SAR EVALUATION REPORT

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

Date of Testing:
09/01/20 - 10/05/20
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M2009170151-01-R1.ZNF

FCC ID: ZNFK200TM

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: LM-K200TM
Additional Model(s): LMK200TM, K200TM

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.33	0.43	0.43	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.15	0.35	0.67	N/A
PCE	UMTS 850	826.40 - 846.60 MHz	0.32	0.35	0.45	N/A
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.18	1.02	0.91	2.64
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.26	0.85	1.16	2.98
PCE	LTE Band 71	665.5 - 695.5 MHz	0.31	0.35	0.47	N/A
PCE	LTE Band 12	699.7 - 715.3 MHz	0.18	0.44	0.51	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	0.38	0.59	0.62	N/A
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.36	0.41	0.42	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.20	1.08	0.95	3.03
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.24	0.57	0.85	3.04
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 41	2498.5 - 2687.5 MHz	0.25	0.42	0.63	N/A
DTS	2.4 GHz WLAN	2412 - 2462 MHz	0.35	0.45	0.45	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			0.73	1.53	1.40	3.13

Note: This revised Test Report (S/N: 1M2009170151-01-R1.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

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.

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 MHz
Bluetooth	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR

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

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

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum Output Power

GSM/GPRS/EDGE 850										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
Max	Max allowed power	33.7	33.7	30.7	29.7	28.7	26.7	24.7	23.7	22.7
	Nominal	33.2	33.2	30.2	29.2	28.2	26.2	24.2	23.2	22.2

GSM/GPRS/EDGE 1900										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
Max	Max allowed power	30.7	30.7	27.7	26.7	25.7	26.2	23.7	22.7	21.7
	Nominal	30.2	30.2	27.2	26.2	25.2	25.7	23.2	22.2	21.2

UMTS Band 5 (850 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6
Max	Max allowed power	25.2	25.2	24.2
	Nominal	24.7	24.7	23.7

UMTS Band 4 (1750 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6
Max	Max allowed power	24.2	24.2	23.2
	Nominal	23.7	23.7	22.7
Hotspot Mode Active	Max allowed power	22.2	22.2	21.2
	Nominal	21.7	21.7	20.7
Proximity Sensor Active	Max allowed power	22.2	22.2	21.2
	Nominal	21.7	21.7	20.7

UMTS Band 2 (1900 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6
Max	Max allowed power	24.7	24.7	23.7
	Nominal	24.2	24.2	23.2
Hotspot Mode Active	Max allowed power	23.2	23.2	22.2
	Nominal	22.7	22.7	21.7
Proximity Sensor Active	Max allowed power	23.2	23.2	22.2
	Nominal	22.7	22.7	21.7

Mode / Band		Modulated Average Output Power (in dBm)		
		Max	Hotspot Mode Active	Proximity Sensor Active
LTE FDD Band 71	Max allowed power	25.2	25.2	25.2
	Nominal	24.7	24.7	24.7
LTE FDD Band 12	Max allowed power	25.2	25.2	25.2
	Nominal	24.7	24.7	24.7
LTE FDD Band 13	Max allowed power	25.2	25.2	25.2
	Nominal	24.7	24.7	24.7
LTE FDD Band 5	Max allowed power	25.2	25.2	25.2
	Nominal	24.7	24.7	24.7
LTE FDD Band 26	Max allowed power	25.2	25.2	25.2
	Nominal	24.7	24.7	24.7
LTE FDD Band 4	Max allowed power	24.2	22.2	22.2
	Nominal	23.7	21.7	21.7
LTE FDD Band 66	Max allowed power	24.2	22.2	22.2
	Nominal	23.7	21.7	21.7
LTE FDD Band 2	Max allowed power	24.7	23.2	23.2
	Nominal	24.2	22.7	22.7
LTE FDD Band 25	Max allowed power	24.7	23.2	23.2
	Nominal	24.2	22.7	22.7
LTE TDD Band 41 (PC3)	Max allowed power	25.2	25.2	25.2
	Nominal	24.7	24.7	24.7
LTE TDD Band 41 (PC2)	Max allowed power	27.2	27.2	27.2
	Nominal	26.7	26.7	26.7

1.3.2 2.4 GHz Maximum Bluetooth and WLAN Output Power

Mode	Band	IEEE 802.11 (in dBm)					
		b		g		n	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.
2.4 GHz WIFI	2.45 GHz	21.5	20.5	19.5	18.5	19.0	18.0
				ch. 1: 16.0	15.0	ch. 1: 15.5	14.5
				ch. 2: 18.0	17.0	ch. 2: 17.5	16.5
				ch. 10: 18.0	17.0	ch. 10: 17.5	16.5
				ch. 11: 16.0	15.0	ch. 11: 15.5	14.5

Bluetooth (in dBm)	
Maximum	7.0
Nominal	6.0

Bluetooth LE (in dBm)	
Maximum	5.5
Nominal	4.5

1.3.3 2.4 GHz Reduced WLAN Output Power

Mode	Band	IEEE 802.11 (in dBm)					
		b		g		n	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.
2.4 GHz WIFI	2.45 GHz	18.0	17.0	18.0 ch. 1: 14.5 ch. 2: 16.5 ch. 10: 16.5 ch. 11: 14.5	17.0 13.5 15.5 15.5 13.5	18.0 ch. 1: 14.5 ch. 2: 16.5 ch. 10: 16.5 ch. 11: 14.5	17.0 13.5 15.5 15.5 13.5

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 1750	Yes	Yes	No	Yes	Yes	Yes
UMTS 1900	Yes	Yes	No	Yes	Yes	Yes
LTE Band 71	Yes	Yes	No	Yes	Yes	Yes
LTE Band 12	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 26 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 66 (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	Yes	No

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing.

1.5 Simultaneous Transmission Capabilities

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

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Phablet	Notes
1	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	Yes	
2	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
3	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
4	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
5	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
6	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
7	GPRS/EDGE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
8	GPRS/EDGE + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered

1. 2.4 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 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. This device supports VOLTE.
6. This device supports VOWIFI.
7. This device supports Bluetooth Tethering.

1.6 Miscellaneous SAR Test Considerations

(A) WIFI/BT

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; [(5/5)* √2.480] = 1.6< 3.0. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

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

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, body-worn and hotspot Bluetooth SAR was not required; [(5/10)* √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.

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

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, phablet Bluetooth SAR was not required; [(5/ 5)* √2.480] = 1.6< 7.5. Per KDB Publication 447498 D01v06, the maximum power of the channel was rounded to the nearest mW before calculation.

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

(B) Licensed Transmitter(s)

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

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

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

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).

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, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)
- FCC KDB Publication 616217 D04v01r02 (Proximity Sensor)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE Band 41 Power Class 2/3)

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					
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 71 (665.5 - 695.5 MHz)				
	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 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 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 13: 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 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 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 71: 5 MHz	665.5 (133147)		680.5 (133297)		695.5 (133447)
LTE Band 71: 10 MHz	668 (133172)		680.5 (133297)		693 (133422)
LTE Band 71: 15 MHz	670.5 (133197)		680.5 (133297)		690.5 (133397)
LTE Band 71: 20 MHz	673 (133222)		680.5 (133297)		688 (133372)
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)		715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)		714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)		713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)		711 (23130)
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)		784.5 (23255)
LTE Band 13: 10 MHz	N/A		782 (23230)		N/A
LTE Band 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 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)		1779.3 (132665)
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)		1778.5 (132657)
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)		1777.5 (132647)
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)		1775 (132622)
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)		1772.5 (132597)
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)		1770 (132572)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)		1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)		1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)		1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)		1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)		1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)		1745 (20300)
LTE Band 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	DL UE Cat 5, UL UE Cat 4				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 10 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, 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:

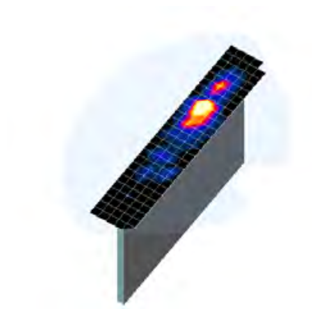

Figure 4-1
Sample SAR Area Scan

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].

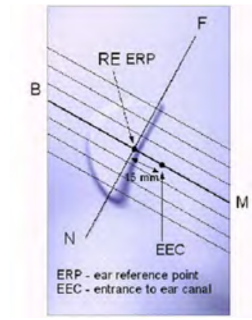

Figure 5-1
Close-Up Side view of ERP

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

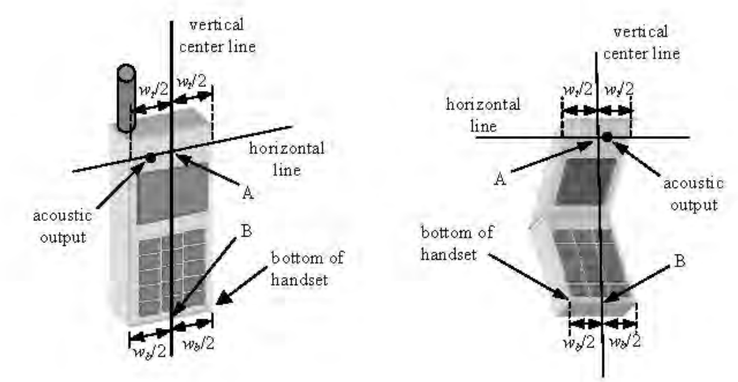

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

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.

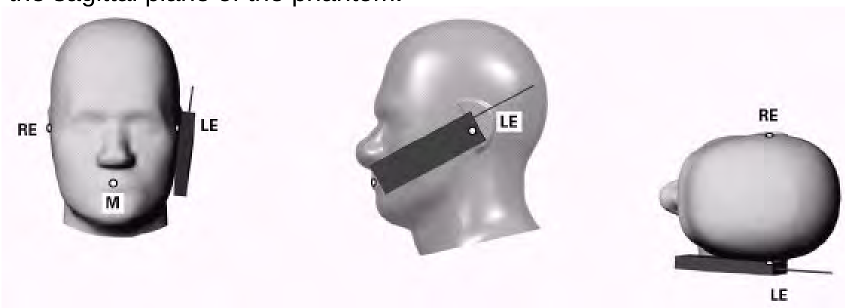

Figure 6-1 Front, Side and Top View of Cheek Position

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).

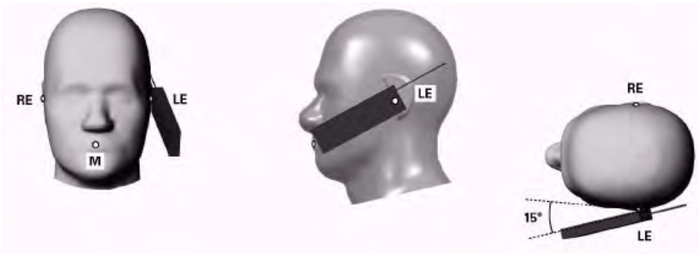

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

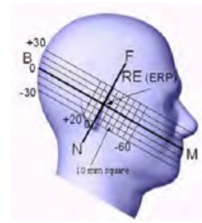

Figure 6-3
Side view w/ relevant markings

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

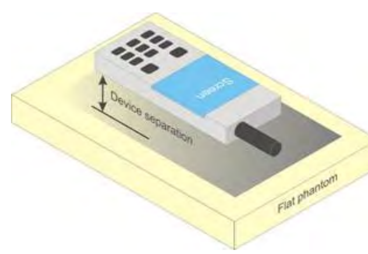

Figure 6-4
Sample Body-Worn Diagram

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

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

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

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1g body and 10g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v06, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

6.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

6.8 Phablet Configurations

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

6.9 Proximity Sensor Considerations

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

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

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

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 3G SAR Test Reduction Procedure

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

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

8.4.2 Head SAR Measurements

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

8.4.3 Body SAR Measurements

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

8.4.4 SAR Measurements with Rel 5 HSDPA

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

8.4.5 SAR Measurements with Rel 6 HSUPA

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

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

8.5 SAR Measurement Conditions for LTE

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

8.5.1 Spectrum Plots for RB Configurations

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

8.5.2 MPR

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

8.5.3 A-MPR

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

8.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

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

8.5.5 TDD

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

8.6 SAR Testing with 802.11 Transmitters

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

8.6.1 General Device Setup

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

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

8.6.2 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.6.3 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.6.4 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, 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.6.5 Initial Test Configuration Procedure

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

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 8.6.4). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.6.6 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

Table 9-1
Maximum Conducted Power

Maximum Burst-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	33.55	33.56	30.35	29.53	**28.51**	26.70	24.43	23.61	22.45
	190	33.62	33.68	30.51	29.67	**28.63**	26.66	24.54	23.70	22.61
	251	33.65	33.67	30.70	29.69	**28.70**	26.62	24.67	23.65	22.68
GSM 1900	512	30.57	30.52	27.60	26.55	**25.31**	26.20	23.57	22.68	21.56
	661	30.51	30.48	27.47	26.38	**25.23**	26.09	23.41	22.46	21.36
	810	30.65	30.69	27.53	26.34	**25.39**	26.10	23.39	22.42	21.29

Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	24.35	24.36	24.16	25.10	**25.33**	17.50	18.24	19.18	19.27
	190	24.42	24.48	24.32	25.24	**25.45**	17.46	18.35	19.27	19.43
	251	24.45	24.47	24.51	25.26	**25.52**	17.42	18.48	19.22	19.50
GSM 1900	512	21.37	21.32	21.41	22.12	**22.13**	17.00	17.38	18.25	18.38
	661	21.31	21.28	21.28	21.95	**22.05**	16.89	17.22	18.03	18.18
	810	21.45	21.49	21.34	21.91	**22.21**	16.90	17.20	17.99	18.11

GSM 850	Frame Avg.Targets:	24.00	24.00	24.01	24.77	**25.02**	17.00	18.01	18.77	19.02
GSM 1900		21.00	21.00	21.01	21.77	**22.02**	16.50	17.01	17.77	18.02

Note:

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

GSM Class: B
GPRS Multislot class: 12 (Max 4 Tx uplink slots)
EDGE Multislot class: 12 (Max 4 Tx uplink slots)
DTM Multislot Class: N/A

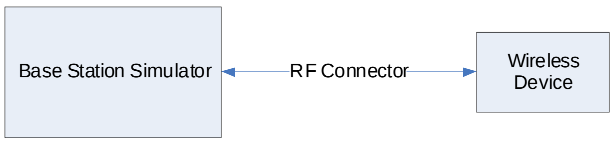

Figure 9-1
Power Measurement Setup

9.2 UMTS Conducted Powers

Table 9-2
Maximum Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			AWS Band [dBm]			PCS Band [dBm]			MPR [dB]
			4132	4183	4233	1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	25.04	25.20	25.04	24.06	24.19	24.08	24.38	24.64	24.44	-
99		12.2 kbps AMR	24.97	25.04	25.03	23.98	24.20	24.07	24.45	24.55	24.39	-
6	HSDPA	Subtest 1	24.09	24.06	24.03	22.93	23.04	23.04	23.30	23.41	23.25	0
6		Subtest 2	24.10	24.17	24.10	22.70	22.90	22.97	23.27	23.35	23.24	0
6		Subtest 3	23.50	23.73	23.66	22.39	22.50	22.49	22.90	22.95	22.84	0.5
6		Subtest 4	23.44	23.59	23.61	22.45	22.55	22.45	22.82	22.94	22.84	0.5
6	HSUPA	Subtest 1	24.07	24.20	24.08	22.85	22.57	22.80	23.09	22.64	22.58	0
6		Subtest 2	22.58	22.55	22.48	21.38	21.43	21.41	21.85	22.22	22.16	1
6		Subtest 3	22.94	22.83	23.05	21.75	21.85	21.70	22.21	22.33	22.20	1
6		Subtest 4	22.90	23.00	23.49	21.87	22.40	21.74	22.68	22.33	22.44	0.5
6		Subtest 5	23.98	24.19	24.09	22.82	22.96	22.84	23.11	23.15	22.98	0

Table 9-3
Reduced Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	AWS Band [dBm]			PCS Band [dBm]			MPR [dB]
			1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	22.04	22.02	21.94	22.75	22.84	22.91	-
99		12.2 kbps AMR	21.96	22.10	21.86	22.68	22.83	22.83	-
6	HSDPA	Subtest 1	20.56	20.49	20.40	21.69	21.87	21.72	0
6		Subtest 2	20.49	20.57	20.51	21.65	21.84	21.78	0
6		Subtest 3	20.01	19.99	19.97	21.19	21.38	21.34	0.5
6		Subtest 4	20.01	19.98	19.97	21.19	21.38	21.34	0.5
6	HSUPA	Subtest 1	20.43	20.47	20.52	21.18	21.33	21.69	0
6		Subtest 2	19.26	19.37	19.46	20.51	20.70	20.69	1
6		Subtest 3	19.20	19.30	19.21	20.40	20.59	20.20	1
6		Subtest 4	19.29	19.85	19.89	21.20	21.31	21.21	0.5
6		Subtest 5	20.44	20.48	20.40	21.63	21.82	21.72	0

This device does not support DC-HSDPA.

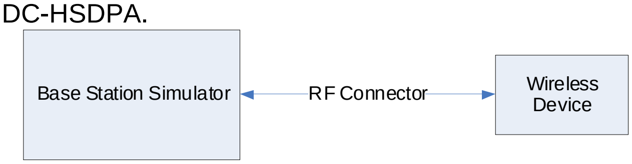

Figure 9-2
Power Measurement Setup

9.3 LTE Conducted Powers

9.3.1 LTE Band 71

Table 9-4
LTE Band 71 Conducted Powers - 20 MHz Bandwidth

LTE Band 71 20 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 133297 (680.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.23	0	0
	1	50	**24.42**		0
	1	99	24.17		0
	50	0	23.78	0-1	1
	50	25	**23.87**		1
	50	50	23.61		1
	100	0	23.70		1
16QAM	1	0	23.88	0-1	1
	1	50	23.48		1
	1	99	23.67		1
	50	0	22.79	0-2	2
	50	25	22.93		2
	50	50	22.76		2
	100	0	22.66		2
64QAM	1	0	22.46	0-2	2
	1	50	22.63		2
	1	99	22.64		2
	50	0	21.60	0-3	3
	50	25	21.89		3
	50	50	21.52		3
	100	0	21.67		3

Note: LTE Band 71 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 9-5
LTE Band 71 Conducted Powers - 15 MHz Bandwidth

LTE Band 71 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 133297 (680.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.30	0	0
	1	36	24.56		0
	1	74	24.38		0
	36	0	23.67	0-1	1
	36	18	23.53		1
	36	37	23.54		1
	75	0	23.53		1
16QAM	1	0	23.82	0-1	1
	1	36	23.60		1
	1	74	23.55		1
	36	0	22.66	0-2	2
	36	18	22.62		2
	36	37	22.53		2
	75	0	22.61		2
64QAM	1	0	22.47	0-2	2
	1	36	22.42		2
	1	74	22.21		2
	36	0	21.53	0-3	3
	36	18	21.49		3
	36	37	21.48		3
	75	0	21.46		3

Note: LTE Band 71 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 9-6
LTE Band 71 Conducted Powers - 10 MHz Bandwidth

LTE Band 71 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 133172 (668.0 MHz)	Mid Channel 133297 (680.5 MHz)	High Channel 133422 (693.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.65	24.45	24.25	0	0
	1	25	24.62	24.65	24.60		0
	1	49	24.57	24.63	24.08		0
	25	0	23.63	23.56	23.53	0-1	1
	25	12	23.60	23.57	23.41		1
	25	25	23.59	23.44	23.37		1
	50	0	23.50	23.62	23.37		1
16QAM	1	0	23.65	23.39	23.84	0-1	1
	1	25	23.57	23.59	23.80		1
	1	49	23.53	23.52	23.60		1
	25	0	22.67	22.54	22.55	0-2	2
	25	12	22.56	22.63	22.36		2
	25	25	22.73	22.59	22.33		2
	50	0	22.65	22.45	22.40		2
64QAM	1	0	22.13	22.01	22.16	0-2	2
	1	25	22.39	22.31	22.28		2
	1	49	21.95	21.85	22.05		2
	25	0	21.61	21.61	21.36	0-3	3
	25	12	21.50	21.60	21.33		3
	25	25	21.49	21.48	21.30		3
	50	0	21.49	21.55	21.35		3

Table 9-7
LTE Band 71 Conducted Powers - 5 MHz Bandwidth

LTE Band 71 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 133147 (665.5 MHz)	Mid Channel 133297 (680.5 MHz)	High Channel 133447 (695.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.60	24.46	24.39	0	0
	1	12	24.78	24.69	24.61		0
	1	24	24.78	24.47	24.25		0
	12	0	23.62	23.56	23.43	0-1	1
	12	6	23.55	23.61	23.37		1
	12	13	23.54	23.59	23.31		1
	25	0	23.62	23.54	23.37		1
16QAM	1	0	23.17	23.05	23.12	0-1	1
	1	12	23.50	23.28	23.67		1
	1	24	23.00	22.87	23.05		1
	12	0	22.62	22.55	22.16	0-2	2
	12	6	22.65	22.60	22.27		2
	12	13	22.58	22.56	22.23		2
	25	0	22.47	22.47	22.32		2
64QAM	1	0	22.40	22.24	22.47	0-2	2
	1	12	22.57	22.42	22.61		2
	1	24	22.33	22.16	21.87		2
	12	0	21.70	21.42	21.34	0-3	3
	12	6	21.67	21.48	21.37		3
	12	13	21.60	21.42	21.41		3
	25	0	21.41	21.43	21.40		3

9.3.2 LTE Band 12

Table 9-8
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	24.50	0	0
	1	25	**24.80**		0
	1	49	24.62		0
	25	0	**23.77**	0-1	1
	25	12	23.71		1
	25	25	23.59		1
	50	0	23.64		1
16QAM	1	0	23.23	0-1	1
	1	25	23.53		1
	1	49	23.08		1
	25	0	22.57	0-2	2
	25	12	22.59		2
	25	25	22.42		2
	50	0	22.50		2
64QAM	1	0	22.22	0-2	2
	1	25	22.14		2
	1	49	22.36		2
	25	0	21.40	0-3	3
	25	12	21.43		3
	25	25	21.39		3
	50	0	21.28		3

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

Table 9-9
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	24.51	24.55	24.36	0	0
	1	12	24.57	24.58	24.50		0
	1	24	24.31	24.37	24.57		0
	12	0	23.40	23.45	23.31	0-1	1
	12	6	23.36	23.54	23.37		1
	12	13	23.24	23.26	23.39		1
	25	0	23.35	23.43	23.32		1
16QAM	1	0	22.82	22.80	22.91	0-1	1
	1	12	22.97	23.28	23.06		1
	1	24	22.80	22.70	23.15		1
	12	0	22.39	22.25	22.40	0-2	2
	12	6	22.27	22.45	22.39		2
	12	13	22.11	22.28	22.32		2
	25	0	22.39	22.34	22.31		2
64QAM	1	0	22.22	22.08	22.20	0-2	2
	1	12	22.43	22.65	22.44		2
	1	24	22.37	22.03	22.51		2
	12	0	21.33	21.23	21.29	0-3	3
	12	6	21.37	21.29	21.42		3
	12	13	21.07	21.07	21.25		3
	25	0	21.25	21.19	21.12		3

Table 9-10
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	24.54	24.60	24.36	0	0
	1	7	24.59	24.79	24.60		0
	1	14	24.46	24.30	24.57		0
	8	0	23.53	23.63	23.37	0-1	1
	8	4	23.46	23.54	23.48		1
	8	7	23.37	23.60	23.61		1
	15	0	23.51	23.41	23.44		1
16QAM	1	0	22.90	23.01	22.87	0-1	1
	1	7	23.05	23.15	23.18		1
	1	14	22.88	22.87	23.06		1
	8	0	22.57	22.52	22.47	0-2	2
	8	4	22.50	22.61	22.69		2
	8	7	22.49	22.60	22.73		2
	15	0	22.42	22.59	22.27		2
64QAM	1	0	22.50	22.20	22.10	0-2	2
	1	7	22.60	22.29	22.61		2
	1	14	22.29	22.08	22.31		2
	8	0	21.39	21.29	21.29	0-3	3
	8	4	21.35	21.53	21.32		3
	8	7	21.25	21.30	21.43		3
	15	0	21.36	21.30	21.26		3

Table 9-11
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	24.59	24.51	24.58	0	0
	1	2	24.46	24.57	24.48		0
	1	5	24.44	24.64	24.57		0
	3	0	24.45	24.34	24.37		0
	3	2	24.39	24.41	24.53		0
	3	3	24.36	24.38	24.43		0
	6	0	23.47	23.52	23.57	0-1	1
16QAM	1	0	23.02	23.18	23.34	0-1	1
	1	2	23.28	23.40	23.33		1
	1	5	22.99	23.25	23.10		1
	3	0	23.30	23.35	23.25		1
	3	2	23.44	23.37	23.34		1
	3	3	23.09	23.37	23.33		1
	6	0	22.34	22.31	22.45	0-2	2
64QAM	1	0	22.55	22.35	22.42	0-2	2
	1	2	22.51	22.59	22.64		2
	1	5	22.40	22.43	22.30		2
	3	0	22.24	22.13	22.23		2
	3	2	22.12	22.09	22.25		2
	3	3	22.11	22.17	22.29		2
	6	0	21.35	21.23	21.35	0-3	3

9.3.3 LTE Band 13

Table 9-12
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

LTE Band 13 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.91	0	0
	1	25	24.94		0
	1	49	**24.96**		0
	25	0	**23.93**	0-1	1
	25	12	23.83		1
	25	25	23.76		1
	50	0	23.90		1
16QAM	1	0	23.44	0-1	1
	1	25	23.37		1
	1	49	23.05		1
	25	0	22.62	0-2	2
	25	12	22.71		2
	25	25	22.56		2
	50	0	22.77		2
64QAM	1	0	22.59	0-2	2
	1	25	22.96		2
	1	49	22.55		2
	25	0	21.56	0-3	3
	25	12	21.69		3
	25	25	21.35		3
	50	0	21.60		3

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

LTE Band 13 5 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.61	0	0
	1	12	24.65		0
	1	24	24.66		0
	12	0	23.71	0-1	1
	12	6	23.68		1
	12	13	23.54		1
	25	0	23.65		1
16QAM	1	0	23.67	0-1	1
	1	12	23.82		1
	1	24	23.63		1
	12	0	22.66	0-2	2
	12	6	22.63		2
	12	13	22.48		2
	25	0	22.59		2
64QAM	1	0	22.57	0-2	2
	1	12	22.81		2
	1	24	22.39		2
	12	0	21.68	0-3	3
	12	6	21.62		3
	12	13	21.42		3
	25	0	21.57		3

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

9.3.4 LTE Band 26 (Cell)

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

LTE Band 26 (Cell) 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 26865 (831.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.89	0	0
	1	36	**25.05**		0
	1	74	24.92		0
	36	0	**23.89**	0-1	1
	36	18	23.73		1
	36	37	23.77		1
	75	0	23.85		1
16QAM	1	0	23.79	0-1	1
	1	36	23.95		1
	1	74	23.29		1
	36	0	22.65	0-2	2
	36	18	22.54		2
	36	37	22.61		2
	75	0	22.81		2
64QAM	1	0	22.47	0-2	2
	1	36	22.63		2
	1	74	22.53		2
	36	0	21.70	0-3	3
	36	18	21.73		3
	36	37	21.67		3
	75	0	21.73		3

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

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

LTE Band 26 (Cell) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26740 (819.0 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 26990 (844.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.52	24.23	24.75	0	0
	1	25	24.82	24.59	24.82		0
	1	49	24.57	24.31	24.65		0
	25	0	23.76	23.87	24.04	0-1	1
	25	12	23.82	23.82	23.99		1
	25	25	23.71	23.78	23.89		1
	50	0	23.74	23.84	24.01		1
16QAM	1	0	23.80	23.70	24.13	0-1	1
	1	25	23.96	23.93	24.00		1
	1	49	23.29	23.84	23.82		1
	25	0	23.04	22.85	23.04	0-2	2
	25	12	23.10	22.86	23.01		2
	25	25	23.00	22.81	23.01		2
	50	0	22.84	22.69	23.10		2
64QAM	1	0	22.45	22.50	23.10	0-2	2
	1	25	22.57	22.80	23.20		2
	1	49	22.53	22.49	23.19		2
	25	0	21.57	21.83	22.15	0-3	3
	25	12	21.73	21.82	22.07		3
	25	25	21.81	21.96	21.98		3
	50	0	21.68	21.76	21.98		3

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

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26715 (816.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27015 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.50	24.58	24.46	0	0
	1	12	24.67	24.88	24.85		0
	1	24	24.70	24.58	24.55		0
	12	0	23.63	23.84	24.00	0-1	1
	12	6	23.72	23.85	23.91		1
	12	13	23.75	23.79	23.86		1
	25	0	23.76	23.77	23.97		1
16QAM	1	0	23.20	24.06	23.70	0-1	1
	1	12	23.72	24.14	24.09		1
	1	24	23.22	23.83	23.61		1
	12	0	22.57	22.66	22.99	0-2	2
	12	6	22.64	22.88	22.70		2
	12	13	22.79	22.66	22.76		2
	25	0	22.82	22.77	23.03		2
64QAM	1	0	22.87	22.52	22.63	0-2	2
	1	12	22.91	22.78	22.91		2
	1	24	22.91	22.53	22.88		2
	12	0	21.67	21.72	21.81	0-3	3
	12	6	21.73	21.97	21.69		3
	12	13	21.77	21.74	21.65		3
	25	0	21.70	21.75	21.95		3

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

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26705 (815.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27025 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.40	24.40	24.74	0	0
	1	7	24.39	24.50	24.93		0
	1	14	24.33	24.39	24.65		0
	8	0	23.66	23.74	23.95	0-1	1
	8	4	23.65	23.81	23.93		1
	8	7	23.59	23.79	23.90		1
	15	0	23.60	23.79	23.91		1
16QAM	1	0	23.52	23.52	23.47	0-1	1
	1	7	23.69	24.20	23.59		1
	1	14	23.46	23.90	23.80		1
	8	0	22.49	22.84	22.80	0-2	2
	8	4	22.39	22.81	22.85		2
	8	7	22.29	22.78	22.94		2
	15	0	22.68	22.82	22.87		2
64QAM	1	0	22.53	22.36	23.20	0-2	2
	1	7	22.68	22.50	22.96		2
	1	14	22.51	22.57	22.81		2
	8	0	21.60	21.85	21.60	0-3	3
	8	4	21.58	21.94	21.85		3
	8	7	21.72	21.91	21.85		3
	15	0	21.57	21.90	21.77		3

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

LTE Band 26 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 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	24.52	24.43	24.71	0	0
	1	2	24.68	24.55	24.75		0
	1	5	24.65	24.50	24.66		0
	3	0	24.38	24.59	24.81		0
	3	2	24.50	24.56	24.91		0
	3	3	24.47	24.62	24.87		0
	6	0	23.70	23.74	23.92	0-1	1
16QAM	1	0	23.43	23.38	23.54	0-1	1
	1	2	23.89	23.45	23.99		1
	1	5	23.74	23.44	23.95		1
	3	0	23.47	23.66	23.92		1
	3	2	23.49	23.93	23.95		1
	3	3	23.58	23.88	24.07		1
	6	0	22.64	22.69	22.87	0-2	2
64QAM	1	0	22.54	22.39	22.60	0-2	2
	1	2	22.53	22.48	22.78		2
	1	5	22.46	22.40	22.66		2
	3	0	22.55	22.82	23.10		2
	3	2	22.67	22.89	22.66		2
	3	3	22.55	22.91	22.64		2
	6	0	21.56	21.56	21.95	0-3	3

9.3.5 LTE Band 66 (AWS)

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

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.82	24.01	23.71	0	0
	1	50	24.19	**24.20**	23.77		0
	1	99	23.98	23.95	23.95		0
	50	0	22.80	**22.94**	22.80	0-1	1
	50	25	22.81	22.81	22.82		1
	50	50	22.73	22.85	22.65		1
	100	0	22.71	22.83	22.83		1
16QAM	1	0	22.76	22.70	22.04	0-1	1
	1	50	22.73	22.60	22.27		1
	1	99	22.63	22.50	22.64		1
	50	0	21.70	21.80	21.52	0-2	2
	50	25	21.87	21.67	21.52		2
	50	50	21.54	21.49	21.36		2
	100	0	21.62	21.64	21.40		2
64QAM	1	0	21.62	21.65	21.41	0-2	2
	1	50	21.66	21.69	21.69		2
	1	99	21.62	21.60	21.41		2
	50	0	20.72	20.85	20.64	0-3	3
	50	25	20.85	20.73	20.70		3
	50	50	20.74	20.46	20.46		3
	100	0	20.69	20.55	20.57		3

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

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.74	23.57	23.81	0	0
	1	36	23.87	23.68	24.01		0
	1	74	23.68	23.24	23.75		0
	36	0	22.83	22.95	22.82	0-1	1
	36	18	22.92	22.89	22.80		1
	36	37	22.87	22.77	22.66		1
	75	0	22.88	22.75	22.69		1
16QAM	1	0	22.65	22.59	22.66	0-1	1
	1	36	22.65	22.48	22.70		1
	1	74	22.45	22.24	22.47		1
	36	0	21.93	21.92	21.86	0-2	2
	36	18	21.95	21.85	21.82		2
	36	37	21.83	21.77	21.52		2
	75	0	21.77	21.77	21.65		2
64QAM	1	0	22.15	21.87	22.09	0-2	2
	1	36	22.14	21.34	22.18		2
	1	74	22.17	21.20	21.91		2
	36	0	21.04	21.18	20.84	0-3	3
	36	18	21.05	21.01	21.07		3
	36	37	20.82	20.86	20.79		3
	75	0	20.88	20.77	20.58		3

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

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.91	23.76	23.80	0	0
	1	25	24.08	23.80	23.87		0
	1	49	23.97	23.78	23.61		0
	25	0	22.86	22.97	22.71	0-1	1
	25	12	22.96	22.94	22.68		1
	25	25	22.94	22.77	22.62		1
	50	0	22.82	22.79	22.72		1
16QAM	1	0	22.81	22.93	22.50	0-1	1
	1	25	22.90	22.40	22.64		1
	1	49	22.74	22.29	22.44		1
	25	0	21.84	21.91	21.85	0-2	2
	25	12	22.04	21.80	21.84		2
	25	25	22.02	21.75	21.55		2
	50	0	21.71	21.80	21.69		2
64QAM	1	0	21.60	21.46	22.09	0-2	2
	1	25	21.60	21.81	22.06		2
	1	49	21.61	21.36	21.89		2
	25	0	21.02	21.01	20.64	0-3	3
	25	12	21.02	20.91	20.83		3
	25	25	21.10	20.95	20.56		3
	50	0	20.87	20.90	20.58		3

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

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.79	23.93	23.43	0	0
	1	12	24.04	24.08	23.73		0
	1	24	23.97	23.80	23.51		0
	12	0	22.80	22.83	22.74	0-1	1
	12	6	22.92	22.88	22.67		1
	12	13	22.86	22.84	22.64		1
	25	0	22.77	22.84	22.76		1
16QAM	1	0	22.48	22.29	22.40	0-1	1
	1	12	22.60	22.58	22.81		1
	1	24	22.67	22.41	22.56		1
	12	0	21.69	21.85	21.61	0-2	2
	12	6	21.73	21.92	21.56		2
	12	13	21.67	21.86	21.51		2
	25	0	21.59	21.73	21.61		2
64QAM	1	0	21.74	21.71	21.31	0-2	2
	1	12	21.79	21.99	21.58		2
	1	24	21.79	21.78	21.42		2
	12	0	20.60	20.90	20.68	0-3	3
	12	6	20.72	21.06	20.53		3
	12	13	20.74	21.01	20.64		3
	25	0	20.71	20.76	20.71		3

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

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.82	23.51	23.56	0	0
	1	7	24.20	23.76	23.83		0
	1	14	24.01	23.78	23.67		0
	8	0	22.82	22.81	22.60	0-1	1
	8	4	22.90	22.85	22.68		1
	8	7	22.81	22.82	22.62		1
	15	0	22.79	22.84	22.69		1
16QAM	1	0	22.71	22.62	22.52	0-1	1
	1	7	22.80	23.09	22.61		1
	1	14	22.70	22.76	22.46		1
	8	0	21.62	21.77	21.62	0-2	2
	8	4	21.62	21.65	21.50		2
	8	7	21.61	21.79	21.54		2
	15	0	21.73	21.91	21.70		2
64QAM	1	0	21.52	21.58	21.92	0-2	2
	1	7	21.75	21.76	22.12		2
	1	14	21.45	21.29	21.97		2
	8	0	20.81	20.68	20.78	0-3	3
	8	4	20.90	20.66	20.72		3
	8	7	20.70	20.62	20.63		3
	15	0	20.73	20.89	20.60		3

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

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.66	23.94	23.31	0	0
	1	2	23.70	23.96	23.33		0
	1	5	23.77	24.07	23.25		0
	3	0	23.93	23.71	23.66		0
	3	2	23.80	23.86	23.66		0
	3	3	23.75	23.87	23.65		0
	6	0	22.87	22.79	22.56	0-1	1
16QAM	1	0	22.57	22.33	22.59	0-1	1
	1	2	22.95	22.39	22.39		1
	1	5	22.97	22.76	22.36		1
	3	0	22.87	22.81	22.94		1
	3	2	22.87	22.90	23.10		1
	3	3	22.87	22.79	22.69		1
	6	0	21.95	21.54	21.58	0-2	2
64QAM	1	0	21.57	22.20	21.97	0-2	2
	1	2	21.55	22.20	21.73		2
	1	5	21.52	22.20	21.69		2
	3	0	21.57	21.68	21.59		2
	3	2	21.66	21.50	21.77		2
	3	3	21.63	21.34	21.57		2
	6	0	20.67	20.89	20.62	0-3	3

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

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132072 (1720.0 MHz)	132322 (1745.0 MHz)	132572 (1770.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	21.56	21.79	21.32	0	0
	1	50	**21.80**	21.74	21.67		0
	1	99	21.52	21.46	21.58		0
	50	0	**21.71**	21.49	21.52	0-1	0
	50	25	21.69	21.45	21.38		0
	50	50	21.63	21.44	21.42		0
	100	0	21.33	21.38	21.32		0
16QAM	1	0	21.49	21.45	21.20	0-1	0
	1	50	21.87	21.51	21.57		0
	1	99	21.50	21.45	21.21		0
	50	0	21.56	21.84	21.32	0-2	0
	50	25	21.40	21.71	21.83		0
	50	50	21.60	21.62	21.41		0
	100	0	21.55	21.60	21.47		0
64QAM	1	0	21.83	21.54	21.33	0-2	0
	1	50	21.88	21.86	21.60		0
	1	99	21.63	21.84	21.84		0
	50	0	20.91	20.71	20.87	0-3	1
	50	25	20.78	20.64	20.84		1
	50	50	20.53	20.62	20.55		1
	100	0	20.44	20.40	20.46		1

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

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	21.35	21.79	21.35	0	0
	1	36	21.81	21.79	21.60		0
	1	74	21.34	21.54	21.16		0
	36	0	21.77	21.82	21.68	0-1	0
	36	18	21.89	21.89	21.61		0
	36	37	21.65	21.72	21.54		0
	75	0	21.67	21.70	21.54		0
16QAM	1	0	21.39	21.68	21.59	0-1	0
	1	36	21.75	21.32	21.78		0
	1	74	21.36	21.21	21.29		0
	36	0	21.74	21.82	21.62	0-2	0
	36	18	21.86	21.78	21.66		0
	36	37	21.76	21.81	21.58		0
	75	0	21.59	21.79	21.65		0
64QAM	1	0	22.19	21.59	22.12	0-2	0
	1	36	21.99	21.31	21.99		0
	1	74	21.87	21.33	21.86		0
	36	0	20.79	20.91	20.78	0-3	1
	36	18	20.81	20.97	20.73		1
	36	37	20.71	20.99	20.67		1
	75	0	20.72	20.82	20.60		1

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

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	21.63	21.61	21.40	0	0
	1	25	21.77	21.68	21.62		0
	1	49	21.53	21.41	21.40		0
	25	0	21.59	21.83	21.60	0-1	0
	25	12	21.68	21.76	21.60		0
	25	25	21.71	21.72	21.49		0
	50	0	21.63	21.72	21.55		0
16QAM	1	0	21.93	21.44	21.84	0-1	0
	1	25	22.06	21.32	21.90		0
	1	49	21.66	21.37	21.58		0
	25	0	21.68	21.76	21.50	0-2	0
	25	12	21.70	21.74	21.61		0
	25	25	21.69	21.76	21.49		0
	50	0	21.61	21.87	21.56		0
64QAM	1	0	21.58	21.62	22.20	0-2	0
	1	25	21.79	21.68	21.89		0
	1	49	21.39	21.38	22.15		0
	25	0	20.86	20.91	20.76	0-3	1
	25	12	20.89	20.83	20.79		1
	25	25	20.91	20.91	20.85		1
	50	0	20.78	20.89	20.67		1

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

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	21.45	21.39	21.51	0	0
	1	12	22.05	21.58	21.55		0
	1	24	21.61	21.42	21.44		0
	12	0	21.62	21.69	21.64	0-1	0
	12	6	21.74	21.63	21.60		0
	12	13	21.70	21.72	21.53		0
	25	0	21.62	21.69	21.64		0
16QAM	1	0	21.39	21.60	21.18	0-1	0
	1	12	21.86	21.82	21.21		0
	1	24	21.83	21.73	21.14		0
	12	0	21.41	21.55	21.57	0-2	0
	12	6	21.64	21.52	21.54		0
	12	13	21.58	21.57	21.47		0
	25	0	21.72	21.60	21.64		0
64QAM	1	0	21.85	21.82	21.63	0-2	0
	1	12	22.11	22.06	21.79		0
	1	24	21.88	22.06	21.78		0
	12	0	20.40	20.71	20.39	0-3	1
	12	6	20.66	20.78	20.60		1
	12	13	20.58	20.95	20.63		1
	25	0	20.78	20.83	20.74		1

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

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	21.52	21.42	21.59	0	0
	1	7	22.00	21.66	21.54		0
	1	14	21.75	21.52	21.44		0
	8	0	21.83	21.61	21.58	0-1	0
	8	4	21.70	21.67	21.53		0
	8	7	21.71	21.81	21.46		0
	15	0	21.68	21.73	21.55		0
16QAM	1	0	21.76	21.55	21.77	0-1	0
	1	7	21.86	21.90	21.75		0
	1	14	21.57	21.54	21.65		0
	8	0	21.75	21.66	21.57	0-2	0
	8	4	21.63	21.48	21.51		0
	8	7	21.75	21.56	21.36		0
	15	0	21.90	21.69	21.67		0
64QAM	1	0	21.45	21.33	21.26	0-2	0
	1	7	21.78	21.40	21.80		0
	1	14	21.50	21.27	21.79		0
	8	0	20.81	20.87	20.95	0-3	1
	8	4	20.72	20.70	20.74		1
	8	7	20.73	20.78	20.83		1
	15	0	20.71	20.89	20.57		1

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

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	21.64	21.61	21.47	0	0
	1	2	21.80	21.77	21.53		0
	1	5	21.68	21.71	21.37		0
	3	0	21.64	21.49	21.56		0
	3	2	21.69	21.52	21.62		0
	3	3	21.67	21.50	21.60		0
	6	0	21.66	21.60	21.56	0-1	0
16QAM	1	0	21.83	21.72	21.26	0-1	0
	1	2	21.91	21.63	21.15		0
	1	5	21.81	21.61	21.30		0
	3	0	21.62	21.41	21.39		0
	3	2	21.62	21.52	21.30		0
	3	3	21.48	21.22	21.18		0
	6	0	21.60	22.03	21.25	0-2	0
64QAM	1	0	21.79	21.53	21.45	0-2	0
	1	2	22.16	21.51	21.42		0
	1	5	22.14	21.53	21.27		0
	3	0	21.47	21.87	21.53		0
	3	2	21.76	21.79	21.46		0
	3	3	21.50	21.77	21.46		0
	6	0	20.82	21.08	20.52	0-3	1

9.3.6 LTE Band 25 (PCS)

Table 9-31
LTE Band 25 (PCS) Maximum 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	24.51	24.51	24.44	0	0
	1	50	**24.70**	24.63	24.67		0
	1	99	24.48	24.46	24.29		0
	50	0	**23.52**	23.38	23.13	0-1	1
	50	25	23.49	23.44	23.28		1
	50	50	23.33	23.31	23.07		1
	100	0	23.38	23.34	23.20		1
16QAM	1	0	23.00	22.87	23.01	0-1	1
	1	50	23.06	23.19	22.74		1
	1	99	22.87	22.69	22.69		1
	50	0	22.11	22.13	22.00	0-2	2
	50	25	22.42	22.27	22.11		2
	50	50	22.21	22.04	21.89		2
	100	0	22.36	22.14	21.96		2
64QAM	1	0	22.20	22.44	22.05	0-2	2
	1	50	22.03	22.65	22.03		2
	1	99	22.01	22.45	22.05		2
	50	0	21.11	21.33	20.98	0-3	3
	50	25	21.22	21.28	20.99		3
	50	50	21.18	21.17	20.88		3
	100	0	21.30	21.24	21.10		3

Table 9-32
LTE Band 25 (PCS) Maximum 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	23.98	23.81	24.07	0	0
	1	36	24.28	24.29	24.44		0
	1	74	24.01	23.76	24.07		0
	36	0	23.15	23.29	23.33	0-1	1
	36	18	23.18	23.30	23.31		1
	36	37	23.09	23.19	23.18		1
	75	0	23.10	23.26	23.11		1
16QAM	1	0	22.77	22.84	23.17	0-1	1
	1	36	23.10	23.55	23.70		1
	1	74	22.72	22.80	23.24		1
	36	0	22.26	22.35	22.39	0-2	2
	36	18	22.31	22.48	22.39		2
	36	37	22.13	22.35	22.10		2
	75	0	22.08	22.37	22.13		2
64QAM	1	0	22.57	22.00	22.42	0-2	2
	1	36	22.70	21.86	22.66		2
	1	74	22.65	21.80	22.53		2
	36	0	21.08	21.41	21.47	0-3	3
	36	18	21.23	21.45	21.38		3
	36	37	21.04	21.33	21.25		3
	75	0	21.10	21.35	21.09		3

Table 9-33
LTE Band 25 (PCS) Maximum 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	24.15	24.09	24.43	0	0
	1	25	24.65	24.26	24.59		0
	1	49	24.15	24.04	24.21		0
	25	0	23.19	23.34	23.21	0-1	1
	25	12	23.17	23.38	23.25		1
	25	25	23.09	23.28	23.16		1
	50	0	23.03	23.34	23.26		1
16QAM	1	0	23.07	23.06	23.07	0-1	1
	1	25	23.10	23.04	23.17		1
	1	49	22.92	22.82	23.13		1
	25	0	22.20	22.47	22.21	0-2	2
	25	12	22.20	22.41	22.38		2
	25	25	22.10	22.33	22.23		2
	50	0	21.92	22.34	22.22		2
64QAM	1	0	21.76	21.92	22.53	0-2	2
	1	25	21.87	21.95	22.62		2
	1	49	21.66	21.48	22.50		2
	25	0	21.19	21.48	21.43	0-3	3
	25	12	21.29	21.40	21.41		3
	25	25	21.19	21.37	21.19		3
	50	0	21.21	21.34	21.35		3

Table 9-34
LTE Band 25 (PCS) Maximum 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	23.99	23.98	24.06	0	0
	1	12	24.07	24.36	23.99		0
	1	24	23.96	24.20	24.06		0
	12	0	23.10	23.30	23.19	0-1	1
	12	6	23.14	23.30	23.16		1
	12	13	23.06	23.26	23.16		1
	25	0	22.97	23.25	23.28		1
16QAM	1	0	22.66	22.90	22.68	0-1	1
	1	12	23.28	23.18	22.78		1
	1	24	23.19	22.94	22.76		1
	12	0	21.90	22.22	22.21	0-2	2
	12	6	21.95	22.20	22.21		2
	12	13	21.88	22.12	22.06		2
	25	0	21.89	22.23	22.27		2
64QAM	1	0	21.89	22.33	22.02	0-2	2
	1	12	22.30	22.48	22.30		2
	1	24	21.91	22.23	22.07		2
	12	0	20.99	21.37	21.14	0-3	3
	12	6	21.04	21.38	21.16		3
	12	13	21.07	21.37	21.02		3
	25	0	20.93	21.29	21.37		3

Table 9-35
LTE Band 25 (PCS) Maximum 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	23.95	24.04	24.23	0	0
	1	7	24.27	24.21	24.43		0
	1	14	24.19	23.99	24.29		0
	8	0	23.06	23.26	23.31	0-1	1
	8	4	23.11	23.27	23.23		1
	8	7	23.09	23.27	23.21		1
	15	0	23.08	23.27	23.36		1
16QAM	1	0	22.76	23.00	23.09	0-1	1
	1	7	23.02	23.08	23.25		1
	1	14	22.42	23.03	23.08		1
	8	0	21.75	22.30	22.39	0-2	2
	8	4	21.64	22.24	22.31		2
	8	7	21.70	22.23	22.28		2
	15	0	22.12	22.35	22.23		2
64QAM	1	0	21.83	21.96	22.46	0-2	2
	1	7	22.03	22.21	22.65		2
	1	14	22.21	21.70	22.56		2
	8	0	21.11	21.11	21.17	0-3	3
	8	4	20.90	21.15	21.21		3
	8	7	20.96	21.28	21.06		3
	15	0	21.02	21.25	21.18		3

Table 9-36
LTE Band 25 (PCS) Maximum 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	24.07	23.91	24.27	0	0
	1	2	24.11	23.98	24.34		0
	1	5	24.14	23.98	24.32		0
	3	0	24.17	24.18	24.15		0
	3	2	24.09	24.30	24.14		0
	3	3	24.04	24.28	24.31		0
	6	0	23.14	23.21	23.20	0-1	1
16QAM	1	0	23.24	23.12	22.73	0-1	1
	1	2	23.32	22.96	22.82		1
	1	5	23.18	22.86	22.90		1
	3	0	22.96	23.08	23.04		1
	3	2	22.94	23.36	23.02		1
	3	3	23.12	23.23	23.20		1
	6	0	21.96	22.22	22.35	0-2	2
64QAM	1	0	21.70	21.75	22.66	0-2	2
	1	2	21.57	21.88	22.27		2
	1	5	21.64	21.68	22.33		2
	3	0	21.87	22.31	22.54		2
	3	2	21.96	22.39	22.38		2
	3	3	21.94	22.37	22.32		2
	6	0	20.87	21.23	21.16	0-3	3

Table 9-37
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	22.41	22.41	22.51	0	0
	1	50	**22.68**	22.37	22.52		0
	1	99	22.33	22.38	22.47		0
	50	0	**22.82**	22.80	22.71	0-1	0
	50	25	22.67	22.65	22.68		0
	50	50	22.28	22.43	22.22		0
	100	0	22.48	22.46	22.32		0
16QAM	1	0	22.20	22.07	22.00	0-1	0
	1	50	22.54	22.26	22.36		0
	1	99	22.09	22.20	22.07		0
	50	0	21.93	21.99	21.76	0-2	0.5
	50	25	22.23	22.00	21.95		0.5
	50	50	22.11	21.97	21.85		0.5
	100	0	22.00	22.03	21.96		0.5
64QAM	1	0	22.06	21.94	22.17	0-2	0.5
	1	50	22.41	21.95	22.07		0.5
	1	99	22.00	21.98	21.72		0.5
	50	0	21.42	21.37	21.14	0-3	1.5
	50	25	21.37	21.33	21.18		1.5
	50	50	21.01	20.91	20.83		1.5
	100	0	21.08	20.82	20.88		1.5

Table 9-38
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	22.48	22.78	22.56	0	0
	1	36	22.44	22.82	22.49		0
	1	74	22.65	22.37	22.41		0
	36	0	22.74	22.85	22.86	0-1	0
	36	18	22.85	22.88	22.87		0
	36	37	22.78	22.82	22.74		0
	75	0	22.67	22.90	22.81		0
16QAM	1	0	22.60	22.68	23.00	0-1	0
	1	36	23.07	22.61	23.04		0
	1	74	22.74	22.22	22.90		0
	36	0	22.36	22.34	22.41	0-2	0.5
	36	18	22.44	22.49	22.25		0.5
	36	37	22.37	22.33	22.16		0.5
	75	0	22.22	22.41	22.19		0.5
64QAM	1	0	22.24	22.19	21.84	0-2	0.5
	1	36	22.34	22.23	22.70		0.5
	1	74	22.12	21.69	22.66		0.5
	36	0	21.23	21.36	21.43	0-3	1.5
	36	18	21.33	21.50	21.42		1.5
	36	37	21.26	21.25	21.24		1.5
	75	0	21.32	21.21	21.31		1.5

Table 9-39
LTE Band 25 (PCS) Reduced Conducted Powers - 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	22.51	22.79	22.52	0	0
	1	25	22.80	22.87	22.70		0
	1	49	22.72	22.77	22.53		0
	25	0	22.68	22.91	22.74	0-1	0
	25	12	22.80	22.89	22.76		0
	25	25	22.75	22.86	22.72		0
	50	0	22.71	22.89	22.76		0
16QAM	1	0	22.93	22.49	22.88	0-1	0
	1	25	22.73	22.45	22.86		0
	1	49	22.93	22.50	22.83		0
	25	0	22.11	22.45	22.17	0-2	0.5
	25	12	22.14	22.43	22.21		0.5
	25	25	22.21	22.22	22.29		0.5
	50	0	22.21	22.36	22.12		0.5
64QAM	1	0	22.01	22.33	22.20	0-2	0.5
	1	25	22.22	22.33	22.54		0.5
	1	49	22.13	22.00	22.67		0.5
	25	0	21.34	21.43	21.30	0-3	1.5
	25	12	21.36	21.51	21.48		1.5
	25	25	21.33	21.40	21.28		1.5
	50	0	21.24	21.39	21.22		1.5

Table 9-40
LTE Band 25 (PCS) Reduced Conducted Powers - 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	22.49	22.51	22.61	0	0
	1	12	23.04	22.68	22.88		0
	1	24	22.64	22.49	22.65		0
	12	0	22.70	22.88	22.73	0-1	0
	12	6	22.72	22.89	22.74		0
	12	13	22.70	22.86	22.67		0
	25	0	22.74	22.83	22.85		0
16QAM	1	0	22.18	22.67	22.53	0-1	0
	1	12	22.74	22.96	22.70		0
	1	24	22.43	22.68	22.53		0
	12	0	21.84	22.38	22.31	0-2	0.5
	12	6	21.99	22.39	22.35		0.5
	12	13	21.85	22.41	22.09		0.5
	25	0	22.18	22.27	22.26		0.5
64QAM	1	0	22.14	22.24	21.93	0-2	0.5
	1	12	22.43	22.22	22.05		0.5
	1	24	22.23	22.25	21.72		0.5
	12	0	21.09	21.38	21.26	0-3	1.5
	12	6	21.06	21.40	21.37		1.5
	12	13	21.09	21.30	21.24		1.5
	25	0	21.12	21.31	21.34		1.5

Table 9-41
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	22.45	22.72	22.62	0	0
	1	7	22.61	22.78	22.63		0
	1	14	22.67	22.82	22.62		0
	8	0	22.68	22.79	22.87	0-1	0
	8	4	22.73	22.81	22.72		0
	8	7	22.70	22.76	22.74		0
	15	0	22.79	22.88	22.86		0
16QAM	1	0	22.65	22.34	22.95	0-1	0
	1	7	22.84	22.70	22.71		0
	1	14	22.70	22.65	22.87		0
	8	0	22.49	22.17	22.19	0-2	0.5
	8	4	22.20	22.09	22.19		0.5
	8	7	22.17	22.23	22.19		0.5
	15	0	22.18	22.35	22.43		0.5
64QAM	1	0	21.97	22.15	22.14	0-2	0.5
	1	7	21.90	22.20	22.10		0.5
	1	14	21.91	22.08	22.60		0.5
	8	0	21.27	21.41	21.26	0-3	1.5
	8	4	21.43	21.27	21.42		1.5
	8	7	21.30	21.49	21.43		1.5
	15	0	21.07	21.41	21.17		1.5

Table 9-42
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	22.45	22.55	22.57	0	0
	1	2	22.69	22.68	22.88		0
	1	5	22.69	22.72	22.65		0
	3	0	22.75	22.71	22.79		0
	3	2	22.66	22.72	22.69		0
	3	3	22.66	22.67	22.68		0
	6	0	22.69	22.79	22.84	0-1	0
16QAM	1	0	22.94	22.38	22.92	0-1	0
	1	2	22.94	22.43	22.85		0
	1	5	22.74	22.64	22.97		0
	3	0	22.54	22.69	22.81		0
	3	2	22.33	22.81	22.62		0
	3	3	22.46	22.67	22.53		0
	6	0	22.43	22.20	22.27	0-2	0.5
64QAM	1	0	22.03	21.89	22.70	0-2	0.5
	1	2	22.10	22.07	22.15		0.5
	1	5	21.83	21.88	22.59		0.5
	3	0	22.37	22.28	21.86		0.5
	3	2	22.45	22.18	22.12		0.5
	3	3	22.33	22.15	22.04		0.5
	6	0	21.24	21.20	21.55	0-3	1.5

9.3.7 LTE Band 41

Table 9-43
LTE Band 41 PC3 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	24.40	24.62	24.73	24.90	24.63	0	0
	1	50	24.44	24.92	**24.93**	24.83	24.80		0
	1	99	24.38	24.75	24.84	24.54	24.67		0
	50	0	23.83	23.82	24.19	23.92	23.63	0-1	1
	50	25	23.93	23.84	**24.20**	24.19	23.82		1
	50	50	23.57	23.84	23.88	23.71	23.67		1
	100	0	23.61	23.76	23.81	23.82	23.68		1
16QAM	1	0	23.42	24.03	24.05	24.02	23.81	0-1	1
	1	50	23.70	24.16	24.02	23.67	23.98		1
	1	99	23.48	24.04	24.04	23.57	24.17		1
	50	0	22.59	22.77	23.03	22.84	22.69	0-2	2
	50	25	22.70	22.92	23.15	23.06	22.72		2
	50	50	22.64	23.01	22.89	22.61	22.57		2
	100	0	22.61	22.98	22.86	22.67	22.59		2
64QAM	1	0	23.18	23.20	22.78	22.80	23.18	0-2	2
	1	50	23.16	23.02	22.58	22.74	23.20		2
	1	99	23.10	23.07	22.61	22.28	23.05		2
	50	0	21.52	21.91	21.93	21.78	21.75	0-3	3
	50	25	21.62	21.95	22.00	21.97	21.73		3
	50	50	21.54	21.82	21.91	21.65	21.47		3
	100	0	21.53	21.66	21.82	21.66	21.82		3

Table 9-44
LTE Band 41 PC3 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	24.30	24.37	24.67	24.45	24.35	0	0
	1	36	24.56	24.57	24.66	24.86	24.37		0
	1	74	24.57	24.46	24.46	24.45	24.08		0
	36	0	23.53	23.76	23.62	23.94	23.67	0-1	1
	36	18	23.62	23.86	23.71	24.03	23.58		1
	36	37	23.64	23.72	23.60	23.97	23.52		1
	75	0	23.62	23.76	23.63	23.31	23.60		1
16QAM	1	0	23.56	23.69	23.07	24.00	23.92	0-1	1
	1	36	23.62	23.83	23.25	23.87	23.63		1
	1	74	23.90	23.63	23.51	23.55	23.22		1
	36	0	22.47	22.56	22.52	23.11	22.48	0-2	2
	36	18	22.64	22.61	22.62	23.03	22.25		2
	36	37	22.57	22.40	22.52	22.20	22.10		2
	75	0	22.52	22.50	22.52	22.16	22.06		2
64QAM	1	0	22.64	22.73	22.63	22.66	22.56	0-2	2
	1	36	22.90	22.89	22.90	22.53	22.51		2
	1	74	22.75	22.52	22.71	22.43	22.34		2
	36	0	21.88	21.48	21.27	21.65	21.48	0-3	3
	36	18	21.90	21.60	21.52	21.74	21.44		3
	36	37	21.80	21.54	21.53	21.51	21.37		3
	75	0	21.89	21.62	21.56	21.25	21.55		3

Table 9-45
LTE Band 41 PC3 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	24.32	24.39	24.66	24.26	24.19	0	0
	1	25	24.62	24.87	24.69	24.60	24.19		0
	1	49	24.40	24.28	24.56	24.20	24.09		0
	25	0	23.71	23.59	23.98	23.85	23.27	0-1	1
	25	12	23.63	23.67	23.96	23.98	23.37		1
	25	25	23.63	23.65	23.89	23.88	23.33		1
	50	0	23.67	23.74	23.93	23.82	23.23		1
16QAM	1	0	23.67	23.76	23.97	23.38	23.60	0-1	1
	1	25	23.97	23.57	23.80	23.52	23.77		1
	1	49	23.86	23.60	23.93	23.24	23.20		1
	25	0	22.91	22.56	22.93	22.92	22.55	0-2	2
	25	12	22.92	22.57	23.04	22.94	22.33		2
	25	25	22.80	22.40	22.87	22.41	22.51		2
	50	0	22.75	22.45	22.82	22.75	22.38		2
64QAM	1	0	22.87	22.63	22.07	22.76	22.67	0-2	2
	1	25	22.97	22.81	22.04	22.56	22.71		2
	1	49	22.84	22.55	22.52	22.40	22.44		2
	25	0	21.70	21.55	21.57	22.14	21.48	0-3	3
	25	12	21.94	21.58	21.58	21.85	21.59		3
	25	25	21.90	21.41	21.61	21.84	21.33		3
	50	0	21.73	21.43	21.78	21.97	21.36		3

Table 9-46
LTE Band 41 PC3 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	24.61	24.25	24.71	24.44	24.14	0	0
	1	12	25.05	24.77	25.12	24.56	24.75		0
	1	24	24.73	24.26	24.75	24.39	24.31		0
	12	0	23.89	23.51	23.64	23.88	23.28	0-1	1
	12	6	23.92	23.49	23.63	23.78	23.37		1
	12	13	23.95	23.44	23.61	23.72	23.25		1
	25	0	24.04	23.40	23.64	23.77	23.28		1
16QAM	1	0	23.75	23.77	23.69	23.97	23.63	0-1	1
	1	12	24.11	23.97	24.16	23.93	23.84		1
	1	24	23.86	23.65	23.71	23.45	23.36		1
	12	0	22.74	22.73	22.78	23.04	22.39	0-2	2
	12	6	22.80	22.61	22.87	22.95	22.34		2
	12	13	22.65	22.49	22.86	22.40	22.37		2
	25	0	22.65	22.38	22.73	22.63	22.23		2
64QAM	1	0	22.85	22.67	22.39	22.77	22.53	0-2	2
	1	12	23.00	22.89	22.43	22.84	22.56		2
	1	24	22.65	22.53	22.67	22.73	22.55		2
	12	0	21.66	21.43	21.83	21.83	21.25	0-3	3
	12	6	21.62	21.64	21.66	21.74	21.38		3
	12	13	21.63	21.26	21.59	21.68	21.31		3
	25	0	21.72	21.46	21.91	21.78	21.32		3

Table 9-47
LTE Band 41 PC2 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	26.02	26.24	26.13	26.35	26.25	0	0
	1	50	26.22	26.15	**26.43**	25.98	26.41		0
	1	99	26.28	26.23	26.03	26.05	26.12		0
	50	0	25.44	**25.62**	25.34	25.50	25.42	0-1	1
	50	25	25.53	25.58	25.31	25.44	25.41		1
	50	50	25.42	25.57	25.41	25.26	25.28		1
	100	0	25.46	25.54	25.35	25.21	25.44		1

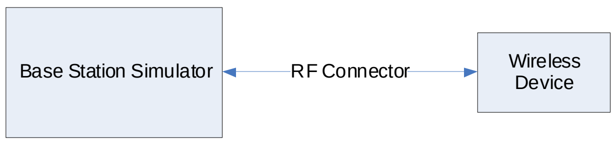

Figure 9-3
Power Measurement Setup

9.4 WLAN Conducted Powers

Table 9-48
2.4 GHz WLAN Maximum Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
		Average	Average	Average
2412	1	20.74	15.69	15.24
2417	2	N/A	17.49	16.99
2422	3	N/A	19.36	18.97
2437	6	21.42	19.39	18.94
2452	9	N/A	19.35	18.74
2457	10	N/A	17.12	16.94
2462	11	20.99	15.41	14.99

Table 9-49
2.4 GHz WLAN Reduced Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
		Average	Average	Average
2412	1	17.17	14.36	14.37
2417	2	N/A	16.38	16.35
2422	3	N/A	17.98	17.96
2437	6	18.00	17.99	17.98
2452	9	N/A	17.97	17.99
2457	10	N/A	16.30	16.25
2462	11	17.68	14.16	14.25

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

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

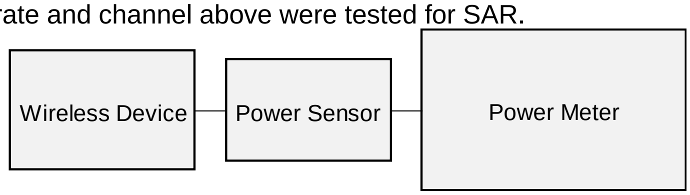

Figure 9-4
Power Measurement Setup

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
09/21/2020	750 Head	22.3	680	0.889	44.108	0.888	42.305	0.11%	4.26%
			695	0.895	44.084	0.889	42.227	0.67%	4.40%
			700	0.896	44.073	0.889	42.201	0.79%	4.44%
			710	0.900	44.000	0.890	42.149	1.12%	4.39%
			725	0.904	43.980	0.891	42.071	1.46%	4.54%
			750	0.914	43.882	0.894	41.942	2.24%	4.63%
			770	0.920	43.800	0.895	41.838	2.79%	4.69%
			785	0.925	43.786	0.896	41.760	3.24%	4.85%
			800	0.932	43.735	0.897	41.682	3.90%	4.93%
09/16/2020	835 Head	21.9	820	0.929	42.533	0.899	41.578	3.34%	2.30%
			835	0.934	42.489	0.900	41.500	3.78%	2.38%
			850	0.940	42.441	0.916	41.500	2.62%	2.27%
10/02/2020	835 Head	21.7	820	0.939	43.009	0.899	41.578	4.45%	3.44%
			835	0.945	42.974	0.900	41.500	5.00%	3.55%
			850	0.950	42.920	0.916	41.500	3.71%	3.42%
9/19/2020	1750 Head	23.5	1710	1.363	39.617	1.348	40.142	1.11%	-1.31%
			1720	1.373	39.568	1.354	40.126	1.40%	-1.39%
			1745	1.398	39.444	1.368	40.087	2.19%	-1.60%
			1750	1.403	39.420	1.371	40.079	2.33%	-1.64%
			1770	1.424	39.327	1.383	40.047	2.96%	-1.80%
			1790	1.444	39.237	1.394	40.016	3.59%	-1.95%
09/16/2020	1900 Head	22.7	1850	1.361	41.049	1.400	40.000	-2.79%	2.62%
			1860	1.372	41.005	1.400	40.000	-2.00%	2.51%
			1880	1.393	40.916	1.400	40.000	-0.50%	2.29%
			1900	1.414	40.833	1.400	40.000	1.00%	2.08%
			1905	1.420	40.812	1.400	40.000	1.43%	2.03%
			1910	1.425	40.791	1.400	40.000	1.79%	1.98%
09/16/2020	2450 Head	24.9	2400	1.784	40.024	1.756	39.289	1.59%	1.87%
			2450	1.840	39.823	1.800	39.200	2.22%	1.59%
			2480	1.875	39.703	1.833	39.162	2.29%	1.38%
			2500	1.898	39.636	1.855	39.136	2.32%	1.28%
			2510	1.910	39.604	1.866	39.123	2.36%	1.23%
			2535	1.939	39.518	1.893	39.092	2.43%	1.09%
			2550	1.957	39.456	1.909	39.073	2.51%	0.98%
			2560	1.969	39.414	1.920	39.060	2.55%	0.91%
			2600	2.017	39.252	1.964	39.009	2.70%	0.62%
			2650	2.077	39.060	2.018	38.945	2.92%	0.30%
			2680	2.112	38.933	2.051	38.907	2.97%	0.07%
			2700	2.136	38.852	2.073	38.882	3.04%	-0.08%
10/02/2020	2450 Head	22.6	2400	1.789	38.394	1.756	39.289	1.88%	-2.28%
			2450	1.830	38.329	1.800	39.200	1.67%	-2.22%
			2480	1.852	38.291	1.833	39.162	1.04%	-2.22%
			2500	1.867	38.252	1.855	39.136	0.65%	-2.26%
			2510	1.875	38.233	1.866	39.123	0.48%	-2.27%
			2535	1.896	38.197	1.893	39.092	0.16%	-2.29%
			2550	1.909	38.179	1.909	39.073	0.00%	-2.29%
			2560	1.918	38.170	1.920	39.060	-0.10%	-2.28%
			2600	1.947	38.115	1.964	39.009	-0.87%	-2.29%
			2650	1.988	38.002	2.018	38.945	-1.49%	-2.42%
			2680	2.014	37.967	2.051	38.907	-1.80%	-2.42%
			2700	2.029	37.943	2.073	38.882	-2.12%	-2.41%

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
09/03/2020	750 Body	22.0	680	0.926	55.487	0.958	55.804	-3.34%	-0.57%
			695	0.931	55.463	0.959	55.745	-2.92%	-0.51%
			700	0.932	55.443	0.959	55.726	-2.82%	-0.51%
			710	0.937	55.432	0.960	55.687	-2.40%	-0.46%
			725	0.942	55.396	0.961	55.629	-1.98%	-0.42%
			750	0.953	55.331	0.964	55.531	-1.14%	-0.36%
			770	0.961	55.271	0.965	55.453	-0.41%	-0.33%
			785	0.967	55.235	0.966	55.395	0.10%	-0.29%
			800	0.975	55.201	0.967	55.336	0.83%	-0.24%
09/01/2020	835 Body	21.6	820	0.949	55.342	0.969	55.258	-2.06%	0.15%
			835	0.956	55.310	0.970	55.200	-1.44%	0.20%
			850	0.961	55.289	0.988	55.154	-2.73%	0.24%
09/22/2020	835 Body	21.2	820	0.939	53.206	0.969	55.258	-3.10%	-3.71%
			835	0.955	53.042	0.970	55.200	-1.55%	-3.91%
			850	0.971	52.892	0.988	55.154	-1.72%	-4.10%
09/15/2020	1750 Body	20.9	1710	1.487	52.498	1.463	53.537	1.64%	-1.94%
			1720	1.500	52.466	1.469	53.511	2.11%	-1.95%
			1745	1.529	52.386	1.485	53.445	2.96%	-1.98%
			1750	1.534	52.367	1.488	53.432	3.09%	-1.99%
			1770	1.556	52.277	1.501	53.379	3.66%	-2.06%
			1790	1.578	52.178	1.514	53.326	4.23%	-2.15%
09/17/2020	1750 Body	21.5	1710	1.467	52.255	1.463	53.537	0.27%	-2.39%
			1720	1.480	52.220	1.469	53.511	0.75%	-2.41%
			1745	1.509	52.138	1.485	53.445	1.62%	-2.45%
			1750	1.515	52.119	1.488	53.432	1.81%	-2.46%
			1770	1.536	52.028	1.501	53.379	2.33%	-2.53%
			1790	1.557	51.924	1.514	53.326	2.84%	-2.63%
09/21/2020	1750 Body	20.9	1710	1.485	51.762	1.463	53.537	1.50%	-3.32%
			1720	1.497	51.721	1.469	53.511	1.91%	-3.35%
			1745	1.525	51.627	1.485	53.445	2.69%	-3.40%
			1750	1.531	51.607	1.488	53.432	2.89%	-3.42%
			1770	1.552	51.514	1.501	53.379	3.40%	-3.49%
			1790	1.573	51.412	1.514	53.326	3.90%	-3.59%
10/05/2020	1750 Body	21.2	1710	1.468	52.624	1.463	53.537	0.34%	-1.71%
			1720	1.481	52.584	1.469	53.511	0.82%	-1.73%
			1745	1.509	52.491	1.485	53.445	1.62%	-1.79%
			1750	1.514	52.472	1.488	53.432	1.75%	-1.80%
			1770	1.535	52.386	1.501	53.379	2.27%	-1.86%
			1790	1.556	52.293	1.514	53.326	2.77%	-1.94%
09/14/2020	1900 Body	23.2	1850	1.521	51.331	1.520	53.300	0.07%	-3.69%
			1860	1.530	51.289	1.520	53.300	0.66%	-3.77%
			1880	1.553	51.245	1.520	53.300	2.17%	-3.86%
			1900	1.574	51.170	1.520	53.300	3.55%	-4.00%
			1905	1.581	51.135	1.520	53.300	4.01%	-4.06%
			1910	1.588	51.123	1.520	53.300	4.47%	-4.08%
9/17/2020	1900 Body	23.8	1850	1.509	51.968	1.520	53.300	-0.72%	-2.50%
			1860	1.519	51.933	1.520	53.300	-0.07%	-2.56%
			1880	1.540	51.860	1.520	53.300	1.32%	-2.70%
			1900	1.562	51.790	1.520	53.300	2.76%	-2.83%
			1905	1.568	51.774	1.520	53.300	3.16%	-2.86%
			1910	1.573	51.757	1.520	53.300	3.49%	-2.89%
9/20/2020	1900 Body	24.3	1850	1.517	52.702	1.520	53.300	-0.20%	-1.12%
			1860	1.528	52.663	1.520	53.300	0.53%	-1.20%
			1880	1.550	52.583	1.520	53.300	1.97%	-1.35%
			1900	1.572	52.503	1.520	53.300	3.42%	-1.50%
			1905	1.578	52.484	1.520	53.300	3.82%	-1.53%
			1910	1.583	52.466	1.520	53.300	4.14%	-1.56%
9/23/2020	1900 Body	24.7	1850	1.493	53.243	1.520	53.300	-1.78%	-0.11%
			1860	1.503	53.209	1.520	53.300	-1.12%	-0.17%
			1880	1.524	53.145	1.520	53.300	0.26%	-0.29%
			1900	1.547	53.096	1.520	53.300	1.78%	-0.38%
			1905	1.552	53.084	1.520	53.300	2.11%	-0.41%
			1910	1.558	53.072	1.520	53.300	2.50%	-0.43%
9/28/2020	1900 Body	22.5	1850	1.510	51.662	1.520	53.300	-0.66%	-3.07%
			1860	1.521	51.629	1.520	53.300	0.07%	-3.14%
			1880	1.543	51.559	1.520	53.300	1.51%	-3.27%
			1900	1.564	51.486	1.520	53.300	2.89%	-3.40%
			1905	1.570	51.469	1.520	53.300	3.29%	-3.44%
			1910	1.575	51.451	1.520	53.300	3.62%	-3.47%
09/14/2020	2450 Body	23.2	2400	1.964	51.261	1.902	52.767	3.26%	-2.85%
			2450	2.034	51.063	1.950	52.700	4.31%	-3.11%
			2480	2.075	50.957	1.993	52.662	4.11%	-3.24%
			2500	2.102	50.881	2.021	52.636	4.01%	-3.33%
			2510	2.115	50.841	2.035	52.623	3.93%	-3.39%
			2535	2.150	50.737	2.071	52.592	3.81%	-3.53%
			2550	2.172	50.677	2.092	52.573	3.82%	-3.61%
			2560	2.186	50.638	2.106	52.560	3.80%	-3.66%
			2600	2.243	50.492	2.163	52.509	3.70%	-3.84%
			2650	2.314	50.283	2.234	52.445	3.58%	-4.12%
			2680	2.357	50.152	2.277	52.407	3.51%	-4.30%
			2700	2.385	50.073	2.305	52.382	3.47%	-4.41%
09/28/2020	2450 Body	22.4	2400	1.983	52.018	1.902	52.767	4.26%	-1.42%
			2450	2.044	51.895	1.950	52.700	4.82%	-1.53%
			2480	2.077	51.815	1.993	52.662	4.21%	-1.61%
			2500	2.100	51.751	2.021	52.636	3.91%	-1.68%
			2510	2.113	51.719	2.035	52.623	3.83%	-1.72%
			2535	2.146	51.644	2.071	52.592	3.62%	-1.80%
			2550	2.166	51.609	2.092	52.573	3.54%	-1.83%
			2560	2.179	51.586	2.106	52.560	3.47%	-1.85%
			2600	2.224	51.471	2.163	52.509	2.82%	-1.98%
			2650	2.288	51.285	2.234	52.445	2.42%	-2.21%
			2680	2.326	51.205	2.277	52.407	2.15%	-2.29%
			2700	2.349	51.150	2.305	52.382	1.91%	-2.35%

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

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 D.

Table 10-3
System Verification Results – 1g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
L	750	HEAD	09/21/2020	23.9	22.2	0.200	1054	7406	1.700	8.630	8.500	-1.51%
E	835	HEAD	09/16/2020	22.7	22.2	0.200	4d047	3589	2.030	9.420	10.150	7.75%
L	835	HEAD	10/02/2020	22.9	21.8	0.200	4d132	7406	1.960	9.650	9.800	1.55%
L	1750	HEAD	09/19/2020	23.1	22.5	0.100	1150	7406	3.860	36.500	38.600	5.75%
L	1900	HEAD	09/16/2020	21.9	22.7	0.100	5d148	7406	4.200	39.100	42.000	7.42%
P	2450	HEAD	09/16/2020	23.7	23.3	0.100	981	7308	5.150	52.300	51.500	-1.53%
E	2450	HEAD	10/02/2020	23.1	22.9	0.100	981	3589	5.350	52.300	53.500	2.29%
E	2600	HEAD	10/02/2020	23.1	22.9	0.100	1064	3589	5.740	58.100	57.400	-1.20%
P	750	BODY	09/03/2020	22.4	22.0	0.200	1054	7551	1.760	8.530	8.800	3.17%
P	835	BODY	09/01/2020	22.4	21.5	0.200	4d132	7551	2.010	9.960	10.050	0.90%
P	835	BODY	09/22/2020	23.7	21.2	0.200	4d132	7308	1.870	9.960	9.350	-6.12%
I	1750	BODY	09/15/2020	20.7	20.9	0.100	1150	7570	3.880	36.600	38.800	6.01%
I	1750	BODY	09/17/2020	22.5	21.5	0.100	1148	7570	3.860	36.300	38.600	6.34%
I	1750	BODY	09/21/2020	20.9	20.9	0.100	1008	7570	3.960	37.400	39.600	5.88%
H	1900	BODY	09/14/2020	23.3	22.4	0.100	5d080	7357	4.000	39.200	40.000	2.04%
J	1900	BODY	09/17/2020	22.7	22.1	0.100	5d080	7571	4.170	39.200	41.700	6.38%
J	1900	BODY	09/20/2020	21.3	22.3	0.100	5d080	7571	4.170	39.200	41.700	6.38%
P	2450	BODY	09/14/2020	22.7	22.6	0.100	981	7308	5.170	50.900	51.700	1.57%
K	2450	BODY	09/28/2020	22.0	22.4	0.100	981	7409	5.280	50.900	52.800	3.73%
K	2600	BODY	09/28/2020	22.0	22.4	0.100	1064	7409	5.490	55.600	54.900	-1.26%

Table 10-4
System Verification Results – 10g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{10g} (W/kg)	1 W Target SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	$Deviation_{10g}$ (%)
I	1750	BODY	09/15/2020	20.7	20.9	0.100	1150	7570	2.040	19.400	20.400	5.15%
I	1750	BODY	10/05/2020	20.9	21.2	0.100	1008	7570	1.970	19.900	19.700	-1.01%
J	1900	BODY	09/23/2020	22.3	22.7	0.100	5d080	7571	2.060	20.600	20.600	0.00%
H	1900	BODY	09/28/2020	21.3	22.5	0.100	5d080	7357	1.910	20.600	19.100	-7.28%

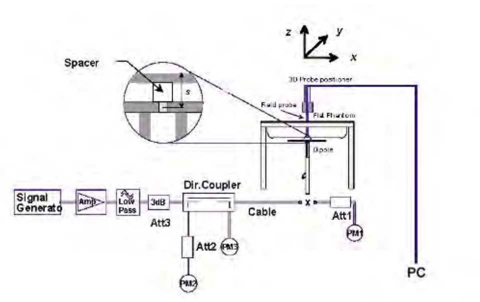

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.62	0.07	Right	Cheek	18829	1	1:8.3	0.284	1.019	0.289	
836.60	190	GSM 850	GSM	33.7	33.62	0.05	Right	Tilt	18829	1	1:8.3	0.153	1.019	0.156	
836.60	190	GSM 850	GSM	33.7	33.62	-0.10	Left	Cheek	18829	1	1:8.3	0.259	1.019	0.264	
836.60	190	GSM 850	GSM	33.7	33.62	0.11	Left	Tilt	18829	1	1:8.3	0.135	1.019	0.138	
836.60	190	GSM 850	GPRS	28.7	28.63	-0.02	Right	Cheek	18829	4	1:2.076	0.322	1.016	0.327	A1
836.60	190	GSM 850	GPRS	28.7	28.63	-0.05	Right	Tilt	18829	4	1:2.076	0.170	1.016	0.173	
836.60	190	GSM 850	GPRS	28.7	28.63	0.10	Left	Cheek	18829	4	1:2.076	0.288	1.016	0.293	
836.60	190	GSM 850	GPRS	28.7	28.63	0.05	Left	Tilt	18829	4	1:2.076	0.144	1.016	0.146	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-2
GSM 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.7	30.51	-0.03	Right	Cheek	18811	1	1:8.3	0.071	1.045	0.074	
1880.00	661	GSM 1900	GSM	30.7	30.51	-0.14	Right	Tilt	18811	1	1:8.3	0.069	1.045	0.072	
1880.00	661	GSM 1900	GSM	30.7	30.51	-0.06	Left	Cheek	18811	1	1:8.3	0.107	1.045	0.112	
1880.00	661	GSM 1900	GSM	30.7	30.51	-0.04	Left	Tilt	18811	1	1:8.3	0.075	1.045	0.078	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.01	Right	Cheek	18811	4	1:2.076	0.084	1.114	0.094	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.14	Right	Tilt	18811	4	1:2.076	0.090	1.114	0.100	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.12	Left	Cheek	18811	4	1:2.076	0.138	1.114	0.154	A2
1880.00	661	GSM 1900	GPRS	25.7	25.23	-0.08	Left	Tilt	18811	4	1:2.076	0.096	1.114	0.107	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.2	25.20	0.20	Right	Cheek	18803	1:1	0.320	1.000	0.320	A3
836.60	4183	UMTS 850	RMC	25.2	25.20	0.15	Right	Tilt	18803	1:1	0.216	1.000	0.216	
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.11	Left	Cheek	18803	1:1	0.287	1.000	0.287	
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.07	Left	Tilt	18803	1:1	0.158	1.000	0.158	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
UMTS 1750 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	0.12	Right	Cheek	18811	1:1	0.171	1.002	0.171	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	-0.14	Right	Tilt	18811	1:1	0.140	1.002	0.140	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	-0.12	Left	Cheek	18811	1:1	0.175	1.002	0.175	A4
1732.40	1412	UMTS 1750	RMC	24.2	24.19	-0.01	Left	Tilt	18811	1:1	0.140	1.002	0.140	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	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	24.7	24.64	0.05	Right	Cheek	18811	1:1	0.159	1.014	0.161	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	0.08	Right	Tilt	18811	1:1	0.170	1.014	0.172	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	0.01	Left	Cheek	18811	1:1	0.258	1.014	0.262	A5
1880.00	9400	UMTS 1900	RMC	24.7	24.64	0.11	Left	Tilt	18811	1:1	0.192	1.014	0.195	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-6
LTE Band 71 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)	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	0.06	0	Right	Cheek	QPSK	1	50	18811	1:1	0.232	1.197	0.278	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	0.03	1	Right	Cheek	QPSK	50	25	18811	1:1	0.172	1.079	0.186	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	-0.01	0	Right	Tilt	QPSK	1	50	18811	1:1	0.111	1.197	0.133	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	0.05	1	Right	Tilt	QPSK	50	25	18811	1:1	0.082	1.079	0.088	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	0.06	0	Left	Cheek	QPSK	1	50	18811	1:1	0.257	1.197	0.308	A6
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	0.02	1	Left	Cheek	QPSK	50	25	18811	1:1	0.196	1.079	0.211	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	0.03	0	Left	Tilt	QPSK	1	50	18811	1:1	0.124	1.197	0.148	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	-0.01	1	Left	Tilt	QPSK	50	25	18811	1:1	0.094	1.079	0.101	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-7
LTE Band 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	25.2	24.80	0.10	0	Right	Cheek	QPSK	1	25	18811	1:1	0.144	1.096	0.158	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.15	1	Right	Cheek	QPSK	25	0	18811	1:1	0.098	1.104	0.108	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	0.15	0	Right	Tilt	QPSK	1	25	18811	1:1	0.063	1.096	0.069	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.12	1	Right	Tilt	QPSK	25	0	18811	1:1	0.042	1.104	0.046	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	0.01	0	Left	Cheek	QPSK	1	25	18811	1:1	0.166	1.096	0.182	A7
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.05	1	Left	Cheek	QPSK	25	0	18811	1:1	0.121	1.104	0.134	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	0.06	0	Left	Tilt	QPSK	1	25	18811	1:1	0.079	1.096	0.087	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.11	1	Left	Tilt	QPSK	25	0	18811	1:1	0.059	1.104	0.065	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-8
LTE Band 13 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.05	0	Right	Cheek	QPSK	1	49	18811	1:1	0.247	1.057	0.261	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	0.06	1	Right	Cheek	QPSK	25	0	18811	1:1	0.182	1.064	0.194	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.17	0	Right	Tilt	QPSK	1	49	18811	1:1	0.136	1.057	0.144	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	-0.02	1	Right	Tilt	QPSK	25	0	18811	1:1	0.095	1.064	0.101	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.17	0	Left	Cheek	QPSK	1	49	18811	1:1	0.360	1.057	0.381	A8
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	0.09	1	Left	Cheek	QPSK	25	0	18811	1:1	0.240	1.064	0.255	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.07	0	Left	Tilt	QPSK	1	49	18811	1:1	0.202	1.057	0.214	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	-0.01	1	Left	Tilt	QPSK	25	0	18811	1:1	0.133	1.064	0.142	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

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

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	0.17	0	Right	Cheek	QPSK	1	36	18803	1:1	0.337	1.035	0.349	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	0.10	1	Right	Cheek	QPSK	36	0	18803	1:1	0.276	1.074	0.296	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	-0.12	0	Right	Tilt	QPSK	1	36	18803	1:1	0.161	1.035	0.167	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	0.03	1	Right	Tilt	QPSK	36	0	18803	1:1	0.130	1.074	0.140	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	0.08	0	Left	Cheek	QPSK	1	36	18803	1:1	0.344	1.035	0.356	A9
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	-0.12	1	Left	Cheek	QPSK	36	0	18803	1:1	0.253	1.074	0.272	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	0.00	0	Left	Tilt	QPSK	1	36	18803	1:1	0.196	1.035	0.203	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	0.11	1	Left	Tilt	QPSK	36	0	18803	1:1	0.146	1.074	0.157	

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

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

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.08	0	Right	Cheek	QPSK	1	50	18837	1:1	0.181	1.000	0.181	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.07	1	Right	Cheek	QPSK	50	0	18837	1:1	0.156	1.062	0.166	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.08	0	Right	Tilt	QPSK	1	50	18837	1:1	0.153	1.000	0.153	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.16	1	Right	Tilt	QPSK	50	0	18837	1:1	0.129	1.062	0.137	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.13	0	Left	Cheek	QPSK	1	50	18837	1:1	0.201	1.000	0.201	A10
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.07	1	Left	Cheek	QPSK	50	0	18837	1:1	0.148	1.062	0.157	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.18	0	Left	Tilt	QPSK	1	50	18837	1:1	0.182	1.000	0.182	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.00	1	Left	Tilt	QPSK	50	0	18837	1:1	0.135	1.062	0.143	

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 25 (PCS) Head SAR

MEASUREMENT RESULTS

FREQUENCY MHz	Ch.		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	0.11	0	Right	Cheek	QPSK	1	50	18811	1:1	0.174	1.000	0.174	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.16	1	Right	Cheek	QPSK	50	0	18811	1:1	0.146	1.042	0.152	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	0.12	0	Right	Tilt	QPSK	1	50	18811	1:1	0.161	1.000	0.161	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.02	1	Right	Tilt	QPSK	50	0	18811	1:1	0.141	1.042	0.147	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	0.12	0	Left	Cheek	QPSK	1	50	18811	1:1	0.237	1.000	0.237	A11
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.08	1	Left	Cheek	QPSK	50	0	18811	1:1	0.194	1.042	0.202	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	-0.08	0	Left	Tilt	QPSK	1	50	18811	1:1	0.182	1.000	0.182	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.03	1	Left	Tilt	QPSK	50	0	18811	1:1	0.144	1.042	0.150	

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

Table 11-12
LTE Band 41 Head SAR

MEASUREMENT RESULTS																			
Power Class	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)	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	0.12	0	Right	Cheek	QPSK	1	50	18803	1:1.58	0.089	1.064	0.095	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.08	1	Right	Cheek	QPSK	50	25	18803	1:1.58	0.082	1.000	0.082	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	0.13	0	Right	Tilt	QPSK	1	50	18803	1:1.58	0.132	1.064	0.140	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	-0.13	1	Right	Tilt	QPSK	50	25	18803	1:1.58	0.100	1.000	0.100	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	0.12	0	Left	Cheek	QPSK	1	50	18803	1:1.58	0.166	1.064	0.177	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.16	1	Left	Cheek	QPSK	50	25	18803	1:1.58	0.130	1.000	0.130	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	-0.05	0	Left	Tilt	QPSK	1	50	18803	1:1.58	0.199	1.064	0.212	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.14	1	Left	Tilt	QPSK	50	25	18803	1:1.58	0.167	1.000	0.167	
Power Class 2	2593.00	40620	Mid	LTE Band 41	20	27.2	26.43	0.19	0	Left	Tilt	QPSK	1	50	18803	1:2.31	0.211	1.194	0.252	A12
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-13
DTS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	18.0	18.00	0.14	Right	Cheek	18746	1	99.9	0.226	-	1.000	1.001	-	
2437	6	802.11b	DSSS	22	18.0	18.00	0.11	Right	Tilt	18746	1	99.9	0.237	-	1.000	1.001	-	
2437	6	802.11b	DSSS	22	18.0	18.00	0.19	Left	Cheek	18746	1	99.9	0.656	0.351	1.000	1.001	0.351	A13
2437	6	802.11b	DSSS	22	18.0	18.00	0.15	Left	Tilt	18746	1	99.9	0.572	-	1.000	1.001	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram										

11.2 Standalone Body-Worn SAR Data

Table 11-14
GSM/UMTS Body-Worn SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.62	-0.03	10 mm	18803	1	1:8.3	back	0.357	1.019	0.364	
836.60	190	GSM 850	GPRS	28.7	28.63	-0.06	10 mm	18803	4	1:2.076	back	0.423	1.016	0.430	A14
1880.00	661	GSM 1900	GSM	30.7	30.51	-0.02	10 mm	18803	1	1:8.3	back	0.241	1.045	0.252	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.09	10 mm	18803	4	1:2.076	back	0.314	1.114	0.350	A15
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.11	10 mm	18803	N/A	1:1	back	0.348	1.000	0.348	A17
1712.40	1312	UMTS 1750	RMC	24.2	24.06	0.02	10 mm	18837	N/A	1:1	back	0.990	1.033	1.023	A19
1732.40	1412	UMTS 1750	RMC	24.2	24.19	0.05	10 mm	18837	N/A	1:1	back	0.963	1.002	0.965	
1752.60	1513	UMTS 1750	RMC	24.2	24.08	-0.01	10 mm	18837	N/A	1:1	back	0.851	1.028	0.875	
1852.40	9262	UMTS 1900	RMC	24.7	24.38	-0.02	10 mm	18811	N/A	1:1	back	0.705	1.076	0.759	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	-0.08	10 mm	18811	N/A	1:1	back	0.734	1.014	0.744	
1907.60	9538	UMTS 1900	RMC	24.7	24.44	0.02	10 mm	18811	N/A	1:1	back	0.804	1.062	0.854	A21
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-15
LTE Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	-0.01	0	18829	QPSK	1	50	10 mm	back	1:1	0.296	1.197	0.354	A23
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	-0.02	1	18829	QPSK	50	25	10 mm	back	1:1	0.227	1.079	0.245	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	-0.03	0	18803	QPSK	1	25	10 mm	back	1:1	0.401	1.096	0.439	A25
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.01	1	18803	QPSK	25	0	10 mm	back	1:1	0.318	1.104	0.351	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.16	0	18803	QPSK	1	49	10 mm	back	1:1	0.562	1.057	0.594	A27
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	-0.07	1	18803	QPSK	25	0	10 mm	back	1:1	0.421	1.064	0.448	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	-0.01	0	18829	QPSK	1	36	10 mm	back	1:1	0.396	1.035	0.410	A29
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	-0.04	1	18829	QPSK	36	0	10 mm	back	1:1	0.298	1.074	0.320	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.2	24.19	-0.04	0	18837	QPSK	1	50	10 mm	back	1:1	1.080	1.002	**1.082**	A31
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.11	0	18837	QPSK	1	50	10 mm	back	1:1	1.010	1.000	1.010	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	23.95	0.18	0	18837	QPSK	1	99	10 mm	back	1:1	0.661	1.059	0.700	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.2	22.81	-0.01	1	18837	QPSK	50	25	10 mm	back	1:1	0.850	1.094	0.930	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.01	1	18837	QPSK	50	0	10 mm	back	1:1	0.855	1.062	0.908	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.2	22.82	0.00	1	18837	QPSK	50	25	10 mm	back	1:1	0.601	1.091	0.656	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.83	-0.02	1	18837	QPSK	100	0	10 mm	back	1:1	0.798	1.089	0.869	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.2	24.19	-0.04	0	18837	QPSK	1	50	10 mm	back	1:1	1.070	1.002	1.072	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	0.03	0	18811	QPSK	1	50	10 mm	back	1:1	0.566	1.000	0.566	A33
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.05	1	18811	QPSK	50	0	10 mm	back	1:1	0.487	1.042	0.507	
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 measurements.

Table 11-16
LTE Band 41 Body-Worn SAR

MEASUREMENT RESULTS																				
Power Class	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)	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	-0.08	0	18803	QPSK	1	50	10 mm	back	1:1.58	0.340	1.064	0.362	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.13	1	18803	QPSK	50	25	10 mm	back	1:1.58	0.273	1.000	0.273	
Power Class 2	2593.00	40620	Mid	LTE Band 41	20	27.2	26.43	0.00	0	18803	QPSK	1	50	10 mm	back	1:2.31	0.352	1.194	0.420	A35
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										**Body 1.6 W/kg (mW/g)** averaged over 1 gram										

Table 11-17
DTS Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	21.5	21.42	0.02	10 mm	18746	1	back	99.9	0.659	0.443	1.019	1.001	**0.452**	A37
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Body 1.6 W/kg (mW/g)** averaged over 1 gram										

11.3 Standalone Hotspot SAR Data

Table 11-18
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	28.7	28.63	-0.06	10 mm	18803	4	1:2.076	back	0.423	1.016	0.430	A14
836.60	190	GSM 850	GPRS	28.7	28.63	0.05	10 mm	18803	4	1:2.076	front	0.300	1.016	0.305	
836.60	190	GSM 850	GPRS	28.7	28.63	0.00	10 mm	18803	4	1:2.076	bottom	0.162	1.016	0.165	
836.60	190	GSM 850	GPRS	28.7	28.63	-0.12	10 mm	18803	4	1:2.076	right	0.285	1.016	0.290	
836.60	190	GSM 850	GPRS	28.7	28.63	0.07	10 mm	18803	4	1:2.076	left	0.261	1.016	0.265	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.09	10 mm	18803	4	1:2.076	back	0.314	1.114	0.350	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.17	10 mm	18803	4	1:2.076	front	0.167	1.114	0.186	
1850.20	512	GSM 1900	GPRS	25.7	25.31	-0.17	10 mm	18803	4	1:2.076	bottom	0.608	1.094	0.665	A16
1880.00	661	GSM 1900	GPRS	25.7	25.23	-0.05	10 mm	18803	4	1:2.076	bottom	0.566	1.114	0.631	
1909.80	810	GSM 1900	GPRS	25.7	25.39	-0.10	10 mm	18803	4	1:2.076	bottom	0.592	1.074	0.636	
1880.00	661	GSM 1900	GPRS	25.7	25.23	-0.14	10 mm	18803	4	1:2.076	right	0.035	1.114	0.039	
1880.00	661	GSM 1900	GPRS	25.7	25.23	0.13	10 mm	18803	4	1:2.076	left	0.112	1.114	0.125	
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.11	10 mm	18803	N/A	1:1	back	0.348	1.000	0.348	
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.02	10 mm	18803	N/A	1:1	front	0.296	1.000	0.296	
836.60	4183	UMTS 850	RMC	25.2	25.20	0.04	10 mm	18803	N/A	1:1	bottom	0.256	1.000	0.256	
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.10	10 mm	18803	N/A	1:1	right	0.452	1.000	0.452	A18
836.60	4183	UMTS 850	RMC	25.2	25.20	-0.03	10 mm	18803	N/A	1:1	left	0.320	1.000	0.320	
1712.40	1312	UMTS 1750	RMC	22.2	22.04	0.00	10 mm	18829	N/A	1:1	back	0.872	1.038	0.905	A20
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.00	10 mm	18829	N/A	1:1	back	0.853	1.042	0.889	
1752.60	1513	UMTS 1750	RMC	22.2	21.94	0.08	10 mm	18829	N/A	1:1	back	0.758	1.062	0.805	
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.01	10 mm	18829	N/A	1:1	front	0.418	1.042	0.436	
1712.40	1312	UMTS 1750	RMC	22.2	22.04	-0.04	10 mm	18829	N/A	1:1	bottom	0.814	1.038	0.845	
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.06	10 mm	18829	N/A	1:1	bottom	0.833	1.042	0.868	
1752.60	1513	UMTS 1750	RMC	22.2	21.94	0.05	10 mm	18829	N/A	1:1	bottom	0.792	1.062	0.841	
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.01	10 mm	18829	N/A	1:1	right	0.128	1.042	0.133	
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.02	10 mm	18829	N/A	1:1	left	0.161	1.042	0.168	
1880.00	9400	UMTS 1900	RMC	23.2	22.84	0.07	10 mm	18803	N/A	1:1	back	0.431	1.086	0.468	
1880.00	9400	UMTS 1900	RMC	23.2	22.84	0.07	10 mm	18803	N/A	1:1	front	0.248	1.086	0.269	
1852.40	9262	UMTS 1900	RMC	23.2	22.75	-0.07	10 mm	18803	N/A	1:1	bottom	0.883	1.109	0.979	
1880.00	9400	UMTS 1900	RMC	23.2	22.84	0.07	10 mm	18803	N/A	1:1	bottom	0.981	1.086	1.065	
1907.60	9538	UMTS 1900	RMC	23.2	22.91	-0.02	10 mm	18803	N/A	1:1	bottom	1.080	1.069	**1.155**	A22
1880.00	9400	UMTS 1900	RMC	23.2	22.84	0.02	10 mm	18803	N/A	1:1	right	0.058	1.086	0.063	
1880.00	9400	UMTS 1900	RMC	23.2	22.84	0.04	10 mm	18803	N/A	1:1	left	0.174	1.086	0.189	
1907.60	9538	UMTS 1900	RMC	23.2	22.91	-0.15	10 mm	18803	N/A	1:1	bottom	0.987	1.069	1.055	
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 measurements.

Table 11-19
LTE Band 71 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)	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	-0.01	0	18829	QPSK	1	50	10 mm	back	1:1	0.296	1.197	0.354	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	-0.02	1	18829	QPSK	50	25	10 mm	back	1:1	0.227	1.079	0.245	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	-0.09	0	18829	QPSK	1	50	10 mm	front	1:1	0.244	1.197	0.292	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	-0.02	1	18829	QPSK	50	25	10 mm	front	1:1	0.186	1.079	0.201	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	-0.09	0	18829	QPSK	1	50	10 mm	bottom	1:1	0.136	1.197	0.163	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	0.00	1	18829	QPSK	50	25	10 mm	bottom	1:1	0.109	1.079	0.118	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	0.08	0	18829	QPSK	1	50	10 mm	right	1:1	0.390	1.197	0.467	A24
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	-0.06	1	18829	QPSK	50	25	10 mm	right	1:1	0.299	1.079	0.323	
680.50	133297	Mid	LTE Band 71	20	25.2	24.42	0.03	0	18829	QPSK	1	50	10 mm	left	1:1	0.198	1.197	0.237	
680.50	133297	Mid	LTE Band 71	20	24.2	23.87	0.01	1	18829	QPSK	50	25	10 mm	left	1:1	0.144	1.079	0.155	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-20
LTE Band 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	25.2	24.80	-0.03	0	18803	QPSK	1	25	10 mm	back	1:1	0.401	1.096	0.439	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.01	1	18803	QPSK	25	0	10 mm	back	1:1	0.318	1.104	0.351	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	-0.03	0	18803	QPSK	1	25	10 mm	front	1:1	0.304	1.096	0.333	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.00	1	18803	QPSK	25	0	10 mm	front	1:1	0.231	1.104	0.255	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	0.07	0	18803	QPSK	1	25	10 mm	bottom	1:1	0.129	1.096	0.141	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	-0.07	1	18803	QPSK	25	0	10 mm	bottom	1:1	0.098	1.104	0.108	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	-0.05	0	18803	QPSK	1	25	10 mm	right	1:1	0.467	1.096	0.512	A26
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	-0.07	1	18803	QPSK	25	0	10 mm	right	1:1	0.356	1.104	0.393	
707.50	23095	Mid	LTE Band 12	10	25.2	24.80	-0.03	0	18803	QPSK	1	25	10 mm	left	1:1	0.301	1.096	0.330	
707.50	23095	Mid	LTE Band 12	10	24.2	23.77	0.07	1	18803	QPSK	25	0	10 mm	left	1:1	0.216	1.104	0.238	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-21
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.16	0	18803	QPSK	1	49	10 mm	back	1:1	0.562	1.057	0.594	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	-0.07	1	18803	QPSK	25	0	10 mm	back	1:1	0.421	1.064	0.448	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.08	0	18803	QPSK	1	49	10 mm	front	1:1	0.420	1.057	0.444	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	0.01	1	18803	QPSK	25	0	10 mm	front	1:1	0.319	1.064	0.339	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	-0.01	0	18803	QPSK	1	49	10 mm	bottom	1:1	0.218	1.057	0.230	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	0.04	1	18803	QPSK	25	0	10 mm	bottom	1:1	0.148	1.064	0.157	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	0.01	0	18803	QPSK	1	49	10 mm	right	1:1	0.590	1.057	0.624	A28
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	0.00	1	18803	QPSK	25	0	10 mm	right	1:1	0.416	1.064	0.443	
782.00	23230	Mid	LTE Band 13	10	25.2	24.96	-0.03	0	18803	QPSK	1	49	10 mm	left	1:1	0.411	1.057	0.434	
782.00	23230	Mid	LTE Band 13	10	24.2	23.93	0.03	1	18803	QPSK	25	0	10 mm	left	1:1	0.266	1.064	0.283	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-22
LTE Band 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	25.2	25.05	-0.01	0	18829	QPSK	1	36	10 mm	back	1:1	0.396	1.035	0.410	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	-0.04	1	18829	QPSK	36	0	10 mm	back	1:1	0.298	1.074	0.320	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	0.05	0	18829	QPSK	1	36	10 mm	front	1:1	0.337	1.035	0.349	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	0.07	1	18829	QPSK	36	0	10 mm	front	1:1	0.266	1.074	0.286	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	0.02	0	18829	QPSK	1	36	10 mm	bottom	1:1	0.245	1.035	0.254	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	-0.04	1	18829	QPSK	36	0	10 mm	bottom	1:1	0.184	1.074	0.198	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	-0.02	0	18829	QPSK	1	36	10 mm	right	1:1	0.408	1.035	0.422	A30
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	-0.03	1	18829	QPSK	36	0	10 mm	right	1:1	0.312	1.074	0.335	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.2	25.05	-0.17	0	18829	QPSK	1	36	10 mm	left	1:1	0.254	1.035	0.263	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.2	23.89	-0.04	1	18829	QPSK	36	0	10 mm	left	1:1	0.202	1.074	0.217	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-23
LTE Band 66 (AWS) Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	-0.04	0	18837	QPSK	1	50	10 mm	back	1:1	0.723	1.096	0.792	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	-0.04	0	18837	QPSK	50	0	10 mm	back	1:1	0.746	1.119	0.835	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.49	-0.01	0	18837	QPSK	50	0	10 mm	back	1:1	0.738	1.178	0.869	
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.52	0.09	0	18837	QPSK	50	0	10 mm	back	1:1	0.540	1.169	0.631	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.38	0.00	0	18837	QPSK	100	0	10 mm	back	1:1	0.703	1.208	0.849	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	-0.06	0	18837	QPSK	1	50	10 mm	front	1:1	0.381	1.096	0.418	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	0.12	0	18837	QPSK	50	0	10 mm	front	1:1	0.387	1.119	0.433	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	-0.01	0	18837	QPSK	1	50	10 mm	bottom	1:1	0.787	1.096	0.863	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.79	0.15	0	18837	QPSK	1	0	10 mm	bottom	1:1	0.817	1.099	0.898	A32
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.67	0.13	0	18837	QPSK	1	50	10 mm	bottom	1:1	0.674	1.130	0.762	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	0.07	0	18837	QPSK	50	0	10 mm	bottom	1:1	0.795	1.119	0.890	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.49	-0.01	0	18837	QPSK	50	0	10 mm	bottom	1:1	0.805	1.178	0.948	
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.52	-0.05	0	18837	QPSK	50	0	10 mm	bottom	1:1	0.697	1.169	0.815	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.38	-0.05	0	18837	QPSK	100	0	10 mm	bottom	1:1	0.785	1.208	0.948	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	-0.05	0	18837	QPSK	1	50	10 mm	right	1:1	0.103	1.096	0.113	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	-0.03	0	18837	QPSK	50	0	10 mm	right	1:1	0.101	1.119	0.113	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	0.03	0	18837	QPSK	1	50	10 mm	left	1:1	0.181	1.096	0.198	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	-0.01	0	18837	QPSK	50	0	10 mm	left	1:1	0.177	1.119	0.198	
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 11-24
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	23.2	22.68	0.04	0	18811	QPSK	1	50	10 mm	back	1:1	0.343	1.127	0.387	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	0.05	0	18811	QPSK	50	0	10 mm	back	1:1	0.331	1.091	0.361	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.68	0.07	0	18811	QPSK	1	50	10 mm	front	1:1	0.220	1.127	0.248	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	0.13	0	18811	QPSK	50	0	10 mm	front	1:1	0.212	1.091	0.231	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.68	0.12	0	18811	QPSK	1	50	10 mm	bottom	1:1	0.756	1.127	0.852	A34
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.41	0.00	0	18811	QPSK	1	0	10 mm	bottom	1:1	0.701	1.199	0.840	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	22.52	-0.03	0	18811	QPSK	1	50	10 mm	bottom	1:1	0.688	1.169	0.804	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	-0.01	0	18811	QPSK	50	0	10 mm	bottom	1:1	0.717	1.091	0.782	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.48	0.02	0	18811	QPSK	100	0	10 mm	bottom	1:1	0.695	1.180	0.820	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.68	0.12	0	18811	QPSK	1	50	10 mm	right	1:1	0.071	1.127	0.080	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	0.10	0	18811	QPSK	50	0	10 mm	right	1:1	0.065	1.091	0.071	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.68	-0.03	0	18811	QPSK	1	50	10 mm	left	1:1	0.146	1.127	0.165	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	0.05	0	18811	QPSK	50	0	10 mm	left	1:1	0.151	1.091	0.165	
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 41 Hotspot SAR

MEASUREMENT RESULTS																				
Power Class	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)	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	-0.08	0	18803	QPSK	1	50	10 mm	back	1:1.58	0.340	1.064	0.362	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.13	1	18803	QPSK	50	25	10 mm	back	1:1.58	0.273	1.000	0.273	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	0.14	0	18803	QPSK	1	50	10 mm	front	1:1.58	0.357	1.064	0.380	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.05	1	18803	QPSK	50	25	10 mm	front	1:1.58	0.299	1.000	0.299	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	-0.12	0	18803	QPSK	1	50	10 mm	bottom	1:1.58	0.516	1.064	0.549	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	-0.13	1	18803	QPSK	50	25	10 mm	bottom	1:1.58	0.405	1.000	0.405	
Power Class 2	2593.00	40620	Mid	LTE Band 41	20	27.2	26.43	-0.05	0	18803	QPSK	1	50	10 mm	bottom	1:2.31	0.528	1.194	0.630	A36
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	-0.13	0	18803	QPSK	1	50	10 mm	right	1:1.58	0.156	1.064	0.166	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	-0.15	1	18803	QPSK	50	25	10 mm	right	1:1.58	0.128	1.000	0.128	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	25.2	24.93	0.16	0	18803	QPSK	1	50	10 mm	left	1:1.58	0.249	1.064	0.265	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	24.2	24.20	0.17	1	18803	QPSK	50	25	10 mm	left	1:1.58	0.197	1.000	0.197	
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
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	21.5	21.42	0.02	10 mm	18746	1	back	99.9	0.659	0.443	1.019	1.001	0.452	A37
2437	6	802.11b	DSSS	22	21.5	21.42	0.06	10 mm	18746	1	front	99.9	0.279	-	1.019	1.001	-	
2437	6	802.11b	DSSS	22	21.5	21.42	0.17	10 mm	18746	1	top	99.9	0.271	-	1.019	1.001	-	
2437	6	802.11b	DSSS	22	21.5	21.42	0.03	10 mm	18746	1	right	99.9	0.408	0.260	1.019	1.001	0.265	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

11.4 Standalone Phablet SAR Data

Table 11-27
UMTS Phablet SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1712.40	1312	UMTS 1750	RMC	24.2	24.06	-0.06	2 mm	18837	1:1	back	2.140	1.033	2.211	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	0.02	2 mm	18837	1:1	back	2.040	1.002	2.044	
1752.60	1513	UMTS 1750	RMC	24.2	24.08	-0.15	2 mm	18837	1:1	back	1.940	1.028	1.994	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	-0.12	0 mm	18837	1:1	front	1.430	1.002	1.433	
1712.40	1312	UMTS 1750	RMC	24.2	24.06	-0.05	2 mm	18837	1:1	bottom	2.100	1.033	2.169	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	-0.03	2 mm	18837	1:1	bottom	2.030	1.002	2.034	
1752.60	1513	UMTS 1750	RMC	24.2	24.08	0.03	2 mm	18837	1:1	bottom	1.950	1.028	2.005	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	0.13	0 mm	18837	1:1	right	0.142	1.002	0.142	
1732.40	1412	UMTS 1750	RMC	24.2	24.19	-0.08	0 mm	18837	1:1	left	0.836	1.002	0.838	
1712.40	1312	UMTS 1750	RMC	22.2	22.04	0.19	0 mm	18837	1:1	back	2.150	1.038	2.232	
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.12	0 mm	18837	1:1	back	2.130	1.042	2.219	
1752.60	1513	UMTS 1750	RMC	22.2	21.94	0.12	0 mm	18837	1:1	back	2.020	1.062	2.145	
1712.40	1312	UMTS 1750	RMC	22.2	22.04	0.05	0 mm	18837	1:1	bottom	2.540	1.038	2.637	A38
1732.40	1412	UMTS 1750	RMC	22.2	22.02	0.00	0 mm	18837	1:1	bottom	2.520	1.042	2.626	
1752.60	1513	UMTS 1750	RMC	22.2	21.94	0.02	0 mm	18837	1:1	bottom	2.430	1.062	2.581	
1852.40	9262	UMTS 1900	RMC	24.7	24.38	-0.13	2 mm	18829	1:1	back	2.560	1.076	2.755	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	-0.06	2 mm	18829	1:1	back	2.680	1.014	2.718	
1907.60	9538	UMTS 1900	RMC	24.7	24.44	0.02	2 mm	18829	1:1	back	2.780	1.062	2.952	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	-0.01	0 mm	18829	1:1	front	1.640	1.014	1.663	
1852.40	9262	UMTS 1900	RMC	24.7	24.38	-0.12	2 mm	18829	1:1	bottom	2.680	1.076	2.884	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	-0.06	2 mm	18829	1:1	bottom	2.800	1.014	2.839	
1907.60	9538	UMTS 1900	RMC	24.7	24.44	-0.12	2 mm	18829	1:1	bottom	2.810	1.062	2.984	A39
1880.00	9400	UMTS 1900	RMC	24.7	24.64	0.15	0 mm	18829	1:1	right	0.069	1.014	0.070	
1880.00	9400	UMTS 1900	RMC	24.7	24.64	0.06	0 mm	18829	1:1	left	1.040	1.014	1.055	
1852.40	9262	UMTS 1900	RMC	23.2	22.75	-0.08	0 mm	08592	1:1	back	1.850	1.109	2.052	
1880.00	9400	UMTS 1900	RMC	23.2	22.84	-0.04	0 mm	08592	1:1	back	1.930	1.086	2.096	
1907.60	9538	UMTS 1900	RMC	23.2	22.91	-0.06	0 mm	08592	1:1	back	1.910	1.069	2.042	
1852.40	9262	UMTS 1900	RMC	23.2	22.75	-0.08	0 mm	08592	1:1	bottom	2.360	1.109	2.617	
1880.00	9400	UMTS 1900	RMC	23.2	22.84	-0.10	0 mm	08592	1:1	bottom	2.330	1.086	2.530	
1907.60	9538	UMTS 1900	RMC	23.2	22.91	-0.08	0 mm	08592	1:1	bottom	2.230	1.069	2.384	
1907.60	9538	UMTS 1900	RMC	24.7	24.44	0.13	2 mm	18829	1:1	bottom	2.620	1.062	2.782	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Phablet 4.0 W/kg (mW/g) averaged over 10 grams						

Note: Blue entry represent variability measurements.

Table 11-28
LTE Band 66 Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.2	24.19	-0.09	0	18837	QPSK	1	50	2 mm	back	1:1	2.480	1.002	2.485	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.21	0	18837	QPSK	1	50	2 mm	back	1:1	2.430	1.000	2.430	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	23.95	0.04	0	18837	QPSK	1	99	2 mm	back	1:1	2.110	1.059	2.234	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.2	22.81	0.08	1	18837	QPSK	50	25	2 mm	back	1:1	2.080	1.094	2.276	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.07	1	18837	QPSK	50	0	2 mm	back	1:1	2.080	1.062	2.209	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.2	22.82	0.04	1	18837	QPSK	50	25	2 mm	back	1:1	1.810	1.091	1.975	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.83	0.05	1	18837	QPSK	100	0	2 mm	back	1:1	2.000	1.089	2.178	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	-0.15	0	18837	QPSK	1	50	0 mm	front	1:1	1.470	1.000	1.470	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	-0.15	1	18837	QPSK	50	0	0 mm	front	1:1	1.230	1.062	1.306	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.2	24.19	0.00	0	18837	QPSK	1	50	2 mm	bottom	1:1	2.770	1.002	2.776	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.10	0	18837	QPSK	1	50	2 mm	bottom	1:1	3.030	1.000	3.030	A40
1770.00	132572	High	LTE Band 66 (AWS)	20	24.2	23.95	-0.02	0	18837	QPSK	1	99	2 mm	bottom	1:1	2.410	1.059	2.552	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.2	22.81	-0.07	1	18837	QPSK	50	25	2 mm	bottom	1:1	2.230	1.094	2.440	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.00	1	18837	QPSK	50	0	2 mm	bottom	1:1	2.380	1.062	2.528	
1770.00	132572	High	LTE Band 66 (AWS)	20	23.2	22.82	-0.02	1	18837	QPSK	50	25	2 mm	bottom	1:1	2.070	1.091	2.258	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.83	-0.10	1	18837	QPSK	100	0	2 mm	bottom	1:1	2.300	1.089	2.505	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	-0.17	0	18837	QPSK	1	50	0 mm	right	1:1	0.171	1.000	0.171	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	0.04	1	18837	QPSK	50	0	0 mm	right	1:1	0.133	1.062	0.141	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.11	0	18837	QPSK	1	50	0 mm	left	1:1	0.881	1.000	0.881	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	23.2	22.94	-0.01	1	18837	QPSK	50	0	0 mm	left	1:1	0.744	1.062	0.790	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	-0.11	0	18829	QPSK	1	50	0 mm	back	1:1	1.860	1.096	2.039	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.79	0.09	0	18829	QPSK	1	0	0 mm	back	1:1	1.900	1.099	2.088	
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.67	-0.13	0	18829	QPSK	1	50	0 mm	back	1:1	1.720	1.130	1.944	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	0.13	0	18829	QPSK	50	0	0 mm	back	1:1	2.010	1.119	2.249	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.49	0.06	0	18829	QPSK	50	0	0 mm	back	1:1	2.030	1.178	2.391	
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.52	0.11	0	18829	QPSK	50	0	0 mm	back	1:1	1.800	1.169	2.104	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.38	0.05	0	18829	QPSK	100	0	0 mm	back	1:1	1.960	1.208	2.368	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.80	-0.02	0	18829	QPSK	1	50	0 mm	bottom	1:1	2.200	1.096	2.411	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.79	0.00	0	18829	QPSK	1	0	0 mm	bottom	1:1	2.400	1.099	2.638	
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.67	-0.16	0	18829	QPSK	1	50	0 mm	bottom	1:1	2.060	1.130	2.328	
1720.00	132072	Low	LTE Band 66 (AWS)	20	22.2	21.71	0.09	0	18829	QPSK	50	0	0 mm	bottom	1:1	2.310	1.119	2.585	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.49	-0.09	0	18829	QPSK	50	0	0 mm	bottom	1:1	2.460	1.178	2.898	
1770.00	132572	High	LTE Band 66 (AWS)	20	22.2	21.52	-0.07	0	18829	QPSK	50	0	0 mm	bottom	1:1	2.140	1.169	2.502	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	22.2	21.38	-0.06	0	18829	QPSK	100	0	0 mm	bottom	1:1	2.380	1.208	2.875	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.2	24.20	0.04	0	18837	QPSK	1	50	2 mm	bottom	1:1	2.750	1.000	2.750	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Phablet 4.0 W/kg (mW/g) averaged over 10 grams										

Note: Blue entry represent variability measurements.

Table 11-29
LTE Band 25 Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																		
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	0.03	0	18829	QPSK	1	50	2 mm	back	1:1	2.530	1.000	2.530	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.7	24.63	-0.02	0	18829	QPSK	1	50	2 mm	back	1:1	2.470	1.016	2.510	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.7	24.67	0.10	0	18829	QPSK	1	50	2 mm	back	1:1	2.620	1.007	2.638	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.01	1	18829	QPSK	50	0	2 mm	back	1:1	2.070	1.042	2.157	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.7	23.44	0.11	1	18829	QPSK	50	25	2 mm	back	1:1	2.020	1.062	2.145	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.7	23.28	0.16	1	18829	QPSK	50	25	2 mm	back	1:1	2.090	1.102	2.303	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.38	0.10	1	18829	QPSK	100	0	2 mm	back	1:1	2.040	1.076	2.195	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	-0.13	0	18829	QPSK	1	50	0 mm	front	1:1	1.630	1.000	1.630	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	-0.13	1	18829	QPSK	50	0	0 mm	front	1:1	1.290	1.042	1.344	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	-0.12	0	18829	QPSK	1	50	2 mm	bottom	1:1	2.460	1.000	2.460	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.7	24.63	0.09	0	18829	QPSK	1	50	2 mm	bottom	1:1	2.450	1.016	2.489	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.7	24.67	-0.08	0	18829	QPSK	1	50	2 mm	bottom	1:1	2.740	1.007	2.759	A41
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	-0.04	1	18829	QPSK	50	0	2 mm	bottom	1:1	2.080	1.042	2.167	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.7	23.44	-0.09	1	18829	QPSK	50	25	2 mm	bottom	1:1	1.990	1.062	2.113	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.7	23.28	-0.12	1	18829	QPSK	50	25	2 mm	bottom	1:1	2.100	1.102	2.314	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.38	-0.02	1	18829	QPSK	100	0	2 mm	bottom	1:1	2.050	1.076	2.206	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	0.06	0	18829	QPSK	1	50	0 mm	right	1:1	0.080	1.000	0.080	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	0.06	1	18829	QPSK	50	0	0 mm	right	1:1	0.066	1.042	0.069	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.7	24.70	-0.21	0	18829	QPSK	1	50	0 mm	left	1:1	0.956	1.000	0.956	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.7	23.52	-0.03	1	18829	QPSK	50	0	0 mm	left	1:1	0.765	1.042	0.797	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.68	-0.14	0	18829	QPSK	1	50	0 mm	back	1:1	1.980	1.127	2.231	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.41	-0.01	0	18829	QPSK	1	0	0 mm	back	1:1	1.940	1.199	2.326	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	22.52	-0.13	0	18829	QPSK	1	50	0 mm	back	1:1	1.880	1.169	2.198	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	-0.12	0	18829	QPSK	50	0	0 mm	back	1:1	2.110	1.091	2.302	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.80	-0.12	0	18829	QPSK	50	0	0 mm	back	1:1	1.960	1.096	2.148	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	22.71	-0.04	0	18829	QPSK	50	0	0 mm	back	1:1	2.050	1.119	2.294	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.48	-0.12	0	18829	QPSK	100	0	0 mm	back	1:1	2.060	1.180	2.431	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.68	-0.21	0	18829	QPSK	1	50	0 mm	bottom	1:1	2.450	1.127	2.761	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.41	-0.12	0	18829	QPSK	1	0	0 mm	bottom	1:1	2.360	1.199	2.830	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	22.52	-0.05	0	18829	QPSK	1	50	0 mm	bottom	1:1	2.420	1.169	2.829	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.82	-0.04	0	18829	QPSK	50	0	0 mm	bottom	1:1	2.560	1.091	2.793	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.2	22.80	-0.10	0	18829	QPSK	50	0	0 mm	bottom	1:1	2.480	1.096	2.718	
1905.00	26590	High	LTE Band 25 (PCS)	20	23.2	22.71	-0.12	0	18829	QPSK	50	0	0 mm	bottom	1:1	2.460	1.119	2.753	
1860.00	26140	Low	LTE Band 25 (PCS)	20	23.2	22.48	-0.13	0	18829	QPSK	100	0	0 mm	bottom	1:1	2.580	1.180	**3.044**	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Phablet 4.0 W/kg (mW/g) averaged over 10 grams										

11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.

4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).
11. This device utilizes power reduction for some wireless modes and technologies, as outlined in Section 1.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.
12. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds below.

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

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

LTE Notes:

1. LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 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. 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, hotspot, and phablet operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g evaluations, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.6.3 for more information.
3. 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.
4. 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.

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

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

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Head)	Estimated SAR (Head)	Separation Distance (Body)	Estimated SAR (Body)	Separation Distance (Phablet)	Estimated SAR (Phablet)
	[MHz]	[dBm]	[mm]	[W/kg]	[mm]	[W/kg]	[mm]	[W/kg]
Bluetooth	2480	7.00	5	0.210	10	0.105	5	0.084

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

12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.327	0.351	0.678
	GSM/GPRS 1900	0.154	0.351	0.505
	UMTS 850	0.320	0.351	0.671
	UMTS 1750	0.175	0.351	0.526
	UMTS 1900	0.262	0.351	0.613
	LTE Band 71	0.308	0.351	0.659
	LTE Band 12	0.182	0.351	0.533
	LTE Band 13	0.381	0.351	**0.732**
	LTE Band 26 (Cell)	0.356	0.351	0.707
	LTE Band 66 (AWS)	0.201	0.351	0.552
	LTE Band 25 (PCS)	0.237	0.351	0.588
	LTE Band 41	0.252	0.351	0.603

Table 12-3
Simultaneous Transmission Scenario with Bluetooth (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.327	0.210	0.537
	GSM/GPRS 1900	0.154	0.210	0.364
	UMTS 850	0.320	0.210	0.530
	UMTS 1750	0.175	0.210	0.385
	UMTS 1900	0.262	0.210	0.472
	LTE Band 71	0.308	0.210	0.518
	LTE Band 12	0.182	0.210	0.392
	LTE Band 13	0.381	0.210	**0.591**
	LTE Band 26 (Cell)	0.356	0.210	0.566
	LTE Band 66 (AWS)	0.201	0.210	0.411
	LTE Band 25 (PCS)	0.237	0.210	0.447
	LTE Band 41	0.252	0.210	0.462

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 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.430	0.452	0.882
	GSM/GPRS 1900	0.350	0.452	0.802
	UMTS 850	0.348	0.452	0.800
	UMTS 1750	1.023	0.452	1.475
	UMTS 1900	0.854	0.452	1.306
	LTE Band 71	0.354	0.452	0.806
	LTE Band 12	0.439	0.452	0.891
	LTE Band 13	0.594	0.452	1.046
	LTE Band 26 (Cell)	0.410	0.452	0.862
	LTE Band 66 (AWS)	1.082	0.452	**1.534**
	LTE Band 25 (PCS)	0.566	0.452	1.018
	LTE Band 41	0.420	0.452	0.872

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.430	0.105	0.535
	GSM/GPRS 1900	0.350	0.105	0.455
	UMTS 850	0.348	0.105	0.453
	UMTS 1750	1.023	0.105	1.128
	UMTS 1900	0.854	0.105	0.959
	LTE Band 71	0.354	0.105	0.459
	LTE Band 12	0.439	0.105	0.544
	LTE Band 13	0.594	0.105	0.699
	LTE Band 26 (Cell)	0.410	0.105	0.515
	LTE Band 66 (AWS)	1.082	0.105	**1.187**
	LTE Band 25 (PCS)	0.566	0.105	0.671
	LTE Band 41	0.420	0.105	0.525

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 the applicable exposure conditions was used for simultaneous transmission analysis.

Table 12-6
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)
		1	2	1+2
Hotspot SAR	GPRS 850	0.430	0.452	0.882
	GPRS 1900	0.665	0.452	1.117
	UMTS 850	0.452	0.452	0.904
	UMTS 1750	0.905	0.452	1.357
	UMTS 1900	1.155	0.452	See Table Below
	LTE Band 71	0.467	0.452	0.919
	LTE Band 12	0.512	0.452	0.964
	LTE Band 13	0.624	0.452	1.076
	LTE Band 26 (Cell)	0.422	0.452	0.874
	LTE Band 66 (AWS)	0.948	0.452	**1.400**
	LTE Band 25 (PCS)	0.852	0.452	1.304
	LTE Band 41	0.630	0.452	1.082

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	Back	0.468	0.452	0.920
	Front	0.269	0.452*	0.721
	Top	-	0.452*	0.452
	Bottom	1.155	-	**1.155**
	Right	0.063	0.265	0.328
	Left	0.189	-	0.189

Table 12-7
Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.430	0.105	0.535
	GPRS 1900	0.665	0.105	0.770
	UMTS 850	0.452	0.105	0.557
	UMTS 1750	0.905	0.105	1.010
	UMTS 1900	1.155	0.105	**1.260**
	LTE Band 71	0.467	0.105	0.572
	LTE Band 12	0.512	0.105	0.617
	LTE Band 13	0.624	0.105	0.729
	LTE Band 26 (Cell)	0.422	0.105	0.527
	LTE Band 66 (AWS)	0.948	0.105	1.053
	LTE Band 25 (PCS)	0.852	0.105	0.957
	LTE Band 41	0.630	0.105	0.735

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

12.6 Phablet Simultaneous Transmission Analysis

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required if wireless router 1g SAR (scaled to the maximum output power, including tolerance) < 1.2 W/kg. Therefore, no further analysis beyond the tables included in this section was required to determine that possible simultaneous transmission scenarios would not exceed the SAR limit.

For SAR summation, the highest reported SAR across all test distances was used as the most conservative evaluation for simultaneous transmission analysis for each device edge.

Table 12-8
Simultaneous Transmission Scenario with Bluetooth (Phablet)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Phablet SAR	UMTS 1750	2.637	0.084	2.721
	UMTS 1900	2.984	0.084	3.068
	LTE Band 66 (AWS)	3.030	0.084	3.114
	LTE Band 25 (PCS)	3.044	0.084	**3.128**

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

12.7 Simultaneous Transmission Conclusion

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

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg
5) When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1720.00	132072	LTE Band 66 (AWS), 20 MHz Bandwidth	QPSK, 1 RB, 50 RB Offset	back	10 mm	1.080	1.070	1.01	N/A	N/A	N/A	N/A
1900	1907.60	9538	UMTS 1900	RMC	bottom	10 mm	1.080	0.987	1.09	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 13-2
Phablet SAR Measurement Variability Results

PHABLET VARIABILITY RESULTS													
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (10g)	1st Repeated SAR (10g)	Ratio	2nd Repeated SAR (10g)	Ratio	3rd Repeated SAR (10g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1745.00	132322	LTE Band 66 (AWS), 20 MHz Bandwidth	QPSK, 1 RB, 50 RB Offset	bottom	2 mm	3.030	2.750	1.10	N/A	N/A	N/A	N/A
1900	1907.60	9538	UMTS 1900	RMC	bottom	2 mm	2.810	2.620	1.07	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Phablet 4.0 W/kg (mW/g) averaged over 10 grams							

13.2 Measurement Uncertainty

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

14 ADDITIONAL TESTING PER FCC GUIDANCE

14.1 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 was < 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)	25.2	27.2
Measured Output Power (dBm)	24.93	26.43
Measured SAR (W/kg)	0.199	0.211
Measured Power (mW)	311.17	439.54
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	196.97	190.32
% deviation from expected linearity		9.74%

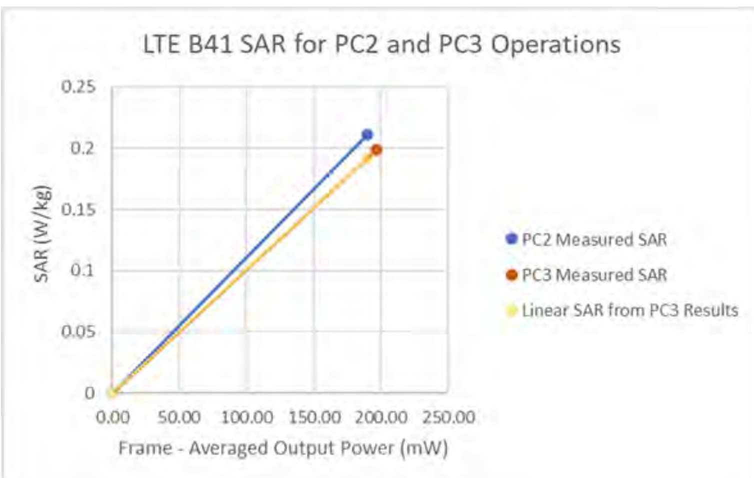

Figure 14-1
LTE Band 41 Head Linearity

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

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	25.20	27.20
Measured Output Power (dBm)	24.93	26.43
Measured SAR (W/kg)	0.34	0.352
Measured Power (mW)	311.17	439.54
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	196.97	190.32
% deviation from expected linearity		7.15%

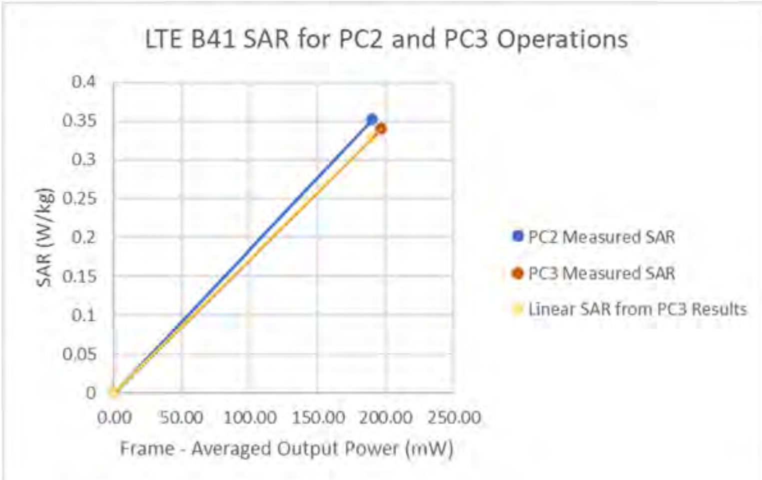

Figure 14-2
LTE Band 41 Body-Worn Linearity

Table 14-3
LTE Band 41 Hotspot Linearity Data

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	25.20	27.20
Measured Output Power (dBm)	24.93	26.43
Measured SAR (W/kg)	0.516	0.528
Measured Power (mW)	311.17	439.54
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	196.97	190.32
% deviation from expected linearity		5.90%

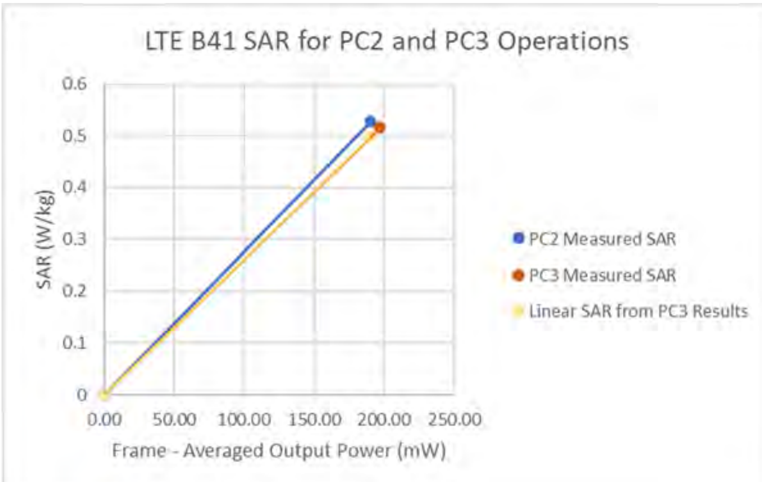

Figure 14-3
LTE Band 41 Hotspot Linearity

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85033E	3.5mm Standard Calibration Kit	6/6/2020	Annual	6/6/2021	MY53402352
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8753ES	Network Analyzer	3/5/2020	Annual	3/5/2021	MY40001472
Agilent	8753ES	S-Parameter Network Analyzer	12/31/2019	Annual	12/31/2020	US39170122
Agilent	E4438C	ESG Vector Signal Generator	12/13/2019	Annual	12/13/2020	MY42082659
Agilent	E4438C	ESG Vector Signal Generator	3/8/2019	Biennial	3/8/2021	MY42082385
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	2/10/2020	Annual	2/10/2021	GB42230325
Agilent	E5515C	Wireless Communications Test Set	2/26/2020	Annual	2/26/2021	GB44400860
Agilent	E5515C	Wireless Communications Test Set	1/14/2020	Triennial	1/14/2023	GB43304447
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB44450273
Agilent	N5182A	MXG Vector Signal Generator	2/19/2020	Annual	2/19/2021	MY47420651
Agilent	N5182A	MXG Vector Signal Generator	5/13/2020	Annual	5/13/2021	MY47420603
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	353468
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	353469
Anritsu	MA24106A	USB Power Sensor	10/10/2019	Annual	10/10/2020	1344545
Anritsu	MA24106A	USB Power Sensor	10/10/2019	Annual	10/10/2020	1344559
Anritsu	MA24106A	USB Power Sensor	12/9/2019	Annual	12/9/2020	1349503
Anritsu	MA24106A	USB Power Sensor	12/9/2019	Annual	12/9/2020	1344554
Anritsu	MA2411B	Pulse Power Sensor	12/4/2019	Annual	12/4/2020	1126066
Anritsu	MA2411B	Pulse Power Sensor	1/21/2020	Annual	1/21/2021	1207470
Anritsu	ML2495A	Power Meter	11/15/2019	Annual	11/15/2020	1039008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Anritsu	MT8820C	Radio Communication Analyzer	9/17/2020	Annual	9/17/2021	6201300731
Anritsu	MT8821C	Radio Communication Analyzer	10/2/2019	Annual	10/2/2020	6201664756
Anritsu	MT8821C	Radio Communication Analyzer	11/22/2019	Annual	11/22/2020	6262044715
Anritsu	MT8821C	Radio Communication Analyzer	2/22/2020	Annual	2/22/2021	6261895213
Anritsu	MT8821C	Radio Communication Analyzer	3/10/2020	Annual	3/10/2021	6200901190
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/9/2018	Biennial	10/9/2020	181647811
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/9/2018	Biennial	10/9/2020	181647802
Control Company	4352	Long Stem Thermometer	6/26/2019	Biennial	6/26/2021	192282744
Control Company	4352	Long Stem Thermometer	6/26/2019	Biennial	6/26/2021	192282739
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	9/1/2020	Annual	9/1/2021	MY53401181
Keysight Technologies	AT/N6705B	DC Power Supply	N/A	N/A	N/A	MY53001315
Keysight Technologies	N9020A	MXA Signal Analyzer	8/14/2020	Annual	8/14/2021	US46470561
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
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	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	NC-100	Torque Wrench	8/4/2020	Biennial	8/4/2022	N/A
Pasternack	NC-100	Torque Wrench	8/4/2020	Biennial	8/4/2022	1445
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	10/4/2019	Annual	10/4/2020	166462
Rohde & Schwarz	CMW500	Radio Communication Tester	10/15/2019	Annual	10/15/2020	109366
Rohde & Schwarz	CMW500	Radio Communication Tester	3/27/2020	Annual	3/27/2021	128633
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
SPEAG	D750V3	750 MHz Dipole	3/11/2020	Annual	3/11/2021	1054
SPEAG	D835V2	835 MHz SAR Dipole	3/13/2019	Biennial	3/13/2021	4d047
SPEAG	D835V2	835 MHz SAR Dipole	1/13/2020	Annual	1/13/2021	4d132
SPEAG	D1750V2	1750 MHz SAR Dipole	10/22/2018	Biennial	10/22/2020	1150
SPEAG	D1900V2	1900 MHz SAR Dipole	2/21/2019	Biennial	2/21/2021	5d148
SPEAG	D2450V2	2450 MHz SAR Dipole	8/16/2018	Triennial	8/16/2021	981
SPEAG	D2600V2	2600 MHz SAR Dipole	6/14/2019	Biennial	6/14/2021	1064
SPEAG	D1750V2	1750 MHz SAR Dipole	5/12/2020	Annual	5/12/2021	1148
SPEAG	D1765V2	1765 MHz SAR Dipole	5/23/2018	Triennial	5/23/2021	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Biennial	10/23/2020	5d080
SPEAG	EX3DV4	SAR Probe	6/23/2020	Annual	6/23/2021	7406
SPEAG	EX3DV4	SAR Probe	1/21/2020	Annual	1/21/2021	3589
SPEAG	EX3DV4	SAR Probe	7/31/2020	Annual	7/31/2021	7308
SPEAG	EX3DV4	SAR Probe	9/19/2019	Annual	9/19/2020	7551
SPEAG	EX3DV4	SAR Probe	12/11/2019	Annual	12/11/2020	7570
SPEAG	EX3DV4	SAR Probe	4/21/2020	Annual	4/21/2021	7357
SPEAG	EX3DV4	SAR Probe	12/11/2019	Annual	12/11/2020	7571
SPEAG	EX3DV4	SAR Probe	6/23/2020	Annual	6/23/2021	7409
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/14/2020	Annual	5/14/2021	1583
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/13/2020	Annual	1/13/2021	1558
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/11/2020	Annual	8/11/2021	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2019	Annual	9/17/2020	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/12/2020	Annual	3/12/2021	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/15/2020	Annual	4/15/2021	1407
SPEAG	DAE4	Data Acquisition Electronics	12/5/2019	Annual	12/5/2020	1533
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2020	Annual	6/18/2021	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2020	Annual	5/12/2021	1070

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

16 MEASUREMENT UNCERTAINTIES

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

17 CONCLUSION

17.1 Measurement Conclusion

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

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

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APPENDIX A: SAR TEST DATA

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

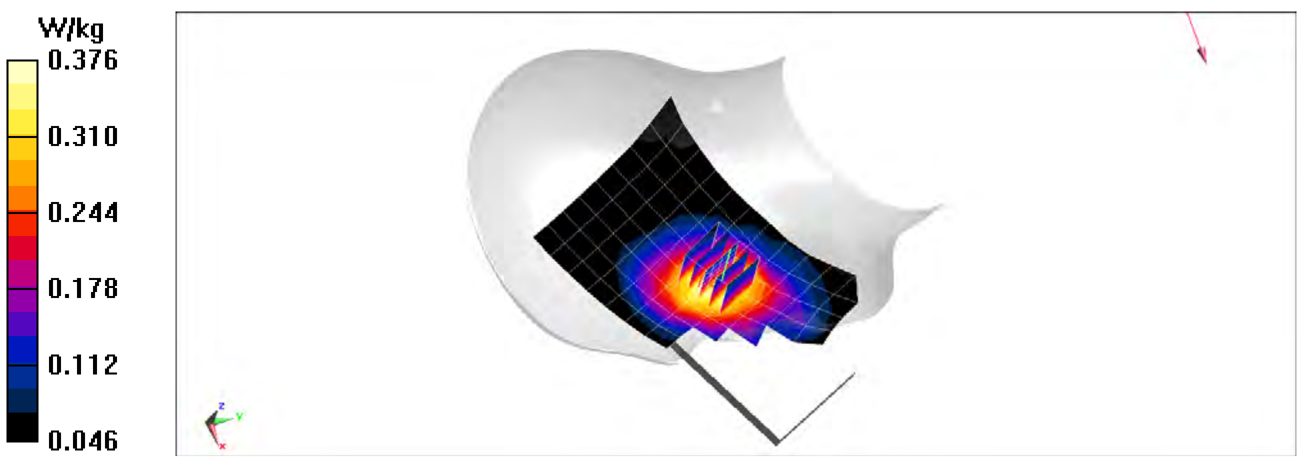
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.076
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.946 S/m; ε_r = 42.968; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 10/02/2020; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7406; ConvF(9.61, 9.61, 9.61) @ 836.6 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: GPRS 850, Right Head, Cheek, Mid.ch, 4 Tx slots

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.98 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.407 W/kg
SAR(1 g) = 0.322 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 77.4%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

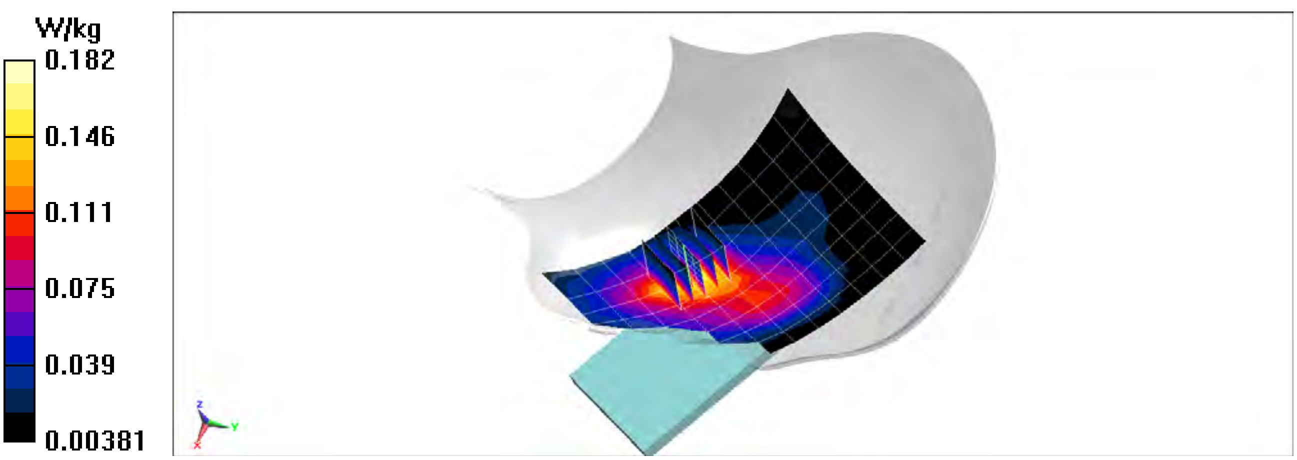
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.393 S/m; ε_r = 40.916; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/16/2020; Ambient Temp: 21.9°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7406; ConvF(7.96, 7.96, 7.96) @ 1880 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: GPRS 1900, Left Head, Cheek, Mid.ch, 4 Tx slots

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.01 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.210 W/kg
SAR(1 g) = 0.138 W/kg
Smallest distance from peaks to all points 3 dB below = 13.9 mm
Ratio of SAR at M2 to SAR at M1 = 66.6%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

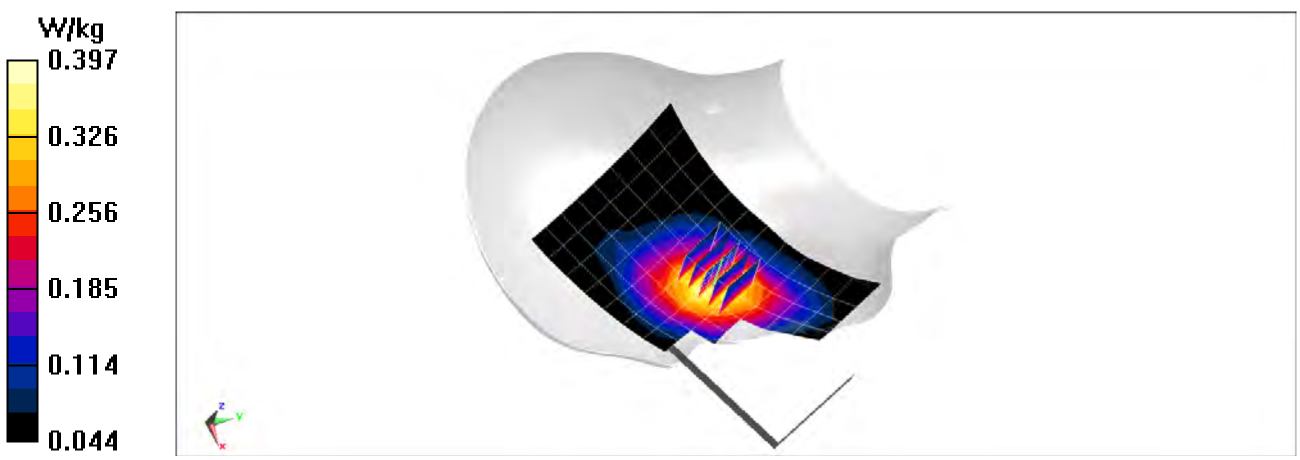
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.935 S/m; ε_r = 42.484; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 09/16/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN3589; ConvF(8.58, 8.58, 8.58) @ 836.6 MHz; Calibrated: 1/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 1/13/2020
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: UMTS 850, Right Head, Cheek, 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 = 18.50 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 0.436 W/kg
SAR(1 g) = 0.320 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 74.3%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

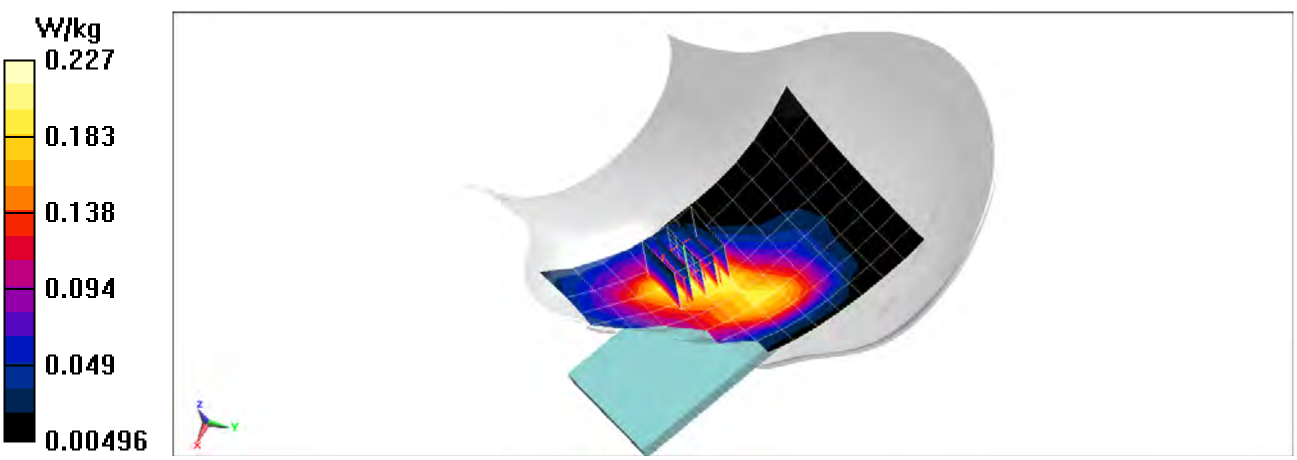
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.385 S/m; ε_r = 39.506; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/19/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7406; ConvF(8.32, 8.32, 8.32) @ 1732.4 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.55 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.262 W/kg
SAR(1 g) = 0.175 W/kg
Smallest distance from peaks to all points 3 dB below = 14.1 mm
Ratio of SAR at M2 to SAR at M1 = 67.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

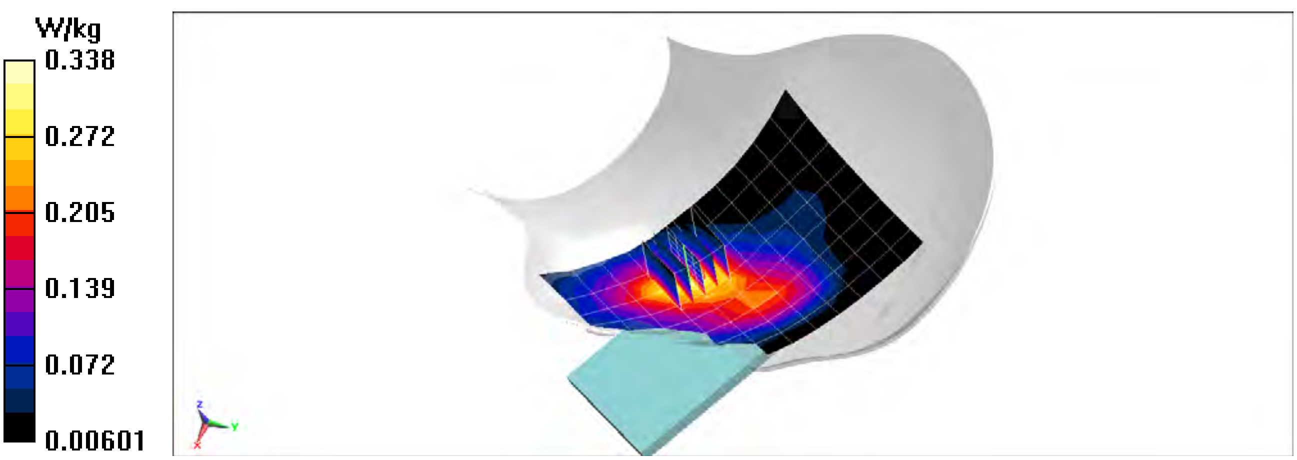
Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.393 S/m; ε_r = 40.916; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/16/2020; Ambient Temp: 21.9°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7406; ConvF(7.96, 7.96, 7.96) @ 1880 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.10 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.388 W/kg
SAR(1 g) = 0.258 W/kg
Smallest distance from peaks to all points 3 dB below = 15 mm
Ratio of SAR at M2 to SAR at M1 = 67.7%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

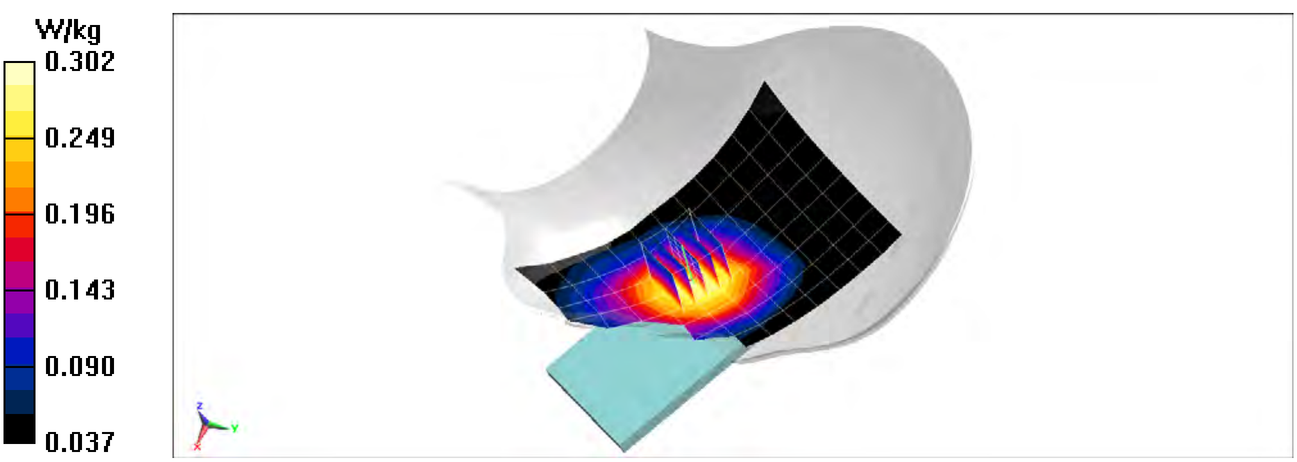
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.889 S/m; ε_r = 44.107; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/21/2020; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(10.04, 10.04, 10.04) @ 680.5 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 71, Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 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 = 17.67 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.322 W/kg
SAR(1 g) = 0.257 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 80.2%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

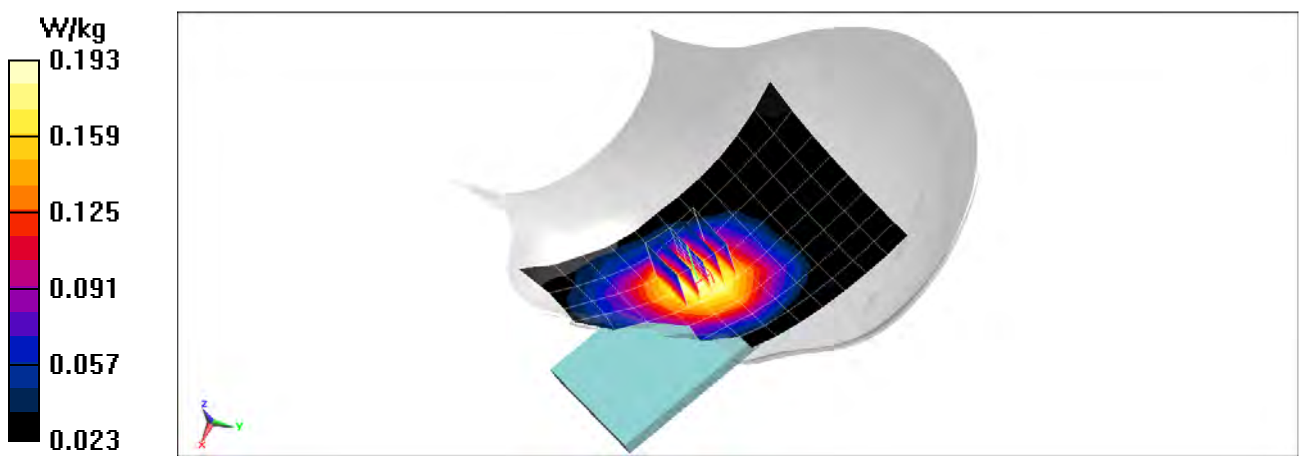
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.899 S/m; ε_r = 44.018; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/21/2020; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(10.04, 10.04, 10.04) @ 707.5 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 12, Left Head, Cheek, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 25 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.17 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.206 W/kg
SAR(1 g) = 0.166 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 80.9%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

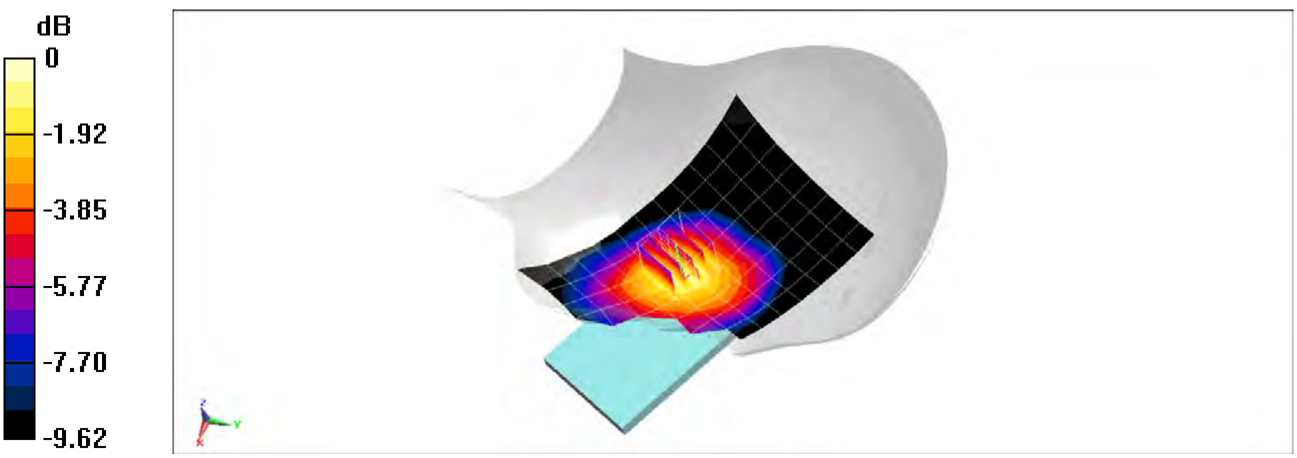
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.924 S/m; ε_r = 43.789; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/21/2020; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(10.04, 10.04, 10.04) @ 782 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 13, Left Head, Cheek, Mid.ch, QPSK, 10 MHz Bandwidth, 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 = 18.29 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.449 W/kg
SAR(1 g) = 0.360 W/kg
Smallest distance from peaks to all points 3 dB below = 25.2 mm
Ratio of SAR at M2 to SAR at M1 = 80.3%



0 dB = 0.420 W/kg = -3.77 dBW/kg

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

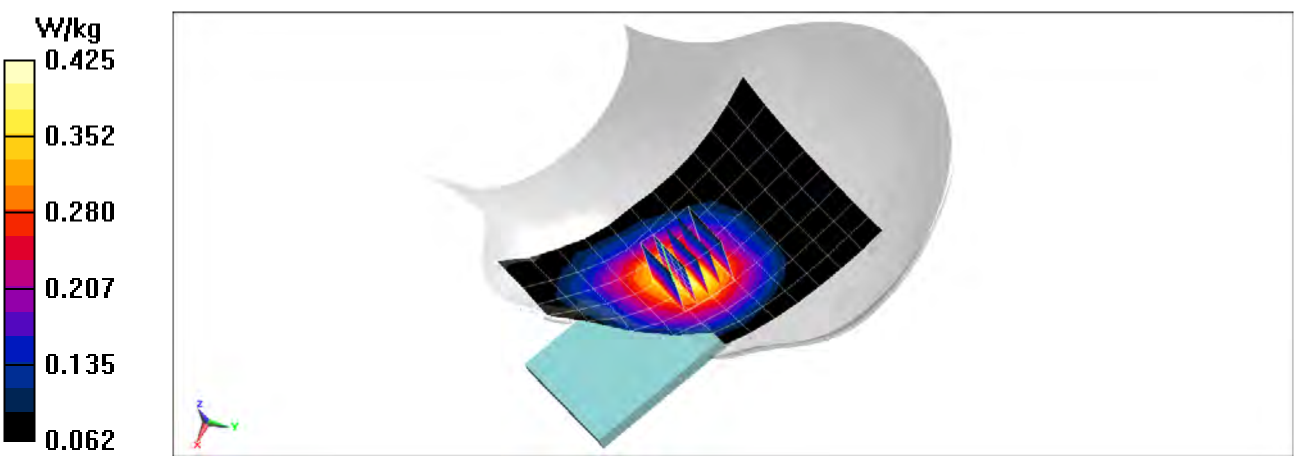
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.933 S/m; ε_r = 42.499; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/16/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN3589; ConvF(8.58, 8.58, 8.58) @ 831.5 MHz; Calibrated: 1/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 1/13/2020
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 26 (Cell.), Left Head, Cheek, Mid.ch,
15 MHz Bandwidth, QPSK, 1 RB, 36 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 = 24.50 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.463 W/kg
SAR(1 g) = 0.344 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 77.1%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18837

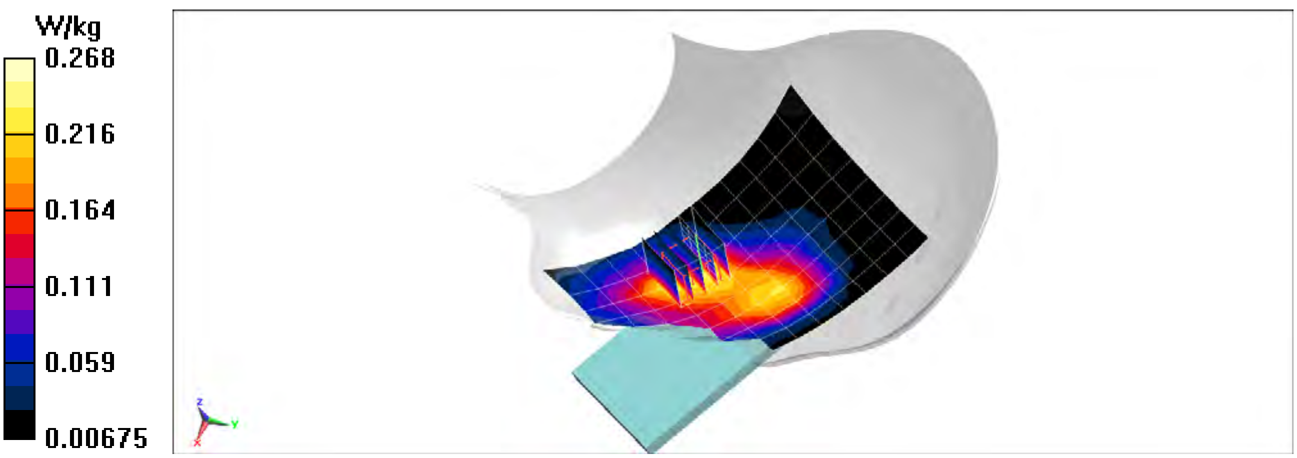
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1745 MHz; σ = 1.398 S/m; ε_r = 39.444; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/19/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7406; ConvF(8.32, 8.32, 8.32) @ 1745 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 66 (AWS), Left Head, Cheek, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 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 = 12.63 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.308 W/kg
SAR(1 g) = 0.201 W/kg
Smallest distance from peaks to all points 3 dB below = 14.7 mm
Ratio of SAR at M2 to SAR at M1 = 66.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

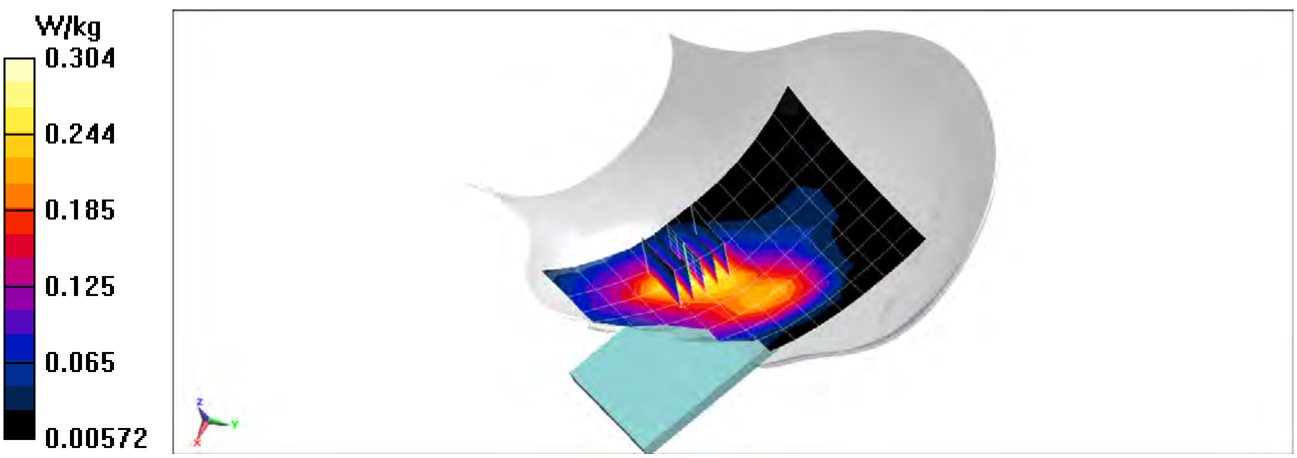
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1860 MHz; σ = 1.372 S/m; ε_r = 41.005; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/16/2020; Ambient Temp: 21.9°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7406; ConvF(7.96, 7.96, 7.96) @ 1860 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Left Head, Cheek, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 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 = 13.98 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.237 W/kg
Smallest distance from peaks to all points 3 dB below = 15.1 mm
Ratio of SAR at M2 to SAR at M1 = 67.6%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

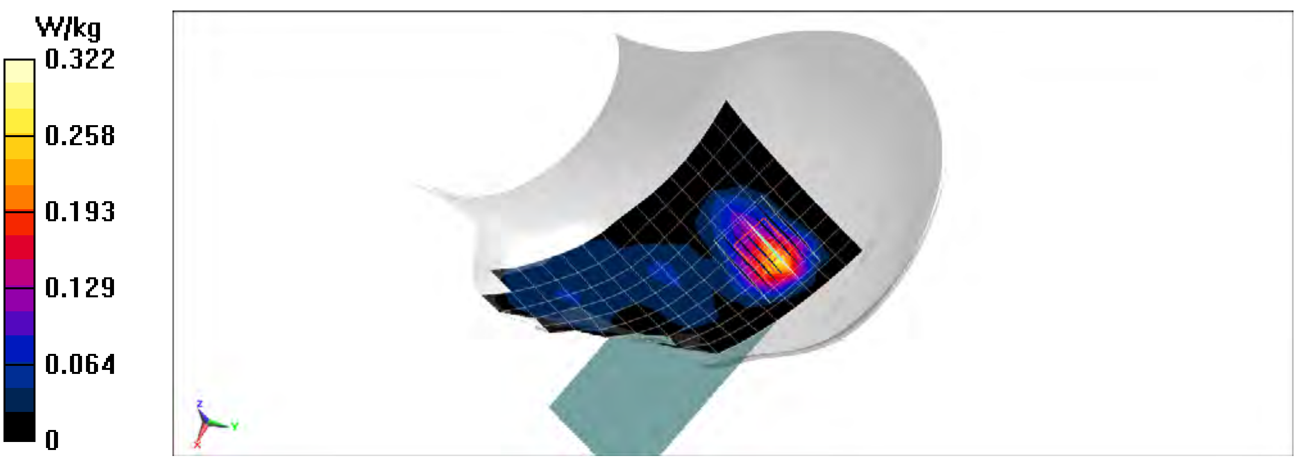
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2593 MHz; Duty Cycle: 1:2.31
Medium: 2450 Head Medium parameters used (interpolated):
f = 2593 MHz; σ = 1.942 S/m; ε_r = 38.125; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 10/02/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(6.6, 6.6, 6.6) @ 2593 MHz; Calibrated: 1/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 1/13/2020
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 41 PC2, Left Head, Tilt, Mid.ch, QPSK,
20 MHz Bandwidth, 1 RB, 50 RB Offset

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.51 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.385 W/kg
SAR(1 g) = 0.211 W/kg
Smallest distance from peaks to all points 3 dB below = 12.2 mm
Ratio of SAR at M2 to SAR at M1 = 55.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18746

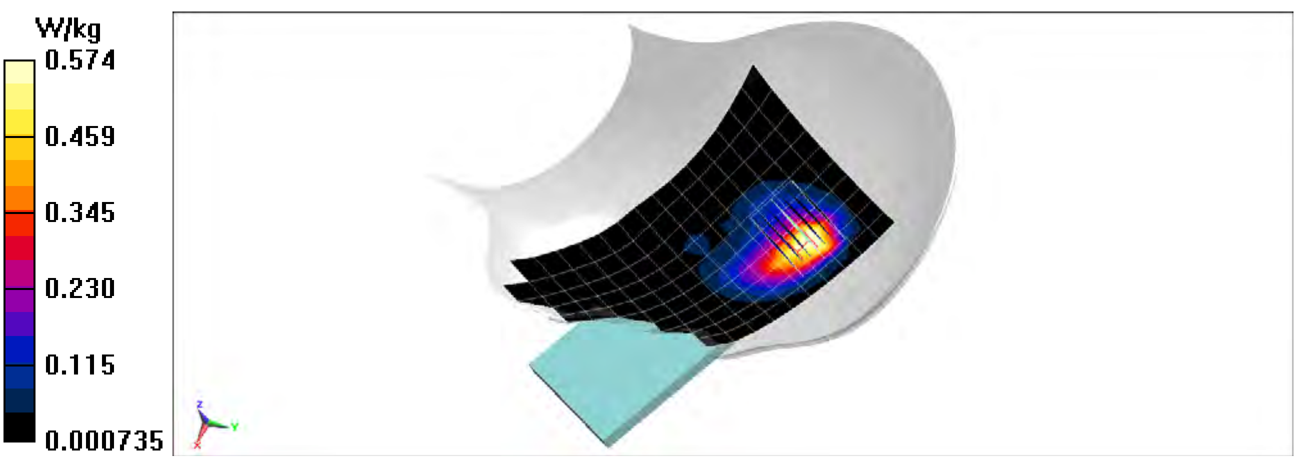
Communication System: UID 0, 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.825 S/m; ε_r = 39.875; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 09/16/2020; Ambient Temp: 23.7°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN7308; ConvF(7.33, 7.33, 7.33) @ 2437 MHz; Calibrated: 7/31/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/11/2020
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.696 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.768 W/kg
SAR(1 g) = 0.351 W/kg
Smallest distance from peaks to all points 3 dB below = 10.5 mm
Ratio of SAR at M2 to SAR at M1 = 44.3%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

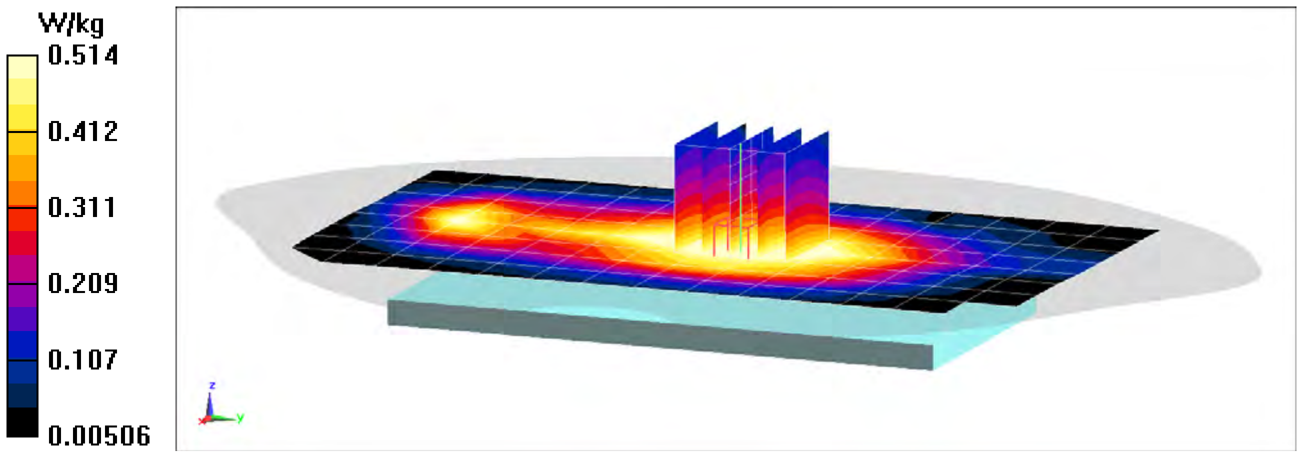
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.076
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.957 S/m; ε_r = 53.026; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/22/2020; Ambient Temp: 23.7°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7308; ConvF(9.92, 9.92, 9.92) @ 836.6 MHz; Calibrated: 7/31/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/11/2020
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: GPRS 850, Body SAR, Back 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 = 20.89 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.566 W/kg
SAR(1 g) = 0.423 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 74.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

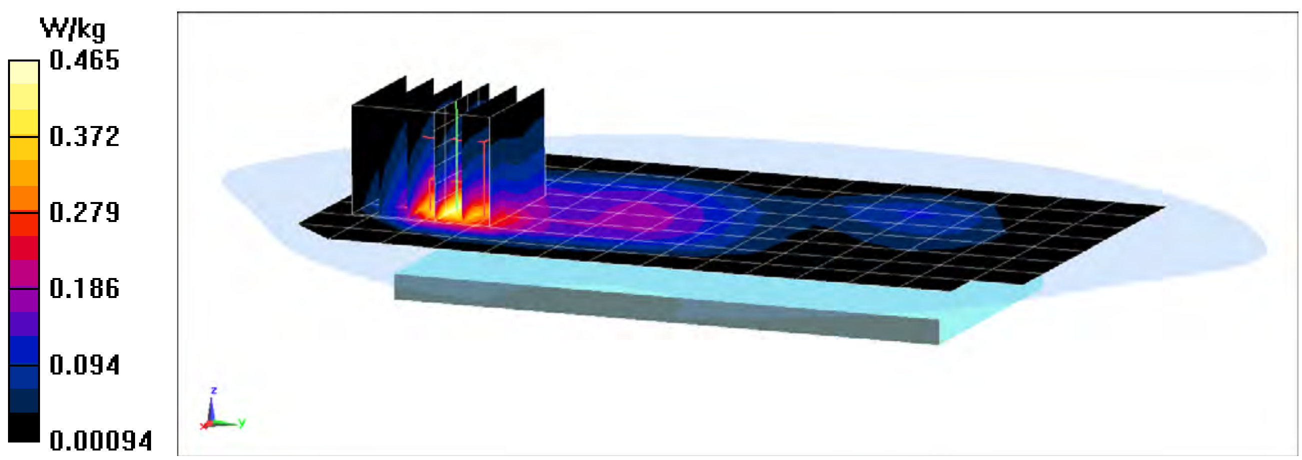
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.54 S/m; ε_r = 51.86; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1880 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.68 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.564 W/kg
SAR(1 g) = 0.314 W/kg
Smallest distance from peaks to all points 3 dB below = 11.3 mm
Ratio of SAR at M2 to SAR at M1 = 56.5%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

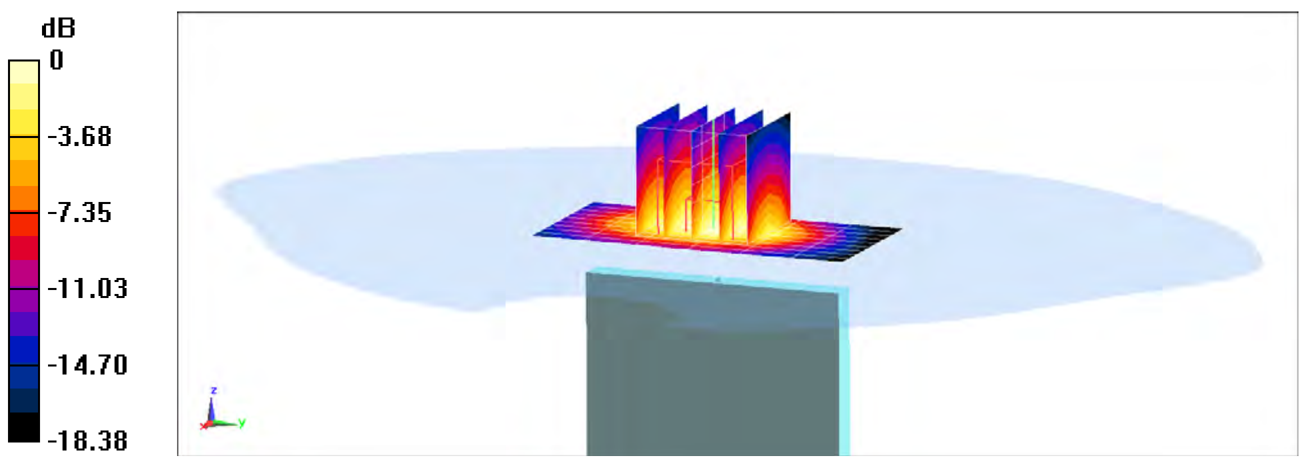
Communication System: UID 0, GSM GPRS; 4 Tx slots; Frequency: 1850.2 MHz; Duty Cycle: 1:2.076
Medium: 1900 Body Medium parameters used (interpolated):
f = 1850.2 MHz; σ = 1.509 S/m; ε_r = 51.967; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1850.2 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.18 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.608 W/kg
Smallest distance from peaks to all points 3 dB below = 11.2 mm
Ratio of SAR at M2 to SAR at M1 = 58.1%



0 dB = 0.897 W/kg = -0.47 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

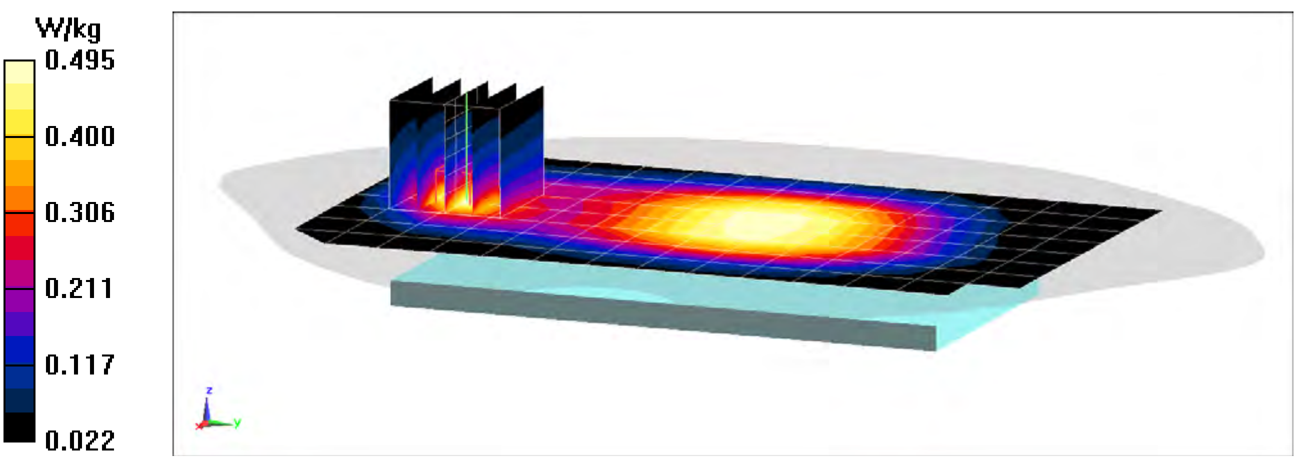
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.957 S/m; ε_r = 55.308; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/01/2020; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7551; ConvF(9.92, 9.92, 9.92) @ 836.6 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.73 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.608 W/kg
SAR(1 g) = 0.348 W/kg
Smallest distance from peaks to all points 3 dB below = 11.6 mm
Ratio of SAR at M2 to SAR at M1 = 59%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

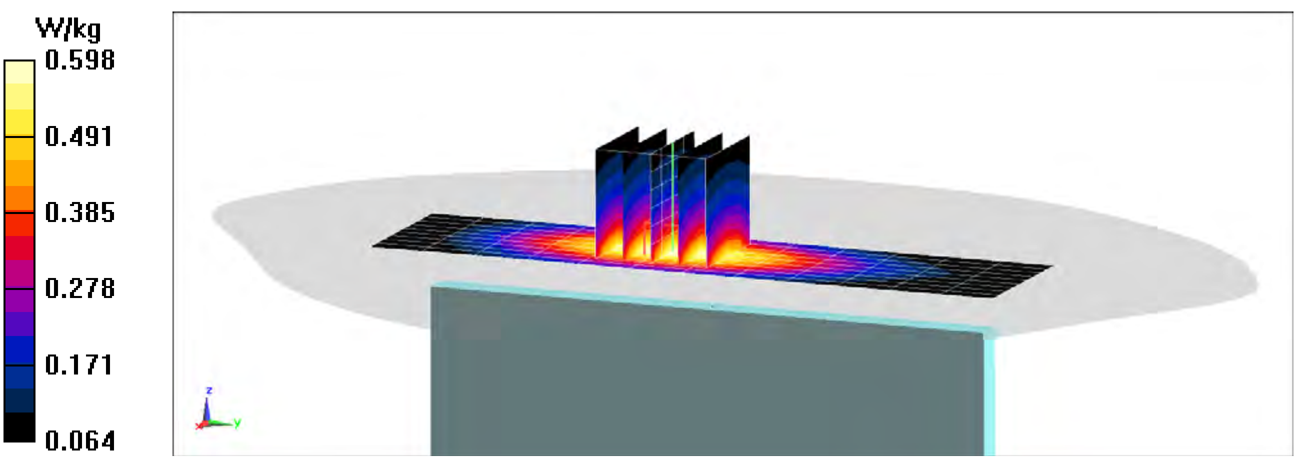
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.957 S/m; ε_r = 55.308; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/01/2020; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7551; ConvF(9.92, 9.92, 9.92) @ 836.6 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: UMTS 850, Body SAR, Right Edge, Mid.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.33 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.681 W/kg
SAR(1 g) = 0.452 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 66.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18837

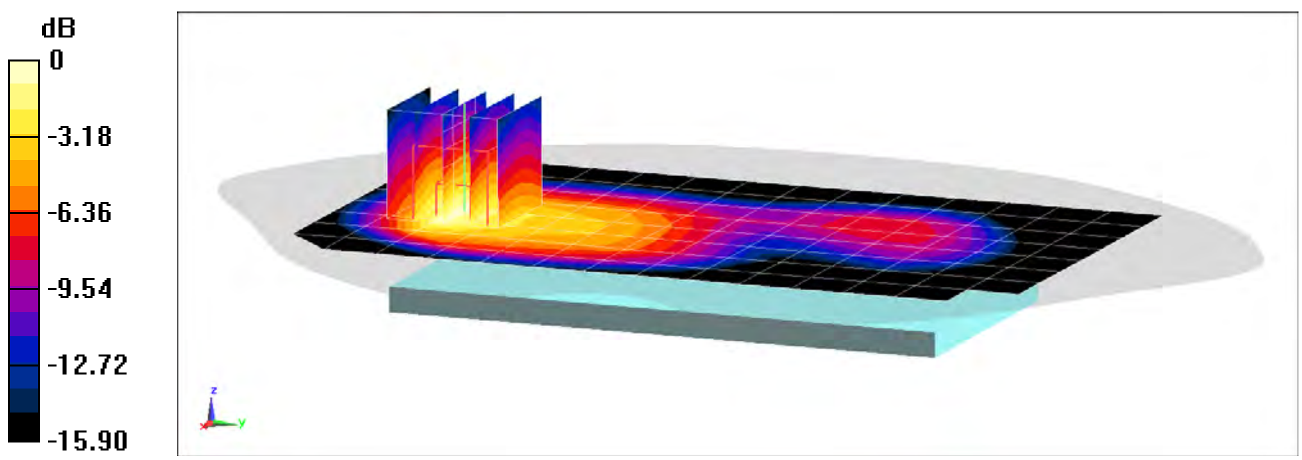
Communication System: UID 0, UMTS; Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1712.4 MHz; σ = 1.49 S/m; ε_r = 52.49; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/15/2020; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1712.4 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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 = 26.80 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 0.990 W/kg
Smallest distance from peaks to all points 3 dB below = 11.6 mm
Ratio of SAR at M2 to SAR at M1 = 62.2%



0 dB = 1.41 W/kg = 1.49 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

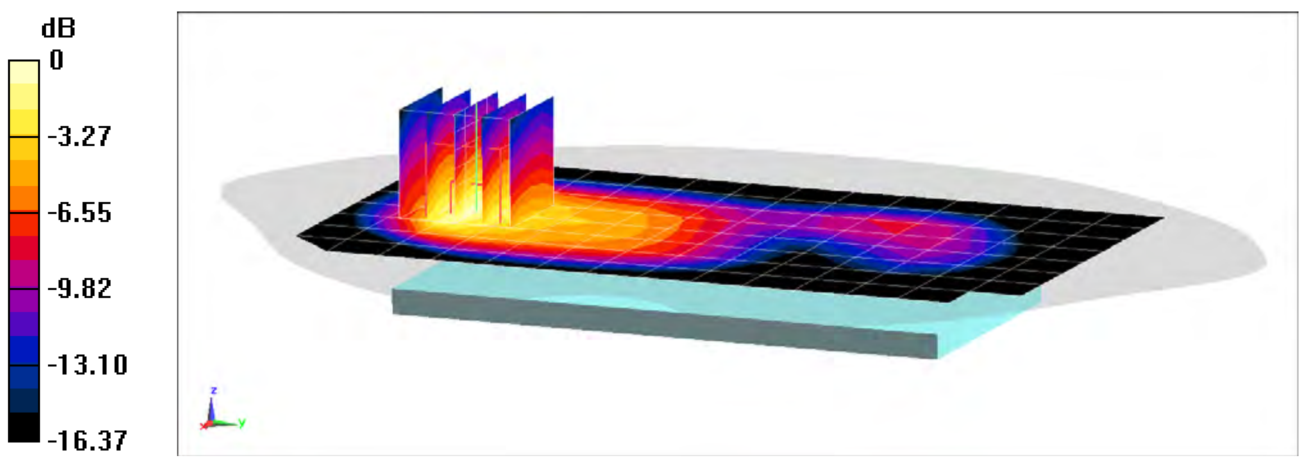
Communication System: UID 0, UMTS; Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1712.4 MHz; σ = 1.47 S/m; ε_r = 52.247; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.5°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1712.4 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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 = 25.68 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.872 W/kg
Smallest distance from peaks to all points 3 dB below = 11.2 mm
Ratio of SAR at M2 to SAR at M1 = 62.8%



0 dB = 1.24 W/kg = 0.93 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

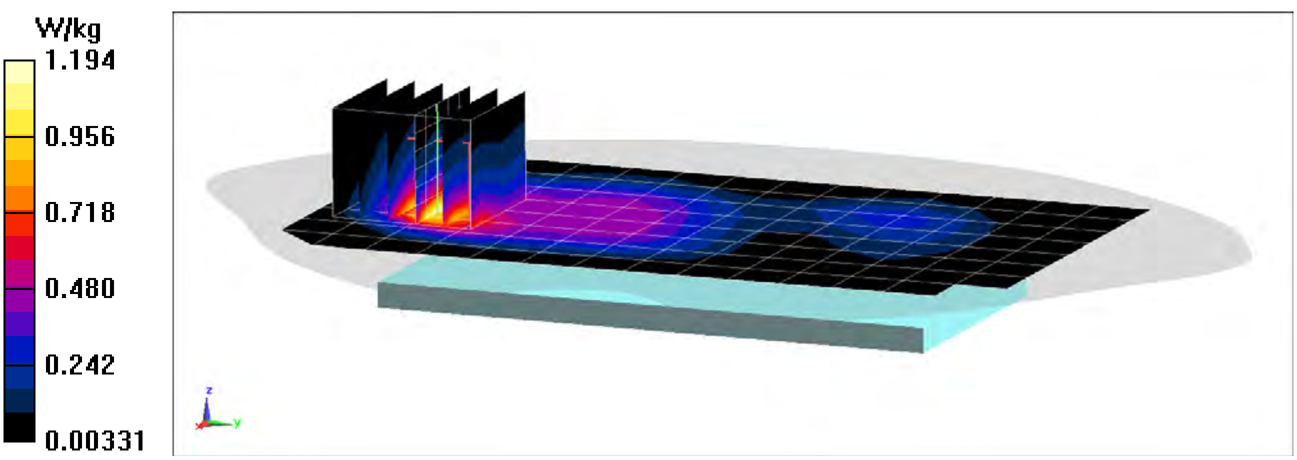
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.585 S/m; ε_r = 51.129; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/14/2020; Ambient Temp: 23.3°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7357; ConvF(7.8, 7.8, 7.8) @ 1907.6 MHz; Calibrated: 4/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/15/2020
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.46 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.804 W/kg
Smallest distance from peaks to all points 3 dB below = 12.8 mm
Ratio of SAR at M2 to SAR at M1 = 54.9%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

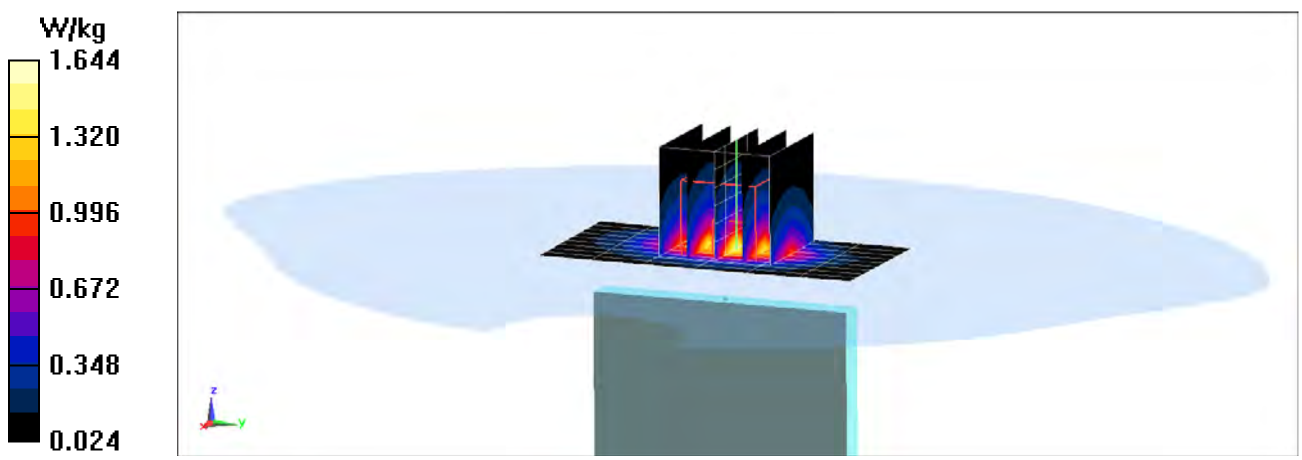
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.581 S/m; ε_r = 52.475; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/20/2020; Ambient Temp: 21.3°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1907.6 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.35 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.94 W/kg
SAR(1 g) = 1.08 W/kg
Smallest distance from peaks to all points 3 dB below = 11.2 mm
Ratio of SAR at M2 to SAR at M1 = 56.5%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

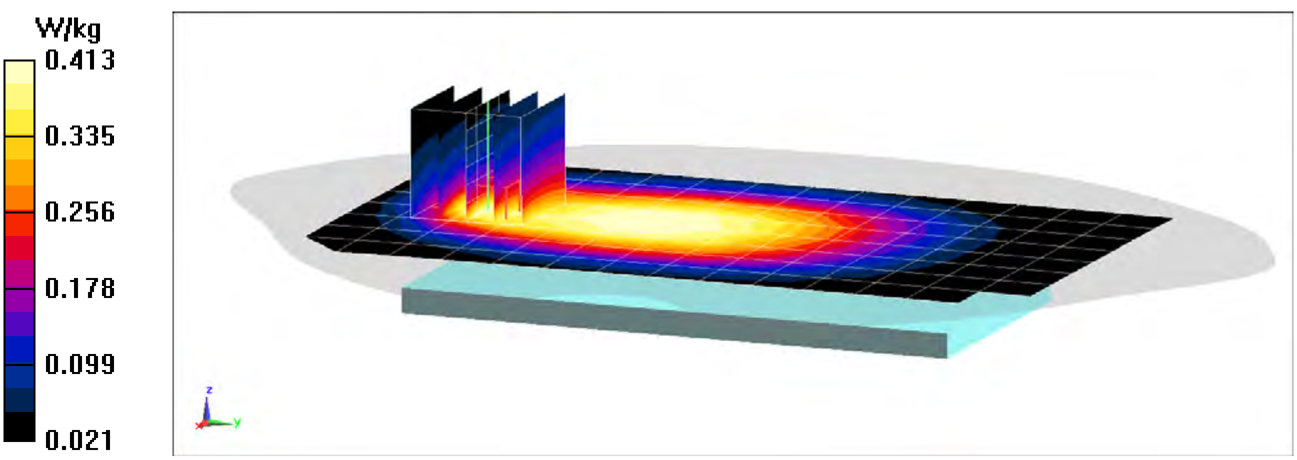
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.926 S/m; ε_r = 55.486; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 680.5 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 71, Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.37 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.500 W/kg
SAR(1 g) = 0.296 W/kg
Smallest distance from peaks to all points 3 dB below = 13.8 mm
Ratio of SAR at M2 to SAR at M1 = 59.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

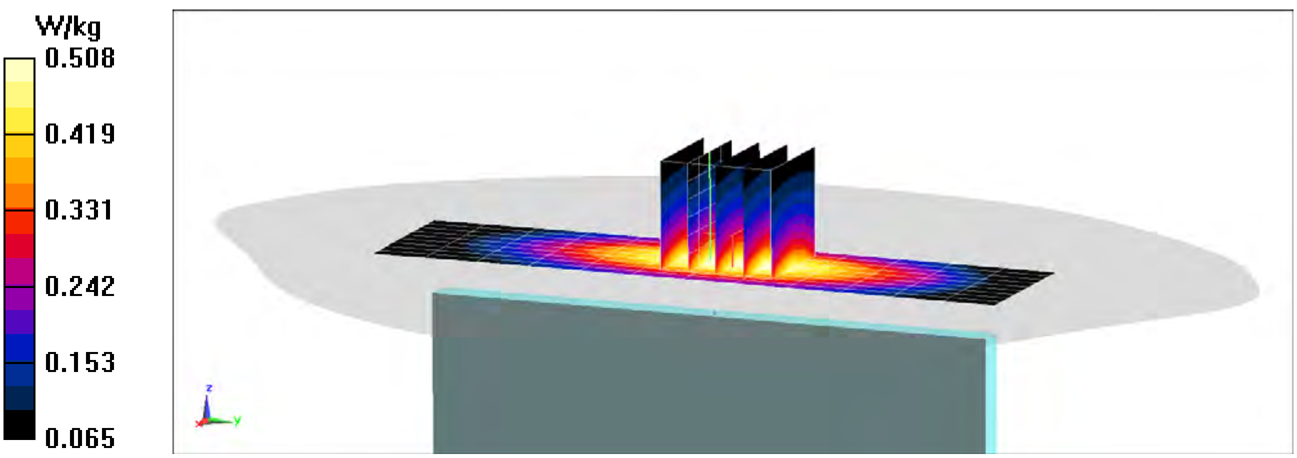
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.926 S/m; ε_r = 55.486; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 680.5 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 71, Body SAR, Right Edge, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.09 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.581 W/kg
SAR(1 g) = 0.390 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 67.7%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

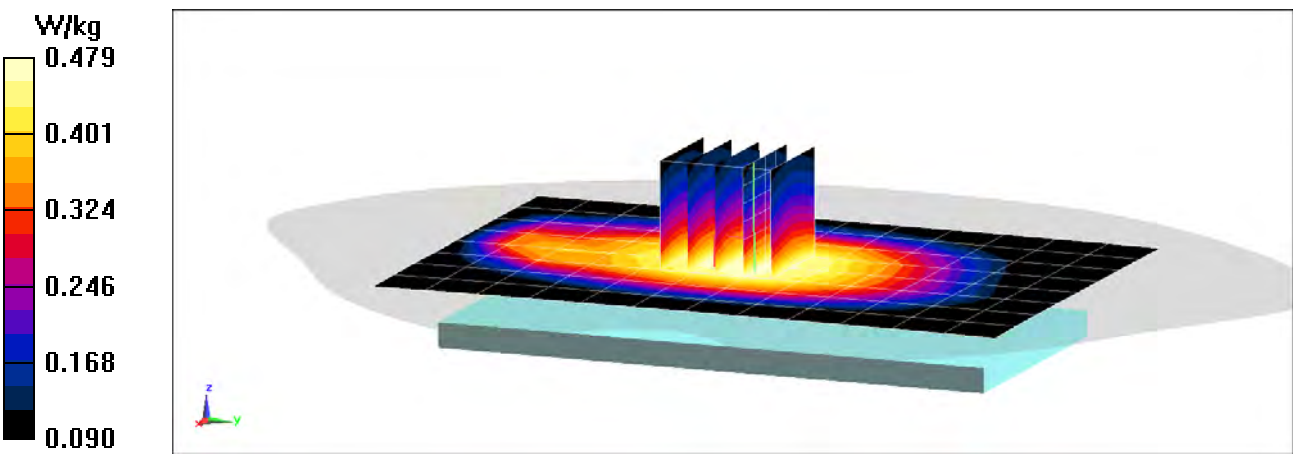
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.936 S/m; ε_r = 55.435; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 707.5 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 12, Body SAR, Back side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.93 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.528 W/kg
SAR(1 g) = 0.401 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 75%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

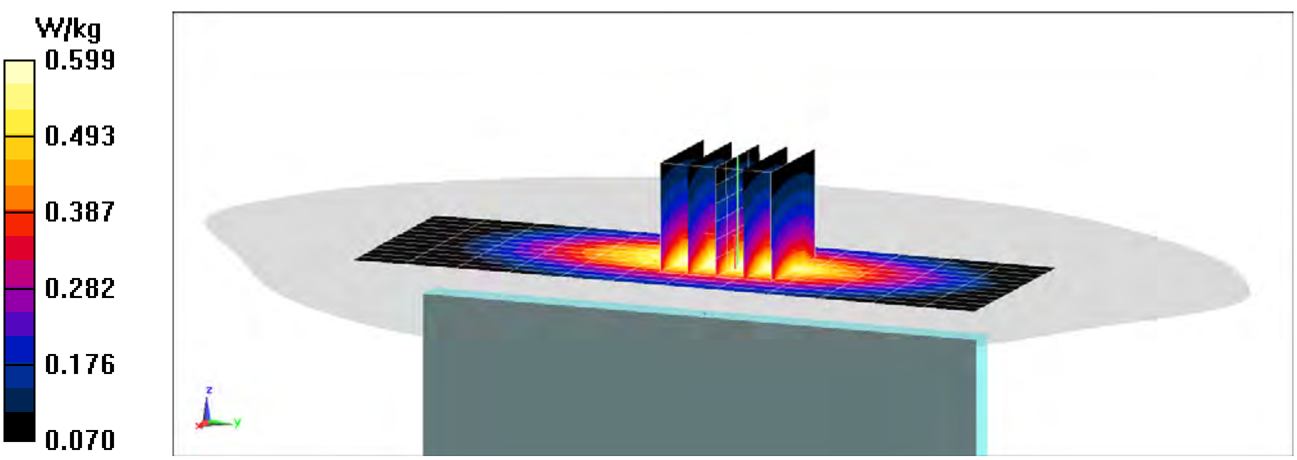
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.936 S/m; ε_r = 55.435; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 707.5 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

**Mode: LTE Band 12, Body SAR, Right Edge, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset**

Area Scan (13x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.92 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.685 W/kg
SAR(1 g) = 0.467 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 69.1%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

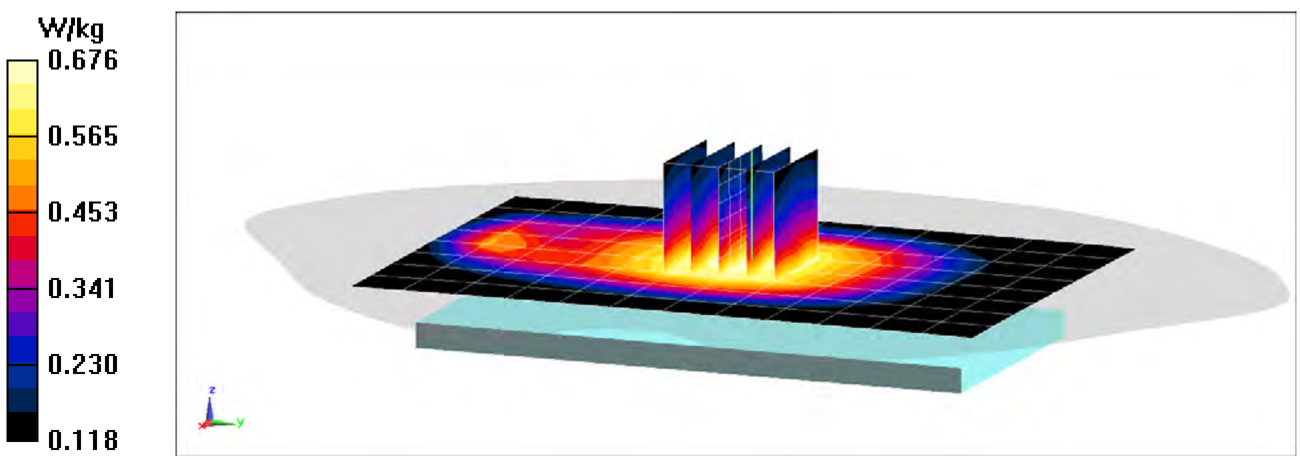
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.966 S/m; ε_r = 55.242; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 782 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.86 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.743 W/kg
SAR(1 g) = 0.562 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 75.9%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

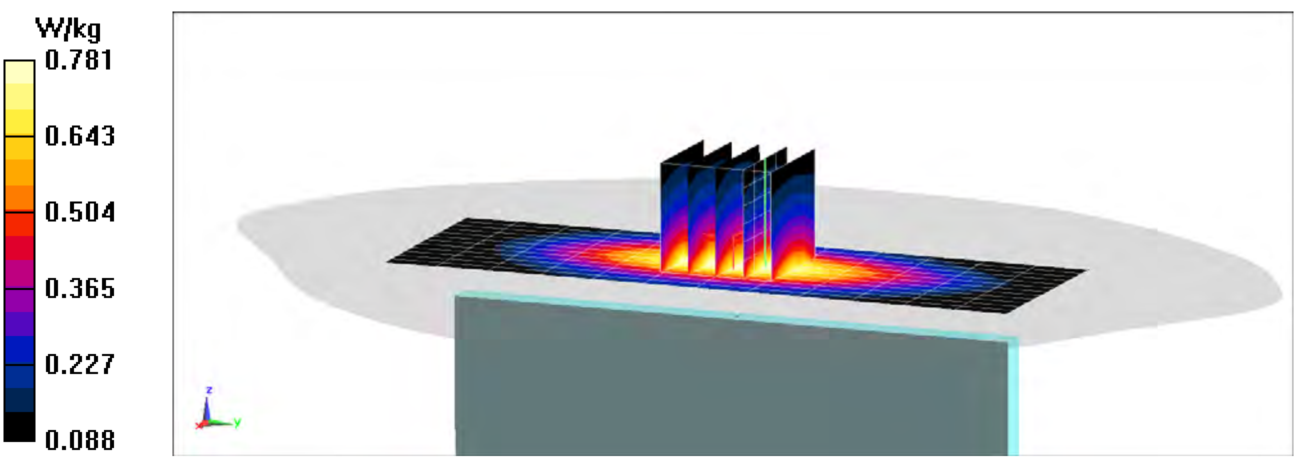
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.966 S/m; ε_r = 55.242; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 782 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (13x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.54 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.896 W/kg
SAR(1 g) = 0.590 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 63.6%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

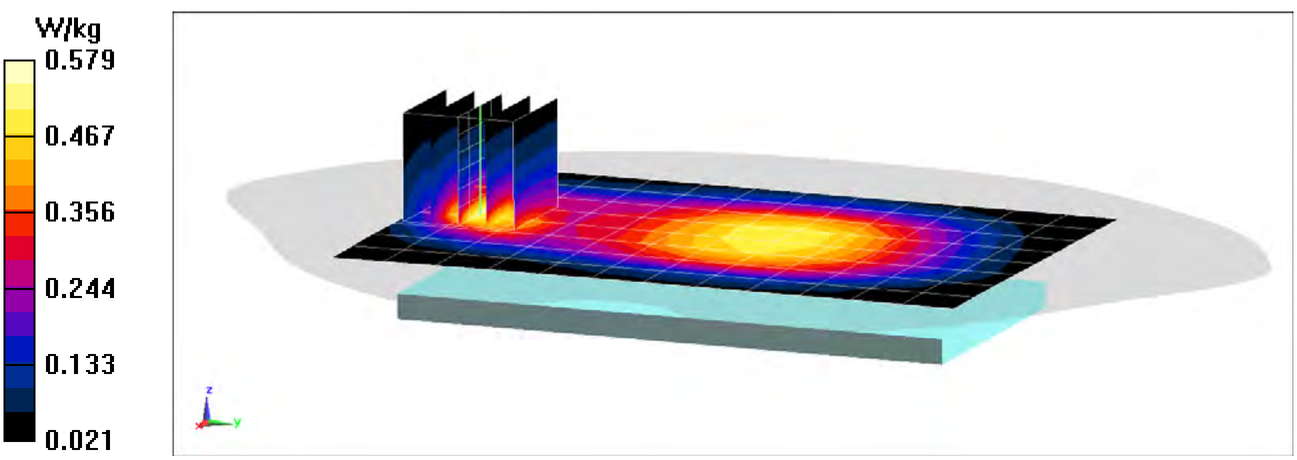
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.954 S/m; ε_r = 55.317; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/01/2020; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7551; ConvF(9.92, 9.92, 9.92) @ 831.5 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 26 (Cell.), Body SAR, Back side, Mid.ch, 15 MHz Bandwidth, QPSK, 1 RB, 36 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 = 21.20 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.702 W/kg
SAR(1 g) = 0.396 W/kg
Smallest distance from peaks to all points 3 dB below = 13.7 mm
Ratio of SAR at M2 to SAR at M1 = 57.3%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

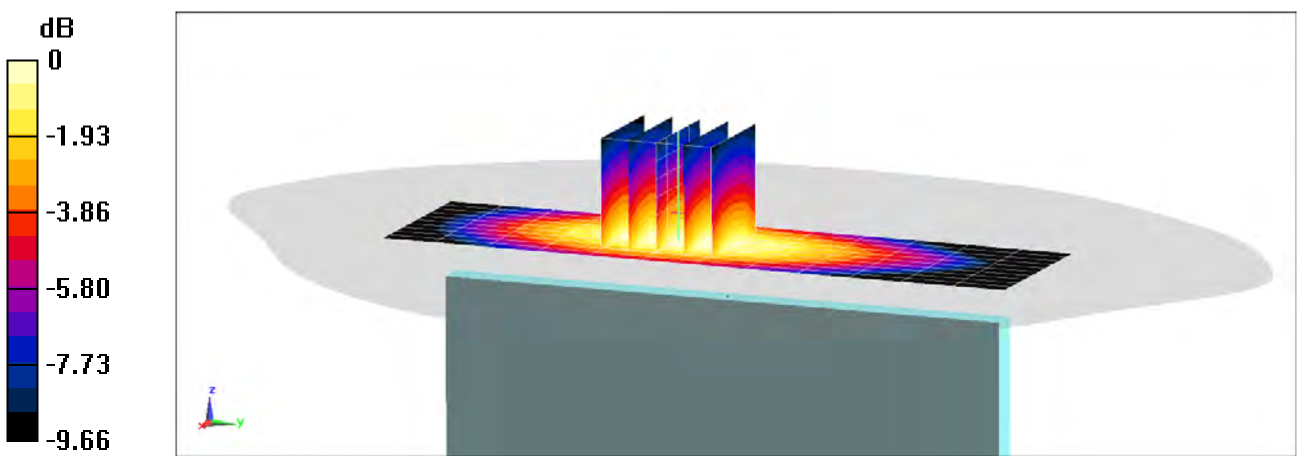
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.954 S/m; ε_r = 55.317; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/01/2020; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7551; ConvF(9.92, 9.92, 9.92) @ 831.5 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (11x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.06 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.612 W/kg
SAR(1 g) = 0.408 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 67%



0 dB = 0.537 W/kg = -2.70 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18837

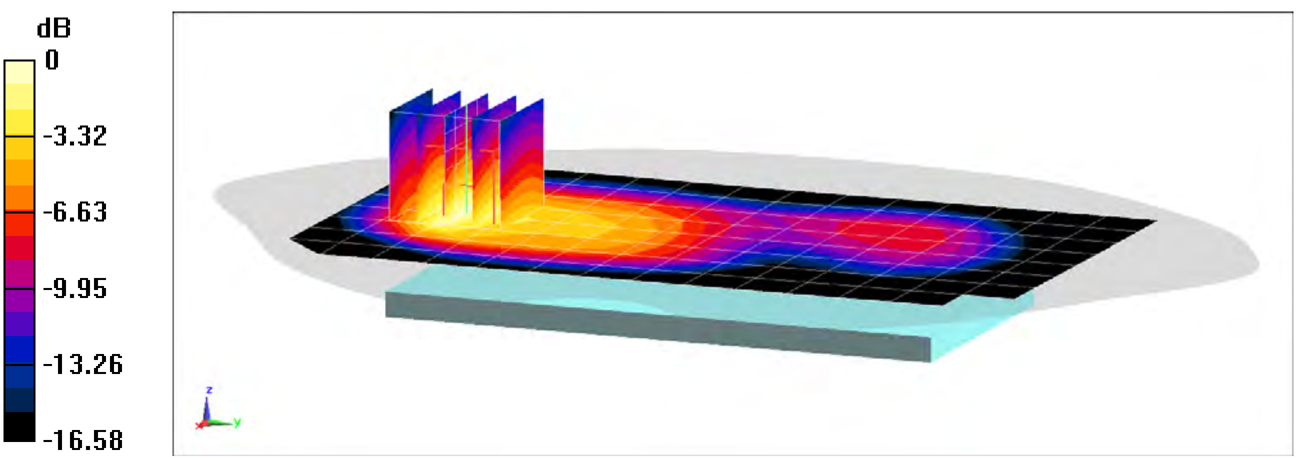
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1720 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1720 MHz; σ = 1.5 S/m; ε_r = 52.466; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/15/2020; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1720 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 66 (AWS), Body SAR, Back side, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.32 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 1.08 W/kg
Smallest distance from peaks to all points 3 dB below = 11.2 mm
Ratio of SAR at M2 to SAR at M1 = 62.6%



0 dB = 1.53 W/kg = 1.85 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18837

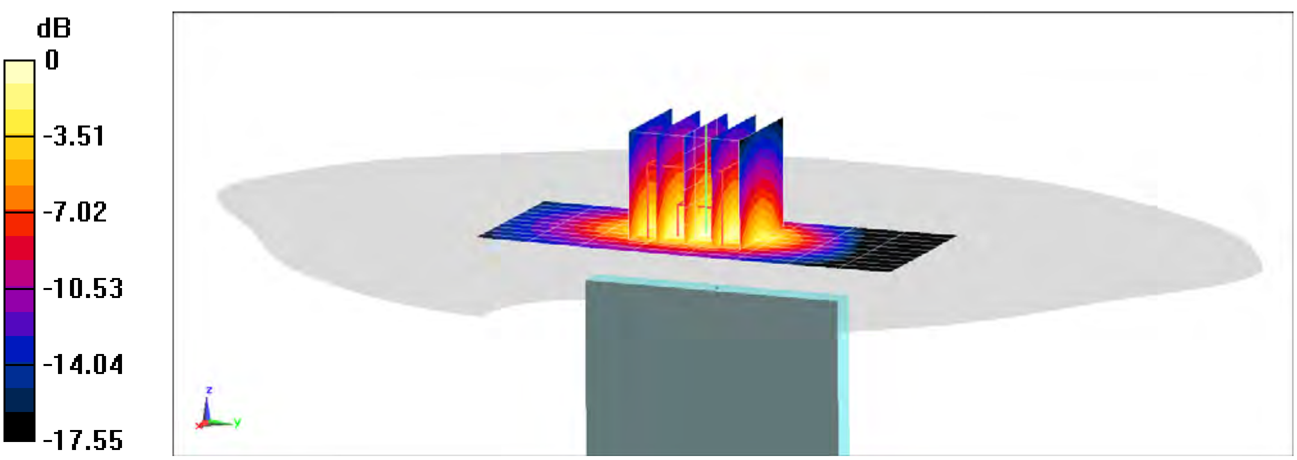
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1745 MHz; σ = 1.509 S/m; ε_r = 52.138; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.5°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1745 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.17 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.817 W/kg
Smallest distance from peaks to all points 3 dB below = 11.2 mm
Ratio of SAR at M2 to SAR at M1 = 60.5%



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

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

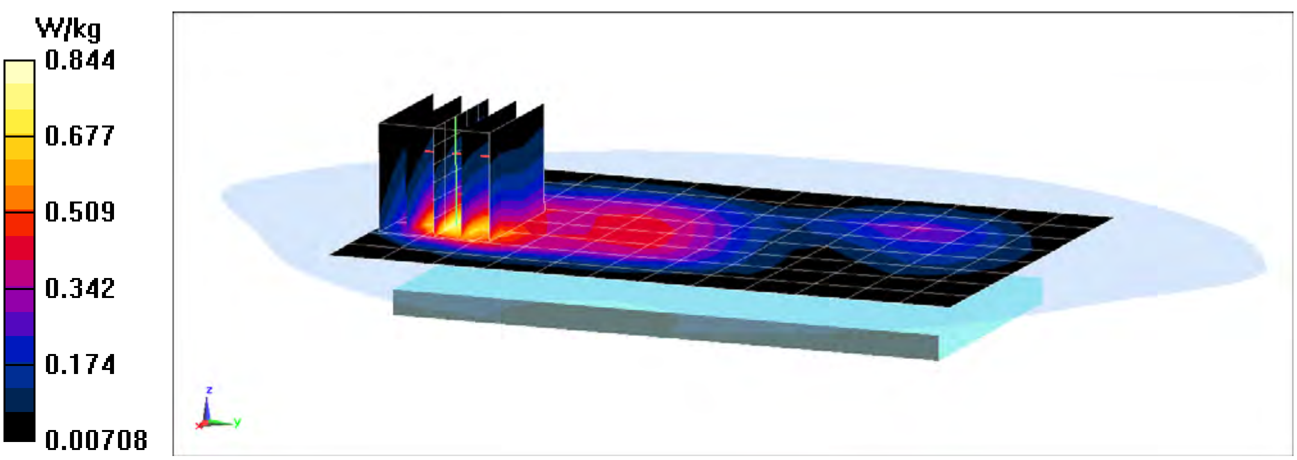
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1860 MHz; σ = 1.519 S/m; ε_r = 51.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1860 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Body SAR, Back side, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.29 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.566 W/kg
Smallest distance from peaks to all points 3 dB below = 13.2 mm
Ratio of SAR at M2 to SAR at M1 = 55.4%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18811

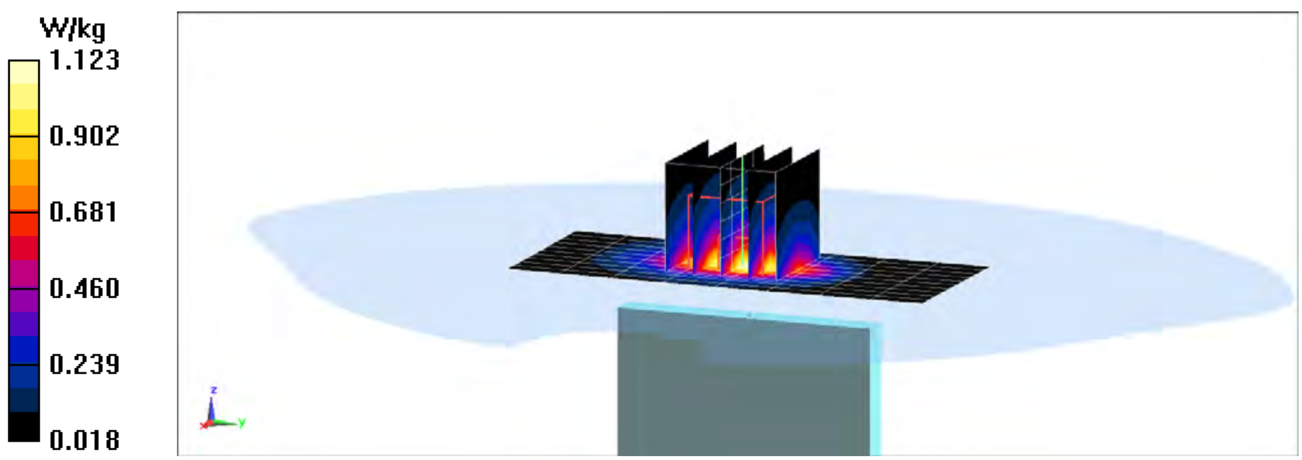
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1860 MHz; σ = 1.519 S/m; ε_r = 51.933; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1860 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Body SAR, Bottom Edge, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.27 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.756 W/kg
Smallest distance from peaks to all points 3 dB below = 12.2 mm
Ratio of SAR at M2 to SAR at M1 = 57.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

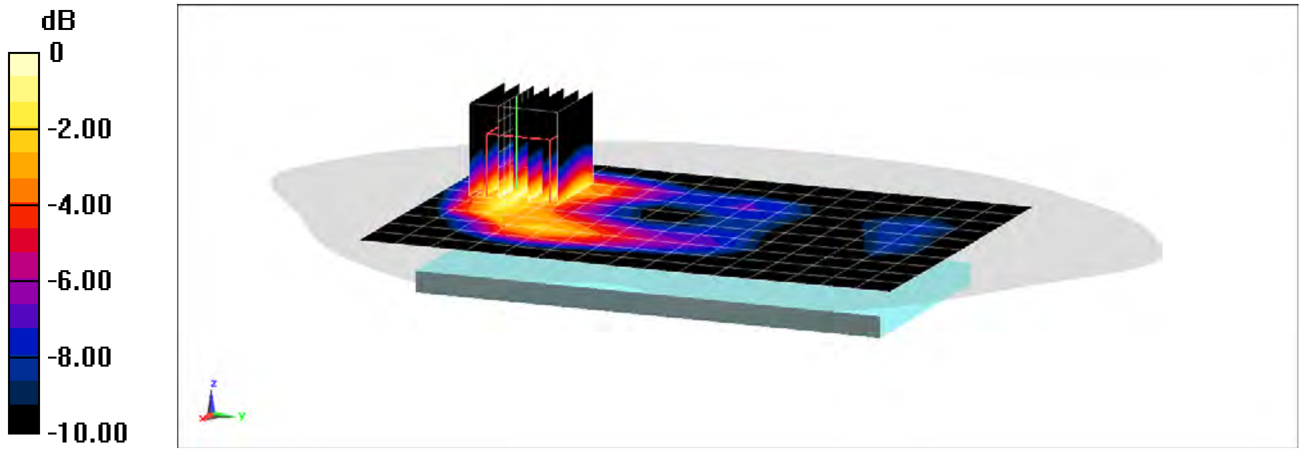
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2593 MHz; Duty Cycle: 1:2.31
Medium: 2450 Body Medium parameters used (interpolated):
f = 2593 MHz; σ = 2.216 S/m; ε_r = 51.491; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/28/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(7.12, 7.12, 7.12) @ 2593 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2020
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 41 PC2, Body SAR, Back side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (11x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.00 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.698 W/kg
SAR(1 g) = 0.352 W/kg
Smallest distance from peaks to all points 3 dB below = 13 mm
Ratio of SAR at M2 to SAR at M1 = 50.1%



0 dB = 0.547 W/kg = -2.62 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18803

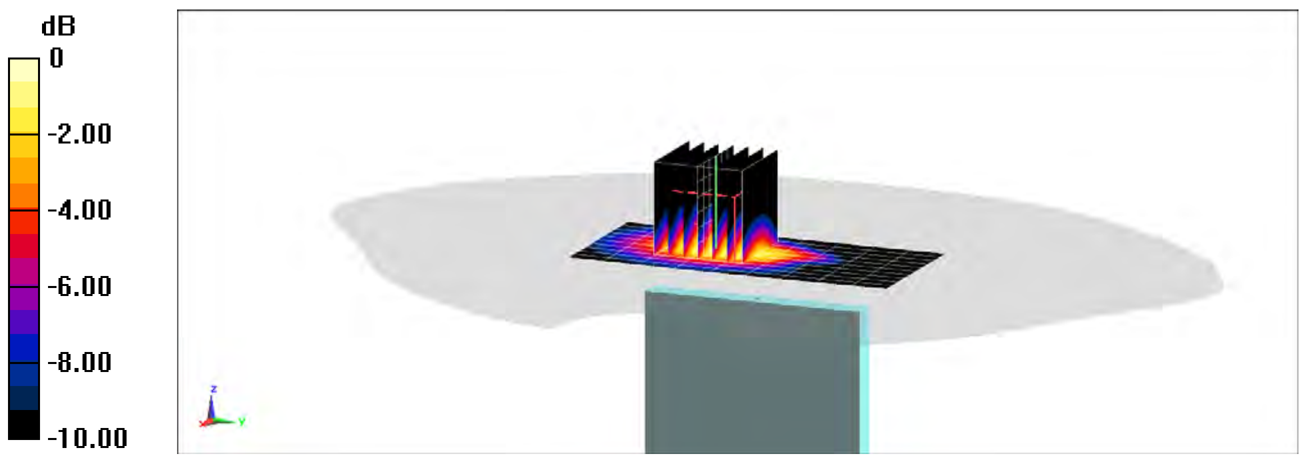
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2593 MHz; Duty Cycle: 1:2.31
Medium: 2450 Body Medium parameters used (interpolated):
f = 2593 MHz; σ = 2.216 S/m; ε_r = 51.491; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/28/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(7.12, 7.12, 7.12) @ 2593 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2020
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 41 PC2, Body SAR, Bottom Edge, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (11x10x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.27 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.528 W/kg
Smallest distance from peaks to all points 3 dB below = 11 mm
Ratio of SAR at M2 to SAR at M1 = 49.8%



0 dB = 0.857 W/kg = -0.67 dBW/kg

PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18746

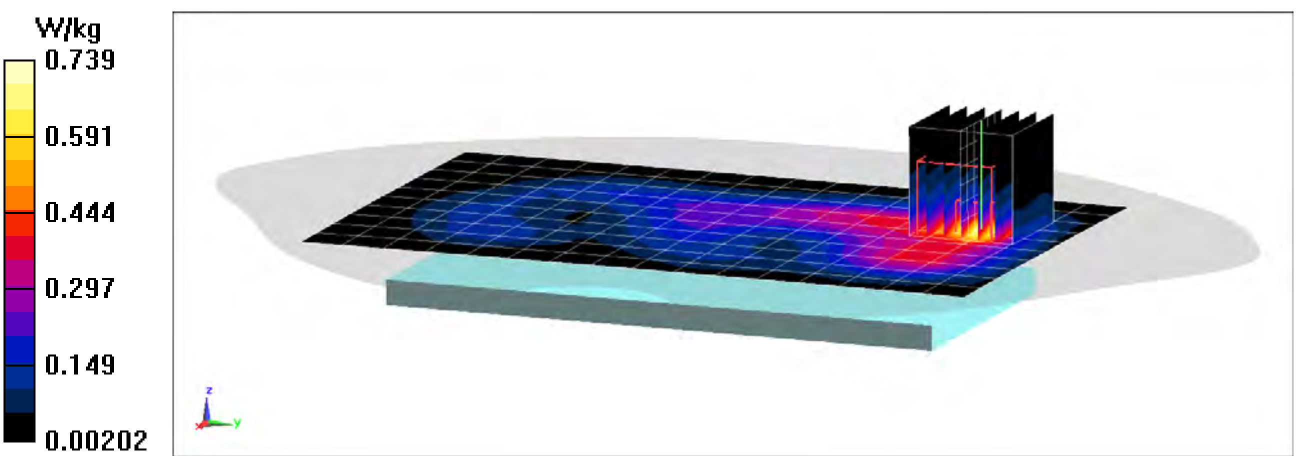
Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2437 MHz; σ = 2.016 S/m; ε_r = 51.114; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/14/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(7.41, 7.41, 7.41) @ 2437 MHz; Calibrated: 7/31/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/11/2020
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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 = 15.83 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.943 W/kg
SAR(1 g) = 0.443 W/kg
Smallest distance from peaks to all points 3 dB below = 11 mm
Ratio of SAR at M2 to SAR at M1 = 47.6%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18837

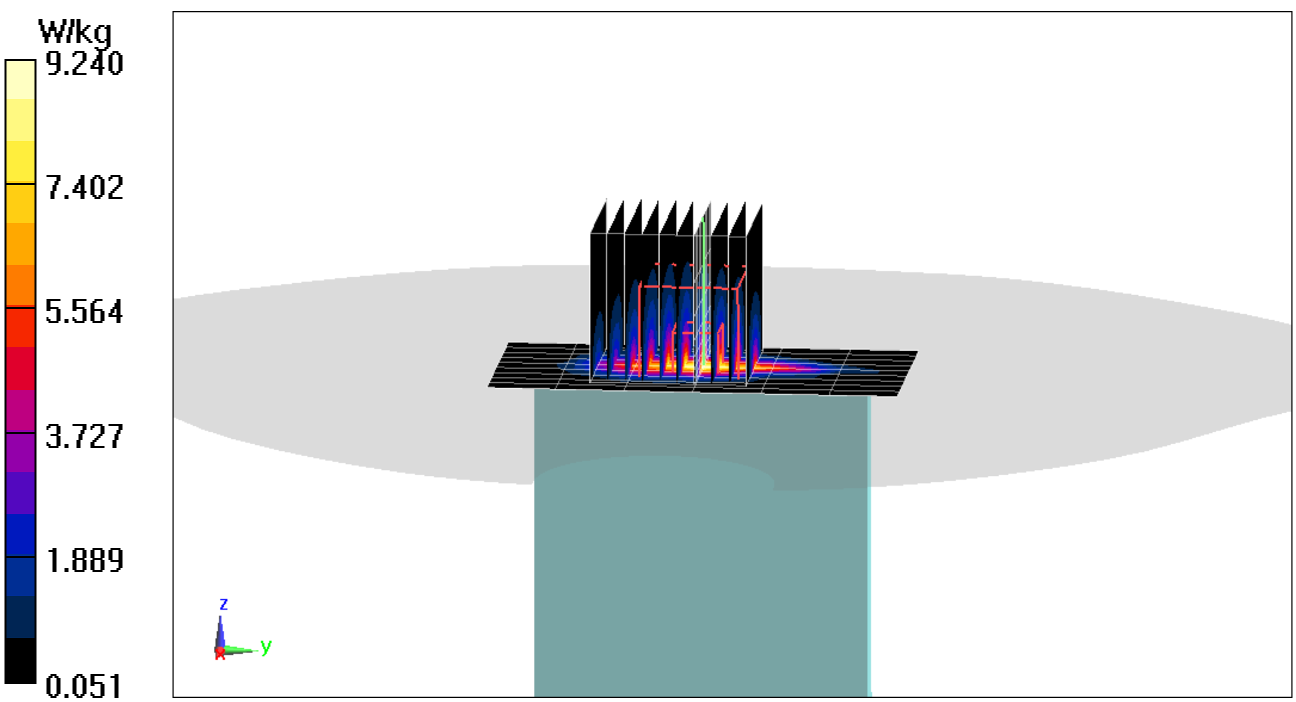
Communication System: UID 0, UMTS; Frequency: 1712.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1712.4 MHz; σ = 1.49 S/m; ε_r = 52.49; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09/15/2020; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1712.4 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (10x10x8)/Cube 0: Measurement grid: dx=3.8mm, dy=3.8mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 62.75 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 12.6 W/kg
SAR(10 g) = 2.54 W/kg
Smallest distance from peaks to all points 3 dB below = 6.8 mm
Ratio of SAR at M2 to SAR at M1 = 78.8%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

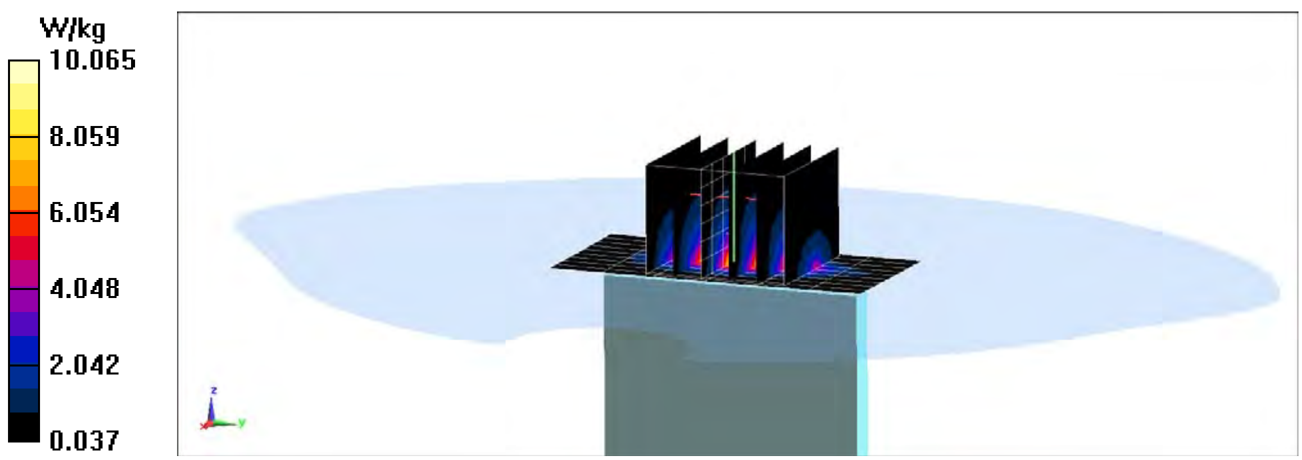
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.555 S/m; ε_r = 53.078; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.2 cm

Test Date: 09/23/2020; Ambient Temp: 22.3°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1907.6 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

UMTS 1900, Phablet SAR, Bottom Edge, High.ch

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 64.43 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 12.4 W/kg
SAR(10 g) = 2.81 W/kg
Smallest distance from peaks to all points 3 dB below > 8 mm
Ratio of SAR at M2 to SAR at M1 = 47.3%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18837

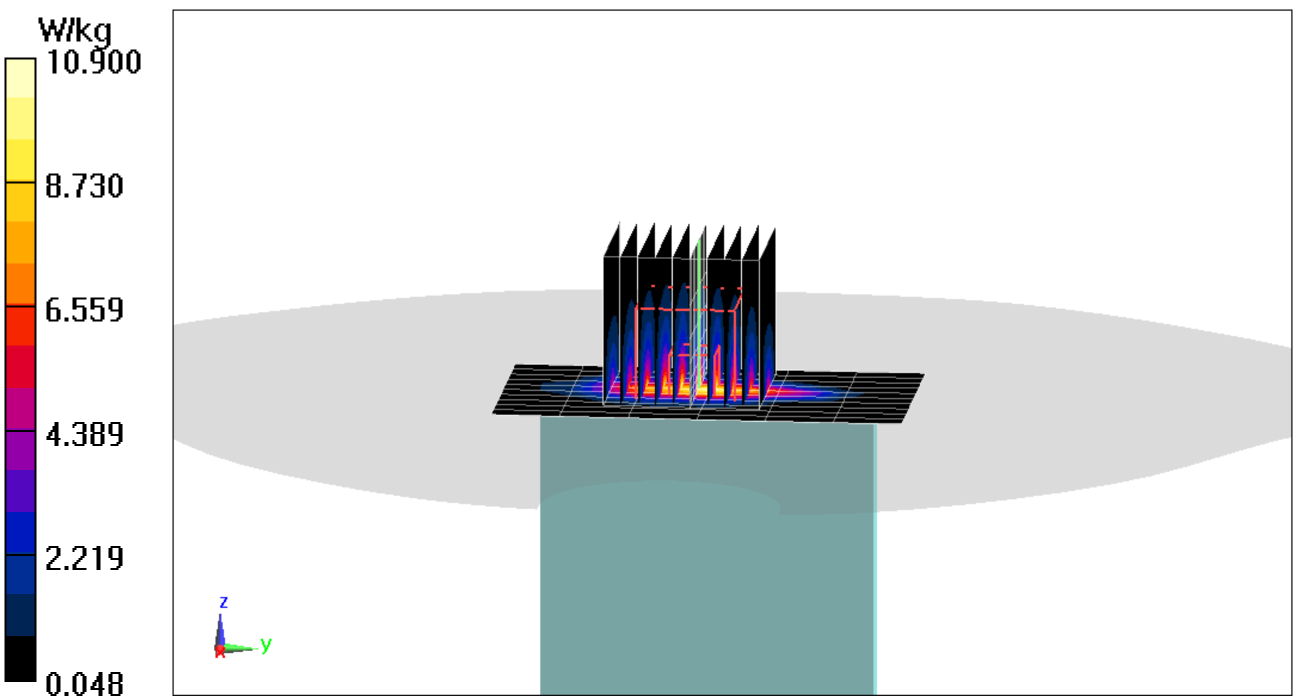
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1745 MHz; σ = 1.509 S/m; ε_r = 52.491; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.2 cm

Test Date: 10/05/2020; Ambient Temp: 20.9°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1745 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 66 (AWS), Phablet SAR, Bottom Edge, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (10x10x8)/Cube 0: Measurement grid: dx=3.8mm, dy=3.8mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 68.57 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 14.6 W/kg
SAR(10 g) = 3.03 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 78%



PCTEST

DUT: ZNFK200TM; Type: Portable Handset; Serial: 18829

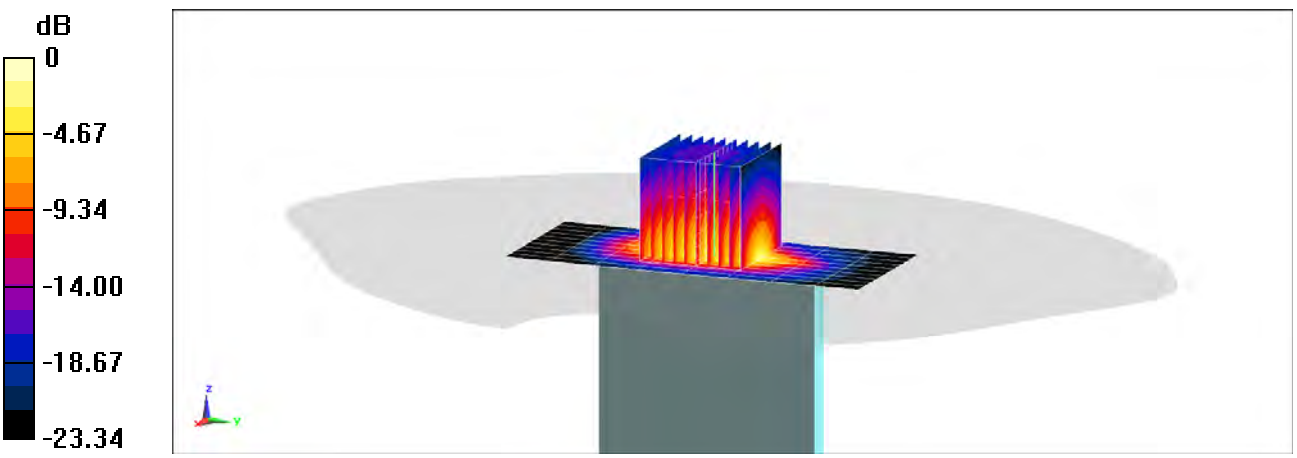
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1905 MHz; σ = 1.57 S/m; ε_r = 51.469; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.2 cm

Test Date: 09/28/2020; Ambient Temp: 21.3°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7357; ConvF(7.8, 7.8, 7.8) @ 1905 MHz; Calibrated: 4/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/15/2020
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Phablet SAR, Bottom Edge, High.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (10x10x8)/Cube 0: Measurement grid: dx=3.8mm, dy=3.8mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 62.82 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 12.4 W/kg
SAR(10 g) = 2.74 W/kg
Smallest distance from peaks to all points 3 dB below = 6.8 mm
Ratio of SAR at M2 to SAR at M1 = 81.9%



0 dB = 9.28 W/kg = 9.68 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST

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

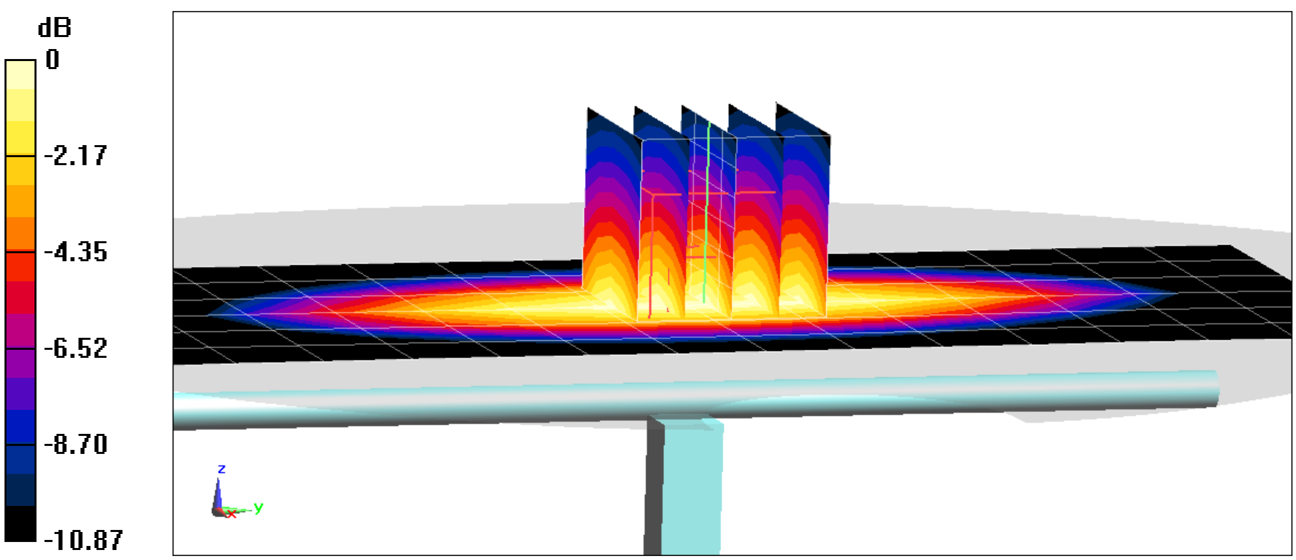
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used:
f = 750 MHz; σ = 0.914 S/m; ε_r = 43.882; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09/21/2020; Ambient Temp: 23.9°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN7406; ConvF(10.04, 10.04, 10.04) @ 750 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 2.67 W/kg
SAR(1 g) = 1.7 W/kg
Deviation(1 g) = -1.51%



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

PCTEST

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

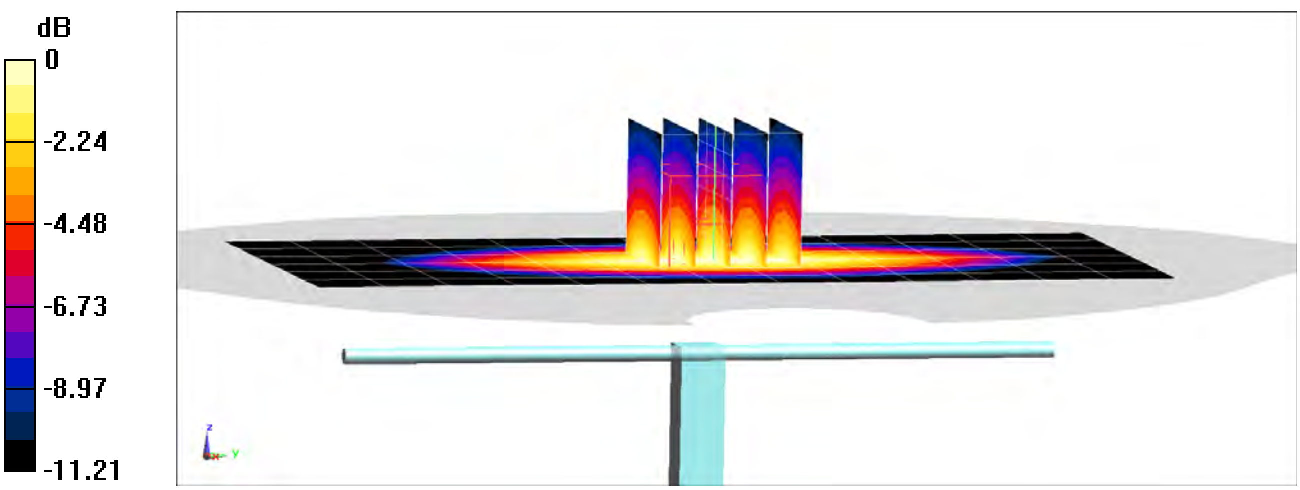
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.934 S/m; ε_r = 42.489; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09/16/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.2°C

Probe: EX3DV4 - SN3589; ConvF(8.58, 8.58, 8.58) @ 835 MHz; Calibrated: 1/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 1/13/2020
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 3.28 W/kg
SAR(1 g) = 2.03 W/kg
Deviation(1 g) = 7.75%



0 dB = 2.81 W/kg = 4.49 dBW/kg

PCTEST

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

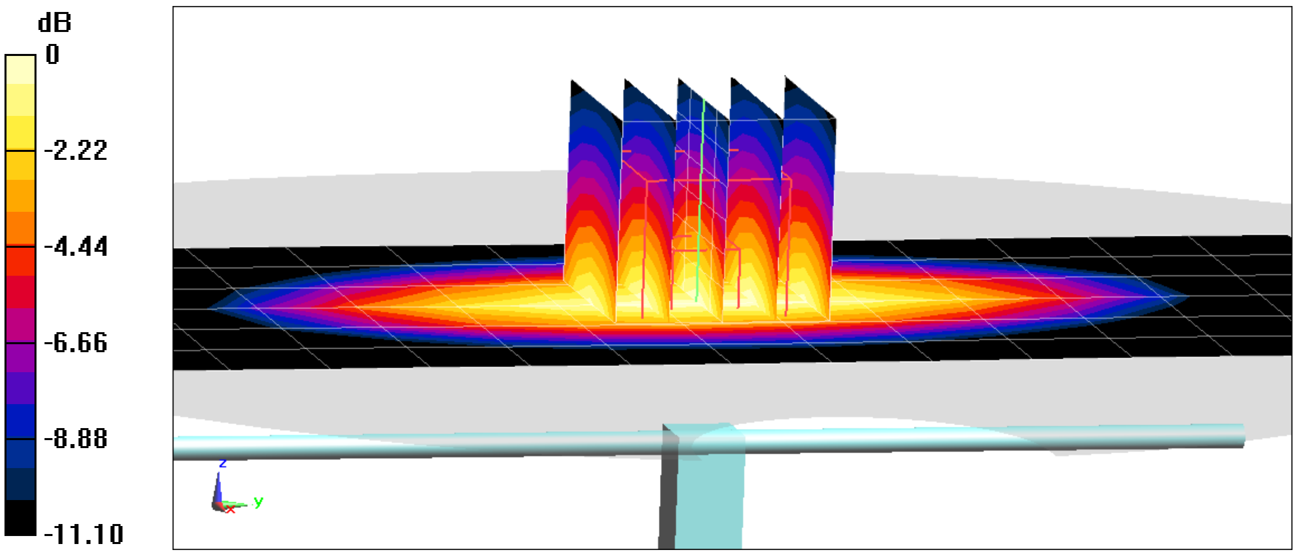
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.945 S/m; ε_r = 42.974; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 10/02/2020; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7406; ConvF(9.61, 9.61, 9.61) @ 835 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 3.05 W/kg
SAR(1 g) = 1.96 W/kg
Deviation(1 g) = 1.55%



0 dB = 2.67 W/kg = 4.27 dBW/kg

PCTEST

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

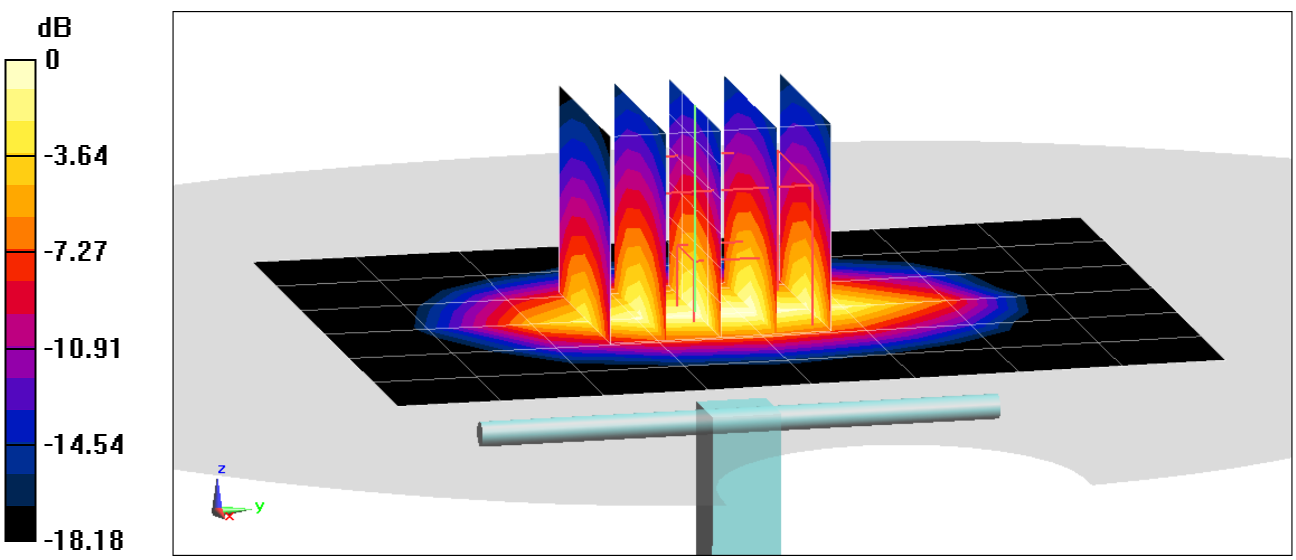
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.403 S/m; ε_r = 39.42; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/19/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7406; ConvF(8.32, 8.32, 8.32) @ 1750 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 7.50 W/kg
SAR(1 g) = 3.86 W/kg
Deviation(1 g) = 5.75%



0 dB = 6.06 W/kg = 7.82 dBW/kg

PCTEST

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

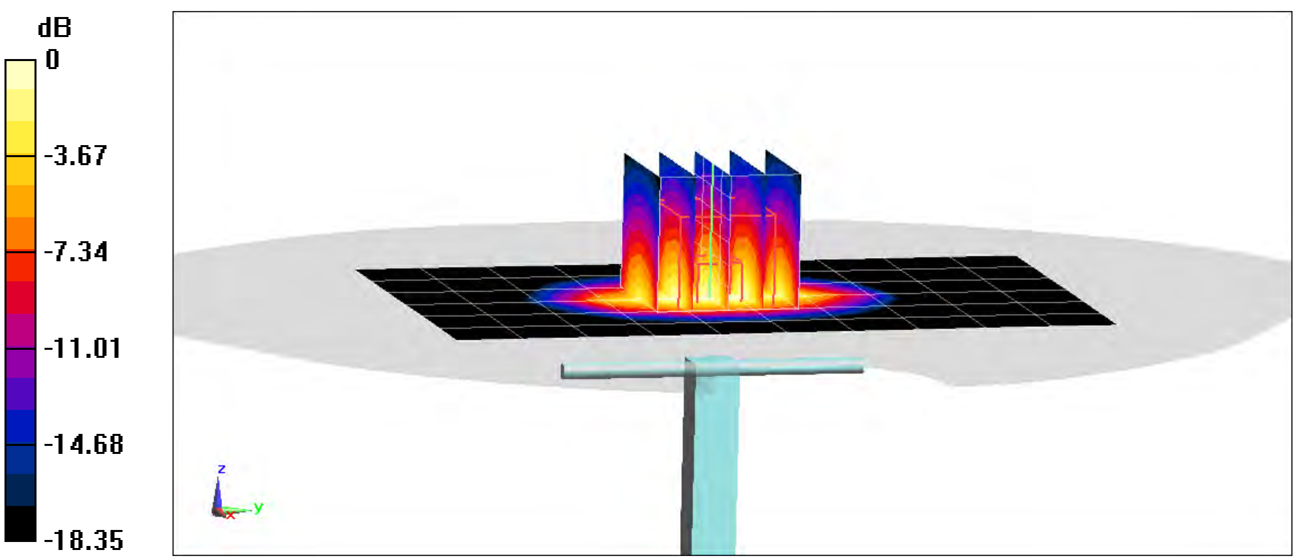
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used:
f = 1900 MHz; σ = 1.414 S/m; ε_r = 40.833; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/16/2020; Ambient Temp: 21.9°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7406; ConvF(7.96, 7.96, 7.96) @ 1900 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1583; Calibrated: 5/14/2020
Phantom: Twin-SAM V8.0; Type: QD 000 P41 Ax; Serial: 1966
Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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) = 7.95 W/kg
SAR(1 g) = 4.2 W/kg
Deviation(1 g) = 7.42%



0 dB = 6.66 W/kg = 8.23 dBW/kg

PCTEST

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

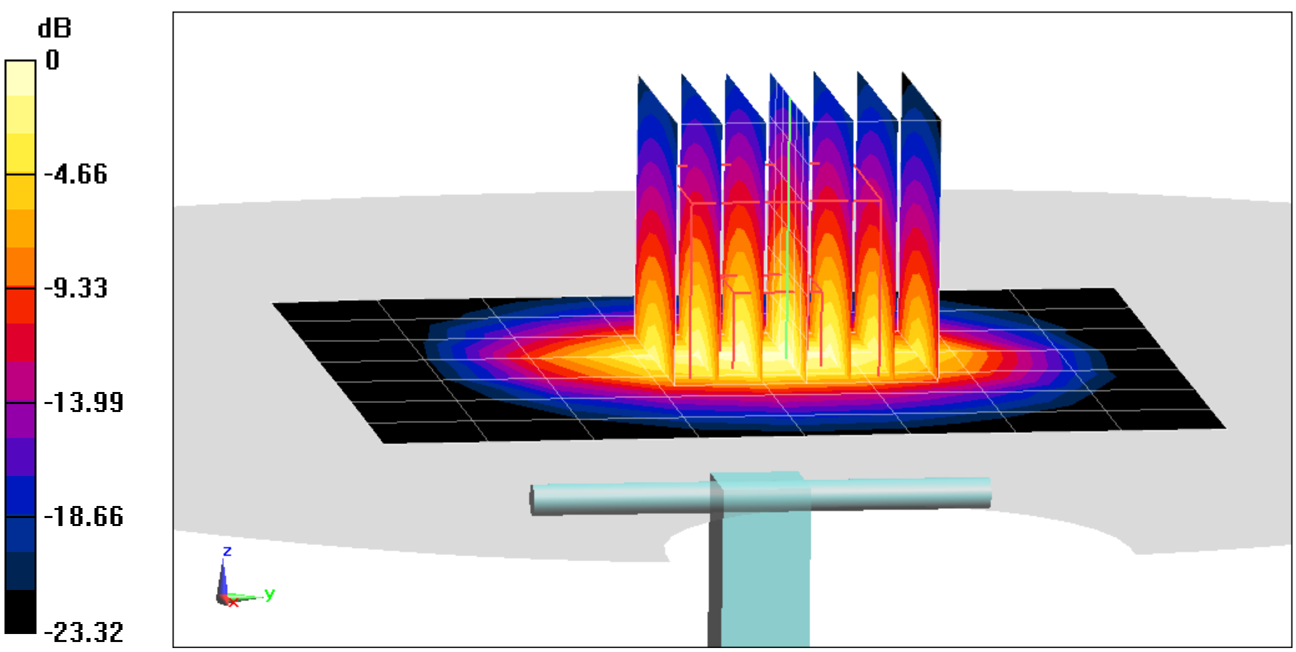
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.84 S/m; ε_r = 39.823; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/16/2020; Ambient Temp: 23.7°C; Tissue Temp: 23.3°C

Probe: EX3DV4 - SN7308; ConvF(7.33, 7.33, 7.33) @ 2450 MHz; Calibrated: 7/31/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/11/2020
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.1 W/kg
SAR(1 g) = 5.15 W/kg
Deviation(1 g) = -1.53%



0 dB = 8.79 W/kg = 9.44 dBW/kg

PCTEST

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

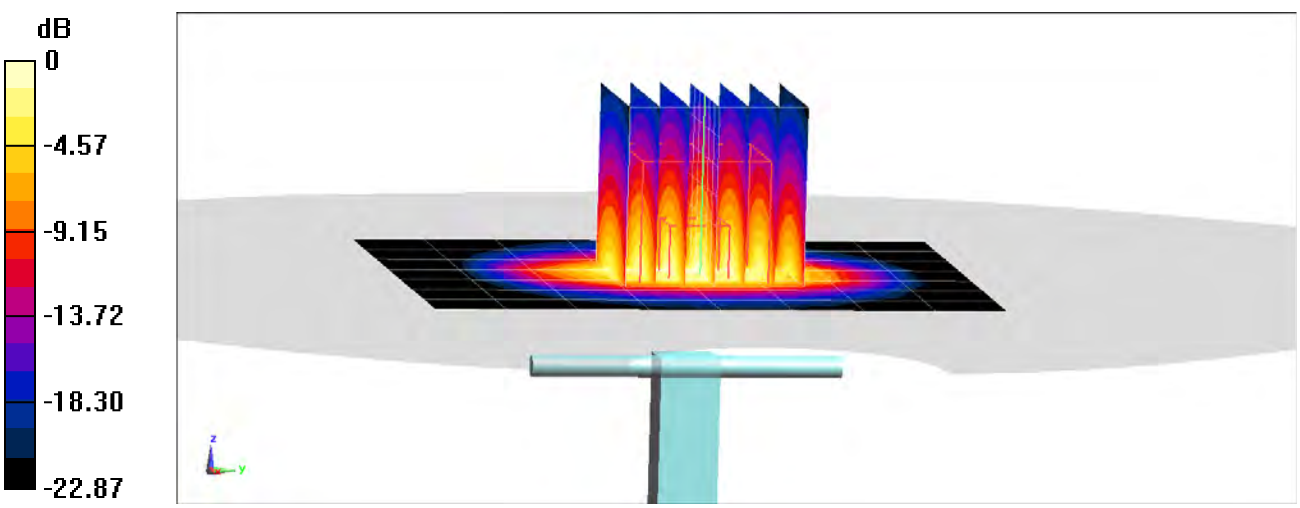
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.83 S/m; ε_r = 38.329; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10/02/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(6.85, 6.85, 6.85) @ 2450 MHz; Calibrated: 1/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 1/13/2020
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.3 W/kg
SAR(1 g) = 5.35 W/kg
Deviation(1 g) = 2.29%



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

PCTEST

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

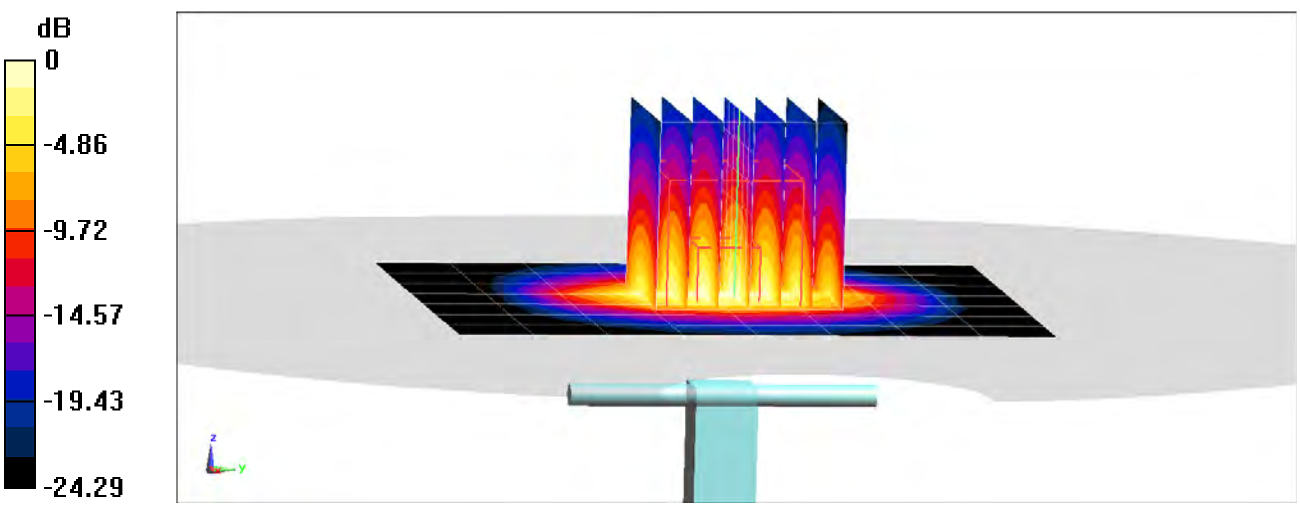
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; σ = 1.947 S/m; ε_r = 38.115; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10/02/2020; Ambient Temp: 23.1°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(6.6, 6.6, 6.6) @ 2600 MHz; Calibrated: 1/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 1/13/2020
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 12.6 W/kg
SAR(1 g) = 5.74 W/kg
Deviation(1 g) = -1.20%



0 dB = 9.95 W/kg = 9.98 dBW/kg

PCTEST

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

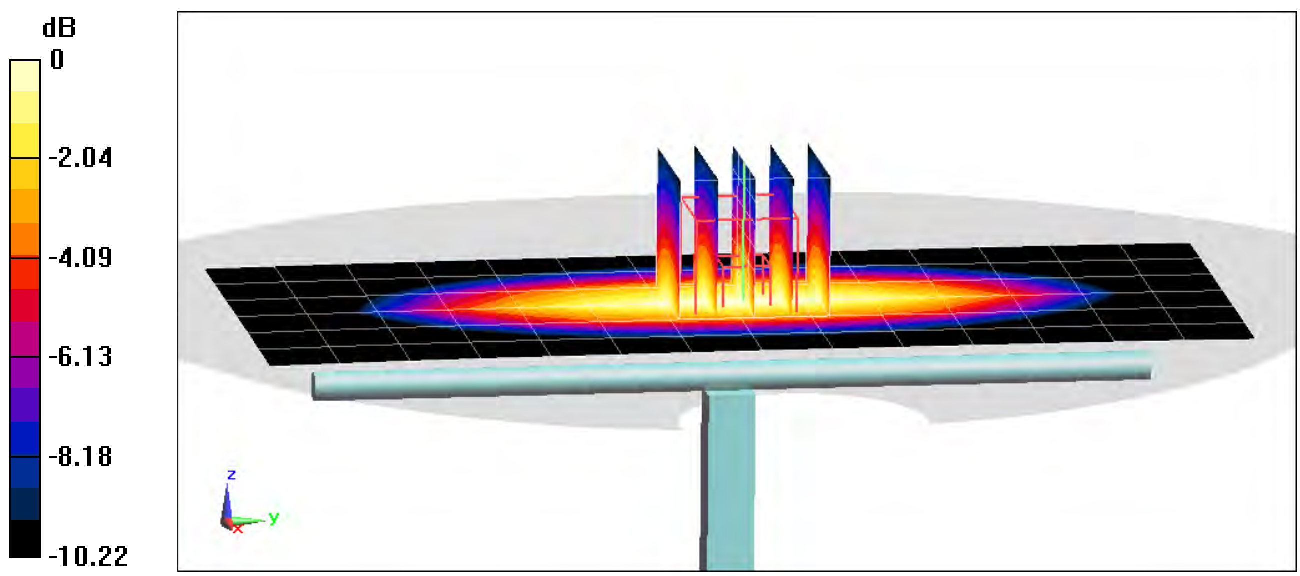
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used:
f = 750 MHz; σ = 0.953 S/m; ε_r = 55.331; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09/03/2020; Ambient Temp: 22.4°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7551; ConvF(10.09, 10.09, 10.09) @ 750 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.71 W/kg
SAR(1 g) = 1.76 W/kg
Deviation(1 g) = 3.17%



0 dB = 2.37 W/kg = 3.75 dBW/kg

PCTEST

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

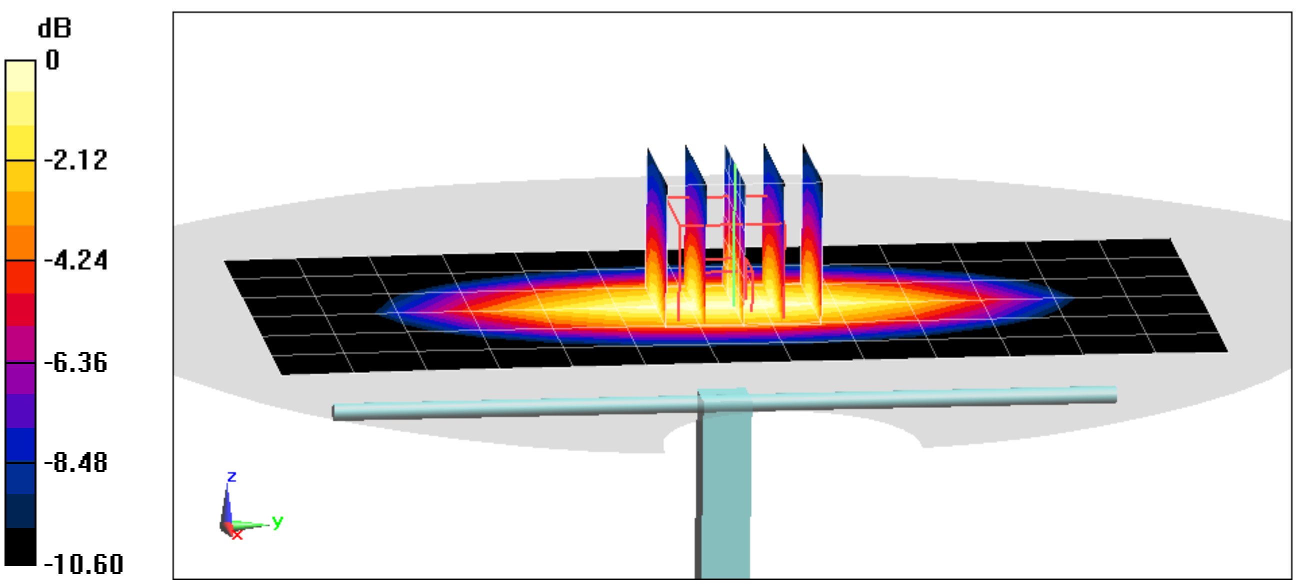
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.956 S/m; ε_r = 55.31; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09/01/2020; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7551; ConvF(9.92, 9.92, 9.92) @ 835 MHz; Calibrated: 9/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1333; Calibrated: 9/17/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 3.14 W/kg
SAR(1 g) = 2.01 W/kg
Deviation(1 g) = 0.90%



0 dB = 2.73 W/kg = 4.36 dBW/kg

PCTEST

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

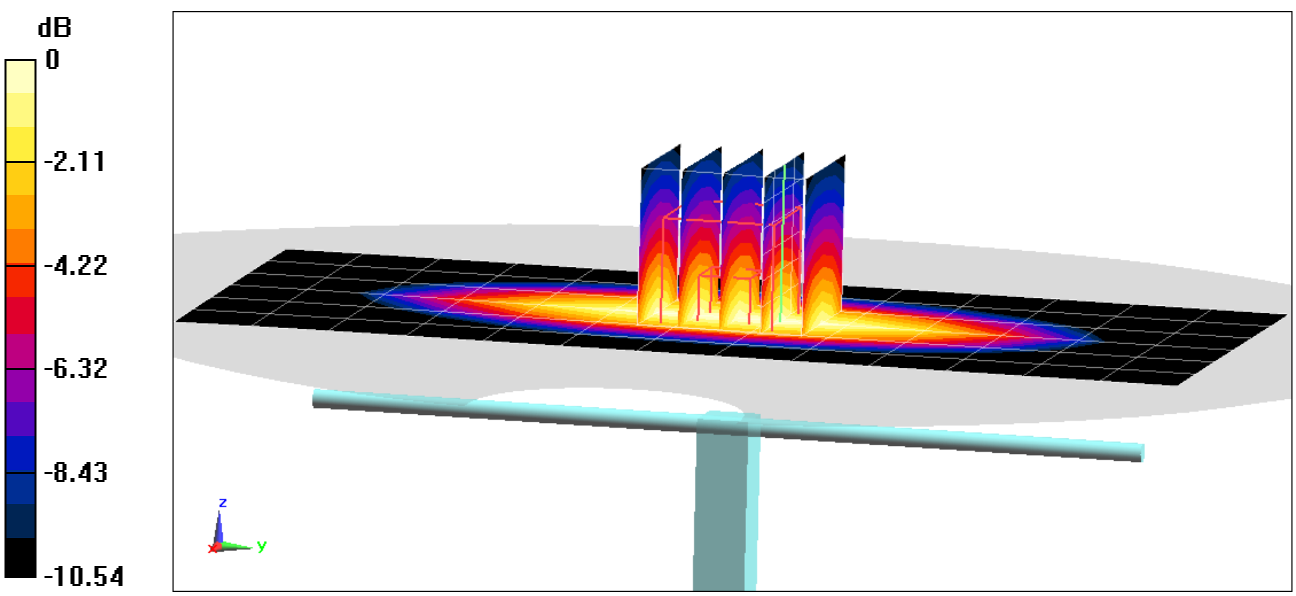
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.955 S/m; ε_r = 53.042; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09/22/2020; Ambient Temp: 23.7°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7308; ConvF(9.92, 9.92, 9.92) @ 835 MHz; Calibrated: 7/31/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/11/2020
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 2.97 W/kg
SAR(1 g) = 1.87 W/kg
Deviation(1 g) = -6.12%



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

PCTEST

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

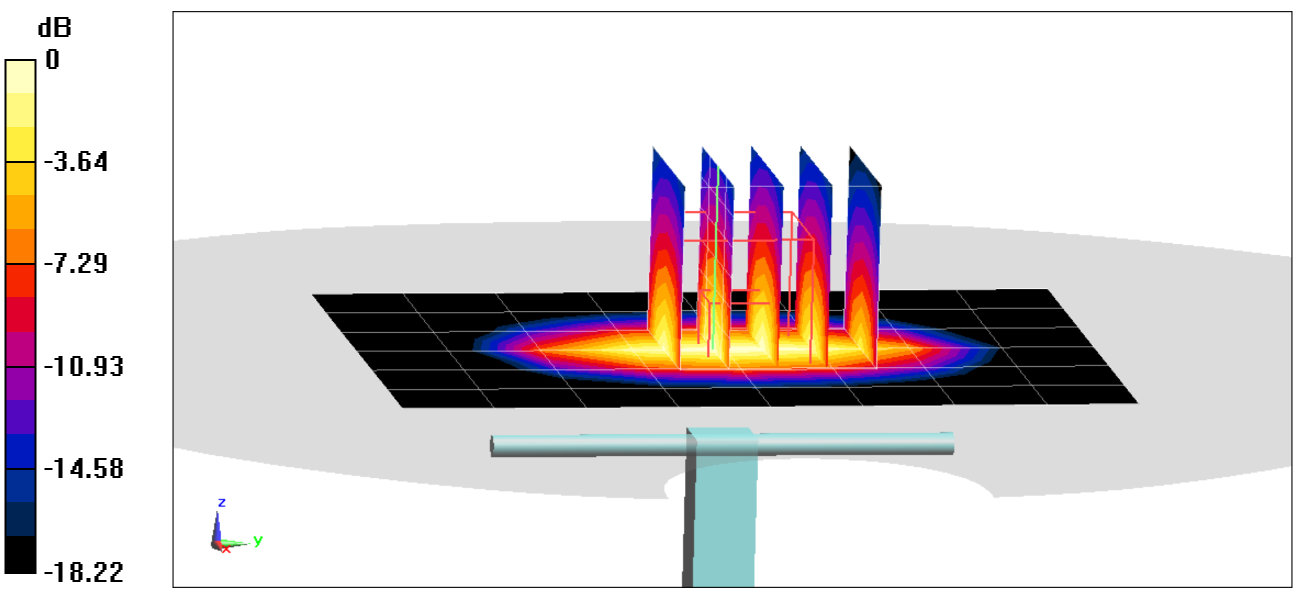
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.534 S/m; ε_r = 52.367; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/15/2020; Ambient Temp: 20.7°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1750 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 7.03 W/kg
SAR(1 g) = 3.88 W/kg; SAR(10 g) = 2.04 W/kg
Deviation(1 g) = 6.01%; Deviation(10 g) = 5.15%



0 dB = 5.90 W/kg = 7.71 dBW/kg

PCTEST

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

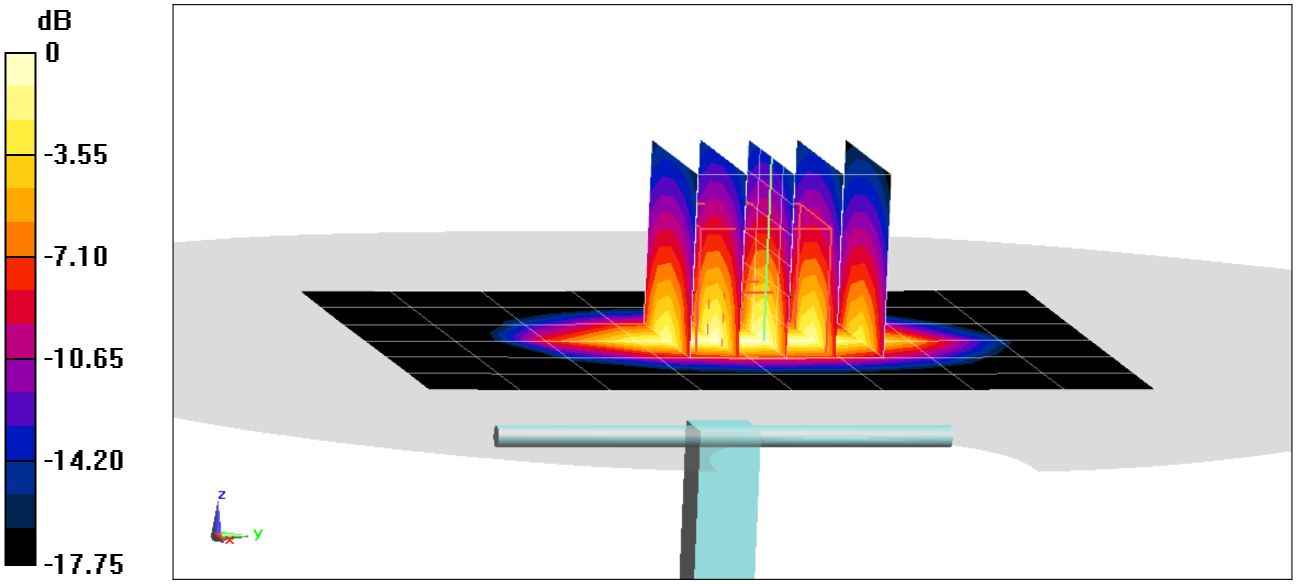
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.515 S/m; ε_r = 52.119; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.5°C; Tissue Temp: 21.5°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1750 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 6.97 W/kg
SAR(1 g) = 3.86 W/kg
Deviation(1 g) = 6.34%



0 dB = 5.86 W/kg = 7.68 dBW/kg

PCTEST

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

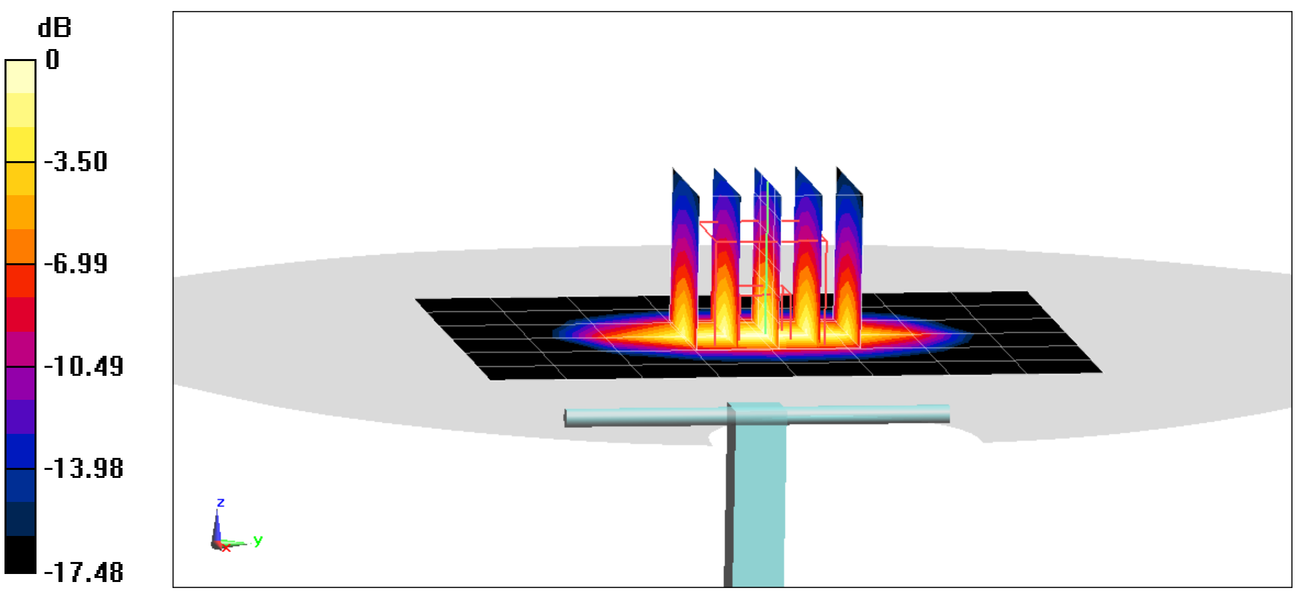
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.531 S/m; ε_r = 51.607; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/21/2020; Ambient Temp: 20.9°C; Tissue Temp: 20.9°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1750 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 7.18 W/kg
SAR(1 g) = 3.96 W/kg
Deviation(1 g) = 5.88%



0 dB = 6.10 W/kg = 7.85 dBW/kg

PCTEST

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

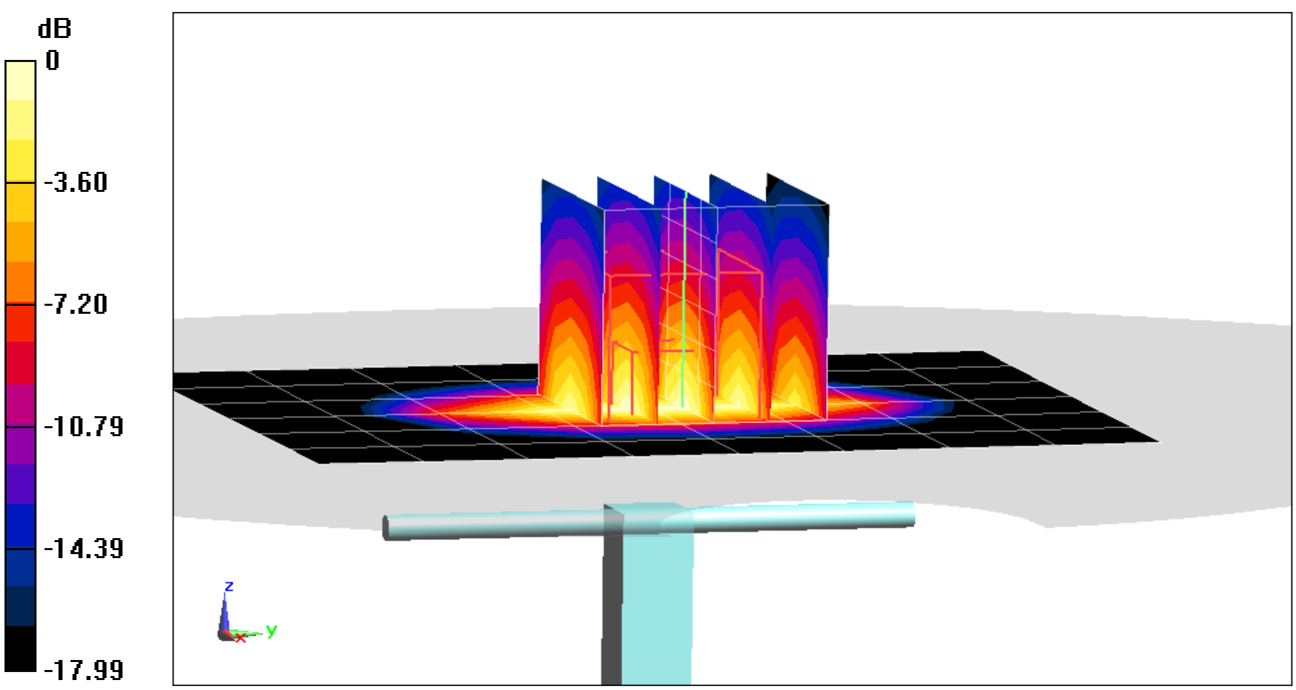
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.514 S/m; ε_r = 52.472; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 10/05/2020; Ambient Temp: 20.9°C; Tissue Temp: 21.2°C

Probe: EX3DV4 - SN7570; ConvF(8.48, 8.48, 8.48) @ 1750 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/12/2020
Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 6.90 W/kg
SAR(10 g) = 1.97 W/kg
Deviation(10 g) = -1.01%



0 dB = 5.76 W/kg = 7.60 dBW/kg

PCTEST

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

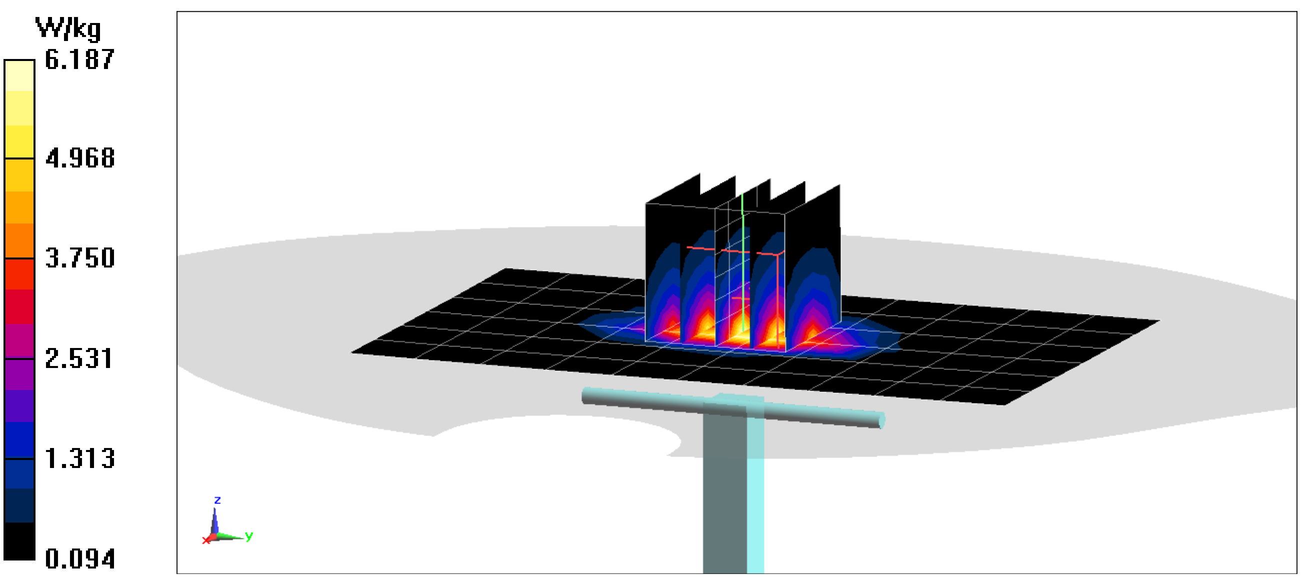
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; σ = 1.574 S/m; ε_r = 51.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/14/2020; Ambient Temp: 23.3°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7357; ConvF(7.8, 7.8, 7.8) @ 1900 MHz; Calibrated: 4/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/15/2020
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 7.29 W/kg
SAR(1 g) = 4.00 W/kg
Deviation(1 g) = 2.04%



PCTEST

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

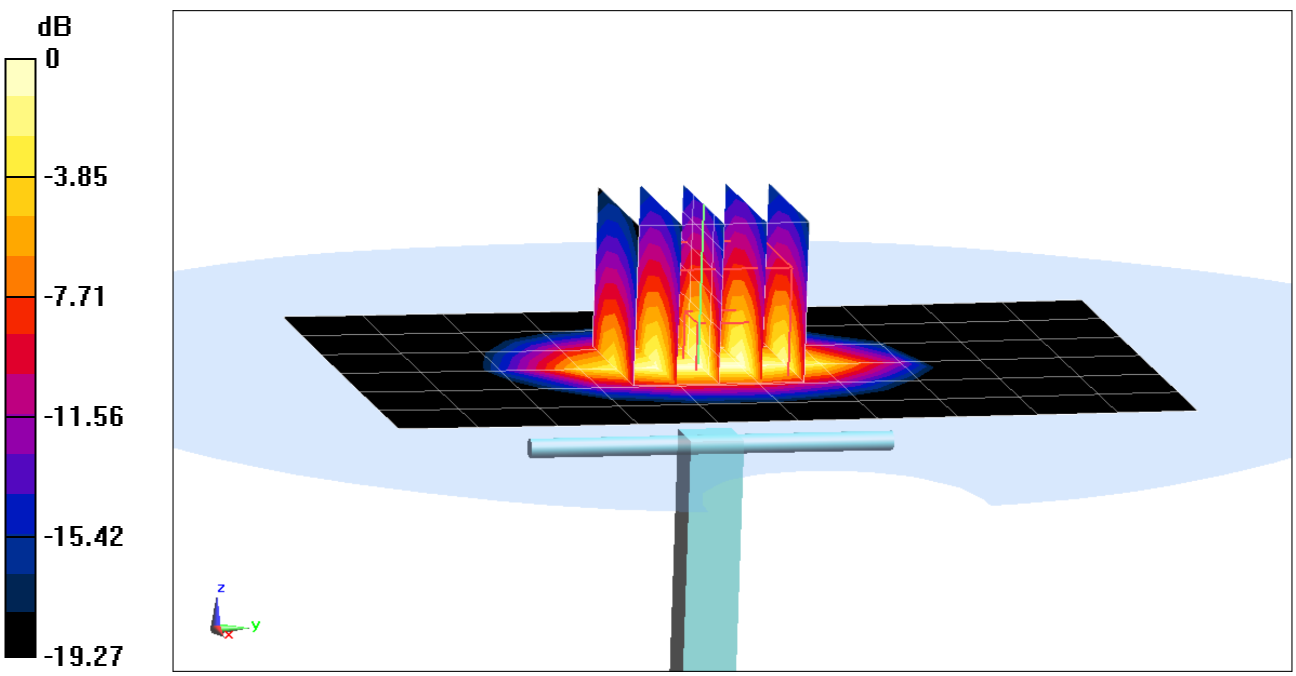
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; σ = 1.562 S/m; ε_r = 51.79; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/17/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1900 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 7.80 W/kg
SAR(1 g) = 4.17 W/kg
Deviation(1 g) = 6.38%



0 dB = 6.43 W/kg = 8.08 dBW/kg

PCTEST

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

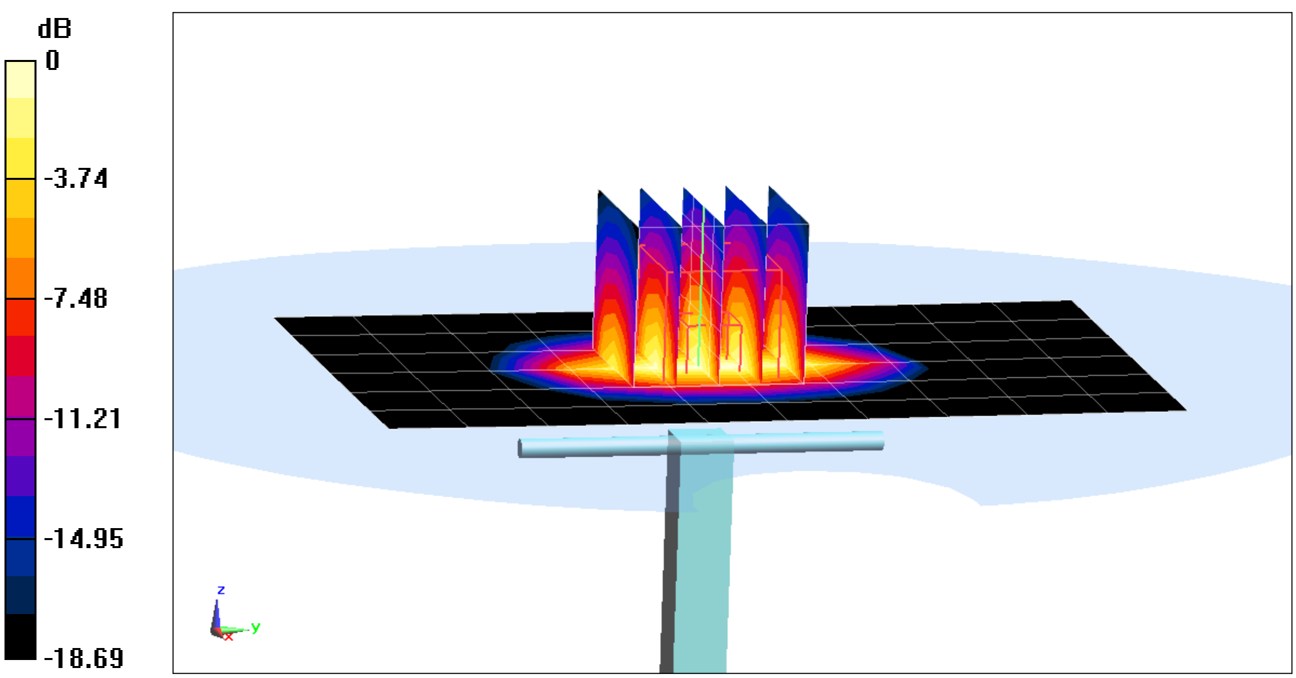
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; σ = 1.572 S/m; ε_r = 52.503; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/20/2020; Ambient Temp: 21.3°C; Tissue Temp: 22.3°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1900 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 4.17 W/kg
Deviation(1 g) = 6.38%



0 dB = 6.48 W/kg = 8.12 dBW/kg

PCTEST

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

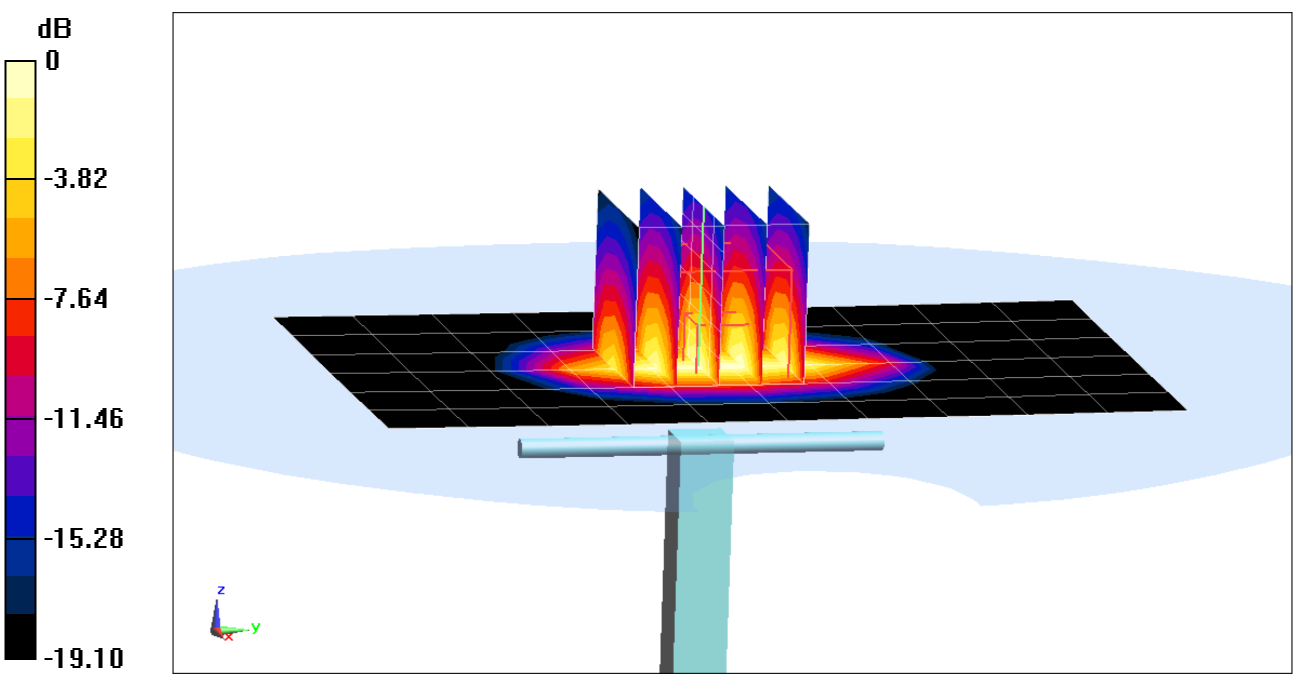
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; σ = 1.547 S/m; ε_r = 53.096; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/23/2020; Ambient Temp: 22.3°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7571; ConvF(7.56, 7.56, 7.56) @ 1900 MHz; Calibrated: 12/11/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1533; Calibrated: 12/5/2019
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 7.57 W/kg
SAR(10 g) = 2.06 W/kg
Deviation(10 g) = 0.00%



0 dB = 6.17 W/kg = 7.90 dBW/kg

PCTEST

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

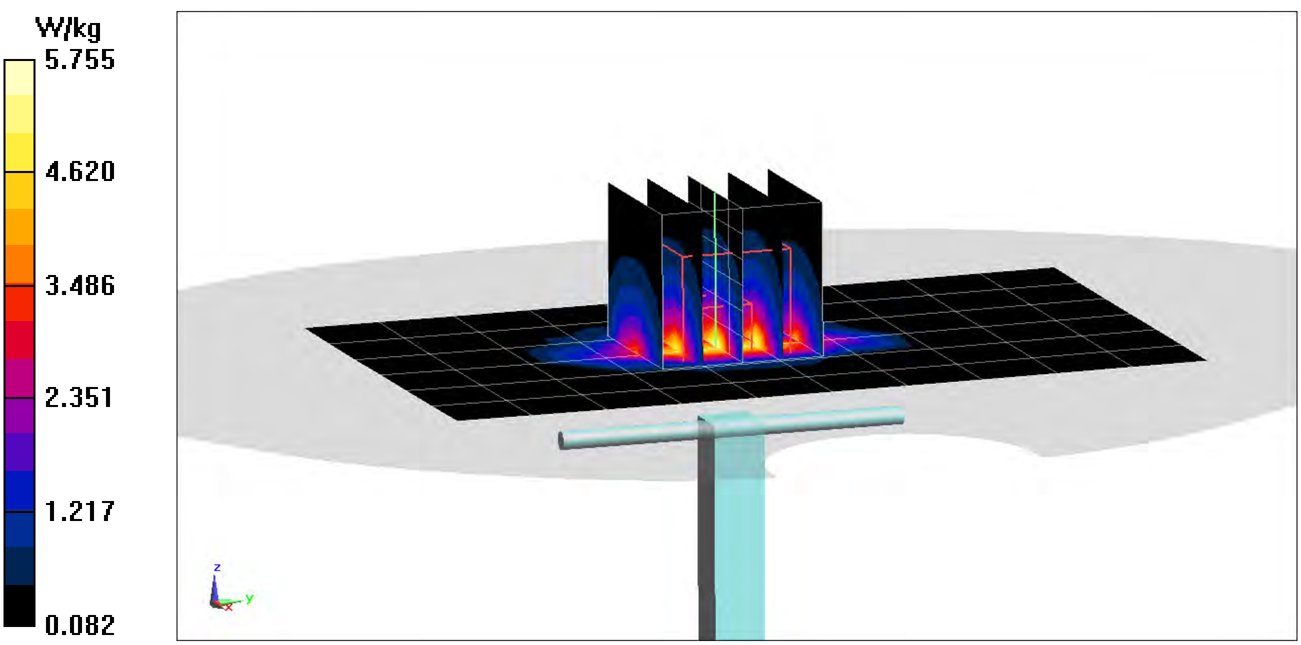
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used:
f = 1900 MHz; σ = 1.564 S/m; ε_r = 51.486; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/28/2020; Ambient Temp: 21.3°C; Tissue Temp: 22.5°C

Probe: EX3DV4 - SN7357; ConvF(7.8, 7.8, 7.8) @ 1900 MHz; Calibrated: 4/21/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/15/2020
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 6.78 W/kg
SAR(10 g) = 1.91 W/kg
Deviation(10 g) = -7.28%



PCTEST

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

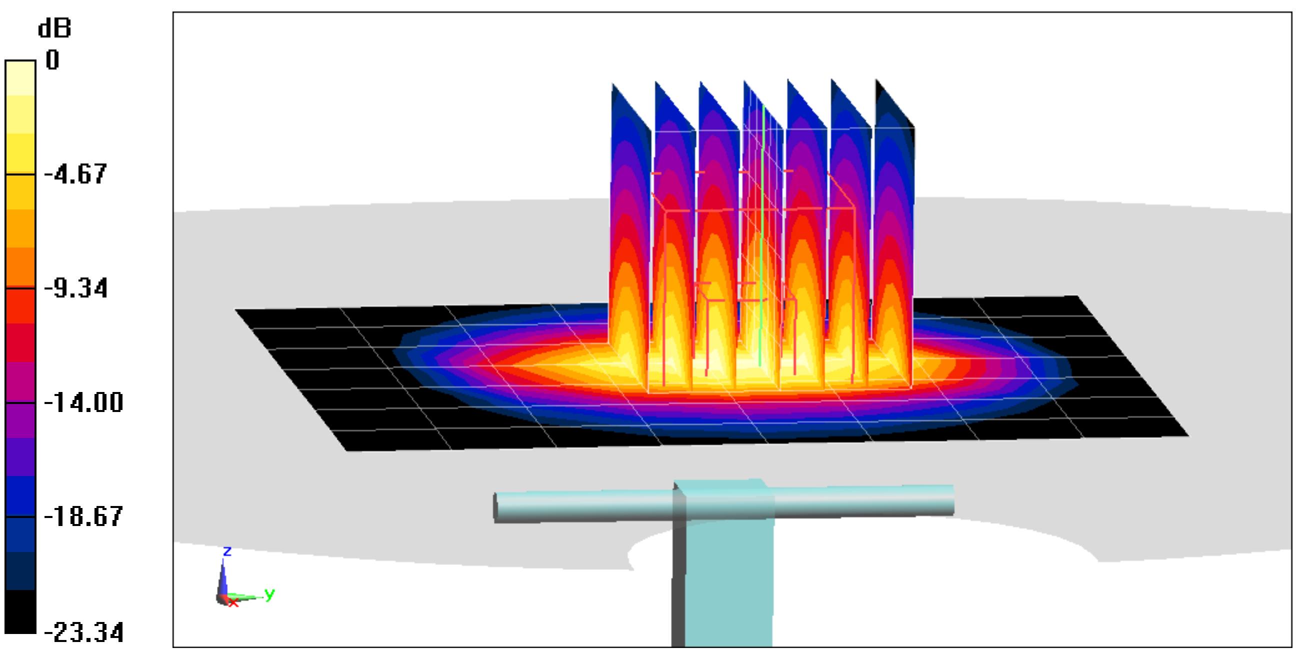
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.034 S/m; ε_r = 51.063; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/14/2020; Ambient Temp: 22.7°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7308; ConvF(7.41, 7.41, 7.41) @ 2450 MHz; Calibrated: 7/31/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/11/2020
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
SAR(1 g) = 5.17 W/kg
Deviation(1 g) = 1.57%



0 dB = 8.93 W/kg = 9.51 dBW/kg

PCTEST

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

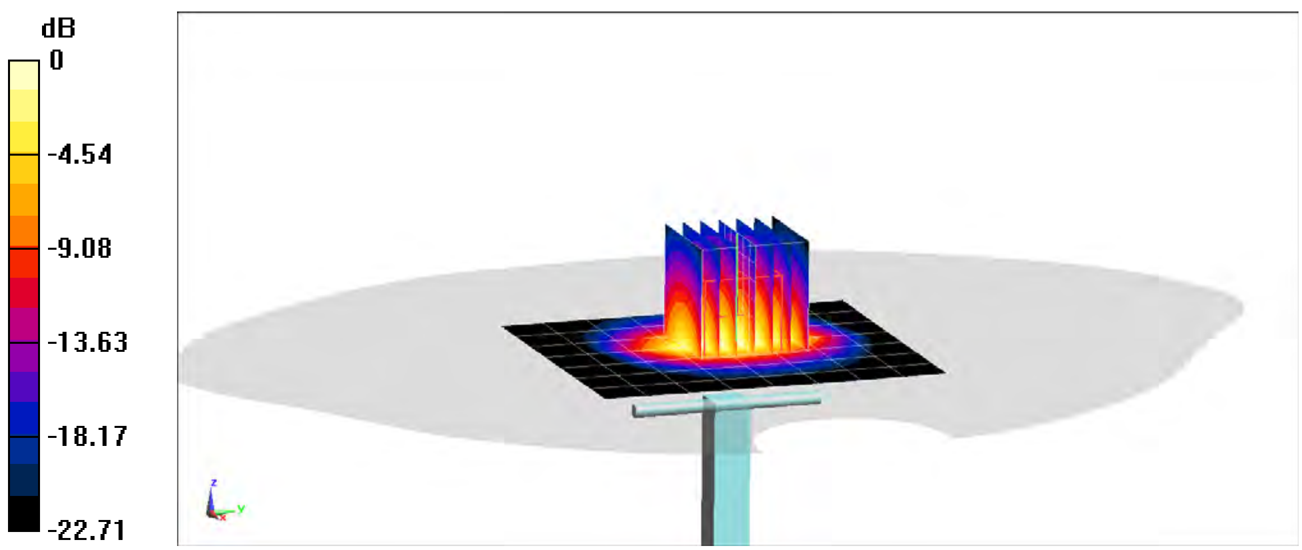
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; $\sigma = 2.044$ S/m; $\varepsilon_r = 51.895$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/28/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(7.24, 7.24, 7.24) @ 2450 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2020
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.28 W/kg
Deviation(1 g) = 3.73%



0 dB = 8.89 W/kg = 9.49 dBW/kg

PCTEST

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

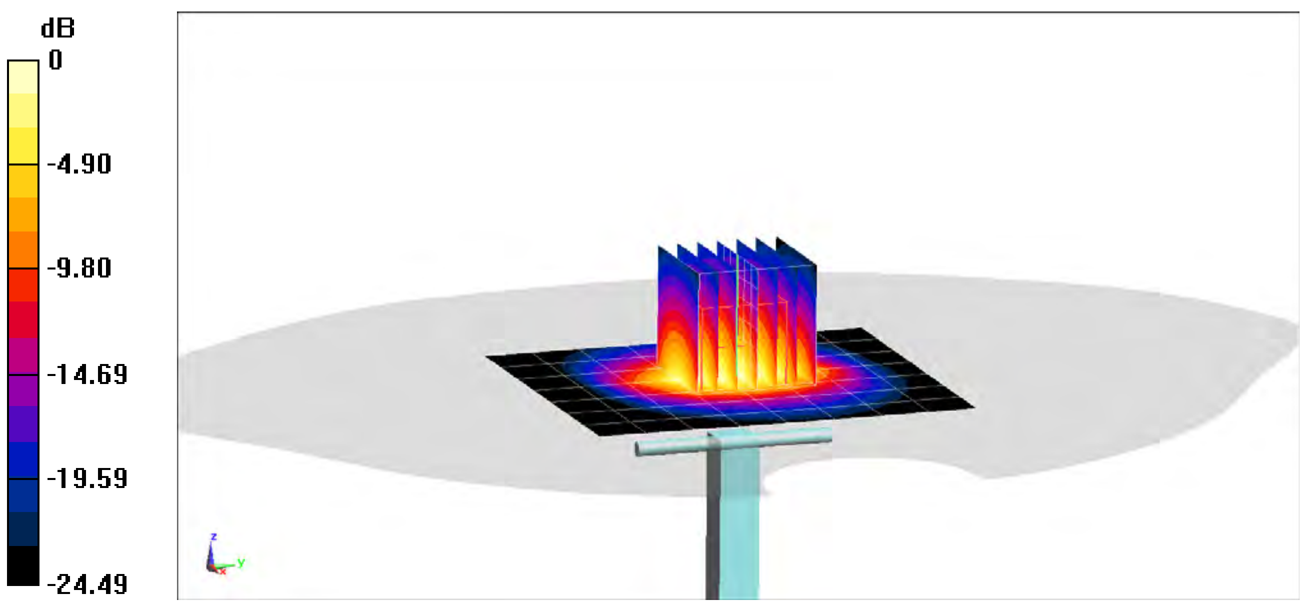
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2600 MHz; σ = 2.224 S/m; ε_r = 51.471; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09/28/2020; Ambient Temp: 22.0°C; Tissue Temp: 22.4°C

Probe: EX3DV4 - SN7409; ConvF(7.12, 7.12, 7.12) @ 2600 MHz; Calibrated: 6/23/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1334; Calibrated: 6/18/2020
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

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) = 5.49 W/kg
Deviation(1 g) = -1.26%



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

APPENDIX C: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

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

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

3 Composition / Information on ingredients

3.2 Mixtures
Description: Aqueous solution with surfactants and inhibitors
Declarable, or hazardous components:

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

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

Figure C-1

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

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Measurement Certificate / Material Test

Item Name	**Body Tissue Simulating Liquid (MBBL600-6000V6)**
Product No.	SL AAM U16 BC (Batch: 200803-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the KDB 865664 compliance standard.

Test Condition

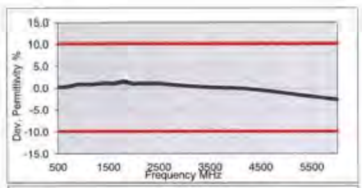
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	6-Aug-20
Operator	CL

Additional Information

TSL Density	
TSL Heat-capacity	

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	56.3	26.8	0.89	56.1	0.95	0.3	-6.3
750	55.8	22.6	0.94	55.5	0.96	0.5	-2.1
800	55.7	21.6	0.96	55.3	0.97	0.7	-1.0
825	55.7	21.1	0.97	55.2	0.98	0.8	-1.0
835	55.7	20.9	0.98	55.1	0.99	1.0	-0.5
850	55.6	20.7	0.98	55.2	0.99	0.8	-1.0
900	55.5	19.9	1.00	55.0	1.05	0.9	-4.8
1400	54.7	15.9	1.24	54.1	1.28	1.1	-3.1
1450	54.6	15.8	1.27	54.0	1.30	1.1	-2.3
1600	54.4	15.3	1.36	53.8	1.39	1.1	-2.2
1625	54.4	15.3	1.38	53.8	1.41	1.2	-2.1
1640	54.4	15.2	1.39	53.7	1.42	1.3	-2.1
1650	54.3	15.2	1.39	53.7	1.43	1.1	-2.8
1700	54.2	15.1	1.43	53.6	1.46	1.2	-2.1
1750	54.2	15.0	1.46	53.4	1.49	1.4	-2.0
1800	54.1	14.9	1.50	53.3	1.52	1.5	-1.3
1810	54.1	14.9	1.51	53.3	1.52	1.5	-0.7
1825	54.1	14.9	1.52	53.3	1.52	1.5	0.0
1850	54.0	14.9	1.53	53.3	1.52	1.3	0.7
1900	54.0	14.8	1.57	53.3	1.52	1.3	3.3
1950	53.9	14.8	1.60	53.3	1.52	1.1	5.3
2000	53.8	14.8	1.64	53.3	1.52	0.9	7.9
2050	53.8	14.7	1.68	53.2	1.57	1.1	7.0
2100	53.7	14.7	1.72	53.2	1.62	1.0	6.2
2150	53.7	14.7	1.76	53.1	1.66	1.1	6.0
2200	53.6	14.7	1.80	53.0	1.71	1.1	5.3
2250	53.5	14.8	1.85	53.0	1.76	1.0	5.1
2300	53.5	14.8	1.89	52.9	1.81	1.1	4.4
2350	53.4	14.8	1.94	52.8	1.85	1.1	4.9
2400	53.3	14.8	1.98	52.8	1.90	1.0	4.2
2450	53.3	14.9	2.03	52.7	1.95	1.1	4.1
2500	53.2	14.9	2.07	52.6	2.02	1.1	2.5
2550	53.1	15.0	2.12	52.6	2.09	1.0	1.4
2600	53.0	15.0	2.17	52.5	2.16	0.9	0.5
3500	51.4	16.0	3.11	51.3	3.31	0.2	-6.0
3700	51.1	16.2	3.34	51.1	3.55	0.1	-5.9
5200	48.3	18.7	5.42	49.0	5.30	-1.5	2.3
5250	48.2	18.8	5.50	49.0	5.36	-1.6	2.5
5300	48.1	18.9	5.57	48.9	5.42	-1.7	2.8
5500	47.7	19.2	5.86	48.6	5.65	-2.0	3.8
5600	47.5	19.3	6.01	48.5	5.77	-2.1	4.2
5700	47.3	19.4	6.16	48.3	5.88	-2.3	4.8
5800	47.0	19.6	6.32	48.2	6.00	-2.4	5.3
6000	46.6	19.8	6.62	47.9	6.23	-2.7	6.3
6500							
7000							
7500							
8000							
8500							
9000							
9500							
10000							



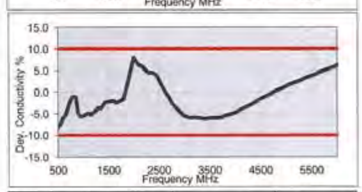


Figure C-2
600 – 5800 MHz Body Tissue Equivalent Matter

Schmid & Partner Engineering AG **s p e a g**

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Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Measurement Certificate / Material Test

Item Name	**Head Tissue Simulating Liquid (HBBL600-10000V6)**
Product No.	SL AAH U16 BC (Batch: 200805-4)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

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

Test Condition

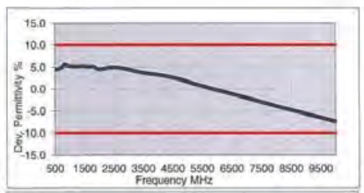
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	6-Aug-20
Operator	CL

Additional Information

TSL Density
TSL Heat-capacity

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	e'	e"	sigma	eps	sigma	Δ-eps	Δ-sigma
600	44.7	25.7	0.86	42.7	0.88	4.6	-2.5
750	44.1	21.7	0.90	41.9	0.89	5.1	0.7
800	44.0	20.7	0.92	41.7	0.90	5.6	2.5
825	43.9	20.3	0.93	41.6	0.91	5.6	2.6
835	43.9	20.1	0.94	41.5	0.91	5.7	3.1
850	43.8	19.9	0.94	41.5	0.92	5.5	2.6
900	43.7	19.1	0.96	41.5	0.97	5.3	-1.0
1400	42.7	15.1	1.18	40.6	1.18	5.2	0.0
1450	42.6	14.9	1.20	40.5	1.20	5.2	0.0
1600	42.4	14.4	1.28	40.3	1.28	5.2	-0.3
1625	42.4	14.4	1.30	40.3	1.30	5.3	0.1
1640	42.4	14.3	1.31	40.3	1.31	5.3	0.3
1650	42.3	14.3	1.31	40.2	1.31	5.1	-0.2
1700	42.2	14.2	1.34	40.2	1.34	5.1	-0.2
1750	42.2	14.1	1.37	40.1	1.37	5.3	-0.1
1800	42.1	14.0	1.40	40.0	1.40	5.3	0.0
1810	42.1	14.0	1.41	40.0	1.40	5.3	0.7
1825	42.1	13.9	1.42	40.0	1.40	5.3	1.4
1850	42.0	13.9	1.43	40.0	1.40	5.0	2.1
1900	41.9	13.8	1.46	40.0	1.40	4.7	4.3
1950	41.9	13.8	1.49	40.0	1.40	4.7	6.4
2000	41.8	13.7	1.53	40.0	1.40	4.5	9.3
2050	41.7	13.7	1.56	39.9	1.44	4.5	8.0
2100	41.7	13.7	1.60	39.8	1.49	4.7	7.5
2150	41.6	13.6	1.63	39.7	1.53	4.7	6.3
2200	41.5	13.6	1.67	39.6	1.58	4.7	5.8
2250	41.5	13.6	1.70	39.6	1.62	4.9	4.8
2300	41.4	13.6	1.74	39.5	1.67	4.9	4.4
2350	41.3	13.6	1.78	39.4	1.71	4.9	4.0
2400	41.2	13.6	1.82	39.3	1.76	4.9	3.7
2450	41.2	13.6	1.85	39.2	1.80	5.1	2.8
2500	41.1	13.6	1.89	39.1	1.85	5.0	1.9
2550	41.0	13.7	1.94	39.1	1.91	4.9	1.6
2600	40.9	13.7	1.98	39.0	1.96	4.8	0.8
3500	39.4	14.2	2.77	37.9	2.91	3.7	-5.1
3700	39.0	14.3	2.95	37.7	3.12	3.5	-5.3
5200	36.4	15.9	4.61	36.0	4.66	1.3	-1.0
5250	36.4	16.0	4.67	35.9	4.71	1.2	-0.9
5300	36.3	16.0	4.72	35.9	4.76	1.1	-0.7
5500	35.9	16.2	4.96	35.6	4.96	0.7	-0.1
5600	35.7	16.3	5.07	35.5	5.07	0.5	0.2
5700	35.5	16.4	5.19	35.4	5.17	0.3	0.4
5800	35.4	16.5	5.31	35.3	5.27	0.1	0.7
6000	35.0	16.6	5.54	35.1	5.48	-0.2	1.2
6500	34.1	17.1	6.17	34.5	6.07	-1.1	1.6
7000	33.2	17.4	6.78	33.9	6.65	-2.0	2.0
7500	32.3	17.7	7.40	33.3	7.24	-2.9	2.2
8000	31.5	18.0	8.01	32.7	7.84	-3.8	2.2
8500	30.6	18.2	8.63	32.1	8.45	-4.7	2.1
9000	29.8	18.4	9.24	31.5	9.08	-5.6	1.8
9500	29.0	18.6	9.84	31.0	9.71	-6.5	1.3
10000	28.1	18.8	10.44	30.4	10.36	-7.4	0.8



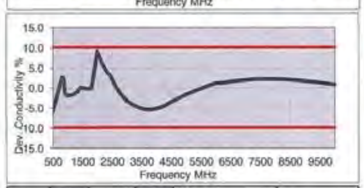


Figure C-3
600 – 5800 MHz Head Tissue Equivalent Matter

APPENDIX D: SAR SYSTEM VALIDATION

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

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

Table D-1
SAR System Validation Summary – 1g

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
						(σ)	(εr)	SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
L	750	8/14/2020	7406	750	Head	0.868	43.769	PASS	PASS	PASS	N/A	N/A	N/A
E	835	2/20/2020	3589	835	Head	0.922	43.402	PASS	PASS	PASS	GMSK	PASS	N/A
L	835	7/6/2020	7406	835	Head	0.903	42.760	PASS	PASS	PASS	GMSK	PASS	N/A
L	1750	7/11/2020	7406	1750	Head	1.321	41.025	PASS	PASS	PASS	N/A	N/A	N/A
L	1900	7/7/2020	7406	1900	Head	1.403	40.885	PASS	PASS	PASS	GMSK	PASS	N/A
P	2450	9/9/2020	7308	2450	Head	1.865	40.970	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
E	2450	2/5/2020	3589	2450	Head	1.823	38.835	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
E	2600	2/5/2020	3589	2600	Head	1.933	38.635	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
P	750	9/26/2019	7551	750	Body	0.959	54.287	PASS	PASS	PASS	N/A	N/A	N/A
P	835	9/26/2019	7551	835	Body	0.991	54.104	PASS	PASS	PASS	GMSK	PASS	N/A
P	835	9/8/2020	7308	835	Body	0.977	54.530	PASS	PASS	PASS	GMSK	PASS	N/A
I	1750	6/17/2020	7570	1750	Body	1.518	52.030	PASS	PASS	PASS	N/A	N/A	N/A
H	1900	6/1/2020	7357	1900	Body	1.555	51.210	PASS	PASS	PASS	GMSK	PASS	N/A
J	1900	1/1/2020	7571	1900	Body	1.579	51.919	PASS	PASS	PASS	GMSK	PASS	N/A
P	2450	9/9/2020	7308	2450	Body	2.028	52.650	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
K	2450	7/7/2020	7409	2450	Body	2.018	51.180	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
K	2600	7/8/2020	7409	2600	Body	2.194	50.730	PASS	PASS	PASS	OFDM/TDD	PASS	PASS

Table D-2
SAR System Validation Summary – 10g

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
						(σ)	(εr)	SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
I	1750	6/17/2020	7570	1750	Body	1.518	52.03	PASS	PASS	PASS	N/A	N/A	N/A
J	1900	1/1/2020	7571	1900	Body	1.579	51.919	PASS	PASS	PASS	GMSK	PASS	N/A
H	1900	6/1/2020	7357	1900	Body	1.555	51.21	PASS	PASS	PASS	GMSK	PASS	N/A

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

APPENDIX F POWER REDUCTION VERIFICATION

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

F.1 Power Verification Procedure

The power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and the output power was monitored. The power measurements were confirmed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.

2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.

3. Steps 1 and 2 were repeated for all individual power reduction mechanisms and combinations thereof. For the combination cases, one mechanism was switched to a 'triggered' state at a time; powers were confirmed to be within tolerances after each additional mechanism was activated.

F.2 Distance Verification Procedure

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

1. A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.

2. The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced, per KDB Publication 616217 D04v01r02 and FCC Guidance. Each applicable test position was evaluated. The distances were confirmed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.

3. Steps 1 and 2 were repeated for low, mid, and high bands, as appropriate (see note below Table F-2 for more details).

4. Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

F.3 Main Antenna Verification Summary

Table F-1
Power Measurement Verification for Main Antenna

Mechanism(s)		Mode/Band	Conducted Power (dBm)		
1st	2nd		Un-triggered (Max)	Mechanism #1 (Reduced)	Mechanism #2 (Reduced)
Grip		UMTS 1750	24.10	22.16	
Hotspot On		UMTS 1750	24.05	22.15	
Grip	Hotspot On	UMTS 1750	24.08	22.15	22.09
Hotspot On	Grip	UMTS 1750	24.04	22.11	22.08
Grip		UMTS 1900	24.54	23.20	
Hotspot On		UMTS 1900	24.54	22.99	
Grip	Hotspot On	UMTS 1900	24.50	23.00	22.98
Hotspot On	Grip	UMTS 1900	24.51	23.05	23.00
Grip		LTE FDD Band 4	23.38	21.84	
Hotspot On		LTE FDD Band 4	23.47	21.85	
Grip	Hotspot On	LTE FDD Band 4	23.46	21.97	21.96
Hotspot On	Grip	LTE FDD Band 4	23.39	21.95	22.00
Grip		LTE FDD Band 66	24.05	21.76	
Hotspot On		LTE FDD Band 66	24.03	21.68	
Grip	Hotspot On	LTE FDD Band 66	24.03	21.90	21.89
Hotspot On	Grip	LTE FDD Band 66	24.04	21.90	21.70
Grip		LTE FDD Band 2	24.36	23.20	
Hotspot On		LTE FDD Band 2	24.32	23.19	
Grip	Hotspot On	LTE FDD Band 2	24.33	23.19	23.18
Hotspot On	Grip	LTE FDD Band 2	24.35	23.17	23.18
Grip		LTE FDD Band 25	24.24	22.79	
Hotspot On		LTE FDD Band 25	24.19	22.80	
Grip	Hotspot On	LTE FDD Band 25	24.21	22.80	22.79
Hotspot On	Grip	LTE FDD Band 25	24.28	22.78	22.79

Table F-2
Distance Measurement Verification for Main Antenna

Mechanism(s)	Test Condition	Band	Distance Measurements (mm)		Minimum Distance per Manufacturer (mm)
			Moving Toward	Moving Away	
Grip	Phablet - Back Side	Mid	5	7	3
Grip	Phablet - Bottom Edge	Mid	4	5	3

*Note: Low band refers to: Mid band refers to: UMTS B2/4, LTE B2/4/25/66

F.4 WIFI Verification Summary

Table F-3
Power Measurement Verification WIFI

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Held-to-Ear	802.11b	21.10	17.99
Held-to-Ear	802.11g	18.85	17.82
Held-to-Ear	802.11n (2.4GHz)	18.60	17.95

APPENDIX G: PROBE CALIBRATION

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: D750V3-1054_Mar20

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1054

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: March 11, 2020

BNV 04-30-2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	31-Dec-19 (No. EX3-7349_Dec19)	Dec-20
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: March 19, 2020

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	V52.10.4
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	42.5 ± 6 %	0.88 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	2.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.63 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.69 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.7 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.53 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	**5.63 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	53.6 Ω - 1.9 jΩ
Return Loss	- 28.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.8 Ω - 4.7 jΩ
Return Loss	- 26.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.035 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 11.03.2020

Test Laboratory: SPEAG, Zurich, Switzerland

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

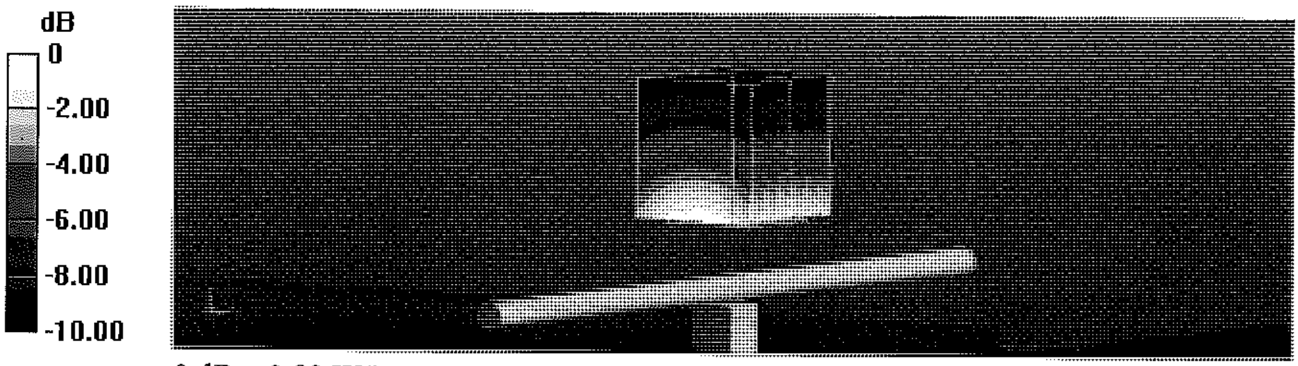
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; $\sigma = 0.88$ S/m; $\varepsilon_r = 42.5$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.07, 10.07, 10.07) @ 750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

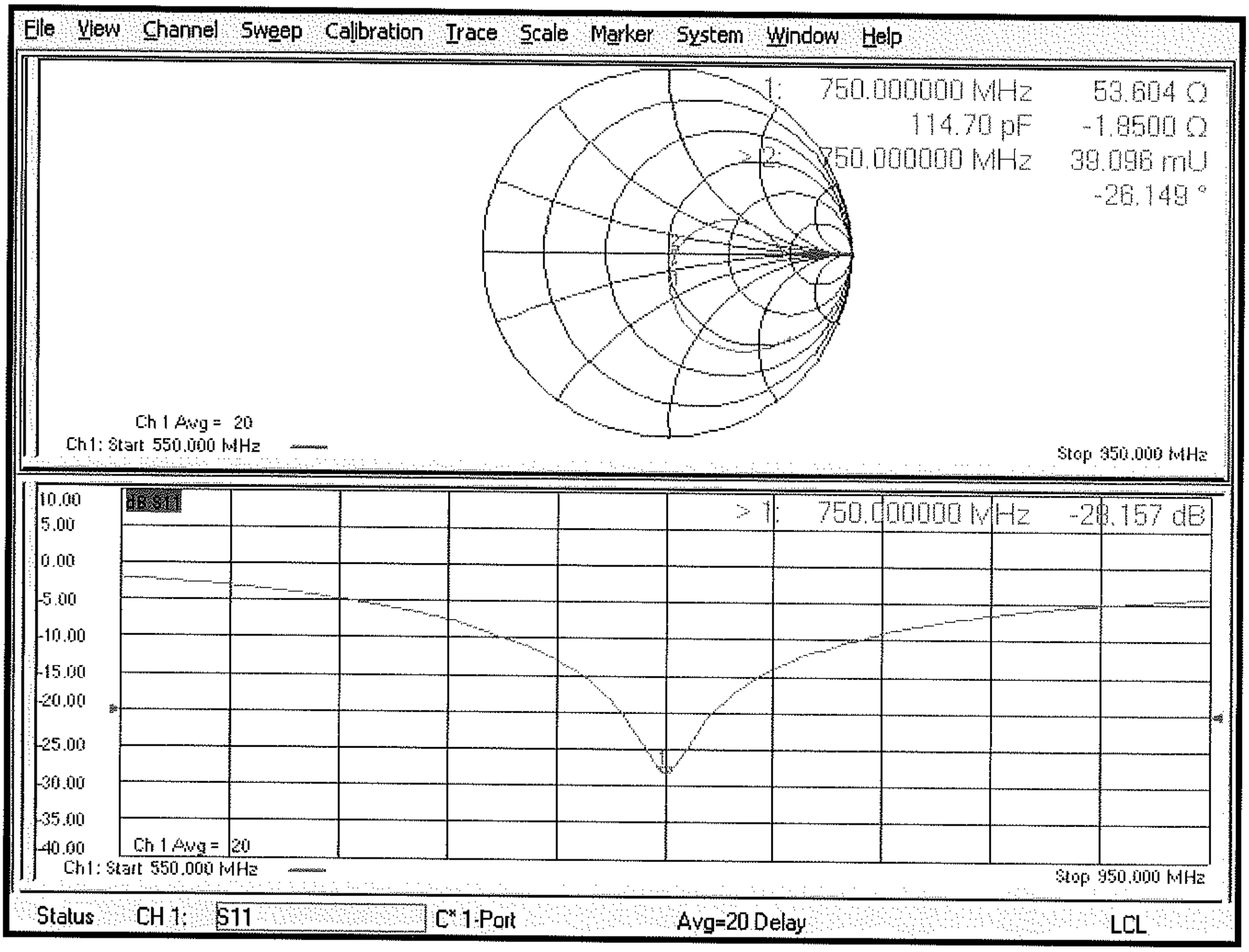
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.98 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.19 W/kg
SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.41 W/kg
Smallest distance from peaks to all points 3 dB below = 17.1 mm
Ratio of SAR at M2 to SAR at M1 = 66.8%
Maximum value of SAR (measured) = 2.82 W/kg



0 dB = 2.82 W/kg = 4.50 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.03.2020

Test Laboratory: SPEAG, Zurich, Switzerland

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

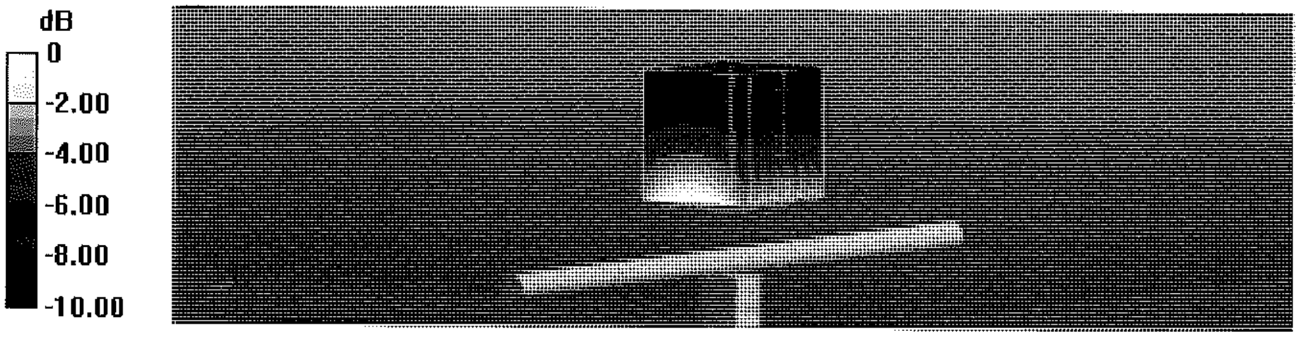
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 54.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.61, 10.61, 10.61) @ 750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

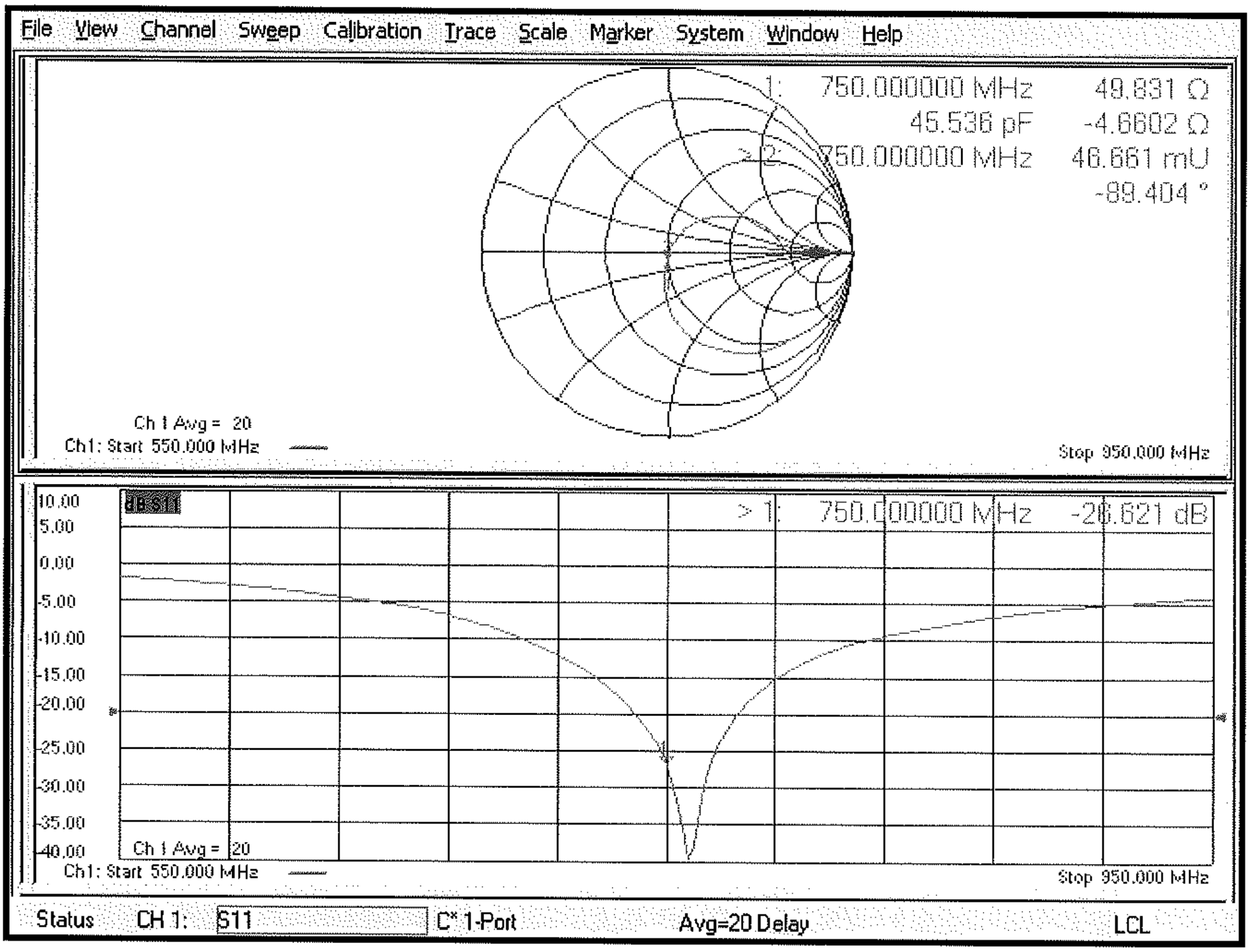
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.15 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.22 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.41 W/kg
Smallest distance from peaks to all points 3 dB below = 16.1 mm
Ratio of SAR at M2 to SAR at M1 = 66.7%
Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

Impedance Measurement Plot for Body TSL



Appendix: Transfer Calibration at Four Validation Locations on SAM Head[1]

Evaluation Condition

Phantom	SAM Head Phantom	For usage with cSAR3D**V2**-R/L

SAR result with SAM Head (Top ≅ C0)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**7.66 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**5.14 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth ≅ F90)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**8.42 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**5.69 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck ≅ H0)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**7.89 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**5.40 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear ≅ D90)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**6.82 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**4.63 W/kg ± 16.9 % (k=2)**

[1] Additional assessments outside the current scope of SCS 0108

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

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

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

Accreditation No.: SCS 0108

Client PC Test

Certificate No: D835V2-4d047_Mar19

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d047
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	March 13, 2019

BN✓ 04-12-2019
BN✓ Extended 04-30-2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

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

Issued: March 13, 2019

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.9 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.42 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.13 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.3 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.47 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.27 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.4 Ω - 2.6 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.8 Ω - 6.1 jΩ
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.387 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

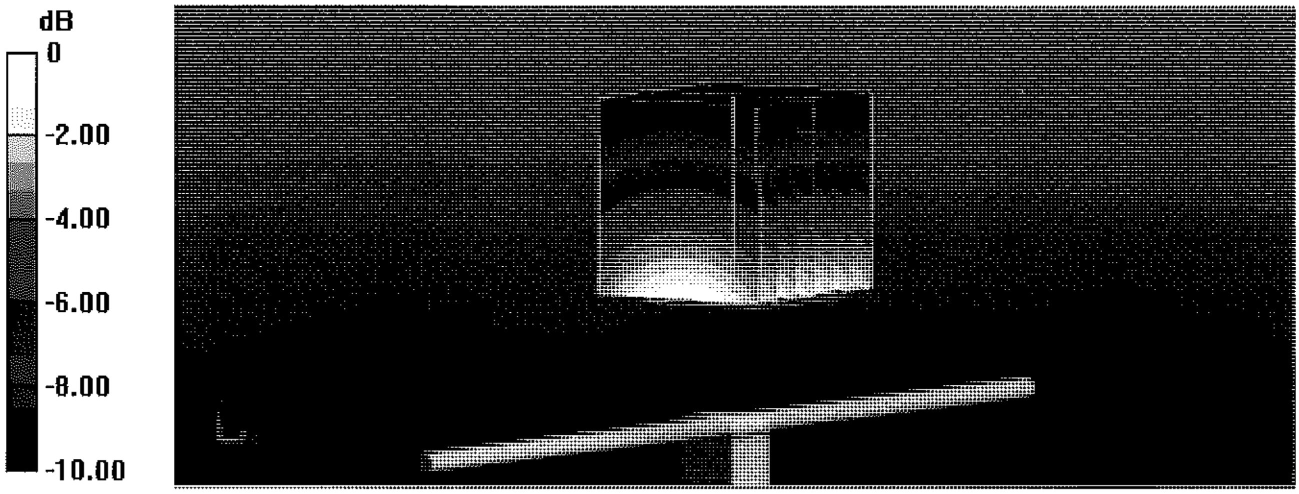
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 41.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10, 10, 10) @ 835 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

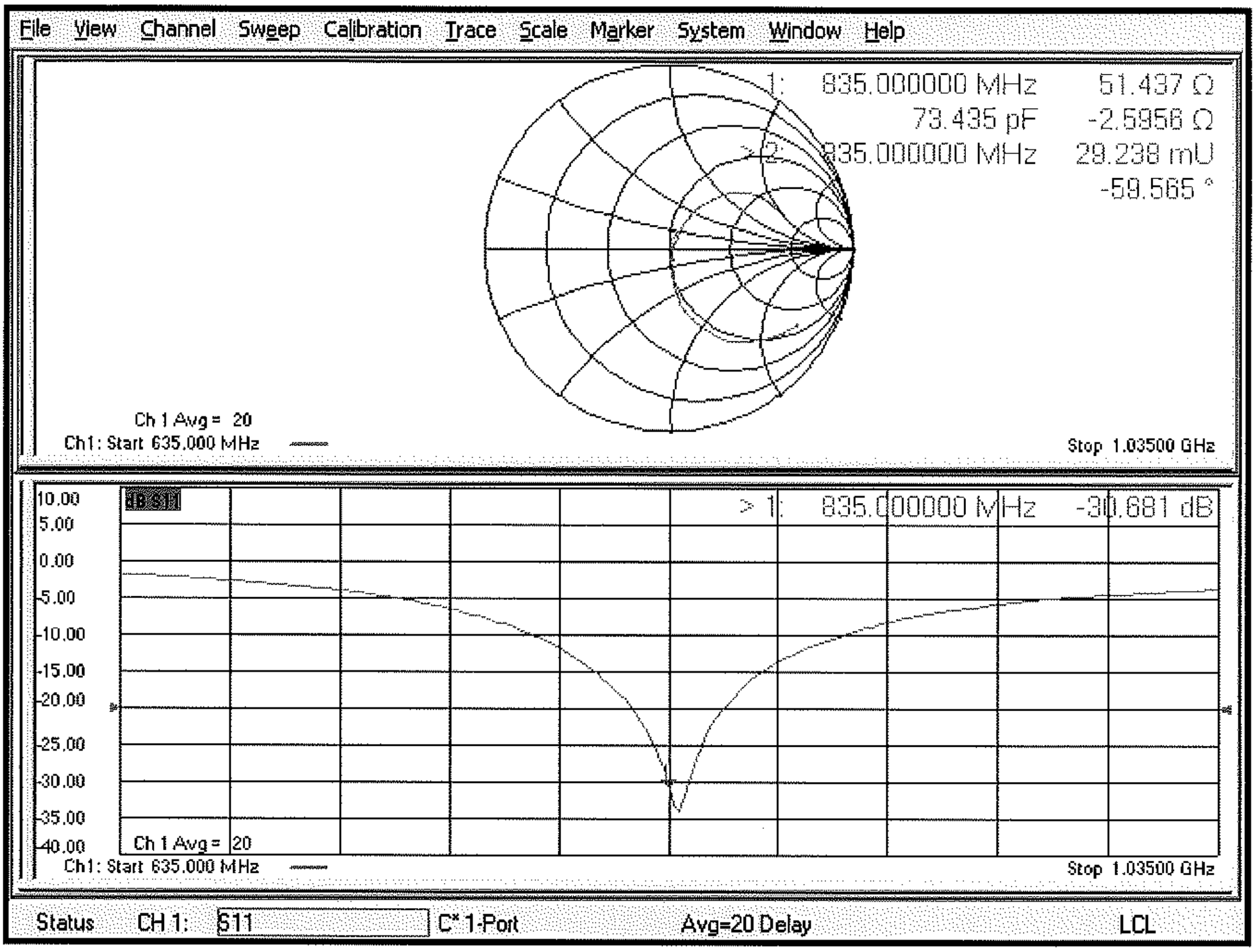
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.48 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg
Maximum value of SAR (measured) = 3.18 W/kg



0 dB = 3.18 W/kg = 5.02 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

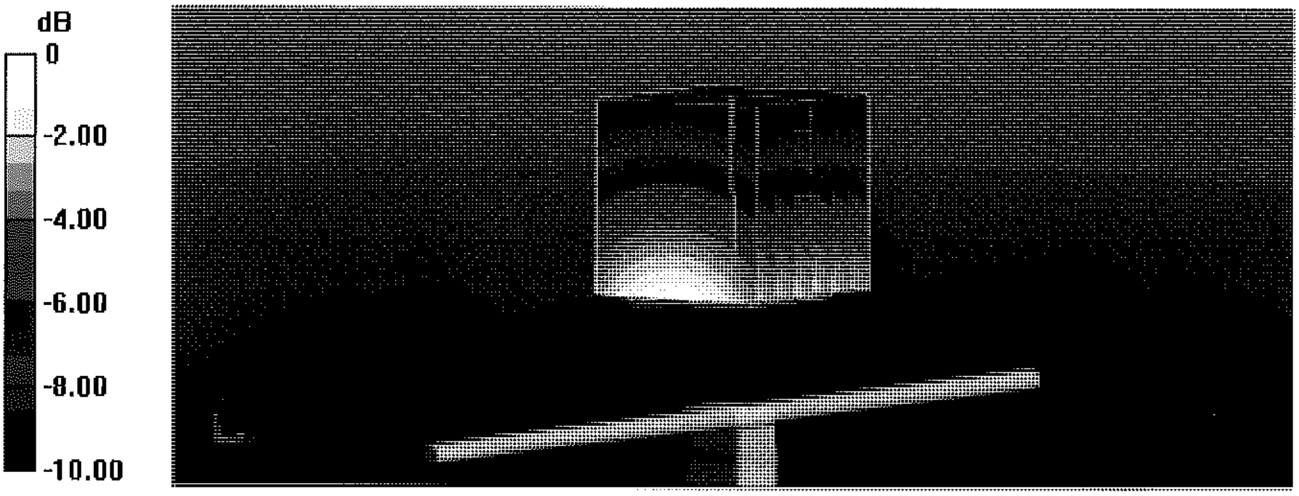
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.15, 10.15, 10.15) @ 835 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

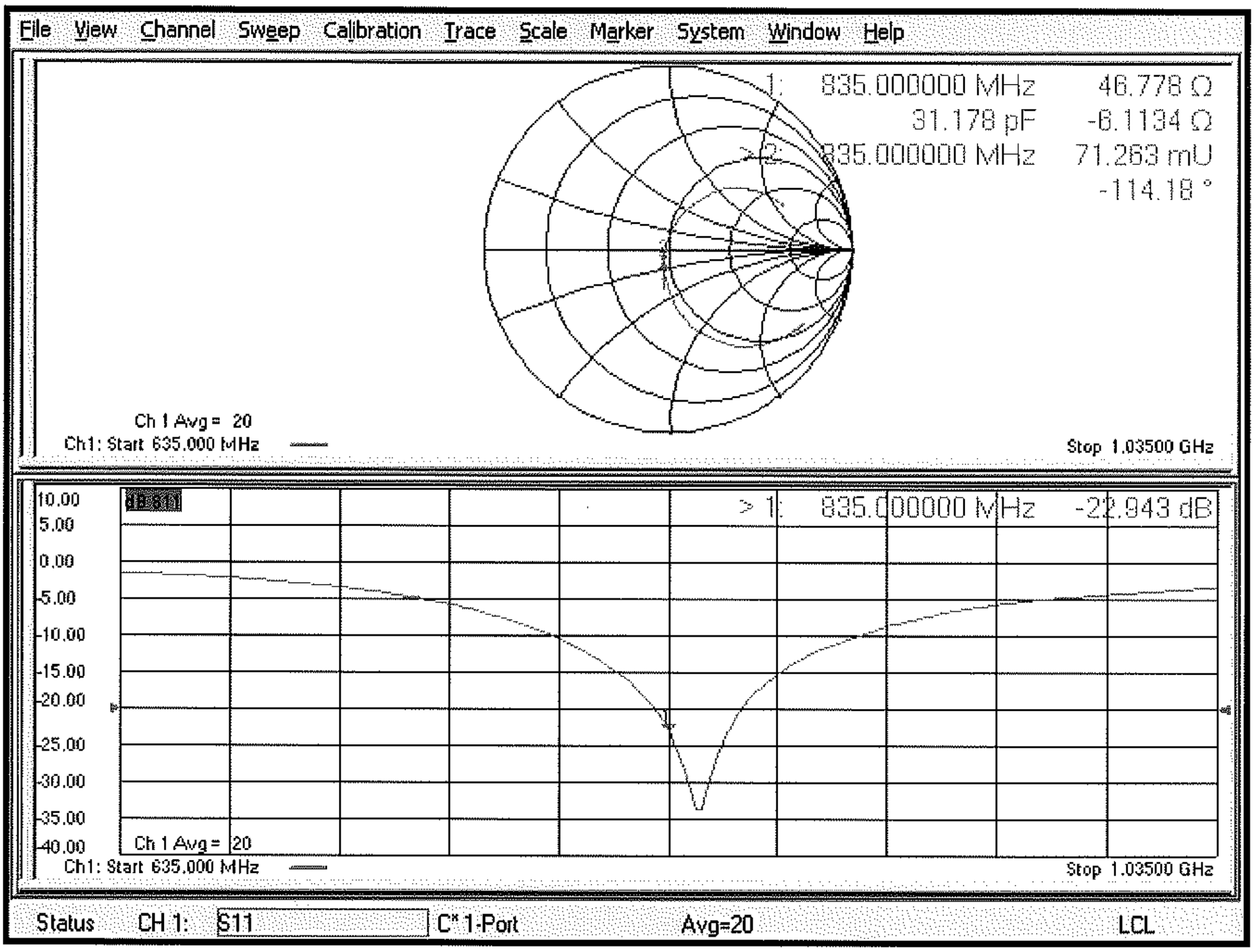
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.49 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 3.23 W/kg



0 dB = 3.23 W/kg = 5.09 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object	D835V2 – SN: 4d047
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	3/13/2020
Description:	SAR Validation Dipole at 835 MHz

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	9/19/2019	Annual	9/19/2020	7551
SPEAG	EX3DV4	SAR Probe	1/21/2020	Annual	1/21/2021	7488
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2019	Annual	9/17/2020	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/13/2020	Annual	1/13/2021	1530

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

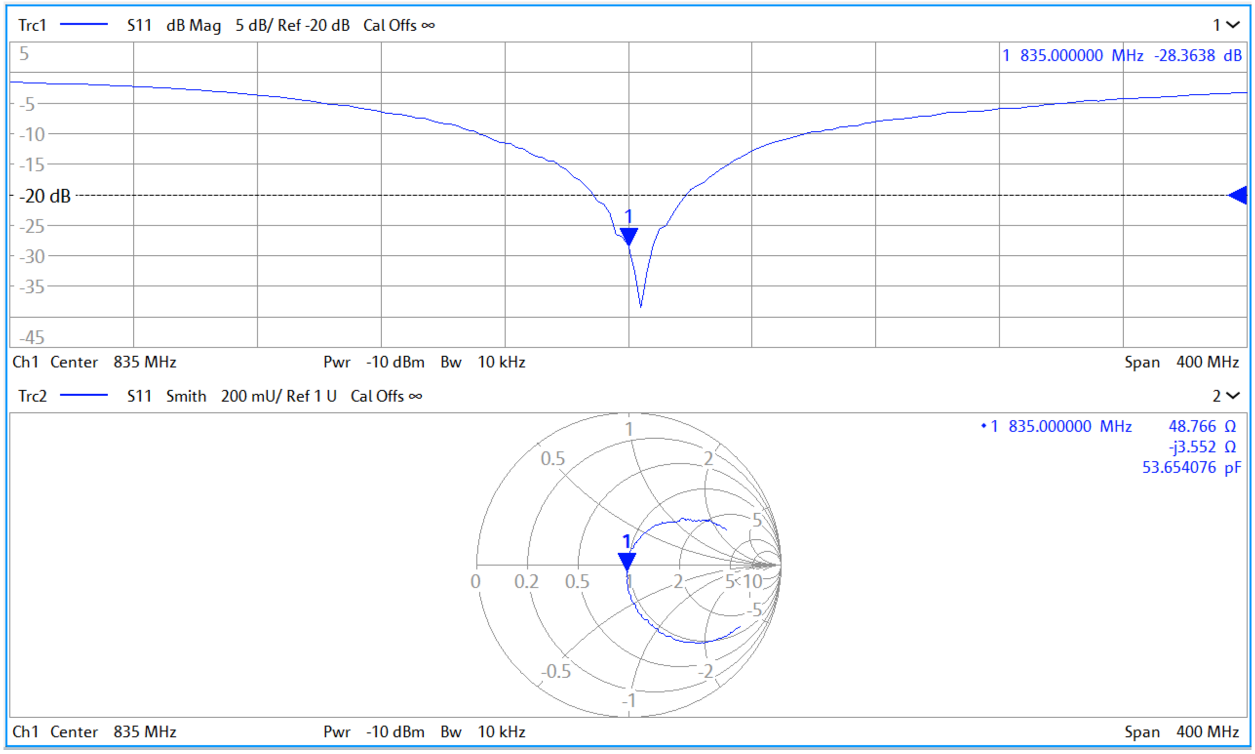
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

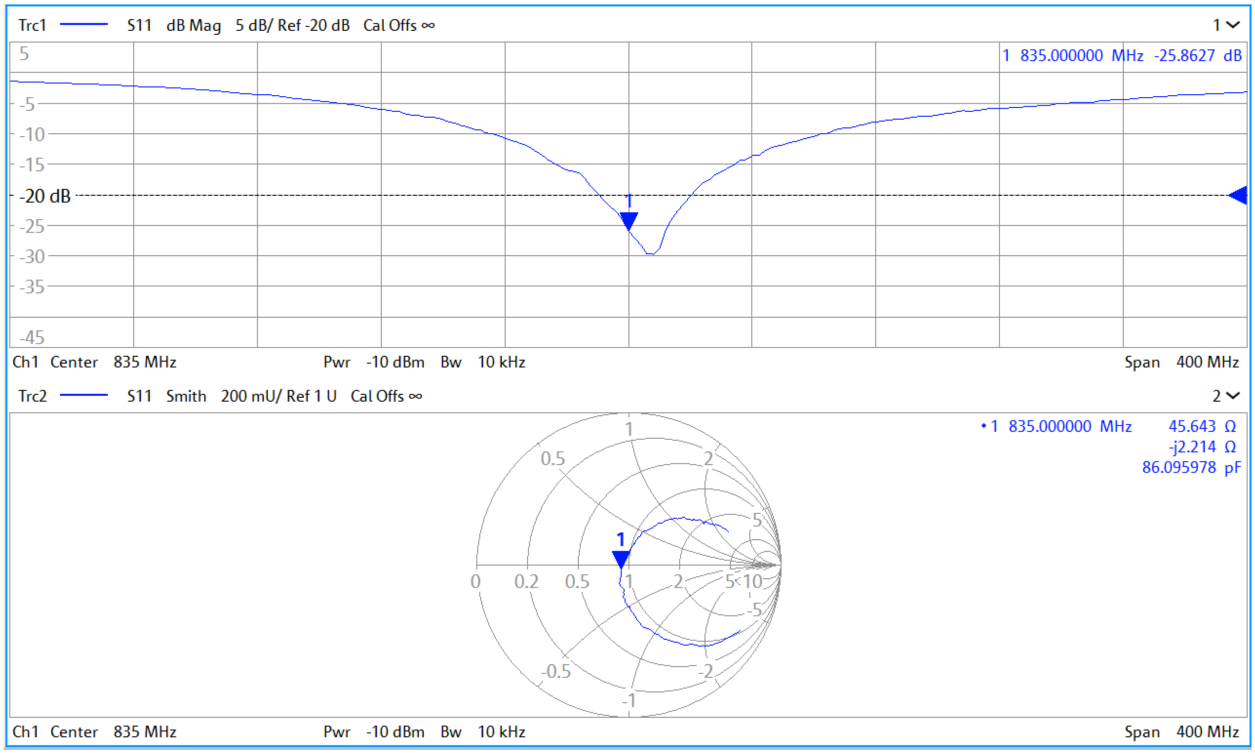
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
3/13/2019	3/13/2020	1.387	1.884	1.87	-0.74%	1.226	1.22	-0.49%	51.4	48.8	2.6	-2.6	-3.6	1.0	-30.7	-28.4	7.60%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
3/13/2019	3/13/2020	1.387	1.894	1.91	0.84%	1.254	1.26	0.48%	46.8	45.6	1.2	-6.1	-2.2	3.9	-22.9	-25.9	-12.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client PC Test

Certificate No: D835V2-4d132_Jan20

CALIBRATION CERTIFICATE

Object: D835V2 - SN:4d132

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: January 13, 2020

BN ✓ 02-05-2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	31-Dec-19 (No. EX3-7349_Dec19)	Dec-20
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: January 21, 2020

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	V52.10.3
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.6 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.65 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.30 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	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	2.53 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.96 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.64 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	50.4 Ω - 3.1 jΩ
Return Loss	- 30.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω - 5.5 jΩ
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 13.01.2020

Test Laboratory: SPEAG, Zurich, Switzerland

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

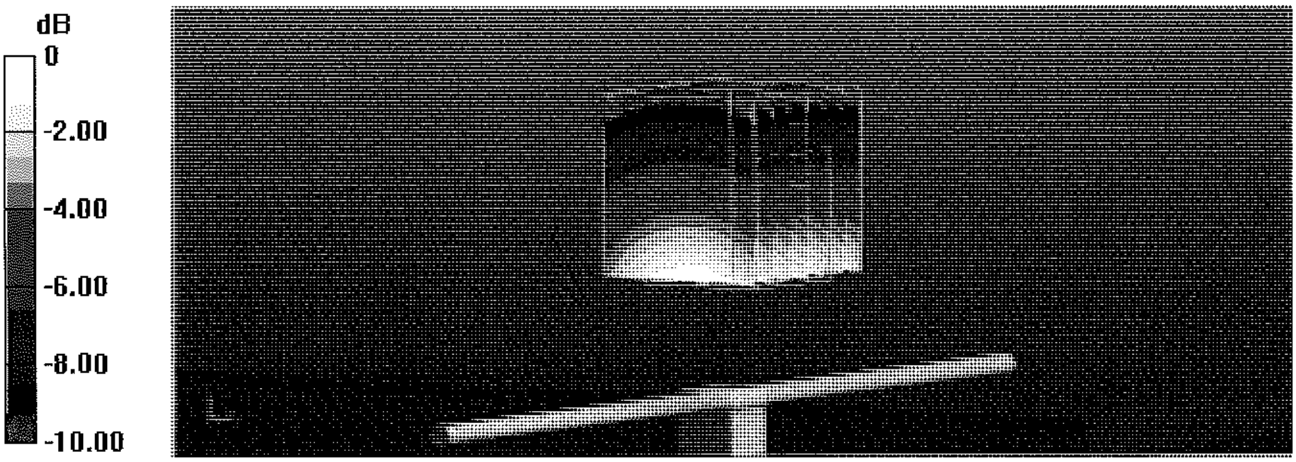
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 42.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.89, 9.89, 9.89) @ 835 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

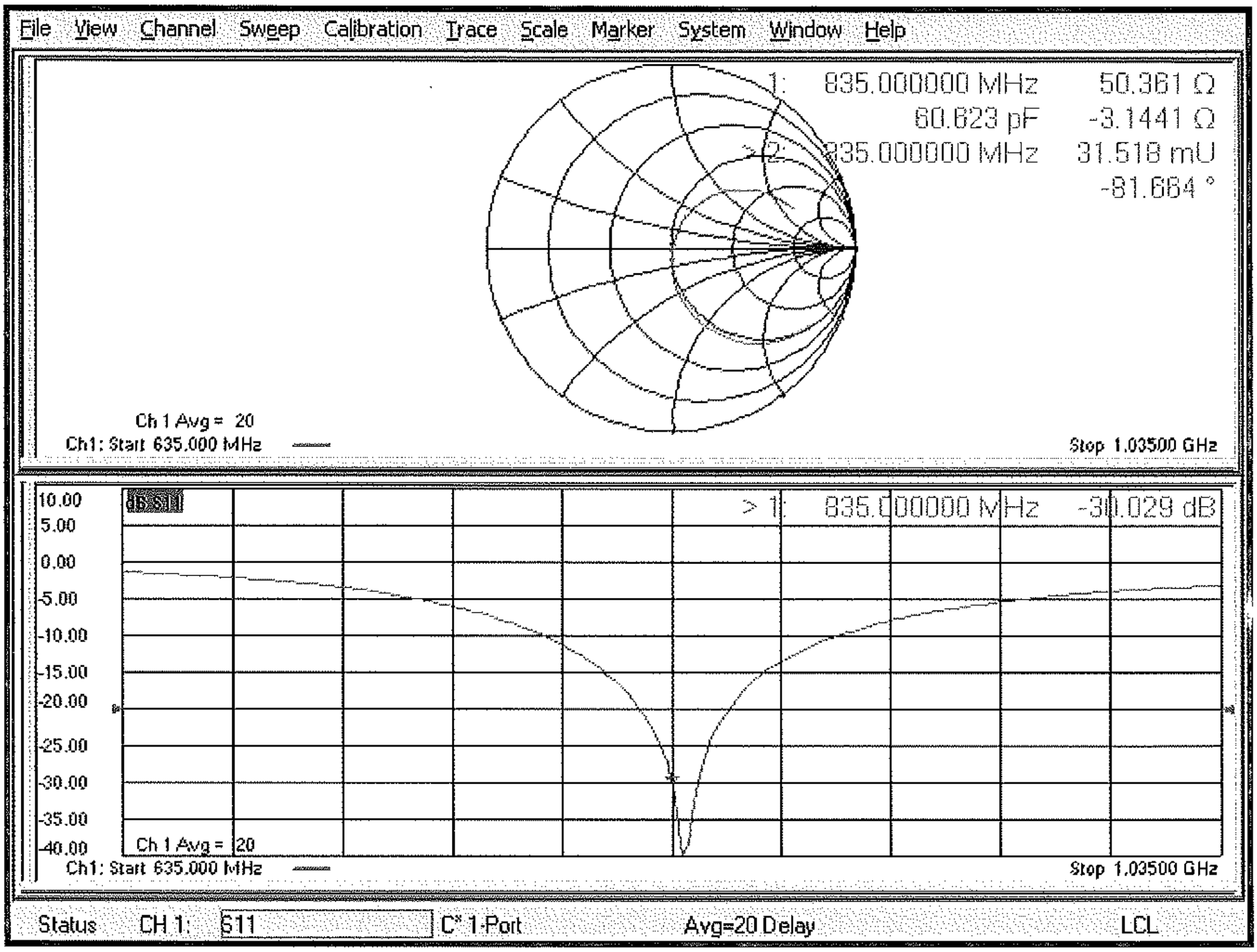
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.94 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.58 W/kg
Smallest distance from peaks to all points 3 dB below = 16 mm
Ratio of SAR at M2 to SAR at M1 = 67.1%
Maximum value of SAR (measured) = 3.20 W/kg



0 dB = 3.20 W/kg = 5.05 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.01.2020

Test Laboratory: SPEAG, Zurich, Switzerland

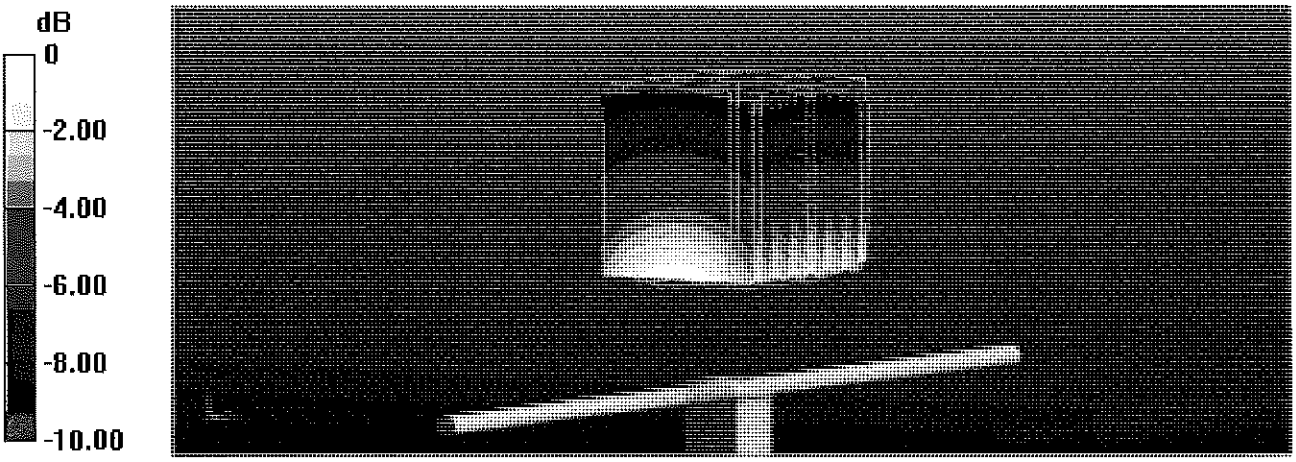
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d132

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.99 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:

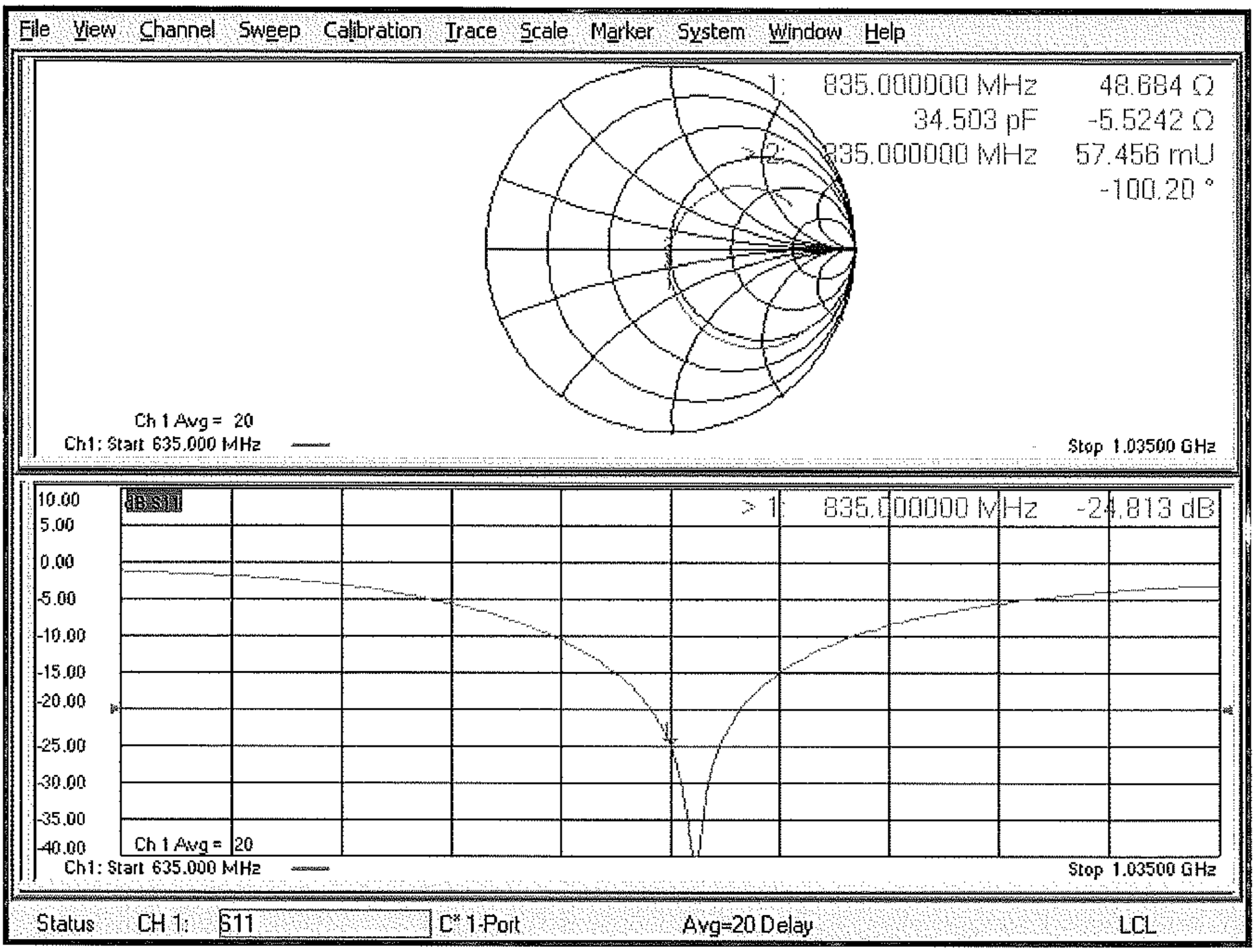
- Probe: EX3DV4 - SN7349; ConvF(10.16, 10.16, 10.16) @ 835 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.64 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.71 W/kg
SAR(1 g) = 2.53 W/kg; SAR(10 g) = 1.68 W/kg
Smallest distance from peaks to all points 3 dB below = 16.2 mm
Ratio of SAR at M2 to SAR at M1 = 68.2%
Maximum value of SAR (measured) = 3.33 W/kg



0 dB = 3.20 W/kg = 5.05 dBW/kg

Impedance Measurement Plot for Body TSL



Appendix: Transfer Calibration at Four Validation Locations on SAM Head[1]

Evaluation Condition

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

SAR result with SAM Head (Top ≅ C0)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**9.34 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**6.19 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth ≅ F90)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**9.80 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**6.59 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck ≅ H0)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**9.32 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**6.30 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear ≅ D90)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR for nominal Head TSL parameters	normalized to 1W	**8.01 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR for nominal Head TSL parameters	normalized to 1W	**5.40 W/kg ± 16.9 % (k=2)**

[1] Additional assessments outside the current scope of SCS 0108

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1750V2-1150_Oct18**

CALIBRATION CERTIFICATE

Object: D1750V2 - SN:1150

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

BN✓ 10/30/2018

Calibration date: October 22, 2018

BN✓ 10-20-2019

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: October 22, 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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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 %	1.33 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	9.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.76 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	53.5 ± 6 %	1.46 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	9.04 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**36.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.82 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.4 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	50.9 Ω - 0.4 jΩ
Return Loss	- 40.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 0.1 jΩ
Return Loss	- 29.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 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: 22.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

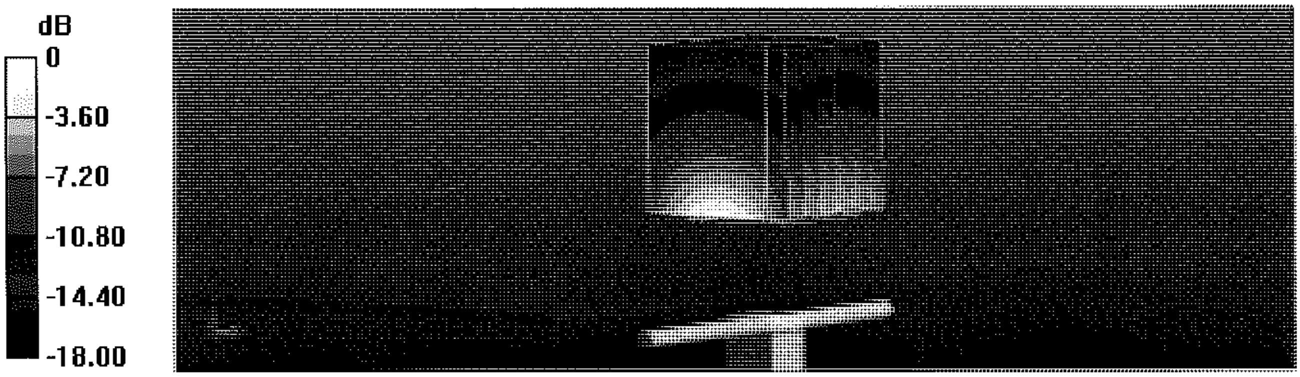
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.33 S/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

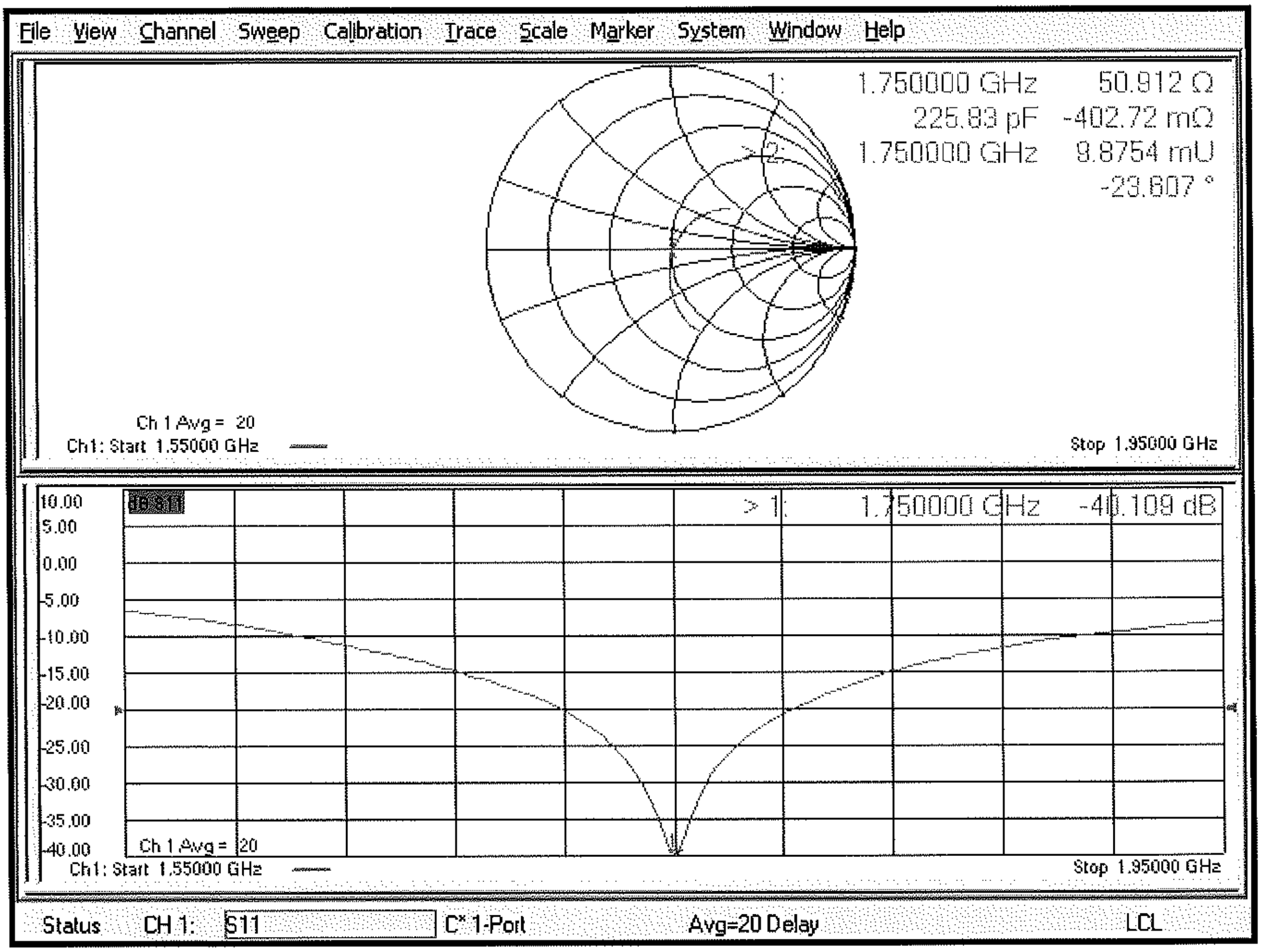
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 108.1 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.02 W/kg; SAR(10 g) = 4.76 W/kg
Maximum value of SAR (measured) = 14.0 W/kg



0 dB = 14.0 W/kg = 11.46 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

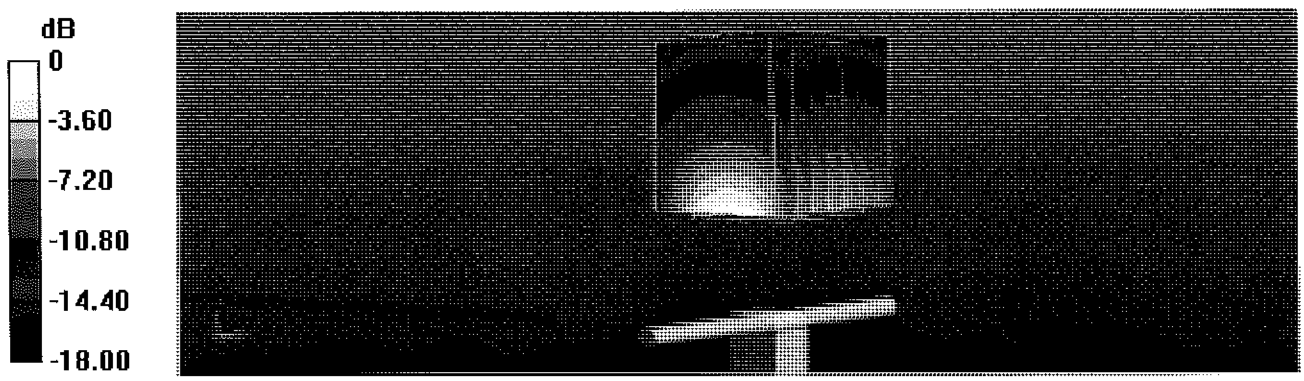
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.46 S/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

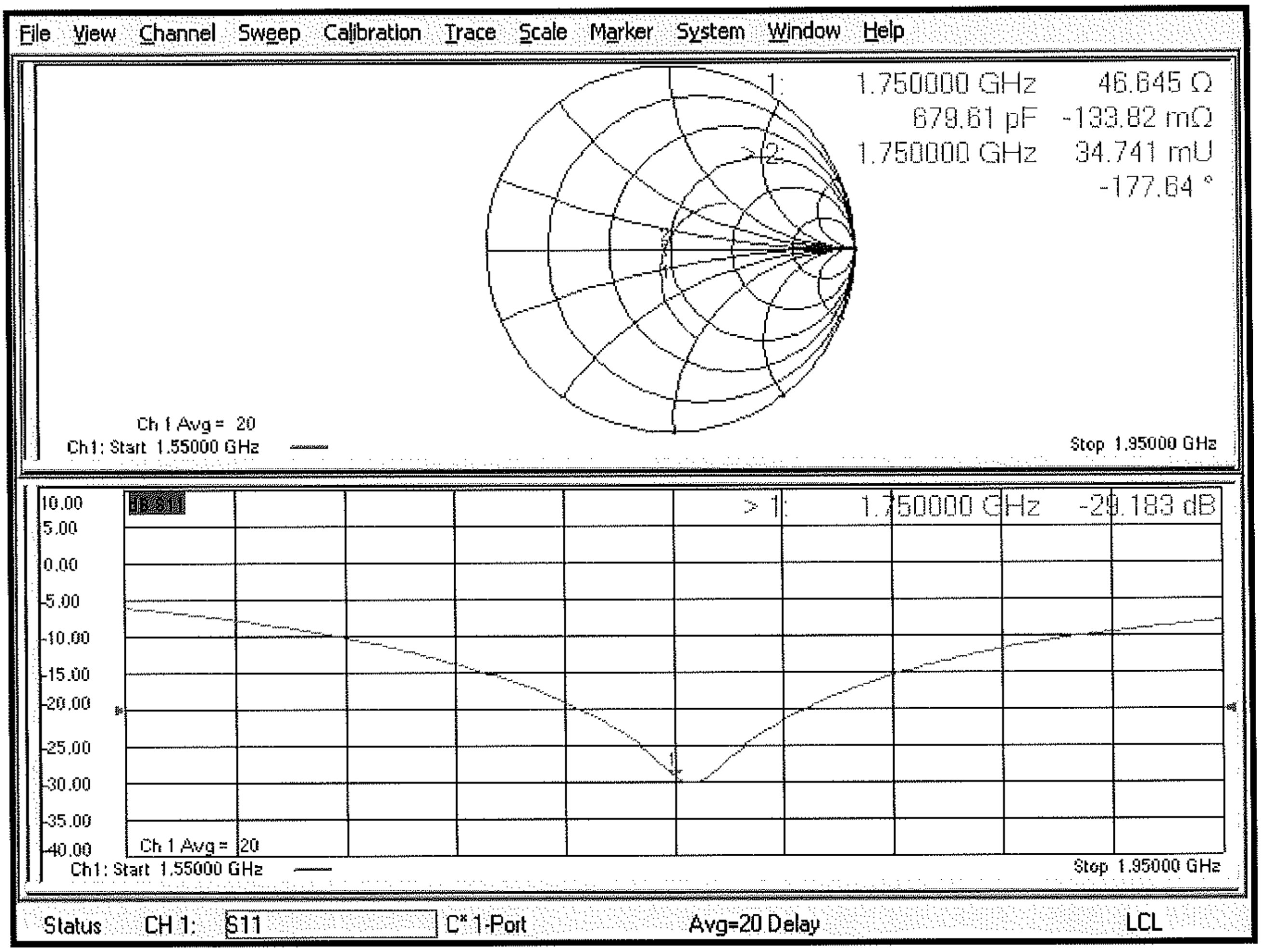
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.1 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.82 W/kg
Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 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.

Extended Calibration date: October 18, 2019

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	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/13/2019	Annual	8/13/2020	1041
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	11/20/2018	Annual	11/20/2019	1039008
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	8/16/2019	Annual	8/16/2020	7308
SPEAG	EX3DV4	SAR Probe	4/24/2019	Annual	4/24/2020	7357
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/18/2019	Annual	4/18/2020	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/14/2019	Annual	8/14/2020	1450

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Team Lead Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

DIPOLE CALIBRATION EXTENSION

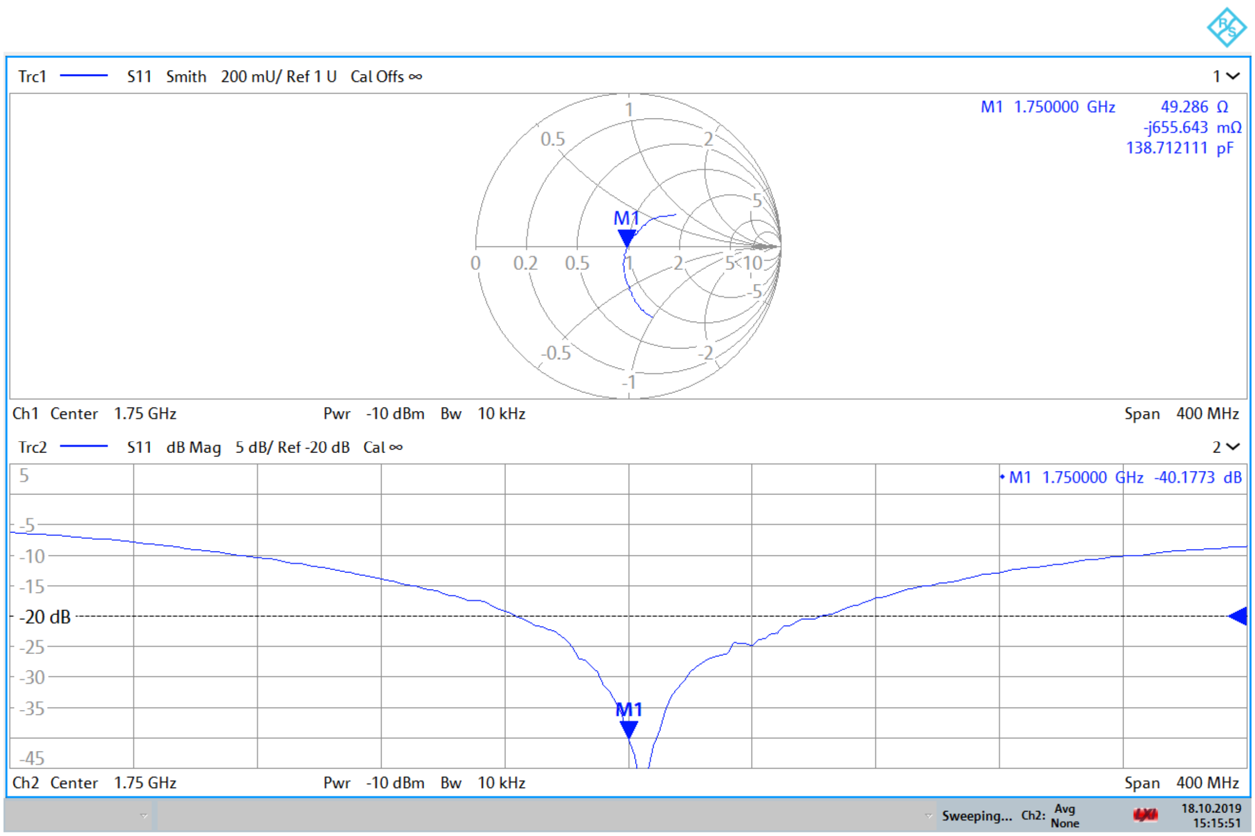
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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
10/22/2018	10/18/2019	1.217	3.65	3.8	4.11%	1.92	2	4.17%	50.9	49.3	1.6	0.4	-0.7	1.1	-40.1	-40.2	-0.20%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
10/22/2018	10/18/2019	1.217	3.66	3.82	4.37%	1.94	2.02	4.12%	46.6	44.7	1.9	-0.1	-0.8	0.7	-29.2	-25	14.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



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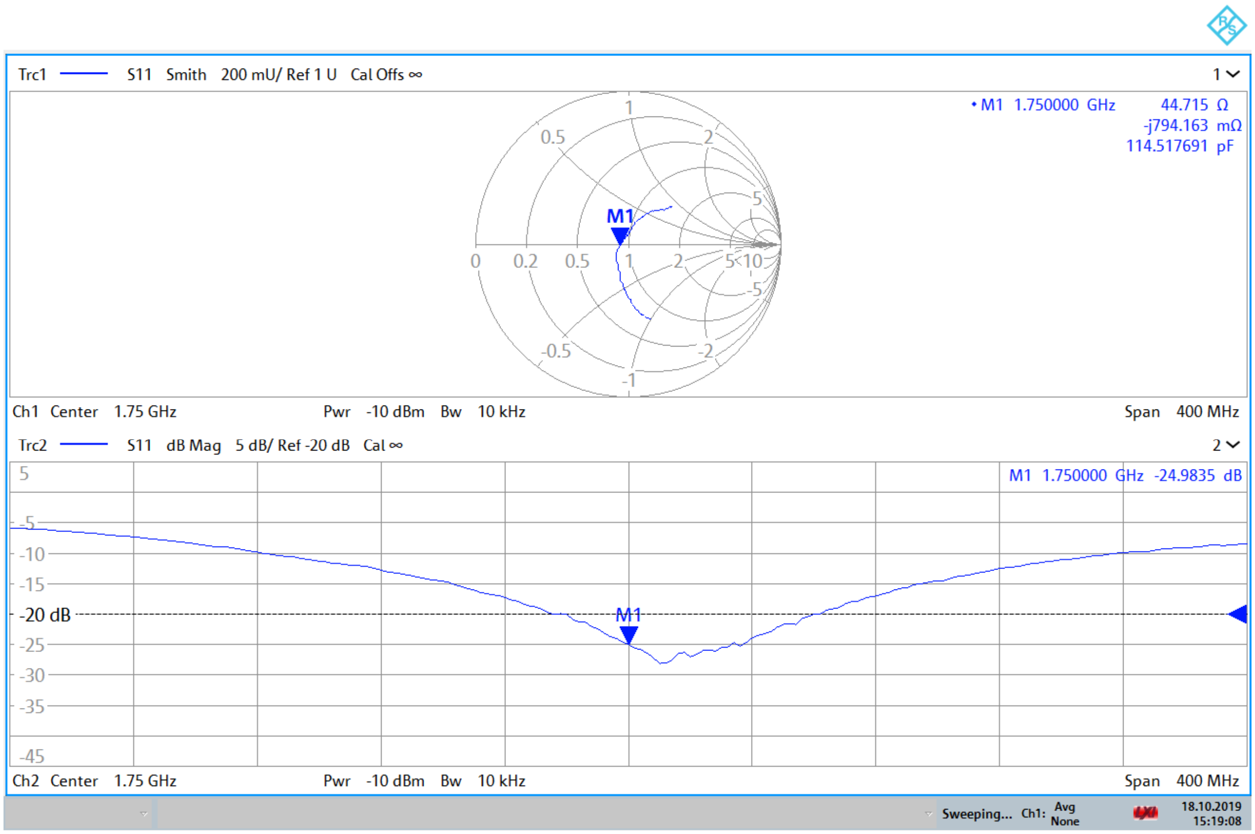
Impedance & Return-Loss Measurement Plot for Body TSL



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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: D1900V2-5d148_Feb19

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d148
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	February 21, 2019

BN ✓ 03-01-19
BN ✓ 02-26-2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

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

Issued: February 21, 2019

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 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	9.65 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.4 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	53.6 ± 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	9.56 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	5.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 6.8 jΩ
Return Loss	- 23.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.4 Ω + 7.8 jΩ
Return Loss	- 21.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.170 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 21.02.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

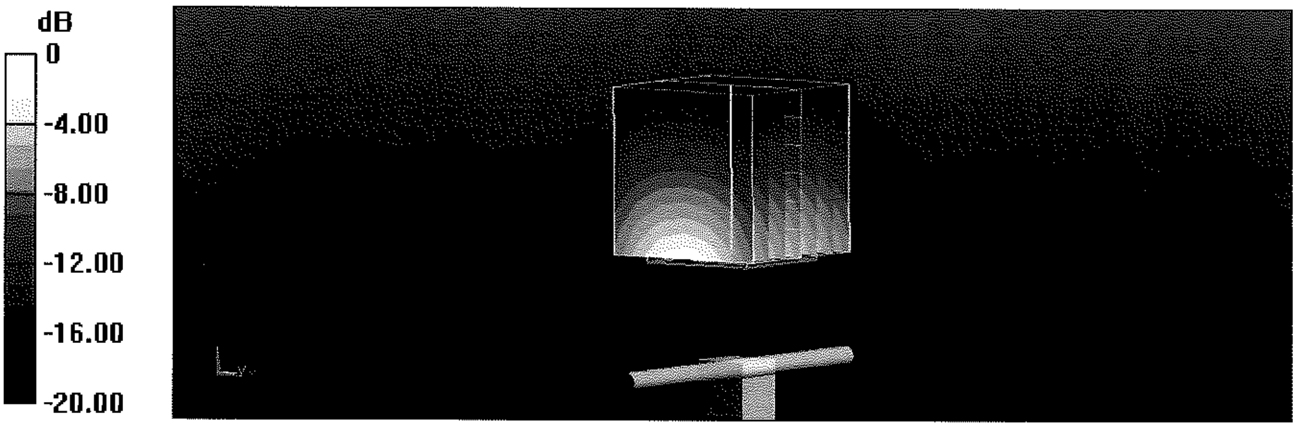
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma = 1.38$ S/m; $\varepsilon_r = 40.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

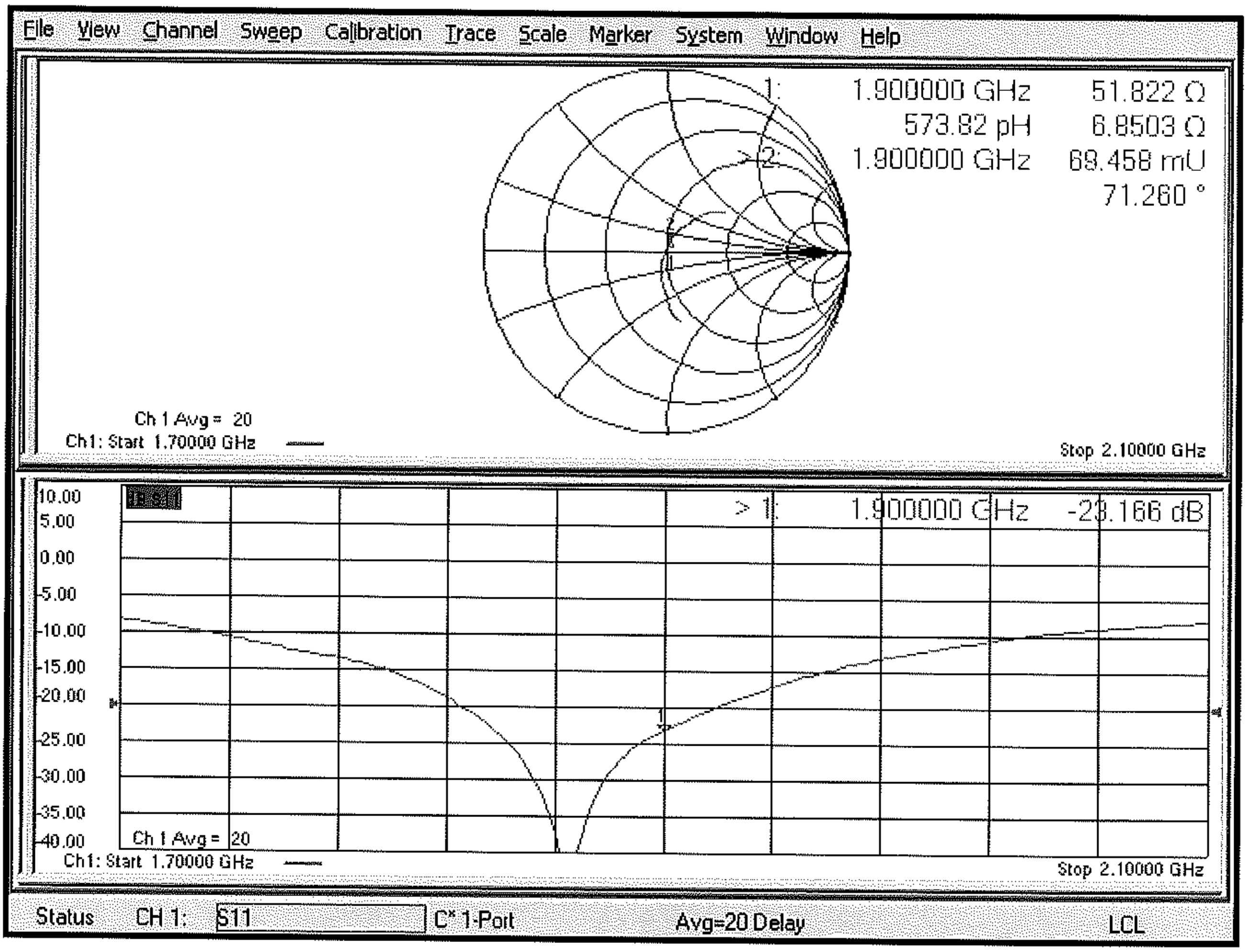
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 109.4 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.65 W/kg; SAR(10 g) = 5.05 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: 21.02.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

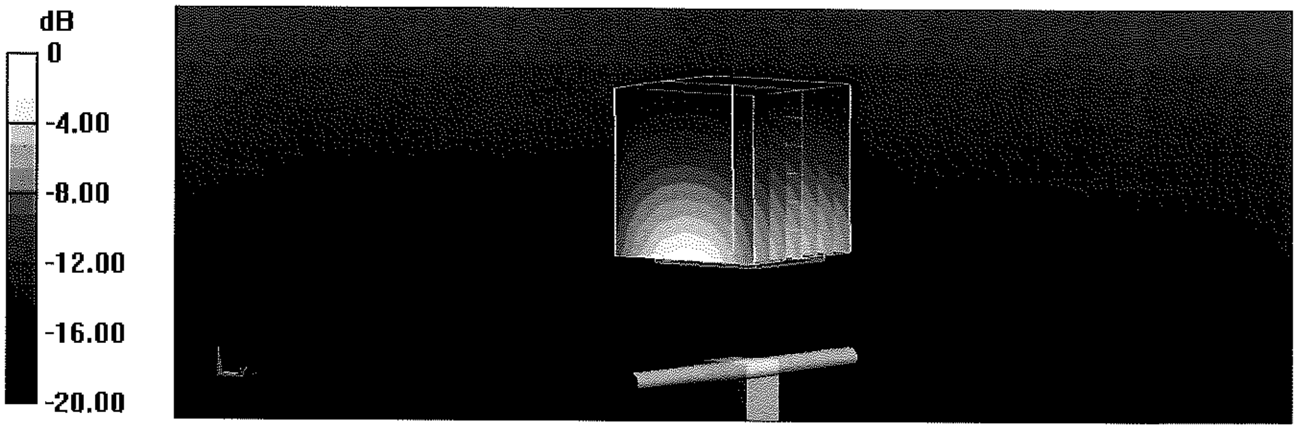
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.23, 8.23, 8.23) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

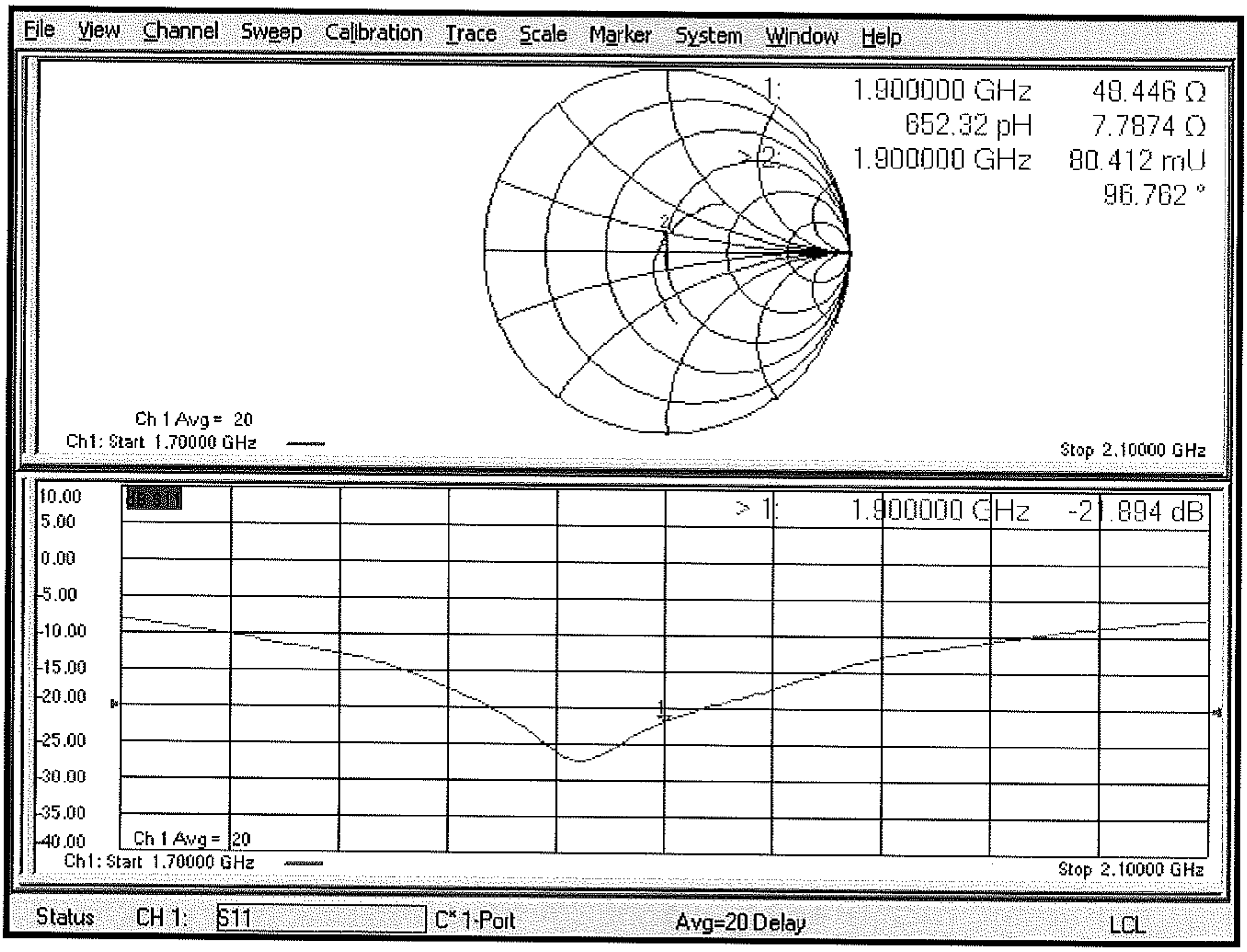
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.7 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 9.56 W/kg; SAR(10 g) = 5.05 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



PCTEST
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	D1900V2 – SN: 5d148
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	2/21/2020
Description:	SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	9/19/2019	Annual	9/19/2020	7551
SPEAG	EX3DV4	SAR Probe	7/16/2019	Annual	7/16/2020	7410
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2019	Annual	9/17/2020	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1322

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

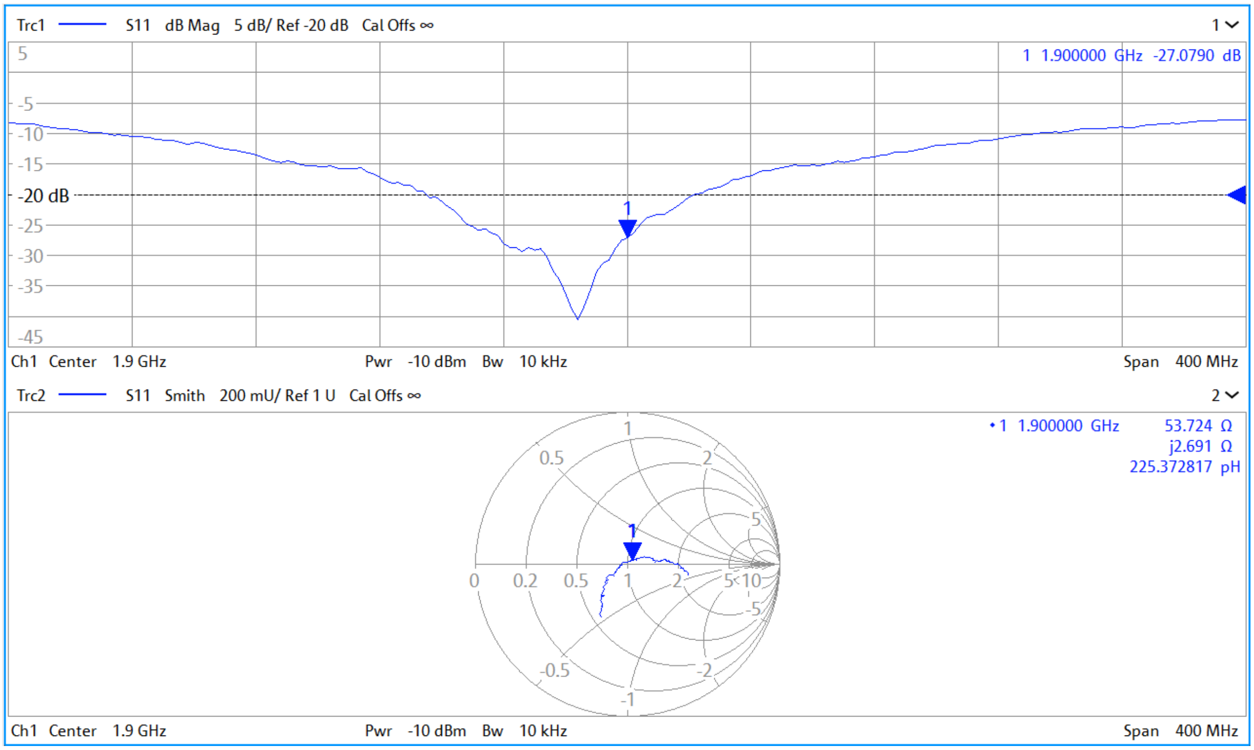
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

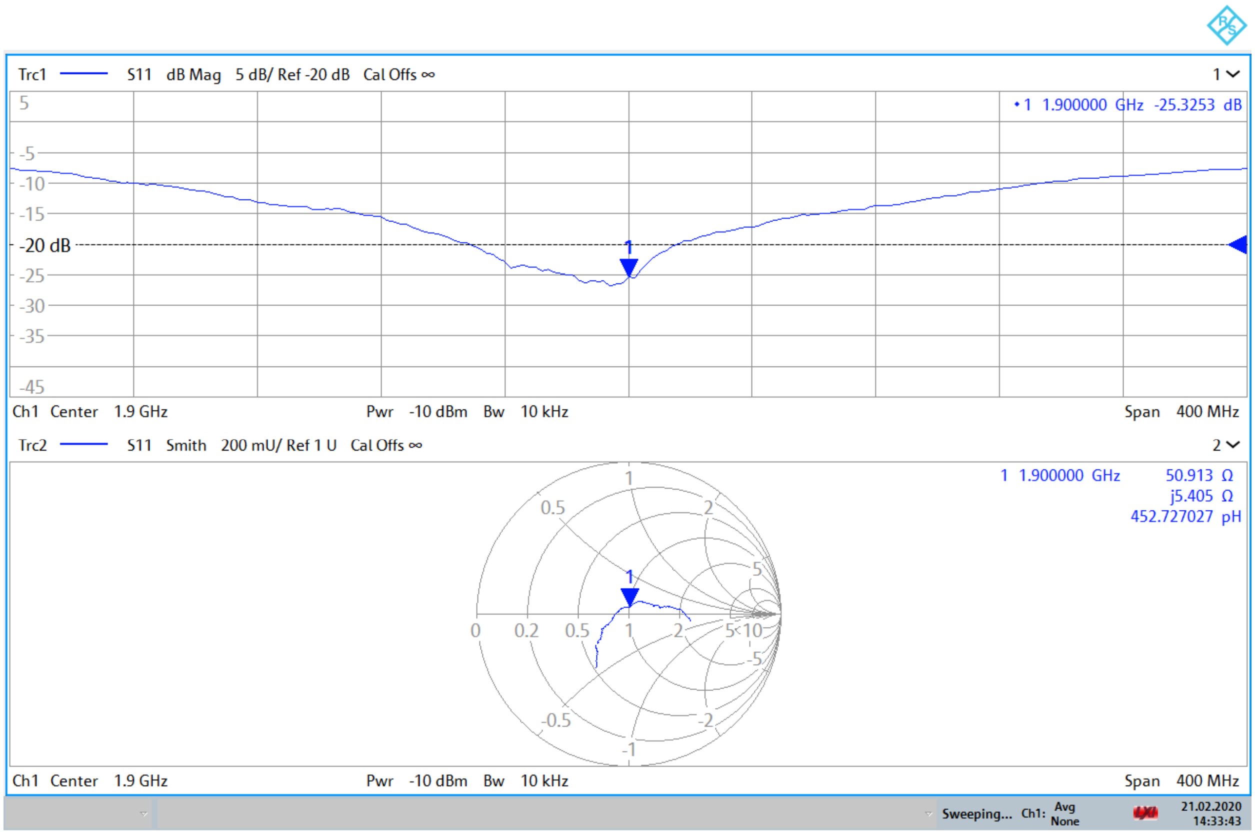
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
2/21/2019	2/21/2020	1.17	3.91	4.15	6.14%	2.04	2.13	4.41%	51.8	53.7	1.9	6.8	2.7	4.1	-23.2	-27.1	-16.70%	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
2/21/2019	2/21/2020	1.17	3.91	4.06	3.84%	2.05	2.08	1.46%	48.4	50.9	2.5	7.8	5.4	2.4	-21.9	-25.3	-15.60%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



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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: D2450V2-981_Aug18

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:981
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 16, 2018

BN✓ 09-06/2018
BN✓ 08/10/2019

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. BN✓ 08-20-20

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

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

Issued: August 23, 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	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	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	37.7 ± 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	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.8 ± 6 %	2.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.11 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	55.0 Ω + 2.3 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.2 Ω + 4.7 jΩ
Return Loss	- 26.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 30, 2014

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	13.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**54.0 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.2 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	13.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**54.0 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.3 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.2 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 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	8.74 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**34.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**17.5 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

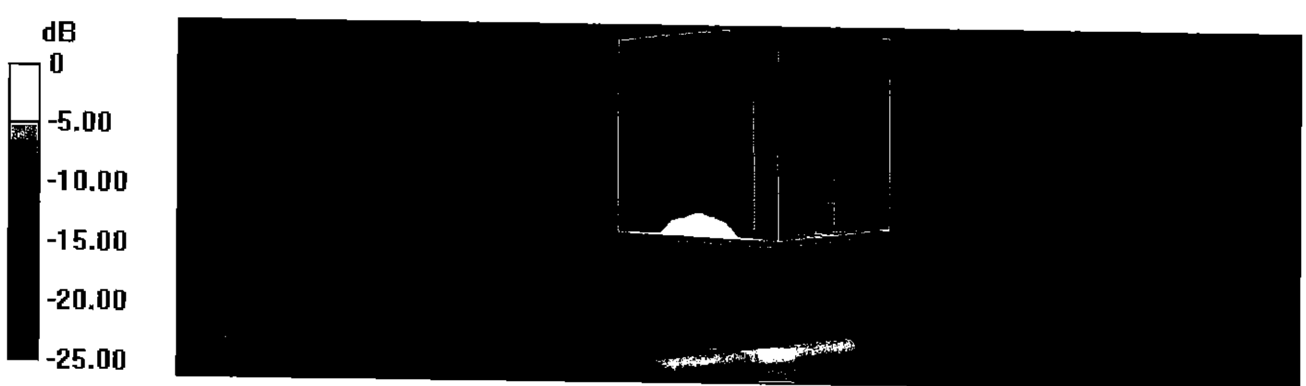
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 37.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

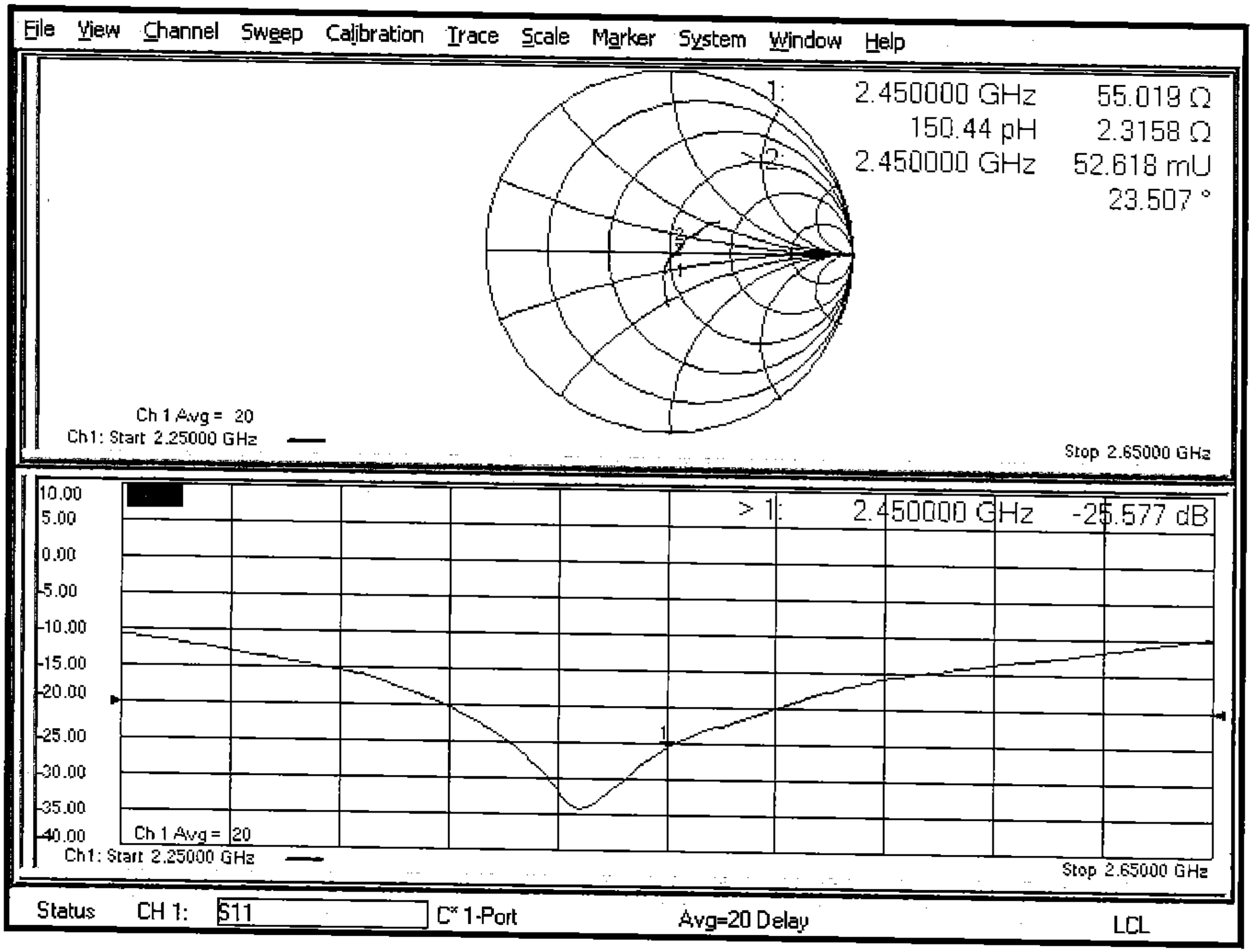
- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.6 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 26.7 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.2 W/kg
Maximum value of SAR (measured) = 22.1 W/kg



0 dB = 22.1 W/kg = 13.44 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

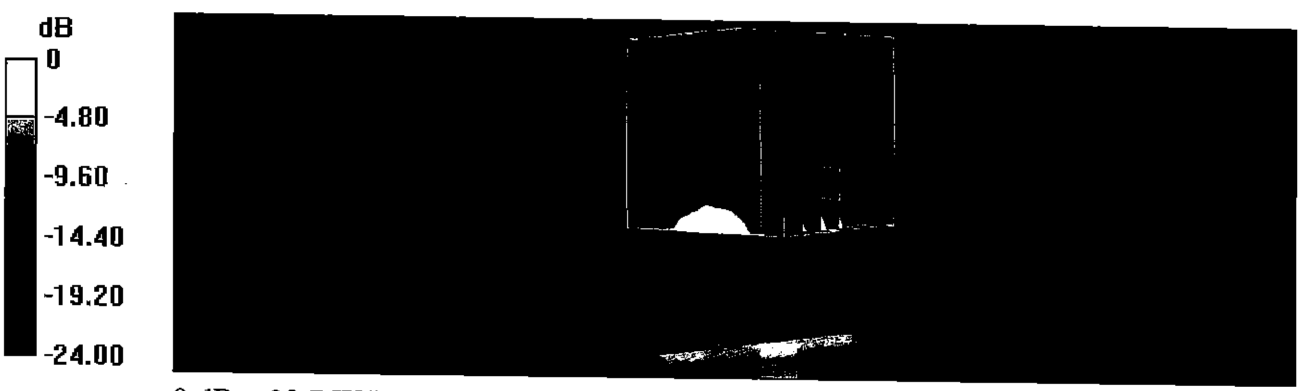
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:981

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 S/m; ε_r = 51.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

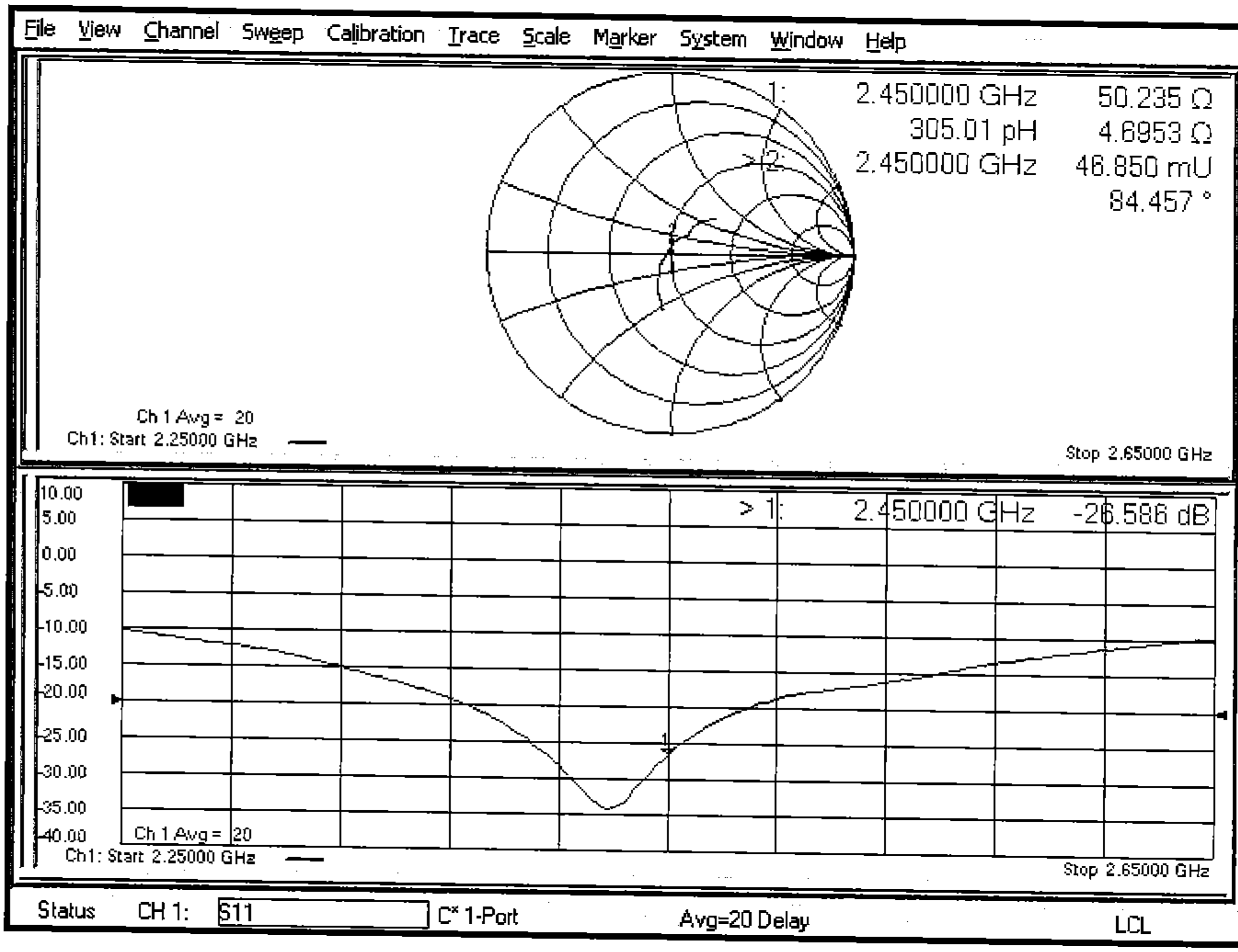
- Probe: EX3DV4 - SN7349; ConvF(8.01, 8.01, 8.01) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.0 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.3 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.11 W/kg
Maximum value of SAR (measured) = 20.7 W/kg



0 dB = 20.7 W/kg = 13.16 dBW/kg

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 16.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW ; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 40.2; ρ = 1000 kg/m^3
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

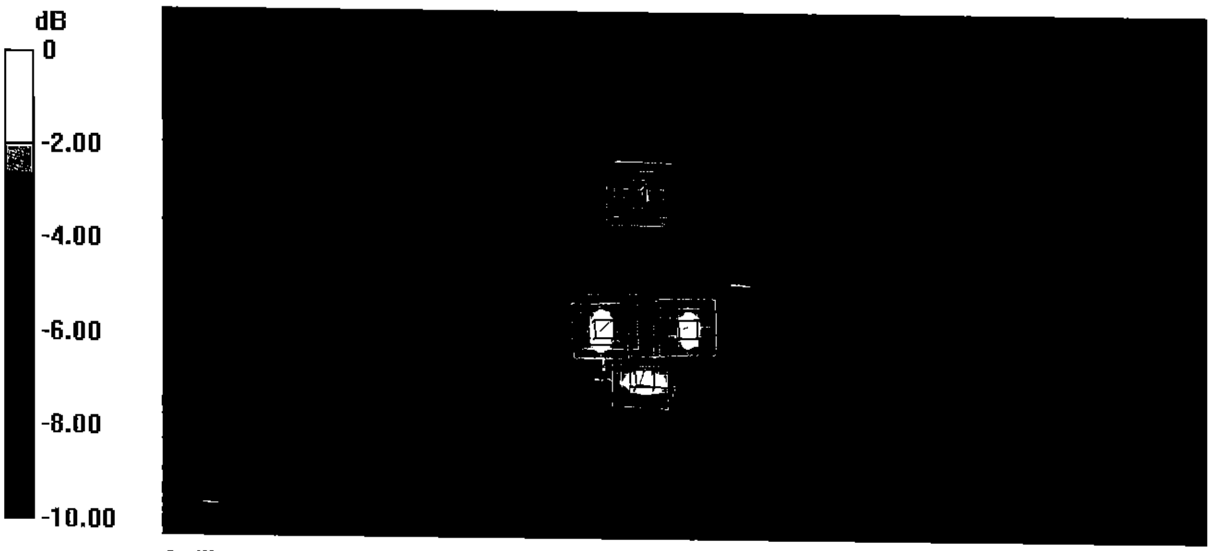
- Probe: EX3DV4 - SN7349; ConvF(7.88, 7.88, 7.88) @ 2450 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

SAM Head Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.2 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 26.4 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.33 W/kg
Maximum value of SAR (measured) = 22.0 W/kg

SAM Head Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 26.3 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 21.7 W/kg

SAM Head Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 112.0 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 24.1 W/kg
SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.11 W/kg
Maximum value of SAR (measured) = 20.5 W/kg

SAM Head Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.03 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 8.74 W/kg; SAR(10 g) = 4.4 W/kg
Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Certification of Calibration

Object	D2450V2 – SN: 981
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Calibration date:	08/09/2019
Description:	SAR Validation Dipole at 2450 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	N5182A	MXG Vector Signal Generator	6/27/2019	Annual	6/27/2020	US46240505
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1339007
Control Company	4040	Temperature / Humidity Monitor	2/28/2018	Biennial	2/28/2020	150761911
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
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	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	5/23/2018	Biennial	5/23/2020	N/A
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	7417
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/13/2019	Annual	2/13/2020	665
SPEAG	EX3DV4	SAR Probe	7/15/2019	Annual	7/15/2020	7547
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1323
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091

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

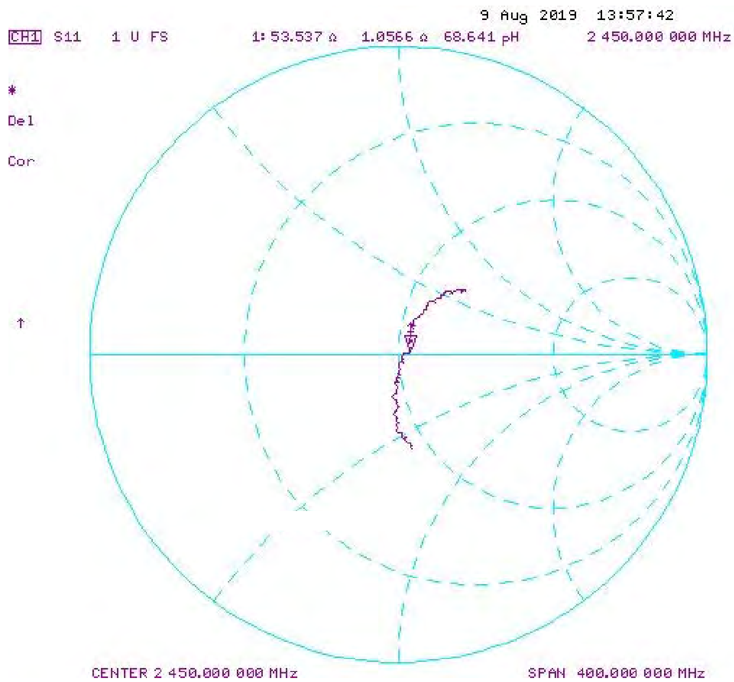
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

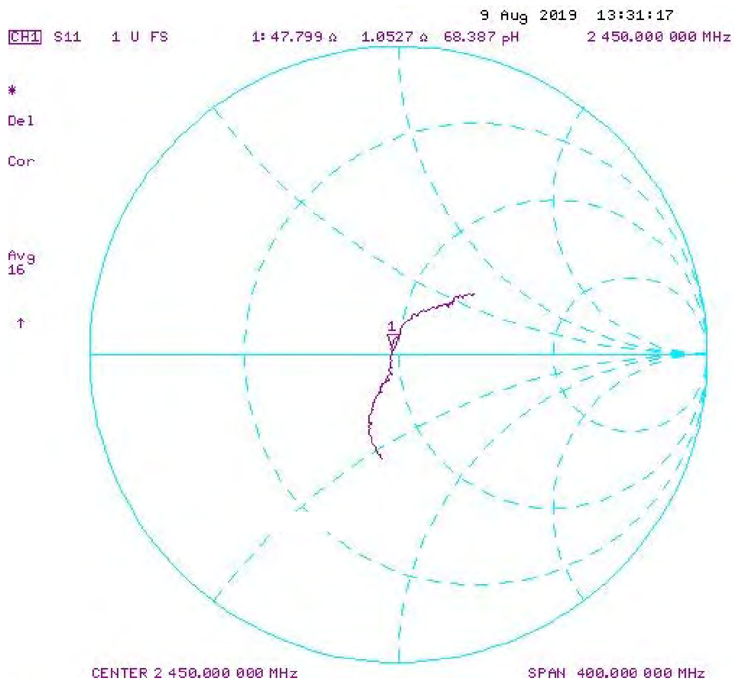
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
8/16/2018	8/9/2019	1.162	5.23	5.53	5.74%	2.44	2.56	4.92%	55	53.5	1.5	2.3	1.1	1.2	-25.6	-28.5	-11.30%	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
8/16/2018	8/9/2019	1.162	5.09	4.98	-2.16%	2.42	2.28	-5.79%	50.2	47.8	2.4	4.7	1.1	3.6	-26.6	-31.8	-19.60%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Object:	Date Issued:	Page 4 of 4
D2450V2 – SN: 981	08/09/2019	

Certification of Calibration

Object	D2450V2 – SN: 981
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	8/16/2020
Description:	SAR Validation Dipole at 2450 MHz

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	11/29/2018	Biennial	11/29/2020	181766816
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Agilent	85033E	3.5mm Standard Calibration Kit	6/6/2020	Annual	6/6/2021	MY53402352
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/27/2019	Annual	8/27/2020	1339027
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk Inc	NC-100	Torque Wrench	8/4/2020	Biennial	8/4/2022	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	1/21/2020	Annual	1/21/2021	3589
SPEAG	EX3DV4	SAR Probe	6/23/2020	Annual	6/23/2021	7409
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2020	Annual	6/18/2021	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/23/2020	Annual	1/13/2021	1558

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

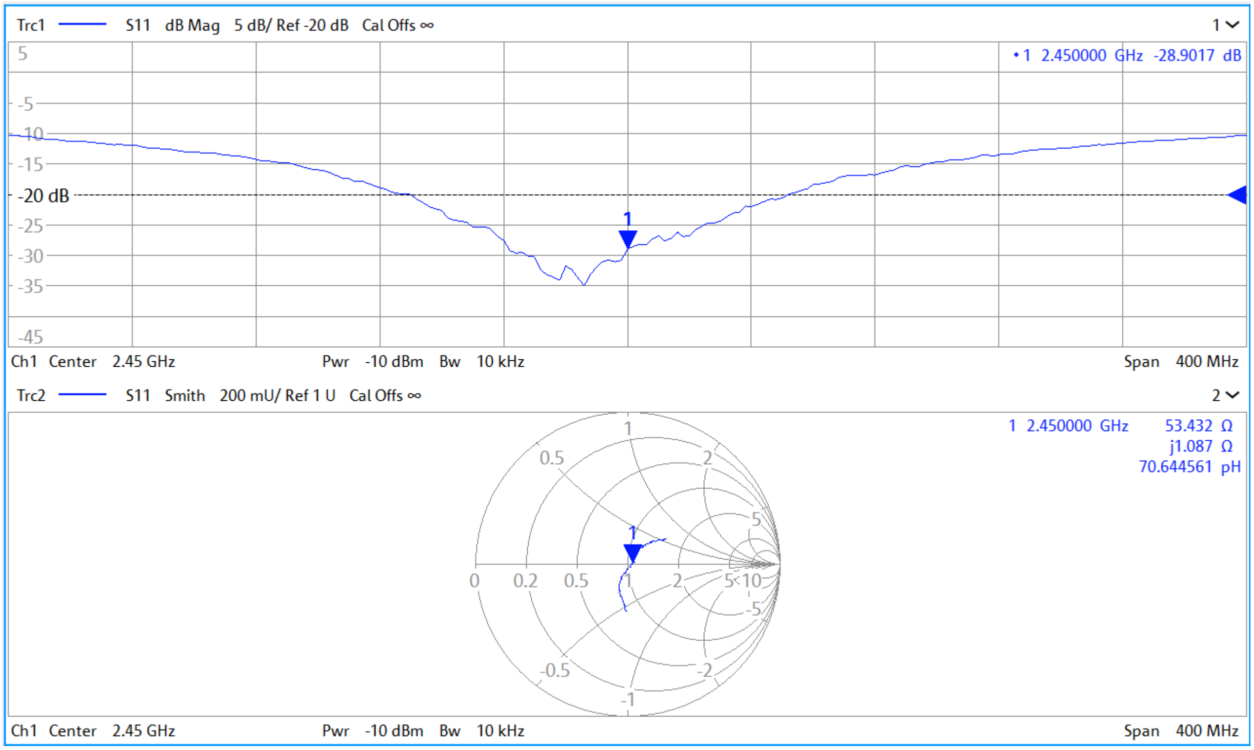
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

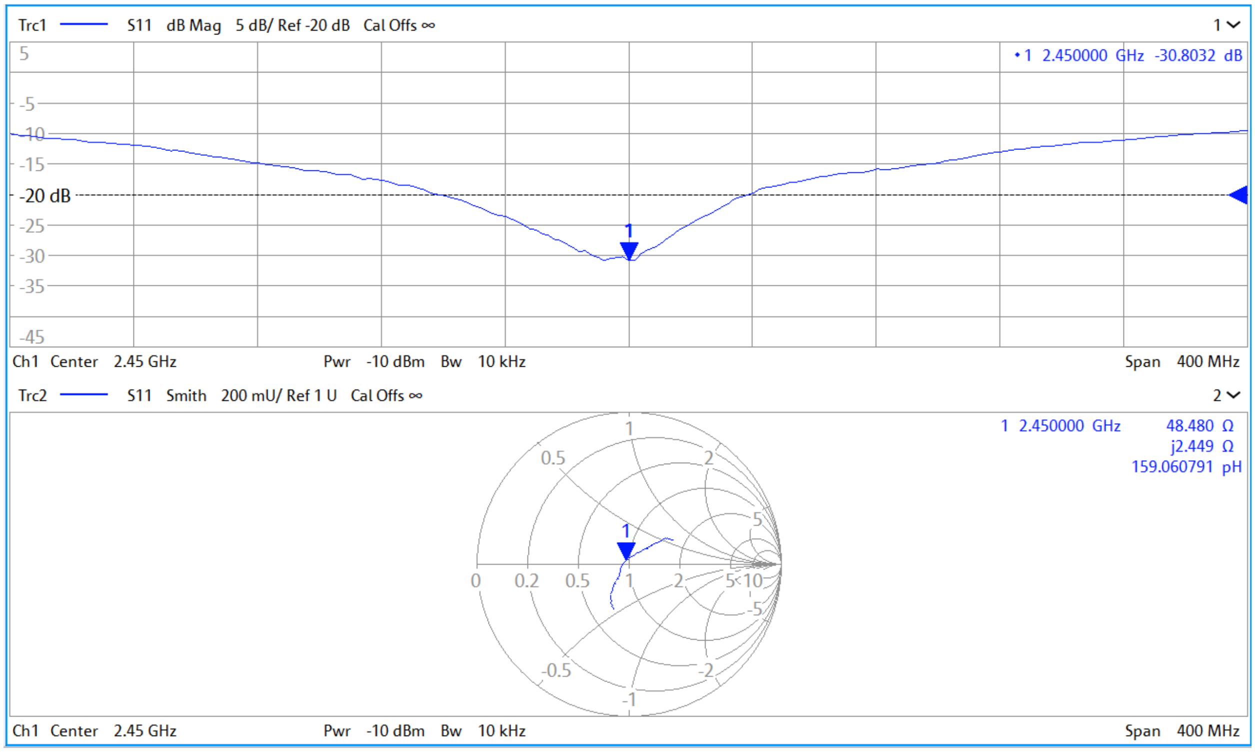
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

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
8/16/2018	8/16/2020	1.162	5.23	5.31	1.53%	2.44	2.4	-1.64%	55	53.4	1.6	2.3	1.1	1.2	-25.6	-28.9	-12.90%	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
8/16/2018	8/16/2020	1.162	5.09	5.3	4.13%	2.42	2.43	0.41%	50.2	48.5	1.7	4.7	2.4	2.3	-26.6	-30.8	-15.80%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2600V2-1064_Jun19

CALIBRATION CERTIFICATE

Object	D2600V2 - SN:1064
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	June 14, 2019

BN✓ 07/31/2019
BN✓ 06-20-20

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: June 20, 2019

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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	37.3 ± 6 %	2.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**58.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.59 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**26.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.5 ± 6 %	2.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**55.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**25.0 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 - 6.9 jΩ
Return Loss	- 23.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω - 4.4 jΩ
Return Loss	- 24.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 14.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

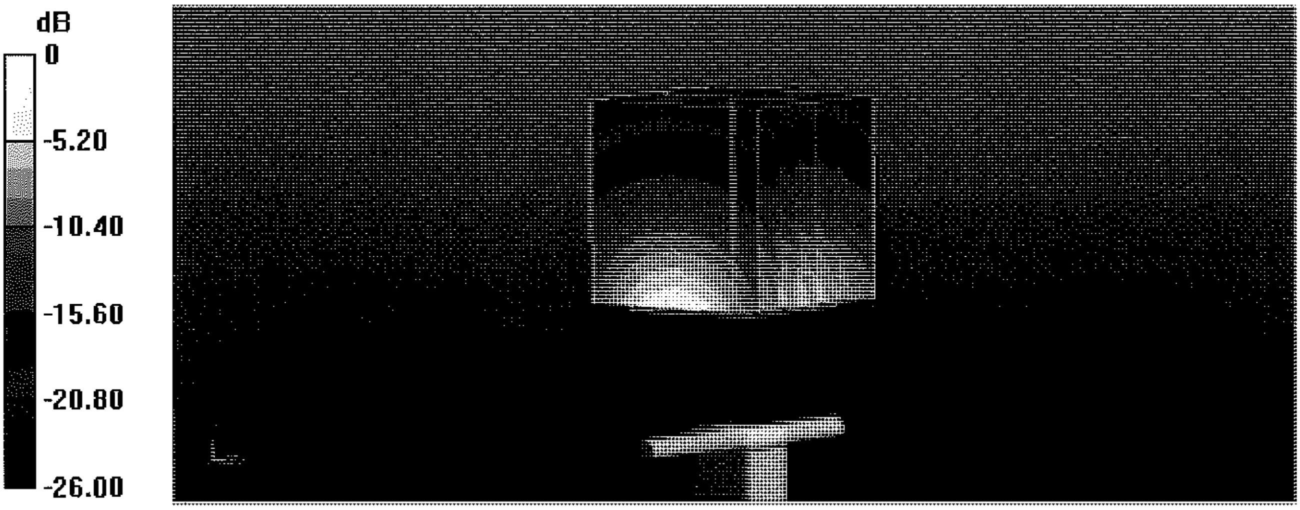
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.03 S/m; ε_r = 37.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.69, 7.69, 7.69) @ 2600 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

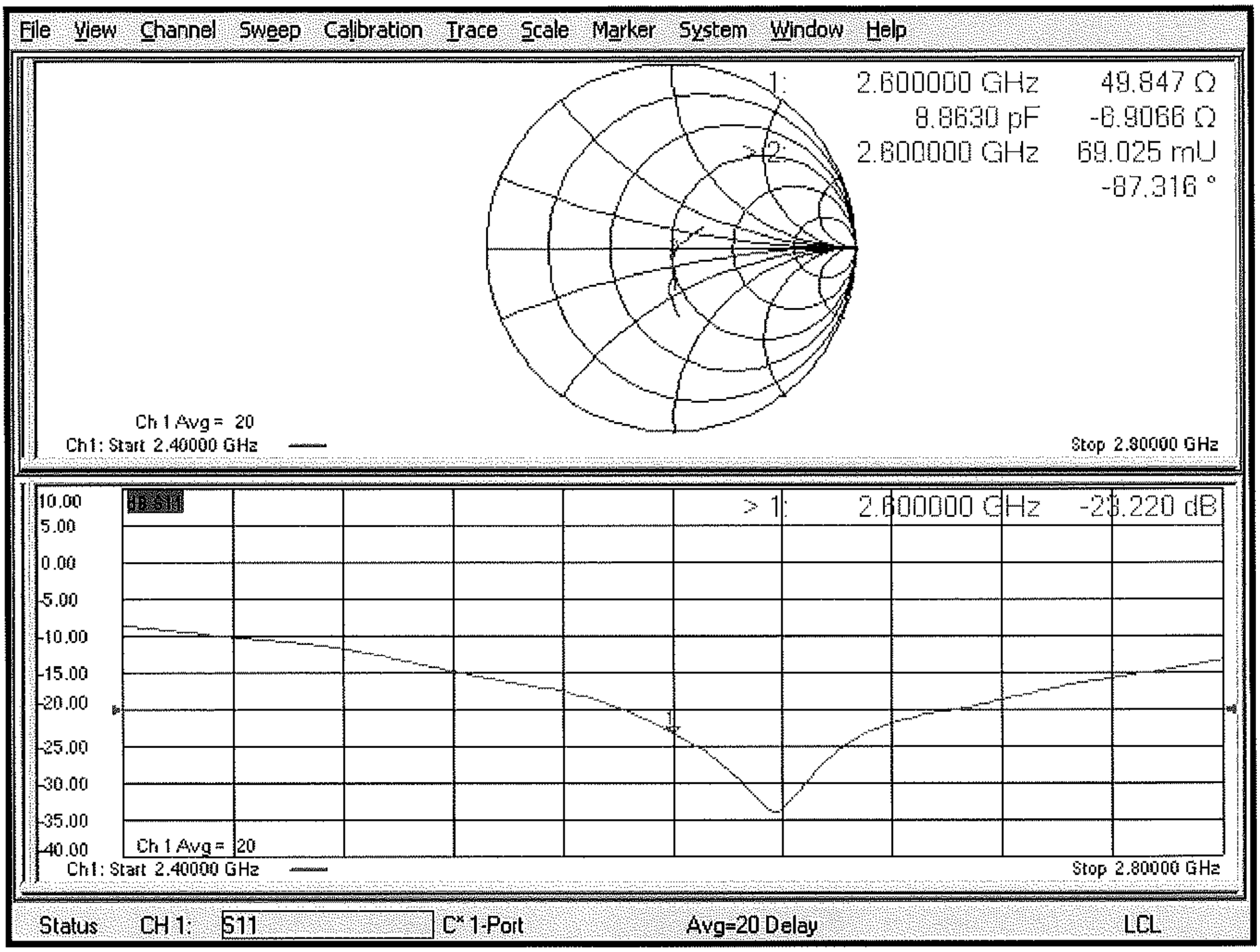
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 120.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 30.2 W/kg
SAR(1 g) = 14.9 W/kg; SAR(10 g) = 6.59 W/kg
Maximum value of SAR (measured) = 25.1 W/kg



0 dB = 25.1 W/kg = 14.00 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 14.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

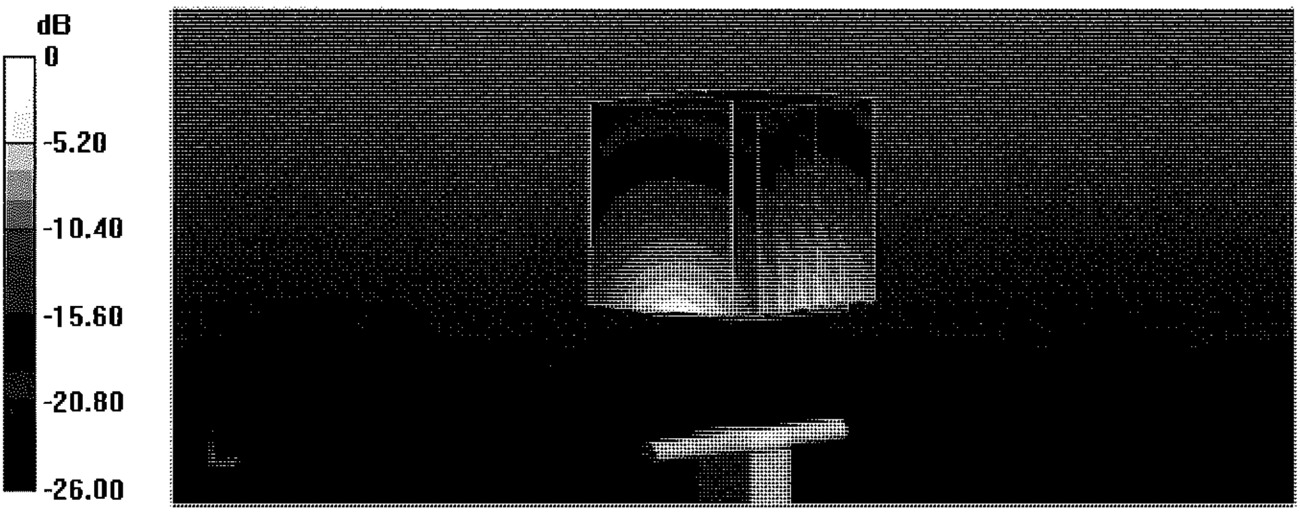
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.22 S/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.8, 7.8, 7.8) @ 2600 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

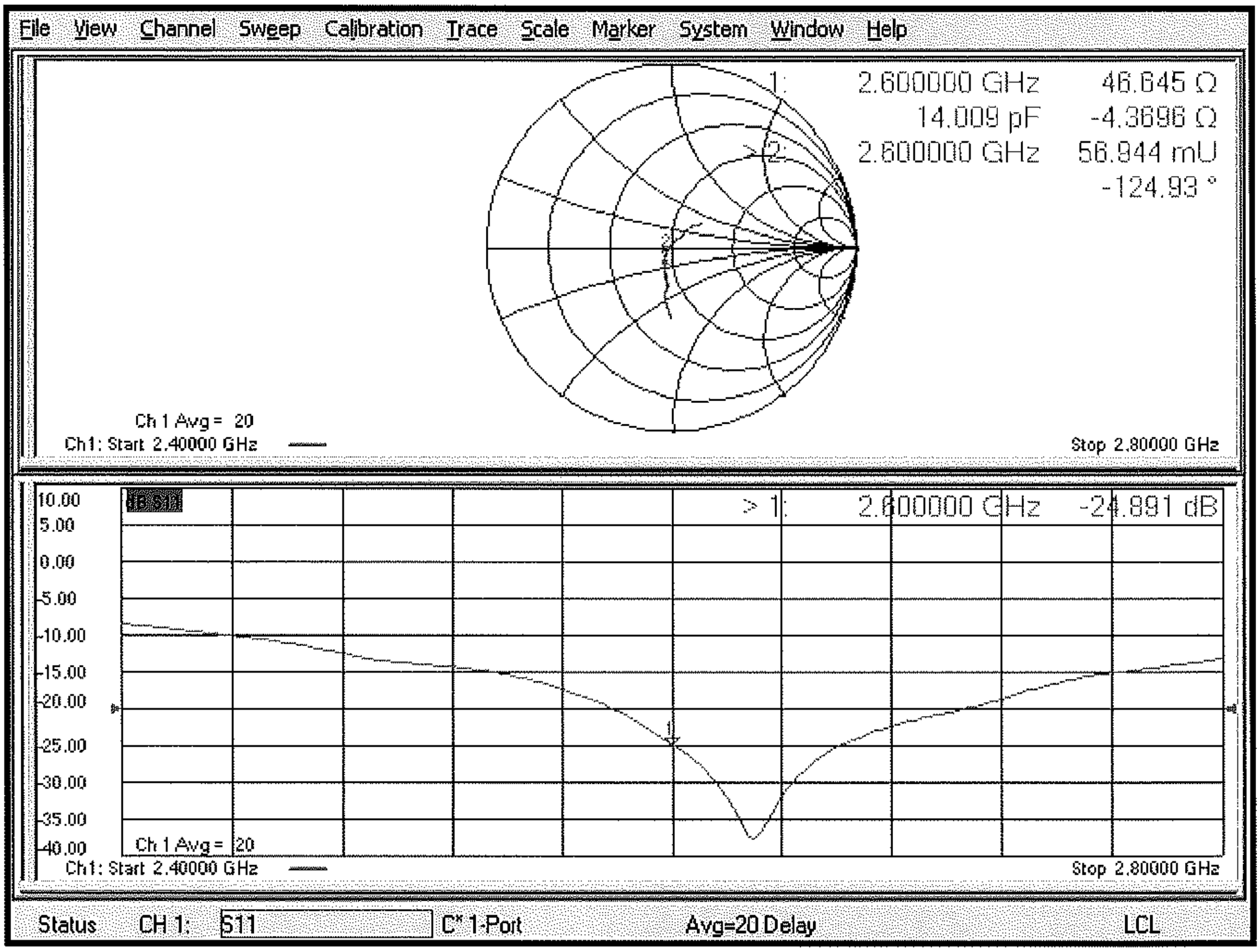
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.6 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 28.9 W/kg
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.33 W/kg
Maximum value of SAR (measured) = 23.6 W/kg



0 dB = 23.6 W/kg = 13.73 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object	D2600V2 – SN: 1064
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extended Calibration date:	June 14, 2020
Description:	SAR Validation Dipole at 2600 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	7/18/2019	Annual	7/18/2020	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	1/21/2020	Annual	1/21/2021	3589
SPEAG	EX3DV4	SAR Probe	7/15/2019	Annual	7/15/2020	7547
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/13/2020	Annual	1/13/2021	1558

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Test Engineer	Test Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Managing Director	KOK

DIPOLE CALIBRATION EXTENSION

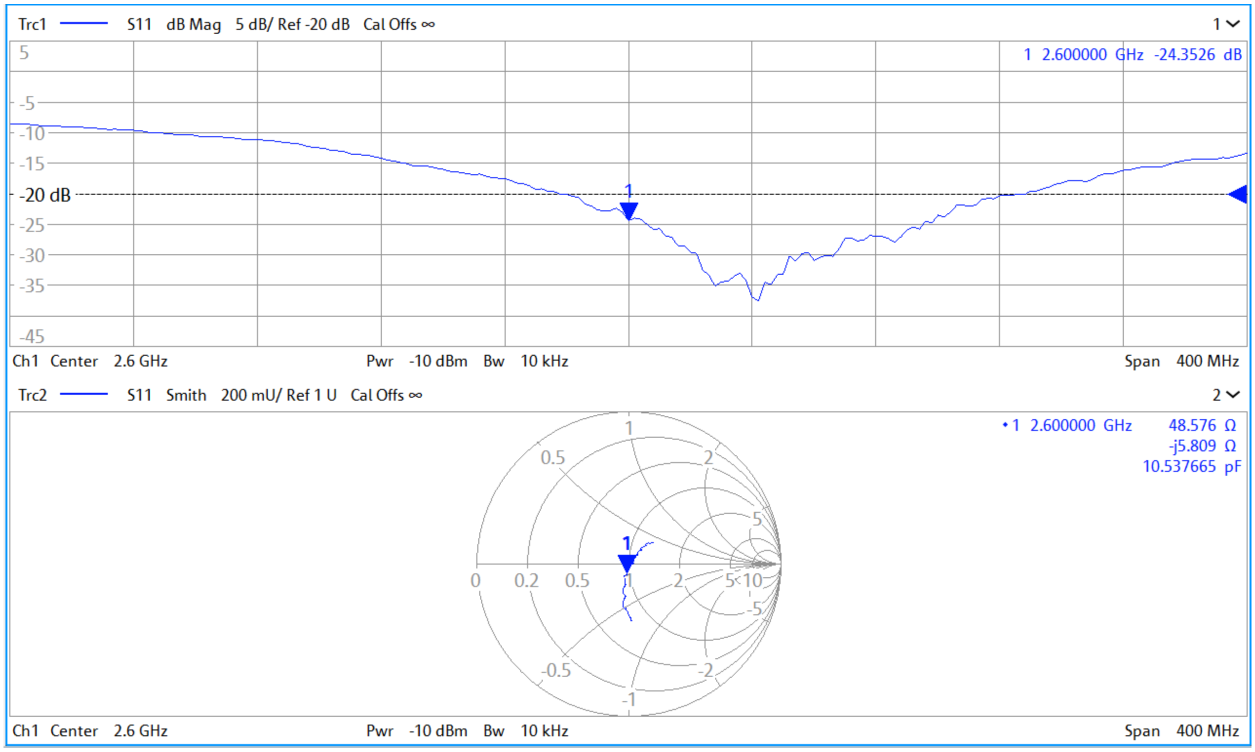
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

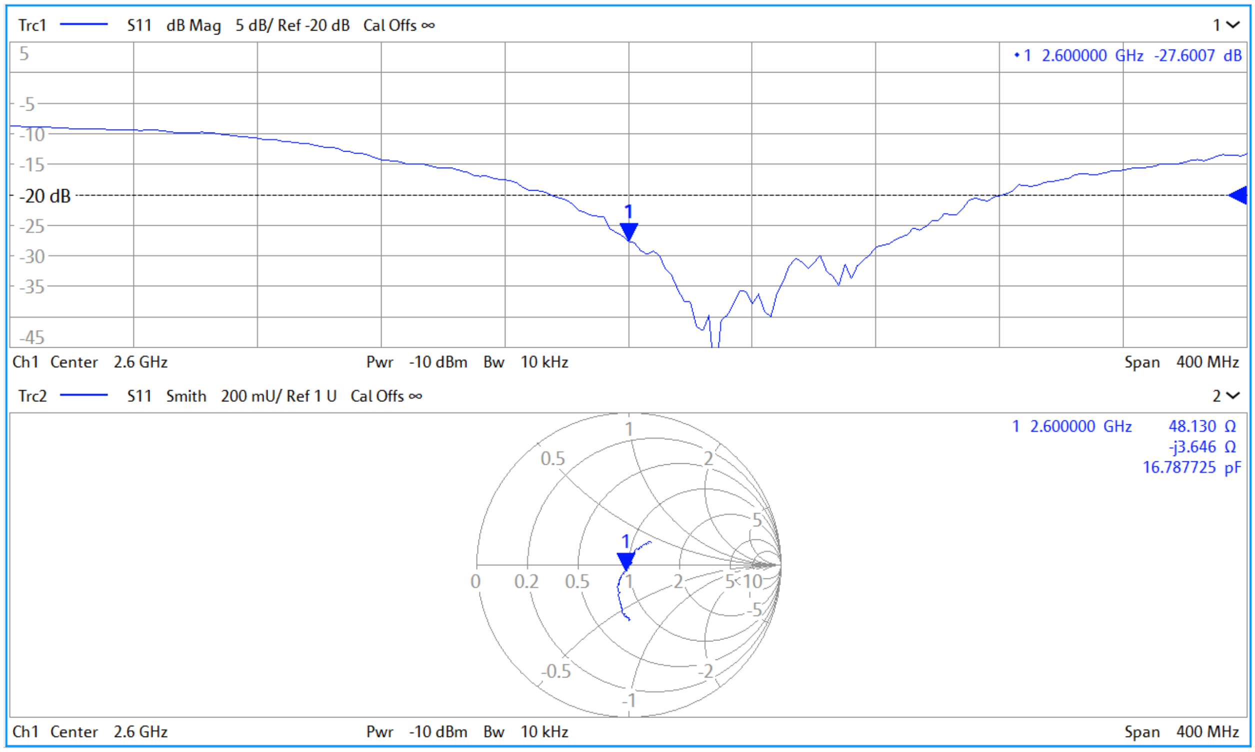
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

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
6/14/2019	6/14/2020	1.151	5.81	5.68	-2.24%	2.6	2.56	-1.54%	49.8	48.6	1.2	-6.9	-5.8	1.1	-23.2	-24.4	-5.00%	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
6/14/2019	6/14/2020	1.151	5.56	5.43	-2.34%	2.5	2.39	-4.40%	46.6	48.1	1.5	-4.4	-3.6	0.8	-24.9	-27.6	-10.80%	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: D1750V2-1148_May20

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1148
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	May 12, 2020

BN ✓
6-2-2020

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	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 7349	31-Dec-19 (No. EX3-7349_Dec19)	Dec-20
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	J. Katzman
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 13, 2020

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	V52.10.4
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	40.3 ± 6 %	1.35 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	8.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**35.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.69 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**18.9 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.1 ± 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	8.98 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**36.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.80 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.3 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2 Ω - 1.9 jΩ
Return Loss	- 33.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.0 Ω - 1.7 jΩ
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 ns

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

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

Additional EUT Data

Manufactured by	SPEAG

DASY5 Validation Report for Head TSL

Date: 12.05.2020

Test Laboratory: SPEAG, Zurich, Switzerland

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

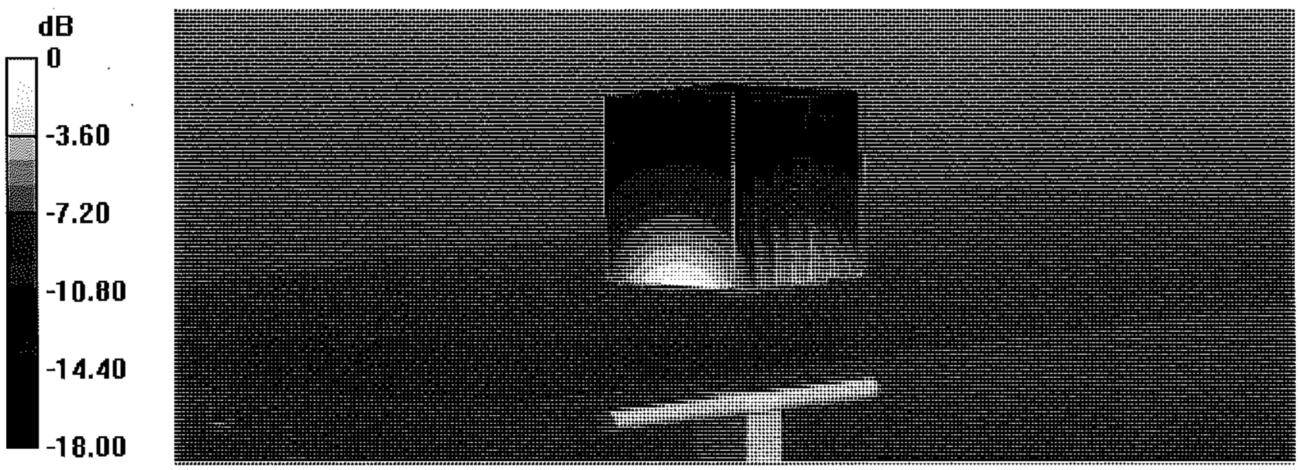
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.35 S/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.76, 8.76, 8.76) @ 1750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

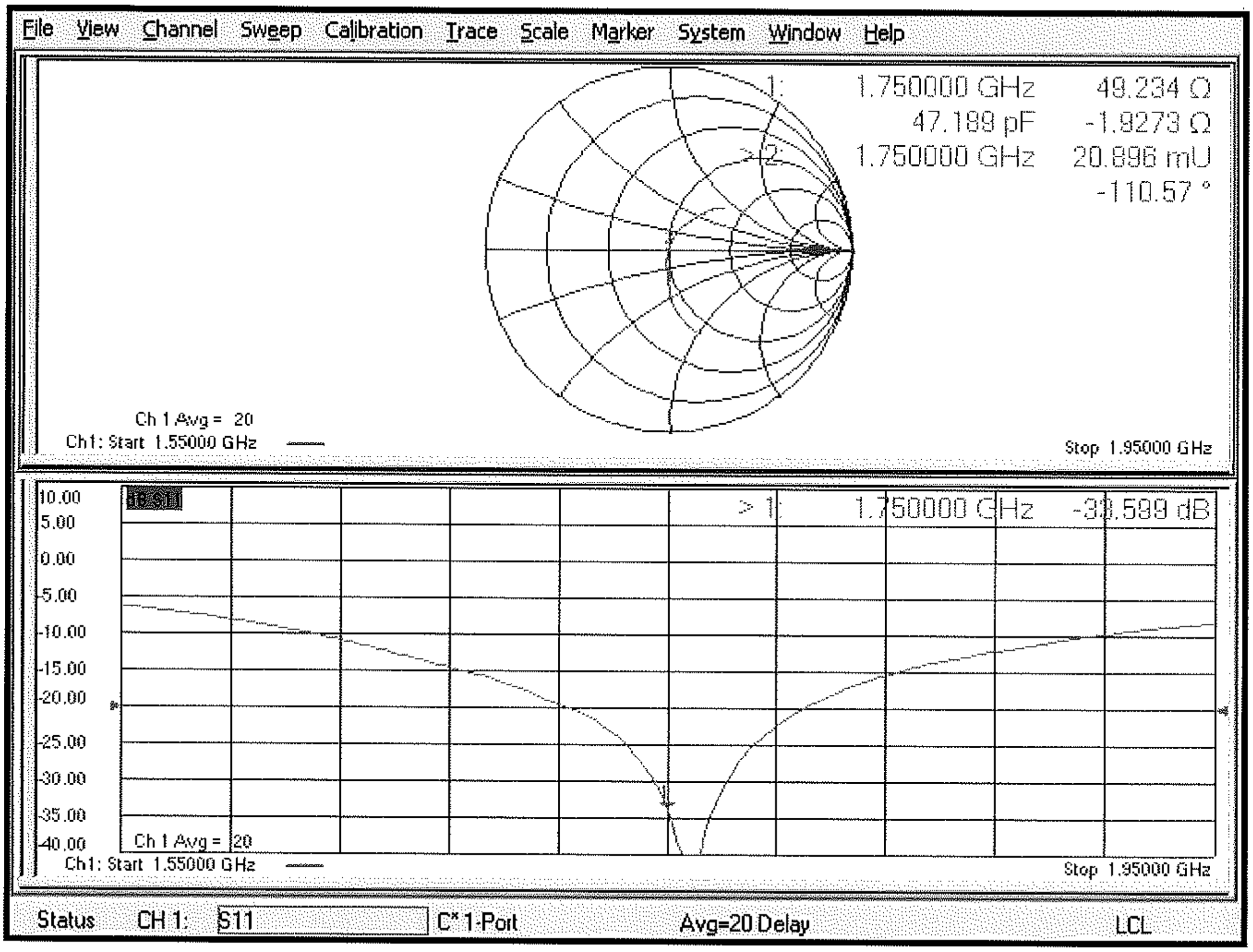
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.6 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 8.88 W/kg; SAR(10 g) = 4.69 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 54.4%
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.05.2020

Test Laboratory: SPEAG, Zurich, Switzerland

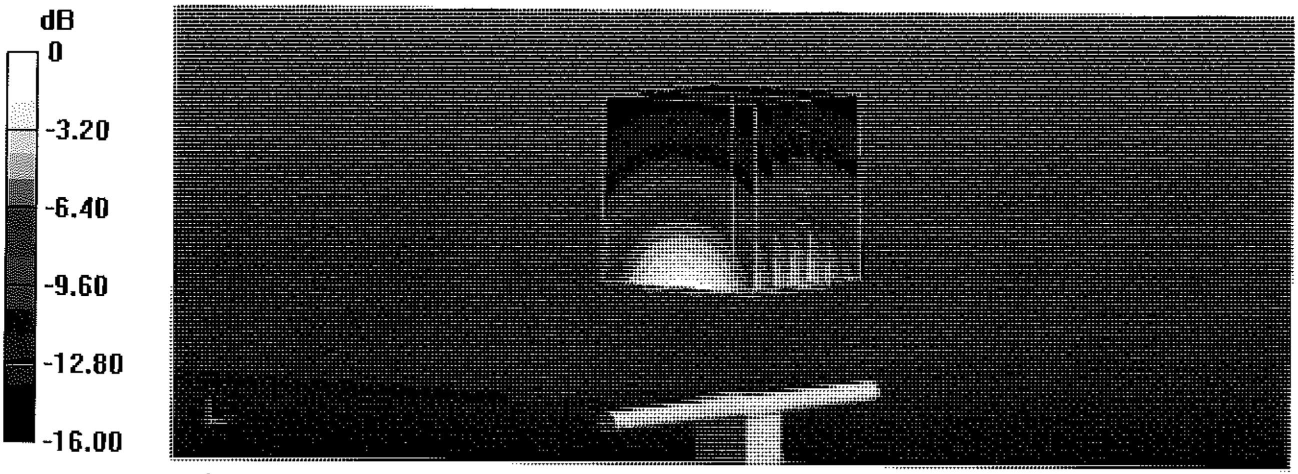
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1148

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 54.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

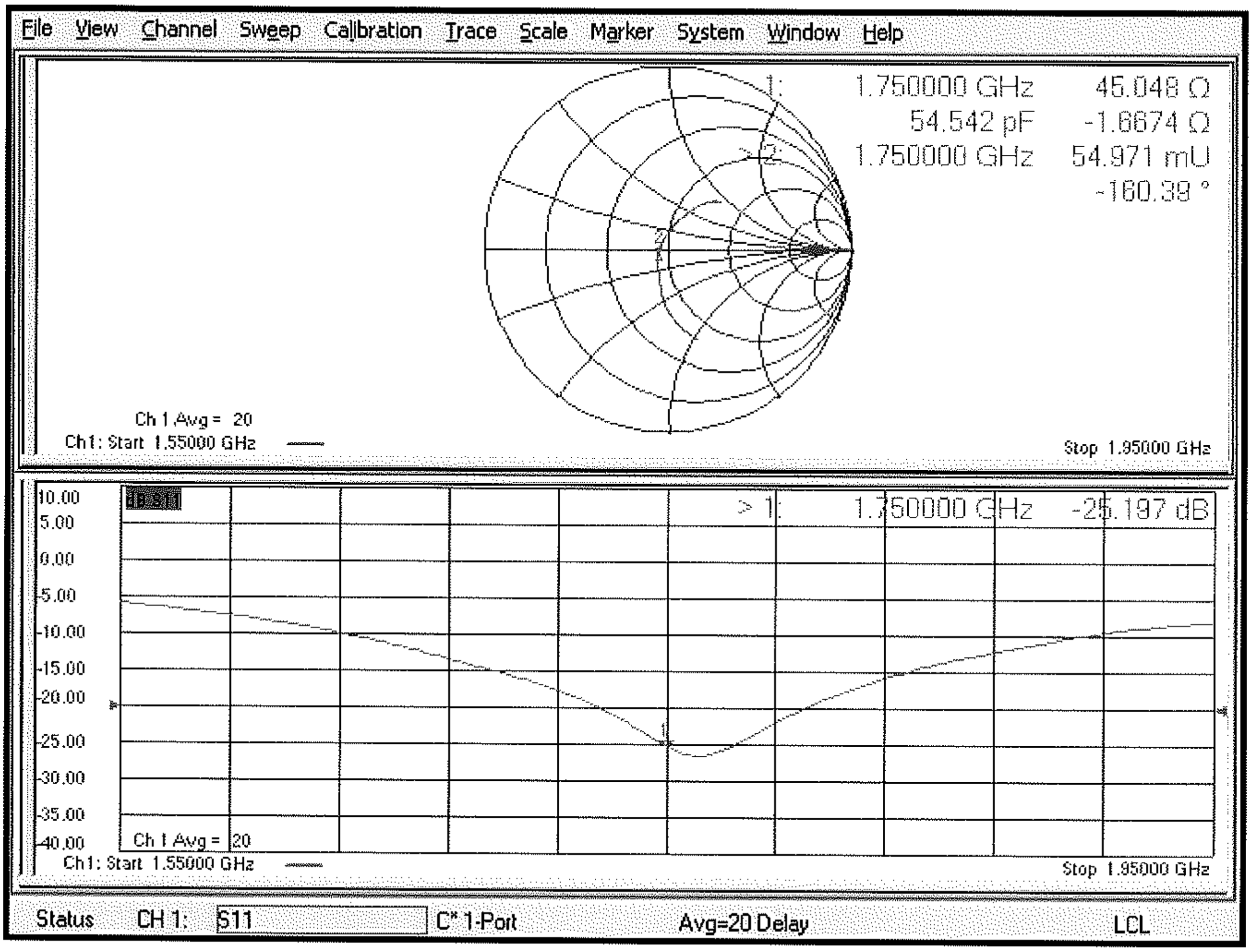
- Probe: EX3DV4 - SN7349; ConvF(8.61, 8.61, 8.61) @ 1750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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 = 99.95 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 8.98 W/kg; SAR(10 g) = 4.8 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 57.1%
Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 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: D1765V2-1008_May18

CALIBRATION CERTIFICATE

Object	D1765V2 - SN:1008
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 23, 2018

BN ✓ 7/16/2018
BN ✓ 05/20/2019
BN ✓ 05/29/2020 Extended

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

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

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

Issued: May 23, 2018

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.34 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.0 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.2 ± 6 %	1.46 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.7 Ω - 6.5 jΩ
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.210 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2005

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

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

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

SAR result with SAM Head (Top)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.4 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.9 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.2 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.4 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Neck)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**37.4 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.2 W/kg ± 16.9 % (k=2)**

SAR result with SAM Head (Ear)

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	7.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**28.7 W/kg ± 17.5 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**16.1 W/kg ± 16.9 % (k=2)**

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

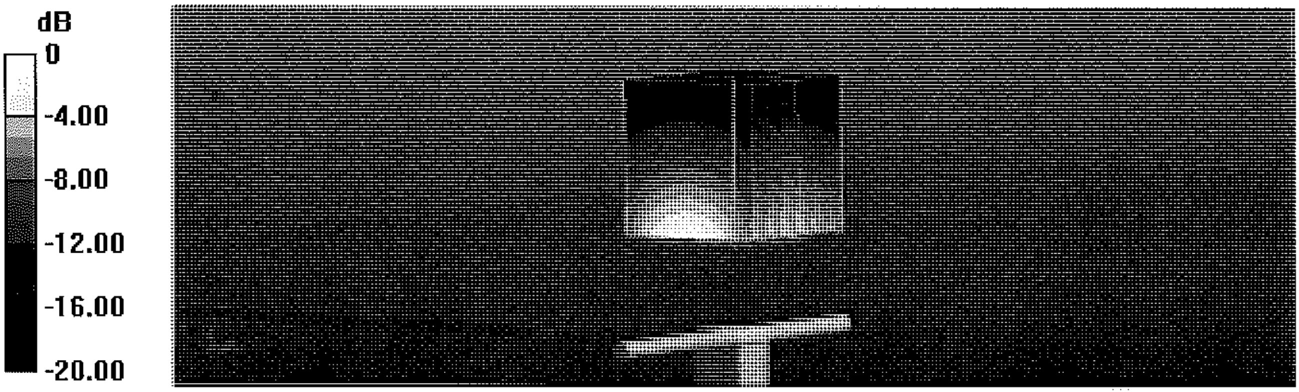
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.34 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

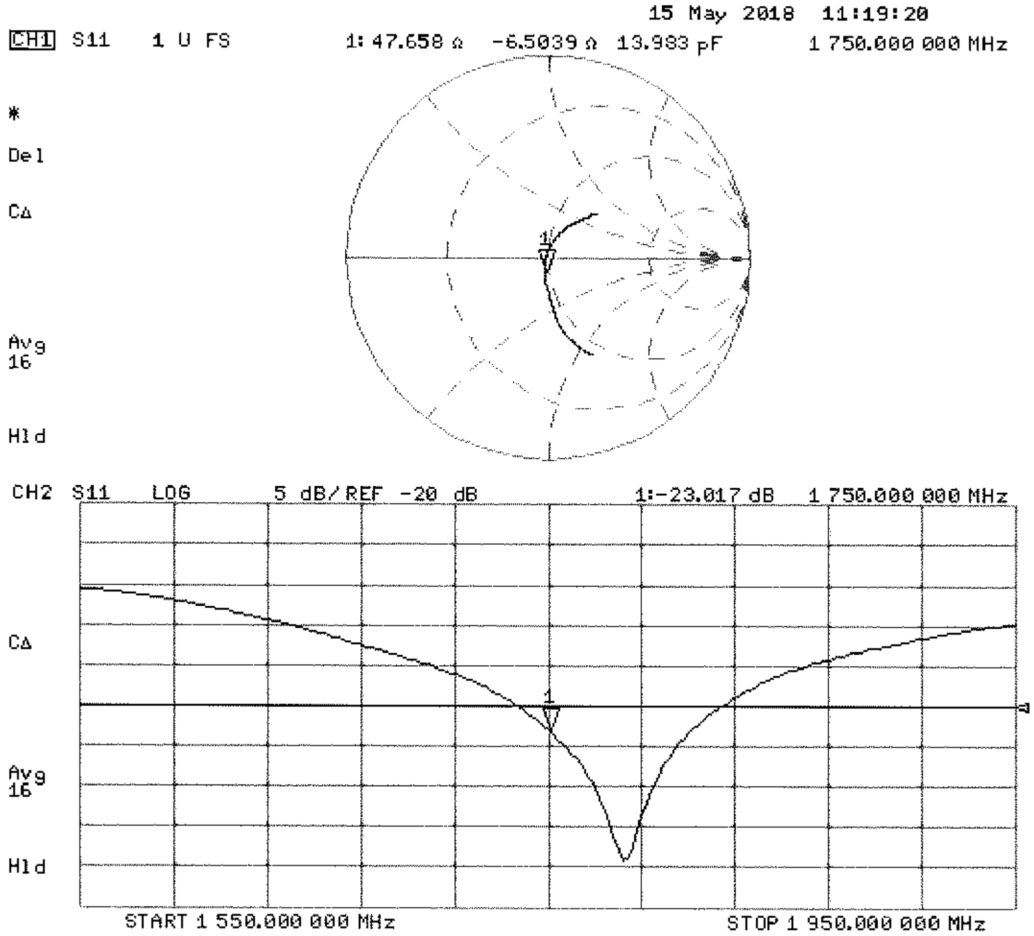
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 8.94 W/kg; SAR(10 g) = 4.71 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

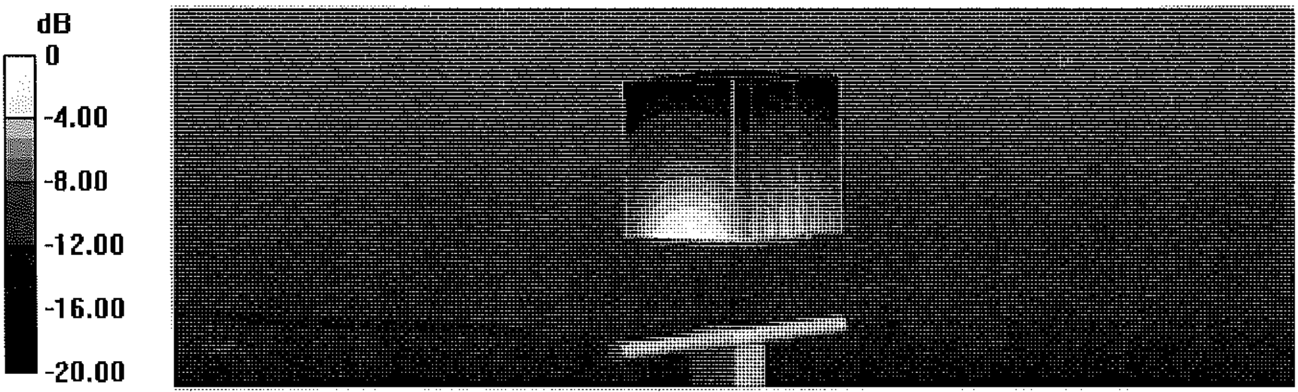
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.46 S/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

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

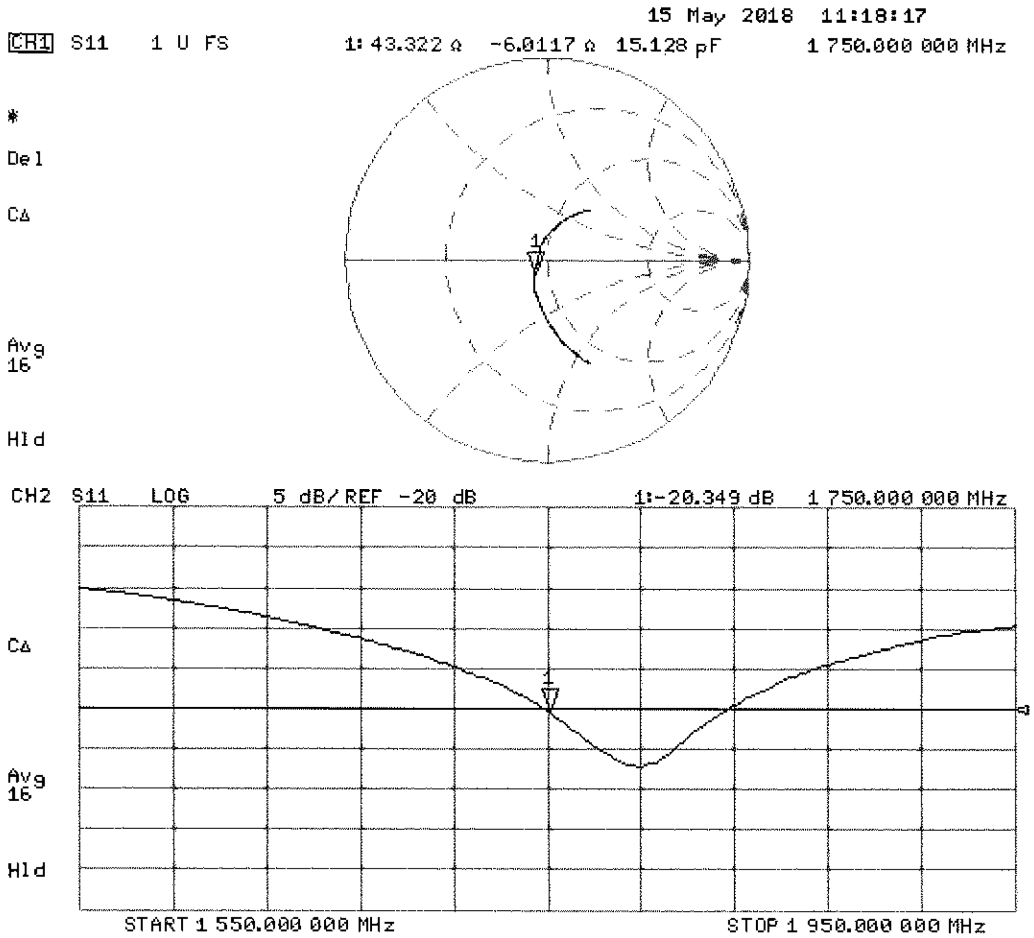
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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



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

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 23.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

DASY52 Configuration:

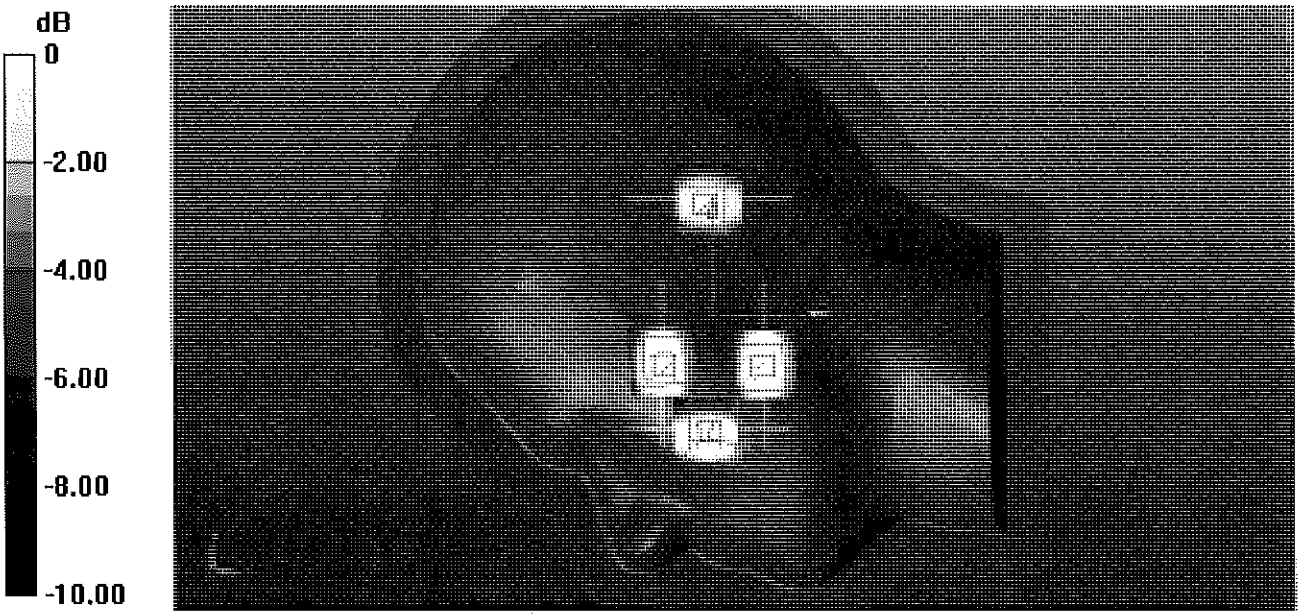
- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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

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

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

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



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

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	D1765V2 – SN: 1008
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	5/17/2019
Description:	SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	3/11/2019	Annual	3/11/2020	US39170122
Agilent	N5182A	MXG Vector Signal Generator	11/28/2018	Annual	11/28/2019	MY47420603
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1027293
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1126066
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/9/2018	Biennial	10/9/2020	181647811
Control Company	4352	Ultra Long Stem Thermometer	6/6/2018	Biennial	6/6/2020	181334678
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	3914
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/14/2019	Annual	2/14/2020	1272
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091

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

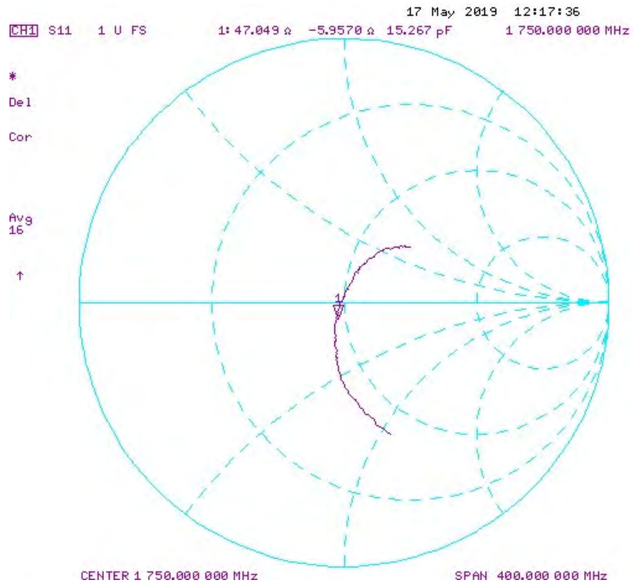
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

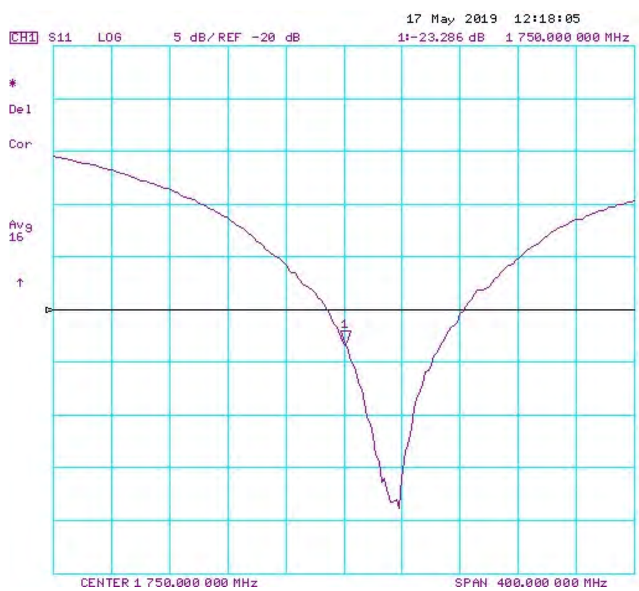
1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does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

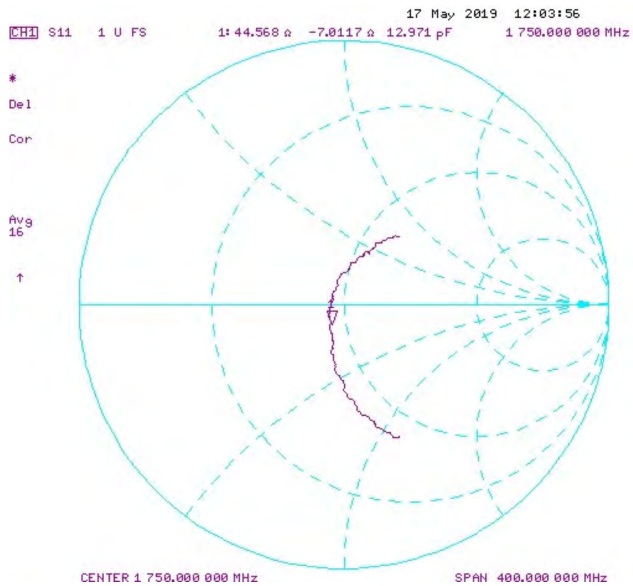
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance 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
5/23/2018	5/17/2019	1.21	3.62	3.63	0.28%	1.9	1.92	1.05%	47.7	47	0.7	-6.5	-6	0.5	-23	-23.3	-1.20%	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
5/23/2018	5/17/2019	1.21	3.74	3.95	5.61%	1.99	2.08	4.52%	43.3	44.6	1.3	-6	-7	1	-20.3	-20.5	-0.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL





Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object	D1765V2 – SN: 1008
Calibration procedure(s)	Procedure for Calibration Extension for SAR Dipoles.
Extension Calibration date:	5/23/2020
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	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench (8" lb)	5/23/2018	Biennial	5/23/2020	22217
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	4/21/2020	Annual	4/21/2021	7357
SPEAG	EX3DV4	SAR Probe	7/16/2019	Annual	7/16/2020	7410
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/12/2020	Annual	3/12/2021	1368

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

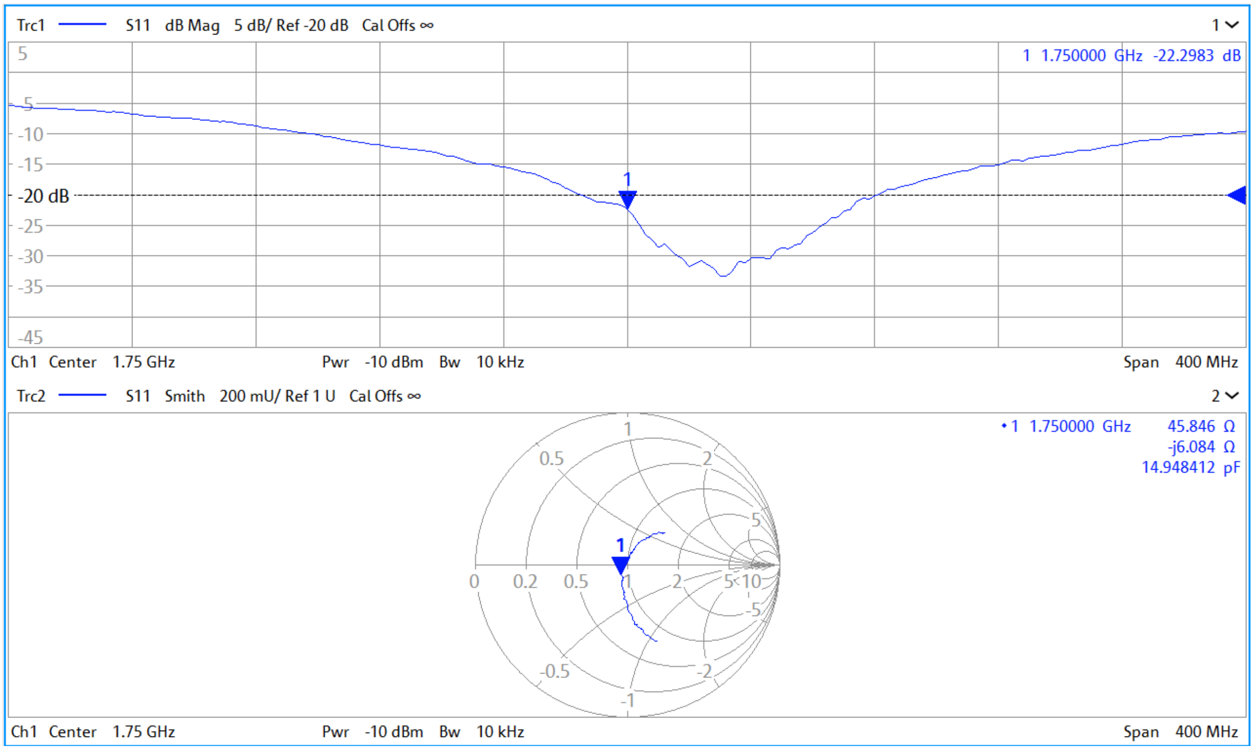
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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.

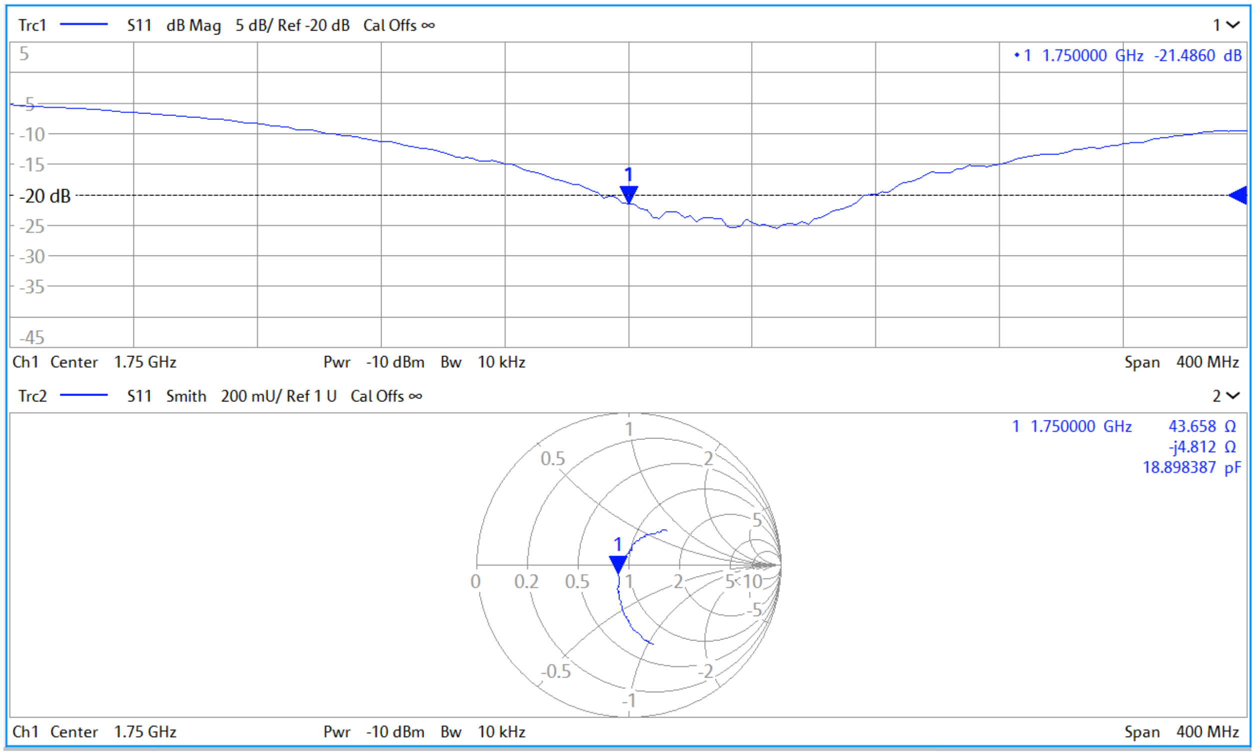
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

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
5/23/2018	5/23/2020	1.21	3.62	3.65	0.83%	1.90	1.94	2.11%	47.7	45.9	1.9	-6.5	-6.1	0.4	-23	-22.3	3.10%	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
5/23/2018	5/23/2020	1.21	3.74	4.00	6.95%	1.99	2.12	6.53%	43.3	43.7	0.4	-6.0	-4.8	1.2	-20.3	-21.5	-5.80%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: **D1900V2-5d080_Oct18**

CALIBRATION CERTIFICATE

Object: D1900V2 - SN:5d080

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

Calibration date: October 23, 2018

BN✓ 10-30-2018
BN✓ 10-20-2019

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

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

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

Issued: October 23, 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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.3 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.9 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 7.9 jΩ
Return Loss	- 21.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 8.1 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 28, 2006

DASY5 Validation Report for Head TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

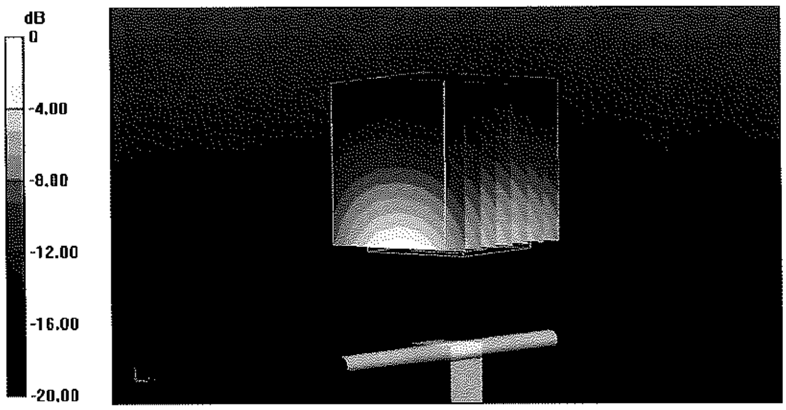
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 40.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

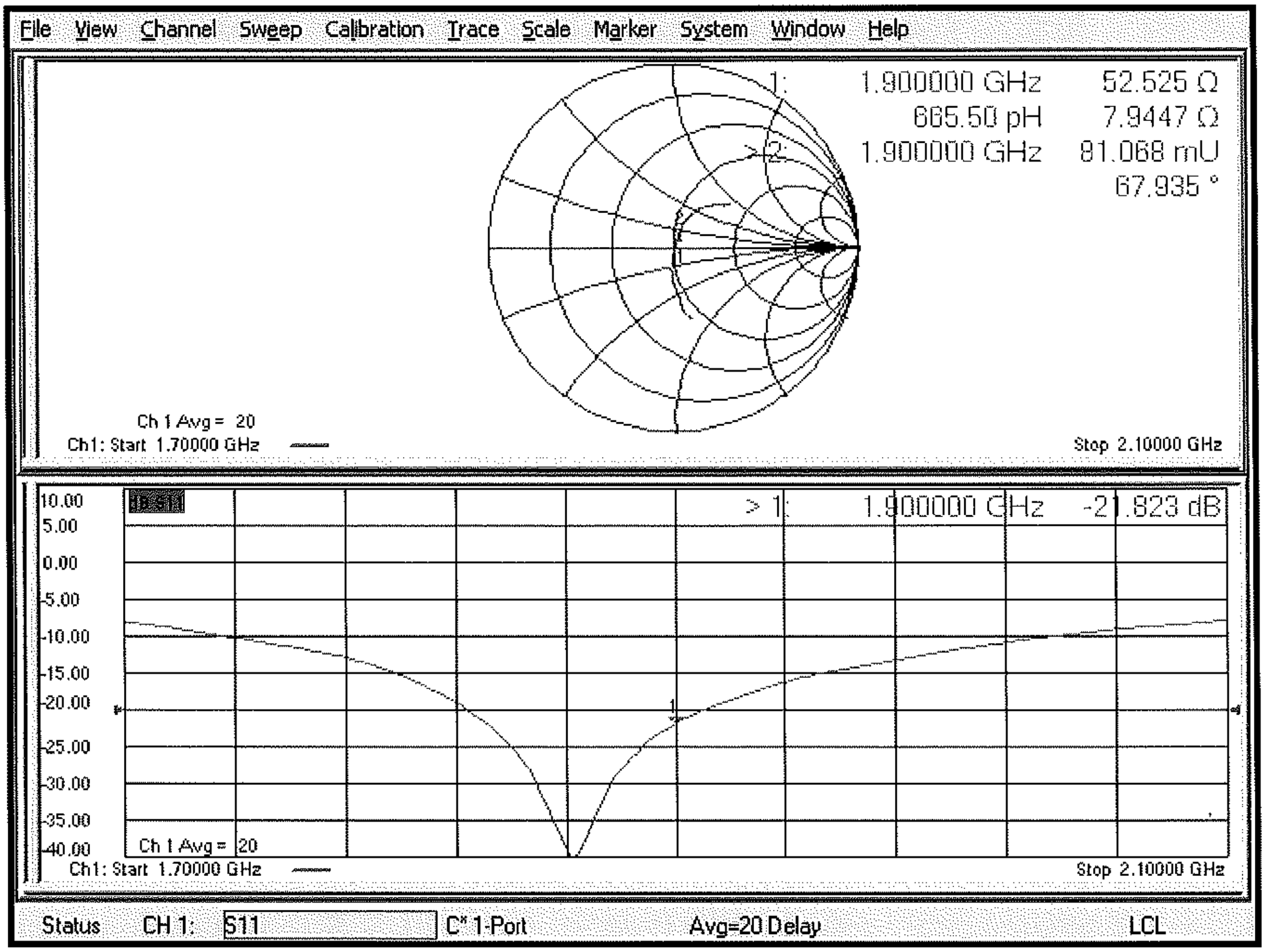
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.0 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg
Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

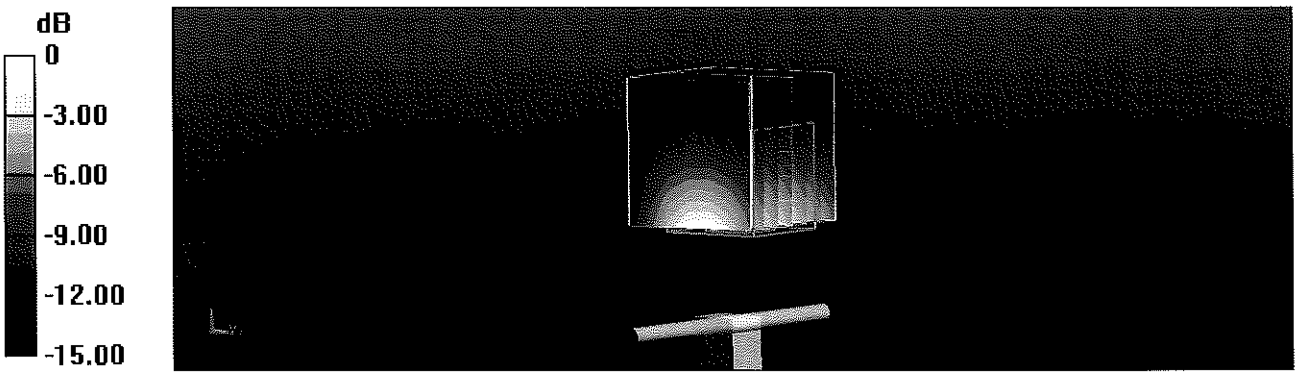
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

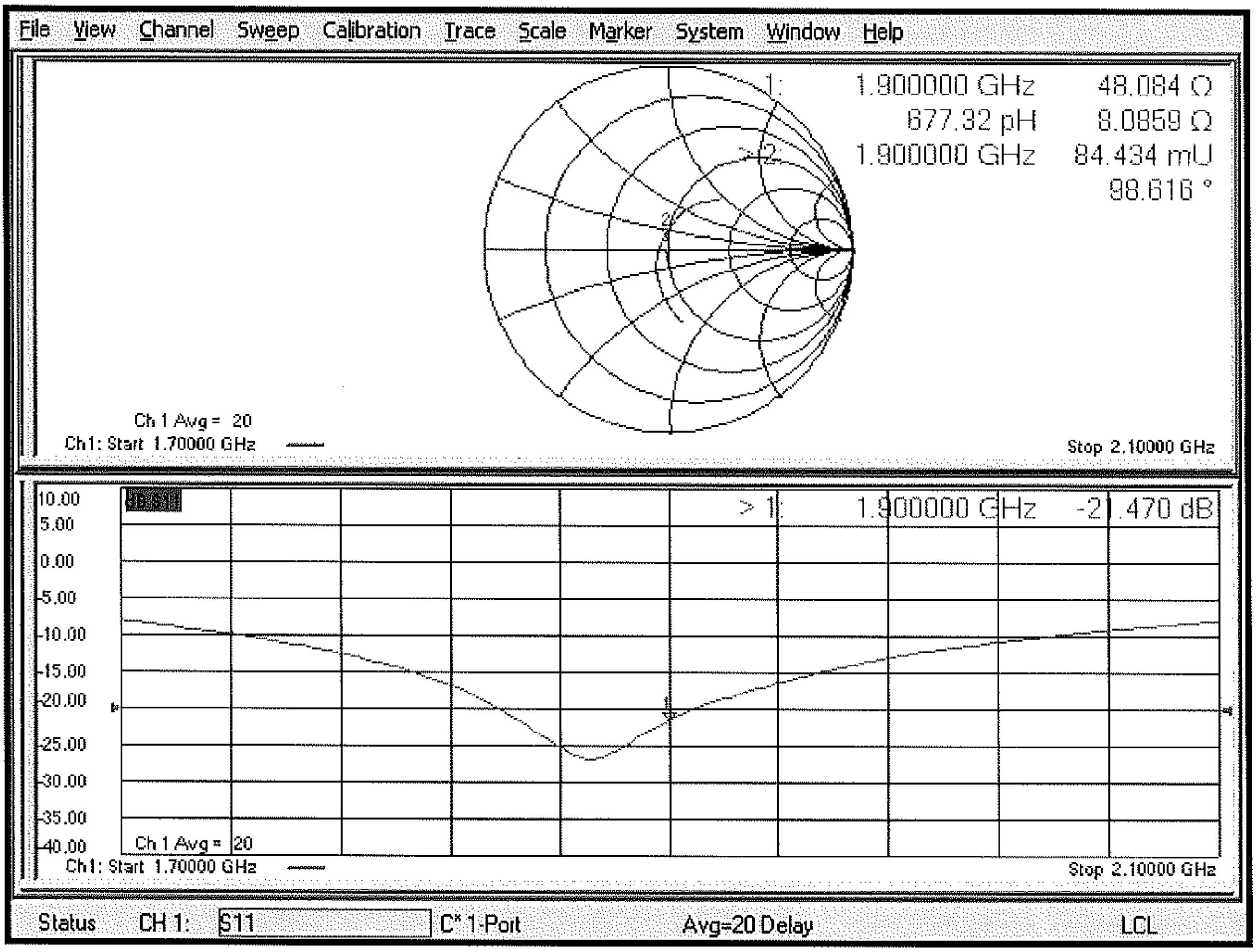
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.86 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.09 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN:5d080

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

Extended Calibration date: October 18, 2019

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/13/2019	Annual	8/13/2020	1041
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	11/20/2018	Annual	11/20/2019	1039008
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	3914
SPEAG	EX3DV4	SAR Probe	5/16/2019	Annual	5/16/2020	7406
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/8/2019	Annual	5/8/2020	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/14/2019	Annual	2/14/2020	1272

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = ±23% (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halbfoster	Team Lead Engineer	BRODIE HALBFOSTER
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	KOK

DIPOLE CALIBRATION EXTENSION

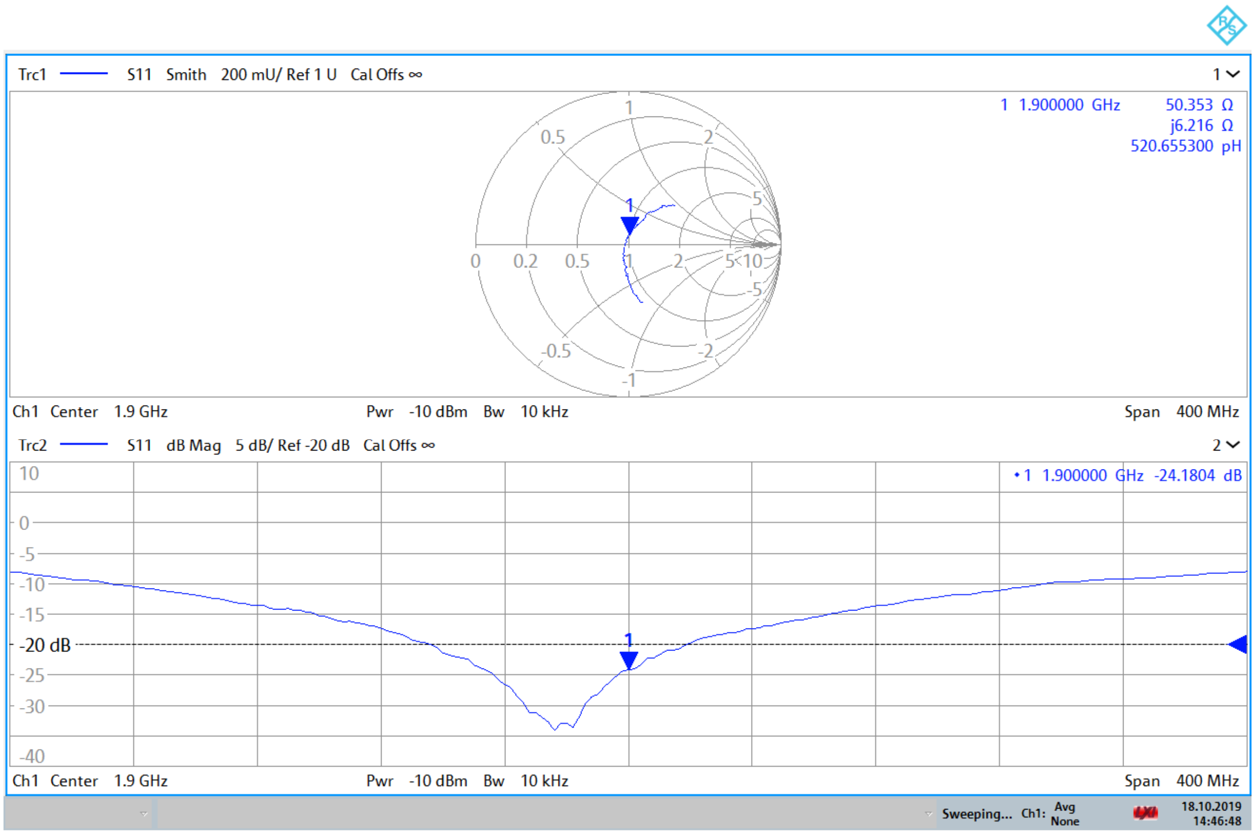
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

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
10/23/2018	10/18/2019	1.193	3.98	4.16	4.52%	2.07	2.13	2.90%	52.5	50.4	2.1	7.9	6.2	1.7	-21.8	-24.2	-10.90%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2019	1.193	3.92	4.21	7.40%	2.06	2.16	4.85%	48.1	46.5	1.6	8.1	6.6	1.5	-21.5	-22.2	-3.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



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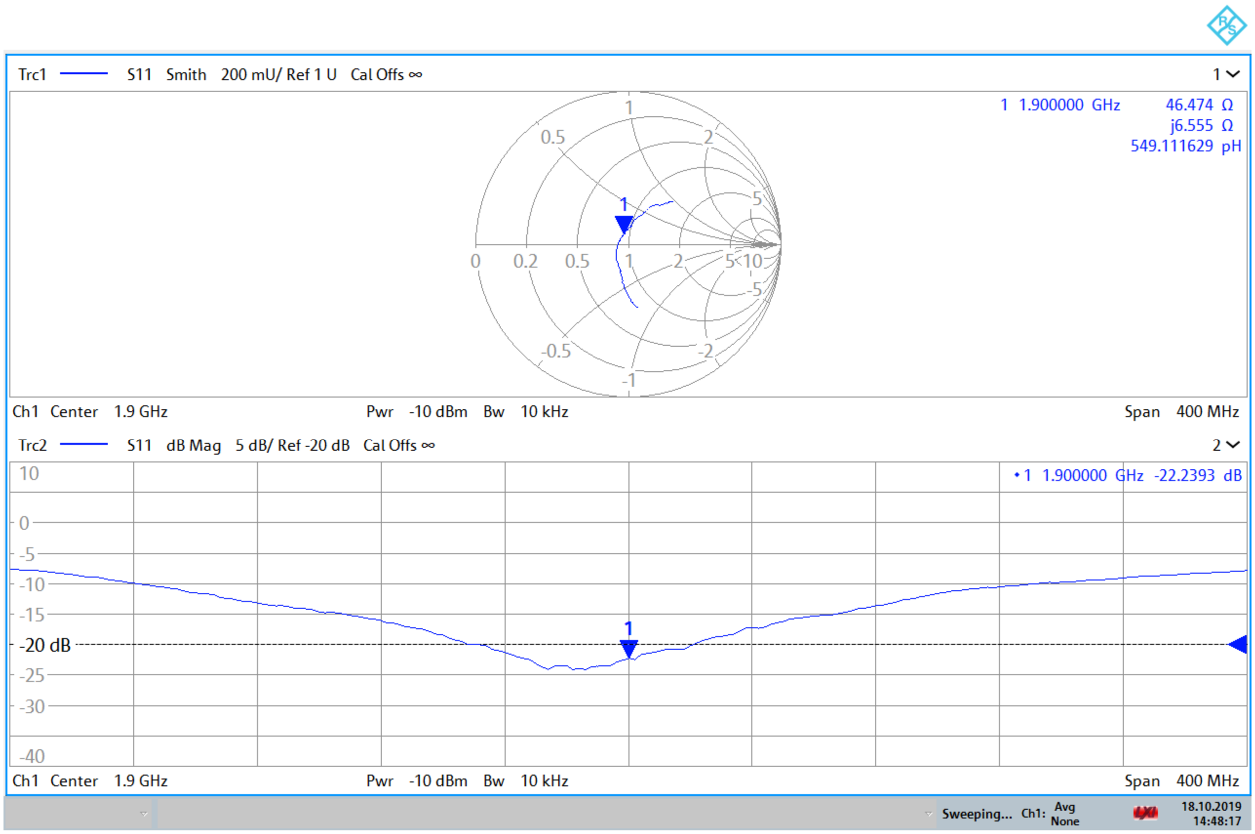
Impedance & Return-Loss Measurement Plot for Body TSL



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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: **EX3-7406_Jun20**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7406

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

BN✓
07-01-2020

Calibration date: June 23, 2020

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	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: June 23, 2020

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7406

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	0.48	0.43	0.46	± 10.1 %
DCP (mV)[B]	99.4	94.6	98.3	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Max dev.	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	136.9	± 3.3 %	± 4.7 %
		Y	0.00	0.00	1.00		152.7		
		Z	0.00	0.00	1.00		152.3		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	20.00	92.47	21.47	10.00	60.0	± 3.6 %	± 9.6 %
		Y	13.84	84.00	17.05		60.0		
		Z	20.00	90.56	20.16		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	20.00	95.36	21.69	6.99	80.0	± 2.3 %	± 9.6 %
		Y	20.00	90.00	17.99		80.0		
		Z	20.00	93.46	20.30		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	20.00	101.64	23.29	3.98	95.0	± 1.1 %	± 9.6 %
		Y	20.00	97.11	20.02		95.0		
		Z	20.00	100.49	22.19		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	20.00	109.15	25.49	2.22	120.0	± 1.0 %	± 9.6 %
		Y	20.00	125.32	31.37		120.0		
		Z	20.00	104.47	22.82		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	1.63	64.84	14.39	1.00	150.0	± 2.5 %	± 9.6 %
		Y	2.54	78.32	19.84		150.0		
		Z	1.71	65.77	14.81		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.12	66.64	15.05	0.00	150.0	± 0.9 %	± 9.6 %
		Y	2.26	70.88	17.66		150.0		
		Z	2.25	67.61	15.50		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	2.75	69.15	18.09	3.01	150.0	± 0.9 %	± 9.6 %
		Y	1.99	66.73	17.59		150.0		
		Z	2.46	67.47	17.28		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.46	66.55	15.45	0.00	150.0	± 0.8 %	± 9.6 %
		Y	3.47	68.06	16.58		150.0		
		Z	3.42	66.39	15.39		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.87	65.40	15.36	0.00	150.0	± 1.8 %	± 9.6 %
		Y	4.61	66.49	16.17		150.0		
		Z	4.80	65.22	15.29		150.0		

Note: For details on UID parameters see Appendix

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:7406

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	47.2	349.81	35.02	10.29	0.21	5.04	1.47	0.17	1.01
Y	22.3	166.33	35.67	7.09	0.00	5.02	0.40	0.08	1.00
Z	46.2	344.43	35.35	7.82	0.14	5.03	0.43	0.27	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	94.3
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

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7406

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	10.04	10.04	10.04	0.43	0.91	± 12.0 %
835	41.5	0.90	9.61	9.61	9.61	0.48	0.87	± 12.0 %
1750	40.1	1.37	8.32	8.32	8.32	0.33	0.86	± 12.0 %
1900	40.0	1.40	7.96	7.96	7.96	0.39	0.86	± 12.0 %
2300	39.5	1.67	7.76	7.76	7.76	0.31	0.95	± 12.0 %
2450	39.2	1.80	7.55	7.55	7.55	0.34	0.95	± 12.0 %
2600	39.0	1.96	7.39	7.39	7.39	0.41	0.90	± 12.0 %
5250	35.9	4.71	5.45	5.45	5.45	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.94	4.94	4.94	0.40	1.80	± 13.1 %
5750	35.4	5.22	5.15	5.15	5.15	0.40	1.80	± 13.1 %

[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. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. 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.

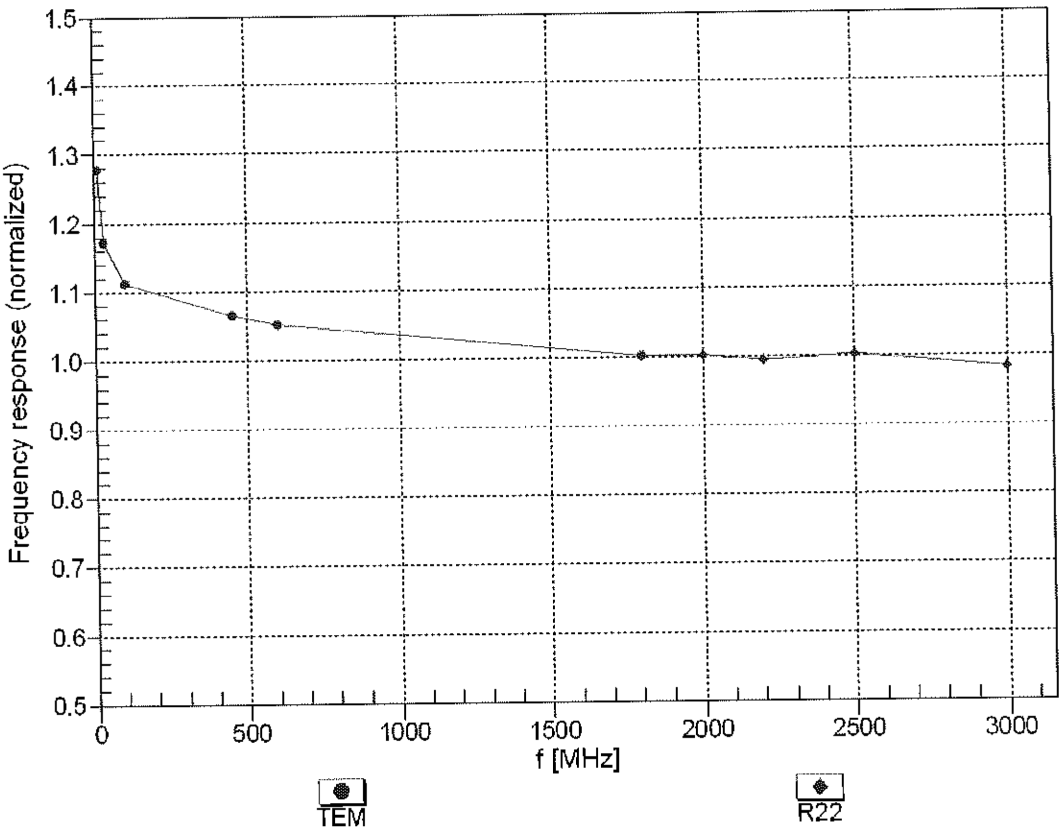
DASY/EASY - Parameters of Probe: EX3DV4 - SN:7406

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	9.66	9.66	9.66	0.37	0.97	± 12.0 %
835	55.2	0.97	9.47	9.47	9.47	0.42	0.80	± 12.0 %
1750	53.4	1.49	7.96	7.96	7.96	0.36	0.86	± 12.0 %
1900	53.3	1.52	7.69	7.69	7.69	0.43	0.86	± 12.0 %
2300	52.9	1.81	7.59	7.59	7.59	0.41	0.95	± 12.0 %
2450	52.7	1.95	7.43	7.43	7.43	0.35	0.95	± 12.0 %
2600	52.5	2.16	7.40	7.40	7.40	0.38	0.95	± 12.0 %
5250	48.9	5.36	5.05	5.05	5.05	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.37	4.37	4.37	0.50	1.90	± 13.1 %
5750	48.3	5.94	4.56	4.56	4.56	0.50	1.90	± 13.1 %

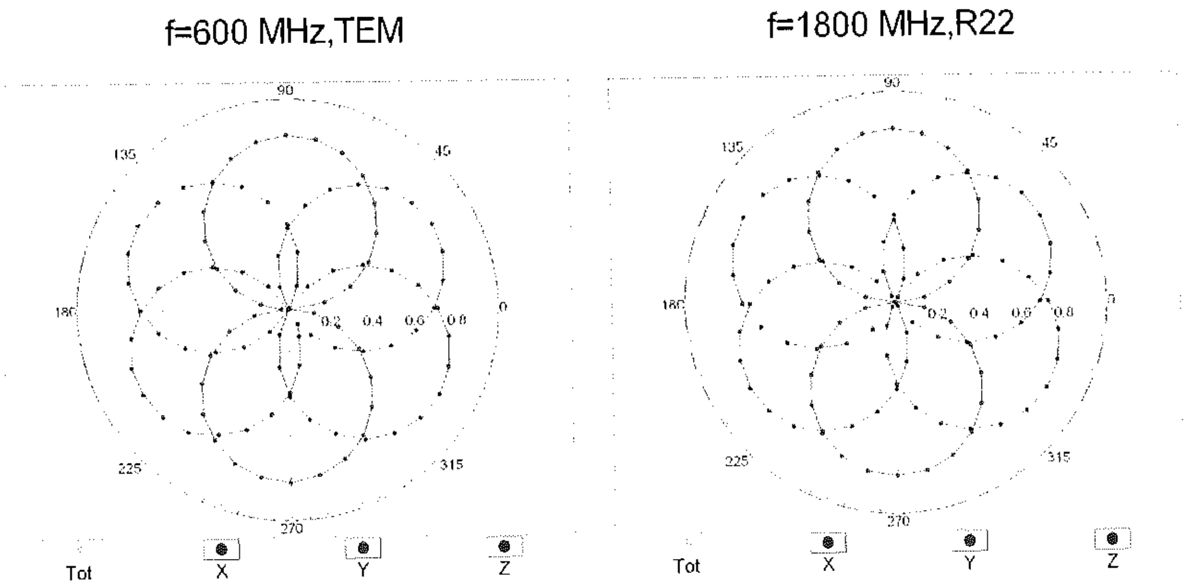
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. 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.

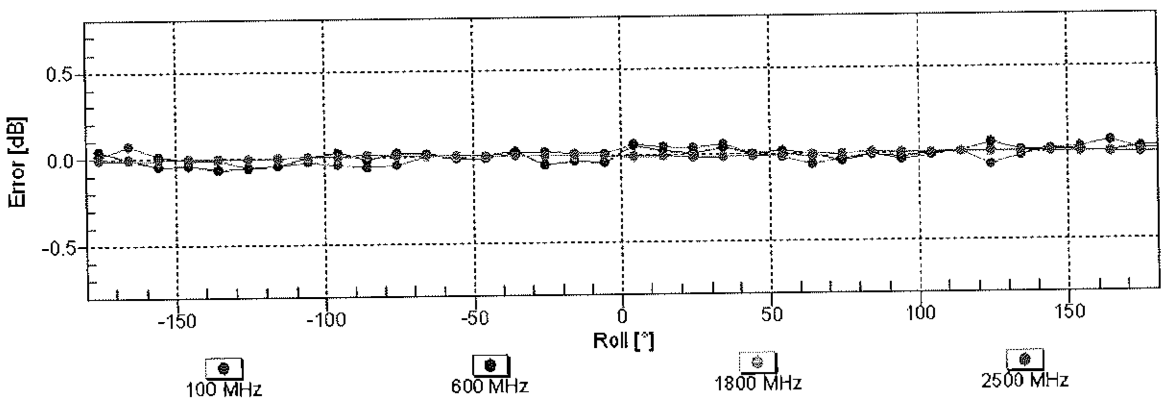
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

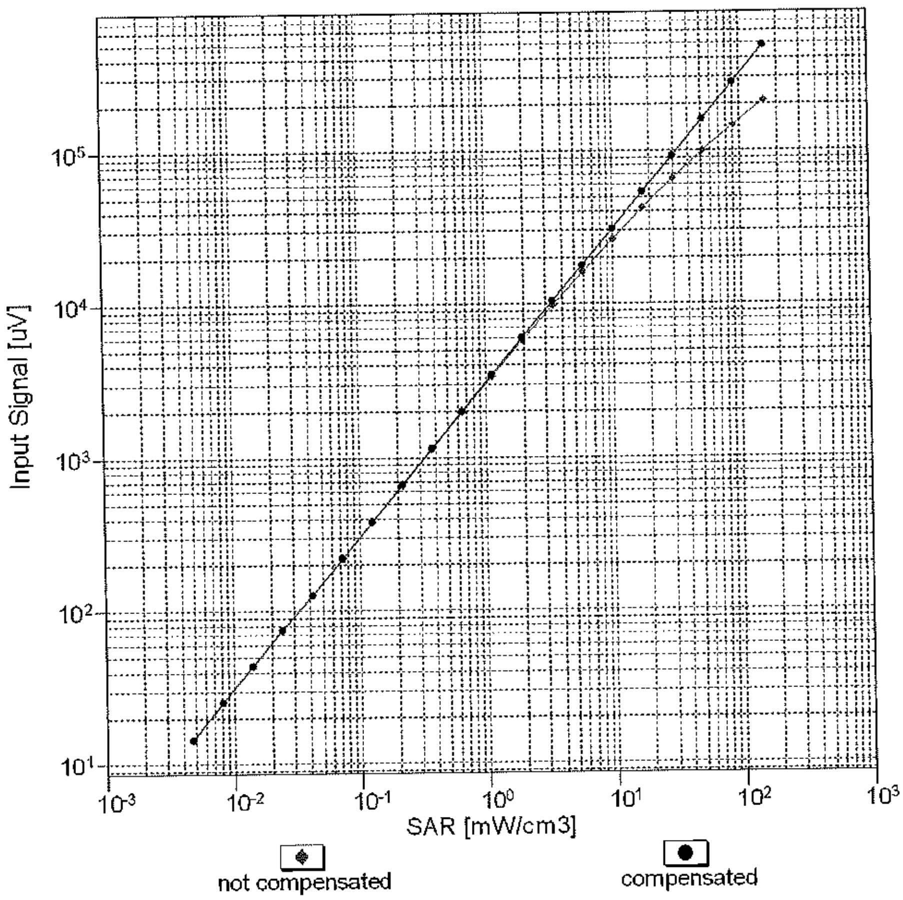
Receiving Pattern (ϕ), $\vartheta = 0°$

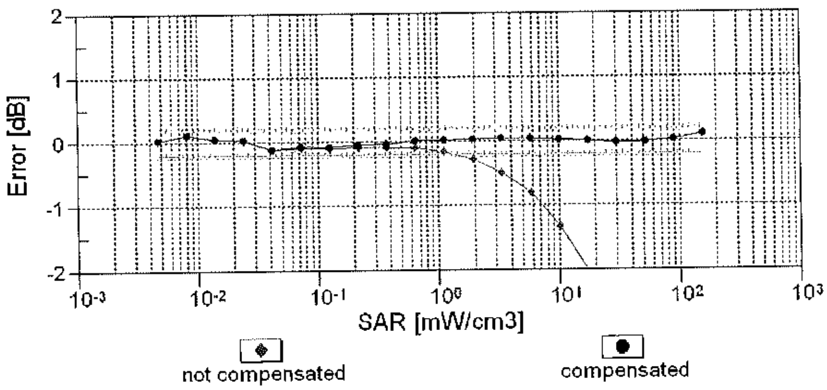




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

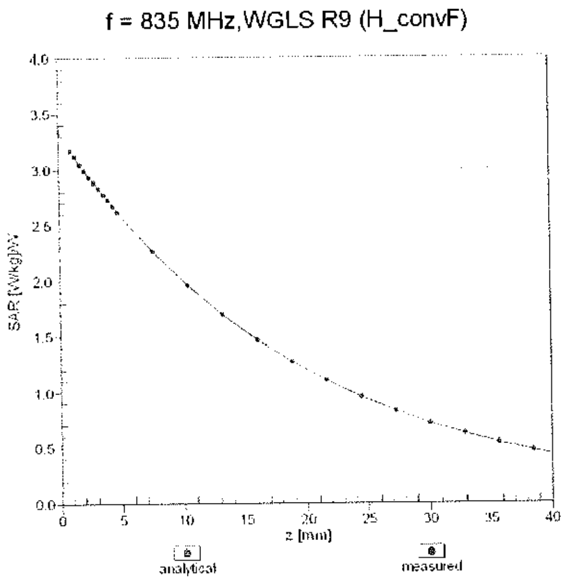
Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)

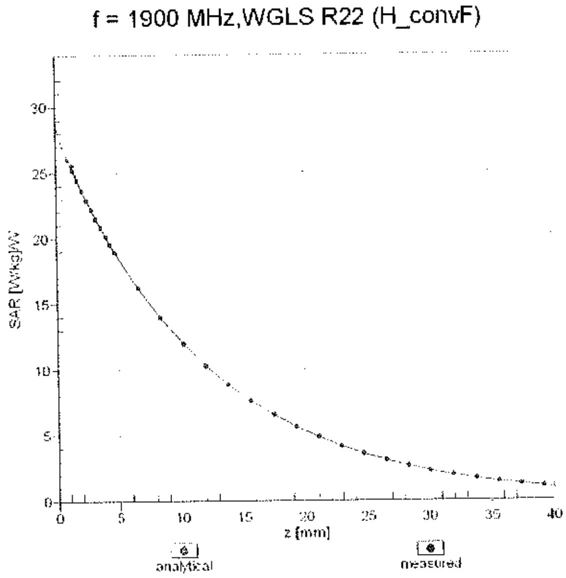




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

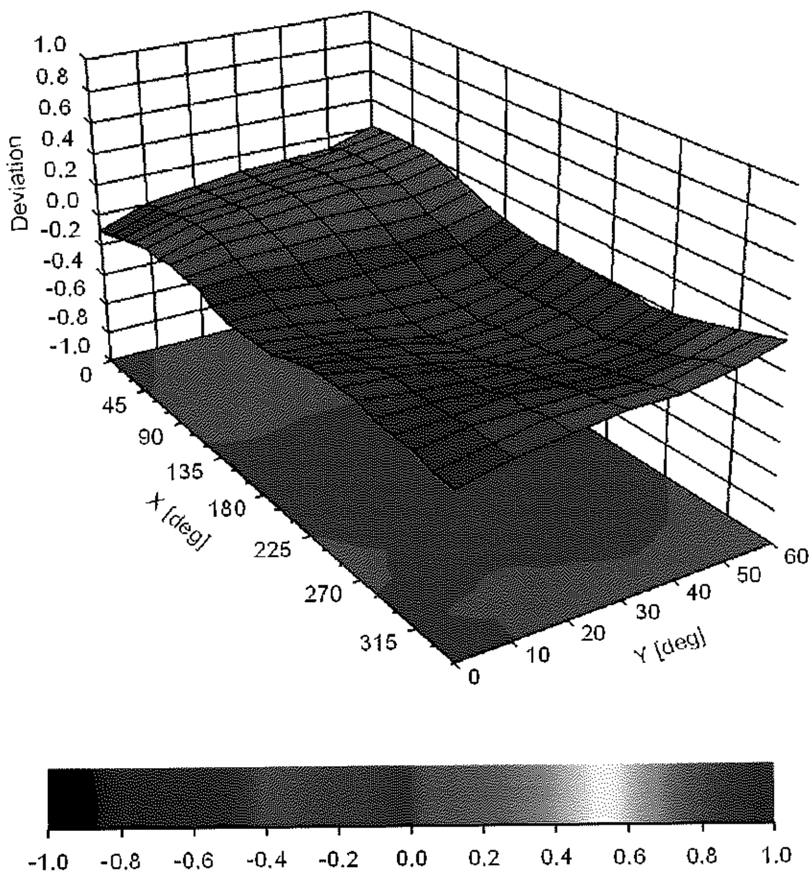
Conversion Factor Assessment





Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc[E] (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	CAB	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAA	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %

10300	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WiMAX	12.57	± 9.6 %
10303	AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	± 9.6 %
10306	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	14.67	± 9.6 %
10307	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC)	WiMAX	14.49	± 9.6 %
10308	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM,AMC 2x3)	WiMAX	14.58	± 9.6 %
10310	AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3	WiMAX	14.57	± 9.6 %
10311	AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	± 9.6 %
10313	AAA	iDEN 1:3	iDEN	10.51	± 9.6 %
10314	AAA	iDEN 1:6	iDEN	13.48	± 9.6 %
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc dc)	WLAN	1.71	± 9.6 %
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10317	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	± 9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	± 9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	± 9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	± 9.6 %
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	± 9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc dc)	WLAN	8.37	± 9.6 %
10401	AAD	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc dc)	WLAN	8.60	± 9.6 %
10402	AAD	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc dc)	WLAN	8.53	± 9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	± 9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	± 9.6 %
10406	AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	± 9.6 %
10410	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10417	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8.19	± 9.6 %
10422	AAB	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAB	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAB	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAB	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAB	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAA	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10447	AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAD	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %
10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10453	AAD	Validation (Square, 10ms, 1ms)	Test	10.00	± 9.6 %
10456	AAB	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	± 9.6 %
10457	AAA	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	± 9.6 %
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAA	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10462	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.30	± 9.6 %

10463	AAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10464	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10467	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10469	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10470	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10471	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10472	AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10473	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10474	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10475	AAE	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10477	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10478	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10479	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10480	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.18	± 9.6 %
10481	AAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10482	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	± 9.6 %
10483	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	± 9.6 %
10484	AAC	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.47	± 9.6 %
10485	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	± 9.6 %
10486	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	± 9.6 %
10487	AAF	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.60	± 9.6 %
10488	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.70	± 9.6 %
10489	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10491	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10492	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.41	± 9.6 %
10493	AAE	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.37	± 9.6 %
10496	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10497	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10498	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.40	± 9.6 %
10499	AAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.68	± 9.6 %
10500	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10501	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.44	± 9.6 %
10502	AAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.52	± 9.6 %
10503	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.72	± 9.6 %
10504	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10505	AAF	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10506	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10507	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10509	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.99	± 9.6 %
10510	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.49	± 9.6 %
10511	AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.42	± 9.6 %
10514	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc dc)	WLAN	1.57	± 9.6 %
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10518	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10519	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc dc)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc dc)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc dc)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10523	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc dc)	WLAN	8.08	± 9.6 %
10524	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc dc)	WLAN	8.27	± 9.6 %
10525	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc dc)	WLAN	8.36	± 9.6 %
10526	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc dc)	WLAN	8.42	± 9.6 %
10527	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc dc)	WLAN	8.21	± 9.6 %

10528	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc dc)	WLAN	8.36	± 9.6 %
10529	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc dc)	WLAN	8.36	± 9.6 %
10531	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc dc)	WLAN	8.43	± 9.6 %
10532	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10533	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc dc)	WLAN	8.38	± 9.6 %
10534	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc dc)	WLAN	8.45	± 9.6 %
10535	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc dc)	WLAN	8.45	± 9.6 %
10536	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc dc)	WLAN	8.32	± 9.6 %
10537	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc dc)	WLAN	8.44	± 9.6 %
10538	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc dc)	WLAN	8.54	± 9.6 %
10540	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc dc)	WLAN	8.39	± 9.6 %
10541	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc dc)	WLAN	8.46	± 9.6 %
10542	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc dc)	WLAN	8.65	± 9.6 %
10543	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc dc)	WLAN	8.65	± 9.6 %
10544	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc dc)	WLAN	8.47	± 9.6 %
10545	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10546	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc dc)	WLAN	8.35	± 9.6 %
10547	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc dc)	WLAN	8.49	± 9.6 %
10548	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc dc)	WLAN	8.37	± 9.6 %
10550	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc dc)	WLAN	8.38	± 9.6 %
10551	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc dc)	WLAN	8.50	± 9.6 %
10552	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc dc)	WLAN	8.42	± 9.6 %
10553	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc dc)	WLAN	8.45	± 9.6 %
10554	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc dc)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc dc)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc dc)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc dc)	WLAN	8.52	± 9.6 %
10558	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc dc)	WLAN	8.61	± 9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc dc)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc dc)	WLAN	8.56	± 9.6 %
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc dc)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc dc)	WLAN	8.77	± 9.6 %
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc dc)	WLAN	8.25	± 9.6 %
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc dc)	WLAN	8.13	± 9.6 %
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc dc)	WLAN	8.00	± 9.6 %
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc dc)	WLAN	8.37	± 9.6 %
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc dc)	WLAN	8.10	± 9.6 %
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc dc)	WLAN	8.30	± 9.6 %
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10583	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10584	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10585	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10586	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10587	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10588	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10589	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10590	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10591	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc dc)	WLAN	8.63	± 9.6 %
10592	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10593	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc dc)	WLAN	8.64	± 9.6 %
10594	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10595	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN	8.74	± 9.6 %

10596	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc dc)	WLAN	8.71	± 9.6 %
10597	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc dc)	WLAN	8.72	± 9.6 %
10598	AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc dc)	WLAN	8.50	± 9.6 %
10599	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc dc)	WLAN	8.79	± 9.6 %
10600	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10601	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc dc)	WLAN	8.82	± 9.6 %
10602	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc dc)	WLAN	8.94	± 9.6 %
10603	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc dc)	WLAN	9.03	± 9.6 %
10604	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc dc)	WLAN	8.76	± 9.6 %
10605	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc dc)	WLAN	8.97	± 9.6 %
10606	AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10607	AAB	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc dc)	WLAN	8.64	± 9.6 %
10608	AAB	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc dc)	WLAN	8.77	± 9.6 %
10609	AAB	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc dc)	WLAN	8.57	± 9.6 %
10610	AAB	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc dc)	WLAN	8.78	± 9.6 %
10611	AAB	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10612	AAB	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10613	AAB	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc dc)	WLAN	8.94	± 9.6 %
10614	AAB	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc dc)	WLAN	8.59	± 9.6 %
10615	AAB	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10616	AAB	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc dc)	WLAN	8.82	± 9.6 %
10617	AAB	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc dc)	WLAN	8.81	± 9.6 %
10618	AAB	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc dc)	WLAN	8.58	± 9.6 %
10619	AAB	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc dc)	WLAN	8.86	± 9.6 %
10620	AAB	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc dc)	WLAN	8.87	± 9.6 %
10621	AAB	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10622	AAB	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc dc)	WLAN	8.68	± 9.6 %
10623	AAB	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10624	AAB	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc dc)	WLAN	8.96	± 9.6 %
10625	AAB	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc dc)	WLAN	8.96	± 9.6 %
10626	AAB	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10627	AAB	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10628	AAB	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc dc)	WLAN	8.71	± 9.6 %
10629	AAB	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10630	AAB	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc dc)	WLAN	8.72	± 9.6 %
10631	AAB	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc dc)	WLAN	8.81	± 9.6 %
10632	AAB	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10633	AAB	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc dc)	WLAN	8.83	± 9.6 %
10634	AAB	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc dc)	WLAN	8.80	± 9.6 %
10635	AAB	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc dc)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc dc)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc dc)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc dc)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc dc)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc dc)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc dc)	WLAN	9.11	± 9.6 %
10646	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
10652	AAE	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	± 9.6 %
10653	AAE	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 %
10654	AAD	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %
10655	AAE	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	± 9.6 %
10658	AAA	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAA	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
10660	AAA	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
10661	AAA	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
10662	AAA	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
10671	AAA	IEEE 802.11ax (20MHz, MCS0, 90pc dc)	WLAN	9.09	± 9.6 %

10672	AAA	IEEE 802.11ax (20MHz, MCS1, 90pc dc)	WLAN	8.57	± 9.6 %
10673	AAA	IEEE 802.11ax (20MHz, MCS2, 90pc dc)	WLAN	8.78	± 9.6 %
10674	AAA	IEEE 802.11ax (20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10675	AAA	IEEE 802.11ax (20MHz, MCS4, 90pc dc)	WLAN	8.90	± 9.6 %
10676	AAA	IEEE 802.11ax (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10677	AAA	IEEE 802.11ax (20MHz, MCS6, 90pc dc)	WLAN	8.73	± 9.6 %
10678	AAA	IEEE 802.11ax (20MHz, MCS7, 90pc dc)	WLAN	8.78	± 9.6 %
10679	AAA	IEEE 802.11ax (20MHz, MCS8, 90pc dc)	WLAN	8.89	± 9.6 %
10680	AAA	IEEE 802.11ax (20MHz, MCS9, 90pc dc)	WLAN	8.80	± 9.6 %
10681	AAA	IEEE 802.11ax (20MHz, MCS10, 90pc dc)	WLAN	8.62	± 9.6 %
10682	AAA	IEEE 802.11ax (20MHz, MCS11, 90pc dc)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10684	AAA	IEEE 802.11ax (20MHz, MCS1, 99pc dc)	WLAN	8.26	± 9.6 %
10685	AAA	IEEE 802.11ax (20MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10686	AAA	IEEE 802.11ax (20MHz, MCS3, 99pc dc)	WLAN	8.28	± 9.6 %
10687	AAA	IEEE 802.11ax (20MHz, MCS4, 99pc dc)	WLAN	8.45	± 9.6 %
10688	AAA	IEEE 802.11ax (20MHz, MCS5, 99pc dc)	WLAN	8.29	± 9.6 %
10689	AAA	IEEE 802.11ax (20MHz, MCS6, 99pc dc)	WLAN	8.55	± 9.6 %
10690	AAA	IEEE 802.11ax (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10691	AAA	IEEE 802.11ax (20MHz, MCS8, 99pc dc)	WLAN	8.25	± 9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc dc)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc dc)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc dc)	WLAN	8.57	± 9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc dc)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc dc)	WLAN	8.91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc dc)	WLAN	8.61	± 9.6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc dc)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc dc)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc dc)	WLAN	8.73	± 9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc dc)	WLAN	8.86	± 9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc dc)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc dc)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc dc)	WLAN	8.69	± 9.6 %
10706	AAA	IEEE 802.11ax (40MHz, MCS11, 90pc dc)	WLAN	8.66	± 9.6 %
10707	AAA	IEEE 802.11ax (40MHz, MCS0, 99pc dc)	WLAN	8.32	± 9.6 %
10708	AAA	IEEE 802.11ax (40MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10709	AAA	IEEE 802.11ax (40MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10710	AAA	IEEE 802.11ax (40MHz, MCS3, 99pc dc)	WLAN	8.29	± 9.6 %
10711	AAA	IEEE 802.11ax (40MHz, MCS4, 99pc dc)	WLAN	8.39	± 9.6 %
10712	AAA	IEEE 802.11ax (40MHz, MCS5, 99pc dc)	WLAN	8.67	± 9.6 %
10713	AAA	IEEE 802.11ax (40MHz, MCS6, 99pc dc)	WLAN	8.33	± 9.6 %
10714	AAA	IEEE 802.11ax (40MHz, MCS7, 99pc dc)	WLAN	8.26	± 9.6 %
10715	AAA	IEEE 802.11ax (40MHz, MCS8, 99pc dc)	WLAN	8.45	± 9.6 %
10716	AAA	IEEE 802.11ax (40MHz, MCS9, 99pc dc)	WLAN	8.30	± 9.6 %
10717	AAA	IEEE 802.11ax (40MHz, MCS10, 99pc dc)	WLAN	8.48	± 9.6 %
10718	AAA	IEEE 802.11ax (40MHz, MCS11, 99pc dc)	WLAN	8.24	± 9.6 %
10719	AAA	IEEE 802.11ax (80MHz, MCS0, 90pc dc)	WLAN	8.81	± 9.6 %
10720	AAA	IEEE 802.11ax (80MHz, MCS1, 90pc dc)	WLAN	8.87	± 9.6 %
10721	AAA	IEEE 802.11ax (80MHz, MCS2, 90pc dc)	WLAN	8.76	± 9.6 %
10722	AAA	IEEE 802.11ax (80MHz, MCS3, 90pc dc)	WLAN	8.55	± 9.6 %
10723	AAA	IEEE 802.11ax (80MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10724	AAA	IEEE 802.11ax (80MHz, MCS5, 90pc dc)	WLAN	8.90	± 9.6 %
10725	AAA	IEEE 802.11ax (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10726	AAA	IEEE 802.11ax (80MHz, MCS7, 90pc dc)	WLAN	8.72	± 9.6 %
10727	AAA	IEEE 802.11ax (80MHz, MCS8, 90pc dc)	WLAN	8.66	± 9.6 %
10728	AAA	IEEE 802.11ax (80MHz, MCS9, 90pc dc)	WLAN	8.65	± 9.6 %
10729	AAA	IEEE 802.11ax (80MHz, MCS10, 90pc dc)	WLAN	8.64	± 9.6 %
10730	AAA	IEEE 802.11ax (80MHz, MCS11, 90pc dc)	WLAN	8.67	± 9.6 %
10731	AAA	IEEE 802.11ax (80MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10732	AAA	IEEE 802.11ax (80MHz, MCS1, 99pc dc)	WLAN	8.46	± 9.6 %
10733	AAA	IEEE 802.11ax (80MHz, MCS2, 99pc dc)	WLAN	8.40	± 9.6 %
10734	AAA	IEEE 802.11ax (80MHz, MCS3, 99pc dc)	WLAN	8.25	± 9.6 %
10735	AAA	IEEE 802.11ax (80MHz, MCS4, 99pc dc)	WLAN	8.33	± 9.6 %

10736	AAA	IEEE 802.11ax (80MHz, MCS5, 99pc dc)	WLAN	8.27	± 9.6 %
10737	AAA	IEEE 802.11ax (80MHz, MCS6, 99pc dc)	WLAN	8.36	± 9.6 %
10738	AAA	IEEE 802.11ax (80MHz, MCS7, 99pc dc)	WLAN	8.42	± 9.6 %
10739	AAA	IEEE 802.11ax (80MHz, MCS8, 99pc dc)	WLAN	8.29	± 9.6 %
10740	AAA	IEEE 802.11ax (80MHz, MCS9, 99pc dc)	WLAN	8.48	± 9.6 %
10741	AAA	IEEE 802.11ax (80MHz, MCS10, 99pc dc)	WLAN	8.40	± 9.6 %
10742	AAA	IEEE 802.11ax (80MHz, MCS11, 99pc dc)	WLAN	8.43	± 9.6 %
10743	AAA	IEEE 802.11ax (160MHz, MCS0, 90pc dc)	WLAN	8.94	± 9.6 %
10744	AAA	IEEE 802.11ax (160MHz, MCS1, 90pc dc)	WLAN	9.16	± 9.6 %
10745	AAA	IEEE 802.11ax (160MHz, MCS2, 90pc dc)	WLAN	8.93	± 9.6 %
10746	AAA	IEEE 802.11ax (160MHz, MCS3, 90pc dc)	WLAN	9.11	± 9.6 %
10747	AAA	IEEE 802.11ax (160MHz, MCS4, 90pc dc)	WLAN	9.04	± 9.6 %
10748	AAA	IEEE 802.11ax (160MHz, MCS5, 90pc dc)	WLAN	8.93	± 9.6 %
10749	AAA	IEEE 802.11ax (160MHz, MCS6, 90pc dc)	WLAN	8.90	± 9.6 %
10750	AAA	IEEE 802.11ax (160MHz, MCS7, 90pc dc)	WLAN	8.79	± 9.6 %
10751	AAA	IEEE 802.11ax (160MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10752	AAA	IEEE 802.11ax (160MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10753	AAA	IEEE 802.11ax (160MHz, MCS10, 90pc dc)	WLAN	9.00	± 9.6 %
10754	AAA	IEEE 802.11ax (160MHz, MCS11, 90pc dc)	WLAN	8.94	± 9.6 %
10755	AAA	IEEE 802.11ax (160MHz, MCS0, 99pc dc)	WLAN	8.64	± 9.6 %
10756	AAA	IEEE 802.11ax (160MHz, MCS1, 99pc dc)	WLAN	8.77	± 9.6 %
10757	AAA	IEEE 802.11ax (160MHz, MCS2, 99pc dc)	WLAN	8.77	± 9.6 %
10758	AAA	IEEE 802.11ax (160MHz, MCS3, 99pc dc)	WLAN	8.69	± 9.6 %
10759	AAA	IEEE 802.11ax (160MHz, MCS4, 99pc dc)	WLAN	8.58	± 9.6 %
10760	AAA	IEEE 802.11ax (160MHz, MCS5, 99pc dc)	WLAN	8.49	± 9.6 %
10761	AAA	IEEE 802.11ax (160MHz, MCS6, 99pc dc)	WLAN	8.58	± 9.6 %
10762	AAA	IEEE 802.11ax (160MHz, MCS7, 99pc dc)	WLAN	8.49	± 9.6 %
10763	AAA	IEEE 802.11ax (160MHz, MCS8, 99pc dc)	WLAN	8.53	± 9.6 %
10764	AAA	IEEE 802.11ax (160MHz, MCS9, 99pc dc)	WLAN	8.54	± 9.6 %
10765	AAA	IEEE 802.11ax (160MHz, MCS10, 99pc dc)	WLAN	8.54	± 9.6 %
10766	AAA	IEEE 802.11ax (160MHz, MCS11, 99pc dc)	WLAN	8.51	± 9.6 %
10767	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	± 9.6 %
10768	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10769	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10770	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10771	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10772	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	± 9.6 %
10773	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	± 9.6 %
10774	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10775	AAB	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10776	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10777	AAB	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10778	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10779	AAB	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10780	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10781	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10782	AAC	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10783	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10784	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	± 9.6 %
10785	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10786	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10787	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	± 9.6 %
10788	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10789	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10790	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10791	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	± 9.6 %
10792	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	± 9.6 %
10793	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	± 9.6 %
10794	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10795	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	± 9.6 %
10796	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10797	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10798	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10799	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %

10801	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10802	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	± 9.6 %
10803	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10805	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10806	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10809	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10810	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10812	AAC	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10817	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10818	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10819	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	± 9.6 %
10820	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10821	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10822	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10823	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10824	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10825	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10827	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10828	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10829	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10830	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	± 9.6 %
10831	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	± 9.6 %
10832	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	± 9.6 %
10833	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10834	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	± 9.6 %
10835	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10836	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	± 9.6 %
10837	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	± 9.6 %
10839	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10840	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	± 9.6 %
10841	AAC	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	± 9.6 %
10843	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	± 9.6 %
10844	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10846	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10854	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10855	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10856	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10857	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10858	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10859	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10860	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10861	AAC	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10863	AAC	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10864	AAC	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10865	AAC	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10866	AAC	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10868	AAC	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	± 9.6 %
10869	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10870	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	± 9.6 %
10871	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10872	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	± 9.6 %
10873	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10874	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10875	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10876	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	± 9.6 %
10877	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	± 9.6 %
10878	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10879	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	± 9.6 %
10880	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	± 9.6 %
10881	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10882	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	± 9.6 %
10883	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	± 9.6 %
10884	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	± 9.6 %
10885	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %

10886	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10888	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	± 9.6 %
10889	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	± 9.6 %
10890	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	± 9.6 %
10891	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	± 9.6 %
10892	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10897	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	± 9.6 %
10898	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10899	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10900	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10901	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10903	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10905	AAA	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10906	AAA	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10907	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	± 9.6 %
10908	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10909	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	± 9.6 %
10910	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10911	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10912	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10913	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10914	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	± 9.6 %
10915	AAA	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10916	AAA	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10917	AAA	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10918	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10919	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10920	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10921	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10922	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	± 9.6 %
10923	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10924	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10925	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	± 9.6 %
10926	AAA	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10927	AAA	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10928	AAA	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10929	AAA	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10930	AAA	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10931	AAA	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10932	AAA	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10936	AAA	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10937	AAA	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	± 9.6 %
10938	AAA	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10939	AAA	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	± 9.6 %
10940	AAA	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	± 9.6 %
10941	AAA	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10942	AAA	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10943	AAA	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	± 9.6 %
10944	AAA	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	± 9.6 %
10945	AAA	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10946	AAA	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10947	AAA	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10948	AAA	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10949	AAA	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10950	AAA	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10951	AAA	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.92	± 9.6 %
10952	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	± 9.6 %
10953	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	± 9.6 %

10954	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	± 9.6 %
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	± 9.6 %
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	± 9.6 %
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	± 9.6 %
10958	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	± 9.6 %
10959	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	± 9.6 %
10960	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	± 9.6 %
10961	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	± 9.6 %
10962	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	± 9.6 %
10963	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10964	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	± 9.6 %
10965	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	± 9.6 %
10966	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10967	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	± 9.6 %
10968	AAA	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	± 9.6 %

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Calibration Laboratory of
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S **Schweizerischer Kalibrierdienst**
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Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: **EX3-3589_Jan20/2**

CALIBRATION CERTIFICATE (Replacement of No: EX3-3589_Jan20)

Object: EX3DV4 - SN:3589

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

BNV
04/30/2020

Calibration date: January 21, 2020

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: March 31, 2020

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)^A	0.44	0.40	0.39	± 10.1 %
DCP (mV)^B	101.5	97.7	97.9	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Max dev.	Max Unc^E (k=2)
0	CW	X	0.00	0.00	1.00	0.00	138.1	± 3.5 %	± 4.7 %
		Y	0.00	0.00	1.00		148.9		
		Z	0.00	0.00	1.00		137.1		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	20.00	93.40	23.88	10.00	60.0	± 1.9 %	± 9.6 %
		Y	20.00	90.04	21.55		60.0		
		Z	20.00	93.40	23.50		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	20.00	93.53	22.66	6.99	80.0	± 1.0 %	± 9.6 %
		Y	20.00	90.11	20.16		80.0		
		Z	20.00	93.36	22.20		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	20.00	95.38	22.01	3.98	95.0	± 1.0 %	± 9.6 %
		Y	20.00	88.87	17.82		95.0		
		Z	20.00	94.79	21.35		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	20.00	102.43	23.98	2.22	120.0	± 1.1 %	± 9.6 %
		Y	20.00	86.64	15.26		120.0		
		Z	20.00	97.99	21.51		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	0.93	64.33	11.56	0.00	150.0	± 3.3 %	± 9.6 %
		Y	0.54	60.00	7.11		150.0		
		Z	0.68	61.48	9.17		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.38	69.01	16.27	0.00	150.0	± 1.3 %	± 9.6 %
		Y	2.02	66.96	14.92		150.0		
		Z	2.15	67.54	15.53		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	3.79	73.46	20.06	3.01	150.0	± 0.6 %	± 9.6 %
		Y	3.12	69.91	18.24		150.0		
		Z	4.11	75.05	20.59		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.59	67.56	16.03	0.00	150.0	± 2.5 %	± 9.6 %
		Y	3.37	66.67	15.43		150.0		
		Z	3.46	66.93	15.67		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.95	65.82	15.63	0.00	150.0	± 4.6 %	± 9.6 %
		Y	4.77	65.46	15.41		150.0		
		Z	4.80	65.52	15.45		150.0		

Note: For details on UID parameters see Appendix

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:3589

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	52.5	386.65	34.73	26.61	1.15	5.10	1.30	0.45	1.01
Y	44.4	339.10	36.93	20.74	1.47	5.06	0.00	0.71	1.01
Z	44.1	325.90	34.85	22.88	1.09	5.07	1.71	0.36	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-32.6
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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

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	8.70	8.70	8.70	0.38	1.00	± 12.0 %
835	41.5	0.90	8.58	8.58	8.58	0.47	0.80	± 12.0 %
1750	40.1	1.37	7.55	7.55	7.55	0.52	0.87	± 12.0 %
1900	40.0	1.40	7.25	7.25	7.25	0.43	0.87	± 12.0 %
2300	39.5	1.67	7.11	7.11	7.11	0.45	0.86	± 12.0 %
2450	39.2	1.80	6.85	6.85	6.85	0.47	0.85	± 12.0 %
2600	39.0	1.96	6.60	6.60	6.60	0.41	0.86	± 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. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. 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.

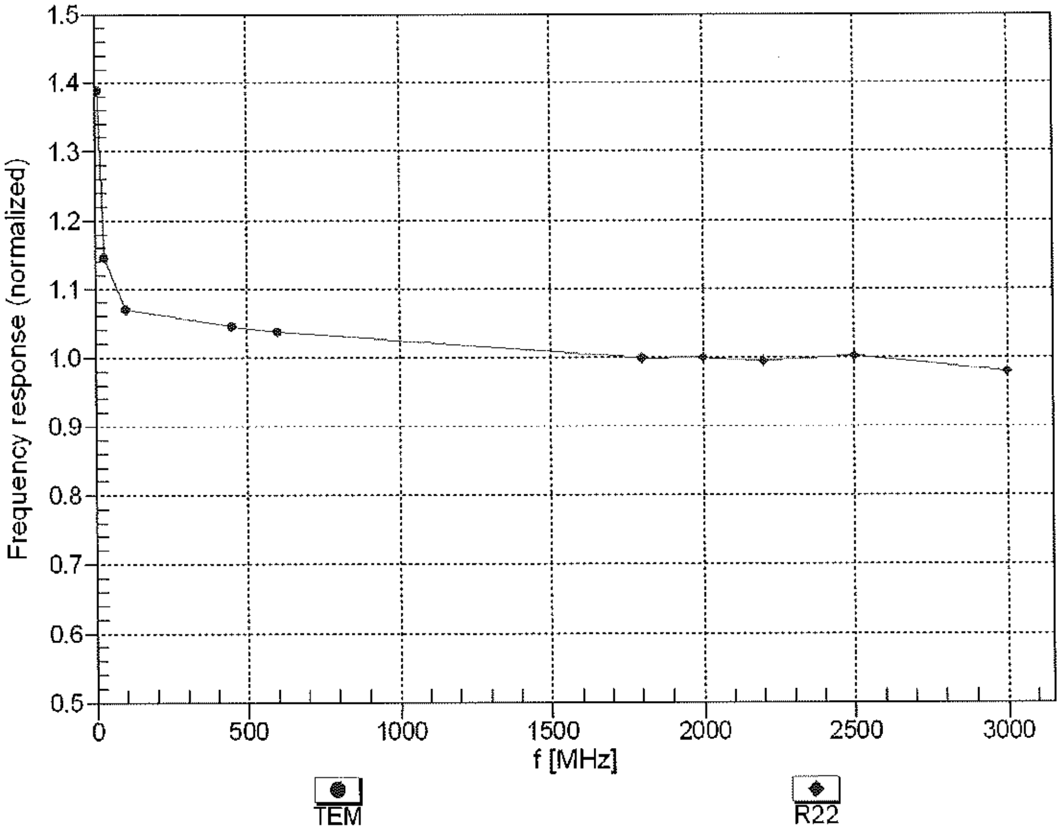
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

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	8.49	8.49	8.49	0.49	0.81	± 12.0 %
835	55.2	0.97	8.27	8.27	8.27	0.29	1.03	± 12.0 %
1750	53.4	1.49	6.93	6.93	6.93	0.41	0.87	± 12.0 %
1900	53.3	1.52	6.72	6.72	6.72	0.35	0.87	± 12.0 %
2300	52.9	1.81	6.62	6.62	6.62	0.34	0.86	± 12.0 %
2450	52.7	1.95	6.60	6.60	6.60	0.40	0.86	± 12.0 %
2600	52.5	2.16	6.35	6.35	6.35	0.37	0.90	± 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. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

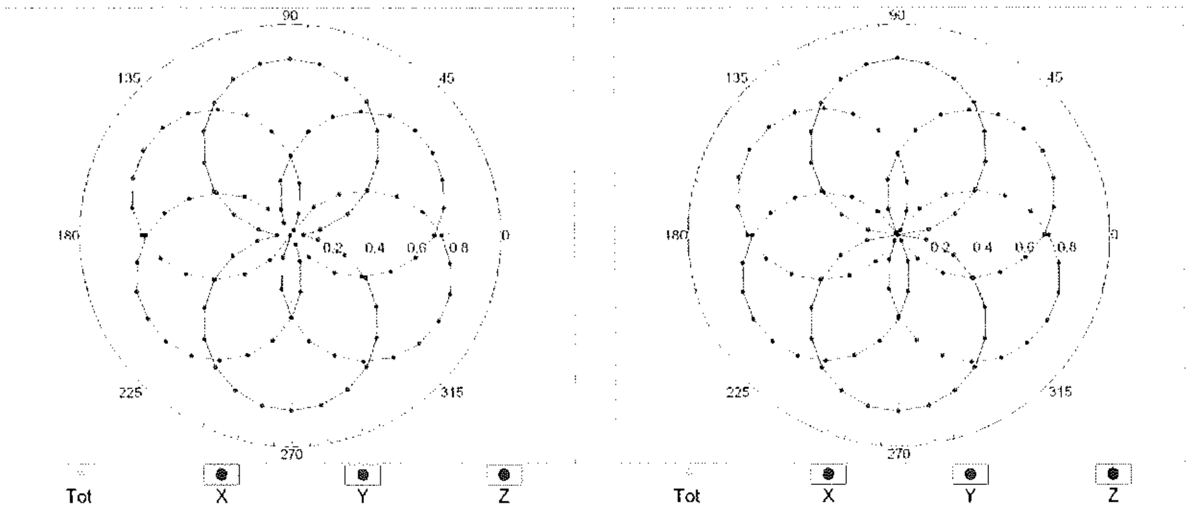
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

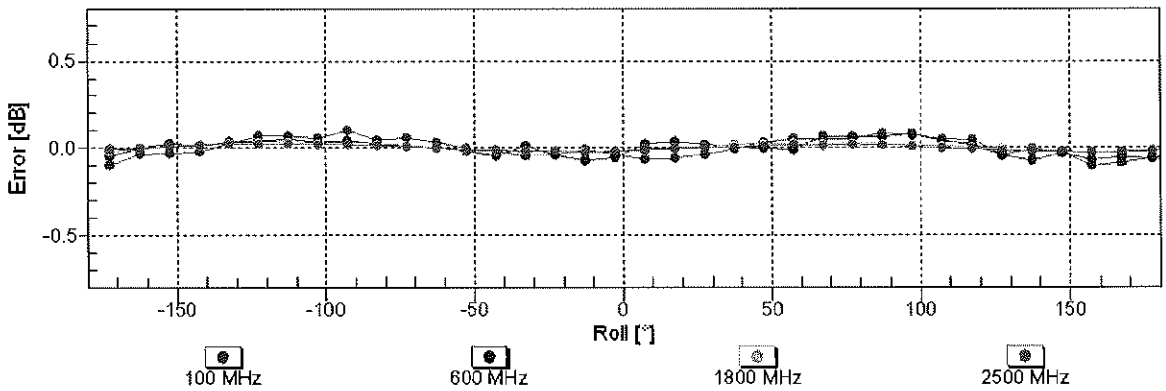


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM f=1800 MHz,R22





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)