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SAR EVALUATION REPORT

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

Date of Testing:
10/03/17 - 10/31/17
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1710050266-01.A3L

FCC ID: A3LSMA730F

APPLICANT: SAMSUNG ELECTRONICS CO., LTD.

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: SM-A730F/DS
Additional Model(s): SM-A730F

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	0.18	0.32	0.54	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.28	0.92	N/A
PCE	UMTS 850	826.40 - 846.60 MHz	0.14	0.27	0.66	N/A
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.18	0.74	0.49	1.82
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.18	0.58	0.89	1.36
PCE	LTE Band 12	699.7 - 715.3 MHz	< 0.1	0.20	0.39	N/A
PCE	LTE Band 17	706.5 - 713.5 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	0.11	0.22	0.47	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.16	0.32	0.65	N/A
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.13	0.29	0.63	N/A
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.20	0.72	0.75	1.73
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.19	0.75	0.87	1.26
PCE	LTE Band 41	2498.5 - 2687.5 MHz	< 0.1	0.22	0.85	N/A
DTS	2.4 GHz WLAN	2412 - 2472 MHz	1.06	0.18	0.41	N/A
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	N/A	N/A
NII	U-NII-2A	5260 - 5320 MHz	0.61	0.51	N/A	2.60
NII	U-NII-2C	5500 - 5720 MHz	0.64	0.28	N/A	1.75
NII	U-NII-3	5745 - 5825 MHz	1.09	0.39	0.69	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.20	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.29	1.26	1.59	3.95

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

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

Randy Ortanez
President

TESTING CERT#2041.01

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

T A B L E   O F   C O N T E N T S

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 17	Voice/Data	706.5 - 713.5 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 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 single step power reduction mechanism for SAR compliance under portable hotspot conditions for some wireless modes and bands. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when hotspot is enabled. Detailed descriptions of the power reduction mechanism are included in the operational description.

This device uses a power reduction mechanism for SAR compliance. The power reduction mechanism is activated when the device is used in close proximity to the user's body. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device. Detailed descriptions of the power reduction mechanism are included in the operational description.

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

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.5**	**33.5**	**30.5**	**29.0**	**27.5**	**27.5**	**25.5**	**24.0**	**22.0**
	Nominal	**33.0**	**33.0**	**30.0**	**28.5**	**27.0**	**27.0**	**25.0**	**23.5**	**21.5**
GSM/GPRS/EDGE 1900	Maximum	**30.0**	**30.0**	**27.0**	**25.0**	**24.0**	**26.0**	**24.0**	**22.5**	**21.1**
	Nominal	**29.5**	**29.5**	**26.5**	**24.5**	**23.5**	**25.5**	**23.5**	**22.0**	**20.6**

Mode / Band		Modulated Average (dBm)			
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*	*3GPP DC-HSDPA*
UMTS Band 5 (850 MHz)	Maximum	**25.0**	**21.0**	**21.5**	**21.0**
	Nominal	**24.5**	**20.5**	**21.0**	**20.5**
UMTS Band 4 (1750 MHz)	Maximum	**23.0**	**22.0**	**22.5**	**22.0**
	Nominal	**22.5**	**21.5**	**22.0**	**21.5**
UMTS Band 2 (1900 MHz)	Maximum	**23.0**	**20.5**	**22.5**	**20.5**
	Nominal	**22.5**	**20.0**	**22.0**	**20.0**

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 17	Maximum	**24.0**
	Nominal	**23.5**
LTE Band 13	Maximum	**23.0**
	Nominal	**22.5**
LTE Band 5 (Cell)	Maximum	**25.0**
	Nominal	**24.5**
LTE Band 26 (Cell)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 66 (AWS)	Maximum	**23.0**
	Nominal	**22.5**
LTE Band 4 (AWS)	Maximum	**23.0**
	Nominal	**22.5**
LTE Band 2 (PCS)	Maximum	**23.0**
	Nominal	**22.5**
LTE Band 41	Maximum	**23.5**
	Nominal	**23.0**

Mode / Band		Modulated Average (dBm)				
		Ch 1-9	Ch 10	Ch 11	Ch 12	Ch 13
IEEE 802.11b (2.4 GHz)	Maximum	**18.5**			**16.5**	**14.5**
	Nominal	**18.0**			**16.0**	**14.0**
IEEE 802.11g (2.4 GHz)	Maximum	**16.5**	**15.5**	**13.5**	**11.5**	**3.0**
	Nominal	**16.0**	**15.0**	**13.0**	**11.0**	**2.5**
IEEE 802.11n (2.4 GHz)	Maximum	**16.5**	**15.5**	**13.5**	**11.5**	**3.0**
	Nominal	**16.0**	**15.0**	**13.0**	**11.0**	**2.5**

Mode / Band		Modulated Average (dBm)												
		20 MHz Bandwidth				40 MHz Bandwidth					80 MHz Bandwidth			
		Ch 36	Ch 40-60	Ch 64	Ch 100-165	Ch 38	Ch 46-54	Ch 62	Ch 102	Ch 118-159	Ch 42	Ch 58	Ch 106	Ch 122-155
IEEE 802.11a (5 GHz)	Maximum	13.5	15.5	14.5	15.5									
	Nominal	13.0	15.0	14.0	15.0									
IEEE 802.11n (5 GHz)	Maximum	13.5	15.5	14.5	15.5	8.5	14.5	7.5	12.5	14.5				
	Nominal	13.0	15.0	14.0	15.0	8.0	14.0	7.0	12.0	14.0				
IEEE 802.11ac (5 GHz)	Maximum	13.5	15.5	14.5	15.5	8.5	14.5	7.5	12.5	14.5	7.5	5.5	7.5	13.5
	Nominal	13.0	15.0	14.0	15.0	8.0	14.0	7.0	12.0	14.0	7.0	5.0	7.0	13.0

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	8.5
	Nominal	8.0
Bluetooth LE	Maximum	5.5
	Nominal	5.0

1.3.2 Reduced Output Power

Mode / Band		Modulated Average (dBm)			
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*	*3GPP DC-HSDPA*
UMTS Band 4 (1750 MHz)	Maximum	18.5	18.5	18.5	18.5
	Nominal	18.0	18.0	18.0	18.0
UMTS Band 2 (1900 MHz)	Maximum	18.5	18.5	18.5	18.5
	Nominal	18.0	18.0	18.0	18.0

Mode / Band		Modulated Average (dBm)
LTE Band 66 (AWS)	Maximum	18.5
	Nominal	18.0
LTE Band 4 (AWS)	Maximum	18.5
	Nominal	18.0
LTE Band 2 (PCS)	Maximum	18.5
	Nominal	18.0

Mode / Band		Modulated Average (dBm)			
		Ch 1-10	Ch 11	Ch 12	Ch 13
IEEE 802.11b (2.4 GHz)	Maximum	15.5			14.5
	Nominal	15.0			14.0
IEEE 802.11g (2.4 GHz)	Maximum	15.5	13.5	11.5	3.0
	Nominal	15.0	13.0	11.0	2.5
IEEE 802.11n (2.4 GHz)	Maximum	15.5	13.5	11.5	3.0
	Nominal	15.0	13.0	11.0	2.5

Mode / Band		Modulated Average (dBm)												
		20 MHz Bandwidth				40 MHz Bandwidth					80 MHz Bandwidth			
		Ch 36	Ch 40-60	Ch 64	Ch 100-165	Ch 38	Ch 46-54	Ch 62	Ch 102	Ch 118-159	Ch 42	Ch 58	Ch 106	Ch 122-155
IEEE 802.11a (5 GHz)	Maximum	13.5	15.5	14.5	15.5									
	Nominal	13.0	15.0	14.0	15.0									
IEEE 802.11n (5 GHz)	Maximum	13.5				8.5	13.5	7.5	12.5	13.5				
	Nominal	13.0				8.0	13.0	7.0	12.0	13.0				
IEEE 802.11ac (5 GHz)	Maximum	13.5				8.5	13.5	7.5	12.5	13.5	7.5	5.5	7.5	13.5
	Nominal	13.0				8.0	13.0	7.0	12.0	13.0	7.0	5.0	7.0	13.0

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

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

1.5 Near Field Communications (NFC) Antenna

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

1.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

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	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
5	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
6	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
7	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
8	LTE + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
9	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
10	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	Yes	
11	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	Yes	Yes	
12	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	Yes^	Yes	

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-NII2A, and U-NII2C were not evaluated for wireless router conditions.
6. This device supports VOLTE.
7. This device supports VoWIFI.

1.7 Miscellaneous SAR Test Considerations

(A) WIFI/BT

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

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

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

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, body-worn Bluetooth SAR was not required; [(7/15)* √2.480] = 0.7< 3.0. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, Hotspot Bluetooth SAR was not required; [(7/10)* √2.480] = 1.1< 3.0. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

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

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, phablet Bluetooth SAR was not required; [(7/ 5)* √2.480] = 2.2< 7.5. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

This device supports IEEE 802.11ac with the following features:

a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 1 Tx antenna output
d) 256 QAM is supported
e) TDWR and Band gap channels are supported

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

(B) Licensed Transmitter(s)

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

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r04.

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

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

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)

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					
FCC ID	A3LSMA730F				
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)		715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)		714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)		713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)		711 (23130)
LTE Band 17: 5 MHz	706.5 (23755)		710 (23790)		713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)		710 (23790)		711 (23800)
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)		784.5 (23255)
LTE Band 13: 10 MHz	N/A		782 (23230)		N/A
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)		848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)		847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)		846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)		844 (20600)
LTE Band 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)		848.3 (27033)
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)		847.5 (27025)
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)		846.5 (27015)
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)		844 (26990)
LTE Band 26 (Cell): 15 MHz	821.5 (26765)		831.5 (26865)		841.5 (26965)
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)		1779.3 (132665)
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)		1778.5 (132657)
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)		1777.5 (132647)
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)		1775 (132622)
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)		1772.5 (132597)
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)		1770 (132572)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)		1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)		1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)		1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)		1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)		1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)		1745 (20300)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)		1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)		1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)		1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)		1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)		1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)		1900 (19100)
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	DL UE Cat 11 (QPSK, 16QAM, 64QAM, 256QAM) UL UE Cat 5 (QPSK, 16QAM, 64QAM)				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 12. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 10 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

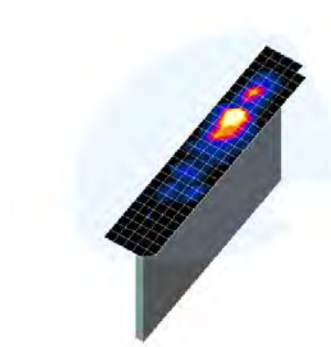

Figure 4-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
   a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

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

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

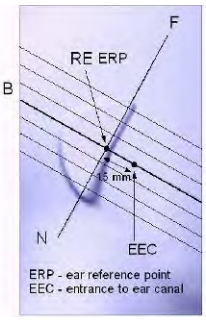

Figure 5-1
Close-Up Side view of ERP

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

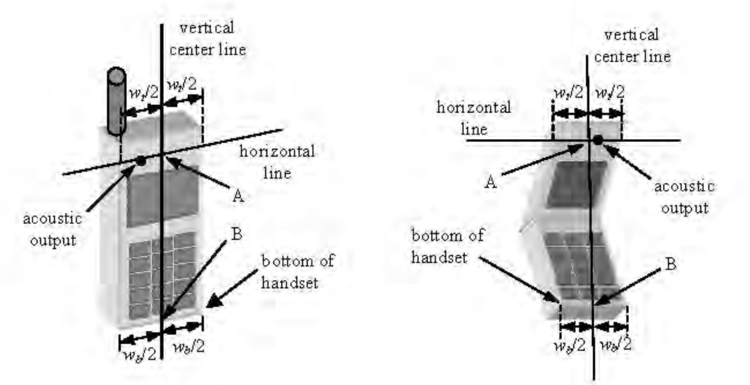

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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.

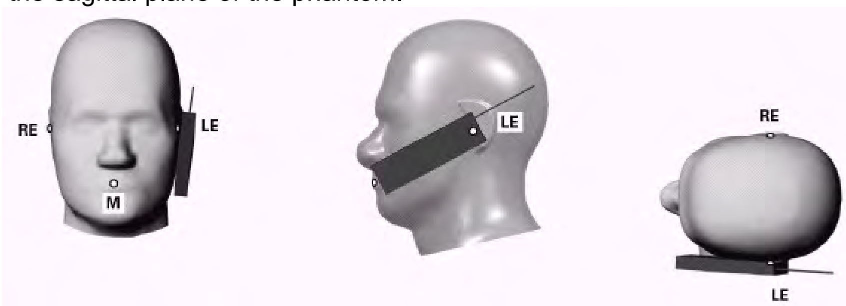

Figure 6-1 Front, Side and Top View of Cheek Position

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).

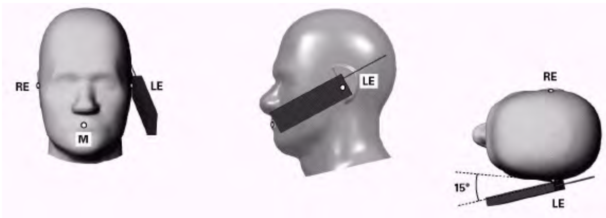

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

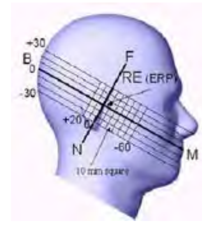

Figure 6-3
Side view w/ relevant markings

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

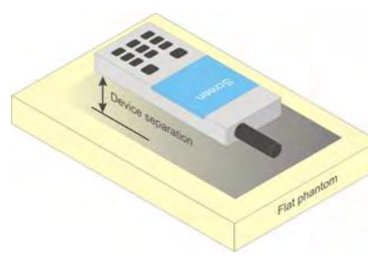

Figure 6-4
Sample Body-Worn Diagram

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.

6.1 Proximity Sensor Considerations

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

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. Sensor triggering distance summary data is included in Appendix G.

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

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 DPDCHn 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 DPDCHn, for the highest reported SAR configuration in 12.2 kbps RMC.

8.4.4 SAR Measurements with Rel 5 HSDPA

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

8.4.5 SAR Measurements with Rel 6 HSUPA

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

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

8.4.6 SAR Measurement Conditions for DC-HSDPA

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

8.5 SAR Measurement Conditions for LTE

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

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 ≤ 0.6 W/kg for LTE Band 41 and ≤ 0.8 W/kg for other LTE Bands, 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. For every supported combination of downlink only carrier aggregation, additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

8.6 SAR Testing with 802.11 Transmitters

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

8.6.1 General Device Setup

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

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

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

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. 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 OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is › 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.6.6 OFDM Transmission Mode and SAR Test Channel Selection

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

8.6.7 Initial Test Configuration Procedure

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

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 8.6.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

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.

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	32.54	32.56	29.53	**27.15**	25.72	26.94	24.21	22.23	20.44
	190	32.73	32.72	29.58	**27.39**	25.94	27.04	24.45	22.23	20.42
	251	32.81	32.78	29.81	**27.25**	25.93	26.96	24.26	22.28	20.37
GSM 1900	512	29.93	29.82	25.56	24.56	**23.39**	25.58	23.34	22.20	20.29
	661	29.84	29.86	25.59	24.77	**23.47**	25.55	23.43	22.10	20.66
	810	29.99	29.96	25.97	25.00	**24.00**	25.95	23.71	22.50	21.08
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	23.51	23.53	23.51	**22.89**	22.71	17.91	18.19	17.97	17.43
	190	23.70	23.69	23.56	**23.13**	22.93	18.01	18.43	17.97	17.41
	251	23.78	23.75	23.79	**22.99**	22.92	17.93	18.24	18.02	17.36
GSM 1900	512	20.90	20.79	19.54	20.30	**20.38**	16.55	17.32	17.94	17.28
	661	20.81	20.83	19.57	20.51	**20.46**	16.52	17.41	17.84	17.65
	810	20.96	20.93	19.95	20.74	**20.99**	16.92	17.69	18.24	18.07
GSM 850	**Frame Avg.Targets:**	23.97	23.97	23.98	**24.24**	23.99	17.97	18.98	19.24	18.49
GSM 1900		20.47	20.47	20.48	20.24	**20.49**	16.47	17.48	17.74	17.59

Note:

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

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

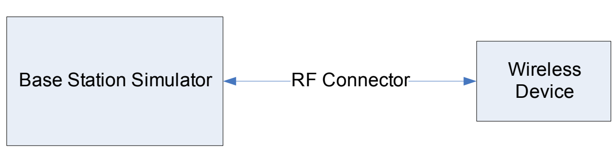

Figure 9-1
Power Measurement Setup

9.2 UMTS Conducted Powers

Table 9-2
Maximum Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	24.64	24.65	24.60	22.15	22.46	22.38	22.45	22.35	22.61	-
99		12.2 kbps AMR	24.64	23.56	24.59	22.13	21.87	22.35	22.41	21.30	22.61	-
6	HSDPA	Subtest 1	20.95	20.84	20.85	21.27	21.60	21.51	20.19	19.99	20.21	0
6		Subtest 2	20.01	19.75	19.83	20.50	20.80	20.71	19.32	19.22	19.38	0
6		Subtest 3	20.03	19.77	19.82	19.50	19.79	19.73	18.26	18.18	18.36	0.5
6		Subtest 4	18.85	18.81	18.85	19.51	19.77	19.74	18.30	18.19	18.40	0.5
6	HSUPA	Subtest 1	19.51	19.33	19.36	20.23	20.50	20.47	20.50	20.37	20.58	0
6		Subtest 2	17.50	17.31	17.42	17.70	18.02	17.97	18.07	18.00	18.16	2
6		Subtest 3	19.54	19.40	19.38	20.26	20.57	20.51	20.60	20.50	20.70	1
6		Subtest 4	17.53	17.40	17.39	17.72	18.04	17.97	18.06	17.98	18.14	2
6		Subtest 5	21.50	21.42	21.41	22.16	22.50	22.42	22.44	22.38	22.50	0
8	DC-HSDPA	Subtest 1	20.95	20.94	20.91	21.44	21.65	21.57	20.33	20.23	20.42	0
8		Subtest 2	20.30	19.98	19.94	20.58	20.74	20.69	19.41	19.28	19.58	0
8		Subtest 3	19.30	19.50	19.10	19.51	19.71	19.70	18.32	18.27	18.43	0.5
8		Subtest 4	18.82	18.91	18.86	19.52	19.79	19.69	18.37	18.26	18.44	0.5

Table 9-3
Reduced Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	18.21	18.46	18.38	18.34	18.25	18.48	-
99		12.2 kbps AMR	18.24	18.45	18.36	18.33	18.26	18.50	-
6	HSDPA	Subtest 1	18.18	18.44	18.36	18.47	18.38	18.50	0
6		Subtest 2	18.24	18.34	18.44	18.48	18.43	18.49	0
6		Subtest 3	18.25	18.49	18.43	18.27	18.18	18.36	0.5
6		Subtest 4	18.24	18.49	18.42	18.26	18.20	18.38	0.5
6	HSUPA	Subtest 1	17.23	17.55	17.47	17.61	17.55	17.70	0
6		Subtest 2	17.16	17.59	17.53	17.68	17.57	17.73	2
6		Subtest 3	17.26	17.58	17.50	17.65	17.48	17.67	1
6		Subtest 4	17.26	17.50	17.55	17.67	17.57	17.65	2
6		Subtest 5	18.22	18.47	18.39	18.50	18.41	18.50	0
8	DC-HSDPA	Subtest 1	18.22	18.38	18.31	18.49	18.47	18.50	0
8		Subtest 2	18.25	18.39	18.37	18.36	18.47	18.47	0
8		Subtest 3	18.25	18.42	18.34	18.31	18.19	18.38	0.5
8		Subtest 4	18.27	18.44	18.38	18.31	18.20	18.37	0.5

DC-HSDPA considerations

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

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

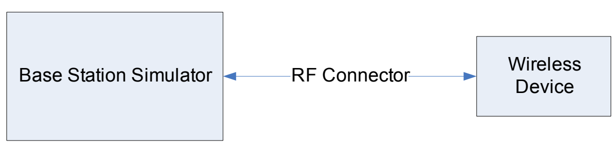

Figure 9-2
Power Measurement Setup

9.3 LTE Conducted Powers

9.3.1 LTE Band 12

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

LTE Band 12 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23095 (707.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**23.41**	0	0
	1	25	23.40		0
	1	49	23.37		0
	25	0	**22.40**	0-1	1
	25	12	22.36		1
	25	25	22.36		1
	50	0	22.35		1
16QAM	1	0	22.45	0-1	1
	1	25	22.11		1
	1	49	22.07		1
	25	0	21.21	0-2	2
	25	12	21.23		2
	25	25	21.30		2
	50	0	21.32		2
64QAM	1	0	21.47	0-2	2
	1	25	21.44		2
	1	49	21.33		2
	25	0	20.29	0-3	3
	25	12	20.25		3
	25	25	20.22		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 23035 (701.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23155 (713.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.33	23.23	23.22	0	0
	1	12	23.34	23.23	23.35		0
	1	24	23.28	23.20	23.31		0
	12	0	22.32	22.36	22.32	0-1	1
	12	6	22.31	22.29	22.26		1
	12	13	22.32	22.35	22.30		1
	25	0	22.32	22.29	22.32		1
16QAM	1	0	22.29	21.98	22.37	0-1	1
	1	12	22.36	21.87	22.37		1
	1	24	22.32	21.81	22.34		1
	12	0	21.36	21.24	21.36	0-2	2
	12	6	21.44	21.23	21.30		2
	12	13	21.34	21.21	21.31		2
	25	0	21.29	21.19	21.22		2
64QAM	1	0	21.25	21.09	21.15	0-2	2
	1	12	21.20	21.01	21.12		2
	1	24	21.15	21.01	21.17		2
	12	0	20.23	20.14	20.26	0-3	3
	12	6	20.21	20.14	20.22		3
	12	13	20.23	20.15	20.23		3
	25	0	20.22	20.15	20.20		3

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

LTE Band 12 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23025 (700.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23165 (714.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.29	23.24	23.23	0	0
	1	7	23.40	23.27	23.27		0
	1	14	23.38	23.26	23.26		0
	8	0	22.37	22.24	22.30	0-1	1
	8	4	22.35	22.24	22.24		1
	8	7	22.39	22.20	22.26		1
	15	0	22.34	22.24	22.29		1
16QAM	1	0	22.24	22.07	22.05	0-1	1
	1	7	22.30	21.96	21.93		1
	1	14	22.26	21.90	21.96		1
	8	0	21.26	21.15	21.36	0-2	2
	8	4	21.29	21.15	21.22		2
	8	7	21.27	21.16	21.22		2
	15	0	21.32	21.08	21.28		2
64QAM	1	0	21.03	20.95	21.02	0-2	2
	1	7	21.04	20.93	21.00		2
	1	14	21.03	20.97	20.97		2
	8	0	20.21	20.16	20.24	0-3	3
	8	4	20.23	20.09	20.14		3
	8	7	20.22	20.08	20.19		3
	15	0	20.15	20.09	20.17		3

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

LTE Band 12 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23017 (699.7 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23173 (715.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.29	23.15	23.29	0	0
	1	2	23.36	23.16	23.28		0
	1	5	23.37	23.17	23.28		0
	3	0	23.39	23.12	23.31		0
	3	2	23.40	23.21	23.33		0
	3	3	23.37	23.20	23.32		0
	6	0	22.39	22.20	22.29	0-1	1
16QAM	1	0	21.91	22.04	21.93	0-1	1
	1	2	21.89	21.98	21.96		1
	1	5	21.91	22.01	21.89		1
	3	0	22.32	22.24	22.24		1
	3	2	22.33	22.24	22.25		1
	3	3	22.37	22.23	22.29		1
	6	0	21.33	21.24	21.34	0-2	2
64QAM	1	0	21.21	20.96	20.99	0-2	2
	1	2	21.13	20.84	20.87		2
	1	5	21.15	20.83	20.90		2
	3	0	21.29	21.17	21.23		2
	3	2	21.26	21.17	21.19		2
	3	3	21.36	21.15	21.22		2
	6	0	20.21	20.03	20.17	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 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.76**	0	0
	1	25	22.68		0
	1	49	22.65		0
	25	0	21.57	0-1	1
	25	12	**21.58**		1
	25	25	21.55		1
	50	0	21.55		1
16QAM	1	0	21.33	0-1	1
	1	25	21.25		1
	1	49	21.28		1
	25	0	20.46	0-2	2
	25	12	20.41		2
	25	25	20.44		2
	50	0	20.47		2
64QAM	1	0	20.67	0-2	2
	1	25	20.63		2
	1	49	20.56		2
	25	0	19.49	0-3	3
	25	12	19.34		3
	25	25	19.35		3
	50	0	19.43		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 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.70	0	0
	1	12	22.58		0
	1	24	22.57		0
	12	0	21.54	0-1	1
	12	6	21.55		1
	12	13	21.52		1
	25	0	21.52		1
16QAM	1	0	21.29	0-1	1
	1	12	21.22		1
	1	24	21.25		1
	12	0	20.43	0-2	2
	12	6	20.40		2
	12	13	20.41		2
	25	0	20.44		2
64QAM	1	0	20.37	0-2	2
	1	12	20.40		2
	1	24	20.42		2
	12	0	19.47	0-3	3
	12	6	19.38		3
	12	13	19.39		3
	25	0	19.39		3

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

9.3.3 LTE Band 5 (Cell)

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

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20525 (836.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.51	0	0
	1	25	**24.58**		0
	1	49	24.44		0
	25	0	**23.45**	0-1	1
	25	12	23.40		1
	25	25	23.34		1
	50	0	23.43		1
16QAM	1	0	23.34	0-1	1
	1	25	23.37		1
	1	49	23.38		1
	25	0	22.51	0-2	2
	25	12	22.43		2
	25	25	22.40		2
	50	0	22.45		2
64QAM	1	0	22.53	0-2	2
	1	25	22.55		2
	1	49	22.23		2
	25	0	21.55	0-3	3
	25	12	21.38		3
	25	25	21.29		3
	50	0	21.34		3

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

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

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20425 (826.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20625 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.15	24.34	24.23	0	0
	1	12	24.19	24.39	24.25		0
	1	24	24.20	24.34	24.25		0
	12	0	23.33	23.37	23.26	0-1	1
	12	6	23.32	23.37	23.29		1
	12	13	23.29	23.34	23.29		1
	25	0	23.30	23.39	23.30		1
16QAM	1	0	22.91	23.34	23.29	0-1	1
	1	12	22.80	23.38	23.23		1
	1	24	22.85	23.31	23.17		1
	12	0	22.36	22.36	22.26	0-2	2
	12	6	22.26	22.36	22.25		2
	12	13	22.25	22.34	22.22		2
	25	0	22.26	22.35	22.25		2
64QAM	1	0	22.20	22.21	22.37	0-2	2
	1	12	22.29	22.20	22.34		2
	1	24	22.13	22.21	22.33		2
	12	0	21.35	21.38	21.35	0-3	3
	12	6	21.28	21.38	21.32		3
	12	13	21.33	21.37	21.30		3
	25	0	21.32	21.42	21.24		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 20415 (825.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20635 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.13	24.35	24.30	0	0
	1	7	24.21	24.32	24.29		0
	1	14	24.18	24.33	24.28		0
	8	0	23.36	23.39	23.35	0-1	1
	8	4	23.28	23.37	23.35		1
	8	7	23.29	23.37	23.32		1
	15	0	23.32	23.34	23.34		1
16QAM	1	0	23.05	23.00	23.29	0-1	1
	1	7	22.79	23.06	23.26		1
	1	14	22.73	23.07	23.19		1
	8	0	22.31	22.38	22.38	0-2	2
	8	4	22.22	22.36	22.42		2
	8	7	22.25	22.40	22.40		2
	15	0	22.27	22.37	22.35		2
64QAM	1	0	21.95	22.24	22.31	0-2	2
	1	7	21.96	22.21	22.22		2
	1	14	21.97	22.30	22.19		2
	8	0	21.36	21.43	21.32	0-3	3
	8	4	21.28	21.39	21.42		3
	8	7	21.28	21.34	21.46		3
	15	0	21.23	21.37	21.35		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 20407 (824.7 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20643 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.22	24.37	24.34	0	0
	1	2	24.26	24.32	24.37		0
	1	5	24.27	24.34	24.37		0
	3	0	24.24	24.26	24.37		0
	3	2	24.27	24.27	24.35		0
	3	3	24.22	24.25	24.34		0
	6	0	23.32	23.30	23.38	0-1	1
16QAM	1	0	23.07	23.11	23.24	0-1	1
	1	2	23.03	23.15	23.25		1
	1	5	22.99	23.09	23.20		1
	3	0	23.22	23.28	23.31		1
	3	2	23.23	23.29	23.35		1
	3	3	23.20	23.34	23.32		1
	6	0	22.24	22.29	22.31	0-2	2
64QAM	1	0	22.25	22.00	22.30	0-2	2
	1	2	22.26	22.05	22.34		2
	1	5	22.17	22.04	22.28		2
	3	0	22.27	22.31	22.42		2
	3	2	22.21	22.30	22.44		2
	3	3	22.25	22.32	22.36		2
	6	0	21.30	21.30	21.34	0-3	3

9.3.4 LTE Band 26 (Cell)

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

LTE Band 26 (Cell) 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 26865 (831.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	23.05	0	0
	1	36	**23.12**		0
	1	74	22.98		0
	36	0	21.95	0-1	1
	36	18	**21.96**		1
	36	37	21.92		1
	75	0	21.87		1
16QAM	1	0	21.68	0-1	1
	1	36	21.76		1
	1	74	21.63		1
	36	0	21.03	0-2	2
	36	18	21.06		2
	36	37	20.99		2
	75	0	21.04		2
64QAM	1	0	20.98	0-2	2
	1	36	20.97		2
	1	74	20.82		2
	36	0	20.07	0-3	3
	36	18	20.03		3
	36	37	20.00		3
	75	0	19.95		3

Note: LTE Band 26 (Cell) at 15 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Table 9-15
LTE Band 26 (Cell) Conducted Powers - 10 MHz Bandwidth

LTE Band 26 (Cell) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26740 (819.0 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 26990 (844.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.97	22.86	22.88	0	0
	1	25	22.84	22.82	22.78		0
	1	49	22.94	22.84	22.72		0
	25	0	22.02	21.85	21.81	0-1	1
	25	12	21.96	21.93	21.79		1
	25	25	21.97	21.83	21.70		1
	50	0	21.98	21.84	21.78		1
16QAM	1	0	22.00	21.98	21.81	0-1	1
	1	25	21.84	21.99	21.83		1
	1	49	21.90	21.77	21.66		1
	25	0	21.00	21.00	20.90	0-2	2
	25	12	20.95	20.95	20.79		2
	25	25	20.92	20.90	20.84		2
	50	0	20.98	20.98	20.81		2
64QAM	1	0	21.12	20.92	20.80	0-2	2
	1	25	21.03	20.87	20.75		2
	1	49	21.03	20.77	20.82		2
	25	0	20.00	19.86	19.85	0-3	3
	25	12	19.93	19.94	19.84		3
	25	25	19.94	19.88	19.81		3
	50	0	19.93	19.80	19.95		3

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

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26715 (816.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27015 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.98	23.02	23.06	0	0
	1	12	23.09	22.98	23.08		0
	1	24	23.08	22.93	23.04		0
	12	0	21.97	21.91	21.96	0-1	1
	12	6	22.01	21.88	22.05		1
	12	13	22.00	21.95	21.90		1
	25	0	21.96	21.94	21.88		1
16QAM	1	0	21.96	21.97	21.90	0-1	1
	1	12	21.87	21.88	22.00		1
	1	24	21.81	21.89	21.81		1
	12	0	21.02	21.00	20.92	0-2	2
	12	6	21.08	20.97	20.93		2
	12	13	20.96	21.03	20.92		2
	25	0	21.02	21.05	20.93		2
64QAM	1	0	21.06	20.82	21.01	0-2	2
	1	12	21.14	20.90	21.07		2
	1	24	21.12	20.85	20.98		2
	12	0	20.09	20.11	19.95	0-3	3
	12	6	20.00	20.05	19.92		3
	12	13	20.05	20.06	19.94		3
	25	0	20.10	20.03	19.93		3

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

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26705 (815.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27025 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.02	22.88	22.98	0	0
	1	7	22.99	22.97	22.97		0
	1	14	22.98	22.93	22.94		0
	8	0	21.92	21.84	21.88	0-1	1
	8	4	21.94	21.81	21.84		1
	8	7	21.97	21.80	21.91		1
	15	0	21.99	21.82	21.85		1
16QAM	1	0	21.92	21.86	21.83	0-1	1
	1	7	21.95	21.75	21.78		1
	1	14	21.92	21.80	21.83		1
	8	0	20.94	20.90	20.88	0-2	2
	8	4	20.97	20.88	20.93		2
	8	7	20.95	20.94	20.92		2
	15	0	20.98	20.87	20.94		2
64QAM	1	0	20.94	20.84	20.94	0-2	2
	1	7	20.92	20.85	20.99		2
	1	14	20.91	20.84	20.86		2
	8	0	19.94	19.81	19.86	0-3	3
	8	4	19.92	19.93	19.93		3
	8	7	19.99	19.92	19.95		3
	15	0	19.87	19.93	19.89		3

Table 9-18
LTE Band 26 (Cell) Conducted Powers -1.4 MHz Bandwidth

LTE Band 26 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26697 (814.7 MHz)	26865 (831.5 MHz)	27033 (848.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.95	22.95	22.97	0	0
	1	2	23.00	22.98	23.09		0
	1	5	23.01	22.99	23.00		0
	3	0	23.02	22.96	23.05		0
	3	2	23.00	23.03	23.01		0
	3	3	23.04	22.97	22.97		0
	6	0	22.05	21.99	21.98	0-1	1
16QAM	1	0	21.88	21.82	22.00	0-1	1
	1	2	21.91	21.95	21.88		1
	1	5	21.88	21.88	21.91		1
	3	0	21.93	21.87	21.88		1
	3	2	22.03	21.88	21.95		1
	3	3	21.98	21.84	21.91		1
	6	0	21.07	20.91	21.10	0-2	2
64QAM	1	0	20.96	20.88	20.89	0-2	2
	1	2	21.18	20.83	20.92		2
	1	5	20.92	20.76	20.98		2
	3	0	21.03	20.87	20.92		2
	3	2	21.00	20.90	20.96		2
	3	3	21.03	20.98	20.94		2
	6	0	20.08	20.02	20.02	0-3	3

9.3.5 LTE Band 66 (AWS)

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

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132072 (1720.0 MHz)	132322 (1745.0 MHz)	132572 (1770.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	21.93	22.24	**22.25**	0	0
	1	50	21.94	22.16	22.17		0
	1	99	21.88	22.14	21.89		0
	50	0	20.85	**21.08**	21.06	0-1	1
	50	25	20.83	21.06	21.04		1
	50	50	20.82	21.03	20.99		1
	100	0	20.82	21.05	21.01		1
16QAM	1	0	20.61	20.83	20.89	0-1	1
	1	50	20.57	20.77	20.81		1
	1	99	20.55	20.72	20.79		1
	50	0	19.86	20.12	20.12	0-2	2
	50	25	19.89	20.10	20.08		2
	50	50	19.87	20.09	20.05		2
	100	0	19.86	20.08	20.08		2
64QAM	1	0	20.00	20.18	20.40	0-2	2
	1	50	20.12	20.15	20.38		2
	1	99	19.75	20.14	20.28		2
	50	0	19.33	19.40	19.67	0-3	3
	50	25	19.22	19.42	19.45		3
	50	50	19.17	19.37	19.46		3
	100	0	19.27	19.41	19.50		3

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

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.16	22.29	22.44	0	0
	1	36	21.96	22.19	22.45		0
	1	74	21.90	22.17	21.94		0
	36	0	20.87	21.11	21.11	0-1	1
	36	18	20.85	21.09	21.09		1
	36	37	20.84	21.11	21.08		1
	75	0	20.84	21.08	21.06		1
16QAM	1	0	20.86	20.75	20.94	0-1	1
	1	36	20.59	20.80	20.86		1
	1	74	20.63	20.75	20.84		1
	36	0	19.88	20.15	20.17	0-2	2
	36	18	19.91	20.13	20.15		2
	36	37	19.89	20.12	20.10		2
	75	0	19.88	20.11	20.13		2
64QAM	1	0	20.02	20.45	20.39	0-2	2
	1	36	19.99	20.21	20.39		2
	1	74	19.82	20.22	20.32		2
	36	0	19.22	19.44	19.59	0-3	3
	36	18	19.21	19.54	19.51		3
	36	37	19.17	19.48	19.49		3
	75	0	19.19	19.43	19.56		3

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

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132022 (1715.0 MHz)	132322 (1745.0 MHz)	132622 (1775.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.23	22.15	22.38	0	0
	1	25	21.95	22.14	22.13		0
	1	49	21.85	22.12	21.85		0
	25	0	20.82	21.06	21.02	0-1	1
	25	12	20.80	21.04	21.00		1
	25	25	20.79	21.01	20.95		1
	50	0	20.79	21.03	20.97		1
16QAM	1	0	20.58	20.81	20.85	0-1	1
	1	25	20.54	20.75	20.77		1
	1	49	20.52	20.72	20.75		1
	25	0	19.83	20.10	20.08	0-2	2
	25	12	19.86	20.08	20.13		2
	25	25	19.84	20.07	20.01		2
	50	0	19.83	20.06	20.04		2
64QAM	1	0	19.95	20.42	20.35	0-2	2
	1	25	20.00	20.40	20.34		2
	1	49	19.93	20.38	20.29		2
	25	0	19.23	19.40	19.63	0-3	3
	25	12	19.16	19.45	19.56		3
	25	25	19.12	19.43	19.56		3
	50	0	19.18	19.40	19.55		3

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

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131997 (1712.5 MHz)	132322 (1745.0 MHz)	132647 (1777.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.31	22.40	22.55	0	0
	1	12	21.92	22.12	22.58		0
	1	24	22.27	22.10	22.51		0
	12	0	20.83	21.04	21.28	0-1	1
	12	6	20.81	21.02	21.26		1
	12	13	20.80	20.99	21.21		1
	25	0	20.80	21.01	21.23		1
16QAM	1	0	20.59	20.79	21.11	0-1	1
	1	12	20.55	20.73	21.03		1
	1	24	20.53	20.68	21.03		1
	12	0	19.84	20.08	20.34	0-2	2
	12	6	19.87	20.06	20.30		2
	12	13	19.85	20.05	20.27		2
	25	0	19.84	20.04	20.30		2
64QAM	1	0	20.19	20.29	20.55	0-2	2
	1	12	20.18	20.35	20.54		2
	1	24	20.17	20.32	20.52		2
	12	0	19.27	19.41	19.55	0-3	3
	12	6	19.28	19.33	19.59		3
	12	13	19.25	19.35	19.55		3
	25	0	19.20	19.36	19.53		3

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

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.16	22.53	22.27	0	0
	1	7	22.00	22.23	22.26		0
	1	14	21.94	22.21	21.98		0
	8	0	20.91	21.15	21.15	0-1	1
	8	4	20.89	21.13	21.13		1
	8	7	20.88	21.10	21.08		1
	15	0	20.88	21.12	21.10		1
16QAM	1	0	20.67	20.90	20.98	0-1	1
	1	7	20.63	20.84	20.90		1
	1	14	20.61	20.79	20.88		1
	8	0	19.92	20.19	20.21	0-2	2
	8	4	19.95	20.17	20.17		2
	8	7	19.93	20.16	20.14		2
	15	0	19.92	20.15	20.17		2
64QAM	1	0	20.10	20.39	20.28	0-2	2
	1	7	20.11	20.28	20.31		2
	1	14	20.06	20.26	20.27		2
	8	0	19.15	19.44	19.58	0-3	3
	8	4	19.14	19.48	19.56		3
	8	7	19.15	19.46	19.55		3
	15	0	19.18	19.43	19.51		3

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

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.14	22.10	22.16	0	0
	1	2	22.00	22.18	22.25		0
	1	5	21.93	22.16	21.97		0
	3	0	22.11	22.10	22.14		0
	3	2	22.12	22.08	22.12		0
	3	3	22.10	22.05	22.07		0
	6	0	20.87	21.07	21.09	0-1	1
16QAM	1	0	20.66	21.85	21.57	0-1	1
	1	2	20.62	20.97	21.57		1
	1	5	20.60	21.74	21.87		1
	3	0	21.09	21.14	21.20		1
	3	2	21.03	21.12	21.16		1
	3	3	21.01	21.11	21.13		1
	6	0	19.91	20.10	20.16	0-2	2
64QAM	1	0	20.35	20.23	20.51	0-2	2
	1	2	20.30	20.24	20.50		2
	1	5	20.30	20.16	20.51		2
	3	0	20.14	20.43	20.58		2
	3	2	20.15	20.38	20.56		2
	3	3	20.11	20.39	20.53		2
	6	0	19.08	19.31	19.53	0-3	3

Table 9-25
LTE Band 66 (AWS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	17.98	18.24	18.21	0	0
	1	50	17.96	**18.25**	18.14		0
	1	99	17.94	18.10	18.09		0
	50	0	16.87	**17.12**	17.08	0-1	1
	50	25	16.89	17.10	17.07		1
	50	50	16.88	17.08	17.04		1
	100	0	16.86	17.10	17.06		1
16QAM	1	0	16.65	16.93	16.89	0-1	1
	1	50	16.63	16.88	16.81		1
	1	99	16.57	16.82	16.73		1
	50	0	15.95	16.21	16.18	0-2	2
	50	25	15.94	16.20	16.14		2
	50	50	15.95	16.16	16.13		2
	100	0	15.90	16.15	16.13		2
64QAM	1	0	16.24	16.37	16.47	0-2	2
	1	50	16.19	16.34	16.50		2
	1	99	16.12	16.28	16.45		2
	50	0	15.27	15.43	15.48	0-3	3
	50	25	15.26	15.40	15.42		3
	50	50	15.25	15.39	15.45		3
	100	0	15.26	15.41	15.44		3

Table 9-26
LTE Band 66 (AWS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	18.26	18.48	18.48	0	0
	1	36	18.18	18.44	18.46		0
	1	74	18.17	18.41	18.40		0
	36	0	17.12	17.37	17.45	0-1	1
	36	18	17.10	17.36	17.38		1
	36	37	17.06	17.33	17.35		1
	75	0	17.08	17.33	17.28		1
16QAM	1	0	16.91	17.17	17.17	0-1	1
	1	36	16.87	17.04	17.12		1
	1	74	16.80	17.05	17.02		1
	36	0	16.11	16.33	16.39	0-2	2
	36	18	16.10	16.31	16.37		2
	36	37	16.11	16.31	16.35		2
	75	0	16.14	16.35	16.36		2
64QAM	1	0	16.09	16.42	16.35	0-2	2
	1	36	16.10	16.37	16.38		2
	1	74	15.99	16.34	16.34		2
	36	0	15.22	15.42	15.40	0-3	3
	36	18	15.19	15.39	15.42		3
	36	37	15.15	15.37	15.39		3
	75	0	15.19	15.40	15.43		3

Table 9-27
LTE Band 66 (AWS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132022 (1715.0 MHz)	132322 (1745.0 MHz)	132622 (1775.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.27	18.42	18.47	0	0
	1	25	18.23	18.45	18.44		0
	1	49	18.22	18.41	18.42		0
	25	0	17.15	17.35	17.36	0-1	1
	25	12	17.13	17.33	17.39		1
	25	25	17.12	17.34	17.29		1
	50	0	17.14	17.32	17.36		1
16QAM	1	0	16.89	17.22	17.16	0-1	1
	1	25	16.87	17.25	17.14		1
	1	49	16.85	17.24	17.15		1
	25	0	16.15	16.31	16.34	0-2	2
	25	12	16.14	16.32	16.32		2
	25	25	16.13	16.35	16.33		2
	50	0	16.17	16.36	16.37		2
64QAM	1	0	16.12	16.38	16.35	0-2	2
	1	25	16.11	16.36	16.34		2
	1	49	16.09	16.35	16.39		2
	25	0	15.23	15.36	15.38	0-3	3
	25	12	15.22	15.37	15.39		3
	25	25	15.19	15.36	15.38		3
	50	0	15.22	15.38	15.40		3

Table 9-28
LTE Band 66 (AWS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131997 (1712.5 MHz)	132322 (1745.0 MHz)	132647 (1777.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.28	18.47	18.48	0	0
	1	12	18.27	18.46	18.47		0
	1	24	18.26	18.44	18.45		0
	12	0	17.14	17.38	17.39	0-1	1
	12	6	17.12	17.37	17.40		1
	12	13	17.11	17.35	17.36		1
	25	0	17.12	17.34	17.39		1
16QAM	1	0	16.88	17.15	17.21	0-1	1
	1	12	16.94	17.16	17.19		1
	1	24	16.90	17.22	17.18		1
	12	0	16.19	16.33	16.35	0-2	2
	12	6	16.18	16.31	16.32		2
	12	13	16.17	16.34	16.34		2
	25	0	16.17	16.34	16.37		2
64QAM	1	0	16.19	16.39	16.45	0-2	2
	1	12	16.20	16.38	16.47		2
	1	24	16.16	16.40	16.43		2
	12	0	15.20	15.36	15.37	0-3	3
	12	6	15.22	15.35	15.36		3
	12	13	15.21	15.35	15.34		3
	25	0	15.19	15.40	15.42		3

Table 9-29
LTE Band 66 (AWS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	18.22	18.38	18.42	0	0
	1	7	18.18	18.41	18.43		0
	1	14	18.16	18.39	18.42		0
	8	0	17.11	17.34	17.38	0-1	1
	8	4	17.09	17.35	17.36		1
	8	7	17.10	17.33	17.35		1
	15	0	17.11	17.34	17.38		1
16QAM	1	0	16.88	17.12	17.20	0-1	1
	1	7	16.85	17.15	17.24		1
	1	14	16.87	17.16	17.20		1
	8	0	16.14	16.31	16.34	0-2	2
	8	4	16.13	16.32	16.33		2
	8	7	16.15	16.29	16.32		2
	15	0	16.16	16.34	16.40		2
64QAM	1	0	16.17	16.45	16.49	0-2	2
	1	7	16.12	16.44	16.48		2
	1	14	16.11	16.44	16.50		2
	8	0	15.18	15.39	15.36	0-3	3
	8	4	15.17	15.38	15.38		3
	8	7	15.16	15.37	15.39		3
	15	0	15.18	15.35	15.37		3

Table 9-30
LTE Band 66 (AWS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	18.12	18.31	18.39	0	0
	1	2	18.11	18.33	18.40		0
	1	5	18.10	18.31	18.38		0
	3	0	18.15	18.34	18.45		0
	3	2	18.16	18.35	18.43		0
	3	3	18.17	18.36	18.41		0
	6	0	17.05	17.29	17.41	0-1	1
16QAM	1	0	16.71	16.98	17.13	0-1	1
	1	2	16.59	17.03	17.16		1
	1	5	16.70	17.02	17.14		1
	3	0	16.97	17.29	17.41		1
	3	2	16.99	17.27	17.36		1
	3	3	16.98	17.30	17.38		1
	6	0	16.14	16.34	16.38	0-2	2
64QAM	1	0	16.00	16.20	16.25	0-2	2
	1	2	15.87	16.18	16.23		2
	1	5	15.86	16.19	16.22		2
	3	0	16.13	16.28	16.35		2
	3	2	16.12	16.27	16.37		2
	3	3	16.13	16.29	16.38		2
	6	0	15.13	15.35	15.43	0-3	3

9.3.6 LTE Band 2 (PCS)

Table 9-31
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

LTE Band 2 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18700 (1860.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19100 (1900.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.31	22.16	22.23	0	0
	1	50	**22.33**	22.15	22.24		0
	1	99	21.66	22.17	22.26		0
	50	0	21.19	20.99	21.09	0-1	1
	50	25	21.17	21.02	21.10		1
	50	50	**21.21**	21.00	21.11		1
	100	0	21.19	20.98	21.09		1
16QAM	1	0	20.97	20.70	20.87	0-1	1
	1	50	21.01	20.72	20.90		1
	1	99	20.96	20.69	20.92		1
	50	0	20.29	20.12	20.21	0-2	2
	50	25	20.30	20.08	20.19		2
	50	50	20.27	20.10	20.20		2
	100	0	20.24	20.05	20.17		2
64QAM	1	0	20.34	20.08	20.03	0-2	2
	1	50	20.45	20.00	20.15		2
	1	99	20.21	19.81	19.97		2
	50	0	19.43	19.07	19.15	0-3	3
	50	25	19.32	19.14	19.18		3
	50	50	19.26	19.08	19.14		3
	100	0	19.30	19.11	19.21		3

Table 9-32
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 2 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18675 (1857.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19125 (1902.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.34	22.21	22.25	0	0
	1	36	22.36	22.20	22.26		0
	1	74	21.98	22.22	22.28		0
	36	0	21.22	21.04	21.08	0-1	1
	36	18	21.20	21.07	21.12		1
	36	37	21.24	21.05	21.13		1
	75	0	21.22	21.08	21.11		1
16QAM	1	0	21.00	20.80	20.89	0-1	1
	1	36	21.04	20.77	21.00		1
	1	74	20.84	20.87	20.85		1
	36	0	20.32	20.17	20.23	0-2	2
	36	18	20.33	20.13	20.21		2
	36	37	20.30	20.15	20.22		2
	75	0	20.27	20.10	20.19		2
64QAM	1	0	20.22	19.81	20.03	0-2	2
	1	36	20.10	19.98	20.02		2
	1	74	20.06	19.91	19.97		2
	36	0	19.47	19.12	19.18	0-3	3
	36	18	19.38	19.15	19.11		3
	36	37	19.35	19.13	19.10		3
	75	0	19.30	19.10	19.16		3

Table 9-33
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 2 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18650 (1855.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19150 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.36	22.13	22.29	0	0
	1	25	22.38	22.12	22.30		0
	1	49	21.75	22.14	22.32		0
	25	0	21.24	20.96	21.15	0-1	1
	25	12	21.22	20.99	21.16		1
	25	25	21.26	20.97	21.17		1
	50	0	21.24	20.95	21.15		1
16QAM	1	0	21.02	20.81	20.96	0-1	1
	1	25	21.06	20.69	20.96		1
	1	49	21.01	20.72	20.98		1
	25	0	20.34	20.09	20.27	0-2	2
	25	12	20.35	20.05	20.25		2
	25	25	20.32	20.07	20.26		2
	50	0	20.29	20.02	20.23		2
64QAM	1	0	20.40	19.96	20.12	0-2	2
	1	25	20.22	19.95	20.00		2
	1	49	20.16	19.87	20.06		2
	25	0	19.30	19.12	19.19	0-3	3
	25	12	19.27	19.06	19.18		3
	25	25	19.25	19.08	19.20		3
	50	0	19.33	19.07	19.18		3

Table 9-34
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 2 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18625 (1852.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19175 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.30	22.11	22.25	0	0
	1	12	22.36	22.10	22.26		0
	1	24	21.70	22.12	22.28		0
	12	0	21.22	20.94	21.16	0-1	1
	12	6	21.20	20.97	21.12		1
	12	13	21.24	20.95	21.13		1
	25	0	21.22	20.93	21.11		1
16QAM	1	0	21.00	20.69	20.98	0-1	1
	1	12	21.04	20.70	20.92		1
	1	24	20.99	20.64	20.94		1
	12	0	20.32	20.07	20.23	0-2	2
	12	6	20.33	20.03	20.21		2
	12	13	20.25	20.05	20.22		2
	25	0	20.27	20.00	20.19		2
64QAM	1	0	20.11	19.80	19.88	0-2	2
	1	12	20.14	19.83	19.92		2
	1	24	20.13	19.81	19.91		2
	12	0	19.33	19.14	19.14	0-3	3
	12	6	19.30	19.08	19.18		3
	12	13	19.26	19.08	19.16		3
	25	0	19.27	19.09	19.20		3

Table 9-35
LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 2 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.35	22.10	22.29	0	0
	1	7	22.35	22.09	22.30		0
	1	14	21.71	22.11	22.32		0
	8	0	21.24	20.93	21.15	0-1	1
	8	4	21.22	20.96	21.16		1
	8	7	21.21	20.94	21.17		1
	15	0	21.20	20.92	21.15		1
16QAM	1	0	21.02	20.64	20.93	0-1	1
	1	7	21.06	20.66	20.96		1
	1	14	21.11	20.63	20.98		1
	8	0	20.34	20.06	20.27	0-2	2
	8	4	20.37	20.02	20.25		2
	8	7	20.32	20.04	20.26		2
	15	0	20.30	19.99	20.23		2
64QAM	1	0	20.10	19.82	19.91	0-2	2
	1	7	20.09	19.89	19.92		2
	1	14	20.04	19.86	19.91		2
	8	0	19.25	19.05	19.13	0-3	3
	8	4	19.29	19.02	19.08		3
	8	7	19.30	18.99	19.05		3
	15	0	19.28	19.09	19.11		3

Table 9-36
LTE Band 2 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 2 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.25	22.15	22.14	0	0
	1	2	22.31	22.17	22.17		0
	1	5	22.31	22.12	22.13		0
	3	0	22.27	22.06	22.20		0
	3	2	22.25	22.07	22.18		0
	3	3	22.24	22.06	22.17		0
	6	0	21.25	21.02	21.12	0-1	1
16QAM	1	0	21.07	20.86	21.00	0-1	1
	1	2	20.84	20.74	20.82		1
	1	5	20.89	20.73	20.80		1
	3	0	21.31	21.00	21.18		1
	3	2	21.27	21.05	21.21		1
	3	3	21.24	21.04	21.20		1
	6	0	20.35	20.09	20.19	0-2	2
64QAM	1	0	20.26	19.90	20.16	0-2	2
	1	2	20.23	19.93	20.09		2
	1	5	20.28	19.92	20.09		2
	3	0	20.45	19.90	20.21		2
	3	2	20.28	19.84	20.31		2
	3	3	20.24	19.89	20.28		2
	6	0	19.27	19.02	19.18	0-3	3

Table 9-37
LTE Band 2 (PCS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 2 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			18700 (1860.0 MHz)	18900 (1880.0 MHz)	19100 (1900.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.23	18.16	**18.26**	0	0
	1	50	18.22	18.23	18.25		0
	1	99	18.21	18.15	18.18		0
	50	0	**17.24**	17.11	17.10	0-1	1
	50	25	17.23	17.03	17.07		1
	50	50	17.22	17.02	17.09		1
	100	0	17.23	17.03	17.10		1
16QAM	1	0	16.97	16.81	16.74	0-1	1
	1	50	17.01	16.79	16.72		1
	1	99	16.81	16.67	16.74		1
	50	0	16.50	16.20	16.21	0-2	2
	50	25	16.34	16.14	16.20		2
	50	50	16.33	16.12	16.18		2
	100	0	16.31	16.10	16.19		2
64QAM	1	0	16.05	16.18	16.19	0-2	2
	1	50	16.06	16.13	16.28		2
	1	99	16.04	16.16	16.24		2
	50	0	15.03	15.14	15.25	0-3	3
	50	25	15.05	15.15	15.22		3
	50	50	15.06	15.17	15.26		3
	100	0	14.94	15.18	15.24		3

Table 9-38
LTE Band 2 (PCS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 2 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			18675 (1857.5 MHz)	18900 (1880.0 MHz)	19125 (1902.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.04	18.15	18.36	0	0
	1	36	18.07	18.18	18.41		0
	1	74	18.10	18.17	18.43		0
	36	0	16.96	17.04	17.20	0-1	1
	36	18	16.94	17.02	17.23		1
	36	37	16.98	17.03	17.22		1
	75	0	16.97	17.05	17.16		1
16QAM	1	0	16.60	16.68	16.76	0-1	1
	1	36	16.66	16.77	16.80		1
	1	74	16.68	16.75	16.83		1
	36	0	16.03	16.11	16.26	0-2	2
	36	18	16.04	16.10	16.30		2
	36	37	16.02	16.13	16.31		2
	75	0	16.05	16.11	16.30		2
64QAM	1	0	15.88	16.00	16.30	0-2	2
	1	36	15.92	16.04	16.29		2
	1	74	15.94	16.08	16.34		2
	36	0	15.06	15.12	15.34	0-3	3
	36	18	15.05	15.13	15.33		3
	36	37	15.06	15.14	15.37		3
	75	0	15.08	15.12	15.25		3

Table 9-39
LTE Band 2 (PCS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 2 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18650 (1855.0 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19150 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	18.05	18.26	18.41	0	0
	1	25	18.12	18.28	18.42		0
	1	49	18.11	18.31	18.46		0
	25	0	16.90	17.11	17.26	0-1	1
	25	12	16.92	17.08	17.25		1
	25	25	16.81	17.10	17.26		1
	50	0	16.93	17.07	17.24		1
16QAM	1	0	16.71	16.89	17.01	0-1	1
	1	25	16.75	16.86	17.03		1
	1	49	16.73	16.84	17.07		1
	25	0	16.01	16.14	16.32	0-2	2
	25	12	16.00	16.13	16.31		2
	25	25	15.99	16.18	16.33		2
	50	0	16.03	16.18	16.36		2
64QAM	1	0	15.96	16.06	16.24	0-2	2
	1	25	15.98	16.08	16.27		2
	1	49	15.95	16.07	16.33		2
	25	0	15.02	15.13	15.33	0-3	3
	25	12	15.04	15.14	15.36		3
	25	25	15.03	15.16	15.35		3
	50	0	15.04	15.15	15.35		3

Table 9-40
LTE Band 2 (PCS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 2 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18625 (1852.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19175 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	18.00	18.23	18.38	0	0
	1	12	17.97	18.18	18.37		0
	1	24	18.02	18.24	18.40		0
	12	0	16.83	17.05	17.15	0-1	1
	12	6	16.81	17.06	17.17		1
	12	13	16.84	17.07	17.20		1
	25	0	16.80	16.95	17.19		1
16QAM	1	0	16.62	16.83	16.92	0-1	1
	1	12	16.60	16.87	16.93		1
	1	24	16.55	16.92	16.95		1
	12	0	15.91	16.12	16.18	0-2	2
	12	6	15.90	16.10	16.22		2
	12	13	15.91	16.11	16.25		2
	25	0	15.90	16.10	16.25		2
64QAM	1	0	15.86	16.03	16.15	0-2	2
	1	12	15.89	16.06	16.17		2
	1	24	15.88	16.08	16.24		2
	12	0	14.91	15.12	15.22	0-3	3
	12	6	14.89	15.11	15.21		3
	12	13	14.88	15.12	15.24		3
	25	0	14.92	15.13	15.25		3

Table 9-41
LTE Band 2 (PCS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 2 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18615 (1851.5 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19185 (1908.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	17.94	18.15	18.30	0	0
	1	7	17.92	18.19	18.31		0
	1	14	17.94	18.12	18.26		0
	8	0	16.81	17.01	17.20	0-1	1
	8	4	16.80	17.02	17.19		1
	8	7	16.79	17.00	17.08		1
	15	0	16.82	17.02	17.17		1
16QAM	1	0	16.71	16.74	17.00	0-1	1
	1	7	16.68	16.73	16.99		1
	1	14	16.62	16.79	16.98		1
	8	0	15.87	16.06	16.22	0-2	2
	8	4	15.86	16.05	16.21		2
	8	7	15.85	16.05	16.24		2
	15	0	15.90	16.12	16.29		2
64QAM	1	0	15.85	16.03	16.16	0-2	2
	1	7	15.84	16.04	16.19		2
	1	14	15.86	15.94	16.23		2
	8	0	14.90	15.08	15.24	0-3	3
	8	4	14.88	15.10	15.26		3
	8	7	14.89	15.06	15.25		3
	15	0	14.88	15.07	15.26		3

Table 9-42
LTE Band 2 (PCS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 2 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 18607 (1850.7 MHz)	Mid Channel 18900 (1880.0 MHz)	High Channel 19193 (1909.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	17.86	18.11	18.30	0	0
	1	2	17.89	18.12	18.33		0
	1	5	17.88	18.09	18.28		0
	3	0	17.85	18.04	18.25		0
	3	2	17.86	18.05	18.22		0
	3	3	17.82	18.03	18.23		0
	6	0	16.67	16.95	17.16	0-1	1
16QAM	1	0	16.38	16.58	16.78	0-1	1
	1	2	16.39	16.59	16.77		1
	1	5	16.36	16.59	16.71		1
	3	0	16.74	16.99	17.15		1
	3	2	16.70	16.97	17.12		1
	3	3	16.68	16.90	17.13		1
	6	0	15.86	16.01	16.19	0-2	2
64QAM	1	0	15.83	15.81	15.97	0-2	2
	1	2	15.60	16.01	15.96		2
	1	5	15.59	15.97	16.02		2
	3	0	15.84	16.04	16.20		2
	3	2	15.82	16.08	16.21		2
	3	3	15.87	16.05	16.23		2
	6	0	14.69	15.05	15.22	0-3	3

9.3.7 LTE Band 41

Table 9-43
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.18	22.89	**23.38**	23.31	23.07	0	0
	1	50	23.21	22.78	23.22	23.03	22.94		0
	1	99	23.17	22.71	23.08	22.86	22.77		0
	50	0	22.12	21.88	**22.29**	22.18	22.07	0-1	1
	50	25	22.16	21.83	22.23	22.07	22.01		1
	50	50	22.15	21.80	22.15	21.98	21.94		1
	100	0	22.09	21.84	22.20	22.05	22.02		1
16QAM	1	0	22.23	21.76	22.19	21.83	21.96	0-1	1
	1	50	22.27	21.53	22.28	21.62	21.84		1
	1	99	22.17	21.42	22.07	21.45	21.63		1
	50	0	21.01	20.77	21.23	21.11	21.13	0-2	2
	50	25	21.06	20.79	21.11	21.04	21.02		2
	50	50	21.10	20.71	21.04	20.89	21.06		2
	100	0	21.09	20.74	21.18	20.98	21.04		2
64QAM	1	0	20.57	20.32	20.88	20.73	20.66	0-2	2
	1	50	20.59	20.33	20.64	20.59	20.51		2
	1	99	20.60	20.19	20.57	20.42	20.24		2
	50	0	19.75	19.49	19.88	19.94	19.86	0-3	3
	50	25	19.80	19.47	19.84	19.89	19.80		3
	50	50	19.83	19.50	19.85	19.85	19.72		3
	100	0	19.82	19.51	19.90	19.93	19.82		3

Table 9-44
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.14	22.86	23.31	23.21	23.00	0	0
	1	36	23.15	22.83	23.21	23.08	22.93		0
	1	74	23.13	22.75	23.07	22.95	22.75		0
	36	0	22.14	21.82	22.23	22.15	22.00	0-1	1
	36	18	22.15	21.83	22.18	22.10	21.93		1
	36	37	22.16	21.78	22.13	22.05	21.88		1
	75	0	22.15	21.79	22.15	22.10	21.93		1
16QAM	1	0	22.10	21.66	22.22	22.18	22.27	0-1	1
	1	36	22.13	21.61	22.12	22.08	22.13		1
	1	74	22.15	21.52	21.97	21.90	22.00		1
	36	0	21.13	20.83	21.18	21.13	20.97	0-2	2
	36	18	21.11	20.76	21.14	21.06	20.90		2
	36	37	21.12	20.70	21.08	21.00	20.85		2
	75	0	21.11	20.71	21.13	21.04	20.91		2
64QAM	1	0	20.54	20.37	20.68	20.79	20.64	0-2	2
	1	36	20.68	20.43	20.66	20.77	20.52		2
	1	74	20.72	20.29	20.55	20.59	20.29		2
	36	0	19.80	19.50	19.91	19.92	19.86	0-3	3
	36	18	19.79	19.51	19.89	19.87	19.78		3
	36	37	19.80	19.46	19.85	19.84	19.69		3
	75	0	19.85	19.51	19.87	19.94	19.84		3

Table 9-45
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	23.11	22.80	23.23	23.13	23.00	0	0
	1	25	23.16	22.81	23.16	23.03	22.93		0
	1	49	23.15	22.73	23.11	22.97	22.83		0
	25	0	22.16	21.81	22.19	22.14	22.03	0-1	1
	25	12	22.15	21.80	22.13	22.06	21.96		1
	25	25	22.14	21.82	22.10	22.03	21.91		1
	50	0	22.11	21.79	22.13	22.04	21.94		1
16QAM	1	0	22.10	21.88	22.33	22.20	22.13	0-1	1
	1	25	22.07	21.76	22.21	22.10	21.98		1
	1	49	22.17	21.77	22.11	22.01	22.00		1
	25	0	21.13	20.77	21.13	21.03	21.00	0-2	2
	25	12	21.06	20.73	21.10	20.97	20.99		2
	25	25	21.09	20.70	21.07	20.93	20.91		2
	50	0	21.04	20.66	21.13	20.99	20.90		2
64QAM	1	0	20.71	20.14	20.58	20.61	20.54	0-2	2
	1	25	20.78	20.15	20.53	20.53	20.44		2
	1	49	20.68	20.18	20.48	20.42	20.34		2
	25	0	19.76	19.49	19.86	19.89	19.82	0-3	3
	25	12	19.79	19.48	19.84	19.87	19.75		3
	25	25	19.80	19.45	19.81	19.82	19.72		3
	50	0	19.82	19.46	19.85	19.87	19.80		3

Table 9-46
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	23.08	22.90	23.13	23.03	22.91	0	0
	1	12	23.11	22.88	23.11	22.97	22.87		0
	1	24	23.10	22.84	23.07	22.93	22.81		0
	12	0	22.11	21.85	22.18	22.08	22.00	0-1	1
	12	6	22.13	21.83	22.13	22.07	21.94		1
	12	13	22.14	21.82	22.10	22.06	21.93		1
	25	0	22.15	21.87	22.15	22.05	21.95		1
16QAM	1	0	21.98	21.83	22.05	21.88	21.92	0-1	1
	1	12	21.95	21.77	22.01	21.86	21.86		1
	1	24	22.00	21.76	21.97	21.83	21.86		1
	12	0	21.10	20.76	21.16	21.04	21.00	0-2	2
	12	6	21.07	20.77	21.11	21.00	20.97		2
	12	13	21.11	20.79	21.09	21.04	20.96		2
	25	0	21.08	20.80	21.10	21.03	21.00		2
64QAM	1	0	20.47	20.22	20.57	20.66	20.63	0-2	2
	1	12	20.54	20.26	20.58	20.61	20.60		2
	1	24	20.51	20.15	20.58	20.58	20.55		2
	12	0	19.78	19.46	19.82	19.87	19.82	0-3	3
	12	6	19.75	19.44	19.83	19.86	19.81		3
	12	13	19.77	19.44	19.81	19.83	19.76		3
	25	0	19.77	19.47	19.84	19.84	19.80		3

9.3.8 LTE Carrier Aggregation Conducted Powers

Table 9-47
LTE B12 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_12A-12A	LTE B12	5	23155	713.5	QPSK	1	12	5155	743.5	LTE B12	5	5010	729	23.24	23.35
CA_2A-12A (1)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	LTE B2	20	900	1960	23.31	23.41
CA_4A-12A (2)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	LTE B4	20	2175	2132.5	23.3	23.41
CA_12A-66A (2)	LTE B12	10	23095	707.5	QPSK	1	0	5095	737.5	LTE B66	20	66786	2145	23.34	23.41

Table 9-48
LTE B17 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-17A	LTE B17	10	23790	710	QPSK	1	0	5790	740	LTE B2	10	900	1960	23.41	23.41
CA_4A-17A	LTE B17	10	23790	710	QPSK	1	0	5790	740	LTE B4	10	2175	2132.5	23.41	23.41

Table 9-49
LTE B13 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-13A	LTE B13	10	23230	782	QPSK	1	0	5230	751	LTE B2	20	900	1960	22.74	22.76
CA_4A-13A	LTE B13	10	23230	782	QPSK	1	0	5230	751	LTE B4	20	2175	2132.5	22.73	22.76

Table 9-50
LTE B5 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-5A	LTE B5	10	20525	836.5	QPSK	1	25	2525	881.5	LTE B2	20	900	1960	24.59	24.58
CA_4A-5A (1)	LTE B5	10	20525	836.5	QPSK	1	25	2525	881.5	LTE B4	20	2175	2132.5	24.55	24.58
CA_5A-41A	LTE B5	10	20525	836.5	QPSK	1	25	2525	881.5	LTE B41	20	40620	2593	24.55	24.58

Table 9-51
LTE B4 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_4A-4A	LTE B4	5	20375	1752.5	QPSK	1	12	2375	2152.5	LTE B4	20	2050	2120	22.29	22.58
CA_4A-5A (1)	LTE B4	5	20375	1752.5	QPSK	1	12	2375	2152.5	LTE B5	10	2525	881.5	22.31	22.58
CA_4A-12A (2)	LTE B4	5	20375	1752.5	QPSK	1	12	2375	2152.5	LTE B12	10	5095	737.5	22.27	22.58
CA_4A-13A	LTE B4	5	20375	1752.5	QPSK	1	12	2375	2152.5	LTE B13	10	5230	751	22.29	22.58
CA_4A-17A	LTE B4	5	20375	1752.5	QPSK	1	12	2375	2152.5	LTE B17	10	5790	740	22.28	22.58

Table 9-52
LTE B66 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_66C	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	20	66994	2165.8	22.33	22.58
CA_66B	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	15	67018	2168.2	22.41	22.58
CA_66A-66A	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	20	66536	2120	22.37	22.58
CA_12A-66A (2)	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B12	10	5095	737.5	22.39	22.58
CA_17A-66A	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B17	10	5790	740	22.38	22.58

Table 9-53
LTE B2 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-5A	LTE B2	10	18650	1855	QPSK	1	25	650	1935	LTE B5	10	2525	881.5	22.41	22.38
CA_2A-12A (1)	LTE B2	10	18650	1855	QPSK	1	25	650	1935	LTE B12	10	5095	737.5	22.4	22.38
CA_2A-13A	LTE B2	10	18650	1855	QPSK	1	25	650	1935	LTE B13	10	5230	751	22.43	22.38
CA_2A-17A	LTE B2	10	18650	1855	QPSK	1	25	650	1935	LTE B17	10	5790	740	22.44	22.38
CA_2A-41A	LTE B2	10	18650	1855	QPSK	1	25	650	1935	LTE B41	20	40620	2593	22.42	22.38

Table 9-54
LTE B41 PCC - 2CC Maximum LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_41A-41A (1)	LTE B41	20	40620	2593	QPSK	1	0	40620	2593	LTE B41	20	39750	2506	23.33	23.38
CA_41C (1)	LTE B41	20	40620	2593	QPSK	1	0	40620	2593	LTE B41	20	40818	2612.8	23.31	23.38

Table 9-55
LTE B4 PCC - 3CC Maximum LTE Carrier Aggregation Conducted Powers

	PCC									SCC 1				SCC 2				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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_4A-12A-12A	LTE B4	5	20375	1752.5	QPSK	1	12	2375	2152.5	LTE B12	5	5095	737.5	LTE B12	5	5035	731.5	22.27	22.58

Table 9-56
LTE B66 PCC - 3CC Maximum LTE Carrier Aggregation Conducted Powers

	PCC									SCC 1				SCC 2				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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_12A-66A-66A	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	20	66536	2120	LTE B12	10	5095	737.5	22.35	22.58
CA_12A-66C	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	20	66994	2165.8	LTE B12	10	5095	737.5	22.38	22.58
CA_12A-66B	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	15	67018	2168.2	LTE B12	10	5095	737.5	22.35	22.58
CA_17A-66A-66A	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	20	66536	2120	LTE B17	10	5790	740	22.39	22.58
CA_17A-66C	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	20	66994	2165.8	LTE B17	10	5790	740	22.36	22.58
CA_17A-66B	LTE B66	5	132647	1777.5	QPSK	1	12	67111	2177.5	LTE B66	15	67018	2168.2	LTE B17	10	5790	740	22.36	22.58

Table 9-57
LTE B41 PCC - 3CC Maximum LTE Carrier Aggregation Conducted Powers

	PCC									SCC 1				SCC 2				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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_41D	LTE B41	20	40620	2593	QPSK	1	0	40620	2593	LTE B41	20	40422	2573.2	LTE B41	20	40818	2612.8	23.32	23.38
CA_41C-41A	LTE B41	20	40620	2593	QPSK	1	0	40620	2593	LTE B41	20	40818	2612.8	LTE B41	20	39750	2506	23.28	23.38
CA_41A-41C	LTE B41	20	40620	2593	QPSK	1	0	40620	2593	LTE B41	20	41292	2660.2	LTE B41	20	41490	2680	23.29	23.38

Table 9-58
LTE B2 PCC - 2CC Reduced LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2A-5A	LTE B2	10	19150	1905	QPSK	1	49	1150	1985	LTE B5	10	2525	881.5	18.26	18.46
CA_2A-12A (1)	LTE B2	10	19150	1905	QPSK	1	49	1150	1985	LTE B12	10	5095	737.5	18.34	18.46
CA_2A-13A	LTE B2	10	19150	1905	QPSK	1	49	1150	1985	LTE B13	10	5230	751	18.26	18.46
CA_2A-17A	LTE B2	10	19150	1905	QPSK	1	49	1150	1985	LTE B17	10	5790	740	18.39	18.46
CA_2A-41A	LTE B2	10	19150	1905	QPSK	1	49	1150	1985	LTE B41	20	40620	2593	18.31	18.46

Table 9-59
LTE B4 PCC - 2CC Reduced LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_4A-4A	LTE B4	15	20300	1745	QPSK	1	0	2300	2145	LTE B4	20	2050	2120	18.42	18.48
CA_4A-5A (1)	LTE B4	15	20300	1745	QPSK	1	0	2300	2145	LTE B5	10	2525	881.5	18.46	18.48
CA_4A-12A (2)	LTE B4	15	20300	1745	QPSK	1	0	2300	2145	LTE B12	10	5095	737.5	18.46	18.48
CA_4A-13A	LTE B4	15	20300	1745	QPSK	1	0	2300	2145	LTE B13	10	5230	751	18.45	18.48
CA_4A-17A	LTE B4	5	20375	1752.5	QPSK	1	0	2375	2152.5	LTE B17	10	5790	740	18.43	18.48

Table 9-60
LTE B66 PCC - 2CC Reduced LTE Carrier Aggregation Conducted 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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_66C	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	20	66615	2127.9	18.4	18.48
CA_66B	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	5	66693	2135.7	18.44	18.48
CA_66A-66A	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	20	67236	2190	18.43	18.48
CA_12A-66A (2)	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B12	10	5095	737.5	18.41	18.48
CA_17A-66A	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B17	10	5790	740	18.4	18.48

Table 9-61
LTE B4 PCC - 3CC Reduced LTE Carrier Aggregation Conducted Powers

	PCC									SCC 1				SCC 2				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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_4A-12A-12A	LTE B4	15	20300	1745	QPSK	1	0	2300	2145	LTE B12	5	5095	737.5	LTE B12	5	5035	731.5	18.38	18.48

Table 9-62
LTE B66 PCC - 3CC Reduced LTE Carrier Aggregation Conducted Powers

	PCC									SCC 1				SCC 2				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]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_12A-66A-66A	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	20	67236	2190	LTE B12	10	5095	737.5	18.48	18.48
CA_12A-66C	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	20	66615	2127.9	LTE B12	10	5095	737.5	18.43	18.48
CA_12A-66B	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	5	66693	2135.7	LTE B12	10	5095	737.5	18.44	18.48
CA_17A-66A-66A	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	20	67236	2190	LTE B17	10	5790	740	18.46	18.48
CA_17A-66C	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	20	66615	2127.9	LTE B17	10	5790	740	18.42	18.48
CA_17A-66B	LTE B66	15	132322	1745	QPSK	1	0	66786	2145	LTE B66	5	66693	2135.7	LTE B17	10	5790	740	18.45	18.48

Notes:

1. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.
2. All control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
3. For downlink carrier aggregation combinations, PCC uplink channel was selected based on section C)3)b)ii) of KBD 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous 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 downlink channels remained fully within the downlink transmission band of the respective component carrier.
4. This device supports LTE capabilities with overlapping transmission frequency ranges. When the supported frequency range of an LTE Band falls completely within an LTE band with a larger transmission frequency range, both LTE bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE bands share the same transmission path, SAR was only assessed for the band with the larger transmission frequency range.

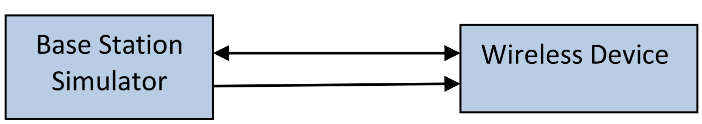

Figure 9-3
Power Measurement Setup

9.4 WLAN Conducted Powers

Table 9-63
Maximum 2.4 GHz WLAN Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	17.40	15.88	15.34
2437	6	17.77	16.29	15.67
2457	10	N/A	14.98	15.16
2462	11	**17.94**	13.08	13.29

Table 9-64
Reduced 2.4 GHz WLAN Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	14.91	14.79	14.40
2437	6	**15.26**	14.71	15.19
2462	11	15.09	13.08	13.29

Table 9-65
5 GHz WLAN Average RF Power

5GHz (20MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
5180	36	12.84	12.77	13.46
5200	40	15.38	15.00	15.25
5220	44	15.01	14.79	15.10
5240	48	15.10	14.87	14.88
5260	52	**15.41**	15.21	15.24
5280	56	15.33	15.35	15.14
5300	60	14.89	15.09	15.41
5320	64	13.65	14.08	14.49
5500	100	**15.47**	15.16	15.49
5600	120	14.88	14.88	15.06
5620	124	14.95	14.75	14.72
5720	144	14.96	14.81	14.91
5745	149	**14.92**	15.02	15.04
5785	157	14.76	14.81	14.79
5825	165	14.89	14.85	14.59

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

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

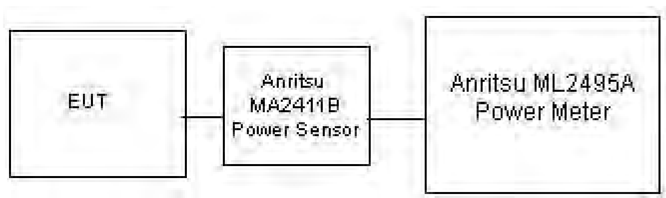

Figure 9-4
Power Measurement Setup

9.5 Bluetooth Conducted Powers

Table 9-66
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power [dBm]	Avg Conducted Power [mW]
2402	1.0	0	7.11	5.138
2441	1.0	39	**8.28**	6.730
2480	1.0	78	8.26	6.698
2402	2.0	0	5.45	3.506
2441	2.0	39	6.62	4.593
2480	2.0	78	6.57	4.543
2402	3.0	0	5.53	3.570
2441	3.0	39	6.70	4.673
2480	3.0	78	6.64	4.612

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

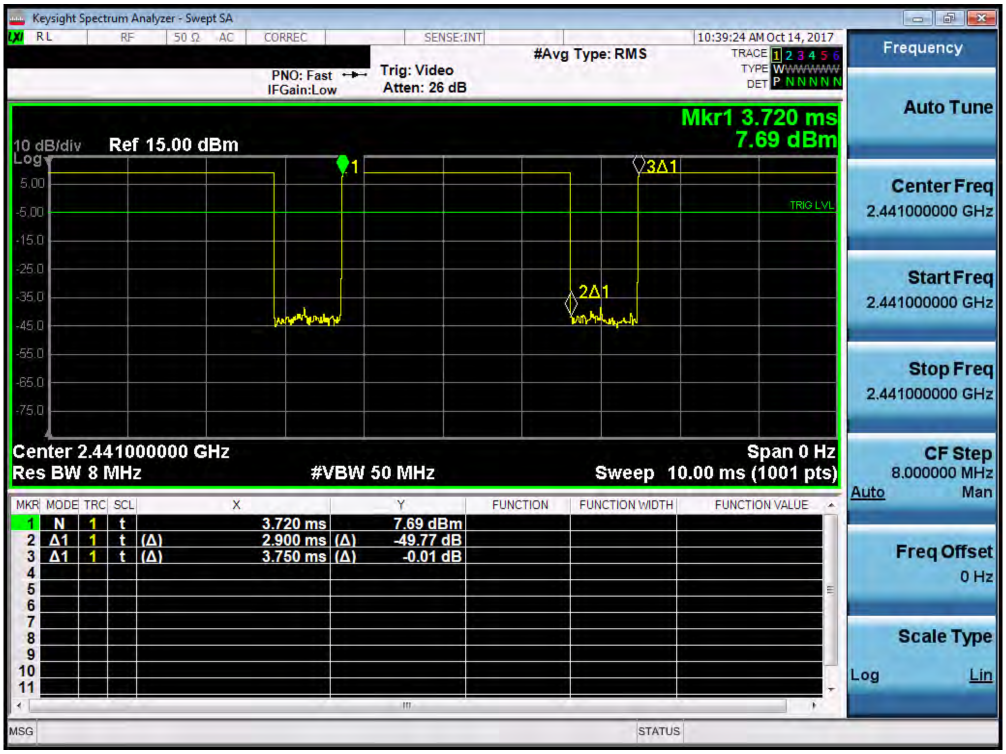

Figure 9-5
Bluetooth Transmission Plot

Equation 9-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.9ms}{3.75ms} * 100\% = 77.3\%$$

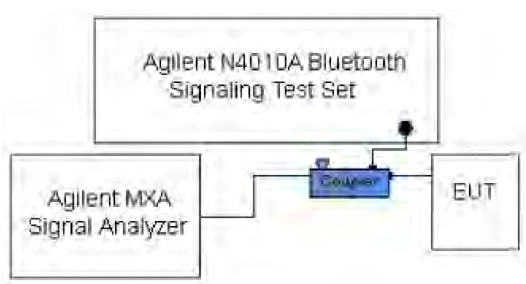

Figure 9-6
Power Measurement Setup

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties - Head

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
10/09/2017	750H	22.0	740	0.883	41.345	0.893	41.994	-1.12%	-1.55%
			755	0.896	41.129	0.894	41.916	0.22%	-1.88%
			770	0.909	40.916	0.895	41.838	1.56%	-2.20%
			785	0.924	40.718	0.896	41.760	3.13%	-2.50%
10/13/2017	750H	23.5	700	0.845	41.508	0.889	42.201	-4.95%	-1.64%
			710	0.851	41.369	0.890	42.149	-4.38%	-1.85%
			740	0.871	40.974	0.893	41.994	-2.46%	-2.43%
			755	0.883	40.752	0.894	41.916	-1.23%	-2.78%
10/09/2017	835H	21.0	820	0.895	41.928	0.899	41.578	-0.44%	0.84%
			835	0.910	41.742	0.900	41.500	1.11%	0.58%
			850	0.925	41.540	0.916	41.500	0.98%	0.10%
10/12/2017	835H	21.0	820	0.883	41.373	0.899	41.578	-1.78%	-0.49%
			835	0.901	41.168	0.900	41.500	0.11%	-0.80%
			850	0.915	40.980	0.916	41.500	-0.11%	-1.25%
10/16/2017	835H	21.2	820	0.883	41.042	0.899	41.578	-1.78%	-1.29%
			835	0.898	40.860	0.900	41.500	-0.22%	-1.54%
			850	0.912	40.678	0.916	41.500	-0.44%	-1.98%
10/09/2017	1750H	21.3	1710	1.356	39.827	1.348	40.142	0.59%	-0.78%
			1750	1.397	39.646	1.371	40.079	1.90%	-1.08%
			1790	1.438	39.442	1.394	40.016	3.16%	-1.43%
10/12/2017	1750H	21.1	1710	1.347	39.498	1.348	40.142	-0.07%	-1.60%
			1750	1.385	39.320	1.371	40.079	1.02%	-1.89%
			1790	1.423	39.119	1.394	40.016	2.08%	-2.24%
10/09/2017	1900H	22.1	1850	1.382	41.015	1.400	40.000	-1.29%	2.54%
			1880	1.416	40.892	1.400	40.000	1.14%	2.23%
			1910	1.449	40.777	1.400	40.000	3.50%	1.94%
10/13/2017	1900H	21.1	1850	1.404	40.573	1.400	40.000	0.29%	1.43%
			1880	1.434	40.446	1.400	40.000	2.43%	1.11%
			1910	1.467	40.317	1.400	40.000	4.79%	0.79%
10/10/2017	2450H-2600H	22.9	2400	1.792	38.322	1.756	39.289	2.05%	-2.46%
			2450	1.849	38.156	1.800	39.200	2.72%	-2.66%
			2500	1.904	37.949	1.855	39.136	2.64%	-3.03%
			2550	1.962	37.773	1.909	39.073	2.78%	-3.33%
			2600	2.020	37.562	1.964	39.009	2.85%	-3.71%
10/17/2017	2450H	21.2	2400	1.828	38.782	1.756	39.289	4.10%	-1.29%
			2450	1.880	38.615	1.800	39.200	4.44%	-1.49%
			2500	1.938	38.406	1.855	39.136	4.47%	-1.87%
10/10/2017	5200H-5800H	21.5	5240	4.506	36.207	4.696	35.940	-4.05%	0.74%
			5260	4.520	36.181	4.717	35.917	-4.18%	0.74%
			5500	4.747	35.856	4.963	35.643	-4.35%	0.60%
			5600	4.862	35.712	5.065	35.529	-4.01%	0.52%
			5745	5.013	35.508	5.214	35.363	-3.86%	0.41%
			5765	5.037	35.498	5.234	35.340	-3.76%	0.45%
			5785	5.061	35.463	5.255	35.317	-3.69%	0.41%
			5825	5.090	35.423	5.296	35.271	-3.89%	0.43%

Table 10-2
Measured Tissue Properties – Body

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
10/09/2017	750B	20.9	740	0.945	55.559	0.963	55.570	-1.87%	-0.02%
			755	0.950	55.516	0.964	55.512	-1.45%	0.01%
			770	0.956	55.476	0.965	55.453	-0.93%	0.04%
			785	0.961	55.429	0.966	55.395	-0.52%	0.06%
10/12/2017	750B	21.2	700	0.917	56.151	0.959	55.726	-4.38%	0.76%
			710	0.927	56.049	0.960	55.687	-3.44%	0.65%
			740	0.955	55.755	0.963	55.570	-0.83%	0.33%
			755	0.969	55.627	0.964	55.512	0.52%	0.21%
10/05/2017	835B	21.2	820	0.971	55.026	0.969	55.258	0.21%	-0.42%
			835	0.986	54.900	0.970	55.200	1.65%	-0.54%
			850	1.001	54.754	0.988	55.154	1.32%	-0.73%
10/11/2017	835B	21.2	820	0.985	52.952	0.969	55.258	1.65%	-4.17%
			835	0.999	52.814	0.970	55.200	2.99%	-4.32%
			850	1.013	52.652	0.988	55.154	2.53%	-4.54%
10/16/2017	835B	20.5	820	0.978	53.214	0.969	55.258	0.93%	-3.70%
			835	0.993	53.058	0.970	55.200	2.37%	-3.88%
			850	1.007	52.910	0.988	55.154	1.92%	-4.07%
10/10/2017	1750B	21.2	1710	1.467	51.067	1.463	53.537	0.27%	-4.61%
			1750	1.510	50.915	1.488	53.432	1.48%	-4.71%
			1790	1.553	50.727	1.514	53.326	2.58%	-4.87%
10/12/2017	1750B	21.5	1710	1.446	52.531	1.463	53.537	-1.16%	-1.88%
			1750	1.473	52.454	1.488	53.432	-1.01%	-1.83%
			1790	1.497	52.370	1.514	53.326	-1.12%	-1.79%
10/16/2017	1750B	20.6	1710	1.447	53.126	1.463	53.537	-1.09%	-0.77%
			1750	1.474	53.087	1.488	53.432	-0.94%	-0.65%
			1790	1.505	53.045	1.514	53.326	-0.59%	-0.53%
10/11/2017	1900B	21.5	1850	1.504	53.673	1.520	53.300	-1.05%	0.70%
			1880	1.540	53.575	1.520	53.300	1.32%	0.52%
			1910	1.574	53.461	1.520	53.300	3.55%	0.30%
10/13/2017	1900B	21.5	1850	1.521	53.325	1.520	53.300	0.07%	0.05%
			1880	1.554	53.250	1.520	53.300	2.24%	-0.09%
			1910	1.589	53.137	1.520	53.300	4.54%	-0.31%
10/31/2017	1900B	21.2	1850	1.490	53.716	1.520	53.300	-1.97%	0.78%
			1880	1.525	53.644	1.520	53.300	0.33%	0.65%
			1910	1.559	53.544	1.520	53.300	2.57%	0.46%
10/09/2017	2450B-2600B	23.0	2400	1.970	53.183	1.902	52.767	3.58%	0.79%
			2450	2.038	53.021	1.950	52.700	4.51%	0.61%
			2500	2.110	52.815	2.021	52.636	4.40%	0.34%
			2550	2.179	52.620	2.092	52.573	4.16%	0.09%
			2600	2.247	52.451	2.163	52.509	3.88%	-0.11%
			2650	2.319	52.240	2.234	52.445	3.80%	-0.39%
			2700	2.390	52.045	2.305	52.382	3.69%	-0.64%

Table 10-3
Measured Tissue Properties – Body (cont.)

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
10/03/2017	5200B-5800B	21.6	5240	5.309	47.447	5.346	48.960	-0.69%	-3.09%
			5260	5.334	47.423	5.369	48.933	-0.65%	-3.09%
			5500	5.656	46.959	5.650	48.607	0.11%	-3.39%
			5600	5.812	46.773	5.766	48.471	0.80%	-3.50%
			5745	6.018	46.505	5.936	48.275	1.38%	-3.67%
			5765	6.050	46.437	5.959	48.248	1.53%	-3.75%
			5785	6.073	46.412	5.982	48.220	1.52%	-3.75%
			5825	6.139	46.366	6.029	48.166	1.82%	-3.74%
10/11/2017	5200B-5800B	21.2	5240	5.393	47.164	5.346	48.960	0.88%	-3.67%
			5260	5.425	47.138	5.369	48.933	1.04%	-3.67%
			5280	5.443	47.094	5.393	48.906	0.93%	-3.71%
			5300	5.479	47.039	5.416	48.879	1.16%	-3.76%
			5500	5.750	46.683	5.650	48.607	1.77%	-3.96%
			5600	5.901	46.462	5.766	48.471	2.34%	-4.14%

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)	$Deviation_{1g}$ (%)
G	750	HEAD	10/09/2017	21.5	22.0	0.200	1161	3332	1.700	8.170	8.500	4.04%
E	750	HEAD	10/13/2017	23.0	23.5	0.200	1161	3319	1.540	8.170	7.700	-5.75%
I	835	HEAD	10/09/2017	21.5	21.2	0.200	4d047	3213	1.870	9.130	9.350	2.41%
I	835	HEAD	10/12/2017	20.7	20.6	0.200	4d047	3213	1.950	9.130	9.750	6.79%
K	835	HEAD	10/16/2017	22.7	21.1	0.200	4d047	7406	1.930	9.130	9.650	5.70%
E	1750	HEAD	10/09/2017	23.1	21.3	0.100	1148	3319	3.900	36.400	39.000	7.14%
E	1750	HEAD	10/12/2017	22.0	21.5	0.100	1150	3319	3.890	36.100	38.900	7.76%
J	1900	HEAD	10/09/2017	21.0	22.1	0.100	5d148	3209	3.930	40.200	39.300	-2.24%
K	1900	HEAD	10/13/2017	22.3	21.1	0.100	5d148	7406	3.880	40.200	38.800	-3.48%
I	2450	HEAD	10/10/2017	23.5	21.4	0.100	719	3213	5.470	51.900	54.700	5.39%
G	2450	HEAD	10/17/2017	22.7	21.6	0.100	719	3332	5.450	51.900	54.500	5.01%
I	2600	HEAD	10/10/2017	23.5	21.4	0.100	1004	3213	6.140	57.600	61.400	6.60%
H	5250	HEAD	10/10/2017	23.7	21.5	0.050	1237	3914	3.750	80.700	75.000	-7.06%
H	5600	HEAD	10/10/2017	23.7	21.5	0.050	1237	3914	3.790	82.500	75.800	-8.12%
H	5750	HEAD	10/10/2017	23.7	21.5	0.050	1237	3914	3.740	80.200	74.800	-6.73%
D	750	BODY	10/09/2017	21.2	20.7	0.200	1054	3288	1.760	8.610	8.800	2.21%
K	750	BODY	10/12/2017	21.9	21.2	0.200	1161	7406	1.730	8.430	8.650	2.61%
E	835	BODY	10/05/2017	22.0	21.5	0.200	4d047	3319	2.010	9.570	10.050	5.02%
G	835	BODY	10/11/2017	22.6	21.2	0.200	4d133	3332	1.960	9.410	9.800	4.14%
J	835	BODY	10/16/2017	20.3	20.5	0.200	4d133	3209	2.030	9.410	10.150	7.86%
E	1750	BODY	10/10/2017	23.1	21.2	0.100	1150	3319	3.720	36.500	37.200	1.92%
J	1900	BODY	10/11/2017	20.1	21.5	0.100	5d149	3209	4.090	40.100	40.900	2.00%
J	1900	BODY	10/13/2017	20.5	21.5	0.100	5d149	3209	4.050	40.100	40.500	1.00%
H	1900	BODY	10/31/2017	22.8	21.2	0.100	5d148	7410	4.350	40.900	43.500	6.36%
K	2450	BODY	10/09/2017	22.1	22.0	0.100	981	7406	5.230	50.800	52.300	2.95%
K	2600	BODY	10/09/2017	22.1	22.0	0.100	1126	7406	5.260	54.300	52.600	-3.13%
D	5250	BODY	10/03/2017	22.5	21.4	0.050	1057	3589	3.650	74.600	73.000	-2.14%
D	5600	BODY	10/03/2017	22.5	21.4	0.050	1057	3589	4.020	78.900	80.400	1.90%
D	5750	BODY	10/03/2017	22.5	21.4	0.050	1057	3589	3.500	75.500	70.000	-7.28%

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)	$Deviation_{10g}$ (%)
D	1750	BODY	10/12/2017	21.8	21.5	0.100	1150	3288	1.980	19.500	19.800	1.54%
D	1750	BODY	10/16/2017	21.6	20.6	0.100	1150	3288	1.960	19.500	19.600	0.51%
J	1900	BODY	10/11/2017	20.1	21.5	0.100	5d149	3209	2.110	21.300	21.100	-0.94%
J	1900	BODY	10/13/2017	20.5	21.5	0.100	5d149	3209	2.090	21.300	20.900	-1.88%
D	5250	BODY	10/11/2017	20.7	20.2	0.050	1237	3589	0.992	21.500	19.840	-7.72%
D	5600	BODY	10/11/2017	20.7	20.2	0.050	1237	3589	1.070	22.100	21.400	-3.17%

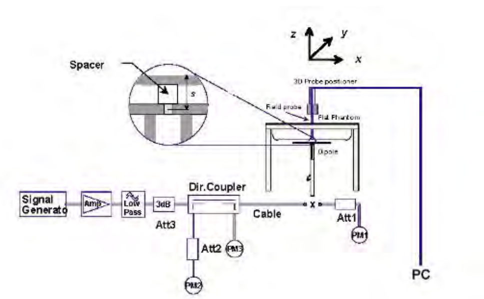

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	32.73	-0.08	Right	Cheek	29446	1:8.3	0.106	1.194	0.127	
836.60	190	GSM 850	GSM	33.5	32.73	-0.13	Right	Tilt	29446	1:8.3	0.147	1.194	0.176	
836.60	190	GSM 850	GSM	33.5	32.73	0.02	Left	Cheek	29446	1:8.3	0.117	1.194	0.140	
836.60	190	GSM 850	GSM	33.5	32.73	-0.01	Left	Tilt	29446	1:8.3	0.149	1.194	0.178	A1
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-2
GSM 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.0	29.84	0.21	Right	Cheek	29909	1:8.3	0.044	1.038	0.046	
1880.00	661	GSM 1900	GSM	30.0	29.84	0.00	Right	Tilt	29909	1:8.3	0.038	1.038	0.039	
1880.00	661	GSM 1900	GSM	30.0	29.84	-0.05	Left	Cheek	29909	1:8.3	0.065	1.038	0.067	A2
1880.00	661	GSM 1900	GSM	30.0	29.84	0.15	Left	Tilt	29909	1:8.3	0.028	1.038	0.029	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.0	24.65	0.12	Right	Cheek	29503	1:1	0.103	1.084	0.112	
836.60	4183	UMTS 850	RMC	25.0	24.65	0.04	Right	Tilt	29503	1:1	0.122	1.084	0.132	
836.60	4183	UMTS 850	RMC	25.0	24.65	0.12	Left	Cheek	29503	1:1	0.097	1.084	0.105	
836.60	4183	UMTS 850	RMC	25.0	24.65	0.04	Left	Tilt	29503	1:1	0.128	1.084	0.139	A3
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
UMTS 1750 Head SAR

MEASUREMENT RESULTS													
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	0.16	Right	Cheek	29586	1:1	0.089	1.132	0.101	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	0.00	Right	Tilt	29586	1:1	0.065	1.132	0.074	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	0.04	Left	Cheek	29586	1:1	0.159	1.132	0.180	A4
1732.40	1412	UMTS 1750	RMC	23.0	22.46	0.06	Left	Tilt	29586	1:1	0.077	1.132	0.087	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	0.12	Right	Cheek	29586	1:1	0.100	1.161	0.116	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	0.08	Right	Tilt	29586	1:1	0.096	1.161	0.111	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	-0.10	Left	Cheek	29586	1:1	0.153	1.161	0.178	A5
1880.00	9400	UMTS 1900	RMC	23.0	22.35	0.14	Left	Tilt	29586	1:1	0.052	1.161	0.060	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-6
LTE Band 12 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	0.09	0	Right	Cheek	QPSK	1	0	29818	1:1	0.082	1.146	0.094	A6
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	0.12	1	Right	Cheek	QPSK	25	0	29818	1:1	0.062	1.148	0.071	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	0.14	0	Right	Tilt	QPSK	1	0	29818	1:1	0.045	1.146	0.052	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	0.17	1	Right	Tilt	QPSK	25	0	29818	1:1	0.035	1.148	0.040	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	0.11	0	Left	Cheek	QPSK	1	0	29818	1:1	0.075	1.146	0.086	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	0.12	1	Left	Cheek	QPSK	25	0	29818	1:1	0.060	1.148	0.069	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	0.17	0	Left	Tilt	QPSK	1	0	29818	1:1	0.059	1.146	0.068	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	0.07	1	Left	Tilt	QPSK	25	0	29818	1:1	0.044	1.148	0.051	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-7
LTE Band 13 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.02	0	Right	Cheek	QPSK	1	0	29628	1:1	0.102	1.057	0.108	A7
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.00	1	Right	Cheek	QPSK	25	12	29628	1:1	0.076	1.102	0.084	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.05	0	Right	Tilt	QPSK	1	0	29628	1:1	0.047	1.057	0.050	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.07	1	Right	Tilt	QPSK	25	12	29628	1:1	0.034	1.102	0.037	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	-0.05	0	Left	Cheek	QPSK	1	0	29628	1:1	0.067	1.057	0.071	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.14	1	Left	Cheek	QPSK	25	12	29628	1:1	0.052	1.102	0.057	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.20	0	Left	Tilt	QPSK	1	0	29628	1:1	0.057	1.057	0.060	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.06	1	Left	Tilt	QPSK	25	12	29628	1:1	0.041	1.102	0.045	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

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

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	-0.08	0	Right	Cheek	QPSK	1	25	29818	1:1	0.145	1.102	0.160	A8
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	0.01	1	Right	Cheek	QPSK	25	0	29818	1:1	0.116	1.135	0.132	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	-0.15	0	Right	Tilt	QPSK	1	25	29818	1:1	0.106	1.102	0.117	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	-0.02	1	Right	Tilt	QPSK	25	0	29818	1:1	0.081	1.135	0.092	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	0.14	0	Left	Cheek	QPSK	1	25	29818	1:1	0.134	1.102	0.148	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	0.08	1	Left	Cheek	QPSK	25	0	29818	1:1	0.106	1.135	0.120	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	-0.01	0	Left	Tilt	QPSK	1	25	29818	1:1	0.132	1.102	0.145	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	0.04	1	Left	Tilt	QPSK	25	0	29818	1:1	0.106	1.135	0.120	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

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

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	0.01	0	Right	Cheek	QPSK	1	36	29818	1:1	0.123	1.091	0.134	A9
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.01	1	Right	Cheek	QPSK	36	18	29818	1:1	0.096	1.132	0.109	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	-0.06	0	Right	Tilt	QPSK	1	36	29818	1:1	0.079	1.091	0.086	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.05	1	Right	Tilt	QPSK	36	18	29818	1:1	0.061	1.132	0.069	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	0.09	0	Left	Cheek	QPSK	1	36	29818	1:1	0.108	1.091	0.118	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.11	1	Left	Cheek	QPSK	36	18	29818	1:1	0.082	1.132	0.093	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	0.13	0	Left	Tilt	QPSK	1	36	29818	1:1	0.106	1.091	0.116	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.04	1	Left	Tilt	QPSK	36	18	29818	1:1	0.079	1.132	0.089	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram									

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

MEASUREMENT RESULTS																			
FREQUENCY			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)	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.02	0	Right	Cheek	QPSK	1	0	29818	1:1	0.117	1.189	0.139	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	0.04	1	Right	Cheek	QPSK	50	0	29818	1:1	0.082	1.236	0.101	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.08	0	Right	Tilt	QPSK	1	0	29818	1:1	0.068	1.189	0.081	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	0.07	1	Right	Tilt	QPSK	50	0	29818	1:1	0.058	1.236	0.072	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.02	0	Left	Cheek	QPSK	1	0	29818	1:1	0.169	1.189	0.201	A10
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	0.05	1	Left	Cheek	QPSK	50	0	29818	1:1	0.120	1.236	0.148	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	0.10	0	Left	Tilt	QPSK	1	0	29818	1:1	0.105	1.189	0.125	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	0.07	1	Left	Tilt	QPSK	50	0	29818	1:1	0.064	1.236	0.079	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-11
LTE Band 2 (PCS) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	0.00	0	Right	Cheek	QPSK	1	50	29909	1:1	0.102	1.167	0.119	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.09	1	Right	Cheek	QPSK	50	50	29909	1:1	0.087	1.199	0.104	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	-0.06	0	Right	Tilt	QPSK	1	50	29909	1:1	0.099	1.167	0.116	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.06	1	Right	Tilt	QPSK	50	50	29909	1:1	0.076	1.199	0.091	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	0.15	0	Left	Cheek	QPSK	1	50	29909	1:1	0.166	1.167	0.194	A11
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.08	1	Left	Cheek	QPSK	50	50	29909	1:1	0.117	1.199	0.140	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	0.18	0	Left	Tilt	QPSK	1	50	29909	1:1	0.057	1.167	0.067	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.01	1	Left	Tilt	QPSK	50	50	29909	1:1	0.050	1.199	0.060	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-12
LTE Band 41 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			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)	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	0.12	0	Right	Cheek	QPSK	1	0	29446	1:1.58	0.055	1.028	0.057	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.10	1	Right	Cheek	QPSK	50	0	29446	1:1.58	0.042	1.050	0.044	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	0.04	0	Right	Tilt	QPSK	1	0	29446	1:1.58	0.041	1.028	0.042	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.14	1	Right	Tilt	QPSK	50	0	29446	1:1.58	0.033	1.050	0.035	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	0.11	0	Left	Cheek	QPSK	1	0	29446	1:1.58	0.062	1.028	0.064	A12
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.20	1	Left	Cheek	QPSK	50	0	29446	1:1.58	0.045	1.050	0.047	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	-0.06	0	Left	Tilt	QPSK	1	0	29446	1:1.58	0.047	1.028	0.048	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.13	1	Left	Tilt	QPSK	50	0	29446	1:1.58	0.040	1.050	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 11-13
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2412	1	802.11b	DSSS	22	15.5	14.91	-0.17	Right	Cheek	29586	1	99.4	1.157	0.890	1.146	1.006	1.026	
2437	6	802.11b	DSSS	22	15.5	15.26	-0.15	Right	Cheek	29586	1	99.4	1.302	0.997	1.057	1.006	1.060	A13
2462	11	802.11b	DSSS	22	15.5	15.09	-0.19	Right	Cheek	29586	1	99.4	1.030	0.899	1.099	1.006	0.994	
2412	1	802.11b	DSSS	22	15.5	14.91	-0.14	Right	Tilt	29586	1	99.4	1.134	0.889	1.146	1.006	1.025	
2437	6	802.11b	DSSS	22	15.5	15.26	-0.17	Right	Tilt	29586	1	99.4	1.143	0.958	1.057	1.006	1.019	
2462	11	802.11b	DSSS	22	15.5	15.09	0.12	Right	Tilt	29586	1	99.4	0.958	0.777	1.099	1.006	0.859	
2437	6	802.11b	DSSS	22	15.5	15.26	0.01	Left	Cheek	29586	1	99.4	0.410	0.368	1.057	1.006	0.391	
2437	6	802.11b	DSSS	22	15.5	15.26	0.01	Left	Tilt	29586	1	99.4	0.392	-	1.057	1.006	-	
2437	6	802.11b	DSSS	22	15.5	15.26	-0.17	Right	Cheek	29586	1	99.4	1.167	0.989	1.057	1.006	1.052	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry indicates Variability measurement.

Table 11-14
NII Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	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)	
5260	52	802.11a	OFDM	20	15.5	15.41	0.14	Right	Cheek	29503	6	98.4	1.041	0.583	1.021	1.016	0.605	
5260	52	802.11a	OFDM	20	15.5	15.41	0.14	Right	Tilt	29503	6	98.4	0.808	0.468	1.021	1.016	0.485	
5260	52	802.11a	OFDM	20	15.5	15.41	0.13	Left	Cheek	29503	6	98.4	0.386	-	1.021	1.016	-	
5260	52	802.11a	OFDM	20	15.5	15.41	0.16	Left	Tilt	29503	6	98.4	0.337	-	1.021	1.016	-	
5500	100	802.11a	OFDM	20	15.5	15.47	0.16	Right	Cheek	29503	6	98.4	1.522	0.624	1.007	1.016	0.638	
5500	100	802.11a	OFDM	20	15.5	15.47	0.15	Right	Tilt	29503	6	98.4	0.995	0.518	1.007	1.016	0.530	
5500	100	802.11a	OFDM	20	15.5	15.47	0.11	Left	Cheek	29503	6	98.4	0.432	-	1.007	1.016	-	
5500	100	802.11a	OFDM	20	15.5	15.47	0.18	Left	Tilt	29503	6	98.4	0.361	-	1.007	1.016	-	
5745	149	802.11a	OFDM	20	15.5	14.92	0.07	Right	Cheek	29503	6	98.4	1.431	0.783	1.143	1.016	0.909	
5785	157	802.11a	OFDM	20	15.5	14.76	0.14	Right	Cheek	29503	6	98.4	1.840	0.858	1.186	1.016	1.034	
5825	165	802.11a	OFDM	20	15.5	14.89	0.12	Right	Cheek	29503	6	98.4	1.986	0.930	1.151	1.016	1.088	A14
5745	149	802.11a	OFDM	20	15.5	14.92	0.17	Right	Tilt	29503	6	98.4	1.146	0.585	1.143	1.016	0.679	
5745	149	802.11a	OFDM	20	15.5	14.92	0.18	Left	Cheek	29503	6	98.4	0.879	-	1.143	1.016	-	
5745	149	802.11a	OFDM	20	15.5	14.92	0.16	Left	Tilt	29503	6	98.4	0.770	-	1.143	1.016	-	
5825	165	802.11a	OFDM	20	15.5	14.89	-0.12	Right	Cheek	29503	6	98.4	1.892	0.904	1.151	1.016	1.057	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry indicates Variability measurement.

Table 11-15
DSS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle %	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441.00	39	Bluetooth	FHSS	8.5	8.28	0.14	Right	Cheek	29859	1	77.3	0.146	1.052	1.294	0.199	A15
2441.00	39	Bluetooth	FHSS	8.5	8.28	0.03	Right	Tilt	29859	1	77.3	0.141	1.052	1.294	0.192	
2441.00	39	Bluetooth	FHSS	8.5	8.28	0.07	Left	Cheek	29859	1	77.3	0.069	1.052	1.294	0.094	
2441.00	39	Bluetooth	FHSS	8.5	8.28	0.06	Left	Tilt	29859	1	77.3	0.066	1.052	1.294	0.090	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram									

11.2 Standalone Body-Worn SAR Data

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

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	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	33.5	32.73	-0.02	15 mm	29909	1	1:8.3	back	0.266	1.194	0.318	A16
1880.00	661	GSM 1900	GSM	30.0	29.84	-0.16	15 mm	29859	1	1:8.3	back	0.272	1.038	0.282	A18
836.60	4183	UMTS 850	RMC	25.0	24.65	-0.18	15 mm	29586	N/A	1:1	back	0.250	1.084	0.271	A20
1712.40	1312	UMTS 1750	RMC	23.0	22.15	-0.05	15 mm	29909	N/A	1:1	back	0.513	1.216	0.624	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	-0.05	15 mm	29909	N/A	1:1	back	0.580	1.132	0.657	
1752.60	1513	UMTS 1750	RMC	23.0	22.38	0.01	15 mm	29909	N/A	1:1	back	0.644	1.153	0.743	A22
1880.00	9400	UMTS 1900	RMC	23.0	22.35	0.00	15 mm	29586	N/A	1:1	back	0.497	1.161	0.577	A24
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-17
LTE Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	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	24.0	23.41	-0.05	0	29859	QPSK	1	0	15 mm	back	1:1	0.174	1.146	0.199	A26
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	-0.01	1	29859	QPSK	25	0	15 mm	back	1:1	0.136	1.148	0.156	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.02	0	29909	QPSK	1	0	15 mm	back	1:1	0.203	1.057	0.215	A28
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.00	1	29909	QPSK	25	12	15 mm	back	1:1	0.150	1.102	0.165	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	0.04	0	29586	QPSK	1	25	15 mm	back	1:1	0.288	1.102	0.317	A30
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	-0.04	1	29586	QPSK	25	0	15 mm	back	1:1	0.232	1.135	0.263	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	0.01	0	29818	QPSK	1	36	15 mm	back	1:1	0.269	1.091	0.293	A32
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	-0.03	1	29818	QPSK	36	18	15 mm	back	1:1	0.212	1.132	0.240	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.0	21.94	0.04	0	29446	QPSK	1	50	15 mm	back	1:1	0.490	1.276	0.625	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.0	22.24	-0.04	0	29446	QPSK	1	0	15 mm	back	1:1	0.522	1.191	0.622	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	0.03	0	29446	QPSK	1	0	15 mm	back	1:1	0.608	1.189	0.723	A34
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	-0.02	1	29446	QPSK	50	0	15 mm	back	1:1	0.416	1.236	0.514	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	0.01	0	29503	QPSK	1	50	15 mm	back	1:1	0.559	1.167	0.652	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	23.0	22.17	-0.02	0	29503	QPSK	1	99	15 mm	back	1:1	0.527	1.211	0.638	
1900.00	19100	High	LTE Band 2 (PCS)	20	23.0	22.26	0.14	0	29503	QPSK	1	99	15 mm	back	1:1	0.634	1.186	0.752	A36
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.00	1	29503	QPSK	50	50	15 mm	back	1:1	0.424	1.199	0.508	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	0.01	0	29859	QPSK	1	0	15 mm	back	1:1.58	0.214	1.028	0.220	A38
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.11	1	29859	QPSK	50	0	15 mm	back	1:1.58	0.166	1.050	0.174	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-18
DTS Body-Worn SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	18.5	17.94	-0.16	15 mm	29818	1	back	99.4	0.229	0.155	1.138	1.006	0.177	A40
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-19
NII Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	15.5	15.41	-0.04	15 mm	29446	6	back	98.4	1.019	0.489	1.021	1.016	0.507	A42
5500	100	802.11a	OFDM	20	15.5	15.47	0.05	15 mm	29446	6	back	98.4	0.544	0.269	1.007	1.016	0.275	
5745	149	802.11a	OFDM	20	15.5	14.92	0.06	15 mm	29446	6	back	98.4	0.752	0.339	1.143	1.016	0.394	
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 11-20
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	29.0	27.39	-0.03	10 mm	29909	3	1:2.76	back	0.371	1.449	0.538	A17
836.60	190	GSM 850	GPRS	29.0	27.39	0.03	10 mm	29909	3	1:2.76	front	0.280	1.449	0.406	
836.60	190	GSM 850	GPRS	29.0	27.39	-0.01	10 mm	29909	3	1:2.76	bottom	0.222	1.449	0.322	
836.60	190	GSM 850	GPRS	29.0	27.39	0.02	10 mm	29909	3	1:2.76	right	0.173	1.449	0.251	
836.60	190	GSM 850	GPRS	29.0	27.39	0.12	10 mm	29909	3	1:2.76	left	0.061	1.449	0.088	
1909.80	810	GSM 1900	GPRS	24.0	24.00	0.00	10 mm	12531	4	1:2.076	back	0.423	1.000	0.423	
1909.80	810	GSM 1900	GPRS	24.0	24.00	-0.07	10 mm	12531	4	1:2.076	front	0.373	1.000	0.373	
1850.20	512	GSM 1900	GPRS	24.0	23.39	-0.07	10 mm	12531	4	1:2.076	bottom	0.616	1.151	0.709	
1880.00	661	GSM 1900	GPRS	24.0	23.47	-0.11	10 mm	12531	4	1:2.076	bottom	0.756	1.130	0.854	
1909.80	810	GSM 1900	GPRS	24.0	24.00	0.02	10 mm	12531	4	1:2.076	bottom	0.918	1.000	**0.918**	A19
1909.80	810	GSM 1900	GPRS	24.0	24.00	0.00	10 mm	12531	4	1:2.076	right	0.103	1.000	0.103	
1909.80	810	GSM 1900	GPRS	24.0	24.00	-0.07	10 mm	12531	4	1:2.076	left	0.056	1.000	0.056	
1909.80	810	GSM 1900	GPRS	24.0	24.00	-0.01	10 mm	12531	4	1:2.076	bottom	0.898	1.000	0.898	
826.40	4132	UMTS 850	RMC	25.0	24.64	-0.16	10 mm	29586	N/A	1:1	back	0.501	1.086	0.544	
836.60	4183	UMTS 850	RMC	25.0	24.65	-0.04	10 mm	29586	N/A	1:1	back	0.542	1.084	0.588	
846.60	4233	UMTS 850	RMC	25.0	24.60	-0.18	10 mm	29586	N/A	1:1	back	0.603	1.096	0.661	A21
836.60	4183	UMTS 850	RMC	25.0	24.65	-0.06	10 mm	29586	N/A	1:1	front	0.385	1.084	0.417	
836.60	4183	UMTS 850	RMC	25.0	24.65	-0.03	10 mm	29586	N/A	1:1	bottom	0.286	1.084	0.310	
836.60	4183	UMTS 850	RMC	25.0	24.65	-0.01	10 mm	29586	N/A	1:1	right	0.216	1.084	0.234	
836.60	4183	UMTS 850	RMC	25.0	24.65	0.05	10 mm	29586	N/A	1:1	left	0.043	1.084	0.047	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.02	10 mm	29909	N/A	1:1	back	0.415	1.009	0.419	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	0.00	10 mm	29909	N/A	1:1	front	0.342	1.009	0.345	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.01	10 mm	29909	N/A	1:1	bottom	0.489	1.009	0.493	A23
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.08	10 mm	29909	N/A	1:1	right	0.067	1.009	0.068	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.09	10 mm	29909	N/A	1:1	left	0.088	1.009	0.089	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	0.01	10 mm	29586	N/A	1:1	back	0.379	1.059	0.401	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	-0.12	10 mm	29586	N/A	1:1	front	0.340	1.059	0.360	
1852.40	9262	UMTS 1900	RMC	18.5	18.34	-0.03	10 mm	29586	N/A	1:1	bottom	0.677	1.038	0.703	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	-0.15	10 mm	29586	N/A	1:1	bottom	0.723	1.059	0.766	
1907.60	9538	UMTS 1900	RMC	18.5	18.48	-0.02	10 mm	29586	N/A	1:1	bottom	0.890	1.005	0.894	A25
1880.00	9400	UMTS 1900	RMC	18.5	18.25	-0.05	10 mm	29586	N/A	1:1	right	0.069	1.059	0.073	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	-0.08	10 mm	29586	N/A	1:1	left	0.055	1.059	0.058	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note: Blue entry indicates Variability measurement.

Table 11-21
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	-0.07	0	29859	QPSK	1	0	10 mm	back	1:1	0.342	1.146	0.392	A27
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	-0.08	1	29859	QPSK	25	0	10 mm	back	1:1	0.264	1.148	0.303	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	0.10	0	29859	QPSK	1	0	10 mm	front	1:1	0.218	1.146	0.250	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	0.04	1	29859	QPSK	25	0	10 mm	front	1:1	0.168	1.148	0.193	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	-0.04	0	29859	QPSK	1	0	10 mm	bottom	1:1	0.155	1.146	0.178	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	-0.13	1	29859	QPSK	25	0	10 mm	bottom	1:1	0.127	1.148	0.146	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	0.01	0	29859	QPSK	1	0	10 mm	right	1:1	0.241	1.146	0.276	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	-0.08	1	29859	QPSK	25	0	10 mm	right	1:1	0.190	1.148	0.218	
707.50	23095	Mid	LTE Band 12	10	24.0	23.41	-0.06	0	29859	QPSK	1	0	10 mm	left	1:1	0.104	1.146	0.119	
707.50	23095	Mid	LTE Band 12	10	23.0	22.40	0.06	1	29859	QPSK	25	0	10 mm	left	1:1	0.080	1.148	0.092	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-22
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.00	0	29909	QPSK	1	0	10 mm	back	1:1	0.440	1.057	0.465	A29
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.02	1	29909	QPSK	25	12	10 mm	back	1:1	0.326	1.102	0.359	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.00	0	29909	QPSK	1	0	10 mm	front	1:1	0.319	1.057	0.337	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.02	1	29909	QPSK	25	12	10 mm	front	1:1	0.237	1.102	0.261	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	-0.04	0	29909	QPSK	1	0	10 mm	bottom	1:1	0.255	1.057	0.270	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	-0.06	1	29909	QPSK	25	12	10 mm	bottom	1:1	0.182	1.102	0.201	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	-0.04	0	29909	QPSK	1	0	10 mm	right	1:1	0.214	1.057	0.226	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	-0.17	1	29909	QPSK	25	12	10 mm	right	1:1	0.144	1.102	0.159	
782.00	23230	Mid	LTE Band 13	10	23.0	22.76	0.10	0	29909	QPSK	1	0	10 mm	left	1:1	0.045	1.057	0.048	
782.00	23230	Mid	LTE Band 13	10	22.0	21.58	0.04	1	29909	QPSK	25	12	10 mm	left	1:1	0.034	1.102	0.037	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-23
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	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	25.0	24.58	-0.08	0	29586	QPSK	1	25	10 mm	back	1:1	0.590	1.102	0.650	A31
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	-0.08	1	29586	QPSK	25	0	10 mm	back	1:1	0.472	1.135	0.536	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	-0.03	0	29586	QPSK	1	25	10 mm	front	1:1	0.468	1.102	0.516	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	-0.01	1	29586	QPSK	25	0	10 mm	front	1:1	0.374	1.135	0.424	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	-0.07	0	29586	QPSK	1	25	10 mm	bottom	1:1	0.339	1.102	0.374	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	-0.05	1	29586	QPSK	25	0	10 mm	bottom	1:1	0.257	1.135	0.292	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	-0.04	0	29586	QPSK	1	25	10 mm	right	1:1	0.209	1.102	0.230	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	0.02	1	29586	QPSK	25	0	10 mm	right	1:1	0.160	1.135	0.182	
836.50	20525	Mid	LTE Band 5 (Cell)	10	25.0	24.58	0.02	0	29586	QPSK	1	25	10 mm	left	1:1	0.073	1.102	0.080	
836.50	20525	Mid	LTE Band 5 (Cell)	10	24.0	23.45	0.07	1	29586	QPSK	25	0	10 mm	left	1:1	0.058	1.135	0.066	
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 11-24
LTE Band 26 (Cell) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	-0.03	0	29818	QPSK	1	36	10 mm	back	1:1	0.575	1.091	0.627	A33
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.02	1	29818	QPSK	36	18	10 mm	back	1:1	0.457	1.132	0.517	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	-0.05	0	29818	QPSK	1	36	10 mm	front	1:1	0.397	1.091	0.433	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.04	1	29818	QPSK	36	18	10 mm	front	1:1	0.312	1.132	0.353	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	-0.05	0	29818	QPSK	1	36	10 mm	bottom	1:1	0.270	1.091	0.295	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	-0.01	1	29818	QPSK	36	18	10 mm	bottom	1:1	0.218	1.132	0.247	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	-0.02	0	29818	QPSK	1	36	10 mm	right	1:1	0.197	1.091	0.215	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	-0.01	1	29818	QPSK	36	18	10 mm	right	1:1	0.155	1.132	0.175	
831.50	26865	Mid	LTE Band 26 (Cell)	15	23.5	23.12	-0.04	0	29818	QPSK	1	36	10 mm	left	1:1	0.056	1.091	0.061	
831.50	26865	Mid	LTE Band 26 (Cell)	15	22.5	21.96	0.03	1	29818	QPSK	36	18	10 mm	left	1:1	0.045	1.132	0.051	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-25
LTE Band 66 (AWS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	0.00	0	29446	QPSK	1	50	10 mm	back	1:1	0.440	1.059	0.466	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	0.00	1	29446	QPSK	50	0	10 mm	back	1:1	0.326	1.091	0.356	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	0.04	0	29446	QPSK	1	50	10 mm	front	1:1	0.411	1.059	0.435	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	-0.01	1	29446	QPSK	50	0	10 mm	front	1:1	0.305	1.091	0.333	
1720.00	132072	Low	LTE Band 66 (AWS)	20	18.5	17.98	-0.02	0	29446	QPSK	1	0	10 mm	bottom	1:1	0.511	1.127	0.576	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	-0.05	0	29446	QPSK	1	50	10 mm	bottom	1:1	0.602	1.059	0.638	
1770.00	132572	High	LTE Band 66 (AWS)	20	18.5	18.21	0.01	0	29446	QPSK	1	0	10 mm	bottom	1:1	0.697	1.069	0.745	A35
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	-0.04	1	29446	QPSK	50	0	10 mm	bottom	1:1	0.450	1.091	0.491	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	0.03	0	29446	QPSK	1	50	10 mm	right	1:1	0.070	1.059	0.074	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	0.01	1	29446	QPSK	50	0	10 mm	right	1:1	0.054	1.091	0.059	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	0.00	0	29446	QPSK	1	50	10 mm	left	1:1	0.078	1.059	0.083	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	0.14	1	29446	QPSK	50	0	10 mm	left	1:1	0.060	1.091	0.065	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-26
LTE Band 2 (PCS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	0.00	0	29503	QPSK	1	0	10 mm	back	1:1	0.428	1.057	0.452	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	0.03	1	29503	QPSK	50	0	10 mm	back	1:1	0.326	1.062	0.346	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	-0.05	0	29503	QPSK	1	0	10 mm	front	1:1	0.376	1.057	0.397	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	-0.03	1	29503	QPSK	50	0	10 mm	front	1:1	0.285	1.062	0.303	
1860.00	18700	Low	LTE Band 2 (PCS)	20	18.5	18.23	-0.08	0	29503	QPSK	1	0	10 mm	bottom	1:1	0.695	1.064	0.739	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	18.5	18.23	-0.06	0	29503	QPSK	1	50	10 mm	bottom	1:1	0.675	1.064	0.718	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	-0.17	0	29503	QPSK	1	0	10 mm	bottom	1:1	0.822	1.057	0.869	A37
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	-0.04	1	29503	QPSK	50	0	10 mm	bottom	1:1	0.527	1.062	0.560	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.23	-0.05	1	29503	QPSK	100	0	10 mm	bottom	1:1	0.590	1.064	0.628	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	-0.15	0	29503	QPSK	1	0	10 mm	right	1:1	0.082	1.057	0.087	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	0.02	1	29503	QPSK	50	0	10 mm	right	1:1	0.060	1.062	0.064	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	-0.04	0	29503	QPSK	1	0	10 mm	left	1:1	0.059	1.057	0.062	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	0.06	1	29503	QPSK	50	0	10 mm	left	1:1	0.044	1.062	0.047	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-27
LTE Band 41 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	-0.04	0	29859	QPSK	1	0	10 mm	back	1:1.58	0.386	1.028	0.397	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.01	1	29859	QPSK	50	0	10 mm	back	1:1.58	0.298	1.050	0.313	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	0.00	0	29859	QPSK	1	0	10 mm	front	1:1.58	0.328	1.028	0.337	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.03	1	29859	QPSK	50	0	10 mm	front	1:1.58	0.251	1.050	0.264	
2506.00	39750	Low	LTE Band 41	20	23.5	23.21	0.09	0	29859	QPSK	1	50	10 mm	bottom	1:1.58	0.724	1.069	0.774	
2549.50	40185	Low-Mid	LTE Band 41	20	23.5	22.89	0.08	0	29859	QPSK	1	0	10 mm	bottom	1:1.58	0.734	1.151	0.845	A39
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	-0.03	0	29859	QPSK	1	0	10 mm	bottom	1:1.58	0.674	1.028	0.693	
2636.50	41055	Mid-High	LTE Band 41	20	23.5	23.31	0.12	0	29859	QPSK	1	0	10 mm	bottom	1:1.58	0.477	1.045	0.498	
2680.00	41490	High	LTE Band 41	20	23.5	23.07	0.06	0	29859	QPSK	1	0	10 mm	bottom	1:1.58	0.393	1.104	0.434	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	0.04	1	29859	QPSK	50	0	10 mm	bottom	1:1.58	0.527	1.050	0.553	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.20	0.09	1	29859	QPSK	100	0	10 mm	bottom	1:1.58	0.470	1.072	0.504	
2593.00	40620	Mid	LTE Band 41	20	23.5	23.38	0.01	0	29859	QPSK	1	0	10 mm	left	1:1.58	0.185	1.028	0.190	
2593.00	40620	Mid	LTE Band 41	20	22.5	22.29	-0.01	1	29859	QPSK	50	0	10 mm	left	1:1.58	0.240	1.050	0.252	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-28
WLAN Hotspot SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2462	11	802.11b	DSSS	22	18.5	17.94	0.10	10 mm	29818	1	back	99.4	0.585	0.355	1.138	1.006	0.406	A41
2462	11	802.11b	DSSS	22	18.5	17.94	-0.18	10 mm	29818	1	front	99.4	0.391	-	1.138	1.006	-	
2462	11	802.11b	DSSS	22	18.5	17.94	0.01	10 mm	29818	1	top	99.4	0.510	0.295	1.138	1.006	0.338	
2462	11	802.11b	DSSS	22	18.5	17.94	0.14	10 mm	29818	1	left	99.4	0.312	-	1.138	1.006	-	
5745	149	802.11a	OFDM	20	15.5	14.92	-0.02	10 mm	29446	6	back	98.4	1.138	0.598	1.143	1.016	0.694	A43
5785	157	802.11a	OFDM	20	15.5	14.76	0.03	10 mm	29446	6	back	98.4	1.231	0.480	1.186	1.016	0.578	
5825	165	802.11a	OFDM	20	15.5	14.89	0.14	10 mm	29446	6	back	98.4	0.923	0.395	1.151	1.016	0.462	
5745	149	802.11a	OFDM	20	15.5	14.92	-0.16	10 mm	29446	6	front	98.4	0.105	-	1.143	1.016	-	
5745	149	802.11a	OFDM	20	15.5	14.92	-0.16	10 mm	29446	6	top	98.4	0.120	-	1.143	1.016	-	
5745	149	802.11a	OFDM	20	15.5	14.92	0.00	10 mm	29446	6	left	98.4	0.182	0.064	1.143	1.016	0.074	
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 11-29
UMTS Phablet SAR Data

MEASUREMENT RESULTS													
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	0.01	10 mm	29909	1:1	back	0.644	1.132	0.729	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	0.00	6 mm	29909	1:1	front	0.916	1.132	1.037	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	-0.01	13 mm	29909	1:1	bottom	0.640	1.132	0.724	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	-0.05	0 mm	29909	1:1	right	0.410	1.132	0.464	
1732.40	1412	UMTS 1750	RMC	23.0	22.46	-0.09	0 mm	29909	1:1	left	0.454	1.132	0.514	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.04	0 mm	29909	1:1	back	1.160	1.009	1.170	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.02	0 mm	29909	1:1	front	1.010	1.009	1.019	
1712.40	1312	UMTS 1750	RMC	18.5	18.21	-0.02	0 mm	29909	1:1	bottom	1.700	1.069	1.817	
1732.40	1412	UMTS 1750	RMC	18.5	18.46	-0.06	0 mm	29909	1:1	bottom	1.760	1.009	1.776	
1752.60	1513	UMTS 1750	RMC	18.5	18.38	-0.04	0 mm	29909	1:1	bottom	1.770	1.028	1.820	A44
1880.00	9400	UMTS 1900	RMC	23.0	22.35	0.07	10 mm	29586	1:1	back	0.576	1.161	0.669	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	-0.07	6 mm	29586	1:1	front	0.425	1.161	0.493	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	0.00	13 mm	29586	1:1	bottom	0.721	1.161	0.837	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	-0.01	0 mm	29586	1:1	right	0.404	1.161	0.469	
1880.00	9400	UMTS 1900	RMC	23.0	22.35	-0.10	0 mm	29586	1:1	left	0.352	1.161	0.409	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	0.07	0 mm	29586	1:1	back	1.010	1.059	1.070	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	-0.04	0 mm	29586	1:1	front	0.974	1.059	1.031	
1880.00	9400	UMTS 1900	RMC	18.5	18.25	0.00	0 mm	29586	1:1	bottom	1.280	1.059	1.356	A45
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 11-30
LTE Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.01	0	29446	QPSK	1	0	10 mm	back	1:1	0.673	1.189	0.800	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	0.01	1	29446	QPSK	50	0	10 mm	back	1:1	0.458	1.236	0.566	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	0.02	0	29446	QPSK	1	0	6 mm	front	1:1	0.958	1.189	1.139	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	0.02	1	29446	QPSK	50	0	6 mm	front	1:1	0.648	1.236	0.801	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.07	0	29446	QPSK	1	0	13 mm	bottom	1:1	0.666	1.189	0.792	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	-0.02	1	29446	QPSK	50	0	13 mm	bottom	1:1	0.428	1.236	0.529	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.07	0	29446	QPSK	1	0	0 mm	right	1:1	0.420	1.189	0.499	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	-0.11	1	29446	QPSK	50	0	0 mm	right	1:1	0.277	1.236	0.342	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.25	-0.01	0	29446	QPSK	1	0	0 mm	left	1:1	0.460	1.189	0.547	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.0	21.08	-0.03	1	29446	QPSK	50	0	0 mm	left	1:1	0.331	1.236	0.409	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	-0.02	0	29446	QPSK	1	50	0 mm	back	1:1	1.080	1.059	1.144	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	0.00	1	29446	QPSK	50	0	0 mm	back	1:1	0.842	1.091	0.919	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	-0.03	0	29446	QPSK	1	50	0 mm	front	1:1	0.951	1.059	1.007	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	-0.06	1	29446	QPSK	50	0	0 mm	front	1:1	0.728	1.091	0.794	
1720.00	132072	Low	LTE Band 66 (AWS)	20	18.5	17.98	-0.05	0	29446	QPSK	1	0	0 mm	bottom	1:1	1.520	1.127	1.713	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	18.5	18.25	-0.03	0	29446	QPSK	1	50	0 mm	bottom	1:1	1.530	1.059	1.620	
1770.00	132572	High	LTE Band 66 (AWS)	20	18.5	18.21	-0.04	0	29446	QPSK	1	0	0 mm	bottom	1:1	1.620	1.069	1.732	A46
1745.00	132322	Mid	LTE Band 66 (AWS)	20	17.5	17.12	-0.07	1	29446	QPSK	50	0	0 mm	bottom	1:1	1.190	1.091	1.298	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	0.01	0	29909	QPSK	1	50	10 mm	back	1:1	0.676	1.167	0.789	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.01	1	29909	QPSK	50	50	10 mm	back	1:1	0.516	1.199	0.619	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	-0.04	0	29909	QPSK	1	50	6 mm	front	1:1	1.020	1.167	1.190	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	-0.06	1	29909	QPSK	50	50	6 mm	front	1:1	0.783	1.199	0.939	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	-0.03	0	29909	QPSK	1	50	13 mm	bottom	1:1	0.751	1.167	0.876	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.00	1	29909	QPSK	50	50	13 mm	bottom	1:1	0.571	1.199	0.685	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	-0.05	0	29909	QPSK	1	50	0 mm	right	1:1	0.491	1.167	0.573	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	0.01	1	29909	QPSK	50	50	0 mm	right	1:1	0.376	1.199	0.451	
1860.00	18700	Low	LTE Band 2 (PCS)	20	23.0	22.33	-0.06	0	29909	QPSK	1	50	0 mm	left	1:1	0.482	1.167	0.562	
1860.00	18700	Low	LTE Band 2 (PCS)	20	22.0	21.21	-0.05	1	29909	QPSK	50	50	0 mm	left	1:1	0.385	1.199	0.462	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	0.05	0	29909	QPSK	1	0	0 mm	back	1:1	1.090	1.057	1.152	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	0.04	1	29909	QPSK	50	0	0 mm	back	1:1	0.827	1.062	0.878	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	0.06	0	29909	QPSK	1	0	0 mm	front	1:1	1.070	1.057	1.131	
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	0.01	1	29909	QPSK	50	0	0 mm	front	1:1	0.805	1.062	0.855	
1900.00	19100	High	LTE Band 2 (PCS)	20	18.5	18.26	-0.13	0	29909	QPSK	1	0	0 mm	bottom	1:1	1.190	1.057	1.258	A47
1860.00	18700	Low	LTE Band 2 (PCS)	20	17.5	17.24	-0.09	1	29909	QPSK	50	0	0 mm	bottom	1:1	0.895	1.062	0.950	
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
WLAN Phablet SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	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	802.11a	OFDM	20	15.5	15.41	0.10	0 mm	29446	6	back	98.4	34.327	2.000	1.021	1.016	2.075	
5280	56	802.11a	OFDM	20	15.5	15.33	0.08	0 mm	29446	6	back	98.4	47.080	2.280	1.040	1.016	2.409	A48
5300	60	802.11a	OFDM	20	15.5	14.89	0.15	0 mm	29446	6	back	98.4	57.111	2.220	1.151	1.016	**2.596**	
5260	52	802.11a	OFDM	20	15.5	15.41	0.13	0 mm	29446	6	front	98.4	2.899	0.320	1.021	1.016	0.332	
5260	52	802.11a	OFDM	20	15.5	15.41	-0.17	0 mm	29446	6	top	98.4	2.039	-	1.021	1.016	-	
5260	52	802.11a	OFDM	20	15.5	15.41	0.00	0 mm	29446	6	left	98.4	0.782	-	1.021	1.016	-	
5500	100	802.11a	OFDM	20	15.5	15.47	0.03	0 mm	29446	6	back	98.4	13.935	1.710	1.007	1.016	1.750	
5500	100	802.11a	OFDM	20	15.5	15.47	0.17	0 mm	29446	6	front	98.4	4.373	0.369	1.007	1.016	0.378	
5500	100	802.11a	OFDM	20	15.5	15.47	0.10	0 mm	29446	6	top	98.4	0.920	-	1.007	1.016	-	
5500	100	802.11a	OFDM	20	15.5	15.47	0.15	0 mm	29446	6	left	98.4	0.714	-	1.007	1.016	-	
5280	56	802.11a	OFDM	20	15.5	15.33	-0.01	0 mm	29446	6	back	98.4	23.233	2.140	1.040	1.016	2.261	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Phablet 4.0 W/kg (mW/g) averaged over 10 grams									

Note: Blue entry indicates Variability measurement.

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. 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.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power

was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.

3. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

UMTS Notes:

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

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported (scaled) for LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. Per KDB Publication 941225 D05Av01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.6.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported

SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 8.6.6 for more information.

4. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
5. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.
6. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

Bluetooth Notes:

1. 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.

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.

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

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

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

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body-Worn)	Estimated SAR (Body-Worn)	Separation Distance (Hotspot)	Estimated SAR (Hotspot)	Separation Distance (Phablet)	Estimated SAR (Phablet)
	[MHz]	[dBm]	[mm]	[W/kg]	[mm]	[W/kg]	[mm]	[W/kg]
Bluetooth	2480	8.50	15	0.098	10	0.147	5	0.118

Note: Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	GSM 850	0.178	1.060	1.238
	GSM 1900	0.067	1.060	1.127
	UMTS 850	0.139	1.060	1.199
	UMTS 1750	0.180	1.060	1.240
	UMTS 1900	0.178	1.060	1.238
	LTE Band 12	0.094	1.060	1.154
	LTE Band 13	0.108	1.060	1.168
	LTE Band 5 (Cell)	0.160	1.060	1.220
	LTE Band 26 (Cell)	0.134	1.060	1.194
	LTE Band 66 (AWS)	0.201	1.060	**1.261**
	LTE Band 2 (PCS)	0.194	1.060	1.254
	LTE Band 41	0.064	1.060	1.124

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	GSM 850	0.178	1.088	1.266
	GSM 1900	0.067	1.088	1.155
	UMTS 850	0.139	1.088	1.227
	UMTS 1750	0.180	1.088	1.268
	UMTS 1900	0.178	1.088	1.266
	LTE Band 12	0.094	1.088	1.182
	LTE Band 13	0.108	1.088	1.196
	LTE Band 5 (Cell)	0.160	1.088	1.248
	LTE Band 26 (Cell)	0.134	1.088	1.222
	LTE Band 66 (AWS)	0.201	1.088	**1.289**
	LTE Band 2 (PCS)	0.194	1.088	1.282
	LTE Band 41	0.064	1.088	1.152

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)
Head SAR	GSM 850	0.178	0.199	0.377
	GSM 1900	0.067	0.199	0.266
	UMTS 850	0.139	0.199	0.338
	UMTS 1750	0.180	0.199	0.379
	UMTS 1900	0.178	0.199	0.377
	LTE Band 12	0.094	0.199	0.293
	LTE Band 13	0.108	0.199	0.307
	LTE Band 5 (Cell)	0.160	0.199	0.359
	LTE Band 26 (Cell)	0.134	0.199	0.333
	LTE Band 66 (AWS)	0.201	0.199	**0.400**
	LTE Band 2 (PCS)	0.194	0.199	0.393
	LTE Band 41	0.064	0.199	0.263

12.4 Body-Worn Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body-Worn	GSM 850	0.318	0.177	0.495
	GSM 1900	0.282	0.177	0.459
	UMTS 850	0.271	0.177	0.448
	UMTS 1750	0.743	0.177	0.920
	UMTS 1900	0.577	0.177	0.754
	LTE Band 12	0.199	0.177	0.376
	LTE Band 13	0.215	0.177	0.392
	LTE Band 5 (Cell)	0.317	0.177	0.494
	LTE Band 26 (Cell)	0.293	0.177	0.470
	LTE Band 66 (AWS)	0.723	0.177	0.900
	LTE Band 2 (PCS)	0.752	0.177	**0.929**
	LTE Band 41	0.220	0.177	0.397

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body-Worn	GSM 850	0.318	0.507	0.825
	GSM 1900	0.282	0.507	0.789
	UMTS 850	0.271	0.507	0.778
	UMTS 1750	0.743	0.507	1.250
	UMTS 1900	0.577	0.507	1.084
	LTE Band 12	0.199	0.507	0.706
	LTE Band 13	0.215	0.507	0.722
	LTE Band 5 (Cell)	0.317	0.507	0.824
	LTE Band 26 (Cell)	0.293	0.507	0.800
	LTE Band 66 (AWS)	0.723	0.507	1.230
	LTE Band 2 (PCS)	0.752	0.507	**1.259**
	LTE Band 41	0.220	0.507	0.727

Table 12-7
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)
Body-Worn	GSM 850	0.318	0.098	0.416
	GSM 1900	0.282	0.098	0.380
	UMTS 850	0.271	0.098	0.369
	UMTS 1750	0.743	0.098	0.841
	UMTS 1900	0.577	0.098	0.675
	LTE Band 12	0.199	0.098	0.297
	LTE Band 13	0.215	0.098	0.313
	LTE Band 5 (Cell)	0.317	0.098	0.415
	LTE Band 26 (Cell)	0.293	0.098	0.391
	LTE Band 66 (AWS)	0.723	0.098	0.821
	LTE Band 2 (PCS)	0.752	0.098	**0.850**
	LTE Band 41	0.220	0.098	0.318

Note: Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.5 Hotspot SAR Simultaneous Transmission Analysis

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

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

Table 12-8
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 SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	GPRS 850	0.538	0.406	0.944
	GPRS 1900	0.918	0.406	**1.324**
	UMTS 850	0.661	0.406	1.067
	UMTS 1750	0.493	0.406	0.899
	UMTS 1900	0.894	0.406	1.300
	LTE Band 12	0.392	0.406	0.798
	LTE Band 13	0.465	0.406	0.871
	LTE Band 5 (Cell)	0.650	0.406	1.056
	LTE Band 26 (Cell)	0.627	0.406	1.033
	LTE Band 66 (AWS)	0.745	0.406	1.151
	LTE Band 2 (PCS)	0.869	0.406	1.275
	LTE Band 41	0.845	0.406	1.251

Table 12-9
Simultaneous Transmission Scenario with 5 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	GPRS 850	0.538	0.694	1.232
	GPRS 1900	0.918	0.694	See Table Below
	UMTS 850	0.661	0.694	1.355
	UMTS 1750	0.493	0.694	1.187
	UMTS 1900	0.894	0.694	**1.588**
	LTE Band 12	0.392	0.694	1.086
	LTE Band 13	0.465	0.694	1.159
	LTE Band 5 (Cell)	0.650	0.694	1.344
	LTE Band 26 (Cell)	0.627	0.694	1.321
	LTE Band 66 (AWS)	0.745	0.694	1.439
	LTE Band 2 (PCS)	0.869	0.694	1.563
	LTE Band 41	0.845	0.694	1.539

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	0.423	0.694	**1.117**
	Front	0.373	0.694*	1.067
	Top	-	0.694*	0.694
	Bottom	0.918	-	0.918
	Right	0.103	-	0.103
	Left	0.056	0.074	0.130

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	GPRS 850	0.538	0.147	0.685
	GPRS 1900	0.918	0.147	**1.065**
	UMTS 850	0.661	0.147	0.808
	UMTS 1750	0.493	0.147	0.640
	UMTS 1900	0.894	0.147	1.041
	LTE Band 12	0.392	0.147	0.539
	LTE Band 13	0.465	0.147	0.612
	LTE Band 5 (Cell)	0.650	0.147	0.797
	LTE Band 26 (Cell)	0.627	0.147	0.774
	LTE Band 66 (AWS)	0.745	0.147	0.892
	LTE Band 2 (PCS)	0.869	0.147	1.016
	LTE Band 41	0.845	0.147	0.992

Note: Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.6 Phablet Simultaneous Transmission Analysis

Table 12-11
Simultaneous Transmission Scenario with 5 GHz WLAN (Phablet)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Phablet SAR	UMTS 1750	1.820	2.596	See Table Below
	UMTS 1900	1.356	2.596	**3.952**
	LTE Band 66 (AWS)	1.732	2.596	See Table Below
	LTE Band 2 (PCS)	1.258	2.596	3.854

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Phablet SAR	Back	1.170	2.596	**3.766**
	Front	1.037	0.378	1.415
	Top	-	2.596*	2.596
	Bottom	1.820	-	1.820
	Right	0.464	-	0.464
	Left	0.514	2.596*	3.110

Simult Tx	Configuration	LTE Band 66 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Phablet SAR	Back	1.144	2.596	**3.740**
	Front	1.139	0.378	1.517
	Top	-	2.596*	2.596
	Bottom	1.732	-	1.732
	Right	0.499	-	0.499
	Left	0.547	2.596*	3.143

Table 12-12
Simultaneous Transmission Scenario with Bluetooth (Phablet)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Phablet SAR	UMTS 1750	1.820	0.118	**1.938**
	UMTS 1900	1.356	0.118	1.474
	LTE Band 66 (AWS)	1.732	0.118	1.850
	LTE Band 2 (PCS)	1.258	0.118	1.376

Note: Bluetooth SAR was not required to be measured per FCC KDB Publication 447498 D01v06. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.7 Simultaneous Transmission Conclusion

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

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 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
Head SAR Measurement Variability Results

HEAD VARIABILITY RESULTS														
Band	FREQUENCY		Mode/Band	Service	Side	Test Position	Data Rate (Mbps)	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)	
2450	2437.00	6	802.11b, 22 MHz Bandwidth	DSSS	Right	Cheek	1	0.997	0.989	1.01	N/A	N/A	N/A	N/A
5750	5825.00	165	802.11a, 20 MHz Bandwidth	OFDM	Right	Cheek	6	0.930	0.904	1.03	N/A	N/A	N/A	N/A
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 13-2
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	4	bottom	10 mm	0.918	0.898	1.02	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 13-3
Phablet SAR Measurement Variability Results

PHABLET VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	Data Rate (Mbps)	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)	
5250	5280.00	56	802.11a, 20 MHz Bandwidth	OFDM	6	back	0 mm	2.280	2.140	1.07	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 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 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/17/2017	Annual	8/17/2018	MY40003841
Agilent	8753ES	S-Parameter Network Analyzer	9/14/2017	Annual	9/14/2018	US39170118
Agilent	E4432B	ESG-D Series Signal Generator	3/24/2017	Annual	3/24/2018	US40053896
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	E5515C	Wireless Communications Test Set	1/8/2015	Triennial	1/8/2018	GB43163447
Agilent	E5515C	Wireless Communications Test Set	5/31/2017	Annual	5/31/2018	GB43304278
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/22/2017	Annual	3/22/2018	MY45470194
Agilent	N4010A	Wireless Connectivity Test Set	CBT	N/A	CBT	GB44450273
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Agilent	N9020A	MXA Signal Analyzer	10/28/2016	Annual	10/28/2017	US46470561
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231535
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231538
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	1039008
Anritsu	ML2496A	Power Meter	4/20/2017	Annual	4/20/2018	1306009
Anritsu	ML2496A	Power Meter	3/28/2017	Annual	3/28/2018	1351001
Anritsu	MT8820C	Radio Communication Analyzer	11/4/2016	Annual	11/4/2017	6201144418
Anritsu	MT8820C	Radio Communication Analyzer	5/23/2017	Annual	5/23/2018	6201240328
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	3/8/2016	Biennial	3/8/2018	160261694
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mitutoyo	CD-6"CSX	Digital Caliper	3/2/2016	Biennial	3/2/2018	13264162
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	7/19/2017	Biennial	7/19/2019	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	12/12/2016	Annual	12/12/2017	833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	4/11/2017	Annual	4/11/2018	836371/0079
Rohde & Schwarz	CMW500	Radio Communication Tester	5/4/2017	Annual	5/4/2018	101699
Rohde & Schwarz	CMW500	Radio Communication Tester	6/6/2017	Annual	6/6/2018	108843
Rohde & Schwarz	CMW500	Radio Communication Tester	9/15/2017	Annual	9/15/2018	109366
Seekonk	NC-100	Torque Wrench (8" lb)	9/1/2016	Biennial	9/1/2018	21053
SPEAG	D750V3	750 MHz SAR Dipole	3/7/2017	Annual	3/7/2018	1054
SPEAG	D750V3	750 MHz SAR Dipole	7/13/2016	Biennial	7/13/2018	1161
SPEAG	D835V2	835 MHz SAR Dipole	7/13/2016	Biennial	7/13/2018	4d047
SPEAG	D835V2	835 MHz SAR Dipole	7/11/2017	Annual	7/11/2018	4d133
SPEAG	D1750V2	1750 MHz SAR Dipole	5/9/2017	Annual	5/9/2018	1148
SPEAG	D1750V2	1750 MHz SAR Dipole	7/14/2016	Biennial	7/14/2018	1150
SPEAG	D1900V2	1900 MHz SAR Dipole	2/9/2017	Annual	2/9/2018	5d148
SPEAG	D1900V2	1900 MHz SAR Dipole	7/11/2017	Annual	7/11/2018	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/17/2017	Annual	8/17/2018	719
SPEAG	D2450V2	2450 MHz SAR Dipole	7/25/2016	Biennial	7/25/2018	981
SPEAG	D2600V2	2600 MHz SAR Dipole	4/13/2017	Annual	4/13/2018	1004
SPEAG	D2600V2	2600 MHz SAR Dipole	7/10/2017	Annual	7/10/2018	1126
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/20/2017	Annual	1/20/2018	1057
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/15/2017	Annual	8/15/2018	1237
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/13/2017	Annual	7/13/2018	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/9/2017	Annual	8/9/2018	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2017	Annual	3/8/2018	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2017	Annual	4/11/2018	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2017	Annual	3/13/2018	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/16/2017	Annual	1/16/2018	1466
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3209
SPEAG	ES3DV3	SAR Probe	2/10/2017	Annual	2/10/2018	3213
SPEAG	ES3DV3	SAR Probe	1/13/2017	Annual	1/13/2018	3288
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3319
SPEAG	ES3DV3	SAR Probe	8/14/2017	Annual	8/14/2018	3332
SPEAG	EX3DV4	SAR Probe	1/13/2017	Annual	1/13/2018	3589
SPEAG	EX3DV4	SAR Probe	2/13/2017	Annual	2/13/2018	3914
SPEAG	EX3DV4	SAR Probe	4/18/2017	Annual	4/18/2018	7406
SPEAG	EX3DV4	SAR Probe	7/17/2017	Annual	7/17/2018	7410

Note:

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

15 MEASUREMENT UNCERTAINTIES

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

16 CONCLUSION

16.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

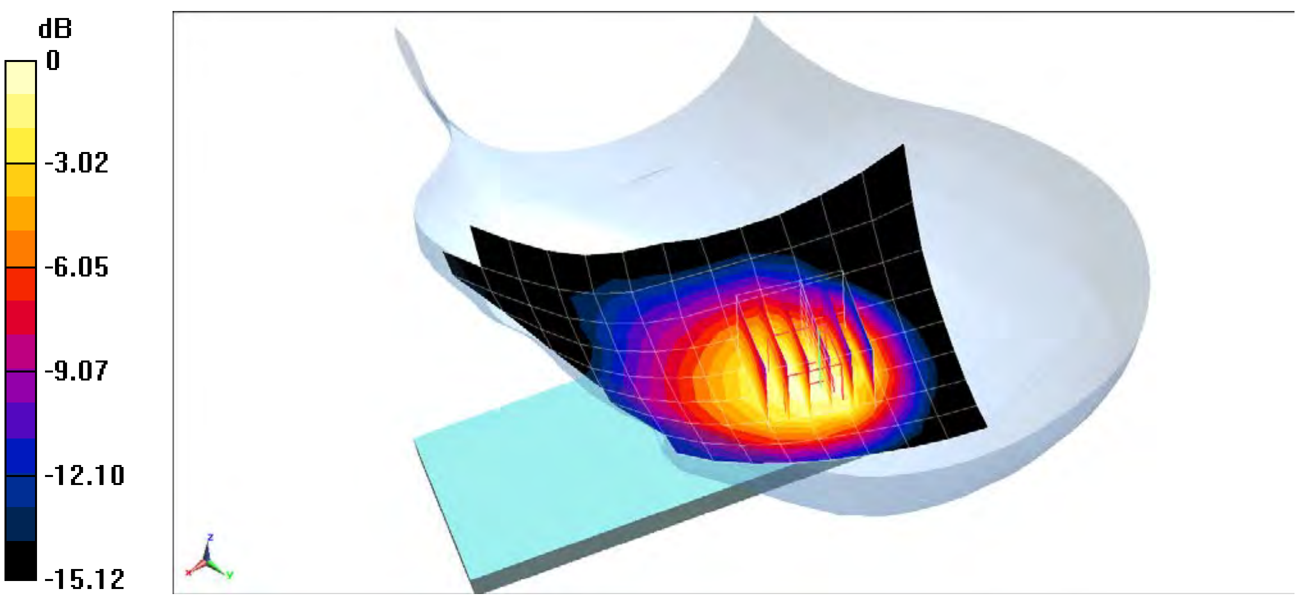
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.912 S/m; ε_r = 41.72; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-09-2017; Ambient Temp: 21.5°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.49, 6.49, 6.49); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GSM 850, Left Head, Tilt, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.42 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.217 W/kg
SAR(1 g) = 0.149 W/kg



0 dB = 0.168 W/kg = -7.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

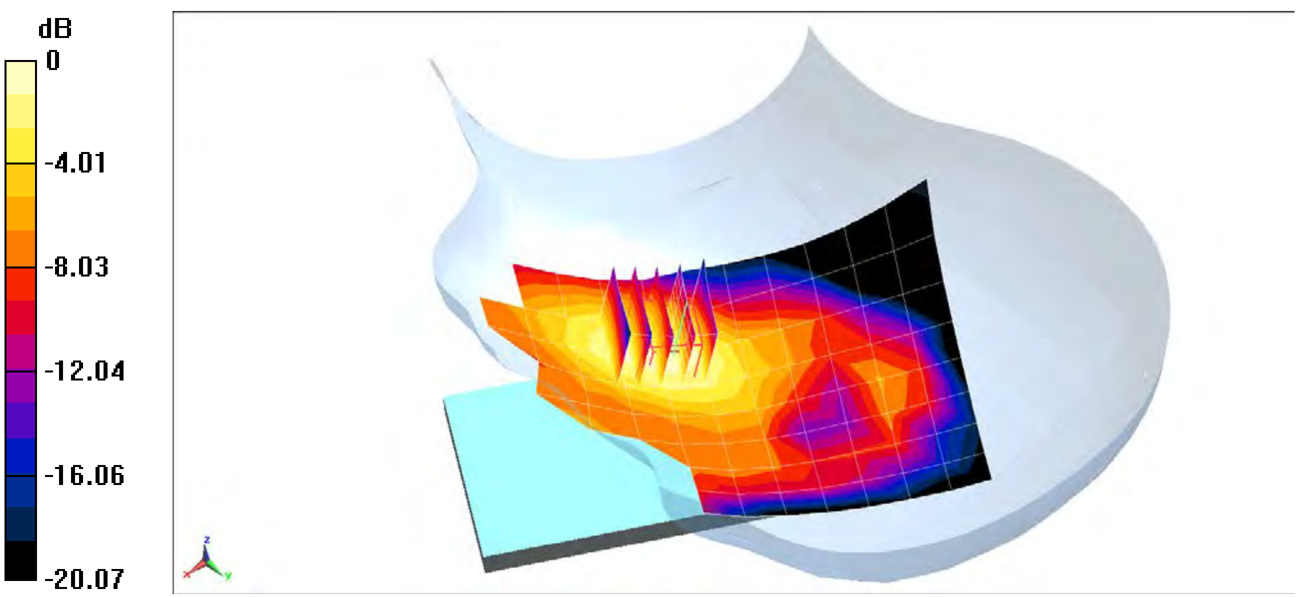
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.416 S/m; ε_r = 40.892; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-09-2017; Ambient Temp: 21.0°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(5.31, 5.31, 5.31); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.110 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.101 W/kg
SAR(1 g) = 0.065 W/kg



0 dB = 0.0754 W/kg = -11.23 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29503

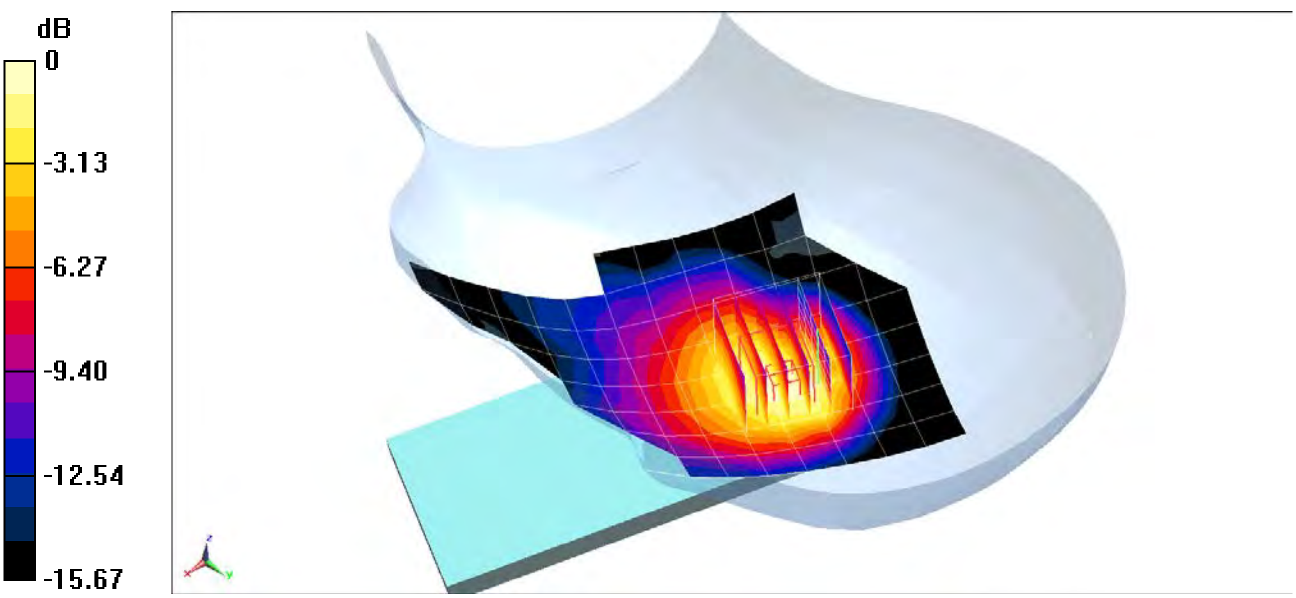
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.899 S/m; ε_r = 40.841; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-16-2017; Ambient Temp: 22.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7406; ConvF(9.97, 9.97, 9.97); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 850, Left Head, Tilt, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.41 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.206 W/kg
SAR(1 g) = 0.128 W/kg



0 dB = 0.167 W/kg = -7.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

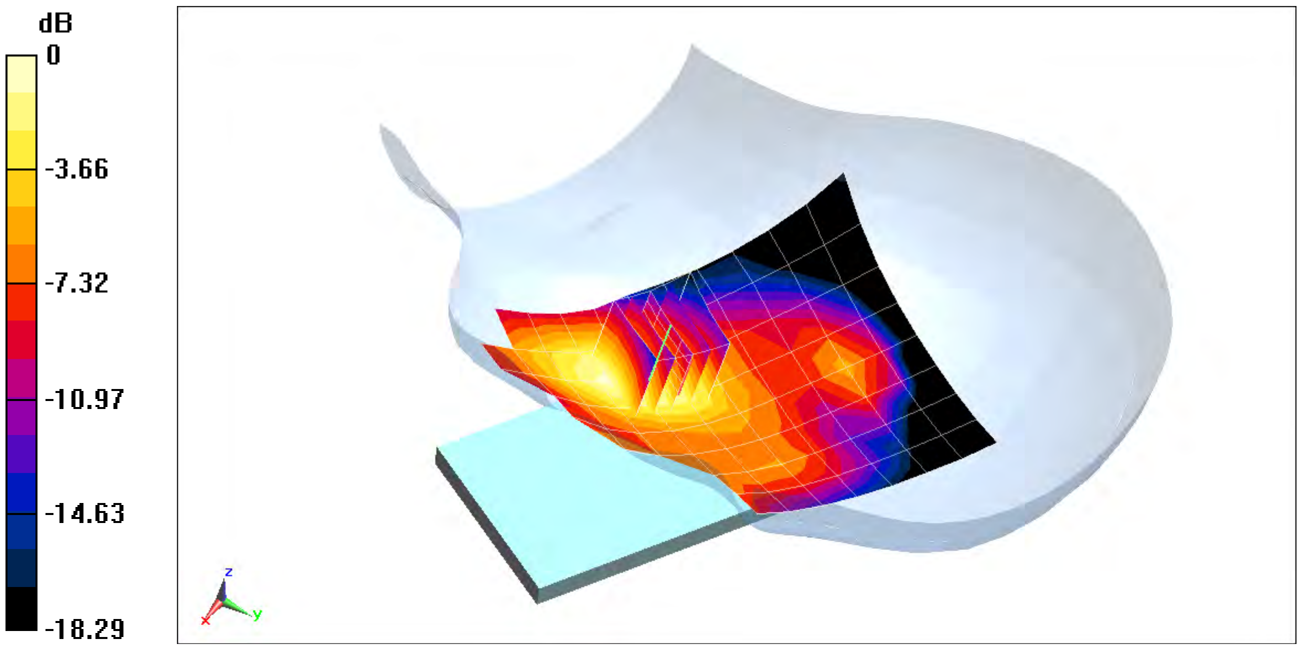
Communication System: UID 0, UMTS; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.368 S/m; ε_r = 39.398; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-12-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(5.38, 5.38, 5.38); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.37 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.159 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

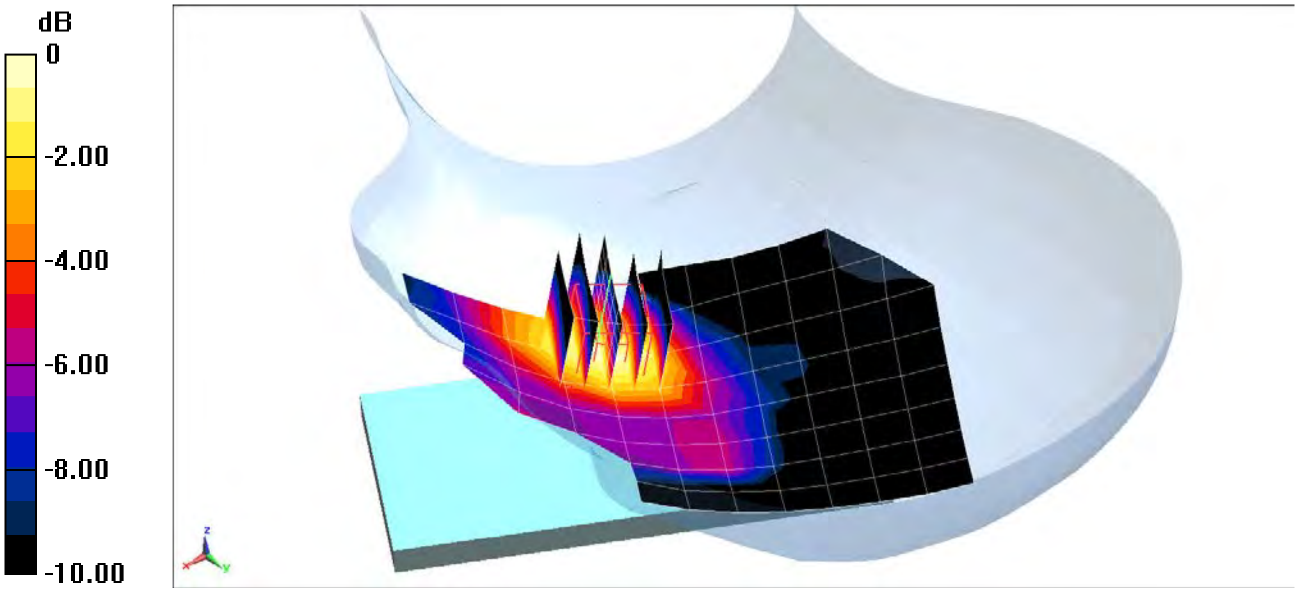
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.434 S/m; ε_r = 40.446; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-13-2017; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7406; ConvF(8.4, 8.4, 8.4); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.64 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.240 W/kg
SAR(1 g) = 0.153 W/kg



0 dB = 0.204 W/kg = -6.90 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

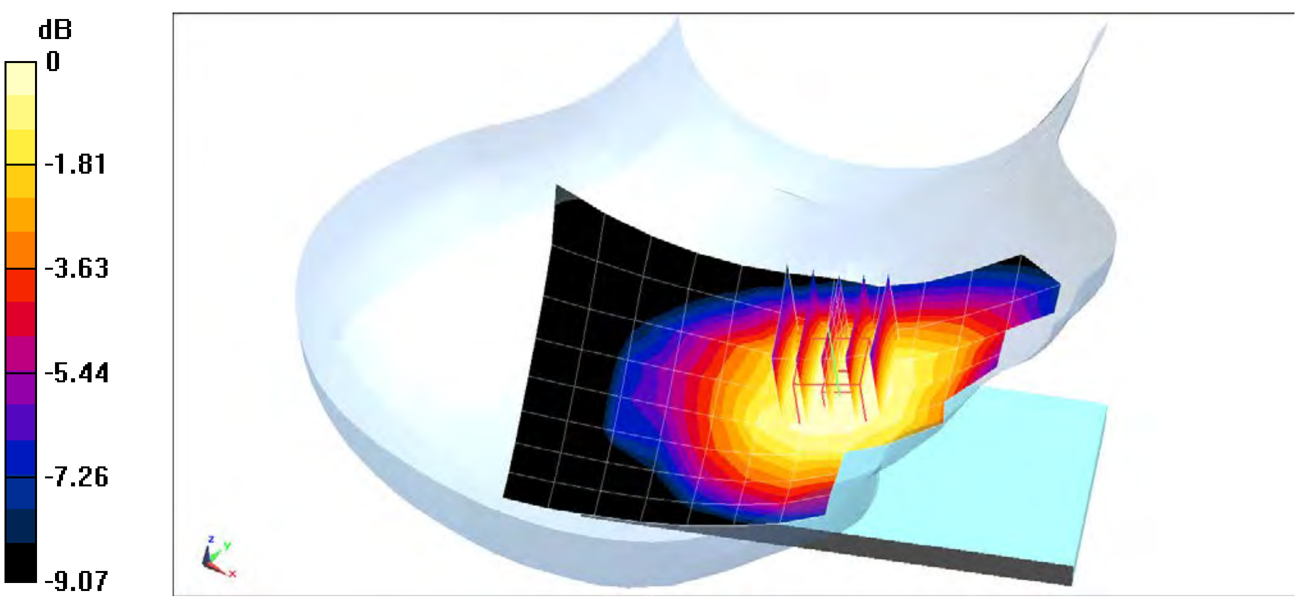
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.85 S/m; ε_r = 41.404; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-13-2017; Ambient Temp: 23.0°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3319; ConvF(6.76, 6.76, 6.76); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.42 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.103 W/kg
SAR(1 g) = 0.082 W/kg



0 dB = 0.0888 W/kg = -10.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29628

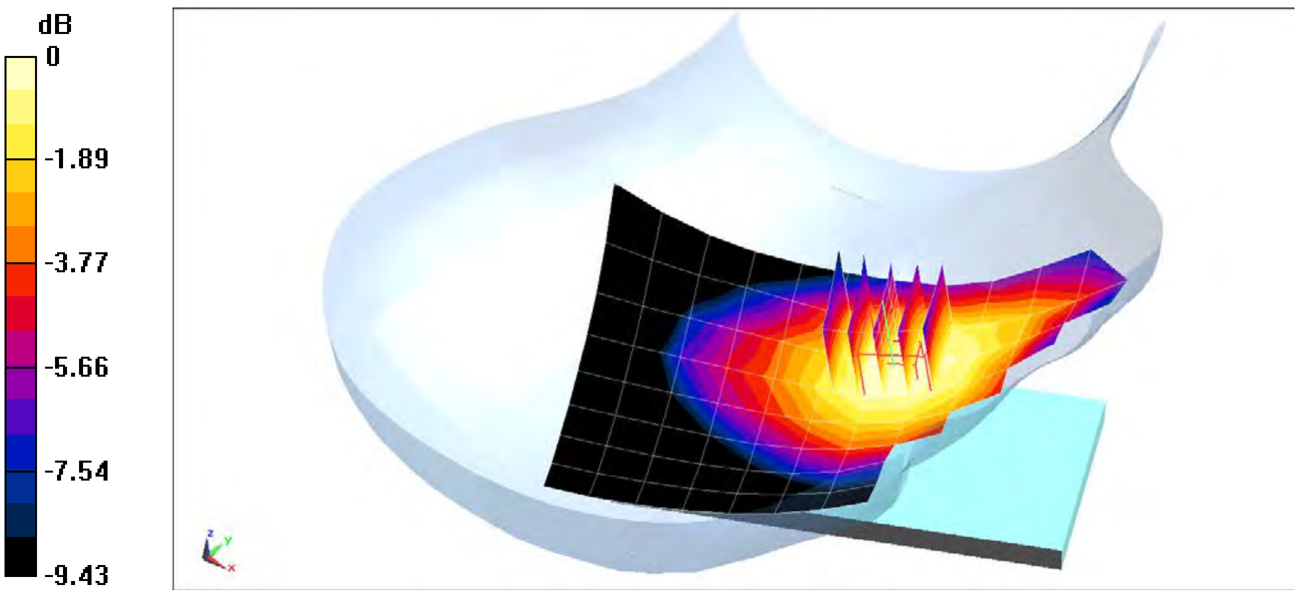
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 782 MHz; $\sigma = 0.921$ S/m; $\varepsilon_r = 40.758$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 10-09-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3332; ConvF(6.81, 6.81, 6.81); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.38 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.125 W/kg
SAR(1 g) = 0.102 W/kg



0 dB = 0.111 W/kg = -9.55 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

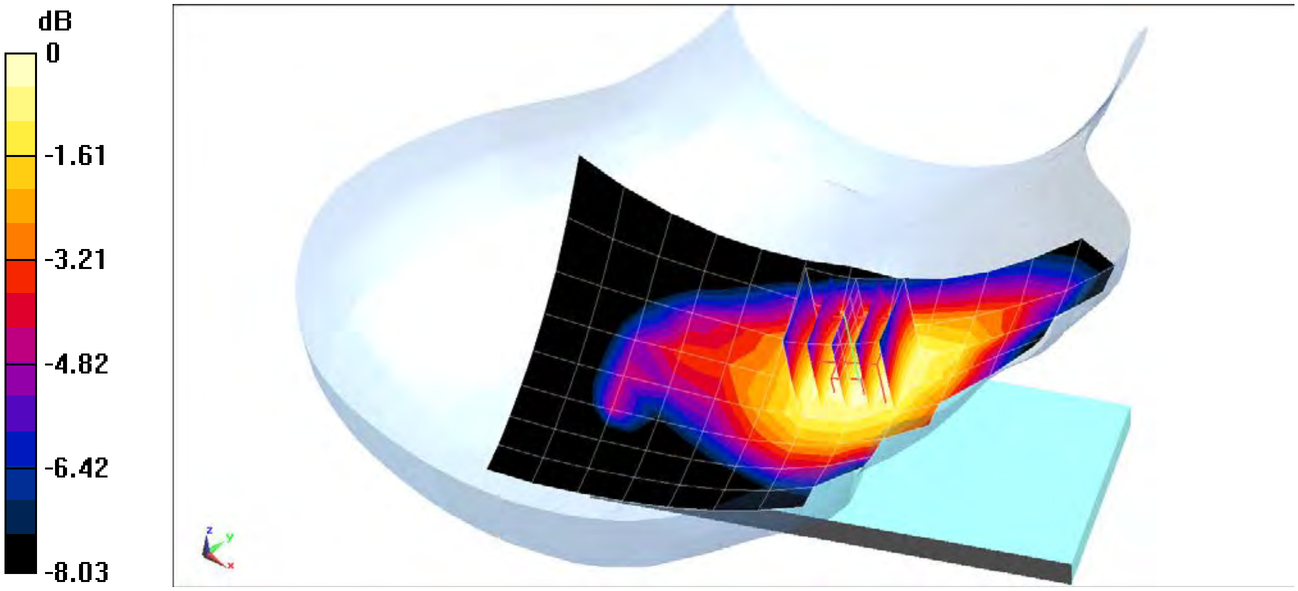
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.902 S/m; ε_r = 41.149; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-12-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3213; ConvF(6.49, 6.49, 6.49); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 13.83 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.179 W/kg
SAR(1 g) = 0.145 W/kg



0 dB = 0.158 W/kg = -8.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

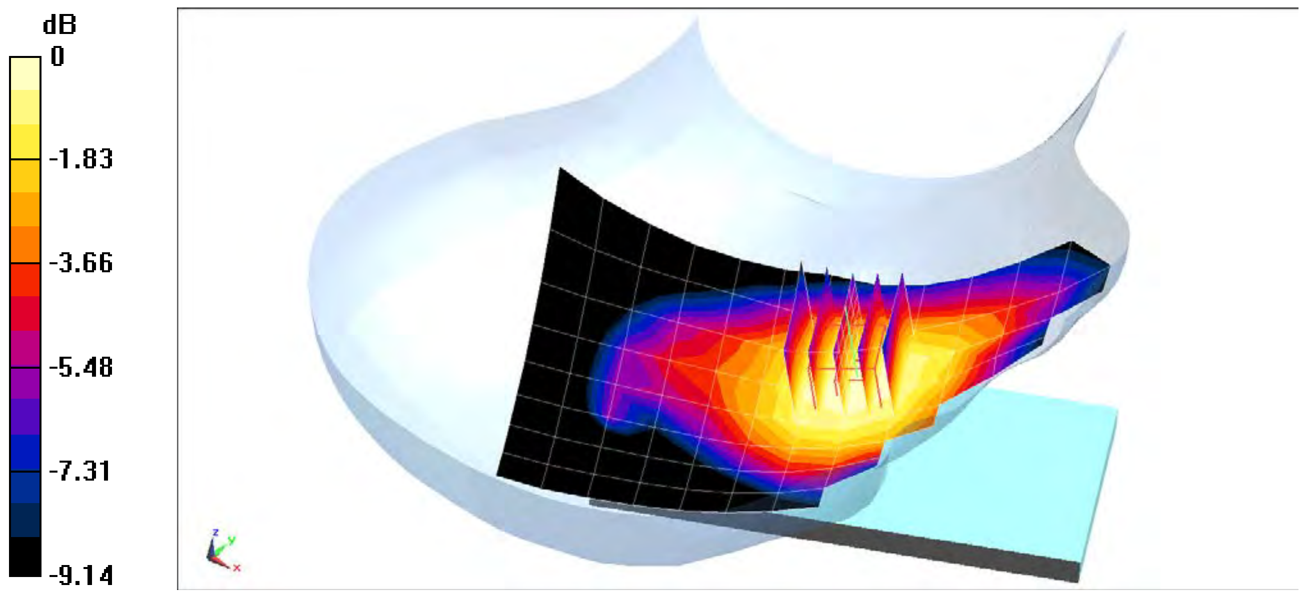
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.897 S/m; ε_r = 41.216; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-12-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3213; ConvF(6.49, 6.49, 6.49); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 26 (Cell.), Right Head, Cheek, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 36 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.65 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.151 W/kg
SAR(1 g) = 0.123 W/kg



0 dB = 0.134 W/kg = -8.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

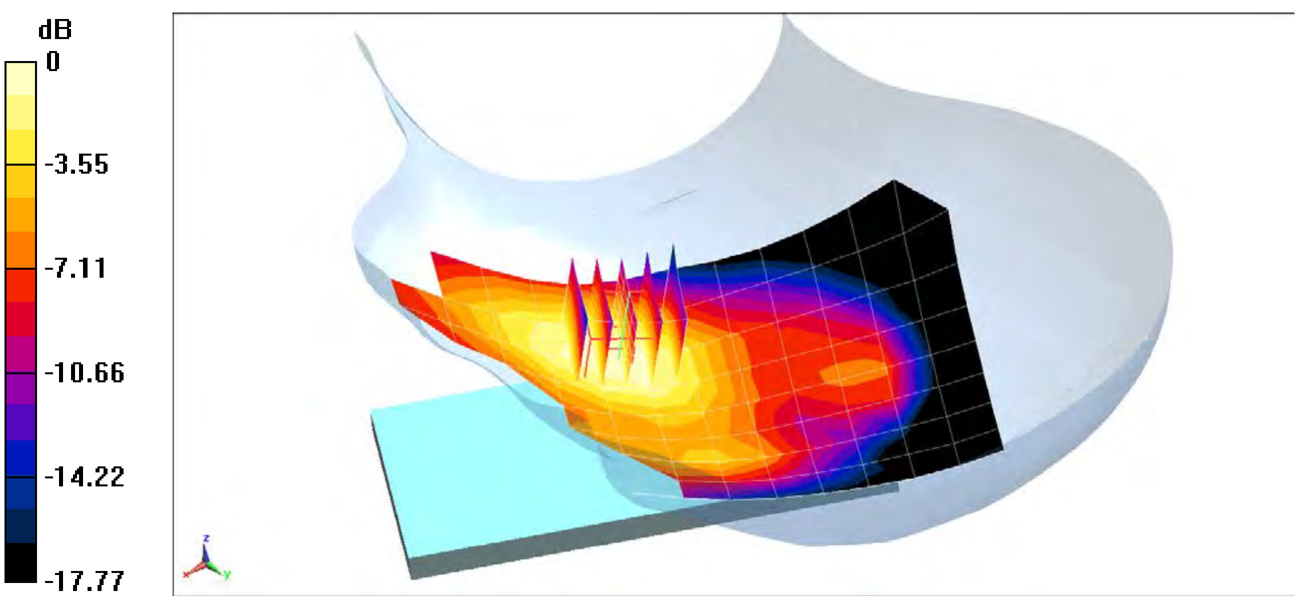
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.418 S/m; ε_r = 39.544; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-09-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3319; ConvF(5.38, 5.38, 5.38); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.04 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.169 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

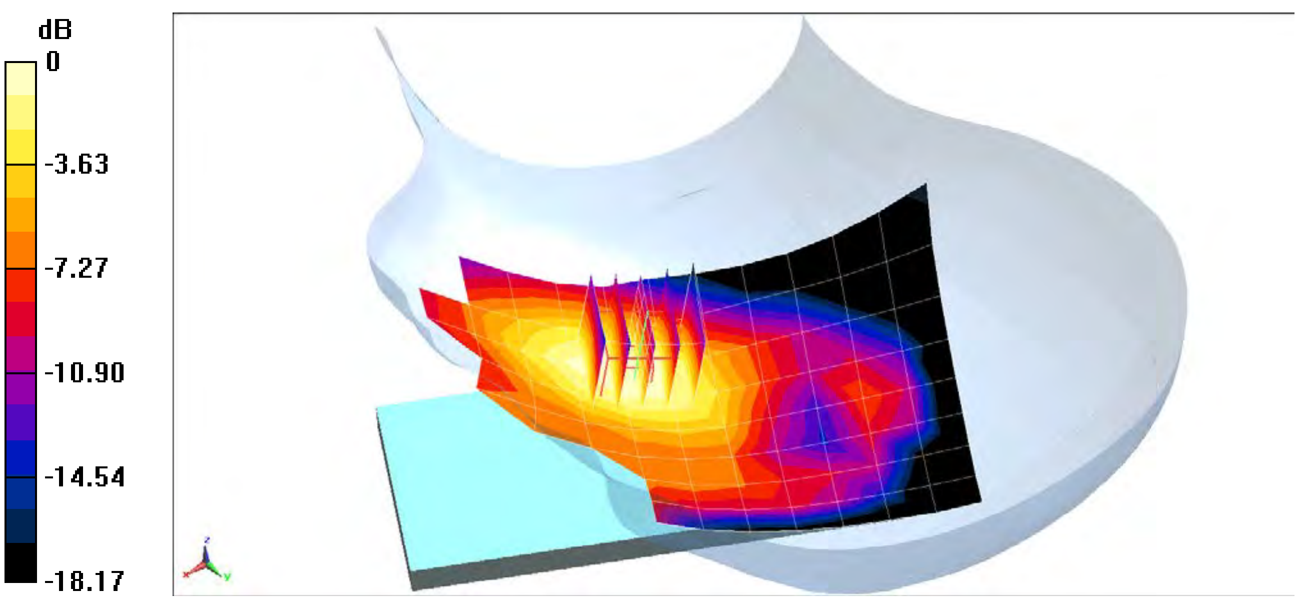
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1860 MHz; σ = 1.393 S/m; ε_r = 40.974; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-09-2017; Ambient Temp: 21.0°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(5.31, 5.31, 5.31); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 2 (PCS), Left Head, Cheek, Low.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 = 12.06 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.258 W/kg
SAR(1 g) = 0.166 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

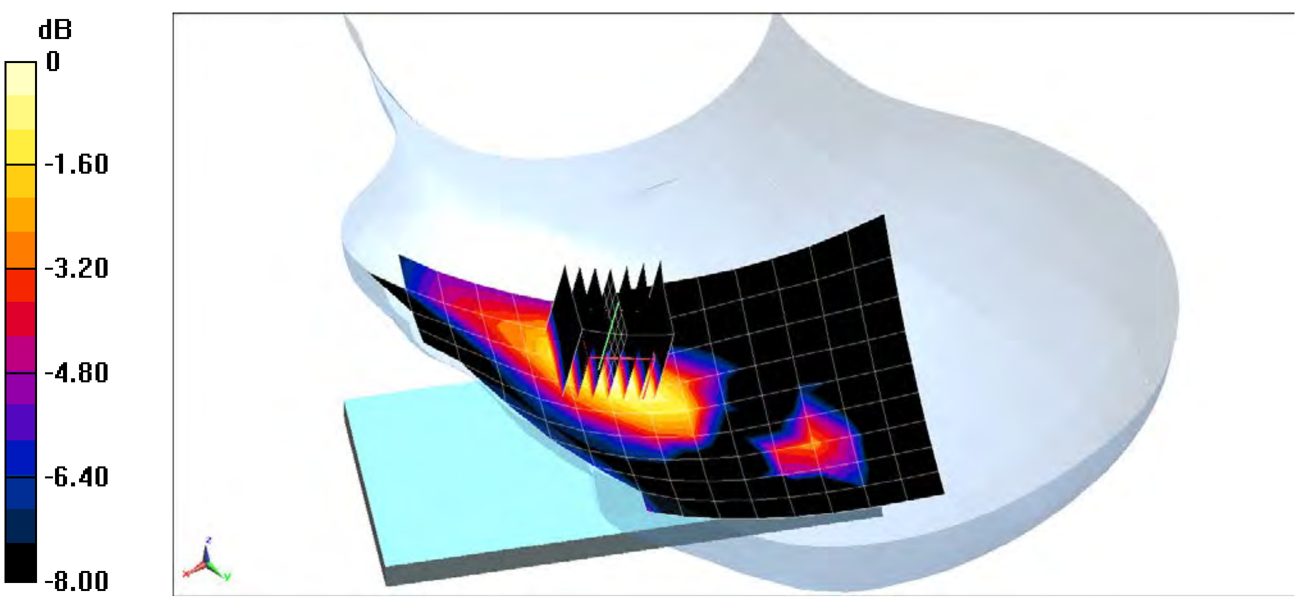
Communication System: UID 0, LTE Band 41; Frequency: 2593 MHz; Duty Cycle: 1:1.58
Medium: 2600 Head; Medium parameters used (interpolated):
f = 2593 MHz; σ = 2.012 S/m; ε_r = 37.592; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10-10-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3213; ConvF(4.52, 4.52, 4.52); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Right; Type: SAM; Serial: 1757
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.528 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.121 W/kg
SAR(1 g) = 0.062 W/kg



0 dB = 0.0778 W/kg = -11.09 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

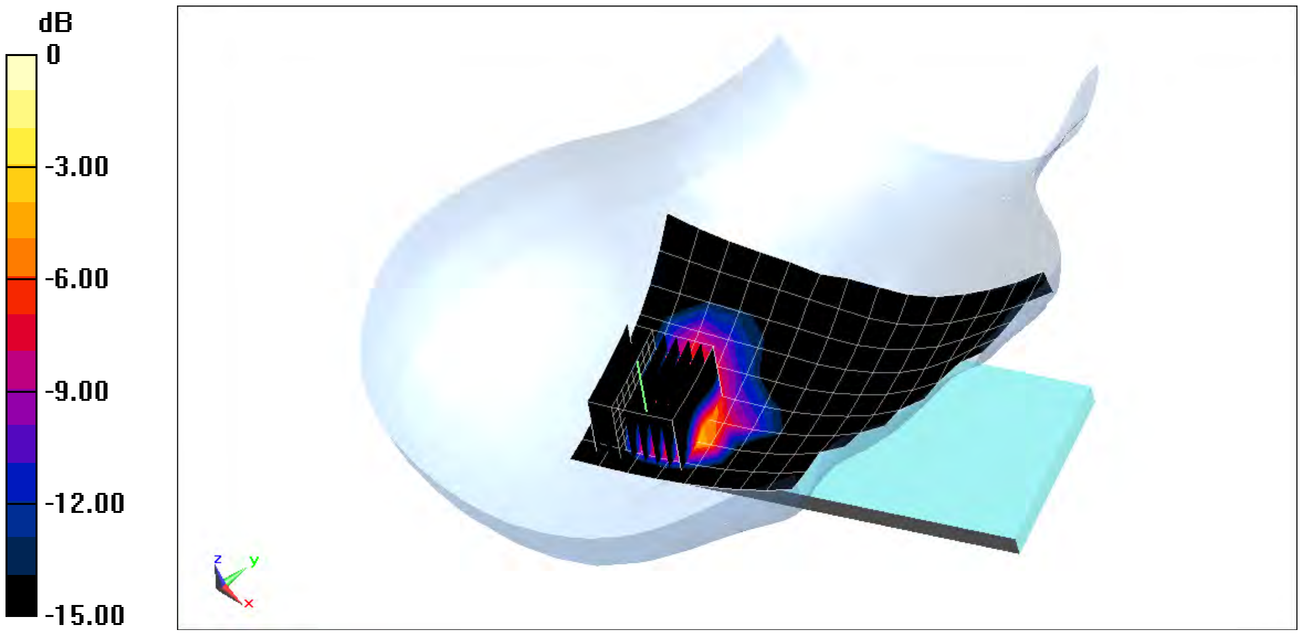
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 MHz Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.866 S/m; ε_r = 38.658; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-17-2017; Ambient Temp: 22.7°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3332; ConvF(4.68, 4.68, 4.68); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11b, 22 MHz Bandwidth, Right Head, Cheek, Ch 6, 1 Mbps

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.33 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 2.67 W/kg
SAR(1 g) = 0.997 W/kg



0 dB = 1.49 W/kg = 1.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29503

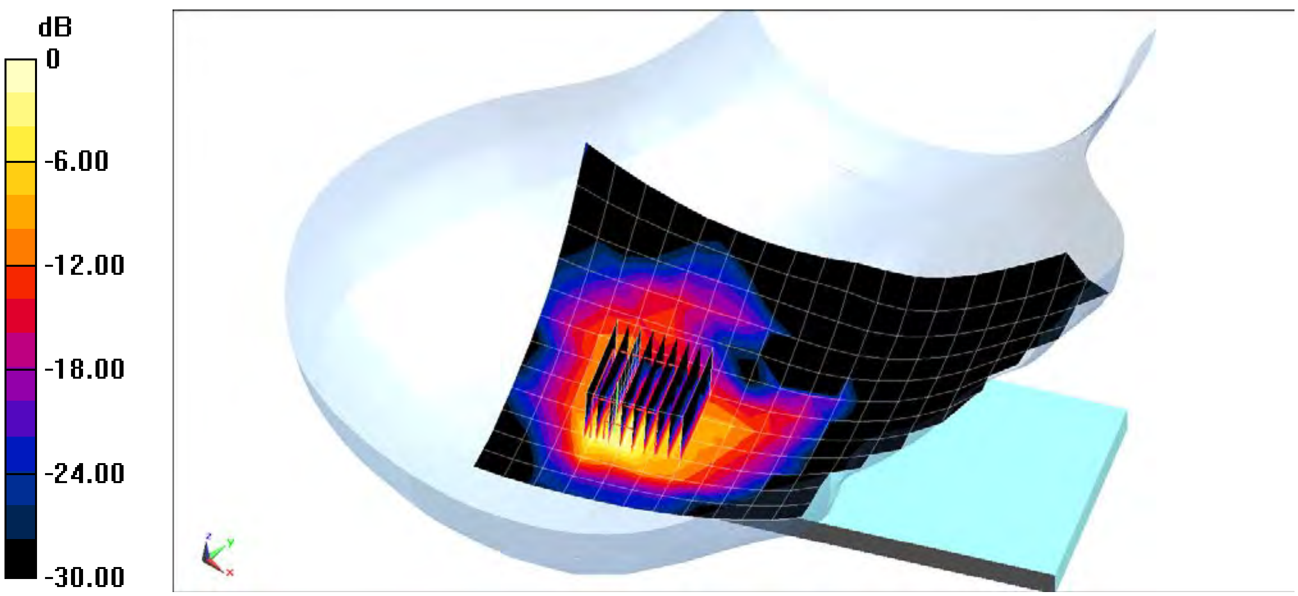
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5GHz Head; Medium parameters used:
f = 5825 MHz; σ = 5.09 S/m; ε_r = 35.423; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-10-2017; Ambient Temp: 23.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(4.91, 4.91, 4.91); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11a, U-NII-3, 20 MHz Bandwidth, Right Head, Cheek, Ch 165, 6 Mbps

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 = 6.328 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 5.11 W/kg
SAR(1 g) = 0.930 W/kg



0 dB = 2.69 W/kg = 4.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29859

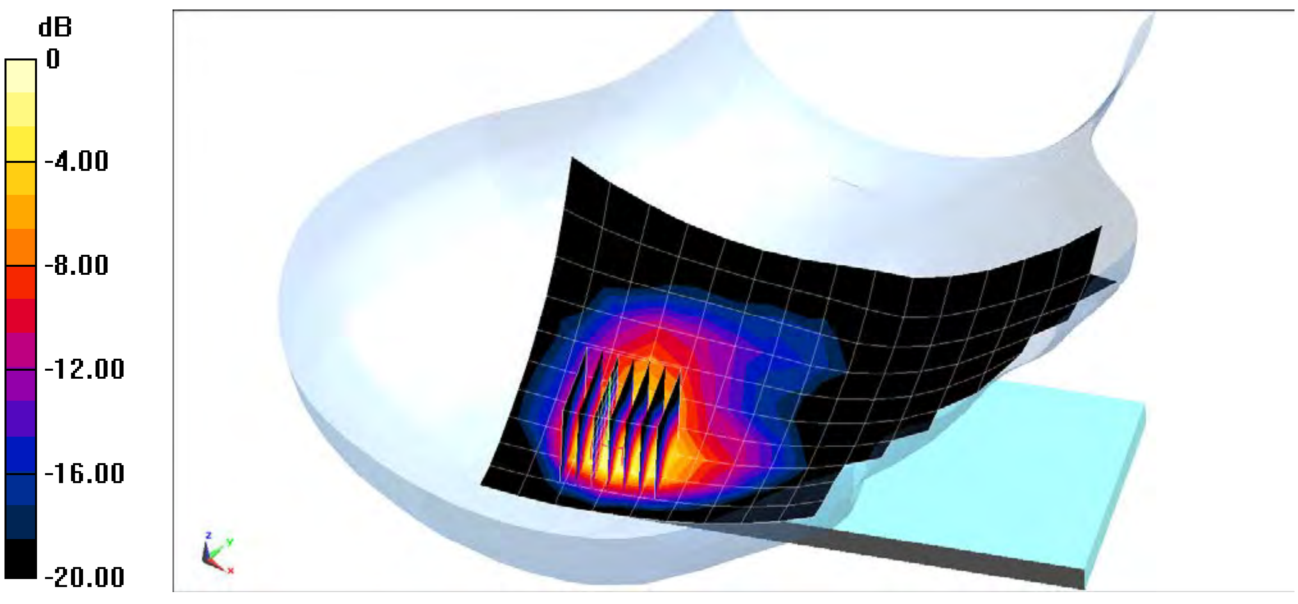
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.294
Medium: 2450 Head; Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.839 S/m; ε_r = 38.186; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10-10-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3213; ConvF(4.7, 4.7, 4.7); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Right; Type: SAM; Serial: 1757
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Bluetooth, Right Head, Cheek, Ch 39, 1Mbps

Area Scan (11x19x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.384 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.385 W/kg
SAR(1 g) = 0.146 W/kg



0 dB = 0.214 W/kg = -6.70 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

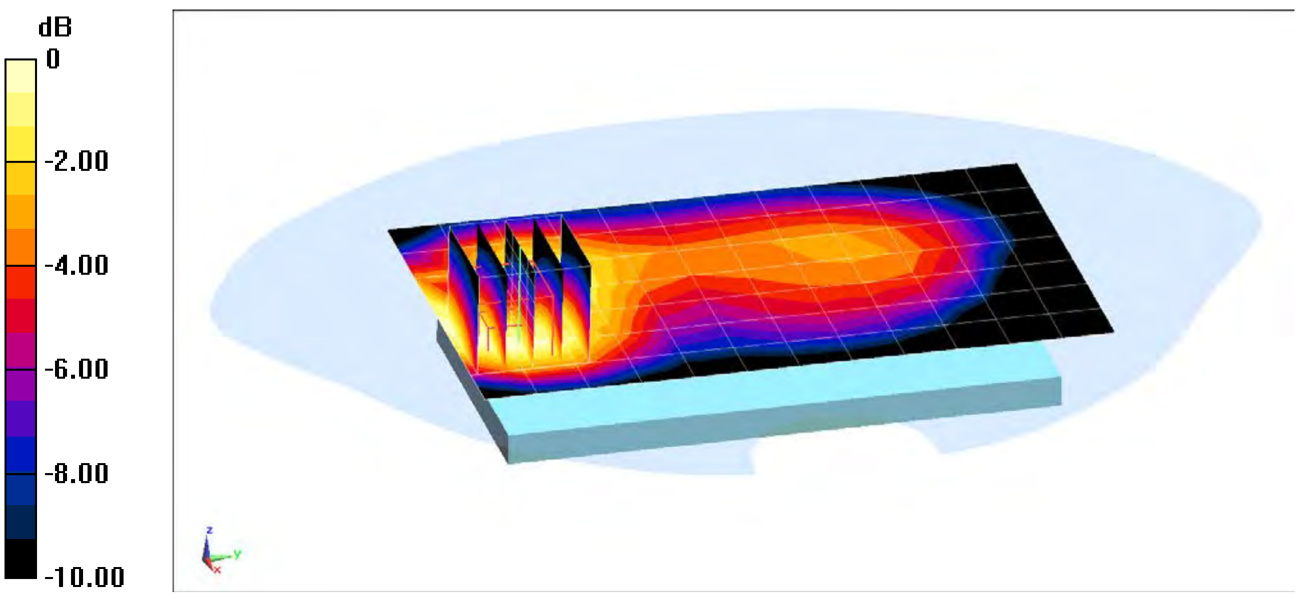
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.988 S/m; ε_r = 54.884; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-05-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.29, 6.29, 6.29); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GSM 850, Body SAR, Back Side, 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 = 17.25 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.418 W/kg
SAR(1 g) = 0.266 W/kg



0 dB = 0.312 W/kg = -5.06 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

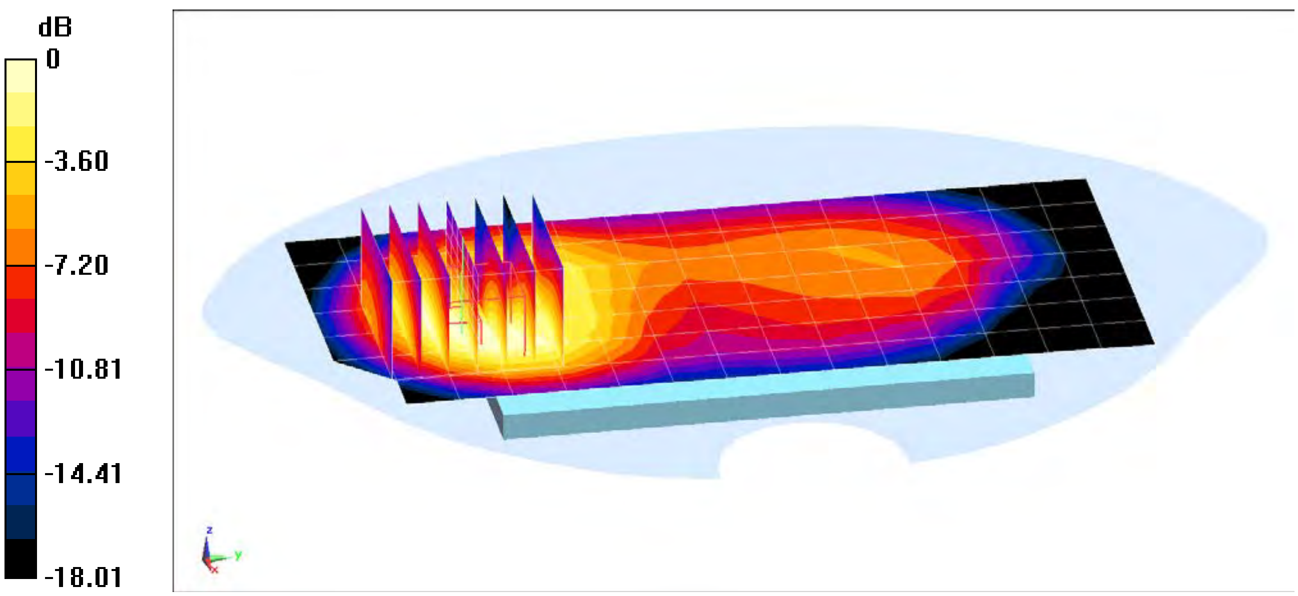
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.988 S/m; ε_r = 54.884; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-05-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.29, 6.29, 6.29); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (8x16x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.15 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.609 W/kg
SAR(1 g) = 0.371 W/kg



0 dB = 0.442 W/kg = -3.55 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29859

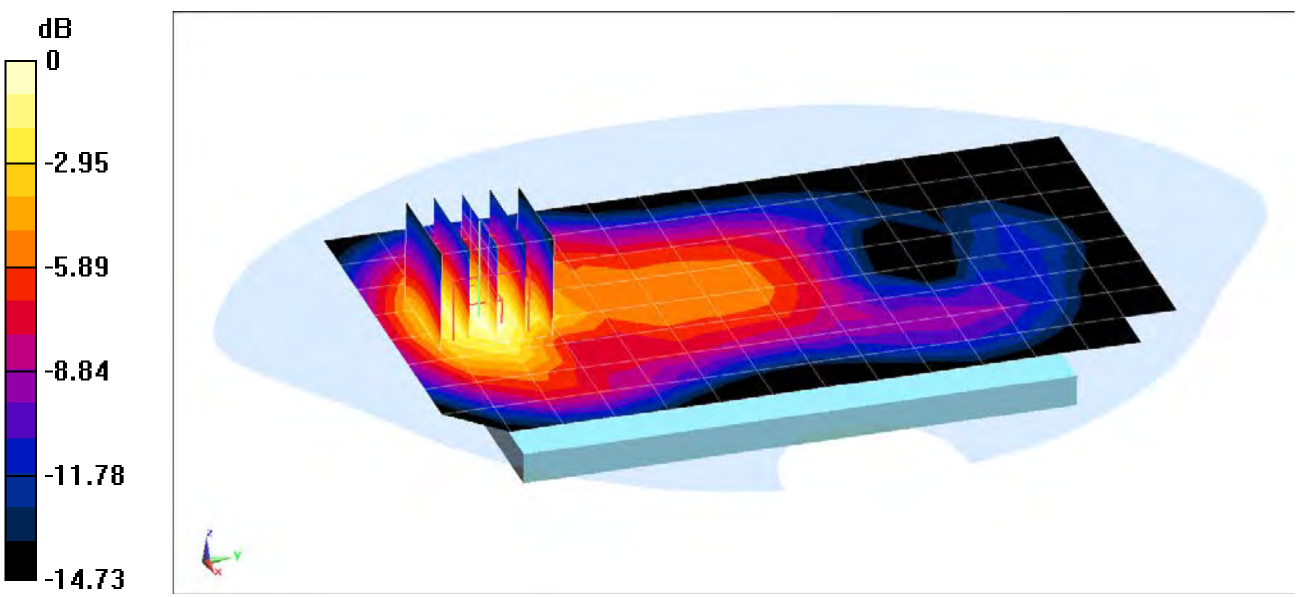
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.554 S/m; ε_r = 53.25; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-13-2017; Ambient Temp: 20.5°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.41 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.430 W/kg
SAR(1 g) = 0.272 W/kg



0 dB = 0.328 W/kg = -4.84 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 12531

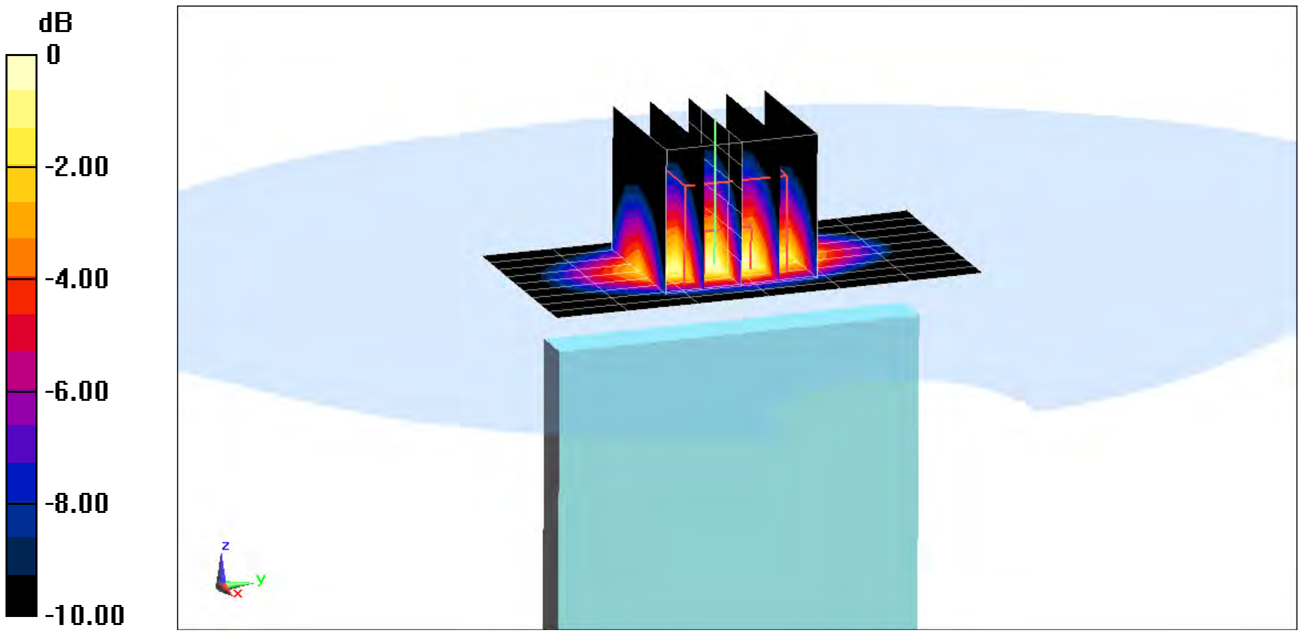
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:2.076
Medium: 1900 Body; Medium parameters used:
f = 1910 MHz; σ = 1.559 S/m; ε_r = 53.544; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-31-2017; Ambient Temp: 22.8°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7410; ConvF(7.98, 7.98, 7.98); Calibrated: 7/17/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 1900, Body SAR, Bottom Edge, High.ch, 4 Tx Slots

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.80 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 0.918 W/kg



0 dB = 1.30 W/kg = 1.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

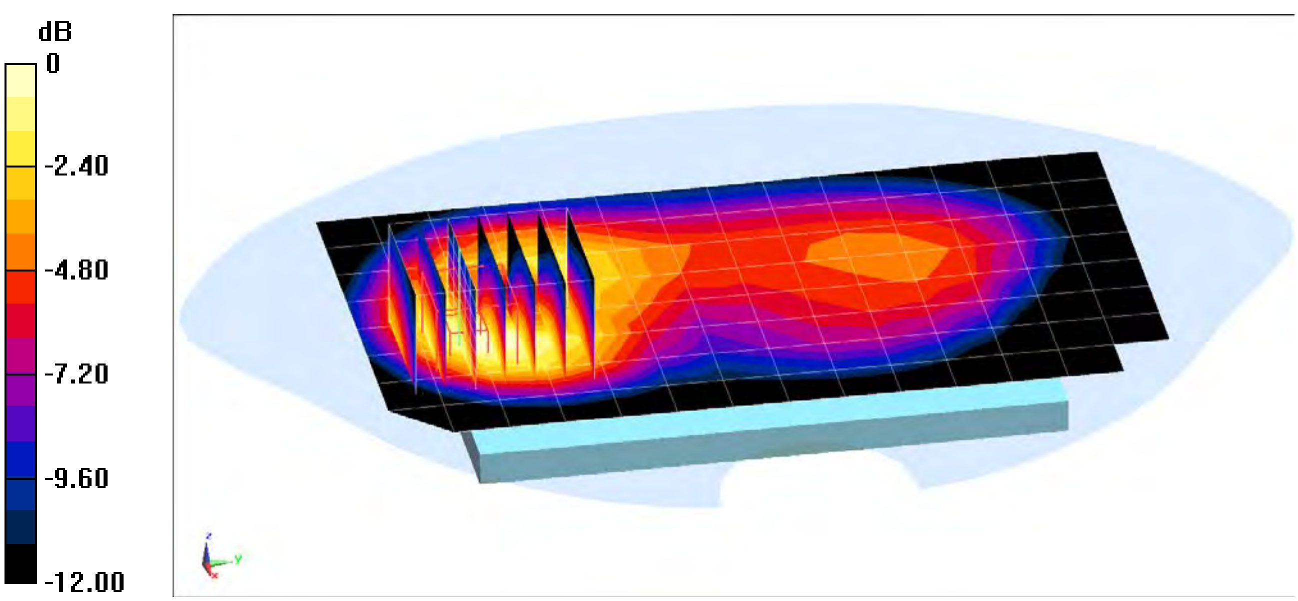
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.994 S/m; ε_r = 53.042; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-16-2017; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.36, 6.36, 6.36); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.73 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.388 W/kg
SAR(1 g) = 0.250 W/kg



0 dB = 0.297 W/kg = -5.27 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

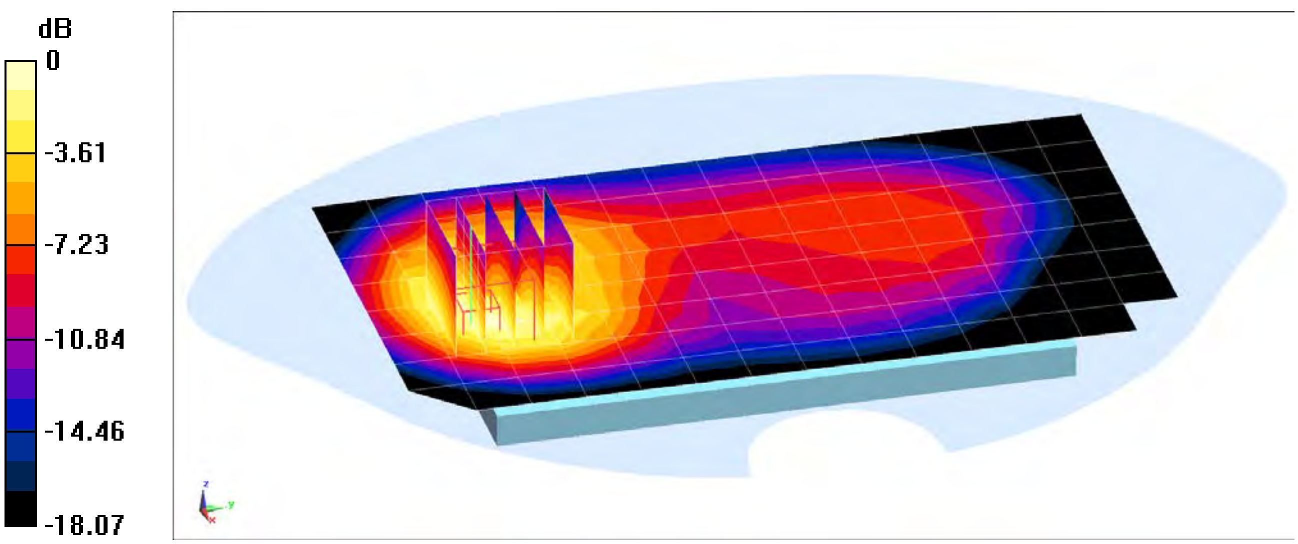
Communication System: UID 0, UMTS; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 846.6 MHz; σ = 1.004 S/m; ε_r = 52.944; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-16-2017; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.36, 6.36, 6.36); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 850, Body SAR, Back Side, High.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.91 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.603 W/kg



0 dB = 0.726 W/kg = -1.39 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

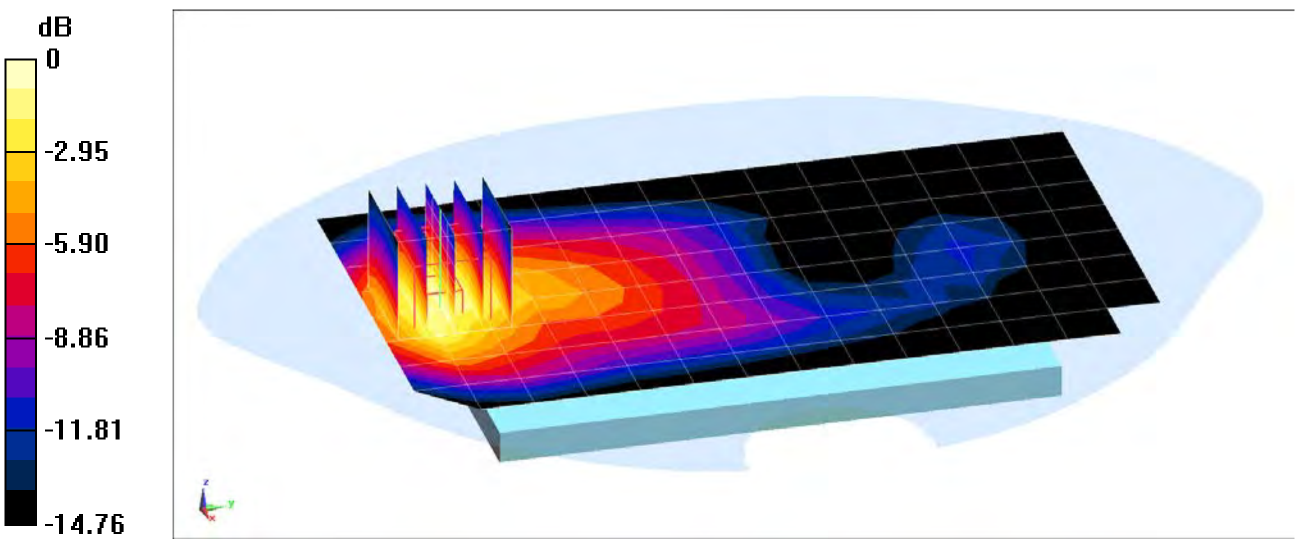
Communication System: UID 0, UMTS; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1752.6 MHz; σ = 1.513 S/m; ε_r = 50.903; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-10-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 1750, Body SAR, Back Side, High.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.06 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.991 W/kg
SAR(1 g) = 0.644 W/kg



0 dB = 0.768 W/kg = -1.15 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

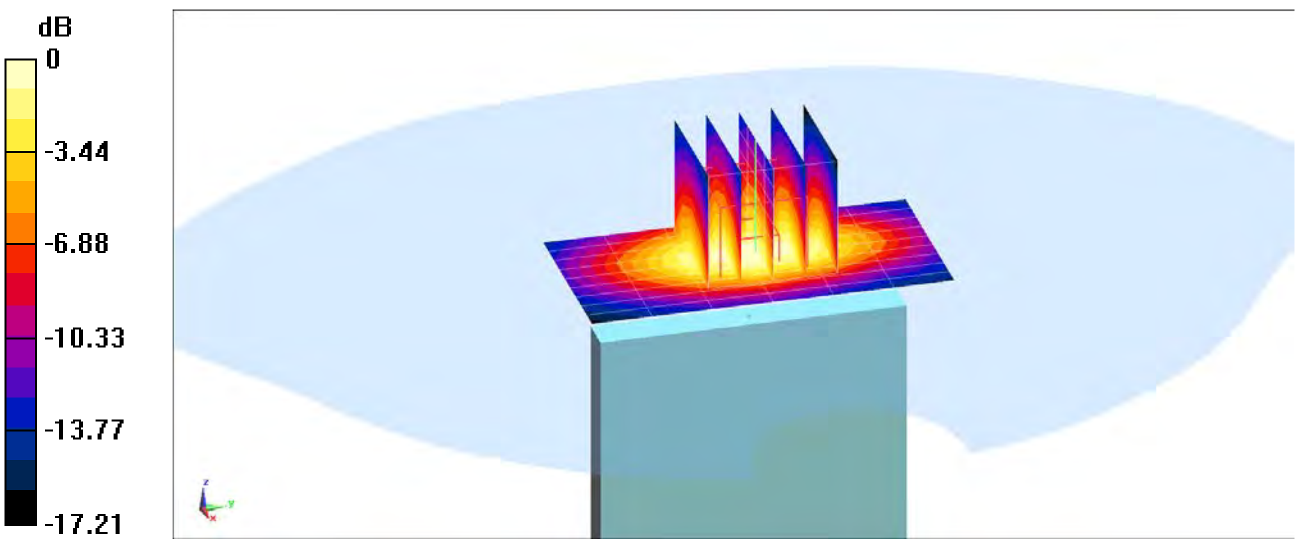
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.491 S/m; ε_r = 50.982; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.39 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.801 W/kg
SAR(1 g) = 0.489 W/kg



0 dB = 0.602 W/kg = -2.20 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

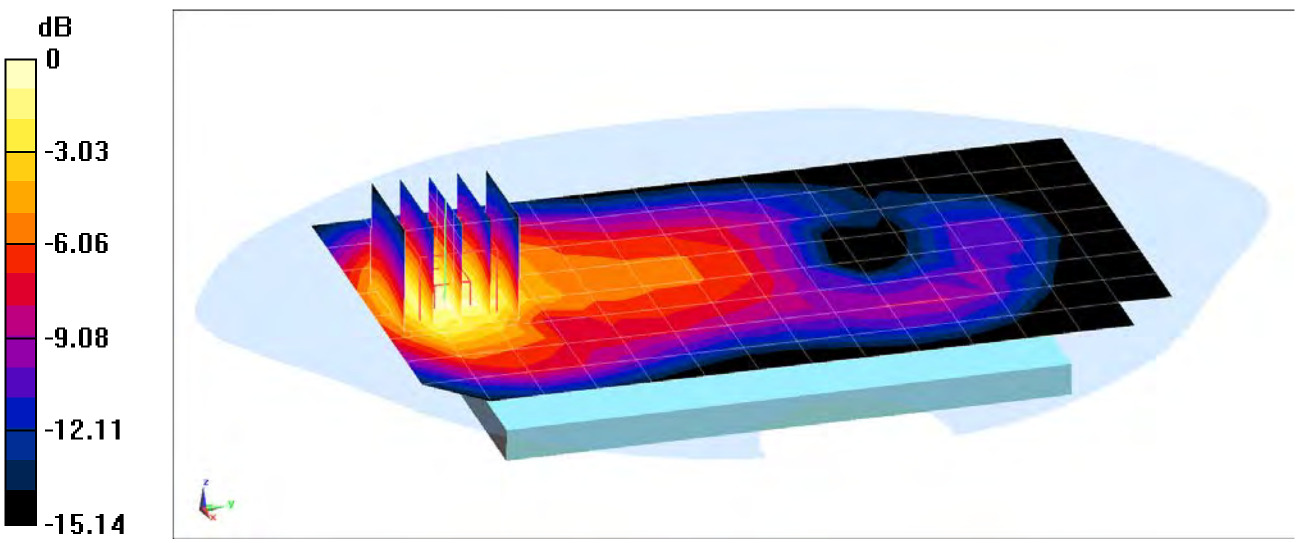
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.54 S/m; ε_r = 53.575; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-11-2017; Ambient Temp: 20.1°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 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 = 19.24 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.780 W/kg
SAR(1 g) = 0.497 W/kg



0 dB = 0.595 W/kg = -2.25 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

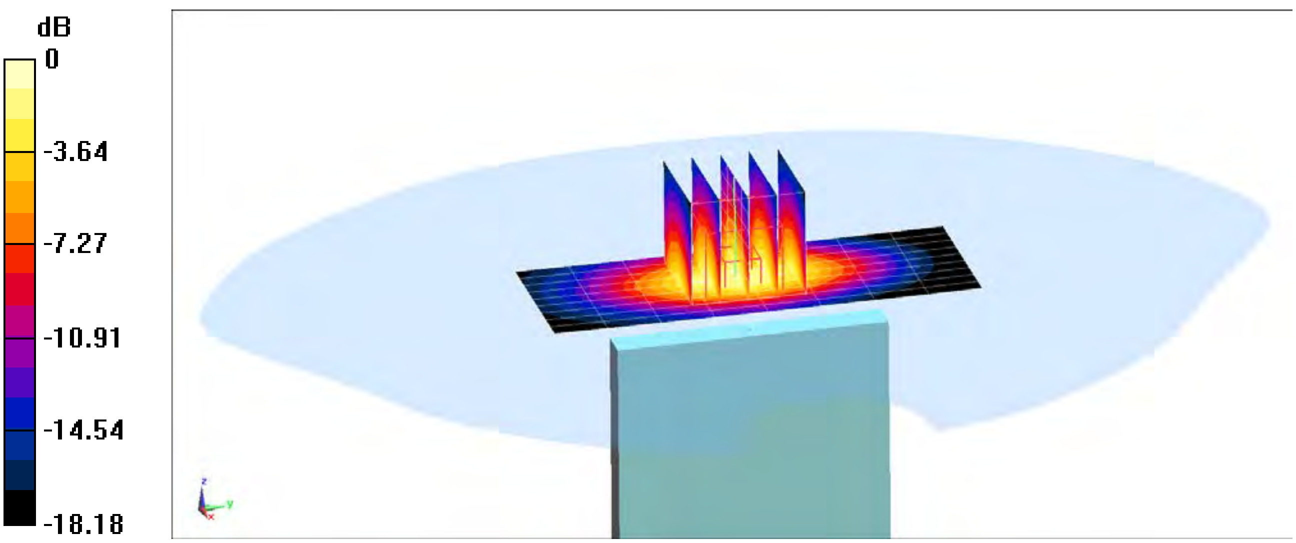
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.571 S/m; ε_r = 53.47; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.1°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.64 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.890 W/kg



0 dB = 1.11 W/kg = 0.45 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29859

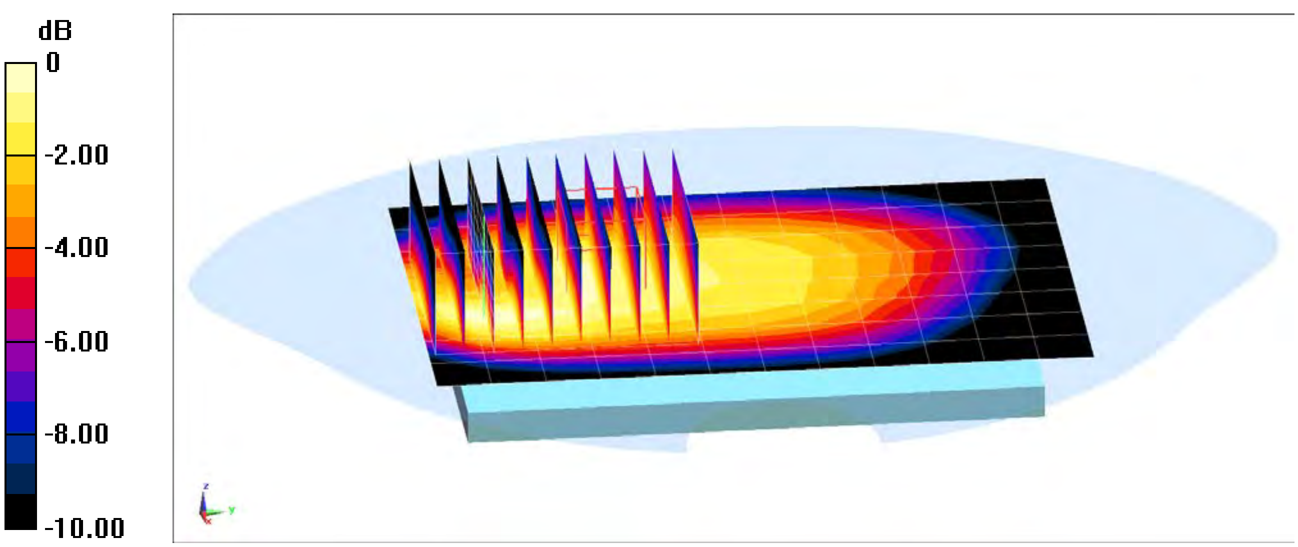
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.925 S/m; ε_r = 56.075; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-12-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 (9x10x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.83 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.276 W/kg
SAR(1 g) = 0.174 W/kg



0 dB = 0.235 W/kg = -6.29 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29859

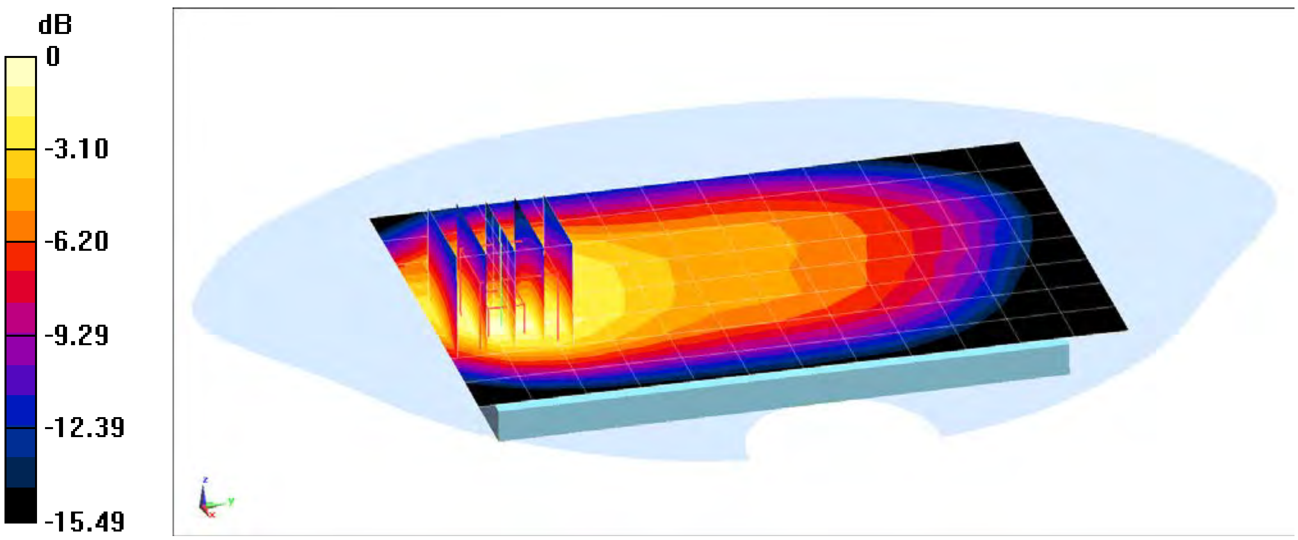
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.925 S/m; ε_r = 56.075; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-12-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.07 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.627 W/kg
SAR(1 g) = 0.342 W/kg



0 dB = 0.522 W/kg = -2.82 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

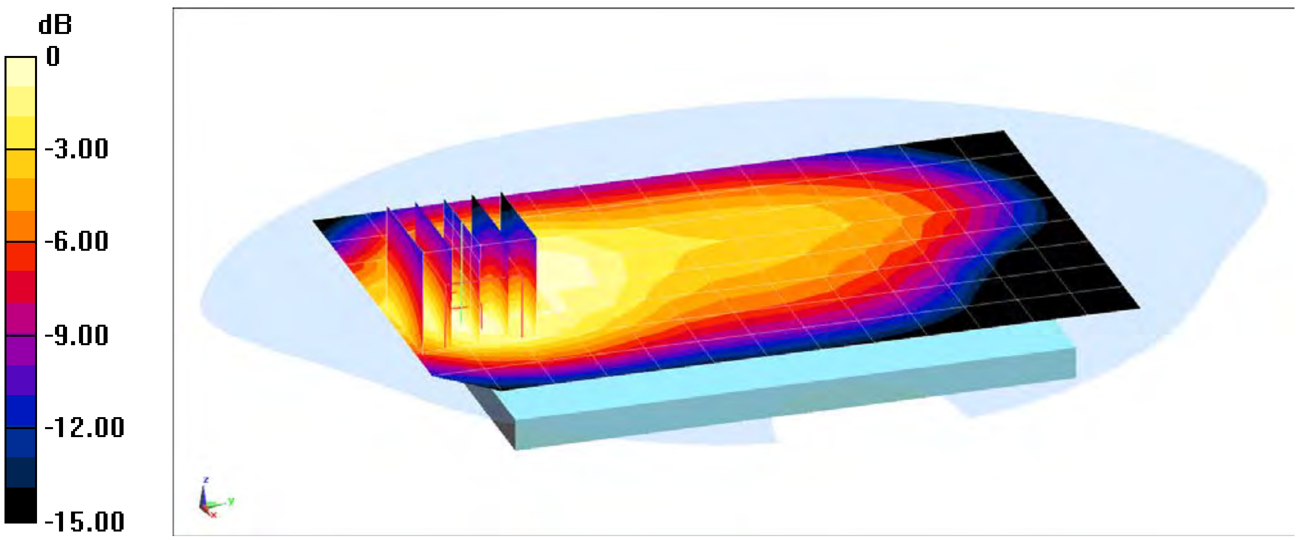
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 782 MHz; $\sigma = 0.96$ S/m; $\varepsilon_r = 55.438$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-09-2017; Ambient Temp: 21.2°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 1/13/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.42 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.324 W/kg
SAR(1 g) = 0.203 W/kg



0 dB = 0.244 W/kg = -6.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

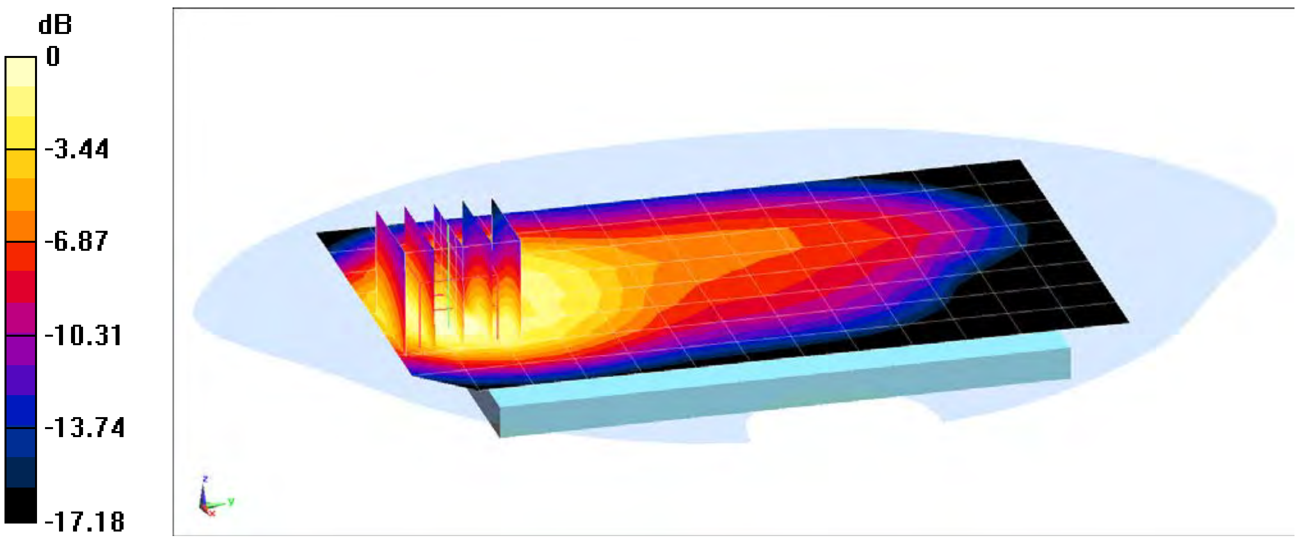
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 782 MHz; σ = 0.96 S/m; ε_r = 55.438; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 21.2°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 1/13/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.85 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.749 W/kg
SAR(1 g) = 0.440 W/kg



0 dB = 0.544 W/kg = -2.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

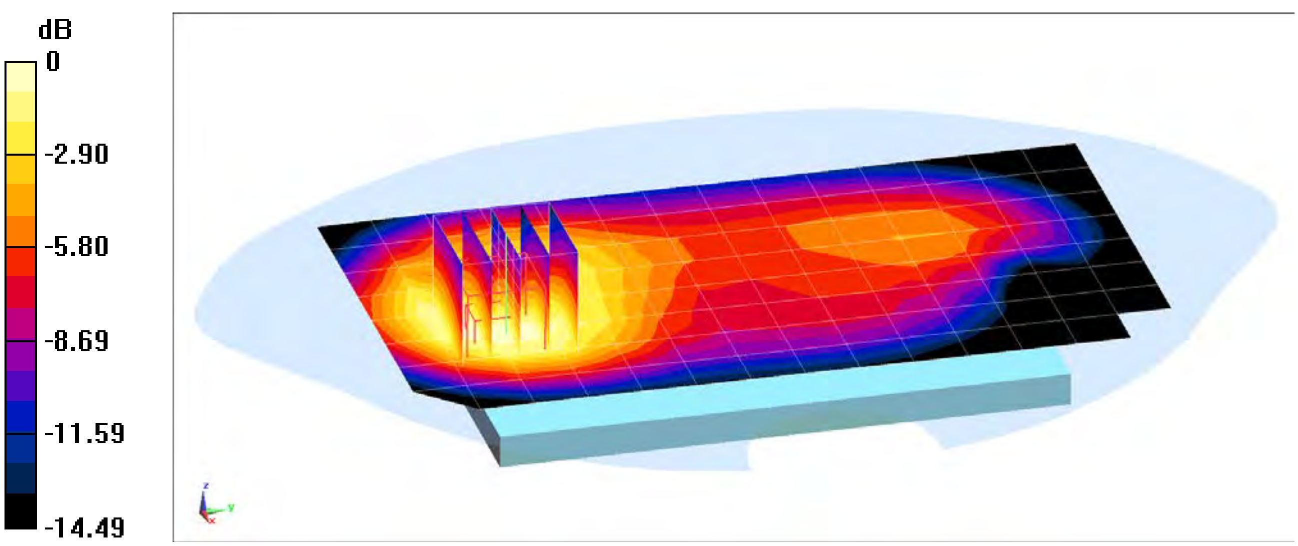
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.994 S/m; ε_r = 53.043; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-16-2017; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.36, 6.36, 6.36); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

**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 = 17.76 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.444 W/kg
SAR(1 g) = 0.288 W/kg



0 dB = 0.334 W/kg = -4.76 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

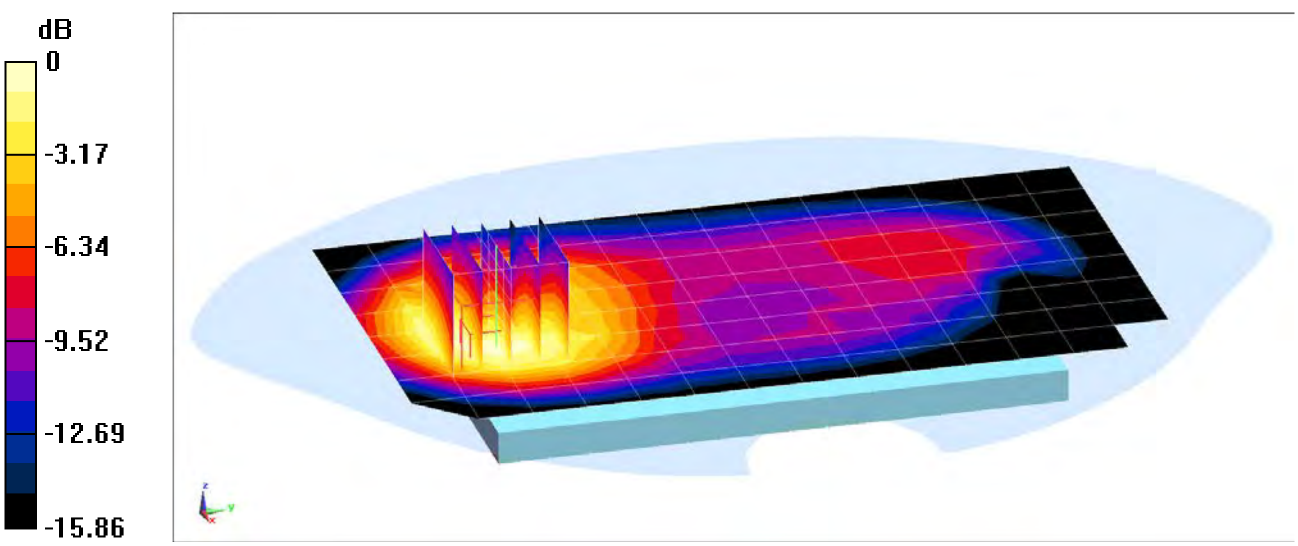
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
$f = 836.5$ MHz; $\sigma = 0.994$ S/m; $\varepsilon_r = 53.043$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-16-2017; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.36, 6.36, 6.36); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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 = 25.46 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.962 W/kg
SAR(1 g) = 0.590 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

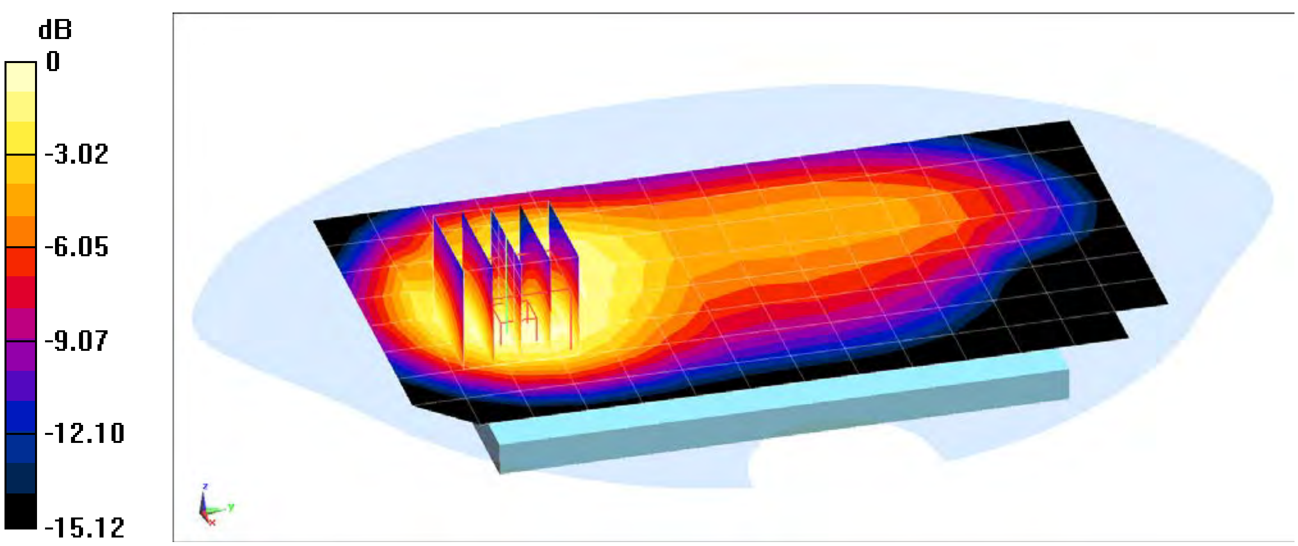
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.996 S/m; ε_r = 52.846; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-11-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(6.47, 6.47, 6.47); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 26 (Cell.), Body SAR, Back Side, Mid.ch, 15 MHz Bandwidth, QPSK, 1 RB, 36 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.27 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.424 W/kg
SAR(1 g) = 0.269 W/kg



0 dB = 0.319 W/kg = -4.96 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

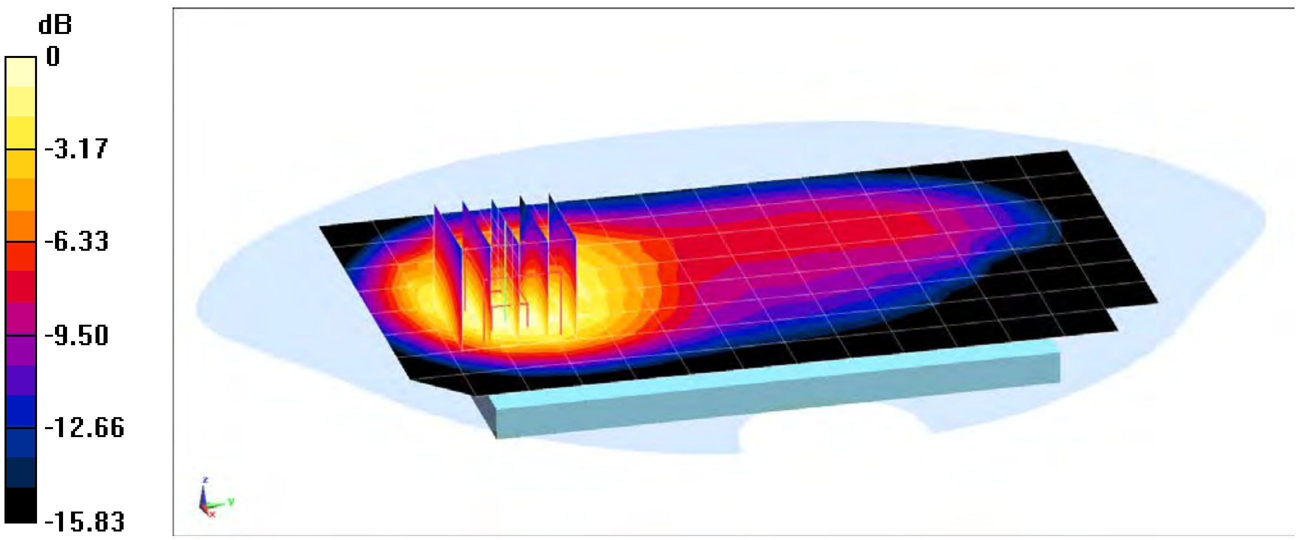
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.996 S/m; ε_r = 52.846; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-11-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(6.47, 6.47, 6.47); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 26 (Cell.), Body SAR, Back Side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 36 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 = 25.63 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.962 W/kg
SAR(1 g) = 0.575 W/kg



0 dB = 0.697 W/kg = -1.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

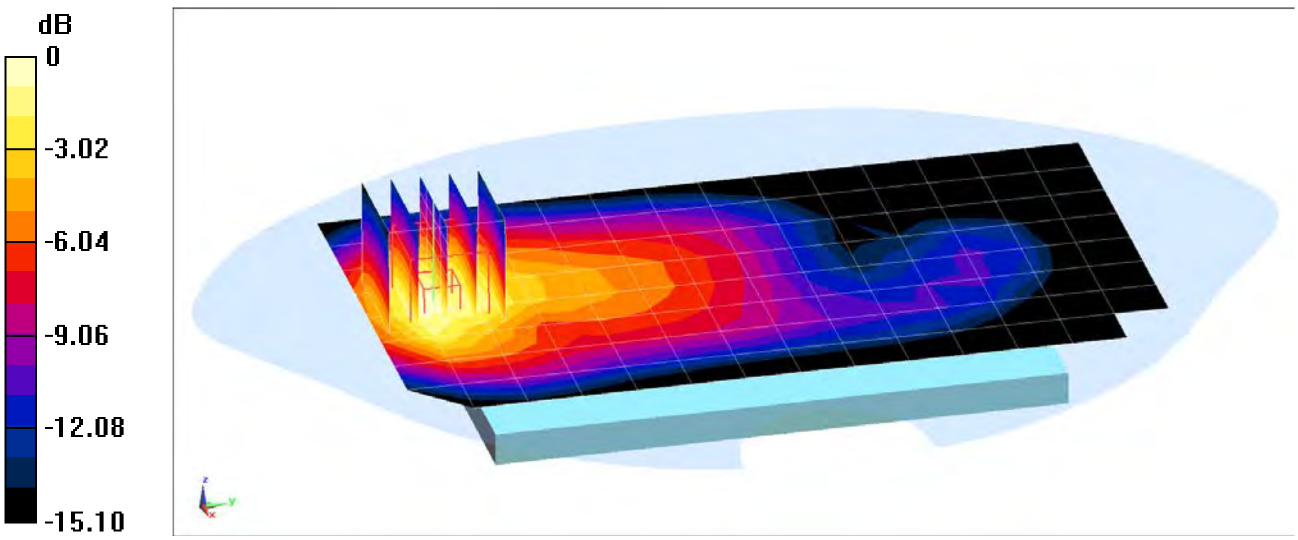
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.531 S/m; ε_r = 50.821; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-10-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.19 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.938 W/kg
SAR(1 g) = 0.608 W/kg



0 dB = 0.726 W/kg = -1.39 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

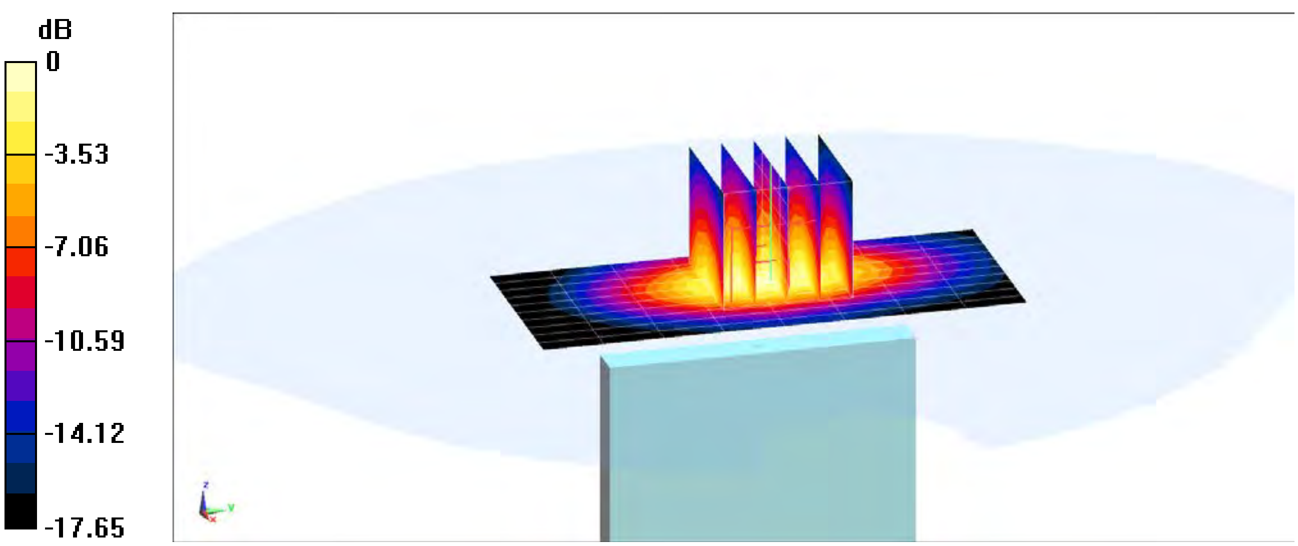
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.531 S/m; ε_r = 50.821; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.93 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.697 W/kg



0 dB = 0.860 W/kg = -0.66 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29503

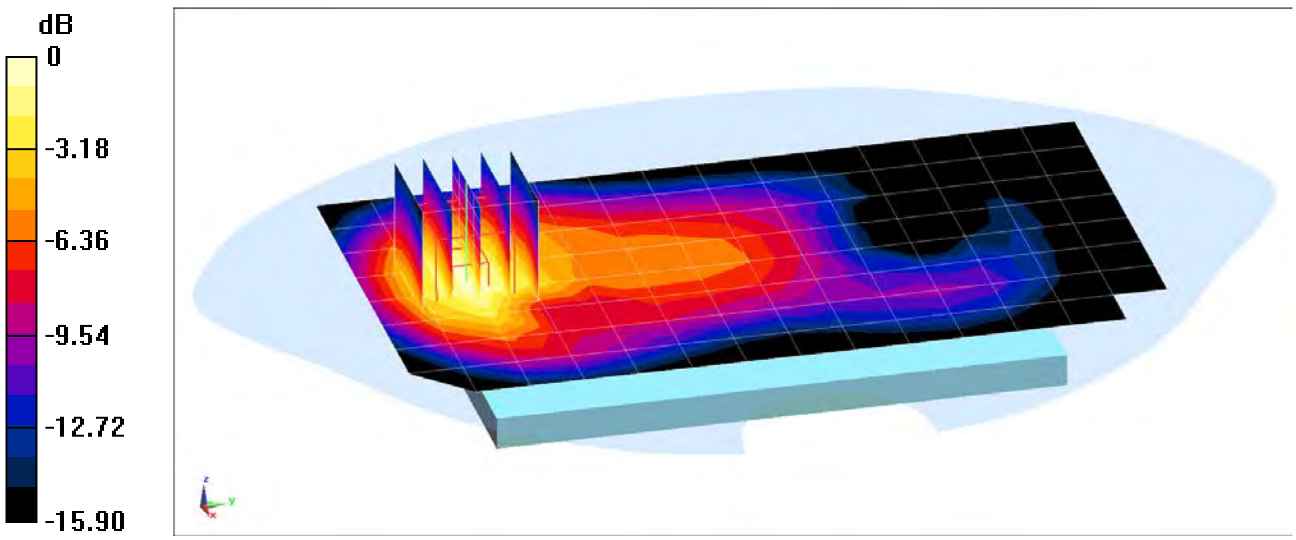
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.563 S/m; ε_r = 53.499; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-11-2017; Ambient Temp: 20.1°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.3030 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.634 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29503

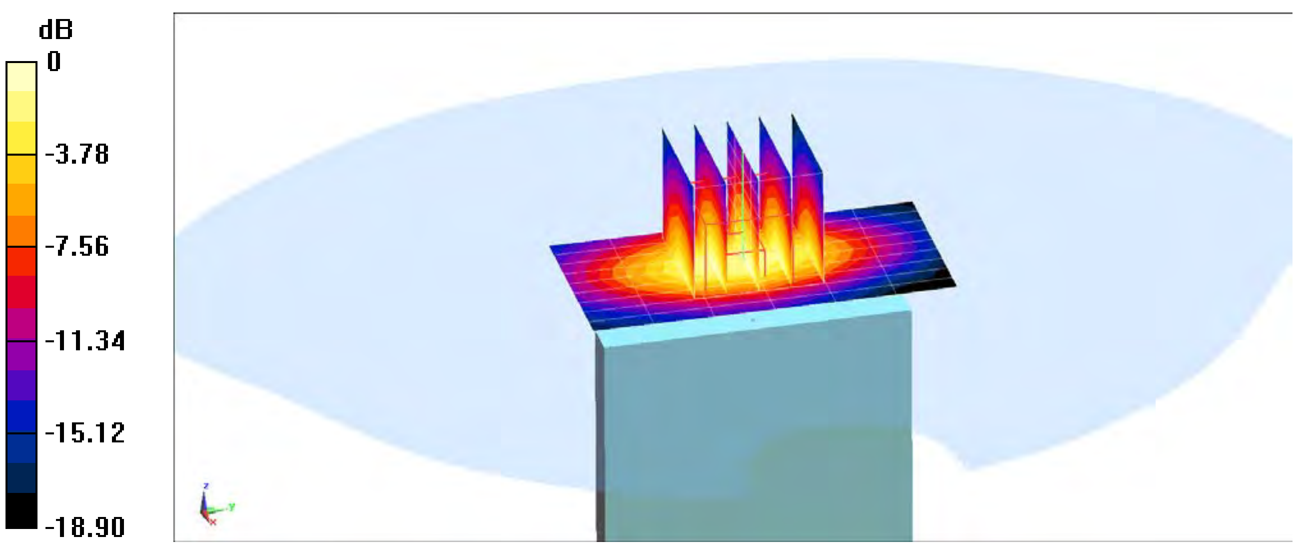
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.563 S/m; ε_r = 53.499; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.1°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 2 (PCS), Body SAR, Bottom Edge, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.93 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.822 W/kg



0 dB = 0.948 W/kg = -0.23 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29859

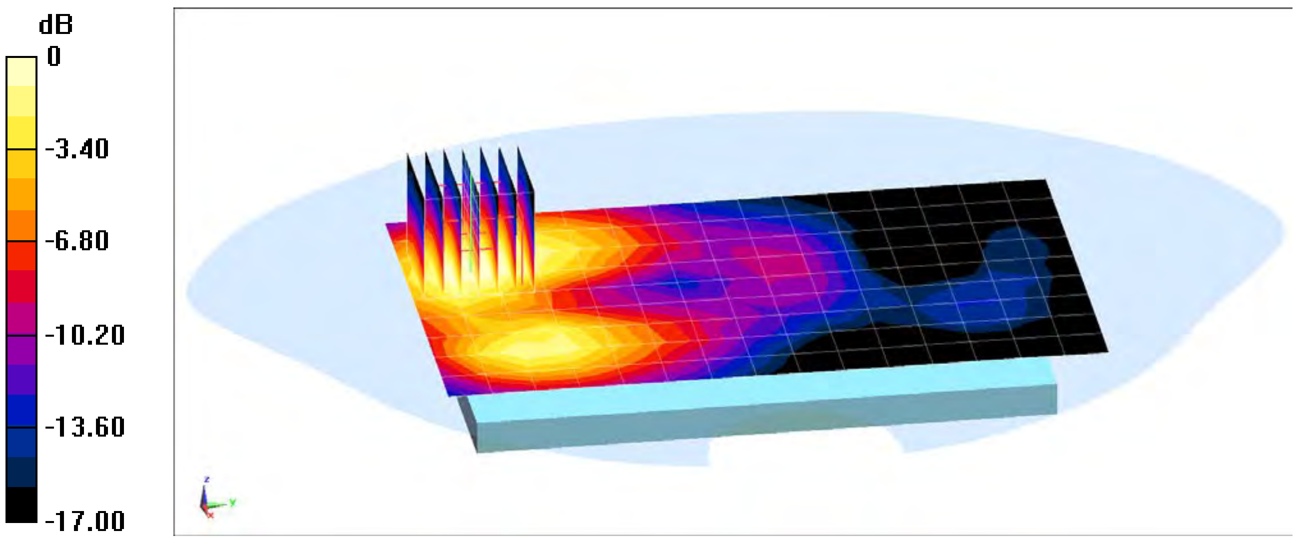
Communication System: UID 0, LTE Band 41; Frequency: 2593 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body; Medium parameters used (interpolated):
f = 2593 MHz; σ = 2.237 S/m; ε_r = 52.475; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-09-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.31, 7.31, 7.31); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.22 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.412 W/kg
SAR(1 g) = 0.214 W/kg



0 dB = 0.334 W/kg = -4.76 dBW/kg

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29859

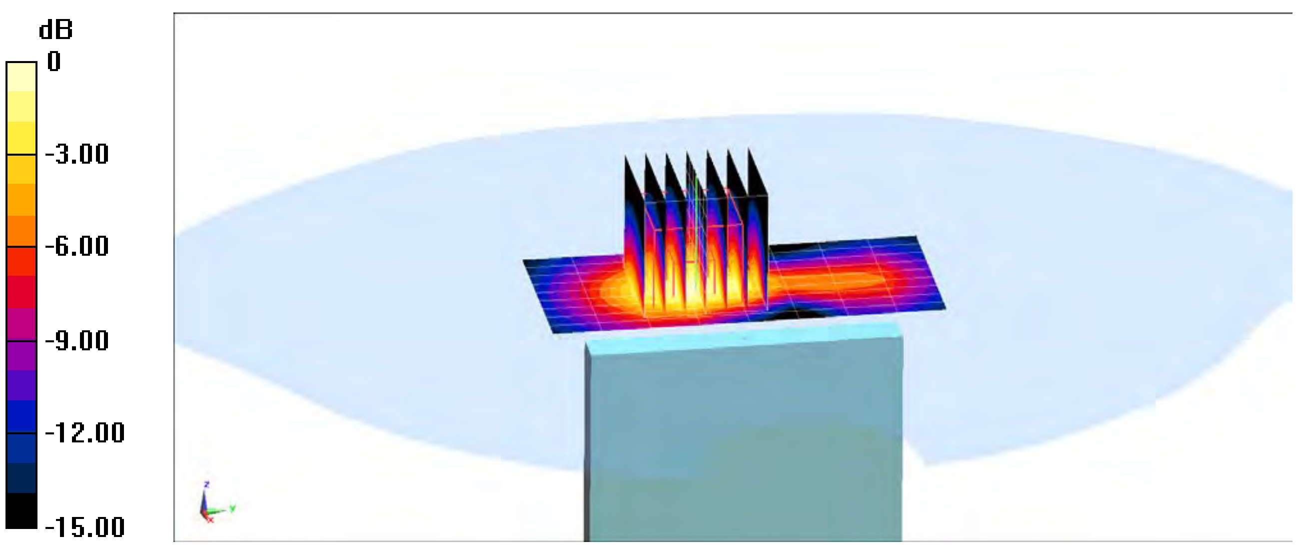
Communication System: UID 0, LTE Band 41; Frequency: 2550 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body; Medium parameters used:
f = 2550 MHz; σ = 2.179 S/m; ε_r = 52.62; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.31, 7.31, 7.31); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.36 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.734 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

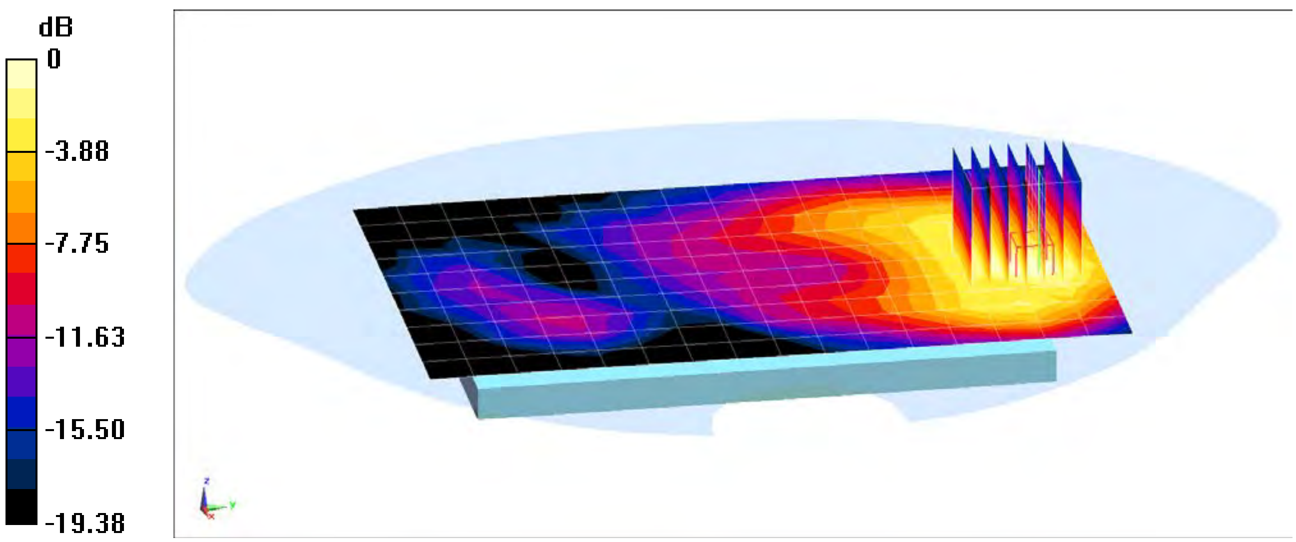
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.055 S/m; ε_r = 52.972; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-09-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.6, 7.6, 7.6); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.251 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.299 W/kg
SAR(1 g) = 0.155 W/kg



0 dB = 0.244 W/kg = -6.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29818

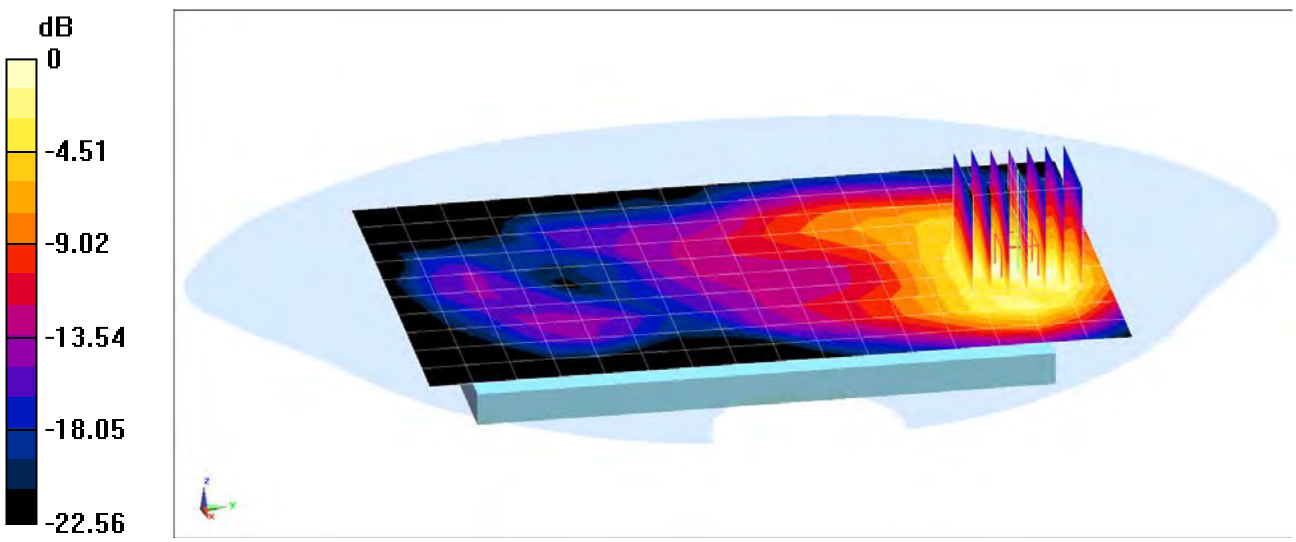
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.055 S/m; ε_r = 52.972; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.6, 7.6, 7.6); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.210 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.733 W/kg
SAR(1 g) = 0.355 W/kg



0 dB = 0.588 W/kg = -2.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

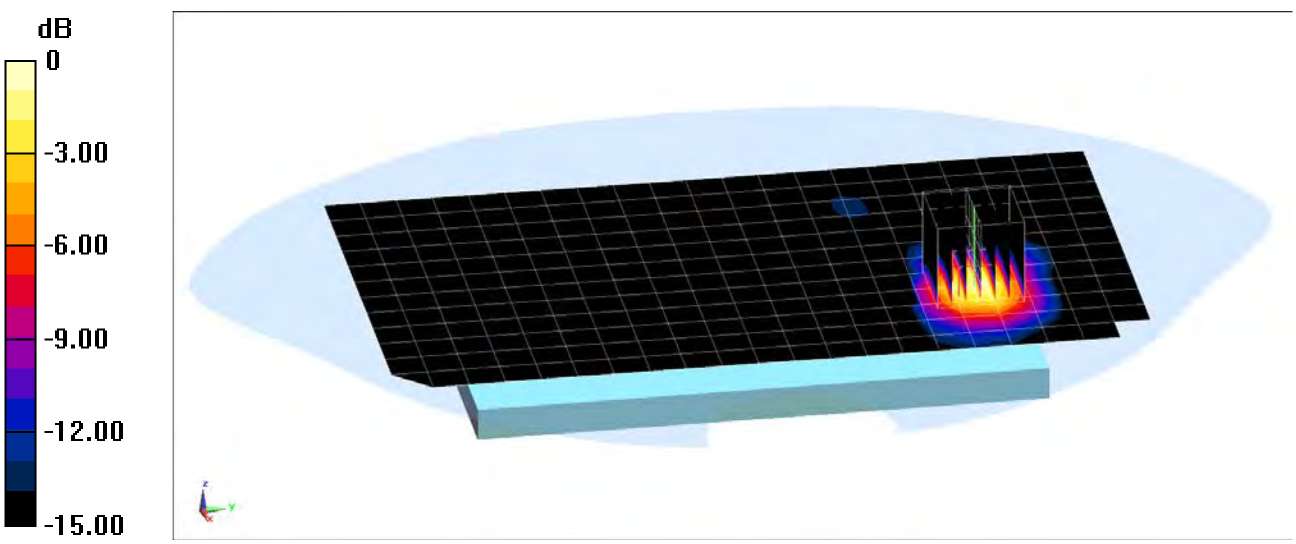
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5260 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5260 MHz; σ = 5.334 S/m; ε_r = 47.423; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-03-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(4.19, 4.19, 4.19); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11a, UNII-2A, 20 MHz Bandwidth, Body SAR, Ch 52, 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 = 10.38 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 0.489 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

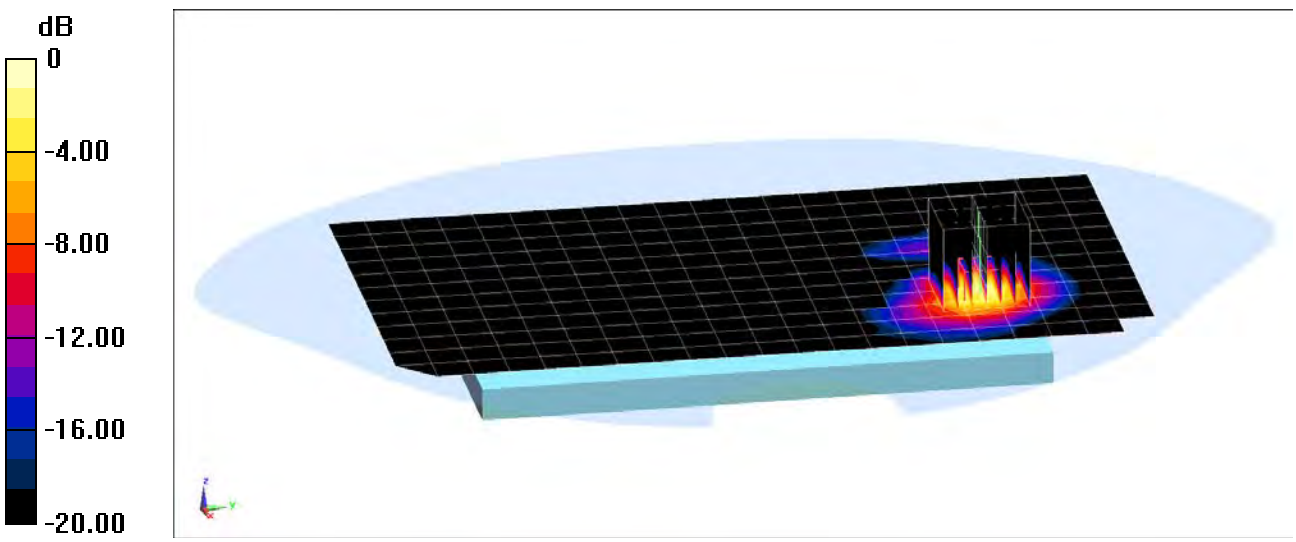
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5745 MHz; $\sigma = 6.018$ S/m; $\varepsilon_r = 46.505$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-03-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.83, 3.83, 3.83); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11a, UNII-3, 20 MHz Bandwidth, Body SAR, Ch 149, 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 = 10.94 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.65 W/kg
SAR(1 g) = 0.598 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

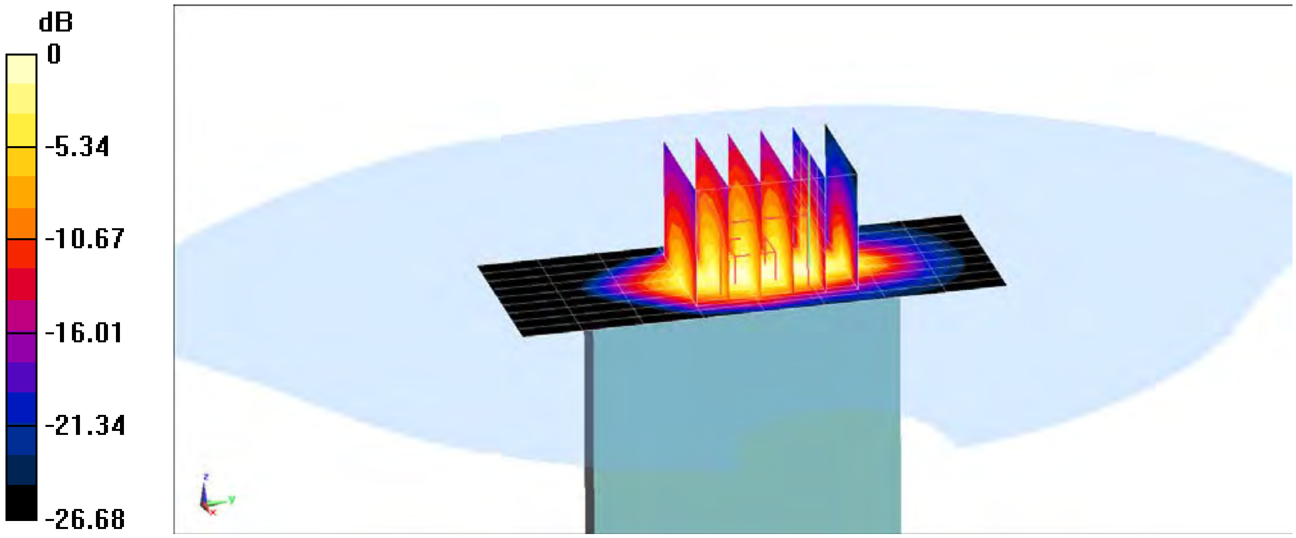
Communication System: UID 0, UMTS; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1752.6 MHz; σ = 1.476 S/m; ε_r = 53.084; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-16-2017; Ambient Temp: 21.6°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3288; ConvF(5.09, 5.09, 5.09); Calibrated: 1/13/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 1750, Phablet SAR, Bottom Edge, High.ch

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.64 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 8.11 W/kg
SAR(10 g) = 1.77 W/kg



0 dB = 5.18 W/kg = 7.14 dBW/kg

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29586

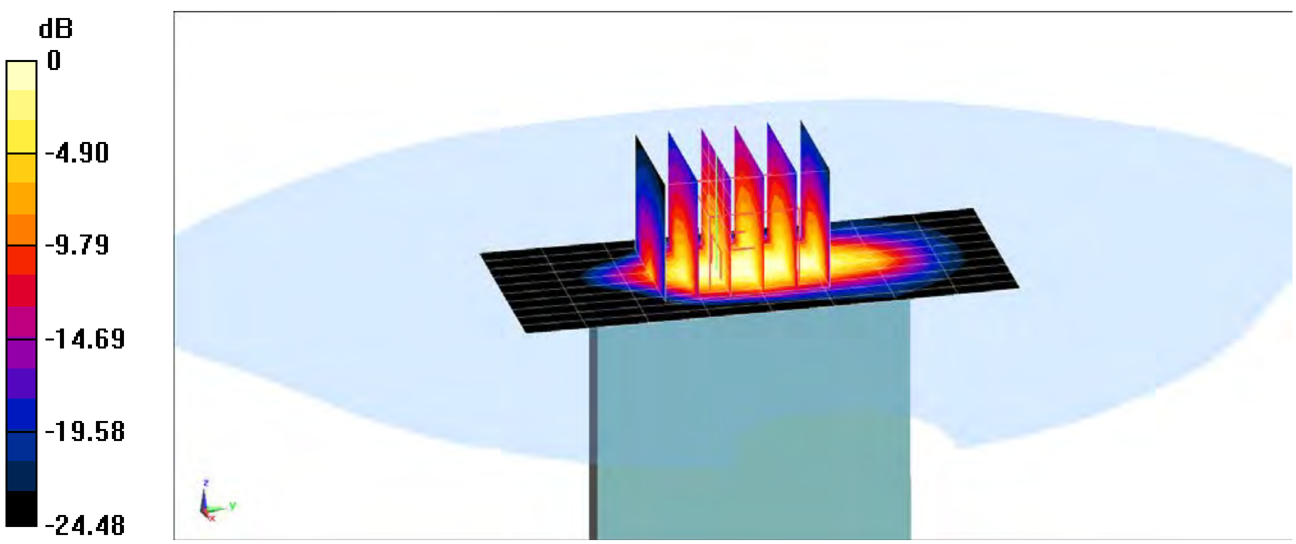
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.54 S/m; ε_r = 53.575; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.1°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 46.54 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 5.83 W/kg
SAR(10 g) = 1.28 W/kg



0 dB = 3.78 W/kg = 5.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

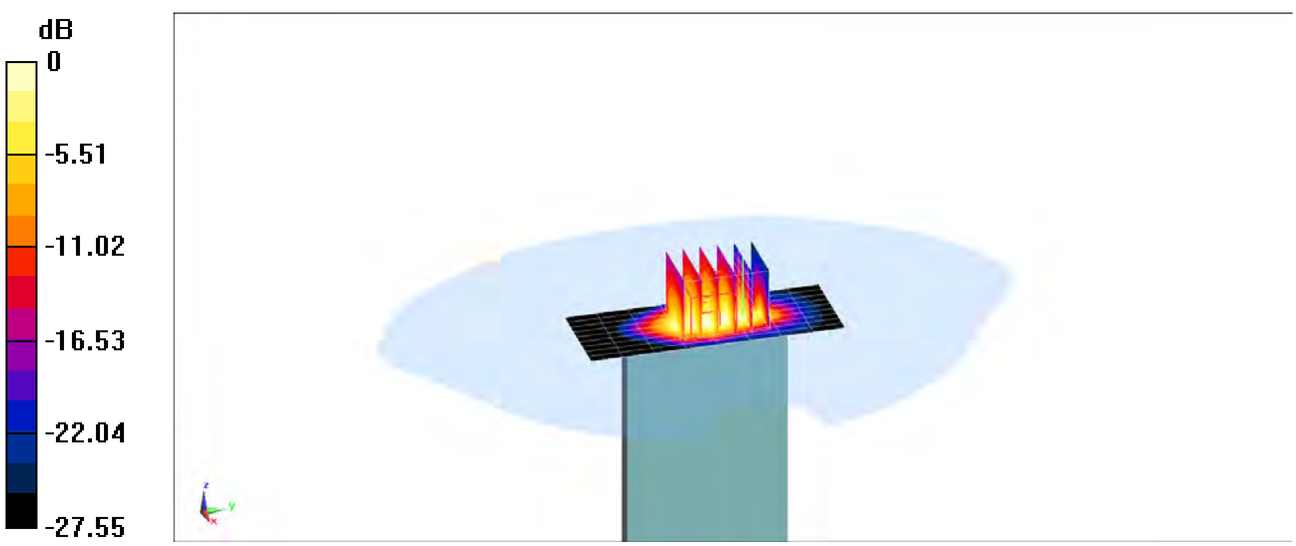
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1770 MHz; σ = 1.485 S/m; ε_r = 52.412; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-12-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3288; ConvF(5.09, 5.09, 5.09); Calibrated: 1/13/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.19 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 7.65 W/kg
SAR(10 g) = 1.62 W/kg



0 dB = 4.71 W/kg = 6.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29909

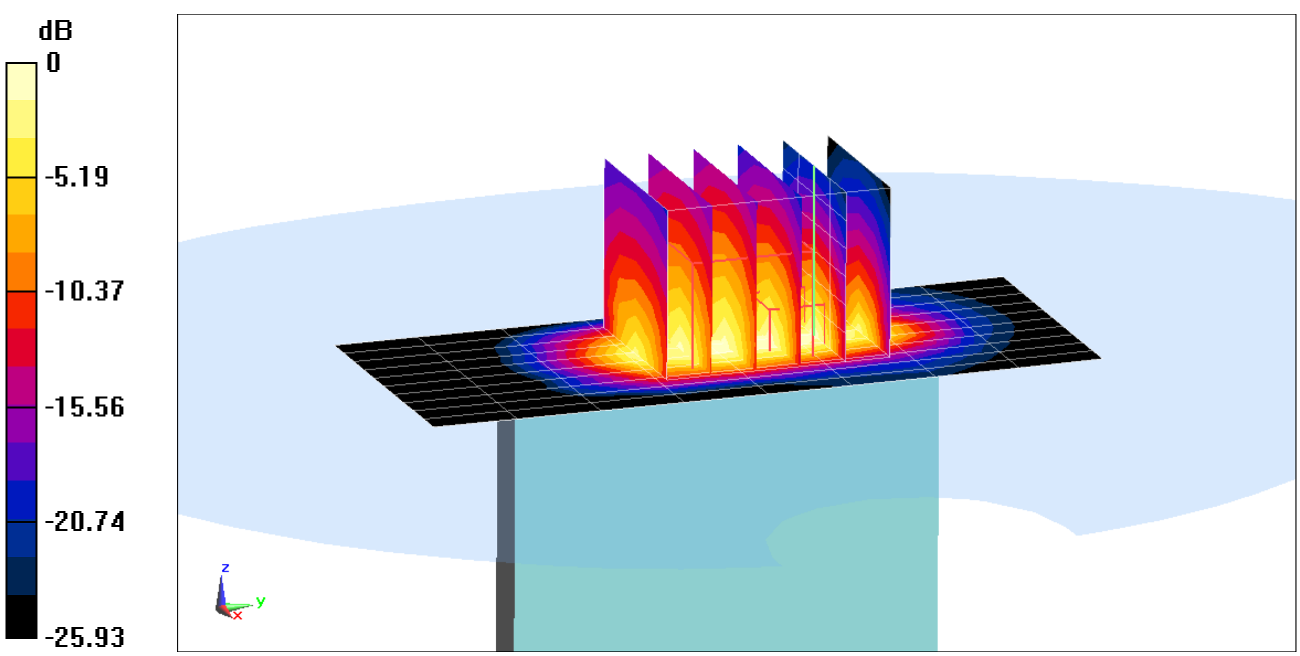
Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.577 S/m; ε_r = 53.175 ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-13-2017; Ambient Temp: 20.5°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 2 (PCS), Phablet SAR, Bottom Edge, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 44.10 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 6.23 W/kg
SAR(10 g) = 1.19 W/kg



0 dB = 3.91 W/kg = 5.92 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMA730F; Type: Portable Handset; Serial: 29446

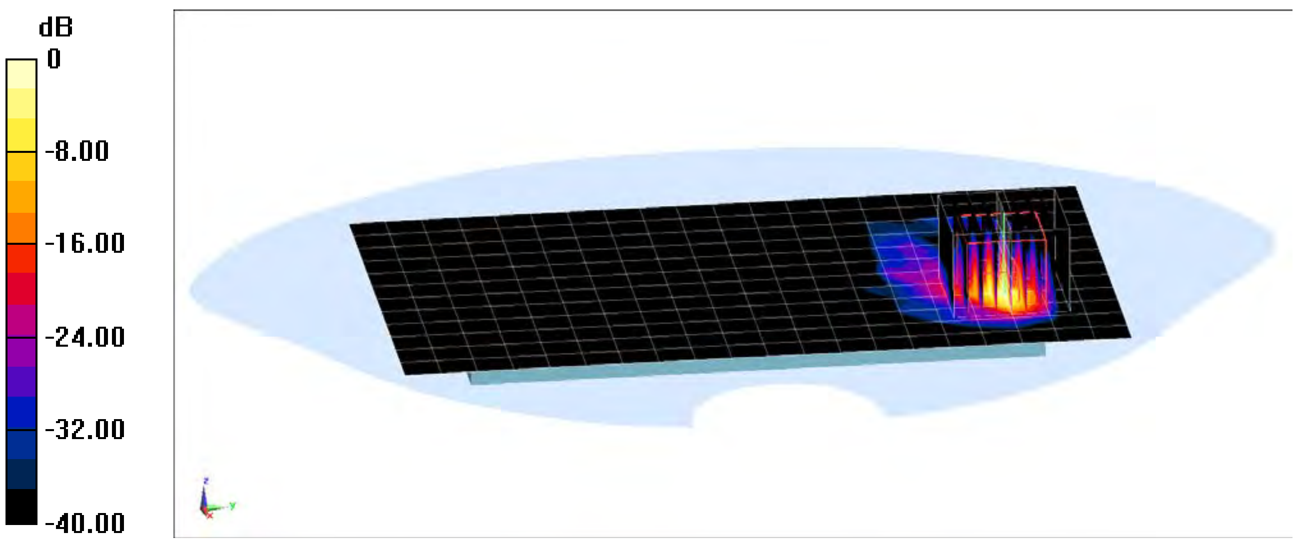
Communication System: UID 0, IEEE 802.11a; Frequency: 5280 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5280 MHz; σ = 5.443 S/m; ε_r = 47.094; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.2°C

Probe: EX3DV4 - SN3589; ConvF(4.19, 4.19, 4.19); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (13x21x1): 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 = 3.075 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 128 W/kg
SAR(10 g) = 2.28 W/kg



0 dB = 51.8 W/kg = 17.14 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

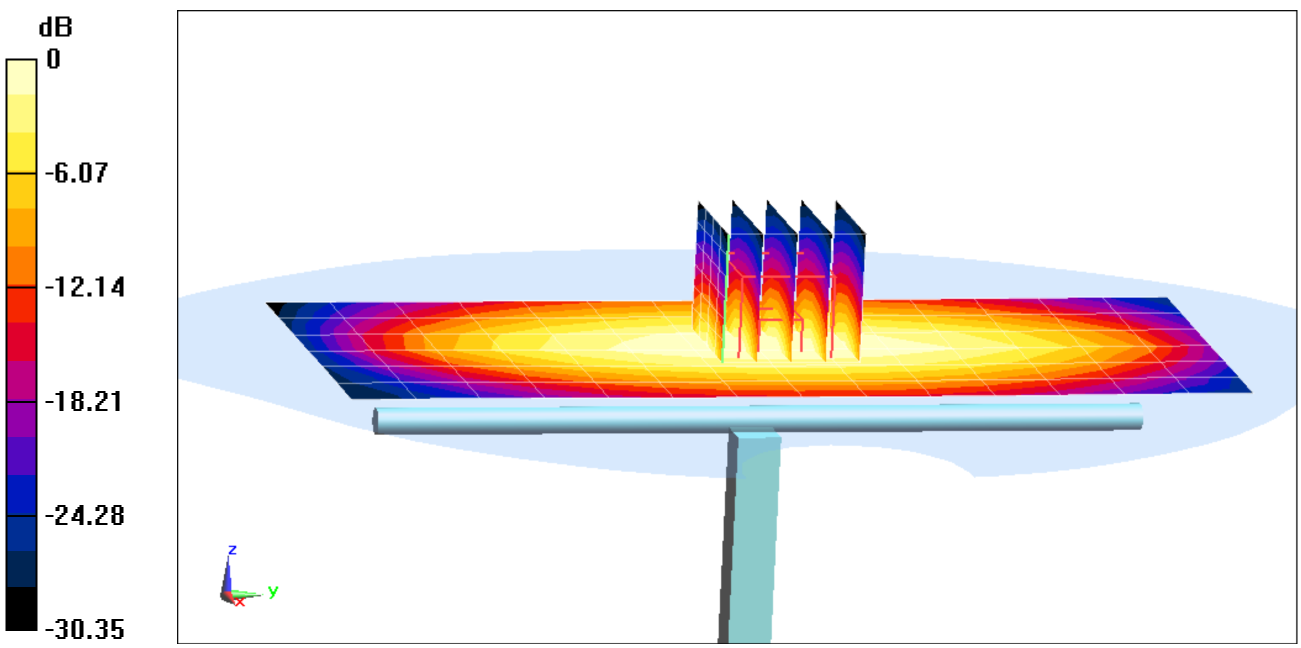
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.892 S/m; ε_r = 41.201; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-09-2017; Ambient Temp: 21.5°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3332; ConvF(6.81, 6.81, 6.81); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.48 W/kg
SAR(1 g) = 1.70 W/kg
Deviation(1 g) = 4.04%



0 dB = 1.56 W/kg = 1.94 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

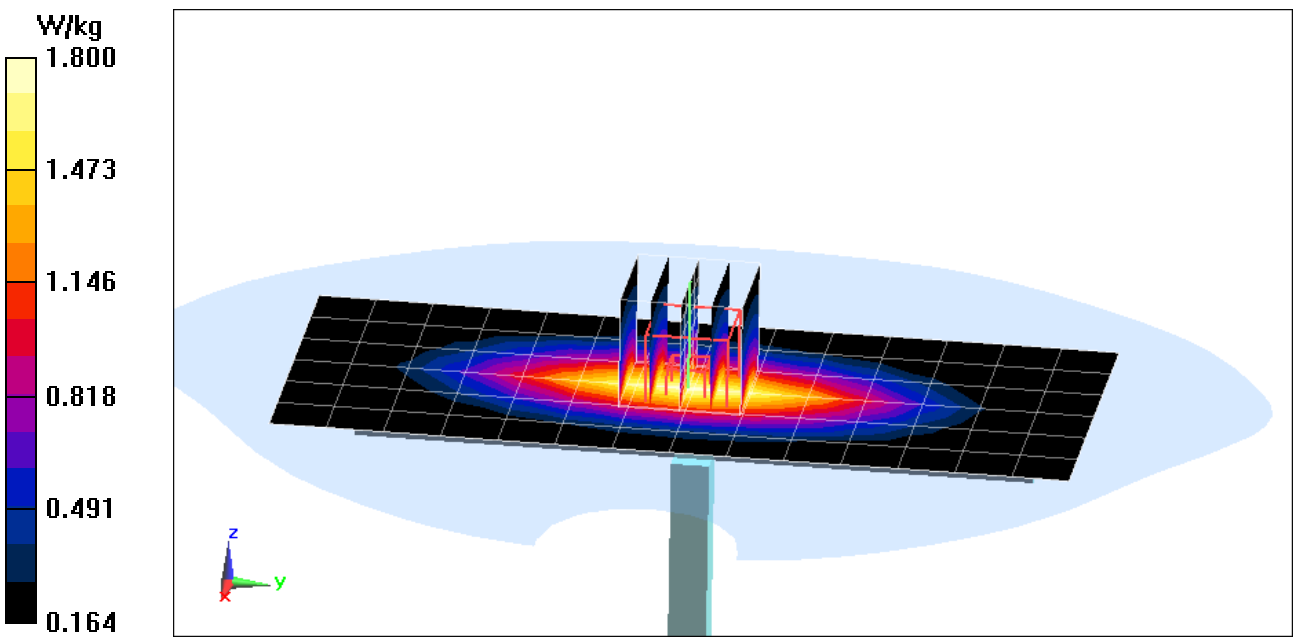
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.879 S/m; ε_r = 40.826; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-13-2017; Ambient Temp: 23.0°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3319; ConvF(6.76, 6.76, 6.76); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 2.28 W/kg
SAR(1 g) = 1.54 W/kg
Deviation(1 g) = -5.75%



PCTEST ENGINEERING LABORATORY, INC.

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

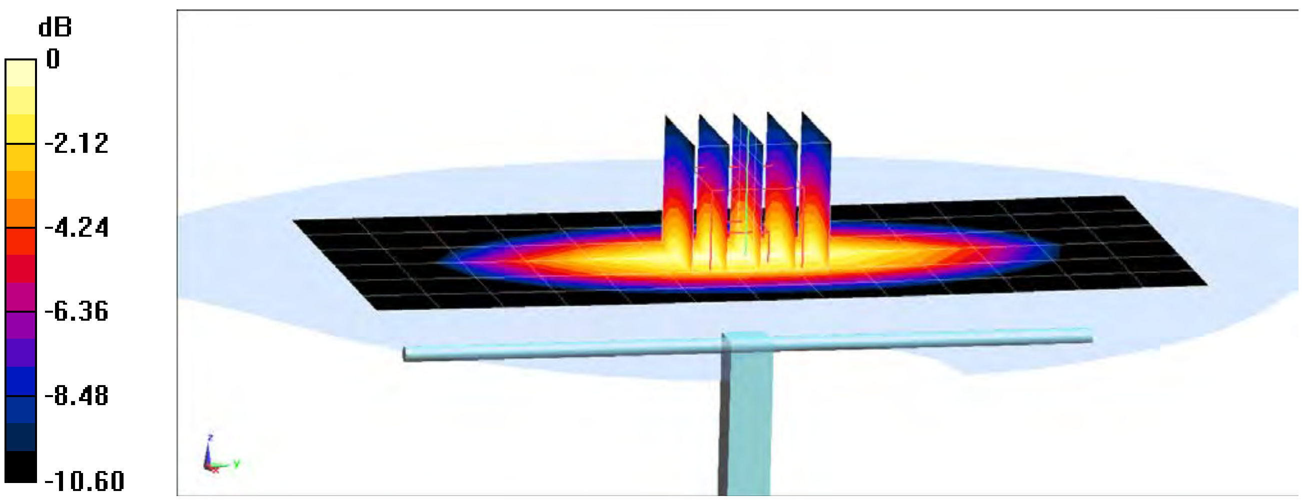
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.901 S/m; ε_r = 41.168; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-12-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3213; ConvF(6.49, 6.49, 6.49); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.88 W/kg
SAR(1 g) = 1.95 W/kg
Deviation(1 g) = 6.79%



0 dB = 2.29 W/kg = 3.60 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

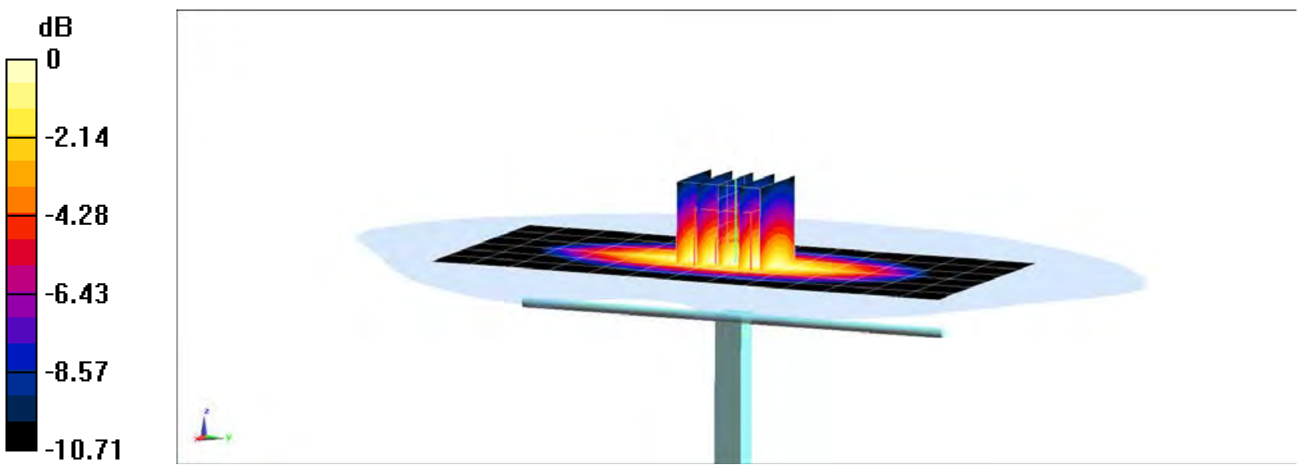
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.898 S/m; ε_r = 40.86; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-16-2017; Ambient Temp: 22.7°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7406; ConvF(9.97, 9.97, 9.97); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.91 W/kg
SAR(1 g) = 1.93 W/kg
Deviation(1 g) = 5.70%



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

PCTEST ENGINEERING LABORATORY, INC.

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

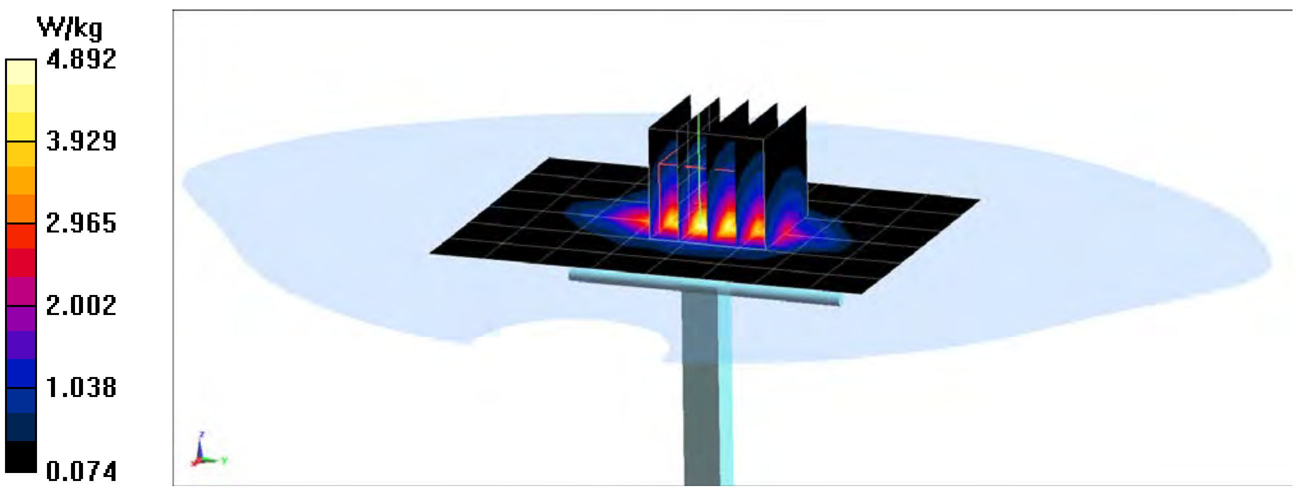
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used:
f = 1750 MHz; σ = 1.397 S/m; ε_r = 39.646; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3319; ConvF(5.38, 5.38, 5.38); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/08/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.00 W/kg
SAR(1 g) = 3.90 W/kg
Deviation(1 g) = 7.14%



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

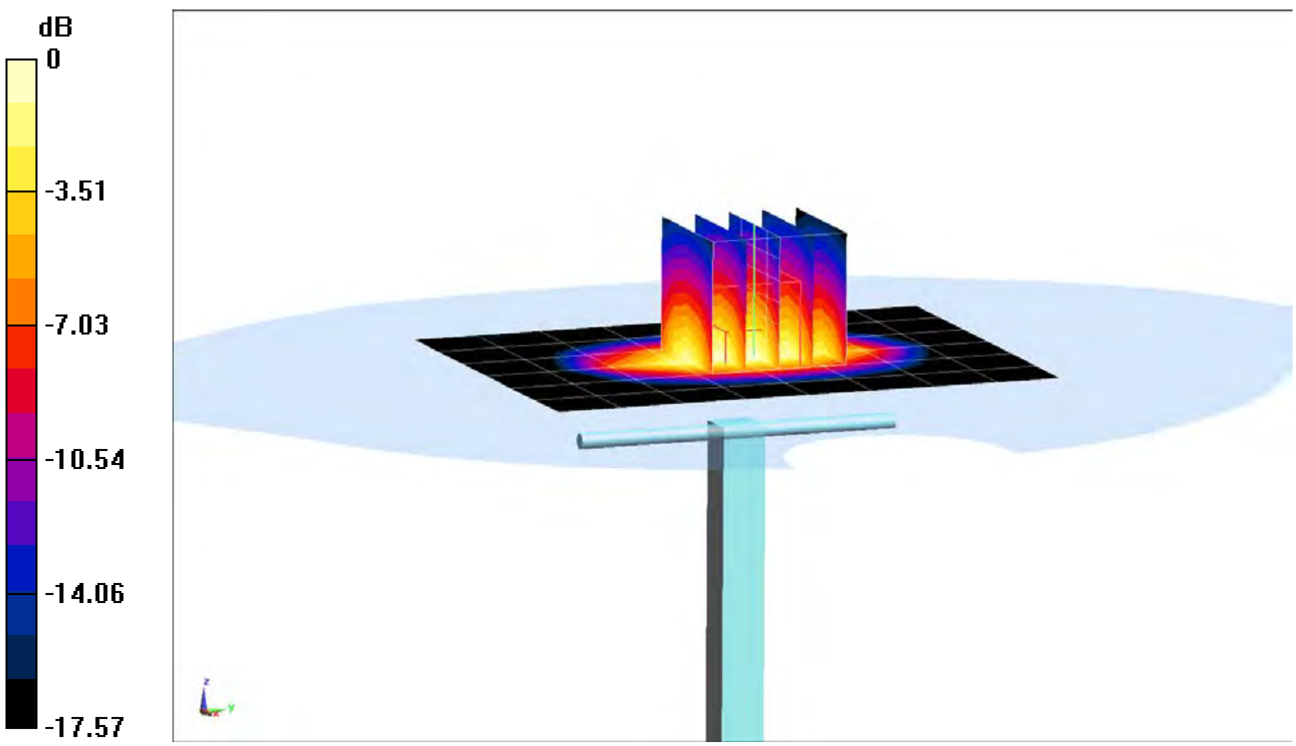
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used:
f = 1750 MHz; σ = 1.385 S/m; ε_r = 39.32; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-12-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(5.38, 5.38, 5.38); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 6.94 W/kg
SAR(1 g) = 3.89 W/kg
Deviation(1 g) = 7.76%



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

PCTEST ENGINEERING LABORATORY, INC.

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

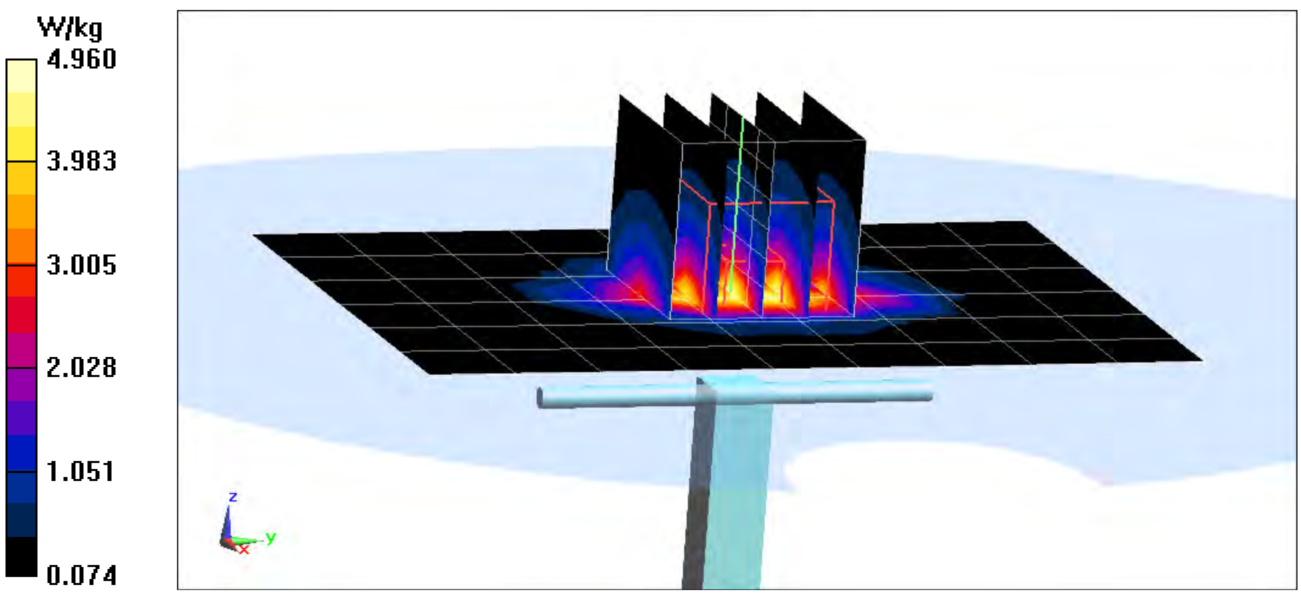
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.438 S/m; ε_r = 40.815; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 21.0°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(5.31, 5.31, 5.31); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.15 W/kg
SAR(1 g) = 3.93 W/kg
Deviation(1 g) = -2.24%



PCTEST ENGINEERING LABORATORY, INC.

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

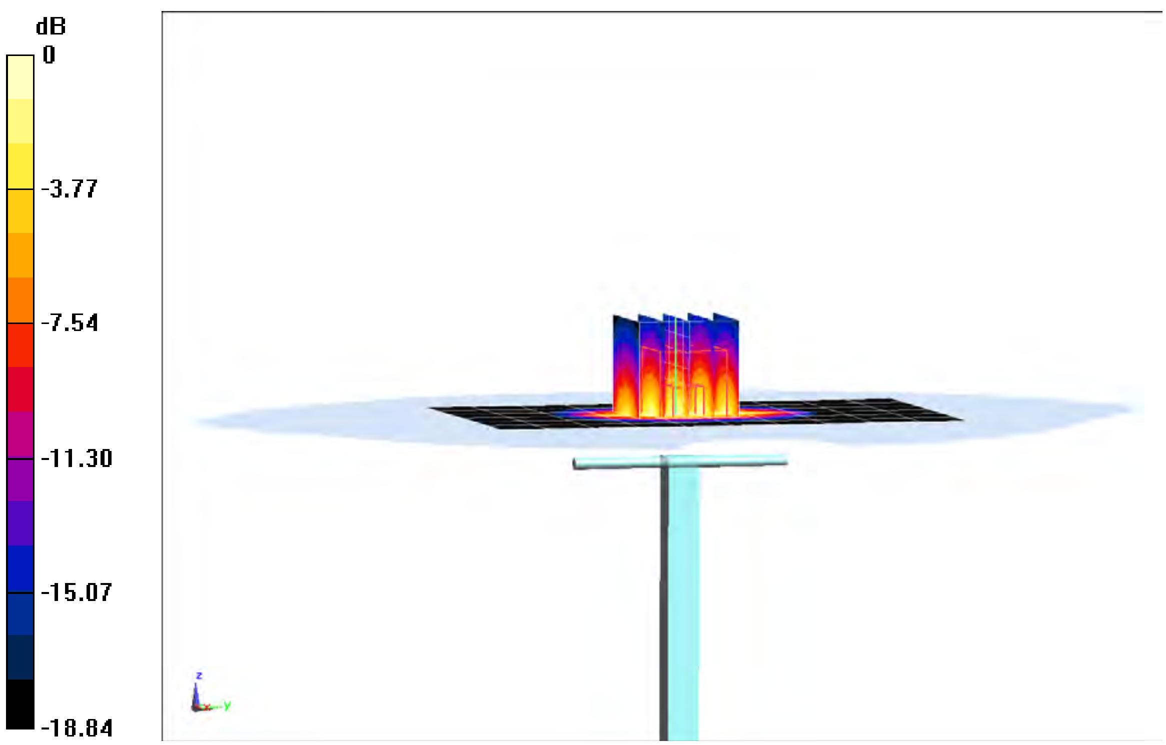
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.456 S/m; ε_r = 40.36; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-13-2017; Ambient Temp: 22.3°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7406; ConvF(8.4, 8.4, 8.4); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 7.50 W/kg
SAR(1 g) = 3.88 W/kg
Deviation(1 g) = -3.48%



0 dB = 6.11 W/kg = 7.86 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719

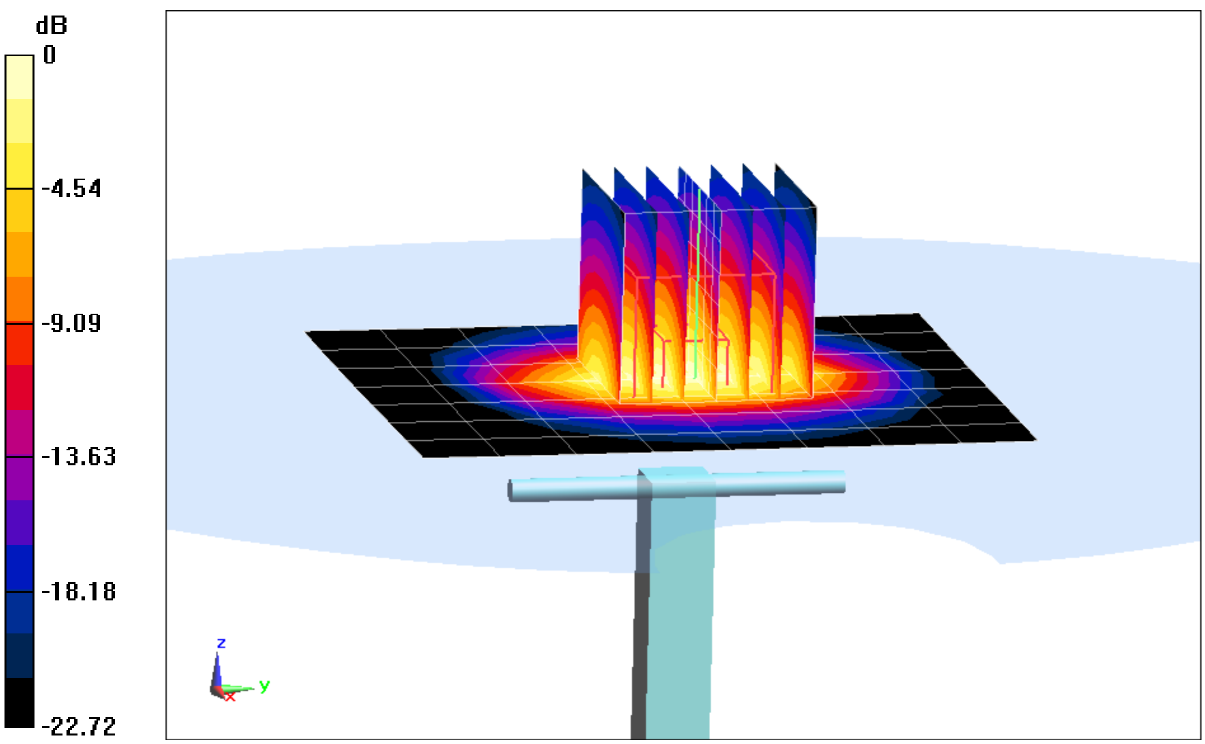
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used:
f = 2450 MHz; σ = 1.849 S/m; ε_r = 38.156; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0cm

Test Date: 10-10-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3213; ConvF(4.7, 4.7, 4.7); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Right; Type: SAM; Serial: 1757
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 5.47 W/kg
Deviation(1 g) = 5.39%



0 dB = 7.19 W/kg = 8.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 719

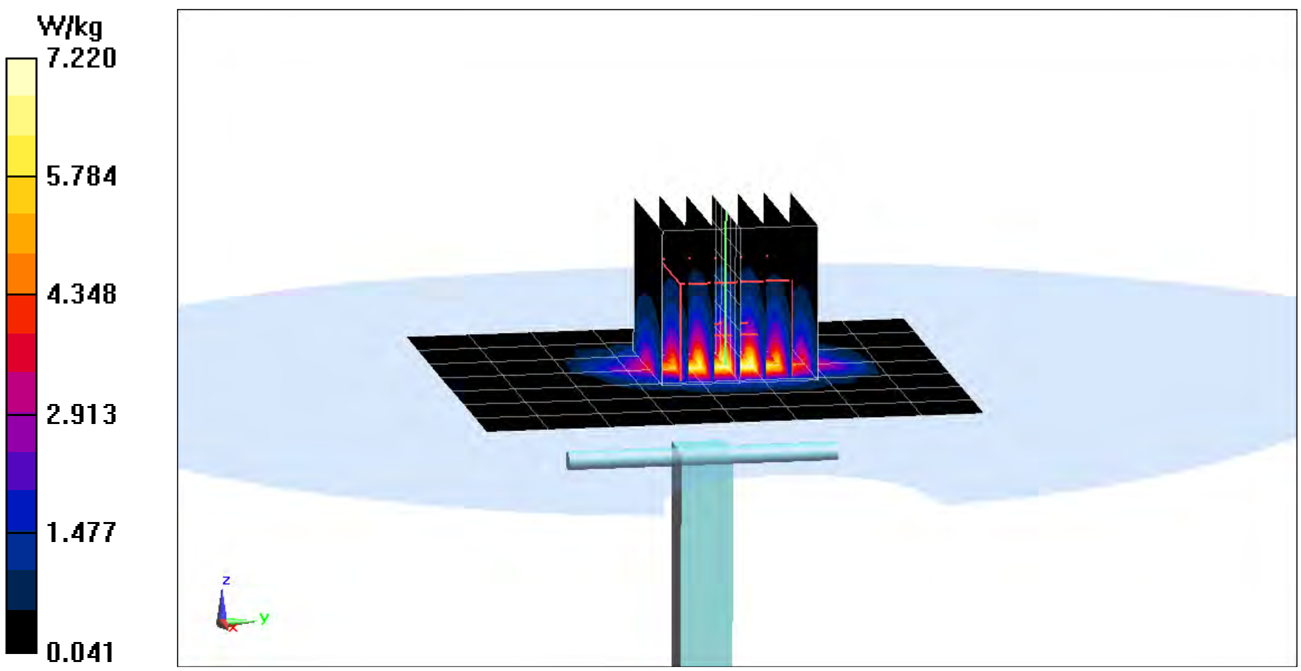
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 MHz Medium parameters used:
$f = 2450$ MHz; $\sigma = 1.88$ S/m; $\varepsilon_r = 38.615$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-17-2017; Ambient Temp: 22.7°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3332; ConvF(4.68, 4.68, 4.68); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 11.2 W/kg
SAR(1 g) = 5.45 W/kg
Deviation(1 g) = 5.01%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1004

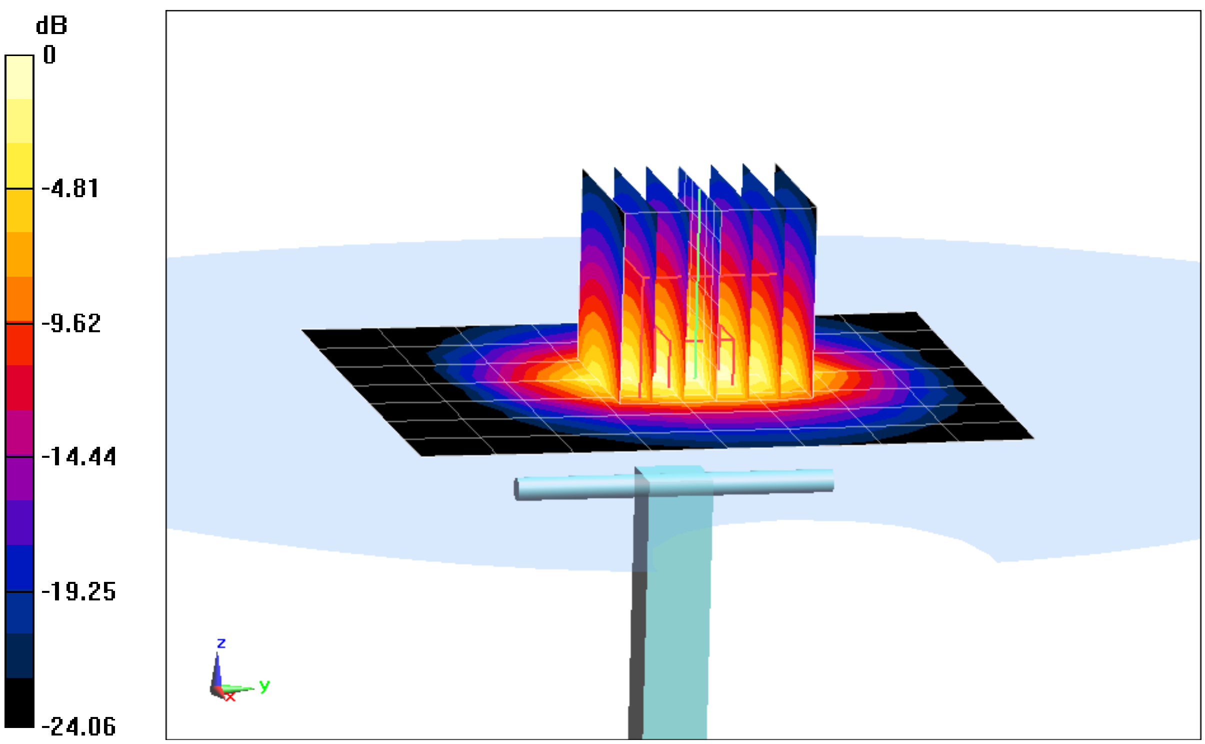
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Head; Medium parameters used:
f = 2600 MHz; σ = 2.02 S/m; ε_r = 37.562; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.5°C; Tissue Temp: 21.4°C

Probe: ES3DV3 - SN3213; ConvF(4.52, 4.52, 4.52); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Right; Type: SAM; Serial: 1757
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 13.6 W/kg
SAR(1 g) = 6.14 W/kg
Deviation(1 g) = 6.60%



0 dB = 8.18 W/kg = 9.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

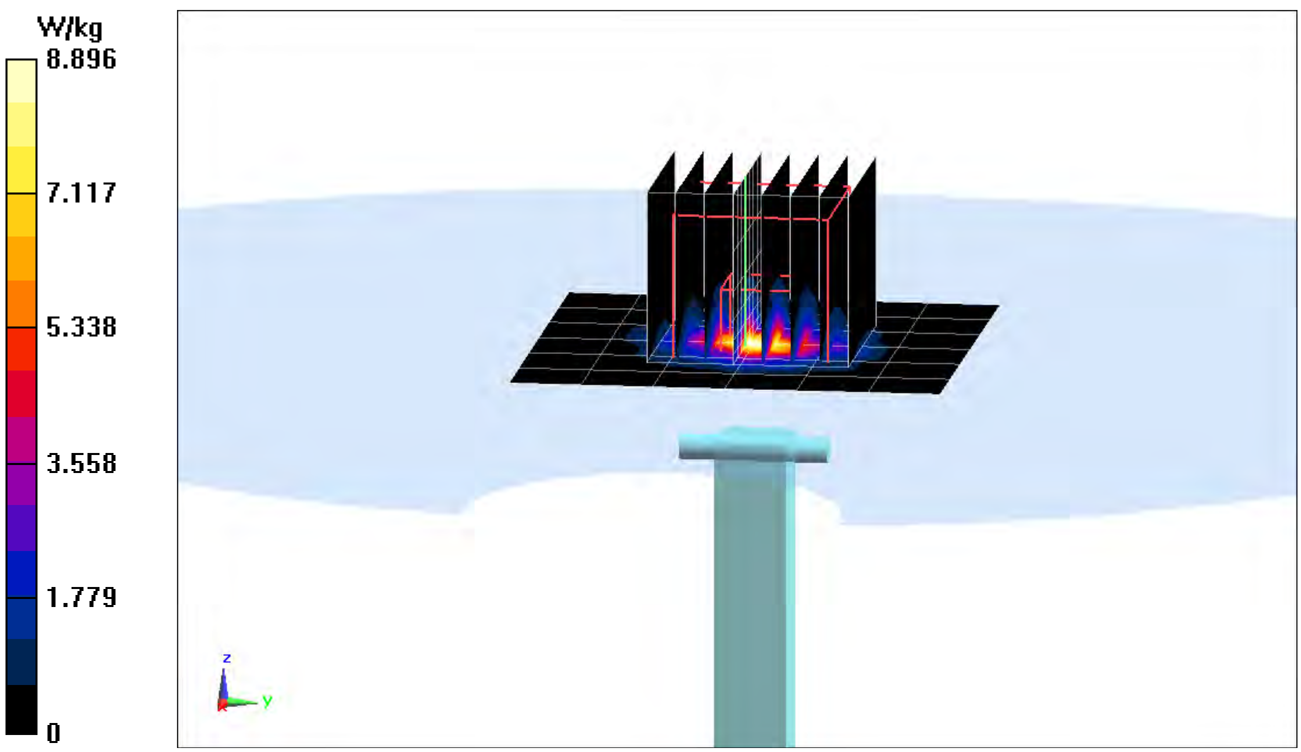
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head; Medium parameters used (interpolated):
f = 5250 MHz; σ = 4.513 S/m; ε_r = 36.194; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(5.49, 5.49, 5.49); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 16.3 W/kg
SAR(1 g) = 3.75 W/kg
Deviation(1 g) = -7.06%



PCTEST ENGINEERING LABORATORY, INC.

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

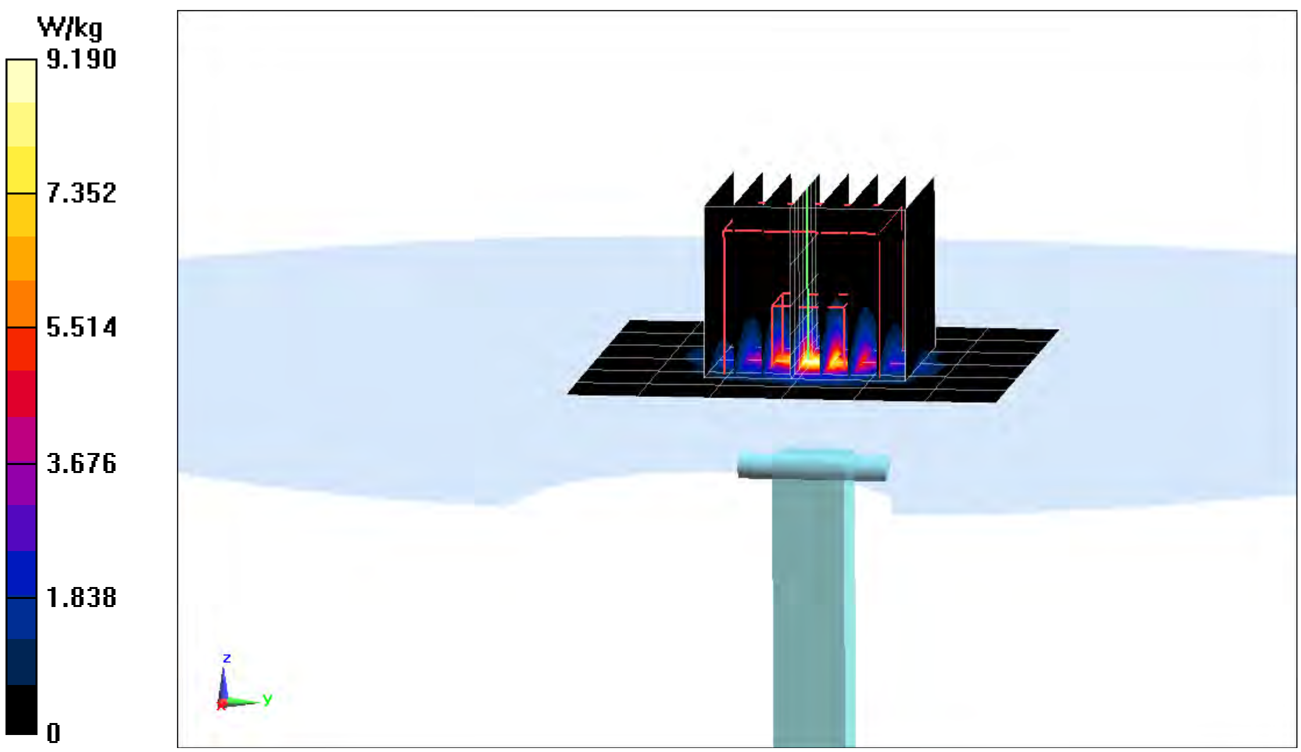
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head; Medium parameters used:
f = 5600 MHz; σ = 4.862 S/m; ε_r = 35.712; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(4.94, 4.94, 4.94); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 16.6 W/kg
SAR(1 g) = 3.79 W/kg
Deviation(1 g) = -8.12%



PCTEST ENGINEERING LABORATORY, INC.

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

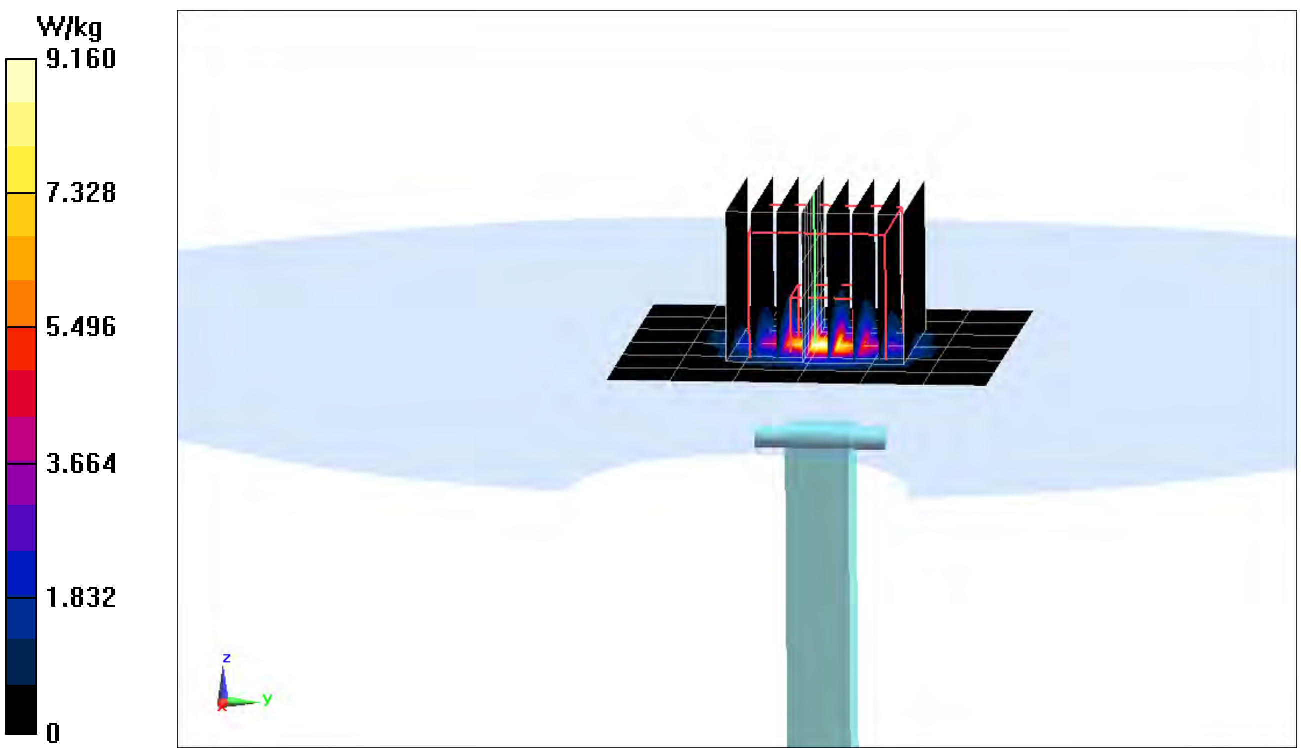
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head; Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.019 S/m; ε_r = 35.505; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.7°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN3914; ConvF(4.91, 4.91, 4.91); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 17.1 W/kg
SAR(1 g) = 3.74 W/kg
Deviation(1 g) = -6.73%



PCTEST ENGINEERING LABORATORY, INC.

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

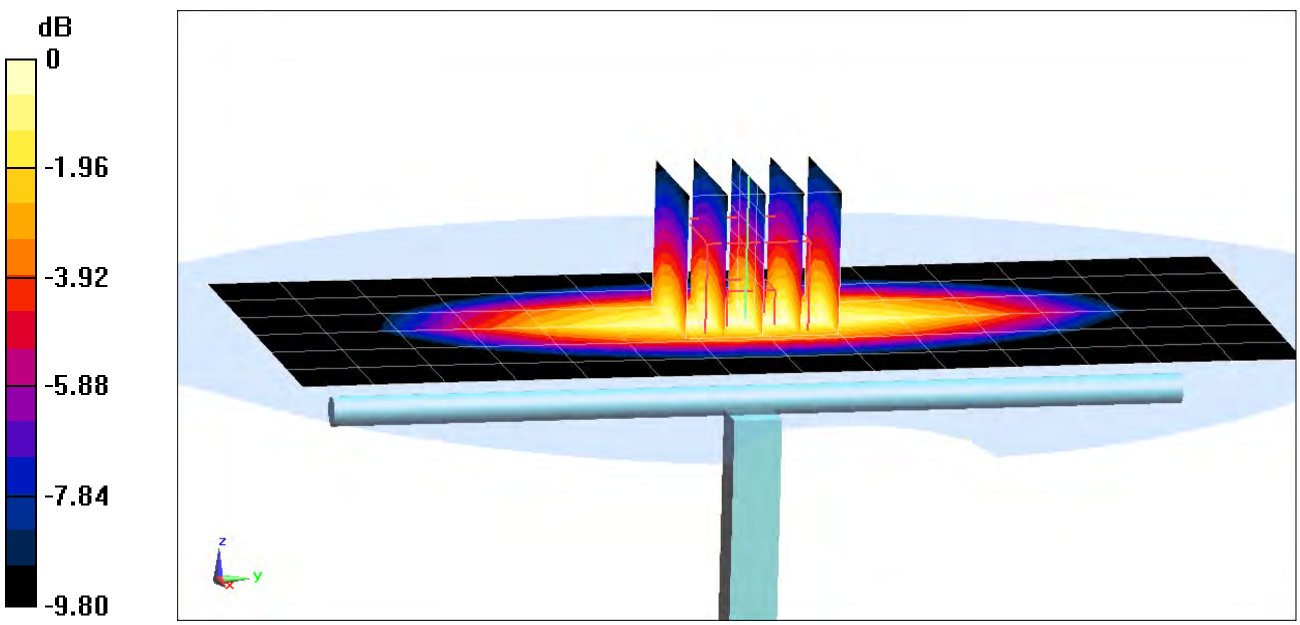
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.948 S/m; ε_r = 55.53; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-09-2017; Ambient Temp: 21.2°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3288; ConvF(6.32, 6.32, 6.32); Calibrated: 1/13/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 2.55 W/kg
SAR(1 g) = 1.76 W/kg
Deviation(1 g) = 2.21%



0 dB = 2.04 W/kg = 3.10 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

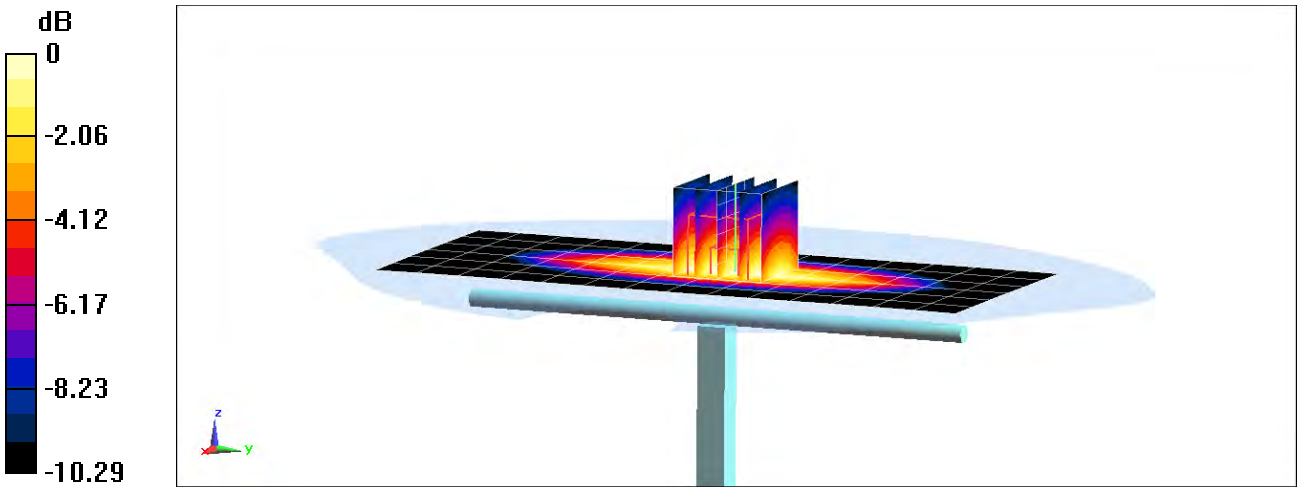
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.964 S/m; ε_r = 55.67; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-12-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 2.60 W/kg
SAR(1 g) = 1.73 W/kg
Deviation(1 g) = 2.61%



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

PCTEST ENGINEERING LABORATORY, INC.

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

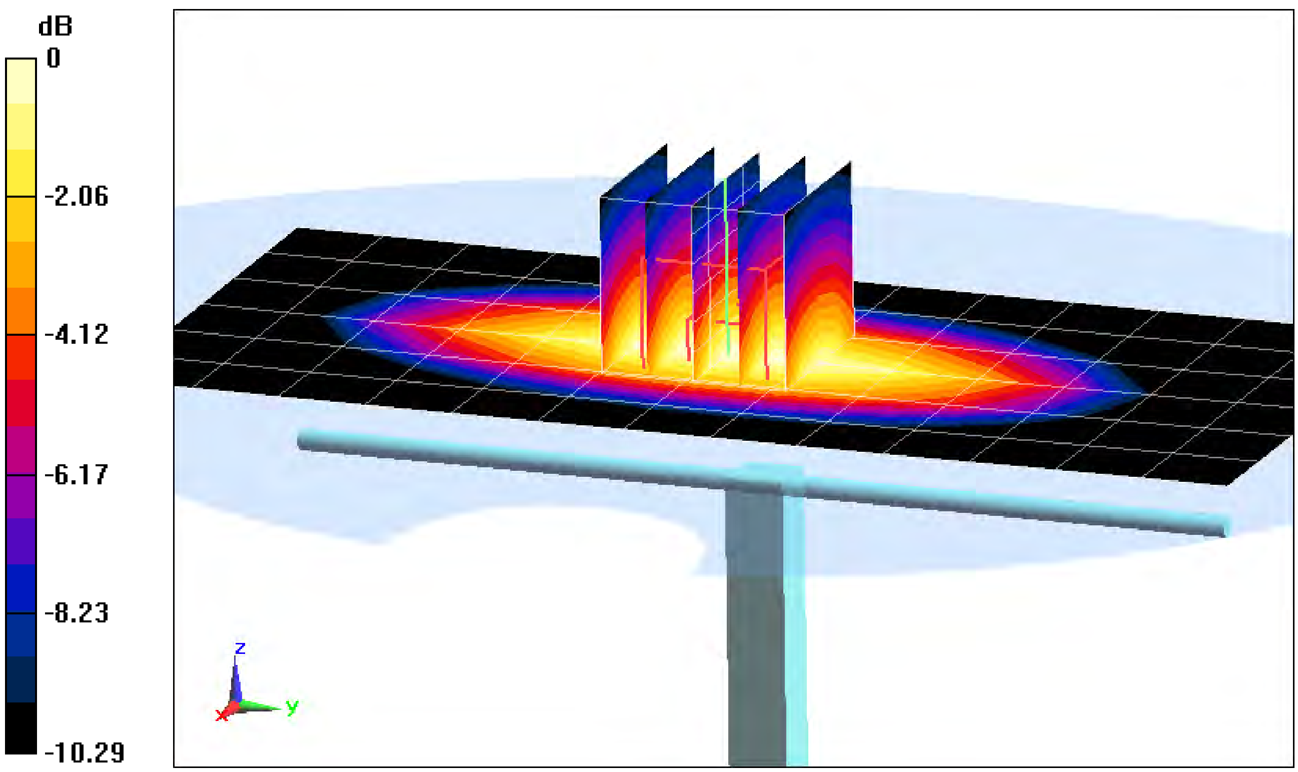
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used:
f = 835 MHz; σ = 0.986 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-05-2017; Ambient Temp: 22.0°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.29, 6.29, 6.29); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 2.94 W/kg
SAR(1 g) = 2.01 W/kg
Deviation(1 g) = 5.02%



0 dB = 2.35 W/kg = 3.71 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

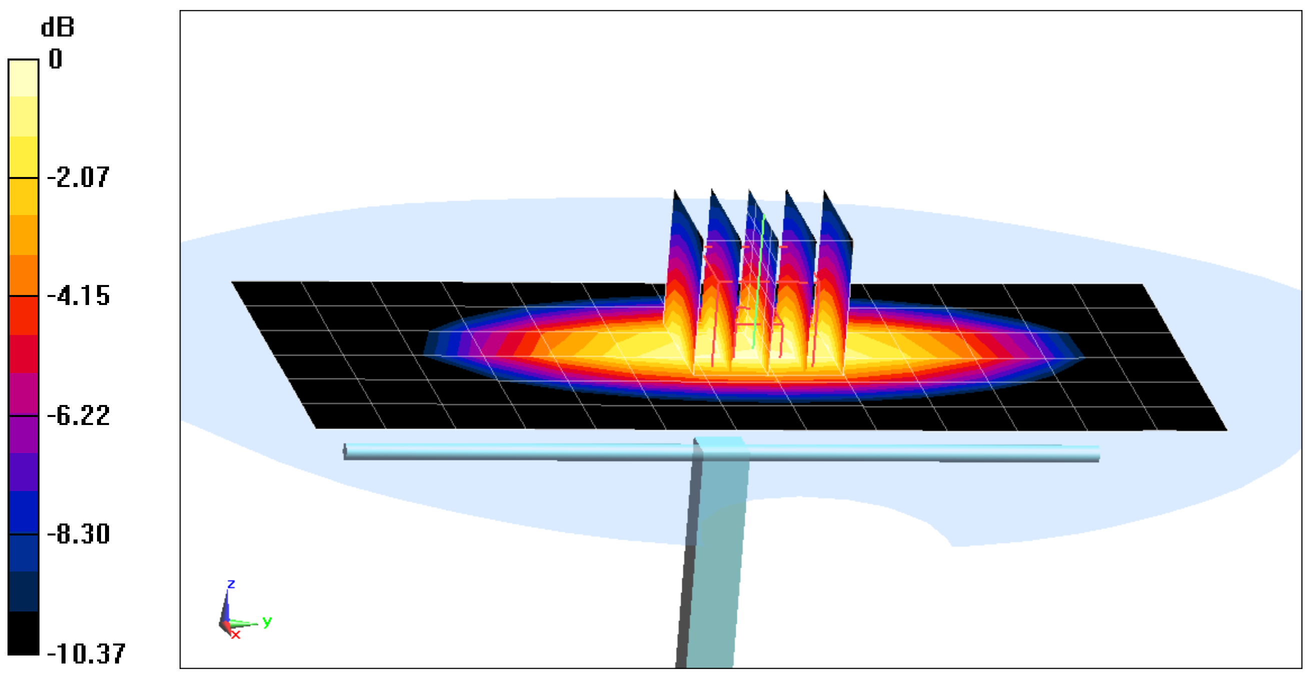
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used:
f = 835 MHz; σ = 0.999 S/m; ε_r = 52.814; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-11-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(6.47, 6.47, 6.47); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 2.84 W/kg
SAR(1 g) = 1.96 W/kg
Deviation(1 g) = 4.14%



0 dB = 2.28 W/kg = 3.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

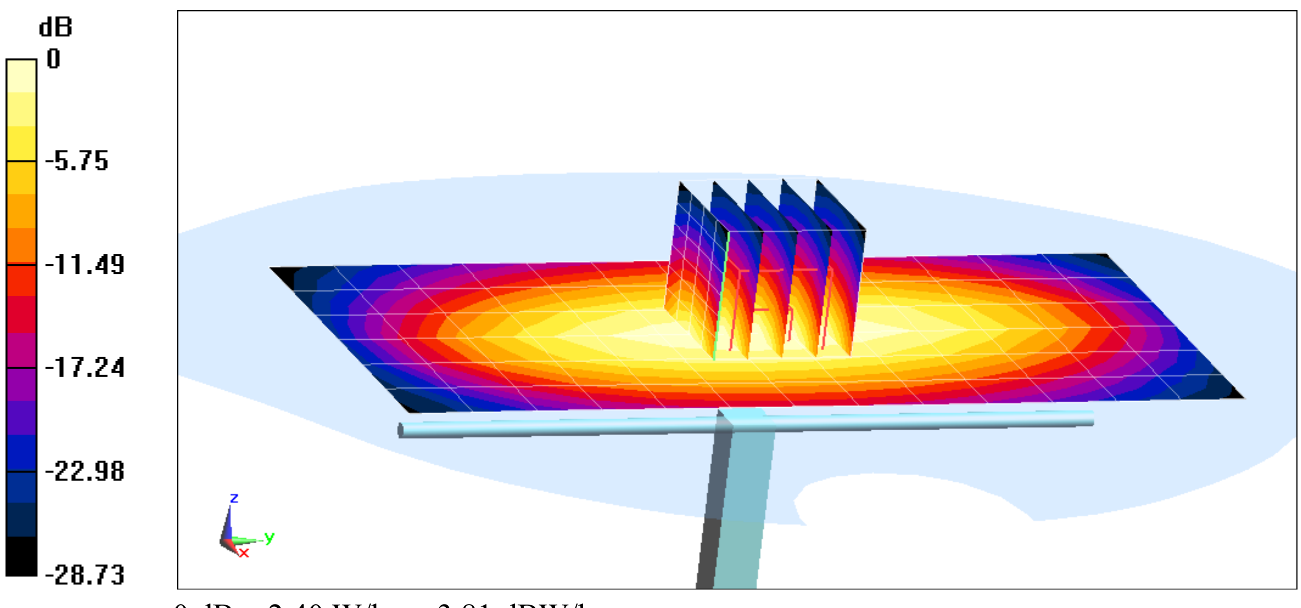
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used:
f = 835 MHz; σ = 0.993 S/m; ε_r = 53.058; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10-16-2017; Ambient Temp: 20.3°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.36, 6.36, 6.36); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Right; Type: QD000P40CD; Serial: 1800
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.96 W/kg
SAR(1 g) = 2.03 W/kg
Deviation(1 g) = 7.86%



0 dB = 2.40 W/kg = 3.81 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

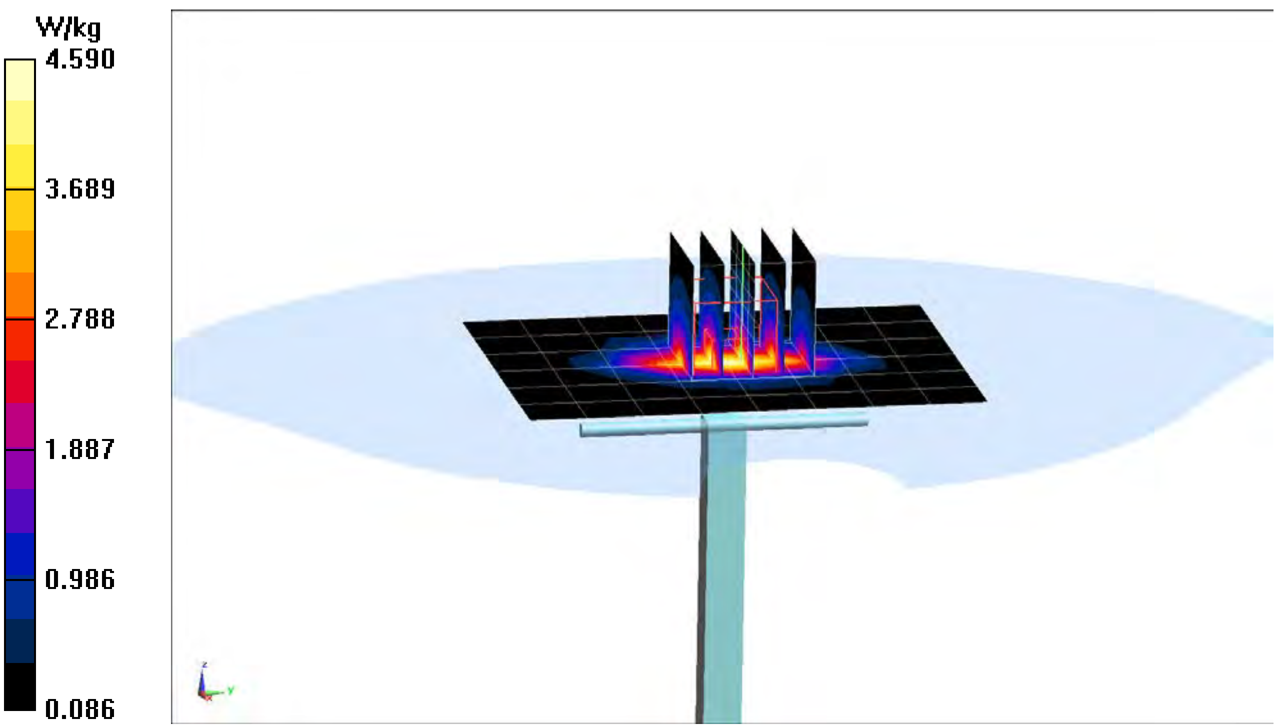
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; σ = 1.51 S/m; ε_r = 50.915; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-10-2017; Ambient Temp: 23.1°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 6.53 W/kg
SAR(1 g) = 3.72 W/kg
Deviation(1 g) = 1.92%



PCTEST ENGINEERING LABORATORY, INC.

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

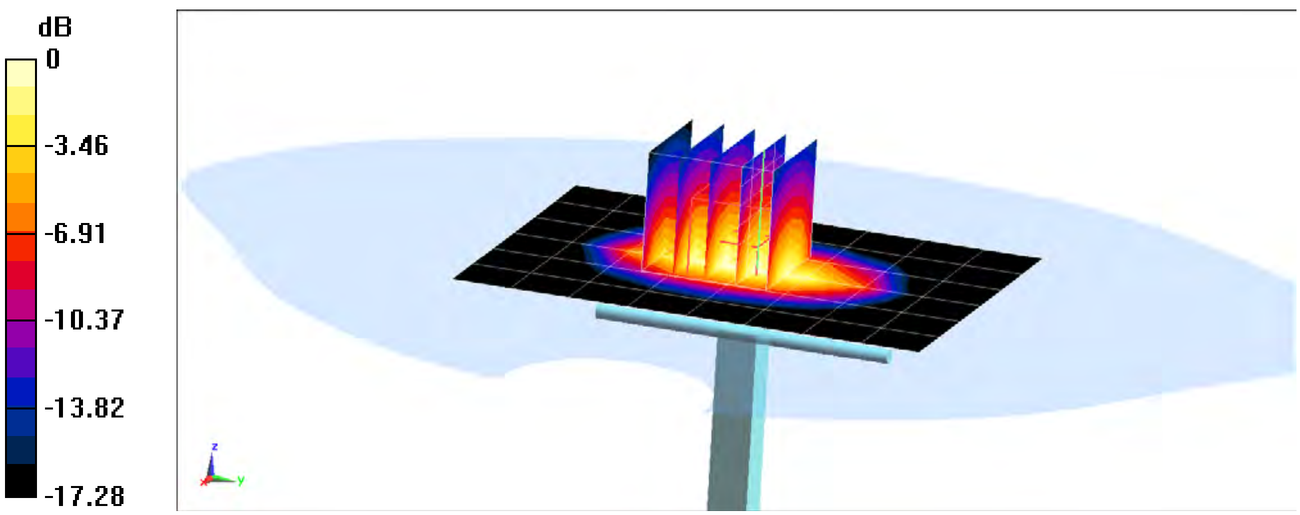
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; σ = 1.473 S/m; ε_r = 52.454; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-12-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3288; ConvF(5.09, 5.09, 5.09); Calibrated: 1/13/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 6.35 W/kg
SAR(10 g) = 1.98 W/kg
Deviation(10 g) = 1.54%



0 dB = 4.55 W/kg = 6.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

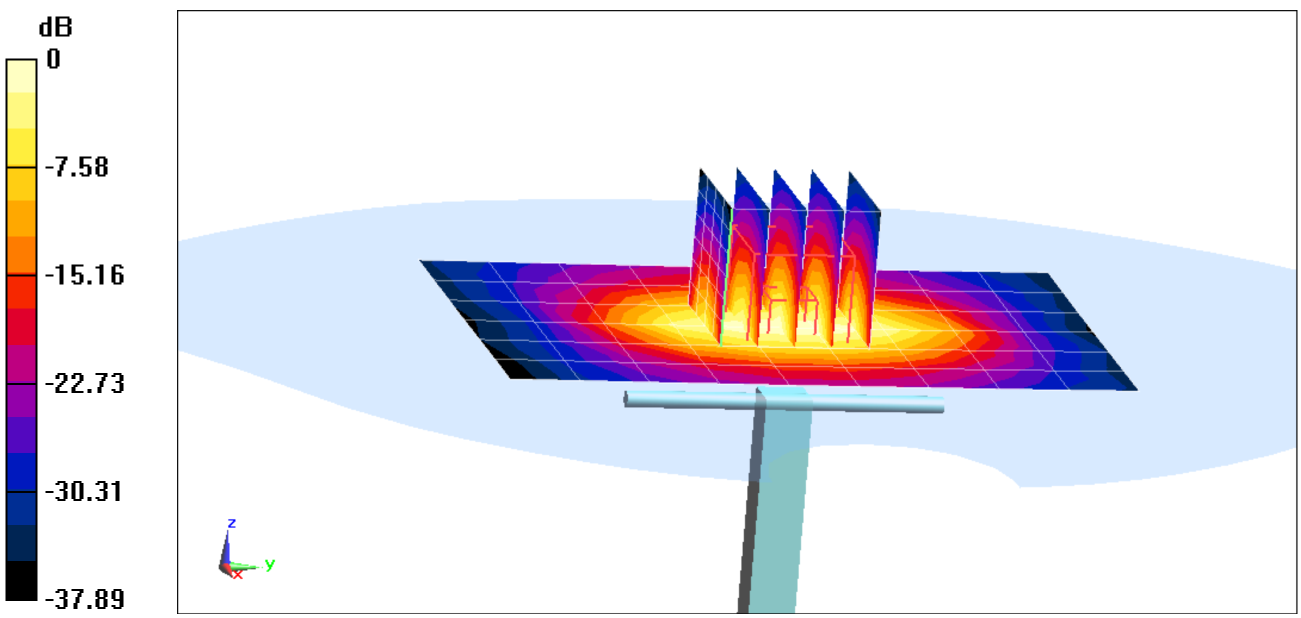
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.563 S/m; ε_r = 53.499; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.1°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.37 W/kg
SAR(1 g) = 4.09 W/kg; SAR(10 g) = 2.11 W/kg
Deviation(1 g) = 2.00%; Deviation(10 g) = -0.94%



0 dB = 4.93 W/kg = 6.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

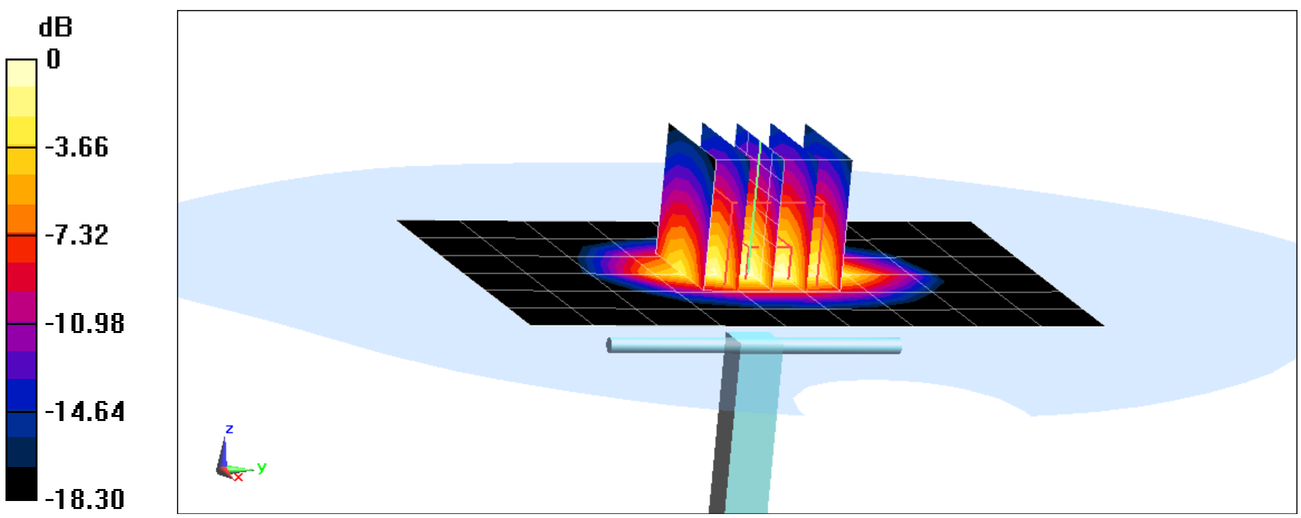
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.577 S/m; ε_r = 53.175; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-13-2017; Ambient Temp: 20.5°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: 1692
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.33 W/kg
SAR(1 g) = 4.05 W/kg; SAR(10 g) = 2.09 W/kg
Deviation(1 g) = 1.00%; Deviation(10 g) = -1.88%



0 dB = 5.13 W/kg = 7.10 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

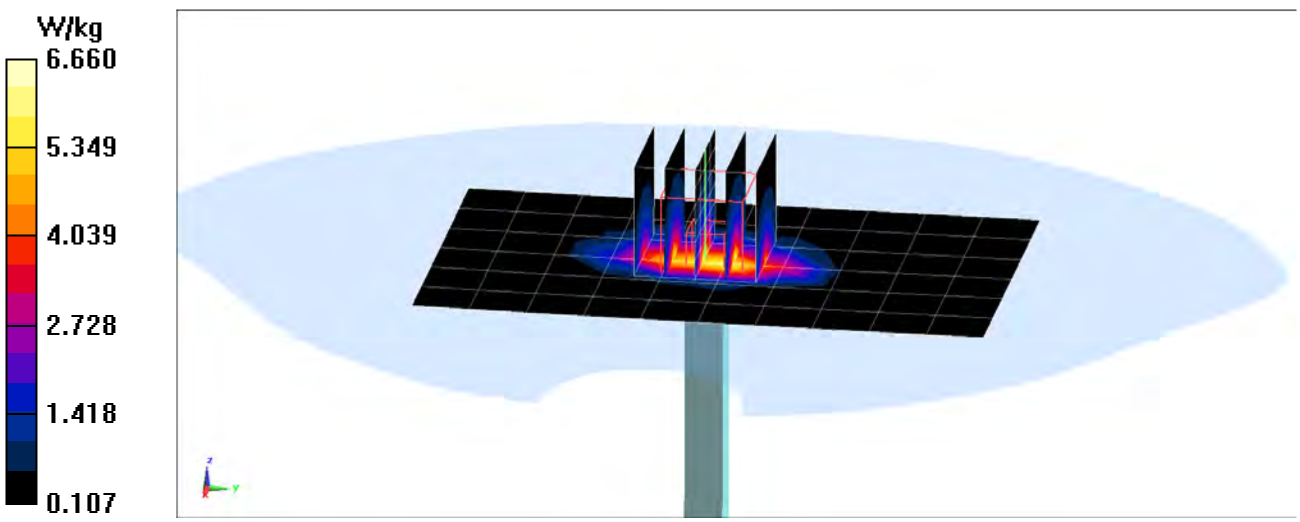
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.548 S/m; ε_r = 53.577; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-31-2017; Ambient Temp: 22.8°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7410; ConvF(7.98, 7.98, 7.98); Calibrated: 7/17/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 7.75 W/kg
SAR(1 g) = 4.35 W/kg
Deviation(1 g) = 6.36%



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

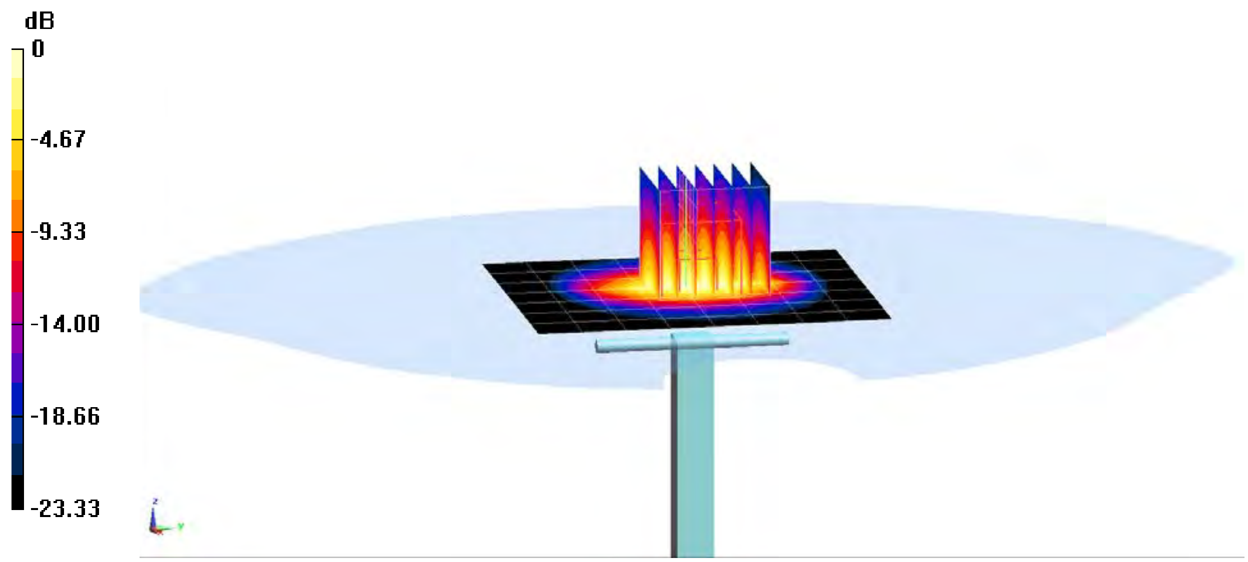
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.038 S/m; ε_r = 53.021; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.6, 7.6, 7.6); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 11.2 W/kg
SAR(1 g) = 5.23 W/kg
Deviation(1 g) = 2.95%



dB = 8.82 W/kg = 9.45 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

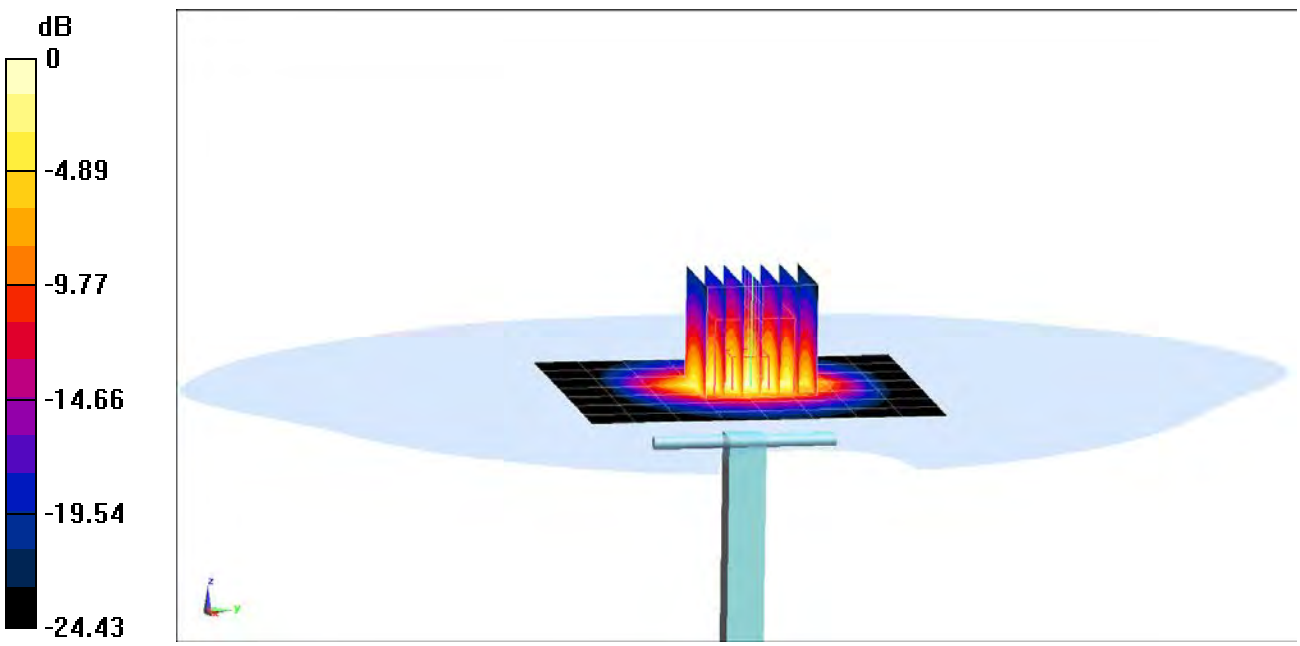
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body; Medium parameters used:
f = 2600 MHz; σ = 2.247 S/m; ε_r = 52.451; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-09-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(7.31, 7.31, 7.31); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 11.6 W/kg
SAR(1 g) = 5.26 W/kg
Deviation(1 g) = -3.13%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

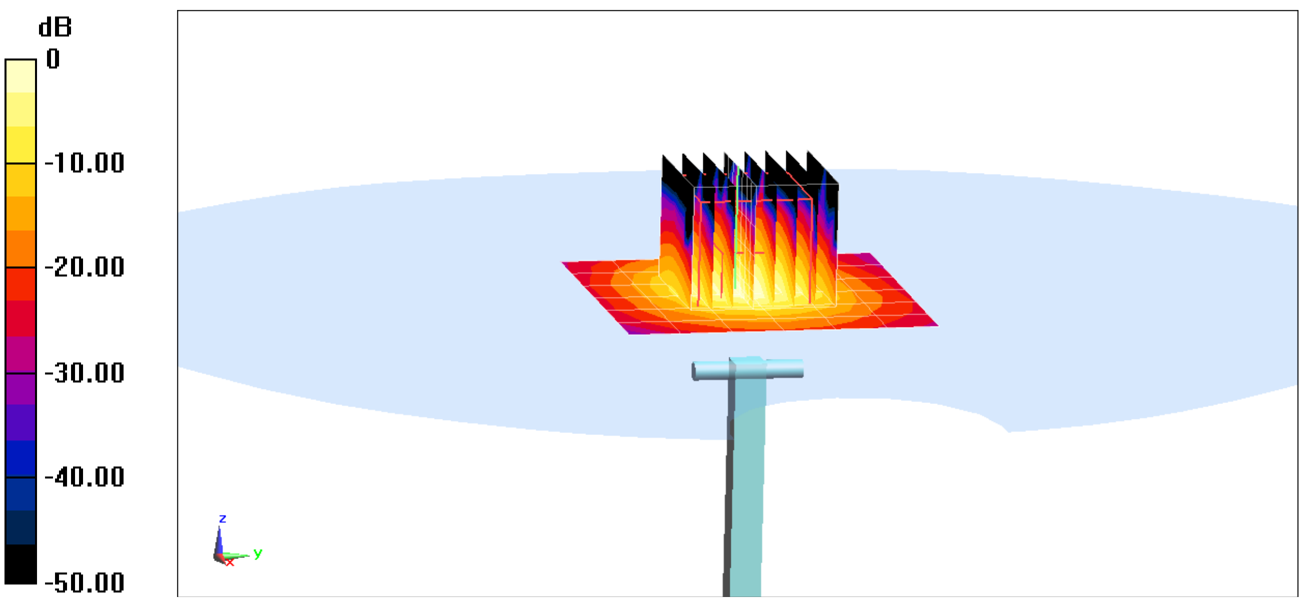
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.322 S/m; ε_r = 47.435; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-03-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(4.19, 4.19, 4.19); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 3.65 W/kg
Deviation(1 g) = -2.14%



0 dB = 8.95 W/kg = 9.52 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

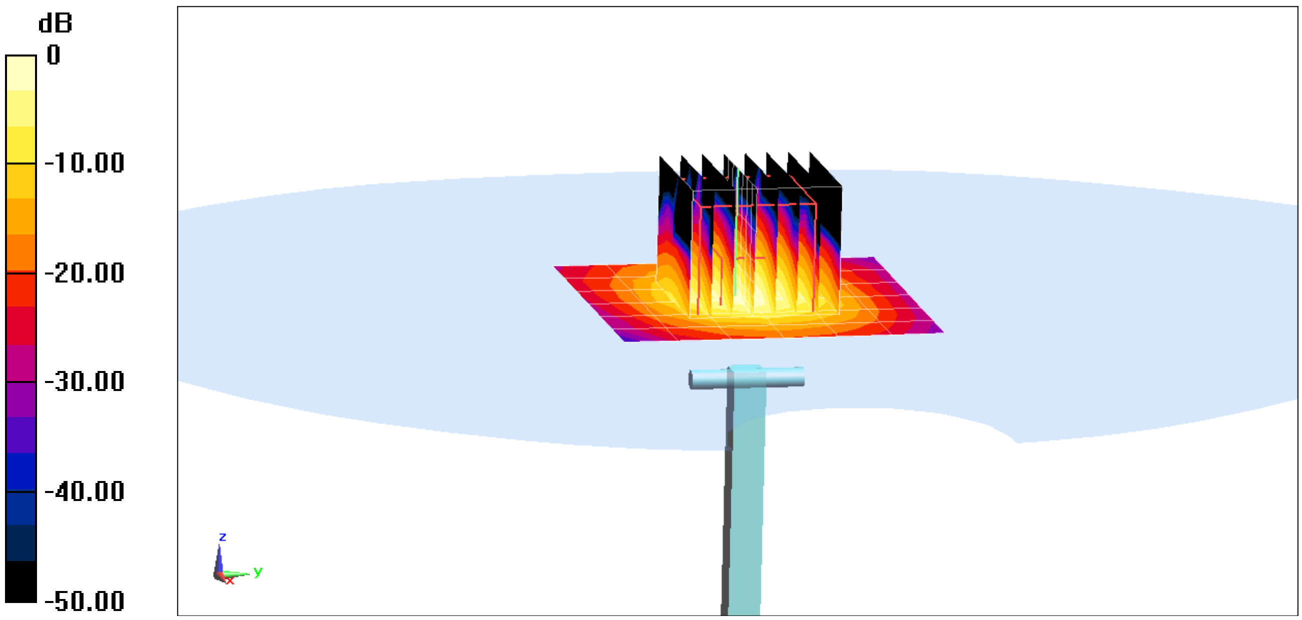
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5600 MHz; σ = 5.812 S/m; ε_r = 46.773; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-03-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.82, 3.82, 3.82); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 18.9 W/kg
SAR(1 g) = 4.02 W/kg
Deviation(1 g) = 1.90%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1057

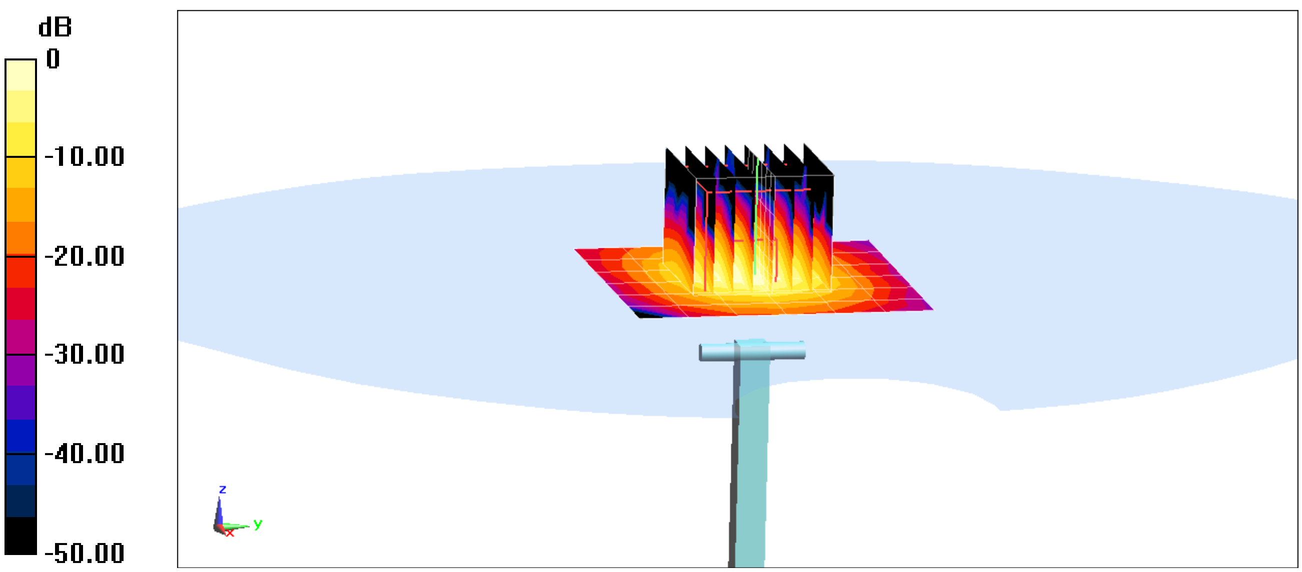
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.026 S/m; ε_r = 46.488; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-03-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN3589; ConvF(3.83, 3.83, 3.83); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Front; Type: QD000P40CD; Serial: 1646
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 3.50 W/kg
Deviation(1 g) = -7.28%



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

PCTEST ENGINEERING LABORATORY, INC.

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

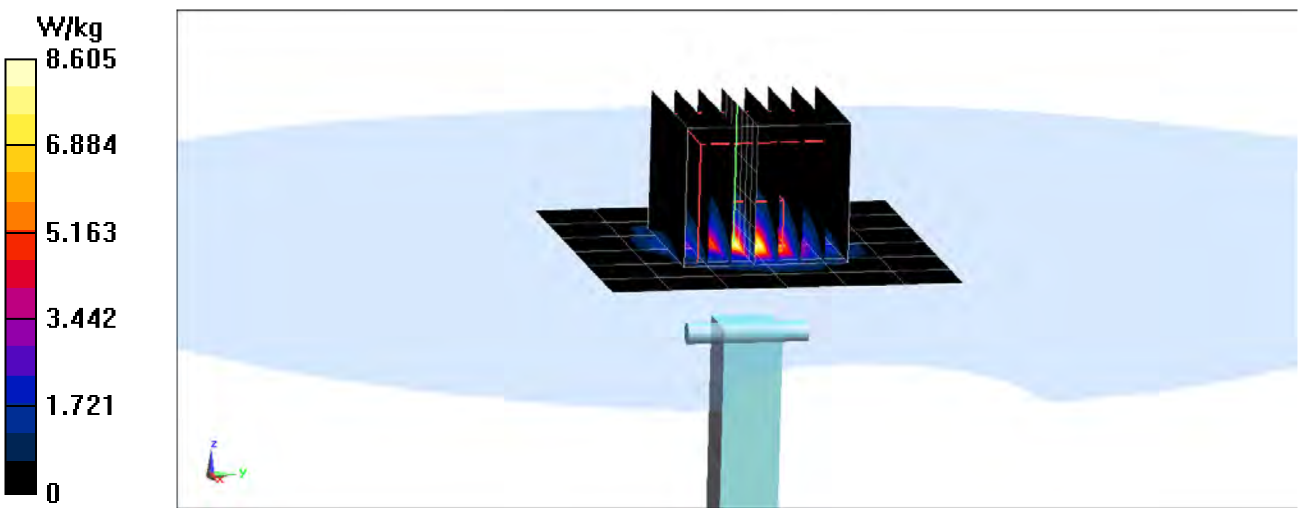
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.409 S/m; ε_r = 47.151; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.2°C

Probe: EX3DV4 - SN3589; ConvF(4.19, 4.19, 4.19); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 15.4 W/kg
SAR(10 g) = 0.992 W/kg
Deviation(10 g) = -7.72%



PCTEST ENGINEERING LABORATORY, INC.

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

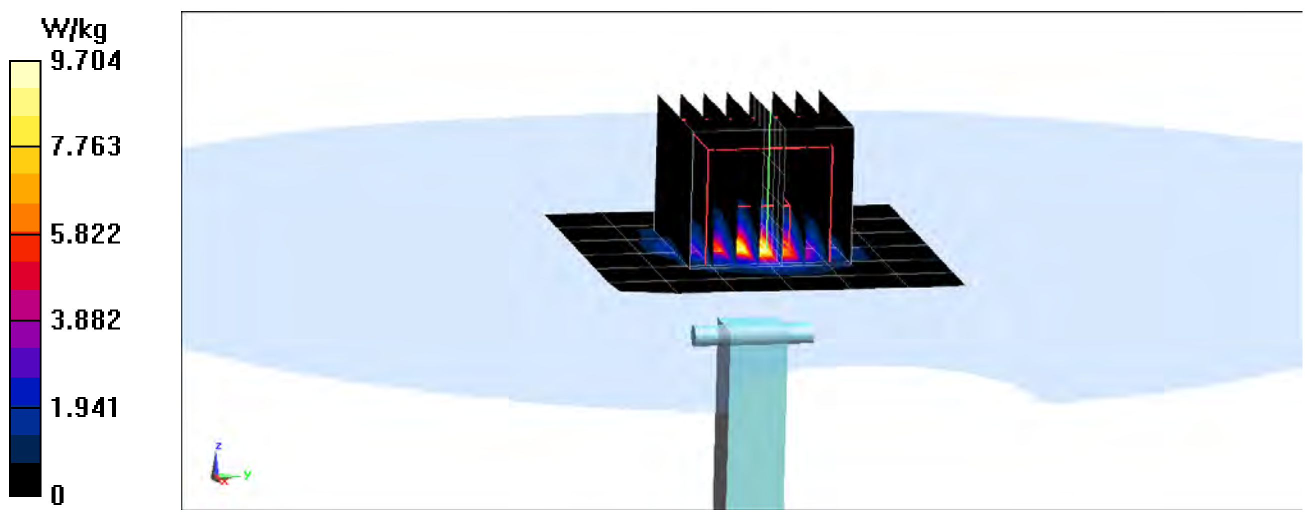
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:
f = 5600 MHz; σ = 5.901 S/m; ε_r = 46.462; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10-11-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.2°C

Probe: EX3DV4 - SN3589; ConvF(3.82, 3.82, 3.82); Calibrated: 1/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1466; Calibrated: 1/16/2017
Phantom: SAM with CRP v5.0 Left; Type: QD000P40CD; Serial: 1687
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 18.6 W/kg
SAR(10 g) = 1.07 W/kg
Deviation(10 g) = -3.17%



APPENDIX C: PROBE CALIBRATION

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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1161_Jul16

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1161
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 13, 2016

√PM 8/9/16 Extended 7/2017 SC ✓

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: July 13, 2016

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.17 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.39 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.1 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

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

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.53 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.6 Ω - 0.9 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 19, 2015

DASY5 Validation Report for Head TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

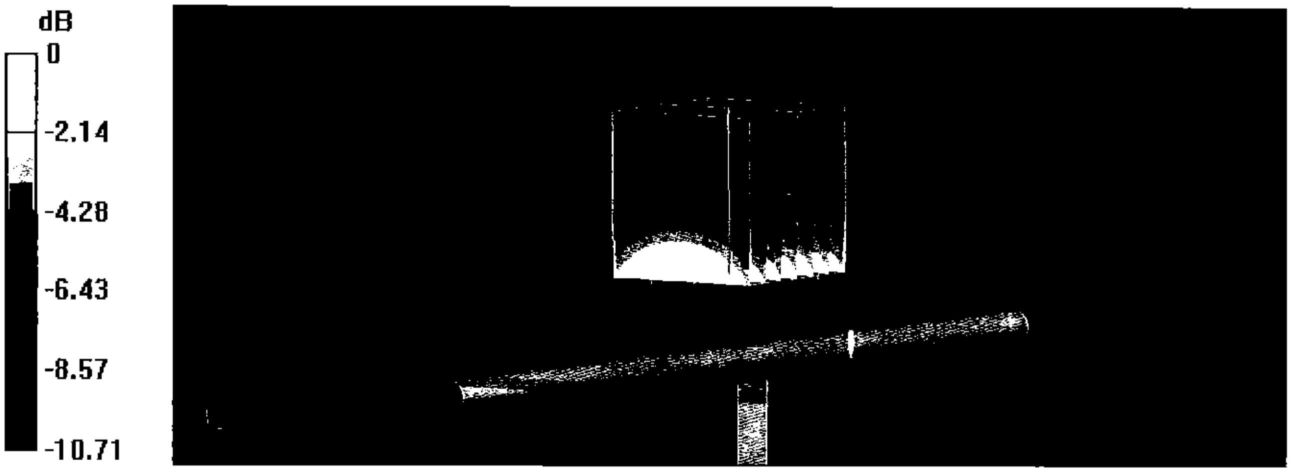
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1161

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.91$ 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:

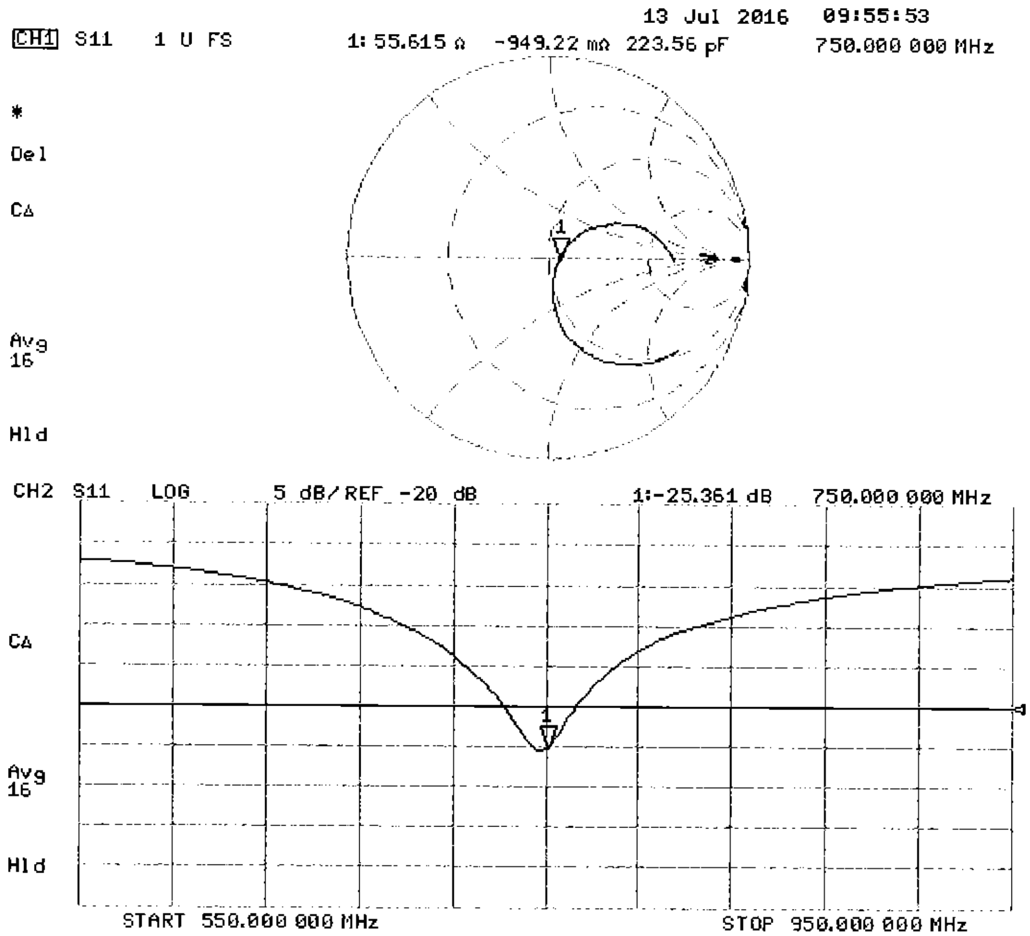
- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.07 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

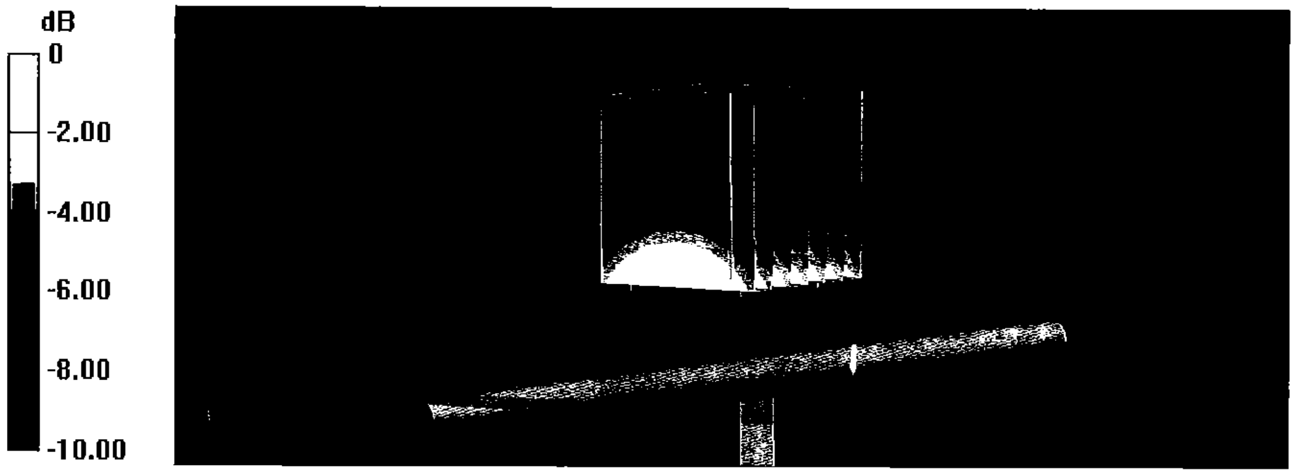
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

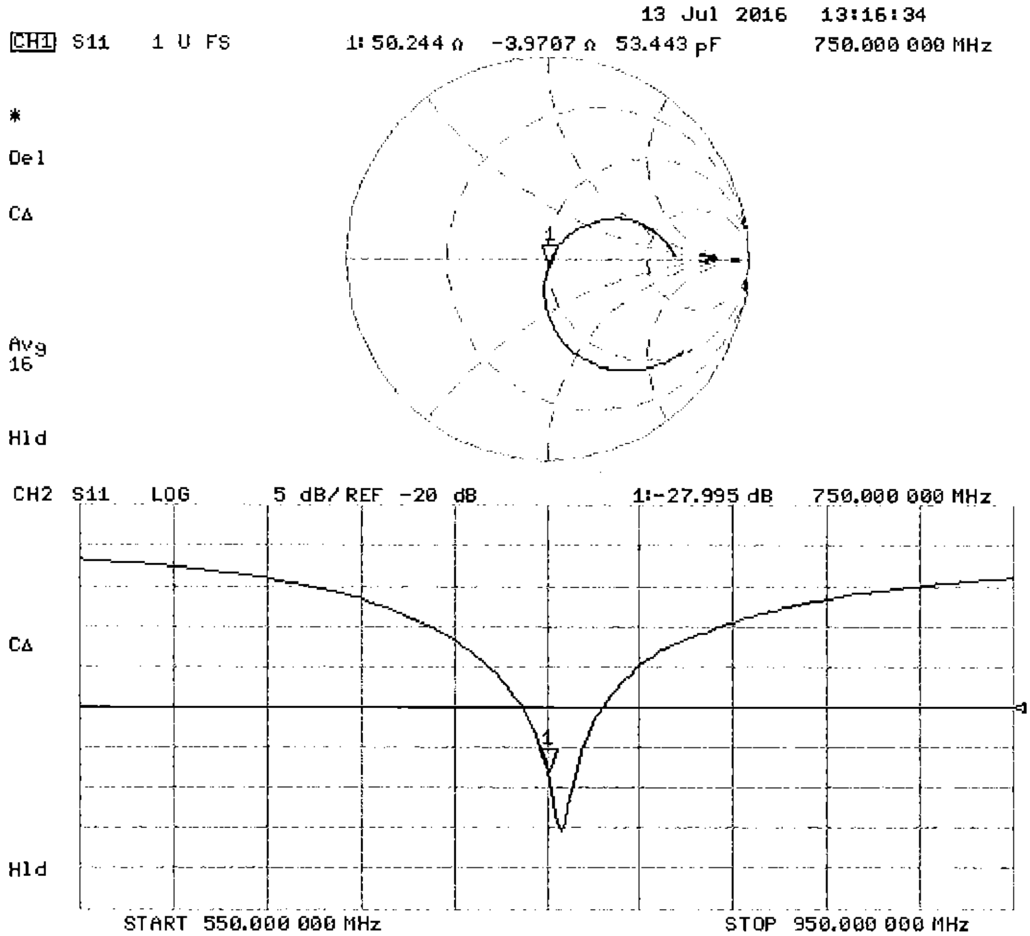
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.33 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



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

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D750V3 – SN: 1161

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Calibration date: July 12, 2017

Description: SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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
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)	6/1/2017	Annual	6/1/2018	MY53401181
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2017	Annual	3/8/2018	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/14/2017	Annual	6/14/2018	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	ES3DV3	SAR Probe	11/15/2016	Annual	11/15/2017	3334
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3319
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

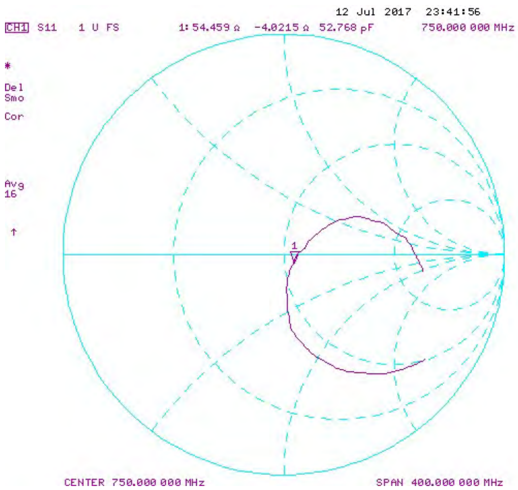
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

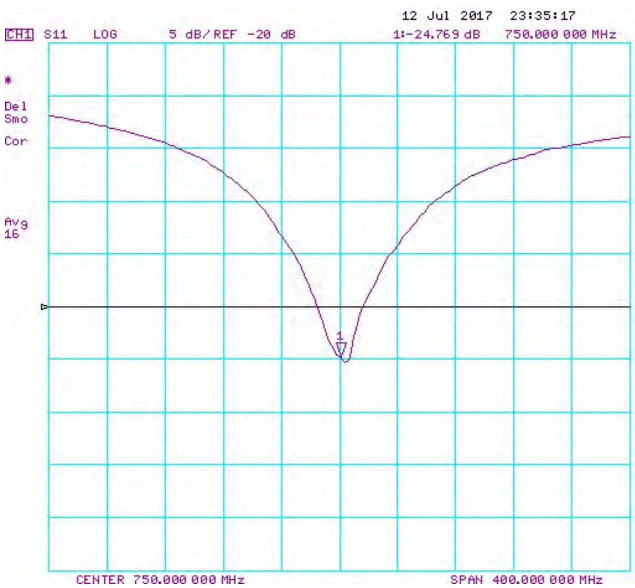
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
7/13/2016	7/12/2017	1.033	1.63	1.65	0.98%	1.08	1.09	1.11%	55.6	54.5	1.1	-0.9	-4.0	3.1	-25.4	-24.8	2.40%	PASS

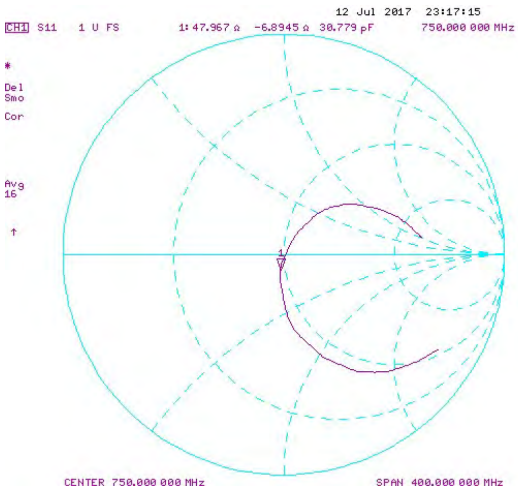
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance 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
7/13/2016	7/12/2017	1.033	1.69	1.75	3.80%	1.11	1.17	5.79%	50.2	48.0	2.2	-4.0	-6.9	2.9	-28.0	-23.9	14.60%	PASS

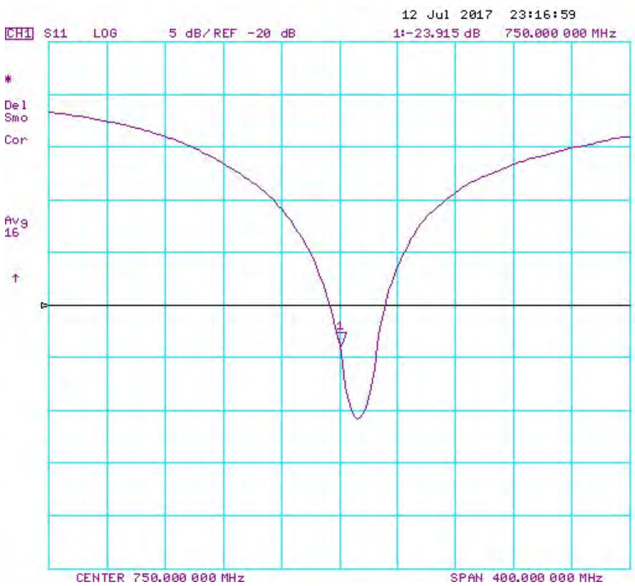
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d047_Jul16

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d047
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 13, 2016

BN✓ 7/16/2016 Extended 7/2017 SC✓

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: July 13, 2016

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.13 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.95 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

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

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.57 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.24 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.8 Ω - 5.9 jΩ
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8 Ω - 8.2 jΩ
Return Loss	- 20.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	None ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 16, 2006

DASY5 Validation Report for Head TSL

Date: 13.07.201

Test Laboratory: SPEAG, Zurich, Switzerland

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

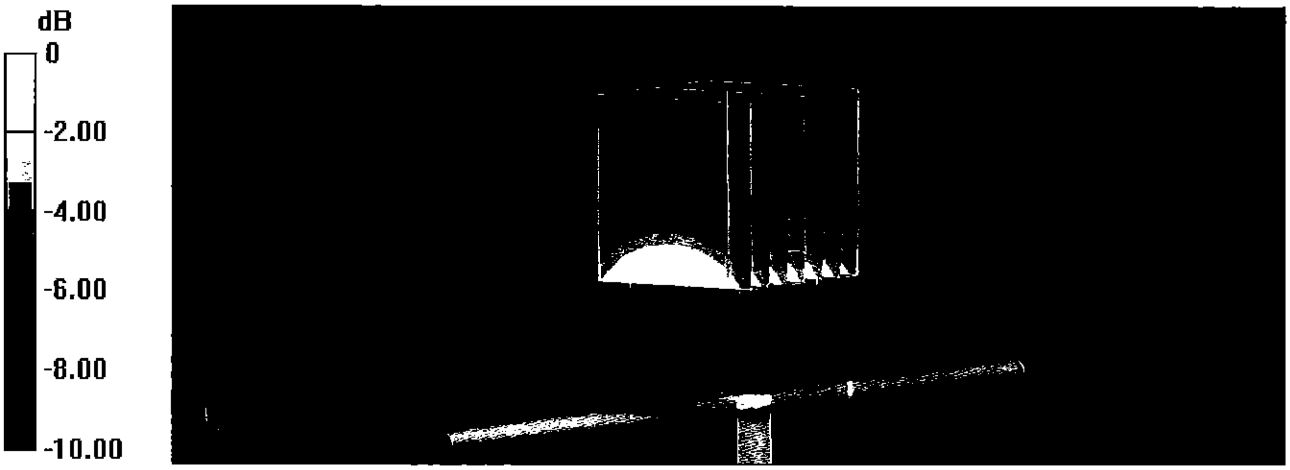
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

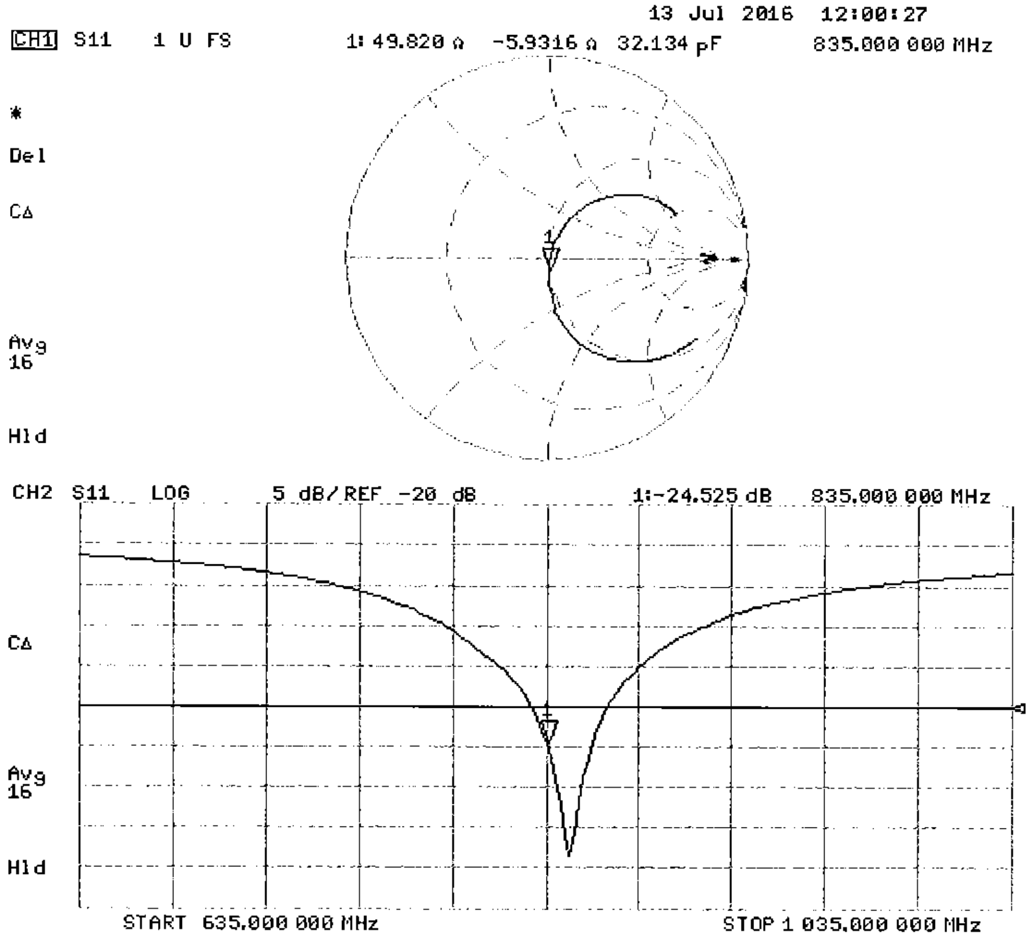
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.98 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.53 W/kg
Maximum value of SAR (measured) = 3.17 W/kg



0 dB = 3.17 W/kg = 5.01 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

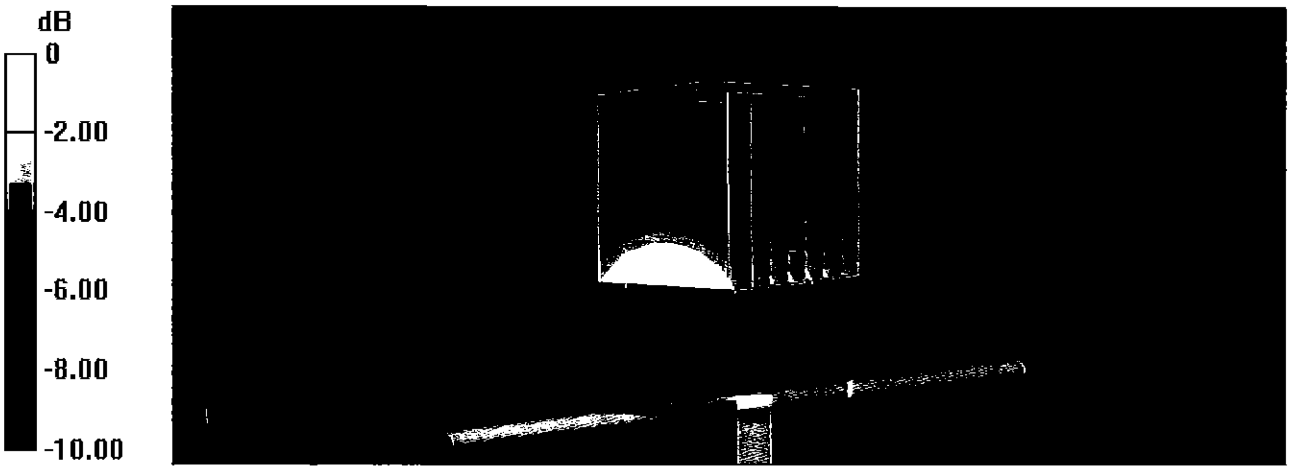
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

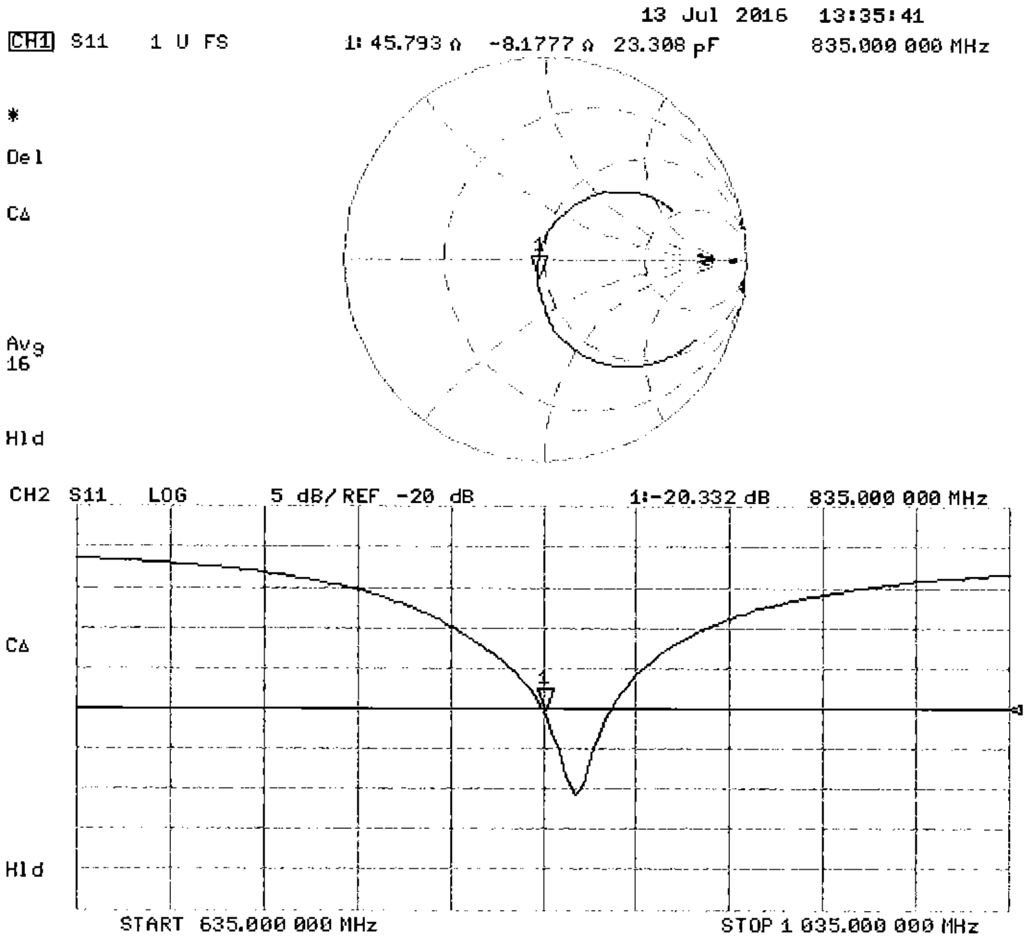
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.88 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27 W/kg = 5.15 dBW/kg

Impedance Measurement Plot for Body TSL



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: 4d047
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Calibration date:	July 13, 2017
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	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	5/2/2017	Biennial	5/2/2019	170330156
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)	6/1/2017	Annual	6/1/2018	MY53401181
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2017	Annual	3/8/2018	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2017	Annual	3/13/2018	1415
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3209
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3319
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	Brodie Halbfoster
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

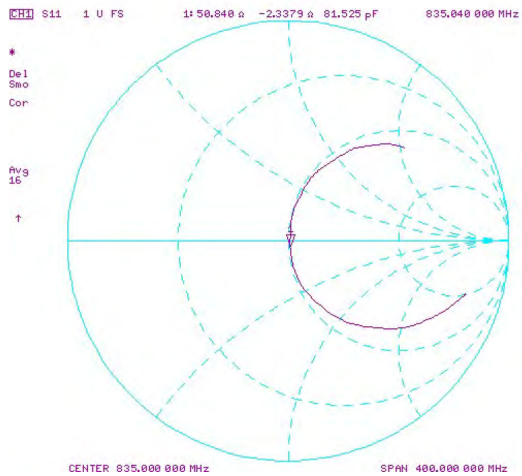
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

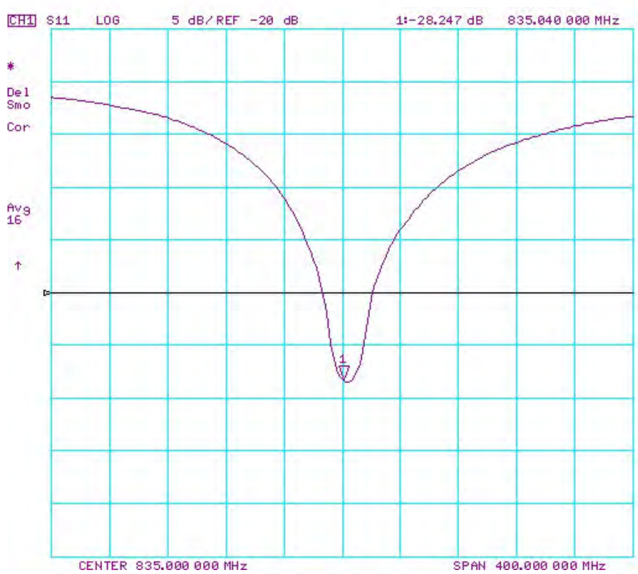
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
7/13/2016	7/13/2017	0	1.83	1.95	6.79%	1.19	1.28	7.56%	49.8	50.8	1	-5.9	-2.3	3.6	-24.5	-28.2	-15.10%	PASS

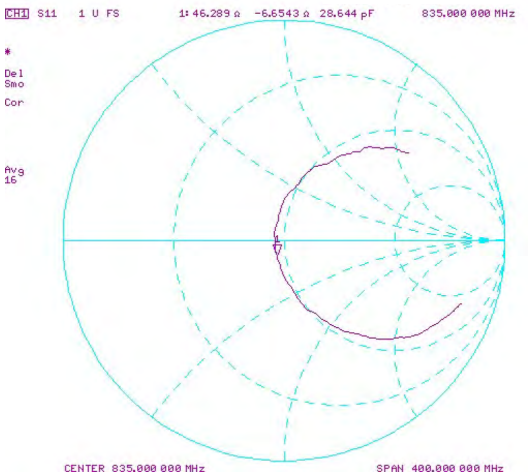
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance 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
7/13/2016	7/13/2017	0	1.91	1.99	3.97%	1.25	1.31	4.97%	45.8	46.3	0.5	-8.2	-6.7	1.5	-20.3	-22.5	-10.80%	PASS

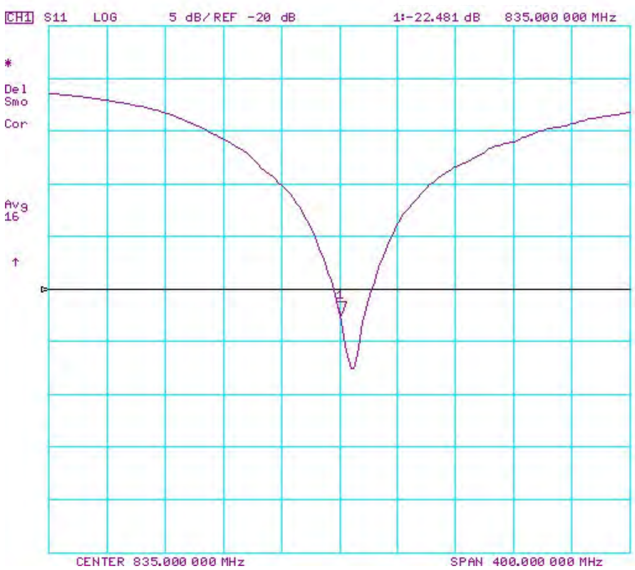
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





Object:	**Date Issued:**	Page 4 of 4
D835V2 – SN: 4d047	07/13/2017	

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

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S Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1750V2-1148_May17

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1148
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 09, 2017

BN ✓
05-23-2017

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-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	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: May 11, 2017

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.4 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	**19.3 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	53.7 ± 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	9.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.0 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	49.8 Ω - 0.7 jΩ
Return Loss	- 42.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.7 Ω - 0.5 jΩ
Return Loss	- 26.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.223 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 30, 2014

DASY5 Validation Report for Head TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

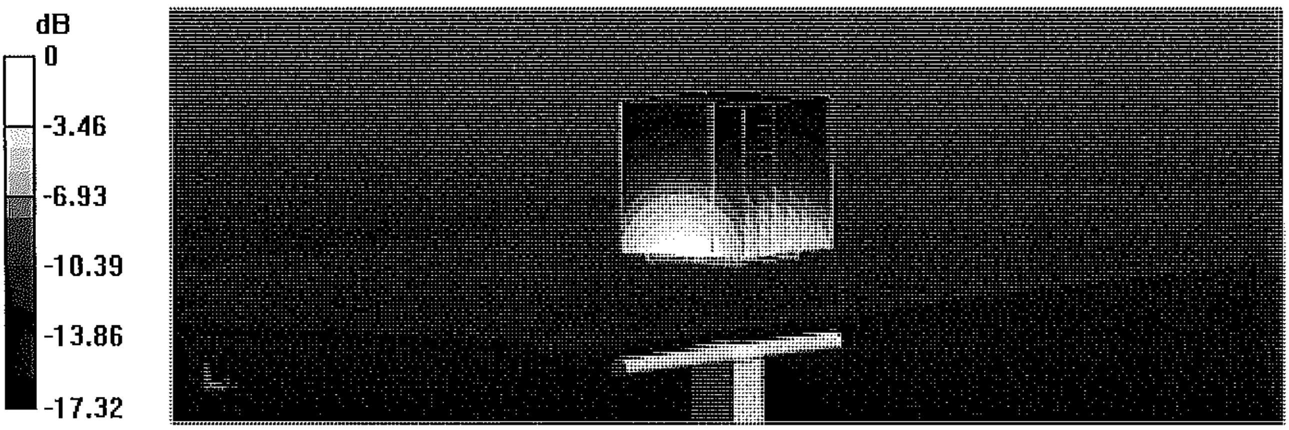
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

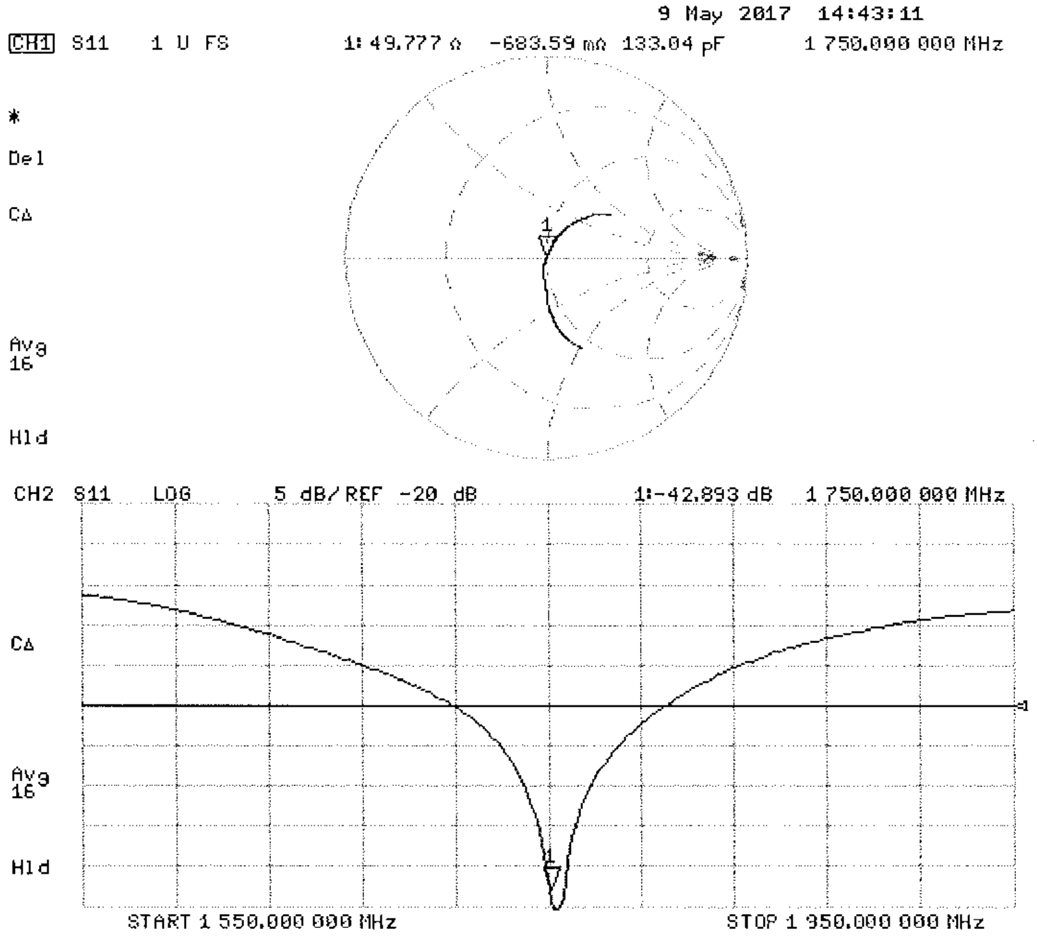
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.4 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 9.11 W/kg; SAR(10 g) = 4.83 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

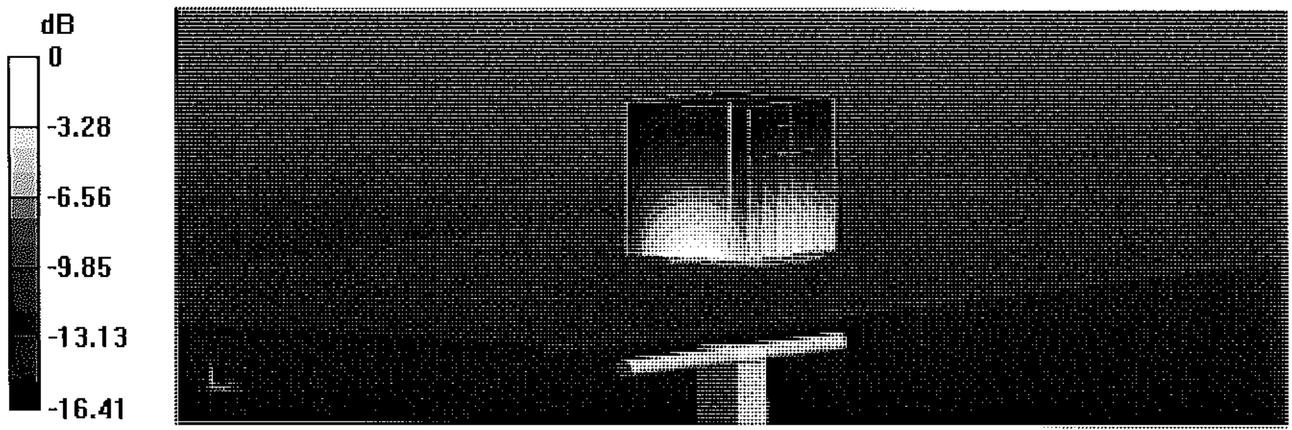
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

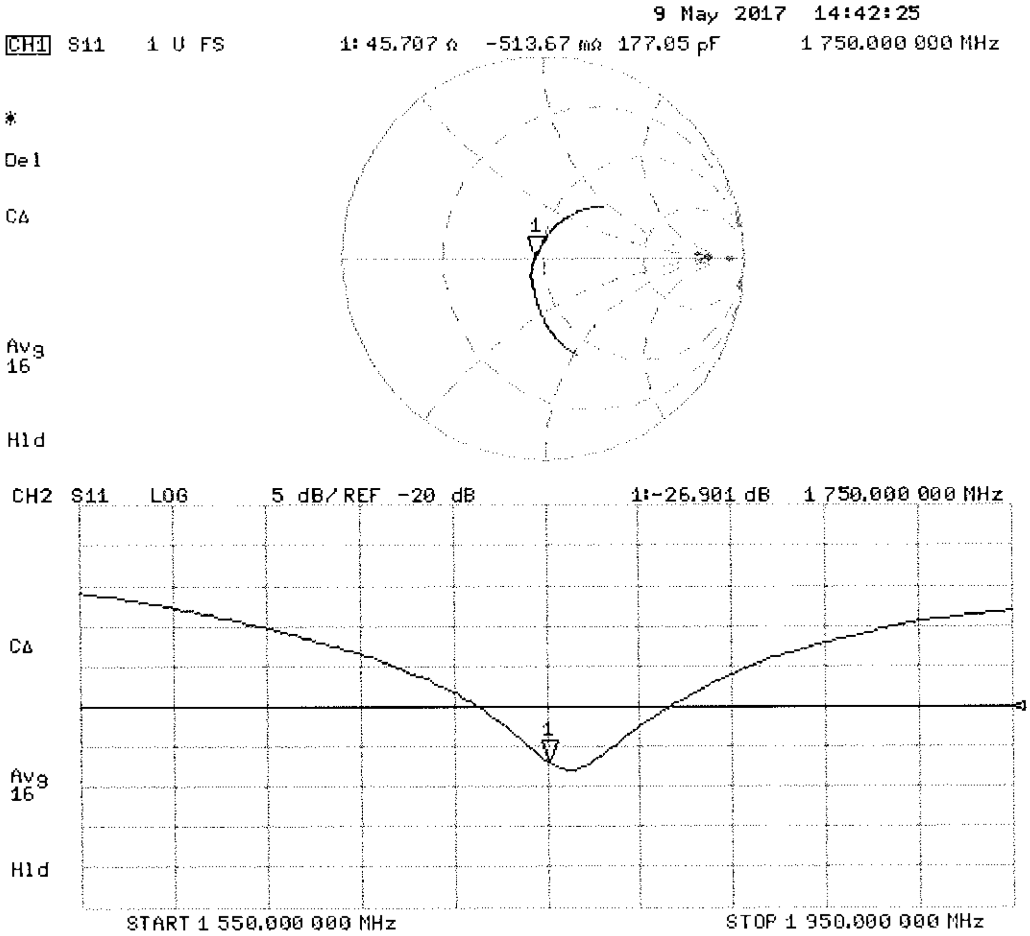
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.49 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 13.1 W/kg



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

Impedance Measurement Plot for Body TSL



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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1750V2-1150_Jul16

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1150
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 14, 2016

√PM 8/9/16
Extended 7/2017 SC ✓

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: July 14, 2016

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.8 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.80 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.2 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	53.4 ± 6 %	1.48 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	9.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**36.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.85 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω + 0.4 jΩ
Return Loss	- 40.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 0.5 jΩ
Return Loss	- 28.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.218 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	April 10, 2015

DASY5 Validation Report for Head TSL

Date: 14.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

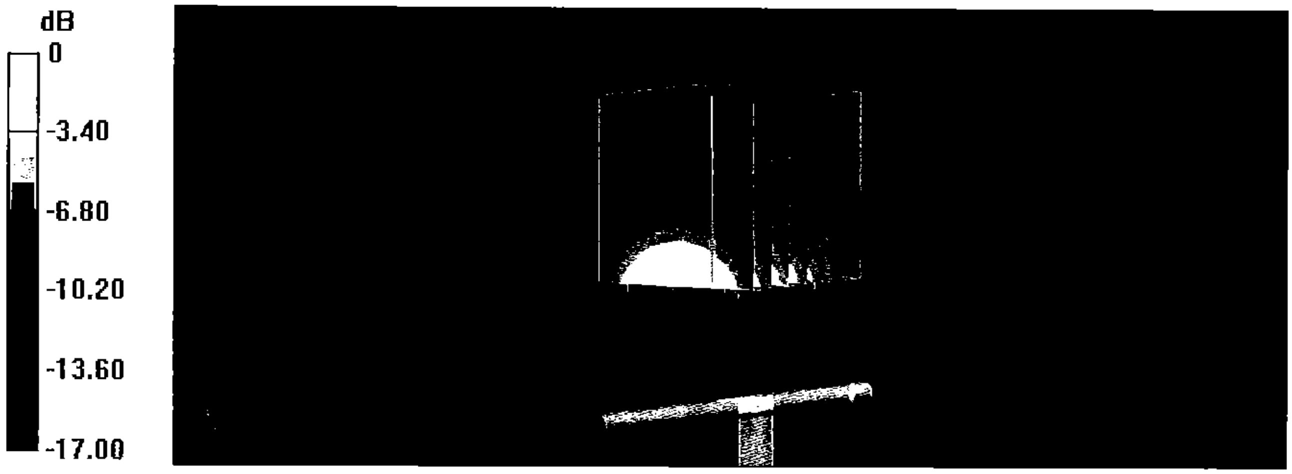
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

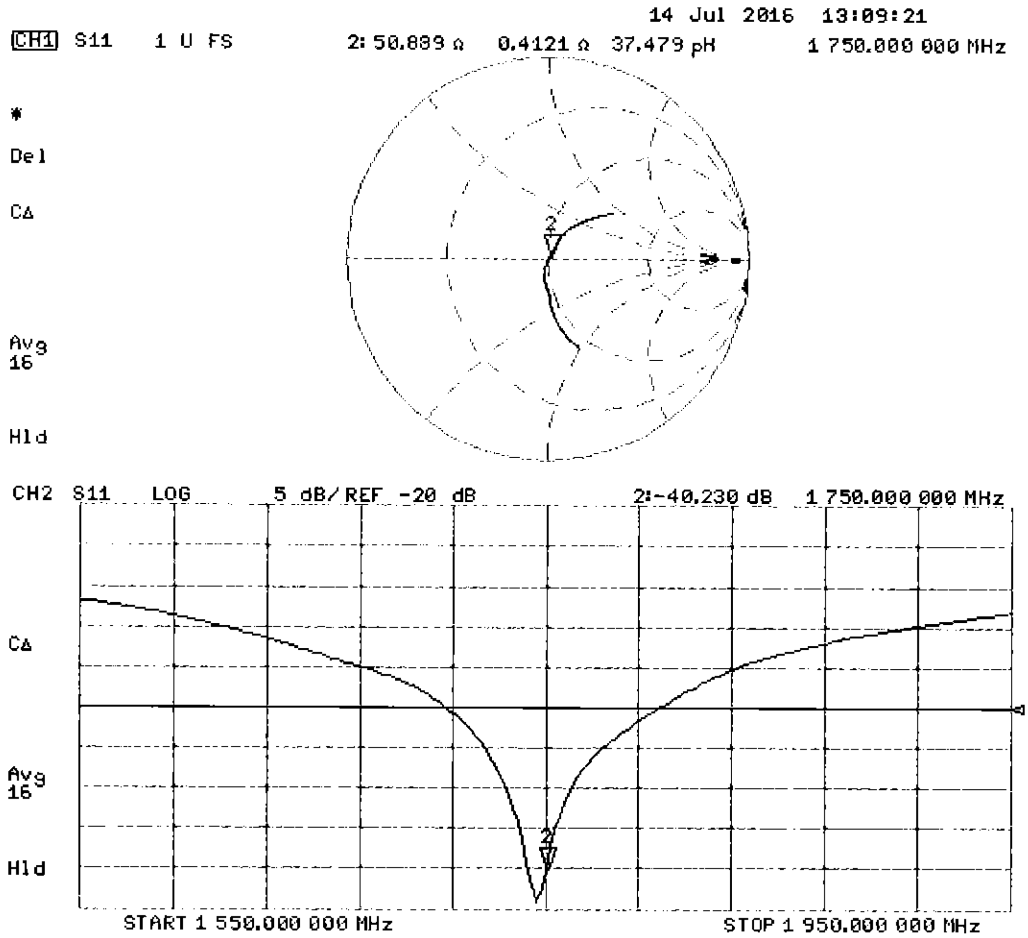
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.4 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 16.6 W/kg
SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.8 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

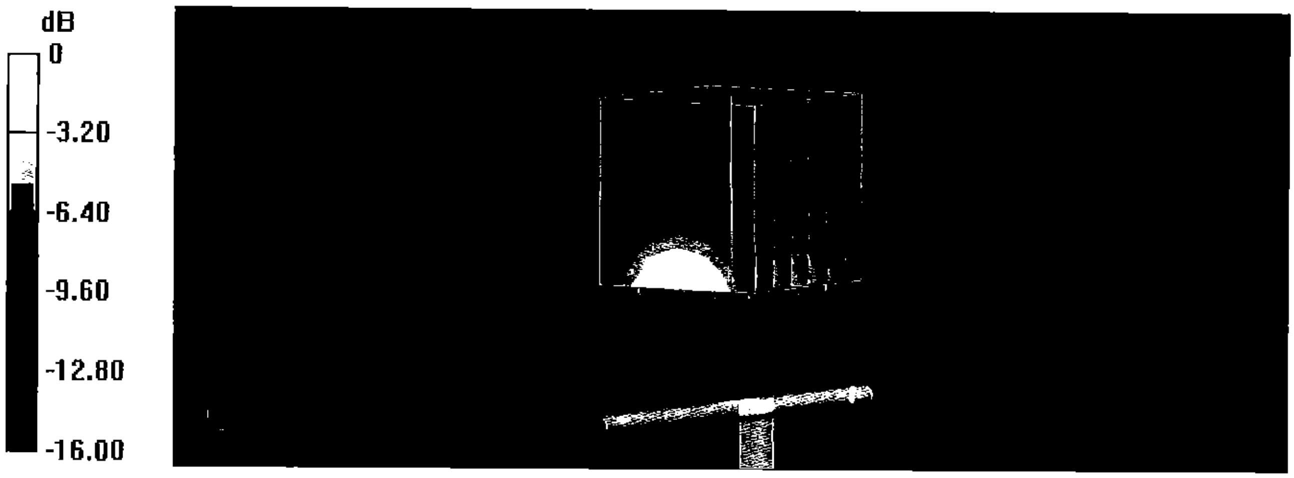
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.48 S/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

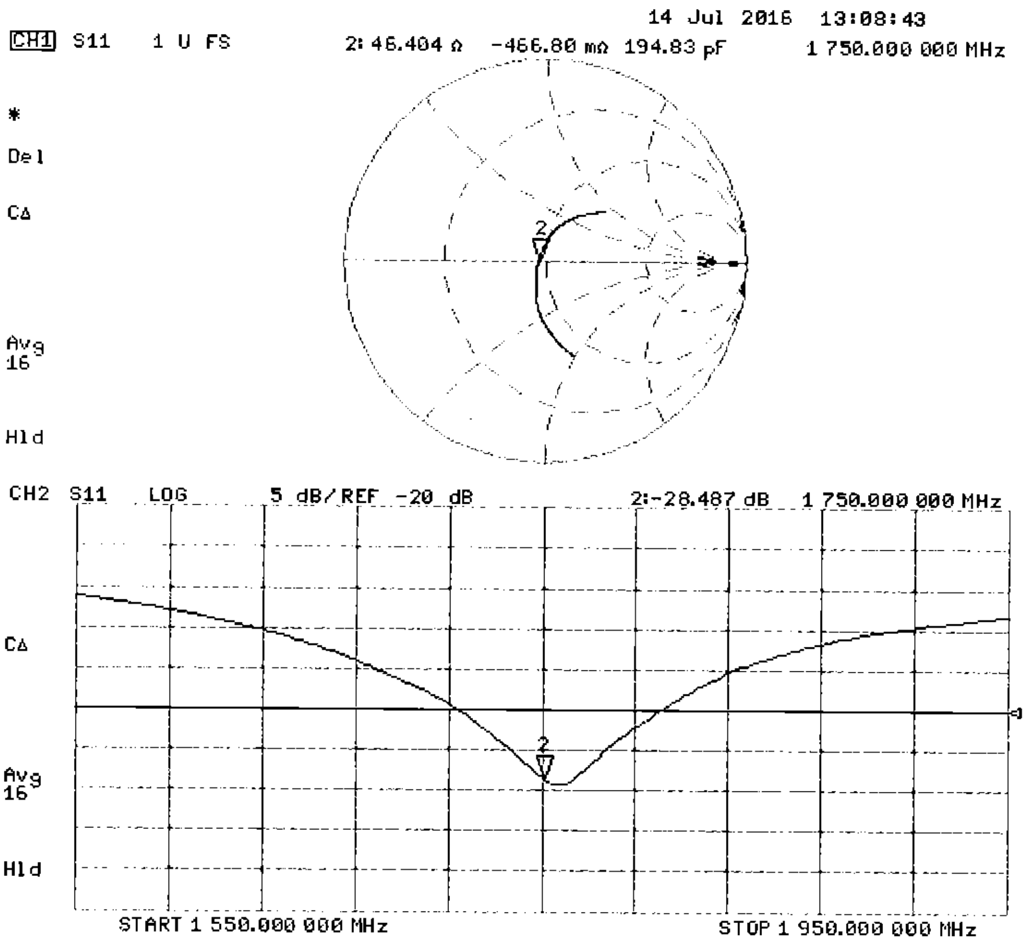
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.4 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.09 W/kg; SAR(10 g) = 4.85 W/kg
Maximum value of SAR (measured) = 13.7 W/kg



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

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1750V2 – SN: 1150

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Calibration date: July 07, 2017

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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
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)	6/1/2017	Annual	6/1/2018	MY53401181
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2017	Annual	3/8/2018	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2017	Annual	3/13/2018	1415
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3209
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3319
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

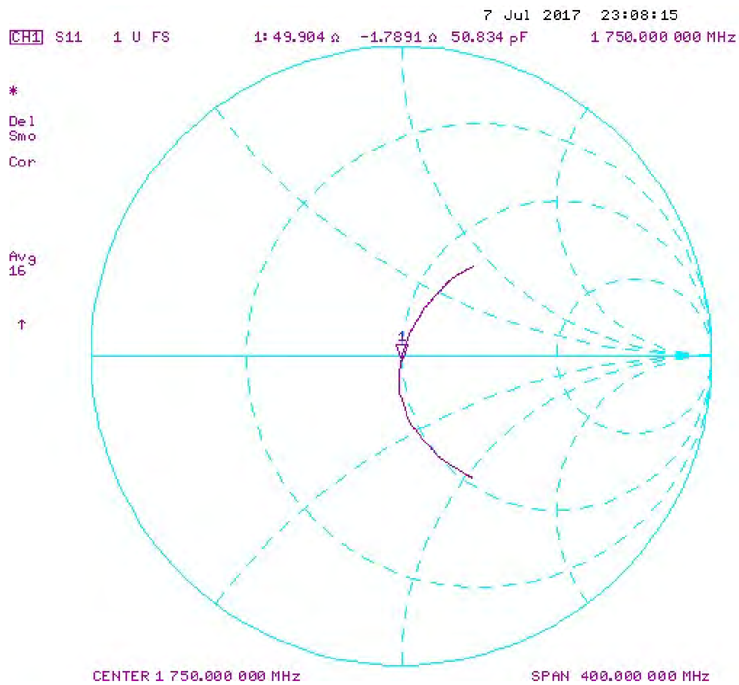
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

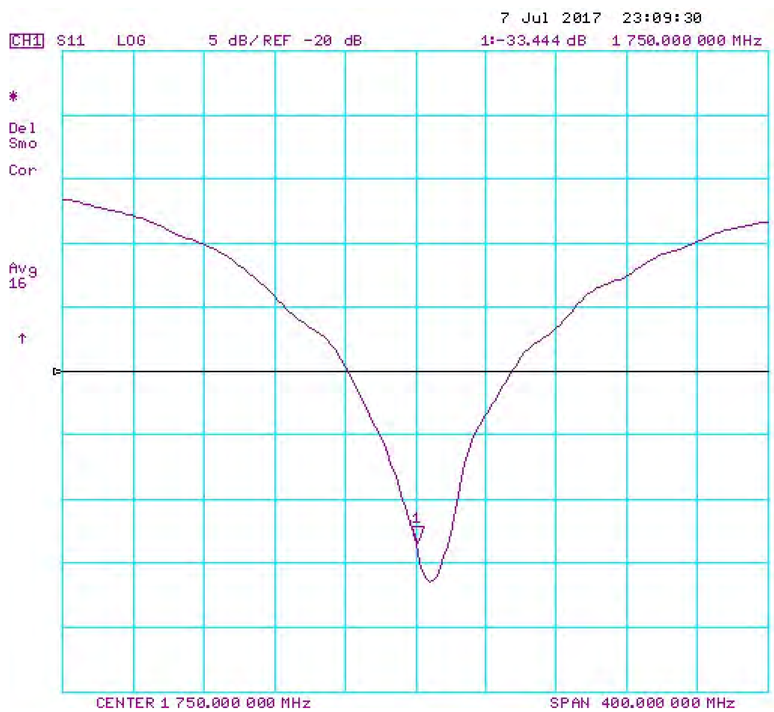
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
7/14/2016	7/7/2017	1.218	3.61	3.57	-1.11%	1.92	1.88	-2.08%	50.9	49.9	1	0.4	-1.8	2.1	-40.2	-33.4	16.90%	PASS

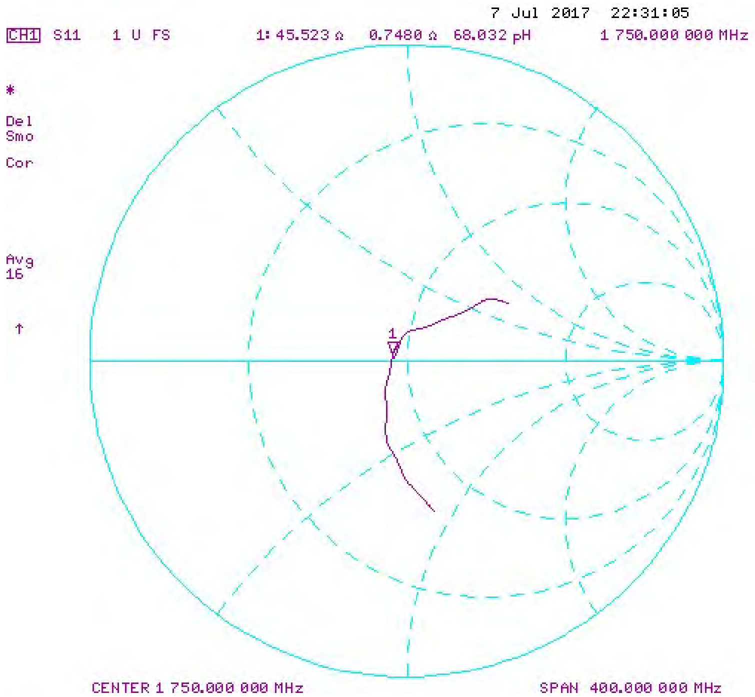
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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
7/14/2016	7/7/2017	1.218	3.65	3.68	0.82%	1.95	1.97	1.03%	46.4	45.5	0.9	-0.5	0.7	1.2	-28.5	-23.6	17.20%	PASS

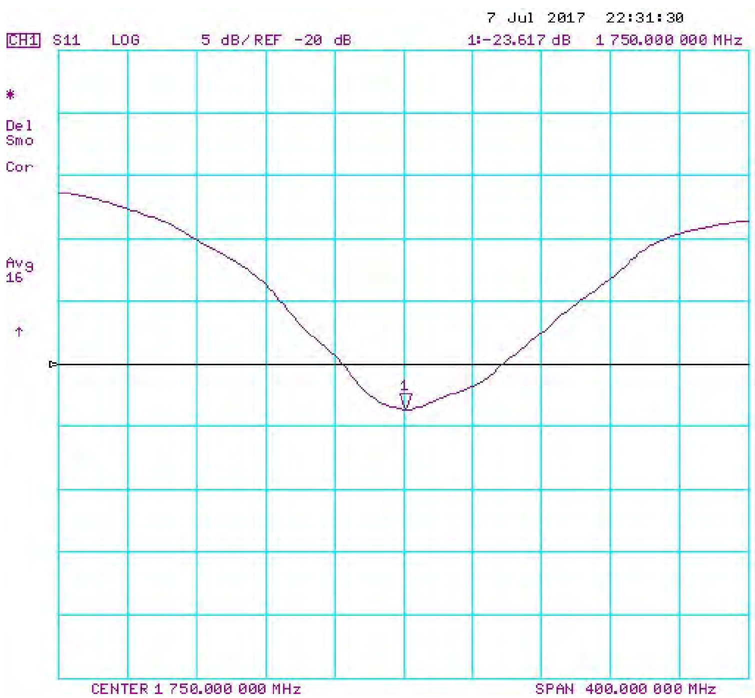
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





Object:	Date Issued:	Page 4 of 4
D1750V2 – SN: 1150	07/07/2017	

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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d148_Feb17**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d148
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	February 09, 2017

BN✓ 03/06/2017

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-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-16)	In house check: Oct-17

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

Issued: February 10, 2017

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.1 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.33 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.1 Ω + 5.8 jΩ
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω + 7.1 jΩ
Return Loss	- 22.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 09.02.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

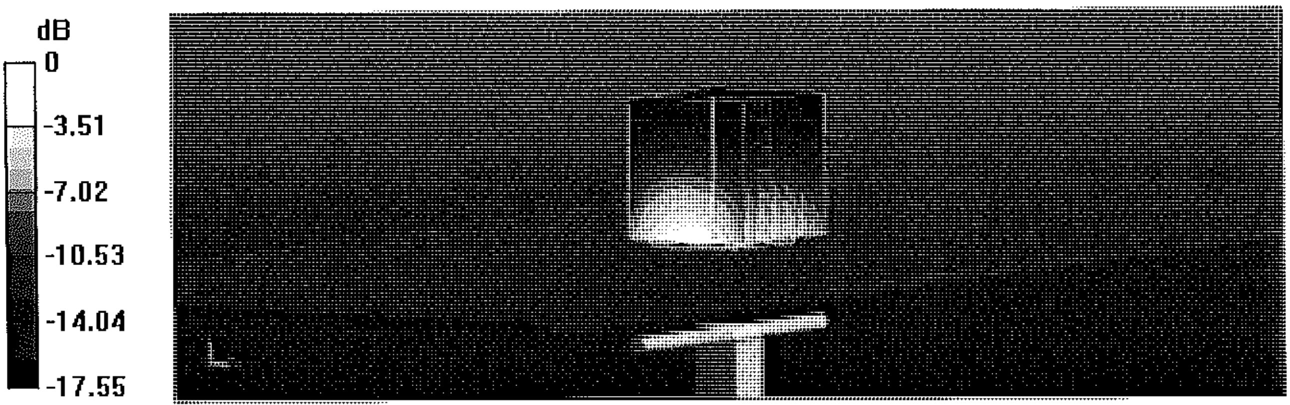
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.12, 8.12, 8.12); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

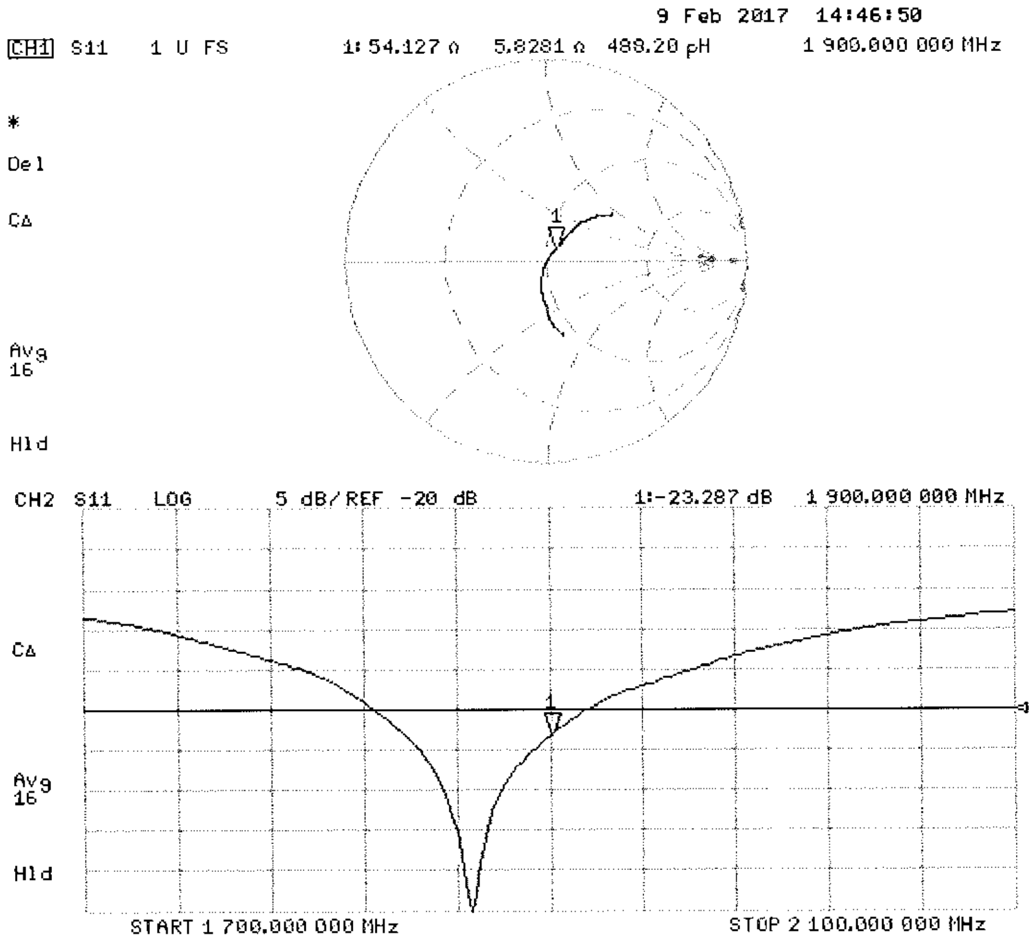
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.8 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 19.2 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



DASY5 Validation Report for Body TSL

Date: 09.02.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

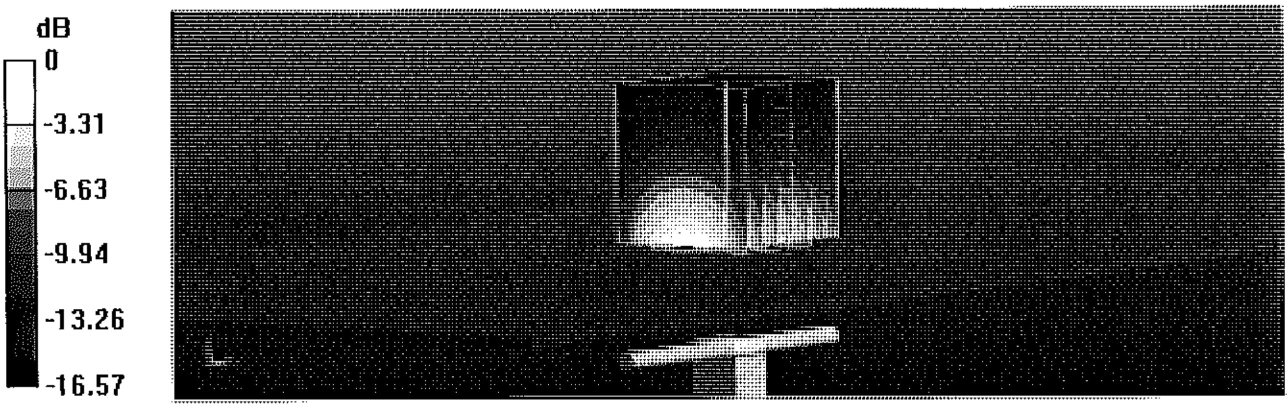
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.5$ S/m; $\varepsilon_r = 54.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

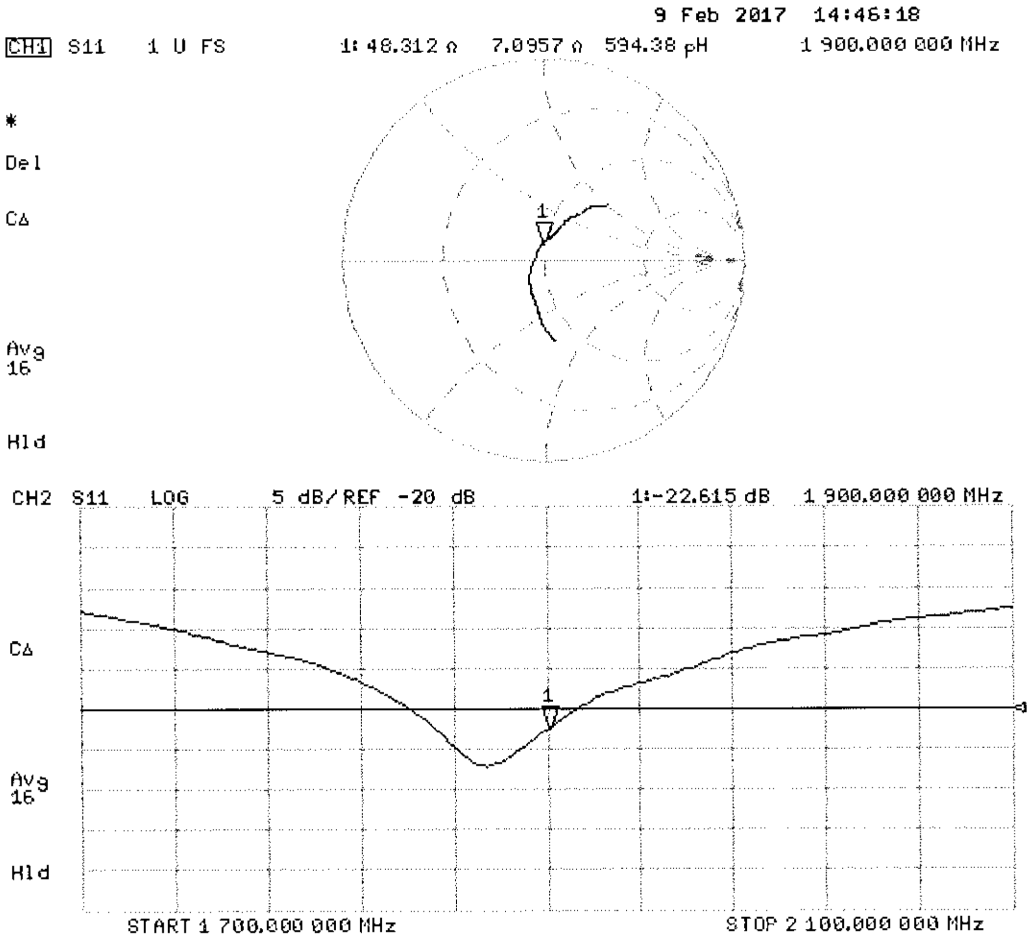
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.3 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 18.1 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.33 W/kg
Maximum value of SAR (measured) = 15.3 W/kg



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2450V2-719_Aug17**

CALIBRATION CERTIFICATE

Object: D2450V2 - SN:719

PM ✓ 8/27/17

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

Calibration date: August 17, 2017

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-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	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: August 17, 2017

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.8 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.9 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.00 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.7 Ω + 7.0 jΩ
Return Loss	- 21.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.4 Ω + 8.1 jΩ
Return Loss	- 21.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 10, 2002

DASY5 Validation Report for Head TSL

Date: 17.08.2017

Test Laboratory: SPEAG, Zurich, Switzerland

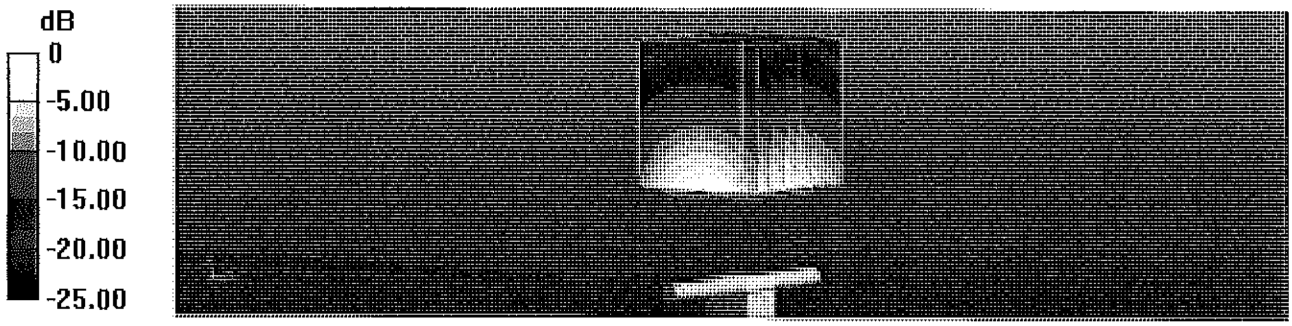
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 719

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma = 1.86$ S/m; $\varepsilon_r = 37.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

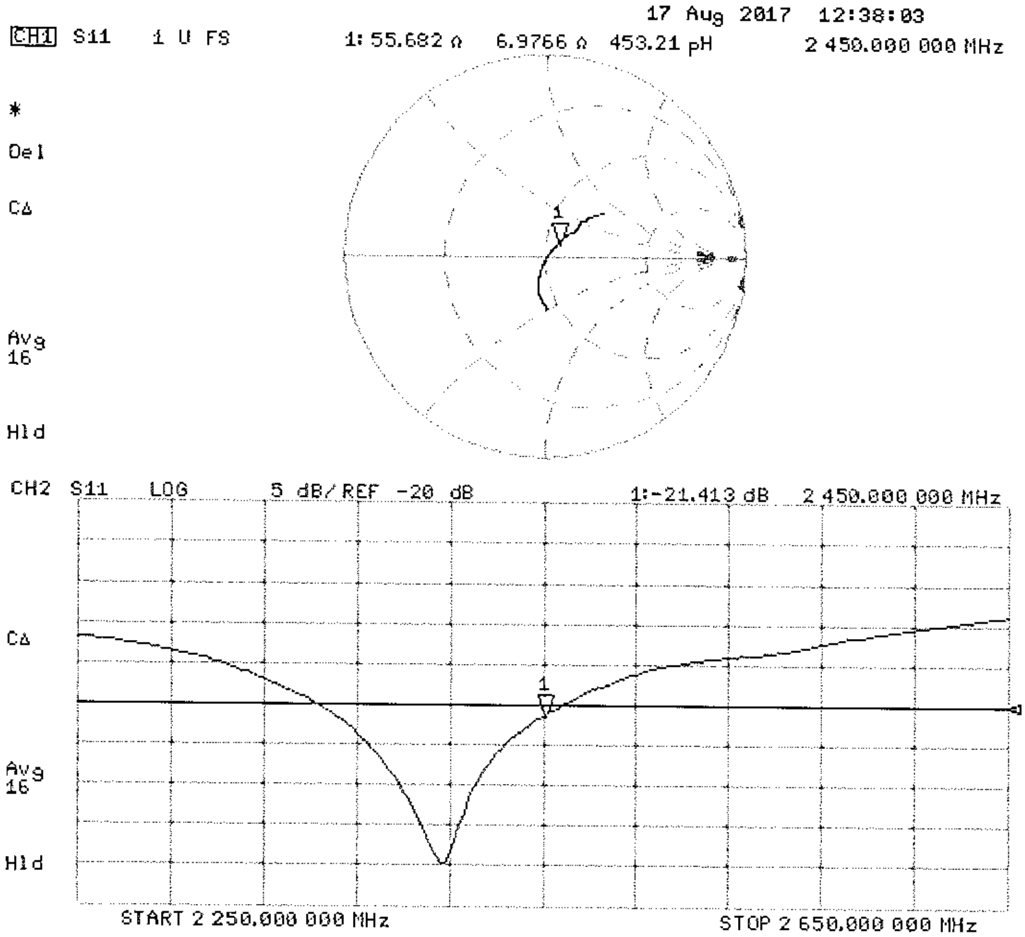
- Probe: EX3DV4 - SN7349; ConvF(8.12, 8.12, 8.12); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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 = 112.8 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.15 W/kg
Maximum value of SAR (measured) = 21.6 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 17.08.2017

Test Laboratory: SPEAG, Zurich, Switzerland

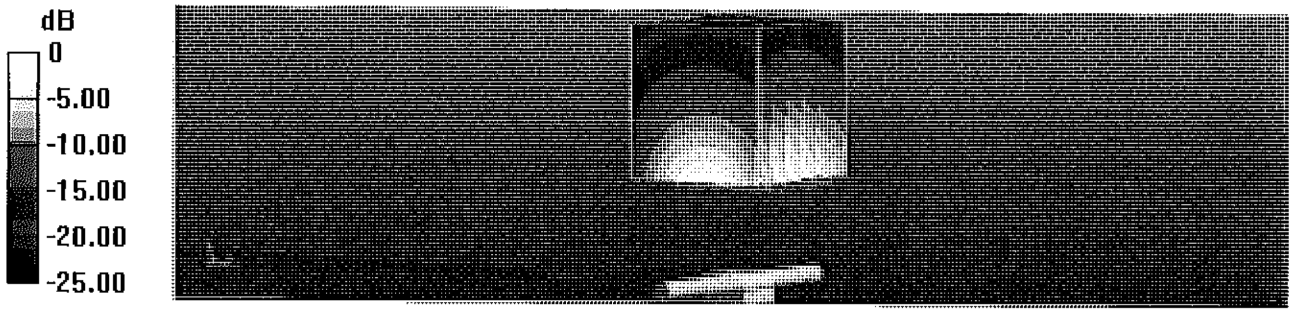
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 719

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

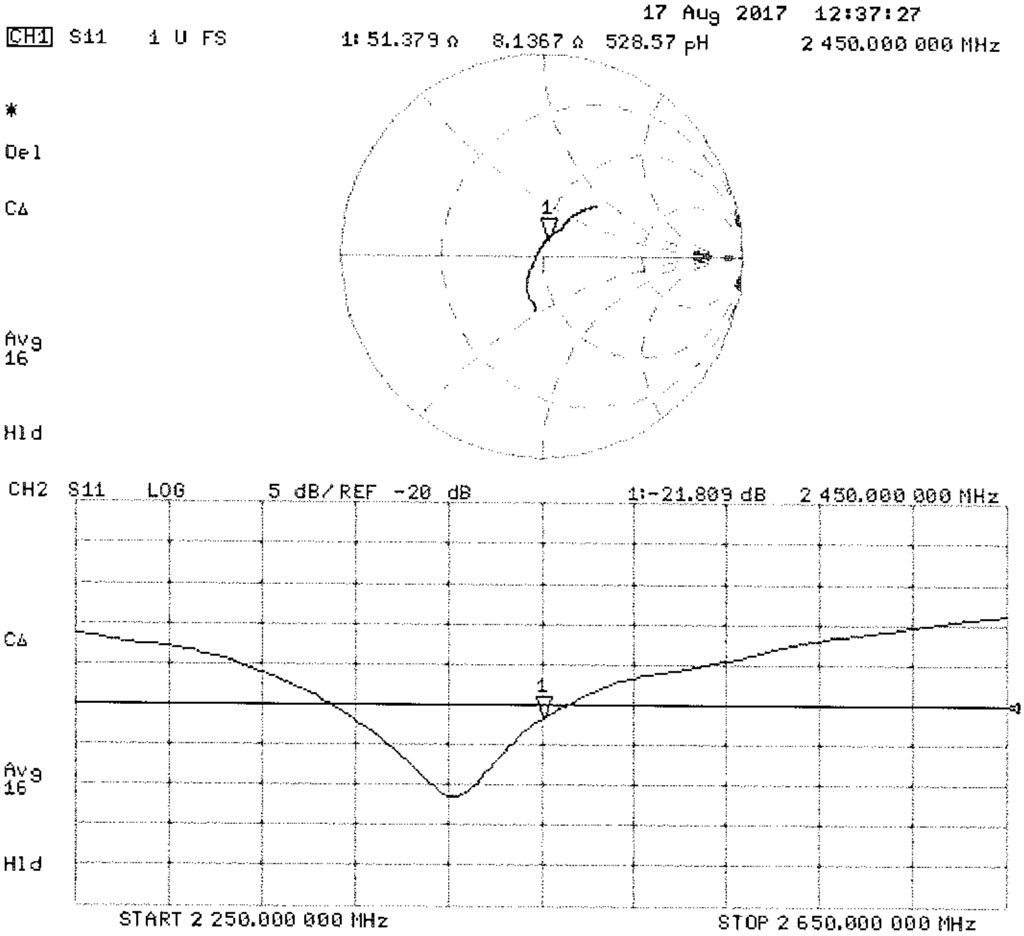
- Probe: EX3DV4 - SN7349; ConvF(8.1, 8.1, 8.1); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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 = 103.0 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 25.2 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 6 W/kg
Maximum value of SAR (measured) = 19.8 W/kg



0 dB = 19.8 W/kg = 12.97 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2600V2-1004_Apr17**

CALIBRATION CERTIFICATE

Object	D2600V2 - SN:1004
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 13, 2017

BNV
5-3-2017

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-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	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: April 18, 2017

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.1 ± 6 %	2.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	2.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**55.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.5 Ω - 5.9 jΩ
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.7 Ω - 4.9 jΩ
Return Loss	- 22.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 23, 2006

DASY5 Validation Report for Head TSL

Date: 13.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004

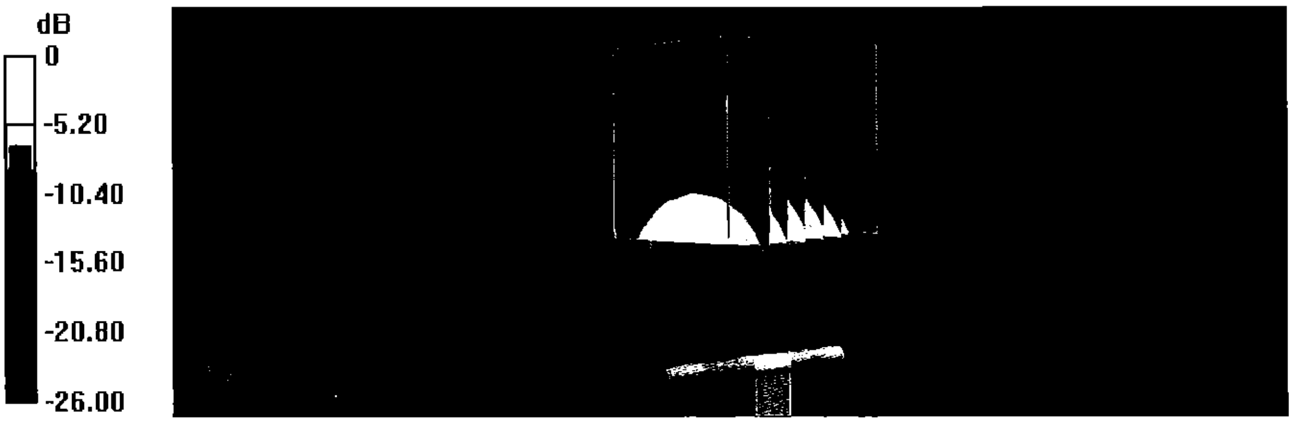
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.03 S/m; ε_r = 37.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.56, 7.56, 7.56); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

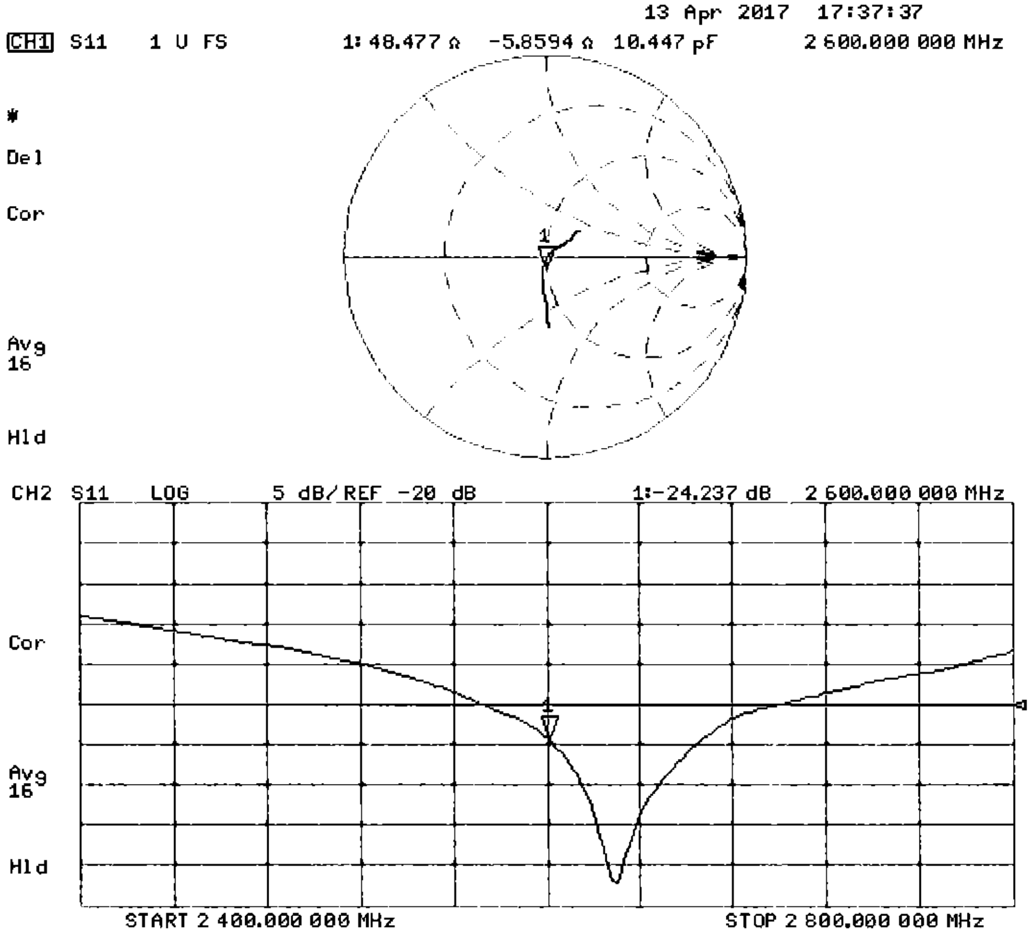
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.4 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.54 W/kg
Maximum value of SAR (measured) = 24.6 W/kg



0 dB = 24.6 W/kg = 13.91 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1004

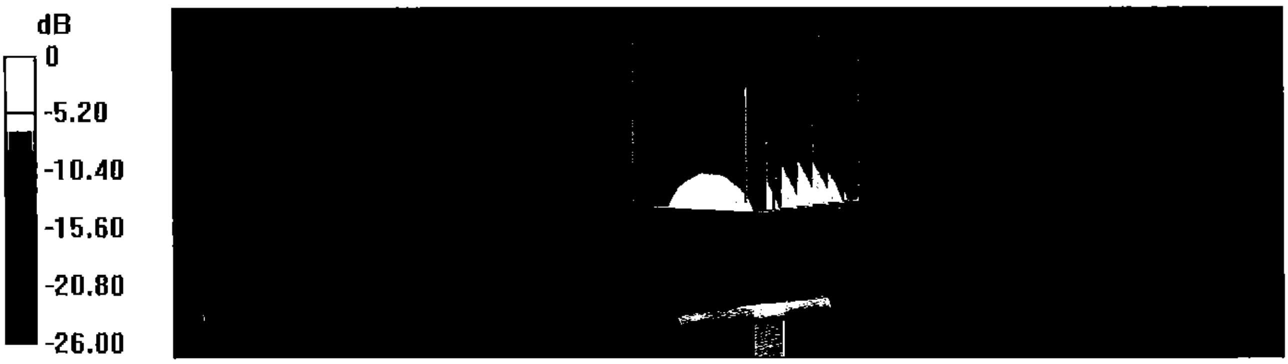
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.21 S/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.48, 7.48, 7.48); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

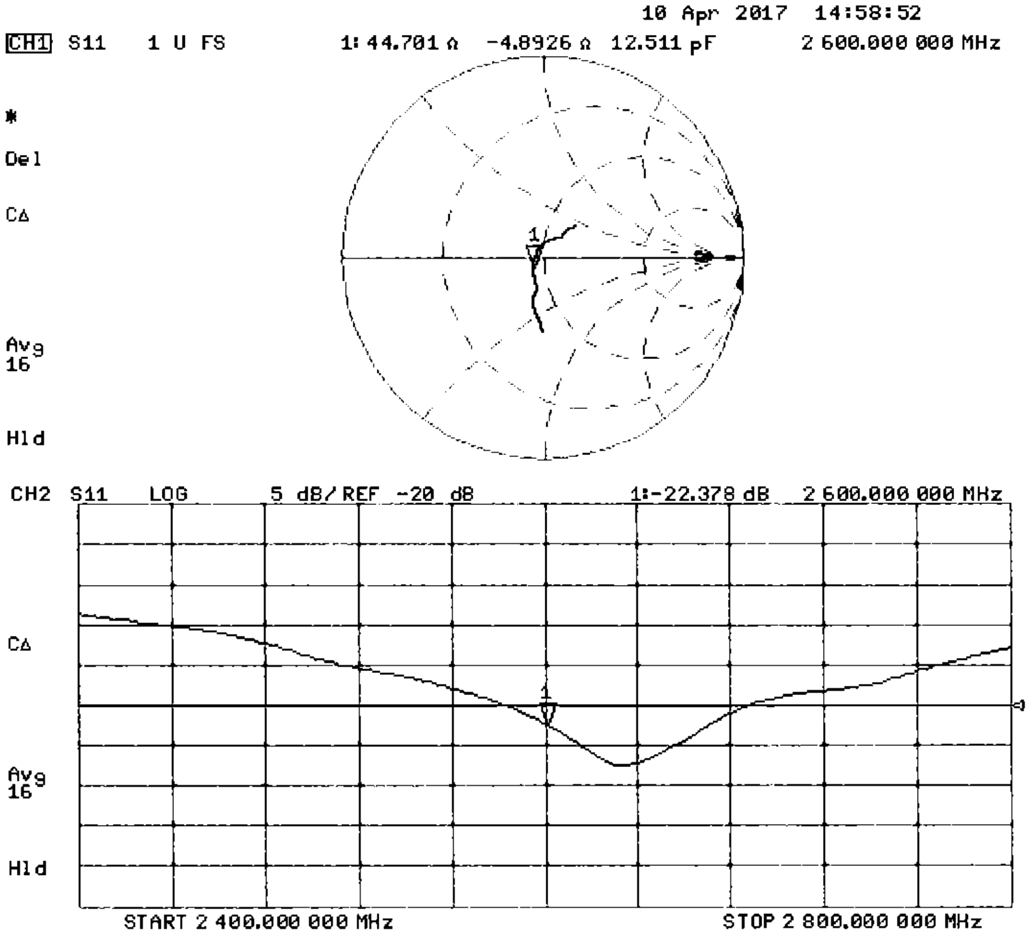
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.3 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 14 W/kg; SAR(10 g) = 6.26 W/kg
Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1237_Aug17**

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN:1237

Calibration procedure(s): QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

PM ✓ 8/27/17

Calibration date: August 15, 2017

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-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: 3503	31-Dec-16 (No. EX3-3503_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: August 16, 2017

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.49 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.0 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.5 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.5 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	4.99 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.46 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.75 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.4 ± 6 %	5.93 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.91 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**78.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.13 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.77 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	49.9 Ω - 5.3 jΩ
Return Loss	- 25.5 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	51.9 Ω + 2.3 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	55.6 Ω - 0.5 jΩ
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	46.9 Ω - 4.2 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	50.2 Ω + 3.0 jΩ
Return Loss	- 30.4 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	53.4 Ω + 0.2 jΩ
Return Loss	- 29.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 04, 2015

DASY5 Validation Report for Head TSL

Date: 15.08.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1237

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.49 S/m; ε_r = 34.7; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.84 S/m; ε_r = 34.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 4.99 S/m; ε_r = 34; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

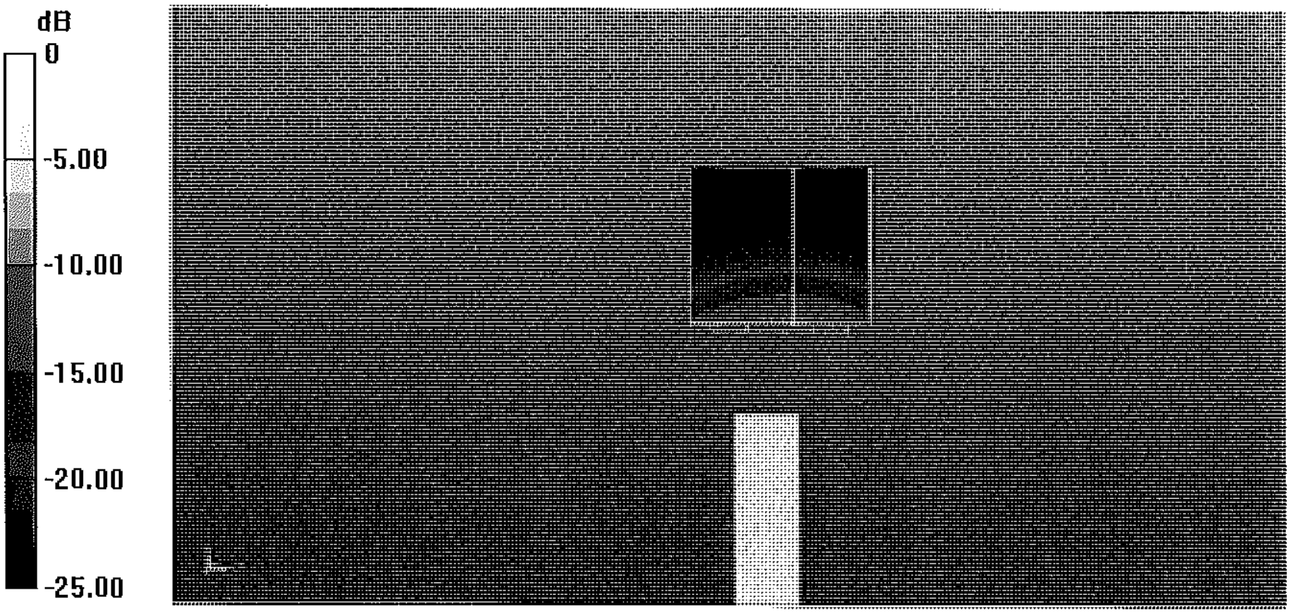
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.58, 5.58, 5.58); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.02, 5.02, 5.02); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.08 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.2 W/kg

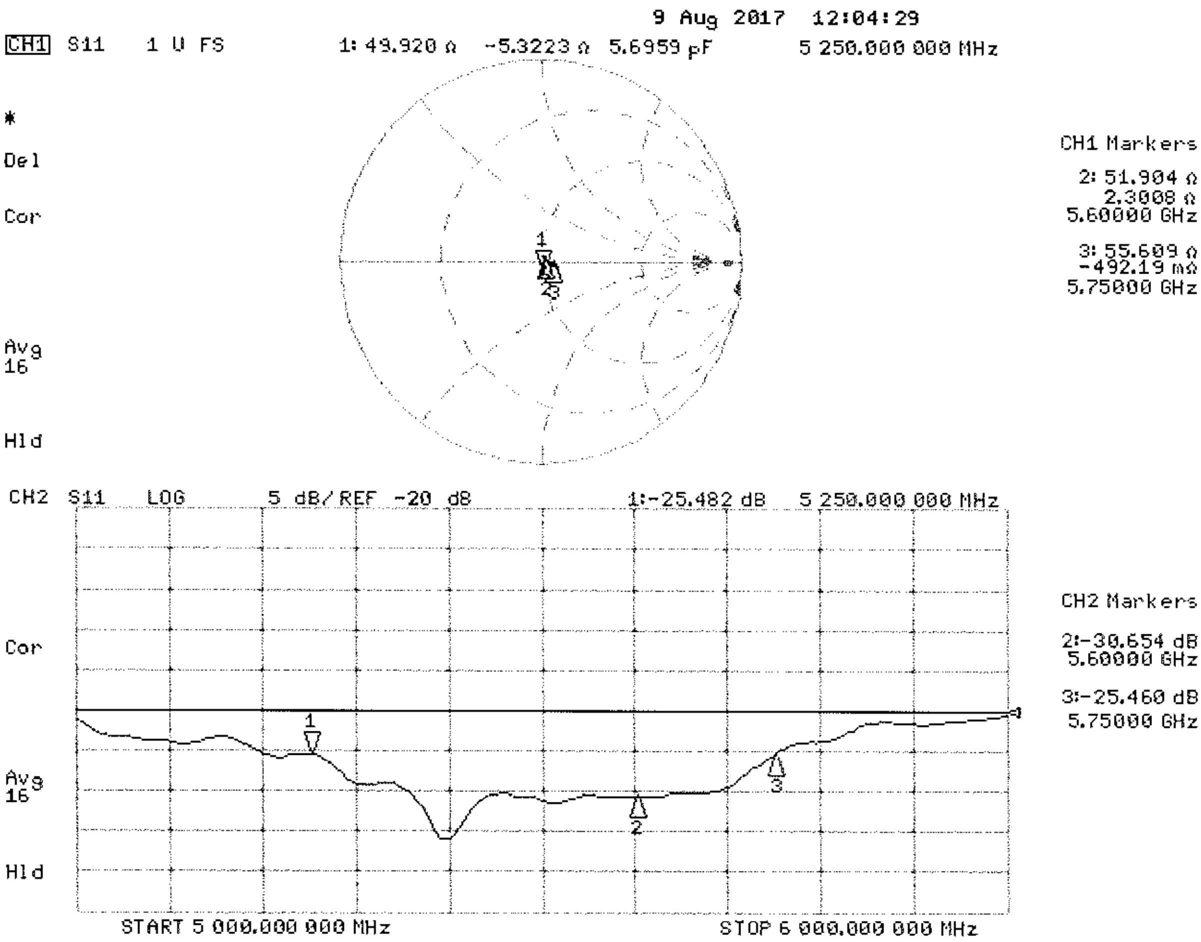
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.04 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 8.33 W/kg; SAR(10 g) = 2.38 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.11 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.08.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1237

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.46 S/m; ε_r = 47; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 5.93 S/m; ε_r = 46.4; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 6.13 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

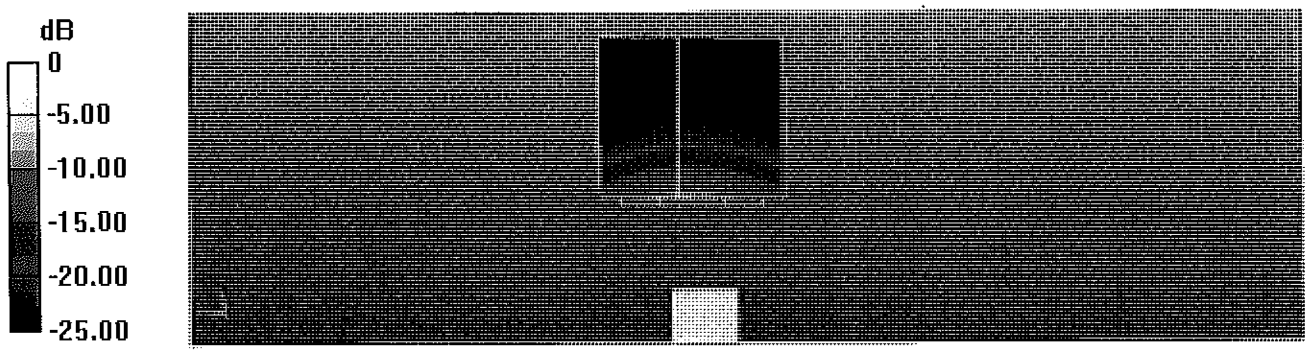
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.14, 5.14, 5.14); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.51, 4.51, 4.51); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.87 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 29.9 W/kg
SAR(1 g) = 7.75 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 18.4 W/kg

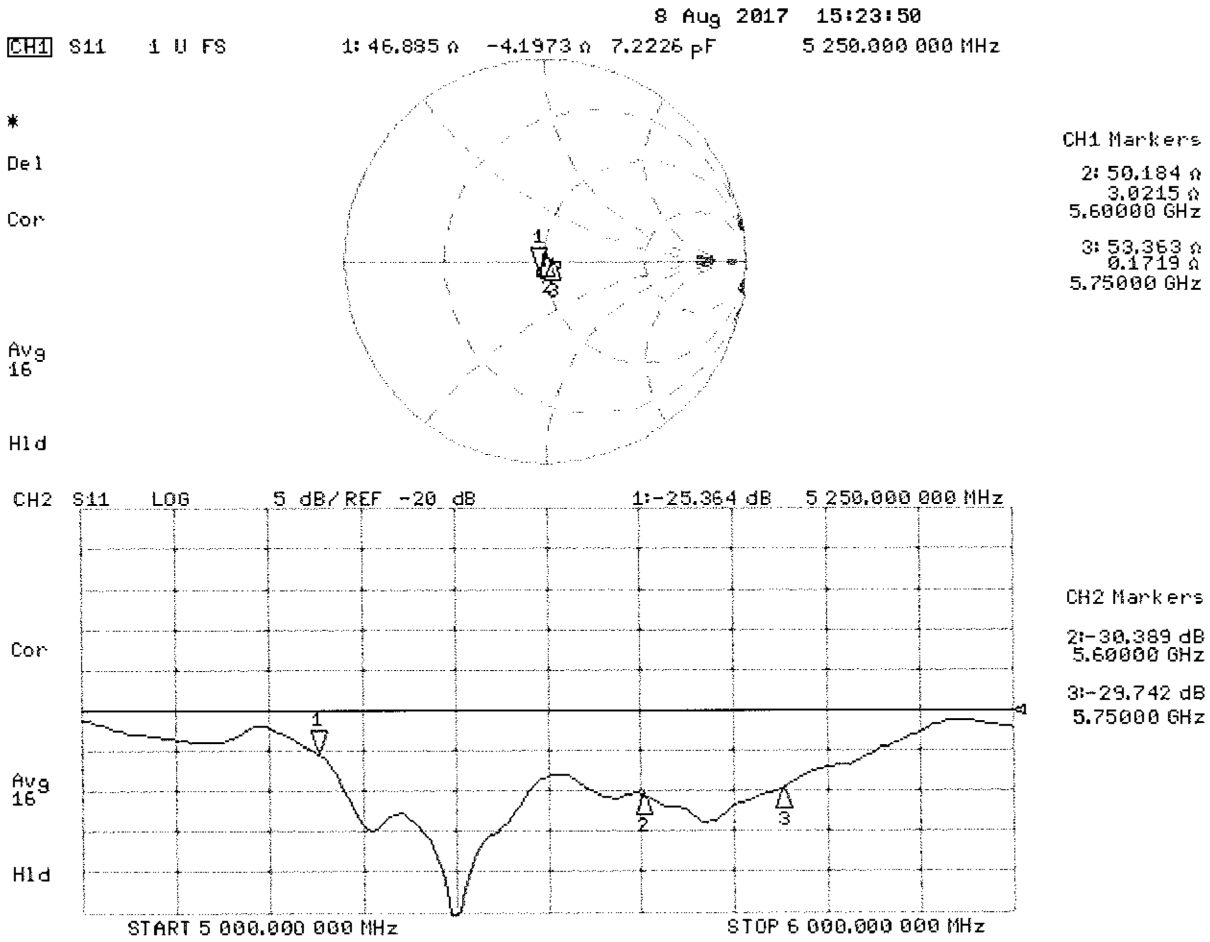
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.11 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.64 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 33.8 W/kg
SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 19.1 W/kg



0 dB = 18.4 W/kg = 12.65 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1054_Mar17

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1054
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	March 07, 2017

BNV
03-27-2017

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-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-16)	In house check: Oct-17

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

Issued: March 14, 2017

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.37 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.50 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	54.6 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.61 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.68 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.7 Ω - 0.7 jΩ
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω - 3.6 jΩ
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 08, 2011

DASY5 Validation Report for Head TSL

Date: 07.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

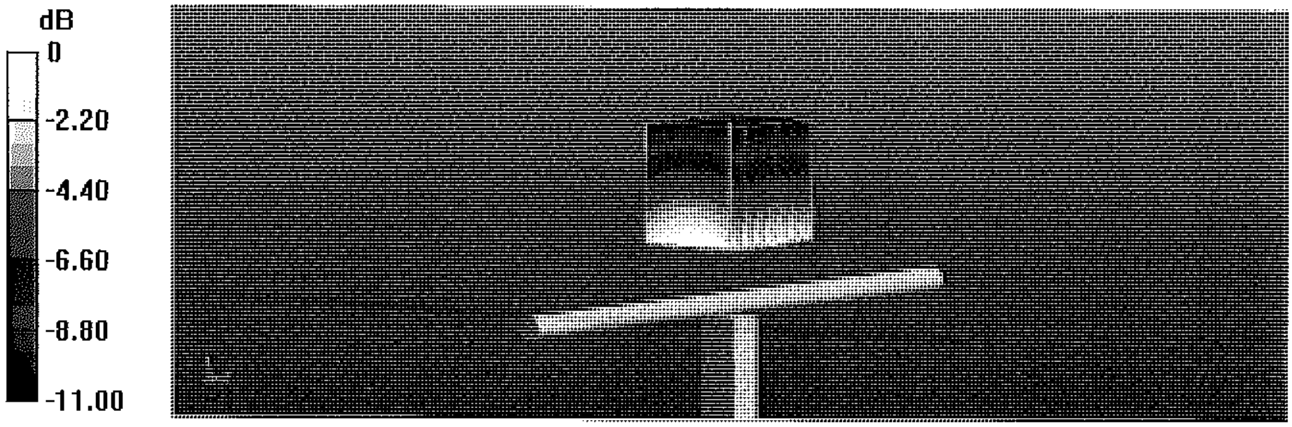
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.17, 10.17, 10.17); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

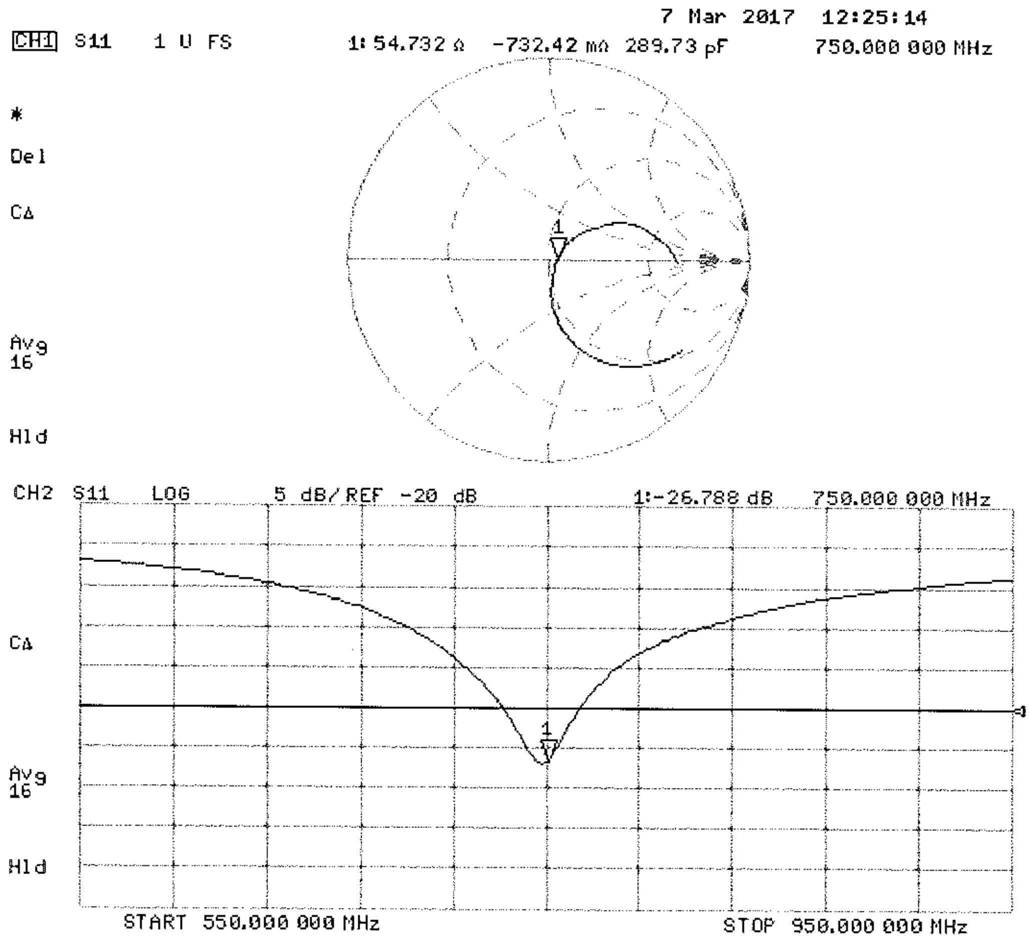
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.71 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.21 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

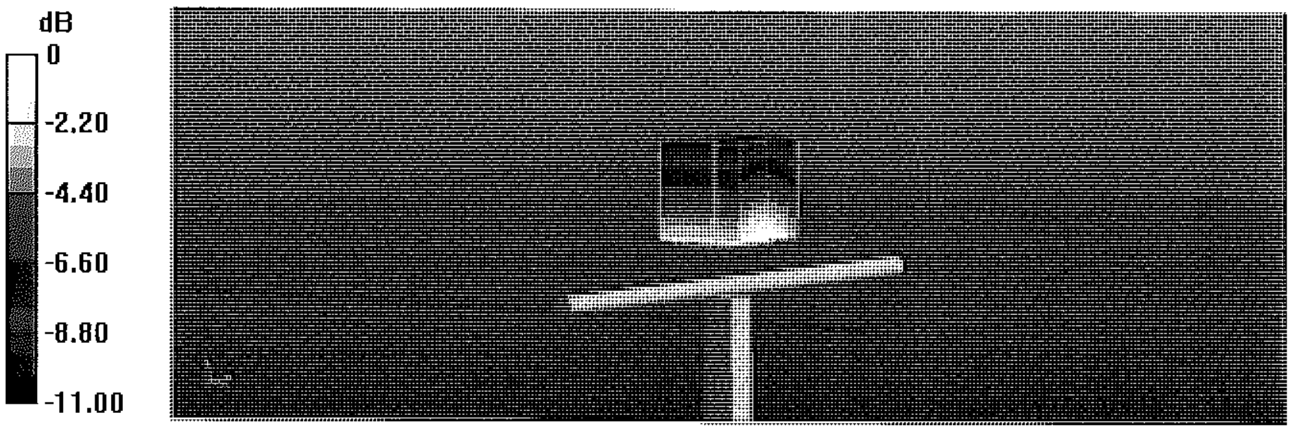
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

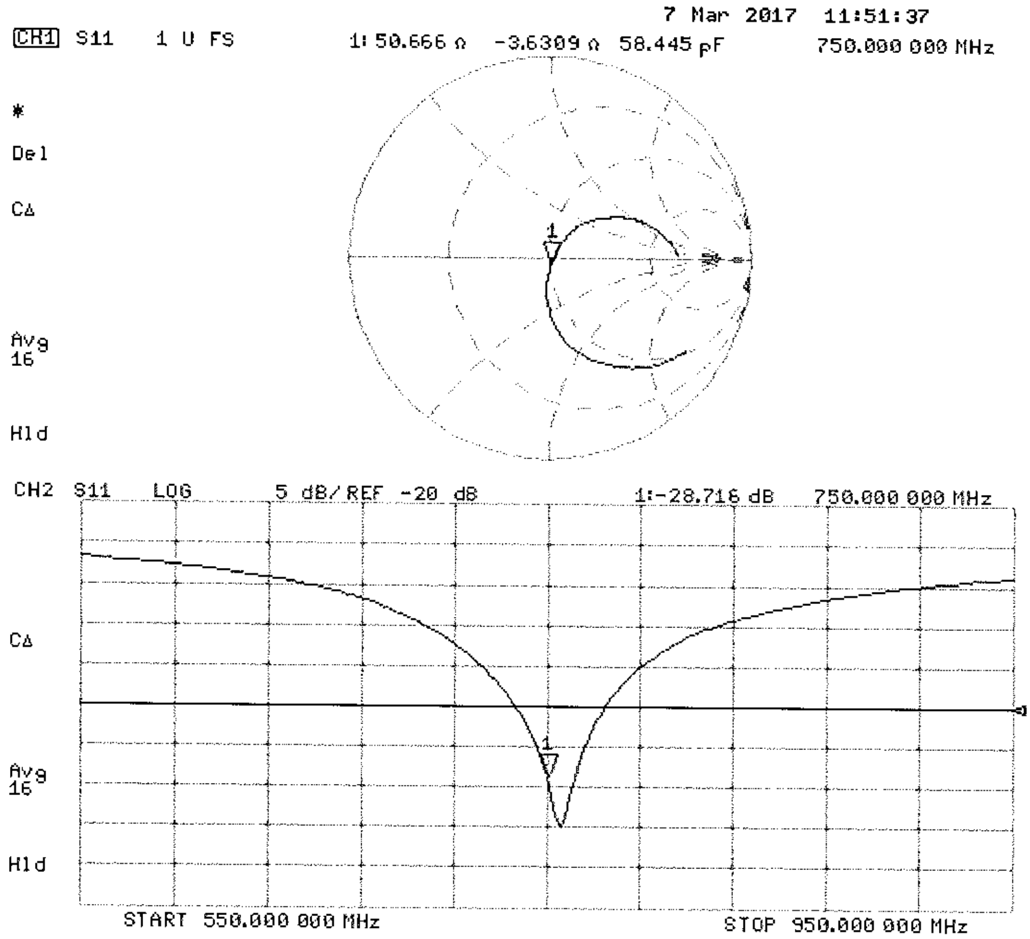
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.88 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.31 W/kg
SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.45 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



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

Impedance Measurement Plot for Body TSL



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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D835V2-4d133_Jul17**

CALIBRATION CERTIFICATE

Object D835V2 - SN:4d133

BN ✓ 8/3/2017

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

Calibration date: July 11, 2017

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-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	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: July 12, 2017

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 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	40.8 ± 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	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.52 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	54.8 ± 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	2.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.41 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.16 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 Ω - 2.9 jΩ
Return Loss	- 30.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 6.8 jΩ
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.196 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: 11.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

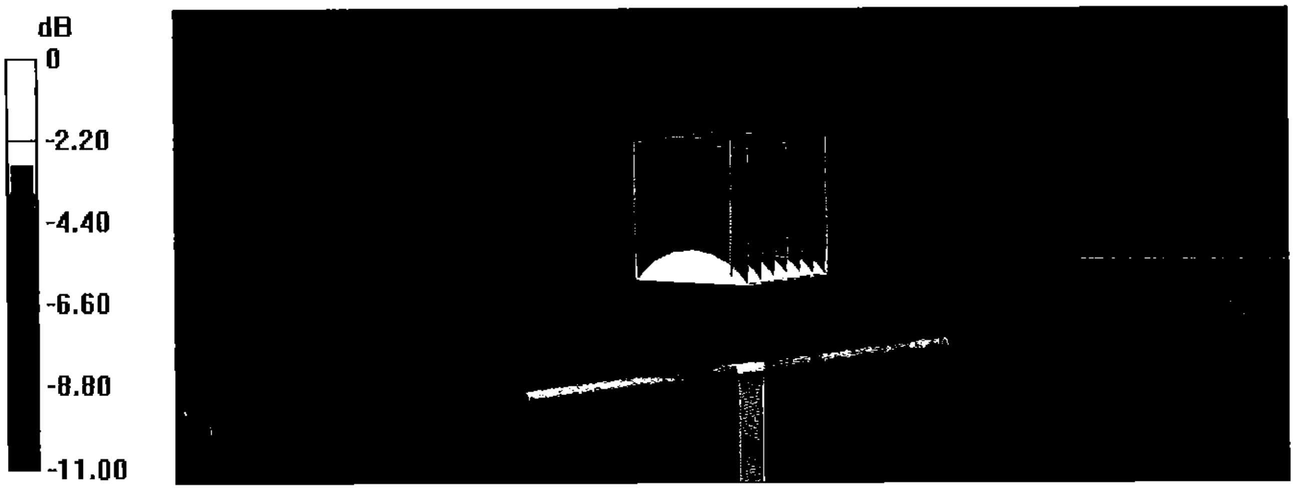
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 40.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

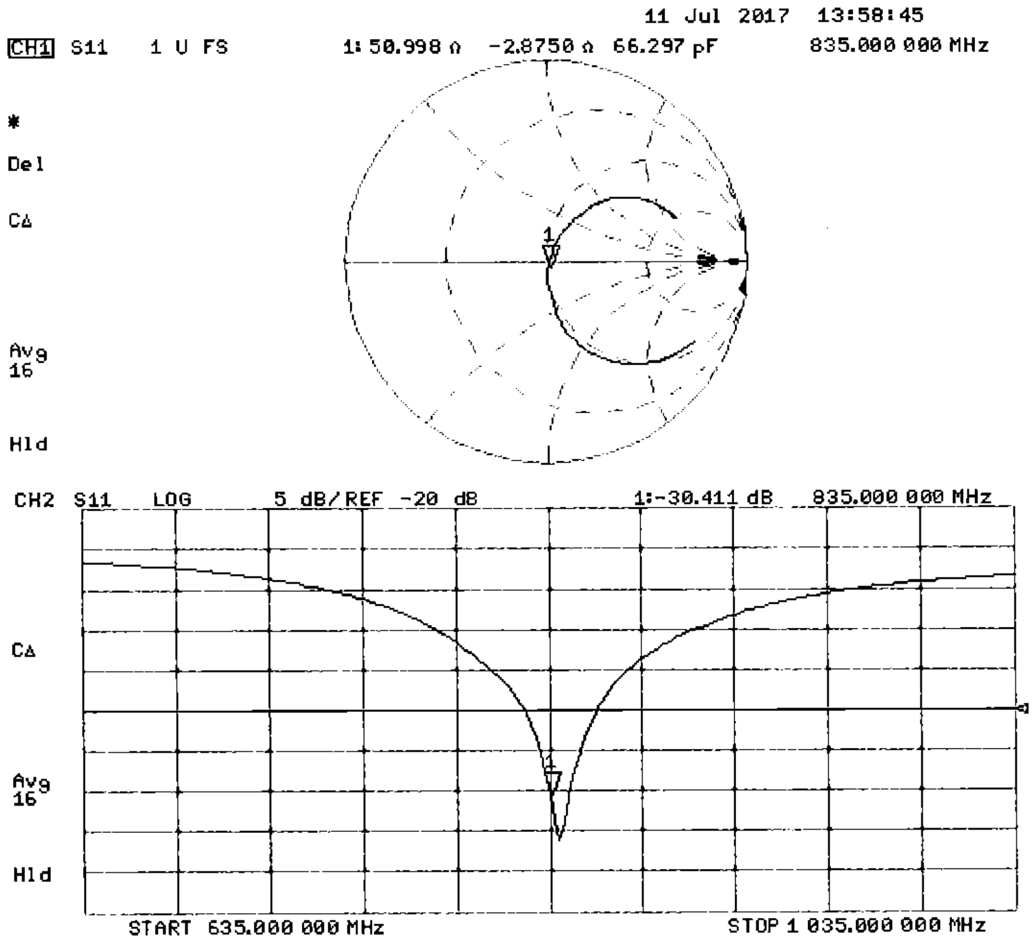
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.84 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.74 W/kg
SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.54 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 11.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

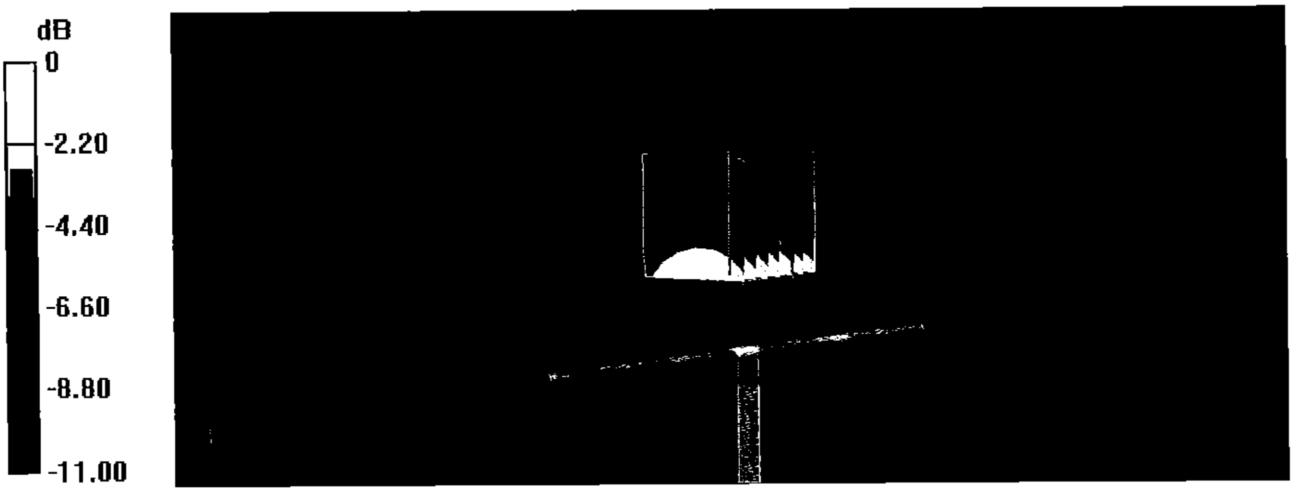
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.2, 10.2, 10.2); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

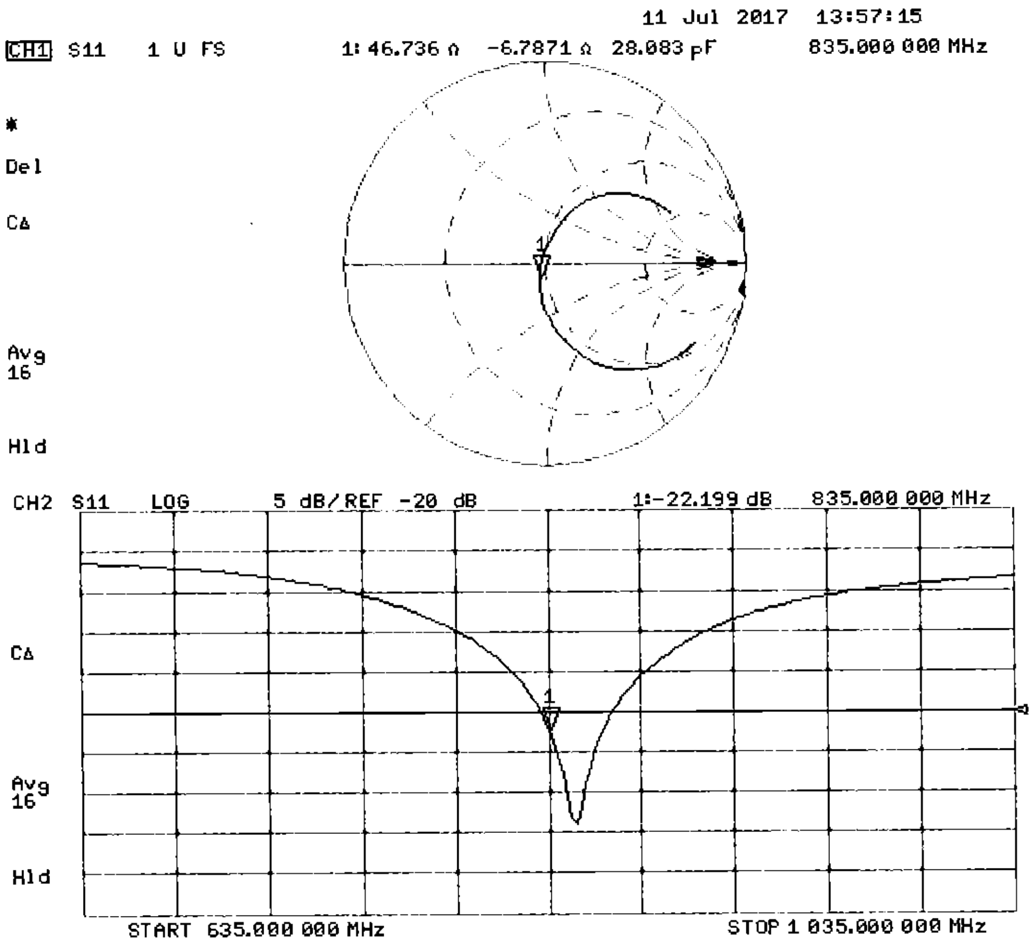
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.25 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.58 W/kg
Maximum value of SAR (measured) = 3.21 W/kg



0 dB = 3.21 W/kg = 5.07 dBW/kg

Impedance Measurement Plot for Body TSL



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Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1900V2-5d149_Jul17

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d149
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 11, 2017

BN
8/3/2017

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-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	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: July 12, 2017

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	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	40.7 ± 6 %	1.39 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	9.82 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.8 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	54.1 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.28 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω + 5.3 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.4 Ω + 7.3 jΩ
Return Loss	- 22.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.196 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 11.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

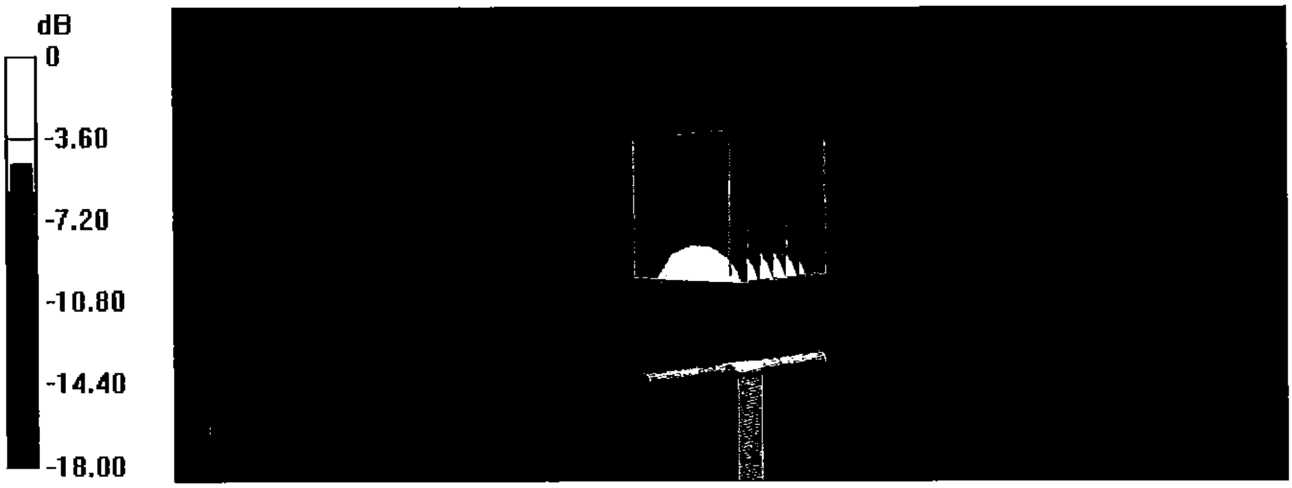
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.39$ S/m; $\varepsilon_r = 40.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

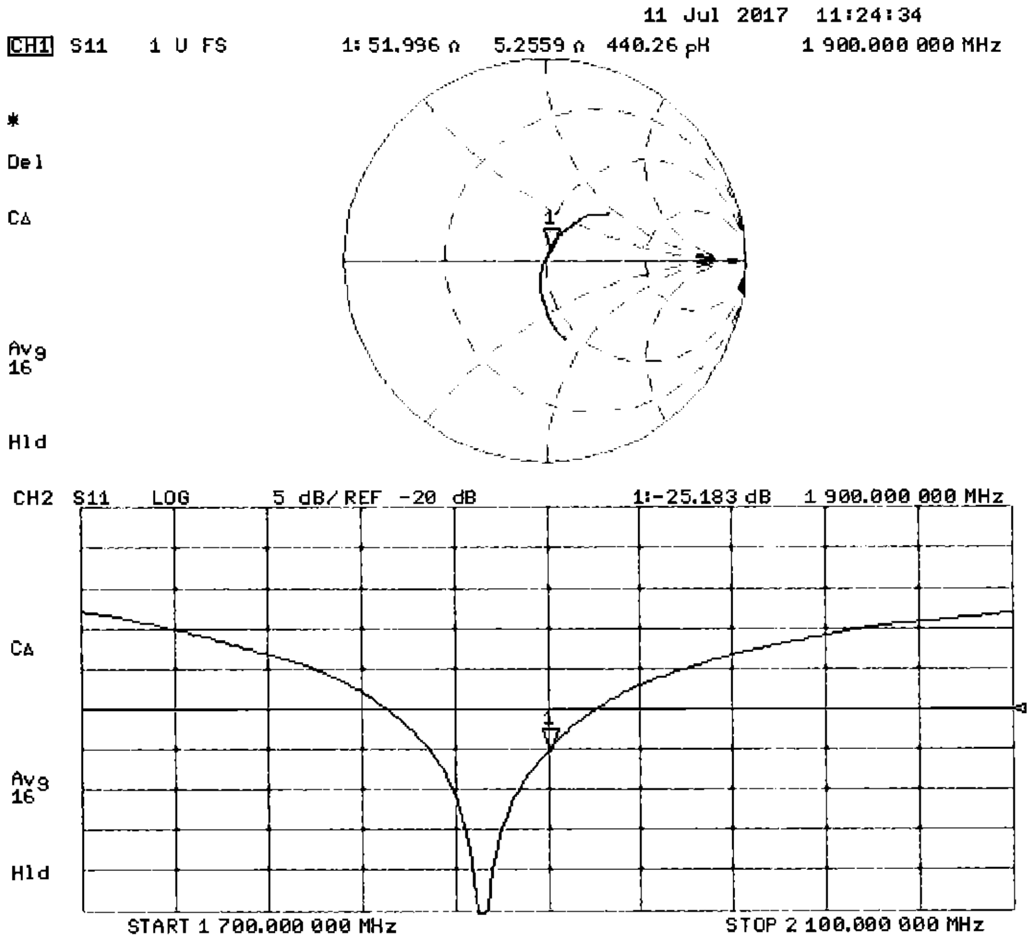
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.6 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 9.82 W/kg; SAR(10 g) = 5.17 W/kg
Maximum value of SAR (measured) = 14.7 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

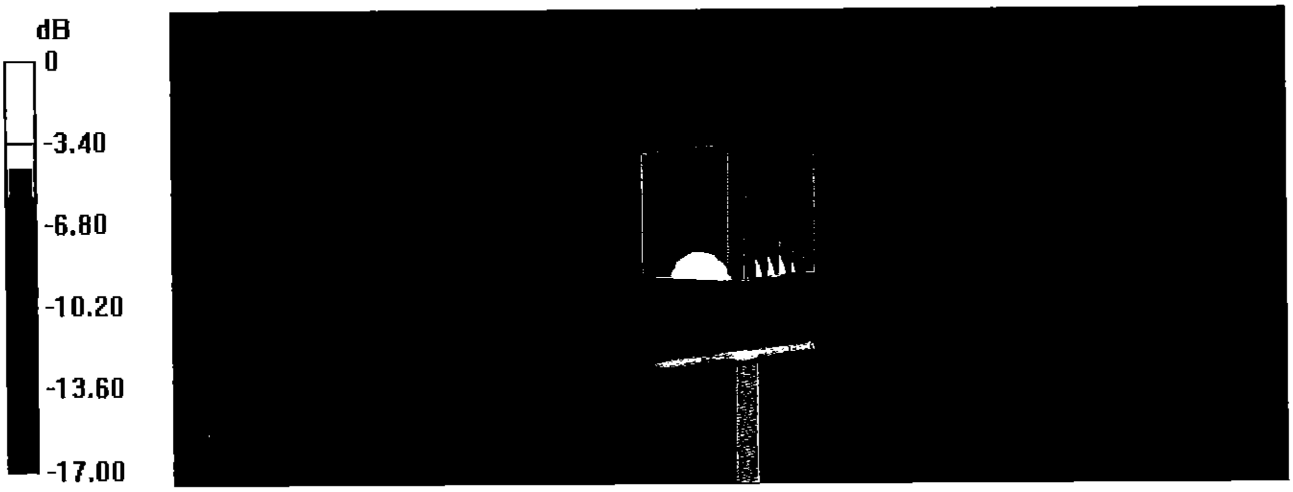
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.5 S/m; ε_r = 54.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.2, 8.2, 8.2); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

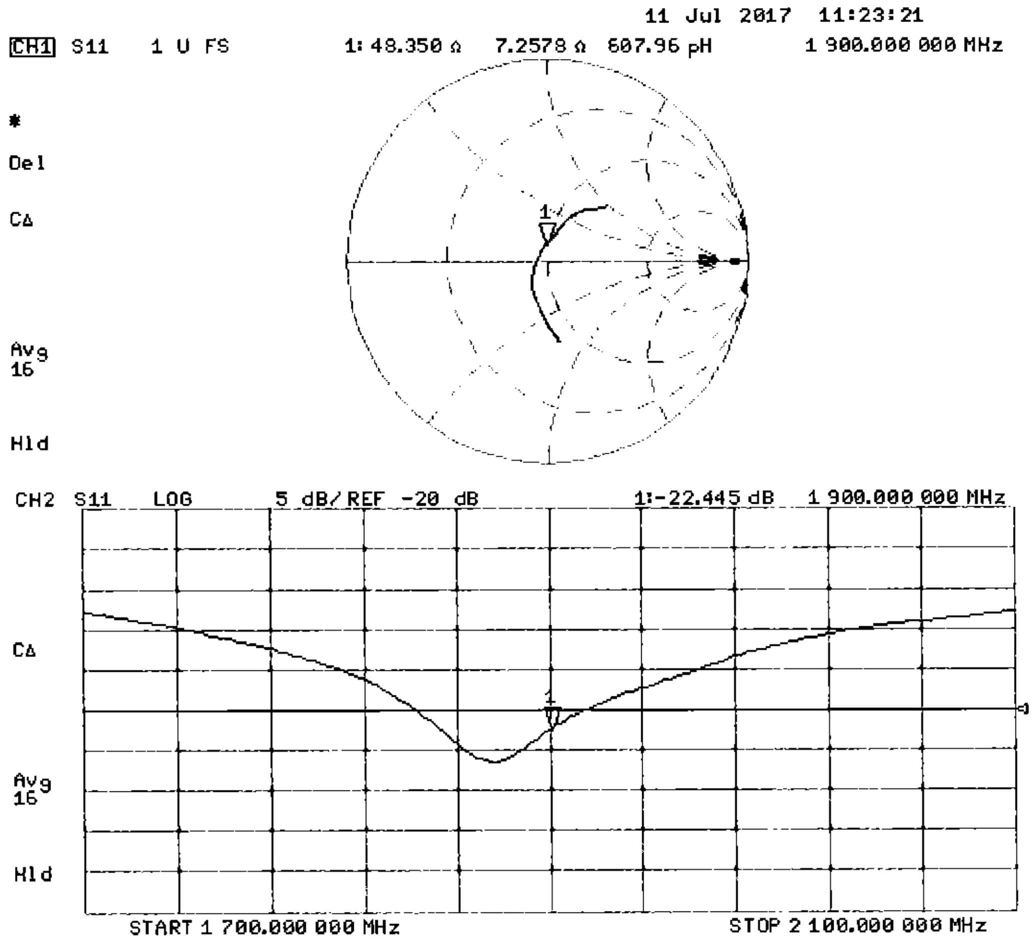
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.4 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.92 W/kg; SAR(10 g) = 5.28 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



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Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client PC Test

Certificate No: **D2450V2-981_Jul16**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:981
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 25, 2016

VPM 8/9/16 Extended 7/2017 SC

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: July 27, 2016

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.0 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.04 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.8 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2 Ω + 3.4 jΩ
Return Loss	- 26.9 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2014

DASY5 Validation Report for Head TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

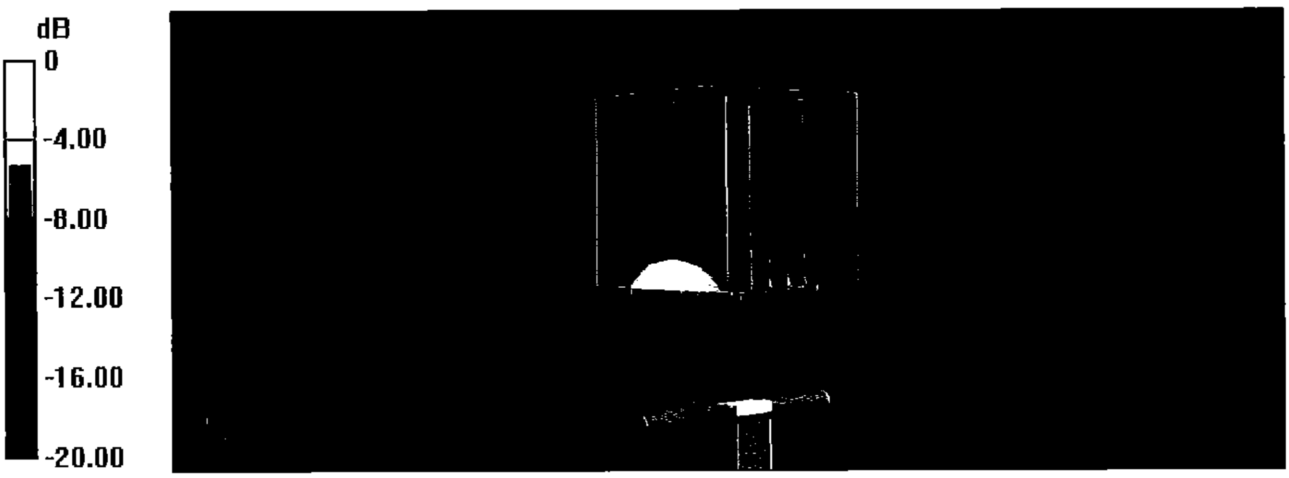
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 38; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

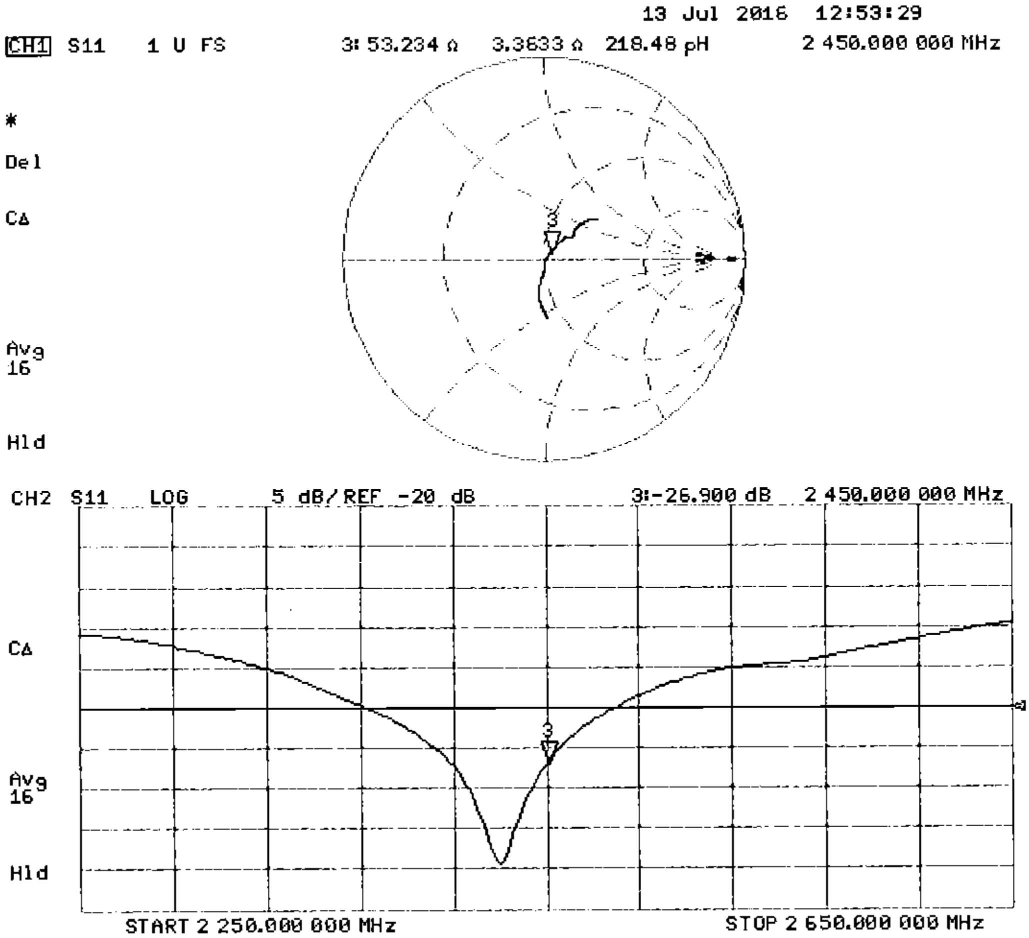
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 25.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

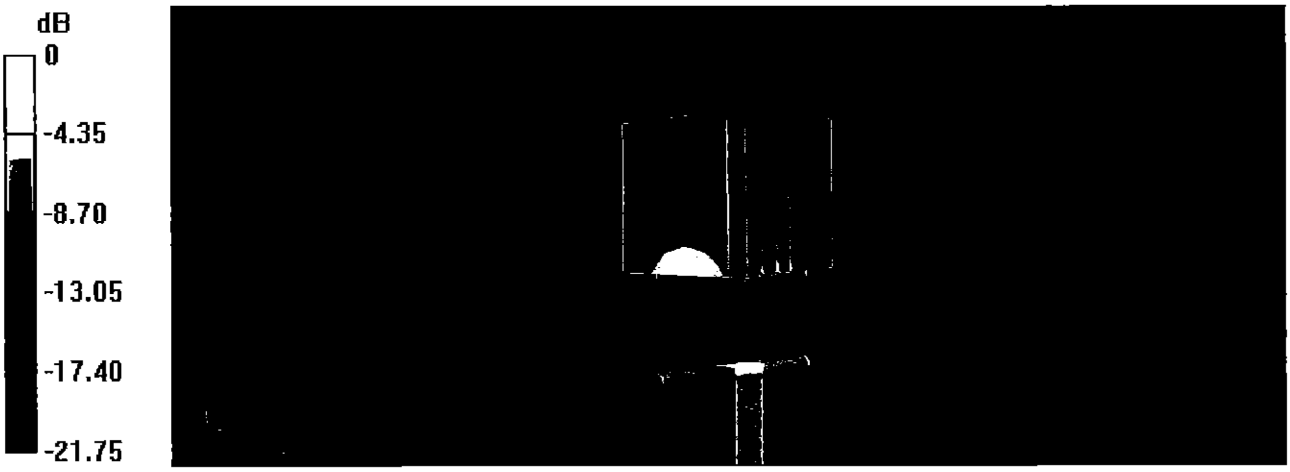
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; $\sigma = 2.03$ S/m; $\varepsilon_r = 51.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

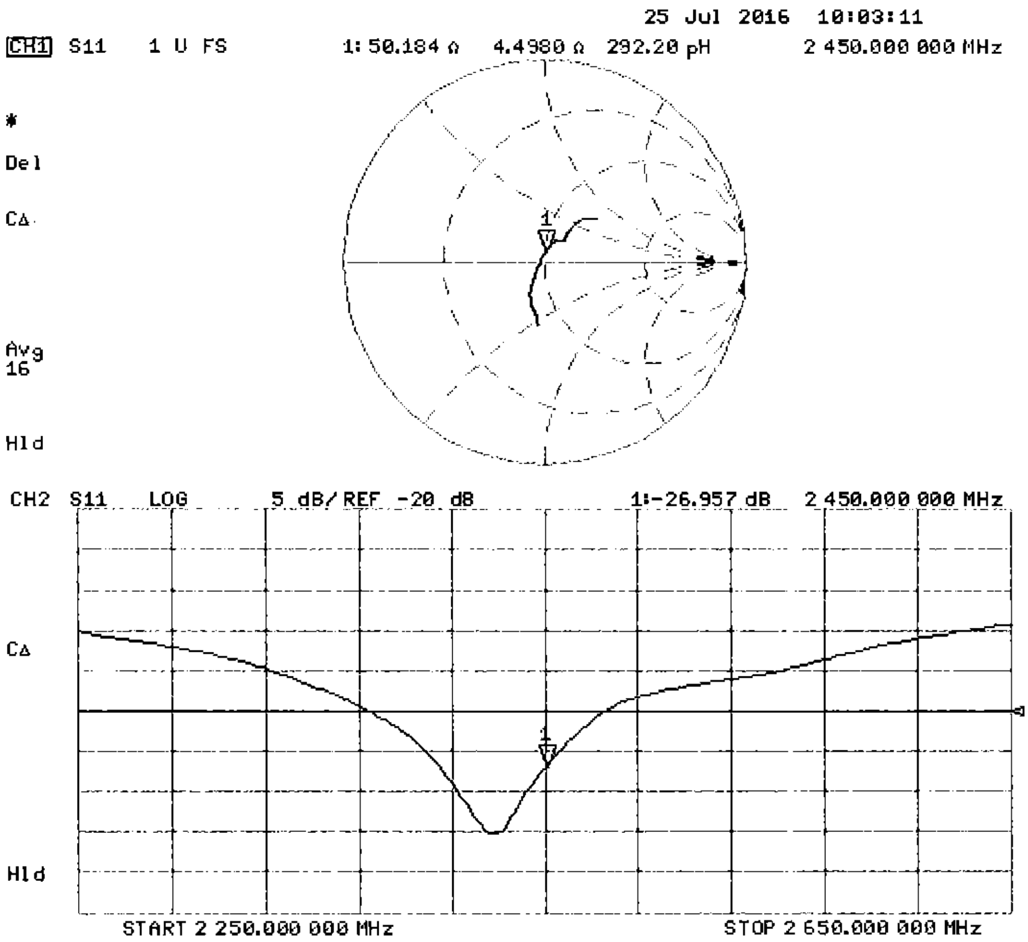
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



0 dB = 21.4 W/kg = 13.30 dBW/kg

Impedance Measurement Plot for Body TSL



PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
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http://www.pctest.com

Certification of Calibration

Object	D2450V2 – SN: 981
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Calibration date:	July 24, 2017
Description:	SAR Validation Dipole at 2450 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
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
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/1/2017	Annual	6/1/2018	MY53401181
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/14/2016	Annual	9/14/2017	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	1272
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	ES3DV3	SAR Probe	9/19/2016	Annual	9/19/2017	3287
SPEAG	ES3DV3	SAR Probe	2/10/2017	Annual	2/10/2018	3213
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1339018
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Agilent	N5182A	MXG Vector Signal Generator	2/28/2017	Annual	2/28/2018	MY47420800
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

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:

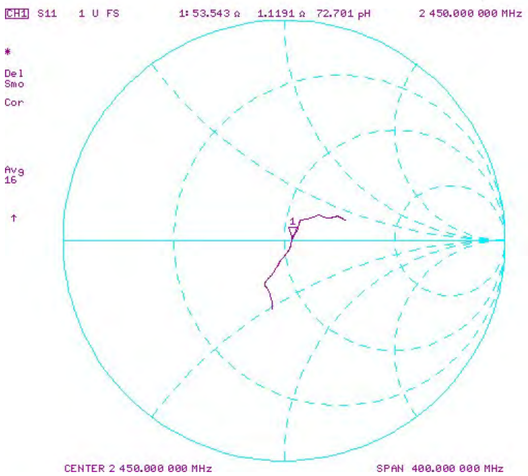
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

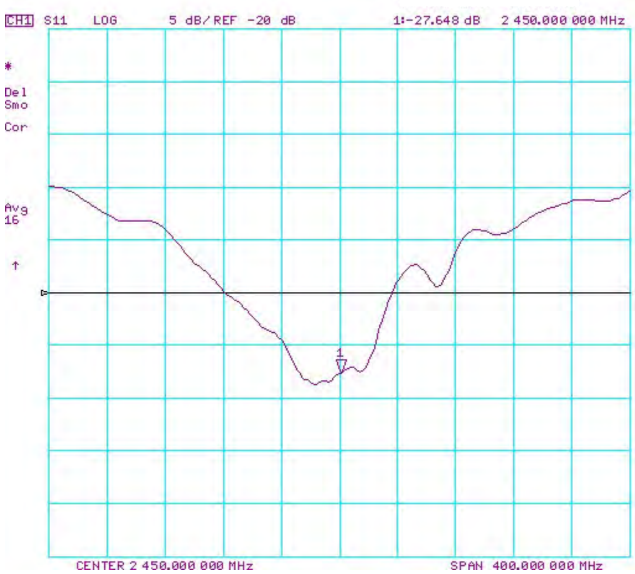
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
7/25/2016	7/24/2017	1.162	5.28	5.57	5.49%	2.47	2.56	3.64%	53.2	53.5	0.3	3.4	1.1	2.3	-26.9	-27.6	-2.60%	PASS

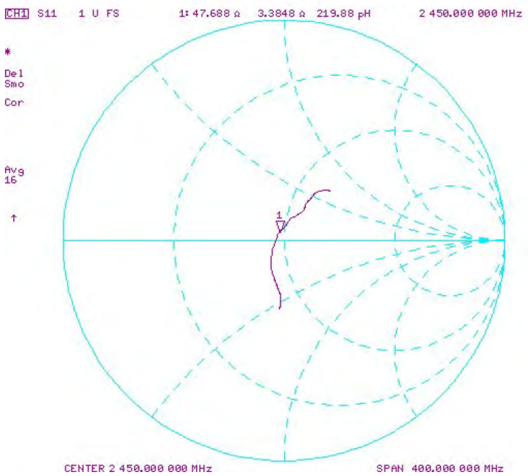
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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
7/25/2016	7/24/2017	1.162	5.08	5.34	5.12%	2.38	2.39	0.42%	50.2	47.7	2.5	4.5	3.4	1.1	-27.0	-27.6	-2.20%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL



Object:	Date Issued:	Page 4 of 4
D2450V2 – SN: 981	07/24/2017	

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

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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D2600V2-1126_Jul17**

CALIBRATION CERTIFICATE

Object D2600V2 - SN:1126

BN✓ 8/3/2017

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

Calibration date: July 10, 2017

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-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	31-May-17 (No. EX3-7349_May17)	May-18
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-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-16)	In house check: Oct-17

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

Issued: July 11, 2017

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

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.2 ± 6 %	2.04 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.2 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.6 ± 6 %	2.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**54.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.4 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.8 Ω - 7.7 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.8 Ω - 5.8 jΩ
Return Loss	- 21.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.154 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 22, 2015

DASY5 Validation Report for Head TSL

Date: 10.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

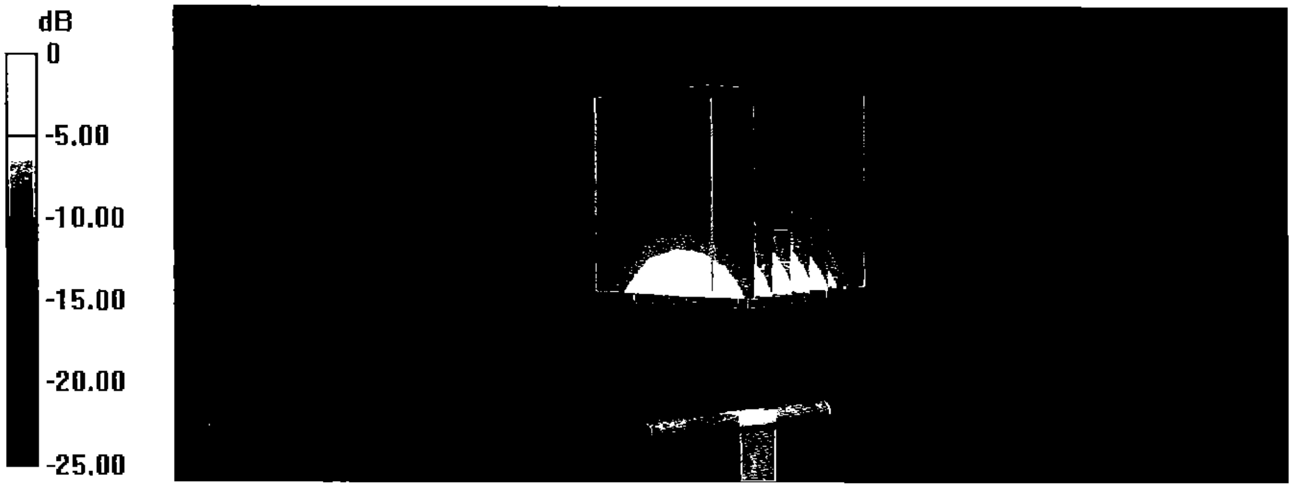
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.04 S/m; ε_r = 37.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

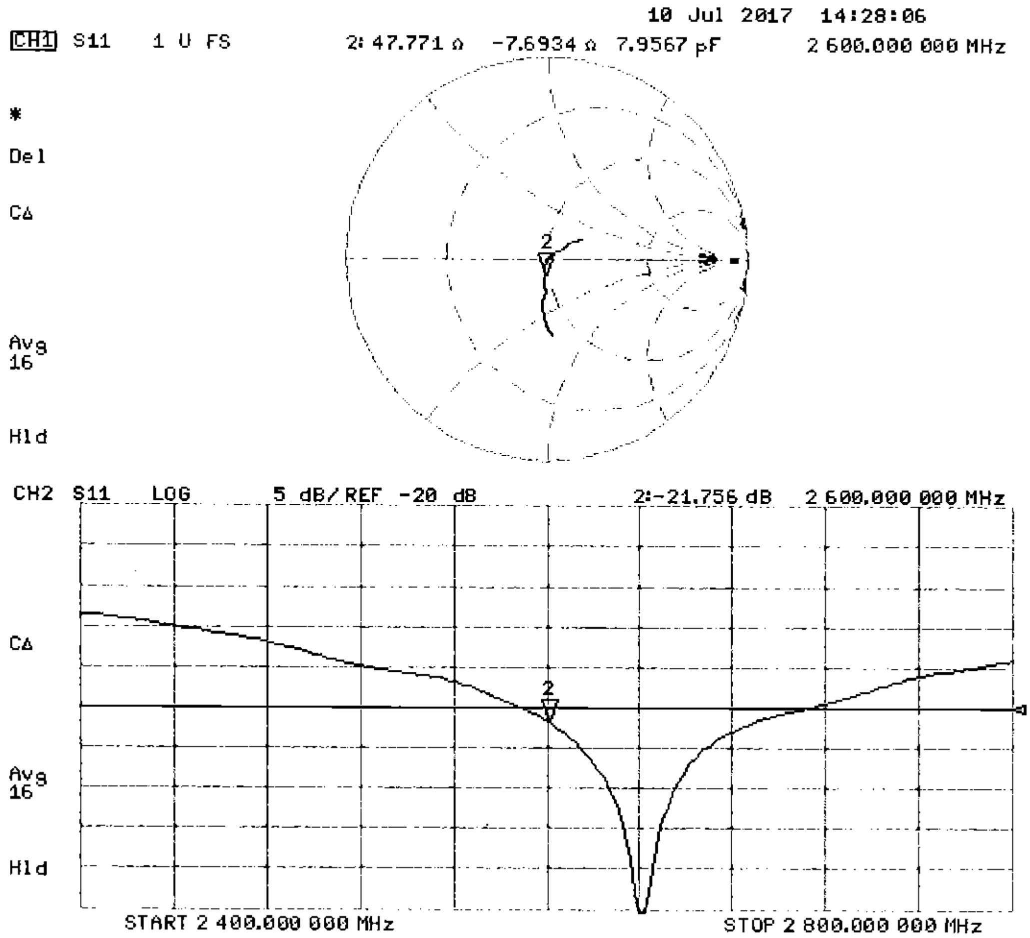
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.2 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.4 W/kg
Maximum value of SAR (measured) = 24.0 W/kg



0 dB = 24.0 W/kg = 13.80 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.07.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

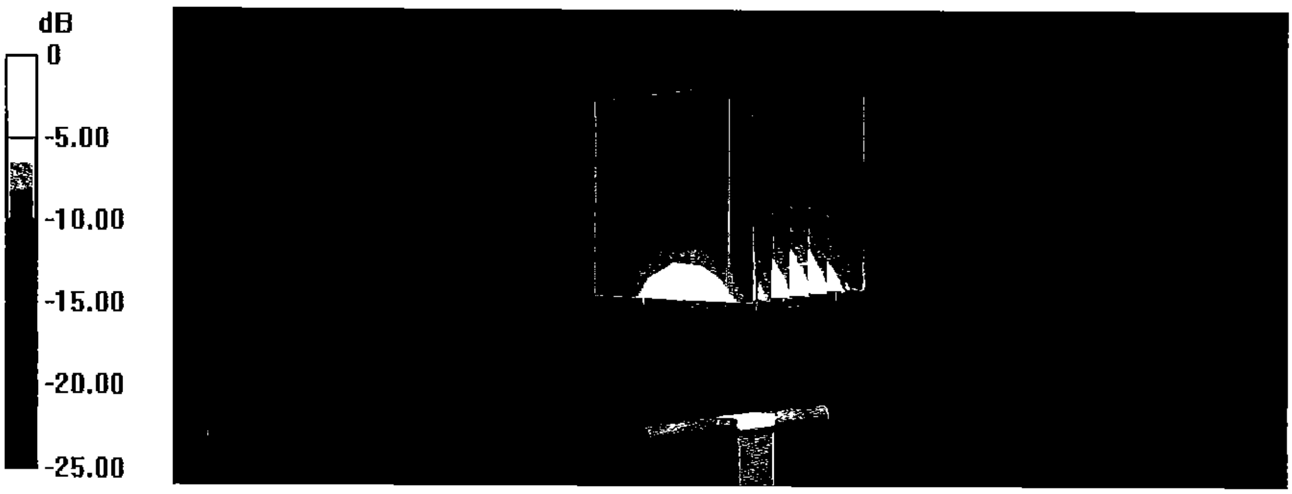
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.22 S/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.94, 7.94, 7.94); Calibrated: 31.05.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

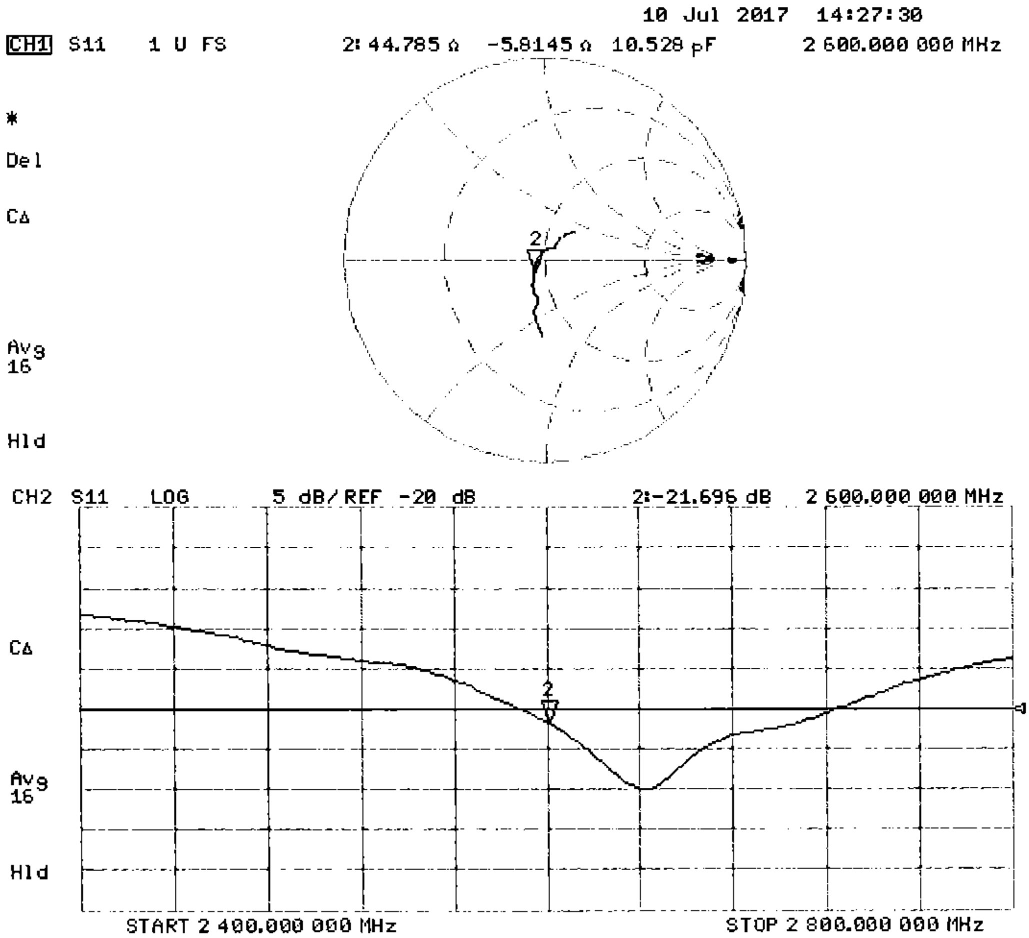
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.8 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 28.9 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.16 W/kg
Maximum value of SAR (measured) = 22.2 W/kg



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1057_Jan17**

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1057

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BNV 01-26-2017

Calibration date: January 20, 2017

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	31-Dec-16 (No. EX3-3503_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-16 (No. 217-02222)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-16 (No. 217-02222)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-16 (No. 217-02223)	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-16)	In house check: Oct-17

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

Issued: January 23, 2017

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	4.50 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.4 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.99 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.6 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.4 ± 6 %	5.43 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.50 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.90 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.95 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**78.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.0 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.4 ± 6 %	6.10 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	50.1 Ω - 5.1 jΩ
Return Loss	- 25.8 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.9 Ω - 0.7 jΩ
Return Loss	- 26.6 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	52.4 Ω + 0.7 jΩ
Return Loss	- 32.4 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	48.9 Ω - 2.9 jΩ
Return Loss	- 30.0 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.4 Ω + 0.1 jΩ
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	52.9 Ω + 2.1 jΩ
Return Loss	- 29.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.204 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

DASY5 Validation Report for Head TSL

Date: 20.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW;
Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.5 S/m; ε_r = 35.3; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.85 S/m; ε_r = 34.7; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 4.99 S/m; ε_r = 34.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

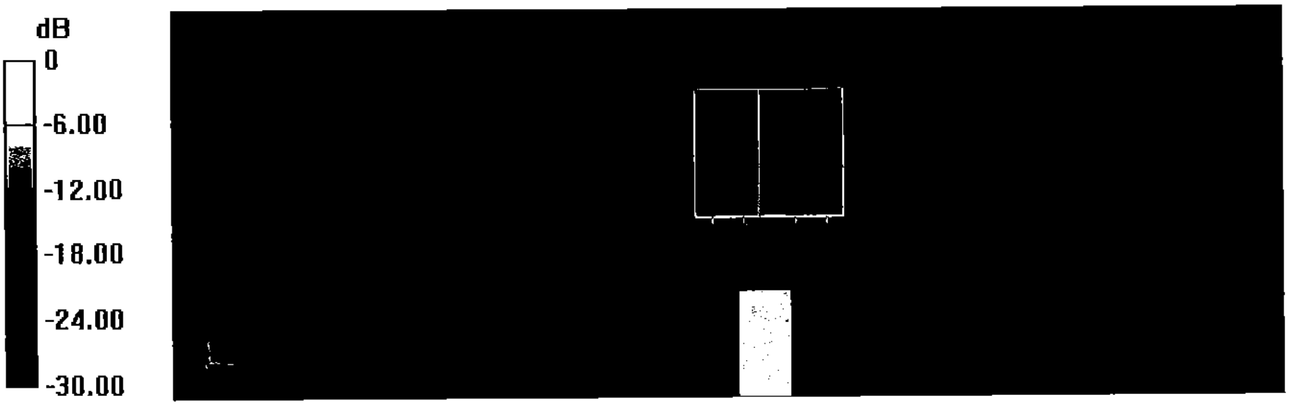
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.58, 5.58, 5.58); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.02, 5.02, 5.02); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.84 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 8.2 W/kg; SAR(10 g) = 2.36 W/kg
Maximum value of SAR (measured) = 18.8 W/kg

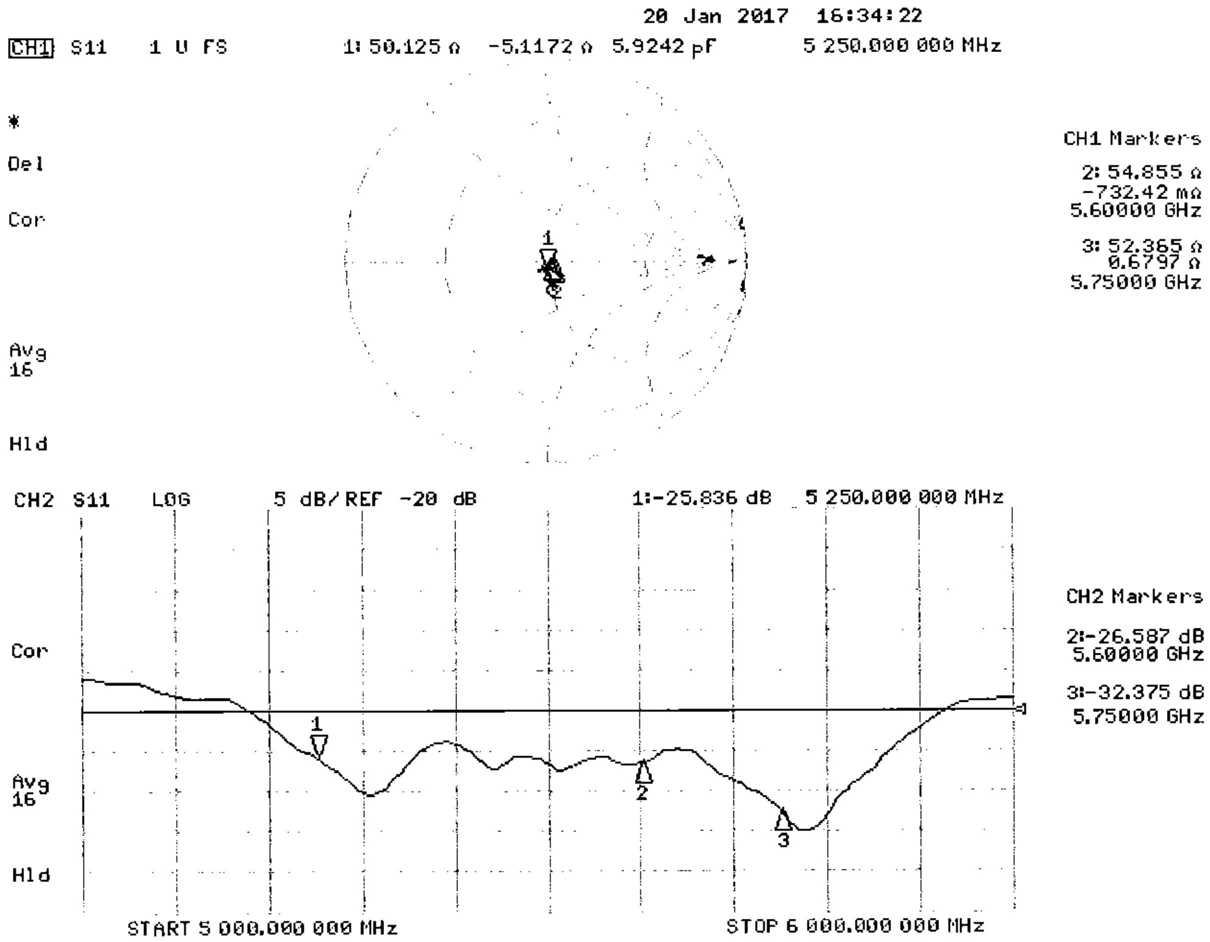
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 73.41 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 34.0 W/kg
SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 19.9 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.30 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 33.8 W/kg
SAR(1 g) = 8.06 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 18.8 W/kg = 12.74 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1057

Communication System: UID 0 - CW;
Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.43 S/m; ε_r = 47.4; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 5.9 S/m; ε_r = 46.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 6.1 S/m; ε_r = 46.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

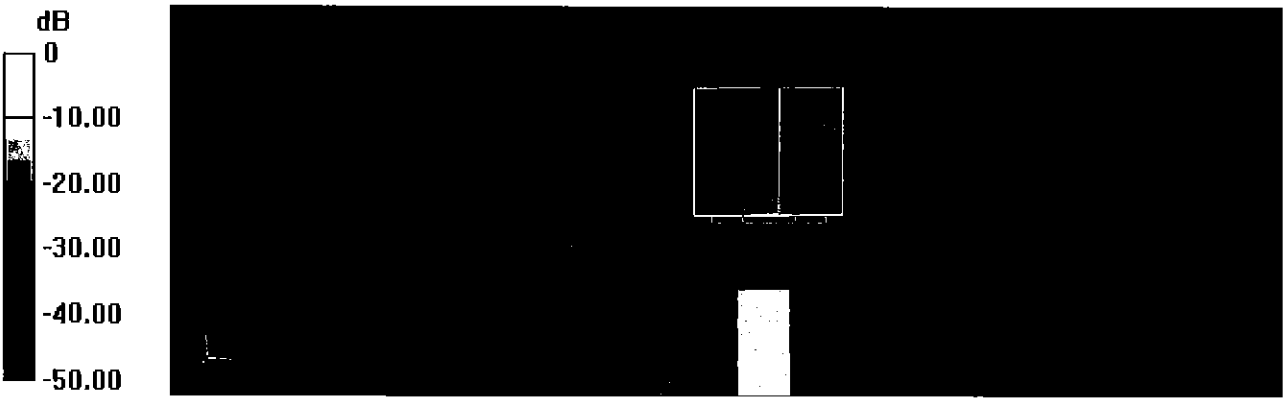
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.14, 5.14, 5.14); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.52, 4.52, 4.52); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.83 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.5 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 17.1 W/kg

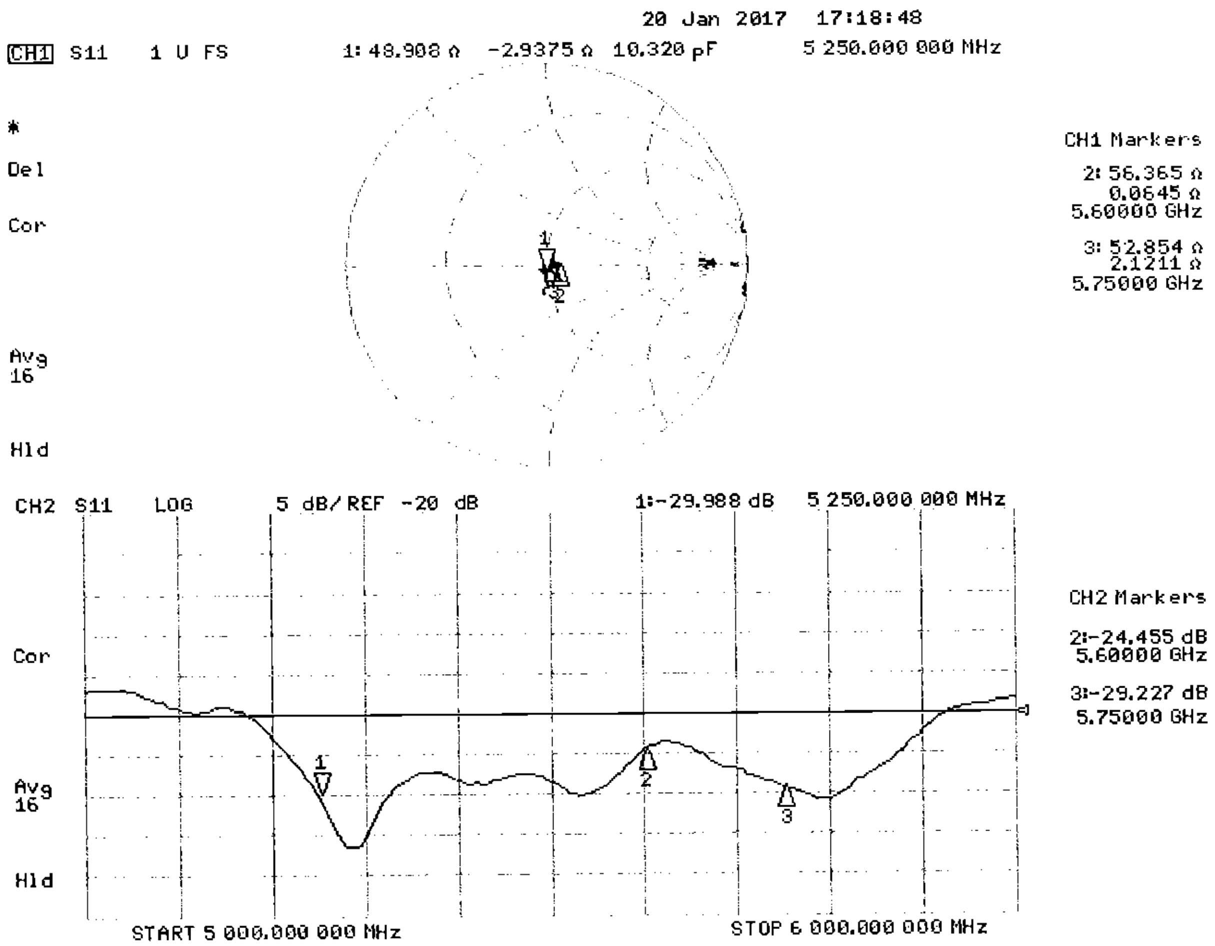
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.06 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 33.5 W/kg
SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 18.7 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.46 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 33.4 W/kg
SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 18.2 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **ES3-3332_Aug17**

CALIBRATION CERTIFICATE

Object ES3DV3 - SN:3332

Calibration procedure(s) QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

PM ✓
8/27/17

Calibration date: August 14, 2017

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-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. 217-02525)	Apr-18
Reference 20 dB Attenuator	SN: S5277 (20x)	07-Apr-17 (No. 217-02528)	Apr-18
Reference Probe ES3DV2	SN: 3013	31-Dec-16 (No. ES3-3013_Dec16)	Dec-17
DAE4	SN: 660	7-Dec-16 (No. DAE4-660_Dec16)	Dec-17
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

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

Issued: August 16, 2017

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe ES3DV3

SN:3332

Manufactured: January 24, 2012
Calibrated: August 14, 2017

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	1.00	0.93	0.88	± 10.1 %
DCP (mV)[B]	104.0	103.0	103.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	192.0	±3.5 %
		Y	0.0	0.0	1.0		194.3	
		Z	0.0	0.0	1.0		179.9	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	76.72	548.9	35.46	56.44	4.600	5.1	0.000	0.903	1.011
Y	44.78	323.3	35.85	29.01	2.529	5.1	0.000	0.546	1.009
Z	38.01	268.3	34.56	26.38	1.777	5.1	0.096	0.424	1.004

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.81	6.81	6.81	0.72	1.31	± 12.0 %
835	41.5	0.90	6.64	6.64	6.64	0.80	1.21	± 12.0 %
1750	40.1	1.37	5.56	5.56	5.56	0.80	1.20	± 12.0 %
1900	40.0	1.40	5.33	5.33	5.33	0.76	1.26	± 12.0 %
2300	39.5	1.67	4.99	4.99	4.99	0.70	1.36	± 12.0 %
2450	39.2	1.80	4.68	4.68	4.68	0.63	1.48	± 12.0 %
2600	39.0	1.96	4.56	4.56	4.56	0.80	1.23	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

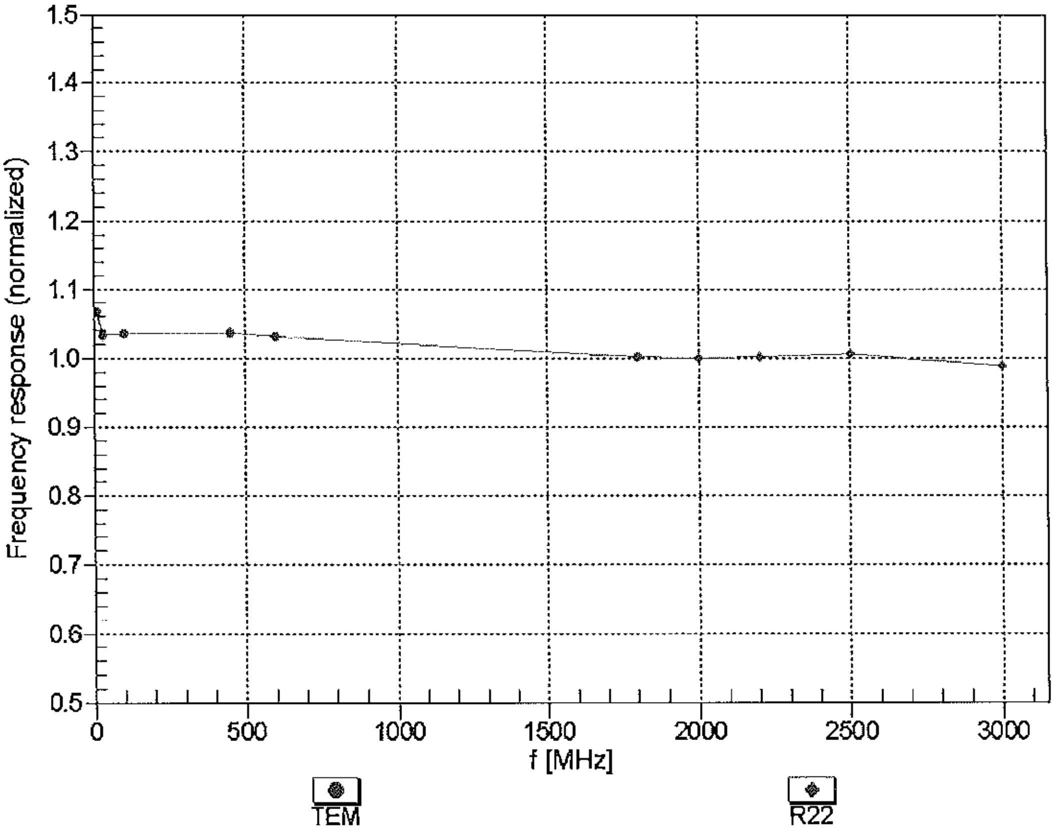
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	6.54	6.54	6.54	0.55	1.43	± 12.0 %
835	55.2	0.97	6.47	6.47	6.47	0.71	1.27	± 12.0 %
1750	53.4	1.49	5.16	5.16	5.16	0.80	1.22	± 12.0 %
1900	53.3	1.52	4.95	4.95	4.95	0.54	1.56	± 12.0 %
2300	52.9	1.81	4.74	4.74	4.74	0.80	1.30	± 12.0 %
2450	52.7	1.95	4.55	4.55	4.55	0.80	1.17	± 12.0 %
2600	52.5	2.16	4.43	4.43	4.43	0.80	1.12	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

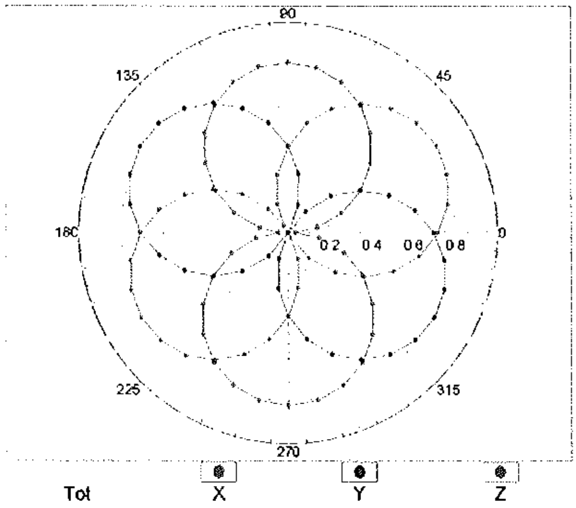
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



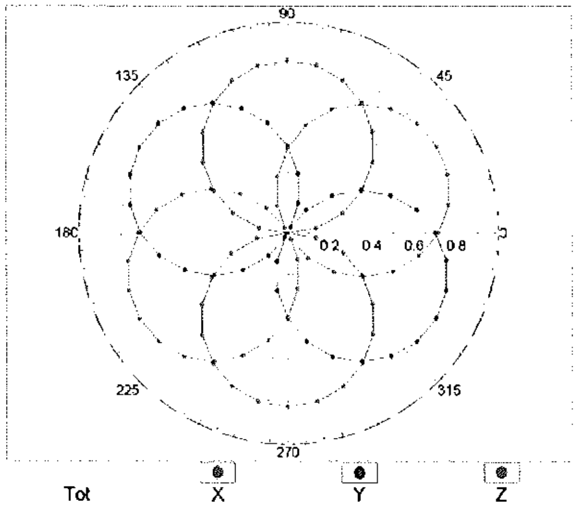
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

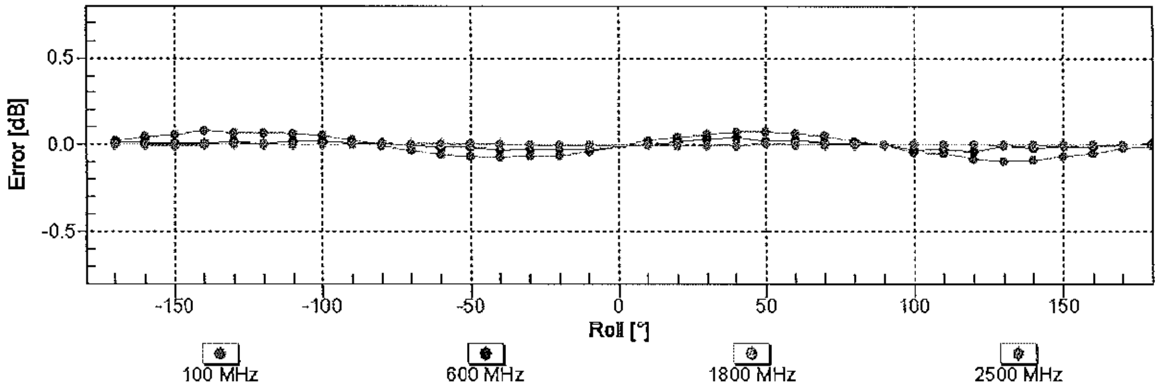
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



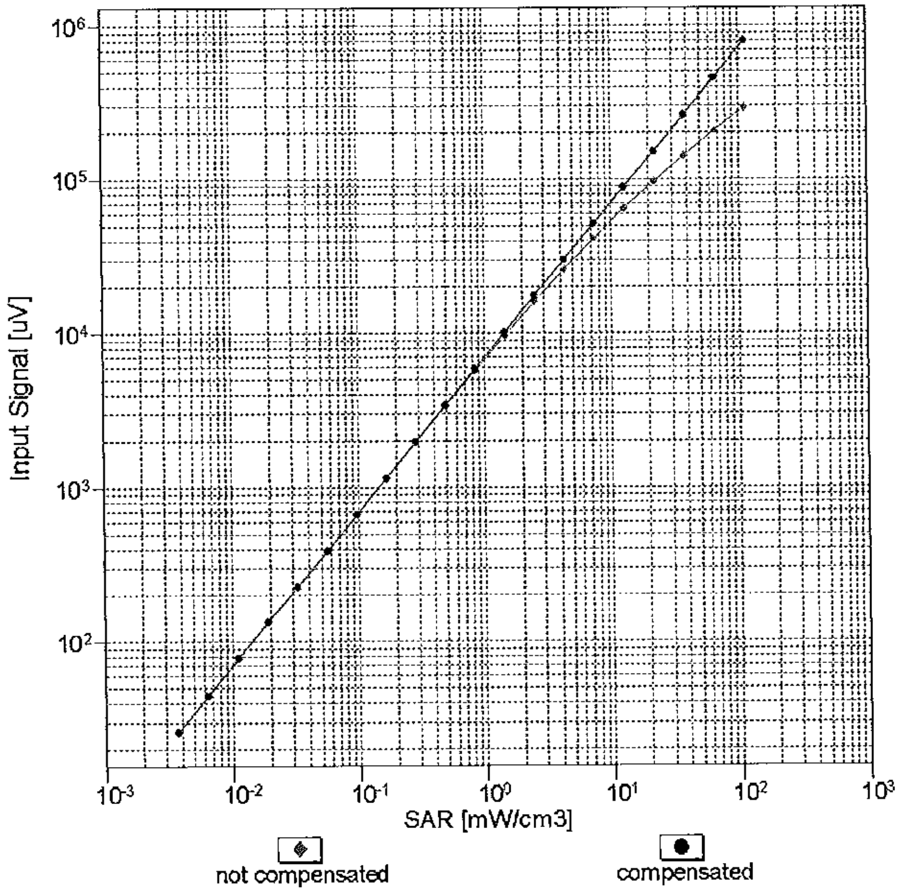
f=1800 MHz,R22

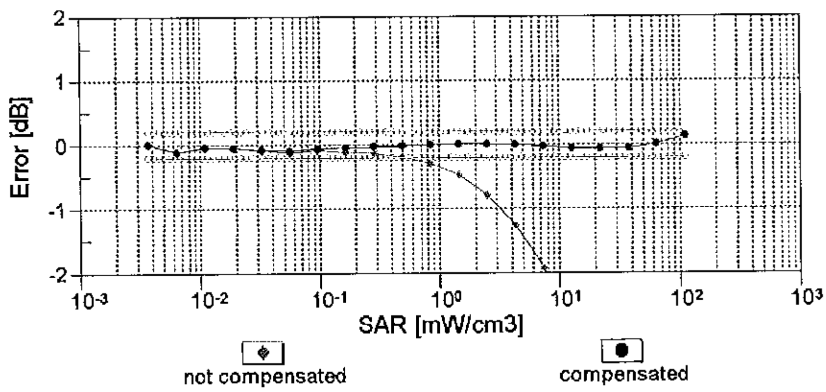




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)

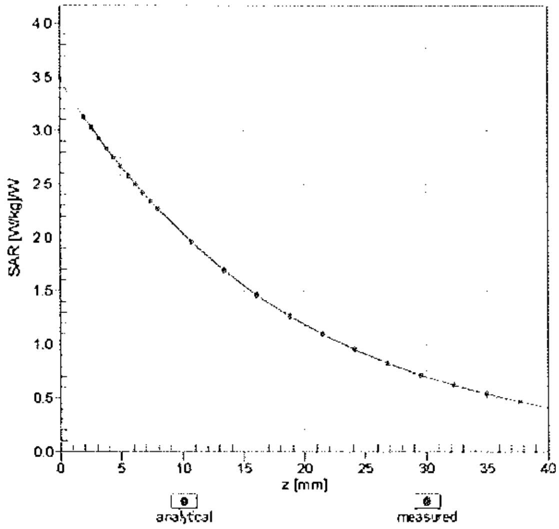




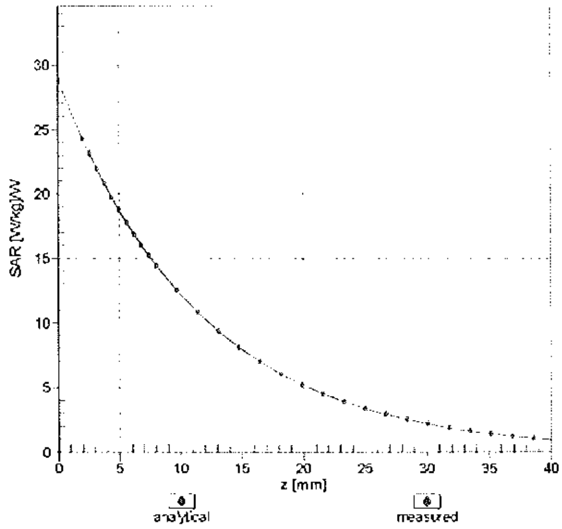
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

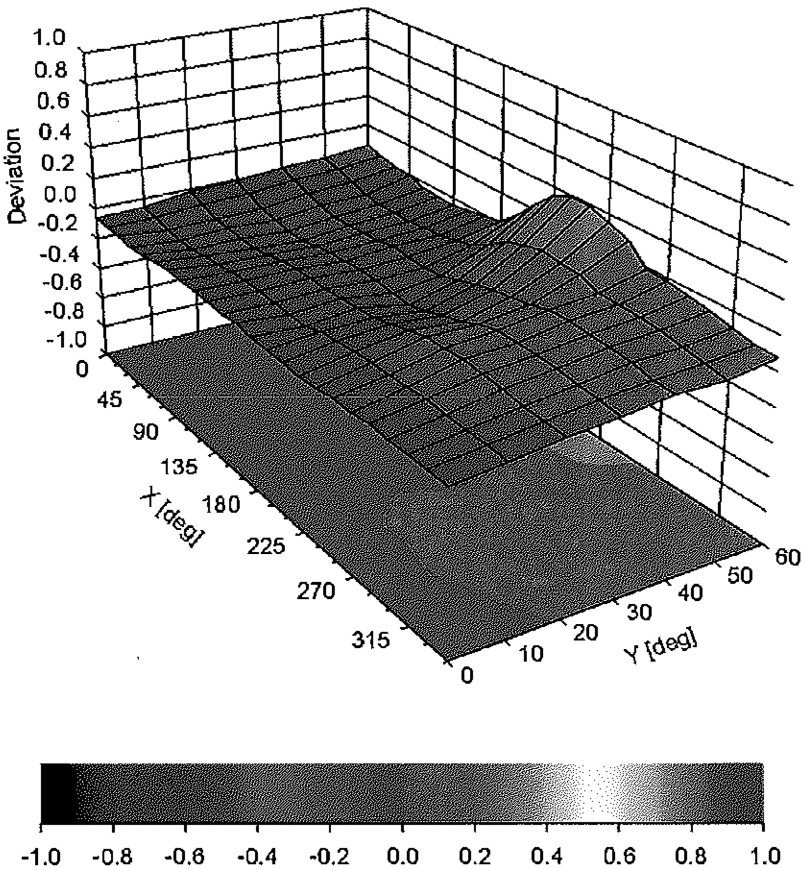


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3332

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	50
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Unc^E (k=2)
0	CW	X	0.00	0.00	1.00	0.00	192.0	± 3.5 %
		Y	0.00	0.00	1.00		194.3	
		Z	0.00	0.00	1.00		179.9	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	9.02	77.08	18.94	10.00	25.0	± 9.6 %
		Y	12.19	85.73	21.41		25.0	
		Z	23.02	95.31	23.86		25.0	
10011-CAB	UMTS-FDD (WCDMA)	X	1.60	76.05	19.77	0.00	150.0	± 9.6 %
		Y	1.08	68.15	15.73		150.0	
		Z	1.25	71.36	17.60		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.52	68.53	17.98	0.41	150.0	± 9.6 %
		Y	1.33	65.39	16.06		150.0	
		Z	1.37	66.35	16.79		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	5.37	67.71	17.82	1.46	150.0	± 9.6 %
		Y	5.07	67.50	17.57		150.0	
		Z	4.99	67.81	17.71		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	11.16	81.48	22.11	9.39	50.0	± 9.6 %
		Y	61.59	115.23	32.13		50.0	
		Z	100.00	122.78	33.35		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	11.07	81.20	22.06	9.57	50.0	± 9.6 %
		Y	43.11	109.07	30.52		50.0	
		Z	100.00	122.63	33.33		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	12.88	85.34	22.06	6.56	60.0	± 9.6 %
		Y	100.00	120.15	31.36		60.0	
		Z	100.00	120.25	30.99		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	19.49	99.22	36.41	12.57	50.0	± 9.6 %
		Y	15.67	100.74	38.44		50.0	
		Z	29.43	124.69	47.97		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	18.92	96.32	32.19	9.56	60.0	± 9.6 %
		Y	17.33	101.02	35.08		60.0	
		Z	24.89	113.23	39.81		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	24.19	95.70	24.33	4.80	80.0	± 9.6 %
		Y	100.00	119.30	30.03		80.0	
		Z	100.00	120.36	30.17		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	115.36	28.49	3.55	100.0	± 9.6 %
		Y	100.00	119.83	29.45		100.0	
		Z	100.00	122.10	30.18		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	16.27	93.78	30.32	7.80	80.0	± 9.6 %
		Y	11.67	92.24	30.90		80.0	
		Z	13.37	97.80	33.46		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	15.68	88.86	22.54	5.30	70.0	± 9.6 %
		Y	100.00	118.49	29.99		70.0	
		Z	100.00	118.88	29.80		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	116.01	27.12	1.88	100.0	± 9.6 %
		Y	100.00	121.13	28.42		100.0	
		Z	100.00	126.03	30.32		100.0	

10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	119.38	27.36	1.17	100.0	± 9.6 %
		Y	100.00	126.54	29.58		100.0	
		Z	100.00	136.16	33.43		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	13.27	88.21	24.10	5.30	70.0	± 9.6 %
		Y	20.91	99.02	27.13		70.0	
		Z	58.05	115.59	31.27		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	16.18	96.67	25.44	1.88	100.0	± 9.6 %
		Y	10.83	91.57	22.94		100.0	
		Z	52.78	113.06	28.24		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	12.45	95.04	24.79	1.17	100.0	± 9.6 %
		Y	5.49	83.70	20.10		100.0	
		Z	18.62	100.06	24.56		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	14.34	89.63	24.62	5.30	70.0	± 9.6 %
		Y	26.79	103.24	28.41		70.0	
		Z	95.10	123.67	33.30		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	15.98	96.45	25.32	1.88	100.0	± 9.6 %
		Y	9.62	89.98	22.43		100.0	
		Z	37.04	108.35	27.08		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	13.91	96.94	25.41	1.17	100.0	± 9.6 %
		Y	5.69	84.50	20.47		100.0	
		Z	19.52	101.18	25.01		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	3.28	80.46	20.53	0.00	150.0	± 9.6 %
		Y	1.92	73.09	15.89		150.0	
		Z	3.08	80.13	18.22		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	11.60	82.51	21.10	7.78	50.0	± 9.6 %
		Y	100.00	118.83	31.00		50.0	
		Z	100.00	118.47	30.39		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.02	128.88	9.05	0.00	150.0	± 9.6 %
		Y	0.00	96.92	0.26		150.0	
		Z	0.02	60.00	140.78		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	10.75	78.30	22.86	13.80	25.0	± 9.6 %
		Y	15.61	90.30	26.65		25.0	
		Z	32.75	104.57	30.45		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	10.92	80.23	22.15	10.79	40.0	± 9.6 %
		Y	20.87	96.36	27.22		40.0	
		Z	64.62	115.72	32.06		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	11.51	81.76	22.84	9.03	50.0	± 9.6 %
		Y	15.28	90.93	25.77		50.0	
		Z	25.94	101.11	28.65		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	14.19	91.88	29.00	6.55	100.0	± 9.6 %
		Y	8.68	86.53	28.09		100.0	
		Z	9.12	89.51	29.70		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	2.01	72.72	19.70	0.61	110.0	± 9.6 %
		Y	1.51	67.62	17.16		110.0	
		Z	1.56	68.78	17.99		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	100.00	126.29	32.07	1.30	110.0	± 9.6 %
		Y	100.00	132.71	34.39		110.0	
		Z	100.00	137.07	36.21		110.0	

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	36.66	112.50	30.92	2.04	110.0	± 9.6 %
		Y	11.07	98.15	27.76		110.0	
		Z	22.12	112.16	32.18		110.0	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	5.03	67.33	17.05	0.49	100.0	± 9.6 %
		Y	4.77	67.19	16.82		100.0	
		Z	4.70	67.51	16.97		100.0	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	5.09	67.56	17.23	0.72	100.0	± 9.6 %
		Y	4.81	67.36	16.96		100.0	
		Z	4.74	67.68	17.11		100.0	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	5.47	67.93	17.49	0.86	100.0	± 9.6 %
		Y	5.10	67.63	17.20		100.0	
		Z	5.00	67.90	17.32		100.0	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	5.40	68.08	17.70	1.21	100.0	± 9.6 %
		Y	5.02	67.68	17.39		100.0	
		Z	4.92	67.92	17.50		100.0	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	5.49	68.31	17.98	1.46	100.0	± 9.6 %
		Y	5.08	67.82	17.62		100.0	
		Z	4.97	68.04	17.73		100.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.84	68.47	18.45	2.04	100.0	± 9.6 %
		Y	5.42	68.13	18.14		100.0	
		Z	5.31	68.42	18.28		100.0	
10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	6.07	69.08	18.91	2.55	100.0	± 9.6 %
		Y	5.53	68.32	18.44		100.0	
		Z	5.39	68.51	18.54		100.0	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	6.13	68.90	19.06	2.67	100.0	± 9.6 %
		Y	5.61	68.37	18.66		100.0	
		Z	5.48	68.58	18.76		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	5.56	68.08	18.26	1.99	100.0	± 9.6 %
		Y	5.22	67.75	17.96		100.0	
		Z	5.14	68.03	18.10		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	5.71	68.87	18.66	2.30	100.0	± 9.6 %
		Y	5.28	68.28	18.29		100.0	
		Z	5.18	68.53	18.42		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	5.93	69.43	19.17	2.83	100.0	± 9.6 %
		Y	5.43	68.68	18.74		100.0	
		Z	5.32	68.95	18.89		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	6.04	69.75	19.56	3.30	100.0	± 9.6 %
		Y	5.49	68.80	18.99		100.0	
		Z	5.38	69.07	19.15		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	6.35	70.65	20.23	3.82	90.0	± 9.6 %
		Y	5.63	69.18	19.44		90.0	
		Z	5.49	69.37	19.56		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	6.37	70.50	20.38	4.15	90.0	± 9.6 %
		Y	5.68	69.10	19.63		90.0	
		Z	5.56	69.34	19.78		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	6.43	70.65	20.50	4.30	90.0	± 9.6 %
		Y	5.73	69.22	19.75		90.0	
		Z	5.61	69.48	19.91		90.0	

10081-CAB	CDMA2000 (1xRTT, RC3)	X	1.62	75.66	18.40	0.00	150.0	± 9.6 %
		Y	0.87	66.71	12.69		150.0	
		Z	1.13	71.02	14.45		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	3.53	66.20	10.93	4.77	80.0	± 9.6 %
		Y	2.19	64.40	9.18		80.0	
		Z	1.96	64.15	8.74		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	12.79	85.25	22.06	6.56	60.0	± 9.6 %
		Y	100.00	120.23	31.42		60.0	
		Z	100.00	120.31	31.04		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	2.06	70.06	17.46	0.00	150.0	± 9.6 %
		Y	1.88	68.31	15.96		150.0	
		Z	2.04	70.38	16.98		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	2.02	70.12	17.47	0.00	150.0	± 9.6 %
		Y	1.84	68.27	15.94		150.0	
		Z	2.00	70.37	16.98		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	18.80	96.14	32.13	9.56	60.0	± 9.6 %
		Y	17.28	100.91	35.04		60.0	
		Z	24.81	113.10	39.77		60.0	
10100-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.84	73.61	18.19	0.00	150.0	± 9.6 %
		Y	3.15	70.58	16.91		150.0	
		Z	3.25	71.69	17.61		150.0	
10101-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.58	69.11	16.83	0.00	150.0	± 9.6 %
		Y	3.26	67.74	16.10		150.0	
		Z	3.26	68.29	16.47		150.0	
10102-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.66	68.88	16.84	0.00	150.0	± 9.6 %
		Y	3.36	67.71	16.19		150.0	
		Z	3.36	68.23	16.52		150.0	
10103-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	9.75	77.78	20.81	3.98	65.0	± 9.6 %
		Y	8.78	79.16	21.83		65.0	
		Z	9.34	81.38	22.82		65.0	
10104-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	9.87	77.22	21.49	3.98	65.0	± 9.6 %
		Y	8.42	77.09	21.77		65.0	
		Z	8.44	78.16	22.31		65.0	
10105-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	9.19	75.82	21.15	3.98	65.0	± 9.6 %
		Y	8.07	76.20	21.66		65.0	
		Z	8.27	77.70	22.41		65.0	
10108-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	3.37	72.69	18.02	0.00	150.0	± 9.6 %
		Y	2.75	69.90	16.77		150.0	
		Z	2.82	71.09	17.51		150.0	
10109-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	3.26	68.97	16.85	0.00	150.0	± 9.6 %
		Y	2.91	67.66	16.01		150.0	
		Z	2.92	68.36	16.42		150.0	
10110-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.79	71.81	17.85	0.00	150.0	± 9.6 %
		Y	2.23	69.12	16.39		150.0	
		Z	2.31	70.62	17.23		150.0	
10111-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.96	69.58	17.27	0.00	150.0	± 9.6 %
		Y	2.63	68.64	16.31		150.0	
		Z	2.69	69.84	16.85		150.0	

10112-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	3.36	68.71	16.80	0.00	150.0	± 9.6 %
		Y	3.03	67.66	16.06		150.0	
		Z	3.04	68.35	16.45		150.0	
10113-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	3.10	69.46	17.27	0.00	150.0	± 9.6 %
		Y	2.78	68.78	16.44		150.0	
		Z	2.83	69.92	16.93		150.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.34	67.65	16.76	0.00	150.0	± 9.6 %
		Y	5.17	67.50	16.64		150.0	
		Z	5.08	67.64	16.74		150.0	
10115-CAB	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.80	68.17	17.01	0.00	150.0	± 9.6 %
		Y	5.44	67.60	16.69		150.0	
		Z	5.33	67.71	16.77		150.0	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.47	67.90	16.79	0.00	150.0	± 9.6 %
		Y	5.25	67.68	16.65		150.0	
		Z	5.17	67.85	16.77		150.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.34	67.65	16.78	0.00	150.0	± 9.6 %
		Y	5.12	67.32	16.56		150.0	
		Z	5.07	67.59	16.73		150.0	
10118-CAB	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.79	68.04	16.95	0.00	150.0	± 9.6 %
		Y	5.52	67.82	16.81		150.0	
		Z	5.42	67.93	16.89		150.0	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.44	67.84	16.78	0.00	150.0	± 9.6 %
		Y	5.24	67.66	16.65		150.0	
		Z	5.17	67.84	16.77		150.0	
10140-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.72	68.86	16.76	0.00	150.0	± 9.6 %
		Y	3.39	67.72	16.10		150.0	
		Z	3.39	68.26	16.45		150.0	
10141-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.82	68.79	16.84	0.00	150.0	± 9.6 %
		Y	3.51	67.83	16.27		150.0	
		Z	3.51	68.36	16.60		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	2.57	71.96	17.88	0.00	150.0	± 9.6 %
		Y	2.01	69.21	16.02		150.0	
		Z	2.13	71.18	16.95		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.89	70.53	17.42	0.00	150.0	± 9.6 %
		Y	2.49	69.45	15.95		150.0	
		Z	2.62	71.11	16.52		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.69	68.52	16.05	0.00	150.0	± 9.6 %
		Y	2.23	66.92	14.20		150.0	
		Z	2.23	67.85	14.42		150.0	
10145-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	2.07	72.06	16.97	0.00	150.0	± 9.6 %
		Y	1.17	64.90	11.31		150.0	
		Z	1.08	64.84	10.72		150.0	
10146-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	4.64	77.66	18.95	0.00	150.0	± 9.6 %
		Y	1.89	66.33	11.57		150.0	
		Z	1.28	62.78	8.70		150.0	
10147-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	5.86	81.36	20.54	0.00	150.0	± 9.6 %
		Y	2.26	68.50	12.73		150.0	
		Z	1.39	63.59	9.24		150.0	

10149-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	3.27	69.03	16.89	0.00	150.0	± 9.6 %
		Y	2.92	67.72	16.06		150.0	
		Z	2.93	68.43	16.47		150.0	
10150-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.37	68.76	16.84	0.00	150.0	± 9.6 %
		Y	3.04	67.71	16.11		150.0	
		Z	3.05	68.41	16.50		150.0	
10151-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.88	78.98	21.39	3.98	65.0	± 9.6 %
		Y	9.54	82.00	22.98		65.0	
		Z	10.52	85.01	24.21		65.0	
10152-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	9.59	77.49	21.44	3.98	65.0	± 9.6 %
		Y	8.05	77.33	21.53		65.0	
		Z	8.15	78.63	22.11		65.0	
10153-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	9.88	78.01	21.96	3.98	65.0	± 9.6 %
		Y	8.51	78.32	22.28		65.0	
		Z	8.64	79.68	22.87		65.0	
10154-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.88	72.43	18.21	0.00	150.0	± 9.6 %
		Y	2.28	69.53	16.65		150.0	
		Z	2.36	71.01	17.47		150.0	
10155-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.96	69.57	17.27	0.00	150.0	± 9.6 %
		Y	2.63	68.66	16.33		150.0	
		Z	2.70	69.87	16.88		150.0	
10156-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	2.50	72.75	18.17	0.00	150.0	± 9.6 %
		Y	1.86	69.32	15.77		150.0	
		Z	2.00	71.53	16.72		150.0	
10157-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.58	69.56	16.46	0.00	150.0	± 9.6 %
		Y	2.07	67.52	14.21		150.0	
		Z	2.11	68.66	14.46		150.0	
10158-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	3.11	69.51	17.31	0.00	150.0	± 9.6 %
		Y	2.79	68.85	16.49		150.0	
		Z	2.84	70.00	16.99		150.0	
10159-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.70	69.94	16.71	0.00	150.0	± 9.6 %
		Y	2.17	67.94	14.47		150.0	
		Z	2.21	69.05	14.68		150.0	
10160-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	3.17	70.70	17.47	0.00	150.0	± 9.6 %
		Y	2.80	69.22	16.63		150.0	
		Z	2.84	70.27	17.24		150.0	
10161-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	3.25	68.62	16.80	0.00	150.0	± 9.6 %
		Y	2.93	67.68	16.03		150.0	
		Z	2.94	68.43	16.42		150.0	
10162-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	3.34	68.54	16.80	0.00	150.0	± 9.6 %
		Y	3.04	67.85	16.15		150.0	
		Z	3.05	68.62	16.54		150.0	
10166-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	4.29	71.19	20.11	3.01	150.0	± 9.6 %
		Y	3.58	69.86	19.45		150.0	
		Z	3.34	69.55	19.26		150.0	
10167-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	5.65	74.34	20.64	3.01	150.0	± 9.6 %
		Y	4.34	72.64	19.86		150.0	
		Z	3.97	72.28	19.65		150.0	

10168-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	6.08	75.90	21.58	3.01	150.0	± 9.6 %
		Y	4.83	75.01	21.26		150.0	
		Z	4.38	74.50	20.98		150.0	
10169-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	4.41	74.54	21.42	3.01	150.0	± 9.6 %
		Y	2.96	68.83	19.02		150.0	
		Z	2.72	67.99	18.57		150.0	
10170-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	6.70	80.82	23.44	3.01	150.0	± 9.6 %
		Y	3.91	74.17	21.18		150.0	
		Z	3.42	72.70	20.49		150.0	
10171-AAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	5.50	76.54	20.93	3.01	150.0	± 9.6 %
		Y	3.29	70.45	18.57		150.0	
		Z	2.94	69.58	18.14		150.0	
10172-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	25.76	101.07	30.32	6.02	65.0	± 9.6 %
		Y	18.45	102.75	32.10		65.0	
		Z	20.86	107.70	33.85		65.0	
10173-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	19.21	92.24	26.33	6.02	65.0	± 9.6 %
		Y	26.29	105.14	31.12		65.0	
		Z	28.49	108.55	32.12		65.0	
10174-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	17.46	89.68	25.13	6.02	65.0	± 9.6 %
		Y	21.35	100.13	29.12		65.0	
		Z	22.92	103.28	30.05		65.0	
10175-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.34	74.12	21.15	3.01	150.0	± 9.6 %
		Y	2.93	68.55	18.79		150.0	
		Z	2.70	67.77	18.36		150.0	
10176-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	6.71	80.84	23.45	3.01	150.0	± 9.6 %
		Y	3.92	74.20	21.19		150.0	
		Z	3.42	72.72	20.50		150.0	
10177-CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	4.38	74.32	21.26	3.01	150.0	± 9.6 %
		Y	2.95	68.69	18.87		150.0	
		Z	2.71	67.87	18.43		150.0	
10178-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	6.59	80.50	23.29	3.01	150.0	± 9.6 %
		Y	3.89	74.02	21.09		150.0	
		Z	3.41	72.61	20.43		150.0	
10179-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	6.03	78.45	22.01	3.01	150.0	± 9.6 %
		Y	3.58	72.24	19.76		150.0	
		Z	3.16	71.11	19.23		150.0	
10180-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	5.47	76.42	20.86	3.01	150.0	± 9.6 %
		Y	3.28	70.40	18.53		150.0	
		Z	2.94	69.55	18.12		150.0	
10181-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.38	74.30	21.25	3.01	150.0	± 9.6 %
		Y	2.95	68.67	18.87		150.0	
		Z	2.71	67.86	18.43		150.0	
10182-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	6.58	80.48	23.29	3.01	150.0	± 9.6 %
		Y	3.88	74.00	21.08		150.0	
		Z	3.40	72.59	20.42		150.0	
10183-AAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	5.46	76.40	20.85	3.01	150.0	± 9.6 %
		Y	3.28	70.38	18.52		150.0	
		Z	2.93	69.53	18.11		150.0	

10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	4.39	74.34	21.27	3.01	150.0	± 9.6 %
		Y	2.96	68.71	18.89		150.0	
		Z	2.72	67.89	18.44		150.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	6.61	80.55	23.32	3.01	150.0	± 9.6 %
		Y	3.90	74.06	21.11		150.0	
		Z	3.42	72.64	20.45		150.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	5.49	76.46	20.88	3.01	150.0	± 9.6 %
		Y	3.29	70.44	18.55		150.0	
		Z	2.95	69.59	18.14		150.0	
10187-CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	4.40	74.38	21.31	3.01	150.0	± 9.6 %
		Y	2.97	68.77	18.95		150.0	
		Z	2.73	67.95	18.51		150.0	
10188-CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	6.86	81.30	23.70	3.01	150.0	± 9.6 %
		Y	4.01	74.64	21.46		150.0	
		Z	3.49	73.09	20.74		150.0	
10189-AAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	5.63	76.95	21.16	3.01	150.0	± 9.6 %
		Y	3.36	70.82	18.81		150.0	
		Z	3.00	69.90	18.37		150.0	
10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.76	66.98	16.56	0.00	150.0	± 9.6 %
		Y	4.53	66.89	16.29		150.0	
		Z	4.48	67.27	16.46		150.0	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.98	67.40	16.66	0.00	150.0	± 9.6 %
		Y	4.70	67.19	16.42		150.0	
		Z	4.63	67.53	16.59		150.0	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	5.02	67.38	16.65	0.00	150.0	± 9.6 %
		Y	4.74	67.22	16.44		150.0	
		Z	4.67	67.55	16.61		150.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.79	67.12	16.61	0.00	150.0	± 9.6 %
		Y	4.53	66.94	16.30		150.0	
		Z	4.47	67.29	16.46		150.0	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	5.00	67.41	16.67	0.00	150.0	± 9.6 %
		Y	4.71	67.21	16.43		150.0	
		Z	4.64	67.54	16.60		150.0	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	5.02	67.39	16.66	0.00	150.0	± 9.6 %
		Y	4.74	67.23	16.45		150.0	
		Z	4.67	67.55	16.61		150.0	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.75	67.15	16.58	0.00	150.0	± 9.6 %
		Y	4.48	66.96	16.27		150.0	
		Z	4.43	67.33	16.43		150.0	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	5.00	67.42	16.67	0.00	150.0	± 9.6 %
		Y	4.70	67.17	16.42		150.0	
		Z	4.63	67.50	16.58		150.0	
10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	5.03	67.33	16.65	0.00	150.0	± 9.6 %
		Y	4.75	67.16	16.44		150.0	
		Z	4.68	67.49	16.60		150.0	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.32	67.70	16.79	0.00	150.0	± 9.6 %
		Y	5.10	67.32	16.56		150.0	
		Z	5.04	67.57	16.71		150.0	

10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.69	67.90	16.90	0.00	150.0	± 9.6 %
		Y	5.41	67.62	16.73		150.0	
		Z	5.32	67.79	16.83		150.0	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.40	67.86	16.79	0.00	150.0	± 9.6 %
		Y	5.14	67.44	16.54		150.0	
		Z	5.08	67.68	16.69		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	3.04	66.91	16.27	0.00	150.0	± 9.6 %
		Y	2.80	66.45	15.40		150.0	
		Z	2.79	67.13	15.62		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	19.62	92.68	26.54	6.02	65.0	± 9.6 %
		Y	28.14	106.53	31.60		65.0	
		Z	30.74	110.09	32.63		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	17.31	89.65	25.20	6.02	65.0	± 9.6 %
		Y	25.62	103.45	30.17		65.0	
		Z	27.71	106.63	31.05		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	25.12	101.14	30.46	6.02	65.0	± 9.6 %
		Y	22.85	107.40	33.58		65.0	
		Z	23.56	110.42	34.69		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	19.21	92.22	26.33	6.02	65.0	± 9.6 %
		Y	26.37	105.18	31.14		65.0	
		Z	28.56	108.58	32.13		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	16.99	89.27	25.02	6.02	65.0	± 9.6 %
		Y	24.08	102.25	29.76		65.0	
		Z	25.76	105.25	30.60		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	24.47	100.57	30.23	6.02	65.0	± 9.6 %
		Y	21.54	106.10	33.13		65.0	
		Z	22.10	109.02	34.22		65.0	
10232-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	19.21	92.23	26.33	6.02	65.0	± 9.6 %
		Y	26.35	105.17	31.13		65.0	
		Z	28.56	108.59	32.14		65.0	
10233-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	16.99	89.29	25.03	6.02	65.0	± 9.6 %
		Y	24.05	102.24	29.76		65.0	
		Z	25.73	105.25	30.60		65.0	
10234-CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	23.75	99.87	29.94	6.02	65.0	± 9.6 %
		Y	20.44	104.88	32.66		65.0	
		Z	20.94	107.73	33.73		65.0	
10235-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	19.23	92.26	26.34	6.02	65.0	± 9.6 %
		Y	26.43	105.24	31.16		65.0	
		Z	28.68	108.68	32.16		65.0	
10236-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	17.05	89.34	25.04	6.02	65.0	± 9.6 %
		Y	24.28	102.38	29.79		65.0	
		Z	26.05	105.43	30.64		65.0	
10237-CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	24.65	100.72	30.28	6.02	65.0	± 9.6 %
		Y	21.67	106.26	33.17		65.0	
		Z	22.28	109.22	34.28		65.0	
10238-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	19.21	92.24	26.33	6.02	65.0	± 9.6 %
		Y	26.34	105.18	31.13		65.0	
		Z	28.55	108.60	32.14		65.0	

10239-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	17.00	89.31	25.04	6.02	65.0	± 9.6 %
		Y	24.00	102.22	29.75		65.0	
		Z	25.68	105.23	30.60		65.0	
10240-CAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	24.60	100.69	30.26	6.02	65.0	± 9.6 %
		Y	21.61	106.21	33.16		65.0	
		Z	22.24	109.18	34.27		65.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	14.83	87.15	27.43	6.98	65.0	± 9.6 %
		Y	11.87	87.25	27.69		65.0	
		Z	12.27	89.81	28.71		65.0	
10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	14.03	85.86	26.85	6.98	65.0	± 9.6 %
		Y	11.07	85.73	27.03		65.0	
		Z	11.88	89.15	28.39		65.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	12.50	85.61	27.61	6.98	65.0	± 9.6 %
		Y	8.91	82.53	26.67		65.0	
		Z	9.40	85.62	28.06		65.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	10.84	80.28	21.46	3.98	65.0	± 9.6 %
		Y	8.60	79.06	19.82		65.0	
		Z	7.30	76.79	18.14		65.0	
10245-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	10.80	80.00	21.33	3.98	65.0	± 9.6 %
		Y	8.32	78.30	19.47		65.0	
		Z	7.01	75.95	17.75		65.0	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	10.19	81.67	21.72	3.98	65.0	± 9.6 %
		Y	9.19	82.92	21.40		65.0	
		Z	10.28	85.26	21.82		65.0	
10247-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	9.24	78.33	20.99	3.98	65.0	± 9.6 %
		Y	7.42	77.41	19.87		65.0	
		Z	7.44	78.18	19.81		65.0	
10248-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	9.29	78.02	20.88	3.98	65.0	± 9.6 %
		Y	7.28	76.69	19.57		65.0	
		Z	7.17	77.21	19.40		65.0	
10249-CAD	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	10.52	82.18	22.29	3.98	65.0	± 9.6 %
		Y	10.94	86.37	23.51		65.0	
		Z	13.59	90.89	24.82		65.0	
10250-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	9.84	79.38	22.27	3.98	65.0	± 9.6 %
		Y	8.59	80.24	22.59		65.0	
		Z	8.91	81.95	23.17		65.0	
10251-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	9.48	77.77	21.45	3.98	65.0	± 9.6 %
		Y	7.96	77.76	21.28		65.0	
		Z	8.06	79.03	21.69		65.0	
10252-CAD	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	10.35	81.23	22.32	3.98	65.0	± 9.6 %
		Y	10.67	85.75	24.25		65.0	
		Z	12.80	90.26	25.85		65.0	
10253-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	9.41	77.10	21.37	3.98	65.0	± 9.6 %
		Y	7.89	76.83	21.30		65.0	
		Z	7.98	78.11	21.82		65.0	
10254-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	9.73	77.64	21.86	3.98	65.0	± 9.6 %
		Y	8.31	77.74	21.96		65.0	
		Z	8.42	79.03	22.48		65.0	

10255-CAD	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	9.76	78.98	21.63	3.98	65.0	± 9.6 %
		Y	9.21	81.58	22.99		65.0	
		Z	10.10	84.50	24.17		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	10.36	79.33	20.55	3.98	65.0	± 9.6 %
		Y	6.89	75.10	17.29		65.0	
		Z	5.38	71.84	15.02		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	10.33	78.98	20.36	3.98	65.0	± 9.6 %
		Y	6.60	74.15	16.79		65.0	
		Z	5.14	70.90	14.50		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	9.84	80.89	21.06	3.98	65.0	± 9.6 %
		Y	6.93	77.80	18.67		65.0	
		Z	6.67	77.68	18.06		65.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	9.48	78.65	21.42	3.98	65.0	± 9.6 %
		Y	7.89	78.48	20.85		65.0	
		Z	8.05	79.67	21.05		65.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	9.52	78.48	21.39	3.98	65.0	± 9.6 %
		Y	7.84	78.08	20.70		65.0	
		Z	7.93	79.11	20.83		65.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	10.28	81.56	22.27	3.98	65.0	± 9.6 %
		Y	10.28	85.25	23.51		65.0	
		Z	12.40	89.51	24.85		65.0	
10262-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	9.83	79.35	22.25	3.98	65.0	± 9.6 %
		Y	8.56	80.18	22.55		65.0	
		Z	8.88	81.87	23.12		65.0	
10263-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	9.48	77.78	21.46	3.98	65.0	± 9.6 %
		Y	7.94	77.74	21.28		65.0	
		Z	8.05	79.01	21.68		65.0	
10264-CAD	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	10.32	81.15	22.28	3.98	65.0	± 9.6 %
		Y	10.57	85.55	24.15		65.0	
		Z	12.63	90.00	25.74		65.0	
10265-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	9.59	77.50	21.45	3.98	65.0	± 9.6 %
		Y	8.04	77.33	21.54		65.0	
		Z	8.14	78.63	22.11		65.0	
10266-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	9.89	78.01	21.96	3.98	65.0	± 9.6 %
		Y	8.50	78.31	22.27		65.0	
		Z	8.64	79.67	22.86		65.0	
10267-CAD	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.88	78.96	21.38	3.98	65.0	± 9.6 %
		Y	9.52	81.96	22.96		65.0	
		Z	10.50	84.95	24.19		65.0	
10268-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	9.95	76.96	21.54	3.98	65.0	± 9.6 %
		Y	8.52	76.88	21.79		65.0	
		Z	8.53	77.92	22.30		65.0	
10269-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	9.89	76.68	21.52	3.98	65.0	± 9.6 %
		Y	8.46	76.46	21.67		65.0	
		Z	8.45	77.44	22.15		65.0	
10270-CAD	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	9.66	77.24	20.86	3.98	65.0	± 9.6 %
		Y	8.81	78.78	21.90		65.0	
		Z	9.16	80.58	22.73		65.0	

10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	X	2.74	67.26	16.17	0.00	150.0	± 9.6 %
		Y	2.61	66.92	15.38		150.0	
		Z	2.66	67.94	15.80		150.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	2.05	72.21	18.03	0.00	150.0	± 9.6 %
		Y	1.65	68.50	15.87		150.0	
		Z	1.80	70.74	17.08		150.0	
10277-CAA	PHS (QPSK)	X	8.03	72.61	16.76	9.03	50.0	± 9.6 %
		Y	5.31	69.07	13.45		50.0	
		Z	4.52	67.70	12.08		50.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	10.53	79.27	21.29	9.03	50.0	± 9.6 %
		Y	8.21	77.64	19.35		50.0	
		Z	7.62	76.93	18.36		50.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	10.71	79.48	21.37	9.03	50.0	± 9.6 %
		Y	8.29	77.74	19.41		50.0	
		Z	7.68	77.01	18.42		50.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	2.46	75.92	18.53	0.00	150.0	± 9.6 %
		Y	1.45	69.17	13.90		150.0	
		Z	1.74	72.52	15.01		150.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	1.54	75.02	18.13	0.00	150.0	± 9.6 %
		Y	0.85	66.46	12.55		150.0	
		Z	1.09	70.54	14.22		150.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	2.85	86.00	22.76	0.00	150.0	± 9.6 %
		Y	1.20	72.00	15.52		150.0	
		Z	3.37	86.48	20.58		150.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	6.08	98.98	27.50	0.00	150.0	± 9.6 %
		Y	2.38	81.80	19.81		150.0	
		Z	91.77	132.75	32.89		150.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	11.42	82.00	23.75	9.03	50.0	± 9.6 %
		Y	13.54	88.04	25.23		50.0	
		Z	20.14	95.71	27.34		50.0	
10297-AAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	3.39	72.81	18.09	0.00	150.0	± 9.6 %
		Y	2.76	70.00	16.84		150.0	
		Z	2.84	71.20	17.58		150.0	
10298-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	2.33	72.89	17.78	0.00	150.0	± 9.6 %
		Y	1.54	67.89	13.96		150.0	
		Z	1.61	69.51	14.40		150.0	
10299-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	4.61	76.96	19.19	0.00	150.0	± 9.6 %
		Y	2.70	70.48	14.61		150.0	
		Z	1.96	66.96	12.10		150.0	
10300-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	3.49	71.59	16.26	0.00	150.0	± 9.6 %
		Y	1.91	65.24	11.36		150.0	
		Z	1.47	63.13	9.40		150.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	6.59	70.34	20.04	4.17	80.0	± 9.6 %
		Y	5.68	68.74	18.85		80.0	
		Z	5.70	69.67	19.26		80.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	7.28	71.73	21.22	4.96	80.0	± 9.6 %
		Y	6.10	69.04	19.43		80.0	
		Z	6.04	69.77	19.77		80.0	

10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	7.35	72.51	21.62	4.96	80.0	± 9.6 %
		Y	5.94	69.06	19.41		80.0	
		Z	5.89	69.82	19.76		80.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	6.69	70.97	20.39	4.17	80.0	± 9.6 %
		Y	5.59	68.42	18.66		80.0	
		Z	5.56	69.20	19.00		80.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	14.75	90.64	29.58	6.02	50.0	± 9.6 %
		Y	10.18	84.38	26.41		50.0	
		Z	10.30	85.54	26.72		50.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	9.44	79.58	25.56	6.02	50.0	± 9.6 %
		Y	7.33	75.98	23.40		50.0	
		Z	6.44	73.04	21.64		50.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	10.22	81.50	26.08	6.02	50.0	± 9.6 %
		Y	7.67	77.32	23.80		50.0	
		Z	7.49	77.77	23.93		50.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	10.67	82.66	26.55	6.02	50.0	± 9.6 %
		Y	7.93	78.29	24.23		50.0	
		Z	7.77	78.85	24.42		50.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	9.59	79.83	25.67	6.02	50.0	± 9.6 %
		Y	7.43	76.26	23.57		50.0	
		Z	6.50	73.23	21.79		50.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	9.69	80.24	25.70	6.02	50.0	± 9.6 %
		Y	7.48	76.59	23.59		50.0	
		Z	7.35	77.19	23.79		50.0	
10311-AAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	3.76	71.88	17.62	0.00	150.0	± 9.6 %
		Y	3.12	69.22	16.46		150.0	
		Z	3.20	70.27	17.11		150.0	
10313-AAA	iDEN 1:3	X	8.04	75.55	17.71	6.99	70.0	± 9.6 %
		Y	8.89	81.65	20.17		70.0	
		Z	12.54	87.83	22.26		70.0	
10314-AAA	iDEN 1:6	X	10.06	79.94	21.38	10.00	30.0	± 9.6 %
		Y	12.66	89.89	25.48		30.0	
		Z	20.06	99.62	28.65		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.30	67.68	17.69	0.17	150.0	± 9.6 %
		Y	1.18	64.90	15.80		150.0	
		Z	1.23	65.94	16.59		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.90	67.26	16.78	0.17	150.0	± 9.6 %
		Y	4.64	67.10	16.54		150.0	
		Z	4.58	67.43	16.69		150.0	
10317-AAB	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.90	67.26	16.78	0.17	150.0	± 9.6 %
		Y	4.64	67.10	16.54		150.0	
		Z	4.58	67.43	16.69		150.0	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	5.01	67.47	16.66	0.00	150.0	± 9.6 %
		Y	4.68	67.24	16.42		150.0	
		Z	4.61	67.58	16.60		150.0	
10401-AAC	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.58	67.43	16.66	0.00	150.0	± 9.6 %
		Y	5.46	67.62	16.70		150.0	
		Z	5.29	67.47	16.64		150.0	

10402-AAC	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.90	68.07	16.80	0.00	150.0	± 9.6 %
		Y	5.66	67.67	16.59		150.0	
		Z	5.60	67.87	16.71		150.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	2.46	75.92	18.53	0.00	115.0	± 9.6 %
		Y	1.45	69.17	13.90		115.0	
		Z	1.74	72.52	15.01		115.0	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	2.46	75.92	18.53	0.00	115.0	± 9.6 %
		Y	1.45	69.17	13.90		115.0	
		Z	1.74	72.52	15.01		115.0	
10406-AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	X	38.96	111.40	30.01	0.00	100.0	± 9.6 %
		Y	96.63	125.46	32.24		100.0	
		Z	100.00	123.89	30.87		100.0	
10410-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	79.33	113.95	29.40	3.23	80.0	± 9.6 %
		Y	100.00	123.80	32.02		80.0	
		Z	100.00	124.20	31.74		80.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	1.01	64.64	16.23	0.00	150.0	± 9.6 %
		Y	1.03	63.36	14.90		150.0	
		Z	1.08	64.37	15.69		150.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.76	67.00	16.58	0.00	150.0	± 9.6 %
		Y	4.53	66.92	16.37		150.0	
		Z	4.48	67.28	16.53		150.0	
10417-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.76	67.00	16.58	0.00	150.0	± 9.6 %
		Y	4.53	66.92	16.37		150.0	
		Z	4.48	67.28	16.53		150.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	X	4.74	67.14	16.57	0.00	150.0	± 9.6 %
		Y	4.53	67.10	16.40		150.0	
		Z	4.48	67.49	16.59		150.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	X	4.77	67.10	16.59	0.00	150.0	± 9.6 %
		Y	4.55	67.04	16.39		150.0	
		Z	4.49	67.42	16.58		150.0	
10422-AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.90	67.10	16.59	0.00	150.0	± 9.6 %
		Y	4.66	67.03	16.41		150.0	
		Z	4.60	67.38	16.58		150.0	
10423-AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	5.14	67.54	16.75	0.00	150.0	± 9.6 %
		Y	4.81	67.33	16.51		150.0	
		Z	4.74	67.65	16.67		150.0	
10424-AAA	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	5.04	67.47	16.71	0.00	150.0	± 9.6 %
		Y	4.74	67.28	16.49		150.0	
		Z	4.66	67.61	16.65		150.0	
10425-AAA	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.61	67.86	16.86	0.00	150.0	± 9.6 %
		Y	5.36	67.59	16.69		150.0	
		Z	5.29	67.80	16.81		150.0	
10426-AAA	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.62	67.87	16.86	0.00	150.0	± 9.6 %
		Y	5.40	67.74	16.76		150.0	
		Z	5.31	67.91	16.86		150.0	

10427-AAA	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.65	67.92	16.88	0.00	150.0	± 9.6 %
		Y	5.39	67.63	16.70		150.0	
		Z	5.28	67.70	16.75		150.0	
10430-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.50	70.33	18.46	0.00	150.0	± 9.6 %
		Y	4.28	71.46	18.38		150.0	
		Z	4.28	72.32	18.56		150.0	
10431-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.56	67.66	16.75	0.00	150.0	± 9.6 %
		Y	4.19	67.51	16.33		150.0	
		Z	4.12	67.97	16.50		150.0	
10432-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.83	67.55	16.72	0.00	150.0	± 9.6 %
		Y	4.50	67.35	16.43		150.0	
		Z	4.43	67.74	16.61		150.0	
10433-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	5.06	67.54	16.75	0.00	150.0	± 9.6 %
		Y	4.75	67.32	16.51		150.0	
		Z	4.68	67.64	16.67		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.58	70.97	18.48	0.00	150.0	± 9.6 %
		Y	4.39	72.38	18.32		150.0	
		Z	4.42	73.36	18.48		150.0	
10435-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	73.07	112.66	29.06	3.23	80.0	± 9.6 %
		Y	100.00	123.60	31.93		80.0	
		Z	100.00	123.98	31.64		80.0	
10447-AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.91	67.87	16.49	0.00	150.0	± 9.6 %
		Y	3.47	67.50	15.53		150.0	
		Z	3.41	68.08	15.62		150.0	
10448-AAB	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	X	4.36	67.43	16.61	0.00	150.0	± 9.6 %
		Y	4.04	67.29	16.20		150.0	
		Z	3.99	67.77	16.38		150.0	
10449-AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	X	4.59	67.37	16.63	0.00	150.0	± 9.6 %
		Y	4.32	67.18	16.33		150.0	
		Z	4.27	67.58	16.51		150.0	
10450-AAB	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.75	67.29	16.62	0.00	150.0	± 9.6 %
		Y	4.52	67.08	16.36		150.0	
		Z	4.47	67.43	16.54		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.88	68.25	16.35	0.00	150.0	± 9.6 %
		Y	3.34	67.60	15.06		150.0	
		Z	3.25	68.08	15.03		150.0	
10456-AAA	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.45	68.48	17.01	0.00	150.0	± 9.6 %
		Y	6.28	68.20	16.88		150.0	
		Z	6.24	68.43	17.01		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.87	65.68	16.38	0.00	150.0	± 9.6 %
		Y	3.81	65.57	16.07		150.0	
		Z	3.81	65.98	16.26		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	3.63	67.17	15.82	0.00	150.0	± 9.6 %
		Y	3.13	66.82	14.32		150.0	
		Z	2.97	66.93	13.99		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	4.79	65.36	16.37	0.00	150.0	± 9.6 %
		Y	4.24	65.27	15.46		150.0	
		Z	4.13	65.72	15.38		150.0	

10460-AAA	UMTS-FDD (WCDMA, AMR)	X	1.54	79.74	21.99	0.00	150.0	± 9.6 %
		Y	0.95	69.06	16.64		150.0	
		Z	1.16	73.20	19.00		150.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	118.00	30.59	3.29	80.0	± 9.6 %
		Y	100.00	127.27	33.69		80.0	
		Z	100.00	128.13	33.61		80.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.76	26.18	3.23	80.0	± 9.6 %
		Y	100.00	111.69	26.26		80.0	
		Z	100.00	109.78	24.92		80.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	61.06	101.21	23.94	3.23	80.0	± 9.6 %
		Y	100.00	108.45	24.70		80.0	
		Z	9.38	82.48	17.38		80.0	
10464-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	116.66	29.84	3.23	80.0	± 9.6 %
		Y	100.00	125.35	32.64		80.0	
		Z	100.00	125.94	32.43		80.0	
10465-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.47	26.02	3.23	80.0	± 9.6 %
		Y	100.00	111.17	26.01		80.0	
		Z	44.16	100.58	22.73		80.0	
10466-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	42.58	96.75	22.75	3.23	80.0	± 9.6 %
		Y	42.99	98.93	22.41		80.0	
		Z	5.89	77.61	15.84		80.0	
10467-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	116.79	29.90	3.23	80.0	± 9.6 %
		Y	100.00	125.60	32.75		80.0	
		Z	100.00	126.22	32.56		80.0	
10468-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.56	26.07	3.23	80.0	± 9.6 %
		Y	100.00	111.35	26.09		80.0	
		Z	61.74	104.33	23.64		80.0	
10469-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	43.83	97.08	22.83	3.23	80.0	± 9.6 %
		Y	46.06	99.70	22.59		80.0	
		Z	6.04	77.89	15.93		80.0	
10470-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	116.81	29.90	3.23	80.0	± 9.6 %
		Y	100.00	125.63	32.76		80.0	
		Z	100.00	126.25	32.56		80.0	
10471-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.53	26.05	3.23	80.0	± 9.6 %
		Y	100.00	111.31	26.07		80.0	
		Z	61.64	104.26	23.61		80.0	
10472-AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	44.10	97.14	22.84	3.23	80.0	± 9.6 %
		Y	46.39	99.73	22.59		80.0	
		Z	6.02	77.83	15.90		80.0	
10473-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	116.79	29.89	3.23	80.0	± 9.6 %
		Y	100.00	125.60	32.74		80.0	
		Z	100.00	126.23	32.55		80.0	
10474-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.54	26.05	3.23	80.0	± 9.6 %
		Y	100.00	111.32	26.07		80.0	
		Z	60.20	104.02	23.55		80.0	
10475-AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	43.66	97.03	22.81	3.23	80.0	± 9.6 %
		Y	44.87	99.39	22.51		80.0	
		Z	5.94	77.72	15.87		80.0	

10477-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.43	26.00	3.23	80.0	± 9.6 %
		Y	100.00	111.14	25.99		80.0	
		Z	48.11	101.47	22.92		80.0	
10478-AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	43.04	96.84	22.76	3.23	80.0	± 9.6 %
		Y	43.24	98.94	22.39		80.0	
		Z	5.86	77.55	15.80		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	18.43	95.26	26.62	3.23	80.0	± 9.6 %
		Y	47.63	113.17	30.89		80.0	
		Z	79.42	120.84	32.18		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	15.38	87.90	23.16	3.23	80.0	± 9.6 %
		Y	35.80	101.51	25.84		80.0	
		Z	33.10	99.76	24.57		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	14.20	86.14	22.35	3.23	80.0	± 9.6 %
		Y	23.64	94.76	23.60		80.0	
		Z	17.83	90.68	21.64		80.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	11.00	86.13	22.59	2.23	80.0	± 9.6 %
		Y	6.54	80.66	19.81		80.0	
		Z	10.00	86.91	21.46		80.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	11.81	84.53	22.26	2.23	80.0	± 9.6 %
		Y	9.59	82.56	20.08		80.0	
		Z	5.79	75.74	16.81		80.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	11.16	83.50	21.93	2.23	80.0	± 9.6 %
		Y	8.15	80.18	19.27		80.0	
		Z	5.05	73.86	16.10		80.0	
10485-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	11.03	86.44	23.15	2.23	80.0	± 9.6 %
		Y	6.87	82.16	21.41		80.0	
		Z	9.87	88.59	23.41		80.0	
10486-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.95	77.02	19.85	2.23	80.0	± 9.6 %
		Y	4.98	74.27	17.96		80.0	
		Z	5.53	76.50	18.48		80.0	
10487-AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.82	76.43	19.65	2.23	80.0	± 9.6 %
		Y	4.85	73.54	17.65		80.0	
		Z	5.25	75.41	18.04		80.0	
10488-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.46	82.96	22.30	2.23	80.0	± 9.6 %
		Y	5.99	78.96	21.12		80.0	
		Z	6.82	82.33	22.47		80.0	
10489-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.62	75.52	19.96	2.23	80.0	± 9.6 %
		Y	4.91	73.20	18.90		80.0	
		Z	5.11	74.84	19.54		80.0	
10490-AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.56	74.88	19.76	2.23	80.0	± 9.6 %
		Y	4.94	72.82	18.76		80.0	
		Z	5.10	74.33	19.33		80.0	
10491-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.98	78.75	20.93	2.23	80.0	± 9.6 %
		Y	5.56	75.73	20.09		80.0	
		Z	5.84	77.68	21.00		80.0	
10492-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.52	73.74	19.47	2.23	80.0	± 9.6 %
		Y	5.01	71.66	18.63		80.0	
		Z	5.04	72.68	19.10		80.0	

10493-AAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.52	73.38	19.36	2.23	80.0	± 9.6 %
		Y	5.05	71.42	18.55		80.0	
		Z	5.05	72.38	18.97		80.0	
10494-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.30	81.16	21.56	2.23	80.0	± 9.6 %
		Y	6.19	77.55	20.65		80.0	
		Z	6.63	79.81	21.68		80.0	
10495-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.75	74.54	19.74	2.23	80.0	± 9.6 %
		Y	5.09	72.10	18.86		80.0	
		Z	5.10	73.07	19.34		80.0	
10496-AAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.67	73.87	19.53	2.23	80.0	± 9.6 %
		Y	5.11	71.66	18.72		80.0	
		Z	5.11	72.57	19.16		80.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.58	84.00	21.43	2.23	80.0	± 9.6 %
		Y	4.27	74.12	16.39		80.0	
		Z	5.12	76.54	16.66		80.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.19	75.19	17.72	2.23	80.0	± 9.6 %
		Y	2.33	64.39	11.23		80.0	
		Z	1.83	62.54	9.68		80.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.08	74.60	17.40	2.23	80.0	± 9.6 %
		Y	2.20	63.55	10.68		80.0	
		Z	1.70	61.64	9.07		80.0	
10500-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.69	83.97	22.50	2.23	80.0	± 9.6 %
		Y	6.26	80.30	21.12		80.0	
		Z	7.99	85.23	22.80		80.0	
10501-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.73	76.14	19.79	2.23	80.0	± 9.6 %
		Y	4.97	73.89	18.33		80.0	
		Z	5.41	76.03	18.94		80.0	
10502-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.66	75.65	19.59	2.23	80.0	± 9.6 %
		Y	4.97	73.54	18.13		80.0	
		Z	5.36	75.51	18.67		80.0	
10503-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.33	82.74	22.21	2.23	80.0	± 9.6 %
		Y	5.90	78.70	21.01		80.0	
		Z	6.71	82.03	22.35		80.0	
10504-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.59	75.44	19.92	2.23	80.0	± 9.6 %
		Y	4.88	73.08	18.84		80.0	
		Z	5.07	74.71	19.47		80.0	
10505-AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.52	74.79	19.72	2.23	80.0	± 9.6 %
		Y	4.91	72.71	18.70		80.0	
		Z	5.07	74.21	19.27		80.0	
10506-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.21	81.00	21.50	2.23	80.0	± 9.6 %
		Y	6.13	77.37	20.57		80.0	
		Z	6.56	79.62	21.60		80.0	
10507-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.72	74.48	19.71	2.23	80.0	± 9.6 %
		Y	5.07	72.03	18.82		80.0	
		Z	5.08	73.01	19.31		80.0	

10508-AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.65	73.80	19.50	2.23	80.0	± 9.6 %
		Y	5.09	71.58	18.67		80.0	
		Z	5.09	72.48	19.12		80.0	
10509-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	8.15	77.43	20.26	2.23	80.0	± 9.6 %
		Y	5.99	74.82	19.62		80.0	
		Z	6.17	76.24	20.35		80.0	
10510-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	6.94	73.36	19.32	2.23	80.0	± 9.6 %
		Y	5.42	71.16	18.60		80.0	
		Z	5.37	71.81	18.97		80.0	
10511-AAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.87	72.87	19.19	2.23	80.0	± 9.6 %
		Y	5.44	70.83	18.50		80.0	
		Z	5.39	71.45	18.85		80.0	
10512-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	9.41	80.22	21.09	2.23	80.0	± 9.6 %
		Y	6.52	76.83	20.24		80.0	
		Z	6.84	78.58	21.10		80.0	
10513-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	7.03	74.19	19.61	2.23	80.0	± 9.6 %
		Y	5.36	71.56	18.76		80.0	
		Z	5.31	72.21	19.14		80.0	
10514-AAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	6.85	73.42	19.39	2.23	80.0	± 9.6 %
		Y	5.32	71.03	18.59		80.0	
		Z	5.27	71.61	18.94		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	0.98	65.05	16.44	0.00	150.0	± 9.6 %
		Y	1.00	63.56	14.97		150.0	
		Z	1.05	64.66	15.82		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	100.00	168.11	45.87	0.00	150.0	± 9.6 %
		Y	0.67	71.83	18.15		150.0	
		Z	1.04	80.65	22.82		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.96	70.11	18.69	0.00	150.0	± 9.6 %
		Y	0.85	65.61	15.70		150.0	
		Z	0.93	67.57	17.12		150.0	
10518-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.76	67.10	16.57	0.00	150.0	± 9.6 %
		Y	4.53	67.01	16.35		150.0	
		Z	4.47	67.38	16.53		150.0	
10519-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	5.02	67.44	16.72	0.00	150.0	± 9.6 %
		Y	4.70	67.22	16.46		150.0	
		Z	4.63	67.55	16.62		150.0	
10520-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.86	67.45	16.66	0.00	150.0	± 9.6 %
		Y	4.55	67.17	16.38		150.0	
		Z	4.48	67.50	16.54		150.0	
10521-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.79	67.47	16.66	0.00	150.0	± 9.6 %
		Y	4.48	67.16	16.36		150.0	
		Z	4.42	67.48	16.53		150.0	
10522-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.82	67.32	16.63	0.00	150.0	± 9.6 %
		Y	4.55	67.29	16.46		150.0	
		Z	4.47	67.62	16.63		150.0	

10523-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.69	67.31	16.53	0.00	150.0	± 9.6 %
		Y	4.44	67.17	16.32		150.0	
		Z	4.39	67.59	16.54		150.0	
10524-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.78	67.32	16.64	0.00	150.0	± 9.6 %
		Y	4.49	67.20	16.43		150.0	
		Z	4.42	67.57	16.62		150.0	
10525-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.72	66.35	16.23	0.00	150.0	± 9.6 %
		Y	4.49	66.26	16.02		150.0	
		Z	4.45	66.66	16.22		150.0	
10526-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.95	66.78	16.37	0.00	150.0	± 9.6 %
		Y	4.64	66.60	16.16		150.0	
		Z	4.58	66.96	16.34		150.0	
10527-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.86	66.80	16.35	0.00	150.0	± 9.6 %
		Y	4.57	66.56	16.10		150.0	
		Z	4.51	66.93	16.29		150.0	
10528-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.89	66.82	16.38	0.00	150.0	± 9.6 %
		Y	4.58	66.57	16.13		150.0	
		Z	4.52	66.94	16.32		150.0	
10529-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.89	66.82	16.38	0.00	150.0	± 9.6 %
		Y	4.58	66.57	16.13		150.0	
		Z	4.52	66.94	16.32		150.0	
10531-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.92	67.00	16.42	0.00	150.0	± 9.6 %
		Y	4.57	66.66	16.14		150.0	
		Z	4.49	66.99	16.31		150.0	
10532-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.76	66.93	16.40	0.00	150.0	± 9.6 %
		Y	4.43	66.51	16.07		150.0	
		Z	4.37	66.85	16.25		150.0	
10533-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.90	66.82	16.35	0.00	150.0	± 9.6 %
		Y	4.59	66.64	16.13		150.0	
		Z	4.53	67.03	16.33		150.0	
10534-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	5.38	66.99	16.41	0.00	150.0	± 9.6 %
		Y	5.14	66.65	16.20		150.0	
		Z	5.08	66.89	16.34		150.0	
10535-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	5.47	67.13	16.46	0.00	150.0	± 9.6 %
		Y	5.21	66.87	16.30		150.0	
		Z	5.13	67.05	16.42		150.0	
10536-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	5.32	67.12	16.45	0.00	150.0	± 9.6 %
		Y	5.08	66.81	16.25		150.0	
		Z	5.02	67.06	16.40		150.0	
10537-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	5.39	67.07	16.42	0.00	150.0	± 9.6 %
		Y	5.13	66.76	16.23		150.0	
		Z	5.08	67.03	16.39		150.0	
10538-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.52	67.19	16.52	0.00	150.0	± 9.6 %
		Y	5.21	66.77	16.27		150.0	
		Z	5.14	66.99	16.41		150.0	
10540-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	5.40	67.10	16.49	0.00	150.0	± 9.6 %
		Y	5.15	66.79	16.30		150.0	
		Z	5.07	66.96	16.41		150.0	

10541-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	5.41	67.10	16.49	0.00	150.0	± 9.6 %
		Y	5.12	66.64	16.21		150.0	
		Z	5.05	66.85	16.34		150.0	
10542-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.53	67.02	16.46	0.00	150.0	± 9.6 %
		Y	5.28	66.73	16.27		150.0	
		Z	5.21	66.95	16.40		150.0	
10543-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.65	67.09	16.50	0.00	150.0	± 9.6 %
		Y	5.35	66.75	16.31		150.0	
		Z	5.28	67.01	16.46		150.0	
10544-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.63	67.05	16.36	0.00	150.0	± 9.6 %
		Y	5.46	66.75	16.19		150.0	
		Z	5.42	66.95	16.31		150.0	
10545-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.85	67.43	16.48	0.00	150.0	± 9.6 %
		Y	5.67	67.24	16.39		150.0	
		Z	5.61	67.44	16.52		150.0	
10546-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.76	67.40	16.49	0.00	150.0	± 9.6 %
		Y	5.52	66.93	16.25		150.0	
		Z	5.45	67.09	16.35		150.0	
10547-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.86	67.50	16.53	0.00	150.0	± 9.6 %
		Y	5.59	67.00	16.28		150.0	
		Z	5.54	67.20	16.40		150.0	
10548-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	6.21	68.68	17.08	0.00	150.0	± 9.6 %
		Y	5.87	68.02	16.76		150.0	
		Z	5.72	67.95	16.76		150.0	
10550-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.77	67.31	16.45	0.00	150.0	± 9.6 %
		Y	5.57	67.05	16.32		150.0	
		Z	5.52	67.30	16.47		150.0	
10551-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.80	67.45	16.48	0.00	150.0	± 9.6 %
		Y	5.55	67.00	16.26		150.0	
		Z	5.45	67.07	16.32		150.0	
10552-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.69	67.19	16.37	0.00	150.0	± 9.6 %
		Y	5.47	66.81	16.17		150.0	
		Z	5.43	67.06	16.31		150.0	
10553-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.78	67.21	16.40	0.00	150.0	± 9.6 %
		Y	5.54	66.82	16.20		150.0	
		Z	5.48	67.01	16.32		150.0	
10554-AAB	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	6.03	67.43	16.45	0.00	150.0	± 9.6 %
		Y	5.89	67.12	16.28		150.0	
		Z	5.84	67.28	16.38		150.0	
10555-AAB	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	6.22	67.88	16.64	0.00	150.0	± 9.6 %
		Y	6.02	67.44	16.43		150.0	
		Z	5.95	67.54	16.50		150.0	
10556-AAB	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	6.20	67.79	16.59	0.00	150.0	± 9.6 %
		Y	6.04	67.49	16.44		150.0	
		Z	5.99	67.66	16.55		150.0	
10557-AAB	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	6.21	67.81	16.62	0.00	150.0	± 9.6 %
		Y	5.99	67.35	16.39		150.0	
		Z	5.93	67.50	16.49		150.0	

10558-AAB	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	6.28	68.03	16.75	0.00	150.0	± 9.6 %
		Y	6.04	67.52	16.49		150.0	
		Z	5.95	67.59	16.55		150.0	
10560-AAB	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	6.28	67.87	16.71	0.00	150.0	± 9.6 %
		Y	6.03	67.35	16.44		150.0	
		Z	5.96	67.49	16.53		150.0	
10561-AAB	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	6.18	67.80	16.71	0.00	150.0	± 9.6 %
		Y	5.96	67.36	16.48		150.0	
		Z	5.90	67.49	16.57		150.0	
10562-AAB	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	6.37	68.38	17.01	0.00	150.0	± 9.6 %
		Y	6.06	67.66	16.63		150.0	
		Z	5.96	67.67	16.66		150.0	
10563-AAB	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	6.58	68.54	17.02	0.00	150.0	± 9.6 %
		Y	6.18	67.65	16.59		150.0	
		Z	6.05	67.62	16.60		150.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	5.11	67.26	16.76	0.46	150.0	± 9.6 %
		Y	4.86	67.10	16.52		150.0	
		Z	4.80	67.44	16.68		150.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	5.41	67.77	17.08	0.46	150.0	± 9.6 %
		Y	5.08	67.53	16.83		150.0	
		Z	5.00	67.82	16.97		150.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	5.23	67.67	16.93	0.46	150.0	± 9.6 %
		Y	4.92	67.38	16.66		150.0	
		Z	4.84	67.67	16.80		150.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	5.26	68.03	17.24	0.46	150.0	± 9.6 %
		Y	4.95	67.77	17.01		150.0	
		Z	4.87	68.04	17.15		150.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	5.14	67.36	16.67	0.46	150.0	± 9.6 %
		Y	4.84	67.19	16.45		150.0	
		Z	4.75	67.49	16.60		150.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	5.19	68.02	17.24	0.46	150.0	± 9.6 %
		Y	4.92	67.92	17.11		150.0	
		Z	4.86	68.27	17.29		150.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	5.23	67.81	17.17	0.46	150.0	± 9.6 %
		Y	4.94	67.74	17.02		150.0	
		Z	4.86	68.06	17.18		150.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.68	70.36	18.73	0.46	130.0	± 9.6 %
		Y	1.37	66.32	16.49		130.0	
		Z	1.41	67.39	17.29		130.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.75	71.47	19.28	0.46	130.0	± 9.6 %
		Y	1.40	67.01	16.89		130.0	
		Z	1.45	68.17	17.74		130.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	100.00	142.31	37.38	0.46	130.0	± 9.6 %
		Y	5.69	99.12	27.30		130.0	
		Z	66.26	143.73	39.41		130.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	3.57	87.71	25.60	0.46	130.0	± 9.6 %
		Y	1.70	74.22	20.29		130.0	
		Z	1.88	76.94	21.86		130.0	

10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.95	67.19	16.89	0.46	130.0	± 9.6 %
		Y	4.69	67.03	16.64		130.0	
		Z	4.63	67.35	16.80		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.98	67.35	16.96	0.46	130.0	± 9.6 %
		Y	4.72	67.20	16.72		130.0	
		Z	4.66	67.55	16.88		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	5.24	67.69	17.13	0.46	130.0	± 9.6 %
		Y	4.90	67.46	16.87		130.0	
		Z	4.82	67.76	17.01		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	5.14	67.89	17.23	0.46	130.0	± 9.6 %
		Y	4.81	67.63	16.98		130.0	
		Z	4.73	67.92	17.12		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.94	67.39	16.68	0.46	130.0	± 9.6 %
		Y	4.58	66.91	16.29		130.0	
		Z	4.50	67.21	16.45		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.98	67.29	16.65	0.46	130.0	± 9.6 %
		Y	4.62	66.97	16.32		130.0	
		Z	4.54	67.27	16.48		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	5.07	68.07	17.23	0.46	130.0	± 9.6 %
		Y	4.72	67.70	16.95		130.0	
		Z	4.65	68.04	17.12		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.90	67.13	16.49	0.46	130.0	± 9.6 %
		Y	4.51	66.68	16.07		130.0	
		Z	4.43	67.00	16.24		130.0	
10583-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.95	67.19	16.89	0.46	130.0	± 9.6 %
		Y	4.69	67.03	16.64		130.0	
		Z	4.63	67.35	16.80		130.0	
10584-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.98	67.35	16.96	0.46	130.0	± 9.6 %
		Y	4.72	67.20	16.72		130.0	
		Z	4.66	67.55	16.88		130.0	
10585-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	5.24	67.69	17.13	0.46	130.0	± 9.6 %
		Y	4.90	67.46	16.87		130.0	
		Z	4.82	67.76	17.01		130.0	
10586-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	5.14	67.89	17.23	0.46	130.0	± 9.6 %
		Y	4.81	67.63	16.98		130.0	
		Z	4.73	67.92	17.12		130.0	
10587-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.94	67.39	16.68	0.46	130.0	± 9.6 %
		Y	4.58	66.91	16.29		130.0	
		Z	4.50	67.21	16.45		130.0	
10588-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.98	67.29	16.65	0.46	130.0	± 9.6 %
		Y	4.62	66.97	16.32		130.0	
		Z	4.54	67.27	16.48		130.0	
10589-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	5.07	68.07	17.23	0.46	130.0	± 9.6 %
		Y	4.72	67.70	16.95		130.0	
		Z	4.65	68.04	17.12		130.0	
10590-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.90	67.13	16.49	0.46	130.0	± 9.6 %
		Y	4.51	66.68	16.07		130.0	
		Z	4.43	67.00	16.24		130.0	