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SAR EVALUATION REPORT

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

Date of Testing:
01/01/20 - 02/03/20
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1911260209-01-R2.A3L

FCC ID: **A3LSMG981JPN**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: SC-51A, SCG01

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	0.17	0.17	0.44	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.28	1.21	3.13
PCE	UMTS 850	826.40 - 846.60 MHz	0.22	0.25	0.42	N/A
PCE	LTE Band 12	699.7 - 715.3 MHz	< 0.1	0.19	0.26	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	0.19	0.27	0.34	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.16	0.19	0.37	N/A
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.17	0.78	0.88	2.20
PCE	LTE Band 41	2498.5 - 2687.5 MHz	< 0.1	0.41	1.12	2.55
DTS	2.4 GHz WLAN	2412 - 2472 MHz	0.33	0.12	0.48	N/A
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	N/A	N/A
NII	U-NII-2A	5260 - 5320 MHz	< 0.1	0.19	N/A	1.26
NII	U-NII-2C	5500 - 5720 MHz	< 0.1	0.21	N/A	1.31
NII	U-NII-3	5745 - 5825 MHz	< 0.1	0.30	0.51	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.19	< 0.1	< 0.1	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			0.65	1.53	1.50	3.86

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.

Note: This revised Test Report (S/N: 1M1911260209-01-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

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TESTING CERT#2041.01

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2472 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	555 Hz - 8.33 kHz

1.2 Power Reduction for SAR

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under portable hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when hotspot is enabled. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions. Detailed descriptions of the power reduction mechanism are included in the operational description.

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

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 Output Power

GSM/GPRS/EDGE 850										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
Max	Max allowed power	33.0	33.0	32.5	30.5	28.5	27.5	26.0	24.0	23.0
	Nominal	32.0	32.0	31.5	29.5	27.5	26.5	25.0	23.0	22.0

GSM/GPRS/EDGE 1900										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
Max	Max allowed power	30.5	30.5	29.5	27.0	25.5	25.5	25.0	23.0	22.0
	Nominal	29.5	29.5	28.5	26.0	24.5	24.5	24.0	22.0	21.0
Hotspot Mode Active	Max allowed power	N/A	28.5	27.5	25.5	23.5	25.5	25.0	23.0	22.0
	Nominal	N/A	27.5	26.5	24.5	22.5	24.5	24.0	22.0	21.0
Grip Sensor Active	Max allowed power	28.5	28.5	27.5	25.5	23.5	25.5	25.0	23.0	22.0
	Nominal	27.5	27.5	26.5	24.5	22.5	24.5	24.0	22.0	21.0

UMTS Band 5 (850 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6
Max	Max allowed power	25.0	24.0	24.0
	Nominal	24.0	23.0	23.0

Mode / Band		Modulated Average Output Power (in dBm)		
		Max	Hotspot Mode Active	Grip Sensor Active
LTE FDD Band 12	Max allowed power	24.0	24.0	24.0
	Nominal	23.0	23.0	23.0
LTE FDD Band 13	Max allowed power	24.0	24.0	24.0
	Nominal	23.0	23.0	23.0
LTE FDD Band 5	Max allowed power	24.0	24.0	24.0
	Nominal	23.0	23.0	23.0
LTE FDD Band 4	Max allowed power	23.5	19.5	20.0
	Nominal	22.5	18.5	19.0
LTE TDD Band 41	Max allowed power	24.0	22.0	23.0
	Nominal	23.0	21.0	22.0

1.3.2 Maximum Bluetooth and SISO/MIMO WLAN Output Power

Note: Targets for 802.11ax RU operations can be found in Appendix H.

Mode	Band	IEEE 802.11 (in dBm)													
		SISO								MIMO					
		b		g		n		ax (SU)		g (CDD + STBC)		n (CDD+STBC, SDM)		ax (SU) (CDD+STBC, SDM)	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
2.4 GHz WIFI	2.45 GHz	21.0 ch. 12: 17.0 ch. 13: 17.0	20.0 16.0 16.0	18.5 ch. 12: 14.5 ch. 13: 10.5	17.5 13.5 9.5	18.5 ch. 12: 14.5 ch. 13: 10.5	17.5 13.5 9.5	16.0 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 13.0 ch. 13: 11.5	15.0 14.5 12.0 12.0 10.5	21.5 ch. 12: 17.5 ch. 13: 13.5	20.5 16.5 12.5	21.5 ch. 12: 17.5 ch. 13: 13.5	20.5 16.5 12.5	16.0 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 13.0 ch. 13: 11.5	15.0 14.5 12.0 12.0 10.5

Mode	Band	IEEE 802.11 (in dBm)															
		SISO								MIMO							
		a		n		ac		ax (SU)		a (CDD + STBC)		n (CDD+STBC, SDM)		ac (CDD+STBC, SDM)		ax (SU) (CDD+STBC, SDM)	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
5 GHz WIFI (20MHz BW)	5200 MHz	16.5	15.5	16.5	15.5	16.5	15.5	16.5 ch. 36: 14.5	15.5 13.5	19.5	18.5	19.5	18.5	19.5	18.5	17.0 ch. 36: 14.5	16.0 13.5
	5300 MHz	16.5	15.5	16.5	15.5	16.5	15.5	16.5 ch. 64: 15.0	15.5 14.0	19.5	18.5	19.5	18.5	19.5	18.5	17.0 ch. 64: 15.0	16.0 14.0
	5500 MHz	16.5	15.5	16.5	15.5	16.5	15.5	16.5	15.5	18.5	17.5	18.5	17.5	18.5	17.5	17.0	16.0
	5800 MHz	16.5	15.5	16.5	15.5	16.5	15.5	16.5	15.5	17.5	16.5	17.5	16.5	17.5	16.5	17.0	16.0
5 GHz WIFI (40MHz BW)	5200 MHz			16.0 ch. 38: 14.5	15.0 13.5	16.0 ch. 38: 14.5	15.0 13.5	16.0 ch. 38: 12.0	15.0 11.0			19.0 ch. 38: 17.5	18.0 16.5	19.0 ch. 38: 17.5	18.0 16.5	16.0 ch. 38: 12.0	15.0 11.0
	5300 MHz			16.0 ch. 62: 14.5	15.0 13.5	16.0 ch. 62: 14.5	15.0 13.5	16.0 ch. 62: 10.5	15.0 9.5			19.0 ch. 62: 17.5	18.0 16.5	19.0 ch. 62: 17.5	18.0 16.5	16.0 ch. 62: 10.5	15.0 9.5
	5500 MHz			16.0 ch. 102: 15.5	15.0 14.5	16.0 ch. 102: 15.5	15.0 14.5	16.0 ch. 102: 14.0	15.0 13.0			18.0	17.0	18.0	17.0	16.0 ch. 102: 14.0	15.0 13.0
	5800 MHz			16.0	15.0	16.0	15.0	16.0	15.0			17.0	16.0	17.0	16.0	16.0	15.0
5 GHz WIFI (80MHz BW)	5200 MHz					13.5	12.5	13.0	12.0					16.5	15.5	13.0	12.0
	5300 MHz					13.5	12.5	11.0	10.0					16.5	15.5	11.0	10.0
	5500 MHz					16.0 ch. 106: 14.0	15.0 13.0	15.0 ch. 106: 12.5	14.0 11.5					18.0 ch. 106: 17.0	17.0 16.0	15.0 ch. 106: 12.5	14.0 11.5
	5800 MHz					16.0	15.0	15.0	14.0					17.0	16.0	15.0	14.0

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	**13.5**
	Nominal	**12.5**
Bluetooth EDR	Maximum	**12.5**
	Nominal	**11.5**
Bluetooth LE (2 Mbps)	Maximum	**9.0**
	Nominal	**8.0**
Bluetooth LE (1 Mbps, 125/500 Kbps)	Maximum	**7.5**
	Nominal	**6.5**

1.3.3 2.4 GHz Reduced WLAN Output Powers

Note: Targets for 802.11ax RU operations can be found in Appendix H

The below table is applicable in the following conditions:

- Head conditions
- Simultaneous conditions with 2.4 GHz WLAN and 5 GHz WLAN

Mode	Band	IEEE 802.11 (in dBm)													
		SISO								MIMO					
		b		g		n		ax (SU)		g (CDD + STBC)		n (CDD+STBC, SDM)		ax (SU) (CDD+STBC, SDM)	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
2.4 GHz WIFI	2.45 GHz	17.0	16.0	17.0 ch. 12: 14.5 ch. 13: 10.5	16.0 13.5 9.5	17.0 ch. 12: 14.5 ch. 13: 10.5	16.0 13.5 9.5	16.0 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 13.0 ch. 13: 11.5	15.0 14.5 12.0 12.0 10.5	20.0 ch. 12: 17.5 ch. 13: 13.5	19.0 16.5 12.5	20.0 ch. 12: 17.5 ch. 13: 13.5	19.0 16.5 12.5	16.0 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 13.0 ch. 13: 11.5	15.0 14.5 12.0 12.0 10.5

The below table is applicable in the following conditions:

- Head conditions during simultaneous conditions with 2.4 GHz WLAN and 5 GHz WLAN

Mode	Band	IEEE 802.11 (in dBm)													
		SISO								MIMO					
		b		g		n		ax (SU)		g (CDD + STBC)		n (CDD+STBC, SDM)		ax (SU) (CDD+STBC, SDM)	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
2.4 GHz WIFI	2.45 GHz	14.0	13.0	14.0 ch. 13: 10.5	13.0 9.5	14.0 ch. 13: 10.5	13.0 9.5	14.0 ch. 11: 13.0 ch. 12: 13.0 ch. 13: 11.5	13.0 12.0 12.0 10.5	17.0 ch. 13: 13.5	16.0 12.5	17.0 ch. 13: 13.5	16.0 12.5	16.0 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 13.0 ch. 13: 11.5	15.0 14.5 12.0 12.0 10.5

1.3.4 5 GHz Reduced WLAN Output Powers

Note: Targets for 802.11ax RU operations can be found in Appendix H

The below table is applicable in the following conditions

- Head conditions
- Simultaneous conditions with 2.4 GHz WLAN and 5 GHz WLAN
- Head conditions during simultaneous conditions with 2.4 GHz WLAN and 5 GHz WLAN

Mode	Band	IEEE 802.11 (in dBm)													
		SISO								MIMO					
		a		n		ac		ax (SU)		n (CDD+STBC, SDM)		ac (CDD+STBC, SDM)		ax (SU) (CDD+STBC, SDM)	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
5 GHz WIFI (20MHz BW)	5200 MHz	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	17.0	16.0	17.0	16.0	17.0 ch. 36: 14.5	16.0 13.5
	5300 MHz	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	17.0	16.0	17.0	16.0	17.0 ch. 64: 15.0	16.0 14.0
	5500 MHz	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	17.0	16.0	17.0	16.0	17.0	16.0
	5800 MHz	14.0	13.0	14.0	13.0	14.0	13.0	14.0	13.0	17.0	16.0	17.0	16.0	17.0	16.0
5 GHz WIFI (40MHz BW)	5200 MHz			14.0	13.0	14.0	13.0	14.0 ch. 38: 12.0	13.0 11.0	17.0	16.0	17.0	16.0	16.0 ch. 38: 12.0	15.0 11.0
	5300 MHz			14.0	13.0	14.0	13.0	14.0 ch. 62: 10.5	13.0 9.5	17.0	16.0	17.0	16.0	16.0 ch. 62: 10.5	15.0 9.5
	5500 MHz			14.0	13.0	14.0	13.0	14.0	13.0	17.0	16.0	17.0	16.0	16.0 ch. 102: 14.0	15.0 13.0
	5800 MHz			14.0	13.0	14.0	13.0	14.0	13.0	17.0	16.0	17.0	16.0	16.0	15.0
5 GHz WIFI (80MHz BW)	5200 MHz					13.5	12.5	13.0	12.0			16.5	15.5	13.0	12.0
	5300 MHz					13.5	12.5	11.0	10.0			16.5	15.5	11.0	10.0
	5500 MHz					14.0	13.0	14.0 ch. 106: 12.5	13.0 11.5			17.0	16.0	15.0 ch. 106: 12.5	14.0 11.5
	5800 MHz					14.0	13.0	14.0	13.0			17.0	16.0	15.0	14.0

1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. The overall diagonal dimension of the device is ≤160 mm and the diagonal display is ≤150 mm. A diagram showing the location of the device antennas can be found in APPENDIX E:. Since the diagonal dimension of this device is > 160 mm and <200 mm, it is considered a "phablet."

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
LTE Band 12	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 41	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN Ant 1	Yes	Yes	Yes	No	No	Yes
2.4 GHz WLAN Ant 2	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN Ant 1	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN Ant 2	Yes	Yes	Yes	No	No	Yes
Bluetooth	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-1, U-NII-2A, U-NII-2C operations are disabled.

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 E:.

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.

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 WI-FI + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
7	GSM voice + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
8	GSM voice + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
9	GSM voice + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
10	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
11	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
12	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
13	UMTS + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
14	UMTS + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
15	UMTS + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
16	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
17	UMTS + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
18	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
19	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
20	LTE + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
21	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
22	LTE + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
23	LTE + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
24	LTE + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
25	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
26	LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
27	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
28	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	Yes	
29	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	Yes	Yes	
30	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
31	GPRS/EDGE + 2.4 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
32	GPRS/EDGE + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
33	GPRS/EDGE + 2.4 GHz WI-FI + 5 GHz WI-FI	N/A	N/A	Yes	Yes	
34	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
35	GPRS/EDGE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
36	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered

1. 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, 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/ax. 802.11a/g/n/ac/ax supports CDD and STBC and 802.11n/ac/ax 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.

1.7 Miscellaneous SAR Test Considerations

(A) WIFI/BT

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

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

This device supports IEEE 802.11ax with the following features:

a) Up to 80 MHz Bandwidth only for 5 GHz
b) Up to 20 MHz Bandwidth only for 2.4 GHz
c) No aggregate channel configurations
d) 2 Tx antenna output
e) Up to 1024 QAM is supported
f) TDWR and Band gap channels are supported for 5 GHz
g) MU-MIMO UL Operations are not 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-1, U-NII-2A & U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

Per April 2019 TCB Workshop Notes, SAR testing was not required for 802.11ax when applying the initial test configuration procedures of KDB 248227, with 802.11ax considered a higher order 802.11 mode.

(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 F.

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. Phablet SAR was not evaluated for licensed technologies since wireless router 1g SAR was < 1.2 W/kg for these modes.

This device supports downlink 4x4 MIMO operations for some LTE Bands. Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

This device supports LTE Carrier Aggregation (CA) for LTE Band 41, with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per 2017 Fall TCB Workshop Notes.

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

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)
- April 2019 TCB Workshop Notes (IEEE 802.11ax, Dynamic Antenna Tuning)

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.

2 LTE INFORMATION

LTE Information					
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 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 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 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	DL UE Cat 20, UL UE Cat 18				
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 14. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 14 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

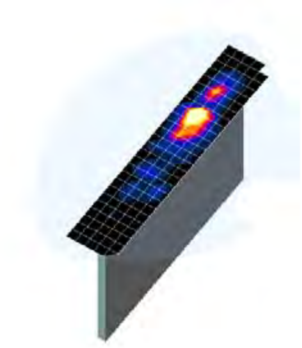


Figure 4-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
    a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

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

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

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

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

*Also compliant to IEEE 1528-2013 Table 6

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

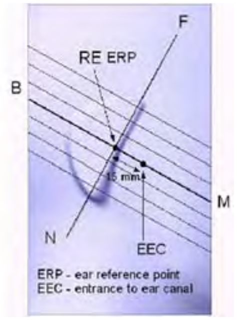


Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

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

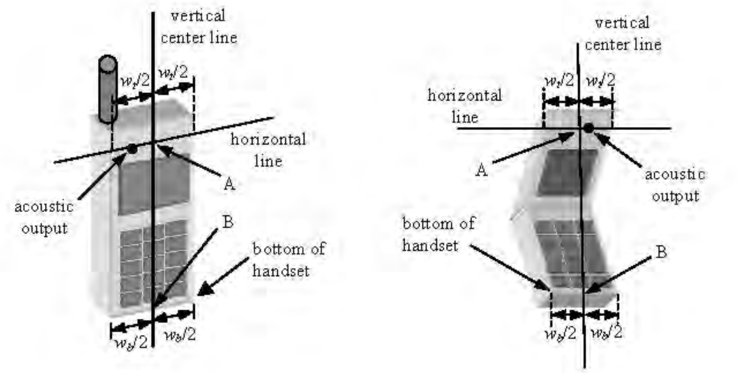


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

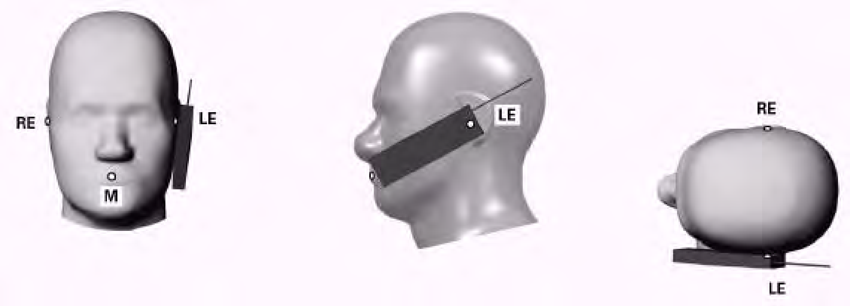


Figure 6-1 Front, Side and Top View of Cheek Position

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

6.3 Positioning for Ear / 15º Tilt

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

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

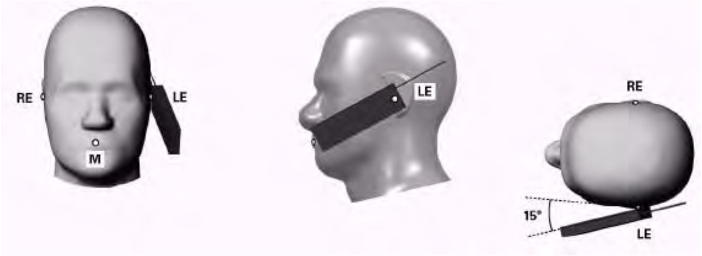


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

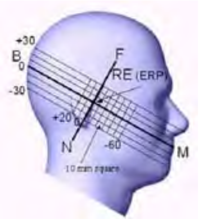


Figure 6-3
Side view w/ relevant markings

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

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

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

6.5 Body-Worn Accessory Configurations

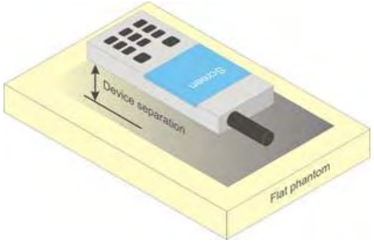


Figure 6-4
Sample Body-Worn Diagram

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.

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

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

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 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 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.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

8.2 3G SAR Test Reduction Procedure

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

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

8.4.2 Head SAR Measurements

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

8.4.3 Body SAR Measurements

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

8.4.4 SAR Measurements with Rel 5 HSDPA

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

8.4.5 SAR Measurements with Rel 6 HSUPA

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

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

8.5 SAR Measurement Conditions for LTE

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

8.5.1 Spectrum Plots for RB Configurations

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

8.5.2 MPR

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

8.5.3 A-MPR

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

8.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.

c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.

d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

8.5.5 TDD

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

8.5.6 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. 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 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/ax 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. Per April 2019 TCB Workshop guidance, 802.11ax was considered the highest order 802.11 mode. 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.

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.

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**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	32.22	32.23	31.55	**29.50**	27.47	26.72	25.32	23.32	22.23
	190	32.43	32.46	32.03	**29.91**	27.84	27.24	25.69	23.53	22.62
	251	32.27	32.29	31.73	**29.53**	27.56	26.95	25.24	23.33	22.30
GSM 1900	512	29.76	29.77	**28.75**	26.32	24.68	25.50	24.31	22.18	21.06
	661	29.60	29.64	**28.60**	26.08	24.46	25.15	23.83	22.05	21.29
	810	30.00	30.02	**28.87**	26.03	24.68	25.40	24.08	22.28	21.35

Calculated Maximum Frame-Averaged Output Power

		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	23.19	23.20	25.53	**25.24**	24.46	17.69	19.30	19.06	19.22
	190	23.40	23.43	26.01	**25.65**	24.83	18.21	19.67	19.27	19.61
	251	23.24	23.26	25.71	**25.27**	24.55	17.92	19.22	19.07	19.29
GSM 1900	512	20.73	20.74	**22.73**	22.06	21.67	16.47	18.29	17.92	18.05
	661	20.57	20.61	**22.58**	21.82	21.45	16.12	17.81	17.79	18.28
	810	20.97	20.99	**22.85**	21.77	21.67	16.37	18.06	18.02	18.34

GSM 850	**Frame Avg.Targets:**	22.97	22.97	25.48	**25.24**	24.49	17.47	18.98	18.74	18.99
GSM 1900		20.47	20.47	**22.48**	21.74	21.49	15.47	17.98	17.74	17.99

Table 9-2
Reduced 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**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 1900	512	27.74	27.85	26.60	**24.48**	22.90	25.32	23.80	21.90	20.78
	661	27.24	27.38	26.38	**24.30**	22.73	25.01	23.63	21.80	20.84
	810	27.94	28.12	26.61	**24.58**	22.98	25.50	24.21	22.31	21.22

Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 1900	512	18.71	18.82	20.58	**20.22**	19.89	16.29	17.78	17.64	17.77
	661	18.21	18.35	20.36	**20.04**	19.72	15.98	17.61	17.54	17.83
	810	18.91	19.09	20.59	**20.32**	19.97	16.47	18.19	18.05	18.21
GSM 1900	**Frame Avg.Targets:**	18.47	18.47	20.48	**20.24**	19.49	15.47	17.98	17.74	17.99

Note:

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

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

Figure 9-1
Power Measurement Setup

9.2 UMTS Conducted Powers

Table 9-3
Maximum Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	24.28	24.50	24.41	-
99		12.2 kbps AMR	24.28	24.55	24.41	-
6	HSDPA	Subtest 1	22.23	22.44	22.30	0
6		Subtest 2	22.24	22.44	22.28	0
6		Subtest 3	20.71	20.97	20.82	0.5
6		Subtest 4	20.73	20.96	20.81	0.5
6	HSUPA	Subtest 1	22.24	22.43	22.29	0
6		Subtest 2	19.25	19.45	19.30	2
6		Subtest 3	20.24	20.45	20.30	1
6		Subtest 4	19.25	19.44	19.31	2
6		Subtest 5	22.26	22.46	22.30	0

This device does not support DC-HSDPA.

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

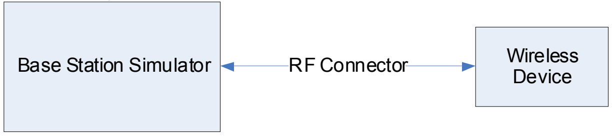


Figure 9-2
Power Measurement Setup

9.3 LTE Conducted Powers

9.3.1 LTE Band 12

Table 9-4
LTE Band 12 Conducted Powers - 10 MHz Bandwidth

LTE Band 12 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			23095 (707.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	**23.25**	0	0
	1	25	23.11		0
	1	49	23.02		0
	25	0	22.21	0-1	1
	25	12	**22.24**		1
	25	25	22.03		1
	50	0	22.18		1
16QAM	1	0	22.29	0-1	1
	1	25	22.08		1
	1	49	21.96		1
	25	0	21.25	0-2	2
	25	12	21.29		2
	25	25	21.11		2
	50	0	21.17		2
64QAM	1	0	21.39	0-2	2
	1	25	21.22		2
	1	49	21.04		2
	25	0	20.26	0-3	3
	25	12	20.31		3
	25	25	20.12		3
	50	0	20.22		3

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

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

LTE Band 12 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			23035 (701.5 MHz)	23095 (707.5 MHz)	23155 (713.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.39	23.03	22.84	0	0
	1	12	23.24	23.01	22.68		0
	1	24	23.10	22.83	22.63		0
	12	0	22.36	22.16	21.96	0-1	1
	12	6	22.34	22.08	21.94		1
	12	13	22.22	22.02	21.88		1
	25	0	22.32	22.06	21.92		1
16QAM	1	0	22.79	22.44	22.24	0-1	1
	1	12	22.66	22.31	22.17		1
	1	24	22.59	22.20	22.08		1
	12	0	21.46	21.26	21.01	0-2	2
	12	6	21.45	21.17	21.02		2
	12	13	21.31	21.09	20.94		2
	25	0	21.34	21.11	20.92		2
64QAM	1	0	21.71	21.67	21.04	0-2	2
	1	12	21.52	21.49	20.93		2
	1	24	21.48	21.35	20.83		2
	12	0	20.47	20.26	19.88	0-3	3
	12	6	20.43	20.18	19.85		3
	12	13	20.29	20.12	19.78		3
	25	0	20.34	20.16	19.94		3

Table 9-6
LTE Band 12 Conducted Powers - 3 MHz Bandwidth

LTE Band 12 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			23025 (700.5 MHz)	23095 (707.5 MHz)	23165 (714.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.36	23.17	22.90	0	0
	1	7	23.27	23.05	22.73		0
	1	14	23.16	22.94	22.75		0
	8	0	22.41	22.12	21.88	0-1	1
	8	4	22.34	22.06	21.87		1
	8	7	22.30	22.03	21.83		1
	15	0	22.33	22.06	21.89		1
16QAM	1	0	22.68	22.90	22.44	0-1	1
	1	7	22.50	22.74	22.30		1
	1	14	22.52	22.66	22.27		1
	8	0	21.44	21.19	20.85	0-2	2
	8	4	21.40	21.13	20.84		2
	8	7	21.35	21.07	20.81		2
	15	0	21.39	21.17	21.00		2
64QAM	1	0	21.86	21.62	20.98	0-2	2
	1	7	21.75	21.45	20.80		2
	1	14	21.66	21.41	20.84		2
	8	0	20.42	20.22	19.95	0-3	3
	8	4	20.35	20.13	19.95		3
	8	7	20.33	20.08	19.91		3
	15	0	20.40	20.11	20.00		3

Table 9-7
LTE Band 12 Conducted Powers -1.4 MHz Bandwidth

LTE Band 12 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			23017 (699.7 MHz)	23095 (707.5 MHz)	23173 (715.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.22	22.98	22.74	0	0
	1	2	23.26	23.05	22.80		0
	1	5	23.13	22.92	22.68		0
	3	0	23.24	22.97	22.73		0
	3	2	23.28	22.91	22.77		0
	3	3	23.18	22.88	22.74		0
	6	0	22.31	21.98	21.76	0-1	1
16QAM	1	0	22.54	22.33	22.26	0-1	1
	1	2	22.62	22.41	22.28		1
	1	5	22.50	22.25	22.19		1
	3	0	22.43	22.13	21.85		1
	3	2	22.45	22.10	21.88		1
	3	3	22.35	22.07	21.84		1
	6	0	21.43	21.02	20.85	0-2	2
64QAM	1	0	21.70	21.54	20.81	0-2	2
	1	2	21.76	21.59	20.88		2
	1	5	21.63	21.46	20.77		2
	3	0	21.36	21.12	20.88		2
	3	2	21.40	21.08	20.92		2
	3	3	21.28	21.04	20.85		2
	6	0	20.34	19.91	19.92	0-3	3

9.3.2 LTE Band 13

Table 9-8
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

LTE Band 13 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			23230 (782.0 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	23.56	0	0
	1	25	23.57		0
	1	49	**23.70**		0
	25	0	22.80	0-1	1
	25	12	22.85		1
	25	25	**22.89**		1
	50	0	22.75		1
16QAM	1	0	22.71	0-1	1
	1	25	22.85		1
	1	49	22.88		1
	25	0	21.93	0-2	2
	25	12	21.94		2
	25	25	21.98		2
	50	0	21.84		2
64QAM	1	0	21.93	0-2	2
	1	25	22.00		2
	1	49	21.97		2
	25	0	20.88	0-3	3
	25	12	20.91		3
	25	25	20.93		3
	50	0	20.85		3

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

LTE Band 13 5 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			23230 (782.0 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	23.55	0	0
	1	12	23.62		0
	1	24	23.69		0
	12	0	22.67	0-1	1
	12	6	22.76		1
	12	13	22.80		1
	25	0	22.72		1
16QAM	1	0	22.94	0-1	1
	1	12	22.97		1
	1	24	23.00		1
	12	0	21.71	0-2	2
	12	6	21.78		2
	12	13	21.82		2
	25	0	21.82		2
64QAM	1	0	21.76	0-2	2
	1	12	21.84		2
	1	24	21.92		2
	12	0	20.78	0-3	3
	12	6	20.84		3
	12	13	20.89		3
	25	0	20.78		3

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

9.3.3 LTE Band 5 (Cell)

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

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20525 (836.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	23.33	0	0
	1	25	**23.36**		0
	1	49	23.33		0
	25	0	22.38	0-1	1
	25	12	22.40		1
	25	25	**22.41**		1
	50	0	22.30		1
16QAM	1	0	22.31	0-1	1
	1	25	22.35		1
	1	49	22.37		1
	25	0	21.42	0-2	2
	25	12	21.43		2
	25	25	21.45		2
	50	0	21.29		2
64QAM	1	0	21.39	0-2	2
	1	25	21.49		2
	1	49	21.43		2
	25	0	20.45	0-3	3
	25	12	20.48		3
	25	25	20.46		3
	50	0	20.35		3

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

Table 9-11
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20425 (826.5 MHz)	20525 (836.5 MHz)	20625 (846.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.09	23.27	23.11	0	0
	1	12	23.16	23.40	23.19		0
	1	24	23.27	23.38	23.11		0
	12	0	22.19	22.39	22.23	0-1	1
	12	6	22.30	22.44	22.28		1
	12	13	22.29	22.43	22.31		1
	25	0	22.25	22.37	22.26		1
16QAM	1	0	22.22	22.65	22.52	0-1	1
	1	12	22.38	22.75	22.56		1
	1	24	22.39	22.75	22.66		1
	12	0	21.16	21.58	21.28	0-2	2
	12	6	21.28	21.59	21.34		2
	12	13	21.26	21.62	21.31		2
	25	0	21.29	21.41	21.34		2
64QAM	1	0	21.45	21.36	21.32	0-2	2
	1	12	21.51	21.54	21.44		2
	1	24	21.54	21.50	21.37		2
	12	0	20.28	20.38	20.36	0-3	3
	12	6	20.40	20.42	20.37		3
	12	13	20.36	20.40	20.37		3
	25	0	20.33	20.39	20.31		3

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

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20415 (825.5 MHz)	20525 (836.5 MHz)	20635 (847.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.98	23.18	23.04	0	0
	1	7	23.03	23.25	23.12		0
	1	14	23.05	23.26	23.20		0
	8	0	22.08	22.26	22.18	0-1	1
	8	4	22.14	22.33	22.22		1
	8	7	22.16	22.31	22.29		1
	15	0	22.14	22.24	22.20		1
16QAM	1	0	22.22	22.44	22.42	0-1	1
	1	7	22.38	22.57	22.52		1
	1	14	22.44	22.58	22.61		1
	8	0	21.17	21.37	21.29	0-2	2
	8	4	21.30	21.43	21.30		2
	8	7	21.24	21.42	21.35		2
	15	0	21.15	21.33	21.23		2
64QAM	1	0	21.25	21.42	21.33	0-2	2
	1	7	21.28	21.54	21.45		2
	1	14	21.31	21.49	21.32		2
	8	0	20.11	20.33	20.24	0-3	3
	8	4	20.23	20.40	20.29		3
	8	7	20.20	20.34	20.30		3
	15	0	20.16	20.34	20.24		3

Table 9-13
LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20407 (824.7 MHz)	20525 (836.5 MHz)	20643 (848.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.87	23.13	23.07	0	0
	1	2	22.96	23.26	23.10		0
	1	5	22.96	23.15	23.07		0
	3	0	22.90	23.14	23.06		0
	3	2	23.00	23.22	23.14		0
	3	3	22.95	23.14	23.08		0
	6	0	22.02	22.22	22.16	0-1	1
16QAM	1	0	22.27	22.46	22.40	0-1	1
	1	2	22.36	22.56	22.46		1
	1	5	22.33	22.52	22.55		1
	3	0	22.14	22.33	22.29		1
	3	2	22.20	22.41	22.32		1
	3	3	22.17	22.38	22.27		1
	6	0	21.13	21.30	21.25	0-2	2
64QAM	1	0	21.20	21.37	21.35	0-2	2
	1	2	21.20	21.54	21.41		2
	1	5	21.22	21.43	21.35		2
	3	0	21.09	21.31	21.27		2
	3	2	21.22	21.42	21.36		2
	3	3	21.15	21.41	21.29		2
	6	0	20.05	20.23	20.25	0-3	3

9.3.4 LTE Band 4 (AWS)

Table 9-14
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20175 (1732.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	22.47	0	0
	1	50	**22.63**		0
	1	99	22.56		0
	50	0	21.58	0-1	1
	50	25	**21.73**		1
	50	50	21.71		1
	100	0	21.65		1
16QAM	1	0	21.85	0-1	1
	1	50	21.90		1
	1	99	21.87		1
	50	0	20.56	0-2	2
	50	25	20.70		2
	50	50	20.72		2
	100	0	20.70		2
64QAM	1	0	20.31	0-2	2
	1	50	20.52		2
	1	99	20.64		2
	50	0	19.35	0-3	3
	50	25	19.54		3
	50	50	19.53		3
	100	0	19.52		3

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

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

LTE Band 4 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20025 (1717.5 MHz)	20175 (1732.5 MHz)	20325 (1747.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.27	22.26	22.58	0	0
	1	36	22.46	22.44	22.85		0
	1	74	22.39	22.45	22.92		0
	36	0	21.54	21.42	21.70	0-1	1
	36	18	21.59	21.57	21.79		1
	36	37	21.51	21.58	21.89		1
	75	0	21.53	21.52	21.75		1
16QAM	1	0	21.54	21.79	21.82	0-1	1
	1	36	21.74	21.99	22.15		1
	1	74	21.67	22.12	22.22		1
	36	0	20.55	20.42	20.72	0-2	2
	36	18	20.61	20.57	20.82		2
	36	37	20.49	20.57	20.92		2
	75	0	20.60	20.56	20.76		2
64QAM	1	0	20.31	20.22	20.95	0-2	2
	1	36	20.48	20.50	21.32		2
	1	74	20.32	20.56	21.35		2
	36	0	19.65	19.46	19.75	0-3	3
	36	18	19.73	19.63	19.83		3
	36	37	19.62	19.63	19.91		3
	75	0	19.61	19.59	19.79		3

Table 9-16
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	**RB Size**	**RB Offset**	**Low Channel**	**Mid Channel**	**High Channel**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
			20000 (1715.0 MHz)	**20175 (1732.5 MHz)**	**20350 (1750.0 MHz)**		
			Conducted Power [dBm]				
QPSK	1	0	22.06	22.02	22.27	0	0
	1	25	22.29	22.31	22.53		0
	1	49	22.05	22.14	22.34		0
	25	0	21.36	21.23	21.55	0-1	1
	25	12	21.36	21.40	21.73		1
	25	25	21.22	21.30	21.65		1
	50	0	21.25	21.31	21.63		1
16QAM	1	0	21.26	21.46	21.72	0-1	1
	1	25	21.52	21.79	22.01		1
	1	49	21.26	21.66	21.87		1
	25	0	20.41	20.30	20.65	0-2	2
	25	12	20.44	20.44	20.80		2
	25	25	20.28	20.34	20.75		2
	50	0	20.26	20.33	20.69		2
64QAM	1	0	20.03	19.91	20.53	0-2	2
	1	25	20.30	20.41	20.94		2
	1	49	19.98	20.20	20.76		2
	25	0	19.45	19.28	19.65	0-3	3
	25	12	19.45	19.46	19.83		3
	25	25	19.35	19.37	19.74		3
	50	0	19.32	19.34	19.71		3

Table 9-17
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	**RB Size**	**RB Offset**	**Low Channel**	**Mid Channel**	**High Channel**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
			19975 (1712.5 MHz)	**20175 (1732.5 MHz)**	**20375 (1752.5 MHz)**		
			Conducted Power [dBm]				
QPSK	1	0	22.37	22.23	22.62	0	0
	1	12	22.38	22.33	22.75		0
	1	24	22.30	22.33	22.68		0
	12	0	21.42	21.32	21.70	0-1	1
	12	6	21.48	21.40	21.78		1
	12	13	21.36	21.38	21.78		1
	25	0	21.42	21.38	21.70		1
16QAM	1	0	21.73	21.67	21.75	0-1	1
	1	12	21.76	21.74	21.90		1
	1	24	21.68	21.67	21.85		1
	12	0	20.61	20.51	20.75	0-2	2
	12	6	20.67	20.63	20.79		2
	12	13	20.56	20.58	20.76		2
	25	0	20.43	20.39	20.73		2
64QAM	1	0	20.50	20.39	21.01	0-2	2
	1	12	20.54	20.50	21.08		2
	1	24	20.41	20.40	21.05		2
	12	0	19.44	19.33	19.83	0-3	3
	12	6	19.47	19.41	19.85		3
	12	13	19.42	19.38	19.82		3
	25	0	19.44	19.40	19.80		3

Table 9-18
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19965 (1711.5 MHz)	20175 (1732.5 MHz)	20385 (1753.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.31	22.23	22.67	0	0
	1	7	22.26	22.24	22.68		0
	1	14	22.18	22.28	22.71		0
	8	0	21.41	21.28	21.73	0-1	1
	8	4	21.37	21.38	21.80		1
	8	7	21.35	21.32	21.79		1
	15	0	21.38	21.36	21.79		1
16QAM	1	0	21.77	21.46	22.26	0-1	1
	1	7	21.69	21.45	22.23		1
	1	14	21.62	21.46	22.25		1
	8	0	20.54	20.32	20.87	0-2	2
	8	4	20.50	20.42	20.96		2
	8	7	20.46	20.37	20.92		2
	15	0	20.48	20.32	20.88		2
64QAM	1	0	20.67	20.19	20.72	0-2	2
	1	7	20.59	20.19	20.75		2
	1	14	20.54	20.24	20.75		2
	8	0	19.43	19.39	19.84	0-3	3
	8	4	19.42	19.47	19.90		3
	8	7	19.34	19.44	19.86		3
	15	0	19.46	19.50	19.80		3

Table 9-19
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19957 (1710.7 MHz)	20175 (1732.5 MHz)	20393 (1754.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.38	22.10	22.64	0	0
	1	2	22.45	22.22	22.67		0
	1	5	22.37	22.16	22.65		0
	3	0	22.33	22.18	22.62		0
	3	2	22.36	22.24	22.65		0
	3	3	22.30	22.23	22.69		0
	6	0	21.33	21.31	21.69	0-1	1
16QAM	1	0	21.67	21.52	21.88	0-1	1
	1	2	21.76	21.69	21.93		1
	1	5	21.69	21.64	21.91		1
	3	0	21.55	21.30	21.86		1
	3	2	21.62	21.38	21.90		1
	3	3	21.57	21.34	21.94		1
	6	0	20.54	20.36	20.68	0-2	2
64QAM	1	0	20.79	20.44	20.42	0-2	2
	1	2	20.89	20.55	20.53		2
	1	5	20.77	20.50	20.44		2
	3	0	20.56	20.36	20.62		2
	3	2	20.58	20.49	20.67		2
	3	3	20.53	20.41	20.64		2
	6	0	19.30	19.34	19.63	0-3	3

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

LTE Band 4 (AWS) 20 MHz Bandwidth					
			Mid Channel		
			20175 (1732.5 MHz)		
Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	18.23	0	0
	1	50	**18.52**		0
	1	99	18.45		0
	50	0	18.41	0-1	0
	50	25	18.61		0
	50	50	**18.69**		0
	100	0	18.51		0
16QAM	1	0	18.78	0-1	0
	1	50	18.48		0
	1	99	18.69		0
	50	0	18.41	0-2	0
	50	25	18.59		0
	50	50	18.64		0
	100	0	18.51		0
64QAM	1	0	18.20	0-2	0
	1	50	18.45		0
	1	99	18.37		0
	50	0	18.47	0-3	0
	50	25	18.48		0
	50	50	18.65		0
	100	0	18.61		0

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

Table 9-21
LTE Band 4 (AWS) Reduced Conducted Powers (Hotspot mode) - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHz Bandwidth							
			Low Channel	Mid Channel	High Channel		
			20025 (1717.5 MHz)	20175 (1732.5 MHz)	20325 (1747.5 MHz)		
Modulation	RB Size	RB Offset	Conducted Power [dBm]			MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	18.15	18.15	18.34	0	0
	1	36	18.36	18.31	18.71		0
	1	74	18.25	18.37	18.64		0
	36	0	18.48	18.32	18.67	0-1	0
	36	18	18.52	18.45	18.75		0
	36	37	18.41	18.48	18.82		0
	75	0	18.48	18.44	18.70		0
16QAM	1	0	18.54	18.34	18.65	0-1	0
	1	36	18.72	18.71	18.97		0
	1	74	18.55	18.80	19.00		0
	36	0	18.48	18.33	18.62	0-2	0
	36	18	18.53	18.52	18.72		0
	36	37	18.46	18.48	18.82		0
	75	0	18.51	18.45	18.68		0
64QAM	1	0	18.56	18.35	18.65	0-2	0
	1	36	18.65	18.61	18.92		0
	1	74	18.48	18.61	18.99		0
	36	0	18.48	18.38	18.66	0-3	0
	36	18	18.55	18.52	18.77		0
	36	37	18.45	18.56	18.83		0
	75	0	18.50	18.45	18.69		0

Table 9-22
LTE Band 4 (AWS) Reduced Conducted Powers (Hotspot mode) - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20000 (1715.0 MHz)	20175 (1732.5 MHz)	20350 (1750.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.05	17.92	18.13	0	0
	1	25	18.27	18.18	18.60		0
	1	49	18.05	17.96	18.41		0
	25	0	18.32	18.14	18.51	0-1	0
	25	12	18.32	18.29	18.70		0
	25	25	18.21	18.18	18.66		0
	50	0	18.24	18.22	18.60		0
16QAM	1	0	18.30	18.20	18.70	0-1	0
	1	25	18.65	18.60	18.98		0
	1	49	18.35	18.47	18.79		0
	25	0	18.31	18.15	18.50	0-2	0
	25	12	18.28	18.34	18.67		0
	25	25	18.17	18.24	18.63		0
	50	0	18.22	18.22	18.59		0
64QAM	1	0	18.18	18.05	18.30	0-2	0
	1	25	18.57	18.39	18.79		0
	1	49	18.11	18.30	18.60		0
	25	0	18.33	18.16	18.48	0-3	0
	25	12	18.31	18.35	18.73		0
	25	25	18.22	18.22	18.61		0
	50	0	18.26	18.27	18.62		0

Table 9-23
LTE Band 4 (AWS) Reduced Conducted Powers (Hotspot mode) - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19975 (1712.5 MHz)	20175 (1732.5 MHz)	20375 (1752.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.25	18.08	18.53	0	0
	1	12	18.29	18.18	18.69		0
	1	24	18.14	18.20	18.51		0
	12	0	18.38	18.25	18.68	0-1	0
	12	6	18.42	18.35	18.69		0
	12	13	18.35	18.30	18.67		0
	25	0	18.34	18.29	18.64		0
16QAM	1	0	18.59	18.40	18.88	0-1	0
	1	12	18.60	18.57	18.94		0
	1	24	18.48	18.46	18.86		0
	12	0	18.44	18.30	18.68	0-2	0
	12	6	18.46	18.39	18.76		0
	12	13	18.36	18.37	18.71		0
	25	0	18.33	18.28	18.63		0
64QAM	1	0	18.43	18.33	18.71	0-2	0
	1	12	18.53	18.43	18.88		0
	1	24	18.45	18.47	18.83		0
	12	0	18.37	18.31	18.68	0-3	0
	12	6	18.39	18.41	18.74		0
	12	13	18.35	18.33	18.75		0
	25	0	18.35	18.29	18.65		0

Table 9-24
LTE Band 4 (AWS) Reduced Conducted Powers (Hotspot mode) - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19965 (1711.5 MHz)	20175 (1732.5 MHz)	20385 (1753.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.30	18.15	18.58	0	0
	1	7	18.28	18.23	18.55		0
	1	14	18.22	18.20	18.60		0
	8	0	18.40	18.28	18.66	0-1	0
	8	4	18.35	18.35	18.75		0
	8	7	18.29	18.31	18.71		0
	15	0	18.33	18.36	18.69		0
16QAM	1	0	18.60	18.48	18.88	0-1	0
	1	7	18.56	18.51	18.92		0
	1	14	18.50	18.52	18.94		0
	8	0	18.44	18.32	18.76	0-2	0
	8	4	18.42	18.40	18.87		0
	8	7	18.38	18.35	18.83		0
	15	0	18.33	18.31	18.74		0
64QAM	1	0	18.55	18.35	18.80	0-2	0
	1	7	18.50	18.44	18.89		0
	1	14	18.42	18.51	18.83		0
	8	0	18.38	18.27	18.71	0-3	0
	8	4	18.40	18.35	18.83		0
	8	7	18.34	18.32	18.71		0
	15	0	18.34	18.35	18.80		0

Table 9-25
LTE Band 4 (AWS) Reduced Conducted Powers (Hotspot mode) -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19957 (1710.7 MHz)	20175 (1732.5 MHz)	20393 (1754.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.24	18.08	18.54	0	0
	1	2	18.31	18.21	18.63		0
	1	5	18.18	18.11	18.57		0
	3	0	18.25	18.08	18.52		0
	3	2	18.26	18.17	18.56		0
	3	3	18.21	18.14	18.57		0
	6	0	18.30	18.23	18.60	0-1	0
16QAM	1	0	18.61	18.40	18.86	0-1	0
	1	2	18.60	18.48	18.81		0
	1	5	18.53	18.46	18.92		0
	3	0	18.41	18.29	18.68		0
	3	2	18.42	18.32	18.72		0
	3	3	18.38	18.26	18.75		0
	6	0	18.34	18.25	18.71	0-2	0
64QAM	1	0	18.49	18.33	18.76	0-2	0
	1	2	18.53	18.47	18.84		0
	1	5	18.48	18.34	18.83		0
	3	0	18.38	18.23	18.71		0
	3	2	18.43	18.36	18.73		0
	3	3	18.36	18.27	18.76		0
	6	0	18.31	18.22	18.62	0-3	0

Table 9-26
LTE Band 4 (AWS) Reduced Conducted Powers (Phablet with grip sensor active) - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20175 (1732.5 MHz)		
			Conducted Power [dBm]		
QPSK	1	0	18.73	0	0
	1	50	**19.10**		0
	1	99	18.95		0
	50	0	18.98	0-1	0
	50	25	18.87		0
	50	50	**19.18**		0
	100	0	19.05		0
16QAM	1	0	18.87	0-1	0
	1	50	19.03		0
	1	99	19.31		0
	50	0	18.92	0-2	0
	50	25	19.05		0
	50	50	19.19		0
	100	0	19.00		0
64QAM	1	0	19.19	0-2	0
	1	50	19.44		0
	1	99	19.02		0
	50	0	18.94	0-3	0
	50	25	19.05		0
	50	50	19.13		0
	100	0	19.10		0

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

Table 9-27
LTE Band 4 (AWS) Reduced Conducted Powers (Phablet with grip sensor active) - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20025 (1717.5 MHz)	20175 (1732.5 MHz)	20325 (1747.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.71	18.70	18.82	0	0
	1	36	18.88	18.86	19.19		0
	1	74	18.80	18.86	19.20		0
	36	0	18.99	18.87	19.16	0-1	0
	36	18	19.05	18.99	19.23		0
	36	37	18.94	19.04	19.30		0
	75	0	19.00	18.98	19.20		0
16QAM	1	0	19.05	18.92	19.16	0-1	0
	1	36	19.20	19.14	19.50		0
	1	74	19.07	19.37	19.60		0
	36	0	18.97	18.88	19.16	0-2	0
	36	18	19.03	18.97	19.26		0
	36	37	18.90	18.96	19.32		0
	75	0	18.98	18.93	19.17		0
64QAM	1	0	18.99	18.93	19.07	0-2	0
	1	36	19.20	19.12	19.43		0
	1	74	19.01	19.18	19.49		0
	36	0	18.99	18.88	19.17	0-3	0
	36	18	19.09	19.00	19.29		0
	36	37	18.96	19.04	19.34		0
	75	0	19.02	18.98	19.22		0

Table 9-28
LTE Band 4 (AWS) Reduced Conducted Powers (Phablet with grip sensor active) - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20000 (1715.0 MHz)	20175 (1732.5 MHz)	20350 (1750.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.47	18.44	18.70	0	0
	1	25	18.77	18.64	19.03		0
	1	49	18.48	18.49	18.81		0
	25	0	18.77	18.62	18.98	0-1	0
	25	12	18.77	18.84	19.16		0
	25	25	18.67	18.72	19.09		0
	50	0	18.72	18.72	19.08		0
16QAM	1	0	18.81	18.79	19.02	0-1	0
	1	25	19.17	19.11	19.49		0
	1	49	18.72	18.98	19.35		0
	25	0	18.81	18.61	19.02	0-2	0
	25	12	18.84	18.81	19.21		0
	25	25	18.69	18.69	19.05		0
	50	0	18.68	18.71	19.09		0
64QAM	1	0	18.64	18.53	18.82	0-2	0
	1	25	19.03	18.89	19.27		0
	1	49	18.62	18.80	19.10		0
	25	0	18.82	18.67	19.01	0-3	0
	25	12	18.82	18.81	19.22		0
	25	25	18.67	18.76	19.13		0
	50	0	18.71	18.77	19.15		0

Table 9-29
LTE Band 4 (AWS) Reduced Conducted Powers (Phablet with grip sensor active) - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19975 (1712.5 MHz)	20175 (1732.5 MHz)	20375 (1752.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.68	18.59	18.93	0	0
	1	12	18.84	18.71	19.13		0
	1	24	18.63	18.63	19.06		0
	12	0	18.82	18.75	19.15	0-1	0
	12	6	18.87	18.84	19.16		0
	12	13	18.83	18.77	19.23		0
	25	0	18.81	18.76	19.16		0
16QAM	1	0	19.04	18.92	19.29	0-1	0
	1	12	19.07	18.98	19.45		0
	1	24	19.02	19.02	19.42		0
	12	0	18.88	18.82	19.20	0-2	0
	12	6	18.93	18.90	19.22		0
	12	13	18.83	18.81	19.22		0
	25	0	18.80	18.77	19.11		0
64QAM	1	0	18.93	18.84	19.18	0-2	0
	1	12	19.04	18.95	19.36		0
	1	24	18.91	18.91	19.35		0
	12	0	18.91	18.76	19.22	0-3	0
	12	6	18.92	18.91	19.26		0
	12	13	18.86	18.85	19.22		0
	25	0	18.80	18.75	19.13		0

Table 9-30

LTE Band 4 (AWS) Reduced Conducted Powers (Phablet with grip sensor active) - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19965 (1711.5 MHz)	20175 (1732.5 MHz)	20385 (1753.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.71	18.68	19.06	0	0
	1	7	18.72	18.61	19.16		0
	1	14	18.67	18.66	19.10		0
	8	0	18.84	18.74	19.19	0-1	0
	8	4	18.81	18.76	19.21		0
	8	7	18.72	18.78	19.18		0
	15	0	18.76	18.72	19.21		0
16QAM	1	0	19.10	18.93	19.42	0-1	0
	1	7	18.96	18.91	19.39		0
	1	14	18.97	19.01	19.16		0
	8	0	18.93	18.76	19.29	0-2	0
	8	4	18.88	18.86	19.35		0
	8	7	18.86	18.80	19.33		0
	15	0	18.79	18.76	19.27		0
64QAM	1	0	19.04	18.87	19.35	0-2	0
	1	7	19.02	18.89	19.39		0
	1	14	18.89	18.96	19.38		0
	8	0	18.91	18.75	19.24	0-3	0
	8	4	18.86	18.86	19.22		0
	8	7	18.81	18.80	19.22		0
	15	0	18.84	18.83	19.30		0

Table 9-31

LTE Band 4 (AWS) Reduced Conducted Powers (Phablet with grip sensor active) -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19957 (1710.7 MHz)	20175 (1732.5 MHz)	20393 (1754.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.67	18.56	19.01	0	0
	1	2	18.78	18.70	19.04		0
	1	5	18.67	18.60	19.05		0
	3	0	18.71	18.53	19.01		0
	3	2	18.75	18.67	19.01		0
	3	3	18.67	18.58	19.03		0
	6	0	18.80	18.72	19.11	0-1	0
16QAM	1	0	19.03	18.91	19.35	0-1	0
	1	2	19.09	18.98	19.38		0
	1	5	19.00	18.96	19.40		0
	3	0	18.89	18.77	19.19		0
	3	2	18.94	18.84	19.23		0
	3	3	18.85	18.80	19.19		0
	6	0	18.80	18.80	19.14	0-2	0
64QAM	1	0	18.93	18.85	19.27	0-2	0
	1	2	18.99	18.98	19.36		0
	1	5	18.95	18.91	19.29		0
	3	0	18.86	18.72	19.16		0
	3	2	18.89	18.89	19.24		0
	3	3	18.84	18.78	19.20		0
	6	0	18.79	18.75	19.13	0-3	0

9.3.5 LTE Band 41

Table 9-32
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.65	23.51	23.47	23.50	23.42	0	0
	1	50	**23.68**	23.44	23.67	23.64	23.53		0
	1	99	23.53	23.49	23.38	23.19	23.63		0
	50	0	22.65	22.52	22.54	22.66	22.70	0-1	1
	50	25	**22.72**	22.60	22.65	22.67	22.62		1
	50	50	22.66	22.57	22.66	22.63	22.69		1
	100	0	22.69	22.53	22.63	22.58	22.65		1
16QAM	1	0	22.75	22.62	22.35	22.63	22.61	0-1	1
	1	50	22.63	22.59	22.58	22.64	22.76		1
	1	99	22.62	22.44	22.32	22.41	22.72		1
	50	0	21.47	21.58	21.49	21.67	21.58	0-2	2
	50	25	21.49	21.62	21.60	21.64	21.66		2
	50	50	21.45	21.64	21.58	21.65	21.63		2
	100	0	21.41	21.55	21.61	21.61	21.77		2
64QAM	1	0	21.29	21.31	20.99	21.27	21.02	0-2	2
	1	50	21.27	21.10	21.36	21.31	21.47		2
	1	99	21.25	21.08	21.05	21.04	21.32		2
	50	0	20.76	20.54	20.73	20.74	20.76	0-3	3
	50	25	20.78	20.58	20.80	20.72	20.80		3
	50	50	20.74	20.56	20.80	20.69	20.93		3
	100	0	20.72	20.55	20.80	20.69	20.80		3

Table 9-33
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.68	23.49	23.55	23.56	23.62	0	0
	1	36	23.57	23.69	23.64	23.67	23.83		0
	1	74	23.52	23.53	23.46	23.50	23.82		0
	36	0	22.71	22.69	22.69	22.75	22.88	0-1	1
	36	18	22.72	22.85	22.83	22.80	22.96		1
	36	37	22.68	22.78	22.74	22.78	23.00		1
	75	0	22.66	22.79	22.77	22.70	22.90		1
16QAM	1	0	22.68	22.63	22.59	22.74	22.80	0-1	1
	1	36	22.65	22.78	22.74	22.80	22.97		1
	1	74	22.67	22.64	22.58	22.60	22.99		1
	36	0	21.67	21.64	21.66	21.69	21.83	0-2	2
	36	18	21.65	21.80	21.77	21.74	21.90		2
	36	37	21.60	21.71	21.68	21.73	21.97		2
	75	0	21.66	21.78	21.75	21.74	21.91		2
64QAM	1	0	21.37	21.20	21.24	21.31	21.36	0-2	2
	1	36	21.31	21.46	21.42	21.41	21.59		2
	1	74	21.30	21.28	21.23	21.27	21.60		2
	36	0	20.70	20.70	20.72	20.80	20.93	0-3	3
	36	18	20.71	20.85	20.82	20.82	21.00		3
	36	37	20.68	20.81	20.75	20.81	20.95		3
	75	0	20.67	20.82	20.79	20.78	20.94		3

Table 9-34
LTE Band 41 Conducted Powers - 10 MHz Bandwidth

LTE Band 41 10 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.42	23.26	23.34	23.27	23.50	0	0
	1	25	23.31	23.53	23.44	23.50	23.69		0
	1	49	23.27	23.33	23.17	23.24	23.45		0
	25	0	22.45	22.48	22.45	22.46	22.66	0-1	1
	25	12	22.47	22.69	22.62	22.55	22.73		1
	25	25	22.40	22.55	22.45	22.53	22.68		1
	50	0	22.39	22.59	22.53	22.46	22.65		1
16QAM	1	0	22.54	22.47	22.43	22.47	22.69	0-1	1
	1	25	22.47	22.74	22.70	22.67	22.85		1
	1	49	22.51	22.45	22.34	22.42	22.62		1
	25	0	21.46	21.48	21.45	21.50	21.66	0-2	2
	25	12	21.48	21.71	21.64	21.58	21.75		2
	25	25	21.44	21.55	21.48	21.57	21.72		2
	50	0	21.43	21.65	21.59	21.53	21.71		2
64QAM	1	0	21.15	21.02	21.00	21.03	21.29	0-2	2
	1	25	21.09	21.36	21.26	21.32	21.50		2
	1	49	21.16	21.07	21.00	21.06	21.27		2
	25	0	20.43	20.46	20.46	20.45	20.66	0-3	3
	25	12	20.46	20.70	20.60	20.59	20.74		3
	25	25	20.40	20.55	20.44	20.56	20.70		3
	50	0	20.45	20.65	20.62	20.58	20.75		3

Table 9-35
LTE Band 41 Conducted Powers - 5 MHz Bandwidth

LTE Band 41 5 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.39	23.42	23.44	23.40	23.61	0	0
	1	12	23.37	23.52	23.49	23.50	23.67		0
	1	24	23.34	23.52	23.41	23.48	23.60		0
	12	0	22.48	22.63	22.55	22.58	22.75	0-1	1
	12	6	22.50	22.68	22.61	22.61	22.78		1
	12	13	22.46	22.64	22.56	22.63	22.80		1
	25	0	22.45	22.63	22.59	22.58	22.75		1
16QAM	1	0	22.53	22.60	22.55	22.57	22.76	0-1	1
	1	12	22.50	22.68	22.53	22.64	22.82		1
	1	24	22.50	22.63	22.51	22.62	22.80		1
	12	0	21.43	21.58	21.49	21.51	21.70	0-2	2
	12	6	21.42	21.64	21.55	21.56	21.73		2
	12	13	21.39	21.59	21.49	21.57	21.74		2
	25	0	21.51	21.70	21.61	21.64	21.82		2
64QAM	1	0	21.11	21.25	21.15	21.24	21.42	0-2	2
	1	12	21.13	21.35	21.22	21.29	21.51		2
	1	24	21.13	21.27	21.19	21.29	21.45		2
	12	0	20.43	20.61	20.51	20.53	20.72	0-3	3
	12	6	20.46	20.68	20.59	20.57	20.76		3
	12	13	20.43	20.63	20.52	20.60	20.78		3
	25	0	20.47	20.68	20.58	20.60	20.76		3

Table 9-36
LTE Band 41 Reduced Conducted Powers (Hotspot mode) - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.84	21.72	21.63	21.57	21.66	0	0
	1	50	21.71	21.66	21.88	21.78	21.92		0
	1	99	21.64	21.77	21.50	21.41	**21.93**		0
	50	0	21.91	21.72	21.82	21.81	**21.95**	0-1	0
	50	25	21.91	21.80	21.85	21.84	21.89		0
	50	50	21.81	21.76	21.90	21.79	21.92		0
	100	0	21.83	21.72	21.60	21.76	21.85		0
16QAM	1	0	21.79	21.66	21.87	21.59	21.66	0-1	0
	1	50	21.70	21.66	21.88	21.82	21.87		0
	1	99	21.69	21.67	21.48	21.38	21.93		0
	50	0	21.99	21.72	21.85	21.84	21.81	0-2	0
	50	25	21.96	21.81	21.83	21.91	21.96		0
	50	50	21.89	21.79	21.91	21.84	21.76		0
	100	0	21.91	21.73	21.95	21.82	21.81		0
64QAM	1	0	21.67	21.59	21.36	21.37	21.45	0-2	0
	1	50	21.60	21.55	21.72	21.65	21.88		0
	1	99	21.55	21.59	21.34	21.18	21.75		0
	50	0	21.00	20.82	20.91	20.85	20.81	0-3	1
	50	25	20.94	20.90	20.88	20.97	21.00		1
	50	50	20.91	20.86	20.95	20.86	20.98		1
	100	0	20.86	20.76	20.93	20.77	20.85		1

Table 9-37
LTE Band 41 Reduced Conducted Powers (Hotspot mode) - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.67	21.38	21.52	21.57	21.71	0	0
	1	36	21.55	21.66	21.68	21.66	21.90		0
	1	74	21.49	21.48	21.46	21.52	21.89		0
	36	0	21.70	21.66	21.68	21.76	21.94	0-1	0
	36	18	21.69	21.83	21.81	21.78	21.93		0
	36	37	21.61	21.74	21.75	21.78	22.00		0
	75	0	21.62	21.72	21.75	21.72	21.98		0
16QAM	1	0	21.68	21.61	21.64	21.77	21.89	0-1	0
	1	36	21.65	21.77	21.81	21.83	21.97		0
	1	74	21.67	21.55	21.66	21.62	21.98		0
	36	0	21.67	21.62	21.68	21.71	21.92	0-2	0
	36	18	21.62	21.75	21.77	21.74	22.00		0
	36	37	21.61	21.71	21.71	21.75	21.95		0
	75	0	21.64	21.75	21.77	21.73	21.91		0
64QAM	1	0	21.40	21.20	21.26	21.34	21.44	0-2	0
	1	36	21.30	21.45	21.45	21.40	21.63		0
	1	74	21.27	21.22	21.26	21.29	21.65		0
	36	0	20.74	20.70	20.74	20.79	20.98	0-3	1
	36	18	20.71	20.85	20.89	20.84	20.98		1
	36	37	20.67	20.76	20.79	20.82	21.00		1
	75	0	20.68	20.78	20.83	20.79	20.92		1

Table 9-38
LTE Band 41 Reduced Conducted Powers (Hotspot mode) - 10 MHz Bandwidth

LTE Band 41 10 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.45	21.19	21.25	21.25	21.57	0	0
	1	25	21.35	21.48	21.45	21.53	21.79		0
	1	49	21.27	21.22	21.06	21.28	21.49		0
	25	0	21.48	21.45	21.49	21.45	21.76	0-1	0
	25	12	21.50	21.65	21.64	21.56	21.84		0
	25	25	21.46	21.52	21.48	21.54	21.79		0
	50	0	21.41	21.53	21.52	21.49	21.75		0
16QAM	1	0	21.60	21.40	21.45	21.45	21.74	0-1	0
	1	25	21.55	21.64	21.63	21.72	21.92		0
	1	49	21.56	21.42	21.36	21.46	21.67		0
	25	0	21.51	21.34	21.49	21.47	21.76	0-2	0
	25	12	21.51	21.53	21.63	21.58	21.83		0
	25	25	21.48	21.58	21.49	21.56	21.79		0
	50	0	21.46	21.50	21.58	21.55	21.79		0
64QAM	1	0	21.15	20.94	20.88	21.03	21.21	0-2	0
	1	25	20.99	21.27	21.12	21.35	21.44		0
	1	49	21.06	21.01	20.88	21.07	21.21		0
	25	0	20.50	20.43	20.42	20.45	20.72	0-3	1
	25	12	20.52	20.64	20.61	20.58	20.84		1
	25	25	20.46	20.53	20.45	20.56	20.81		1
	50	0	20.51	20.63	20.59	20.55	20.83		1

Table 9-39
LTE Band 41 Reduced Conducted Powers (Hotspot mode) - 5 MHz Bandwidth

LTE Band 41 5 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.35	21.40	21.41	21.43	21.70	0	0
	1	12	21.31	21.48	21.45	21.47	21.76		0
	1	24	21.34	21.49	21.43	21.46	21.70		0
	12	0	21.46	21.62	21.55	21.55	21.83	0-1	0
	12	6	21.46	21.65	21.62	21.57	21.85		0
	12	13	21.45	21.60	21.57	21.62	21.85		0
	25	0	21.45	21.64	21.56	21.54	21.80		0
16QAM	1	0	21.52	21.55	21.60	21.57	21.85	0-1	0
	1	12	21.51	21.60	21.61	21.59	21.96		0
	1	24	21.46	21.60	21.56	21.56	21.85		0
	12	0	21.41	21.57	21.51	21.49	21.77	0-2	0
	12	6	21.42	21.58	21.56	21.53	21.81		0
	12	13	21.39	21.57	21.53	21.57	21.81		0
	25	0	21.48	21.69	21.66	21.63	21.87		0
64QAM	1	0	21.11	21.20	21.21	21.19	21.56	0-2	0
	1	12	21.10	21.33	21.24	21.31	21.61		0
	1	24	21.12	21.28	21.24	21.25	21.56		0
	12	0	20.43	20.58	20.51	20.54	20.80	0-3	1
	12	6	20.45	20.62	20.62	20.57	20.83		1
	12	13	20.41	20.58	20.56	20.60	20.82		1
	25	0	20.46	20.64	20.64	20.58	20.83		1

Table 9-40
LTE Band 41 Reduced Conducted Powers (Phablet with grip sensor active) - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.21	22.00	22.18	22.22	22.31	0	0
	1	50	22.04	22.03	**22.58**	22.36	22.40		0
	1	99	21.96	22.07	22.14	22.00	21.95		0
	50	0	22.26	22.09	22.46	22.44	22.24	0-1	0
	50	25	22.23	22.18	**22.64**	22.48	22.46		0
	50	50	22.13	22.10	22.47	22.39	22.40		0
	100	0	22.10	22.07	22.57	22.40	22.36		0
16QAM	1	0	22.38	22.13	22.30	22.40	22.42	0-1	0
	1	50	22.26	22.26	22.62	22.62	22.64		0
	1	99	22.19	22.18	22.29	22.14	22.11		0
	50	0	21.32	21.09	21.51	21.51	21.51	0-2	1
	50	25	21.25	21.23	21.66	21.52	21.51		1
	50	50	21.19	21.19	21.59	21.44	21.43		1
	100	0	21.14	21.04	21.59	21.43	21.39		1
64QAM	1	0	20.93	20.81	20.90	20.98	20.99	0-2	1
	1	50	20.89	20.83	21.35	21.23	21.22		1
	1	99	20.82	20.84	20.98	20.70	20.71		1
	50	0	20.28	20.11	20.60	20.52	20.50	0-3	2
	50	25	20.26	20.24	20.71	20.53	20.54		2
	50	50	20.18	20.20	20.56	20.44	20.43		2
	100	0	20.20	20.12	20.57	20.44	20.39		2

Table 9-41
LTE Band 41 Reduced Conducted Powers (Phablet with grip sensor active) - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.62	22.41	22.59	22.58	22.70	0	0
	1	36	22.50	22.60	22.67	22.67	22.91		0
	1	74	22.42	22.44	22.40	22.50	22.86		0
	36	0	22.64	22.60	22.68	22.71	22.90	0-1	0
	36	18	22.62	22.78	22.81	22.76	23.00		0
	36	37	22.58	22.70	22.73	22.77	22.99		0
	75	0	22.57	22.69	22.74	22.69	22.94		0
16QAM	1	0	22.56	22.59	22.67	22.67	22.83	0-1	0
	1	36	22.58	22.77	22.73	22.79	22.98		0
	1	74	22.59	22.55	22.61	22.59	23.00		0
	36	0	21.58	21.58	21.62	21.66	21.86	0-2	1
	36	18	21.55	21.72	21.75	21.71	21.95		1
	36	37	21.52	21.66	21.66	21.72	22.00		1
	75	0	21.57	21.71	21.74	21.71	21.95		1
64QAM	1	0	21.33	21.17	21.20	21.30	21.42	0-2	1
	1	36	21.25	21.40	21.39	21.36	21.62		1
	1	74	21.22	21.20	21.21	21.27	21.62		1
	36	0	20.68	20.65	20.69	20.75	20.96	0-3	2
	36	18	20.64	20.78	20.79	20.80	20.97		2
	36	37	20.57	20.70	20.74	20.78	20.98		2
	75	0	20.59	20.74	20.75	20.74	20.99		2

Table 9-42
LTE Band 41 Reduced Conducted Powers (Phablet with grip sensor active) - 10 MHz Bandwidth

LTE Band 41 10 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.43	22.23	22.55	22.28	22.55	0	0
	1	25	22.33	22.47	22.73	22.53	22.73		0
	1	49	22.32	22.27	22.47	22.31	22.49		0
	25	0	22.43	22.42	22.72	22.44	22.71	0-1	0
	25	12	22.37	22.61	22.78	22.53	22.79		0
	25	25	22.39	22.50	22.75	22.50	22.76		0
	50	0	22.32	22.52	22.71	22.46	22.73		0
16QAM	1	0	22.54	22.40	22.75	22.42	22.75	0-1	0
	1	25	22.44	22.65	22.97	22.70	22.97		0
	1	49	22.44	22.40	22.67	22.42	22.68		0
	25	0	21.43	21.41	21.71	21.44	21.72	0-2	1
	25	12	21.44	21.63	21.81	21.55	21.80		1
	25	25	21.34	21.52	21.78	21.55	21.79		1
	50	0	21.39	21.60	21.73	21.51	21.77		1
64QAM	1	0	21.15	20.83	21.18	20.87	21.19	0-2	1
	1	25	21.09	21.11	21.40	21.13	21.43		1
	1	49	21.11	20.91	21.18	20.93	21.20		1
	25	0	20.41	20.42	20.70	20.47	20.72	0-3	2
	25	12	20.42	20.62	20.79	20.55	20.82		2
	25	25	20.35	20.53	20.76	20.52	20.76		2
	50	0	20.42	20.60	20.80	20.55	20.81		2

Table 9-43
LTE Band 41 Reduced Conducted Powers (Phablet with grip sensor active) - 5 MHz Bandwidth

LTE Band 41 5 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.30	22.40	22.40	22.43	22.69	0	0
	1	12	22.29	22.47	22.44	22.50	22.77		0
	1	24	22.26	22.43	22.42	22.53	22.69		0
	12	0	22.44	22.56	22.54	22.57	22.80	0-1	0
	12	6	22.44	22.60	22.59	22.59	22.83		0
	12	13	22.37	22.58	22.56	22.62	22.86		0
	25	0	22.40	22.60	22.56	22.57	22.79		0
16QAM	1	0	22.46	22.50	22.50	22.53	22.82	0-1	0
	1	12	22.42	22.60	22.51	22.65	22.90		0
	1	24	22.43	22.60	22.47	22.59	22.84		0
	12	0	21.38	21.51	21.47	21.50	21.76	0-2	1
	12	6	21.39	21.56	21.56	21.55	21.75		1
	12	13	21.36	21.52	21.50	21.57	21.79		1
	25	0	21.48	21.63	21.63	21.62	21.87		1
64QAM	1	0	21.09	21.17	21.16	21.23	21.46	0-2	1
	1	12	21.09	21.28	21.22	21.29	21.54		1
	1	24	21.11	21.21	21.17	21.26	21.50		1
	12	0	20.44	20.54	20.53	20.56	20.77	0-3	2
	12	6	20.44	20.58	20.59	20.60	20.80		2
	12	13	20.39	20.54	20.54	20.63	20.85		2
	25	0	20.45	20.60	20.60	20.59	20.81		2

9.3.6 LTE Uplink Carrier Aggregation Conducted Powers

Table 9-44
LTE Uplink Carrier Aggregation Conducted Powers

	PCC							SCC							Power	
Combination	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/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_41C	LTE B41	20	39750	2506.0	QPSK	1	99	LTE B41	20	39948	2525.8	QPSK	1	0	23.85	23.53

Table 9-45
LTE Uplink Carrier Aggregation Conducted Powers (Hotspot Mode)

	PCC							SCC							Power	
Combination	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/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_41C	LTE B41	20	39750	2506.0	QPSK	1	99	LTE B41	20	39948	2525.8	QPSK	1	0	21.67	21.64

Table 9-46
LTE Uplink Carrier Aggregation Conducted Powers(Phablet with grip sensor active)

	PCC							SCC							Power	
Combination	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/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_41C	LTE B41	20	41490	2680.0	QPSK	50	0	LTE B41	20	41292	2660.2	QPSK	50	50	22.97	22.24

Notes:

1. This device supports uplink carrier aggregation for LTE CA_41C with a maximum of two 20 MHz component carriers. 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.

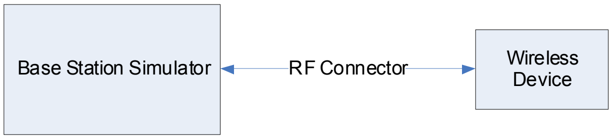


Figure 9-3
Power Measurement Setup

9.4 WLAN Conducted Powers

Table 9-47
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	802.11ax
		Average	Average	Average	Average
2412	1	20.86	18.13	18.04	15.31
2437	6	20.81	18.42	18.33	15.87
2462	11	20.59	18.48	18.19	12.75

Table 9-48
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	802.11ax
		Average	Average	Average	Average
2412	1	20.48	18.45	18.47	15.38
2437	6	20.59	18.36	18.28	15.31
2462	11	20.97	18.06	17.79	12.72

Table 9-49
Max Output Powers During Conditions with 2.4 GHz and 5 GHz WLAN

2.4GHz 802.11n Conducted Power [dBm]			
Freq [MHz]	Channel	ANT1	ANT2
2412	1	16.45	16.22
2437	6	16.53	15.80
2462	11	16.66	16.01

Table 9-50
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	802.11ax
		Average	Average	Average	Average
5180	36	16.23	16.19	16.31	13.54
5200	40	16.15	16.27	16.35	16.48
5220	44	16.23	16.26	16.32	15.59
5240	48	16.25	16.42	16.32	15.57
5260	52	16.46	16.43	16.41	15.67
5280	56	16.40	16.47	16.44	15.79
5300	60	16.47	16.37	16.48	15.66
5320	64	16.17	16.12	16.13	14.78
5500	100	15.80	15.78	15.72	16.05
5600	120	15.94	15.98	15.91	16.07
5620	124	15.67	15.79	15.69	15.83
5720	144	15.64	15.61	15.70	15.77
5745	149	15.77	15.59	15.57	15.62
5785	157	16.07	16.23	16.20	16.26
5825	165	15.97	16.09	16.11	15.95

Table 9-51
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	802.11ax
		Average	Average	Average	Average
5180	36	16.29	16.09	16.13	13.80
5200	40	16.29	16.19	16.20	16.48
5220	44	16.12	16.12	16.21	16.46
5240	48	16.11	16.10	16.16	16.43
5260	52	15.83	15.90	15.89	16.16
5280	56	15.97	16.00	15.96	16.10
5300	60	15.95	15.91	15.98	16.22
5320	64	15.95	15.86	15.88	14.48
5500	100	15.88	15.78	15.79	16.20
5600	120	15.96	15.98	15.98	16.31
5620	124	16.05	16.07	16.15	16.32
5720	144	16.21	16.13	16.10	16.45
5745	149	16.29	16.39	16.34	15.70
5785	157	16.42	16.30	16.40	15.69
5825	165	16.22	16.26	16.23	16.47

Table 9-52
5 GHz WLAN Maximum Average RF Power – MIMO

5GHz (20MHz) 802.11n Conducted Power [dBm]				
Freq [MHz]	Channel	ANT1	ANT2	MIMO
5180	36	16.19	16.09	19.15
5200	40	16.27	16.19	19.24
5220	44	16.26	16.12	19.20
5240	48	16.42	16.10	19.27
5260	52	16.43	15.90	19.18
5280	56	16.47	16.00	19.25
5300	60	16.37	15.91	19.16
5320	64	16.12	15.86	19.00
5500	100	14.97	15.20	18.10
5600	120	15.01	14.98	18.00
5620	124	15.12	14.89	18.02
5720	144	15.07	14.58	17.84
5745	149	14.42	13.73	17.10
5785	157	14.38	13.92	17.17
5825	165	14.22	13.78	17.02

Table 9-53
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	802.11ax
		Average	Average	Average	Average
2412	1	16.88	16.95	16.45	15.31
2437	6	16.17	16.80	16.53	15.87
2462	11	16.69	16.89	16.66	12.75

Table 9-54
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	802.11ax
		Average	Average	Average	Average
2412	1	16.38	16.18	16.22	15.38
2437	6	16.51	16.05	15.80	15.31
2462	11	16.37	16.23	16.01	12.72

Table 9-55
5 GHz WLAN Reduced Average RF Power – Ant 1

5GHz (40MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11n	802.11ac	802.11ax
		Average	Average	Average
5190	38	13.77	13.71	11.22
5230	46	13.10	13.73	13.32
5270	54	13.28	13.21	13.52
5310	62	13.95	13.93	10.46

5GHz (80MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11ac	802.11ax
		Average	Average
5530	106	13.33	12.15
5610	122	13.22	13.44
5690	138	13.48	13.89
5775	155	13.82	13.97

Table 9-56
5 GHz WLAN Reduced Average RF Power – Ant 2

5GHz (40MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11n	802.11ac	802.11ax
		Average	Average	Average
5190	38	13.37	13.36	11.77
5230	46	13.65	13.57	13.86
5270	54	13.35	13.46	13.69
5310	62	13.12	13.21	9.77

5GHz (80MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11ac	802.11ax
		Average	Average
5530	106	13.88	11.72
5610	122	13.84	13.39
5690	138	13.78	13.57
5775	155	13.80	13.68

Table 9-57
Reduced Output Powers During Conditions with 2.4 GHz and 5 GHz WLAN

2.4GHz 802.11n Conducted Power [dBm]			
Freq [MHz]	**Channel**	**ANT1**	**ANT2**
2412	1	13.96	13.15
2437	6	13.09	13.78
2462	11	13.35	13.98

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.

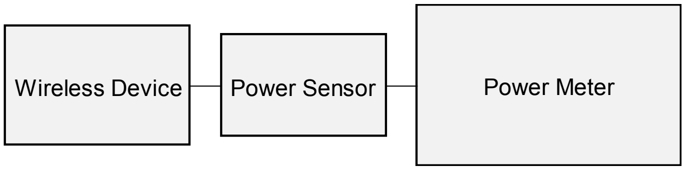


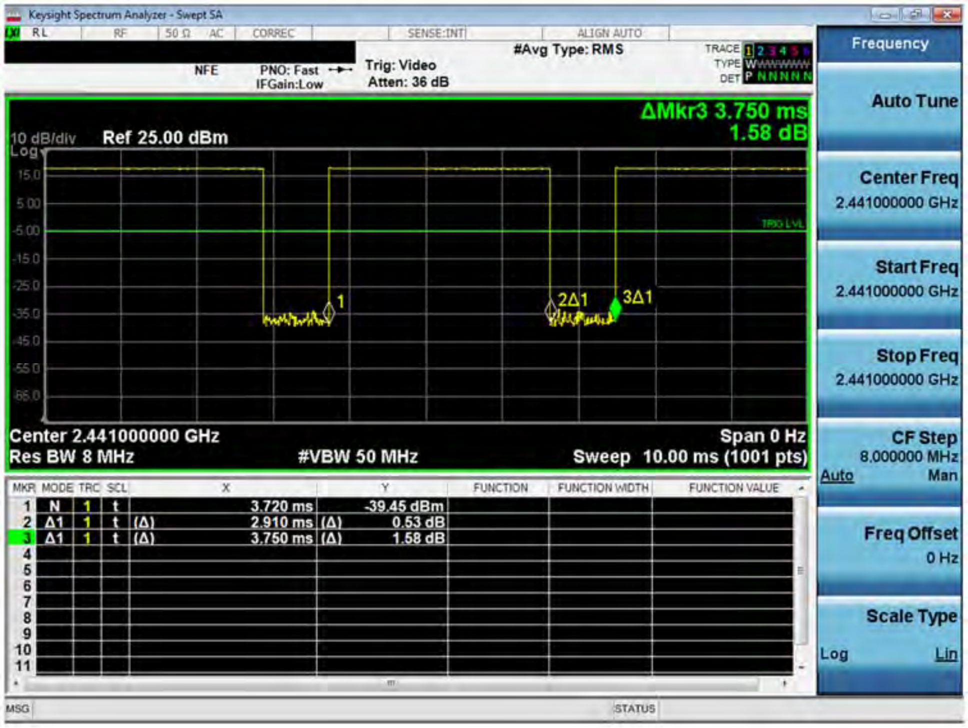
Figure 9-4
Power Measurement Setup

9.5 Bluetooth Conducted Powers

Table 9-58
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	**12.77**	18.919
2441	1.0	39	12.08	16.154
2480	1.0	78	11.54	14.241
2402	2.0	0	10.49	11.205
2441	2.0	39	11.70	14.801
2480	2.0	78	7.89	6.156
2402	3.0	0	10.44	11.070
2441	3.0	39	11.68	14.711
2480	3.0	78	7.84	6.086

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



[redacted]

NFE PNO: Fast IFGain:Low

Trig: Video

Atten: 36 dB

#Avg Type: RMS

ΔMkr3 3.750 ms 1.58 dB

Ref 25.00 dBm

Center 2.441000000 GHz

Res BW 8 MHz

#VBW 50 MHz

Span 0 Hz

Sweep 10.00 ms (1001 pts)

MKR	MODE	TRC	SCL	X		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	3.720 ms		-39.45 dBm			
2	Δ1	1	t (Δ)	2.910 ms	(Δ)	0.53 dB			
3	Δ1	1	t (Δ)	3.750 ms	(Δ)	1.58 dB			
4									
5									
6									
7									
8									
9									
10									
11									

Figure 9-5
Bluetooth Transmission Plot

Equation 9-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.91\ ms}{3.75\ ms} * 100\% = 77.6\%$$

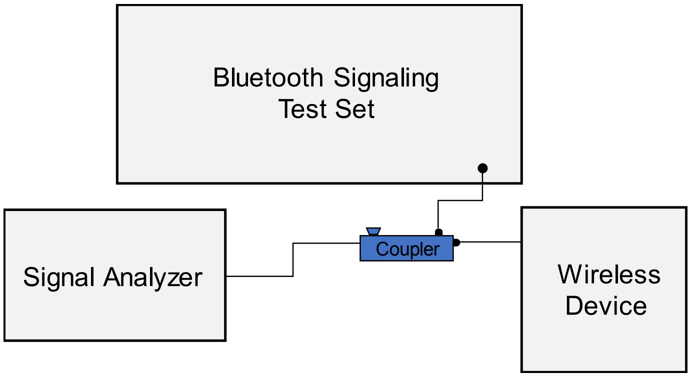


Figure 9-6
Power Measurement Setup

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Head Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
01/13/2020	700 Head	21.0	700	0.874	40.449	0.889	42.201	-1.69%	-4.15%
			710	0.878	40.415	0.890	42.149	-1.35%	-4.11%
			750	0.892	40.283	0.894	41.942	-0.22%	-3.96%
01/22/2020	700 Head	21.3	750	0.912	41.207	0.894	41.942	2.01%	-1.75%
			770	0.919	41.148	0.895	41.838	2.68%	-1.65%
			785	0.924	41.108	0.896	41.760	3.13%	-1.56%
01/20/2020	835 Head	20.6	820	0.903	39.830	0.899	41.578	0.44%	-4.20%
			835	0.909	39.769	0.900	41.500	1.00%	-4.17%
			850	0.915	39.710	0.916	41.500	-0.11%	-4.31%
01/01/2020	1750 Head	21.2	1710	1.317	39.588	1.348	40.142	-2.30%	-1.38%
			1720	1.323	39.572	1.354	40.126	-2.29%	-1.38%
			1745	1.341	39.534	1.368	40.087	-1.97%	-1.38%
			1750	1.345	39.526	1.371	40.079	-1.90%	-1.38%
			1770	1.357	39.492	1.383	40.047	-1.88%	-1.39%
			1790	1.368	39.449	1.394	40.016	-1.87%	-1.42%
01/04/2020	1900 Head	21.6	1850	1.406	39.411	1.400	40.000	0.43%	-1.47%
			1860	1.412	39.397	1.400	40.000	0.86%	-1.51%
			1880	1.423	39.364	1.400	40.000	1.64%	-1.59%
			1900	1.433	39.339	1.400	40.000	2.36%	-1.65%
			1905	1.436	39.332	1.400	40.000	2.57%	-1.67%
			1910	1.438	39.326	1.400	40.000	2.71%	-1.69%
01/03/2020	2400 Head	24.0	2400	1.811	38.837	1.756	39.289	3.13%	-1.15%
			2450	1.849	38.777	1.800	39.200	2.72%	-1.08%
			2500	1.886	38.704	1.855	39.136	1.67%	-1.10%
01/10/2020	2400 Head	23.2	2450	1.818	37.483	1.800	39.200	1.00%	-4.38%
			2500	1.853	37.413	1.855	39.136	-0.11%	-4.40%
			2510	1.861	37.400	1.866	39.123	-0.27%	-4.40%
			2535	1.881	37.360	1.893	39.092	-0.63%	-4.43%
			2550	1.893	37.336	1.909	39.073	-0.84%	-4.45%
			2560	1.901	37.322	1.920	39.060	-0.99%	-4.45%
			2600	1.930	37.273	1.964	39.009	-1.73%	-4.45%
			2650	1.970	37.193	2.018	38.945	-2.38%	-4.50%
			2680	1.994	37.144	2.051	38.907	-2.78%	-4.53%
			2700	2.009	37.110	2.073	38.882	-3.09%	-4.56%
01/13/2020	5200-5800 Head	21.5	5250	4.685	35.654	4.706	35.929	-0.45%	-0.77%
			5270	4.713	35.616	4.727	35.906	-0.30%	-0.81%
			5310	4.756	35.562	4.768	35.860	-0.25%	-0.83%
			5530	5.014	35.177	4.994	35.609	0.40%	-1.21%
			5600	5.094	35.009	5.065	35.529	0.57%	-1.46%
			5690	5.199	34.847	5.158	35.426	0.79%	-1.63%
			5750	5.278	34.766	5.219	35.357	1.13%	-1.67%
			5775	5.303	34.719	5.245	35.329	1.11%	-1.73%

Table 10-2
Body Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
01/08/2020	700 Body	21.2	700	0.932	54.067	0.959	55.726	-2.82%	-2.98%
			710	0.935	54.041	0.960	55.687	-2.60%	-2.96%
			750	0.951	53.946	0.964	55.531	-1.35%	-2.85%
			770	0.958	53.900	0.965	55.453	-0.73%	-2.80%
			785	0.964	53.862	0.966	55.395	-0.21%	-2.77%
01/18/2020	835 Body	19.8	820	0.967	53.174	0.969	55.258	-0.21%	-3.77%
			835	0.974	53.129	0.970	55.200	0.41%	-3.75%
			850	0.982	53.088	0.988	55.154	-0.61%	-3.75%
01/20/2020	835 Body	22.1	820	0.986	54.203	0.969	55.258	1.75%	-1.91%
			835	0.991	54.176	0.970	55.200	2.16%	-1.86%
			850	0.996	54.141	0.988	55.154	0.81%	-1.84%
01/20/2020	1750 Body	21.2	1710	1.400	53.897	1.463	53.537	-4.31%	0.67%
			1720	1.411	53.868	1.469	53.511	-3.95%	0.67%
			1745	1.439	53.794	1.485	53.445	-3.10%	0.65%
			1750	1.444	53.779	1.488	53.432	-2.96%	0.65%
			1770	1.465	53.718	1.501	53.379	-2.40%	0.64%
			1790	1.487	53.645	1.514	53.326	-1.78%	0.60%
01/03/2020	1900 Body	23.0	1850	1.526	52.638	1.520	53.300	0.39%	-1.24%
			1860	1.537	52.608	1.520	53.300	1.12%	-1.30%
			1880	1.560	52.538	1.520	53.300	2.63%	-1.43%
			1900	1.583	52.463	1.520	53.300	4.14%	-1.57%
			1905	1.588	52.444	1.520	53.300	4.47%	-1.61%
			1910	1.594	52.425	1.520	53.300	4.87%	-1.64%
01/06/2020	1900 Body	23.2	1850	1.513	52.000	1.520	53.300	-0.46%	-2.44%
			1860	1.523	51.968	1.520	53.300	0.20%	-2.50%
			1880	1.546	51.901	1.520	53.300	1.71%	-2.62%
			1900	1.569	51.832	1.520	53.300	3.22%	-2.75%
			1905	1.574	51.812	1.520	53.300	3.55%	-2.79%
			1910	1.580	51.793	1.520	53.300	3.95%	-2.83%
01/17/2020	1900 Body	21.4	1850	1.509	51.108	1.520	53.300	-0.72%	-4.11%
			1860	1.520	51.073	1.520	53.300	0.00%	-4.18%
			1880	1.543	51.009	1.520	53.300	1.51%	-4.30%
			1900	1.565	50.943	1.520	53.300	2.96%	-4.42%
			1905	1.571	50.926	1.520	53.300	3.36%	-4.45%
			1910	1.577	50.909	1.520	53.300	3.75%	-4.49%
01/22/2020	2400 Body	22.4	2400	1.919	51.443	1.902	52.767	0.89%	-2.51%
			2450	1.983	51.313	1.950	52.700	1.69%	-2.63%
			2500	2.038	51.161	2.021	52.636	0.84%	-2.80%
01/23/2020	2400 Body	22.7	2450	2.047	50.787	1.950	52.700	4.97%	-3.63%
			2500	2.105	50.634	2.021	52.636	4.16%	-3.80%
			2510	2.118	50.603	2.035	52.623	4.08%	-3.84%
			2535	2.147	50.519	2.071	52.592	3.67%	-3.94%
			2550	2.165	50.476	2.092	52.573	3.49%	-3.99%
			2560	2.176	50.451	2.106	52.560	3.32%	-4.01%
			2600	2.224	50.339	2.163	52.509	2.82%	-4.13%
			2650	2.282	50.170	2.234	52.445	2.15%	-4.34%
			2680	2.318	50.079	2.277	52.407	1.80%	-4.44%
			2700	2.343	50.014	2.305	52.382	1.65%	-4.52%
01/27/2020	2400 Body	23.7	2400	1.943	50.926	1.902	52.767	2.16%	-3.49%
			2450	2.000	50.784	1.950	52.700	2.56%	-3.64%
			2500	2.055	50.654	2.021	52.636	1.68%	-3.77%
			2510	2.066	50.629	2.035	52.623	1.52%	-3.79%
			2535	2.095	50.555	2.071	52.592	1.16%	-3.87%
			2550	2.113	50.507	2.092	52.573	1.00%	-3.93%
			2560	2.125	50.477	2.106	52.560	0.90%	-3.96%
			2600	2.171	50.362	2.163	52.509	0.37%	-4.09%
			2650	2.231	50.212	2.234	52.445	-0.13%	-4.26%
			2680	2.265	50.127	2.277	52.407	-0.53%	-4.35%
			2700	2.288	50.063	2.305	52.382	-0.74%	-4.43%

Table 10-3
Body Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
01/05/2020	5200-5800 Body	22.6	5250	5.495	47.949	5.358	48.947	2.56%	-2.04%
			5260	5.513	47.923	5.369	48.933	2.68%	-2.06%
			5270	5.525	47.895	5.381	48.919	2.68%	-2.09%
			5280	5.536	47.887	5.393	48.906	2.65%	-2.08%
			5290	5.550	47.880	5.404	48.892	2.70%	-2.07%
			5300	5.564	47.876	5.416	48.879	2.73%	-2.05%
			5310	5.574	47.862	5.428	48.865	2.69%	-2.05%
			5320	5.579	47.845	5.439	48.851	2.57%	-2.06%
			5500	5.821	47.534	5.650	48.607	3.03%	-2.21%
			5510	5.839	47.505	5.661	48.594	3.14%	-2.24%
			5520	5.853	47.487	5.673	48.580	3.17%	-2.25%
			5530	5.866	47.490	5.685	48.566	3.18%	-2.22%
			5540	5.877	47.483	5.696	48.553	3.18%	-2.20%
			5550	5.884	47.464	5.708	48.539	3.08%	-2.21%
			5560	5.891	47.441	5.720	48.526	2.99%	-2.24%
			5580	5.912	47.412	5.743	48.499	2.94%	-2.24%
			5600	5.942	47.372	5.766	48.471	3.05%	-2.27%
			5610	5.957	47.349	5.778	48.458	3.10%	-2.29%
			5620	5.975	47.334	5.790	48.444	3.20%	-2.29%
			5640	6.010	47.293	5.813	48.417	3.39%	-2.32%
			5660	6.034	47.278	5.837	48.390	3.38%	-2.30%
			5670	6.047	47.271	5.848	48.376	3.40%	-2.28%
			5680	6.059	47.247	5.860	48.363	3.40%	-2.31%
			5690	6.070	47.228	5.872	48.349	3.37%	-2.32%
			5700	6.081	47.218	5.883	48.336	3.37%	-2.31%
			5710	6.094	47.213	5.895	48.322	3.38%	-2.30%
			5720	6.107	47.188	5.907	48.309	3.39%	-2.32%
			5745	6.141	47.129	5.936	48.275	3.45%	-2.37%
			5750	6.147	47.117	5.942	48.268	3.45%	-2.38%
			5755	6.155	47.102	5.947	48.261	3.50%	-2.40%
			5765	6.169	47.085	5.959	48.248	3.52%	-2.41%
			5775	6.187	47.082	5.971	48.234	3.62%	-2.39%
			5785	6.207	47.079	5.982	48.220	3.76%	-2.37%
			5795	6.224	47.072	5.994	48.207	3.84%	-2.35%
			5800	6.230	47.068	6.000	48.200	3.83%	-2.35%
			5805	6.234	47.062	6.006	48.193	3.80%	-2.35%
			5825	6.252	47.041	6.029	48.166	3.70%	-2.34%
02/03/2020	5200-5800 Body	22.8	5250	5.388	48.355	5.358	48.947	0.56%	-1.21%
			5260	5.406	48.340	5.369	48.933	0.69%	-1.21%
			5270	5.418	48.328	5.381	48.919	0.69%	-1.21%
			5280	5.426	48.327	5.393	48.906	0.61%	-1.18%
			5290	5.436	48.323	5.404	48.892	0.59%	-1.16%
			5300	5.448	48.310	5.416	48.879	0.59%	-1.16%
			5310	5.459	48.293	5.428	48.865	0.57%	-1.17%
			5320	5.468	48.271	5.439	48.851	0.53%	-1.19%
			5500	5.699	47.957	5.650	48.607	0.87%	-1.34%
			5510	5.715	47.949	5.661	48.594	0.95%	-1.33%
			5520	5.728	47.953	5.673	48.580	0.97%	-1.29%
			5530	5.740	47.958	5.685	48.566	0.97%	-1.25%
			5540	5.753	47.951	5.696	48.553	1.00%	-1.24%
			5550	5.765	47.927	5.708	48.539	1.00%	-1.26%
			5560	5.775	47.893	5.720	48.526	0.96%	-1.30%
			5580	5.798	47.836	5.743	48.499	0.96%	-1.37%
			5600	5.829	47.806	5.766	48.471	1.09%	-1.37%
			5720	5.983	47.606	5.907	48.309	1.29%	-1.46%
			5750	6.030	47.590	5.942	48.268	1.48%	-1.40%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

10.2 Test System Verification

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

Table 10-4
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$_{1g}$ (%)
E	750	HEAD	01/13/2020	23.4	21.0	0.200	1003	7417	1.530	8.280	7.650	-7.61%
D	750	HEAD	01/22/2020	22.3	21.3	0.200	1054	3914	1.700	8.290	8.500	2.53%
E	835	HEAD	01/20/2020	20.7	21.1	0.200	4d047	7417	1.780	9.420	8.900	-5.52%
H	1750	HEAD	01/01/2020	22.1	21.2	0.100	1148	7406	3.440	37.000	34.400	-7.03%
L	1900	HEAD	01/04/2020	23.2	21.6	0.100	5d148	7410	4.150	39.100	41.500	6.14%
E	2450	HEAD	01/03/2020	24.3	22.0	0.100	981	7417	5.510	52.300	55.100	5.35%
E	2450	HEAD	01/10/2020	23.1	22.2	0.100	981	7417	5.360	52.300	53.600	2.49%
H	5250	HEAD	01/13/2020	21.5	23.0	0.050	1191	7406	3.740	80.800	74.800	-7.43%
H	5600	HEAD	01/13/2020	21.5	23.0	0.050	1191	7406	3.780	82.700	75.600	-8.59%
H	5750	HEAD	01/13/2020	21.5	23.0	0.050	1191	7406	3.710	80.200	74.200	-7.48%
H	750	BODY	01/08/2020	23.1	21.2	0.200	1003	7406	1.690	8.580	8.450	-1.52%
M	835	BODY	01/18/2020	20.5	19.8	0.200	4d133	7308	1.980	9.750	9.900	1.54%
H	835	BODY	01/20/2020	23.4	22.1	0.200	4d047	7406	2.020	9.470	10.100	6.65%
I	1750	BODY	01/20/2020	22.2	21.2	0.100	1148	7357	3.760	37.700	37.600	-0.27%
J	1900	BODY	01/03/2020	21.9	21.4	0.100	5d080	7571	4.260	39.200	42.600	8.67%
J	1900	BODY	01/06/2020	22.7	22.9	0.100	5d080	7571	4.210	39.200	42.100	7.40%
M	2450	BODY	01/22/2020	22.0	22.4	0.100	797	7308	5.140	51.100	51.400	0.59%
K	2450	BODY	01/23/2020	23.7	22.0	0.100	981	7547	5.180	50.900	51.800	1.77%
K	2600	BODY	01/23/2020	23.7	22.0	0.100	1064	7547	5.610	55.600	56.100	0.90%
G	5250	BODY	01/05/2020	23.5	22.0	0.050	1191	7409	3.890	77.000	77.800	1.04%
G	5600	BODY	01/05/2020	23.5	22.0	0.050	1191	7409	4.140	78.600	82.800	5.34%
G	5750	BODY	01/05/2020	23.5	22.0	0.050	1191	7409	4.050	76.900	81.000	5.33%

Table 10-5
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)**	**$Deviation_{10g}$ (%)**
I	1750	BODY	01/20/2020	22.2	21.2	0.100	1148	7357	1.990	19.800	19.900	0.51%
P	1900	BODY	01/17/2020	20.3	20.5	0.100	5d080	7551	2.060	20.600	20.600	0.00%
K	2450	BODY	01/27/2020	23.7	22.4	0.100	981	7547	2.250	24.200	22.500	-7.02%
K	2600	BODY	01/27/2020	23.7	22.4	0.100	1064	7547	2.400	25.000	24.000	-4.00%
G	5250	BODY	02/03/2020	23.5	21.8	0.050	1191	7409	1.080	21.400	21.600	0.93%
G	5600	BODY	02/03/2020	23.5	21.8	0.050	1191	7409	1.080	21.900	21.600	-1.37%
G	5750	BODY	02/03/2020	23.5	21.8	0.050	1191	7409	1.030	21.300	20.600	-3.29%

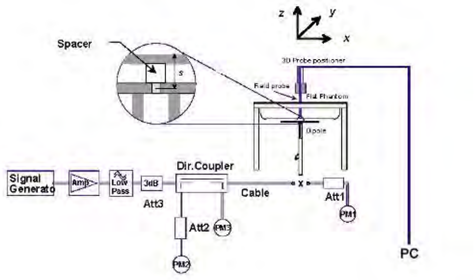


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.0	32.43	0.04	Right	Cheek	8623M	1:8.3	0.153	1.140	0.174	A1
836.60	190	GSM 850	GSM	33.0	32.43	0.05	Right	Tilt	8623M	1:8.3	0.074	1.140	0.084	
836.60	190	GSM 850	GSM	33.0	32.43	0.15	Left	Cheek	8623M	1:8.3	0.124	1.140	0.141	
836.60	190	GSM 850	GSM	33.0	32.43	0.19	Left	Tilt	8623M	1:8.3	0.065	1.140	0.074	
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	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.5	29.60	-0.12	Right	Cheek	8629M	1:8.3	0.056	1.230	0.069	A2
1880.00	661	GSM 1900	GSM	30.5	29.60	0.11	Right	Tilt	8629M	1:8.3	0.022	1.230	0.027	
1880.00	661	GSM 1900	GSM	30.5	29.60	0.02	Left	Cheek	8629M	1:8.3	0.054	1.230	0.066	
1880.00	661	GSM 1900	GSM	30.5	29.60	-0.13	Left	Tilt	8629M	1:8.3	0.029	1.230	0.036	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna State	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.0	24.50	0.06	Right	Cheek	13	8632M	1:1	0.192	1.122	**0.215**	A3
836.60	4183	UMTS 850	RMC	25.0	24.50	0.03	Right	Tilt	13	8632M	1:1	0.093	1.122	0.104	
836.60	4183	UMTS 850	RMC	25.0	24.50	0.10	Left	Cheek	13	8632M	1:1	0.165	1.122	0.185	
836.60	4183	UMTS 850	RMC	25.0	24.50	0.08	Left	Tilt	13	8632M	1:1	0.091	1.122	0.102	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
LTE Band 12 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	1	24.0	23.25	0.10	0	Right	Cheek	QPSK	1	0	8632M	1:1	0.073	1.189	0.087	A4
707.50	23095	Mid	LTE Band 12	10	1	23.0	22.24	0.11	1	Right	Cheek	QPSK	25	12	8632M	1:1	0.066	1.191	0.079	
707.50	23095	Mid	LTE Band 12	10	1	24.0	23.25	-0.12	0	Right	Tilt	QPSK	1	0	8632M	1:1	0.039	1.189	0.046	
707.50	23095	Mid	LTE Band 12	10	1	23.0	22.24	0.13	1	Right	Tilt	QPSK	25	12	8632M	1:1	0.029	1.191	0.035	
707.50	23095	Mid	LTE Band 12	10	1	24.0	23.25	-0.02	0	Left	Cheek	QPSK	1	0	8632M	1:1	0.065	1.189	0.077	
707.50	23095	Mid	LTE Band 12	10	1	23.0	22.24	0.16	1	Left	Cheek	QPSK	25	12	8632M	1:1	0.061	1.191	0.073	
707.50	23095	Mid	LTE Band 12	10	1	24.0	23.25	0.18	0	Left	Tilt	QPSK	1	0	8632M	1:1	0.027	1.189	0.032	
707.50	23095	Mid	LTE Band 12	10	1	23.0	22.24	0.04	1	Left	Tilt	QPSK	25	12	8632M	1:1	0.026	1.191	0.031	
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]	Antenna State	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	0	24.0	23.70	0.03	0	Right	Cheek	QPSK	1	49	8642M	1:1	0.175	1.072	0.188	A5
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.10	1	Right	Cheek	QPSK	25	25	8642M	1:1	0.134	1.026	0.137	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	0.12	0	Right	Tilt	QPSK	1	49	8642M	1:1	0.094	1.072	0.101	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	-0.04	1	Right	Tilt	QPSK	25	25	8642M	1:1	0.072	1.026	0.074	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	0.11	0	Left	Cheek	QPSK	1	49	8642M	1:1	0.143	1.072	0.153	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.05	1	Left	Cheek	QPSK	25	25	8642M	1:1	0.121	1.026	0.124	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	0.11	0	Left	Tilt	QPSK	1	49	8642M	1:1	0.086	1.072	0.092	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.07	1	Left	Tilt	QPSK	25	25	8642M	1:1	0.079	1.026	0.081	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

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

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	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)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.08	0	Right	Cheek	QPSK	1	25	8623M	1:1	0.139	1.159	0.161	A6
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.04	1	Right	Cheek	QPSK	25	25	8623M	1:1	0.117	1.146	0.134	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.06	0	Right	Tilt	QPSK	1	25	8623M	1:1	0.061	1.159	0.071	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.10	1	Right	Tilt	QPSK	25	25	8623M	1:1	0.047	1.146	0.054	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.16	0	Left	Cheek	QPSK	1	25	8623M	1:1	0.105	1.159	0.122	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.17	1	Left	Cheek	QPSK	25	25	8623M	1:1	0.090	1.146	0.103	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.01	0	Left	Tilt	QPSK	1	25	8623M	1:1	0.055	1.159	0.064	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.12	1	Left	Tilt	QPSK	25	25	8623M	1:1	0.048	1.146	0.055	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-7
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	23.5	22.63	0.15	0	Right	Cheek	QPSK	1	50	8644M	1:1	0.102	1.222	0.125	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	22.5	21.73	0.12	1	Right	Cheek	QPSK	50	25	8644M	1:1	0.081	1.194	0.097	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	23.5	22.63	0.17	0	Right	Tilt	QPSK	1	50	8644M	1:1	0.049	1.222	0.060	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	22.5	21.73	0.17	1	Right	Tilt	QPSK	50	25	8644M	1:1	0.036	1.194	0.043	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	23.5	22.63	0.07	0	Left	Cheek	QPSK	1	50	8644M	1:1	0.141	1.222	0.172	A7
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	22.5	21.73	0.03	1	Left	Cheek	QPSK	50	25	8644M	1:1	0.118	1.194	0.141	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	23.5	22.63	0.17	0	Left	Tilt	QPSK	1	50	8644M	1:1	0.041	1.222	0.050	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	26	22.5	21.73	0.17	1	Left	Tilt	QPSK	50	25	8644M	1:1	0.035	1.194	0.042	
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 41 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)	Scaling Factor	Reported SAR (1g)	Plot #
		MHz	Ch.															(W/kg)		(W/kg)	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.17	0	Right	Cheek	QPSK	1	50	8635M	1:1.58	0.046	1.076	0.049	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.12	1	Right	Cheek	QPSK	50	25	8635M	1:1.58	0.037	1.067	0.039	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.19	0	Right	Tilt	QPSK	1	50	8635M	1:1.58	0.032	1.076	0.034	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.18	1	Right	Tilt	QPSK	50	25	8635M	1:1.58	0.026	1.067	0.028	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.19	0	Left	Cheek	QPSK	1	50	8635M	1:1.58	0.062	1.076	0.067	A8
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.53	0.18	0	Left	Cheek	QPSK	1	99	8635M	1:1.58	0.056	1.114	0.062	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.17	1	Left	Cheek	QPSK	50	25	8635M	1:1.58	0.047	1.067	0.050	
2 CC Uplink	PCC	2506.00	39750	Low	LTE Band 41	20	24.0	23.85	0.16	0	Left	Cheek	QPSK	1	99	8635M	1:1.58	0.058	1.035	0.060	
	SCC	2525.80	39948	Low										1	0						
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.19	0	Left	Tilt	QPSK	1	50	8635M	1:1.58	0.020	1.076	0.022	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.18	1	Left	Tilt	QPSK	50	25	8635M	1:1.58	0.015	1.067	0.016	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-9
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	17.0	16.88	0.19	Right	Cheek	1	8645M	1	100.0	0.293	-	1.028	1.000	-	
2412	1	802.11b	DSSS	22	17.0	16.88	0.13	Right	Tilt	1	8645M	1	100.0	0.335	-	1.028	1.000	-	
2412	1	802.11b	DSSS	22	17.0	16.88	0.12	Left	Cheek	1	8645M	1	100.0	0.337	-	1.028	1.000	-	
2412	1	802.11b	DSSS	22	17.0	16.88	0.18	Left	Tilt	1	8645M	1	100.0	0.364	0.319	1.028	1.000	**0.328**	A9
2437	6	802.11b	DSSS	22	17.0	16.51	0.19	Right	Cheek	2	8645M	1	100.0	0.041	0.023	1.119	1.000	0.026	
2437	6	802.11b	DSSS	22	17.0	16.51	-0.13	Right	Tilt	2	8645M	1	100.0	0.019	-	1.119	1.000	-	
2437	6	802.11b	DSSS	22	17.0	16.51	0.16	Left	Cheek	2	8645M	1	100.0	0.011	-	1.119	1.000	-	
2437	6	802.11b	DSSS	22	17.0	16.51	0.16	Left	Tilt	2	8645M	1	100.0	0.015	-	1.119	1.000	-	
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
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)	
5310	62	802.11n	OFDM	40	14.0	13.95	0.14	Right	Cheek	1	8621M	13.5	98.5	0.101	-	1.012	1.015	-	
5310	62	802.11n	OFDM	40	14.0	13.95	0.19	Right	Tilt	1	8621M	13.5	98.5	0.105	0.035	1.012	1.015	0.036	
5310	62	802.11n	OFDM	40	14.0	13.95	0.13	Left	Cheek	1	8621M	13.5	98.5	0.051	-	1.012	1.015	-	
5310	62	802.11n	OFDM	40	14.0	13.95	0.16	Left	Tilt	1	8621M	13.5	98.5	0.061	-	1.012	1.015	-	
5270	54	802.11n	OFDM	40	14.0	13.35	0.19	Right	Cheek	2	8621M	13.5	98.2	0.062	-	1.161	1.018	-	
5270	54	802.11n	OFDM	40	14.0	13.35	0.15	Right	Tilt	2	8621M	13.5	98.2	0.073	0.021	1.161	1.018	0.025	
5270	54	802.11n	OFDM	40	14.0	13.35	0.11	Left	Cheek	2	8621M	13.5	98.2	0.019	-	1.161	1.018	-	
5270	54	802.11n	OFDM	40	14.0	13.35	0.19	Left	Tilt	2	8621M	13.5	98.2	0.021	-	1.161	1.018	-	
5690	138	802.11ac	OFDM	80	14.0	13.48	-0.13	Right	Cheek	1	8621M	29.3	96.0	0.108	0.031	1.127	1.042	0.036	
5690	138	802.11ac	OFDM	80	14.0	13.48	0.17	Right	Tilt	1	8621M	29.3	96.0	0.078	-	1.127	1.042	-	
5690	138	802.11ac	OFDM	80	14.0	13.48	0.19	Left	Cheek	1	8621M	29.3	96.0	0.038	-	1.127	1.042	-	
5690	138	802.11ac	OFDM	80	14.0	13.48	-0.19	Left	Tilt	1	8621M	29.3	96.0	0.048	-	1.127	1.042	-	
5530	106	802.11ac	OFDM	80	14.0	13.88	0.13	Right	Cheek	2	8621M	29.3	95.5	0.164	0.042	1.028	1.047	**0.045**	
5530	106	802.11ac	OFDM	80	14.0	13.88	0.10	Right	Tilt	2	8621M	29.3	95.5	0.130	-	1.028	1.047	-	
5530	106	802.11ac	OFDM	80	14.0	13.88	0.16	Left	Cheek	2	8621M	29.3	95.5	0.044	-	1.028	1.047	-	
5530	106	802.11ac	OFDM	80	14.0	13.88	0.12	Left	Tilt	2	8621M	29.3	95.5	0.075	-	1.028	1.047	-	
5775	155	802.11ac	OFDM	80	14.0	13.82	-0.12	Right	Cheek	1	8621M	29.3	96.0	0.105	0.023	1.042	1.042	0.025	
5775	155	802.11ac	OFDM	80	14.0	13.82	0.12	Right	Tilt	1	8621M	29.3	96.0	0.079	-	1.042	1.042	-	
5775	155	802.11ac	OFDM	80	14.0	13.82	0.20	Left	Cheek	1	8621M	29.3	96.0	0.036	-	1.042	1.042	-	
5775	155	802.11ac	OFDM	80	14.0	13.82	0.15	Left	Tilt	1	8621M	29.3	96.0	0.051	-	1.042	1.042	-	
5775	155	802.11ac	OFDM	80	14.0	13.80	0.19	Right	Cheek	2	8621M	29.3	95.5	0.113	0.042	1.047	1.047	**0.046**	A10
5775	155	802.11ac	OFDM	80	14.0	13.80	0.10	Right	Tilt	2	8621M	29.3	95.5	0.062	-	1.047	1.047	-	
5775	155	802.11ac	OFDM	80	14.0	13.80	0.20	Left	Cheek	2	8621M	29.3	95.5	0.018	-	1.047	1.047	-	
5775	155	802.11ac	OFDM	80	14.0	13.80	0.00	Left	Tilt	2	8621M	29.3	95.5	0.016	-	1.047	1.047	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Head** **1.6 W/kg (mW/g)** averaged over 1 gram											

Table 11-11
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)	
2402.00	0	Bluetooth	FHSS	13.5	12.77	-0.02	Right	Cheek	8645M	1	77.6	0.087	1.183	1.289	0.133	
2402.00	0	Bluetooth	FHSS	13.5	12.77	0.14	Right	Tilt	8645M	1	77.6	0.119	1.183	1.289	0.181	
2402.00	0	Bluetooth	FHSS	13.5	12.77	-0.20	Left	Cheek	8645M	1	77.6	0.118	1.183	1.289	0.180	
2402.00	0	Bluetooth	FHSS	13.5	12.77	0.15	Left	Tilt	8645M	1	77.6	0.124	1.183	1.289	**0.189**	A11
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 11-12
GSM/UMTS Body-Worn SAR Data

MEASUREMENT RESULTS

FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna State	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.0	32.43	0.00	15 mm	N/A	8632M	1	1:8.3	back	0.149	1.140	0.170	A12
1880.00	661	GSM 1900	GSM	30.5	29.60	0.02	15 mm	N/A	8632M	1	1:8.3	back	0.227	1.230	0.279	A14
836.60	4183	UMTS 850	RMC	25.0	24.50	0.00	15 mm	13	8626M	N/A	1:1	back	0.221	1.122	0.248	A16
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 11-13
LTE Body-Worn SAR

FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	13	24.0	23.25	-0.01	0	8642M	QPSK	1	0	15 mm	back	1:1	0.156	1.189	0.185	A18
707.50	23095	Mid	LTE Band 12	10	13	23.0	22.24	0.02	1	8642M	QPSK	25	12	15 mm	back	1:1	0.122	1.191	0.145	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	-0.01	0	8642M	QPSK	1	49	15 mm	back	1:1	0.251	1.072	0.269	A20
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.00	1	8642M	QPSK	25	25	15 mm	back	1:1	0.198	1.026	0.203	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.01	0	8626M	QPSK	1	25	15 mm	back	1:1	0.162	1.159	0.188	A22
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.02	1	8626M	QPSK	25	25	15 mm	back	1:1	0.128	1.146	0.147	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	23.5	22.63	0.01	0	8629M	QPSK	1	50	15 mm	back	1:1	0.637	1.222	**0.778**	A24
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	22.5	21.73	0.04	1	8629M	QPSK	50	25	15 mm	back	1:1	0.525	1.194	0.627	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-14
LTE Band 41 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	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.00	0	8635M	QPSK	1	50	15 mm	back	1:1.58	0.342	1.076	0.368	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.53	-0.01	0	8635M	QPSK	1	99	15 mm	back	1:1.58	0.347	1.114	0.387	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.03	1	8635M	QPSK	50	25	15 mm	back	1:1.58	0.281	1.067	0.300	
2 CC Uplink	PCC	2506.00	39750	Low	LTE Band 41	20	24.0	23.85	-0.03	0	8635M	QPSK	1	99	15 mm	back	1:1.58	0.391	1.035	0.405	A26
2 CC Uplink	SCC	2525.80	39948	Low									1	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 11-15
DTS Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	21.0	20.86	-0.16	15 mm	1	8621M	1	back	100.0	0.177	0.112	1.033	1.000	0.116	A28
2462	11	802.11b	DSSS	22	21.0	20.97	0.09	15 mm	2	8621M	1	back	100.0	0.151	0.108	1.007	1.000	0.109	
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
NII Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5300	60	802.11a	OFDM	20	16.5	16.47	0.15	15 mm	1	8645M	6	back	99.7	0.431	0.185	1.007	1.003	0.187	
5280	56	802.11a	OFDM	20	16.5	15.97	0.02	15 mm	2	8645M	6	back	99.3	0.346	0.163	1.130	1.007	0.185	
5600	120	802.11a	OFDM	20	16.5	15.94	0.11	15 mm	1	8645M	6	back	99.7	0.447	0.173	1.138	1.003	0.197	
5720	144	802.11a	OFDM	20	16.5	16.21	0.13	15 mm	2	8645M	6	back	99.3	0.457	0.193	1.069	1.007	0.208	
5785	157	802.11a	OFDM	20	16.5	16.07	0.20	15 mm	1	8645M	6	back	99.7	0.645	0.273	1.104	1.003	0.302	A30
5785	157	802.11a	OFDM	20	16.5	16.42	0.13	15 mm	2	8645M	6	back	99.3	0.384	0.164	1.019	1.007	0.168	
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
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)	
2402	0	Bluetooth	FHSS	13.5	12.77	-0.11	15 mm	8621M	1	back	77.6	0.009	1.183	1.289	0.014	A32
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram								

11.3 Standalone Hotspot SAR Data

Table 11-18
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna State	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	30.5	29.91	-0.09	10 mm	N/A	8632M	3	1:2.76	back	0.387	1.146	0.444	A13
836.60	190	GSM 850	GPRS	30.5	29.91	-0.15	10 mm	N/A	8632M	3	1:2.76	front	0.239	1.146	0.274	
836.60	190	GSM 850	GPRS	30.5	29.91	-0.03	10 mm	N/A	8632M	3	1:2.76	bottom	0.183	1.146	0.210	
836.60	190	GSM 850	GPRS	30.5	29.91	0.01	10 mm	N/A	8632M	3	1:2.76	right	0.263	1.146	0.301	
836.60	190	GSM 850	GPRS	30.5	29.91	-0.09	10 mm	N/A	8632M	3	1:2.76	left	0.139	1.146	0.159	
1880.00	661	GSM 1900	GPRS	25.5	24.30	-0.10	10 mm	N/A	8632M	3	1:2.76	back	0.392	1.318	0.517	
1880.00	661	GSM 1900	GPRS	25.5	24.30	-0.10	10 mm	N/A	8632M	3	1:2.76	front	0.478	1.318	0.630	
1850.20	512	GSM 1900	GPRS	25.5	24.48	-0.09	10 mm	N/A	8632M	3	1:2.76	bottom	0.760	1.265	0.961	
1880.00	661	GSM 1900	GPRS	25.5	24.30	0.07	10 mm	N/A	8632M	3	1:2.76	bottom	0.705	1.318	0.929	
1909.80	810	GSM 1900	GPRS	25.5	24.58	0.06	10 mm	N/A	8632M	3	1:2.76	bottom	0.976	1.236	**1.206**	A15
1880.00	661	GSM 1900	GPRS	25.5	24.30	0.20	10 mm	N/A	8632M	3	1:2.76	right	0.123	1.318	0.162	
1880.00	661	GSM 1900	GPRS	25.5	24.30	0.19	10 mm	N/A	8632M	3	1:2.76	left	0.057	1.318	0.075	
1909.80	810	GSM 1900	GPRS	25.5	24.58	-0.02	10 mm	N/A	8632M	3	1:2.76	bottom	0.882	1.236	1.090	
836.60	4183	UMTS 850	RMC	25.0	24.50	-0.01	10 mm	13	8626M	N/A	1:1	back	0.377	1.122	0.423	A17
836.60	4183	UMTS 850	RMC	25.0	24.50	0.06	10 mm	13	8626M	N/A	1:1	front	0.234	1.122	0.263	
836.60	4183	UMTS 850	RMC	25.0	24.50	-0.02	10 mm	13	8626M	N/A	1:1	bottom	0.181	1.122	0.203	
836.60	4183	UMTS 850	RMC	25.0	24.50	0.01	10 mm	13	8626M	N/A	1:1	right	0.279	1.122	0.313	
836.60	4183	UMTS 850	RMC	25.0	24.50	0.02	10 mm	13	8626M	N/A	1:1	left	0.162	1.122	0.182	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry represents variability measurement.

Table 11-19
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																		
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	13	24.0	23.25	-0.04	0	8642M	QPSK	1	0	10 mm	back	1:1	0.215	1.189	0.256	A19
707.50	23095	Mid	LTE Band 12	10	13	23.0	22.24	-0.11	1	8642M	QPSK	25	12	10 mm	back	1:1	0.170	1.191	0.202	
707.50	23095	Mid	LTE Band 12	10	13	24.0	23.25	0.05	0	8642M	QPSK	1	0	10 mm	front	1:1	0.173	1.189	0.206	
707.50	23095	Mid	LTE Band 12	10	13	23.0	22.24	0.03	1	8642M	QPSK	25	12	10 mm	front	1:1	0.133	1.191	0.158	
707.50	23095	Mid	LTE Band 12	10	13	24.0	23.25	0.03	0	8642M	QPSK	1	0	10 mm	bottom	1:1	0.097	1.189	0.115	
707.50	23095	Mid	LTE Band 12	10	13	23.0	22.24	-0.01	1	8642M	QPSK	25	12	10 mm	bottom	1:1	0.077	1.191	0.092	
707.50	23095	Mid	LTE Band 12	10	13	24.0	23.25	-0.09	0	8642M	QPSK	1	0	10 mm	right	1:1	0.137	1.189	0.163	
707.50	23095	Mid	LTE Band 12	10	13	23.0	22.24	0.02	1	8642M	QPSK	25	12	10 mm	right	1:1	0.114	1.191	0.136	
707.50	23095	Mid	LTE Band 12	10	13	24.0	23.25	-0.04	0	8642M	QPSK	1	0	10 mm	left	1:1	0.115	1.189	0.137	
707.50	23095	Mid	LTE Band 12	10	13	23.0	22.24	-0.01	1	8642M	QPSK	25	12	10 mm	left	1:1	0.090	1.191	0.107	
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 11-20
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	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	0	24.0	23.70	-0.04	0	8642M	QPSK	1	49	10 mm	back	1:1	0.318	1.072	0.341	A21
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.00	1	8642M	QPSK	25	25	10 mm	back	1:1	0.254	1.026	0.261	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	-0.05	0	8642M	QPSK	1	49	10 mm	front	1:1	0.252	1.072	0.270	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.02	1	8642M	QPSK	25	25	10 mm	front	1:1	0.200	1.026	0.205	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	0.13	0	8642M	QPSK	1	49	10 mm	bottom	1:1	0.159	1.072	0.170	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	0.05	1	8642M	QPSK	25	25	10 mm	bottom	1:1	0.118	1.026	0.121	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	-0.06	0	8642M	QPSK	1	49	10 mm	right	1:1	0.257	1.072	0.276	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	-0.01	1	8642M	QPSK	25	25	10 mm	right	1:1	0.199	1.026	0.204	
782.00	23230	Mid	LTE Band 13	10	0	24.0	23.70	-0.05	0	8642M	QPSK	1	49	10 mm	left	1:1	0.151	1.072	0.162	
782.00	23230	Mid	LTE Band 13	10	0	23.0	22.89	-0.02	1	8642M	QPSK	25	25	10 mm	left	1:1	0.120	1.026	0.123	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-21
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	-0.02	0	8626M	QPSK	1	25	10 mm	back	1:1	0.315	1.159	0.365	A23
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.00	1	8626M	QPSK	25	25	10 mm	back	1:1	0.258	1.146	0.296	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.09	0	8626M	QPSK	1	25	10 mm	front	1:1	0.186	1.159	0.216	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	0.06	1	8626M	QPSK	25	25	10 mm	front	1:1	0.151	1.146	0.173	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.13	0	8626M	QPSK	1	25	10 mm	bottom	1:1	0.101	1.159	0.117	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	-0.16	1	8626M	QPSK	25	25	10 mm	bottom	1:1	0.094	1.146	0.108	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	-0.02	0	8626M	QPSK	1	25	10 mm	right	1:1	0.182	1.159	0.211	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	-0.02	1	8626M	QPSK	25	25	10 mm	right	1:1	0.143	1.146	0.164	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	24.0	23.36	0.11	0	8626M	QPSK	1	25	10 mm	left	1:1	0.097	1.159	0.112	
836.50	20525	Mid	LTE Band 5 (Cell)	10	13	23.0	22.41	-0.10	1	8626M	QPSK	25	25	10 mm	left	1:1	0.084	1.146	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											

Table 11-22
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS

FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.52	0.06	0	8629M	QPSK	1	50	10 mm	back	1:1	0.436	1.253	0.546	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.69	0.14	0	8629M	QPSK	50	50	10 mm	back	1:1	0.449	1.205	0.541	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.52	0.13	0	8629M	QPSK	1	50	10 mm	front	1:1	0.418	1.253	0.524	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.69	0.16	0	8629M	QPSK	50	50	10 mm	front	1:1	0.438	1.205	0.528	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.52	0.03	0	8629M	QPSK	1	50	10 mm	bottom	1:1	0.700	1.253	0.877	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.69	-0.02	0	8629M	QPSK	50	50	10 mm	bottom	1:1	0.729	1.205	0.878	A25
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.51	-0.03	0	8629M	QPSK	100	0	10 mm	bottom	1:1	0.703	1.256	0.883	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.52	0.10	0	8629M	QPSK	1	50	10 mm	right	1:1	0.079	1.253	0.099	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.69	0.08	0	8629M	QPSK	50	50	10 mm	right	1:1	0.082	1.205	0.099	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.52	0.17	0	8629M	QPSK	1	50	10 mm	left	1:1	0.062	1.253	0.078	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	19.5	18.69	0.04	0	8629M	QPSK	50	50	10 mm	left	1:1	0.062	1.205	0.075	

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

Table 11-23
LTE Band 41 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	2680.00	41490	High	LTE Band 41	20	22.0	21.93	0.00	0	8635M	QPSK	1	99	10 mm	back	1:1.58	0.342	1.016	0.347	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.95	0.03	0	8635M	QPSK	50	0	10 mm	back	1:1.58	0.342	1.012	0.346	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.93	0.01	0	8635M	QPSK	1	99	10 mm	front	1:1.58	0.276	1.016	0.280	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.95	0.03	0	8635M	QPSK	50	0	10 mm	front	1:1.58	0.280	1.012	0.283	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	22.0	21.84	0.06	0	8635M	QPSK	1	0	10 mm	bottom	1:1.58	1.080	1.038	1.121	A27
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	22.0	21.64	-0.04	0	8635M	QPSK	1	99	10 mm	bottom	1:1.58	1.010	1.086	1.097	
1 CC Uplink	N/A	2549.50	40185	Low-Mid	LTE Band 41	20	22.0	21.77	0.02	0	8635M	QPSK	1	99	10 mm	bottom	1:1.58	0.698	1.054	0.736	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	22.0	21.88	-0.10	0	8635M	QPSK	1	50	10 mm	bottom	1:1.58	1.000	1.028	1.028	
1 CC Uplink	N/A	2636.50	41055	Mid-High	LTE Band 41	20	22.0	21.78	-0.12	0	8635M	QPSK	1	50	10 mm	bottom	1:1.58	0.654	1.052	0.688	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.93	-0.04	0	8635M	QPSK	1	99	10 mm	bottom	1:1.58	0.745	1.016	0.757	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	22.0	21.91	-0.01	0	8635M	QPSK	50	0	10 mm	bottom	1:1.58	1.080	1.021	1.103	
1 CC Uplink	N/A	2549.50	40185	Low-Mid	LTE Band 41	20	22.0	21.80	0.12	0	8635M	QPSK	50	25	10 mm	bottom	1:1.58	0.790	1.047	0.827	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	22.0	21.90	0.17	0	8635M	QPSK	50	50	10 mm	bottom	1:1.58	1.040	1.023	1.064	
1 CC Uplink	N/A	2636.50	41055	Mid-High	LTE Band 41	20	22.0	21.84	0.13	0	8635M	QPSK	50	25	10 mm	bottom	1:1.58	0.734	1.038	0.762	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.95	-0.04	0	8635M	QPSK	50	0	10 mm	bottom	1:1.58	0.717	1.012	0.726	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.85	-0.04	0	8635M	QPSK	100	0	10 mm	bottom	1:1.58	0.734	1.035	0.760	
2 CC Uplink	PCC	2506.00	39750	Low	LTE Band 41	20	22.0	21.67	-0.07	0	8635M	QPSK	1	99	10 mm	bottom	1:1.58	0.968	1.079	1.044	
2 CC Uplink	SCC	2525.80	39948	Low									1	0							
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.93	-0.06	0	8635M	QPSK	1	99	10 mm	right	1:1.58	0.031	1.016	0.031	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.95	0.05	0	8635M	QPSK	50	0	10 mm	right	1:1.58	0.033	1.012	0.033	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.93	0.19	0	8635M	QPSK	1	99	10 mm	left	1:1.58	0.080	1.016	0.081	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	22.0	21.95	-0.02	0	8635M	QPSK	50	0	10 mm	left	1:1.58	0.088	1.012	0.089	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	22.0	21.84	0.19	0	8635M	QPSK	1	0	10 mm	bottom	1:1.58	1.040	1.038	1.080	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	22.0	21.90	0.17	0	8635M	QPSK	50	50	10 mm	bottom	1:1.58	1.010	1.023	1.033	

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 entries represent variability measurements.

Table 11-24
WLAN Hotspot SAR

MEASUREMENT RESULTS

FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	21.0	20.86	-0.11	10 mm	1	8621M	1	back	100.0	0.308	0.197	1.033	1.000	0.204	
2412	1	802.11b	DSSS	22	21.0	20.86	0.12	10 mm	1	8621M	1	front	100.0	0.162	-	1.033	1.000	-	
2412	1	802.11b	DSSS	22	21.0	20.86	0.10	10 mm	1	8621M	1	top	100.0	0.748	0.464	1.033	1.000	**0.479**	A29
2412	1	802.11b	DSSS	22	21.0	20.86	-0.18	10 mm	1	8621M	1	left	100.0	0.078	-	1.033	1.000	-	
2462	11	802.11b	DSSS	22	21.0	20.97	0.05	10 mm	2	8621M	1	back	100.0	0.373	0.293	1.007	1.000	0.295	
2462	11	802.11b	DSSS	22	21.0	20.97	0.12	10 mm	2	8621M	1	front	100.0	0.014	-	1.007	1.000	-	
2462	11	802.11b	DSSS	22	21.0	20.97	0.17	10 mm	2	8621M	1	top	100.0	0.054	-	1.007	1.000	-	
2462	11	802.11b	DSSS	22	21.0	20.97	0.15	10 mm	2	8621M	1	left	100.0	0.085	-	1.007	1.000	-	
5785	157	802.11a	OFDM	20	16.5	16.07	0.13	10 mm	1	8645M	6	back	99.7	1.222	0.461	1.104	1.003	**0.510**	A31
5785	157	802.11a	OFDM	20	16.5	16.07	0.19	10 mm	1	8645M	6	front	99.7	0.020	0.008	1.104	1.003	0.009	
5785	157	802.11a	OFDM	20	16.5	16.07	0.18	10 mm	1	8645M	6	top	99.7	0.124	-	1.104	1.003	-	
5785	157	802.11a	OFDM	20	16.5	16.07	0.15	10 mm	1	8645M	6	left	99.7	0.332	0.127	1.104	1.003	0.141	
5785	157	802.11a	OFDM	20	16.5	16.42	0.05	10 mm	2	8645M	6	back	99.3	0.602	0.241	1.019	1.007	0.247	
5785	157	802.11a	OFDM	20	16.5	16.42	-0.13	10 mm	2	8645M	6	front	99.3	0.020	0.008	1.019	1.007	0.008	
5785	157	802.11a	OFDM	20	16.5	16.42	0.17	10 mm	2	8645M	6	top	99.3	0.131	-	1.019	1.007	-	
5785	157	802.11a	OFDM	20	16.5	16.42	0.17	10 mm	2	8645M	6	left	99.3	0.160	-	1.019	1.007	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram											

Table 11-25
DTS Hotspot SAR for Conditions with 2.4 GHz and 5 GHz WLAN 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)	
2462	11	802.11n	OFDM	20	17.0	16.66	17.0	16.01	0.16	10 mm	MIMO	8639M	13	back	99.3	0.226	0.154	1.256	1.007	0.195	
2462	11	802.11n	OFDM	20	17.0	16.66	17.0	16.01	0.04	10 mm	MIMO	8639M	13	front	99.3	0.096	-	1.256	1.007	-	
2462	11	802.11n	OFDM	20	17.0	16.66	17.0	16.01	-0.02	10 mm	MIMO	8639M	13	top	99.3	0.287	0.186	1.256	1.007	0.235	
2462	11	802.11n	OFDM	20	17.0	16.66	17.0	16.01	0.00	10 mm	MIMO	8639M	13	left	99.3	0.063	-	1.256	1.007	-	
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: DTS MIMO was additionally evaluated at the maximum allowed output power during operations with Simultaneous 2.4 GHz and 5 GHz WLAN. 5 GHz WIFI was not transmitting during the above evaluations.

Table 11-26
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)	
2402	0	Bluetooth	FHSS	13.5	12.77	0.17	10 mm	8621M	1	back	77.6	0.019	1.183	1.289	0.029	
2402	0	Bluetooth	FHSS	13.5	12.77	0.20	10 mm	8621M	1	front	77.6	0.012	1.183	1.289	0.018	
2402	0	Bluetooth	FHSS	13.5	12.77	0.03	10 mm	8621M	1	top	77.6	0.050	1.183	1.289	**0.076**	A33
2402	0	Bluetooth	FHSS	13.5	12.77	-0.16	10 mm	8621M	1	left	77.6	0.004	1.183	1.289	0.006	
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 11-27
GPRS Phablet 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 (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GPRS	29.5	28.60	-0.08	8 mm	8632M	2	1:4.15	back	0.389	1.230	0.478	
1880.00	661	GSM 1900	GPRS	29.5	28.60	-0.05	6 mm	8632M	2	1:4.15	front	0.516	1.230	0.635	
1880.00	661	GSM 1900	GPRS	29.5	28.60	-0.01	11 mm	8632M	2	1:4.15	bottom	0.521	1.230	0.641	
1880.00	661	GSM 1900	GPRS	29.5	28.60	0.12	0 mm	8632M	2	1:4.15	right	0.181	1.230	0.223	
1880.00	661	GSM 1900	GPRS	29.5	28.60	-0.01	0 mm	8632M	2	1:4.15	left	0.163	1.230	0.200	
1880.00	661	GSM 1900	GPRS	25.5	24.30	0.17	0 mm	8632M	3	1:2.76	back	1.330	1.318	1.753	
1880.00	661	GSM 1900	GPRS	25.5	24.30	-0.02	0 mm	8632M	3	1:2.76	front	1.160	1.318	1.529	
1850.20	512	GSM 1900	GPRS	25.5	24.48	0.00	0 mm	8632M	3	1:2.76	bottom	2.030	1.265	2.568	
1880.00	661	GSM 1900	GPRS	25.5	24.30	0.02	0 mm	8632M	3	1:2.76	bottom	1.980	1.318	2.610	
1909.80	810	GSM 1900	GPRS	25.5	24.58	0.04	0 mm	8632M	3	1:2.76	bottom	2.530	1.236	3.127	A34
1909.80	810	GSM 1900	GPRS	25.5	24.58	0.14	0 mm	8632M	3	1:2.76	bottom	2.490	1.236	3.078	
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 represents variability measurement.

Table 11-28
LTE B4 Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Antenna State	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	23.5	22.63	-0.01	0	8635M	QPSK	1	50	8 mm	back	1:1	0.907	1.222	1.108	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	22.5	21.73	0.00	1	8635M	QPSK	50	25	8 mm	back	1:1	0.750	1.194	0.896	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	23.5	22.63	0.12	0	8635M	QPSK	1	50	6 mm	front	1:1	1.090	1.222	1.332	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	22.5	21.73	0.09	1	8635M	QPSK	50	25	6 mm	front	1:1	0.900	1.194	1.075	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	23.5	22.63	0.03	0	8635M	QPSK	1	50	11 mm	bottom	1:1	0.959	1.222	1.172	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	22.5	21.73	-0.01	1	8635M	QPSK	50	25	11 mm	bottom	1:1	0.787	1.194	0.940	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	23.5	22.63	0.01	0	8635M	QPSK	1	50	0 mm	right	1:1	0.421	1.222	0.514	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	22.5	21.73	0.03	1	8635M	QPSK	50	25	0 mm	right	1:1	0.350	1.194	0.418	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	23.5	22.63	-0.01	0	8635M	QPSK	1	50	0 mm	left	1:1	0.377	1.222	0.461	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	22.5	21.73	0.01	1	8635M	QPSK	50	25	0 mm	left	1:1	0.304	1.194	0.363	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.10	0.06	0	8635M	QPSK	1	50	0 mm	back	1:1	1.650	1.230	2.030	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.18	0.02	0	8635M	QPSK	50	50	0 mm	back	1:1	1.780	1.208	2.150	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.05	0.04	0	8635M	QPSK	100	0	0 mm	back	1:1	1.760	1.245	2.191	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.10	0.00	0	8635M	QPSK	1	50	0 mm	front	1:1	1.720	1.230	2.116	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.18	0.03	0	8635M	QPSK	50	50	0 mm	front	1:1	1.600	1.208	1.933	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.05	0.03	0	8635M	QPSK	100	0	0 mm	front	1:1	1.740	1.245	2.166	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.10	-0.11	0	8635M	QPSK	1	50	0 mm	bottom	1:1	1.670	1.230	2.054	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.18	-0.05	0	8635M	QPSK	50	50	0 mm	bottom	1:1	1.800	1.208	2.174	A35
1732.50	20175	Mid	LTE Band 4 (AWS)	20	55	20.0	19.05	-0.18	0	8635M	QPSK	100	0	0 mm	bottom	1:1	1.770	1.245	2.204	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Phablet 4.0 W/kg (mW/g) averaged over 10 grams										

Table 11-29
LTE B41 Phablet 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]	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)	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	-0.05	0	8635M	QPSK	1	50	8 mm	back	1:1.58	0.388	1.076	0.417	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	-0.04	1	8635M	QPSK	50	25	8 mm	back	1:1.58	0.314	1.067	0.335	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	-0.01	0	8635M	QPSK	1	50	6 mm	front	1:1.58	0.534	1.076	0.575	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.00	1	8635M	QPSK	50	25	6 mm	front	1:1.58	0.438	1.067	0.467	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.00	0	8635M	QPSK	1	50	11 mm	bottom	1:1.58	0.590	1.076	0.635	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.03	1	8635M	QPSK	50	25	11 mm	bottom	1:1.58	0.490	1.067	0.523	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	0.03	0	8635M	QPSK	1	50	0 mm	right	1:1.58	0.087	1.076	0.094	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	0.07	1	8635M	QPSK	50	25	0 mm	right	1:1.58	0.070	1.067	0.075	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	24.0	23.68	-0.19	0	8635M	QPSK	1	50	0 mm	left	1:1.58	0.258	1.076	0.278	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.72	-0.17	1	8635M	QPSK	50	25	0 mm	left	1:1.58	0.226	1.067	0.241	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.21	0.11	0	8635M	QPSK	1	0	0 mm	back	1:1.58	1.700	1.199	2.038	
1 CC Uplink	N/A	2549.50	40185	Low-Mid	LTE Band 41	20	23.0	22.07	0.16	0	8635M	QPSK	1	99	0 mm	back	1:1.58	1.360	1.239	1.685	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.58	0.15	0	8635M	QPSK	1	50	0 mm	back	1:1.58	1.680	1.102	1.851	
1 CC Uplink	N/A	2636.50	41055	Mid-High	LTE Band 41	20	23.0	22.36	0.17	0	8635M	QPSK	1	50	0 mm	back	1:1.58	1.860	1.159	2.156	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	23.0	22.40	0.13	0	8635M	QPSK	1	50	0 mm	back	1:1.58	1.810	1.148	2.078	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.26	0.13	0	8635M	QPSK	50	0	0 mm	back	1:1.58	1.730	1.186	2.052	
1 CC Uplink	N/A	2549.50	40185	Low-Mid	LTE Band 41	20	23.0	22.18	0.12	0	8635M	QPSK	50	25	0 mm	back	1:1.58	1.460	1.208	1.764	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.64	0.19	0	8635M	QPSK	50	25	0 mm	back	1:1.58	1.680	1.086	1.824	
1 CC Uplink	N/A	2636.50	41055	Mid-High	LTE Band 41	20	23.0	22.48	-0.16	0	8635M	QPSK	50	25	0 mm	back	1:1.58	2.010	1.127	2.265	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	23.0	22.46	-0.19	0	8635M	QPSK	50	25	0 mm	back	1:1.58	2.020	1.132	2.287	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.57	-0.18	0	8635M	QPSK	100	0	0 mm	back	1:1.58	1.710	1.104	1.888	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.58	-0.05	0	8635M	QPSK	1	50	0 mm	front	1:1.58	1.300	1.102	1.433	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.64	-0.08	0	8635M	QPSK	50	25	0 mm	front	1:1.58	1.360	1.086	1.477	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.21	-0.16	0	8635M	QPSK	1	0	0 mm	bottom	1:1.58	1.260	1.199	1.511	
1 CC Uplink	N/A	2549.50	40185	Low-Mid	LTE Band 41	20	23.0	22.07	-0.13	0	8635M	QPSK	1	99	0 mm	bottom	1:1.58	1.070	1.239	1.326	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.58	-0.15	0	8635M	QPSK	1	50	0 mm	bottom	1:1.58	1.500	1.102	1.653	
1 CC Uplink	N/A	2636.50	41055	Mid-High	LTE Band 41	20	23.0	22.36	-0.19	0	8635M	QPSK	1	50	0 mm	bottom	1:1.58	2.050	1.159	2.376	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	23.0	22.40	-0.17	0	8635M	QPSK	1	50	0 mm	bottom	1:1.58	2.070	1.148	2.376	
1 CC Uplink	N/A	2506.00	39750	Low	LTE Band 41	20	23.0	22.26	-0.14	0	8635M	QPSK	50	0	0 mm	bottom	1:1.58	1.300	1.186	1.542	
1 CC Uplink	N/A	2549.50	40185	Low-Mid	LTE Band 41	20	23.0	22.18	-0.19	0	8635M	QPSK	50	25	0 mm	bottom	1:1.58	1.110	1.208	1.341	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.64	-0.17	0	8635M	QPSK	50	25	0 mm	bottom	1:1.58	1.590	1.086	1.727	
1 CC Uplink	N/A	2636.50	41055	Mid-High	LTE Band 41	20	23.0	22.48	-0.15	0	8635M	QPSK	50	25	0 mm	bottom	1:1.58	2.120	1.127	2.389	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	23.0	22.24	-0.19	0	8635M	QPSK	50	0	0 mm	bottom	1:1.58	2.070	1.191	2.465	
1 CC Uplink	N/A	2680.00	41490	High	LTE Band 41	20	23.0	22.46	-0.19	0	8635M	QPSK	50	25	0 mm	bottom	1:1.58	2.140	1.132	2.422	
1 CC Uplink	N/A	2593.00	40620	Mid	LTE Band 41	20	23.0	22.57	-0.18	0	8635M	QPSK	100	0	0 mm	bottom	1:1.58	1.550	1.104	1.711	
2 CC Uplink	PCC	2680.00	41490	High	LTE Band 41	20	23.0	22.97	-0.11	0	8635M	QPSK	50	0	0 mm	bottom	1:1.58	2.530	1.007	2.548	A36
2 CC Uplink	SCC	2660.20	41292	High									50	50							
2 CC Uplink	PCC	2680.00	41490	High	LTE Band 41	20	23.0	22.97	-0.12	0	8635M	QPSK	50	0	0 mm	bottom	1:1.58	2.530	1.007	2.548	
2 CC Uplink	SCC	2660.20	41292	High									50	50							
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 represents variability measurement.

Table 11-30
WLAN Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (10g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5300	60	802.11a	OFDM	20	16.5	16.47	0.16	0 mm	1	8645M	6	back	99.7	19.789	1.250	1.007	1.003	1.263	
5300	60	802.11a	OFDM	20	16.5	16.47	0.20	0 mm	1	8645M	6	front	99.7	0.404	0.056	1.007	1.003	0.057	
5300	60	802.11a	OFDM	20	16.5	16.47	-0.05	0 mm	1	8645M	6	top	99.7	1.111	-	1.007	1.003	-	
5300	60	802.11a	OFDM	20	16.5	16.47	0.03	0 mm	1	8645M	6	left	99.7	4.206	0.244	1.007	1.003	0.246	
5280	56	802.11a	OFDM	20	16.5	15.97	0.20	0 mm	2	8645M	6	back	99.3	9.182	1.090	1.130	1.007	1.240	
5280	56	802.11a	OFDM	20	16.5	15.97	0.19	0 mm	2	8645M	6	front	99.3	0.360	0.038	1.130	1.007	0.043	
5280	56	802.11a	OFDM	20	16.5	15.97	0.17	0 mm	2	8645M	6	top	99.3	1.195	-	1.130	1.007	-	
5280	56	802.11a	OFDM	20	16.5	15.97	0.12	0 mm	2	8645M	6	left	99.3	3.486	0.292	1.130	1.007	0.332	
5600	120	802.11a	OFDM	20	16.5	15.94	0.13	0 mm	1	8645M	6	back	99.7	21.995	1.050	1.138	1.003	1.198	
5600	120	802.11a	OFDM	20	16.5	15.94	0.16	0 mm	1	8645M	6	front	99.7	0.257	0.032	1.138	1.003	0.037	
5600	120	802.11a	OFDM	20	16.5	15.94	0.11	0 mm	1	8645M	6	top	99.7	1.158	-	1.138	1.003	-	
5600	120	802.11a	OFDM	20	16.5	15.94	0.09	0 mm	1	8645M	6	left	99.7	3.145	0.191	1.138	1.003	0.218	
5720	144	802.11a	OFDM	20	16.5	16.21	-0.14	0 mm	2	8645M	6	back	99.3	18.326	1.220	1.069	1.007	1.313	
5720	144	802.11a	OFDM	20	16.5	16.21	0.13	0 mm	2	8645M	6	front	99.3	0.437	0.053	1.069	1.007	0.057	
5720	144	802.11a	OFDM	20	16.5	16.21	0.18	0 mm	2	8645M	6	top	99.3	1.431	-	1.069	1.007	-	
5720	144	802.11a	OFDM	20	16.5	16.21	0.19	0 mm	2	8645M	6	left	99.3	4.250	0.362	1.069	1.007	0.390	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Phablet 4.0 W/kg (mW/g) averaged over 10 grams											

Table 11-31
5 GHz 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	16.5	16.43	16.5	15.90	0.12	0 mm	MIMO	8645M	13	back	99.3	21.560	1.730	1.148	1.007	2.000	
5280	56	802.11n	OFDM	20	16.5	16.47	16.5	16.00	0.20	0 mm	MIMO	8645M	13	back	99.3	21.141	1.760	1.122	1.007	1.989	A37
5320	64	802.11n	OFDM	20	16.5	16.12	16.5	15.86	0.11	0 mm	MIMO	8645M	13	back	99.3	19.285	1.640	1.159	1.007	1.914	
5280	56	802.11n	OFDM	20	16.5	16.47	16.5	16.00	0.13	0 mm	MIMO	8645M	13	front	99.3	0.383	0.067	1.122	1.007	0.076	
5280	56	802.11n	OFDM	20	16.5	16.47	16.5	16.00	0.11	0 mm	MIMO	8645M	13	top	99.3	1.521	-	1.122	1.007	-	
5280	56	802.11n	OFDM	20	16.5	16.47	16.5	16.00	0.01	0 mm	MIMO	8645M	13	left	99.3	5.390	0.449	1.122	1.007	0.507	
5500	100	802.11n	OFDM	20	15.5	14.97	15.5	15.20	0.16	0 mm	MIMO	8645M	13	back	99.3	21.014	1.610	1.130	1.007	1.832	
5500	100	802.11n	OFDM	20	15.5	14.97	15.5	15.20	-0.11	0 mm	MIMO	8645M	13	front	99.3	0.384	0.059	1.130	1.007	0.067	
5500	100	802.11n	OFDM	20	15.5	14.97	15.5	15.20	-0.13	0 mm	MIMO	8645M	13	top	99.3	1.423	-	1.130	1.007	-	
5500	100	802.11n	OFDM	20	15.5	14.97	15.5	15.20	-0.12	0 mm	MIMO	8645M	13	left	99.3	4.833	0.377	1.130	1.007	0.429	
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: To achieve a maximum allowed power of 19.5 dBm for UNII-2A and 18.5 dBm for UNII-2C, each antenna transmits at a maximum allowed power of 16.5 dBm for UNII-2A and 15.5 dBm for UNII-2C.

11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.

6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg for 1g SAR or 2.0 W/kg for 10g SAR. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
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 supports dynamic antenna tuning for some bands. Per FCC Guidance, SAR was measured according to the normally required SAR measurement configurations with tuner active. The auto-tune state determined by the device was verified before and after each SAR measurement and is listed in tables above. Please see Section 14 for supplemental data.
12. 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.
13. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds below.
14. The orange highlights throughout the report represents the highest SAR per FCC Equipment Class reflected on the FCC Grant.

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.

UMTS Notes:

1. UMTS mode 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 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 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 41 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 41, 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/ax) 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.
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 9.5 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.

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.

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

12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM 850	0.174	0.328	0.026	0.502	0.200	0.528
	GSM 1900	0.069	0.328	0.026	0.397	0.095	0.423
	UMTS 850	0.215	0.328	0.026	0.543	0.241	**0.569**
	LTE Band 12	0.087	0.328	0.026	0.415	0.113	0.441
	LTE Band 13	0.188	0.328	0.026	0.516	0.214	0.542
	LTE Band 5 (Cell)	0.161	0.328	0.026	0.489	0.187	0.515
	LTE Band 4 (AWS)	0.172	0.328	0.026	0.500	0.198	0.526
	LTE Band 41	0.067	0.328	0.026	0.395	0.093	0.421

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM 850	0.174	0.036	0.046	0.210	0.220	0.256
	GSM 1900	0.069	0.036	0.046	0.105	0.115	0.151
	UMTS 850	0.215	0.036	0.046	0.251	0.261	**0.297**
	LTE Band 12	0.087	0.036	0.046	0.123	0.133	0.169
	LTE Band 13	0.188	0.036	0.046	0.224	0.234	0.270
	LTE Band 5 (Cell)	0.161	0.036	0.046	0.197	0.207	0.243
	LTE Band 4 (AWS)	0.172	0.036	0.046	0.208	0.218	0.254
	LTE Band 41	0.067	0.036	0.046	0.103	0.113	0.149

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Head SAR	GSM 850	0.174	0.328	0.026	0.036	0.046	0.610
	GSM 1900	0.069	0.328	0.026	0.036	0.046	0.505
	UMTS 850	0.215	0.328	0.026	0.036	0.046	**0.651**
	LTE Band 12	0.087	0.328	0.026	0.036	0.046	0.523
	LTE Band 13	0.188	0.328	0.026	0.036	0.046	0.624
	LTE Band 5 (Cell)	0.161	0.328	0.026	0.036	0.046	0.597
	LTE Band 4 (AWS)	0.172	0.328	0.026	0.036	0.046	0.608
	LTE Band 41	0.067	0.328	0.026	0.036	0.046	0.503

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM 850	0.174	0.189	0.363
	GSM 1900	0.069	0.189	0.258
	UMTS 850	0.215	0.189	**0.404**
	LTE Band 12	0.087	0.189	0.276
	LTE Band 13	0.188	0.189	0.377
	LTE Band 5 (Cell)	0.161	0.189	0.350
	LTE Band 4 (AWS)	0.172	0.189	0.361
	LTE Band 41	0.067	0.189	0.256

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	GSM 850	0.174	0.189	0.036	0.399
	GSM 1900	0.069	0.189	0.036	0.294
	UMTS 850	0.215	0.189	0.036	**0.440**
	LTE Band 12	0.087	0.189	0.036	0.312
	LTE Band 13	0.188	0.189	0.036	0.413
	LTE Band 5 (Cell)	0.161	0.189	0.036	0.386
	LTE Band 4 (AWS)	0.172	0.189	0.036	0.397
	LTE Band 41	0.067	0.189	0.036	0.292

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	GSM 850	0.174	0.189	0.046	0.409
	GSM 1900	0.069	0.189	0.046	0.304
	UMTS 850	0.215	0.189	0.046	**0.450**
	LTE Band 12	0.087	0.189	0.046	0.322
	LTE Band 13	0.188	0.189	0.046	0.423
	LTE Band 5 (Cell)	0.161	0.189	0.046	0.396
	LTE Band 4 (AWS)	0.172	0.189	0.046	0.407
	LTE Band 41	0.067	0.189	0.046	0.302

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+4
Head SAR	GSM 850	0.174	0.189	0.036	0.046	0.445
	GSM 1900	0.069	0.189	0.036	0.046	0.340
	UMTS 850	0.215	0.189	0.036	0.046	**0.486**
	LTE Band 12	0.087	0.189	0.036	0.046	0.358
	LTE Band 13	0.188	0.189	0.036	0.046	0.459
	LTE Band 5 (Cell)	0.161	0.189	0.036	0.046	0.432
	LTE Band 4 (AWS)	0.172	0.189	0.036	0.046	0.443
	LTE Band 41	0.067	0.189	0.036	0.046	0.338

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-6
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.170	0.116	0.122	0.286	0.292	0.408
	GSM 1900	0.279	0.116	0.122	0.395	0.401	0.517
	UMTS 850	0.248	0.116	0.122	0.364	0.370	0.486
	LTE Band 12	0.185	0.116	0.122	0.301	0.307	0.423
	LTE Band 13	0.269	0.116	0.122	0.385	0.391	0.507
	LTE Band 5 (Cell)	0.188	0.116	0.122	0.304	0.310	0.426
	LTE Band 4 (AWS)	0.778	0.116	0.122	0.894	0.900	**1.016**
	LTE Band 41	0.405	0.116	0.122	0.521	0.527	0.643

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.170	0.302	0.208	0.472	0.378	0.680
	GSM 1900	0.279	0.302	0.208	0.581	0.487	0.789
	UMTS 850	0.248	0.302	0.208	0.550	0.456	0.758
	LTE Band 12	0.185	0.302	0.208	0.487	0.393	0.695
	LTE Band 13	0.269	0.302	0.208	0.571	0.477	0.779
	LTE Band 5 (Cell)	0.188	0.302	0.208	0.490	0.396	0.698
	LTE Band 4 (AWS)	0.778	0.302	0.208	1.080	0.986	**1.288**
	LTE Band 41	0.405	0.302	0.208	0.707	0.613	0.915

Table 12-8
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body-Worn	GSM 850	0.170	0.116	0.122	0.302	0.208	0.918
	GSM 1900	0.279	0.116	0.122	0.302	0.208	1.027
	UMTS 850	0.248	0.116	0.122	0.302	0.208	0.996
	LTE Band 12	0.185	0.116	0.122	0.302	0.208	0.933
	LTE Band 13	0.269	0.116	0.122	0.302	0.208	1.017
	LTE Band 5 (Cell)	0.188	0.116	0.122	0.302	0.208	0.936
	LTE Band 4 (AWS)	0.778	0.116	0.122	0.302	0.208	**1.526**
	LTE Band 41	0.405	0.116	0.122	0.302	0.208	1.153

Table 12-9
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM 850	0.170	0.014	0.184
	GSM 1900	0.279	0.014	0.293
	UMTS 850	0.248	0.014	0.262
	LTE Band 12	0.185	0.014	0.199
	LTE Band 13	0.269	0.014	0.283
	LTE Band 5 (Cell)	0.188	0.014	0.202
	LTE Band 4 (AWS)	0.778	0.014	**0.792**
	LTE Band 41	0.405	0.014	0.419

Table 12-10
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body-Worn	GSM 850	0.170	0.014	0.302	0.486
	GSM 1900	0.279	0.014	0.302	0.595
	UMTS 850	0.248	0.014	0.302	0.564
	LTE Band 12	0.185	0.014	0.302	0.501
	LTE Band 13	0.269	0.014	0.302	0.585
	LTE Band 5 (Cell)	0.188	0.014	0.302	0.504
	LTE Band 4 (AWS)	0.778	0.014	0.302	**1.094**
	LTE Band 41	0.405	0.014	0.302	0.721

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body-Worn	GSM 850	0.170	0.014	0.208	0.392
	GSM 1900	0.279	0.014	0.208	0.501
	UMTS 850	0.248	0.014	0.208	0.470
	LTE Band 12	0.185	0.014	0.208	0.407
	LTE Band 13	0.269	0.014	0.208	0.491
	LTE Band 5 (Cell)	0.188	0.014	0.208	0.410
	LTE Band 4 (AWS)	0.778	0.014	0.208	**1.000**
	LTE Band 41	0.405	0.014	0.208	0.627

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+4
Body-Worn	GSM 850	0.170	0.014	0.302	0.208	0.694
	GSM 1900	0.279	0.014	0.302	0.208	0.803
	UMTS 850	0.248	0.014	0.302	0.208	0.772
	LTE Band 12	0.185	0.014	0.302	0.208	0.709
	LTE Band 13	0.269	0.014	0.302	0.208	0.793
	LTE Band 5 (Cell)	0.188	0.014	0.302	0.208	0.712
	LTE Band 4 (AWS)	0.778	0.014	0.302	0.208	**1.302**
	LTE Band 41	0.405	0.014	0.302	0.208	0.929

12.5 Hotspot SAR Simultaneous Transmission Analysis

Table 12-11
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	GPRS 850	0.444	0.479	0.295	0.923	0.739	1.218
	GPRS 1900	1.206	0.479	0.295	See Table Below	**1.501**	See Table Below
	UMTS 850	0.423	0.479	0.295	0.902	0.718	1.197
	LTE Band 12	0.256	0.479	0.295	0.735	0.551	1.030
	LTE Band 13	0.341	0.479	0.295	0.820	0.636	1.115
	LTE Band 5 (Cell)	0.365	0.479	0.295	0.844	0.660	1.139
	LTE Band 4 (AWS)	0.883	0.479	0.295	1.362	1.178	See Table Below
	LTE Band 41	1.121	0.479	0.295	See Table Below	1.416	See Table Below

Simult Tx	Configuration	GPRS 1900 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	Back	0.517	0.204	0.295	0.721	0.812	1.016
	Front	0.630	0.479*	0.295*	1.109	0.925	**1.404**
	Top	-	0.479	0.295*	0.479	0.295	0.774
	Bottom	1.206	-	-	1.206	1.206	1.206
	Right	0.162	-	-	0.162	0.162	0.162
	Left	0.075	0.479*	0.295*	0.554	0.370	0.849

Simult Tx	Configuration	LTE Band 4 (AWS) 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	Back	0.546	0.204	0.295	0.750	0.841	1.045
	Front	0.528	0.479*	0.295*	1.007	0.823	**1.302**
	Top	-	0.479	0.295*	0.479	0.295	0.774
	Bottom	0.883	-	-	0.883	0.883	0.883
	Right	0.099	-	-	0.099	0.099	0.099
	Left	0.078	0.479*	0.295*	0.557	0.373	0.852

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	Back	0.347	0.204	0.295	0.551	0.642	0.846
	Front	0.283	0.479*	0.295*	0.762	0.578	1.057
	Top	-	0.479	0.295*	0.479	0.295	0.774
	Bottom	1.121	-	-	**1.121**	**1.121**	**1.121**
	Right	0.033	-	-	0.033	0.033	0.033
	Left	0.089	0.479*	0.295*	0.568	0.384	0.863

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	0.444	0.510	0.247	0.954	0.691	1.201
	GPRS 1900	1.206	0.510	0.247	See Table Below	**1.453**	See Table Below
	UMTS 850	0.423	0.510	0.247	0.933	0.670	1.180
	LTE Band 12	0.256	0.510	0.247	0.766	0.503	1.013
	LTE Band 13	0.341	0.510	0.247	0.851	0.588	1.098
	LTE Band 5 (Cell)	0.365	0.510	0.247	0.875	0.612	1.122
	LTE Band 4 (AWS)	0.883	0.510	0.247	1.393	1.130	See Table Below
	LTE Band 41	1.121	0.510	0.247	See Table Below	1.368	See Table Below

Simult Tx	Configuration	GPRS 1900 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	Back	0.517	0.510	0.247	1.027	0.764	**1.274**
	Front	0.630	0.009	0.008	0.639	0.638	0.647
	Top	-	0.510*	0.247*	0.510	0.247	0.757
	Bottom	1.206	-	-	1.206	1.206	1.206
	Right	0.162	-	-	0.162	0.162	0.162
	Left	0.075	0.141	0.247*	0.216	0.322	0.463

Simult Tx	Configuration	LTE Band 4 (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	1+2+3
Hotspot SAR	Back	0.546	0.510	0.247	1.056	0.793	**1.303**
	Front	0.528	0.009	0.008	0.537	0.536	0.545
	Top	-	0.510*	0.247*	0.510	0.247	0.757
	Bottom	0.883	-	-	0.883	0.883	0.883
	Right	0.099	-	-	0.099	0.099	0.099
	Left	0.078	0.141	0.247*	0.219	0.325	0.466

Simult Tx	Configuration	LTE Band 41 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	Back	0.347	0.510	0.247	0.857	0.594	1.104
	Front	0.283	0.009	0.008	0.292	0.291	0.300
	Top	-	0.510*	0.247*	0.510	0.247	0.757
	Bottom	1.121	-	-	**1.121**	**1.121**	**1.121**
	Right	0.033	-	-	0.033	0.033	0.033
	Left	0.089	0.141	0.247*	0.230	0.336	0.477

Table 12-13
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO and 5 GHz WLAN MIMO (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO 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	GPRS 850	0.444	0.235	0.510	0.247	1.436
	GPRS 1900	1.206	0.235	0.510	0.247	See Table Below
	UMTS 850	0.423	0.235	0.510	0.247	1.415
	LTE Band 12	0.256	0.235	0.510	0.247	1.248
	LTE Band 13	0.341	0.235	0.510	0.247	1.333
	LTE Band 5 (Cell)	0.365	0.235	0.510	0.247	1.357
	LTE Band 4 (AWS)	0.883	0.235	0.510	0.247	See Table Below
	LTE Band 41	1.121	0.235	0.510	0.247	See Table Below

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN MIMO 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	0.517	0.195	0.510	0.247	**1.469**
	Front	0.630	0.235*	0.009	0.008	0.882
	Top	-	0.235	0.510*	0.247*	0.992
	Bottom	1.206	-	-	-	1.206
	Right	0.162	-	-	-	0.162
	Left	0.075	0.235*	0.141	0.247*	0.698

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO 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	0.546	0.195	0.510	0.247	**1.498**
	Front	0.528	0.235*	0.009	0.008	0.780
	Top	-	0.235	0.510*	0.247*	0.992
	Bottom	0.883	-	-	-	0.883
	Right	0.099	-	-	-	0.099
	Left	0.078	0.235*	0.141	0.247*	0.701

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN MIMO 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	0.347	0.195	0.510	0.247	**1.299**
	Front	0.283	0.235*	0.009	0.008	0.535
	Top	-	0.235	0.510*	0.247*	0.992
	Bottom	1.121	-	-	-	1.121
	Right	0.033	-	-	-	0.033
	Left	0.089	0.235*	0.141	0.247*	0.712

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	0.444	0.076	0.520
	GPRS 1900	1.206	0.076	**1.282**
	UMTS 850	0.423	0.076	0.499
	LTE Band 12	0.256	0.076	0.332
	LTE Band 13	0.341	0.076	0.417
	LTE Band 5 (Cell)	0.365	0.076	0.441
	LTE Band 4 (AWS)	0.883	0.076	0.959
	LTE Band 41	1.121	0.076	1.197

Table 12-15
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN (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)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.444	0.076	0.510	1.030
	GPRS 1900	1.206	0.076	0.510	See Table Below
	UMTS 850	0.423	0.076	0.510	1.009
	LTE Band 12	0.256	0.076	0.510	0.842
	LTE Band 13	0.341	0.076	0.510	0.927
	LTE Band 5 (Cell)	0.365	0.076	0.510	0.951
	LTE Band 4 (AWS)	0.883	0.076	0.510	**1.469**
	LTE Band 41	1.121	0.076	0.510	See Table Below

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.517	0.029	0.510	1.056
	Front	0.630	0.018	0.009	0.657
	Top	-	0.076	0.510*	0.586
	Bottom	1.206	-	-	**1.206**
	Right	0.162	-	-	0.162
	Left	0.075	0.006	0.141	0.222

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.347	0.029	0.510	0.886
	Front	0.283	0.018	0.009	0.310
	Top	-	0.076	0.510*	0.586
	Bottom	1.121	-	-	**1.121**
	Right	0.033	-	-	0.033
	Left	0.089	0.006	0.141	0.236

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth 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	0.444	0.076	0.247	0.767
	GPRS 1900	1.206	0.076	0.247	**1.529**
	UMTS 850	0.423	0.076	0.247	0.746
	LTE Band 12	0.256	0.076	0.247	0.579
	LTE Band 13	0.341	0.076	0.247	0.664
	LTE Band 5 (Cell)	0.365	0.076	0.247	0.688
	LTE Band 4 (AWS)	0.883	0.076	0.247	1.206
	LTE Band 41	1.121	0.076	0.247	1.444

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+4
Hotspot SAR	GPRS 850	0.444	0.076	0.510	0.247	1.277
	GPRS 1900	1.206	0.076	0.510	0.247	See Table Below
	UMTS 850	0.423	0.076	0.510	0.247	1.256
	LTE Band 12	0.256	0.076	0.510	0.247	1.089
	LTE Band 13	0.341	0.076	0.510	0.247	1.174
	LTE Band 5 (Cell)	0.365	0.076	0.510	0.247	1.198
	LTE Band 4 (AWS)	0.883	0.076	0.510	0.247	See Table Below
	LTE Band 41	1.121	0.076	0.510	0.247	See Table Below

Simult Tx	Configuration	GPRS 1900 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	0.517	0.029	0.510	0.247	**1.303**
	Front	0.630	0.018	0.009	0.008	0.665
	Top	-	0.076	0.510*	0.247*	0.833
	Bottom	1.206	-	-	-	1.206
	Right	0.162	-	-	-	0.162
	Left	0.075	0.006	0.141	0.247*	0.469

Simult Tx	Configuration	LTE Band 4 (AWS) 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	0.546	0.029	0.510	0.247	**1.332**
	Front	0.528	0.018	0.009	0.008	0.563
	Top	-	0.076	0.510*	0.247*	0.833
	Bottom	0.883	-	-	-	0.883
	Right	0.099	-	-	-	0.099
	Left	0.078	0.006	0.141	0.247*	0.472

Simult Tx	Configuration	LTE Band 41 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	0.347	0.029	0.510	0.247	**1.133**
	Front	0.283	0.018	0.009	0.008	0.318
	Top	-	0.076	0.510*	0.247*	0.833
	Bottom	1.121	-	-	-	1.121
	Right	0.033	-	-	-	0.033
	Left	0.089	0.006	0.141	0.247*	0.483

12.6 Phablet 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	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	GPRS 1900	3.127	1.263	See Table Below
	LTE Band 4 (AWS)	2.204	1.263	3.467
	LTE Band 41	2.548	1.263	**3.811**

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.753	1.263	3.016
	Front	1.529	0.057	1.586
	Top	-	1.263*	1.263
	Bottom	3.127	-	**3.127**
	Right	0.223	-	0.223
	Left	0.200	0.246	0.446

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	GPRS 1900	3.127	1.313	See Table Below
	LTE Band 4 (AWS)	2.204	1.313	3.517
	LTE Band 41	2.548	1.313	**3.861**

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.753	1.313	3.066
	Front	1.529	0.057	1.586
	Top	-	1.313*	1.313
	Bottom	3.127	-	**3.127**
	Right	0.223	-	0.223
	Left	0.200	0.390	0.590

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	Back	1.753	2.000	**3.753**
	Front	1.529	0.076	1.605
	Top	-	2.000*	2.000
	Bottom	3.127	-	3.127
	Right	0.223	-	0.223
	Left	0.200	0.507	0.707

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Phablet SAR	Back	2.191	2.000	See Note 1	0.06
	Front	2.166	0.076	**2.242**	N/A
	Top	-	2.000*	2.000	N/A
	Bottom	2.204	-	2.204	N/A
	Right	0.514	-	0.514	N/A
	Left	0.461	0.507	0.968	N/A

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Phablet SAR	Back	2.287	2.000	See Note 1	0.07
	Front	1.477	0.076	1.553	N/A
	Top	-	2.000*	2.000	N/A
	Bottom	2.548	-	**2.548**	N/A
	Right	0.094	-	0.094	N/A
	Left	0.278	0.507	0.785	N/A

Notes:

1. No evaluation was performed to determine the aggregate 10g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.10 per FCC KDB 447498 D01v06. See Section 12.7 for detailed SPLS ratio analysis.

12.7 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v06, when the sum of the standalone transmitters is more than 4 W/kg for 10g, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is ≤ 0.10 for 10g, simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

$$\text{Distance}_{Tx1-Tx2} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \quad \text{(Phablet)}$$

$$\text{SPLS Ratio} = \frac{(SAR_1 + SAR_2)^{1.5}}{R_i}$$

12.7.1 Back Side SPLSR Evaluation and Analysis

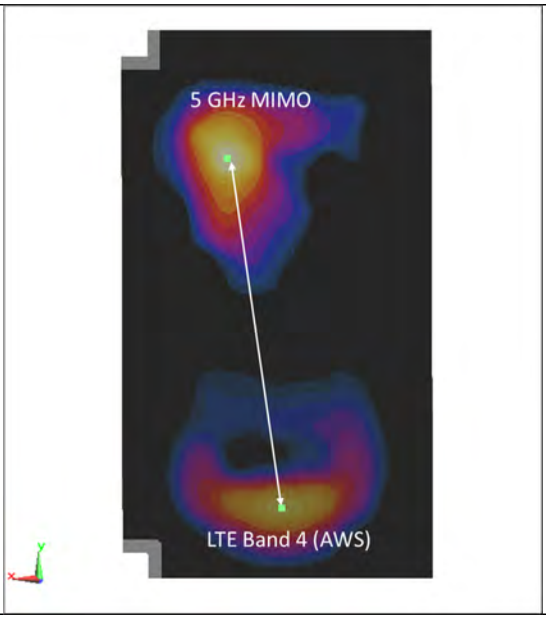
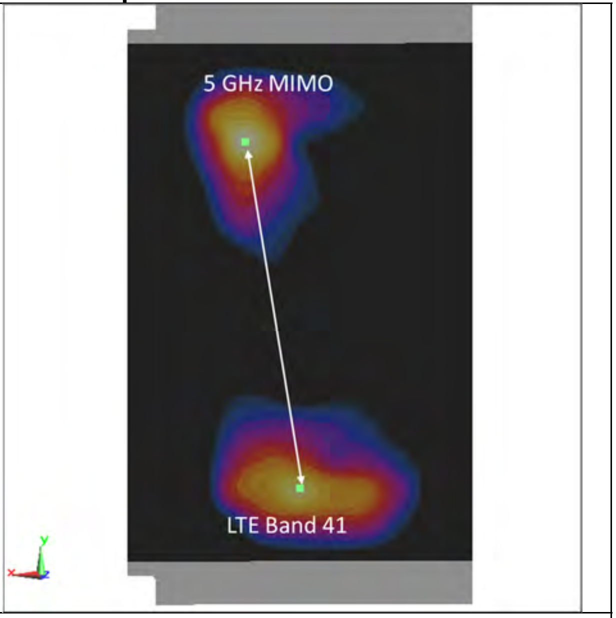
Table 12-17
Peak SAR Locations for Phablet Back Side

Mode/Band	x (mm)	y (mm)
5 GHz WLAN MIMO	-6.00	59.00
LTE Band 4 (AWS)	-26.50	-78.00
LTE Band 41	-15.00	-69.80

Table 12-18
Back Side SAR to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D_{a-b}	$(a+b)^{1.5}/D_{a-b}$	
5 GHz WLAN MIMO	LTE Band 4 (AWS)	2.000	2.191	4.191	138.53	0.06	1
5 GHz WLAN MIMO	LTE Band 41	2.000	2.287	4.287	129.11	0.07	2

Table 12-19
Back Side SAR to Peak Location Separation Ratio Plots

	
1	2

12.8 Simultaneous Transmission Conclusion

The above numerical summed SAR results and SPLSR analysis are sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013 Section 6.3.4.1.2.

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was 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	# of Time Slots	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1900	1909.80	810	GSM 1900	GPRS	3	bottom	10 mm	0.976	0.882	1.11	N/A	N/A	N/A	N/A
2450	2506.00	39750	LTE Band 41, 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	N/A	bottom	10 mm	1.080	1.040	1.04	N/A	N/A	N/A	N/A
2600	2593.00	40620	LTE Band 41, 20 MHz Bandwidth	QPSK, 50 RB, 50 RB Offset	N/A	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	# of Time Slots	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)	
1900	1909.80	810	GSM 1900	GPRS	3	bottom	0 mm	2.530	2.490	1.02	N/A	N/A	N/A	N/A
2600	PCC: 2680.00 SCC: 2660.20	PCC: 41490 SCC: 41292	LTE Band 41, 20 MHz Bandwidth	PCC: QPSK, 50 RB, 0 RB Offset SCC QPSK, 50 RB, 50 RB Offset	N/A	bottom	0 mm	2.530	2.530	1.00	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.

14 ADDITIONAL TESTING PER FCC GUIDANCE

14.1 Tuner Testing

Per April 2019 TCB Workshop Notes, the following test procedures were followed to demonstrate that the SAR results in Section 11 represented the appropriate SAR test conditions. For bands with dynamic tuning implemented, SAR was measured according to the required FCC SAR test procedures with the dynamic tuner active to allow the device to automatically tune to the antenna state for the respective RF exposure test configurations. Additional single point SAR time-sweep measurements were evaluated for other tuner states to determine that the other tuner configurations would result in equivalent or lower SAR values. The additional tuner hardware has no influence on the antenna characteristics, other than impedance matching.

To evaluate all the tuner states, the 60 tuner states were divided among the aggregate band, mode and exposure combinations. Single point time-sweep measurements were performed at the peak SAR location determined by the zoom scan of the configuration with the highest reported SAR for each combination. The tuner state was able to be established remotely so that the device was not moved for the entire series of single point SAR for the tuner states in each combination. The SAR probe remained stationary at the same position throughout the entire series of single point measurements for each combination. When the single point SAR or 1g SAR was > 1.2 W/kg for a particular band/mode/exposure condition, point SAR measurements were made for all 60 states.

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

Table 14-1
Supplemental Head SAR Data

Supplemental Head SAR Data									
UMTS B5		LTE B12		LTE B13		LTE B5		LTE B4	
RMC		QPSK, 10 MHz, 1 RB, 0 RB Offset		QPSK, 10 MHz, 1 RB, 49 RB Offset		QPSK, 10 MHz, 1 RB, 25 RB Offset		QPSK, 20 MHz, 1 RB, 50 RB Offset	
Test Position	Right Cheek	Test Position	Right Cheek	Test Position	Right Cheek	Test Position	Right cheek	Test Position	Left Cheek
Frequency (MHz)	836.6	Frequency (MHz)	707.5	Frequency (MHz)	782.0	Frequency (MHz)	836.5	Frequency (MHz)	1732.5
Channel	4183	Channel	23095	Channel	23230	Channel	20525	Channel	20175
Measured 1g SAR (W/kg)	0.192	Measured 1g SAR (W/kg)	0.073	Measured 1g SAR (W/kg)	0.175	Measured 1g SAR (W/kg)	0.139	Measured 1g SAR (W/kg)	0.141
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 13)	0.226	Auto-tune (State 1)	0.093	Auto-tune (State 0)	0.189	Auto-tune (State 13)	0.152	Auto-tune (State 26)	0.253
Default (State 0)	0.202	Default (State 0)	0.094	Default (State 0)	0.190	Default (State 0)	0.149	Default (State 0)	0.208
State 0	0.202	State 0	0.094	State 0	0.190	State 0	0.149	State 0	0.208
State 1	0.224	State 1	0.094	State 3	0.198	State 2	0.157	State 13	0.125
State 7	0.143	State 4	0.080	State 11	0.051	State 5	0.141	State 15	0.108
State 13	0.218	State 10	0.011	State 18	0.174	State 13	0.156	State 21	0.063
State 20	0.119	State 17	0.073	State 26	0.074	State 14	0.154	State 26	0.252
State 33	0.105	State 23	0.009	State 34	0.054	State 25	0.008	State 28	0.236
State 48	0.037	State 30	0.072	State 37	0.012	State 32	0.108	State 36	0.106
State 55	0.093	State 35	0.003	State 45	0.097	State 42	0.125	State 44	0.175
State 58	0.219	State 39	0.048	State 52	0.194	State 46	0.082	State 51	0.049
		State 59	0.047			State 54	0.148	State 58	0.123

Table 14-2
Supplemental Body SAR Data

Supplemental Body SAR Data									
UMTS B5		LTE B12		LTE B13		LTE B5		LTE B4	
RMC		QPSK, 10 MHz, 1 RB, 0 RB, Offset		QPSK, 10 MHz, 1 RB, 49 RB, Offset		QPSK, 10 MHz, 1 RB, 25 RB Offset		QPSK, 20 MHz, 100 RB, 0 RB Offset	
Test Position	back	Test Position	back	Test Position	back	Test Position	back	Test Position	Bottom Edge
Spacing	10 mm	Spacing	10 mm	Spacing	10 mm	Spacing	10 mm	Spacing	10 mm
Frequency (MHz)	836.6	Frequency (MHz)	707.5	Frequency (MHz)	782.0	Frequency (MHz)	836.5	Frequency (MHz)	1732.5
Channel	4183	Channel	23095	Channel	23230	Channel	20525	Channel	20175
Measured 1g SAR (W/kg)	0.377	Measured 1g SAR (W/kg)	0.215	Measured 1g SAR (W/kg)	0.318	Measured 1g SAR (W/kg)	0.315	Measured 1g SAR (W/kg)	0.703
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 13)	0.509	Auto-tune (State 13)	0.304	Auto-tune (State 0)	0.499	Auto-tune (State 13)	0.468	Auto-tune (State 55)	1.146
Default (State 0)	0.456	Default (State 0)	0.293	Default (State 0)	0.499	Default (State 0)	0.439	Default (State 0)	1.141
State 0	0.456	State 0	0.293	State 0	0.499	State 0	0.439	State 0	1.141
State 3	0.475	State 13	0.304	State 6	0.420	State 1	0.468	State 12	0.424
State 8	0.210	State 18	0.201	State 11	0.124	State 4	0.439	State 33	0.983
State 13	0.497	State 22	0.052	State 19	0.373	State 9	0.128	State 40	1.050
State 16	0.450	State 29	0.209	State 27	0.242	State 13	0.479	State 45	0.935
State 24	0.050	State 38	0.001	State 35	0.069	State 15	0.449	State 47	0.935
State 31	0.419	State 41	0.223	State 48	0.082	State 22	0.103	State 53	1.146
State 39	0.238	State 46	0.058	State 53	0.212	State 43	0.415	State 55	1.148
State 48	0.238	State 50	0.005	State 56	0.500	State 49	0.046	State 57	1.092
State 55	0.216	State 57	0.145			State 54	0.439		

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	Network Analyzer	3/19/2019	Annual	3/19/2020	MY40001472
Agilent	8753ES	S-Parameter Network Analyzer	8/26/2019	Annual	8/26/2020	MY40000670
Agilent	8753ES	S-Parameter Vector Network Analyzer	9/19/2019	Annual	9/19/2020	MY40003841
Agilent	E4438C	ESG Vector Signal Generator	9/13/2019	Annual	9/13/2020	MY42081752
Agilent	E5515C	Wireless Communications Test Set	2/28/2018	Biennial	2/28/2020	GB41450275
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	GB46170464
Agilent	N5182A	MXG Vector Signal Generator	7/10/2019	Annual	7/10/2020	MY47420800
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	MA24106A	USB Power Sensor	8/5/2019	Annual	8/5/2020	1827527
Anritsu	MA24106A	USB Power Sensor	5/22/2019	Annual	5/22/2020	1231535
Anritsu	MA2411B	Pulse Power Sensor	12/4/2019	Annual	12/4/2020	1126066
Anritsu	MA2411B	Pulse Power Sensor	6/11/2019	Annual	6/11/2020	1207364
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Anritsu	ML2496A	Power Meter	12/17/2019	Annual	12/17/2020	1138001
Anritsu	MT8820C	Radio Communication Analyzer	7/25/2019	Annual	7/25/2020	6201240328
Anritsu	MT8821C	Radio Communication Analyzer	3/18/2019	Annual	3/18/2020	6201144419
Anritsu	MT8862A	Wireless Connectivity Test Set	8/8/2019	Annual	8/8/2020	6261782395
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/9/2018	Biennial	10/9/2020	181647802
Control Company	4352	Long Stem Thermometer	6/26/2019	Biennial	6/26/2021	192282739
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330158
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Keysight Technologies	AT/N6705B	DC Power Supply	N/A	N/A	N/A	MY53001315
Keysight Technologies	N6705B	DC Power Analyzer	4/27/2019	Biennial	4/27/2021	MY53004059
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	5/23/2018	Biennial	5/23/2020	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	8/26/2019	Annual	8/26/2020	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	6/24/2019	Annual	6/24/2020	101699
Seekonk	NC-100	Torque Wrench (8" lb)	5/10/2018	Biennial	5/10/2020	21053
Seekonk	NC-100	Torque Wrench (8" lb)	5/23/2018	Biennial	5/23/2020	N/A
SPEAG	D1750V2	1750 MHz SAR Dipole	5/15/2019	Annual	5/15/2020	1148
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Biennial	10/23/2020	5d080
SPEAG	D1900V2	1900 MHz SAR Dipole	2/21/2019	Annual	2/21/2020	5d148
SPEAG	D2450V2	2450 MHz SAR Dipole	9/11/2017	Triennial	9/11/2020	797
SPEAG	D2450V2	2450 MHz SAR Dipole	8/16/2018	Biennial	8/16/2020	981
SPEAG	D2600V2	2600 MHz SAR Dipole	6/14/2019	Annual	6/14/2020	1064
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/17/2019	Annual	9/17/2020	1191
SPEAG	D750V3	750 MHz SAR Dipole	3/18/2019	Annual	3/18/2020	1054
SPEAG	D750V3	750 MHz SAR Dipole	1/15/2018	Biennial	1/15/2020	1003
SPEAG	D835V2	835 MHz SAR Dipole	3/13/2019	Annual	3/13/2020	4d047
SPEAG	D835V2	835 MHz SAR Dipole	10/19/2018	Biennial	10/19/2020	4d133
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/13/2019	Annual	2/13/2020	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/8/2019	Annual	5/8/2020	728
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/14/2019	Annual	2/14/2020	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2019	Annual	9/17/2020	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/20/2019	Annual	6/20/2020	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/18/2019	Annual	4/18/2020	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/14/2019	Annual	8/14/2020	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/5/2019	Annual	12/5/2020	1533
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	DAK-3.5	Dielectric Assessment Kit	10/22/2019	Annual	10/22/2020	1091
SPEAG	DAK-3.5	Dielectric Parameter Probes	12/16/2019	Annual	12/16/2020	1278
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/13/2019	Annual	8/13/2020	1041
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	3914
SPEAG	EX3DV4	SAR Probe	8/16/2019	Annual	8/16/2020	7308
SPEAG	EX3DV4	SAR Probe	4/24/2019	Annual	4/24/2020	7357
SPEAG	EX3DV4	SAR Probe	5/16/2019	Annual	5/16/2020	7406
SPEAG	EX3DV4	SAR Probe	6/19/2019	Annual	6/19/2020	7409
SPEAG	EX3DV4	SAR Probe	7/16/2019	Annual	7/16/2020	7410
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	7417
SPEAG	EX3DV4	SAR Probe	7/15/2019	Annual	7/15/2020	7547
SPEAG	EX3DV4	SAR Probe	9/19/2019	Annual	9/19/2020	7551
SPEAG	EX3DV4	SAR Probe	12/11/2019	Annual	12/11/2020	7571

Note:

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

16 MEASUREMENT UNCERTAINTIES

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

17 CONCLUSION

17.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8623M

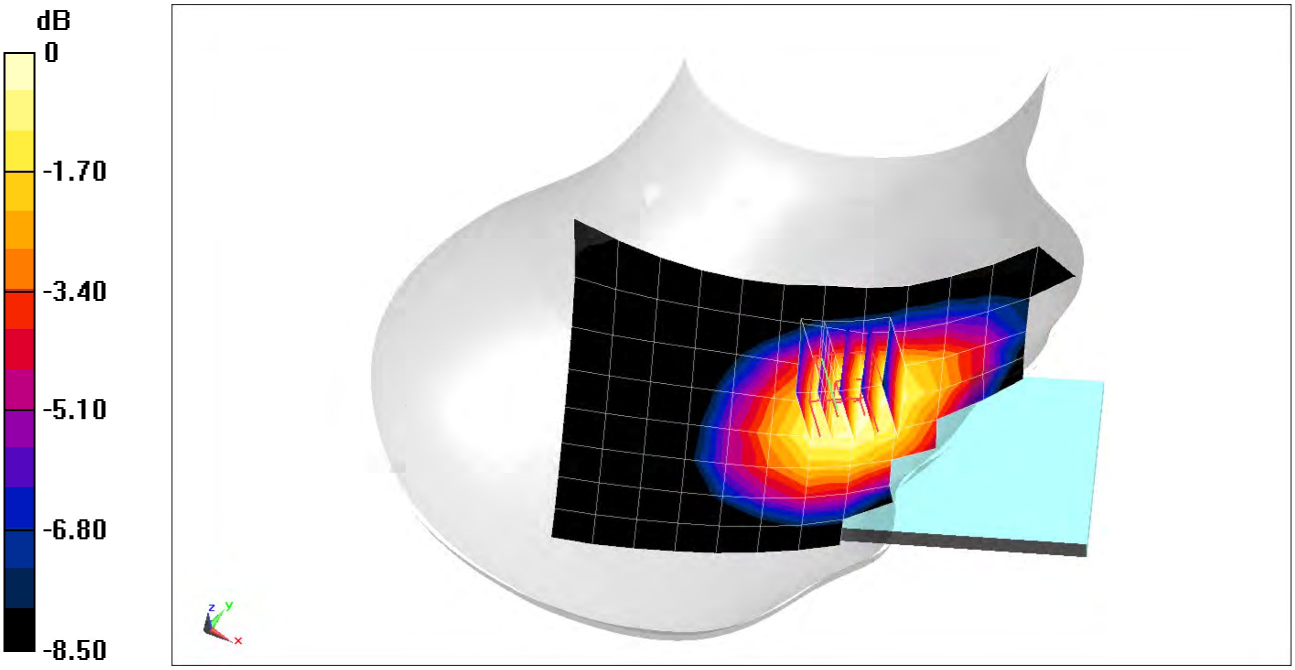
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
$f = 836.6$ MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 39.762$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 01/20/2020; Ambient Temp: 20.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7417; ConvF(10.07, 10.07, 10.07) @ 836.6 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.22 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.198 W/kg
SAR(1 g) = 0.153 W/kg



0 dB = 0.180 W/kg = -7.45 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8629M

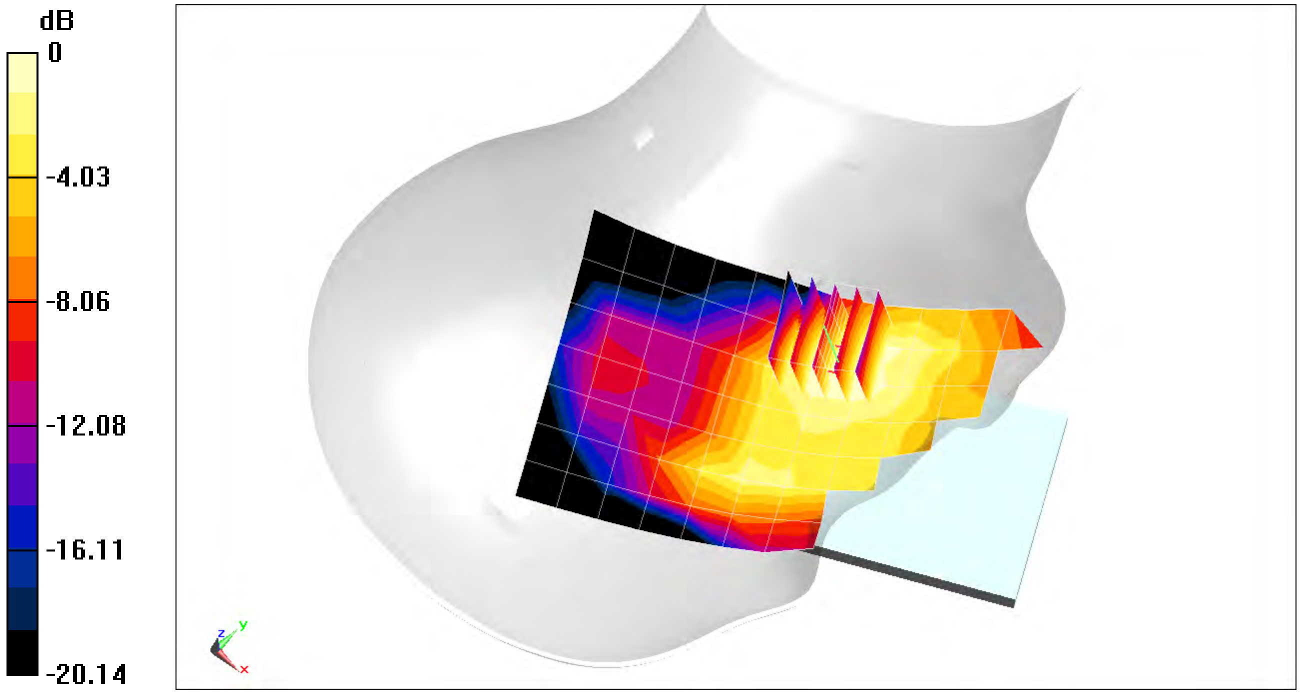
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.423 S/m; ε_r = 39.364; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01/04/2020; Ambient Temp: 23.2°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN7410; ConvF(8.11, 8.11, 8.11) @ 1880 MHz; Calibrated: 7/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.776 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.0860 W/kg
SAR(1 g) = 0.056 W/kg



0 dB = 0.0746 W/kg = -11.27 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

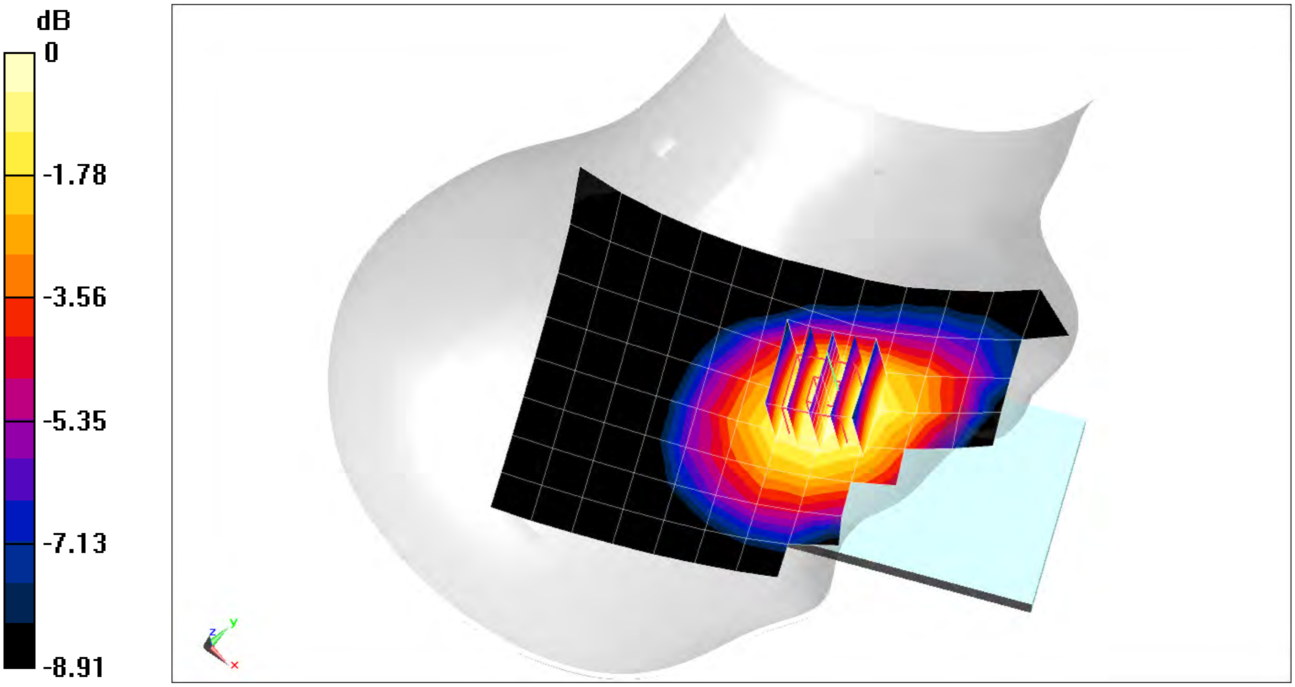
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 39.762$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 01/20/2020; Ambient Temp: 20.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7417; ConvF(10.07, 10.07, 10.07) @ 836.6 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.83 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.255 W/kg
SAR(1 g) = 0.192 W/kg



0 dB = 0.228 W/kg = -6.42 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

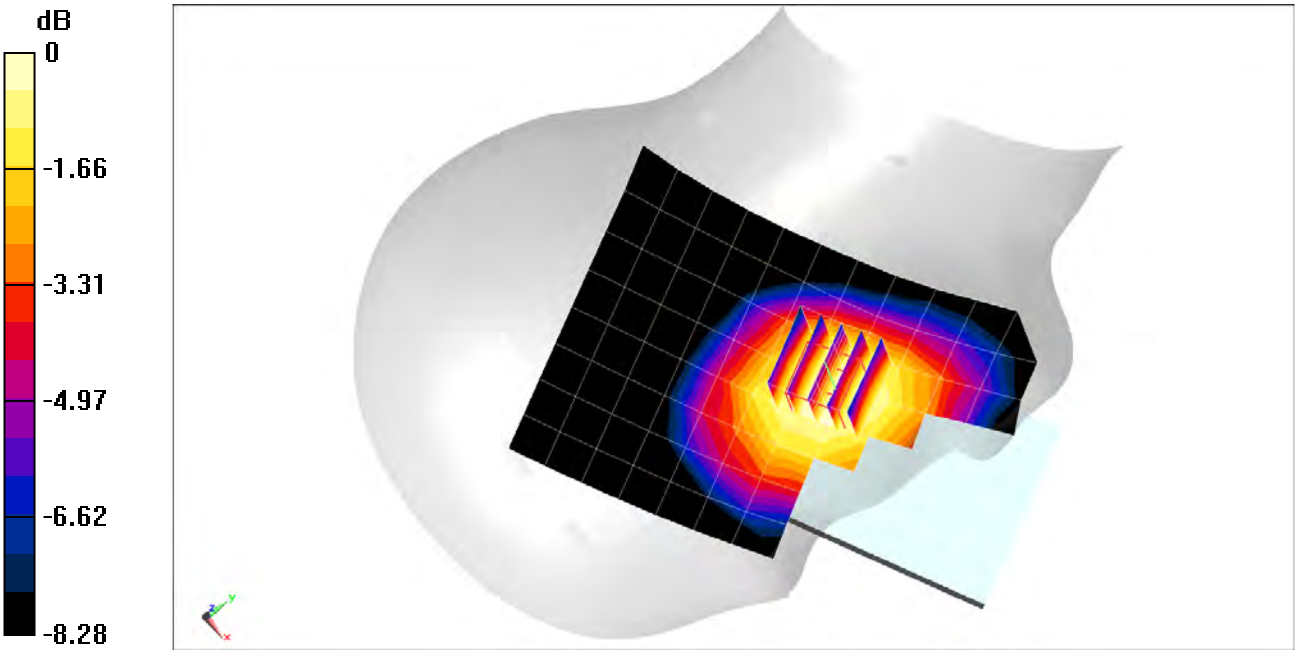
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.877 S/m; ε_r = 40.424; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01/13/2020; Ambient Temp: 23.4°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7417; ConvF(10.36, 10.36, 10.36) @ 707.5 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.721 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.0890 W/kg
SAR(1 g) = 0.073 W/kg



0 dB = 0.0841 W/kg = -10.75 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8642M

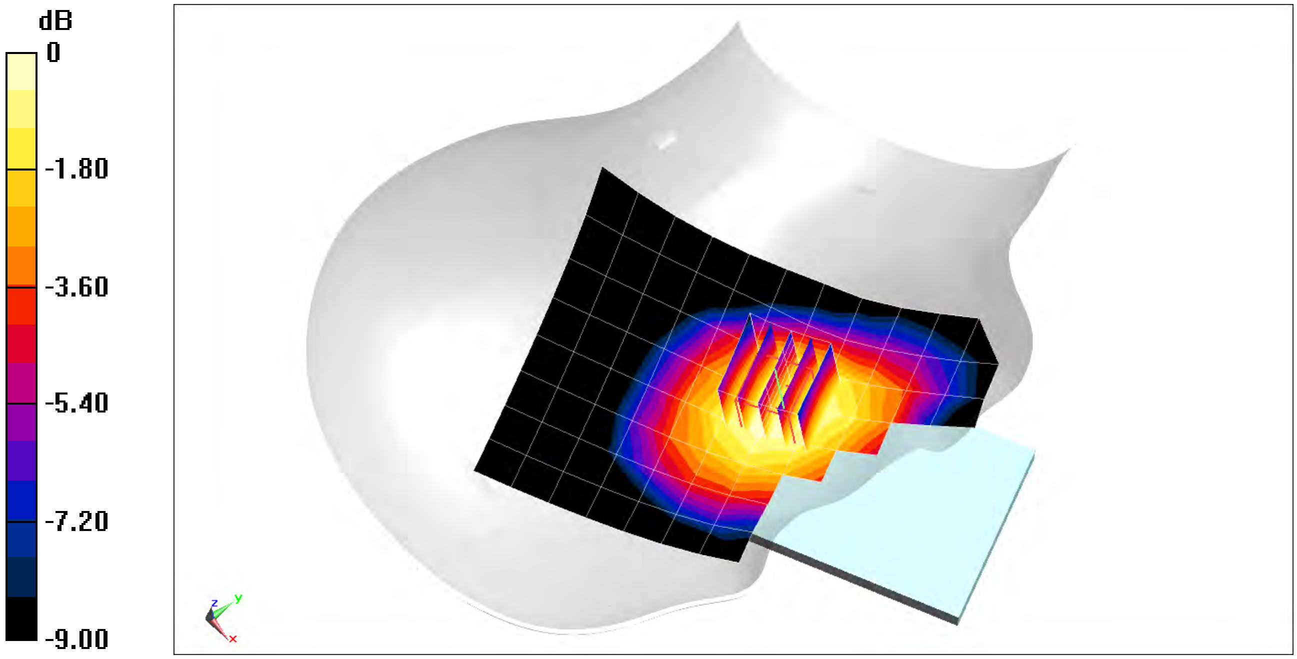
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; $\sigma = 0.923$ S/m; $\varepsilon_r = 41.116$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 01/22/2020; Ambient Temp: 22.3°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3914; ConvF(10, 10, 10) @ 782 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/14/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.42 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.223 W/kg
SAR(1 g) = 0.175 W/kg



0 dB = 0.205 W/kg = -6.88 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8623M

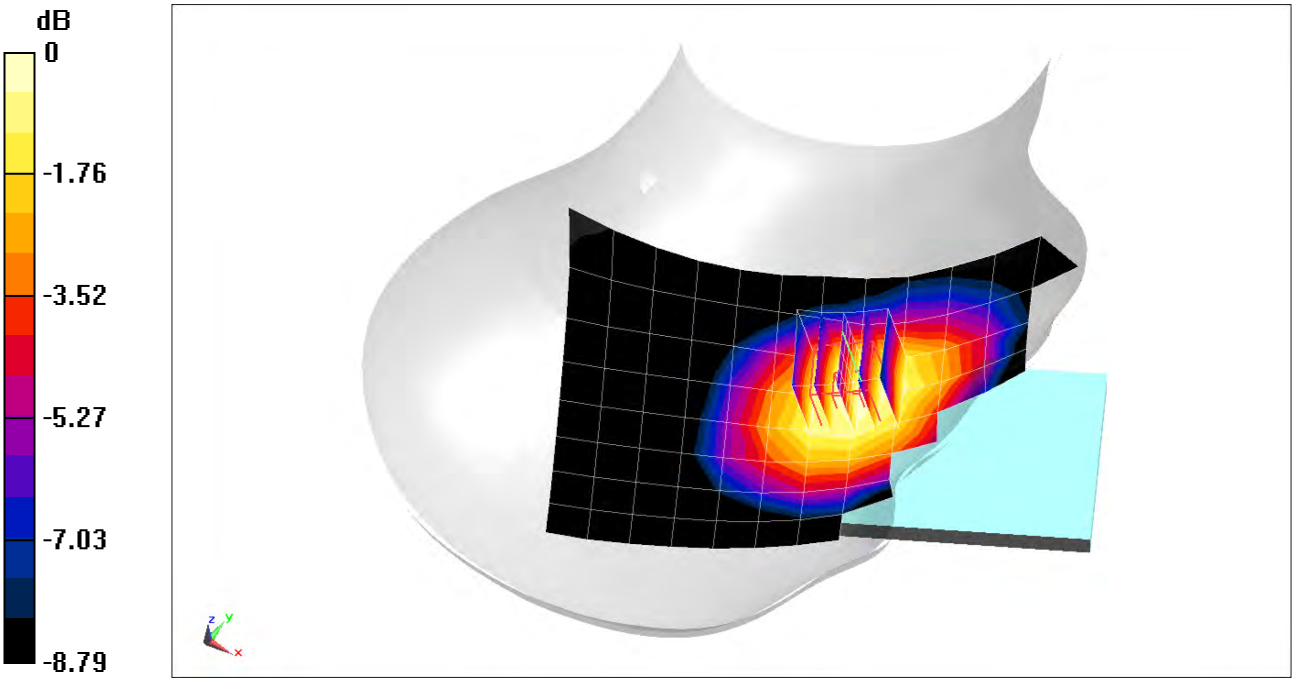
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.5 MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 39.763$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 01/20/2020; Ambient Temp: 20.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7417; ConvF(10.07, 10.07, 10.07) @ 836.5 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 5 (Cell.), Right Head, Cheek, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.94 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.179 W/kg
SAR(1 g) = 0.139 W/kg



0 dB = 0.163 W/kg = -7.88 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8644M

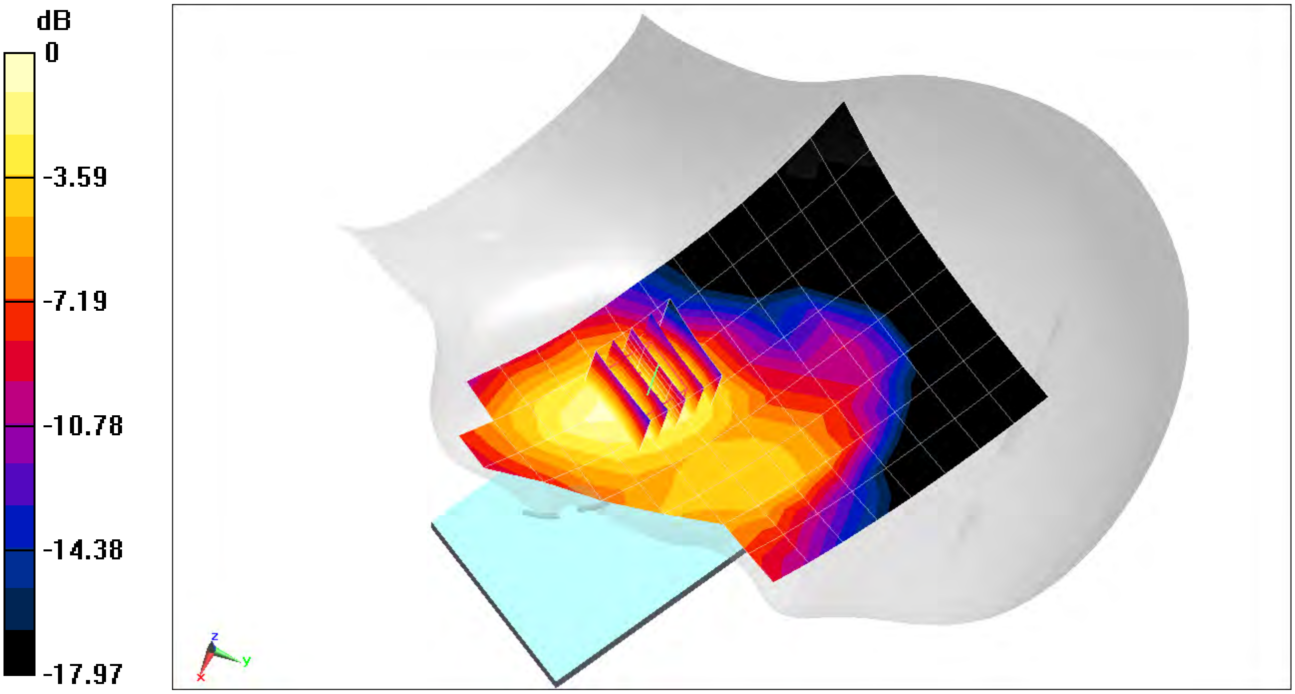
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.332 S/m; ε_r = 39.553; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01/01/2020; Ambient Temp: 22.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(8.57, 8.57, 8.57) @ 1732.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 4 (AWS), Left 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 = 11.15 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.223 W/kg
SAR(1 g) = 0.141 W/kg



0 dB = 0.191 W/kg = -7.19 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8635M

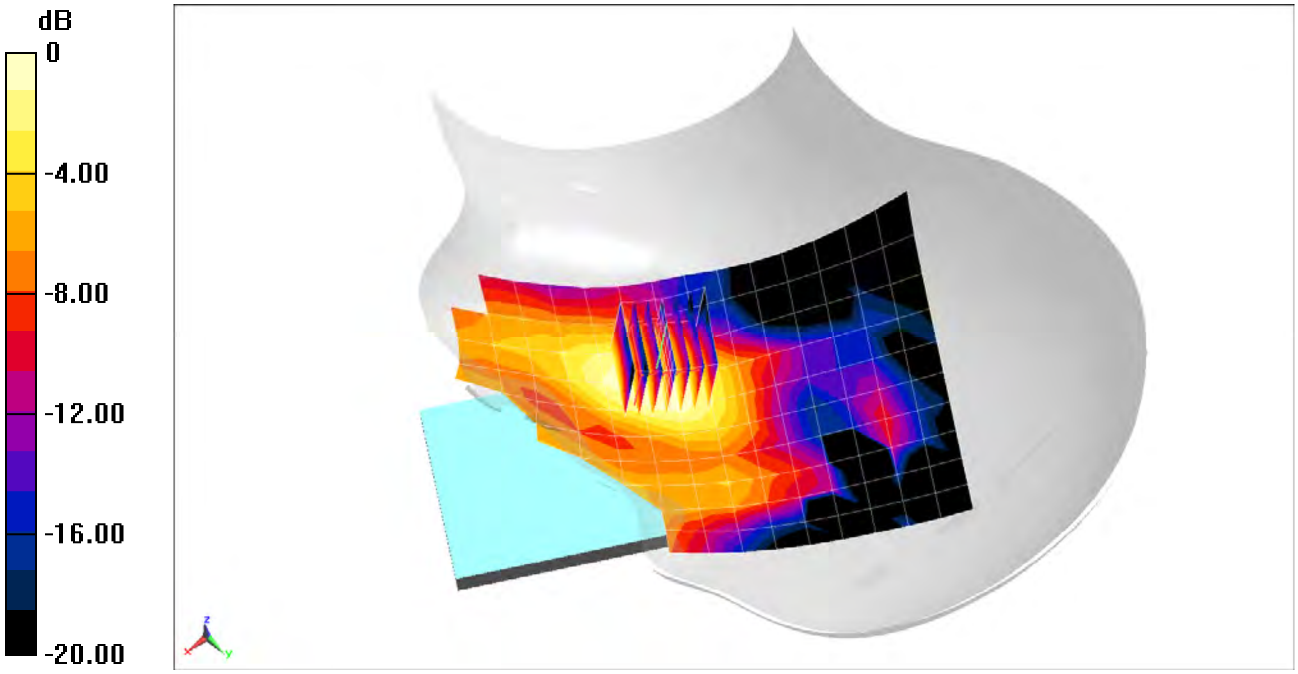
Communication System: UID 0, LTE Band 41 (Class 3); Frequency: 2506 MHz; Duty Cycle: 1:1.58
Medium: 2450 Head Medium parameters used (interpolated):
f = 2506 MHz; $\sigma = 1.858$ S/m; $\varepsilon_r = 37.405$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 01/10/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7417; ConvF(7.46, 7.46, 7.46) @ 2506 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 41, Left Head, Cheek, Low.ch, QPSK 20 MHz Bandwidth, 1 RB, 50 RB Offset

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.538 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.115 W/kg
SAR(1 g) = 0.062 W/kg



0 dB = 0.0933 W/kg = -10.30 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8645M

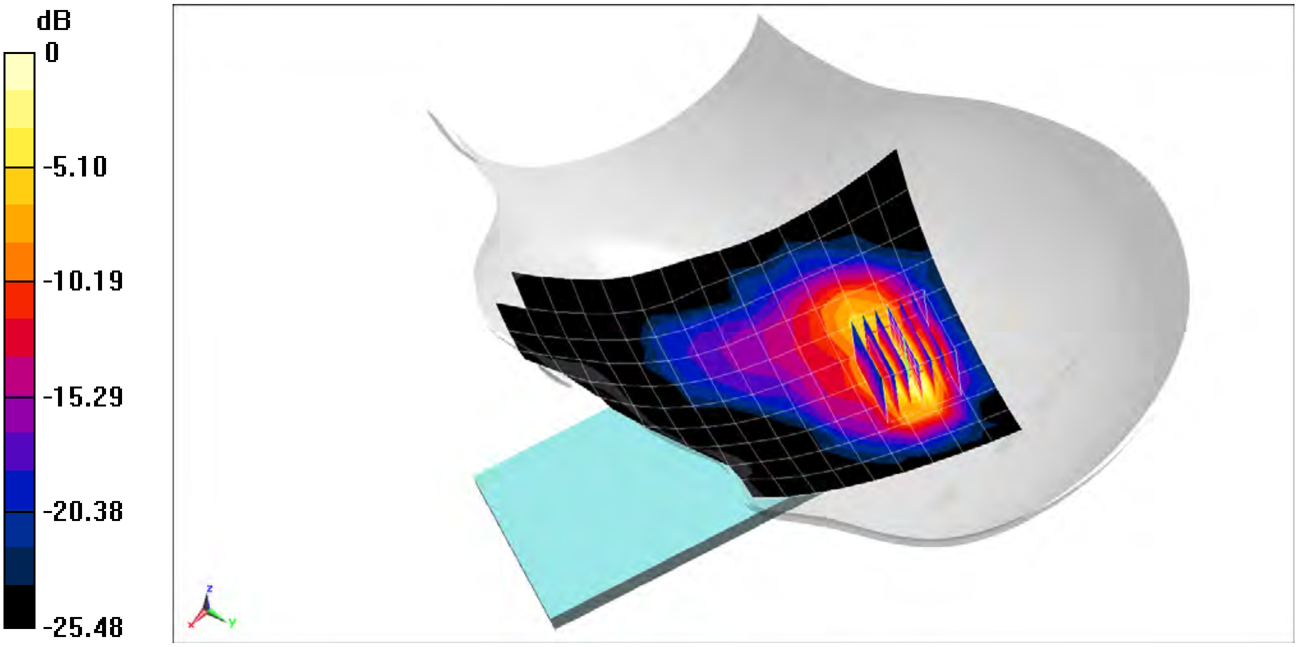
Communication System: UID 0, 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.82 S/m; ε_r = 38.823; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01/03/2020; Ambient Temp: 24.3°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7417; ConvF(7.46, 7.46, 7.46) @ 2412 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Antenna 1, Left Head, Tilt, Ch 1, 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 = 10.88 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.809 W/kg
SAR(1 g) = 0.319 W/kg



0 dB = 0.620 W/kg = -2.08 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8621M

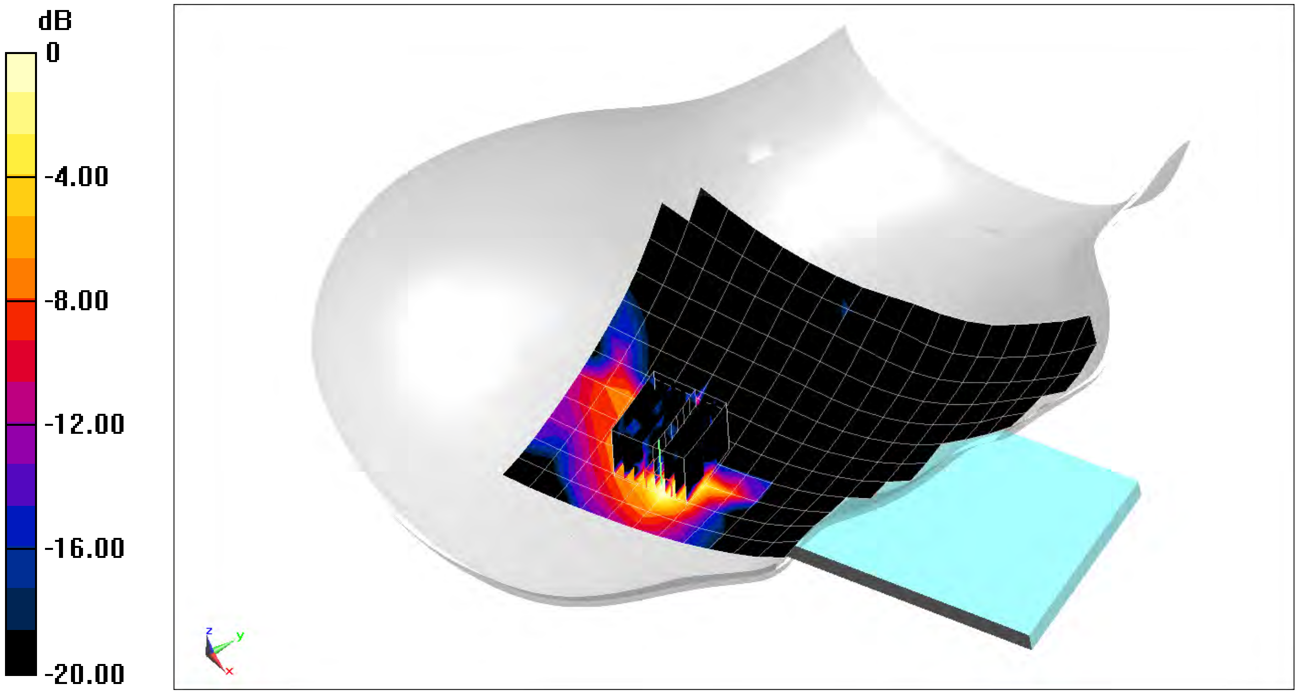
Communication System: UID 0, 802.11ac 5.2-5.8 GHz Band; Frequency: 5775 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Head Medium parameters used:
f = 5775 MHz; σ = 5.303 S/m; ε_r = 34.719; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 01/13/2020; Ambient Temp: 21.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7406; ConvF(5.23, 5.23, 5.23) @ 5775 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 20; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 0 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.221 W/kg
SAR(1 g) = 0.042 W/kg



0 dB = 0.128 W/kg = -8.93 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8645M

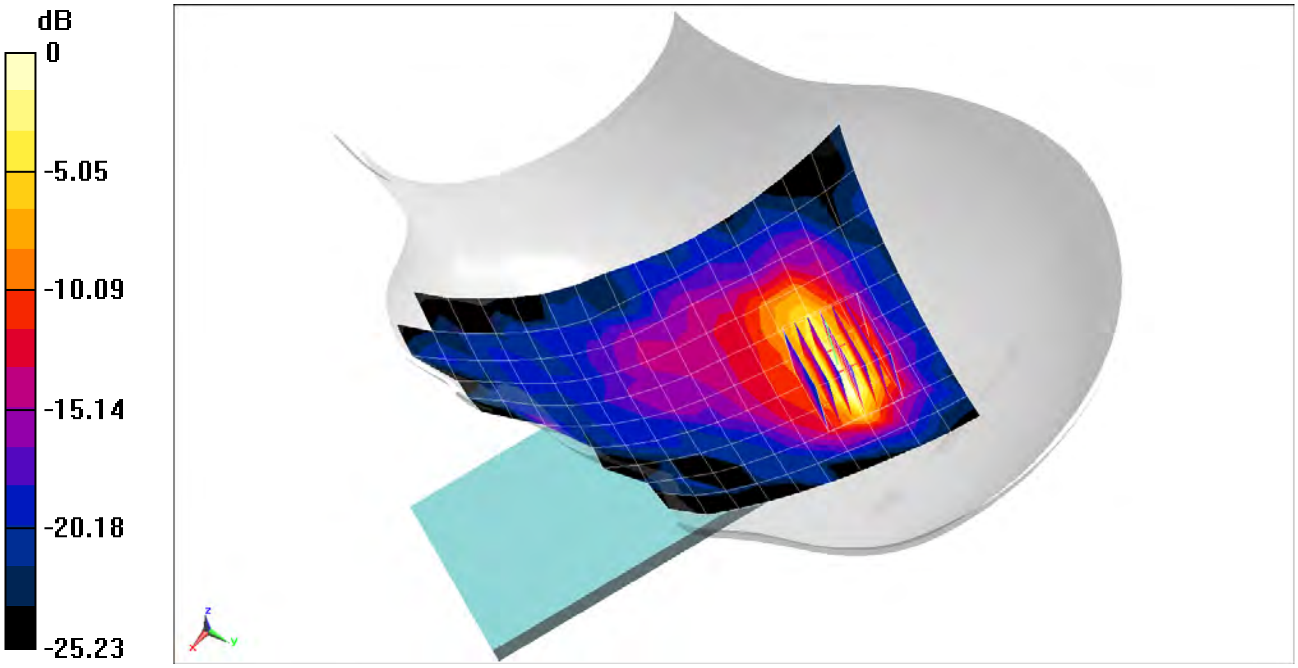
Communication System: UID 0, Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1.289
Medium: 2450 Head Medium parameters used (interpolated):
f = 2402 MHz; σ = 1.813 S/m; ε_r = 38.835; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 01/03/2020; Ambient Temp: 24.3°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7417; ConvF(7.46, 7.46, 7.46) @ 2402 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: Bluetooth, Left Head, Tilt, Ch 0, 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 = 8.021 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.270 W/kg
SAR(1 g) = 0.124 W/kg



0 dB = 0.218 W/kg = -6.62 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

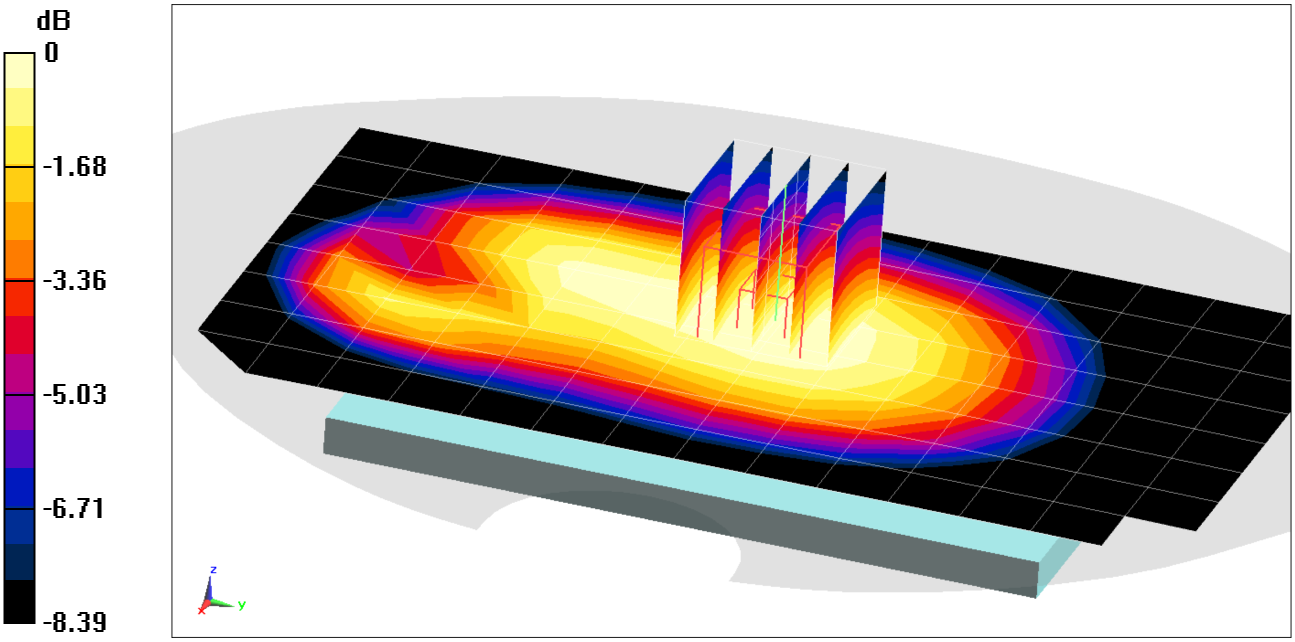
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.975 S/m; ε_r = 53.124; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/18/2020; Ambient Temp: 20.5°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7308; ConvF(10.43, 10.43, 10.43) @ 836.6 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.61 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.200 W/kg
SAR(1 g) = 0.149 W/kg



0 dB = 0.182 W/kg = -7.40 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

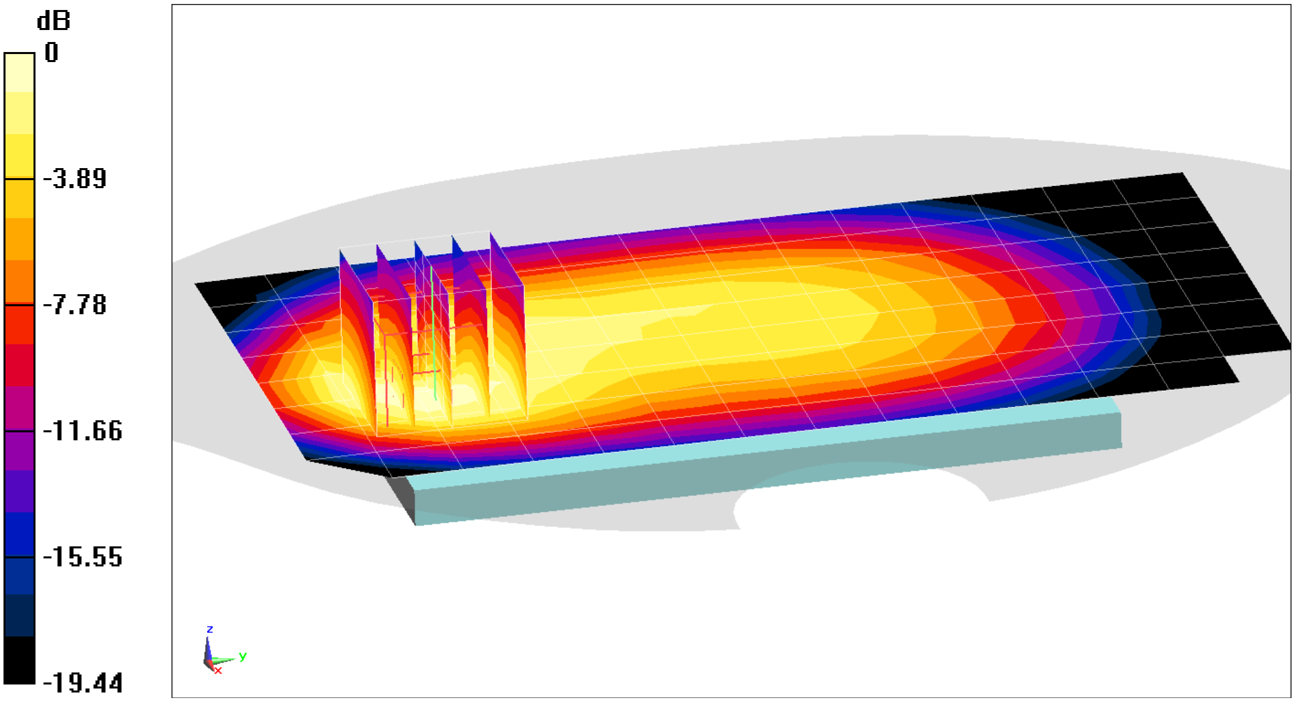
Communication System: UID 0, _GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.975 S/m; ε_r = 53.124; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/18/2020; Ambient Temp: 20.5°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7308; ConvF(10.43, 10.43, 10.43) @ 836.6 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 3 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.92 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.690 W/kg
SAR(1 g) = 0.387 W/kg



0 dB = 0.569 W/kg = -2.45 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

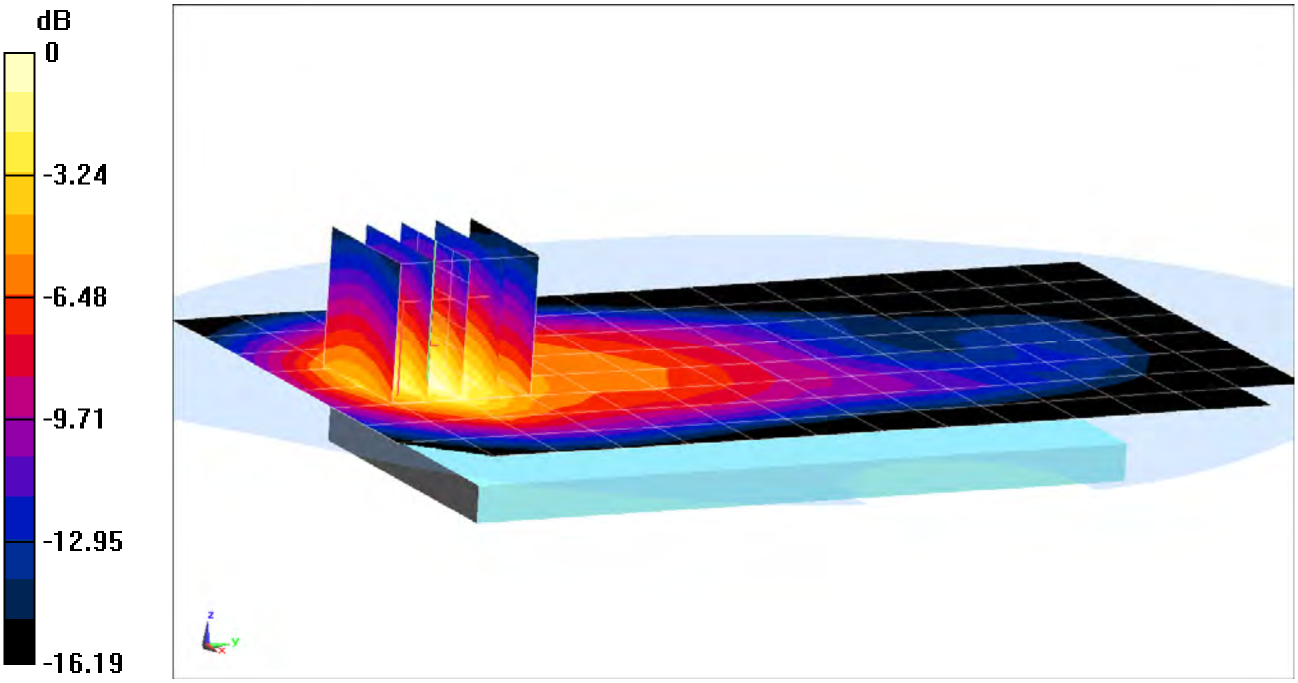
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.56 S/m; ε_r = 52.538; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/03/2020; Ambient Temp: 21.9°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1880 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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 = 12.78 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.376 W/kg
SAR(1 g) = 0.227 W/kg



0 dB = 0.327 W/kg = -4.85 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

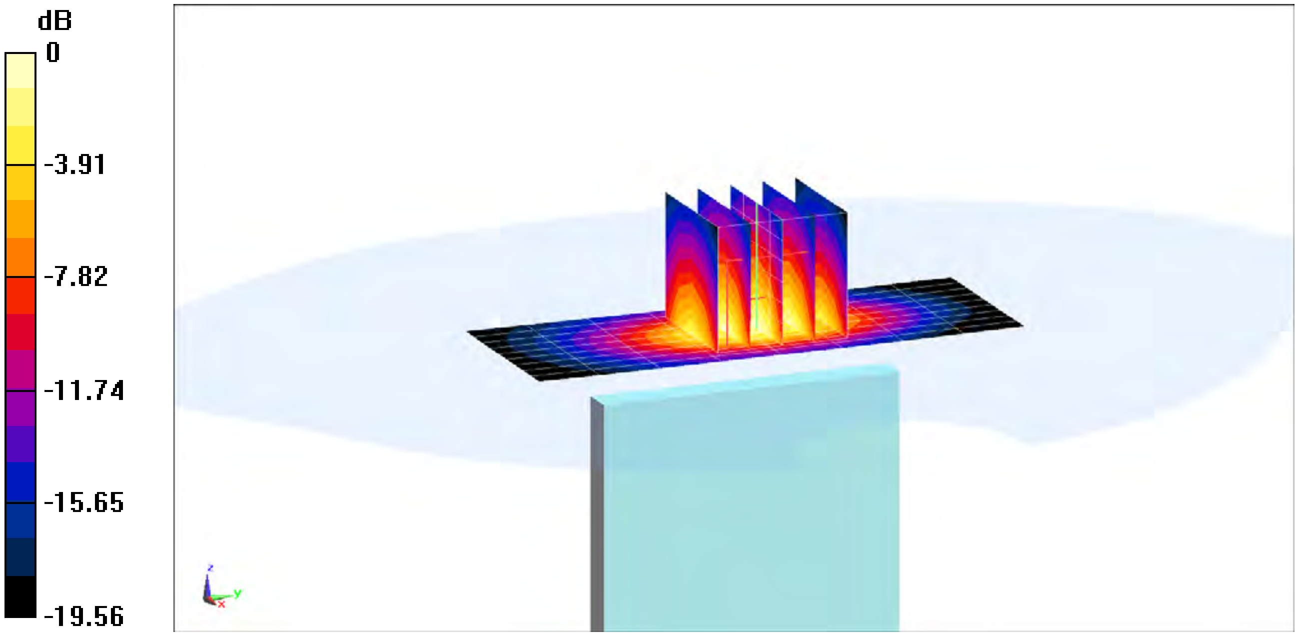
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.58 S/m; ε_r = 51.793; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/06/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1909.8 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.26 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.976 W/kg



0 dB = 1.48 W/kg = 1.70 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8626M

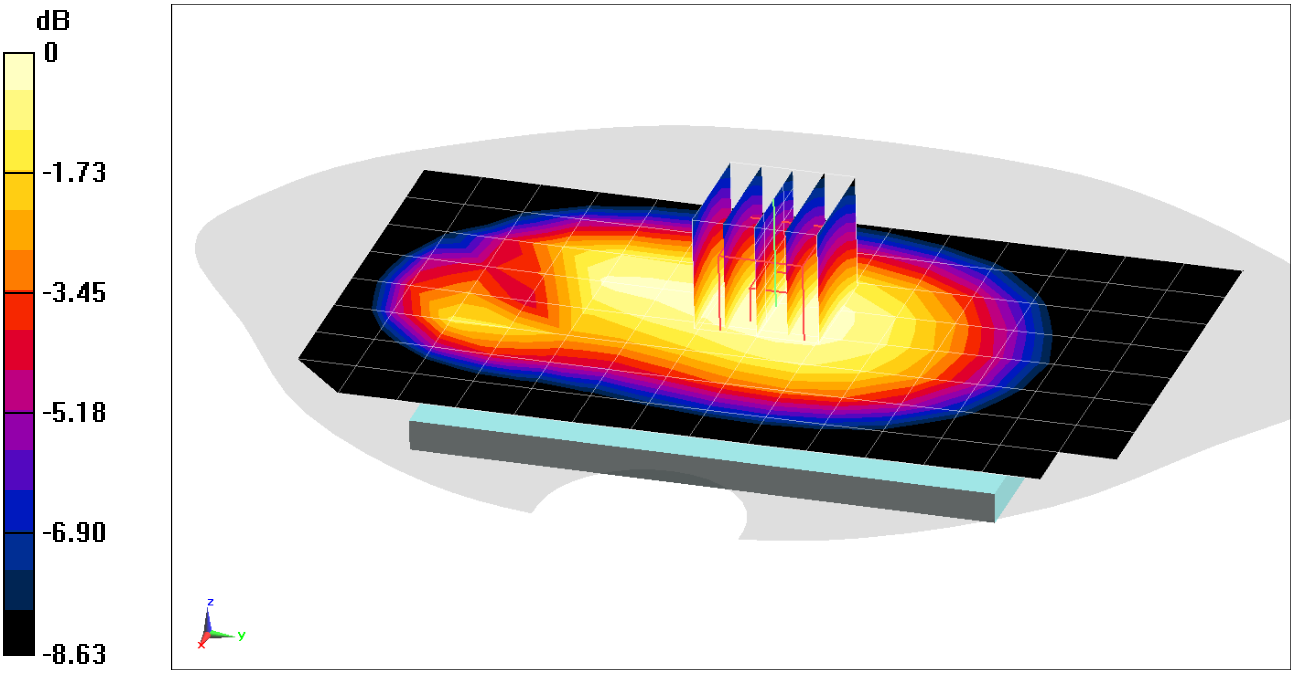
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma = 0.992$ S/m; $\varepsilon_r = 54.172$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/20/2020; Ambient Temp: 23.4°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.6 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.05 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.311 W/kg
SAR(1 g) = 0.221 W/kg



0 dB = 0.277 W/kg = -5.58 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8626M

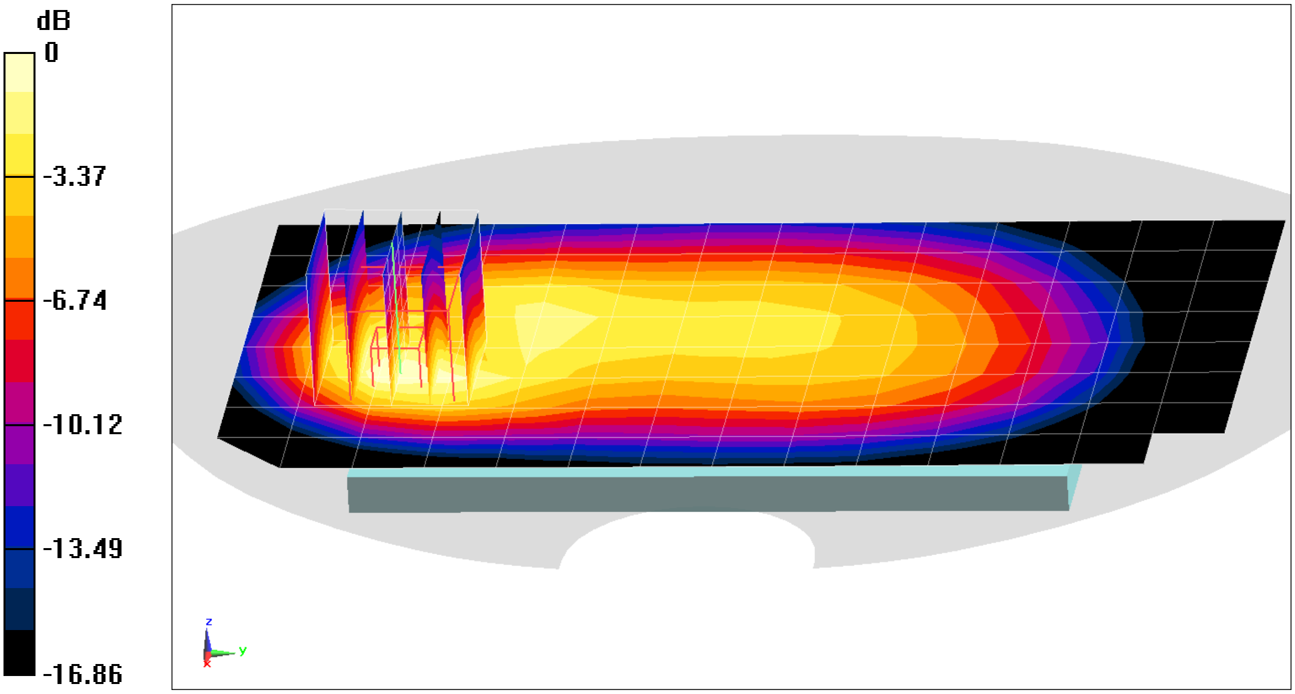
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; $\sigma = 0.992$ S/m; $\varepsilon_r = 54.172$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/20/2020; Ambient Temp: 23.4°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.6 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.28 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.706 W/kg
SAR(1 g) = 0.377 W/kg



0 dB = 0.580 W/kg = -2.37 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8642M

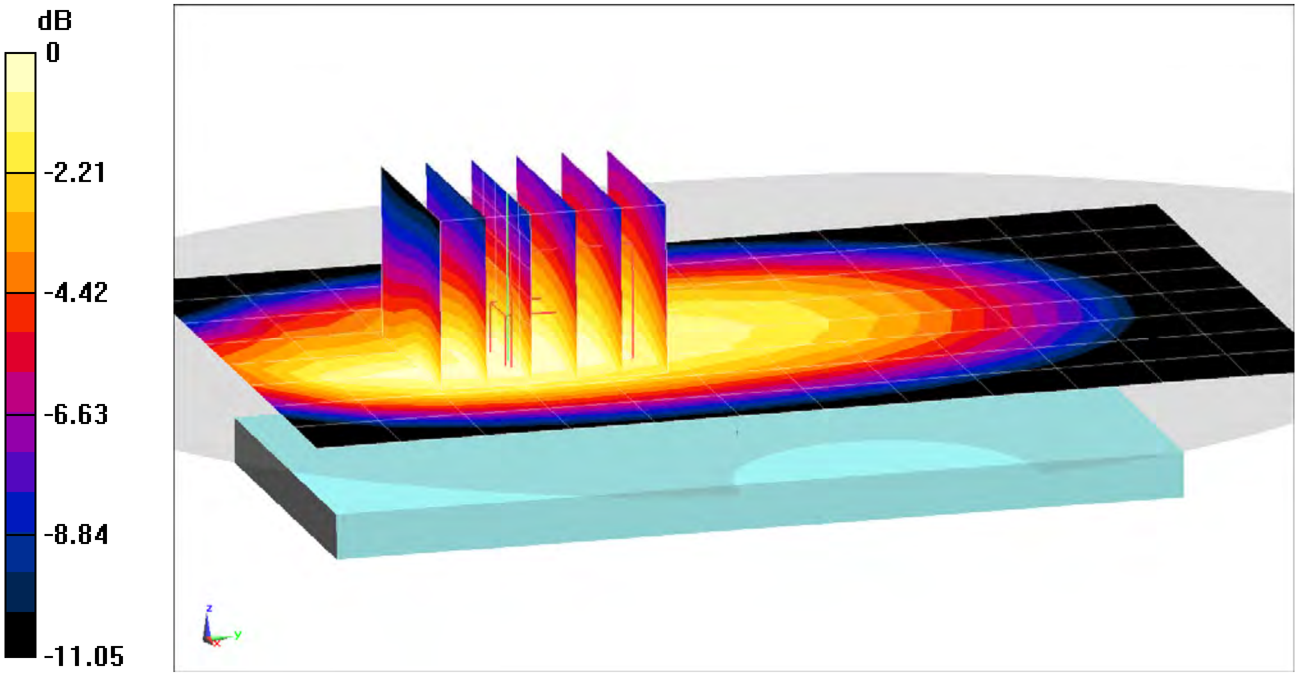
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 700 Body Medium parameters used (interpolated):
$f = 707.5$ MHz; $\sigma = 0.935$ S/m; $\varepsilon_r = 54.047$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/08/2020; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(10.05, 10.05, 10.05) @ 707.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.14 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.232 W/kg
SAR(1 g) = 0.156 W/kg



0 dB = 0.200 W/kg = -6.99 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8642M

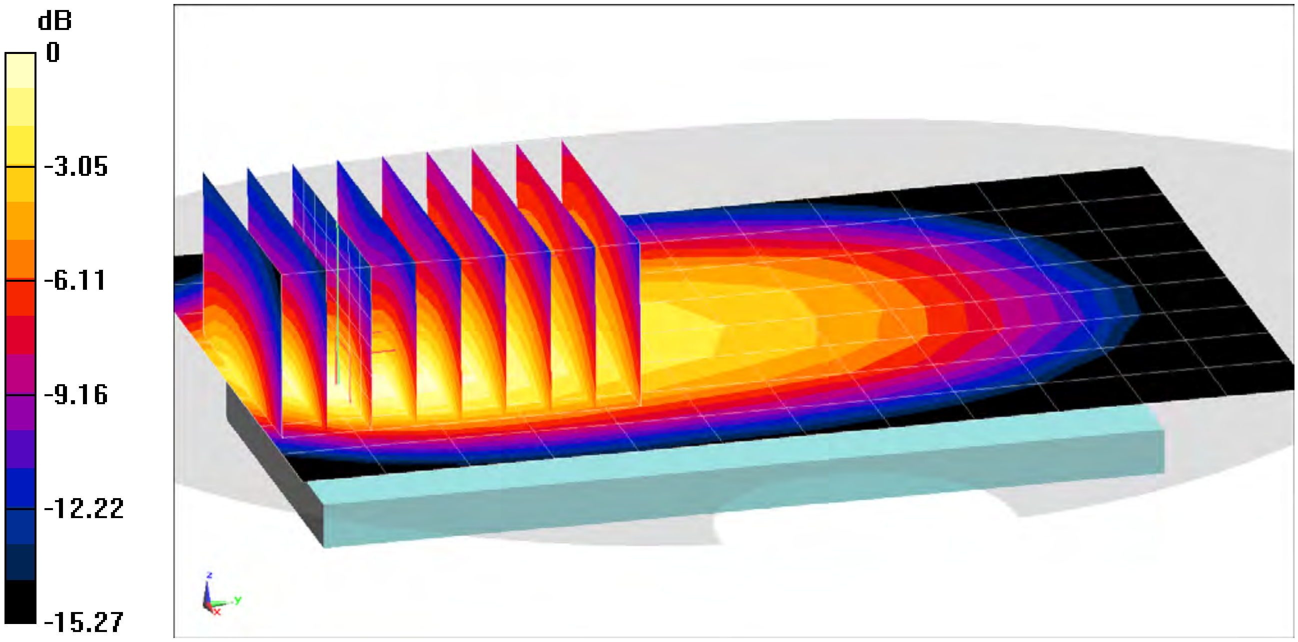
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 700 Body Medium parameters used (interpolated):
f = 707.5 MHz; $\sigma = 0.935$ S/m; $\varepsilon_r = 54.047$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/08/2020; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(10.05, 10.05, 10.05) @ 707.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (8x9x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.47 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.392 W/kg
SAR(1 g) = 0.215 W/kg



0 dB = 0.321 W/kg = -4.93 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8642M

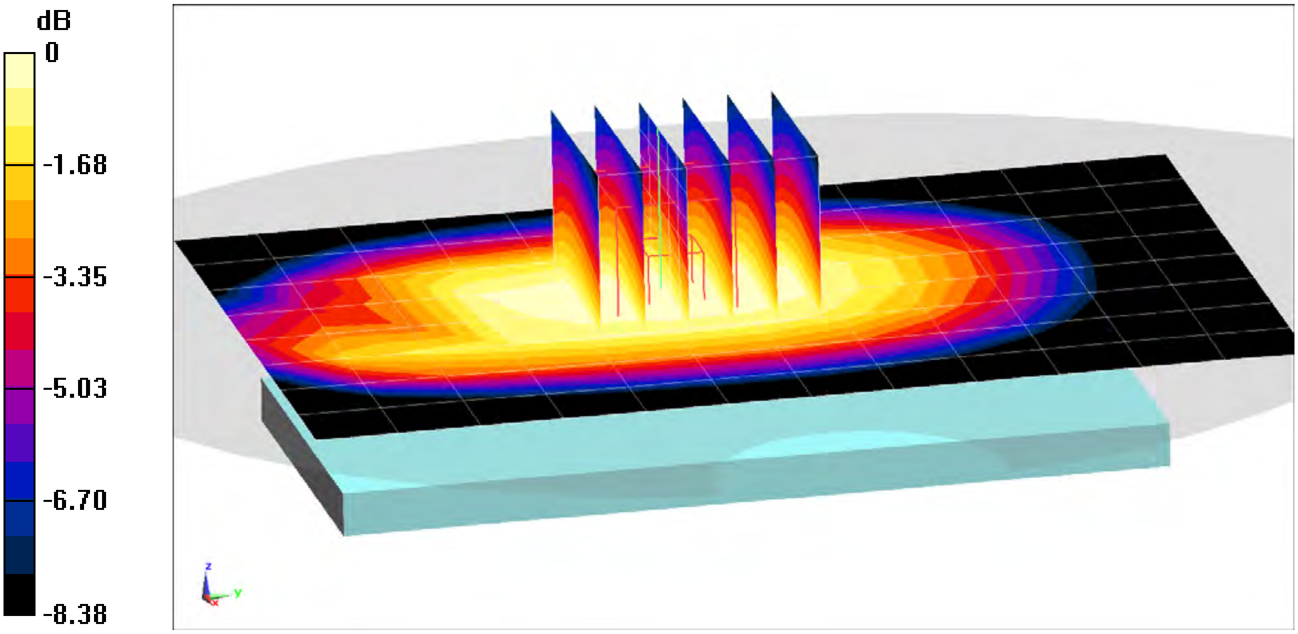
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 700 Body Medium parameters used (interpolated):
f = 782 MHz; $\sigma = 0.963$ S/m; $\varepsilon_r = 53.87$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/08/2020; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(10.05, 10.05, 10.05) @ 782 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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 = 16.25 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.342 W/kg
SAR(1 g) = 0.251 W/kg



0 dB = 0.308 W/kg = -5.11 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8642M

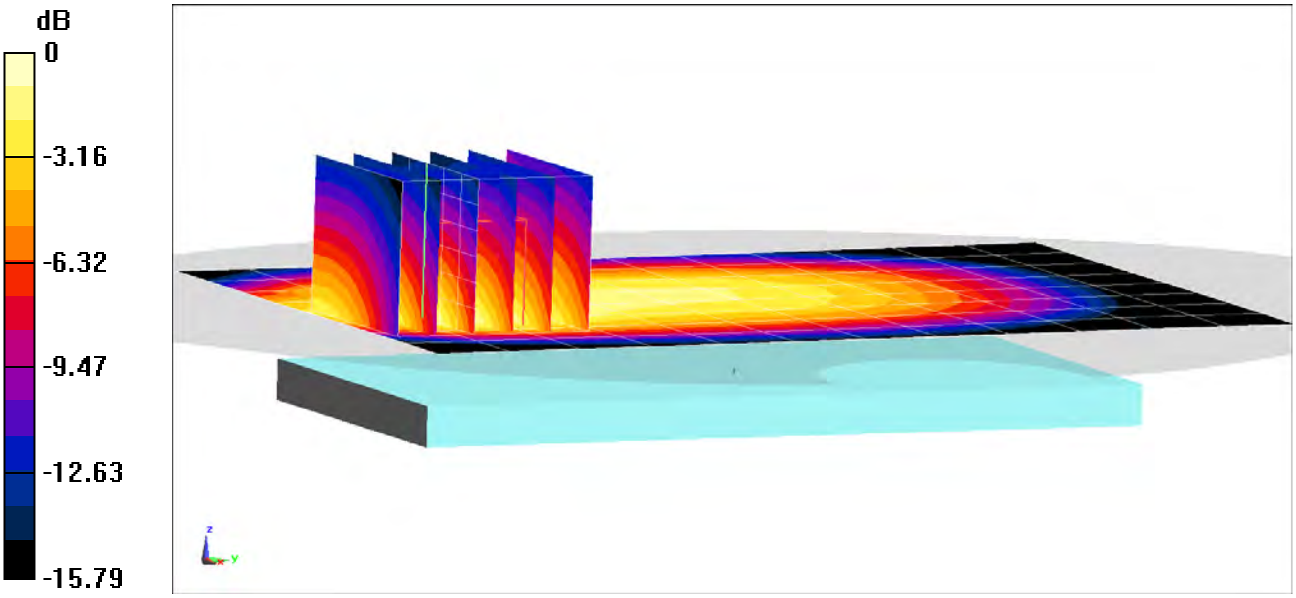
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 700 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.963 S/m; ε_r = 53.87; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/08/2020; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(10.05, 10.05, 10.05) @ 782 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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 = 18.88 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.593 W/kg
SAR(1 g) = 0.318 W/kg



0 dB = 0.488 W/kg = -3.12 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8626M

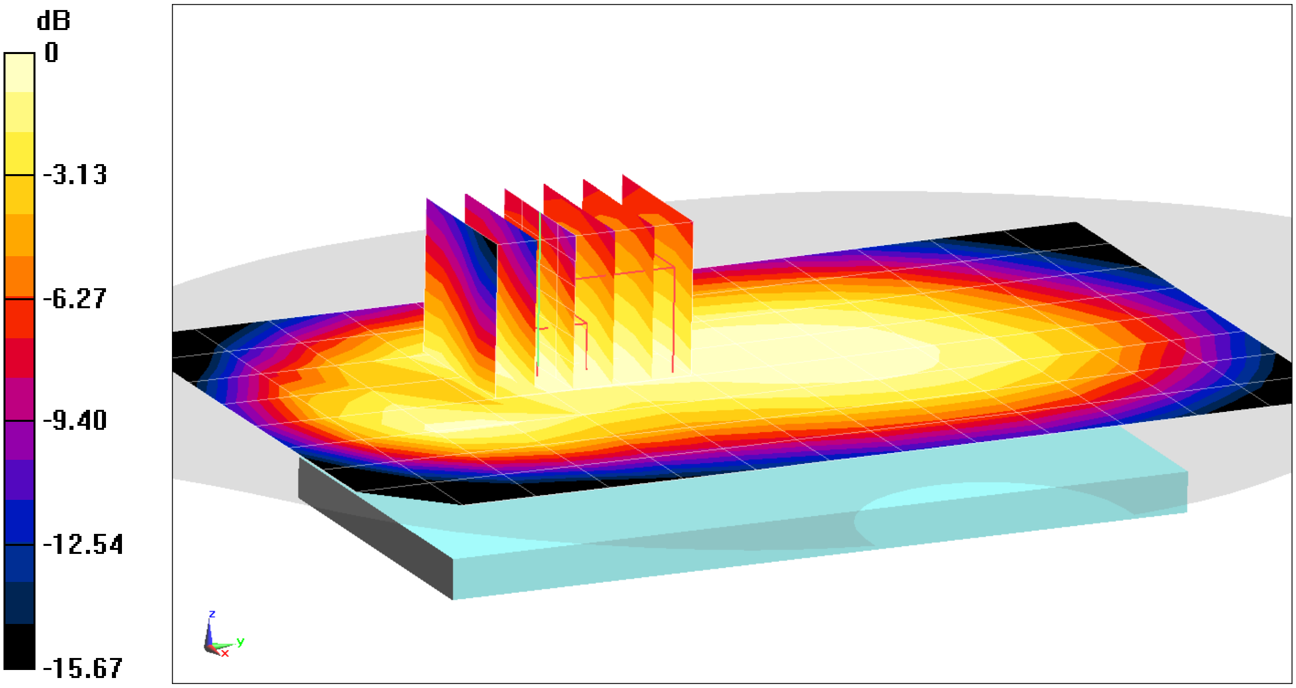
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.992 S/m; ε_r = 54.172; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/20/2020; Ambient Temp: 23.4°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 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 = 12.96 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.230 W/kg
SAR(1 g) = 0.162 W/kg



0 dB = 0.205 W/kg = -6.88 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8626M

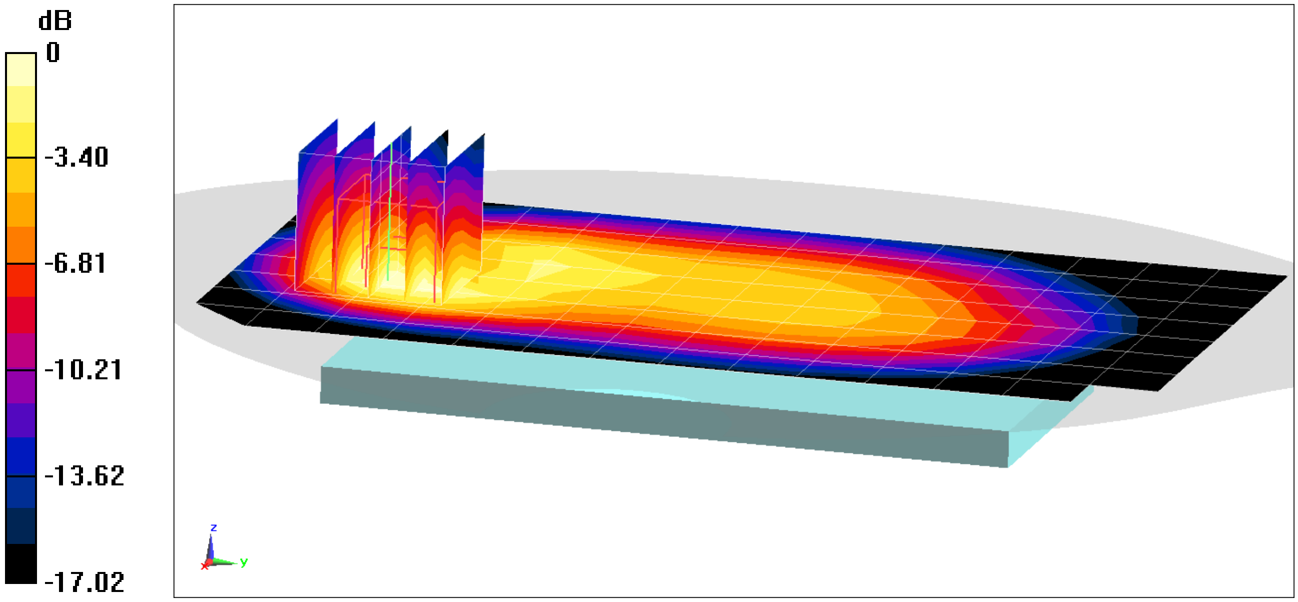
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.992 S/m; ε_r = 54.172; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/20/2020; Ambient Temp: 23.4°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.58 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.588 W/kg
SAR(1 g) = 0.315 W/kg



0 dB = 0.482 W/kg = -3.17 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8629M

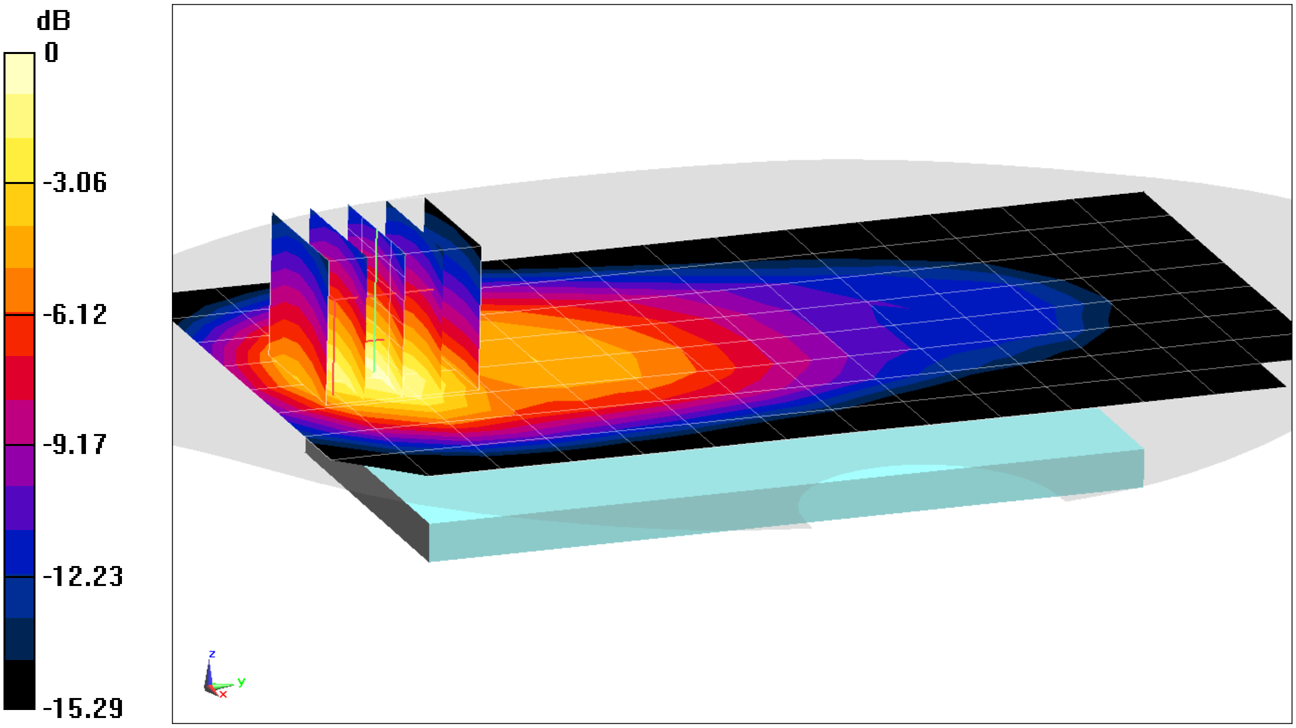
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.425 S/m; ε_r = 53.831; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/20/2020; Ambient Temp: 22.2°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1732.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.11 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.637 W/kg



0 dB = 0.893 W/kg = -0.49 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8629M

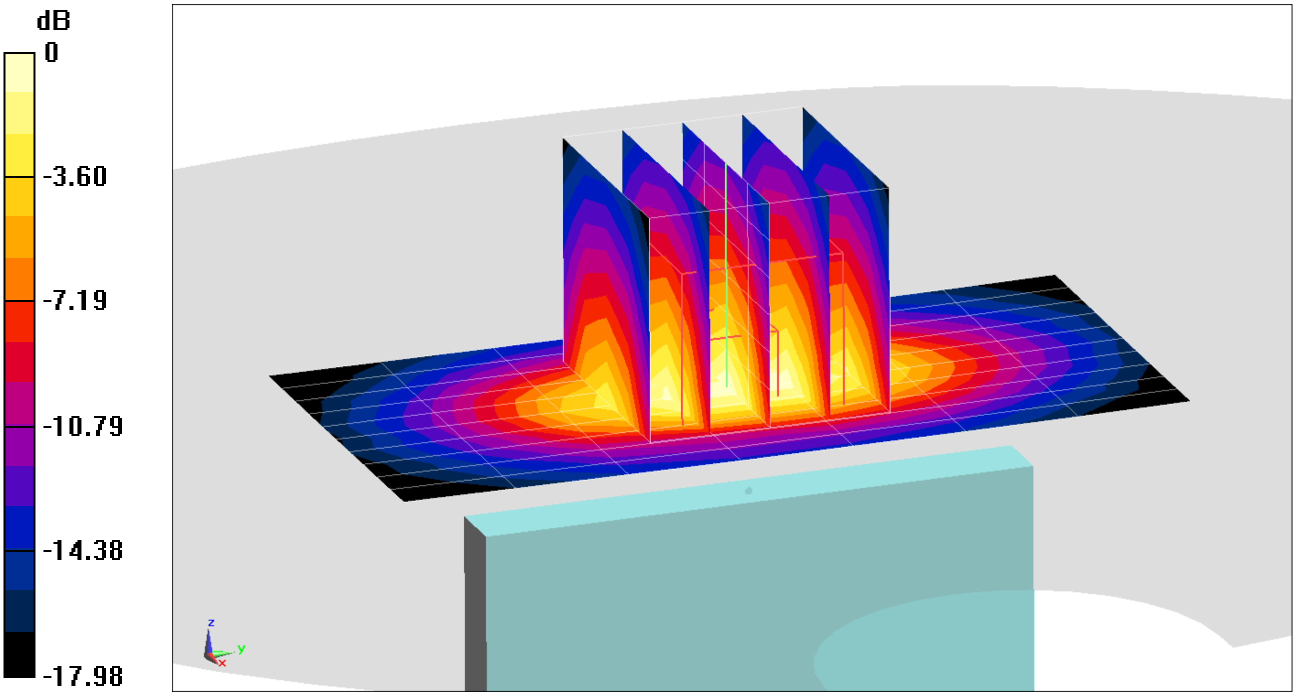
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; $\sigma = 1.425$ S/m; $\varepsilon_r = 53.831$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/20/2020; Ambient Temp: 22.2°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1732.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Mid.ch 20 MHz Bandwidth, QPSK, 50 RB, 50 RB Offset

Area Scan (11x8x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.08 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.729 W/kg



0 dB = 1.10 W/kg = 0.41 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8635M

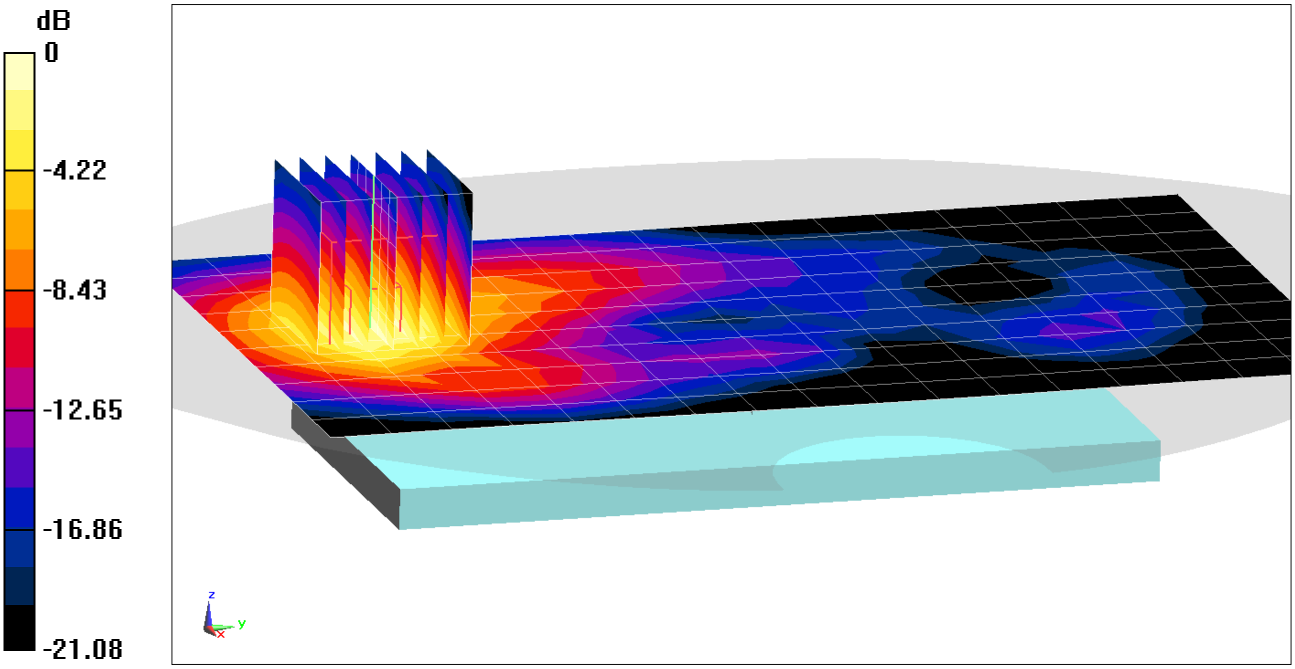
Communication System: UID 0, LTE Band 41; Frequency: 2506 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used (interpolated):
f = 2506 MHz; σ = 2.113 S/m; ε_r = 50.616; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/23/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7547; ConvF(7.3, 7.3, 7.3) @ 2506 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

Mode: LTE Band 41, Body SAR, Back side, Uplink Carrier Aggregation
PCC: Channel 39750, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset
SCC: Channel 39948, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.36 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.745 W/kg
SAR(1 g) = 0.391 W/kg



0 dB = 0.607 W/kg = -2.17 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8635M

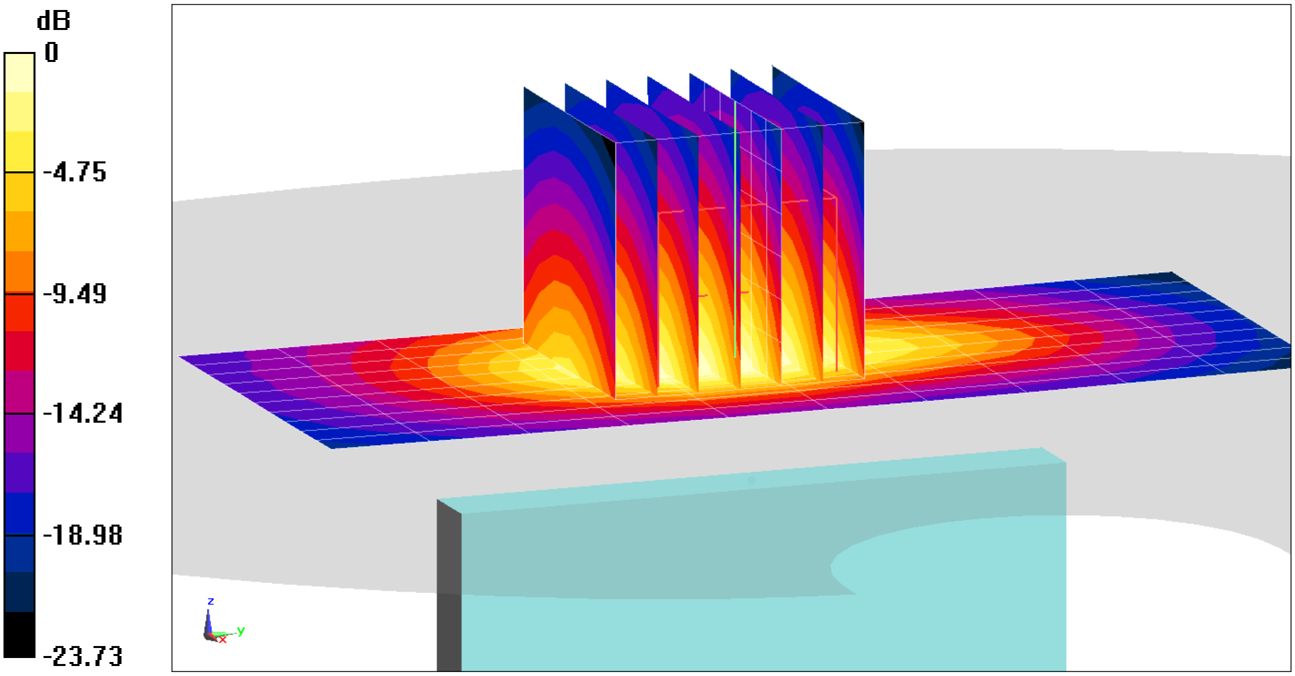
Communication System: UID 0, LTE Band 41; Frequency: 2506 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used (interpolated):
f = 2506 MHz; σ = 2.113 S/m; ε_r = 50.616; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/23/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7547; ConvF(7.3, 7.3, 7.3) @ 2506 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

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

Area Scan (11x11x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.61 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.18 W/kg
SAR(1 g) = 1.08 W/kg



0 dB = 1.75 W/kg = 2.43 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8621M

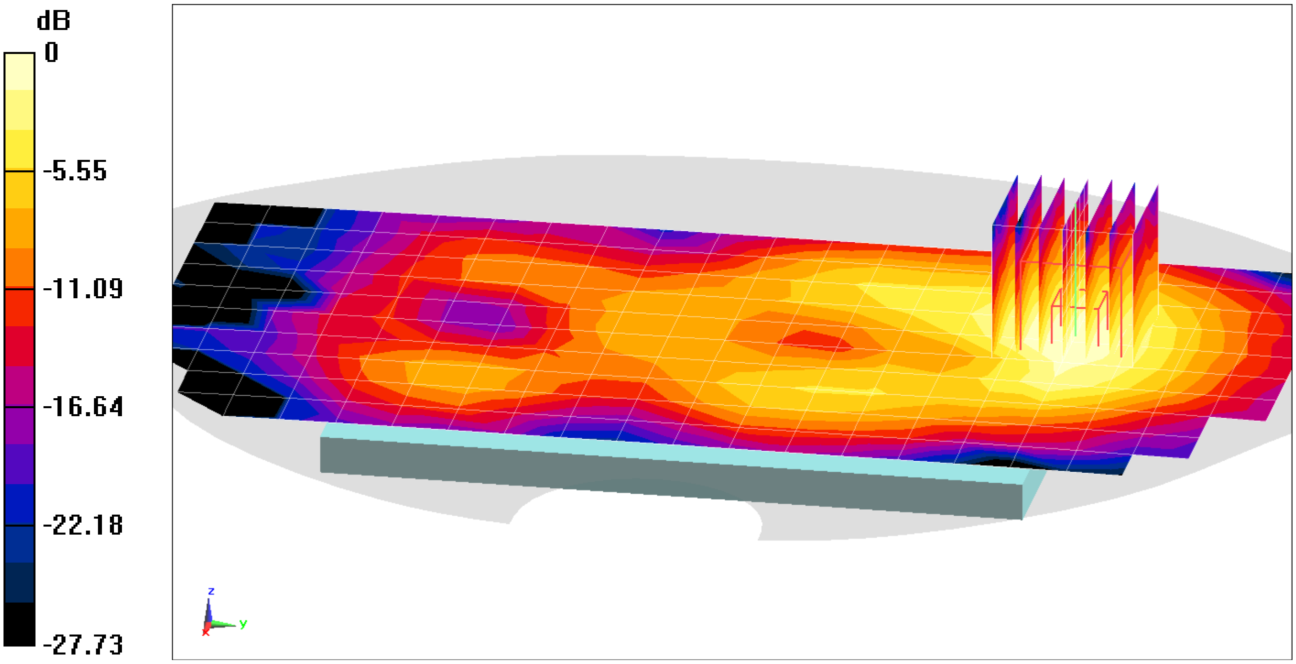
Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.935 S/m; ε_r = 51.411; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/22/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7308; ConvF(7.46, 7.46, 7.46) @ 2412 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (11x21x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.073 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.211 W/kg
SAR(1 g) = 0.112 W/kg



0 dB = 0.172 W/kg = -7.64 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8621M

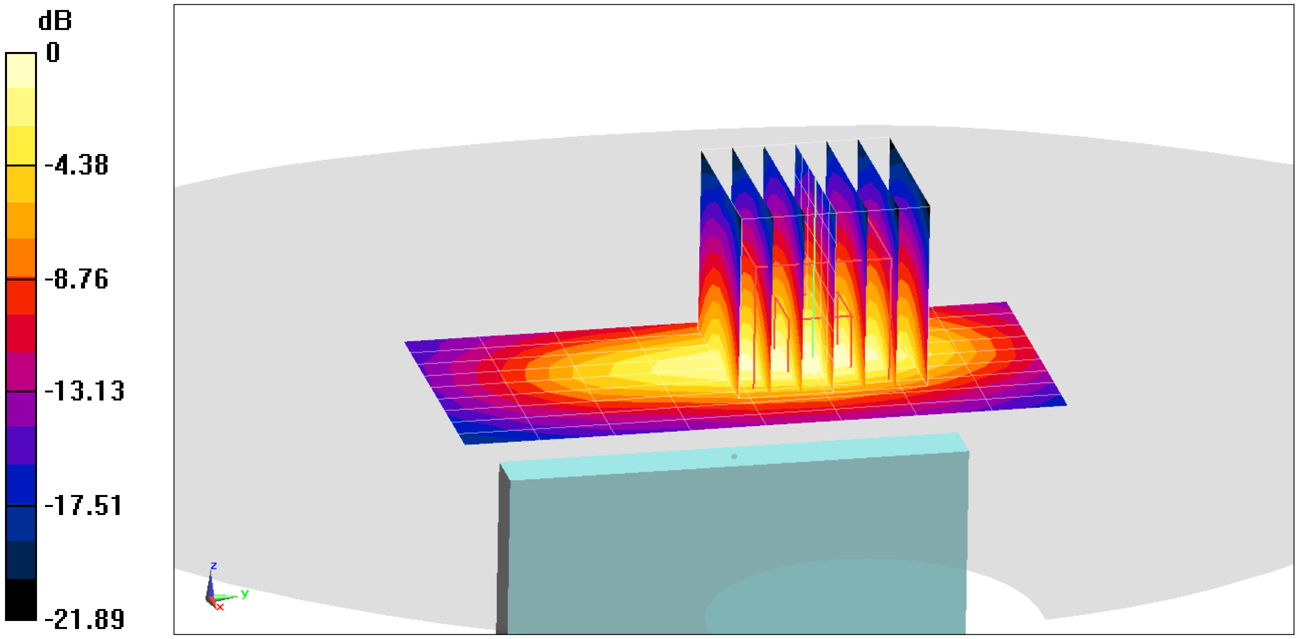
Communication System: UID 0, _IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.935 S/m; ε_r = 51.411; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/22/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7308; ConvF(7.46, 7.46, 7.46) @ 2412 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.51 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.921 W/kg
SAR(1 g) = 0.464 W/kg



0 dB = 0.751 W/kg = -1.24 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8645M

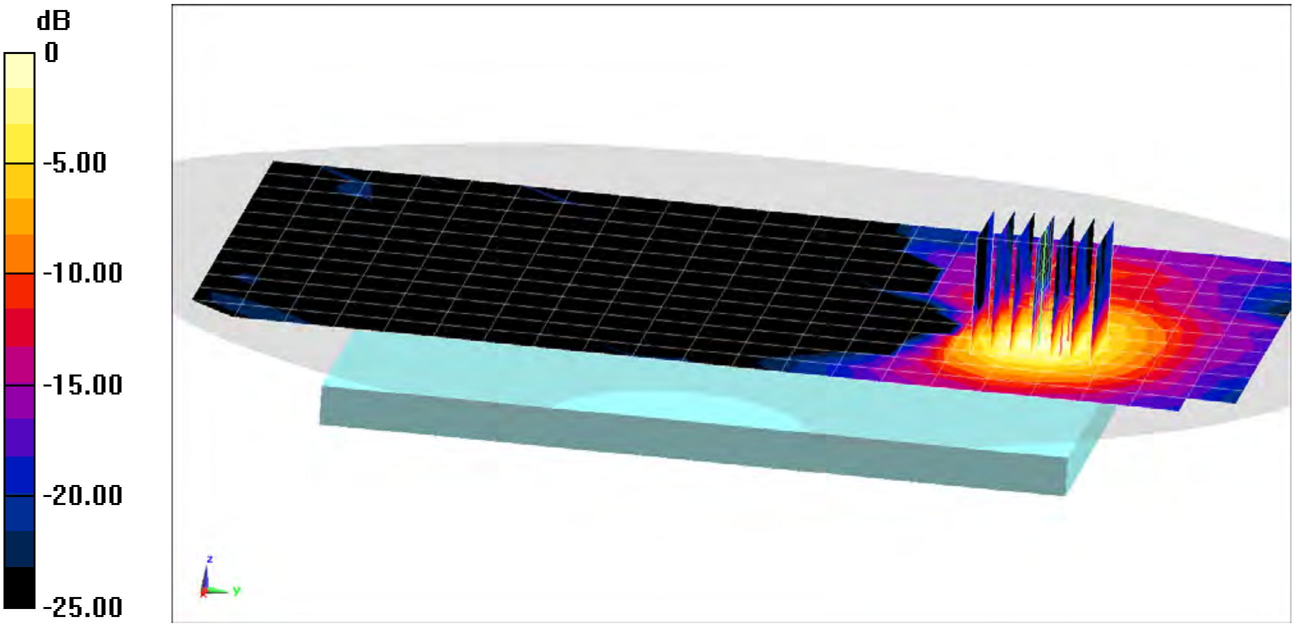
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Body Medium parameters used:
f = 5785 MHz; $\sigma = 6.207$ S/m; $\varepsilon_r = 47.079$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/05/2020; Ambient Temp: 23.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7409; ConvF(4.23, 4.23, 4.23) @ 5785 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: IEEE 802.11a, Antenna 1, UNII-3, 20 MHz Bandwidth, Body SAR, Ch 157, 6 Mbps, Back Side

Area scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 6.720 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 1.21 W/kg
SAR(1 g) = 0.273 W/kg



0 dB = 0.660 W/kg = -1.80 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8645M

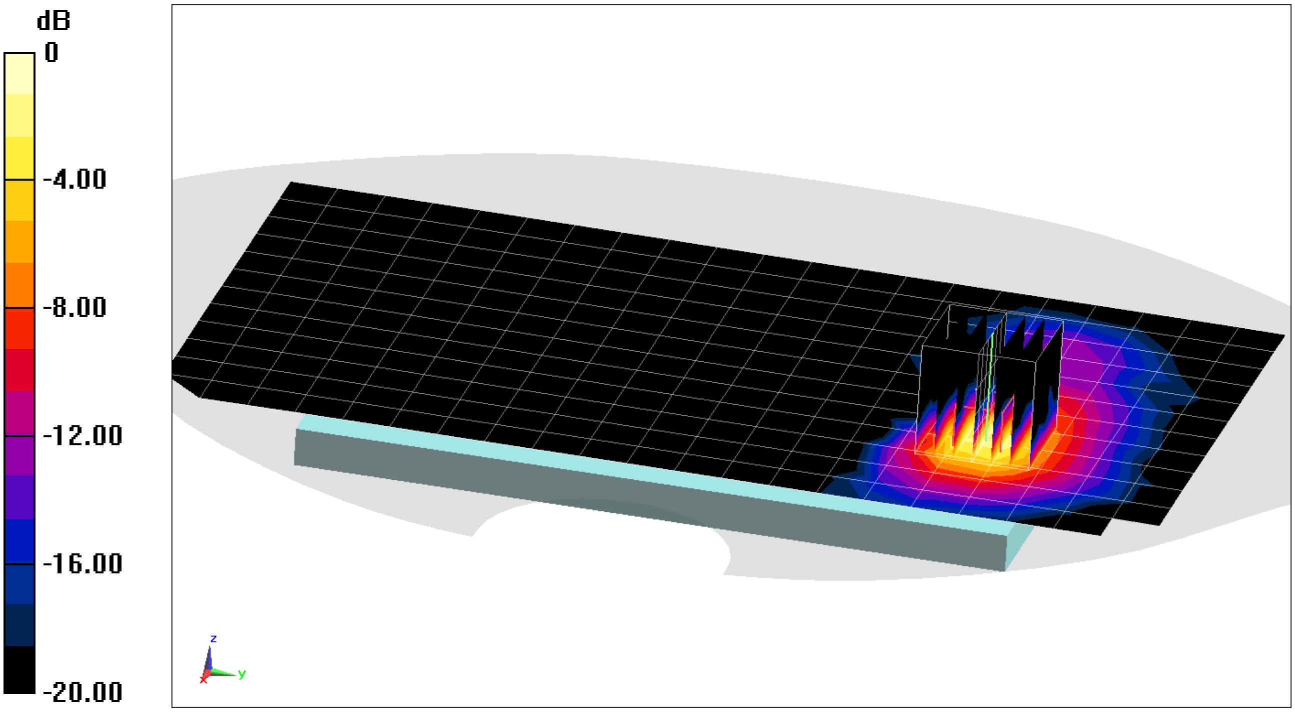
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Body Medium parameters used:
f = 5785 MHz; $\sigma = 6.207$ S/m; $\varepsilon_r = 47.079$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/05/2020; Ambient Temp: 23.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7409; ConvF(4.23, 4.23, 4.23) @ 5785 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: IEEE 802.11a, Antenna 1, U-NII-3, 20 MHz Bandwidth, Body SAR, Ch 157, 6 Mbps, Back Side

Area scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.072 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.21 W/kg
SAR(1 g) = 0.461 W/kg



0 dB = 1.19 W/kg = 0.76 dBW/kg

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8621M

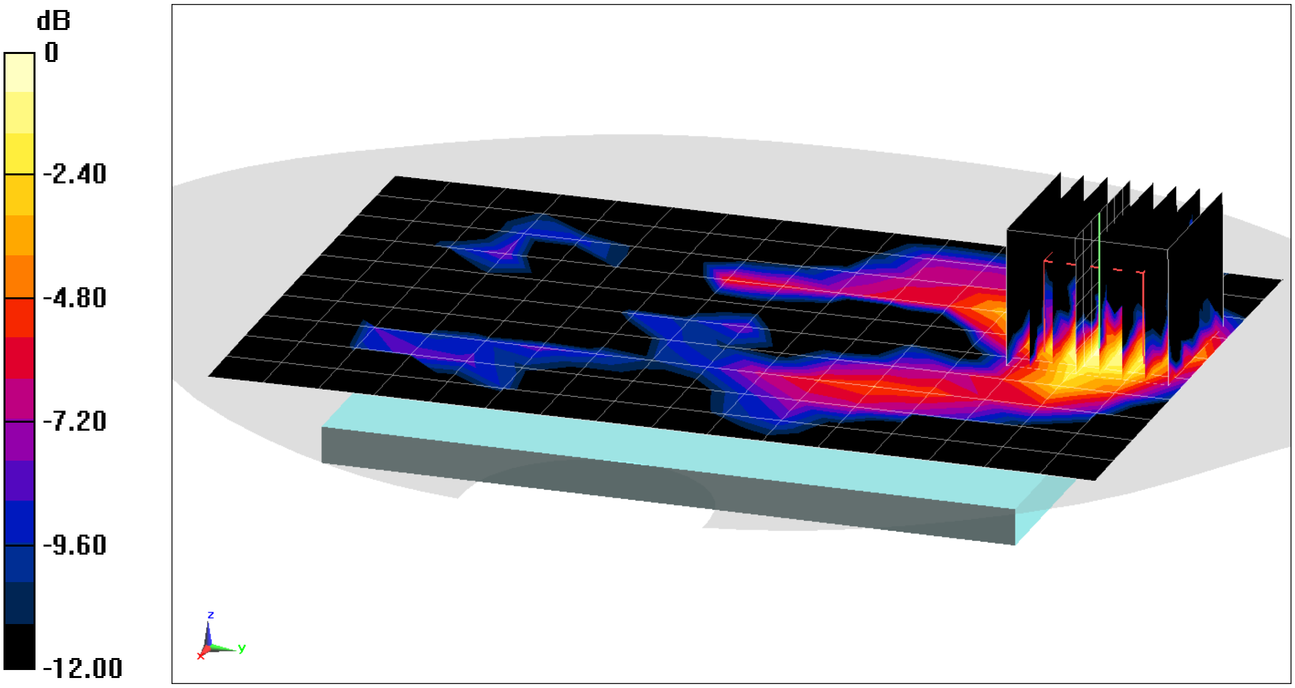
Communication System: UID 0, Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
f = 2402 MHz; $\sigma = 1.922$ S/m; $\varepsilon_r = 51.437$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/22/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7308; ConvF(7.46, 7.46, 7.46) @ 2402 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: Bluetooth, Body SAR, Ch 0, 1 Mbps, Back Side

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.294 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.0200 W/kg
SAR(1 g) = 0.00858 W/kg



0 dB = 0.0153 W/kg = -18.15 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8621M

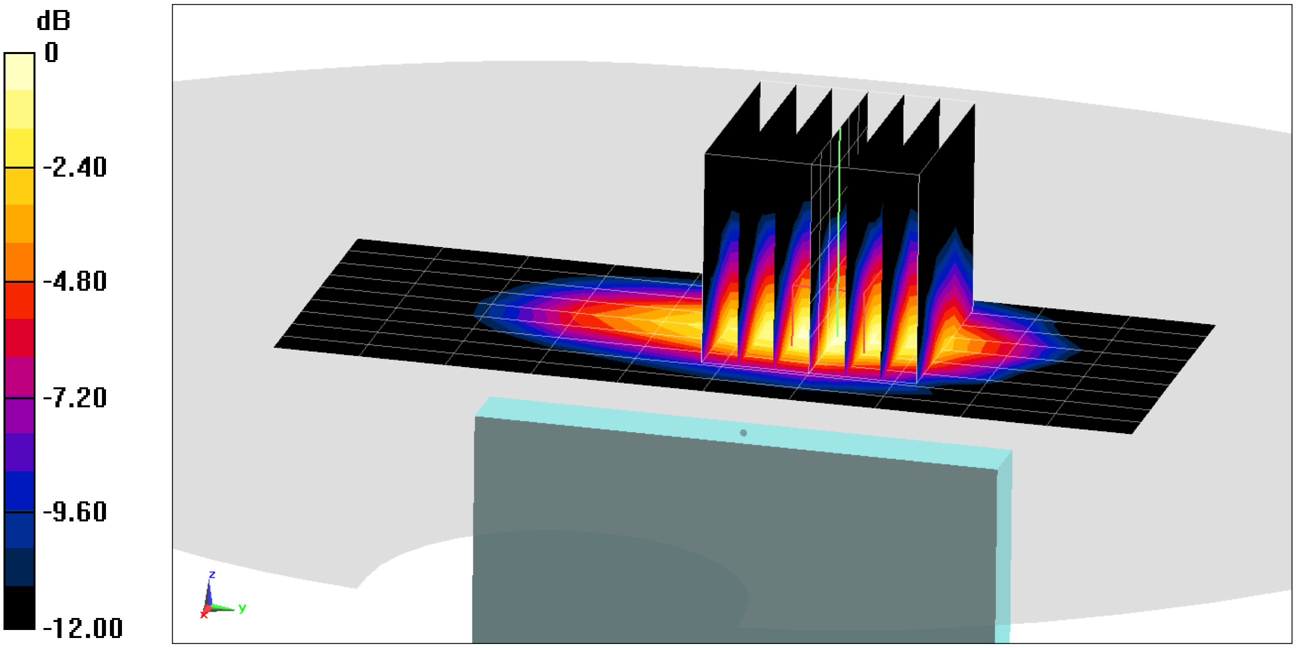
Communication System: UID 0, Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1.289
Medium: 2450 Body Medium parameters used (interpolated):
f = 2402 MHz; σ = 1.922 S/m; ε_r = 51.437; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/22/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7308; ConvF(7.46, 7.46, 7.46) @ 2402 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: Bluetooth, Body SAR, Ch 0, 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 = 5.521 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.104 W/kg
SAR(1 g) = 0.050 W/kg



0 dB = 0.0827 W/kg = -10.82 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8632M

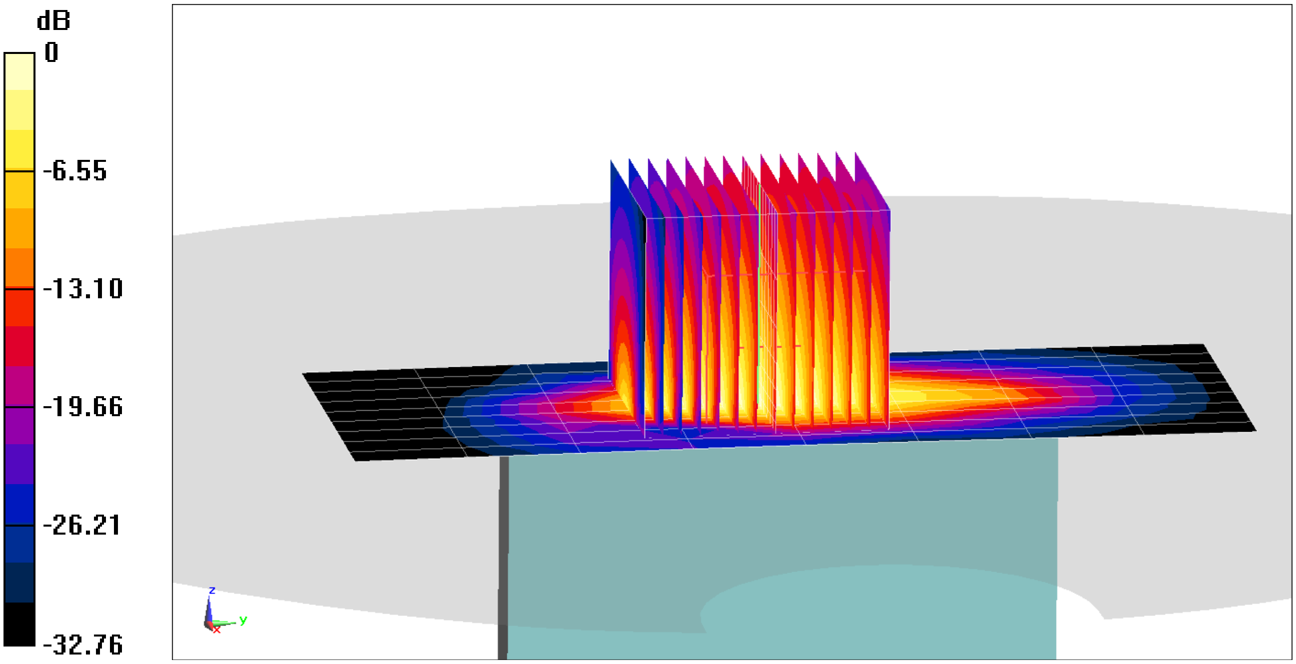
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; $\sigma = 1.577$ S/m; $\varepsilon_r = 50.909$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01/17/2020; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7551; ConvF(7.69, 7.69, 7.69) @ 1909.8 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: GPRS 1900, Phablet SAR, Bottom Edge, High.ch, 3 Tx Slots

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (13x14x8)/Cube 0: Measurement grid: dx=2.5mm, dy=2.5mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 69.28 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(10 g) = 2.53 W/kg



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

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8635M

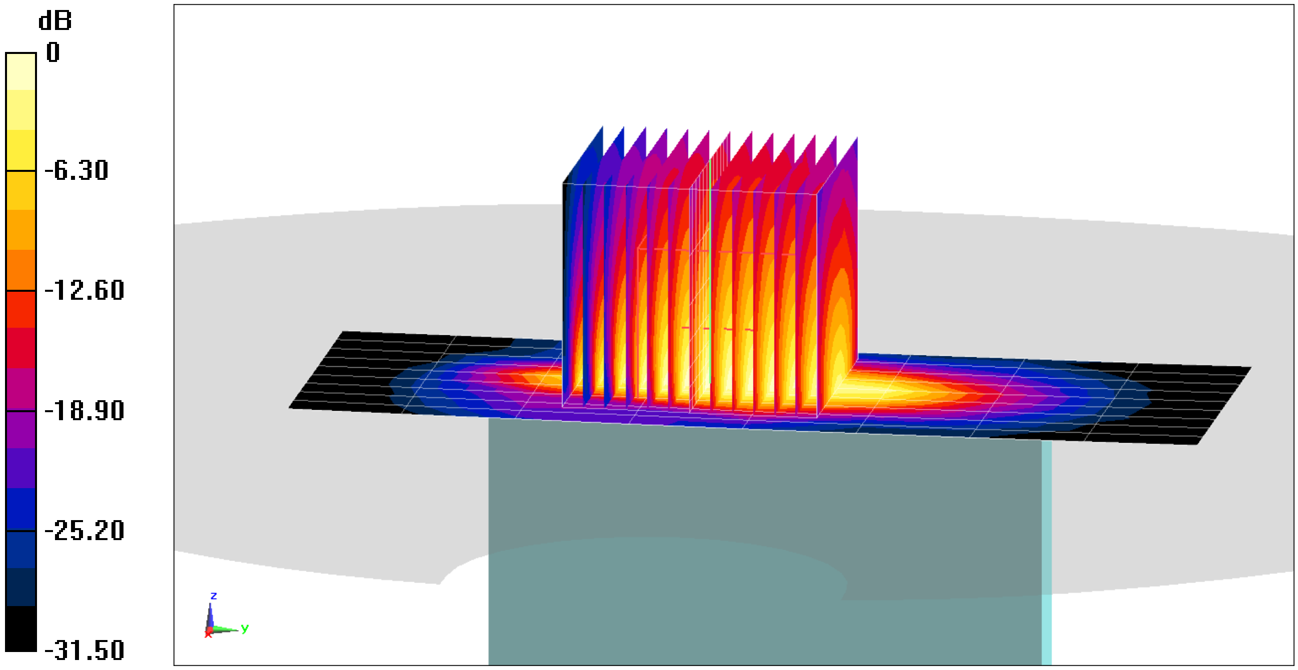
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.425 S/m; ε_r = 53.831; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01/20/2020; Ambient Temp: 22.2°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1732.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

Mode: LTE Band 4 (AWS), Phablet SAR, Bottom Edge, Mid.ch
20 MHz Bandwidth, QPSK, 50 RB, 50 RB Offset

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (13x13x8)/Cube 0: Measurement grid: dx=2.8mm, dy=2.8mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 61.92 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 12.3 W/kg
SAR(10 g) = 1.8 W/kg



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

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8635M

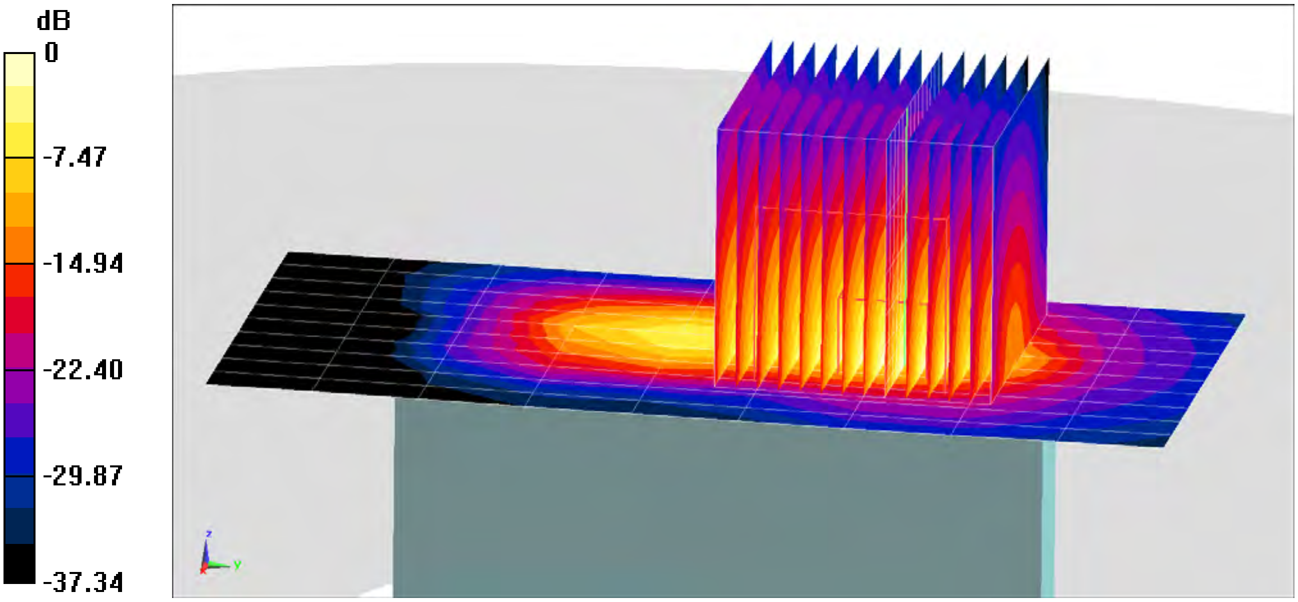
Communication System: UID 0, LTE Band 41 (Class 3); Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used:
f = 2680 MHz; σ = 2.265 S/m; ε_r = 50.127; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 01/27/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7547; ConvF(7.18, 7.18, 7.18) @ 2680 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

Mode: LTE Band 41, Phablet SAR, Bottom Edge, Uplink Carrier Aggregation
PCC: Channel 41490, 20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset
SCC: Channel 41292, 20 MHz Bandwidth, QPSK, 50 RB, 50 RB Offset

Area Scan (11x10x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (15x14x8)/Cube 0: Measurement grid: dx=2.4mm, dy=2.4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 57.01 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 42.1 W/kg
SAR(10 g) = 2.53 W/kg



0 dB = 21.3 W/kg = 13.28 dBW/kg

PCTEST

DUT: A3LSMG981JPN; Type: Portable Handset; Serial: 8645M

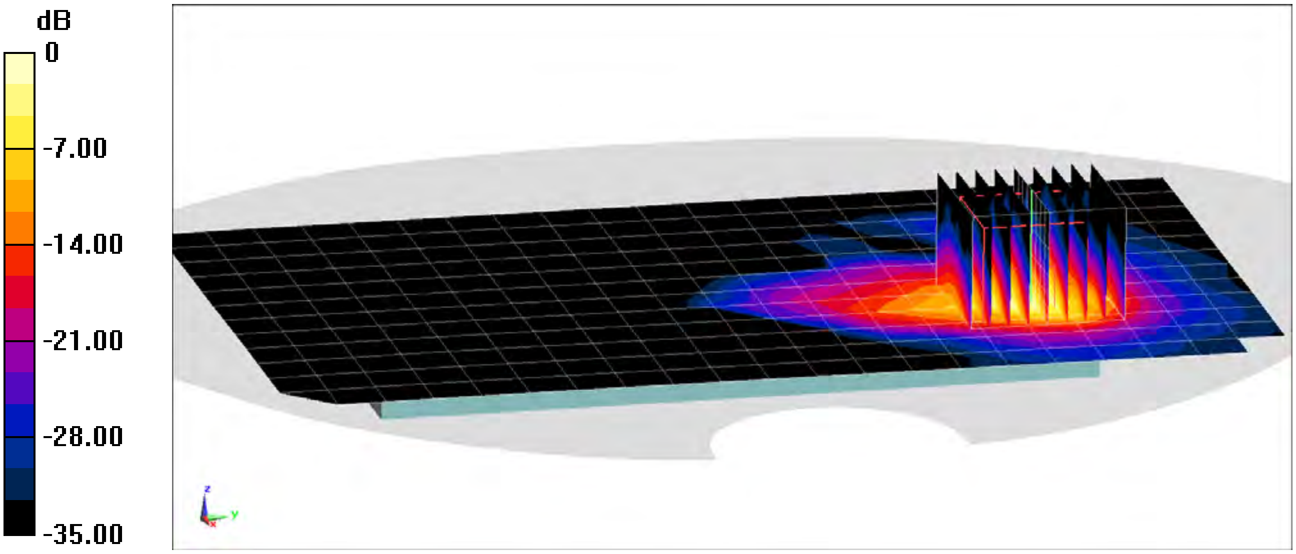
Communication System: UID 0, 802.11n 5.2-5.8 GHz Band; Frequency: 5280 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5280 MHz; $\sigma = 5.426$ S/m; $\varepsilon_r = 48.327$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02/03/2020; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7409; ConvF(4.7, 4.7, 4.7) @ 5280 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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

Area Scan (13x22x1): 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 = 27.94 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 38.2 W/kg
SAR(10 g) = 1.76 W/kg



0 dB = 21.6 W/kg = 13.34 dBW/kg

APPENDIX B: VERIFICATION DATA

PCTEST

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

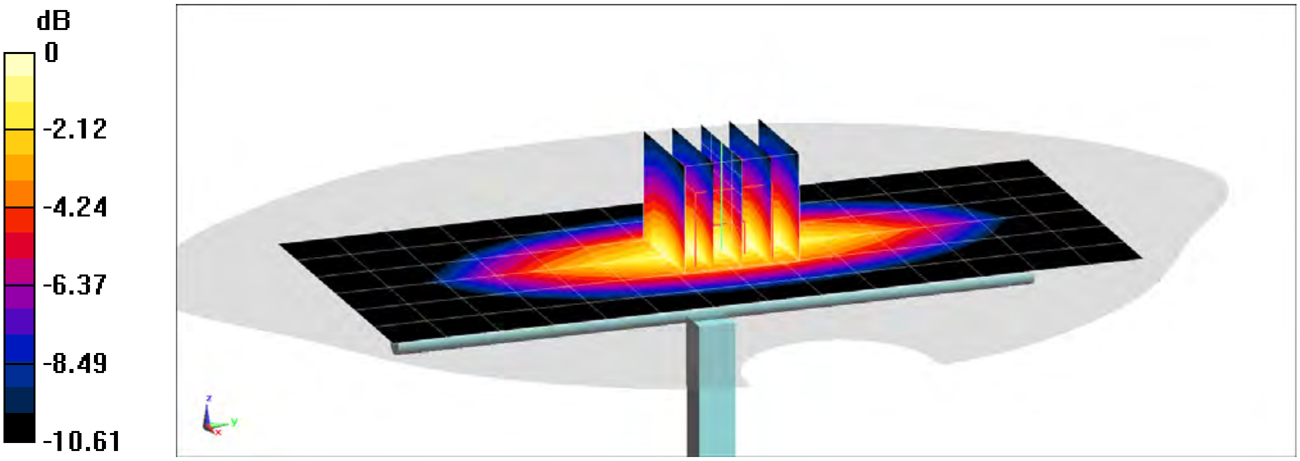
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used:
f = 750 MHz; σ = 0.892 S/m; ε_r = 40.283; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/13/2020; Ambient Temp: 23.4°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7417; ConvF(10.36, 10.36, 10.36) @ 750 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 2.23 W/kg
SAR(1 g) = 1.53 W/kg
Deviation(1 g) = -7.61%



0 dB = 2.02 W/kg = 3.05 dBW/kg

PCTEST

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

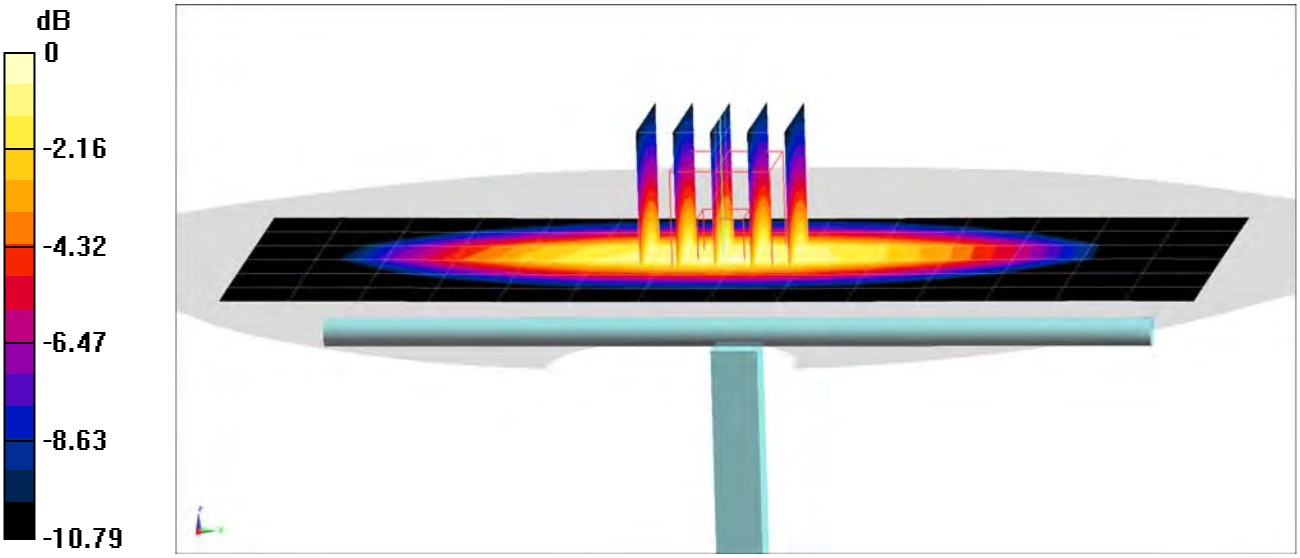
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used:
f = 750 MHz; $\sigma = 0.912$ S/m; $\varepsilon_r = 41.207$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/22/2020; Ambient Temp: 22.3°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3914; ConvF(10, 10, 10) @ 750 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/14/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1646
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 2.63 W/kg
SAR(1 g) = 1.7 W/kg
Deviation(1 g) = 2.53%



0 dB = 2.31 W/kg = 3.64 dBW/kg

PCTEST

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

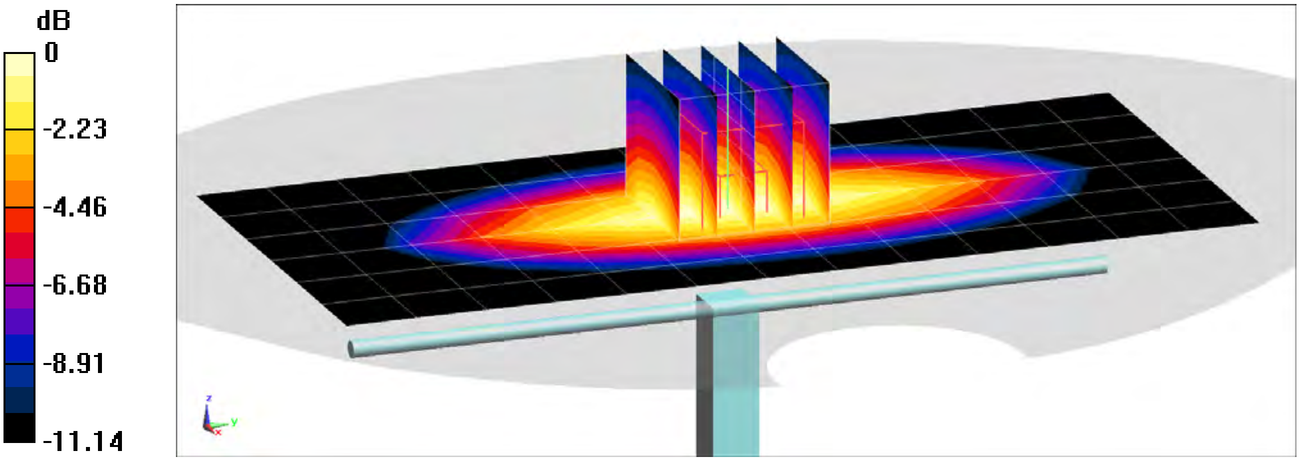
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; $\sigma = 0.909$ S/m; $\varepsilon_r = 39.769$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/20/2020; Ambient Temp: 20.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7417; ConvF(10.07, 10.07, 10.07) @ 835 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

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) = 2.71 W/kg
SAR(1 g) = 1.78 W/kg
Deviation(1 g) = -5.52%



0 dB = 2.39 W/kg = 3.78 dBW/kg

PCTEST

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

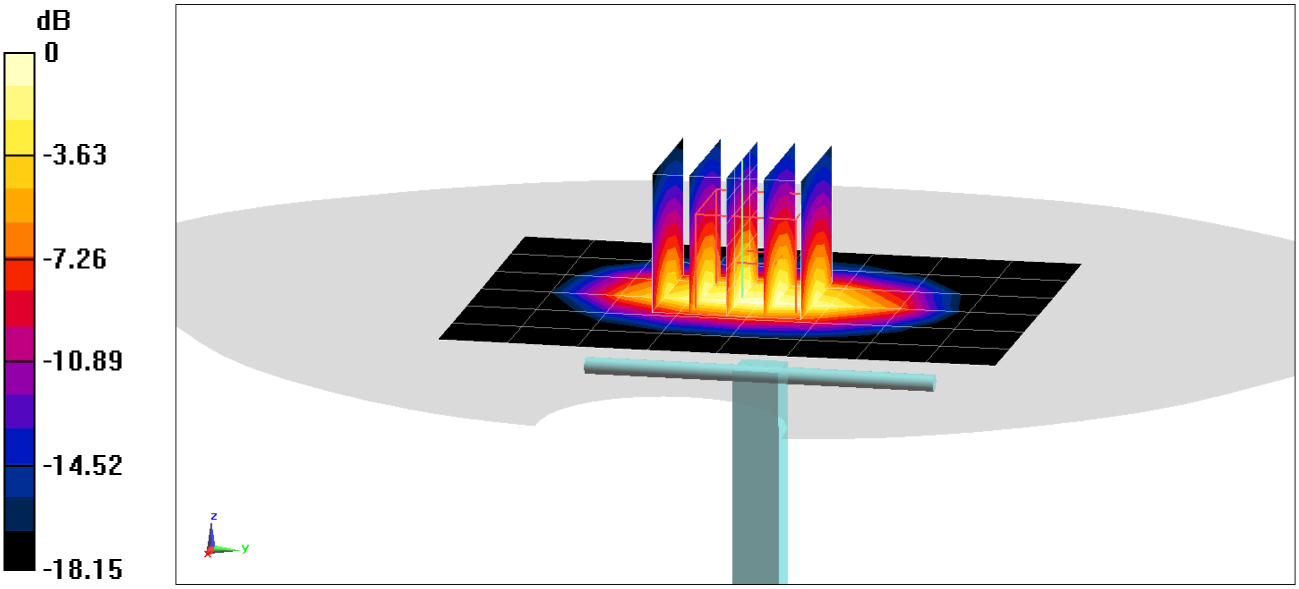
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used:
$f = 1750$ MHz; $\sigma = 1.345$ S/m; $\varepsilon_r = 39.526$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/01/2020; Ambient Temp: 22.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(8.57, 8.57, 8.57) @ 1750 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 6.47 W/kg
SAR(1 g) = 3.44 W/kg
Deviation(1 g) = -7.03%



0 dB = 5.33 W/kg = 7.27 dBW/kg

PCTEST

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

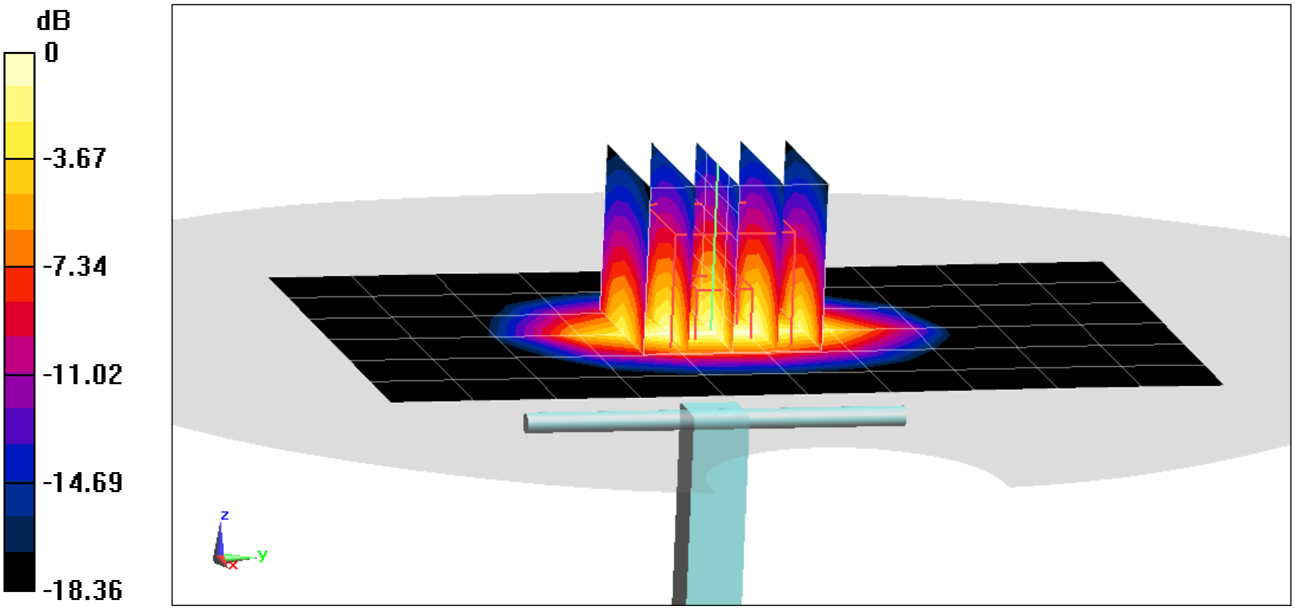
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:
f = 1900 MHz; $\sigma = 1.433$ S/m; $\varepsilon_r = 39.339$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/04/2020; Ambient Temp: 23.2°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN7410; ConvF(8.11, 8.11, 8.11) @ 1900 MHz; Calibrated: 7/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

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) = 7.85 W/kg
SAR(1 g) = 4.15 W/kg
Deviation(1 g) = 6.14%



0 dB = 6.55 W/kg = 8.16 dBW/kg

PCTEST

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

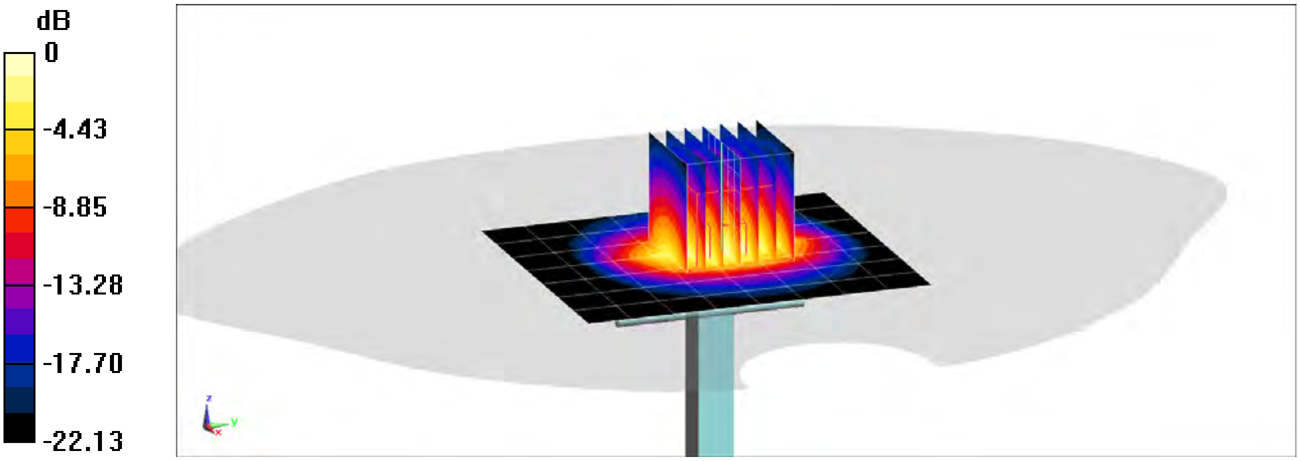
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma = 1.849$ S/m; $\varepsilon_r = 38.777$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/03/2020; Ambient Temp: 24.3°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7417; ConvF(7.46, 7.46, 7.46) @ 2450 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.51 W/kg
Deviation(1 g) = 5.35%



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

PCTEST

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

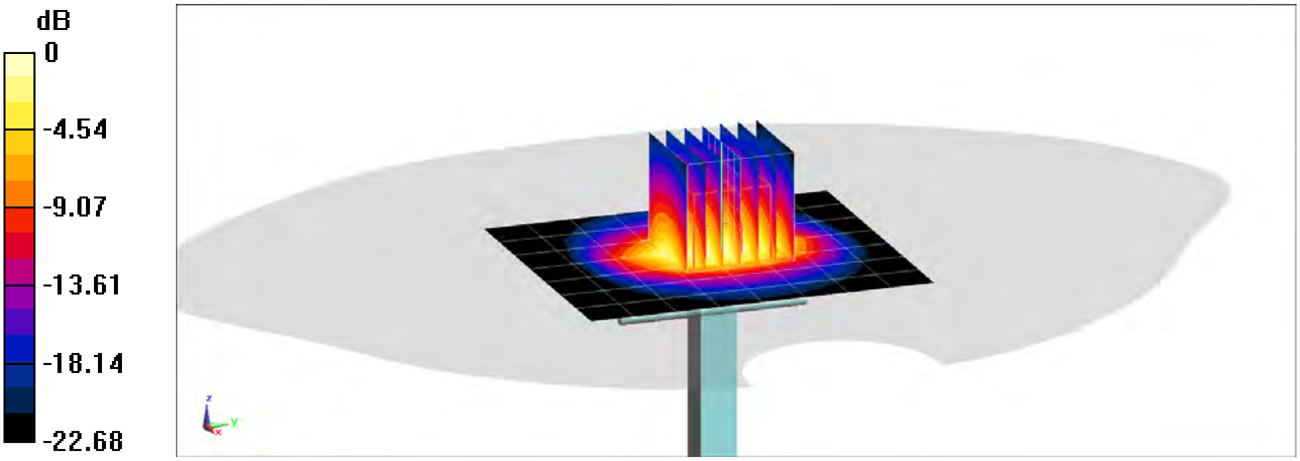
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; $\sigma = 1.818$ S/m; $\varepsilon_r = 37.483$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/10/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7417; ConvF(7.46, 7.46, 7.46) @ 2450 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
SAR(1 g) = 5.36 W/kg
Deviation(1 g) = 2.49%



0 dB = 9.09 W/kg = 9.59 dBW/kg

PCTEST

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

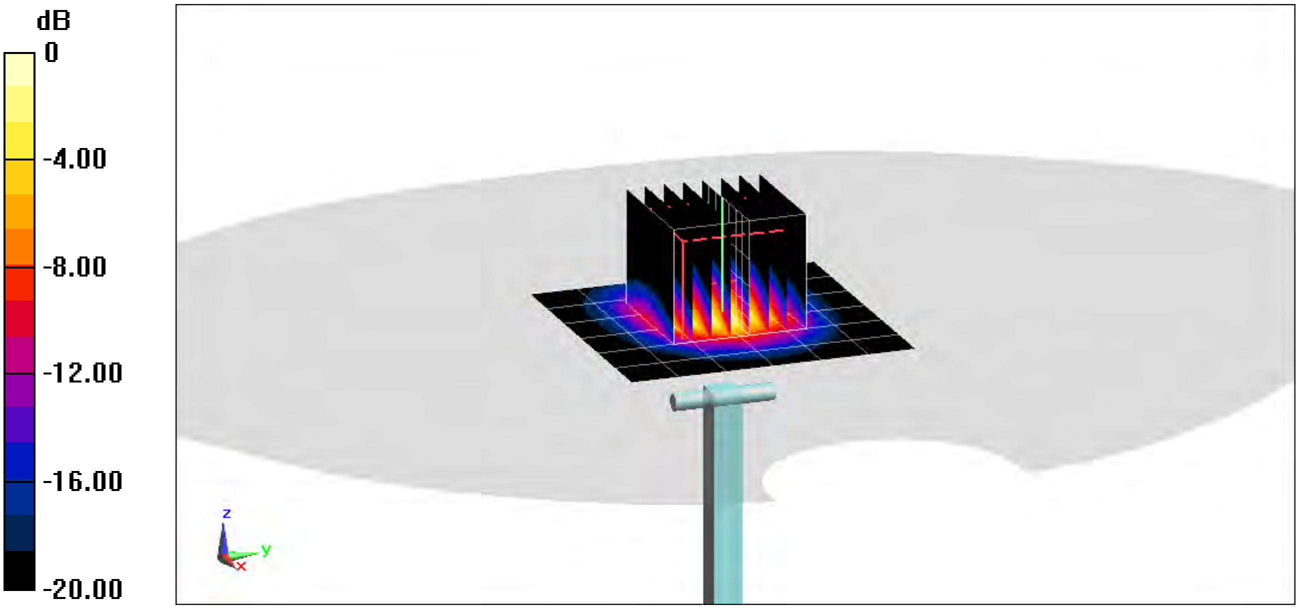
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Head; Medium parameters used:
f = 5250 MHz; $\sigma = 4.685$ S/m; $\varepsilon_r = 35.654$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/13/2020; Ambient Temp: 21.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7406; ConvF(5.54, 5.54, 5.54) @ 5250 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 20; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 15.2 W/kg
SAR(1 g) = 3.74 W/kg
Deviation(1 g) = -7.43%



0 dB = 8.74 W/kg = 9.42 dBW/kg

PCTEST

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

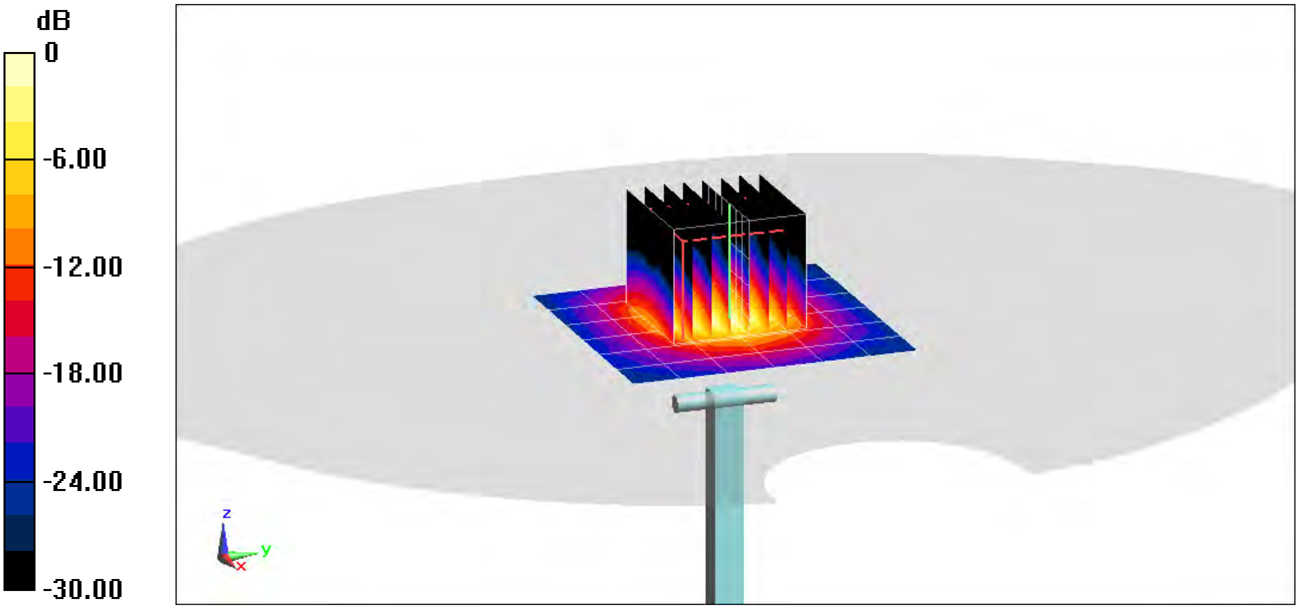
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Head; Medium parameters used:
f = 5600 MHz; σ = 5.094 S/m; ε_r = 35.009; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/13/2020; Ambient Temp: 21.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7406; ConvF(4.94, 4.94, 4.94) @ 5600 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 20; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 3.78 W/kg
Deviation(1 g) = -8.59%



0 dB = 9.02 W/kg = 9.55 dBW/kg

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

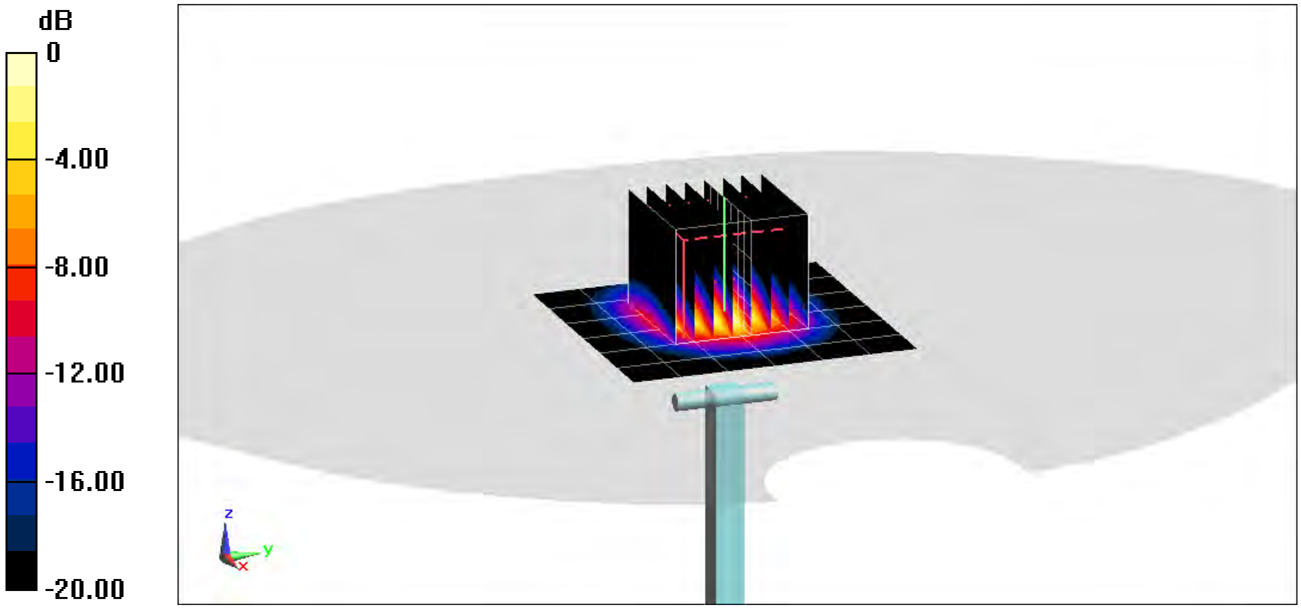
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Head; Medium parameters used:
f = 5750 MHz; σ = 5.278 S/m; ε_r = 34.766; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/13/2020; Ambient Temp: 21.5°C; Tissue Temp: 23.0°C

Probe: EX3DV4 - SN7406; ConvF(5.23, 5.23, 5.23) @ 5750 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 20; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 3.71 W/kg
Deviation(1 g) = -7.48%



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

PCTEST

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

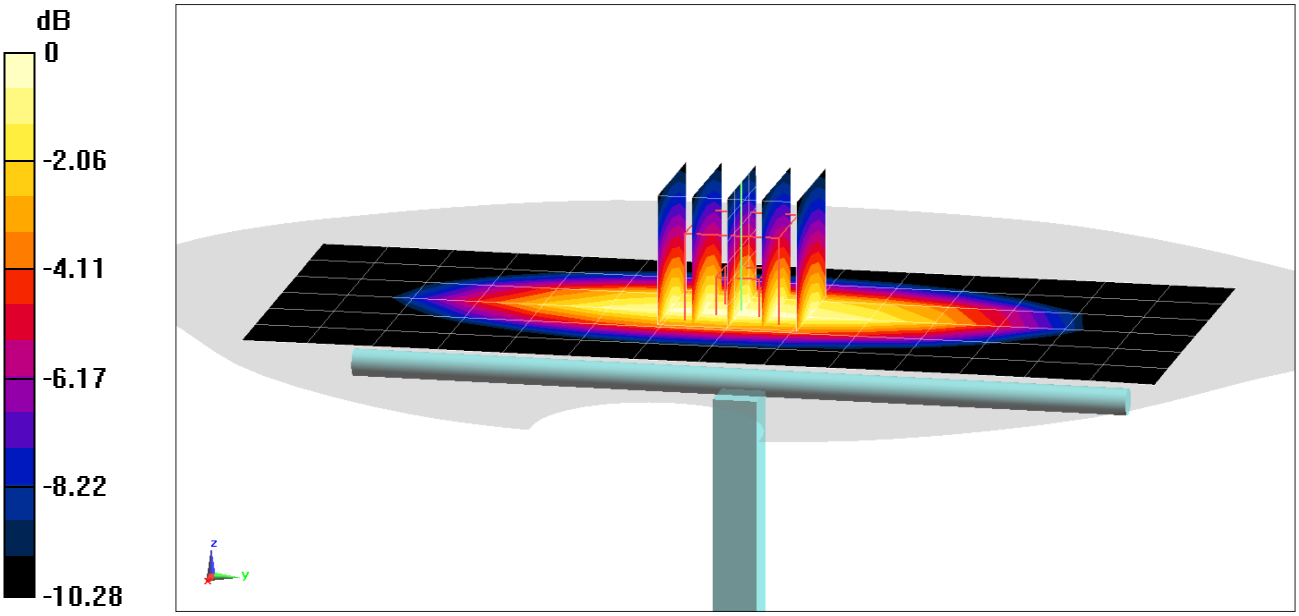
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 700 Body; Medium parameters used:
f = 750 MHz; $\sigma = 0.951$ S/m; $\varepsilon_r = 53.946$; $\rho = 1000\ \text{kg/m}^3$
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/08/2020; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(10.05, 10.05, 10.05) @ 750 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Left 30; Type: QD 000 P40 CD; Serial: 1715
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 2.57 W/kg
SAR(1 g) = 1.69 W/kg
Deviation(1 g) = -1.52%



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

PCTEST

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

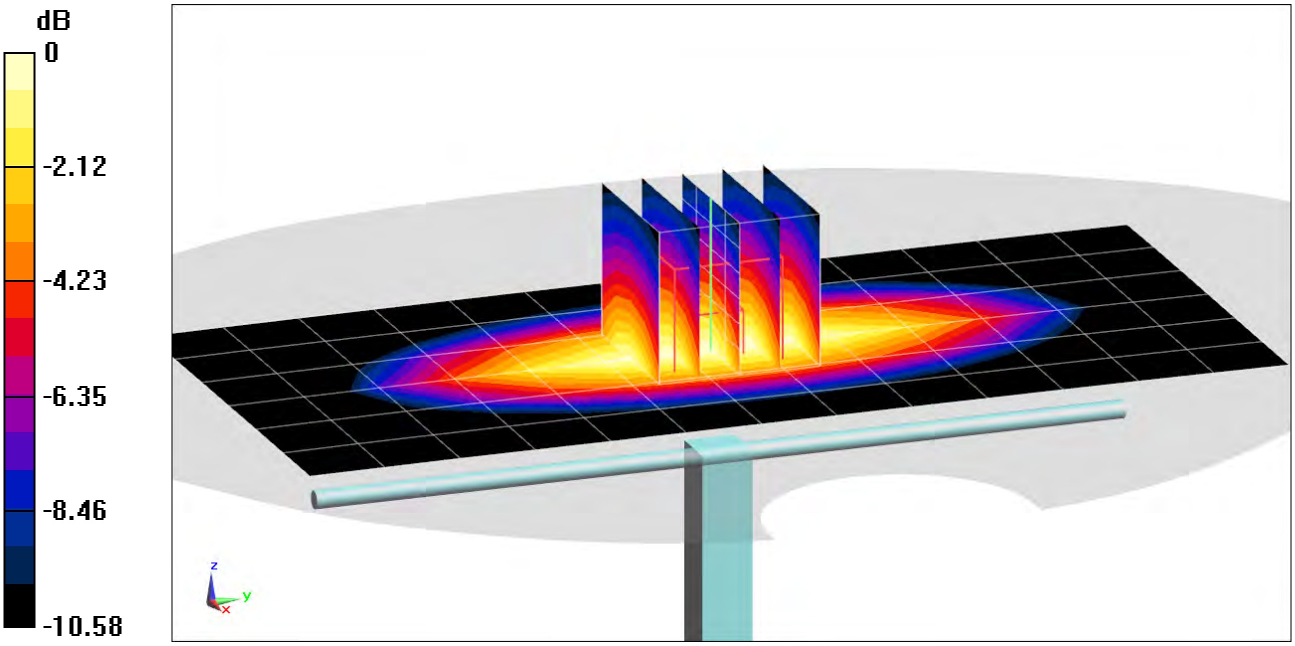
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; $\sigma = 0.974$ S/m; $\varepsilon_r = 53.129$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/18/2020; Ambient Temp: 20.5°C; Tissue Temp: 19.8°C

Probe: EX3DV4 - SN7308; ConvF(10.43, 10.43, 10.43) @ 835 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 2.95 W/kg
SAR(1 g) = 1.98 W/kg
Deviation(1 g) = 1.54%



0 dB = 2.63 W/kg = 4.20 dBW/kg

PCTEST

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

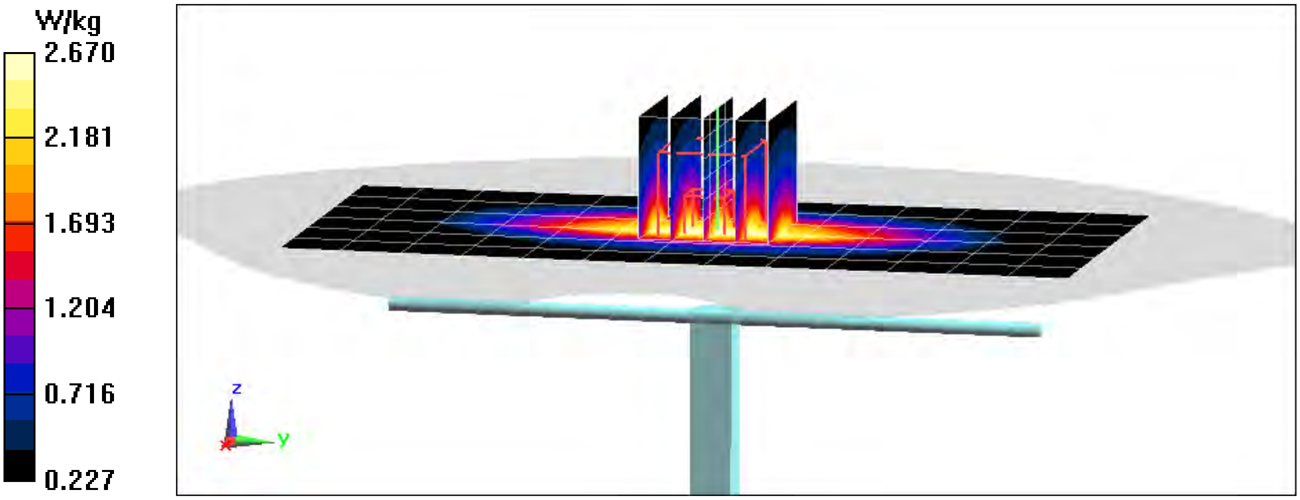
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used:
f = 835 MHz; $\sigma = 0.991$ S/m; $\varepsilon_r = 54.176$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 01/20/2020; Ambient Temp: 23.4°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 835 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn728; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 3.08 W/kg
SAR(1 g) = 2.02 W/kg
Deviation(1 g) = 6.65%



PCTEST

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

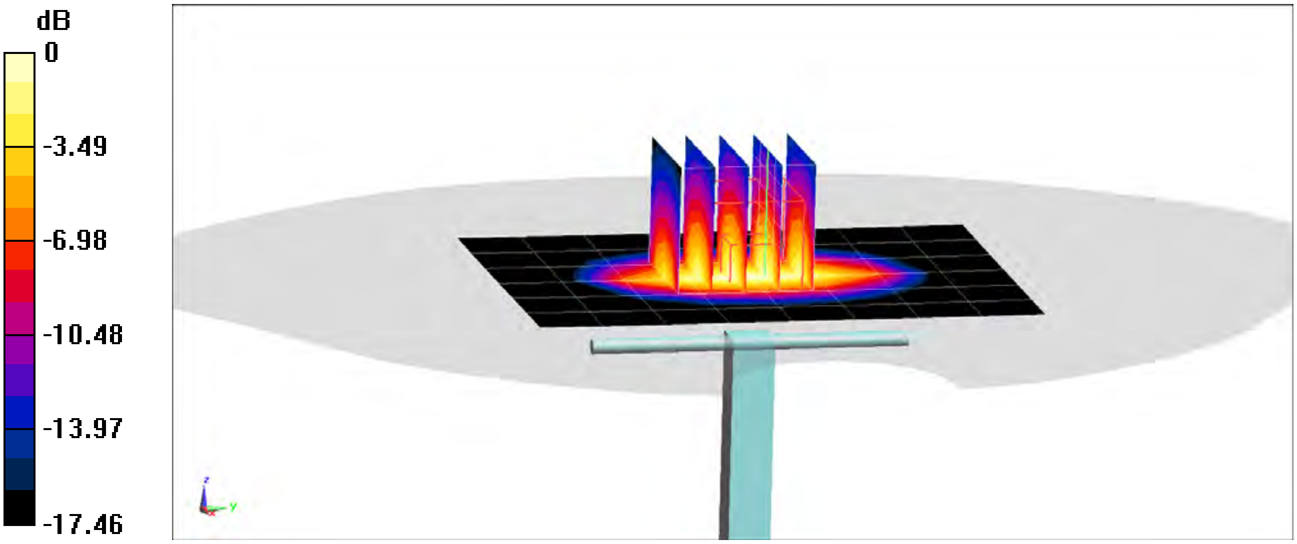
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; $\sigma = 1.444$ S/m; $\varepsilon_r = 53.779$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/20/2020; Ambient Temp: 22.2°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1750 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 3.76 W/kg; SAR(10 g) = 1.99 W/kg
Deviation(1 g) = -0.27%; Deviation(10 g) = 0.51%



0 dB = 5.66 W/kg = 7.53 dBW/kg

PCTEST

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

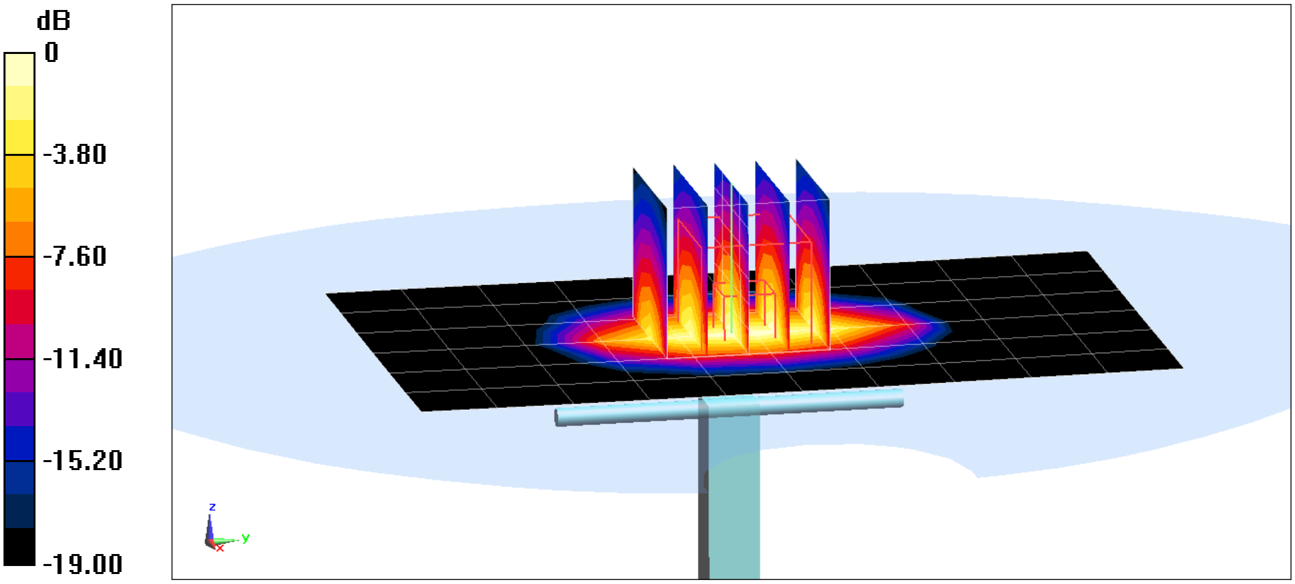
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; $\sigma = 1.583$ S/m; $\varepsilon_r = 52.463$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/03/2020; Ambient Temp: 21.9°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1900 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 7.88 W/kg
SAR(1 g) = 4.26 W/kg
Deviation(1 g) = 8.67%



0 dB = 6.57 W/kg = 8.18 dBW/kg

PCTEST

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

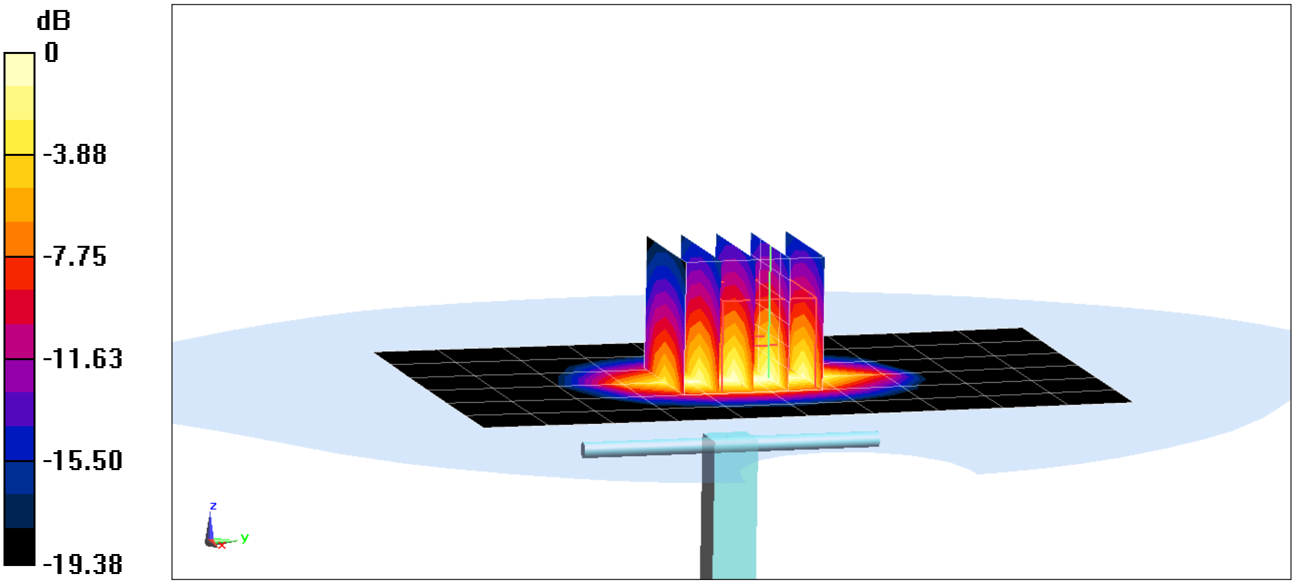
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; σ = 1.569 S/m; ε_r = 51.832; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/06/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1900 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 7.78 W/kg
SAR(1 g) = 4.21 W/kg
Deviation(1 g) = 7.40%



0 dB = 6.44 W/kg = 8.09 dBW/kg

PCTEST

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

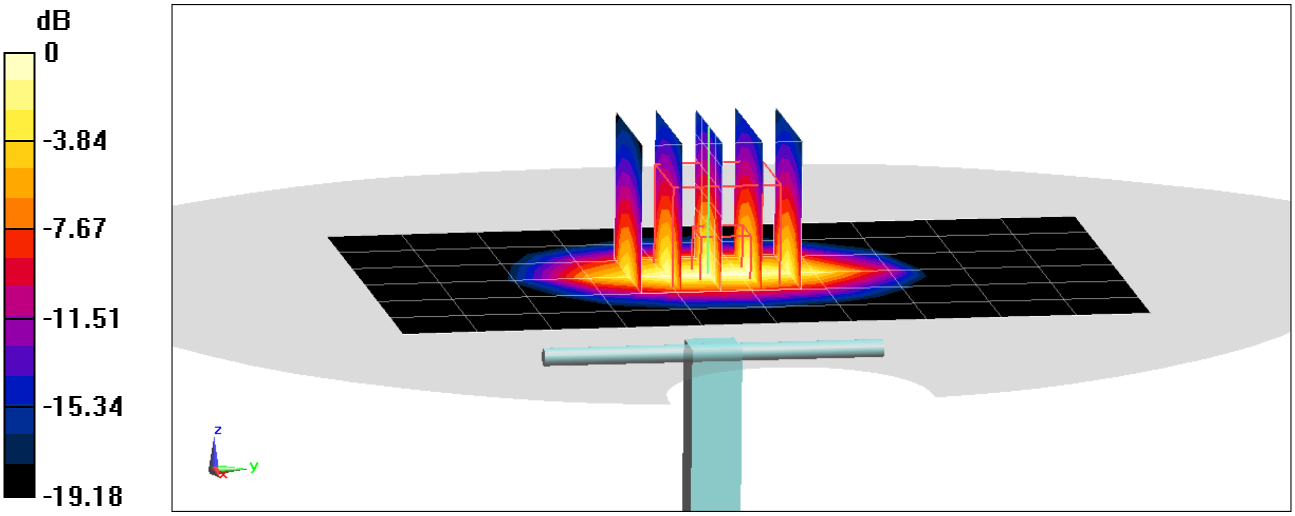
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used:
f = 1900 MHz; $\sigma = 1.565$ S/m; $\varepsilon_r = 50.943$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/17/2020; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7551; ConvF(7.69, 7.69, 7.69) @ 1900 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 7.85 W/kg
SAR(10 g) = 2.06 W/kg
Deviation(10 g) = 0.00%



0 dB = 6.45 W/kg = 8.10 dBW/kg

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 797

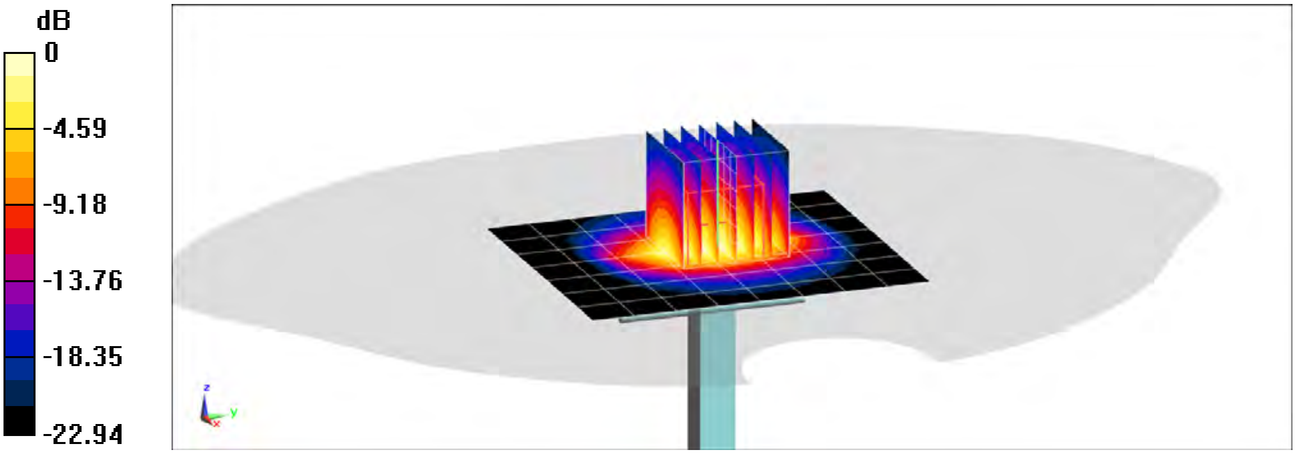
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.983 S/m; ε_r = 51.313; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/22/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7308; ConvF(7.46, 7.46, 7.46) @ 2450 MHz; Calibrated: 8/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/14/2019
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1964
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 5.14 W/kg
Deviation(1 g) = 0.59%



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

PCTEST

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

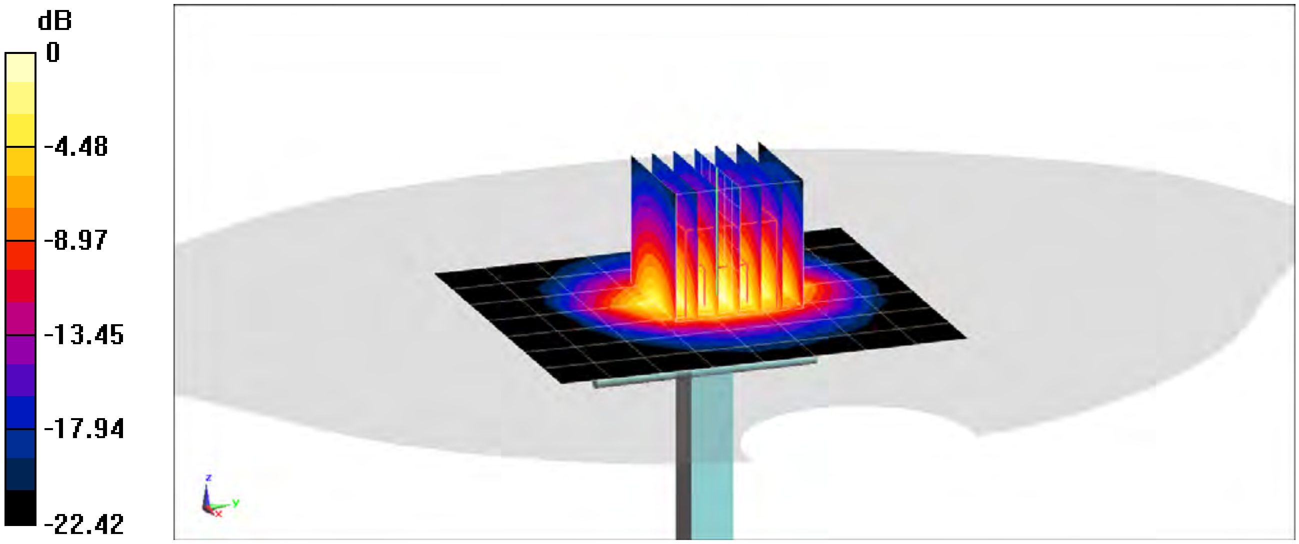
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
$f = 2450$ MHz; $\sigma = 2.047$ S/m; $\varepsilon_r = 50.787$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/23/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7547; ConvF(7.3, 7.3, 7.3) @ 2450 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

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) = 5.18 W/kg
Deviation(1 g) = 1.77%



0 dB = 8.72 W/kg = 9.41 dBW/kg

PCTEST

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1064

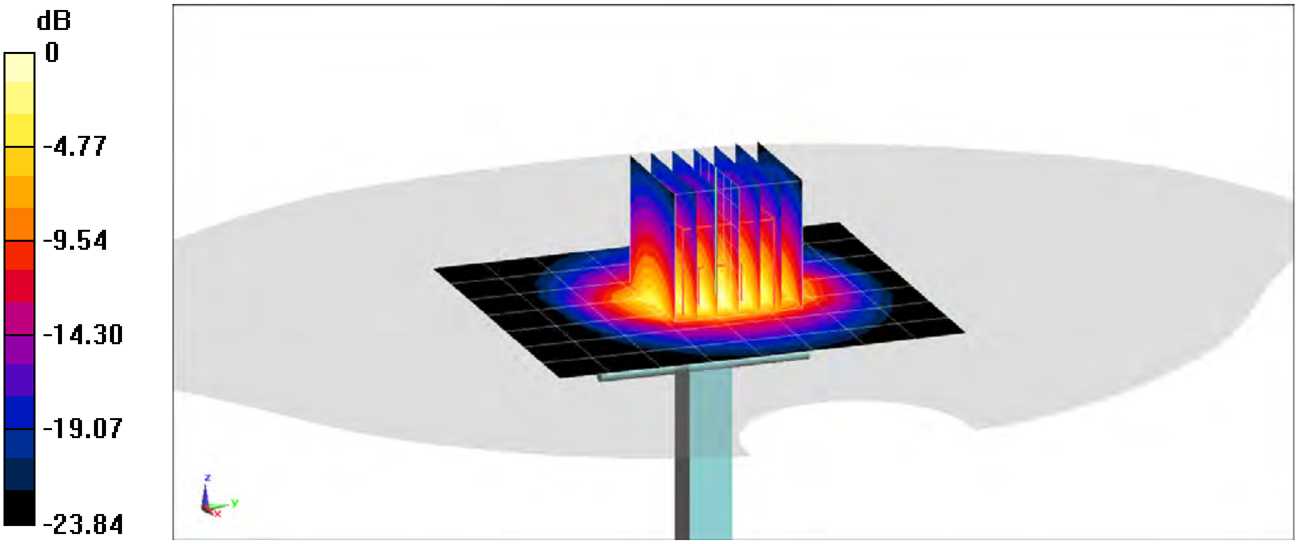
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; $\sigma = 2.224$ S/m; $\varepsilon_r = 50.339$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/23/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7547; ConvF(7.18, 7.18, 7.18) @ 2600 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 5.61 W/kg
Deviation(1 g) = 0.90%



0 dB = 9.76 W/kg = 9.89 dBW/kg

PCTEST

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

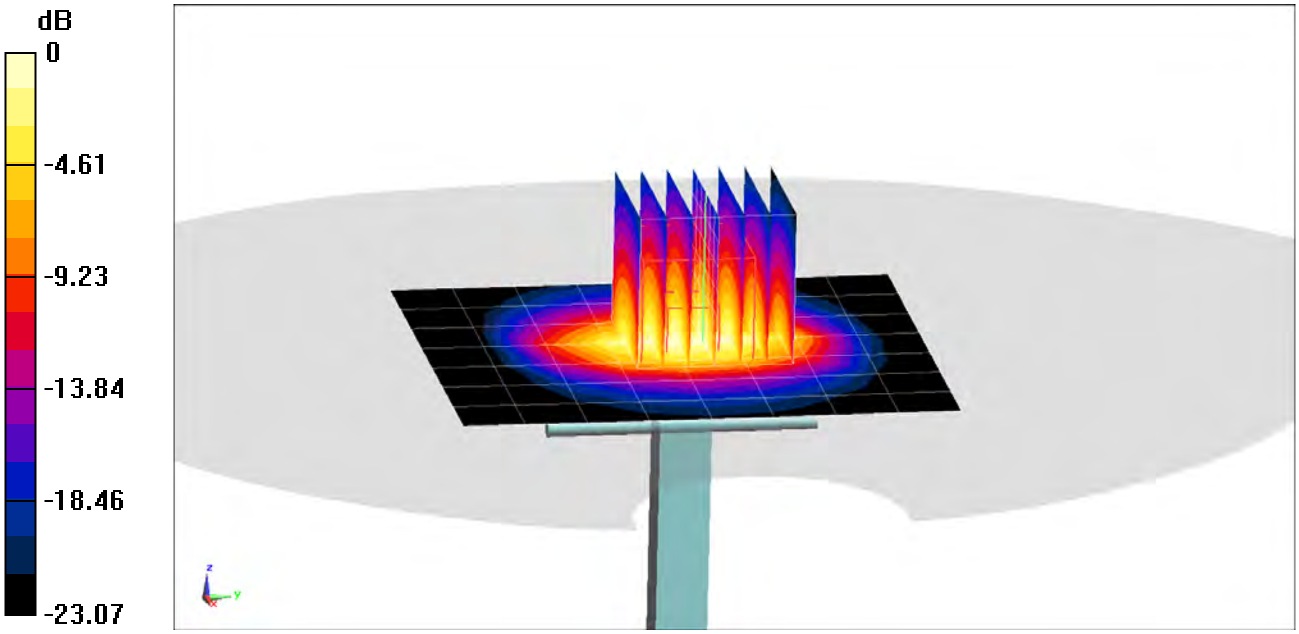
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; $\sigma = 2$ S/m; $\varepsilon_r = 50.784$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/27/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7547; ConvF(7.3, 7.3, 7.3) @ 2450 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

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) = 10.1 W/kg
SAR(10 g) = 2.25 W/kg
Deviation(10 g) = -7.02%



0 dB = 8.11 W/kg = 9.09 dBW/kg

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1064

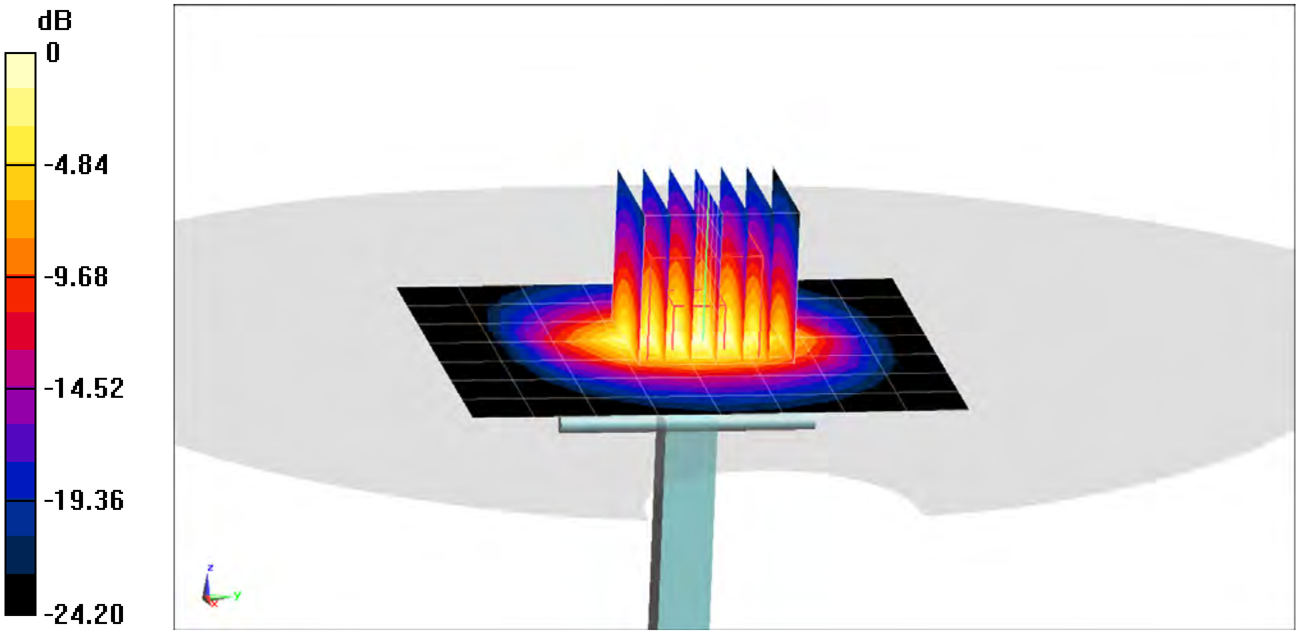
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; $\sigma = 2.171$ S/m; $\varepsilon_r = 50.362$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/27/2020; Ambient Temp: 23.7°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7547; ConvF(7.18, 7.18, 7.18) @ 2600 MHz; Calibrated: 7/15/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 7/11/2019
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 (7470)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.8 W/kg
SAR(10 g) = 2.4 W/kg
Deviation(10 g) = -4.00%



0 dB = 9.29 W/kg = 9.68 dBW/kg

PCTEST

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

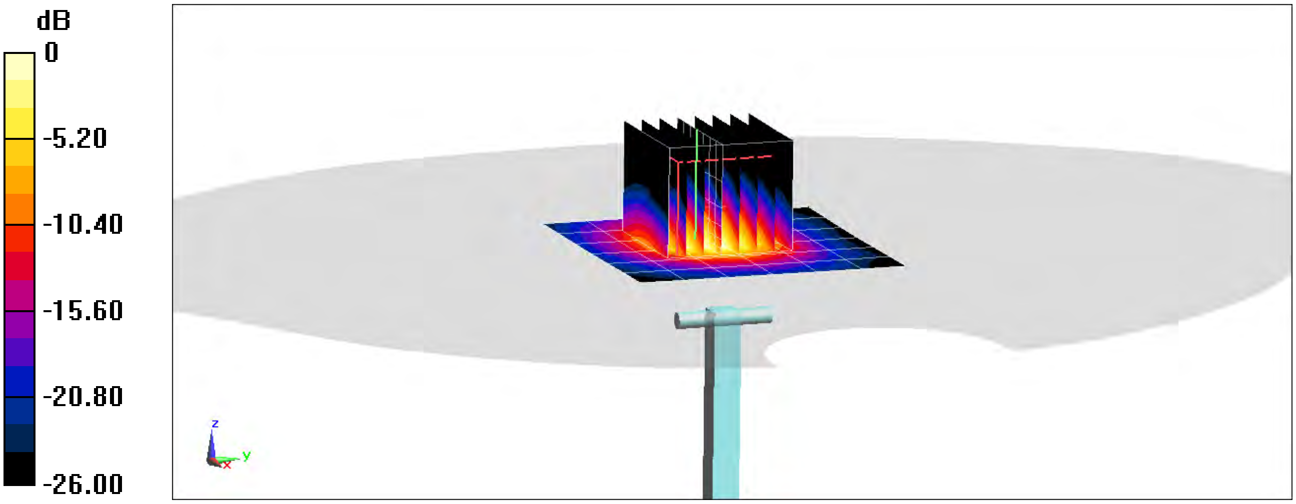
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Body Medium parameters used:
f = 5250 MHz; $\sigma = 5.495$ S/m; $\varepsilon_r = 47.949$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/05/2020; Ambient Temp: 23.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7409; ConvF(4.7, 4.7, 4.7) @ 5250 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 3.89 W/kg
Deviation(1 g) = 1.04%



0 dB = 9.06 W/kg = 9.57 dBW/kg

PCTEST

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

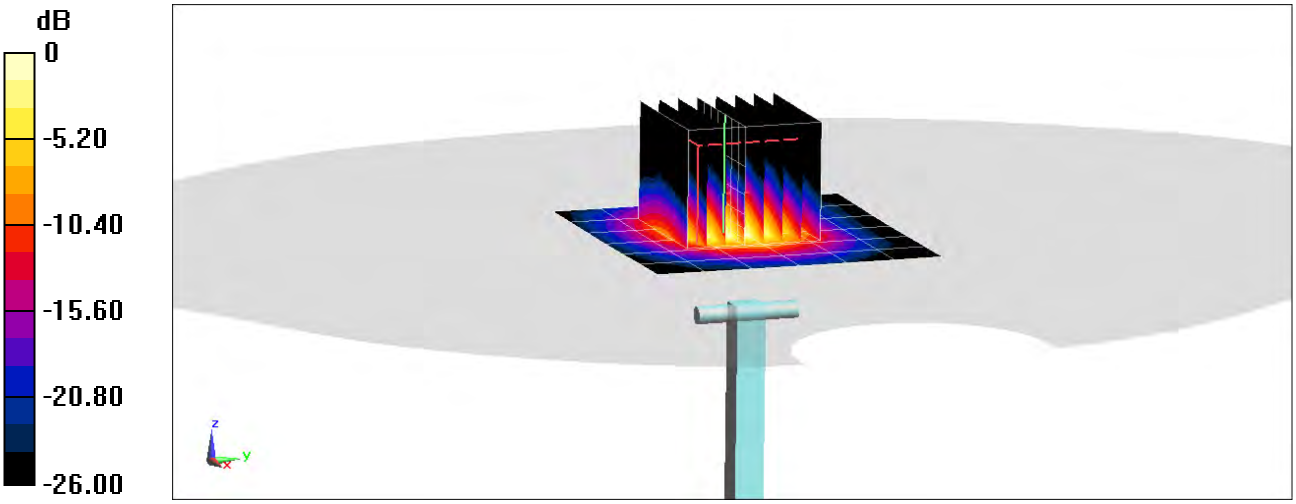
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Body Medium parameters used:
f = 5600 MHz; $\sigma = 5.942$ S/m; $\varepsilon_r = 47.372$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/05/2020; Ambient Temp: 23.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7409; ConvF(4.22, 4.22, 4.22) @ 5600 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 19.4 W/kg
SAR(1 g) = 4.14 W/kg
Deviation(1 g) = 5.34%



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

PCTEST

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

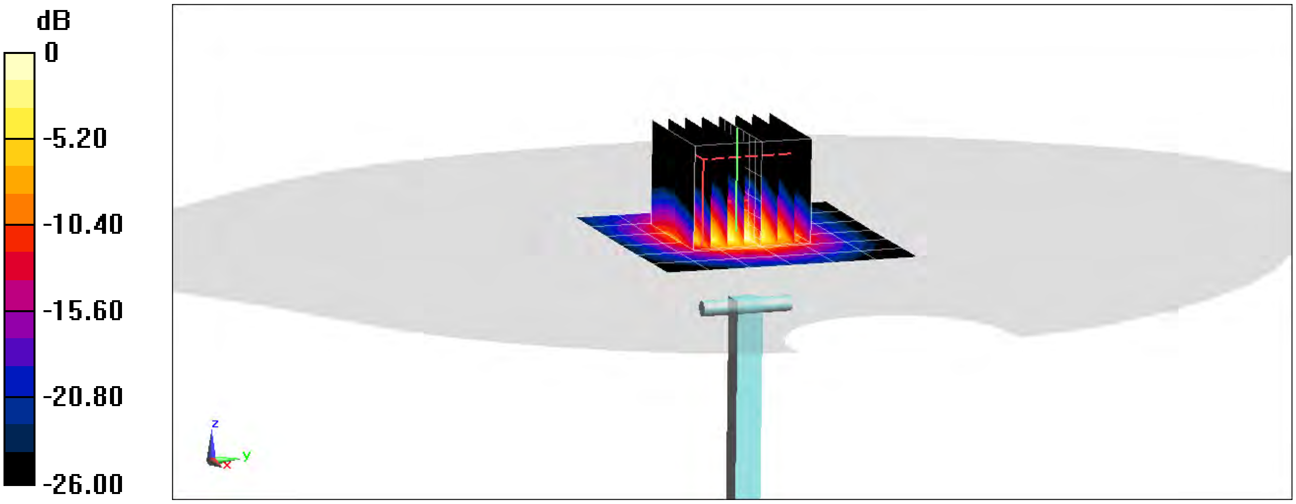
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5200-5800 Body Medium parameters used:
f = 5750 MHz; $\sigma = 6.147$ S/m; $\varepsilon_r = 47.117$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 01/05/2020; Ambient Temp: 23.5°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7409; ConvF(4.23, 4.23, 4.23) @ 5750 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 19.7 W/kg
SAR(1 g) = 4.05 W/kg
Deviation(1 g) = 5.33%



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

PCTEST

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

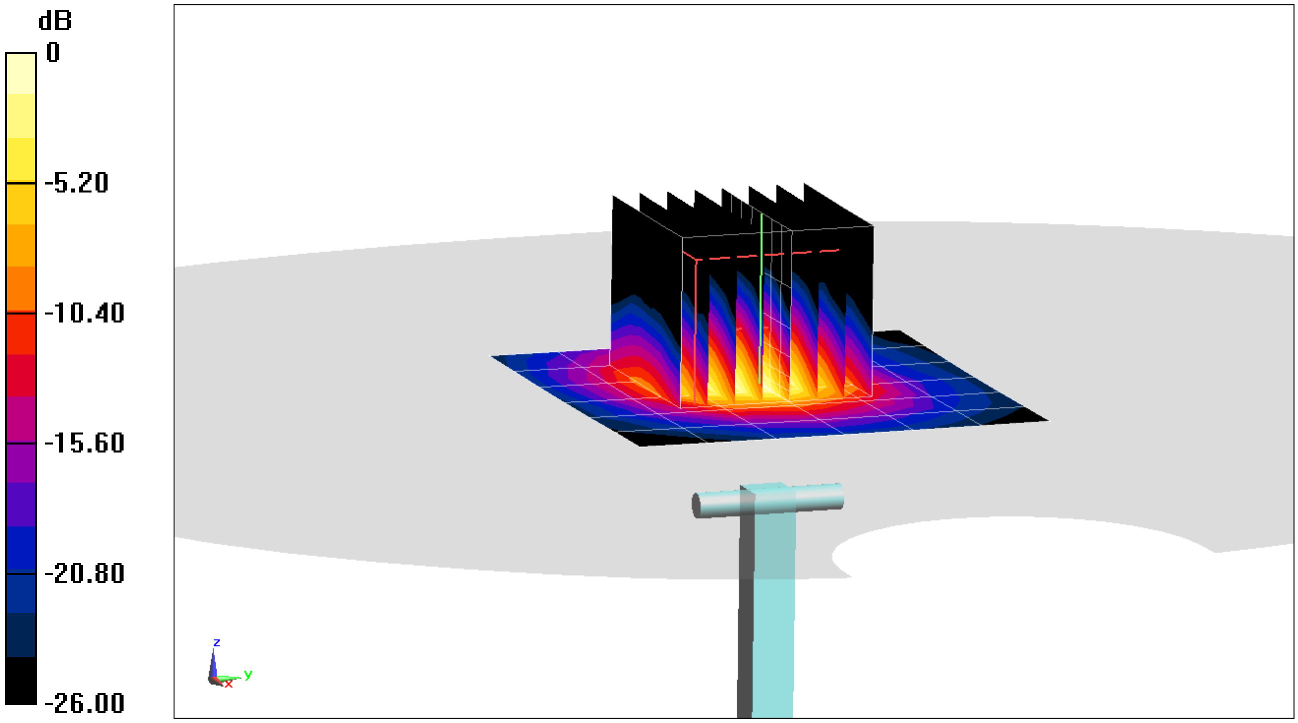
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5250 MHz; $\sigma = 5.388$ S/m; $\varepsilon_r = 48.355$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-03-2020; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7409; ConvF(4.7, 4.7, 4.7) @ 5250 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.6 W/kg
SAR(10 g) = 1.08 W/kg
Deviation(10 g) = 0.93%



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

PCTEST

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

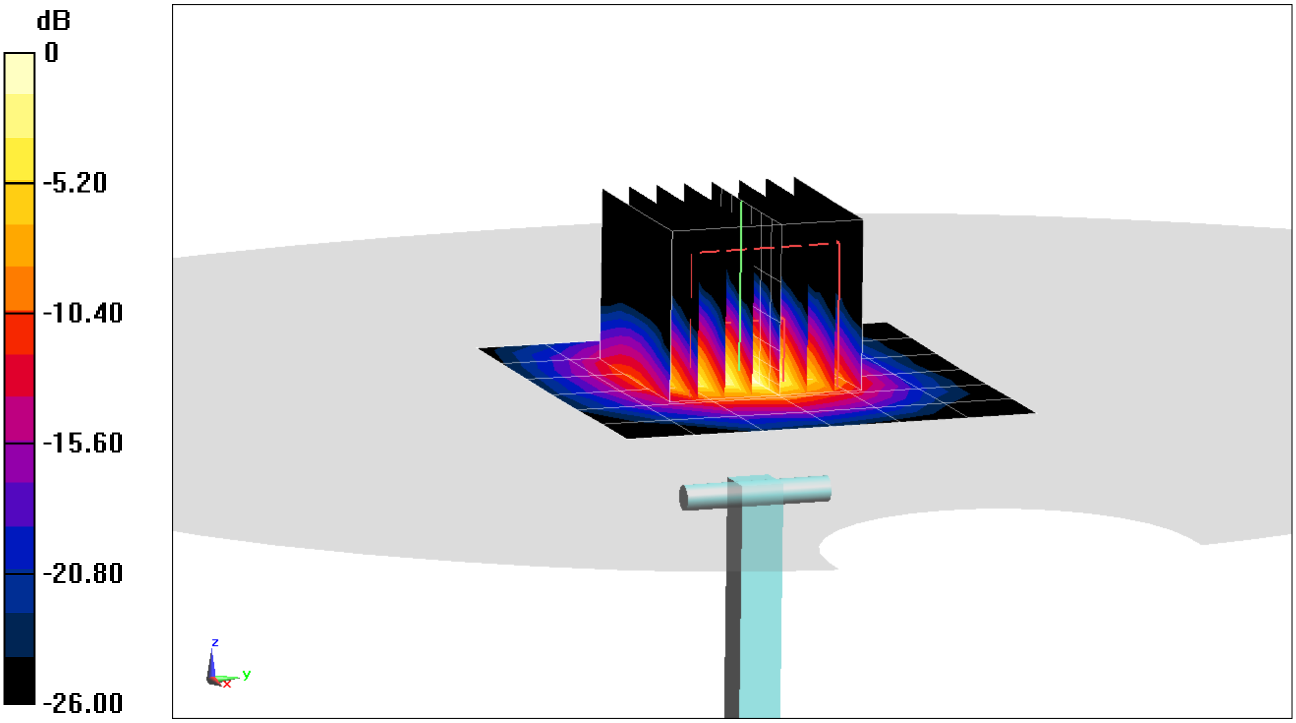
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.829 S/m; ε_r = 47.806; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-03-2020; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7409; ConvF(4.22, 4.22, 4.22) @ 5600 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 18.3 W/kg
SAR(10 g) = 1.08 W/kg
Deviation(10 g) = -1.37%



0 dB = 9.74 W/kg = 9.89 dBW/kg

PCTEST

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

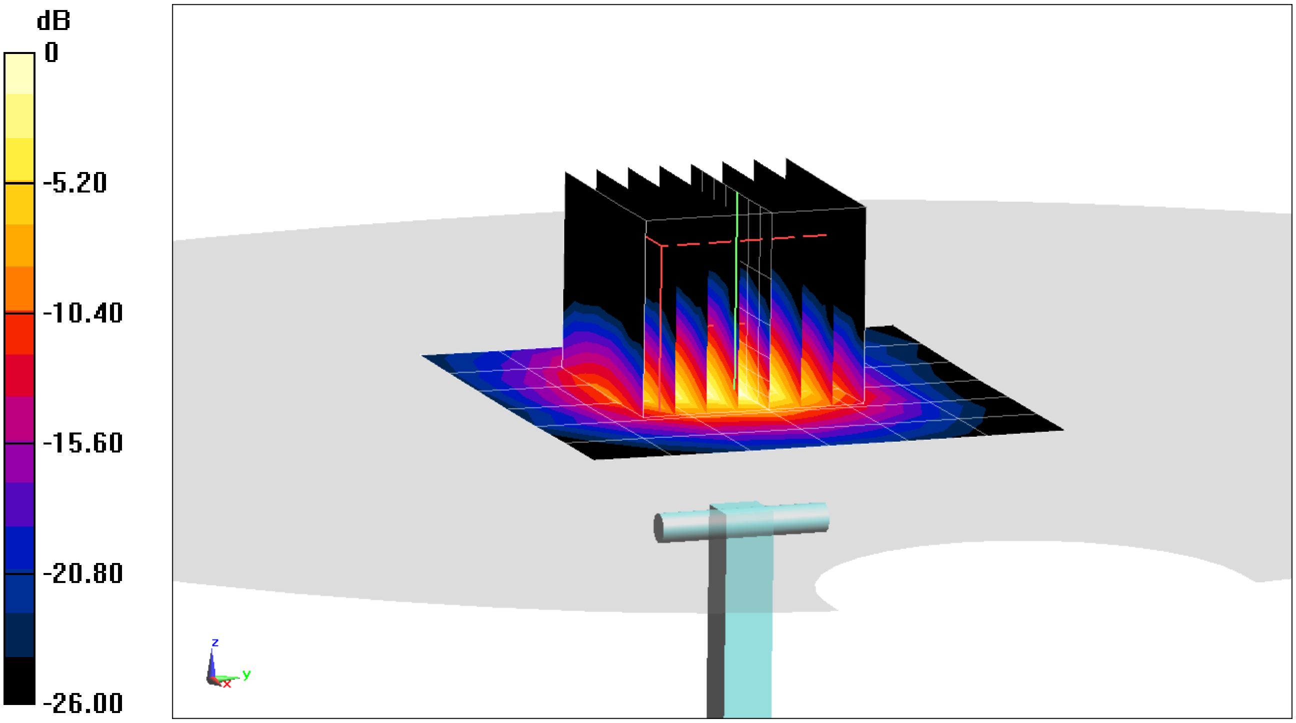
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:
f = 5750 MHz; σ = 6.03 S/m; ε_r = 47.59; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-03-2020; Ambient Temp: 23.5°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7409; ConvF(4.23, 4.23, 4.23) @ 5750 MHz; Calibrated: 6/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/20/2019
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7470)

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) = 18.2 W/kg
SAR(10 g) = 1.03 W/kg
Deviation(10 g) = -3.29%



0 dB = 9.14 W/kg = 9.61 dBW/kg

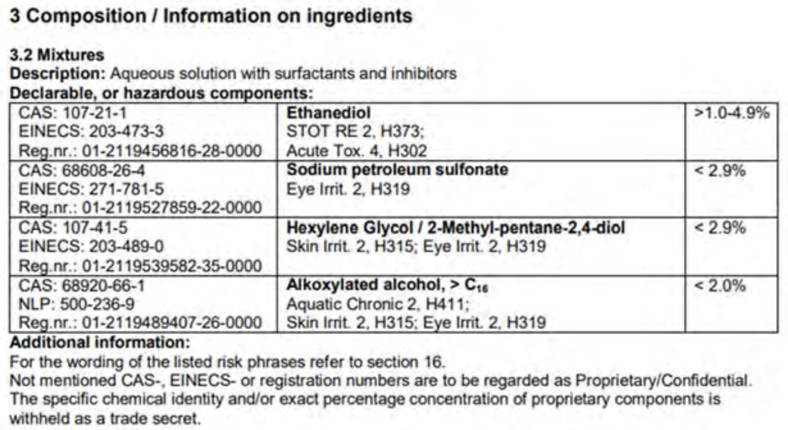
APPENDIX C: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

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

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



3 Composition / Information on ingredients

3.2 Mixtures

Description: Aqueous solution with surfactants and inhibitors

Declarable, or hazardous components:

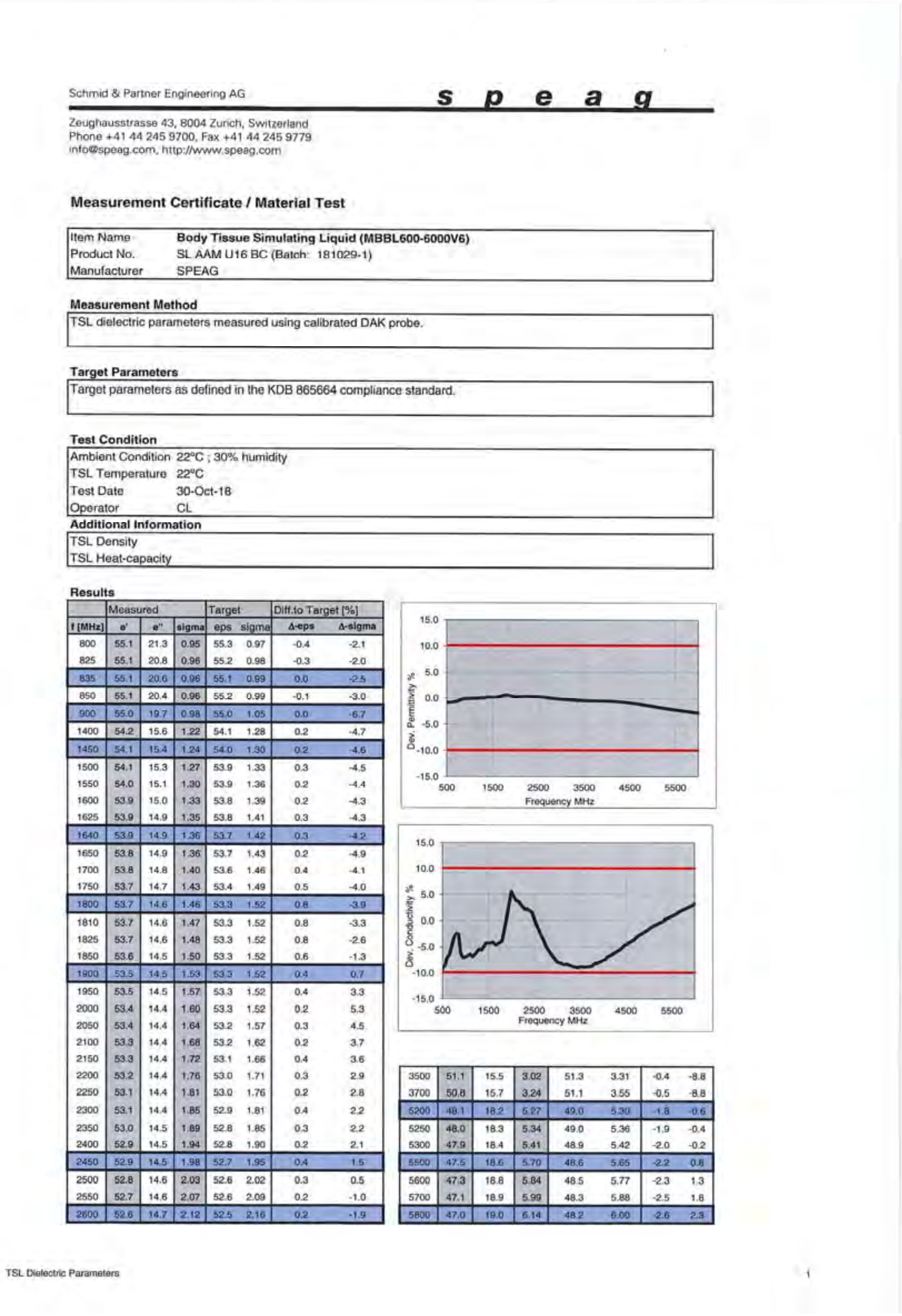
CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	**Ethanediol** STOT RE 2, H373; Acute Tox. 4, H302	>1.0-4.9%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	**Sodium petroleum sulfonate** Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	**Hexylene Glycol / 2-Methyl-pentane-2,4-diol** Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	**Alkoxylated alcohol, > C_{16}** Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:

For the wording of the listed risk phrases refer to section 16.
Not mentioned CAS-, EINECS- or registration numbers are to be regarded as Proprietary/Confidential.
The specific chemical identity and/or exact percentage concentration of proprietary components is withheld as a trade secret.

Figure C-1

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



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Measurement Certificate / Material Test

Item Name	**Body Tissue Simulating Liquid (MBBL600-6000V6)**
Product No.	SL AAM U16 BC (Batch: 181029-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the KDB 865664 compliance standard.

Test Condition

Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	30-Oct-18
Operator	CL

Additional Information

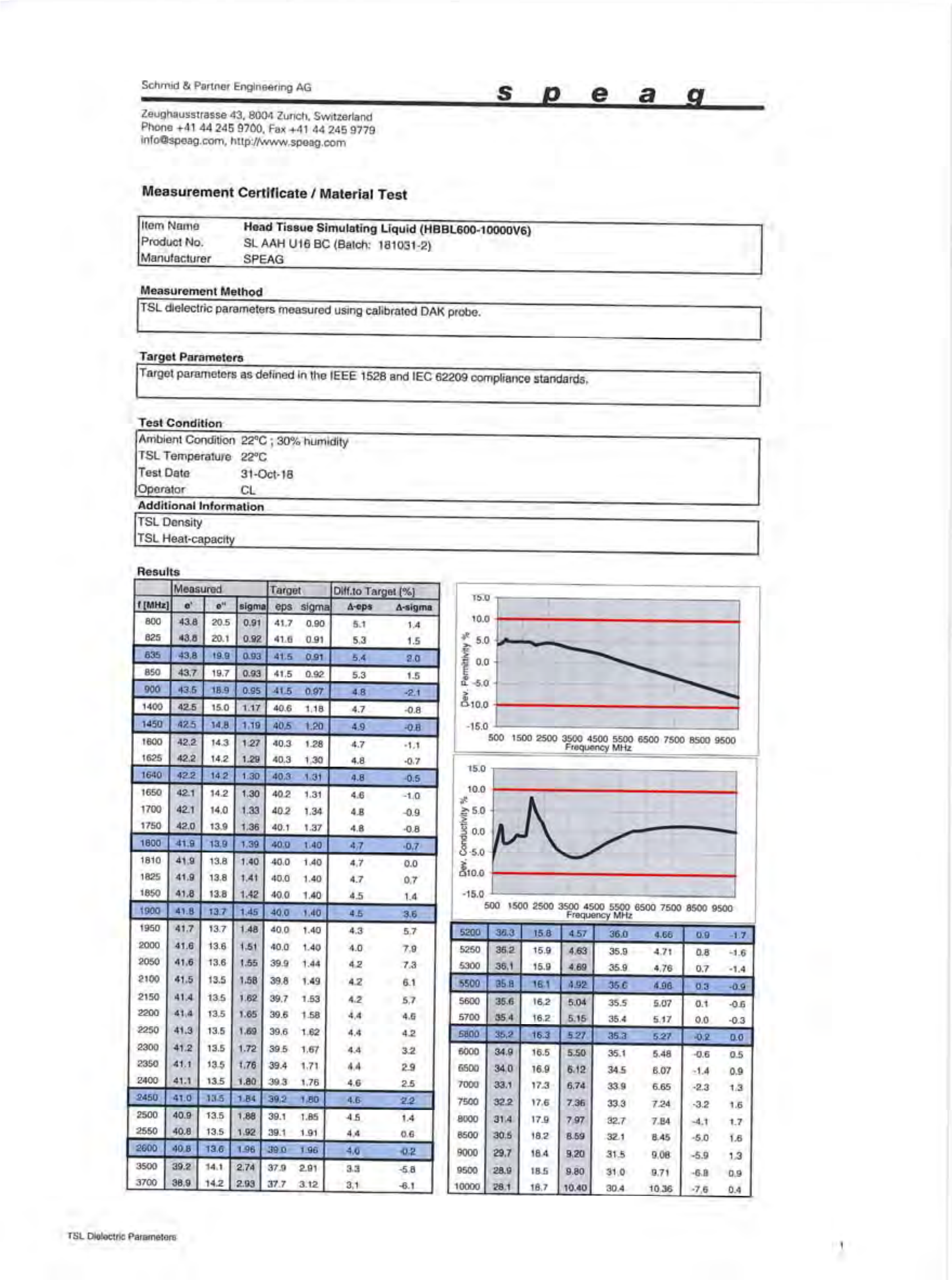
TSL Density
TSL Heat-capacity

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	e'	e"	sigma	eps	sigma	Δ-eps	Δ-sigma
800	55.1	21.3	0.95	55.3	0.97	-0.4	-2.1
825	55.1	20.8	0.96	55.2	0.98	-0.3	-2.0
835	55.1	20.6	0.96	55.1	0.99	0.0	-2.5
850	55.1	20.4	0.96	55.2	0.99	-0.1	-3.0
900	55.0	19.7	0.98	55.0	1.05	0.0	-6.7
1400	54.2	15.6	1.22	54.1	1.28	0.2	-4.7
1450	54.1	15.4	1.24	54.0	1.30	0.2	-4.6
1500	54.1	15.3	1.27	53.9	1.33	0.3	-4.5
1550	54.0	15.1	1.30	53.9	1.36	0.2	-4.4
1600	53.9	15.0	1.33	53.8	1.39	0.2	-4.3
1625	53.9	14.9	1.35	53.8	1.41	0.3	-4.3
1640	53.9	14.9	1.36	53.7	1.42	0.3	-4.2
1650	53.8	14.9	1.36	53.7	1.43	0.2	-4.9
1700	53.8	14.8	1.40	53.6	1.46	0.4	-4.1
1750	53.7	14.7	1.43	53.4	1.49	0.5	-4.0
1800	53.7	14.6	1.46	53.3	1.52	0.8	-3.9
1810	53.7	14.6	1.47	53.3	1.52	0.8	-3.3
1825	53.7	14.6	1.48	53.3	1.52	0.8	-2.6
1850	53.6	14.5	1.50	53.3	1.52	0.6	-1.3
1900	53.5	14.5	1.53	53.3	1.52	0.4	0.7
1950	53.5	14.5	1.57	53.3	1.52	0.4	3.3
2000	53.4	14.4	1.60	53.3	1.52	0.2	5.3
2050	53.4	14.4	1.64	53.2	1.57	0.3	4.5
2100	53.3	14.4	1.68	53.2	1.62	0.2	3.7
2150	53.3	14.4	1.72	53.1	1.66	0.4	3.6
2200	53.2	14.4	1.76	53.0	1.71	0.3	2.9
2250	53.1	14.4	1.81	53.0	1.76	0.2	2.8
2300	53.1	14.4	1.85	52.9	1.81	0.4	2.2
2350	53.0	14.5	1.89	52.8	1.85	0.3	2.2
2400	52.9	14.5	1.94	52.8	1.90	0.2	2.1
2450	52.9	14.5	1.98	52.7	1.95	0.4	1.5
2500	52.8	14.6	2.03	52.6	2.02	0.3	0.5
2550	52.7	14.6	2.07	52.6	2.09	0.2	-1.0
2600	52.6	14.7	2.12	52.5	2.16	0.2	-1.9
3500	51.1	15.5	3.02	51.3	3.31	-0.4	-8.8
3700	50.8	15.7	3.24	51.1	3.55	-0.5	-8.8
5200	48.1	18.2	5.27	49.0	5.30	-1.8	-0.6
5250	48.0	18.3	5.34	49.0	5.36	-1.9	-0.4
5300	47.9	18.4	5.41	48.9	5.42	-2.0	-0.2
5500	47.5	18.6	5.70	48.6	5.65	-2.2	0.8
5600	47.3	18.8	5.84	48.5	5.77	-2.3	1.3
5700	47.1	18.9	5.99	48.3	5.88	-2.5	1.8
5800	47.0	19.0	6.14	48.2	6.00	-2.6	2.3

TSL Dielectric Parameters

Figure C-2
600 – 5800 MHz Body Tissue Equivalent Matter



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Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HBBL600-10000V6)**
Product No.	SL AAH U16 BC (Batch: 181031-2)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

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

Test Condition

Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	31-Oct-18
Operator	CL

Additional Information

TSL Density
TSL Heat-capacity

Results

	Measured			Target		Diff.to Target (%)	
f [MHz]	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
800	43.8	20.5	0.91	41.7	0.90	5.1	1.4
825	43.8	20.1	0.92	41.6	0.91	5.3	1.5
835	43.8	19.9	0.93	41.5	0.91	5.4	2.0
850	43.7	19.7	0.93	41.5	0.92	5.3	1.5
900	43.5	18.9	0.95	41.5	0.97	4.8	-2.1
1400	42.5	15.0	1.17	40.6	1.18	4.7	-0.8
1450	42.5	14.8	1.19	40.5	1.20	4.9	-0.8
1600	42.2	14.3	1.27	40.3	1.28	4.7	-1.1
1625	42.2	14.2	1.29	40.3	1.30	4.8	-0.7
1640	42.2	14.2	1.30	40.3	1.31	4.8	-0.5
1650	42.1	14.2	1.30	40.2	1.31	4.6	-1.0
1700	42.1	14.0	1.33	40.2	1.34	4.8	-0.9
1750	42.0	13.9	1.36	40.1	1.37	4.8	-0.8
1800	41.9	13.9	1.39	40.0	1.40	4.7	-0.7
1810	41.9	13.8	1.40	40.0	1.40	4.7	0.0
1825	41.9	13.8	1.41	40.0	1.40	4.7	0.7
1850	41.8	13.8	1.42	40.0	1.40	4.5	1.4
1900	41.8	13.7	1.45	40.0	1.40	4.5	3.6
1950	41.7	13.7	1.48	40.0	1.40	4.3	5.7
2000	41.6	13.6	1.51	40.0	1.40	4.0	7.9
2050	41.6	13.6	1.55	39.9	1.44	4.2	7.3
2100	41.5	13.5	1.58	39.8	1.49	4.2	6.1
2150	41.4	13.5	1.62	39.7	1.53	4.2	5.7
2200	41.4	13.5	1.65	39.6	1.58	4.4	4.6
2250	41.3	13.5	1.69	39.6	1.62	4.4	4.2
2300	41.2	13.5	1.72	39.5	1.67	4.4	3.2
2350	41.1	13.5	1.76	39.4	1.71	4.4	2.9
2400	41.1	13.5	1.80	39.3	1.76	4.6	2.5
2450	41.0	13.5	1.84	39.2	1.80	4.6	2.2
2500	40.9	13.5	1.88	39.1	1.85	4.5	1.4
2550	40.8	13.5	1.92	39.1	1.91	4.4	0.6
2600	40.8	13.6	1.96	39.0	1.96	4.6	-0.2
3500	39.2	14.1	2.74	37.9	2.91	3.3	-5.8
3700	38.9	14.2	2.93	37.7	3.12	3.1	-6.1
5200	36.3	15.8	4.57	36.0	4.66	0.9	-1.7
5250	36.2	15.9	4.63	35.9	4.71	0.8	-1.6
5300	36.1	15.9	4.69	35.9	4.76	0.7	-1.4
5500	35.8	16.1	4.92	35.6	4.96	0.3	-0.9
5600	35.6	16.2	5.04	35.5	5.07	0.1	-0.6
5700	35.4	16.2	5.15	35.4	5.17	0.0	-0.3
5800	35.2	16.3	5.27	35.3	5.27	-0.2	0.0
6000	34.9	16.5	5.50	35.1	5.48	-0.6	0.5
6500	34.0	16.9	6.12	34.5	6.07	-1.4	0.9
7000	33.1	17.3	6.74	33.9	6.65	-2.3	1.3
7500	32.2	17.6	7.36	33.3	7.24	-3.2	1.6
8000	31.4	17.9	7.97	32.7	7.84	-4.1	1.7
8500	30.5	18.2	8.59	32.1	8.45	-5.0	1.6
9000	29.7	18.4	9.20	31.5	9.08	-5.9	1.3
9500	28.9	18.5	9.80	31.0	9.71	-6.8	0.9
10000	28.1	18.7	10.40	30.4	10.36	-7.6	0.4

TSL Dielectric Parameters

Figure C-3
600 – 5800 MHz Head Tissue Equivalent Matter

APPENDIX D: SAR SYSTEM VALIDATION

Per FCC KDB Publication 865664 D02v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

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

Table D-1
SAR System Validation Summary – 1g

SAR System	Freq. (MHz)	Date	Probe SN	Probe Cal Point		Cond. (σ)	Perm. (εr)	CW VALIDATION			MOD. VALIDATION		
								SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
E	750	9/12/2019	7417	750	Head	0.930	42.992	PASS	PASS	PASS	N/A	N/A	N/A
D	750	4/12/2019	3914	750	Head	0.903	42.785	PASS	PASS	PASS	N/A	N/A	N/A
E	835	9/20/2019	7417	835	Head	0.912	43.450	PASS	PASS	PASS	GMSK	PASS	N/A
H	1750	12/20/2019	7406	1750	Head	1.379	39.702	PASS	PASS	PASS	N/A	N/A	N/A
L	1900	9/24/2019	7410	1900	Head	1.442	39.947	PASS	PASS	PASS	GMSK	PASS	N/A
E	2450	9/5/2019	7417	2450	Head	1.855	39.542	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
H	5250	12/7/2019	7406	5250	Head	4.709	35.885	PASS	PASS	PASS	OFDM	N/A	PASS
H	5600	12/7/2019	7406	5600	Head	5.120	35.211	PASS	PASS	PASS	OFDM	N/A	PASS
H	5750	12/7/2019	7406	5750	Head	5.309	34.961	PASS	PASS	PASS	OFDM	N/A	PASS
H	750	1/6/2020	7406	750	Body	0.945	54.380	PASS	PASS	PASS	N/A	N/A	N/A
M	835	10/16/2019	7308	835	Body	0.985	53.070	PASS	PASS	PASS	GMSK	PASS	N/A
H	835	1/6/2020	7406	835	Body	0.978	54.174	PASS	PASS	PASS	GMSK	PASS	N/A
I	1750	5/21/2019	7357	1750	Body	1.442	55.384	PASS	PASS	PASS	N/A	N/A	N/A
J	1900	1/1/2020	7571	1900	Body	1.579	51.919	PASS	PASS	PASS	GMSK	PASS	N/A
M	2450	10/10/2019	7308	2450	Body	1.962	51.230	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
K	2450	9/6/2019	7547	2450	Body	1.996	51.898	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
K	2600	9/5/2019	7547	2600	Body	2.716	52.040	PASS	PASS	PASS	TDD	PASS	N/A
G	5250	10/4/2019	7409	5250	Body	5.223	47.070	PASS	PASS	PASS	OFDM	N/A	PASS
G	5600	10/7/2019	7409	5600	Body	5.884	47.080	PASS	PASS	PASS	OFDM	N/A	PASS
G	5750	10/7/2019	7409	5750	Body	6.111	46.780	PASS	PASS	PASS	OFDM	N/A	PASS

Table D-2
SAR System Validation Summary – 10g

SAR System	Freq. (MHz)	Date	Probe SN	Probe Cal Point		Cond. (σ)	Perm. (εr)	CW VALIDATION			MOD. VALIDATION		
								SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
I	1750	5/21/2019	7357	1750	Body	1.442	55.384	PASS	PASS	PASS	N/A	N/A	N/A
P	1900	10/8/2019	7551	1900	Body	1.542	51.760	PASS	PASS	PASS	GMSK	PASS	N/A
K	2450	9/6/2019	7547	2450	Body	1.996	51.898	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
K	2600	9/5/2019	7547	2600	Body	2.716	52.040	PASS	PASS	PASS	TDD	PASS	N/A
G	5250	10/4/2019	7409	5250	Body	5.223	47.070	PASS	PASS	PASS	OFDM	N/A	PASS
G	5600	10/7/2019	7409	5600	Body	5.884	47.080	PASS	PASS	PASS	OFDM	N/A	PASS
G	5750	10/7/2019	7409	5750	Body	6.111	46.780	PASS	PASS	PASS	OFDM	N/A	PASS

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to FCC KDB Publication 865664 D01v01r04.

APPENDIX F: DOWNLINK LTE CA RF CONDUCTED POWERS

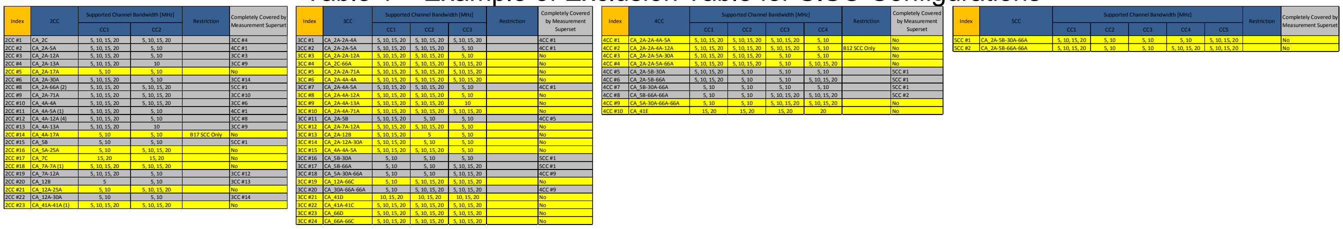
1.1 LTE Downlink Only Carrier Aggregation Test Reduction Methodology

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number of component carriers (CCs) supported by the product implementation. Per April 2018 TCBC Workshop Notes, the following test reduction methodology was applied to determine the combinations required for conducted power measurements.

LTE DLCA Test Reduction Methodology:

- The supported combinations were arranged by the number of component carriers in columns.
- Any limitations on the PCC or SCC for each combination were identified alongside the combination (e.g. CA_2A-2A-4A-12A, but B12 can only be configured as a SCC).
- Power measurements were performed for "supersets" (LTE CA combinations with multiple components carriers) and any "subsets" (LTE CA combinations with fewer component carriers) that were not completely covered by the supersets.
- Only subsets that have the exact same components as a superset were excluded for measurement.
- When there were certain restrictions on component carriers that existed in the superset that were not applied for the subset, the subset configuration was additionally evaluated.
- Both inter-band and intra-band downlink carrier aggregation scenarios were considered.
- Downlink CA combinations for SISO and 4x4 Downlink MIMO operations were measured independently, per May 2017 TCBC Workshop notes.

Table 1 – Example of Exclusion Table for SISO Configurations



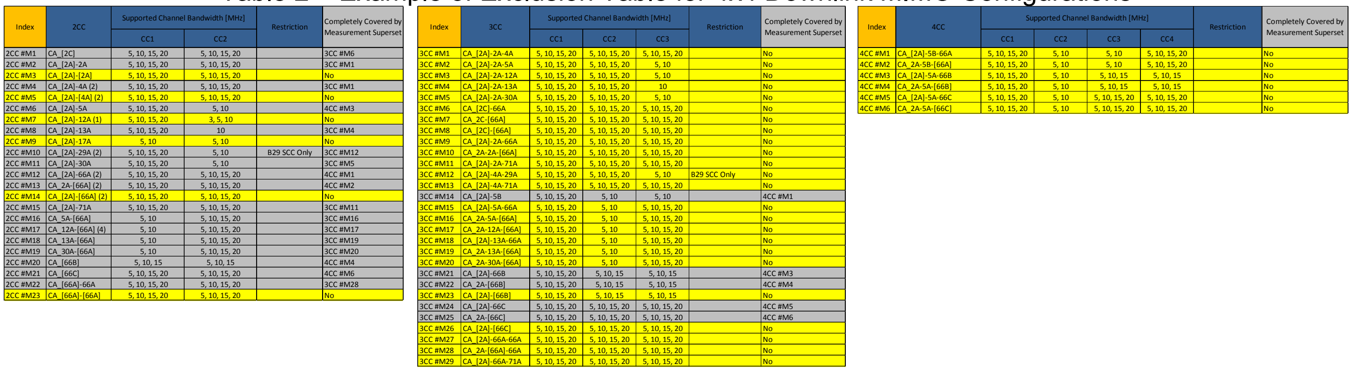
Index	2CC	Supported Channel Bandwidth [MHz]		Restriction	Completely Covered by Measurement Superset
		CC1	CC2		
2CC #1	CA_2C	5, 10, 15, 20	5, 10, 15, 20		3CC #4
2CC #2	CA_2A-5A	5, 10, 15, 20	5, 10		4CC #1
2CC #3	CA_2A-12A	5, 10, 15, 20	5, 10		3CC #3
2CC #4	CA_2A-13A	5, 10, 15, 20	10		3CC #9
2CC #5	CA_2A-17A	5, 10	5, 10		No
2CC #6	CA_2A-30A	5, 10, 15, 20	5, 10		3CC #14
2CC #8	CA_2A-66A (2)	5, 10, 15, 20	5, 10, 15, 20		5CC #1
2CC #9	CA_2A-71A	5, 10, 15, 20	5, 10, 15, 20		3CC #10
2CC #10	CA_4A-4A	5, 10, 15, 20	5, 10, 15, 20		3CC #6
2CC #11	CA_4A-5A (1)	5, 10, 15, 20	5, 10		4CC #1
2CC #12	CA_4A-12A (4)	5, 10, 15, 20	5, 10		3CC #8
2CC #13	CA_4A-13A	5, 10, 15, 20	10		3CC #9
2CC #14	CA_4A-17A	5, 10	5, 10	B17 SCC Only	No
2CC #15	CA_5B	5, 10	5, 10		5CC #1
2CC #16	CA_5A-25A	5, 10	5, 10, 15, 20		No
2CC #17	CA_7C	15, 20	15, 20		No
2CC #18	CA_7A-7A (1)	5, 10, 15, 20	5, 10, 15, 20		No
2CC #19	CA_7A-12A	5, 10, 15, 20	5, 10		3CC #12
2CC #20	CA_12B	5	5, 10		3CC #13
2CC #21	CA_12A-25A	5, 10	5, 10, 15, 20		No
2CC #22	CA_12A-30A	5, 10	5, 10		3CC #14
2CC #23	CA_41A-41A (1)	5, 10, 15, 20	5, 10, 15, 20		No

Index	3CC	Supported Channel Bandwidth [MHz]			Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3		
3CC #1	CA_2A-2A-4A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		4CC #1
3CC #2	CA_2A-2A-5A	5, 10, 15, 20	5, 10, 15, 20	5, 10		4CC #1
3CC #3	CA_2A-2A-12A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #4	CA_2C-66A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #5	CA_2A-2A-71A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #6	CA_2A-4A-4A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #7	CA_2A-4A-5A	5, 10, 15, 20	5, 10, 15, 20	5, 10		4CC #1
3CC #8	CA_2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #9	CA_2A-4A-13A	5, 10, 15, 20	5, 10, 15, 20	10		No
3CC #10	CA_2A-4A-71A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #11	CA_2A-5B	5, 10, 15, 20	5, 10	5, 10		4CC #5
3CC #12	CA_2A-7A-12A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #13	CA_2A-12B	5, 10, 15, 20	5	5, 10		No
3CC #14	CA_2A-12A-30A	5, 10, 15, 20	5, 10	5, 10		No
3CC #15	CA_4A-4A-5A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #16	CA_5B-30A	5, 10	5, 10	5, 10		5CC #1
3CC #17	CA_5B-66A	5, 10	5, 10	5, 10, 15, 20		5CC #1
3CC #18	CA_5A-30A-66A	5, 10	5, 10	5, 10, 15, 20		4CC #9
3CC #19	CA_12A-66C	5, 10	5, 10, 15, 20	5, 10, 15, 20		No
3CC #20	CA_30A-66A-66A	5, 10	5, 10, 15, 20	5, 10, 15, 20		4CC #9
3CC #21	CA_41D	10, 15, 20	10, 15, 20	10, 15, 20		No
3CC #22	CA_41A-41C	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #23	CA_66D	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #24	CA_66A-66C	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No

Index	4CC	Supported Channel Bandwidth [MHz]				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
4CC #1	CA_2A-2A-4A-5A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
4CC #2	CA_2A-2A-4A-12A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20	5, 10	B12 SCC Only	No
4CC #3	CA_2A-2A-5A-30A	5, 10, 15, 20	5, 10, 15, 20	5, 10	5, 10		No
4CC #4	CA_2A-2A-5A-66A	5, 10, 15, 20	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
4CC #5	CA_2A-5B-30A	5, 10, 15, 20	5, 10	5, 10	5, 10		5CC #1
4CC #6	CA_2A-5B-66A	5, 10, 15, 20	5, 10	5, 10	5, 10, 15, 20		5CC #1
4CC #7	CA_5B-30A-66A	5, 10	5, 10	5, 10	5, 10		5CC #1
4CC #8	CA_5B-66A-66A	5, 10	5, 10	5, 10, 15, 20	5, 10, 15, 20		5CC #2
4CC #9	CA_5A-30A-66A-66A	5, 10	5, 10	5, 10, 15, 20	5, 10, 15, 20		No
4CC #10	CA_41E	15, 20	15, 20	15, 20	20		No

Index	5CC	Supported Channel Bandwidth [MHz]					Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4	CC5		
5CC #1	CA_2A-5B-30A-66A	5, 10, 15, 20	5, 10	5, 10	5, 10	5, 10, 15, 20		No
5CC #2	CA_2A-5B-66A-66A	5, 10, 15, 20	5, 10	5, 10	5, 10, 15, 20	5, 10, 15, 20		No

Table 2 – Example of Exclusion Table for 4x4 Downlink MIMO Configurations



Index	2CC	Supported Channel Bandwidth [MHz]		Restriction	Completely Covered by Measurement Superset
		CC1	CC2		
2CC #M1	CA_[2C]	5, 10, 15, 20	5, 10, 15, 20		3CC #M6
2CC #M2	CA_[2A]-2A	5, 10, 15, 20	5, 10, 15, 20		3CC #M1
2CC #M3	CA_[2A]-[2A]	5, 10, 15, 20	5, 10, 15, 20		No
2CC #M4	CA_[2A]-4A (2)	5, 10, 15, 20	5, 10, 15, 20		3CC #M1
2CC #M5	CA_[2A]-[4A] (2)	5, 10, 15, 20	5, 10, 15, 20		No
2CC #M6	CA_[2A]-5A	5, 10, 15, 20	5, 10		4CC #M3
2CC #M7	CA_[2A]-12A (1)	5, 10, 15, 20	3, 5, 10		No
2CC #M8	CA_[2A]-13A	5, 10, 15, 20	10		3CC #M4
2CC #M9	CA_[2A]-17A	5, 10	5, 10		No
2CC #M10	CA_[2A]-29A (2)	5, 10, 15, 20	5, 10	B29 SCC Only	3CC #M12
2CC #M11	CA_[2A]-30A	5, 10, 15, 20	5, 10		3CC #M5
2CC #M12	CA_[2A]-66A (2)	5, 10, 15, 20	5, 10, 15, 20		4CC #M1
2CC #M13	CA_2A-[66A] (2)	5, 10, 15, 20	5, 10, 15, 20		4CC #M2
2CC #M14	CA_[2A]-[66A] (2)	5, 10, 15, 20	5, 10, 15, 20		No
2CC #M15	CA_[2A]-71A	5, 10, 15, 20	5, 10, 15, 20		3CC #M11
2CC #M16	CA_5A-[66A]	5, 10	5, 10, 15, 20		3CC #M16
2CC #M17	CA_12A-[66A] (4)	5, 10	5, 10, 15, 20		3CC #M17
2CC #M18	CA_13A-[66A]	5, 10	5, 10, 15, 20		3CC #M19
2CC #M19	CA_30A-[66A]	5, 10	5, 10, 15, 20		3CC #M20
2CC #M20	CA_[66B]	5, 10, 15	5, 10, 15		4CC #M4
2CC #M21	CA_[66C]	5, 10, 15, 20	5, 10, 15, 20		4CC #M6
2CC #M22	CA_[66A]-66A	5, 10, 15, 20	5, 10, 15, 20		3CC #M28
2CC #M23	CA_[66A]-[66A]	5, 10, 15, 20	5, 10, 15, 20		No

Index	3CC	Supported Channel Bandwidth [MHz]			Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3		
3CC #M1	CA_[2A]-2A-4A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M2	CA_[2A]-2A-5A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #M3	CA_[2A]-2A-12A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #M4	CA_[2A]-2A-13A	5, 10, 15, 20	5, 10, 15, 20	10		No
3CC #M5	CA_[2A]-2A-30A	5, 10, 15, 20	5, 10, 15, 20	5, 10		No
3CC #M6	CA_[2C]-66A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M7	CA_2C-[66A]	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M8	CA_[2C]-[66A]	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M9	CA_[2A]-2A-66A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M10	CA_2A-2A-[66A]	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M11	CA_[2A]-2A-71A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M12	CA_[2A]-4A-29A	5, 10, 15, 20	5, 10, 15, 20	5, 10	B29 SCC Only	No
3CC #M13	CA_[2A]-4A-71A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M14	CA_[2A]-5B	5, 10, 15, 20	5, 10	5, 10		4CC #M1
3CC #M15	CA_[2A]-5A-66A	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
3CC #M16	CA_2A-5A-[66A]	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
3CC #M17	CA_2A-12A-[66A]	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
3CC #M18	CA_[2A]-13A-66A	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
3CC #M19	CA_2A-13A-[66A]	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
3CC #M20	CA_2A-30A-[66A]	5, 10, 15, 20	5, 10	5, 10, 15, 20		No
3CC #M21	CA_[2A]-66B	5, 10, 15, 20	5, 10, 15	5, 10, 15		4CC #M3
3CC #M22	CA_2A-[66B]	5, 10, 15, 20	5, 10, 15	5, 10, 15		4CC #M4
3CC #M23	CA_[2A]-[66B]	5, 10, 15, 20	5, 10, 15	5, 10, 15		No
3CC #M24	CA_[2A]-66C	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		4CC #M5
3CC #M25	CA_2A-[66C]	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		4CC #M6
3CC #M26	CA_[2A]-[66C]	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M27	CA_[2A]-66A-66A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M28	CA_2A-[66A]-66A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No
3CC #M29	CA_[2A]-66A-71A	5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20		No

Index	4CC	Supported Channel Bandwidth [MHz]				Restriction	Completely Covered by Measurement Superset
		CC1	CC2	CC3	CC4		
4CC #M1	CA_[2A]-5B-66A	5, 10, 15, 20	5, 10	5, 10	5, 10, 15, 20		No
4CC #M2	CA_2A-5B-[66A]	5, 10, 15, 20	5, 10	5, 10	5, 10, 15, 20		No
4CC #M3	CA_[2A]-5A-66B	5, 10, 15, 20	5, 10	5, 10, 15	5, 10, 15		No
4CC #M4	CA_2A-5A-[66B]	5, 10, 15, 20	5, 10	5, 10, 15	5, 10, 15		No
4CC #M5	CA_[2A]-5A-66C	5, 10, 15, 20	5, 10	5, 10, 15, 20	5, 10, 15, 20		No
4CC #M6	CA_2A-5A-[66C]	5, 10, 15, 20	5, 10	5, 10, 15, 20	5, 10, 15, 20		No

Note: [CC] indicates component carrier with 4x4 DL MIMO antenna configuration

1.2 LTE Downlink Only Carrier Aggregation Test Selection and Setup

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers (CCs) supported by the product implementation. For those configurations required by April 2018 TCBC Workshop Notes, conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the maximum 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. All bands required for SAR testing per FCC KDB procedures were considered. Based on the measured maximum powers below, no additional SAR tests were required for DLCA SAR configurations.

General PCC and SCC configuration selection procedure

- PCC uplink channel, channel bandwidth, modulation and RB configurations were selected based on section C)3)b)ii) of KDB 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
- To maximize aggregated bandwidth, highest channel bandwidth available for that CA combination was selected for SCC. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers.
- All selected PCC and SCC(s) remained fully within the uplink/downlink transmission band of the respective component carrier.
-

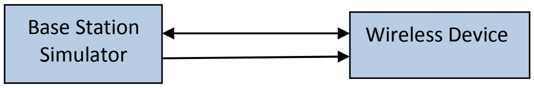


Figure 1
DL CA Power Measurement Setup

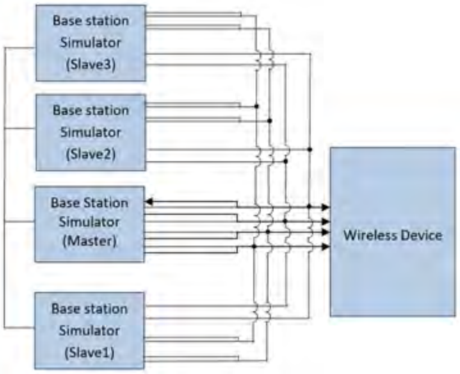


Figure 2
DL CA with DL 4x4 MIMO Power Measurement Setup

1.3 Downlink Carrier Aggregation RF Conducted Powers

1.3.1 LTE Band 41 as PCC

Table 1
Maximum Output Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_41C (1)	LTE B41	15	41490	2680	QPSK	1	36	41490	2680	LTE B41	20	41319	2662.9	23.63	23.83

1.4 DL CA with DL 4x4 MIMO RF Conduction Powers

This device supports downlink 4x4 MIMO operations for some LTE bands. Uplink transmission is limited to a single output stream. When carrier aggregation was applicable, the general test selection and setup procedures described in Section 1.2 were applied.

Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

1.4.1 LTE 4x4 MIMO DL Standalone Powers

Table 2
Maximum Output Powers

LTE Band	Bandwidth [MHz]	Channel	Frequency [MHz]	Modulation	RB Size	RB Offset	4x4 DL MIMO Tx. Power [dBm]	Single Antenna Tx. Power [dBm]
41	15	41490	2680	QPSK	1	36	23.68	23.83

1.4.2 LTE Band 41 as PCC

Table 3
Maximum Output Powers

	PCC										SCC					Power	
Combination	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	DL Ant. Config.	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	DL Ant. Config.	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_[41C] (1)	LTE B41	15	41490	2680	QPSK	1	36	41490	2680	4x4	LTE B41	20	41319	2662.9	4x4	23.65	23.83

APPENDIX G POWER REDUCTION VERIFICATION

Per the May 2017 TCBC Workshop Notes, demonstration of proper functioning of the power reduction mechanisms is required to support the corresponding SAR configurations. The verification process was divided into two parts: (1) evaluation of output power levels for individual or multiple triggering mechanisms and (2) evaluation of the triggering distances for proximity-based sensors.

G.1 Power Verification Procedure

The power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and the output power was monitored. The power measurements were confirmed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Steps 1 and 2 were repeated for all individual power reduction mechanisms and combinations thereof. For the combination cases, one mechanism was switched to a 'triggered' state at a time; powers were confirmed to be within tolerances after each additional mechanism was activated.

G.2 Distance Verification Procedure

The distance verification procedure was performed according to the following procedure:

1. A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.
2. The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced, per KDB Publication 616217 D04v01r02 and FCC Guidance. Each applicable test position was evaluated. The distances were confirmed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.
3. Steps 1 and 2 were repeated for low, mid, and high bands, as appropriate (see note below Table G-2 for more details).
4. Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

G.3 Main Antenna Verification Summary

Table G-1
Power Measurement Verification for Main Antenna

Mechanism(s)		Mode/Band	Conducted Power (dBm)		
1st	2nd		Un-triggered (Max)	Mechanism #1 (Reduced)	Mechanism #2 (Reduced)
Hotspot On		GPRS 1900 1 Tx Slot	29.30	27.02	
Hotspot On	Grip	GPRS 1900 1 Tx Slot	29.29	26.98	27.01
Grip		GPRS 1900 1 Tx Slot	29.31	27.24	
Grip	Hotspot On	GPRS 1900 1 Tx Slot	29.28	27.35	27.20
Hotspot On		LTE FDD Band 4	21.83	18.28	
Hotspot On	Grip	LTE FDD Band 4	21.82	18.29	18.30
Grip		LTE FDD Band 4	21.80	18.84	
Grip	Hotspot On	LTE FDD Band 4	21.84	18.86	18.30
Hotspot On		LTE TDD Band 41	23.34	21.61	.
Hotspot On	Grip	LTE TDD Band 41	23.33	21.64	21.63
Grip		LTE TDD Band 41	23.31	22.61	
Grip	Hotspot On	LTE TDD Band 41	23.35	22.62	21.60

Table G-2
Distance Measurement Verification for Main Antenna

Mechanism(s)	Test Condition	Band	Distance Measurements (mm)		Minimum Distance per Manufacturer (mm)
			Moving Toward	Moving Away	
Grip	Phablet - Back Side	Mid	10	12	9
Grip	Phablet - Back Side	High	10	12	9
Grip	Phablet - Front Side	Mid	8	10	7
Grip	Phablet - Front Side	High	8	10	7
Grip	Phablet - Bottom Edge	Mid	12	14	12
Grip	Phablet - Bottom Edge	High	12	14	12

*Note: Low band refers to: Mid band refers to: GSM1900, LTE B4; High band refers to: LTE B41

G.4 WIFI Verification Summary

Table G-3
Power Measurement Verification WIFI – Antenna 1

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Held-to-Ear	802.11b	19.40	15.04
Held-to-Ear	802.11g	18.07	15.84
Held-to-Ear	802.11n (2.4GHz)	17.77	15.84
Held-to-Ear	802.11a	16.50	13.79
Held-to-Ear	802.11n (5GHz, 20MHz BW)	15.44	13.94
Held-to-Ear	802.11ac (20MHz BW)	15.64	14.00
Held-to-Ear	802.11n (5GHz, 40MHz BW)	15.28	13.21
Held-to-Ear	802.11ac (40MHz BW)	15.11	14.00
Held-to-Ear	802.11ac (80MHz BW)	15.17	13.99

*Note: MIMO WIFI modes were not evaluated due to equipment limitations.

Table G-4
Power Measurement Verification WIFI – Antenna 2

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Held-to-Ear	802.11b	19.00	15.13
Held-to-Ear	802.11g	18.50	15.92
Held-to-Ear	802.11n (2.4GHz)	17.71	16.34
Held-to-Ear	802.11a	16.30	13.53
Held-to-Ear	802.11n (5GHz, 20MHz BW)	15.88	13.83
Held-to-Ear	802.11ac (20MHz BW)	15.83	13.78
Held-to-Ear	802.11n (5GHz, 40MHz BW)	15.28	13.92
Held-to-Ear	802.11ac (40MHz BW)	15.63	13.89
Held-to-Ear	802.11ac (80MHz BW)	15.17	13.11

*Note: MIMO WIFI modes were not evaluated due to equipment limitations.

APPENDIX H: IEEE 802.11AX RU SAR EXCLUSION

1.1 IEEE 802.11ax RU SAR Exclusion

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 106T, 242T, 484T and 996T.

Per April 2019 TCB Workshop Notes, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

1.2 IEEE 802.11ax RU Target Powers

1.2.1 Maximum 802.11ax RU WLAN Output Power

Tones		SISO (ANT1/2) /in dBm				MIMO (ALL) /in dBm			
		2.4GHz	5GHz/20MHz	5GHz/40MHz	5GHz/80MHz	2.4GHz	5GHz/20MHz	5GHz/40MHz	5GHz/80MHz
26T	Maximum	13.5 ch. 12: 12.5 ch. 13: 6.5	11	11	11	13.5 ch. 12: 12.5 ch. 13: 6.5	11	11	11
	Nominal	12.5 ch. 12: 11.5 ch. 13: 5.5	10	10	10	12.5 ch. 12: 11.5 ch. 13: 5.5	10	10	10
52T	Maximum	16 ch. 12: 14.0 ch. 13: 9.0	13	13	13	16 ch. 12: 14.0 ch. 13: 9.0	13	13	13
	Nominal	15 ch. 12: 13.0 ch. 13: 8.0	12	12	12	15 ch. 12: 13.0 ch. 13: 8.0	12	12	12
106T	Maximum	16 ch. 12: 14.0 ch. 13: 9.5	15	15	15	16 ch. 12: 14.0 ch. 13: 9.5	15	15	15
	Nominal	15 ch. 12: 13.0 ch. 13: 8.5	14	14	14	15 ch. 12: 13.0 ch. 13: 8.5	14	14	14
242T	Maximum	16 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 11.5 ch. 13: 7.5	16 ch. 36: 14.5 ch. 64: 15	16 ch. 62: 15.0	15	16 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 11.5 ch. 13: 7.5	17 ch. 36: 14.5 ch. 64: 15	16 ch. 62: 15.0	15
	Nominal	15 ch. 1: 14.5 ch. 11: 12.0 ch. 12: 10.5 ch. 13: 6.5	15 ch. 36: 13.5 ch. 64: 14.0	15 ch. 62: 14.0	14	15 ch. 1: 14.5 ch. 11: 12.0 ch. 12: 10.5 ch. 13: 6.5	16 ch. 36: 13.5 ch. 64: 14.0	15 ch. 62: 14.0	14
484T	Maximum			16 ch. 38: 12.0 ch. 62: 10.5 ch. 102: 14.0	15 ch. 42: 13.5 ch. 58: 12.0 ch. 106: 14.5			16 ch. 38: 12.0 ch. 62: 10.5 ch. 102: 14.0	15 ch. 42: 13.5 ch. 58: 12.0 ch. 106: 14.5
	Nominal			15 ch. 38: 11.0 ch. 62: 9.5 ch. 102: 13.0	14 ch. 42: 12.5 ch. 58: 11.0 ch. 106: 13.5			15 ch. 38: 11.0 ch. 62: 9.5 ch. 102: 13.0	14 ch. 42: 12.5 ch. 58: 11.0 ch. 106: 13.5
996T	Maximum				15 ch. 42: 13.0 ch. 58: 11.0 ch. 106: 12.5				15 ch. 42: 13.0 ch. 58: 11.0 ch. 106: 12.5
	Nominal				14 ch. 42: 12.0 ch. 58: 10.0 ch. 106: 11.5				14 ch. 42: 12.0 ch. 58: 10.0 ch. 106: 11.5

1.2.2 **Reduced 802.11ax RU WLAN Output Power – Table 1**

Applicable for conditions:

- RCV Active
- Simultaneous conditions with 2.4 GHz WLAN and 5 GHz WLAN

Tones		SISO (ANT1/2) /in dBm				MIMO (ALL) /in dBm			
		2.4GHz	**5GHz/20MHz**	**5GHz/40MHz**	**5GHz/80MHz**	**2.4GHz**	**5GHz/20MHz**	**5GHz/40MHz**	**5GHz/80MHz**
26T	Maximum	13.5 ch. 12: 12.5 ch. 13: 6.5	11	11	11	13.5 ch. 12: 12.5 ch. 13: 6.5	11	11	11
	Nominal	12.5 ch. 12: 11.5 ch. 13: 5.5	10	10	10	12.5 ch. 12: 11.5 ch. 13: 5.5	10	10	10
52T	Maximum	16 ch. 12: 14.0 ch. 13: 9.0	13	13	13	16 ch. 12: 14.0 ch. 13: 9.0	13	13	13
	Nominal	15 ch. 12: 13.0 ch. 13: 8.0	12	12	12	15 ch. 12: 13.0 ch. 13: 8.0	12	12	12
106T	Maximum	16 ch. 12: 14.0 ch. 13: 9.5	14	14	14	16 ch. 12: 14.0 ch. 13: 9.5	15	15	15
	Nominal	15 ch. 12: 13.0 ch. 13: 8.5	13	13	13	15 ch. 12: 13.0 ch. 13: 8.5	14	14	14
242T	Maximum	16 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 11.5 ch. 13: 7.5	14	14	14	16 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 11.5 ch. 13: 7.5	17 ch. 36: 14.5 ch. 64: 15	16 ch. 62: 15.0	15
	Nominal	15 ch. 1: 14.5 ch. 11: 12.0 ch. 12: 10.5 ch. 13: 6.5	13	13	13	15 ch. 1: 14.5 ch. 11: 12.0 ch. 12: 10.5 ch. 13: 6.5	16 ch. 36: 13.5 ch. 64: 14.0	15 ch. 62: 14.0	14
484T	Maximum			14 ch. 38: 12.0 ch. 62: 10.5	14 ch. 42: 13.5 ch. 58: 12.0			16 ch. 38: 12.0 ch. 62: 10.5 ch. 102: 14.0	15 ch. 42: 13.5 ch. 58: 12.0 ch. 106: 14.5
	Nominal			13 ch. 38: 11.0 ch. 62: 9.5	13 ch. 42: 12.5 ch. 58: 11.0			15 ch. 38: 11.0 ch. 62: 9.5 ch. 102: 13.0	14 ch. 42: 12.5 ch. 58: 11.0 ch. 106: 13.5
996T	Maximum				14 ch. 42: 13.0 ch. 58: 11.0 ch. 106: 12.5				15 ch. 42: 13.0 ch. 58: 11.0 ch. 106: 12.5
	Nominal				13 ch. 42: 12.0 ch. 58: 10.0 ch. 106: 11.5				14 ch. 42: 12.0 ch. 58: 10.0 ch. 106: 11.5

1.2.3 Reduced 802.11ax RU WLAN Output Power – Table 2

Applicable for conditions:

- RCV Active during simultaneous conditions with 2.4 GHz WLAN and 5 GHz WLAN

Tones		SISO (ANT1/2) /in dBm				MIMO (ALL) /in dBm			
		2.4GHz	5GHz/20MHz	5GHz/40MHz	5GHz/80MHz	2.4GHz	5GHz/20MHz	5GHz/40MHz	5GHz/80MHz
26T	Maximum	13.5 ch. 12: 12.5 ch. 13: 6.5	11	11	11	13.5 ch. 12: 12.5 ch. 13: 6.5	11	11	11
	Nominal	12.5 ch. 12: 11.5 ch. 13: 5.5	10	10	10	12.5 ch. 12: 11.5 ch. 13: 5.5	10	10	10
52T	Maximum	14 ch. 13: 9.0	13	13	13	16 ch. 12: 14.0 ch. 13: 9.0	13	13	13
	Nominal	13 ch. 13: 8.0	12	12	12	15 ch. 12: 13.0 ch. 13: 8.0	12	12	12
106T	Maximum	14 ch. 13: 9.5	14	14	14	16 ch. 12: 14.0 ch. 13: 9.5	15	15	15
	Nominal	13 ch. 13: 8.5	13	13	13	15 ch. 12: 13.0 ch. 13: 8.5	14	14	14
242T	Maximum	14 ch. 11: 13.0 ch. 12: 11.5 ch. 13: 7.5	14	14	14	16 ch. 1: 15.5 ch. 11: 13.0 ch. 12: 11.5 ch. 13: 7.5	17 ch. 36: 14.5 ch. 64: 15	16 ch. 62: 15.0	15
	Nominal	13 ch. 11: 12.0 ch. 12: 10.5 ch. 13: 6.5	13	13	13	15 ch. 1: 14.5 ch. 11: 12.0 ch. 12: 10.5 ch. 13: 6.5	16 ch. 36: 13.5 ch. 64: 14.0	15 ch. 62: 14.0	14
484T	Maximum			14 ch. 38: 12.0 ch. 62: 10.5	14 ch. 42: 13.5 ch. 58: 12.0			16 ch. 38: 12.0 ch. 62: 10.5 ch. 102: 14.0	15 ch. 42: 13.5 ch. 58: 12.0 ch. 106: 14.5
	Nominal			13 ch. 38: 11.0 ch. 62: 9.5	13 ch. 42: 12.5 ch. 58: 11.0			15 ch. 38: 11.0 ch. 62: 9.5 ch. 102: 13.0	14 ch. 42: 12.5 ch. 58: 11.0 ch. 106: 13.5
996T	Maximum				14 ch. 42: 13.0 ch. 58: 11.0 ch. 106: 12.5				15 ch. 42: 13.0 ch. 58: 11.0 ch. 106: 12.5
	Nominal				13 ch. 42: 12.0 ch. 58: 10.0 ch. 106: 11.5				14 ch. 42: 12.0 ch. 58: 10.0 ch. 106: 11.5

1.3 IEEE 802.11ax Measured Powers

Table 1
Maximum 2.4 GHz 802.11ax RU Output Power – Ant 1

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	52T	37	15.94
			38	15.62
			40	15.54
2437	6	52T	37	15.25
			38	15.68
			40	15.71
2462	11	52T	37	15.72
			38	15.07
			40	15.61

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	13.47
			4	13.46
			8	12.76
2437	6	26T	0	13.26
			4	13.34
			8	12.99
2462	11	26T	0	13.47
			4	12.77
			8	12.62

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	106T	53	15.27
			54	15.76
2437	6	106T	53	15.72
			54	15.72
2462	11	106T	53	15.01
			54	15.72

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	242T	61	15.31
2437	6	242T	61	15.87
2462	11	242T	61	12.75

Table 2
Maximum 2.4 GHz 802.11ax RU Output Power – Ant 2

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	12.72
			4	12.56
			8	12.68
2437	6	26T	0	12.85
			4	12.81
			8	13.46
2462	11	26T	0	13.15
			4	13.23
			8	13.42

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	52T	37	15.77
			38	15.69
			40	15.66
2437	6	52T	37	15.94
			38	15.28
			40	15.71
2462	11	52T	37	15.13
			38	15.12
			40	15.44

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	106T	53	15.63
			54	15.27
2437	6	106T	53	15.09
			54	15.41
2462	11	106T	53	15.11
			54	15.82

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	242T	61	15.38
2437	6	242T	61	15.31
2462	11	242T	61	12.72

Table 3
Maximum 5 GHz 802.11ax RU Output Power – Ant 1

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					0	4	8
20MHz BW	1	5180	36	26T	10.49	10.84	10.80
		5200	40	26T	10.40	10.81	10.67
		5240	48	26T	10.37	10.75	10.66
	2A	5260	52	26T	10.50	10.73	10.65
		5280	56	26T	10.52	10.78	10.64
		5320	64	26T	10.50	10.79	10.56
	2C	5500	100	26T	10.98	10.41	10.38
		5600	120	26T	10.07	10.31	10.13
		5720	144	26T	10.86	10.34	10.11
	3	5745	149	26T	10.76	10.98	10.75
		5785	157	26T	10.88	10.45	10.96
		5825	165	26T	10.69	10.25	10.90

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	39	40
20MHz BW	1	5180	36	52T	12.49	12.92	12.76
		5200	40	52T	12.49	12.72	12.73
		5240	48	52T	12.47	12.82	12.75
	2A	5260	52	52T	12.52	12.81	12.67
		5280	56	52T	12.49	12.80	12.67
		5320	64	52T	12.54	12.70	12.57
	2C	5500	100	52T	12.86	12.41	12.98
		5600	120	52T	12.82	12.20	12.93
		5720	144	52T	12.79	12.97	12.89
	3	5745	149	52T	12.70	12.90	12.68
		5785	157	52T	12.86	12.33	12.95
		5825	165	52T	12.73	12.20	12.85

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	54	N/A
20MHz BW	1	5180	36	106T	14.54	14.72	
		5200	40	106T	14.50	14.65	
		5240	48	106T	14.53	14.57	
	2A	5260	52	106T	14.60	14.71	
		5280	56	106T	14.53	14.78	
		5320	64	106T	14.56	14.67	
	2C	5500	100	106T	14.82	14.86	
		5600	120	106T	14.71	14.78	
		5720	144	106T	14.79	14.78	
	3	5745	149	106T	14.67	14.70	
		5785	157	106T	14.87	14.97	
		5825	165	106T	14.84	14.80	

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	N/A	N/A
20MHz BW	1	5180	36	242T	13.65		
		5200	40	242T	15.53		
		5240	48	242T	15.50		
	2A	5260	52	242T	15.60		
		5280	56	242T	15.55		
		5320	64	242T	14.57		
	2C	5500	100	242T	15.77		
		5600	120	242T	15.65		
		5720	144	242T	15.53		
	3	5745	149	242T	15.60		
		5785	157	242T	15.84		
		5825	165	242T	15.74		

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					0	8	17
40MHz BW	1	5190	38	26T	10.95	10.32	10.09
		5230	46	26T	10.90	10.21	10.98
	2A	5270	54	26T	10.90	10.17	10.98
		5310	62	26T	10.89	10.11	10.74
	2C	5510	102	26T	10.52	10.71	10.65
		5590	118	26T	10.33	10.58	10.44
		5710	142	26T	10.27	10.64	10.55
	3	5755	151	26T	10.41	10.53	10.59
		5795	159	26T	10.89	10.56	10.21

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	40	44
40MHz BW	1	5190	38	52T	12.21	12.20	12.26
		5230	46	52T	12.15	12.23	12.23
	2A	5270	54	52T	12.13	12.19	12.09
		5310	62	52T	12.05	12.09	12.02
	2C	5510	102	52T	12.60	12.65	12.81
		5590	118	52T	12.42	12.50	12.51
		5710	142	52T	12.48	12.55	12.63
	3	5755	151	52T	12.62	12.55	12.73
		5795	159	52T	12.18	12.59	12.41

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	54	56
40MHz BW	1	5190	38	106T	14.37	14.21	14.45
		5230	46	106T	14.31	14.08	14.37
	2A	5270	54	106T	14.43	14.16	14.37
		5310	62	106T	14.30	14.98	14.16
	2C	5510	102	106T	14.72	14.32	14.92
		5590	118	106T	14.50	14.22	14.57
		5710	142	106T	14.53	14.33	14.64
	3	5755	151	106T	14.76	14.46	14.83
		5795	159	106T	14.34	14.41	14.69

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	N/A
40MHz BW	1	5190	38	242T	15.60	15.46	
		5230	46	242T	15.68	15.45	
	2A	5270	54	242T	15.64	15.58	
		5310	62	242T	14.67	14.44	
	2C	5510	102	242T	15.82	15.95	
		5590	118	242T	15.64	15.67	
		5710	142	242T	15.63	15.70	
	3	5755	151	242T	15.86	15.98	
		5795	159	242T	15.70	15.90	

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
40MHz BW	1	5190	38	484T	11.46		
		5230	46	484T	15.17		
	2A	5270	54	484T	15.03		
		5310	62	484T	10.47		
	2C	5510	102	484T	13.91		
		5590	118	484T	15.25		
		5710	142	484T	15.22		
	3	5755	151	484T	15.87		
		5795	159	484T	15.77		

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					0	18	36
	1	5210	42	26T	10.96	10.60	10.91
	2A	5290	58	26T	10.83	10.57	10.66
	2C	5530	106	26T	10.53	10.31	10.44
		5610	122	26T	10.26	10.01	10.23
		5690	138	26T	10.31	10.03	10.28
	3	5775	155	26T	10.23	10.11	10.56

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	44	52
	1	5210	42	52T	12.13	12.59	12.05
	2A	5290	58	52T	12.97	12.36	12.92
	2C	5530	106	52T	12.45	12.89	12.54
		5610	122	52T	12.27	12.72	12.27
		5690	138	52T	12.25	12.61	12.31
	3	5775	155	52T	12.21	12.91	12.63

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	56	60
	1	5210	42	106T	14.90	14.25	14.96
	2A	5290	58	106T	14.74	14.19	14.80
	2C	5530	106	106T	14.26	14.46	14.14
		5610	122	106T	14.97	14.32	14.97
		5690	138	106T	14.96	14.24	14.94
	3	5775	155	106T	14.57	14.99	14.76

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	64
	1	5210	42	242T	14.27	14.42	14.26
	2A	5290	58	242T	14.15	14.40	14.07
	2C	5530	106	242T	14.53	14.78	14.41
		5610	122	242T	14.22	14.52	14.28
		5690	138	242T	14.29	14.50	14.21
	3	5775	155	242T	14.91	14.99	14.97

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	66	N/A
	1	5210	42	484T	13.29	13.23	
	2A	5290	58	484T	11.24	11.22	
	2C	5530	106	484T	14.32	14.39	
		5610	122	484T	14.27	14.20	
		5690	138	484T	14.11	14.18	
	3	5775	155	484T	14.62	14.76	

80MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					67	N/A	N/A
	1	5210	42	996T	12.29		
	2A	5290	58	996T	10.25		
	2C	5530	106	996T	11.85		
		5610	122	996T	14.97		
		5690	138	996T	14.89		
	3	5775	155	996T	14.63		

Table 4
Maximum 5 GHz 802.11ax RU Output Power – Ant 2

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					0	4	8
	1	5180	36	26T	10.84	10.33	10.98
		5200	40	26T	10.86	10.33	10.21
		5240	48	26T	10.87	10.30	10.26
	2A	5260	52	26T	10.76	10.07	10.91
		5280	56	26T	10.78	10.14	10.06
		5320	64	26T	10.96	10.24	10.12
	2C	5500	100	26T	10.54	10.82	10.53
		5600	120	26T	10.94	10.03	10.78
		5720	144	26T	10.83	10.97	10.84
	3	5745	149	26T	10.36	10.70	10.18
		5785	157	26T	10.32	10.56	10.23
		5825	165	26T	10.14	10.55	10.04

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	39	40
	1	5180	36	52T	12.63	12.95	12.91
		5200	40	52T	12.81	12.98	12.99
		5240	48	52T	12.84	12.93	12.97
	2A	5260	52	52T	12.70	12.93	12.87
		5280	56	52T	12.77	12.05	12.98
		5320	64	52T	12.91	12.17	12.07
	2C	5500	100	52T	12.60	12.78	12.52
		5600	120	52T	12.79	12.90	12.81
		5720	144	52T	12.92	12.95	12.76
	3	5745	149	52T	12.96	12.26	12.90
		5785	157	52T	12.13	12.40	12.05
		5825	165	52T	12.79	12.19	12.83

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	54	N/A
	1	5180	36	106T	14.69	14.87	
		5200	40	106T	14.73	14.84	
		5240	48	106T	14.80	14.93	
	2A	5260	52	106T	14.55	14.69	
		5280	56	106T	14.68	14.88	
		5320	64	106T	14.87	14.86	
	2C	5500	100	106T	14.74	14.64	
		5600	120	106T	14.95	14.72	
		5720	144	106T	14.82	14.89	
	3	5745	149	106T	14.81	14.73	
		5785	157	106T	14.82	14.76	
		5825	165	106T	14.65	14.68	

20MHz BW	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	N/A	N/A
	1	5180	36	242T	14.01		
		5200	40	242T	15.81		
		5240	48	242T	15.85		
	2A	5260	52	242T	15.66		
		5280	56	242T	15.68		
		5320	64	242T	14.75		
	2C	5500	100	242T	15.38		
		5600	120	242T	15.58		
		5720	144	242T	15.65		
	3	5745	149	242T	15.72		
		5785	157	242T	15.79		
		5825	165	242T	15.71		

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					0	8	17
40MHz BW	1	5190	38	26T	10.29	10.68	10.35
		5230	46	26T	10.28	10.71	10.36
	2A	5270	54	26T	10.15	10.27	10.30
		5310	62	26T	10.21	10.37	10.35
	2C	5510	102	26T	10.06	10.08	10.22
		5590	118	26T	10.07	10.05	10.03
		5710	142	26T	10.27	10.28	10.16
	3	5755	151	26T	10.59	10.81	10.68
		5795	159	26T	10.14	10.75	10.10

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	40	44
40MHz BW	1	5190	38	52T	12.33	12.43	12.38
		5230	46	52T	12.34	12.48	12.48
	2A	5270	54	52T	12.22	12.21	12.39
		5310	62	52T	12.37	12.28	12.41
	2C	5510	102	52T	12.27	12.07	12.37
		5590	118	52T	12.18	12.17	12.19
		5710	142	52T	12.46	12.26	12.41
	3	5755	151	52T	12.69	12.65	12.75
		5795	159	52T	12.25	12.67	12.30

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	54	56
40MHz BW	1	5190	38	106T	14.65	14.52	14.57
		5230	46	106T	14.57	14.48	14.75
	2A	5270	54	106T	14.38	14.23	14.47
		5310	62	106T	14.47	14.33	14.43
	2C	5510	102	106T	14.38	14.11	14.65
		5590	118	106T	14.53	14.06	14.48
		5710	142	106T	14.61	14.09	14.63
	3	5755	151	106T	14.69	14.39	14.73
		5795	159	106T	14.33	14.36	14.41

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	N/A
40MHz BW	1	5190	38	242T	15.08	15.11	
		5230	46	242T	15.07	15.03	
	2A	5270	54	242T	15.06	15.09	
		5310	62	242T	14.80	14.75	
	2C	5510	102	242T	15.52	15.73	
		5590	118	242T	15.57	15.60	
		5710	142	242T	15.57	15.74	
	3	5755	151	242T	15.90	15.92	
		5795	159	242T	15.75	15.96	

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	N/A	N/A
40MHz BW	1	5190	38	484T	11.96		
		5230	46	484T	15.86		
	2A	5270	54	484T	15.88		
		5310	62	484T	9.89		
	2C	5510	102	484T	13.63		
		5590	118	484T	15.36		
		5710	142	484T	15.48		
	3	5755	151	484T	15.76		
		5795	159	484T	15.67		

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					0	18	36
80MHz BW	1	5210	42	26T	10.23	10.10	10.42
	2A	5290	58	26T	10.10	10.97	10.26
	2C	5530	106	26T	10.05	10.69	10.12
		5610	122	26T	10.13	10.76	10.15
		5690	138	26T	10.23	10.76	10.07
	3	5775	155	26T	10.70	10.45	10.54

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					37	44	52
80MHz BW	1	5210	42	52T	12.29	12.88	12.52
	2A	5290	58	52T	12.13	12.74	12.43
	2C	5530	106	52T	12.12	12.57	12.28
		5610	122	52T	12.24	12.49	12.19
		5690	138	52T	12.39	12.58	12.31
	3	5775	155	52T	12.75	12.09	12.71

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					53	56	60
80MHz BW	1	5210	42	106T	14.57	14.82	14.51
	2A	5290	58	106T	14.47	14.88	14.60
	2C	5530	106	106T	14.30	14.54	14.30
		5610	122	106T	14.32	14.48	14.27
		5690	138	106T	14.49	14.50	14.26
	3	5775	155	106T	14.69	14.92	14.62

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					61	62	64
80MHz BW	1	5210	42	242T	14.78	14.94	14.78
	2A	5290	58	242T	14.85	14.27	14.81
	2C	5530	106	242T	14.41	14.68	14.61
		5610	122	242T	14.51	14.72	14.56
		5690	138	242T	14.56	14.72	14.51
	3	5775	155	242T	14.80	14.86	14.91

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					65	66	N/A
80MHz BW	1	5210	42	484T	12.77	12.90	
	2A	5290	58	484T	11.77	11.84	
	2C	5530	106	484T	14.36	14.45	
		5610	122	484T	14.43	14.55	
		5690	138	484T	14.47	14.52	
	3	5775	155	484T	14.58	14.65	

	Band	Freq [MHz]	Channel	Tones	Avg Conducted Power (dBm)		
					RU Index		
					67	N/A	N/A
80MHz BW	1	5210	42	996T	12.69		
	2A	5290	58	996T	10.27		
	2C	5530	106	996T	12.05		
		5610	122	996T	14.68		
		5690	138	996T	14.84		
	3	5775	155	996T	14.22		

APPENDIX I: PROBE and DIPOLE CALIBRATION

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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D750V3-1003_Jan18**

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1003

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

Calibration date: January 15, 2018

BN ✓
01-25-2018

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.

BN ✓
02/06/2019

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-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
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:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 15, 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	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.28 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.42 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	55.0 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.58 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.71 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω - 2.1 jΩ
Return Loss	- 27.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω - 6.2 jΩ
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.043 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 21, 2009

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 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**7.94 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.32 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.22 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.52 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.06 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.52 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.67 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.70 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**4.60 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 12.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

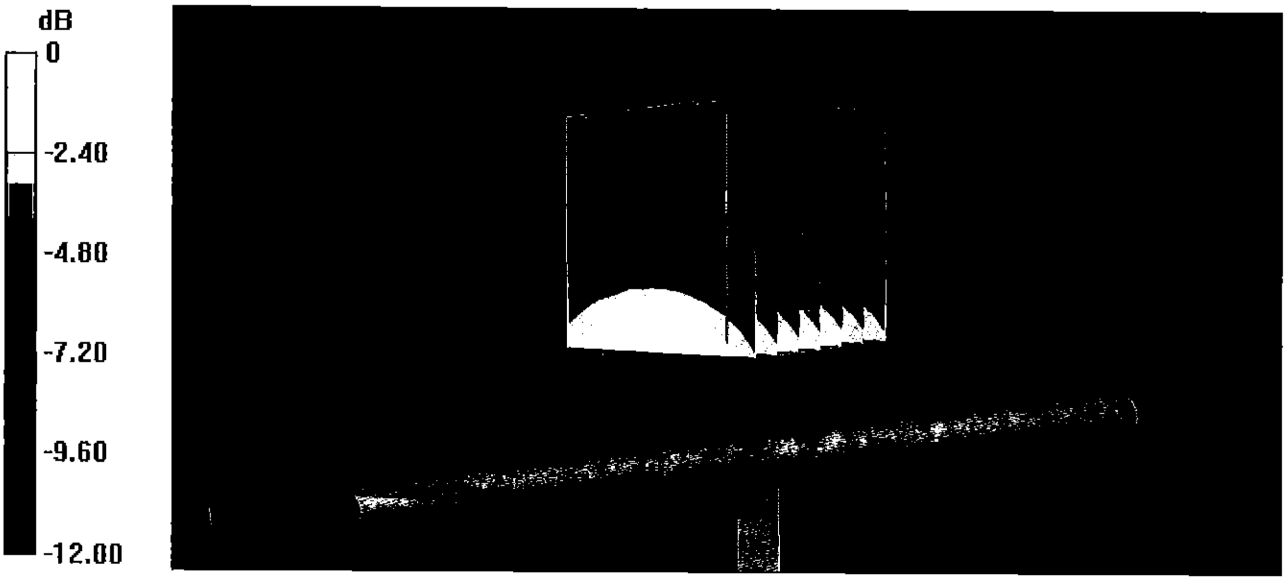
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.9$ S/m; $\varepsilon_r = 40.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

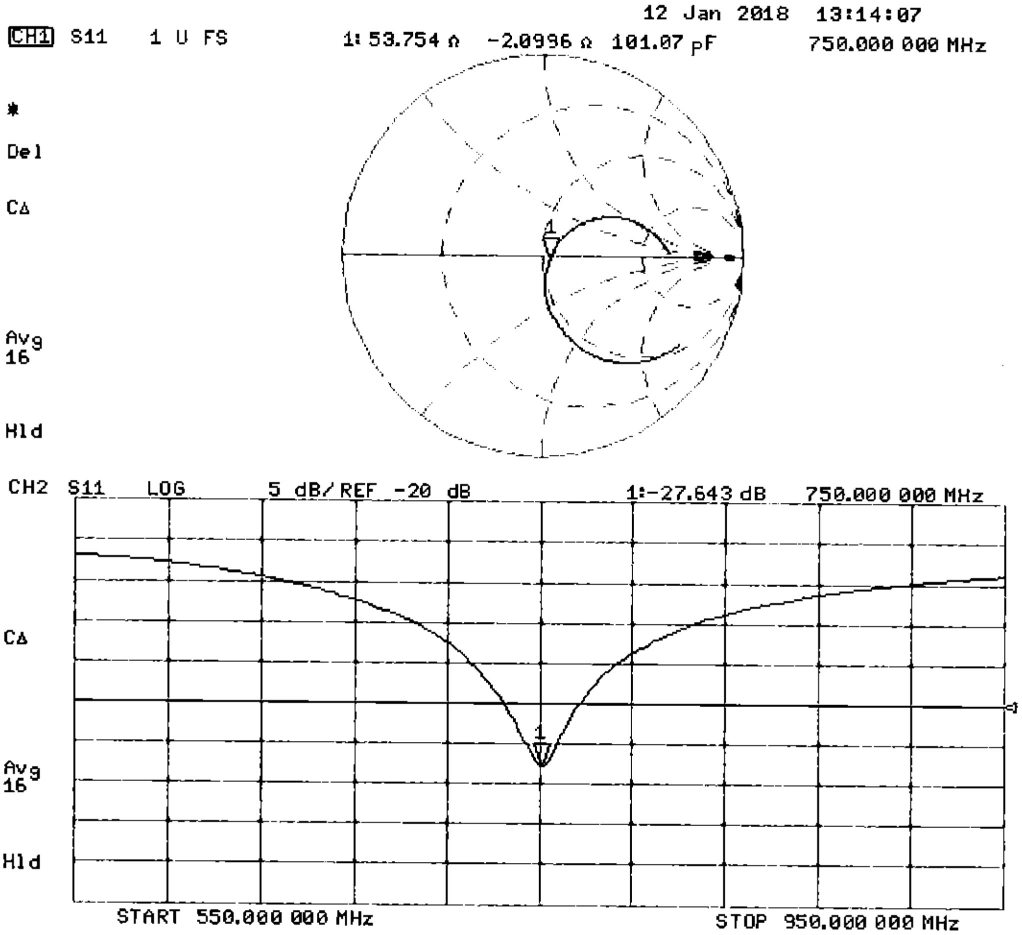
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.11 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

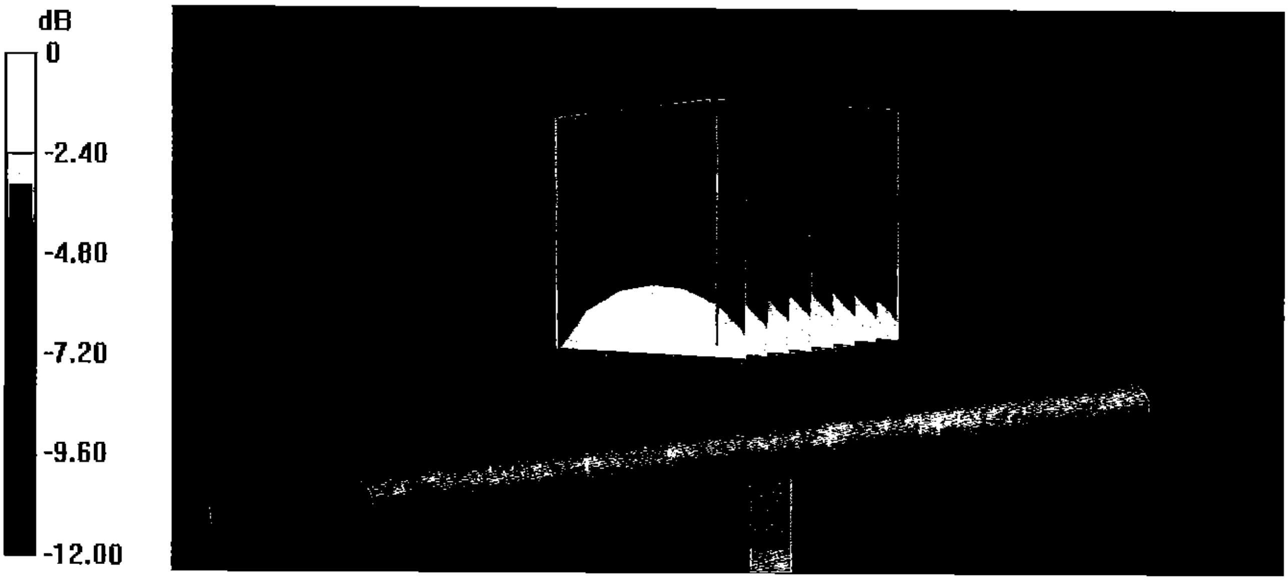
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.96$ S/m; $\varepsilon_r = 55$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

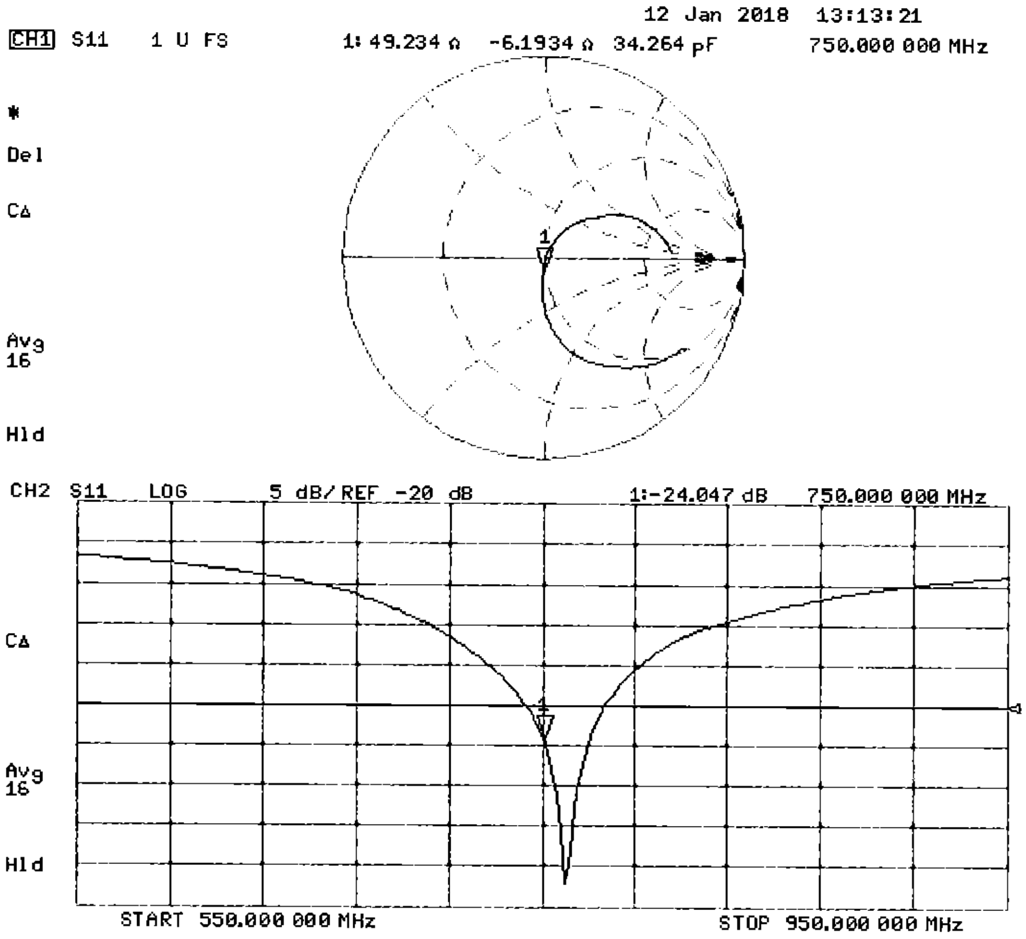
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.31 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.43 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



DASY5 Validation Report for SAM Head

Date: 15.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.9$ S/m; $\varepsilon_r = 44.2$; $\rho = 1000$ kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

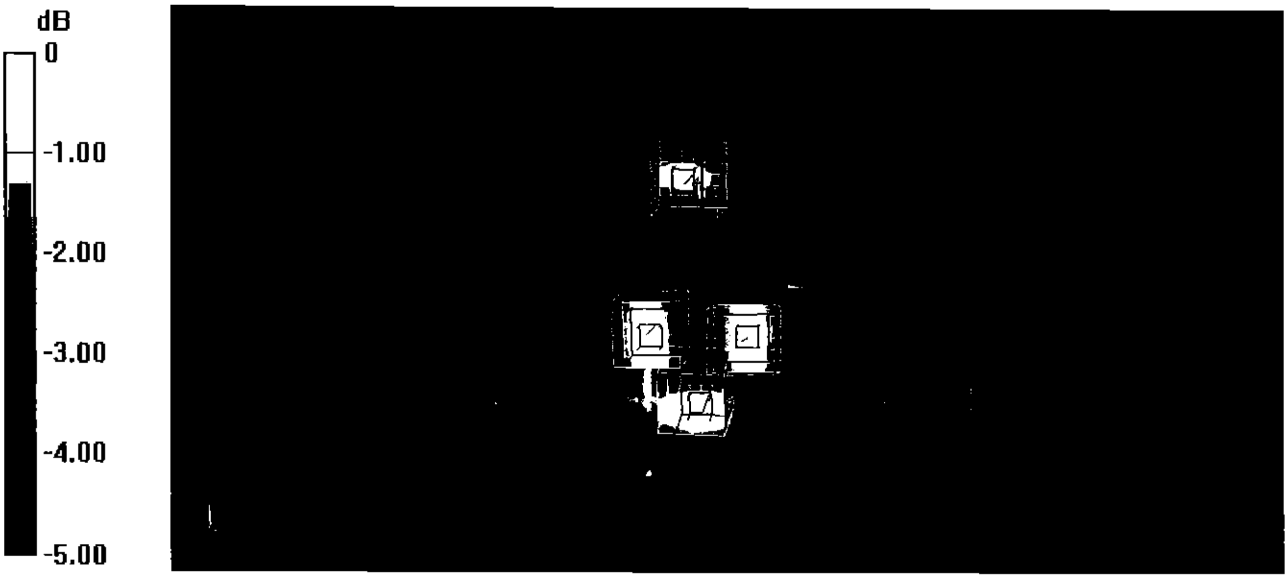
- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

SAM Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.79 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 2.89 W/kg
SAR(1 g) = 1.98 W/kg; SAR(10 g) = 1.33 W/kg
Maximum value of SAR (measured) = 2.58 W/kg

SAM Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.85 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 2.94 W/kg
SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.62 W/kg

SAM Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.29 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.78 W/kg
SAR(1 g) = 2.01 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.56 W/kg

SAM Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.01 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.31 W/kg
SAR(1 g) = 1.67 W/kg; SAR(10 g) = 1.15 W/kg
Maximum value of SAR (measured) = 2.11 W/kg



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

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http://www.pctest.com

Certification of Calibration

Object	D750V3 – SN: 1003
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	1/15/2019
Description:	SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	2/8/2018	Annual	2/8/2019	US39170122
Agilent	N5182A	MXG Vector Signal Generator	4/18/2018	Annual	4/18/2019	MY47420800
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
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
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

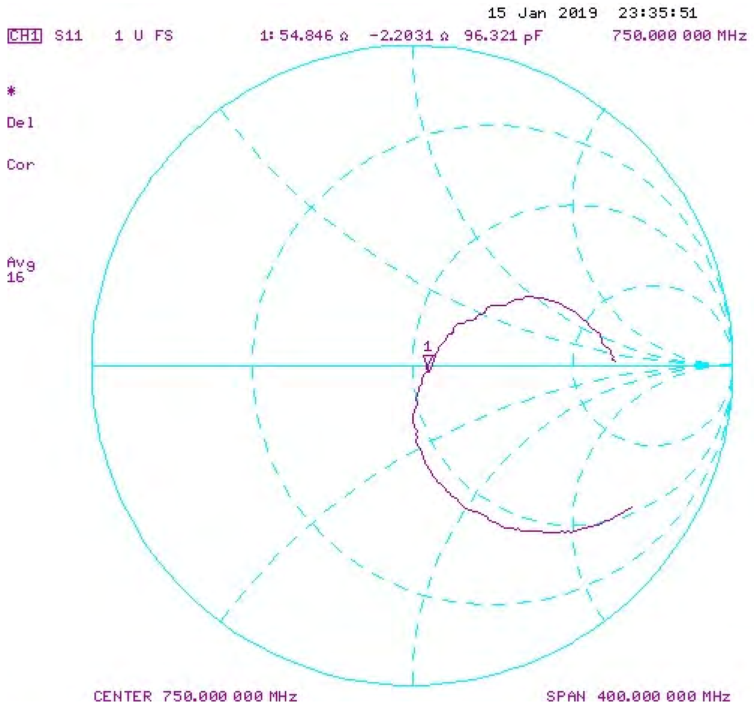
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

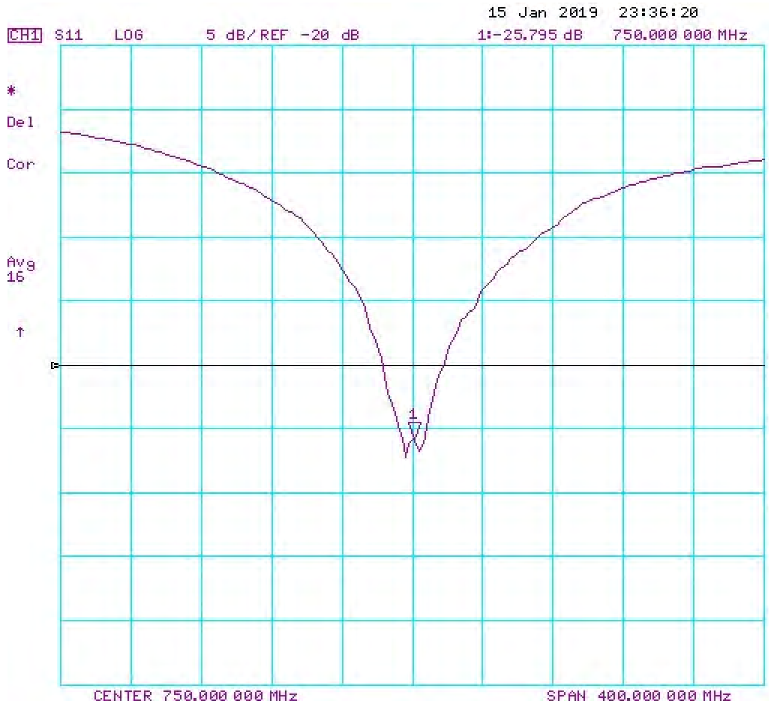
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

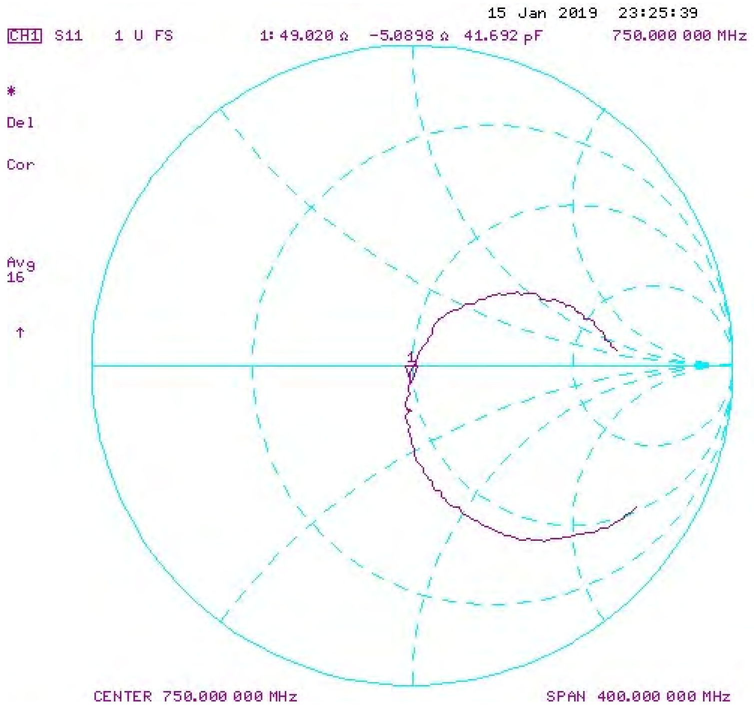
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 23.0 dBm	Measured Head SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
1/15/2018	1/15/2019	1.043	1.656	1.75	5.68%	1.08	1.15	6.09%	53.8	54.8	1	-2.1	-2.2	0.1	-27.6	-25.8	6.50%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
1/15/2018	1/15/2019	1.043	1.716	1.84	7.23%	1.14	1.23	7.71%	49.2	49	0.2	-6.2	-5.1	1.1	-24	-25.6	-6.80%	PASS

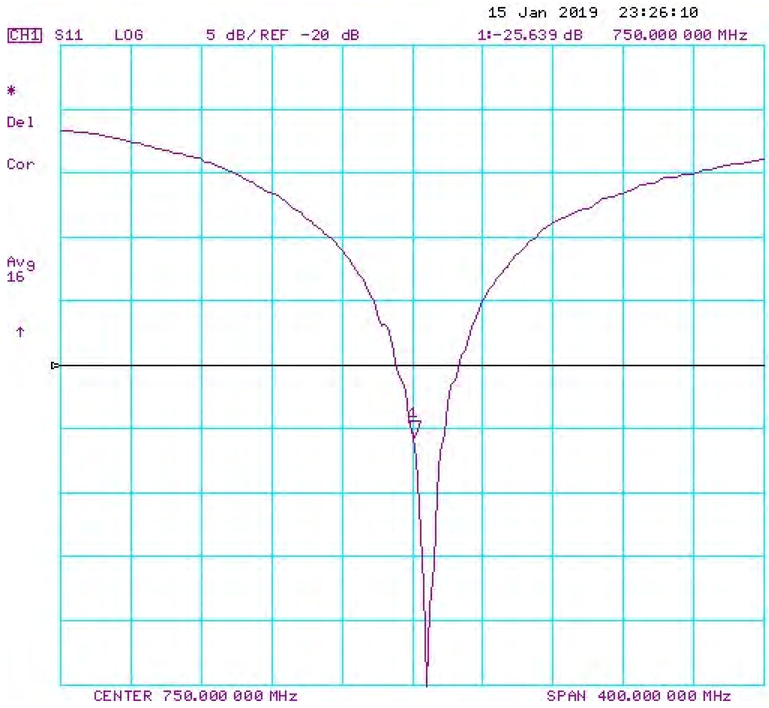
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1054_Mar19/2

CALIBRATION CERTIFICATE (Replacement of No:D750V3-1154_Mar19)

Object	D750V3 - SN:1054
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	March 18, 2019

BNV
4-29-2019

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	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	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: April 12, 2019

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 = 5.0 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	42.1 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.29 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.48 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.5 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.18 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.55 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.67 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.5 Ω - 0.3 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.2 Ω - 3.0 jΩ
Return Loss	- 30.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

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 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**7.72 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.23 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.20 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.55 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.00 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.00 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.51 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.66 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.64 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**4.55 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

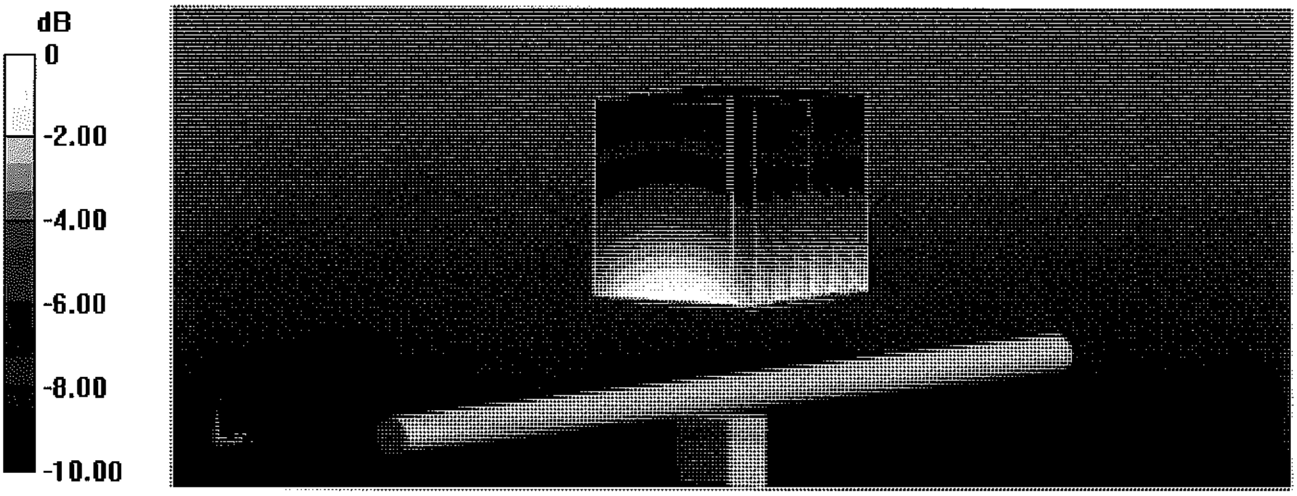
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.89$ S/m; $\varepsilon_r = 42.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.32, 10.32, 10.32) @ 750 MHz; Calibrated: 31.12.2018
- 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)

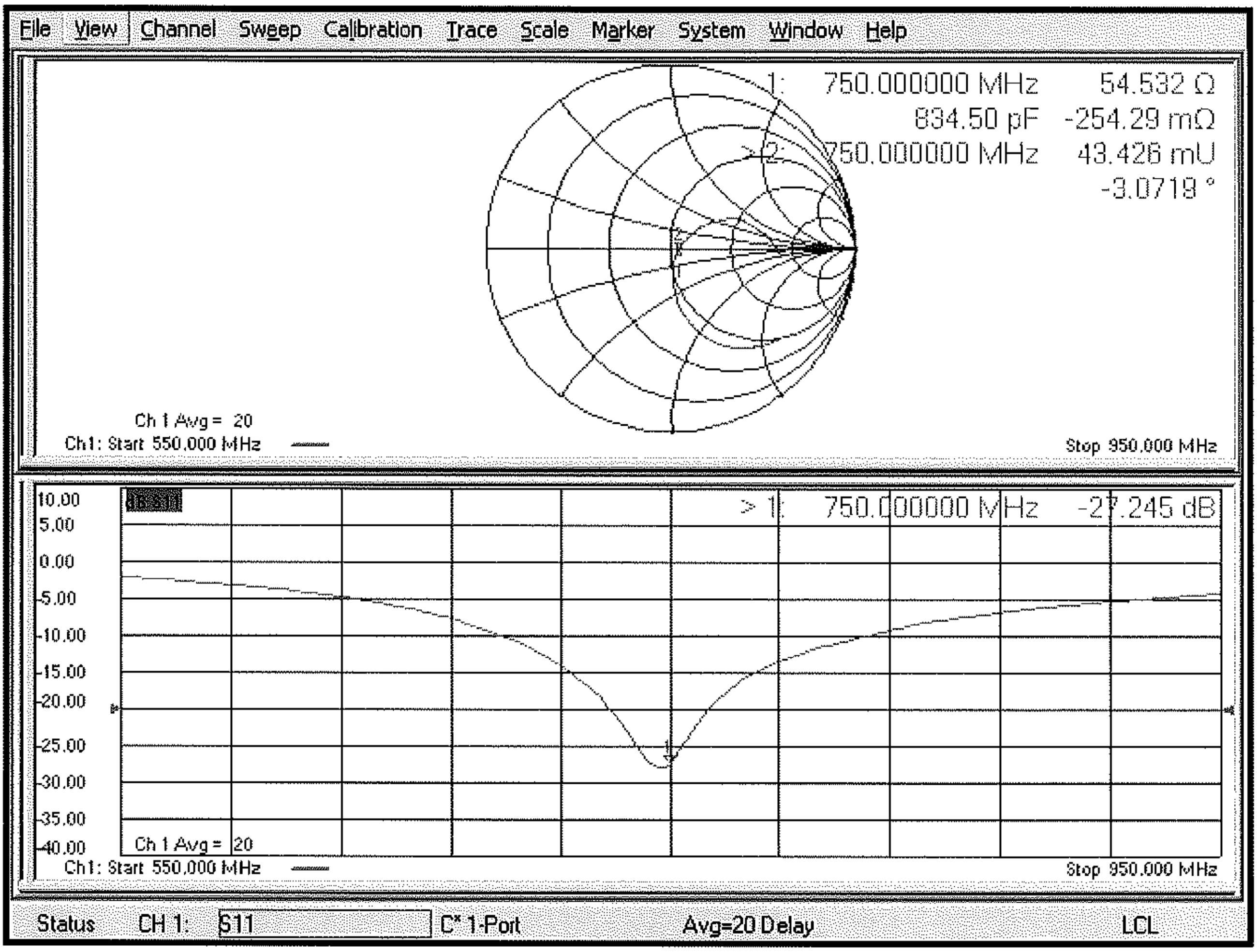
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.96 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.06 W/kg
SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.73 W/kg



0 dB = 2.73 W/kg = 4.36 dBW/kg

Impedance Measurement Plot for Head TSL



```
1:   750.000000 MHz    54.532 Ω
          834.50 pF   -254.29 mΩ
>2:  750.000000 MHz    43.426 mU
                      -3.0719 °

Ch 1 Avg = 20
Ch1: Start 550.000 MHz                Stop 950.000 MHz

> 1:  750.000000 MHz   -27.245 dB

Ch 1 Avg = 20
Ch1: Start 550.000 MHz                Stop 950.000 MHz

Status   CH 1:  S11   C* 1-Port   Avg=20 Delay   LCL
```

DASY5 Validation Report for Body TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

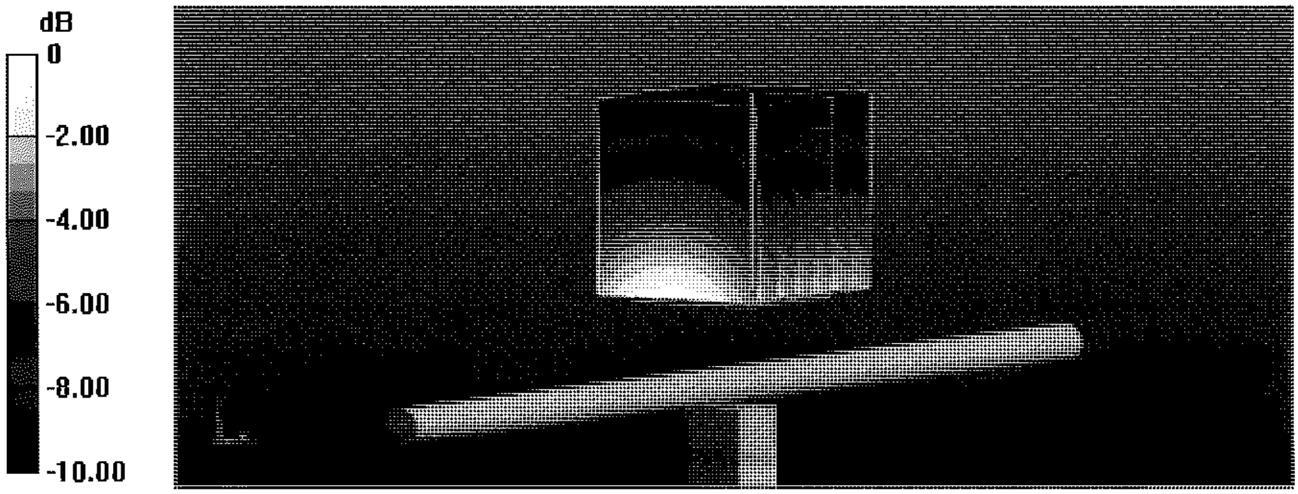
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.98$ S/m; $\varepsilon_r = 54.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.29, 10.29, 10.29) @ 750 MHz; Calibrated: 31.12.2018
- 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)

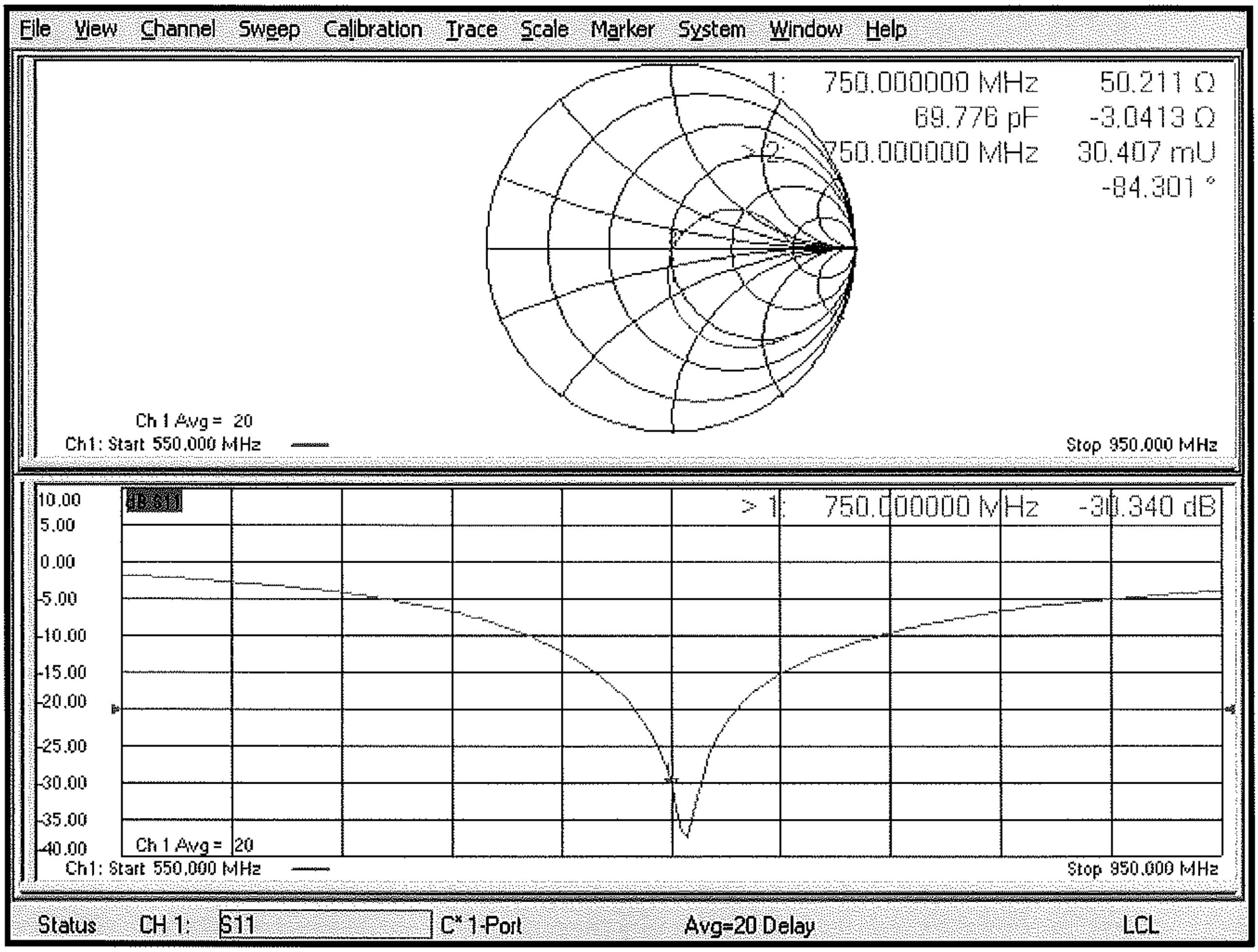
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.37 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.19 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.44 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



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

Impedance Measurement Plot for Body TSL



1: 750.000000 MHz 50.211 Ω
69.776 pF -3.0413 Ω
>2: 750.000000 MHz 30.407 mU
-84.301 °

> 1: 750.000000 MHz -30.340 dB

DASY5 Validation Report for SAM Head

Date: 18.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.904$ S/m; $\varepsilon_r = 44.22$; $\rho = 1000$ kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

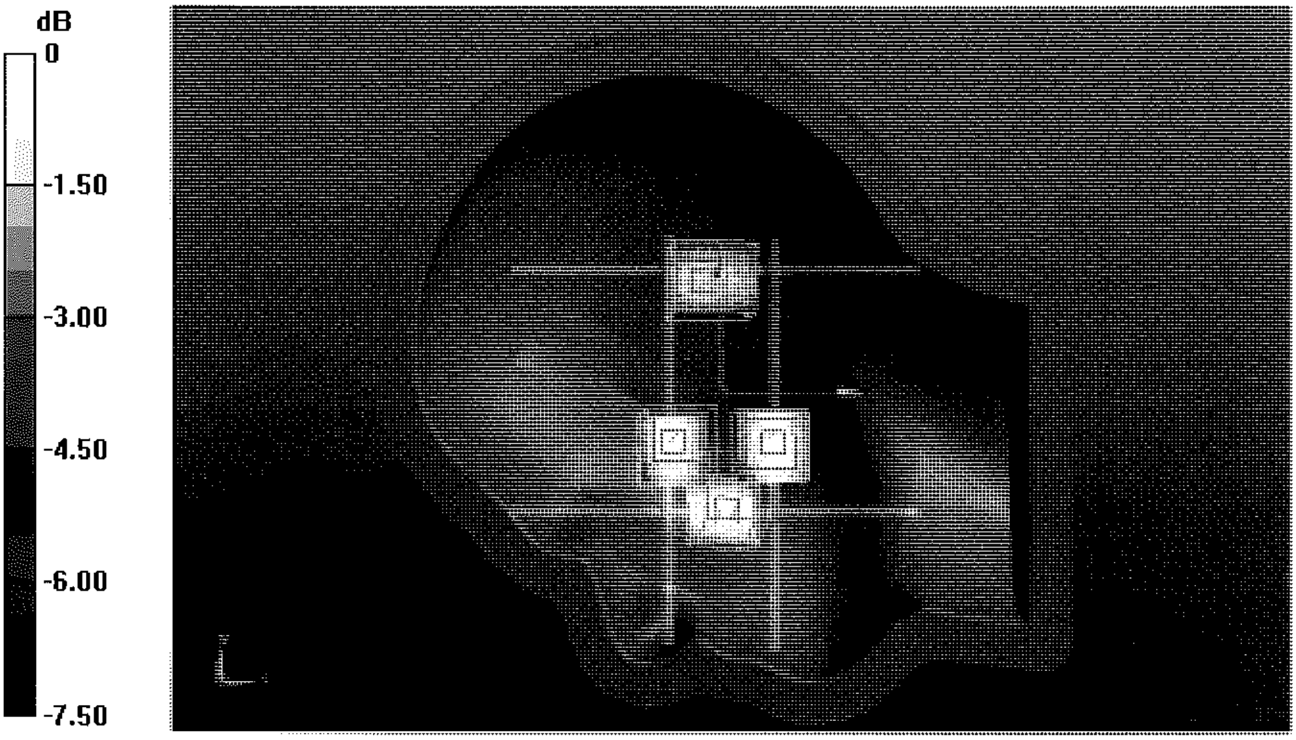
- Probe: EX3DV4 - SN7349; ConvF(10.32, 10.32, 10.32) @ 750 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: SAM Head
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

SAM Right/Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.66 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.80 W/kg
SAR(1 g) = 1.93 W/kg; SAR(10 g) = 1.31 W/kg
Maximum value of SAR (measured) = 2.52 W/kg

SAM Right/Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.68 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.98 W/kg
SAR(1 g) = 2.05 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (measured) = 2.68 W/kg

SAM Right/Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.23 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 2.82 W/kg
SAR(1 g) = 2 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.56 W/kg

SAM Right/Head/Ear/Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.76 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.32 W/kg
SAR(1 g) = 1.66 W/kg; SAR(10 g) = 1.14 W/kg
Maximum value of SAR (measured) = 2.11 W/kg



0 dB = 2.11 W/kg = 3.24 dBW/kg

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

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C **Service suisse d'étalonnage**
S **Servizio svizzero di taratura**
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d047_Mar19

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d047
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	March 13, 2019

BN✓
04-12-2019

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	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	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: March 13, 2019

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	41.9 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.42 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.13 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	54.3 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.47 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.27 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	51.4 Ω - 2.6 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.8 Ω - 6.1 jΩ
Return Loss	- 22.9 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

DASY5 Validation Report for Head TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

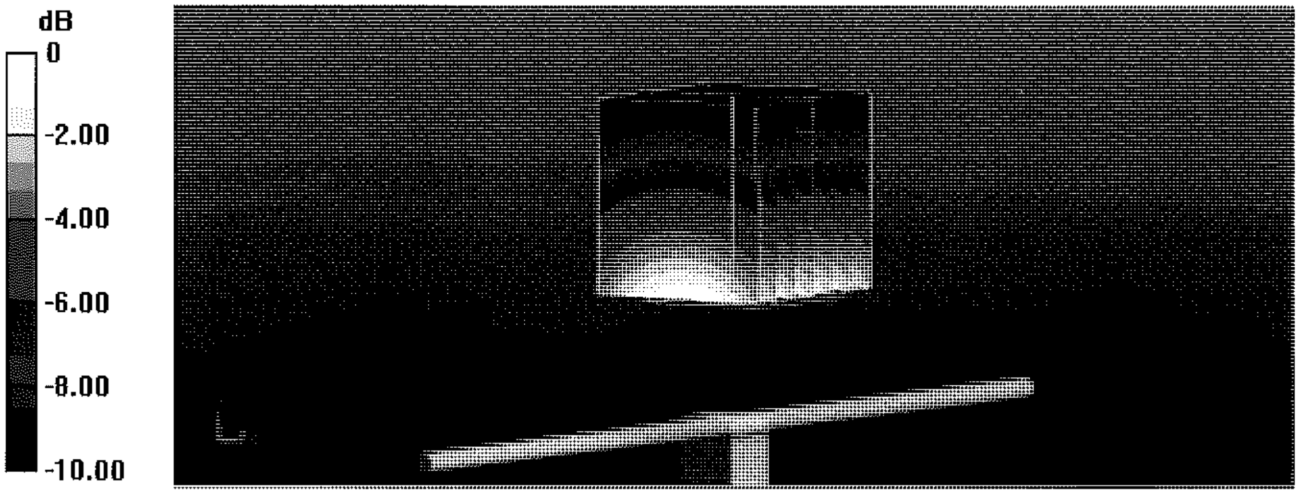
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 41.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10, 10, 10) @ 835 MHz; Calibrated: 31.12.2018
- 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)

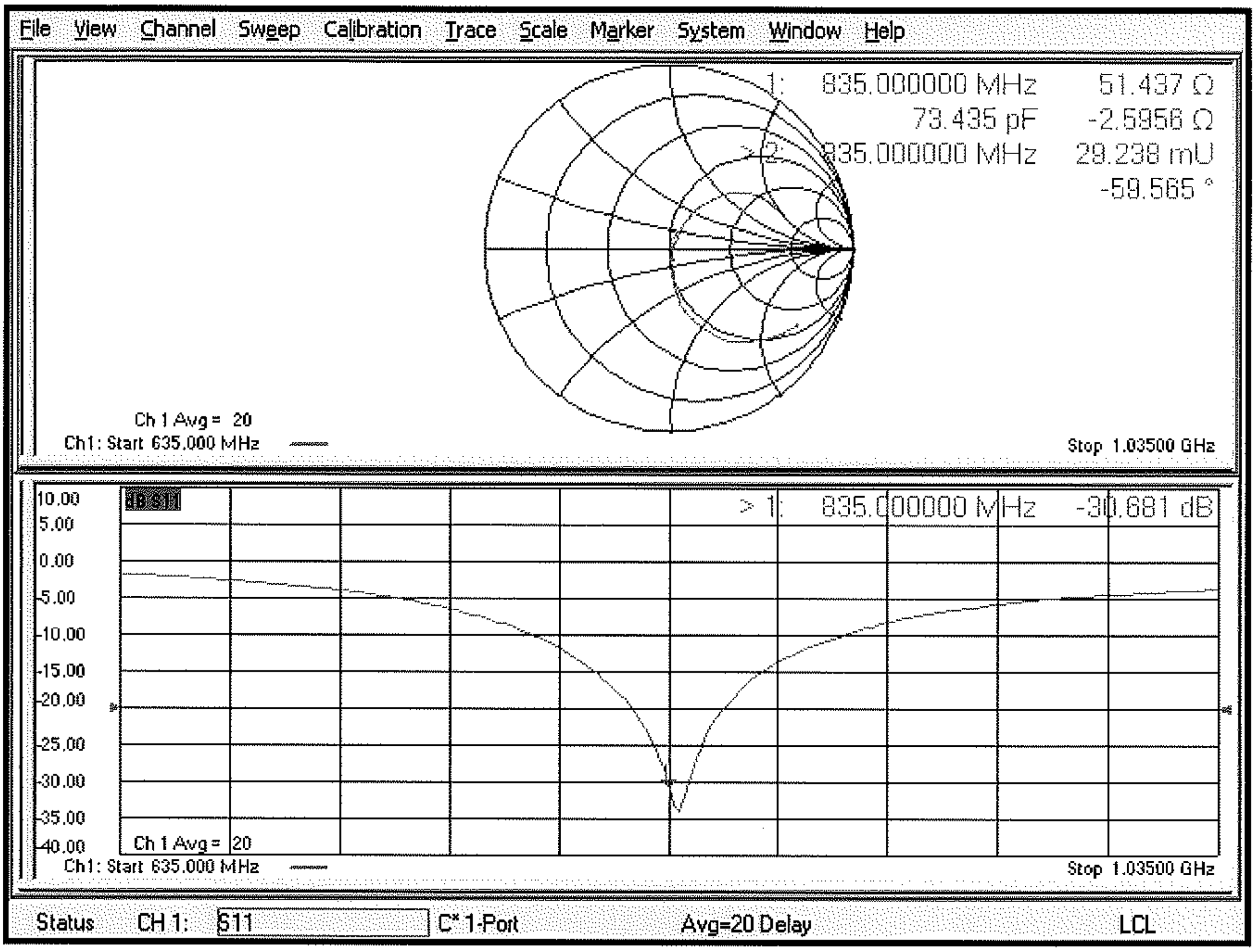
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.48 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg
Maximum value of SAR (measured) = 3.18 W/kg



0 dB = 3.18 W/kg = 5.02 dBW/kg

Impedance Measurement Plot for Head TSL



1: 835.000000 MHz 51.437 Ω
73.435 pF -2.5956 Ω
>2: 835.000000 MHz 29.238 mU
-59.565 °

Ch 1 Avg = 20
Ch1: Start 635.000 MHz
Stop 1.03500 GHz

> 1: 835.000000 MHz -30.681 dB

Ch 1 Avg = 20
Ch1: Start 635.000 MHz
Stop 1.03500 GHz

Status CH 1: S11 C* 1-Port Avg=20 Delay LCL

DASY5 Validation Report for Body TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

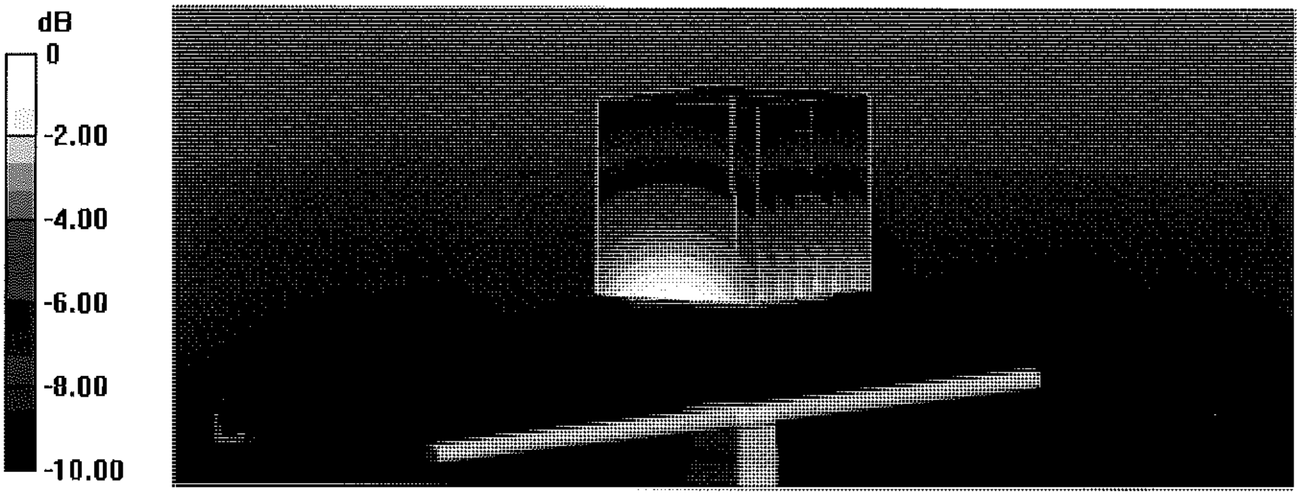
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 1.01$ S/m; $\varepsilon_r = 54.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.15, 10.15, 10.15) @ 835 MHz; Calibrated: 31.12.2018
- 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)

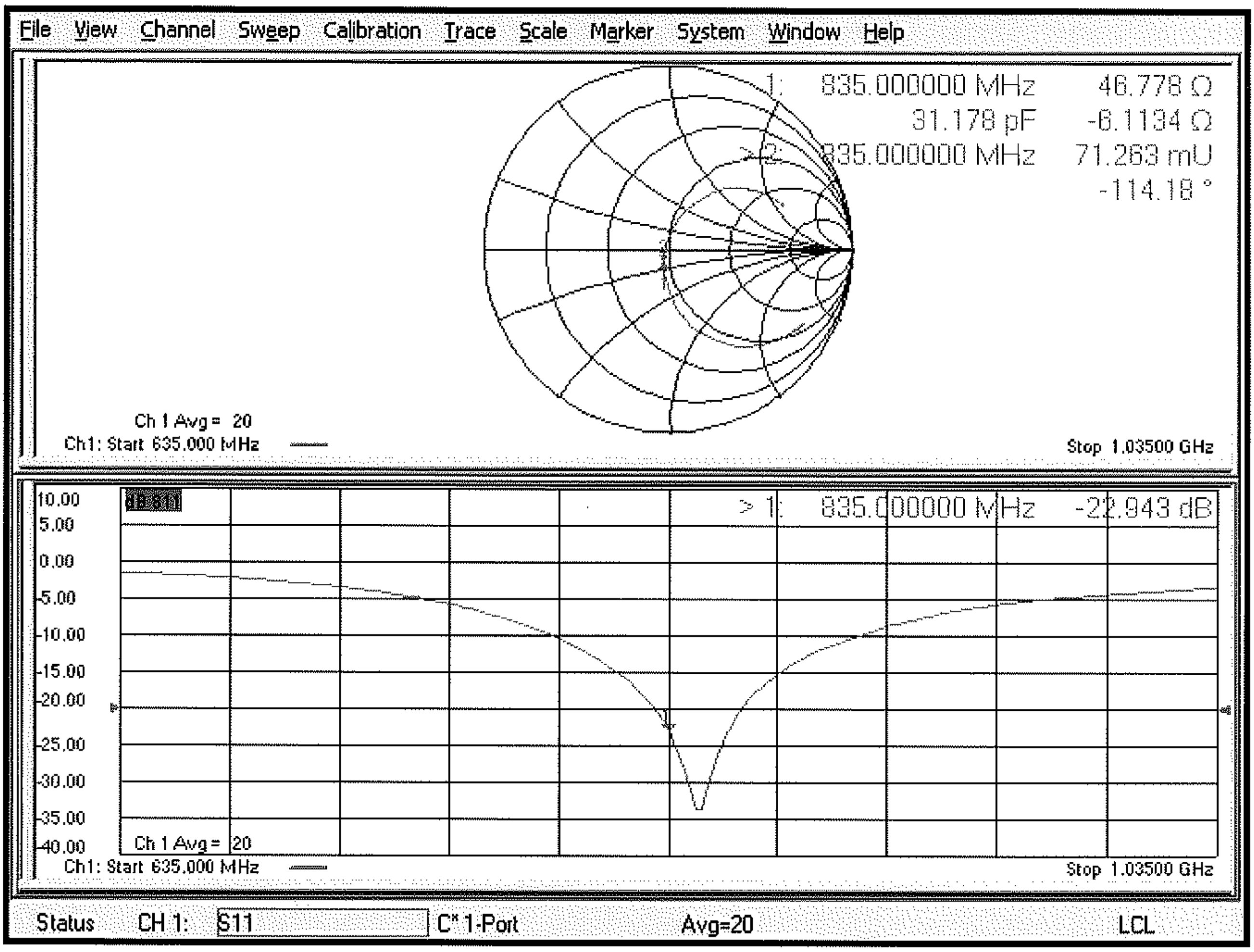
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.49 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 3.23 W/kg



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

Impedance Measurement Plot for Body TSL



```
 1:  835.000000 MHz    46.778 Ω
          31.178 pF   -6.1134 Ω
>2:  835.000000 MHz   71.263 mU
                       -114.18 °

> 1: 835.000000 MHz   -22.943 dB
```

```
Status   CH 1:  S11   C* 1-Port   Avg=20   LCL
```

Calibration Laboratory of
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Multilateral Agreement for the recognition of calibration certificates

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
Calibration date:	October 19, 2018

BN ✓
10/30/2018

BN ✓
10-20-2019

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 cm^3 (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 cm^3 (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 cm^3 (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 cm^3 (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

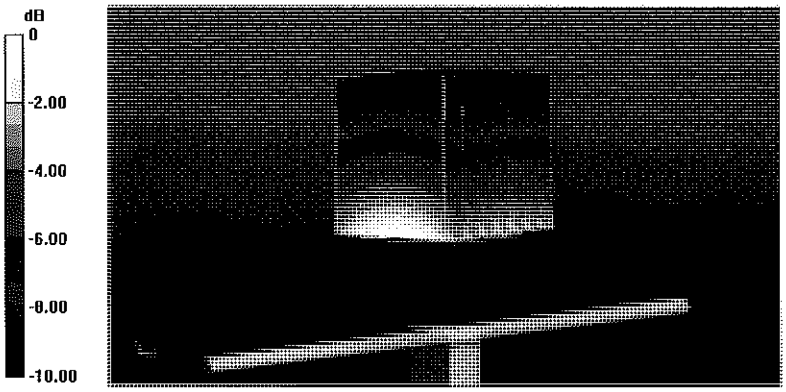
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.91$ S/m; $\varepsilon_r = 40.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 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)

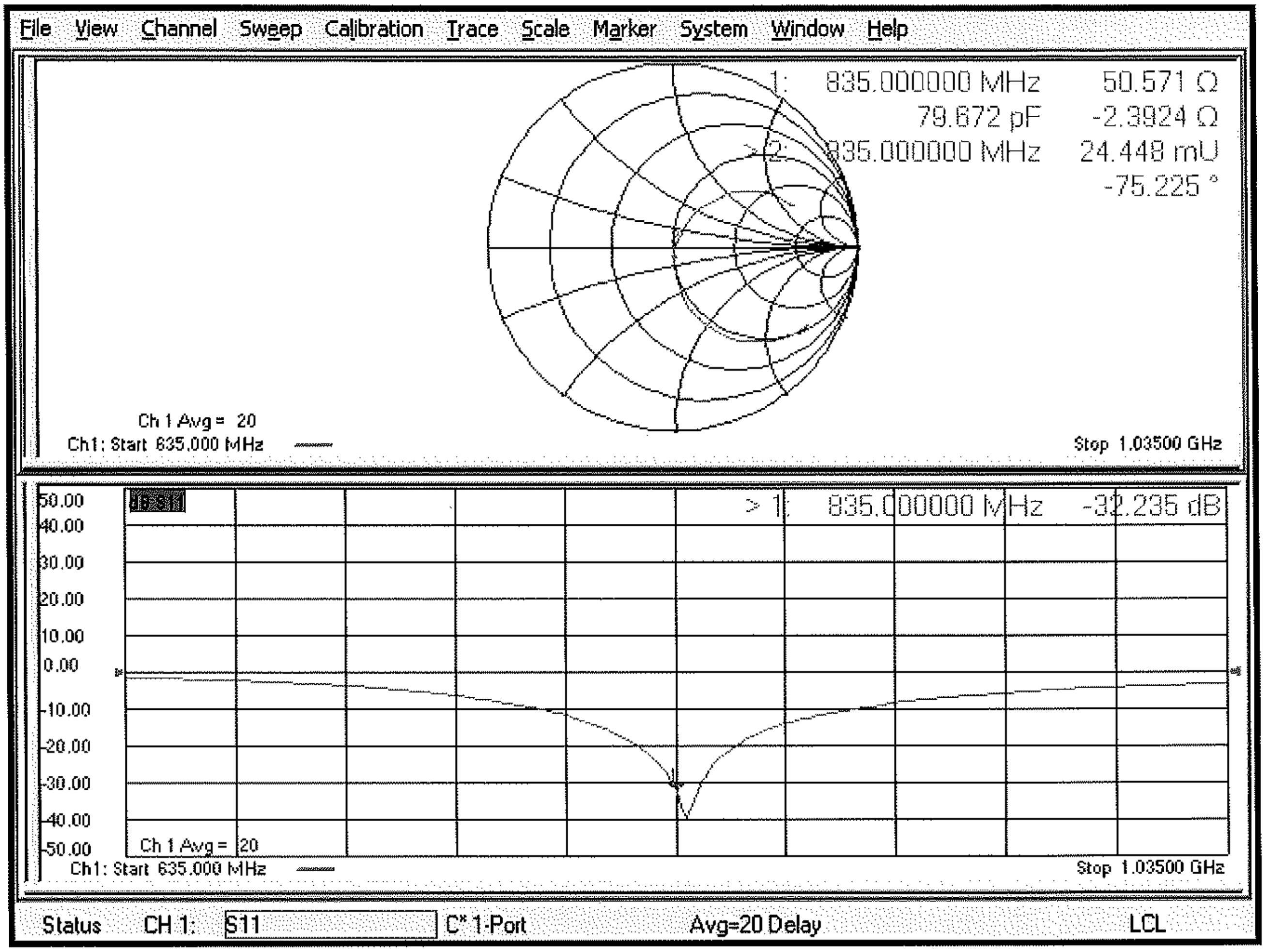
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



```
1:   835.000000 MHz     50.571 Ω
              79.672 pF  -2.3924 Ω
> 2: 835.000000 MHz     24.448 mU
                         -75.225 °
```

```
Ch 1 Avg = 20
Ch1: Start 635.000 MHz                Stop 1.03500 GHz
```

```
> 1: 835.000000 MHz   -32.235 dB
```

```
Ch 1 Avg = 20
Ch1: Start 635.000 MHz                Stop 1.03500 GHz
```

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

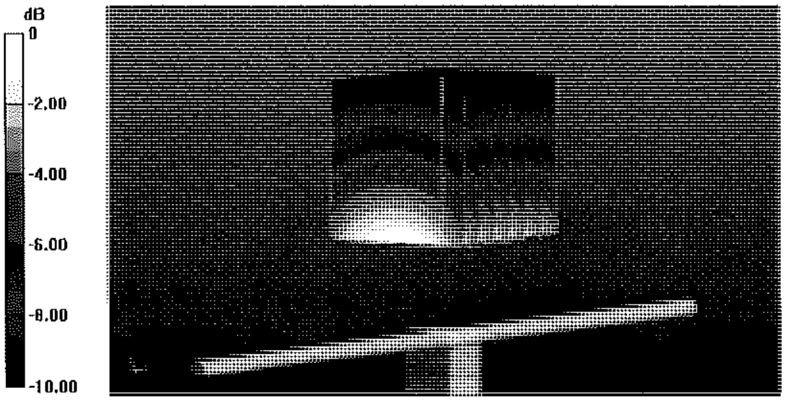
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.98$ S/m; $\varepsilon_r = 54.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(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)

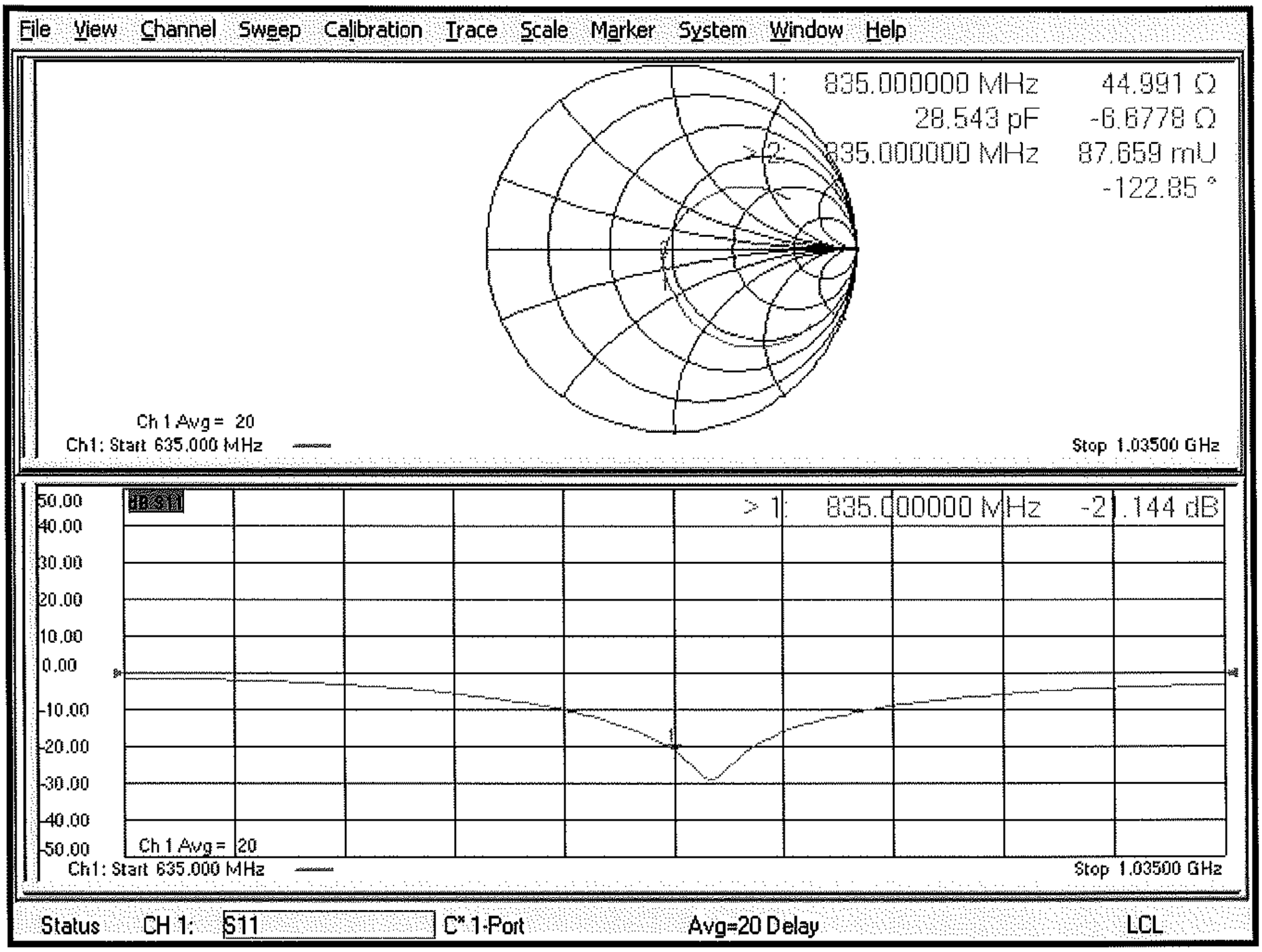
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



```
>1:  835.000000 MHz   44.991 Ω
                 28.543 pF   -6.6778 Ω
>2:  835.000000 MHz   87.659 mU
                             -122.85 °
Ch 1 Avg = 20
Ch1: Start 635.000 MHz                         Stop 1.03500 GHz

> 1:  835.000000 MHz   -21.144 dB
Ch 1 Avg = 20
Ch1: Start 635.000 MHz                         Stop 1.03500 GHz

Status   CH 1:  S11   C* 1-Port      Avg=20 Delay        LCL
```

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

Certification of Calibration

Object	D835V2 – SN:4d133
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	October 18, 2019
Description:	SAR Validation Dipole at 835 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/13/2019	Annual	8/13/2020	1041
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	11/20/2018	Annual	11/20/2019	1039008
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	9/19/2019	Annual	9/19/2020	7551
SPEAG	EX3DV4	SAR Probe	4/24/2019	Annual	4/24/2020	7357
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2019	Annual	9/17/2020	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/18/2019	Annual	4/18/2020	1407

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Team Lead Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

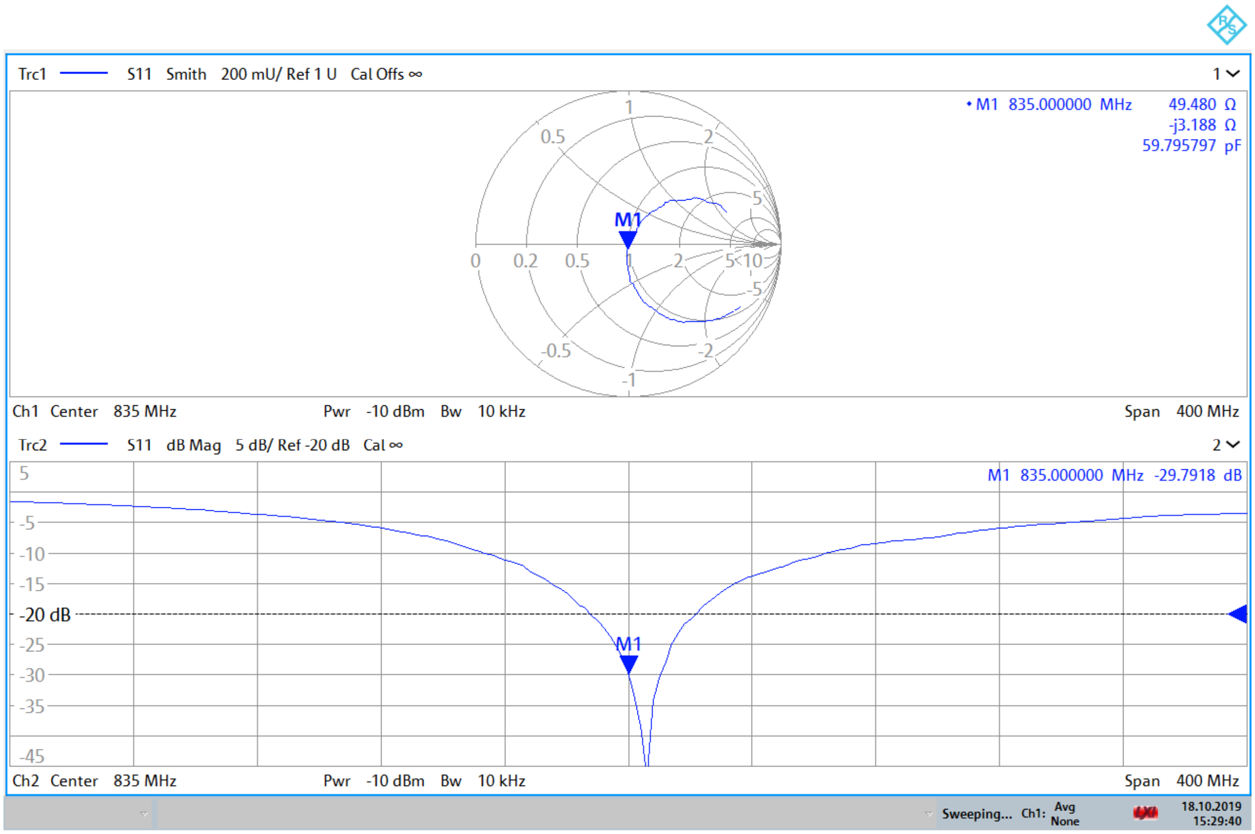
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 23.0 dBm	Measured Head SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 23.0 dBm	Measured Head SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
10/19/2018	10/18/2019	1.397	1.886	2.03	7.64%	1.22	1.32	8.20%	50.6	49.5	1.1	-2.4	-3.2	0.8	-32.2	-29.8	7.50%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
10/19/2018	10/18/2019	1.397	1.95	2.07	6.15%	1.28	1.36	6.25%	45	45.1	0.1	-6.7	-5.1	1.6	-21.1	-22.6	-6.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Trc1 S11 Smith 200 mU/ Ref 1 U Cal Offs ∞

• M1 835.000000 MHz 49.480 Ω
-j3.188 Ω
59.795797 pF

Ch1 Center 835 MHz Pwr -10 dBm Bw 10 kHz Span 400 MHz

Trc2 S11 dB Mag 5 dB/ Ref -20 dB Cal ∞

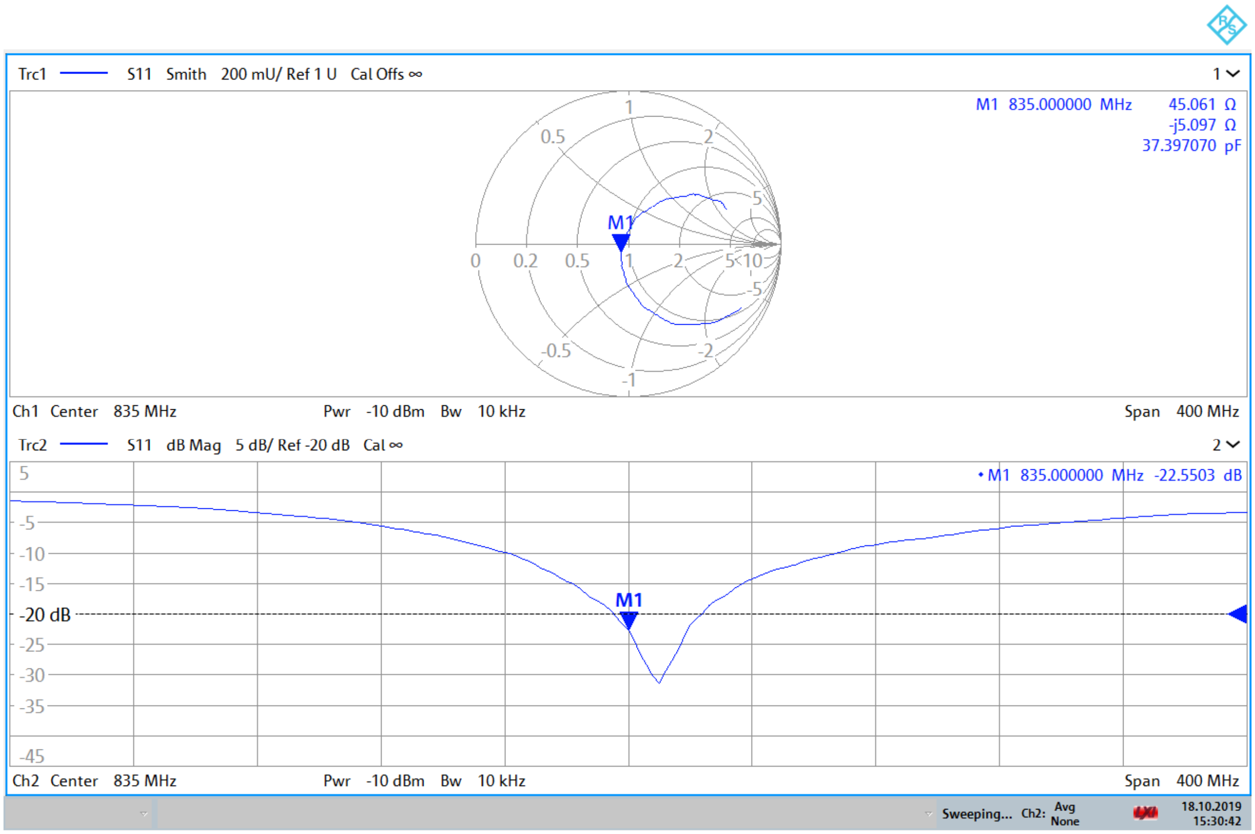
M1 835.000000 MHz -29.7918 dB

Ch2 Center 835 MHz Pwr -10 dBm Bw 10 kHz Span 400 MHz

Sweeping... Ch1: Avg None 18.10.2019 15:29:40

`15:29:41 18.10.2019`

Impedance & Return-Loss Measurement Plot for Body TSL



Trc1 S11 Smith 200 mU/ Ref 1 U Cal Offs ∞

M1 835.000000 MHz 45.061 Ω
-j5.097 Ω
37.397070 pF

Ch1 Center 835 MHz Pwr -10 dBm Bw 10 kHz Span 400 MHz

Trc2 S11 dB Mag 5 dB/ Ref -20 dB Cal ∞

• M1 835.000000 MHz -22.5503 dB

Ch2 Center 835 MHz Pwr -10 dBm Bw 10 kHz Span 400 MHz

Sweeping... Ch2: Avg None 18.10.2019 15:30:42

15:30:43 18.10.2019

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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1750V2-1148_May19**

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1148
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	May 15, 2019

BN✓
05-23-2019

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	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	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:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 15, 2019

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	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	40.0 ± 6 %	1.34 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.83 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.5 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.35 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.8 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.4 Ω - 0.2 jΩ
Return Loss	- 37.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 Ω - 0.5 jΩ
Return Loss	- 31.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 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

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 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.9 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.3 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.8 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.3 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.6 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (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 (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	7.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**28.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	3.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**16.0 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 08.05.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

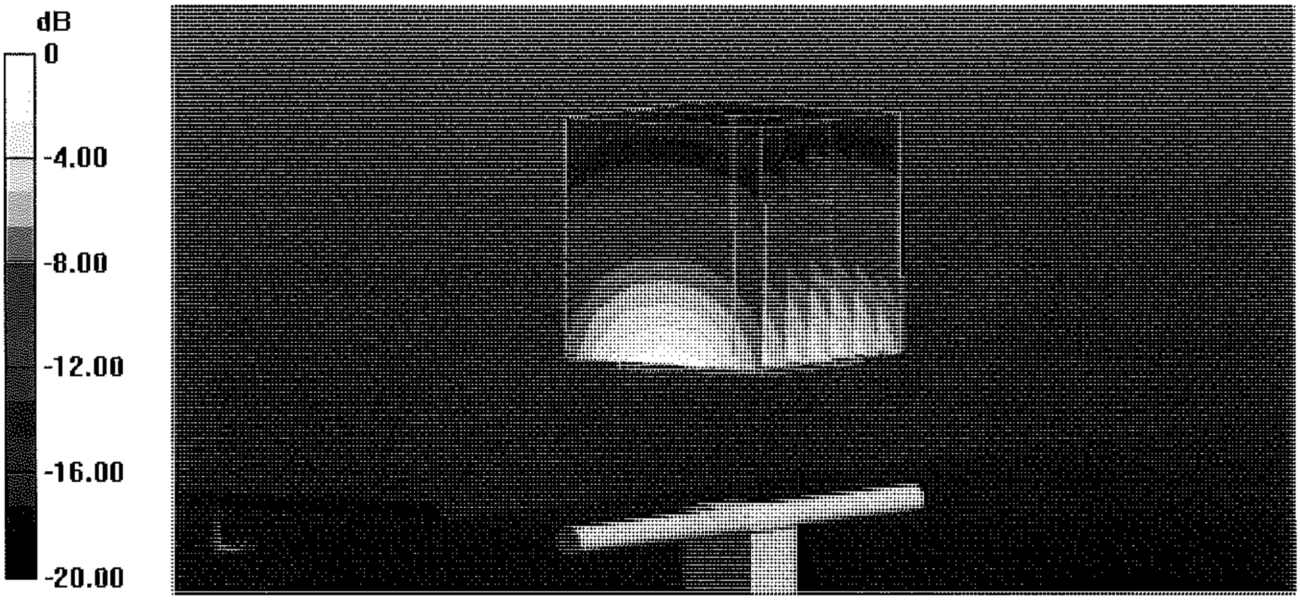
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma = 1.34$ S/m; $\varepsilon_r = 40$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.59, 8.59, 8.59) @ 1750 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

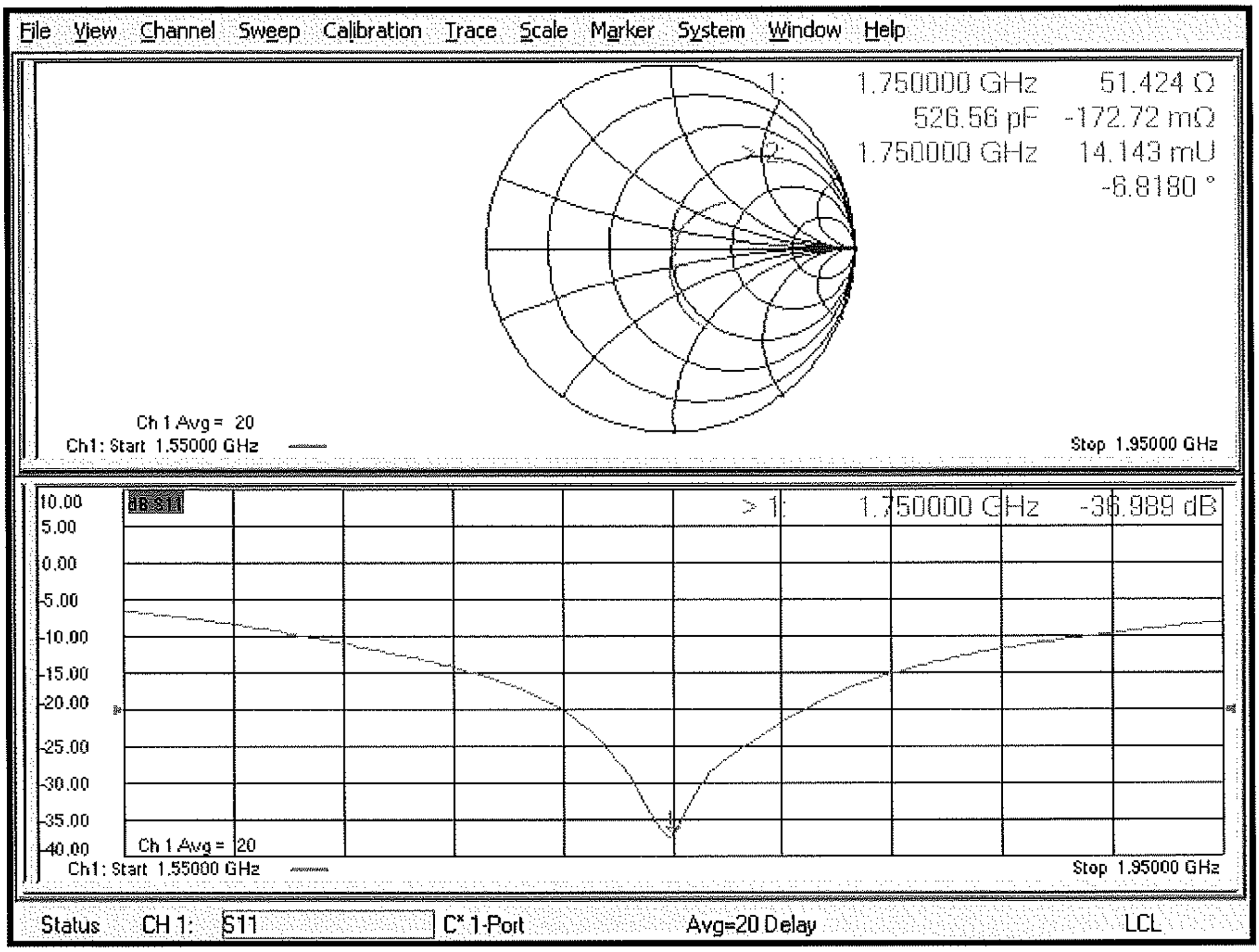
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.8 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.13 W/kg; SAR(10 g) = 4.83 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



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

Impedance Measurement Plot for Head TSL



```
1:  1.750000 GHz    51.424 Ω
        526.56 pF  -172.72 mΩ
>2: 1.750000 GHz    14.143 mU
                   -6.8180 °
Ch 1 Avg = 20
Ch1: Start 1.55000 GHz                 Stop 1.95000 GHz

> 1: 1.750000 GHz   -36.989 dB
Ch 1 Avg = 20
Ch1: Start 1.55000 GHz                 Stop 1.95000 GHz

Status  CH 1: S11   C* 1-Port   Avg=20 Delay   LCL
```

DASY5 Validation Report for Body TSL

Date: 08.05.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

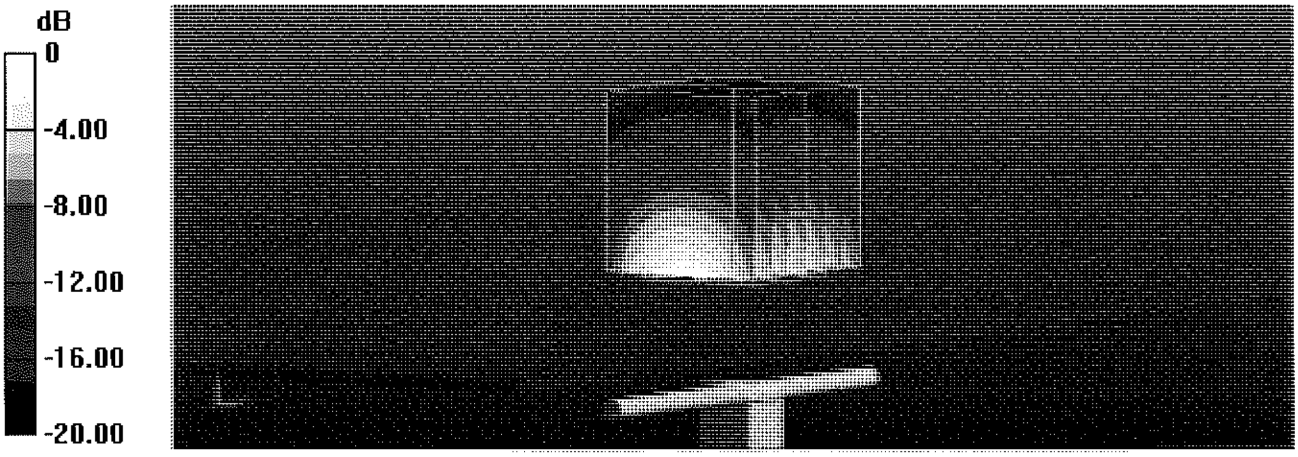
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma = 1.47$ S/m; $\varepsilon_r = 53.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43) @ 1750 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

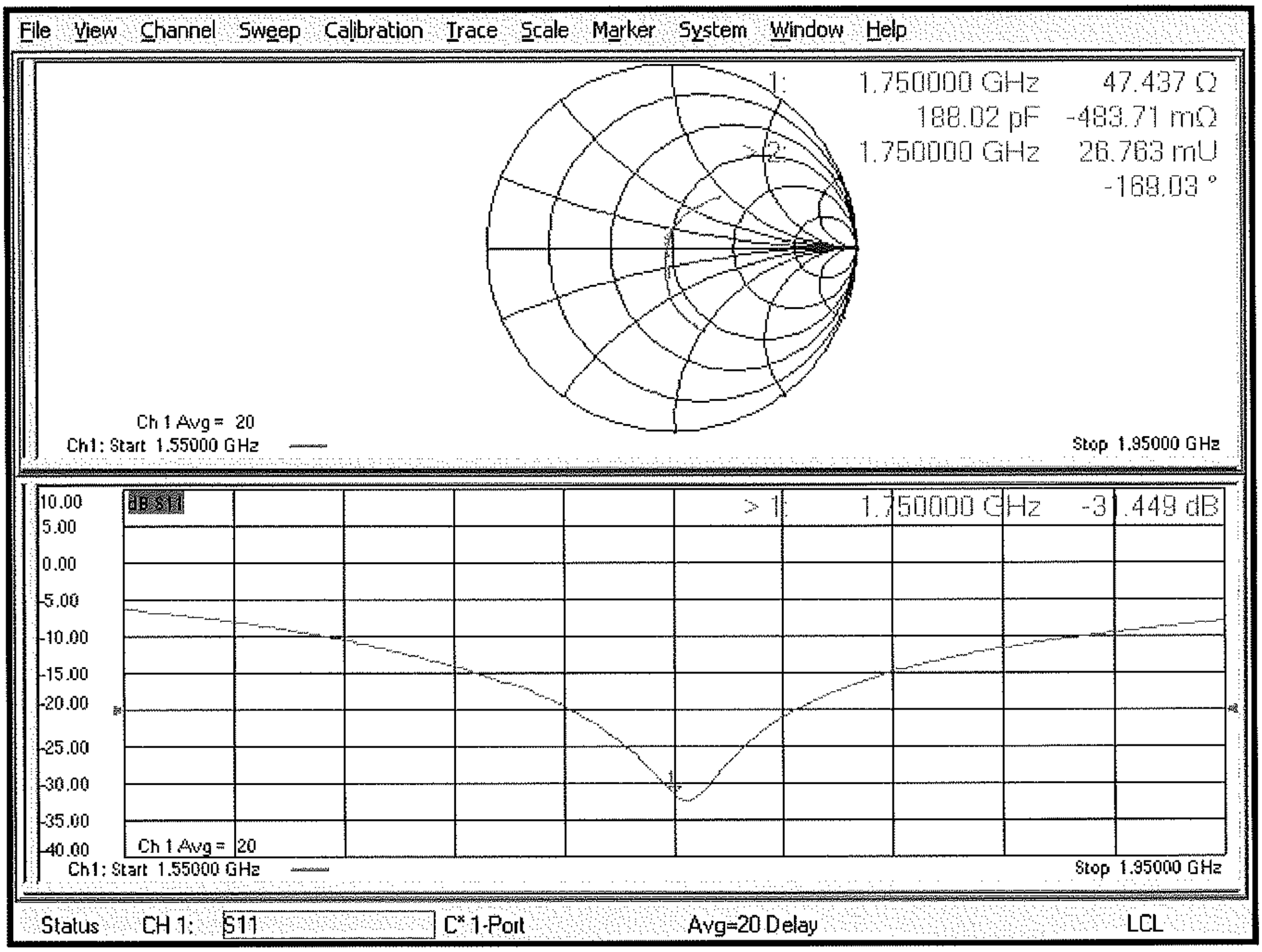
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.1 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.35 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.4 W/kg = 11.58 dBW/kg

Impedance Measurement Plot for Body TSL



```
1:      1.750000 GHz    47.437 Ω
            188.02 pF  -483.71 mΩ
> 2:    1.750000 GHz   26.763 mU
                        -169.03 °

Ch 1 Avg =  20
Ch1: Start  1.55000 GHz                    Stop  1.95000 GHz

> 1:    1.750000 GHz   -31.449 dB

Ch 1 Avg = 20
Ch1: Start  1.55000 GHz                    Stop  1.95000 GHz

CH 1:  S11
```

DASY5 Validation Report for SAM Head

Date: 15.05.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; $\sigma = 1.37$ S/m; $\varepsilon_r = 42.1$; $\rho = 1000$ kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

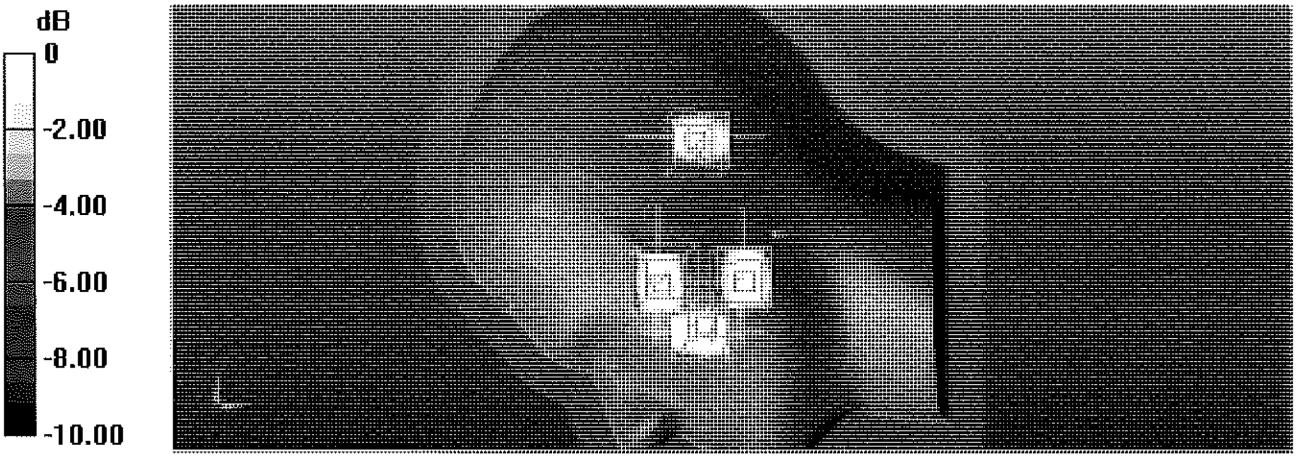
- Probe: EX3DV4 - SN7349; ConvF(8.59, 8.59, 8.59) @ 1750 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: SAM Head
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

SAM Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.2 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.38 W/kg; SAR(10 g) = 5.04 W/kg
Maximum value of SAR (measured) = 14.2 W/kg

SAM Head/Mouth/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) = 16.5 W/kg
SAR(1 g) = 9.34 W/kg; SAR(10 g) = 5.04 W/kg
Maximum value of SAR (measured) = 13.9 W/kg

SAM Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.3 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.95 W/kg
Maximum value of SAR (measured) = 13.1 W/kg

SAM Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.82 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 7.11 W/kg; SAR(10 g) = 3.98 W/kg
Maximum value of SAR (measured) = 10.2 W/kg



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

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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1900V2-5d080_Oct18

CALIBRATION CERTIFICATE

Object D1900V2 - SN:5d080

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

Calibration date: October 23, 2018

BN✓
10-30-2018

BN✓
10-20-2019

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.

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	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 7.9 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 8.1 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 28, 2006

DASY5 Validation Report for Head TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

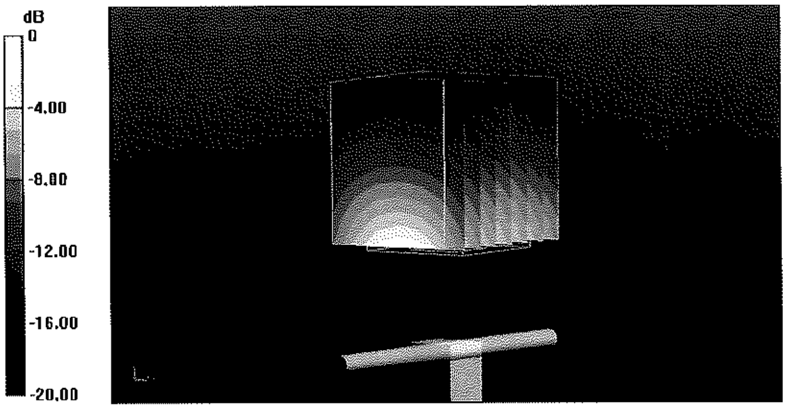
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

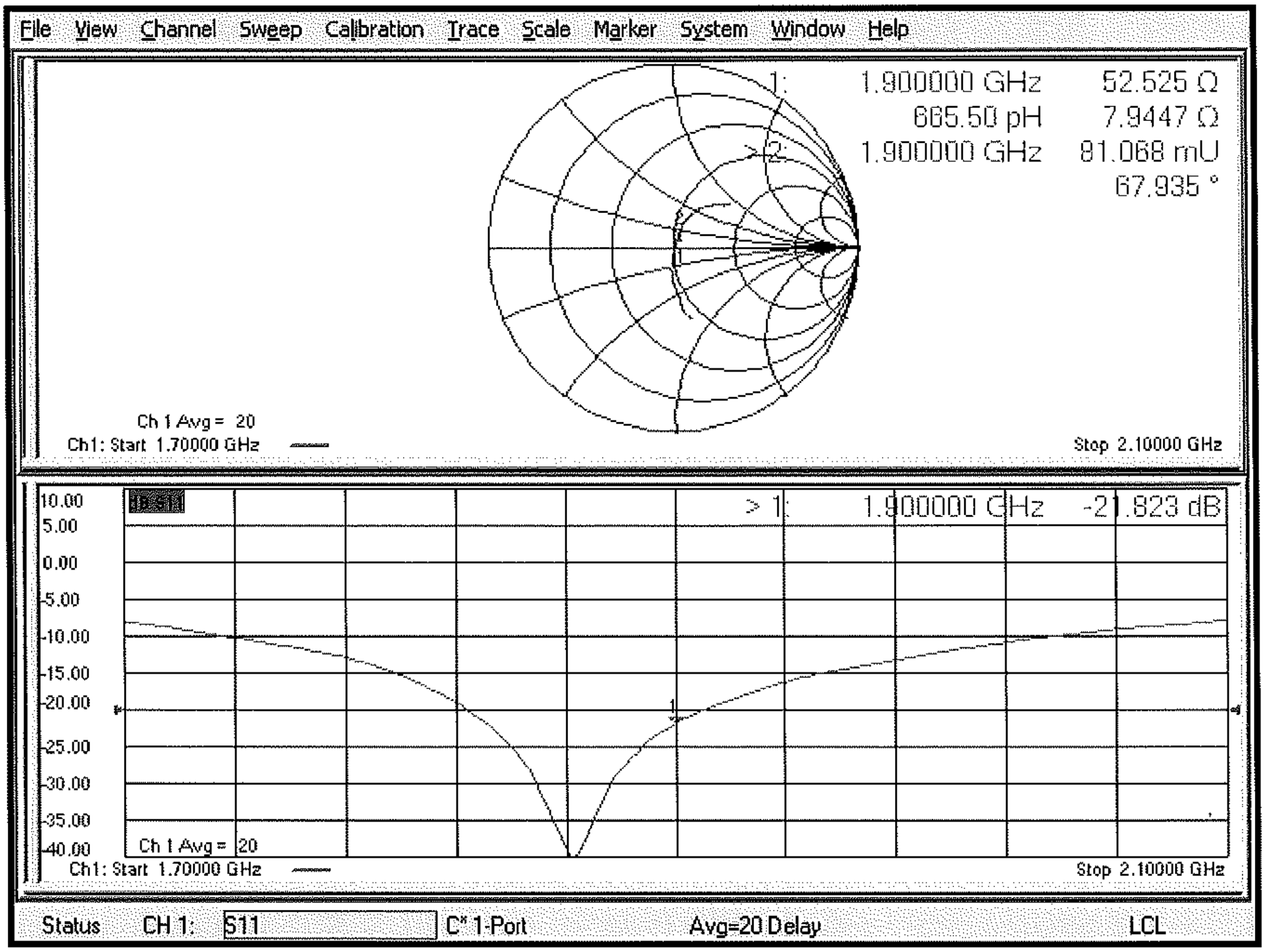
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.0 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg
Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg

Impedance Measurement Plot for Head TSL



```
1:   1.900000 GHz   52.525 Ω
     665.50 pH      7.9447 Ω
>2:  1.900000 GHz   81.068 mU
                    67.935 °

> 1:  1.900000 GHz   -21.823 dB

Status   CH 1:  S11   C* 1-Port   Avg=20 Delay   LCL
```

DASY5 Validation Report for Body TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

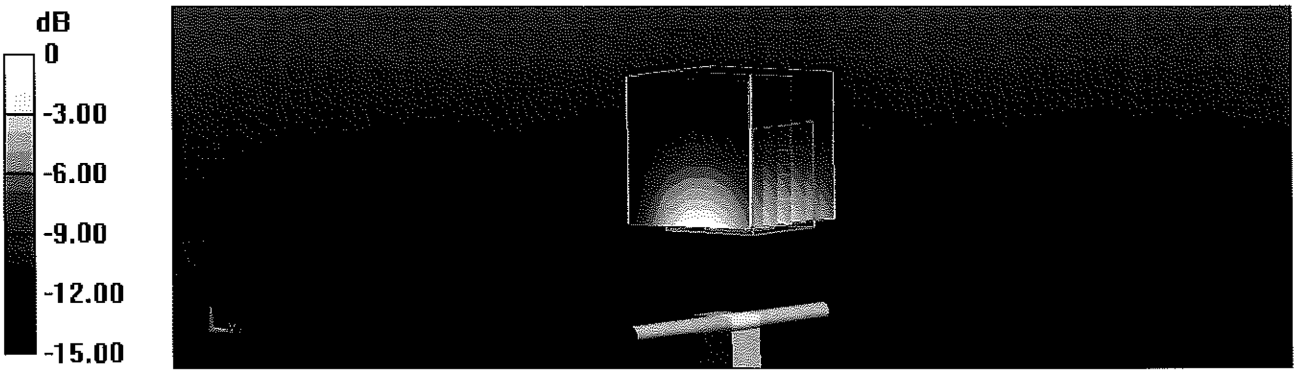
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.47$ S/m; $\varepsilon_r = 52.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

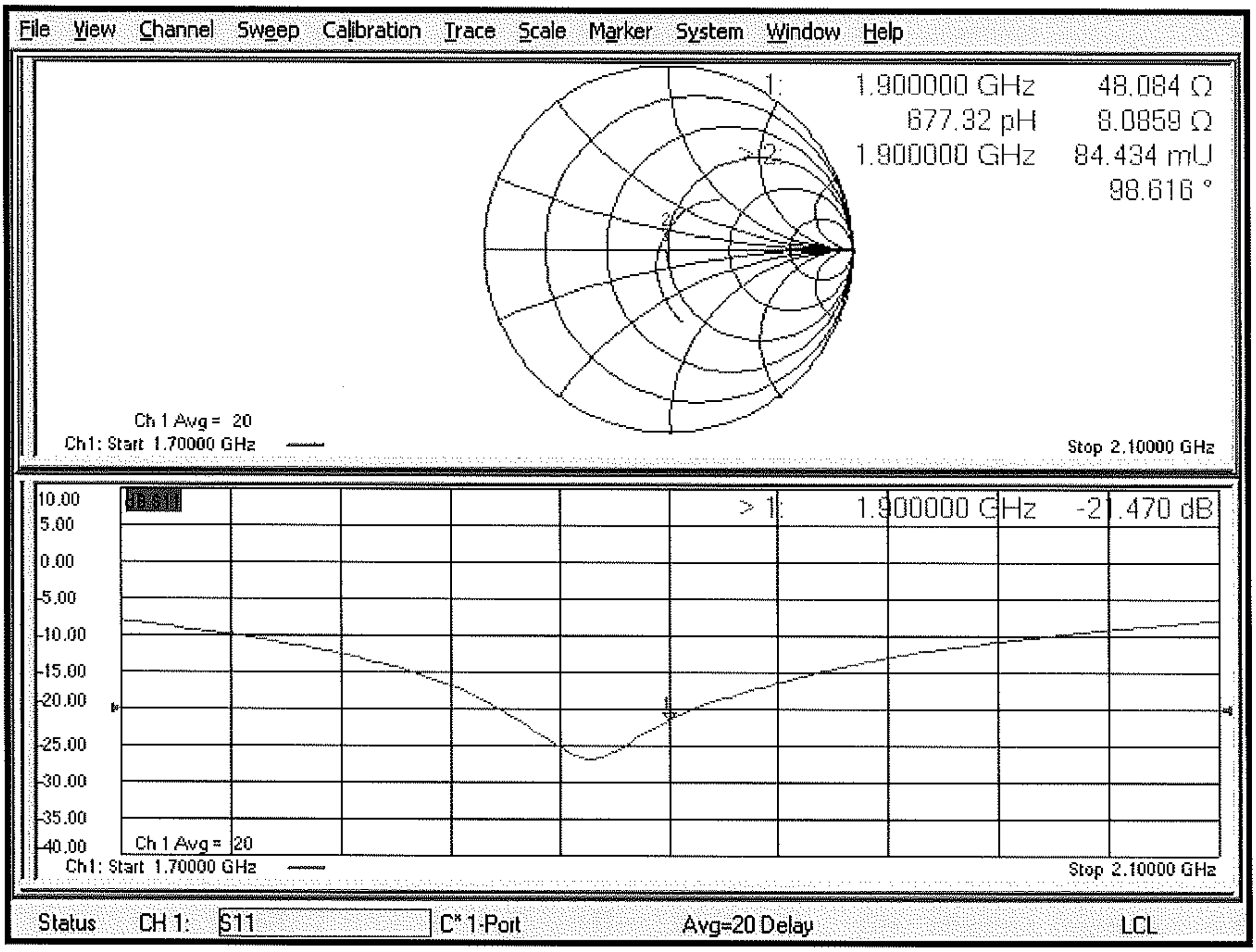
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.86 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.09 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



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

Impedance Measurement Plot for Body TSL



```
1:   1.900000 GHz   48.084 Ω
          677.32 pH   8.0859 Ω
>2:  1.900000 GHz   84.434 mU
                    98.616 °
Ch 1 Avg = 20
Ch1: Start 1.70000 GHz          Stop 2.10000 GHz

> 1:  1.900000 GHz   -21.470 dB
Ch 1 Avg = 20
Ch1: Start 1.70000 GHz          Stop 2.10000 GHz

Status   CH 1:  S11   C* 1-Port   Avg=20 Delay   LCL
```

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http://www.pctest.com

Certification of Calibration

Object	D1900V2 – SN:5d080
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	October 18, 2019
Description:	SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/13/2019	Annual	8/13/2020	1041
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	11/20/2018	Annual	11/20/2019	1039008
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	3914
SPEAG	EX3DV4	SAR Probe	5/16/2019	Annual	5/16/2020	7406
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/8/2019	Annual	5/8/2020	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/14/2019	Annual	2/14/2020	1272

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Team Lead Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	

DIPOLE CALIBRATION EXTENSION

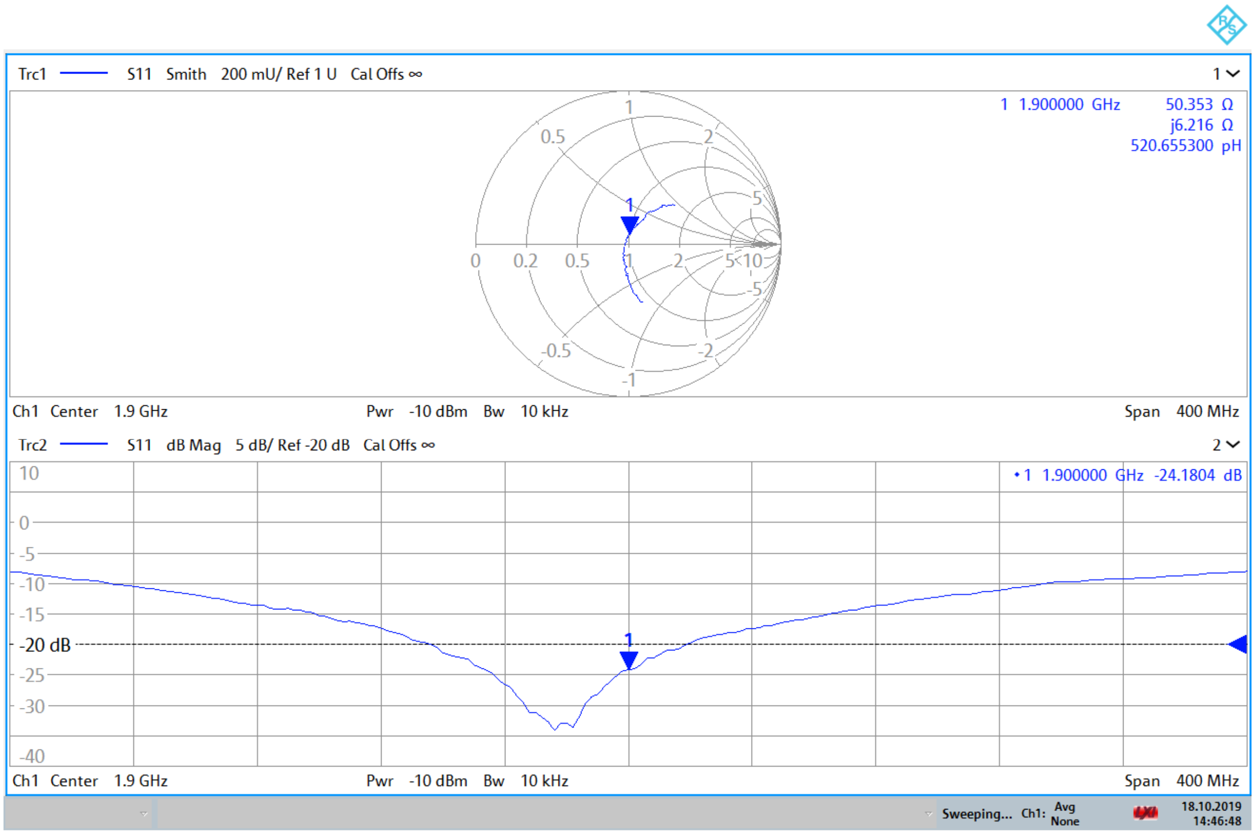
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2019	1.193	3.98	4.16	4.52%	2.07	2.13	2.90%	52.5	50.4	2.1	7.9	6.2	1.7	-21.8	-24.2	-10.90%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2019	1.193	3.92	4.21	7.40%	2.06	2.16	4.85%	48.1	46.5	1.6	8.1	6.6	1.5	-21.5	-22.2	-3.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



```
Trc1  S11  Smith  200 mU/ Ref 1 U  Cal Offs ∞                                1
                                                    1  1.900000 GHz    50.353 Ω
                                                                        j6.216 Ω
                                                                    520.655300 pH
Ch1  Center  1.9 GHz          Pwr  -10 dBm   Bw  10 kHz              Span  400 MHz
Trc2  S11  dB Mag  5 dB/ Ref -20 dB  Cal Offs ∞                               2
                                          • 1  1.900000 GHz  -24.1804 dB
Ch1  Center  1.9 GHz          Pwr  -10 dBm   Bw  10 kHz              Span  400 MHz
                                    Sweeping...  Ch1: Avg None   18.10.2019 14:46:48
```

14:46:49 18.10.2019