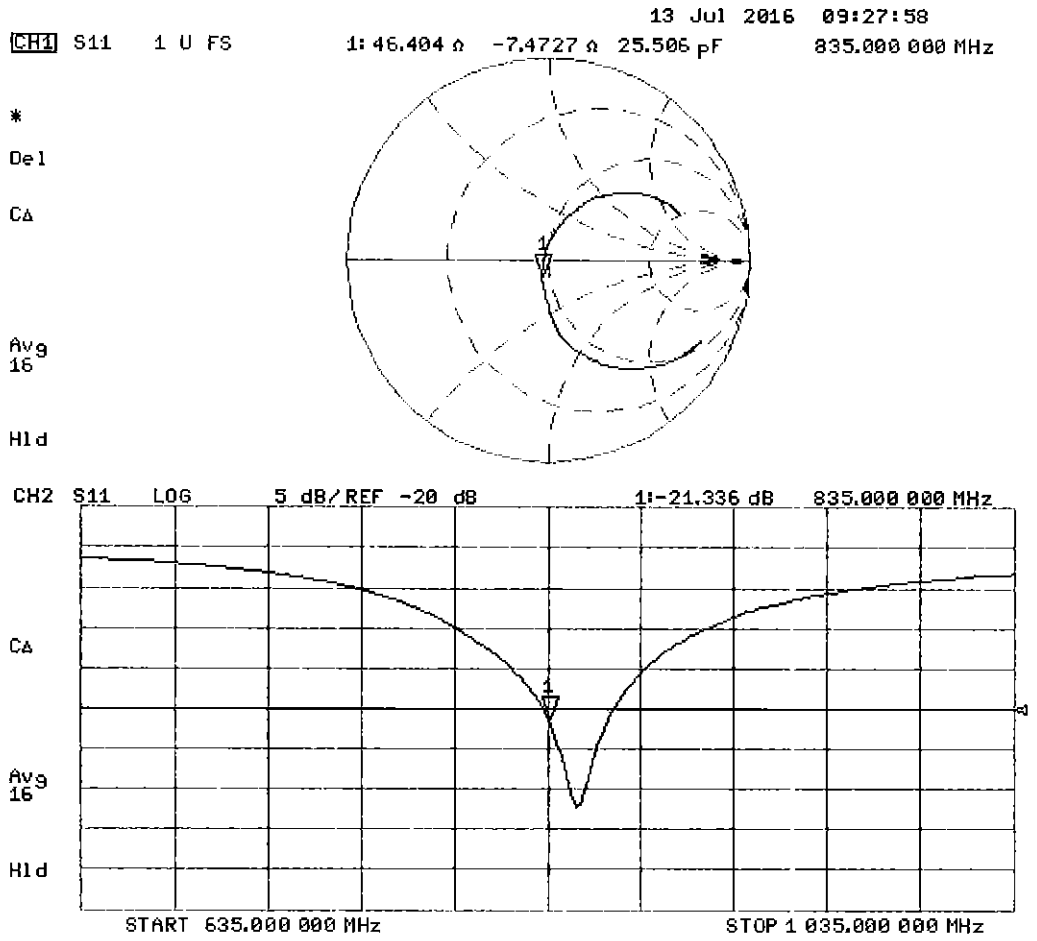
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d047_Jul16

CALIBRATION CERTIFICATE

Object D835V2 - SN:4d047

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

BN✓
7/16/2016

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:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 13, 2016

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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	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	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.13 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.95 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	2.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.57 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.24 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	49.8 Ω - 5.9 jΩ
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8 Ω - 8.2 jΩ
Return Loss	- 20.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	None 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 16, 2006

DASY5 Validation Report for Head TSL

Date: 13.07.201

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d047

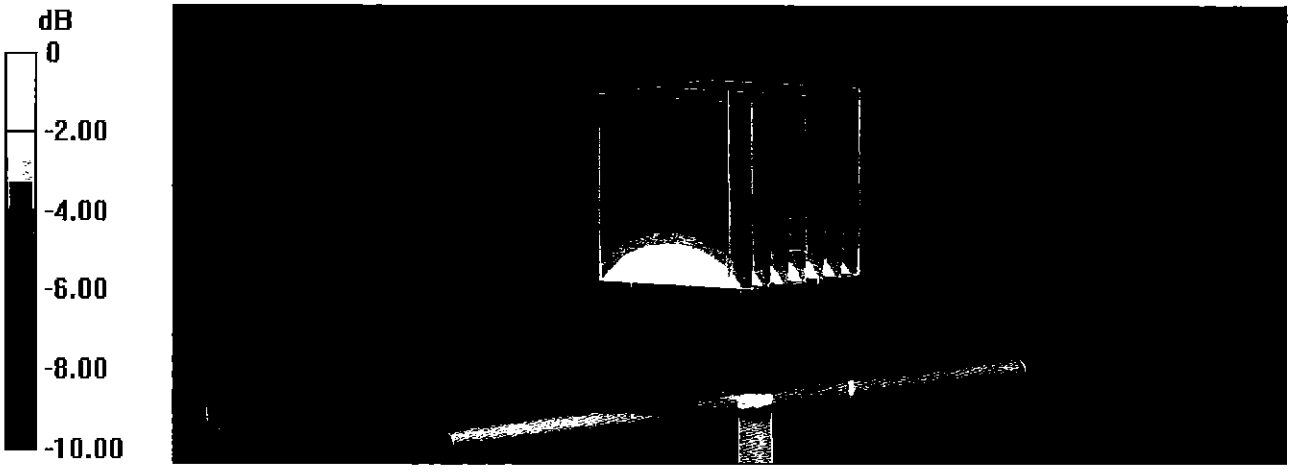
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

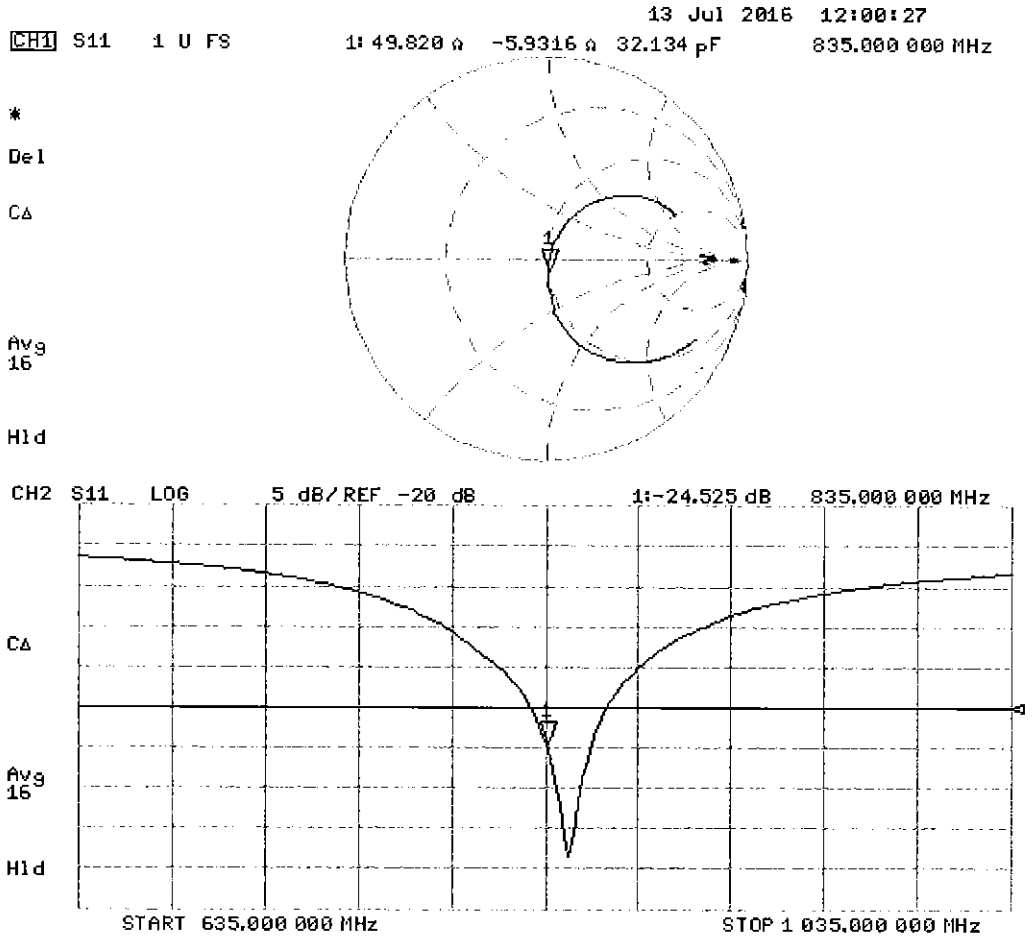
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.98 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.53 W/kg
Maximum value of SAR (measured) = 3.17 W/kg



0 dB = 3.17 W/kg = 5.01 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 D835V2; Type: D835V2; Serial: D835V2 - SN:4d047

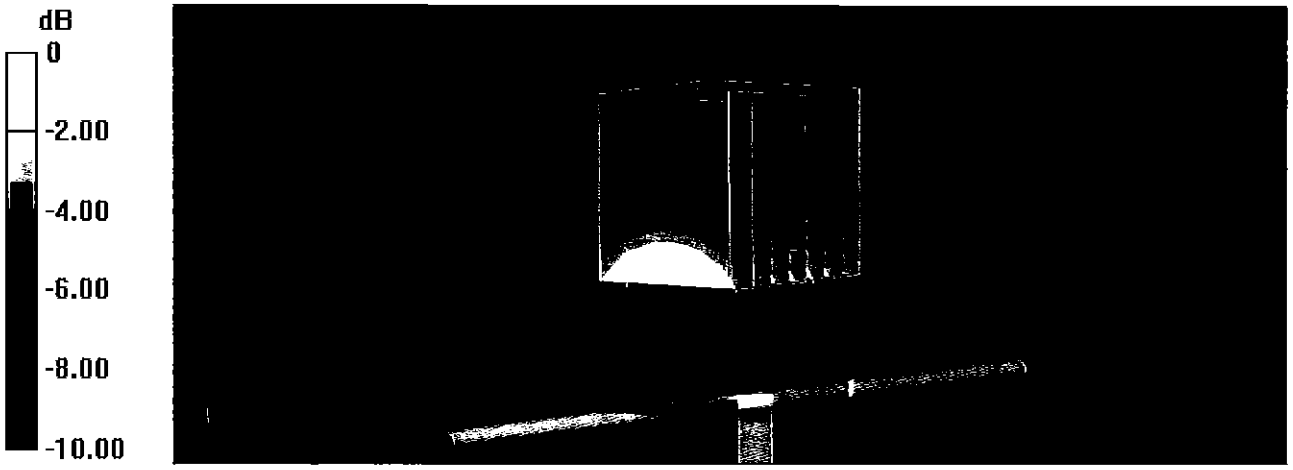
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.73, 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)

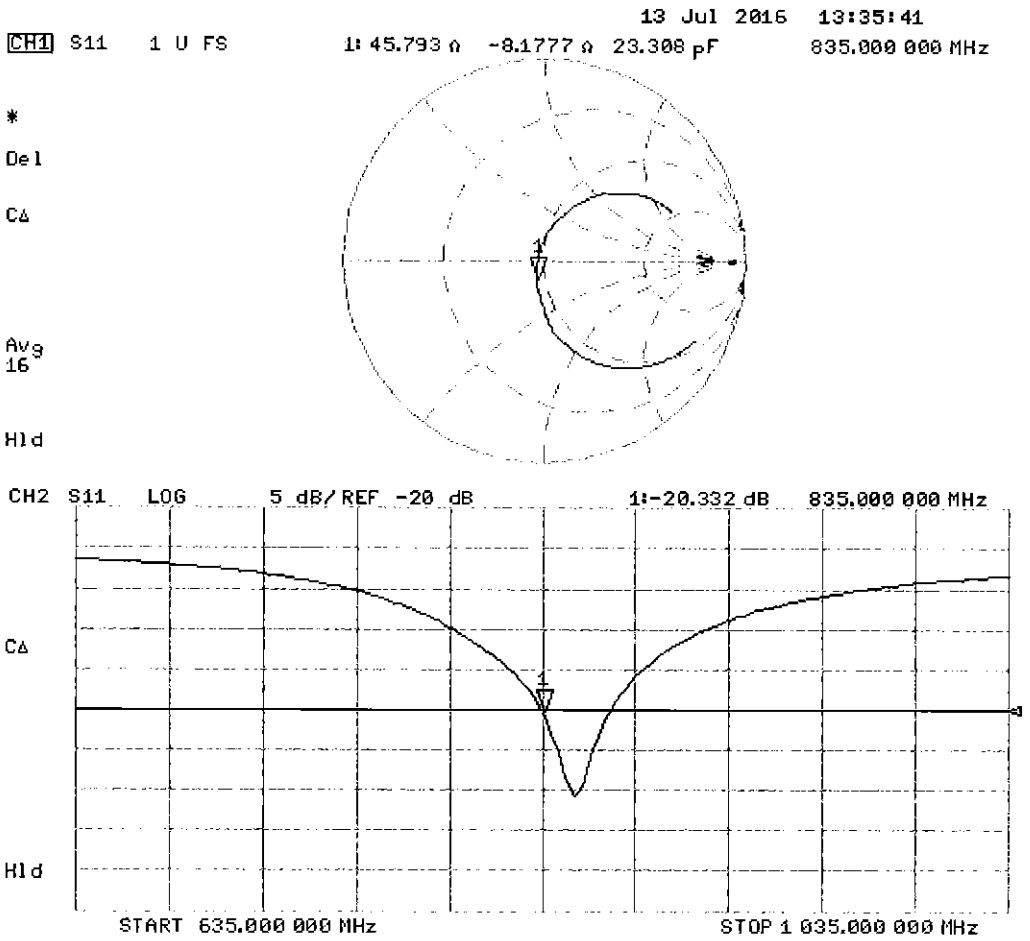
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.88 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27 W/kg = 5.15 dBW/kg

Impedance Measurement Plot for Body TSL



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Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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S Swiss Calibration Service

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **ES3-3022_Aug15**

CALIBRATION CERTIFICATE

Object ES3DV2 - SN:3022

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

Calibration date: August 26, 2015

BN ✓
9/3/2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 27, 2015

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

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

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S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 0108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

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"

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV2

SN:3022

Manufactured: April 15, 2003
Calibrated: August 26, 2015

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

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.00	1.03	0.95	± 10.1 %
DCP (mV)[B]	99.9	99.7	100.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	179.6	±3.3 %
		Y	0.0	0.0	1.0		183.9	
		Z	0.0	0.0	1.0		179.0	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	3.60	65.9	14.2	10.00	43.5	±2.2 %
		Y	2.84	63.5	13.0		43.3	
		Z	2.76	63.7	12.7		41.7	
10011-CAB	UMTS-FDD (WCDMA)	X	3.32	67.0	18.7	2.91	144.4	±0.7 %
		Y	3.24	66.3	18.0		147.3	
		Z	3.19	66.3	18.0		143.5	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	3.15	69.9	19.5	1.87	146.1	±0.7 %
		Y	2.88	67.7	18.0		147.9	
		Z	2.78	67.4	17.8		145.6	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	11.40	71.3	23.8	9.46	144.9	±3.3 %
		Y	11.15	70.5	23.1		146.9	
		Z	10.95	70.5	23.3		140.3	
10021-DAB	GSM-FDD (TDMA, GMSK)	X	20.66	99.8	29.2	9.39	132.6	±2.2 %
		Y	14.36	93.3	26.6		145.3	
		Z	17.17	97.2	27.8		145.4	
10023-DAB	GPRS-FDD (TDMA, GMSK, TN 0)	X	17.22	96.5	28.2	9.57	125.4	±1.9 %
		Y	11.06	88.6	25.0		136.0	
		Z	8.71	84.6	23.4		130.7	
10024-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	31.05	99.5	25.9	6.56	135.2	±2.2 %
		Y	25.28	97.4	25.0		132.5	
		Z	21.58	95.7	24.5		144.4	
10027-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	42.88	99.9	24.0	4.80	129.5	±1.9 %
		Y	40.80	99.6	23.7		124.9	
		Z	38.42	99.7	23.7		137.8	
10028-DAB	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	44.48	100.0	23.2	3.55	138.2	±1.9 %
		Y	44.03	99.7	22.8		133.0	
		Z	41.36	99.8	22.8		147.5	
10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	16.08	99.5	23.3	1.16	127.5	±1.4 %
		Y	79.69	99.6	19.3		146.2	
		Z	45.81	99.9	20.4		138.2	
10100-CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.43	67.4	19.8	5.67	138.7	±1.4 %
		Y	6.27	66.8	19.2		134.9	
		Z	6.16	66.6	19.2		127.6	

10103-CAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	10.13	75.0	25.9	9.29	129.4	±3.3 %
		Y	9.46	73.0	24.5		131.8	
		Z	9.52	74.0	25.4		137.0	
10108-CAC	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	6.27	66.9	19.7	5.80	137.0	±1.7 %
		Y	6.24	66.7	19.3		140.0	
		Z	6.06	66.3	19.2		127.1	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	10.16	68.7	21.3	8.07	127.7	±2.2 %
		Y	9.99	68.2	20.9		131.5	
		Z	10.22	69.1	21.4		141.6	
10151-CAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.34	73.4	25.2	9.28	125.0	±3.3 %
		Y	8.92	72.2	24.3		127.2	
		Z	8.95	73.1	25.1		131.9	
10154-CAC	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	5.95	66.4	19.4	5.75	134.4	±1.4 %
		Y	5.92	66.2	19.1		137.0	
		Z	5.98	66.7	19.5		146.8	
10160-CAB	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	6.39	66.9	19.6	5.82	139.9	±1.7 %
		Y	6.35	66.7	19.3		141.9	
		Z	6.15	66.2	19.2		128.4	
10169-CAB	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.96	66.6	19.8	5.73	137.3	±1.4 %
		Y	4.85	66.1	19.3		139.8	
		Z	4.85	66.6	19.7		146.7	
10172-CAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	8.75	78.7	28.3	9.21	138.9	±3.0 %
		Y	7.69	75.1	26.1		140.1	
		Z	7.80	76.6	27.2		144.0	
10175-CAC	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.88	66.2	19.6	5.72	132.0	±1.4 %
		Y	4.77	65.8	19.1		132.6	
		Z	4.83	66.5	19.6		146.0	
10181-CAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.91	66.3	19.7	5.72	131.7	±1.4 %
		Y	4.82	66.0	19.2		138.4	
		Z	4.86	66.7	19.7		145.7	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	10.04	69.1	21.7	8.10	140.9	±2.2 %
		Y	9.62	67.9	20.8		125.2	
		Z	9.74	68.6	21.3		133.3	
10225-CAB	UMTS-FDD (HSPA+)	X	7.01	67.1	19.6	5.97	143.7	±1.4 %
		Y	6.78	66.2	19.0		129.3	
		Z	6.80	66.7	19.3		136.5	
10237-CAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	8.55	78.0	27.9	9.21	134.6	±3.0 %
		Y	7.79	75.6	26.3		141.6	
		Z	7.89	76.9	27.4		145.2	
10252-CAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	9.30	74.8	26.1	9.24	134.8	±3.3 %
		Y	8.65	72.5	24.5		136.4	
		Z	8.33	72.3	24.8		126.6	
10267-CAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	10.20	76.2	26.8	9.30	144.8	±3.3 %
		Y	9.41	73.7	25.1		145.9	
		Z	9.18	73.9	25.6		138.6	

10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	4.45	66.7	18.9	3.96	147.0	±0.9 %
		Y	4.21	65.5	17.9		126.5	
		Z	4.36	66.5	18.5		148.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	3.57	66.3	18.5	3.46	134.3	±0.7 %
		Y	3.48	65.6	17.8		136.8	
		Z	3.51	66.2	18.3		136.4	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	3.53	66.4	18.6	3.39	135.8	±0.7 %
		Y	3.45	65.8	17.9		140.4	
		Z	3.50	66.5	18.5		137.0	
10297-AAA	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	6.18	66.5	19.5	5.81	129.4	±1.4 %
		Y	6.15	66.3	19.1		133.6	
		Z	6.13	66.5	19.3		131.2	
10311-AAA	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	6.77	67.2	19.9	6.06	134.8	±1.7 %
		Y	6.81	67.3	19.7		144.8	
		Z	6.68	67.1	19.7		136.7	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	10.30	69.4	22.0	8.37	142.0	±2.5 %
		Y	9.90	68.2	21.1		126.8	
		Z	10.15	69.3	21.9		142.6	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	4.72	68.1	18.9	3.76	147.8	±0.7 %
		Y	4.56	67.5	18.2		133.6	
		Z	4.61	68.2	18.7		147.4	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	4.57	67.8	18.8	3.77	144.3	±0.7 %
		Y	4.43	67.3	18.1		131.3	
		Z	4.57	68.3	18.8		145.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	2.64	67.9	18.7	1.54	142.1	±0.5 %
		Y	2.36	65.4	16.8		130.3	
		Z	2.50	66.7	17.7		145.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	10.04	69.0	21.7	8.23	138.8	±2.2 %
		Y	9.71	68.0	20.9		125.6	
		Z	9.94	69.0	21.6		140.4	

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 7 and 8).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.33	6.33	6.33	0.46	1.43	± 12.0 %
835	41.5	0.90	6.11	6.11	6.11	0.24	2.08	± 12.0 %
1750	40.1	1.37	5.08	5.08	5.08	0.45	1.47	± 12.0 %
1900	40.0	1.40	4.93	4.93	4.93	0.59	1.25	± 12.0 %
2300	39.5	1.67	4.63	4.63	4.63	0.55	1.39	± 12.0 %
2450	39.2	1.80	4.30	4.30	4.30	0.51	1.47	± 12.0 %
2600	39.0	1.96	4.12	4.12	4.12	0.57	1.46	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	6.16	6.16	6.16	0.50	1.34	± 12.0 %
835	55.2	0.97	6.13	6.13	6.13	0.25	2.16	± 12.0 %
1750	53.4	1.49	4.79	4.79	4.79	0.61	1.33	± 12.0 %
1900	53.3	1.52	4.56	4.56	4.56	0.31	2.02	± 12.0 %
2300	52.9	1.81	4.32	4.32	4.32	0.79	1.19	± 12.0 %
2450	52.7	1.95	4.08	4.08	4.08	0.80	1.12	± 12.0 %
2600	52.5	2.16	3.96	3.96	3.96	0.80	1.10	± 12.0 %

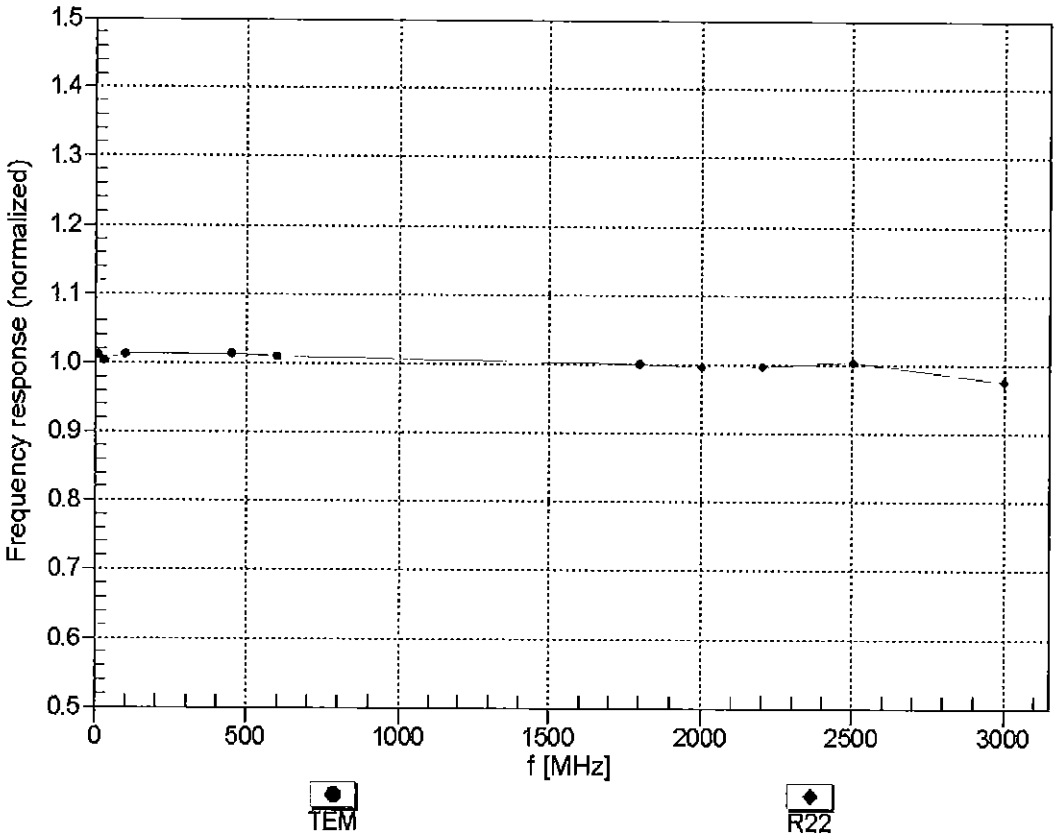
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

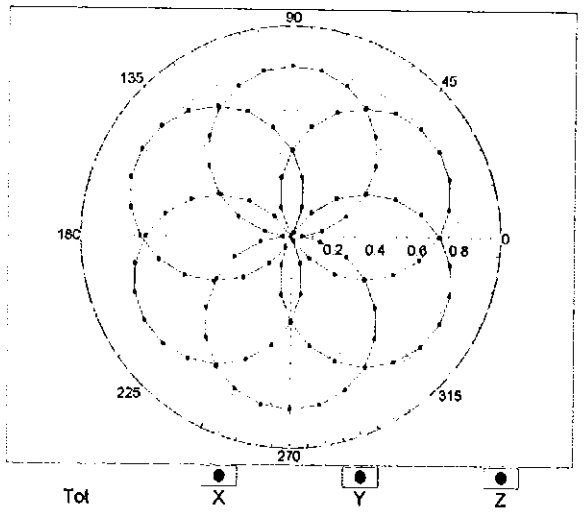
(TEM-Cell:ifi110 EXX, Waveguide: R22)



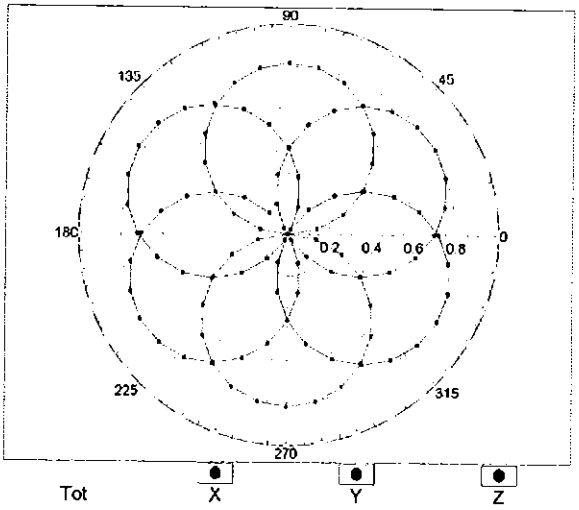
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

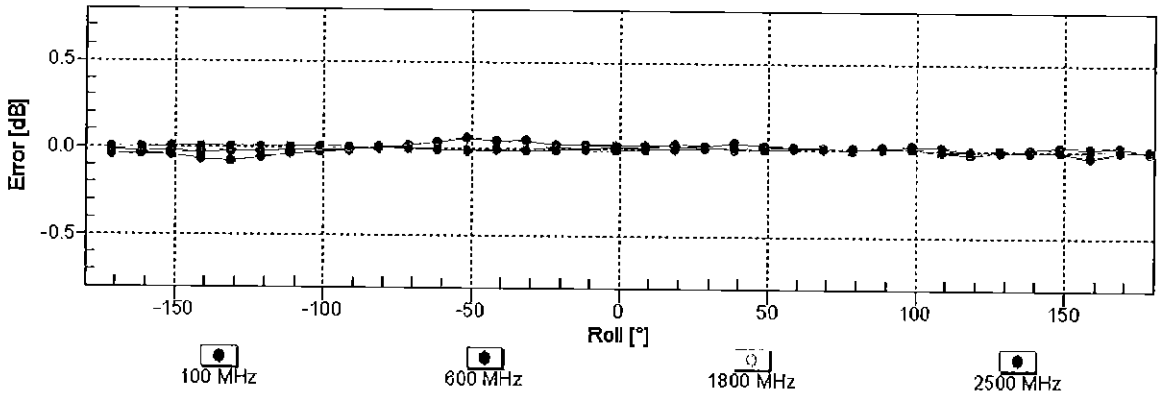
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

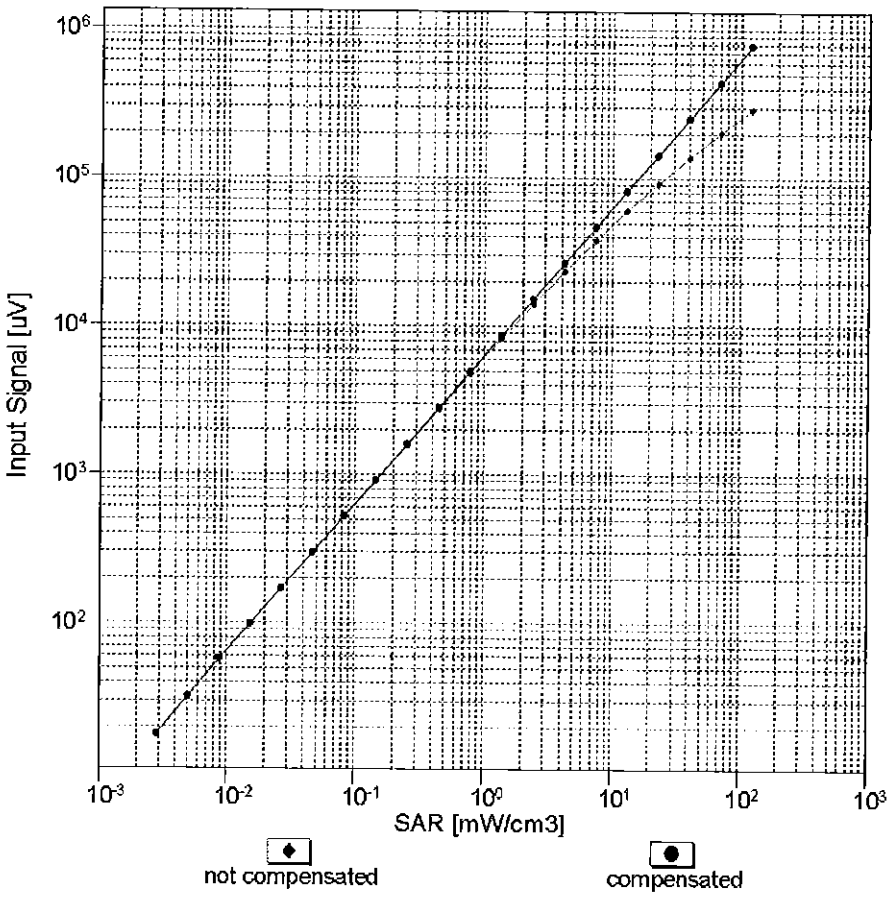


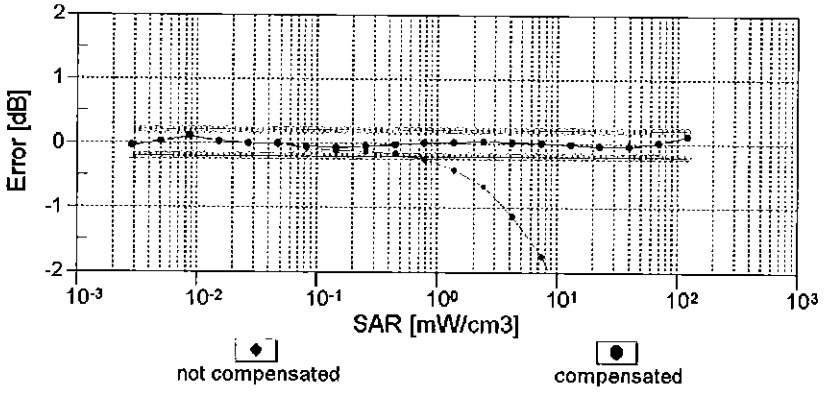


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)

(TEM cell , f_{eval}= 1900 MHz)

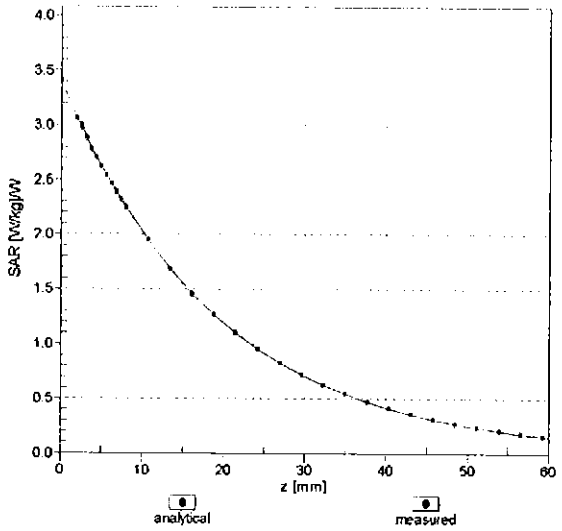




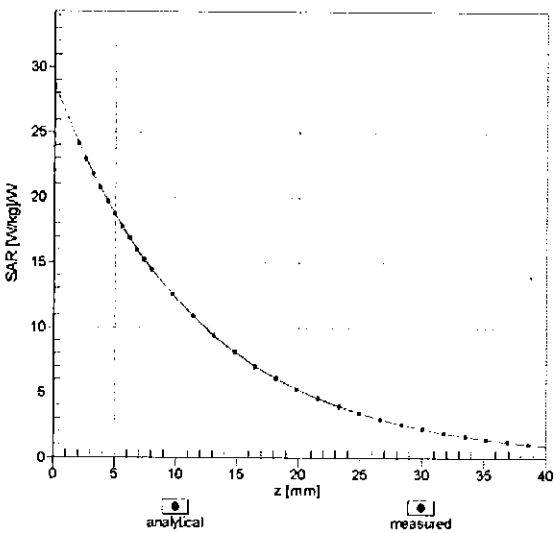
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

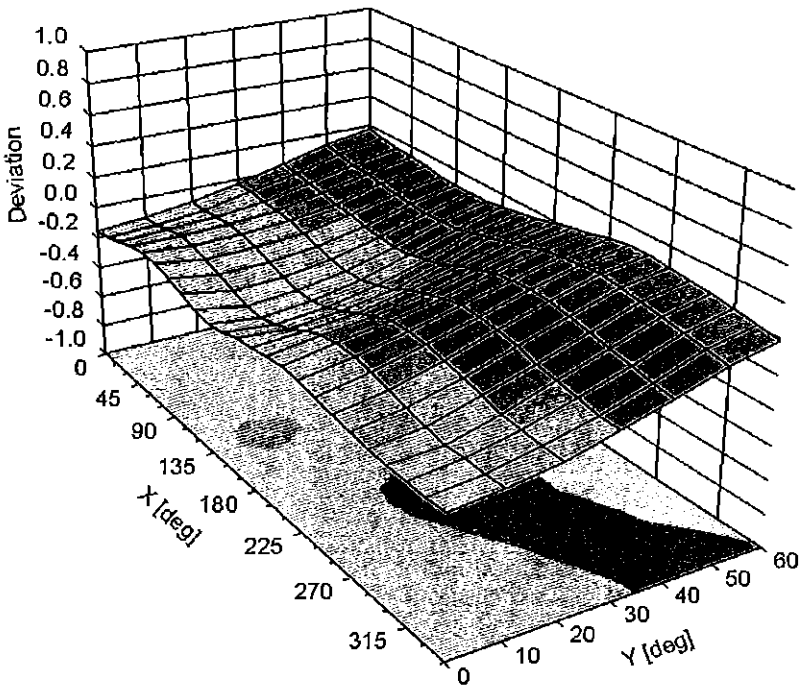


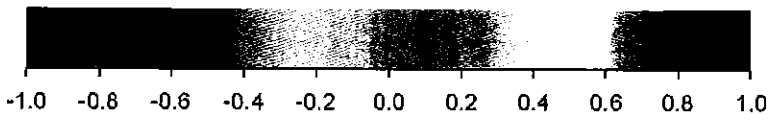
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	98.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm