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SAR EVALUATION REPORT

Applicant Name:
LG Electronics U.S.A., Inc.
1000 Sylvan Avenue
Englewood Cliffs, NJ 07632
United States

Date of Testing:
01/21/19 - 02/20/19
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1901150005-01-R3.ZNF

FCC ID: **ZNFV450VM**

APPLICANT: **LG ELECTRONICS U.S.A., INC.**

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: LM-V450VM
Additional Model(s): LMV450VM, V450VM

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.11	0.68	0.64	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.31	0.55	N/A
PCE	UMTS 850	826.40 - 846.60 MHz	0.14	1.01	1.01	N/A
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.15	0.49	1.03	2.11
PCE	LTE Band 13	779.5 - 784.5 MHz	0.15	0.67	0.67	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.12	0.98	0.98	N/A
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.15	0.66	1.03	2.51
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.12	0.47	1.07	2.24
CBE	LTE Band 48	3552.5 - 3697.5 MHz	0.14	0.22	0.22	N/A
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.53	0.30	0.30	N/A
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	0.20	N/A
NII	U-NII-2A	5260 - 5320 MHz	0.70	0.23	N/A	1.82
NII	U-NII-2C	5500 - 5720 MHz	0.67	0.17	N/A	1.03
NII	U-NII-3	5745 - 5825 MHz	0.92	0.30	0.30	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.22	< 0.1	< 0.1	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.45	1.58	1.58	3.94

Note: This revised Test Report (S/N: 1M1901150005-01-R3.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

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

Randy Ortanez
President

The SAR Tick is an initiative of the Mobile & Wireless Forum (MWF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MWF. Further details can be obtained by emailing: sartick@mwfai.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
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 48	Voice/Data	3552.5 - 3697.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	1.3 kHz - 3.3 kHz
5G NR - n261	Data	27500 - 28350 MHz
5G NR - n260	Data	37000 - 40000 MHz

1.2 Power Reduction for SAR

This device uses a power reduction mechanism for SAR compliance. The power reduction mechanism is activated when the device is used in close proximity to the user's body. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device. 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 and in some simultaneous transmission conditions with 5G NR and 2.4 GHz + 5 GHz WIFI Active. 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.

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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 2G/3G/4G Maximum Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*1 TX Slots*	*2 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.7**	**33.7**	**29.5**	**27.0**	**27.0**
	Nominal	**33.2**	**33.2**	**29.0**	**26.5**	**26.5**
GSM/GPRS/EDGE 1900	Maximum	**31.2**	**31.2**	**27.5**	**26.0**	**26.0**
	Nominal	**30.7**	**30.7**	**27.0**	**25.5**	**25.5**

Mode / Band		Modulated Average (dBm)			
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*	*3GPP DC-HSDPA*
UMTS Band 5 (850 MHz)	Maximum	**25.5**	**25.5**	**25.5**	**25.5**
	Nominal	**25.0**	**25.0**	**25.0**	**25.0**
UMTS Band 2 (1900 MHz)	Maximum	**25.2**	**25.2**	**25.2**	**25.2**
	Nominal	**24.7**	**24.7**	**24.7**	**24.7**

Mode / Band		Modulated Average (dBm)
LTE Band 13	Maximum	**25.5**
	Nominal	**25.0**
LTE Band 5 (Cell)	Maximum	**25.5**
	Nominal	**25.0**
LTE Band 66 (AWS)	Maximum	**25.2**
	Nominal	**24.7**
LTE Band 4 (AWS)	Maximum	**25.2**
	Nominal	**24.7**
LTE Band 2 (PCS)	Maximum	**25.2**
	Nominal	**24.7**
LTE Band 48	Maximum	**23.7**
	Nominal	**23.2**

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1.3.2 3G/4G Reduced Output Power

Mode / Band		Modulated Average (dBm)			
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*	*3GPP DC-HSDPA*
UMTS Band 2 (1900 MHz)	Maximum	**23.7**	**23.7**	**23.7**	**23.7**
	Nominal	**23.2**	**23.2**	**23.2**	**23.2**

Mode / Band		Modulated Average (dBm)
LTE Band 66 (AWS)	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 4 (AWS)	Maximum	**23.7**
	Nominal	**23.2**
LTE Band 2 (PCS)	Maximum	**23.7**
	Nominal	**23.2**

1.3.3 WLAN/Bluetooth Maximum Output Power

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		Ch 1-2	Ch 3-9	Ch 10-11
IEEE 802.11b (2.4 GHz)	Maximum	**20.5**		
	Nominal	**19.5**		
IEEE 802.11g (2.4 GHz)	Maximum	**17.5**	**19.5**	**18.0**
	Nominal	**16.5**	**18.5**	**17.0**
IEEE 802.11n (2.4 GHz)	Maximum	**16.5**	**18.5**	**17.0**
	Nominal	**15.5**	**17.5**	**16.0**
IEEE 802.11ac (2.4 GHz)	Maximum	**16.5**	**18.5**	**17.0**
	Nominal	**15.5**	**17.5**	**16.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)			
		20 MHz Bandwidth		40 MHz Bandwidth	80 MHz Bandwidth
		Ch 36, 44-52, 60-153	Ch 40, 56, 157-165		
IEEE 802.11a (5 GHz)	Maximum	**17.0**	**18.0**		
	Nominal	**16.0**	**17.0**		
IEEE 802.11n (5 GHz)	Maximum	**17.0**	**18.0**	**16.0**	
	Nominal	**16.0**	**17.0**	**15.0**	
IEEE 802.11ac (5 GHz)	Maximum	**17.0**	**18.0**	**16.0**	**13.5**
	Nominal	**16.0**	**17.0**	**15.0**	**12.5**

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Mode / Band		Modulated Average - MIMO (dBm)		
		Ch 1-2	Ch 3-9	Ch 10-11
IEEE 802.11b (2.4 GHz)	Maximum	**23.5**		
	Nominal	**22.5**		
IEEE 802.11g (2.4 GHz)	Maximum	**20.5**	**22.5**	**21.0**
	Nominal	**19.5**	**21.5**	**20.0**
IEEE 802.11n (2.4 GHz)	Maximum	**19.5**	**21.5**	**20.0**
	Nominal	**18.5**	**20.5**	**19.0**
IEEE 802.11ac (2.4 GHz)	Maximum	**19.5**	**21.5**	**20.0**
	Nominal	**18.5**	**20.5**	**19.0**

Mode / Band		Modulated Average - MIMO (dBm)			
		20 MHz Bandwidth		40 MHz Bandwidth	80 MHz Bandwidth
		Ch 36, 44-52, 60-153	Ch 40, 56, 157-165		
IEEE 802.11a (5 GHz)	Maximum	**20.0**	**21.0**		
	Nominal	**19.0**	**20.0**		
IEEE 802.11n (5 GHz)	Maximum	**20.0**	**21.0**	**19.0**	
	Nominal	**19.0**	**20.0**	**18.0**	
IEEE 802.11ac (5 GHz)	Maximum	**20.0**	**21.0**	**19.0**	**16.5**
	Nominal	**19.0**	**20.0**	**18.0**	**15.5**

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	**12.5**
	Nominal	**11.5**
Bluetooth LE	Maximum	**8.0**
	Nominal	**7.0**

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1.3.4 WLAN Reduced Output Power

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		Ch 1-2	Ch 3-9	Ch 10-11
IEEE 802.11b (2.4 GHz)	Maximum	**18.0**		
	Nominal	**17.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**17.5**	**18.0**	**18.0**
	Nominal	**16.5**	**17.0**	**17.0**
IEEE 802.11n (2.4 GHz)	Maximum	**16.5**	**18.0**	**17.0**
	Nominal	**15.5**	**17.0**	**16.0**
IEEE 802.11ac (2.4 GHz)	Maximum	**16.5**	**18.0**	**17.0**
	Nominal	**15.5**	**17.0**	**16.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		Ch 1-2	Ch 3-9	Ch 10-11
IEEE 802.11b (2.4 GHz)	Maximum	**21.0**		
	Nominal	**20.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**20.5**	**21.0**	**21.0**
	Nominal	**19.5**	**20.0**	**20.0**
IEEE 802.11n (2.4 GHz)	Maximum	**19.5**	**21.0**	**20.0**
	Nominal	**18.5**	**20.0**	**19.0**
IEEE 802.11ac (2.4 GHz)	Maximum	**19.5**	**21.0**	**20.0**
	Nominal	**18.5**	**20.0**	**19.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**15.0**		
	Nominal	**14.0**		
IEEE 802.11n (5 GHz)	Maximum	**15.0**	**15.0**	
	Nominal	**14.0**	**14.0**	
IEEE 802.11ac (5 GHz)	Maximum	**15.0**	**15.0**	**13.5**
	Nominal	**14.0**	**14.0**	**12.5**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**18.0**		
	Nominal	**17.0**		
IEEE 802.11n (5 GHz)	Maximum	**18.0**	**18.0**	
	Nominal	**17.0**	**17.0**	
IEEE 802.11ac (5 GHz)	Maximum	**18.0**	**18.0**	**16.5**
	Nominal	**17.0**	**17.0**	**15.5**

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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	No
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	No
UMTS 1900	Yes	Yes	No	Yes	No	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	No
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	No
LTE Band 66 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	No	Yes
LTE Band 48	Yes	Yes	No	Yes	Yes	No
2.4 GHz WLAN Ant 1	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN Ant 2	Yes	Yes	Yes	No	Yes	No
5 GHz WLAN Ant 1	Yes	Yes	Yes	No	Yes	No
5 GHz WLAN Ant 2	Yes	Yes	Yes	No	Yes	No
Bluetooth	Yes	Yes	Yes	No	Yes	No

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-2A and U-NII-2C operations are disabled.

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 operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

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.

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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	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
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 Bluetooth + 5 GHz WI-FI	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
7	GSM voice + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
8	GSM voice + 2.4 GHz WI-FI Ant 1 + 5 GHz WI-FI Ant 2	Yes	Yes	N/A	Yes	
9	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
10	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
11	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
12	UMTS + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
13	UMTS + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
14	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
15	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
16	UMTS + 2.4 GHz WI-FI Ant 1 + 5 GHz WI-FI Ant 2	Yes	Yes	Yes	Yes	
17	LTE + 5G NR	Yes	Yes	N/A	Yes	
18	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
19	LTE + 2.4 GHz WI-FI + 5G NR	Yes	Yes	Yes	Yes	
20	LTE + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
21	LTE + 5 GHz WI-FI + 5G NR	Yes	Yes	Yes	Yes	
22	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
23	LTE + 2.4 GHz Bluetooth + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
24	LTE + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
25	LTE + 2.4 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
26	LTE + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
27	LTE + 5 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
28	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
29	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
30	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
31	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
32	LTE + 2.4 GHz WI-FI Ant 1 + 5 GHz WI-FI Ant 2	Yes	Yes	Yes	Yes	
33	LTE + 2.4 GHz WI-FI Ant 1 + 5 GHz WI-FI Ant 2 + 5G NR	Yes	Yes	Yes	Yes	
34	GPRS/EDGE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
35	GPRS/EDGE + 5 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
36	GPRS/EDGE + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
37	GPRS/EDGE + 2.4 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
38	GPRS/EDGE + 5 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
39	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
40	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
41	GPRS/EDGE + 2.4 GHz WI-FI Ant 1 + 5 GHz WI-FI Ant 2	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered

1. Bluetooth cannot transmit simultaneously with 2.4 GHz WLAN.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5 GHz Wireless Router is only supported for the U-NII-1, U-NII-3 by S/W, therefore U-NII-2A, and U-NII-2C were not evaluated for wireless router conditions.
6. This device supports 2x2 MIMO Tx for WLAN 802.11a/g/n/ac. 802.11a/g/n/ac supports CDD and STBC and 802.11n/ac additionally supports SDM. Each WLAN antenna can transmit independently or together when operating with MIMO.
7. This device supports VOLTE.
8. This device supports VoWIFI.
9. This device supports Bluetooth Tethering.
10. For 5G NR, QTM-0 and QTM-1 cannot transmit simultaneously.
11. LTE + 5G NR operations are possible only with LTE B2, B4, B5, B13, and B66.

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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-2A & U-NII-2C WIFI, only 2.4 GHz U-NII-1, and U-NII-3 WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB Publication 941225 D06v02r01.

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

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-2A & U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz WLAN, U-NII-1 WLAN, U-NII-3 WLAN, and Bluetooth 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 LTE Carrier Aggregation (CA) in the downlink. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive. The downlink carrier aggregation exclusion analysis can be found in Appendix H.
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.

This device supports downlink 4x4 MIMO operations for some LTE Bands. Per May 2017 TCB Workshop Guidance, SAR for downlink 4x4 MIMO was not needed since the maximum average output power in 4x4 downlink MIMO mode was not > 0.25 dB higher than the maximum output power with downlink 4x4 MIMO inactive.

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This device supports LTE capabilities with overlapping transmission frequency ranges. When the supported frequency range of an LTE Band falls completely within an LTE band with a larger transmission frequency range, both LTE bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

This device supports 64QAM on the uplink and 256QAM on the downlink for LTE Operations. Conducted powers for 64QAM configurations were measured per Section 5.1 of FCC KDB Publication 941225 D05v02r05. SAR was not required for 64QAM since the highest maximum output power for 64 QAM is ≤ ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg, per Section 5.2.4 of FCC KDB Publication 941225 D05v02r05.

This device supports LTE Carrier Aggregation (CA) for LTE Band 5 with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per 2017 Fall TCB Workshop Notes.

This device supports 5G NR for Bands n261 and n260. RF Exposure assessment and simultaneous transmission analysis for these bands can be found in test report 1M1901150005-15-R3.ZNF.

1.8 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)
- FCC KDB Publication 616217 D04v01r02 (Proximity Sensor)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE 4x4 Downlink MIMO)
- April 2018 TCB Workshop Notes (LTE Carrier Aggregation)

1.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 11.

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2 LTE INFORMATION

LTE Information					
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 48 (3552.5 - 3697.5 MHz)				
Channel Bandwidths	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 48: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
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 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)	1779.3 (132665)	
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)	1778.5 (132657)	
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)	1777.5 (132647)	
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)	1775 (132622)	
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)	1772.5 (132597)	
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)	1770 (132572)	
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)	1754.3 (20393)	
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)	1753.5 (20385)	
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)	1752.5 (20375)	
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)	1750 (20350)	
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)	1747.5 (20325)	
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)	1745 (20300)	
LTE Band 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 48: 5 MHz	3552.5 (55265)	3600.8 (55748)	N/A	3649.2 (56232)	3697.5 (56715)
LTE Band 48: 10 MHz	3555 (55290)	3601.7 (55757)	N/A	3648.3 (56223)	3695 (56690)
LTE Band 48: 15 MHz	3557.5 (55315)	3602.5 (55765)	N/A	3647.5 (56215)	3692.5 (56665)
LTE Band 48: 20 MHz	3560 (55340)	3603.3 (55773)	N/A	3646.7 (56207)	3690 (56640)
UE Category	DL UE Cat 19 (QPSK, 16QAM, 64QAM, 256QAM), UL UE Cat 13 (QPSK, 16QAM, 64QAM)				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 12. It supports carrier aggregation, downlink MIMO, LAA features as shown in Section 9 and Appendix H. All other uplink communications are identical to the Release 8 specifications. Uplink communications are done on the PCC unless otherwise specified. The following LTE Release 12 Features are not supported: Relay, HetNet, Enhanced eICIC, 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:

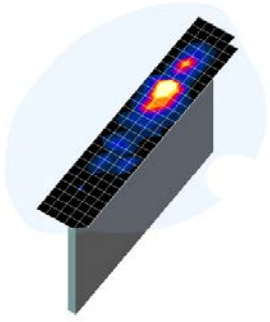

Figure 4-1
Sample SAR Area Scan

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].

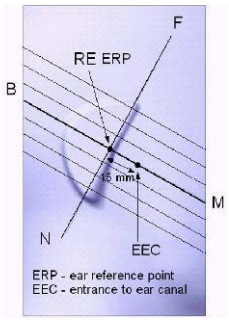

Figure 5-1
Close-Up Side view of ERP

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

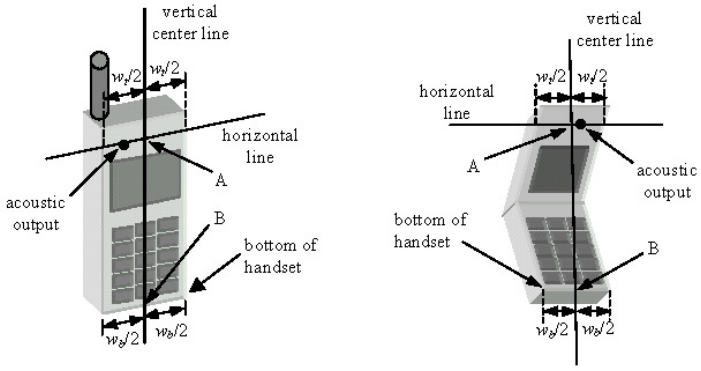

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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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.

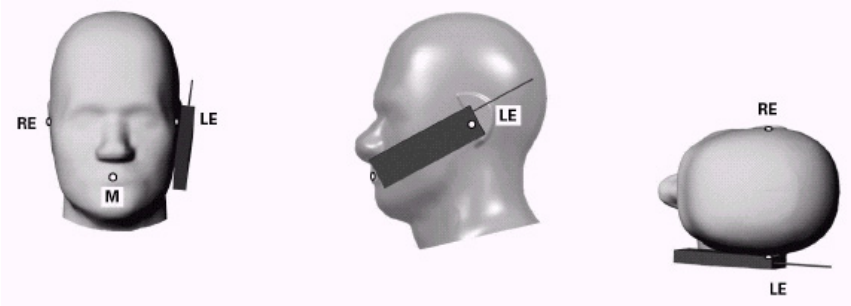

Figure 6-1 Front, Side and Top View of Cheek Position

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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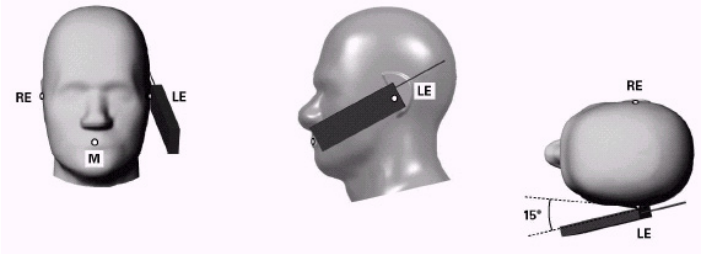

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

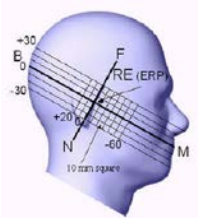

Figure 6-3
Side view w/ relevant markings

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.

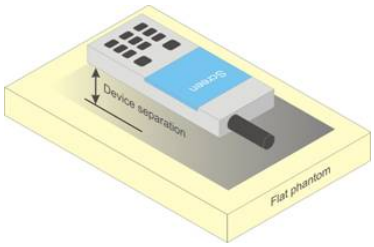

Figure 6-4
Sample Body-Worn Diagram

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

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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 1g body and 10g 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.

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

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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 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

6.9 Proximity Sensor Configurations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close the user's body.

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation 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 Publication 616217 D04v01r02 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 sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antennas.

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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 ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

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

8.5.5 TDD

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

8.5.6 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink

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carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for downlink only carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

8.6 SAR Testing with 802.11 Transmitters

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

8.6.1 General Device Setup

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

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

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

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g 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

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

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 10g 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 10g 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 10g 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 10g 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

Table 9-1
Maximum Conducted Power

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**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
GSM 850	128	33.35	**33.53**	29.28	26.55	26.50
	190	33.46	**33.40**	29.17	26.68	26.66
	251	33.43	**33.43**	29.25	26.63	26.64
GSM 1900	512	30.71	**30.75**	27.13	25.51	25.74
	661	30.83	**31.02**	27.28	25.80	25.62
	810	30.97	**30.91**	27.01	25.71	25.65

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**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
GSM 850	128	24.32	**24.50**	23.26	17.52	20.48
	190	24.43	**24.37**	23.15	17.65	20.64
	251	24.40	**24.40**	23.23	17.60	20.62
GSM 1900	512	21.68	**21.72**	21.11	16.48	19.72
	661	21.80	**21.99**	21.26	16.77	19.60
	810	21.94	**21.88**	20.99	16.68	19.63
GSM 850	**Frame Avg.Targets:**	24.17	**24.17**	22.98	17.47	20.48
GSM 1900		21.67	**21.67**	20.98	16.47	19.48

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: 10 (Max 2 Tx uplink slots)
EDGE Multislot class: 10 (Max 2 Tx uplink slots)
DTM Multislot Class: N/A

Figure 9-1
Power Measurement Setup

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9.2 UMTS Conducted Powers

Table 9-2
Maximum Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	25.32	25.28	25.40	25.20	25.04	25.02	-
99		12.2 kbps AMR	25.34	25.37	25.22	25.19	25.16	24.85	-
6	HSDPA	Subtest 1	25.23	25.45	25.41	24.91	24.92	24.94	0
6		Subtest 2	25.05	25.32	25.46	24.93	25.01	24.95	0
6		Subtest 3	24.55	24.84	24.52	24.62	24.68	24.53	0.5
6		Subtest 4	24.67	24.74	24.86	24.49	24.63	24.60	0.5
6	HSUPA	Subtest 1	25.26	25.17	25.46	24.39	24.54	24.64	0
6		Subtest 2	23.16	23.34	23.19	22.87	23.02	22.96	2
6		Subtest 3	24.30	24.18	24.41	23.96	24.04	24.09	1
6		Subtest 4	23.13	23.30	23.39	23.14	23.04	23.00	2
6		Subtest 5	25.27	25.36	25.20	24.20	24.27	24.67	0
8	DC-HSDPA	Subtest 1	25.42	25.30	25.43	25.05	24.99	24.96	0
8		Subtest 2	25.28	25.29	25.41	25.08	24.84	24.97	0
8		Subtest 3	24.75	24.69	24.78	24.54	24.69	24.56	0.5
8		Subtest 4	24.53	24.69	24.83	24.67	24.47	24.66	0.5

Table 9-3
Reduced Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	PCS Band [dBm]			3GPP MPR [dB]
			9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.67	23.48	23.49	-
99		12.2 kbps AMR	23.65	23.63	23.35	-
6	HSDPA	Subtest 1	23.42	23.56	23.48	0
6		Subtest 2	23.32	23.61	23.55	0
6		Subtest 3	23.06	23.09	23.08	0.5
6		Subtest 4	23.00	23.07	23.20	0.5
6	HSUPA	Subtest 1	22.80	23.11	23.20	0
6		Subtest 2	21.33	21.52	21.49	2
6		Subtest 3	22.39	22.60	22.64	1
6		Subtest 4	21.66	21.55	21.44	2
6		Subtest 5	22.64	22.71	23.12	0
8	DC-HSDPA	Subtest 1	23.58	23.54	23.49	0
8		Subtest 2	23.54	23.40	23.43	0
8		Subtest 3	22.94	23.20	23.13	0.5
8		Subtest 4	23.12	22.96	23.20	0.5

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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

Figure 9-2
Power Measurement Setup

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9.3 LTE Conducted Powers

9.3.1 LTE Band 13

Table 9-4
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

LTE Band 13 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.97	0	0
	1	25	24.89		0
	1	49	**25.15**		0
	25	0	**24.07**	0-1	1
	25	12	23.98		1
	25	25	24.00		1
	50	0	24.00		1
16QAM	1	0	24.05	0-1	1
	1	25	23.91		1
	1	49	24.07		1
	25	0	22.94	0-2	2
	25	12	23.09		2
	25	25	23.15		2
	50	0	23.19		2
64QAM	1	0	23.23	0-2	2
	1	25	23.06		2
	1	49	23.15		2
	25	0	22.11	0-3	3
	25	12	22.22		3
	25	25	21.98		3
	50	0	22.25		3

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

LTE Band 13 5 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	25.15	0	0
	1	12	25.22		0
	1	24	24.98		0
	12	0	24.24	0-1	1
	12	6	24.07		1
	12	13	24.16		1
	25	0	24.23		1
16QAM	1	0	24.00	0-1	1
	1	12	24.24		1
	1	24	24.10		1
	12	0	23.24	0-2	2
	12	6	23.03		2
	12	13	22.95		2
	25	0	23.23		2
64QAM	1	0	23.18	0-2	2
	1	12	23.01		2
	1	24	23.20		2
	12	0	22.00	0-3	3
	12	6	21.96		3
	12	13	22.13		3
	25	0	21.91		3

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

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9.3.2 LTE Band 5 (Cell)

Table 9-6
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	25.02	0	0
	1	25	25.18		0
	1	49	**25.26**		0
	25	0	**24.08**	0-1	1
	25	12	23.95		1
	25	25	24.02		1
	50	0	24.02		1
16QAM	1	0	23.98	0-1	1
	1	25	24.12		1
	1	49	23.97		1
	25	0	23.00	0-2	2
	25	12	23.03		2
	25	25	23.17		2
	50	0	23.12		2
64QAM	1	0	22.98	0-2	2
	1	25	23.18		2
	1	49	23.24		2
	25	0	21.92	0-3	3
	25	12	22.13		3
	25	25	22.18		3
	50	0	22.10		3

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

Table 9-7
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	25.03	25.14	24.99	0	0
	1	12	25.15	25.09	25.07		0
	1	24	25.09	24.89	25.09		0
	12	0	24.21	24.16	23.94	0-1	1
	12	6	23.92	23.99	23.98		1
	12	13	23.97	24.18	23.99		1
	25	0	24.14	24.08	24.08		1
16QAM	1	0	23.97	24.10	24.16	0-1	1
	1	12	24.05	24.09	24.14		1
	1	24	24.16	24.28	23.96		1
	12	0	23.02	23.28	23.15	0-2	2
	12	6	23.19	23.20	23.29		2
	12	13	23.28	23.07	23.08		2
	25	0	23.19	22.97	23.19		2
64QAM	1	0	22.96	23.17	23.16	0-2	2
	1	12	22.94	23.04	23.11		2
	1	24	22.97	22.90	23.05		2
	12	0	22.25	22.09	21.91	0-3	3
	12	6	22.29	22.10	22.14		3
	12	13	22.04	22.18	22.03		3
	25	0	22.02	22.06	22.13		3

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Table 9-8
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	25.15	25.15	24.90	0	0
	1	7	25.07	25.22	24.97		0
	1	14	25.25	25.13	25.20		0
	8	0	24.09	24.16	24.22	0-1	1
	8	4	24.00	24.03	24.18		1
	8	7	24.17	24.01	24.21		1
	15	0	24.11	24.19	23.98		1
16QAM	1	0	23.99	24.22	24.13	0-1	1
	1	7	24.03	24.27	23.90		1
	1	14	24.18	24.09	24.28		1
	8	0	22.88	23.06	23.25	0-2	2
	8	4	23.04	23.08	23.02		2
	8	7	23.18	23.10	23.06		2
	15	0	22.96	23.03	23.03		2
64QAM	1	0	23.00	23.19	22.96	0-2	2
	1	7	23.22	23.26	23.19		2
	1	14	23.26	22.89	22.93		2
	8	0	22.05	21.93	22.04	0-3	3
	8	4	22.01	22.08	22.14		3
	8	7	22.22	22.00	22.13		3
	15	0	22.20	21.97	22.29		3

Table 9-9
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	25.18	25.08	25.03	0	0
	1	2	25.22	25.08	25.30		0
	1	5	25.11	25.14	24.94		0
	3	0	24.88	25.20	25.20		0
	3	2	25.16	25.07	25.16		0
	3	3	25.14	24.93	24.96		0
	6	0	23.95	24.10	23.96	0-1	1
16QAM	1	0	24.13	24.01	23.98	0-1	1
	1	2	23.96	24.02	24.30		1
	1	5	24.23	24.11	24.05		1
	3	0	24.13	24.09	24.24		1
	3	2	23.98	24.00	23.95		1
	3	3	24.01	24.18	24.21		1
	6	0	22.99	22.87	23.00	0-2	2
64QAM	1	0	23.02	23.16	23.23	0-2	2
	1	2	23.25	22.90	22.97		2
	1	5	23.28	23.07	23.02		2
	3	0	22.94	22.97	23.04		2
	3	2	22.92	22.99	23.05		2
	3	3	23.27	23.05	23.24		2
	6	0	22.24	22.17	21.96	0-3	3

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9.3.3 LTE Band 66 (AWS)

Table 9-10
LTE Band 66 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	25.04	24.84	24.82	0	0
	1	50	24.89	**25.09**	24.95		0
	1	99	24.90	25.03	25.00		0
	50	0	23.75	23.75	23.83	0-1	1
	50	25	23.75	24.03	23.85		1
	50	50	24.07	23.80	**24.09**		1
	100	0	23.70	24.00	23.86		1
16QAM	1	0	24.03	24.04	24.10	0-1	1
	1	50	23.73	24.05	23.97		1
	1	99	23.95	23.82	23.85		1
	50	0	22.82	22.97	22.75	0-2	2
	50	25	22.96	22.76	22.85		2
	50	50	23.08	22.98	22.95		2
	100	0	22.87	22.95	22.89		2
64QAM	1	0	23.10	22.81	23.09	0-2	2
	1	50	22.71	22.71	22.99		2
	1	99	22.89	22.76	22.80		2
	50	0	21.94	22.04	21.96	0-3	3
	50	25	21.80	21.70	21.92		3
	50	50	21.94	21.88	21.76		3
	100	0	21.83	21.81	21.74		3

Table 9-11
LTE Band 66 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.91	24.76	24.95	0	0
	1	36	24.89	24.83	24.74		0
	1	74	25.06	24.84	25.08		0
	36	0	23.80	23.92	23.77	0-1	1
	36	18	23.70	23.77	23.80		1
	36	37	23.91	24.08	23.96		1
	75	0	23.83	23.88	24.00		1
16QAM	1	0	24.05	23.93	24.01	0-1	1
	1	36	23.81	23.75	23.90		1
	1	74	23.74	23.86	23.77		1
	36	0	22.74	22.95	23.03	0-2	2
	36	18	22.72	22.73	23.04		2
	36	37	22.97	22.76	22.88		2
	75	0	22.78	22.98	22.95		2
64QAM	1	0	22.71	22.87	22.88	0-2	2
	1	36	23.02	22.76	22.74		2
	1	74	22.74	22.77	22.92		2
	36	0	22.06	21.83	21.77	0-3	3
	36	18	21.70	21.77	21.79		3
	36	37	22.09	21.78	21.77		3
	75	0	21.99	22.03	21.90		3

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Table 9-12
LTE Band 66 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.78	24.92	24.89	0	0
	1	25	24.87	24.76	24.84		0
	1	49	24.90	24.93	24.87		0
	25	0	23.80	23.78	24.07	0-1	1
	25	12	23.80	23.79	24.08		1
	25	25	24.03	24.06	23.95		1
	50	0	24.00	23.85	23.74		1
16QAM	1	0	23.94	23.96	24.05	0-1	1
	1	25	24.02	23.86	23.87		1
	1	49	23.93	23.85	23.93		1
	25	0	22.75	22.99	23.06	0-2	2
	25	12	22.71	22.82	22.98		2
	25	25	23.00	22.83	23.10		2
	50	0	22.78	22.79	22.70		2
64QAM	1	0	23.10	22.84	22.96	0-2	2
	1	25	22.83	22.73	22.92		2
	1	49	23.06	22.83	22.86		2
	25	0	21.94	21.95	22.06	0-3	3
	25	12	21.75	22.01	21.91		3
	25	25	22.03	22.07	21.71		3
	50	0	22.02	21.73	21.90		3

Table 9-13
LTE Band 66 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.91	25.03	24.85	0	0
	1	12	24.78	24.73	25.02		0
	1	24	25.07	24.85	24.82		0
	12	0	23.87	23.86	23.80	0-1	1
	12	6	23.81	23.73	24.03		1
	12	13	23.97	23.77	23.76		1
	25	0	23.89	24.03	23.73		1
16QAM	1	0	24.04	23.85	23.77	0-1	1
	1	12	24.06	24.08	24.03		1
	1	24	24.01	23.72	24.00		1
	12	0	22.72	22.78	22.91	0-2	2
	12	6	23.00	22.85	22.95		2
	12	13	22.93	22.85	22.89		2
	25	0	22.86	22.84	23.09		2
64QAM	1	0	22.93	22.71	22.90	0-2	2
	1	12	22.75	22.74	22.86		2
	1	24	22.95	22.93	23.03		2
	12	0	21.87	21.96	21.72	0-3	3
	12	6	21.71	21.99	21.73		3
	12	13	22.08	21.76	21.80		3
	25	0	22.05	21.72	21.78		3

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Table 9-14
LTE Band 66 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.95	25.05	24.86	0	0
	1	7	24.97	24.79	25.05		0
	1	14	24.97	25.03	25.04		0
	8	0	23.81	23.80	23.80	0-1	1
	8	4	24.00	23.80	23.84		1
	8	7	23.89	24.05	23.96		1
	15	0	23.86	24.04	23.99		1
16QAM	1	0	23.98	23.71	23.95	0-1	1
	1	7	23.88	23.72	23.90		1
	1	14	23.95	23.79	23.78		1
	8	0	22.98	22.99	22.71	0-2	2
	8	4	22.73	22.89	23.03		2
	8	7	22.79	22.88	22.88		2
	15	0	22.94	23.08	23.02		2
64QAM	1	0	22.70	22.98	22.94	0-2	2
	1	7	22.77	23.00	22.76		2
	1	14	22.73	23.07	22.98		2
	8	0	21.78	21.83	22.05	0-3	3
	8	4	22.01	21.97	21.83		3
	8	7	22.00	22.10	21.76		3
	15	0	21.99	21.98	21.92		3

Table 9-15
LTE Band 66 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.77	24.71	24.92	0	0
	1	2	25.09	25.00	24.95		0
	1	5	24.97	24.78	24.71		0
	3	0	25.02	24.95	24.99		0
	3	2	24.87	24.76	24.93		0
	3	3	24.85	24.70	24.94		0
	6	0	23.74	23.71	24.04	0-1	1
16QAM	1	0	23.80	23.75	23.78	0-1	1
	1	2	24.09	23.95	23.71		1
	1	5	23.86	23.91	23.95		1
	3	0	23.80	23.89	23.75		1
	3	2	23.96	23.72	23.95		1
	3	3	23.79	23.83	23.75		1
	6	0	23.03	22.74	23.08	0-2	2
64QAM	1	0	22.87	22.96	22.96	0-2	2
	1	2	22.76	22.89	23.07		2
	1	5	22.71	23.09	22.80		2
	3	0	22.95	22.82	22.80		2
	3	2	22.77	23.04	22.76		2
	3	3	22.86	23.01	22.71		2
	6	0	21.95	21.86	21.80	0-3	3

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Table 9-16
LTE Band 66 (AWS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.46	23.23	**23.66**	0	0
	1	50	23.26	23.40	23.38		0
	1	99	23.29	23.45	23.32		0
	50	0	23.52	23.37	**23.55**	0-1	0
	50	25	23.15	23.13	23.23		0
	50	50	23.12	23.48	23.41		0
	100	0	23.32	23.33	23.12		0
16QAM	1	0	23.52	23.41	23.34	0-1	0
	1	50	23.53	23.18	23.42		0
	1	99	23.35	23.55	23.56		0
	50	0	22.33	22.33	22.27	0-2	0.5
	50	25	22.55	22.24	22.54		0.5
	50	50	22.42	22.29	22.26		0.5
	100	0	22.19	22.07	22.16		0.5
64QAM	1	0	22.49	22.50	22.29	0-2	0.5
	1	50	22.45	22.51	22.18		0.5
	1	99	22.29	22.54	22.52		0.5
	50	0	21.38	21.53	21.35	0-3	1.5
	50	25	21.57	21.11	21.33		1.5
	50	50	21.20	21.39	21.14		1.5
	100	0	21.27	21.44	21.22		1.5

Table 9-17
LTE Band 66 (AWS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.52	23.16	23.34	0	0
	1	36	23.46	23.48	23.21		0
	1	74	23.34	23.53	23.18		0
	36	0	23.35	23.23	23.34	0-1	0
	36	18	23.29	23.18	23.47		0
	36	37	23.33	23.56	23.30		0
	75	0	23.12	23.35	23.35		0
16QAM	1	0	23.51	23.57	23.16	0-1	0
	1	36	23.15	23.21	23.14		0
	1	74	23.25	23.20	23.15		0
	36	0	22.23	22.40	22.31	0-2	0.5
	36	18	22.38	22.34	22.43		0.5
	36	37	22.41	22.19	22.32		0.5
	75	0	22.26	22.32	22.11		0.5
64QAM	1	0	22.38	22.26	22.08	0-2	0.5
	1	36	22.54	22.17	22.39		0.5
	1	74	22.30	22.36	22.40		0.5
	36	0	21.45	21.24	21.47	0-3	1.5
	36	18	21.47	21.28	21.32		1.5
	36	37	21.52	21.23	21.21		1.5
	75	0	21.54	21.42	21.42		1.5

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Table 9-18
LTE Band 66 (AWS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.37	23.51	23.26	0	0
	1	25	23.34	23.24	23.23		0
	1	49	23.41	23.46	23.15		0
	25	0	23.13	23.31	23.13	0-1	0
	25	12	23.33	23.20	23.31		0
	25	25	23.32	23.43	23.17		0
	50	0	23.41	23.48	23.35		0
16QAM	1	0	23.32	23.32	23.29	0-1	0
	1	25	23.31	23.26	23.49		0
	1	49	23.48	23.31	23.43		0
	25	0	22.24	22.21	22.45	0-2	0.5
	25	12	22.20	22.34	22.39		0.5
	25	25	22.24	22.48	22.42		0.5
	50	0	22.35	22.38	22.46		0.5
64QAM	1	0	22.31	22.15	22.38	0-2	0.5
	1	25	22.34	22.25	22.42		0.5
	1	49	22.26	22.25	22.33		0.5
	25	0	21.19	21.34	21.38	0-3	1.5
	25	12	21.56	21.13	21.13		1.5
	25	25	21.47	21.52	21.49		1.5
	50	0	21.26	21.33	21.31		1.5

Table 9-19
LTE Band 66 (AWS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.45	23.40	23.24	0	0
	1	12	23.51	23.39	23.32		0
	1	24	23.27	23.23	23.11		0
	12	0	23.32	23.22	23.21	0-1	0
	12	6	23.23	23.21	23.40		0
	12	13	23.13	23.22	23.49		0
	25	0	23.40	23.40	23.22		0
16QAM	1	0	23.28	23.24	23.48	0-1	0
	1	12	23.18	23.43	23.38		0
	1	24	23.34	23.15	23.44		0
	12	0	22.22	22.50	22.32	0-2	0.5
	12	6	22.41	22.25	22.41		0.5
	12	13	22.40	22.33	22.41		0.5
	25	0	22.19	22.42	22.35		0.5
64QAM	1	0	22.51	22.30	22.51	0-2	0.5
	1	12	22.45	22.44	22.21		0.5
	1	24	22.21	22.19	22.38		0.5
	12	0	21.38	21.13	21.19	0-3	1.5
	12	6	21.37	21.14	21.28		1.5
	12	13	21.35	21.34	21.25		1.5
	25	0	21.22	21.35	21.31		1.5

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Table 9-20
LTE Band 66 (AWS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.30	23.12	23.27	0	0
	1	7	23.34	23.46	23.32		0
	1	14	23.15	23.29	23.19		0
	8	0	23.43	23.27	23.26	0-1	0
	8	4	23.21	23.41	23.37		0
	8	7	23.39	23.18	23.41		0
	15	0	23.57	23.26	23.50		0
16QAM	1	0	23.49	23.34	23.12	0-1	0
	1	7	23.15	23.21	23.35		0
	1	14	23.37	23.34	23.49		0
	8	0	22.45	22.24	22.25	0-2	0.5
	8	4	22.40	22.20	22.26		0.5
	8	7	22.17	22.33	22.55		0.5
	15	0	22.36	22.46	22.24		0.5
64QAM	1	0	22.39	22.36	22.47	0-2	0.5
	1	7	22.22	22.40	22.33		0.5
	1	14	22.34	22.27	22.37		0.5
	8	0	21.43	21.46	21.13	0-3	1.5
	8	4	21.41	21.43	21.08		1.5
	8	7	21.49	21.22	21.35		1.5
	15	0	21.48	21.13	21.19		1.5

Table 9-21
LTE Band 66 (AWS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.49	23.22	23.15	0	0
	1	2	23.24	23.50	23.22		0
	1	5	23.24	23.44	23.44		0
	3	0	23.26	23.46	23.42		0
	3	2	23.35	23.13	23.52		0
	3	3	23.49	23.40	23.32		0
	6	0	23.56	23.13	23.53	0-1	0
16QAM	1	0	23.19	23.32	23.39	0-1	0
	1	2	23.11	23.42	23.35		0
	1	5	23.22	23.48	23.28		0
	3	0	23.45	23.39	23.34		0
	3	2	23.13	23.45	23.20		0
	3	3	23.34	23.25	23.12		0
	6	0	22.29	22.20	22.53	0-2	0.5
64QAM	1	0	22.47	22.23	22.08	0-2	0.5
	1	2	22.26	22.25	22.32		0.5
	1	5	22.20	22.28	22.24		0.5
	3	0	22.36	22.26	22.25		0.5
	3	2	22.32	22.54	22.35		0.5
	3	3	22.46	22.31	22.45		0.5
	6	0	21.22	21.36	21.18	0-3	1.5

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9.3.4 LTE Band 2 (PCS)

Table 9-22
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	24.73	24.76	24.72	0	0
	1	50	24.81	25.00	25.01		0
	1	99	24.98	24.79	**25.08**		0
	50	0	23.84	23.79	23.87	0-1	1
	50	25	23.98	23.75	**24.10**		1
	50	50	24.02	24.02	23.88		1
	100	0	24.09	24.01	23.86		1
16QAM	1	0	23.86	23.79	23.97	0-1	1
	1	50	23.78	23.74	23.90		1
	1	99	24.06	23.70	23.97		1
	50	0	23.09	22.80	22.70	0-2	2
	50	25	22.93	22.75	22.99		2
	50	50	22.94	22.77	22.84		2
	100	0	22.91	22.74	23.04		2
64QAM	1	0	22.73	22.73	22.72	0-2	2
	1	50	22.88	22.72	23.09		2
	1	99	23.10	22.81	23.06		2
	50	0	22.01	21.79	21.94	0-3	3
	50	25	22.04	21.97	21.74		3
	50	50	22.00	22.09	21.86		3
	100	0	22.07	21.94	21.77		3

Table 9-23
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	25.03	24.72	25.05	0	0
	1	36	24.81	24.95	25.09		0
	1	74	24.77	25.00	24.87		0
	36	0	23.88	24.00	24.01	0-1	1
	36	18	23.98	23.83	23.75		1
	36	37	23.81	24.10	23.91		1
	75	0	23.83	24.04	24.07		1
16QAM	1	0	24.01	23.79	24.03	0-1	1
	1	36	23.73	23.86	24.06		1
	1	74	24.04	23.86	23.83		1
	36	0	22.88	22.77	23.07	0-2	2
	36	18	22.84	23.02	22.84		2
	36	37	22.74	23.06	22.90		2
	75	0	22.80	23.00	22.95		2
64QAM	1	0	22.96	22.75	22.77	0-2	2
	1	36	22.96	22.99	23.00		2
	1	74	22.99	22.76	22.90		2
	36	0	21.94	21.75	21.74	0-3	3
	36	18	21.85	21.75	21.99		3
	36	37	21.75	21.83	21.82		3
	75	0	21.72	22.07	21.71		3

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Table 9-24
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	24.71	24.84	24.96	0	0
	1	25	24.80	24.82	24.93		0
	1	49	25.05	24.85	24.97		0
	25	0	23.79	23.71	23.77	0-1	1
	25	12	23.88	23.91	23.98		1
	25	25	23.85	24.03	23.72		1
	50	0	23.73	23.83	23.98		1
16QAM	1	0	23.90	23.81	24.01	0-1	1
	1	25	23.76	23.98	23.81		1
	1	49	24.08	23.94	23.98		1
	25	0	23.06	22.79	23.00	0-2	2
	25	12	22.74	23.07	22.85		2
	25	25	23.03	22.81	23.01		2
	50	0	22.88	22.91	23.08		2
64QAM	1	0	22.78	22.83	22.70	0-2	2
	1	25	22.90	22.95	22.79		2
	1	49	22.95	22.97	22.71		2
	25	0	21.97	21.86	21.82	0-3	3
	25	12	21.85	21.71	21.87		3
	25	25	21.90	21.73	21.87		3
	50	0	21.92	21.96	21.95		3

Table 9-25
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	25.09	25.02	24.85	0	0
	1	12	25.02	25.04	25.07		0
	1	24	24.70	24.83	24.71		0
	12	0	23.98	23.86	23.76	0-1	1
	12	6	23.95	23.80	23.98		1
	12	13	23.83	23.97	23.72		1
	25	0	24.02	23.73	23.89		1
16QAM	1	0	24.00	24.06	23.96	0-1	1
	1	12	23.97	23.99	24.07		1
	1	24	24.06	23.80	24.06		1
	12	0	22.92	23.06	22.83	0-2	2
	12	6	22.89	23.07	23.00		2
	12	13	22.99	22.85	23.01		2
	25	0	22.85	22.72	22.94		2
64QAM	1	0	22.75	23.09	23.02	0-2	2
	1	12	22.74	23.02	22.88		2
	1	24	23.02	22.76	22.74		2
	12	0	21.85	22.00	21.79	0-3	3
	12	6	21.85	21.98	21.72		3
	12	13	21.92	21.77	21.82		3
	25	0	22.07	21.85	21.88		3

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Table 9-26
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	25.04	24.88	24.72	0	0
	1	7	24.83	24.98	24.72		0
	1	14	24.74	24.89	24.82		0
	8	0	23.93	23.93	23.88	0-1	1
	8	4	24.07	23.98	23.86		1
	8	7	23.85	23.97	23.81		1
	15	0	23.96	23.88	24.01		1
16QAM	1	0	23.94	23.81	23.96	0-1	1
	1	7	23.88	23.83	23.93		1
	1	14	23.89	23.71	23.74		1
	8	0	23.01	22.87	23.10	0-2	2
	8	4	23.07	23.02	22.90		2
	8	7	23.08	22.98	22.72		2
	15	0	22.75	23.00	22.82		2
64QAM	1	0	22.96	22.75	23.00	0-2	2
	1	7	22.74	23.01	22.87		2
	1	14	23.06	22.93	23.09		2
	8	0	21.96	21.83	21.90	0-3	3
	8	4	22.08	21.82	21.77		3
	8	7	22.01	21.81	21.77		3
	15	0	22.06	21.97	21.87		3

Table 9-27
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	25.01	25.09	25.07	0	0
	1	2	24.92	24.88	24.81		0
	1	5	25.02	24.99	24.88		0
	3	0	24.99	24.87	25.00		0
	3	2	25.04	24.92	24.95		0
	3	3	24.86	24.81	25.05		0
	6	0	24.06	24.08	23.87	0-1	1
16QAM	1	0	23.80	23.81	23.72	0-1	1
	1	2	23.95	24.03	23.96		1
	1	5	24.00	24.05	23.75		1
	3	0	24.04	23.83	23.94		1
	3	2	24.04	23.94	23.93		1
	3	3	23.80	24.04	23.84		1
	6	0	23.05	23.03	22.76	0-2	2
64QAM	1	0	22.75	22.92	22.85	0-2	2
	1	2	22.73	22.75	22.98		2
	1	5	22.78	22.84	22.85		2
	3	0	23.07	22.87	23.06		2
	3	2	22.85	23.08	22.81		2
	3	3	22.74	22.84	22.98		2
	6	0	22.02	21.71	21.73	0-3	3

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Table 9-28
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	23.30	23.33	23.37	0	0
	1	50	23.57	**23.68**	23.33		0
	1	99	23.47	23.41	23.38		0
	50	0	23.31	23.55	23.54	0-1	0
	50	25	**23.65**	23.50	23.40		0
	50	50	23.38	23.25	23.22		0
	100	0	23.63	23.60	23.34		0
16QAM	1	0	23.51	23.52	23.22	0-1	0
	1	50	23.44	23.59	23.43		0
	1	99	23.42	23.22	23.40		0
	50	0	22.42	22.52	22.54	0-2	0.5
	50	25	22.51	22.61	22.62		0.5
	50	50	22.55	22.48	22.58		0.5
	100	0	22.44	22.25	22.34		0.5
64QAM	1	0	22.26	22.23	22.33	0-2	0.5
	1	50	22.39	22.52	22.65		0.5
	1	99	22.36	22.59	22.41		0.5
	50	0	21.24	21.46	21.32	0-3	1.5
	50	25	21.46	21.47	21.39		1.5
	50	50	21.60	21.56	21.46		1.5
	100	0	21.53	21.40	21.39		1.5

Table 9-29
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	23.51	23.52	23.52	0	0
	1	36	23.30	23.31	23.29		0
	1	74	23.25	23.35	23.31		0
	36	0	23.50	23.60	23.31	0-1	0
	36	18	23.62	23.36	23.62		0
	36	37	23.45	23.47	23.35		0
	75	0	23.57	23.53	23.51		0
16QAM	1	0	23.57	23.38	23.41	0-1	0
	1	36	23.57	23.30	23.26		0
	1	74	23.45	23.42	23.64		0
	36	0	22.44	22.62	22.46	0-2	0.5
	36	18	22.24	22.51	22.58		0.5
	36	37	22.56	22.41	22.52		0.5
	75	0	22.51	22.35	22.62		0.5
64QAM	1	0	22.48	22.27	22.55	0-2	0.5
	1	36	22.45	22.63	22.27		0.5
	1	74	22.34	22.33	22.25		0.5
	36	0	21.58	21.56	21.22	0-3	1.5
	36	18	21.26	21.42	21.33		1.5
	36	37	21.52	21.49	21.31		1.5
	75	0	21.61	21.21	21.32		1.5

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Table 9-30
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	23.65	23.45	23.56	0	0
	1	25	23.25	23.32	23.50		0
	1	49	23.28	23.45	23.61		0
	25	0	23.25	23.65	23.48	0-1	0
	25	12	23.61	23.39	23.30		0
	25	25	23.44	23.40	23.52		0
	50	0	23.38	23.42	23.30		0
16QAM	1	0	23.51	23.25	23.33	0-1	0
	1	25	23.22	23.54	23.54		0
	1	49	23.41	23.55	23.56		0
	25	0	22.52	22.34	22.38	0-2	0.5
	25	12	22.21	22.38	22.38		0.5
	25	25	22.20	22.22	22.55		0.5
	50	0	22.44	22.38	22.39		0.5
64QAM	1	0	22.64	22.50	22.41	0-2	0.5
	1	25	22.20	22.39	22.39		0.5
	1	49	22.22	22.59	22.31		0.5
	25	0	21.20	21.45	21.56	0-3	1.5
	25	12	21.32	21.27	21.43		1.5
	25	25	21.39	21.28	21.55		1.5
	50	0	21.52	21.53	21.24		1.5

Table 9-31
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	23.31	23.43	23.55	0	0
	1	12	23.61	23.44	23.52		0
	1	24	23.45	23.60	23.62		0
	12	0	23.64	23.36	23.25	0-1	0
	12	6	23.51	23.32	23.41		0
	12	13	23.35	23.57	23.31		0
	25	0	23.39	23.37	23.47		0
16QAM	1	0	23.60	23.30	23.46	0-1	0
	1	12	23.31	23.43	23.44		0
	1	24	23.46	23.63	23.23		0
	12	0	22.23	22.35	22.55	0-2	0.5
	12	6	22.42	22.35	22.32		0.5
	12	13	22.49	22.57	22.35		0.5
	25	0	22.52	22.41	22.47		0.5
64QAM	1	0	22.42	22.41	22.59	0-2	0.5
	1	12	22.48	22.53	22.62		0.5
	1	24	22.57	22.20	22.45		0.5
	12	0	21.57	21.61	21.31	0-3	1.5
	12	6	21.46	21.53	21.51		1.5
	12	13	21.37	21.38	21.28		1.5
	25	0	21.29	21.28	21.24		1.5

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Table 9-32
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	23.47	23.59	23.47	0	0
	1	7	23.37	23.42	23.53		0
	1	14	23.25	23.64	23.31		0
	8	0	23.37	23.37	23.41	0-1	0
	8	4	23.35	23.61	23.52		0
	8	7	23.41	23.40	23.50		0
	15	0	23.21	23.35	23.45		0
16QAM	1	0	23.57	23.58	23.62	0-1	0
	1	7	23.32	23.37	23.34		0
	1	14	23.42	23.62	23.47		0
	8	0	22.21	22.55	22.54	0-2	0.5
	8	4	22.22	22.56	22.24		0.5
	8	7	22.28	22.54	22.62		0.5
	15	0	22.53	22.48	22.51		0.5
64QAM	1	0	22.63	22.56	22.43	0-2	0.5
	1	7	22.44	22.41	22.64		0.5
	1	14	22.59	22.37	22.25		0.5
	8	0	21.52	21.33	21.37	0-3	1.5
	8	4	21.21	21.43	21.46		1.5
	8	7	21.62	21.22	21.28		1.5
	15	0	21.26	21.33	21.41		1.5

Table 9-33
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	23.61	23.65	23.35	0	0
	1	2	23.48	23.36	23.25		0
	1	5	23.55	23.29	23.47		0
	3	0	23.61	23.42	23.29		0
	3	2	23.40	23.37	23.58		0
	3	3	23.47	23.59	23.27		0
	6	0	23.22	23.41	23.55	0-1	0
16QAM	1	0	23.27	23.31	23.62	0-1	0
	1	2	23.45	23.49	23.64		0
	1	5	23.31	23.22	23.24		0
	3	0	23.58	23.65	23.20		0
	3	2	23.27	23.36	23.31		0
	3	3	23.60	23.40	23.43		0
	6	0	22.29	22.39	22.36	0-2	0.5
64QAM	1	0	22.53	22.65	22.23	0-2	0.5
	1	2	22.38	22.45	22.52		0.5
	1	5	22.43	22.51	22.51		0.5
	3	0	22.29	22.34	22.22		0.5
	3	2	22.48	22.33	22.33		0.5
	3	3	22.46	22.56	22.65		0.5
	6	0	21.29	21.31	21.49	0-3	1.5

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9.3.5 LTE Band 48

Table 9-34
LTE Band 48 Conducted Powers - 20 MHz Bandwidth

LTE Band 48 20 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			55340 (3560.0 MHz)	55773 (3603.3 MHz)	56207 (3646.7 MHz)	56640 (3690.0 MHz)		
			Conducted Power [dBm]					
QPSK	1	0	23.31	23.39	23.11	23.38	0	0
	1	50	23.21	23.36	23.35	23.08		0
	1	99	23.37	23.15	**23.44**	23.40		0
	50	0	22.25	22.37	22.35	22.28	0-1	1
	50	25	22.32	22.16	22.27	22.40		1
	50	50	**22.44**	22.22	22.22	22.25		1
	100	0	22.39	22.31	22.13	22.20		1
16QAM	1	0	22.35	22.33	22.16	22.26	0-1	1
	1	50	22.21	22.28	22.23	22.23		1
	1	99	22.27	22.24	22.12	22.10		1
	50	0	21.16	21.39	21.22	21.30	0-2	2
	50	25	21.25	21.11	21.22	21.40		2
	50	50	21.30	21.15	21.22	21.33		2
	100	0	21.16	21.23	21.41	21.39		2
64QAM	1	0	21.24	21.29	21.35	21.29	0-2	2
	1	50	21.17	21.47	21.24	21.34		2
	1	99	21.45	21.17	21.38	21.29		2
	50	0	20.36	20.32	20.22	20.31	0-3	3
	50	25	20.14	20.13	20.26	20.22		3
	50	50	20.45	20.29	20.47	20.28		3
	100	0	20.14	20.16	20.34	20.40		3

Table 9-35
LTE Band 48 Conducted Powers - 15 MHz Bandwidth

LTE Band 48 15 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			55315 (3557.5 MHz)	55765 (3602.5 MHz)	56215 (3647.5 MHz)	56665 (3692.5 MHz)		
			Conducted Power [dBm]					
QPSK	1	0	23.45	23.42	23.13	23.15	0	0
	1	36	23.41	23.21	23.11	23.38		0
	1	74	23.27	23.35	23.45	23.17		0
	36	0	22.18	22.36	22.47	22.09	0-1	1
	36	18	22.16	22.30	22.16	22.29		1
	36	37	22.27	22.10	22.34	22.34		1
	75	0	22.23	22.25	22.43	22.38		1
16QAM	1	0	22.32	22.29	22.40	22.30	0-1	1
	1	36	22.47	22.41	22.14	22.27		1
	1	74	22.30	22.34	22.32	22.17		1
	36	0	21.14	21.33	21.40	21.39	0-2	2
	36	18	21.42	21.16	21.31	21.27		2
	36	37	21.30	21.20	21.20	21.19		2
	75	0	21.12	21.12	21.37	21.26		2
64QAM	1	0	21.36	21.25	21.38	21.22	0-2	2
	1	36	21.49	21.20	21.18	21.20		2
	1	74	21.41	21.30	21.04	21.33		2
	36	0	20.24	20.44	20.38	20.30	0-3	3
	36	18	20.28	20.18	20.20	20.30		3
	36	37	20.38	20.28	20.18	20.30		3
	75	0	20.09	20.18	20.21	20.21		3

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Table 9-36
LTE Band 48 Conducted Powers - 10 MHz Bandwidth

LTE Band 48 10 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			55290 (3555.0 MHz)	55757 (3601.7 MHz)	56223 (3648.3 MHz)	56690 (3695.0 MHz)		
			Conducted Power [dBm]					
QPSK	1	0	23.28	23.14	23.46	23.34	0	0
	1	25	23.09	23.32	23.36	23.15		0
	1	49	23.26	23.16	23.24	23.40		0
	25	0	22.27	22.27	22.19	22.12	0-1	1
	25	12	22.09	22.19	22.27	22.37		1
	25	25	22.15	22.45	22.18	22.33		1
	50	0	22.23	22.37	22.39	22.14		1
16QAM	1	0	22.16	22.35	22.22	22.41	0-1	1
	1	25	22.33	22.30	22.17	22.26		1
	1	49	22.20	22.38	22.20	22.13		1
	25	0	21.48	21.08	21.19	21.27	0-2	2
	25	12	21.30	21.41	21.24	21.09		2
	25	25	21.34	21.35	21.26	21.13		2
	50	0	21.17	21.21	21.27	21.42		2
64QAM	1	0	21.15	21.41	21.44	21.26	0-2	2
	1	25	21.20	21.36	21.17	21.37		2
	1	49	21.47	21.39	21.37	21.29		2
	25	0	20.13	20.19	20.39	20.22	0-3	3
	25	12	20.16	20.33	20.38	20.37		3
	25	25	20.18	20.36	20.31	20.39		3
	50	0	20.44	20.28	20.30	20.36		3

Table 9-37
LTE Band 48 Conducted Powers - 5 MHz Bandwidth

LTE Band 48 5 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			55265 (3552.5 MHz)	55748 (3600.8 MHz)	56232 (3649.2 MHz)	56715 (3697.5 MHz)		
			Conducted Power [dBm]					
QPSK	1	0	23.34	23.49	23.44	23.21	0	0
	1	12	23.40	23.47	23.18	23.39		0
	1	24	23.24	23.23	23.38	23.36		0
	12	0	22.22	22.19	22.37	22.15	0-1	1
	12	6	22.15	22.16	22.41	22.26		1
	12	13	22.42	22.19	22.23	22.31		1
	25	0	22.09	22.35	22.21	22.24		1
16QAM	1	0	22.20	22.21	22.33	22.35	0-1	1
	1	12	22.23	22.19	22.39	22.18		1
	1	24	22.23	22.28	22.31	22.31		1
	12	0	21.28	21.24	21.32	21.18	0-2	2
	12	6	21.21	21.30	21.36	21.43		2
	12	13	21.31	21.41	21.38	21.34		2
	25	0	21.20	21.26	21.11	21.34		2
64QAM	1	0	21.43	21.21	21.37	21.44	0-2	2
	1	12	21.40	21.33	21.40	21.21		2
	1	24	21.27	21.26	21.24	21.42		2
	12	0	20.12	20.25	20.14	20.18	0-3	3
	12	6	20.34	20.28	20.33	20.29		3
	12	13	20.25	20.17	20.19	20.28		3
	25	0	20.37	20.25	20.25	20.44		3

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9.3.6 LTE Uplink Carrier Aggregation Conducted Powers

Table 9-38
LTE Uplink Carrier Aggregation Conducted Powers

	PCC									SCC									Power	
Combination	PCC Band	PCC Bandwidth [MHz]	PCC UL Channel	PCC UL Frequency [MHz]	PCC DL Channel	PCC DL Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC UL Channel	SCC UL Frequency [MHz]	SCC DL Channel	SCC DL Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	LTE Tx.Power with UL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_5B	LTE B5	10	20525	836.5	2525	881.5	QPSK	1	49	LTE B5	5	20597	843.7	2597	888.7	QPSK	1	0	25.50	25.26

Notes:

1. This device supports uplink carrier aggregation for LTE CA_5B. For intraband contiguous carrier aggregation scenarios, 3GPP 36.101 Table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when non-contiguous RB allocation is implemented. The conducted powers and MPR settings in this device are permanently implemented per the above 3GPP requirements.
2. Per FCC Guidance, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

Figure 9-3
Power Measurement Setup

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9.4 WLAN Conducted Powers

Table 9-39
2.4 GHz WLAN Maximum Average RF Power – Ant 1

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ac
		Average	Average	Average	Average
2412	1	19.89	17.20	15.81	15.83
2422	3	N/A	19.11	17.80	17.76
2437	6	19.90	19.09	17.86	17.83
2452	9	N/A	18.84	17.55	17.54
2462	11	**20.06**	17.46	16.20	16.20

Table 9-40
2.4 GHz WLAN Maximum Average RF Power – Ant 2

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ac
		Average	Average	Average	Average
2412	1	19.94	17.17	16.07	16.04
2422	3	N/A	19.23	18.19	18.23
2437	6	19.98	19.13	18.07	18.06
2452	9	N/A	19.19	18.02	18.02
2462	11	**20.04**	17.90	16.85	16.75

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Table 9-41
5 GHz WLAN Maximum Average RF Power – Ant 1

5GHz (20MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
		Average	Average	Average
5180	36	16.52	16.79	16.80
5200	40	**17.94**	17.75	17.82
5220	44	16.31	16.89	16.82
5240	48	16.36	16.83	16.91
5260	52	16.35	16.86	16.92
5280	56	**17.96**	17.84	17.89
5300	60	16.27	16.98	16.98
5320	64	16.39	16.97	16.95
5500	100	16.41	16.97	16.88
5600	120	**16.50**	16.36	16.25
5620	124	16.44	16.38	16.31
5720	144	16.03	16.91	16.90
5745	149	16.02	16.91	16.90
5785	157	17.05	17.99	17.99
5805	161	**17.76**	17.66	17.64
5825	165	17.39	17.27	17.27

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REV 21.2 M
12/05/2018

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Table 9-42
5 GHz WLAN Maximum Average RF Power – Ant 2

5GHz (20MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
		Average	Average	Average
5180	36	16.90	16.64	16.67
5200	40	**17.99**	17.83	17.83
5220	44	16.91	16.73	16.83
5240	48	16.41	16.83	16.90
5260	52	16.98	16.88	16.82
5280	56	**17.53**	17.95	17.91
5300	60	16.59	16.91	16.91
5320	64	16.95	16.80	16.83
5500	100	16.96	16.88	16.84
5600	120	**16.99**	16.73	16.75
5620	124	16.92	16.77	16.75
5720	144	16.96	16.80	16.85
5745	149	16.30	16.91	16.96
5785	157	17.36	17.29	17.27
5805	161	**17.60**	17.54	17.76
5825	165	17.24	17.92	17.99

Table 9-43
5 GHz WLAN Maximum Average RF Power – MIMO

5GHz (20MHz) 802.11n Conducted Power [dBm]				
Freq [MHz]	Channel	ANT1	ANT2	MIMO
5180	36	16.79	16.64	19.73
5200	40	17.75	17.83	20.80
5220	44	16.89	16.73	19.82
5240	48	16.83	16.83	19.84
5260	52	16.86	16.88	19.88
5280	56	**17.84**	**17.95**	**20.91**
5300	60	16.98	16.91	19.96
5320	64	16.97	16.80	19.90
5500	100	**16.97**	**16.88**	**19.94**
5600	120	16.36	16.73	19.56
5620	124	16.38	16.77	19.59
5720	144	16.91	16.80	19.87
5745	149	16.91	16.91	19.92
5785	157	17.99	17.29	20.66
5805	161	17.66	17.54	20.61
5825	165	17.27	17.92	20.62

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Table 9-44
2.4 GHz WLAN Reduced Average RF Power – Ant 1

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ac
		Average	Average	Average	Average
2412	1	17.45	17.49	15.81	15.83
2422	3	N/A	17.75	17.58	17.56
2437	6	17.22	17.56	17.86	17.83
2452	9	N/A	N/A	17.42	17.50
2462	11	**17.87**	17.46	16.20	16.20

Table 9-45
2.4 GHz WLAN Reduced Average RF Power – Ant 2

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ac
		Average	Average	Average	Average
2412	1	17.90	17.17	16.07	16.04
2422	3	N/A	17.90	17.80	17.83
2437	6	17.94	17.97	17.96	17.95
2452	9	N/A	N/A	17.98	17.95
2462	11	**17.98**	17.90	16.85	16.75

Table 9-46
2.4 GHz WLAN Reduced Average RF Power – MIMO

2.4GHz 802.11n Conducted Power [dBm]				
Freq [MHz]	Channel	ANT1	ANT2	MIMO
2412	1	15.81	16.07	18.95
2422	3	17.58	17.80	20.70
2437	6	**17.86**	**17.96**	**20.92**
2452	9	17.42	17.98	20.72
2462	11	16.20	16.85	19.55

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Table 9-47
5 GHz WLAN Reduced Average RF Power – Ant 1

5GHz (40MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11n	802.11ac
		Average	Average
5190	38	**14.76**	14.77
5230	46	14.60	14.57
5270	54	**14.64**	14.60
5310	62	14.45	14.37
5510	102	14.48	14.53
5590	118	**14.90**	14.81
5630	126	14.30	14.30
5710	142	14.51	14.43
5755	151	14.50	14.35
5795	159	**14.76**	14.67

Table 9-48
5 GHz WLAN Reduced Average RF Power – Ant 2

5GHz (40MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11n	802.11ac
		Average	Average
5190	38	14.12	14.07
5230	46	**14.14**	14.10
5270	54	14.32	14.35
5310	62	**14.32**	14.30
5510	102	14.13	14.15
5590	118	**14.30**	14.31
5630	126	14.24	14.23
5710	142	14.06	14.03
5755	151	14.22	14.20
5795	159	**14.55**	14.52

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Table 9-49
5 GHz WLAN Reduced Average RF Power – MIMO

5GHz (40MHz) 802.11n Conducted Power [dBm]				
Freq [MHz]	**Channel**	**ANT1**	**ANT2**	**MIMO**
5190	38	**14.76**	**14.12**	**17.46**
5230	46	14.60	14.14	17.39
5270	54	**14.64**	**14.32**	**17.49**
5310	62	14.45	14.32	17.40
5510	102	14.48	14.13	17.32
5590	118	**14.90**	**14.30**	**17.62**
5630	126	14.30	14.24	17.28
5710	142	14.51	14.06	17.30
5755	151	14.50	14.22	17.37
5795	159	**14.76**	**14.55**	**17.67**

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

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

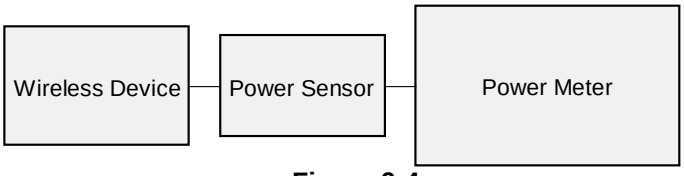

Figure 9-4
Power Measurement Setup

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9.5 Bluetooth Conducted Powers

Table 9-50
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	11.45	13.951
2441	1.0	39	**11.67**	14.692
2480	1.0	78	11.23	13.287
2402	2.0	0	10.82	12.065
2441	2.0	39	11.08	12.825
2480	2.0	78	10.62	11.541
2402	3.0	0	10.88	12.260
2441	3.0	39	11.14	13.014
2480	3.0	78	10.69	11.725

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

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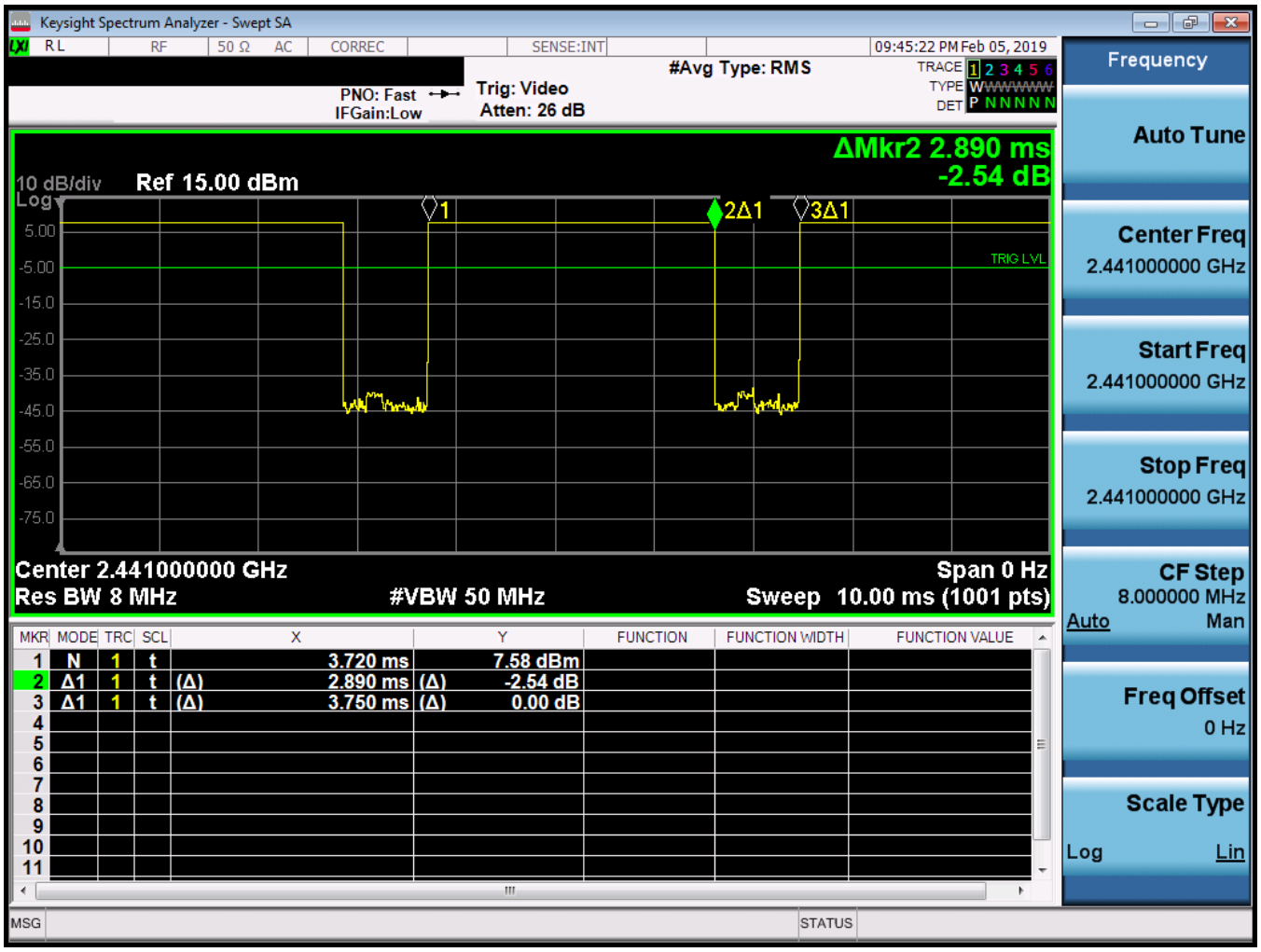

Figure 9-5
Bluetooth Transmission Plot

Equation 9-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.89ms}{3.75ms} * 100\% = 77.1\%$$

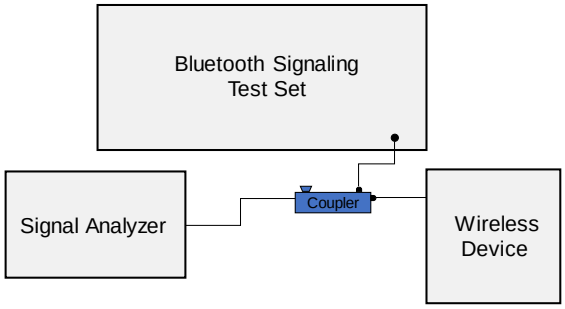

Figure 9-6
Power Measurement Setup

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10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties - Head

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
01/28/2019	750H	20.8	740	0.875	42.294	0.893	41.994	-2.02%	0.71%
			755	0.880	42.241	0.894	41.916	-1.57%	0.78%
			770	0.885	42.187	0.895	41.838	-1.12%	0.83%
			785	0.890	42.131	0.896	41.760	-0.67%	0.89%
02/01/2019	835H	21.1	820	0.922	41.042	0.899	41.578	2.56%	-1.29%
			835	0.928	40.992	0.900	41.500	3.11%	-1.22%
			850	0.933	40.934	0.916	41.500	1.86%	-1.36%
02/11/2019	835H	20.3	820	0.875	39.560	0.899	41.578	-2.67%	-4.85%
			835	0.881	39.523	0.900	41.500	-2.11%	-4.76%
			850	0.887	39.481	0.916	41.500	-3.17%	-4.87%
02/04/2019	1750H	21.1	1710	1.366	41.930	1.348	40.142	1.34%	4.45%
			1750	1.387	41.854	1.371	40.079	1.17%	4.43%
			1790	1.410	41.786	1.394	40.016	1.15%	4.42%
02/06/2019	1900H	21.5	1850	1.401	39.085	1.400	40.000	0.07%	-2.29%
			1880	1.418	39.011	1.400	40.000	1.29%	-2.47%
			1910	1.435	38.956	1.400	40.000	2.50%	-2.61%
01/29/2019	2450H	21.1	2400	1.790	38.607	1.756	39.289	1.94%	-1.74%
			2450	1.830	38.536	1.800	39.200	1.67%	-1.69%
			2500	1.864	38.478	1.855	39.136	0.49%	-1.68%
02/05/2019	2450H	22.4	2400	1.757	38.298	1.756	39.289	0.06%	-2.52%
			2450	1.792	38.231	1.800	39.200	-0.44%	-2.47%
			2500	1.828	38.162	1.855	39.136	-1.46%	-2.49%
02/07/2019	3500H-3700H	20.4	3500	2.908	37.921	2.913	37.929	-0.17%	-0.02%
			3550	2.939	37.861	2.964	37.871	-0.84%	-0.03%
			3600	2.986	37.782	3.015	37.814	-0.96%	-0.08%
			3645	3.027	37.730	3.061	37.763	-1.11%	-0.09%
			3685	3.047	37.760	3.102	37.717	-1.77%	0.11%
			3725	3.094	37.646	3.143	37.671	-1.56%	-0.07%
02/19/2019	5200H-5800H	21.1	5240	4.565	34.926	4.696	35.940	-2.79%	-2.82%
			5260	4.581	34.840	4.717	35.917	-2.88%	-3.00%
			5280	4.615	34.824	4.737	35.894	-2.58%	-2.98%
			5600	4.978	34.279	5.065	35.529	-1.72%	-3.52%
			5745	5.162	34.044	5.214	35.363	-1.00%	-3.73%
			5765	5.194	34.018	5.234	35.340	-0.76%	-3.74%
			5785	5.213	33.965	5.255	35.317	-0.80%	-3.83%
			5805	5.233	33.942	5.275	35.294	-0.80%	-3.83%
			5825	5.248	33.909	5.296	35.271	-0.91%	-3.86%

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Table 10-2
Measured Tissue Properties - Body

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
02/13/2019	750B	20.7	740	0.964	53.535	0.963	55.570	0.10%	-3.66%
			755	0.969	53.494	0.964	55.512	0.52%	-3.64%
			770	0.975	53.455	0.965	55.453	1.04%	-3.60%
			785	0.981	53.413	0.966	55.395	1.55%	-3.58%
01/28/2019	835B	18.9	820	0.960	53.174	0.969	55.258	-0.93%	-3.77%
			835	0.977	53.010	0.970	55.200	0.72%	-3.97%
			850	0.994	52.831	0.988	55.154	0.61%	-4.21%
02/06/2019	835B	21.8	820	0.955	53.883	0.969	55.258	-1.44%	-2.49%
			835	0.967	53.744	0.970	55.200	-0.31%	-2.64%
			850	0.982	53.569	0.988	55.154	-0.61%	-2.87%
02/18/2019	835B	20.0	820	0.959	53.939	0.969	55.258	-1.03%	-2.39%
			835	0.975	53.775	0.970	55.200	0.52%	-2.58%
			850	0.991	53.611	0.988	55.154	0.30%	-2.80%
01/21/2019	1750B	20.9	1710	1.461	51.904	1.463	53.537	-0.14%	-3.05%
			1750	1.488	51.840	1.488	53.432	0.00%	-2.98%
			1790	1.513	51.791	1.514	53.326	-0.07%	-2.88%
01/24/2019	1750B	20.2	1710	1.488	51.095	1.463	53.537	1.71%	-4.56%
			1750	1.518	51.068	1.488	53.432	2.02%	-4.42%
			1790	1.551	51.006	1.514	53.326	2.44%	-4.35%
02/20/2019	1750B	21.7	1710	1.410	52.659	1.463	53.537	-3.62%	-1.64%
			1750	1.457	52.518	1.488	53.432	-2.08%	-1.71%
			1790	1.495	52.430	1.514	53.326	-1.25%	-1.68%
02/11/2019	1900B	22.2	1850	1.518	53.479	1.520	53.300	-0.13%	0.34%
			1880	1.554	53.356	1.520	53.300	2.24%	0.11%
			1910	1.591	53.218	1.520	53.300	4.67%	-0.15%
02/14/2019	1900B	23.4	1850	1.506	52.497	1.520	53.300	-0.92%	-1.51%
			1880	1.536	52.388	1.520	53.300	1.05%	-1.71%
			1910	1.571	52.335	1.520	53.300	3.36%	-1.81%
02/02/2019	2450B	23.0	2400	1.986	51.712	1.902	52.767	4.42%	-2.00%
			2450	2.041	51.597	1.950	52.700	4.67%	-2.09%
			2500	2.093	51.470	2.021	52.636	3.56%	-2.22%
02/05/2019	2450B	23.2	2400	1.975	52.118	1.902	52.767	3.84%	-1.23%
			2450	2.035	51.977	1.950	52.700	4.36%	-1.37%
			2500	2.091	51.817	2.021	52.636	3.46%	-1.56%
02/04/2019	3500B-3700B	20.5	3500	3.165	51.186	3.314	51.321	-4.50%	-0.26%
			3550	3.219	51.065	3.372	51.254	-4.54%	-0.37%
			3600	3.279	50.922	3.431	51.186	-4.43%	-0.52%
			3645	3.341	50.835	3.483	51.125	-4.08%	-0.57%
			3685	3.373	50.791	3.530	51.070	-4.45%	-0.55%
			3725	3.438	50.703	3.577	51.016	-3.89%	-0.61%
01/29/2019	5200B-5800B	22.6	5200	5.360	48.201	5.299	49.014	1.15%	-1.66%
			5240	5.432	48.148	5.346	48.960	1.61%	-1.66%
			5260	5.465	48.093	5.369	48.933	1.79%	-1.72%
			5280	5.493	48.056	5.393	48.906	1.85%	-1.74%
			5320	5.537	47.984	5.439	48.851	1.80%	-1.77%
			5500	5.804	47.619	5.650	48.607	2.73%	-2.03%
			5600	5.969	47.449	5.766	48.471	3.52%	-2.11%
			5745	6.169	47.177	5.936	48.275	3.93%	-2.27%
			5765	6.217	47.153	5.959	48.248	4.33%	-2.27%
			5805	6.284	47.060	6.006	48.193	4.63%	-2.35%

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
System Verification Results – 1g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
G	750	HEAD	01/28/2019	21.5	20.8	0.200	1161	7410	1.610	8.030	8.050	0.25%
G	835	HEAD	02/01/2019	22.6	21.1	0.200	4d047	7410	2.000	9.470	10.000	5.60%
G	835	HEAD	02/11/2019	21.1	20.3	0.200	4d133	7410	1.910	9.430	9.550	1.27%
H	1750	HEAD	02/04/2019	22.3	21.1	0.100	1008	7409	3.790	36.200	37.900	4.70%
G	1900	HEAD	02/06/2019	22.6	21.5	0.100	5d149	7410	4.090	39.300	40.900	4.07%
G	2450	HEAD	01/29/2019	23.2	21.1	0.100	981	7410	5.190	52.300	51.900	-0.76%
G	2450	HEAD	02/05/2019	24.0	22.4	0.100	981	7410	5.130	52.300	51.300	-1.91%
H	3500	HEAD	02/07/2019	21.7	20.4	0.100	1059	3949	6.540	64.600	65.400	1.24%
H	3700	HEAD	02/07/2019	21.7	20.4	0.100	1018	3949	6.340	65.800	63.400	-3.65%
H	5250	HEAD	02/19/2019	21.6	21.1	0.050	1237	7409	3.840	81.300	76.800	-5.54%
H	5600	HEAD	02/19/2019	21.6	21.1	0.050	1237	7409	4.170	85.700	83.400	-2.68%
H	5750	HEAD	02/19/2019	21.6	21.1	0.050	1237	7409	3.750	80.600	75.000	-6.95%
E	750	BODY	02/13/2019	22.9	21.0	0.200	1003	3589	1.710	8.580	8.550	-0.35%
D	835	BODY	01/28/2019	22.1	19.3	0.200	4d047	7357	1.940	9.710	9.700	-0.10%
D	835	BODY	02/06/2019	22.2	21.8	0.200	4d047	7357	2.080	9.710	10.400	7.11%
D	835	BODY	02/18/2019	21.5	20.0	0.200	4d047	7357	2.050	9.710	10.250	5.56%
J	1750	BODY	01/21/2019	21.5	20.9	0.100	1008	3347	3.610	37.400	36.100	-3.48%
G	1750	BODY	02/20/2019	21.6	21.7	0.100	1150	7410	3.780	36.600	37.800	3.28%
J	1900	BODY	02/11/2019	21.4	20.8	0.100	5d149	7488	4.180	39.400	41.800	6.09%
J	1900	BODY	02/14/2019	21.1	21.9	0.100	5d080	7488	4.040	39.200	40.400	3.06%
K	2450	BODY	02/02/2019	21.7	21.6	0.100	981	3319	4.900	50.900	49.000	-3.73%
K	2450	BODY	02/05/2019	22.7	22.9	0.100	981	3319	4.950	50.900	49.500	-2.75%
L	3500	BODY	02/04/2019	20.7	20.3	0.100	1059	3914	6.000	65.100	60.000	-7.83%
L	3700	BODY	02/04/2019	20.7	20.3	0.100	1018	3914	5.990	64.300	59.900	-6.84%
L	5250	BODY	01/29/2019	22.0	22.6	0.050	1191	7308	3.500	77.000	70.000	-9.09%
L	5600	BODY	01/29/2019	22.0	22.6	0.050	1191	7308	3.740	79.200	74.800	-5.56%
L	5750	BODY	01/29/2019	22.0	22.6	0.050	1191	7308	3.470	76.100	69.400	-8.80%

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Table 10-4
System Verification Results – 10g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{10g} (W/kg)	1 W Target SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	$Deviation_{10g}$ (%)
J	1750	BODY	01/24/2019	20.8	20.2	0.100	1150	3347	2.030	19.400	20.300	4.64%
J	1900	BODY	02/11/2019	21.4	20.8	0.100	5d149	7488	2.140	20.700	21.400	3.38%
J	1900	BODY	02/14/2019	21.1	21.9	0.100	5d080	7488	2.050	20.600	20.500	-0.49%
L	5250	BODY	01/29/2019	22.0	22.6	0.050	1191	7308	0.973	21.600	19.460	-9.91%
L	5600	BODY	01/29/2019	22.0	22.6	0.050	1191	7308	1.030	22.200	20.600	-7.21%

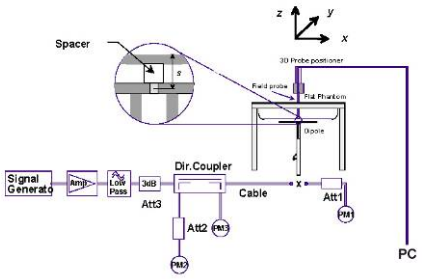

Figure 10-1
System Verification Setup Diagram

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	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.46	0.09	Right	Cheek	00954	1	1:8.3	0.080	1.057	0.085	
836.60	190	GSM 850	GSM	33.7	33.46	-0.09	Right	Tilt	00954	1	1:8.3	0.046	1.057	0.049	
836.60	190	GSM 850	GSM	33.7	33.46	-0.08	Left	Cheek	00954	1	1:8.3	0.103	1.057	0.109	A1
836.60	190	GSM 850	GSM	33.7	33.46	0.10	Left	Tilt	00954	1	1:8.3	0.047	1.057	0.050	
836.60	190	GSM 850	GPRS	33.7	33.40	0.14	Right	Cheek	00954	1	1:8.3	0.078	1.072	0.084	
836.60	190	GSM 850	GPRS	33.7	33.40	0.21	Right	Tilt	00954	1	1:8.3	0.048	1.072	0.051	
836.60	190	GSM 850	GPRS	33.7	33.40	-0.03	Left	Cheek	00954	1	1:8.3	0.097	1.072	0.104	
836.60	190	GSM 850	GPRS	33.7	33.40	-0.10	Left	Tilt	00954	1	1:8.3	0.045	1.072	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 11-2
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	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	31.2	30.83	0.10	Right	Cheek	00954	1	1:8.3	0.074	1.089	0.081	A2
1880.00	661	GSM 1900	GSM	31.2	30.83	-0.11	Right	Tilt	00954	1	1:8.3	0.036	1.089	0.039	
1880.00	661	GSM 1900	GSM	31.2	30.83	0.04	Left	Cheek	00954	1	1:8.3	0.053	1.089	0.058	
1880.00	661	GSM 1900	GSM	31.2	30.83	0.15	Left	Tilt	00954	1	1:8.3	0.037	1.089	0.040	
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.12	Right	Cheek	00954	1	1:8.3	0.072	1.042	0.075	
1880.00	661	GSM 1900	GPRS	31.2	31.02	-0.11	Right	Tilt	00954	1	1:8.3	0.034	1.042	0.035	
1880.00	661	GSM 1900	GPRS	31.2	31.02	-0.03	Left	Cheek	00954	1	1:8.3	0.051	1.042	0.053	
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.19	Left	Tilt	00954	1	1:8.3	0.036	1.042	0.038	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

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Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	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	25.5	25.28	-0.05	Right	Cheek	00954	1:1	0.103	1.052	0.108	
836.60	4183	UMTS 850	RMC	25.5	25.28	0.21	Right	Tilt	00954	1:1	0.068	1.052	0.072	
836.60	4183	UMTS 850	RMC	25.5	25.28	-0.13	Left	Cheek	00954	1:1	0.130	1.052	0.137	A3
836.60	4183	UMTS 850	RMC	25.5	25.28	-0.16	Left	Tilt	00954	1:1	0.063	1.052	0.066	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.06	Right	Cheek	00954	1:1	0.143	1.038	**0.148**	A4
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.14	Right	Tilt	00954	1:1	0.065	1.038	0.067	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.04	Left	Cheek	00954	1:1	0.109	1.038	0.113	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.18	Left	Tilt	00954	1:1	0.083	1.038	0.086	
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
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	25.5	25.15	0.19	0	Right	Cheek	QPSK	1	49	00947	1:1	0.113	1.084	0.122	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	0.05	1	Right	Cheek	QPSK	25	0	00947	1:1	0.087	1.104	0.096	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	0.09	0	Right	Tilt	QPSK	1	49	00947	1:1	0.074	1.084	0.080	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	0.13	1	Right	Tilt	QPSK	25	0	00947	1:1	0.054	1.104	0.060	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	-0.05	0	Left	Cheek	QPSK	1	49	00947	1:1	0.140	1.084	**0.152**	A5
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	0.03	1	Left	Cheek	QPSK	25	0	00947	1:1	0.104	1.104	0.115	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	0.17	0	Left	Tilt	QPSK	1	49	00947	1:1	0.063	1.084	0.068	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	-0.01	1	Left	Tilt	QPSK	25	0	00947	1:1	0.053	1.104	0.059	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

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Table 11-6
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																						
1 CC Uplink | 2 CC Uplink	Component Carrier	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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
		MHz	Ch.																		
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.01	0	Right	Cheek	QPSK	1	49	00947	1:1	0.114	1.057	0.120	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	-0.08	1	Right	Cheek	QPSK	25	0	00947	1:1	0.083	1.102	0.091	
2 CC Uplink	PCC	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	-0.19	0	Right	Cheek	QPSK	1	49	00947	1:1	0.116	1.000	0.116	A6
2 CC Uplink	SCC	843.70	20597	Mid	LTE Band 5 (Cell)	5								1	0						
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.19	0	Right	Tilt	QPSK	1	49	00947	1:1	0.067	1.057	0.071	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.07	1	Right	Tilt	QPSK	25	0	00947	1:1	0.045	1.102	0.050	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	-0.11	0	Left	Cheek	QPSK	1	49	00947	1:1	0.103	1.057	0.109	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.02	1	Left	Cheek	QPSK	25	0	00947	1:1	0.086	1.102	0.095	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	-0.02	0	Left	Tilt	QPSK	1	49	00947	1:1	0.053	1.057	0.056	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.01	1	Left	Tilt	QPSK	25	0	00947	1:1	0.042	1.102	0.046	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-7
LTE Band 66 (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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.03	0	Right	Cheek	QPSK	1	50	00939	1:1	0.146	1.026	**0.150**	A7
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	0.06	1	Right	Cheek	QPSK	50	50	00939	1:1	0.125	1.026	0.128	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	0.06	0	Right	Tilt	QPSK	1	50	00939	1:1	0.124	1.026	0.127	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	0.06	1	Right	Tilt	QPSK	50	50	00939	1:1	0.103	1.026	0.106	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	0.01	0	Left	Cheek	QPSK	1	50	00939	1:1	0.126	1.026	0.129	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	0.08	1	Left	Cheek	QPSK	50	50	00939	1:1	0.116	1.026	0.119	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	0.05	0	Left	Tilt	QPSK	1	50	00939	1:1	0.101	1.026	0.104	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.07	1	Left	Tilt	QPSK	50	50	00939	1:1	0.093	1.026	0.095	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population												Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-8
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) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.05	0	Right	Cheek	QPSK	1	99	00939	1:1	0.118	1.028	0.121	A8
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.12	1	Right	Cheek	QPSK	50	25	00939	1:1	0.111	1.023	0.114	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	0.06	0	Right	Tilt	QPSK	1	99	00939	1:1	0.060	1.028	0.062	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.13	1	Right	Tilt	QPSK	50	25	00939	1:1	0.046	1.023	0.047	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	0.03	0	Left	Cheek	QPSK	1	99	00939	1:1	0.095	1.028	0.098	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.10	1	Left	Cheek	QPSK	50	25	00939	1:1	0.082	1.023	0.084	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	0.09	0	Left	Tilt	QPSK	1	99	00939	1:1	0.068	1.028	0.070	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.10	1	Left	Tilt	QPSK	50	25	00939	1:1	0.061	1.023	0.062	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population												Head 1.6 W/kg (mW/g) averaged over 1 gram							

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Table 11-9
LTE Band 48 Head SAR

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)	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	-0.03	0	Right	Cheek	QPSK	1	99	00947	1:1.58	0.127	1.062	**0.135**	A9
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.00	1	Right	Cheek	QPSK	50	50	00947	1:1.58	0.084	1.062	0.089	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.13	0	Right	Tilt	QPSK	1	99	00947	1:1.58	0.062	1.062	0.066	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	-0.09	1	Right	Tilt	QPSK	50	50	00947	1:1.58	0.043	1.062	0.046	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.10	0	Left	Cheek	QPSK	1	99	00947	1:1.58	0.038	1.062	0.040	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.02	1	Left	Cheek	QPSK	50	50	00947	1:1.58	0.021	1.062	0.022	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.18	0	Left	Tilt	QPSK	1	99	00947	1:1.58	0.026	1.062	0.028	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.18	1	Left	Tilt	QPSK	50	50	00947	1:1.58	0.023	1.062	0.024	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT
Spatial Peak
Uncontrolled Exposure/General Population

Head
1.6 W/kg (mW/g)
averaged over 1 gram

Table 11-10
DTS Head SAR

MEASUREMENT RESULTS

FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	18.0	17.87	-0.10	Right	Cheek	1	01143	1	99.3	0.304	-	1.030	1.007	-	
2462	11	802.11b	DSSS	22	18.0	17.87	0.06	Right	Tilt	1	01143	1	99.3	0.361	-	1.030	1.007	-	
2462	11	802.11b	DSSS	22	18.0	17.87	0.19	Left	Cheek	1	01143	1	99.3	0.699	0.425	1.030	1.007	0.441	
2462	11	802.11b	DSSS	22	18.0	17.87	0.15	Left	Tilt	1	01143	1	99.3	0.848	0.509	1.030	1.007	**0.528**	A10
2462	11	802.11b	DSSS	22	18.0	17.98	-0.03	Right	Cheek	2	01143	1	99.1	0.091	-	1.005	1.009	-	
2462	11	802.11b	DSSS	22	18.0	17.98	0.11	Right	Tilt	2	01143	1	99.1	0.069	-	1.005	1.009	-	
2462	11	802.11b	DSSS	22	18.0	17.98	0.12	Left	Cheek	2	01143	1	99.1	0.380	0.226	1.005	1.009	0.229	
2462	11	802.11b	DSSS	22	18.0	17.98	0.14	Left	Tilt	2	01143	1	99.1	0.224	-	1.005	1.009	-	

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 11-11
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)	
5280	56	802.11a	OFDM	20	18.0	17.96	0.20	Right	Cheek	1	01127	6	98.3	0.436	-	1.009	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.96	0.20	Right	Tilt	1	01127	6	98.3	0.550	-	1.009	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.96	0.12	Left	Cheek	1	01127	6	98.3	1.859	0.656	1.009	1.017	0.673	
5280	56	802.11a	OFDM	20	18.0	17.96	0.12	Left	Tilt	1	01127	6	98.3	1.001	0.684	1.009	1.017	0.702	
5280	56	802.11a	OFDM	20	18.0	17.53	0.00	Right	Cheek	2	01127	6	98.3	0.185	-	1.114	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.53	-0.15	Right	Tilt	2	01127	6	98.3	0.173	-	1.114	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.53	-0.16	Left	Cheek	2	01127	6	98.3	0.309	0.146	1.114	1.017	0.165	
5280	56	802.11a	OFDM	20	18.0	17.53	0.16	Left	Tilt	2	01127	6	98.3	0.302	-	1.114	1.017	-	
5270	54	802.11n	OFDM	40	15.0	14.64	0.15	Right	Cheek	1	01127	13.5	97.2	0.246	-	1.086	1.029	-	
5270	54	802.11n	OFDM	40	15.0	14.64	-0.18	Right	Tilt	1	01127	13.5	97.2	0.224	-	1.086	1.029	-	
5270	54	802.11n	OFDM	40	15.0	14.64	0.13	Left	Cheek	1	01127	13.5	97.2	0.769	0.299	1.086	1.029	0.334	
5270	54	802.11n	OFDM	40	15.0	14.64	0.20	Left	Tilt	1	01127	13.5	97.2	0.806	0.321	1.086	1.029	0.359	
5600	120	802.11a	OFDM	20	17.0	16.50	0.00	Right	Cheek	1	01127	6	98.3	0.371	-	1.122	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.50	0.20	Right	Tilt	1	01127	6	98.3	0.446	-	1.122	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.50	-0.13	Left	Cheek	1	01127	6	98.3	1.214	0.426	1.122	1.017	0.486	
5600	120	802.11a	OFDM	20	17.0	16.50	0.15	Left	Tilt	1	01127	6	98.3	1.134	0.584	1.122	1.017	0.666	
5600	120	802.11a	OFDM	20	17.0	16.99	0.20	Right	Cheek	2	01127	6	98.3	0.060	-	1.002	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.99	0.20	Right	Tilt	2	01127	6	98.3	0.060	-	1.002	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.99	0.16	Left	Cheek	2	01127	6	98.3	0.109	-	1.002	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.99	0.13	Left	Tilt	2	01127	6	98.3	0.119	0.055	1.002	1.017	0.056	
5590	118	802.11n	OFDM	40	15.0	14.90	0.15	Right	Cheek	1	01127	13.5	97.2	0.234	-	1.023	1.029	-	
5590	118	802.11n	OFDM	40	15.0	14.90	0.05	Right	Tilt	1	01127	13.5	97.2	0.192	-	1.023	1.029	-	
5590	118	802.11n	OFDM	40	15.0	14.90	0.17	Left	Cheek	1	01127	13.5	97.2	0.734	0.242	1.023	1.029	0.255	
5590	118	802.11n	OFDM	40	15.0	14.90	0.15	Left	Tilt	1	01127	13.5	97.2	0.733	-	1.023	1.029	-	
5805	161	802.11a	OFDM	20	18.0	17.76	0.18	Right	Cheek	1	01127	6	98.3	0.749	0.284	1.057	1.017	0.305	
5805	161	802.11a	OFDM	20	18.0	17.76	0.19	Right	Tilt	1	01127	6	98.3	0.681	-	1.057	1.017	-	
5785	157	802.11a	OFDM	20	18.0	17.05	0.12	Left	Cheek	1	01127	6	98.3	1.693	0.723	1.245	1.017	**0.915**	
5805	161	802.11a	OFDM	20	18.0	17.76	0.11	Left	Cheek	1	01127	6	98.3	1.508	0.735	1.057	1.017	0.790	A11
5825	165	802.11a	OFDM	20	18.0	17.39	0.12	Left	Cheek	1	01127	6	98.3	1.468	0.681	1.151	1.017	0.797	
5785	157	802.11a	OFDM	20	18.0	17.05	0.16	Left	Tilt	1	01127	6	98.3	1.636	-	1.245	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.76	0.13	Left	Tilt	1	01127	6	98.3	1.673	0.701	1.057	1.017	0.754	
5825	165	802.11a	OFDM	20	18.0	17.39	0.14	Left	Tilt	1	01127	6	98.3	1.696	-	1.151	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.60	-0.20	Right	Cheek	2	01127	6	98.3	0.083	-	1.096	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.60	0.20	Right	Tilt	2	01127	6	98.3	0.065	-	1.096	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.60	0.20	Left	Cheek	2	01127	6	98.3	0.093	0.023	1.096	1.017	0.026	
5805	161	802.11a	OFDM	20	18.0	17.60	0.00	Left	Tilt	2	01127	6	98.3	0.086	-	1.096	1.017	-	
5795	159	802.11n	OFDM	40	15.0	14.76	0.14	Right	Cheek	1	01127	13.5	97.2	0.269	-	1.057	1.029	-	
5795	159	802.11n	OFDM	40	15.0	14.76	0.20	Right	Tilt	1	01127	13.5	97.2	0.270	-	1.057	1.029	-	
5795	159	802.11n	OFDM	40	15.0	14.76	0.12	Left	Cheek	1	01127	13.5	97.2	0.976	0.338	1.057	1.029	0.368	
5795	159	802.11n	OFDM	40	15.0	14.76	0.14	Left	Tilt	1	01127	13.5	97.2	0.811	-	1.057	1.029	-	
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 11-12
DSS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441.00	39	Bluetooth	FHSS	12.5	11.67	-0.19	Right	Cheek	01143	1	77.1	0.048	1.211	1.297	0.075	
2441.00	39	Bluetooth	FHSS	12.5	11.67	0.11	Right	Tilt	01143	1	77.1	0.078	1.211	1.297	0.123	
2441.00	39	Bluetooth	FHSS	12.5	11.67	-0.14	Left	Cheek	01143	1	77.1	0.121	1.211	1.297	0.190	
2441.00	39	Bluetooth	FHSS	12.5	11.67	0.07	Left	Tilt	01143	1	77.1	0.138	1.211	1.297	**0.217**	A12
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 11-13
GSM/UMTS Body-Worn SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
824.20	128	GSM 850	GSM	33.7	33.35	-0.07	10 mm	00954	1	1:8.3	back	0.626	1.084	0.679	A13
836.60	190	GSM 850	GSM	33.7	33.46	0.14	10 mm	00954	1	1:8.3	back	0.612	1.057	0.647	
848.80	251	GSM 850	GSM	33.7	33.43	-0.07	10 mm	00954	1	1:8.3	back	0.601	1.064	0.639	
824.20	128	GSM 850	GPRS	33.7	33.53	-0.18	10 mm	00954	1	1:8.3	back	0.600	1.040	0.624	
836.60	190	GSM 850	GPRS	33.7	33.40	-0.04	10 mm	00954	1	1:8.3	back	0.595	1.072	0.638	
848.80	251	GSM 850	GPRS	33.7	33.43	-0.13	10 mm	00954	1	1:8.3	back	0.557	1.064	0.593	
1880.00	661	GSM 1900	GSM	31.2	30.83	0.02	10 mm	00954	1	1:8.3	back	0.280	1.089	0.305	A15
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.04	10 mm	00954	1	1:8.3	back	0.231	1.042	0.241	
826.40	4132	UMTS 850	RMC	25.5	25.32	0.03	10 mm	00954	N/A	1:1	back	0.901	1.042	0.939	
836.60	4183	UMTS 850	RMC	25.5	25.28	-0.01	10 mm	00954	N/A	1:1	back	0.963	1.052	**1.013**	
846.60	4233	UMTS 850	RMC	25.5	25.40	-0.01	10 mm	00954	N/A	1:1	back	0.977	1.023	0.999	
846.60	4233	UMTS 850	RMC	25.5	25.40	-0.11	10 mm	00954	N/A	1:1	back	0.987	1.023	**1.010**	A17
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.15	10 mm	00954	N/A	1:1	back	0.474	1.038	0.492	A18
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note: Blue entry indicates variability measurement.

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Table 11-14
LTE Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	0.00	0	00939	QPSK	1	49	10 mm	back	1:1	0.616	1.084	0.668	A20
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	-0.01	1	00939	QPSK	25	0	10 mm	back	1:1	0.452	1.104	0.499	
1720.00	132072	Low	LTE Band 66 (AWS)	20	25.2	25.04	-0.01	0	00939	QPSK	1	0	10 mm	back	1:1	0.508	1.038	0.527	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.01	0	00939	QPSK	1	50	10 mm	back	1:1	0.594	1.026	0.609	
1770.00	132572	High	LTE Band 66 (AWS)	20	25.2	25.00	-0.02	0	00939	QPSK	1	99	10 mm	back	1:1	0.631	1.047	0.661	A22
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.03	1	00939	QPSK	50	50	10 mm	back	1:1	0.536	1.026	0.550	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	0.01	0	00939	QPSK	1	99	10 mm	back	1:1	0.459	1.028	0.472	A24
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.12	1	00939	QPSK	50	25	10 mm	back	1:1	0.377	1.023	0.386	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.09	0	00947	QPSK	1	99	10 mm	back	1:1.58	0.207	1.062	**0.220**	A26
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.18	1	00947	QPSK	50	50	10 mm	back	1:1.58	0.144	1.062	0.153	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-15
LTE Band 5 (Cell.) Body-Worn SAR

MEASUREMENT RESULTS																				
1 CC Uplink | 2 CC Uplink	Component Carrier	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)	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.05	0	00947	QPSK	1	49	10 mm	back	1:1	0.926	1.057	0.979	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.12	1	00947	QPSK	25	0	10 mm	back	1:1	0.657	1.102	0.724	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.02	-0.05	1	00947	QPSK	50	0	10 mm	back	1:1	0.635	1.117	0.709	
2 CC Uplink	PCC	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	-0.12	0	00947	QPSK	1	49	10 mm	back	1:1	0.946	1.000	0.946	A21
2 CC Uplink	SCC	843.70	20597	Mid	LTE Band 5 (Cell)	5								0							
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 11-16
DTS SISO Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	20.5	20.06	0.06	10 mm	1	01127	1	back	99.3	0.176	0.138	1.107	1.007	0.154	
2462	11	802.11b	DSSS	22	20.5	20.04	0.10	10 mm	2	01127	1	back	99.1	0.355	0.265	1.112	1.009	**0.297**	A27
2462	11	802.11b	DSSS	22	18.0	17.87	0.15	10 mm	1	01143	1	back	99.3	0.093	0.077	1.030	1.007	0.080	
2462	11	802.11b	DSSS	22	18.0	17.98	0.12	10 mm	2	01143	1	back	99.1	0.187	0.152	1.005	1.009	0.154	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram					

Table 11-17
DTS MIMO Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power (Ant 1) [dBm]	Conducted Power (Ant 1) [dBm]	Maximum Allowed Power (Ant 2) [dBm]	Conducted Power (Ant 2) [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.															W/kg	(W/kg)			(W/kg)	
2437	6	802.11n	OFDM	20	18.0	17.86	18.0	17.96	0.21	10 mm	MIMO	01143	6.5	back	98.2	0.214	0.210	1.033	1.018	0.221	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note: To achieve the 21.0 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.0 dBm.

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Table 11-18
NII SISO Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5280	56	802.11a	OFDM	20	18.0	17.96	-0.19	10 mm	1	01127	6	back	98.3	0.510	0.222	1.009	1.017	0.228	
5280	56	802.11a	OFDM	20	18.0	17.53	0.09	10 mm	2	01127	6	back	98.3	0.359	0.185	1.114	1.017	0.210	
5270	54	802.11n	OFDM	40	15.0	14.64	-0.01	10 mm	1	01127	13.5	back	97.2	0.207	0.093	1.086	1.029	0.104	
5310	62	802.11n	OFDM	40	15.0	14.32	0.18	10 mm	2	01127	13.5	back	97.3	0.182	0.075	1.169	1.028	0.090	
5600	120	802.11a	OFDM	20	17.0	16.50	0.12	10 mm	1	01127	6	back	98.3	0.246	0.108	1.122	1.017	0.123	
5600	120	802.11a	OFDM	20	17.0	16.99	0.09	10 mm	2	01127	6	back	98.3	0.478	0.171	1.002	1.017	0.174	
5590	118	802.11n	OFDM	40	15.0	14.90	0.16	10 mm	1	01127	13.5	back	97.2	0.146	0.056	1.023	1.029	0.059	
5590	118	802.11n	OFDM	40	15.0	14.30	-0.11	10 mm	2	01127	13.5	back	97.3	0.194	0.078	1.175	1.028	0.094	
5805	161	802.11a	OFDM	20	18.0	17.76	0.13	10 mm	1	01127	6	back	98.3	0.373	0.164	1.057	1.017	0.176	
5805	161	802.11a	OFDM	20	18.0	17.60	0.15	10 mm	2	01127	6	back	98.3	0.581	0.269	1.096	1.017	**0.300**	A28
5795	159	802.11n	OFDM	40	15.0	14.76	0.14	10 mm	1	01127	13.5	back	97.2	0.143	0.064	1.057	1.029	0.070	
5795	159	802.11n	OFDM	40	15.0	14.55	0.20	10 mm	2	01127	13.5	back	97.3	0.281	0.106	1.109	1.028	0.121	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population												Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-19
NII MIMO Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power (Ant 1) [dBm]	Conducted Power (Ant 1) [dBm]	Maximum Allowed Power (Ant 2) [dBm]	Conducted Power (Ant 2) [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.															W/kg	(W/kg)			(W/kg)	
5270	54	802.11n	OFDM	40	15.0	14.64	15.0	14.32	0.17	10 mm	MIMO	01127	27	back	97.3	0.300	0.110	1.169	1.028	0.132	
5590	118	802.11n	OFDM	40	15.0	14.90	15.0	14.30	0.12	10 mm	MIMO	01127	27	back	97.3	0.325	0.109	1.175	1.028	0.132	
5795	159	802.11n	OFDM	40	15.0	14.76	15.0	14.55	0.07	10 mm	MIMO	01127	27	back	97.3	0.405	0.144	1.109	1.028	0.164	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note: To achieve the 18.0 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 15.0 dBm.

Table 11-20
DSS Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441	39	Bluetooth	FHSS	12.5	11.67	0.08	10 mm	01143	1	back	77.1	0.026	1.211	1.297	**0.041**	A29
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 11-21
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	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	33.7	33.53	-0.18	10 mm	00954	1	1:8.3	back	0.600	1.040	0.624	A14
836.60	190	GSM 850	GPRS	33.7	33.40	-0.04	10 mm	00954	1	1:8.3	back	0.595	1.072	0.638	
848.80	251	GSM 850	GPRS	33.7	33.43	-0.13	10 mm	00954	1	1:8.3	back	0.557	1.064	0.593	
836.60	190	GSM 850	GPRS	33.7	33.40	0.00	10 mm	00954	1	1:8.3	front	0.359	1.072	0.385	
836.60	190	GSM 850	GPRS	33.7	33.40	0.14	10 mm	00954	1	1:8.3	bottom	0.144	1.072	0.154	
836.60	190	GSM 850	GPRS	33.7	33.40	-0.15	10 mm	00954	1	1:8.3	right	0.278	1.072	0.298	
836.60	190	GSM 850	GPRS	33.7	33.40	-0.03	10 mm	00954	1	1:8.3	left	0.074	1.072	0.079	
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.04	10 mm	00954	1	1:8.3	back	0.231	1.042	0.241	
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.03	10 mm	00954	1	1:8.3	front	0.218	1.042	0.227	
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.02	10 mm	00954	1	1:8.3	bottom	0.527	1.042	0.549	A16
1880.00	661	GSM 1900	GPRS	31.2	31.02	0.01	10 mm	00954	1	1:8.3	right	0.067	1.042	0.070	
1880.00	661	GSM 1900	GPRS	31.2	31.02	-0.13	10 mm	00954	1	1:8.3	left	0.096	1.042	0.100	
826.40	4132	UMTS 850	RMC	25.5	25.32	0.03	10 mm	00954	N/A	1:1	back	0.901	1.042	0.939	
836.60	4183	UMTS 850	RMC	25.5	25.28	-0.01	10 mm	00954	N/A	1:1	back	0.963	1.052	1.013	
846.60	4233	UMTS 850	RMC	25.5	25.40	-0.01	10 mm	00954	N/A	1:1	back	0.977	1.023	0.999	
836.60	4183	UMTS 850	RMC	25.5	25.28	0.02	10 mm	00954	N/A	1:1	front	0.547	1.052	0.575	
836.60	4183	UMTS 850	RMC	25.5	25.28	-0.07	10 mm	00954	N/A	1:1	bottom	0.240	1.052	0.252	
836.60	4183	UMTS 850	RMC	25.5	25.28	-0.01	10 mm	00954	N/A	1:1	right	0.342	1.052	0.360	
836.60	4183	UMTS 850	RMC	25.5	25.28	0.03	10 mm	00954	N/A	1:1	left	0.136	1.052	0.143	
846.60	4233	UMTS 850	RMC	25.5	25.40	-0.11	10 mm	00954	N/A	1:1	back	0.987	1.023	1.010	A17
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.15	10 mm	00954	N/A	1:1	back	0.474	1.038	0.492	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.04	10 mm	00954	N/A	1:1	front	0.440	1.038	0.457	
1852.40	9262	UMTS 1900	RMC	25.2	25.20	-0.01	10 mm	00954	N/A	1:1	bottom	0.910	1.000	0.910	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.01	10 mm	00954	N/A	1:1	bottom	0.947	1.038	0.983	
1907.60	9538	UMTS 1900	RMC	25.2	25.02	0.05	10 mm	00954	N/A	1:1	bottom	0.987	1.042	1.028	A19
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.04	10 mm	00954	N/A	1:1	right	0.123	1.038	0.128	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	0.12	10 mm	00954	N/A	1:1	left	0.163	1.038	0.169	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note: Blue entry indicates variability measurement.

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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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	0.00	0	00939	QPSK	1	49	10 mm	back	1:1	0.616	1.084	0.668	A20
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	-0.01	1	00939	QPSK	25	0	10 mm	back	1:1	0.452	1.104	0.499	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	-0.01	0	00939	QPSK	1	49	10 mm	front	1:1	0.475	1.084	0.515	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	-0.05	1	00939	QPSK	25	0	10 mm	front	1:1	0.349	1.104	0.385	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	0.02	0	00939	QPSK	1	49	10 mm	bottom	1:1	0.191	1.084	0.207	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	0.01	1	00939	QPSK	25	0	10 mm	bottom	1:1	0.148	1.104	0.163	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	0.01	0	00939	QPSK	1	49	10 mm	right	1:1	0.360	1.084	0.390	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	0.00	1	00939	QPSK	25	0	10 mm	right	1:1	0.258	1.104	0.285	
782.00	23230	Mid	LTE Band 13	10	25.5	25.15	-0.01	0	00939	QPSK	1	49	10 mm	left	1:1	0.121	1.084	0.131	
782.00	23230	Mid	LTE Band 13	10	24.5	24.07	0.01	1	00939	QPSK	25	0	10 mm	left	1:1	0.092	1.104	0.102	
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																					
1 CC Uplink | 2 CC Uplink	Component Carrier	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)	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.05	0	00947	QPSK	1	49	10 mm	back	1:1	0.926	1.057	0.979	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.12	1	00947	QPSK	25	0	10 mm	back	1:1	0.657	1.102	0.724	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.02	-0.05	1	00947	QPSK	50	0	10 mm	back	1:1	0.635	1.117	0.709	
2 CC Uplink	PCC	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.50	-0.12	0	00947	QPSK	1	49	10 mm	back	1:1	0.946	1.000	0.946	A21
2 CC Uplink	SCC	843.70	20597	Mid	LTE Band 5 (Cell)	5							1	0							
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.12	0	00947	QPSK	1	49	10 mm	front	1:1	0.568	1.057	0.600	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.01	1	00947	QPSK	25	0	10 mm	front	1:1	0.419	1.102	0.462	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.14	0	00947	QPSK	1	49	10 mm	bottom	1:1	0.235	1.057	0.248	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.05	1	00947	QPSK	25	0	10 mm	bottom	1:1	0.166	1.102	0.183	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	0.06	0	00947	QPSK	1	49	10 mm	right	1:1	0.476	1.057	0.503	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	-0.04	1	00947	QPSK	25	0	10 mm	right	1:1	0.338	1.102	0.372	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	25.5	25.26	-0.02	0	00947	QPSK	1	49	10 mm	left	1:1	0.129	1.057	0.136	
1 CC Uplink	N/A	836.50	20525	Mid	LTE Band 5 (Cell)	10	24.5	24.08	0.04	1	00947	QPSK	25	0	10 mm	left	1:1	0.087	1.102	0.096	
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 66 (AWS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1720.00	132072	Low	LTE Band 66 (AWS)	20	25.2	25.04	-0.01	0	00939	QPSK	1	0	10 mm	back	1:1	0.508	1.038	0.527	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.01	0	00939	QPSK	1	50	10 mm	back	1:1	0.594	1.026	0.609	
1770.00	132572	High	LTE Band 66 (AWS)	20	25.2	25.00	-0.02	0	00939	QPSK	1	99	10 mm	back	1:1	0.631	1.047	0.661	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.03	1	00939	QPSK	50	50	10 mm	back	1:1	0.536	1.026	0.550	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.01	0	00939	QPSK	1	50	10 mm	front	1:1	0.598	1.026	0.614	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.02	1	00939	QPSK	50	50	10 mm	front	1:1	0.536	1.026	0.550	
1720.00	132072	Low	LTE Band 66 (AWS)	20	25.2	25.04	-0.03	0	00939	QPSK	1	0	10 mm	bottom	1:1	0.791	1.038	0.821	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.08	0	00939	QPSK	1	50	10 mm	bottom	1:1	0.836	1.026	0.858	
1770.00	132572	High	LTE Band 66 (AWS)	20	25.2	25.00	-0.07	0	00939	QPSK	1	99	10 mm	bottom	1:1	0.874	1.047	0.915	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.03	1	00939	QPSK	50	50	10 mm	bottom	1:1	0.748	1.026	0.767	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.00	-0.05	1	00939	QPSK	100	0	10 mm	bottom	1:1	0.698	1.047	0.731	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	0.13	0	00939	QPSK	1	50	10 mm	right	1:1	0.150	1.026	0.154	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	0.02	1	00939	QPSK	50	50	10 mm	right	1:1	0.144	1.026	0.148	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.11	0	00939	QPSK	1	50	10 mm	left	1:1	0.223	1.026	0.229	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.05	1	00939	QPSK	50	50	10 mm	left	1:1	0.209	1.026	0.214	
1770.00	132572	High	LTE Band 66 (AWS)	20	25.2	25.00	-0.07	0	00939	QPSK	1	99	10 mm	bottom	1:1	0.988	1.047	1.034	A23
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: Blue entry indicates variability measurement.

Table 11-25
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)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	0.01	0	00939	QPSK	1	99	10 mm	back	1:1	0.459	1.028	0.472	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.12	1	00939	QPSK	50	25	10 mm	back	1:1	0.377	1.023	0.386	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.01	0	00939	QPSK	1	99	10 mm	front	1:1	0.421	1.028	0.433	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.06	1	00939	QPSK	50	25	10 mm	front	1:1	0.362	1.023	0.370	
1860.00	18700	Low	LTE Band 2 (PCS)	20	25.2	24.98	-0.02	0	00939	QPSK	1	99	10 mm	bottom	1:1	0.970	1.052	1.020	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	25.2	25.00	-0.09	0	00939	QPSK	1	50	10 mm	bottom	1:1	1.010	1.047	1.057	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.03	0	00939	QPSK	1	99	10 mm	bottom	1:1	1.040	1.028	**1.069**	A25
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.2	24.02	-0.02	1	00939	QPSK	50	50	10 mm	bottom	1:1	0.784	1.042	0.817	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	24.2	24.02	-0.03	1	00939	QPSK	50	50	10 mm	bottom	1:1	0.838	1.042	0.873	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	-0.03	1	00939	QPSK	50	25	10 mm	bottom	1:1	0.831	1.023	0.850	
1860.00	18700	Low	LTE Band 2 (PCS)	20	24.2	24.09	-0.02	1	00939	QPSK	100	0	10 mm	bottom	1:1	0.785	1.026	0.805	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.11	0	00939	QPSK	1	99	10 mm	right	1:1	0.109	1.028	0.112	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	-0.09	1	00939	QPSK	50	25	10 mm	right	1:1	0.091	1.023	0.093	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.07	0	00939	QPSK	1	99	10 mm	left	1:1	0.149	1.028	0.153	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	-0.01	1	00939	QPSK	50	25	10 mm	left	1:1	0.145	1.023	0.148	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.05	0	00939	QPSK	1	99	10 mm	bottom	1:1	1.010	1.028	1.038	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: Blue entry indicates variability measurement.

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Table 11-26
LTE Band 48 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)	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.09	0	00947	QPSK	1	99	10 mm	back	1:1.58	0.207	1.062	**0.220**	A26
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.18	1	00947	QPSK	50	50	10 mm	back	1:1.58	0.144	1.062	0.153	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	-0.14	0	00947	QPSK	1	99	10 mm	front	1:1.58	0.106	1.062	0.113	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	-0.02	1	00947	QPSK	50	50	10 mm	front	1:1.58	0.087	1.062	0.092	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.08	0	00947	QPSK	1	99	10 mm	bottom	1:1.58	0.032	1.062	0.034	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.15	1	00947	QPSK	50	50	10 mm	bottom	1:1.58	0.019	1.062	0.020	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.04	0	00947	QPSK	1	99	10 mm	right	1:1.58	0.142	1.062	0.151	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	0.02	1	00947	QPSK	50	50	10 mm	right	1:1.58	0.095	1.062	0.101	
3646.70	56207	Mid-High	LTE Band 48	20	23.7	23.44	0.15	0	00947	QPSK	1	99	10 mm	left	1:1.58	0.025	1.062	0.027	
3560.00	55340	Low	LTE Band 48	20	22.7	22.44	-0.03	1	00947	QPSK	50	50	10 mm	left	1:1.58	0.016	1.062	0.017	
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
WLAN SISO Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	20.5	20.06	0.06	10 mm	1	01127	1	back	99.3	0.176	-	1.107	1.007	-	
2462	11	802.11b	DSSS	22	20.5	20.06	0.20	10 mm	1	01127	1	front	99.3	0.142	-	1.107	1.007	-	
2462	11	802.11b	DSSS	22	20.5	20.06	0.15	10 mm	1	01127	1	top	99.3	0.214	0.185	1.107	1.007	0.206	
2462	11	802.11b	DSSS	22	20.5	20.06	0.13	10 mm	1	01127	1	right	99.3	0.060	-	1.107	1.007	-	
2462	11	802.11b	DSSS	22	20.5	20.04	0.10	10 mm	2	01127	1	back	99.1	0.355	0.265	1.112	1.009	**0.297**	A27
2462	11	802.11b	DSSS	22	20.5	20.04	0.13	10 mm	2	01127	1	front	99.1	0.080	-	1.112	1.009	-	
2462	11	802.11b	DSSS	22	20.5	20.04	0.20	10 mm	2	01127	1	top	99.1	0.026	-	1.112	1.009	-	
2462	11	802.11b	DSSS	22	20.5	20.04	0.06	10 mm	2	01127	1	right	99.1	0.256	-	1.112	1.009	-	
2462	11	802.11b	DSSS	22	18.0	17.87	0.15	10 mm	1	01143	1	back	99.3	0.093	0.077	1.030	1.007	0.080	
2462	11	802.11b	DSSS	22	18.0	17.98	0.12	10 mm	2	01143	1	back	99.1	0.187	0.152	1.005	1.009	0.154	
2462	11	802.11b	DSSS	22	18.0	17.87	0.19	10 mm	1	01143	1	right	99.3	0.037	0.027	1.030	1.007	0.028	
2462	11	802.11b	DSSS	22	18.0	17.98	0.17	10 mm	2	01143	1	right	99.1	0.183	0.145	1.005	1.009	0.147	
5200	40	802.11a	OFDM	20	18.0	17.94	0.04	10 mm	1	01127	6	back	98.3	0.427	0.190	1.014	1.017	0.196	
5200	40	802.11a	OFDM	20	18.0	17.94	0.11	10 mm	1	01127	6	front	98.3	0.125	-	1.014	1.017	-	
5200	40	802.11a	OFDM	20	18.0	17.94	-0.17	10 mm	1	01127	6	top	98.3	0.247	-	1.014	1.017	-	
5200	40	802.11a	OFDM	20	18.0	17.94	-0.20	10 mm	1	01127	6	right	98.3	0.215	-	1.014	1.017	-	
5200	40	802.11a	OFDM	20	18.0	17.99	0.13	10 mm	2	01127	6	back	98.3	0.482	0.171	1.002	1.017	0.174	
5200	40	802.11a	OFDM	20	18.0	17.99	0.00	10 mm	2	01127	6	front	98.3	0.032	-	1.002	1.017	-	
5200	40	802.11a	OFDM	20	18.0	17.99	-0.10	10 mm	2	01127	6	top	98.3	0.036	-	1.002	1.017	-	
5200	40	802.11a	OFDM	20	18.0	17.99	0.07	10 mm	2	01127	6	right	98.3	0.140	-	1.002	1.017	-	
5190	38	802.11n	OFDM	40	15.0	14.76	0.15	10 mm	1	01127	13.5	back	97.2	0.205	0.087	1.057	1.029	0.095	
5230	46	802.11n	OFDM	40	15.0	14.14	0.09	10 mm	2	01127	13.5	back	97.3	0.160	0.062	1.219	1.028	0.078	
5190	38	802.11n	OFDM	40	15.0	14.76	0.00	10 mm	1	01127	13.5	right	97.2	0.094	0.037	1.057	1.029	0.040	
5230	46	802.11n	OFDM	40	15.0	14.14	0.00	10 mm	2	01127	13.5	right	97.3	0.068	0.024	1.219	1.028	0.030	
5805	161	802.11a	OFDM	20	18.0	17.76	0.13	10 mm	1	01127	6	back	98.3	0.373	0.164	1.057	1.017	0.176	
5805	161	802.11a	OFDM	20	18.0	17.76	0.00	10 mm	1	01127	6	front	98.3	0.158	-	1.057	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.76	0.15	10 mm	1	01127	6	top	98.3	0.134	-	1.057	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.76	0.17	10 mm	1	01127	6	right	98.3	0.118	-	1.057	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.60	0.15	10 mm	2	01127	6	back	98.3	0.581	0.269	1.096	1.017	**0.300**	A28
5805	161	802.11a	OFDM	20	18.0	17.60	-0.20	10 mm	2	01127	6	front	98.3	0.014	-	1.096	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.60	0.00	10 mm	2	01127	6	top	98.3	0.019	-	1.096	1.017	-	
5805	161	802.11a	OFDM	20	18.0	17.60	0.18	10 mm	2	01127	6	right	98.3	0.184	-	1.096	1.017	-	
5795	159	802.11n	OFDM	40	15.0	14.76	0.14	10 mm	1	01127	13.5	back	97.2	0.143	0.064	1.057	1.029	0.070	
5795	159	802.11n	OFDM	40	15.0	14.55	0.20	10 mm	2	01127	13.5	back	97.3	0.281	0.106	1.109	1.028	0.121	
5795	159	802.11n	OFDM	40	15.0	14.76	0.00	10 mm	1	01127	13.5	right	97.2	0.047	0.016	1.057	1.029	0.017	
5795	159	802.11n	OFDM	40	15.0	14.55	0.00	10 mm	2	01127	13.5	right	97.3	0.094	0.034	1.109	1.028	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					

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Table 11-28
WLAN MIMO Hotspot SAR

MEASUREMENT RESULTS																						
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power (Ant 1) [dBm]	Conducted Power (Ant 1) [dBm]	Maximum Allowed Power (Ant 2) [dBm]	Conducted Power (Ant 2) [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.															W/kg	(W/kg)			(W/kg)	
2437	6	802.11n	OFDM	20	18.0	17.86	18.0	17.96	0.21	10 mm	MIMO	01143	13	back	98.2	0.214	0.210	1.033	1.018	0.221	
2437	6	802.11n	OFDM	20	18.0	17.86	18.0	17.96	0.17	10 mm	MIMO	01143	13	right	98.2	0.175	0.140	1.033	1.018	0.147	
5190	38	802.11n	OFDM	40	15.0	14.76	15.0	14.12	0.20	10 mm	MIMO	01127	27	back	97.3	0.262	0.108	1.225	1.028	0.136	
5190	38	802.11n	OFDM	40	15.0	14.76	15.0	14.12	0.10	10 mm	MIMO	01127	27	right	97.3	0.129	0.046	1.225	1.028	0.058	
5795	159	802.11n	OFDM	40	15.0	14.76	15.0	14.55	0.07	10 mm	MIMO	01127	27	back	97.3	0.405	0.144	1.109	1.028	0.164	
5795	159	802.11n	OFDM	40	15.0	14.76	15.0	14.55	-0.20	10 mm	MIMO	01127	27	right	97.3	0.128	0.041	1.109	1.028	0.047	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram							

Note:

1. To achieve the 21.0 dBm (ch. 6) maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.0 dBm (ch. 6).
2. To achieve the 18.0 dBm (ch. 38, 159) maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 15.0 dBm (ch. 38, 159).

Table 11-29
DSS Hotspot SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441	39	Bluetooth	FHSS	12.5	11.67	0.08	10 mm	01143	1	back	77.1	0.026	1.211	1.297	0.041	
2441	39	Bluetooth	FHSS	12.5	11.67	0.18	10 mm	01143	1	front	77.1	0.018	1.211	1.297	0.028	
2441	39	Bluetooth	FHSS	12.5	11.67	0.15	10 mm	01143	1	top	77.1	0.030	1.211	1.297	**0.047**	A30
2441	39	Bluetooth	FHSS	12.5	11.67	0.13	10 mm	01143	1	right	77.1	0.007	1.211	1.297	0.011	
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)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.01	2 mm	00954	1:1	back	1.130	1.038	1.173	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.02	1 mm	00954	1:1	front	1.250	1.038	1.298	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.12	3 mm	00954	1:1	bottom	1.460	1.038	1.515	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.03	0 mm	00954	1:1	right	0.200	1.038	0.208	
1880.00	9400	UMTS 1900	RMC	25.2	25.04	-0.02	0 mm	00954	1:1	left	0.662	1.038	0.687	
1880.00	9400	UMTS 1900	RMC	23.7	23.48	0.12	0 mm	00954	1:1	back	1.770	1.052	1.862	
1880.00	9400	UMTS 1900	RMC	23.7	23.48	-0.05	0 mm	00954	1:1	front	1.410	1.052	1.483	
1852.40	9262	UMTS 1900	RMC	23.7	23.67	-0.05	0 mm	00954	1:1	bottom	1.990	1.007	2.004	
1880.00	9400	UMTS 1900	RMC	23.7	23.48	-0.03	0 mm	00954	1:1	bottom	2.000	1.052	2.104	
1907.60	9538	UMTS 1900	RMC	23.7	23.49	-0.04	0 mm	00954	1:1	bottom	2.010	1.050	2.111	A31
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 Band 66 (AWS) 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)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.01	0	00939	QPSK	1	50	2 mm	back	1:1	1.180	1.026	1.211	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.03	1	00939	QPSK	50	50	2 mm	back	1:1	1.110	1.026	1.139	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.12	0	00939	QPSK	1	50	1 mm	front	1:1	1.840	1.026	1.888	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.16	1	00939	QPSK	50	50	1 mm	front	1:1	1.760	1.026	1.806	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	0.04	0	00939	QPSK	1	50	3 mm	bottom	1:1	1.400	1.026	1.436	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	-0.07	1	00939	QPSK	50	50	3 mm	bottom	1:1	1.260	1.026	1.293	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	0.00	0	00939	QPSK	1	50	0 mm	right	1:1	0.252	1.026	0.259	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	0.00	1	00939	QPSK	50	50	0 mm	right	1:1	0.246	1.026	0.252	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	25.2	25.09	-0.16	0	00939	QPSK	1	50	0 mm	left	1:1	0.673	1.026	0.690	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	24.09	0.00	1	00939	QPSK	50	50	0 mm	left	1:1	0.652	1.026	0.669	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.66	-0.12	0	00939	QPSK	1	0	0 mm	back	1:1	1.340	1.009	1.352	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.55	0.01	0	00939	QPSK	50	0	0 mm	back	1:1	1.410	1.035	1.459	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.7	23.46	-0.17	0	00939	QPSK	1	0	0 mm	front	1:1	1.740	1.057	1.839	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.7	23.45	-0.17	0	00939	QPSK	1	99	0 mm	front	1:1	1.990	1.059	2.107	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.66	-0.11	0	00939	QPSK	1	0	0 mm	front	1:1	2.100	1.009	2.119	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.7	23.52	-0.11	0	00939	QPSK	50	0	0 mm	front	1:1	1.870	1.042	1.949	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.7	23.48	-0.17	0	00939	QPSK	50	50	0 mm	front	1:1	2.080	1.052	2.188	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.55	-0.15	0	00939	QPSK	50	0	0 mm	front	1:1	2.240	1.035	2.318	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.7	23.33	-0.13	0	00939	QPSK	100	0	0 mm	front	1:1	2.060	1.089	2.243	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.7	23.46	0.04	0	00939	QPSK	1	0	0 mm	bottom	1:1	2.090	1.057	2.209	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.7	23.45	-0.13	0	00939	QPSK	1	99	0 mm	bottom	1:1	2.150	1.059	2.277	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.66	-0.12	0	00939	QPSK	1	0	0 mm	bottom	1:1	2.260	1.009	2.280	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.7	23.52	-0.10	0	00939	QPSK	50	0	0 mm	bottom	1:1	2.230	1.042	2.324	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.7	23.48	-0.10	0	00939	QPSK	50	50	0 mm	bottom	1:1	2.310	1.052	2.430	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.55	-0.06	0	00939	QPSK	50	0	0 mm	bottom	1:1	2.380	1.035	2.463	A32
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.7	23.33	-0.11	0	00939	QPSK	100	0	0 mm	bottom	1:1	2.300	1.089	**2.505**	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.7	23.55	-0.11	0	00939	QPSK	50	0	0 mm	bottom	1:1	2.380	1.035	2.463	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Phablet 4.0 W/kg (mW/g) averaged over 10 grams										

Note: Blue entry indicates variability measurement.

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Table 11-32
LTE Band 2 (PCS) 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.																		
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.01	0	00939	QPSK	1	99	2 mm	back	1:1	1.030	1.028	1.059	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.07	1	00939	QPSK	50	25	2 mm	back	1:1	0.870	1.023	0.890	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.03	0	00939	QPSK	1	99	1 mm	front	1:1	1.350	1.028	1.388	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	-0.02	1	00939	QPSK	50	25	1 mm	front	1:1	1.140	1.023	1.166	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.05	0	00939	QPSK	1	99	3 mm	bottom	1:1	1.430	1.028	1.470	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	-0.06	1	00939	QPSK	50	25	3 mm	bottom	1:1	1.200	1.023	1.228	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	0.03	0	00939	QPSK	1	99	0 mm	right	1:1	0.194	1.028	0.199	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	0.01	1	00939	QPSK	50	25	0 mm	right	1:1	0.158	1.023	0.162	
1900.00	19100	High	LTE Band 2 (PCS)	20	25.2	25.08	-0.18	0	00939	QPSK	1	99	0 mm	left	1:1	0.545	1.028	0.560	
1900.00	19100	High	LTE Band 2 (PCS)	20	24.2	24.10	-0.09	1	00939	QPSK	50	25	0 mm	left	1:1	0.472	1.023	0.483	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.7	23.68	-0.21	0	00939	QPSK	1	50	0 mm	back	1:1	1.280	1.005	1.286	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.7	23.65	-0.16	0	00939	QPSK	50	25	0 mm	back	1:1	1.320	1.012	1.336	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.7	23.68	0.03	0	00939	QPSK	1	50	0 mm	front	1:1	1.720	1.005	1.729	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.7	23.65	-0.02	0	00939	QPSK	50	25	0 mm	front	1:1	1.900	1.012	1.923	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.7	23.57	-0.10	0	00939	QPSK	1	50	0 mm	bottom	1:1	2.020	1.030	2.081	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.7	23.68	-0.09	0	00939	QPSK	1	50	0 mm	bottom	1:1	2.100	1.005	2.111	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.7	23.38	-0.01	0	00939	QPSK	1	99	0 mm	bottom	1:1	1.990	1.076	2.141	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.7	23.65	-0.05	0	00939	QPSK	50	25	0 mm	bottom	1:1	2.100	1.012	2.125	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.7	23.55	-0.09	0	00939	QPSK	50	0	0 mm	bottom	1:1	2.120	1.035	2.194	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.7	23.54	-0.07	0	00939	QPSK	50	0	0 mm	bottom	1:1	2.160	1.038	2.242	A33
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.7	23.63	-0.10	0	00939	QPSK	100	0	0 mm	bottom	1:1	2.110	1.016	2.144	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.7	23.54	-0.11	0	00939	QPSK	50	0	0 mm	bottom	1:1	2.090	1.038	2.169	

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

Note: Blue entry indicates variability measurement.

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Table 11-33
WLAN SISO 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	18.0	17.96	-0.12	0 mm	1	01127	6	back	98.3	6.366	0.776	1.009	1.017	0.796	
5280	56	802.11a	OFDM	20	18.0	17.96	0.00	0 mm	1	01127	6	front	98.3	3.407	-	1.009	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.96	0.12	0 mm	1	01127	6	top	98.3	3.442	-	1.009	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.96	0.16	0 mm	1	01127	6	right	98.3	6.056	-	1.009	1.017	-	
5260	52	802.11a	OFDM	20	17.0	16.98	-0.11	0 mm	2	01127	6	back	98.3	12.943	1.410	1.005	1.017	1.441	
5280	56	802.11a	OFDM	20	18.0	17.53	-0.14	0 mm	2	01127	6	back	98.3	26.570	1.610	1.114	1.017	1.824	
5320	64	802.11a	OFDM	20	17.0	16.95	-0.17	0 mm	2	01127	6	back	98.3	15.051	1.300	1.012	1.017	1.338	
5280	56	802.11a	OFDM	20	18.0	17.53	0.20	0 mm	2	01127	6	front	98.3	0.858	0.098	1.114	1.017	0.111	
5280	56	802.11a	OFDM	20	18.0	17.53	0.13	0 mm	2	01127	6	top	98.3	0.330	-	1.114	1.017	-	
5280	56	802.11a	OFDM	20	18.0	17.53	0.17	0 mm	2	01127	6	right	98.3	1.409	0.158	1.114	1.017	0.179	
5270	54	802.11n	OFDM	40	15.0	14.64	-0.03	0 mm	1	01127	13.5	back	97.2	1.675	0.274	1.086	1.029	0.306	
5310	62	802.11n	OFDM	40	15.0	14.32	-0.07	0 mm	2	01127	13.5	back	97.3	14.854	0.674	1.169	1.028	0.810	
5270	54	802.11n	OFDM	40	15.0	14.64	-0.20	0 mm	1	01127	13.5	right	97.2	2.100	0.184	1.086	1.029	0.206	
5310	62	802.11n	OFDM	40	15.0	14.32	0.15	0 mm	2	01127	13.5	right	97.3	0.623	0.077	1.169	1.028	0.093	
5600	120	802.11a	OFDM	20	17.0	16.50	0.05	0 mm	1	01127	6	back	98.3	4.806	0.487	1.122	1.017	0.556	
5600	120	802.11a	OFDM	20	17.0	16.50	0.20	0 mm	1	01127	6	front	98.3	2.798	-	1.122	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.50	0.01	0 mm	1	01127	6	top	98.3	2.918	-	1.122	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.50	0.20	0 mm	1	01127	6	right	98.3	1.830	-	1.122	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.99	-0.11	0 mm	2	01127	6	back	98.3	9.590	1.010	1.002	1.017	1.029	
5600	120	802.11a	OFDM	20	17.0	16.99	0.00	0 mm	2	01127	6	front	98.3	0.496	0.027	1.002	1.017	0.028	
5600	120	802.11a	OFDM	20	17.0	16.99	0.20	0 mm	2	01127	6	top	98.3	0.152	-	1.002	1.017	-	
5600	120	802.11a	OFDM	20	17.0	16.99	0.12	0 mm	2	01127	6	right	98.3	0.919	0.098	1.002	1.017	0.100	
5590	118	802.11n	OFDM	40	15.0	14.90	-0.08	0 mm	1	01127	13.5	back	97.2	1.377	0.205	1.023	1.029	0.216	
5590	118	802.11n	OFDM	40	15.0	14.30	-0.19	0 mm	2	01127	13.5	back	97.3	9.707	0.475	1.175	1.028	0.574	
5590	118	802.11n	OFDM	40	15.0	14.90	-0.17	0 mm	1	01127	13.5	right	97.2	0.824	0.083	1.023	1.029	0.087	
5590	118	802.11n	OFDM	40	15.0	14.30	0.00	0 mm	2	01127	13.5	right	97.3	0.546	0.061	1.175	1.028	0.074	

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

Table 11-34
WLAN MIMO Phablet SAR

MEASUREMENT RESULTS																					
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power (Ant 1) [dBm]	Conducted Power (Ant 1) [dBm]	Maximum Allowed Power (Ant 2) [dBm]	Conducted Power (Ant 2) [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)	
5260	52	802.11n	OFDM	20	17.0	16.86	17.0	16.88	-0.11	0 mm	MIMO	01127	13	back	98.1	12.523	1.370	1.033	1.019	1.442	
5280	56	802.11n	OFDM	20	18.0	17.84	18.0	17.95	-0.14	0 mm	MIMO	01127	13	back	98.1	16.690	1.730	1.038	1.019	1.830	A34
5320	64	802.11n	OFDM	20	17.0	16.97	17.0	16.80	-0.13	0 mm	MIMO	01127	13	back	98.1	12.475	1.320	1.047	1.019	1.408	
5280	56	802.11n	OFDM	20	18.0	17.84	18.0	17.95	0.10	0 mm	MIMO	01127	13	front	98.1	3.922	-	1.038	1.019	-	
5280	56	802.11n	OFDM	20	18.0	17.84	18.0	17.95	0.00	0 mm	MIMO	01127	13	top	98.1	1.995	-	1.038	1.019	-	
5280	56	802.11n	OFDM	20	18.0	17.84	18.0	17.95	0.13	0 mm	MIMO	01127	13	right	98.1	6.601	0.524	1.038	1.019	0.554	
5270	54	802.11n	OFDM	40	15.0	14.64	15.0	14.32	-0.15	0 mm	MIMO	01127	27	back	97.3	13.689	0.761	1.169	1.028	0.915	
5270	54	802.11n	OFDM	40	15.0	14.64	15.0	14.32	0.14	0 mm	MIMO	01127	27	right	97.3	2.509	0.241	1.169	1.028	0.290	
5500	100	802.11n	OFDM	20	17.0	16.97	17.0	16.88	-0.13	0 mm	MIMO	01127	13	back	98.1	10.196	1.380	1.028	1.019	1.446	
5500	100	802.11n	OFDM	20	17.0	16.97	17.0	16.88	0.00	0 mm	MIMO	01127	13	front	98.1	2.980	0.231	1.028	1.019	0.242	
5500	100	802.11n	OFDM	20	17.0	16.97	17.0	16.88	0.20	0 mm	MIMO	01127	13	top	98.1	1.708	-	1.028	1.019	-	
5500	100	802.11n	OFDM	20	17.0	16.97	17.0	16.88	0.19	0 mm	MIMO	01127	13	right	98.1	2.881	-	1.028	1.019	-	
5590	118	802.11n	OFDM	40	15.0	14.90	15.0	14.30	0.07	0 mm	MIMO	01127	27	back	97.3	9.916	0.544	1.175	1.028	0.657	
5590	118	802.11n	OFDM	40	15.0	14.90	15.0	14.30	0.21	0 mm	MIMO	01127	27	right	97.3	0.920	0.113	1.175	1.028	0.136	

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

Note:

1. To achieve the 21.0 dBm (ch. 56) and 20.0 dBm (ch. 52, 64, 100) maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 18.0 dBm (ch. 56) and 17.0 (ch. 52, 64, 100).
2. To achieve the 18.0 dBm (ch. 54, 118) maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 15.0 dBm (ch. 54, 118).

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11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, 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 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. 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. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds below.

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 for 1g evaluations 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.
4. GPRS was additionally evaluated for head and body-worn exposure conditions to address possible VoIP scenarios.

UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at

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the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported LTE Band 48 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.
7. For LTE Band 5, per FCC guidance, SAR was first measured with only a single carrier active in the uplink (carrier aggregation not active). For each exposure condition, the uplink CA scenario with two component carriers was additionally tested for the configuration with the highest SAR when carrier aggregation was not active. The SCC was configured with the closest available contiguous channel. The two component carriers were configured so the resource blocks are physically allocated side by side to achieve the maximum output power.

WLAN Notes:

1. For held-to-ear, hotspot, and phablet 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 for 1g evaluations, 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 for 1g evaluations. See Section 8.6.6 for more information.
4. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06 by either evaluating the sum of the 1g SAR values of each antenna transmitting independently or making a SAR measurement with both antennas transmitting simultaneously. Please see Section 12 for complete analysis.

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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 for 1g evaluations or all test channels were measured.
6. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.
7. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Bluetooth Notes

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 0 for the time domain plot and calculation for the duty factor of the device.
2. Head and hotspot Bluetooth SAR were evaluated for BT BR tethering applications.

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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 1g 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 1g or 10g SAR.

Simultaneous transmission analysis including 5G NR combinations is addressed in RF Exposure report: 1M1901150005-15-R3.ZNF

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12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM/GPRS 850	0.109	0.528	0.229	0.637	0.338	0.866
	GSM/GPRS 1900	0.081	0.528	0.229	0.609	0.310	0.838
	UMTS 850	0.137	0.528	0.229	0.665	0.366	0.894
	UMTS 1900	0.148	0.528	0.229	0.676	0.377	0.905
	LTE Band 13	0.152	0.528	0.229	0.680	0.381	**0.909**
	LTE Band 5 (Cell)	0.120	0.528	0.229	0.648	0.349	0.877
	LTE Band 66 (AWS)	0.150	0.528	0.229	0.678	0.379	0.907
	LTE Band 2 (PCS)	0.121	0.528	0.229	0.649	0.350	0.878
	LTE Band 48	0.135	0.528	0.229	0.663	0.364	0.892

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM/GPRS 850	0.109	0.915	0.165	1.024	0.274	1.189
	GSM/GPRS 1900	0.081	0.915	0.165	0.996	0.246	1.161
	UMTS 850	0.137	0.915	0.165	1.052	0.302	1.217
	UMTS 1900	0.148	0.915	0.165	1.063	0.313	1.228
	LTE Band 13	0.152	0.915	0.165	1.067	0.317	**1.232**
	LTE Band 5 (Cell)	0.120	0.915	0.165	1.035	0.285	1.200
	LTE Band 66 (AWS)	0.150	0.915	0.165	1.065	0.315	1.230
	LTE Band 2 (PCS)	0.121	0.915	0.165	1.036	0.286	1.201
	LTE Band 48	0.135	0.915	0.165	1.050	0.300	1.215

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Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz WLAN and 5 GHz 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/GPRS 850	0.109	0.528	0.165	0.802
	GSM/GPRS 1900	0.081	0.528	0.165	0.774
	UMTS 850	0.137	0.528	0.165	0.830
	UMTS 1900	0.148	0.528	0.165	0.841
	LTE Band 13	0.152	0.528	0.165	**0.845**
	LTE Band 5 (Cell)	0.120	0.528	0.165	0.813
	LTE Band 66 (AWS)	0.150	0.528	0.165	0.843
	LTE Band 2 (PCS)	0.121	0.528	0.165	0.814
	LTE Band 48	0.135	0.528	0.165	0.828

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.109	0.217	0.326
	GSM/GPRS 1900	0.081	0.217	0.298
	UMTS 850	0.137	0.217	0.354
	UMTS 1900	0.148	0.217	0.365
	LTE Band 13	0.152	0.217	**0.369**
	LTE Band 5 (Cell)	0.120	0.217	0.337
	LTE Band 66 (AWS)	0.150	0.217	0.367
	LTE Band 2 (PCS)	0.121	0.217	0.338
	LTE Band 48	0.135	0.217	0.352

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+3	1+2+4	1+2+3+4
Head SAR	GSM/GPRS 850	0.109	0.217	0.915	0.165	1.241	0.491	1.406
	GSM/GPRS 1900	0.081	0.217	0.915	0.165	1.213	0.463	1.378
	UMTS 850	0.137	0.217	0.915	0.165	1.269	0.519	1.434
	UMTS 1900	0.148	0.217	0.915	0.165	1.280	0.530	1.445
	LTE Band 13	0.152	0.217	0.915	0.165	1.284	0.534	**1.449**
	LTE Band 5 (Cell)	0.120	0.217	0.915	0.165	1.252	0.502	1.417
	LTE Band 66 (AWS)	0.150	0.217	0.915	0.165	1.282	0.532	1.447
	LTE Band 2 (PCS)	0.121	0.217	0.915	0.165	1.253	0.503	1.418
	LTE Band 48	0.135	0.217	0.915	0.165	1.267	0.517	1.432

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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 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM/GPRS 850	0.679	0.154	0.297	0.833	0.976	1.130
	GSM/GPRS 1900	0.305	0.154	0.297	0.459	0.602	0.756
	UMTS 850	1.013	0.154	0.297	1.167	1.310	**1.464**
	UMTS 1900	0.492	0.154	0.297	0.646	0.789	0.943
	LTE Band 13	0.668	0.154	0.297	0.822	0.965	1.119
	LTE Band 5 (Cell)	0.979	0.154	0.297	1.133	1.276	1.430
	LTE Band 66 (AWS)	0.661	0.154	0.297	0.815	0.958	1.112
	LTE Band 2 (PCS)	0.472	0.154	0.297	0.626	0.769	0.923
	LTE Band 48	0.220	0.154	0.297	0.374	0.517	0.671

Table 12-7
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn 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
Body-Worn	GSM/GPRS 850	0.679	0.228	0.300	0.907	0.979	1.207
	GSM/GPRS 1900	0.305	0.228	0.300	0.533	0.605	0.833
	UMTS 850	1.013	0.228	0.300	1.241	1.313	**1.541**
	UMTS 1900	0.492	0.228	0.300	0.720	0.792	1.020
	LTE Band 13	0.668	0.228	0.300	0.896	0.968	1.196
	LTE Band 5 (Cell)	0.979	0.228	0.300	1.207	1.279	1.507
	LTE Band 66 (AWS)	0.661	0.228	0.300	0.889	0.961	1.189
	LTE Band 2 (PCS)	0.472	0.228	0.300	0.700	0.772	1.000
	LTE Band 48	0.220	0.228	0.300	0.448	0.520	0.748

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Table 12-8
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 1 and 5 GHz WLAN Ant 2 (Body-Worn 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
Body-Worn	GSM/GPRS 850	0.679	0.154	0.300	1.133
	GSM/GPRS 1900	0.305	0.154	0.300	0.759
	UMTS 850	1.013	0.154	0.300	**1.467**
	UMTS 1900	0.492	0.154	0.300	0.946
	LTE Band 13	0.668	0.154	0.300	1.122
	LTE Band 5 (Cell)	0.979	0.154	0.300	1.433
	LTE Band 66 (AWS)	0.661	0.154	0.300	1.115
	LTE Band 2 (PCS)	0.472	0.154	0.300	0.926
	LTE Band 48	0.220	0.154	0.300	0.674

Table 12-9
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.679	0.041	0.720
	GSM/GPRS 1900	0.305	0.041	0.346
	UMTS 850	1.013	0.041	**1.054**
	UMTS 1900	0.492	0.041	0.533
	LTE Band 13	0.668	0.041	0.709
	LTE Band 5 (Cell)	0.979	0.041	1.020
	LTE Band 66 (AWS)	0.661	0.041	0.702
	LTE Band 2 (PCS)	0.472	0.041	0.513
	LTE Band 48	0.220	0.041	0.261

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Table 12-10
Simultaneous Transmission Scenario with 5 GHz WLAN and Bluetooth (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+3	1+2+4	1+2+3+4
Body-Worn	GSM/GPRS 850	0.679	0.041	0.228	0.300	0.948	1.020	1.248
	GSM/GPRS 1900	0.305	0.041	0.228	0.300	0.574	0.646	0.874
	UMTS 850	1.013	0.041	0.228	0.300	1.282	1.354	**1.582**
	UMTS 1900	0.492	0.041	0.228	0.300	0.761	0.833	1.061
	LTE Band 13	0.668	0.041	0.228	0.300	0.937	1.009	1.237
	LTE Band 5 (Cell)	0.979	0.041	0.228	0.300	1.248	1.320	1.548
	LTE Band 66 (AWS)	0.661	0.041	0.228	0.300	0.930	1.002	1.230
	LTE Band 2 (PCS)	0.472	0.041	0.228	0.300	0.741	0.813	1.041
	LTE Band 48	0.220	0.041	0.228	0.300	0.489	0.561	0.789

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12.5 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

(*) 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 applicable exposure conditions was used for 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	1+2+3
Hotspot SAR	GPRS 850	0.638	0.206	0.297	0.844	0.935	1.141
	GPRS 1900	0.549	0.206	0.297	0.755	0.846	1.052
	UMTS 850	1.013	0.206	0.297	1.219	1.310	1.516
	UMTS 1900	1.028	0.206	0.297	1.234	1.325	1.531
	LTE Band 13	0.668	0.206	0.297	0.874	0.965	1.171
	LTE Band 5 (Cell)	0.979	0.206	0.297	1.185	1.276	1.482
	LTE Band 66 (AWS)	1.034	0.206	0.297	1.240	1.331	1.537
	LTE Band 2 (PCS)	1.069	0.206	0.297	1.275	1.366	**1.572**
	LTE Band 48	0.220	0.206	0.297	0.426	0.517	0.723

Table 12-12
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	0.638	0.196	0.300	0.834	0.938	1.134
	GPRS 1900	0.549	0.196	0.300	0.745	0.849	1.045
	UMTS 850	1.013	0.196	0.300	1.209	1.313	1.509
	UMTS 1900	1.028	0.196	0.300	1.224	1.328	1.524
	LTE Band 13	0.668	0.196	0.300	0.864	0.968	1.164
	LTE Band 5 (Cell)	0.979	0.196	0.300	1.175	1.279	1.475
	LTE Band 66 (AWS)	1.034	0.196	0.300	1.230	1.334	1.530
	LTE Band 2 (PCS)	1.069	0.196	0.300	1.265	1.369	**1.565**
	LTE Band 48	0.220	0.196	0.300	0.416	0.520	0.716

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Table 12-13
Simultaneous Transmission Scenario with 2.4 GHz WLAN Ant 1 and 5 GHz WLAN Ant 2 (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	0.638	0.206	0.300	1.144
	GPRS 1900	0.549	0.206	0.300	1.055
	UMTS 850	1.013	0.206	0.300	1.519
	UMTS 1900	1.028	0.206	0.300	1.534
	LTE Band 13	0.668	0.206	0.300	1.174
	LTE Band 5 (Cell)	0.979	0.206	0.300	1.485
	LTE Band 66 (AWS)	1.034	0.206	0.300	1.540
	LTE Band 2 (PCS)	1.069	0.206	0.300	**1.575**
	LTE Band 48	0.220	0.206	0.300	0.726

Table 12-14
Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.638	0.047	0.685
	GPRS 1900	0.549	0.047	0.596
	UMTS 850	1.013	0.047	1.060
	UMTS 1900	1.028	0.047	1.075
	LTE Band 13	0.668	0.047	0.715
	LTE Band 5 (Cell)	0.979	0.047	1.026
	LTE Band 66 (AWS)	1.034	0.047	1.081
	LTE Band 2 (PCS)	1.069	0.047	**1.116**
	LTE Band 48	0.220	0.047	0.267

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Table 12-15
Simultaneous Transmission Scenario with 5 GHz WLAN and Bluetooth (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+3	1+2+4	1+2+3+4
Hotspot SAR	GPRS 850	0.638	0.047	0.196	0.300	0.881	0.985	1.181
	GPRS 1900	0.549	0.047	0.196	0.300	0.792	0.896	1.092
	UMTS 850	1.013	0.047	0.196	0.300	1.256	1.360	1.556
	UMTS 1900	1.028	0.047	0.196	0.300	1.271	1.375	1.571
	LTE Band 13	0.668	0.047	0.196	0.300	0.911	1.015	1.211
	LTE Band 5 (Cell)	0.979	0.047	0.196	0.300	1.222	1.326	1.522
	LTE Band 66 (AWS)	1.034	0.047	0.196	0.300	1.277	1.381	**1.577**
	LTE Band 2 (PCS)	1.069	0.047	0.196	0.300	1.312	1.416	See Table Below
	LTE Band 48	0.220	0.047	0.196	0.300	0.463	0.567	0.763

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Hotspot SAR	Back	0.472	0.041	0.196	0.300	1.009
	Front	0.433	0.028	0.196*	0.300*	0.957
	Top	-	0.047	0.196*	0.300*	0.543
	Bottom	1.069	-	-	-	**1.069**
	Right	0.112	0.011	0.196*	0.300*	0.619
	Left	0.153	-	-	-	0.153

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12.6 Phablet Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

(*) 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 applicable exposure conditions was used for 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 beyond the tables included in this section was required to determine that possible simultaneous transmission scenarios would not exceed the SAR limit.

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.

Table 12-16
Simultaneous Transmission Scenario with 5 GHz WLAN (Phablet)

Exposure Condition	Mode	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
Phablet SAR	UMTS 1900	2.111	0.796	1.824	2.907	**3.935**
	LTE Band 66 (AWS)	2.505	0.796	1.824	3.301	See Table Below
	LTE Band 2 (PCS)	2.242	0.796	1.824	3.038	See Table Below

Simult Tx	Configuration	LTE Band 66 (AWS) 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
Phablet SAR	Back	1.459	0.796	1.824	2.255	**3.283**
	Front	2.318	0.796*	0.111	3.114	2.429
	Top	-	0.796*	1.824*	0.796	1.824
	Bottom	2.505	-	-	2.505	2.505
	Right	0.259	0.796*	0.179	1.055	0.438
	Left	0.690	-	-	0.690	0.690

Simult Tx	Configuration	LTE Band 2 (PCS) 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
Phablet SAR	Back	1.336	0.796	1.824	2.132	**3.160**
	Front	1.923	0.796*	0.111	2.719	2.034
	Top	-	0.796*	1.824*	0.796	1.824
	Bottom	2.242	-	-	2.242	2.242
	Right	0.199	0.796*	0.179	0.995	0.378
	Left	0.560	-	-	0.560	0.560

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Table 12-17
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Phablet)

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 1900	2.111	1.830	**3.941**
	LTE Band 66 (AWS)	2.505	1.830	See Table Below
	LTE Band 2 (PCS)	2.242	1.830	See Table Below

Simult Tx	Configuration	LTE Band 66 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.459	1.830	**3.289**
	Front	2.318	0.242	2.560
	Top	-	1.830*	1.830
	Bottom	2.505	-	2.505
	Right	0.259	0.554	0.813
	Left	0.690	-	0.690

Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.336	1.830	**3.166**
	Front	1.923	0.242	2.165
	Top	-	1.830*	1.830
	Bottom	2.242	-	2.242
	Right	0.199	0.554	0.753
	Left	0.560	-	0.560

12.7 Simultaneous Transmission Conclusion

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

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13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 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 performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1g 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 10g 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	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	846.60	4233	UMTS 850	RMC	back	10 mm	0.977	0.987	1.01	N/A	N/A	N/A	N/A
1750	1770.00	132572	LTE Band 66 (AWS), 20 MHz Bandwidth	QPSK, 1 RB, 99 RB Offset	bottom	10 mm	0.874	0.988	1.13	N/A	N/A	N/A	N/A
1900	1900.00	19100	LTE Band 2 (PCS), 20 MHz Bandwidth	QPSK, 1 RB, 99 RB Offset	bottom	10 mm	1.040	1.010	1.03	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						

Table 13-2
Phablet SAR Measurement Variability Results

PHABLET VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (10g)	1st Repeated SAR (10g)	Ratio	2nd Repeated SAR (10g)	Ratio	3rd Repeated SAR (10g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1770.00	132572	LTE Band 66 (AWS), 20 MHz Bandwidth	QPSK, 50 RB, 0 RB Offset	bottom	0 mm	2.380	2.380	1.00	N/A	N/A	N/A	N/A
1900	1900.00	19100	LTE Band 2 (PCS), 20 MHz Bandwidth	QPSK, 50 RB, 0 RB Offset	bottom	0 mm	2.160	2.090	1.03	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Phablet 4.0 W/kg (mW/g) averaged over 10 grams						

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 EQUIPMENT LIST

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	8753ES	S-Parameter Network Analyzer	7/30/2018	Annual	7/30/2019	MY40000670
Agilent	E4432B	ESG-D Series Signal Generator	4/19/2018	Annual	4/19/2019	US40053896
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	E4438C	ESG Vector Signal Generator	3/23/2017	Biennial	3/23/2019	MY42082659
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	12/18/2018	Annual	12/18/2019	GB42230325
Agilent	E5515C	Wireless Communications Test Set	5/22/2018	Biennial	5/22/2020	GB43193563
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB44450273
Agilent	N5182A	MXG Vector Signal Generator	11/28/2018	Annual	11/28/2019	MY47420603
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Anritsu	MA24106A	USB Power Sensor	6/5/2018	Annual	6/5/2019	1231535
Anritsu	MA24106A	USB Power Sensor	6/5/2018	Annual	6/5/2019	1231538
Anritsu	MA24106A	USB Power Sensor	6/5/2018	Annual	6/5/2019	1244515
Anritsu	MA24106A	USB Power Sensor	1/31/2019	Annual	1/31/2020	1244524
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1126066
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339008
Anritsu	ML2496A	Power Meter	6/19/2018	Annual	6/19/2019	1306009
Anritsu	ML2496A	Power Meter	5/21/2018	Annual	5/21/2019	1351001
Anritsu	MT8821C	Radio Communication Analyzer	11/6/2018	Annual	11/6/2019	6200901190
Anritsu	MT8821C	Radio Communication Analyzer	7/26/2018	Annual	7/26/2019	6201144418
Anritsu	MT8862A	Wireless Connectivity Test Set	7/3/2018	Annual	7/3/2019	6261782395
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/9/2018	Biennial	10/9/2020	181647812
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
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	4/18/2018	Biennial	4/18/2020	13264165
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	NC-100	Torque Wrench	4/18/2018	Annual	4/18/2019	1445
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	5/18/2018	Annual	5/18/2019	109892
Rohde & Schwarz	CMW500	Radio Communication Tester	11/14/2018	Annual	11/14/2019	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	6/9/2018	Annual	6/9/2019	108843
Rohde & Schwarz	CMW500	Radio Communication Tester	10/4/2018	Annual	10/4/2019	109366
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	5/29/2018	Annual	5/29/2019	161662
SPEAG	D750V3	750 MHz SAR Dipole	1/15/2018	Biennial	1/15/2020	1003
SPEAG	D750V3	750 MHz SAR Dipole	10/19/2018	Annual	10/19/2019	1161
SPEAG	D835V2	835 MHz SAR Dipole	10/19/2018	Annual	10/19/2019	4d047
SPEAG	D835V2	835 MHz SAR Dipole	10/19/2018	Annual	10/19/2019	4d133
SPEAG	D1750V2	1750 MHz SAR Dipole	10/22/2018	Annual	10/22/2019	1150
SPEAG	D1765V2	1765 MHz SAR Dipole	5/23/2018	Annual	5/23/2019	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Annual	10/23/2019	5d080
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Annual	10/23/2019	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/16/2018	Annual	8/16/2019	981
SPEAG	D3500V2	3500 MHz SAR Dipole	1/11/2018	Biennial	1/11/2020	1059
SPEAG	D3700V2	3700 MHz SAR Dipole	1/11/2018	Biennial	1/11/2020	1018
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/21/2016	Triennial	9/21/2019	1191
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/10/2018	Annual	8/10/2019	1237
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2018	Annual	2/15/2019	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2018	Annual	7/11/2019	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/7/2018	Annual	3/7/2019	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2018	Annual	4/11/2019	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/22/2018	Annual	8/22/2019	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1530
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091
SPEAG	ES3DV3	SAR Probe	3/13/2018	Annual	3/13/2019	3319
SPEAG	ES3DV3	SAR Probe	3/27/2018	Annual	3/27/2019	3347
SPEAG	EX3DV4	SAR Probe	1/25/2019	Annual	1/25/2020	3589
SPEAG	EX3DV4	SAR Probe	2/14/2018	Annual	2/14/2019	3914
SPEAG	EX3DV4	SAR Probe	8/24/2018	Annual	8/24/2019	3949
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	4/18/2018	Annual	4/18/2019	7357
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7410
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7488

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 was used solely within its calibration period.

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15 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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16 CONCLUSION

16.1 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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[27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02

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

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

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

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APPENDIX A: SAR TEST DATA

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DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

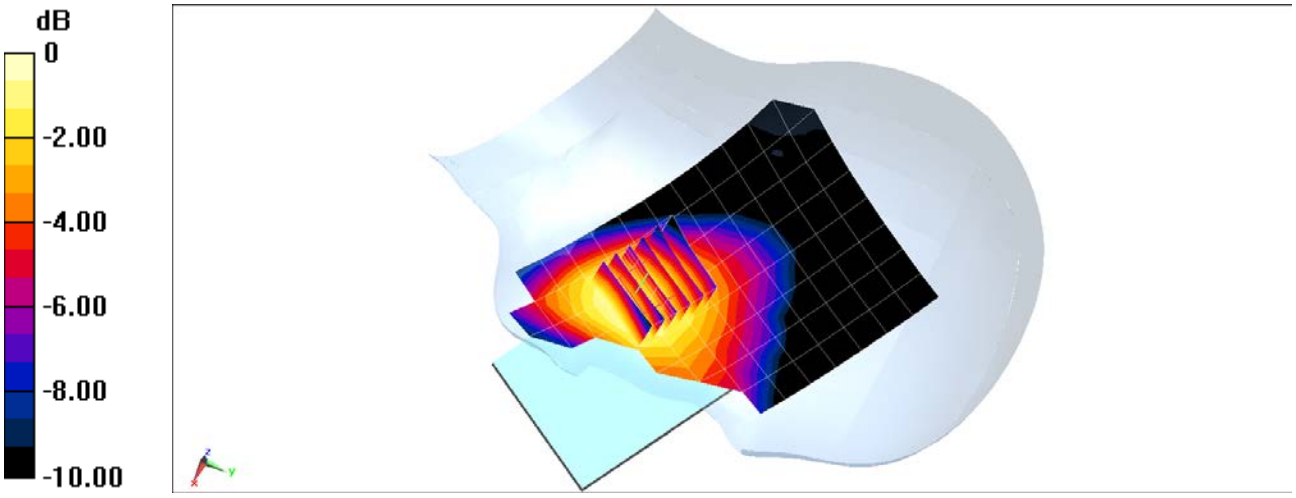
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.929 S/m; ε_r = 40.986; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-01-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GSM 850, Left 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 = 10.80 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.127 W/kg
SAR(1 g) = 0.103 W/kg



0 dB = 0.119 W/kg = -9.24 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

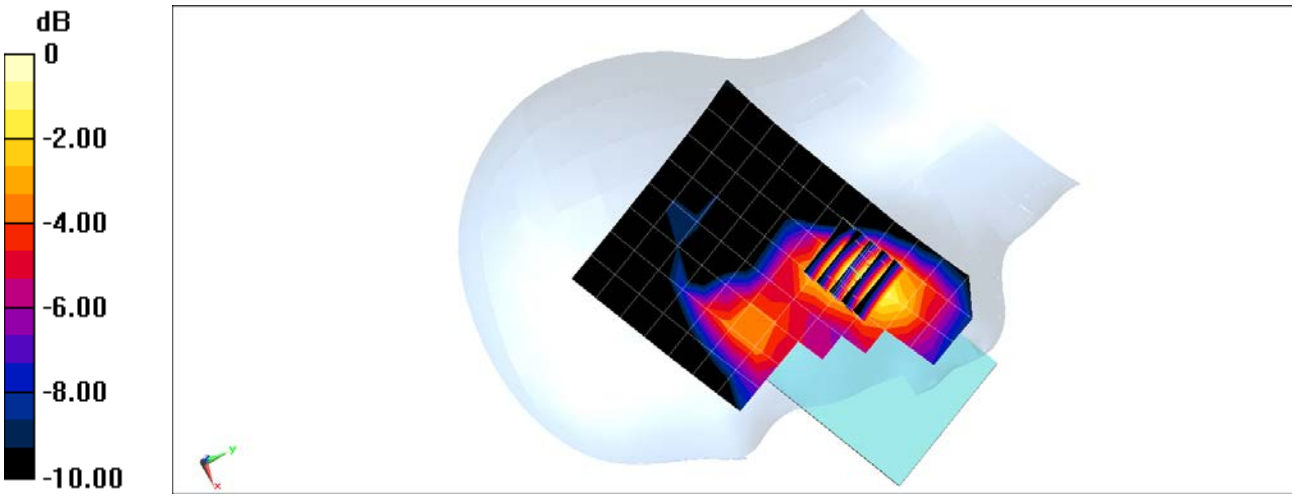
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.418 S/m; ε_r = 39.011; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-06-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1880 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GSM 1900, 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 = 7.582 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.108 W/kg
SAR(1 g) = 0.074 W/kg



0 dB = 0.0945 W/kg = -10.25 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

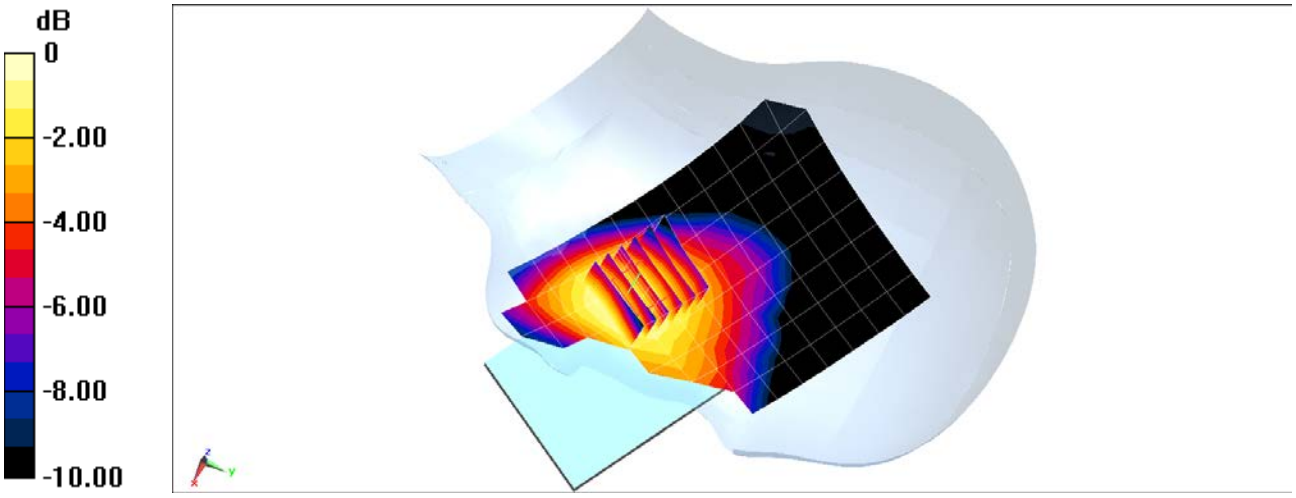
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.929 S/m; ε_r = 40.986; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-01-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 850, Left 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 = 12.23 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.159 W/kg
SAR(1 g) = 0.130 W/kg



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

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

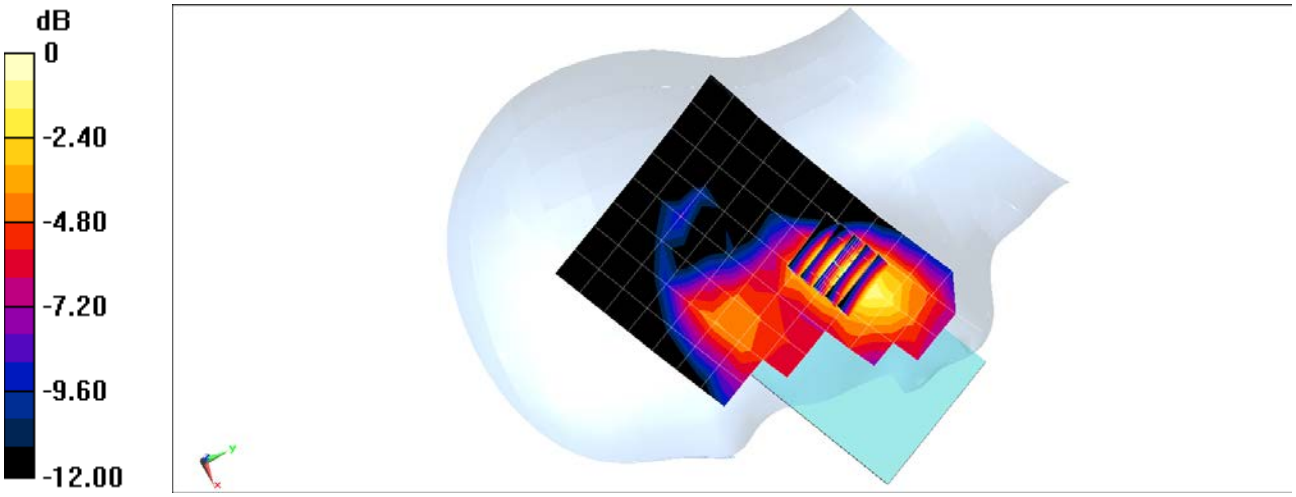
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.418 S/m; ε_r = 39.011; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-06-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1880 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1900, 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 = 10.62 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.214 W/kg
SAR(1 g) = 0.143 W/kg



0 dB = 0.188 W/kg = -7.26 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00947

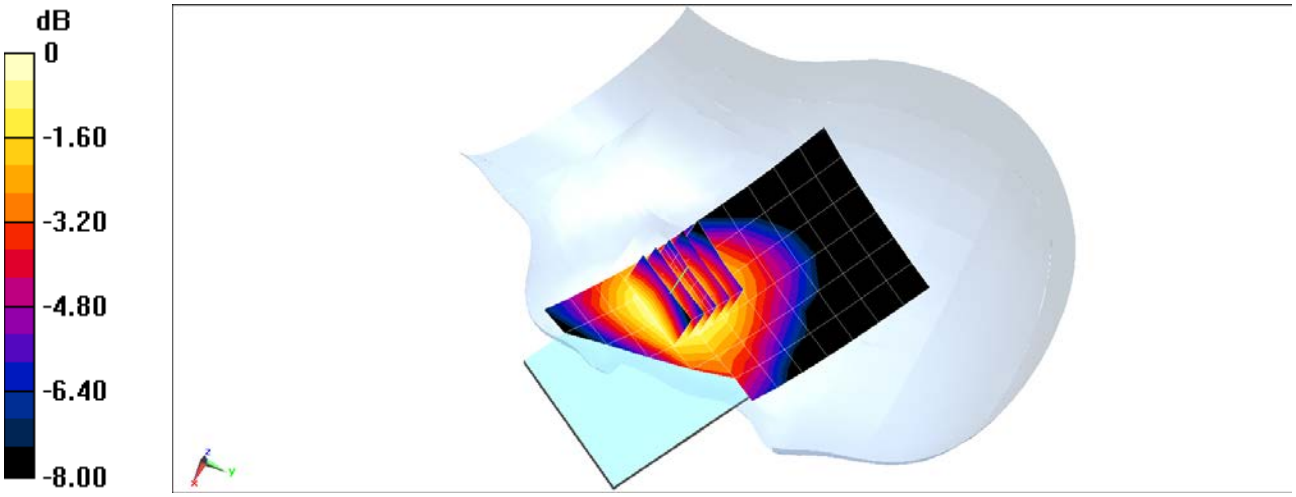
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.889 S/m; ε_r = 42.142; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-28-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(10.13, 10.13, 10.13) @ 782 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Left Head, Cheek, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 49 RB Offset

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.16 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.167 W/kg
SAR(1 g) = 0.140 W/kg



0 dB = 0.157 W/kg = -8.04 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00947

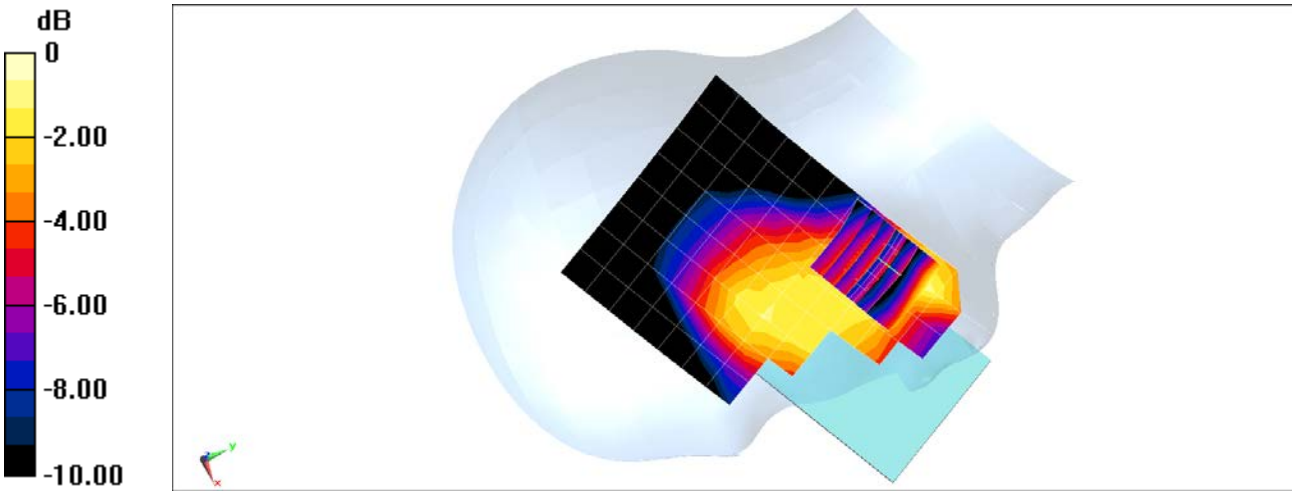
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.882$ S/m; $\varepsilon_r = 39.519$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 02-11-2019; Ambient Temp: 21.1°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 836.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 5 (Cell.) ULCA, Right Head, Cheek
PCC: 10 MHz Bandwidth, QPSK, Ch. 20525, 1 RB, 49 RB Offset
SCC: 5 MHz Bandwidth, QPSK, Ch. 20597, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.35 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.163 W/kg
SAR(1 g) = 0.116 W/kg



0 dB = 0.145 W/kg = -8.39 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

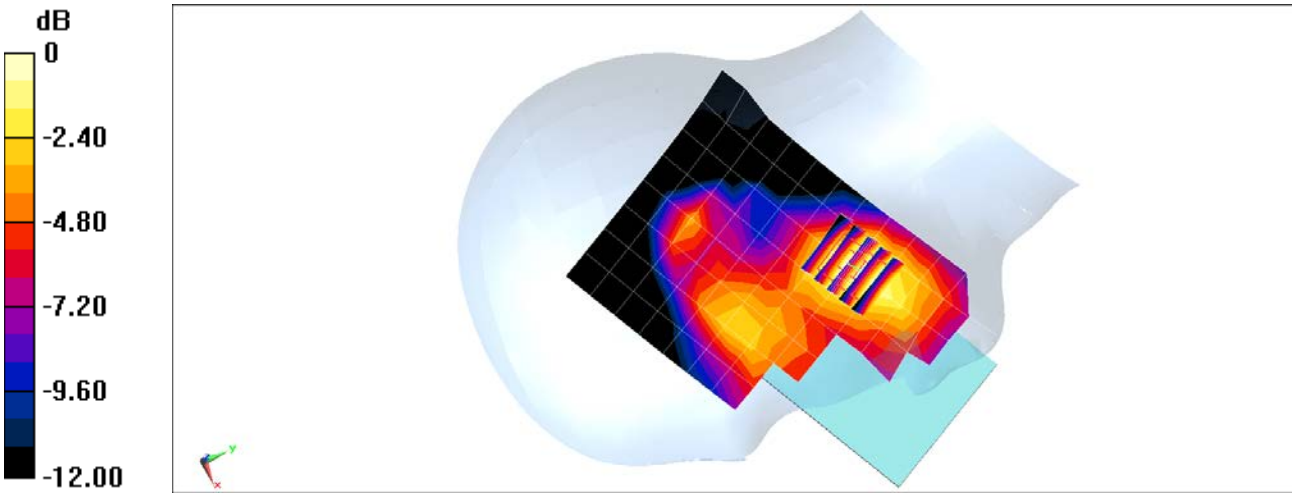
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1745 MHz; σ = 1.384 S/m; ε_r = 41.864; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-04-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7409; ConvF(8.43, 8.43, 8.43) @ 1745 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 66 (AWS), Right Head, Cheek, 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 = 11.12 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.219 W/kg
SAR(1 g) = 0.146 W/kg



0 dB = 0.190 W/kg = -7.21 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

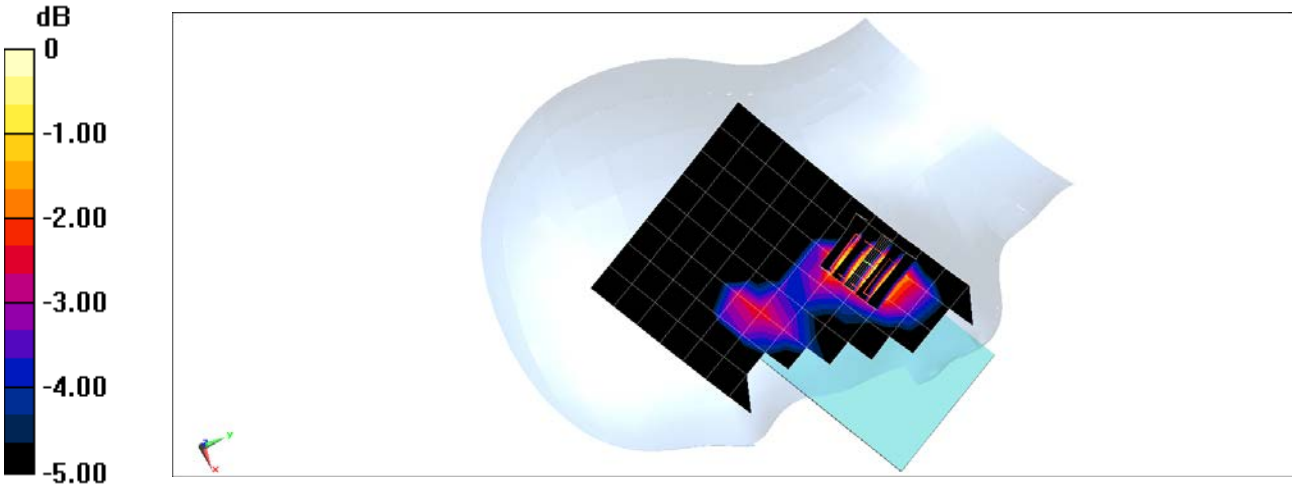
Communication System: UID 0, _LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.429 S/m; ε_r = 38.974; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-06-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1900 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 2 (PCS), Right Head, Cheek, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.24 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.181 W/kg
SAR(1 g) = 0.118 W/kg



0 dB = 0.150 W/kg = -8.24 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00947

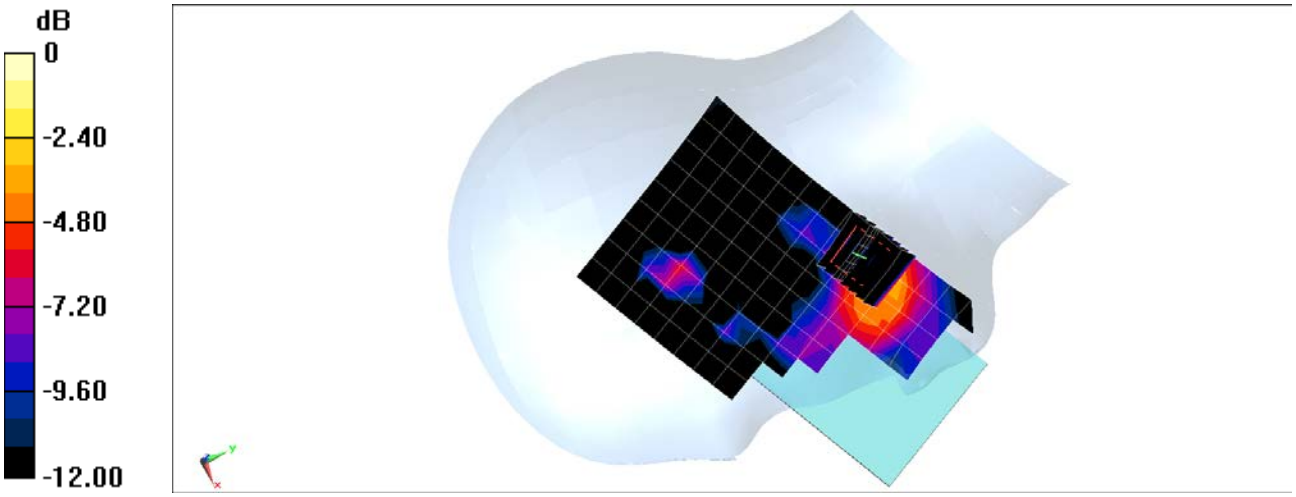
Communication System: UID 0, LTE Band 48; Frequency: 3646.7 MHz; Duty Cycle: 1:1.58
Medium: 3700 Head Medium parameters used (interpolated):
f = 3646.7 MHz; σ = 3.028 S/m; ε_r = 37.731; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 02-07-2019; Ambient Temp: 21.7°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3949; ConvF(7.24, 7.24, 7.24) @ 3646.7 MHz; Calibrated: 8/24/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 48, Right Head, Cheek, Mid-High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 7.448 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.127 W/kg



0 dB = 0.250 W/kg = -6.02 dBW/kg

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DUT: ZNFV450VM; Type: Portable Handset; Serial: 01143

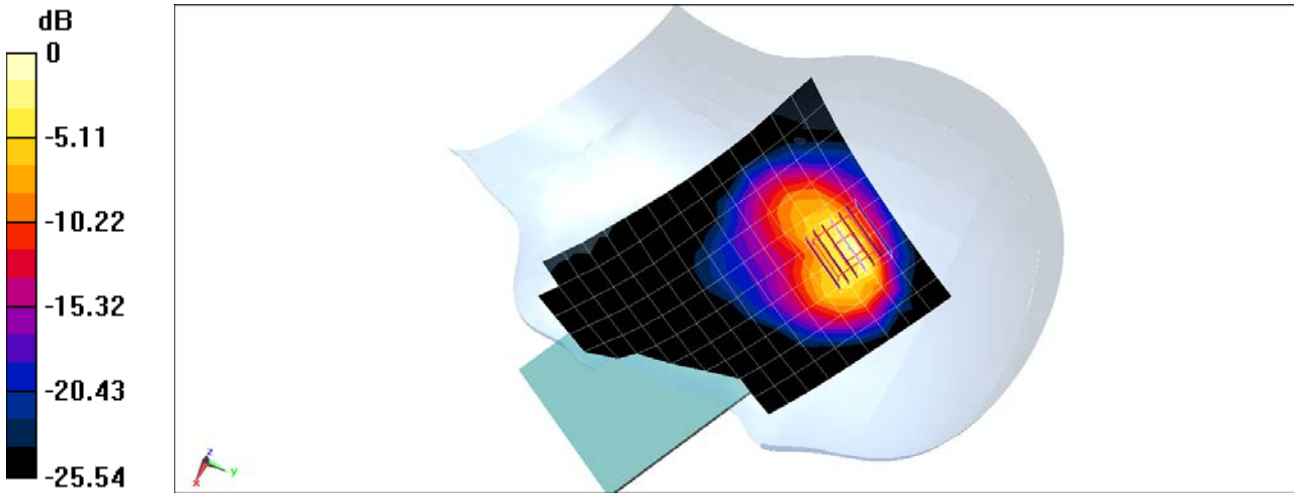
Communication System: UID 0, _IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2462 MHz; σ = 1.838 S/m; ε_r = 38.522; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01-29-2019; Ambient Temp: 23.2°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2462 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11b, Antenna 1, 22 MHz Bandwidth, Left Head, Tilt, Ch 11, 1 Mbps

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.82 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.509 W/kg



0 dB = 0.966 W/kg = -0.15 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01127

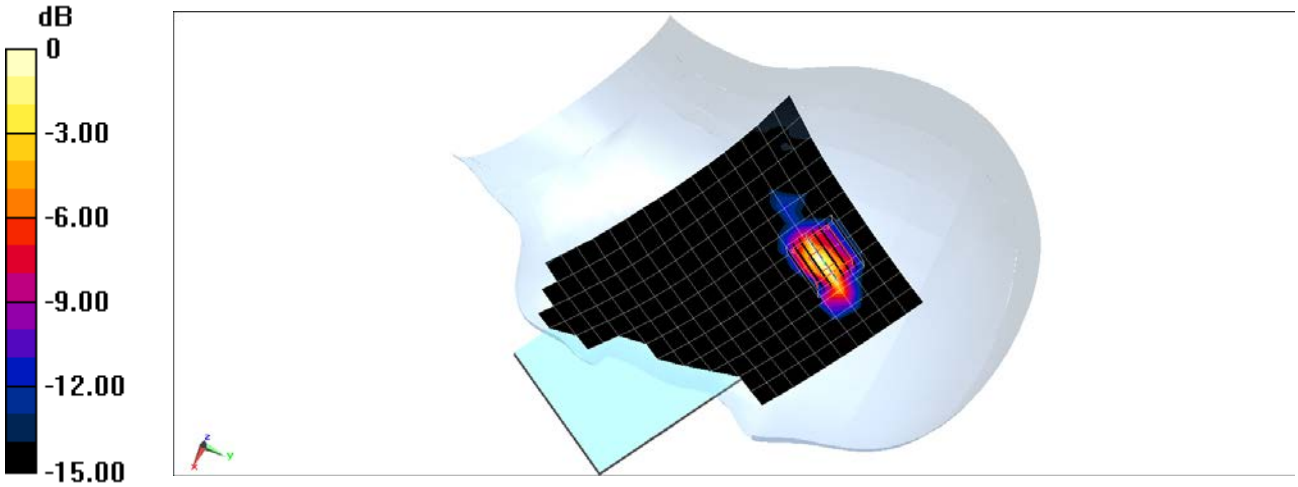
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5805 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5805 MHz; σ = 5.233 S/m; ε_r = 33.942; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-19-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5805 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, Antenna 1, U-NII-3, 20 MHz Bandwidth, Left Head, Cheek, Ch 161, 6 Mbps

Area Scan (13x11x1): 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 = 4.723 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 3.44 W/kg
SAR(1 g) = 0.735 W/kg



0 dB = 1.94 W/kg = 2.88 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01143

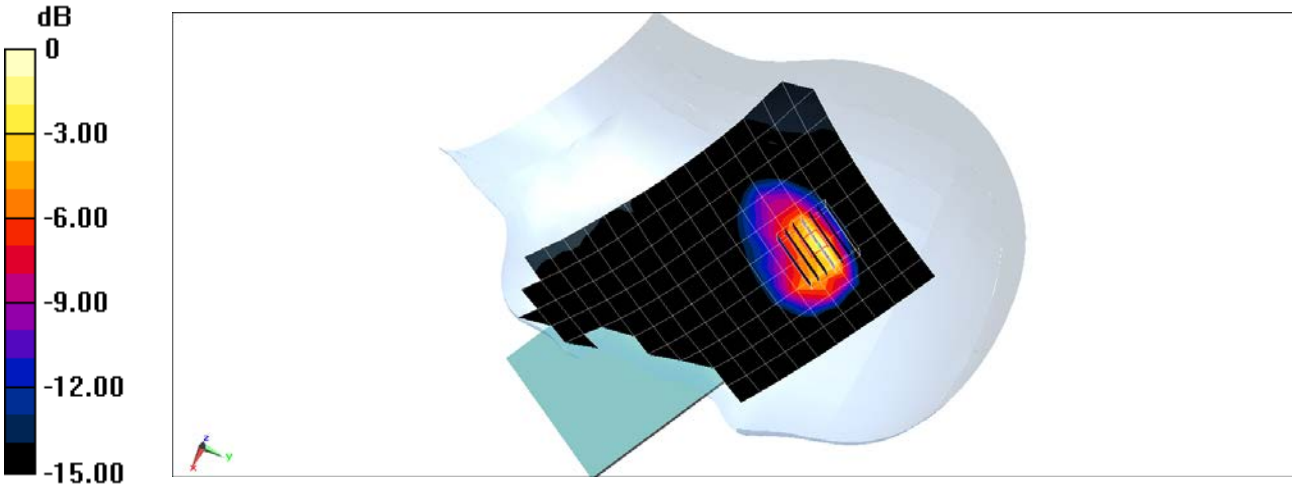
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Head Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.786 S/m; ε_r = 38.243; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 02-05-2019; Ambient Temp: 24.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2441 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Bluetooth, Left Head, Tilt, Ch 39, 1 Mbps

Area Scan (11x19x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.12 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.353 W/kg
SAR(1 g) = 0.138 W/kg



0 dB = 0.278 W/kg = -5.56 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

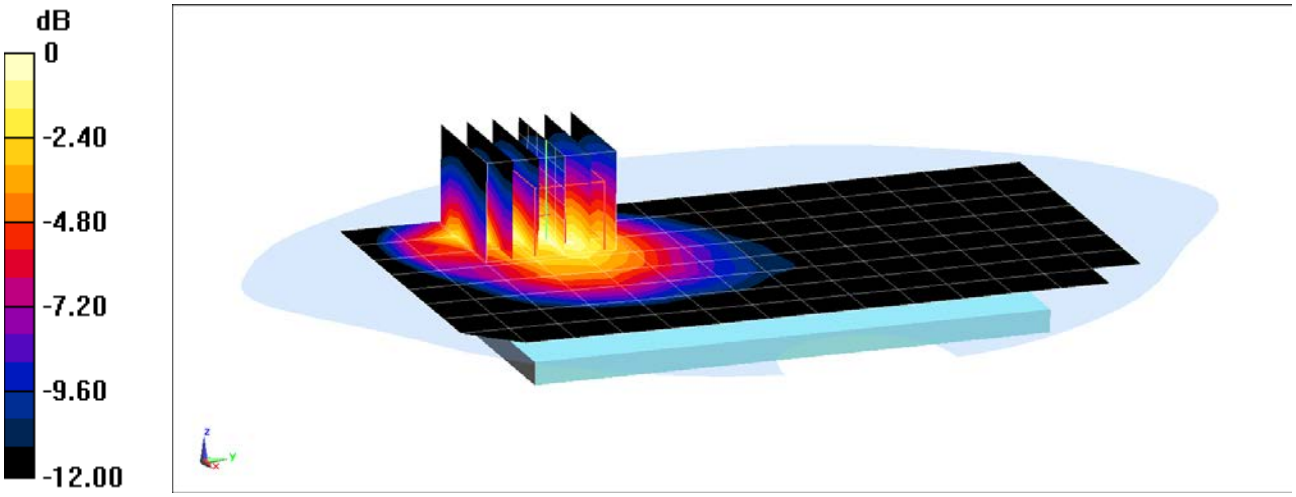
Communication System: UID 0, GSM; Frequency: 824.2 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 824.2 MHz; σ = 0.965 S/m; ε_r = 53.128; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-28-2012; Ambient Temp: 22.1°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 824.2 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GSM 850, Body SAR, Back Side, Low.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 = 25.26 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.626 W/kg



0 dB = 0.902 W/kg = -0.45 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

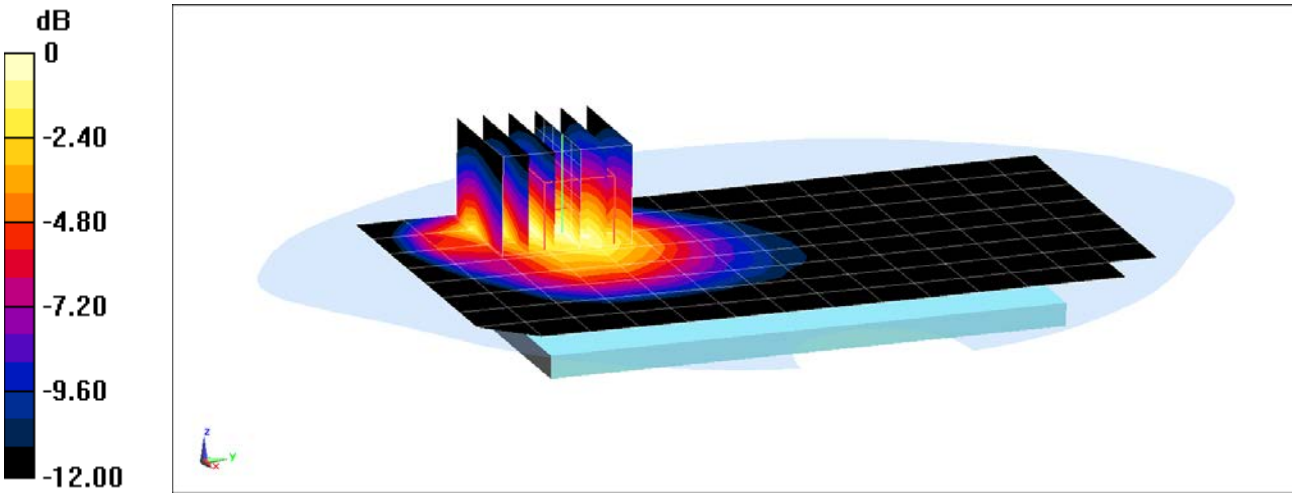
Communication System: UID 0, _GSM GPRS; 1 Tx slot; Frequency: 824.2 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 824.2 MHz; σ = 0.965 S/m; ε_r = 53.128; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-28-2012; Ambient Temp: 22.1°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 824.2 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 850, Body SAR, Back Side, Low.ch, 1 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.99 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.600 W/kg



0 dB = 0.825 W/kg = -0.84 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

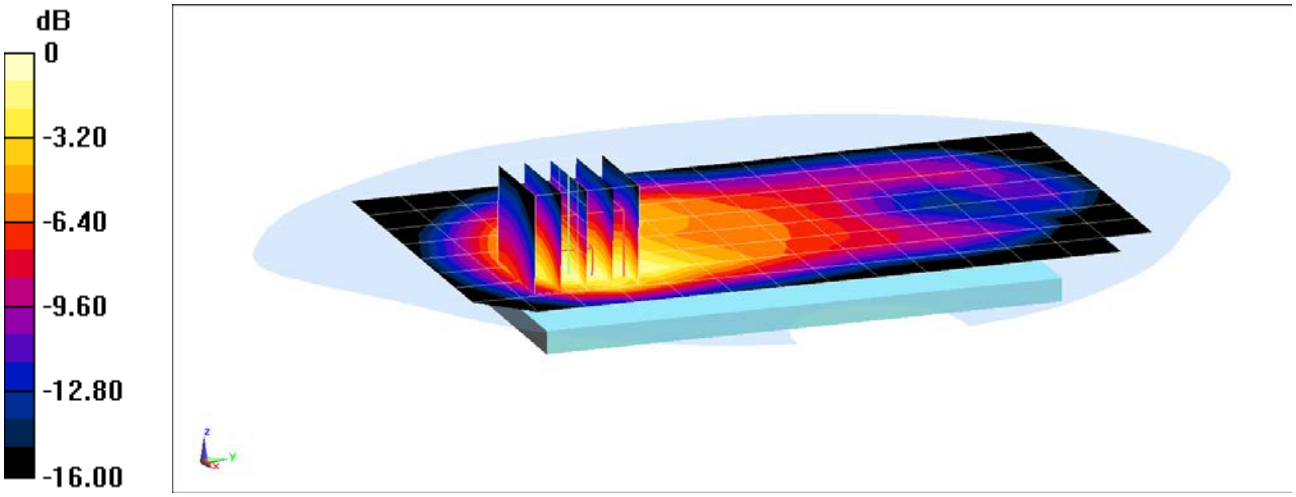
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.536 S/m; ε_r = 52.388; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2019; Ambient Temp: 21.1°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GSM 1900, 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 = 14.34 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.498 W/kg
SAR(1 g) = 0.280 W/kg



0 dB = 0.423 W/kg = -3.74 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

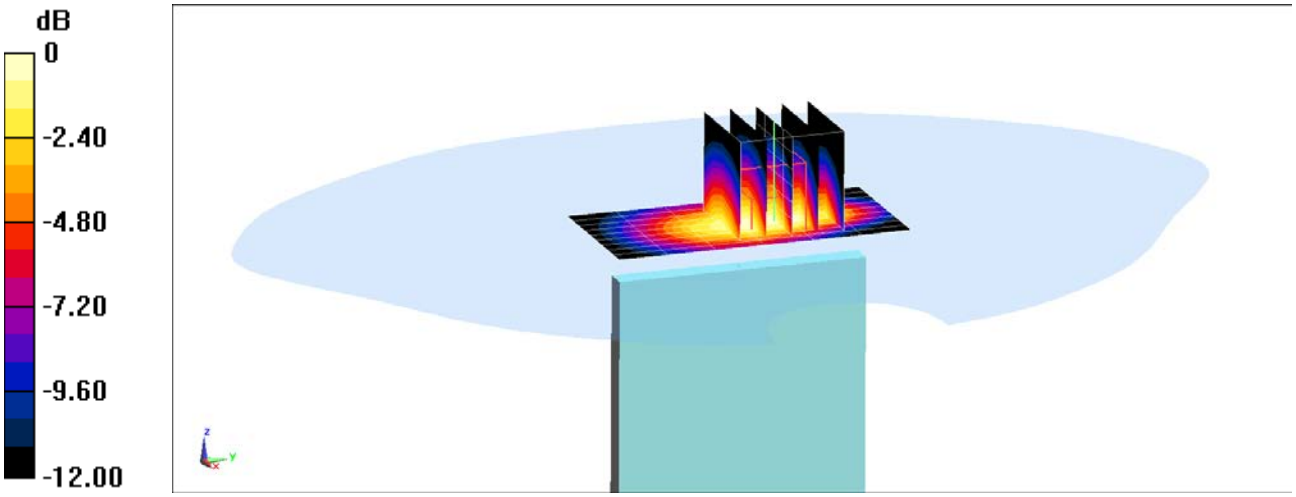
Communication System: UID 0, _GSM GPRS; 1 Tx slot; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.536 S/m; ε_r = 52.388; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2019; Ambient Temp: 21.1°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 1900, Body SAR, Bottom Edge, Mid.ch, 1 Tx Slots

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.36 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.902 W/kg
SAR(1 g) = 0.527 W/kg



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

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

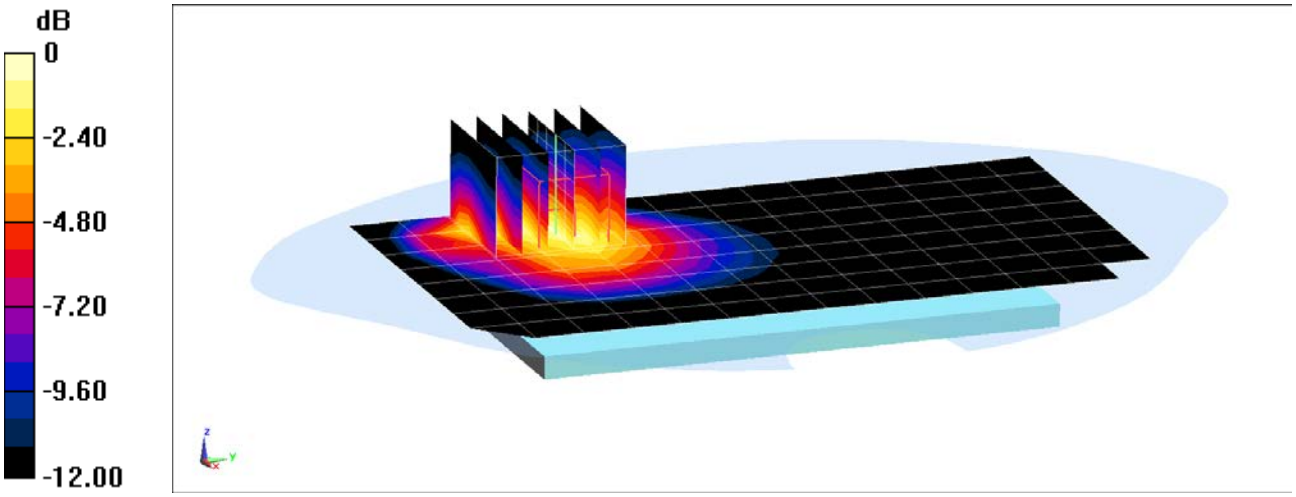
Communication System: UID 0, UMTS; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 846.6 MHz; σ = 0.987 S/m; ε_r = 53.648; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-18-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 846.6 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 850, Body SAR, Back Side, High.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 = 31.47 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.987 W/kg



0 dB = 1.45 W/kg = 1.61 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

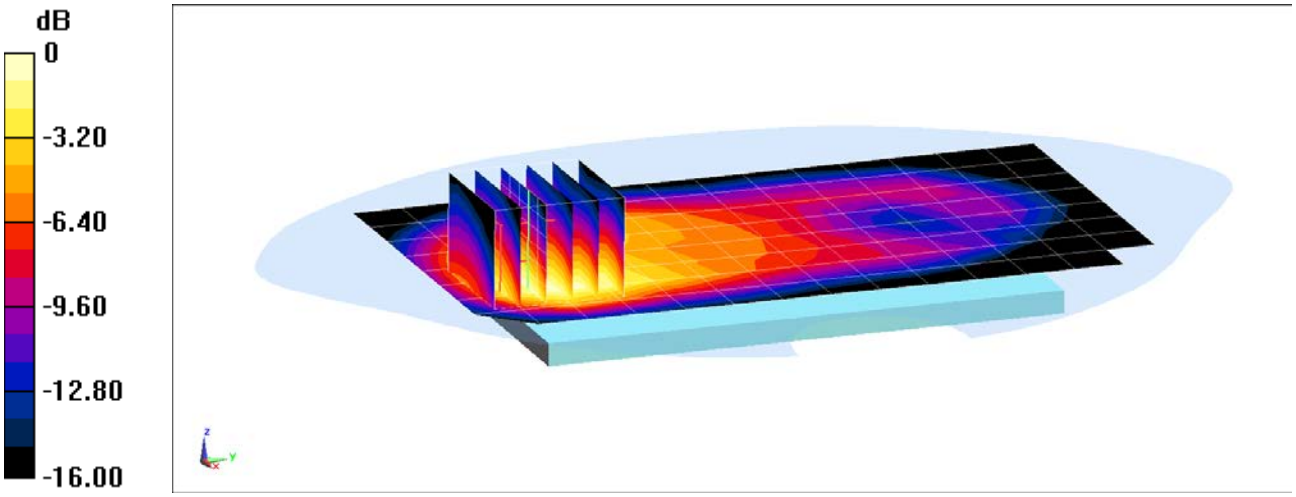
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.536 S/m; ε_r = 52.388; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2019; Ambient Temp: 21.1°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1900, Body SAR, Back Side, 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 = 17.19 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.836 W/kg
SAR(1 g) = 0.474 W/kg



0 dB = 0.704 W/kg = -1.52 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

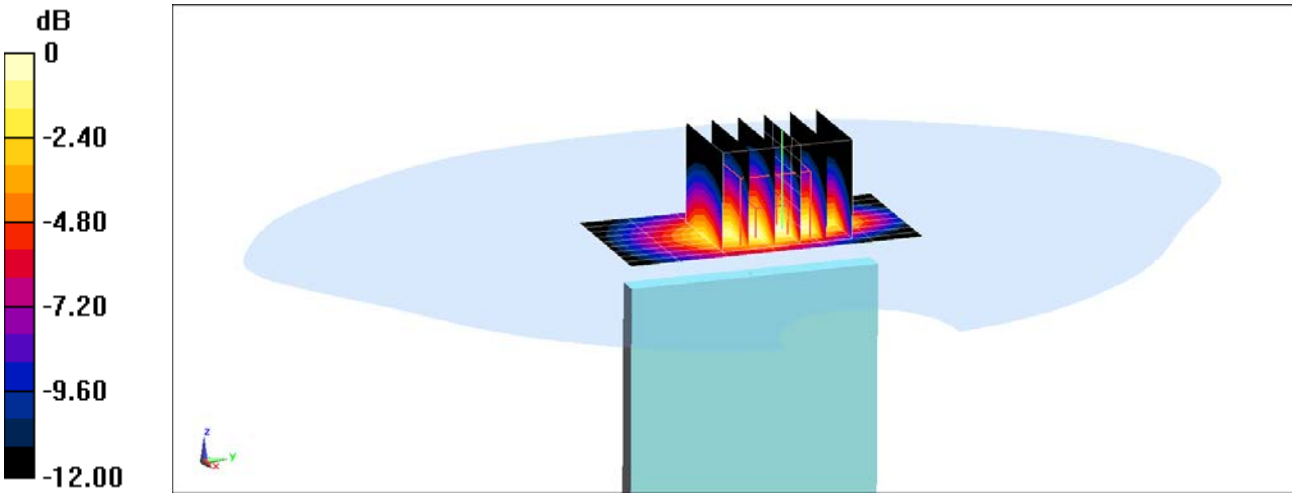
Communication System: UID 0, UMTS, Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.568 S/m; ε_r = 52.339; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2019; Ambient Temp: 21.1°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1907.6 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.07 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.987 W/kg



0 dB = 1.44 W/kg = 1.58 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

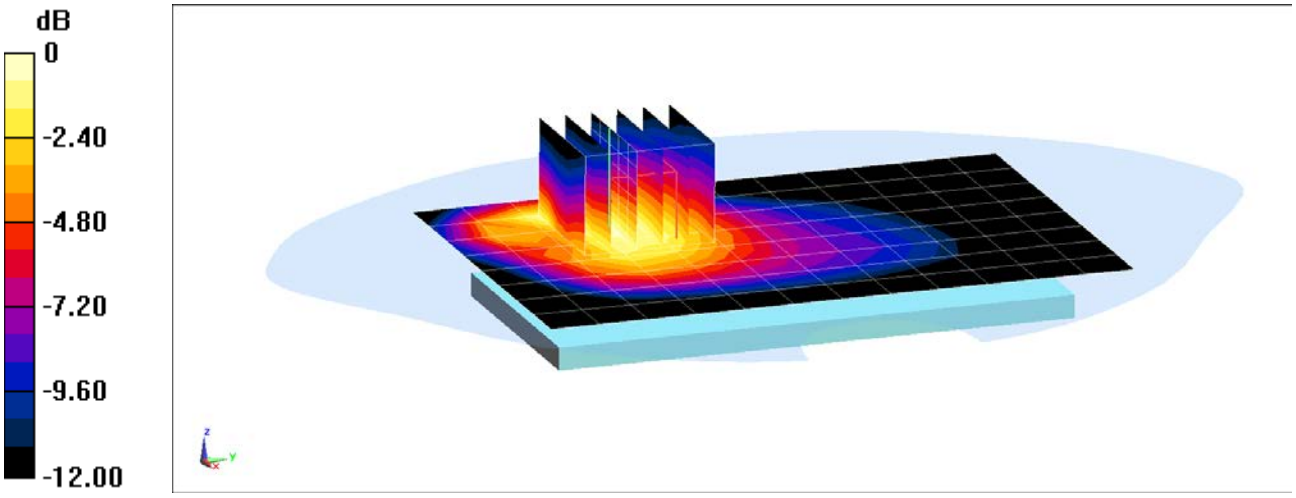
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.98 S/m; ε_r = 53.421; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-13-2019; Ambient Temp: 22.9°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN3589; ConvF(8.34, 8.34, 8.34) @ 782 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Body SAR, Back Side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.75 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.616 W/kg



0 dB = 0.868 W/kg = -0.61 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00947

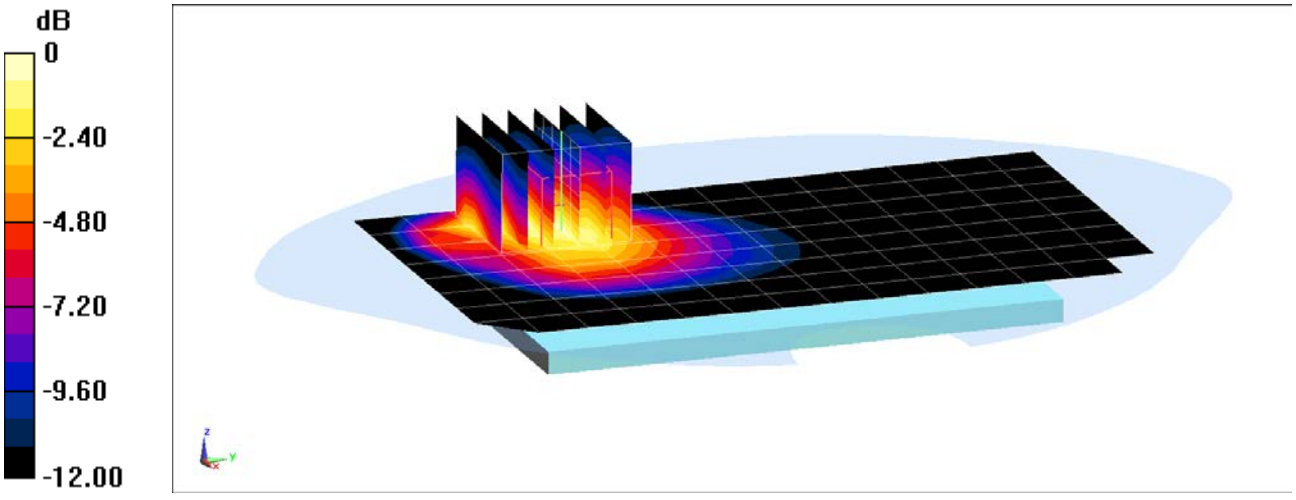
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.969 S/m; ε_r = 53.727; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-06-2019; Ambient Temp: 22.2°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 836.5 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 5 (Cell.) ULCA, Body SAR, Back Side,
PCC: 10 MHz Bandwidth, QPSK, Ch. 20525, 1 RB, 49 RB Offset
SCC: 5 MHz Bandwidth, QPSK, Ch. 20597, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.47 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.64 W/kg
SAR(1 g) = 0.946 W/kg



0 dB = 1.36 W/kg = 1.34 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

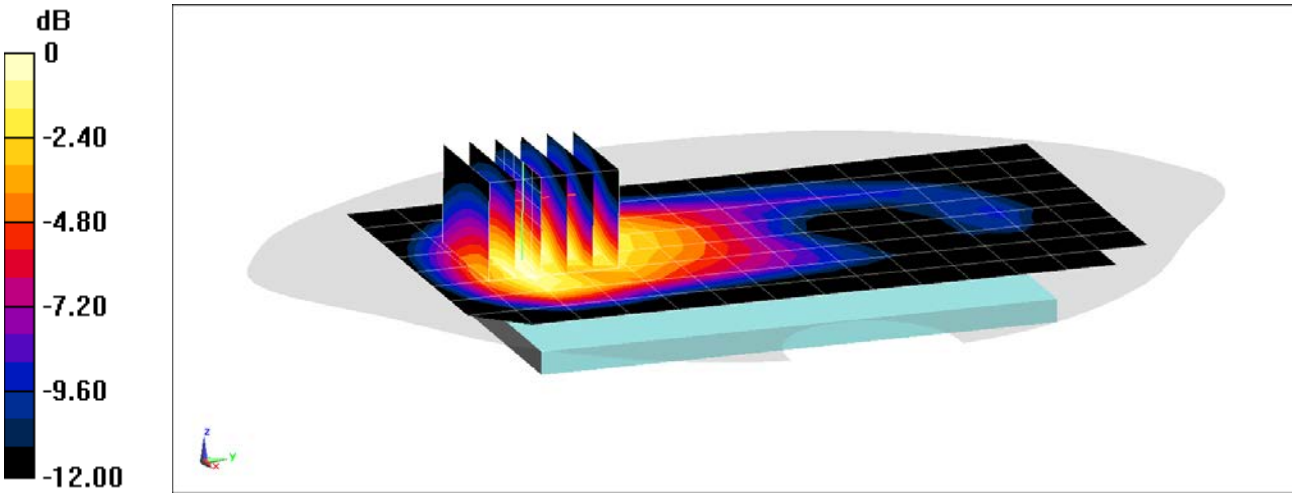
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.5 S/m; ε_r = 51.816; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3347; ConvF(5.17, 5.17, 5.17) @ 1770 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 66 (AWS), Body SAR, Back Side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 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 = 21.77 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.631 W/kg



0 dB = 0.742 W/kg = -1.30 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

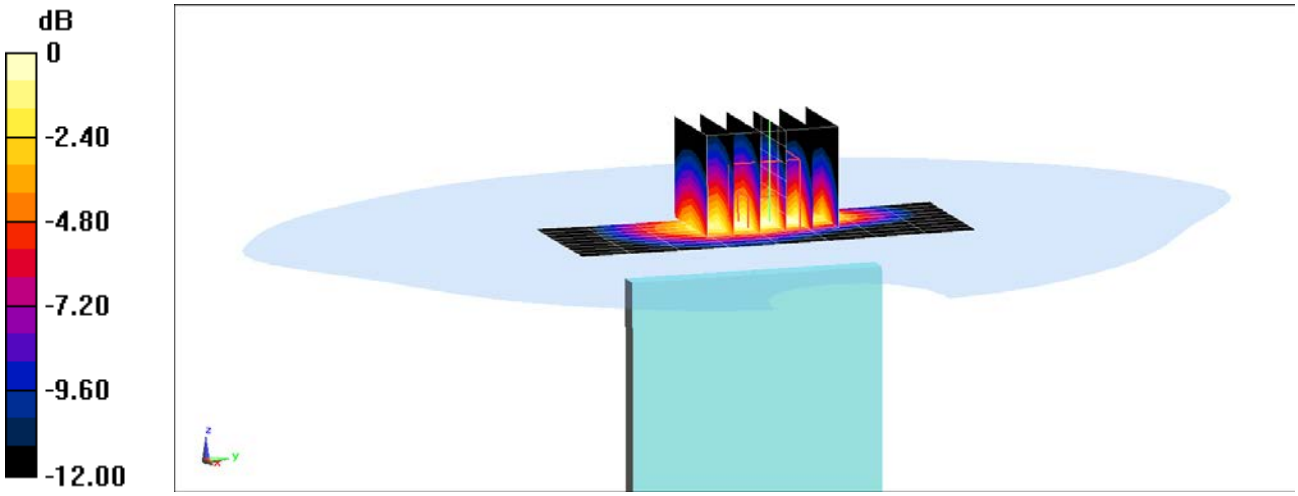
Communication System: UID 0, _LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated)
f = 1770 MHz; σ = 1.476 S/m; ε_r = 52.474; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 2-20-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1770 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 66 (AWS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.40 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.70 W/kg
SAR(1 g) = 0.988 W/kg



0 dB = 1.46 W/kg = 1.64 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

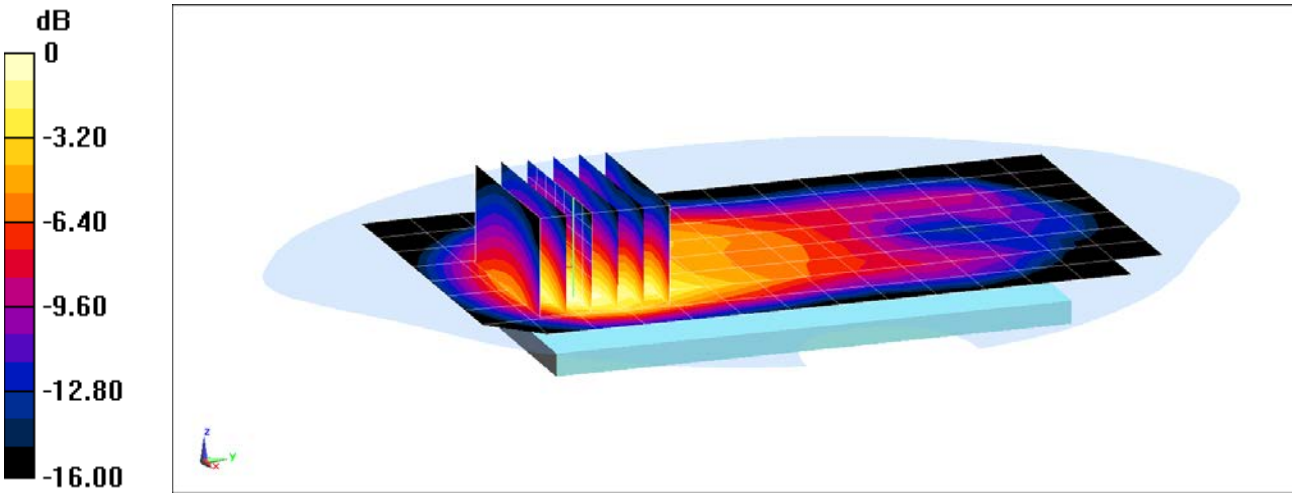
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.579 S/m; ε_r = 53.264; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2019; Ambient Temp: 21.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 2 (PCS), Body SAR, Back Side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (8x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.89 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.780 W/kg
SAR(1 g) = 0.459 W/kg



0 dB = 0.662 W/kg = -1.79 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

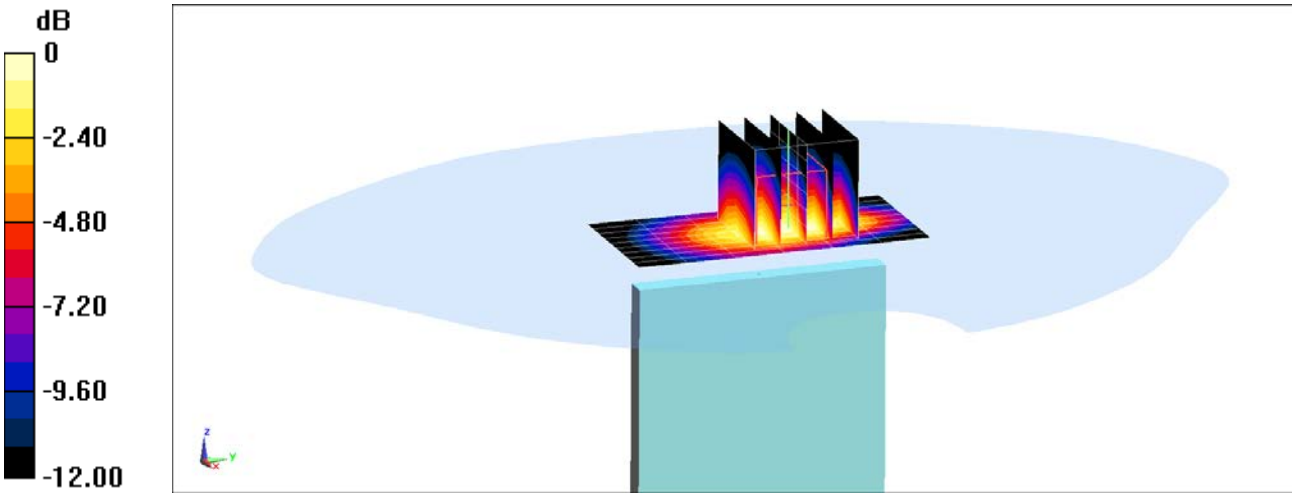
Communication System: UID 0, _LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
$f = 1900$ MHz; $\sigma = 1.579$ S/m; $\varepsilon_r = 53.264$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2019; Ambient Temp: 21.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 2 (PCS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.00 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.04 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00947

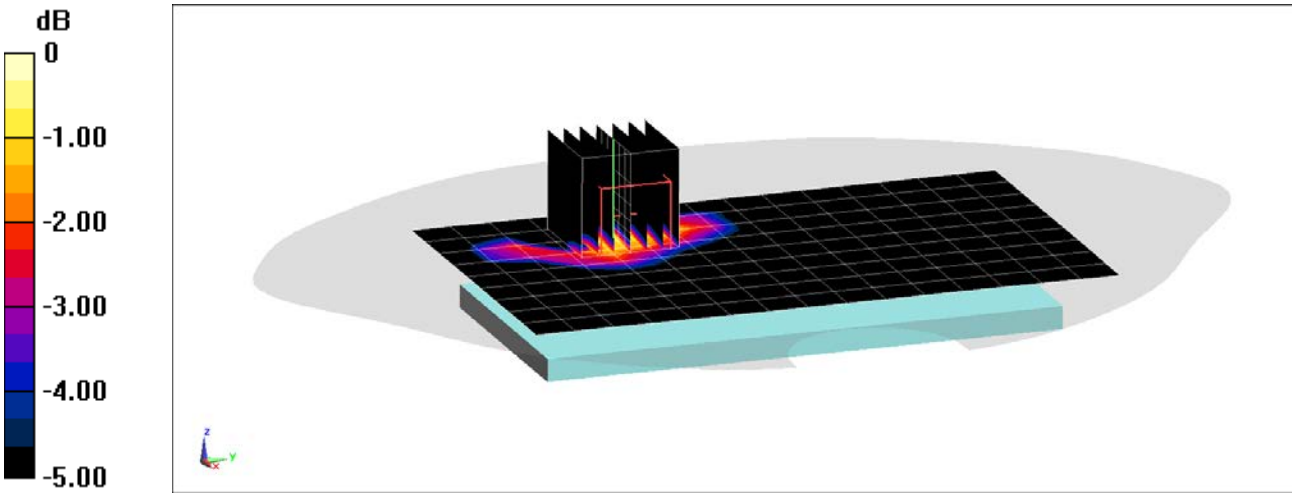
Communication System: UID 0, LTE Band 48; Frequency: 3646.7 MHz; Duty Cycle: 1:1.58
Medium: 3700 Body Medium parameters used (interpolated):
f = 3646.7 MHz; σ = 3.342 S/m; ε_r = 50.833; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-04-2019; Ambient Temp: 20.7°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3914; ConvF(6.64, 6.64, 6.64) @ 3646.7 MHz; Calibrated: 2/14/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 48, Body SAR, Back Side, Mid-High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 8.255 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.551 W/kg
SAR(1 g) = 0.207 W/kg



0 dB = 0.390 W/kg = -4.09 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01127

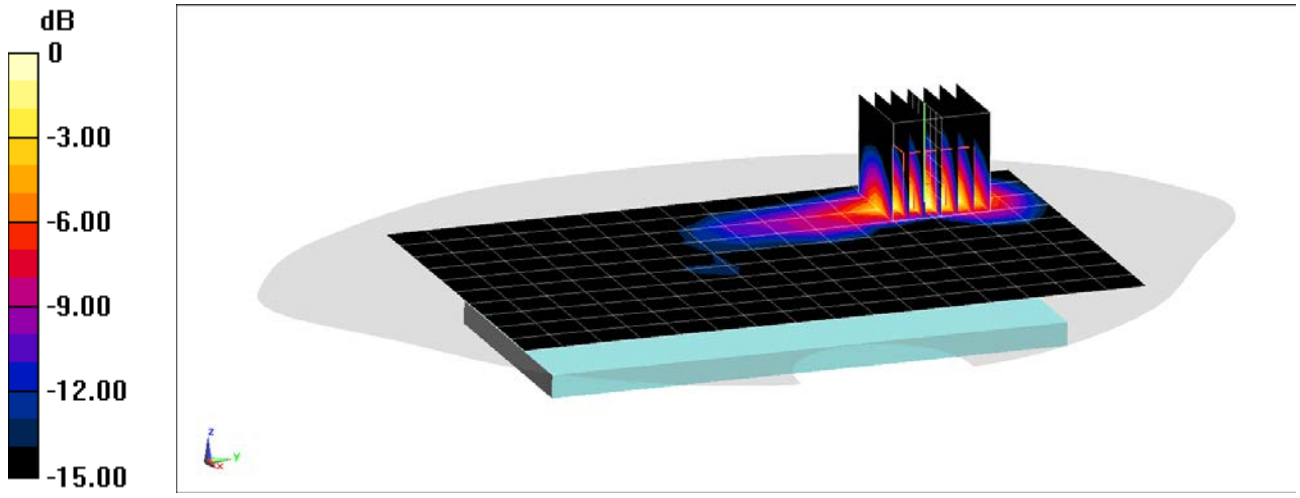
Communication System: UID 0, _IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.053 S/m; ε_r = 51.567; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2462 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11b, Antenna 2, 22 MHz Bandwidth, Body SAR, Ch 11, 1 Mbps, Back Side

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.945 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.565 W/kg
SAR(1 g) = 0.265 W/kg



0 dB = 0.362 W/kg = -4.41 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01127

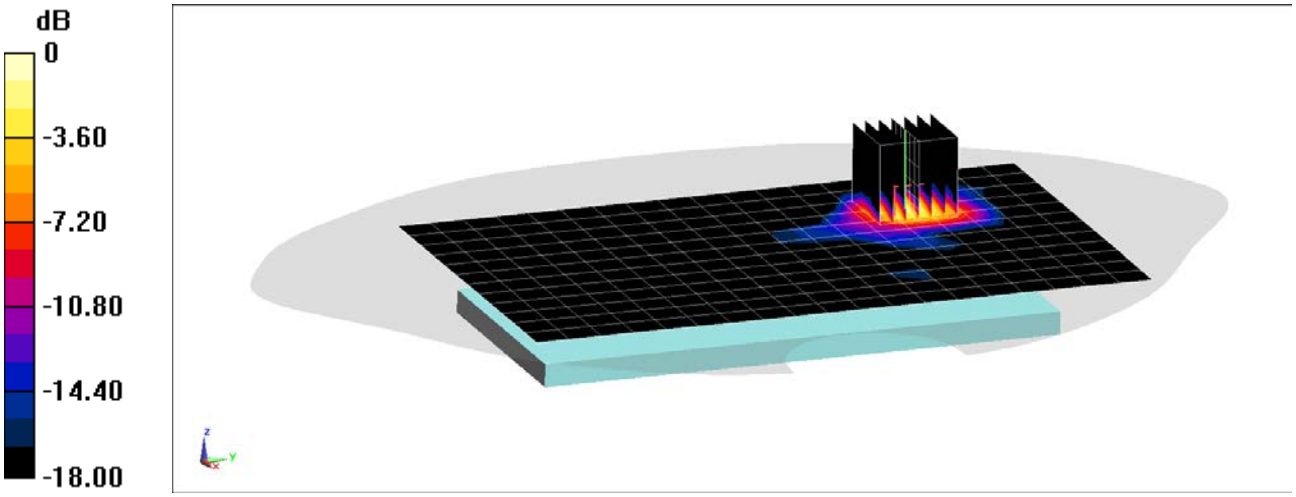
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5805 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5805 MHz; σ = 6.284 S/m; ε_r = 47.06; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5805 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, Antenna 2, UNII-3, 20 MHz Bandwidth, Body SAR, Ch 161, 6 Mbps, Back Side

Area Scan (13x20x1): 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 = 7.026 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.269 W/kg



0 dB = 0.750 W/kg = -1.25 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01143

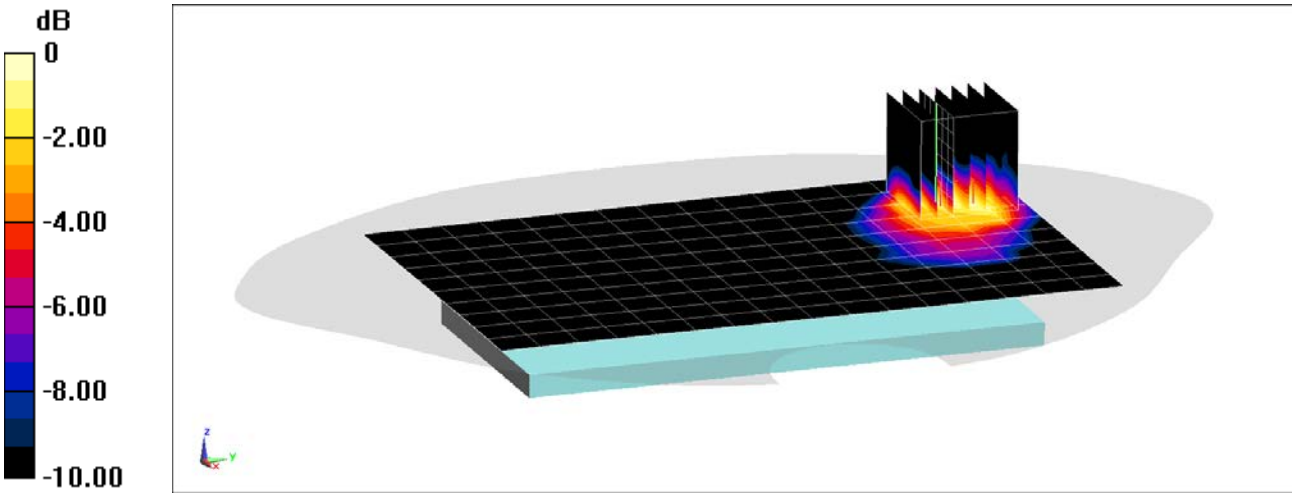
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 2.024 S/m; ε_r = 52.002; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-05-2019; Ambient Temp: 22.7°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2441 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.001 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.0530 W/kg
SAR(1 g) = 0.026 W/kg



0 dB = 0.0339 W/kg = -14.70 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01143

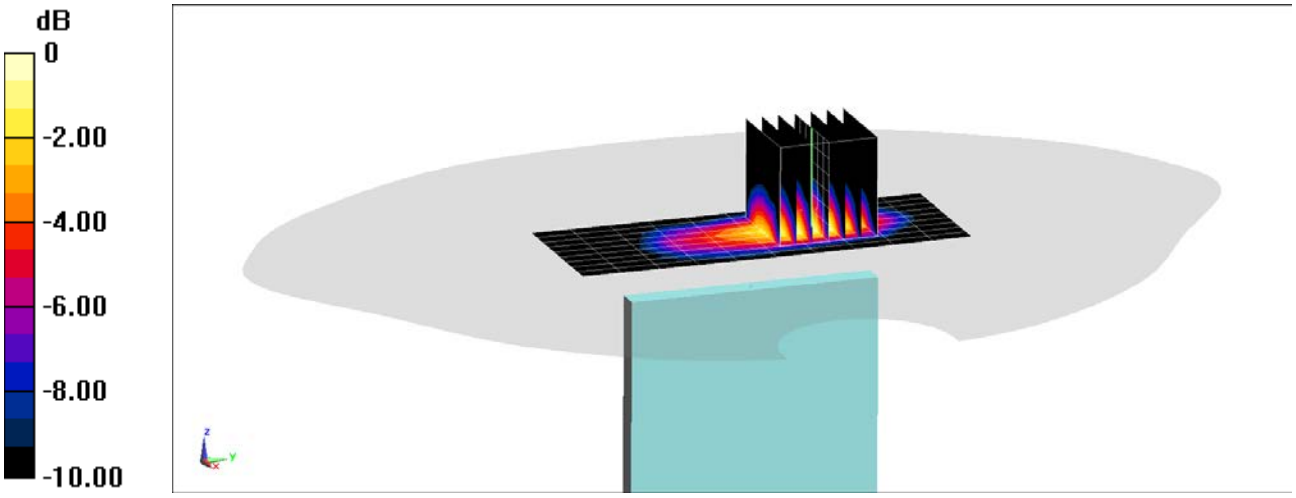
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 2.024 S/m; ε_r = 52.002; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-05-2019; Ambient Temp: 22.7°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2441 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Top Edge

Area Scan (10x11x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.226 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.0830 W/kg
SAR(1 g) = 0.030 W/kg



0 dB = 0.0413 W/kg = -13.84 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00954

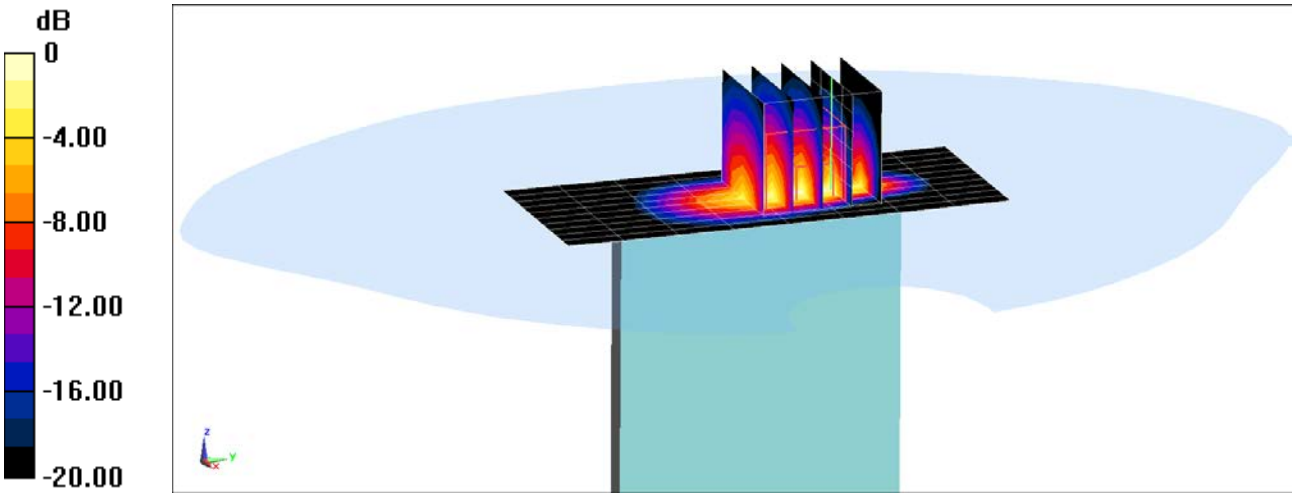
Communication System: UID 0, UMTS, Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.568 S/m; ε_r = 52.339; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02-14-2019; Ambient Temp: 21.1°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1907.6 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: UMTS 1900, Phablet SAR, Bottom Edge, High.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 = 59.43 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 13.5 W/kg
SAR(10 g) = 2.01 W/kg



0 dB = 10.6 W/kg = 10.25 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

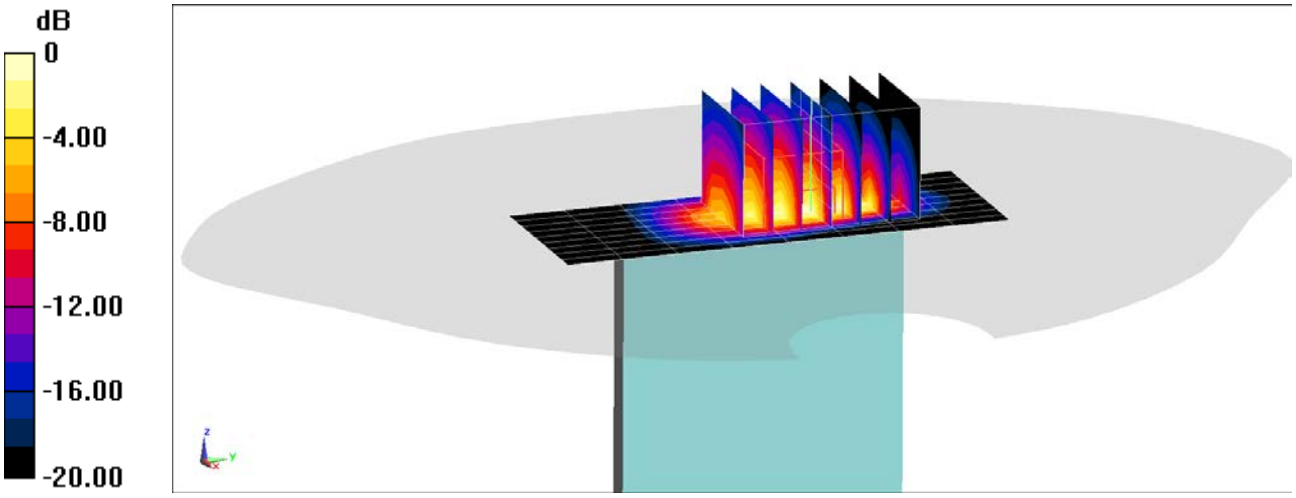
Communication System: UID 0, _LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.535 S/m; ε_r = 51.037; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-24-2019; Ambient Temp: 20.8°C; Tissue Temp: 20.2°C

Probe: ES3DV3 - SN3347; ConvF(5.17, 5.17, 5.17) @ 1770 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 66 (AWS), Phablet SAR, Bottom Edge, High.ch, 20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 63.88 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 13.2 W/kg
SAR(10 g) = 2.38 W/kg



0 dB = 7.73 W/kg = 8.88 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 00939

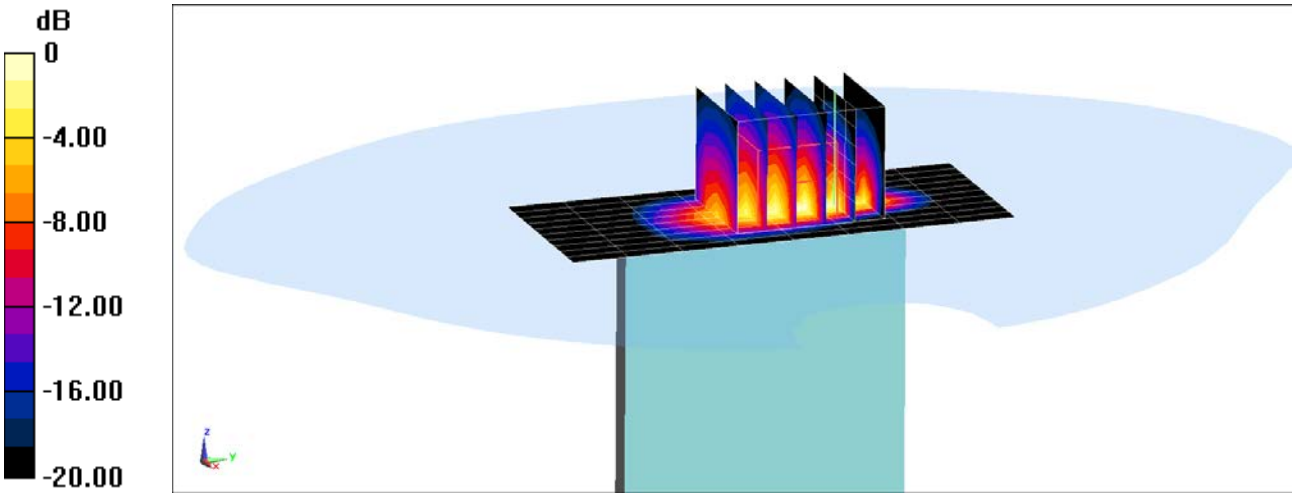
Communication System: UID 0, _LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.579 S/m; ε_r = 53.264; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02-11-2019; Ambient Temp: 21.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 2 (PCS), Phablet SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 61.27 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 12.8 W/kg
SAR(10 g) = 2.16 W/kg



0 dB = 10.0 W/kg = 10.00 dBW/kg

DUT: ZNFV450VM; Type: Portable Handset; Serial: 01127

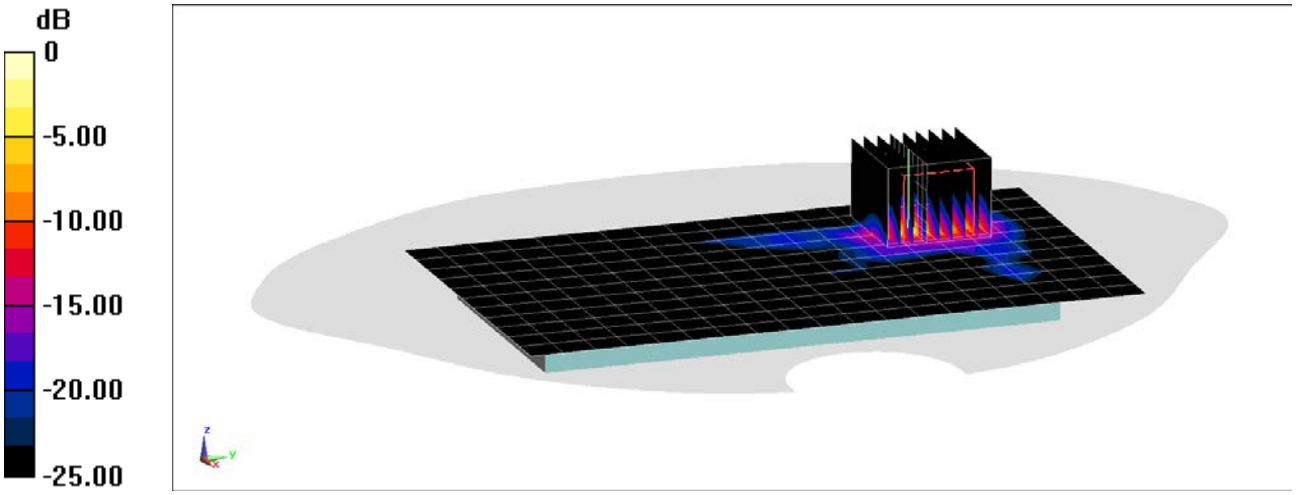
Communication System: UID 0, 802.11n 5.2-5.8 GHz Band; Frequency: 5280 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5280 MHz; σ = 5.493 S/m; ε_r = 48.056; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5280 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11n, MIMO, U-NII-2A, 20 MHz Bandwidth, Phablet SAR, Ch 56, 13 Mbps, Back Side

Area Scan (12x20x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 37.87 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 72.9 W/kg
SAR(10 g) = 1.73 W/kg



0 dB = 33.4 W/kg = 15.24 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

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PCTEST ENGINEERING LABORATORY, INC.

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

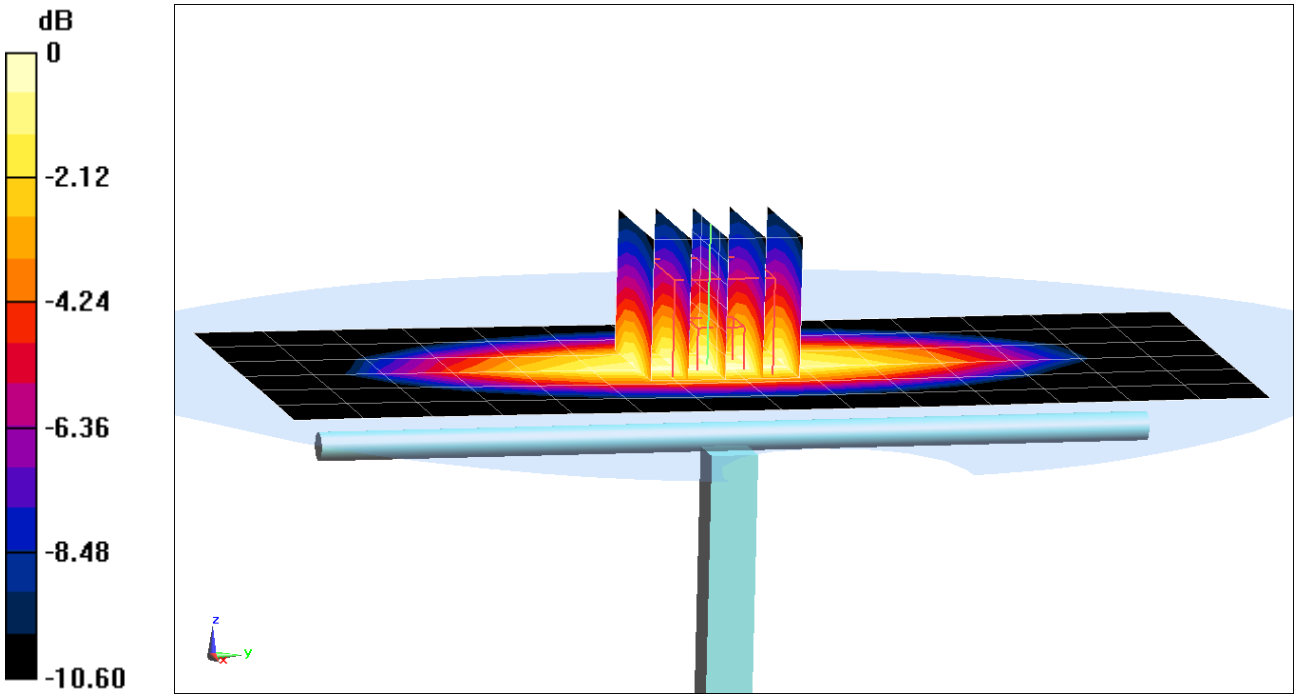
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; σ = 0.878 S/m; ε_r = 42.259; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-28-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7410; ConvF(10.13, 10.13, 10.13) @ 750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 1.61 W/kg
Deviation(1 g) = 0.25%



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

PCTEST ENGINEERING LABORATORY, INC.

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

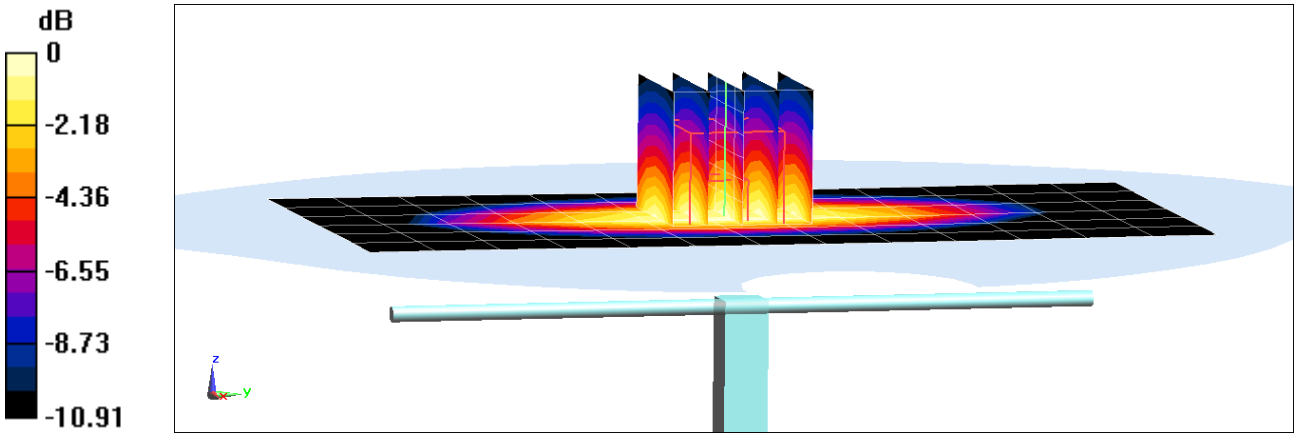
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.928 S/m; ε_r = 40.992; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-01-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 835 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 3.04 W/kg
SAR(1 g) = 2 W/kg
Deviation(1 g) = 5.60%



0 dB = 2.70 W/kg = 4.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

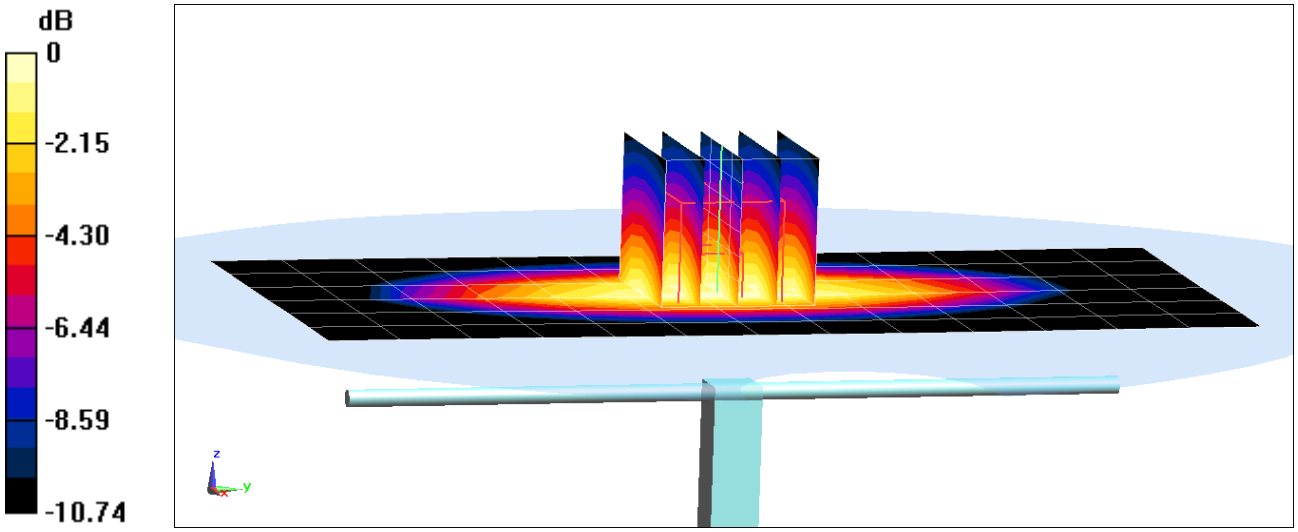
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.881 S/m; ε_r = 39.523; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-11-2019; Ambient Temp: 21.1°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7410; ConvF(9.81, 9.81, 9.81) @ 835 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 1.91 W/kg
Deviation(1 g) = 1.27%



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

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

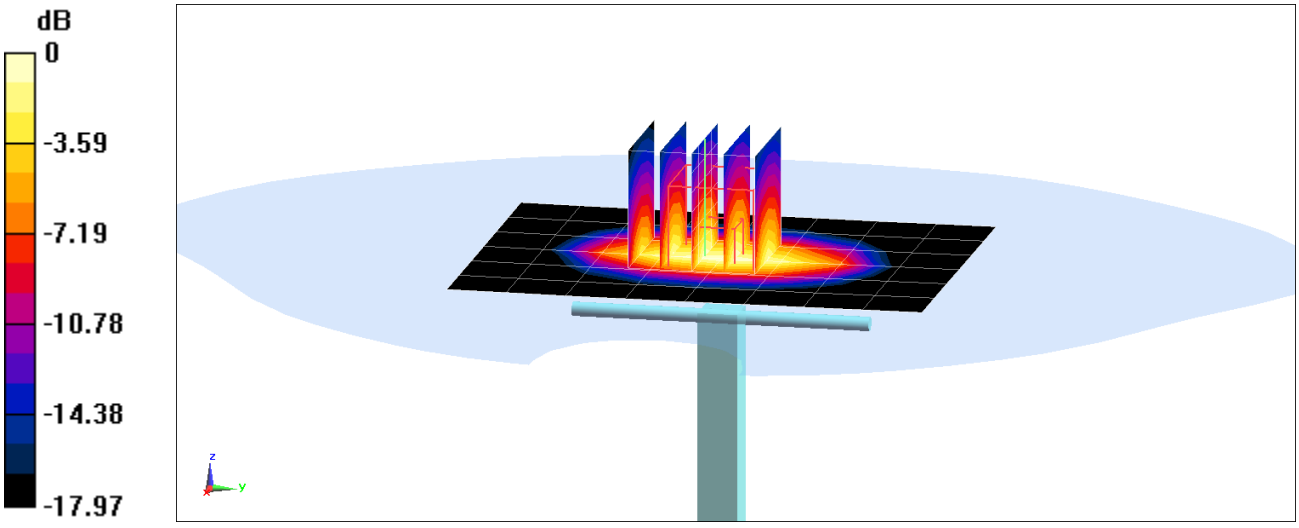
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.387 S/m; ε_r = 41.854; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-04-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7409; ConvF(8.43, 8.43, 8.43) @ 1750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 7.15 W/kg
SAR(1 g) = 3.79 W/kg
Deviation(1 g) = 4.70%



0 dB = 5.80 W/kg = 7.63 dBW/kg

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

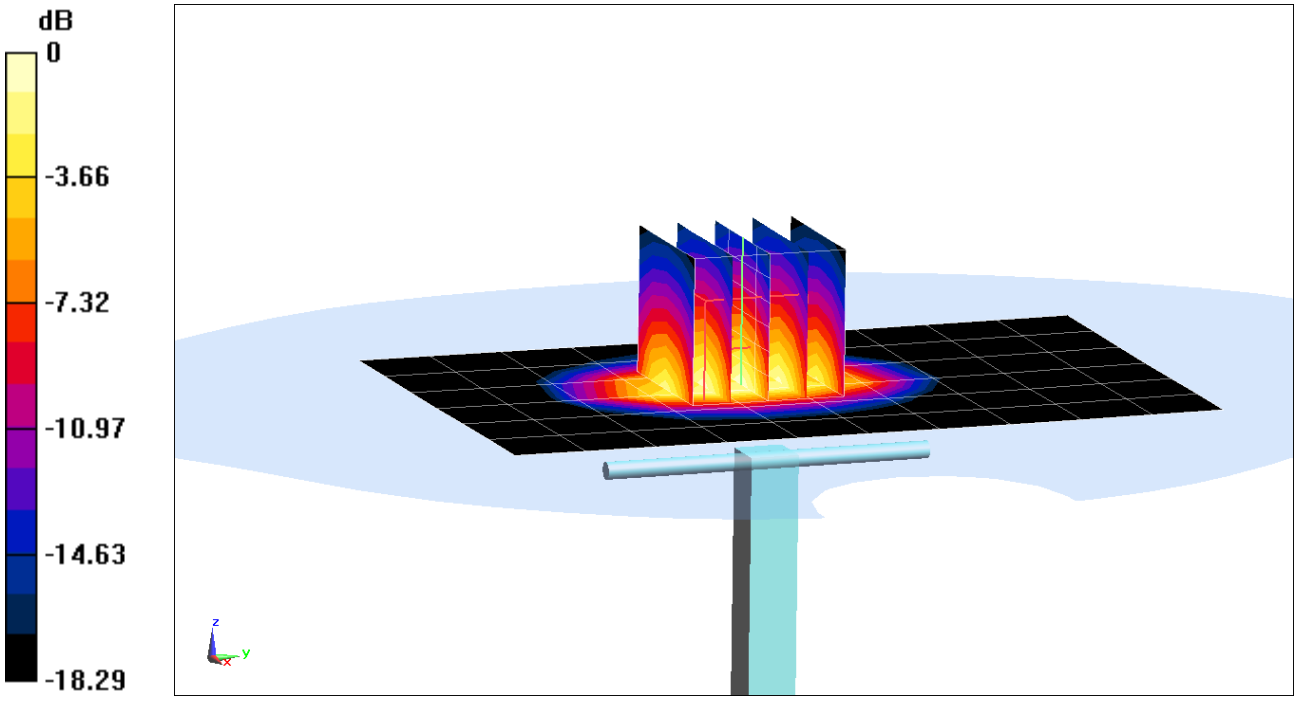
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.429 S/m; ε_r = 38.974; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-06-2019; Ambient Temp: 22.6°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1900 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.42 W/kg
SAR(1 g) = 4.09 W/kg
Deviation(1 g) = 4.07%



0 dB = 6.33 W/kg = 8.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

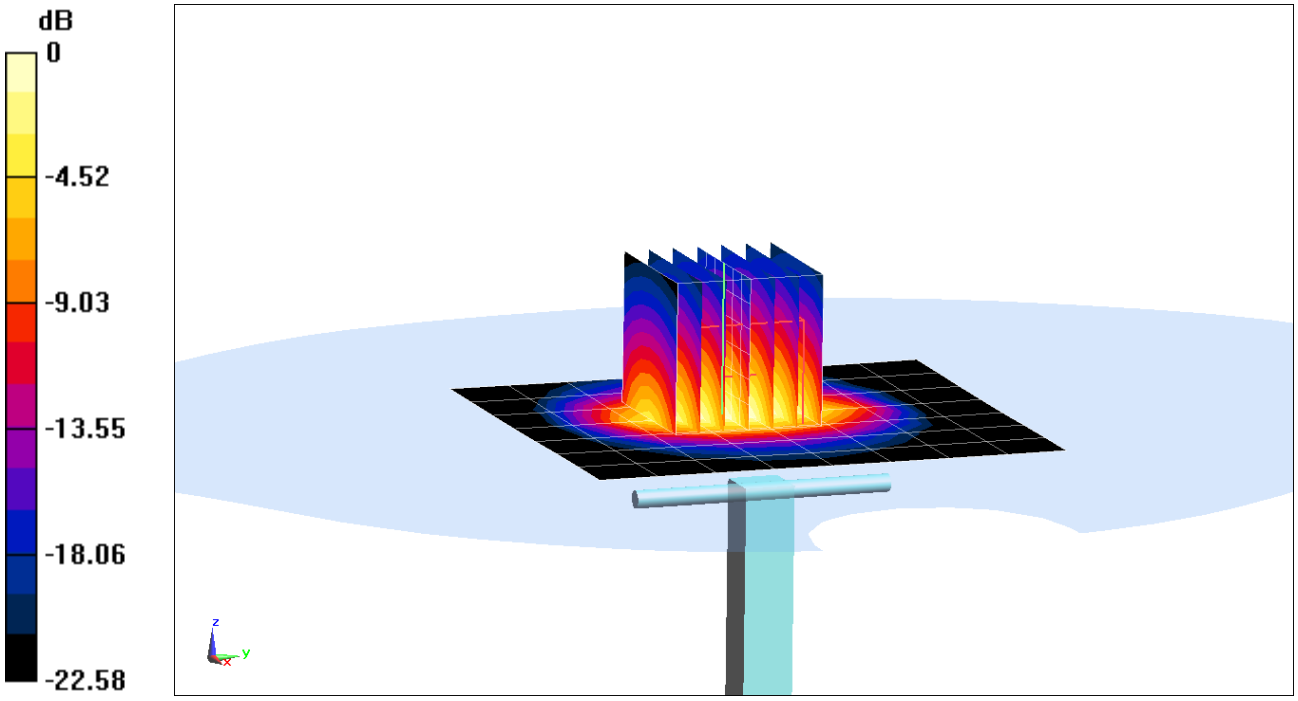
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.83 S/m; ε_r = 38.536; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 23.2°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2450 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.9 W/kg
SAR(1 g) = 5.19 W/kg
Deviation(1 g) = -0.76%



0 dB = 8.65 W/kg = 9.37 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

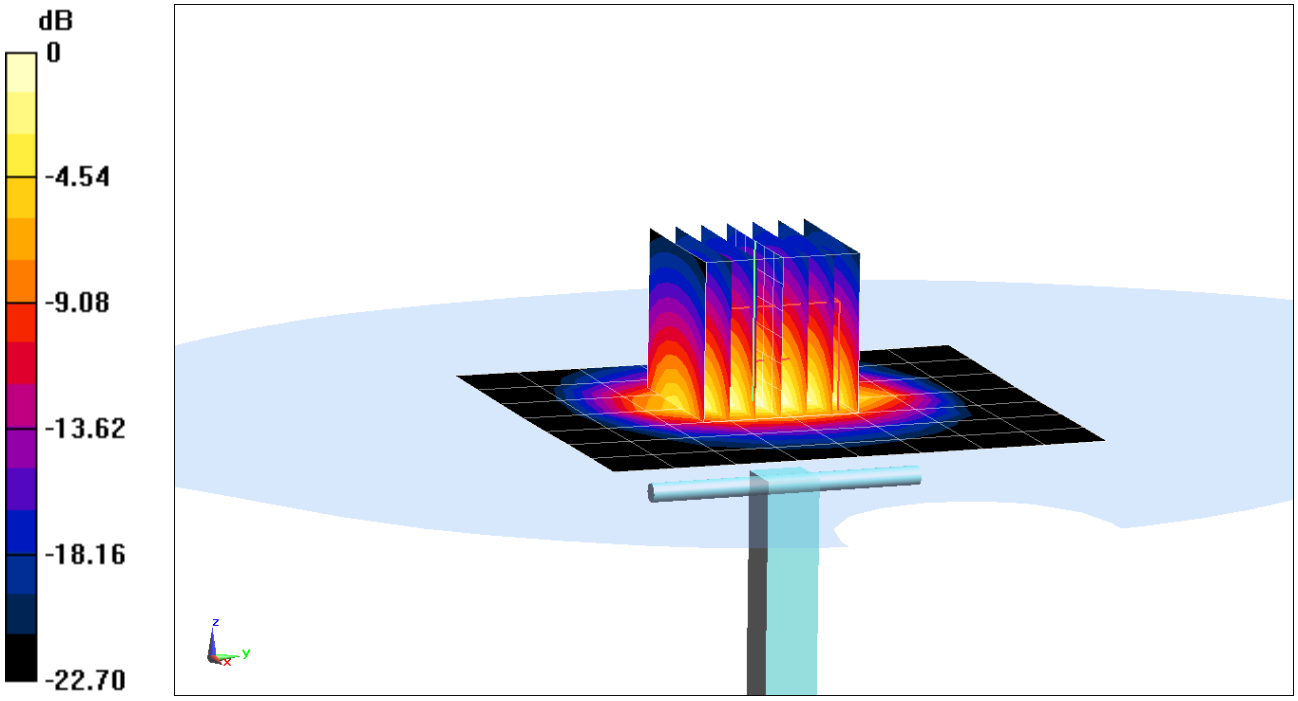
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.792 S/m; ε_r = 38.231; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-05-2019; Ambient Temp: 24.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7410; ConvF(7.5, 7.5, 7.5) @ 2450 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.8 W/kg
SAR(1 g) = 5.13 W/kg
Deviation(1 g) = -1.91%



0 dB = 8.64 W/kg = 9.37 dBW/kg

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: 1059

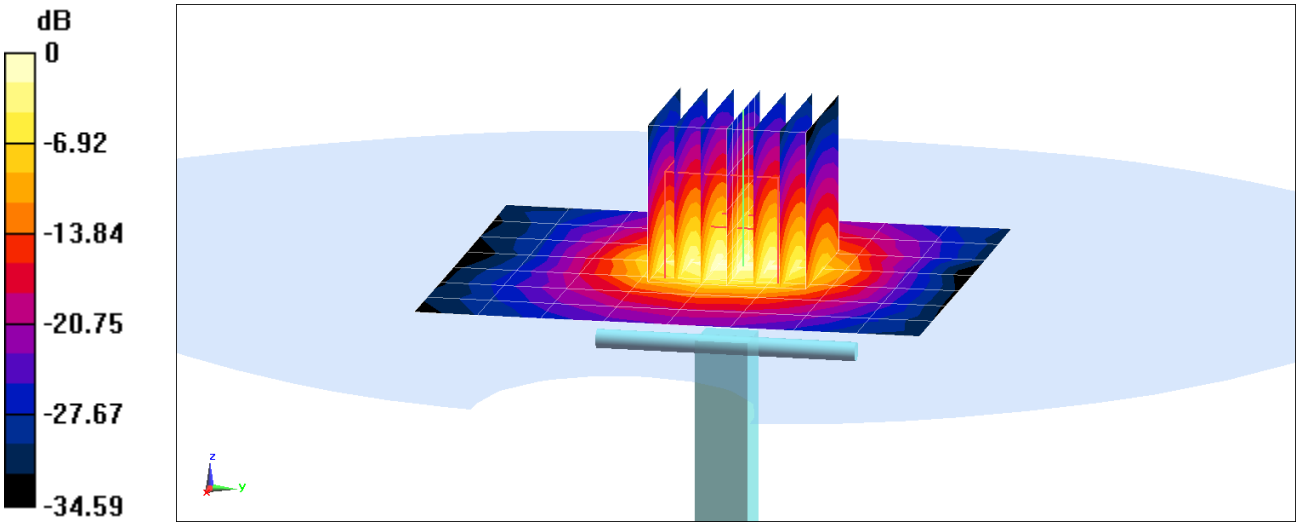
Communication System: UID 0, CW; Frequency: 3500 MHz; Duty Cycle: 1:1
Medium: 3500 Head Medium parameters used:
f = 3500 MHz; σ = 2.908 S/m; ε_r = 37.921; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-07-2019; Ambient Temp: 21.7°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3949; ConvF(7.36, 7.36, 7.36) @ 3500 MHz; Calibrated: 8/24/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

3500 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.8 W/kg
SAR(1 g) = 6.54 W/kg
Deviation(1 g) = 1.24%



0 dB = 13.0 W/kg = 11.14 dBW/kg

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: 1018

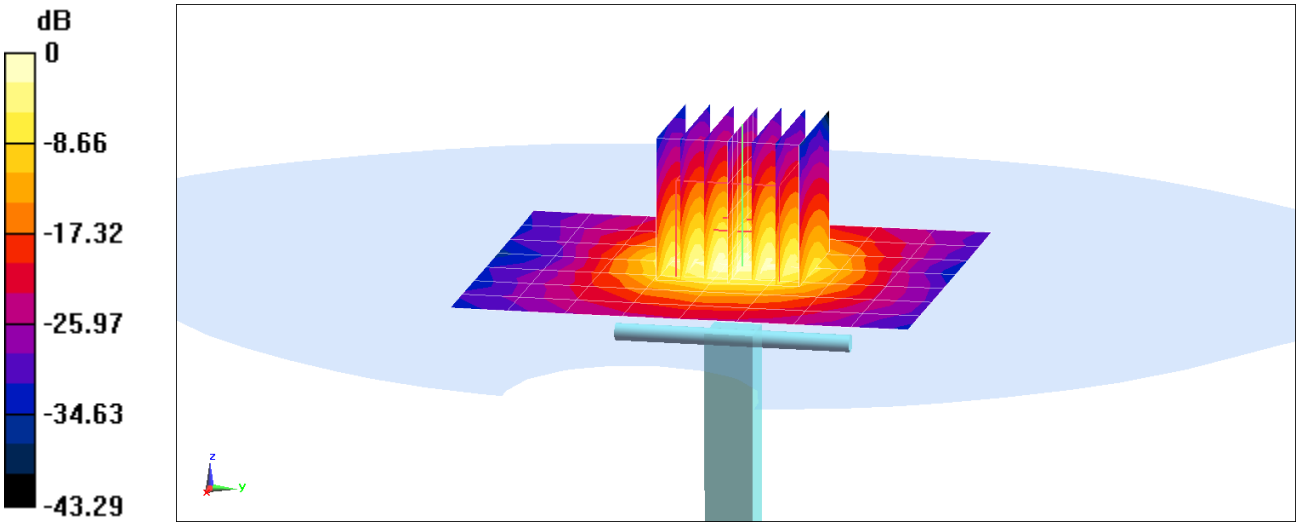
Communication System: UID 0, CW; Frequency: 3700 MHz; Duty Cycle: 1:1
Medium: 3700 Head Medium parameters used (interpolated):
f = 3700 MHz; σ = 3.065 S/m; ε_r = 37.717; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-07-2019; Ambient Temp: 21.7°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3949; ConvF(7.24, 7.24, 7.24) @ 3700 MHz; Calibrated: 8/24/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

3700 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 19.2 W/kg
SAR(1 g) = 6.34 W/kg
Deviation(1 g) = -3.65%



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

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

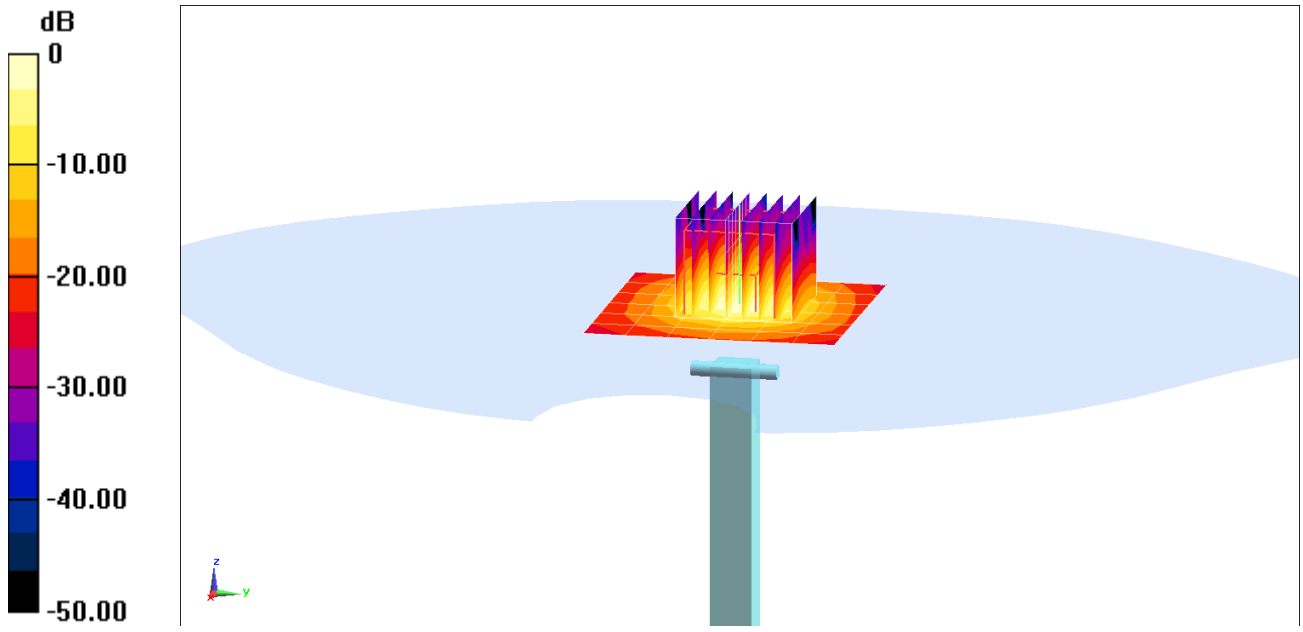
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
$f = 5250$ MHz; $\sigma = 4.573$ S/m; $\varepsilon_r = 34.883$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-19-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7409; ConvF(5.2, 5.2, 5.2) @ 5250 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 15.7 W/kg
SAR(1 g) = 3.84 W/kg
Deviation(1 g) = -5.54%



0 dB = 9.53 W/kg = 9.79 dBW/kg

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

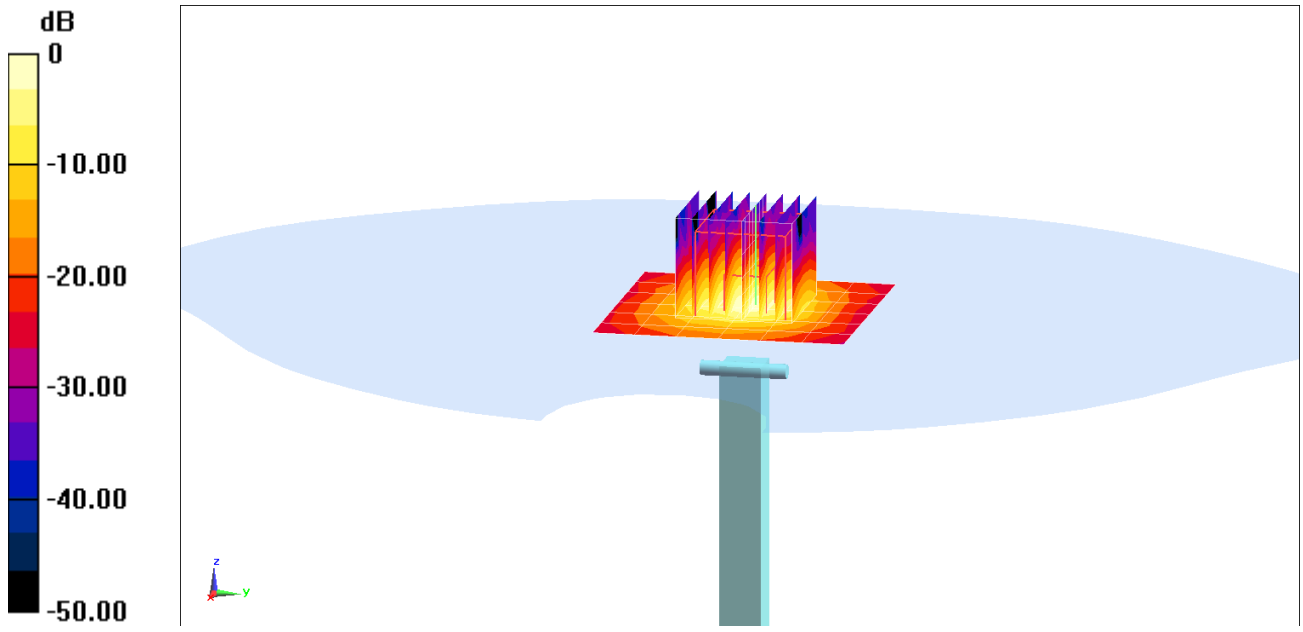
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.978 S/m; ε_r = 34.279; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-19-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7409; ConvF(4.77, 4.77, 4.77) @ 5600 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 18.4 W/kg
SAR(1 g) = 4.17 W/kg
Deviation(1 g) = -2.68%



0 dB = 10.2 W/kg = 10.09 dBW/kg

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

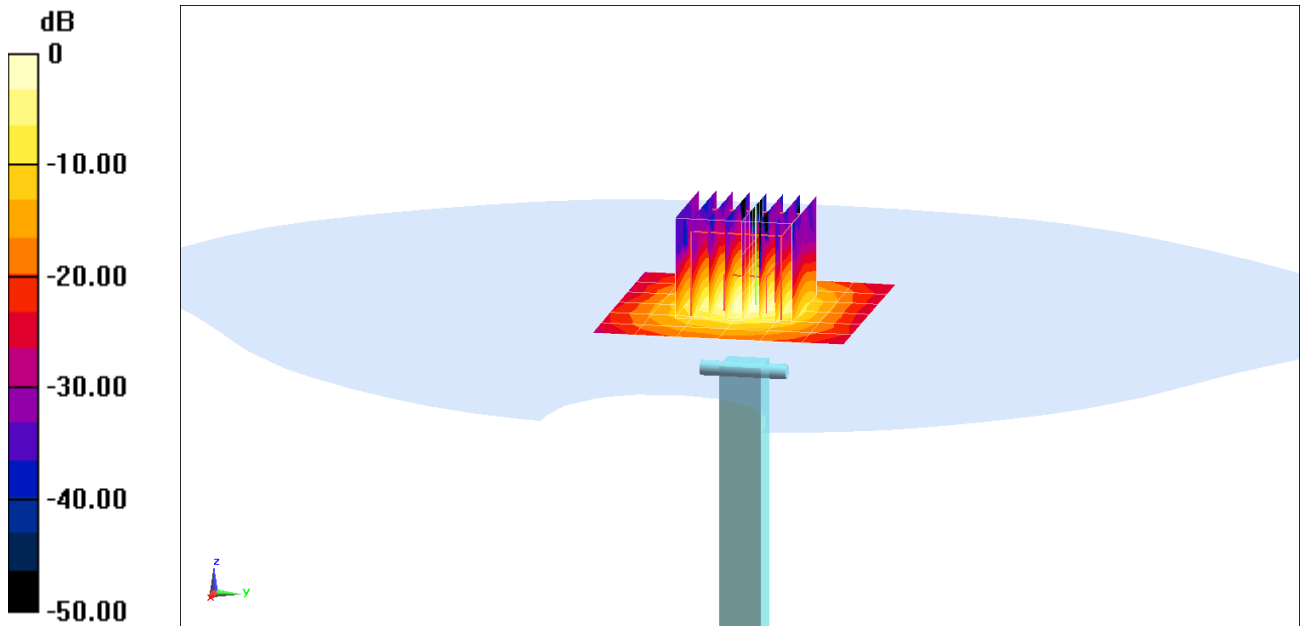
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.17 S/m; ε_r = 34.038; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-19-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7409; ConvF(4.82, 4.82, 4.82) @ 5750 MHz; Calibrated: 6/25/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2018
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 17.2 W/kg
SAR(1 g) = 3.75 W/kg
Deviation(1 g) = -6.95%



0 dB = 9.32 W/kg = 9.69 dBW/kg

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

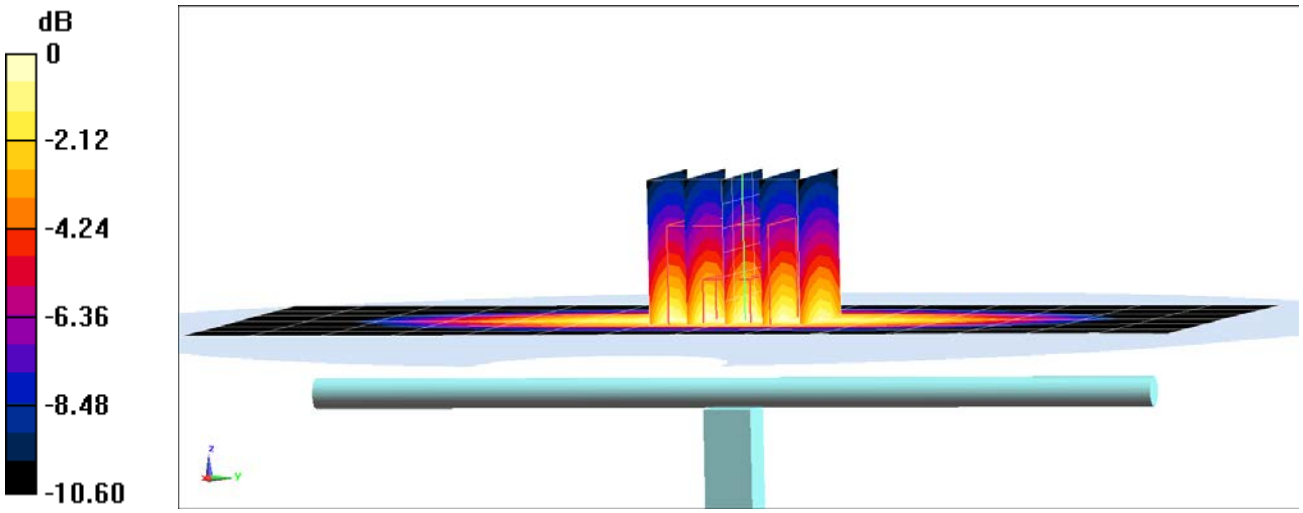
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.967 S/m; ε_r = 53.508; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-13-2019; Ambient Temp: 22.9°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN3589; ConvF(8.34, 8.34, 8.34) @ 750 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 2.71 W/kg
SAR(1 g) = 1.71 W/kg
Deviation(1 g) = -0.35%



0 dB = 2.32 W/kg = 3.65 dBW/kg

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

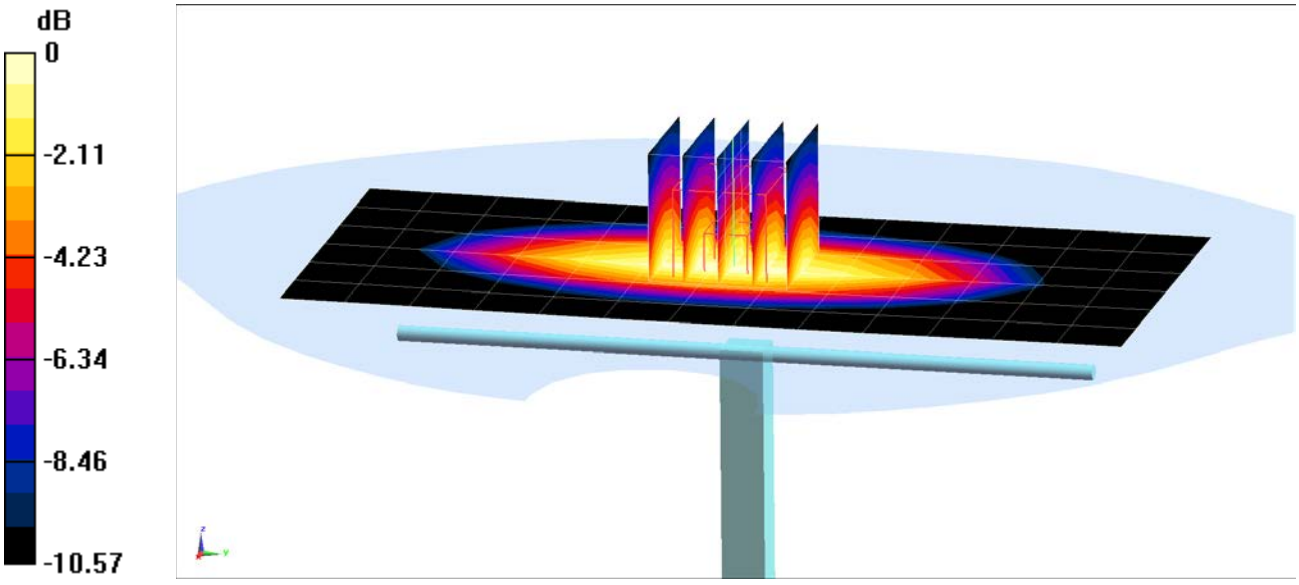
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.977 S/m; ε_r = 53.01; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01-28-2012; Ambient Temp: 22.1°C; Tissue Temp: 19.3°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 2.91 W/kg
SAR(1 g) = 1.94 W/kg
Deviation(1 g) = -0.10%



0 dB = 2.58 W/kg = 4.12 dBW/kg

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

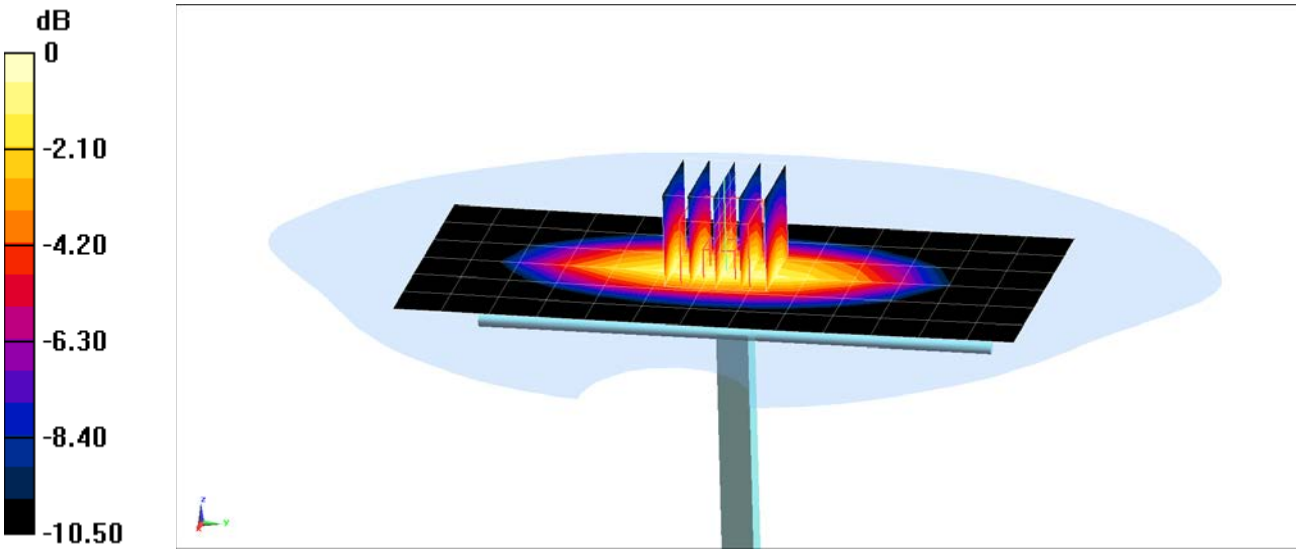
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.967 S/m; ε_r = 53.744; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-06-2019; Ambient Temp: 22.2°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 3.13 W/kg
SAR(1 g) = 2.08 W/kg
Deviation(1 g) = 7.11%



0 dB = 2.77 W/kg = 4.42 dBW/kg

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

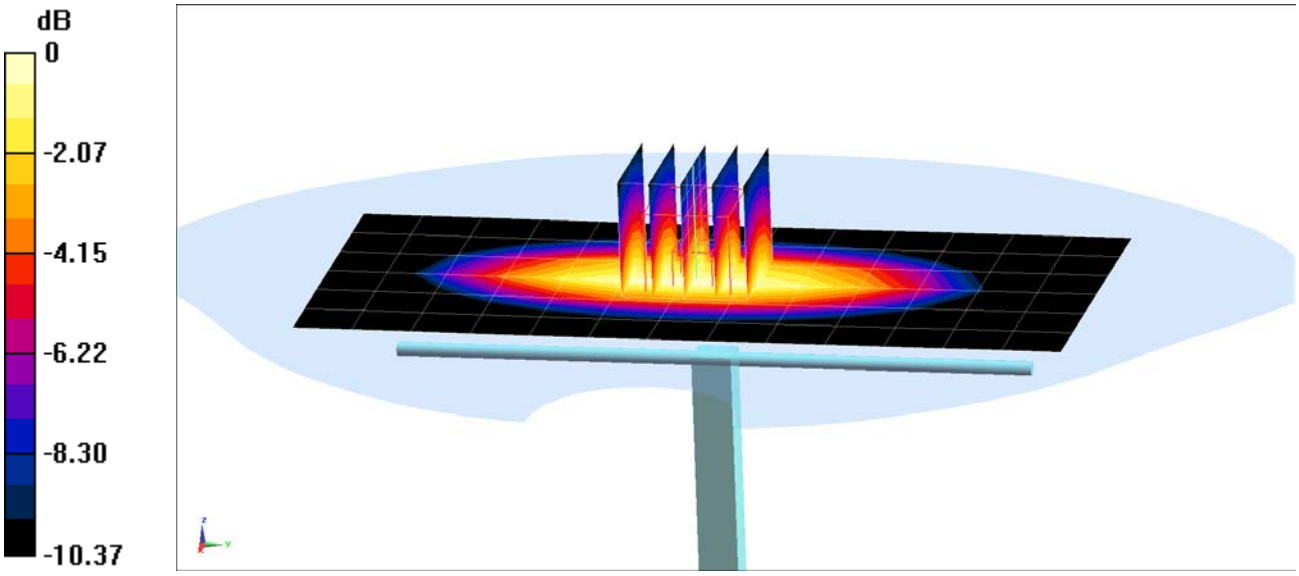
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.975 S/m; ε_r = 53.775; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02-18-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN7357; ConvF(10.17, 10.17, 10.17) @ 835 MHz; Calibrated: 4/18/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2018
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 3.09 W/kg
SAR(1 g) = 2.05 W/kg
Deviation(1 g) = 5.56%



0 dB = 2.74 W/kg = 4.38 dBW/kg

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

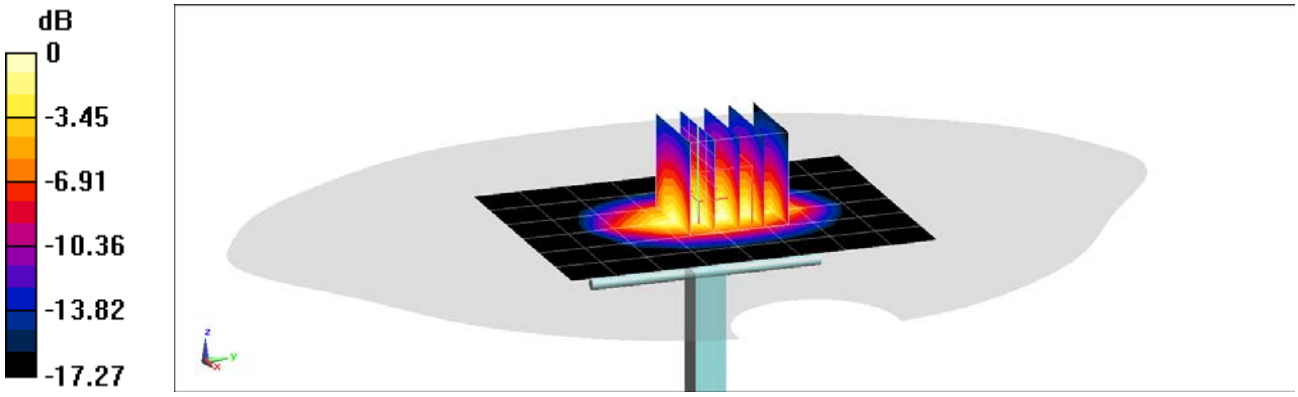
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.488 S/m; ε_r = 51.84; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-21-2019; Ambient Temp: 21.5°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3347; ConvF(5.17, 5.17, 5.17) @ 1750 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.33 W/kg
SAR(1 g) = 3.61 W/kg
Deviation(1 g) = -3.48%



0 dB = 4.47 W/kg = 6.50 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

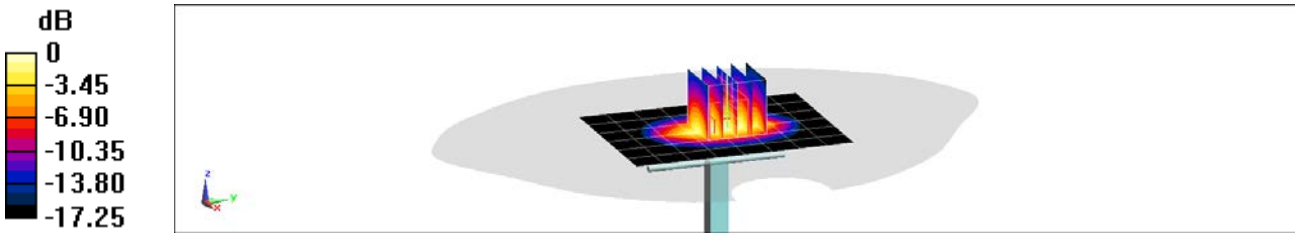
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.518 S/m; ε_r = 51.068; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-24-2019; Ambient Temp: 20.8°C; Tissue Temp: 20.2°C

Probe: ES3DV3 - SN3347; ConvF(5.17, 5.17, 5.17) @ 1750 MHz; Calibrated: 3/27/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.67 W/kg
SAR(10 g) = 2.03 W/kg
Deviation(10 g) = 4.64%



0 dB = 4.73 W/kg = 6.75 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1150

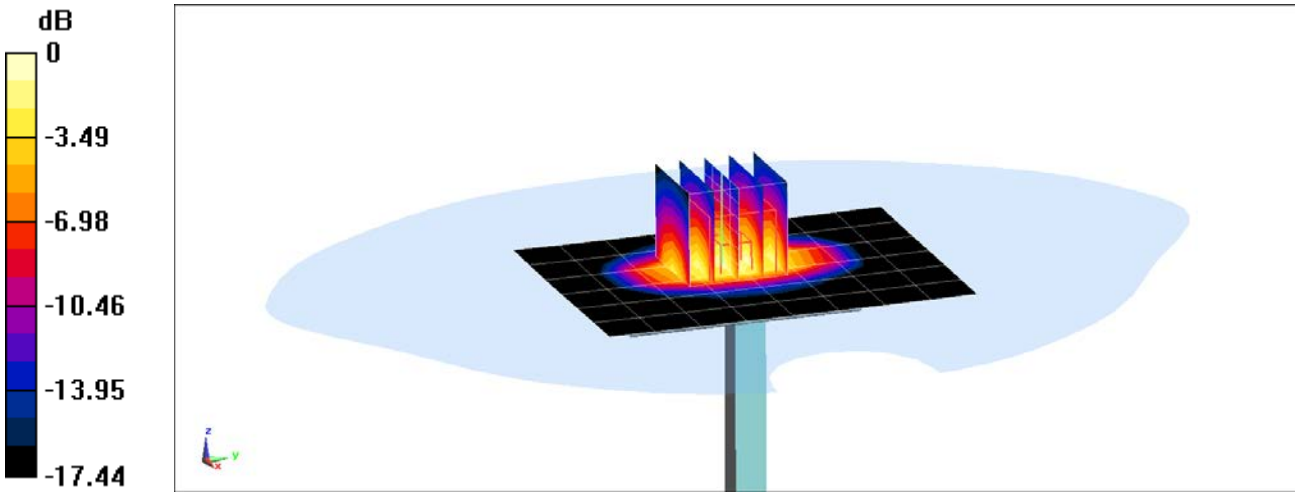
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.457 S/m; ε_r = 52.518; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-20-2019; Ambient Temp: 21.6°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(8.06, 8.06, 8.06) @ 1750 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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) = 6.80 W/kg
SAR(1 g) = 3.78 W/kg
Deviation(1 g) = 3.28%



0 dB = 5.71 W/kg = 7.57 dBW/kg

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

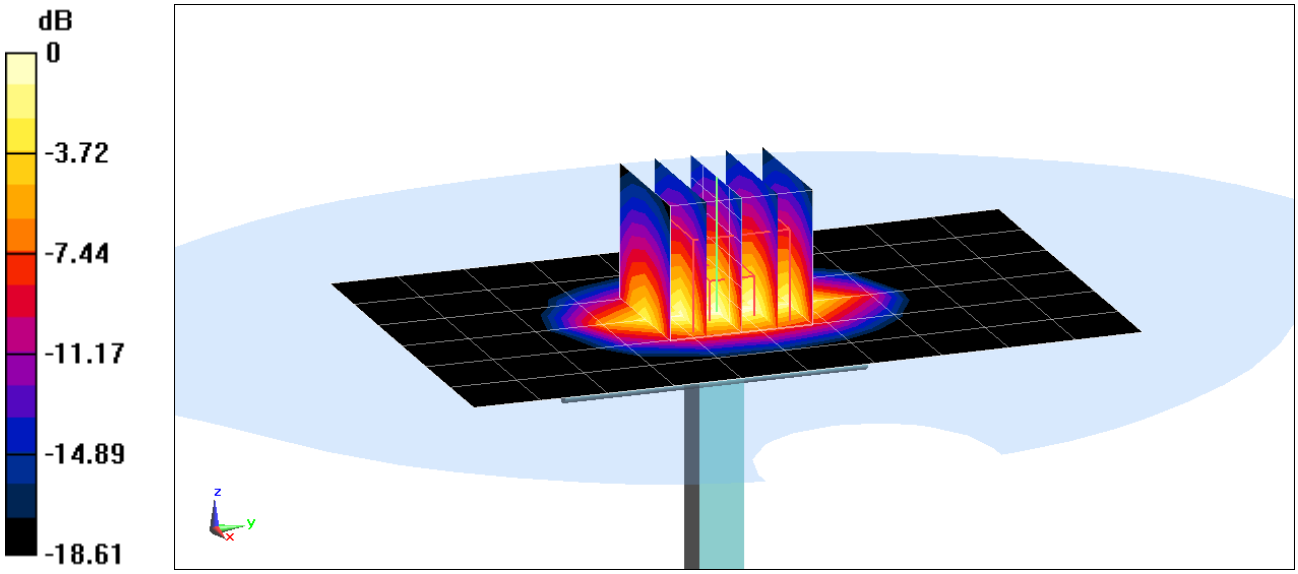
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.579 S/m; ε_r = 53.264; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-11-2019; Ambient Temp: 21.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.76 W/kg
SAR(1 g) = 4.18 W/kg; SAR(10 g) = 2.14 W/kg
Deviation(1 g) = 6.09%; Deviation(10 g) = 3.38%



0 dB = 6.51 W/kg = 8.14 dBW/kg

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

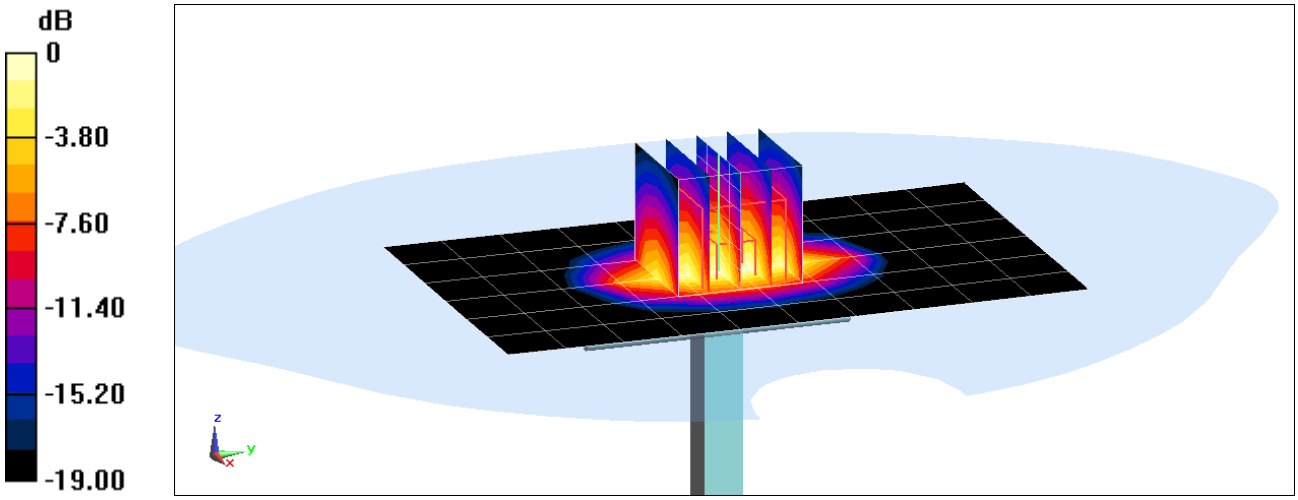
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.559 S/m; ε_r = 52.353; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-14-2019; Ambient Temp: 21.1°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.65 W/kg
SAR(1 g) = 4.04 W/kg; SAR(10 g) = 2.05 W/kg
Deviation(1 g) = 3.06%; Deviation(10 g) = -0.49%



0 dB = 6.32 W/kg = 8.01 dBW/kg

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

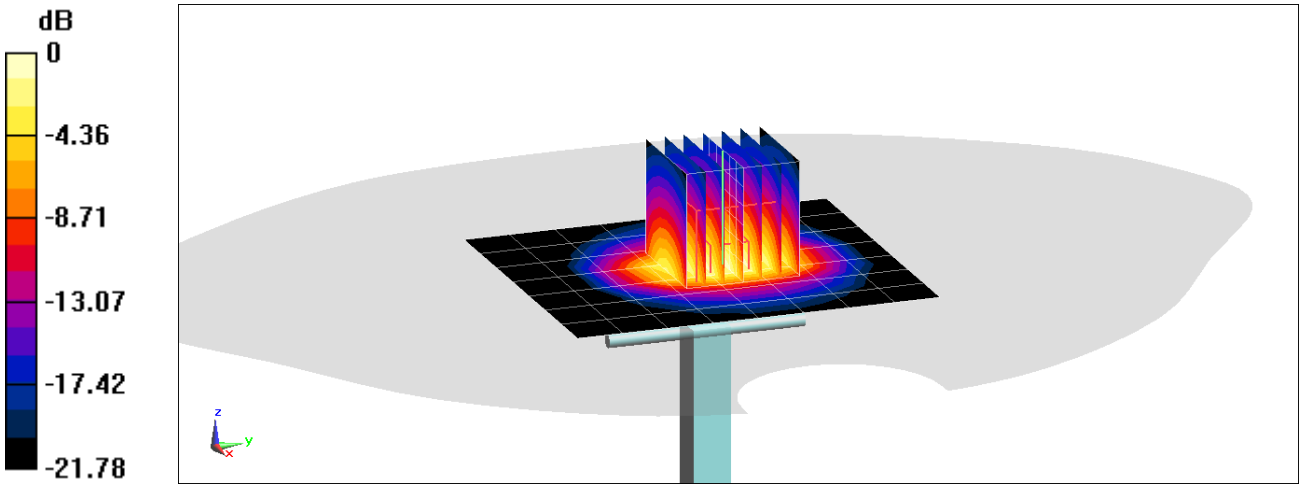
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.041 S/m; ε_r = 51.597; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-02-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.0 W/kg
SAR(1 g) = 4.9 W/kg g
Deviation(1 g) = -3.73%



0 dB = 6.49 W/kg = 8.12 dBW/kg

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

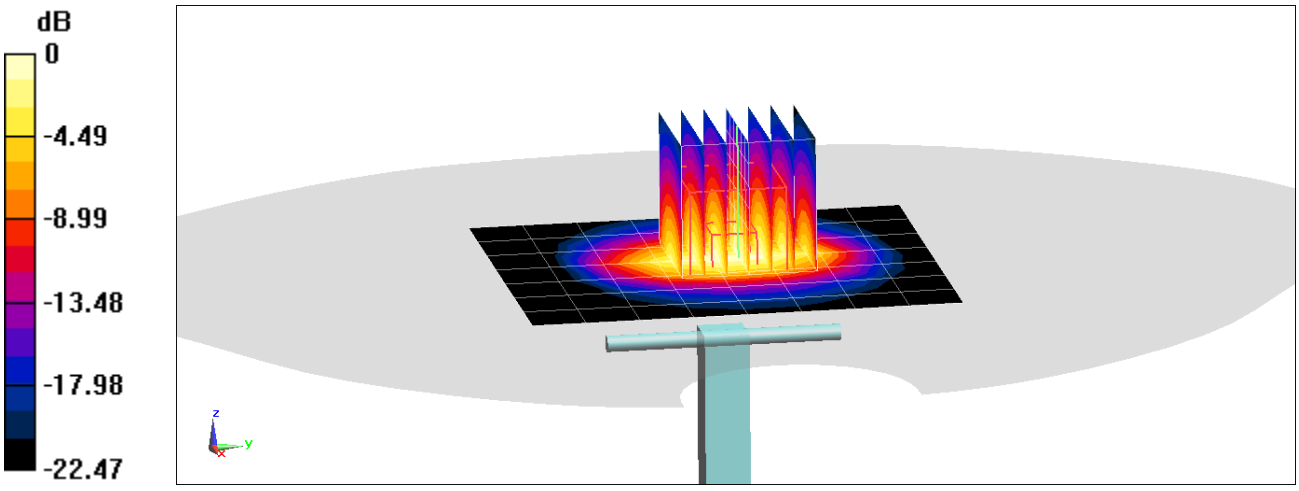
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.035 S/m; ε_r = 51.977; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-05-2019; Ambient Temp: 22.7°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3319; ConvF(4.51, 4.51, 4.51) @ 2450 MHz; Calibrated: 3/13/2018
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/7/2018
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.2 W/kg
SAR(1 g) = 4.95 W/kg
Deviation(1 g) = -2.75%



0 dB = 6.51 W/kg = 8.14 dBW/kg

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: 1059

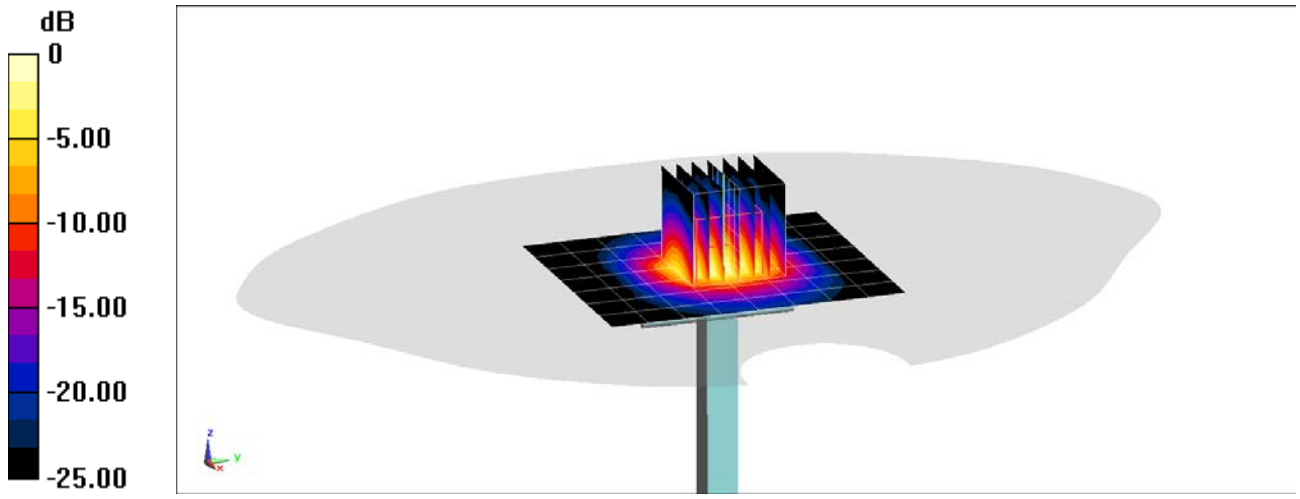
Communication System: UID 0, CW; Frequency: 3500 MHz; Duty Cycle: 1:1
Medium: 3500 Body Medium parameters used:
f = 3500 MHz; σ = 3.165 S/m; ε_r = 51.186; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-04-2019; Ambient Temp: 20.7°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3914; ConvF(6.81, 6.81, 6.81) @ 3500 MHz; Calibrated: 2/14/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

3500 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 15.3 W/kg
SAR(1 g) = 6 W/kg
Deviation(1 g) = -7.83%



0 dB = 11.4 W/kg = 10.57 dBW/kg

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: 1018

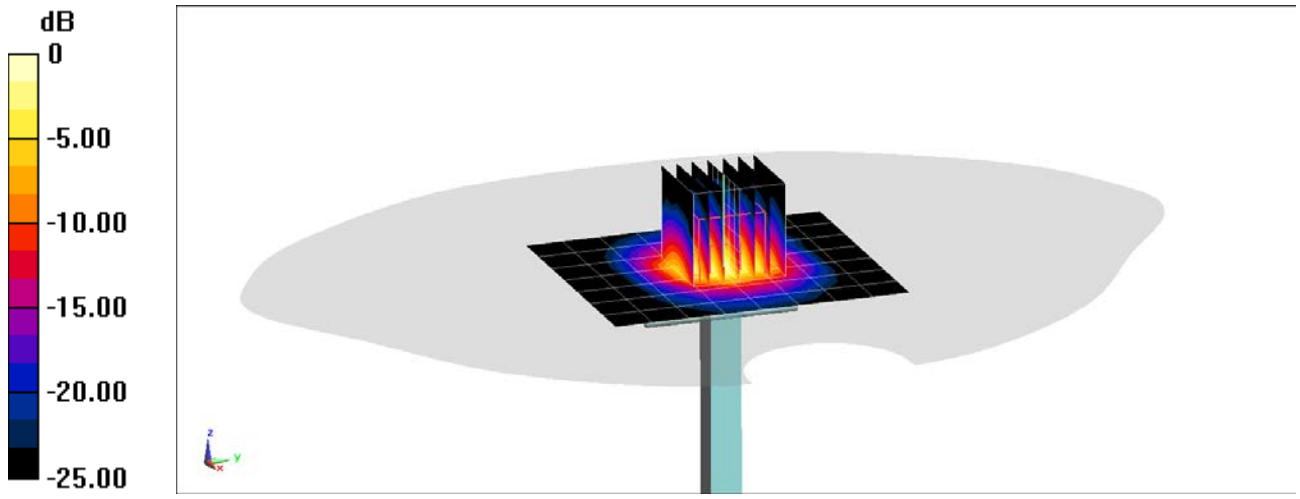
Communication System: UID 0, CW; Frequency: 3700 MHz; Duty Cycle: 1:1
Medium: 3700 Body Medium parameters used (interpolated):
f = 3700 MHz; σ = 3.397 S/m; ε_r = 50.758; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-04-2019; Ambient Temp: 20.7°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN3914; ConvF(6.64, 6.64, 6.64) @ 3700 MHz; Calibrated: 2/14/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

3700 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 5.99 W/kg
Deviation(1 g) = -6.84%



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

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

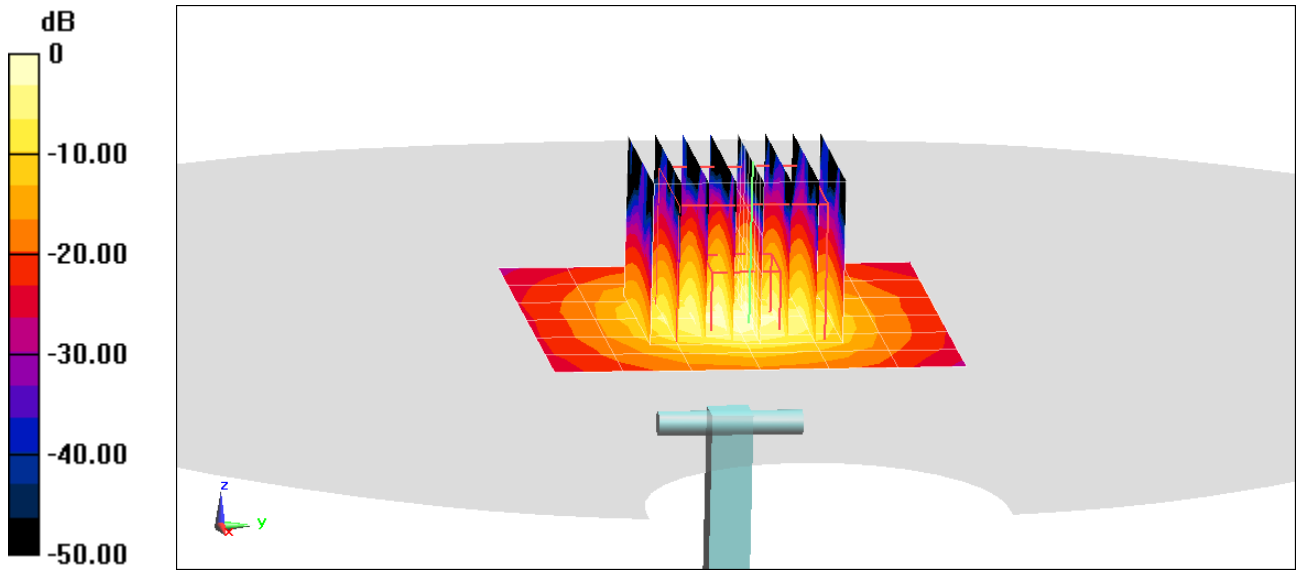
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.448 S/m; ε_r = 48.121; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5250 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 14.3 W/kg
SAR(1 g) = 3.5 W/kg; SAR(10 g) = 0.973 W/kg
Deviation(1 g) = -9.09%; Deviation(10 g) = -9.91%



0 dB = 8.62 W/kg = 9.36 dBW/kg

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

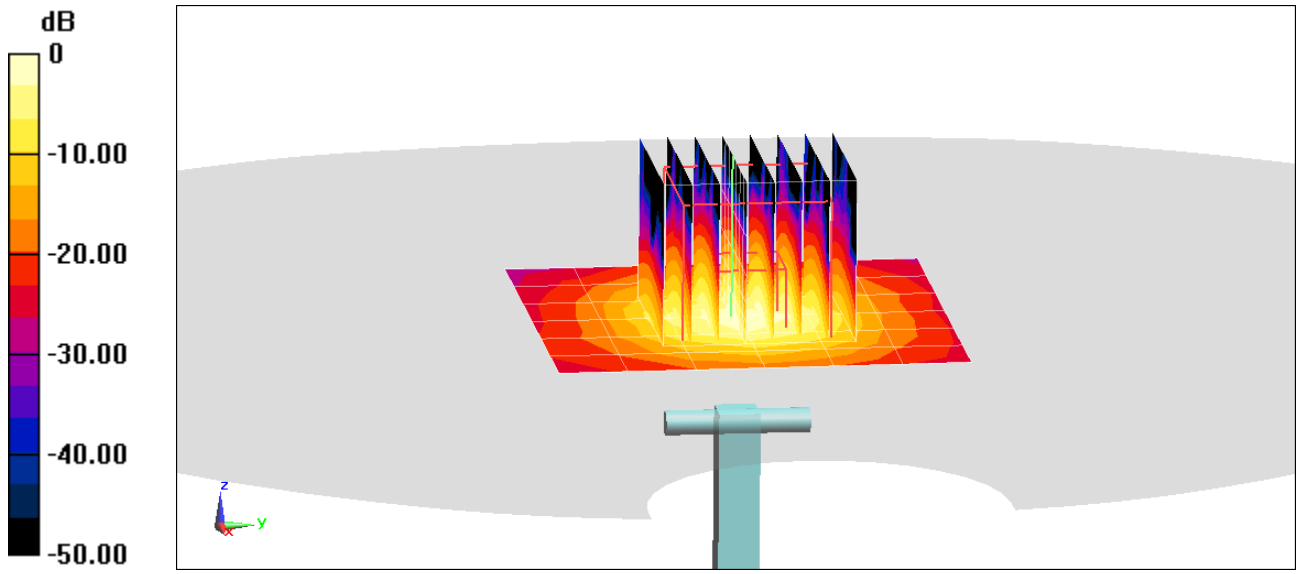
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.969 S/m; ε_r = 47.449; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 17.4 W/kg
SAR(1 g) = 3.74 W/kg; SAR(10 g) = 1.03 W/kg
Deviation(1 g) = -5.56%; Deviation(10 g) = -7.21%



0 dB = 9.20 W/kg = 9.64 dBW/kg

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

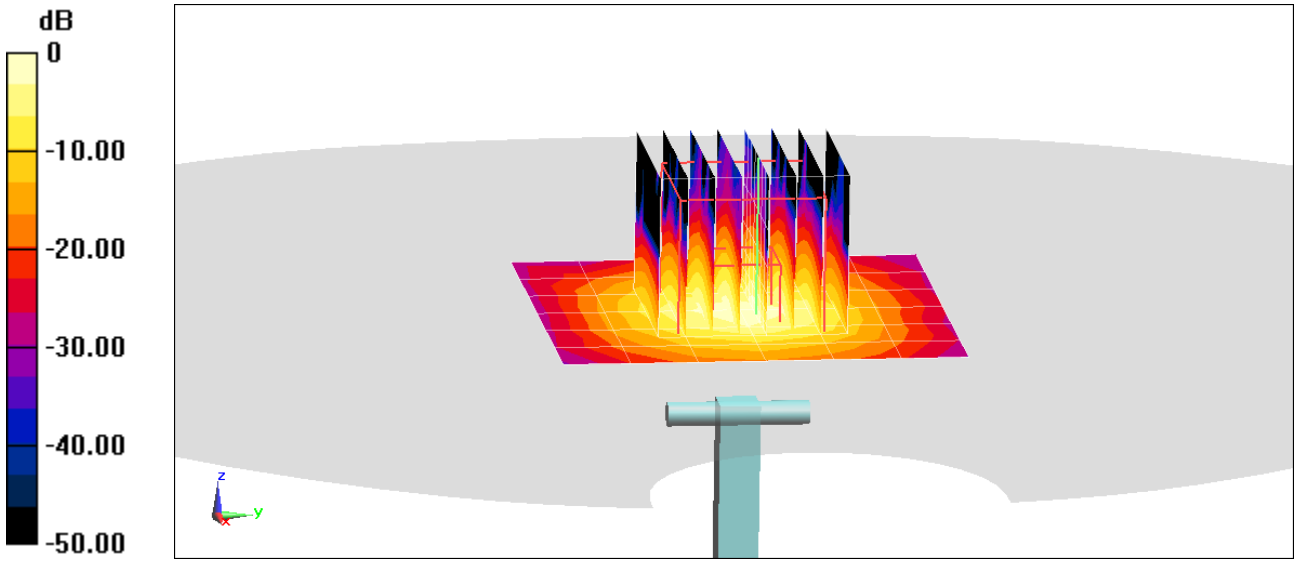
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.181 S/m; ε_r = 47.171; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01-29-2019; Ambient Temp: 22.0°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

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) = 16.2 W/kg
SAR(1 g) = 3.47 W/kg
Deviation(1 g) = -8.80%



0 dB = 8.65 W/kg = 9.37 dBW/kg

APPENDIX C: PROBE CALIBRATION

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Accreditation No.: SCS 0108

Client PC Test

Certificate No: D750V3-1161_Oct18

CALIBRATION CERTIFICATE

Object D750V3 - SN:1161

Calibration procedure(s) QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: October 19, 2018

BN ✓
10-30-2018

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Manu Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 22, 2018

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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
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	V52.10.2
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	40.8 ± 6 %	0.89 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	2.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.03 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.26 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 %	0.96 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	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.43 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.55 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 - 1.9 jΩ
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.6 Ω - 4.2 jΩ
Return Loss	- 27.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.032 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: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

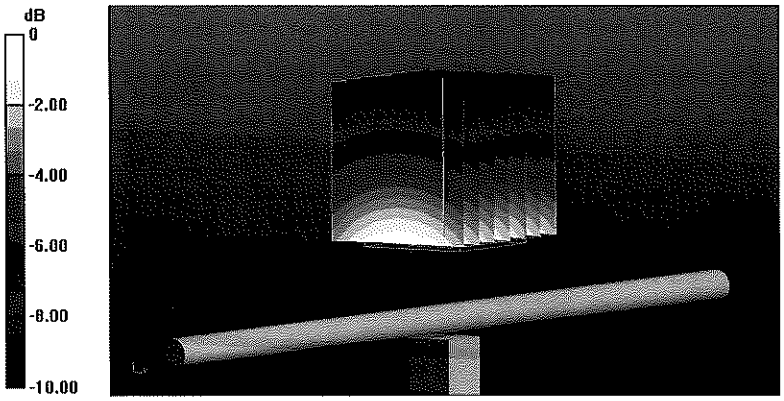
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.89 S/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

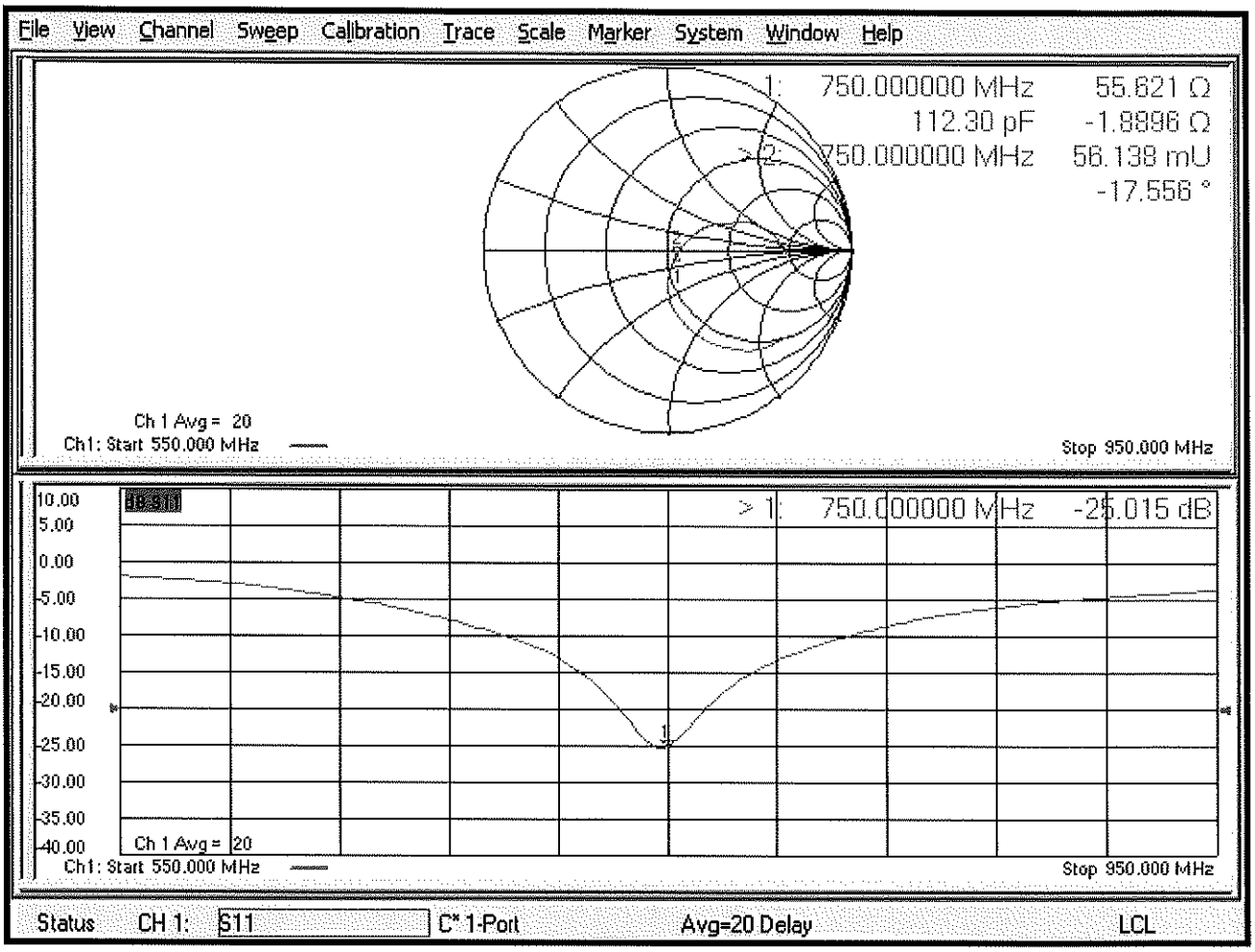
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.51 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.04 W/kg
SAR(1 g) = 2.02 W/kg; SAR(10 g) = 1.32 W/kg
Maximum value of SAR (measured) = 2.70 W/kg



0 dB = 2.70 W/kg = 4.31 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

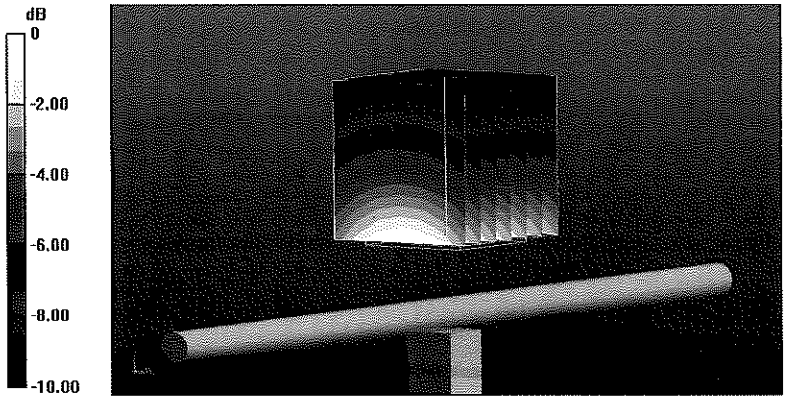
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

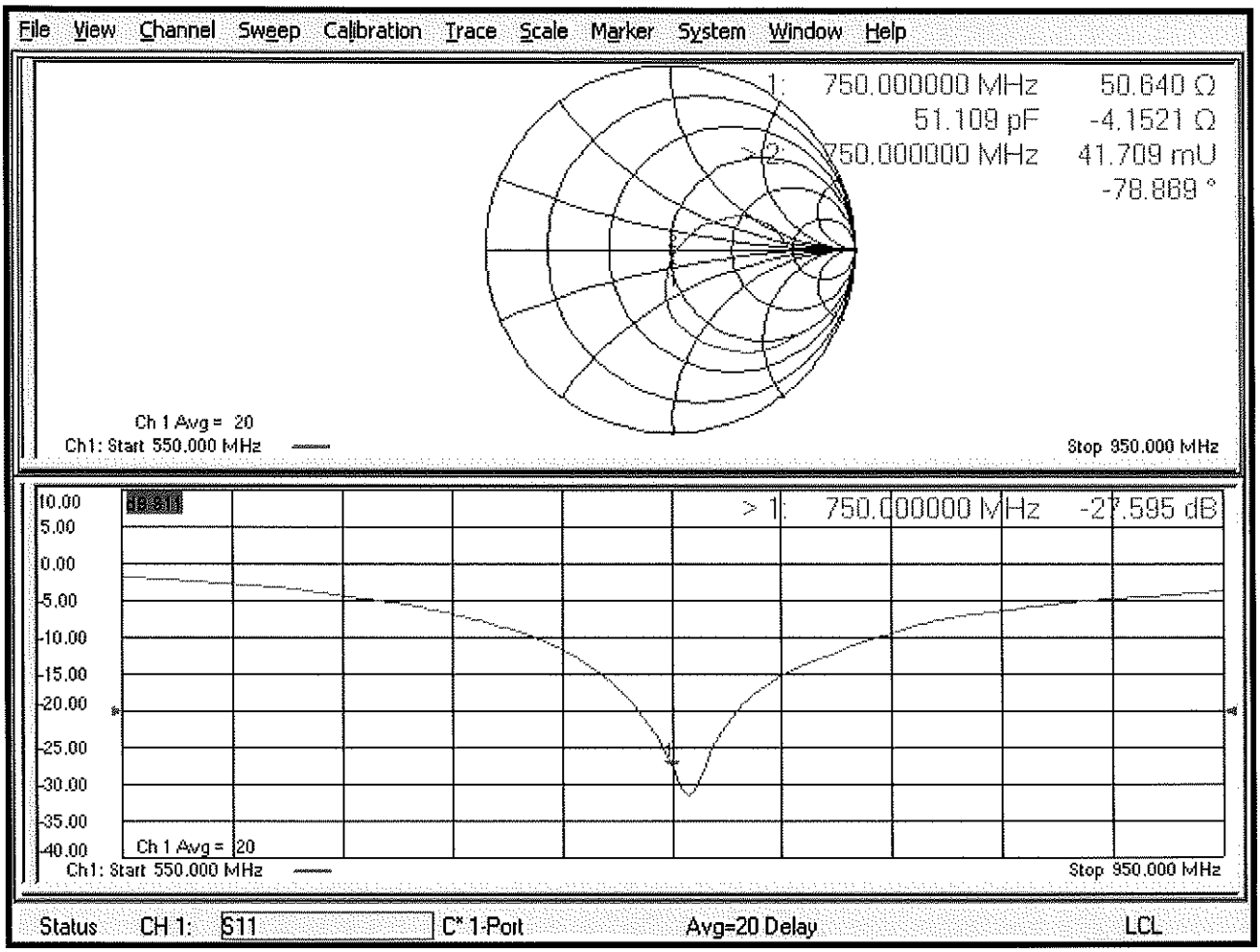
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.57 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.18 W/kg
SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (measured) = 2.83 W/kg



0 dB = 2.83 W/kg = 4.52 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client PC Test

Certificate No: D835V2-4d047_Oct18

CALIBRATION CERTIFICATE

Object: D835V2 - SN:4d047

Calibration procedure(s): QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: October 19, 2018

BN ✓
10-30-2018

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Manu Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 22, 2018

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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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
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	V52.10.2
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 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.47 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.14 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 %	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	2.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.71 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (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	**6.36 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	51.0 Ω - 0.5 jΩ
Return Loss	- 39.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.6 Ω - 4.1 jΩ
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 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: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

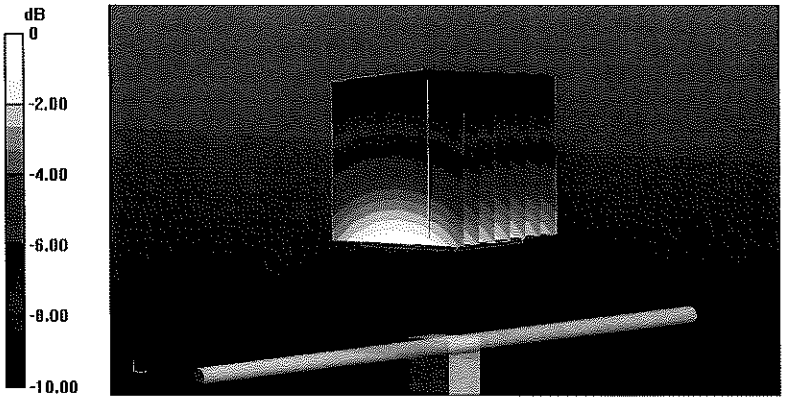
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

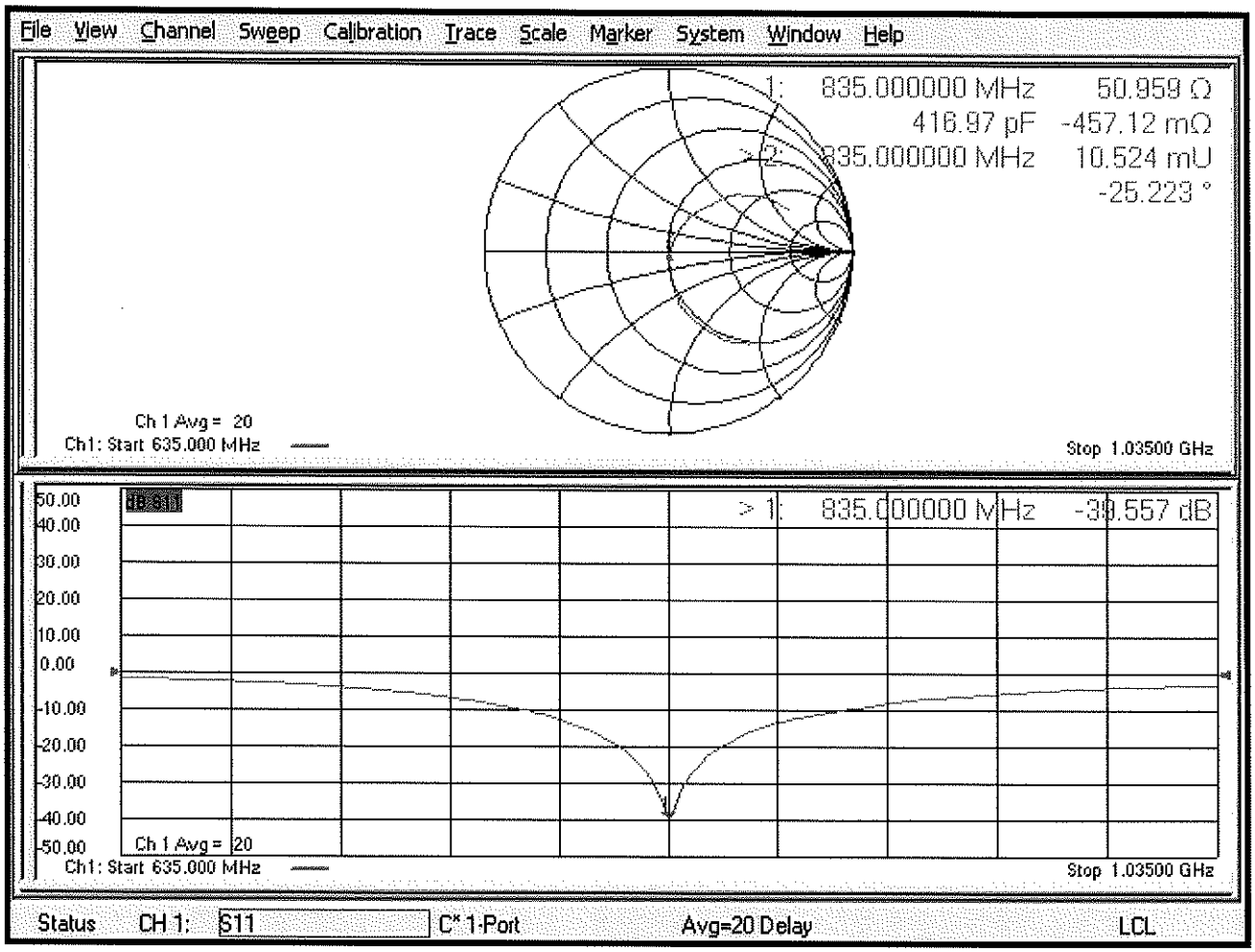
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.84 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.55 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

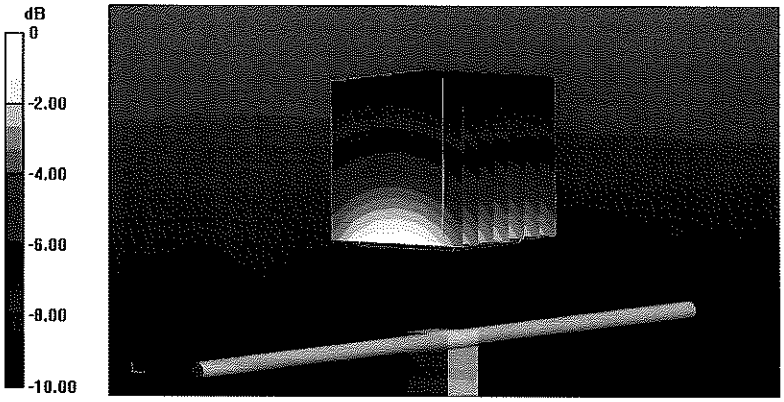
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

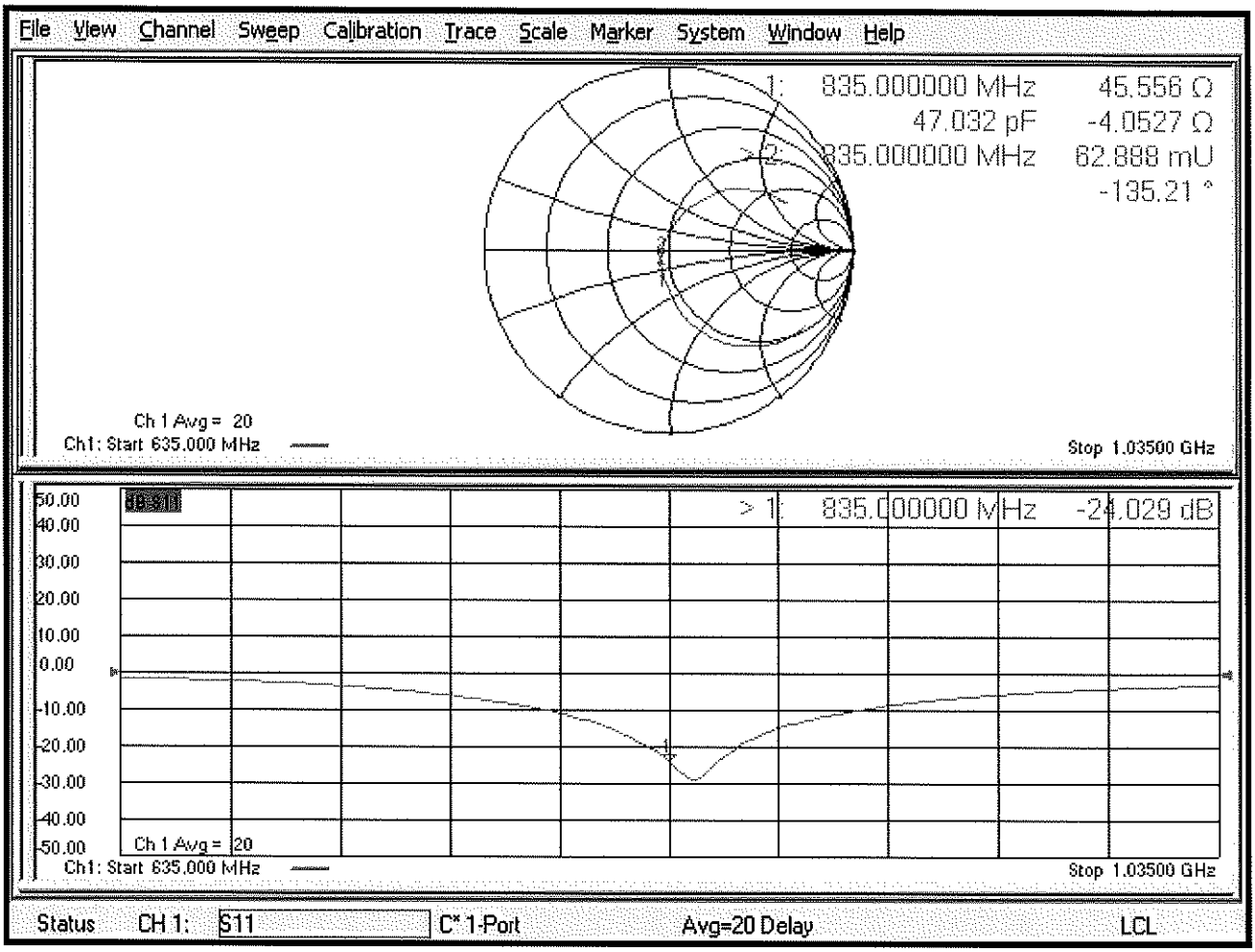
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.27 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.28 W/kg



0 dB = 3.28 W/kg = 5.16 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d133_Oct18

CALIBRATION CERTIFICATE

Object D835V2 - SN:4d133

Calibration procedure(s) QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

BN ✓
10/30/2018

Calibration date: October 19, 2018

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Manu Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 22, 2018

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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
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	V52.10.2
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 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.43 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 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 %	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	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.75 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.40 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω - 2.4 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.0 Ω - 6.7 jΩ
Return Loss	- 21.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.397 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: 19.10.2018

Test Laboratory: The name of your organization

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

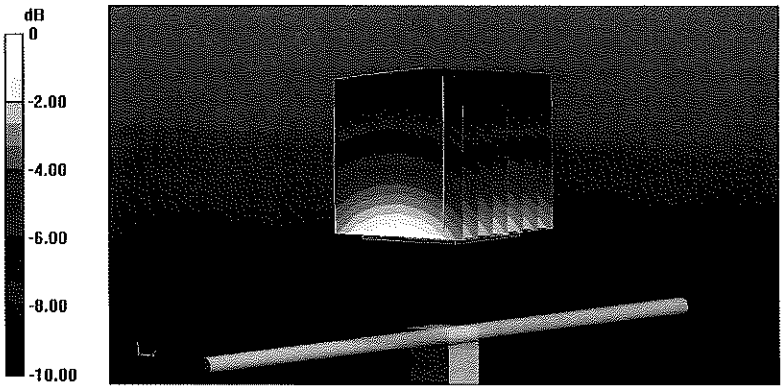
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

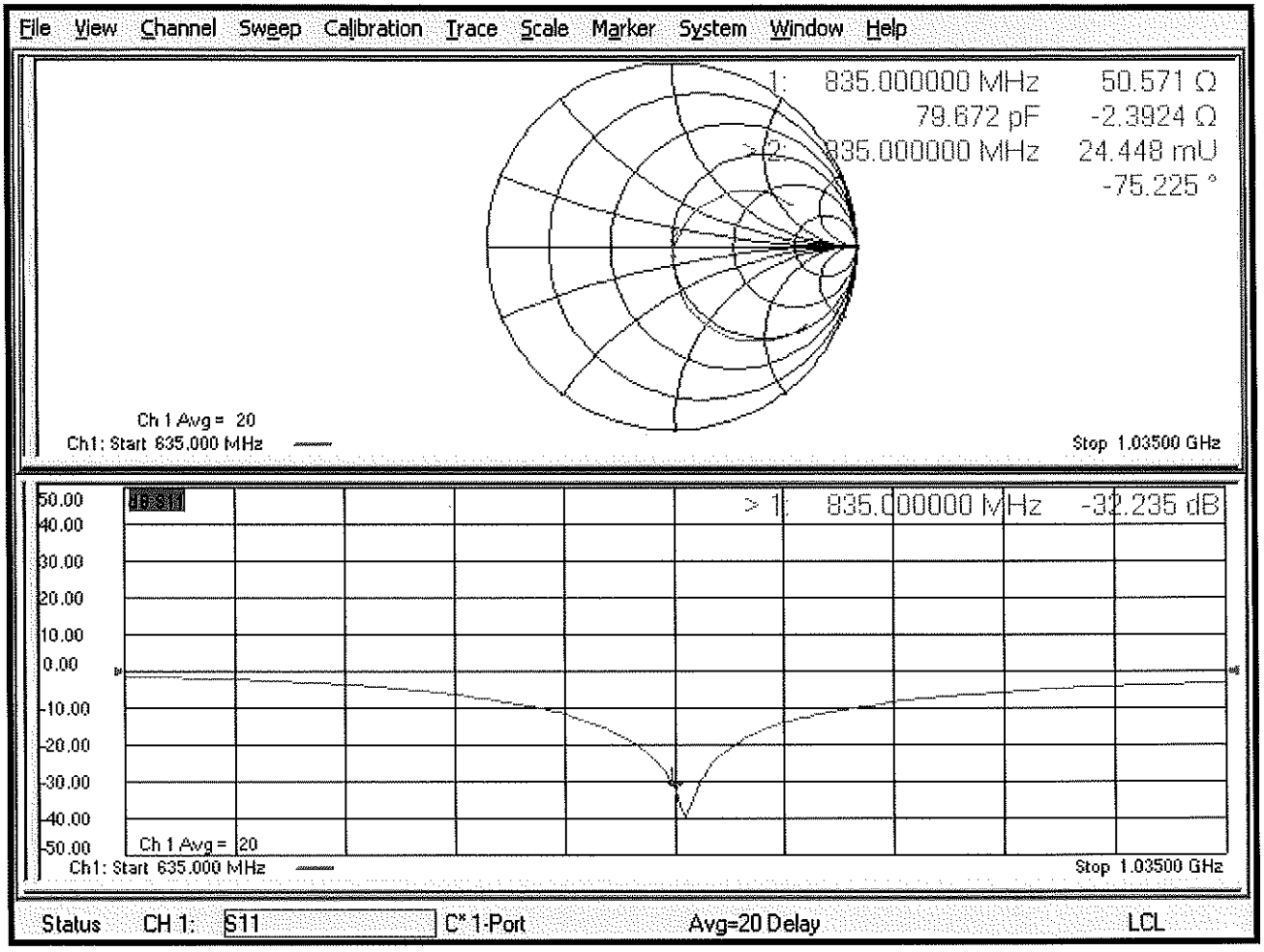
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.02 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.54 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 19.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

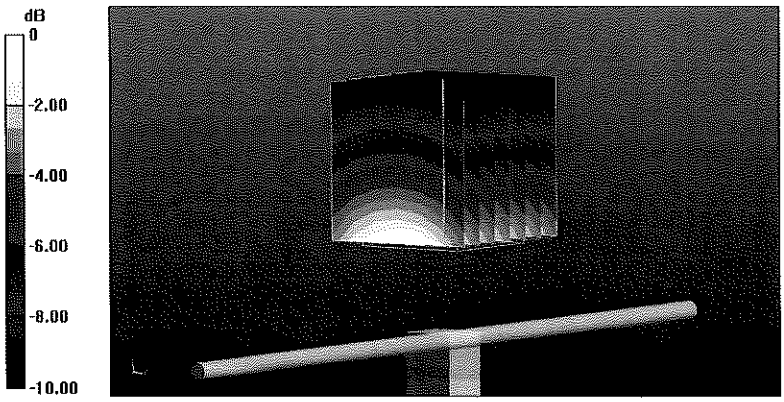
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

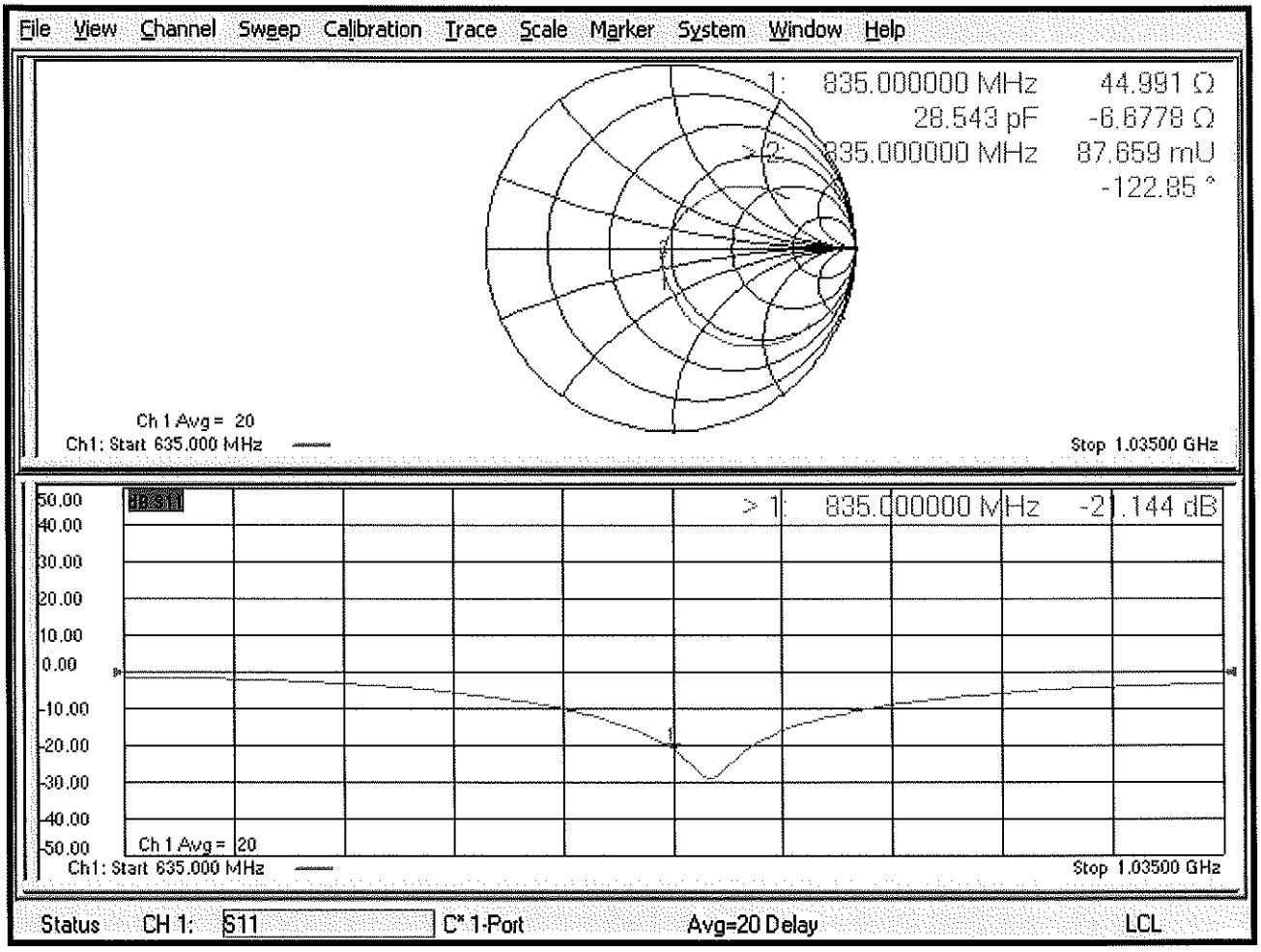
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.61 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 3.28 W/kg



0 dB = 3.28 W/kg = 5.16 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1765V2-1008_May18

CALIBRATION CERTIFICATE

Object: D1765V2 - SN:1008

Calibration procedure(s): QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

BN ✓ 7/16/2018

Calibration date: May 23, 2018

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

	Name	Function	Signature
Calibrated by:	Manu Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 23, 2018

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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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 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	39.0 ± 6 %	1.34 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	**36.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.0 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	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.2 ± 6 %	1.46 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	9.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.9 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	47.7 Ω - 6.5 jΩ
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.3 Ω - 6.0 jΩ
Return Loss	- 20.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.210 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2005

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L

SAR result with SAM Head (Top)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.4 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.9 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.2 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.4 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.4 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.2 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	7.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**28.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**16.1 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

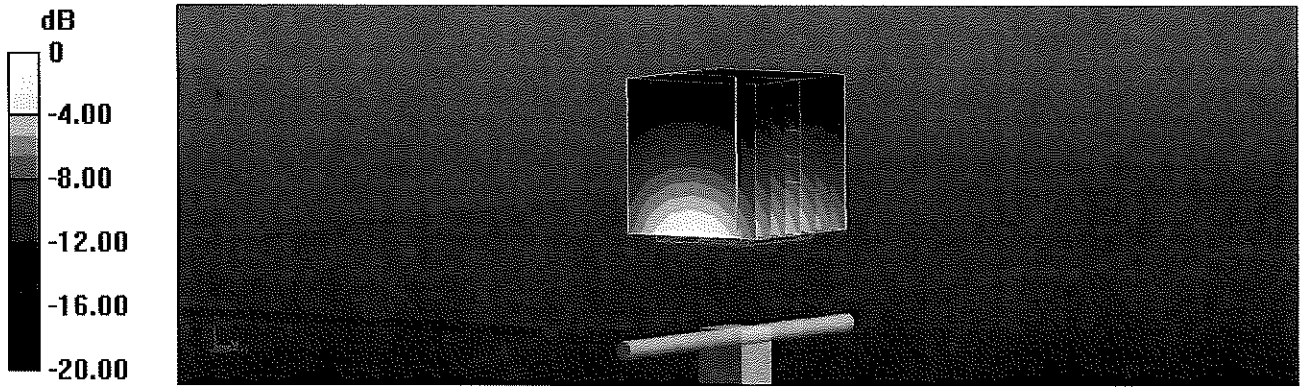
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.34 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

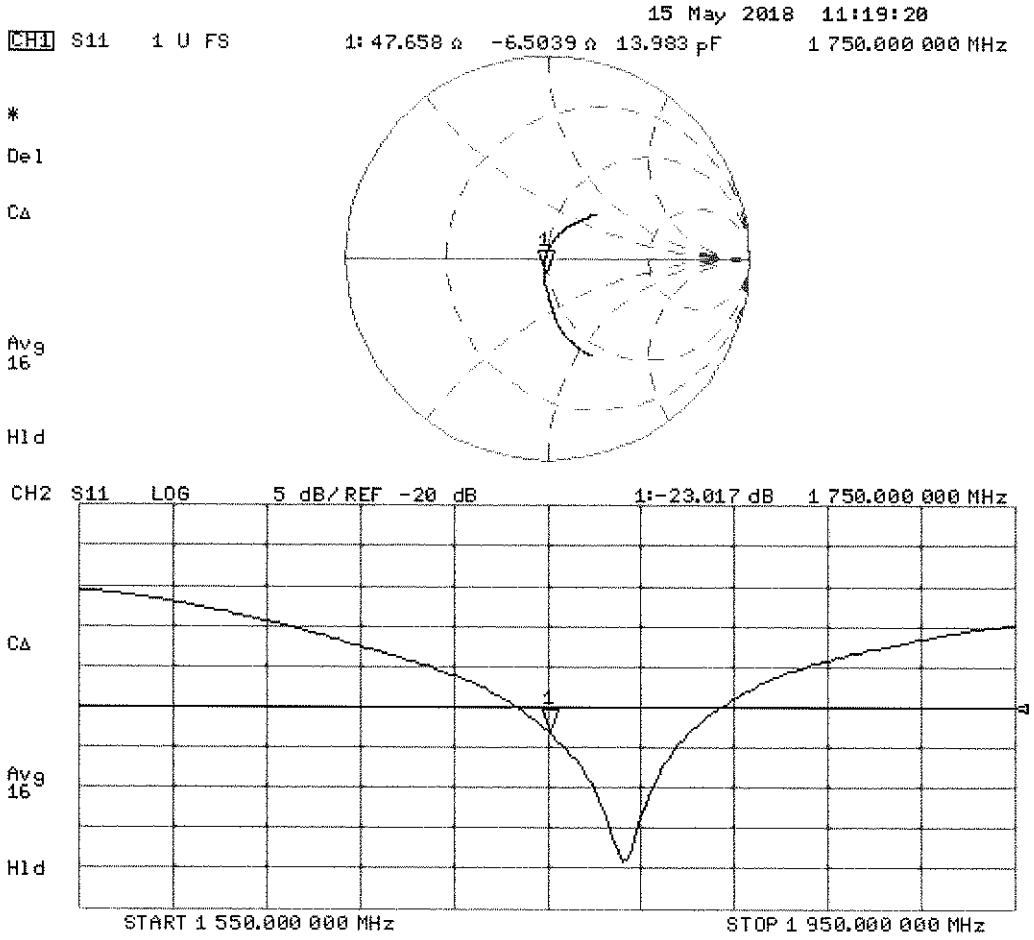
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 8.94 W/kg; SAR(10 g) = 4.71 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

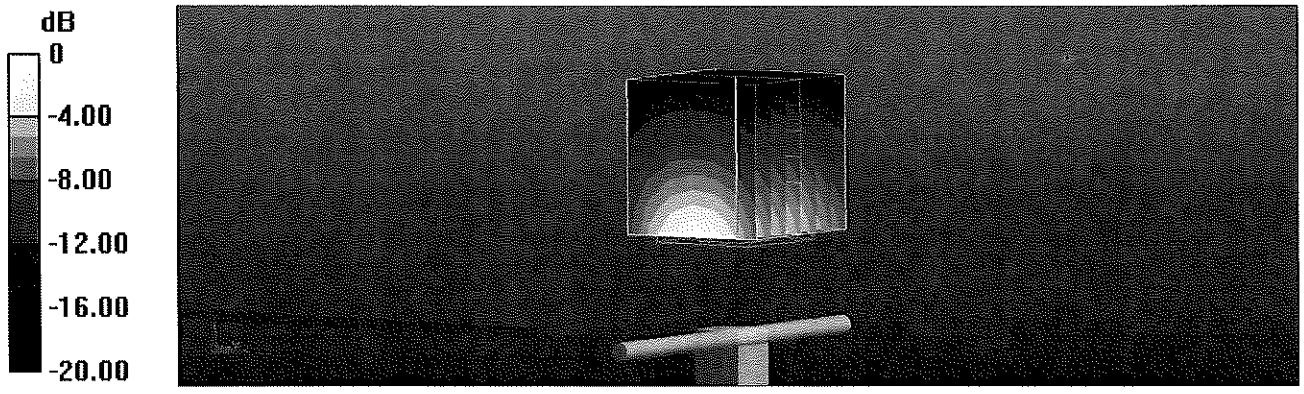
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.46 S/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

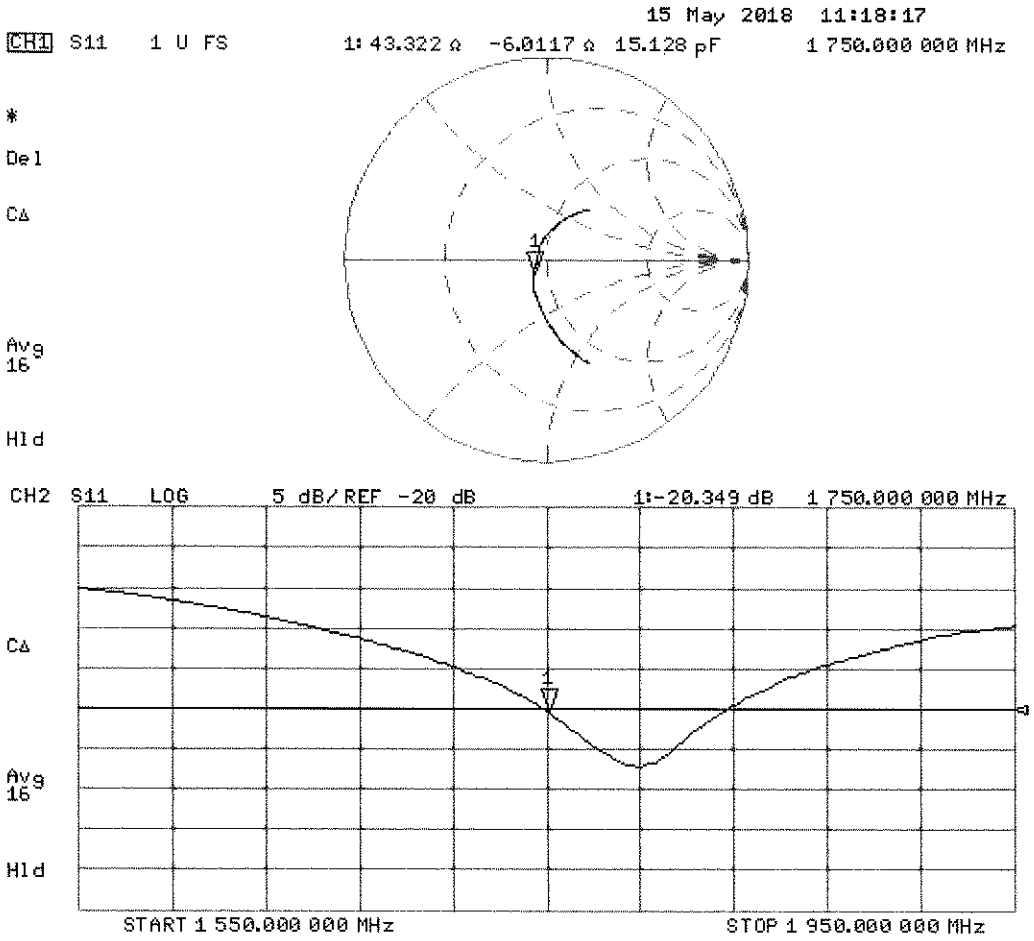
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.4 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.21 W/kg; SAR(10 g) = 4.92 W/kg
Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.37 dBW/kg

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 23.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 41.8; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

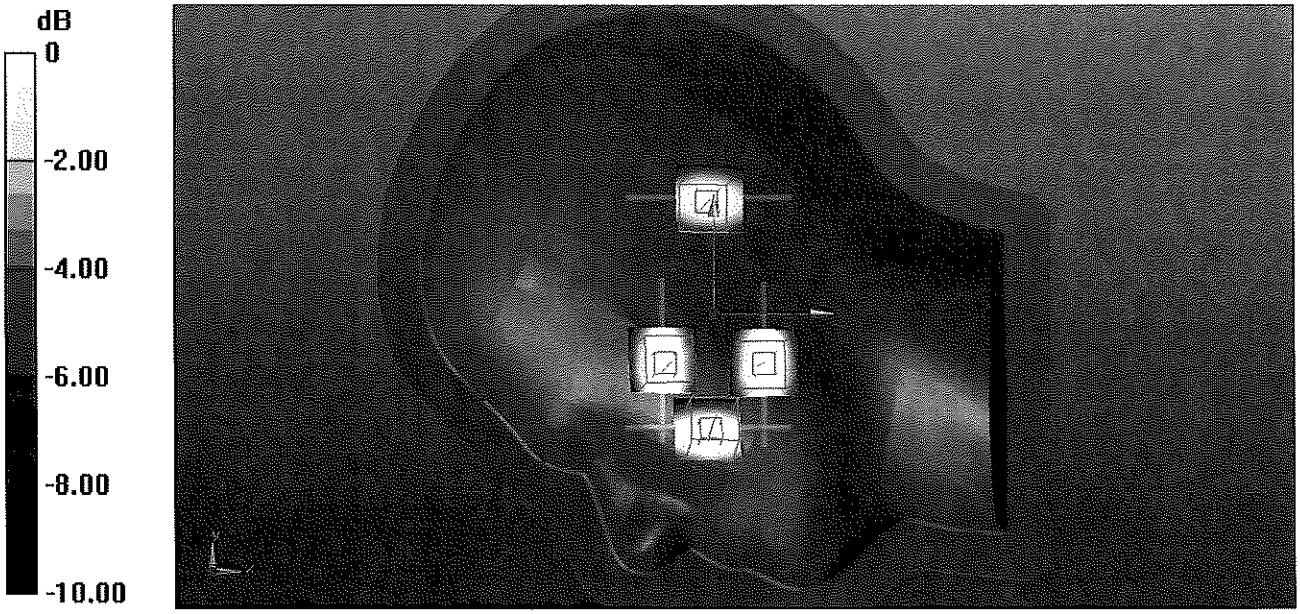
- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

SAM/Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.8 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.95 W/kg
Maximum value of SAR (measured) = 13.9 W/kg

SAM/Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.2 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.47 W/kg; SAR(10 g) = 5.06 W/kg
Maximum value of SAR (measured) = 13.7 W/kg

SAM/Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.7 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.26 W/kg; SAR(10 g) = 5.02 W/kg
Maximum value of SAR (measured) = 13.8 W/kg

SAM/Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.46 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 11.8 W/kg
SAR(1 g) = 7.12 W/kg; SAR(10 g) = 4.01 W/kg
Maximum value of SAR (measured) = 10.3 W/kg



0 dB = 10.3 W/kg = 10.13 dBW/kg

Calibration Laboratory of
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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: D1900V2-5d149_Oct18

CALIBRATION CERTIFICATE

Object D1900V2 - SN:5d149

Calibration procedure(s) QA CAL-05.v10
Calibration procedure for dipole validation kits above 700 MHz

BNV
10-30-2018

Calibration date: October 23, 2018

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	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

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

Issued: October 23, 2018

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