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

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:
03/22/18 - 04/10/18
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1803090037-01-R2.A3L

FCC ID: **A3LSMJ337P**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: SM-J337P

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)
PCE	CDMA/EVDO BC10 (§90S)	817.90 - 823.10 MHz	0.44	0.65	0.69
PCE	CDMA/EVDO BC0 (§22H)	824.70 - 848.31 MHz	0.49	0.67	0.82
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	1.03	0.79	0.99
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.42	0.64	0.85
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.30	0.21	0.27
PCE	UMTS 850	826.40 - 846.60 MHz	0.44	0.75	0.82
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.86	0.78	1.40
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.77	0.52	0.68
PCE	LTE Band 12	699.7 - 715.3 MHz	0.22	0.32	0.43
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.49	0.73	0.86
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	N/A	N/A	N/A
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.75	0.78	1.24
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	1.03	0.82	0.84
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A	N/A
PCE	LTE Band 41	2498.5 - 2687.5 MHz	0.56	0.58	0.73
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.78	0.20	0.38
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	N/A
NII	U-NII-2A	5260 - 5320 MHz	1.06	0.39	N/A
NII	U-NII-2C	5500 - 5720 MHz	0.72	0.33	N/A
NII	U-NII-3	5745 - 5825 MHz	0.56	0.54	1.04
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.59	1.36	1.57

Note: This revised Test Report (S/N: 1M1803090037-01-R2.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.7 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

SAR ELIGIBLE ilac-MRA ACCREDITED TESTING CERT#2041.01

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

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
CDMA/EVDO BC10 (§90S)	Voice/Data	817.90 - 823.10 MHz
CDMA/EVDO BC0 (§22H)	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
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	Data	699.7 - 715.3 MHz
LTE Band 26 (Cell)	Data	814.7 - 848.3 MHz
LTE Band 5 (Cell)	Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Data	1850.7 - 1909.3 MHz
LTE Band 41	Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR.

This device utilizes a single step power reduction mechanism for some wireless modes and bands for SAR compliance under portable hotspot conditions and during held-to-ear conditions during voice or VOIP scenarios. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when hotspot is enabled. Held-to-ear exposure conditions were evaluated at reduced power for the applicable modes per FCC guidance. 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 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	**33.2**	**33.2**	**30.0**	**29.0**	**28.0**	**26.5**	**24.5**	**23.5**	**22.0**
	Nominal	**32.2**	**32.2**	**29.0**	**28.0**	**27.0**	**25.5**	**23.5**	**22.5**	**21.0**
GSM/GPRS/EDGE 1900	Maximum	**30.2**	**30.2**	**27.5**	**26.0**	**25.0**	**25.0**	**23.5**	**22.5**	**21.0**
	Nominal	**29.2**	**29.2**	**26.5**	**25.0**	**24.0**	**24.0**	**22.5**	**21.5**	**20.0**

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**24.0**	**23.5**	**23.5**
	Nominal	**23.0**	**22.5**	**22.5**
UMTS Band 4 (1750 MHz)	Maximum	**24.0**	**23.5**	**23.5**
	Nominal	**23.0**	**22.5**	**22.5**
UMTS Band 2 (1900 MHz)	Maximum	**24.0**	**23.5**	**23.5**
	Nominal	**23.0**	**22.5**	**22.5**

Mode / Band		Modulated Average (dBm)
CDMA/EVDO BC10 (§90S)	Maximum	**25.0**
	Nominal	**24.0**
CDMA/EVDO BC0 (§22H)	Maximum	**25.0**
	Nominal	**24.0**
PCS CDMA/EVDO	Maximum	**25.5**
	Nominal	**24.5**

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**24.5**
	Nominal	**23.5**
LTE Band 26 (Cell)	Maximum	**25.0**
	Nominal	**24.0**
LTE Band 5 (Cell)	Maximum	**25.0**
	Nominal	**24.0**
LTE Band 4 (AWS)	Maximum	**24.5**
	Nominal	**23.5**
LTE Band 25 (PCS)	Maximum	**25.0**
	Nominal	**24.0**
LTE Band 2 (PCS)	Maximum	**25.0**
	Nominal	**24.0**
LTE Band 41 PC3	Maximum	**24.0**
	Nominal	**23.0**
LTE Band 41 PC2	Maximum	**28.0**
	Nominal	**27.0**

Mode / Band		Modulated Average (dBm)		
		Ch. 1-9	Ch. 10	Ch. 11
IEEE 802.11b (2.4 GHz)	Maximum	**19.0**		
	Nominal	**18.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**16.0**	**15.0**	**11.0**
	Nominal	**15.0**	**14.0**	**10.0**
IEEE 802.11n (2.4 GHz)	Maximum	**16.0**	**14.0**	**11.0**
	Nominal	**15.0**	**13.0**	**10.0**

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	**9.0**
	Nominal	**8.0**
Bluetooth LE	Maximum	**6.0**
	Nominal	**5.0**

Mode / Band		Modulated Average (dBm)					
		20 MHz Bandwidth			40 MHz Bandwidth		
		Ch.40-60, Ch.100-165	Ch. 36	Ch. 64	Ch.46-54, Ch.110-159	Ch.38, Ch.62	Ch. 102
IEEE 802.11a (5 GHz)	Maximum	**16.0**	**13.0**	**15.0**			
	Nominal	**15.0**	**12.0**	**14.0**			
IEEE 802.11n (5 GHz)	Maximum	**16.0**	**13.0**	**15.0**	**15.0**	**9.0**	**12.0**
	Nominal	**15.0**	**12.0**	**14.0**	**14.0**	**8.0**	**11.0**

1.3.1 Reduced 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 1900	Maximum	**29.0**	**29.0**	**26.0**	**24.5**	**23.5**	**25.0**	**23.0**	**22.0**	**20.5**
	Nominal	**28.0**	**28.0**	**25.0**	**23.5**	**22.5**	**24.0**	**22.0**	**21.0**	**19.5**

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 2 (1900 MHz)	Maximum	**23.0**	**22.0**	**22.0**
	Nominal	**22.0**	**21.0**	**21.0**

Mode / Band		Modulated Average (dBm)
CDMA/EVDO BC10 (§90S)	Maximum	**24.7**
	Nominal	**23.7**
CDMA/EVDO BC0 (§22H)	Maximum	**24.7**
	Nominal	**23.7**
PCS CDMA/EVDO	Maximum	**24.0**
	Nominal	**23.0**

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	**23.5**
	Nominal	**22.5**
LTE Band 25 (PCS)	Maximum	**23.5**
	Nominal	**22.5**
LTE Band 2 (PCS)	Maximum	**23.5**
	Nominal	**22.5**
LTE Band 41 PC2	Maximum	**25.0**
	Nominal	**24.0**

Mode / Band		Modulated Average (dBm)		
		Ch. 1-9	Ch. 10	Ch. 11
IEEE 802.11b (2.4 GHz)	Maximum	**16.0**		
	Nominal	**15.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**16.0**	**15.0**	**11.0**
	Nominal	**15.0**	**14.0**	**10.0**
IEEE 802.11n (2.4 GHz)	Maximum	**16.0**	**14.0**	**11.0**
	Nominal	**15.0**	**13.0**	**10.0**

Mode / Band		Modulated Average (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	
			Ch.46-54, Ch.102-159	Ch.38, Ch. 62
IEEE 802.11a (5 GHz)	Maximum	**11.0**		
	Nominal	**10.0**		
IEEE 802.11n (5 GHz)	Maximum	**11.0**	**11.0**	**9.0**
	Nominal	**10.0**	**10.0**	**8.0**

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
EVDO BC10 (§90S)	Yes	Yes	No	Yes	Yes	Yes
EVDO BC0 (§22H)	Yes	Yes	No	Yes	Yes	Yes
PCS EVDO	Yes	Yes	No	Yes	Yes	Yes
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 26 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 25 (PCS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 41	Yes	Yes	No	Yes	Yes	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 if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-1, U-NII-2A, U-NII-2C operations are disabled. Therefore, U-NII-1, U-NII-2A, U-NII-2C operations are not considered in this section.

1.5 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	Notes
1	1x CDMA voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
2	1x CDMA voice + 5 GHz WI-FI	Yes	Yes	N/A	
3	1x CDMA voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	^ Bluetooth Tethering is considered
4	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
5	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	
6	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	^ Bluetooth Tethering is considered
7	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	
8	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	
9	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	^ Bluetooth Tethering is considered
10	LTE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
11	LTE + 5 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
12	LTE + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
13	CDMA/EVDO data + 2.4 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
14	CDMA/EVDO data + 5 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
15	CDMA/EVDO data + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
16	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	
17	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	Yes	
18	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	Yes^	^ Bluetooth Tethering is considered

1. 2.4 GHz WLAN, 5 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII2A, and U-NII2C were not evaluated for wireless router conditions.
6. This device supports VoWIFI.

1.6 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, head Bluetooth SAR was not required; [(8/5)* √2.480] = 2.5< 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; [(8/10)* √2.480] = 1.3< 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, body-worn Bluetooth SAR was not required; [(8/15)* √2.480] = 0.8< 3.0. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

(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.

CDMA 1X Advanced technology was not required for SAR since the maximum allowed output powers for 1x Advanced was not more than 0.25 dB higher than the maximum powers for 1x and the measured SAR in any 1x mode exposure conditions was not greater than 1.2 W/kg per FCC KDB Publication 941225 D01v03r01.

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

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

This device supports both Power Class 2 (PC2) and Power Class 3 (PC3) for LTE Band 41. Per May 2017 TCB Workshop Notes, SAR tests were performed with Power Class 3 (given the specific UL/DL limitations for Power Class 2). Additionally, SAR testing for the power class condition was evaluated for the highest configuration in Power Class 3 for each test configuration to confirm the results were scalable linearly (See Section 14.1).

1.7 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE Band 41 Power Class 2/3)
- Fall 2017 TCB Workshop Notes (LTE Carrier Aggregation)

1.8 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	**A3LSMJ337P**				
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)		715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)		714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)		713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)		711 (23130)
LTE Band 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 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)		848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)		847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)		846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)		844 (20600)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)		1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)		1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)		1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)		1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)		1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)		1745 (20300)
LTE Band 25 (PCS): 1.4 MHz	1850.7 (26047)		1882.5 (26365)		1914.3 (26683)
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)		1913.5 (26675)
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)		1912.5 (26665)
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)		1910 (26640)
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)		1882.5 (26365)		1907.5 (26615)
LTE Band 25 (PCS): 20 MHz	1860 (26140)		1882.5 (26365)		1905 (26590)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)		1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)		1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)		1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)		1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)		1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)		1900 (19100)
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	6				
Modulations Supported in UL	QPSK, 16QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE 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 10. It supports a maximum of 2 carriers in the downlink. 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:

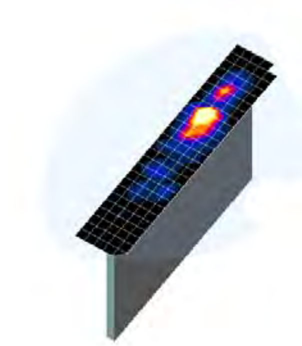


Figure 4-1
Sample SAR Area Scan

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

*Also compliant to IEEE 1528-2013 Table 6

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

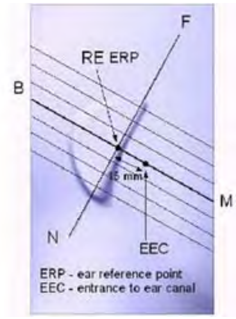


Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

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

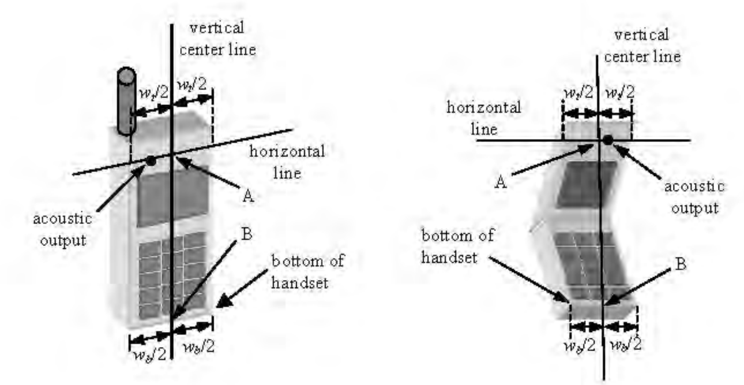


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

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

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

6.3 Positioning for Ear / 15º Tilt

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

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

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

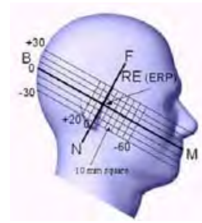


Figure 6-3
Side view w/ relevant markings

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

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

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

6.5 Body-Worn Accessory Configurations

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

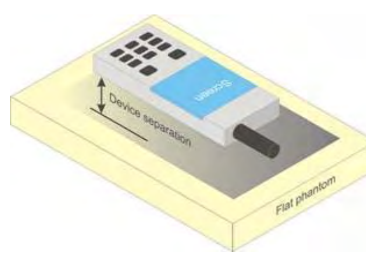


Figure 6-4
Sample Body-Worn Diagram

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

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

6.6 Extremity Exposure Configurations

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

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 CDMA2000

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

8.4.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by FCC KDB Publication 941225 D01v03r01 "3G SAR Measurement Procedures." Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 8-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH_0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 8-2 was applied.

Table 8-1
Parameters for Max. Power for RC1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 8-2
Parameters for Max. Power for RC3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

5. FCHs were configured at full rate for maximum SAR with “All Up” power control bits.

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at fullrate in SO55. The 3G SAR test reduction procedure is applied to RC1 with RC3 as the primary mode; otherwise, SAR is required for the channel with maximum measured output in RC1 using the head exposure configuration that results in the highest reported SAR in RC3.

Head SAR is additionally evaluated using EVDO Rev. A to support compliance for VoIP operations. See Section 8.4.5 for EVDO Rev. A configuration parameters.

8.4.3 Body-worn SAR Measurements

SAR for body-worn exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCHn), with FCH only as the primary mode. Otherwise, SAR is required for multiple code channel configuration (FCH + SCHn), with FCH at full rate and SCH0 enabled at 9600 bps, using the highest reported SAR configuration for FCH only. When multiple code channels are enabled, the transmitter output can shift by more than 0.5 dB and may lead to higher SAR drifts and SCH dropouts.

The 3G SAR test reduction procedure is applied to body-worn accessory SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

8.4.4 Body-worn SAR Measurements for EVDO Devices

For handsets with EVDO capabilities, the 3G SAR test reduction procedure is applied to EVDO Rev. 0 with 1x RTT RC3 as the primary mode to determine body-worn accessory test requirements. Otherwise, body-worn accessory SAR is required for Rev. 0, at 153.6 kbps, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

The 3G SAR test reduction procedure is applied to Rev. A, with Rev. 0 as the primary mode to determine body-worn accessory SAR test requirements. When SAR is not required for Rev. 0, the 3G SAR test reduction is applied with 1x RTT RC3 as the primary mode.

When SAR is required for EVDO Rev. A, SAR is measured with a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations, using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0 or 1x RTT RC3, as appropriate.

8.4.5 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. The 3G SAR test reduction procedure is applied to Rev. A, Subtype 2 Physical layer configuration, with Rev. 0 as the primary mode; otherwise, SAR is measured for Rev. A using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations.

For EVDO data devices that also support 1x RTT voice and/or data operations, the 3G SAR test reduction procedure is applied to 1x RTT RC3 and RC1 with EVDO Rev. 0 and Rev. A as the respective primary modes. Otherwise, the 'Body-Worn Accessory SAR' procedures in the '3GPP2 CDMA 2000 1x Handsets' section are applied.

8.4.6 CDMA2000 1x Advanced

This device additionally supports 1x Advanced. Conducted powers are measured using SO75 with RC8 on the uplink and RC11 on the downlink per FCC KDB Publication 941225 D01v03r01. Smart blanking is disabled for all measurements. The EUT is configured with forward power control Mode 000 and reverse power control at 400 bps. Conducted powers are measured on an Agilent 8960 Series 10 Wireless Communications Test Set, Model E5515C using the CDMA2000 1x Advanced application, Option E1962B-410.

The 3G SAR test reduction procedure is applied to the 1x-Advanced transmission mode with 1x RTT RC3 as the primary mode. When SAR measurement is required, the 1x-Advanced power measurement configurations are used. The1x Advanced SAR procedures are applied separately to head, body-worn accessory and other exposure conditions.

8.5 SAR Measurement Conditions for UMTS

8.5.1 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.

8.5.2 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.

8.5.3 Body SAR Measurements

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

8.5.4 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.

8.5.5 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.

8.6 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).

8.6.1 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.

8.6.2 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.

8.6.3 A-MPR

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

8.6.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

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

8.6.5 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.

8.6.6 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.

8.7 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.

8.7.1 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.

8.7.2 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.

8.7.3 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.

8.7.4 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.

8.7.5 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.

8.7.6 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.

8.7.7 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 8.7.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.8 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 CDMA Conducted Powers

Table 9-1
Maximum Conducted Power

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	564	90S	820.1	24.42	24.43	24.38	24.36	24.42	24.41	24.44
Cellular	1013	22H	824.7	24.59	24.56	24.59	24.47	24.49	24.55	24.53
	384	22H	836.52	24.48	24.46	24.43	24.52	24.52	24.41	24.43
	777	22H	848.31	24.59	24.58	23.81	24.58	24.59	24.61	24.73
PCS	25	24E	1851.25	24.54	24.51	24.53	24.52	24.51	24.55	24.61
	600	24E	1880	24.49	24.46	24.43	24.44	24.46	24.49	24.57
	1175	24E	1908.75	24.57	24.55	24.51	24.55	24.55	24.57	24.64

Table 9-2
Reduced Conducted Power

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	564	90S	820.1	24.19	24.16	23.95	24.18	24.17	24.03	24.07
Cellular	1013	22H	824.7	23.74	23.77	23.35	23.77	23.78	23.74	23.80
	384	22H	836.52	23.75	23.76	23.33	23.71	23.77	23.77	23.81
	777	22H	848.31	23.66	23.63	23.19	23.61	23.74	23.74	23.76
PCS	25	24E	1851.25	23.20	23.18	23.16	23.20	23.21	23.23	23.21
	600	24E	1880	23.16	23.12	23.14	23.14	23.15	23.06	23.09
	1175	24E	1908.75	23.23	23.22	23.20	23.25	23.24	23.02	23.01

Note: RC1 is only applicable for IS-95 compatibility. For FCC Rule Part 90S, Per FCC KDB Publication 447498 D01v06 4.1.g), only one channel is required since the device operates within the transmission range of 817.90 – 823.10 MHz.

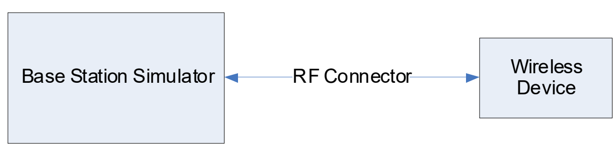


Figure 9-1
Power Measurement Setup

9.2 GSM Conducted Powers

Table 9-3
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	31.76	31.84	29.52	28.66	**27.27**	25.97	23.97	23.06	21.66
	190	31.94	32.02	29.61	28.73	**27.31**	26.04	24.04	23.09	21.64
	251	31.96	32.04	29.86	28.84	**27.57**	26.29	24.21	23.34	21.97
GSM 1900	512	29.70	29.61	27.02	25.69	**24.07**	24.65	22.95	21.87	20.53
	661	29.28	29.29	26.83	25.26	**23.87**	24.96	23.36	21.97	20.78
	810	29.36	29.45	26.92	25.57	**23.92**	24.99	23.39	22.18	20.87

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	22.73	22.81	23.50	24.40	**24.26**	16.94	17.95	18.80	18.65
	190	22.91	22.99	23.59	24.47	**24.30**	17.01	18.02	18.83	18.63
	251	22.93	23.01	23.84	24.58	**24.56**	17.26	18.19	19.08	18.96
GSM 1900	512	20.67	20.58	21.00	21.43	21.06	15.62	16.93	17.61	17.52
	661	20.25	20.26	20.81	21.00	20.86	15.93	17.34	17.71	17.77
	810	20.33	20.42	20.90	21.31	20.91	15.96	17.37	17.92	17.86

GSM 850	Frame Avg.Targets:	23.17	23.17	22.98	23.74	**23.99**	16.47	17.48	18.24	17.99
GSM 1900		20.17	20.17	20.48	20.74	20.99	14.97	16.48	17.24	16.99

Table 9-4
Reduced Conducted Power

Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 1900	512	28.21	28.15	25.87	24.45	**22.79**	24.51	22.83	21.56	20.37
	661	28.24	28.18	25.96	24.47	**23.34**	24.49	22.78	21.71	20.46
	810	27.93	27.94	26.00	24.50	**23.19**	24.57	22.89	21.78	20.45

Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 1900	512	19.18	19.12	19.85	20.19	**19.78**	15.48	16.81	17.30	17.36
	661	19.21	19.15	19.94	20.21	**20.33**	15.46	16.76	17.45	17.45
	810	18.90	18.91	19.98	20.24	**20.18**	15.54	16.87	17.52	17.44
GSM 1900	Frame Avg.Targets:	18.97	18.97	18.98	19.24	**19.49**	14.97	15.98	16.74	16.49

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

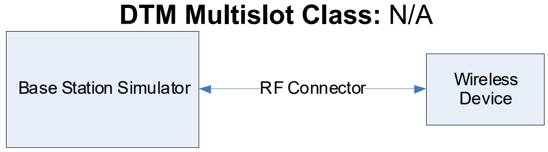


Figure 9-2
Power Measurement Setup

9.3 UMTS Conducted Powers

Table 9-5
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	22.96	22.89	22.85	22.76	22.77	22.72	22.85	22.95	22.87	-
99		12.2 kbps AMR	22.94	23.03	22.76	22.67	22.76	22.71	22.85	22.97	22.89	-
6	HSDPA	Subtest 1	23.10	23.02	23.05	23.28	23.23	23.18	23.00	23.13	23.07	0
6		Subtest 2	22.61	22.51	22.49	22.70	22.57	23.26	23.21	23.21	23.13	0
6		Subtest 3	22.57	22.55	22.48	22.72	22.62	22.84	22.64	22.83	22.77	0.5
6		Subtest 4	21.64	21.66	21.57	21.87	21.76	22.87	22.67	22.84	22.78	0.5
6	HSUPA	Subtest 1	22.24	22.34	22.27	21.02	21.35	22.41	22.11	22.25	22.16	0
6		Subtest 2	20.65	20.56	20.58	18.59	19.02	20.01	20.15	20.33	20.25	2
6		Subtest 3	21.71	21.64	21.60	21.55	21.39	21.66	21.37	21.47	21.41	1
6		Subtest 4	20.62	20.61	20.51	18.59	19.01	20.00	20.11	20.36	20.28	2
6		Subtest 5	23.21	23.16	23.15	23.26	23.25	23.18	22.94	23.03	22.97	0

Table 9-6
Reduced Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	PCS Band [dBm]			3GPP MPR [dB]
			9262	9400	9538	
99	WCDMA	12.2 kbps RMC	21.95	21.99	21.95	-
99		12.2 kbps AMR	21.98	21.96	21.99	-
6	HSDPA	Subtest 1	21.96	21.91	21.99	0
6		Subtest 2	21.98	21.95	21.97	0
6		Subtest 3	21.98	21.96	21.99	0.5
6		Subtest 4	21.99	21.95	21.98	0.5
6	HSUPA	Subtest 1	21.28	21.21	21.19	0
6		Subtest 2	19.81	20.14	19.78	2
6		Subtest 3	21.21	21.23	21.24	1
6		Subtest 4	19.82	20.13	19.82	2
6		Subtest 5	21.97	21.93	21.95	0

This device does not support DC-HSDPA.

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

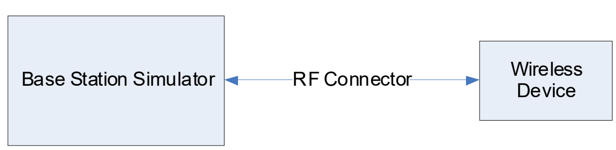


Figure 9-3
Power Measurement Setup

9.4 LTE Conducted Powers

9.4.1 LTE Band 12

Table 9-7
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	24.39	0	0
	1	25	24.37		0
	1	49	**24.41**		0
	25	0	**23.18**	0-1	1
	25	12	23.16		1
	25	25	23.15		1
	50	0	23.17		1
16QAM	1	0	23.22	0-1	1
	1	25	23.20		1
	1	49	23.03		1
	25	0	22.13	0-2	2
	25	12	22.14		2
	25	25	22.12		2
	50	0	22.16		2

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

Table 9-8
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	24.32	24.35	24.39	0	0
	1	12	24.31	24.35	24.40		0
	1	24	24.34	24.36	24.38		0
	12	0	23.24	23.26	23.30	0-1	1
	12	6	23.23	23.27	23.29		1
	12	13	23.28	23.29	23.28		1
	25	0	23.25	23.27	23.27		1
16QAM	1	0	23.07	23.08	23.11	0-1	1
	1	12	23.12	23.11	23.13		1
	1	24	23.07	23.11	23.13		1
	12	0	22.16	22.19	22.25	0-2	2
	12	6	22.20	22.27	22.24		2
	12	13	22.20	22.26	22.23		2
	25	0	22.21	22.23	22.24		2

Table 9-9
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	24.36	24.36	24.38	0	0
	1	7	24.38	24.41	24.39		0
	1	14	24.37	24.40	24.34		0
	8	0	23.26	23.27	23.27	0-1	1
	8	4	23.26	23.26	23.28		1
	8	7	23.25	23.29	23.27		1
	15	0	23.27	23.27	23.24		1
16QAM	1	0	22.93	22.97	22.99	0-1	1
	1	7	22.95	22.99	23.04		1
	1	14	22.94	23.00	23.03		1
	8	0	22.19	22.21	22.20	0-2	2
	8	4	22.25	22.21	22.22		2
	8	7	22.22	22.21	22.23		2
	15	0	22.22	22.24	22.21		2

Table 9-10
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	24.41	24.40	24.39	0	0
	1	2	24.46	24.41	24.43		0
	1	5	24.46	24.40	24.41		0
	3	0	24.45	24.39	24.26		0
	3	2	24.42	24.42	24.23		0
	3	3	24.43	24.34	24.24		0
	6	0	23.17	23.11	23.11	0-1	1
16QAM	1	0	22.86	22.83	22.87	0-1	1
	1	2	22.90	22.84	22.77		1
	1	5	22.91	22.87	22.83		1
	3	0	23.05	23.04	23.03		1
	3	2	23.07	23.04	23.02		1
	3	3	23.10	23.05	23.00		1
	6	0	22.08	22.02	22.02	0-2	2

9.4.2 LTE Band 26 (Cell)

Table 9-11
LTE Band 26 (Cell) Conducted Powers - 15 MHz Bandwidth

LTE Band 26 (Cell) 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 26865 (831.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**24.03**	0	0
	1	36	24.00		0
	1	74	23.91		0
	36	0	**22.97**	0-1	1
	36	18	22.94		1
	36	37	22.90		1
	75	0	22.91		1
16QAM	1	0	22.94	0-1	1
	1	36	22.90		1
	1	74	22.80		1
	36	0	21.92	0-2	2
	36	18	21.90		2
	36	37	21.87		2
	75	0	21.86		2

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

Table 9-12
LTE Band 26 (Cell) Conducted Powers - 10 MHz Bandwidth

LTE Band 26 (Cell) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26740 (819.0 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 26990 (844.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.10	24.12	24.21	0	0
	1	25	24.06	24.11	24.14		0
	1	49	24.02	24.04	24.15		0
	25	0	23.05	23.13	23.15	0-1	1
	25	12	23.06	23.13	23.13		1
	25	25	23.06	23.10	23.12		1
	50	0	23.06	23.10	23.13		1
16QAM	1	0	22.85	22.93	23.01	0-1	1
	1	25	22.89	22.89	22.95		1
	1	49	22.90	22.87	22.93		1
	25	0	21.97	22.08	21.98	0-2	2
	25	12	21.97	22.04	21.98		2
	25	25	21.97	22.03	21.70		2
	50	0	22.04	22.08	22.13		2

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

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26715 (816.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27015 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.79	23.82	23.83	0	0
	1	12	23.79	23.84	23.82		0
	1	24	23.79	23.82	23.85		0
	12	0	22.73	22.80	22.79	0-1	1
	12	6	22.72	22.79	22.78		1
	12	13	22.72	22.78	22.77		1
	25	0	22.72	22.80	22.79		1
16QAM	1	0	22.49	22.51	22.60	0-1	1
	1	12	22.42	22.53	22.58		1
	1	24	22.41	22.44	22.58		1
	12	0	21.64	21.70	21.74	0-2	2
	12	6	21.63	21.72	21.70		2
	12	13	21.63	21.72	21.73		2
	25	0	21.64	21.73	21.73		2

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

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26705 (815.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27025 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.81	23.85	23.79	0	0
	1	7	23.81	23.87	23.78		0
	1	14	23.82	23.81	23.81		0
	8	0	22.77	22.82	22.76	0-1	1
	8	4	22.77	22.81	22.74		1
	8	7	22.79	22.81	22.75		1
	15	0	22.79	22.83	22.77		1
16QAM	1	0	22.56	22.60	22.51	0-1	1
	1	7	22.60	22.53	22.55		1
	1	14	22.59	22.51	22.58		1
	8	0	21.73	21.79	21.69	0-2	2
	8	4	21.73	21.81	21.71		2
	8	7	21.74	21.76	21.72		2
	15	0	21.71	21.76	21.71		2

Table 9-15
LTE Band 26 (Cell) Conducted Powers -1.4 MHz Bandwidth

LTE Band 26 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26697 (814.7 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27033 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.91	23.88	23.77	0	0
	1	2	23.95	23.87	23.82		0
	1	5	23.93	23.89	23.82		0
	3	0	23.88	23.85	23.77		0
	3	2	23.87	23.84	23.77		0
	3	3	23.84	23.82	23.78		0
	6	0	22.81	22.84	22.75	0-1	1
16QAM	1	0	22.53	22.52	22.43	0-1	1
	1	2	22.56	22.46	22.54		1
	1	5	22.57	22.49	22.52		1
	3	0	22.75	22.77	22.68		1
	3	2	22.79	22.77	22.68		1
	3	3	22.81	22.76	22.69		1
	6	0	21.80	21.83	21.71	0-2	2

9.4.3 LTE Band 4 (AWS)

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

LTE Band 4 (AWS) 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**23.33**	0	0
	1	50	23.29		0
	1	99	23.29		0
	50	0	**22.32**	0-1	1
	50	25	22.30		1
	50	50	22.31		1
	100	0	22.31		1
16QAM	1	0	22.12	0-1	1
	1	50	22.09		1
	1	99	22.07		1
	50	0	21.38	0-2	2
	50	25	21.37		2
	50	50	21.35		2
	100	0	21.34		2

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

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

LTE Band 4 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.49	23.42	23.62	0	0
	1	36	23.41	23.40	23.56		0
	1	74	23.38	23.36	23.50		0
	36	0	22.38	22.35	22.54	0-1	1
	36	18	22.36	22.33	22.53		1
	36	37	22.36	22.32	22.51		1
	75	0	22.38	22.34	22.54		1
16QAM	1	0	22.27	22.25	22.36	0-1	1
	1	36	22.16	22.17	22.33		1
	1	74	22.15	22.21	22.34		1
	36	0	21.44	21.39	21.61	0-2	2
	36	18	21.41	21.40	21.60		2
	36	37	21.39	21.39	21.56		2
	75	0	21.42	21.39	21.58		2

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

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.44	23.34	23.52	0	0
	1	25	23.38	23.29	23.45		0
	1	49	23.37	23.30	23.42		0
	25	0	22.42	22.33	22.49	0-1	1
	25	12	22.41	22.32	22.48		1
	25	25	22.41	22.32	22.46		1
	50	0	22.42	22.32	22.48		1
16QAM	1	0	22.39	22.19	22.41	0-1	1
	1	25	22.39	22.21	22.41		1
	1	49	22.39	22.25	22.39		1
	25	0	21.46	21.37	21.54	0-2	2
	25	12	21.46	21.36	21.50		2
	25	25	21.46	21.35	21.49		2
	50	0	21.50	21.40	21.55		2

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

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.48	23.32	23.66	0	0
	1	12	23.44	23.29	23.61		0
	1	24	23.43	23.30	23.58		0
	12	0	22.45	22.31	22.64	0-1	1
	12	6	22.47	22.31	22.63		1
	12	13	22.47	22.30	22.61		1
	25	0	22.47	22.30	22.64		1
16QAM	1	0	22.34	22.22	22.57	0-1	1
	1	12	22.35	22.29	22.62		1
	1	24	22.34	22.26	22.57		1
	12	0	21.48	21.31	21.65	0-2	2
	12	6	21.48	21.30	21.65		2
	12	13	21.46	21.31	21.65		2
	25	0	21.51	21.36	21.67		2

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

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19965 (1711.5 MHz)	20175 (1732.5 MHz)	20385 (1753.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.47	23.32	23.54	0	0
	1	7	23.47	23.35	23.59		0
	1	14	23.49	23.33	23.54		0
	8	0	22.50	22.31	22.52	0-1	1
	8	4	22.48	22.31	22.51		1
	8	7	22.49	22.31	22.52		1
	15	0	22.49	22.30	22.52		1
16QAM	1	0	22.29	22.17	22.31	0-1	1
	1	7	22.38	22.14	22.33		1
	1	14	22.30	22.14	22.35		1
	8	0	21.56	21.36	21.60	0-2	2
	8	4	21.56	21.38	21.58		2
	8	7	21.57	21.35	21.60		2
	15	0	21.54	21.36	21.59		2

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

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19957 (1710.7 MHz)	20175 (1732.5 MHz)	20393 (1754.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.57	23.35	23.50	0	0
	1	2	23.58	23.33	23.56		0
	1	5	23.55	23.35	23.53		0
	3	0	23.52	23.33	23.50		0
	3	2	23.52	23.30	23.51		0
	3	3	23.51	23.31	23.48		0
	6	0	22.51	22.32	22.50	0-1	1
16QAM	1	0	22.19	21.99	22.24	0-1	1
	1	2	22.24	22.06	22.25		1
	1	5	22.23	22.08	22.26		1
	3	0	22.50	22.29	22.43		1
	3	2	22.50	22.29	22.45		1
	3	3	22.48	22.27	22.49		1
	6	0	21.57	21.35	21.52	0-2	2

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

LTE Band 4 (AWS) 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.49**	0	0
	1	50	22.38		0
	1	99	22.34		0
	50	0	**21.45**	0-1	1
	50	25	21.36		1
	50	50	21.44		1
	100	0	21.42		1
16QAM	1	0	21.58	0-1	1
	1	50	21.65		1
	1	99	21.48		1
	50	0	20.51	0-2	2
	50	25	20.46		2
	50	50	20.40		2
	100	0	20.50		2

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

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

LTE Band 4 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.36	22.39	22.46	0	0
	1	36	22.32	22.38	22.39		0
	1	74	22.28	22.37	22.33		0
	36	0	21.34	21.41	21.43	0-1	1
	36	18	21.32	21.40	21.41		1
	36	37	21.31	21.38	21.38		1
	75	0	21.32	21.41	21.41		1
16QAM	1	0	21.21	21.29	21.36	0-1	1
	1	36	21.24	21.31	21.35		1
	1	74	21.22	21.32	21.16		1
	36	0	20.41	20.46	20.48	0-2	2
	36	18	20.37	20.44	20.44		2
	36	37	20.38	20.43	20.40		2
	75	0	20.40	20.45	20.45		2

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

LTE Band 4 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			20000 (1715.0 MHz)	20175 (1732.5 MHz)	20350 (1750.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.36	22.43	22.49	0	0
	1	25	22.30	22.39	22.41		0
	1	49	22.29	22.40	22.38		0
	25	0	21.32	21.41	21.43	0-1	1
	25	12	21.33	21.43	21.42		1
	25	25	21.33	21.41	21.40		1
	50	0	21.32	21.38	21.41		1
16QAM	1	0	21.30	21.33	21.23	0-1	1
	1	25	21.39	21.34	21.38		1
	1	49	21.33	21.37	21.31		1
	25	0	20.34	20.43	20.46	0-2	2
	25	12	20.35	20.42	20.44		2
	25	25	20.32	20.43	20.43		2
	50	0	20.39	20.46	20.46		2

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

LTE Band 4 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			19975 (1712.5 MHz)	20175 (1732.5 MHz)	20375 (1752.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.36	22.42	22.45	0	0
	1	12	22.34	22.36	22.38		0
	1	24	22.30	22.37	22.39		0
	12	0	21.36	21.41	21.42	0-1	1
	12	6	21.36	21.38	21.40		1
	12	13	21.35	21.39	21.38		1
	25	0	21.35	21.40	21.42		1
16QAM	1	0	21.25	21.16	21.29	0-1	1
	1	12	21.27	21.32	21.32		1
	1	24	21.25	21.31	21.26		1
	12	0	20.38	20.45	20.44	0-2	2
	12	6	20.41	20.44	20.45		2
	12	13	20.40	20.40	20.44		2
	25	0	20.39	20.43	20.45		2

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

LTE Band 4 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.36	22.37	22.35	0	0
	1	7	22.35	22.38	22.29		0
	1	14	22.44	22.35	22.30		0
	8	0	21.36	21.38	21.30	0-1	1
	8	4	21.36	21.37	21.30		1
	8	7	21.36	21.37	21.28		1
	15	0	21.38	21.38	21.30		1
16QAM	1	0	21.21	21.17	20.97	0-1	1
	1	7	21.16	21.23	20.95		1
	1	14	21.20	21.09	20.96		1
	8	0	20.43	20.44	20.39	0-2	2
	8	4	20.42	20.45	20.39		2
	8	7	20.41	20.46	20.38		2
	15	0	20.44	20.47	20.36		2

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

LTE Band 4 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.41	22.46	22.34	0	0
	1	2	22.49	22.45	22.35		0
	1	5	22.43	22.49	22.39		0
	3	0	22.44	22.41	22.30		0
	3	2	22.44	22.42	22.27		0
	3	3	22.43	22.41	22.29		0
	6	0	21.40	21.36	21.28	0-1	1
16QAM	1	0	21.21	21.17	20.97	0-1	1
	1	2	21.16	21.23	20.95		1
	1	5	21.20	21.09	20.96		1
	3	0	21.35	21.31	21.19		1
	3	2	21.33	21.30	21.19		1
	3	3	21.32	21.30	21.17		1
	6	0	20.41	20.43	20.29	0-2	2

9.4.4 LTE Band 25 (PCS)

Table 9-28
LTE Band 25 (PCS) Conducted Powers - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26140 (1860.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26590 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.07	**24.14**	24.09	0	0
	1	50	24.05	24.12	24.10		0
	1	99	24.02	24.11	24.00		0
	50	0	23.08	**23.13**	23.09	0-1	1
	50	25	23.06	23.12	23.07		1
	50	50	23.05	23.12	23.05		1
	100	0	23.04	23.10	23.07		1
16QAM	1	0	22.97	23.01	22.97	0-1	1
	1	50	22.92	23.05	22.93		1
	1	99	22.89	22.99	22.96		1
	50	0	22.04	22.17	22.17	0-2	2
	50	25	22.04	22.16	22.17		2
	50	50	22.03	22.15	22.07		2
	100	0	22.01	22.09	22.06		2

Table 9-29
LTE Band 25 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26115 (1857.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26615 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.13	24.15	24.12	0	0
	1	36	24.10	24.16	24.09		0
	1	74	24.09	24.18	24.05		0
	36	0	23.03	23.11	23.04	0-1	1
	36	18	23.01	23.12	23.05		1
	36	37	23.00	23.13	23.03		1
	75	0	23.03	23.11	23.04		1
16QAM	1	0	22.86	22.85	22.78	0-1	1
	1	36	22.78	22.84	22.77		1
	1	74	22.77	22.86	22.76		1
	36	0	22.03	22.11	22.05	0-2	2
	36	18	22.02	22.11	22.02		2
	36	37	22.00	22.13	22.00		2
	75	0	22.02	22.12	22.02		2

Table 9-30
LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.08	24.16	24.09	0	0
	1	25	24.05	24.18	24.06		0
	1	49	24.07	24.19	24.03		0
	25	0	23.02	23.11	23.02	0-1	1
	25	12	23.00	23.13	23.01		1
	25	25	23.02	23.13	22.98		1
	50	0	23.00	23.12	22.99		1
16QAM	1	0	22.82	23.05	22.98	0-1	1
	1	25	22.79	22.98	22.89		1
	1	49	22.81	23.05	22.86		1
	25	0	21.99	22.11	22.01	0-2	2
	25	12	21.98	22.11	21.99		2
	25	25	21.98	22.10	21.96		2
	50	0	22.03	22.12	22.01		2

Table 9-31
LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26065 (1852.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26665 (1912.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.07	24.17	23.97	0	0
	1	12	24.08	24.19	23.97		0
	1	24	24.10	24.14	23.97		0
	12	0	23.07	23.11	22.93	0-1	1
	12	6	23.05	23.12	22.92		1
	12	13	23.06	23.10	22.89		1
	25	0	23.07	23.13	22.91		1
16QAM	1	0	22.93	23.00	22.78	0-1	1
	1	12	22.92	22.98	22.85		1
	1	24	22.86	22.97	22.80		1
	12	0	22.04	22.11	21.88	0-2	2
	12	6	22.06	22.11	21.88		2
	12	13	22.04	22.11	21.84		2
	25	0	22.05	22.10	21.89		2

Table 9-32
LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26055 (1851.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26675 (1913.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.14	24.13	23.90	0	0
	1	7	24.10	24.18	23.91		0
	1	14	24.11	24.17	23.91		0
	8	0	23.09	23.11	22.92	0-1	1
	8	4	23.08	23.12	22.92		1
	8	7	23.08	23.11	22.91		1
	15	0	23.07	23.18	23.05		1
16QAM	1	0	22.89	22.88	22.76	0-1	1
	1	7	22.88	22.93	22.74		1
	1	14	22.92	22.95	22.78		1
	8	0	22.11	22.17	21.96	0-2	2
	8	4	22.14	22.17	21.98		2
	8	7	22.13	22.19	21.95		2
	15	0	22.10	22.13	21.92		2

Table 9-33
LTE Band 25 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26047 (1850.7 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26683 (1914.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.16	24.18	23.98	0	0
	1	2	24.13	24.21	24.03		0
	1	5	24.18	24.23	24.02		0
	3	0	24.09	24.14	24.00		0
	3	2	24.12	24.15	23.97		0
	3	3	24.12	24.16	23.99		0
	6	0	23.12	23.15	22.96	0-1	1
16QAM	1	0	22.86	22.94	22.82	0-1	1
	1	2	22.88	22.93	22.78		1
	1	5	22.94	22.90	22.80		1
	3	0	23.07	23.09	22.90		1
	3	2	23.06	23.12	22.91		1
	3	3	23.06	23.12	22.88		1
	6	0	22.07	22.11	21.90	0-2	2

Table 9-34
LTE Band 25 (PCS) Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26140 (1860.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26590 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	**22.60**	22.57	22.46	0	0
	1	50	22.58	22.55	22.47		0
	1	99	22.57	22.56	22.40		0
	50	0	**21.57**	21.54	21.45	0-1	1
	50	25	21.55	21.55	21.44		1
	50	50	21.53	21.54	21.43		1
	100	0	21.55	21.53	21.44		1
16QAM	1	0	21.61	21.60	21.49	0-1	1
	1	50	21.64	21.57	21.53		1
	1	99	21.68	21.52	21.45		1
	50	0	20.60	20.68	20.57	0-2	2
	50	25	20.61	20.66	20.58		2
	50	50	20.60	20.66	20.51		2
	100	0	20.62	20.60	20.49		2

Table 9-35
LTE Band 25 (PCS) Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26115 (1857.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26615 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.57	22.57	22.47	0	0
	1	36	22.52	22.51	22.43		0
	1	74	22.47	22.51	22.40		0
	36	0	21.59	21.56	21.50	0-1	1
	36	18	21.55	21.55	21.47		1
	36	37	21.53	21.58	21.45		1
	75	0	21.55	21.54	21.47		1
16QAM	1	0	21.38	21.49	21.42	0-1	1
	1	36	21.29	21.50	21.47		1
	1	74	21.50	21.54	21.44		1
	36	0	20.64	20.61	20.55	0-2	2
	36	18	20.60	20.64	20.54		2
	36	37	20.60	20.62	20.53		2
	75	0	20.62	20.62	20.54		2

Table 9-36
LTE Band 25 (PCS) Reduced Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.52	22.54	22.56	0	0
	1	25	22.52	22.51	22.53		0
	1	49	22.48	22.52	22.47		0
	25	0	21.56	21.57	21.58	0-1	1
	25	12	21.55	21.57	21.56		1
	25	25	21.54	21.56	21.54		1
	50	0	21.56	21.56	21.56		1
16QAM	1	0	21.34	21.44	21.51	0-1	1
	1	25	21.41	21.31	21.57		1
	1	49	21.48	21.52	21.56		1
	25	0	20.59	20.63	20.63	0-2	2
	25	12	20.61	20.62	20.62		2
	25	25	20.60	20.60	20.60		2
	50	0	20.63	20.63	20.63		2

Table 9-37
LTE Band 25 (PCS) Reduced Conducted Powers - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26065 (1852.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26665 (1912.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.58	22.55	22.44	0	0
	1	12	22.52	22.53	22.41		0
	1	24	22.48	22.53	22.34		0
	12	0	21.56	21.57	21.41	0-1	1
	12	6	21.55	21.56	21.39		1
	12	13	21.54	21.56	21.40		1
	25	0	21.56	21.58	21.40		1
16QAM	1	0	21.42	21.43	21.18	0-1	1
	1	12	21.43	21.52	21.29		1
	1	24	21.28	21.51	21.30		1
	12	0	20.61	20.62	20.45	0-2	2
	12	6	20.61	20.64	20.44		2
	12	13	20.61	20.62	20.45		2
	25	0	20.60	20.59	20.41		2

Table 9-38
LTE Band 25 (PCS) Reduced Conducted Powers - 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26055 (1851.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26675 (1913.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.52	22.52	22.36	0	0
	1	7	22.50	22.49	22.35		0
	1	14	22.48	22.54	22.35		0
	8	0	21.56	21.57	21.40	0-1	1
	8	4	21.55	21.56	21.39		1
	8	7	21.55	21.57	21.39		1
	15	0	21.57	21.61	21.49		1
16QAM	1	0	21.42	21.43	21.27	0-1	1
	1	7	21.47	21.48	21.34		1
	1	14	21.47	21.49	21.29		1
	8	0	20.63	20.66	20.47	0-2	2
	8	4	20.64	20.61	20.44		2
	8	7	20.63	20.63	20.48		2
	15	0	20.63	20.65	20.47		2

Table 9-39
LTE Band 25 (PCS) Reduced Conducted Powers -1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26047 (1850.7 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26683 (1914.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.62	22.61	22.45	0	0
	1	2	22.61	22.59	22.50		0
	1	5	22.56	22.60	22.40		0
	3	0	22.60	22.55	22.41		0
	3	2	22.60	22.55	22.43		0
	3	3	22.59	22.57	22.42		0
	6	0	21.58	21.57	21.42	0-1	1
16QAM	1	0	21.27	21.30	21.07	0-1	1
	1	2	21.29	21.28	21.10		1
	1	5	21.29	21.24	21.13		1
	3	0	21.51	21.50	21.32		1
	3	2	21.53	21.47	21.33		1
	3	3	21.55	21.49	21.37		1
	6	0	20.64	20.62	20.47	0-2	2

9.4.5 LTE Band 41

Table 9-40
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.73	22.73	22.80	22.79	22.91	0	0
	1	50	22.69	22.77	22.84	22.81	22.96		0
	1	99	22.66	22.78	22.80	22.79	**22.98**		0
	50	0	21.69	21.76	21.80	21.85	21.98	0-1	1
	50	25	21.65	21.75	21.80	21.83	**21.99**		1
	50	50	21.64	21.74	21.79	21.82	21.97		1
	100	0	21.66	21.76	21.82	21.84	21.98		1
16QAM	1	0	21.32	21.38	21.39	21.36	21.68	0-1	1
	1	50	21.22	21.41	21.50	21.36	21.59		1
	1	99	21.26	21.27	21.44	21.39	21.58		1
	50	0	20.74	20.78	20.82	20.82	20.97	0-2	2
	50	25	20.72	20.78	20.80	20.80	20.97		2
	50	50	20.68	20.77	20.78	20.77	20.98		2
	100	0	20.68	20.75	20.77	20.77	20.94		2

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

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.69	22.77	22.73	22.79	22.82	0	0
	1	36	22.73	22.81	22.80	22.80	22.80		0
	1	74	22.72	22.77	22.74	22.75	22.78		0
	36	0	21.60	21.67	21.69	21.79	21.80	0-1	1
	36	18	21.58	21.67	21.68	21.75	21.77		1
	36	37	21.57	21.65	21.70	21.75	21.77		1
	75	0	21.57	21.66	21.69	21.75	21.76		1
16QAM	1	0	21.25	21.51	21.28	21.58	21.63	0-1	1
	1	36	21.35	21.54	21.29	21.47	21.54		1
	1	74	21.37	21.34	21.49	21.48	21.56		1
	36	0	20.57	20.64	20.63	20.67	20.72	0-2	2
	36	18	20.56	20.64	20.63	20.65	20.70		2
	36	37	20.57	20.62	20.64	20.66	20.68		2
	75	0	20.59	20.64	20.63	20.68	20.69		2

Table 9-42
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	22.77	22.84	22.84	22.89	22.91	0	0
	1	25	22.78	22.85	22.83	22.92	22.88		0
	1	49	22.76	22.84	22.85	22.90	22.91		0
	25	0	21.56	21.66	21.70	21.76	21.78	0-1	1
	25	12	21.57	21.67	21.68	21.76	21.77		1
	25	25	21.57	21.67	21.68	21.75	21.77		1
	50	0	21.58	21.66	21.68	21.73	21.74		1
16QAM	1	0	20.96	21.12	21.18	21.34	21.16	0-1	1
	1	25	21.04	21.14	21.16	21.11	21.06		1
	1	49	21.15	21.02	21.23	21.12	21.06		1
	25	0	20.53	20.53	20.55	20.58	20.64	0-2	2
	25	12	20.49	20.54	20.52	20.57	20.57		2
	25	25	20.50	20.55	20.51	20.59	20.59		2
	50	0	20.62	20.64	20.68	20.70	20.71		2

Table 9-43
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	22.69	22.88	22.85	22.92	22.93	0	0
	1	12	22.81	22.86	22.90	22.96	22.92		0
	1	24	22.80	22.85	22.88	22.88	22.92		0
	12	0	21.57	21.68	21.69	21.76	21.77	0-1	1
	12	6	21.57	21.66	21.70	21.76	21.75		1
	12	13	21.57	21.64	21.70	21.75	21.74		1
	25	0	21.57	21.68	21.62	21.76	21.75		1
16QAM	1	0	21.29	21.21	21.11	21.47	21.54	0-1	1
	1	12	21.47	21.42	21.07	21.35	21.42		1
	1	24	21.37	21.30	21.34	21.14	21.43		1
	12	0	20.58	20.65	20.62	20.64	20.65	0-2	2
	12	6	20.55	20.66	20.70	20.72	20.64		2
	12	13	20.56	20.72	20.66	20.69	20.71		2
	25	0	20.49	20.58	20.58	20.61	20.64		2

Table 9-44
LTE Band 41 PC2 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	26.84	26.88	26.97	26.98	27.29	0	0
	1	50	26.80	26.88	26.97	26.99	**27.30**		0
	1	99	26.76	26.91	26.96	26.99	27.21		0
	50	0	25.74	25.77	25.83	25.88	26.08	0-1	1
	50	25	25.69	25.78	25.83	25.86	**26.09**		1
	50	50	25.69	25.78	25.83	25.86	26.08		1
	100	0	25.70	25.77	25.82	25.85	26.05		1
16QAM	1	0	25.56	25.63	25.50	25.86	25.93	0-1	1
	1	50	25.49	25.49	25.63	25.74	25.87		1
	1	99	25.49	25.64	25.61	25.71	25.88		1
	50	0	24.87	24.91	24.97	25.09	25.26	0-2	2
	50	25	24.85	24.90	25.00	25.02	25.26		2
	50	50	24.84	24.91	25.00	25.02	25.27		2
	100	0	24.79	24.89	24.95	24.97	25.21		2

Table 9-45
LTE Band 41 PC2 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	26.70	26.78	26.80	26.92	27.03	0	0
	1	36	26.75	26.87	26.86	27.00	27.06		0
	1	74	26.72	26.80	26.85	26.89	26.95		0
	36	0	25.68	25.73	25.74	25.84	25.88	0-1	1
	36	18	25.66	25.72	25.74	25.81	25.88		1
	36	37	25.66	25.73	25.75	25.80	25.86		1
	75	0	25.64	25.72	25.74	25.80	25.85		1
16QAM	1	0	25.48	25.67	25.68	25.68	25.81	0-1	1
	1	36	25.46	25.68	25.57	25.75	25.69		1
	1	74	25.54	25.61	25.52	25.78	25.69		1
	36	0	24.75	24.81	24.83	24.92	24.98	0-2	2
	36	18	24.74	24.78	24.84	24.90	24.97		2
	36	37	24.73	24.81	24.82	24.88	24.96		2
	75	0	24.74	24.79	24.80	24.89	24.95		2

Table 9-46
LTE Band 41 PC2 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	26.83	27.02	26.97	27.13	27.17	0	0
	1	25	26.87	26.94	27.03	27.07	27.14		0
	1	49	26.95	27.03	27.05	27.11	27.18		0
	25	0	25.69	25.76	25.78	25.85	25.89	0-1	1
	25	12	25.70	25.76	25.76	25.84	25.88		1
	25	25	25.69	25.77	25.77	25.83	25.88		1
	50	0	25.67	25.74	25.75	25.83	25.88		1
16QAM	1	0	25.18	25.07	25.21	25.27	25.52	0-1	1
	1	25	25.20	25.11	25.22	25.26	25.22		1
	1	49	25.26	25.22	25.28	25.41	25.36		1
	25	0	24.72	24.76	24.81	24.85	24.86	0-2	2
	25	12	24.69	24.76	24.74	24.85	24.86		2
	25	25	24.68	24.74	24.77	24.84	24.88		2
	50	0	24.80	24.84	24.86	24.94	24.96		2

Table 9-47
LTE Band 41 PC2 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	26.66	26.79	26.90	26.98	27.08	0	0
	1	12	26.76	26.86	26.92	26.99	27.09		0
	1	24	26.69	26.86	26.95	26.99	27.05		0
	12	0	25.66	25.73	25.75	25.82	25.88	0-1	1
	12	6	25.66	25.73	25.76	25.83	25.89		1
	12	13	25.66	25.73	25.75	25.83	25.88		1
	25	0	25.65	25.74	25.75	25.82	25.87		1
16QAM	1	0	25.23	25.25	25.19	25.50	25.33	0-1	1
	1	12	25.31	25.32	25.35	25.33	25.42		1
	1	24	25.32	25.28	25.20	25.35	25.48		1
	12	0	24.66	24.71	24.82	24.83	24.88	0-2	2
	12	6	24.57	24.71	24.78	24.83	24.91		2
	12	13	24.59	24.73	24.79	24.85	24.88		2
	25	0	24.64	24.71	24.70	24.81	24.86		2

Table 9-48
LTE Band 41 PC2 Reduced Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.95	24.02	24.01	24.08	24.24	0	0
	1	50	23.93	23.96	24.05	24.03	24.28		0
	1	99	23.93	24.04	24.07	24.11	**24.30**		0
	50	0	23.73	23.77	23.83	23.85	24.01	0-1	0
	50	25	23.70	23.76	23.81	23.83	24.00		0
	50	50	23.68	23.78	23.82	23.82	**24.02**		0
	100	0	23.72	23.77	23.82	23.81	24.00		0
16QAM	1	0	23.46	23.80	23.64	23.69	23.83	0-1	0
	1	50	23.47	23.59	23.77	23.60	23.83		0
	1	99	23.48	23.51	23.80	23.59	23.82		0
	50	0	23.84	23.86	23.92	23.97	24.17	0-2	0
	50	25	23.82	23.86	23.90	23.95	24.17		0
	50	50	23.76	23.89	23.93	23.95	24.19		0
	100	0	23.77	23.84	23.90	23.92	24.12		0

Table 9-49
LTE Band 41 PC2 Reduced Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	23.69	23.78	23.76	23.88	23.88	0	0
	1	36	23.67	23.77	23.77	23.84	23.85		0
	1	74	23.59	23.74	23.73	23.80	23.86		0
	36	0	23.69	23.74	23.74	23.83	23.87	0-1	0
	36	18	23.67	23.75	23.75	23.82	23.83		0
	36	37	23.67	23.73	23.76	23.81	23.85		0
	75	0	23.66	23.74	23.74	23.79	23.83		0
16QAM	1	0	23.64	23.51	23.50	23.71	23.70	0-1	0
	1	36	23.52	23.57	23.54	23.69	23.68		0
	1	74	23.50	23.56	23.64	23.62	23.47		0
	36	0	23.72	23.79	23.70	23.87	23.93	0-2	0
	36	18	23.69	23.75	23.79	23.85	23.91		0
	36	37	23.69	23.77	23.78	23.85	23.83		0
	75	0	23.71	23.78	23.79	23.84	23.93		0

Table 9-50
LTE Band 41 PC2 Reduced 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	23.81	23.87	23.87	23.98	24.01	0	0
	1	25	23.77	23.86	23.87	24.03	23.95		0
	1	49	23.84	23.91	23.94	23.97	23.90		0
	25	0	23.67	23.74	23.72	23.78	23.81	0-1	0
	25	12	23.68	23.73	23.74	23.76	23.79		0
	25	25	23.65	23.72	23.73	23.74	23.77		0
	50	0	23.64	23.73	23.66	23.78	23.77		0
16QAM	1	0	23.32	23.42	23.50	23.68	23.64	0-1	0
	1	25	23.26	23.48	23.34	23.66	23.75		0
	1	49	23.19	23.35	23.61	23.57	23.59		0
	25	0	23.66	23.71	23.72	23.81	23.77	0-2	0
	25	12	23.64	23.70	23.69	23.78	23.84		0
	25	25	23.61	23.72	23.70	23.87	23.77		0
	50	0	23.72	23.82	23.83	23.86	23.90		0

Table 9-51
LTE Band 41 PC2 Reduced 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	23.74	23.82	23.82	23.89	23.93	0	0
	1	12	23.73	23.79	23.85	23.88	23.92		0
	1	24	23.60	23.82	23.82	23.88	23.94		0
	12	0	23.66	23.70	23.72	23.77	23.78	0-1	0
	12	6	23.65	23.71	23.72	23.76	23.78		0
	12	13	23.65	23.70	23.71	23.76	23.77		0
	25	0	23.62	23.69	23.70	23.76	23.77		0
16QAM	1	0	23.28	23.23	23.36	23.31	23.47	0-1	0
	1	12	23.33	23.39	23.35	23.13	23.56		0
	1	24	23.24	23.39	23.46	23.06	23.58		0
	12	0	23.56	23.71	23.68	23.83	23.81	0-2	0
	12	6	23.67	23.72	23.80	23.85	23.80		0
	12	13	23.66	23.62	23.80	23.83	23.80		0
	25	0	23.60	23.67	23.69	23.74	23.80		0

9.4.6 LTE Carrier Aggregation Conducted Powers

Table 9-52
LTE Carrier Aggregation Maximum Conducted Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_41C	LTE B41	20	41490	2680	QPSK	1	99	41490	2680	LTE B41	20	41292	2660.2	23.02	22.98
CA_41C	LTE B41 PC2	20	41490	2680	QPSK	1	50	41490	2680	LTE B41 PC2	20	41292	2660.2	27.11	27.30

Table 9-53
LTE Carrier Aggregation Reduced Conducted Powers

	PCC									SCC				Power	
Combination	PCC Band	PCC BW [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Ch.	PCC (DL) Freq. [MHz]	SCC Band	SCC BW [MHz]	SCC (DL) Ch.	SCC (DL) Freq. [MHz]	LTE Tx.Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_41C	LTE B41 PC2	20	41490	2680	QPSK	1	99	41490	2680	LTE B41 PC2	20	41292	2660.2	24.03	24.30

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.

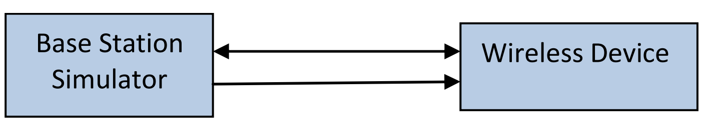


Figure 9-4
Power Measurement Setup

9.5 WLAN Conducted Powers

Table 9-54
2.4 GHz WLAN Maximum Average RF Power

2.4GHz Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11b
		Average
2412	1	18.67
2437	6	18.68
2462	11	18.31

2.4GHz Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11g	802.11n
		Average	Average
2412	1	15.35	15.11
2437	6	15.64	15.41
2457	10	14.47	13.39

Table 9-55
5 GHz WLAN Maximum Average RF Power

5GHz (20MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11a	802.11n
		Average	Average
5180	36	12.39	12.30
5200	40	15.04	15.11
5220	44	14.83	14.95
5240	48	14.62	14.95
5260	52	14.72	14.79
5280	56	14.89	14.99
5300	60	14.61	14.71
5320	64	14.12	14.12
5500	100	15.11	14.78
5600	120	14.39	14.43
5620	124	14.49	14.42
5720	144	14.67	14.32
5745	149	14.78	14.66
5785	157	14.77	14.64
5825	165	14.78	14.59

Table 9-56
2.4 GHz WLAN Reduced Average RF Power

2.4GHz Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11b
		Average
2412	1	15.35
2437	6	15.45
2462	11	15.39

2.4GHz Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11g	802.11n
		Average	Average
2412	1	15.35	15.11
2437	6	15.64	15.41
2457	10	14.47	13.39

Table 9-57
5 GHz WLAN Reduced Average RF Power

5GHz (40MHz) Conducted Power [dBm]		
Freq [MHz]	Channel	IEEE Transmission Mode
		802.11n
		Average
5190	38	8.86
5230	46	10.12
5270	54	10.99
5310	62	8.37
5510	102	10.85
5590	118	10.81
5630	126	10.86
5710	142	10.42
5755	151	10.72
5795	159	10.82

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

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

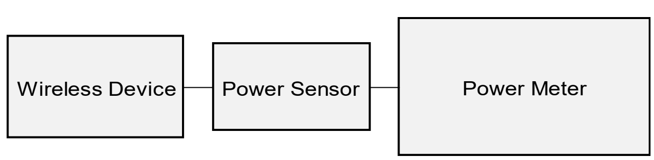


Figure 9-5
Power Measurement Setup

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Head Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
3/30/2018	750H	21.0	700	0.863	43.215	0.889	42.201	-2.92%	2.40%
			710	0.873	43.085	0.890	42.149	-1.91%	2.22%
			740	0.900	42.685	0.893	41.994	0.78%	1.65%
			755	0.913	42.469	0.894	41.916	2.13%	1.32%
3/25/2018	835H	21.3	820	0.884	41.223	0.899	41.578	-1.67%	-0.85%
			835	0.899	41.025	0.900	41.500	-0.11%	-1.14%
			850	0.914	40.840	0.916	41.500	-0.22%	-1.59%
4/2/2018	835H	19.7	820	0.905	42.630	0.899	41.578	0.67%	2.53%
			835	0.920	42.445	0.900	41.500	2.22%	2.28%
			850	0.935	42.263	0.916	41.500	2.07%	1.84%
4/2/2018	1750H	21.4	1710	1.348	39.541	1.348	40.142	0.00%	-1.50%
			1750	1.388	39.359	1.371	40.079	1.24%	-1.80%
			1790	1.430	39.200	1.394	40.016	2.58%	-2.04%
4/2/2018	1900H	22.1	1850	1.345	39.370	1.400	40.000	-3.93%	-1.58%
			1880	1.377	39.254	1.400	40.000	-1.64%	-1.87%
			1910	1.409	39.118	1.400	40.000	0.64%	-2.20%
4/10/2018	1900H	21.6	1850	1.405	39.627	1.400	40.000	0.36%	-0.93%
			1880	1.437	39.509	1.400	40.000	2.64%	-1.23%
			1910	1.468	39.386	1.400	40.000	4.86%	-1.53%
3/25/2018	2450H	23.5	2600	1.933	40.057	1.964	39.009	-1.58%	2.69%
			2650	1.991	39.890	2.018	38.945	-1.34%	2.43%
			2700	2.047	39.695	2.073	38.882	-1.25%	2.09%
3/28/2018	2450H	23.2	2400	1.753	40.274	1.756	39.289	-0.17%	2.51%
			2450	1.808	40.109	1.800	39.200	0.44%	2.32%
			2500	1.866	39.918	1.855	39.136	0.59%	2.00%
03/26/2018	5200H-5800H	22.3	5180	4.573	37.599	4.635	36.009	-1.34%	4.42%
			5200	4.611	37.578	4.655	35.986	-0.95%	4.42%
			5220	4.616	37.581	4.676	35.963	-1.28%	4.50%
			5240	4.659	37.531	4.696	35.940	-0.79%	4.43%
			5260	4.680	37.538	4.717	35.917	-0.78%	4.51%
			5280	4.677	37.436	4.737	35.894	-1.27%	4.30%
			5300	4.706	37.487	4.758	35.871	-1.09%	4.51%
			5320	4.736	37.336	4.778	35.849	-0.88%	4.15%
			5500	4.886	37.146	4.963	35.643	-1.55%	4.22%
			5520	4.942	37.088	4.983	35.620	-0.82%	4.12%
			5540	4.954	37.142	5.004	35.597	-1.00%	4.34%
			5560	4.972	37.026	5.024	35.574	-1.04%	4.08%
			5580	5.031	37.068	5.045	35.551	-0.28%	4.27%
			5600	5.020	36.954	5.065	35.529	-0.89%	4.01%
			5620	5.047	36.994	5.086	35.506	-0.77%	4.19%
			5640	5.086	36.922	5.106	35.483	-0.39%	4.06%
			5660	5.091	36.971	5.127	35.460	-0.70%	4.26%
			5680	5.116	36.894	5.147	35.437	-0.60%	4.11%
			5700	5.127	36.883	5.168	35.414	-0.79%	4.15%
			5745	5.192	36.779	5.214	35.363	-0.42%	4.00%
			5765	5.201	36.758	5.234	35.340	-0.63%	4.01%
			5785	5.217	36.796	5.255	35.317	-0.72%	4.19%
			5800	5.243	36.662	5.270	35.300	-0.51%	3.86%
			5805	5.255	36.680	5.275	35.294	-0.38%	3.93%
			5825	5.263	36.694	5.296	35.271	-0.62%	4.03%

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.

Table 10-2
Measured Body Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
4/3/2018	750B	21.7	700	0.970	53.149	0.959	55.726	1.15%	-4.62%
			710	0.974	53.123	0.960	55.687	1.46%	-4.60%
			740	0.984	53.066	0.963	55.570	2.18%	-4.51%
			755	0.990	53.033	0.964	55.512	2.70%	-4.47%
3/22/2018	835B	20.7	820	0.944	53.006	0.969	55.258	-2.58%	-4.08%
			835	0.958	52.853	0.970	55.200	-1.24%	-4.25%
			850	0.972	52.698	0.988	55.154	-1.62%	-4.45%
3/28/2018	835B	21.2	820	0.946	54.045	0.969	55.258	-2.37%	-2.20%
			835	0.964	53.907	0.970	55.200	-0.62%	-2.34%
			850	0.976	53.775	0.988	55.154	-1.21%	-2.50%
3/26/2018	1750B	21.3	1710	1.479	51.319	1.463	53.537	1.09%	-4.14%
			1750	1.527	51.137	1.488	53.432	2.62%	-4.30%
			1790	1.571	50.987	1.514	53.326	3.76%	-4.39%
4/3/2018	1750B	22.1	1710	1.437	51.957	1.463	53.537	-1.78%	-2.95%
			1750	1.480	51.845	1.488	53.432	-0.54%	-2.97%
			1790	1.525	51.702	1.514	53.326	0.73%	-3.05%
3/24/2018	1900B	22.5	1850	1.521	52.721	1.520	53.300	0.07%	-1.09%
			1880	1.557	52.639	1.520	53.300	2.43%	-1.24%
			1910	1.590	52.538	1.520	53.300	4.61%	-1.43%
3/26/2018	1900B	22.0	1850	1.520	53.122	1.520	53.300	0.00%	-0.33%
			1880	1.555	53.014	1.520	53.300	2.30%	-0.54%
			1910	1.590	52.935	1.520	53.300	4.61%	-0.68%
4/2/2018	1900B	22.1	1850	1.522	54.195	1.520	53.300	0.13%	1.68%
			1880	1.555	54.092	1.520	53.300	2.30%	1.49%
			1910	1.590	53.987	1.520	53.300	4.61%	1.29%
3/24/2018	2450B	23.3	2550	2.123	51.675	2.092	52.573	1.48%	-1.71%
			2600	2.180	51.524	2.163	52.509	0.79%	-1.88%
			2650	2.241	51.380	2.234	52.445	0.31%	-2.03%
			2700	2.302	51.224	2.305	52.382	-0.13%	-2.21%
3/28/2018	2450B	22.2	2400	1.954	50.629	1.902	52.767	2.73%	-4.05%
			2450	2.011	50.491	1.950	52.700	3.13%	-4.19%
			2500	2.070	50.356	2.021	52.636	2.42%	-4.33%
			2550	2.126	50.238	2.092	52.573	1.63%	-4.44%
			2600	2.185	50.074	2.163	52.509	1.02%	-4.64%
			2650	2.247	49.931	2.234	52.445	0.58%	-4.79%
			2700	2.305	49.769	2.305	52.382	0.00%	-4.99%
03/26/2018	5200B-5800B	21.6	5180	5.393	47.301	5.276	49.041	2.22%	-3.55%
			5200	5.420	47.239	5.299	49.014	2.28%	-3.62%
			5220	5.458	47.219	5.323	48.987	2.54%	-3.61%
			5240	5.482	47.192	5.346	48.960	2.54%	-3.61%
			5260	5.507	47.138	5.369	48.933	2.57%	-3.67%
			5280	5.526	47.094	5.393	48.906	2.47%	-3.71%
			5300	5.559	47.048	5.416	48.879	2.64%	-3.75%
			5320	5.570	47.047	5.439	48.851	2.41%	-3.69%
			5500	5.810	46.734	5.650	48.607	2.83%	-3.85%
			5520	5.839	46.691	5.673	48.580	2.93%	-3.89%
			5540	5.855	46.654	5.696	48.553	2.79%	-3.91%
			5560	5.899	46.619	5.720	48.526	3.13%	-3.93%
			5580	5.927	46.614	5.743	48.499	3.20%	-3.89%
			5600	5.953	46.547	5.766	48.471	3.24%	-3.97%
			5620	5.977	46.501	5.790	48.444	3.23%	-4.01%
			5640	6.004	46.468	5.813	48.417	3.29%	-4.03%
			5660	6.030	46.452	5.837	48.390	3.31%	-4.00%
			5680	6.073	46.418	5.860	48.363	3.63%	-4.02%
			5700	6.096	46.402	5.883	48.336	3.62%	-4.00%
			5745	6.151	46.296	5.936	48.275	3.62%	-4.10%
			5765	6.184	46.257	5.959	48.248	3.78%	-4.13%
			5785	6.202	46.246	5.982	48.220	3.68%	-4.09%
			5800	6.228	46.191	6.000	48.200	3.80%	-4.17%
			5805	6.239	46.195	6.006	48.193	3.88%	-4.15%
			5825	6.265	46.182	6.029	48.166	3.91%	-4.12%

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

10.2 Test System Verification

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

Table 10-3
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
H	750	HEAD	03/30/2018	23.8	21.2	0.200	1161	7410	1.620	8.170	8.100	-0.86%
E	835	HEAD	03/25/2018	23.5	21.5	0.200	4d132	3213	1.980	9.360	9.900	5.77%
E	835	HEAD	04/02/2018	19.8	19.7	0.200	4d132	3213	1.900	9.360	9.500	1.50%
H	1750	HEAD	04/02/2018	22.0	21.4	0.100	1148	7410	3.500	36.400	35.000	-3.85%
G	1900	HEAD	04/02/2018	22.9	21.2	0.100	5d080	3332	3.660	39.300	36.600	-6.87%
H	1900	HEAD	04/10/2018	24.0	21.8	0.100	5d148	7410	3.870	40.100	38.700	-3.49%
G	2450	HEAD	03/28/2018	22.3	21.5	0.100	797	3332	4.920	52.700	49.200	-6.64%
G	2600	HEAD	03/25/2018	23.2	23.1	0.100	1126	3332	5.210	56.400	52.100	-7.62%
G	2600	HEAD	03/28/2018	22.3	21.5	0.100	1126	3332	5.620	56.400	56.200	-0.35%
H	5250	HEAD	03/26/2018	21.5	20.4	0.050	1120	3589	3.900	81.300	78.000	-4.06%
H	5600	HEAD	03/26/2018	21.5	20.4	0.050	1120	3589	4.270	84.700	85.400	0.83%
H	5750	HEAD	03/26/2018	21.5	20.4	0.050	1120	3589	3.900	81.000	78.000	-3.70%
I	750	BODY	04/03/2018	22.0	20.9	0.200	1054	3287	1.750	8.610	8.750	1.63%
E	835	BODY	03/22/2018	21.3	20.7	0.200	4d132	3213	1.920	9.710	9.600	-1.13%
E	835	BODY	03/28/2018	20.8	21.2	0.200	4d132	3213	2.060	9.710	10.300	6.08%
K	1750	BODY	03/26/2018	22.0	21.3	0.100	1150	7406	3.920	36.500	39.200	7.40%
H	1750	BODY	04/03/2018	22.5	22.1	0.100	1148	7410	3.490	37.000	34.900	-5.68%
J	1900	BODY	03/24/2018	22.0	22.5	0.100	5d148	3914	4.250	39.600	42.500	7.32%
J	1900	BODY	03/26/2018	22.1	22.0	0.100	5d148	3914	4.180	39.600	41.800	5.56%
J	1900	BODY	04/02/2018	21.0	21.0	0.100	5d148	3914	4.260	39.600	42.600	7.58%
K	2450	BODY	03/28/2018	22.5	22.2	0.100	797	7406	5.060	51.100	50.600	-0.98%
G	2600	BODY	03/24/2018	22.4	23.1	0.100	1126	3332	5.290	54.300	52.900	-2.58%
K	2600	BODY	03/28/2018	22.5	22.2	0.100	1126	7406	5.570	54.300	55.700	2.58%
D	5250	BODY	03/26/2018	21.6	20.7	0.050	1237	7308	3.560	76.900	71.200	-7.41%
D	5600	BODY	03/26/2018	21.6	20.7	0.050	1237	7308	3.690	78.500	73.800	-5.99%
D	5750	BODY	03/26/2018	21.6	20.7	0.050	1237	7308	3.600	77.100	72.000	-6.61%

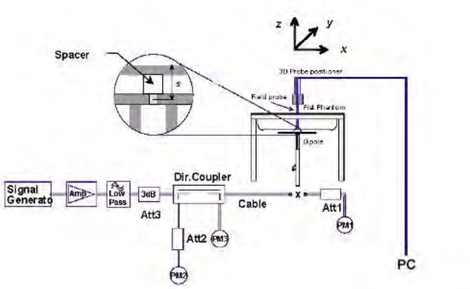


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
CDMA BC10 (§90S) 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)	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	24.7	24.16	-0.05	Right	Cheek	05814	1:1	0.378	1.132	0.428	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	24.7	24.16	0.02	Right	Tilt	05814	1:1	0.235	1.132	0.266	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	24.7	24.16	0.02	Left	Cheek	05814	1:1	0.370	1.132	0.419	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	24.7	24.16	0.05	Left	Tilt	05814	1:1	0.196	1.132	0.222	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	24.7	24.07	0.01	Right	Cheek	05814	1:1	0.382	1.156	0.442	A1
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	24.7	24.07	0.01	Right	Tilt	05814	1:1	0.259	1.156	0.299	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	24.7	24.07	-0.01	Left	Cheek	05814	1:1	0.376	1.156	0.435	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	24.7	24.07	0.01	Left	Tilt	05814	1:1	0.204	1.156	0.236	
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
CDMA BC0 (§22H) 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)	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	24.7	23.76	0.02	Right	Cheek	05814	1:1	0.395	1.242	0.491	A2
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	24.7	23.76	-0.08	Right	Tilt	05814	1:1	0.273	1.242	0.339	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	24.7	23.76	0.00	Left	Cheek	05814	1:1	0.377	1.242	0.468	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	24.7	23.76	-0.01	Left	Tilt	05814	1:1	0.228	1.242	0.283	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	24.7	23.81	0.07	Right	Cheek	05814	1:1	0.371	1.227	0.455	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	24.7	23.81	0.09	Right	Tilt	05814	1:1	0.248	1.227	0.304	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	24.7	23.81	0.00	Left	Cheek	05814	1:1	0.362	1.227	0.444	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	24.7	23.81	0.03	Left	Tilt	05814	1:1	0.228	1.227	0.280	
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
PCS CDMA 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	600	PCS CDMA	RC3 / SO55	24.0	23.12	-0.03	Right	Cheek	58145	1:1	0.436	1.225	0.534	
1880.00	600	PCS CDMA	RC3 / SO55	24.0	23.12	0.02	Right	Tilt	58145	1:1	0.180	1.225	0.221	
1851.25	25	PCS CDMA	RC3 / SO55	24.0	23.18	-0.01	Left	Cheek	58145	1:1	0.723	1.208	0.873	
1880.00	600	PCS CDMA	RC3 / SO55	24.0	23.12	-0.14	Left	Cheek	58145	1:1	0.746	1.225	0.914	
1908.75	1175	PCS CDMA	RC3 / SO55	24.0	23.22	-0.07	Left	Cheek	58145	1:1	0.754	1.197	0.903	
1880.00	600	PCS CDMA	RC3 / SO55	24.0	23.12	0.01	Left	Tilt	58145	1:1	0.320	1.225	0.392	
1880.00	600	PCS CDMA	EVDO Rev. A	24.0	23.09	-0.16	Right	Cheek	58145	1:1	0.435	1.233	0.536	
1880.00	600	PCS CDMA	EVDO Rev. A	24.0	23.09	-0.05	Right	Tilt	58145	1:1	0.172	1.233	0.212	
1851.25	25	PCS CDMA	EVDO Rev. A	24.0	23.21	0.12	Left	Cheek	58145	1:1	0.776	1.199	0.930	
1880.00	600	PCS CDMA	EVDO Rev. A	24.0	23.09	-0.02	Left	Cheek	58145	1:1	0.811	1.233	1.000	
1908.75	1175	PCS CDMA	EVDO Rev. A	24.0	23.01	-0.08	Left	Cheek	58145	1:1	0.823	1.256	**1.034**	A3
1880.00	600	PCS CDMA	EVDO Rev. A	24.0	23.09	-0.15	Left	Tilt	58145	1:1	0.318	1.233	0.392	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Head** **1.6 W/kg (mW/g)** averaged over 1 gram							

Table 11-4
GSM 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.2	31.94	0.07	Right	Cheek	57634	1	1:8.3	0.313	1.337	0.418	A4
836.60	190	GSM 850	GSM	33.2	31.94	0.01	Right	Tilt	57634	1	1:8.3	0.180	1.337	0.241	
836.60	190	GSM 850	GSM	33.2	31.94	0.03	Left	Cheek	57634	1	1:8.3	0.288	1.337	0.385	
836.60	190	GSM 850	GSM	33.2	31.94	-0.01	Left	Tilt	57634	1	1:8.3	0.163	1.337	0.218	
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
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	29.0	28.24	-0.08	Right	Cheek	57527	1:8.3	0.131	1.191	0.156	
1880.00	661	GSM 1900	GSM	29.0	28.24	-0.05	Right	Tilt	57527	1:8.3	0.059	1.191	0.070	
1880.00	661	GSM 1900	GSM	29.0	28.24	-0.01	Left	Cheek	57527	1:8.3	0.248	1.191	0.295	A5
1880.00	661	GSM 1900	GSM	29.0	28.24	-0.01	Left	Tilt	57527	1:8.3	0.102	1.191	0.121	
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
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	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.05	Right	Cheek	57634	N/A	1:1	0.338	1.291	0.436	A6
836.60	4183	UMTS 850	RMC	24.0	22.89	0.02	Right	Tilt	57634	N/A	1:1	0.207	1.291	0.267	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.01	Left	Cheek	57634	N/A	1:1	0.323	1.291	0.417	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.01	Left	Tilt	57634	N/A	1:1	0.189	1.291	0.244	
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
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	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	-0.05	Right	Cheek	57634	N/A	1:1	0.340	1.327	0.451	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	-0.01	Right	Tilt	57634	N/A	1:1	0.185	1.327	0.245	
1712.40	1312	UMTS 1750	RMC	24.0	22.76	-0.01	Left	Cheek	57634	N/A	1:1	0.623	1.330	0.829	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.01	Left	Cheek	57634	N/A	1:1	0.620	1.327	0.823	
1752.60	1513	UMTS 1750	RMC	24.0	22.72	0.04	Left	Cheek	57634	N/A	1:1	0.640	1.343	0.860	A7
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.12	Left	Tilt	57634	N/A	1:1	0.279	1.327	0.370	
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
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	21.99	-0.06	Right	Cheek	57527	1:1	0.340	1.262	0.429	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	0.10	Right	Tilt	57527	1:1	0.134	1.262	0.169	
1852.40	9262	UMTS 1900	RMC	23.0	21.95	0.04	Left	Cheek	57527	1:1	0.523	1.274	0.666	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	0.04	Left	Cheek	57527	1:1	0.613	1.262	0.774	A8
1907.60	9538	UMTS 1900	RMC	23.0	21.95	0.00	Left	Cheek	57527	1:1	0.584	1.274	0.744	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	0.05	Left	Tilt	57527	1:1	0.243	1.262	0.307	
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 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	24.5	24.41	-0.03	0	Right	Cheek	QPSK	1	49	05757	1:1	0.215	1.021	0.220	A9
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.00	1	Right	Cheek	QPSK	25	0	05757	1:1	0.160	1.076	0.172	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.01	0	Right	Tilt	QPSK	1	49	05757	1:1	0.112	1.021	0.114	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.00	1	Right	Tilt	QPSK	25	0	05757	1:1	0.102	1.076	0.110	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.06	0	Left	Cheek	QPSK	1	49	05757	1:1	0.179	1.021	0.183	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.06	1	Left	Cheek	QPSK	25	0	05757	1:1	0.137	1.076	0.147	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.06	0	Left	Tilt	QPSK	1	49	05757	1:1	0.086	1.021	0.088	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.09	1	Left	Tilt	QPSK	25	0	05757	1:1	0.080	1.076	0.086	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-10
LTE Band 26 (Cell) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	0.07	0	Right	Cheek	QPSK	1	0	05757	1:1	0.391	1.250	0.489	A10
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.02	1	Right	Cheek	QPSK	36	0	05757	1:1	0.303	1.268	0.384	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	-0.03	0	Right	Tilt	QPSK	1	0	05757	1:1	0.250	1.250	0.313	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.06	1	Right	Tilt	QPSK	36	0	05757	1:1	0.194	1.268	0.246	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	-0.06	0	Left	Cheek	QPSK	1	0	05757	1:1	0.381	1.250	0.476	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.03	1	Left	Cheek	QPSK	36	0	05757	1:1	0.287	1.268	0.364	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	0.08	0	Left	Tilt	QPSK	1	0	05757	1:1	0.230	1.250	0.288	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.02	1	Left	Tilt	QPSK	36	0	05757	1:1	0.169	1.268	0.214	
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 4 (AWS) Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	-0.06	0	Right	Cheek	QPSK	1	0	57576	1:1	0.365	1.262	0.461	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	-0.01	1	Right	Cheek	QPSK	50	0	57576	1:1	0.282	1.274	0.359	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	0.00	0	Right	Tilt	QPSK	1	0	57576	1:1	0.206	1.262	0.260	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	0.04	1	Right	Tilt	QPSK	50	0	57576	1:1	0.157	1.274	0.200	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	-0.03	0	Left	Cheek	QPSK	1	0	57576	1:1	0.594	1.262	0.750	A11
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	-0.02	1	Left	Cheek	QPSK	50	0	57576	1:1	0.500	1.274	0.637	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.42	0.06	1	Left	Cheek	QPSK	100	0	57576	1:1	0.528	1.282	0.677	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	0.03	0	Left	Tilt	QPSK	1	0	57576	1:1	0.289	1.262	0.365	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	0.01	1	Left	Tilt	QPSK	50	0	57576	1:1	0.231	1.274	0.294	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-12
LTE Band 25 (PCS) Head SAR

MEASUREMENT RESULTS

FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.05	0	Right	Cheek	QPSK	1	0	58145	1:1	0.388	1.230	0.477	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	-0.15	1	Right	Cheek	QPSK	50	0	58145	1:1	0.320	1.239	0.396	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.05	0	Right	Tilt	QPSK	1	0	58145	1:1	0.205	1.230	0.252	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	-0.16	1	Right	Tilt	QPSK	50	0	58145	1:1	0.078	1.239	0.097	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.20	0	Left	Cheek	QPSK	1	0	58145	1:1	0.827	1.230	1.017	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.57	0.02	0	Left	Cheek	QPSK	1	0	58145	1:1	0.829	1.239	**1.027**	A12
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.47	0.01	0	Left	Cheek	QPSK	1	50	58145	1:1	0.766	1.268	0.971	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	0.03	1	Left	Cheek	QPSK	50	0	58145	1:1	0.662	1.239	0.820	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	22.5	21.55	0.01	1	Left	Cheek	QPSK	50	25	58145	1:1	0.631	1.245	0.786	
1905.00	26590	High	LTE Band 25 (PCS)	20	22.5	21.45	0.00	1	Left	Cheek	QPSK	50	0	58145	1:1	0.652	1.274	0.831	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.55	0.03	1	Left	Cheek	QPSK	100	0	58145	1:1	0.651	1.245	0.810	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.01	0	Left	Tilt	QPSK	1	0	58145	1:1	0.342	1.230	0.421	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	0.03	1	Left	Tilt	QPSK	50	0	58145	1:1	0.254	1.239	0.315	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.57	0.19	0	Left	Cheek	QPSK	1	0	58145	1:1	0.805	1.239	0.997	
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 represents variability measurement.

Table 11-13
LTE Band 41 Head SAR

MEASUREMENT RESULTS

1 CC Uplink | 2 CC Uplink	FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
	MHz	Ch.															(W/kg)		(W/kg)	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	-0.12	0	Right	Cheek	QPSK	1	99	05764	1:1.58	0.281	1.265	0.355	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.14	1	Right	Cheek	QPSK	50	25	05764	1:1.58	0.221	1.262	0.279	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	0.10	0	Right	Tilt	QPSK	1	99	05764	1:1.58	0.310	1.265	0.392	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.08	1	Right	Tilt	QPSK	50	25	05764	1:1.58	0.259	1.262	0.327	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	0.16	0	Left	Cheek	QPSK	1	99	05764	1:1.58	0.446	1.265	0.564	A13
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.04	1	Left	Cheek	QPSK	50	25	05764	1:1.58	0.352	1.262	0.444	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	-0.17	0	Left	Tilt	QPSK	1	99	05764	1:1.58	0.206	1.265	0.261	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.02	1	Left	Tilt	QPSK	50	25	05764	1:1.58	0.157	1.262	0.198	
1 CC Uplink - Power Class 2	2680.00	41490	High	LTE Band 41	20	25.0	24.30	-0.01	0	Left	Cheek	QPSK	1	99	05764	1:2.31	0.393	1.175	0.462	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-14
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	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	16.0	15.35	0.10	Right	Cheek	58079	1	99.0	0.750	0.664	1.161	1.010	**0.779**	A14
2437	6	802.11b	DSSS	22	16.0	15.45	0.10	Right	Cheek	58079	1	99.0	0.718	0.634	1.135	1.010	0.727	
2462	11	802.11b	DSSS	22	16.0	15.39	-0.04	Right	Cheek	58079	1	99.0	0.799	0.657	1.151	1.010	0.764	
2437	6	802.11b	DSSS	22	16.0	15.45	-0.06	Right	Tilt	58079	1	99.0	0.526	0.451	1.135	1.010	0.517	
2437	6	802.11b	DSSS	22	16.0	15.45	-0.10	Left	Cheek	58079	1	99.0	0.497	0.431	1.135	1.010	0.494	
2437	6	802.11b	DSSS	22	16.0	15.45	0.10	Left	Tilt	58079	1	99.0	0.346	-	1.135	1.010	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Head** **1.6 W/kg (mW/g)** averaged over 1 gram										

Table 11-15
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)	
5270	54	802.11n	OFDM	40	11.0	10.99	-0.10	Right	Cheek	57592	13.5	88.8	1.856	0.898	1.002	1.126	1.013	
5310	62	802.11n	OFDM	40	9.0	8.37	0.10	Right	Cheek	57592	13.5	88.8	1.022	0.396	1.156	1.126	0.515	
5270	54	802.11n	OFDM	40	11.0	10.99	0.18	Right	Tilt	57592	13.5	88.8	1.050	0.495	1.002	1.126	0.558	
5270	54	802.11n	OFDM	40	11.0	10.99	0.03	Left	Cheek	57592	13.5	88.8	0.530	0.304	1.002	1.126	0.343	
5270	54	802.11n	OFDM	40	11.0	10.99	0.15	Left	Tilt	57592	13.5	88.8	0.336	-	1.002	1.126	-	
5270	54	802.11n	OFDM	40	11.0	10.99	0.16	Right	Cheek	57592	13.5	88.8	2.015	0.938	1.002	1.126	**1.058**	A15
5630	126	802.11n	OFDM	40	11.0	10.86	0.11	Right	Cheek	57592	13.5	88.8	1.407	0.617	1.033	1.126	0.718	
5630	126	802.11n	OFDM	40	11.0	10.86	0.19	Right	Tilt	57592	13.5	88.8	0.814	0.342	1.033	1.126	0.398	
5630	126	802.11n	OFDM	40	11.0	10.86	0.18	Left	Cheek	57592	13.5	88.8	0.390	0.277	1.033	1.126	0.322	
5630	126	802.11n	OFDM	40	11.0	10.86	0.14	Left	Tilt	57592	13.5	88.8	0.358	-	1.033	1.126	-	
5795	159	802.11n	OFDM	40	11.0	10.82	0.10	Right	Cheek	57592	13.5	88.8	1.153	0.473	1.042	1.126	0.555	
5795	159	802.11n	OFDM	40	11.0	10.82	0.15	Right	Tilt	57592	13.5	88.8	0.699	0.289	1.042	1.126	0.339	
5795	159	802.11n	OFDM	40	11.0	10.82	-0.17	Left	Cheek	57592	13.5	88.8	0.597	0.206	1.042	1.126	0.242	
5795	159	802.11n	OFDM	40	11.0	10.82	0.12	Left	Tilt	57592	13.5	88.8	0.413	-	1.042	1.126	-	
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 represents variability measurement.

11.2 Standalone Body-Worn SAR Data

Table 11-16
GSM/UMTS/CDMA Body-Worn 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 (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
820.10	564	CDMA BC10 (§90S)	TDSO / SO32	25.0	24.42	-0.01	15 mm	05757	1:1	back	0.567	1.143	0.648	A16
824.70	1013	CDMA BC0 (§22H)	TDSO / SO32	25.0	24.49	-0.02	15 mm	05757	1:1	back	0.542	1.125	0.610	
836.52	384	CDMA BC0 (§22H)	TDSO / SO32	25.0	24.52	-0.01	15 mm	05757	1:1	back	0.592	1.117	0.661	
848.31	777	CDMA BC0 (§22H)	TDSO / SO32	25.0	24.59	-0.05	15 mm	05757	1:1	back	0.609	1.099	0.669	A18
1851.25	25	PCS CDMA	TDSO / SO32	25.5	24.51	0.02	15 mm	57576	1:1	back	0.629	1.256	0.790	A20
1880.00	600	PCS CDMA	TDSO / SO32	25.5	24.46	0.00	15 mm	57576	1:1	back	0.543	1.271	0.690	
1908.75	1175	PCS CDMA	TDSO / SO32	25.5	24.55	-0.02	15 mm	57576	1:1	back	0.543	1.245	0.676	
824.20	128	GSM 850	GSM	33.2	31.76	-0.02	15 mm	57634	1:8.3	back	0.394	1.393	0.549	
836.60	190	GSM 850	GSM	33.2	31.94	0.03	15 mm	57634	1:8.3	back	0.472	1.337	0.631	
848.80	251	GSM 850	GSM	33.2	31.96	-0.01	15 mm	57634	1:8.3	back	0.478	1.330	0.636	A22
1880.00	661	GSM 1900	GSM	30.2	29.28	0.05	15 mm	57634	1:8.3	back	0.169	1.236	0.209	A24
826.40	4132	UMTS 850	RMC	24.0	22.96	0.01	15 mm	57634	1:1	back	0.512	1.271	0.651	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.03	15 mm	57634	1:1	back	0.545	1.291	0.704	
846.60	4233	UMTS 850	RMC	24.0	22.85	0.02	15 mm	57634	1:1	back	0.575	1.303	0.749	A26
1712.40	1312	UMTS 1750	RMC	24.0	22.76	0.02	15 mm	57634	1:1	back	0.586	1.330	0.779	A28
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.04	15 mm	57634	1:1	back	0.554	1.327	0.735	
1752.60	1513	UMTS 1750	RMC	24.0	22.72	0.05	15 mm	57634	1:1	back	0.557	1.343	0.748	
1880.00	9400	UMTS 1900	RMC	24.0	22.95	0.03	15 mm	57634	1:1	back	0.409	1.274	0.521	A30
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 MHz	Ch.		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 #
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.03	0	05757	QPSK	1	49	15 mm	back	1:1	0.309	1.021	0.315	A32
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	-0.02	1	05757	QPSK	25	0	15 mm	back	1:1	0.249	1.076	0.268	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	-0.07	0	05757	QPSK	1	0	15 mm	back	1:1	0.580	1.250	0.725	A34
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.03	1	05757	QPSK	36	0	15 mm	back	1:1	0.490	1.268	0.621	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	24.5	23.33	0.01	0	57576	QPSK	1	0	15 mm	back	1:1	0.592	1.309	0.775	A36
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.32	0.00	1	57576	QPSK	50	0	15 mm	back	1:1	0.476	1.312	0.625	
1860.00	26140	Low	LTE Band 25 (PCS)	20	25.0	24.07	-0.13	0	57576	QPSK	1	0	15 mm	back	1:1	0.663	1.239	**0.821**	A38
1882.50	26365	Mid	LTE Band 25 (PCS)	20	25.0	24.14	0.07	0	57576	QPSK	1	0	15 mm	back	1:1	0.659	1.219	0.803	
1905.00	26590	High	LTE Band 25 (PCS)	20	25.0	24.10	-0.03	0	57576	QPSK	1	50	15 mm	back	1:1	0.568	1.230	0.699	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.0	23.13	0.02	1	57576	QPSK	50	0	15 mm	back	1:1	0.509	1.222	0.622	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.0	23.10	0.00	1	57576	QPSK	100	0	15 mm	back	1:1	0.471	1.230	0.579	

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

Table 11-18
LTE Band 41 Body-Worn SAR

MEASUREMENT RESULTS

1 CC Uplink | 2 CC Uplink	FREQUENCY MHz	Ch.		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 #
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	-0.01	0	05764	QPSK	1	99	15 mm	back	1:1.58	0.280	1.265	0.354	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.06	1	05764	QPSK	50	25	15 mm	back	1:1.58	0.227	1.262	0.286	
1 CC Uplink - Power Class 2	2680.00	41490	High	LTE Band 41	20	28.0	27.21	0.05	0	05764	QPSK	1	99	15 mm	back	1:2.31	0.484	1.199	0.580	A40

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

Table 11-19
DTS Body-Worn SAR

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.	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 W/kg	SAR (1g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g) (W/kg)	Plot #
2437	6	802.11b	DSSS	22	19.0	18.68	0.18	15 mm	57592	1	back	99.0	0.268	0.186	1.076	1.010	**0.202**	A42

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

Table 11-20
NII Body-Worn SAR

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.	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 W/kg	SAR (1g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g) (W/kg)	Plot #
5280	56	802.11a	OFDM	20	16.0	14.89	0.04	15 mm	58137	6	back	98.6	0.713	0.300	1.291	1.014	0.393	
5500	100	802.11a	OFDM	20	16.0	15.11	0.13	15 mm	58137	6	back	98.6	0.597	0.267	1.227	1.014	0.332	
5825	165	802.11a	OFDM	20	16.0	14.78	0.02	15 mm	58137	6	back	98.6	0.838	0.401	1.324	1.014	**0.538**	A44

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

11.3 Standalone Hotspot SAR Data

Table 11-21
CDMA 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)	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	24.7	24.03	0.01	10 mm	05814	N/A	1:1	back	0.587	1.167	0.685	A17
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	24.7	24.03	0.00	10 mm	05814	N/A	1:1	front	0.409	1.167	0.477	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	24.7	24.03	-0.03	10 mm	05814	N/A	1:1	bottom	0.041	1.167	0.048	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	24.7	24.03	0.02	10 mm	05814	N/A	1:1	right	0.305	1.167	0.356	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	24.7	24.03	0.05	10 mm	05814	N/A	1:1	left	0.317	1.167	0.370	
824.70	1013	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.74	0.04	10 mm	05814	N/A	1:1	back	0.629	1.247	0.784	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.77	0.02	10 mm	05814	N/A	1:1	back	0.659	1.239	0.817	A19
848.31	777	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.74	0.04	10 mm	05814	N/A	1:1	back	0.650	1.247	0.811	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.77	0.01	10 mm	05814	N/A	1:1	front	0.467	1.239	0.579	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.77	-0.08	10 mm	05814	N/A	1:1	bottom	0.065	1.239	0.081	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.77	0.04	10 mm	05814	N/A	1:1	right	0.377	1.239	0.467	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	24.7	23.77	-0.01	10 mm	05814	N/A	1:1	left	0.359	1.239	0.445	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.0	23.23	0.02	10 mm	58145	N/A	1:1	back	0.827	1.194	0.987	A21
1880.00	600	PCS CDMA	EVDO Rev. 0	24.0	23.06	0.07	10 mm	58145	N/A	1:1	back	0.691	1.242	0.858	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.0	23.02	0.05	10 mm	58145	N/A	1:1	back	0.721	1.253	0.903	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.0	23.23	-0.02	10 mm	58145	N/A	1:1	front	0.788	1.194	0.941	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.0	23.06	-0.05	10 mm	58145	N/A	1:1	front	0.668	1.242	0.830	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.0	23.02	0.06	10 mm	58145	N/A	1:1	front	0.712	1.253	0.892	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.0	23.06	0.05	10 mm	58145	N/A	1:1	bottom	0.268	1.242	0.333	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.0	23.06	0.04	10 mm	58145	N/A	1:1	right	0.197	1.242	0.245	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.0	23.06	-0.02	10 mm	58145	N/A	1:1	left	0.570	1.242	0.708	
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
GSM/UMTS Hotspot SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
824.20	128	GSM 850	GPRS	28.0	27.27	-0.10	10 mm	57634	4	1:2.076	back	0.718	1.183	0.849	
836.60	190	GSM 850	GPRS	28.0	27.31	0.04	10 mm	57634	4	1:2.076	back	0.724	1.172	0.849	
848.80	251	GSM 850	GPRS	28.0	27.57	-0.02	10 mm	57634	4	1:2.076	back	0.773	1.104	0.853	A23
836.60	190	GSM 850	GPRS	28.0	27.31	0.00	10 mm	57634	4	1:2.076	front	0.495	1.172	0.580	
836.60	190	GSM 850	GPRS	28.0	27.31	0.01	10 mm	57634	4	1:2.076	bottom	0.066	1.172	0.077	
836.60	190	GSM 850	GPRS	28.0	27.31	-0.19	10 mm	57634	4	1:2.076	right	0.413	1.172	0.484	
836.60	190	GSM 850	GPRS	28.0	27.31	0.04	10 mm	57634	4	1:2.076	left	0.397	1.172	0.465	
1880.00	661	GSM 1900	GPRS	23.5	23.34	0.03	10 mm	57527	4	1:2.076	back	0.239	1.038	0.248	
1880.00	661	GSM 1900	GPRS	23.5	23.34	-0.01	10 mm	57527	4	1:2.076	front	0.259	1.038	0.269	A25
1880.00	661	GSM 1900	GPRS	23.5	23.34	-0.18	10 mm	57527	4	1:2.076	bottom	0.090	1.038	0.093	
1880.00	661	GSM 1900	GPRS	23.5	23.34	-0.03	10 mm	57527	4	1:2.076	right	0.073	1.038	0.076	
1880.00	661	GSM 1900	GPRS	23.5	23.34	-0.01	10 mm	57527	4	1:2.076	left	0.168	1.038	0.174	
826.40	4132	UMTS 850	RMC	24.0	22.96	-0.01	10 mm	57634	N/A	1:1	back	0.599	1.271	0.761	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.00	10 mm	57634	N/A	1:1	back	0.627	1.291	0.809	
846.60	4233	UMTS 850	RMC	24.0	22.85	0.01	10 mm	57634	N/A	1:1	back	0.632	1.303	0.823	A27
836.60	4183	UMTS 850	RMC	24.0	22.89	0.00	10 mm	57634	N/A	1:1	front	0.439	1.291	0.567	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.03	10 mm	57634	N/A	1:1	bottom	0.061	1.291	0.079	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.00	10 mm	57634	N/A	1:1	right	0.358	1.291	0.462	
836.60	4183	UMTS 850	RMC	24.0	22.89	0.00	10 mm	57634	N/A	1:1	left	0.319	1.291	0.412	
1712.40	1312	UMTS 1750	RMC	24.0	22.76	0.00	10 mm	57634	N/A	1:1	back	1.050	1.330	**1.397**	A29
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.00	10 mm	57634	N/A	1:1	back	1.010	1.327	1.340	
1752.60	1513	UMTS 1750	RMC	24.0	22.72	0.09	10 mm	57634	N/A	1:1	back	1.040	1.343	**1.397**	
1712.40	1312	UMTS 1750	RMC	24.0	22.76	-0.08	10 mm	57634	N/A	1:1	front	0.909	1.330	1.209	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.00	10 mm	57634	N/A	1:1	front	0.887	1.327	1.177	
1752.60	1513	UMTS 1750	RMC	24.0	22.72	-0.01	10 mm	57634	N/A	1:1	front	0.891	1.343	1.197	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.00	10 mm	57634	N/A	1:1	bottom	0.196	1.327	0.260	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.04	10 mm	57634	N/A	1:1	right	0.144	1.327	0.191	
1732.40	1412	UMTS 1750	RMC	24.0	22.77	0.03	10 mm	57634	N/A	1:1	left	0.595	1.327	0.790	
1712.40	1312	UMTS 1750	RMC	24.0	22.76	0.01	15 mm	57634	N/A	1:1	back	1.050	1.330	**1.397**	
1852.40	9262	UMTS 1900	RMC	23.0	21.95	-0.03	10 mm	57527	N/A	1:1	back	0.516	1.274	0.657	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	-0.03	10 mm	57527	N/A	1:1	back	0.536	1.262	0.676	A31
1907.60	9538	UMTS 1900	RMC	23.0	21.95	-0.05	10 mm	57527	N/A	1:1	back	0.511	1.274	0.651	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	-0.01	10 mm	57527	N/A	1:1	front	0.533	1.262	0.673	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	0.04	10 mm	57527	N/A	1:1	bottom	0.214	1.262	0.270	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	0.07	10 mm	57527	N/A	1:1	right	0.146	1.262	0.184	
1880.00	9400	UMTS 1900	RMC	23.0	21.99	-0.10	10 mm	57527	N/A	1:1	left	0.437	1.262	0.551	
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 represent variability measurement.

Table 11-23
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	24.5	24.41	-0.03	0	05757	QPSK	1	49	10 mm	back	1:1	0.418	1.021	0.427	A33
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.04	1	05757	QPSK	25	0	10 mm	back	1:1	0.326	1.076	0.351	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.04	0	05757	QPSK	1	49	10 mm	front	1:1	0.251	1.021	0.256	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.04	1	05757	QPSK	25	0	10 mm	front	1:1	0.197	1.076	0.212	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.00	0	05757	QPSK	1	49	10 mm	bottom	1:1	0.032	1.021	0.033	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.00	1	05757	QPSK	25	0	10 mm	bottom	1:1	0.023	1.076	0.025	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	-0.07	0	05757	QPSK	1	49	10 mm	right	1:1	0.223	1.021	0.228	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	0.00	1	05757	QPSK	25	0	10 mm	right	1:1	0.182	1.076	0.196	
707.50	23095	Mid	LTE Band 12	10	24.5	24.41	0.01	0	05757	QPSK	1	49	10 mm	left	1:1	0.267	1.021	0.273	
707.50	23095	Mid	LTE Band 12	10	23.5	23.18	-0.07	1	05757	QPSK	25	0	10 mm	left	1:1	0.203	1.076	0.218	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-24
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	25.0	24.03	-0.07	0	05757	QPSK	1	0	10 mm	back	1:1	0.684	1.250	0.855	A35
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.01	1	05757	QPSK	36	0	10 mm	back	1:1	0.575	1.268	0.729	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.91	-0.01	1	05757	QPSK	75	0	10 mm	back	1:1	0.577	1.285	0.741	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	0.04	0	05757	QPSK	1	0	10 mm	front	1:1	0.485	1.250	0.606	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.01	1	05757	QPSK	36	0	10 mm	front	1:1	0.404	1.268	0.512	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	0.03	0	05757	QPSK	1	0	10 mm	bottom	1:1	0.054	1.250	0.068	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	-0.01	1	05757	QPSK	36	0	10 mm	bottom	1:1	0.052	1.268	0.066	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	-0.04	0	05757	QPSK	1	0	10 mm	right	1:1	0.408	1.250	0.510	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	0.00	1	05757	QPSK	36	0	10 mm	right	1:1	0.355	1.268	0.450	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.0	24.03	-0.18	0	05757	QPSK	1	0	10 mm	left	1:1	0.404	1.250	0.505	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.0	22.97	-0.04	1	05757	QPSK	36	0	10 mm	left	1:1	0.338	1.268	0.429	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-25
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	0.01	0	58145	QPSK	1	0	10 mm	back	1:1	0.986	1.262	1.244	A37
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	0.01	1	58145	QPSK	50	0	10 mm	back	1:1	0.793	1.274	1.010	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.42	0.00	1	58145	QPSK	100	0	10 mm	back	1:1	0.795	1.282	1.019	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	-0.10	0	58145	QPSK	1	0	10 mm	front	1:1	0.969	1.262	1.223	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	-0.03	1	58145	QPSK	50	0	10 mm	front	1:1	0.793	1.274	1.010	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.42	0.00	1	58145	QPSK	100	0	10 mm	front	1:1	0.790	1.282	1.013	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	0.03	0	58145	QPSK	1	0	10 mm	bottom	1:1	0.213	1.262	0.269	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	-0.02	1	58145	QPSK	50	0	10 mm	bottom	1:1	0.184	1.274	0.234	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	0.13	0	58145	QPSK	1	0	10 mm	right	1:1	0.313	1.262	0.395	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	0.03	1	58145	QPSK	50	0	10 mm	right	1:1	0.258	1.274	0.329	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.49	-0.05	0	58145	QPSK	1	0	10 mm	left	1:1	0.549	1.262	0.693	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.45	-0.04	1	58145	QPSK	50	0	10 mm	left	1:1	0.447	1.274	0.569	
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 25 (PCS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.04	0	58145	QPSK	1	0	10 mm	back	1:1	0.655	1.230	0.806	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.57	0.02	0	58145	QPSK	1	0	10 mm	back	1:1	0.674	1.239	0.835	A39
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.47	-0.04	0	58145	QPSK	1	50	10 mm	back	1:1	0.572	1.268	0.725	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	-0.04	1	58145	QPSK	50	0	10 mm	back	1:1	0.516	1.239	0.639	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.55	0.01	1	58145	QPSK	100	0	10 mm	back	1:1	0.478	1.245	0.595	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.04	0	58145	QPSK	1	0	10 mm	front	1:1	0.671	1.230	0.825	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.57	0.00	0	58145	QPSK	1	0	10 mm	front	1:1	0.651	1.239	0.807	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.5	22.47	0.04	0	58145	QPSK	1	50	10 mm	front	1:1	0.643	1.268	0.815	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	0.02	1	58145	QPSK	50	0	10 mm	front	1:1	0.508	1.239	0.629	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.55	0.06	1	58145	QPSK	100	0	10 mm	front	1:1	0.442	1.245	0.550	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	-0.05	0	58145	QPSK	1	0	10 mm	bottom	1:1	0.261	1.230	0.321	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	-0.09	1	58145	QPSK	50	0	10 mm	bottom	1:1	0.207	1.239	0.256	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.04	0	58145	QPSK	1	0	10 mm	right	1:1	0.185	1.230	0.228	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	-0.13	1	58145	QPSK	50	0	10 mm	right	1:1	0.145	1.239	0.180	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.5	22.60	0.01	0	58145	QPSK	1	0	10 mm	left	1:1	0.498	1.230	0.613	
1860.00	26140	Low	LTE Band 25 (PCS)	20	22.5	21.57	-0.04	1	58145	QPSK	50	0	10 mm	left	1:1	0.396	1.239	0.491	
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																					
1 CC Uplink | 2 CC Uplink	FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
	MHz	Ch.															(W/kg)		(W/kg)	
1 CC Uplink - Power Class 3	2506.00	39750	Low	LTE Band 41	20	24.0	22.73	-0.14	0	57642	QPSK	1	0	10 mm	back	1:1.58	0.251	1.340	0.336	
1 CC Uplink - Power Class 3	2549.50	40185	Low-Mid	LTE Band 41	20	24.0	22.78	0.14	0	57642	QPSK	1	99	10 mm	back	1:1.58	0.315	1.324	0.417	
1 CC Uplink - Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.0	22.84	-0.06	0	57642	QPSK	1	50	10 mm	back	1:1.58	0.407	1.306	0.532	
1 CC Uplink - Power Class 3	2636.50	41055	Mid-High	LTE Band 41	20	24.0	22.81	-0.03	0	57642	QPSK	1	50	10 mm	back	1:1.58	0.493	1.315	0.648	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	0.16	0	57642	QPSK	1	99	10 mm	back	1:1.58	0.580	1.265	0.734	A41
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.04	1	57642	QPSK	50	25	10 mm	back	1:1.58	0.460	1.262	0.581	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.98	0.00	1	57624	QPSK	100	0	10 mm	back	1:1.58	0.412	1.265	0.521	
1 CC Uplink - Power Class 2	2680.00	41490	High	LTE Band 41	20	25.0	24.30	0.02	0	57642	QPSK	1	99	10 mm	back	1:2.31	0.494	1.175	0.580	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	-0.03	0	57642	QPSK	1	99	10 mm	front	1:1.58	0.473	1.265	0.598	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.05	1	57642	QPSK	50	25	10 mm	front	1:1.58	0.390	1.262	0.492	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	0.06	0	57642	QPSK	1	99	10 mm	bottom	1:1.58	0.199	1.265	0.252	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.07	1	57642	QPSK	50	25	10 mm	bottom	1:1.58	0.171	1.262	0.216	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	0.12	0	57642	QPSK	1	99	10 mm	right	1:1.58	0.061	1.265	0.077	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.17	1	57642	QPSK	50	25	10 mm	right	1:1.58	0.048	1.262	0.061	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	24.0	22.98	-0.02	0	57642	QPSK	1	99	10 mm	left	1:1.58	0.245	1.265	0.310	
1 CC Uplink - Power Class 3	2680.00	41490	High	LTE Band 41	20	23.0	21.99	0.04	1	57642	QPSK	50	25	10 mm	left	1:1.58	0.202	1.262	0.255	
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)	
2437	6	802.11b	DSSS	22	19.0	18.68	0.19	10 mm	57592	1	back	99.0	0.488	0.352	1.076	1.010	0.383	A43
2437	6	802.11b	DSSS	22	19.0	18.68	0.11	10 mm	57592	1	front	99.0	0.466	0.307	1.076	1.010	0.334	
2437	6	802.11b	DSSS	22	19.0	18.68	0.14	10 mm	57592	1	top	99.0	0.360	-	1.076	1.010	-	
2437	6	802.11b	DSSS	22	19.0	18.68	0.20	10 mm	57592	1	left	99.0	0.177	-	1.076	1.010	-	
5745	149	802.11a	OFDM	20	16.0	14.78	-0.04	10 mm	58137	6	back	98.6	1.688	0.730	1.324	1.014	0.980	
5785	157	802.11a	OFDM	20	16.0	14.77	0.05	10 mm	58137	6	back	98.6	1.826	0.775	1.327	1.014	1.043	A45
5825	165	802.11a	OFDM	20	16.0	14.78	0.01	10 mm	58137	6	back	98.6	1.429	0.653	1.324	1.014	0.877	
5825	165	802.11a	OFDM	20	16.0	14.78	0.12	10 mm	58137	6	front	98.6	0.475	0.195	1.324	1.014	0.262	
5825	165	802.11a	OFDM	20	16.0	14.78	0.16	10 mm	58137	6	top	98.6	0.499	-	1.324	1.014	-	
5825	165	802.11a	OFDM	20	16.0	14.78	0.16	10 mm	58137	6	left	98.6	1.091	0.478	1.324	1.014	0.642	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. This device utilizes power reduction for some wireless modes and technologies, as outlined in Section 1.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v03r01.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. EVDO Rev0 and RevA and TDSO / SO32 FCH+SCH SAR tests were not required per the 3G SAR Test Reduction Procedure in FCC KDB Publication 941225 D01v03r01.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01v03r01 procedures for data devices. Wireless Router SAR tests for Subtype 2 of Rev.A and 1x RTT configurations were not required per the 3G SAR Test Reduction Policy in KDB Publication 941225 D01v03r01.
4. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.

5. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.
6. CDMA 1X Advanced technology was not required for SAR since the maximum allowed output powers for 1X Advanced was not more than 0.25 dB higher than the maximum powers for 1X.

UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at 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 8.6.4.
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 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.
7. This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3 % using UL-DL configuration 1. Per FCC Guidance, all SAR tests were performed using Power Class 3. SAR with power class 2 at the available duty factor was additionally performed for the power class 3 configuration with the highest SAR configuration for each exposure conditions. Please see Section 14 for linearity results.

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 for 1g evaluations, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.7.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg for 1g evaluations. See Section 8.7.6 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 for 1g evaluations or all test channels were measured.
5. 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.

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.

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Head)	Estimated SAR (Head)	Separation Distance (Body-worn)	Estimated SAR (Body-worn)	Separation Distance (Hotspot)	Estimated SAR (Hotspot)
	[MHz]	[dBm]	[mm]	[W/kg]	[mm]	[W/kg]	[mm]	[W/kg]
Bluetooth	2480	9.00	5	0.336	15	0.112	10	0.168

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

(*) 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 12-2
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	CDMA/EVDO BC10 (§90S)	0.442	0.779	1.221
	CDMA/EVDO BC0 (§22H)	0.491	0.779	1.270
	PCS CDMA/EVDO	1.034	0.779	See Table Below
	GSM 850	0.418	0.779	1.197
	GSM 1900	0.295	0.779	1.074
	UMTS 850	0.436	0.779	1.215
	UMTS 1750	0.860	0.779	See Table Below
	UMTS 1900	0.774	0.779	**1.553**
	LTE Band 12	0.220	0.779	0.999
	LTE Band 26 (Cell)	0.489	0.779	1.268
	LTE Band 4 (AWS)	0.750	0.779	1.529
	LTE Band 25 (PCS)	1.027	0.779	See Table Below
	LTE Band 41	0.564	0.779	1.343

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.534	0.779	1.313
	Right Tilt	0.221	0.517	0.738
	Left Cheek	0.914	0.494	1.408
	Left Tilt	0.392	0.779*	1.171

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.536	0.779	1.315
	Right Tilt	0.212	0.517	0.729
	Left Cheek	1.034	0.494	1.528
	Left Tilt	0.392	0.779*	1.171

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.451	0.779	1.230
	Right Tilt	0.245	0.517	0.762
	Left Cheek	0.860	0.494	1.354
	Left Tilt	0.370	0.779*	1.149

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.477	0.779	1.256
	Right Tilt	0.252	0.517	0.769
	Left Cheek	1.027	0.494	1.521
	Left Tilt	0.421	0.779*	1.200

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	CDMA/EVDO BC10 (§90S)	0.442	1.058	1.500
	CDMA/EVDO BC0 (§22H)	0.491	1.058	**1.549**
	PCS CDMA/EVDO	1.034	1.058	See Table Below
	GSM 850	0.418	1.058	1.476
	GSM 1900	0.295	1.058	1.353
	UMTS 850	0.436	1.058	1.494
	UMTS 1750	0.860	1.058	See Table Below
	UMTS 1900	0.774	1.058	See Table Below
	LTE Band 12	0.220	1.058	1.278
	LTE Band 26 (Cell)	0.489	1.058	1.547
	LTE Band 4 (AWS)	0.750	1.058	See Table Below
	LTE Band 25 (PCS)	1.027	1.058	See Table Below
	LTE Band 41	0.564	1.058	See Table Below

Configuration	PCS CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Cheek	0.534	1.058	1.592	N/A
Right Tilt	0.221	0.558	0.779	N/A
Left Cheek	0.914	0.343	1.257	N/A
Left Tilt	0.392	1.058*	1.450	N/A

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.536	1.058	**1.594**
	Right Tilt	0.212	0.558	0.770
	Left Cheek	1.034	0.343	1.377
	Left Tilt	0.392	1.058*	1.450

Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Cheek	0.451	1.058	1.509	N/A
Right Tilt	0.245	0.558	0.803	N/A
Left Cheek	0.860	0.343	1.203	N/A
Left Tilt	0.370	1.058*	1.428	N/A

Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Cheek	0.429	1.058	**1.487**	N/A
Right Tilt	0.169	0.558	0.727	N/A
Left Cheek	0.774	0.343	1.117	N/A
Left Tilt	0.307	1.058*	1.365	N/A

Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Cheek	0.355	1.058	1.413	N/A
Right Tilt	0.392	0.558	0.950	N/A
Left Cheek	0.564	0.343	0.907	N/A
Left Tilt	0.261	1.058*	1.319	N/A

Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Cheek	0.461	1.058	**1.519**	N/A
Right Tilt	0.260	0.558	0.818	N/A
Left Cheek	0.750	0.343	1.093	N/A
Left Tilt	0.365	1.058*	1.423	N/A

Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Right Cheek	0.477	1.058	**1.535**	N/A
Right Tilt	0.252	0.558	0.810	N/A
Left Cheek	1.027	0.343	1.370	N/A
Left Tilt	0.421	1.058*	1.479	N/A

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	CDMA/EVDO BC10 (§90S)	0.442	0.336	0.778
	CDMA/EVDO BC0 (§22H)	0.491	0.336	0.827
	PCS CDMA/EVDO	1.034	0.336	1.370
	GSM 850	0.418	0.336	0.754
	GSM 1900	0.295	0.336	0.631
	UMTS 850	0.436	0.336	0.772
	UMTS 1750	0.860	0.336	1.196
	UMTS 1900	0.774	0.336	1.110
	LTE Band 12	0.220	0.336	0.556
	LTE Band 26 (Cell)	0.489	0.336	0.825
	LTE Band 4 (AWS)	0.750	0.336	1.086
	LTE Band 25 (PCS)	1.027	0.336	1.363
	LTE Band 41	0.564	0.336	0.900

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.

12.4 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	CDMA BC10 (§90S)	0.648	0.202	0.850
	CDMA BC0 (§22H)	0.669	0.202	0.871
	PCS CDMA	0.790	0.202	0.992
	GSM 850	0.636	0.202	0.838
	GSM 1900	0.209	0.202	0.411
	UMTS 850	0.749	0.202	0.951
	UMTS 1750	0.779	0.202	0.981
	UMTS 1900	0.521	0.202	0.723
	LTE Band 12	0.315	0.202	0.517
	LTE Band 26 (Cell)	0.725	0.202	0.927
	LTE Band 4 (AWS)	0.775	0.202	0.977
	LTE Band 25 (PCS)	0.821	0.202	1.023
	LTE Band 41	0.580	0.202	0.782

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	CDMA BC10 (§90S)	0.648	0.538	1.186
	CDMA BC0 (§22H)	0.669	0.538	1.207
	PCS CDMA	0.790	0.538	1.328
	GSM 850	0.636	0.538	1.174
	GSM 1900	0.209	0.538	0.747
	UMTS 850	0.749	0.538	1.287
	UMTS 1750	0.779	0.538	1.317
	UMTS 1900	0.521	0.538	1.059
	LTE Band 12	0.315	0.538	0.853
	LTE Band 26 (Cell)	0.725	0.538	1.263
	LTE Band 4 (AWS)	0.775	0.538	1.313
	LTE Band 25 (PCS)	0.821	0.538	1.359
	LTE Band 41	0.580	0.538	1.118

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	CDMA BC10 (§90S)	0.648	0.112	0.760
	CDMA BC0 (§22H)	0.669	0.112	0.781
	PCS CDMA	0.790	0.112	0.902
	GSM 850	0.636	0.112	0.748
	GSM 1900	0.209	0.112	0.321
	UMTS 850	0.749	0.112	0.861
	UMTS 1750	0.779	0.112	0.891
	UMTS 1900	0.521	0.112	0.633
	LTE Band 12	0.315	0.112	0.427
	LTE Band 26 (Cell)	0.725	0.112	0.837
	LTE Band 4 (AWS)	0.775	0.112	0.887
	LTE Band 25 (PCS)	0.821	0.112	0.933
	LTE Band 41	0.580	0.112	0.692

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	EVDO BC10 (§90S)	0.685	0.383	1.068
	EVDO BC0 (§22H)	0.817	0.383	1.200
	PCS EVDO	0.987	0.383	1.370
	GPRS 850	0.853	0.383	1.236
	GPRS 1900	0.269	0.383	0.652
	UMTS 850	0.823	0.383	1.206
	UMTS 1750	1.397	0.383	See Table Below
	UMTS 1900	0.676	0.383	1.059
	LTE Band 12	0.427	0.383	0.810
	LTE Band 26 (Cell)	0.855	0.383	1.238
	LTE Band 4 (AWS)	1.244	0.383	See Table Below
	LTE Band 25 (PCS)	0.835	0.383	1.218
	LTE Band 41	0.734	0.383	1.117

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	1.244	0.383	See Note 1	0.02
	Front	1.223	0.334	**1.557**	N/A
	Top	-	0.383*	0.383	N/A
	Bottom	0.269	-	0.269	N/A
	Right	0.395	-	0.395	N/A
	Left	0.693	0.383*	1.076	N/A

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	1.397	0.383	See Note 1	0.02
	Front	1.209	0.334	**1.543**	N/A
	Top	-	0.383*	0.383	N/A
	Bottom	0.260	-	0.260	N/A
	Right	0.191	-	0.191	N/A
	Left	0.790	0.383*	1.173	N/A

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	EVDO BC10 (§90S)	0.685	1.043	See Table Below
	EVDO BC0 (§22H)	0.817	1.043	See Table Below
	PCS EVDO	0.987	1.043	See Table Below
	GPRS 850	0.853	1.043	See Table Below
	GPRS 1900	0.269	1.043	1.312
	UMTS 850	0.823	1.043	See Table Below
	UMTS 1750	1.397	1.043	See Table Below
	UMTS 1900	0.676	1.043	See Table Below
	LTE Band 12	0.427	1.043	**1.470**
	LTE Band 26 (Cell)	0.855	1.043	See Table Below
	LTE Band 4 (AWS)	1.244	1.043	See Table Below
	LTE Band 25 (PCS)	0.835	1.043	See Table Below
	LTE Band 41	0.734	1.043	See Table Below

Simult Tx	Configuration	EVDO BC10 (§90S) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.685	1.043	See Note 1	0.03
	Front	0.477	0.262	0.739	N/A
	Top	-	1.043*	**1.043**	N/A
	Bottom	0.048	-	0.048	N/A
	Right	0.356	-	0.356	N/A
	Left	0.370	0.642	1.012	N/A

Simult Tx	Configuration	EVDO BC0 (§22H) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.817	1.043	See Note 1	0.04
	Front	0.579	0.262	0.841	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.081	-	0.081	N/A
	Right	0.467	-	0.467	N/A
	Left	0.445	0.642	**1.087**	N/A

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.987	1.043	See Note 1	0.03
	Front	0.941	0.262	1.203	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.333	-	0.333	N/A
	Right	0.245	-	0.245	N/A
	Left	0.708	0.642	**1.350**	N/A

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.853	1.043	See Note 1	0.04
	Front	0.580	0.262	0.842	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.077	-	0.077	N/A
	Right	0.484	-	0.484	N/A
	Left	0.465	0.642	**1.107**	N/A

Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.823	1.043	See Note 1	0.03
	Front	0.567	0.262	0.829	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.079	-	0.079	N/A
	Right	0.462	-	0.462	N/A
	Left	0.412	0.642	**1.054**	N/A

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	1.397	1.043	See Note 1	0.04
	Front	1.209	0.262	**1.471**	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.260	-	0.260	N/A
	Right	0.191	-	0.191	N/A
	Left	0.790	0.642	1.432	N/A

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.676	1.043	See Note 1	0.02
	Front	0.673	0.262	0.935	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.270	-	0.270	N/A
	Right	0.184	-	0.184	N/A
	Left	0.551	0.642	**1.193**	N/A

Simult Tx	Configuration	LTE Band 26 (Cell) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.855	1.043	See Note 1	0.04
	Front	0.606	0.262	0.868	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.068	-	0.068	N/A
	Right	0.510	-	0.510	N/A
	Left	0.505	0.642	**1.147**	N/A

Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	1.244	1.043	See Note 1	0.04
	Front	1.223	0.262	**1.485**	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.269	-	0.269	N/A
	Right	0.395	-	0.395	N/A
	Left	0.693	0.642	1.335	N/A

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.835	1.043	See Note 1	0.03
	Front	0.825	0.262	1.087	N/A
	Top	-	1.043*	1.043	N/A
	Bottom	0.321	-	0.321	N/A
	Right	0.228	-	0.228	N/A
	Left	0.613	0.642	**1.255**	N/A

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
Hotspot SAR	Back	0.734	1.043	See Note 1	0.02
	Front	0.598	0.262	0.860	N/A
	Top	-	1.043*	**1.043**	N/A
	Bottom	0.252	-	0.252	N/A
	Right	0.077	-	0.077	N/A
	Left	0.310	0.642	0.952	N/A

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	EVDO BC10 (§90S)	0.685	0.168	0.853
	EVDO BC0 (§22H)	0.817	0.168	0.985
	PCS EVDO	0.987	0.168	1.155
	GPRS 850	0.853	0.168	1.021
	GPRS 1900	0.269	0.168	0.437
	UMTS 850	0.823	0.168	0.991
	UMTS 1750	1.397	0.168	**1.565**
	UMTS 1900	0.676	0.168	0.844
	LTE Band 12	0.427	0.168	0.595
	LTE Band 26 (Cell)	0.855	0.168	1.023
	LTE Band 4 (AWS)	1.244	0.168	1.412
	LTE Band 25 (PCS)	0.835	0.168	1.003
	LTE Band 41	0.734	0.168	0.902

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.

Notes:

1. No evaluation was performed to determine the aggregate 1g SAR for these configurations as the SPLS ratio between the antenna pairs was not greater than 0.04 per FCC KDB 447498 D01v06. See Section 12.6 for detailed SPLS ratio analysis.

12.6 SPLSR Evaluation and Analysis

Per FCC KDB Publication 447498 D01v06, when the sum of the standalone transmitters is more than 1.6 W/kg for 1g, the SAR sum to peak locations can be analyzed to determine SAR distribution overlaps. When the SAR peak to location ratio (shown below) for each pair of antennas is $\leq$ 0.04 for 1g, simultaneous SAR evaluation is not required. The distance between the transmitters was calculated using the following formula.

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

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

12.6.1 Back Side SPLSR Evaluation and Analysis

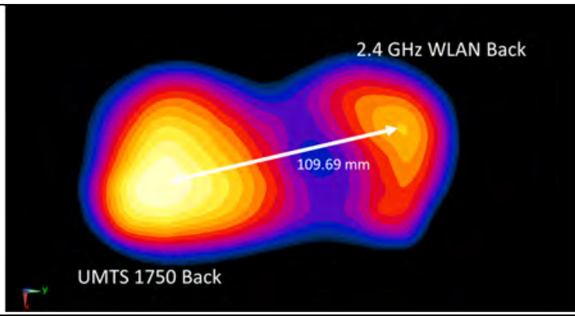
Table 12-11
Peak SAR Locations for Body Back Side at 1.0 cm

Mode/Band	x (mm)	y (mm)	Reported SAR (W/kg)
2.4 GHz WLAN Back	-31.00	66.20	0.383
5 GHz WLAN Back	14.00	53.00	1.043
UMTS 1750 Back	-13.00	-42.00	1.397
PCS EVDO Back	-18.50	-38.00	0.987
GPRS 850 Back	-17.00	2.00	0.853
EVDO BC10 (§90S) Back	-18.50	-10.50	0.685
EVDO BC0 (§22H) Back	-17.00	-6.00	0.817
LTE Band 26 (Cell) Back	-17.00	-9.00	0.855
UMTS 850 Back	-18.50	-38.00	0.823
LTE Band 41 Back	-5.90	-50.40	0.734
LTE Band 4 (AWS) Back	-5.00	-40.50	1.244
LTE Band 25 (PCS) Back	-2.50	-46.00	0.835
UMTS 1900 Back	-4.00	-54.00	0.676

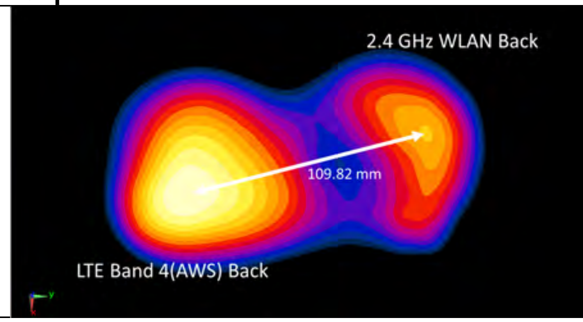
Table 12-12
Back Side SAR to Peak Location Separation Ratio Calculations at 1.0 cm

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D_{a-b}	$(a+b)^{1.5}/D_{a-b}$	
2.4 GHz WLAN Back	UMTS 1750 Back	0.383	1.397	1.780	109.69	0.02	1
2.4 GHz WLAN Back	LTE Band 4 (AWS) Back	0.383	1.244	1.627	109.82	0.02	2
5 GHz WLAN Back	EVDO BC10 (§90S) Back	1.043	0.685	1.728	71.33	0.03	3
5 GHz WLAN Back	EVDO BC0 (§22H) Back	1.043	0.817	1.860	66.65	0.04	4
5 GHz WLAN Back	PCS EVDO Back	1.043	0.987	2.030	96.63	0.03	5
5 GHz WLAN Back	GPRS 850 Back	1.043	0.853	1.896	59.68	0.04	6
5 GHz WLAN Back	UMTS 850 Back	1.043	0.823	1.866	96.63	0.03	7
5 GHz WLAN Back	UMTS 1750 Back	1.043	1.397	2.440	98.76	0.04	8
5 GHz WLAN Back	UMTS 1900 Back	1.043	0.676	1.719	108.50	0.02	9
5 GHz WLAN Back	LTE Band 26 (Cell) Back	1.043	0.855	1.898	69.32	0.04	10
5 GHz WLAN Back	LTE Band 4 (AWS) Back	1.043	1.244	2.287	95.41	0.04	11
5 GHz WLAN Back	LTE Band 25 (PCS) Back	1.043	0.835	1.878	100.37	0.03	12
5 GHz WLAN Back	LTE Band 41 Back	1.043	0.734	1.777	105.30	0.02	13

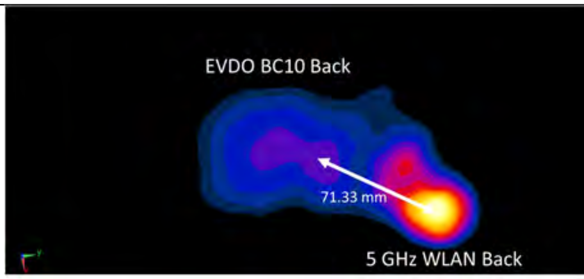
Table 12-13
Back Side SAR to Peak Location Separation Ratio Plots at 1.0 cm



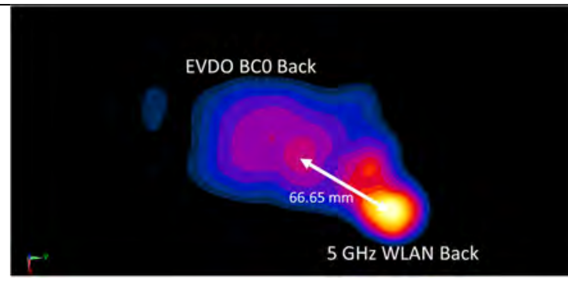
1



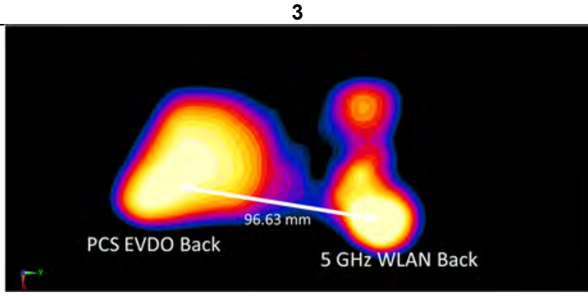
2



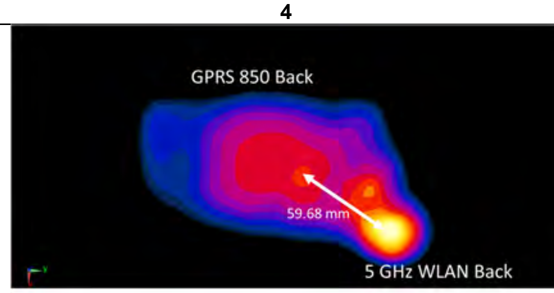
3



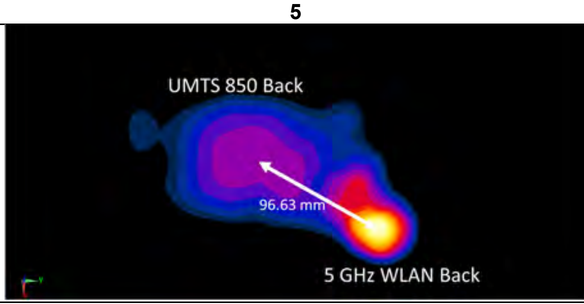
4



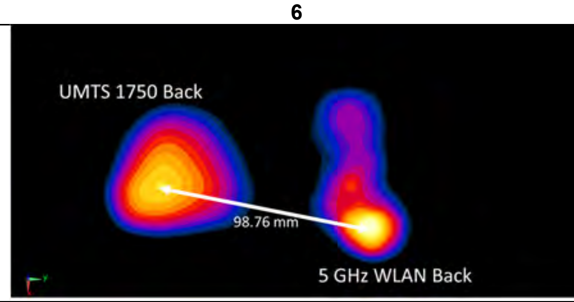
5



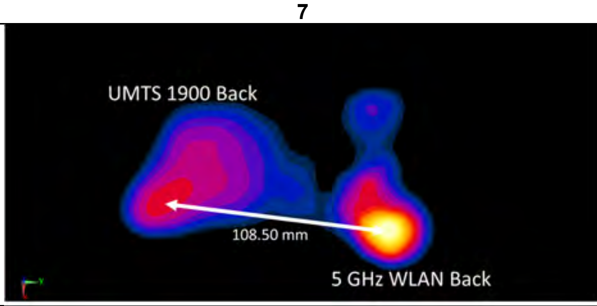
6



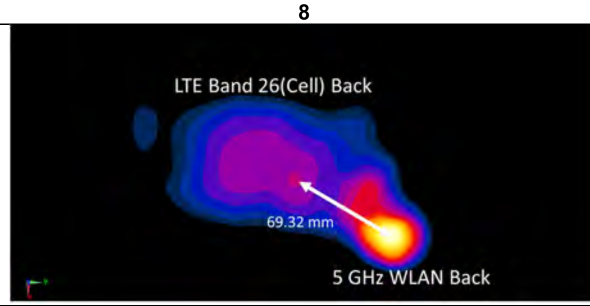
7



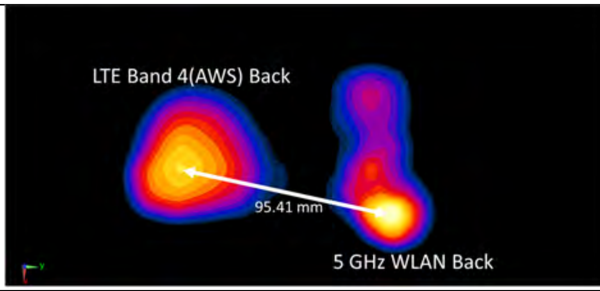
8



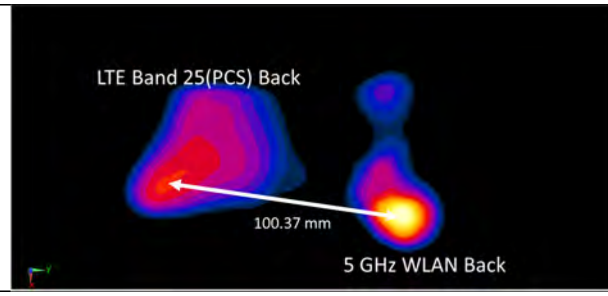
9



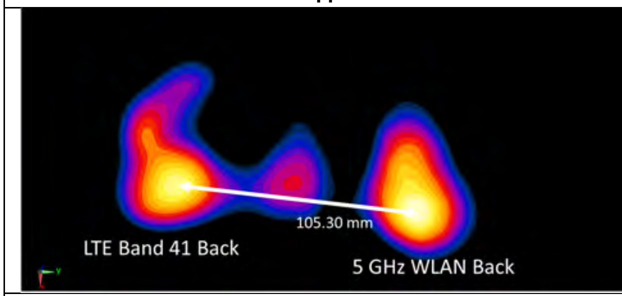
10



11



12



13

12.7 Simultaneous Transmission Conclusion

The above numerical summed SAR results and SPLSR analysis are sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528- 2013 Section 6.3.4.1.

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

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)	
1900	1882.50	26365	LTE Band 25 (PCS), 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	Left	Cheek	N/A	0.829	0.805	1.03	N/A	N/A	N/A	N/A
5250	5270.00	54	802.11n, 40 MHz Bandwidth	OFDM	Right	Cheek	13.5	0.898	0.938	1.04	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	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1712.40	1312	UMTS 1750	RMC	back	10 mm	1.050	1.050	1.00	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram							

13.2 Measurement Uncertainty

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

14 ADDITIONAL TESTING PER FCC GUIDANCE

14.1 LTE Band 41 Power Class 2 and Power Class 3 Linearity

This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3 % using UL-DL configuration 1. Per May 2017 TCB Workshop Notes based on the device behavior, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the highest power and available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR for each exposure condition. The linearity between the Power Class 2 and Power Class 3 SAR results and the respective frame averaged powers was calculated to determine that the results were linear. Per May 2017 TCB Workshop, no additional SAR measurements were required since the linearity between power classes as < 10% and all reported SAR values were < 1.4 W/kg for 1g.

LTE Band 41 SAR testing with power class 2 at the highest power and available duty factor was additionally performed for the power class 3 configuration with the highest SAR for each exposure condition.

Table 14-1
LTE Band 41 Head Linearity Data

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	24	25
Measured Output Power (dBm)	22.98	24.3
Measured SAR (W/kg)	0.446	0.393
Measured Power (mW)	198.61	269.15
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	125.72	116.54
% deviation from expected linearity		-4.95%

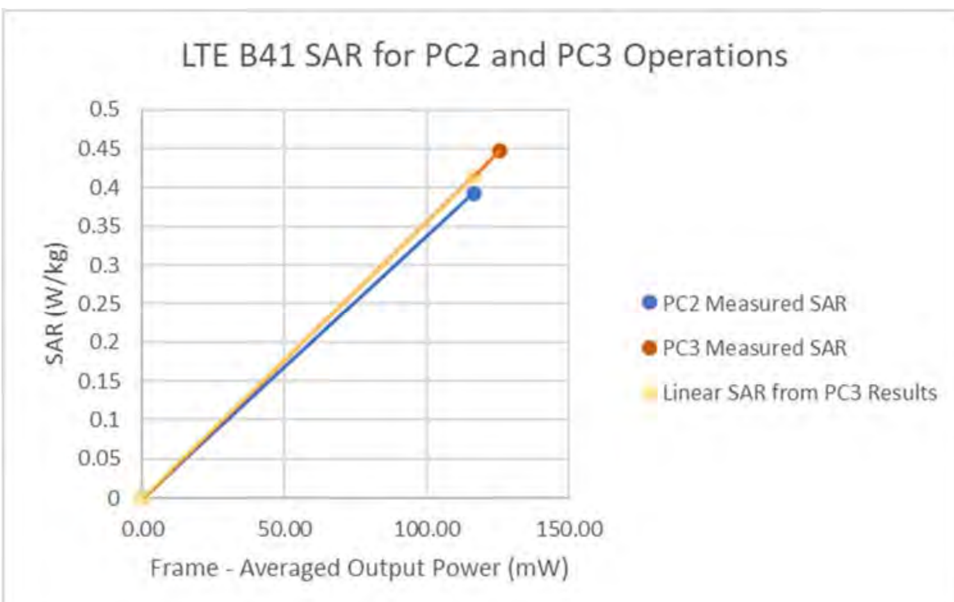


Figure 14-1
LTE Band 41 Head Linearity

Table 14-2
LTE Band 41 Body-Worn Linearity Data

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	24	28
Measured Output Power (dBm)	22.98	27.21
Measured SAR (W/kg)	0.28	0.484
Measured Power (mW)	198.61	526.02
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	125.72	227.77
% deviation from expected linearity		-4.59%

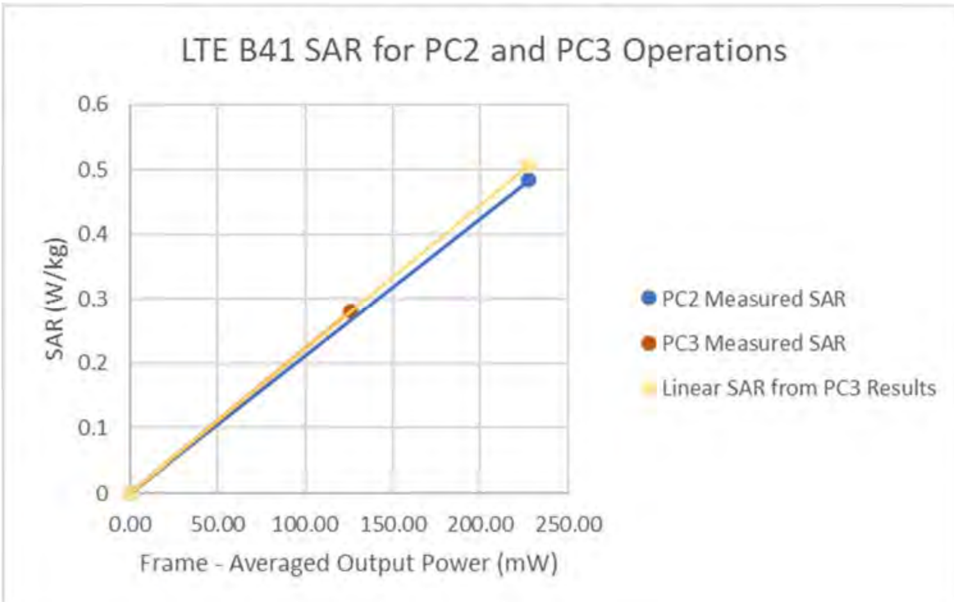


Figure 14-2
LTE Band 41 Body-Worn Linearity

Table 14-3
LTE Band 41 Hotspot Linearity Data

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	24	25
Measured Output Power (dBm)	22.98	24.3
Measured SAR (W/kg)	0.58	0.494
Measured Power (mW)	198.61	269.15
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	125.72	116.54
% deviation from expected linearity		-8.12%

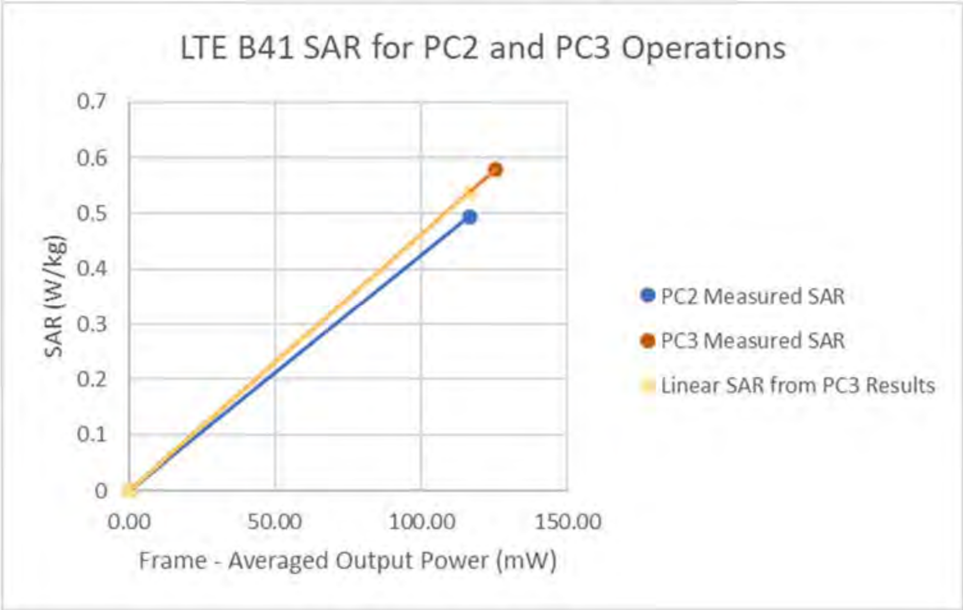


Figure 14-3
LTE Band 41 Hotspot Linearity

15 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	2/8/2018	Annual	2/8/2019	US39170122
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	E5515C	Wireless Communications Test Set	5/31/2017	Annual	5/31/2018	GB43304278
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	11/15/2017	Annual	11/15/2018	GB42230325
Agilent	E5515C	Wireless Communications Test Set	CBT	N/A	CBT	US41140256
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB44450273
Agilent	N5182A	MXG Vector Signal Generator	1/24/2018	Annual	1/24/2019	MY47420651
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433978
Anritsu	MA24106A	USB Power Sensor	3/12/2018	Annual	3/12/2019	1349501
Anritsu	MA24106A	USB Power Sensor	3/12/2018	Annual	3/12/2019	1344557
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1339018
Anritsu	ML2496A	Power Meter	4/20/2017	Annual	4/20/2018	1306009
Anritsu	MT8821C	Radio Communication Analyzer	11/17/2017	Annual	11/17/2018	6201381794
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
Control Company	4040	Therm./ Clock/ Humidity Monitor	1/8/2018	Annual	1/8/2019	160574418
Control Company	4352	Ultra Long Stem Thermometer	1/8/2018	Annual	1/8/2019	160508122
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
MCL	BW-N6W5+	6dB Attenuator	N/A		N/A	1139
Mini Circuits	PWR-4GHS	USB Power Sensor	1/20/2018	Annual	1/20/2019	11710030063
Mini Circuits	PWR-4GHS	USB Power Sensor	1/22/2018	Annual	1/22/2019	11710030062
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
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
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	4/11/2017	Annual	4/11/2018	836371/0079
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	7/20/2017	Annual	7/20/2018	132885
Rohde & Schwarz	CMW500	Radio Communication Tester	11/3/2017	Annual	11/3/2018	100976
Seekonk	NC-100	Torque Wrench (8" lb)	9/1/2016	Biennial	9/1/2018	21053
SPEAG	DAK-12	Dielectric Assessment Kit (10MHz - 3GHz)	3/13/2018	Annual	3/13/2019	1102
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/12/2017	Annual	9/12/2018	1091
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	7/11/2017	Annual	7/11/2018	1039
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/8/2017	Annual	8/8/2018	1041
SPEAG	D750V3	750 MHz SAR Dipole	7/13/2016	Biennial	7/13/2018	1161
SPEAG	D835V2	835 MHz SAR Dipole	1/15/2018	Annual	1/15/2019	4d132
SPEAG	D1750V2	1750 MHz SAR Dipole	5/9/2017	Annual	5/9/2018	1148
SPEAG	D1900V2	1900 MHz SAR Dipole	7/8/2016	Biennial	7/8/2018	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	9/11/2017	Annual	9/11/2018	797
SPEAG	D2600V2	2600 MHz SAR Dipole	7/10/2017	Annual	7/10/2018	1126
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/12/2018	Annual	2/12/2019	1120
SPEAG	D750V3	750 MHz Dipole	3/7/2017	Biennial	3/7/2019	1054
SPEAG	D1750V2	1750 MHz SAR Dipole	7/14/2016	Biennial	7/14/2018	1150
SPEAG	D1900V2	1900 MHz SAR Dipole	2/7/2018	Annual	2/7/2019	5d148
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/15/2017	Annual	8/15/2018	1237
SPEAG	EX3DV4	SAR Probe	7/17/2017	Annual	7/17/2018	7410
SPEAG	ES3DV3	SAR Probe	2/13/2018	Annual	2/13/2019	3213
SPEAG	ES3DV3	SAR Probe	8/14/2017	Annual	8/14/2018	3332
SPEAG	EX3DV4	SAR Probe	1/16/2018	Annual	1/16/2019	3589
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287
SPEAG	EX3DV4	SAR Probe	4/18/2017	Annual	4/18/2018	7406
SPEAG	EX3DV4	SAR Probe	2/14/2018	Annual	2/14/2019	3914
SPEAG	EX3DV4	SAR Probe	8/16/2017	Annual	8/16/2018	7308
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/13/2017	Annual	7/13/2018	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2018	Annual	2/9/2019	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/9/2017	Annual	8/9/2018	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/21/2017	Annual	6/21/2018	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2017	Annual	4/11/2018	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2018	Annual	2/15/2019	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/14/2017	Annual	6/14/2018	1334

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

16 MEASUREMENT UNCERTAINTIES

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

17 CONCLUSION

17.1 Measurement Conclusion

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

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

18 REFERENCES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[20] IEC 62209-1, Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz), July 2016.

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

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

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

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

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

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

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

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

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

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

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05814

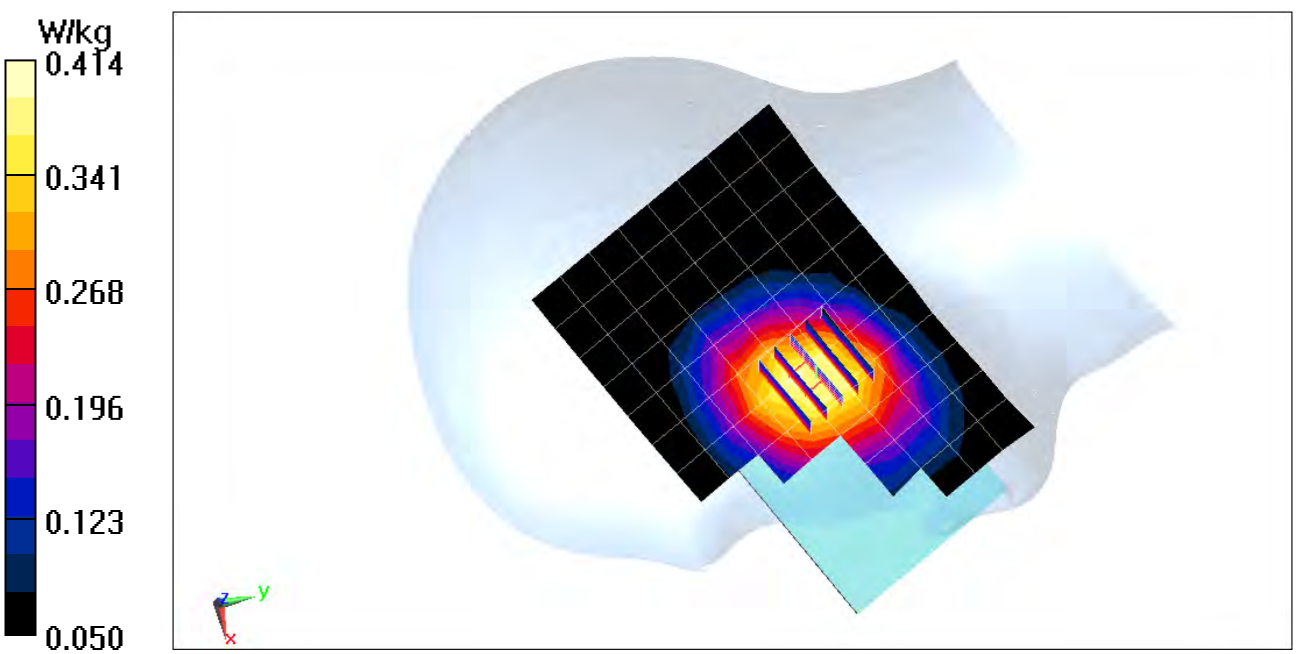
Communication System: UID 0, Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
$f = 820.1$ MHz; $\sigma = 0.905$ S/m; $\varepsilon_r = 42.629$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 04-02-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.7°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. EVDO Rev. A BC10, Rule Part 90S, Right Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.33 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.469 W/kg
SAR(1 g) = 0.382 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05814

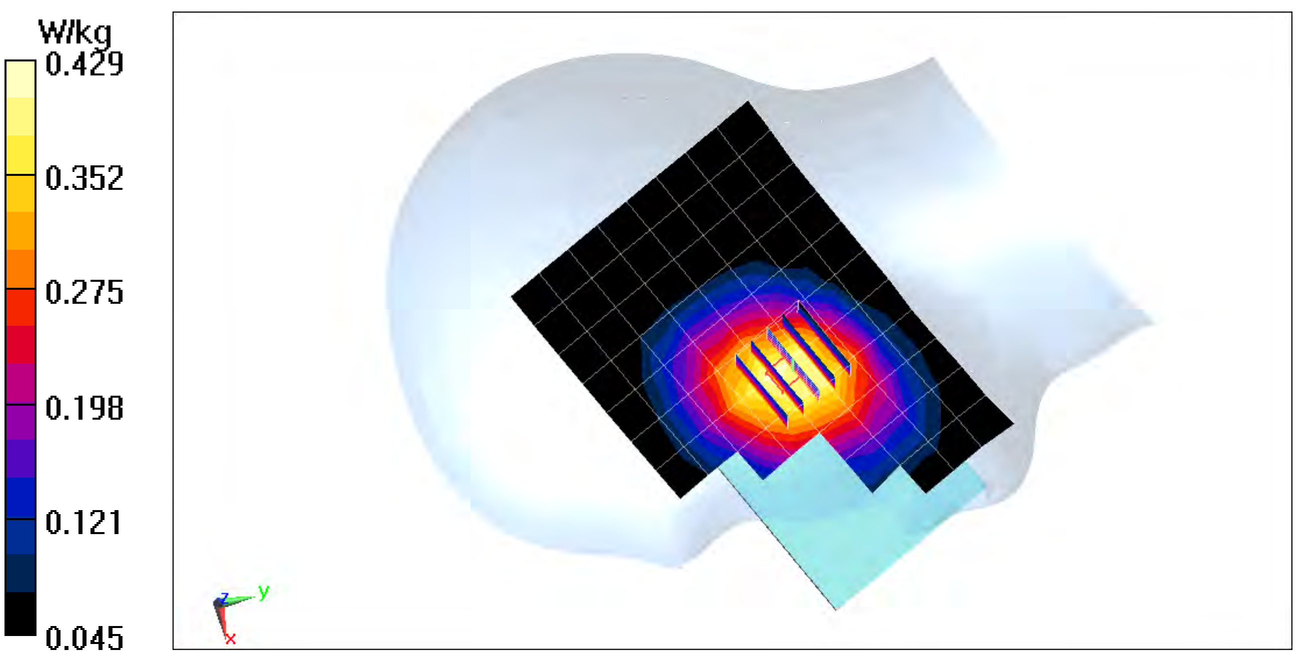
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.922 S/m; ε_r = 42.427; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 04-02-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.7°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. CDMA BC0, Rule Part 22H, Right Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.46 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.497 W/kg
SAR(1 g) = 0.395 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58145

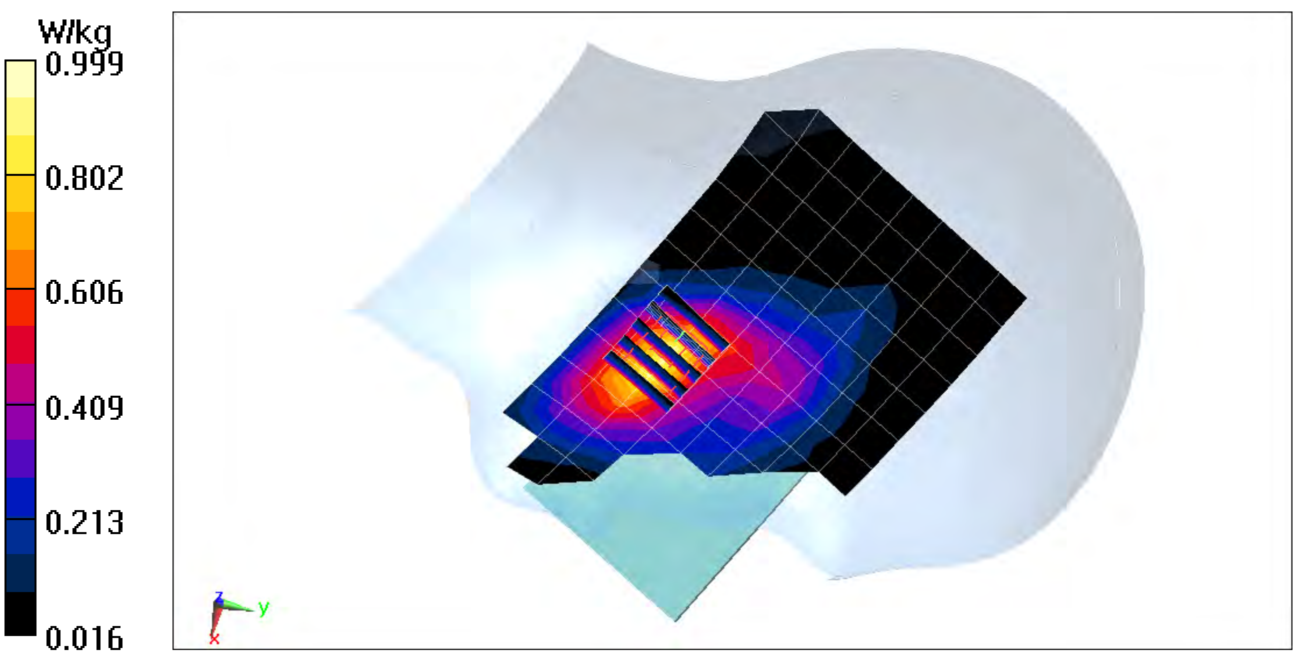
Communication System: UID 0, PCS CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.408 S/m; ε_r = 39.124; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 04-02-2018; Ambient Temp: 22.9°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(5.33, 5.33, 5.33); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: PCS EVDO Rev A, Left Head, Cheek, High.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.24 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.823 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

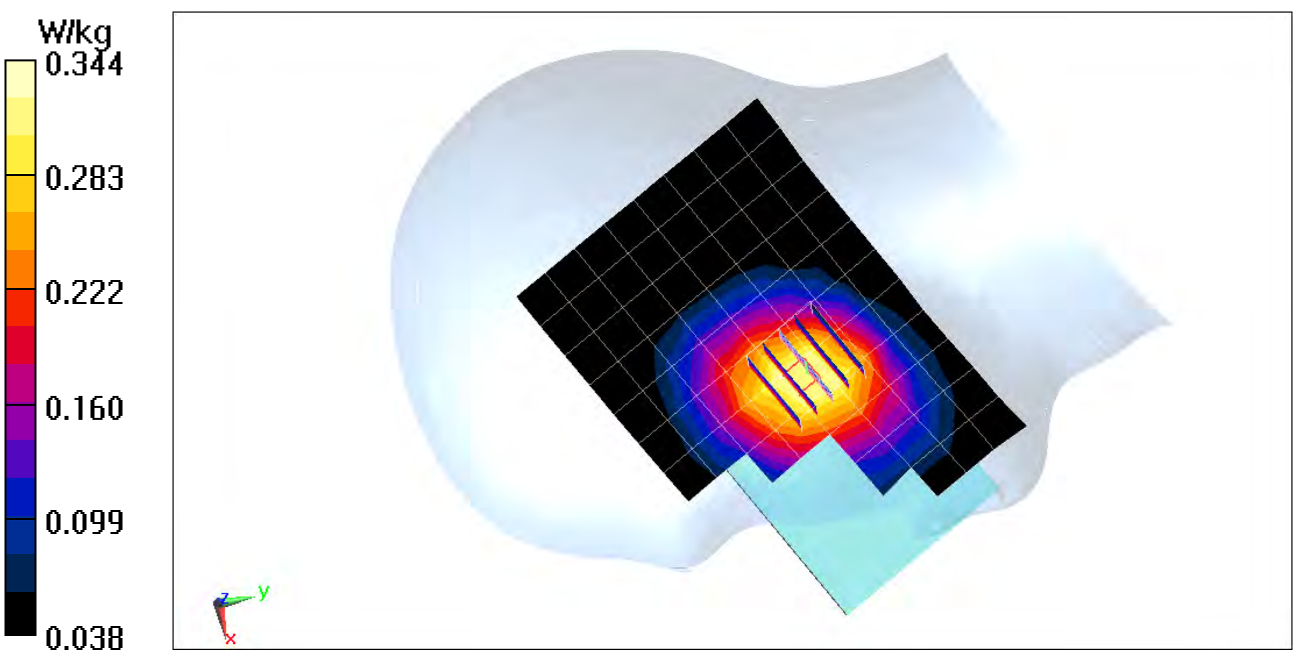
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.901 S/m; ε_r = 41.005; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-25-2018; Ambient Temp: 23.5°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.38 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.393 W/kg
SAR(1 g) = 0.313 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57527

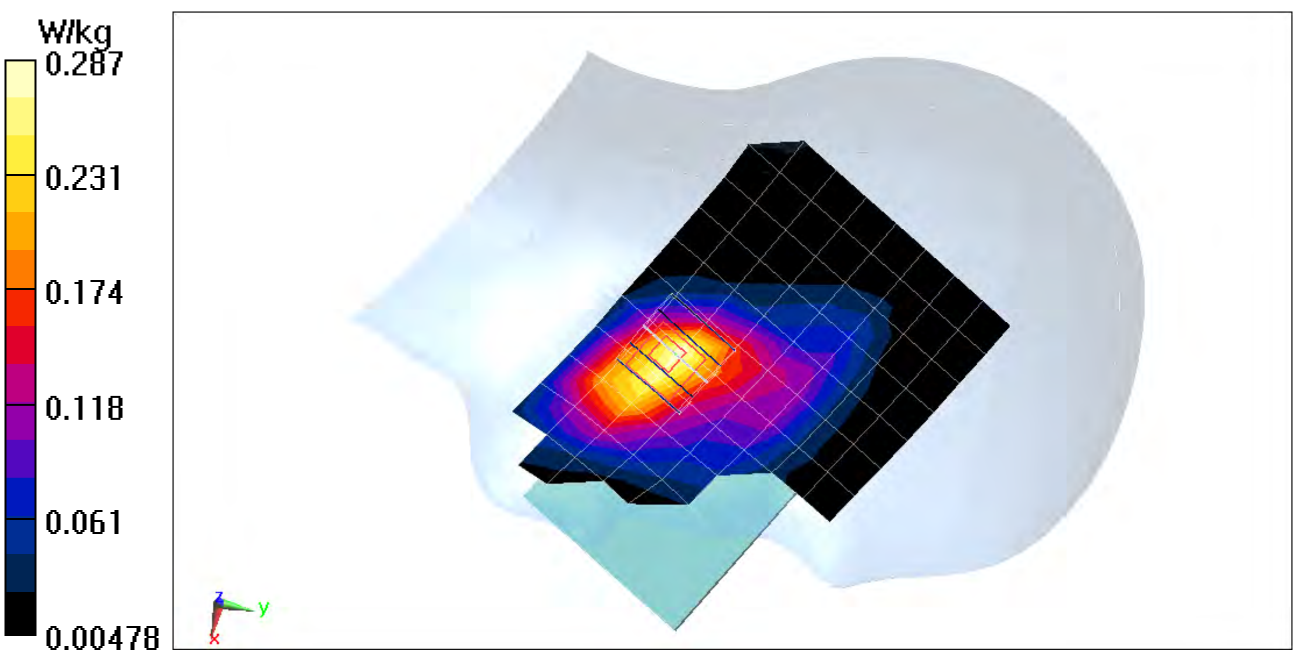
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.377 S/m; ε_r = 39.254; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 04-02-2018; Ambient Temp: 22.9°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(5.33, 5.33, 5.33); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
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 = 13.98 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.394 W/kg
SAR(1 g) = 0.248 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

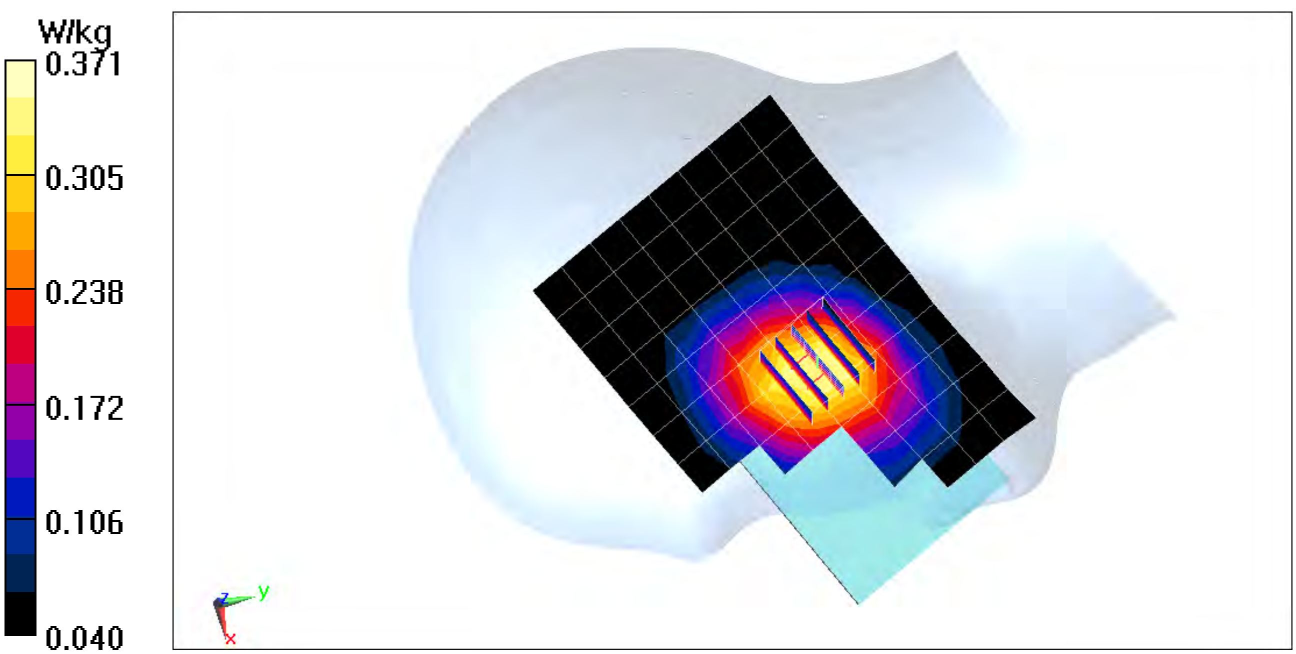
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.922 S/m; ε_r = 42.426; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 04-02-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.7°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.86 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.421 W/kg
SAR(1 g) = 0.338 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

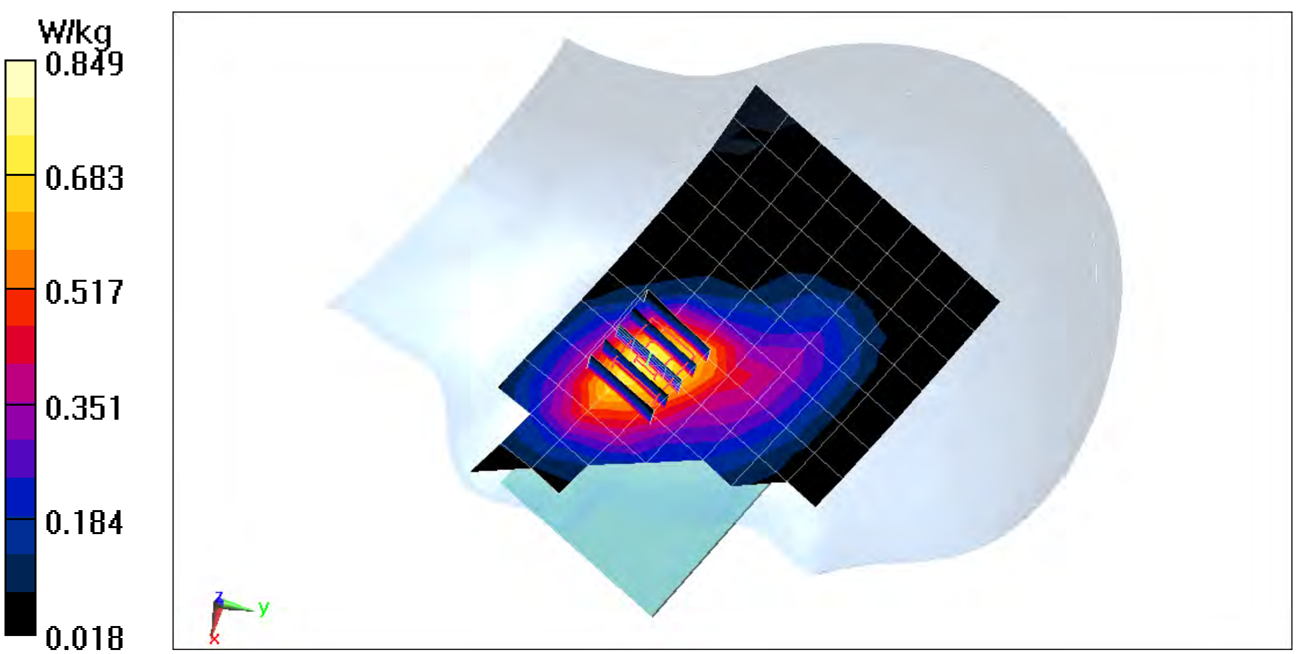
Communication System: UID 0, UMTS; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1752.6 MHz; σ = 1.391 S/m; ε_r = 39.349; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 04-02-2018; Ambient Temp: 22.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7410; ConvF(8.66, 8.66, 8.66); 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: UMTS 1750, Left Head, Cheek, High.ch

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.12 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.969 W/kg
SAR(1 g) = 0.640 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57527

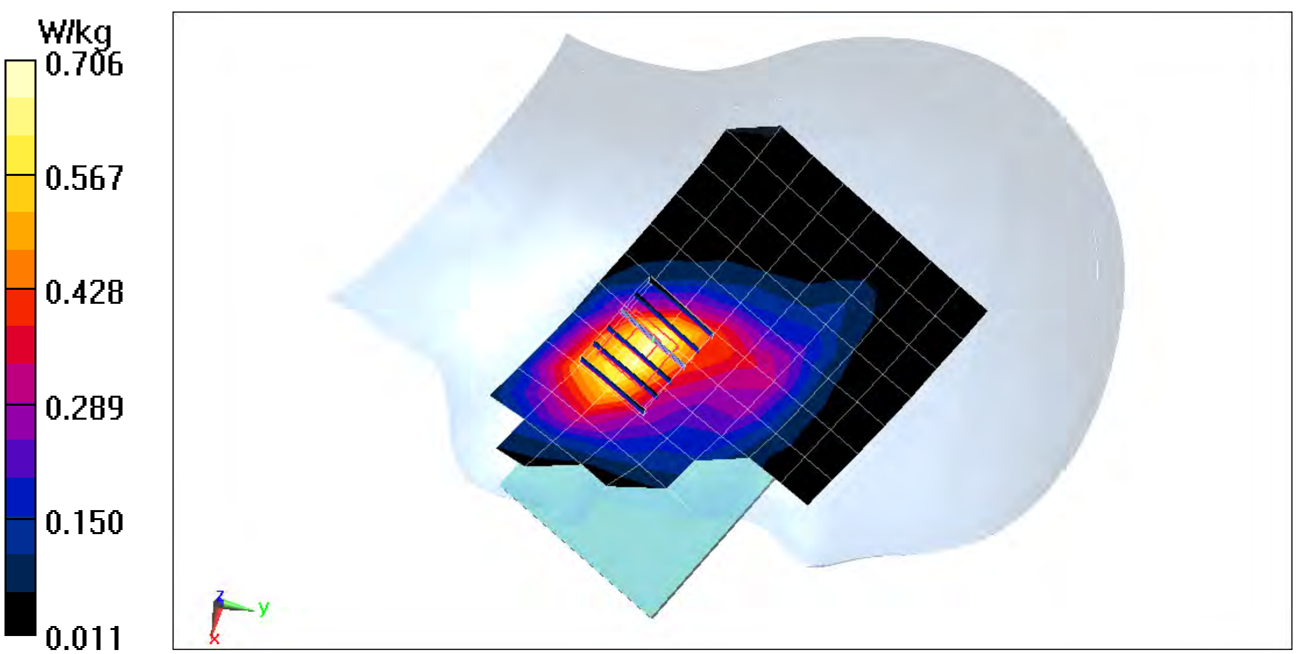
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.377 S/m; ε_r = 39.254; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 04-02-2018; Ambient Temp: 22.9°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(5.33, 5.33, 5.33); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
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 (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.06 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.976 W/kg
SAR(1 g) = 0.613 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

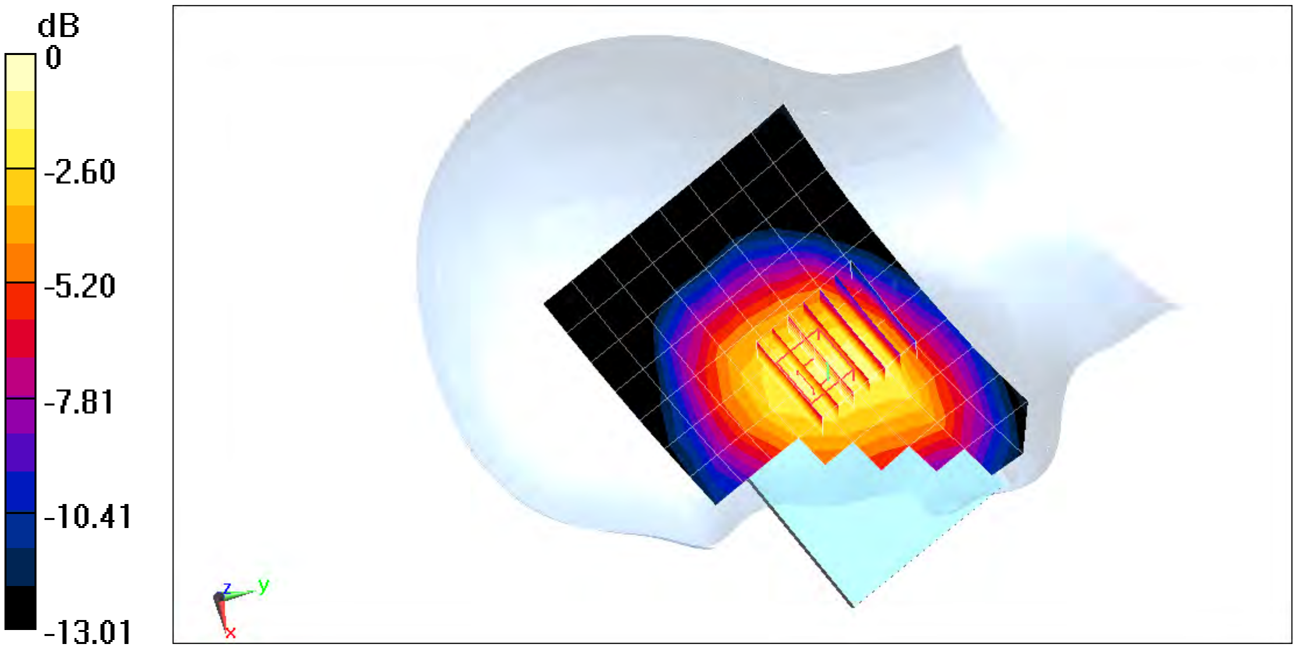
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.871 S/m; ε_r = 43.118; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-30-2018; Ambient Temp: 23.8°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7410; ConvF(10.6, 10.6, 10.6); Calibrated: 7/17/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
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, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.15 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.263 W/kg
SAR(1 g) = 0.215 W/kg



0 dB = 0.248 W/kg = -6.06 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

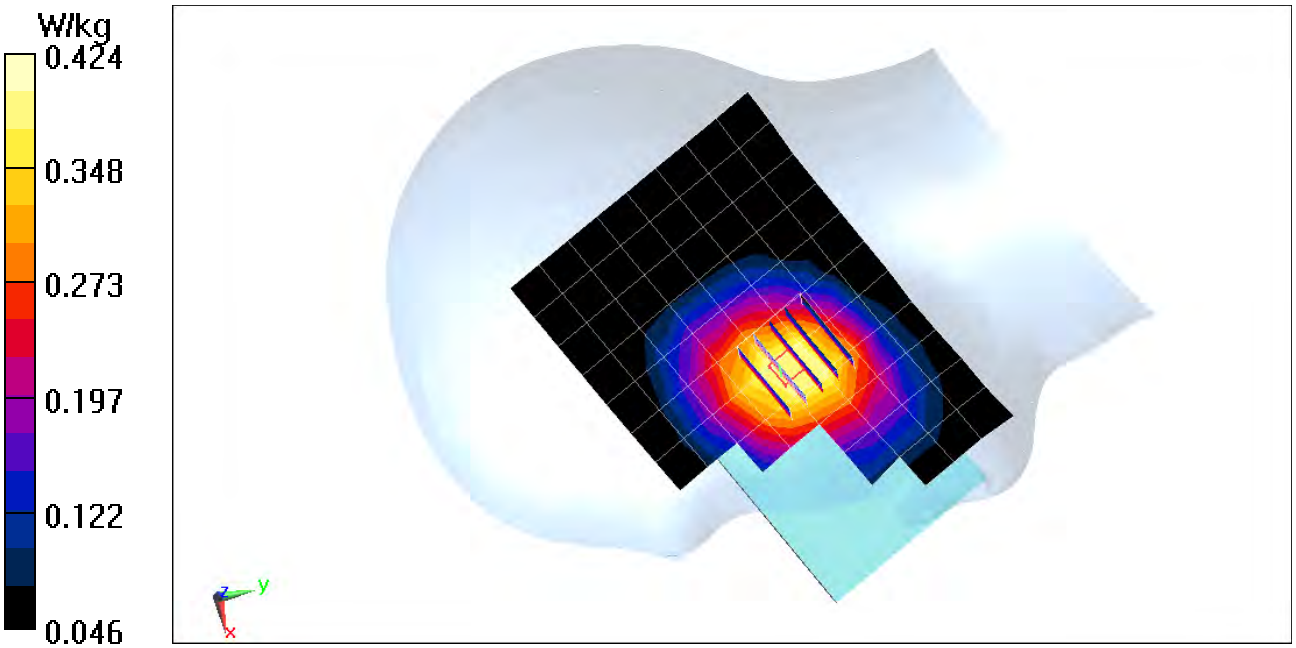
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.916 S/m; ε_r = 42.488; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 04-02-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.7°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
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 26 (Cell.), Right Head, Cheek, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.24 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.482 W/kg
SAR(1 g) = 0.391 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57576

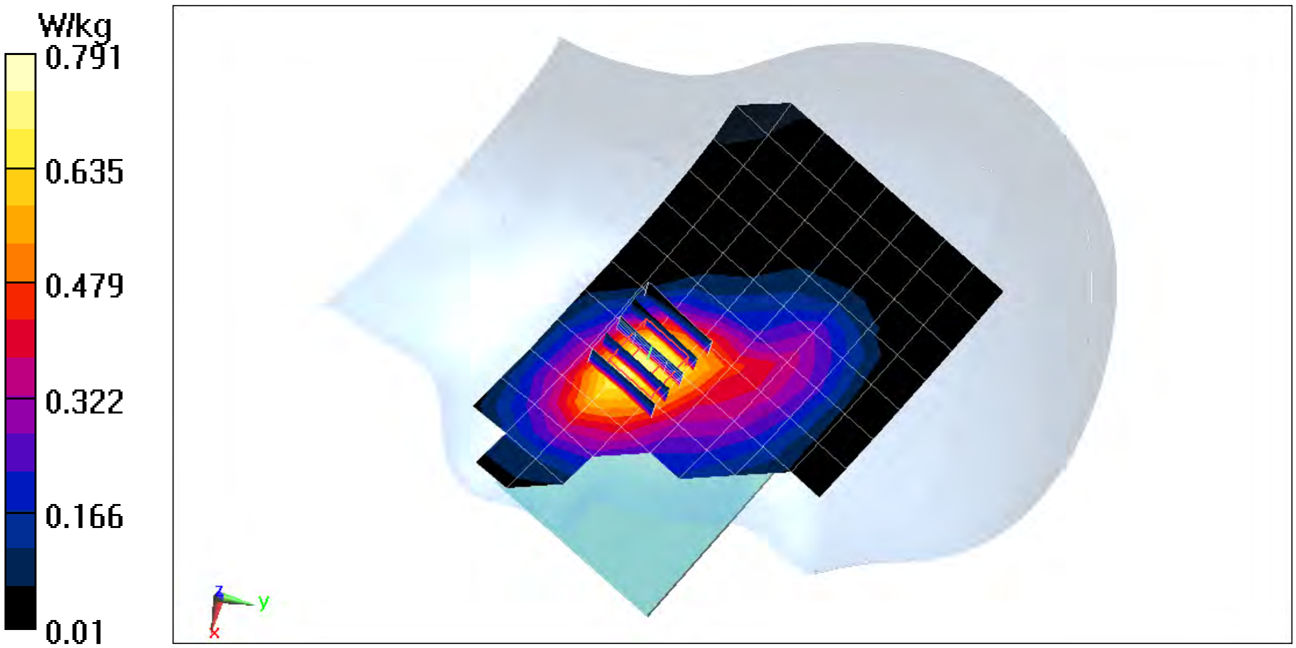
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.37 S/m; ε_r = 39.439; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 04-02-2018; Ambient Temp: 22.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7410; ConvF(8.66, 8.66, 8.66); 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: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.72 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.891 W/kg
SAR(1 g) = 0.594 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58145

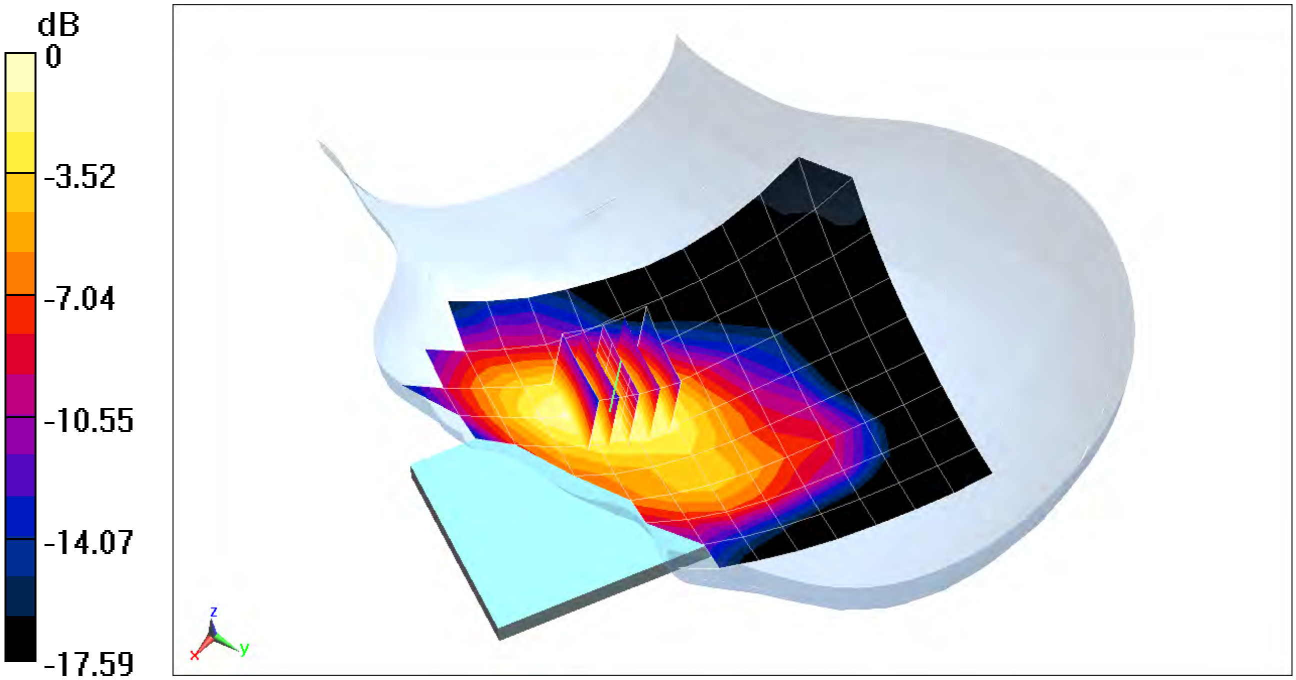
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1882.5 MHz; σ = 1.44 S/m; ε_r = 39.499; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 04-10-2018; Ambient Temp: 24.0°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7410; ConvF(8.37, 8.37, 8.37); Calibrated: 7/17/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.30 V/m; Power Drift = 0.02 dB
Maximum value of SAR (measured) = 1.10 W/kg
SAR(1 g) = 0.829 W/kg



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

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05764

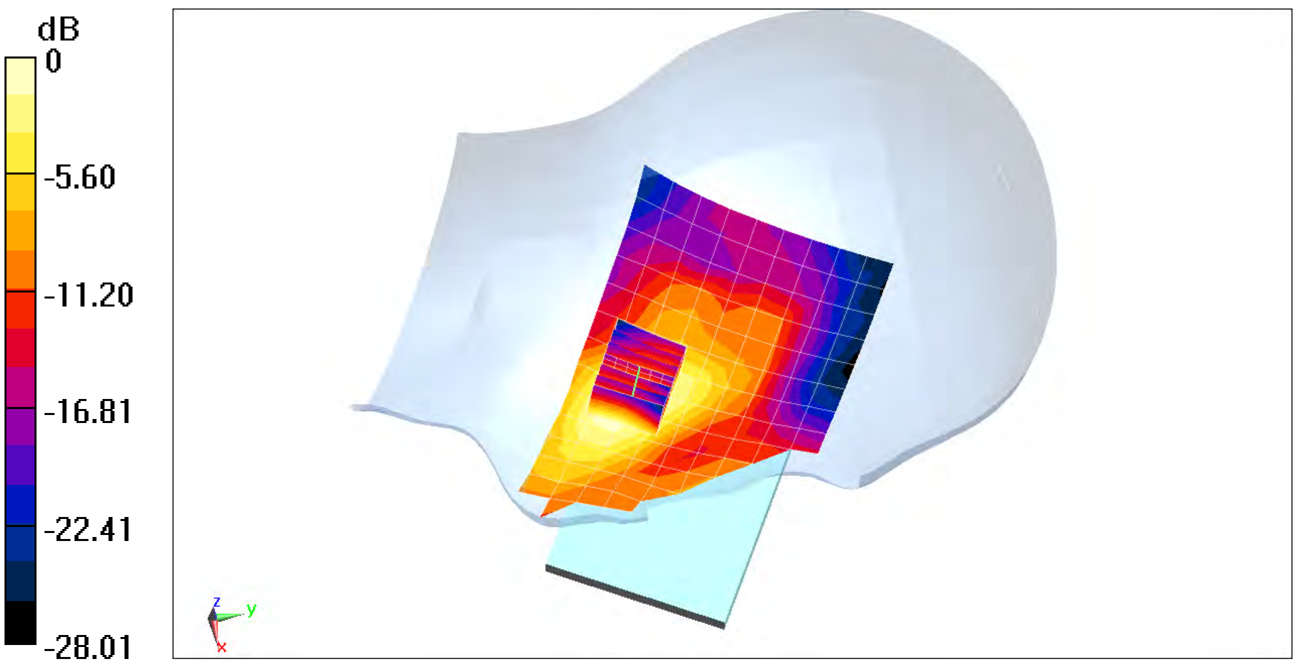
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2450 Head Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.025 S/m; ε_r = 39.773; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 03-25-2018; Ambient Temp: 23.2°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3332; ConvF(4.56, 4.56, 4.56); 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 41, Left Head, Cheek, High.ch, QPSK,
20 MHz Bandwidth, 1 RB, 99 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 = 16.95 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.838 W/kg
SAR(1 g) = 0.446 W/kg



0 dB = 0.561 W/kg = -2.51 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58079

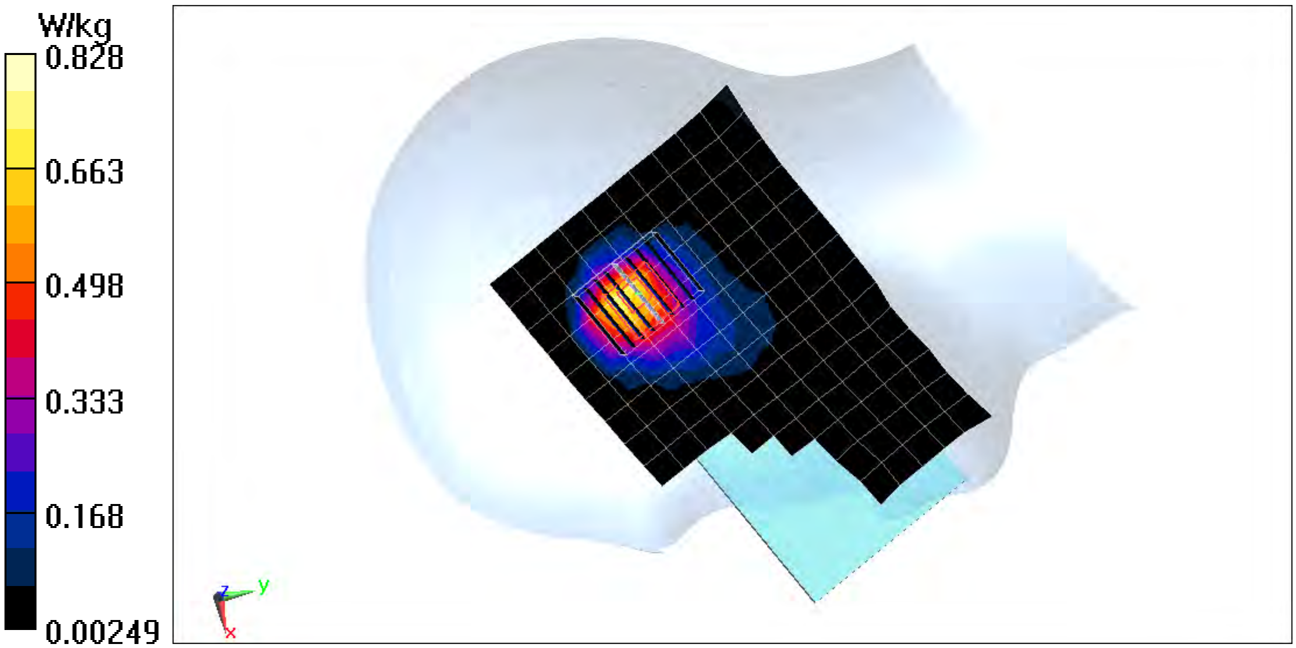
Communication System: UID 0, _IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.766 S/m; ε_r = 40.234; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-28-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.5°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 1, 1 Mbps

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (9x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.96 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.53 W/kg
SAR(1 g) = 0.664 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57592

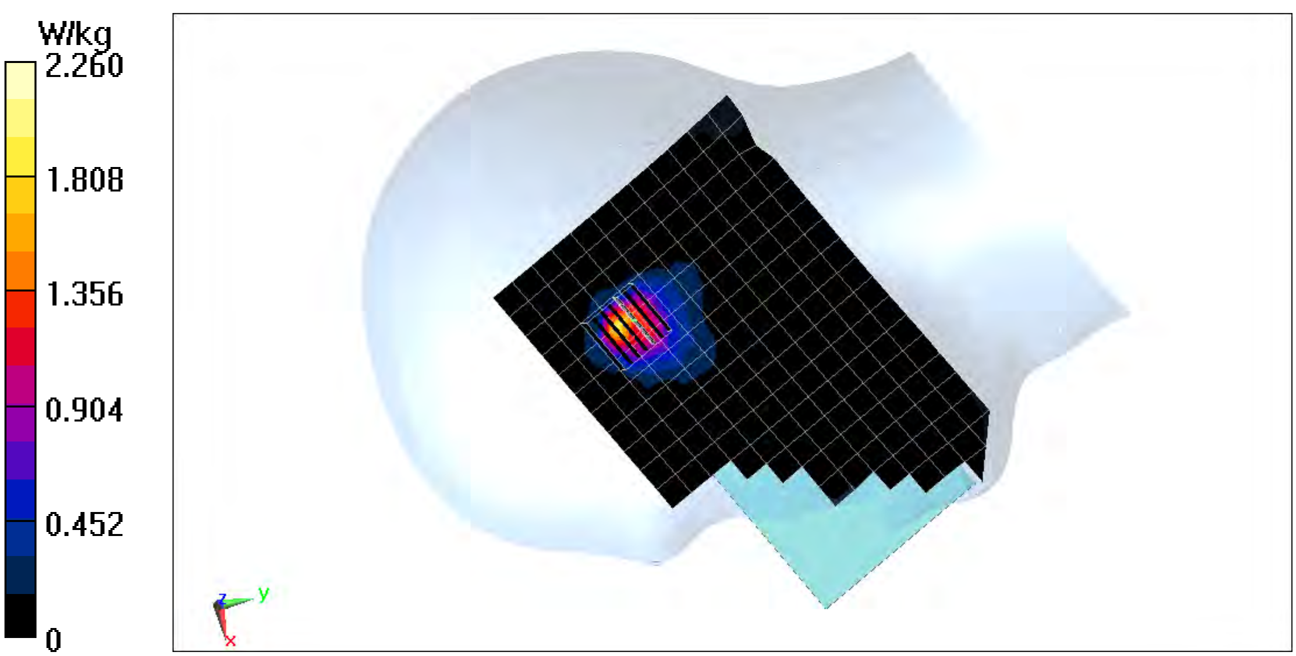
Communication System: UID 0, 802.11n 5.2-5.8 GHz Band;
Frequency: 5270 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5270 MHz; σ = 4.679 S/m; ε_r = 37.487; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 03-26-2018; Ambient Temp: 21.5°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3589; ConvF(4.69, 4.69, 4.69); Calibrated: 1/16/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: SAR IEEE 802.11n, U-NII-2A, 40 MHz Bandwidth, Right Head, Cheek, Ch 54, 13.5 Mbps

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 = 3.505 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 3.98 W/kg
SAR(1 g) = 0.938 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

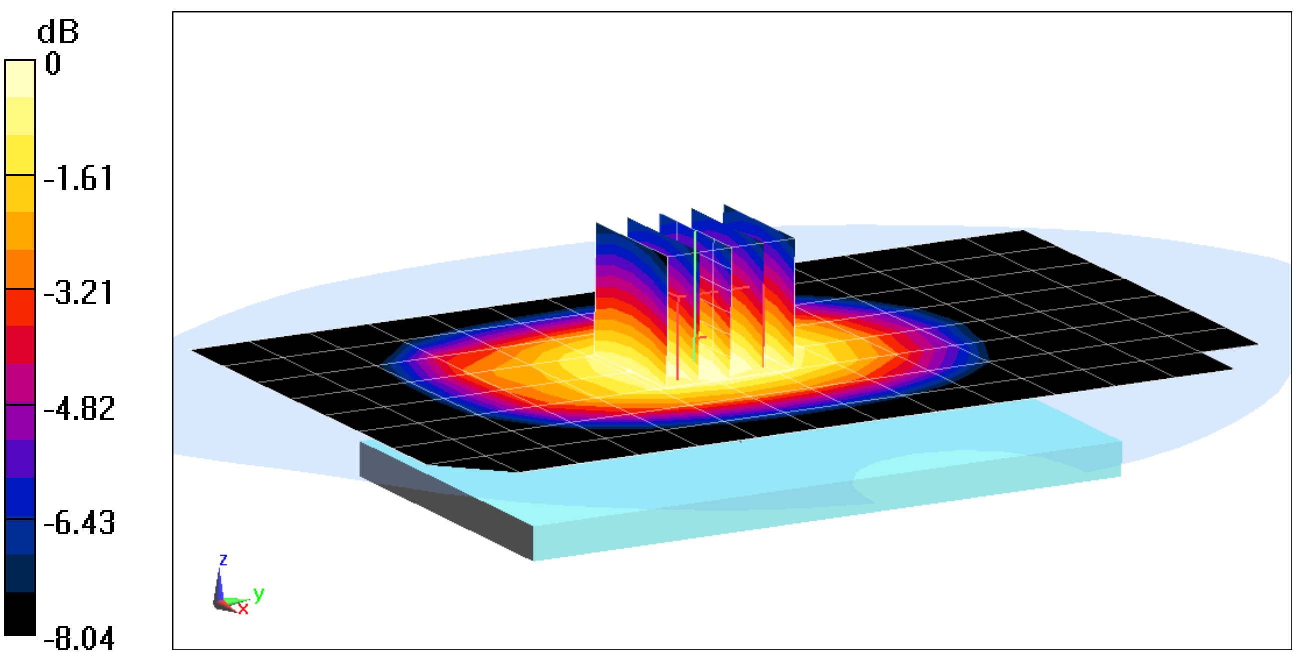
Communication System: UID 0, CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.946 S/m; ε_r = 54.044; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. CDMA BC10, Rule Part 90S, 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 = 25.37 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.708 W/kg
SAR(1 g) = 0.567 W/kg



0 dB = 0.621 W/kg = -2.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05814

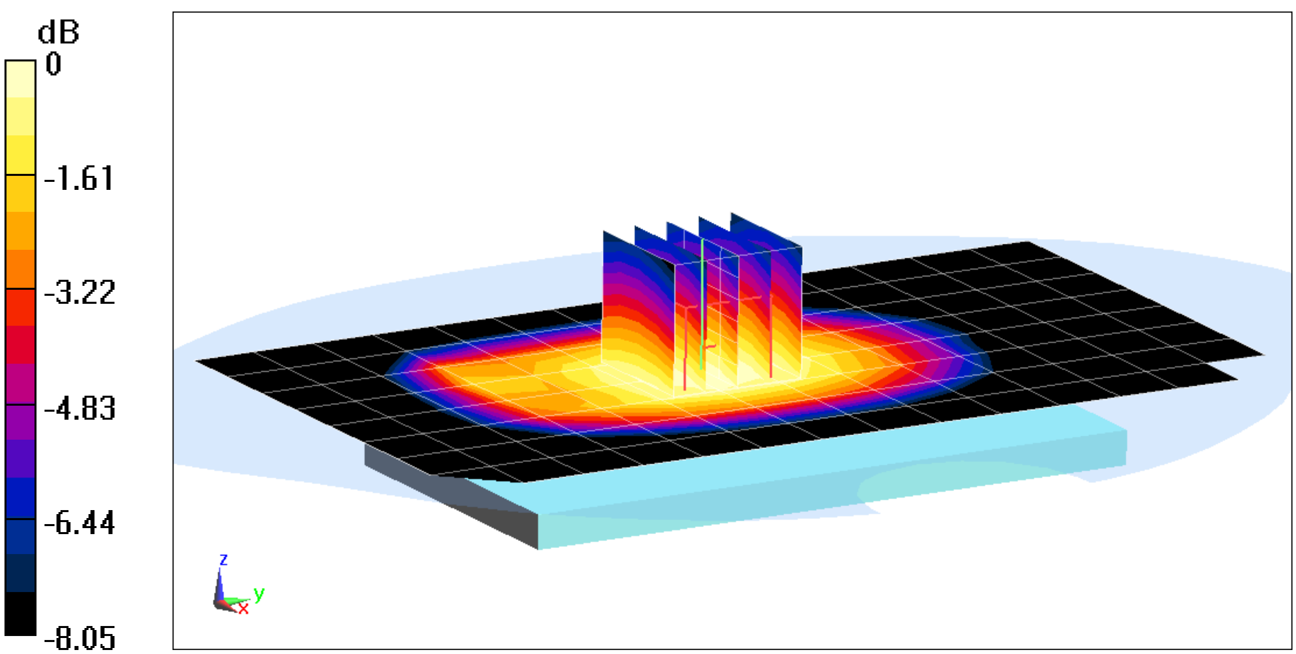
Communication System: UID 0, CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.946 S/m; ε_r = 54.044; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. EVDO BC10, Rule Part 90S, 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 = 25.65 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.721 W/kg
SAR(1 g) = 0.587 W/kg



0 dB = 0.641 W/kg = -1.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

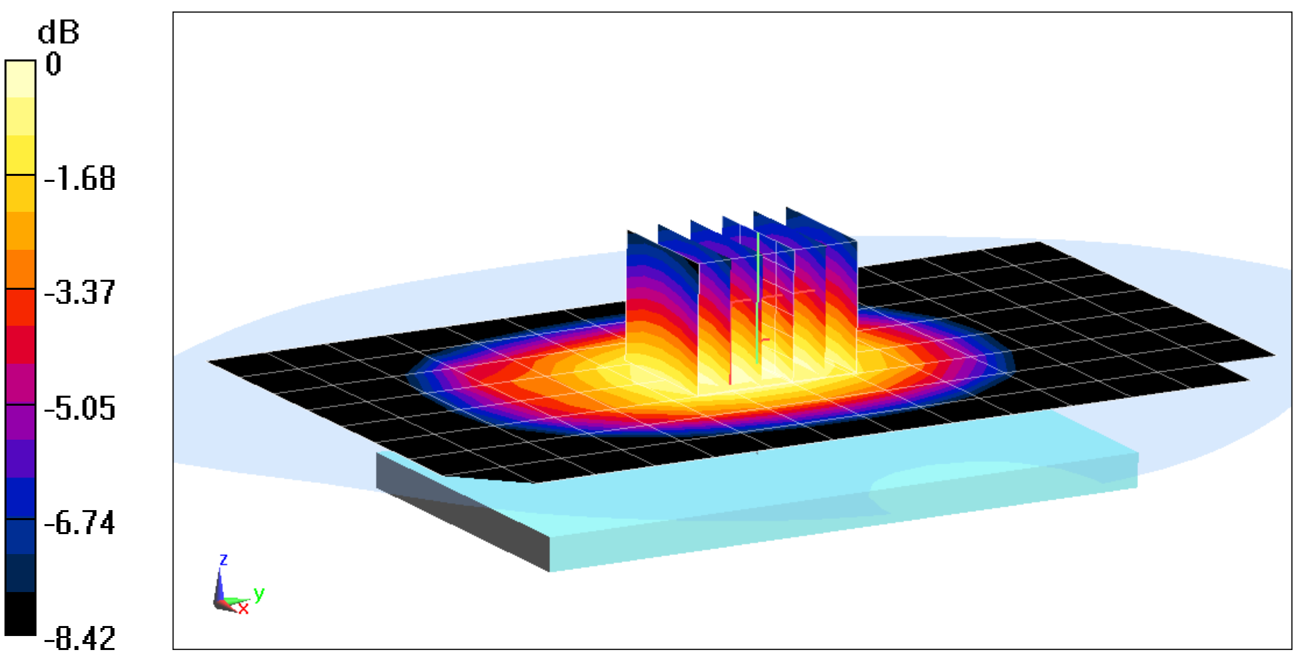
Communication System: UID 0, CDMA; Frequency: 848.31 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 848.31 MHz; σ = 0.975 S/m; ε_r = 53.79; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. CDMA BC0, Rule Part 22H, Body SAR, Back side, High.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.80 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.772 W/kg
SAR(1 g) = 0.609 W/kg



0 dB = 0.671 W/kg = -1.73 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05814

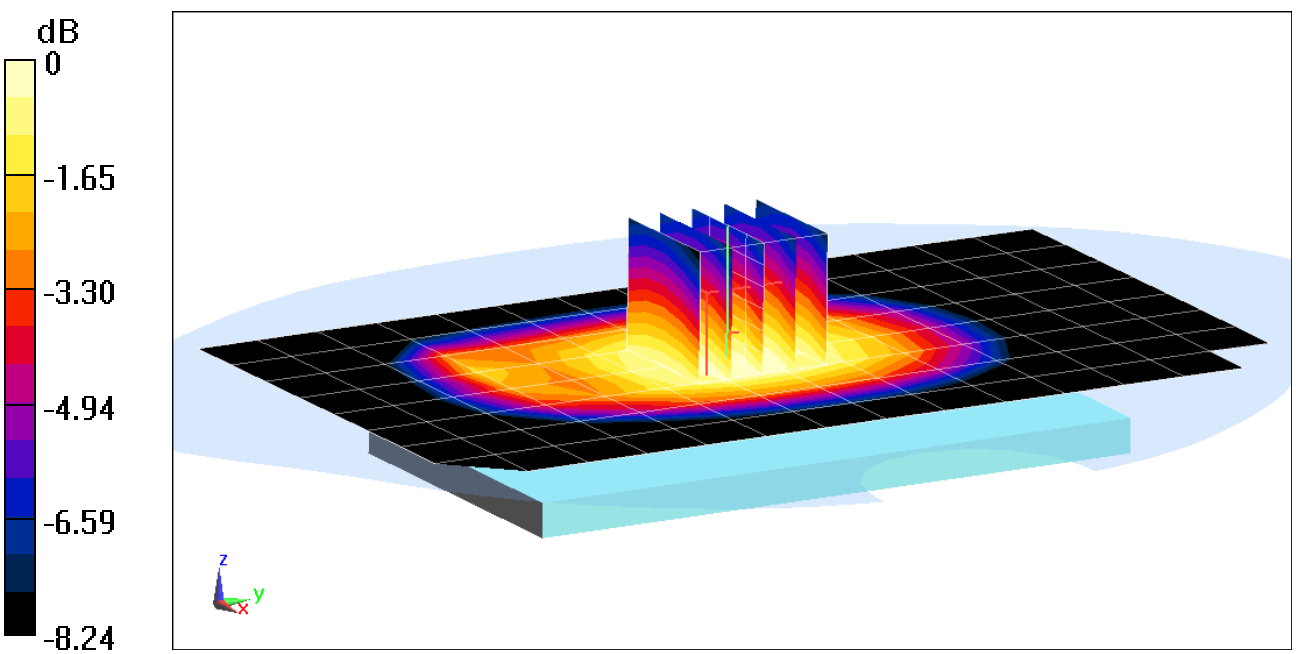
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.52 MHz; $\sigma = 0.965$ S/m; $\varepsilon_r = 53.894$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Cell. EVDO BC0, Rule Part 22H, 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 = 27.04 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.816 W/kg
SAR(1 g) = 0.659 W/kg



0 dB = 0.720 W/kg = -1.43 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57576

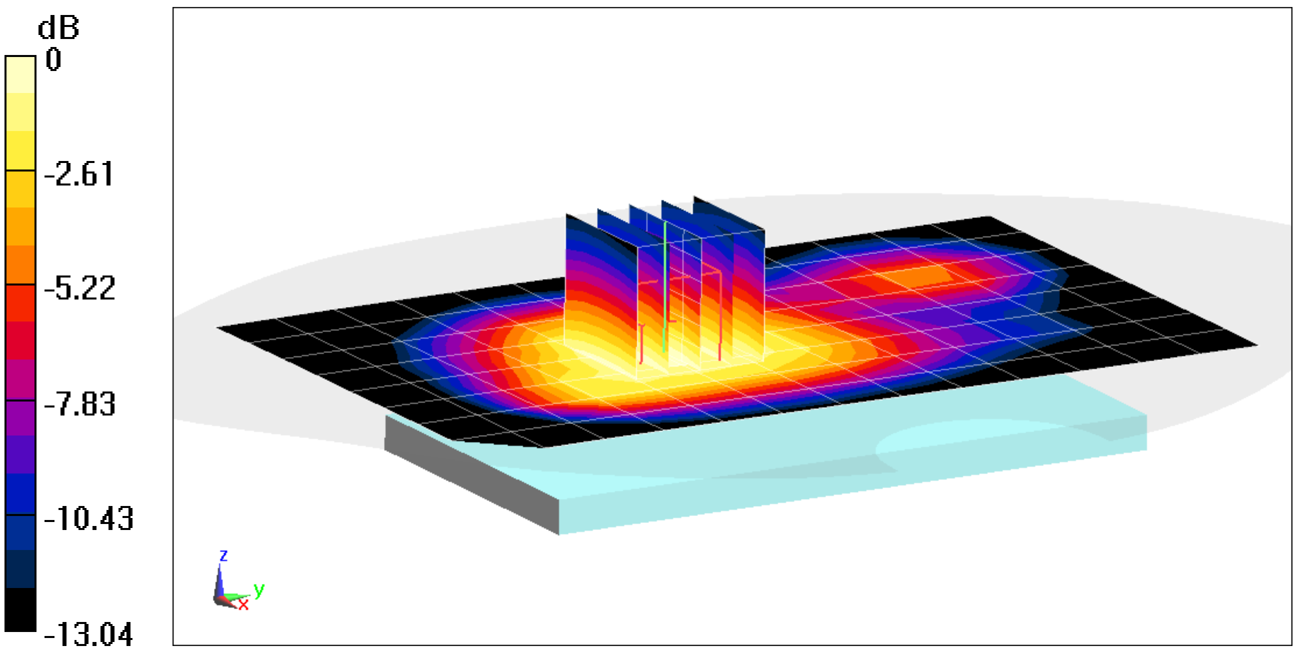
Communication System: UID 0, CDMA; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1851.25 MHz; σ = 1.521 S/m; ε_r = 53.117; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: PCS CDMA, Body SAR, Back side, Low.ch

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.76 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.975 W/kg
SAR(1 g) = 0.629 W/kg



0 dB = 0.844 W/kg = -0.74 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58145

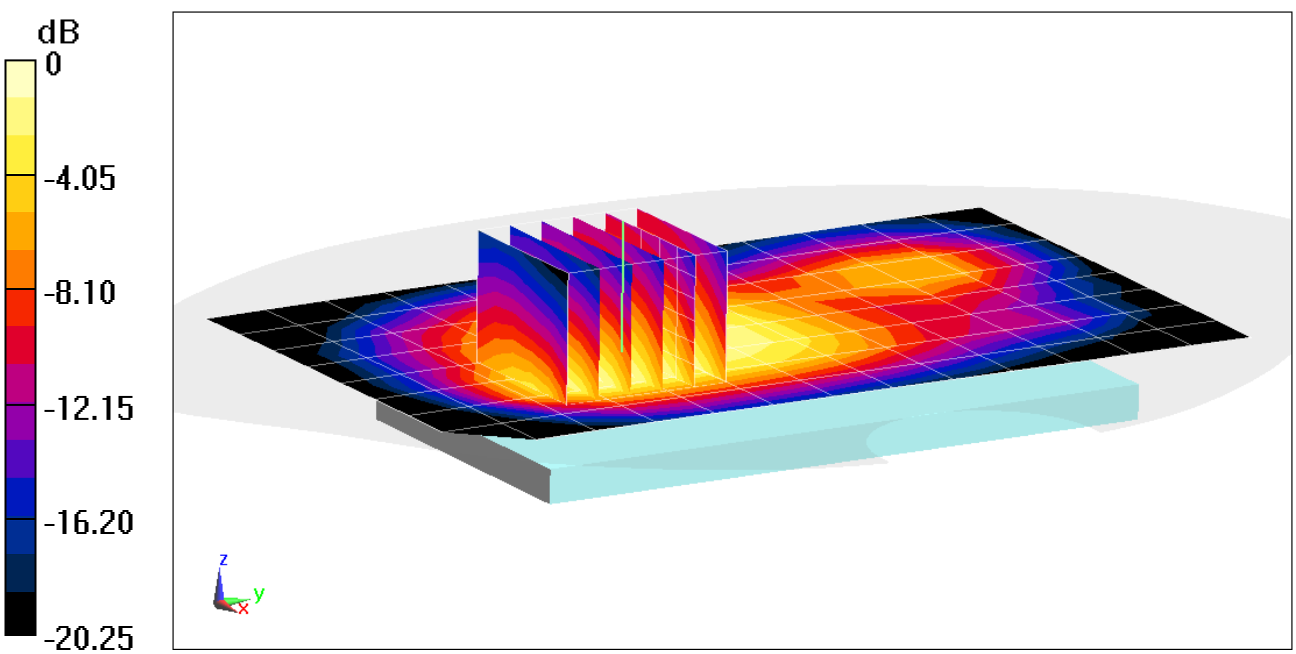
Communication System: UID 0, CDMA; Frequency: 1851.25 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1851.25 MHz; σ = 1.521 S/m; ε_r = 53.117; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: PCS EVDO, Body SAR, Back side, Low.ch

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.74 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.827 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

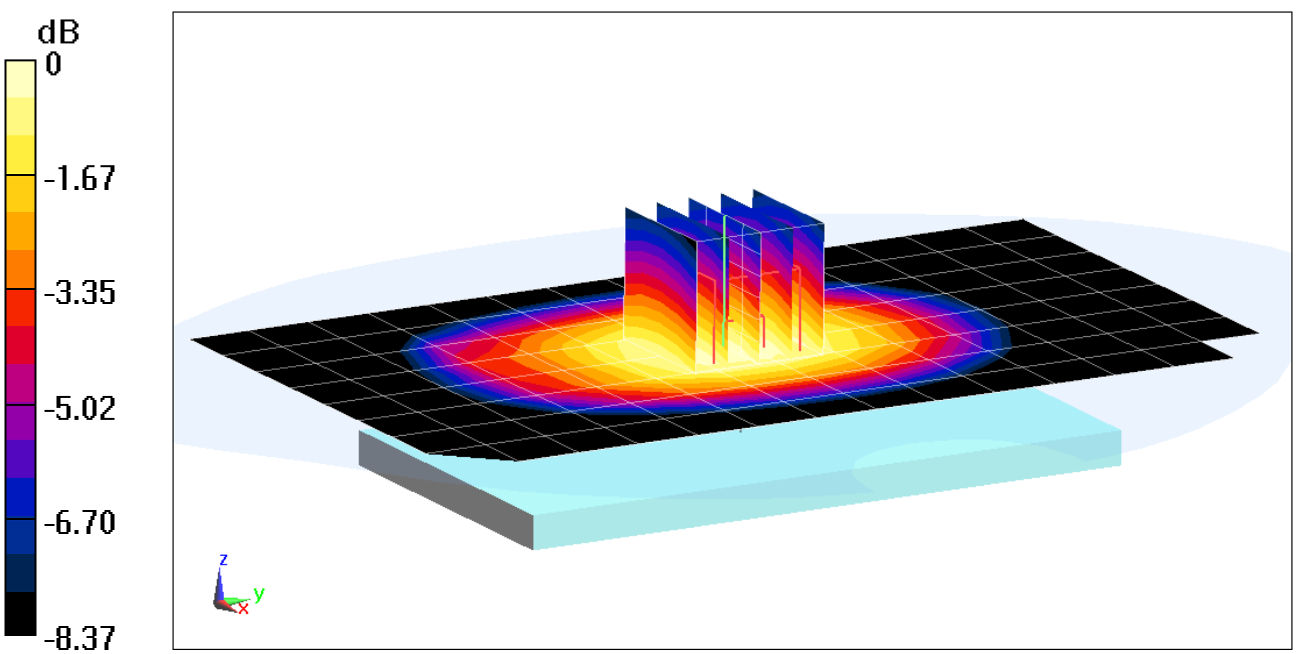
Communication System: UID 0, GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 848.8 MHz; σ = 0.971 S/m; ε_r = 52.71; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-22-2018; Ambient Temp: 21.3°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
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, 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 = 22.99 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.608 W/kg
SAR(1 g) = 0.478 W/kg



0 dB = 0.526 W/kg = -2.79 dBW/kg

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

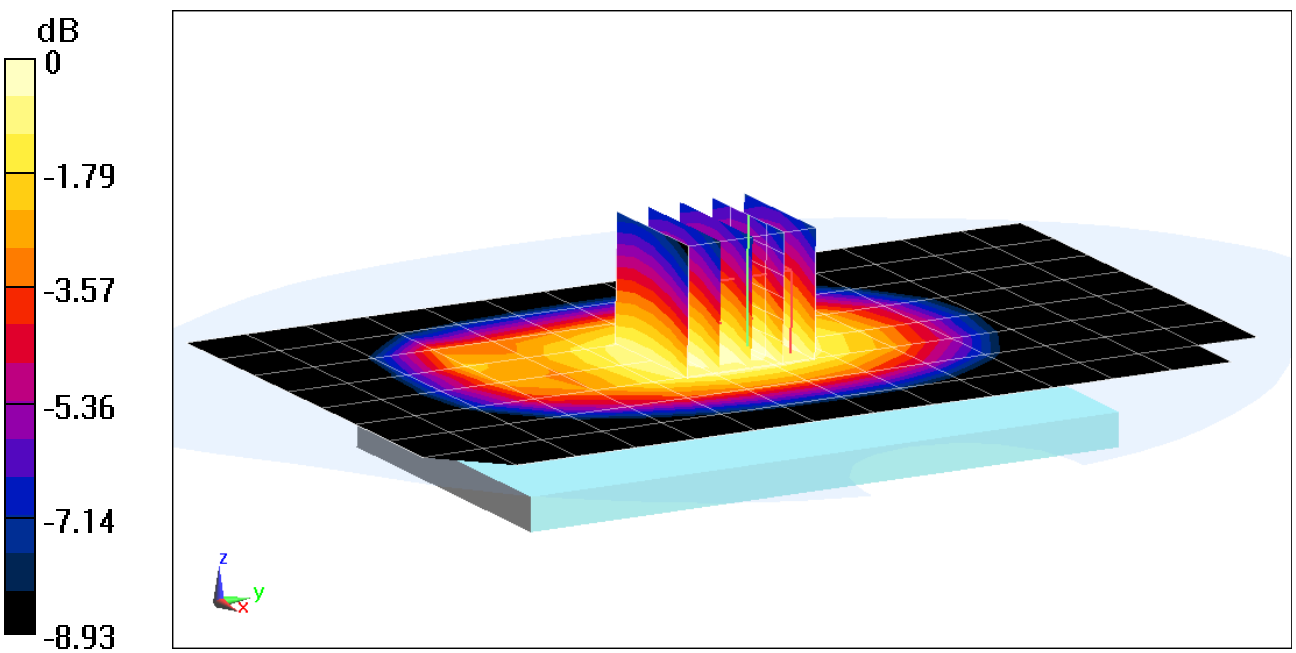
Communication System: UID 0, _GSM GPRS; 4 Tx slots;
Frequency: 848.8 MHz; Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 848.8 MHz; σ = 0.971 S/m; ε_r = 52.71; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-22-2018; Ambient Temp: 21.3°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
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, High.ch, 4 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.09 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.960 W/kg
SAR(1 g) = 0.773 W/kg



0 dB = 0.842 W/kg = -0.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

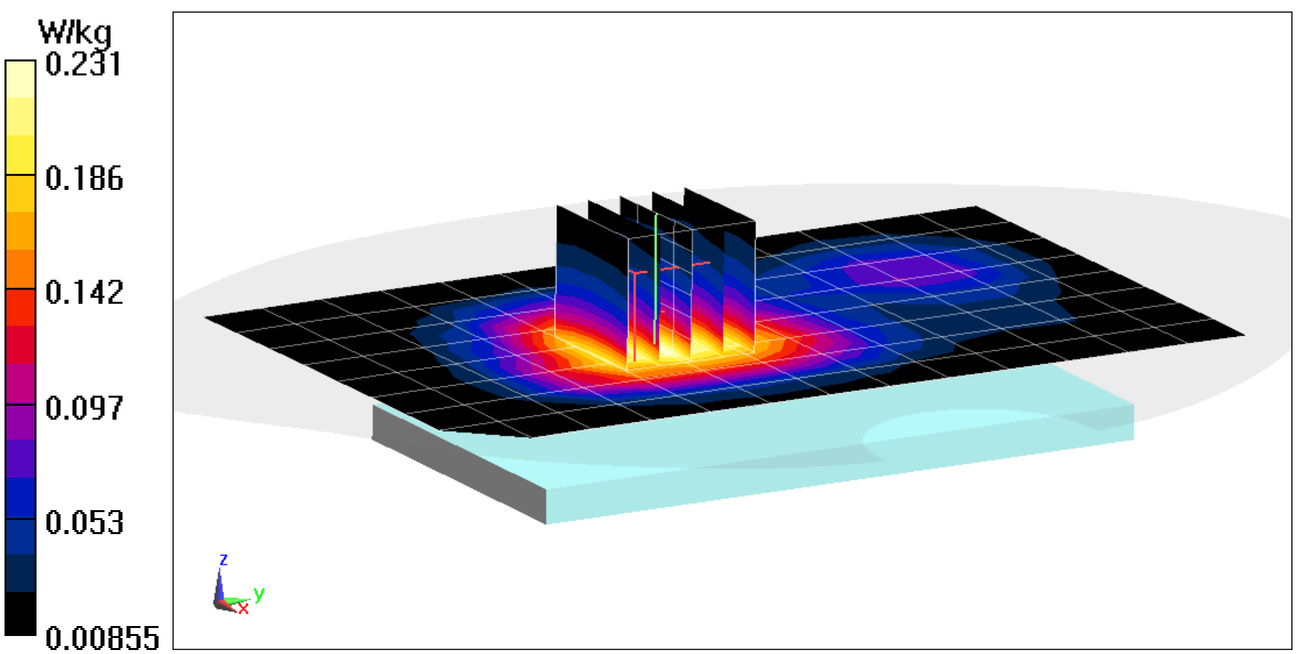
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.555 S/m; ε_r = 53.014; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.71 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.266 W/kg
SAR(1 g) = 0.169 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57527

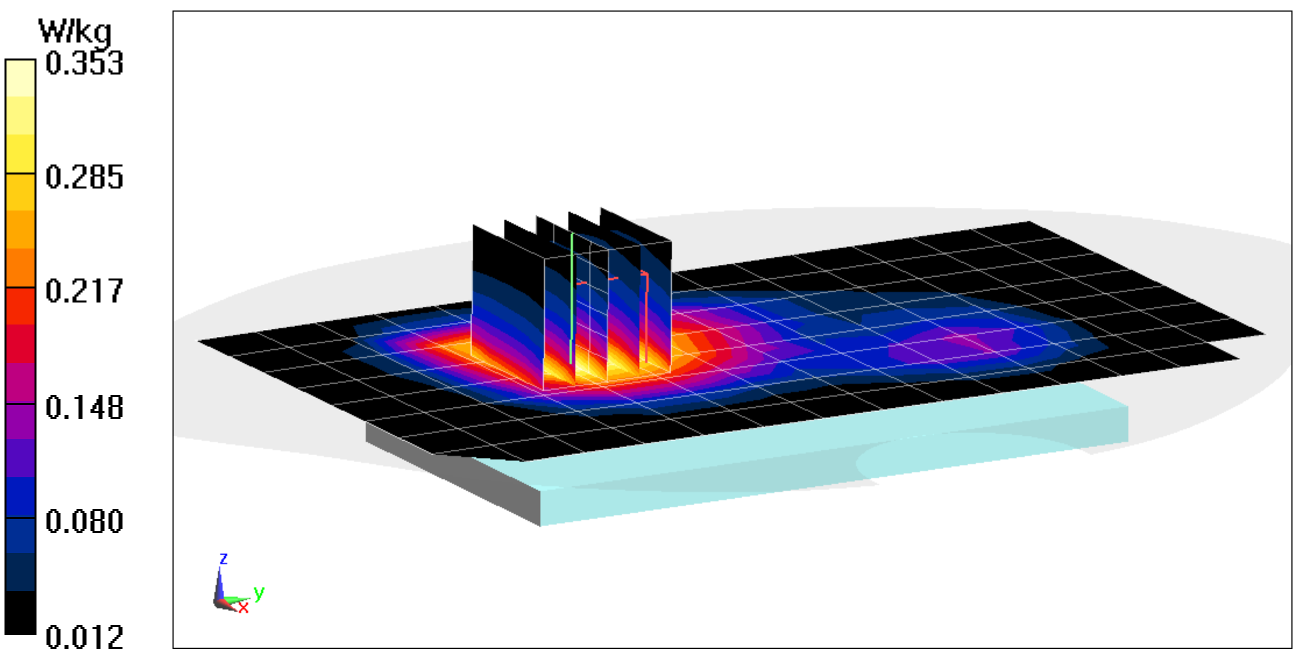
Communication System: UID 0, GSM GPRS; 4 Tx slots;
Frequency: 1880 MHz; Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.555 S/m; ε_r = 53.014; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 1900, Body SAR, Front side, Mid.ch, 4 Tx Slots

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.28 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.412 W/kg
SAR(1 g) = 0.259 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

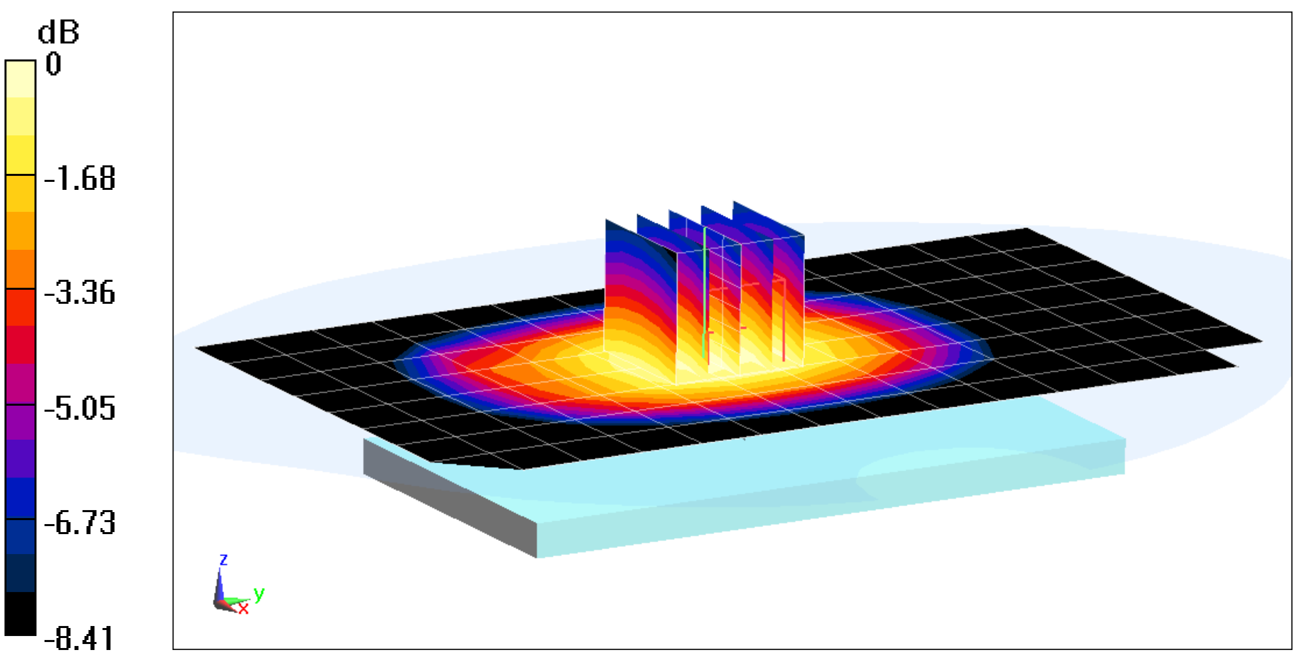
Communication System: UID 0, UMTS; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 846.6 MHz; σ = 0.973 S/m; ε_r = 53.805; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
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 = 25.06 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.725 W/kg
SAR(1 g) = 0.575 W/kg



0 dB = 0.629 W/kg = -2.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

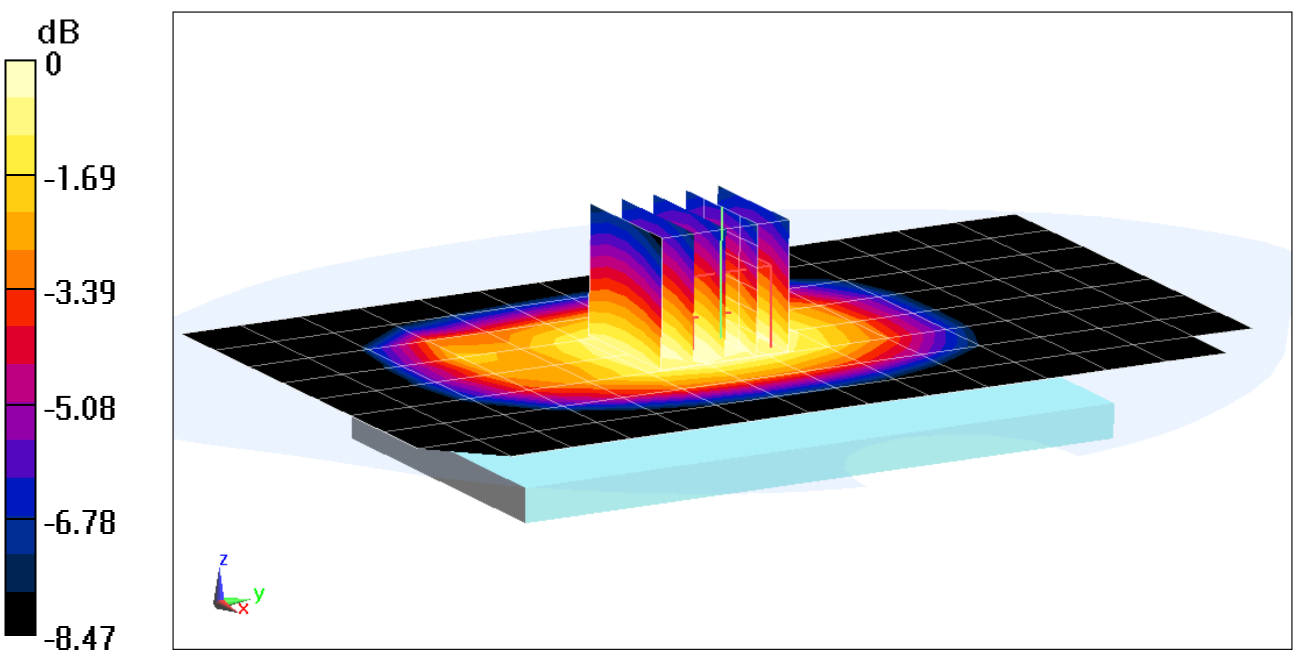
Communication System: UID 0, UMTS; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 846.6 MHz; σ = 0.973 S/m; ε_r = 53.805; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
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 = 26.32 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.788 W/kg
SAR(1 g) = 0.632 W/kg



0 dB = 0.688 W/kg = -1.62 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

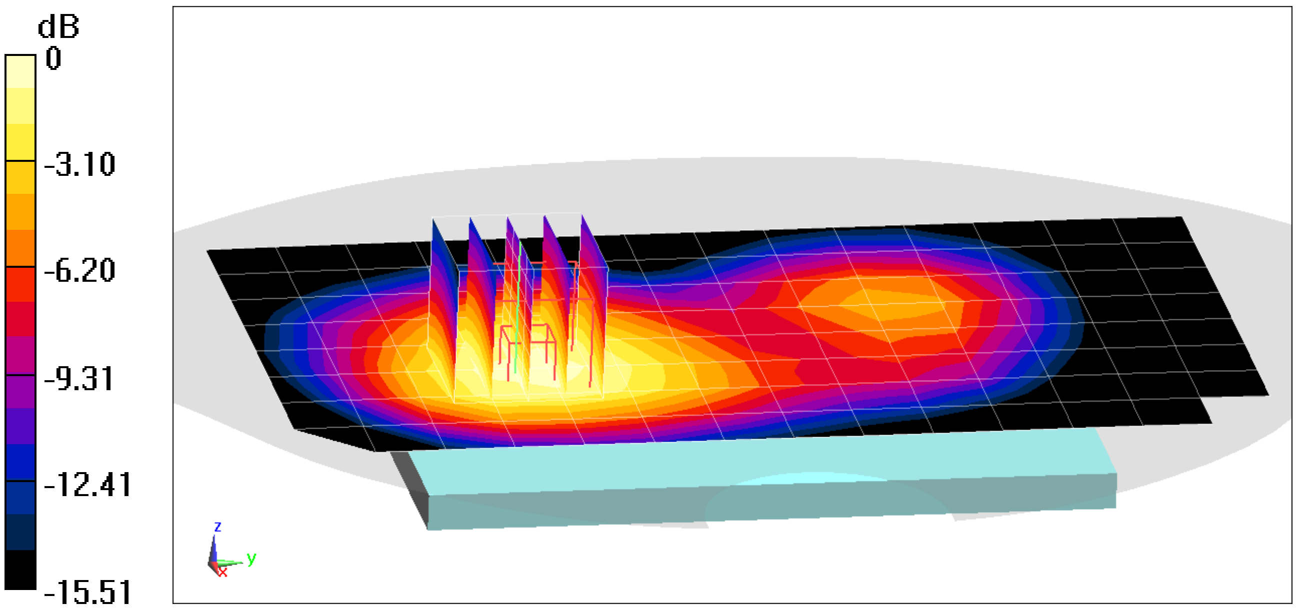
Communication System: UID 0, UMTS; Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1712.4 MHz; σ = 1.482 S/m; ε_r = 51.308; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-26-2018; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.41 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.891 W/kg
SAR(1 g) = 0.586 W/kg



0 dB = 0.781 W/kg = -1.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

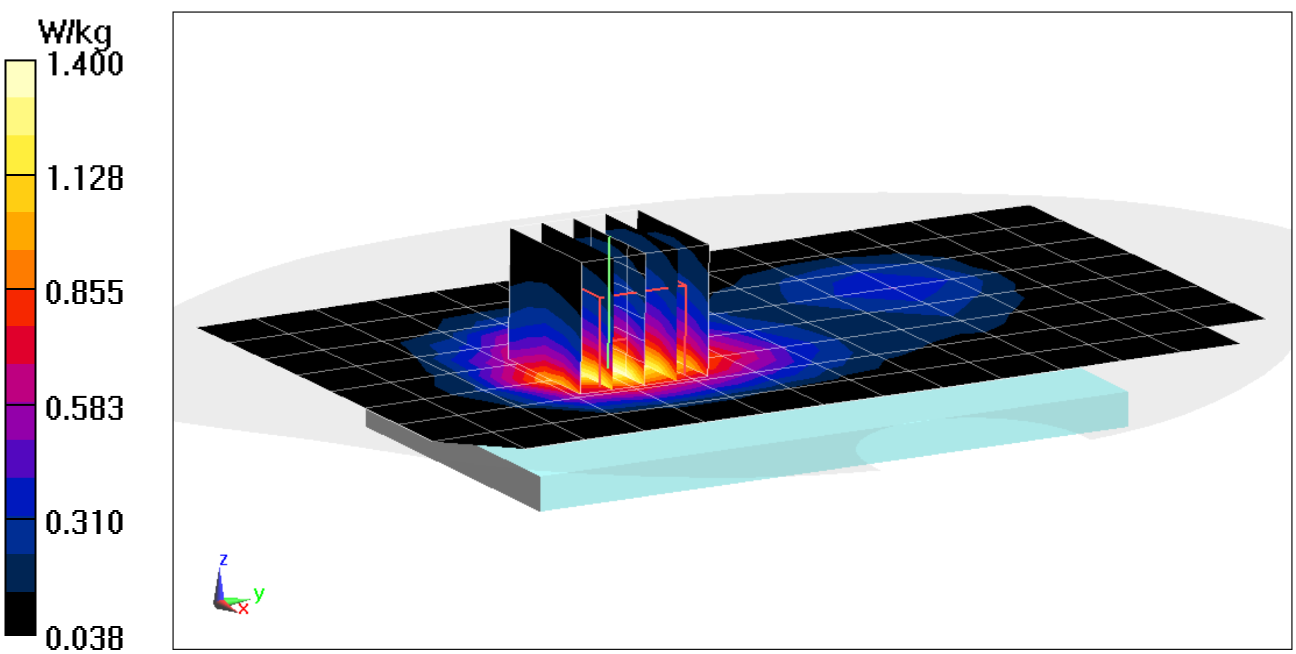
Communication System: UID 0, UMTS; Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1712.4 MHz; σ = 1.482 S/m; ε_r = 51.308; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: UMTS 1750, Body SAR, Back side, Low.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 = 27.31 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 1.05 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57634

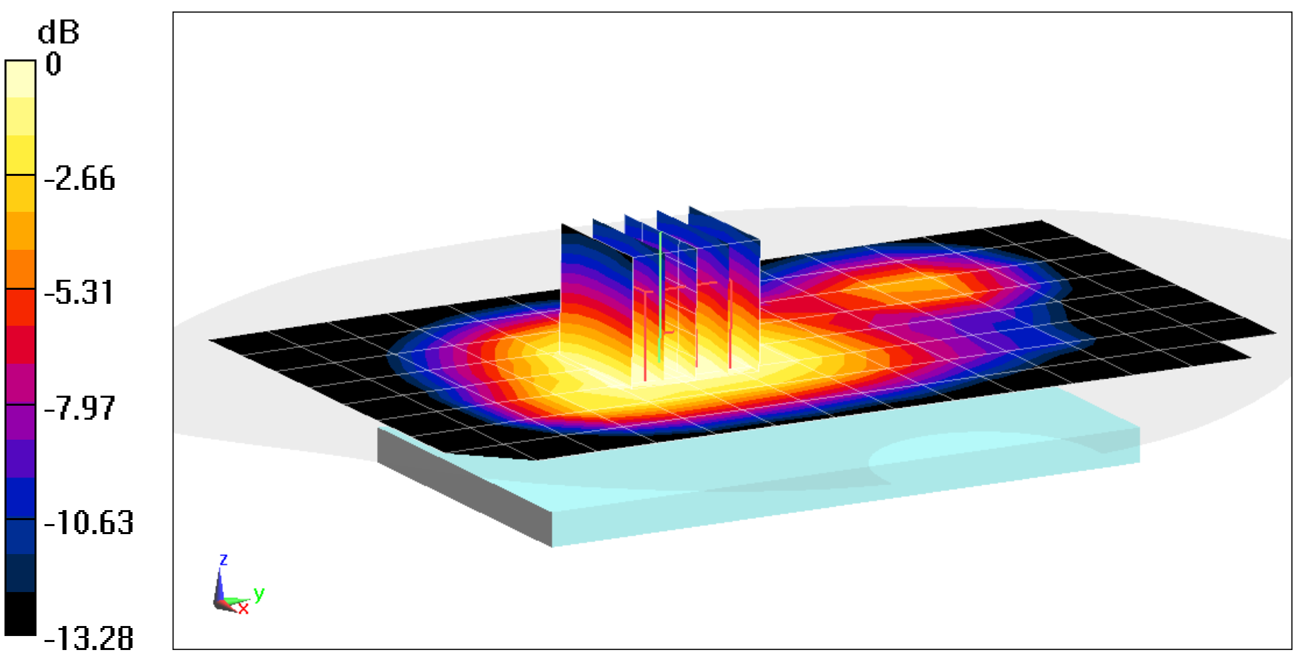
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; $\sigma = 1.555$ S/m; $\varepsilon_r = 53.014$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
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 = 16.66 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.635 W/kg
SAR(1 g) = 0.409 W/kg



0 dB = 0.552 W/kg = -2.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57527

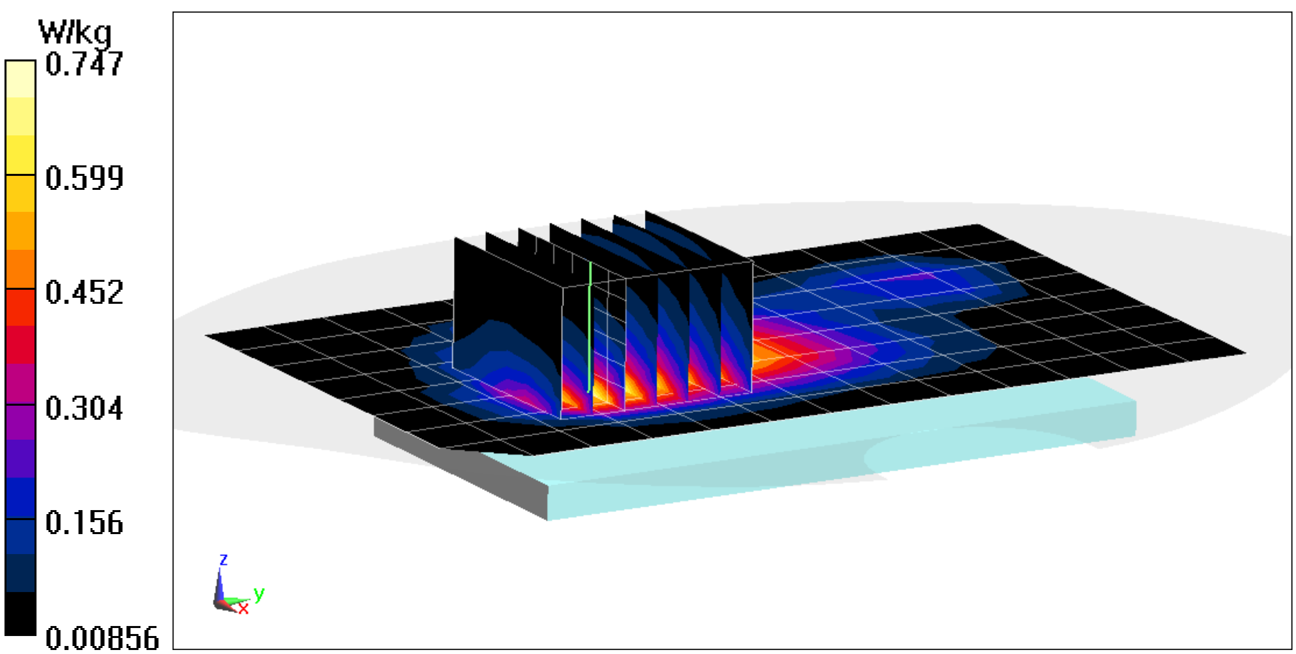
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.557 S/m; ε_r = 52.639; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-24-2018; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.64 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.913 W/kg
SAR(1 g) = 0.536 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

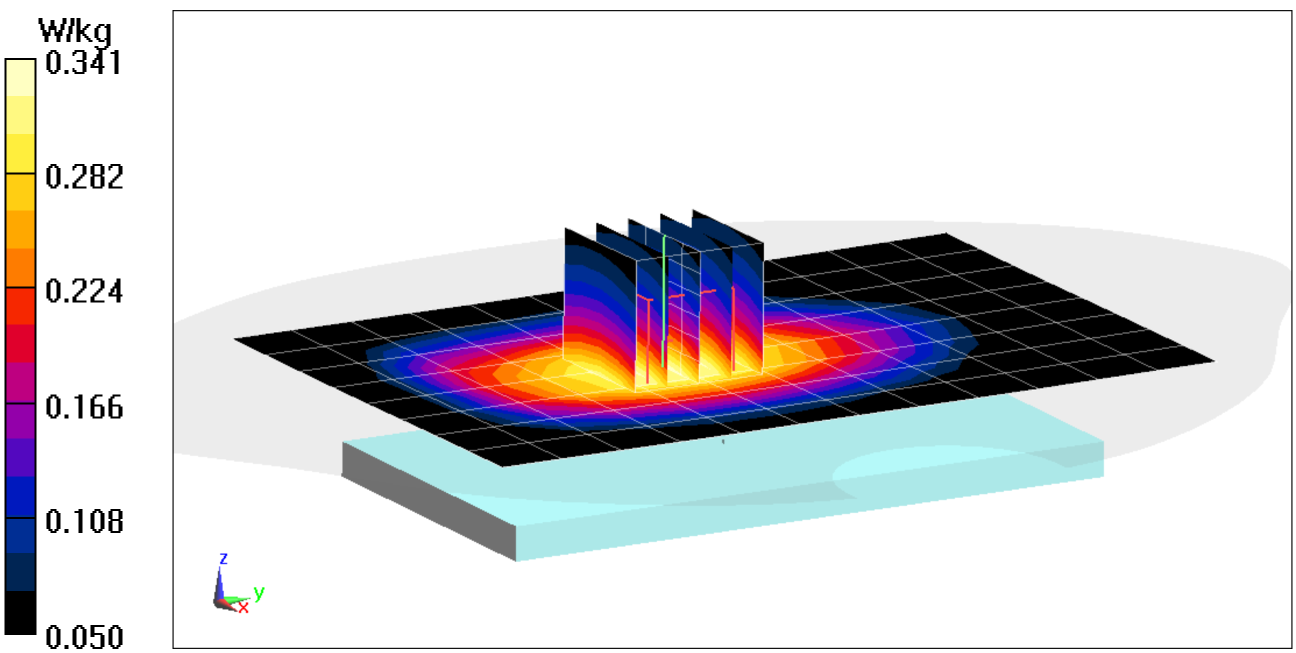
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.973 S/m; ε_r = 53.129; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2018; Ambient Temp: 22.0°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3287; ConvF(6.71, 6.71, 6.71); Calibrated: 9/18/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1692
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, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.44 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.394 W/kg
SAR(1 g) = 0.309 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

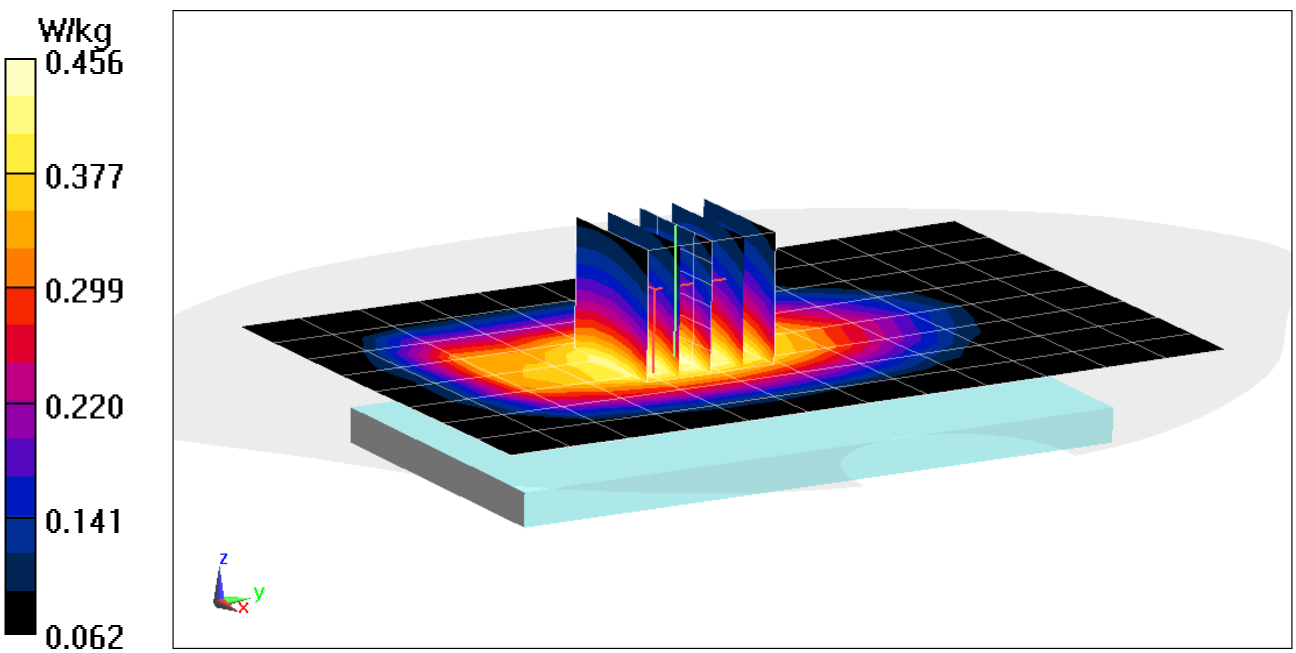
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.973 S/m; ε_r = 53.129; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-03-2018; Ambient Temp: 22.0°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3287; ConvF(6.71, 6.71, 6.71); Calibrated: 9/18/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1692
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, 49 RB Offset**

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.45 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.529 W/kg
SAR(1 g) = 0.418 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

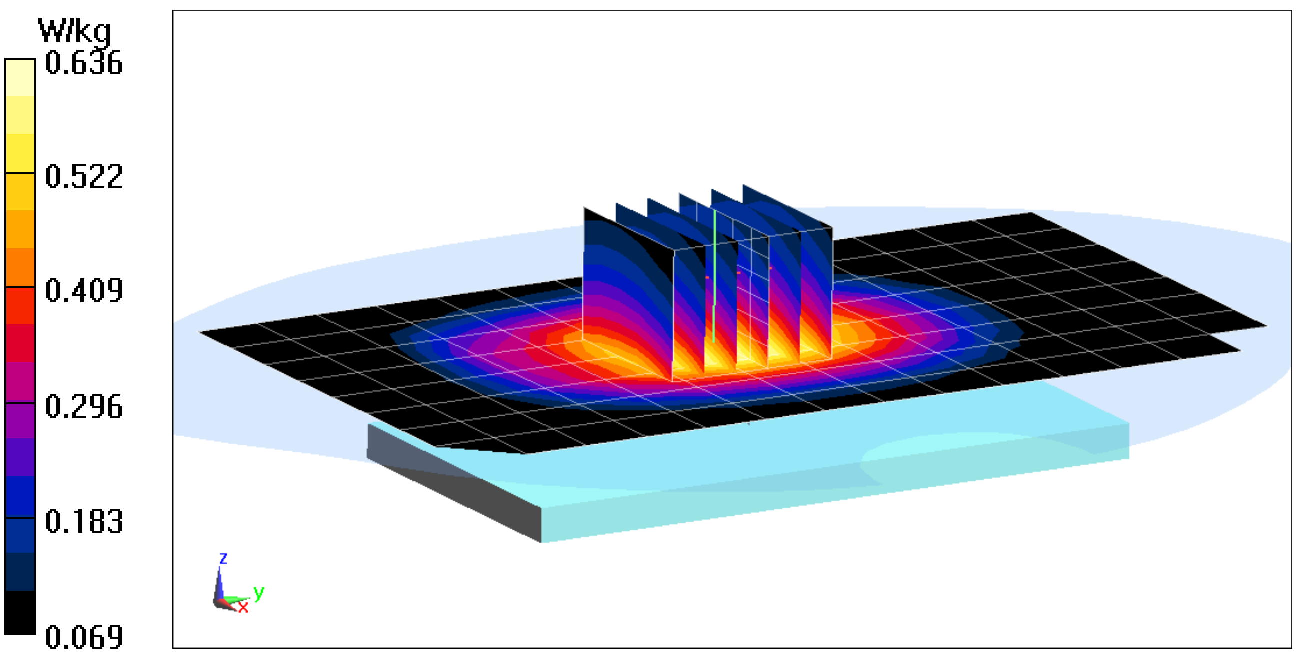
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.96 S/m; ε_r = 53.939; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
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 26 (Cell.), Body SAR, Back side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.934 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.730 W/kg
SAR(1 g) = 0.580 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05757

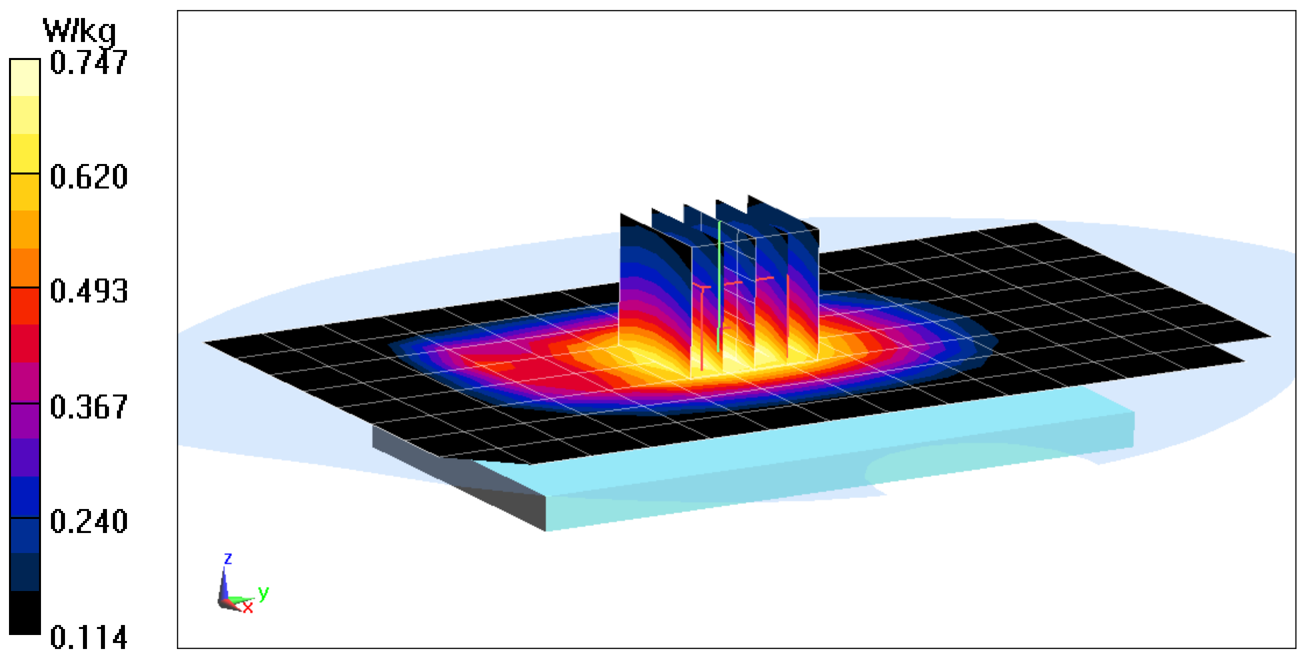
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.96 S/m; ε_r = 53.939; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
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 26 (Cell.), Body SAR, Back side, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.84 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.842 W/kg
SAR(1 g) = 0.684 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57576

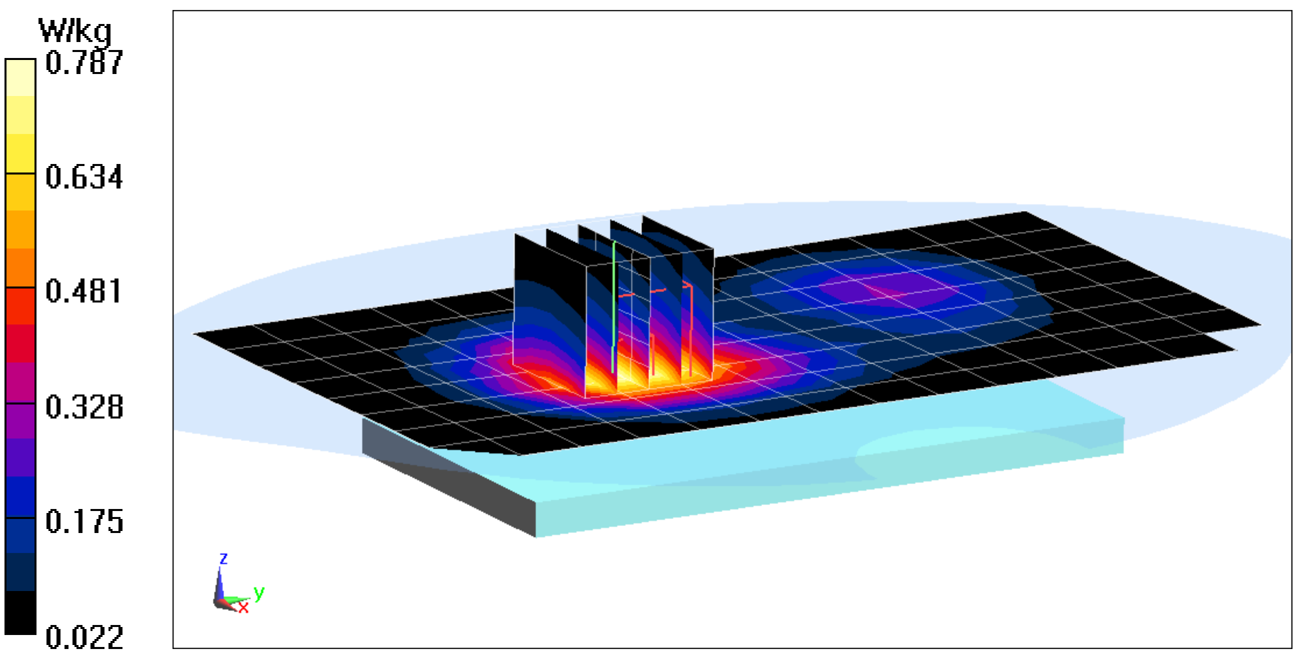
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.461 S/m; ε_r = 51.894; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7410; ConvF(8.32, 8.32, 8.32); 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: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.77 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.893 W/kg
SAR(1 g) = 0.592 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58145

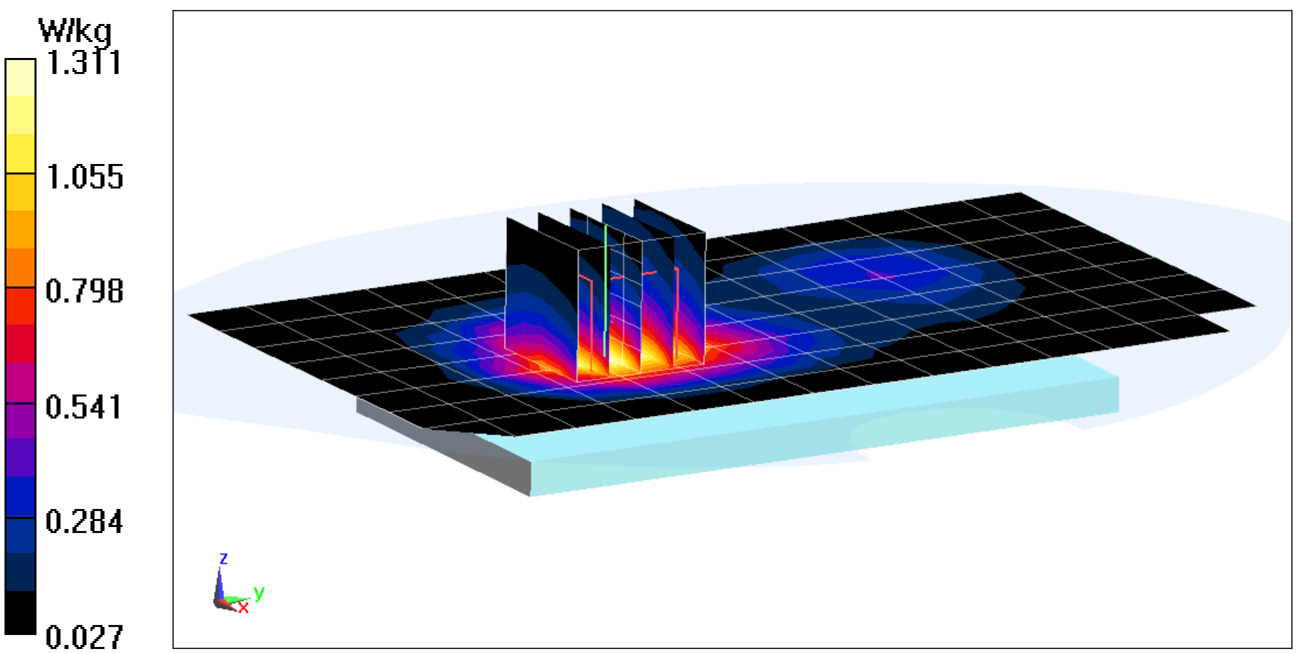
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.461 S/m; ε_r = 51.894; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-03-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7410; ConvF(8.32, 8.32, 8.32); 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: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.95 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 0.986 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57576

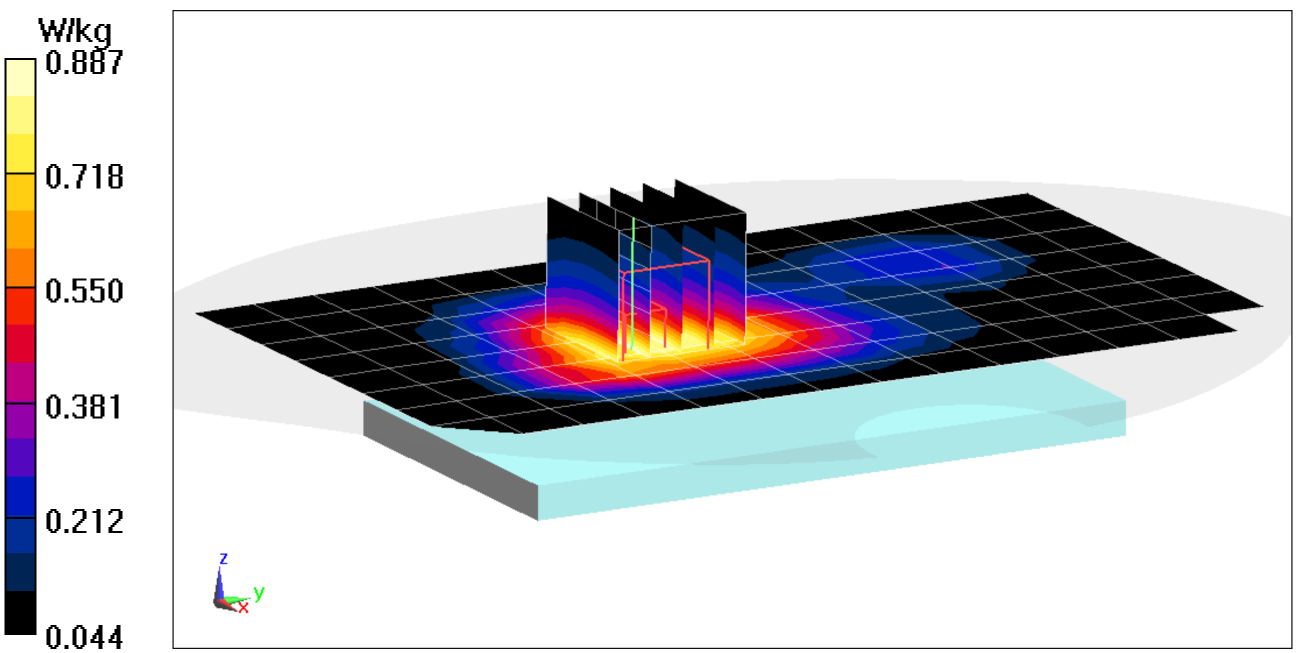
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1860 MHz; $\sigma = 1.532$ S/m; $\varepsilon_r = 53.086$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 25 (PCS), Body SAR, Back side, Low.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 = 21.27 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.663 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58145

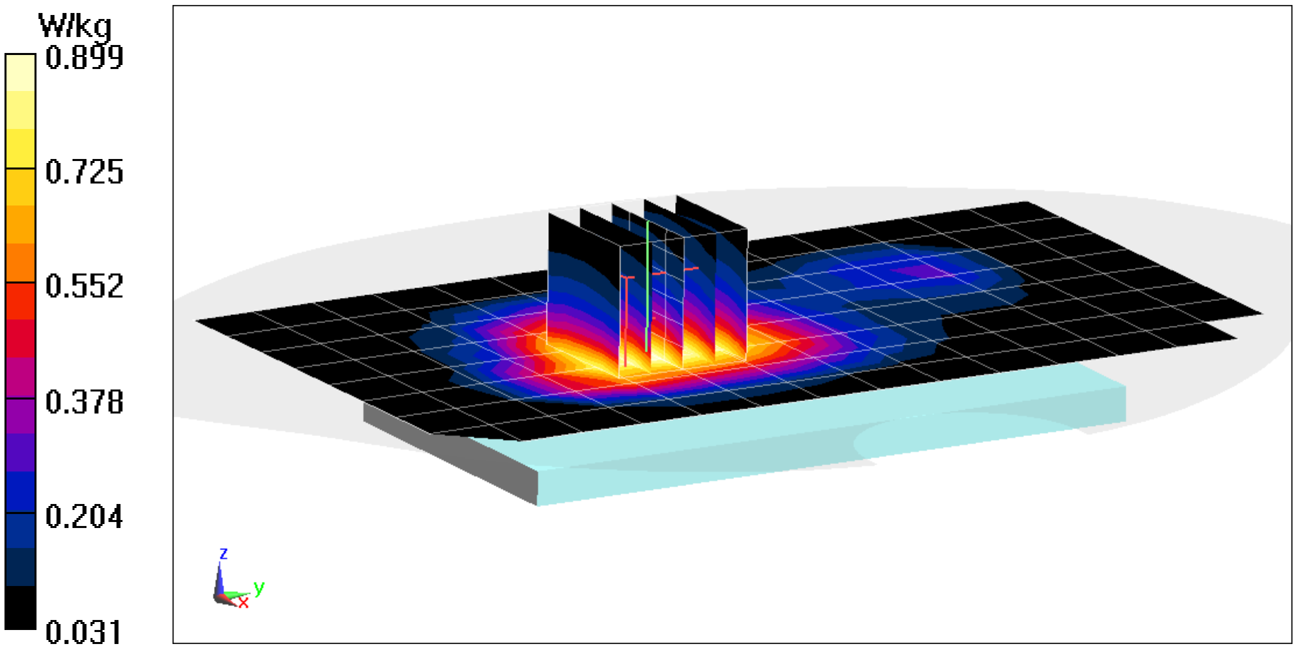
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1882.5 MHz; σ = 1.558 S/m; ε_r = 54.083; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-02-2018; Ambient Temp: 21.0°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.20 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.674 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 05764

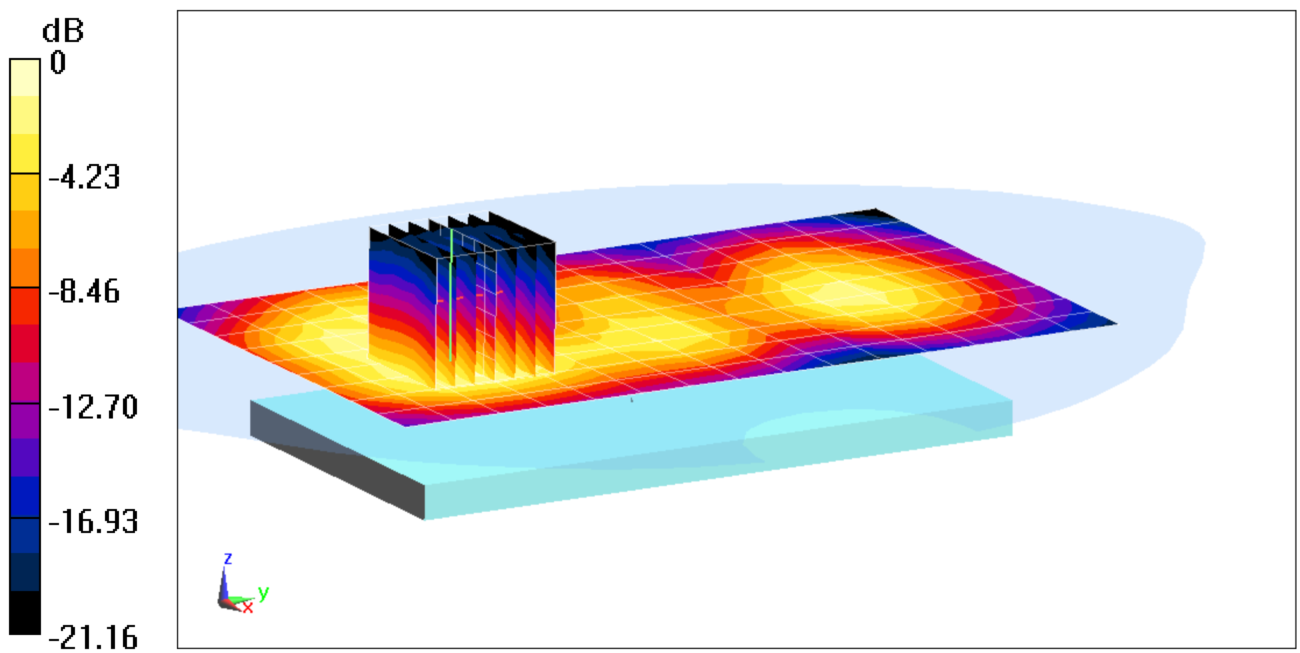
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2680 MHz; Duty Cycle: 1:2.31
Medium: 2450 Body Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.278 S/m; ε_r = 51.286; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-24-2018; Ambient Temp: 22.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3332; ConvF(4.43, 4.43, 4.43); 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 41 PC2, Body SAR, Back side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 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 = 15.36 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.959 W/kg
SAR(1 g) = 0.484 W/kg



0 dB = 0.900 W/kg = -0.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57642

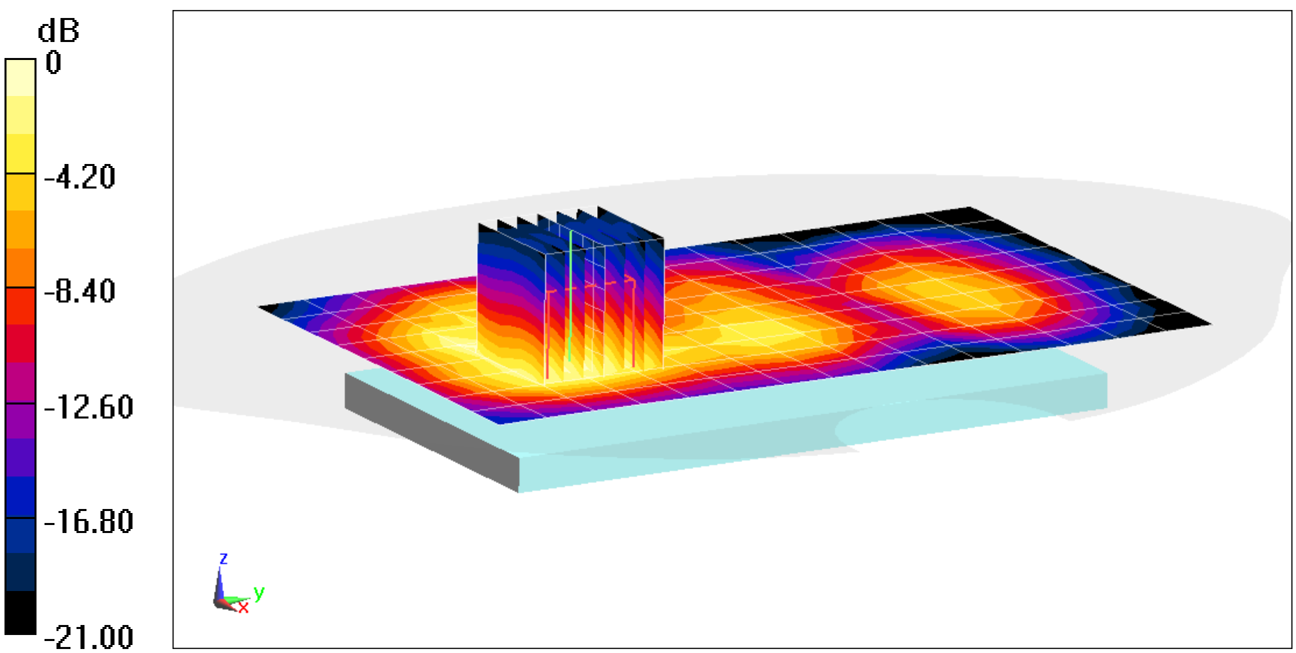
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2450 Body Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.282 S/m; ε_r = 49.834; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.2°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: Right Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1797
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 41, Body SAR, Back side, High.ch,
20 MHz Bandwidth, QPSK, 1 RB, 99 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 = 16.75 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.580 W/kg



0 dB = 0.932 W/kg = -0.31 dBW/kg

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57592

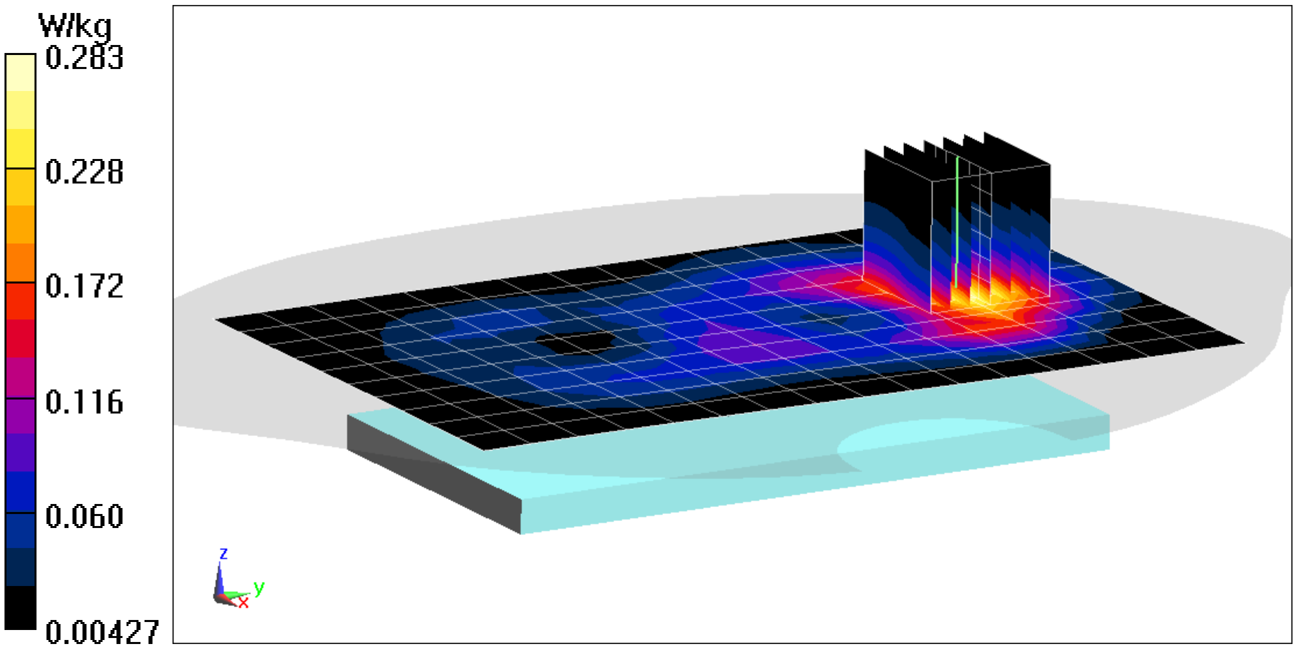
Communication System: UID 0, 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.996 S/m; ε_r = 50.527; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.2°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: Right Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1797
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

**Mode: IEEE 802.11b, 22 MHz Bandwidth,
Body SAR, Ch 6, 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 = 10.12 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.344 W/kg
SAR(1 g) = 0.186 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 57592

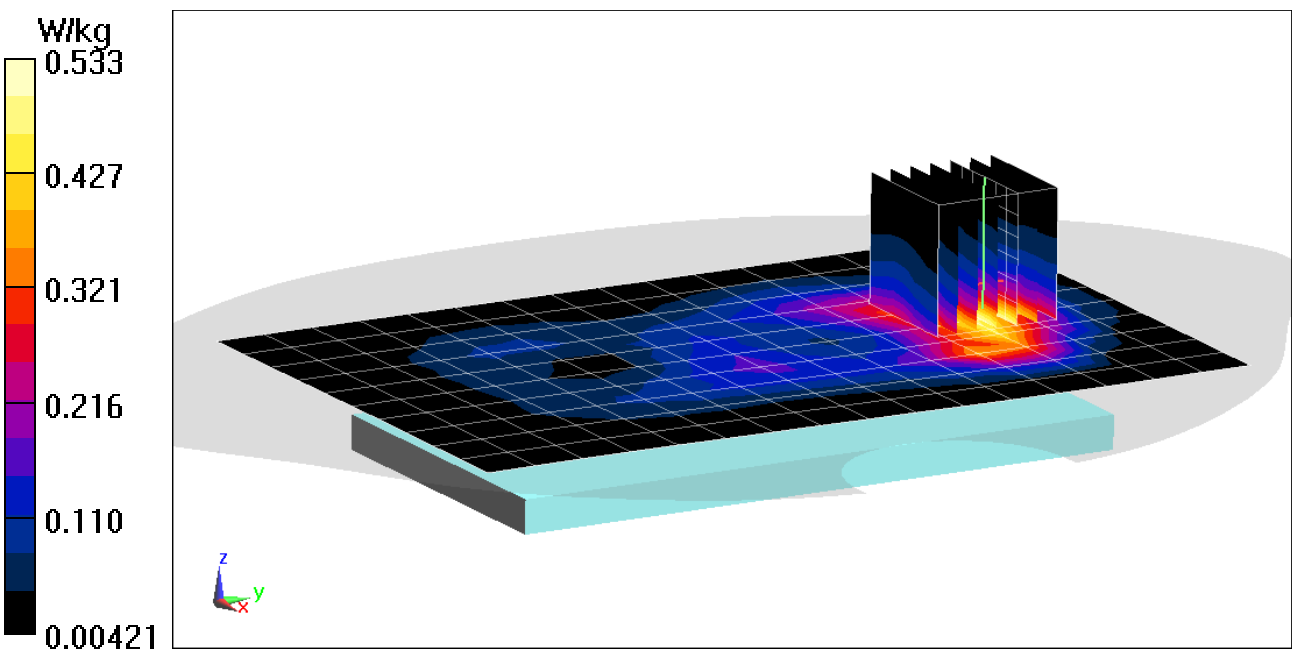
Communication System: UID 0, 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.996 S/m; ε_r = 50.527; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.2°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: Right Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1797
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11b, 22 MHz Bandwidth,
Body SAR, Ch 6, 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 = 13.21 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.651 W/kg
SAR(1 g) = 0.352 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58137

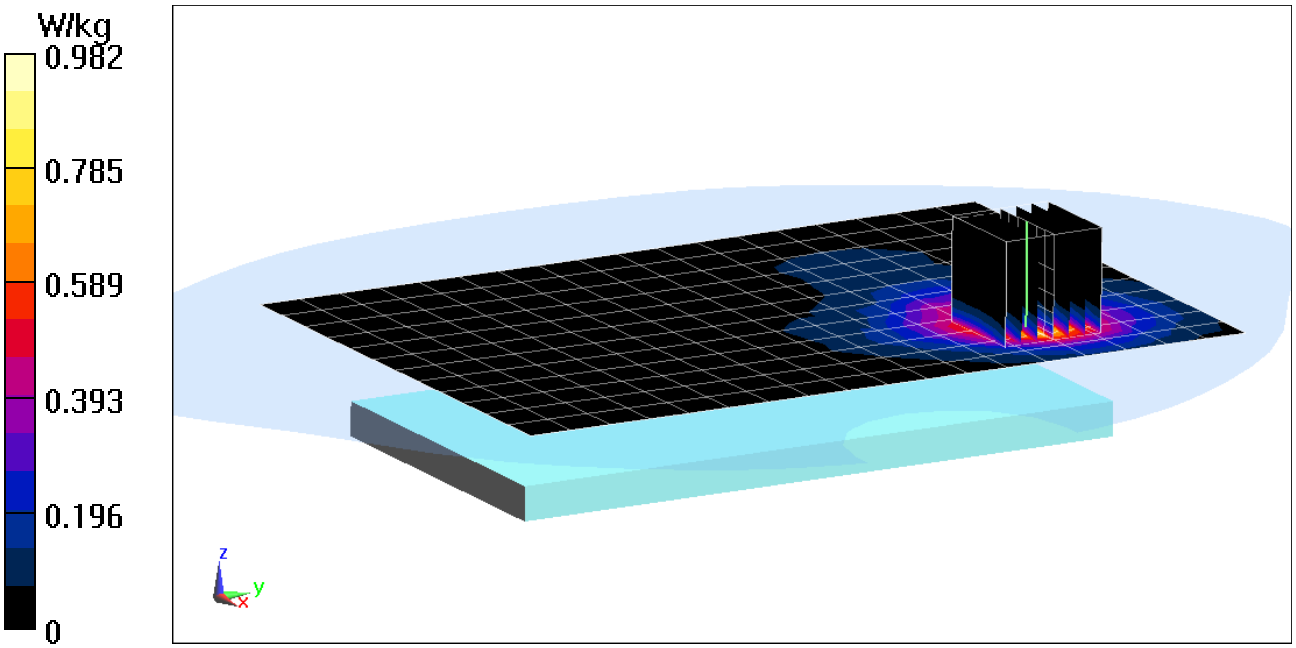
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5825 MHz; σ = 6.265 S/m; ε_r = 46.182; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-26-2018; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.5, 4.5, 4.5); Calibrated: 8/16/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/14/2017
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 165, 6 Mbps, Back Side

Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 7.864 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 0.401 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMJ337P; Type: Portable Handset; Serial: 58137

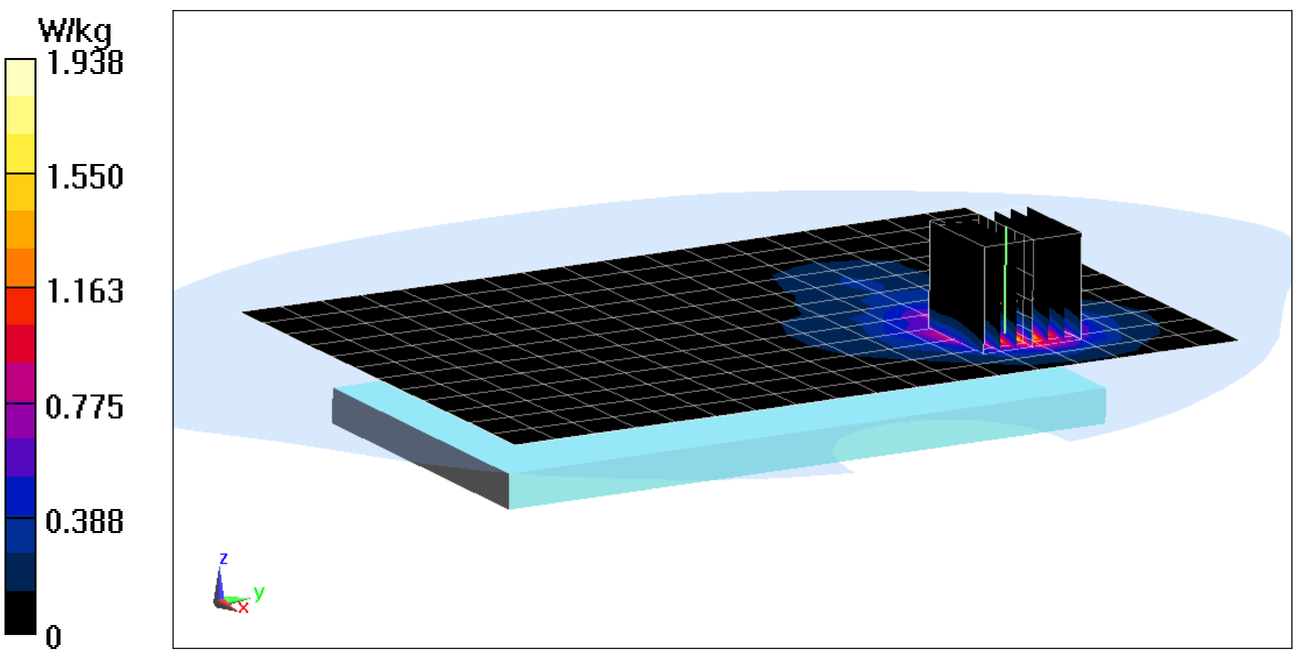
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5785 MHz; σ = 6.202 S/m; ε_r = 46.246; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.5, 4.5, 4.5); Calibrated: 8/16/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/14/2017
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 157, 6 Mbps, Back Side

Area Scan (13x19x1): 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 = 11.35 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 3.63 W/kg
SAR(1 g) = 0.775 W/kg



APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

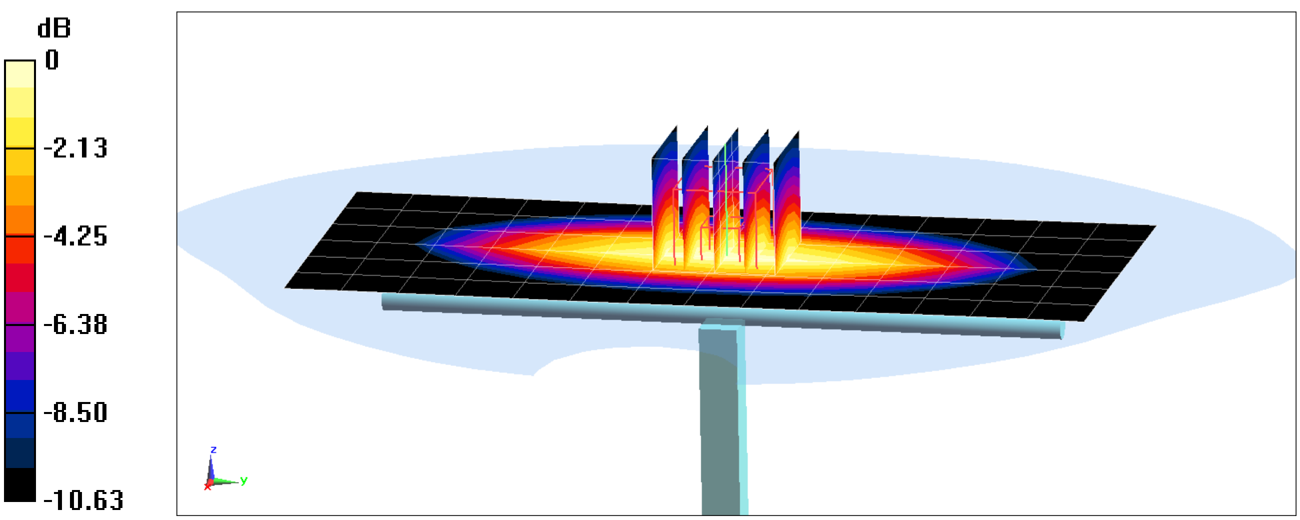
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; σ = 0.909 S/m; ε_r = 42.541; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-30-2018; Ambient Temp: 23.8°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7410; ConvF(10.6, 10.6, 10.6); Calibrated: 7/17/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
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) = 2.41 W/kg
SAR(1 g) = 1.62 W/kg
Deviation(1 g) = -0.86%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

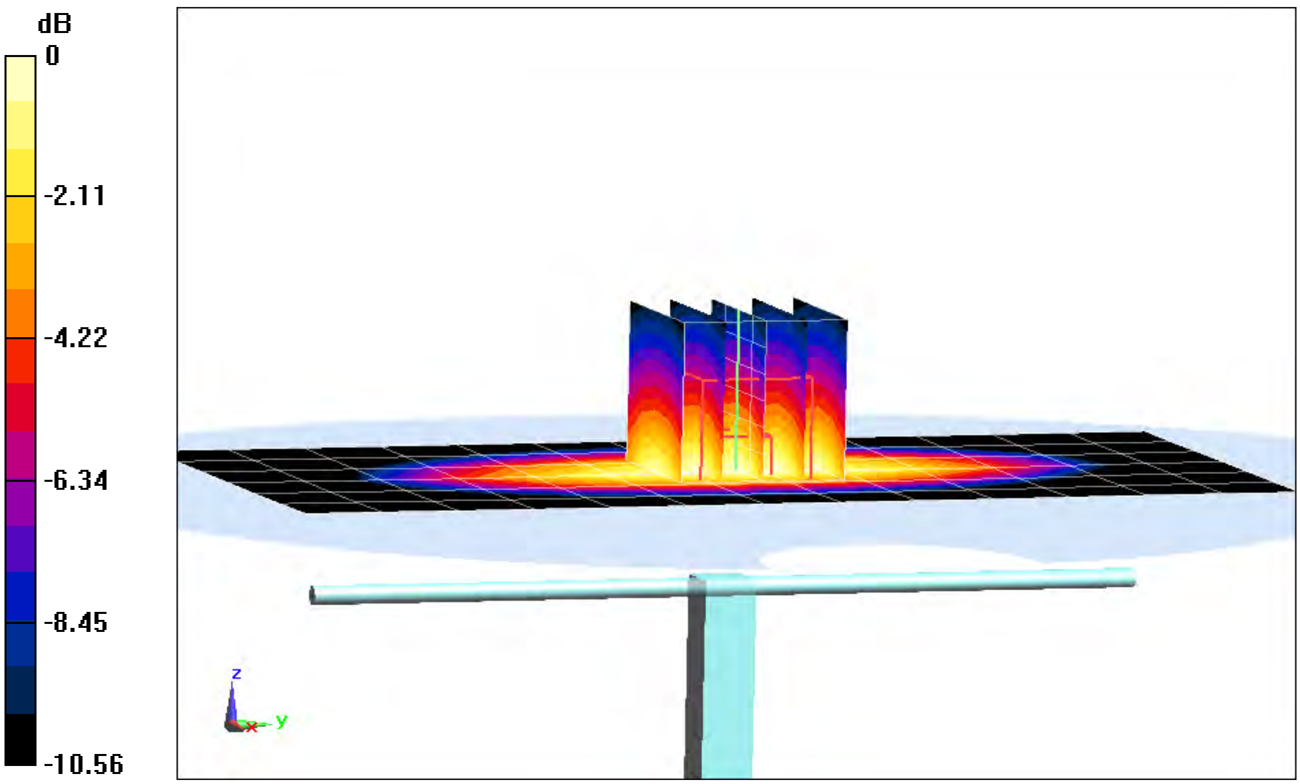
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.899 S/m; ε_r = 41.025; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-25-2018; Ambient Temp: 23.5°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 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) = 2.92 W/kg
SAR(1 g) = 1.98 W/kg
Deviation(1 g) = 5.77%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

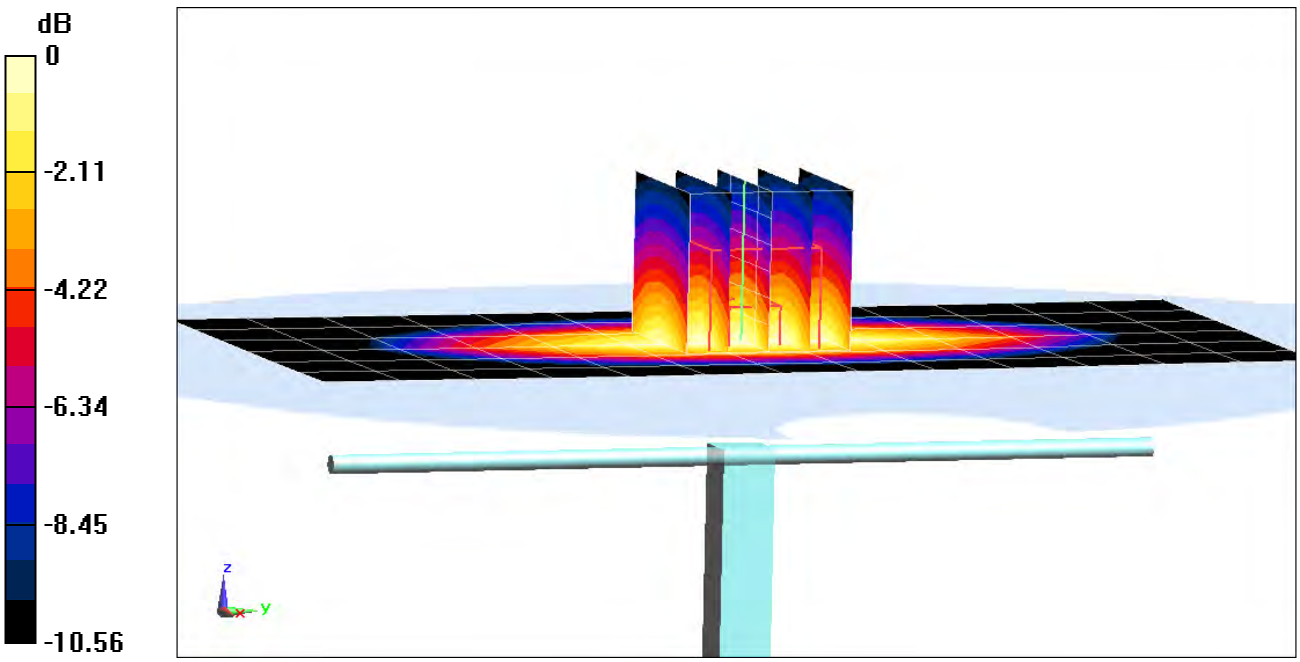
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; $\sigma = 0.92$ S/m; $\varepsilon_r = 42.445$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-02-2018; Ambient Temp: 19.8°C; Tissue Temp: 19.7°C

Probe: ES3DV3 - SN3213; ConvF(6.42, 6.42, 6.42); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: 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) = 2.79 W/kg
SAR(1 g) = 1.9 W/kg
Deviation(1 g) = 1.50%



0 dB = 2.22 W/kg = 3.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

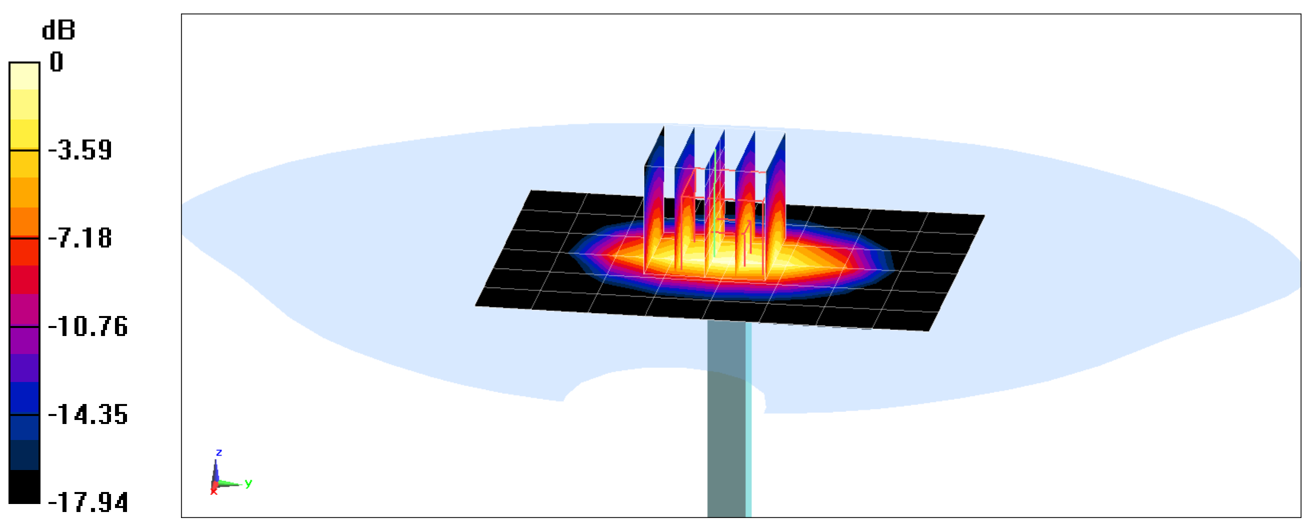
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.388 S/m; ε_r = 39.359; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-02-2018; Ambient Temp: 22.0°C; Tissue Temp: 21.4°C

Probe: EX3DV4 - SN7410; ConvF(8.66, 8.66, 8.66); 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)

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) = 6.41 W/kg
SAR(1 g) = 3.5 W/kg
Deviation(1 g) = -3.85%



0 dB = 5.31 W/kg = 7.25 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

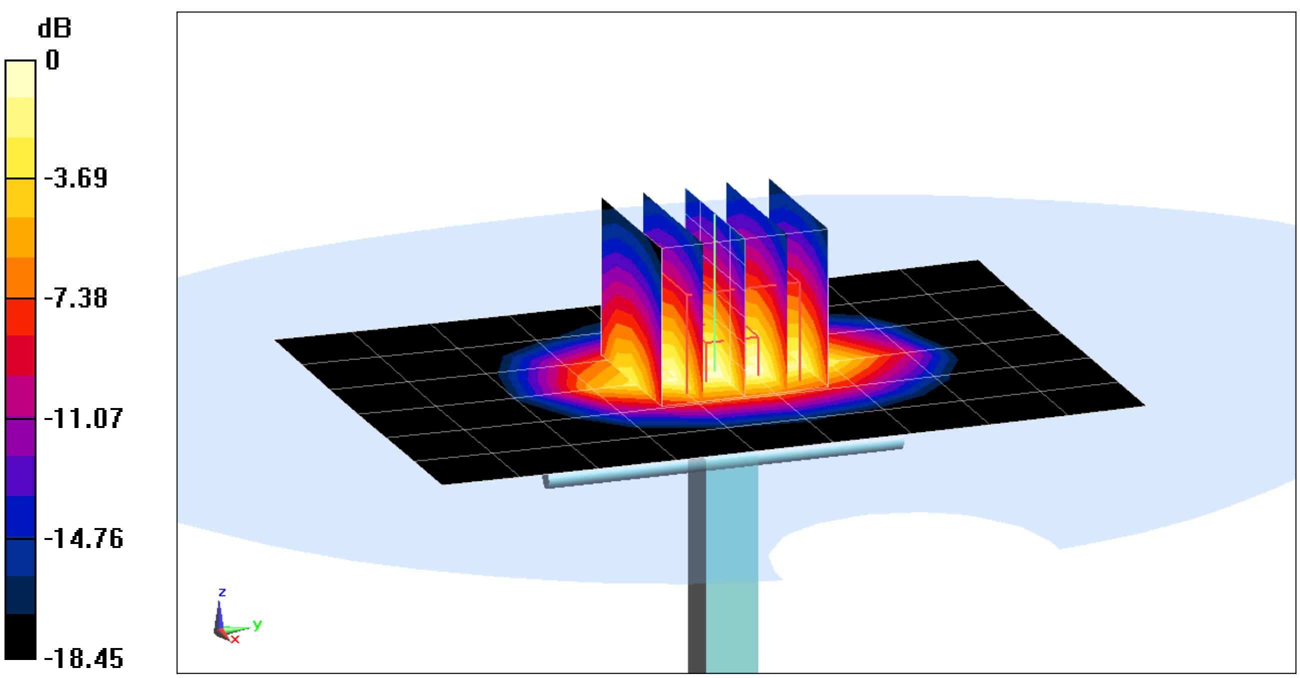
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.398 S/m; ε_r = 39.163; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-02-2018; Ambient Temp: 22.9°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3332; ConvF(5.33, 5.33, 5.33); Calibrated: 8/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 8/9/2017
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
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) = 6.66 W/kg
SAR(1 g) = 3.66 W/kg
Deviation(1 g) = -6.87%



0 dB = 4.63 W/kg = 6.66 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

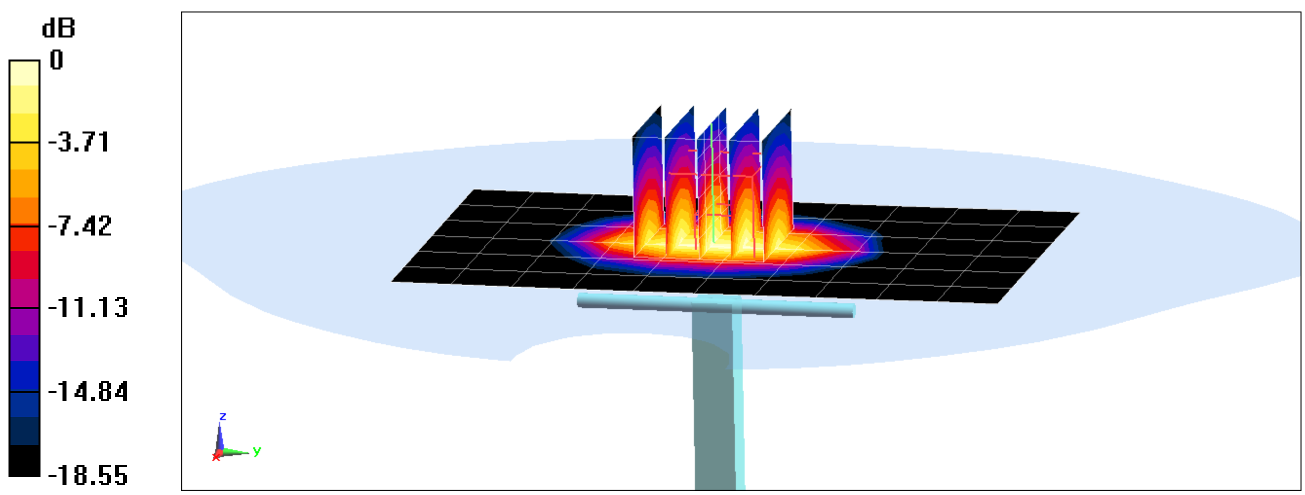
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.458 S/m; ε_r = 39.427; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-10-2018; Ambient Temp: 24.0°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7410; ConvF(8.37, 8.37, 8.37); Calibrated: 7/17/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
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) = 7.06 W/kg
SAR(1 g) = 3.87 W/kg
Deviation(1 g) = -3.49%



0 dB = 5.99 W/kg = 7.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

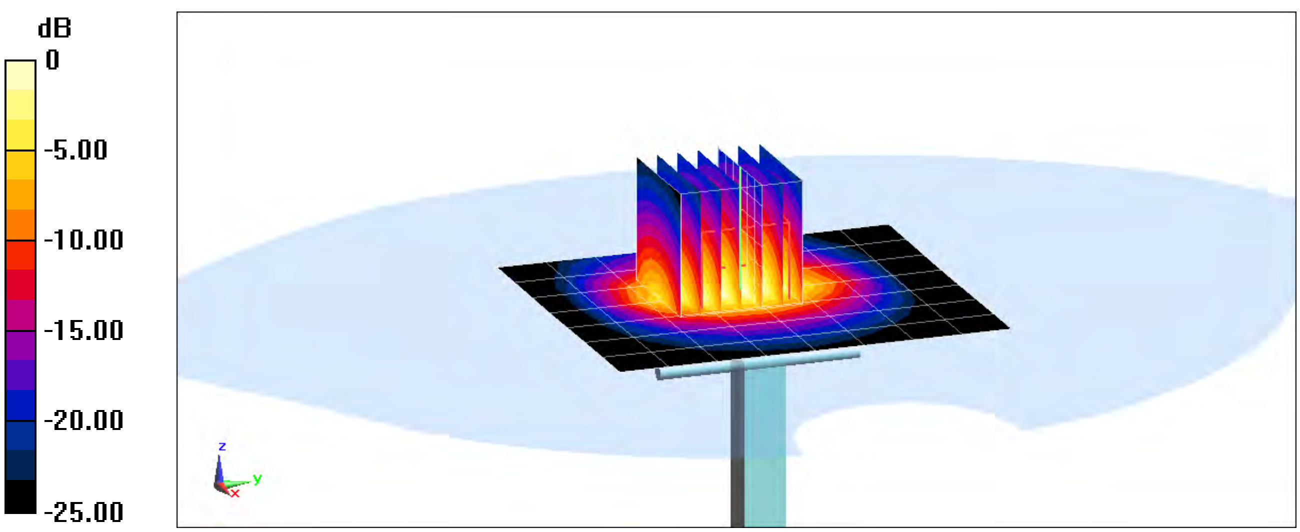
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; σ = 1.933 S/m; ε_r = 40.057; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-25-2018; Ambient Temp: 23.2°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3332; ConvF(4.56, 4.56, 4.56); 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)

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) = 11.4 W/kg
SAR(1 g) = 5.21 W/kg
Deviation(1 g) = -7.62%



0 dB = 6.83 W/kg = 8.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

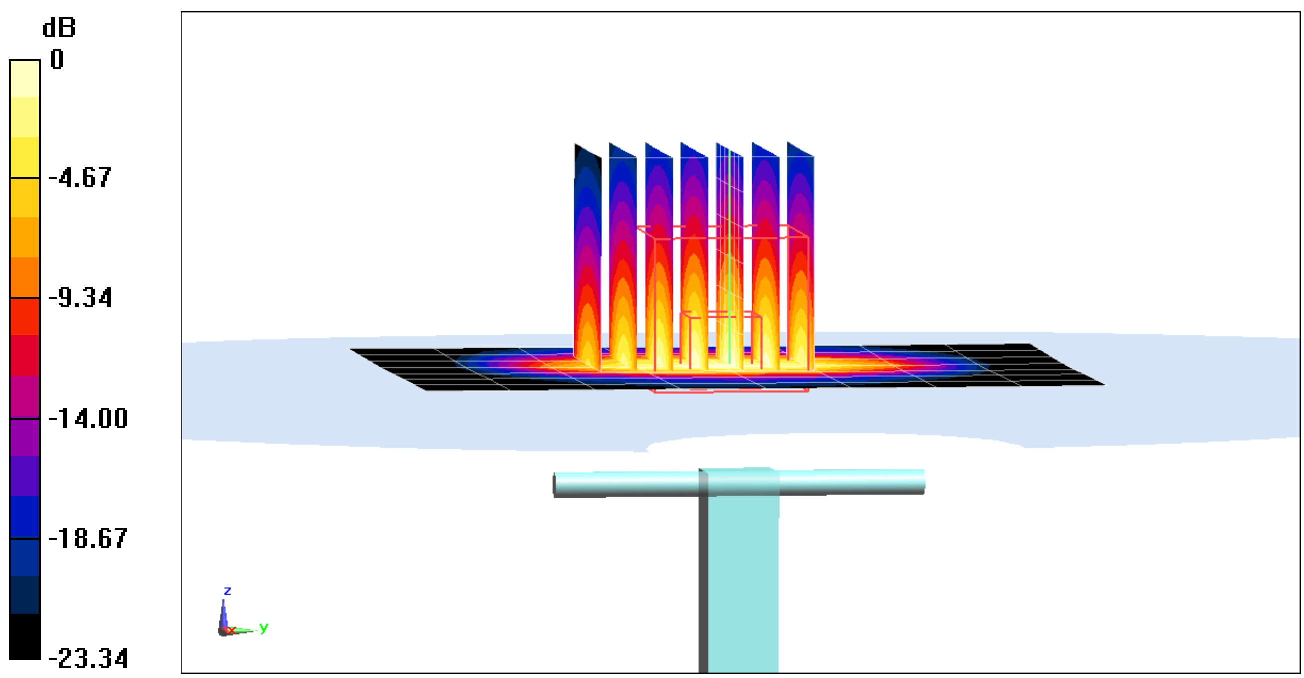
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.808 S/m; ε_r = 40.109; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 22.3°C; Tissue Temp: 21.5°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) = 10.1 W/kg
SAR(1 g) = 4.92 W/kg
Deviation(1 g) = -6.64%



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

PCTEST ENGINEERING LABORATORY, INC.

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

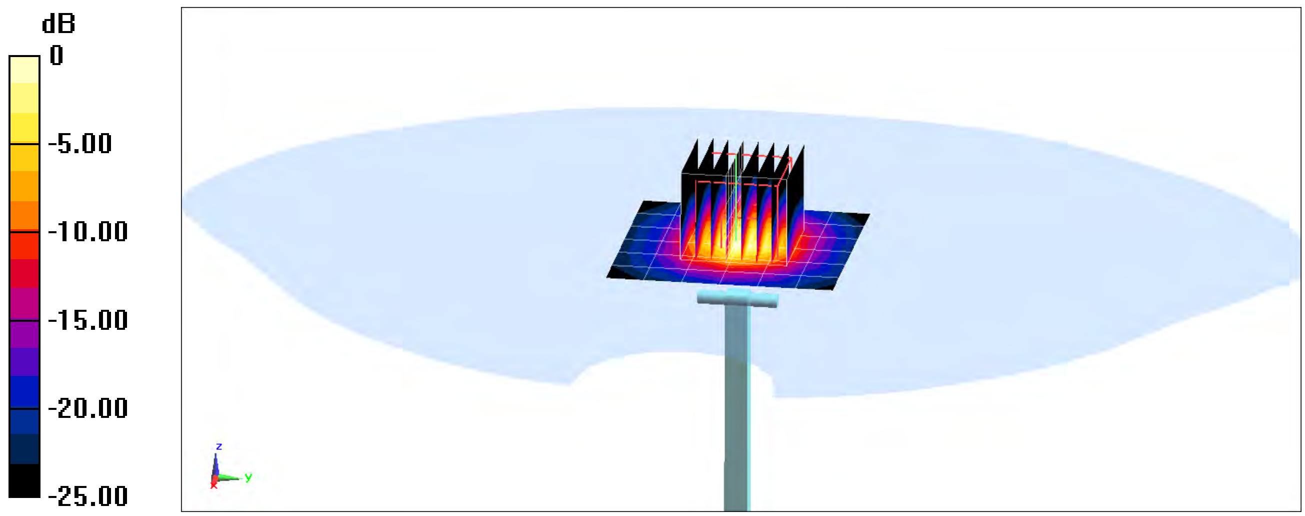
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5250 MHz; σ = 4.67 S/m; ε_r = 37.535; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.5°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3589; ConvF(4.69, 4.69, 4.69); Calibrated: 1/16/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
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) = 16.2 W/kg
SAR(1 g) = 3.9 W/kg
Deviation(1 g) = -4.06%



0 dB = 9.62 W/kg = 9.83 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

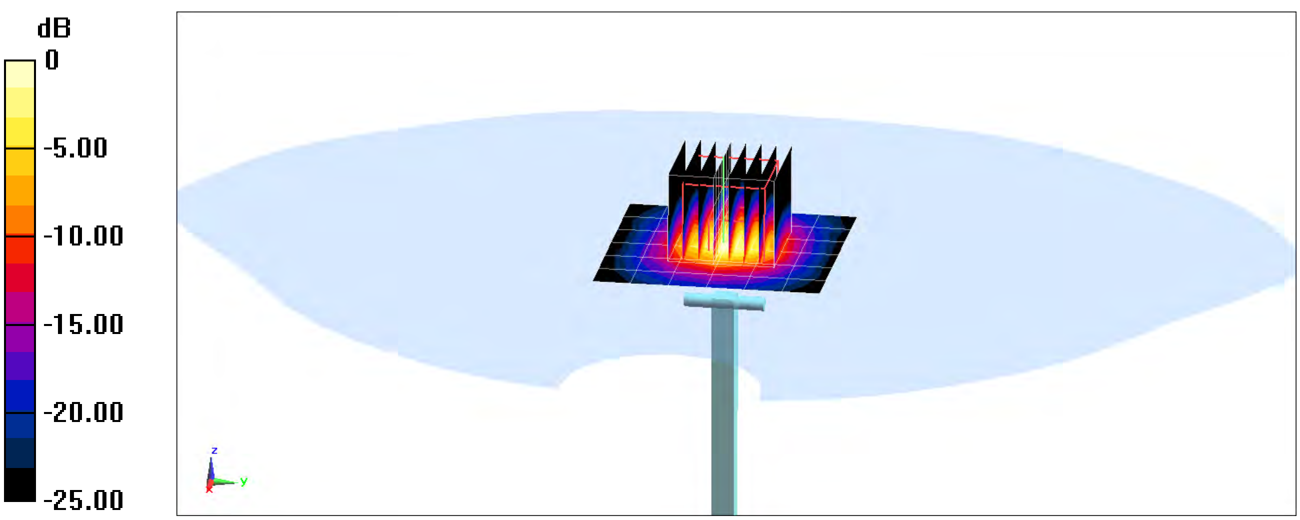
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 5.02 S/m; ε_r = 36.954; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.5°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3589; ConvF(4.17, 4.17, 4.17); Calibrated: 1/16/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
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) = 18.3 W/kg
SAR(1 g) = 4.27 W/kg
Deviation(1 g) = 0.83%



0 dB = 10.4 W/kg = 10.17 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

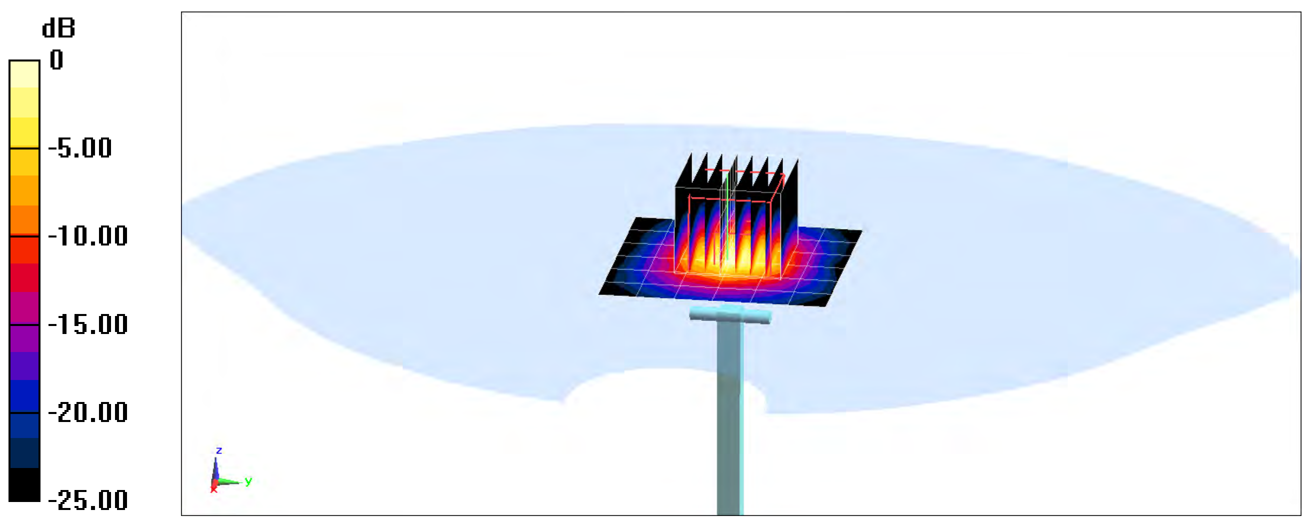
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.194 S/m; ε_r = 36.774; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.5°C; Tissue Temp: 20.4°C

Probe: EX3DV4 - SN3589; ConvF(4.42, 4.42, 4.42); Calibrated: 1/16/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/13/2017
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) = 17.3 W/kg
SAR(1 g) = 3.9 W/kg
Deviation(1 g) = -3.70%



0 dB = 9.45 W/kg = 9.75 dBW/kg

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

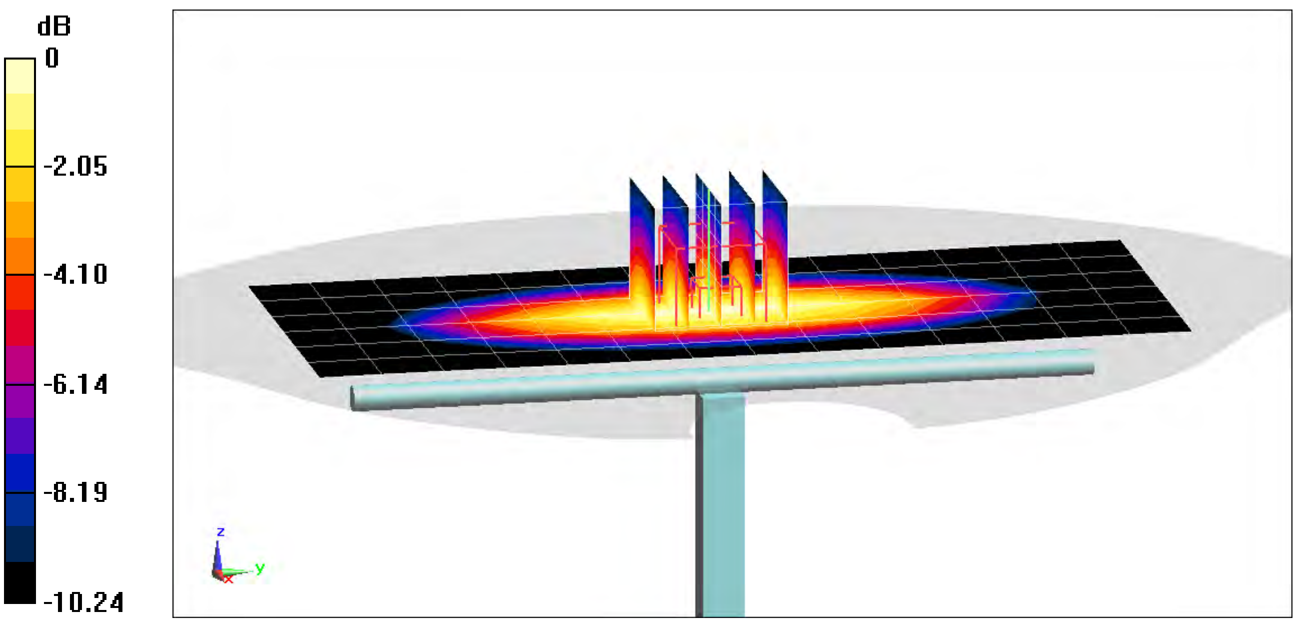
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.988 S/m; ε_r = 53.044; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 04-03-2018; Ambient Temp: 22.0ºC; Tissue Temp: 20.9ºC

Probe: ES3DV3 - SN3287; ConvF(6.71, 6.71, 6.71); Calibrated: 9/18/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 6/21/2017
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1692
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) = 2.59 W/kg
SAR(1 g) = 1.75 W/kg
Deviation(1 g) = 1.63%



0 dB = 2.00 W/kg = 3.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

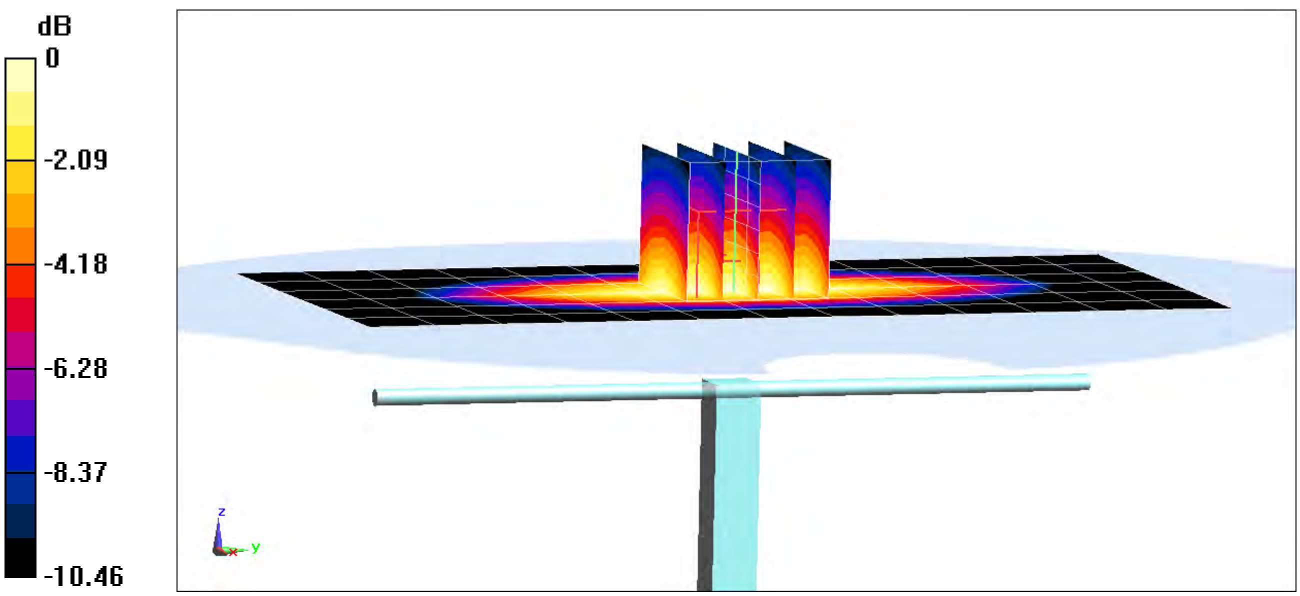
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.958 S/m; ε_r = 52.853; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-22-2018; Ambient Temp: 21.3°C; Tissue Temp: 20.7°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
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) = 2.79 W/kg
SAR(1 g) = 1.92 W/kg
Deviation(1 g) = -1.13%



0 dB = 2.24 W/kg = 3.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d132

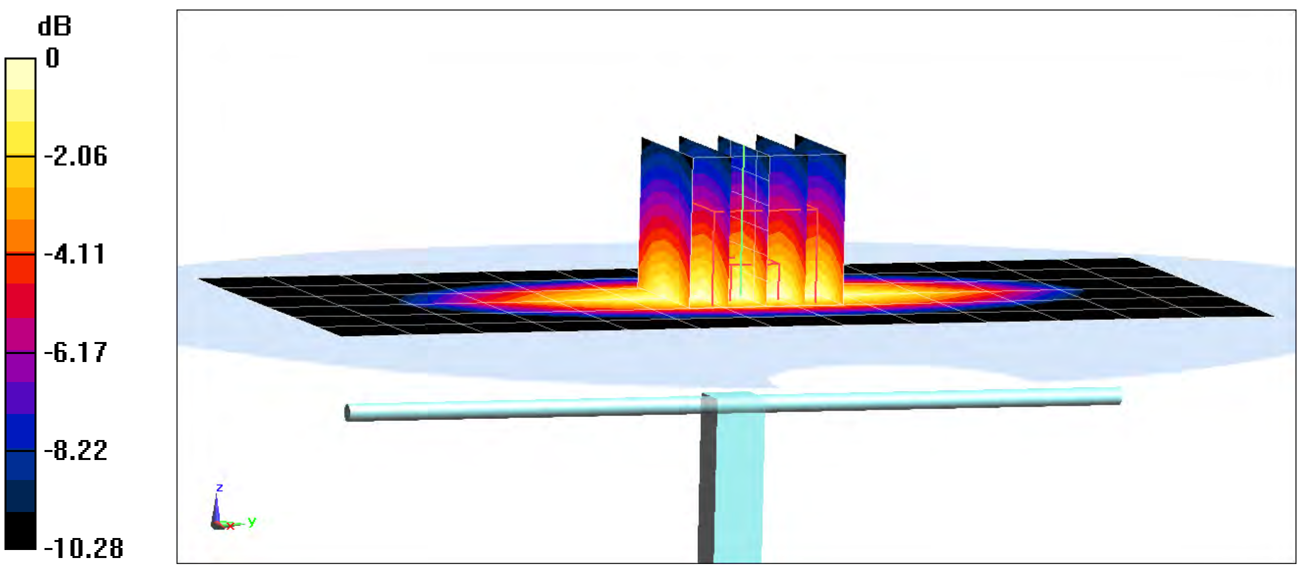
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.964 S/m; ε_r = 53.907; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 03-28-2018; Ambient Temp: 20.8°C; Tissue Temp: 21.2°C

Probe: ES3DV3 - SN3213; ConvF(6.2, 6.2, 6.2); Calibrated: 2/13/2018;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2018
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
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) = 3.02 W/kg
SAR(1 g) = 2.06 W/kg
Deviation(1 g) = 6.08%



0 dB = 2.40 W/kg = 3.80 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

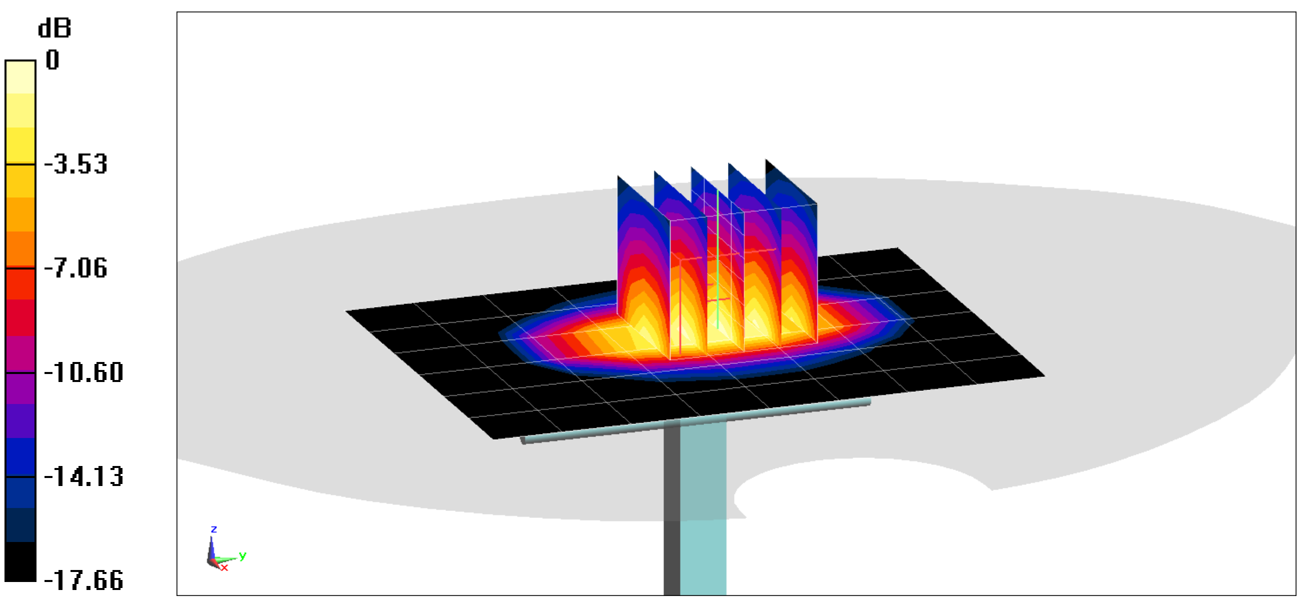
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.527 S/m; ε_r = 51.137; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7406; ConvF(8.08, 8.08, 8.08); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1375
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) = 7.06 W/kg
SAR(1 g) = 3.92 W/kg
Deviation(1 g) = 7.40%



0 dB = 5.82 W/kg = 7.65 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

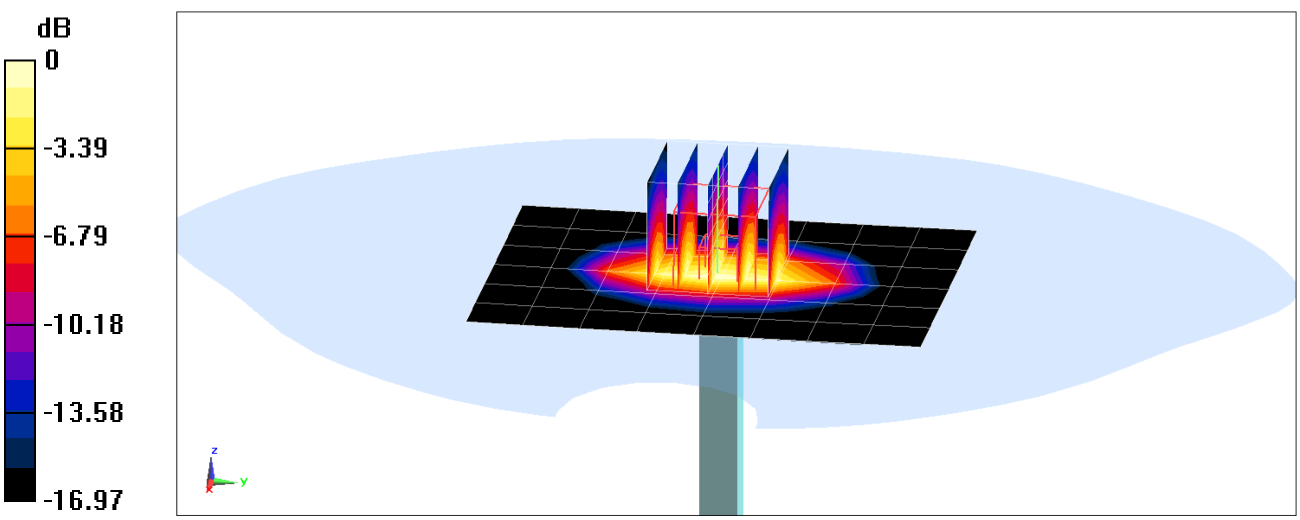
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; $\sigma = 1.48$ S/m; $\varepsilon_r = 51.845$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-03-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7410; ConvF(8.32, 8.32, 8.32); 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)

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) = 6.23 W/kg
SAR(1 g) = 3.49 W/kg
Deviation(1 g) = -5.68%



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

PCTEST ENGINEERING LABORATORY, INC.

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

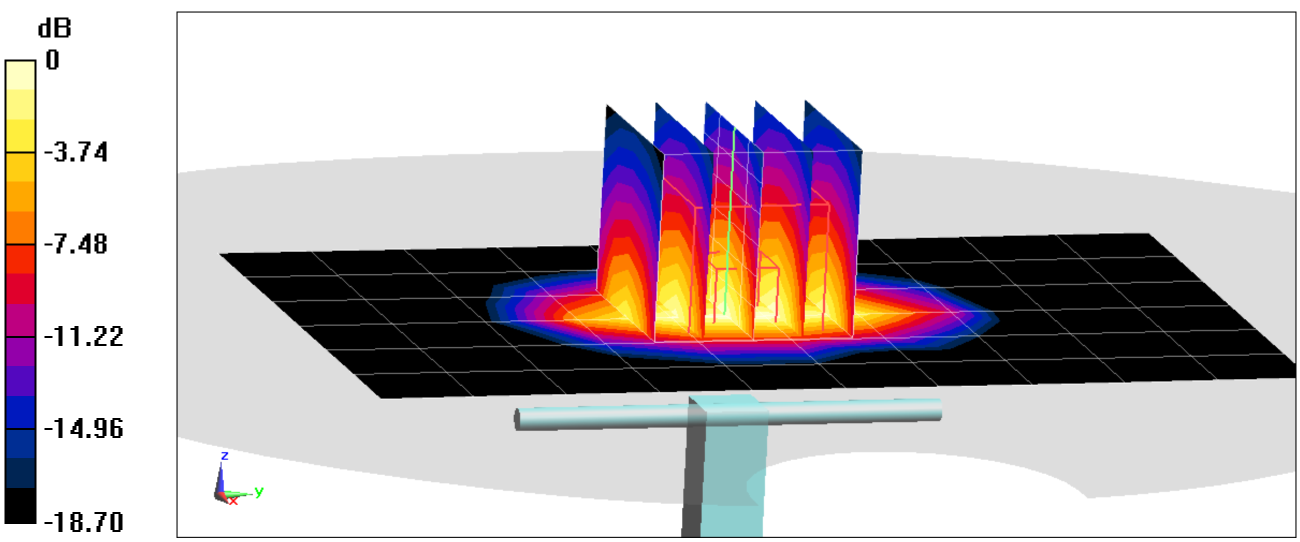
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.579 S/m; ε_r = 52.572; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-24-2018; Ambient Temp: 22.0°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 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 (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.89 W/kg
SAR(1 g) = 4.25 W/kg
Deviation(1 g) = 7.32%



0 dB = 6.61 W/kg = 8.20 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

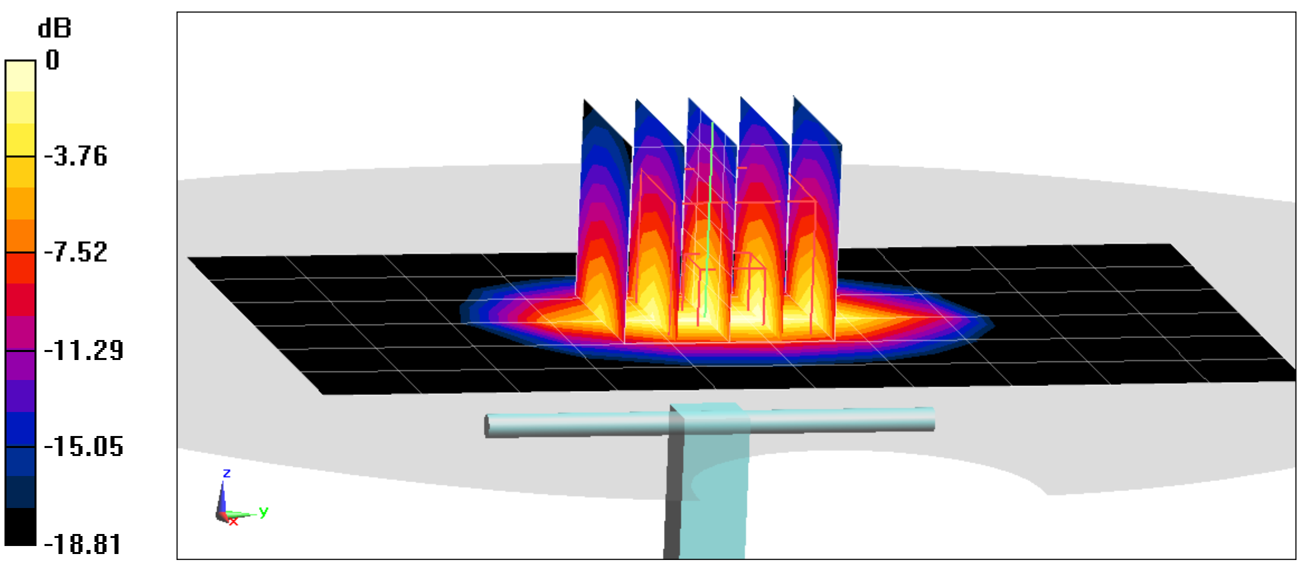
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.578 S/m; ε_r = 52.961; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 22.1°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 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 (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) = 4.18 W/kg
Deviation(1 g) = 5.56%



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

PCTEST ENGINEERING LABORATORY, INC.

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

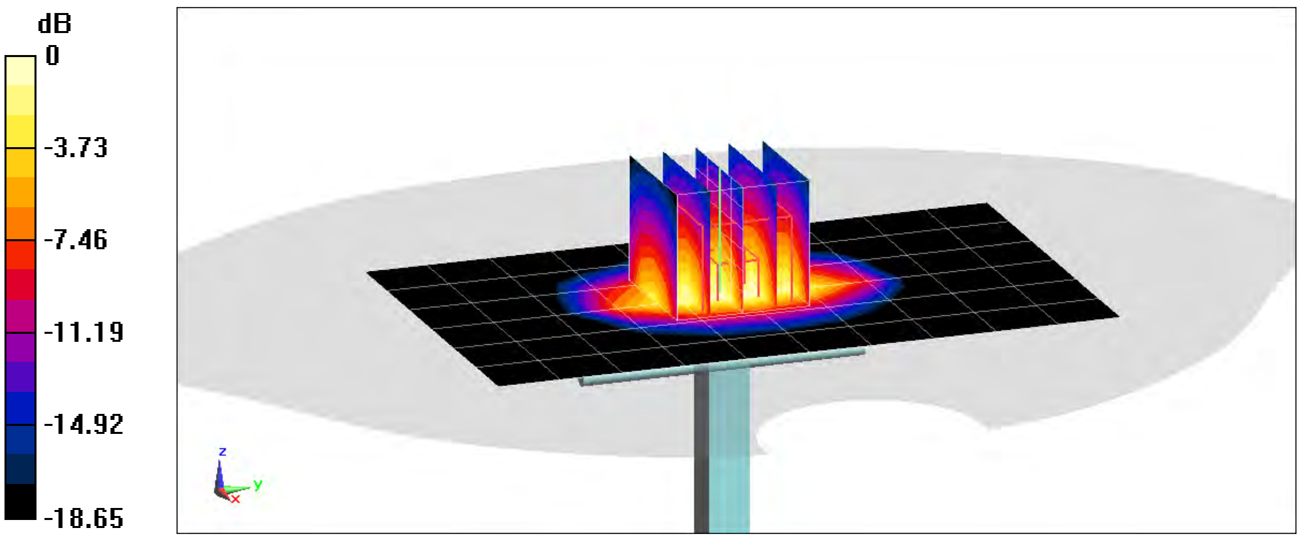
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.578 S/m; ε_r = 54.022; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 04-02-2018; Ambient Temp: 21.0°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN3914; ConvF(7.62, 7.62, 7.62); Calibrated: 2/14/2018;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/15/2018
Phantom: Twin-SAM V5.0 Right; Type: QD 000 P40 CD; Serial: 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 (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.84 W/kg
SAR(1 g) = 4.26 W/kg
Deviation(1 g) = 7.58%



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

PCTEST ENGINEERING LABORATORY, INC.

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

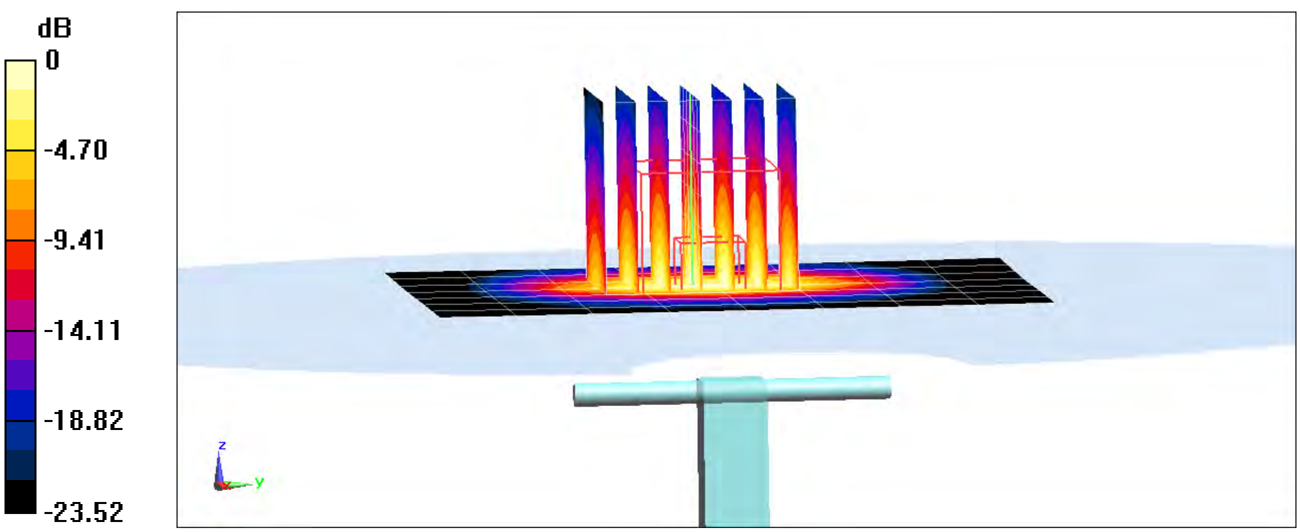
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2600 MHz; σ = 2.18 S/m; ε_r = 51.524; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-24-2018; Ambient Temp: 22.4°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3332; ConvF(4.43, 4.43, 4.43); 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)

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) = 11.7 W/kg
SAR(1 g) = 5.29 W/kg
Deviation(1 g) = -2.58%



0 dB = 6.98 W/kg = 8.44 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

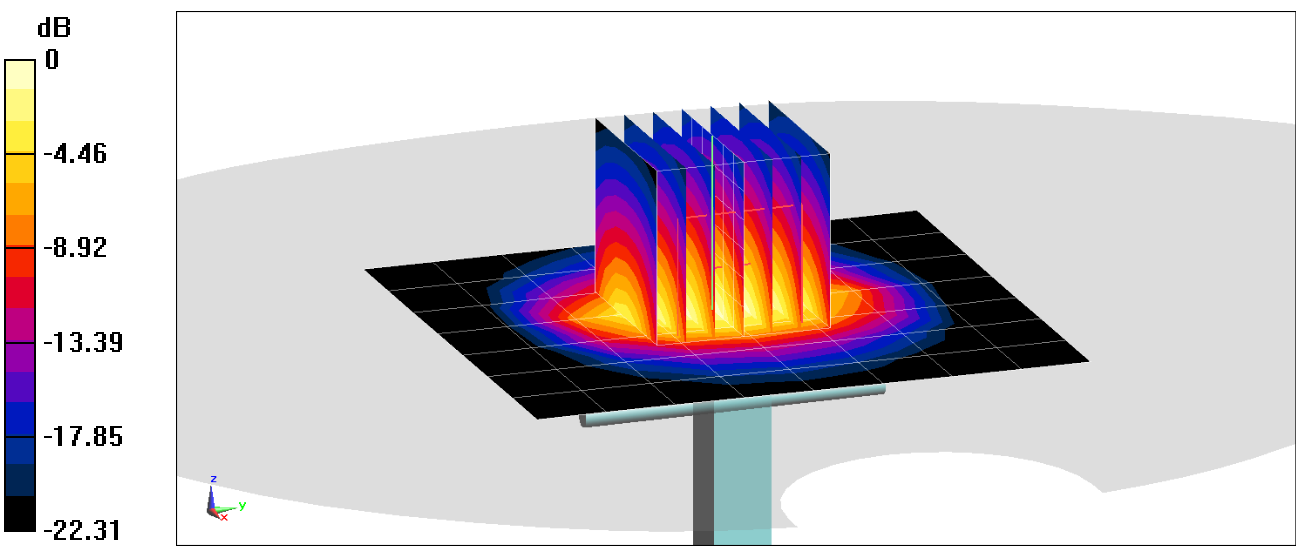
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.011 S/m; ε_r = 50.491; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.2°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: Right Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1797
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) = 10.6 W/kg
SAR(1 g) = 5.06 W/kg
Deviation(1 g) = -0.98%



0 dB = 8.51 W/kg = 9.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

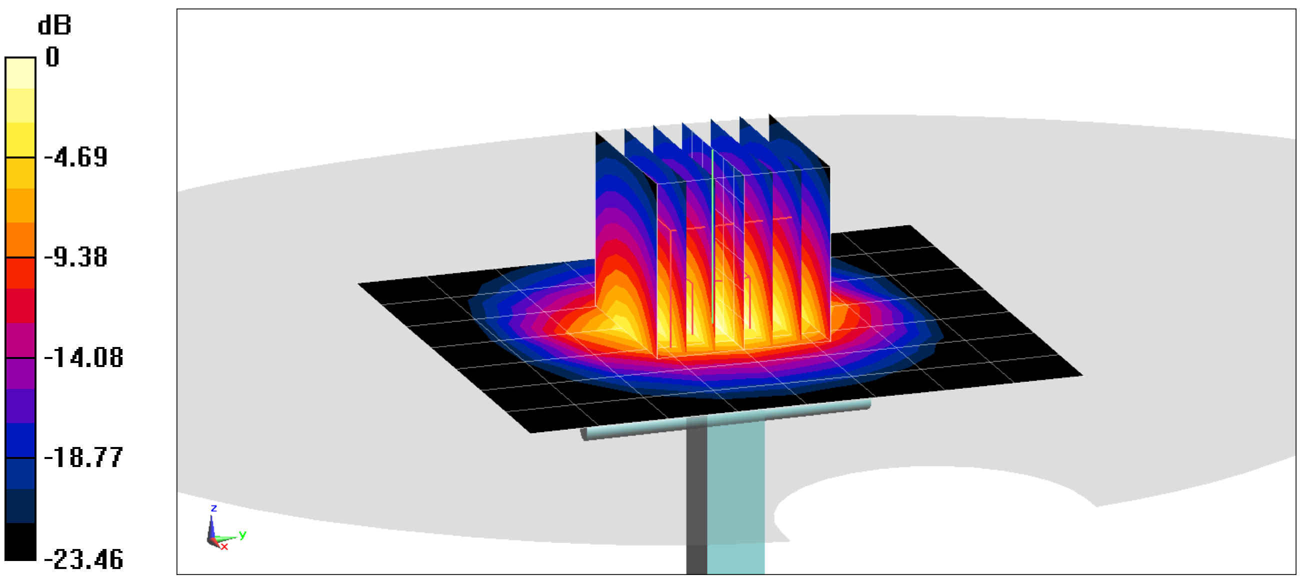
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2600 MHz; σ = 2.185 S/m; ε_r = 50.074; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-28-2018; Ambient Temp: 22.5°C; Tissue Temp: 22.2°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: Right Twin-SAM V5.0 Type: QD 000 P40 CD; Serial: 1797
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) = 12.3 W/kg
SAR(1 g) = 5.57 W/kg
Deviation(1 g) = 2.58%



0 dB = 9.60 W/kg = 9.82 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

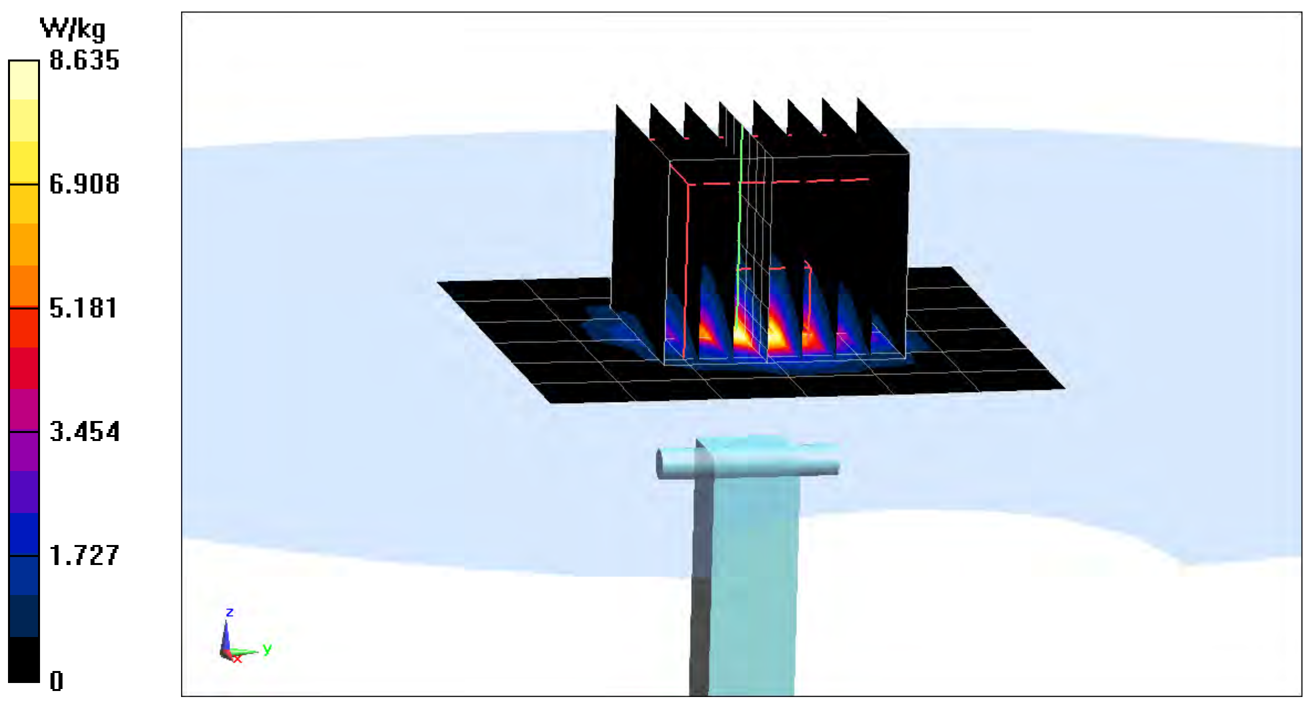
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.495 S/m; ε_r = 47.165; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.84, 4.84, 4.84); Calibrated: 8/16/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/14/2017
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) = 16.8 W/kg
SAR(1 g) = 3.56 W/kg
Deviation(1 g) = -7.41%



PCTEST ENGINEERING LABORATORY, INC.

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

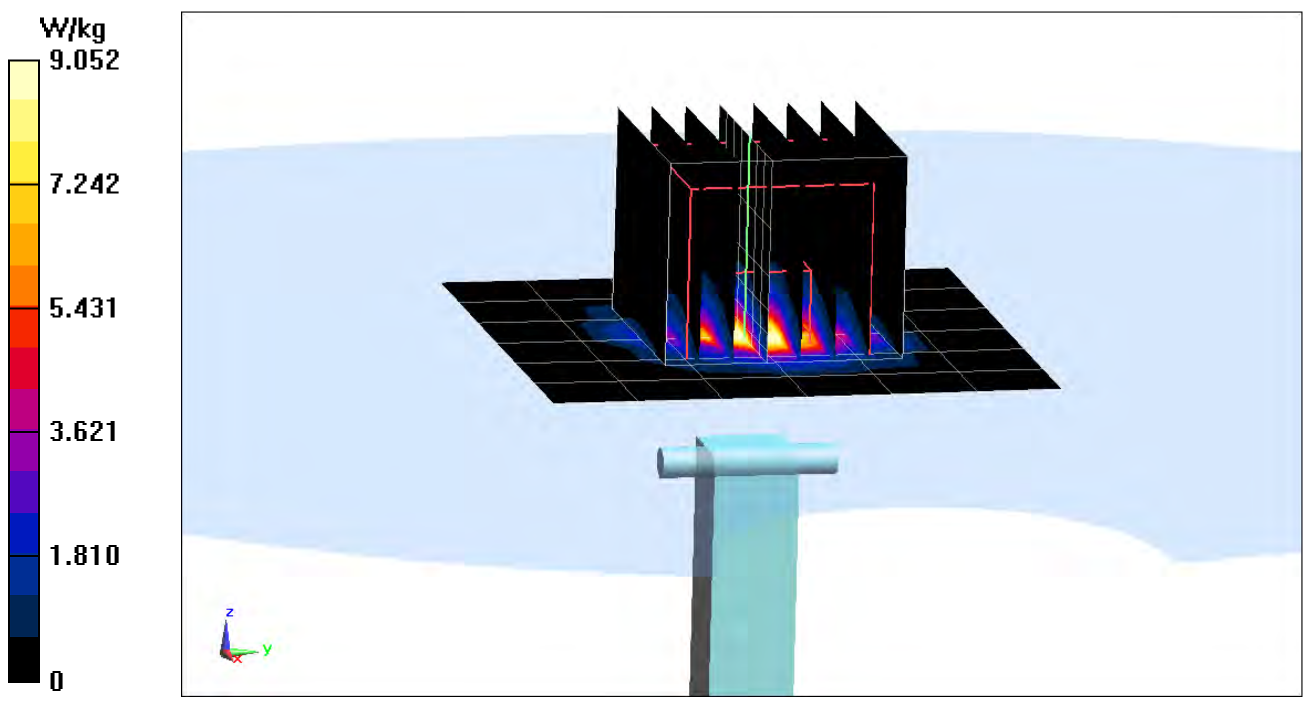
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.953 S/m; ε_r = 46.547; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.23, 4.23, 4.23); Calibrated: 8/16/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/14/2017
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) = 18.5 W/kg
SAR(1 g) = 3.69 W/kg
Deviation(1 g) = -5.99%



PCTEST ENGINEERING LABORATORY, INC.

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

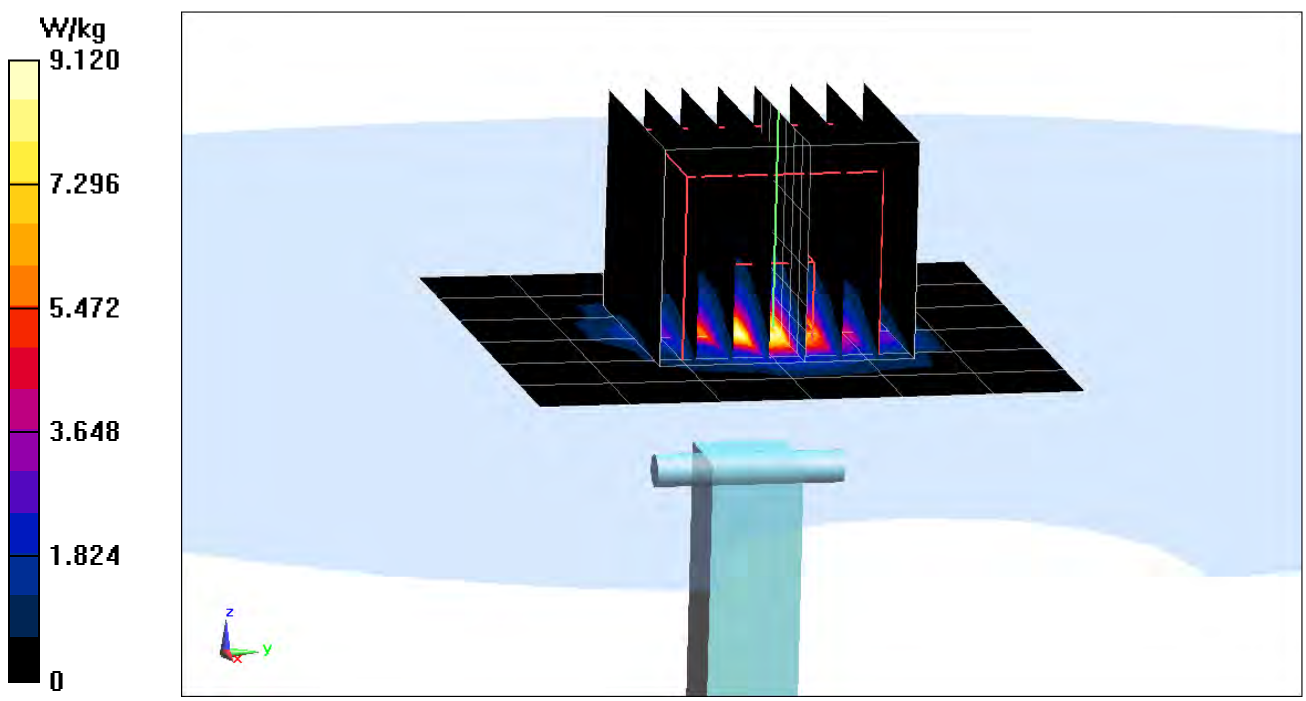
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.159 S/m; ε_r = 46.286; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 03-26-2018; Ambient Temp: 21.6°C; Tissue Temp: 20.7°C

Probe: EX3DV4 - SN7308; ConvF(4.5, 4.5, 4.5); Calibrated: 8/16/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/14/2017
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) = 18.5 W/kg
SAR(1 g) = 3.6 W/kg
Deviation(1 g) = -6.61%



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

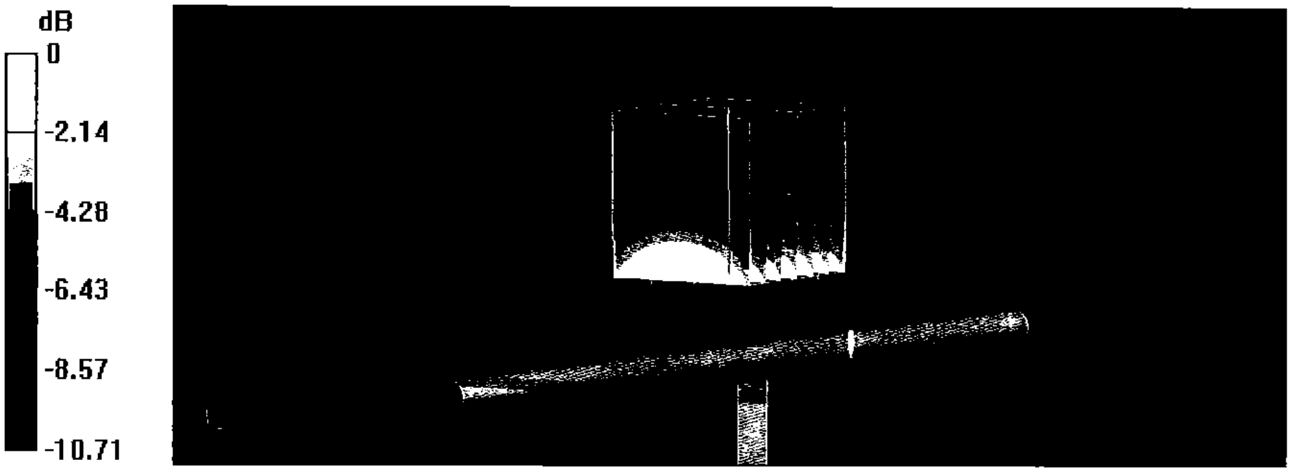
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1161

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

DASY52 Configuration:

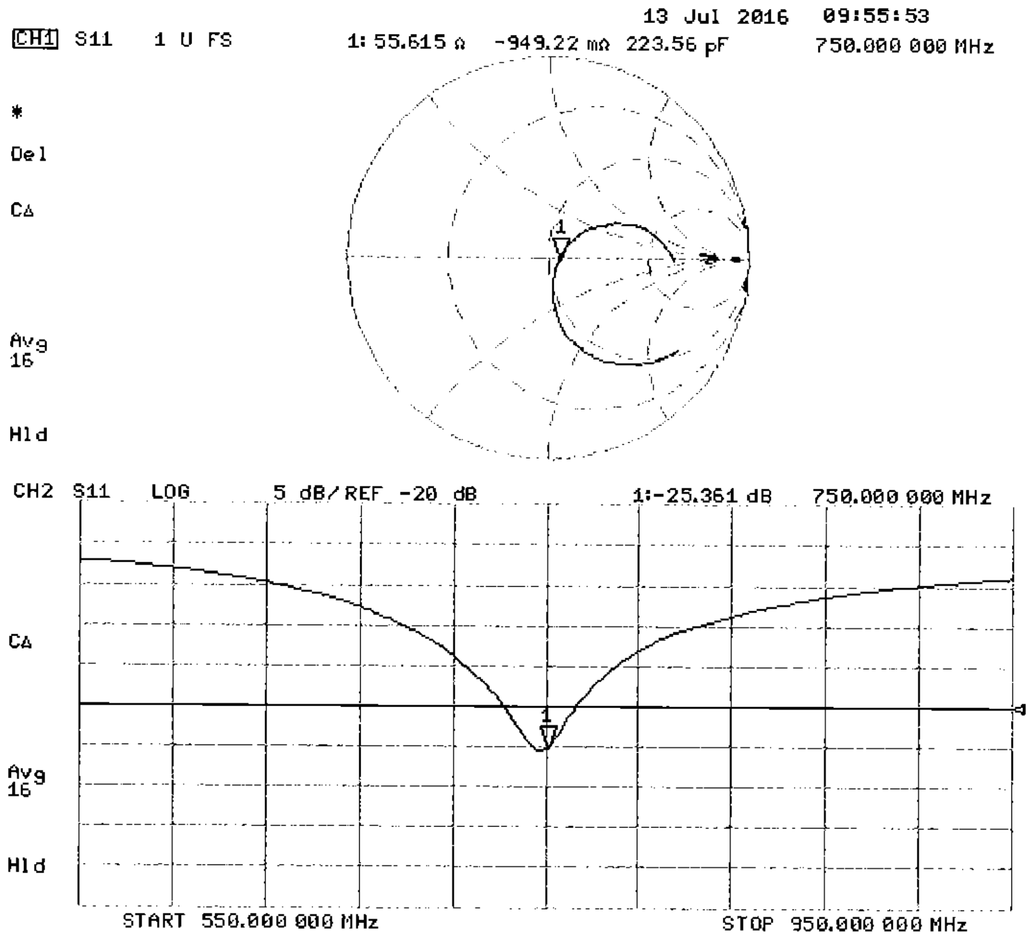
- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.07 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

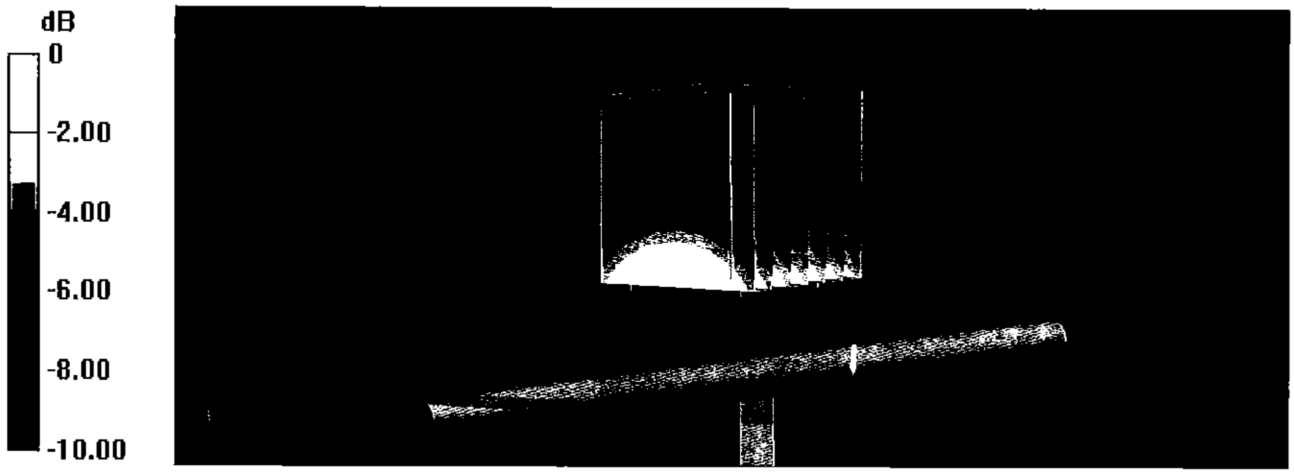
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 55.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

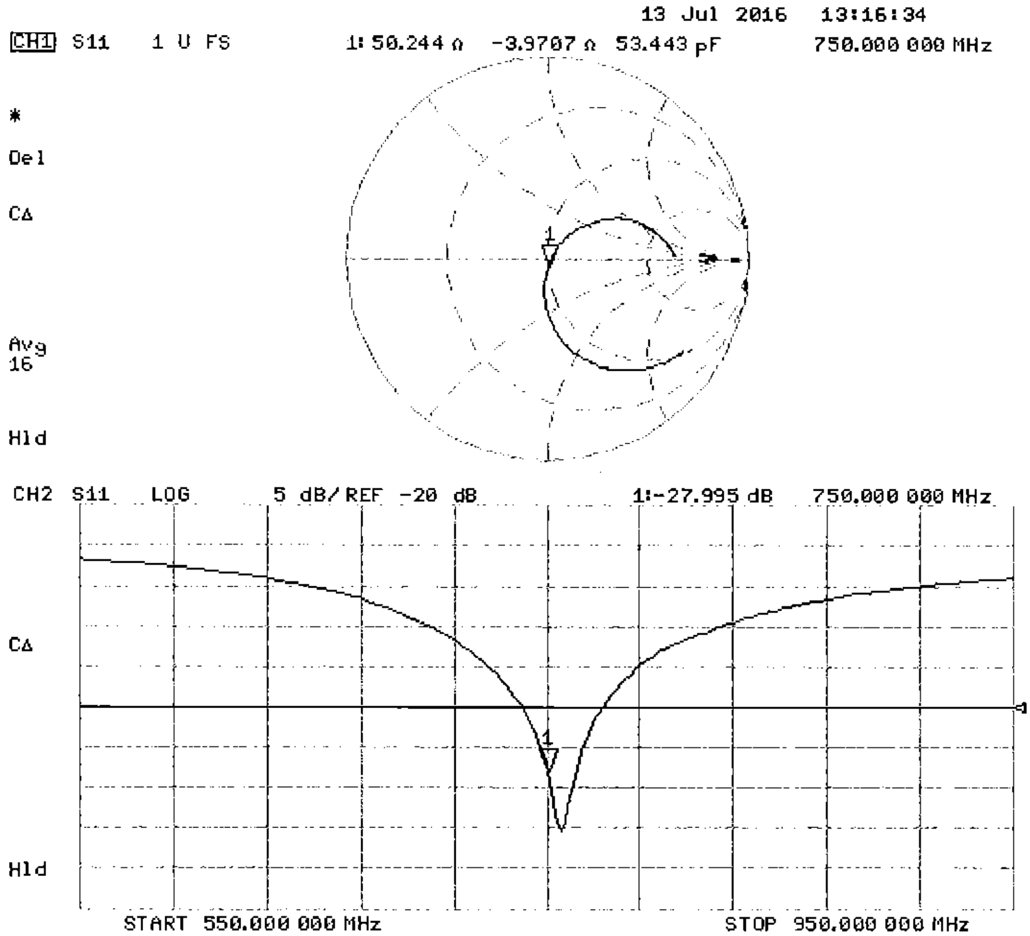
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.33 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



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

Impedance Measurement Plot for Body TSL



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	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:

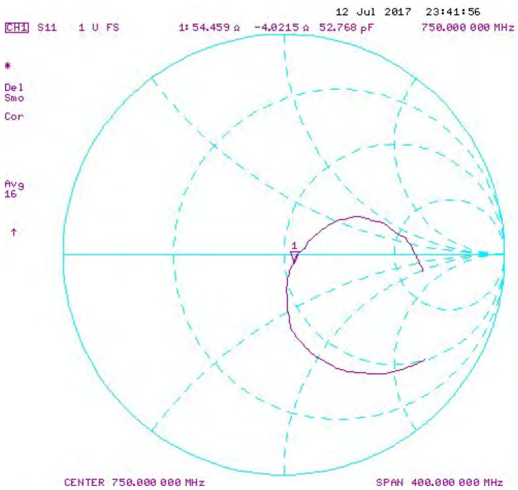
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

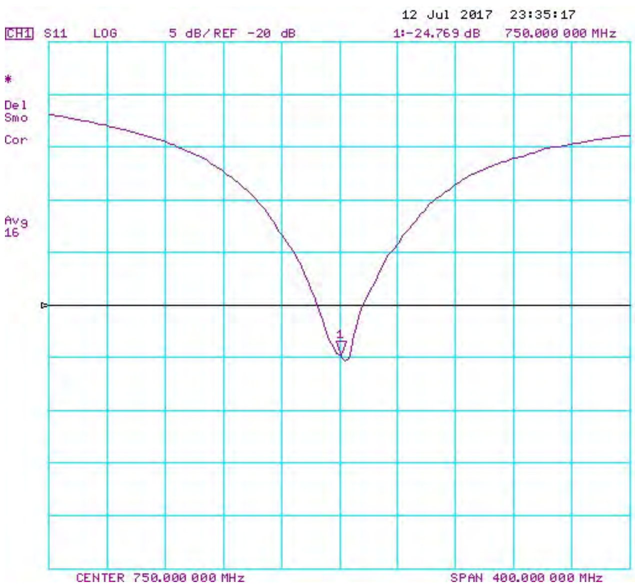
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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

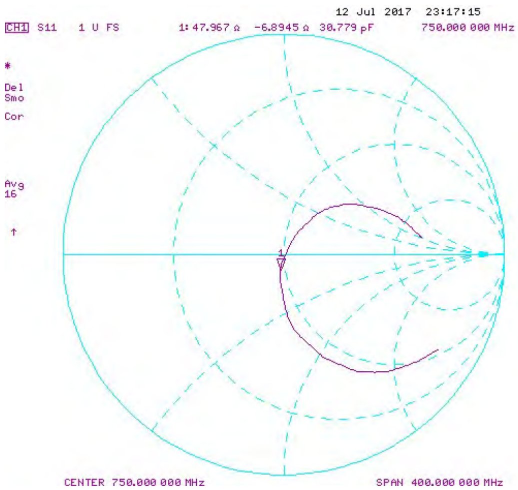
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 23.0 dBm	Measured Body SAR (1g) W/kg @ 23.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 23.0 dBm	Measured Body SAR (10g) W/kg @ 23.0 dBm	Deviation 10g (%)	Certificate Impedance 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

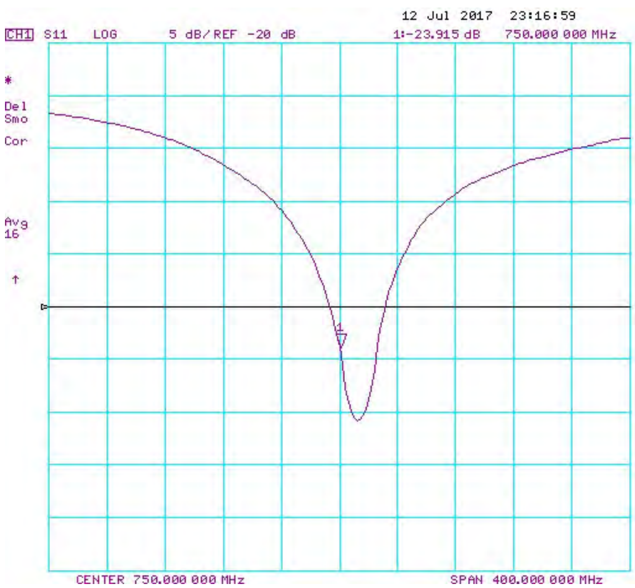
Impedance & Return-Loss Measurement Plot for Head TSL





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**
S **Servizio svizzero di taratura**
Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d132_Jan18

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d132
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	January 15, 2018

BN ✓
01-25-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

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

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: January 15, 2018

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**

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 = 5.0 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	40.7 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.36 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 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 %	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	2.47 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.71 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.39 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	51.8 Ω - 2.9 jΩ
Return Loss	- 29.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.4 Ω - 5.7 jΩ
Return Loss	- 23.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 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

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

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

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

SAR result with SAM Head (Top)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.41 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.21 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.69 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.64 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.45 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.22 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.25 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**7.96 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.39 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 08.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

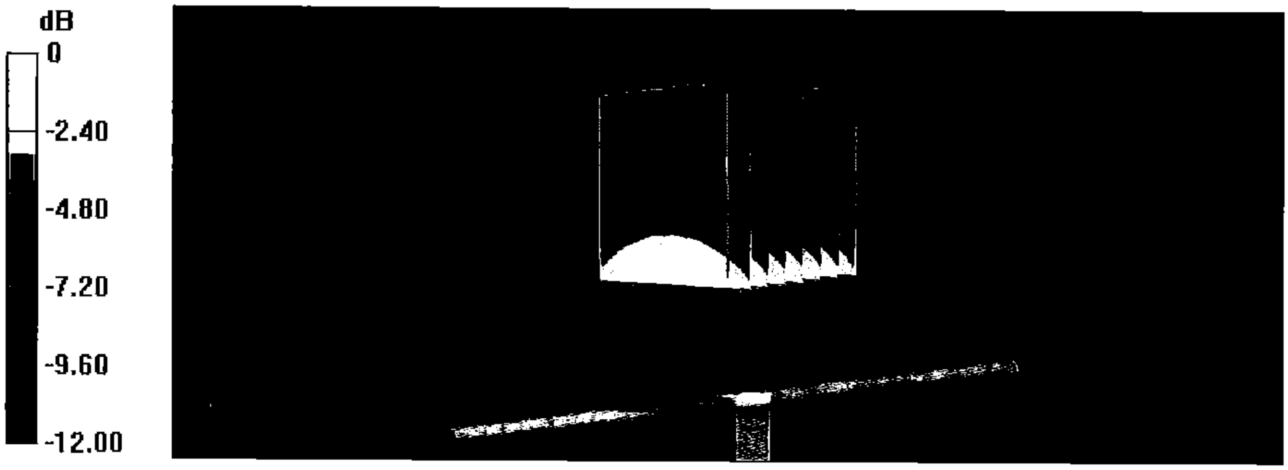
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d132

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.92 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:

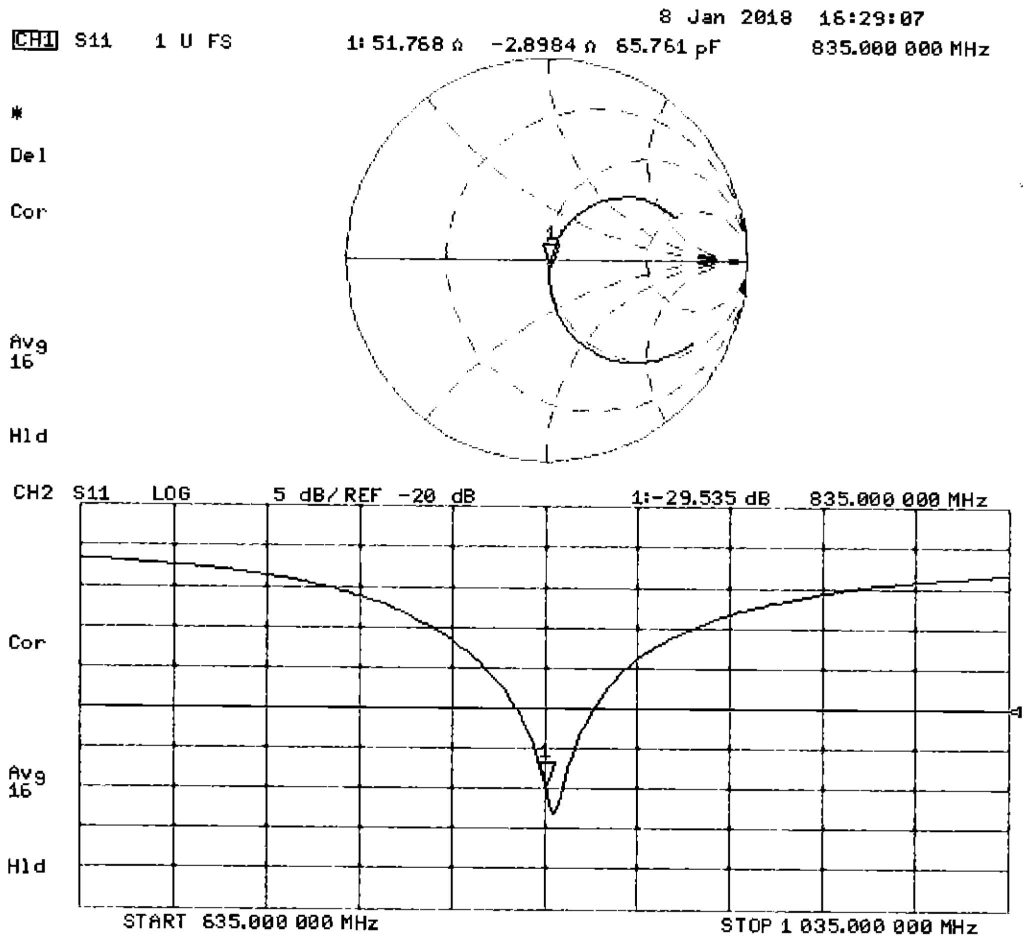
- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.23 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 3.22 W/kg



0 dB = 3.22 W/kg = 5.08 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d132

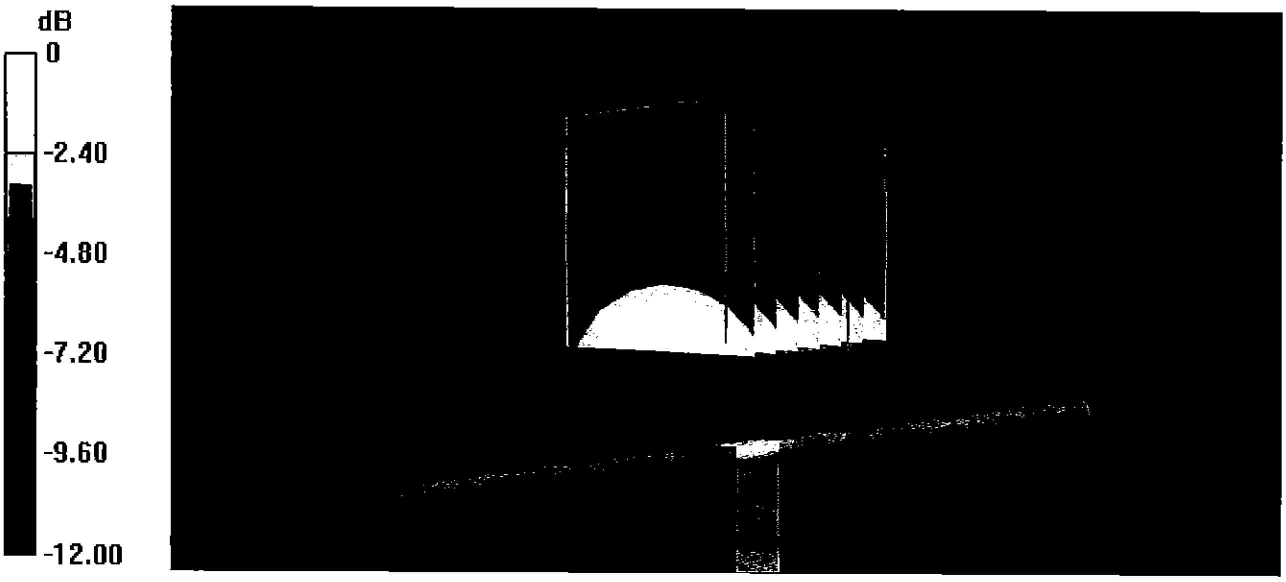
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.99$ S/m; $\varepsilon_r = 54.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

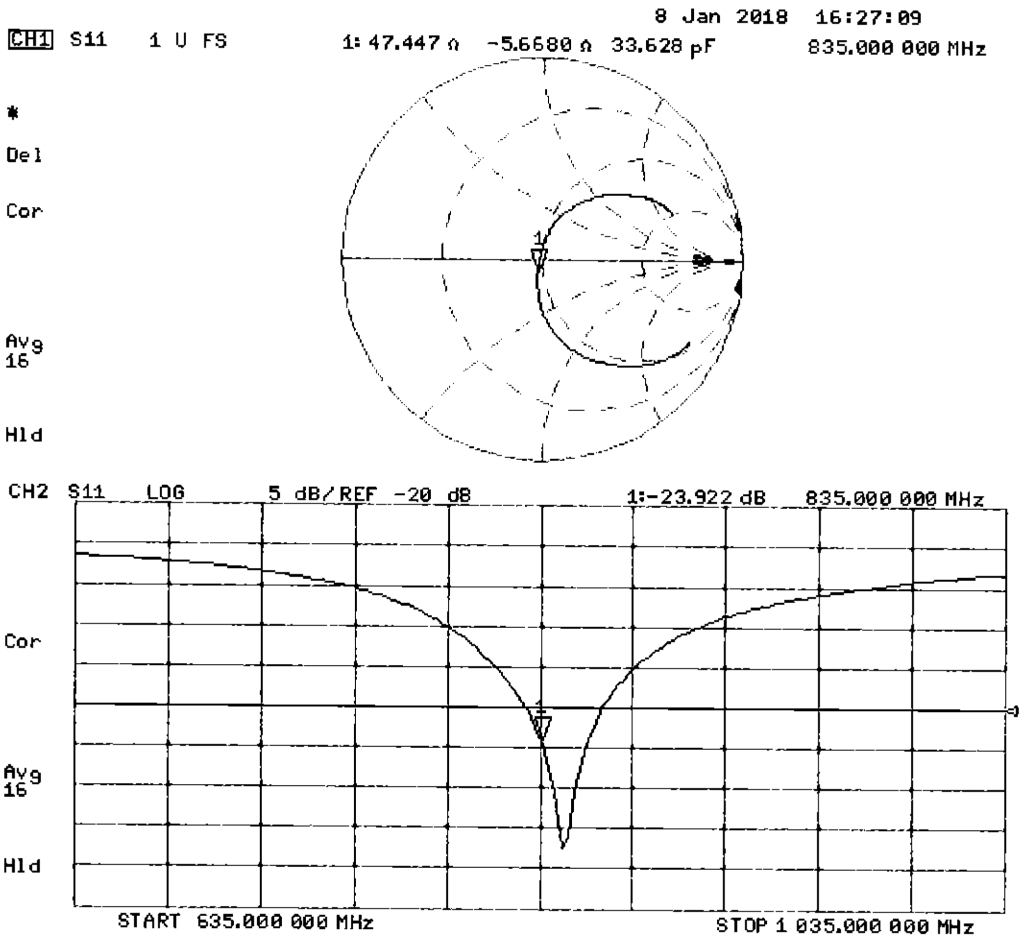
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.55 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.66 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 3.24 W/kg



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

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 15.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d132

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 44.1; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

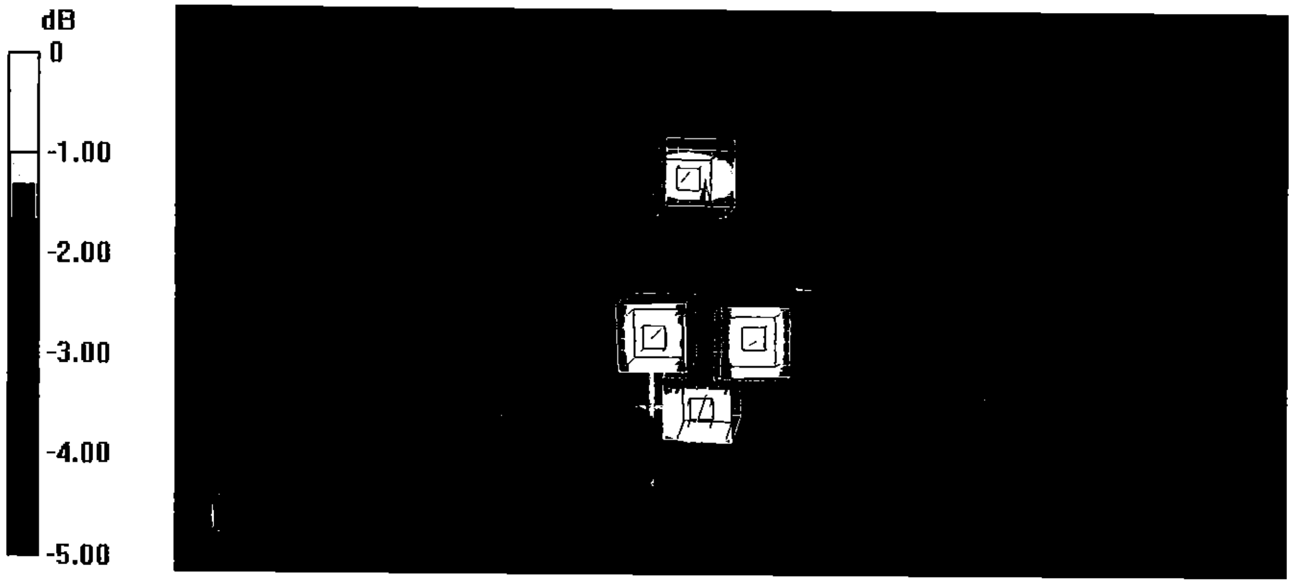
- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

SAM Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.00 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.58 W/kg
Maximum value of SAR (measured) = 3.16 W/kg

SAM Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.99 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.65 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.64 W/kg
Maximum value of SAR (measured) = 3.19 W/kg

SAM Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.20 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 3.33 W/kg
SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 3.04 W/kg

SAM Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.03 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.90 W/kg
SAR(1 g) = 2.03 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.61 W/kg



0 dB = 2.61 W/kg = 4.17 dBW/kg

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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: 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

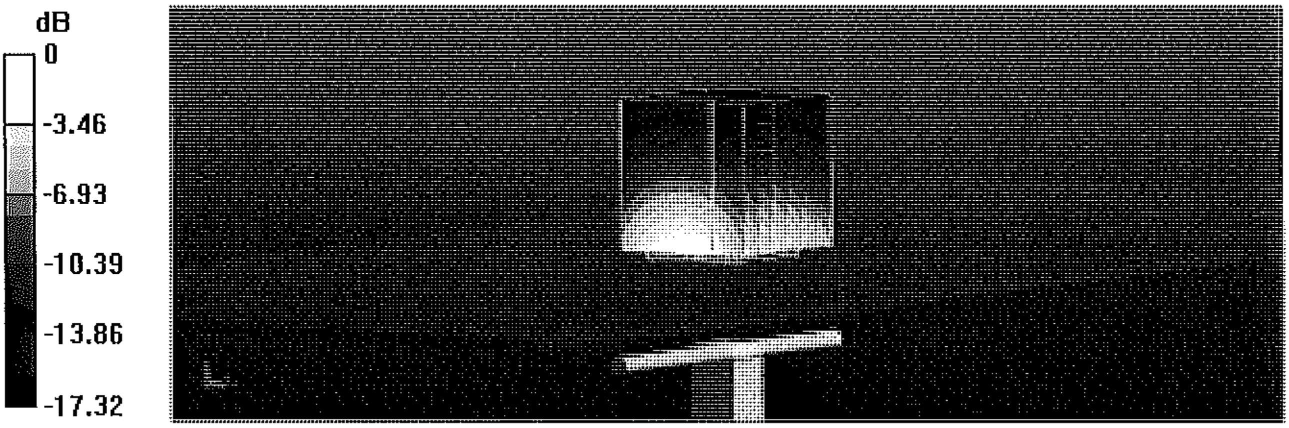
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

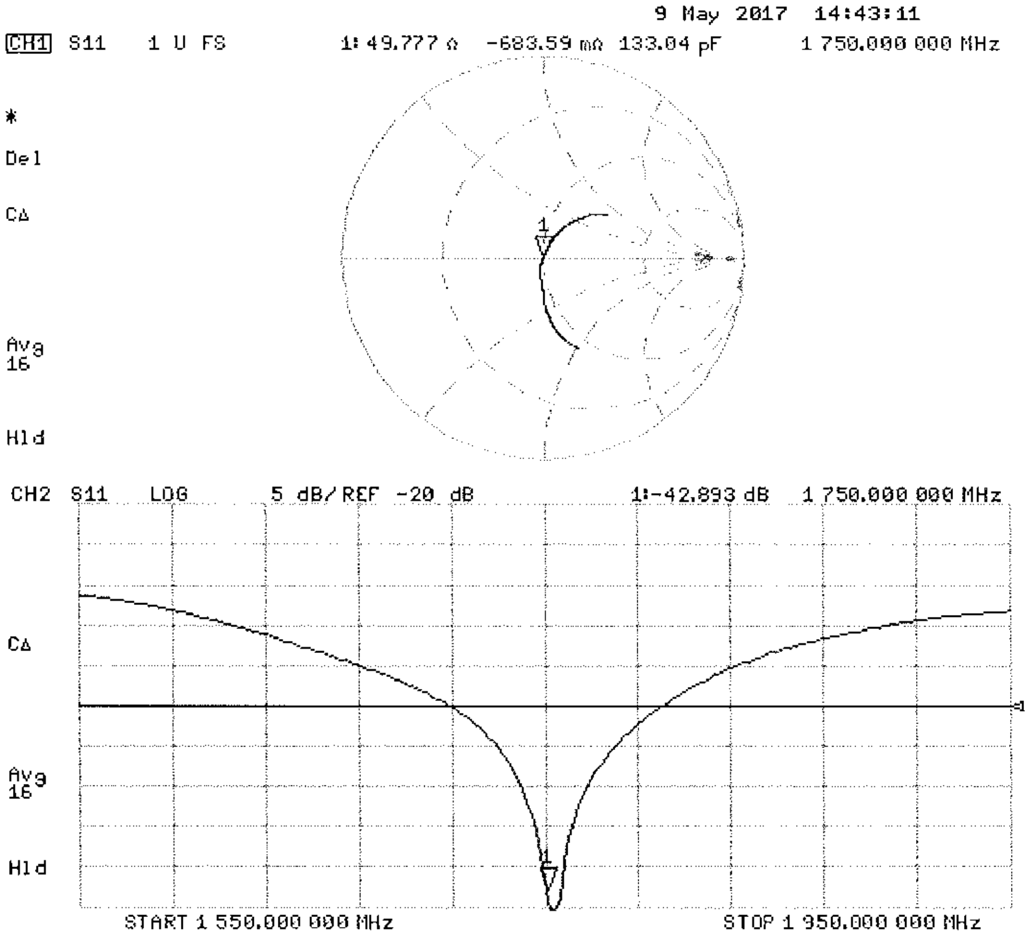
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

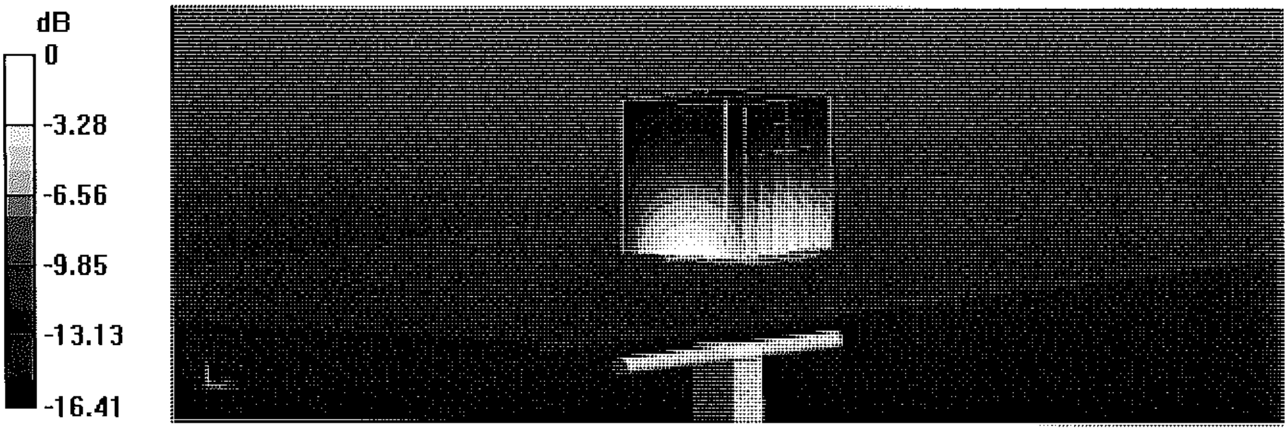
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

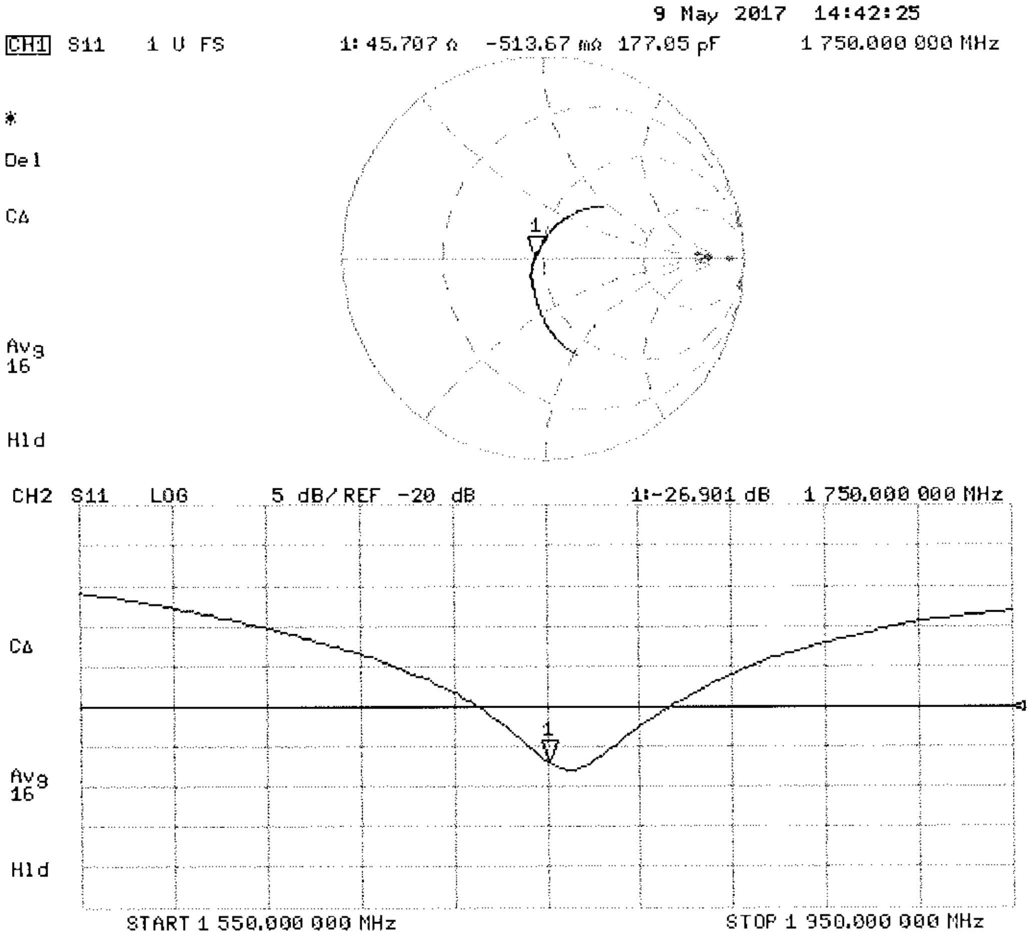
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

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

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

Accreditation No.: SCS 0108

Client PC Test

Certificate No: D1900V2-5d080_Jul16

CALIBRATION CERTIFICATE

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

BN ✓ 7/16/2016 Extended 7/2017 SL ✓

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

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

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

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.7 ± 6 %	1.51 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.75 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω + 5.3 jΩ
Return Loss	- 25.1 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 28, 2006

DASY5 Validation Report for Head TSL

Date: 08.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

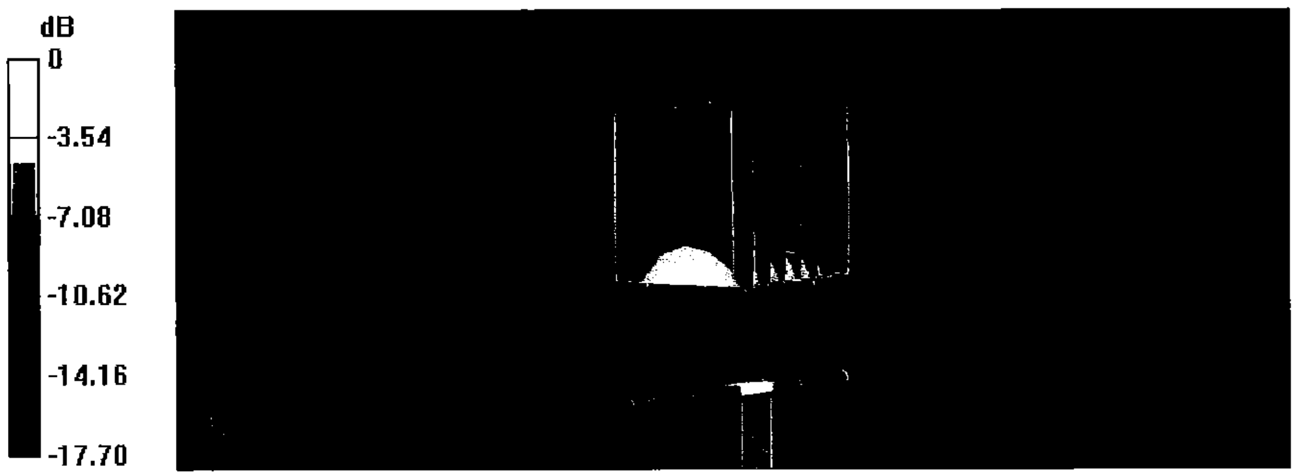
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.99, 7.99, 7.99); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

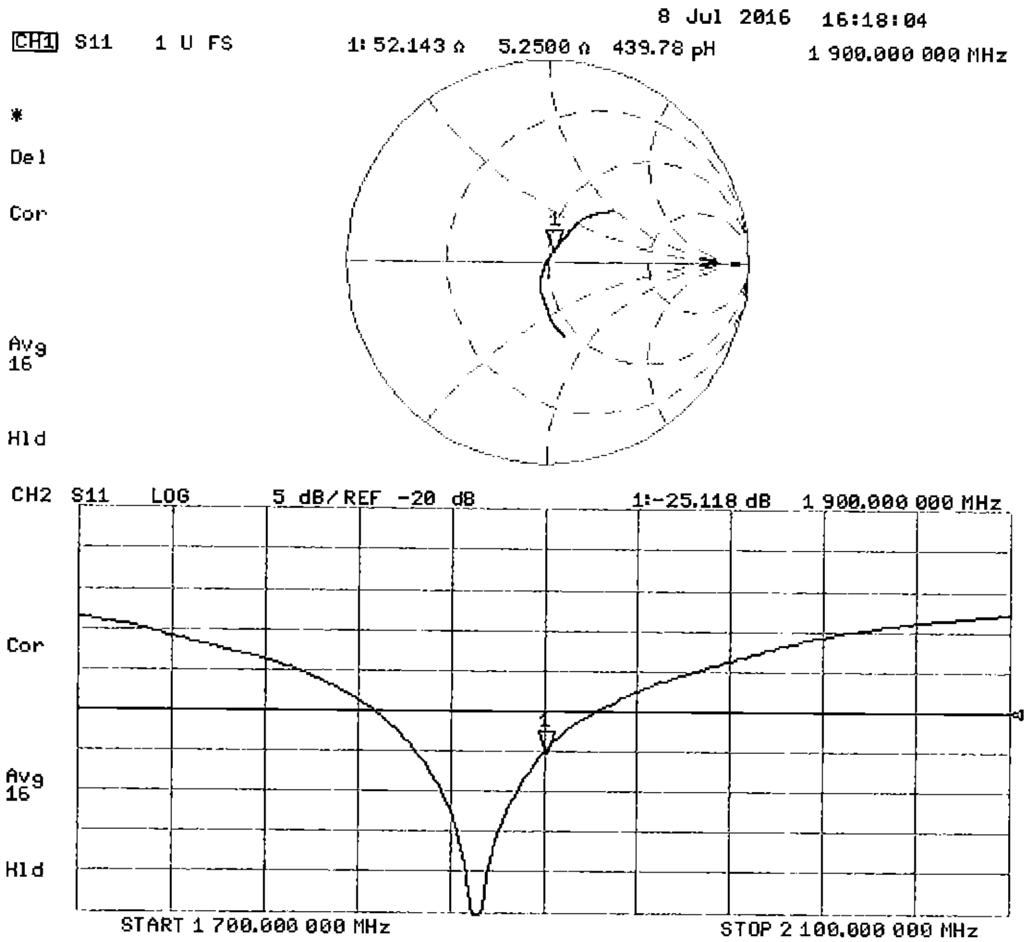
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

DASY52 Configuration:

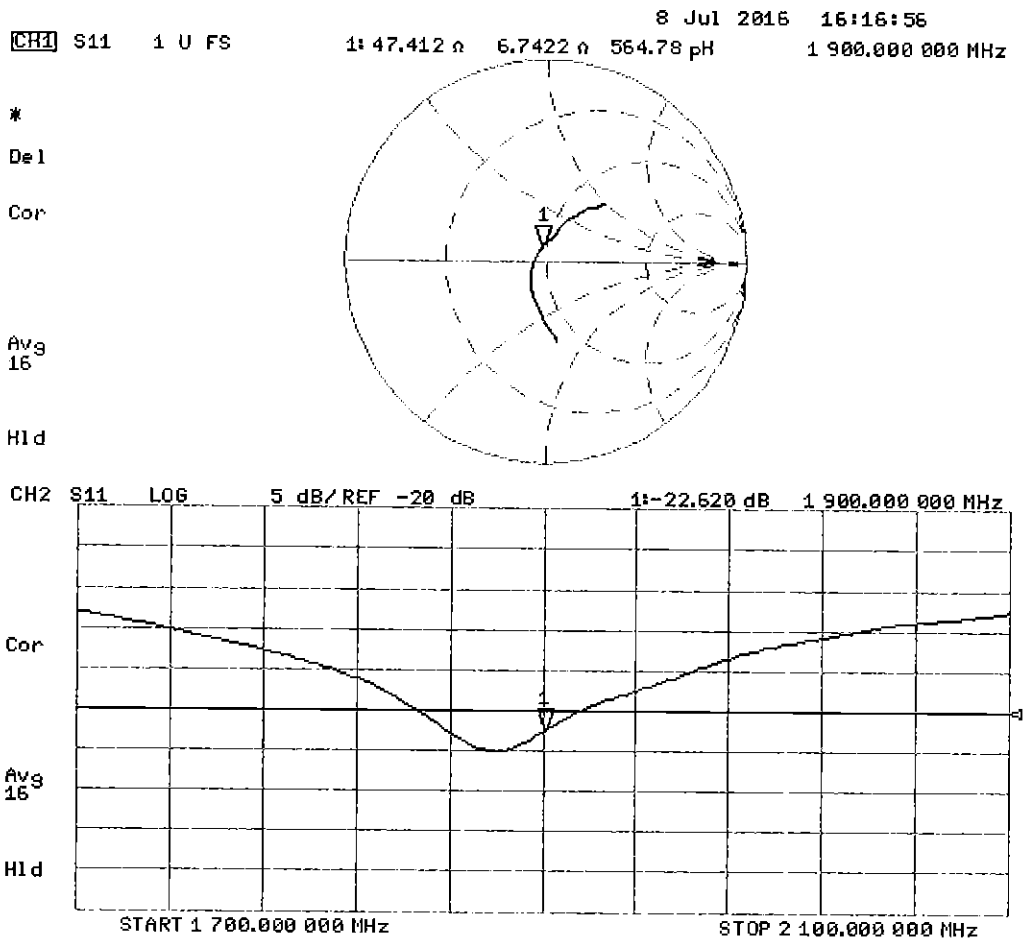
- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

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

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

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

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d080

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Calibration date: July 06, 2017

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	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	3/13/2017	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
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:

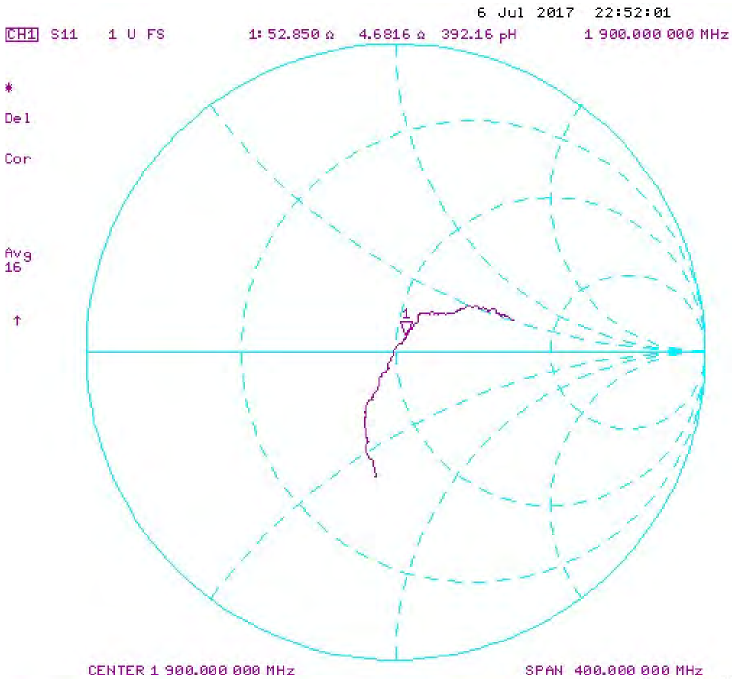
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

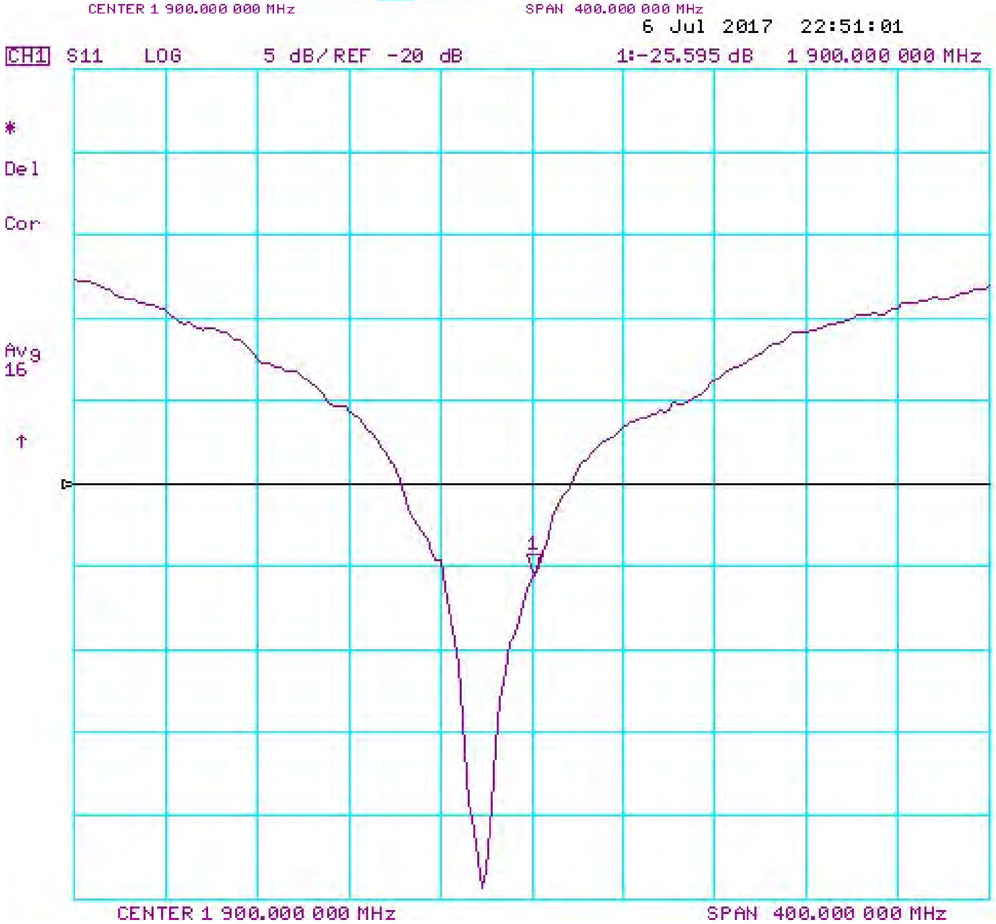
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
7/8/2016	7/6/2017	1.192	3.93	3.86	-1.78%	2.05	2	-2.44%	52.1	52.9	0.8	5.3	4.7	0.6	-25.1	-25.6	-2.00%	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
7/8/2016	7/6/2017	1.192	3.91	4.05	3.58%	2.07	2.11	1.93%	47.4	48.5	1.1	6.8	5.1	1.7	-22.6	-25.5	-12.80%	PASS

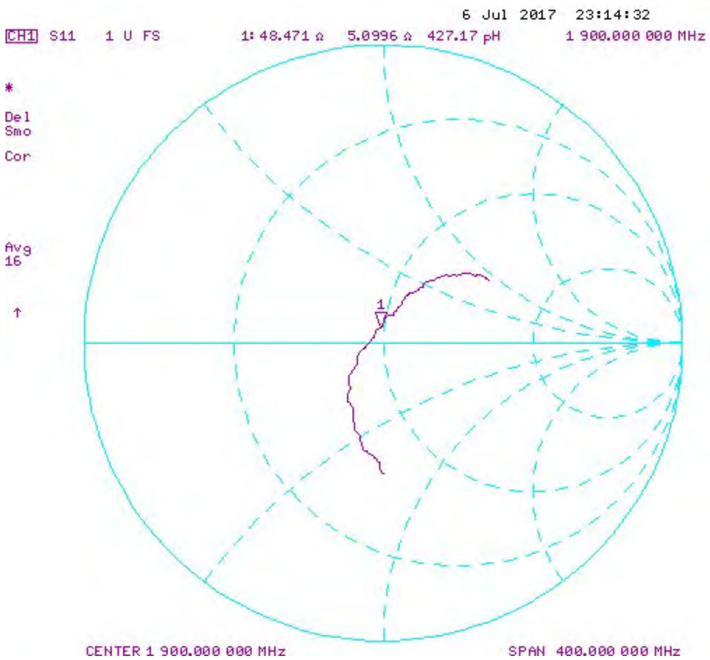
Impedance & Return-Loss Measurement Plot for Head TSL

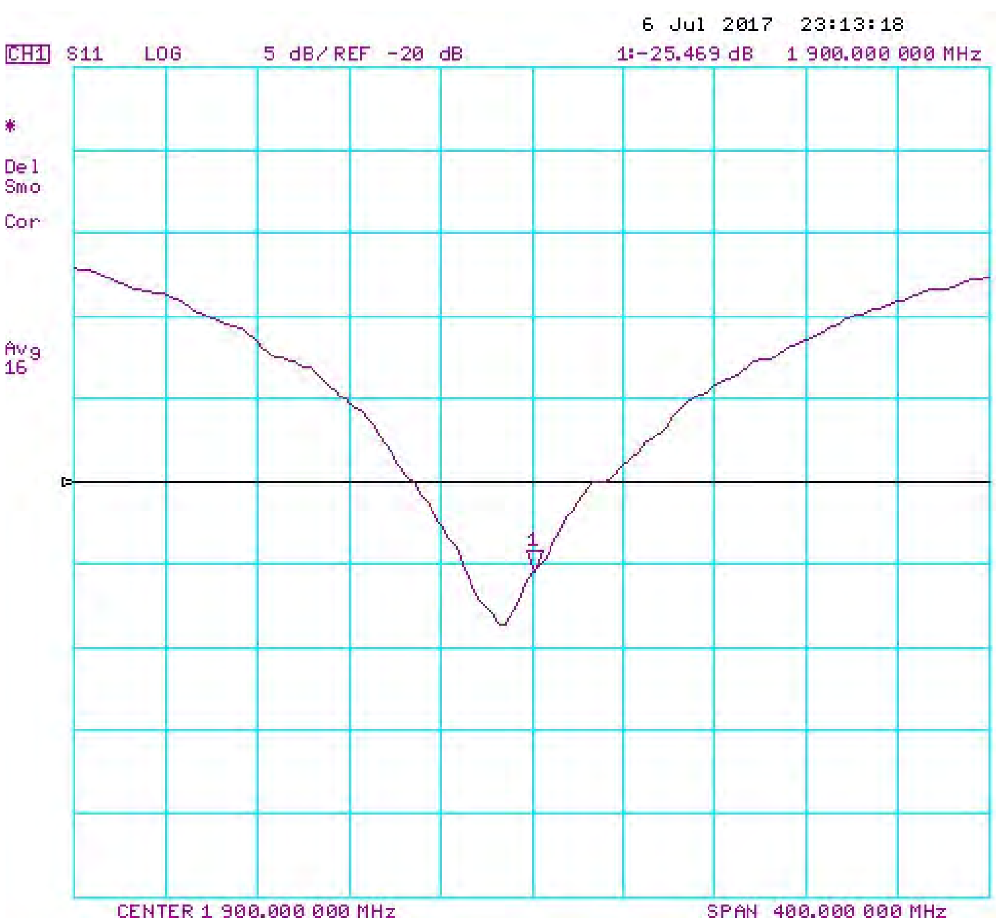




Object:	Date Issued:	Page 3 of 4
D1900V2 – SN: 5d080	07/06/2017	

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**
S **Servizio svizzero di taratura**
Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2450V2-797_Sep17

CALIBRATION CERTIFICATE

Object: D2450V2 - SN:797

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

SC ✓ 10/03/2017

Calibration date: September 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:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: September 11, 2017

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

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	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.9 ± 6 %	2.04 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	13.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω + 7.4 jΩ
Return Loss	- 21.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.7 Ω + 9.1 jΩ
Return Loss	- 20.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.152 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2006

DASY5 Validation Report for Head TSL

Date: 11.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

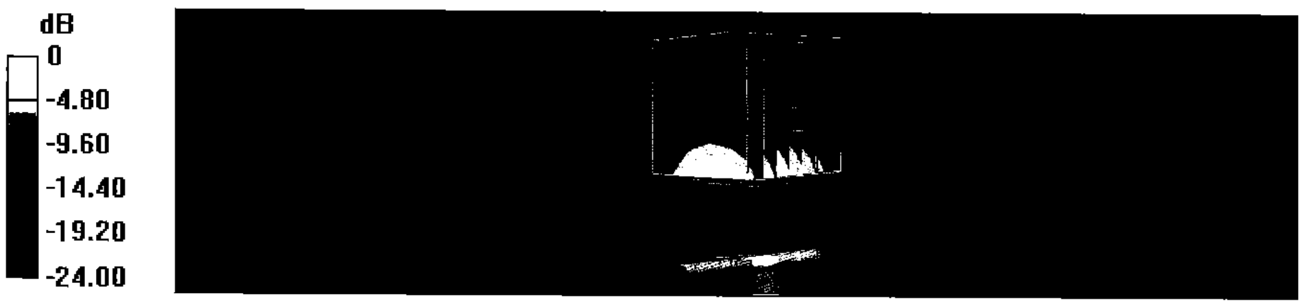
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.12, 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)

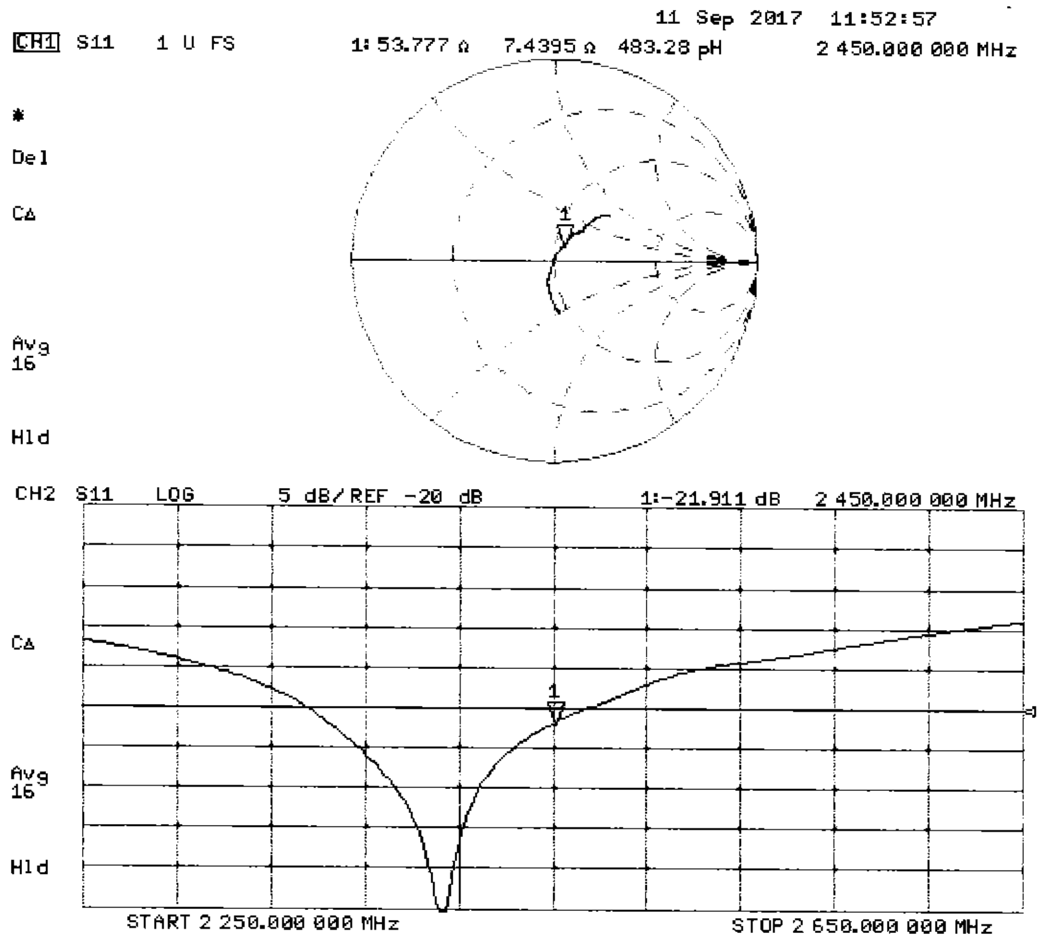
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.5 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.28 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: 11.09.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

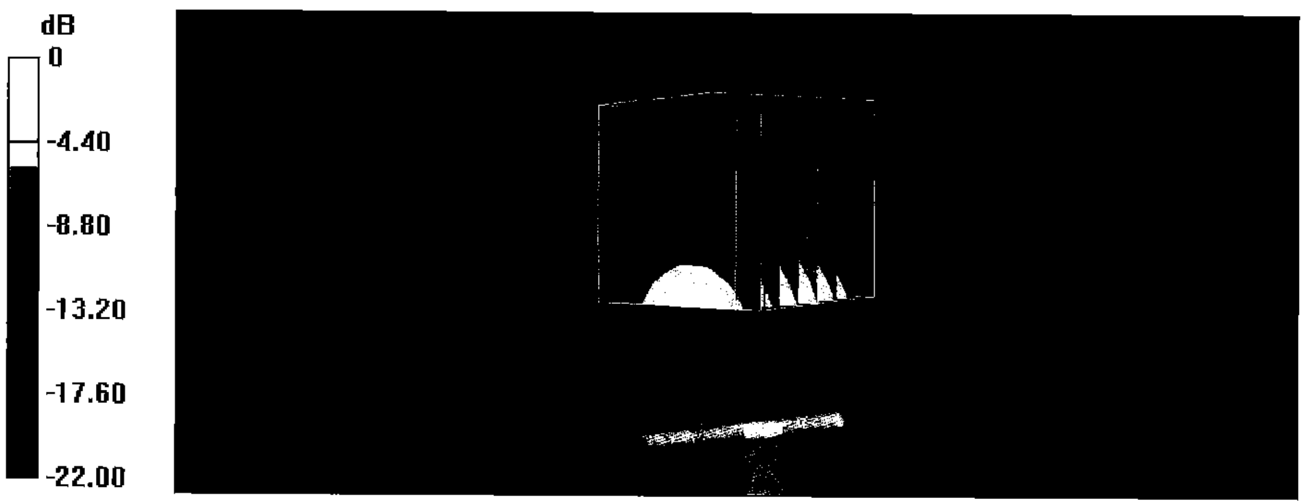
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.04 S/m; ε_r = 51.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

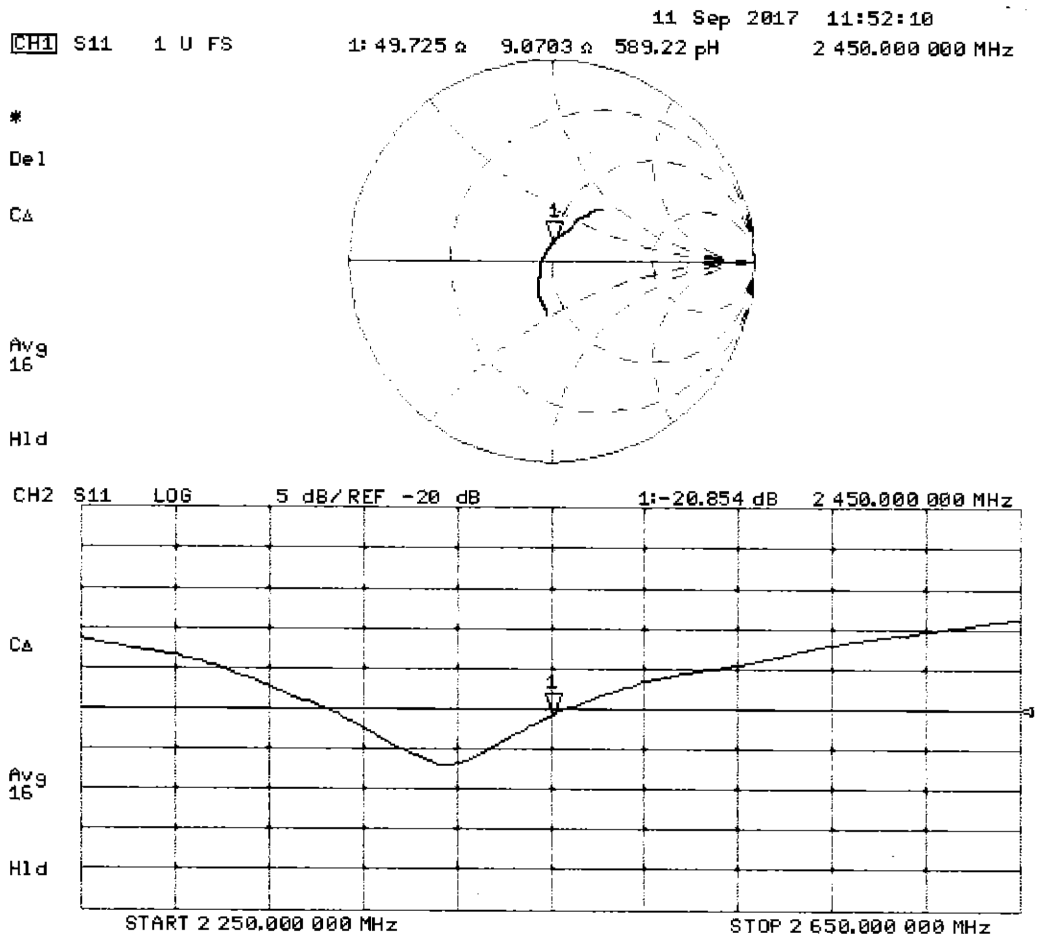
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.4 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.14 W/kg
Maximum value of SAR (measured) = 20.3 W/kg



0 dB = 20.3 W/kg = 13.07 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: 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

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

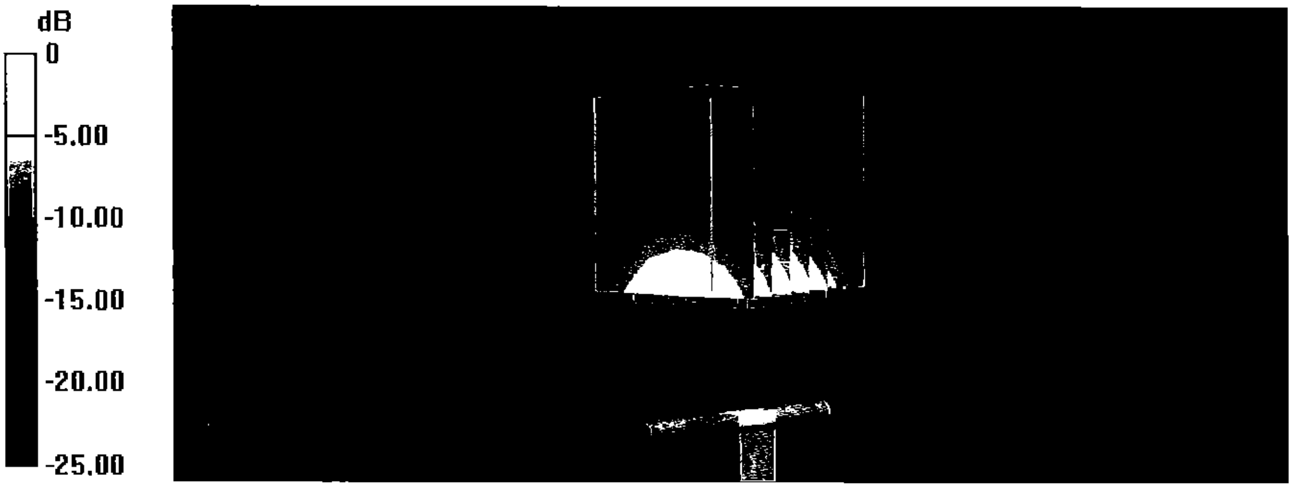
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.04 S/m; ε_r = 37.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

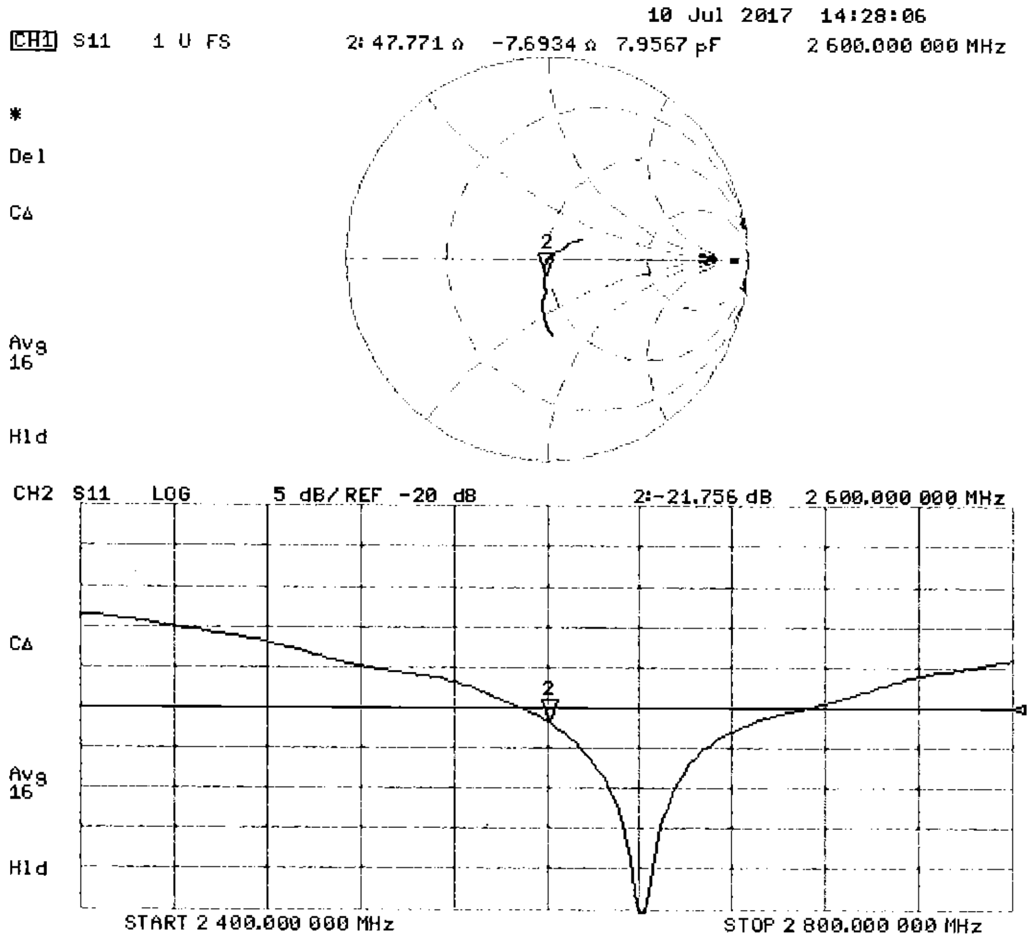
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

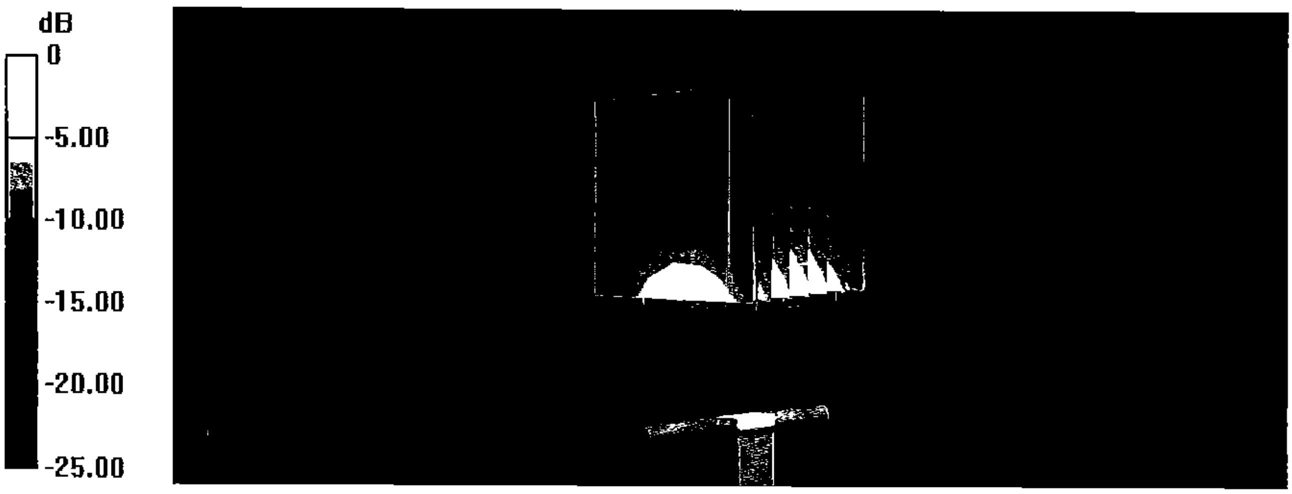
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.22 S/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

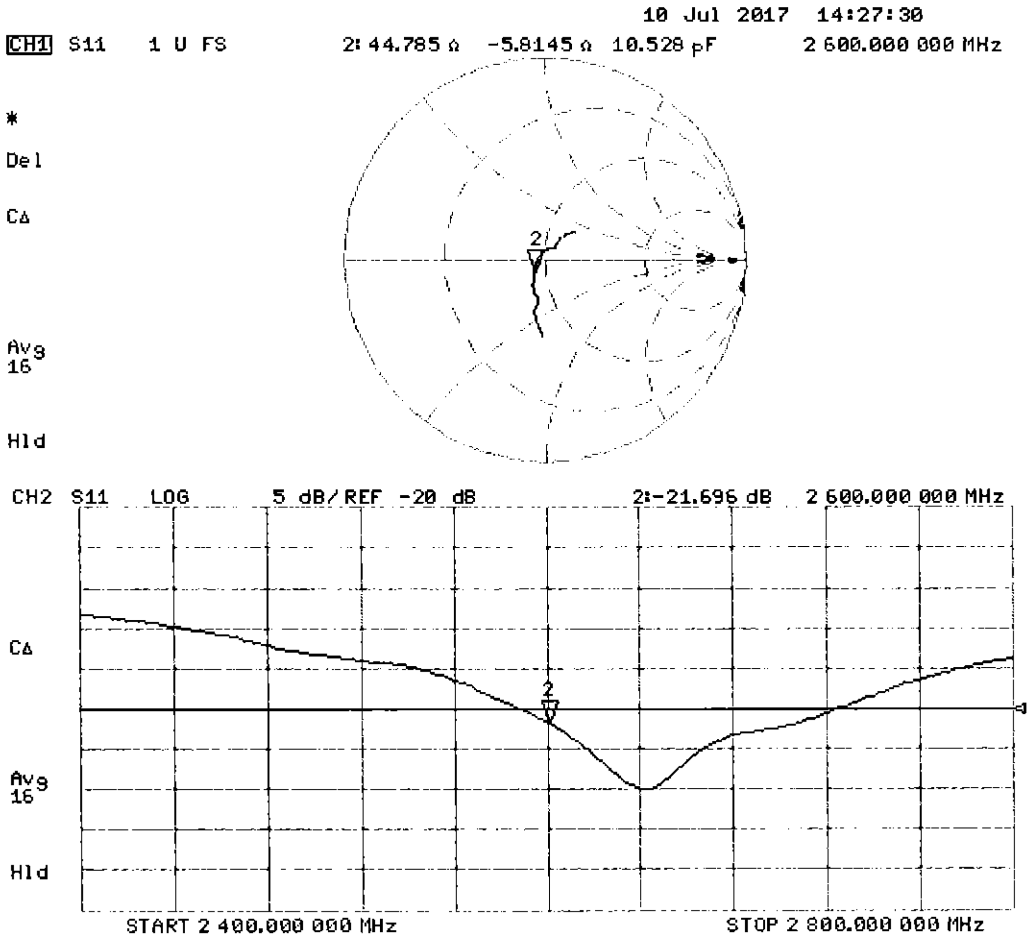
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D5GHzV2-1120_Feb18

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN:1120

Calibration procedure(s): QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

BN ✓
03-02-2018

Calibration date: February 12, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-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	30-Dec-17 (No. EX3-3503_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: February 12, 2018

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	36.3 ± 6 %	4.59 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.3 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	35.8 ± 6 %	4.95 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	8.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.7 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 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	35.6 ± 6 %	5.10 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	**81.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.1 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 %	5.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.54 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.95 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	7.85 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**78.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.19 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.7 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	6.15 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 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)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	52.0 Ω - 1.3 jΩ
Return Loss	- 32.5 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	57.9 Ω + 0.2 jΩ
Return Loss	- 22.7 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.3 Ω + 5.5 jΩ
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	51.4 Ω + 0.3 jΩ
Return Loss	- 36.8 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	59.1 Ω + 1.6 jΩ
Return Loss	- 21.4 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	54.0 Ω + 5.9 jΩ
Return Loss	- 23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 08, 2011

DASY5 Validation Report for Head TSL

Date: 09.02.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1120

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; $\sigma = 4.59$ S/m; $\varepsilon_r = 36.3$; $\rho = 1000$ kg/m^3,
Medium parameters used: f = 5600 MHz; $\sigma = 4.95$ S/m; $\varepsilon_r = 35.8$; $\rho = 1000$ kg/m^3,
Medium parameters used: f = 5750 MHz; $\sigma = 5.1$ S/m; $\varepsilon_r = 35.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

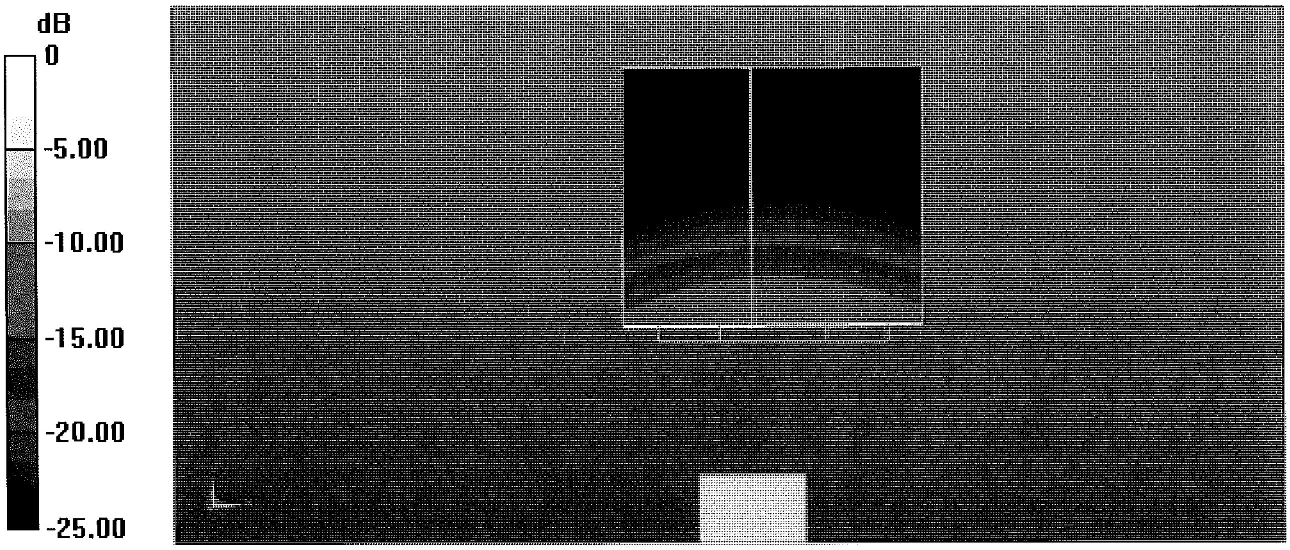
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.51, 5.51, 5.51); Calibrated: 30.12.2017, ConvF(5.05, 5.05, 5.05); Calibrated: 30.12.2017, ConvF(4.98, 4.98, 4.98); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(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 = 71.09 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

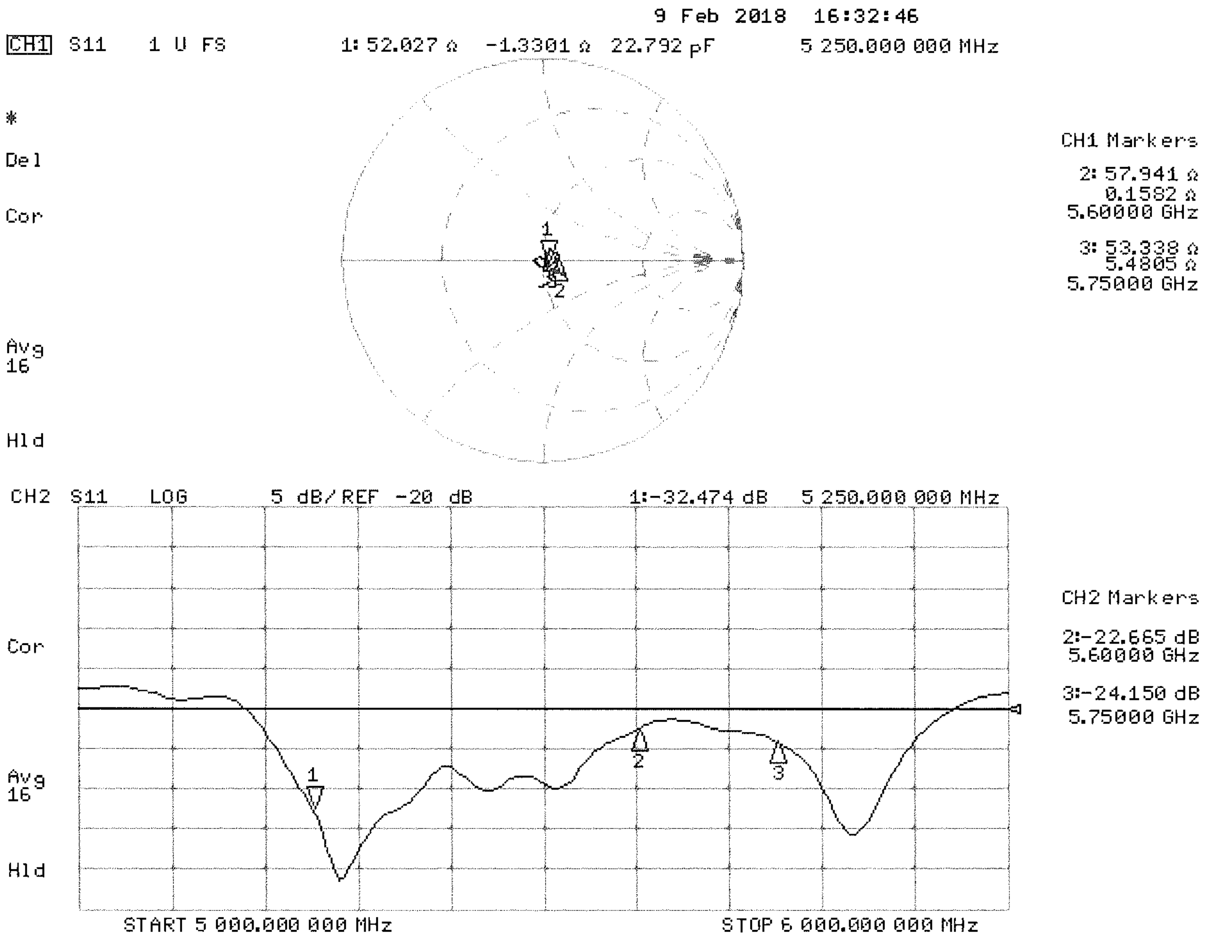
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.10 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.42 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.73 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 31.7 W/kg
SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 19.1 W/kg



0 dB = 19.1 W/kg = 12.81 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.02.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1120

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.48 S/m; ε_r = 47.4; ρ = 1000 kg/m^3,
Medium parameters used: f = 5600 MHz; σ = 5.95 S/m; ε_r = 46.8; ρ = 1000 kg/m^3,
Medium parameters used: f = 5750 MHz; σ = 6.15 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

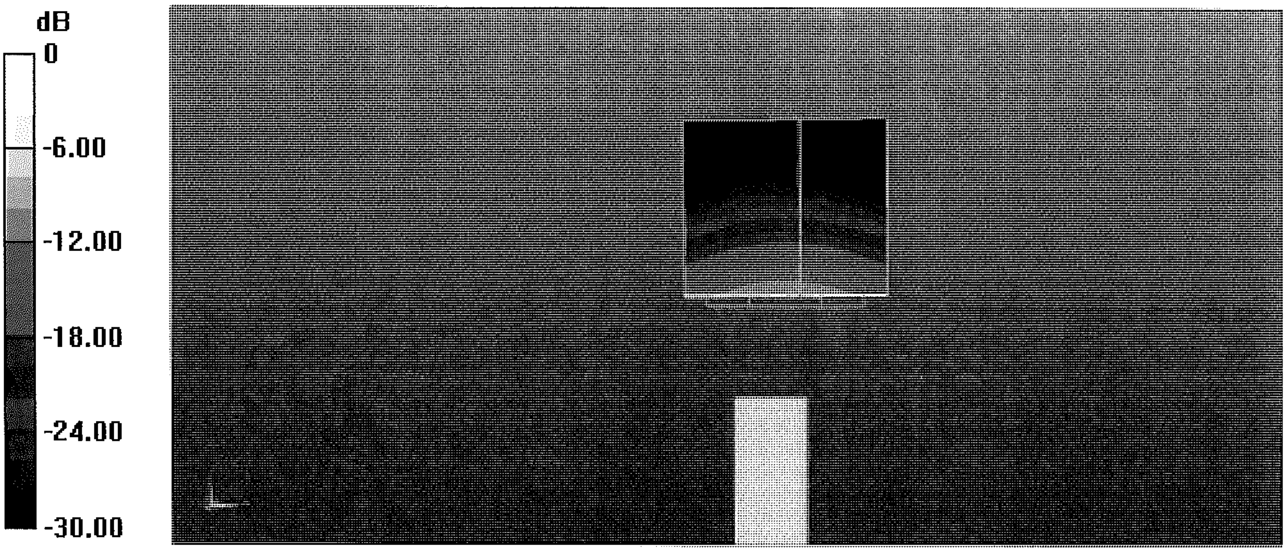
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.26, 5.26, 5.26); Calibrated: 30.12.2017, ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2017, ConvF(4.57, 4.57, 4.57); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.63 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 7.54 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 17.1 W/kg

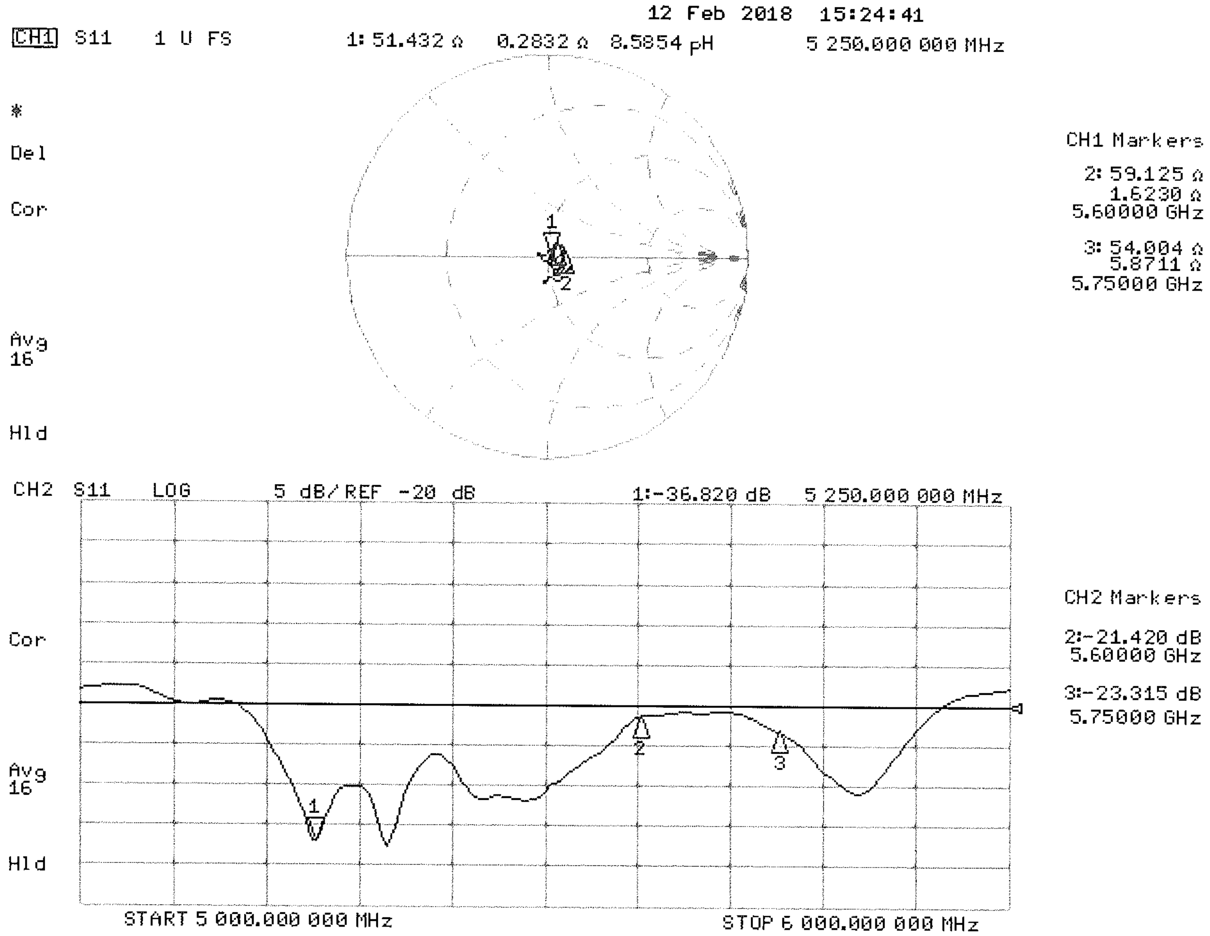
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.26 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 7.85 W/kg; SAR(10 g) = 2.19 W/kg
Maximum value of SAR (measured) = 18.5 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 = 63.56 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 17.9 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **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

BN✓ 03-27-2017
BN✓ 04-04-2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	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	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: March 14, 2017

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

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

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

Accreditation No.: **SCS 0108**

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	**5.60 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

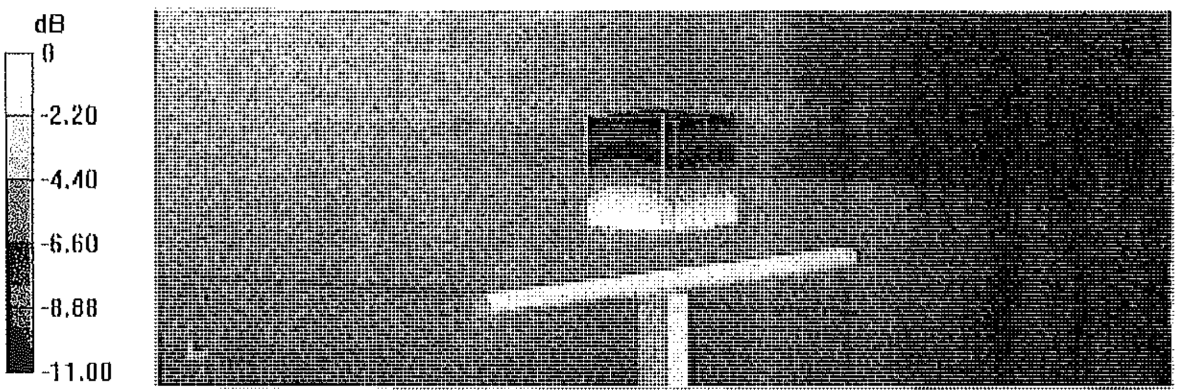
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

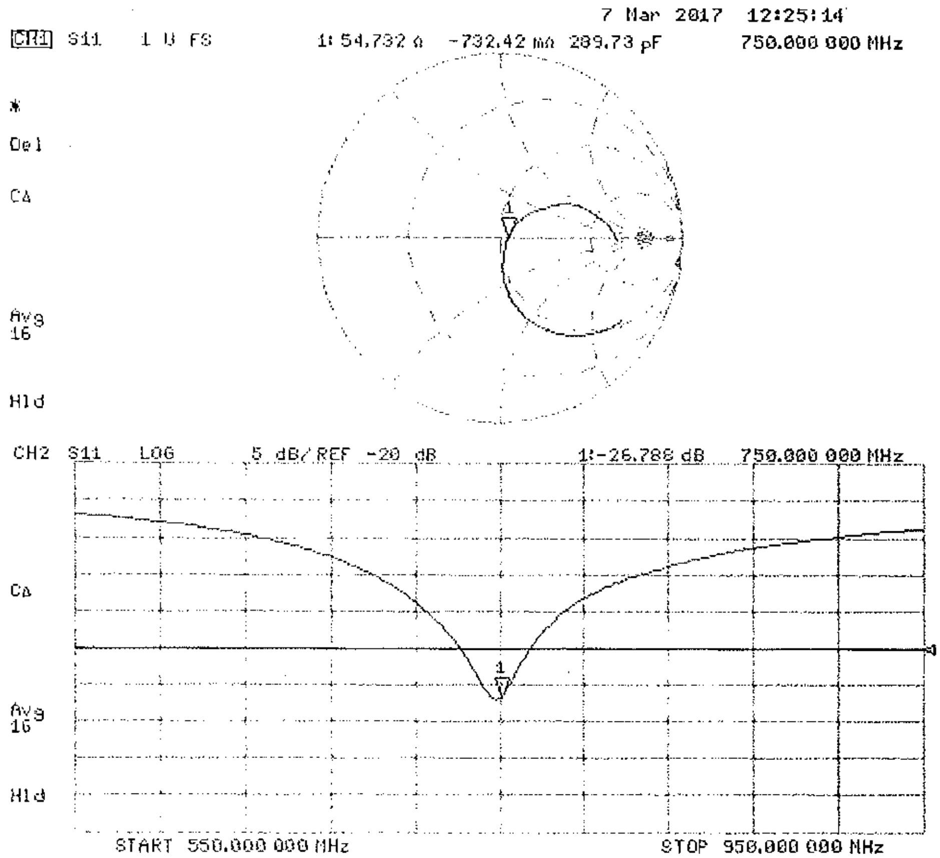
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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

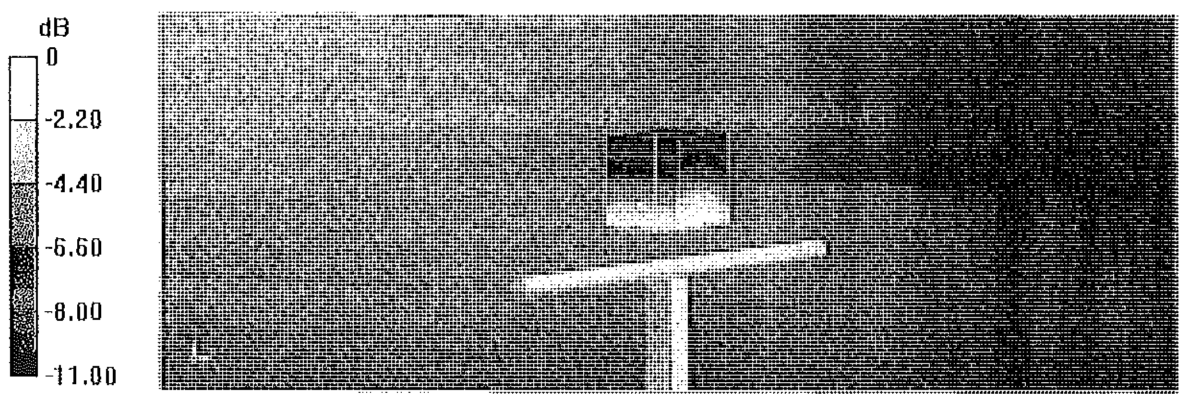
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.99$ S/m; $\varepsilon_r = 54.6$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

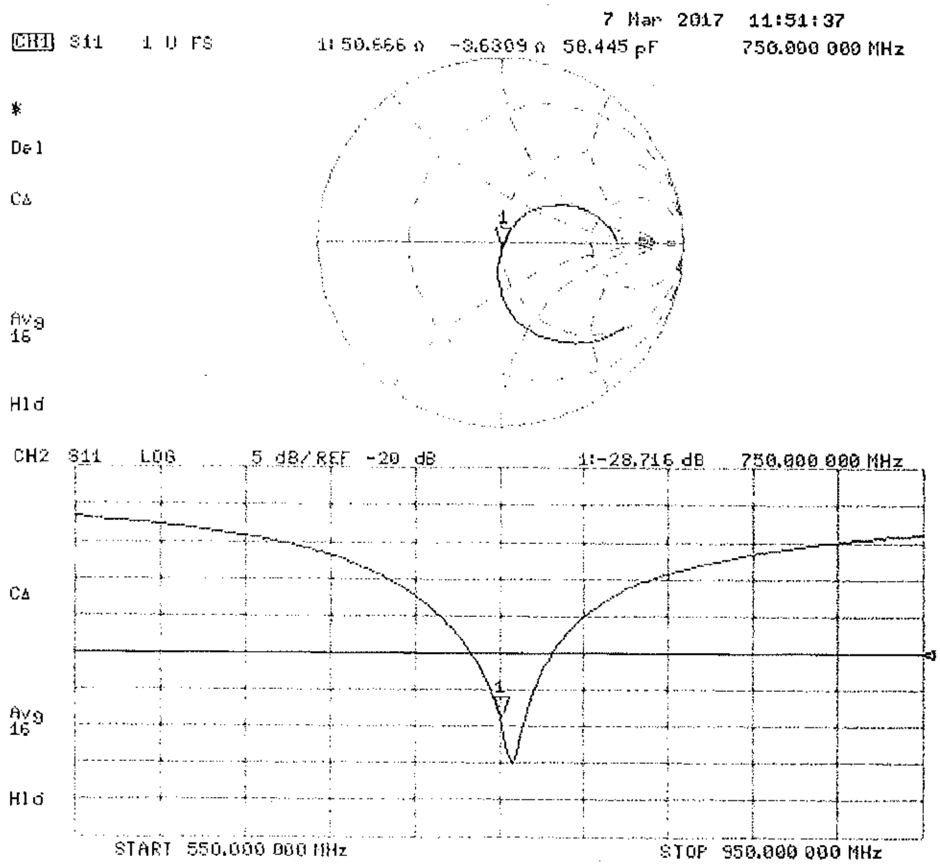
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



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	D750V3 – SN:1054
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	March 07, 2018
Description:	SAR Validation Dipole at 750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	8/3/2017	Annual	8/3/2018	MY40000670
Agilent	N5182A	MXG Vector Signal Generator	1/24/2018	Annual	1/24/2019	MY47420651
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	3/2/2018	Annual	3/2/2019	1207364
Anritsu	MA2411B	Pulse Power Sensor	10/16/2017	Annual	10/16/2018	1126066
Anritsu	ML2495A	Power Meter	10/22/2017	Annual	10/22/2018	1328004
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/1/2017	Annual	6/1/2018	MY53401181
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	1/22/2018	Annual	1/22/2019	N/A
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/13/2017	Annual	7/13/2018	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/21/2017	Annual	6/21/2018	1333
SPEAG	EX3DV4	SAR Probe	7/17/2017	Annual	7/17/2018	7410
SPEAG	ES3DV3	SAR Probe	9/18/2017	Annual	9/18/2018	3287

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:

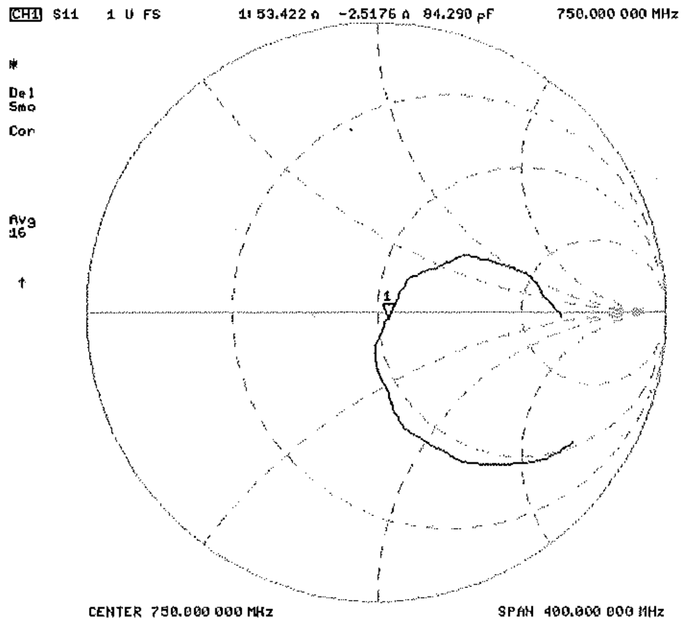
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

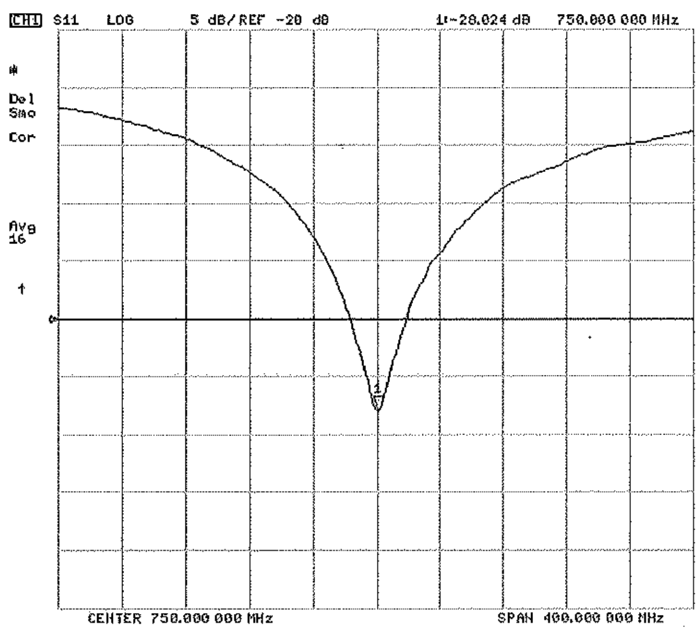
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
3/7/2017	3/7/2018	1.033	1.67	1.70	1.56%	1.10	1.11	0.91%	54.7	53.4	1.3	-0.7	-2.5	1.8	-26.8	-28.0	-4.60%	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
3/7/2017	3/7/2018	1.033	1.72	1.70	-1.20%	1.14	1.12	-1.41%	50.7	50.4	0.3	-3.6	-3.9	0.3	-28.7	-28.5	0.60%	PASS

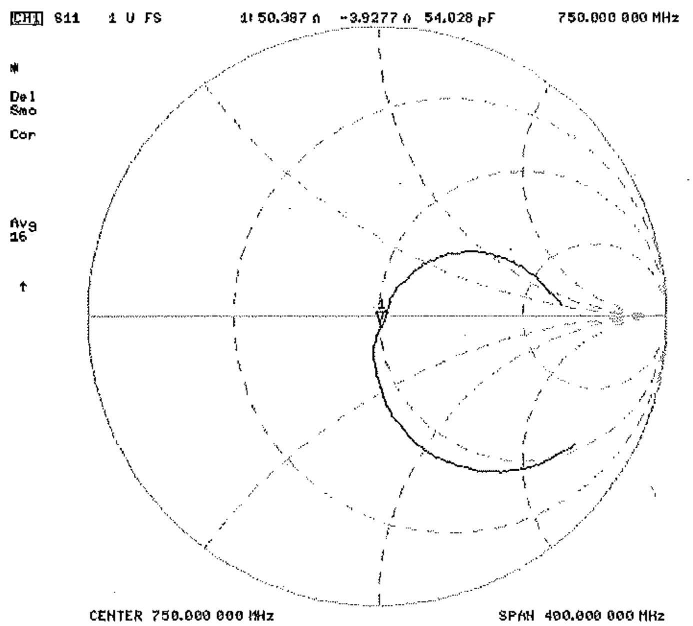
Impedance & Return-Loss Measurement Plot for Head TSL

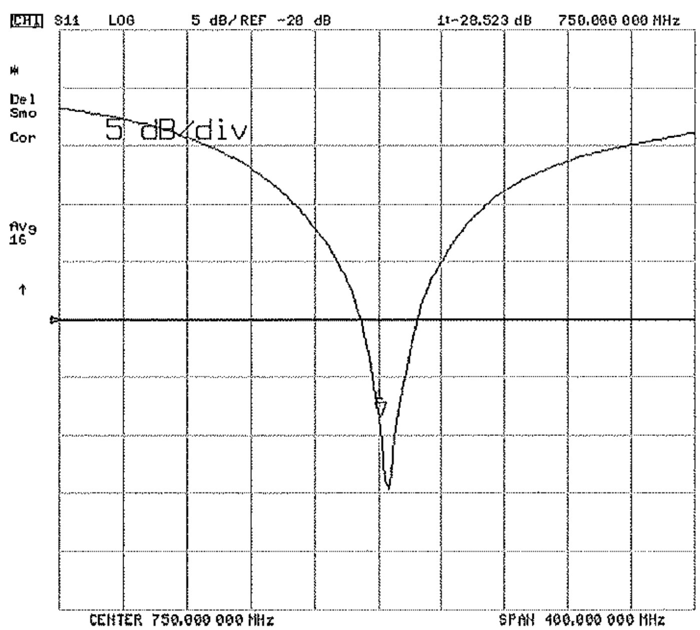




Object:	Date Issued:	
D750V3 – SN:1054	03/07/2018	

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: 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 9/2017 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

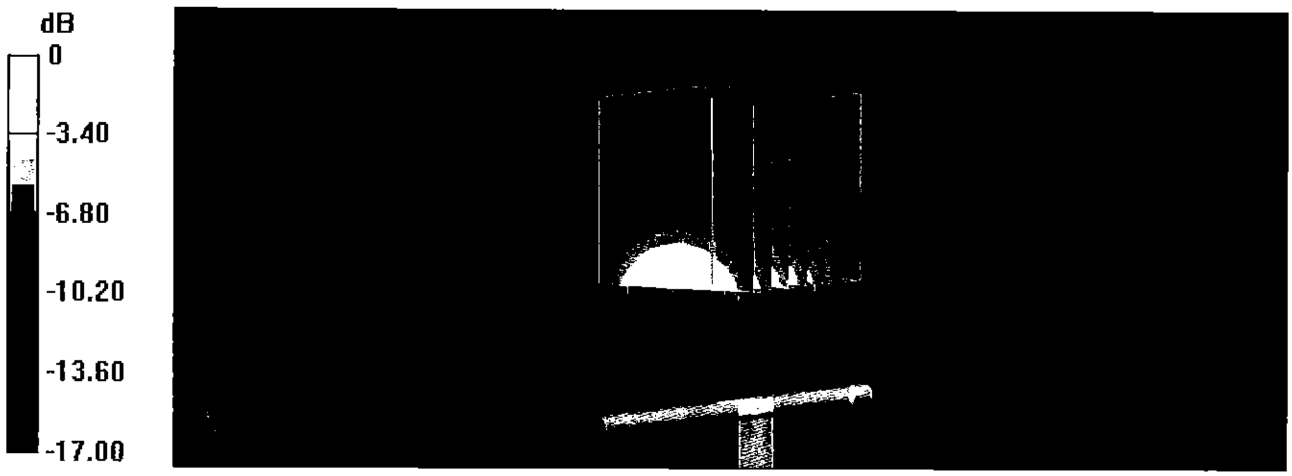
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

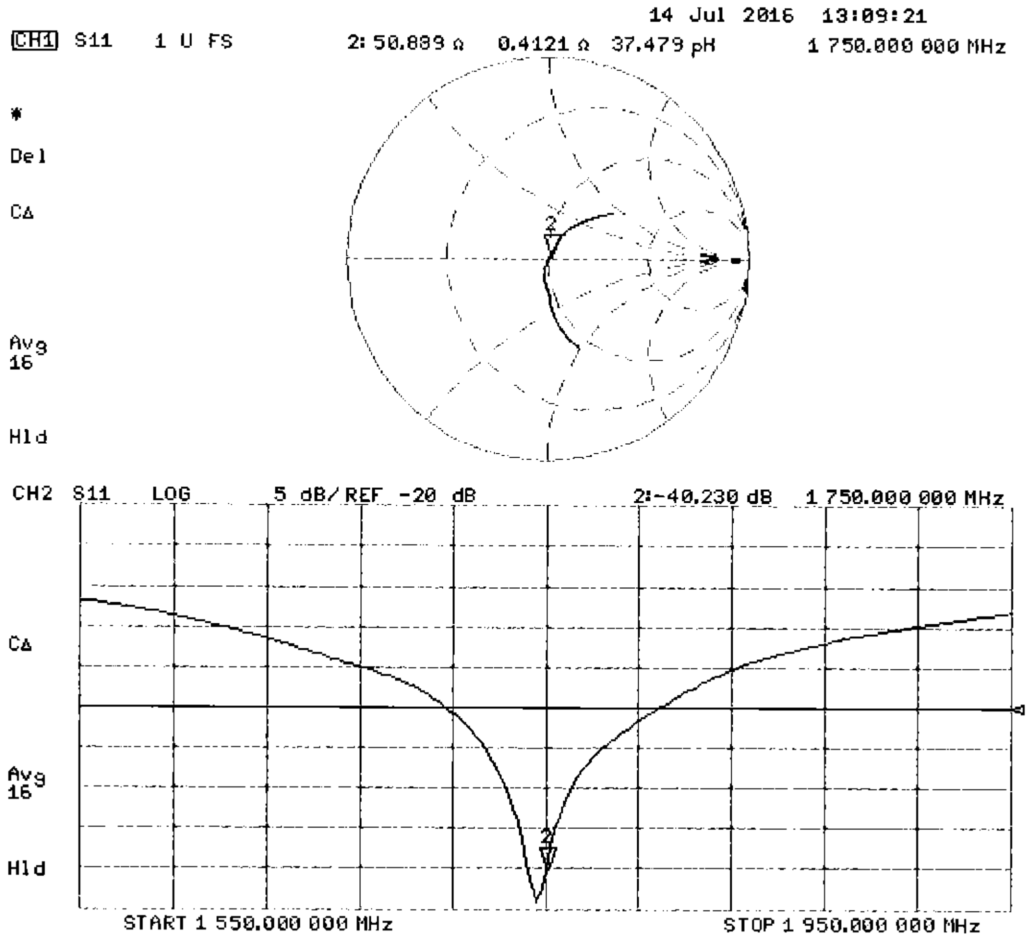
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

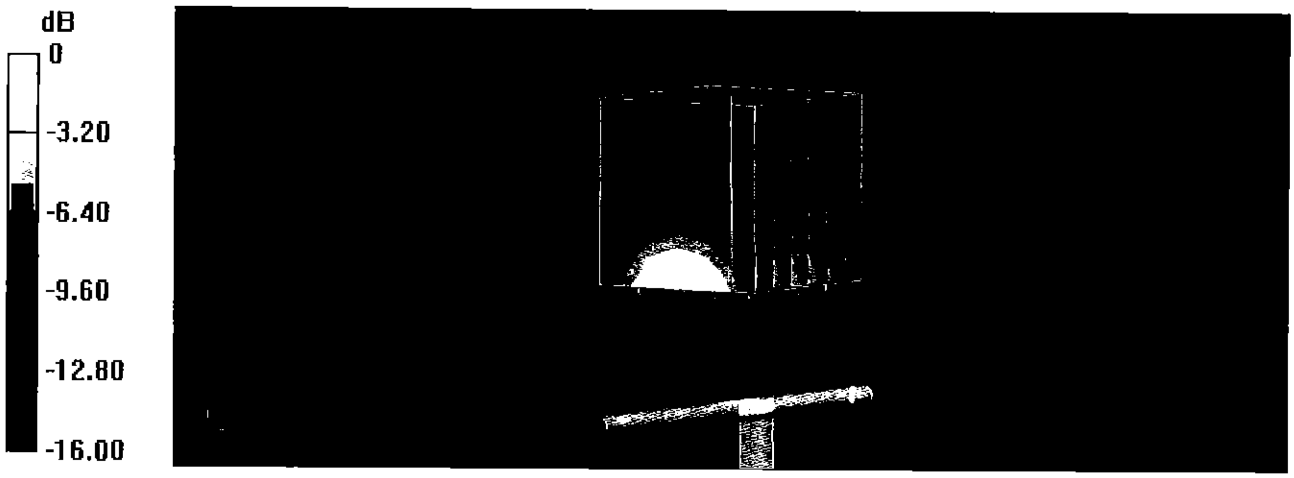
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.48 S/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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)

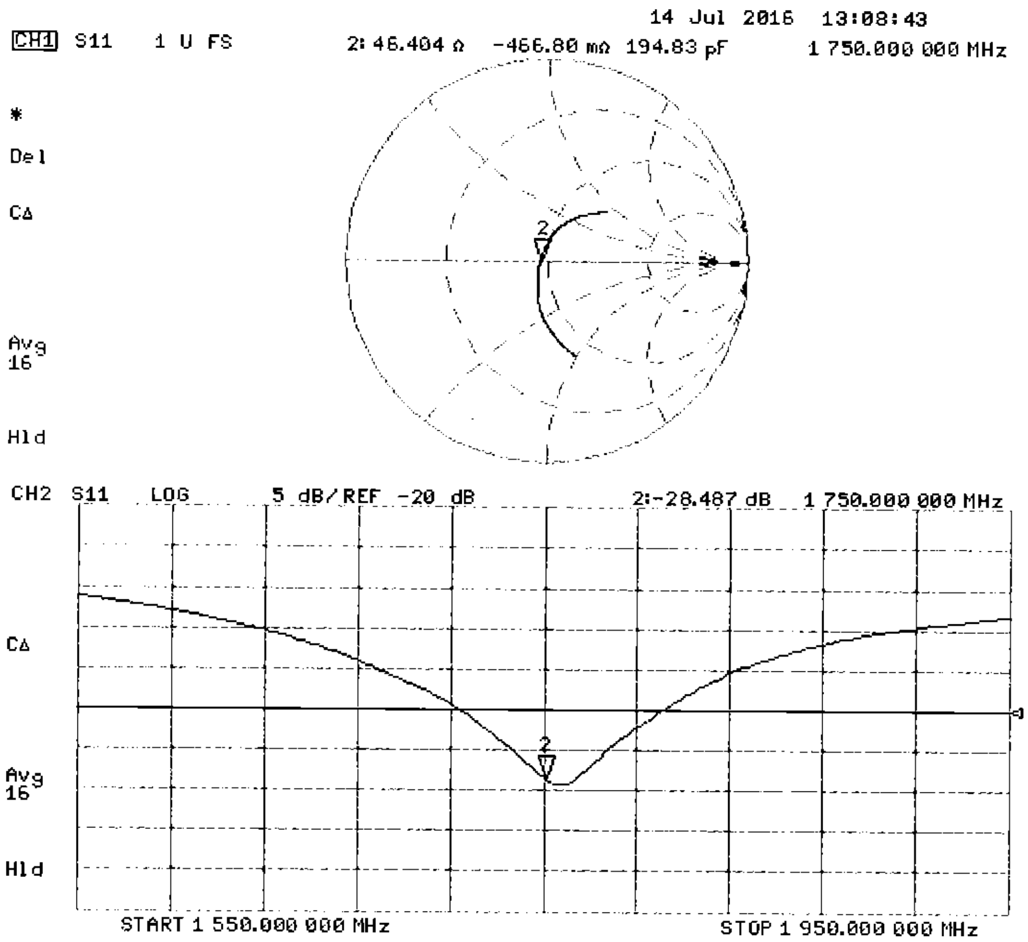
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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:

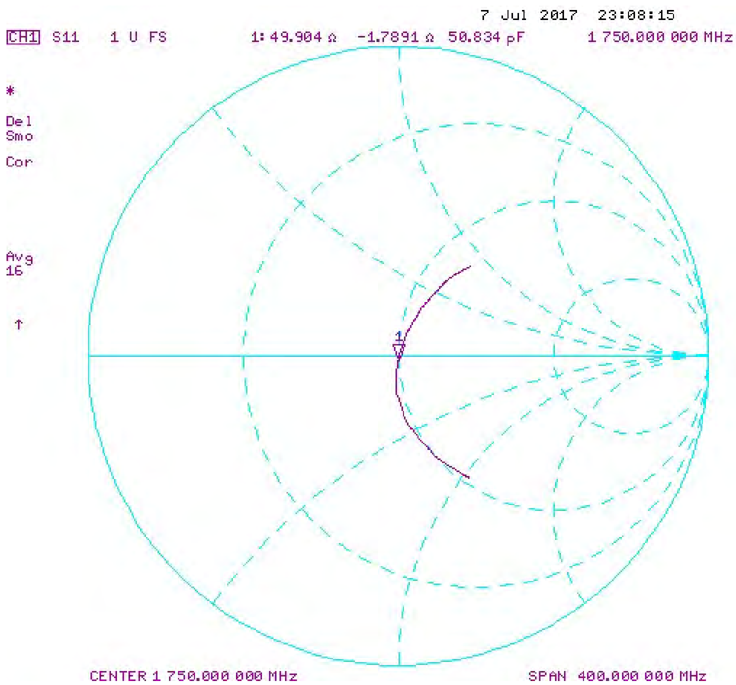
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

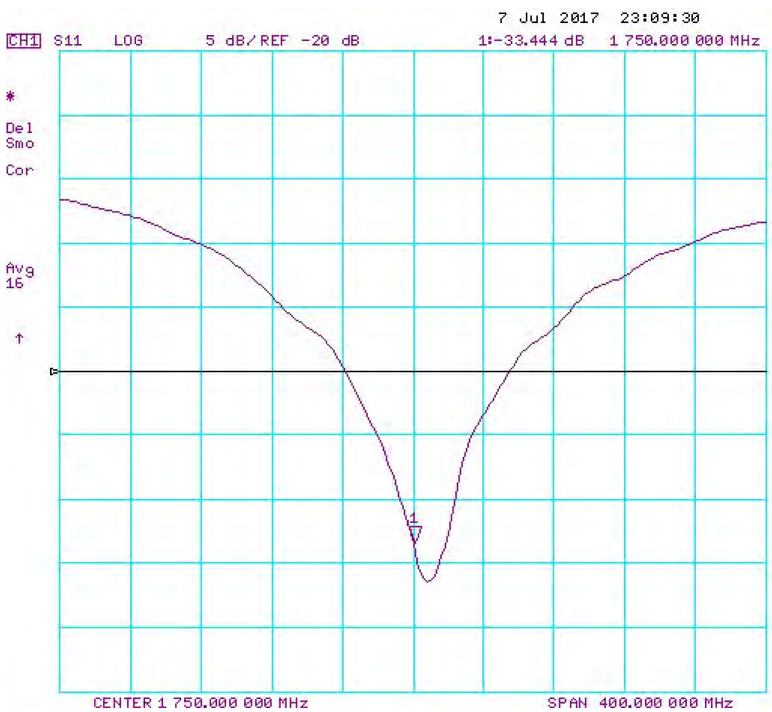
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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

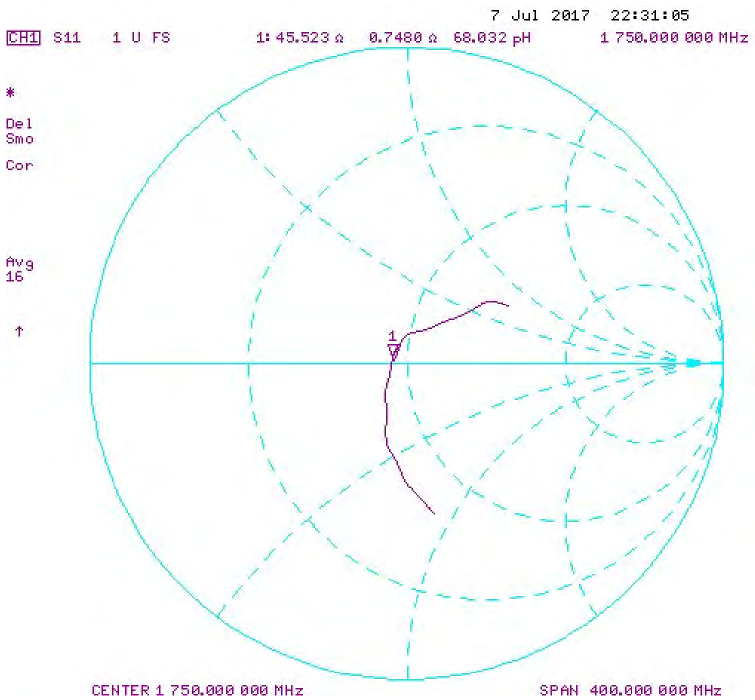
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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

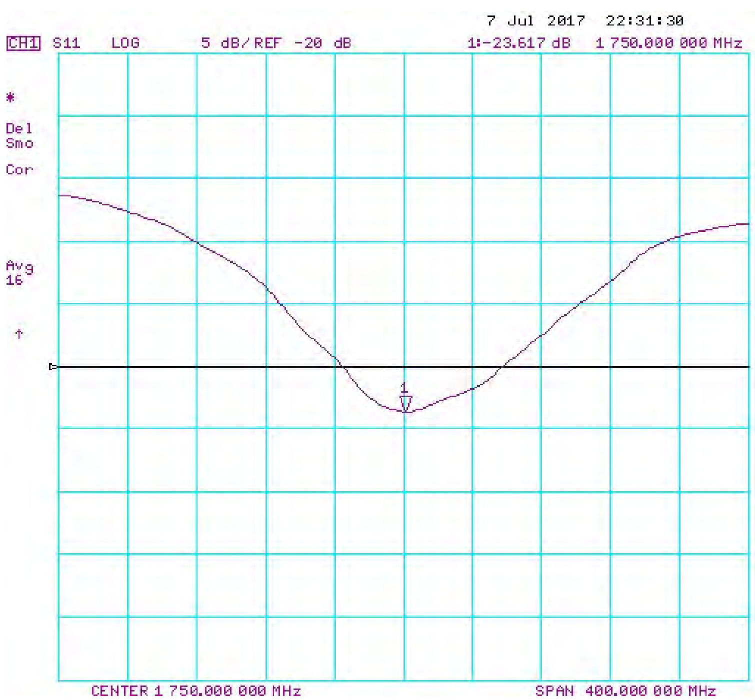
Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL





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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D1900V2-5d148_Feb18

CALIBRATION CERTIFICATE

Object: D1900V2 - SN:5d148

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

BN✓ 03-02-2018

Calibration date: February 07, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

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

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

Issued: February 7, 2018

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	9.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 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	9.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω + 5.8 jΩ
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.8 Ω + 6.5 jΩ
Return Loss	- 23.1 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: 07.02.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

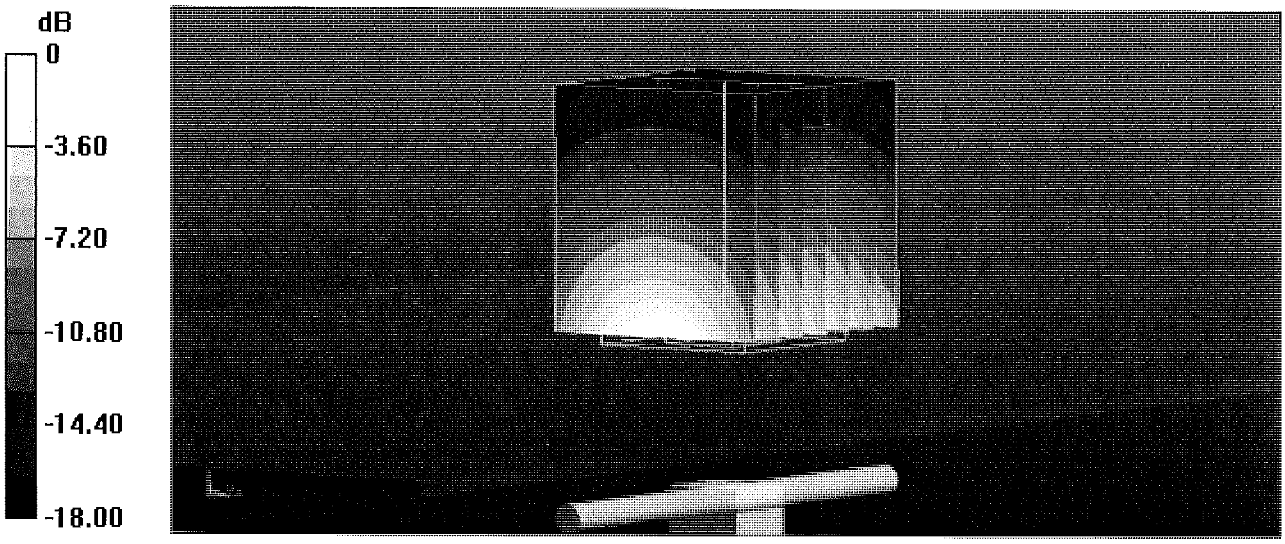
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.39 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

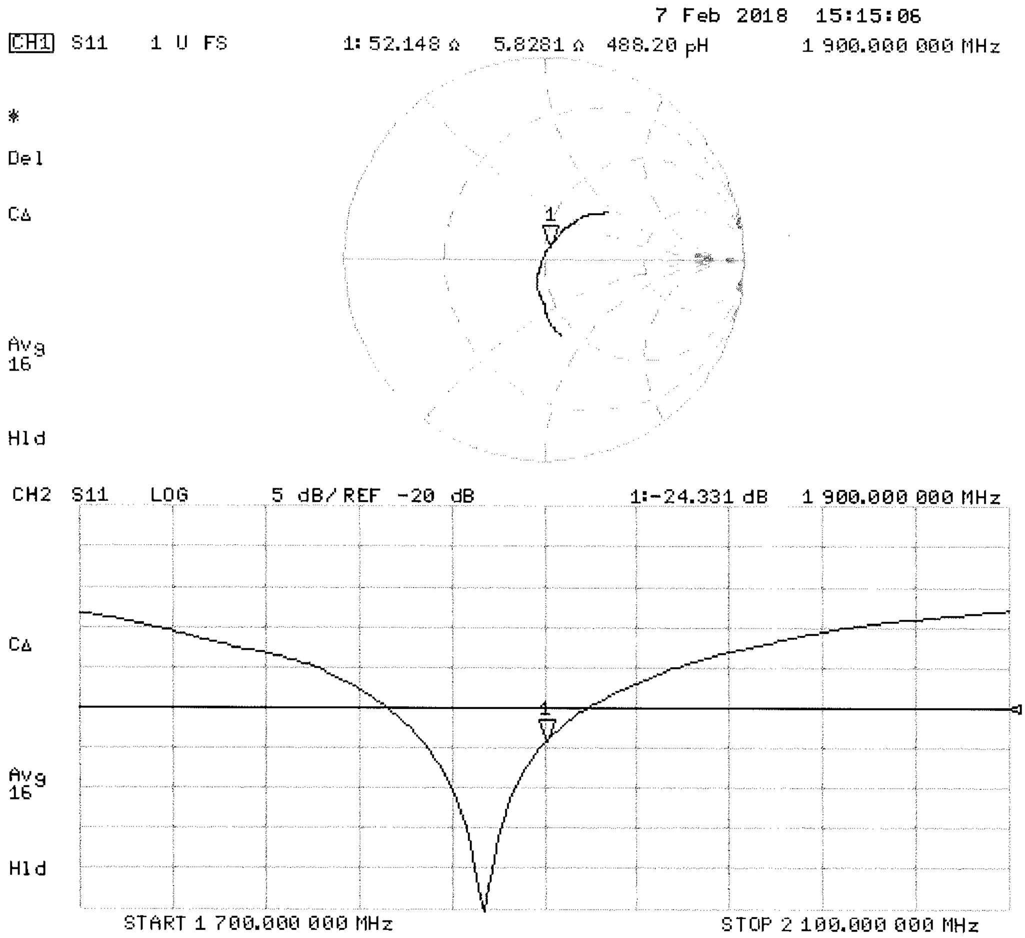
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 109.6 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.22 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 Head TSL



DASY5 Validation Report for Body TSL

Date: 07.02.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

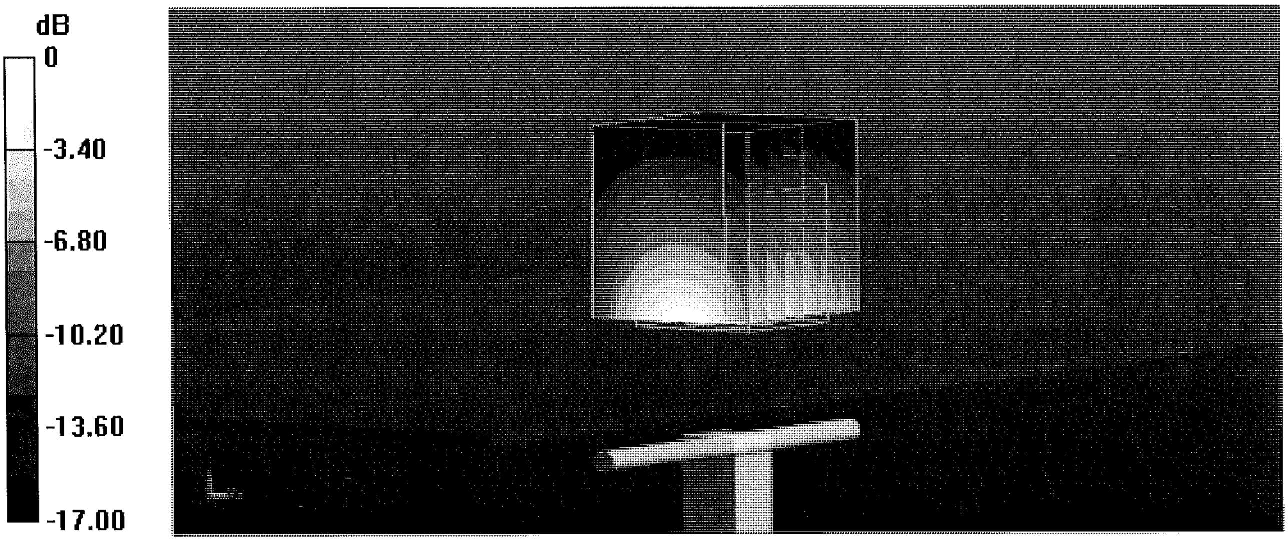
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.48$ S/m; $\varepsilon_r = 55.2$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

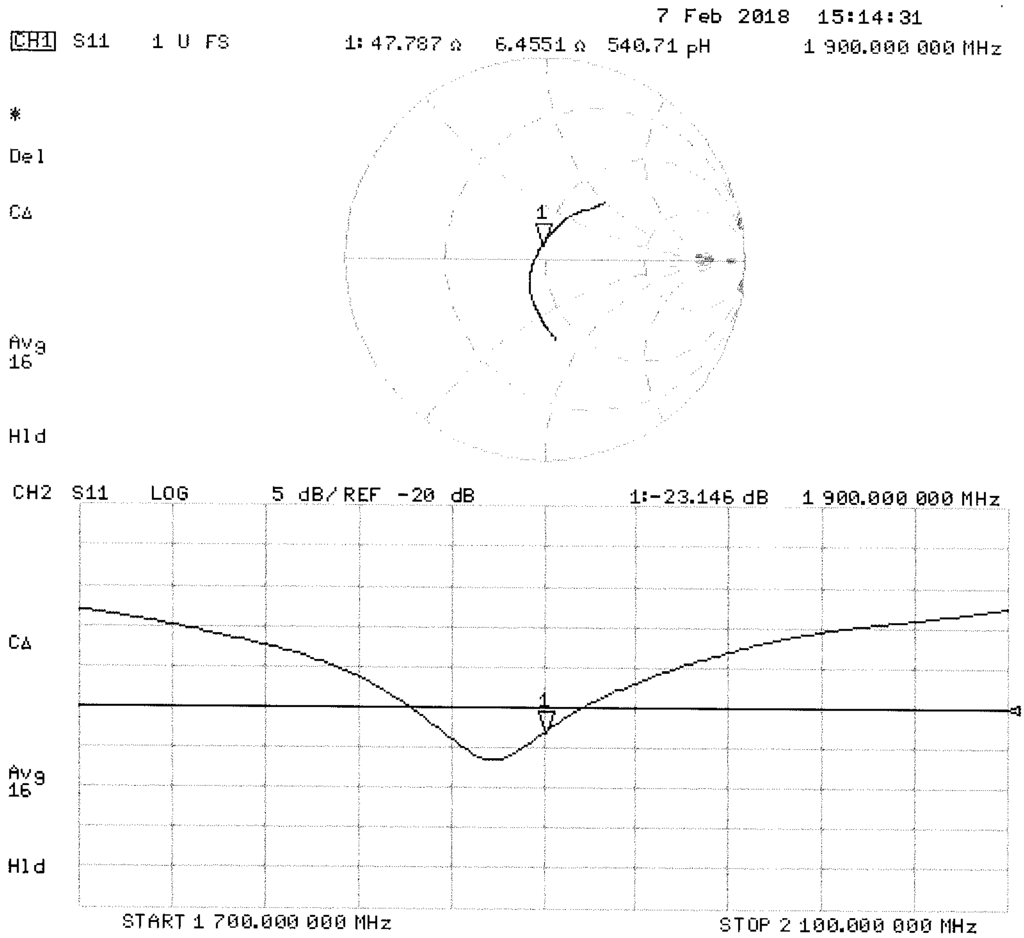
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.0 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.68 W/kg; SAR(10 g) = 5.14 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



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1237_Aug17**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1237
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	August 15, 2017

PM ✓ 8/27/17

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

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

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

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

Accreditation No.: **SCS 0108**

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)

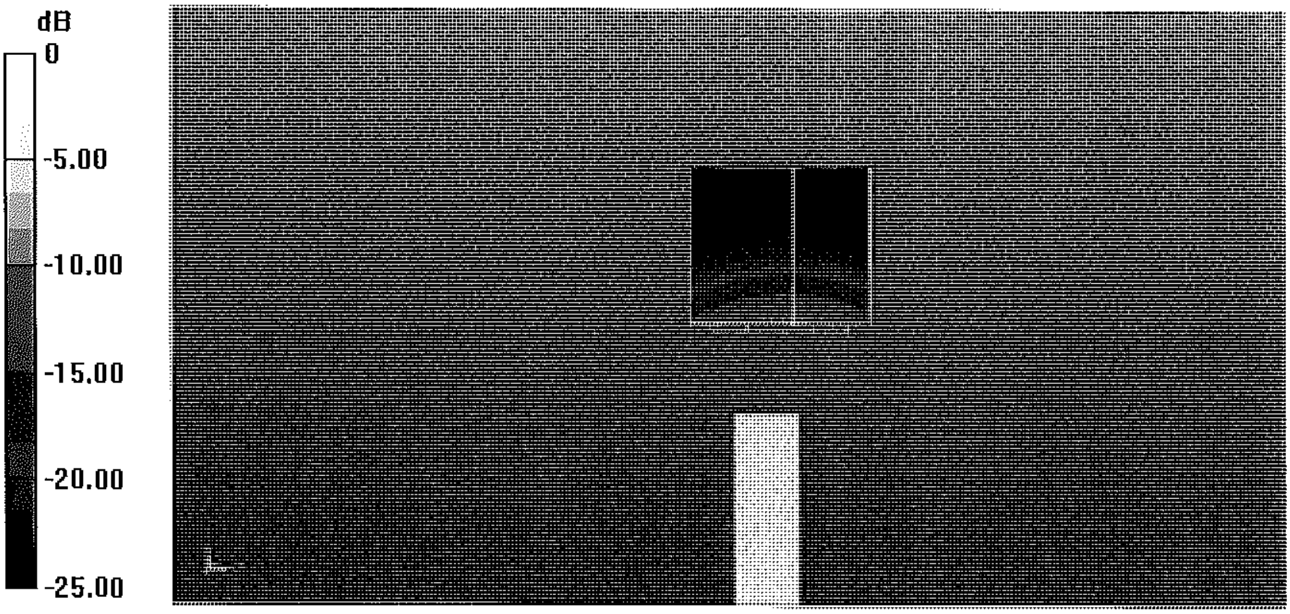
DASY52 Configuration:

- 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

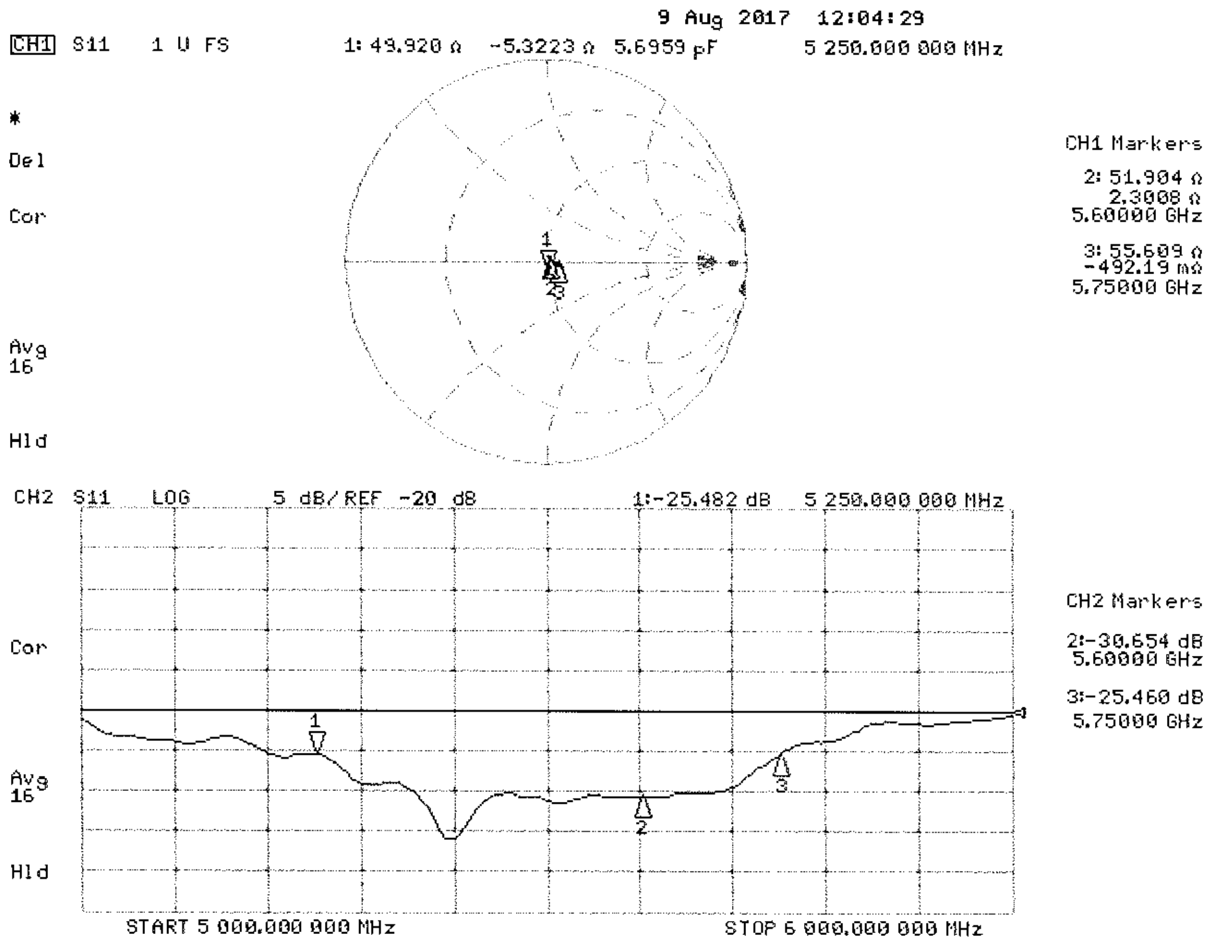
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.04 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 8.33 W/kg; SAR(10 g) = 2.38 W/kg
Maximum value of SAR (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)

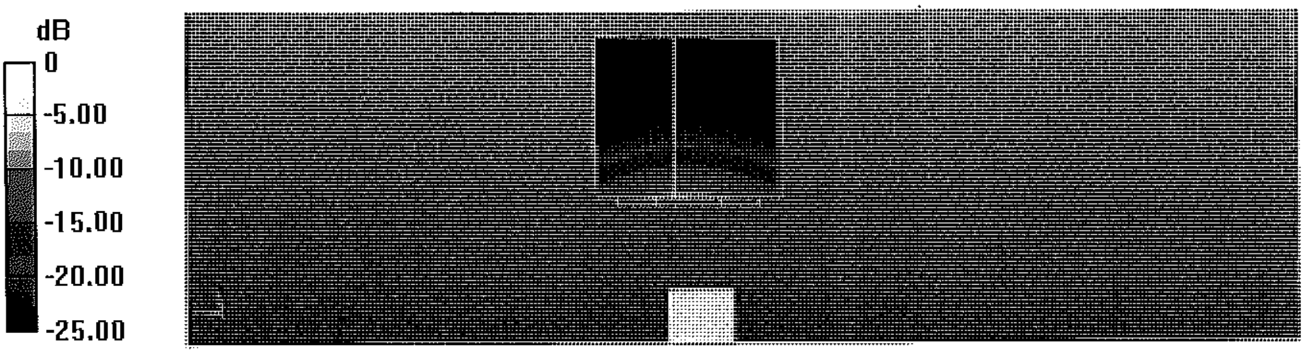
DASY52 Configuration:

- 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

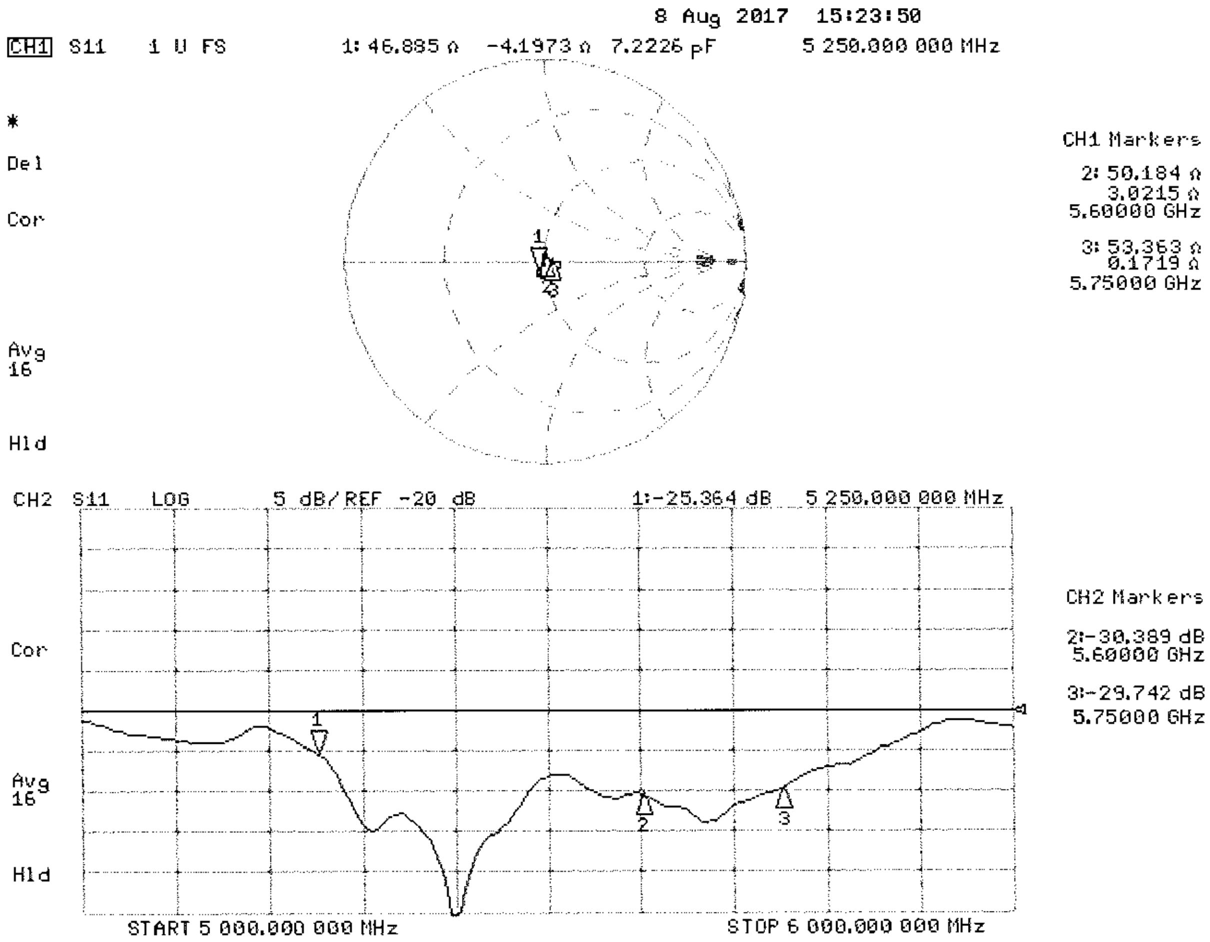
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.11 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (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



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: **EX3-7410_Jul17**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7410

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

BN ✓
8/3/2017

Calibration date: July 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. 217-02525)	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: July 17, 2017

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

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

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

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

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
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., $\vartheta = 0$ 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 $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ 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 EX3DV4

SN:7410

Manufactured: November 24, 2015
Calibrated: July 17, 2017

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7410

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)^2)[A]	0.40	0.46	0.43	± 10.1 %
DCP (mV)[B]	95.4	94.7	91.2	

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	130.7	±3.5 %
		Y	0.0	0.0	1.0		146.7	
		Z	0.0	0.0	1.0		132.5	

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	41.43	313.6	36.54	8.525	0.381	5.024	0.000	0.467	1.003
Y	41.67	315.5	36.57	10.32	0.000	5.055	0.334	0.426	1.004
Z	51.58	393.9	37.05	11.42	0.427	5.066	0.000	0.561	1.006

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: EX3DV4 - SN:7410

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	10.60	10.60	10.60	0.53	0.80	± 12.0 %
835	41.5	0.90	10.08	10.08	10.08	0.41	0.98	± 12.0 %
1750	40.1	1.37	8.66	8.66	8.66	0.41	0.82	± 12.0 %
1900	40.0	1.40	8.37	8.37	8.37	0.28	1.19	± 12.0 %
2300	39.5	1.67	8.02	8.02	8.02	0.35	0.80	± 12.0 %
2450	39.2	1.80	7.68	7.68	7.68	0.33	0.89	± 12.0 %
2600	39.0	1.96	7.42	7.42	7.42	0.40	0.80	± 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.

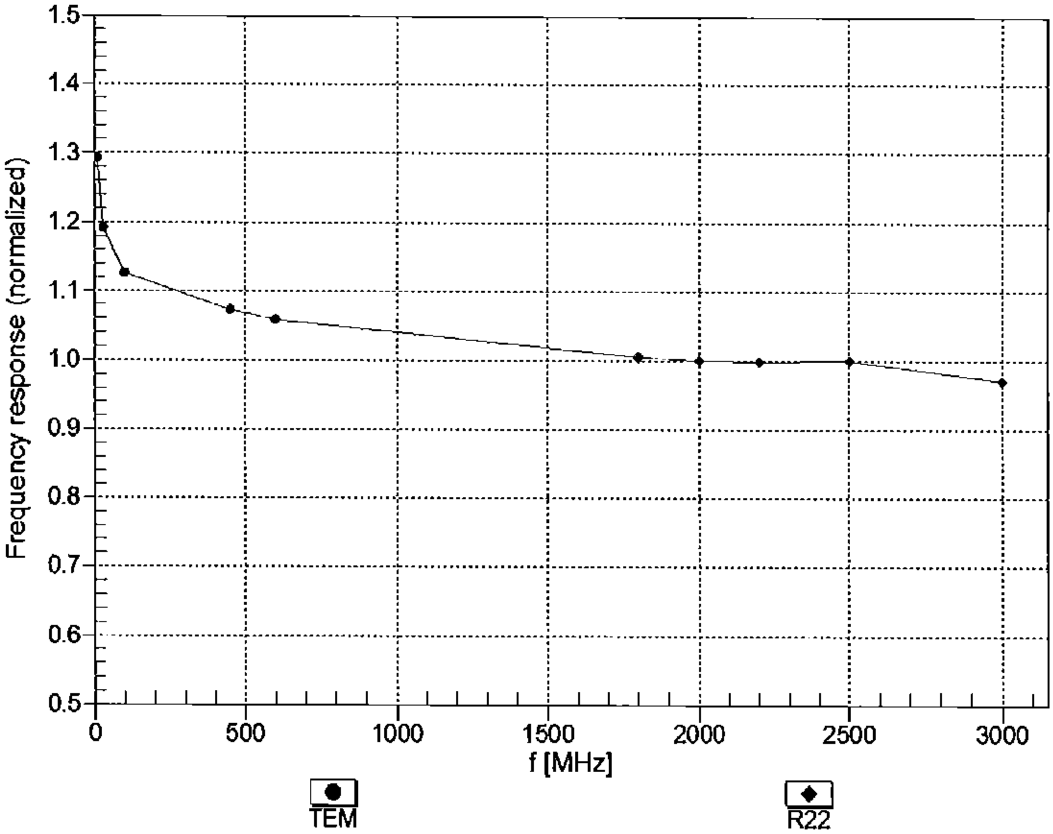
DASY/EASY - Parameters of Probe: EX3DV4 - SN:7410

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	10.19	10.19	10.19	0.33	1.02	± 12.0 %
835	55.2	0.97	9.95	9.95	9.95	0.50	0.80	± 12.0 %
1750	53.4	1.49	8.32	8.32	8.32	0.39	0.86	± 12.0 %
1900	53.3	1.52	7.98	7.98	7.98	0.44	0.86	± 12.0 %
2300	52.9	1.81	7.85	7.85	7.85	0.44	0.84	± 12.0 %
2450	52.7	1.95	7.69	7.69	7.69	0.37	0.89	± 12.0 %
2600	52.5	2.16	7.43	7.43	7.43	0.28	0.99	± 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.

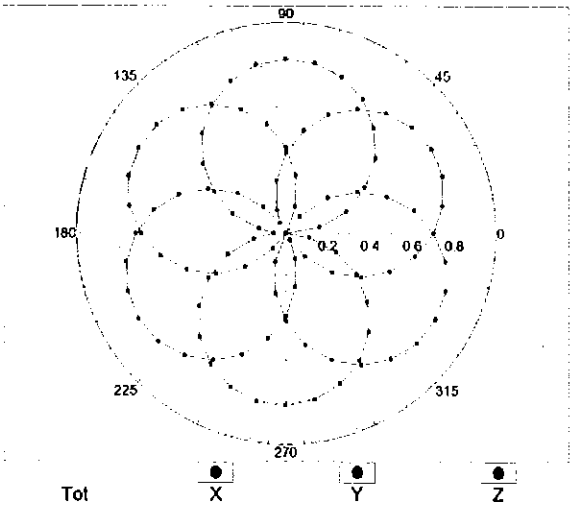
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



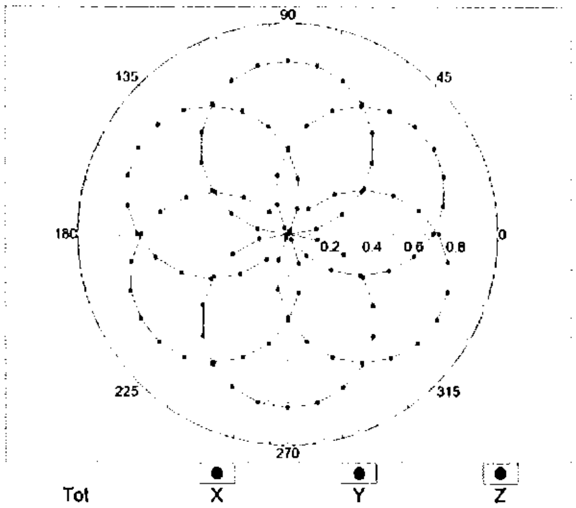
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

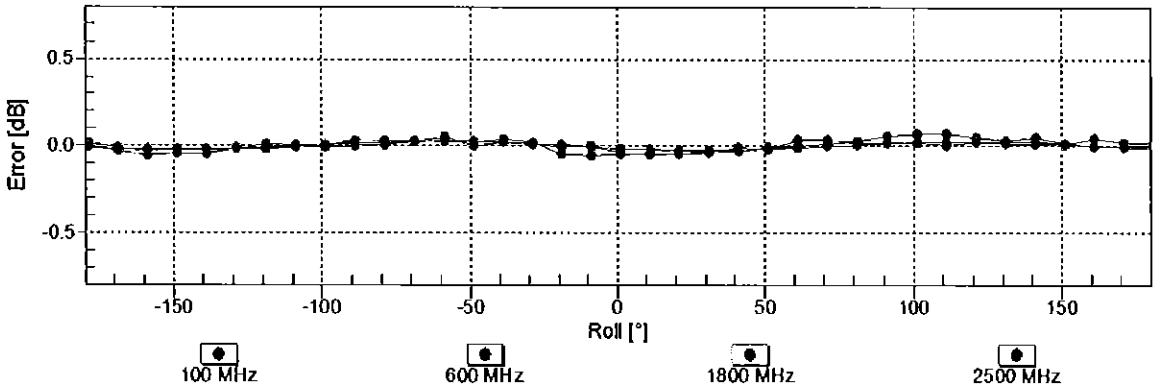
Receiving Pattern (ϕ), $\vartheta = 0°$

f=600 MHz,TEM



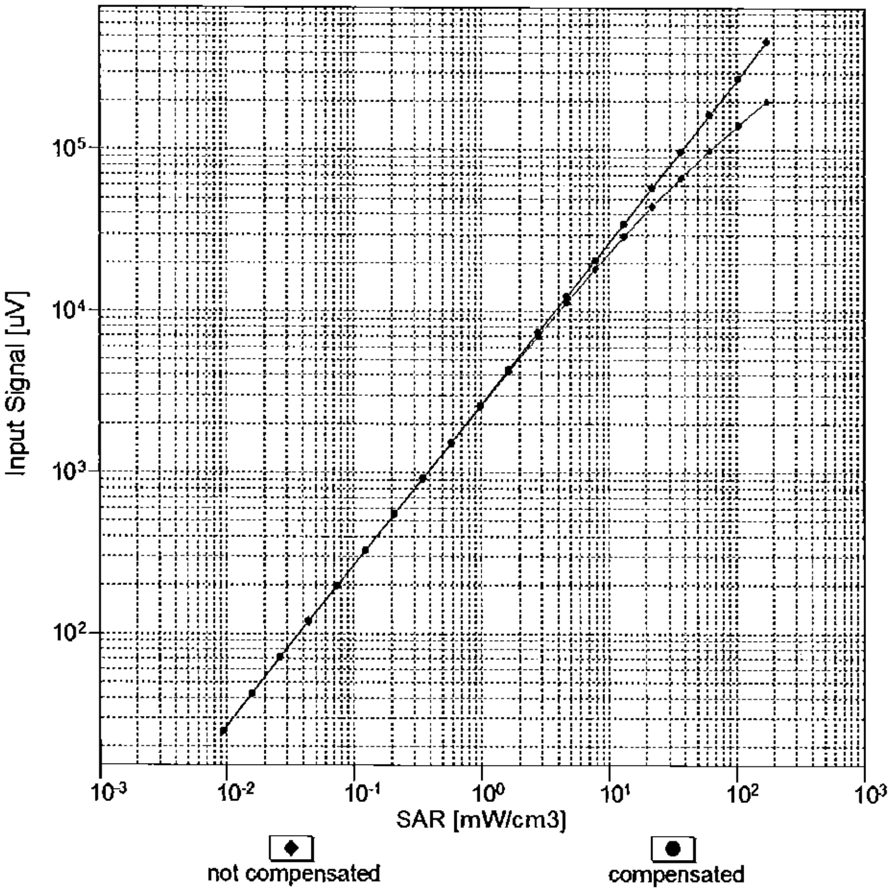
f=1800 MHz,R22

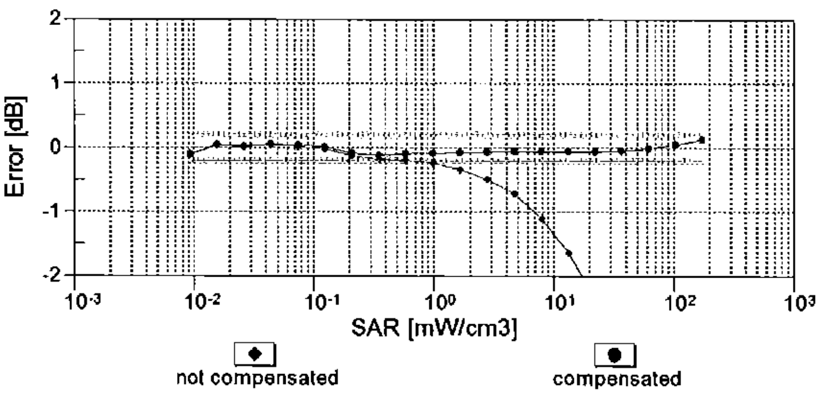




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)

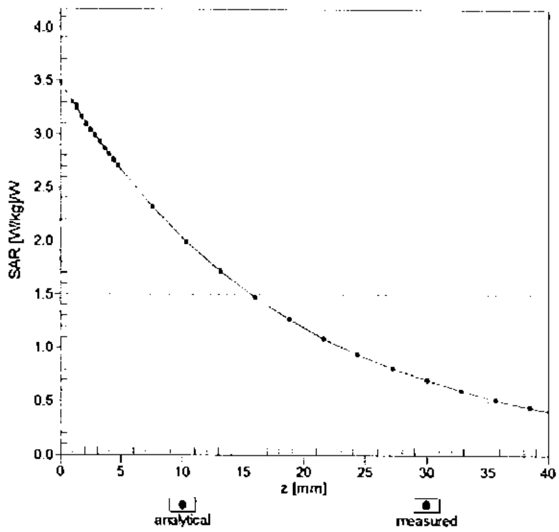




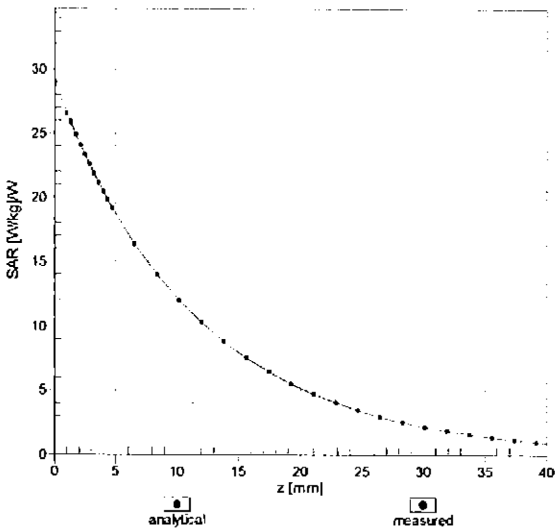
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

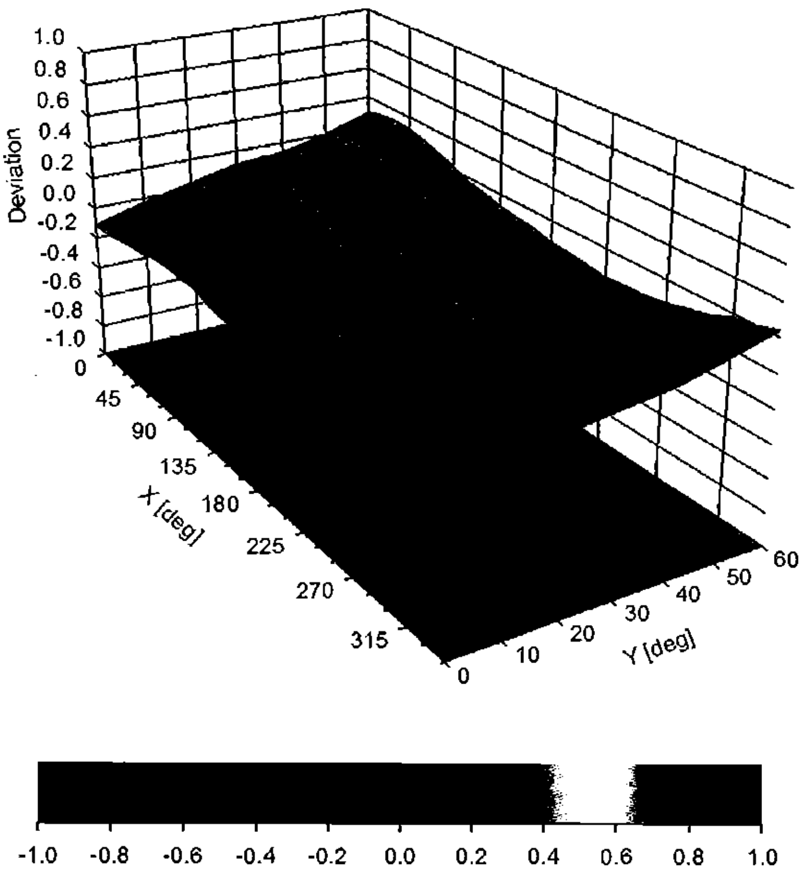


f = 1900 MHz,WGLS R22 (H_convF)



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: EX3DV4 - SN:7410

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	1.2
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 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	130.7	± 3.5 %
		Y	0.00	0.00	1.00		146.7	
		Z	0.00	0.00	1.00		132.5	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	2.07	65.38	9.86	10.00	20.0	± 9.6 %
		Y	1.71	64.71	9.07		20.0	
		Z	3.44	71.14	12.92		20.0	
10011-CAB	UMTS-FDD (WCDMA)	X	1.05	67.82	15.62	0.00	150.0	± 9.6 %
		Y	1.11	68.91	16.28		150.0	
		Z	1.02	66.59	14.94		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.16	63.70	15.28	0.41	150.0	± 9.6 %
		Y	1.18	64.10	15.65		150.0	
		Z	1.17	63.41	15.09		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	4.78	66.61	17.05	1.46	150.0	± 9.6 %
		Y	4.80	66.74	17.21		150.0	
		Z	4.93	66.52	17.11		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	100.00	111.37	25.72	9.39	50.0	± 9.6 %
		Y	100.00	111.58	25.35		50.0	
		Z	100.00	117.02	28.59		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	100.00	110.83	25.53	9.57	50.0	± 9.6 %
		Y	1707.76	142.54	31.32		50.0	
		Z	100.00	116.46	28.39		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	100.00	111.84	24.81	6.56	60.0	± 9.6 %
		Y	100.00	114.48	25.68		60.0	
		Z	100.00	118.35	28.09		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	3.46	65.17	23.20	12.57	50.0	± 9.6 %
		Y	5.27	82.06	33.95		50.0	
		Z	3.61	65.78	23.81		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	6.19	83.69	29.67	9.56	60.0	± 9.6 %
		Y	7.27	90.43	33.46		60.0	
		Z	7.46	87.49	31.34		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	114.23	25.06	4.80	80.0	± 9.6 %
		Y	100.00	119.65	27.19		80.0	
		Z	100.00	121.09	28.48		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	118.39	26.12	3.55	100.0	± 9.6 %
		Y	100.00	127.35	29.74		100.0	
		Z	100.00	125.00	29.42		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	4.31	75.70	25.15	7.80	80.0	± 9.6 %
		Y	4.62	78.76	27.21		80.0	
		Z	5.10	78.80	26.60		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	100.00	110.42	23.70	5.30	70.0	± 9.6 %
		Y	100.00	113.76	24.95		70.0	
		Z	100.00	117.44	27.22		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	118.50	24.77	1.88	100.0	± 9.6 %
		Y	100.00	132.66	30.37		100.0	
		Z	100.00	126.29	28.44		100.0	

10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	133.47	29.67	1.17	100.0	± 9.6 %
		Y	100.00	157.48	38.89		100.0	
		Z	100.00	136.04	31.29		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	8.66	91.15	24.16	5.30	70.0	± 9.6 %
		Y	61.92	124.81	33.89		70.0	
		Z	18.44	105.53	29.79		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	2.66	76.47	17.66	1.88	100.0	± 9.6 %
		Y	4.91	85.76	21.28		100.0	
		Z	3.14	79.12	19.77		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	1.87	72.76	15.96	1.17	100.0	± 9.6 %
		Y	2.71	78.22	18.36		100.0	
		Z	2.01	73.50	17.25		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	12.89	97.56	26.18	5.30	70.0	± 9.6 %
		Y	100.00	133.04	35.90		70.0	
		Z	33.52	115.95	32.67		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	2.40	75.20	17.16	1.88	100.0	± 9.6 %
		Y	4.17	83.65	20.57		100.0	
		Z	2.91	78.15	19.38		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	1.89	73.11	16.24	1.17	100.0	± 9.6 %
		Y	2.73	78.67	18.67		100.0	
		Z	2.03	73.85	17.51		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	1.93	73.30	15.79	0.00	150.0	± 9.6 %
		Y	2.16	74.82	16.50		150.0	
		Z	1.82	71.39	15.74		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	100.00	108.18	23.51	7.78	50.0	± 9.6 %
		Y	100.00	108.75	23.44		50.0	
		Z	100.00	113.77	26.32		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.00	97.63	1.20	0.00	150.0	± 9.6 %
		Y	0.00	97.90	0.75		150.0	
		Z	0.00	95.09	2.63		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	29.38	92.85	22.01	13.80	25.0	± 9.6 %
		Y	100.00	106.19	24.33		25.0	
		Z	100.00	113.54	28.60		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	92.32	108.50	25.07	10.79	40.0	± 9.6 %
		Y	100.00	108.13	24.14		40.0	
		Z	100.00	114.66	27.93		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	28.80	103.53	27.62	9.03	50.0	± 9.6 %
		Y	100.00	125.87	33.73		50.0	
		Z	90.56	125.80	34.77		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	3.55	72.15	22.79	6.55	100.0	± 9.6 %
		Y	3.72	74.09	24.21		100.0	
		Z	4.11	74.59	23.97		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.17	64.52	15.76	0.61	110.0	± 9.6 %
		Y	1.20	65.09	16.25		110.0	
		Z	1.19	64.38	15.68		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	5.38	97.28	26.54	1.30	110.0	± 9.6 %
		Y	94.12	145.74	39.06		110.0	
		Z	7.25	100.99	27.69		110.0	

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	2.03	75.84	20.79	2.04	110.0	± 9.6 %
		Y	2.53	80.86	23.32		110.0	
		Z	2.46	78.49	22.05		110.0	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.60	66.68	16.54	0.49	100.0	± 9.6 %
		Y	4.62	66.77	16.65		100.0	
		Z	4.74	66.54	16.54		100.0	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.61	66.74	16.62	0.72	100.0	± 9.6 %
		Y	4.63	66.85	16.75		100.0	
		Z	4.75	66.63	16.64		100.0	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	4.88	66.97	16.83	0.86	100.0	± 9.6 %
		Y	4.90	67.08	16.96		100.0	
		Z	5.06	66.93	16.89		100.0	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	4.74	66.82	16.90	1.21	100.0	± 9.6 %
		Y	4.76	66.95	17.05		100.0	
		Z	4.91	66.81	16.98		100.0	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	4.74	66.80	17.04	1.46	100.0	± 9.6 %
		Y	4.77	66.94	17.21		100.0	
		Z	4.93	66.83	17.15		100.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.03	66.98	17.46	2.04	100.0	± 9.6 %
		Y	5.05	67.14	17.66		100.0	
		Z	5.21	66.94	17.57		100.0	
10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.05	66.91	17.63	2.55	100.0	± 9.6 %
		Y	5.07	67.08	17.84		100.0	
		Z	5.27	67.04	17.82		100.0	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.12	66.93	17.81	2.67	100.0	± 9.6 %
		Y	5.15	67.10	18.04		100.0	
		Z	5.34	66.99	17.99		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.86	66.65	17.32	1.99	100.0	± 9.6 %
		Y	4.89	66.79	17.50		100.0	
		Z	5.01	66.60	17.41		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	4.82	66.89	17.50	2.30	100.0	± 9.6 %
		Y	4.84	67.05	17.70		100.0	
		Z	4.99	66.92	17.63		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	4.86	67.00	17.79	2.83	100.0	± 9.6 %
		Y	4.89	67.17	18.02		100.0	
		Z	5.04	67.03	17.94		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	4.85	66.87	17.91	3.30	100.0	± 9.6 %
		Y	4.86	67.04	18.15		100.0	
		Z	5.01	66.88	18.08		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	4.86	66.89	18.16	3.82	90.0	± 9.6 %
		Y	4.87	67.06	18.42		90.0	
		Z	5.04	67.00	18.40		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	4.88	66.70	18.29	4.15	90.0	± 9.6 %
		Y	4.89	66.85	18.55		90.0	
		Z	5.03	66.71	18.47		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	4.91	66.76	18.38	4.30	90.0	± 9.6 %
		Y	4.91	66.91	18.65		90.0	
		Z	5.05	66.76	18.56		90.0	

10081-CAB	CDMA2000 (1xRTT, RC3)	X	0.83	66.43	12.40	0.00	150.0	± 9.6 %
		Y	0.90	67.46	13.02		150.0	
		Z	0.87	65.72	12.74		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	0.60	60.00	4.03	4.77	80.0	± 9.6 %
		Y	1.74	63.67	4.99		80.0	
		Z	0.50	57.10	2.51		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	100.00	111.84	24.82	6.56	60.0	± 9.6 %
		Y	100.00	114.47	25.69		60.0	
		Z	100.00	118.36	28.12		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	1.87	68.36	15.98	0.00	150.0	± 9.6 %
		Y	1.92	68.79	16.27		150.0	
		Z	1.83	67.16	15.53		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.83	68.30	15.96	0.00	150.0	± 9.6 %
		Y	1.88	68.76	16.25		150.0	
		Z	1.79	67.10	15.49		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	6.23	83.81	29.72	9.56	60.0	± 9.6 %
		Y	7.34	90.66	33.54		60.0	
		Z	7.51	87.64	31.39		60.0	
10100-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.10	70.42	16.91	0.00	150.0	± 9.6 %
		Y	3.17	70.79	17.14		150.0	
		Z	3.14	69.95	16.56		150.0	
10101-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.21	67.53	16.05	0.00	150.0	± 9.6 %
		Y	3.24	67.71	16.18		150.0	
		Z	3.28	67.33	15.89		150.0	
10102-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.31	67.53	16.15	0.00	150.0	± 9.6 %
		Y	3.34	67.67	16.26		150.0	
		Z	3.39	67.31	16.00		150.0	
10103-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	5.23	73.47	19.72	3.98	65.0	± 9.6 %
		Y	5.84	75.95	21.01		65.0	
		Z	5.88	74.83	20.39		65.0	
10104-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	5.46	71.98	19.77	3.98	65.0	± 9.6 %
		Y	5.63	73.01	20.49		65.0	
		Z	6.00	73.07	20.39		65.0	
10105-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	5.42	71.61	19.91	3.98	65.0	± 9.6 %
		Y	5.43	72.06	20.36		65.0	
		Z	5.47	71.05	19.77		65.0	
10108-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	2.70	69.72	16.76	0.00	150.0	± 9.6 %
		Y	2.76	70.10	16.99		150.0	
		Z	2.75	69.19	16.39		150.0	
10109-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	2.86	67.48	15.96	0.00	150.0	± 9.6 %
		Y	2.89	67.67	16.11		150.0	
		Z	2.94	67.16	15.80		150.0	
10110-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.18	68.93	16.34	0.00	150.0	± 9.6 %
		Y	2.24	69.40	16.63		150.0	
		Z	2.24	68.24	15.99		150.0	
10111-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.61	68.71	16.36	0.00	150.0	± 9.6 %
		Y	2.63	68.84	16.47		150.0	
		Z	2.65	67.91	16.10		150.0	

10112-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	2.99	67.52	16.03	0.00	150.0	± 9.6 %
		Y	3.01	67.67	16.15		150.0	
		Z	3.06	67.16	15.86		150.0	
10113-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.77	68.89	16.50	0.00	150.0	± 9.6 %
		Y	2.78	68.97	16.58		150.0	
		Z	2.81	68.06	16.24		150.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.09	67.23	16.55	0.00	150.0	± 9.6 %
		Y	5.10	67.28	16.60		150.0	
		Z	5.19	67.11	16.46		150.0	
10115-CAB	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.34	67.29	16.58	0.00	150.0	± 9.6 %
		Y	5.35	67.33	16.63		150.0	
		Z	5.51	67.33	16.58		150.0	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.18	67.42	16.57	0.00	150.0	± 9.6 %
		Y	5.19	67.47	16.62		150.0	
		Z	5.30	67.34	16.50		150.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.06	67.11	16.50	0.00	150.0	± 9.6 %
		Y	5.07	67.16	16.56		150.0	
		Z	5.16	66.99	16.42		150.0	
10118-CAB	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.42	67.49	16.69	0.00	150.0	± 9.6 %
		Y	5.44	67.54	16.74		150.0	
		Z	5.60	67.55	16.70		150.0	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.16	67.38	16.56	0.00	150.0	± 9.6 %
		Y	5.17	67.43	16.62		150.0	
		Z	5.27	67.27	16.48		150.0	
10140-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.34	67.53	16.06	0.00	150.0	± 9.6 %
		Y	3.37	67.68	16.18		150.0	
		Z	3.42	67.31	15.91		150.0	
10141-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.47	67.67	16.25	0.00	150.0	± 9.6 %
		Y	3.49	67.79	16.35		150.0	
		Z	3.55	67.42	16.09		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	1.97	69.09	15.95	0.00	150.0	± 9.6 %
		Y	2.03	69.63	16.28		150.0	
		Z	2.02	68.20	15.69		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.49	69.65	15.98	0.00	150.0	± 9.6 %
		Y	2.52	69.83	16.12		150.0	
		Z	2.51	68.62	15.86		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.16	66.67	13.99	0.00	150.0	± 9.6 %
		Y	2.21	66.99	14.22		150.0	
		Z	2.30	66.43	14.30		150.0	
10145-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.07	64.11	10.67	0.00	150.0	± 9.6 %
		Y	1.11	64.57	11.01		150.0	
		Z	1.31	65.51	12.40		150.0	
10146-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	1.34	62.65	9.02	0.00	150.0	± 9.6 %
		Y	1.43	63.27	9.42		150.0	
		Z	2.01	66.35	12.18		150.0	
10147-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	1.45	63.47	9.57	0.00	150.0	± 9.6 %
		Y	1.57	64.27	10.06		150.0	
		Z	2.34	68.34	13.28		150.0	

10149-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	2.87	67.55	16.01	0.00	150.0	± 9.6 %
		Y	2.90	67.73	16.15		150.0	
		Z	2.95	67.22	15.84		150.0	
10150-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.00	67.58	16.08	0.00	150.0	± 9.6 %
		Y	3.02	67.73	16.20		150.0	
		Z	3.07	67.21	15.90		150.0	
10151-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	5.65	76.57	21.08	3.98	65.0	± 9.6 %
		Y	6.17	78.83	22.29		65.0	
		Z	6.35	77.82	21.74		65.0	
10152-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	4.98	71.84	19.37	3.98	65.0	± 9.6 %
		Y	5.18	73.09	20.20		65.0	
		Z	5.53	73.00	20.11		65.0	
10153-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	5.35	72.93	20.23	3.98	65.0	± 9.6 %
		Y	5.53	74.06	20.99		65.0	
		Z	5.88	73.94	20.90		65.0	
10154-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.24	69.40	16.63	0.00	150.0	± 9.6 %
		Y	2.29	69.81	16.88		150.0	
		Z	2.29	68.69	16.27		150.0	
10155-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.62	68.74	16.38	0.00	150.0	± 9.6 %
		Y	2.64	68.87	16.49		150.0	
		Z	2.65	67.91	16.11		150.0	
10156-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	1.81	69.21	15.68	0.00	150.0	± 9.6 %
		Y	1.88	69.80	16.04		150.0	
		Z	1.87	68.31	15.53		150.0	
10157-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.01	67.27	13.98	0.00	150.0	± 9.6 %
		Y	2.06	67.66	14.24		150.0	
		Z	2.13	67.00	14.37		150.0	
10158-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	2.78	68.97	16.55	0.00	150.0	± 9.6 %
		Y	2.79	69.05	16.63		150.0	
		Z	2.81	68.12	16.28		150.0	
10159-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.12	67.76	14.27	0.00	150.0	± 9.6 %
		Y	2.17	68.10	14.50		150.0	
		Z	2.25	67.49	14.68		150.0	
10160-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	2.73	68.96	16.55	0.00	150.0	± 9.6 %
		Y	2.78	69.27	16.76		150.0	
		Z	2.78	68.34	16.22		150.0	
10161-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	2.89	67.56	16.00	0.00	150.0	± 9.6 %
		Y	2.92	67.72	16.12		150.0	
		Z	2.97	67.14	15.84		150.0	
10162-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	3.00	67.76	16.13	0.00	150.0	± 9.6 %
		Y	3.03	67.89	16.24		150.0	
		Z	3.08	67.27	15.94		150.0	
10166-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	3.29	68.55	18.62	3.01	150.0	± 9.6 %
		Y	3.39	69.14	19.00		150.0	
		Z	3.56	68.77	18.74		150.0	
10167-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	3.85	70.83	18.84	3.01	150.0	± 9.6 %
		Y	4.06	71.87	19.39		150.0	
		Z	4.27	71.19	19.04		150.0	

10168-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	4.31	73.34	20.36	3.01	150.0	± 9.6 %
		Y	4.51	74.19	20.77		150.0	
		Z	4.72	73.40	20.38		150.0	
10169-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	2.65	67.07	17.95	3.01	150.0	± 9.6 %
		Y	2.76	67.90	18.46		150.0	
		Z	2.95	68.18	18.47		150.0	
10170-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	3.35	71.83	19.98	3.01	150.0	± 9.6 %
		Y	3.58	73.08	20.56		150.0	
		Z	3.90	73.37	20.58		150.0	
10171-AAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	2.80	68.11	17.24	3.01	150.0	± 9.6 %
		Y	3.01	69.49	17.99		150.0	
		Z	3.23	69.44	17.85		150.0	
10172-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	3.65	76.31	22.99	6.02	65.0	± 9.6 %
		Y	5.48	85.89	27.40		65.0	
		Z	5.55	83.03	25.87		65.0	
10173-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	6.66	85.15	24.55	6.02	65.0	± 9.6 %
		Y	10.56	95.03	28.43		65.0	
		Z	12.26	94.72	28.10		65.0	
10174-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	4.93	79.32	21.92	6.02	65.0	± 9.6 %
		Y	8.98	90.91	26.48		65.0	
		Z	8.81	87.78	25.30		65.0	
10175-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	2.62	66.79	17.70	3.01	150.0	± 9.6 %
		Y	2.73	67.64	18.24		150.0	
		Z	2.91	67.87	18.21		150.0	
10176-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	3.35	71.86	19.99	3.01	150.0	± 9.6 %
		Y	3.58	73.10	20.58		150.0	
		Z	3.90	73.39	20.59		150.0	
10177-CAF	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	2.64	66.92	17.79	3.01	150.0	± 9.6 %
		Y	2.75	67.76	18.31		150.0	
		Z	2.94	68.03	18.32		150.0	
10178-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	3.33	71.68	19.88	3.01	150.0	± 9.6 %
		Y	3.56	72.95	20.49		150.0	
		Z	3.86	73.15	20.45		150.0	
10179-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	3.04	69.83	18.46	3.01	150.0	± 9.6 %
		Y	3.27	71.21	19.16		150.0	
		Z	3.53	71.24	19.06		150.0	
10180-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	2.79	68.06	17.20	3.01	150.0	± 9.6 %
		Y	3.00	69.44	17.95		150.0	
		Z	3.23	69.37	17.80		150.0	
10181-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	2.64	66.91	17.79	3.01	150.0	± 9.6 %
		Y	2.74	67.75	18.31		150.0	
		Z	2.93	68.01	18.31		150.0	
10182-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	3.32	71.66	19.87	3.01	150.0	± 9.6 %
		Y	3.55	72.93	20.48		150.0	
		Z	3.85	73.13	20.44		150.0	
10183-AAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	2.79	68.04	17.19	3.01	150.0	± 9.6 %
		Y	3.00	69.42	17.94		150.0	
		Z	3.22	69.35	17.79		150.0	

10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	2.65	66.95	17.81	3.01	150.0	± 9.6 %
		Y	2.75	67.79	18.33		150.0	
		Z	2.95	68.05	18.33		150.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	3.34	71.72	19.91	3.01	150.0	± 9.6 %
		Y	3.57	72.99	20.51		150.0	
		Z	3.87	73.20	20.48		150.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	2.80	68.09	17.22	3.01	150.0	± 9.6 %
		Y	3.01	69.48	17.97		150.0	
		Z	3.23	69.41	17.82		150.0	
10187-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	2.66	67.00	17.88	3.01	150.0	± 9.6 %
		Y	2.76	67.84	18.40		150.0	
		Z	2.95	68.09	18.39		150.0	
10188-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	3.43	72.31	20.28	3.01	150.0	± 9.6 %
		Y	3.66	73.53	20.84		150.0	
		Z	4.00	73.86	20.87		150.0	
10189-AAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	2.85	68.45	17.48	3.01	150.0	± 9.6 %
		Y	3.07	69.84	18.22		150.0	
		Z	3.30	69.81	18.09		150.0	
10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.48	66.73	16.24	0.00	150.0	± 9.6 %
		Y	4.49	66.78	16.30		150.0	
		Z	4.58	66.49	16.16		150.0	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.63	67.01	16.37	0.00	150.0	± 9.6 %
		Y	4.65	67.06	16.43		150.0	
		Z	4.76	66.82	16.28		150.0	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	4.67	67.04	16.38	0.00	150.0	± 9.6 %
		Y	4.69	67.09	16.44		150.0	
		Z	4.80	66.85	16.30		150.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.47	66.77	16.24	0.00	150.0	± 9.6 %
		Y	4.48	66.82	16.30		150.0	
		Z	4.59	66.56	16.19		150.0	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	4.64	67.02	16.38	0.00	150.0	± 9.6 %
		Y	4.66	67.08	16.44		150.0	
		Z	4.78	66.84	16.30		150.0	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	4.67	67.05	16.39	0.00	150.0	± 9.6 %
		Y	4.68	67.10	16.45		150.0	
		Z	4.81	66.86	16.31		150.0	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.42	66.79	16.21	0.00	150.0	± 9.6 %
		Y	4.44	66.84	16.27		150.0	
		Z	4.54	66.57	16.15		150.0	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	4.64	66.99	16.36	0.00	150.0	± 9.6 %
		Y	4.65	67.04	16.42		150.0	
		Z	4.77	66.82	16.29		150.0	
10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	4.68	66.98	16.38	0.00	150.0	± 9.6 %
		Y	4.69	67.03	16.44		150.0	
		Z	4.81	66.80	16.30		150.0	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.03	67.11	16.49	0.00	150.0	± 9.6 %
		Y	5.04	67.15	16.55		150.0	
		Z	5.14	67.00	16.41		150.0	

10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.33	67.33	16.62	0.00	150.0	± 9.6 %
		Y	5.34	67.38	16.68		150.0	
		Z	5.45	67.21	16.54		150.0	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.07	67.22	16.48	0.00	150.0	± 9.6 %
		Y	5.09	67.26	16.53		150.0	
		Z	5.18	67.11	16.40		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.76	66.33	15.32	0.00	150.0	± 9.6 %
		Y	2.78	66.46	15.44		150.0	
		Z	2.85	65.93	15.34		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	7.05	86.26	25.03	6.02	65.0	± 9.6 %
		Y	11.33	96.43	28.97		65.0	
		Z	13.18	96.17	28.66		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	7.07	85.23	24.04	6.02	65.0	± 9.6 %
		Y	11.45	95.09	27.83		65.0	
		Z	12.76	94.16	27.40		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	4.84	82.15	25.37	6.02	65.0	± 9.6 %
		Y	6.17	88.64	28.46		65.0	
		Z	7.76	90.12	28.51		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	6.71	85.26	24.59	6.02	65.0	± 9.6 %
		Y	10.65	95.13	28.47		65.0	
		Z	12.36	94.84	28.14		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	6.68	84.20	23.61	6.02	65.0	± 9.6 %
		Y	10.65	93.73	27.33		65.0	
		Z	11.94	92.89	26.92		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	4.67	81.40	24.99	6.02	65.0	± 9.6 %
		Y	5.94	87.77	28.07		65.0	
		Z	7.43	89.17	28.10		65.0	
10232-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	6.69	85.24	24.58	6.02	65.0	± 9.6 %
		Y	10.63	95.12	28.47		65.0	
		Z	12.34	94.82	28.14		65.0	
10233-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	6.66	84.17	23.60	6.02	65.0	± 9.6 %
		Y	10.62	93.69	27.32		65.0	
		Z	11.91	92.86	26.91		65.0	
10234-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	4.54	80.75	24.63	6.02	65.0	± 9.6 %
		Y	5.76	87.05	27.69		65.0	
		Z	7.17	88.32	27.68		65.0	
10235-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	6.69	85.26	24.59	6.02	65.0	± 9.6 %
		Y	10.64	95.16	28.48		65.0	
		Z	12.35	94.85	28.15		65.0	
10236-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	6.73	84.30	23.64	6.02	65.0	± 9.6 %
		Y	10.78	93.91	27.38		65.0	
		Z	12.05	93.03	26.96		65.0	
10237-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	4.67	81.42	25.00	6.02	65.0	± 9.6 %
		Y	5.94	87.83	28.10		65.0	
		Z	7.43	89.21	28.12		65.0	
10238-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	6.68	85.21	24.57	6.02	65.0	± 9.6 %
		Y	10.60	95.09	28.46		65.0	
		Z	12.31	94.79	28.13		65.0	

10239-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	6.64	84.13	23.58	6.02	65.0	± 9.6 %
		Y	10.57	93.64	27.30		65.0	
		Z	11.87	92.82	26.90		65.0	
10240-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	4.66	81.38	24.99	6.02	65.0	± 9.6 %
		Y	5.92	87.78	28.08		65.0	
		Z	7.41	89.16	28.10		65.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	6.49	77.69	23.88	6.98	65.0	± 9.6 %
		Y	7.06	80.22	25.34		65.0	
		Z	7.33	78.75	24.61		65.0	
10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	5.69	74.96	22.63	6.98	65.0	± 9.6 %
		Y	6.72	79.20	24.84		65.0	
		Z	6.48	76.10	23.39		65.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	5.22	73.93	23.04	6.98	65.0	± 9.6 %
		Y	5.37	75.23	24.06		65.0	
		Z	5.30	72.76	22.72		65.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	4.03	70.70	15.63	3.98	65.0	± 9.6 %
		Y	4.63	73.27	17.01		65.0	
		Z	5.80	76.12	19.17		65.0	
10245-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	3.94	70.12	15.32	3.98	65.0	± 9.6 %
		Y	4.47	72.48	16.60		65.0	
		Z	5.67	75.49	18.85		65.0	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	4.17	75.16	18.15	3.98	65.0	± 9.6 %
		Y	5.29	79.64	20.23		65.0	
		Z	5.81	80.17	21.10		65.0	
10247-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	4.10	71.58	17.29	3.98	65.0	± 9.6 %
		Y	4.43	73.43	18.37		65.0	
		Z	4.92	74.07	19.21		65.0	
10248-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	4.07	70.96	16.98	3.98	65.0	± 9.6 %
		Y	4.37	72.65	17.99		65.0	
		Z	4.90	73.42	18.88		65.0	
10249-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	5.33	79.24	20.92	3.98	65.0	± 9.6 %
		Y	6.73	84.01	23.05		65.0	
		Z	6.62	82.34	22.76		65.0	
10250-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	4.99	74.32	20.40	3.98	65.0	± 9.6 %
		Y	5.24	75.79	21.30		65.0	
		Z	5.59	75.60	21.35		65.0	
10251-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	4.75	72.14	19.02	3.98	65.0	± 9.6 %
		Y	4.99	73.56	19.92		65.0	
		Z	5.35	73.44	20.02		65.0	
10252-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	5.62	79.05	22.01	3.98	65.0	± 9.6 %
		Y	6.48	82.42	23.65		65.0	
		Z	6.49	80.72	22.96		65.0	
10253-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	4.91	71.43	19.12	3.98	65.0	± 9.6 %
		Y	5.09	72.60	19.93		65.0	
		Z	5.40	72.41	19.86		65.0	
10254-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	5.23	72.40	19.88	3.98	65.0	± 9.6 %
		Y	5.41	73.49	20.63		65.0	
		Z	5.73	73.30	20.57		65.0	

10255-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	5.37	75.82	20.95	3.98	65.0	± 9.6 %
		Y	5.81	77.90	22.11		65.0	
		Z	5.98	76.90	21.60		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	2.95	66.44	12.43	3.98	65.0	± 9.6 %
		Y	3.25	68.14	13.47		65.0	
		Z	4.63	72.57	16.66		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	2.90	65.89	12.05	3.98	65.0	± 9.6 %
		Y	3.14	67.36	12.98		65.0	
		Z	4.49	71.73	16.18		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	2.90	69.51	14.64	3.98	65.0	± 9.6 %
		Y	3.44	72.54	16.25		65.0	
		Z	4.52	75.89	18.60		65.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	4.46	72.72	18.47	3.98	65.0	± 9.6 %
		Y	4.78	74.47	19.50		65.0	
		Z	5.19	74.62	19.97		65.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	4.49	72.43	18.33	3.98	65.0	± 9.6 %
		Y	4.79	74.08	19.32		65.0	
		Z	5.22	74.34	19.84		65.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	5.17	78.27	21.02	3.98	65.0	± 9.6 %
		Y	6.16	82.12	22.85		65.0	
		Z	6.14	80.53	22.44		65.0	
10262-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	4.98	74.25	20.35	3.98	65.0	± 9.6 %
		Y	5.23	75.73	21.26		65.0	
		Z	5.58	75.55	21.31		65.0	
10263-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	4.74	72.12	19.01	3.98	65.0	± 9.6 %
		Y	4.98	73.53	19.91		65.0	
		Z	5.34	73.42	20.01		65.0	
10264-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	5.56	78.83	21.90	3.98	65.0	± 9.6 %
		Y	6.41	82.18	23.54		65.0	
		Z	6.42	80.51	22.86		65.0	
10265-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	4.98	71.84	19.37	3.98	65.0	± 9.6 %
		Y	5.18	73.09	20.20		65.0	
		Z	5.53	73.00	20.12		65.0	
10266-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	5.34	72.91	20.22	3.98	65.0	± 9.6 %
		Y	5.53	74.04	20.98		65.0	
		Z	5.88	73.92	20.89		65.0	
10267-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	5.64	76.53	21.06	3.98	65.0	± 9.6 %
		Y	6.16	78.78	22.27		65.0	
		Z	6.34	77.78	21.72		65.0	
10268-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	5.63	71.94	19.85	3.98	65.0	± 9.6 %
		Y	5.78	72.88	20.51		65.0	
		Z	6.14	72.88	20.41		65.0	
10269-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	5.64	71.57	19.72	3.98	65.0	± 9.6 %
		Y	5.77	72.45	20.36		65.0	
		Z	6.12	72.44	20.27		65.0	
10270-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	5.66	74.09	20.17	3.98	65.0	± 9.6 %
		Y	5.94	75.48	21.01		65.0	
		Z	6.22	75.05	20.69		65.0	