



SAR EVALUATION REPORT

Applicant Name:

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

Date of Testing:

08/10/15 – 08/31/15

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

0Y1508101525-R1.ZNF

FCC ID:

ZNFVS990

APPLICANT:

LG ELECTRONICS MOBILECOMM U.S.A., INC.

DUT Type:

Portable Handset

Application Type:

Certification

FCC Rule Part(s):

CFR §2.1093

Model(s):

LG-VS990; LGVS990; VS990; LG-VS990W; LGVS990W; VS990W

Equipment Class	Band & Mode	Tx Frequency	SAR			10 gm Phablet (W/kg)
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)	
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.35	0.66	0.66	
PCE	UMTS 850	826.40 - 846.60 MHz	0.25	0.45	0.45	
PCE	Cell. CDMA/EVDO	824.70 - 848.31 MHz	0.27	0.43	0.40	
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.21	0.27	
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.15	0.47	0.68	
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	0.15	0.44	0.58	
PCE	LTE Band 13	779.5 - 784.5 MHz	0.28	0.46	0.51	
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.25	0.45	0.45	
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.15	0.48	0.51	
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	0.17	0.44	0.69	
PCE	LTE Band 7	2502.5 - 2567.5 MHz	0.16	1.00	1.20	
DTS	2.4 GHz WLAN	2412 - 2462 MHz	1.05	0.16	0.19	
NII	U-NII-1	5180 - 5240 MHz				
NII	U-NII-2A	5260 - 5320 MHz	0.23	0.52		0.73
NII	U-NII-2C	5500 - 5720 MHz	0.17	0.51		0.65
NII	U-NII-3	5745 - 5825 MHz	0.44	0.52	0.52	
DSS/DTS	Bluetooth	2402 - 2480 MHz	N/A	< 0.1		N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.40	1.52	1.52	

Note: This revised Test Report (S/N: 0Y1508101525-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 1.9 of this report; for North American frequency bands only.

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


Randy Ortanez
President



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

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 1 of 80

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

1	DEVICE UNDER TEST	3
2	LTE INFORMATION	10
3	INTRODUCTION	11
4	DOSIMETRIC ASSESSMENT	12
5	DEFINITION OF REFERENCE POINTS	13
6	TEST CONFIGURATION POSITIONS FOR HANDSETS	14
7	RF EXPOSURE LIMITS	17
8	FCC MEASUREMENT PROCEDURES.....	18
9	RF CONDUCTED POWERS.....	23
10	SYSTEM VERIFICATION.....	51
11	SAR DATA SUMMARY	55
12	FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS.....	68
13	ADDITIONAL TESTING PER FCC GUIDANCE	73
14	SAR MEASUREMENT VARIABILITY	74
15	EQUIPMENT LIST.....	75
16	MEASUREMENT UNCERTAINTIES	76
17	CONCLUSION.....	78
18	REFERENCES	79
APPENDIX A: SAR TEST PLOTS		
APPENDIX B: SAR DIPOLE VERIFICATION PLOTS		
APPENDIX C: PROBE AND DIPOLE CALIBRATION CERTIFICATES		
APPENDIX D: SAR TISSUE SPECIFICATIONS		
APPENDIX E: SAR SYSTEM VALIDATION		
APPENDIX F: DUT ANTENNA DIAGRAM & SAR TEST SETUP PHOTOGRAPHS		

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 2 of 80	

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
UMTS 850	Voice/Data	826.40 - 846.60 MHz
Cell. CDMA/EVDO	Voice/Data	824.70 - 848.31 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 7	Voice/Data	2502.5 - 2567.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

1.2 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 D01v05.

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 TX Slot	1 TX Slots	2 TX Slots	1 TX Slots	2 TX Slots
GSM/GPRS/EDGE 850	Maximum	33.2	33.2	31.2	27.2	26.2
	Nominal	32.7	32.7	30.7	26.7	25.7
GSM/GPRS/EDGE 1900	Maximum	30.2	30.2	28.2	26.2	25.2
	Nominal	29.7	29.7	27.7	25.7	24.7

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA
UMTS Band 5 (850 MHz)	Maximum	24.2	24.2	24.2
	Nominal	23.7	23.7	23.7
UMTS Band 2 (1900 MHz)	Maximum	24.2	24.2	24.2
	Nominal	23.7	23.7	23.7

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 3 of 80

Mode / Band		Modulated Average (dBm)
Cell. CDMA/EVDO	Maximum	24.7
	Nominal	24.2
PCS CDMA/EVDO	Maximum	24.7
	Nominal	24.2

Mode / Band		Modulated Average (dBm)
LTE Band 13	Maximum	24.7
	Nominal	24.2
LTE Band 5 (Cell)	Maximum	24.7
	Nominal	24.2
LTE Band 4 (AWS)	Maximum	25.2
	Nominal	24.7
LTE Band 2 (PCS)	Maximum	25.2
	Nominal	24.7
LTE Band 7	Maximum	24.2
	Nominal	23.7

Mode / Band		Channel	Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	1	17.0
	Nominal		16.0
	Maximum	2~10	17.5
	Nominal		16.5
	Maximum	11	17.0
	Nominal		16.0
IEEE 802.11g (2.4 GHz)	Maximum	1	14.0
	Nominal		13.0
	Maximum	2~10	15.5
	Nominal		14.5
	Maximum	11	13.0
	Nominal		12.0
IEEE 802.11n (2.4 GHz)	Maximum	1	13.0
	Nominal		12.0
	Maximum	2~10	15.0
	Nominal		14.0
	Maximum	11	12.0
	Nominal		11.0
Bluetooth	Maximum		9.5
	Nominal		8.5
Bluetooth LE	Maximum		6.0

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 4 of 80

Mode / Band		Channel	Modulated Average (dBm)
			20 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	36	14.0
	Nominal		13.0
	Maximum	40~60	15.0
	Nominal		14.0
	Maximum	64	14.0
	Nominal		13.0
	Maximum	100	13.0
	Nominal		12.0
	Maximum	104~161	15.0
	Nominal		14.0
	Maximum	165	15.0
	Nominal		14.0
IEEE 802.11n (5 GHz)	Maximum	36	13.0
	Nominal		12.0
	Maximum	40~60	15.0
	Nominal		14.0
	Maximum	64	13.0
	Nominal		12.0
	Maximum	100	13.0
	Nominal		12.0
	Maximum	104~161	15.0
	Nominal		14.0
	Maximum	165	14.0
	Nominal		13.0
IEEE 802.11ac (5 GHz)	Maximum	36	13.0
	Nominal		12.0
	Maximum	40~60	15.0
	Nominal		14.0
	Maximum	64	13.0
	Nominal		12.0
	Maximum	100	12.0
	Nominal		11.0
	Maximum	104~161	15.0
	Nominal		14.0
	Maximum	165	14.0
	Nominal		13.0

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 5 of 80

Mode / Band		Channel	Modulated Average (dBm)	Channel	Modulated Average (dBm)
			40 MHz Bandwidth		80 MHz Bandwidth
IEEE 802.11n (5 GHz)	Maximum	38	12.0		
	Nominal		11.0		
	Maximum	46~54	13.0		
	Nominal		12.0		
	Maximum	62	12.0		
	Nominal		11.0		
	Maximum	102	11.0		
	Nominal		10.0		
	Maximum	110~159	13.0		
	Nominal		12.0		
IEEE 802.11ac (5 GHz)	Maximum	38	12.0	42	11.0
	Nominal		11.0		10.0
	Maximum	46~54	13.0	58	10.0
	Nominal		12.0		9.0
	Maximum	62	12.0	106	10.0
	Nominal		11.0		9.0
	Maximum	102	11.0	138~155	11.0
	Nominal		10.0		10.0
	Maximum	110~159	13.0		
	Nominal		12.0		

1.3 DUT Antenna Locations

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

Table 1-1
Sides for SAR Testing

Device Sides/Edges for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
Cell. EVDO	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Yes	Yes	No	Yes	No	Yes
PCS EVDO	Yes	Yes	No	Yes	No	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	Yes	Yes	No	Yes	No	Yes
LTE Band 7	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR or Phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02 guidance, page 2 and FCC KDB 648474 D04v01r02. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-1, U-NII-2A and U-NII-2C WLAN operations are disabled.

1.4 Near Field Communications (NFC) Antenna

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

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 6 of 80

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D05v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-1 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

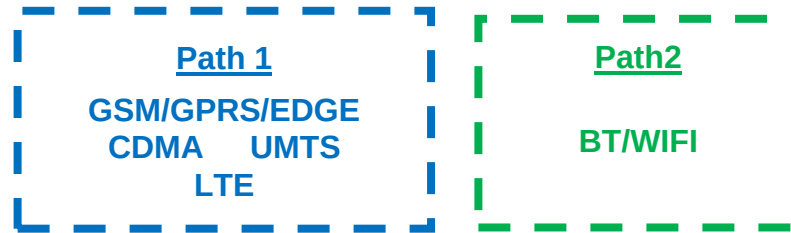


Figure 1-1
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05 3) procedures.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Phablet	Notes
1	1x CDMA voice + 2.4 GHz Wi-Fi	Yes	Yes	N/A	Yes	
2	1x CDMA voice + 5 GHz Wi-Fi	Yes	Yes	N/A	Yes	
3	1x CDMA voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
4	GSM voice + 2.4 GHz Wi-Fi	Yes	Yes	N/A	Yes	
5	GSM voice + 5 GHz Wi-Fi	Yes	Yes	N/A	Yes	
6	GSM voice + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
7	UMTS + 2.4 GHz Wi-Fi	Yes	Yes	Yes	Yes	
8	UMTS + 5 GHz Wi-Fi	Yes	Yes	Yes	Yes	
9	UMTS + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
10	LTE + 2.4 GHz Wi-Fi	Yes	Yes	Yes	Yes	
11	LTE + 5 GHz Wi-Fi	Yes	Yes	Yes	Yes	
12	LTE + 2.4 GHz Bluetooth	N/A	Yes	N/A	Yes	
13	CDMA/EVDO data + 2.4 GHz Wi-Fi	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
14	CDMA/EVDO data + 5 GHz Wi-Fi	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
15	CDMA/EVDO data + 2.4 GHz Bluetooth	N/A	Yes*	N/A	Yes	*-Pre-installed VOIP applications are considered.
16	GPRS/EDGE + 2.4 GHz Wi-Fi	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
17	GPRS/EDGE + 5 GHz Wi-Fi	Yes*	Yes*	Yes	Yes	*-Pre-installed VOIP applications are considered.
18	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	Yes*	N/A	Yes	*-Pre-installed VOIP applications are considered.

1. All licensed modes share the same antenna path and cannot transmit simultaneously.
2. 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.
3. Per the manufacturer, WIFI Direct is expected to be used in conjunction with a held-to-ear or body-worn accessory voice call.
4. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII-2A, and U-NII-2C were not evaluated for wireless router conditions.
5. This device supports VoLTE.
6. 2.4 GHz Bluetooth cannot transmit simultaneously with 2.4 GHz WLAN or 5 GHz WLAN.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: OY1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 7 of 80

1.6 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A & U-NII-2C WIFI, only 2.4 GHz DTS and U-NII-3 WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02.

This device supports IEEE 802.11ac with the following features:

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

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg for 1g SAR and less than 3.0 W/kg for 10g SAR, SAR is not required for U-NII-1 band according to FCC KDB 248227 D01v02r01.

Per FCC KDB 447498 D01v05, the 10g SAR exclusion threshold for distances <50mm is defined by the following equation:

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

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; $[(9/5) * \sqrt{2.480}] = 2.8 < 7.5$. Per KDB Publication 447498 D01v05, the maximum power of the channel was rounded to the nearest mW before calculation.

Per FCC KDB Publication 648474 D04v01r02, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Because wireless router operations are not supported for U-NII-2A & U-NII-2C WLAN, Phablet SAR tests were required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1-g SAR > 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 D01v02.

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 D05v02r03.

This device supports LTE Carrier Aggregation (CA) in the downlink only. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r01, SAR for LTE CA operations was not needed since the maximum average output power in

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 8 of 80

LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

Per FCC KDB Publication 648474 D04v01r02, 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. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1-g SAR > 1.2 W/kg.

1.7 Power Reduction for SAR

There is no power reduction used for any band/mode implemented in this device for SAR purposes.

1.8 Wireless Charging Battery Cover

This DUT may be used with a standard battery cover or with an optional wireless charging battery cover. Per FCC KDB Publication 648474 D04v01r02, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the configuration with the highest reported SAR for each wireless technology, frequency band, operating mode, and exposure condition. Since reported SAR did not exceed 1.2 W/kg, additional testing with the wireless charging battery cover was not required.

1.9 Guidance Applied

- IEEE 1528-2003
- FCC KDB Publication 941225 D01v03, D05v02r03, D05Av01, D06v02 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r01 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v05r02 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r03, D02v01r01 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r02 (Phablet Procedures, Wireless Charging Cover)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)

1.10 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.

	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number	Phablet Serial Number
GSM/GPRS/EDGE 850	6851	6851	6851	-
UMTS 850	6851	6935	6935	-
Cell. CDMA/EVDO	6851	6851	6851	-
GSM/GPRS/EDGE 1900	6851	6851	6851	-
UMTS 1900	6851	6851	6851	-
PCS CDMA/EVDO	2332	6851	6851	-
LTE Band 13	6844	6844	6844	-
LTE Band 5 (Cell)	6844	6844	6844	-
LTE Band 4 (AWS)	6836	6844	6844	-
LTE Band 2 (PCS)	6844	6844	6844	-
LTE Band 7	6844	6844	6844	-
2.4 GHz WLAN	6935	6869	6869	-
5 GHz WLAN	6869	6869	6869	6869
Bluetooth	-	6869	-	-

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 9 of 80

2

LTE INFORMATION

LTE Information			
FCC ID	ZNFVS990		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 13 (779.5 - 784.5 MHz)		
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)		
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)		
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)		
	LTE Band 7 (2502.5 - 2567.5 MHz)		
Channel Bandwidths	LTE Band 13: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 7: 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
LTE Band 13: 5 MHz	779.5 (23205)	782 (23230)	784.5 (23255)
LTE Band 13: 10 MHz	782 (23230)	782 (23230)	782 (23230)
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	831 (20470)	836.5 (20525)	842.5 (20585)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)	1732.5 (20175)	1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)	1732.5 (20175)	1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)	1880 (18900)	1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)	1880 (18900)	1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	1880 (18900)	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)	1880 (18900)	1900 (19100)
LTE Band 7: 5 MHz	2502.5 (20775)	2535 (21100)	2567.5 (21425)
LTE Band 7: 10 MHz	2505 (20800)	2535 (21100)	2565 (21400)
LTE Band 7: 15 MHz	2507.5 (20825)	2535 (21100)	2562.5 (21375)
LTE Band 7: 20 MHz	2510 (20850)	2535 (21100)	2560 (21350)
UE Category	6		
Modulations Supported in UL	QPSK, 16QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES		
A-MPR (Additional MPR) disabled for SAR Testing?	YES		
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations		
LTE Release 10 Additional Information	This device does not support full CA features on 3GPP Release 10. It supports a maximum of 2 carriers in the downlink. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. Due to carrier capability, only the combinations listed above are supported. The following LTE Release 10 Features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WIFI Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.		

FCC ID: ZNFVS990				Reviewed by: Quality Manager
Document S/N: OY1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 10 of 80

3 INTRODUCTION

The FCC and Industry 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/m³)
- 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]

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 11 of 80

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01 and IEEE 1528-2013:

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 D01v01 (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 D01v01 (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.

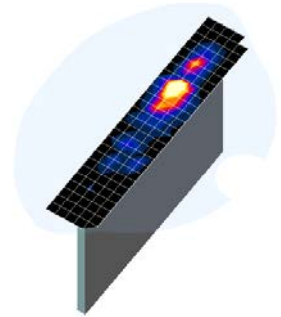


Figure 4-1
Sample SAR Area
Scan

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01*

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

*Also compliant to IEEE 1528-2013 Table 6

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 12 of 80

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].

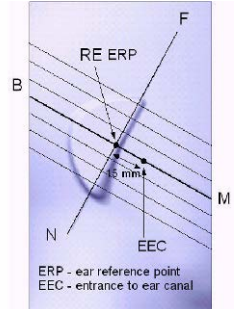


Figure 5-1
Close-Up Side view
of ERP

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 then 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

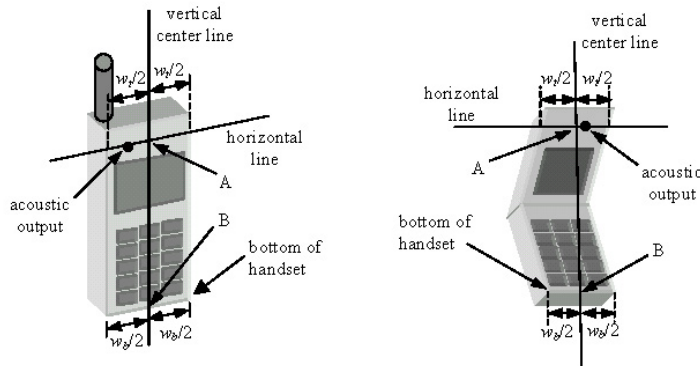


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 13 of 80

6

TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

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

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.

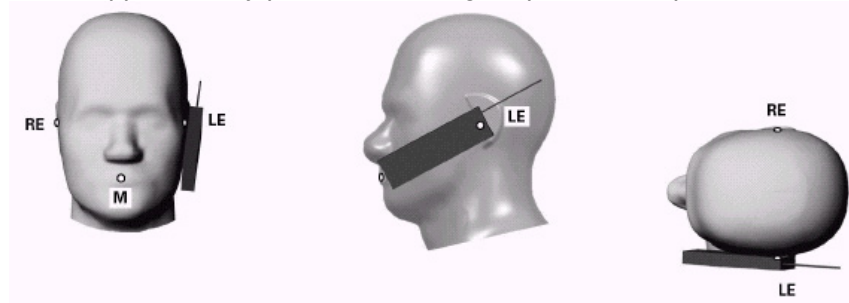


Figure 6-1 Front, Side and Top View of Cheek Position

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 with 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 / 15° 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 15 degrees.
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).

FCC ID: ZNFVS990	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 14 of 80

6.5 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 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v05 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v05, 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.

6.6 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 D06 v01 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) 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 D01v05 publication 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.

6.7 Phablet Configurations

For smart phones with a display diagonal dimension $> 15.0 \text{ cm}$ or an overall diagonal dimension $> 16.0 \text{ cm}$ 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 D04 v01r02 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 $\leq 25 \text{ mm}$ from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g SAR $> 1.2 \text{ W/kg}$.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 16 of 80

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 <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (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.

FCC ID: ZNFVS990	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT	 LG	Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 17 of 80	

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 D01v05, 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 D01v01r02.

8.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03, 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 D01v03 "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

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 18 of 80

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 for Handsets 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 for Handsets 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 D05v02r03 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.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 19 of 80

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 D05v02r03:

- a. Per Section 4.2.1, 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 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 4.2.1.
- c. Per Section 4.2.3, 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 4.2.4 and 4.3, 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 4.2.1 through 4.2.3 is less than or equal to $\frac{1}{2}$ 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 Downlink Carrier Aggregation

LTE Carrier Aggregation (CA) measurements are made in accordance to 3GPP TS 36.521-1 V10.4.0 (2012-12). The RRC connection is only handled by one cell, the Primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds the Secondary component carrier (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to release 8 specifications on the PCC. Additional output powers are measured using two carriers in the downlink for the release 8 configurations with the highest output power among all channels, RB configurations and bandwidths for each uplink band. Per FCC KDB Publication 941225 D05A v01r01, no SAR measurements are required when the average output power with downlink carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink carrier aggregation inactive.

8.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r01 for more details.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: OY1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 20 of 80

8.6.1 General Device Setup

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

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

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

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR.

8.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.

Unless band gap channels are permanently disabled, SAR must be considered for these channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

8.6.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g SAR and ≤ 1.0 W/kg for 10g SAR, 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 for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test positions are measured.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 21 of 80

8.6.5 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a 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 exposure configuration 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.

8.6.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.6.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 GHz bands, 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, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

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

8.6.8 Subsequent Test Configuration Procedures

For OFDM configurations, in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure, when applicable. When the highest reported SAR for the initial test configuration, adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power, is ≤ 1.2 W/kg, no additional SAR testing for the subsequent test configurations is required.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 22 of 80

9

RF CONDUCTED POWERS

9.1 CDMA Conducted Powers

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	1013	22H	824.7	24.57	24.53	24.50	24.56	24.52	24.55	24.50
	384	22H	836.52	24.58	24.58	24.55	24.57	24.55	24.60	24.56
	777	22H	848.31	24.50	24.50	24.49	24.50	24.50	24.58	24.55
PCS	25	24E	1851.25	24.63	24.63	24.56	24.63	24.63	24.61	24.59
	600	24E	1880	24.64	24.65	24.53	24.63	24.63	24.60	24.56
	1175	24E	1908.75	24.60	24.65	24.60	24.64	24.65	24.62	24.53

Note: RC1 is only applicable for IS-95 compatibility.

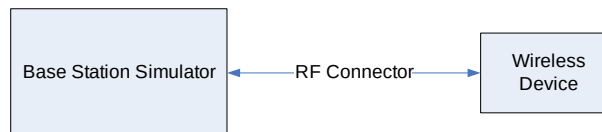


Figure 9-1
Power Measurement Setup

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 23 of 80

9.2 GSM Conducted Powers

		Maximum Burst-Averaged Output Power				
		Voice	GPRS/EDGE Data (GMSK)		EDGE Data (8-PSK)	
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot
GSM 850	128	33.11	33.13	30.93	27.11	26.13
	190	33.05	33.15	30.75	27.14	26.13
	251	33.16	33.02	30.82	27.14	26.10
GSM 1900	512	30.04	30.02	27.86	26.12	25.13
	661	30.20	30.19	28.20	26.16	25.14
	810	30.20	30.03	28.05	26.16	25.12
		Calculated Maximum Frame-Averaged Output Power				
		Voice	GPRS/EDGE Data (GMSK)		EDGE Data (8-PSK)	
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot
GSM 850	128	24.08	24.10	24.91	18.08	20.11
	190	24.02	24.12	24.73	18.11	20.11
	251	24.13	23.99	24.80	18.11	20.08
GSM 1900	512	21.01	20.99	21.84	17.09	19.11
	661	21.17	21.16	22.18	17.13	19.12
	810	21.17	21.00	22.03	17.13	19.10
GSM 850	Frame Avg. Targets:	23.67	23.67	24.68	17.67	19.68
GSM 1900		20.67	20.67	21.68	16.67	18.68

Note:

- 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.
- 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.
- EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

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

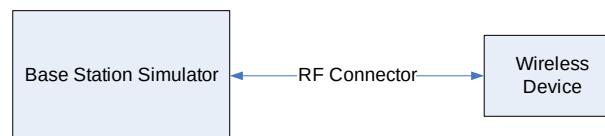


Figure 9-2
Power Measurement Setup

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 24 of 80

9.3 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	24.15	24.11	24.14	24.12	24.15	24.12	-
99		12.2 kbps AMR	24.15	24.10	24.16	24.14	24.17	24.01	-
6	HSDPA	Subtest 1	24.12	24.15	24.14	24.13	24.16	24.16	0
6		Subtest 2	24.11	24.15	24.11	24.11	24.15	24.13	0
6		Subtest 3	23.66	23.60	23.62	23.63	23.66	23.66	0.5
6		Subtest 4	23.67	23.65	23.64	23.62	23.65	23.51	0.5
6	HSPA	Subtest 1	23.73	23.70	24.04	23.66	23.70	23.68	0
6		Subtest 2	22.03	22.19	22.11	22.07	22.02	22.03	2
6		Subtest 3	22.74	22.76	22.92	22.66	22.72	22.54	1
6		Subtest 4	22.92	23.03	22.92	22.71	22.83	22.82	2
6		Subtest 5	23.37	23.33	23.56	23.25	23.26	23.23	0

It is expected by the manufacturer that MPR for some HSPA subtests may be up to 1 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.



Figure 9-3
Power Measurement Setup

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 25 of 80

9.4 LTE Conducted Powers

9.4.1 LTE Band 13

Table 9-1
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	10	QPSK	1	0	24.70	0	0
	782.0	23230	10	QPSK	1	25	24.46	0	0
	782.0	23230	10	QPSK	1	49	24.63	0	0
	782.0	23230	10	QPSK	25	0	23.07	0-1	1
	782.0	23230	10	QPSK	25	12	23.16	0-1	1
	782.0	23230	10	QPSK	25	25	23.11	0-1	1
	782.0	23230	10	QPSK	50	0	23.12	0-1	1
	782.0	23230	10	16QAM	1	0	23.33	0-1	1
	782.0	23230	10	16QAM	1	25	23.38	0-1	1
	782.0	23230	10	16QAM	1	49	23.38	0-1	1
	782.0	23230	10	16QAM	25	0	22.09	0-2	2
	782.0	23230	10	16QAM	25	12	22.14	0-2	2
	782.0	23230	10	16QAM	25	25	22.12	0-2	2
	782.0	23230	10	16QAM	50	0	22.13	0-2	2

Table 9-2
LTE Band 13 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	782.0	23230	5	QPSK	1	0	24.53	0	0
	782.0	23230	5	QPSK	1	12	24.46	0	0
	782.0	23230	5	QPSK	1	24	24.47	0	0
	782.0	23230	5	QPSK	12	0	23.15	0-1	1
	782.0	23230	5	QPSK	12	6	23.18	0-1	1
	782.0	23230	5	QPSK	12	13	23.19	0-1	1
	782.0	23230	5	QPSK	25	0	23.16	0-1	1
	782.0	23230	5	16-QAM	1	0	23.34	0-1	1
	782.0	23230	5	16-QAM	1	12	23.54	0-1	1
	782.0	23230	5	16-QAM	1	24	23.55	0-1	1
	782.0	23230	5	16-QAM	12	0	22.32	0-2	2
	782.0	23230	5	16-QAM	12	6	22.32	0-2	2
	782.0	23230	5	16-QAM	12	13	22.30	0-2	2
	782.0	23230	5	16-QAM	25	0	22.18	0-2	2

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.

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 26 of 80

9.4.2

LTE Band 5 (Cell)

Table 9-3
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	836.5	20525	10	QPSK	1	0	24.59	0	0
	836.5	20525	10	QPSK	1	25	24.56	0	0
	836.5	20525	10	QPSK	1	49	24.67	0	0
	836.5	20525	10	QPSK	25	0	23.54	0-1	1
	836.5	20525	10	QPSK	25	12	23.53	0-1	1
	836.5	20525	10	QPSK	25	25	23.57	0-1	1
	836.5	20525	10	QPSK	50	0	23.58	0-1	1
	836.5	20525	10	16QAM	1	0	23.46	0-1	1
	836.5	20525	10	16QAM	1	25	23.55	0-1	1
	836.5	20525	10	16QAM	1	49	23.50	0-1	1
	836.5	20525	10	16QAM	25	0	22.53	0-2	2
	836.5	20525	10	16QAM	25	12	22.55	0-2	2
	836.5	20525	10	16QAM	25	25	22.56	0-2	2
	836.5	20525	10	16QAM	50	0	22.58	0-2	2

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

FCC ID: ZNFVS990	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT	 LG	Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 27 of 80

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	826.5	20425	5	QPSK	1	0	24.53	0	0
	826.5	20425	5	QPSK	1	12	24.48	0	0
	826.5	20425	5	QPSK	1	24	24.53	0	0
	826.5	20425	5	QPSK	12	0	23.36	0-1	1
	826.5	20425	5	QPSK	12	6	23.35	0-1	1
	826.5	20425	5	QPSK	12	13	23.39	0-1	1
	826.5	20425	5	QPSK	25	0	23.36	0-1	1
	826.5	20425	5	16-QAM	1	0	23.42	0-1	1
	826.5	20425	5	16-QAM	1	12	23.39	0-1	1
	826.5	20425	5	16-QAM	1	24	23.45	0-1	1
	826.5	20425	5	16-QAM	12	0	22.48	0-2	2
	826.5	20425	5	16-QAM	12	6	22.50	0-2	2
	826.5	20425	5	16-QAM	12	13	22.51	0-2	2
Mid	836.5	20525	5	QPSK	1	0	24.52	0	0
	836.5	20525	5	QPSK	1	12	24.56	0	0
	836.5	20525	5	QPSK	1	24	24.51	0	0
	836.5	20525	5	QPSK	12	0	23.47	0-1	1
	836.5	20525	5	QPSK	12	6	23.52	0-1	1
	836.5	20525	5	QPSK	12	13	23.56	0-1	1
	836.5	20525	5	QPSK	25	0	23.44	0-1	1
	836.5	20525	5	16-QAM	1	0	23.23	0-1	1
	836.5	20525	5	16-QAM	1	12	23.28	0-1	1
	836.5	20525	5	16-QAM	1	24	23.28	0-1	1
	836.5	20525	5	16-QAM	12	0	22.51	0-2	2
	836.5	20525	5	16-QAM	12	6	22.56	0-2	2
	836.5	20525	5	16-QAM	12	13	22.61	0-2	2
	836.5	20525	5	16-QAM	25	0	22.52	0-2	2
High	846.5	20625	5	QPSK	1	0	24.65	0	0
	846.5	20625	5	QPSK	1	12	24.59	0	0
	846.5	20625	5	QPSK	1	24	24.53	0	0
	846.5	20625	5	QPSK	12	0	23.45	0-1	1
	846.5	20625	5	QPSK	12	6	23.51	0-1	1
	846.5	20625	5	QPSK	12	13	23.45	0-1	1
	846.5	20625	5	QPSK	25	0	23.43	0-1	1
	846.5	20625	5	16-QAM	1	0	23.05	0-1	1
	846.5	20625	5	16-QAM	1	12	23.01	0-1	1
	846.5	20625	5	16-QAM	1	24	22.94	0-1	1
	846.5	20625	5	16-QAM	12	0	22.37	0-2	2
	846.5	20625	5	16-QAM	12	6	22.41	0-2	2
	846.5	20625	5	16-QAM	12	13	22.38	0-2	2
	846.5	20625	5	16-QAM	25	0	22.39	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 28 of 80

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	825.5	20415	3	QPSK	1	0	24.54	0	0
	825.5	20415	3	QPSK	1	7	24.52	0	0
	825.5	20415	3	QPSK	1	14	24.34	0	0
	825.5	20415	3	QPSK	8	0	23.32	0-1	1
	825.5	20415	3	QPSK	8	4	23.32	0-1	1
	825.5	20415	3	QPSK	8	7	23.37	0-1	1
	825.5	20415	3	QPSK	15	0	23.34	0-1	1
	825.5	20415	3	16-QAM	1	0	23.26	0-1	1
	825.5	20415	3	16-QAM	1	7	23.41	0-1	1
	825.5	20415	3	16-QAM	1	14	23.25	0-1	1
	825.5	20415	3	16-QAM	8	0	22.47	0-2	2
	825.5	20415	3	16-QAM	8	4	22.48	0-2	2
	825.5	20415	3	16-QAM	8	7	22.41	0-2	2
	825.5	20415	3	16-QAM	15	0	22.37	0-2	2
Mid	836.5	20525	3	QPSK	1	0	24.59	0	0
	836.5	20525	3	QPSK	1	7	24.65	0	0
	836.5	20525	3	QPSK	1	14	24.62	0	0
	836.5	20525	3	QPSK	8	0	23.49	0-1	1
	836.5	20525	3	QPSK	8	4	23.51	0-1	1
	836.5	20525	3	QPSK	8	7	23.48	0-1	1
	836.5	20525	3	QPSK	15	0	23.50	0-1	1
	836.5	20525	3	16-QAM	1	0	23.37	0-1	1
	836.5	20525	3	16-QAM	1	7	23.54	0-1	1
	836.5	20525	3	16-QAM	1	14	23.45	0-1	1
	836.5	20525	3	16-QAM	8	0	22.44	0-2	2
	836.5	20525	3	16-QAM	8	4	22.53	0-2	2
	836.5	20525	3	16-QAM	8	7	22.50	0-2	2
	836.5	20525	3	16-QAM	15	0	22.51	0-2	2
High	847.5	20635	3	QPSK	1	0	24.70	0	0
	847.5	20635	3	QPSK	1	7	24.68	0	0
	847.5	20635	3	QPSK	1	14	24.62	0	0
	847.5	20635	3	QPSK	8	0	23.39	0-1	1
	847.5	20635	3	QPSK	8	4	23.49	0-1	1
	847.5	20635	3	QPSK	8	7	23.35	0-1	1
	847.5	20635	3	QPSK	15	0	23.38	0-1	1
	847.5	20635	3	16-QAM	1	0	23.55	0-1	1
	847.5	20635	3	16-QAM	1	7	23.67	0-1	1
	847.5	20635	3	16-QAM	1	14	23.32	0-1	1
	847.5	20635	3	16-QAM	8	0	22.33	0-2	2
	847.5	20635	3	16-QAM	8	4	22.40	0-2	2
	847.5	20635	3	16-QAM	8	7	22.33	0-2	2
	847.5	20635	3	16-QAM	15	0	22.33	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 29 of 80

Table 9-6
LTE Band 5 (Cell) Conducted Powers – 1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	824.7	20407	1.4	QPSK	1	0	24.56	0	0
	824.7	20407	1.4	QPSK	1	2	24.62	0	0
	824.7	20407	1.4	QPSK	1	5	24.44	0	0
	824.7	20407	1.4	QPSK	3	0	24.43	0	0
	824.7	20407	1.4	QPSK	3	2	24.46	0	0
	824.7	20407	1.4	QPSK	3	3	24.40	0	0
	824.7	20407	1.4	QPSK	6	0	23.38	0-1	1
	824.7	20407	1.4	16-QAM	1	0	22.97	0-1	1
	824.7	20407	1.4	16-QAM	1	2	23.55	0-1	1
	824.7	20407	1.4	16-QAM	1	5	23.42	0-1	1
	824.7	20407	1.4	16-QAM	3	0	23.11	0-1	1
	824.7	20407	1.4	16-QAM	3	2	23.12	0-1	1
	824.7	20407	1.4	16-QAM	3	3	23.05	0-1	1
	824.7	20407	1.4	16-QAM	6	0	22.36	0-2	2
Mid	836.5	20525	1.4	QPSK	1	0	24.42	0	0
	836.5	20525	1.4	QPSK	1	2	24.50	0	0
	836.5	20525	1.4	QPSK	1	5	24.43	0	0
	836.5	20525	1.4	QPSK	3	0	24.39	0	0
	836.5	20525	1.4	QPSK	3	2	24.48	0	0
	836.5	20525	1.4	QPSK	3	3	24.42	0	0
	836.5	20525	1.4	QPSK	6	0	23.34	0-1	1
	836.5	20525	1.4	16-QAM	1	0	23.29	0-1	1
	836.5	20525	1.4	16-QAM	1	2	23.39	0-1	1
	836.5	20525	1.4	16-QAM	1	5	23.33	0-1	1
	836.5	20525	1.4	16-QAM	3	0	22.99	0-1	1
	836.5	20525	1.4	16-QAM	3	2	23.10	0-1	1
	836.5	20525	1.4	16-QAM	3	3	23.06	0-1	1
	836.5	20525	1.4	16-QAM	6	0	22.53	0-2	2
High	848.3	20643	1.4	QPSK	1	0	24.49	0	0
	848.3	20643	1.4	QPSK	1	2	24.61	0	0
	848.3	20643	1.4	QPSK	1	5	24.55	0	0
	848.3	20643	1.4	QPSK	3	0	24.30	0	0
	848.3	20643	1.4	QPSK	3	2	24.29	0	0
	848.3	20643	1.4	QPSK	3	3	24.29	0	0
	848.3	20643	1.4	QPSK	6	0	23.18	0-1	1
	848.3	20643	1.4	16-QAM	1	0	23.40	0-1	1
	848.3	20643	1.4	16-QAM	1	2	23.45	0-1	1
	848.3	20643	1.4	16-QAM	1	5	23.31	0-1	1
	848.3	20643	1.4	16-QAM	3	0	22.93	0-1	1
	848.3	20643	1.4	16-QAM	3	2	22.97	0-1	1
	848.3	20643	1.4	16-QAM	3	3	22.96	0-1	1
	848.3	20643	1.4	16-QAM	6	0	22.18	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 30 of 80

9.4.3

LTE Band 4 (AWS)

Table 9-7

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Mid	1732.5	20175	20	QPSK	1	0	25.05	0	0
	1732.5	20175	20	QPSK	1	50	25.08	0	0
	1732.5	20175	20	QPSK	1	99	25.20	0	0
	1732.5	20175	20	QPSK	50	0	23.66	0-1	1
	1732.5	20175	20	QPSK	50	25	23.62	0-1	1
	1732.5	20175	20	QPSK	50	50	23.80	0-1	1
	1732.5	20175	20	QPSK	100	0	23.67	0-1	1
	1732.5	20175	20	16QAM	1	0	23.71	0-1	1
	1732.5	20175	20	16QAM	1	50	23.82	0-1	1
	1732.5	20175	20	16QAM	1	99	23.91	0-1	1
	1732.5	20175	20	16QAM	50	0	22.60	0-2	2
	1732.5	20175	20	16QAM	50	25	22.59	0-2	2
	1732.5	20175	20	16QAM	50	50	22.78	0-2	2
	1732.5	20175	20	16QAM	100	0	22.66	0-2	2

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

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 31 of 80

Table 9-8
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1717.5	20025	15	QPSK	1	0	25.20	0	0
	1717.5	20025	15	QPSK	1	36	24.93	0	0
	1717.5	20025	15	QPSK	1	74	25.11	0	0
	1717.5	20025	15	QPSK	36	0	23.67	0-1	1
	1717.5	20025	15	QPSK	36	18	23.63	0-1	1
	1717.5	20025	15	QPSK	36	37	23.74	0-1	1
	1717.5	20025	15	QPSK	75	0	23.67	0-1	1
	1717.5	20025	15	16QAM	1	0	23.76	0-1	1
	1717.5	20025	15	16QAM	1	36	23.65	0-1	1
	1717.5	20025	15	16QAM	1	74	23.60	0-1	1
	1717.5	20025	15	16QAM	36	0	22.62	0-2	2
	1717.5	20025	15	16QAM	36	18	22.62	0-2	2
	1717.5	20025	15	16QAM	36	37	22.74	0-2	2
	1717.5	20025	15	16QAM	75	0	22.67	0-2	2
Mid	1732.5	20175	15	QPSK	1	0	24.82	0	0
	1732.5	20175	15	QPSK	1	36	24.97	0	0
	1732.5	20175	15	QPSK	1	74	24.89	0	0
	1732.5	20175	15	QPSK	36	0	23.66	0-1	1
	1732.5	20175	15	QPSK	36	18	23.69	0-1	1
	1732.5	20175	15	QPSK	36	37	23.64	0-1	1
	1732.5	20175	15	QPSK	75	0	23.62	0-1	1
	1732.5	20175	15	16QAM	1	0	23.52	0-1	1
	1732.5	20175	15	16QAM	1	36	23.51	0-1	1
	1732.5	20175	15	16QAM	1	74	23.63	0-1	1
	1732.5	20175	15	16QAM	36	0	22.57	0-2	2
	1732.5	20175	15	16QAM	36	18	22.66	0-2	2
	1732.5	20175	15	16QAM	36	37	22.58	0-2	2
	1732.5	20175	15	16QAM	75	0	22.61	0-2	2
High	1747.5	20325	15	QPSK	1	0	25.15	0	0
	1747.5	20325	15	QPSK	1	36	25.02	0	0
	1747.5	20325	15	QPSK	1	74	24.94	0	0
	1747.5	20325	15	QPSK	36	0	23.63	0-1	1
	1747.5	20325	15	QPSK	36	18	23.68	0-1	1
	1747.5	20325	15	QPSK	36	37	23.67	0-1	1
	1747.5	20325	15	QPSK	75	0	23.73	0-1	1
	1747.5	20325	15	16QAM	1	0	23.73	0-1	1
	1747.5	20325	15	16QAM	1	36	23.79	0-1	1
	1747.5	20325	15	16QAM	1	74	23.68	0-1	1
	1747.5	20325	15	16QAM	36	0	22.64	0-2	2
	1747.5	20325	15	16QAM	36	18	22.73	0-2	2
	1747.5	20325	15	16QAM	36	37	22.73	0-2	2
	1747.5	20325	15	16QAM	75	0	22.69	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 32 of 80

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1715	20000	10	QPSK	1	0	25.03	0	0
	1715	20000	10	QPSK	1	25	24.83	0	0
	1715	20000	10	QPSK	1	49	24.90	0	0
	1715	20000	10	QPSK	25	0	23.56	0-1	1
	1715	20000	10	QPSK	25	12	23.69	0-1	1
	1715	20000	10	QPSK	25	25	23.62	0-1	1
	1715	20000	10	QPSK	50	0	23.62	0-1	1
	1715	20000	10	16QAM	1	0	23.75	0-1	1
	1715	20000	10	16QAM	1	25	23.59	0-1	1
	1715	20000	10	16QAM	1	49	23.65	0-1	1
	1715	20000	10	16QAM	25	0	22.57	0-2	2
	1715	20000	10	16QAM	25	12	22.69	0-2	2
	1715	20000	10	16QAM	25	25	22.61	0-2	2
	1715	20000	10	16QAM	50	0	22.63	0-2	2
Mid	1732.5	20175	10	QPSK	1	0	24.99	0	0
	1732.5	20175	10	QPSK	1	25	24.85	0	0
	1732.5	20175	10	QPSK	1	49	25.07	0	0
	1732.5	20175	10	QPSK	25	0	23.58	0-1	1
	1732.5	20175	10	QPSK	25	12	23.71	0-1	1
	1732.5	20175	10	QPSK	25	25	23.62	0-1	1
	1732.5	20175	10	QPSK	50	0	23.62	0-1	1
	1732.5	20175	10	16QAM	1	0	23.76	0-1	1
	1732.5	20175	10	16QAM	1	25	23.68	0-1	1
	1732.5	20175	10	16QAM	1	49	23.73	0-1	1
	1732.5	20175	10	16QAM	25	0	22.57	0-2	2
	1732.5	20175	10	16QAM	25	12	22.70	0-2	2
	1732.5	20175	10	16QAM	25	25	22.61	0-2	2
	1732.5	20175	10	16QAM	50	0	22.61	0-2	2
High	1750	20350	10	QPSK	1	0	25.17	0	0
	1750	20350	10	QPSK	1	25	25.10	0	0
	1750	20350	10	QPSK	1	49	24.99	0	0
	1750	20350	10	QPSK	25	0	23.80	0-1	1
	1750	20350	10	QPSK	25	12	23.81	0-1	1
	1750	20350	10	QPSK	25	25	23.69	0-1	1
	1750	20350	10	QPSK	50	0	23.80	0-1	1
	1750	20350	10	16QAM	1	0	23.79	0-1	1
	1750	20350	10	16QAM	1	25	23.84	0-1	1
	1750	20350	10	16QAM	1	49	23.65	0-1	1
	1750	20350	10	16QAM	25	0	22.78	0-2	2
	1750	20350	10	16QAM	25	12	22.81	0-2	2
	1750	20350	10	16QAM	25	25	22.74	0-2	2
	1750	20350	10	16QAM	50	0	22.83	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 33 of 80

Table 9-10
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1712.5	19975	5	QPSK	1	0	25.20	0	0
	1712.5	19975	5	QPSK	1	12	24.93	0	0
	1712.5	19975	5	QPSK	1	24	25.06	0	0
	1712.5	19975	5	QPSK	12	0	23.69	0-1	1
	1712.5	19975	5	QPSK	12	6	23.74	0-1	1
	1712.5	19975	5	QPSK	12	13	23.71	0-1	1
	1712.5	19975	5	QPSK	25	0	23.73	0-1	1
	1712.5	19975	5	16-QAM	1	0	23.86	0-1	1
	1712.5	19975	5	16-QAM	1	12	23.69	0-1	1
	1712.5	19975	5	16-QAM	1	24	23.73	0-1	1
	1712.5	19975	5	16-QAM	12	0	22.86	0-2	2
	1712.5	19975	5	16-QAM	12	6	22.86	0-2	2
	1712.5	19975	5	16-QAM	12	13	22.79	0-2	2
	1712.5	19975	5	16-QAM	25	0	22.75	0-2	2
Mid	1732.5	20175	5	QPSK	1	0	24.99	0	0
	1732.5	20175	5	QPSK	1	12	24.92	0	0
	1732.5	20175	5	QPSK	1	24	25.20	0	0
	1732.5	20175	5	QPSK	12	0	23.66	0-1	1
	1732.5	20175	5	QPSK	12	6	23.63	0-1	1
	1732.5	20175	5	QPSK	12	13	23.66	0-1	1
	1732.5	20175	5	QPSK	25	0	23.60	0-1	1
	1732.5	20175	5	16-QAM	1	0	23.95	0-1	1
	1732.5	20175	5	16-QAM	1	12	23.94	0-1	1
	1732.5	20175	5	16-QAM	1	24	24.05	0-1	1
	1732.5	20175	5	16-QAM	12	0	22.76	0-2	2
	1732.5	20175	5	16-QAM	12	6	22.74	0-2	2
	1732.5	20175	5	16-QAM	12	13	22.76	0-2	2
	1732.5	20175	5	16-QAM	25	0	22.61	0-2	2
High	1752.5	20375	5	QPSK	1	0	25.03	0	0
	1752.5	20375	5	QPSK	1	12	24.90	0	0
	1752.5	20375	5	QPSK	1	24	24.96	0	0
	1752.5	20375	5	QPSK	12	0	23.75	0-1	1
	1752.5	20375	5	QPSK	12	6	23.79	0-1	1
	1752.5	20375	5	QPSK	12	13	23.76	0-1	1
	1752.5	20375	5	QPSK	25	0	23.66	0-1	1
	1752.5	20375	5	16-QAM	1	0	23.75	0-1	1
	1752.5	20375	5	16-QAM	1	12	23.67	0-1	1
	1752.5	20375	5	16-QAM	1	24	23.75	0-1	1
	1752.5	20375	5	16-QAM	12	0	22.79	0-2	2
	1752.5	20375	5	16-QAM	12	6	22.85	0-2	2
	1752.5	20375	5	16-QAM	12	13	22.76	0-2	2
	1752.5	20375	5	16-QAM	25	0	22.75	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 34 of 80

Table 9-11
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1711.5	19965	3	QPSK	1	0	24.97	0	0
	1711.5	19965	3	QPSK	1	7	25.18	0	0
	1711.5	19965	3	QPSK	1	14	24.90	0	0
	1711.5	19965	3	QPSK	8	0	23.65	0-1	1
	1711.5	19965	3	QPSK	8	4	23.66	0-1	1
	1711.5	19965	3	QPSK	8	7	23.66	0-1	1
	1711.5	19965	3	QPSK	15	0	23.60	0-1	1
	1711.5	19965	3	16-QAM	1	0	23.65	0-1	1
	1711.5	19965	3	16-QAM	1	7	23.93	0-1	1
	1711.5	19965	3	16-QAM	1	14	23.73	0-1	1
	1711.5	19965	3	16-QAM	8	0	22.77	0-2	2
	1711.5	19965	3	16-QAM	8	4	22.74	0-2	2
	1711.5	19965	3	16-QAM	8	7	22.74	0-2	2
Mid	1732.5	20175	3	QPSK	1	0	24.92	0	0
	1732.5	20175	3	QPSK	1	7	24.83	0	0
	1732.5	20175	3	QPSK	1	14	24.98	0	0
	1732.5	20175	3	QPSK	8	0	23.60	0-1	1
	1732.5	20175	3	QPSK	8	4	23.58	0-1	1
	1732.5	20175	3	QPSK	8	7	23.59	0-1	1
	1732.5	20175	3	QPSK	15	0	23.57	0-1	1
	1732.5	20175	3	16-QAM	1	0	23.59	0-1	1
	1732.5	20175	3	16-QAM	1	7	23.68	0-1	1
	1732.5	20175	3	16-QAM	1	14	23.67	0-1	1
	1732.5	20175	3	16-QAM	8	0	22.59	0-2	2
	1732.5	20175	3	16-QAM	8	4	22.58	0-2	2
	1732.5	20175	3	16-QAM	8	7	22.57	0-2	2
	1732.5	20175	3	16-QAM	15	0	22.56	0-2	2
High	1753.5	20385	3	QPSK	1	0	25.15	0	0
	1753.5	20385	3	QPSK	1	7	25.06	0	0
	1753.5	20385	3	QPSK	1	14	25.03	0	0
	1753.5	20385	3	QPSK	8	0	23.79	0-1	1
	1753.5	20385	3	QPSK	8	4	23.82	0-1	1
	1753.5	20385	3	QPSK	8	7	23.56	0-1	1
	1753.5	20385	3	QPSK	15	0	23.70	0-1	1
	1753.5	20385	3	16-QAM	1	0	24.01	0-1	1
	1753.5	20385	3	16-QAM	1	7	24.14	0-1	1
	1753.5	20385	3	16-QAM	1	14	24.12	0-1	1
	1753.5	20385	3	16-QAM	8	0	22.79	0-2	2
	1753.5	20385	3	16-QAM	8	4	22.69	0-2	2
	1753.5	20385	3	16-QAM	8	7	22.73	0-2	2
	1753.5	20385	3	16-QAM	15	0	22.75	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 35 of 80

Table 9-12
LTE Band 4 (AWS) Conducted Powers – 1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1710.7	19957	1.4	QPSK	1	0	24.79	0	0
	1710.7	19957	1.4	QPSK	1	2	24.78	0	0
	1710.7	19957	1.4	QPSK	1	5	24.80	0	0
	1710.7	19957	1.4	QPSK	3	0	24.79	0	0
	1710.7	19957	1.4	QPSK	3	2	24.81	0	0
	1710.7	19957	1.4	QPSK	3	3	24.79	0	0
	1710.7	19957	1.4	QPSK	6	0	23.58	0-1	1
	1710.7	19957	1.4	16-QAM	1	0	23.95	0-1	1
	1710.7	19957	1.4	16-QAM	1	2	23.70	0-1	1
	1710.7	19957	1.4	16-QAM	1	5	23.94	0-1	1
	1710.7	19957	1.4	16-QAM	3	0	23.60	0-1	1
	1710.7	19957	1.4	16-QAM	3	2	23.60	0-1	1
	1710.7	19957	1.4	16-QAM	3	3	23.58	0-1	1
Mid	1710.7	19957	1.4	16-QAM	6	0	22.55	0-2	2
	1732.5	20175	1.4	QPSK	1	0	24.81	0	0
	1732.5	20175	1.4	QPSK	1	2	24.95	0	0
	1732.5	20175	1.4	QPSK	1	5	24.70	0	0
	1732.5	20175	1.4	QPSK	3	0	24.74	0	0
	1732.5	20175	1.4	QPSK	3	2	24.71	0	0
	1732.5	20175	1.4	QPSK	3	3	24.70	0	0
	1732.5	20175	1.4	QPSK	6	0	23.49	0-1	1
	1732.5	20175	1.4	16-QAM	1	0	23.60	0-1	1
	1732.5	20175	1.4	16-QAM	1	2	23.70	0-1	1
	1732.5	20175	1.4	16-QAM	1	5	23.69	0-1	1
	1732.5	20175	1.4	16-QAM	3	0	23.48	0-1	1
	1732.5	20175	1.4	16-QAM	3	2	23.49	0-1	1
	1732.5	20175	1.4	16-QAM	3	3	23.46	0-1	1
High	1732.5	20175	1.4	16-QAM	6	0	22.67	0-2	2
	1754.3	20393	1.4	QPSK	1	0	25.03	0	0
	1754.3	20393	1.4	QPSK	1	2	25.18	0	0
	1754.3	20393	1.4	QPSK	1	5	25.04	0	0
	1754.3	20393	1.4	QPSK	3	0	24.80	0	0
	1754.3	20393	1.4	QPSK	3	2	24.87	0	0
	1754.3	20393	1.4	QPSK	3	3	24.84	0	0
	1754.3	20393	1.4	QPSK	6	0	23.73	0-1	1
	1754.3	20393	1.4	16-QAM	1	0	24.05	0-1	1
	1754.3	20393	1.4	16-QAM	1	2	24.20	0-1	1
	1754.3	20393	1.4	16-QAM	1	5	24.14	0-1	1
	1754.3	20393	1.4	16-QAM	3	0	23.47	0-1	1
	1754.3	20393	1.4	16-QAM	3	2	23.66	0-1	1
	1754.3	20393	1.4	16-QAM	3	3	23.59	0-1	1
	1754.3	20393	1.4	16-QAM	6	0	22.63	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 36 of 80

9.4.4

LTE Band 2 (PCS)

Table 9-13

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1860	18700	20	QPSK	1	0	25.04	0	0
	1860	18700	20	QPSK	1	50	25.05	0	0
	1860	18700	20	QPSK	1	99	24.98	0	0
	1860	18700	20	QPSK	50	0	23.70	0-1	1
	1860	18700	20	QPSK	50	25	23.65	0-1	1
	1860	18700	20	QPSK	50	50	23.66	0-1	1
	1860	18700	20	QPSK	100	0	23.69	0-1	1
	1860	18700	20	16QAM	1	0	23.88	0-1	1
	1860	18700	20	16QAM	1	50	23.77	0-1	1
	1860	18700	20	16QAM	1	99	23.68	0-1	1
	1860	18700	20	16QAM	50	0	22.69	0-2	2
	1860	18700	20	16QAM	50	25	22.68	0-2	2
	1860	18700	20	16QAM	50	50	22.67	0-2	2
	1860	18700	20	16QAM	100	0	22.76	0-2	2
Mid	1880.0	18900	20	QPSK	1	0	25.08	0	0
	1880.0	18900	20	QPSK	1	50	25.18	0	0
	1880.0	18900	20	QPSK	1	99	25.10	0	0
	1880.0	18900	20	QPSK	50	0	23.75	0-1	1
	1880.0	18900	20	QPSK	50	25	23.72	0-1	1
	1880.0	18900	20	QPSK	50	50	23.82	0-1	1
	1880.0	18900	20	QPSK	100	0	23.81	0-1	1
	1880.0	18900	20	16QAM	1	0	23.84	0-1	1
	1880.0	18900	20	16QAM	1	50	24.11	0-1	1
	1880.0	18900	20	16QAM	1	99	23.96	0-1	1
	1880.0	18900	20	16QAM	50	0	22.75	0-2	2
	1880.0	18900	20	16QAM	50	25	22.74	0-2	2
	1880.0	18900	20	16QAM	50	50	22.82	0-2	2
	1880.0	18900	20	16QAM	100	0	22.83	0-2	2
High	1900	19100	20	QPSK	1	0	25.07	0	0
	1900	19100	20	QPSK	1	50	25.12	0	0
	1900	19100	20	QPSK	1	99	25.03	0	0
	1900	19100	20	QPSK	50	0	23.70	0-1	1
	1900	19100	20	QPSK	50	25	23.73	0-1	1
	1900	19100	20	QPSK	50	50	23.74	0-1	1
	1900	19100	20	QPSK	100	0	23.76	0-1	1
	1900	19100	20	16QAM	1	0	23.90	0-1	1
	1900	19100	20	16QAM	1	50	23.87	0-1	1
	1900	19100	20	16QAM	1	99	23.76	0-1	1
	1900	19100	20	16QAM	50	0	22.73	0-2	2
	1900	19100	20	16QAM	50	25	22.81	0-2	2
	1900	19100	20	16QAM	50	50	22.77	0-2	2
	1900	19100	20	16QAM	100	0	22.73	0-2	2

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 37 of 80

Table 9-14
LTE Band 2 (PCS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1857.5	18675	15	QPSK	1	0	25.19	0	0
	1857.5	18675	15	QPSK	1	36	25.14	0	0
	1857.5	18675	15	QPSK	1	74	25.13	0	0
	1857.5	18675	15	QPSK	36	0	23.59	0-1	1
	1857.5	18675	15	QPSK	36	18	23.63	0-1	1
	1857.5	18675	15	QPSK	36	37	23.61	0-1	1
	1857.5	18675	15	QPSK	75	0	23.52	0-1	1
	1857.5	18675	15	16QAM	1	0	23.78	0-1	1
	1857.5	18675	15	16QAM	1	36	23.73	0-1	1
	1857.5	18675	15	16QAM	1	74	23.81	0-1	1
	1857.5	18675	15	16QAM	36	0	22.57	0-2	2
	1857.5	18675	15	16QAM	36	18	22.63	0-2	2
Mid	1857.5	18675	15	16QAM	36	37	22.60	0-2	2
	1857.5	18675	15	16QAM	75	0	22.56	0-2	2
	1880.0	18900	15	QPSK	1	0	24.92	0	0
	1880.0	18900	15	QPSK	1	36	25.11	0	0
	1880.0	18900	15	QPSK	1	74	25.02	0	0
	1880.0	18900	15	QPSK	36	0	23.49	0-1	1
	1880.0	18900	15	QPSK	36	18	23.65	0-1	1
	1880.0	18900	15	QPSK	36	37	23.56	0-1	1
	1880.0	18900	15	QPSK	75	0	23.59	0-1	1
	1880.0	18900	15	16QAM	1	0	23.59	0-1	1
	1880.0	18900	15	16QAM	1	36	23.71	0-1	1
	1880.0	18900	15	16QAM	1	74	23.64	0-1	1
High	1880.0	18900	15	16QAM	36	0	22.45	0-2	2
	1880.0	18900	15	16QAM	36	18	22.59	0-2	2
	1880.0	18900	15	16QAM	36	37	22.55	0-2	2
	1880.0	18900	15	16QAM	75	0	22.59	0-2	2
	1902.5	19125	15	QPSK	1	0	25.01	0	0
	1902.5	19125	15	QPSK	1	36	25.01	0	0
	1902.5	19125	15	QPSK	1	74	24.88	0	0
	1902.5	19125	15	QPSK	36	0	23.53	0-1	1
	1902.5	19125	15	QPSK	36	18	23.51	0-1	1
	1902.5	19125	15	QPSK	36	37	23.43	0-1	1
	1902.5	19125	15	QPSK	75	0	23.48	0-1	1
	1902.5	19125	15	16QAM	1	0	24.07	0-1	1
	1902.5	19125	15	16QAM	1	36	23.76	0-1	1
	1902.5	19125	15	16QAM	1	74	23.71	0-1	1
	1902.5	19125	15	16QAM	36	0	22.50	0-2	2
	1902.5	19125	15	16QAM	36	18	22.57	0-2	2
	1902.5	19125	15	16QAM	36	37	22.42	0-2	2
	1902.5	19125	15	16QAM	75	0	22.48	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 38 of 80

Table 9-15
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1855	18650	10	QPSK	1	0	24.89	0	0
	1855	18650	10	QPSK	1	25	24.97	0	0
	1855	18650	10	QPSK	1	49	24.99	0	0
	1855	18650	10	QPSK	25	0	23.73	0-1	1
	1855	18650	10	QPSK	25	12	23.69	0-1	1
	1855	18650	10	QPSK	25	25	23.72	0-1	1
	1855	18650	10	QPSK	50	0	23.75	0-1	1
	1855	18650	10	16QAM	1	0	24.03	0-1	1
	1855	18650	10	16QAM	1	25	24.02	0-1	1
	1855	18650	10	16QAM	1	49	23.86	0-1	1
	1855	18650	10	16QAM	25	0	22.72	0-2	2
	1855	18650	10	16QAM	25	12	22.70	0-2	2
	1855	18650	10	16QAM	25	25	22.71	0-2	2
	1855	18650	10	16QAM	50	0	22.76	0-2	2
Mid	1880.0	18900	10	QPSK	1	0	25.15	0	0
	1880.0	18900	10	QPSK	1	25	25.19	0	0
	1880.0	18900	10	QPSK	1	49	25.19	0	0
	1880.0	18900	10	QPSK	25	0	23.77	0-1	1
	1880.0	18900	10	QPSK	25	12	23.80	0-1	1
	1880.0	18900	10	QPSK	25	25	23.70	0-1	1
	1880.0	18900	10	QPSK	50	0	23.72	0-1	1
	1880.0	18900	10	16QAM	1	0	23.90	0-1	1
	1880.0	18900	10	16QAM	1	25	23.89	0-1	1
	1880.0	18900	10	16QAM	1	49	23.80	0-1	1
	1880.0	18900	10	16QAM	25	0	22.75	0-2	2
	1880.0	18900	10	16QAM	25	12	22.78	0-2	2
	1880.0	18900	10	16QAM	25	25	22.69	0-2	2
	1880.0	18900	10	16QAM	50	0	22.69	0-2	2
High	1905	19150	10	QPSK	1	0	25.15	0	0
	1905	19150	10	QPSK	1	25	25.18	0	0
	1905	19150	10	QPSK	1	49	25.03	0	0
	1905	19150	10	QPSK	25	0	23.61	0-1	1
	1905	19150	10	QPSK	25	12	23.62	0-1	1
	1905	19150	10	QPSK	25	25	23.67	0-1	1
	1905	19150	10	QPSK	50	0	23.63	0-1	1
	1905	19150	10	16QAM	1	0	24.07	0-1	1
	1905	19150	10	16QAM	1	25	24.04	0-1	1
	1905	19150	10	16QAM	1	49	23.86	0-1	1
	1905	19150	10	16QAM	25	0	22.68	0-2	2
	1905	19150	10	16QAM	25	12	22.65	0-2	2
	1905	19150	10	16QAM	25	25	22.77	0-2	2
	1905	19150	10	16QAM	50	0	22.69	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 39 of 80

Table 9-16
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1852.5	18625	5	QPSK	1	0	25.20	0	0
	1852.5	18625	5	QPSK	1	12	25.12	0	0
	1852.5	18625	5	QPSK	1	24	25.19	0	0
	1852.5	18625	5	QPSK	12	0	23.71	0-1	1
	1852.5	18625	5	QPSK	12	6	23.79	0-1	1
	1852.5	18625	5	QPSK	12	13	23.76	0-1	1
	1852.5	18625	5	QPSK	25	0	23.77	0-1	1
	1852.5	18625	5	16-QAM	1	0	24.02	0-1	1
	1852.5	18625	5	16-QAM	1	12	24.07	0-1	1
	1852.5	18625	5	16-QAM	1	24	24.04	0-1	1
	1852.5	18625	5	16-QAM	12	0	22.87	0-2	2
	1852.5	18625	5	16-QAM	12	6	22.95	0-2	2
Mid	1852.5	18625	5	16-QAM	12	13	22.91	0-2	2
	1852.5	18625	5	16-QAM	25	0	22.84	0-2	2
	1880.0	18900	5	QPSK	1	0	25.16	0	0
	1880.0	18900	5	QPSK	1	12	25.05	0	0
	1880.0	18900	5	QPSK	1	24	25.05	0	0
	1880.0	18900	5	QPSK	12	0	23.88	0-1	1
	1880.0	18900	5	QPSK	12	6	23.88	0-1	1
	1880.0	18900	5	QPSK	12	13	23.80	0-1	1
	1880.0	18900	5	QPSK	25	0	23.83	0-1	1
	1880.0	18900	5	16-QAM	1	0	23.70	0-1	1
	1880.0	18900	5	16-QAM	1	12	23.66	0-1	1
	1880.0	18900	5	16-QAM	1	24	23.68	0-1	1
High	1880.0	18900	5	16-QAM	12	0	22.90	0-2	2
	1880.0	18900	5	16-QAM	12	6	22.93	0-2	2
	1880.0	18900	5	16-QAM	12	13	22.84	0-2	2
	1880.0	18900	5	16-QAM	25	0	22.95	0-2	2
	1907.5	19175	5	QPSK	1	0	25.07	0	0
	1907.5	19175	5	QPSK	1	12	25.17	0	0
	1907.5	19175	5	QPSK	1	24	25.07	0	0
	1907.5	19175	5	QPSK	12	0	23.69	0-1	1
	1907.5	19175	5	QPSK	12	6	23.74	0-1	1
	1907.5	19175	5	QPSK	12	13	23.67	0-1	1
	1907.5	19175	5	QPSK	25	0	23.73	0-1	1
	1907.5	19175	5	16-QAM	1	0	23.39	0-1	1
	1907.5	19175	5	16-QAM	1	12	23.53	0-1	1
	1907.5	19175	5	16-QAM	1	24	23.55	0-1	1
	1907.5	19175	5	16-QAM	12	0	22.77	0-2	2
	1907.5	19175	5	16-QAM	12	6	22.83	0-2	2
	1907.5	19175	5	16-QAM	12	13	22.69	0-2	2
	1907.5	19175	5	16-QAM	25	0	22.80	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 40 of 80

Table 9-17
LTE Band 2 (PCS) Conducted Powers - 3 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1851.5	18615	3	QPSK	1	0	25.00	0	0
	1851.5	18615	3	QPSK	1	7	25.19	0	0
	1851.5	18615	3	QPSK	1	14	25.20	0	0
	1851.5	18615	3	QPSK	8	0	23.76	0-1	1
	1851.5	18615	3	QPSK	8	4	23.74	0-1	1
	1851.5	18615	3	QPSK	8	7	23.78	0-1	1
	1851.5	18615	3	QPSK	15	0	23.67	0-1	1
	1851.5	18615	3	16-QAM	1	0	23.63	0-1	1
	1851.5	18615	3	16-QAM	1	7	23.89	0-1	1
	1851.5	18615	3	16-QAM	1	14	23.77	0-1	1
	1851.5	18615	3	16-QAM	8	0	22.88	0-2	2
	1851.5	18615	3	16-QAM	8	4	22.86	0-2	2
	1851.5	18615	3	16-QAM	8	7	22.85	0-2	2
	1851.5	18615	3	16-QAM	15	0	22.75	0-2	2
Mid	1880.0	18900	3	QPSK	1	0	25.19	0	0
	1880.0	18900	3	QPSK	1	7	25.19	0	0
	1880.0	18900	3	QPSK	1	14	25.19	0	0
	1880.0	18900	3	QPSK	8	0	23.77	0-1	1
	1880.0	18900	3	QPSK	8	4	23.89	0-1	1
	1880.0	18900	3	QPSK	8	7	23.83	0-1	1
	1880.0	18900	3	QPSK	15	0	23.86	0-1	1
	1880.0	18900	3	16-QAM	1	0	23.79	0-1	1
	1880.0	18900	3	16-QAM	1	7	23.90	0-1	1
	1880.0	18900	3	16-QAM	1	14	23.77	0-1	1
	1880.0	18900	3	16-QAM	8	0	22.76	0-2	2
	1880.0	18900	3	16-QAM	8	4	22.90	0-2	2
	1880.0	18900	3	16-QAM	8	7	22.82	0-2	2
	1880.0	18900	3	16-QAM	15	0	22.86	0-2	2
High	1908.5	19185	3	QPSK	1	0	25.18	0	0
	1908.5	19185	3	QPSK	1	7	25.17	0	0
	1908.5	19185	3	QPSK	1	14	25.20	0	0
	1908.5	19185	3	QPSK	8	0	23.76	0-1	1
	1908.5	19185	3	QPSK	8	4	23.82	0-1	1
	1908.5	19185	3	QPSK	8	7	23.80	0-1	1
	1908.5	19185	3	QPSK	15	0	23.81	0-1	1
	1908.5	19185	3	16-QAM	1	0	23.96	0-1	1
	1908.5	19185	3	16-QAM	1	7	23.98	0-1	1
	1908.5	19185	3	16-QAM	1	14	24.05	0-1	1
	1908.5	19185	3	16-QAM	8	0	22.82	0-2	2
	1908.5	19185	3	16-QAM	8	4	22.83	0-2	2
	1908.5	19185	3	16-QAM	8	7	22.76	0-2	2
	1908.5	19185	3	16-QAM	15	0	22.80	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT 	Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 41 of 80

Table 9-18
LTE Band 2 (PCS) Conducted Powers – 1.4 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	1850.7	18607	1.4	QPSK	1	0	24.95	0	0
	1850.7	18607	1.4	QPSK	1	2	25.07	0	0
	1850.7	18607	1.4	QPSK	1	5	24.87	0	0
	1850.7	18607	1.4	QPSK	3	0	24.90	0	0
	1850.7	18607	1.4	QPSK	3	2	24.99	0	0
	1850.7	18607	1.4	QPSK	3	3	24.82	0	0
	1850.7	18607	1.4	QPSK	6	0	23.84	0-1	1
	1850.7	18607	1.4	16-QAM	1	0	23.58	0-1	1
	1850.7	18607	1.4	16-QAM	1	2	23.88	0-1	1
	1850.7	18607	1.4	16-QAM	1	5	23.86	0-1	1
	1850.7	18607	1.4	16-QAM	3	0	23.51	0-1	1
	1850.7	18607	1.4	16-QAM	3	2	23.58	0-1	1
	1850.7	18607	1.4	16-QAM	3	3	23.49	0-1	1
	1850.7	18607	1.4	16-QAM	6	0	22.80	0-2	2
Mid	1880.0	18900	1.4	QPSK	1	0	24.93	0	0
	1880.0	18900	1.4	QPSK	1	2	25.03	0	0
	1880.0	18900	1.4	QPSK	1	5	24.98	0	0
	1880.0	18900	1.4	QPSK	3	0	24.84	0	0
	1880.0	18900	1.4	QPSK	3	2	24.98	0	0
	1880.0	18900	1.4	QPSK	3	3	24.92	0	0
	1880.0	18900	1.4	QPSK	6	0	23.89	0-1	1
	1880.0	18900	1.4	16-QAM	1	0	23.74	0-1	1
	1880.0	18900	1.4	16-QAM	1	2	23.92	0-1	1
	1880.0	18900	1.4	16-QAM	1	5	23.74	0-1	1
	1880.0	18900	1.4	16-QAM	3	0	23.56	0-1	1
	1880.0	18900	1.4	16-QAM	3	2	23.71	0-1	1
	1880.0	18900	1.4	16-QAM	3	3	23.66	0-1	1
	1880.0	18900	1.4	16-QAM	6	0	23.07	0-2	2
High	1909.3	19193	1.4	QPSK	1	0	25.11	0	0
	1909.3	19193	1.4	QPSK	1	2	25.06	0	0
	1909.3	19193	1.4	QPSK	1	5	25.12	0	0
	1909.3	19193	1.4	QPSK	3	0	24.96	0	0
	1909.3	19193	1.4	QPSK	3	2	24.94	0	0
	1909.3	19193	1.4	QPSK	3	3	24.97	0	0
	1909.3	19193	1.4	QPSK	6	0	23.82	0-1	1
	1909.3	19193	1.4	16-QAM	1	0	24.05	0-1	1
	1909.3	19193	1.4	16-QAM	1	2	24.20	0-1	1
	1909.3	19193	1.4	16-QAM	1	5	24.03	0-1	1
	1909.3	19193	1.4	16-QAM	3	0	23.51	0-1	1
	1909.3	19193	1.4	16-QAM	3	2	23.47	0-1	1
	1909.3	19193	1.4	16-QAM	3	3	23.53	0-1	1
	1909.3	19193	1.4	16-QAM	6	0	22.83	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 42 of 80

9.4.5

LTE Band 7

Table 9-19
LTE Band 7 Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	2510	20850	20	QPSK	1	0	24.17	0	0
	2510	20850	20	QPSK	1	50	23.92	0	0
	2510	20850	20	QPSK	1	99	23.89	0	0
	2510	20850	20	QPSK	50	0	23.00	0-1	1
	2510	20850	20	QPSK	50	25	22.85	0-1	1
	2510	20850	20	QPSK	50	50	22.91	0-1	1
	2510	20850	20	QPSK	100	0	22.77	0-1	1
	2510	20850	20	16QAM	1	0	23.01	0-1	1
	2510	20850	20	16QAM	1	50	22.90	0-1	1
	2510	20850	20	16QAM	1	99	22.79	0-1	1
	2510	20850	20	16QAM	50	0	21.84	0-2	2
	2510	20850	20	16QAM	50	25	21.80	0-2	2
Mid	2535.0	21100	20	QPSK	1	0	24.00	0	0
	2535.0	21100	20	QPSK	1	50	24.14	0	0
	2535.0	21100	20	QPSK	1	99	23.95	0	0
	2535.0	21100	20	QPSK	50	0	23.05	0-1	1
	2535.0	21100	20	QPSK	50	25	23.04	0-1	1
	2535.0	21100	20	QPSK	50	50	23.00	0-1	1
	2535.0	21100	20	QPSK	100	0	22.96	0-1	1
	2535.0	21100	20	16QAM	1	0	23.09	0-1	1
	2535.0	21100	20	16QAM	1	50	23.08	0-1	1
	2535.0	21100	20	16QAM	1	99	23.11	0-1	1
	2535.0	21100	20	16QAM	50	0	21.97	0-2	2
	2535.0	21100	20	16QAM	50	25	21.98	0-2	2
High	2560	21350	20	QPSK	1	0	24.18	0	0
	2560	21350	20	QPSK	1	50	24.20	0	0
	2560	21350	20	QPSK	1	99	24.17	0	0
	2560	21350	20	QPSK	50	0	22.99	0-1	1
	2560	21350	20	QPSK	50	25	23.06	0-1	1
	2560	21350	20	QPSK	50	50	23.07	0-1	1
	2560	21350	20	QPSK	100	0	23.00	0-1	1
	2560	21350	20	16QAM	1	0	23.05	0-1	1
	2560	21350	20	16QAM	1	50	23.12	0-1	1
	2560	21350	20	16QAM	1	99	23.13	0-1	1
	2560	21350	20	16QAM	50	0	22.03	0-2	2
	2560	21350	20	16QAM	50	25	22.07	0-2	2
	2560	21350	20	16QAM	50	50	22.08	0-2	2
	2560	21350	20	16QAM	100	0	21.90	0-2	2

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 43 of 80

Table 9-20
LTE Band 7 Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	2507.5	20825	15	QPSK	1	0	24.12	0	0
	2507.5	20825	15	QPSK	1	36	24.08	0	0
	2507.5	20825	15	QPSK	1	74	24.06	0	0
	2507.5	20825	15	QPSK	36	0	22.90	0-1	1
	2507.5	20825	15	QPSK	36	18	22.91	0-1	1
	2507.5	20825	15	QPSK	36	37	22.89	0-1	1
	2507.5	20825	15	QPSK	75	0	22.83	0-1	1
	2507.5	20825	15	16QAM	1	0	22.91	0-1	1
	2507.5	20825	15	16QAM	1	36	22.91	0-1	1
	2507.5	20825	15	16QAM	1	74	22.86	0-1	1
	2507.5	20825	15	16QAM	36	0	21.84	0-2	2
	2507.5	20825	15	16QAM	36	18	21.87	0-2	2
	2507.5	20825	15	16QAM	36	37	21.82	0-2	2
	2507.5	20825	15	16QAM	75	0	21.81	0-2	2
Mid	2535.0	21100	15	QPSK	1	0	24.09	0	0
	2535.0	21100	15	QPSK	1	36	24.18	0	0
	2535.0	21100	15	QPSK	1	74	23.96	0	0
	2535.0	21100	15	QPSK	36	0	23.04	0-1	1
	2535.0	21100	15	QPSK	36	18	22.99	0-1	1
	2535.0	21100	15	QPSK	36	37	23.01	0-1	1
	2535.0	21100	15	QPSK	75	0	22.99	0-1	1
	2535.0	21100	15	16QAM	1	0	22.89	0-1	1
	2535.0	21100	15	16QAM	1	36	22.86	0-1	1
	2535.0	21100	15	16QAM	1	74	22.82	0-1	1
	2535.0	21100	15	16QAM	36	0	21.95	0-2	2
	2535.0	21100	15	16QAM	36	18	21.97	0-2	2
	2535.0	21100	15	16QAM	36	37	21.93	0-2	2
	2535.0	21100	15	16QAM	75	0	21.91	0-2	2
High	2562.5	21375	15	QPSK	1	0	24.12	0	0
	2562.5	21375	15	QPSK	1	36	24.14	0	0
	2562.5	21375	15	QPSK	1	74	24.18	0	0
	2562.5	21375	15	QPSK	36	0	22.85	0-1	1
	2562.5	21375	15	QPSK	36	18	22.90	0-1	1
	2562.5	21375	15	QPSK	36	37	22.88	0-1	1
	2562.5	21375	15	QPSK	75	0	22.91	0-1	1
	2562.5	21375	15	16QAM	1	0	22.93	0-1	1
	2562.5	21375	15	16QAM	1	36	22.93	0-1	1
	2562.5	21375	15	16QAM	1	74	22.84	0-1	1
	2562.5	21375	15	16QAM	36	0	21.80	0-2	2
	2562.5	21375	15	16QAM	36	18	21.91	0-2	2
	2562.5	21375	15	16QAM	36	37	21.86	0-2	2
	2562.5	21375	15	16QAM	75	0	21.92	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 44 of 80

Table 9-21
LTE Band 7 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	2505	20800	10	QPSK	1	0	24.06	0	0
	2505	20800	10	QPSK	1	25	24.03	0	0
	2505	20800	10	QPSK	1	49	23.96	0	0
	2505	20800	10	QPSK	25	0	22.87	0-1	1
	2505	20800	10	QPSK	25	12	22.87	0-1	1
	2505	20800	10	QPSK	25	25	22.77	0-1	1
	2505	20800	10	QPSK	50	0	22.88	0-1	1
	2505	20800	10	16QAM	1	0	23.13	0-1	1
	2505	20800	10	16QAM	1	25	22.99	0-1	1
	2505	20800	10	16QAM	1	49	22.97	0-1	1
	2505	20800	10	16QAM	25	0	21.82	0-2	2
	2505	20800	10	16QAM	25	12	21.85	0-2	2
Mid	2505	20800	10	16QAM	25	25	21.79	0-2	2
	2505	20800	10	16QAM	50	0	21.84	0-2	2
	2535.0	21100	10	QPSK	1	0	23.99	0	0
	2535.0	21100	10	QPSK	1	25	23.87	0	0
	2535.0	21100	10	QPSK	1	49	23.93	0	0
	2535.0	21100	10	QPSK	25	0	22.83	0-1	1
	2535.0	21100	10	QPSK	25	12	22.81	0-1	1
	2535.0	21100	10	QPSK	25	25	22.81	0-1	1
	2535.0	21100	10	QPSK	50	0	22.83	0-1	1
	2535.0	21100	10	16QAM	1	0	22.80	0-1	1
	2535.0	21100	10	16QAM	1	25	22.80	0-1	1
	2535.0	21100	10	16QAM	1	49	22.75	0-1	1
High	2535.0	21100	10	16QAM	25	0	21.76	0-2	2
	2535.0	21100	10	16QAM	25	12	21.74	0-2	2
	2535.0	21100	10	16QAM	25	25	21.84	0-2	2
	2535.0	21100	10	16QAM	50	0	21.80	0-2	2
	2565	21400	10	QPSK	1	0	24.18	0	0
	2565	21400	10	QPSK	1	25	23.95	0	0
	2565	21400	10	QPSK	1	49	24.17	0	0
	2565	21400	10	QPSK	25	0	22.85	0-1	1
	2565	21400	10	QPSK	25	12	22.99	0-1	1
	2565	21400	10	QPSK	25	25	22.95	0-1	1
	2565	21400	10	QPSK	50	0	22.86	0-1	1
	2565	21400	10	16QAM	1	0	23.13	0-1	1
	2565	21400	10	16QAM	1	25	23.18	0-1	1
	2565	21400	10	16QAM	1	49	23.15	0-1	1
	2565	21400	10	16QAM	25	0	21.83	0-2	2
	2565	21400	10	16QAM	25	12	21.91	0-2	2
	2565	21400	10	16QAM	25	25	21.90	0-2	2
	2565	21400	10	16QAM	50	0	21.93	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 45 of 80

Table 9-22
LTE Band 7 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
Low	2502.5	20775	5	QPSK	1	0	24.19	0	0
	2502.5	20775	5	QPSK	1	12	23.88	0	0
	2502.5	20775	5	QPSK	1	24	24.20	0	0
	2502.5	20775	5	QPSK	12	0	22.96	0-1	1
	2502.5	20775	5	QPSK	12	6	22.88	0-1	1
	2502.5	20775	5	QPSK	12	13	22.93	0-1	1
	2502.5	20775	5	QPSK	25	0	22.91	0-1	1
	2502.5	20775	5	16-QAM	1	0	23.17	0-1	1
	2502.5	20775	5	16-QAM	1	12	22.88	0-1	1
	2502.5	20775	5	16-QAM	1	24	22.95	0-1	1
	2502.5	20775	5	16-QAM	12	0	22.04	0-2	2
	2502.5	20775	5	16-QAM	12	6	21.97	0-2	2
Mid	2502.5	20775	5	16-QAM	12	13	21.96	0-2	2
	2502.5	20775	5	16-QAM	25	0	21.85	0-2	2
	2535.0	21100	5	QPSK	1	0	23.98	0	0
	2535.0	21100	5	QPSK	1	12	23.84	0	0
	2535.0	21100	5	QPSK	1	24	23.89	0	0
	2535.0	21100	5	QPSK	12	0	22.80	0-1	1
	2535.0	21100	5	QPSK	12	6	22.85	0-1	1
	2535.0	21100	5	QPSK	12	13	22.84	0-1	1
	2535.0	21100	5	QPSK	25	0	22.77	0-1	1
	2535.0	21100	5	16-QAM	1	0	22.70	0-1	1
	2535.0	21100	5	16-QAM	1	12	22.63	0-1	1
	2535.0	21100	5	16-QAM	1	24	22.72	0-1	1
High	2567.5	21425	5	16-QAM	12	0	21.76	0-2	2
	2567.5	21425	5	16-QAM	12	6	21.85	0-2	2
	2567.5	21425	5	16-QAM	12	13	21.84	0-2	2
	2567.5	21425	5	16-QAM	25	0	21.83	0-2	2
	2567.5	21425	5	QPSK	1	0	24.03	0	0
	2567.5	21425	5	QPSK	1	12	23.92	0	0
	2567.5	21425	5	QPSK	1	24	24.11	0	0
	2567.5	21425	5	QPSK	12	0	22.82	0-1	1
	2567.5	21425	5	QPSK	12	6	22.87	0-1	1
	2567.5	21425	5	QPSK	12	13	22.87	0-1	1
	2567.5	21425	5	QPSK	25	0	22.82	0-1	1
	2567.5	21425	5	16-QAM	1	0	22.66	0-1	1
	2567.5	21425	5	16-QAM	1	12	22.62	0-1	1
	2567.5	21425	5	16-QAM	1	24	22.67	0-1	1
	2567.5	21425	5	16-QAM	12	0	21.77	0-2	2
	2567.5	21425	5	16-QAM	12	6	21.86	0-2	2
	2567.5	21425	5	16-QAM	12	13	21.85	0-2	2
	2567.5	21425	5	16-QAM	25	0	21.86	0-2	2

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 46 of 80

9.4.6 LTE Carrier Aggregation Conducted Powers

Table 9-23
LTE Carrier Aggregation Conducted Powers

PCC						SCC				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Frequency [MHz]	PCC (UL) Channel	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Frequency [MHz]	SCC (DL) Channel	LTE Rel 10 Tx.Power (dBm)	LTE Rel. 8 Tx.Power (dBm)
LTE B13	10	782	23230	1	0	LTE B4	20	2132.5	2175	24.55	24.70
LTE B4	5	1732.5	20175	1	24	LTE B13	10	751	5230	25.02	25.20
LTE B13	10	782	23230	1	0	LTE B2	20	1960	900	24.60	24.70
LTE B2	5	1852.5	18625	1	0	LTE B13	10	751	5230	25.01	25.20
LTE B4	5	1732.5	20175	1	24	LTE B5	10	881.5	2525	25.06	25.20
LTE B5	10	836.5	20525	1	49	LTE B4	20	2132.5	2175	24.70	24.67
LTE B2	5	1852.5	18625	1	0	LTE B5	10	881.5	2525	25.02	25.20
LTE B5	10	836.5	20525	1	49	LTE B2	20	1960	900	24.70	24.67
LTE B2	5	1852.5	18625	1	0	LTE B2	20	1960	900	25.17	25.20
LTE B4	5	1732.5	20175	1	24	LTE B4	15	2147.5	2325	25.20	25.20
LTE B2	5	1852.5	18625	1	0	LTE B4	20	2132.5	2175	25.18	25.20
LTE B4	5	1732.5	20175	1	24	LTE B2	20	1960	900	25.09	25.20

Notes:

1. The device does not support all Rel. 10 Carrier Aggregation features due to modem chipset limitation.
2. The device only supports LTE downlink Carrier Aggregation. Uplink Carrier Aggregation is not supported. Power measurements were performed with two DL carriers for the Release 8 configuration that had the highest output power (across all bandwidths, channels and RB Configurations) for each band
3. All control and acknowledge data is sent on uplink channels that operate identical to release 8 specifications.

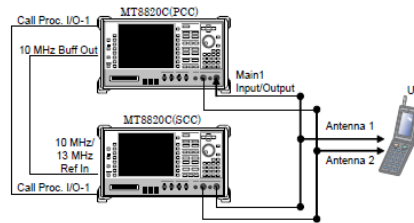


Figure 9-4
Power Measurement Setup

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 47 of 80

9.5 WLAN Conducted Powers

Table 9-24
2.4 GHz Average RF Power

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]	
		IEEE Transmission Mode	
		802.11b	802.11g
2412	1	15.34	12.43
2417	2	15.56	13.74
2437	6	16.18	14.23
2457	10	16.02	14.08
2462	11	15.74	11.94

Table 9-25
5 GHz (20 MHz Bandwidth) Average RF Power

Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
5180	36	13.05	11.91	11.88
5200	40	14.10	13.68	13.78
5220	44	14.32	13.93	13.80
5240	48	14.07	13.77	13.84
5260	52	14.36	13.95	14.04
5280	56	14.26	13.98	14.03
5300	60	14.40	13.89	14.09
5320	64	13.49	12.21	12.15
5500	100	12.38	11.10	10.86
5580	116	14.11	13.53	13.62
5660	132	14.14	13.74	13.66
5720	144	14.02	13.78	13.62
5745	149	13.57	13.33	13.36
5785	157	13.58	13.23	13.25
5825	165	13.63	12.38	12.34

Justification for test configurations for WLAN per KDB Publication 248227 D01DR02-41929:

- 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.

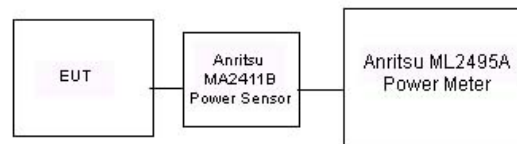


Figure 9-5
Power Measurement Setup for Bandwidths < 50 MHz

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 48 of 80

9.6 Bluetooth Conducted Powers

Table 9-26
Bluetooth RF Conducted Powers

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	8.06	6.397
2441	1.0	39	8.70	7.413
2480	1.0	78	7.05	5.070
2402	2.0	0	2.71	1.866
2441	2.0	39	4.19	2.624
2480	2.0	78	2.60	1.820
2402	3.0	0	2.77	1.892
2441	3.0	39	4.25	2.661
2480	3.0	78	2.72	1.871

Notes:

- The bolded data rate and channel above were tested for SAR.

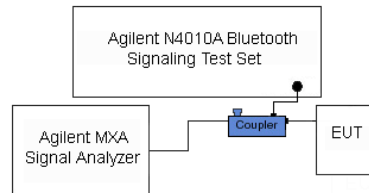


Figure 9-6
Power Measurement Setup

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 49 of 80

9.7 Additional Conducted Powers

This device uses three sub-bands for UMTS Band 5 and LTE Band 5. The channel closest to the middle of the each sub-band was selected for additional evaluation, per FCC Guidance.

Table 9-27
Additional UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]		3GPP MPR [dB]
			4149	4219	
99	WCDMA	12.2 kbps RMC	24.10	24.08	-
99		12.2 kbps AMR	24.06	24.11	-

Table 9-28
Additional LTE Band 5 Conducted Powers

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
831	20470	10	QPSK	1	0	24.55	0	0
831	20470	10	QPSK	1	25	24.53	0	0
831	20470	10	QPSK	1	49	24.59	0	0
831	20470	10	QPSK	25	0	23.51	0	1
831	20470	10	QPSK	25	12	23.56	0	1
831	20470	10	QPSK	25	25	23.52	0-1	1
831	20470	10	QPSK	50	0	23.49	0-1	1
831	20470	10	16QAM	1	0	23.49	0-1	1
831	20470	10	16QAM	1	25	23.56	0-1	1
831	20470	10	16QAM	1	49	23.50	0-1	1
831	20470	10	16QAM	25	0	22.26	0-1	2
831	20470	10	16QAM	25	12	22.51	0-1	2
831	20470	10	16QAM	25	25	22.58	0-2	2
831	20470	10	16QAM	50	0	22.50	0-2	2
842.5	20585	10	QPSK	1	0	24.62	0	0
842.5	20585	10	QPSK	1	25	24.53	0	0
842.5	20585	10	QPSK	1	49	24.61	0	0
842.5	20585	10	QPSK	25	0	23.50	0	1
842.5	20585	10	QPSK	25	12	23.46	0	1
842.5	20585	10	QPSK	25	25	23.45	0-1	1
842.5	20585	10	QPSK	50	0	23.50	0-1	1
842.5	20585	10	16QAM	1	0	23.51	0-1	1
842.5	20585	10	16QAM	1	25	23.53	0-1	1
842.5	20585	10	16QAM	1	49	23.40	0-1	1
842.5	20585	10	16QAM	25	0	22.53	0-1	2
842.5	20585	10	16QAM	25	12	22.49	0-1	2
842.5	20585	10	16QAM	25	25	22.48	0-2	2
842.5	20585	10	16QAM	50	0	22.53	0-2	2

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 50 of 80

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties – Head

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
8/13/2015	750H	22.3	725	0.878	43.275	0.891	42.071	-1.46%	2.86%
			740	0.890	43.129	0.893	41.994	-0.34%	2.70%
			755	0.904	42.934	0.894	41.916	1.12%	2.43%
			770	0.920	42.737	0.895	41.838	2.79%	2.15%
			785	0.934	42.545	0.896	41.760	4.24%	1.88%
8/13/2015	835H	22.4	820	0.870	40.492	0.899	41.578	-3.23%	-2.61%
			835	0.884	40.302	0.900	41.500	-1.78%	-2.89%
			850	0.898	40.120	0.916	41.500	-1.97%	-3.33%
8/31/2015	835H	22.3	820	0.871	40.288	0.899	41.578	-3.11%	-3.10%
			835	0.884	40.089	0.900	41.500	-1.78%	-3.40%
			850	0.898	39.889	0.916	41.500	-1.97%	-3.88%
8/11/2015	1750H	22.3	1710	1.325	39.295	1.348	40.142	-1.71%	-2.11%
			1750	1.364	39.124	1.371	40.079	-0.51%	-2.38%
			1790	1.403	38.927	1.394	40.016	0.65%	-2.72%
8/17/2015	1900H	22.1	1850	1.385	40.930	1.400	40.000	-1.07%	2.33%
			1880	1.411	40.826	1.400	40.000	0.79%	2.07%
			1910	1.443	40.715	1.400	40.000	3.07%	1.79%
8/10/2015	2400H-2600H	23.4	2400	1.817	38.624	1.756	39.289	3.47%	-1.69%
			2450	1.874	38.426	1.800	39.200	4.11%	-1.97%
			2500	1.933	38.215	1.855	39.136	4.20%	-2.35%
			2550	1.993	38.009	1.909	39.073	4.40%	-2.72%
			2600	2.053	37.796	1.964	39.009	4.53%	-3.11%
08/17/2015	5200H-5800H	22.6	5300	4.583	34.998	4.758	35.871	-3.68%	-2.43%
			5600	4.900	34.646	5.065	35.529	-3.26%	-2.49%
			5660	4.936	34.511	5.127	35.460	-3.73%	-2.68%
			5800	5.101	34.402	5.270	35.300	-3.21%	-2.54%
			5825	5.091	34.259	5.296	35.271	-3.87%	-2.87%

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 51 of 80

Table 10-2
Measured Tissue Properties – Body

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
8/13/2015	750B	22.0	725	0.941	54.608	0.961	55.629	-2.08%	-1.84%
			740	0.955	54.460	0.963	55.570	-0.83%	-2.00%
			755	0.970	54.287	0.964	55.512	0.62%	-2.21%
			770	0.984	54.115	0.965	55.453	1.97%	-2.41%
			785	0.999	53.962	0.966	55.395	3.42%	-2.59%
8/10/2015	835B	21.8	820	0.979	53.787	0.969	55.258	1.03%	-2.66%
			835	0.991	53.624	0.970	55.200	2.16%	-2.86%
			850	1.008	53.504	0.988	55.154	2.02%	-2.99%
8/31/2015	835B	21.8	820	0.983	53.119	0.969	55.258	1.44%	-3.87%
			835	0.994	52.894	0.970	55.200	2.47%	-4.18%
			850	1.008	52.758	0.988	55.154	2.02%	-4.34%
8/11/2015	1750B	22.2	1710	1.421	51.795	1.463	53.537	-2.87%	-3.25%
			1750	1.464	51.658	1.488	53.432	-1.61%	-3.32%
			1790	1.506	51.521	1.514	53.326	-0.53%	-3.38%
8/10/2015	1900B	21.6	1850	1.481	51.698	1.520	53.300	-2.57%	-3.01%
			1880	1.515	51.588	1.520	53.300	-0.33%	-3.21%
			1910	1.553	51.509	1.520	53.300	2.17%	-3.36%
8/13/2015	1900B	21.8	1850	1.491	52.661	1.520	53.300	-1.91%	-1.20%
			1880	1.526	52.552	1.520	53.300	0.39%	-1.40%
			1910	1.561	52.447	1.520	53.300	2.70%	-1.60%
8/12/2015	2450B	23.2	2401	1.955	51.937	1.903	52.765	2.73%	-1.57%
			2450	2.016	51.739	1.950	52.700	3.38%	-1.82%
			2499	2.087	51.536	2.019	52.638	3.37%	-2.09%
8/17/2015	2400B-2600B	21.7	2400	1.970	51.898	1.902	52.767	3.58%	-1.65%
			2450	2.039	51.754	1.950	52.700	4.56%	-1.80%
			2500	2.105	51.511	2.021	52.636	4.16%	-2.14%
			2550	2.179	51.347	2.092	52.573	4.16%	-2.33%
			2600	2.246	51.134	2.163	52.509	3.84%	-2.62%
08/10/2015	5200B-5800B	22.7	5300	5.407	46.508	5.416	48.879	-0.17%	-4.85%
			5600	5.785	46.151	5.766	48.471	0.33%	-4.79%
			5660	5.862	46.038	5.837	48.390	0.43%	-4.86%
			5800	6.028	45.839	6.000	48.200	0.47%	-4.90%
			5825	6.061	45.842	6.029	48.166	0.53%	-4.82%

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 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.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 52 of 80

10.2 Test System Verification

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

Table 10-3
System Verification Results – 1g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation _{1g} (%)
H	750	HEAD	08/13/2015	23.1	22.3	0.200	1003	3263	1.680	8.090	8.400	3.83%
G	835	HEAD	08/13/2015	22.5	22.5	0.100	4d119	3318	0.964	9.380	9.640	2.77%
G	835	HEAD	08/31/2015	21.0	22.3	0.200	4d133	3318	1.830	9.130	9.150	0.22%
B	1750	HEAD	08/11/2015	23.2	22.2	0.100	1008	3334	3.640	37.700	36.400	-3.45%
J	1900	HEAD	08/17/2015	21.8	22.1	0.100	5d141	3319	3.750	39.900	37.500	-6.02%
E	2450	HEAD	08/10/2015	23.2	23.4	0.100	719	3332	5.160	52.100	51.600	-0.96%
E	2600	HEAD	08/10/2015	23.2	23.4	0.100	1071	3332	5.840	57.500	58.400	1.57%
D	5300	HEAD	08/17/2015	22.9	22.6	0.050	1057	7357	4.020	84.700	80.400	-5.08%
D	5600	HEAD	08/17/2015	22.9	22.6	0.050	1057	7357	4.170	83.800	83.400	-0.48%
D	5800	HEAD	08/17/2015	22.9	22.6	0.050	1057	7357	3.770	81.100	75.400	-7.03%
G	750	BODY	08/13/2015	22.3	22.0	0.200	1003	3318	1.600	8.460	8.000	-5.44%
G	835	BODY	08/10/2015	22.9	21.8	0.200	4d119	3318	1.850	9.200	9.250	0.54%
I	835	BODY	08/31/2015	22.7	21.8	0.200	4d119	3213	1.760	9.200	8.800	-4.35%
H	1750	BODY	08/11/2015	22.3	22.2	0.100	1051	3263	3.840	37.100	38.400	3.50%
K	1900	BODY	08/10/2015	22.1	21.6	0.100	5d149	3288	4.080	40.400	40.800	0.99%
K	1900	BODY	08/13/2015	23.3	21.8	0.100	5d141	3288	4.180	40.000	41.800	4.50%
E	2450	BODY	08/12/2015	23.5	23.2	0.100	882	3332	5.440	50.700	54.400	7.30%
G	2450	BODY	08/17/2015	22.3	21.7	0.100	882	3318	5.330	50.700	53.300	5.13%
G	2600	BODY	08/17/2015	21.9	21.7	0.100	1071	3318	5.320	56.900	53.200	-6.50%
A	5300	BODY	08/10/2015	24.2	22.7	0.050	1191	3914	4.100	79.900	82.000	2.63%
A	5600	BODY	08/10/2015	24.2	22.7	0.050	1191	3914	4.410	84.100	88.200	4.88%
A	5800	BODY	08/10/2015	24.2	22.7	0.050	1191	3914	3.990	78.000	79.800	2.31%

FCC ID: ZNFVS990			SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset			Page 53 of 80

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)	Dipole SN	Probe SN	Measured SAR _{10g} (W/kg)	1 W Target SAR _{10g} (W/kg)	1 W Normalized SAR _{10g} (W/kg)	Deviation _{10g} (%)
A	5300	BODY	08/10/2015	24.2	22.7	0.050	1191	3914	1.130	22.300	22.600	1.35%
A	5600	BODY	08/10/2015	24.2	22.7	0.050	1191	3914	1.200	23.300	24.000	3.00%

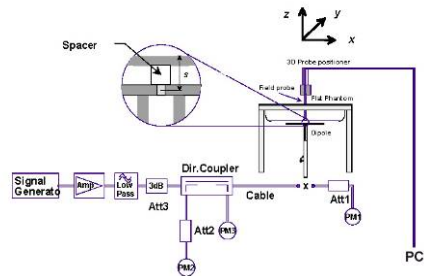


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 54 of 80

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

**Table 11-1
GSM 850 Head SAR**

MEASUREMENT RESULTS																
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.2	33.05	0.05	Right	Cheek	Standard	6851	1	1:8.3	0.296	1.035	0.306	
836.60	190	GSM 850	GSM	33.2	33.05	-0.02	Right	Cheek	Wireless Charging	6851	1	1:8.3	0.318	1.035	0.329	
836.60	190	GSM 850	GSM	33.2	33.05	0.01	Right	Tilt	Standard	6851	1	1:8.3	0.128	1.035	0.132	
836.60	190	GSM 850	GSM	33.2	33.05	-0.13	Left	Cheek	Standard	6851	1	1:8.3	0.185	1.035	0.191	
836.60	190	GSM 850	GSM	33.2	33.05	0.20	Left	Tilt	Standard	6851	1	1:8.3	0.112	1.035	0.116	
836.60	190	GSM 850	GPRS	31.2	30.75	-0.01	Right	Cheek	Standard	6851	2	1:4.15	0.318	1.109	0.353	A1
836.60	190	GSM 850	GPRS	31.2	30.75	0.17	Right	Cheek	Wireless Charging	6851	2	1:4.15	0.315	1.109	0.349	
836.60	190	GSM 850	GPRS	31.2	30.75	0.05	Right	Tilt	Standard	6851	2	1:4.15	0.119	1.109	0.132	
836.60	190	GSM 850	GPRS	31.2	30.75	0.20	Left	Cheek	Standard	6851	2	1:4.15	0.225	1.109	0.250	
836.60	190	GSM 850	GPRS	31.2	30.75	0.20	Left	Tilt	Standard	6851	2	1:4.15	0.123	1.109	0.136	
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
UMTS 850 Head SAR**

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.04	Right	Cheek	Standard	6851	1:1	0.239	1.023	0.244	A2
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.03	Right	Cheek	Standard	6851	1:1	0.249	1.021	0.254	
836.60	4183	UMTS 850	RMC	24.2	24.11	0.00	Right	Cheek	Wireless Charging	6851	1:1	0.241	1.021	0.246	
843.80	4219	UMTS 850	RMC	24.2	24.08	0.08	Right	Cheek	Standard	6851	1:1	0.214	1.028	0.220	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.00	Right	Tilt	Standard	6851	1:1	0.119	1.023	0.122	
836.60	4183	UMTS 850	RMC	24.2	24.11	0.04	Right	Tilt	Standard	6851	1:1	0.129	1.021	0.132	
843.80	4219	UMTS 850	RMC	24.2	24.08	0.02	Right	Tilt	Standard	6851	1:1	0.102	1.028	0.105	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.14	Left	Cheek	Standard	6851	1:1	0.189	1.023	0.193	
836.60	4183	UMTS 850	RMC	24.2	24.11	0.09	Left	Cheek	Standard	6851	1:1	0.179	1.021	0.183	
843.80	4219	UMTS 850	RMC	24.2	24.08	0.02	Left	Cheek	Standard	6851	1:1	0.149	1.028	0.153	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.08	Left	Tilt	Standard	6851	1:1	0.108	1.023	0.110	
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.09	Left	Tilt	Standard	6851	1:1	0.111	1.021	0.113	
843.80	4219	UMTS 850	RMC	24.2	24.08	0.10	Left	Tilt	Standard	6851	1:1	0.085	1.028	0.087	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

FCC ID: ZNFVS990			SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset			Page 55 of 80

Table 11-3
CDMA 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.52	384	Cell. CDMA	RC3 / SO55	24.7	24.58	0.06	Right	Cheek	Standard	6851	1:1	0.230	1.028	0.236	A3
836.52	384	Cell. CDMA	RC3 / SO55	24.7	24.58	0.13	Right	Cheek	Wireless Charging	6851	1:1	0.267	1.028	0.274	
836.52	384	Cell. CDMA	RC3 / SO55	24.7	24.58	-0.13	Right	Tilt	Standard	6851	1:1	0.119	1.028	0.122	
836.52	384	Cell. CDMA	RC3 / SO55	24.7	24.58	-0.04	Left	Cheek	Standard	6851	1:1	0.161	1.028	0.166	
836.52	384	Cell. CDMA	RC3 / SO55	24.7	24.58	0.07	Left	Tilt	Standard	6851	1:1	0.108	1.028	0.111	
836.52	384	Cell. CDMA	EVDO Rev. A	24.7	24.56	0.15	Right	Cheek	Standard	6851	1:1	0.225	1.033	0.232	
836.52	384	Cell. CDMA	EVDO Rev. A	24.7	24.56	-0.03	Right	Cheek	Wireless Charging	6851	1:1	0.248	1.033	0.256	
836.52	384	Cell. CDMA	EVDO Rev. A	24.7	24.56	-0.13	Right	Tilt	Standard	6851	1:1	0.139	1.033	0.144	
836.52	384	Cell. CDMA	EVDO Rev. A	24.7	24.56	-0.08	Left	Cheek	Standard	6851	1:1	0.177	1.033	0.183	
836.52	384	Cell. CDMA	EVDO Rev. A	24.7	24.56	0.03	Left	Tilt	Standard	6851	1:1	0.097	1.033	0.100	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
GSM 1900 Head

MEASUREMENT RESULTS																
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.2	30.20	-0.01	Right	Cheek	Standard	6851	1	1:8.3	0.057	1.000	0.057	A4
1880.00	661	GSM 1900	GSM	30.2	30.20	0.06	Right	Tilt	Standard	6851	1	1:8.3	0.023	1.000	0.023	
1880.00	661	GSM 1900	GSM	30.2	30.20	0.08	Left	Cheek	Standard	6851	1	1:8.3	0.065	1.000	0.065	
1880.00	661	GSM 1900	GSM	30.2	30.20	0.06	Left	Cheek	Wireless Charging	6851	1	1:8.3	0.060	1.000	0.060	
1880.00	661	GSM 1900	GSM	30.2	30.20	0.02	Left	Tilt	Standard	6851	1	1:8.3	0.020	1.000	0.020	
1880.00	661	GSM 1900	GPRS	28.2	28.20	-0.09	Right	Cheek	Standard	6851	2	1:4.15	0.073	1.000	0.073	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.14	Right	Cheek	Wireless Charging	6851	2	1:4.15	0.057	1.000	0.057	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.20	Right	Tilt	Standard	6851	2	1:4.15	0.028	1.000	0.028	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.06	Left	Cheek	Standard	6851	2	1:4.15	0.066	1.000	0.066	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.13	Left	Tilt	Standard	6851	2	1:4.15	0.020	1.000	0.020	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Duty Cycle	SAR(1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.10	Right	Cheek	Standard	6851	1:1	0.144	1.012	0.146	A5
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.07	Right	Cheek	Wireless Charging	6851	1:1	0.134	1.012	0.136	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	0.20	Right	Tilt	Standard	6851	1:1	0.043	1.012	0.044	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	0.07	Left	Cheek	Standard	6851	1:1	0.126	1.012	0.128	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	0.00	Left	Tilt	Standard	6851	1:1	0.039	1.012	0.039	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 56 of 80

Table 11-6
CDMA 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	600	PCS CDMA	RC3 / SO55	24.7	24.65	-0.05	Right	Cheek	Standard	2332	1:1	0.119	1.012	0.120	
1880.00	600	PCS CDMA	RC3 / SO55	24.7	24.65	-0.10	Right	Tilt	Standard	2332	1:1	0.058	1.012	0.059	
1880.00	600	PCS CDMA	RC3 / SO55	24.7	24.65	0.11	Left	Cheek	Standard	2332	1:1	0.132	1.012	0.134	
1880.00	600	PCS CDMA	RC3 / SO55	24.7	24.65	0.17	Left	Cheek	Wireless Charging	2332	1:1	0.126	1.012	0.128	
1880.00	600	PCS CDMA	RC3 / SO55	24.7	24.65	-0.02	Left	Tilt	Standard	2332	1:1	0.040	1.012	0.040	
1880.00	600	PCS CDMA	EVDO Rev. A	24.7	24.56	0.21	Right	Cheek	Standard	2332	1:1	0.143	1.033	0.148	A6
1880.00	600	PCS CDMA	EVDO Rev. A	24.7	24.56	0.07	Right	Cheek	Wireless Charging	2332	1:1	0.116	1.033	0.120	
1880.00	600	PCS CDMA	EVDO Rev. A	24.7	24.56	-0.07	Right	Tilt	Standard	2332	1:1	0.047	1.033	0.049	
1880.00	600	PCS CDMA	EVDO Rev. A	24.7	24.56	0.13	Left	Cheek	Standard	2332	1:1	0.123	1.033	0.127	
1880.00	600	PCS CDMA	EVDO Rev. A	24.7	24.56	0.06	Left	Tilt	Standard	2332	1:1	0.037	1.033	0.038	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-7
LTE Band 13 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR (1g)	Plot	
MHz	Ch.															(W/kg)		(W/kg)		
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	-0.04	0	Right	Cheek	QPSK	1	0	6844	1:1	0.280	1.000	0.280	A7
782.00	23230	Mid	LTE Band 13	10	Wireless Charging	24.7	24.70	-0.02	0	Right	Cheek	QPSK	1	0	6844	1:1	0.274	1.000	0.274	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	0.00	1	Right	Cheek	QPSK	25	12	6844	1:1	0.204	1.132	0.231	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	0.10	0	Right	Tilt	QPSK	1	0	6844	1:1	0.158	1.000	0.158	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	-0.01	1	Right	Tilt	QPSK	25	12	6844	1:1	0.113	1.132	0.128	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	0.05	0	Left	Cheek	QPSK	1	0	6844	1:1	0.230	1.000	0.230	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	0.00	1	Left	Cheek	QPSK	25	12	6844	1:1	0.170	1.132	0.192	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	-0.07	0	Left	Tilt	QPSK	1	0	6844	1:1	0.140	1.000	0.140	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	0.03	1	Left	Tilt	QPSK	25	12	6844	1:1	0.109	1.132	0.123	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 57 of 80

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

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	-0.12	0	Right	Cheek	QPSK	1	49	6844	1:1	0.246	1.026	0.254	A6
831.00	20470	Low	LTE Band 5 (Cell)	10	Wireless Charging	24.7	24.59	-0.14	0	Right	Cheek	QPSK	1	49	6844	1:1	0.235	1.026	0.241	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.00	0	Right	Cheek	QPSK	1	49	6844	1:1	0.232	1.007	0.234	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.04	0	Right	Cheek	QPSK	1	0	6844	1:1	0.236	1.019	0.240	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.04	1	Right	Cheek	QPSK	25	12	6844	1:1	0.189	1.033	0.195	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.03	1	Right	Cheek	QPSK	25	25	6844	1:1	0.185	1.030	0.191	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.01	1	Right	Cheek	QPSK	25	0	6844	1:1	0.177	1.047	0.185	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.05	1	Right	Cheek	QPSK	50	0	6844	1:1	0.182	1.028	0.187	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	0.06	0	Right	Tilt	QPSK	1	49	6844	1:1	0.124	1.026	0.127	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.04	0	Right	Tilt	QPSK	1	49	6844	1:1	0.120	1.007	0.121	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	0.08	0	Right	Tilt	QPSK	1	0	6844	1:1	0.132	1.019	0.135	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.07	1	Right	Tilt	QPSK	25	12	6844	1:1	0.101	1.033	0.104	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.11	1	Right	Tilt	QPSK	25	25	6844	1:1	0.094	1.030	0.097	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.02	1	Right	Tilt	QPSK	25	0	6844	1:1	0.094	1.047	0.098	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.19	1	Right	Tilt	QPSK	50	0	6844	1:1	0.092	1.028	0.095	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	-0.06	0	Left	Cheek	QPSK	1	49	6844	1:1	0.156	1.026	0.160	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.19	0	Left	Cheek	QPSK	1	49	6844	1:1	0.161	1.007	0.162	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.02	0	Left	Cheek	QPSK	1	0	6844	1:1	0.185	1.019	0.189	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.04	1	Left	Cheek	QPSK	25	12	6844	1:1	0.147	1.033	0.152	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	-0.01	1	Left	Cheek	QPSK	25	25	6844	1:1	0.132	1.030	0.136	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.11	1	Left	Cheek	QPSK	25	0	6844	1:1	0.132	1.047	0.138	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.01	1	Left	Cheek	QPSK	50	0	6844	1:1	0.136	1.028	0.140	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	0.16	0	Left	Tilt	QPSK	1	49	6844	1:1	0.116	1.026	0.119	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	-0.01	0	Left	Tilt	QPSK	1	49	6844	1:1	0.127	1.007	0.128	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.04	0	Left	Tilt	QPSK	1	0	6844	1:1	0.135	1.019	0.138	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.00	1	Left	Tilt	QPSK	25	12	6844	1:1	0.102	1.033	0.105	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.00	1	Left	Tilt	QPSK	25	25	6844	1:1	0.100	1.030	0.103	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.03	1	Left	Tilt	QPSK	25	0	6844	1:1	0.098	1.047	0.103	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.08	1	Left	Tilt	QPSK	50	0	6844	1:1	0.101	1.028	0.104	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Head										
Spatial Peak										1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population										averaged over 1 gram										

Table 11-9
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR (1g)	Plot	
MHz	Ch.															(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	0.08	0	Right	Cheek	QPSK	1	99	6836	1:1	0.104	1.000	0.104	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.04	1	Right	Cheek	QPSK	50	50	6836	1:1	0.083	1.096	0.091	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	-0.01	0	Right	Tilt	QPSK	1	99	6836	1:1	0.035	1.000	0.035	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.17	1	Right	Tilt	QPSK	50	50	6836	1:1	0.027	1.096	0.030	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	-0.02	0	Left	Cheek	QPSK	1	99	6836	1:1	0.152	1.000	0.152	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging	25.2	25.20	0.07	0	Left	Cheek	QPSK	1	99	6836	1:1	0.153	1.000	0.153	A6
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.02	1	Left	Cheek	QPSK	50	50	6836	1:1	0.128	1.096	0.140	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	-0.04	0	Left	Tilt	QPSK	1	99	6836	1:1	0.032	1.000	0.032	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.18	1	Left	Tilt	QPSK	50	50	6836	1:1	0.027	1.096	0.030	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Head										
Spatial Peak										1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population										averaged over 1 gram										

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 58 of 80

Table 11-10
LTE Band 2 (PCS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR [1g]	Plot	
MHz	Ch.															(W/kg)	(W/kg)			
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	25.2	25.18	-0.15	0	Right	Cheek	QPSK	1	50	6844	1.1	0.152	1.005	0.153	A10
1880.00	18900	Md	LTE Band 2 (PCS)	20	Wireless Charging	25.2	25.18	0.09	0	Right	Cheek	QPSK	1	50	6844	1.1	0.137	1.005	0.138	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	24.2	23.82	-0.09	1	Right	Cheek	QPSK	50	50	6844	1.1	0.151	1.091	0.165	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	25.2	25.18	-0.06	0	Right	Tilt	QPSK	1	50	6844	1.1	0.047	1.005	0.047	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	24.2	23.82	-0.05	1	Right	Tilt	QPSK	50	50	6844	1.1	0.045	1.091	0.049	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	25.2	25.18	0.14	0	Left	Cheek	QPSK	1	50	6844	1.1	0.106	1.005	0.107	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	24.2	23.82	0.13	1	Left	Cheek	QPSK	50	50	6844	1.1	0.105	1.091	0.115	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	25.2	25.18	-0.03	0	Left	Tilt	QPSK	1	50	6844	1.1	0.038	1.005	0.038	
1880.00	18900	Md	LTE Band 2 (PCS)	20	Standard	24.2	23.82	0.05	1	Left	Tilt	QPSK	50	50	6844	1.1	0.036	1.091	0.039	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak										Head 1.6 W/kg (mW/g) averaged over 1 gram										
Uncontrolled Exposure/General Population																				

Table 11-11
LTE Band 7 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR [1g]	Plot	
MHz	Ch.															(W/kg)	(W/kg)			
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	-0.20	0	Right	Cheek	QPSK	1	50	6844	1:1	0.161	1.000	0.161	A11
2560.00	21350	High	LTE Band 7	20	Wireless Charging	24.2	24.20	0.05	0	Right	Cheek	QPSK	1	50	6844	1:1	0.160	1.000	0.160	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	0.13	1	Right	Cheek	QPSK	50	50	6844	1:1	0.120	1.030	0.124	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	0.18	0	Right	Tilt	QPSK	1	50	6844	1:1	0.059	1.000	0.059	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	0.19	1	Right	Tilt	QPSK	50	50	6844	1:1	0.041	1.030	0.042	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	0.13	0	Left	Cheek	QPSK	1	50	6844	1:1	0.085	1.000	0.085	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	0.20	1	Left	Cheek	QPSK	50	50	6844	1:1	0.063	1.030	0.065	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	0.06	0	Left	Tilt	QPSK	1	50	6844	1:1	0.088	1.000	0.088	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	0.05	1	Left	Tilt	QPSK	50	50	6844	1:1	0.058	1.030	0.060	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Head										
Spatial Peak										1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population										averaged over 1 gram										

Table 11-12
DTS Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)	(W/kg)			
2437	6	802.11b	DSSS	22	17.5	16.18	0.02	Right	Cheek	Standard	6935	1	99.0	0.964	0.786	1.355	1.010	1.048	A12
2457	10	802.11b	DSSS	22	17.5	16.02	0.01	Right	Cheek	Standard	6935	1	99.0	0.922	0.712	1.406	1.010	1.011	
2437	6	802.11b	DSSS	22	17.5	16.18	0.02	Right	Cheek	Wireless Charging	6935	1	99.0	0.957	0.717	1.355	1.010	0.982	
2437	6	802.11b	DSSS	22	17.5	16.18	-0.03	Right	Tilt	Standard	6935	1	99.0	0.475	0.385	1.355	1.010	0.527	
2437	6	802.11b	DSSS	22	17.5	16.18	-	Left	Cheek	Standard	6935	1	99.0	0.303	-	1.355	1.010	-	
2437	6	802.11b	DSSS	22	17.5	16.18	-	Left	Tilt	Standard	6935	1	99.0	0.357	-	1.355	1.010	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Head									
Spatial Peak										1.6 W/kg (mW/g)									
Uncontrolled Exposure/General Population										averaged over 1 gram									

Table 11-13
NII Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Cover Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5300	60	802.11a	OFDM	20	15.0	14.40	-0.20	Right	Cheek	Standard	6869	6	99.1	0.435	0.196	1.148	1.009	0.227	
5300	60	802.11a	OFDM	20	15.0	14.40	-	Right	Tilt	Standard	6869	6	99.1	0.269	-	1.148	1.009	-	
5300	60	802.11a	OFDM	20	15.0	14.40	-	Left	Cheek	Standard	6869	6	99.1	0.123	-	1.148	1.009	-	
5300	60	802.11a	OFDM	20	15.0	14.40	-	Left	Tilt	Standard	6869	6	99.1	0.125	-	1.148	1.009	-	
5660	132	802.11a	OFDM	20	15.0	14.14	-0.21	Right	Cheek	Standard	6869	6	99.1	0.264	0.136	1.219	1.009	0.167	
5660	132	802.11a	OFDM	20	15.0	14.14	-	Right	Tilt	Standard	6869	6	99.1	0.190	-	1.219	1.009	-	
5660	132	802.11a	OFDM	20	15.0	14.14	-	Left	Cheek	Standard	6869	6	99.1	0.157	-	1.219	1.009	-	
5660	132	802.11a	OFDM	20	15.0	14.14	-	Left	Tilt	Standard	6869	6	99.1	0.114	-	1.219	1.009	-	
5825	165	802.11a	OFDM	20	15.0	13.63	-0.12	Right	Cheek	Standard	6869	6	99.1	0.644	0.284	1.371	1.009	0.393	
5825	165	802.11a	OFDM	20	15.0	13.63	0.08	Right	Cheek	Wireless Charging	6869	6	99.1	0.479	0.318	1.371	1.009	0.448	A13
5825	165	802.11a	OFDM	20	15.0	13.63	-	Right	Tilt	Standard	6869	6	99.1	0.412	-	1.371	1.009	-	
5825	165	802.11a	OFDM	20	15.0	13.63	-	Left	Cheek	Standard	6869	6	99.1	0.340	-	1.371	1.009	-	
5825	165	802.11a	OFDM	20	15.0	13.63	-	Left	Tilt	Standard	6869	6	99.1	0.274	-	1.371	1.009	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Head									
Spatial Peak										1.6 W/kg (mW/g)									
Uncontrolled Exposure/General Population										averaged over 1 gram									

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 59 of 80

11.2 Standalone Body-Worn SAR Data

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

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.2	33.05	-0.02	10 mm	Standard	6851	1	1.8.3	back	0.500	1.035	0.518	
836.60	190	GSM 850	GSM	33.2	33.05	-0.05	10 mm	Wireless Charging	6851	1	1.8.3	back	0.498	1.035	0.515	
836.60	190	GSM 850	GPRS	31.2	30.75	0.02	10 mm	Standard	6851	2	1.4.15	back	0.592	1.109	0.657	A14
836.60	190	GSM 850	GPRS	31.2	30.75	-0.07	10 mm	Wireless Charging	6851	2	1.4.15	back	0.549	1.109	0.609	
829.80	4149	UMTS 850	RMC	24.2	24.10	-0.05	10 mm	Standard	6935	N/A	1.1	back	0.281	1.023	0.287	
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.02	10 mm	Standard	6935	N/A	1.1	back	0.443	1.021	0.452	A15
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.06	10 mm	Wireless Charging	6935	N/A	1.1	back	0.408	1.021	0.417	
843.80	4219	UMTS 850	RMC	24.2	24.08	-0.04	10 mm	Standard	6935	N/A	1.1	back	0.303	1.028	0.311	
836.52	384	Cell. CDMA	TDSO / SO32	24.7	24.55	-0.14	10 mm	Standard	6851	N/A	1.1	back	0.414	1.035	0.428	A16
836.52	384	Cell. CDMA	TDSO / SO32	24.7	24.55	0.09	10 mm	Wireless Charging	6851	N/A	1.1	back	0.393	1.035	0.407	
1880.00	661	GSM 1900	GSM	30.2	30.20	0.16	10 mm	Standard	6851	1	1.8.3	back	0.196	1.000	0.196	
1880.00	661	GSM 1900	GSM	30.2	30.20	-0.07	10 mm	Wireless Charging	6851	1	1.8.3	back	0.189	1.000	0.189	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.04	10 mm	Standard	6851	2	1.4.15	back	0.214	1.000	0.214	A18
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.03	10 mm	Wireless Charging	6851	2	1.4.15	back	0.194	1.000	0.194	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.08	10 mm	Standard	6851	N/A	1.1	back	0.414	1.012	0.419	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.16	10 mm	Wireless Charging	6851	N/A	1.1	back	0.462	1.012	0.468	A20
1880.00	600	PCS CDMA	TDSO / SO32	24.7	24.63	0.01	10 mm	Standard	6851	N/A	1.1	back	0.428	1.016	0.435	A22
1880.00	600	PCS CDMA	TDSO / SO32	24.7	24.63	0.01	10 mm	Wireless Charging	6851	N/A	1.1	back	0.415	1.016	0.422	
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]	Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																			
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	-0.06	0	6844	QPSK	1	0	10 mm	back	1:1	0.458	1.000	0.458	A24
782.00	23230	Mid	LTE Band 13	10	Wireless Charging	24.7	24.70	-0.02	0	6844	QPSK	1	0	10 mm	back	1:1	0.389	1.000	0.389	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	-0.04	1	6844	QPSK	25	12	10 mm	back	1:1	0.290	1.132	0.328	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	0.01	0	6844	QPSK	1	49	10 mm	back	1:1	0.426	1.026	0.437	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.01	0	6844	QPSK	1	49	10 mm	back	1:1	0.401	1.007	0.404	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.01	0	6844	QPSK	1	0	10 mm	back	1:1	0.443	1.019	0.451	A25
842.50	20585	High	LTE Band 5 (Cell)	10	Wireless Charging	24.7	24.62	-0.02	0	6844	QPSK	1	0	10 mm	back	1:1	0.425	1.019	0.433	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.11	1	6844	QPSK	25	12	10 mm	back	1:1	0.338	1.033	0.349	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.03	1	6844	QPSK	25	25	10 mm	back	1:1	0.301	1.030	0.310	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	0.00	1	6844	QPSK	25	0	10 mm	back	1:1	0.345	1.047	0.361	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.03	1	6844	QPSK	50	0	10 mm	back	1:1	0.298	1.028	0.306	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	0.08	0	6844	QPSK	1	99	10 mm	back	1:1	0.469	1.000	0.469	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging	25.2	25.20	0.02	0	6844	QPSK	1	99	10 mm	back	1:1	0.483	1.000	0.483	A27
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.04	1	6844	QPSK	50	50	10 mm	back	1:1	0.379	1.096	0.415	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	25.2	25.18	0.03	0	6844	QPSK	1	50	10 mm	back	1:1	0.436	1.005	0.438	A29
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Wireless Charging	25.2	25.18	-0.04	0	6844	QPSK	1	50	10 mm	back	1:1	0.400	1.005	0.402	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	24.2	23.82	0.03	1	6844	QPSK	50	50	10 mm	back	1:1	0.381	1.091	0.416	
2510.00	20850	Low	LTE Band 7	20	Standard	24.2	24.17	-0.04	0	6844	QPSK	1	0	10 mm	back	1:1	0.993	1.007	1.000	A31
2510.00	20850	Low	LTE Band 7	20	Wireless Charging	24.2	24.17	0.18	0	6844	QPSK	1	0	10 mm	back	1:1	0.894	1.007	0.900	
2535.00	21100	Mid	LTE Band 7	20	Standard	24.2	24.14	-0.03	0	6844	QPSK	1	50	10 mm	back	1:1	0.944	1.014	0.957	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	-0.10	0	6844	QPSK	1	50	10 mm	back	1:1	0.930	1.000	0.930	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	-0.01	1	6844	QPSK	50	50	10 mm	back	1:1	0.702	1.030	0.723	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.00	-0.06	1	6844	QPSK	100	0	10 mm	back	1:1	0.724	1.047	0.758	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Body										
Spatial Peak										1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population										averaged over 1 gram										

FCC ID: ZNFVS990			SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 60 of 80		

**Table 11-16
DTS Body-Worn SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dbm]	Conducted Power [dbm]	Power Drift [db]	Spacing	Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	17.5	16.18	0.03	10 mm	Standard	6869	1	back	99.0	0.147	0.114	1.355	1.010	0.156	
2437	6	802.11b	DSSS	22	17.5	16.18	0.19	10 mm	Wireless Charging	6869	1	back	99.0	0.145	0.118	1.355	1.010	0.162	A33
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 11-17
NII Body-Worn SAR**

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	Data Rate [Mbps]	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR [g]	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR [g]	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5300	60	802.11a	OFDM	20	15.0	14.40	-0.10	10 mm	Standard	6869	6	back	99.1	0.869	0.448	1.148	1.009	0.859	A35
5300	60	802.11a	OFDM	20	15.0	14.40	-0.01	10 mm	Wireless Charging	6869	6	back	99.1	0.826	0.274	1.148	1.009	0.318	
5660	132	802.11a	OFDM	20	15.0	14.14	-0.07	10 mm	Standard	6869	6	back	99.1	0.802	0.414	1.219	1.009	0.510	
5825	165	802.11a	OFDM	20	15.0	13.63	-0.21	10 mm	Standard	6869	6	back	99.1	0.759	0.373	1.371	1.009	0.516	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body											
Spatial Peak								1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population								averaged over 1 gram											

**Table 11-18
Bluetooth Body-Worn SAR**

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.															
2441	39	Bluetooth	FHSS	9.5	8.70	0.03	10 mm	Standard	6869	1	back	1:1	0.015	1.202	0.018	A37
2441	39	Bluetooth	FHSS	9.5	8.70	0.03	10 mm	Wireless Charging	6869	1	back	1:1	0.012	1.202	0.014	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram								

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 61 of 80

11.3 Standalone Wireless Router SAR Data

Table 11-19
GPRS/UMTS/CDMA Hotspot SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	31.2	30.75	0.02	10 mm	Standard	6851	2	1:4.15	back	0.592	1.109	0.657	A14
836.60	190	GSM 850	GPRS	31.2	30.75	-0.07	10 mm	Wireless Charging	6851	2	1:4.15	back	0.549	1.109	0.609	
836.60	190	GSM 850	GPRS	31.2	30.75	0.02	10 mm	Standard	6851	2	1:4.15	front	0.298	1.109	0.330	
836.60	190	GSM 850	GPRS	31.2	30.75	0.08	10 mm	Standard	6851	2	1:4.15	bottom	0.194	1.109	0.215	
836.60	190	GSM 850	GPRS	31.2	30.75	-0.03	10 mm	Standard	6851	2	1:4.15	right	0.115	1.109	0.128	
836.60	190	GSM 850	GPRS	31.2	30.75	-0.02	10 mm	Standard	6851	2	1:4.15	left	0.084	1.109	0.093	
829.80	4149	UMTS 850	RMC	24.2	24.10	-0.05	10 mm	Standard	6935	N/A	1:1	back	0.281	1.023	0.287	
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.02	10 mm	Standard	6935	N/A	1:1	back	0.443	1.021	0.452	A15
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.06	10 mm	Wireless Charging	6935	N/A	1:1	back	0.408	1.021	0.417	
843.80	4219	UMTS 850	RMC	24.2	24.08	-0.04	10 mm	Standard	6935	N/A	1:1	back	0.303	1.028	0.311	
829.80	4149	UMTS 850	RMC	24.2	24.10	-0.01	10 mm	Standard	6935	N/A	1:1	front	0.287	1.023	0.294	
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.03	10 mm	Standard	6935	N/A	1:1	front	0.392	1.021	0.400	
843.80	4219	UMTS 850	RMC	24.2	24.08	0.04	10 mm	Standard	6935	N/A	1:1	front	0.305	1.028	0.314	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.10	10 mm	Standard	6935	N/A	1:1	bottom	0.231	1.023	0.236	
836.60	4183	UMTS 850	RMC	24.2	24.11	-0.02	10 mm	Standard	6935	N/A	1:1	bottom	0.292	1.021	0.298	
843.80	4219	UMTS 850	RMC	24.2	24.08	-0.02	10 mm	Standard	6935	N/A	1:1	bottom	0.262	1.028	0.269	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.03	10 mm	Standard	6935	N/A	1:1	right	0.293	1.023	0.300	
836.60	4183	UMTS 850	RMC	24.2	24.11	0.03	10 mm	Standard	6935	N/A	1:1	right	0.377	1.021	0.385	
843.80	4219	UMTS 850	RMC	24.2	24.08	-0.04	10 mm	Standard	6935	N/A	1:1	right	0.245	1.028	0.252	
829.80	4149	UMTS 850	RMC	24.2	24.10	0.00	10 mm	Standard	6935	N/A	1:1	left	0.096	1.023	0.098	
836.60	4183	UMTS 850	RMC	24.2	24.11	0.08	10 mm	Standard	6935	N/A	1:1	left	0.118	1.021	0.120	
843.80	4219	UMTS 850	RMC	24.2	24.08	0.07	10 mm	Standard	6935	N/A	1:1	left	0.060	1.028	0.062	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.7	24.60	0.02	10 mm	Standard	6851	N/A	1:1	back	0.386	1.023	0.395	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.7	24.60	-0.04	10 mm	Standard	6851	N/A	1:1	front	0.395	1.023	0.404	A17
836.52	384	Cell. CDMA	EVDO Rev. 0	24.7	24.60	-0.03	10 mm	Wireless Charging	6851	N/A	1:1	front	0.391	1.023	0.400	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.7	24.60	0.04	10 mm	Standard	6851	N/A	1:1	bottom	0.267	1.023	0.273	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.7	24.60	0.05	10 mm	Standard	6851	N/A	1:1	right	0.164	1.023	0.168	
836.52	384	Cell. CDMA	EVDO Rev. 0	24.7	24.60	0.11	10 mm	Standard	6851	N/A	1:1	left	0.102	1.023	0.104	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.04	10 mm	Standard	6851	2	1:4.15	back	0.214	1.000	0.214	
1880.00	661	GSM 1900	GPRS	28.2	28.20	-0.07	10 mm	Standard	6851	2	1:4.15	front	0.219	1.000	0.219	
1880.00	661	GSM 1900	GPRS	28.2	28.20	-0.06	10 mm	Standard	6851	2	1:4.15	bottom	0.267	1.000	0.267	
1880.00	661	GSM 1900	GPRS	28.2	28.20	0.02	10 mm	Wireless Charging	6851	2	1:4.15	bottom	0.273	1.000	0.273	A19
1880.00	661	GSM 1900	GPRS	28.2	28.20	-0.07	10 mm	Standard	6851	2	1:4.15	left	0.178	1.000	0.178	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.08	10 mm	Standard	6851	N/A	1:1	back	0.414	1.012	0.419	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	0.10	10 mm	Standard	6851	N/A	1:1	front	0.656	1.012	0.664	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	0.02	10 mm	Standard	6851	N/A	1:1	bottom	0.674	1.012	0.682	A21
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.01	10 mm	Wireless Charging	6851	N/A	1:1	bottom	0.550	1.012	0.557	
1880.00	9400	UMTS 1900	RMC	24.2	24.15	-0.01	10 mm	Standard	6851	N/A	1:1	left	0.328	1.012	0.332	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.7	24.60	0.03	10 mm	Standard	6851	N/A	1:1	back	0.396	1.023	0.405	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.7	24.60	0.03	10 mm	Standard	6851	N/A	1:1	front	0.467	1.023	0.478	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.7	24.60	-0.01	10 mm	Standard	6851	N/A	1:1	bottom	0.513	1.023	0.525	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.7	24.60	-0.05	10 mm	Wireless Charging	6851	N/A	1:1	bottom	0.564	1.023	0.577	A23
1880.00	600	PCS CDMA	EVDO Rev. 0	24.7	24.60	0.14	10 mm	Standard	6851	N/A	1:1	left	0.311	1.023	0.318	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak							Body 1.6 W/kg (mW/g) averaged over 1 gram									
Uncontrolled Exposure/General Population																

FCC ID: ZNFVS990			SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 62 of 80		

Table 11-20
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																			
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	-0.06	0	6844	QPSK	1	0	10 mm	back	1.1	0.458	1.000	0.458	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	-0.04	1	6844	QPSK	25	12	10 mm	back	1.1	0.290	1.132	0.328	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	0.05	0	6844	QPSK	1	0	10 mm	front	1.1	0.421	1.000	0.421	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	0.00	1	6844	QPSK	25	12	10 mm	front	1.1	0.304	1.132	0.344	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	0.11	0	6844	QPSK	1	0	10 mm	bottom	1.1	0.260	1.000	0.260	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	-0.01	1	6844	QPSK	25	12	10 mm	bottom	1.1	0.190	1.132	0.215	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	-0.15	0	6844	QPSK	1	0	10 mm	right	1.1	0.498	1.000	0.498	
782.00	23230	Mid	LTE Band 13	10	Wireless Charging	24.7	24.70	-0.20	0	6844	QPSK	1	0	10 mm	right	1.1	0.505	1.000	0.505	A25
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	0.02	1	6844	QPSK	25	12	10 mm	right	1.1	0.383	1.132	0.434	
782.00	23230	Mid	LTE Band 13	10	Standard	24.7	24.70	0.02	0	6844	QPSK	1	0	10 mm	left	1.1	0.290	1.000	0.290	
782.00	23230	Mid	LTE Band 13	10	Standard	23.7	23.16	0.00	1	6844	QPSK	25	12	10 mm	left	1.1	0.222	1.132	0.251	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

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

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	0.01	0	6844	QPSK	1	49	10 mm	back	1:1	0.426	1.026	0.437	A26
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.01	0	6844	QPSK	1	49	10 mm	back	1:1	0.401	1.007	0.404	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.01	0	6844	QPSK	1	0	10 mm	back	1:1	0.443	1.019	0.451	
842.50	20585	High	LTE Band 5 (Cell)	10	Wireless Charging	24.7	24.62	-0.02	0	6844	QPSK	1	0	10 mm	back	1:1	0.425	1.019	0.433	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.11	1	6844	QPSK	25	12	10 mm	back	1:1	0.338	1.033	0.349	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.03	1	6844	QPSK	25	25	10 mm	back	1:1	0.301	1.030	0.310	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	0.00	1	6844	QPSK	25	0	10 mm	back	1:1	0.345	1.047	0.361	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.03	1	6844	QPSK	50	0	10 mm	back	1:1	0.298	1.028	0.306	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	-0.11	0	6844	QPSK	1	49	10 mm	front	1:1	0.413	1.026	0.424	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.01	0	6844	QPSK	1	49	10 mm	front	1:1	0.418	1.007	0.421	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.01	0	6844	QPSK	1	0	10 mm	front	1:1	0.413	1.019	0.421	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	-0.11	1	6844	QPSK	25	12	10 mm	front	1:1	0.325	1.033	0.336	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	-0.04	1	6844	QPSK	25	25	10 mm	front	1:1	0.317	1.030	0.327	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	0.02	1	6844	QPSK	25	0	10 mm	front	1:1	0.332	1.047	0.348	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.03	1	6844	QPSK	50	0	10 mm	front	1:1	0.317	1.028	0.326	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	-0.04	0	6844	QPSK	1	49	10 mm	bottom	1:1	0.303	1.026	0.311	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	-0.13	0	6844	QPSK	1	49	10 mm	bottom	1:1	0.307	1.007	0.309	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.07	0	6844	QPSK	1	0	10 mm	bottom	1:1	0.305	1.019	0.311	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	-0.04	1	6844	QPSK	25	12	10 mm	bottom	1:1	0.229	1.033	0.237	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	-0.08	1	6844	QPSK	25	25	10 mm	bottom	1:1	0.230	1.030	0.237	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.07	1	6844	QPSK	25	0	10 mm	bottom	1:1	0.226	1.047	0.237	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	-0.03	1	6844	QPSK	50	0	10 mm	bottom	1:1	0.226	1.028	0.232	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	0.08	0	6844	QPSK	1	49	10 mm	right	1:1	0.356	1.026	0.365	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	-0.09	0	6844	QPSK	1	49	10 mm	right	1:1	0.351	1.007	0.353	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.01	0	6844	QPSK	1	0	10 mm	right	1:1	0.345	1.019	0.352	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.01	1	6844	QPSK	25	12	10 mm	right	1:1	0.272	1.033	0.281	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.00	1	6844	QPSK	25	25	10 mm	right	1:1	0.281	1.030	0.289	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.05	1	6844	QPSK	25	0	10 mm	right	1:1	0.251	1.047	0.263	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.01	1	6844	QPSK	50	0	10 mm	right	1:1	0.280	1.028	0.288	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	24.7	24.59	-0.03	0	6844	QPSK	1	49	10 mm	left	1:1	0.107	1.026	0.110	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	24.7	24.67	0.19	0	6844	QPSK	1	49	10 mm	left	1:1	0.094	1.007	0.095	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	24.7	24.62	-0.01	0	6844	QPSK	1	0	10 mm	left	1:1	0.108	1.019	0.110	
831.00	20470	Low	LTE Band 5 (Cell)	10	Standard	23.7	23.56	0.09	1	6844	QPSK	25	12	10 mm	left	1:1	0.092	1.033	0.095	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.57	0.07	1	6844	QPSK	25	25	10 mm	left	1:1	0.078	1.030	0.080	
842.50	20585	High	LTE Band 5 (Cell)	10	Standard	23.7	23.50	-0.07	1	6844	QPSK	25	0	10 mm	left	1:1	0.074	1.047	0.077	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.7	23.58	0.05	1	6844	QPSK	50	0	10 mm	left	1:1	0.084	1.028	0.086	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Body										
Spatial Peak										1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population										averaged over 1 gram										

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 63 of 80

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

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	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	Scaled SAR (1g)	Plot	
MHz	Ch.															(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	0.08	0	6844	QPSK	1	99	10 mm	back	1:1	0.469	1.000	0.469	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.04	1	6844	QPSK	50	50	10 mm	back	1:1	0.379	1.096	0.415	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	0.00	0	6844	QPSK	1	99	10 mm	front	1:1	0.472	1.000	0.472	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	0.02	1	6844	QPSK	50	50	10 mm	front	1:1	0.404	1.096	0.443	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	0.00	0	6844	QPSK	1	99	10 mm	bottom	1:1	0.507	1.000	0.507	A28
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging	25.2	25.20	-0.09	0	6844	QPSK	1	99	10 mm	bottom	1:1	0.479	1.000	0.479	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	-0.03	1	6844	QPSK	50	50	10 mm	bottom	1:1	0.478	1.096	0.524	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	25.2	25.20	-0.02	0	6844	QPSK	1	99	10 mm	left	1:1	0.381	1.000	0.381	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	24.2	23.80	-0.01	1	6844	QPSK	50	50	10 mm	left	1:1	0.346	1.096	0.379	
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 2 (PCS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.																			
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	25.2	25.18	0.03	0	6844	QPSK	1	50	10 mm	back	1:1	0.436	1.005	0.438	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	24.2	23.82	0.03	1	6844	QPSK	50	50	10 mm	back	1:1	0.381	1.091	0.416	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	25.2	25.18	-0.14	0	6844	QPSK	1	50	10 mm	front	1:1	0.579	1.005	0.582	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	24.2	23.82	-0.12	1	6844	QPSK	50	50	10 mm	front	1:1	0.511	1.091	0.558	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	25.2	25.18	-0.09	0	6844	QPSK	1	50	10 mm	bottom	1:1	0.598	1.005	0.601	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Wireless Charging	25.2	25.18	-0.09	0	6844	QPSK	1	50	10 mm	bottom	1:1	0.688	1.005	0.691	A30
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	24.2	23.82	-0.10	1	6844	QPSK	50	50	10 mm	bottom	1:1	0.513	1.091	0.560	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	25.2	25.18	-0.17	0	6844	QPSK	1	50	10 mm	left	1:1	0.394	1.005	0.396	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	24.2	23.82	-0.13	1	6844	QPSK	50	50	10 mm	left	1:1	0.344	1.091	0.375	
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 7 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) [W/kg]	Scaling Factor	Scaled SAR (1g) [W/kg]	Plot #	
MHz	Ch.																			
2510.00	20850	Low	LTE Band 7	20	Standard	24.2	24.17	-0.04	0	6844	QPSK	1	0	10 mm	back	1:1	0.993	1.007	1.000	A32
2535.00	21100	Mid	LTE Band 7	20	Standard	24.2	24.14	-0.03	0	6844	QPSK	1	50	10 mm	back	1:1	0.944	1.014	0.957	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	-0.10	0	6844	QPSK	1	50	10 mm	back	1:1	0.930	1.000	0.930	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	-0.01	1	6844	QPSK	50	50	10 mm	back	1:1	0.702	1.030	0.723	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.00	-0.06	1	6844	QPSK	100	0	10 mm	back	1:1	0.724	1.047	0.758	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	0.11	0	6844	QPSK	1	50	10 mm	front	1:1	0.732	1.000	0.732	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	-0.04	1	6844	QPSK	50	50	10 mm	front	1:1	0.538	1.030	0.554	
2510.00	20850	Low	LTE Band 7	20	Standard	24.2	24.17	0.06	0	6844	QPSK	1	0	10 mm	bottom	1:1	1.190	1.007	1.198	
2510.00	20850	Low	LTE Band 7	20	Wireless Charging	24.2	24.17	-0.09	0	6844	QPSK	1	0	10 mm	bottom	1:1	1.140	1.007	1.148	
2535.00	21100	Mid	LTE Band 7	20	Standard	24.2	24.14	-0.15	0	6844	QPSK	1	50	10 mm	bottom	1:1	1.150	1.014	1.166	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	0.00	0	6844	QPSK	1	50	10 mm	bottom	1:1	1.020	1.000	1.020	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	0.15	1	6844	QPSK	50	50	10 mm	bottom	1:1	0.772	1.030	0.795	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.00	0.04	1	6844	QPSK	100	0	10 mm	bottom	1:1	0.780	1.047	0.817	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	-0.13	0	6844	QPSK	1	50	10 mm	right	1:1	0.237	1.000	0.237	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	-0.02	1	6844	QPSK	50	50	10 mm	right	1:1	0.179	1.030	0.184	
2560.00	21350	High	LTE Band 7	20	Standard	24.2	24.20	-0.17	0	6844	QPSK	1	50	10 mm	left	1:1	0.077	1.000	0.077	
2560.00	21350	High	LTE Band 7	20	Standard	23.2	23.07	-0.15	1	6844	QPSK	50	50	10 mm	left	1:1	0.059	1.030	0.061	
2510.00	20850	Low	LTE Band 7	20	Standard	24.2	24.17	0.07	0	6844	QPSK	1	0	10 mm	bottom	1:1	1.180	1.007	1.188	
2535.00	21100	Mid	LTE Band 7	20	Standard	24.2	24.14	-0.03	0	6844	QPSK	1	50	10 mm	bottom	1:1	1.060	1.014	1.075	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT										Body										
Spatial Peak										1.6 W/kg (mW/g)										
Uncontrolled Exposure/General Population										averaged over 1 gram										

Blue entry represents variability measurement.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 64 of 80

Table 11-25
WLAN Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	Data Rate [Mbps]	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)	(Duty Cycle)	(W/kg)		
2437	6	802.11b	DSSS	22	17.5	16.18	-	10 mm	Standard	6869	1	back	99.0	0.147	-	1.355	1.010	-	
2437	6	802.11b	DSSS	22	17.5	16.18	-	10 mm	Standard	6869	1	front	99.0	0.180	-	1.355	1.010	-	
2437	6	802.11b	DSSS	22	17.5	16.18	-	10 mm	Standard	6869	1	top	99.0	0.113	-	1.355	1.010	-	
2437	6	802.11b	DSSS	22	17.5	16.18	-0.01	10 mm	Standard	6869	1	left	99.0	0.189	0.140	1.355	1.010	0.192	A34
2437	6	802.11b	DSSS	22	17.5	16.18	-0.12	10 mm	Wireless Charging	6869	1	left	99.0	0.181	0.136	1.355	1.010	0.186	
5825	165	802.11a	OFDM	20	15.0	13.63	-0.21	10 mm	Standard	6869	6	back	99.1	0.759	0.373	1.371	1.009	0.516	A36
5825	165	802.11a	OFDM	20	15.0	13.63	0.19	10 mm	Wireless Charging	6869	6	back	99.1	0.286	0.106	1.371	1.009	0.146	
5825	165	802.11a	OFDM	20	15.0	13.63	-	10 mm	Standard	6869	6	front	99.1	0.114	-	1.371	1.009	-	
5825	165	802.11a	OFDM	20	15.0	13.63	-	10 mm	Standard	6869	6	top	99.1	0.095	-	1.371	1.009	-	
5825	165	802.11a	OFDM	20	15.0	13.63	0.09	10 mm	Standard	6869	6	left	99.1	0.192	0.075	1.371	1.009	0.104	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT												Body							
Spatial Peak												1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population												averaged over 1 gram							

11.4 Standalone Phablet SAR Data

Table 11-26
WLAN Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Cover Type	Device Serial Number	Data Rate [Mbps]	Side	Duty Cycle (%)	Peak SAR of Area Scan [W/kg]	SAR (10g) [W/kg]	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Scaled SAR (10g) [W/kg]	Plot #
MHz	Ch.																		
5300	60	802.11a	OFDM	20	15.0	14.40	-0.20	0mm	Standard	6869	6	back	99.1	4.578	0.630	1.148	1.009	0.730	A38
5300	60	802.11a	OFDM	20	15.0	14.40	-0.20	0mm	Wireless Charging	6869	6	back	99.1	4.524	0.524	1.148	1.009	0.607	
5300	60	802.11a	OFDM	20	15.0	14.40	-	0mm	Standard	6869	6	front	99.1	1.073	-	1.148	1.009	-	
5300	60	802.11a	OFDM	20	15.0	14.40	-	0mm	Standard	6869	6	top	99.1	0.600	-	1.148	1.009	-	
5300	60	802.11a	OFDM	20	15.0	14.40	-	0mm	Standard	6869	6	left	99.1	0.750	-	1.148	1.009	-	
5660	132	802.11a	OFDM	20	15.0	14.14	-0.12	0mm	Standard	6869	6	back	99.1	2.796	0.525	1.219	1.009	0.646	
5660	132	802.11a	OFDM	20	15.0	14.14	-	0mm	Standard	6869	6	front	99.1	0.590	-	1.219	1.009	-	
5660	132	802.11a	OFDM	20	15.0	14.14	-	0mm	Standard	6869	6	top	99.1	0.159	-	1.219	1.009	-	
5660	132	802.11a	OFDM	20	15.0	14.14	-	0mm	Standard	6869	6	left	99.1	1.413	-	1.219	1.009	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT												Phablet							
Spatial Peak												4.0 W/kg (mW/g)							
Uncontrolled Exposure/General Population												averaged over 10 grams							

SAR Test Notes

General Notes:

- The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2003, and FCC KDB Publication 447498 D01v05.
- Batteries are fully charged at the beginning of the SAR measurements.
- Liquid tissue depth was at least 15.0 cm for all frequencies.
- 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.
- SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v05.
- 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.
- Per FCC KDB 865664 D01 v01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
- During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.6 for more details).

FCC ID: ZNFVS990			SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset			Page 65 of 80

9. Per FCC KDB Publication 648474 D04v01r01, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, hand SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.
10. Per FCC KDB Publication 648474 D03, SAR was measured using the standard battery cover and then repeated with the wireless charging cover for the configuration with the highest measured SAR for each wireless technology, frequency band, operating mode, and exposure condition. Since reported SAR did not exceed 1.2 W/kg, additional testing with the wireless charging cover was not required.
11. This device supports dynamic antenna tuning for UMTS Band 5, LTE Bands 5, and LTE Band 13. Per FCC Guidance, SAR was measured according to the normally required SAR measurement configurations with the closed loop tuner active. Please see Section 13 for supplemental data to demonstrate the tuning states used in the full SAR measurements represent worst case or close to worst case conditions.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR. GPRS was additionally evaluated for head and body-worn voice calls to cover VoIP.
2. Justification for reduced test configurations per KDB Publication 941225 D03v03 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. 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 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v03.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. EVDO Rev0 and RevA and TDSO / SO32 FCH+SCH SAR tests were not required per the 3G SAR Test Reduction Procedure in FCC KDB Publication 941225 D01v03.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01v03 procedures for data devices. Wireless Router SAR tests for Subtype 2 of Rev.A and 1x RTT configurations were not required per the 3G SAR Test Reduction Policy in KDB Publication 941225 D01v03.
4. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.
5. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 66 of 80

UMTS Notes:

1. UMTS mode in was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03.
2. Per FCC KDB Publication 447498 D01v05, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is $> \frac{1}{2}$ dB, instead of the middle channel, the highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r03. The general test procedures used for testing can be found in Section 8.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC Guidance, LTE CA SAR was not needed for testing since the data sent by uplink on the uplink physical channels does not change between Rel. 8 and Rel. 10.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.7.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r01 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg. See Section 8.7.6 for more information.
4. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 67 of 80

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r02 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/ac 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 447498 D01v05 IV.C.1.iii and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg.

Note:

1. Main Antenna SAR Testing was not required for Phablet exposure conditions per FCC KDB 648474. Therefore, no further analysis was required to determine that possible simultaneous scenarios would not exceed the SAR limit.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 68 of 80

12.3 Head SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	GSM/GPRS 850	0.353	1.048	1.401
	UMTS 850	0.254	1.048	1.302
	Cell. CDMA/EVDO	0.274	1.048	1.322
	GSM/GPRS 1900	0.073	1.048	1.121
	UMTS 1900	0.146	1.048	1.194
	PCS CDMA/EVDO	0.148	1.048	1.196
	LTE Band 13	0.280	1.048	1.328
	LTE Band 5 (Cell)	0.254	1.048	1.302
	LTE Band 4 (AWS)	0.153	1.048	1.201
	LTE Band 2 (PCS)	0.165	1.048	1.213
	LTE Band 7	0.161	1.048	1.209

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	GSM/GPRS 850	0.353	0.440	0.793
	UMTS 850	0.254	0.440	0.694
	Cell. CDMA/EVDO	0.274	0.440	0.714
	GSM/GPRS 1900	0.073	0.440	0.513
	UMTS 1900	0.146	0.440	0.586
	PCS CDMA/EVDO	0.148	0.440	0.588
	LTE Band 13	0.280	0.440	0.720
	LTE Band 5 (Cell)	0.254	0.440	0.694
	LTE Band 4 (AWS)	0.153	0.440	0.593
	LTE Band 2 (PCS)	0.165	0.440	0.605
	LTE Band 7	0.161	0.440	0.601

The worst case 5 GHz WIFI reported SAR for each head configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 69 of 80

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-3
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)
Body-Worn	GSM/GPRS 850	0.657	0.162	0.819
	UMTS 850	0.452	0.162	0.614
	Cell. CDMA	0.428	0.162	0.590
	GSM/GPRS 1900	0.214	0.162	0.376
	UMTS 1900	0.468	0.162	0.630
	PCS CDMA	0.435	0.162	0.597
	LTE Band 13	0.458	0.162	0.620
	LTE Band 5 (Cell)	0.451	0.162	0.613
	LTE Band 4 (AWS)	0.483	0.162	0.645
	LTE Band 2 (PCS)	0.438	0.162	0.600
	LTE Band 7	1.000	0.162	1.162

Table 12-4
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body-Worn	GSM/GPRS 850	0.657	0.519	1.176
	UMTS 850	0.452	0.519	0.971
	Cell. CDMA	0.428	0.519	0.947
	GSM/GPRS 1900	0.214	0.519	0.733
	UMTS 1900	0.468	0.519	0.987
	PCS CDMA	0.435	0.519	0.954
	LTE Band 13	0.458	0.519	0.977
	LTE Band 5 (Cell)	0.451	0.519	0.970
	LTE Band 4 (AWS)	0.483	0.519	1.002
	LTE Band 2 (PCS)	0.438	0.519	0.957
	LTE Band 7	1.000	0.519	1.519

The worst case 5 GHz WIFI reported SAR for each body-worn configuration was considered for simultaneous SAR exclusion via summation of standalone SAR, regardless of whether the WIFI channel has WIFI Hotspot capability, for simplicity to determine compliance. Please note that the actual simultaneous transmission SAR will not exceed the summed levels indicated.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 70 of 80

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)
Body-Worn	GSM/GPRS 850	0.657	0.018	0.675
	UMTS 850	0.452	0.018	0.470
	Cell. CDMA	0.428	0.018	0.446
	GSM/GPRS 1900	0.214	0.018	0.232
	UMTS 1900	0.468	0.018	0.486
	PCS CDMA	0.435	0.018	0.453
	LTE Band 13	0.458	0.018	0.476
	LTE Band 5 (Cell)	0.451	0.018	0.469
	LTE Band 4 (AWS)	0.483	0.018	0.501
	LTE Band 2 (PCS)	0.438	0.018	0.456
	LTE Band 7	1.000	0.018	1.018

FCC ID: ZNFVS990		SAR EVALUATION REPORT 	Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 71 of 80

12.5 Hotspot SAR Simultaneous Transmission Analysis

Table 12-6
Simultaneous Transmission Scenario 2.4 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	GPRS 850	0.657	0.192	0.849
	UMTS 850	0.452	0.192	0.644
	Cell. EVDO	0.404	0.192	0.596
	GPRS 1900	0.273	0.192	0.465
	UMTS 1900	0.682	0.192	0.874
	PCS EVDO	0.577	0.192	0.769
	LTE Band 13	0.505	0.192	0.697
	LTE Band 5 (Cell)	0.451	0.192	0.643
	LTE Band 4 (AWS)	0.524	0.192	0.716
	LTE Band 2 (PCS)	0.691	0.192	0.883
	LTE Band 7	1.198	0.192	1.390

Table 12-7
Simultaneous Transmission Scenario 5 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	GPRS 850	0.657	0.516	1.173
	UMTS 850	0.452	0.516	0.968
	Cell. EVDO	0.404	0.516	0.920
	GPRS 1900	0.273	0.516	0.789
	UMTS 1900	0.682	0.516	1.198
	PCS EVDO	0.577	0.516	1.093
	LTE Band 13	0.505	0.516	1.021
	LTE Band 5 (Cell)	0.451	0.516	0.967
	LTE Band 4 (AWS)	0.524	0.516	1.040
	LTE Band 2 (PCS)	0.691	0.516	1.207
	LTE Band 7	1.198	0.516	See Below

Table 12-8
Simultaneous Transmission Scenario 5 GHz WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 7 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Hotspot SAR	Back	1.000	0.516	1.516
	Front	0.732	0.516*	1.248
	Top	-	0.516*	0.516
	Bottom	1.198	-	1.198
	Right	0.237	-	0.237
	Left	0.077	0.104	0.181

Full SAR measurements for WLAN for the front side and top edge were not required per the initial test position procedures in FCC KDB Publication 248227 D01v02r01. The most conservative SAR value was used to determine simultaneous transmission SAR test exclusion.

12.6 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 D01v05 and IEEE 1528-2013 Section 6.3.4.1.2.

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 72 of 80

13 ADDITIONAL TESTING PER FCC GUIDANCE

Per FCC Guidance, the following test procedures were followed to demonstrate that the tuning states used in the SAR results in Section 11 represent a conservative worst case condition. For each exposure condition and operating mode, the test position and sub-band with the highest measured SAR configuration was selected. The SAR probe was positioned at the highest measured SAR point in the area scan and time-sweep SAR measurements at the single point were performed for all available tuning states. Tuning states were configured via test tools and the device was not moved between measurements.

Table 13-1
Additional SAR Data

Exposure Condition	Mode	Service/Modulation	Bandwidth (MHz)	Sub-band	Frequency (MHz)	Channel	RB Size	RB offset	Test Position	Spacing	Measured 1g SAR (W/kg)	Average Value of Time Sweep (W/kg)			
												S0	S1	S2	S3
Head	UMTS B5	RMC	N/A	2	836.6	4183	N/A	N/A	Right Cheek	N/A	0.249	0.304	0.264	0.118	N/A
	LTE B5	QPSK	10	1	831	20470	1	49			0.248	0.289	0.259	0.208	0.105
	LTE B13	QPSK	10	2	782	23230	1	0			0.280	0.298	0.267	0.167	0.091
Body-Worn	UMTS B5	RMC	N/A	2	836.6	4183	N/A	N/A	Back Side	10 mm	0.443	0.432	0.357	0.168	N/A
	LTE B5	QPSK	10	3	842.5	20585	1	0			0.443	0.596	0.490	0.404	0.234
	LTE B13	QPSK	10	2	782	23230	1	0			0.458	0.475	0.451	0.316	0.182
Hotspot	UMTS B5	RMC	N/A	2	836.6	4183	N/A	N/A	Back Side	10 mm	0.443	0.432	0.357	0.168	N/A
	LTE B5	QPSK	10	3	842.5	20585	1	0			0.443	0.596	0.490	0.404	0.234
	LTE B13	QPSK	10	2	782	23230	1	0	Right Edge		0.498	0.560	0.498	0.350	0.211

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 73 of 80

14 SAR MEASUREMENT VARIABILITY

14.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, 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 ($\sim 10\%$ from the 1-g 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) 10g Phablet SAR measurement variability analysis applies a factor of 2.5 to the procedures outlined 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)	
2450	2510.00	20850	LTE Band 7	QPSK, 1 RB, 0 RB Offset	bottom	10 mm	1.190	1.180	1.01	N/A	N/A	N/A	N/A
2600	2535.00	21100	LTE Band 7	QPSK, 1 RB, 50 RB Offset	bottom	10 mm	1.150	1.060	1.08	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT						Body							
Spatial Peak						1.6 W/kg (mW/g)							
Uncontrolled Exposure/General Population						averaged over 1 gram							

14.2 Measurement Uncertainty

The measured SAR was < 1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 74 of 80

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/15/2015	Annual	3/15/2016	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	12/30/2014	Annual	12/30/2015	JP38020182
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00387
Agilent	8648D	(9kHz-4GHz) Signal Generator	3/15/2015	Annual	3/15/2016	3629U00687
Agilent	E4438C	ESG Vector Signal Generator	3/12/2015	Annual	3/12/2016	MY45090700
Agilent	E4438C	ESG Vector Signal Generator	3/13/2015	Annual	3/13/2016	MY42082385
Agilent	E4432B	ESG-D Series Signal Generator	3/16/2015	Annual	3/16/2016	US40053896
Agilent	N9020A	MKA Signal Analyzer	10/27/2014	Annual	10/27/2015	US46470561
Agilent	N5182A	MKG Vector Signal Generator	10/27/2014	Annual	10/27/2015	MY47420603
Agilent	N5182A	MKG Vector Signal Generator	3/16/2015	Annual	3/16/2016	MY47420800
Agilent	8753ES	S-Parameter Network Analyzer	1/20/2015	Annual	1/20/2016	US39170122
Agilent	8753ES	S-Parameter Network Analyzer	3/12/2015	Annual	3/12/2016	MY40000670
Agilent	E5515C	Wireless Communications Test Set	11/5/2013	Biennial	11/5/2015	GB46310798
Agilent	E5515C	Wireless Communications Test Set	6/18/2015	Biennial	6/18/2017	GB41450275
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433977
Amplifier Research	1551G6	Amplifier	CBT	N/A	CBT	433978
Anritsu	MA2438A	Power Meter	3/13/2015	Annual	3/13/2016	1189013
Anritsu	MA2438A	Power Meter	3/13/2015	Annual	3/13/2016	1070030
Anritsu	MA2495A	Power Meter	10/31/2013	Biennial	10/31/2015	1039008
Anritsu	MA2495A	Power Meter	10/31/2013	Biennial	10/31/2015	941001
Anritsu	MA2481A	Power Sensor	3/10/2015	Annual	3/10/2016	2400
Anritsu	MA2481A	Power Sensor	3/11/2015	Annual	3/11/2016	5318
Anritsu	MA2411B	Pulse Power Sensor	11/17/2014	Annual	11/17/2015	1126066
Anritsu	MA2411B	Pulse Power Sensor	3/13/2015	Annual	3/13/2016	1207470
Anritsu	MT8820C	Radio Communication Analyzer	6/12/2015	Annual	6/12/2016	6201240328
Anritsu	MT8820C	Radio Communication Analyzer	7/24/2015	Annual	7/24/2016	6200901190
Anritsu	MA24106A	USB Power Sensor	5/29/2015	Annual	5/29/2016	1244512
Anritsu	MA24106A	USB Power Sensor	5/29/2015	Annual	5/29/2016	1248508
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTECH	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M155A00-009
Control Company	4040	Digital Thermometer	3/15/2015	Biennial	3/15/2017	150194929
Fisher Scientific	S407993	Long Stem Thermometer	11/4/2013	Biennial	11/4/2015	130671826
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/30/2014	Annual	10/30/2015	1833460
Gigatronics	8651A	Universal Power Meter	10/30/2014	Annual	10/30/2015	8650319
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R897950903
MiniCircuits	VLP-600D+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-120D+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-295D+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mitutoyo	CD-6°CSX	Digital Caliper	5/8/2014	Biennial	5/8/2016	13264165
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE220B-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	3/23/2015	Annual	3/23/2016	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	6/3/2015	Annual	6/3/2016	109892
Rohde & Schwarz	CMW500	Radio Communication Tester	7/21/2015	Annual	7/21/2016	116743
Seekonk	NC-100	Torque Wrench	3/18/2014	Biennial	3/18/2016	22313
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
SPEAG	D1750V2	1750 MHz SAR Dipole	4/15/2015	Annual	4/15/2016	1051
SPEAG	D1765V2	1765 MHz SAR Dipole	5/13/2015	Annual	5/13/2016	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	4/14/2015	Annual	4/14/2016	5d141
SPEAG	D1900V2	1900 MHz SAR Dipole	7/14/2015	Annual	7/14/2016	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/11/2014	Annual	8/11/2015	719
SPEAG	D2450V2	2450 MHz SAR Dipole	2/18/2015	Annual	2/18/2016	882
SPEAG	D2600V2	2600 MHz SAR Dipole	10/20/2014	Annual	10/20/2015	1071
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/21/2015	Annual	1/21/2016	1057
SPEAG	D835V2	835 MHz SAR Dipole	7/22/2015	Annual	7/22/2016	4d133
SPEAG	D750V3	750 MHz Dipole	1/16/2015	Annual	1/16/2016	1003
SPEAG	D835V2	835 MHz SAR Dipole	4/13/2015	Annual	4/13/2016	4d119
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2014	Annual	9/17/2015	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/18/2014	Annual	9/18/2015	1364
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/31/2014	Annual	10/31/2015	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/12/2014	Annual	12/12/2015	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/14/2015	Annual	1/14/2016	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/20/2015	Annual	4/20/2016	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2015	Annual	3/13/2016	1334
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2015	Annual	3/13/2016	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/17/2015	Annual	6/17/2016	859
SPEAG	DAK-3.5	Dielectric Assessment Kit	10/21/2014	Annual	10/21/2015	1091
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2015	Annual	5/12/2016	1070
SPEAG	DAK5-3.5	Portable Dielectric Assessment Kit	7/14/2015	Annual	7/14/2016	1039
SPEAG	D5GHzV2	SAR Dipole	9/25/2014	Annual	9/25/2015	1191
SPEAG	ES30V3	SAR Probe	9/18/2014	Annual	9/18/2015	3332
SPEAG	ES30V3	SAR Probe	1/20/2015	Annual	1/20/2016	3213
SPEAG	ES30V3	SAR Probe	9/24/2014	Annual	9/24/2015	3288
SPEAG	ES30V3	SAR Probe	12/16/2014	Annual	12/16/2015	3334
SPEAG	ES30V3	SAR Probe	1/23/2015	Annual	1/23/2016	3318
SPEAG	EX30V4	SAR Probe	2/10/2015	Annual	2/10/2016	3914
SPEAG	ES30V3	SAR Probe	3/19/2015	Annual	3/19/2016	3319
SPEAG	EX30V4	SAR Probe	4/23/2015	Annual	4/23/2016	7357
SPEAG	ES30V3	SAR Probe	5/20/2015	Annual	5/20/2016	3263

Note:

- All equipment was used solely within its calibration period.
- 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.

FCC ID: ZNFVS990		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 75 of 80

16 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz:

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary E ffect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout E lectronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.1	11.7
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.2	23.5

The above measurement uncertainties are according to IEEE Std. 1528-2003

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	
			Page 76 of 80

Applicable for frequencies up to 6 GHz:

a	b	c	d	e= f(d,k)	f	g	h = c x i/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary E ffect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout E lectronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	E.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.4	12.0
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.7	24.0

The above measurement uncertainties are according to IEEE Std. 1528-2003

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 77 of 80

17 CONCLUSION

17.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry 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]

FCC ID: ZNFVS990	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT	 LG	Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 78 of 80

18 REFERENCES

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.
- [2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.
- [3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.
- [4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.
- [5] IEEE Standards Coordinating Committee 39 –Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.
- [6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. -124.
- [9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [13] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.
- [15] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.
- [16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.
- [17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

FCC ID: ZNFVS990	 SAR EVALUATION REPORT 		Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset	Page 79 of 80

- [18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [19] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.
- [20] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.
- [21] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.
- [22] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009
- [23] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07
- [24] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227 D01v01r02
- [25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D02-D04
- [26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04
- [27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02
- [28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02
- [29] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [30] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

FCC ID: ZNFVS990			SAR EVALUATION REPORT 	Reviewed by: Quality Manager
Document S/N: 0Y1508101525-R1.ZNF	Test Dates: 08/10/15 – 08/31/15	DUT Type: Portable Handset		Page 80 of 80

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Head Medium parameters used (interpolated):
 $f = 836.6 \text{ MHz}$; $\sigma = 0.885 \text{ S/m}$; $\epsilon_r = 40.283$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 850, Right Head, Cheek, Mid.ch, 2 Tx slots, Standard Cover

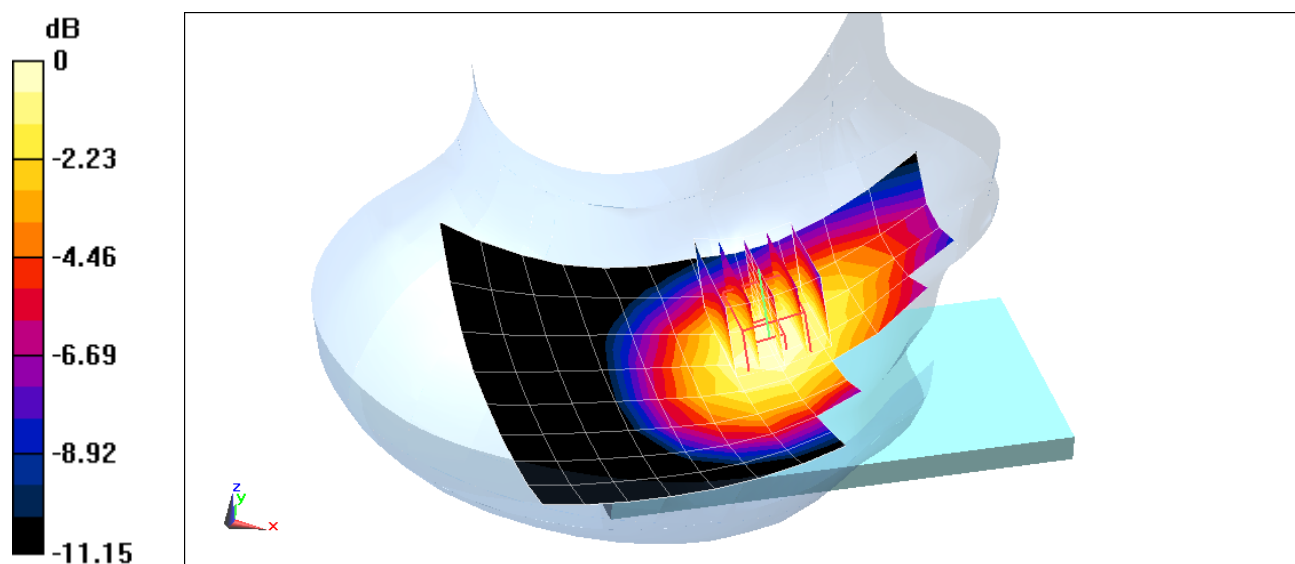
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.42 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.404 W/kg

SAR(1 g) = 0.318 W/kg



0 dB = 0.343 W/kg = -4.65 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
 $f = 836.6 \text{ MHz}$; $\sigma = 0.885 \text{ S/m}$; $\epsilon_r = 40.283$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

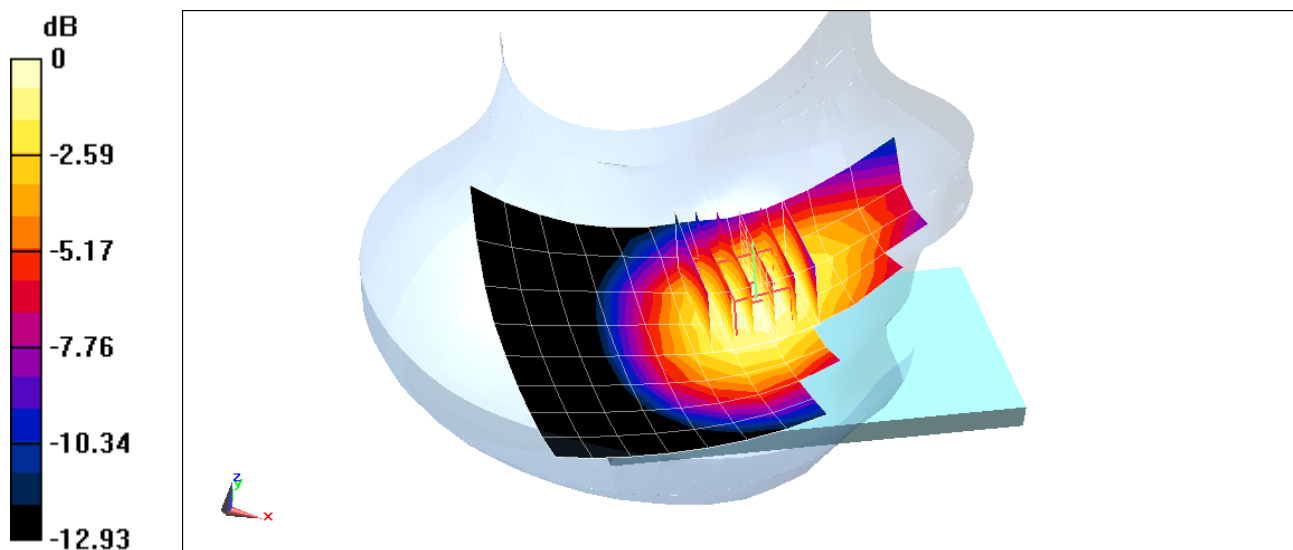
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.28 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.321 W/kg

SAR(1 g) = 0.249 W/kg



0 dB = 0.273 W/kg = -5.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
 $f = 836.52 \text{ MHz}$; $\sigma = 0.885 \text{ S/m}$; $\epsilon_r = 40.284$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015
Phantom: SAM Front; Type: SAM; Serial: 1686
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. CDMA, Right Head, Cheek, Mid.ch, Wireless Charging Cover

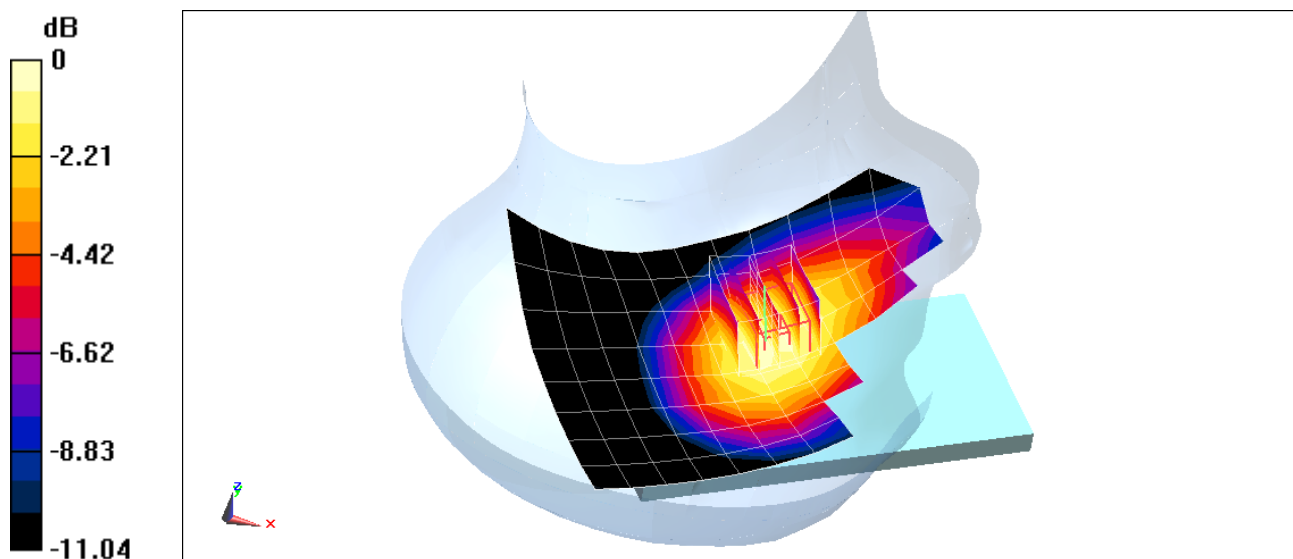
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.38 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.347 W/kg

SAR(1 g) = 0.267 W/kg



0 dB = 0.293 W/kg = -5.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.411 \text{ S/m}$; $\epsilon_r = 40.826$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-17-2015; Ambient Temp: 21.8°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.1, 5.1, 5.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 1900, Right Head, Cheek, Mid.ch, 2 Tx slots, Standard Cover

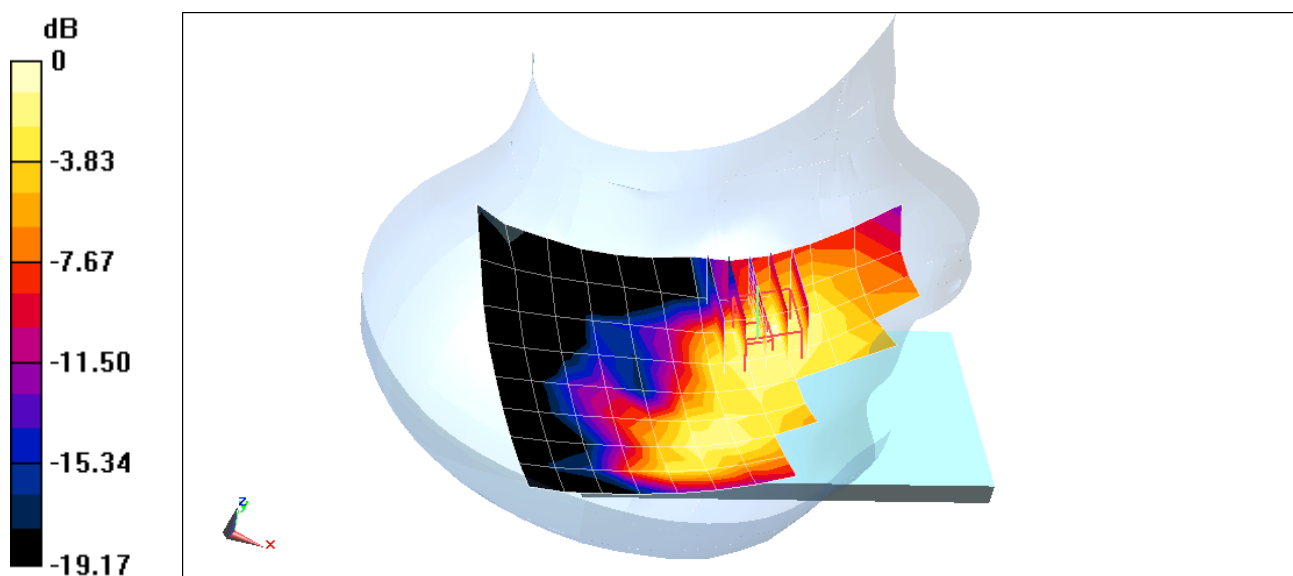
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.071 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.117 W/kg

SAR(1 g) = 0.073 W/kg



0 dB = 0.0874 W/kg = -10.58 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.411 \text{ S/m}$; $\epsilon_r = 40.826$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-17-2015; Ambient Temp: 21.8°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.1, 5.1, 5.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Right Head, Cheek, Mid.ch, Standard Cover

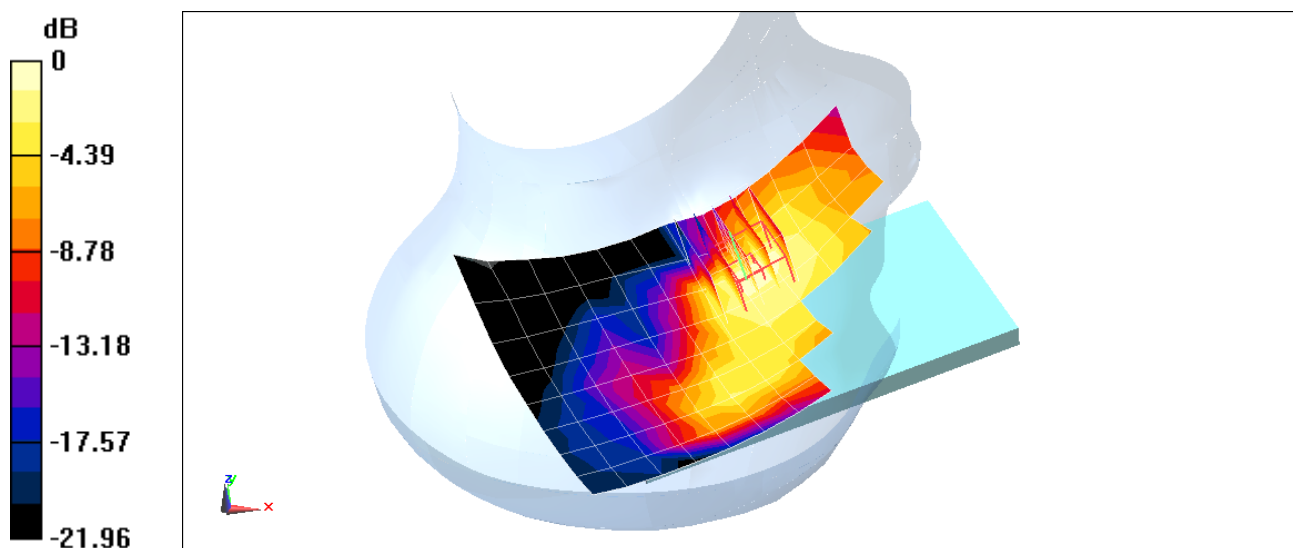
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.04 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.248 W/kg

SAR(1 g) = 0.144 W/kg



0 dB = 0.173 W/kg = -7.62 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 2332

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.411 \text{ S/m}$; $\epsilon_r = 40.826$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-17-2015; Ambient Temp: 21.8°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.1, 5.1, 5.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS EVDO Rev A, Right Head, Cheek, Mid.ch, Standard Cover

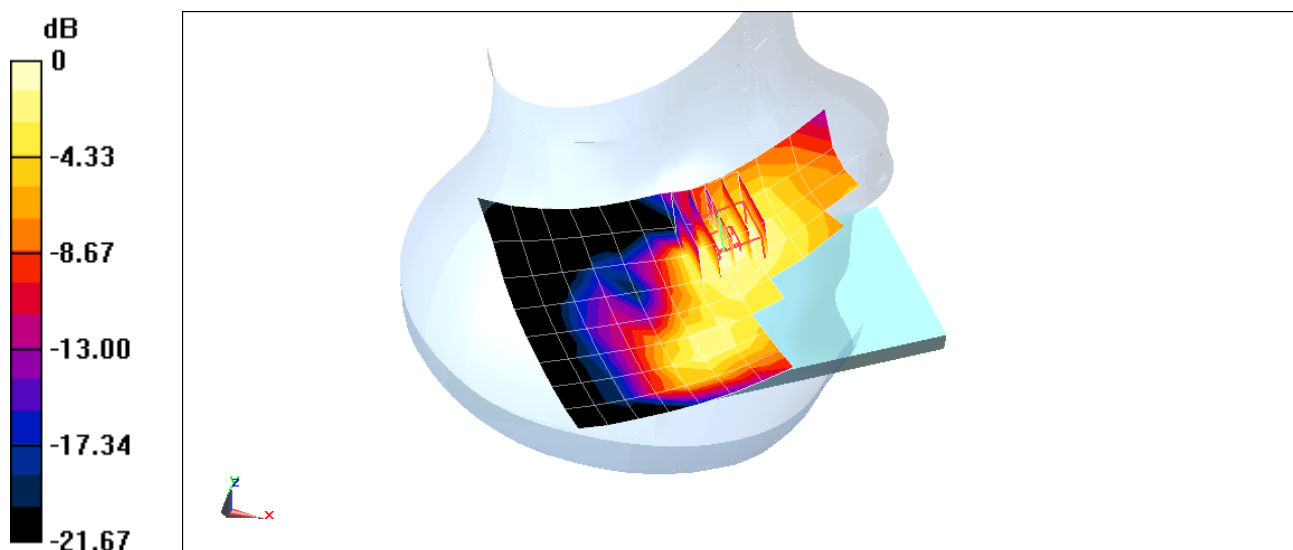
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.30 V/m; Power Drift = 0.21 dB

Peak SAR (extrapolated) = 0.247 W/kg

SAR(1 g) = 0.143 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 770 Head Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.931 \text{ S/m}$; $\epsilon_r = 42.583$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3263; ConvF(6.27, 6.27, 6.27); Calibrated: 5/20/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

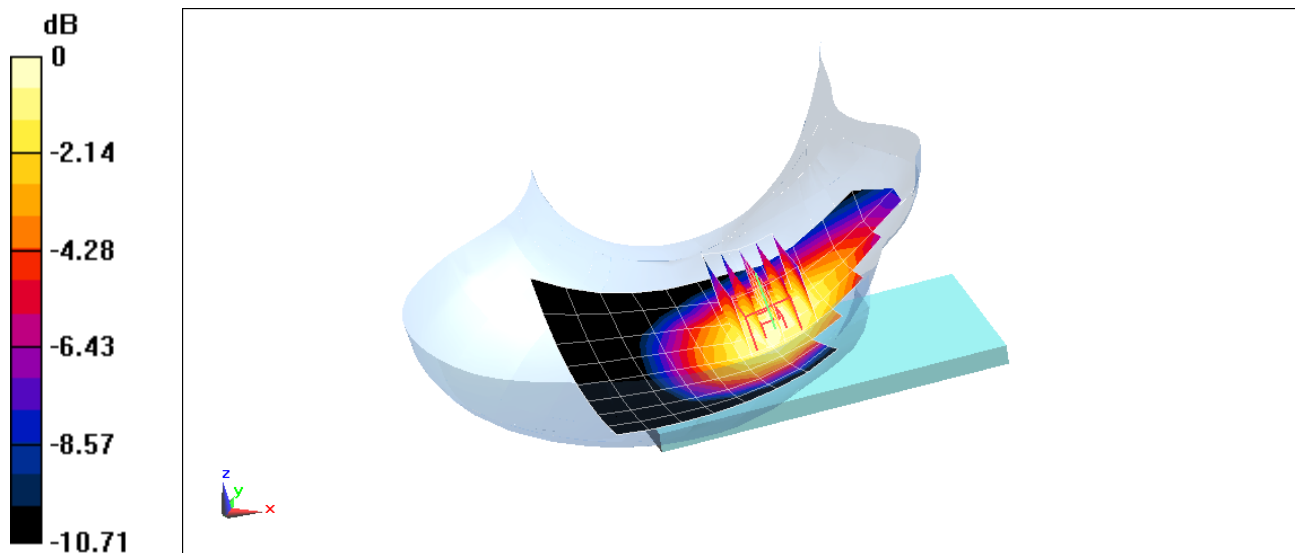
Area Scan (9x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.50 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.351 W/kg

SAR(1 g) = 0.280 W/kg



0 dB = 0.306 W/kg = -5.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 831 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
 $f = 831 \text{ MHz}$; $\sigma = 0.881 \text{ S/m}$; $\epsilon_r = 40.142$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-31-2015; Ambient Temp: 21.0°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 5 (Cell.), Right Head, Cheek, Low.ch, 10 MHz Bandwidth,
QPSK, 1 RB, 49 RB Offset, Standard Cover**

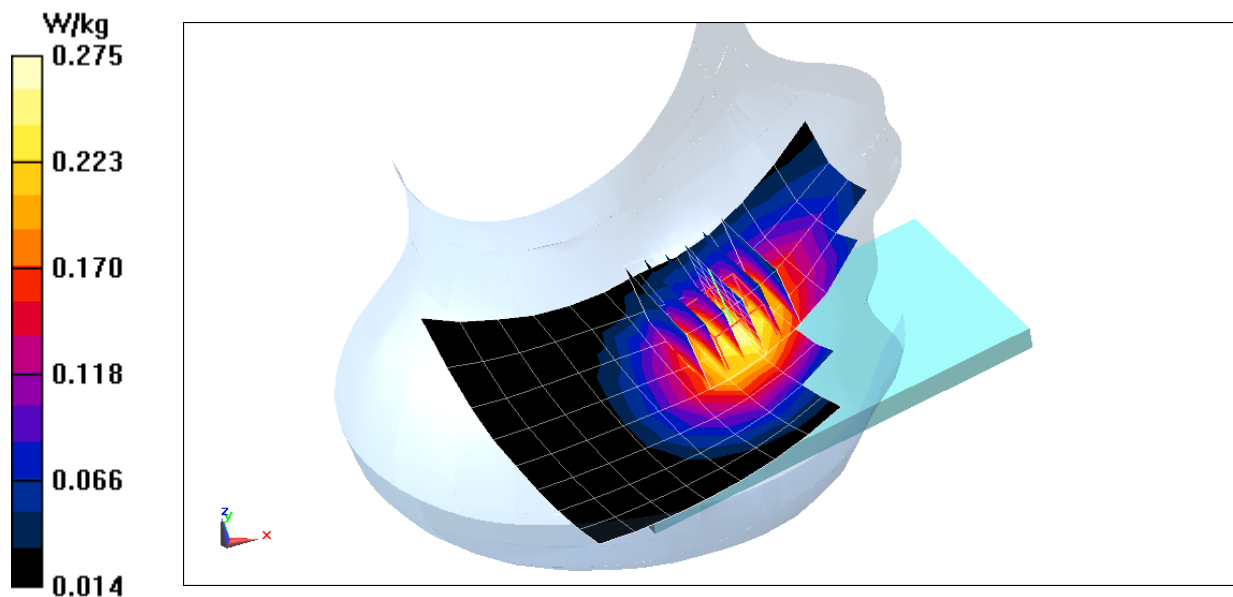
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 18.14 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.321 W/kg

SAR(1 g) = 0.248 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6836

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
 $f = 1732.5 \text{ MHz}$; $\sigma = 1.347 \text{ S/m}$; $\epsilon_r = 39.199$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section

Test Date: 08-11-2015; Ambient Temp: 23.2°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3334; ConvF(5.21, 5.21, 5.21); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: Sub Twin Sam v5.0; Type: QD000P40CD; Serial: TP:1626

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 99 RB Offset, Wireless Charging Cover**

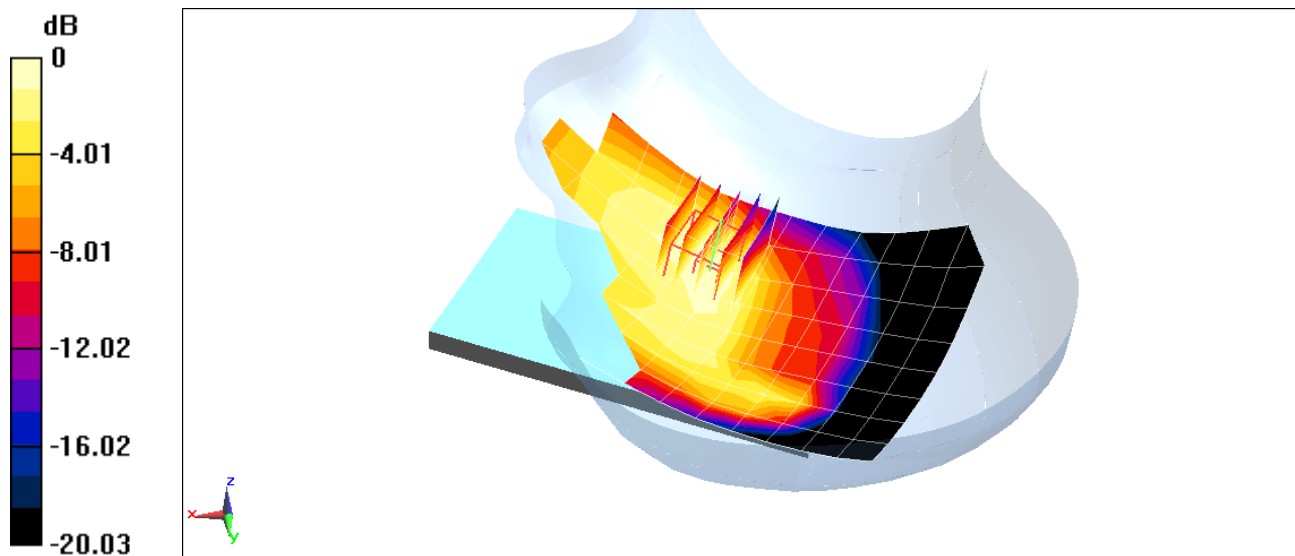
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.77 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.215 W/kg

SAR(1 g) = 0.153 W/kg



0 dB = 0.178 W/kg = -7.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.411 \text{ S/m}$; $\epsilon_r = 40.826$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-17-2015; Ambient Temp: 21.8°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.1, 5.1, 5.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 2 (PCS), Right Head, Cheek, Mid.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 50 RB Offset, Standard Cover**

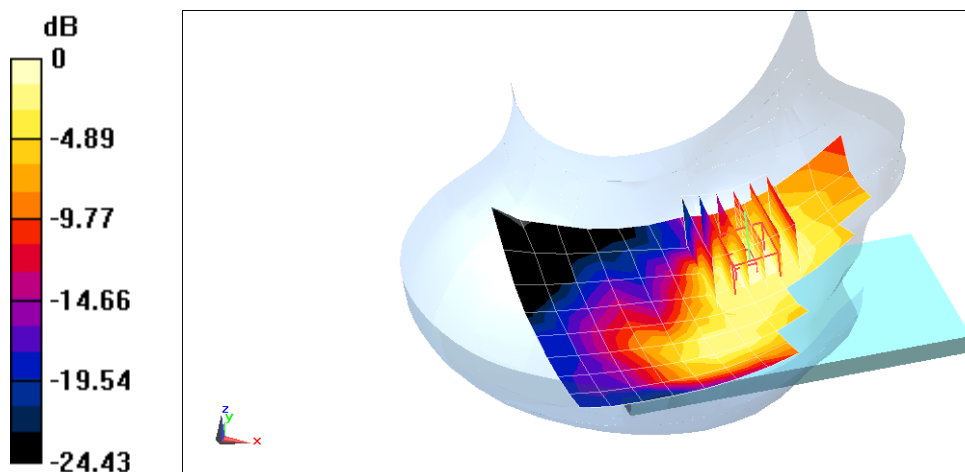
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.24 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.255 W/kg

SAR(1 g) = 0.152 W/kg



0 dB = 0.166 W/kg = -7.80 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 7; Frequency: 2560 MHz; Duty Cycle: 1:1
Medium: 2400 Head Medium parameters used (interpolated):
 $f = 2560 \text{ MHz}$; $\sigma = 2.005 \text{ S/m}$; $\epsilon_r = 37.966$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-10-2015; Ambient Temp: 23.2°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3332; ConvF(4.35, 4.35, 4.35); Calibrated: 9/18/2014;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 7, Right Head, Cheek, High.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 50 RB Offset, Standard Cover**

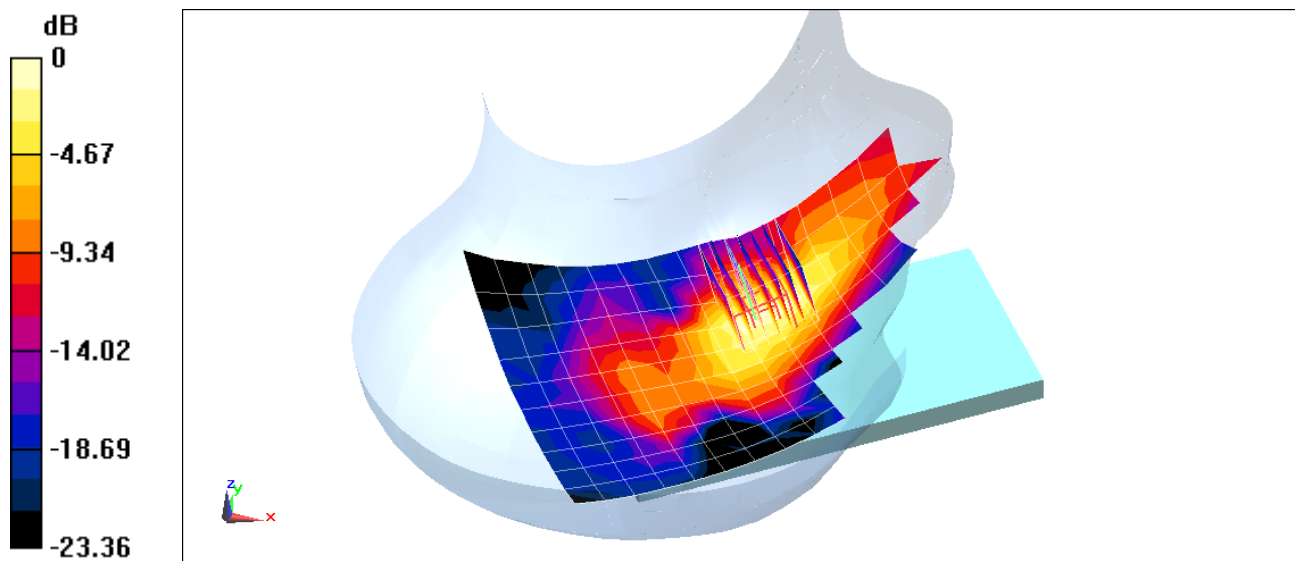
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 10.95 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 0.324 W/kg

SAR(1 g) = 0.161 W/kg



0 dB = 0.203 W/kg = -6.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6935

Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2400 Head Medium parameters used (interpolated):
 $f = 2437 \text{ MHz}$; $\sigma = 1.859 \text{ S/m}$; $\epsilon_r = 38.477$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Right Section

Test Date: 08-10-2015; Ambient Temp: 23.2°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3332; ConvF(4.49, 4.49, 4.49); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

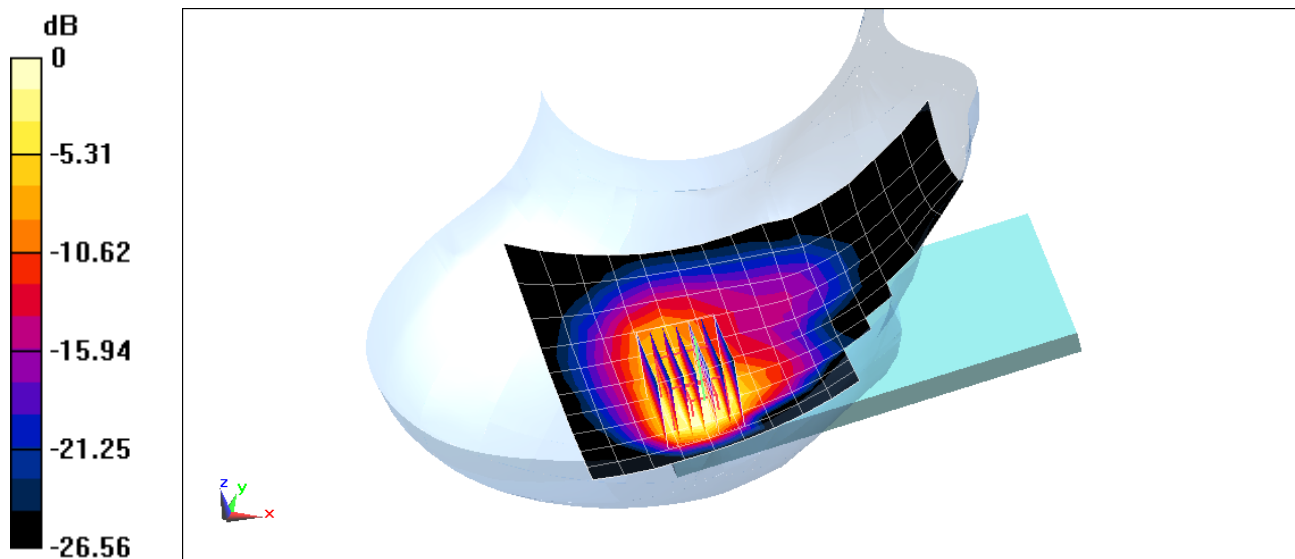
Area Scan (11x18x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (8x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.33 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.83 W/kg

SAR(1 g) = 0.766 W/kg



0 dB = 0.999 W/kg = -0.00 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: 5GHz Head Medium parameters used:

$f = 5825 \text{ MHz}$; $\sigma = 5.091 \text{ S/m}$; $\epsilon_r = 34.259$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7357; ConvF(4.41, 4.41, 4.41); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

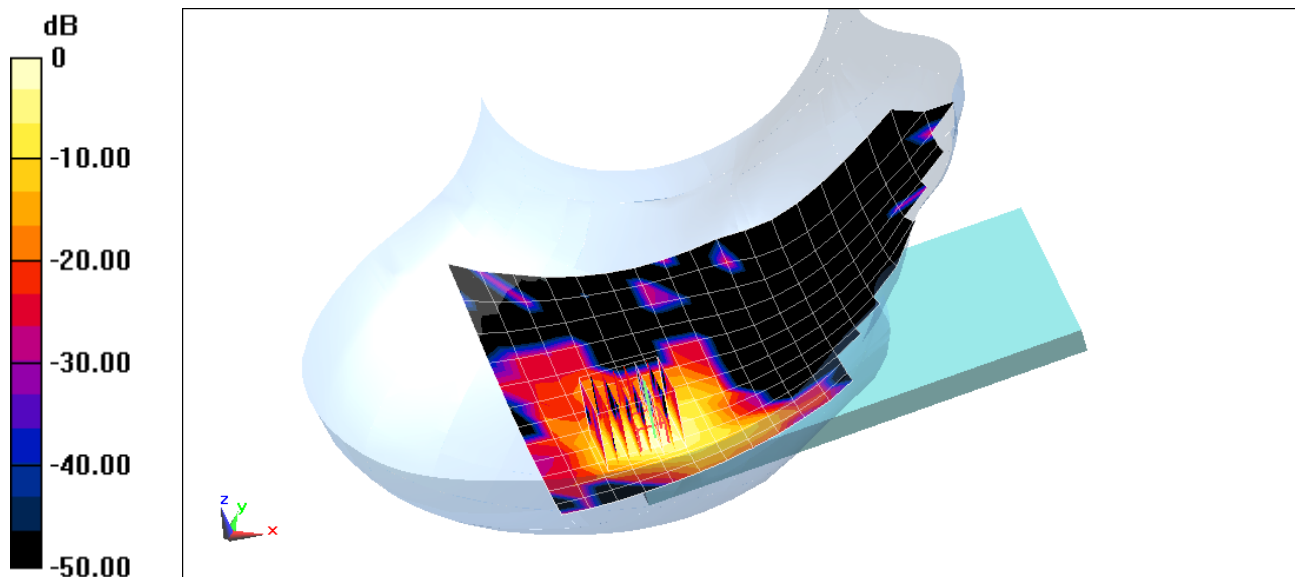
Area Scan (13x21x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 5.606 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.51 W/kg

SAR(1 g) = 0.318 W/kg



0 dB = 0.854 W/kg = -0.69 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15
Medium: 835 Body Medium parameters used (interpolated):
 $f = 836.6 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.611$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 2 Tx Slots, Standard Cover

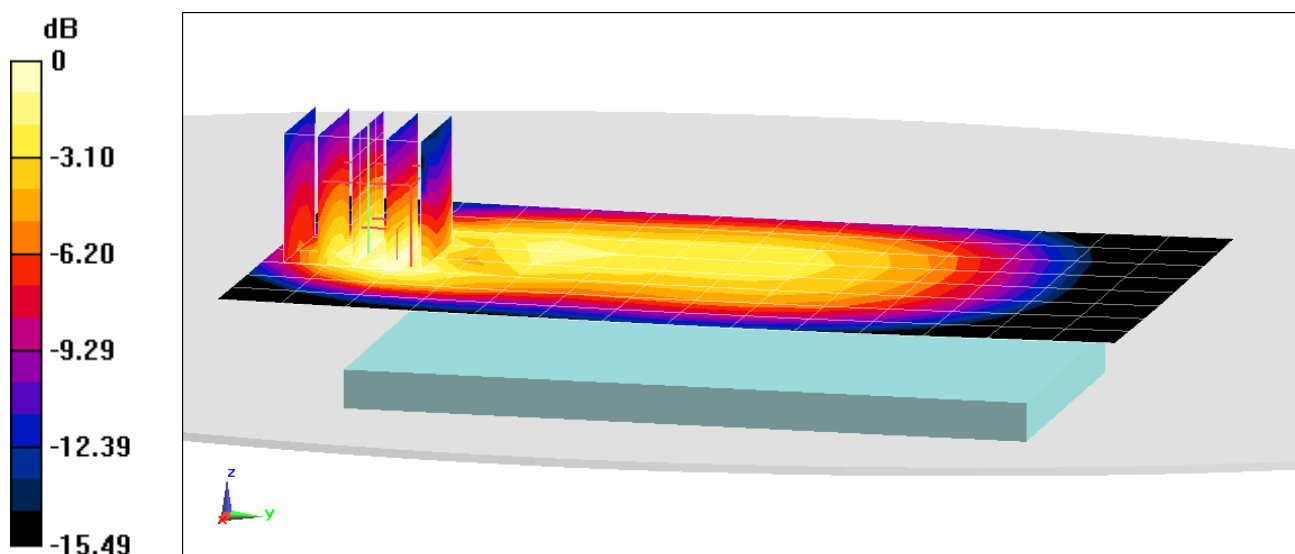
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$;

Reference Value = 25.50 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.00 W/kg

SAR(1 g) = 0.592 W/kg



0 dB = 0.690 W/kg = -1.61 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6935

Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
 $f = 836.6 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.611$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

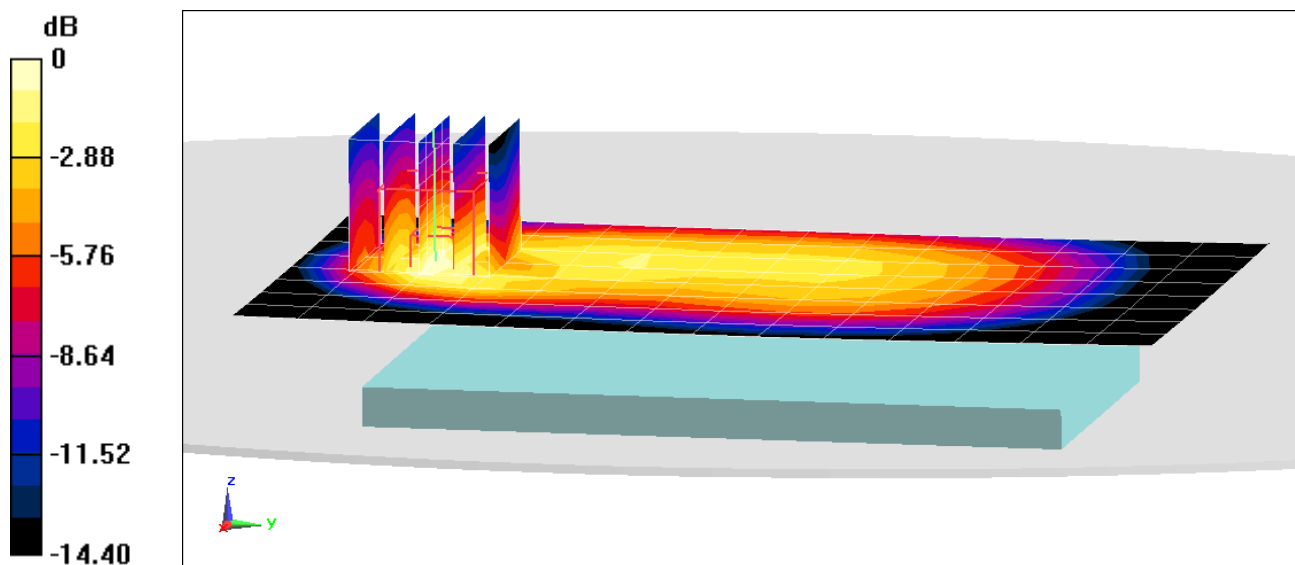
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 22.24 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.750 W/kg

SAR(1 g) = 0.443 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
 $f = 836.52 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.612$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. CDMA, Body SAR, Back side, Mid.ch, Standard Cover

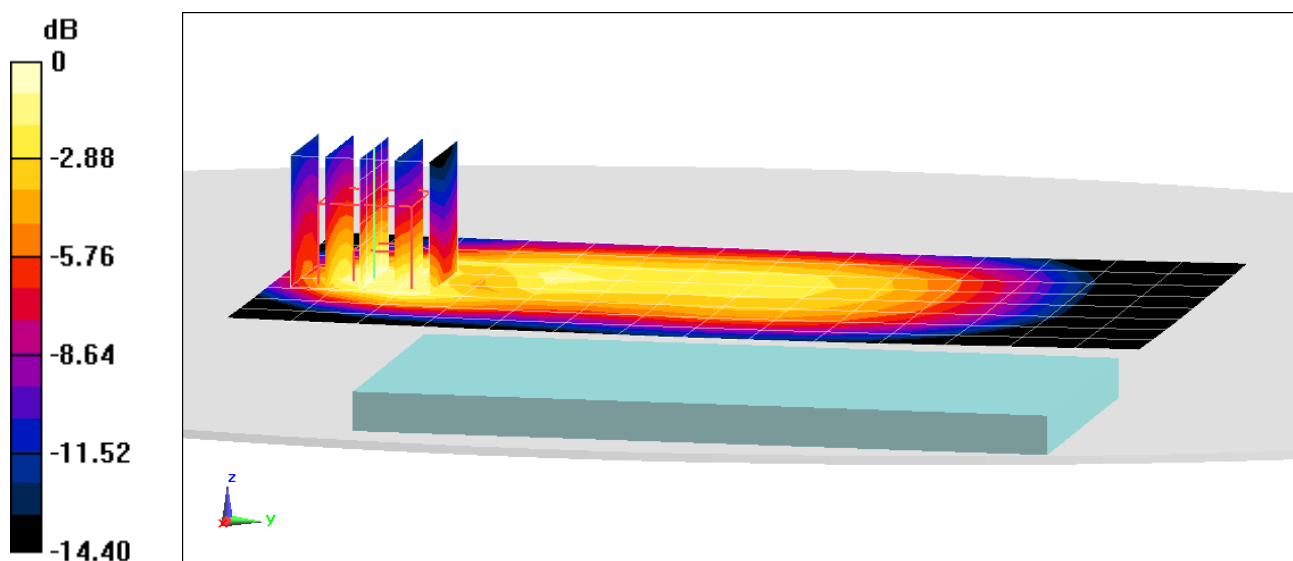
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.64 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.695 W/kg

SAR(1 g) = 0.414 W/kg



0 dB = 0.500 W/kg = -3.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
 $f = 836.52 \text{ MHz}$; $\sigma = 0.993 \text{ S/m}$; $\epsilon_r = 53.612$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015
Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: Cell. EVDO Rev.0, Body SAR, Front side, Mid.ch, Standard Cover

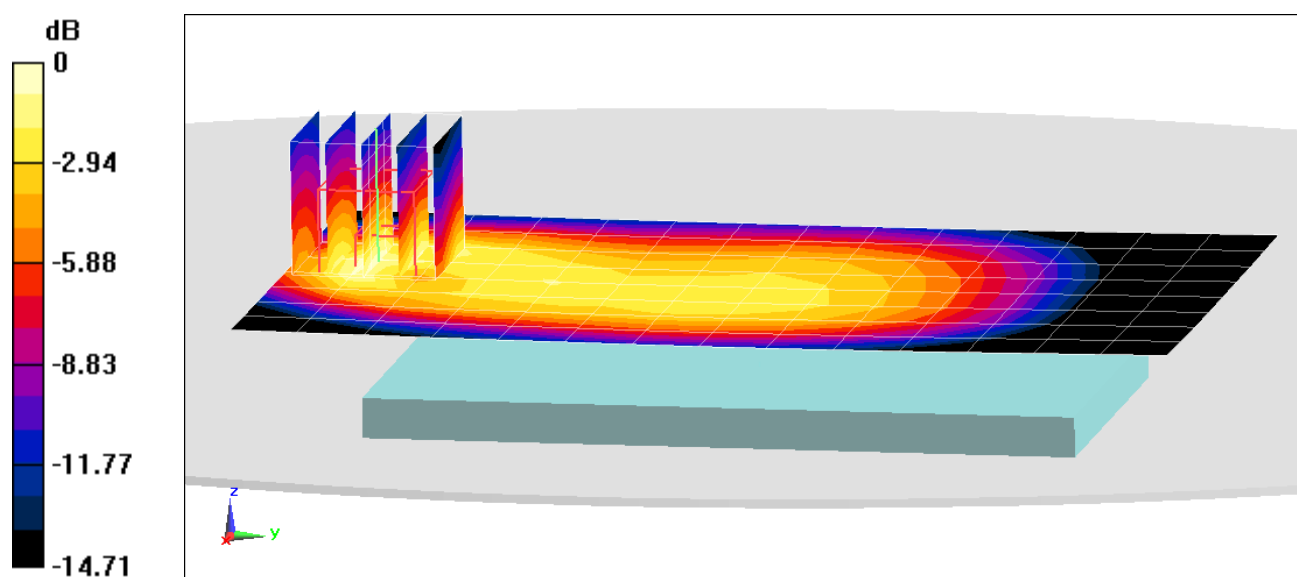
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.30 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.674 W/kg

SAR(1 g) = 0.395 W/kg



0 dB = 0.486 W/kg = -3.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 52.552$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.3°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: GPRS 1900, Body SAR, Back side, Mid.ch, 2 Tx Slots, Standard Cover

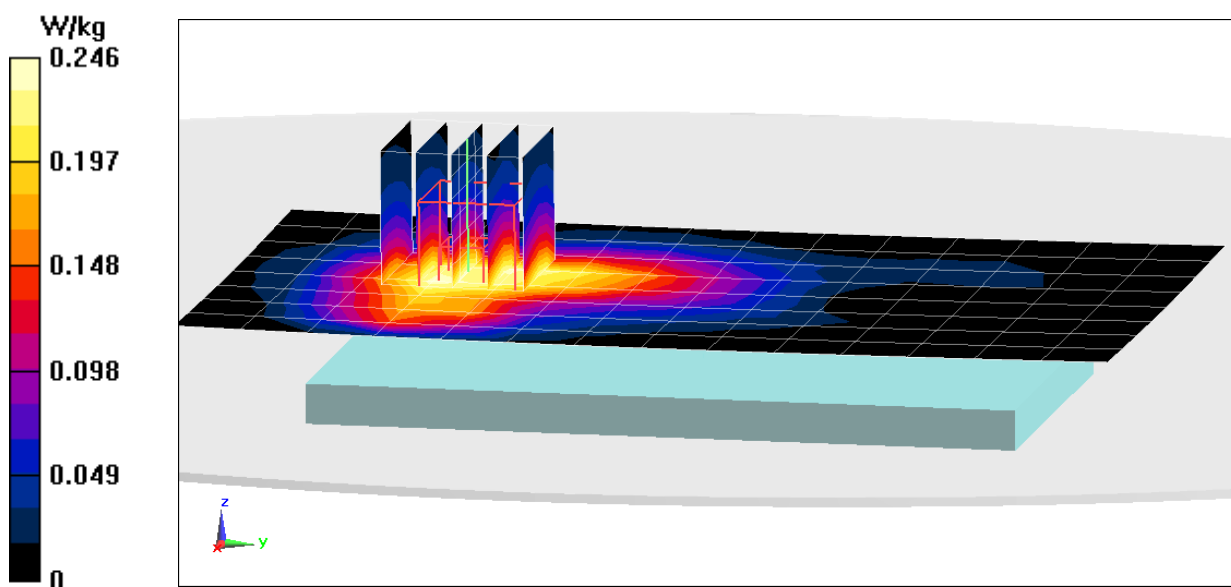
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.45 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.317 W/kg

SAR(1 g) = 0.214 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 52.552$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.3°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: GPRS 1900, Body SAR, Bottom Edge, Mid.ch, 2 Tx Slots,
Wireless Charging Cover**

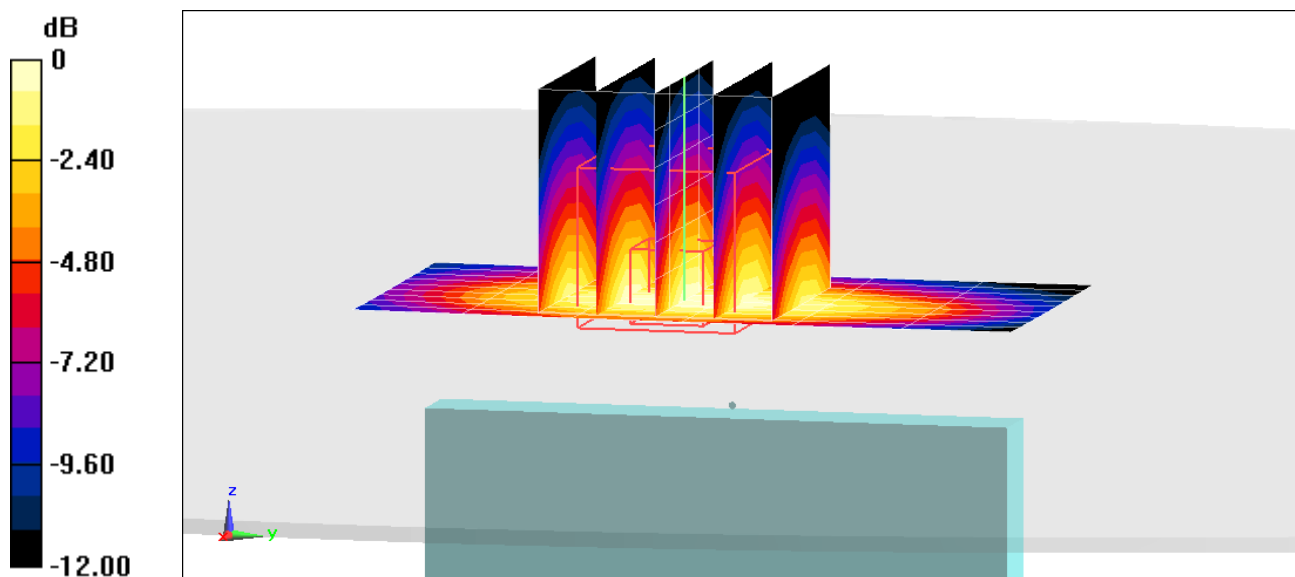
Area Scan (10x7x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 14.08 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.433 W/kg

SAR(1 g) = 0.273 W/kg



0 dB = 0.316 W/kg = -5.00 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.515 \text{ S/m}$; $\epsilon_r = 51.588$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

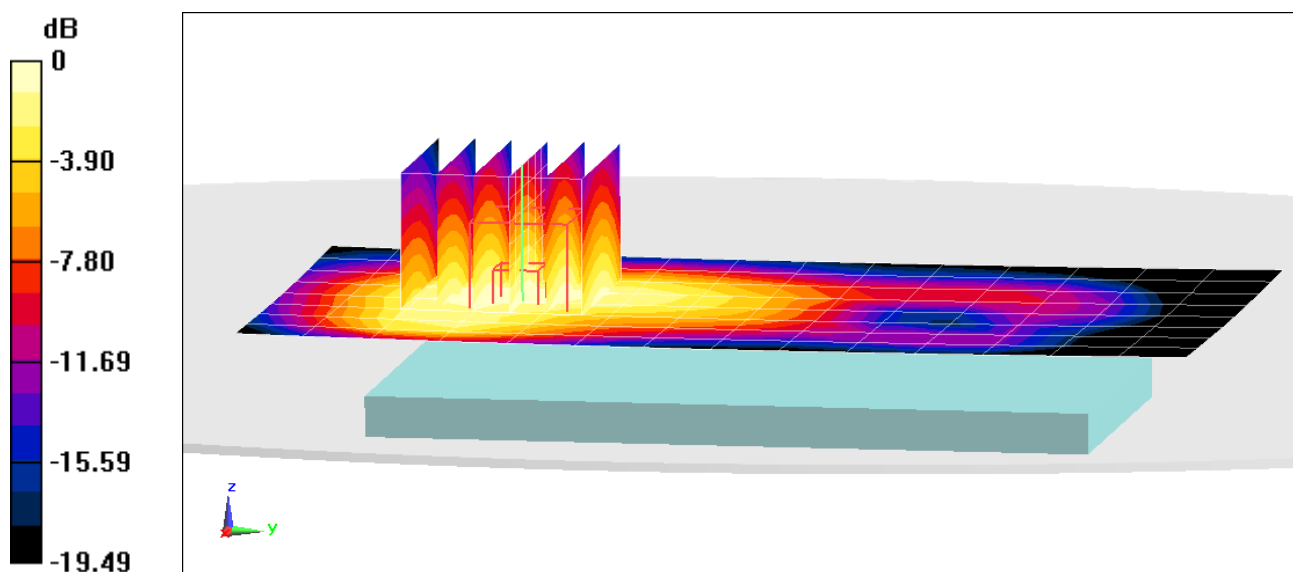
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (7x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 15.67 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 0.687 W/kg

SAR(1 g) = 0.462 W/kg



0 dB = 0.525 W/kg = -2.80 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880$ MHz; $\sigma = 1.515$ S/m; $\epsilon_r = 51.588$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: UMTS 1900, Body SAR, Bottom Edge, Mid.ch, Standard Cover

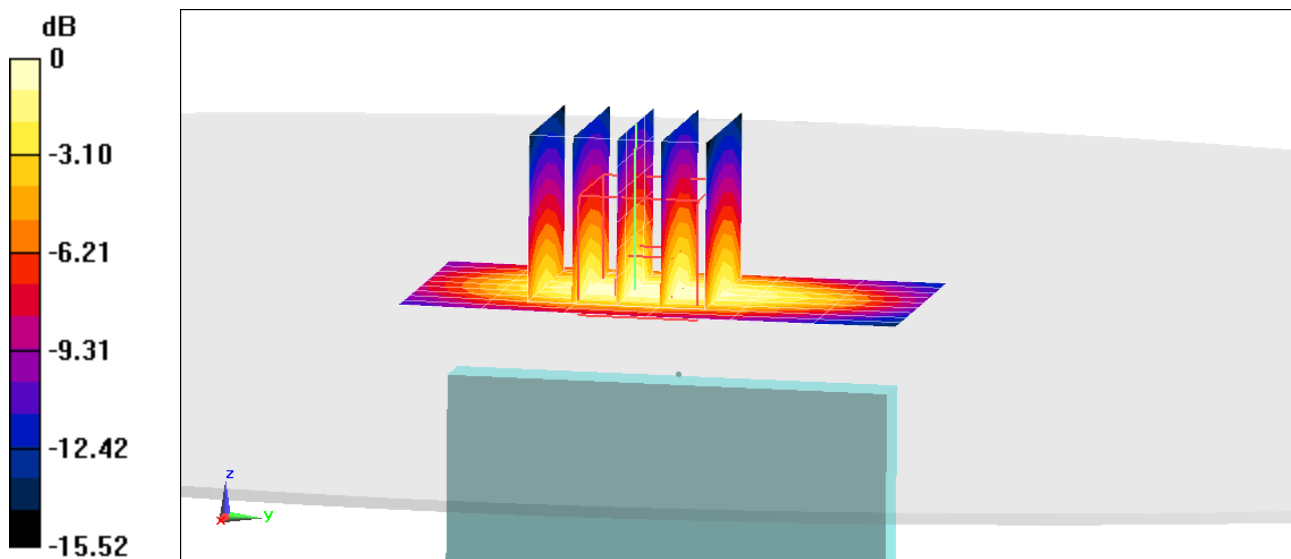
Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.25 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.674 W/kg



0 dB = 0.815 W/kg = -0.89 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 52.552$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.3°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS CDMA, Body SAR, Back side, Mid.ch, Standard Cover

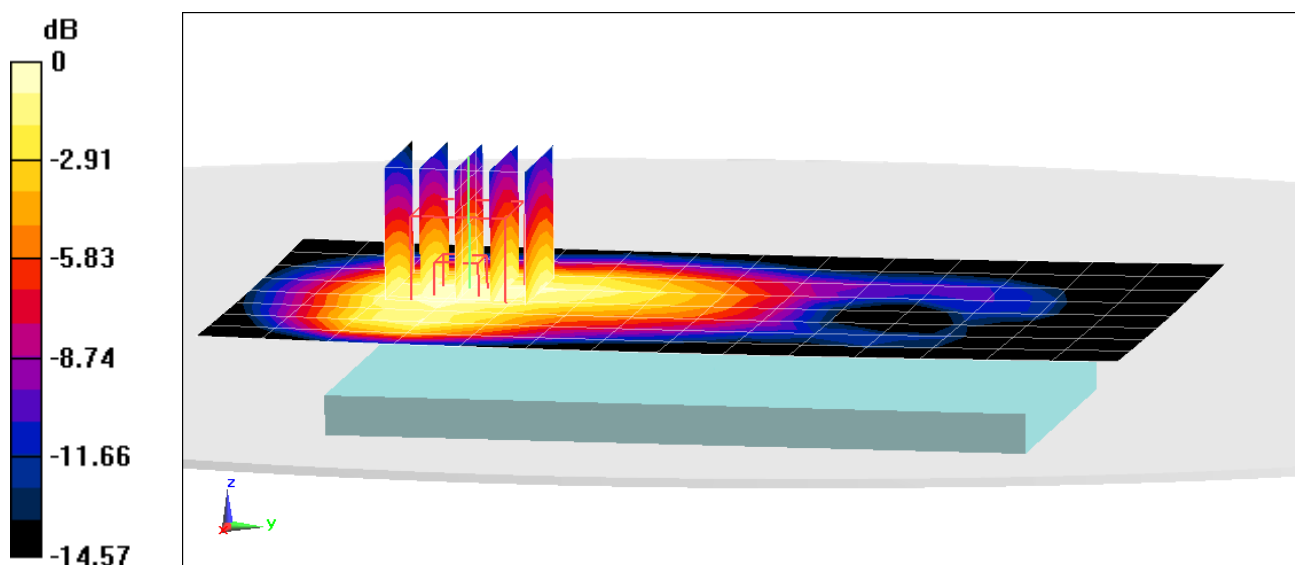
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.66 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.636 W/kg

SAR(1 g) = 0.428 W/kg



0 dB = 0.493 W/kg = -3.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6851

Communication System: UID 0, CDMA; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.526 \text{ S/m}$; $\epsilon_r = 52.552$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.3°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Mode: PCS EVDO Rev.0, Body SAR, Bottom Edge, Mid.ch, Wireless Charging Cover

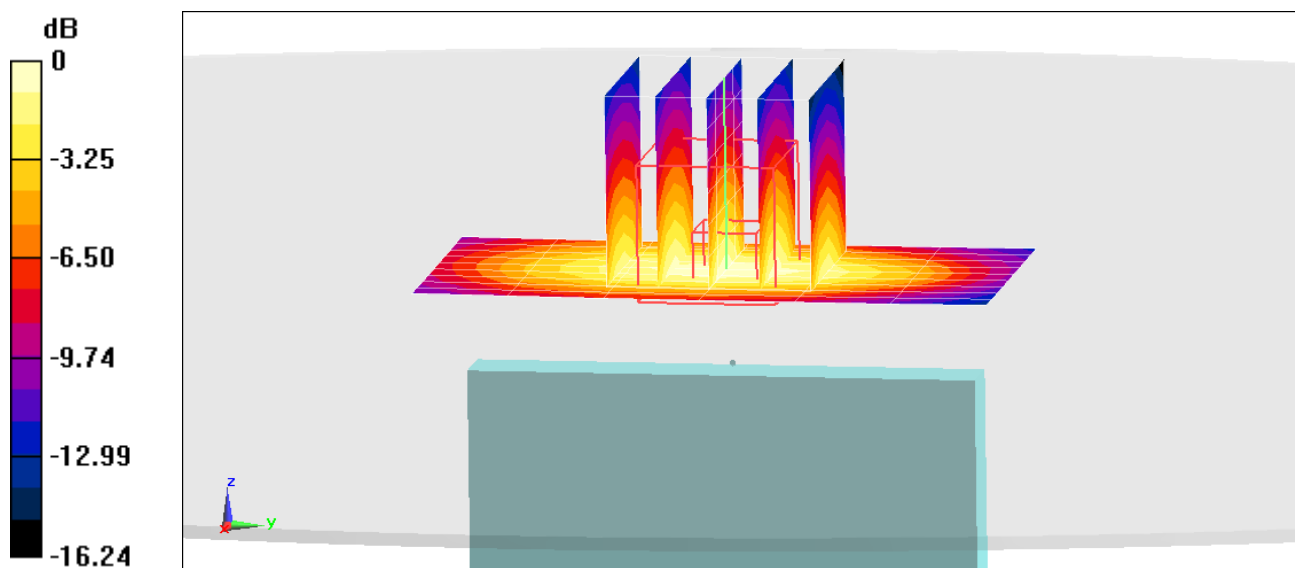
Area Scan (10x7x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.45 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.895 W/kg

SAR(1 g) = 0.564 W/kg



0 dB = 0.668 W/kg = -1.75 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.996 \text{ S/m}$; $\epsilon_r = 53.993$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3318; ConvF(6.22, 6.22, 6.22); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

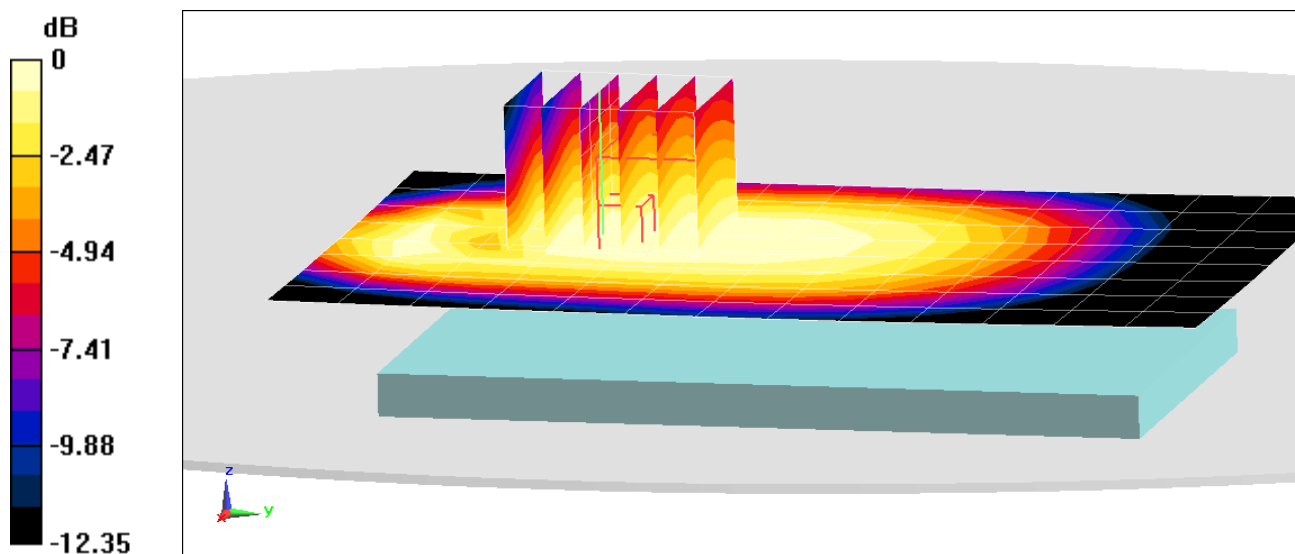
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.19 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.584 W/kg

SAR(1 g) = 0.458 W/kg



0 dB = 0.502 W/kg = -2.99 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
 $f = 782 \text{ MHz}$; $\sigma = 0.996 \text{ S/m}$; $\epsilon_r = 53.993$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3318; ConvF(6.22, 6.22, 6.22); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 13, Body SAR, Right Edge, Mid.ch, 10 MHz Bandwidth,
QPSK, 1 RB, 0 RB Offset, Wireless Charging Cover**

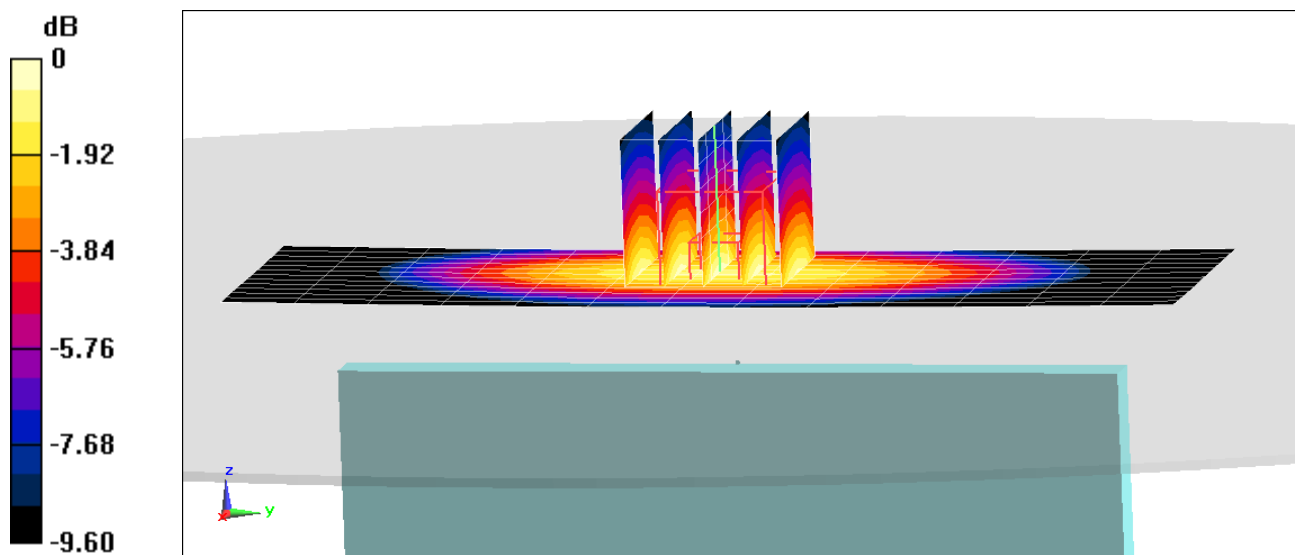
Area Scan (13x14x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 23.53 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 0.725 W/kg

SAR(1 g) = 0.505 W/kg



0 dB = 0.582 W/kg = -2.35 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 5; Frequency: 842.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
 $f = 842.5 \text{ MHz}$; $\sigma = 1.001 \text{ S/m}$; $\epsilon_r = 52.826$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-31-2015; Ambient Temp: 22.7°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 1/20/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI v5.0 Left; Type: QD0VA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 5 (Cell.), Body SAR, Back side, High.ch, 10 MHz Bandwidth,
QPSK, 1 RB, 0 RB Offset, Standard Cover**

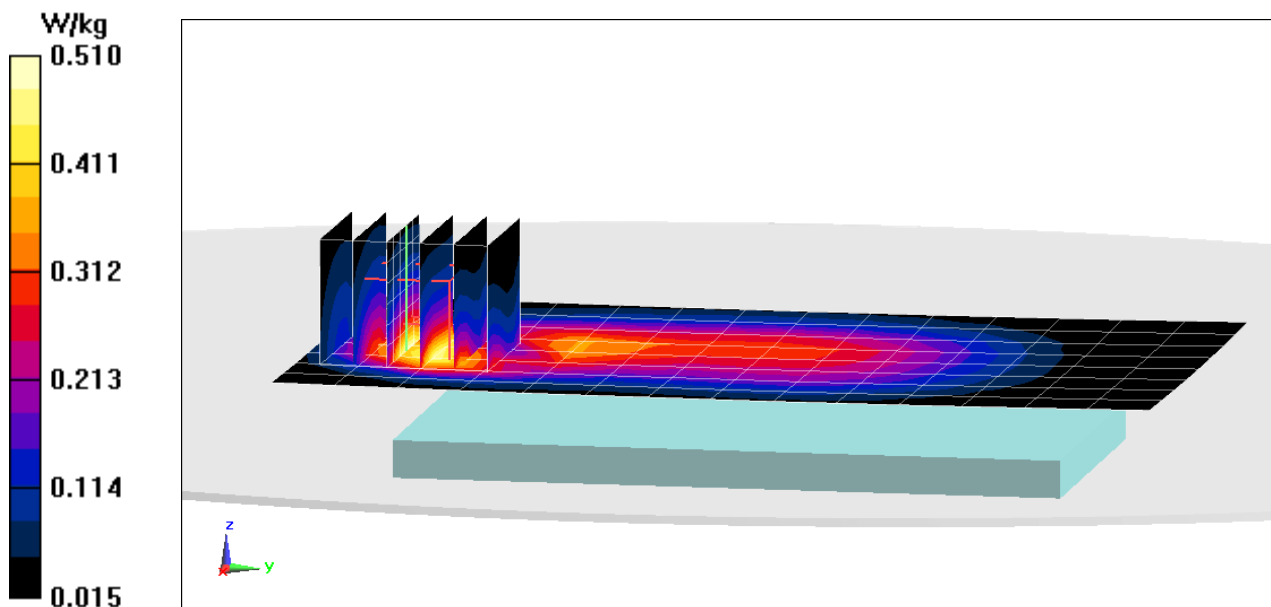
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.23 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.736 W/kg

SAR(1 g) = 0.443 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
 $f = 1732.5 \text{ MHz}$; $\sigma = 1.445 \text{ S/m}$; $\epsilon_r = 51.718$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Body SAR, Back side, Mid.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 99 RB Offset, Wireless Charging Cover**

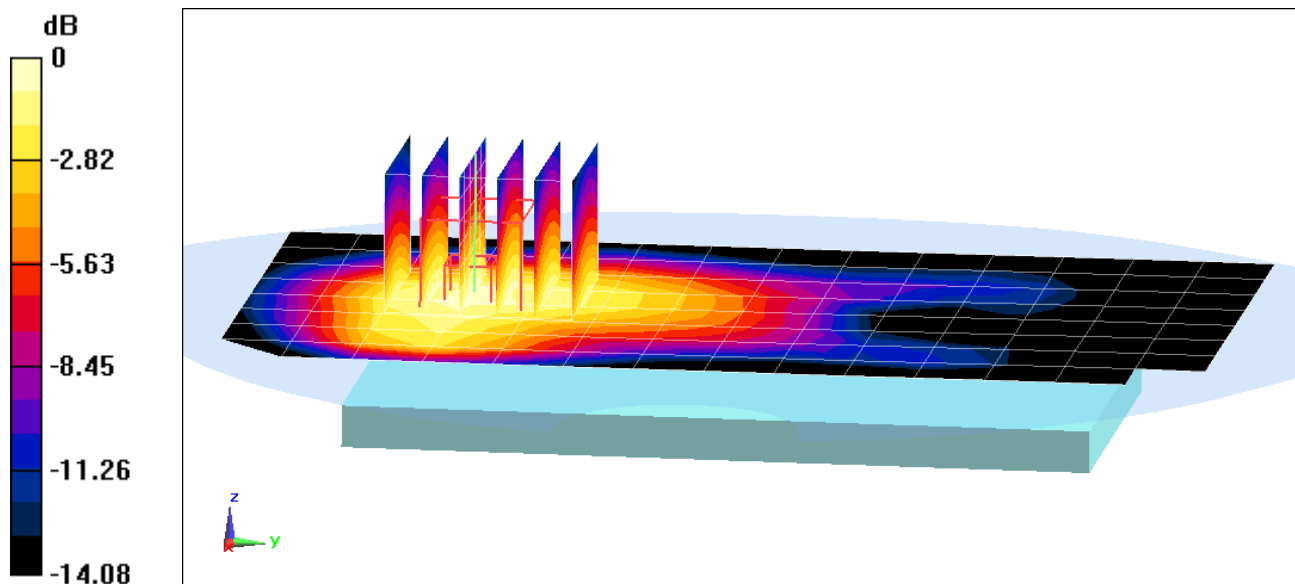
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (6x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 19.20 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.694 W/kg

SAR(1 g) = 0.483 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
 $f = 1732.5 \text{ MHz}$; $\sigma = 1.445 \text{ S/m}$; $\epsilon_r = 51.718$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Mid.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 99 RB Offset, Standard Cover**

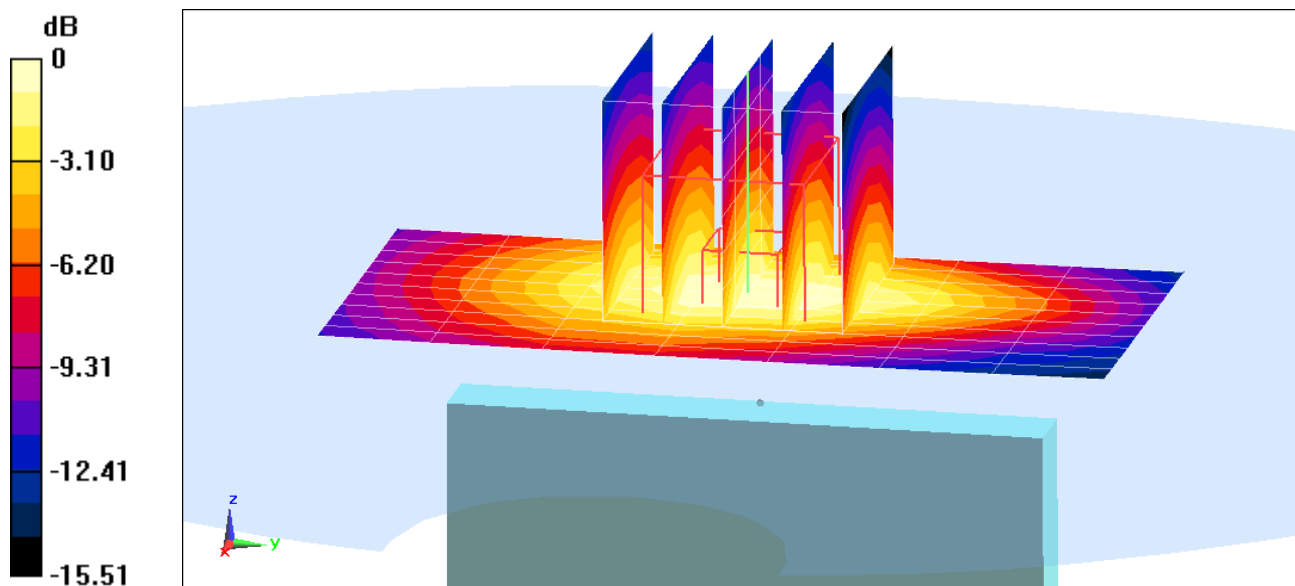
Area Scan (11x8x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 20.09 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.794 W/kg

SAR(1 g) = 0.507 W/kg



0 dB = 0.609 W/kg = -2.15 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.515 \text{ S/m}$; $\epsilon_r = 51.588$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 2 (PCS), Body SAR, Back side, Mid.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 50 RB Offset, Standard Cover**

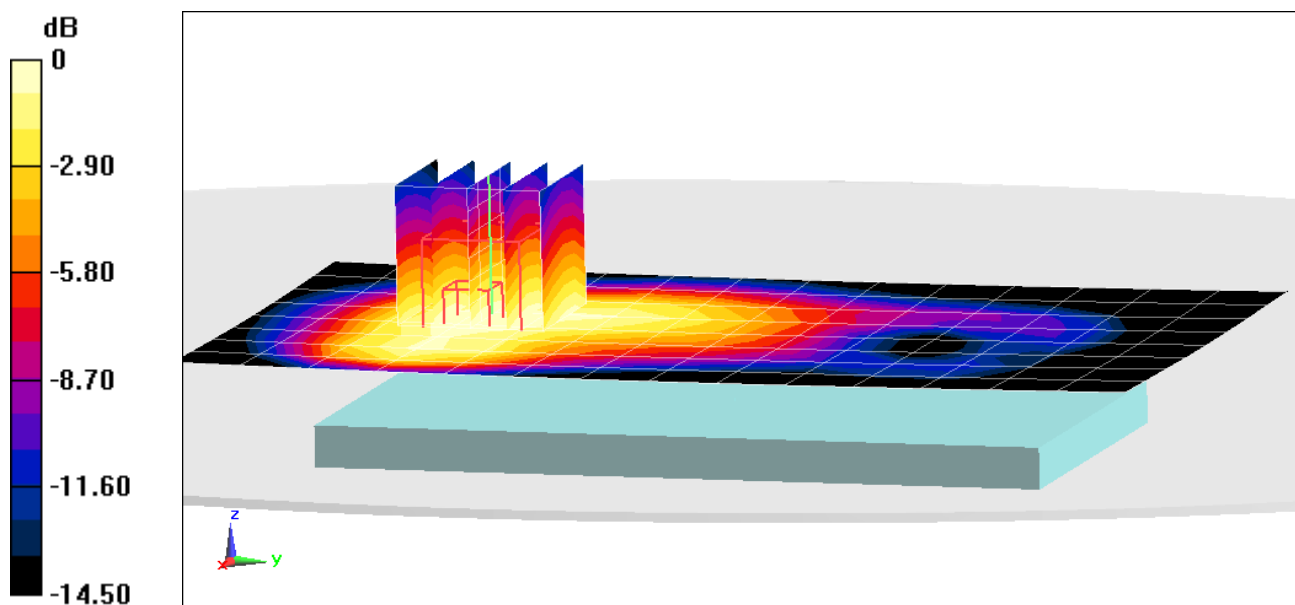
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 17.58 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.656 W/kg

SAR(1 g) = 0.436 W/kg



0 dB = 0.497 W/kg = -3.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 2 (PCS); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.515 \text{ S/m}$; $\epsilon_r = 51.588$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 2 (PCS), Body SAR, Bottom Edge, Mid.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 50 RB Offset, Wireless Charging Cover**

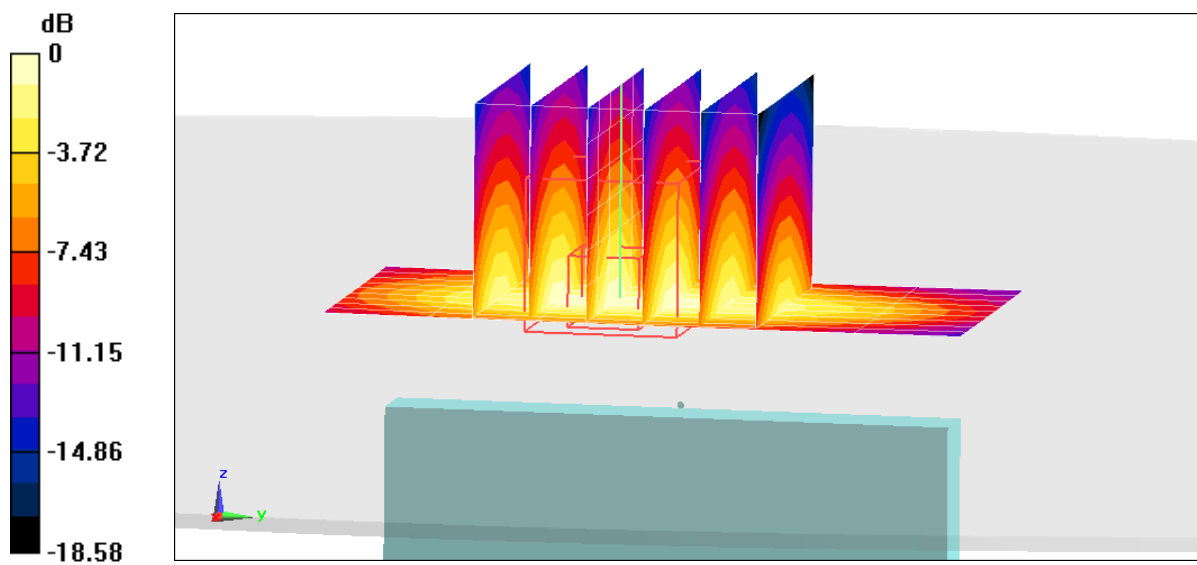
Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.34 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.10 W/kg

SAR(1 g) = 0.688 W/kg



0 dB = 0.779 W/kg = -1.08 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 7; Frequency: 2510 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
 $f = 2510 \text{ MHz}$; $\sigma = 2.12 \text{ S/m}$; $\epsilon_r = 51.478$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 7, Body SAR, Back side, Low.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 0 RB Offset, Standard Cover**

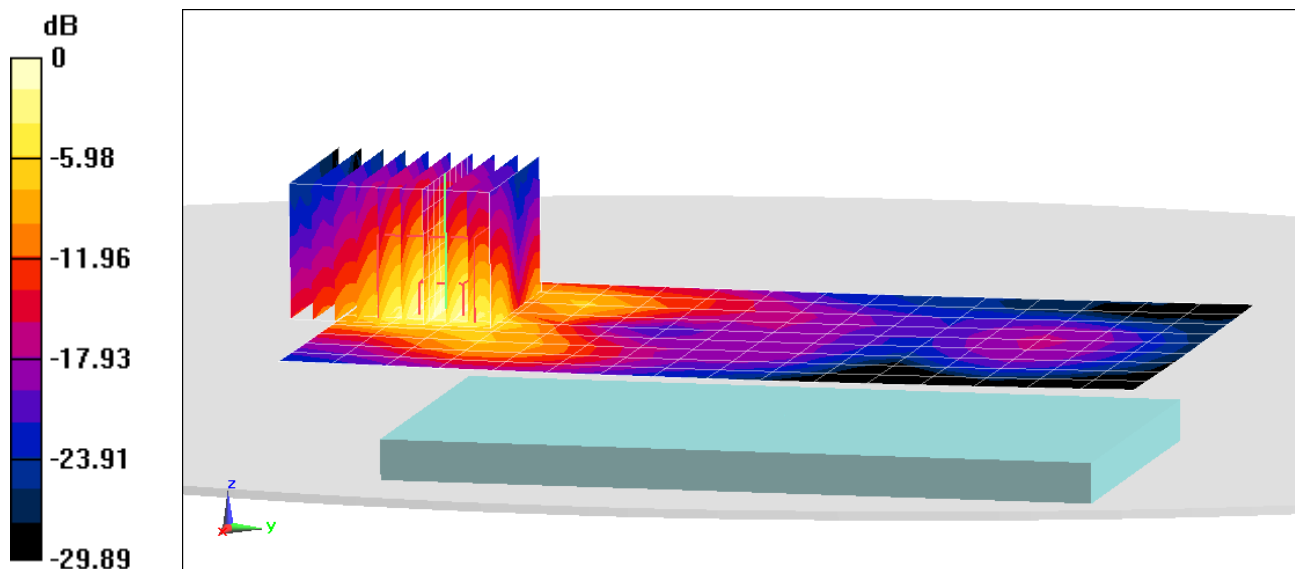
Area Scan (10x17x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (10x10x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.85 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 2.11 W/kg

SAR(1 g) = 0.993 W/kg



0 dB = 1.33 W/kg = 1.24 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6844

Communication System: UID 0, LTE Band 7; Frequency: 2510 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
 $f = 2510 \text{ MHz}$; $\sigma = 2.12 \text{ S/m}$; $\epsilon_r = 51.478$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: LTE Band 7, Body SAR, Bottom Edge, Low.ch, 20 MHz Bandwidth,
QPSK, 1 RB, 0 RB Offset, Standard Cover**

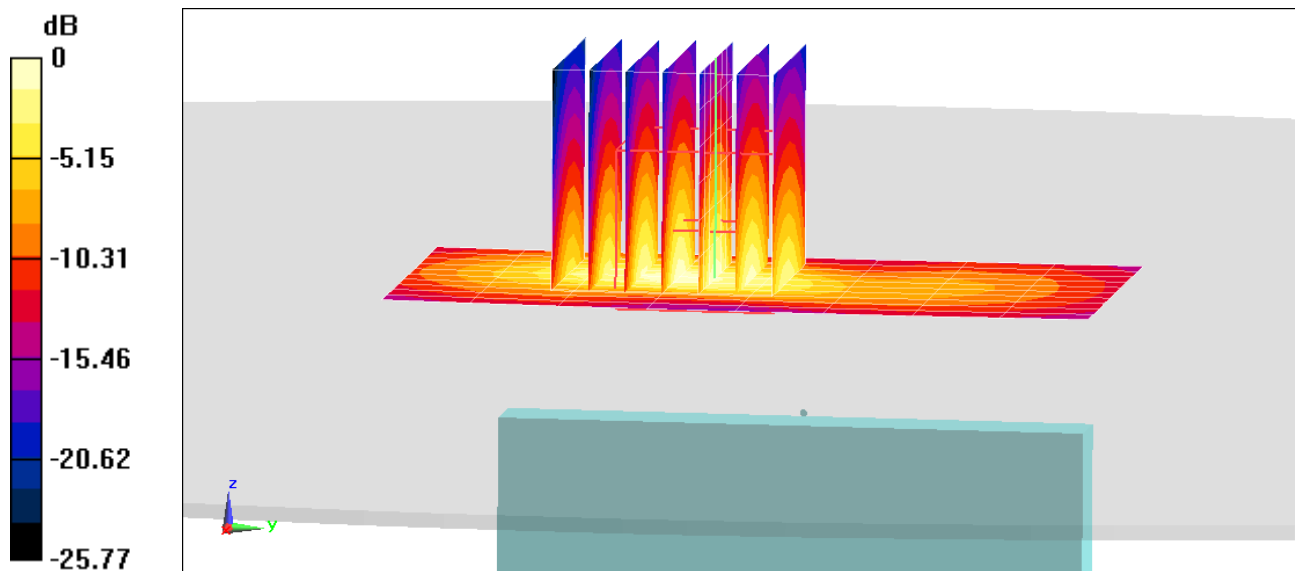
Area Scan (11x9x1): Measurement grid: $dx=5\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 25.21 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 2.48 W/kg

SAR(1 g) = 1.19 W/kg



0 dB = 1.58 W/kg = 1.99 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2 \text{ S/m}$; $\epsilon_r = 51.792$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-12-2015; Ambient Temp: 23.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3332; ConvF(4.31, 4.31, 4.31); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 06,
1 Mbps, Back Side, Wireless Charging Cover**

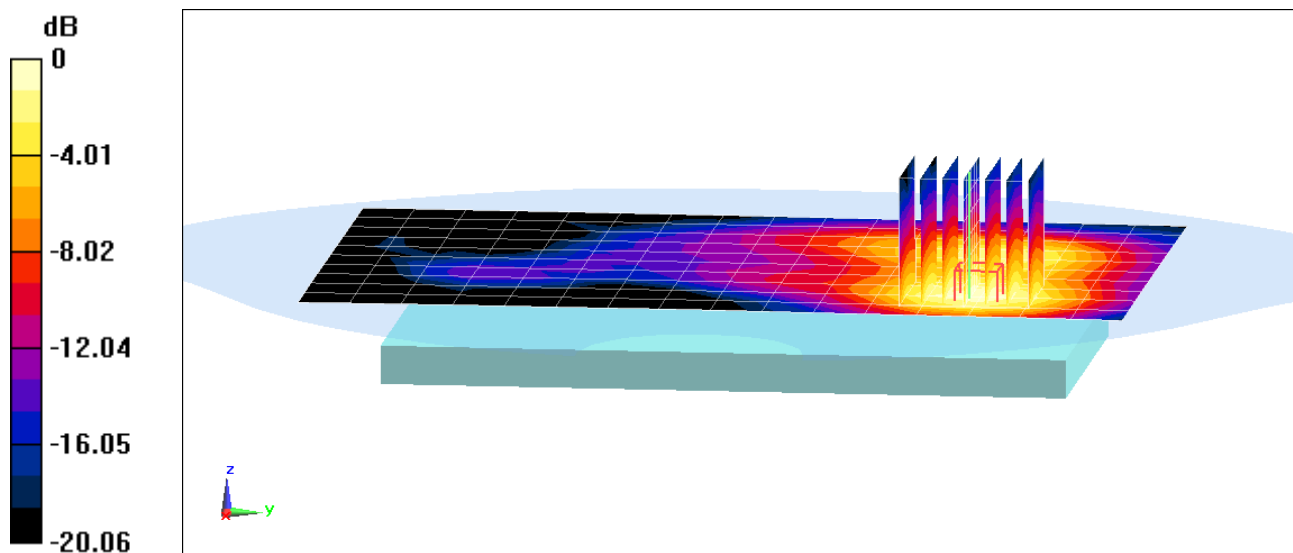
Area Scan (11x17x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.039 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.241 W/kg

SAR(1 g) = 0.118 W/kg



0 dB = 0.147 W/kg = -8.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2 \text{ S/m}$; $\epsilon_r = 51.792$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0cm

Test Date: 08-12-2015; Ambient Temp: 23.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3332; ConvF(4.31, 4.31, 4.31); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11b, 22 MHz Bandwidth, Body SAR, Ch 06,
1 Mbps, Left Edge, Standard Cover**

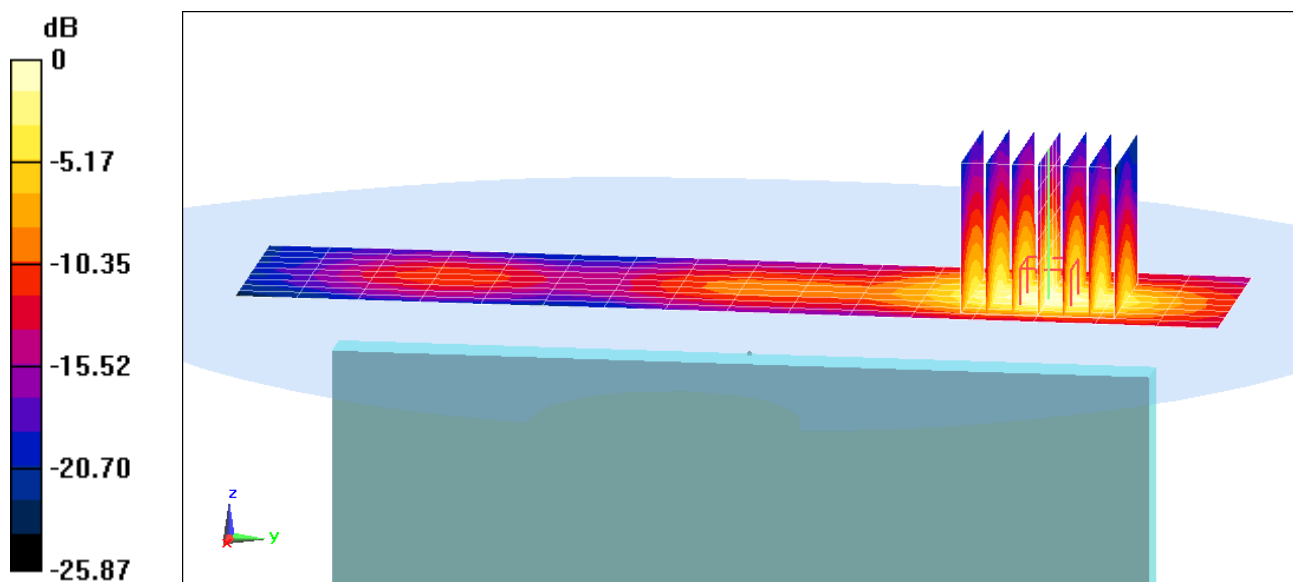
Area Scan (10x17x1): Measurement grid: $dx=5\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.207 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.301 W/kg

SAR(1 g) = 0.140 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 5.407 \text{ S/m}$; $\epsilon_r = 46.508$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 24.2°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3914; ConvF(4.33, 4.33, 4.33); Calibrated: 2/10/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/31/2014

Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11a, U-NII-2A, 20 MHz Bandwidth, Body SAR, Ch 60,
6 Mbps, Back Side, Standard Cover**

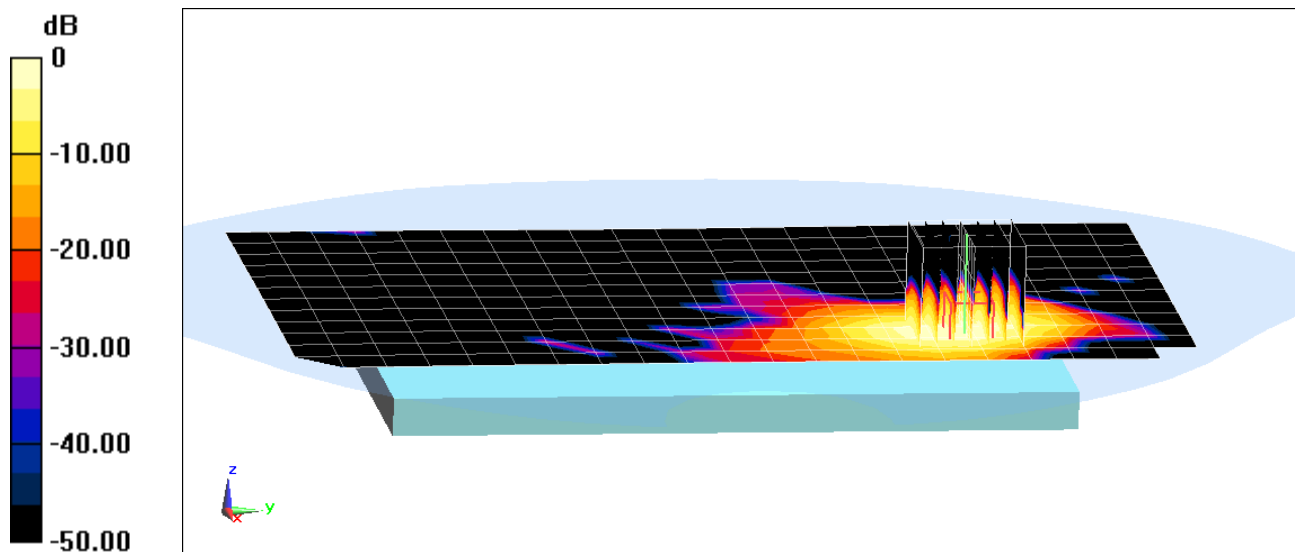
Area Scan (13x22x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 8.712 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.73 W/kg

SAR(1 g) = 0.448 W/kg



0 dB = 1.05 W/kg = 0.21 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5825 \text{ MHz}$; $\sigma = 6.061 \text{ S/m}$; $\epsilon_r = 45.842$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 24.2°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3914; ConvF(4.01, 4.01, 4.01); Calibrated: 2/10/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/31/2014

Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11a, U-NII-3, 20 MHz Bandwidth, Body SAR, Ch 165,
6 Mbps, Back Side, Standard Cover**

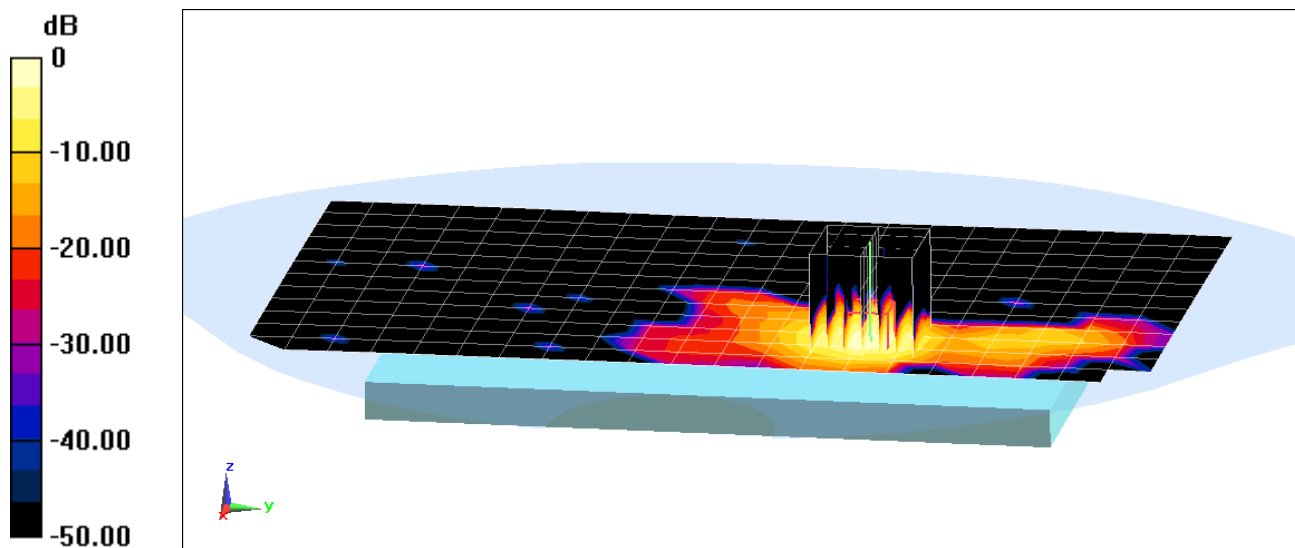
Area Scan (13x22x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 7.516 V/m; Power Drift = -0.21 dB

Peak SAR (extrapolated) = 1.64 W/kg

SAR(1 g) = 0.373 W/kg



0 dB = 1.01 W/kg = 0.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2441 \text{ MHz}$; $\sigma = 2.005 \text{ S/m}$; $\epsilon_r = 51.775$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-12-2015; Ambient Temp: 23.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3332; ConvF(4.31, 4.31, 4.31); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

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

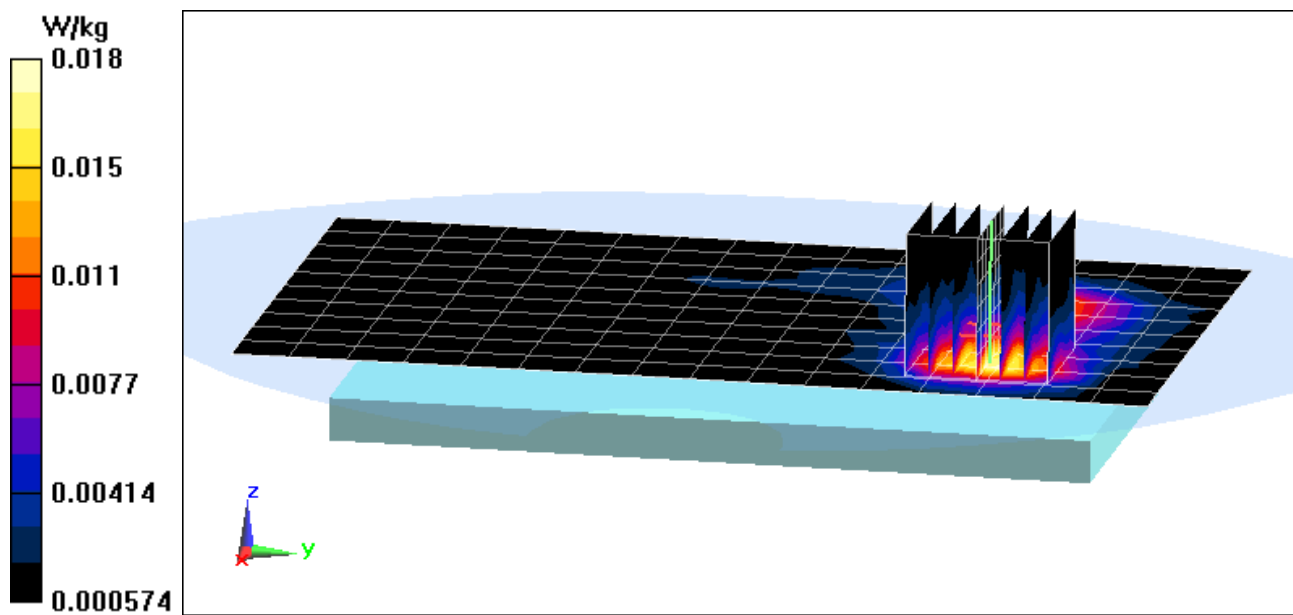
Area Scan (11x17x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.776 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.0300 W/kg

SAR(1 g) = 0.015 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFVS990; Type: Portable Handset; Serial: 6869

Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 5.407 \text{ S/m}$; $\epsilon_r = 46.508$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 0.0 cm

Test Date: 08-10-2015; Ambient Temp: 24.2°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3914; ConvF(4.33, 4.33, 4.33); Calibrated: 2/10/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/31/2014

Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

**Mode: IEEE 802.11a, U-NII-2A, 20 MHz Bandwidth, Phablet SAR, Ch 60,
6 Mbps, Back Side, Standard Cover**

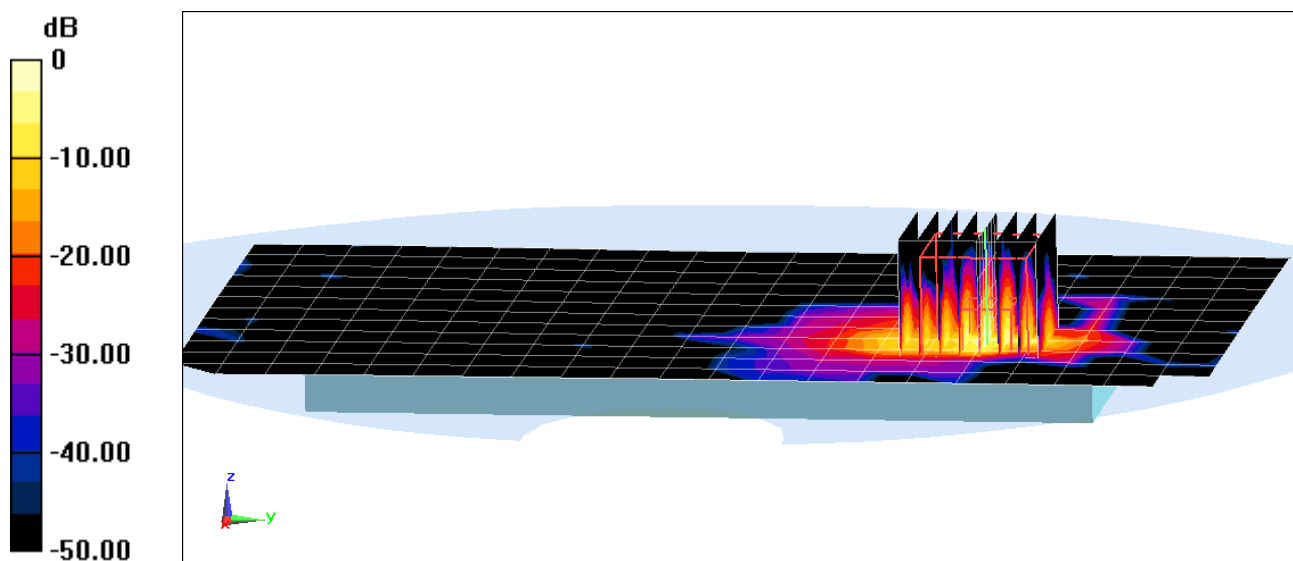
Area Scan (13x22x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Reference Value = 22.15 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 24.0 W/kg

SAR(10 g) = 0.630 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Head Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.899 \text{ S/m}$; $\epsilon_r = 42.999$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-13-2015; Ambient Temp: 23.1°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3263; ConvF(6.27, 6.27, 6.27); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

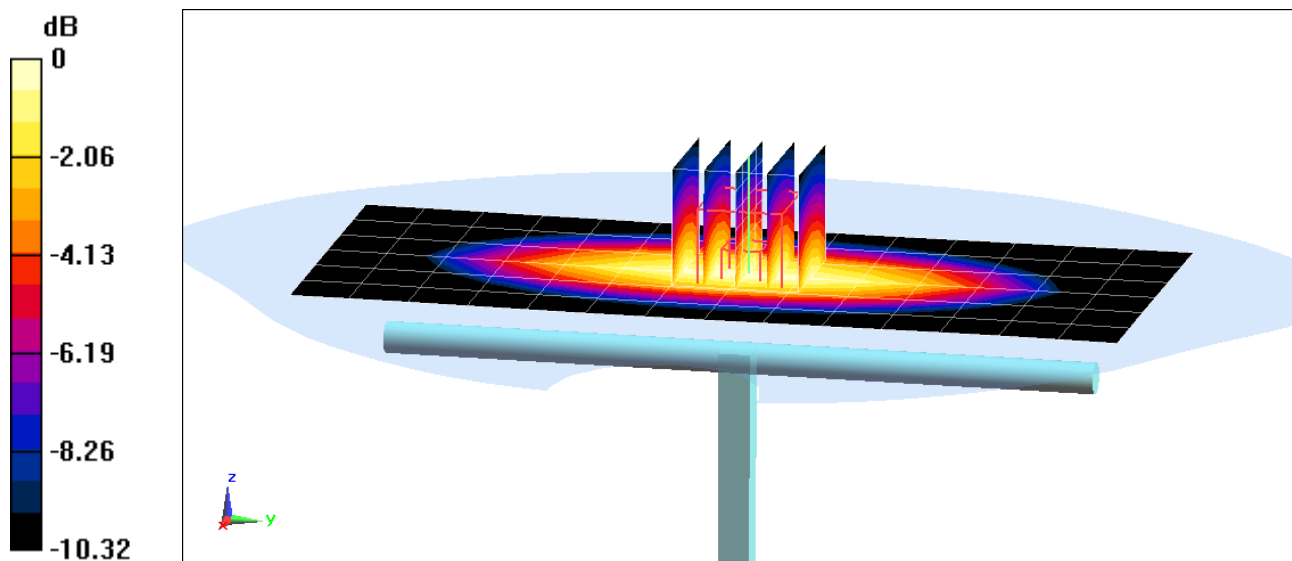
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23dBm (200 mW)

Peak SAR (extrapolated) = 2.49 W/kg

SAR(1 g) = 1.68 W/kg

Deviation = 3.83%



0 dB = 1.97 W/kg = 2.94 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.884 \text{ S/m}$; $\epsilon_r = 40.302$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-13-2015; Ambient Temp: 22.5°C; Tissue Temp: 22.5°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

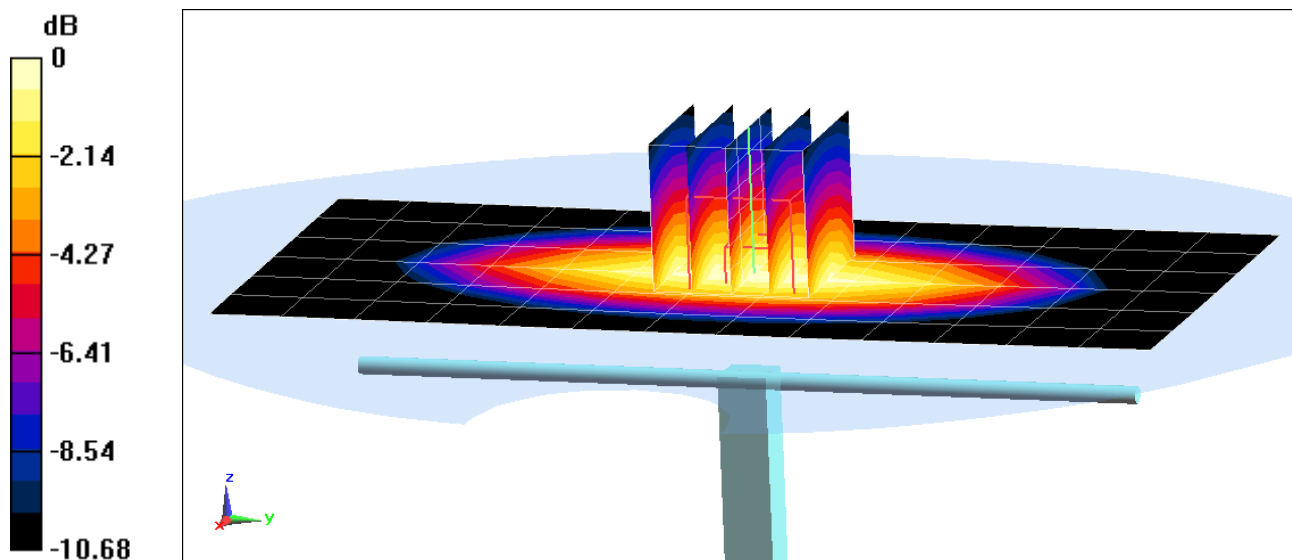
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.964 W/kg

Deviation = 2.77%



0 dB = 1.13 W/kg = 0.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.884 \text{ S/m}$; $\epsilon_r = 40.089$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-31-2015; Ambient Temp: 21.0°C; Tissue Temp: 22.3°C

Probe: ES3DV3 - SN3318; ConvF(6.39, 6.39, 6.39); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: SAM Front; Type: SAM; Serial: 1686

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

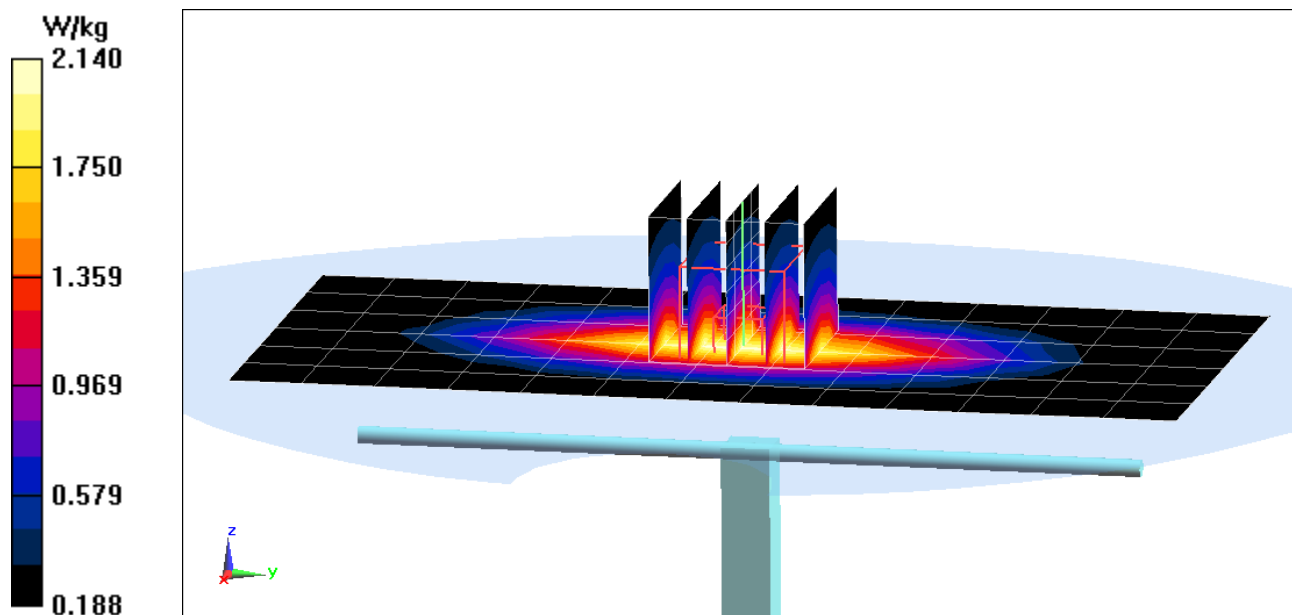
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.73 W/kg

SAR(1 g) = 1.83 W/kg

Deviation = 0.22%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Head Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.364 \text{ S/m}$; $\epsilon_r = 39.124$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 23.2°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3334; ConvF(5.21, 5.21, 5.21); Calibrated: 12/16/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1415; Calibrated: 12/12/2014

Phantom: Sub Twin Sam v5.0; Type: QD000P40CD; Serial: TP:1626

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

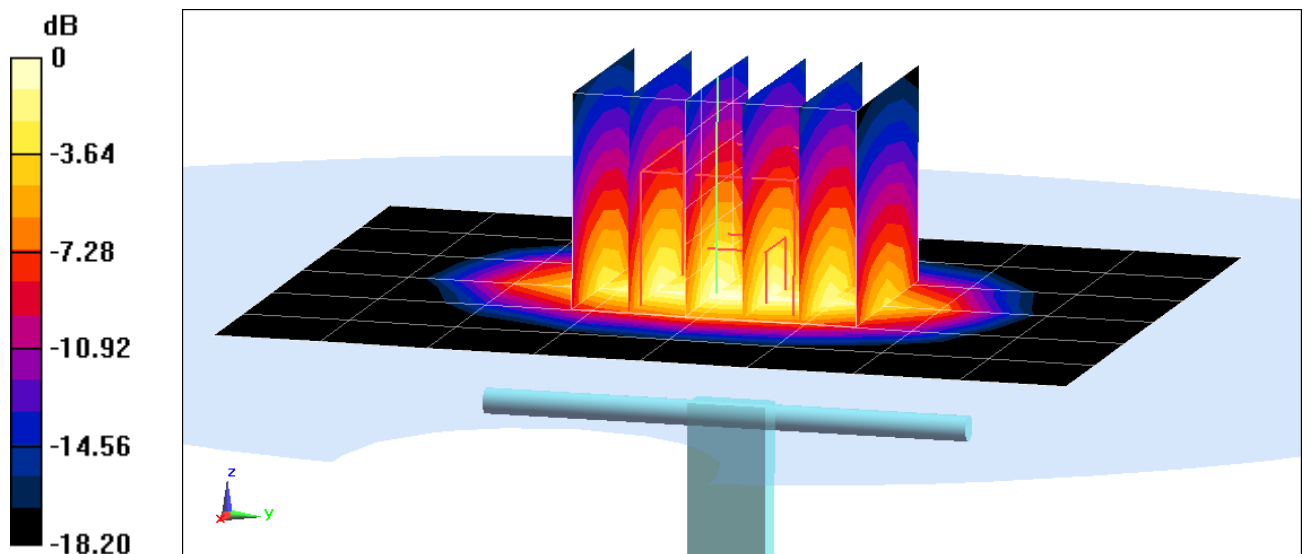
Zoom Scan (5x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.45 W/kg

SAR(1 g) = 3.64 W/kg

Deviation = -3.45%



0 dB = 4.57 W/kg = 6.60 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.432 \text{ S/m}$; $\epsilon_r = 40.752$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 21.8°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3319; ConvF(5.1, 5.1, 5.1); Calibrated: 3/19/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1368; Calibrated: 3/13/2015

Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

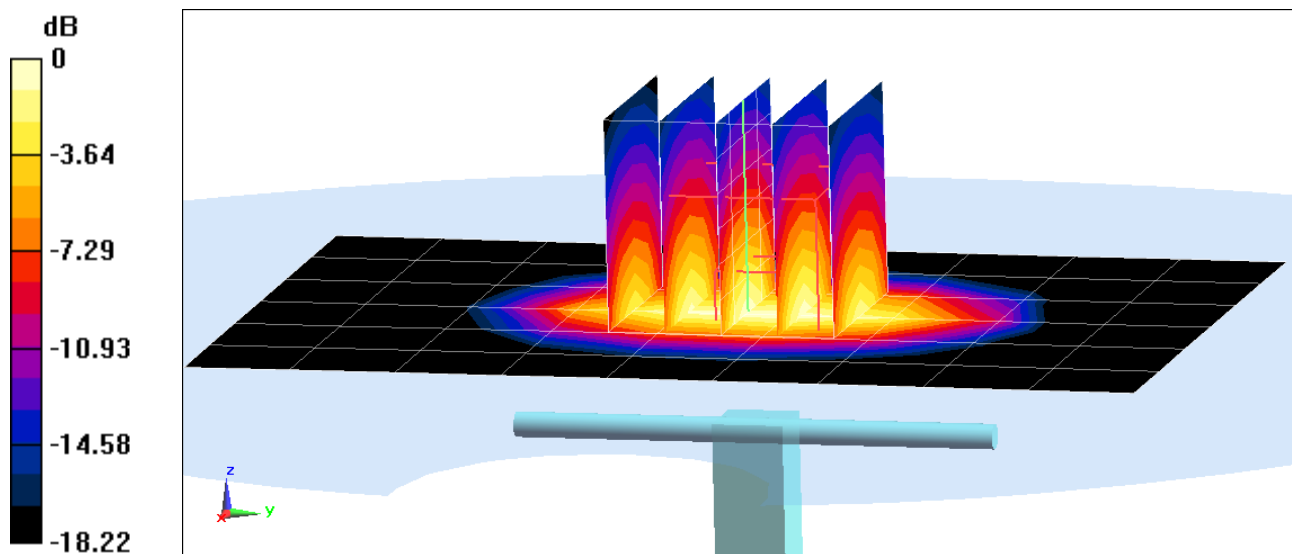
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.76 W/kg

SAR(1 g) = 3.75 W/kg

Deviation = -6.02%



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

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2400 Head Medium parameters used:

$f = 2450$ MHz; $\sigma = 1.874$ S/m; $\epsilon_r = 38.426$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 23.2°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3332; ConvF(4.49, 4.49, 4.49); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

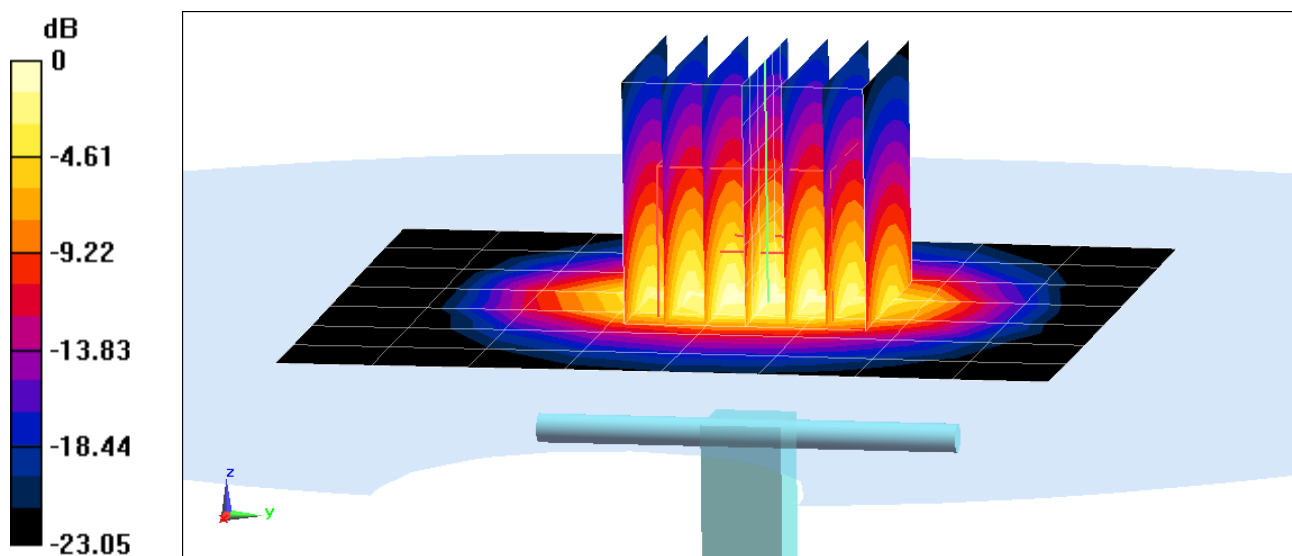
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.9 W/kg

SAR(1 g) = 5.16 W/kg

Deviation = -0.96%



0 dB = 6.82 W/kg = 8.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1071

Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium: 2400 Head Medium parameters used:

$f = 2600 \text{ MHz}$; $\sigma = 2.053 \text{ S/m}$; $\epsilon_r = 37.796$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 23.2°C; Tissue Temp: 23.4°C

Probe: ES3DV3 - SN3332; ConvF(4.35, 4.35, 4.35); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2600 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

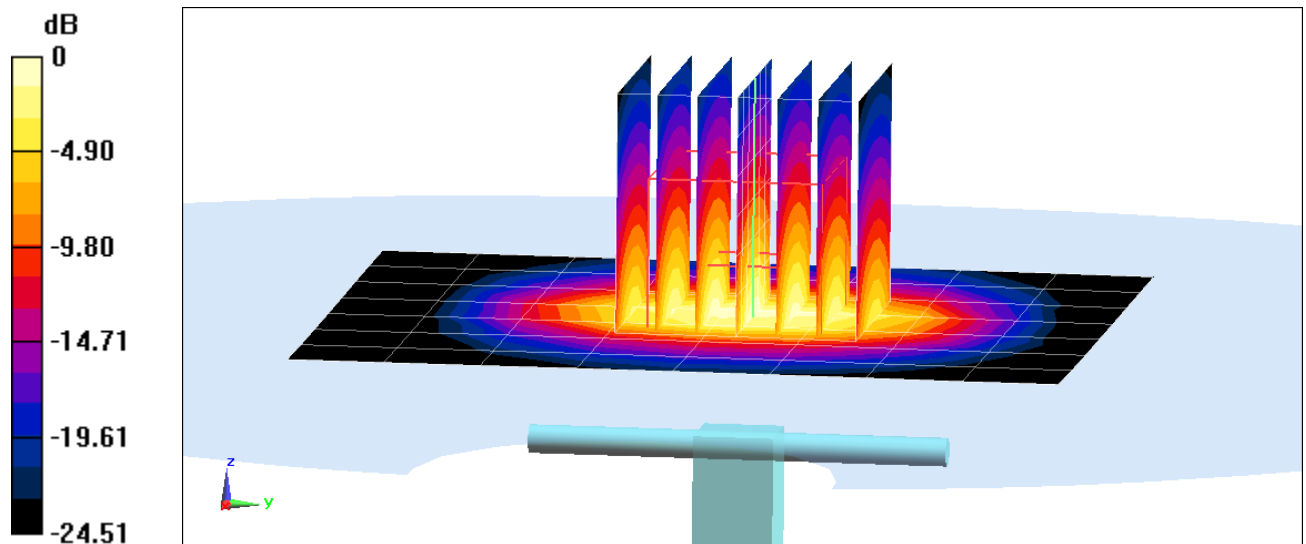
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 12.8 W/kg

SAR(1 g) = 5.84 W/kg

Deviation = 1.57%



0 dB = 7.74 W/kg = 8.89 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1057

Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5GHz Head Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 4.583 \text{ S/m}$; $\epsilon_r = 34.998$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7357; ConvF(4.93, 4.93, 4.93); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x8x1): Measurement grid: dx=10mm, dy=10mm

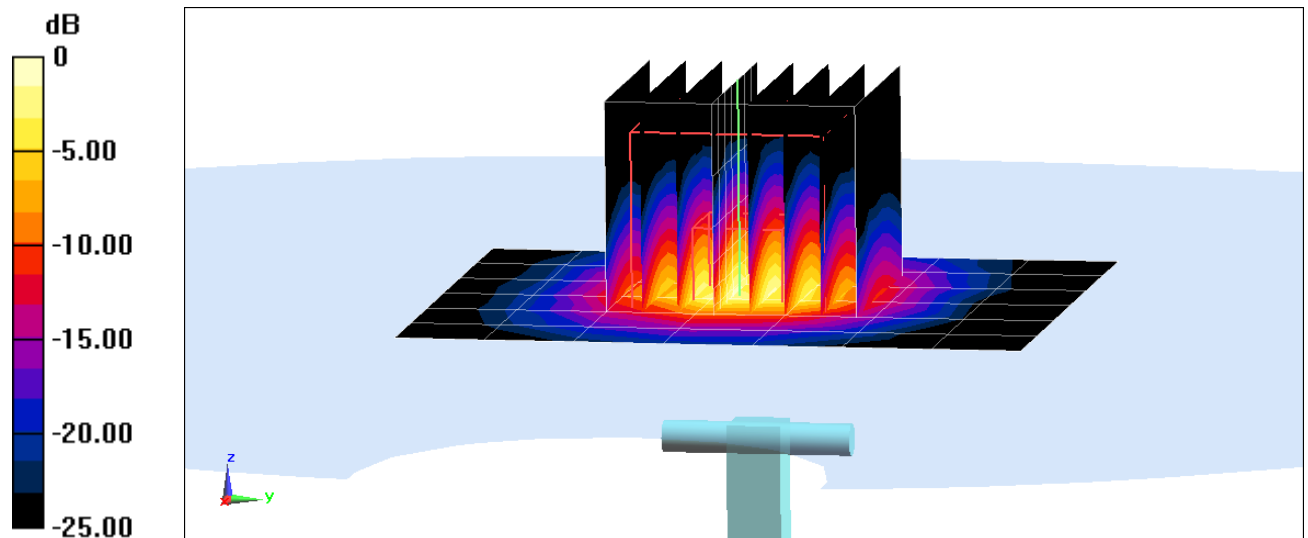
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 4.02 W/kg

Deviation = -5.08%



0 dB = 9.51 W/kg = 9.78 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5600 MHz; Type: D5GHzV2; Serial: 1057

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5GHz Head Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 4.9 \text{ S/m}$; $\epsilon_r = 34.646$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7357; ConvF(4.38, 4.38, 4.38); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

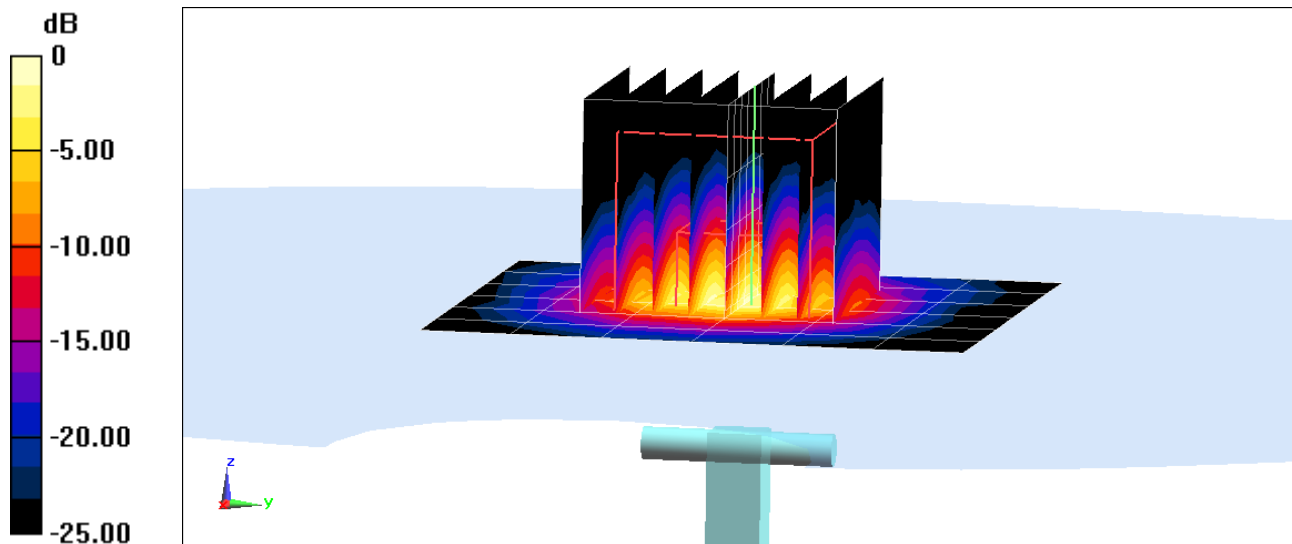
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 4.17 W/kg

Deviation = -0.48%



0 dB = 9.94 W/kg = 9.97 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5GHz Head Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.101 \text{ S/m}$; $\epsilon_r = 34.402$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.9°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7357; ConvF(4.41, 4.41, 4.41); Calibrated: 4/23/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/13/2015

Phantom: SAM v5.0 front; Type: QD000P40CD; Serial: TP-1646

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x7x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

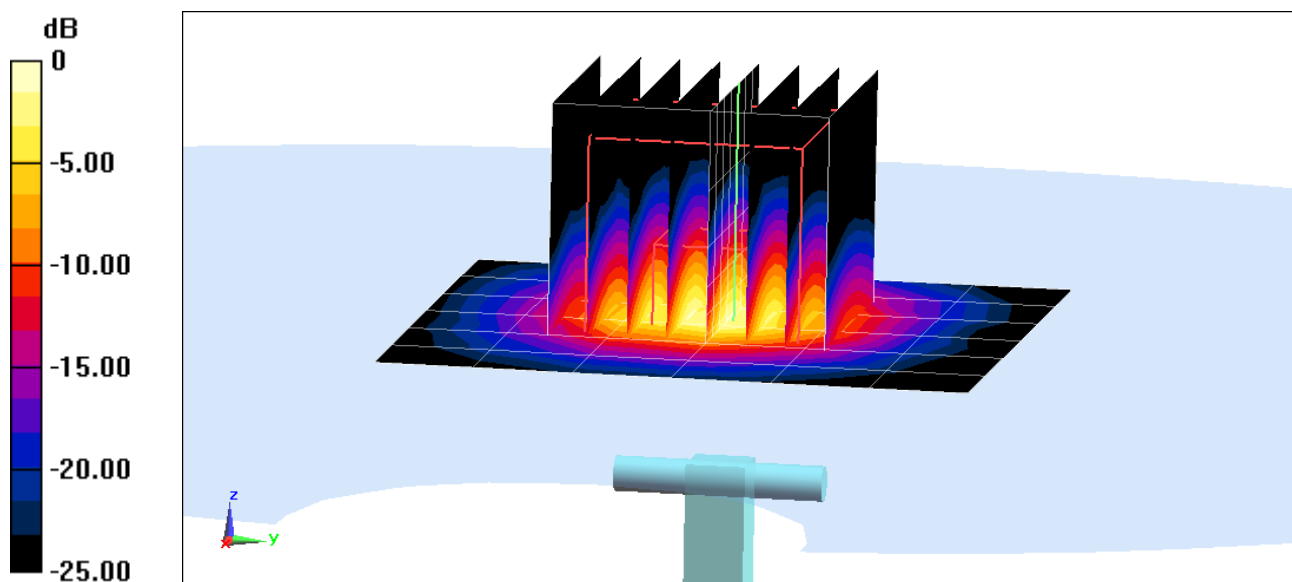
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 16.5 W/kg

SAR(1 g) = 3.77 W/kg

Deviation = -7.03%



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

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.965 \text{ S/m}$; $\epsilon_r = 54.345$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-13-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3318; ConvF(6.22, 6.22, 6.22); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

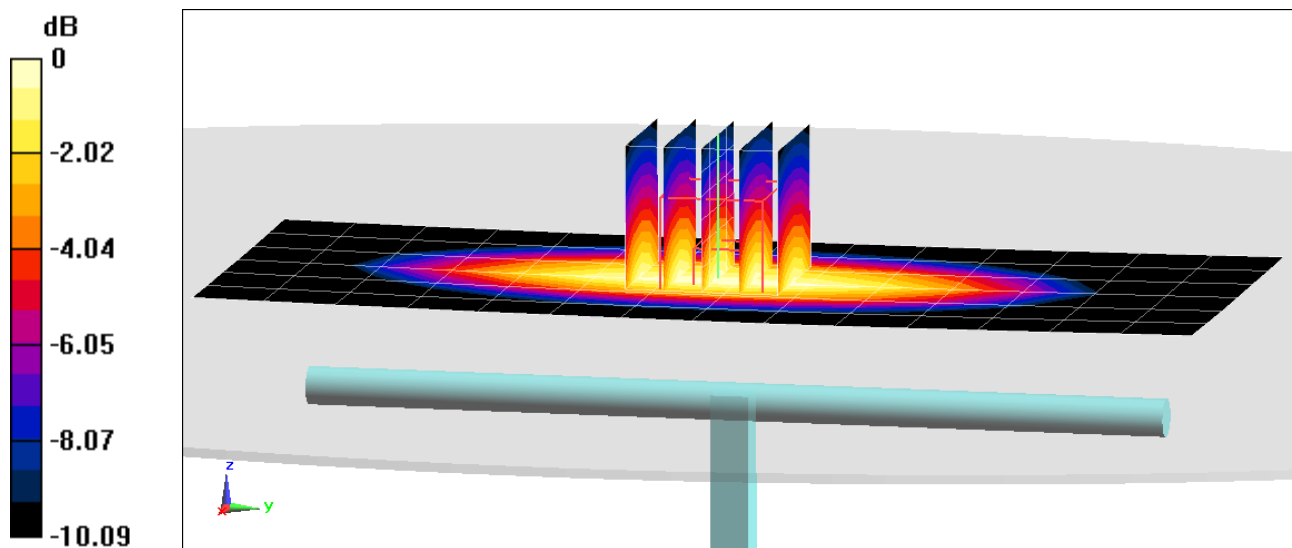
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.36 W/kg

SAR(1 g) = 1.6 W/kg

Deviation = -5.44%



0 dB = 1.88 W/kg = 2.74 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.991 \text{ S/m}$; $\epsilon_r = 53.624$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-10-2015; Ambient Temp: 22.9°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3318; ConvF(6.23, 6.23, 6.23); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

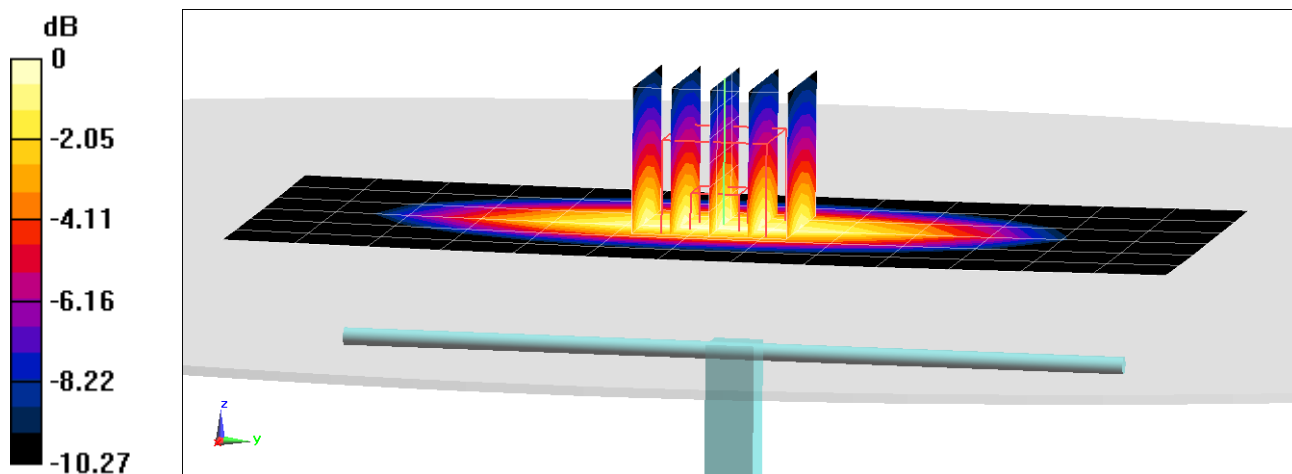
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.72 W/kg

SAR(1 g) = 1.85 W/kg

Deviation = 0.54%



PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d119

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.994 \text{ S/m}$; $\epsilon_r = 52.894$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.5 cm

Test Date: 08-31-2015; Ambient Temp: 22.7°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3213; ConvF(6.07, 6.07, 6.07); Calibrated: 1/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1407; Calibrated: 4/20/2015

Phantom: ELI v5.0 Left; Type: QD0VA001BB; Serial: TP:1202

Measurement SW: DASY52, Version 52.8 (8);SEMCAD X Version 14.6.10 (7331)

835 MHz System Verification

Area Scan (7x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

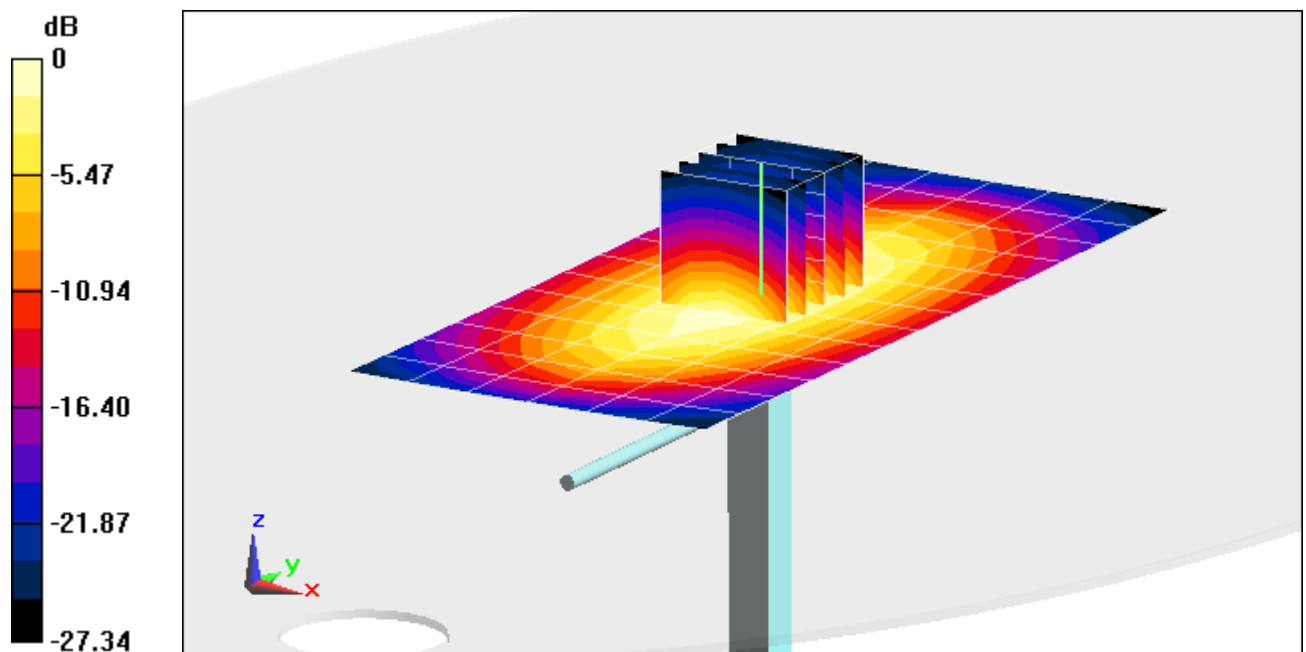
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 23 dBm (200 mW)

Peak SAR (extrapolated) = 2.54 W/kg

SAR(1 g) = 1.76 W/kg

Deviation = -4.35%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.464 \text{ S/m}$; $\epsilon_r = 51.658$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-11-2015; Ambient Temp: 22.3°C; Tissue Temp: 22.2°C

Probe: ES3DV3 - SN3263; ConvF(4.88, 4.88, 4.88); Calibrated: 5/20/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn859; Calibrated: 6/17/2015

Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

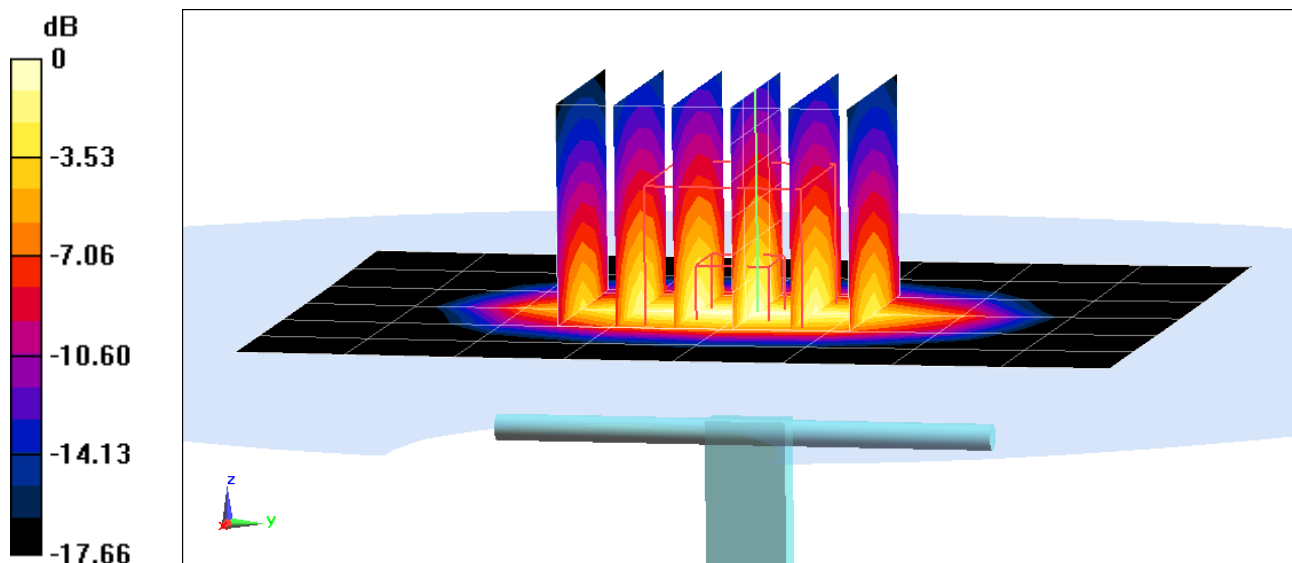
Zoom Scan (5x6x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 6.63 W/kg

SAR(1 g) = 3.84 W/kg

Deviation = 3.50%



0 dB = 4.77 W/kg = 6.79 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.54 \text{ S/m}$; $\epsilon_r = 51.535$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

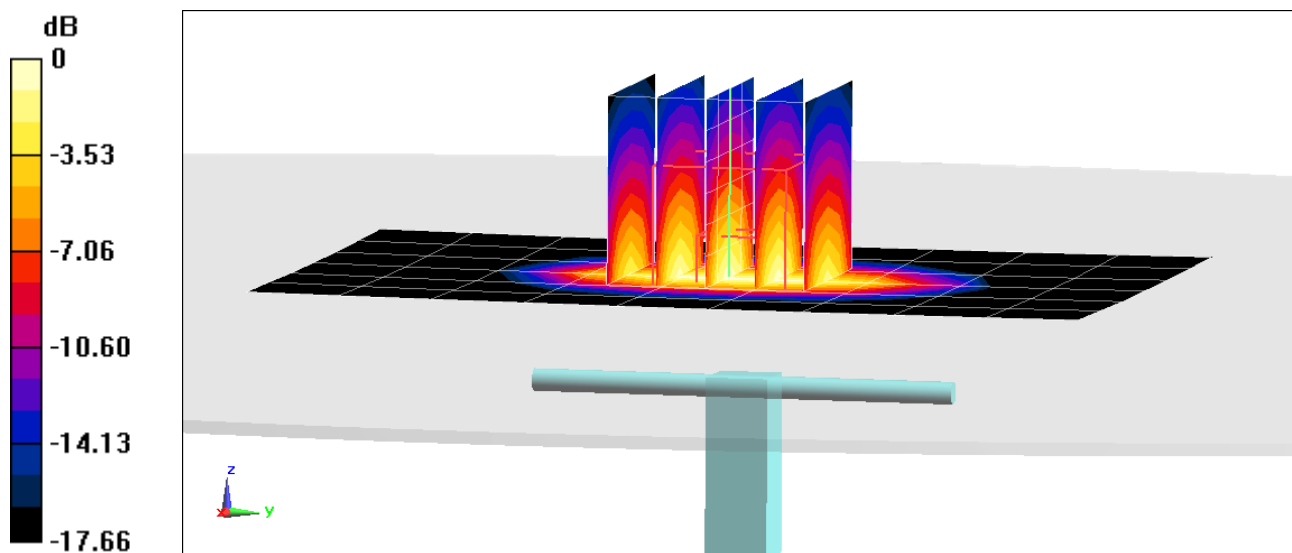
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.26 W/kg

SAR(1 g) = 4.08 W/kg

Deviation = 0.99%



0 dB = 5.17 W/kg = 7.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d141

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.549 \text{ S/m}$; $\epsilon_r = 52.482$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-13-2015; Ambient Temp: 23.3°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3288; ConvF(4.82, 4.82, 4.82); Calibrated: 9/24/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1364; Calibrated: 9/18/2014

Phantom: ELI v5.0; Type: QDOVA001BB; Serial: 1229

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

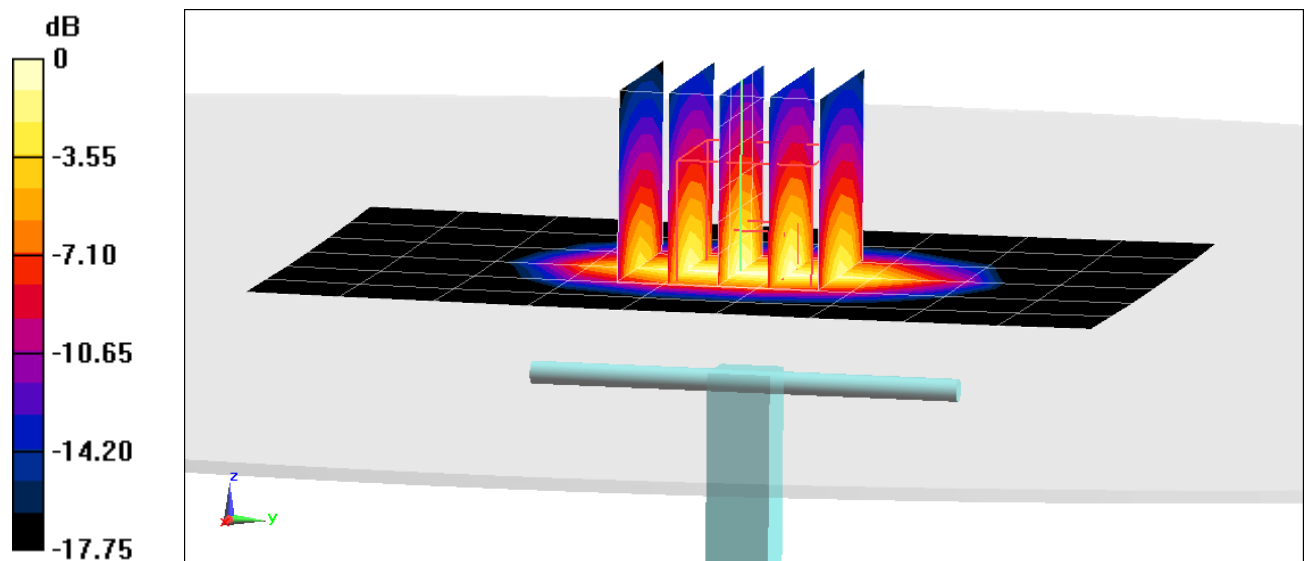
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 7.40 W/kg

SAR(1 g) = 4.18 W/kg

Deviation = 4.50%



0 dB = 5.23 W/kg = 7.19 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.016 \text{ S/m}$; $\epsilon_r = 51.739$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-12-2015; Ambient Temp: 23.5°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3332; ConvF(4.31, 4.31, 4.31); Calibrated: 9/18/2014;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/17/2014

Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

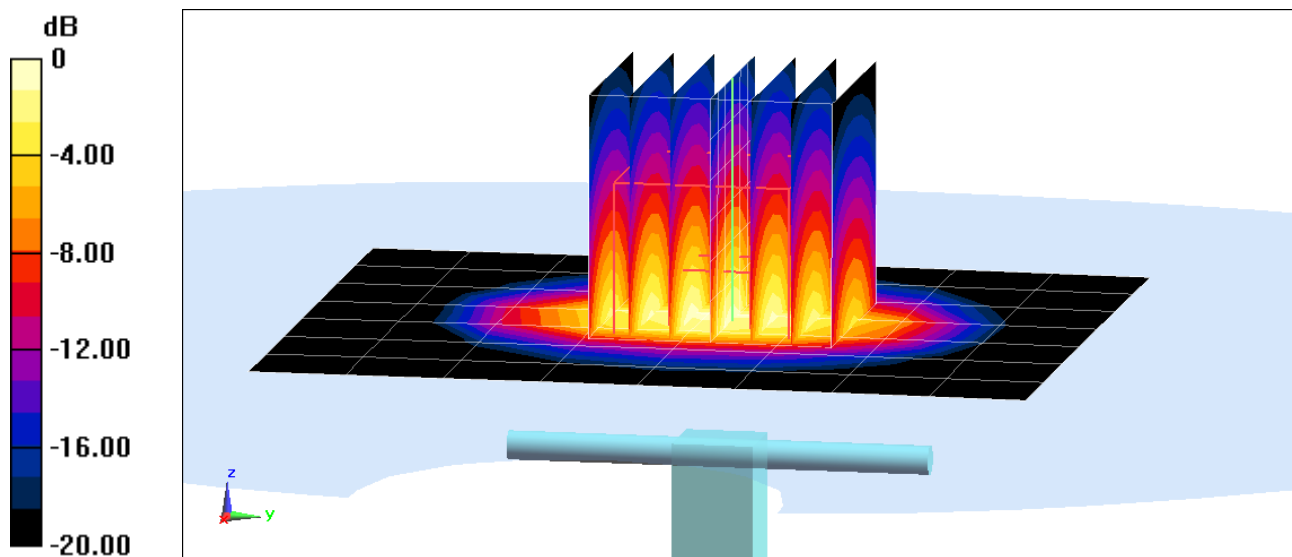
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 11.3 W/kg

SAR(1 g) = 5.44 W/kg

Deviation = 7.30%



0 dB = 7.18 W/kg = 8.56 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 882

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body Medium parameters used:

$f = 2450$ MHz; $\sigma = 2.039$ S/m; $\epsilon_r = 51.754$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3318; ConvF(4.37, 4.37, 4.37); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2450 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

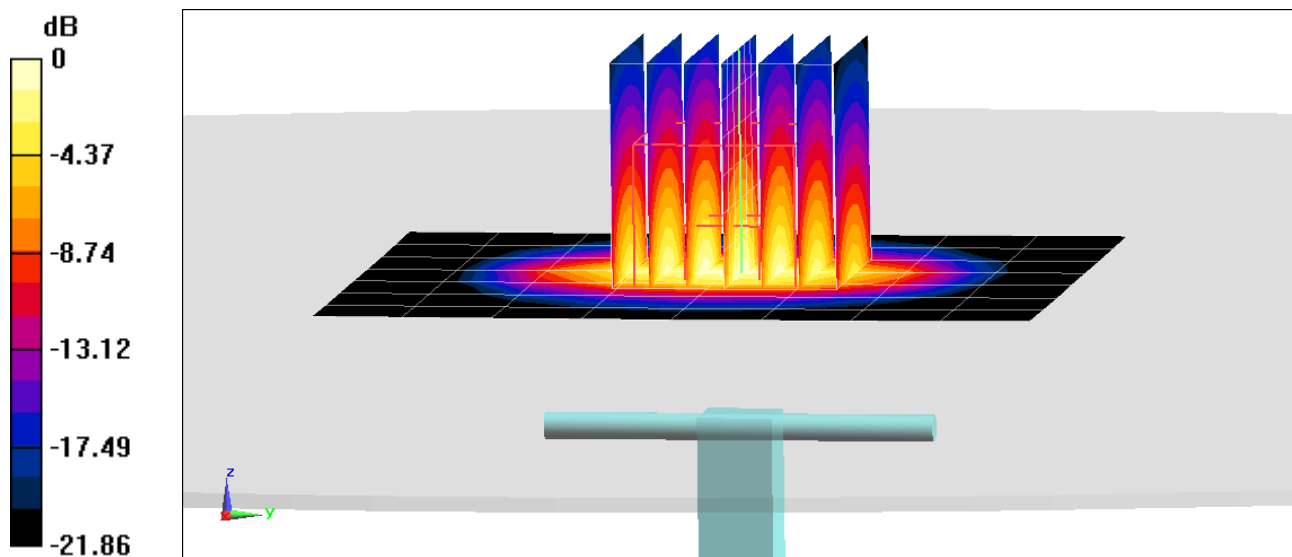
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 11.2 W/kg

SAR(1 g) = 5.33 W/kg

Deviation = 5.13%



0 dB = 6.99 W/kg = 8.44 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1071

Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium: 2600 Body Medium parameters used:

$f = 2600$ MHz; $\sigma = 2.246$ S/m; $\epsilon_r = 51.134$; $\rho = 1000$ kg/m³

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-17-2015; Ambient Temp: 21.9°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3318; ConvF(4.17, 4.17, 4.17); Calibrated: 1/23/2015;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/14/2015

Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2027

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

2600 MHz System Verification

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm

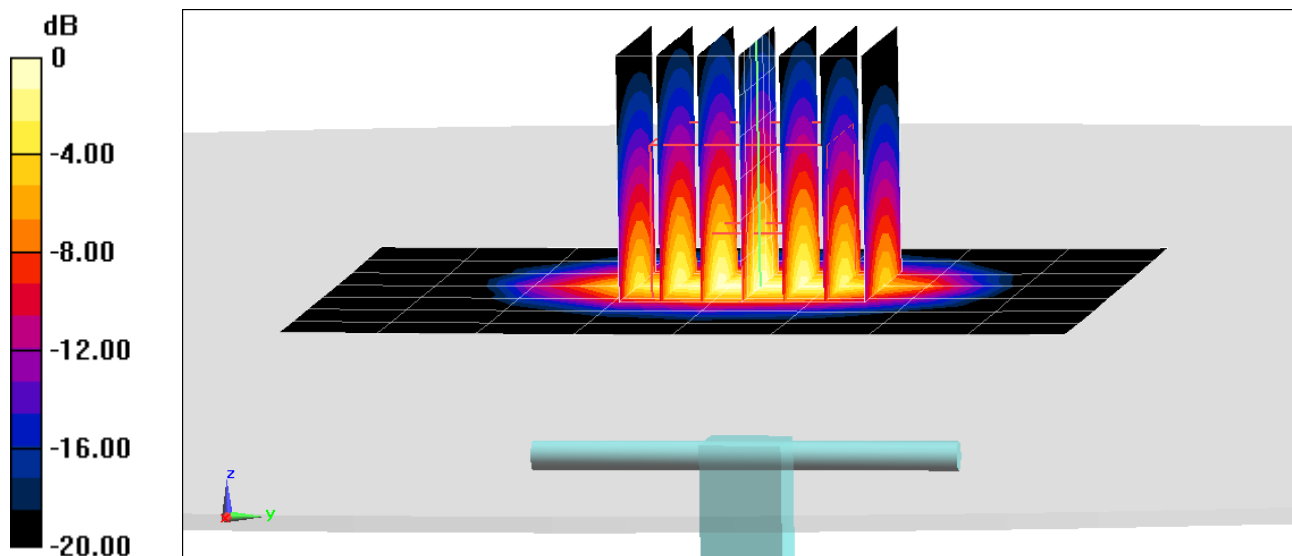
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 12.2 W/kg

SAR(1 g) = 5.32 W/kg

Deviation = -6.50%



0 dB = 7.05 W/kg = 8.48 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 5.407 \text{ S/m}$; $\epsilon_r = 46.508$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 24.2°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3914; ConvF(4.33, 4.33, 4.33); Calibrated: 2/10/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/31/2014

Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5300 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

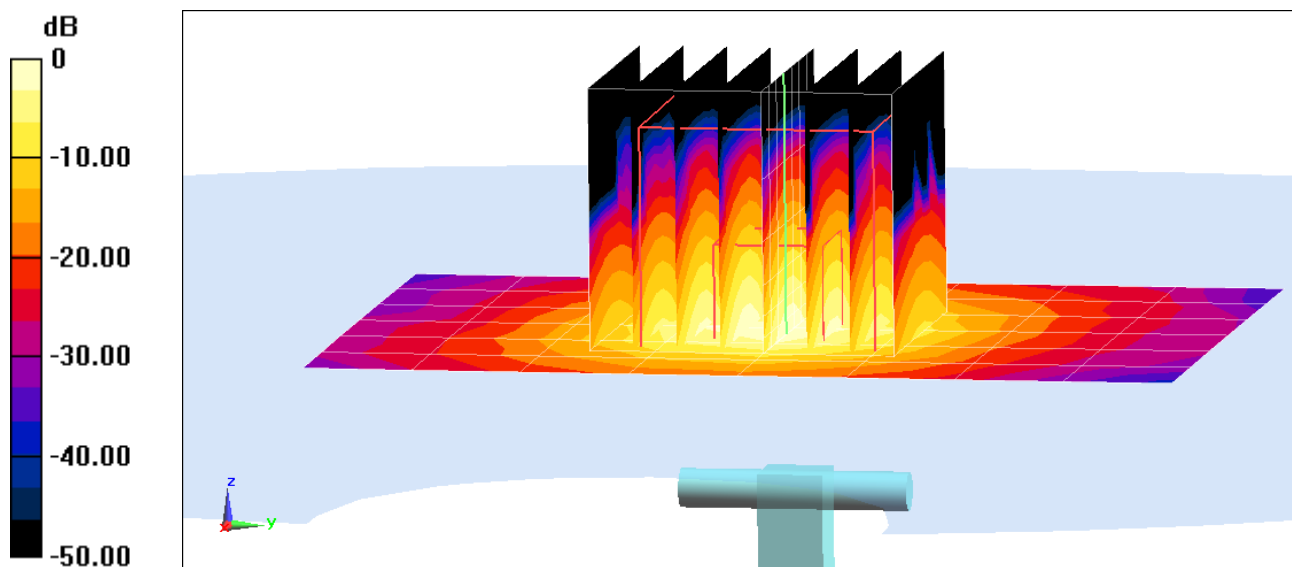
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 4.1 W/kg; SAR(10 g) = 1.13 W/kg

Deviation (1g) = 2.63%; Deviation (10g) = 1.35%



0 dB = 9.78 W/kg = 9.90 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5600 \text{ MHz}$; $\sigma = 5.785 \text{ S/m}$; $\epsilon_r = 46.151$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 24.2°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3914; ConvF(3.89, 3.89, 3.89); Calibrated: 2/10/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/31/2014

Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5600 MHz System Verification

Area Scan (7x9x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

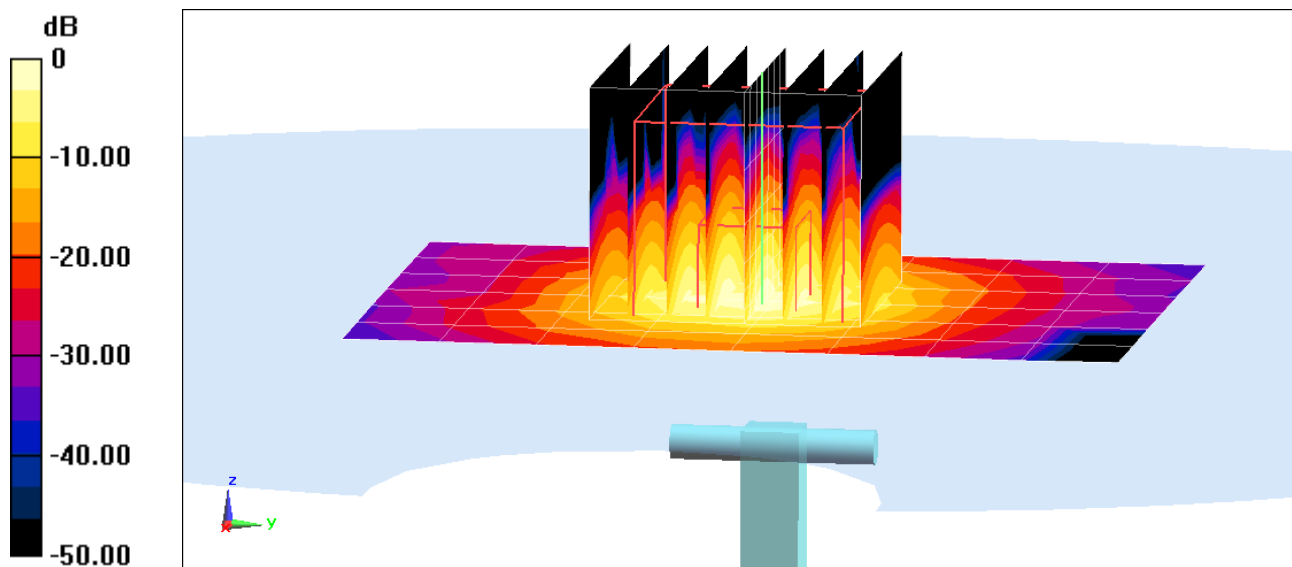
Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$; Graded Ratio: 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 19.5 W/kg

SAR(1 g) = 4.41 W/kg; SAR(10 g) = 1.2 W/kg

Deviation (1g) = 4.88%; Deviation (10g) = 3.00%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: UID 0, CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 6.028 \text{ S/m}$; $\epsilon_r = 45.839$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section ; Space: 1.0 cm

Test Date: 08-10-2015; Ambient Temp: 24.2°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3914; ConvF(4.01, 4.01, 4.01); Calibrated: 2/10/2015;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/31/2014

Phantom: SAM Sub ; Type: QD000P40CC; Serial: TP:1357

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

5800 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

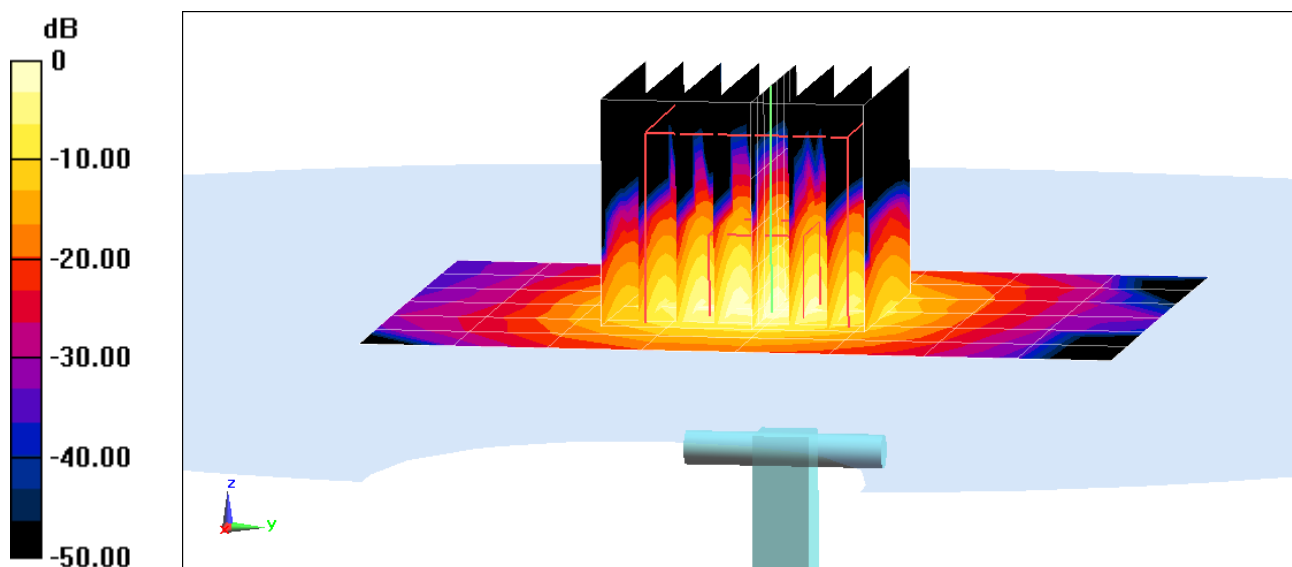
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 17 dBm (50 mW)

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 3.99 W/kg

Deviation = 2.31%



0 dB = 9.92 W/kg = 9.97 dBW/kg

APPENDIX C: PROBE CALIBRATION



Accreditation No.: **SCS 0108**

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

Certificate No: **D750V3-1003_Jan15**

Client **PC Test**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1003**

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

CC
2/3/15

Calibration date: **January 16, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Name** Michael Weber **Function** Laboratory Technician

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: January 19, 2015

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



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

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 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 $\pm$ 0.2) °C	41.7 $\pm$ 6 %	0.91 mho/m $\pm$ 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	2.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.09 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.32 W/kg $\pm$ 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 $\pm$ 0.2) °C	56.0 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.46 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.58 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 Ω - 1.4 j Ω
Return Loss	- 28.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 3.8 j Ω
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.043 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 21, 2009

DASY5 Validation Report for Head TSL

Date: 16.01.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.91 \text{ S/m}$; $\epsilon_r = 41.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

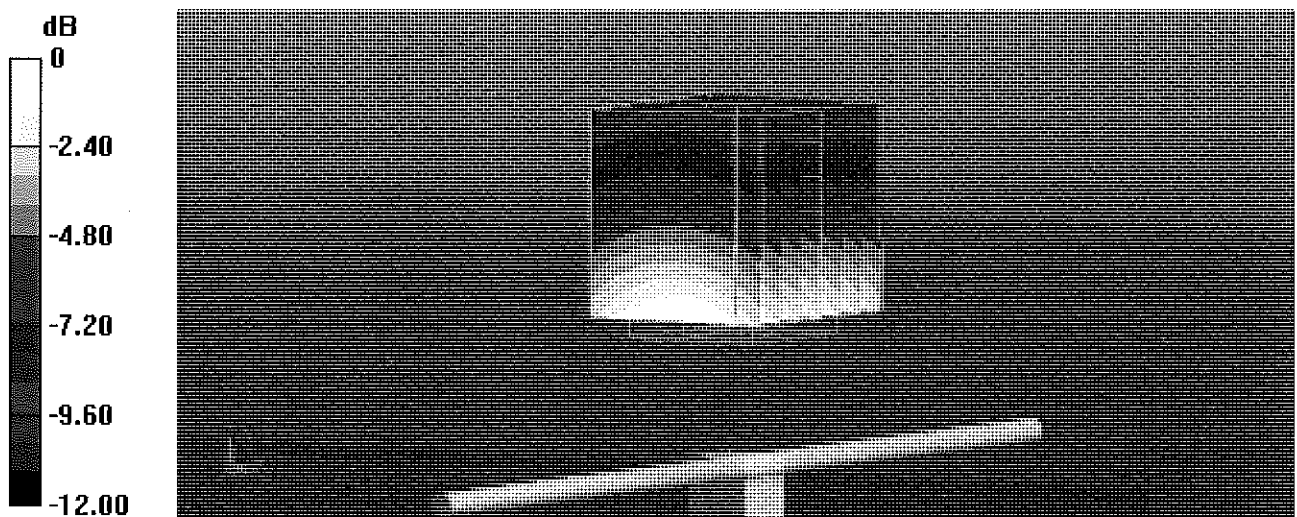
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 53.08 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.05 W/kg

SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.35 W/kg

Maximum value of SAR (measured) = 2.41 W/kg

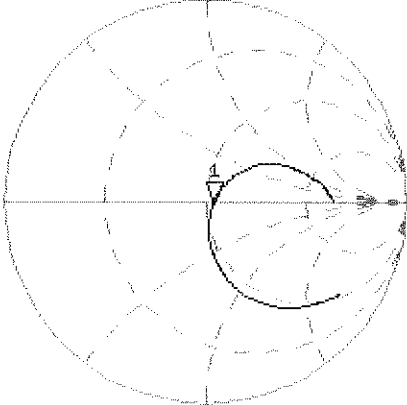


0 dB = 2.41 W/kg = 3.82 dBW/kg

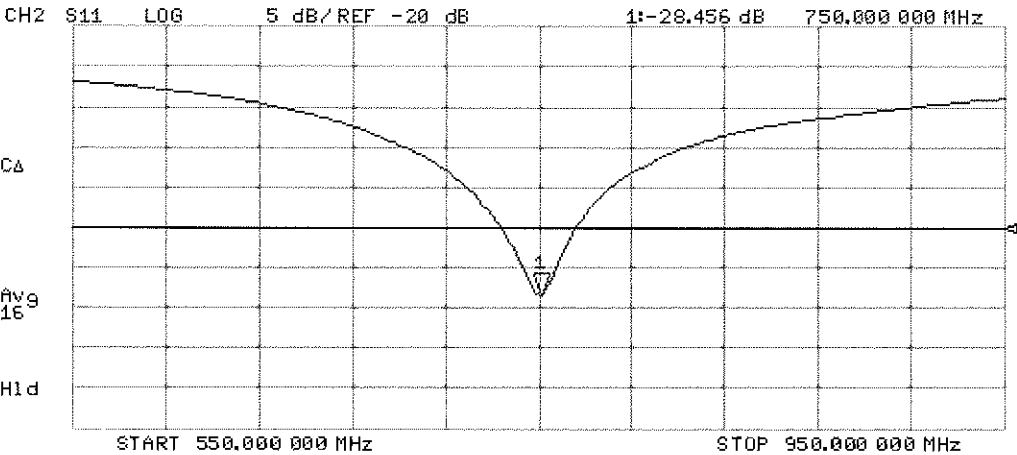
Impedance Measurement Plot for Head TSL

16 Jan 2015 16:07:22
[CH1] S11 1 U FS 1: 53.666 Ω -1.3730 Δ 154.55 pF 750.000 000 MHz

*
Del
CA



Avg
16
H1d



DASY5 Validation Report for Body TSL

Date: 16.01.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.99 \text{ S/m}$; $\epsilon_r = 56$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.21, 6.21, 6.21); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

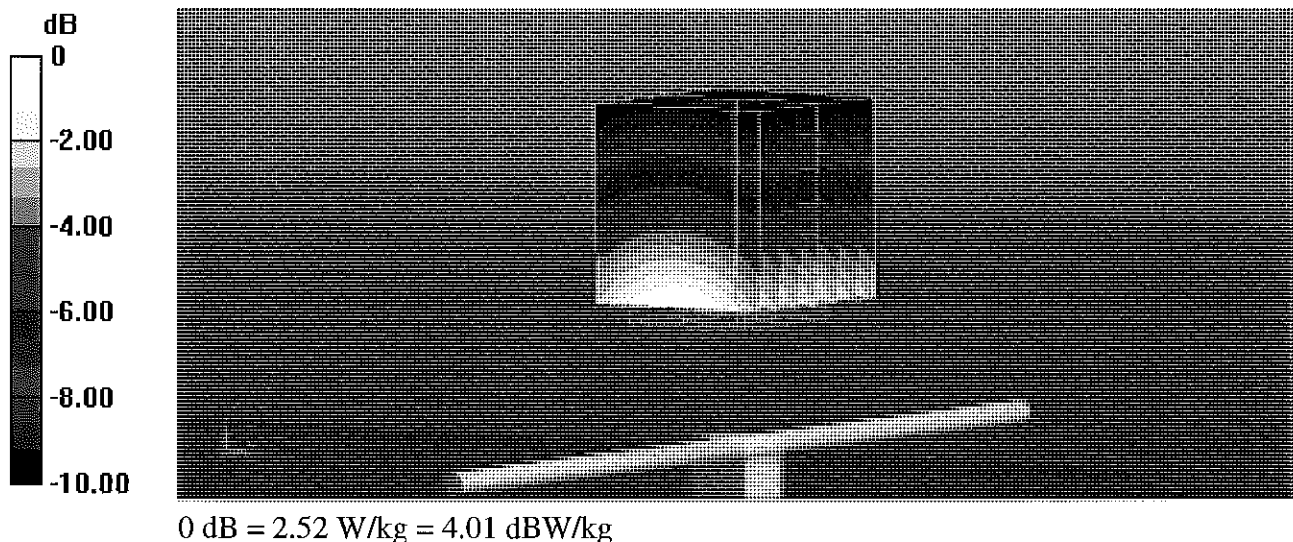
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 52.21 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 3.16 W/kg

SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.42 W/kg

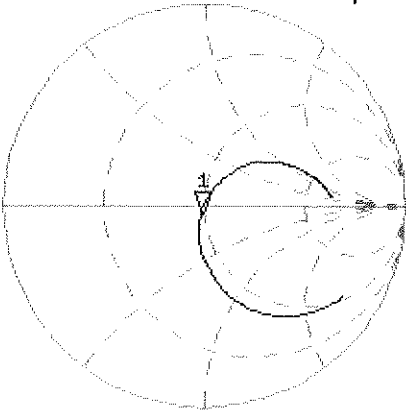
Maximum value of SAR (measured) = 2.52 W/kg



Impedance Measurement Plot for Body TSL

16 Jan 2015 13:37:35
[CH1] S11 1 U FS 1: 48.268 Ω -3.7676 Ω 56.324 pF 750.000 000 MHz

*
De1
CA

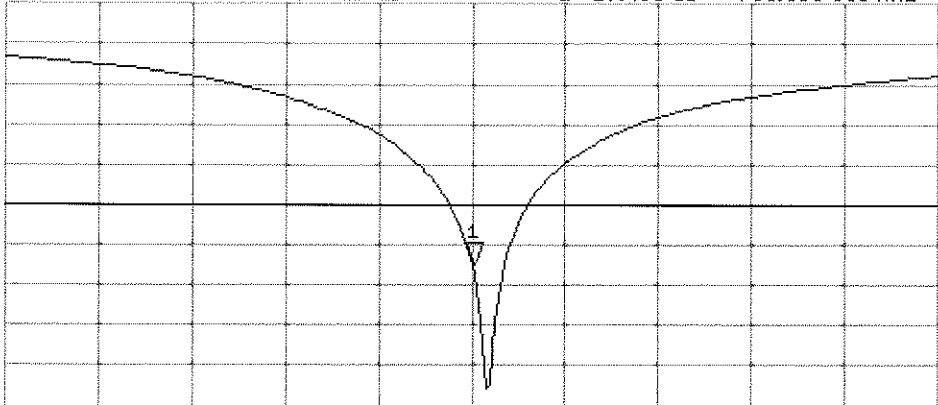


Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-27.498 dB 750.000 000 MHz

CA

Avg
16
H1d



START 550.000 000 MHz STOP 950.000 000 MHz



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: **D835V2-4d119_Apr15**

CALIBRATION CERTIFICATE

Object **D835V2 - SN:4d119**

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

Calibration date: **April 13, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Israe Elnaouq** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: April 13, 2015

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



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

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 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 $\pm$ 0.2) °C	40.9 $\pm$ 6 %	0.94 mho/m $\pm$ 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	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.38 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.11 W/kg $\pm$ 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 $\pm$ 0.2) °C	55.4 $\pm$ 6 %	1.01 mho/m $\pm$ 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	2.37 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.20 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.06 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.2 Ω - 2.2 j Ω
Return Loss	- 33.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7 Ω - 4.9 j Ω
Return Loss	- 25.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 13.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d119

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.94 \text{ S/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

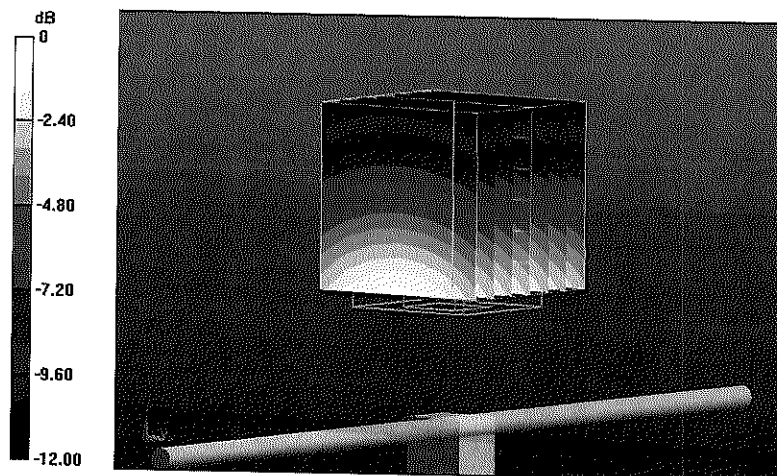
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.77 V/m ; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.64 W/kg

SAR(1 g) = 2.43 W/kg ; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 2.85 W/kg



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

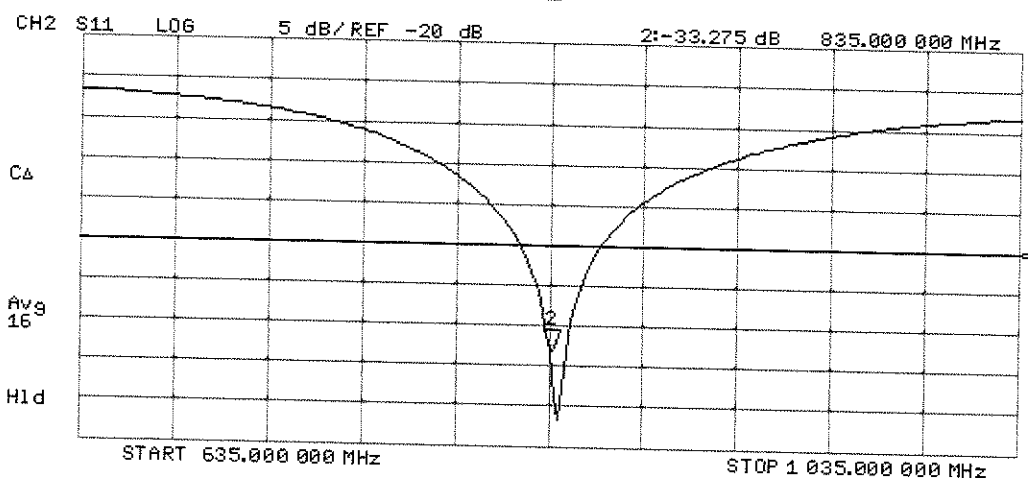
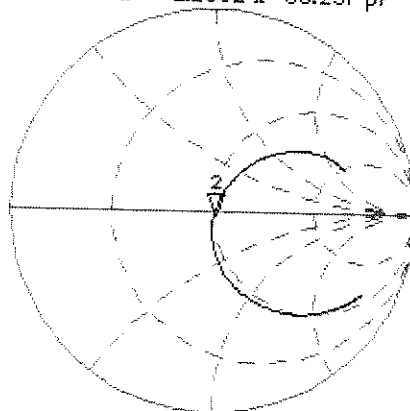
Impedance Measurement Plot for Head TSL

CH1 S11 1 U FS 13 Apr 2015 13:42:59
 2: 50.213 Ω -2.1602 Ω 88.237 pF 835.000 000 MHz

*
 Del
 CA

Avg
 16

H1d



DASY5 Validation Report for Body TSL

Date: 13.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d119

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.01 \text{ S/m}$; $\epsilon_r = 55.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.17, 6.17, 6.17); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

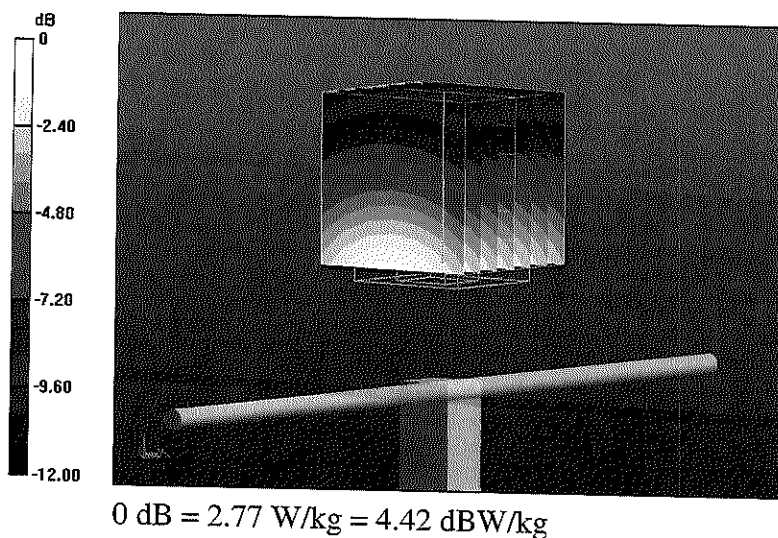
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.44 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 2.77 W/kg



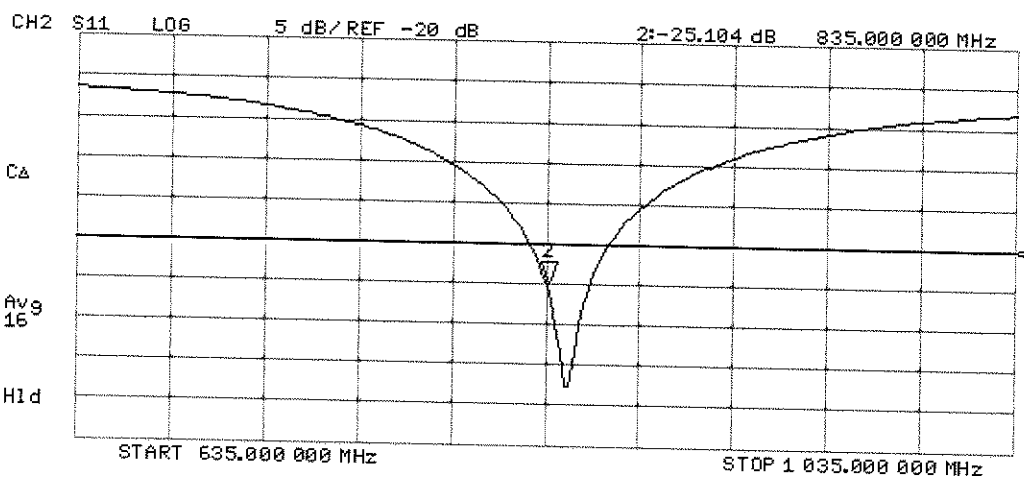
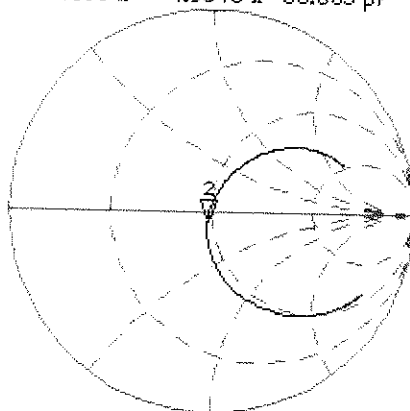
Impedance Measurement Plot for Body TSL

CH1 S11 1 U FS 13 Apr 2015 10:53:33
 2: 47.658 Ω -4.9043 Ω 38.865 pF 835.000 000 MHz

*
 Del
 CA

Avg
 16

H1d





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: **D835V2-4d133_Jul15**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d133**

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

PN ✓
8/4/15

Calibration date: **July 23, 2015**

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 $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Name** Michael Weber **Function** Laboratory Technician

Signature
M. Weber

Approved by: **Name** Katja Pokovic **Function** Technical Manager

K. Pokovic

Issued: July 23, 2015

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 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 $\pm$ 0.2) °C	42.4 $\pm$ 6 %	0.92 mho/m $\pm$ 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	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.13 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.94 W/kg $\pm$ 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 $\pm$ 0.2) °C	54.9 $\pm$ 6 %	1.00 mho/m $\pm$ 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	2.37 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.25 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.08 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.6 Ω - 1.6 j Ω
Return Loss	- 33.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω - 3.7 j Ω
Return Loss	- 27.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 22, 2011

DASY5 Validation Report for Head TSL

Date: 22.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.92 \text{ S/m}$; $\epsilon_r = 42.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

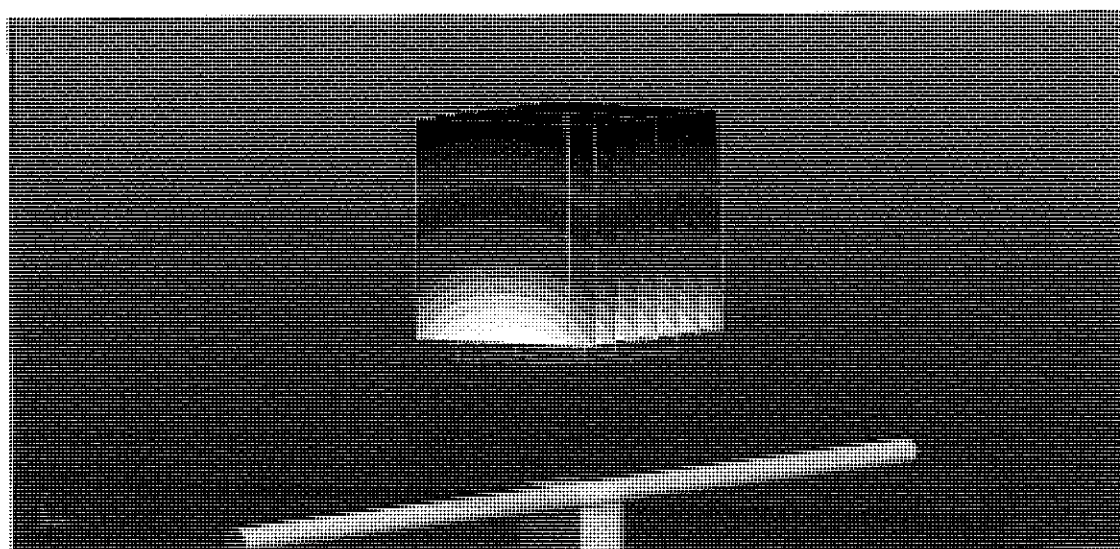
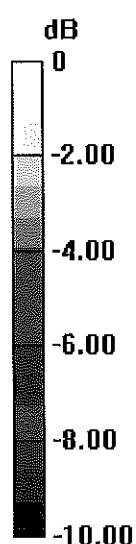
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.11 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 2.31 W/kg; SAR(10 g) = 1.5 W/kg

Maximum value of SAR (measured) = 2.70 W/kg

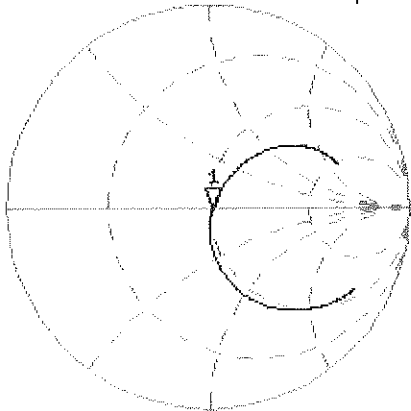


0 dB = 2.70 W/kg = 4.31 dBW/kg

Impedance Measurement Plot for Head TSL

22 Jul 2015 09:20:37
CH1 S11 1 U FS 1: 51.563 Ω -1.6152 Ω 118.00 pF 835.000 000 MHz

*
De1
Cor



Avg
16

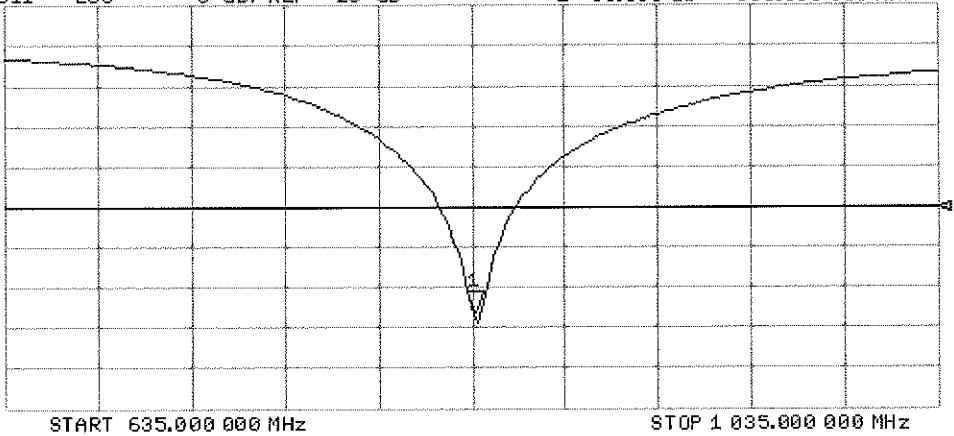
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-33.086 dB 835.000 000 MHz

Cor

Avg
16

H1d



DASY5 Validation Report for Body TSL

Date: 23.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1 \text{ S/m}$; $\epsilon_r = 54.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.17, 6.17, 6.17); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

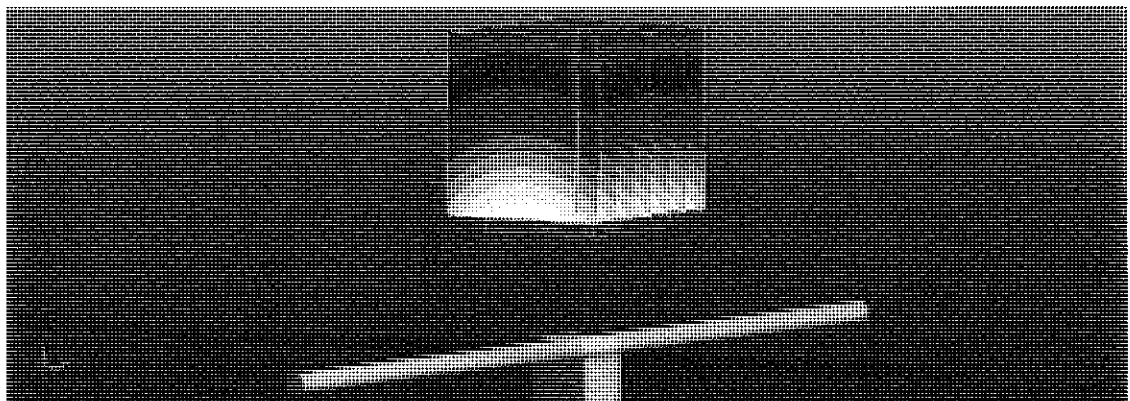
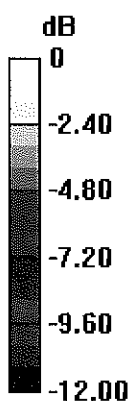
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.56 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.50 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 2.77 W/kg

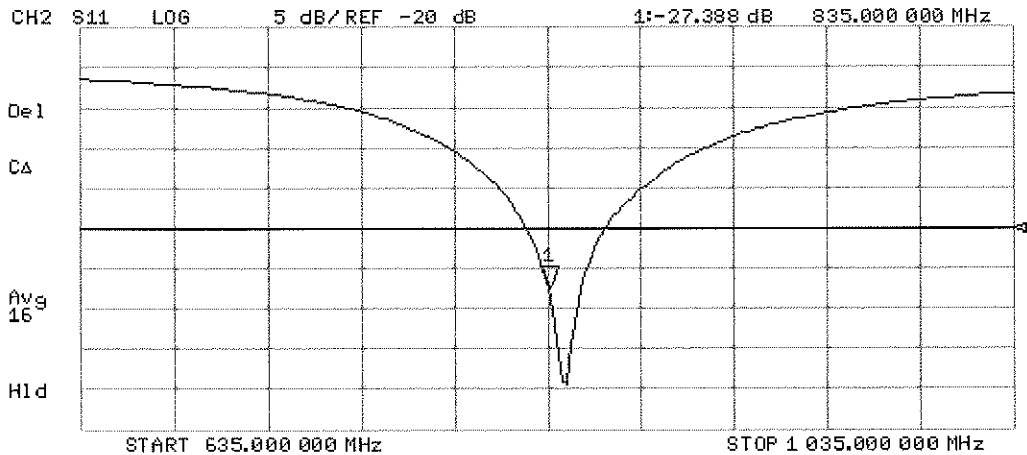
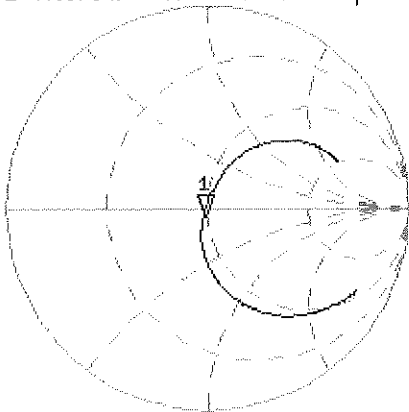


0 dB = 2.77 W/kg = 4.42 dBW/kg

Impedance Measurement Plot for Body TSL

23 Jul 2015 12:09:09
[CH1] S11 1 U FS 1: 47.979 Ω -3.6699 Ω 51.937 pF 835.000 000 MHz

*
Del
CA
Avg
16
H1d





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_May15**

CALIBRATION CERTIFICATE

Object **D1765V2 - SN: 1008**

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

CCV
 5/28/15

Calibration date: **May 13, 2015**

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 EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Name** **Michael Weber** **Function** **Laboratory Technician**

Signature

M. Weber

Approved by: **Katja Pokovic** **Technical Manager**

Katja Pokovic

Issued: May 15, 2015

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.38 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.37 mho/m $\pm$ 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	9.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	37.7 W/kg $\pm$ 17.0 % (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	20.1 W/kg $\pm$ 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	1.50 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.5 $\pm$ 6 %	1.49 mho/m $\pm$ 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	9.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	38.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.4 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.5 Ω - 4.6 j Ω
Return Loss	- 26.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.8 Ω - 5.3 j Ω
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.211 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

DASY5 Validation Report for Head TSL

Date: 13.05.2015

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; $\sigma = 1.37$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

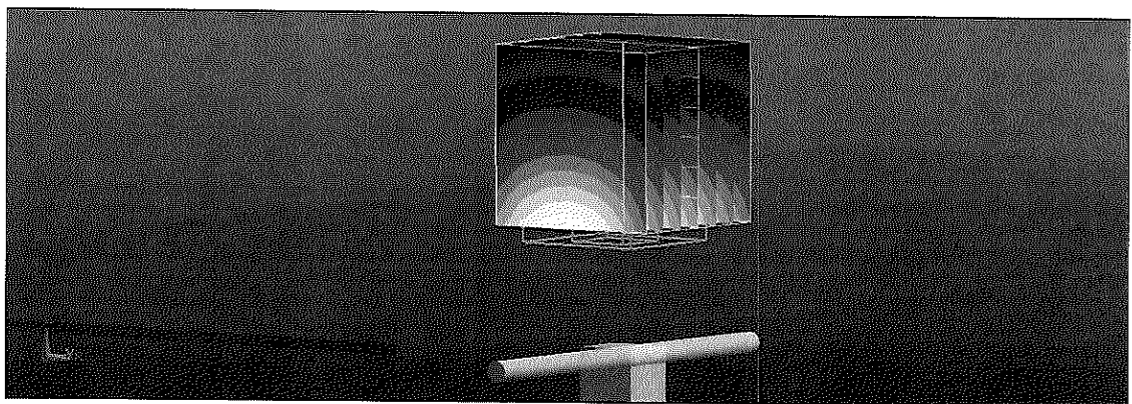
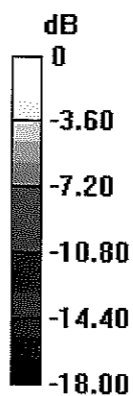
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.56 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 17.0 W/kg

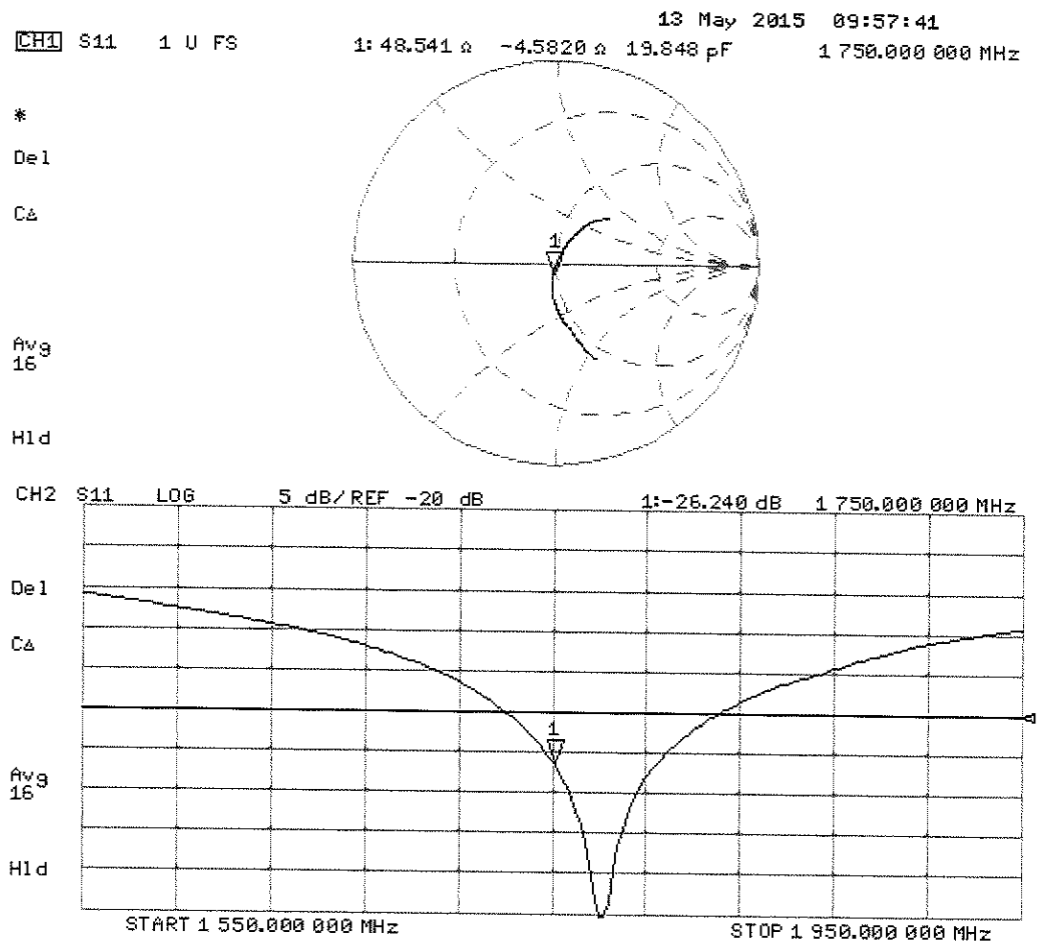
SAR(1 g) = 9.45 W/kg; SAR(10 g) = 5.02 W/kg

Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.05.2015

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; $\sigma = 1.49$ S/m; $\epsilon_r = 51.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.88, 4.88, 4.88); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

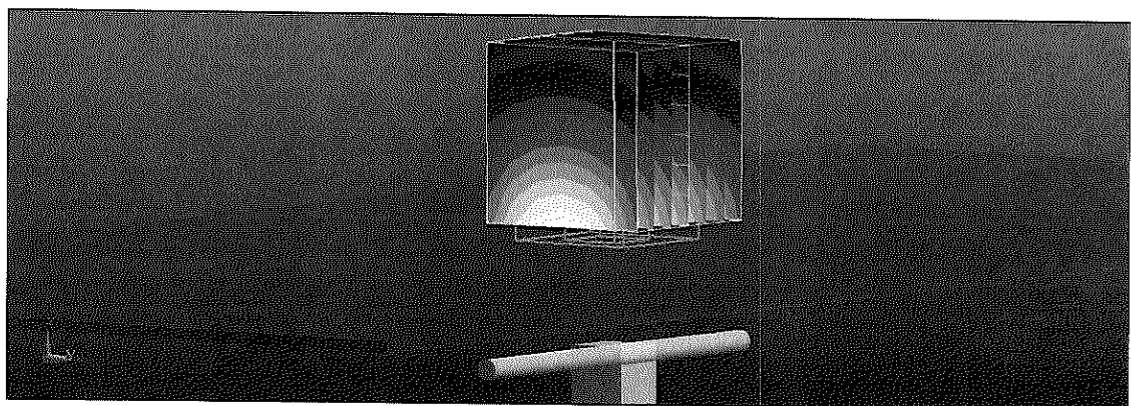
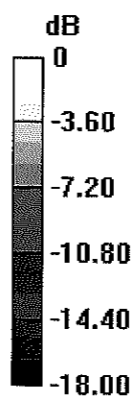
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.70 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 16.5 W/kg

SAR(1 g) = 9.55 W/kg; SAR(10 g) = 5.12 W/kg

Maximum value of SAR (measured) = 12.0 W/kg

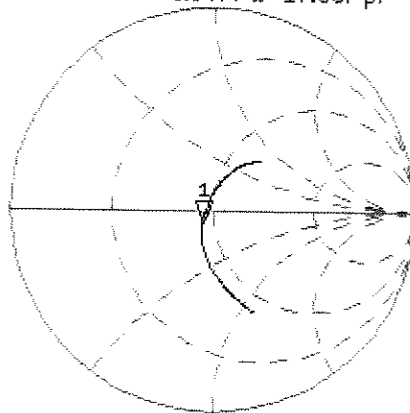


0 dB = 12.0 W/kg = 10.79 dBW/kg

Impedance Measurement Plot for Body TSL

13 May 2015 09:57:07
 [CH1] S11 1 U FS 1: 44.771 Ω -5.3477 Ω 17.007 pF 1 750.000 000 MHz

*
 Del
 CA



Avg
 16

H1d

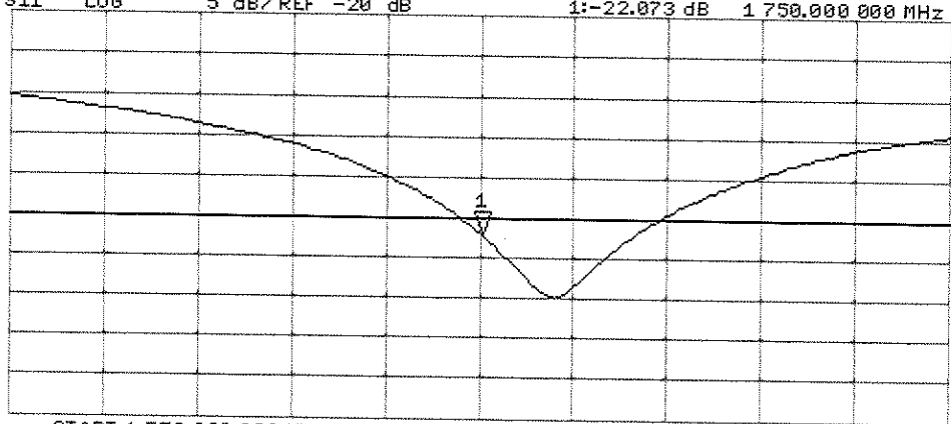
CH2 S11 LOG 5 dB/REF -20 dB 1:-22.073 dB 1 750.000 000 MHz

Del

CA

Avg
 16

H1d



START 1 550.000 000 MHz

STOP 1 950.000 000 MHz



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D1900V2-5d141_Apr15**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d141**

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

Calibration date: **April 14, 2015**

PN ✓
 4/29/15

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-15 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by: **Name** Claudio Leubler **Function** Laboratory Technician

Signature

Approved by: **Name** Katja Pokovic **Function** Technical Manager

Issued: April 14, 2015

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 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 $\pm$ 0.2) °C	38.6 $\pm$ 6 %	1.37 mho/m $\pm$ 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	39.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.9 W/kg $\pm$ 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 $\pm$ 0.2) °C	52.8 $\pm$ 6 %	1.50 mho/m $\pm$ 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	9.94 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.29 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.2 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.0 \Omega + 4.6 j\Omega$
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.2 \Omega + 5.6 j\Omega$
Return Loss	- 24.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 14.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d141

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 38.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5, 5, 5); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

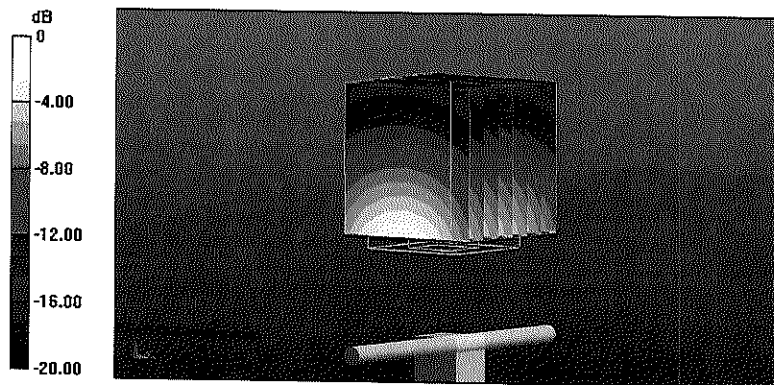
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.18 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.2 W/kg

Maximum value of SAR (measured) = 12.5 W/kg

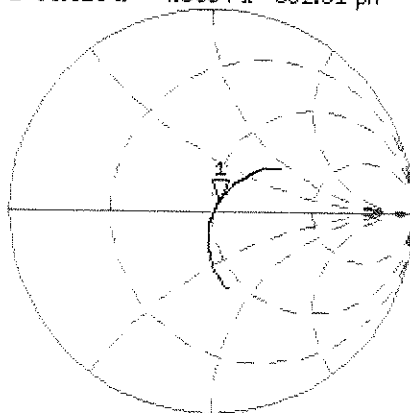


0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Head TSL

14 Apr 2015 13:39:53
 [CH1] S11 1 U FS 1: 53.010 Ω 4.5664 Ω 382.51 pF 1 900.000 000 MHz

*
 De1
 CA



Avg
 16

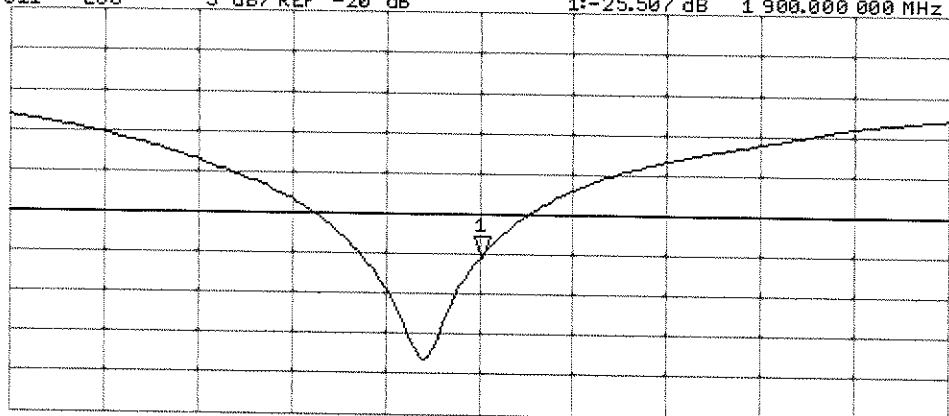
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.507 dB 1 900.000 000 MHz

CA

Avg
 16

H1d



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 14.04.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d141

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

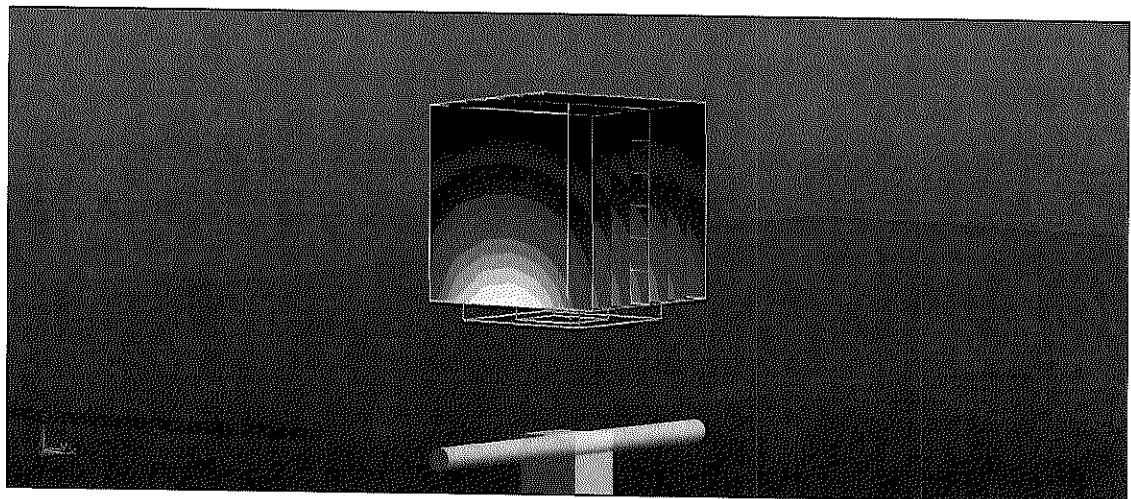
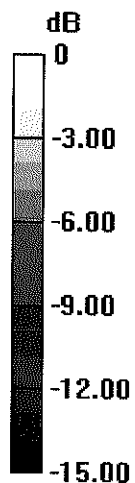
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.73 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 9.94 W/kg; SAR(10 g) = 5.29 W/kg

Maximum value of SAR (measured) = 12.5 W/kg

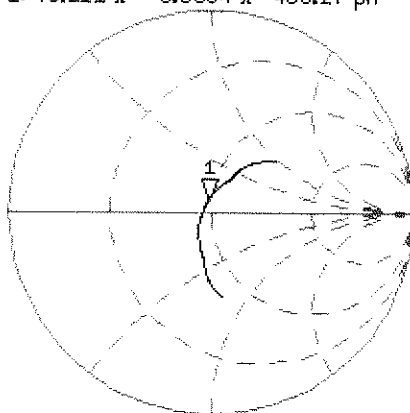


0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Body TSL

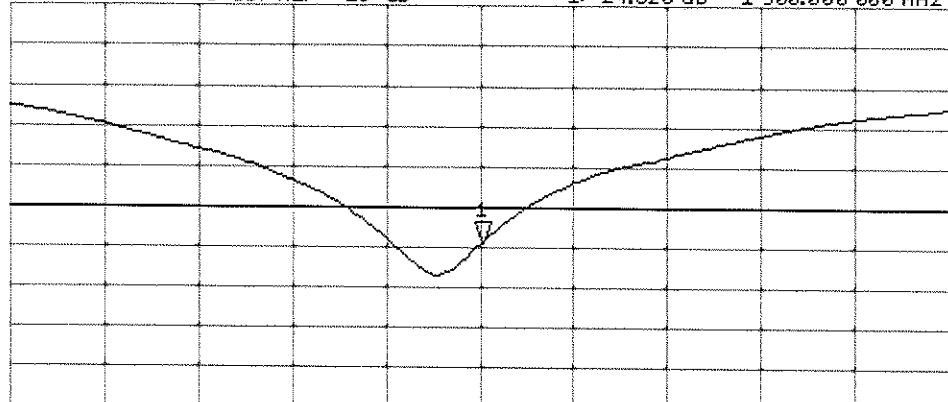
14 Apr 2015 13:39:04
 CH1 S11 1 U FS 1: 48.211 Ω 5.5664 Ω 466.27 pF 1 900.000 000 MHz

*
 Del
 CA
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-24,520 dB 1 900.000 000 MHz

CA
 Avg
 16
 H1d



START 1 700.000 000 MHz

STOP 2 100.000 000 MHz