PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctest.com

SAR EVALUATION REPORT

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

Date of Testing:
06/12/19 - 07/07/19
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1906100096-03-R1.ZNF

FCC ID: **ZNFX320TA**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: LM-X320TA
Additional Model(s): LMX320TA, X320TA, LM-X320MA, LMX320MA, X320MA

Equipment Class	Band & Mode	Tx Frequency	SAR		
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.30	0.36	0.38
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.35	0.37	0.37
PCE	UMTS 850	826.40 - 846.60 MHz	0.32	0.42	0.43
PCE	UMTS 1750	1712.4 - 1752.6 MHz	0.68	1.03	1.03
PCE	UMTS 1900	1852.4 - 1907.6 MHz	0.66	0.84	0.84
PCE	CDMA/EVDO BC10 (§90S)	817.90 - 823.10 MHz	0.28	0.36	0.31
PCE	CDMA/EVDO BC0 (§22H)	824.70 - 848.31 MHz	0.39	0.57	0.46
PCE	PCS CDMA/EVDO	1851.25 - 1908.75 MHz	0.72	0.78	0.89
PCE	LTE Band 71	665.5 - 695.5 MHz	0.23	0.38	0.40
PCE	LTE Band 12	699.7 - 715.3 MHz	0.33	0.41	0.48
PCE	LTE Band 13	779.5 - 784.5 MHz	0.17	0.30	0.35
PCE	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.31	0.51	0.51
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	N/A	N/A	N/A
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.70	0.85	0.85
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A	N/A
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.56	0.69	0.74
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A	N/A
PCE	LTE Band 41	2498.5 - 2687.5 MHz	0.21	0.47	1.25
DTS	2.4 GHz WLAN	2412 - 2462 MHz	1.12	0.37	0.37
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	0.54
NII	U-NII-2A	5260 - 5320 MHz	0.54	0.46	N/A
NII	U-NII-2C	5500 - 5720 MHz	0.59	0.42	N/A
NII	U-NII-3	5745 - 5825 MHz	0.59	0.30	0.47
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.28	< 0.1	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03:			1.59	1.54	1.57

Note: This revised Test Report (S/N: 1M1906100096-03-R1.ZNF) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

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

Randy Ortanez
President

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

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

TABLE OF CONTENTS

1 DEVICE UNDER TEST 3

2 LTE INFORMATION 11

3 INTRODUCTION 12

4 DOSIMETRIC ASSESSMENT 13

5 DEFINITION OF REFERENCE POINTS 14

6 TEST CONFIGURATION POSITIONS 15

7 RF EXPOSURE LIMITS 18

8 FCC MEASUREMENT PROCEDURES 19

9 RF CONDUCTED POWERS 27

10 SYSTEM VERIFICATION 56

11 SAR DATA SUMMARY 62

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS 80

13 SAR MEASUREMENT VARIABILITY 96

14 ADDITIONAL TESTING PER FCC GUIDANCE 98

15 EQUIPMENT LIST 101

16 MEASUREMENT UNCERTAINTIES 102

17 CONCLUSION 103

18 REFERENCES 104

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

APPENDIX G: POWER REDUCTION VERIFICATION

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
CDMA/EVDO BC10 (§90S)	Voice/Data	817.90 - 823.10 MHz
CDMA/EVDO BC0 (§22H)	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz

1.2 Power Reduction for SAR

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

1.3 Nominal and Maximum Output Power Specifications

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

1.3.1 Maximum Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 850	Maximum	**33.7**	**33.7**	**30.7**	**29.0**	**28.0**	**26.5**	**26.5**	**25.5**	**24.5**
	Nominal	**33.2**	**33.2**	**30.2**	**28.5**	**27.5**	**26.0**	**26.0**	**25.0**	**24.0**
GSM/GPRS/EDGE 1900	Maximum	**30.7**	**30.7**	**27.5**	**26.5**	**25.5**	**25.5**	**25.5**	**24.5**	**23.5**
	Nominal	**30.2**	**30.2**	**27.0**	**26.0**	**25.0**	**25.0**	**25.0**	**24.0**	**23.0**

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*
UMTS Band 5 (850 MHz)	Maximum	**25.3**	**25.3**	**25.3**
	Nominal	**24.8**	**24.8**	**24.8**
UMTS Band 4 (1750 MHz)	Maximum	**24.8**	**24.8**	**24.8**
	Nominal	**24.3**	**24.3**	**24.3**
UMTS Band 2 (1900 MHz)	Maximum	**24.8**	**24.8**	**24.8**
	Nominal	**24.3**	**24.3**	**24.3**

Mode / Band		Modulated Average (dBm)
CDMA/EVDO BC10 (§90S)	Maximum	**25.3**
	Nominal	**24.8**
CDMA/EVDO BC0 (§22H)	Maximum	**25.3**
	Nominal	**24.8**
PCS CDMA/EVDO	Maximum	**24.8**
	Nominal	**24.3**

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Mode / Band		Modulated Average (dBm)
LTE Band 71	Maximum	**25.3**
	Nominal	**24.8**
LTE Band 12	Maximum	**25.3**
	Nominal	**24.8**
LTE Band 13	Maximum	**25.3**
	Nominal	**24.8**
LTE Band 26 (Cell)	Maximum	**25.3**
	Nominal	**24.8**
LTE Band 5 (Cell)	Maximum	**25.3**
	Nominal	**24.8**
LTE Band 66 (AWS)	Maximum	**24.8**
	Nominal	**24.3**
LTE Band 4 (AWS)	Maximum	**24.8**
	Nominal	**24.3**
LTE Band 25 (PCS)	Maximum	**24.8**
	Nominal	**24.3**
LTE Band 2 (PCS)	Maximum	**24.8**
	Nominal	**24.3**
LTE Band 41 (PC3)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 41 (PC2)	Maximum	**26.5**
	Nominal	**26.0**

© 2019 PCTEST Engineering Laboratory, Inc.

REV 21.3 M
02/15/2019

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Mode / Band		Modulated Average (dBm)		
		Ch 1	Ch 2-10	Ch 11
IEEE 802.11b (2.4 GHz)	Maximum	**20.0**		
	Nominal	**19.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**16.5**	**18.5**	**15.5**
	Nominal	**15.5**	**17.5**	**14.5**
IEEE 802.11n (2.4 GHz)	Maximum	**16.0**	**18.0**	**15.0**
	Nominal	**15.0**	**17.0**	**14.0**

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	**10.5**
	Nominal	**9.5**
Bluetooth LE	Maximum	**1.5**
	Nominal	**0.5**

Mode / Band		Modulated Average (dBm)			
		20 MHz Bandwidth		40 MHz Bandwidth	
		Ch 36, 64, 100	Ch 40, 44, 48-56, 60, 104, 108-165	Ch 38, 62, 102	Ch 46, 54, 110-159
IEEE 802.11a (5 GHz)	Maximum	**15.5**	**17.5**		
	Nominal	**14.5**	**16.5**		
IEEE 802.11n (5 GHz)	Maximum	**15.0**	**17.0**	**11.5**	**14.0**
	Nominal	**14.0**	**16.0**	**10.5**	**13.0**

1.3.2 Reduced Power

Mode / Band		Modulated Average (dBm)		
		Ch 1	Ch 2-10	Ch 11
IEEE 802.11b (2.4 GHz)	Maximum	**17.0**		
	Nominal	**16.0**		
IEEE 802.11g (2.4 GHz)	Maximum	**15.0**	**17.0**	**14.0**
	Nominal	**14.0**	**16.0**	**13.0**
IEEE 802.11n (2.4 GHz)	Maximum	**13.5**	**15.5**	**12.5**
	Nominal	**12.5**	**14.5**	**11.5**

Mode / Band		Modulated Average (dBm)			
		20 MHz Bandwidth		40 MHz Bandwidth	
		Ch 36, 64, 100	Ch 40, 44, 48-56, 60, 104, 108-165	Ch 38, 62, 102	Ch 46, 54, 110-159
IEEE 802.11a (5 GHz)	Maximum	**11.5**	**13.5**		
	Nominal	**10.5**	**12.5**		
IEEE 802.11n (5 GHz)	Maximum	**9.5**	**11.5**	**11.0**	**13.0**
	Nominal	**8.5**	**10.5**	**10.0**	**12.0**

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	No	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
UMTS 1750	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Yes	Yes	No	Yes	No	Yes
EVDO BC10 (§90S)	Yes	Yes	No	Yes	Yes	Yes
EVDO BC0 (§22H)	Yes	Yes	No	Yes	Yes	Yes
PCS EVDO	Yes	Yes	No	Yes	No	Yes
LTE Band 71	Yes	Yes	No	Yes	Yes	Yes
LTE Band 12	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 26 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 66 (AWS)	Yes	Yes	No	Yes	No	Yes
LTE Band 25 (PCS)	Yes	Yes	No	Yes	No	Yes
LTE Band 41	Yes	Yes	No	Yes	Yes	Yes
2.4 GHz WLAN	Yes	Yes	Yes	No	Yes	No
5 GHz WLAN	Yes	Yes	Yes	No	Yes	No
Bluetooth	Yes	Yes	Yes	No	Yes	No

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

1.5 Simultaneous Transmission Capabilities

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Notes
1	1x CDMA voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
2	1x CDMA voice + 5 GHz WI-FI	Yes	Yes	N/A	
3	1x CDMA voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	^ Bluetooth Tethering is considered
4	1x CMDA voice + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	N/A	^ Bluetooth Tethering is considered
5	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	
6	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	
7	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	^ Bluetooth Tethering is considered
8	GSM voice + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	N/A	^ Bluetooth Tethering is considered
9	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	
10	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	
11	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	^ Bluetooth Tethering is considered
12	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	^ Bluetooth Tethering is considered
13	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	
14	LTE + 5 GHz WI-FI	Yes	Yes	Yes	
15	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	^ Bluetooth Tethering is considered
16	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes^	Yes	Yes^	^ Bluetooth Tethering is considered
17	CDMA/EVDO data + 2.4 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
18	CDMA/EVDO data + 5 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
19	CDMA/EVDO data + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
20	CDMA/EVDO data + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes*^	Yes*	Yes^	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
21	GPRS/EDGE + 2.4 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
22	GPRS/EDGE + 5 GHz WI-FI	Yes*	Yes*	Yes	* Pre-installed VOIP applications are considered
23	GPRS/EDGE + 2.4 GHz Bluetooth	Yes*^	Yes*	Yes^	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered
24	GPRS/EDGE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes*^	Yes*	Yes^	* Pre-installed VOIP applications are considered ^ Bluetooth Tethering is considered

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

1.6 Miscellaneous SAR Test Considerations

(A) WIFI/BT

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

(B) Licensed Transmitter(s)

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

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

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

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

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

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

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

1.7 Guidance Applied

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

1.8 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 11.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

2 LTE INFORMATION

LTE Information					
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 71 (665.5 - 695.5 MHz)				
	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 71: 5 MHz	665.5 (133147)		680.5 (133297)	695.5 (133447)	
LTE Band 71: 10 MHz	668 (133172)		680.5 (133297)	693 (133422)	
LTE Band 71: 15 MHz	670.5 (133197)		680.5 (133297)	690.5 (133397)	
LTE Band 71: 20 MHz	673 (133222)		680.5 (133297)	688 (133372)	
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)	784.5 (23255)	
LTE Band 13: 10 MHz	N/A		782 (23230)	N/A	
LTE Band 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)	848.3 (27033)	
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)	847.5 (27025)	
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)	846.5 (27015)	
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)	844 (26990)	
LTE Band 26 (Cell): 15 MHz	821.5 (26765)		831.5 (26865)	841.5 (26965)	
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)	846.5 (20625)	
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)	844 (20600)	
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)	1779.3 (132665)	
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)	1778.5 (132657)	
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)	1777.5 (132647)	
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)	1775 (132622)	
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)	1772.5 (132597)	
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)	1770 (132572)	
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)	1754.3 (20393)	
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)	1753.5 (20385)	
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)	1752.5 (20375)	
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)	1750 (20350)	
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)	1747.5 (20325)	
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)	1745 (20300)	
LTE Band 25 (PCS): 1.4 MHz	1850.7 (26047)		1882.5 (26365)	1914.3 (26683)	
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)	1913.5 (26675)	
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)	1912.5 (26665)	
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)	1910 (26640)	
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)		1882.5 (26365)	1907.5 (26615)	
LTE Band 25 (PCS): 20 MHz	1860 (26140)		1882.5 (26365)	1905 (26590)	
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)	1909.3 (19193)	
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)	1908.5 (19185)	
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)	1907.5 (19175)	
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)	1905 (19150)	
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)	1902.5 (19125)	
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)	1900 (19100)	
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	DL UE Cat 4, UL UE Cat 5				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 10. All uplink communications are identical to the Release 8 Specifications.The following LTE Release 10 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

© 2019 PCTEST Engineering Laboratory, Inc.

REV 21.3 M
02/15/2019

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

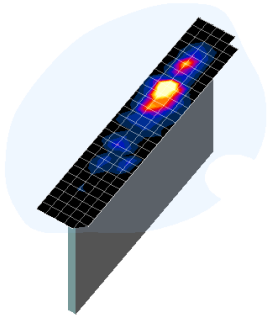


Figure 4-1
Sample SAR Area Scan

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

   a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

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

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

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

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

*Also compliant to IEEE 1528-2013 Table 6

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

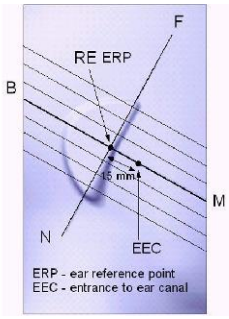


Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

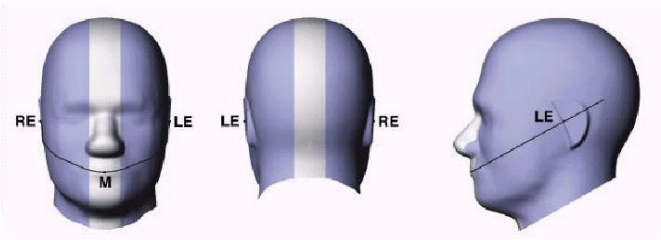


Figure 5-2
Front, back and side view of SAM Twin Phantom

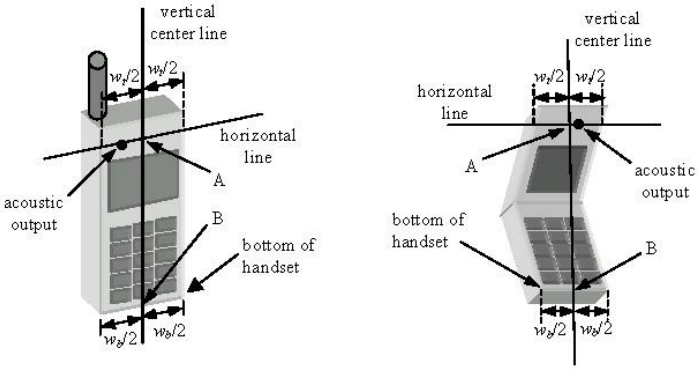


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

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

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

6.3 Positioning for Ear / 15º Tilt

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

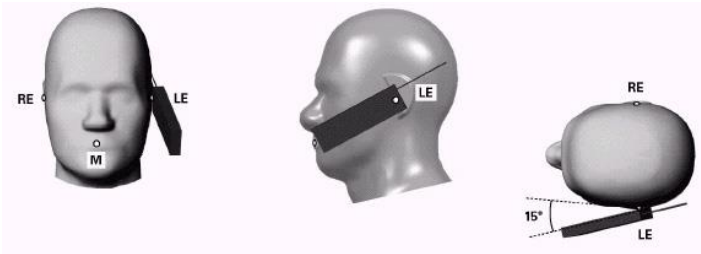


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

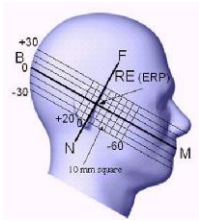


Figure 6-3
Side view w/ relevant markings

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

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

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

6.5 Body-Worn Accessory Configurations

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

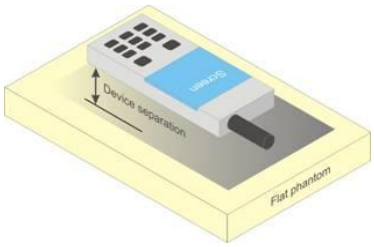


Figure 6-4
Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

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

6.6 Extremity Exposure Configurations

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

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

6.7 Wireless Router Configurations

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 3G SAR Test Reduction Procedure

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

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for CDMA2000

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

8.4.1 Output Power Verification

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

Table 8-1
Parameters for Max. Power for RC1

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

Table 8-2
Parameters for Max. Power for RC3

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

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

8.4.2 Head SAR Measurements

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

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

8.4.3 Body-worn SAR Measurements

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

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

8.4.4 Body-worn SAR Measurements for EVDO Devices

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

8.4.5 Body SAR Measurements for EVDO Hotspot

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

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

8.4.6 CDMA2000 1x Advanced

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

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

8.5 SAR Measurement Conditions for UMTS

8.5.1 Output Power Verification

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

8.5.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

8.5.3 Body SAR Measurements

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

8.5.4 SAR Measurements with Rel 5 HSDPA

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

8.5.5 SAR Measurements with Rel 6 HSUPA

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

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

8.5.6 SAR Measurement Conditions for DC-HSDPA

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

8.6 SAR Measurement Conditions for LTE

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

8.6.1 Spectrum Plots for RB Configurations

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

8.6.2 MPR

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

8.6.3 A-MPR

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

8.6.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

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

8.6.5 TDD

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

8.6.6 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for downlink only carrier aggregation configurations when the average output

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

8.7 SAR Testing with 802.11 Transmitters

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

8.7.1 General Device Setup

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

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

8.7.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. Each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

8.7.4 Initial Test Position Procedure

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.5 2.4 GHz SAR Test Requirements

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

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

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

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

8.7.6 OFDM Transmission Mode and SAR Test Channel Selection

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

8.7.7 Initial Test Configuration Procedure

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

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 8.7.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

8.7.8 Subsequent Test Configuration Procedures

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9 RF CONDUCTED POWERS

9.1 CDMA Conducted Powers

Table 9-1
Maximum Conducted Power

Band	Channel	Rule Part	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
	F-RC		MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	564	90S	820.1	24.61	24.62	24.62	24.58	24.60	24.63	24.64
Cellular	1013	22H	824.7	24.51	24.57	24.69	24.52	24.51	24.75	24.70
	384	22H	836.52	24.63	24.65	24.38	24.63	24.63	24.61	24.63
	777	22H	848.31	24.73	24.77	24.48	24.67	24.65	24.72	24.73
PCS	25	24E	1851.25	24.24	24.33	24.40	24.51	24.41	24.30	24.33
	600	24E	1880	24.18	24.20	24.34	24.47	24.38	24.28	24.24
	1175	24E	1908.75	24.27	24.24	24.35	24.37	24.40	24.32	24.29

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

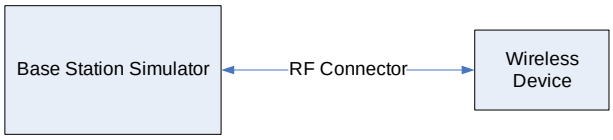


Figure 9-1
Power Measurement Setup

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.2 GSM Conducted Powers

Table 9-2
Maximum Conducted Power

Maximum Burst-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	33.35	33.38	30.61	28.86	**27.04**	26.24	25.60	24.24	22.81
	190	33.23	33.21	30.40	28.71	**27.41**	26.23	25.78	24.51	22.94
	251	33.31	33.32	30.50	28.79	**27.54**	26.14	25.91	24.61	23.14
GSM 1900	512	29.95	29.95	26.84	25.70	**25.27**	25.40	25.23	24.03	23.22
	661	30.00	29.83	26.99	25.76	**25.30**	25.48	25.35	24.13	23.47
	810	30.24	30.30	26.75	26.45	**25.32**	25.50	25.49	24.34	23.49

Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	24.32	24.35	24.59	24.60	**24.03**	17.21	19.58	19.98	19.80
	190	24.20	24.18	24.38	24.45	**24.40**	17.20	19.76	20.25	19.93
	251	24.28	24.29	24.48	24.53	**24.53**	17.11	19.89	20.35	20.13
GSM 1900	512	20.92	20.92	20.82	21.44	**22.26**	16.37	19.21	19.77	20.21
	661	20.97	20.80	20.97	21.50	**22.29**	16.45	19.33	19.87	20.46
	810	21.21	21.27	20.73	22.19	**22.31**	16.47	19.47	20.08	20.48
GSM 850	**Frame Avg.Targets:**	24.17	24.17	24.18	24.24	**24.49**	16.97	19.98	20.74	20.99
GSM 1900		21.17	21.17	20.98	21.74	**21.99**	15.97	18.98	19.74	19.99

Note:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.

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

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

Figure 9-2
Power Measurement Setup

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.3 UMTS Conducted Powers

Table 9-3
Maximum Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	25.03	25.05	25.06	24.33	24.38	24.35	24.45	24.59	24.47	-
99		12.2 kbps AMR	24.97	25.00	25.07	24.35	24.29	24.36	24.48	24.42	24.39	-
6	HSDPA	Subtest 1	24.24	24.13	24.19	24.42	24.44	24.39	24.53	24.30	24.23	0
6		Subtest 2	24.32	24.11	24.25	24.45	24.44	24.51	24.53	24.30	24.24	0
6		Subtest 3	23.80	23.68	23.86	24.18	24.20	24.24	24.20	24.18	24.15	0.5
6		Subtest 4	23.81	23.69	23.82	24.30	24.20	24.26	24.18	24.15	24.12	0.5
6	HSUPA	Subtest 1	23.80	23.80	23.88	23.30	23.43	23.87	23.78	23.38	23.32	0
6		Subtest 2	22.51	22.33	22.76	22.28	22.71	22.42	22.18	22.43	22.30	2
6		Subtest 3	22.94	22.81	22.88	22.84	22.91	23.00	23.12	22.71	22.58	1
6		Subtest 4	22.82	22.45	22.86	22.78	22.80	22.70	22.75	22.55	22.62	2
6		Subtest 5	24.29	24.26	24.35	24.32	24.25	24.36	24.35	24.20	24.30	0

This device does not support DC-HSDPA.

Figure 9-3
Power Measurement Setup

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4 LTE Conducted Powers

9.4.1 LTE Band 71

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

LTE Band 71 20 MHz Bandwidth					
Modulation	**RB Size**	**RB Offset**	**Mid Channel 133297 (680.5 MHz) Conducted Power [dBm]**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
QPSK	1	0	**25.30**	0	0
	1	50	25.24		0
	1	99	24.82		0
	50	0	**23.40**	0-1	1
	50	25	23.37		1
	50	50	23.32		1
	100	0	23.32		1
16QAM	1	0	23.33	0-1	1
	1	50	23.56		1
	1	99	23.34		1
	50	0	22.49	0-2	2
	50	25	22.57		2
	50	50	22.45		2
	100	0	22.58		2
64QAM	1	0	22.64	0-2	2
	1	50	22.71		2
	1	99	22.68		2
	50	0	21.87	0-3	3
	50	25	21.85		3
	50	50	21.98		3
	100	0	21.92		3

Note: LTE Band 71 at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-5
LTE Band 71 Conducted Powers - 15 MHz Bandwidth

LTE Band 71 15 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 133297 (680.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	24.72	0	0
	1	36	24.73		0
	1	74	24.41		0
	36	0	23.10	0-1	1
	36	18	23.12		1
	36	37	23.13		1
	75	0	23.08		1
16QAM	1	0	23.14	0-1	1
	1	36	23.10		1
	1	74	23.05		1
	36	0	22.18	0-2	2
	36	18	22.20		2
	36	37	22.24		2
	75	0	22.13		2
64QAM	1	0	22.14	0-2	2
	1	36	22.85		2
	1	74	22.42		2
	36	0	21.11	0-3	3
	36	18	21.20		3
	36	37	21.19		3
	75	0	21.16		3

Note: LTE Band 71 at 15 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-6
LTE Band 71 Conducted Powers - 10 MHz Bandwidth

LTE Band 71 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 133172 (668.0 MHz)	Mid Channel 133297 (680.5 MHz)	High Channel 133422 (693.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	25.00	25.12	24.72	0	0
	1	25	25.17	25.08	25.22		0
	1	49	25.12	24.93	24.95		0
	25	0	23.38	23.26	23.47	0-1	1
	25	12	23.47	23.25	23.55		1
	25	25	23.46	23.24	23.40		1
	50	0	23.42	23.24	23.46		1
16QAM	1	0	23.44	23.48	23.40	0-1	1
	1	25	23.36	23.55	23.32		1
	1	49	23.30	23.64	23.22		1
	25	0	22.28	22.52	22.58	0-2	2
	25	12	22.39	22.49	22.63		2
	25	25	22.36	22.40	22.49		2
	50	0	22.31	22.29	22.52		2
64QAM	1	0	22.53	22.84	22.40	0-2	2
	1	25	22.48	22.89	22.42		2
	1	49	22.32	23.17	22.25		2
	25	0	21.26	21.41	21.53	0-3	3
	25	12	21.22	21.33	21.56		3
	25	25	21.34	21.22	21.48		3
	50	0	21.35	21.33	21.38		3

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

LTE Band 71 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 133147 (665.5 MHz)	Mid Channel 133297 (680.5 MHz)	High Channel 133447 (695.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	25.03	24.72	24.90	0	0
	1	12	25.10	25.11	25.03		0
	1	24	24.74	24.69	24.89		0
	12	0	23.17	23.26	23.17	0-1	1
	12	6	23.30	23.31	23.16		1
	12	13	23.22	23.30	23.03		1
	25	0	23.15	23.14	23.14		1
16QAM	1	0	23.28	23.26	23.20	0-1	1
	1	12	23.78	23.14	23.47		1
	1	24	23.23	23.18	23.20		1
	12	0	22.32	22.30	22.21	0-2	2
	12	6	22.46	22.23	22.21		2
	12	13	22.36	22.22	22.11		2
	25	0	22.30	22.25	22.21		2
64QAM	1	0	22.11	22.83	22.29	0-2	2
	1	12	22.27	22.87	22.55		2
	1	24	22.24	22.74	22.14		2
	12	0	21.20	21.20	21.09	0-3	3
	12	6	21.26	21.29	21.13		3
	12	13	21.29	21.14	21.09		3
	25	0	21.29	21.19	21.23		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.2 LTE Band 12

Table 9-8
LTE Band 12 Conducted Powers - 10 MHz Bandwidth

LTE Band 12 10 MHz Bandwidth					
Modulation	**RB Size**	**RB Offset**	**Mid Channel** **23095** **(707.5 MHz)** **Conducted Power [dBm]**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
QPSK	1	0	25.10	0	0
	1	25	25.01		0
	1	49	**25.15**		0
	25	0	**23.46**	0-1	1
	25	12	23.38		1
	25	25	23.32		1
	50	0	23.31		1
16QAM	1	0	24.00	0-1	1
	1	25	23.95		1
	1	49	24.13		1
	25	0	22.48	0-2	2
	25	12	22.47		2
	25	25	22.41		2
	50	0	22.48		2
64QAM	1	0	22.74	0-2	2
	1	25	22.81		2
	1	49	22.61		2
	25	0	21.99	0-3	3
	25	12	21.95		3
	25	25	21.98		3
	50	0	21.97		3

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

LTE Band 12 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23035 (701.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23155 (713.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.73	24.99	24.80	0	0
	1	12	25.05	25.11	25.06		0
	1	24	25.02	24.73	24.83		0
	12	0	23.24	23.29	23.41	0-1	1
	12	6	23.15	23.37	23.48		1
	12	13	23.28	23.24	23.18		1
	25	0	23.21	23.23	23.17		1
16QAM	1	0	23.30	23.25	23.26	0-1	1
	1	12	23.30	23.41	23.35		1
	1	24	23.22	23.32	23.28		1
	12	0	22.32	22.25	22.18	0-2	2
	12	6	22.11	22.26	22.33		2
	12	13	22.14	22.22	22.20		2
	25	0	22.14	22.37	22.50		2
64QAM	1	0	22.24	22.88	22.22	0-2	2
	1	12	22.51	23.15	22.32		2
	1	24	22.44	22.63	22.17		2
	12	0	21.32	21.16	21.15	0-3	3
	12	6	21.32	21.33	21.36		3
	12	13	21.29	21.39	21.20		3
	25	0	21.20	21.26	21.24		3

Table 9-10
LTE Band 12 Conducted Powers - 3 MHz Bandwidth

LTE Band 12 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23025 (700.5 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23165 (714.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.75	24.84	24.92	0	0
	1	7	25.04	25.19	25.08		0
	1	14	25.07	25.07	25.04		0
	8	0	23.30	23.20	23.22	0-1	1
	8	4	23.27	23.35	23.25		1
	8	7	23.26	23.34	23.24		1
	15	0	23.18	23.31	23.26		1
16QAM	1	0	23.33	23.59	23.37	0-1	1
	1	7	23.39	24.09	23.30		1
	1	14	23.35	23.84	23.38		1
	8	0	22.35	22.26	22.21	0-2	2
	8	4	22.22	22.30	22.20		2
	8	7	22.22	22.25	22.24		2
	15	0	22.33	22.44	22.41		2
64QAM	1	0	22.33	22.85	22.20	0-2	2
	1	7	22.29	23.14	22.29		2
	1	14	22.36	22.71	22.28		2
	8	0	21.39	21.37	21.34	0-3	3
	8	4	21.35	21.39	21.24		3
	8	7	21.34	21.37	21.25		3
	15	0	21.45	21.42	21.36		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-11
LTE Band 12 Conducted Powers -1.4 MHz Bandwidth

LTE Band 12 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 23017 (699.7 MHz)	Mid Channel 23095 (707.5 MHz)	High Channel 23173 (715.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.94	24.65	25.04	0	0
	1	2	25.09	24.72	24.99		0
	1	5	24.98	24.71	25.08		0
	3	0	24.98	24.88	24.90		0
	3	2	24.89	24.91	24.95		0
	3	3	24.71	24.97	24.86		0
	6	0	23.17	23.46	23.30	0-1	1
16QAM	1	0	23.30	23.60	23.40	0-1	1
	1	2	23.17	23.62	23.35		1
	1	5	23.15	23.50	23.29		1
	3	0	23.62	23.20	23.34		1
	3	2	23.56	23.48	23.39		1
	3	3	23.27	23.62	23.32		1
	6	0	22.26	22.27	22.29	0-2	2
64QAM	1	0	22.23	22.48	22.29	0-2	2
	1	2	22.15	22.56	22.20		2
	1	5	22.30	22.55	22.55		2
	3	0	22.30	22.46	22.36		2
	3	2	22.27	22.40	22.43		2
	3	3	22.26	22.40	22.35		2
	6	0	21.32	21.07	21.28	0-3	3

© 2019 PCTEST Engineering Laboratory, Inc.

REV 21.3 M
02/15/2019

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.3 LTE Band 13

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

LTE Band 13 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	25.00	0	0
	1	25	**25.26**		0
	1	49	25.05		0
	25	0	**23.62**	0-1	1
	25	12	23.46		1
	25	25	23.46		1
	50	0	23.56		1
16QAM	1	0	23.63	0-1	1
	1	25	23.48		1
	1	49	23.59		1
	25	0	22.68	0-2	2
	25	12	22.66		2
	25	25	22.63		2
	50	0	22.46		2
64QAM	1	0	22.68	0-2	2
	1	25	22.62		2
	1	49	22.60		2
	25	0	21.77	0-3	3
	25	12	21.88		3
	25	25	21.72		3
	50	0	21.86		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

LTE Band 13 5 MHz Bandwidth					
Modulation	**RB Size**	**RB Offset**	**Mid Channel** **23230** **(782.0 MHz)** **Conducted Power [dBm]**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
QPSK	1	0	25.10	0	0
	1	12	25.05		0
	1	24	24.95		0
	12	0	23.40	0-1	1
	12	6	23.26		1
	12	13	23.15		1
	25	0	23.17		1
16QAM	1	0	23.12	0-1	1
	1	12	23.15		1
	1	24	23.15		1
	12	0	22.19	0-2	2
	12	6	22.35		2
	12	13	22.35		2
	25	0	22.30		2
64QAM	1	0	22.40	0-2	2
	1	12	22.24		2
	1	24	22.21		2
	12	0	21.15	0-3	3
	12	6	21.20		3
	12	13	21.11		3
	25	0	21.33		3

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.4 LTE Band 26 (Cell)

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

LTE Band 26 (Cell) 15 MHz Bandwidth					
Modulation	**RB Size**	**RB Offset**	**Mid Channel 26865 (831.5 MHz) Conducted Power [dBm]**	**MPR Allowed per 3GPP [dB]**	**MPR [dB]**
QPSK	1	0	25.12	0	0
	1	36	**25.17**		0
	1	74	25.10		0
	36	0	23.41	0-1	1
	36	18	23.24		1
	36	37	**23.43**		1
	75	0	23.41		1
16QAM	1	0	23.58	0-1	1
	1	36	23.64		1
	1	74	23.51		1
	36	0	22.41	0-2	2
	36	18	22.33		2
	36	37	22.32		2
	75	0	22.46		2
64QAM	1	0	23.04	0-2	2
	1	36	22.94		2
	1	74	22.87		2
	36	0	21.86	0-3	3
	36	18	21.76		3
	36	37	21.77		3
	75	0	21.76		3

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

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

LTE Band 26 (Cell) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26740 (819.0 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 26990 (844.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.61	24.44	24.95	0	0
	1	25	25.02	24.83	25.06		0
	1	49	24.56	24.91	24.61		0
	25	0	23.23	23.13	23.27	0-1	1
	25	12	23.29	23.26	23.25		1
	25	25	23.17	23.15	23.24		1
	50	0	23.16	23.28	23.16		1
16QAM	1	0	23.33	23.24	23.26	0-1	1
	1	25	23.48	23.55	23.44		1
	1	49	23.30	23.08	23.06		1
	25	0	22.36	22.16	22.36	0-2	2
	25	12	22.43	22.16	22.28		2
	25	25	22.31	22.16	22.27		2
	50	0	22.28	22.25	22.20		2
64QAM	1	0	22.35	21.93	22.45	0-2	2
	1	25	22.58	22.00	22.39		2
	1	49	22.35	22.02	22.44		2
	25	0	21.39	21.09	21.30	0-3	3
	25	12	21.40	21.17	21.29		3
	25	25	21.27	21.11	21.22		3
	50	0	21.21	21.07	21.28		3

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

LTE Band 26 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26715 (816.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27015 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.57	24.48	24.70	0	0
	1	12	25.06	25.01	25.02		0
	1	24	24.94	24.92	24.79		0
	12	0	23.40	23.37	23.31	0-1	1
	12	6	23.41	23.34	23.32		1
	12	13	23.32	23.24	23.14		1
	25	0	23.33	23.28	23.29		1
16QAM	1	0	23.20	23.18	23.15	0-1	1
	1	12	23.50	23.11	23.15		1
	1	24	23.25	23.20	23.15		1
	12	0	22.31	22.26	22.30	0-2	2
	12	6	22.41	22.29	22.31		2
	12	13	22.43	22.43	22.14		2
	25	0	22.27	22.39	22.23		2
64QAM	1	0	22.68	22.30	22.25	0-2	2
	1	12	23.05	22.34	22.29		2
	1	24	22.97	22.20	22.15		2
	12	0	21.44	21.20	21.39	0-3	3
	12	6	21.46	21.25	21.47		3
	12	13	21.38	21.25	21.25		3
	25	0	21.25	21.25	21.45		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

LTE Band 26 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26705 (815.5 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27025 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.79	24.78	24.79	0	0
	1	7	24.78	24.88	24.91		0
	1	14	24.74	24.74	24.65		0
	8	0	23.25	23.27	23.40	0-1	1
	8	4	23.37	23.40	23.35		1
	8	7	23.33	23.43	23.20		1
	15	0	23.33	23.30	23.27		1
16QAM	1	0	23.23	23.37	23.24	0-1	1
	1	7	23.10	23.51	23.32		1
	1	14	23.11	23.37	23.11		1
	8	0	22.26	22.23	22.38	0-2	2
	8	4	22.38	22.19	22.03		2
	8	7	22.35	22.34	22.15		2
	15	0	22.22	22.30	22.29		2
64QAM	1	0	22.45	22.33	22.38	0-2	2
	1	7	22.42	22.38	22.54		2
	1	14	22.50	22.21	22.27		2
	8	0	21.24	21.01	21.27	0-3	3
	8	4	21.30	21.10	21.08		3
	8	7	21.36	21.02	21.13		3
	15	0	21.21	21.14	21.44		3

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

LTE Band 26 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26697 (814.7 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 27033 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.79	24.66	24.84	0	0
	1	2	24.85	24.70	24.82		0
	1	5	24.91	24.87	24.80		0
	3	0	24.75	24.89	24.96		0
	3	2	24.78	24.87	24.85		0
	3	3	24.83	24.84	24.79		0
	6	0	23.27	23.29	23.37	0-1	1
16QAM	1	0	23.11	23.35	23.57	0-1	1
	1	2	23.18	23.39	23.45		1
	1	5	23.32	23.29	23.37		1
	3	0	22.96	23.31	23.25		1
	3	2	23.10	23.23	23.20		1
	3	3	23.07	23.26	23.32		1
	6	0	22.26	22.05	22.06	0-2	2
64QAM	1	0	22.48	21.98	22.72	0-2	2
	1	2	22.56	22.08	22.73		2
	1	5	22.43	22.01	22.64		2
	3	0	22.19	22.39	22.15		2
	3	2	22.44	22.68	22.28		2
	3	3	22.40	22.51	22.16		2
	6	0	21.25	21.20	21.06	0-3	3

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.5 LTE Band 66 (AWS)

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

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.59	24.62	24.53	0	0
	1	50	24.63	24.61	24.51		0
	1	99	24.58	24.63	**24.64**		0
	50	0	22.82	22.72	22.78	0-1	1
	50	25	**22.86**	22.85	22.72		1
	50	50	22.74	22.84	22.74		1
	100	0	22.73	22.70	22.72		1
16QAM	1	0	22.69	22.85	22.81	0-1	1
	1	50	22.76	22.95	22.77		1
	1	99	22.90	22.71	22.80		1
	50	0	21.65	21.96	21.90	0-2	2
	50	25	21.77	21.88	21.91		2
	50	50	21.75	21.78	21.76		2
	100	0	21.82	21.96	21.70		2
64QAM	1	0	21.72	21.75	21.82	0-2	2
	1	50	22.02	21.92	21.91		2
	1	99	22.05	21.98	21.76		2
	50	0	20.86	20.96	20.92	0-3	3
	50	25	20.98	20.96	20.99		3
	50	50	20.73	20.72	20.71		3
	100	0	20.84	20.93	20.78		3

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

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132047 (1717.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132597 (1772.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.70	24.64	24.41	0	0
	1	36	24.63	24.66	24.52		0
	1	74	24.68	24.68	24.49		0
	36	0	22.75	22.80	22.63	0-1	1
	36	18	22.84	22.87	22.57		1
	36	37	22.81	22.84	22.59		1
	75	0	22.76	22.88	22.54		1
16QAM	1	0	22.75	22.69	22.56	0-1	1
	1	36	23.17	22.73	22.63		1
	1	74	22.79	22.70	22.53		1
	36	0	21.71	22.02	21.56	0-2	2
	36	18	22.01	22.05	21.74		2
	36	37	21.86	21.75	21.61		2
	75	0	21.83	21.88	21.58		2
64QAM	1	0	21.73	21.80	21.65	0-2	2
	1	36	21.70	21.90	21.68		2
	1	74	21.71	21.70	21.75		2
	36	0	20.83	21.10	20.82	0-3	3
	36	18	21.04	21.04	20.72		3
	36	37	20.97	21.03	20.60		3
	75	0	20.77	20.84	20.73		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132022 (1715.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132622 (1775.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.53	24.54	24.30	0	0
	1	25	24.57	24.63	24.35		0
	1	49	24.56	24.51	24.17		0
	25	0	22.79	22.90	22.69	0-1	1
	25	12	22.80	22.88	22.68		1
	25	25	22.76	22.78	22.63		1
	50	0	22.78	22.93	22.62		1
16QAM	1	0	22.60	22.78	22.36	0-1	1
	1	25	22.73	22.91	22.57		1
	1	49	22.58	22.75	22.42		1
	25	0	21.94	22.02	21.73	0-2	2
	25	12	21.97	22.10	21.73		2
	25	25	21.88	22.01	21.56		2
	50	0	21.88	21.93	21.65		2
64QAM	1	0	21.69	21.83	21.63	0-2	2
	1	25	21.73	22.13	21.77		2
	1	49	21.60	21.81	21.71		2
	25	0	20.88	20.94	20.86	0-3	3
	25	12	20.77	20.98	20.58		3
	25	25	20.87	21.01	20.58		3
	50	0	20.95	20.96	20.63		3

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

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131997 (1712.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132647 (1777.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.25	24.36	24.21	0	0
	1	12	24.50	24.62	24.40		0
	1	24	24.50	24.50	24.33		0
	12	0	22.75	22.88	22.66	0-1	1
	12	6	22.80	22.81	22.74		1
	12	13	22.74	22.75	22.64		1
	25	0	22.81	22.86	22.60		1
16QAM	1	0	22.70	22.64	22.48	0-1	1
	1	12	23.03	23.14	22.94		1
	1	24	22.66	22.68	22.44		1
	12	0	21.83	21.77	21.60	0-2	2
	12	6	21.69	21.83	21.64		2
	12	13	21.66	21.77	21.58		2
	25	0	21.73	21.93	21.63		2
64QAM	1	0	21.73	21.72	21.44	0-2	2
	1	12	21.90	21.99	21.64		2
	1	24	21.83	21.91	21.44		2
	12	0	20.73	20.90	20.66	0-3	3
	12	6	20.70	20.90	20.76		3
	12	13	20.63	20.88	20.67		3
	25	0	20.89	20.99	20.64		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131987 (1711.5 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132657 (1778.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.55	24.55	24.23	0	0
	1	7	24.46	24.60	24.41		0
	1	14	24.50	24.48	24.35		0
	8	0	22.81	22.93	22.69	0-1	1
	8	4	22.79	22.96	22.72		1
	8	7	22.77	22.86	22.71		1
	15	0	22.77	22.93	22.70		1
16QAM	1	0	22.78	22.74	22.79	0-1	1
	1	7	22.89	23.21	22.47		1
	1	14	22.78	22.72	22.52		1
	8	0	21.87	21.87	21.66	0-2	2
	8	4	21.85	22.19	21.74		2
	8	7	22.06	22.23	21.64		2
	15	0	22.07	22.13	21.69		2
64QAM	1	0	21.68	21.85	21.52	0-2	2
	1	7	21.97	22.13	21.74		2
	1	14	21.68	21.96	21.65		2
	8	0	20.79	20.81	20.68	0-3	3
	8	4	20.87	20.90	20.73		3
	8	7	20.79	20.88	20.74		3
	15	0	21.04	20.93	20.73		3

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

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 131979 (1710.7 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132665 (1779.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.45	24.53	24.36	0	0
	1	2	24.55	24.61	24.42		0
	1	5	24.52	24.58	24.29		0
	3	0	24.40	24.53	24.27		0
	3	2	24.42	24.54	24.31		0
	3	3	24.43	24.56	24.28		0
	6	0	22.89	23.05	22.78	0-1	1
16QAM	1	0	22.86	23.06	22.92	0-1	1
	1	2	22.81	23.67	22.76		1
	1	5	23.00	23.11	22.64		1
	3	0	22.83	23.16	22.79		1
	3	2	23.04	23.18	22.84		1
	3	3	23.01	23.16	22.83		1
	6	0	21.88	22.01	21.70	0-2	2
64QAM	1	0	21.81	22.01	21.87	0-2	2
	1	2	21.82	22.06	22.06		2
	1	5	22.03	22.15	22.06		2
	3	0	21.66	21.90	21.59		2
	3	2	21.56	21.93	21.51		2
	3	3	21.66	21.87	21.56		2
	6	0	20.86	20.75	20.77	0-3	3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.6 LTE Band 25 (PCS)

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

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26140 (1860.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26590 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.32	**24.65**	24.49	0	0
	1	50	24.41	24.63	24.52		0
	1	99	24.39	24.43	24.06		0
	50	0	22.64	22.74	22.72	0-1	1
	50	25	22.75	**22.78**	22.67		1
	50	50	22.77	22.65	22.68		1
	100	0	22.68	22.75	22.74		1
16QAM	1	0	22.56	22.70	22.69	0-1	1
	1	50	22.68	22.99	22.64		1
	1	99	22.46	22.65	22.69		1
	50	0	21.85	21.92	21.65	0-2	2
	50	25	21.79	21.94	21.77		2
	50	50	21.81	21.71	21.61		2
	100	0	21.77	21.82	21.77		2
64QAM	1	0	21.96	21.82	22.01	0-2	2
	1	50	22.11	22.04	22.08		2
	1	99	21.83	22.09	22.10		2
	50	0	20.83	20.70	20.73	0-3	3
	50	25	20.68	20.77	20.86		3
	50	50	20.70	20.69	20.62		3
	100	0	20.75	20.73	20.78		3

Table 9-26
LTE Band 25 (PCS) Conducted Powers - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26115 (1857.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26615 (1907.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.42	24.31	24.37	0	0
	1	36	24.58	24.38	24.50		0
	1	74	24.49	24.22	24.15		0
	36	0	22.86	22.95	22.91	0-1	1
	36	18	22.84	22.96	22.71		1
	36	37	22.74	22.70	22.65		1
	75	0	22.76	22.89	22.81		1
16QAM	1	0	22.75	22.97	22.80	0-1	1
	1	36	23.03	23.08	22.76		1
	1	74	22.74	22.87	22.57		1
	36	0	21.91	21.80	21.92	0-2	2
	36	18	21.91	21.91	21.92		2
	36	37	21.80	21.65	21.71		2
	75	0	21.77	21.76	21.75		2
64QAM	1	0	21.74	21.54	21.90	0-2	2
	1	36	21.95	21.75	21.91		2
	1	74	21.90	21.43	21.74		2
	36	0	20.83	20.90	20.88	0-3	3
	36	18	20.89	20.82	20.80		3
	36	37	20.71	20.57	20.74		3
	75	0	20.83	20.76	20.74		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-27
LTE Band 25 (PCS) Conducted Powers - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26090 (1855.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26640 (1910.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.32	24.58	24.39	0	0
	1	25	24.49	24.53	24.26		0
	1	49	24.29	24.71	24.17		0
	25	0	22.75	22.93	22.95	0-1	1
	25	12	22.76	22.91	22.90		1
	25	25	22.68	22.81	22.84		1
	50	0	22.81	22.87	22.67		1
16QAM	1	0	22.83	23.04	22.61	0-1	1
	1	25	22.99	22.93	22.51		1
	1	49	22.76	23.00	22.42		1
	25	0	21.96	22.09	21.76	0-2	2
	25	12	21.99	21.89	21.53		2
	25	25	21.94	21.81	21.59		2
	50	0	22.05	21.96	21.71		2
64QAM	1	0	22.37	22.08	22.01	0-2	2
	1	25	22.60	21.96	21.70		2
	1	49	22.20	21.92	21.90		2
	25	0	20.75	20.77	20.91	0-3	3
	25	12	20.78	20.75	20.88		3
	25	25	20.75	20.79	20.77		3
	50	0	20.70	20.85	20.79		3

Table 9-28
LTE Band 25 (PCS) Conducted Powers - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26065 (1852.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26665 (1912.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.22	24.32	24.44	0	0
	1	12	24.54	24.50	24.36		0
	1	24	24.36	24.54	24.07		0
	12	0	22.74	22.87	22.70	0-1	1
	12	6	22.75	22.87	22.62		1
	12	13	22.59	22.77	22.71		1
	25	0	22.72	22.84	22.66		1
16QAM	1	0	22.73	22.68	22.65	0-1	1
	1	12	22.67	23.01	23.17		1
	1	24	22.91	22.71	22.76		1
	12	0	21.70	21.72	21.71	0-2	2
	12	6	21.80	21.72	21.62		2
	12	13	21.80	21.62	21.48		2
	25	0	21.78	21.81	21.71		2
64QAM	1	0	21.97	21.86	21.73	0-2	2
	1	12	22.47	22.02	21.92		2
	1	24	22.20	21.85	21.55		2
	12	0	20.78	20.82	20.69	0-3	3
	12	6	20.91	20.81	20.77		3
	12	13	20.72	20.71	20.72		3
	25	0	20.83	20.67	20.69		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-29
LTE Band 25 (PCS) Conducted Powers - 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26055 (1851.5 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26675 (1913.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.24	24.61	24.16	0	0
	1	7	24.47	24.59	24.49		0
	1	14	24.37	24.49	24.31		0
	8	0	22.63	23.00	22.79	0-1	1
	8	4	22.76	22.98	22.72		1
	8	7	22.72	22.93	22.77		1
	15	0	22.64	22.93	22.70		1
16QAM	1	0	23.16	22.82	22.66	0-1	1
	1	7	23.22	22.77	22.69		1
	1	14	23.19	22.67	22.63		1
	8	0	21.75	21.83	21.65	0-2	2
	8	4	21.59	21.84	21.67		2
	8	7	21.57	21.82	21.65		2
	15	0	21.51	21.67	21.72		2
64QAM	1	0	21.95	21.63	21.55	0-2	2
	1	7	22.28	21.68	21.65		2
	1	14	22.16	21.77	21.62		2
	8	0	20.80	20.73	20.58	0-3	3
	8	4	20.95	20.94	20.51		3
	8	7	21.00	20.76	20.51		3
	15	0	20.71	20.62	20.58		3

Table 9-30
LTE Band 25 (PCS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26047 (1850.7 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26683 (1914.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.01	24.47	24.46	0	0
	1	2	24.07	24.35	24.40		0
	1	5	24.26	24.34	24.30		0
	3	0	24.34	24.57	24.25		0
	3	2	24.44	24.51	24.15		0
	3	3	24.48	24.38	24.30		0
	6	0	22.80	22.82	22.77	0-1	1
16QAM	1	0	22.92	22.62	22.72	0-1	1
	1	2	22.93	22.60	22.72		1
	1	5	22.91	22.66	22.68		1
	3	0	22.73	22.65	23.00		1
	3	2	22.81	22.72	23.13		1
	3	3	22.79	22.65	23.14		1
	6	0	21.82	21.70	21.73	0-2	2
64QAM	1	0	22.25	21.73	21.90	0-2	2
	1	2	22.50	21.74	22.09		2
	1	5	22.34	21.69	21.82		2
	3	0	21.70	21.69	21.84		2
	3	2	21.72	21.82	21.72		2
	3	3	21.71	21.84	21.69		2
	6	0	20.79	20.76	20.77	0-3	3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.7 LTE Band 41 Power Class 3

Table 9-31
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.13	23.16	23.06	23.43	23.42	0	0
	1	50	23.48	23.39	**23.50**	23.48	23.43		0
	1	99	23.09	23.03	23.01	23.33	23.26		0
	50	0	22.14	22.47	22.26	22.48	22.46	0-1	1
	50	25	22.26	22.35	**22.50**	22.36	22.46		1
	50	50	22.08	22.14	22.41	22.38	22.25		1
	100	0	22.16	22.16	22.23	22.33	22.32		1
16QAM	1	0	21.92	22.25	22.05	22.13	22.35	0-1	1
	1	50	22.06	22.00	22.35	22.15	21.96		1
	1	99	21.92	21.99	22.10	22.22	21.90		1
	50	0	20.90	21.22	21.09	21.19	21.42	0-2	2
	50	25	21.12	21.37	21.50	21.46	21.31		2
	50	50	21.11	21.22	21.43	21.50	21.16		2
	100	0	21.08	21.16	21.21	21.26	21.35		2
64QAM	1	0	20.65	20.73	20.88	20.93	20.94	0-2	2
	1	50	20.97	21.09	21.47	20.93	21.01		2
	1	99	20.75	20.71	21.06	20.87	20.58		2
	50	0	20.23	20.35	20.32	20.33	20.50	0-3	3
	50	25	20.28	20.43	20.50	20.45	20.46		3
	50	50	20.05	20.39	20.50	20.35	20.32		3
	100	0	20.14	20.48	20.43	20.38	20.50		3

Table 9-32
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.26	23.38	23.39	23.44	23.47	0	0
	1	36	23.25	23.34	23.48	23.48	23.48		0
	1	74	23.34	23.25	23.34	23.42	23.45		0
	36	0	22.28	22.48	22.42	22.44	22.45	0-1	1
	36	18	22.48	22.37	22.42	22.47	22.48		1
	36	37	22.43	22.50	22.41	22.46	22.47		1
	75	0	22.35	22.50	22.45	22.40	22.46		1
16QAM	1	0	22.49	22.09	22.35	22.48	22.50	0-1	1
	1	36	22.34	22.38	22.29	22.50	22.47		1
	1	74	22.25	22.16	22.13	22.22	22.03		1
	36	0	21.22	21.32	21.45	21.44	21.33	0-2	2
	36	18	21.31	21.49	21.45	21.46	21.31		2
	36	37	21.38	21.42	21.25	21.49	21.26		2
	75	0	21.22	21.33	21.50	21.47	21.35		2
64QAM	1	0	21.42	21.24	21.16	21.22	21.37	0-2	2
	1	36	21.45	21.29	21.07	21.36	21.11		2
	1	74	21.50	20.97	20.82	20.73	21.46		2
	36	0	20.29	20.43	20.50	20.31	20.43	0-3	3
	36	18	20.49	20.46	20.37	20.47	20.50		3
	36	37	20.50	20.47	20.46	20.47	20.50		3
	75	0	20.42	20.42	20.36	20.48	20.38		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-33
LTE Band 41 Conducted Powers - 10 MHz Bandwidth

LTE Band 41 10 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.35	23.36	23.41	23.46	23.45	0	0
	1	25	23.40	23.45	23.50	23.49	23.50		0
	1	49	23.37	23.44	23.46	23.50	23.40		0
	25	0	22.49	22.47	22.44	22.46	22.50	0-1	1
	25	12	22.46	22.47	22.40	22.47	22.45		1
	25	25	22.42	22.40	22.50	22.29	22.37		1
	50	0	22.41	22.50	22.45	22.38	22.37		1
16QAM	1	0	21.98	22.21	22.24	22.40	22.25	0-1	1
	1	25	22.35	22.47	22.50	22.47	22.49		1
	1	49	22.23	22.28	22.28	22.32	22.40		1
	25	0	21.47	21.41	21.49	21.21	21.38	0-2	2
	25	12	21.34	21.38	21.47	21.26	21.39		2
	25	25	21.30	21.32	21.43	21.25	21.32		2
	50	0	21.38	21.28	21.47	21.48	21.49		2
64QAM	1	0	21.40	21.49	21.35	21.43	21.34	0-2	2
	1	25	21.41	21.50	21.50	21.45	21.49		2
	1	49	21.50	21.41	21.50	21.02	21.33		2
	25	0	20.45	20.37	20.31	20.48	20.40	0-3	3
	25	12	20.50	20.37	20.50	20.38	20.36		3
	25	25	20.45	20.25	20.48	20.37	20.26		3
	50	0	20.38	20.42	20.44	20.44	20.32		3

Table 9-34
LTE Band 41 Conducted Powers - 5 MHz Bandwidth

LTE Band 41 5 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	23.49	23.19	23.48	23.48	23.46	0	0
	1	12	23.46	23.43	23.43	23.50	23.49		0
	1	24	23.36	23.21	23.50	23.38	23.38		0
	12	0	22.49	22.44	22.49	22.50	22.45	0-1	1
	12	6	22.49	22.38	22.40	22.47	22.39		1
	12	13	22.40	22.37	22.50	22.41	22.36		1
	25	0	22.41	22.45	22.36	22.47	22.40		1
16QAM	1	0	22.32	22.45	22.10	22.04	22.47	0-1	1
	1	12	22.47	22.50	22.38	22.50	22.50		1
	1	24	22.36	22.26	22.43	22.41	22.38		1
	12	0	21.42	21.37	21.46	21.41	21.36	0-2	2
	12	6	21.48	21.35	21.47	21.49	21.46		2
	12	13	21.35	21.23	21.46	21.44	21.43		2
	25	0	21.20	21.37	21.23	21.39	21.35		2
64QAM	1	0	21.40	20.52	20.76	21.24	21.27	0-2	2
	1	12	21.50	20.94	21.11	21.47	21.12		2
	1	24	21.44	20.50	21.20	21.22	21.30		2
	12	0	20.26	20.35	20.49	20.30	20.43	0-3	3
	12	6	20.33	20.42	20.50	20.43	20.47		3
	12	13	20.19	20.31	20.43	20.48	20.44		3
	25	0	20.17	20.36	20.42	20.37	20.49		3

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.4.8 LTE Band 41 Power Class 2

Table 9-35
LTE Band 41 Conducted Powers - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	25.73	25.81	26.07	26.35	25.93	0	0
	1	50	26.05	25.95	**26.50**	26.46	26.32		0
	1	99	25.69	25.61	26.21	26.15	25.80		0
	50	0	25.09	24.75	**25.36**	25.26	25.18	0-1	1
	50	25	25.04	24.73	25.35	25.34	25.21		1
	50	50	24.94	24.65	25.24	25.28	25.07		1
	100	0	24.97	24.75	25.22	25.20	25.10		1
16QAM	1	0	25.10	24.50	25.40	25.28	25.30	0-1	1
	1	50	25.30	24.79	25.42	25.50	25.07		1
	1	99	24.93	24.57	25.23	24.94	24.71		1
	50	0	23.87	23.62	24.17	24.16	24.15	0-2	2
	50	25	23.97	23.61	24.24	24.34	24.08		2
	50	50	23.76	23.40	24.11	24.26	24.02		2
	100	0	23.80	23.54	24.09	24.14	24.09		2
64QAM	1	0	24.02	24.23	24.28	24.34	24.22	0-2	2
	1	50	24.28	24.15	24.45	24.44	24.43		2
	1	99	24.01	23.61	24.25	24.30	23.97		2
	50	0	23.07	23.40	23.34	23.24	23.30	0-3	3
	50	25	23.08	23.38	23.40	23.34	23.21		3
	50	50	22.99	23.37	23.37	23.26	23.16		3
	100	0	22.91	23.36	23.26	23.22	23.14		3

Table 9-36
LTE Band 41 Conducted Powers - 15 MHz Bandwidth

LTE Band 41 15 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	26.18	26.02	26.18	26.43	26.15	0	0
	1	36	26.39	26.17	26.31	26.50	26.47		0
	1	74	26.10	26.33	26.45	26.41	26.10		0
	36	0	25.20	25.17	25.44	25.38	25.49	0-1	1
	36	18	25.20	25.20	25.40	25.49	25.44		1
	36	37	25.18	25.10	25.38	25.42	25.47		1
	75	0	25.12	25.14	25.30	25.35	25.45		1
16QAM	1	0	25.16	24.89	25.02	25.43	25.26	0-1	1
	1	36	25.26	24.96	25.23	25.47	25.21		1
	1	74	25.22	24.93	25.03	25.48	25.20		1
	36	0	24.02	24.03	24.14	24.32	24.29	0-2	2
	36	18	24.07	24.02	24.25	24.41	24.27		2
	36	37	23.98	23.93	24.21	24.27	24.20		2
	75	0	23.93	23.97	24.13	24.37	24.20		2
64QAM	1	0	23.68	24.07	24.24	24.18	24.31	0-2	2
	1	36	23.79	24.13	24.34	24.48	24.29		2
	1	74	23.59	24.12	24.27	24.29	24.27		2
	36	0	23.22	23.25	23.40	23.39	23.43	0-3	3
	36	18	23.18	23.24	23.50	23.48	23.46		3
	36	37	23.14	23.23	23.44	23.42	23.35		3
	75	0	23.13	23.23	23.38	23.44	23.42		3

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-37
LTE Band 41 Conducted Powers - 10 MHz Bandwidth

LTE Band 41 10 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	25.88	26.14	26.32	26.33	26.23	0	0
	1	25	26.40	26.44	26.40	26.50	26.47		0
	1	49	26.18	26.04	26.36	26.34	26.18		0
	25	0	25.26	25.16	25.39	25.32	25.41	0-1	1
	25	12	25.19	25.32	25.38	25.43	25.37		1
	25	25	25.16	25.22	25.34	25.32	25.33		1
	50	0	25.17	25.19	25.44	25.25	25.34		1
16QAM	1	0	25.11	24.77	25.31	25.27	25.21	0-1	1
	1	25	25.37	24.90	25.03	25.46	25.24		1
	1	49	25.15	24.66	25.18	25.44	25.16		1
	25	0	23.96	23.99	24.06	24.36	24.26	0-2	2
	25	12	24.04	24.10	24.30	24.23	24.23		2
	25	25	24.00	23.96	24.24	24.25	24.04		2
	50	0	24.06	23.98	24.23	24.19	24.25		2
64QAM	1	0	24.41	24.33	24.35	24.36	24.31	0-2	2
	1	25	24.49	24.40	24.43	24.47	24.23		2
	1	49	24.47	24.24	24.39	24.35	24.21		2
	25	0	23.39	23.29	23.25	23.37	23.34	0-3	3
	25	12	23.36	23.29	23.41	23.39	23.19		3
	25	25	23.26	23.12	23.26	23.48	23.17		3
	50	0	23.20	23.22	23.45	23.47	23.31		3

Table 9-38
LTE Band 41 Conducted Powers - 5 MHz Bandwidth

LTE Band 41 5 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel 39750 (2506.0 MHz)	Low-Mid Channel 40185 (2549.5 MHz)	Mid Channel 40620 (2593.0 MHz)	Mid-High Channel 41055 (2636.5 MHz)	High Channel 41490 (2680.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
QPSK	1	0	26.01	26.08	26.26	26.28	26.06	0	0
	1	12	26.37	26.33	26.47	26.45	26.50		0
	1	24	26.12	26.18	26.39	26.38	26.16		0
	12	0	25.18	25.24	25.35	25.42	25.42	0-1	1
	12	6	25.19	25.21	25.40	25.45	25.33		1
	12	13	25.10	25.09	25.35	25.33	25.20		1
	25	0	25.12	25.13	25.35	25.32	25.27		1
16QAM	1	0	25.45	25.38	25.04	25.48	25.15	0-1	1
	1	12	25.41	25.49	25.42	25.48	25.49		1
	1	24	25.26	25.39	25.33	25.44	25.50		1
	12	0	24.09	24.17	24.09	24.30	24.15	0-2	2
	12	6	24.08	24.25	24.21	24.42	24.12		2
	12	13	23.99	24.05	24.16	24.30	24.10		2
	25	0	23.83	23.94	24.13	24.21	24.14		2
64QAM	1	0	24.33	24.47	24.41	23.89	24.39	0-2	2
	1	12	24.50	24.49	24.50	24.21	24.37		2
	1	24	24.36	24.35	24.43	23.76	24.32		2
	12	0	22.84	22.92	23.31	23.41	23.25	0-3	3
	12	6	22.96	23.00	23.43	23.44	23.30		3
	12	13	22.90	22.97	23.37	23.41	23.28		3
	25	0	22.95	23.06	23.43	23.47	23.31		3

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

9.5 WLAN Conducted Powers

Table 9-39
2.4 GHz WLAN Maximum Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	19.53	16.40	15.65
2417	2	N/A	18.21	17.68
2437	6	**19.64**	18.27	17.78
2457	10	N/A	18.19	17.62
2462	11	19.59	15.09	14.64

Table 9-40
5 GHz WLAN Maximum Average RF Power

5GHz (20MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11a	802.11n
5180	36	14.65	14.18
5200	40	16.69	16.27
5220	44	**16.81**	16.36
5240	48	16.52	16.11
5260	52	16.54	16.12
5280	56	16.61	16.02
5300	60	**16.71**	16.31
5320	64	14.67	14.17
5500	100	14.56	14.47
5520	104	16.55	16.18
5600	120	16.69	16.37
5620	124	**16.69**	16.67
5720	144	16.59	16.41
5745	149	16.73	16.50
5785	157	**17.12**	16.77
5825	165	16.83	16.61

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 9-41
2.4 GHz WLAN Reduced Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	16.31	14.52	12.81
2417	2	N/A	16.52	14.84
2437	6	**16.54**	16.63	14.96
2457	10	N/A	16.37	14.76
2462	11	16.14	13.46	11.89

Table 9-42
5 GHz WLAN Reduced Average RF Power

5GHz (20MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11a	802.11n
5180	36	10.97	9.26
5200	40	13.14	11.38
5220	44	12.98	11.08
5240	48	12.94	11.10
5260	52	13.01	11.09
5280	56	**13.03**	10.97
5300	60	12.89	11.02
5320	64	11.04	9.19
5500	100	11.12	9.41
5520	104	13.10	11.11
5600	120	13.12	11.34
5620	124	**13.13**	11.16
5720	144	12.92	11.11
5745	149	13.17	11.28
5785	157	**13.38**	11.47
5825	165	13.35	11.45

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

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- The bolded data rate and channel above were tested for SAR.

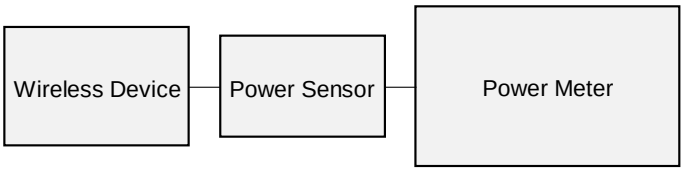


Figure 9-4
Power Measurement Setup

9.6 Bluetooth Conducted Powers

Table 9-43
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	9.63	9.190
2441	1.0	39	**10.38**	10.914
2480	1.0	78	9.34	8.586
2402	2.0	0	8.98	7.903
2441	2.0	39	10.01	10.013
2480	2.0	78	8.69	7.393
2402	3.0	0	9.03	8.004
2441	3.0	39	10.06	10.138
2480	3.0	78	8.74	7.486

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

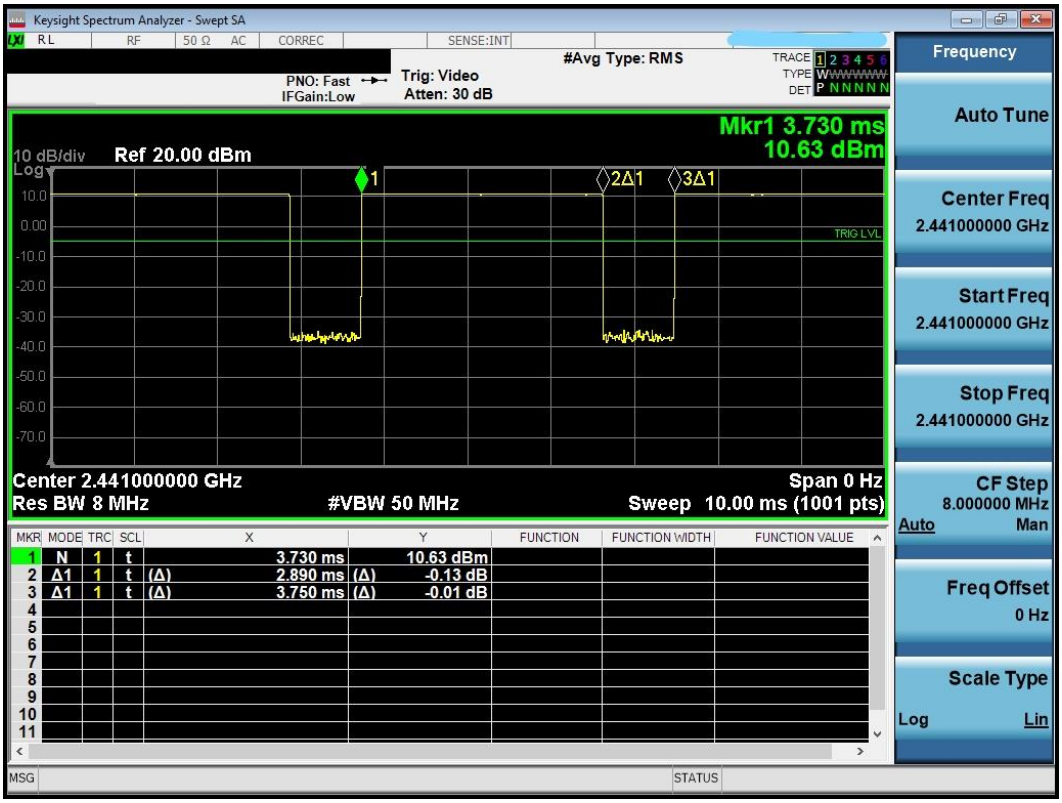


Figure 9-5
Bluetooth Transmission Plot

Equation 9-1
Bluetooth Duty Cycle Calculation

$$\boldsymbol{Duty\ Cycle} = \frac{\boldsymbol{Pulse\ Width}}{\boldsymbol{Period}} * \mathbf{100\%} = \frac{\mathbf{2.89}\boldsymbol{ms}}{\mathbf{3.75}\boldsymbol{ms}} * \mathbf{100\%} = \mathbf{77.1\%}$$

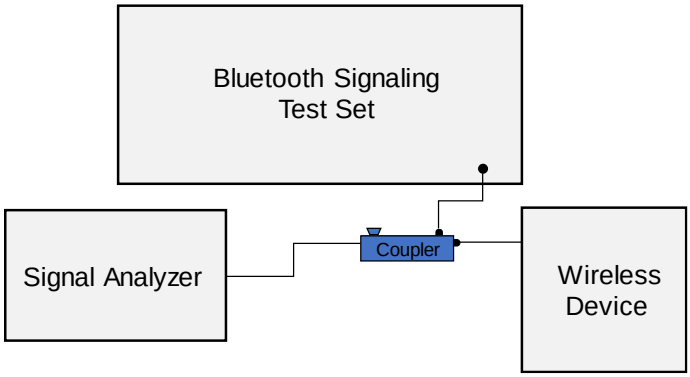


Figure 9-6
Power Measurement Setup

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
6/12/2019	750H	20.5	680	0.860	43.913	0.888	42.305	-3.15%	3.80%
			695	0.864	43.861	0.889	42.227	-2.81%	3.87%
			740	0.880	43.710	0.893	41.994	-1.46%	4.09%
			755	0.887	43.680	0.894	41.916	-0.78%	4.21%
			770	0.892	43.639	0.895	41.838	-0.34%	4.30%
7/1/2019	750H	20.3	700	0.861	42.459	0.889	42.201	-3.15%	0.61%
			710	0.864	42.428	0.890	42.149	-2.92%	0.66%
			740	0.875	42.342	0.893	41.994	-2.02%	0.83%
			755	0.880	42.294	0.894	41.916	-1.57%	0.90%
			770	0.885	42.248	0.895	41.838	-1.12%	0.98%
			785	0.891	42.200	0.896	41.760	-0.56%	1.05%
			800	0.896	42.152	0.897	41.682	-0.11%	1.13%
6/14/2019	835H	21.2	820	0.902	41.268	0.899	41.578	0.33%	-0.75%
			835	0.908	41.215	0.900	41.500	0.89%	-0.69%
			850	0.913	41.176	0.916	41.500	-0.33%	-0.78%
6/17/2019	835H	21.2	820	0.925	42.103	0.899	41.578	2.89%	1.26%
			835	0.931	42.065	0.900	41.500	3.44%	1.36%
			850	0.936	42.032	0.916	41.500	2.18%	1.28%
7/3/2019	835H	22.0	820	0.926	42.113	0.899	41.578	3.00%	1.29%
			835	0.932	42.078	0.900	41.500	3.56%	1.39%
			850	0.937	42.045	0.916	41.500	2.29%	1.31%
6/19/2019	1750H	22.8	1710	1.338	39.843	1.348	40.142	-0.74%	-0.74%
			1750	1.362	39.781	1.371	40.079	-0.66%	-0.74%
			1790	1.385	39.699	1.394	40.016	-0.65%	-0.79%
7/1/2019	1900H	21.3	1850	1.414	40.748	1.400	40.000	1.00%	1.87%
			1880	1.433	40.707	1.400	40.000	2.36%	1.77%
			1910	1.452	40.667	1.400	40.000	3.71%	1.67%
6/26/2019	2450H	21.7	2400	1.821	40.718	1.756	39.289	3.70%	3.64%
			2450	1.858	40.633	1.800	39.200	3.22%	3.66%
			2500	1.898	40.568	1.855	39.136	2.32%	3.66%
7/5/2019	2450H	21.3	2450	1.859	40.148	1.800	39.200	3.28%	2.42%
			2550	1.941	39.986	1.909	39.073	1.68%	2.34%
			2600	1.986	39.900	1.964	39.009	1.12%	2.28%

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 10-2
Measured Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε
07/01/2019	5200H-5800H	22.5	5180	4.468	34.852	4.635	36.009
			5200	4.491	34.811	4.655	35.986
			5220	4.512	34.782	4.676	35.963
			5240	4.531	34.758	4.696	35.940
			5260	4.551	34.722	4.717	35.917
			5280	4.577	34.677	4.737	35.894
			5300	4.598	34.642	4.758	35.871
			5320	4.619	34.611	4.778	35.849
			5500	4.811	34.305	4.963	35.643
			5520	4.834	34.264	4.983	35.620
			5540	4.860	34.229	5.004	35.597
			5560	4.885	34.194	5.024	35.574
			5580	4.907	34.172	5.045	35.551
			5600	4.928	34.134	5.065	35.529
			5620	4.950	34.094	5.086	35.506
			5640	4.973	34.043	5.106	35.483
			5660	4.998	33.998	5.127	35.460
			5680	5.024	33.984	5.147	35.437
			5700	5.044	33.959	5.168	35.414
			5745	5.094	33.880	5.214	35.363
			5765	5.116	33.831	5.234	35.340
			5785	5.143	33.803	5.255	35.317
			5800	5.159	33.778	5.270	35.300
			5805	5.164	33.772	5.275	35.294
			5825	5.184	33.748	5.296	35.271

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 10-3
Measured Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
6/17/2019	750B	23.5	680	0.917	57.277	0.958	55.804	-4.28%	2.64%
			695	0.922	57.239	0.959	55.745	-3.86%	2.68%
			700	0.923	57.227	0.959	55.726	-3.75%	2.69%
			710	0.927	57.207	0.960	55.687	-3.44%	2.73%
			740	0.937	57.151	0.963	55.570	-2.70%	2.85%
			755	0.942	57.123	0.964	55.512	-2.28%	2.90%
			770	0.948	57.091	0.965	55.453	-1.76%	2.95%
			800	0.958	57.005	0.967	55.336	-0.93%	3.02%
6/26/2019	835B	22.0	835	0.965	54.499	0.970	55.200	-0.52%	-1.27%
			850	0.980	54.357	0.988	55.154	-0.81%	-1.45%
6/28/2019	835B	21.7	820	0.950	54.282	0.969	55.258	-1.96%	-1.77%
			835	0.966	54.143	0.970	55.200	-0.41%	-1.91%
			850	0.981	53.997	0.988	55.154	-0.71%	-2.10%
6/23/2019	1750B	21.9	1710	1.454	51.238	1.463	53.537	-0.62%	-4.29%
			1750	1.500	51.102	1.488	53.432	0.81%	-4.36%
			1790	1.545	50.940	1.514	53.326	2.05%	-4.47%
7/3/2019	1750B	21.9	1710	1.497	51.941	1.463	53.537	2.32%	-2.98%
			1750	1.543	51.760	1.488	53.432	3.70%	-3.13%
			1790	1.586	51.573	1.514	53.326	4.76%	-3.29%
6/25/2019	1900B	20.6	1850	1.524	54.532	1.520	53.300	0.26%	2.31%
			1880	1.545	54.514	1.520	53.300	1.64%	2.28%
			1910	1.569	54.491	1.520	53.300	3.22%	2.23%
7/1/2019	1900B	22.7	1850	1.503	51.182	1.520	53.300	-1.12%	-3.97%
			1880	1.536	51.067	1.520	53.300	1.05%	-4.19%
			1910	1.570	50.971	1.520	53.300	3.29%	-4.37%
7/5/2019	1900B	24.8	1850	1.496	52.937	1.520	53.300	-1.58%	-0.68%
			1880	1.529	52.827	1.520	53.300	0.59%	-0.89%
			1910	1.562	52.735	1.520	53.300	2.76%	-1.06%
6/24/2019	2450B	20.8	2400	1.981	53.453	1.902	52.767	4.15%	1.30%
			2450	2.028	53.361	1.950	52.700	4.00%	1.25%
			2500	2.075	53.310	2.021	52.636	2.67%	1.28%
6/27/2019	2450B	22.6	2400	1.948	51.410	1.902	52.767	2.42%	-2.57%
			2450	2.006	51.261	1.950	52.700	2.87%	-2.73%
			2500	2.064	51.101	2.021	52.636	2.13%	-2.92%
7/4/2019	2450B	23.7	2400	1.965	51.423	1.902	52.767	3.31%	-2.55%
			2450	2.022	51.296	1.950	52.700	3.69%	-2.66%
			2500	2.079	51.168	2.021	52.636	2.87%	-2.79%
			2550	2.140	51.028	2.092	52.573	2.29%	-2.94%
			2600	2.202	50.887	2.163	52.509	1.80%	-3.09%
			2650	2.261	50.736	2.234	52.445	1.21%	-3.26%
			2700	2.323	50.591	2.305	52.382	0.78%	-3.42%
7/7/2019	2600B	23.2	2600	2.190	50.769	2.163	52.509	1.25%	-3.31%
			2650	2.246	50.627	2.234	52.445	0.54%	-3.47%
			2700	2.306	50.479	2.305	52.382	0.04%	-3.63%

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 10-4
Measured Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
06/27/2019	5200B-5800B	22.1	5180	5.352	48.703	5.276	49.041	1.44%	-0.69%
			5200	5.385	48.659	5.299	49.014	1.62%	-0.72%
			5220	5.415	48.610	5.323	48.987	1.73%	-0.77%
			5240	5.442	48.567	5.346	48.960	1.80%	-0.80%
			5260	5.465	48.532	5.369	48.933	1.79%	-0.82%
			5280	5.493	48.504	5.393	48.906	1.85%	-0.82%
			5300	5.524	48.466	5.416	48.879	1.99%	-0.84%
			5320	5.560	48.429	5.439	48.851	2.22%	-0.86%
			5500	5.813	48.090	5.650	48.607	2.88%	-1.06%
			5520	5.850	48.051	5.673	48.580	3.12%	-1.09%
			5540	5.886	47.997	5.696	48.553	3.34%	-1.15%
			5560	5.917	47.968	5.720	48.526	3.44%	-1.15%
			5580	5.951	47.943	5.743	48.499	3.62%	-1.15%
			5600	5.972	47.912	5.766	48.471	3.57%	-1.15%
			5620	5.998	47.848	5.790	48.444	3.59%	-1.23%
			5640	6.033	47.789	5.813	48.417	3.78%	-1.30%
			5660	6.071	47.763	5.837	48.390	4.01%	-1.30%
			5680	6.102	47.735	5.860	48.363	4.13%	-1.30%
			5700	6.135	47.729	5.883	48.336	4.28%	-1.26%
			5745	6.197	47.605	5.936	48.275	4.40%	-1.39%
			5765	6.228	47.556	5.959	48.248	4.51%	-1.43%
			5785	6.268	47.514	5.982	48.220	4.78%	-1.46%
			5800	6.292	47.512	6.000	48.200	4.87%	-1.43%
			5805	6.298	47.519	6.006	48.193	4.86%	-1.40%
			5825	6.323	47.483	6.029	48.166	4.88%	-1.42%

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

10.2 Test System Verification

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

Table 10-2
System Verification Results

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
I	750	HEAD	06/12/2019	20.8	20.5	0.200	1003	7357	1.610	8.280	8.050	-2.78%
H	750	HEAD	07/01/2019	20.9	20.3	0.200	1003	7406	1.620	8.280	8.100	-2.17%
H	835	HEAD	06/14/2019	20.9	20.8	0.200	4d132	7406	2.030	9.590	10.150	5.84%
H	835	HEAD	06/17/2019	20.9	20.6	0.200	4d132	7406	2.020	9.590	10.100	5.32%
H	835	HEAD	07/03/2019	21.9	22.0	0.200	4d132	7406	2.050	9.590	10.250	6.88%
H	1750	HEAD	06/19/2019	21.9	22.0	0.100	1008	7406	3.860	36.200	38.600	6.63%
G	1900	HEAD	07/01/2019	22.0	21.3	0.100	5d149	7410	3.990	39.300	39.900	1.53%
E	2450	HEAD	06/26/2019	22.1	21.7	0.100	797	3589	5.340	52.700	53.400	1.33%
E	2450	HEAD	07/05/2019	22.5	21.3	0.100	797	3589	5.330	52.700	53.300	1.14%
E	2600	HEAD	07/05/2019	22.5	21.3	0.100	1126	3589	5.780	54.500	57.800	6.06%
H	5250	HEAD	07/01/2019	20.9	20.5	0.050	1191	7406	4.000	78.900	80.000	1.39%
H	5600	HEAD	07/01/2019	20.9	20.5	0.050	1191	7406	4.220	83.600	84.400	0.96%
H	5750	HEAD	07/01/2019	20.9	20.5	0.050	1191	7406	4.050	79.100	81.000	2.40%
I	750	BODY	06/17/2019	21.7	21.8	0.200	1003	7357	1.730	8.580	8.650	0.82%
G	835	BODY	06/26/2019	23.0	22.0	0.200	4d132	7410	2.010	9.670	10.050	3.93%
G	835	BODY	06/28/2019	22.3	21.7	0.200	4d133	7410	2.090	9.750	10.450	7.18%
I	1750	BODY	06/23/2019	19.5	21.6	0.100	1150	7357	3.880	36.600	38.800	6.01%
I	1750	BODY	07/03/2019	23.9	21.9	0.100	1150	7357	3.780	36.600	37.800	3.28%
J	1900	BODY	06/25/2019	20.1	20.6	0.100	5d149	7488	4.250	39.400	42.500	7.87%
J	1900	BODY	07/01/2019	20.7	22.7	0.100	5d080	7488	4.080	39.200	40.800	4.08%
J	1900	BODY	07/05/2019	21.3	24.8	0.100	5d080	7488	4.170	39.200	41.700	6.38%
K	2450	BODY	06/24/2019	21.3	20.3	0.100	719	7417	5.090	50.100	50.900	1.60%
K	2450	BODY	06/27/2019	23.9	21.8	0.100	719	7417	4.970	50.100	49.700	-0.80%
K	2450	BODY	07/04/2019	23.4	21.7	0.100	719	7417	4.950	50.100	49.500	-1.20%
K	2600	BODY	07/04/2019	23.4	21.7	0.100	1004	7417	5.160	54.800	51.600	-5.84%
K	2600	BODY	07/07/2019	23.0	22.1	0.100	1004	7417	5.360	54.800	53.600	-2.19%
L	5250	BODY	06/27/2019	23.5	21.1	0.050	1191	7308	3.710	77.000	74.200	-3.64%
L	5600	BODY	06/27/2019	23.5	21.1	0.050	1191	7308	3.890	79.200	77.800	-1.77%
L	5750	BODY	06/27/2019	23.5	21.1	0.050	1191	7308	3.580	76.100	71.600	-5.91%

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

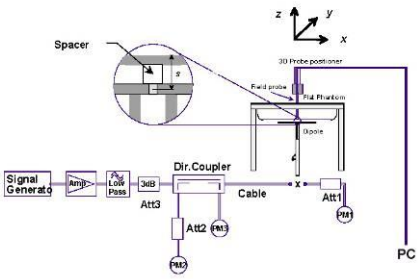


Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.23	0.06	Right	Cheek	85097	1	1:8.3	0.266	1.114	0.296	A1
836.60	190	GSM 850	GSM	33.7	33.23	0.05	Right	Tilt	85097	1	1:8.3	0.118	1.114	0.131	
836.60	190	GSM 850	GSM	33.7	33.23	0.01	Left	Cheek	85097	1	1:8.3	0.239	1.114	0.266	
836.60	190	GSM 850	GSM	33.7	33.23	0.14	Left	Tilt	85097	1	1:8.3	0.124	1.114	0.138	
836.60	190	GSM 850	GPRS	28.0	27.41	0.01	Right	Cheek	85097	4	1:2.076	0.239	1.146	0.274	
836.60	190	GSM 850	GPRS	28.0	27.41	0.04	Right	Tilt	85097	4	1:2.076	0.114	1.146	0.131	
836.60	190	GSM 850	GPRS	28.0	27.41	-0.05	Left	Cheek	85097	4	1:2.076	0.239	1.146	0.274	
836.60	190	GSM 850	GPRS	28.0	27.41	-0.04	Left	Tilt	85097	4	1:2.076	0.124	1.146	0.142	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-2
GSM 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	# of Time Slots	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.7	30.00	0.14	Right	Cheek	85097	1	1:8.3	0.113	1.175	0.133	
1880.00	661	GSM 1900	GSM	30.7	30.00	-0.06	Right	Tilt	85097	1	1:8.3	0.096	1.175	0.113	
1880.00	661	GSM 1900	GSM	30.7	30.00	0.12	Left	Cheek	85097	1	1:8.3	0.251	1.175	0.295	
1880.00	661	GSM 1900	GSM	30.7	30.00	-0.16	Left	Tilt	85097	1	1:8.3	0.093	1.175	0.109	
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.04	Right	Cheek	85097	4	1:2.076	0.162	1.047	0.170	
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.13	Right	Tilt	85097	4	1:2.076	0.134	1.047	0.140	
1880.00	661	GSM 1900	GPRS	25.5	25.30	0.13	Left	Cheek	85097	4	1:2.076	0.331	1.047	0.347	A2
1880.00	661	GSM 1900	GPRS	25.5	25.30	0.13	Left	Tilt	85097	4	1:2.076	0.137	1.047	0.143	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram								

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.3	25.05	-0.05	Right	Cheek	85089	1:1	0.296	1.059	0.313	
836.60	4183	UMTS 850	RMC	25.3	25.05	0.00	Right	Tilt	85089	1:1	0.150	1.059	0.159	
836.60	4183	UMTS 850	RMC	25.3	25.05	0.05	Left	Cheek	85089	1:1	0.298	1.059	0.316	A3
836.60	4183	UMTS 850	RMC	25.3	25.05	0.11	Left	Tilt	85089	1:1	0.148	1.059	0.157	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-4
UMTS 1750 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.11	Right	Cheek	85089	1:1	0.260	1.102	0.287	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.11	Right	Tilt	85089	1:1	0.345	1.102	0.380	
1712.40	1312	UMTS 1750	RMC	24.8	24.33	0.02	Left	Cheek	85089	1:1	0.557	1.114	0.620	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	-0.01	Left	Cheek	85089	1:1	0.597	1.102	0.658	
1752.60	1513	UMTS 1750	RMC	24.8	24.35	0.02	Left	Cheek	85089	1:1	0.613	1.109	0.680	A4
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.06	Left	Tilt	85089	1:1	0.294	1.102	0.324	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.12	Right	Cheek	85089	1:1	0.307	1.050	0.322	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.05	Right	Tilt	85089	1:1	0.221	1.050	0.232	
1852.40	9262	UMTS 1900	RMC	24.8	24.45	0.07	Left	Cheek	85089	1:1	0.546	1.084	0.592	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	-0.01	Left	Cheek	85089	1:1	0.591	1.050	0.621	
1907.60	9538	UMTS 1900	RMC	24.8	24.47	0.07	Left	Cheek	85089	1:1	0.610	1.079	0.658	A5
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.08	Left	Tilt	85089	1:1	0.232	1.050	0.244	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-6
CDMA BC10 (§90S) Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.3	24.62	0.00	Right	Cheek	85089	1:1	0.239	1.169	0.279	A6
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.3	24.62	0.08	Right	Tilt	85089	1:1	0.106	1.169	0.124	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.3	24.62	0.02	Left	Cheek	85089	1:1	0.230	1.169	0.269	
820.10	564	CDMA BC10 (§90S)	RC3 / SO55	25.3	24.62	-0.08	Left	Tilt	85089	1:1	0.122	1.169	0.143	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.3	24.64	0.07	Right	Cheek	85089	1:1	0.192	1.164	0.223	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.3	24.64	0.06	Right	Tilt	85089	1:1	0.091	1.164	0.106	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.3	24.64	0.04	Left	Cheek	85089	1:1	0.178	1.164	0.207	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. A	25.3	24.64	0.04	Left	Tilt	85089	1:1	0.104	1.164	0.121	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-7
CDMA BC0 (§22H) Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.3	24.65	0.06	Right	Cheek	85089	1:1	0.338	1.161	0.392	A7
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.3	24.65	-0.08	Right	Tilt	85089	1:1	0.143	1.161	0.166	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.3	24.65	0.02	Left	Cheek	85089	1:1	0.307	1.161	0.356	
836.52	384	CDMA BC0 (§22H)	RC3 / SO55	25.3	24.65	-0.01	Left	Tilt	85089	1:1	0.160	1.161	0.186	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.3	24.63	0.04	Right	Cheek	85089	1:1	0.272	1.167	0.317	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.3	24.63	0.01	Right	Tilt	85089	1:1	0.136	1.167	0.159	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.3	24.63	0.03	Left	Cheek	85089	1:1	0.239	1.167	0.279	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. A	25.3	24.63	0.05	Left	Tilt	85089	1:1	0.135	1.167	0.158	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-8
PCS CDMA Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	600	PCS CDMA	RC3 / SO55	24.8	24.20	0.18	Right	Cheek	85089	1:1	0.340	1.148	0.390	
1880.00	600	PCS CDMA	RC3 / SO55	24.8	24.20	0.18	Right	Tilt	85089	1:1	0.246	1.148	0.282	
1851.25	25	PCS CDMA	RC3 / SO55	24.8	24.33	0.06	Left	Cheek	85089	1:1	0.581	1.114	0.647	
1880.00	600	PCS CDMA	RC3 / SO55	24.8	24.20	0.17	Left	Cheek	85089	1:1	0.624	1.148	**0.716**	
1908.75	1175	PCS CDMA	RC3 / SO55	24.8	24.24	0.09	Left	Cheek	85089	1:1	0.624	1.138	0.710	
1880.00	600	PCS CDMA	RC3 / SO55	24.8	24.20	-0.08	Left	Tilt	85089	1:1	0.229	1.148	0.263	
1880.00	600	PCS CDMA	EVDO Rev. A	24.8	24.24	0.03	Right	Cheek	85089	1:1	0.327	1.138	0.372	
1880.00	600	PCS CDMA	EVDO Rev. A	24.8	24.24	-0.03	Right	Tilt	85089	1:1	0.229	1.138	0.261	
1851.25	25	PCS CDMA	EVDO Rev. A	24.8	24.33	0.07	Left	Cheek	85089	1:1	0.559	1.114	0.623	
1880.00	600	PCS CDMA	EVDO Rev. A	24.8	24.24	0.19	Left	Cheek	85089	1:1	0.578	1.138	0.658	
1908.75	1175	PCS CDMA	EVDO Rev. A	24.8	24.29	0.13	Left	Cheek	85089	1:1	0.626	1.125	0.704	A8
1880.00	600	PCS CDMA	EVDO Rev. A	24.8	24.24	0.08	Left	Tilt	85089	1:1	0.226	1.138	0.257	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Head 1.6 W/kg (mW/g)** averaged over 1 gram							

Table 11-9
LTE Band 71 Head SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	-0.05	0	Right	Cheek	QPSK	1	0	85139	1:1	0.230	1.000	0.230	A9
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	-0.04	1	Right	Cheek	QPSK	50	0	85139	1:1	0.156	1.230	0.192	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	-0.02	0	Right	Tilt	QPSK	1	0	85139	1:1	0.118	1.000	0.118	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.11	1	Right	Tilt	QPSK	50	0	85139	1:1	0.086	1.230	0.106	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	-0.06	0	Left	Cheek	QPSK	1	0	85139	1:1	0.228	1.000	0.228	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.01	1	Left	Cheek	QPSK	50	0	85139	1:1	0.161	1.230	0.198	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	0.13	0	Left	Tilt	QPSK	1	0	85139	1:1	0.124	1.000	0.124	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.16	1	Left	Tilt	QPSK	50	0	85139	1:1	0.096	1.230	0.118	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									**Head 1.6 W/kg (mW/g)** averaged over 1 gram										

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-10
LTE Band 12 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	-0.08	0	Right	Cheek	QPSK	1	49	85139	1:1	0.270	1.035	0.279	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	-0.03	1	Right	Cheek	QPSK	25	0	85139	1:1	0.203	1.213	0.246	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	-0.04	0	Right	Tilt	QPSK	1	49	85139	1:1	0.124	1.035	0.128	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.05	1	Right	Tilt	QPSK	25	0	85139	1:1	0.109	1.213	0.132	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	-0.04	0	Left	Cheek	QPSK	1	49	85139	1:1	0.321	1.035	0.332	A10
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	-0.02	1	Left	Cheek	QPSK	25	0	85139	1:1	0.198	1.213	0.240	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	-0.20	0	Left	Tilt	QPSK	1	49	85139	1:1	0.176	1.035	0.182	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.04	1	Left	Tilt	QPSK	25	0	85139	1:1	0.102	1.213	0.124	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-11
LTE Band 13 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.13	0	Right	Cheek	QPSK	1	25	85139	1:1	0.171	1.009	0.173	A11
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	-0.13	1	Right	Cheek	QPSK	25	0	85139	1:1	0.114	1.169	0.133	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.06	0	Right	Tilt	QPSK	1	25	85139	1:1	0.100	1.009	0.101	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.08	1	Right	Tilt	QPSK	25	0	85139	1:1	0.064	1.169	0.075	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.03	0	Left	Cheek	QPSK	1	25	85139	1:1	0.152	1.009	0.153	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.07	1	Left	Cheek	QPSK	25	0	85139	1:1	0.105	1.169	0.123	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	-0.10	0	Left	Tilt	QPSK	1	25	85139	1:1	0.092	1.009	0.093	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.07	1	Left	Tilt	QPSK	25	0	85139	1:1	0.072	1.169	0.084	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-12
LTE Band 26 (Cell) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	-0.13	0	Right	Cheek	QPSK	1	36	85071	1:1	0.298	1.030	0.307	A12
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	-0.06	1	Right	Cheek	QPSK	36	37	85071	1:1	0.198	1.222	0.242	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	0.01	0	Right	Tilt	QPSK	1	36	85071	1:1	0.165	1.030	0.170	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.06	1	Right	Tilt	QPSK	36	37	85071	1:1	0.111	1.222	0.136	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	0.08	0	Left	Cheek	QPSK	1	36	85071	1:1	0.293	1.030	0.302	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.10	1	Left	Cheek	QPSK	36	37	85071	1:1	0.188	1.222	0.230	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	-0.12	0	Left	Tilt	QPSK	1	36	85071	1:1	0.176	1.030	0.181	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.01	1	Left	Tilt	QPSK	36	37	85071	1:1	0.115	1.222	0.141	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

© 2019 PCTEST Engineering Laboratory, Inc.

REV 21.3 M
02/15/2019

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-13
LTE Band 66 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	-0.11	0	Right	Cheek	QPSK	1	99	85139	1:1	0.294	1.038	0.305	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.17	1	Right	Cheek	QPSK	50	25	85139	1:1	0.151	1.242	0.188	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	-0.10	0	Right	Tilt	QPSK	1	99	85139	1:1	0.360	1.038	0.374	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.05	1	Right	Tilt	QPSK	50	25	85139	1:1	0.210	1.242	0.261	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.8	24.63	0.10	0	Left	Cheek	QPSK	1	50	85139	1:1	0.551	1.040	0.573	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.8	24.63	0.00	0	Left	Cheek	QPSK	1	99	85139	1:1	0.676	1.040	0.703	A13
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	-0.12	0	Left	Cheek	QPSK	1	99	85139	1:1	0.652	1.038	0.677	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.07	1	Left	Cheek	QPSK	50	25	85139	1:1	0.374	1.242	0.465	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	0.13	0	Left	Tilt	QPSK	1	99	85139	1:1	0.300	1.038	0.311	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.13	1	Left	Tilt	QPSK	50	25	85139	1:1	0.155	1.242	0.193	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-14
LTE Band 25 (PCS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	0.13	0	Right	Cheek	QPSK	1	0	85071	1:1	0.312	1.035	0.323	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	0.12	1	Right	Cheek	QPSK	50	25	85071	1:1	0.201	1.265	0.254	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	-0.17	0	Right	Tilt	QPSK	1	0	85071	1:1	0.194	1.035	0.201	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	-0.12	1	Right	Tilt	QPSK	50	25	85071	1:1	0.131	1.265	0.166	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	0.04	0	Left	Cheek	QPSK	1	0	85071	1:1	0.543	1.035	0.562	A14
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	0.21	1	Left	Cheek	QPSK	50	25	85071	1:1	0.388	1.265	0.491	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	0.12	0	Left	Tilt	QPSK	1	0	85071	1:1	0.188	1.035	0.195	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	0.12	1	Left	Tilt	QPSK	50	25	85071	1:1	0.121	1.265	0.153	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-15
LTE Band 41 Head SAR

MEASUREMENT RESULTS																				
Power Class	FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
	MHz	Ch.															(W/kg)		(W/kg)	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.17	0	Right	Cheek	QPSK	1	50	85139	1:1.58	0.097	1.000	0.097	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.10	1	Right	Cheek	QPSK	50	25	85139	1:1.58	0.064	1.000	0.064	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.05	0	Right	Tilt	QPSK	1	50	85139	1:1.58	0.125	1.000	0.125	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.19	1	Right	Tilt	QPSK	50	25	85139	1:1.58	0.067	1.000	0.067	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	-0.13	0	Left	Cheek	QPSK	1	50	85139	1:1.58	0.157	1.000	0.157	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.17	1	Left	Cheek	QPSK	50	25	85139	1:1.58	0.095	1.000	0.095	
Power Class 2	2593.00	40620	Mid	LTE Band 41	20	26.5	26.50	0.14	0	Left	Cheek	QPSK	1	50	85139	1:2.31	0.207	1.000	0.207	A15
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.08	0	Left	Tilt	QPSK	1	50	85139	1:1.58	0.066	1.000	0.066	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.05	1	Left	Tilt	QPSK	50	25	85139	1:1.58	0.048	1.000	0.048	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-16
DTS Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	17.0	16.54	0.02	Right	Cheek	85337	1	99.8	0.635	-	1.112	1.002	-	
2437	6	802.11b	DSSS	22	17.0	16.54	0.13	Right	Tilt	85337	1	99.8	0.639	-	1.112	1.002	-	
2412	1	802.11b	DSSS	22	17.0	16.31	0.12	Left	Cheek	85337	1	99.8	1.402	0.952	1.172	1.002	**1.118**	A16
2437	6	802.11b	DSSS	22	17.0	16.54	0.03	Left	Cheek	85337	1	99.8	1.355	0.898	1.112	1.002	1.001	
2462	11	802.11b	DSSS	22	17.0	16.14	0.08	Left	Cheek	85337	1	99.8	1.188	0.797	1.219	1.002	0.973	
2437	6	802.11b	DSSS	22	17.0	16.54	0.08	Left	Tilt	85337	1	99.8	0.908	0.569	1.112	1.002	0.634	
2412	1	802.11b	DSSS	22	17.0	16.31	-0.05	Left	Cheek	85337	1	99.8	1.412	0.915	1.172	1.002	1.075	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g)** averaged over 1 gram										

Note: Blue entry represents variability measurement.

Table 11-17
NII Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5280	56	802.11a	OFDM	20	13.5	13.03	-0.12	Right	Cheek	85337	6	99.2	0.929	-	1.114	1.008	-	
5280	56	802.11a	OFDM	20	13.5	13.03	-0.01	Right	Tilt	85337	6	99.2	1.006	-	1.114	1.008	-	
5280	56	802.11a	OFDM	20	13.5	13.03	0.06	Left	Cheek	85337	6	99.2	1.055	0.457	1.114	1.008	0.513	
5280	56	802.11a	OFDM	20	13.5	13.03	0.12	Left	Tilt	85337	6	99.2	1.093	0.481	1.114	1.008	0.540	
5620	124	802.11a	OFDM	20	13.5	13.13	0.03	Right	Cheek	85337	6	99.2	0.838	-	1.089	1.008	-	
5620	124	802.11a	OFDM	20	13.5	13.13	0.13	Right	Tilt	85337	6	99.2	0.904	-	1.089	1.008	-	
5620	124	802.11a	OFDM	20	13.5	13.13	0.20	Left	Cheek	85337	6	99.2	1.212	0.541	1.089	1.008	**0.594**	
5620	124	802.11a	OFDM	20	13.5	13.13	0.12	Left	Tilt	85337	6	99.2	1.129	0.397	1.089	1.008	0.436	
5785	157	802.11a	OFDM	20	13.5	13.38	0.02	Right	Cheek	85337	6	99.2	0.776	-	1.028	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.38	0.12	Right	Tilt	85337	6	99.2	0.722	-	1.028	1.008	-	
5785	157	802.11a	OFDM	20	13.5	13.38	0.19	Left	Cheek	85337	6	99.2	1.068	0.573	1.028	1.008	**0.594**	A17
5785	157	802.11a	OFDM	20	13.5	13.38	0.10	Left	Tilt	85337	6	99.2	0.788	0.551	1.028	1.008	0.571	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								**Head 1.6 W/kg (mW/g)** averaged over 1 gram										

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-18
DSS Head SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441.00	39	Bluetooth	FHSS	10.5	10.38	-0.01	Right	Cheek	85337	1	77.1	0.094	1.028	1.297	0.125	
2441.00	39	Bluetooth	FHSS	10.5	10.38	0.04	Right	Tilt	85337	1	77.1	0.091	1.028	1.297	0.121	
2441.00	39	Bluetooth	FHSS	10.5	10.38	0.00	Left	Cheek	85337	1	77.1	0.209	1.028	1.297	**0.279**	A18
2441.00	39	Bluetooth	FHSS	10.5	10.38	0.01	Left	Tilt	85337	1	77.1	0.128	1.028	1.297	0.171	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Head 1.6 W/kg (mW/g) averaged over 1 gram**									

11.2 Standalone Body-Worn SAR Data

Table 11-19
GSM/UMTS/CDMA Body-Worn SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.7	33.23	-0.03	10 mm	85097	1	1:8.3	back	0.317	1.114	0.353	A19
836.60	190	GSM 850	GPRS	28.0	27.41	-0.06	10 mm	85097	4	1:2.076	back	0.310	1.146	0.355	
1880.00	661	GSM 1900	GSM	30.7	30.00	0.02	10 mm	85097	1	1:8.3	back	0.226	1.175	0.266	
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.01	10 mm	85097	4	1:2.076	back	0.352	1.047	0.369	A21
836.60	4183	UMTS 850	RMC	25.3	25.05	0.04	10 mm	85097	N/A	1:1	back	0.395	1.059	0.418	A22
1712.40	1312	UMTS 1750	RMC	24.8	24.33	-0.01	10 mm	85089	N/A	1:1	back	0.884	1.114	0.985	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.01	10 mm	85089	N/A	1:1	back	0.932	1.102	**1.027**	A24
1752.60	1513	UMTS 1750	RMC	24.8	24.35	-0.02	10 mm	85089	N/A	1:1	back	0.879	1.109	0.975	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.01	10 mm	85089	N/A	1:1	back	0.911	1.102	1.004	
1852.40	9262	UMTS 1900	RMC	24.8	24.45	-0.01	10 mm	85170	N/A	1:1	back	0.701	1.084	0.760	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.02	10 mm	85170	N/A	1:1	back	0.754	1.050	0.792	
1907.60	9538	UMTS 1900	RMC	24.8	24.47	-0.02	10 mm	85170	N/A	1:1	back	0.781	1.079	0.843	A25
820.10	564	CDMA BC10 (§90S)	TDSO / SO32	25.3	24.60	0.07	10 mm	85089	N/A	1:1	back	0.305	1.175	0.358	A26
836.52	384	CDMA BC0 (§22H)	TDSO / SO32	25.3	24.63	0.02	10 mm	85089	N/A	1:1	back	0.486	1.167	0.567	A28
1851.25	25	PCS CDMA	TDSO / SO32	24.8	24.41	-0.05	10 mm	85170	N/A	1:1	back	0.652	1.094	0.713	
1880.00	600	PCS CDMA	TDSO / SO32	24.8	24.38	0.01	10 mm	85170	N/A	1:1	back	0.684	1.102	0.754	
1908.75	1175	PCS CDMA	TDSO / SO32	24.8	24.40	0.06	10 mm	85170	N/A	1:1	back	0.713	1.096	0.781	A30
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Body 1.6 W/kg (mW/g) averaged over 1 gram**									

Note: Blue entry represents variability measurement.

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-20
LTE Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.														(W/kg)		(W/kg)	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	-0.16	85139	QPSK	1	0	10 mm	back	1:1	0.382	1.000	0.382	A32
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.02	85139	QPSK	50	0	10 mm	back	1:1	0.242	1.230	0.298	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	0.13	85139	QPSK	1	49	10 mm	back	1:1	0.400	1.035	0.414	A34
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.04	85139	QPSK	25	0	10 mm	back	1:1	0.287	1.213	0.348	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.03	85071	QPSK	1	25	10 mm	back	1:1	0.299	1.009	0.302	A36
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.09	85071	QPSK	25	0	10 mm	back	1:1	0.201	1.169	0.235	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	0.08	85071	QPSK	1	36	10 mm	back	1:1	0.490	1.030	0.505	A38
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.01	85071	QPSK	36	37	10 mm	back	1:1	0.301	1.222	0.368	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.8	24.63	0.13	85071	QPSK	1	50	10 mm	back	1:1	0.813	1.040	0.846	A39
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.8	24.63	-0.06	85071	QPSK	1	99	10 mm	back	1:1	0.800	1.040	0.832	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	-0.13	85071	QPSK	1	99	10 mm	back	1:1	0.745	1.038	0.773	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.04	85071	QPSK	50	25	10 mm	back	1:1	0.541	1.242	0.672	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.73	0.03	85071	QPSK	100	0	10 mm	back	1:1	0.559	1.279	0.715	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.8	24.41	0.11	85071	QPSK	1	50	10 mm	back	1:1	0.607	1.094	0.664	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	0.06	85071	QPSK	1	0	10 mm	back	1:1	0.618	1.035	0.640	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.8	24.52	-0.09	85071	QPSK	1	50	10 mm	back	1:1	0.647	1.067	0.690	A40
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	-0.07	85071	QPSK	50	25	10 mm	back	1:1	0.414	1.265	0.524	
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 B41 Body-Worn SAR

MEASUREMENT RESULTS																				
Power Class	FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
	MHz	Ch.															(W/kg)		(W/kg)	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.01	0	85139	QPSK	1	50	10 mm	back	1:1.58	0.338	1.000	0.338	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.19	1	85139	QPSK	50	25	10 mm	back	1:1.58	0.235	1.000	0.235	
Power Class 2	2593.00	40620	Mid	LTE Band 41	20	26.5	26.50	0.09	0	85139	QPSK	1	50	10 mm	back	1:2.31	0.469	1.000	0.469	A42
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-22
DTS Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	20.0	19.64	-0.07	10 mm	85337	1	back	99.8	0.556	0.343	1.086	1.002	0.373	A44
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
NII Body-Worn SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
5300	60	802.11a	OFDM	20	17.5	16.71	-0.20	10 mm	85337	6	back	99.2	0.783	0.381	1.199	1.008	0.460	A45
5620	124	802.11a	OFDM	20	17.5	16.69	-0.09	10 mm	85337	6	back	99.2	0.729	0.349	1.205	1.008	0.424	
5785	157	802.11a	OFDM	20	17.5	17.12	-0.05	10 mm	85337	6	back	99.2	0.596	0.268	1.091	1.008	0.295	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-24
DSS Body-Worn SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441	39	Bluetooth	FHSS	10.5	10.38	0.00	10 mm	85337	1	back	77.1	0.041	1.028	1.297	0.055	A47
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

11.3 Standalone Hotspot SAR Data

Table 11-25
GPRS/UMTS/CDMA Hotspot SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	28.0	27.41	-0.06	10 mm	85097	4	1:2.076	back	0.310	1.146	0.355	
836.60	190	GSM 850	GPRS	28.0	27.41	0.01	10 mm	85097	4	1:2.076	front	0.273	1.146	0.313	
836.60	190	GSM 850	GPRS	28.0	27.41	-0.17	10 mm	85097	4	1:2.076	bottom	0.170	1.146	0.195	
836.60	190	GSM 850	GPRS	28.0	27.41	0.01	10 mm	85097	4	1:2.076	right	0.329	1.146	0.377	A20
836.60	190	GSM 850	GPRS	28.0	27.41	0.06	10 mm	85097	4	1:2.076	left	0.209	1.146	0.240	
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.01	10 mm	85097	4	1:2.076	back	0.352	1.047	0.369	A21
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.01	10 mm	85097	4	1:2.076	front	0.290	1.047	0.304	
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.08	10 mm	85097	4	1:2.076	bottom	0.278	1.047	0.291	
1880.00	661	GSM 1900	GPRS	25.5	25.30	-0.05	10 mm	85097	4	1:2.076	left	0.349	1.047	0.365	
836.60	4183	UMTS 850	RMC	25.3	25.05	0.04	10 mm	85097	N/A	1:1	back	0.395	1.059	0.418	
836.60	4183	UMTS 850	RMC	25.3	25.05	0.01	10 mm	85097	N/A	1:1	front	0.354	1.059	0.375	
836.60	4183	UMTS 850	RMC	25.3	25.05	0.00	10 mm	85097	N/A	1:1	bottom	0.203	1.059	0.215	
836.60	4183	UMTS 850	RMC	25.3	25.05	-0.01	10 mm	85097	N/A	1:1	right	0.408	1.059	0.432	A23
836.60	4183	UMTS 850	RMC	25.3	25.05	0.03	10 mm	85097	N/A	1:1	left	0.249	1.059	0.264	
1712.40	1312	UMTS 1750	RMC	24.8	24.33	-0.01	10 mm	85089	N/A	1:1	back	0.884	1.114	0.985	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.01	10 mm	85089	N/A	1:1	back	0.932	1.102	1.027	A24
1752.60	1513	UMTS 1750	RMC	24.8	24.35	-0.02	10 mm	85089	N/A	1:1	back	0.879	1.109	0.975	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	-0.02	10 mm	85089	N/A	1:1	front	0.709	1.102	0.781	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.08	10 mm	85089	N/A	1:1	bottom	0.340	1.102	0.375	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	-0.02	10 mm	85089	N/A	1:1	left	0.724	1.102	0.798	
1732.40	1412	UMTS 1750	RMC	24.8	24.38	0.01	10 mm	85089	N/A	1:1	back	0.911	1.102	1.004	
1852.40	9262	UMTS 1900	RMC	24.8	24.45	-0.01	10 mm	85170	N/A	1:1	back	0.701	1.084	0.760	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.02	10 mm	85170	N/A	1:1	back	0.754	1.050	0.792	
1907.60	9538	UMTS 1900	RMC	24.8	24.47	-0.02	10 mm	85170	N/A	1:1	back	0.781	1.079	0.843	A25
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.06	10 mm	85170	N/A	1:1	front	0.638	1.050	0.670	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.07	10 mm	85170	N/A	1:1	bottom	0.623	1.050	0.654	
1880.00	9400	UMTS 1900	RMC	24.8	24.59	0.00	10 mm	85170	N/A	1:1	left	0.754	1.050	0.792	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.3	24.63	0.02	10 mm	85089	N/A	1:1	back	0.241	1.167	0.281	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.3	24.63	0.08	10 mm	85089	N/A	1:1	front	0.213	1.167	0.249	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.3	24.63	-0.10	10 mm	85089	N/A	1:1	bottom	0.141	1.167	0.165	
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.3	24.63	-0.02	10 mm	85089	N/A	1:1	right	0.261	1.167	0.305	A27
820.10	564	CDMA BC10 (§90S)	EVDO Rev. 0	25.3	24.63	0.00	10 mm	85089	N/A	1:1	left	0.128	1.167	0.149	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.3	24.61	0.04	10 mm	85089	N/A	1:1	back	0.377	1.172	0.442	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.3	24.61	-0.03	10 mm	85089	N/A	1:1	front	0.327	1.172	0.383	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.3	24.61	-0.07	10 mm	85089	N/A	1:1	bottom	0.184	1.172	0.216	
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.3	24.61	0.15	10 mm	85089	N/A	1:1	right	0.393	1.172	0.461	A29
836.52	384	CDMA BC0 (§22H)	EVDO Rev. 0	25.3	24.61	0.01	10 mm	85089	N/A	1:1	left	0.235	1.172	0.275	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.8	24.28	0.00	10 mm	85170	N/A	1:1	back	0.578	1.127	0.651	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.8	24.28	0.06	10 mm	85170	N/A	1:1	front	0.515	1.127	0.580	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.8	24.28	-0.10	10 mm	85170	N/A	1:1	bottom	0.515	1.127	0.580	
1851.25	25	PCS CDMA	EVDO Rev. 0	24.8	24.30	0.03	10 mm	85170	N/A	1:1	left	0.679	1.122	0.762	
1880.00	600	PCS CDMA	EVDO Rev. 0	24.8	24.28	0.04	10 mm	85170	N/A	1:1	left	0.711	1.127	0.801	
1908.75	1175	PCS CDMA	EVDO Rev. 0	24.8	24.32	-0.07	10 mm	85170	N/A	1:1	left	0.795	1.117	0.888	A31
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

Note: Blue entry represents variability measurement.

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-26
LTE Band 71 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	-0.16	0	85139	QPSK	1	0	10 mm	back	1:1	0.382	1.000	0.382	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.02	1	85139	QPSK	50	0	10 mm	back	1:1	0.242	1.230	0.298	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	0.00	0	85139	QPSK	1	0	10 mm	front	1:1	0.396	1.000	0.396	A33
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.04	1	85139	QPSK	50	0	10 mm	front	1:1	0.263	1.230	0.323	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	0.11	0	85139	QPSK	1	0	10 mm	bottom	1:1	0.232	1.000	0.232	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	-0.01	1	85139	QPSK	50	0	10 mm	bottom	1:1	0.156	1.230	0.192	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	-0.12	0	85139	QPSK	1	0	10 mm	right	1:1	0.282	1.000	0.282	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	0.04	1	85139	QPSK	50	0	10 mm	right	1:1	0.184	1.230	0.226	
680.50	133297	Mid	LTE Band 71	20	25.3	25.30	0.04	0	85139	QPSK	1	0	10 mm	left	1:1	0.194	1.000	0.194	
680.50	133297	Mid	LTE Band 71	20	24.3	23.40	-0.01	1	85139	QPSK	50	0	10 mm	left	1:1	0.131	1.230	0.161	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-27
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	0.13	0	85139	QPSK	1	49	10 mm	back	1:1	0.400	1.035	0.414	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.04	1	85139	QPSK	25	0	10 mm	back	1:1	0.287	1.213	0.348	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	0.03	0	85139	QPSK	1	49	10 mm	front	1:1	0.462	1.035	0.478	A35
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.08	1	85139	QPSK	25	0	10 mm	front	1:1	0.298	1.213	0.361	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	0.10	0	85139	QPSK	1	49	10 mm	bottom	1:1	0.265	1.035	0.274	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.00	1	85139	QPSK	25	0	10 mm	bottom	1:1	0.171	1.213	0.207	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	0.01	0	85139	QPSK	1	49	10 mm	right	1:1	0.386	1.035	0.400	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	0.03	1	85139	QPSK	25	0	10 mm	right	1:1	0.307	1.213	0.372	
707.50	23095	Mid	LTE Band 12	10	25.3	25.15	-0.08	0	85139	QPSK	1	49	10 mm	left	1:1	0.220	1.035	0.228	
707.50	23095	Mid	LTE Band 12	10	24.3	23.46	-0.02	1	85139	QPSK	25	0	10 mm	left	1:1	0.177	1.213	0.215	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-28
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.03	0	85071	QPSK	1	25	10 mm	back	1:1	0.299	1.009	0.302	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.09	1	85071	QPSK	25	0	10 mm	back	1:1	0.201	1.169	0.235	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.06	0	85071	QPSK	1	25	10 mm	front	1:1	0.296	1.009	0.299	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	-0.08	1	85071	QPSK	25	0	10 mm	front	1:1	0.200	1.169	0.234	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	-0.10	0	85071	QPSK	1	25	10 mm	bottom	1:1	0.254	1.009	0.256	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.09	1	85071	QPSK	25	0	10 mm	bottom	1:1	0.164	1.169	0.192	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.04	0	85071	QPSK	1	25	10 mm	right	1:1	0.344	1.009	0.347	A37
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	0.04	1	85071	QPSK	25	0	10 mm	right	1:1	0.226	1.169	0.264	
782.00	23230	Mid	LTE Band 13	10	25.3	25.26	0.13	0	85071	QPSK	1	25	10 mm	left	1:1	0.191	1.009	0.193	
782.00	23230	Mid	LTE Band 13	10	24.3	23.62	-0.04	1	85071	QPSK	25	0	10 mm	left	1:1	0.118	1.169	0.138	
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 11-29
LTE Band 26 (Cell) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	0.08	0	85071	QPSK	1	36	10 mm	back	1:1	0.490	1.030	0.505	A38
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.01	1	85071	QPSK	36	37	10 mm	back	1:1	0.301	1.222	0.368	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	-0.01	0	85071	QPSK	1	36	10 mm	front	1:1	0.401	1.030	0.413	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	-0.07	1	85071	QPSK	36	37	10 mm	front	1:1	0.274	1.222	0.335	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	0.08	0	85071	QPSK	1	36	10 mm	bottom	1:1	0.193	1.030	0.199	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.03	1	85071	QPSK	36	37	10 mm	bottom	1:1	0.137	1.222	0.167	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	-0.02	0	85071	QPSK	1	36	10 mm	right	1:1	0.454	1.030	0.468	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	-0.01	1	85071	QPSK	36	37	10 mm	right	1:1	0.347	1.222	0.424	
831.50	26865	Mid	LTE Band 26 (Cell)	15	25.3	25.17	-0.16	0	85071	QPSK	1	36	10 mm	left	1:1	0.322	1.030	0.332	
831.50	26865	Mid	LTE Band 26 (Cell)	15	24.3	23.43	0.12	1	85071	QPSK	36	37	10 mm	left	1:1	0.235	1.222	0.287	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

© 2019 PCTEST Engineering Laboratory, Inc.

REV 21.3 M
02/15/2019

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-30
LTE Band 66 (AWS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.8	24.63	0.13	0	85071	QPSK	1	50	10 mm	back	1:1	0.813	1.040	0.846	A39
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.8	24.63	-0.06	0	85071	QPSK	1	99	10 mm	back	1:1	0.800	1.040	0.832	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	-0.13	0	85071	QPSK	1	99	10 mm	back	1:1	0.745	1.038	0.773	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.04	1	85071	QPSK	50	25	10 mm	back	1:1	0.541	1.242	0.672	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.73	0.03	1	85071	QPSK	100	0	10 mm	back	1:1	0.559	1.279	0.715	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	0.00	0	85071	QPSK	1	99	10 mm	front	1:1	0.601	1.038	0.624	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.03	1	85071	QPSK	50	25	10 mm	front	1:1	0.448	1.242	0.556	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	0.12	0	85071	QPSK	1	99	10 mm	bottom	1:1	0.351	1.038	0.364	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.05	1	85071	QPSK	50	25	10 mm	bottom	1:1	0.214	1.242	0.266	
1720.00	132072	Low	LTE Band 66 (AWS)	20	24.8	24.63	0.06	0	85071	QPSK	1	50	10 mm	left	1:1	0.725	1.040	0.754	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	24.8	24.63	0.13	0	85071	QPSK	1	99	10 mm	left	1:1	0.672	1.040	0.699	
1770.00	132572	High	LTE Band 66 (AWS)	20	24.8	24.64	-0.01	0	85071	QPSK	1	99	10 mm	left	1:1	0.770	1.038	0.799	
1720.00	132072	Low	LTE Band 66 (AWS)	20	23.8	22.86	0.04	1	85071	QPSK	50	25	10 mm	left	1:1	0.470	1.242	0.584	
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 11-31
LTE Band 25 (PCS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.8	24.41	0.11	0	85139	QPSK	1	50	10 mm	back	1:1	0.607	1.094	0.664	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	0.06	0	85139	QPSK	1	0	10 mm	back	1:1	0.618	1.035	0.640	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.8	24.52	-0.09	0	85139	QPSK	1	50	10 mm	back	1:1	0.647	1.067	0.690	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	-0.07	1	85139	QPSK	50	25	10 mm	back	1:1	0.414	1.265	0.524	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	0.01	0	85139	QPSK	1	0	10 mm	front	1:1	0.584	1.035	0.604	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	0.08	1	85139	QPSK	50	25	10 mm	front	1:1	0.406	1.265	0.514	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	-0.09	0	85139	QPSK	1	0	10 mm	bottom	1:1	0.502	1.035	0.520	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	0.01	1	85139	QPSK	50	25	10 mm	bottom	1:1	0.353	1.265	0.447	
1860.00	26140	Low	LTE Band 25 (PCS)	20	24.8	24.41	0.17	0	85139	QPSK	1	50	10 mm	left	1:1	0.638	1.094	0.698	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.8	24.65	-0.02	0	85139	QPSK	1	0	10 mm	left	1:1	0.627	1.035	0.649	
1905.00	26590	High	LTE Band 25 (PCS)	20	24.8	24.52	0.09	0	85139	QPSK	1	50	10 mm	left	1:1	0.692	1.067	0.738	A41
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.8	22.78	-0.08	1	85139	QPSK	50	25	10 mm	left	1:1	0.447	1.265	0.565	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram										

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-32
LTE Band 41 Hotspot SAR

MEASUREMENT RESULTS																				
Power Class	FREQUENCY			Side	Modulation	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Device Serial Number	RB Size	RB Offset	MPR [dB]	Spacing	Maximum Allowed Power	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
	MHz	Ch.															(W/kg)		(W/kg)	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.01	0	85139	QPSK	1	50	10 mm	back	1:1.58	0.338	1.000	0.338	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.19	1	85139	QPSK	50	25	10 mm	back	1:1.58	0.235	1.000	0.235	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	-0.04	0	85139	QPSK	1	50	10 mm	front	1:1.58	0.523	1.000	0.523	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.13	1	85139	QPSK	50	25	10 mm	front	1:1.58	0.374	1.000	0.374	
Power Class 3	2506.00	39750	Low	LTE Band 41	20	23.5	23.48	-0.10	0	85139	QPSK	1	50	10 mm	bottom	1:1.58	0.897	1.005	0.901	
Power Class 3	2549.50	40185	Low-Mid	LTE Band 41	20	23.5	23.39	0.08	0	85139	QPSK	1	50	10 mm	bottom	1:1.58	0.933	1.026	0.957	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.18	0	85139	QPSK	1	50	10 mm	bottom	1:1.58	0.907	1.000	0.907	
Power Class 3	2636.50	41055	Mid-High	LTE Band 41	20	23.5	23.48	-0.12	0	85139	QPSK	1	50	10 mm	bottom	1:1.58	0.946	1.005	0.951	
Power Class 3	2680.00	41490	High	LTE Band 41	20	23.5	23.43	0.14	0	85139	QPSK	1	50	10 mm	bottom	1:1.58	0.919	1.016	0.934	
Power Class 3	2506.00	39750	Low	LTE Band 41	20	22.5	22.26	-0.05	1	85139	QPSK	50	25	10 mm	bottom	1:1.58	0.616	1.057	0.651	
Power Class 3	2549.50	40185	Low-Mid	LTE Band 41	20	22.5	22.47	-0.12	1	85139	QPSK	50	0	10 mm	bottom	1:1.58	0.622	1.007	0.626	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.05	1	85139	QPSK	50	25	10 mm	bottom	1:1.58	0.648	1.000	0.648	
Power Class 3	2636.50	41055	Mid-High	LTE Band 41	20	22.5	22.48	-0.01	1	85139	QPSK	50	0	10 mm	bottom	1:1.58	0.644	1.005	0.647	
Power Class 3	2680.00	41490	High	LTE Band 41	20	22.5	22.46	-0.04	1	85139	QPSK	50	25	10 mm	bottom	1:1.58	0.645	1.009	0.651	
Power Class 3	2636.50	41055	Mid-High	LTE Band 41	20	22.5	22.33	0.05	1	85139	QPSK	100	0	10 mm	bottom	1:1.58	0.664	1.040	0.691	
Power Class 2	2549.50	40185	Low-Mid	LTE Band 41	20	26.5	25.95	-0.03	0	85139	QPSK	1	50	10 mm	bottom	1:2.31	1.100	1.135	**1.249**	A43
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	0.14	0	85139	QPSK	1	50	10 mm	right	1:1.58	0.057	1.000	0.057	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.20	1	85139	QPSK	50	25	10 mm	right	1:1.58	0.041	1.000	0.041	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	23.5	23.50	-0.18	0	85139	QPSK	1	50	10 mm	left	1:1.58	0.101	1.000	0.101	
Power Class 3	2593.00	40620	Mid	LTE Band 41	20	22.5	22.50	0.03	1	85139	QPSK	50	25	10 mm	left	1:1.58	0.071	1.000	0.071	
Power Class 2	2549.50	40185	Low-Mid	LTE Band 41	20	26.5	25.95	-0.07	0	85139	QPSK	1	50	10 mm	bottom	1:2.31	1.040	1.135	1.180	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

Note: Blue entry represents variability measurement.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 11-33
WLAN Hotspot SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												W/kg	(W/kg)			(W/kg)	
2437	6	802.11b	DSSS	22	20.0	19.64	-0.07	10 mm	85337	1	back	99.8	0.556	0.343	1.086	1.002	**0.373**	A44
2437	6	802.11b	DSSS	22	20.0	19.64	-0.03	10 mm	85337	1	front	99.8	0.362	-	1.086	1.002	-	
2437	6	802.11b	DSSS	22	20.0	19.64	-0.09	10 mm	85337	1	top	99.8	0.500	0.320	1.086	1.002	0.348	
2437	6	802.11b	DSSS	22	20.0	19.64	-0.13	10 mm	85337	1	right	99.8	0.229	-	1.086	1.002	-	
5220	44	802.11a	OFDM	20	17.5	16.81	-0.04	10 mm	85337	6	back	99.2	0.961	0.460	1.172	1.008	**0.543**	A46
5220	44	802.11a	OFDM	20	17.5	16.81	-0.16	10 mm	85337	6	front	99.2	0.654	-	1.172	1.008	-	
5220	44	802.11a	OFDM	20	17.5	16.81	-0.14	10 mm	85337	6	top	99.2	0.834	0.359	1.172	1.008	0.424	
5220	44	802.11a	OFDM	20	17.5	16.81	0.13	10 mm	85337	6	right	99.2	0.287	-	1.172	1.008	-	
5785	157	802.11a	OFDM	20	17.5	17.12	-0.05	10 mm	85337	6	back	99.2	0.596	0.268	1.091	1.008	0.295	
5785	157	802.11a	OFDM	20	17.5	17.12	-0.08	10 mm	85337	6	front	99.2	0.527	-	1.091	1.008	-	
5785	157	802.11a	OFDM	20	17.5	17.12	-0.10	10 mm	85337	6	top	99.2	0.956	0.426	1.091	1.008	0.468	
5785	157	802.11a	OFDM	20	17.5	17.12	-0.15	10 mm	85337	6	right	99.2	0.219	-	1.091	1.008	-	
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 11-34
DSS Hotspot SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)			(W/kg)	
2441	39	Bluetooth	FHSS	10.5	10.38	0.00	10 mm	85337	1	back	77.1	0.041	1.028	1.297	**0.055**	
2441	39	Bluetooth	FHSS	10.5	10.38	0.15	10 mm	85337	1	front	77.1	0.031	1.028	1.297	0.041	
2441	39	Bluetooth	FHSS	10.5	10.38	0.13	10 mm	85337	1	top	77.1	0.041	1.028	1.297	**0.055**	A48
2441	39	Bluetooth	FHSS	10.5	10.38	0.11	10 mm	85337	1	right	77.1	0.024	1.028	1.297	0.032	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**									**Body** **1.6 W/kg (mW/g)** averaged over 1 gram							

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).

GSM Test Notes:

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

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per FCC KDB Publication 941225 D01v03r01.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. EVDO Rev0 and RevA and TDSO / SO32 FCH+SCH SAR tests were not required per the 3G SAR Test Reduction Procedure in FCC KDB Publication 941225 D01v03r01.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01v03r01 procedures for data devices. Wireless Router SAR tests for Subtype 2 of Rev.A and 1x RTT configurations were not required per the 3G SAR Test Reduction Policy in KDB Publication 941225 D01v03r01.
4. Head SAR was additionally evaluated using EVDO Rev. A to determine compliance for VoIP operations.
5. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.
6. CDMA 1X Advanced technology was not required for SAR since the maximum allowed output powers for 1X Advanced was not more than 0.25 dB higher than the maximum powers for 1X.

UMTS Notes:

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.6.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3 % using UL-DL configuration 1. Per FCC Guidance, all SAR tests were performed using Power Class 3. SAR with power class 2 at the available duty factor was additionally performed for the power class 3 configuration with the highest SAR configuration for each exposure conditions. Please see Section **14** for linearity results.

WLAN Notes:

1. For held-to-ear, and hotspot, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g evaluations, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 8.7.5 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg for 1g evaluations. See Section 8.7.6 for more information.
4. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg for 1g evaluations or all test channels were measured.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

Bluetooth Notes

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 9.6 for the time domain plot and calculation for the duty factor of the device.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

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)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.296	1.118	1.414
	GSM/GPRS 1900	0.347	1.118	1.465
	UMTS 850	0.316	1.118	1.434
	UMTS 1750	0.680	1.118	See Table Below
	UMTS 1900	0.658	1.118	See Table Below
	CDMA/EVDO BC10 (§90S)	0.279	1.118	1.397
	CDMA/EVDO BC0 (§22H)	0.392	1.118	1.510
	PCS CDMA/EVDO	0.716	1.118	See Table Below
	LTE Band 71	0.230	1.118	1.348
	LTE Band 12	0.332	1.118	1.450
	LTE Band 13	0.173	1.118	1.291
	LTE Band 26 (Cell)	0.307	1.118	1.425
	LTE Band 66 (AWS)	0.703	1.118	See Table Below
	LTE Band 25 (PCS)	0.562	1.118	See Table Below
	LTE Band 41	0.207	1.118	1.325

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Head SAR	Right Cheek	0.287	1.118*	1.405	N/A
	Right Tilt	0.380	1.118*	1.498	N/A
	Left Cheek	0.680	1.118	See Note 1	0.03
	Left Tilt	0.324	0.634	0.958	N/A

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Head SAR	Right Cheek	0.322	1.118*	1.440	N/A
	Right Tilt	0.232	1.118*	1.350	N/A
	Left Cheek	0.658	1.118	See Note 1	0.03
	Left Tilt	0.244	0.634	0.878	N/A

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Simult Tx	Configuration	PCS CDMA SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Head SAR	Right Cheek	0.390	1.118*	1.508	N/A
	Right Tilt	0.282	1.118*	1.400	N/A
	Left Cheek	0.716	1.118	See Note 1	0.03
	Left Tilt	0.263	0.634	0.897	N/A

Simult Tx	Configuration	PCS EVDO SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Head SAR	Right Cheek	0.372	1.118*	1.490	N/A
	Right Tilt	0.261	1.118*	1.379	N/A
	Left Cheek	0.704	1.118	See Note 1	0.03
	Left Tilt	0.257	0.634	0.891	N/A

Simult Tx	Configuration	LTE Band 66 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Head SAR	Right Cheek	0.305	1.118*	1.423	N/A
	Right Tilt	0.374	1.118*	1.492	N/A
	Left Cheek	0.703	1.118	See Note 1	0.03
	Left Tilt	0.311	0.634	0.945	N/A

Simult Tx	Configuration	LTE Band 25 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	SPLSR
		1	2	1+2	1+2
Head SAR	Right Cheek	0.323	1.118*	1.441	N/A
	Right Tilt	0.201	1.118*	1.319	N/A
	Left Cheek	0.562	1.118	See Note 1	0.03
	Left Tilt	0.195	0.634	0.829	N/A

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)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.296	0.594	0.890
	GSM/GPRS 1900	0.347	0.594	0.941
	UMTS 850	0.316	0.594	0.910
	UMTS 1750	0.680	0.594	1.274
	UMTS 1900	0.658	0.594	1.252
	CDMA/EVDO BC10 (§90S)	0.279	0.594	0.873
	CDMA/EVDO BC0 (§22H)	0.392	0.594	0.986
	PCS CDMA/EVDO	0.716	0.594	1.310
	LTE Band 71	0.230	0.594	0.824
	LTE Band 12	0.332	0.594	0.926
	LTE Band 13	0.173	0.594	0.767
	LTE Band 26 (Cell)	0.307	0.594	0.901
	LTE Band 66 (AWS)	0.703	0.594	1.297
	LTE Band 25 (PCS)	0.562	0.594	1.156
	LTE Band 41	0.207	0.594	0.801

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM/GPRS 850	0.296	0.279	0.575
	GSM/GPRS 1900	0.347	0.279	0.626
	UMTS 850	0.316	0.279	0.595
	UMTS 1750	0.680	0.279	0.959
	UMTS 1900	0.658	0.279	0.937
	CDMA/EVDO BC10 (§90S)	0.279	0.279	0.558
	CDMA/EVDO BC0 (§22H)	0.392	0.279	0.671
	PCS CDMA/EVDO	0.716	0.279	0.995
	LTE Band 71	0.230	0.279	0.509
	LTE Band 12	0.332	0.279	0.611
	LTE Band 13	0.173	0.279	0.452
	LTE Band 26 (Cell)	0.307	0.279	0.586
	LTE Band 66 (AWS)	0.703	0.279	0.982
	LTE Band 25 (PCS)	0.562	0.279	0.841
	LTE Band 41	0.207	0.279	0.486

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 12-4
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	GSM/GPRS 850	0.296	0.594	0.279	1.169
	GSM/GPRS 1900	0.347	0.594	0.279	1.220
	UMTS 850	0.316	0.594	0.279	1.189
	UMTS 1750	0.680	0.594	0.279	1.553
	UMTS 1900	0.658	0.594	0.279	1.531
	CDMA/EVDO BC10 (§90S)	0.279	0.594	0.279	1.152
	CDMA/EVDO BC0 (§22H)	0.392	0.594	0.279	1.265
	PCS CDMA/EVDO	0.716	0.594	0.279	**1.589**
	LTE Band 71	0.230	0.594	0.279	1.103
	LTE Band 12	0.332	0.594	0.279	1.205
	LTE Band 13	0.173	0.594	0.279	1.046
	LTE Band 26 (Cell)	0.307	0.594	0.279	1.180
	LTE Band 66 (AWS)	0.703	0.594	0.279	1.576
	LTE Band 25 (PCS)	0.562	0.594	0.279	1.435
	LTE Band 41	0.207	0.594	0.279	1.080

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-5
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.355	0.373	0.728
	GSM/GPRS 1900	0.369	0.373	0.742
	UMTS 850	0.418	0.373	0.791
	UMTS 1750	1.027	0.373	1.400
	UMTS 1900	0.843	0.373	1.216
	CDMA BC10 (§90S)	0.358	0.373	0.731
	CDMA BC0 (§22H)	0.567	0.373	0.940
	PCS CDMA	0.781	0.373	1.154
	LTE Band 71	0.382	0.373	0.755
	LTE Band 12	0.414	0.373	0.787
	LTE Band 13	0.302	0.373	0.675
	LTE Band 26 (Cell)	0.505	0.373	0.878
	LTE Band 66 (AWS)	0.846	0.373	1.219
	LTE Band 25 (PCS)	0.690	0.373	1.063
	LTE Band 41	0.469	0.373	0.842

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 12-6
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)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.355	0.460	0.815
	GSM/GPRS 1900	0.369	0.460	0.829
	UMTS 850	0.418	0.460	0.878
	UMTS 1750	1.027	0.460	1.487
	UMTS 1900	0.843	0.460	1.303
	CDMA BC10 (§90S)	0.358	0.460	0.818
	CDMA BC0 (§22H)	0.567	0.460	1.027
	PCS CDMA	0.781	0.460	1.241
	LTE Band 71	0.382	0.460	0.842
	LTE Band 12	0.414	0.460	0.874
	LTE Band 13	0.302	0.460	0.762
	LTE Band 26 (Cell)	0.505	0.460	0.965
	LTE Band 66 (AWS)	0.846	0.460	1.306
	LTE Band 25 (PCS)	0.690	0.460	1.150
	LTE Band 41	0.469	0.460	0.929

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM/GPRS 850	0.355	0.055	0.410
	GSM/GPRS 1900	0.369	0.055	0.424
	UMTS 850	0.418	0.055	0.473
	UMTS 1750	1.027	0.055	1.082
	UMTS 1900	0.843	0.055	0.898
	CDMA BC10 (§90S)	0.358	0.055	0.413
	CDMA BC0 (§22H)	0.567	0.055	0.622
	PCS CDMA	0.781	0.055	0.836
	LTE Band 71	0.382	0.055	0.437
	LTE Band 12	0.414	0.055	0.469
	LTE Band 13	0.302	0.055	0.357
	LTE Band 26 (Cell)	0.505	0.055	0.560
	LTE Band 66 (AWS)	0.846	0.055	0.901
	LTE Band 25 (PCS)	0.690	0.055	0.745
	LTE Band 41	0.469	0.055	0.524

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 12-8
Simultaneous Transmission Scenario with 5 GHz WLAN and Bluetooth (Body-Worn at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body-Worn	GSM/GPRS 850	0.355	0.460	0.055	0.870
	GSM/GPRS 1900	0.369	0.460	0.055	0.884
	UMTS 850	0.418	0.460	0.055	0.933
	UMTS 1750	1.027	0.460	0.055	**1.542**
	UMTS 1900	0.843	0.460	0.055	1.358
	CDMA BC10 (§90S)	0.358	0.460	0.055	0.873
	CDMA BC0 (§22H)	0.567	0.460	0.055	1.082
	PCS CDMA	0.781	0.460	0.055	1.296
	LTE Band 71	0.382	0.460	0.055	0.897
	LTE Band 12	0.414	0.460	0.055	0.929
	LTE Band 13	0.302	0.460	0.055	0.817
	LTE Band 26 (Cell)	0.505	0.460	0.055	1.020
	LTE Band 66 (AWS)	0.846	0.460	0.055	1.361
	LTE Band 25 (PCS)	0.690	0.460	0.055	1.205
	LTE Band 41	0.469	0.460	0.055	0.984

12.5 Hotspot SAR Simultaneous Transmission Analysis

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 12-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.377	0.373	0.750
	GPRS 1900	0.369	0.373	0.742
	UMTS 850	0.432	0.373	0.805
	UMTS 1750	1.027	0.373	1.400
	UMTS 1900	0.843	0.373	1.216
	EVDO BC10 (§90S)	0.305	0.373	0.678
	EVDO BC0 (§22H)	0.461	0.373	0.834
	PCS EVDO	0.888	0.373	1.261
	LTE Band 71	0.396	0.373	0.769
	LTE Band 12	0.478	0.373	0.851
	LTE Band 13	0.347	0.373	0.720
	LTE Band 26 (Cell)	0.505	0.373	0.878
	LTE Band 66 (AWS)	0.846	0.373	1.219
	LTE Band 25 (PCS)	0.738	0.373	1.111
	LTE Band 41	1.249	0.373	See Table Below

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	Back	0.469	0.373	0.842
	Front	0.523	0.373*	0.896
	Top	-	0.348	0.348
	Bottom	1.249	-	**1.249**
	Right	0.057	0.373*	0.430
	Left	0.101	-	0.101

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 12-10
Simultaneous Transmission Scenario with 5 GHz WLAN (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.377	0.543	0.920
	GPRS 1900	0.369	0.543	0.912
	UMTS 850	0.432	0.543	0.975
	UMTS 1750	1.027	0.543	**1.570**
	UMTS 1900	0.843	0.543	1.386
	EVDO BC10 (§90S)	0.305	0.543	0.848
	EVDO BC0 (§22H)	0.461	0.543	1.004
	PCS EVDO	0.888	0.543	1.431
	LTE Band 71	0.396	0.543	0.939
	LTE Band 12	0.478	0.543	1.021
	LTE Band 13	0.347	0.543	0.890
	LTE Band 26 (Cell)	0.505	0.543	1.048
	LTE Band 66 (AWS)	0.846	0.543	1.389
	LTE Band 25 (PCS)	0.738	0.543	1.281
	LTE Band 41	1.249	0.543	See Table Below

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	Back	0.469	0.543	1.012
	Front	0.523	0.543*	1.066
	Top	-	0.468	0.468
	Bottom	1.249	-	1.249
	Right	0.057	0.543*	0.600
	Left	0.101	-	0.101

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 12-11
Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	GPRS 850	0.377	0.055	0.432
	GPRS 1900	0.369	0.055	0.424
	UMTS 850	0.432	0.055	0.487
	UMTS 1750	1.027	0.055	1.082
	UMTS 1900	0.843	0.055	0.898
	EVDO BC10 (§90S)	0.305	0.055	0.360
	EVDO BC0 (§22H)	0.461	0.055	0.516
	PCS EVDO	0.888	0.055	0.943
	LTE Band 71	0.396	0.055	0.451
	LTE Band 12	0.478	0.055	0.533
	LTE Band 13	0.347	0.055	0.402
	LTE Band 26 (Cell)	0.505	0.055	0.560
	LTE Band 66 (AWS)	0.846	0.055	0.901
	LTE Band 25 (PCS)	0.738	0.055	0.793
	LTE Band 41	1.249	0.055	1.304

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	GPRS 850	0.377	0.543	0.055	0.975
	GPRS 1900	0.369	0.543	0.055	0.967
	UMTS 850	0.432	0.543	0.055	1.030
	UMTS 1750	1.027	0.543	0.055	See Table Below
	UMTS 1900	0.843	0.543	0.055	1.441
	EVDO BC10 (§90S)	0.305	0.543	0.055	0.903
	EVDO BC0 (§22H)	0.461	0.543	0.055	1.059
	PCS EVDO	0.888	0.543	0.055	1.486
	LTE Band 71	0.396	0.543	0.055	0.994
	LTE Band 12	0.478	0.543	0.055	1.076
	LTE Band 13	0.347	0.543	0.055	0.945
	LTE Band 26 (Cell)	0.505	0.543	0.055	1.103
	LTE Band 66 (AWS)	0.846	0.543	0.055	1.444
	LTE Band 25 (PCS)	0.738	0.543	0.055	1.336
	LTE Band 41	1.249	0.543	0.055	See Table Below

Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)	SPLSR		
		1	2	3	1+2+3	1+2	1+3	2+3
Hotspot SAR	Back	1.027	0.543	0.055	See Note 1	0.02	0.01	0.03
	Front	0.781	0.543*	0.041	1.275	N/A	N/A	N/A
	Top	-	0.468	0.055	0.623	N/A	N/A	N/A
	Bottom	0.375	-	-	0.375	N/A	N/A	N/A
	Right	-	0.543*	0.032	0.575	N/A	N/A	N/A
	Left	0.798	-	-	0.798	N/A	N/A	N/A

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Simult Tx	Configuration	LTE Band 41 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.338	0.543	0.055	0.936
	Front	0.523	0.543*	0.041	1.107
	Top	-	0.468	0.055	0.523
	Bottom	1.249	-	-	**1.249**
	Right	0.057	0.543*	0.032	0.632
	Left	0.101	-	-	0.101

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

12.6 SPLSR Evaluation and Analysis

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

$$\text{Distance}_{Tx1-Tx2} = R_i = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2} \text{ (Head)}$$

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

12.6.1 Head SAR SPLSR Evaluation and Analysis

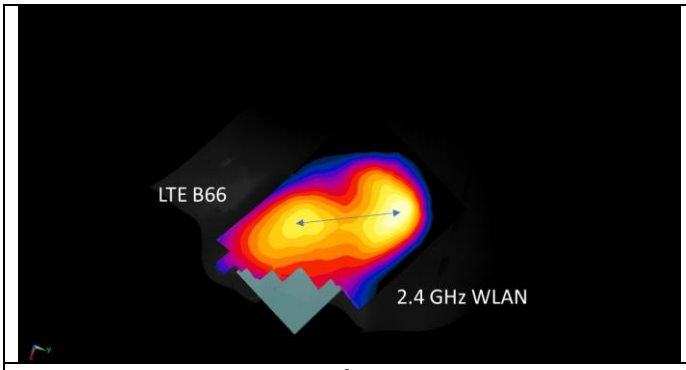
Table 12-13
Peak SAR Locations for Head SAR – Left Cheek

Mode/Band	x (mm)	y (mm)	z (mm)	Reported SAR (W/kg)
LTE B66	64.62	252.23	-173.31	0.703
UMTS 1750	67.93	248.58	-175.55	0.680
2.4 GHz WLAN	20.22	327.07	-173.94	1.118
PCS CDMA	53.15	250.11	-175.72	0.716
PCS EVDO	53.16	250.09	-175.78	0.704
UMTS 1900	52.00	249.00	-175.80	0.658
LTE Band 25 (PCS)	52.14	252.38	-176.21	0.562

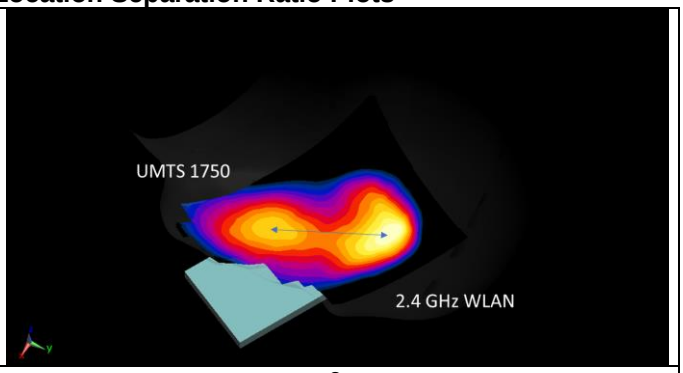
Table 12-14
Head SAR – Left Cheek to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D_{a-b}	$(a+b)^{1.5}/D_{a-b}$	
2.4 GHz WLAN	LTE B66	1.118	0.703	1.821	87.02	0.03	1
2.4 GHz WLAN	UMTS 1750	1.118	0.680	1.798	91.87	0.03	2
2.4 GHz WLAN	PCS CDMA	1.118	0.716	1.834	83.73	0.03	3
2.4 GHz WLAN	PCS EVDO	1.118	0.704	1.822	83.75	0.03	4
2.4 GHz WLAN	UMTS 1900	1.118	0.658	1.776	84.31	0.03	5
2.4 GHz WLAN	LTE Band 25 (PCS)	1.118	0.562	1.68	81.26	0.03	6

Table 12-15
Head SAR – Left Cheek to Peak Location Separation Ratio Plots

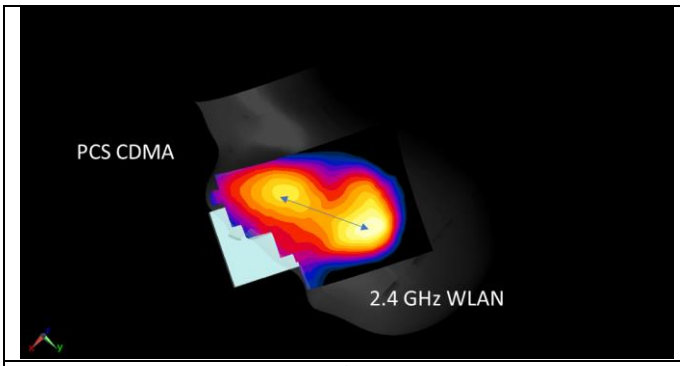


1

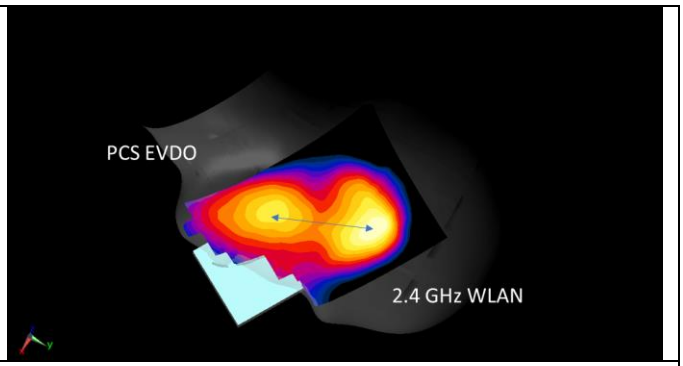


2

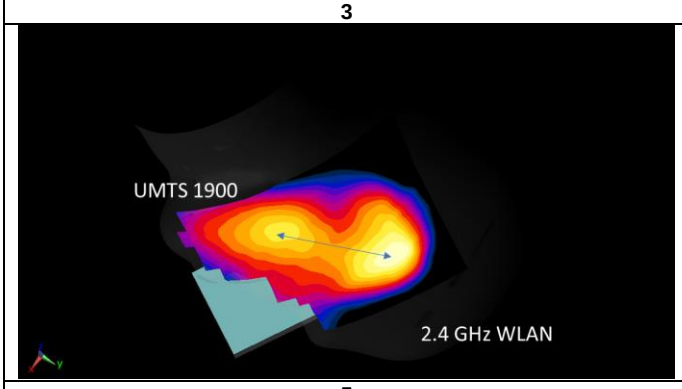
© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



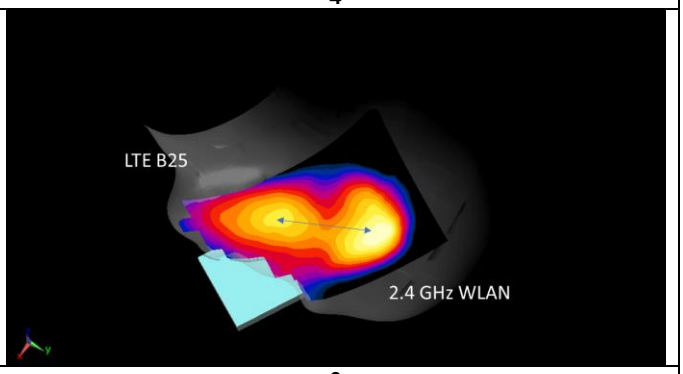
3



4



5



6

12.6.2 Back Side SPLSR Evaluation and Analysis

Table 12-16
Peak SAR Locations for Hotspot Back Side

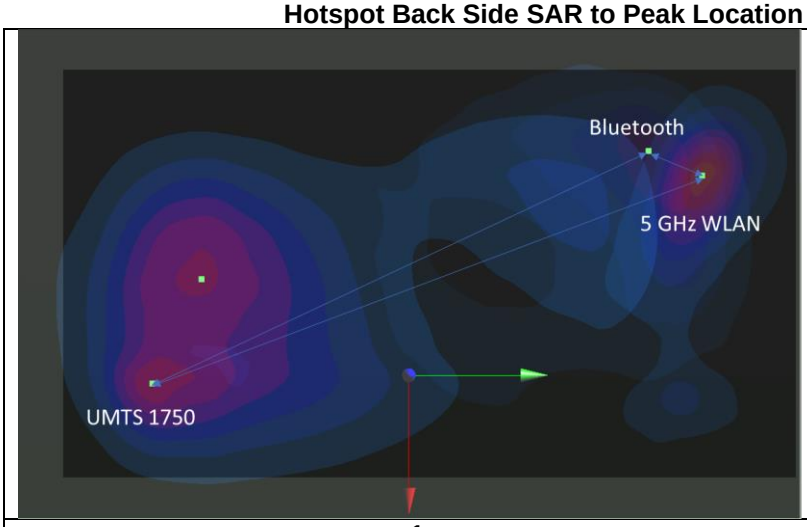
Mode/Band	x (mm)	y (mm)	Reported SAR (W/kg)
5 GHz WLAN	-46.00	72.00	0.543
UMTS 1750	-23.50	-51.00	1.027
Bluetooth	-55.00	58.80	0.055

Table 12-17
Hotspot Back Side SAR to Peak Location Separation Ratio Calculations

Antenna Pair		Standalone SAR (W/kg)		Standalone SAR Sum (W/kg)	Peak SAR Separation Distance (mm)	SPLS Ratio	Plot Number
Ant "a"	Ant "b"	a	b	a+b	D_{a-b}	$(a+b)^{1.5}/D_{a-b}$	
UMTS 1750	5 GHz WLAN	1.027	0.543	1.57	125.04	0.02	1
5 GHz WLAN	Bluetooth	0.543	0.055	0.598	15.98	0.03	1
UMTS 1750	Bluetooth	1.027	0.055	1.082	114.23	0.01	1

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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



1

12.7 Simultaneous Transmission Conclusion

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

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

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

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

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

Table 13-1
Head SAR Measurement Variability Results

HEAD VARIABILITY RESULTS															
Band	FREQUENCY		Mode	Service	Side	Test Position	Data Rate (Mbps)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
2450	2412.00	1	802.11b, 22 MHz Bandwidth	DSSS	Left	Cheek	1	0.952	0.915	1.04	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Head 1.6 W/kg (mW/g) averaged over 1 gram									

Table 13-2
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.					(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1732.40	1412	UMTS 1750	RMC	back	10 mm	0.932	0.911	1.02	N/A	N/A	N/A	N/A
2600	2549.50	40185	LTE Band 41 Power Class 2, 20 MHz Bandwidth	QPSK, 1 RB, 50 RB Offset	bottom	10 mm	1.100	1.040	1.06	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram								

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

13.2 Measurement Uncertainty

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

14 ADDITIONAL TESTING PER FCC GUIDANCE

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

This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3 % using UL-DL configuration 1. Per May 2017 TCB Workshop Notes based on the device behavior, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the highest power and available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR for each exposure condition. The linearity between the Power Class 2 and Power Class 3 SAR results and the respective frame averaged powers was calculated to determine that the results were linear. Per May 2017 TCB Workshop, no additional SAR measurements were required since the linearity between power classes was < 10% and all reported SAR values were < 1.4 W/kg for 1g and < 3.5 W/kg for 10g.

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

Table 14-1
LTE Band 41 Head Linearity Data

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	23.5	26.5
Measured Output Power (dBm)	23.5	**26.5**
Measured SAR (W/kg)	0.157	0.207
Measured Power (mW)	223.87	446.68
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	141.71	193.41
% deviation from expected linearity		-3.40%

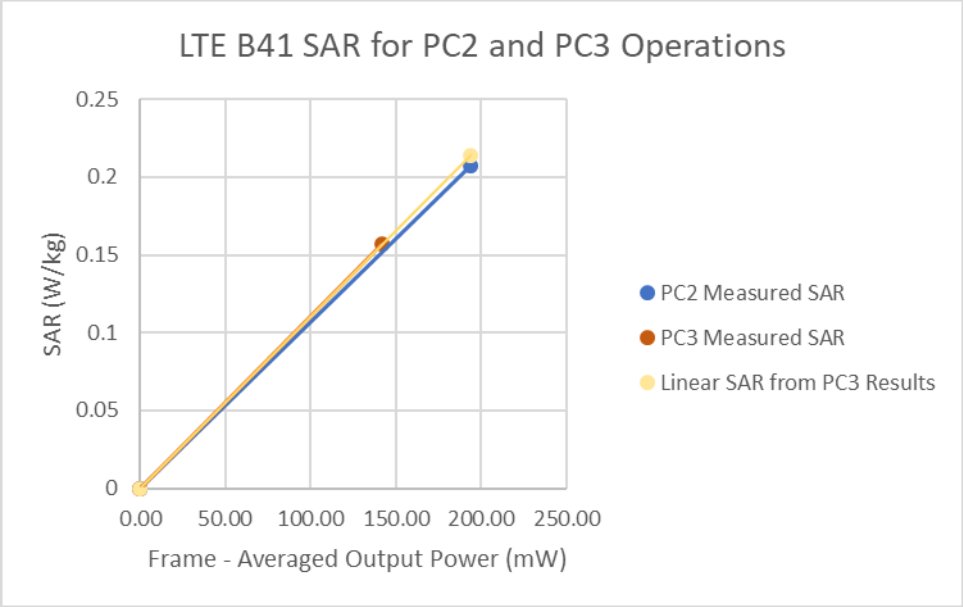


Figure 14-1
LTE Band 41 Head Linearity

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	23.5	26.5
Measured Output Power (dBm)	23.5	**26.5**
Measured SAR (W/kg)	0.338	0.469
Measured Power (mW)	223.87	446.68
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	141.71	193.41
% deviation from expected linearity		1.67%

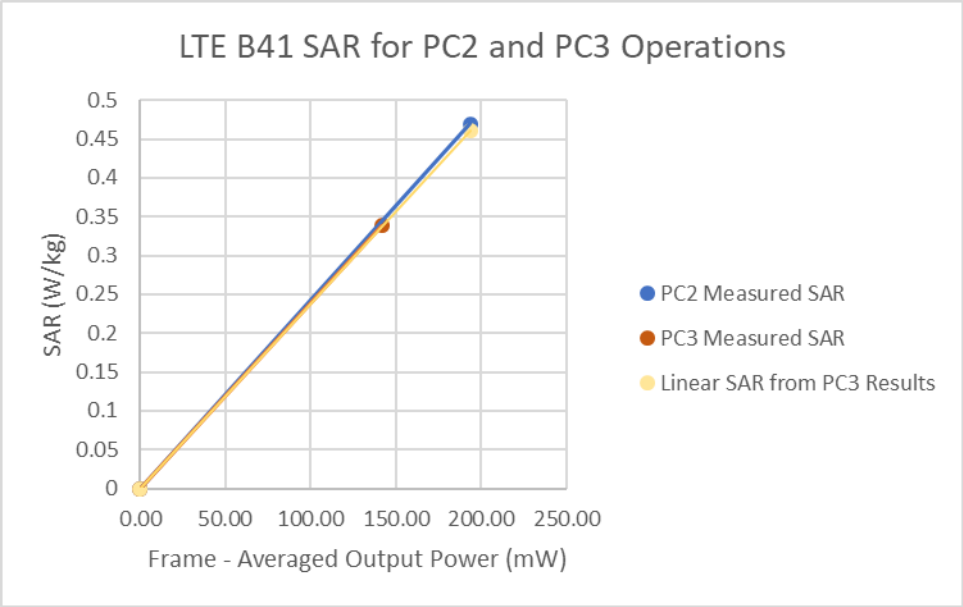


Figure 14-2
LTE Band 41 Body-Worn Linearity

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

Table 14-3
LTE Band 41 Hotspot Linearity Data

	LTE Band 41 PC3	LTE Band 41 PC2
Maximum Allowed Output Power (dBm)	23.5	26.5
Measured Output Power (dBm)	23.39	**25.95**
Measured SAR (W/kg)	0.933	1.04
Measured Power (mW)	218.27	393.55
Duty Cycle	63.3%	43.3%
Frame Averaged Output Power (mW)	138.17	170.41
% deviation from expected linearity		-9.62%

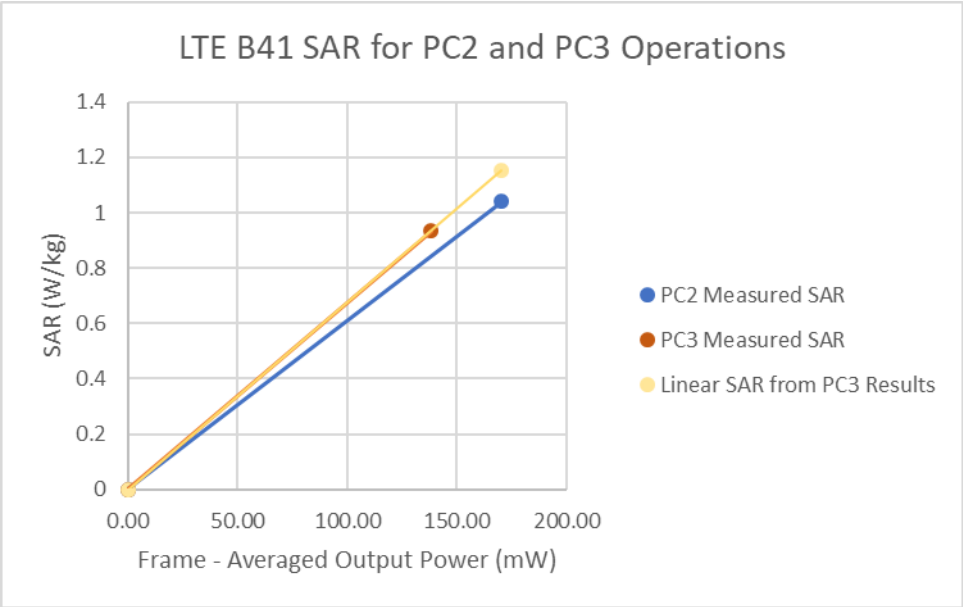


Figure 14-3
LTE Band 41 Hotspot Linearity

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	E4438C	ESG Vector Signal Generator	3/8/2019	Biennial	3/8/2021	MY42082385
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Agilent	8753ES	Network Analyzer	3/19/2019	Annual	3/19/2020	MY40001472
Agilent	8753ES	S-Parameter Network Analyzer	3/11/2019	Annual	3/11/2020	US39170122
Agilent	8753ES	S-Parameter Network Analyzer	10/2/2018	Annual	10/2/2019	US39170118
Agilent	8753ES	S-Parameter Vector Network Analyzer	8/30/2018	Annual	8/30/2019	MY40003841
Agilent	E5515C	Wireless Communications Test Set	2/7/2018	Triennial	2/7/2021	GB43304447
Agilent	E5515C	Wireless Communications Test Set	5/22/2018	Biennial	5/22/2020	GB43193563
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB44450273
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Amplifier Research	150A100C	DC Amplifier	CBT	N/A	CBT	348812
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1207470
Anritsu	MA24106A	USB Power Sensor	5/6/2019	Annual	5/6/2020	1231538
Anritsu	ML2496A	Power Meter	10/21/2018	Annual	10/21/2019	1138001
Anritsu	MT8821C	Radio Communication Analyzer	11/6/2018	Annual	11/6/2019	6200901190
Anritsu	MT8820C	Radio Communication Analyzer	3/29/2019	Annual	3/29/2020	6201300731
Anritsu	MT8821C	Radio Communication Analyzer	7/26/2018	Annual	7/26/2019	6201144418
Anritsu	MT8821C	Radio Communication Analyzer	7/24/2018	Annual	7/24/2019	6201664756
Anritsu	MT8821C	Radio Communication Analyzer	3/6/2019	Annual	3/6/2020	6201381794
Anritsu	MA24106A	USB Power Sensor	3/5/2019	Annual	3/5/2020	1344555
Anritsu	MA24106A	USB Power Sensor	3/5/2019	Annual	3/5/2020	1349501
Anritsu	MA24106A	USB Power Sensor	10/19/2018	Annual	10/19/2019	1349503
Anritsu	MT8862A	Wireless Connectivity Test Set	7/3/2018	Annual	7/3/2019	6261782395
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Control Company	4040	Therm./ Clock/ Humidity Monitor	1/8/2019	Annual	1/8/2020	160473909
Control Company	4040	Therm./ Clock/ Humidity Monitor	1/8/2019	Annual	1/8/2020	160574418
Control Company	4352	Ultra Long Stem Thermometer	2/28/2018	Biennial	2/28/2020	170330160
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
Pasternack	NC-100	Torque Wrench	5/23/2018	Biennial	5/23/2020	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	11/14/2018	Annual	11/14/2019	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	10/4/2018	Annual	10/4/2019	109366
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	1/30/2019	Annual	1/30/2020	162125
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	10/30/2018	Annual	10/30/2019	164948
Seekonk	NC-100	Torque Wrench	11/1/2017	Biennial	11/1/2019	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/7/2019	Annual	5/7/2020	1070
SPEAG	D1750V2	1750 MHz SAR Dipole	10/22/2018	Annual	10/22/2019	1150
SPEAG	D1765V2	1765 MHz SAR Dipole	5/23/2018	Biennial	5/23/2020	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Annual	10/23/2019	5d080
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Annual	10/23/2019	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	8/17/2017	Biennial	8/17/2019	719
SPEAG	D2450V2	2450 MHz SAR Dipole	9/11/2017	Biennial	9/11/2019	797
SPEAG	D2600V2	2600 MHz SAR Dipole	4/11/2018	Biennial	4/11/2020	1004
SPEAG	D2600V2	2600 MHz SAR Dipole	8/13/2018	Annual	8/13/2019	1126
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/21/2016	Triennial	9/21/2019	1191
SPEAG	D750V3	750 MHz SAR Dipole	1/15/2018	Biennial	1/15/2020	1003
SPEAG	D835V2	835 MHz SAR Dipole	1/22/2019	Annual	1/22/2020	4d132
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/13/2019	Annual	2/13/2020	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/8/2019	Annual	5/8/2020	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2018	Annual	7/11/2019	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/18/2019	Annual	4/18/2020	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/22/2018	Annual	8/22/2019	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/15/2019	Annual	1/15/2020	1530
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/3/2018	Annual	10/3/2019	1558
SPEAG	EX3DV4	SAR Probe	1/25/2019	Annual	1/25/2020	3589
SPEAG	EX3DV4	SAR Probe	8/23/2018	Annual	8/23/2019	7308
SPEAG	EX3DV4	SAR Probe	4/24/2019	Annual	4/24/2020	7357
SPEAG	EX3DV4	SAR Probe	5/16/2019	Annual	5/16/2020	7406
SPEAG	EX3DV4	SAR Probe	7/20/2018	Annual	7/20/2019	7410
SPEAG	EX3DV4	SAR Probe	1/24/2019	Annual	1/24/2020	7488
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	7417

Notes:

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

16 MEASUREMENT UNCERTAINTIES

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

© 2019 PCTEST Engineering Laboratory, Inc.

REV 21.3 M
02/15/2019

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

17 CONCLUSION

17.1 Measurement Conclusion

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

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

© 2019 PCTEST Engineering Laboratory, Inc.

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

18 REFERENCES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

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

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

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

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

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

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

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

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

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

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

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

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

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

© 2019 PCTEST Engineering Laboratory, Inc. All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

APPENDIX A: SAR TEST DATA

© 2019 PCTEST Engineering Laboratory, Inc.

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

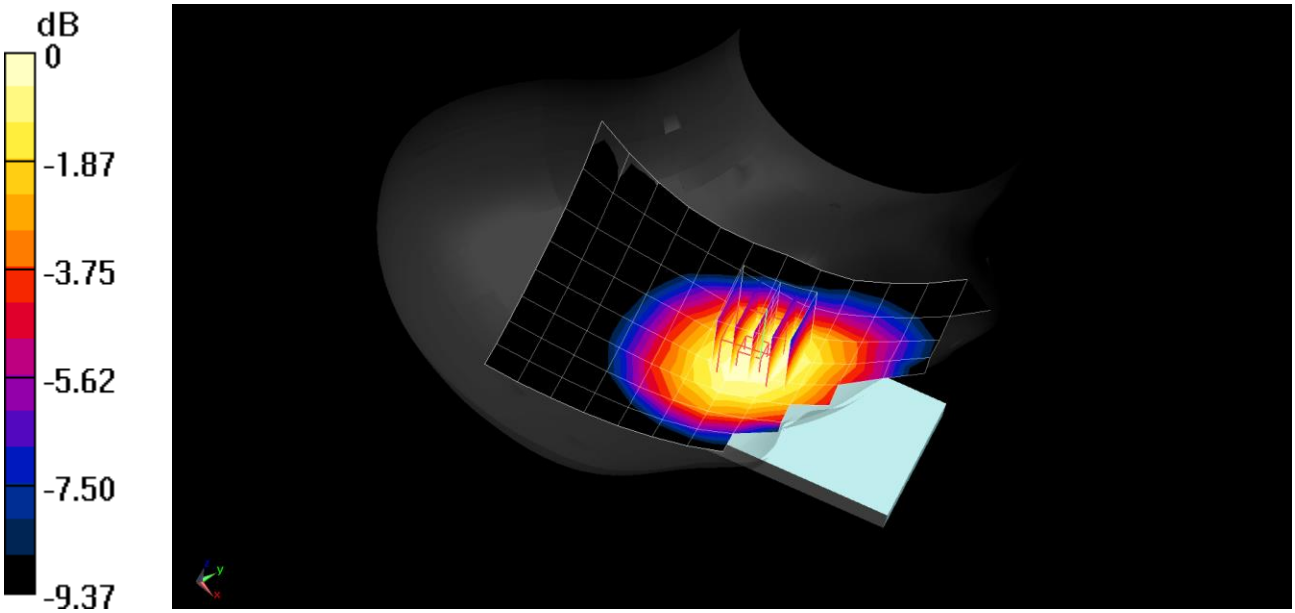
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 MHz Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.933 S/m; ε_r = 42.074; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-03-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.6 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.27 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.332 W/kg
SAR(1 g) = 0.266 W/kg



0 dB = 0.310 W/kg = -5.09 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

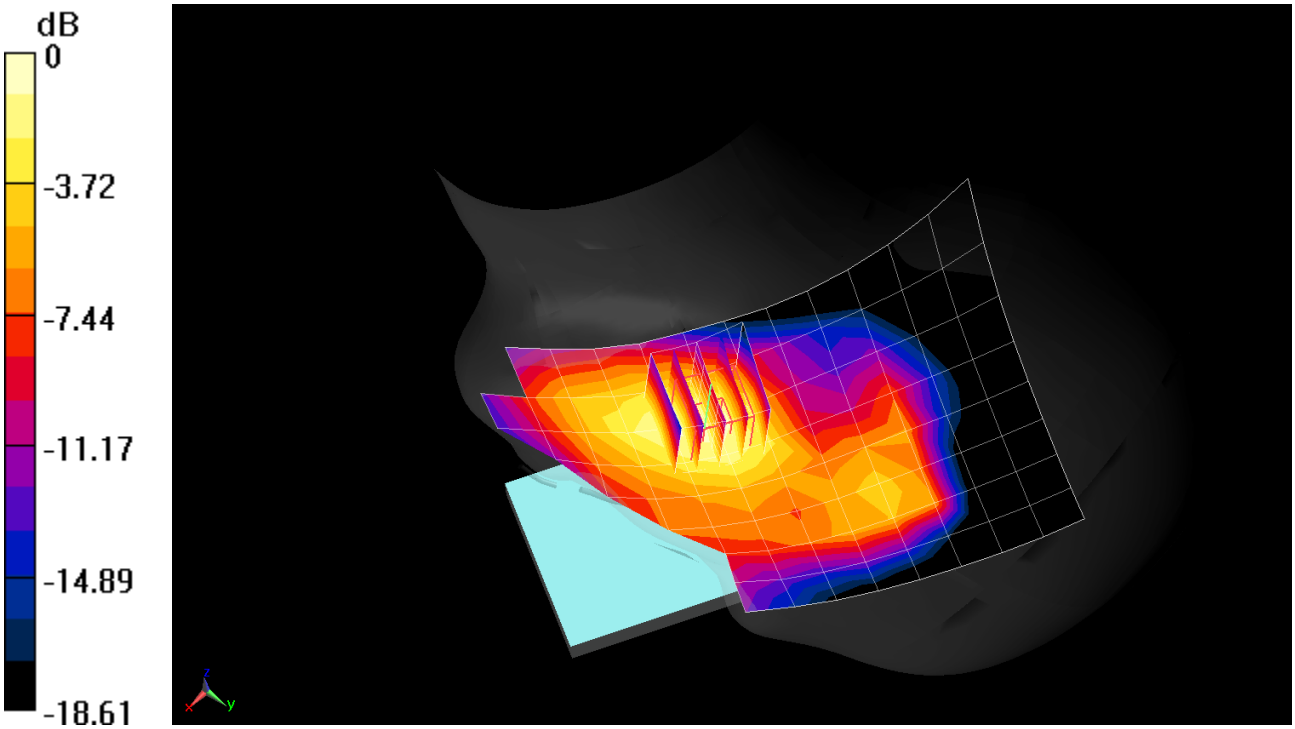
Communication System: UID 0, _GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076
Medium: 1900 Head; Medium parameters used:
f = 1880 MHz; σ = 1.433 S/m; ε_r = 40.707; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-01-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1880 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.71 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.488 W/kg
SAR(1 g) = 0.331 W/kg



0 dB = 0.430 W/kg = -3.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

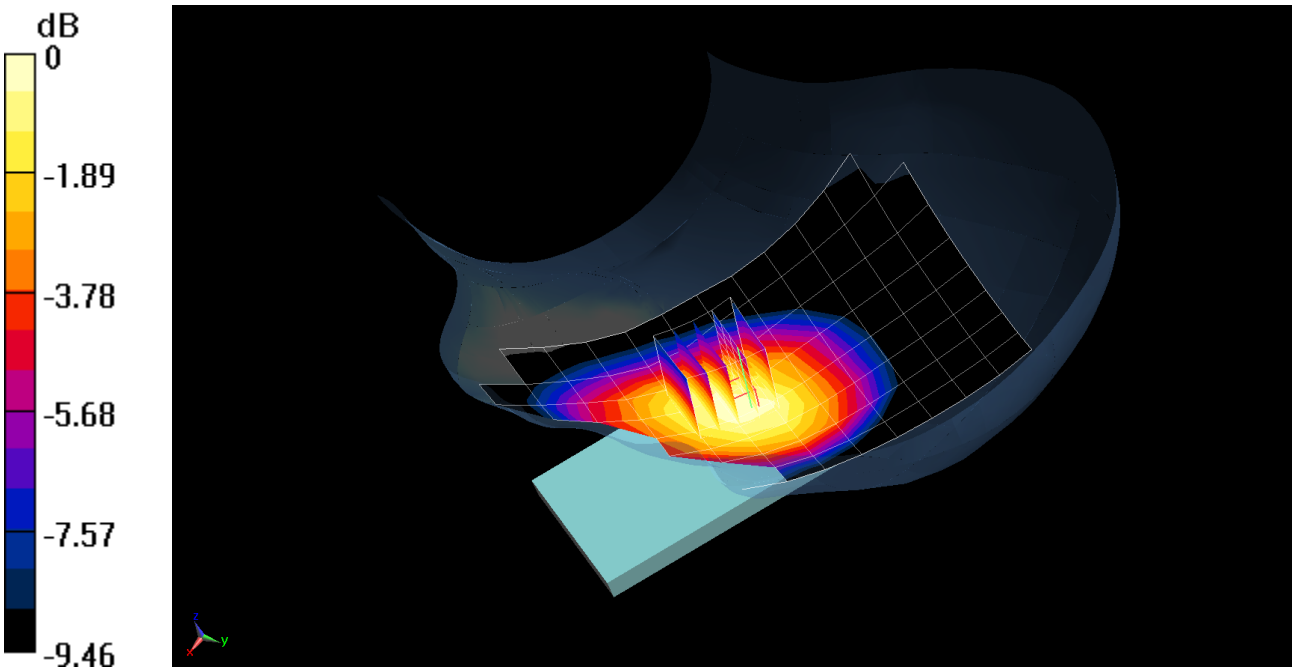
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.932 S/m; ε_r = 42.061; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-17-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.6 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.20 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.381 W/kg
SAR(1 g) = 0.298 W/kg



0 dB = 0.350 W/kg = -4.56 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

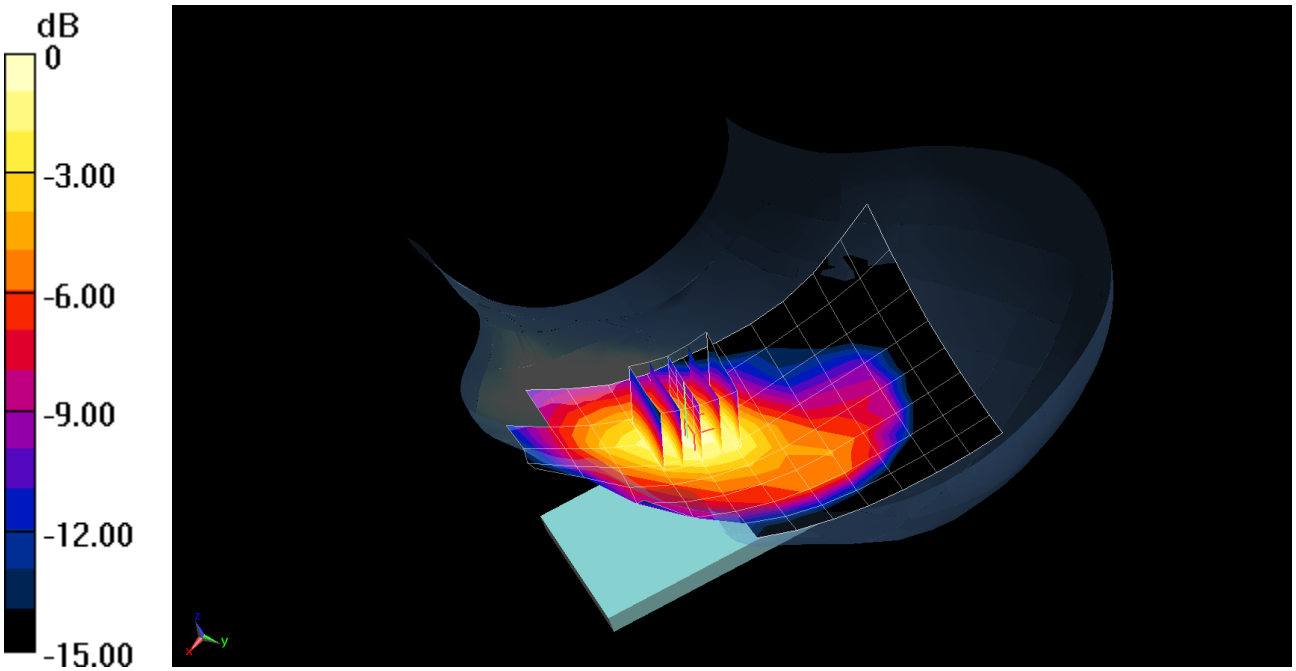
Communication System: UID 0, UMTS, Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1752.6 MHz; σ = 1.363 S/m; ε_r = 39.776; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-19-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(8.57, 8.57, 8.57) @ 1752.6 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.69 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.934 W/kg
SAR(1 g) = 0.613 W/kg



0 dB = 0.808 W/kg = -0.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

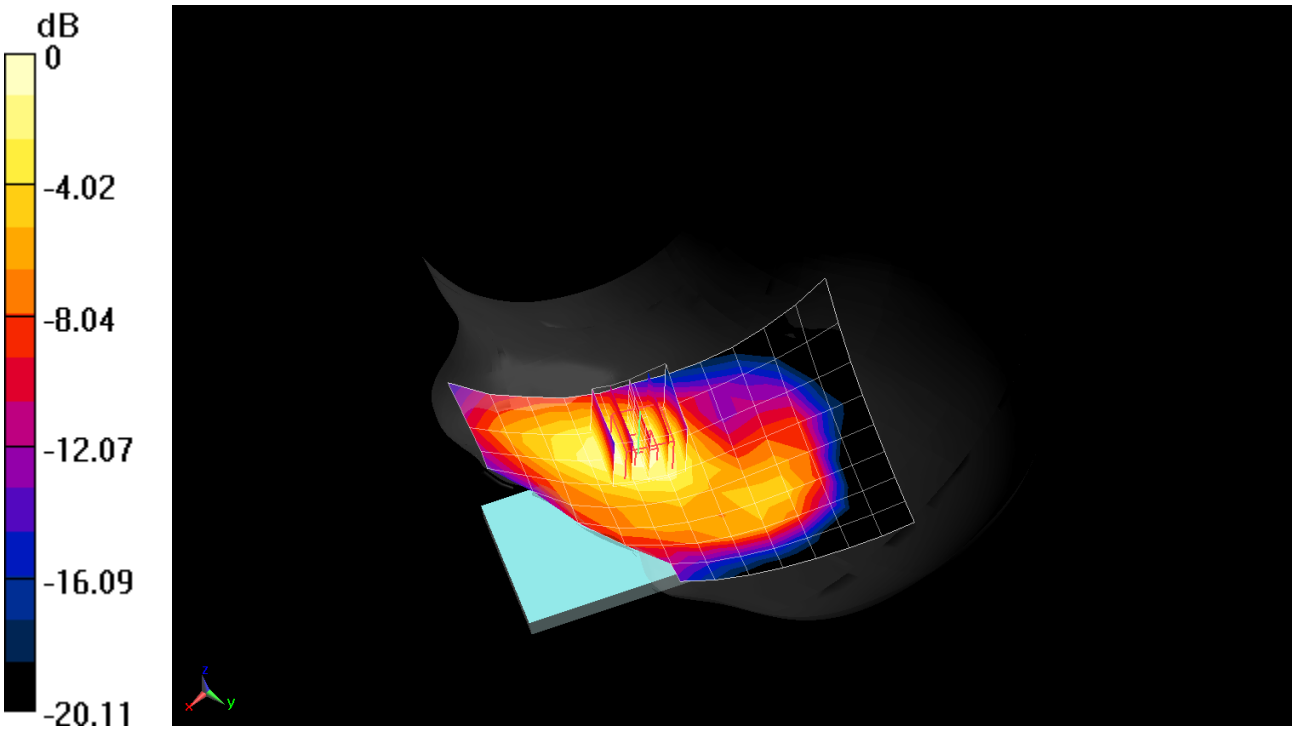
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.45 S/m; ε_r = 40.67; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-01-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1907.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.41 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.885 W/kg
SAR(1 g) = 0.610 W/kg



0 dB = 0.799 W/kg = -0.97 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

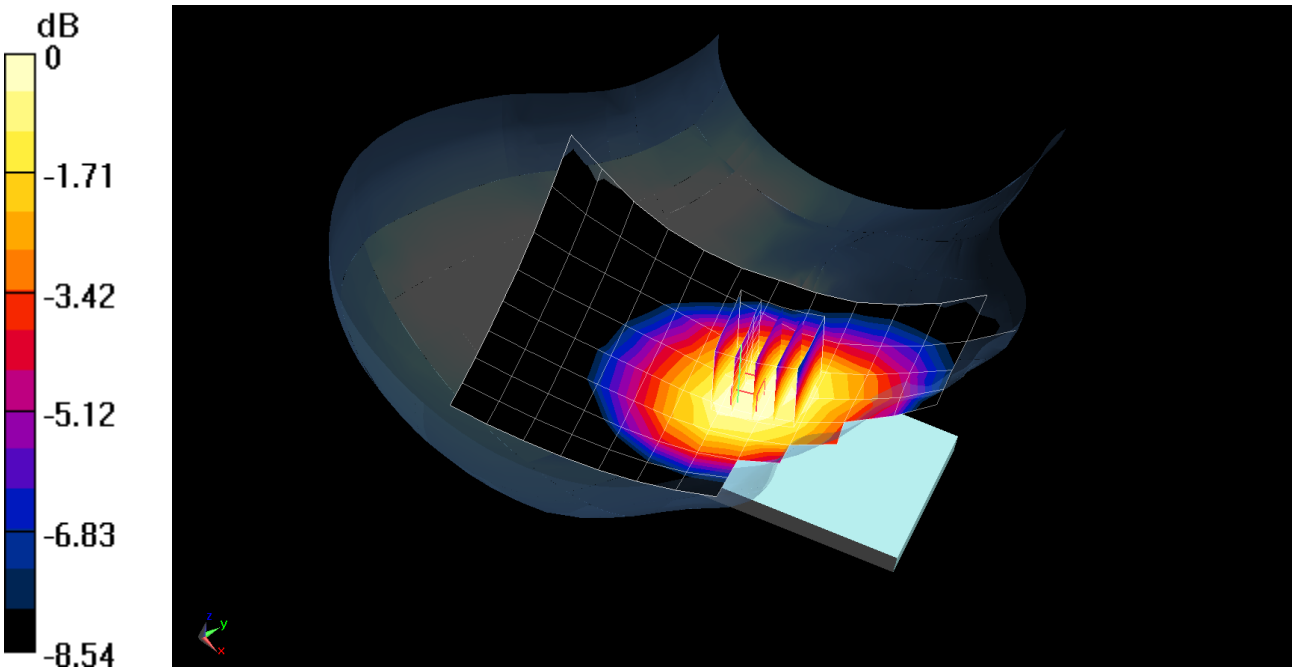
Communication System: UID 0, Cellular CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.925 S/m; ε_r = 42.103; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 06-17-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 820.1 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. CDMA, Rule Part 90S, Right Head, Cheek, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.45 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.298 W/kg
SAR(1 g) = 0.239 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

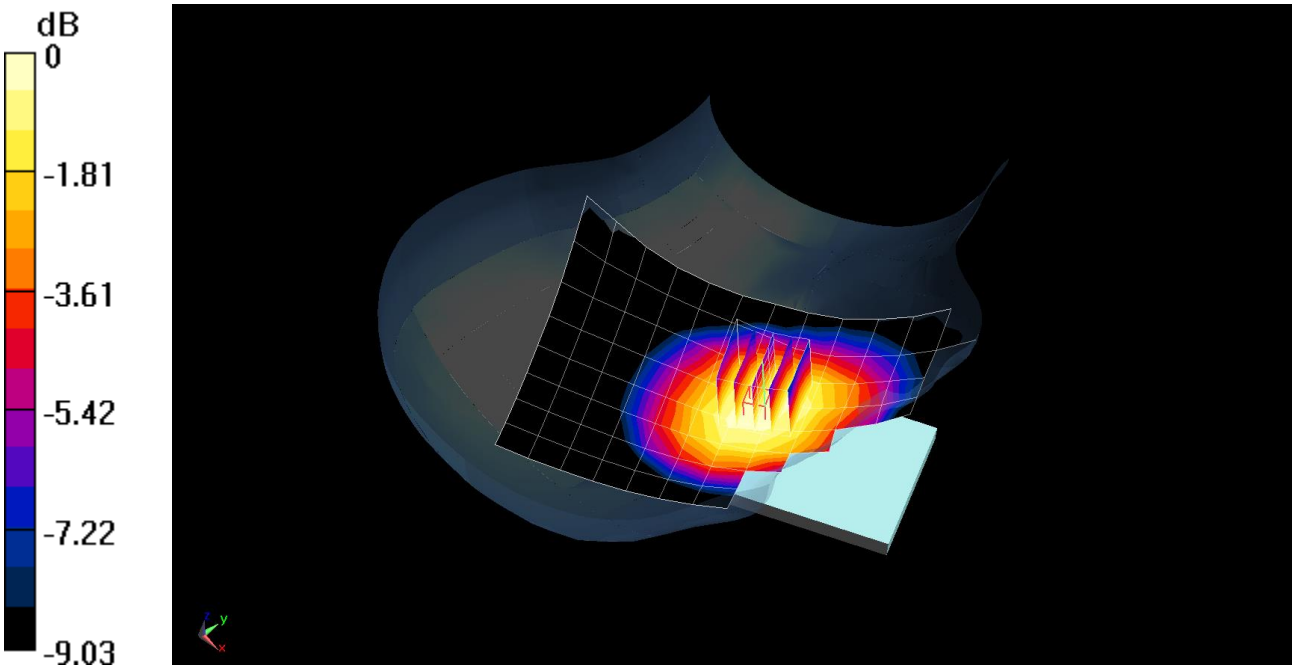
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.932 S/m; ε_r = 42.062; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 06-17-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 836.52 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.44 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.420 W/kg
SAR(1 g) = 0.338 W/kg



0 dB = 0.394 W/kg = -4.05 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

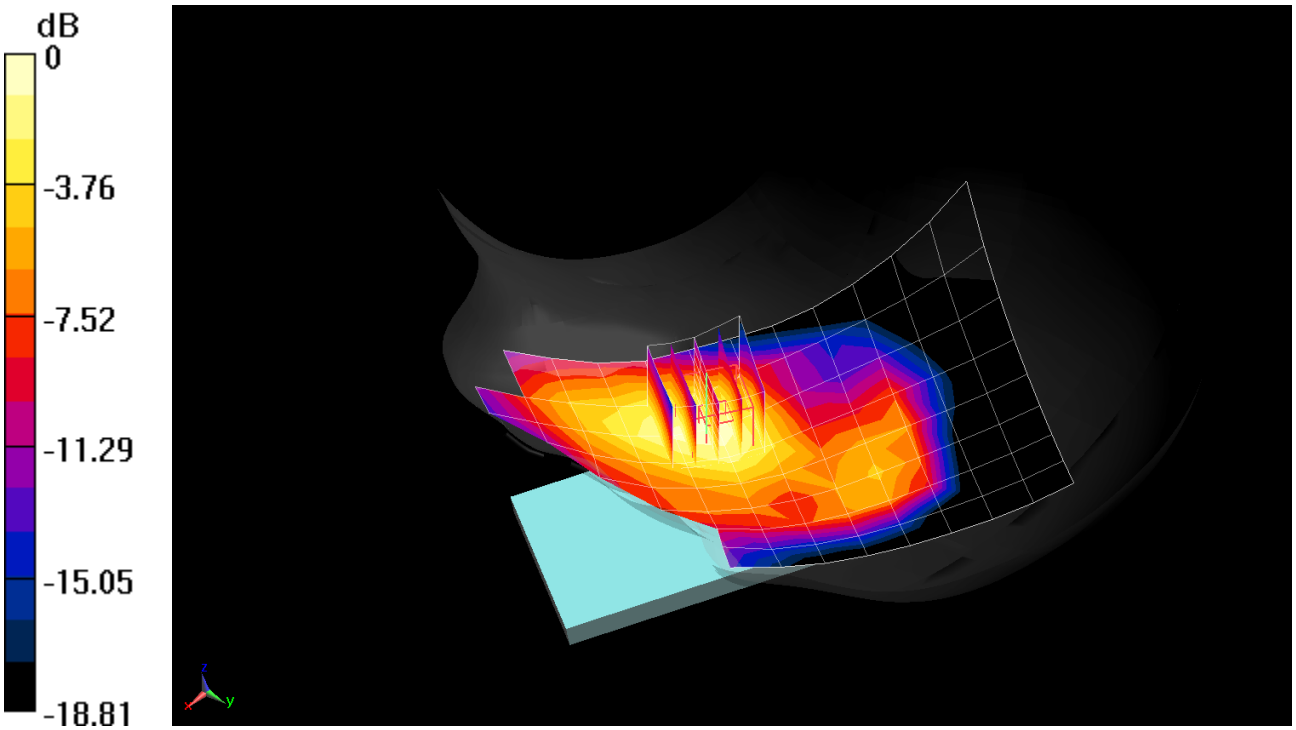
Communication System: UID 0, PCS CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.451 S/m; ε_r = 40.669; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-01-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1908.75 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.35 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.912 W/kg
SAR(1 g) = 0.626 W/kg



0 dB = 0.801 W/kg = -0.96 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

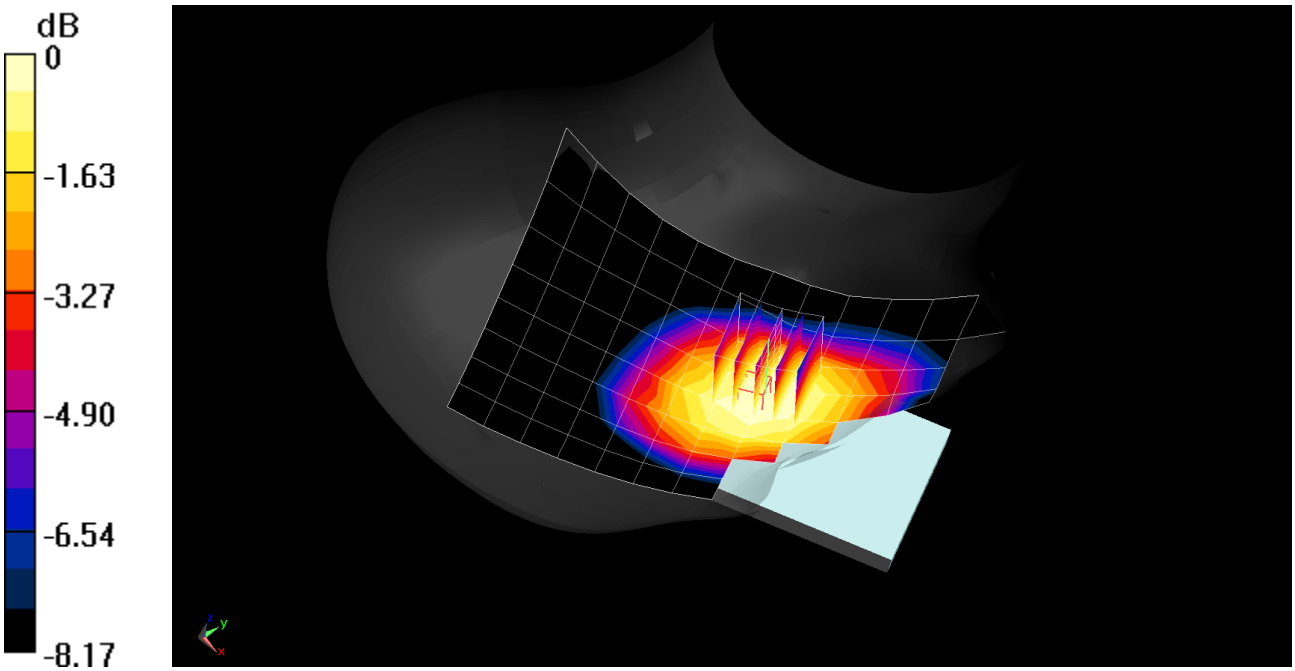
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.86 S/m; ε_r = 43.911; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 06-12-2019; Ambient Temp: 20.8°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7357; ConvF(10.26, 10.26, 10.26) @ 680.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V5.0 (30) Back Right; Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 71, Right Head, Cheek, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.12 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.270 W/kg
SAR(1 g) = 0.230 W/kg



0 dB = 0.256 W/kg = -5.92 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

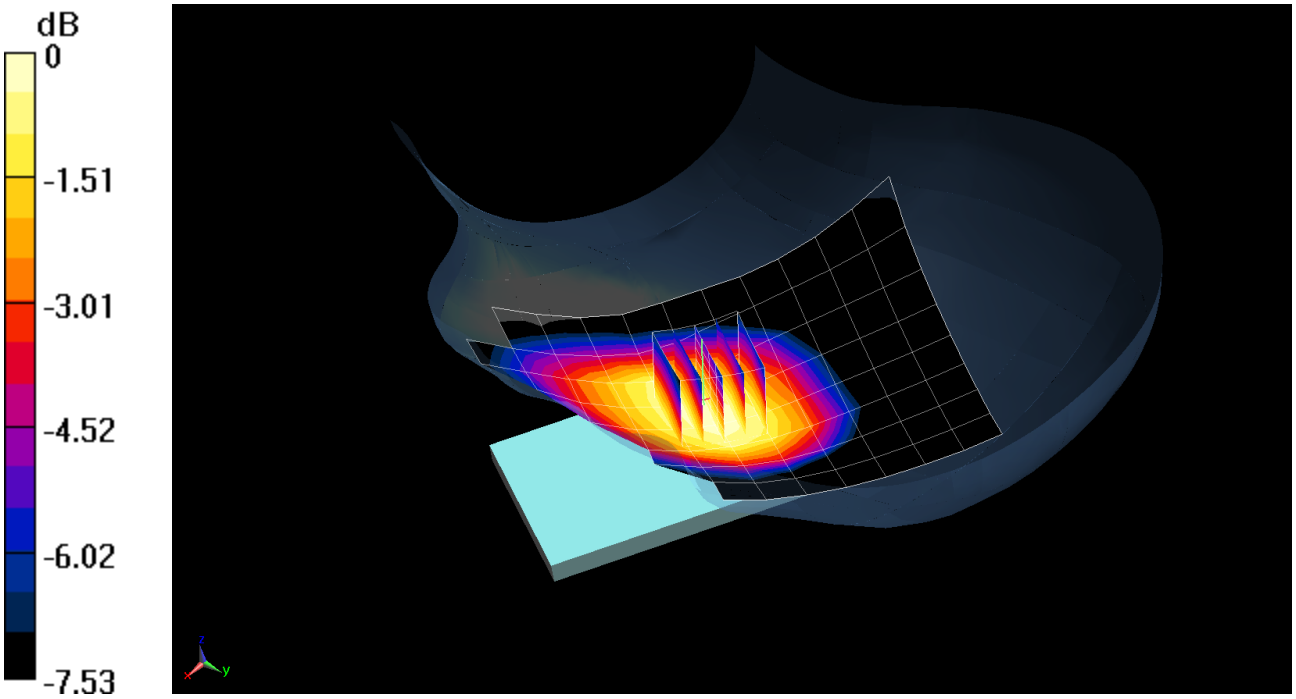
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 MHz Head; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.863 S/m; ε_r = 42.436; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7406; ConvF(10.26, 10.26, 10.26) @ 707.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 12, Left Head, Cheek, Mid.ch, QPSK, 10 MHz Bandwidth, 1 RB, 49 RB Offset

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.28 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.392 W/kg
SAR(1 g) = 0.321 W/kg



0 dB = 0.371 W/kg = -4.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

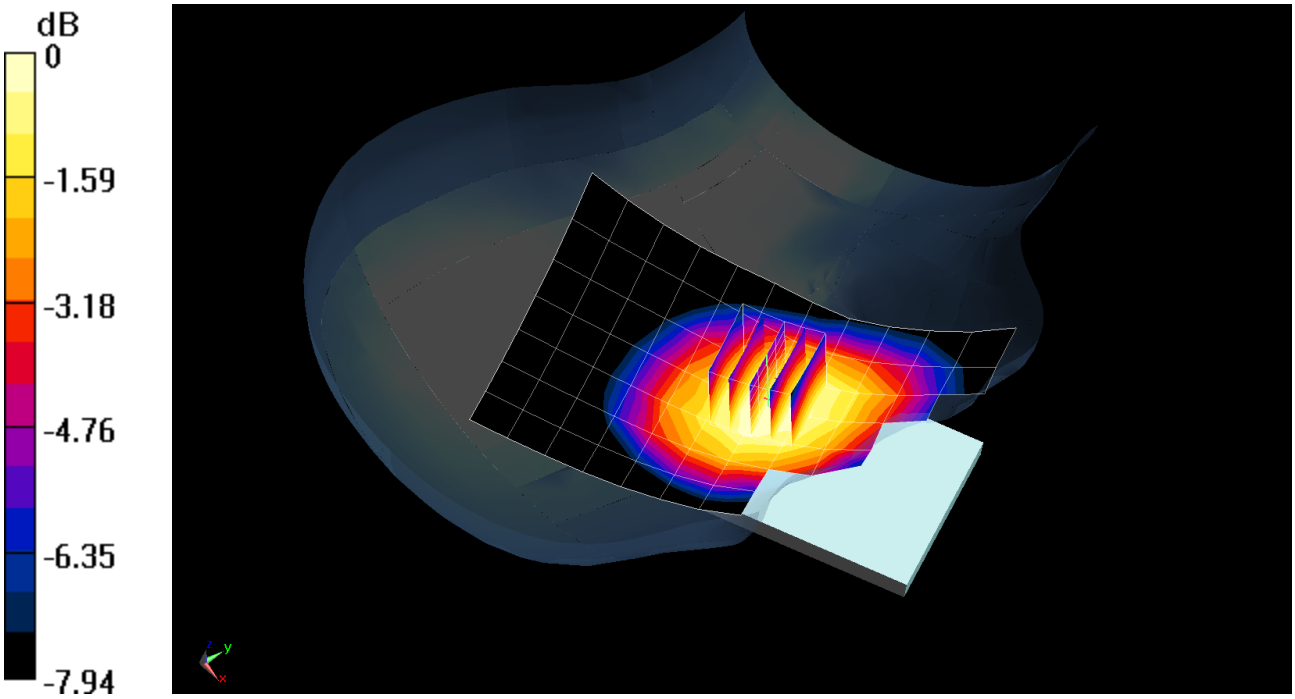
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 MHz Head; Medium parameters used (interpolated):
f = 782 MHz; σ = 0.89 S/m; ε_r = 42.21; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7406; ConvF(10.26, 10.26, 10.26) @ 782 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Right Head, Cheek, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.39 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.208 W/kg
SAR(1 g) = 0.171 W/kg



0 dB = 0.196 W/kg = -7.08 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85071

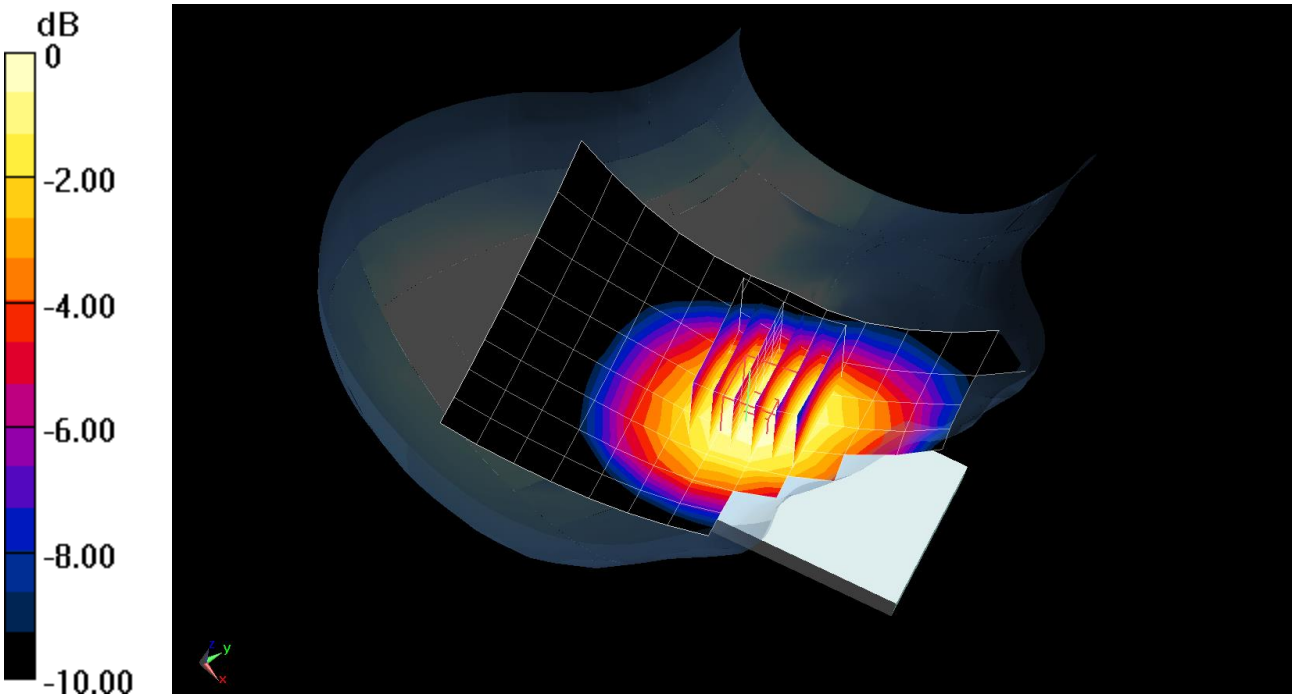
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.907 S/m; ε_r = 41.227; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 06-14-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 831.5 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.61 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.367 W/kg
SAR(1 g) = 0.298 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

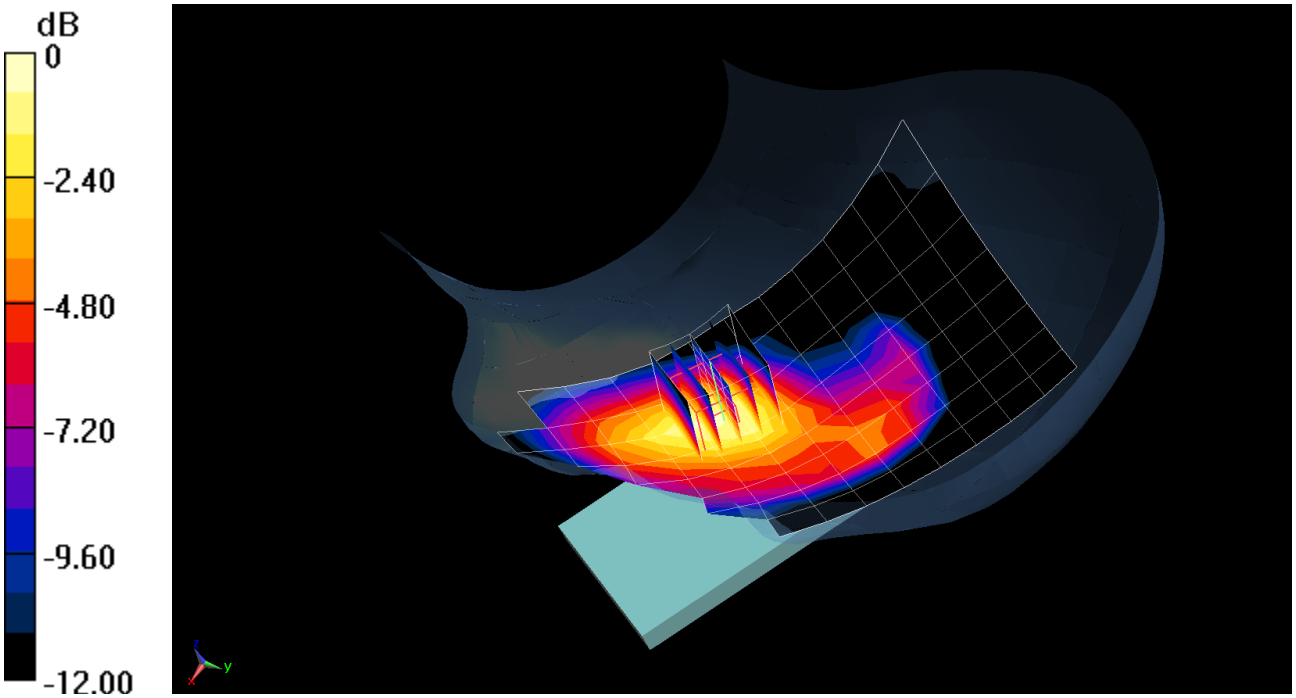
Communication System: UID 0, _LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1
Medium: 1750 Head; Medium parameters used (interpolated):
f = 1745 MHz; σ = 1.359 S/m; ε_r = 39.789; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-19-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(8.57, 8.57, 8.57) @ 1745 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 66 (AWS), Left Head, Cheek, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.33 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.676 W/kg



0 dB = 0.898 W/kg = -0.47 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85071

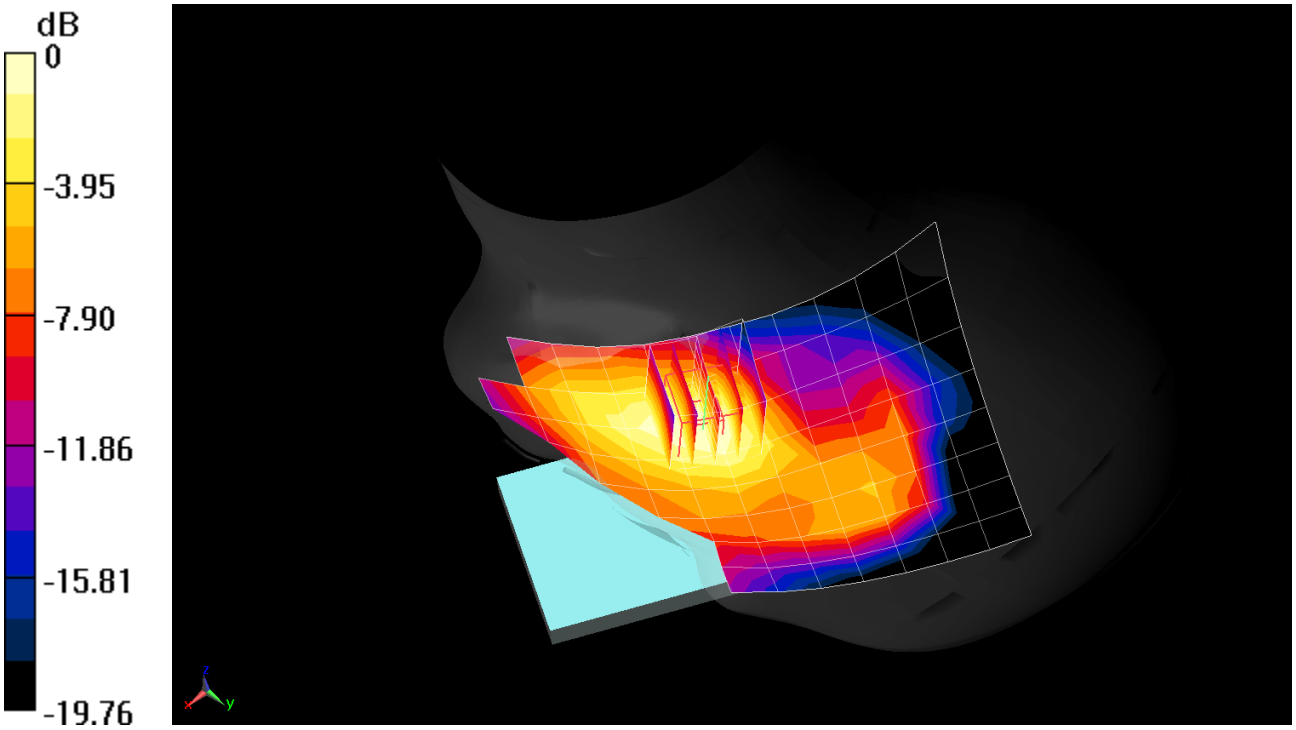
Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1
Medium: 1900 Head; Medium parameters used (interpolated):
f = 1882.5 MHz; σ = 1.435 S/m; ε_r = 40.704; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-01-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1882.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.25 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.793 W/kg
SAR(1 g) = 0.543 W/kg



0 dB = 0.686 W/kg = -1.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

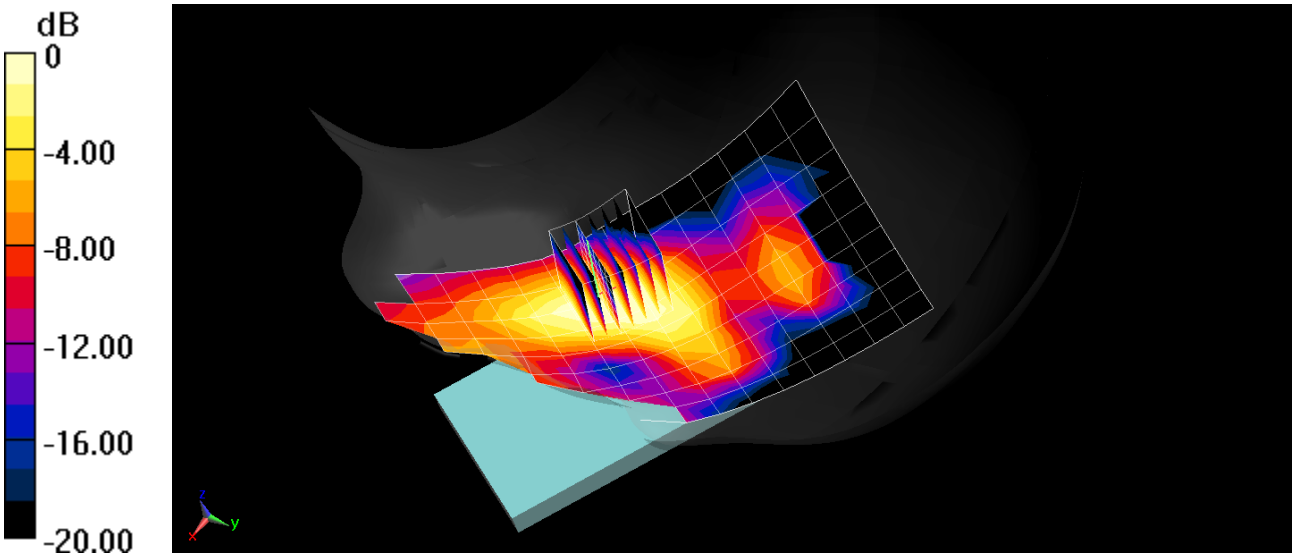
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2593 MHz; Duty Cycle: 1:2.31
Medium: 2450 Head; Medium parameters used (interpolated):
f = 2593 MHz; σ = 1.98 S/m; ε_r = 39.912; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-05-2019; Ambient Temp: 22.5°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3589; ConvF(6.25, 6.25, 6.25) @ 2593 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 41, Left Head, Cheek, Mid.ch, QPSK, 20 MHz Bandwidth, 1 RB, 50 RB Offset Power Class 2

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.25 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.384 W/kg
SAR(1 g) = 0.207 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

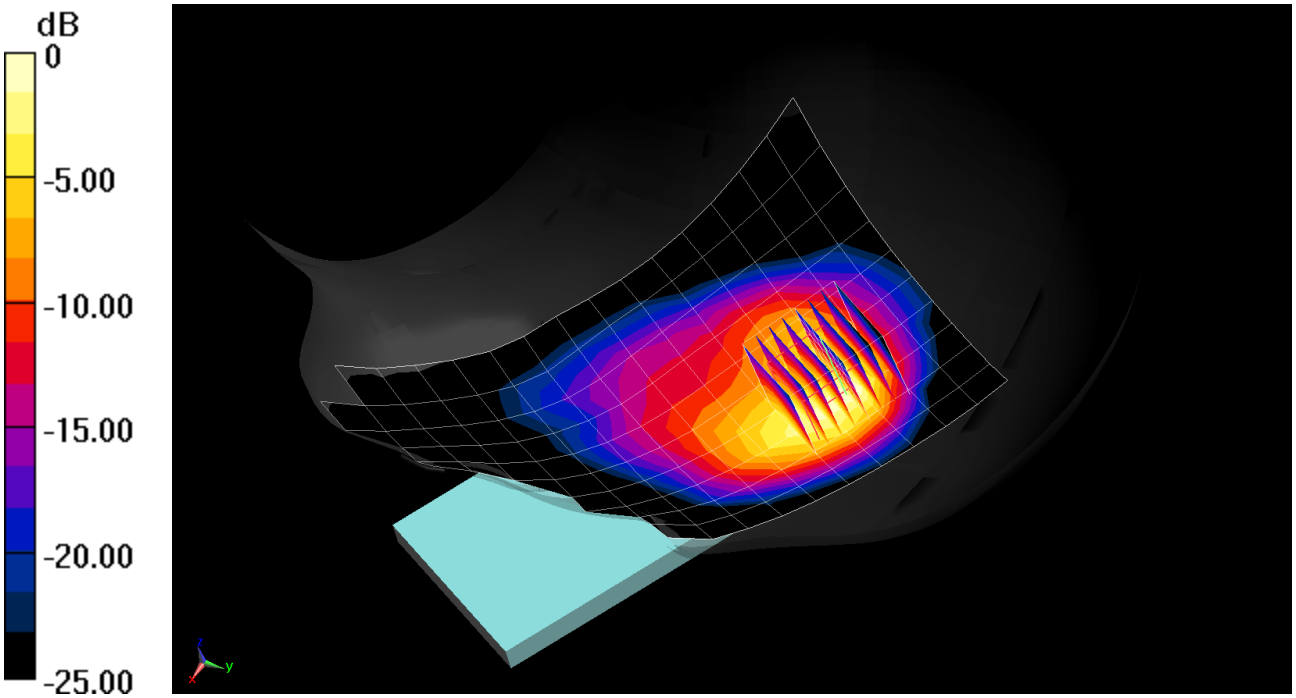
Communication System: UID 0, _IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Head; Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.83 S/m; ε_r = 40.698; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-26-2019; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2412 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.68 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.952 W/kg



0 dB = 1.59 W/kg = 2.01 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

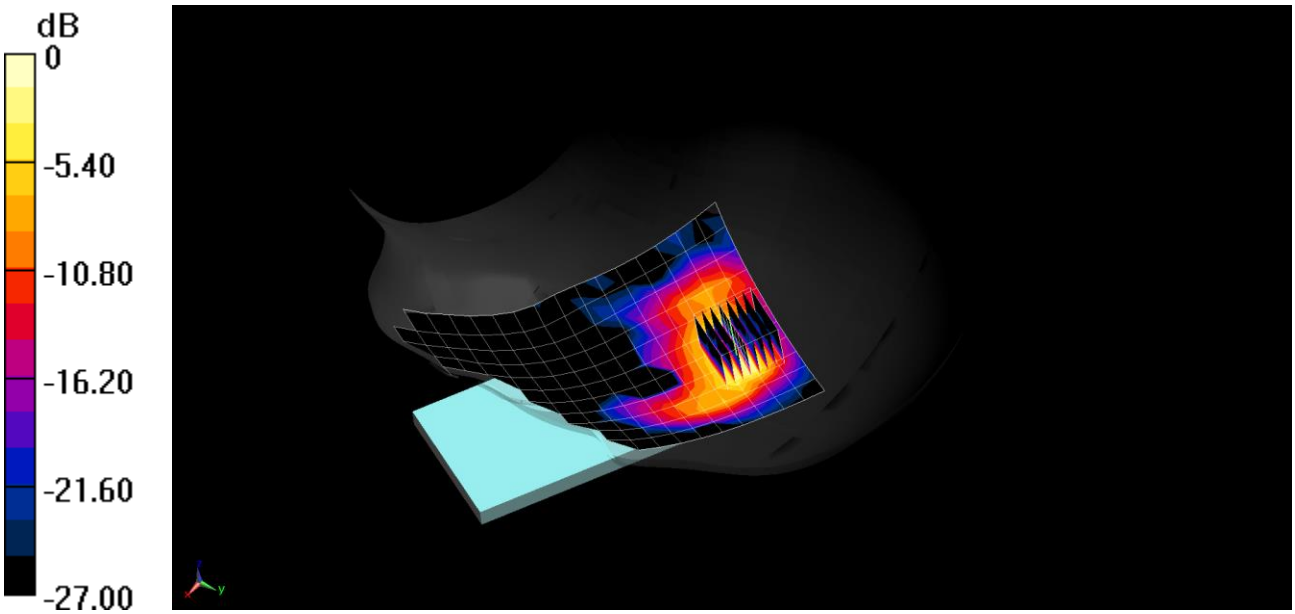
Communication System: UID 0, _IEEE 802.11a; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5GHzHead; Medium parameters used:
f = 5785 MHz; σ = 5.143 S/m; ε_r = 33.803; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7406; ConvF(5.23, 5.23, 5.23) @ 5785 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 20; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, U-NII-3, 20 MHz Bandwidth, Left Head, Cheek, Ch 157, 6 Mbps

Area Scan (12x18x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 7.986 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.83 W/kg
SAR(1 g) = 0.573 W/kg



0 dB = 1.60 W/kg = 2.04 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

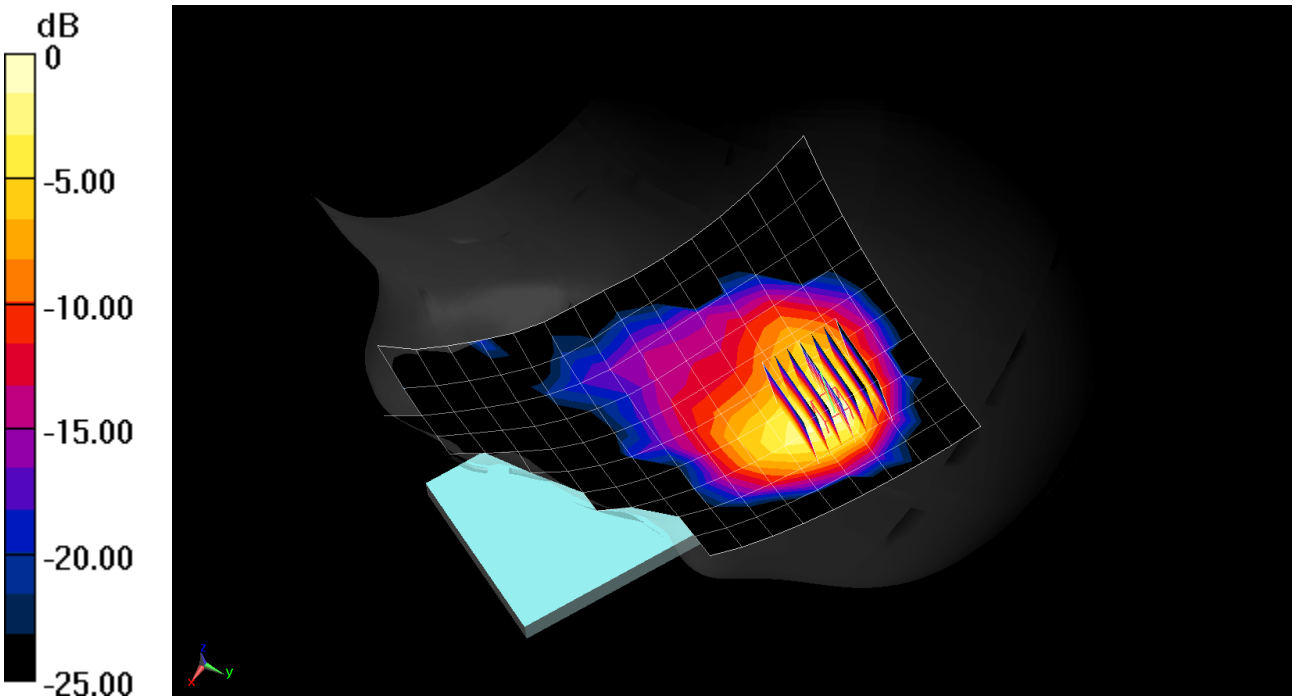
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Head; Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.851 S/m; ε_r = 40.648; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 06-26-2019; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2441 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.22 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.466 W/kg
SAR(1 g) = 0.209 W/kg



0 dB = 0.355 W/kg = -4.50 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

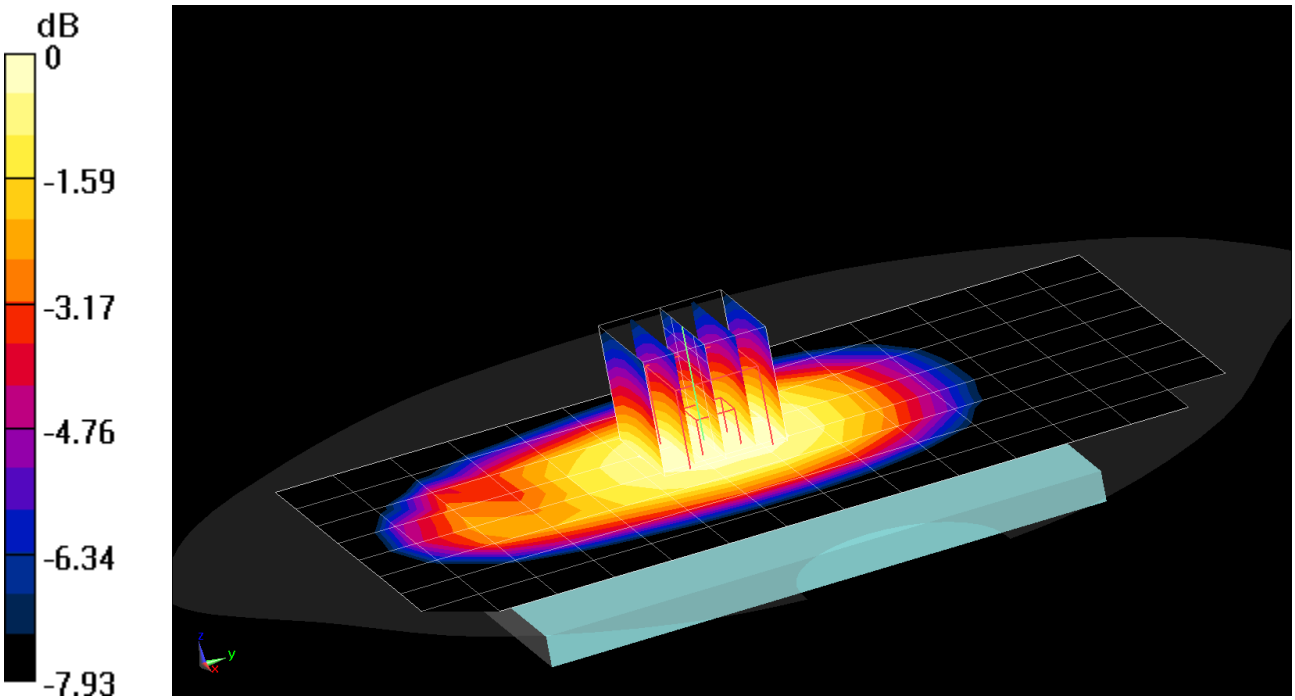
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.967 S/m; ε_r = 54.484; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.42 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.406 W/kg
SAR(1 g) = 0.317 W/kg



0 dB = 0.376 W/kg = -4.25 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

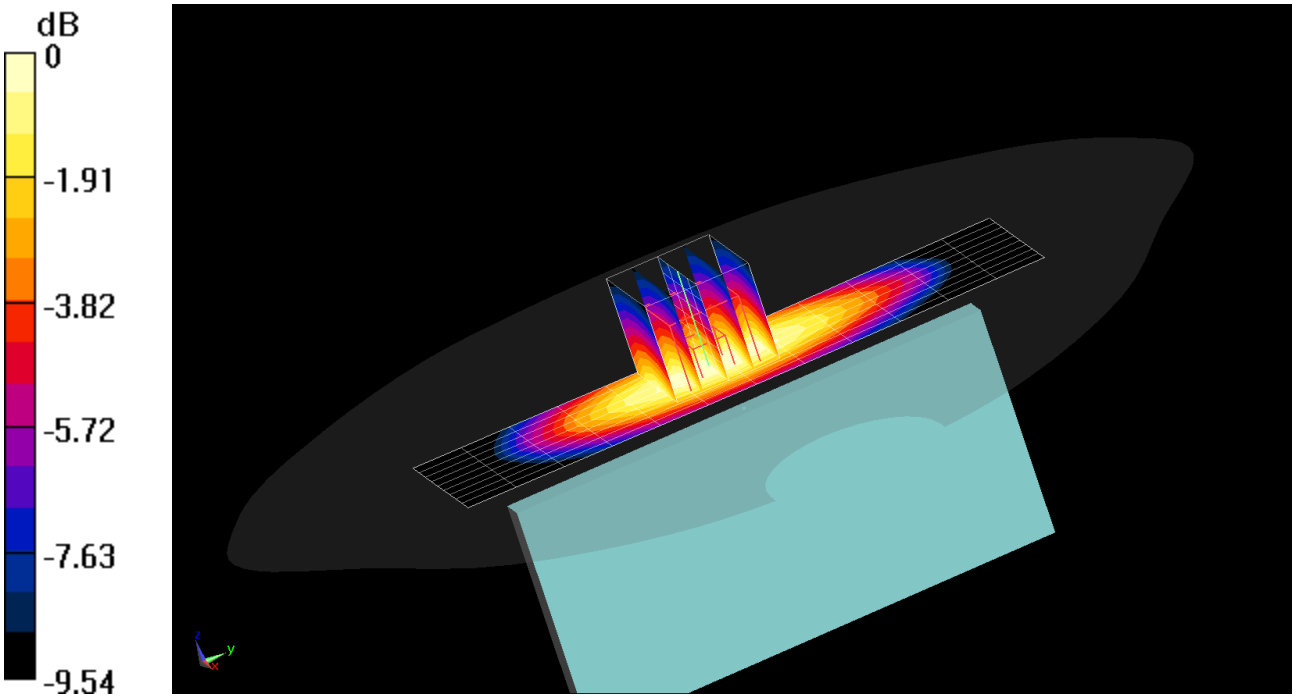
Communication System: UID 0, _GSM GPRS; 4 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.076
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.967 S/m; ε_r = 54.484; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: GPRS 850, Body SAR, Right Edge, Mid.ch, 4 Tx Slots

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.92 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.476 W/kg
SAR(1 g) = 0.329 W/kg



0 dB = 0.428 W/kg = -3.69 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

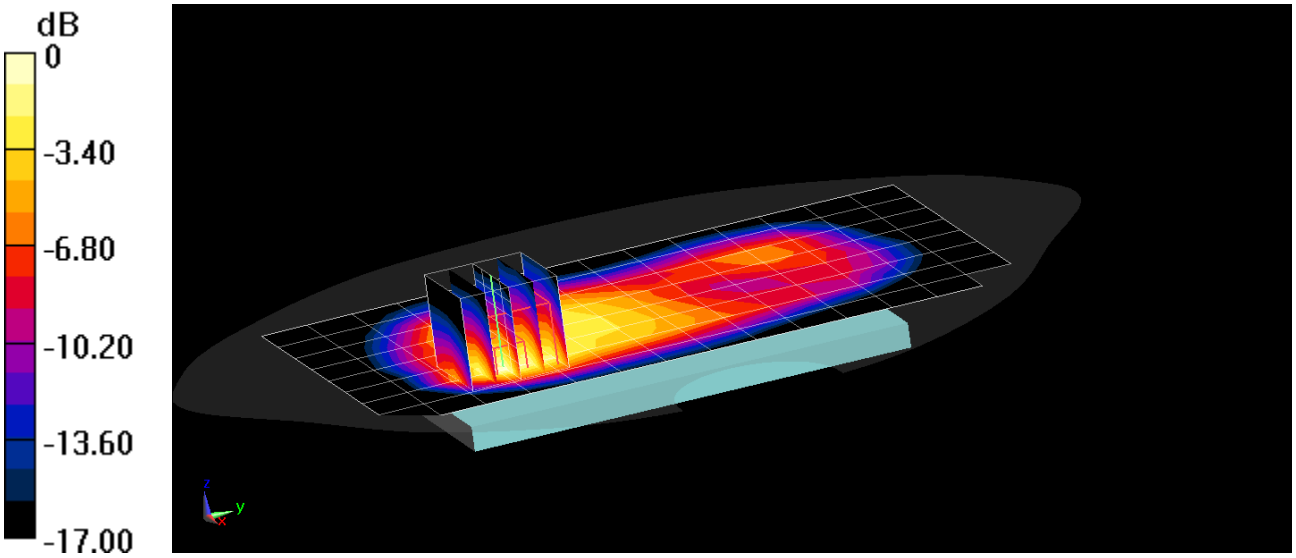
Communication System: UID 0, _GSM GPRS; 4 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.076
Medium: 1900 Body; Medium parameters used:
f = 1880 MHz; σ = 1.536 S/m; ε_r = 51.067; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-01-2019; Ambient Temp: 20.7°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1880 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.26 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.698 W/kg
SAR(1 g) = 0.352 W/kg



0 dB = 0.574 W/kg = -2.41 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

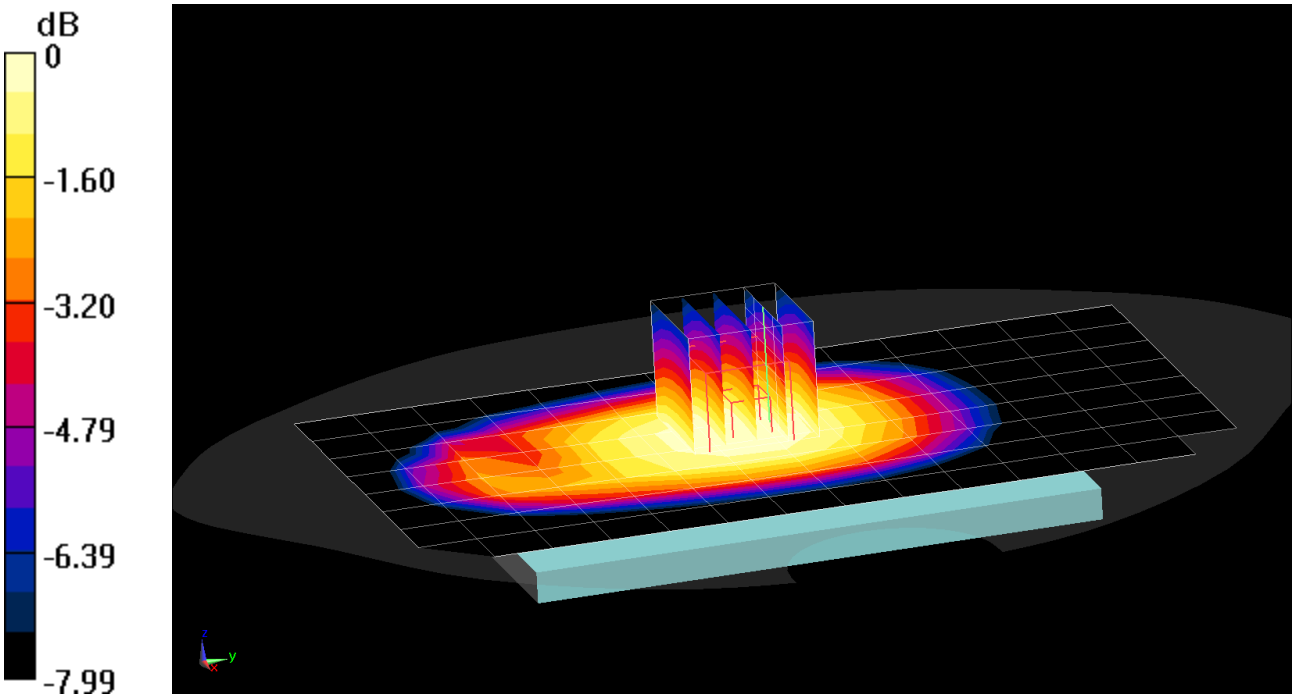
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.967 S/m; ε_r = 54.484; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.64 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.505 W/kg
SAR(1 g) = 0.395 W/kg



0 dB = 0.467 W/kg = -3.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85097

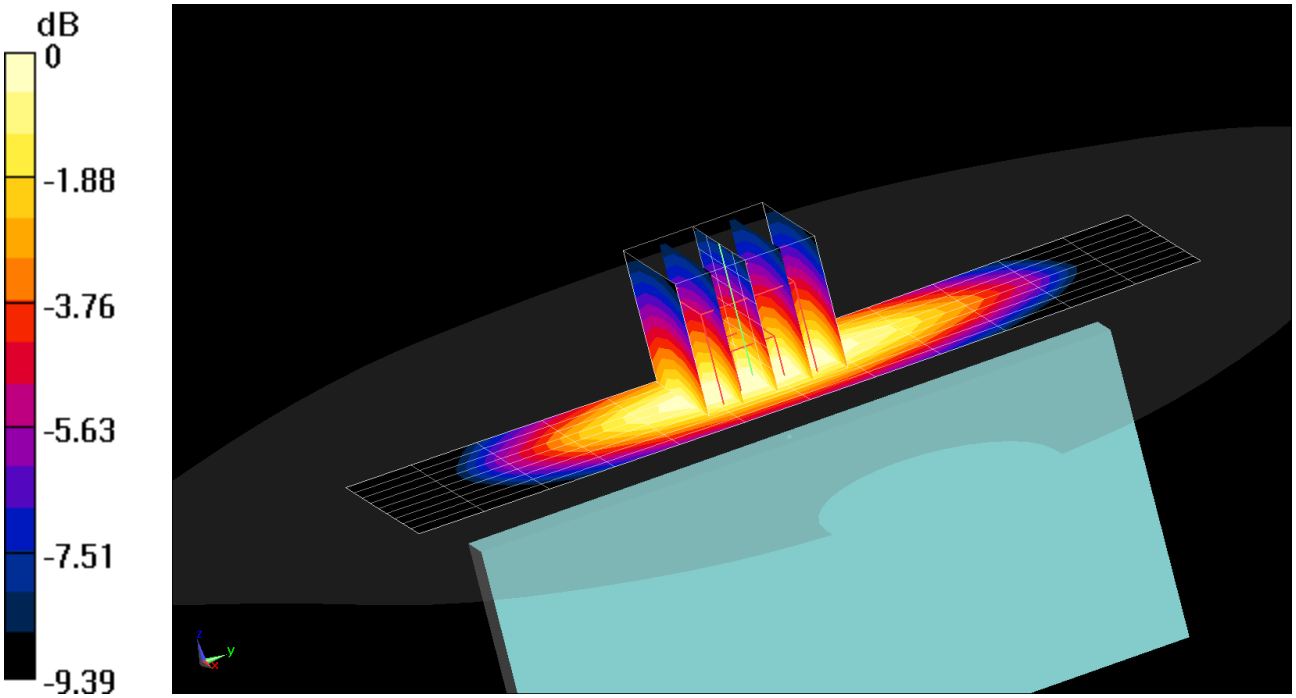
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.967 S/m; ε_r = 54.484; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 836.6 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.15 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.587 W/kg
SAR(1 g) = 0.408 W/kg



0 dB = 0.528 W/kg = -2.77 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

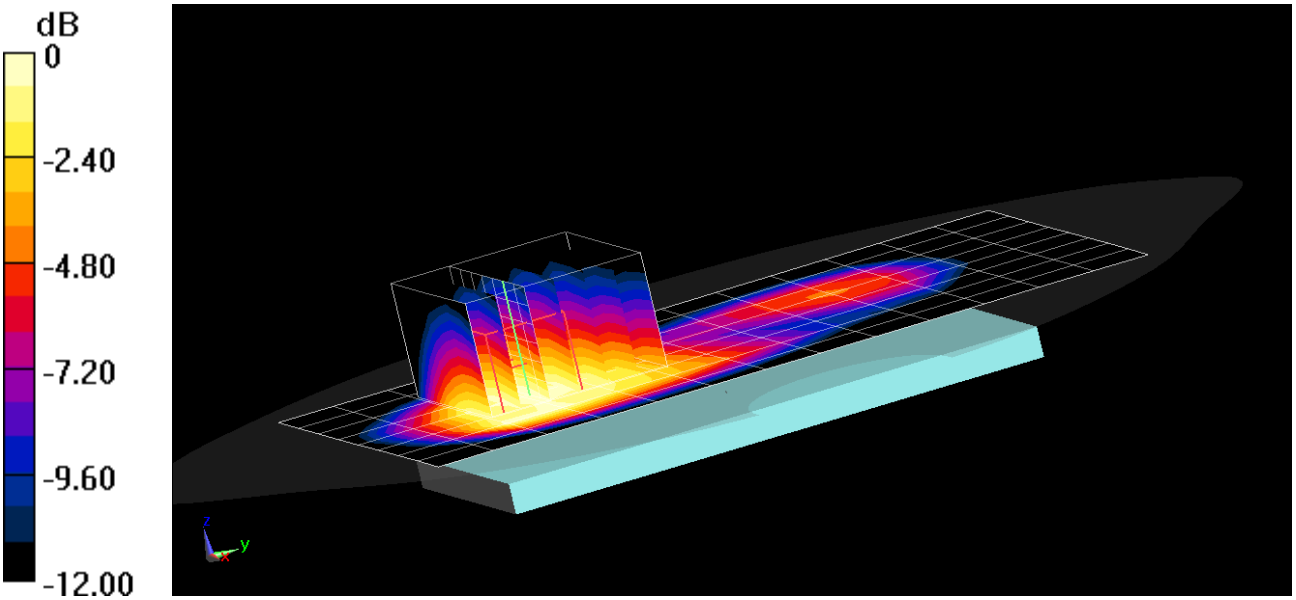
Communication System: UID 0, UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1732.4 MHz; σ = 1.48 S/m; ε_r = 51.162; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-23-2019; Ambient Temp: 19.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1732.4 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V5.0 Back Right; Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (8x7x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.74 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.932 W/kg



0 dB = 1.23 W/kg = 0.90 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85170

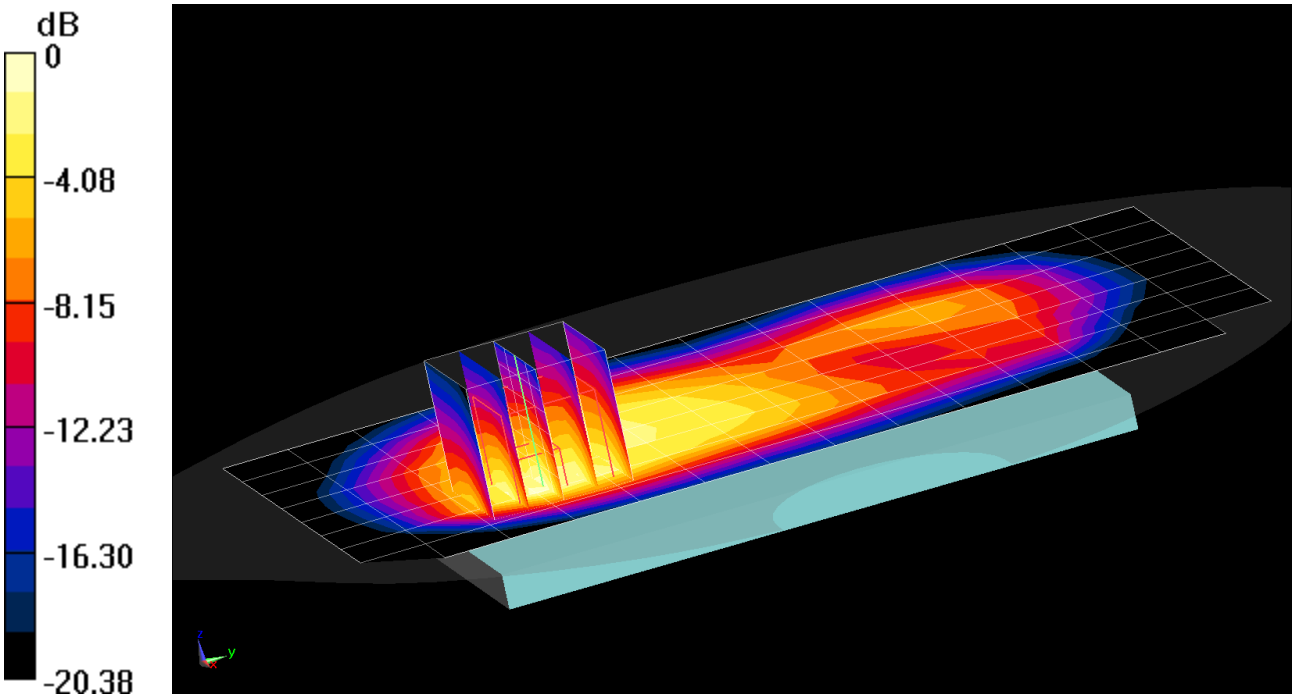
Communication System: UID 0, UMTS; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1907.6 MHz; σ = 1.567 S/m; ε_r = 54.493; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-25-2019; Ambient Temp: 20.1°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1907.6 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.89 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.781 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

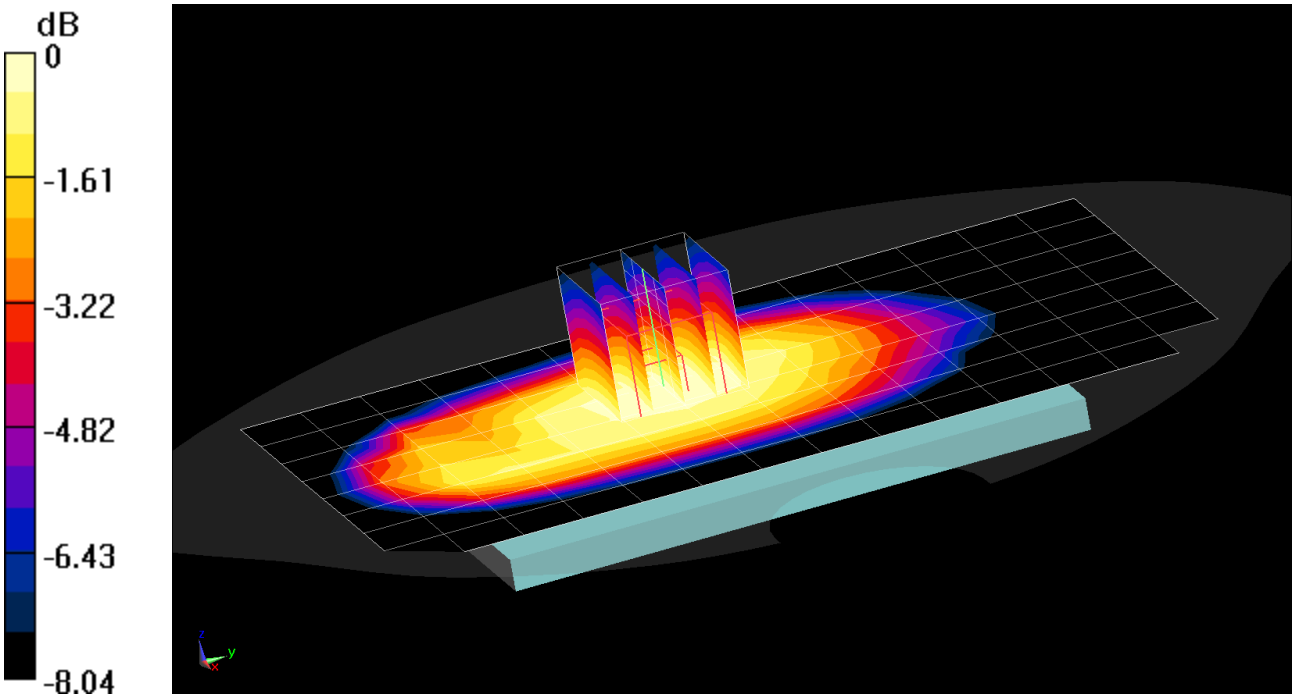
Communication System: UID 0, CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.95 S/m; ε_r = 54.281; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 820.1 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. CDMA BC10, Body SAR, Back side, Mid.ch

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.14 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.393 W/kg
SAR(1 g) = 0.305 W/kg



0 dB = 0.365 W/kg = -4.38 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

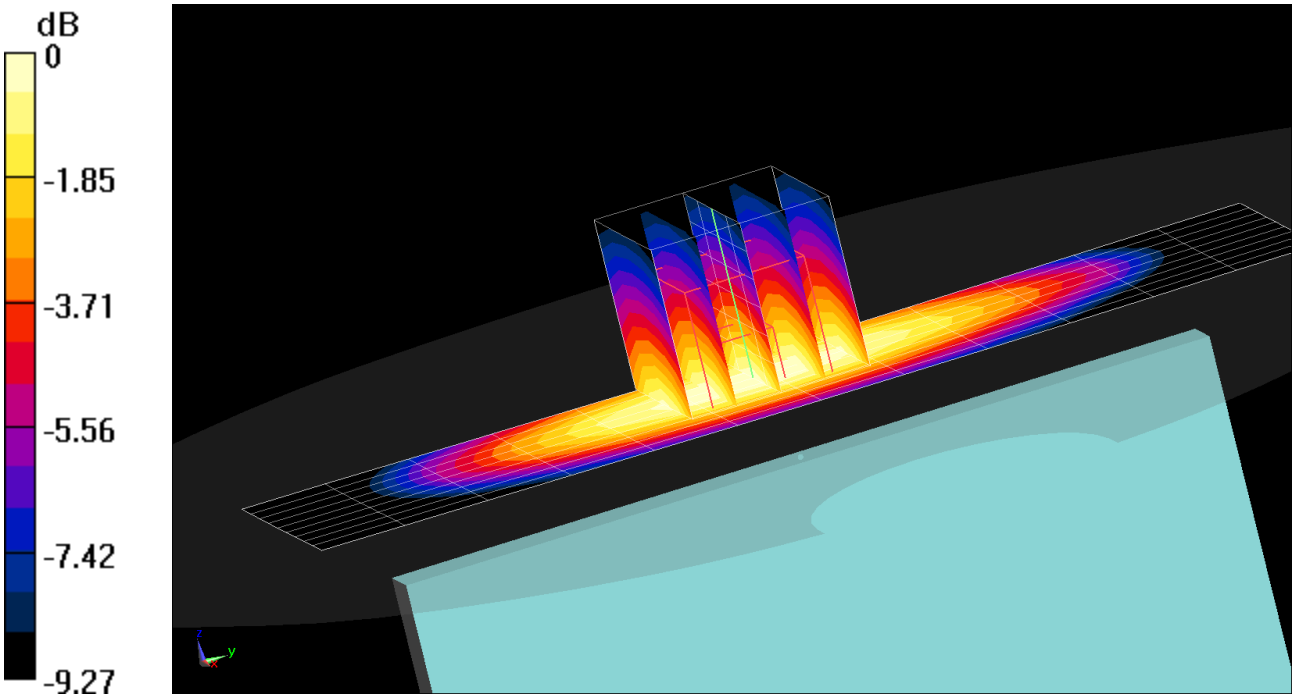
Communication System: UID 0, CDMA; Frequency: 820.1 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 820.1 MHz; σ = 0.95 S/m; ε_r = 54.281; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 820.1 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. EVDO BC10, Body SAR, Right Edge, Mid.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.02 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.375 W/kg
SAR(1 g) = 0.261 W/kg



0 dB = 0.337 W/kg = -4.72 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

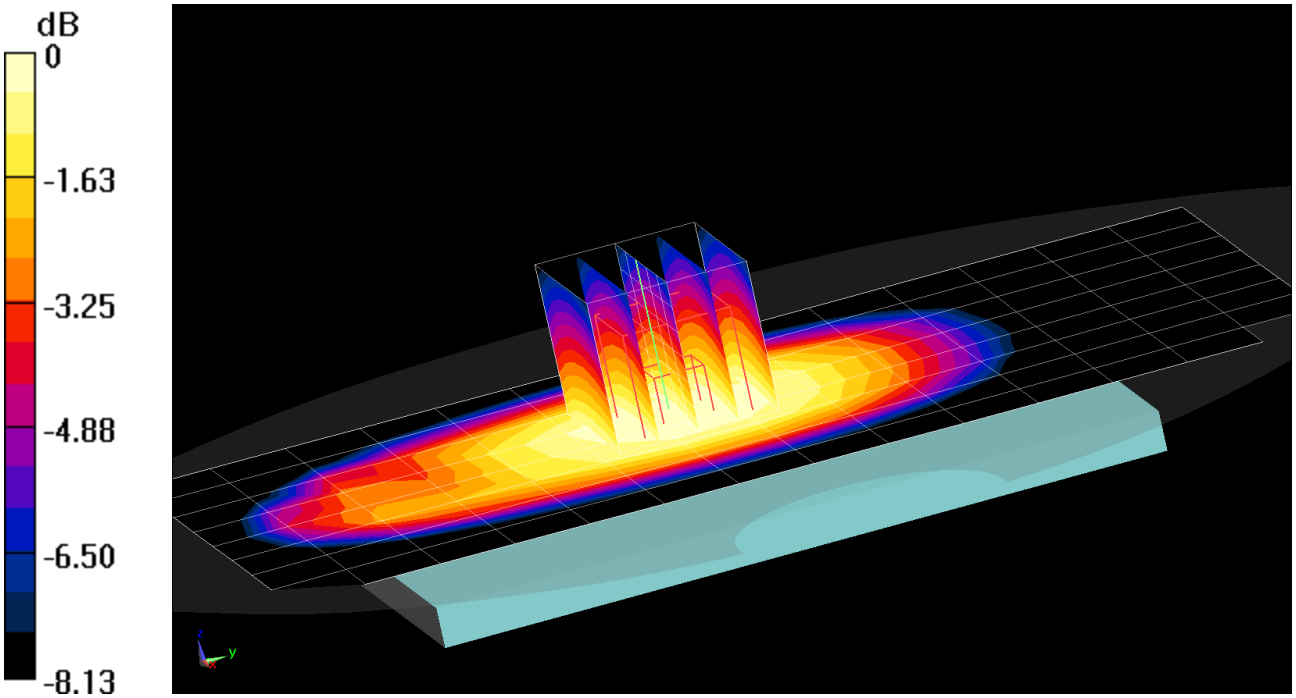
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.968 S/m; ε_r = 54.128; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 836.52 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.90 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.622 W/kg
SAR(1 g) = 0.486 W/kg



0 dB = 0.575 W/kg = -2.40 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85089

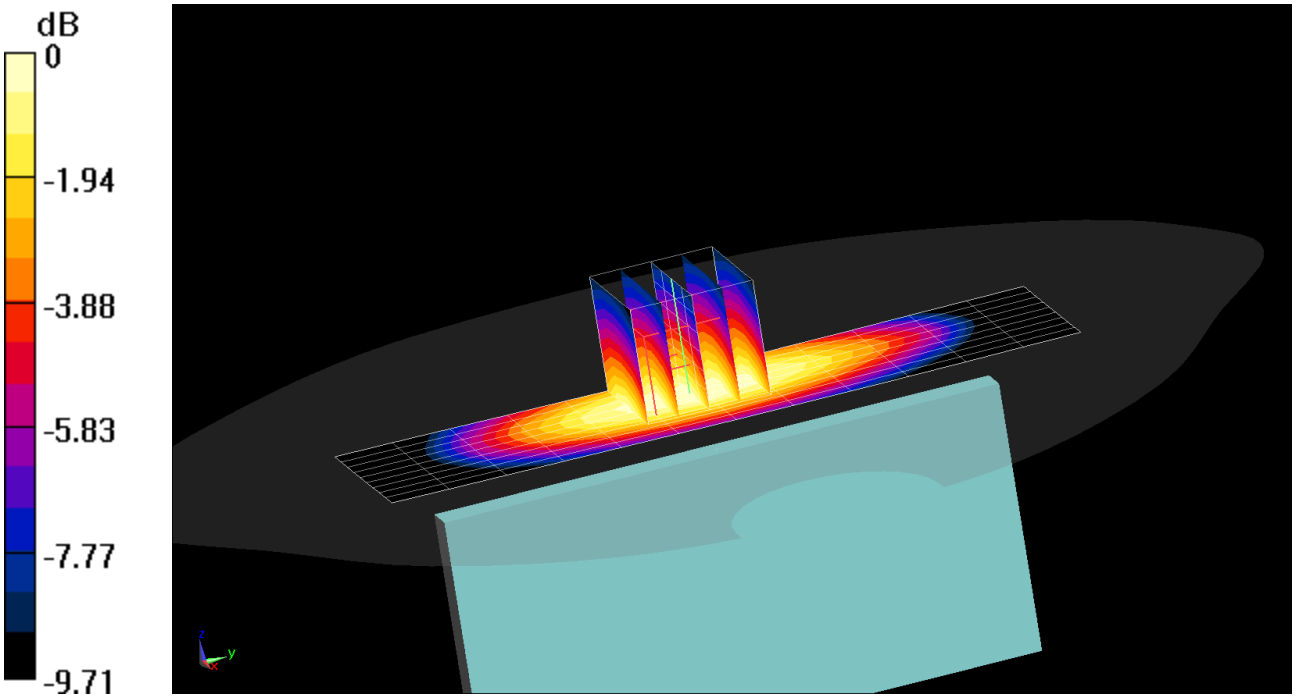
Communication System: UID 0, CDMA; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 836.52 MHz; σ = 0.968 S/m; ε_r = 54.128; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-28-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 836.52 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Cell. EVDO, Body SAR, Right Edge, Mid.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.54 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.570 W/kg
SAR(1 g) = 0.393 W/kg



0 dB = 0.509 W/kg = -2.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85170

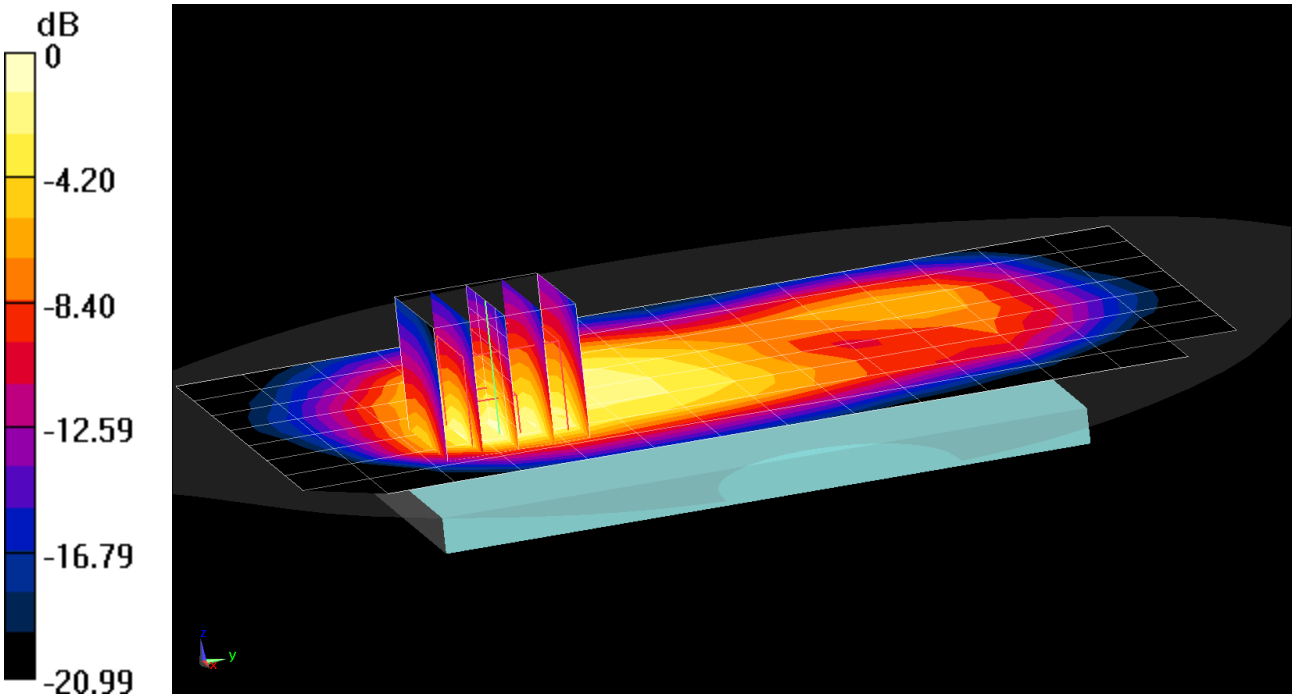
Communication System: UID 0, CDMA; Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.568 S/m; ε_r = 54.492; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-25-2019; Ambient Temp: 20.1°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1908.75 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.33 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.713 W/kg



0 dB = 1.08 W/kg = 0.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85170

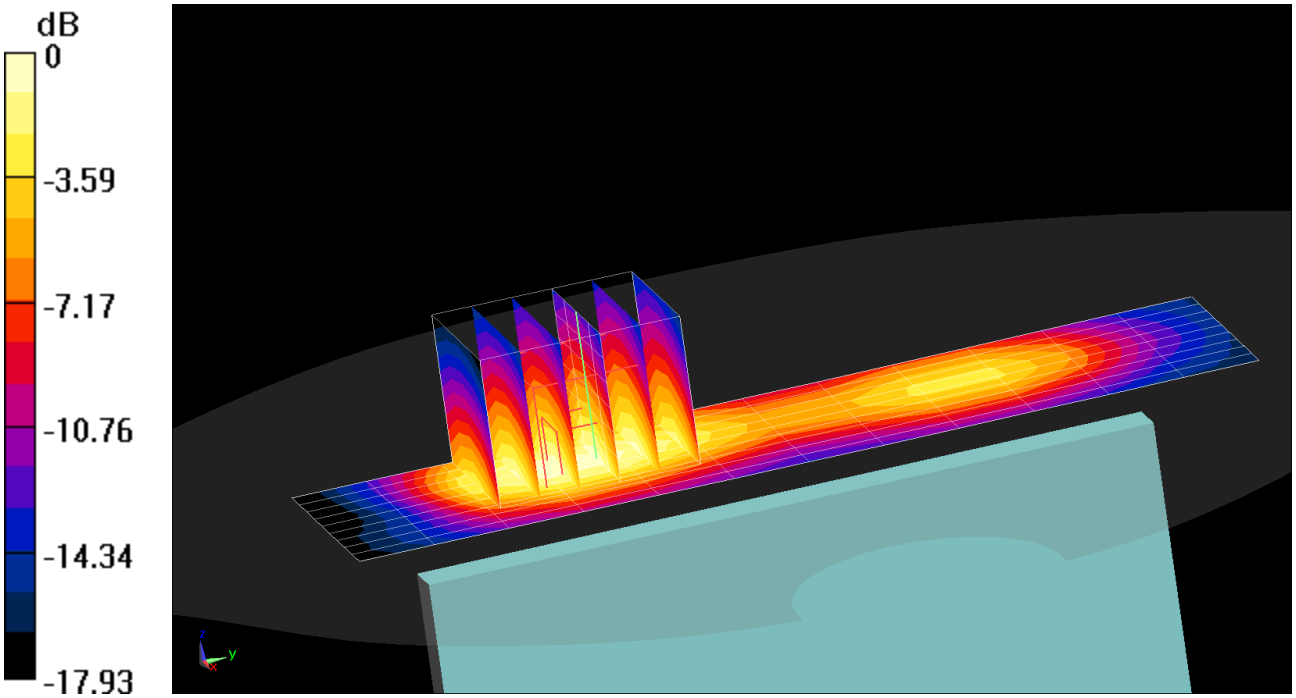
Communication System: UID 0, CDMA, Frequency: 1908.75 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1908.75 MHz; σ = 1.568 S/m; ε_r = 54.492; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-25-2019; Ambient Temp: 20.1°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1908.75 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: PCS EVDO, Body SAR, Left Edge, High.ch

Area Scan (10x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.40 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.795 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

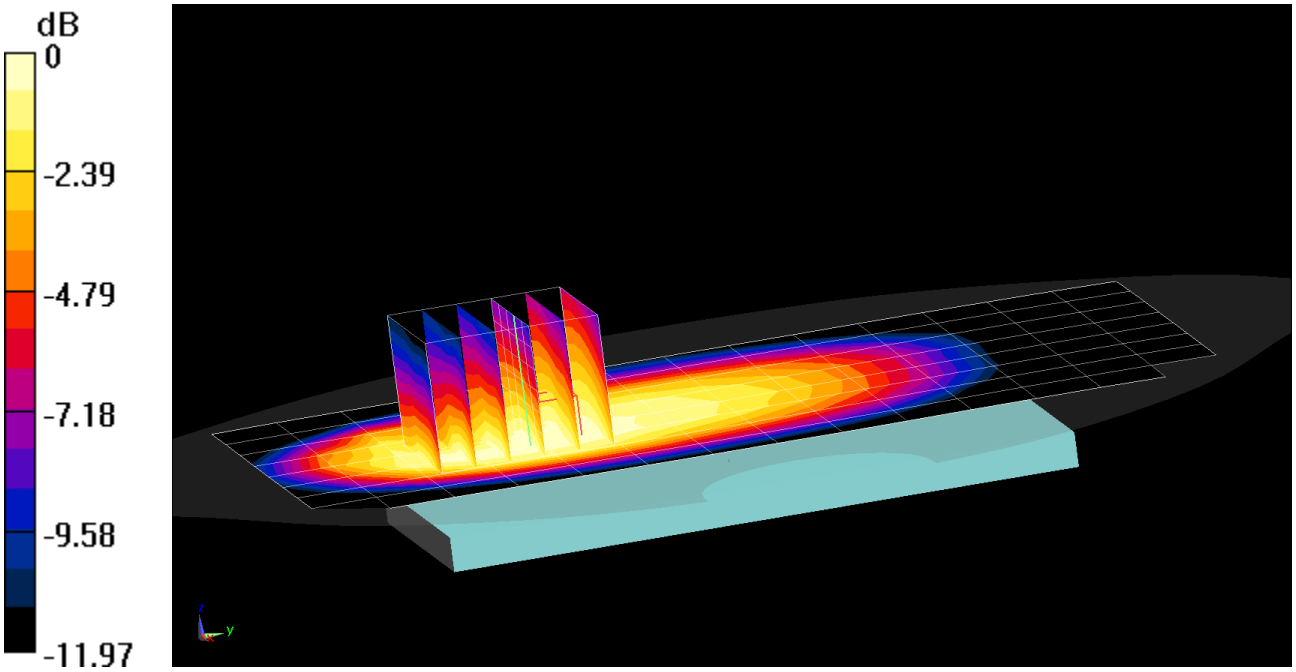
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.917 S/m; ε_r = 57.276; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 680.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 71, Body SAR, Back side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.93 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.550 W/kg
SAR(1 g) = 0.382 W/kg



0 dB = 0.485 W/kg = -3.14 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

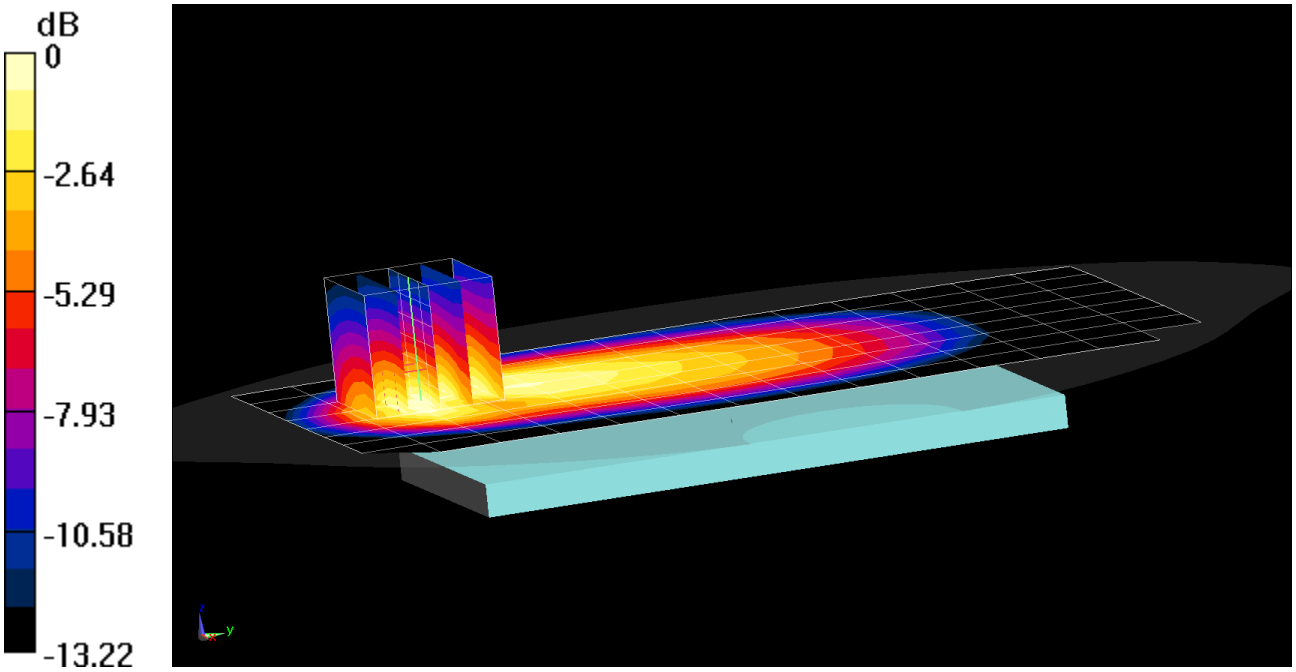
Communication System: UID 0, LTE Band 71; Frequency: 680.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 680.5 MHz; σ = 0.917 S/m; ε_r = 57.276; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 680.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 71, Body SAR, Front side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.38 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.729 W/kg
SAR(1 g) = 0.396 W/kg



0 dB = 0.591 W/kg = -2.28 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

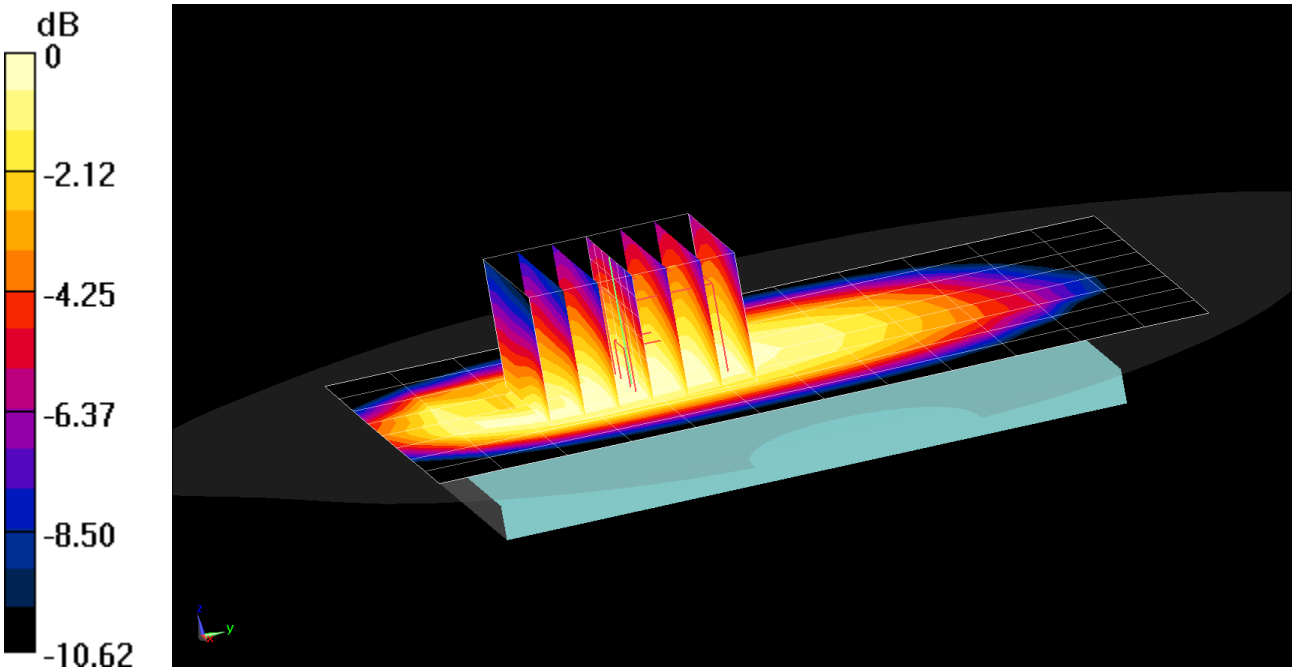
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.926 S/m; ε_r = 57.212; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 707.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 12, Body SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.66 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.547 W/kg
SAR(1 g) = 0.400 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

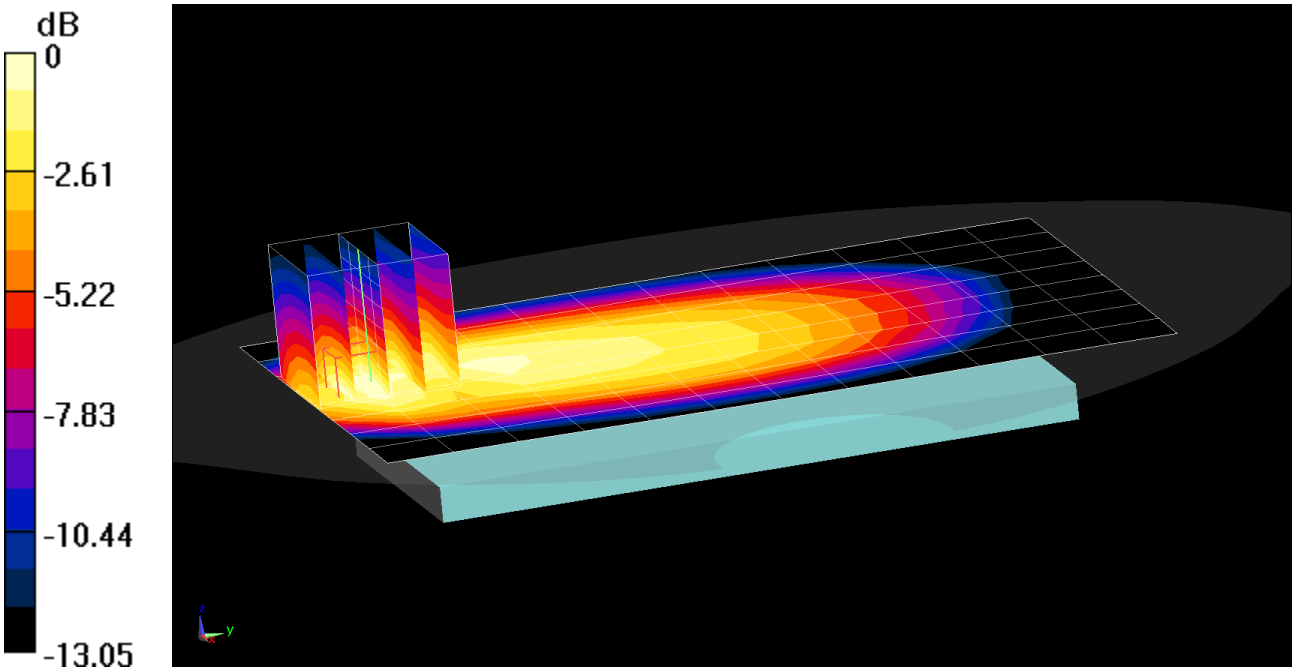
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.926 S/m; ε_r = 57.212; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 707.5 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 12, Body SAR, Front side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 49 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.55 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.848 W/kg
SAR(1 g) = 0.462 W/kg



0 dB = 0.663 W/kg = -1.78 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85071

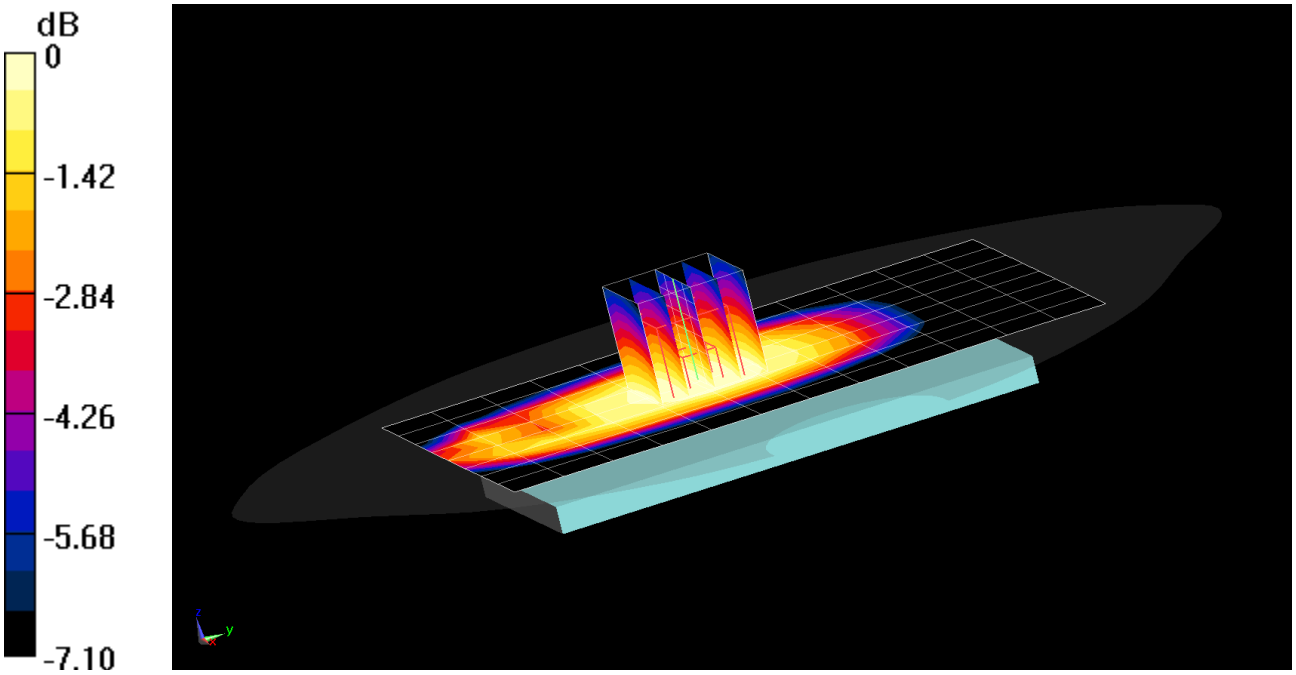
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 782 MHz; σ = 0.952 S/m; ε_r = 57.057; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 782 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Body SAR, Back side, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.82 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.380 W/kg
SAR(1 g) = 0.299 W/kg



0 dB = 0.352 W/kg = -4.53 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85071

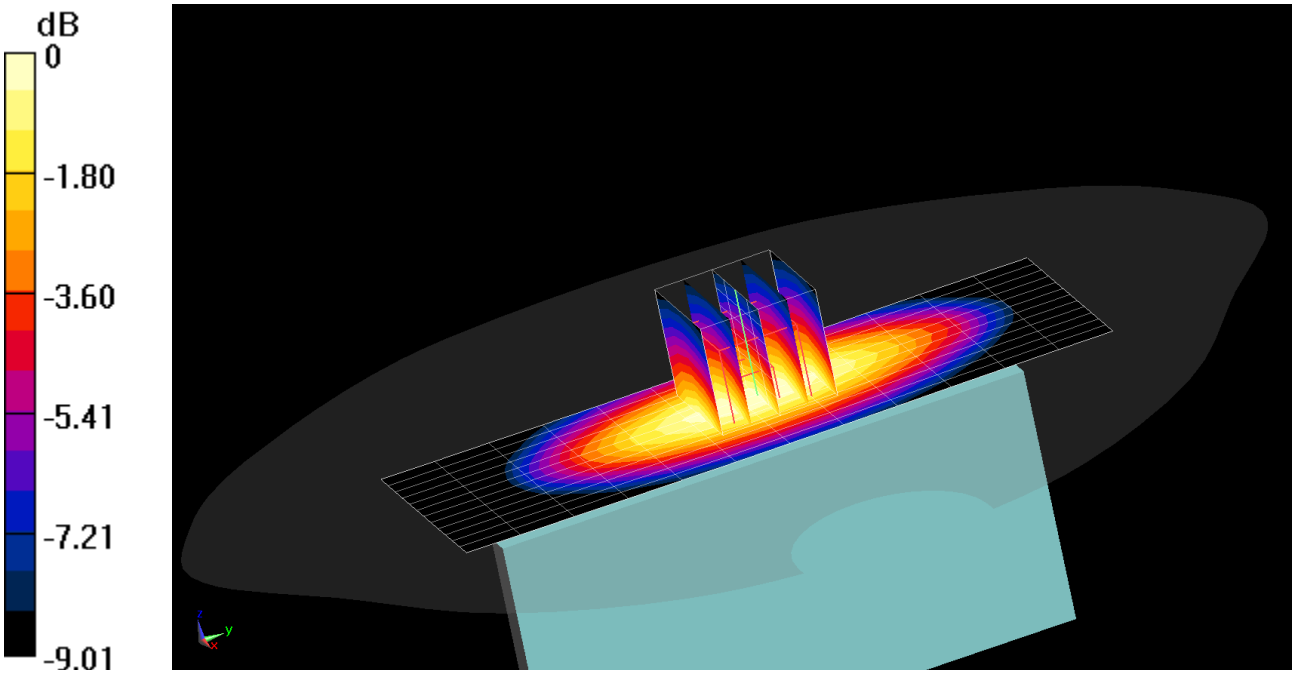
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 782 MHz; σ = 0.952 S/m; ε_r = 57.057; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 782 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 13, Body SAR, Right Edge, Mid.ch, 10 MHz Bandwidth, QPSK, 1 RB, 25 RB Offset

Area Scan (13x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.48 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.501 W/kg
SAR(1 g) = 0.344 W/kg



0 dB = 0.446 W/kg = -3.51 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85071

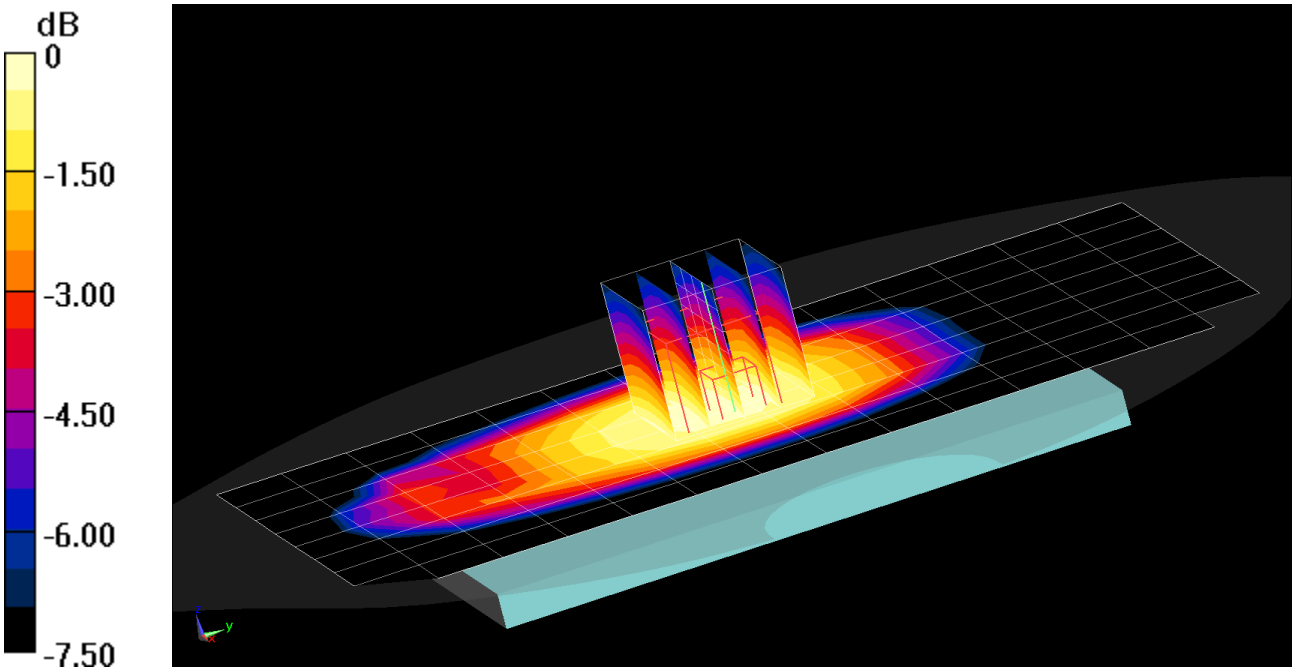
Communication System: UID 0, LTE Band 26; Frequency: 831.5 MHz; Duty Cycle: 1:1
Medium: 835 Body; Medium parameters used (interpolated):
f = 831.5 MHz; σ = 0.962 S/m; ε_r = 54.533; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 831.5 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.80 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.628 W/kg
SAR(1 g) = 0.490 W/kg



0 dB = 0.581 W/kg = -2.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85071

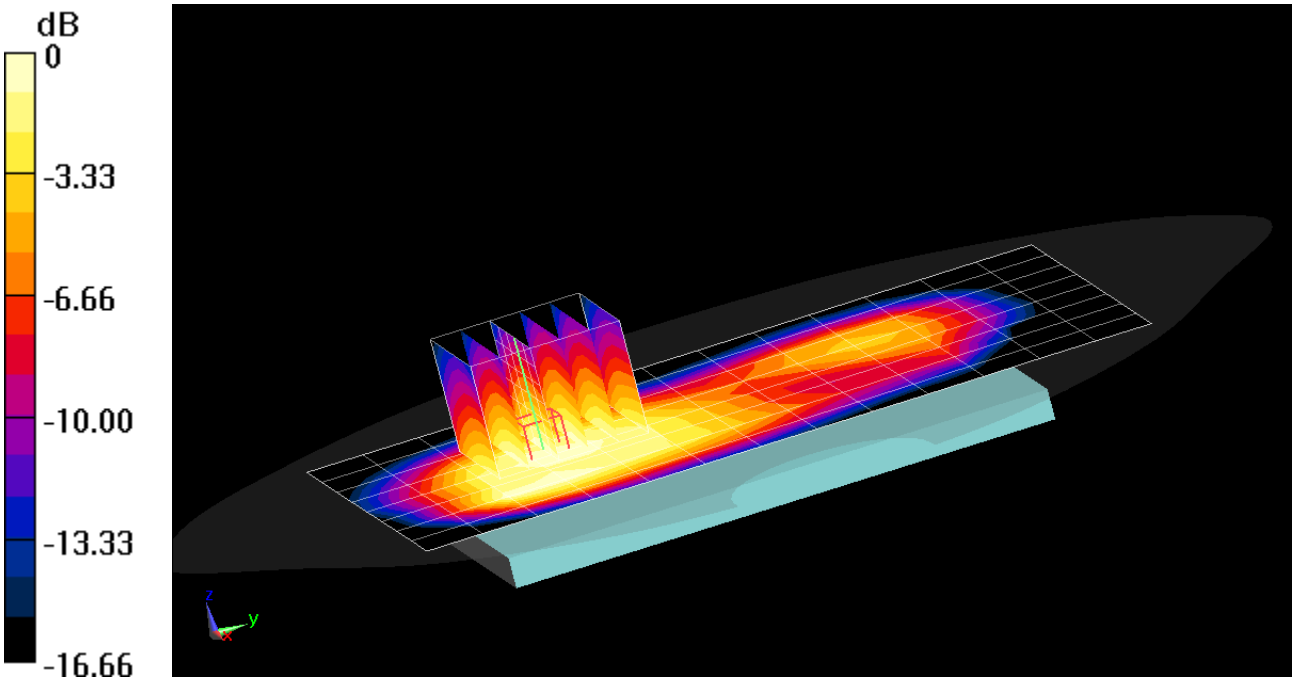
Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1720 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used (interpolated):
f = 1720 MHz; σ = 1.509 S/m; ε_r = 51.896; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2019; Ambient Temp: 23.9°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1720 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.07 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.813 W/kg



0 dB = 1.09 W/kg = 0.37 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

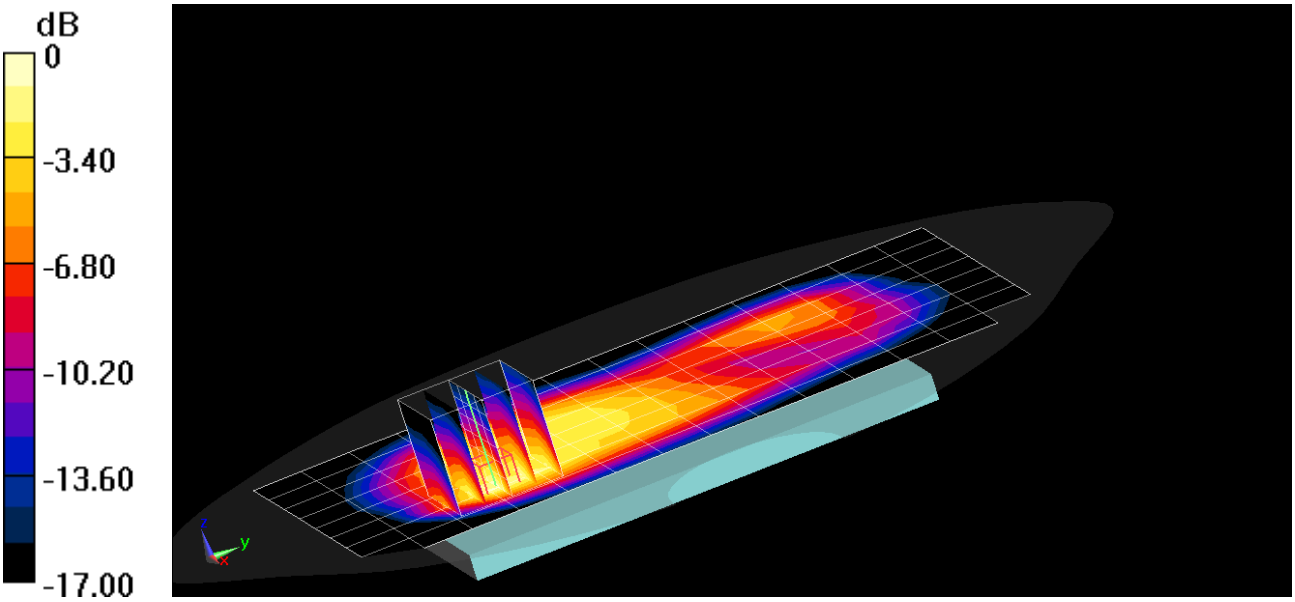
Communication System: UID 0, _LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.557 S/m; ε_r = 52.75; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-05-2019; Ambient Temp: 21.3°C; Tissue Temp: 24.8°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1905 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.66 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.647 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

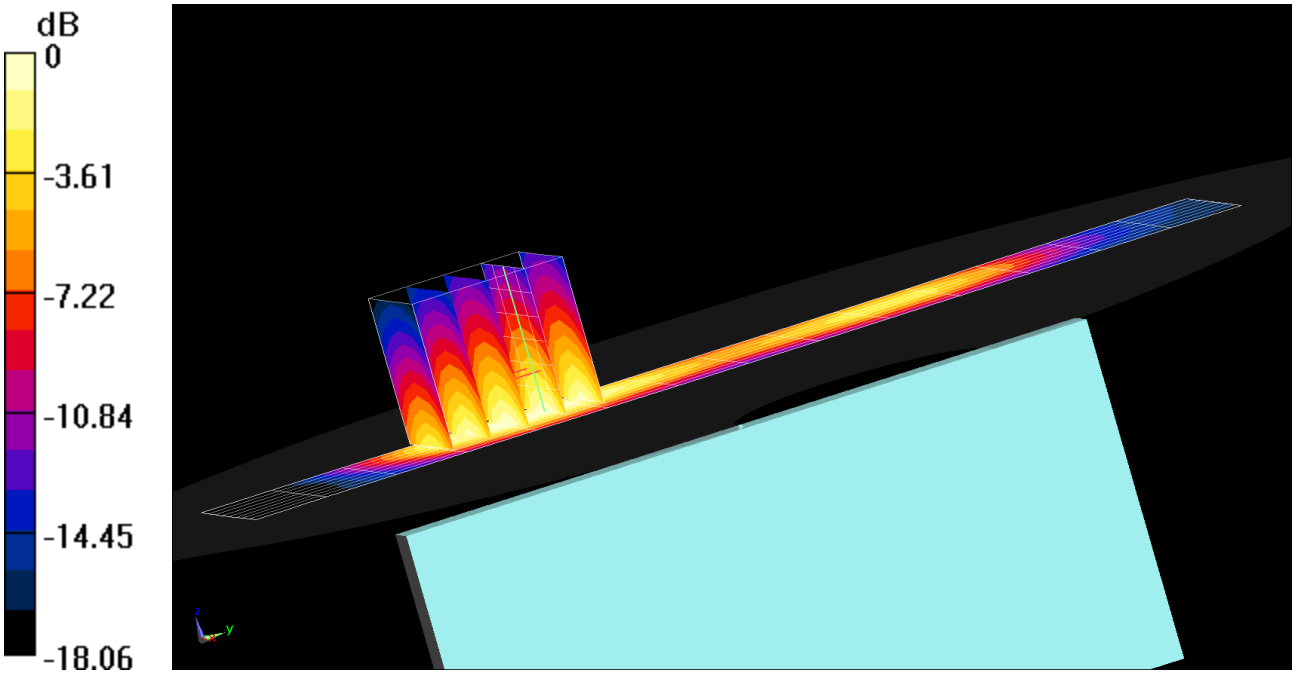
Communication System: UID 0, _LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1
Medium: 1900 Body; Medium parameters used (interpolated):
f = 1905 MHz; σ = 1.565 S/m; ε_r = 54.495; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-25-2019; Ambient Temp: 20.1°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1905 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (9x15x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.39 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.692 W/kg



0 dB = 0.988 W/kg = -0.05 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

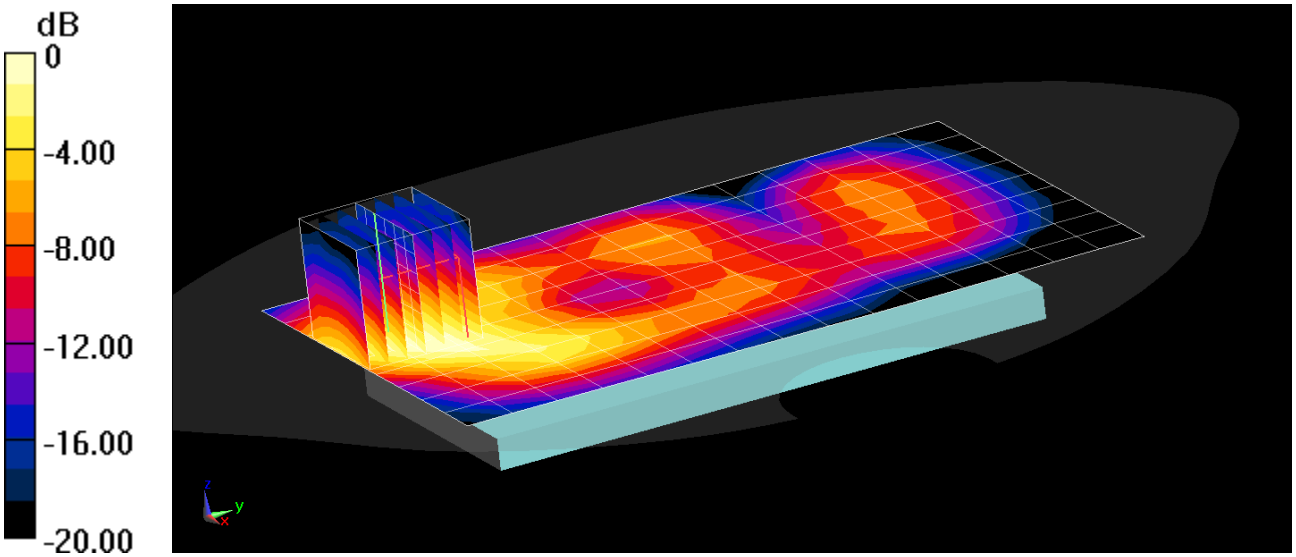
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2593 MHz; Duty Cycle: 1:2.31
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2593 MHz; σ = 2.193 S/m; ε_r = 50.907; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-04-2019; Ambient Temp: 23.4°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7417; ConvF(7.37, 7.37, 7.37) @ 2593 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 41, Body SAR, Back side, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset Power Class 2

Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.10 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.925 W/kg
SAR(1 g) = 0.469 W/kg



0 dB = 0.740 W/kg = -1.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85139

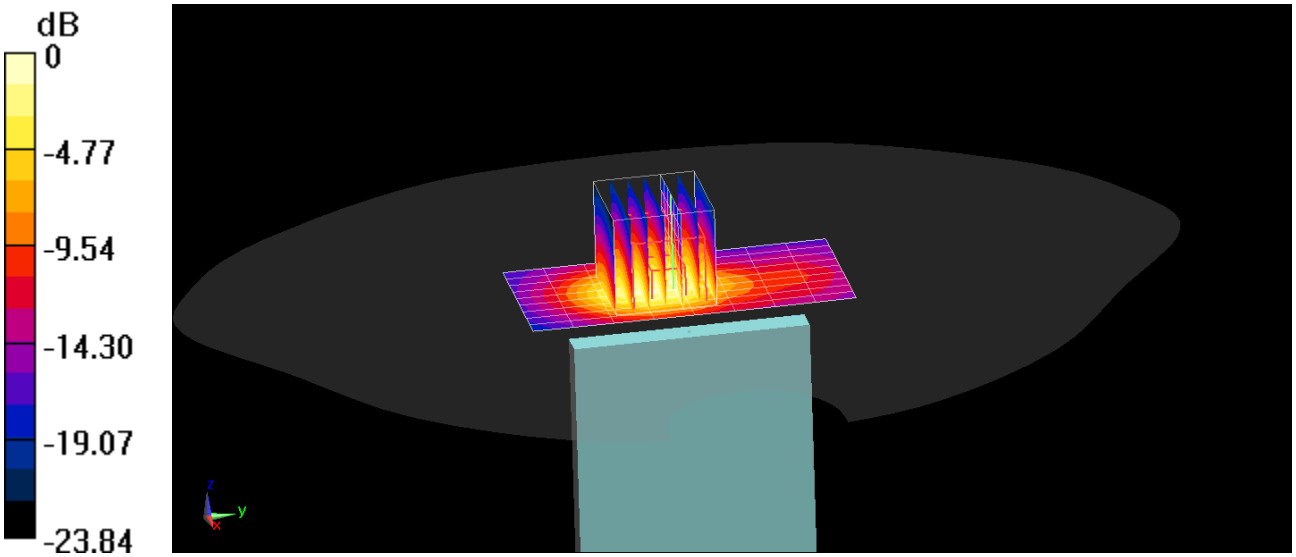
Communication System: UID 0, _LTE Band 41 (Class 2); Frequency: 2549.5 MHz; Duty Cycle: 1:2.31
Medium: 2450 Body; Medium parameters used:
f = 2550 MHz; σ = 2.14 S/m; ε_r = 51.028; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-04-2019; Ambient Temp: 23.4°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7417; ConvF(7.37, 7.37, 7.37) @ 2549.5 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: LTE Band 41, Body SAR, Bottom Edge, Low-Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset Power Class 2

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.01 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 1.1 W/kg



0 dB = 1.85 W/kg = 2.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

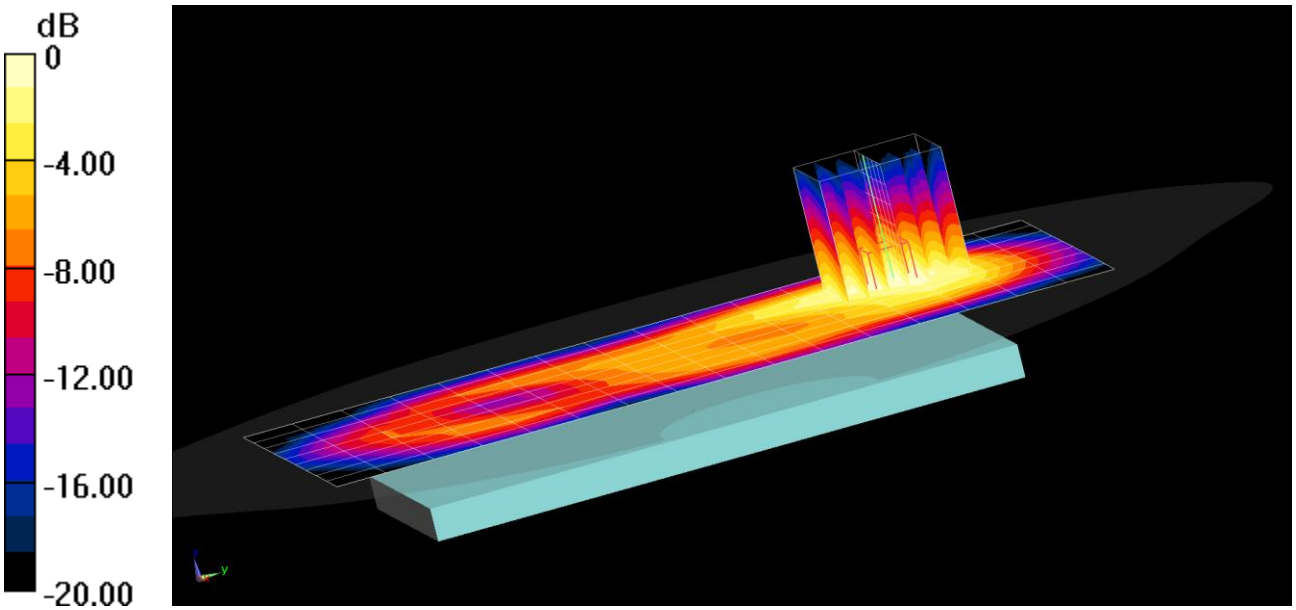
Communication System: UID 0, _IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 MHz Body; Medium parameters used (interpolated):
f = 2437 MHz; σ = 2.016 S/m; ε_r = 53.385; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-24-2019; Ambient Temp: 21.3°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7308; ConvF(7.57, 7.57, 7.57) @ 2437 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.58 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.683 W/kg
SAR(1 g) = 0.343 W/kg



0 dB = 0.538 W/kg = -2.69 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

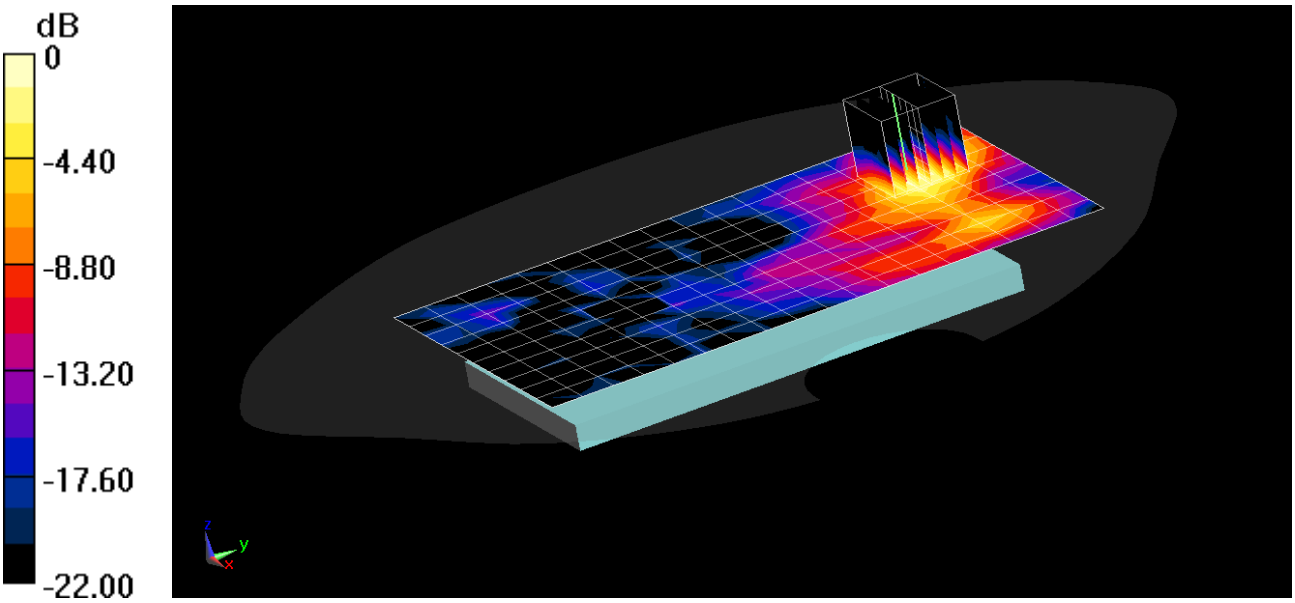
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: 5GHz Body; Medium parameters used:
f = 5300 MHz; σ = 5.524 S/m; ε_r = 48.466; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.5°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5300 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, UNII-2A, 20 MHz Bandwidth, Body SAR, Ch 60, 6 Mbps, Back Side

Area Scan (11x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 8.939 V/m; Power Drift = -0.20 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.381 W/kg



0 dB = 0.858 W/kg = -0.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

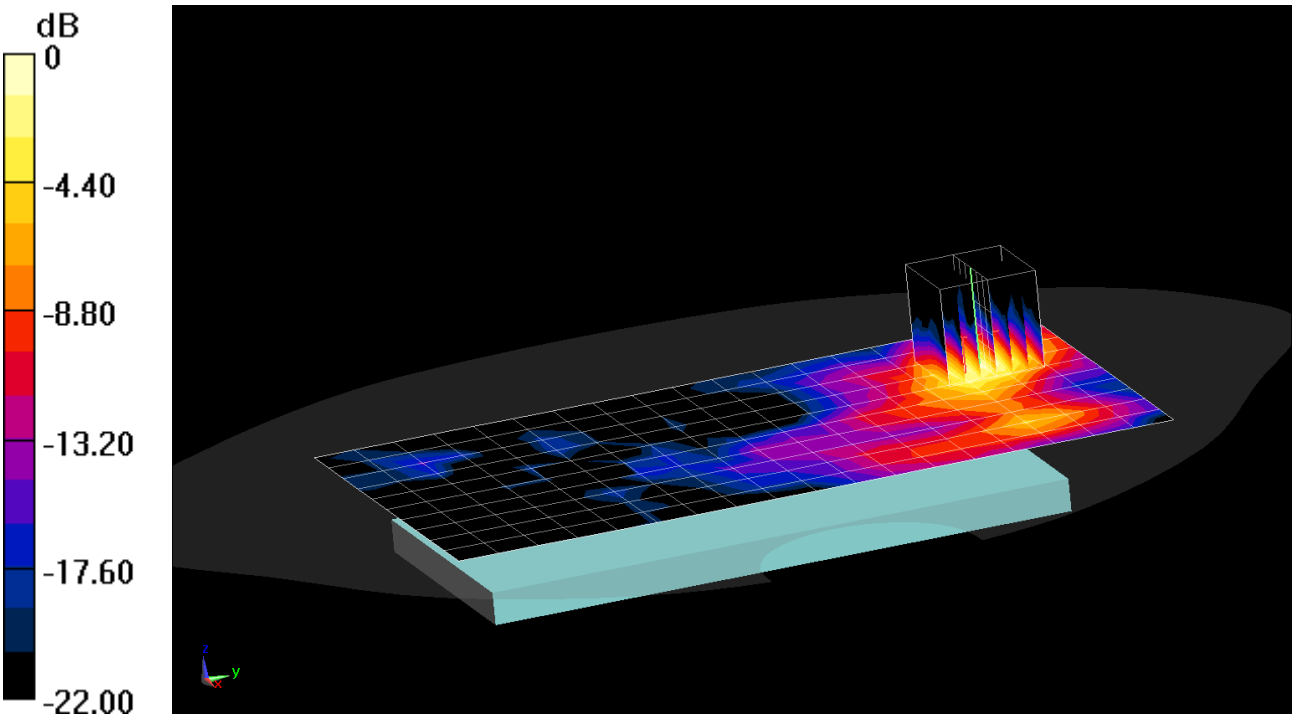
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5220 MHz; Duty Cycle: 1:1
Medium: 5GHz Body; Medium parameters used:
f = 5220 MHz; σ = 5.415 S/m; ε_r = 48.61; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.5°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5220 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: IEEE 802.11a, UNII-1, 20 MHz Bandwidth, Body SAR, Ch 44, 6 Mbps, Back Side

Area Scan (11x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 9.993 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.63 W/kg
SAR(1 g) = 0.460 W/kg



0 dB = 1.06 W/kg = 0.25 dBW/kg

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

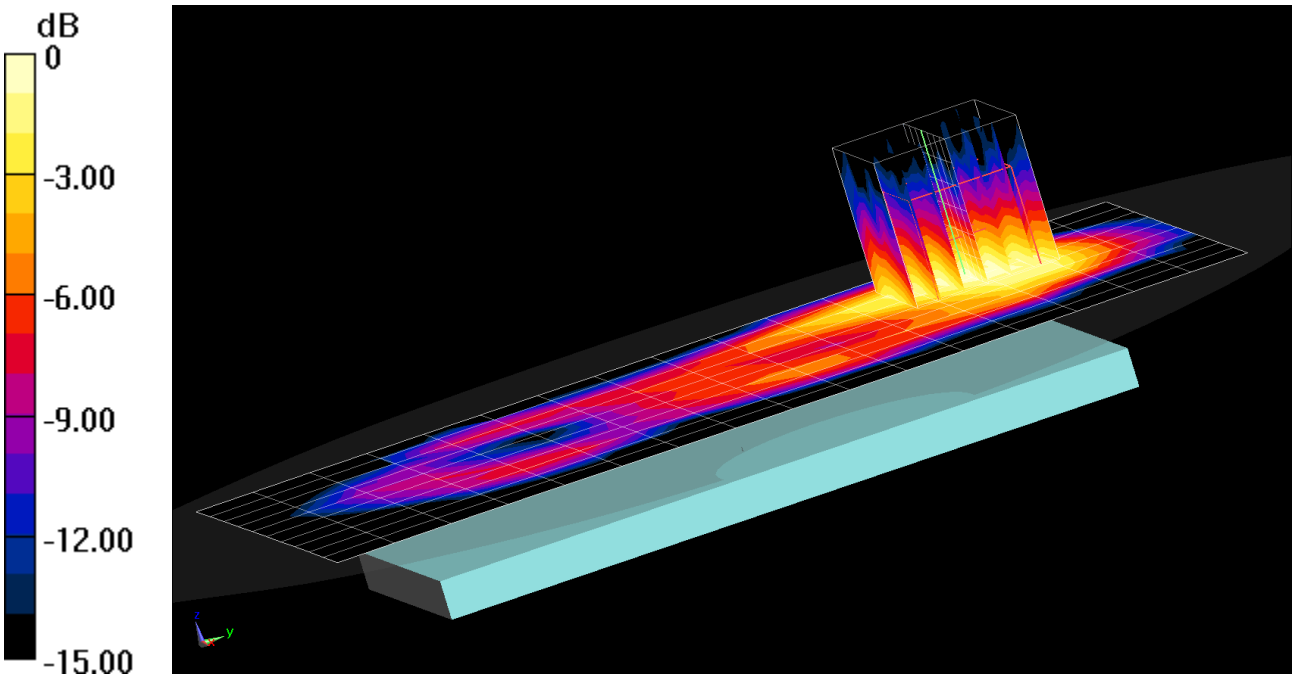
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.996 S/m; ε_r = 51.288; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.9°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2441 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.690 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.0820 W/kg
SAR(1 g) = 0.041 W/kg



0 dB = 0.0641 W/kg = -11.93 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: ZNFX320TA; Type: Portable Handset; Serial: 85337

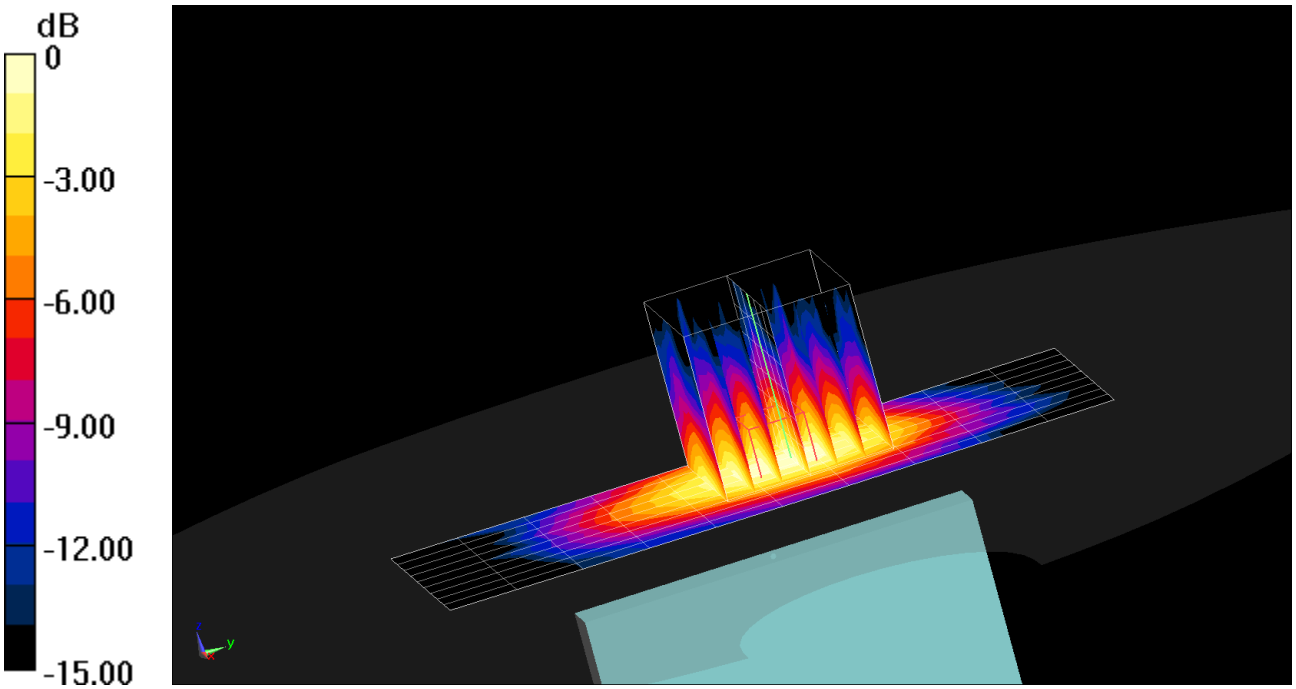
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.297
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.996 S/m; ε_r = 51.288; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.9°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2441 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Top Edge

Area Scan (10x11x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.705 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.0810 W/kg
SAR(1 g) = 0.041 W/kg



0 dB = 0.0641 W/kg = -11.93 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

© 2019 PCTEST Engineering Laboratory, Inc.

PCTEST ENGINEERING LABORATORY, INC.

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

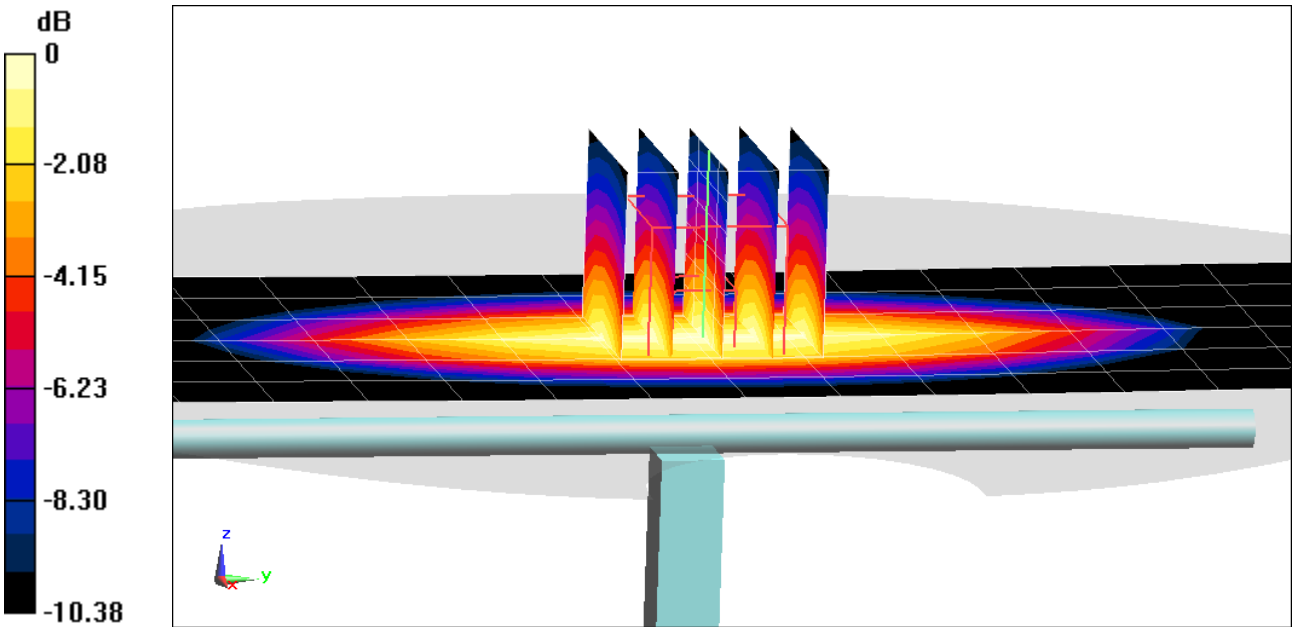
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.885 S/m; ε_r = 43.69; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-12-2019; Ambient Temp: 20.8°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7357; ConvF(10.26, 10.26, 10.26) @ 750 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V5.0 (30) Back Right; Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.43 W/kg
SAR(1 g) = 1.61 W/kg
Deviation(1 g) = -2.78%



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

PCTEST ENGINEERING LABORATORY, INC.

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

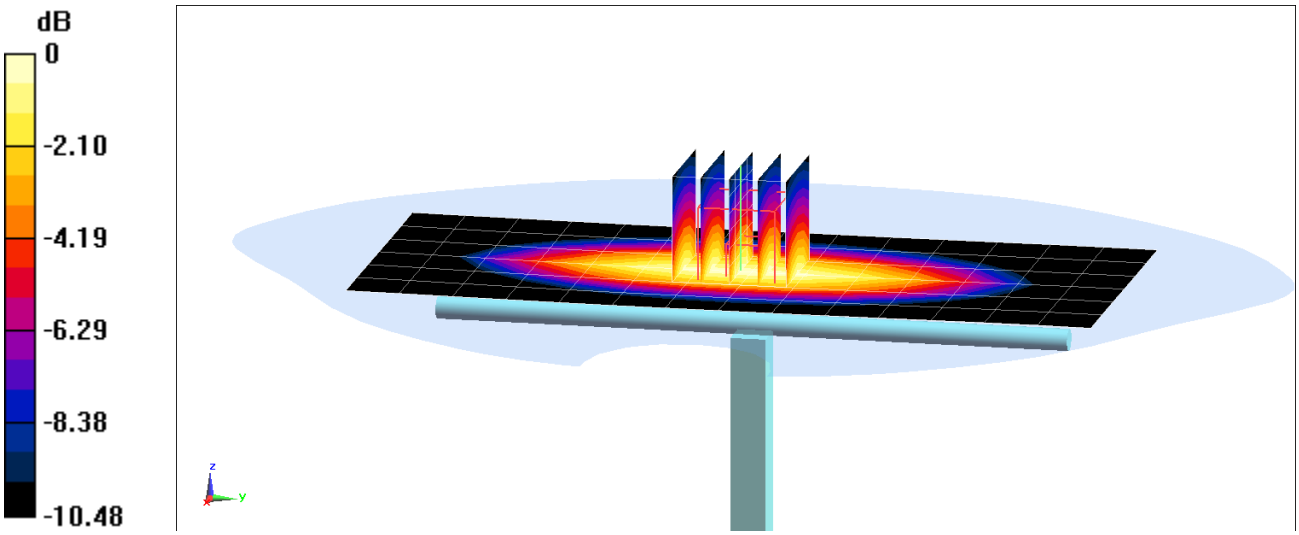
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; σ = 0.878 S/m; ε_r = 42.31; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7406; ConvF(10.26, 10.26, 10.26) @ 750 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.42 W/kg
SAR(1 g) = 1.62 W/kg
Deviation(1 g) = -2.17%



0 dB = 2.16 W/kg = 3.34 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

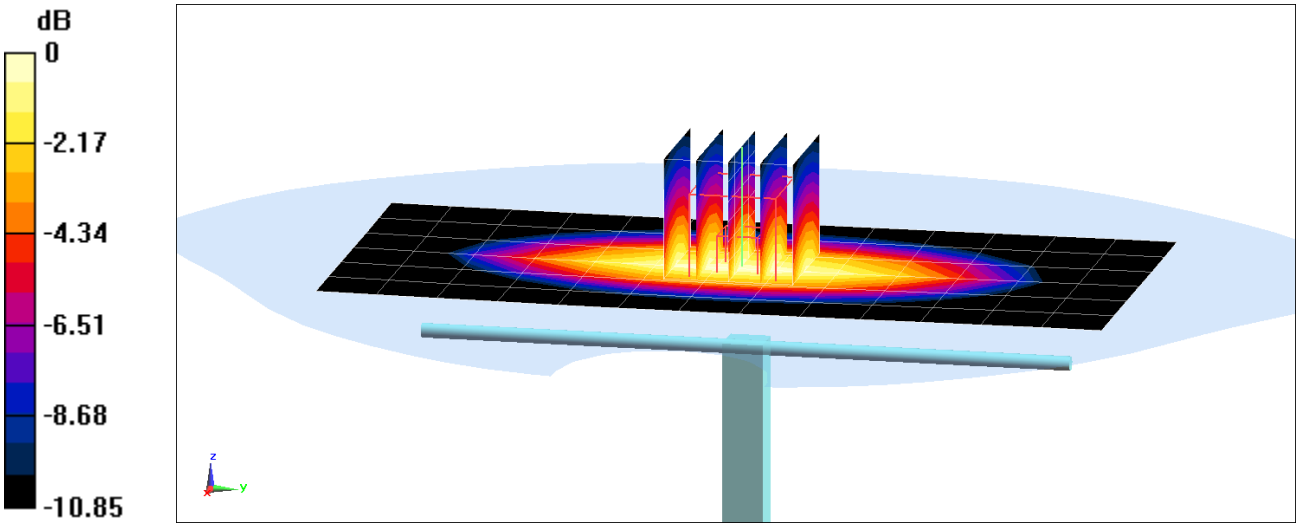
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.908 S/m; ε_r = 41.215; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-14-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 835 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.07 W/kg
SAR(1 g) = 2.03 W/kg
Deviation(1 g) = 5.84%



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

PCTEST ENGINEERING LABORATORY, INC.

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

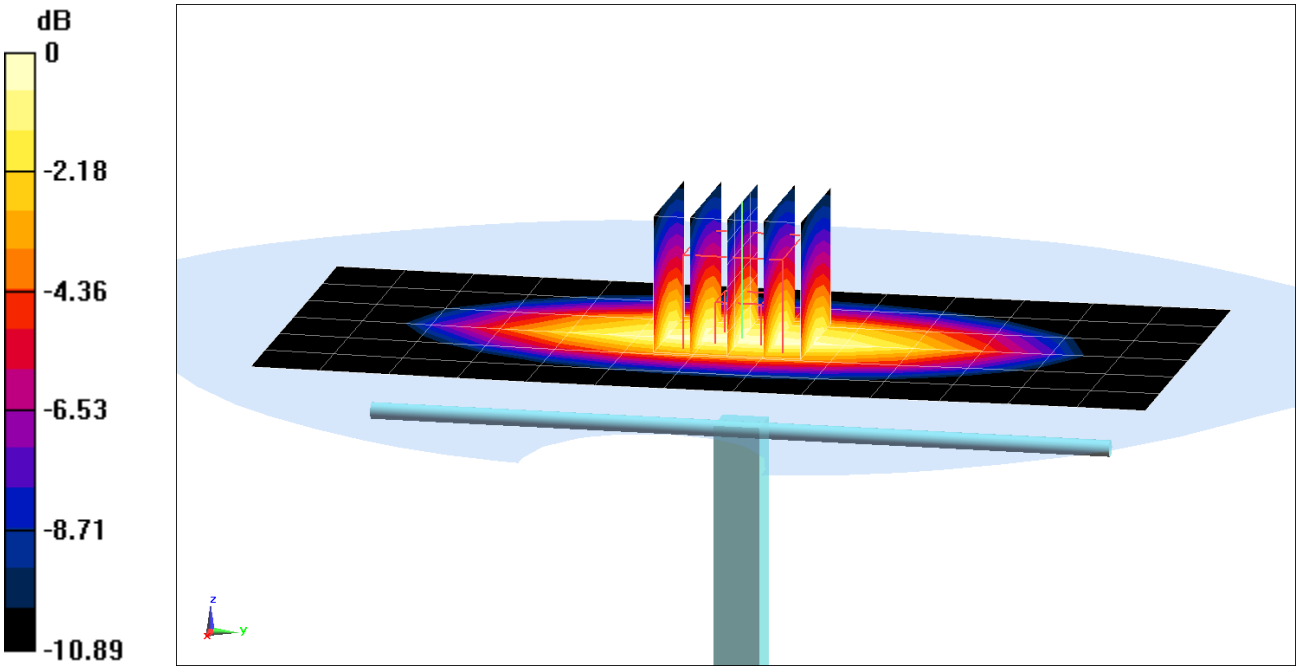
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.931 S/m; ε_r = 42.065; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-17-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 835 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.06 W/kg
SAR(1 g) = 2.02 W/kg
Deviation(1 g) = 5.32%



0 dB = 2.71 W/kg = 4.33 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

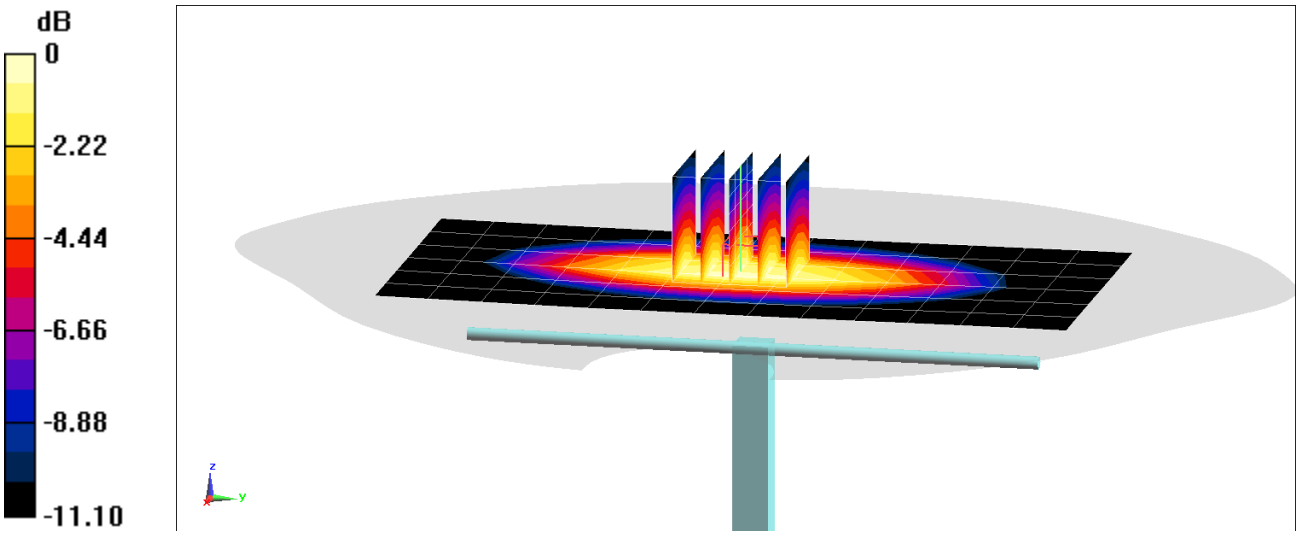
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head; Medium parameters used:
f = 835 MHz; σ = 0.932 S/m; ε_r = 42.078; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-03-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(9.78, 9.78, 9.78) @ 835 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: Twin-SAM V5.0 Right 30; Type: QD 000 P40 CD; Serial: 1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.20 W/kg
SAR(1 g) = 2.05 W/kg
Deviation(1 g) = 6.88%



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

PCTEST ENGINEERING LABORATORY, INC.

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

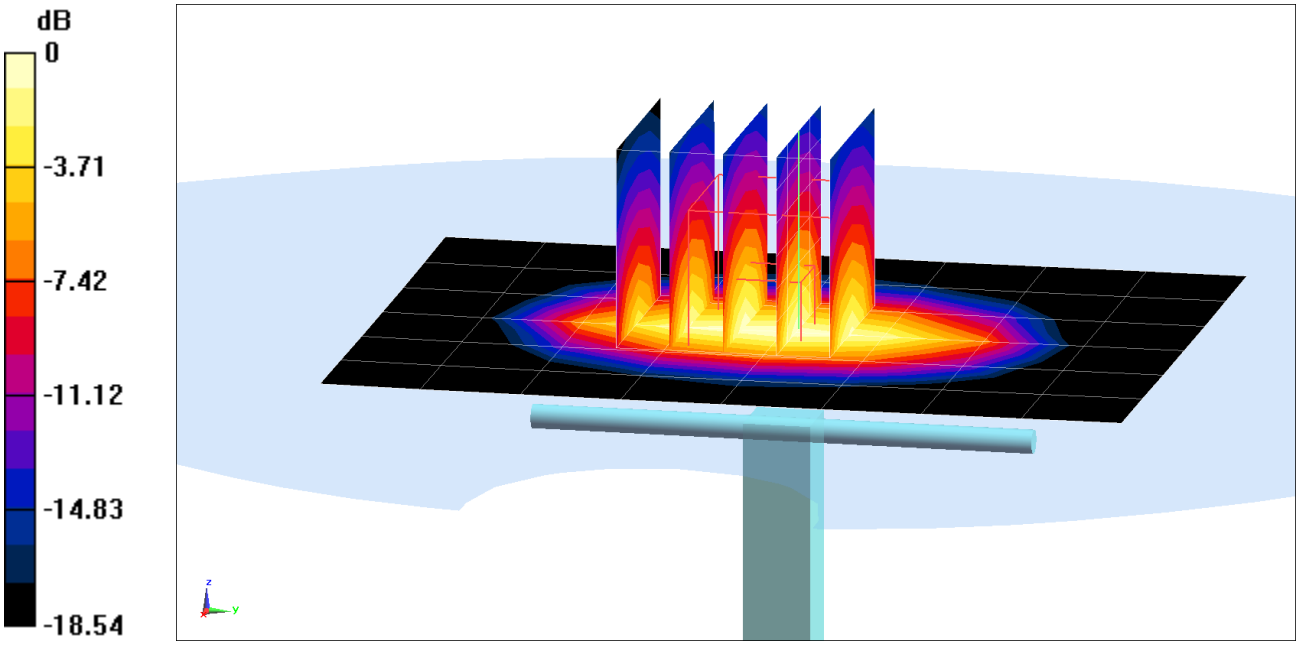
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.362 S/m; ε_r = 39.781; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-19-2019; Ambient Temp: 21.9°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7406; ConvF(8.57, 8.57, 8.57) @ 1750 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM 30 with CRP v5.0 right; Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.11 W/kg
SAR(1 g) = 3.86 W/kg
Deviation(1 g) = 6.63%



0 dB = 5.87 W/kg = 7.69 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

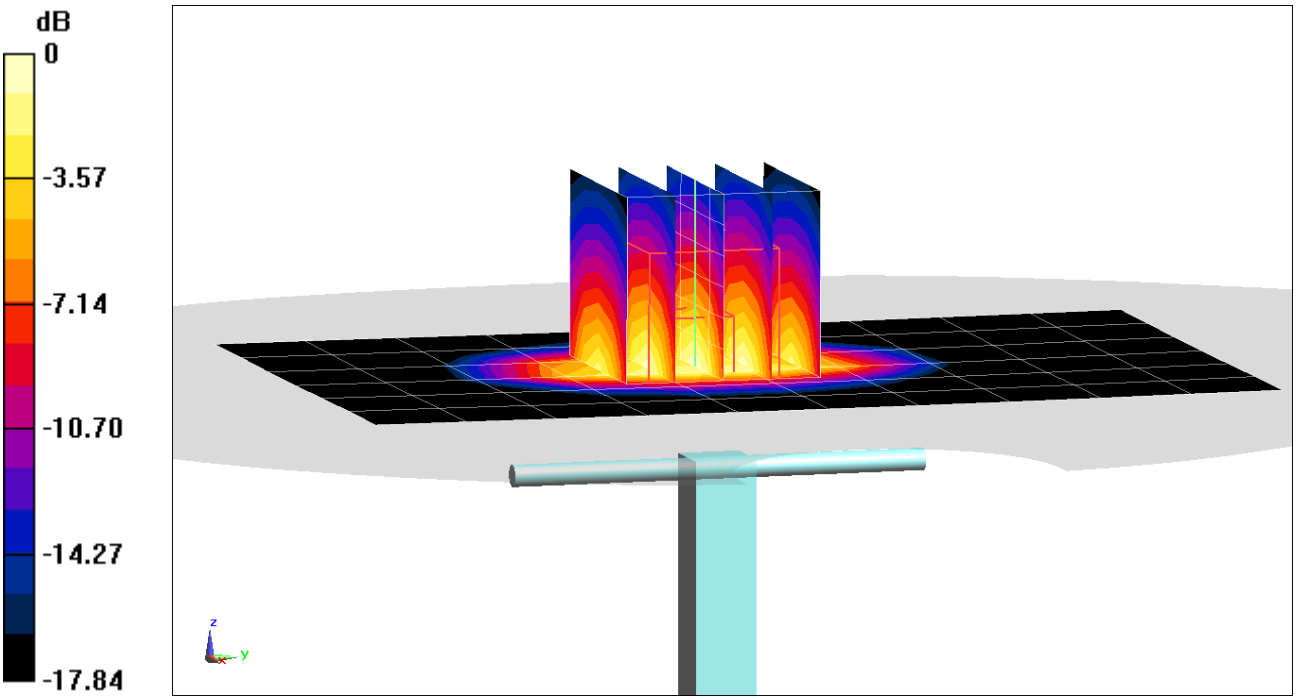
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.446 S/m; ε_r = 40.68; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-01-2019; Ambient Temp: 22.0°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN7410; ConvF(8.16, 8.16, 8.16) @ 1900 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.11 W/kg
SAR(1 g) = 3.99 W/kg
Deviation(1 g) = 1.53%



0 dB = 6.12 W/kg = 7.87 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

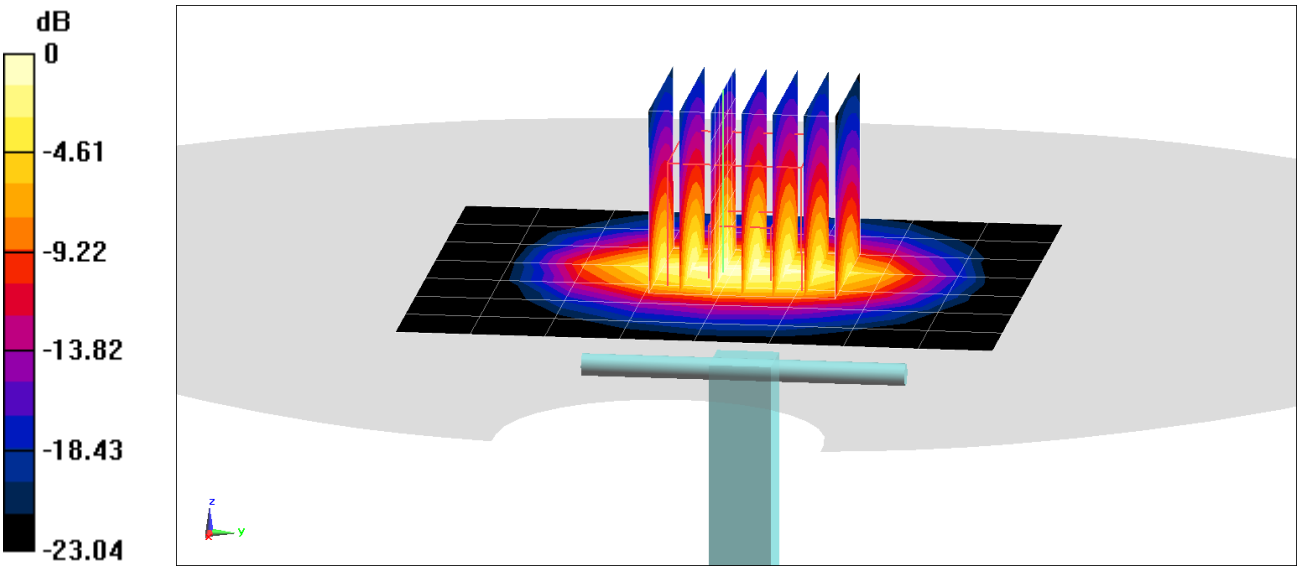
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.858 S/m; ε_r = 40.633; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-26-2019; Ambient Temp: 22.1°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2450 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.34 W/kg
Deviation(1 g) = 1.33%



0 dB = 8.94 W/kg = 9.51 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

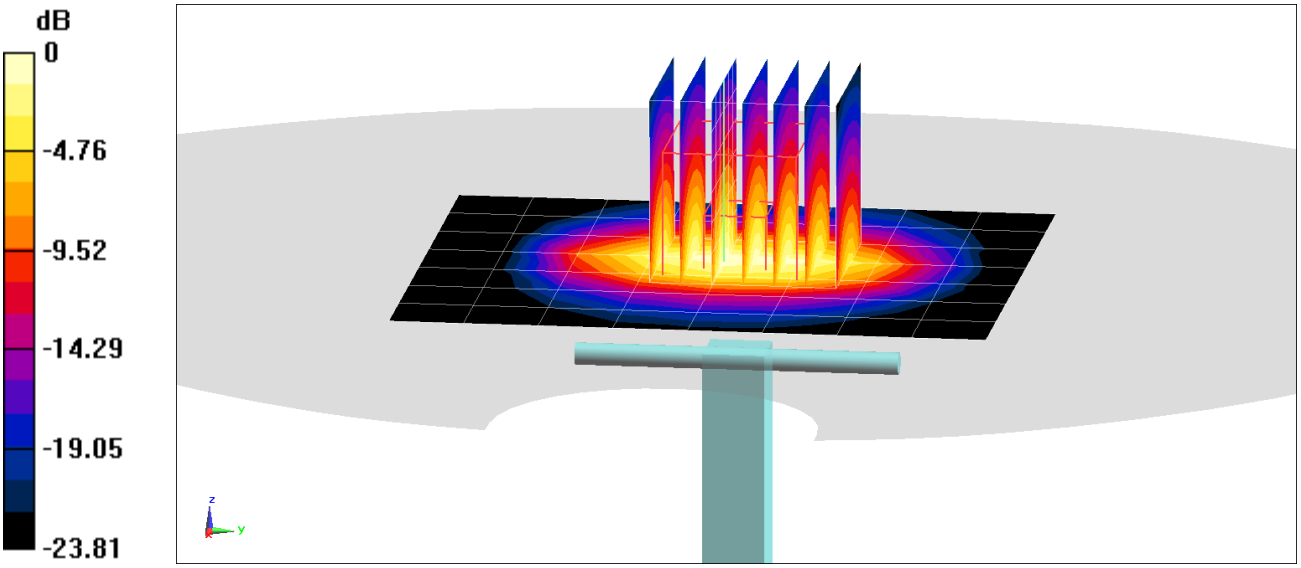
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.859 S/m; ε_r = 40.148; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-05-2019; Ambient Temp: 22.5°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3589; ConvF(6.46, 6.46, 6.46) @ 2450 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.6 W/kg
SAR(1 g) = 5.33 W/kg
Deviation(1 g) = 1.14%



0 dB = 9.05 W/kg = 9.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

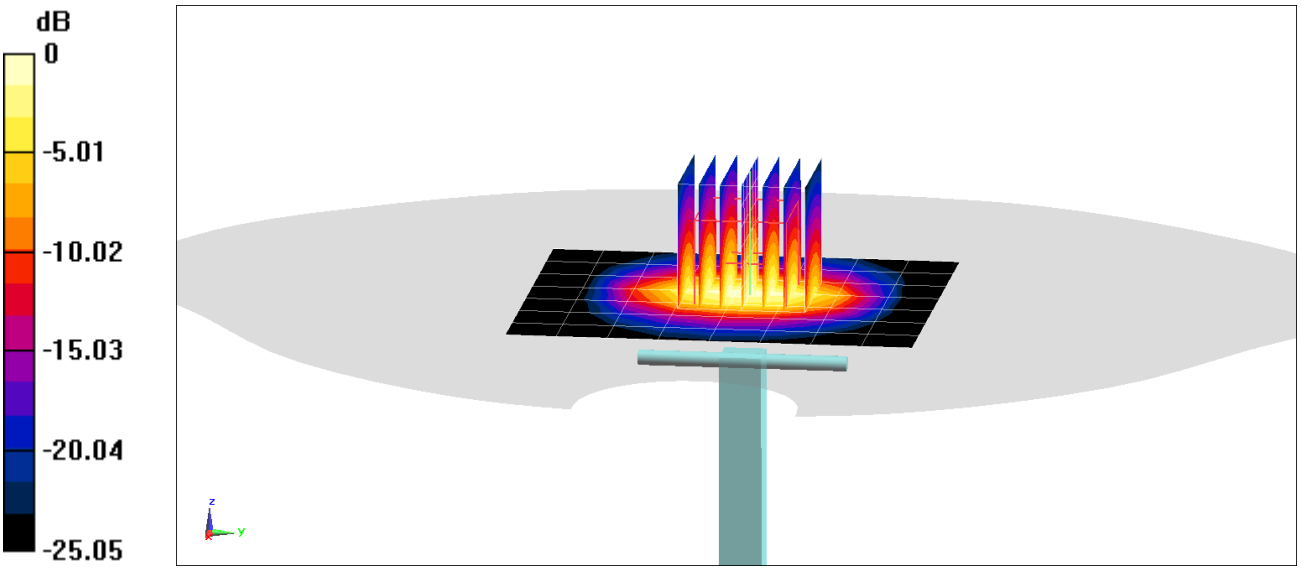
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2600 MHz; σ = 1.986 S/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-05-2019; Ambient Temp: 22.5°C; Tissue Temp: 21.3°C

Probe: EX3DV4 - SN3589; ConvF(6.25, 6.25, 6.25) @ 2600 MHz; Calibrated: 1/25/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1450; Calibrated: 8/22/2018
Phantom: Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1647
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.7 W/kg
SAR(1 g) = 5.78 W/kg
Deviation(1 g) = 6.06%



0 dB = 9.99 W/kg = 10.00 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

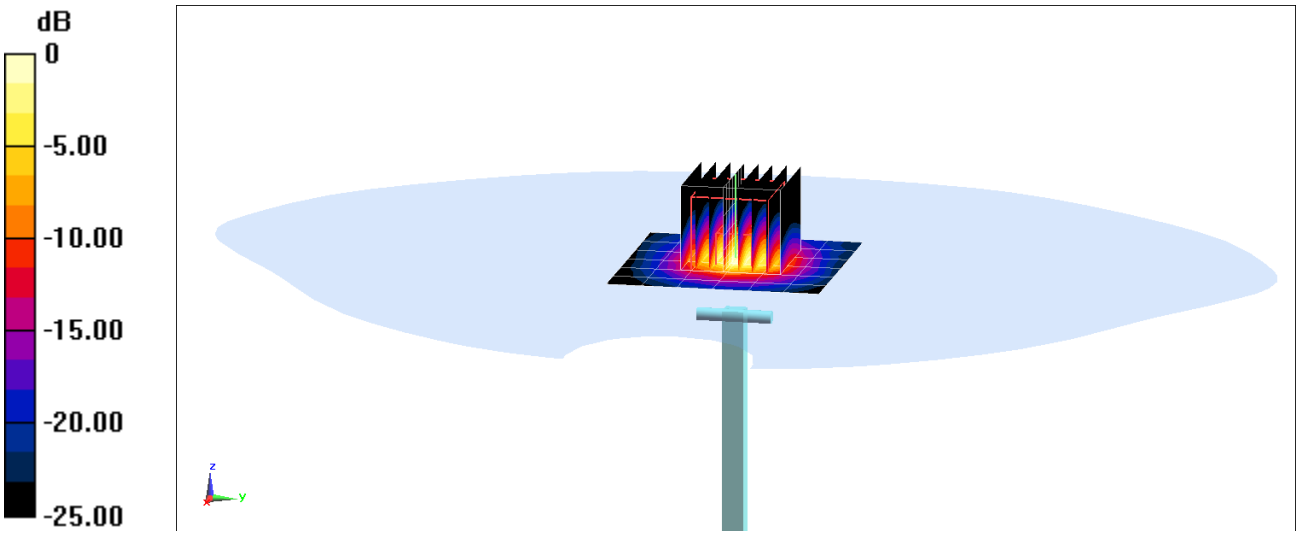
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5250 MHz; σ = 4.541 S/m; ε_r = 34.74; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7406; ConvF(5.54, 5.54, 5.54) @ 5250 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 4.00 W/kg
Deviation(1 g) = 1.39%



0 dB = 9.70 W/kg = 9.87 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

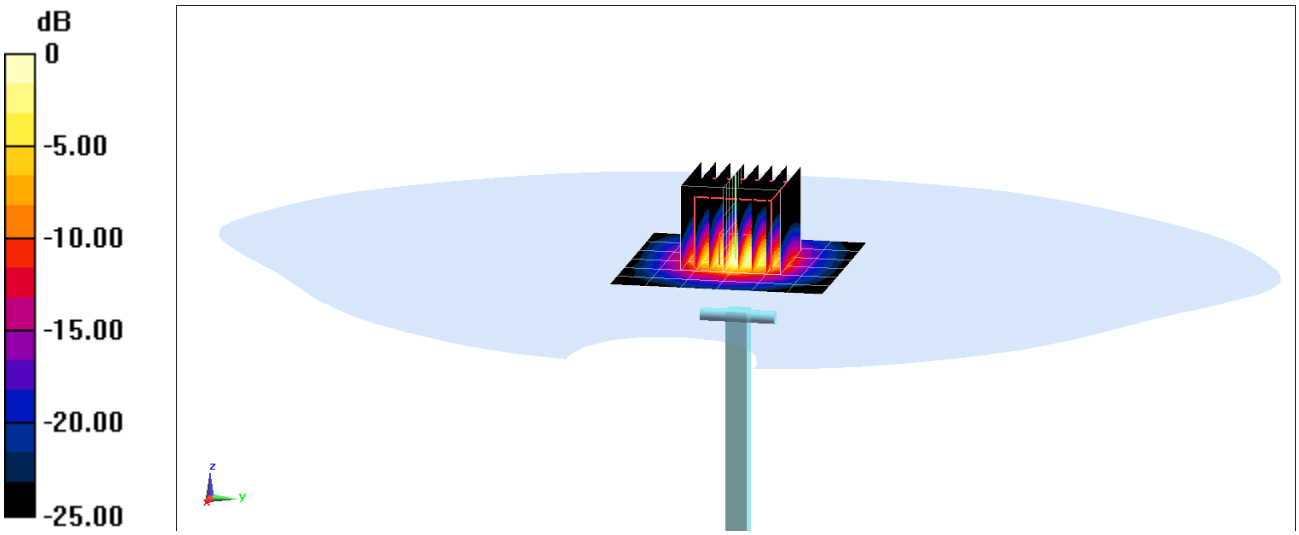
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.928 S/m; ε_r = 34.134; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7406; ConvF(4.94, 4.94, 4.94) @ 5600 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 4.22 W/kg
Deviation(1 g) = 0.96%



0 dB = 10.3 W/kg = 10.13 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

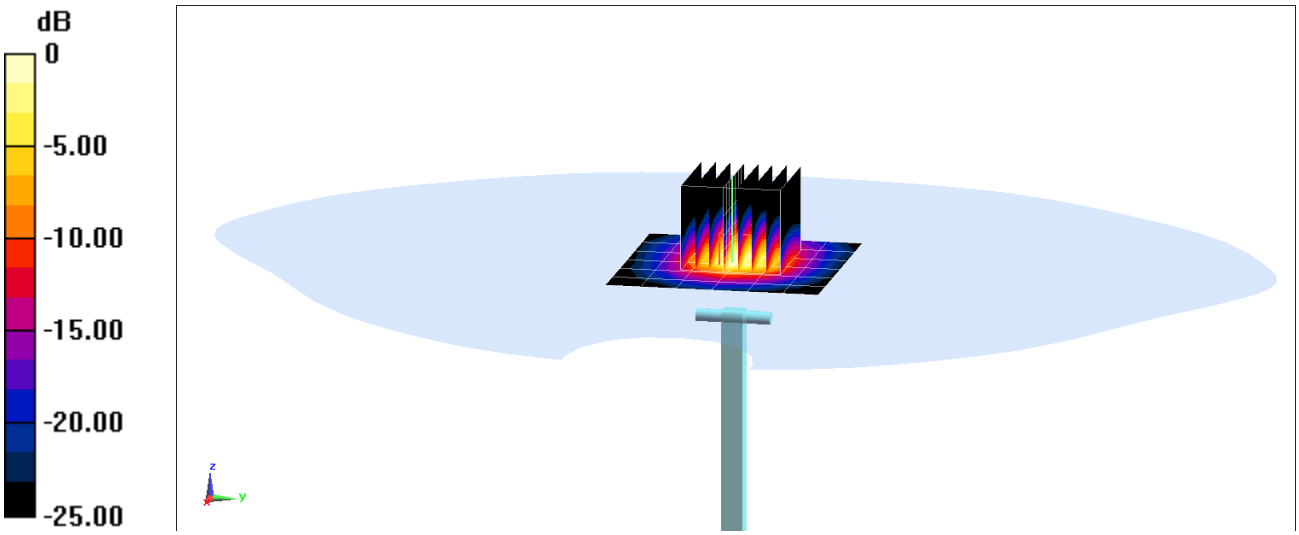
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.099 S/m; ε_r = 33.868; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-01-2019; Ambient Temp: 20.9°C; Tissue Temp: 20.5°C

Probe: EX3DV4 - SN7406; ConvF(5.23, 5.23, 5.23) @ 5750 MHz; Calibrated: 5/16/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn859; Calibrated: 5/8/2019
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 4.05 W/kg
Deviation(1 g) = 2.40%



0 dB = 9.75 W/kg = 9.89 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

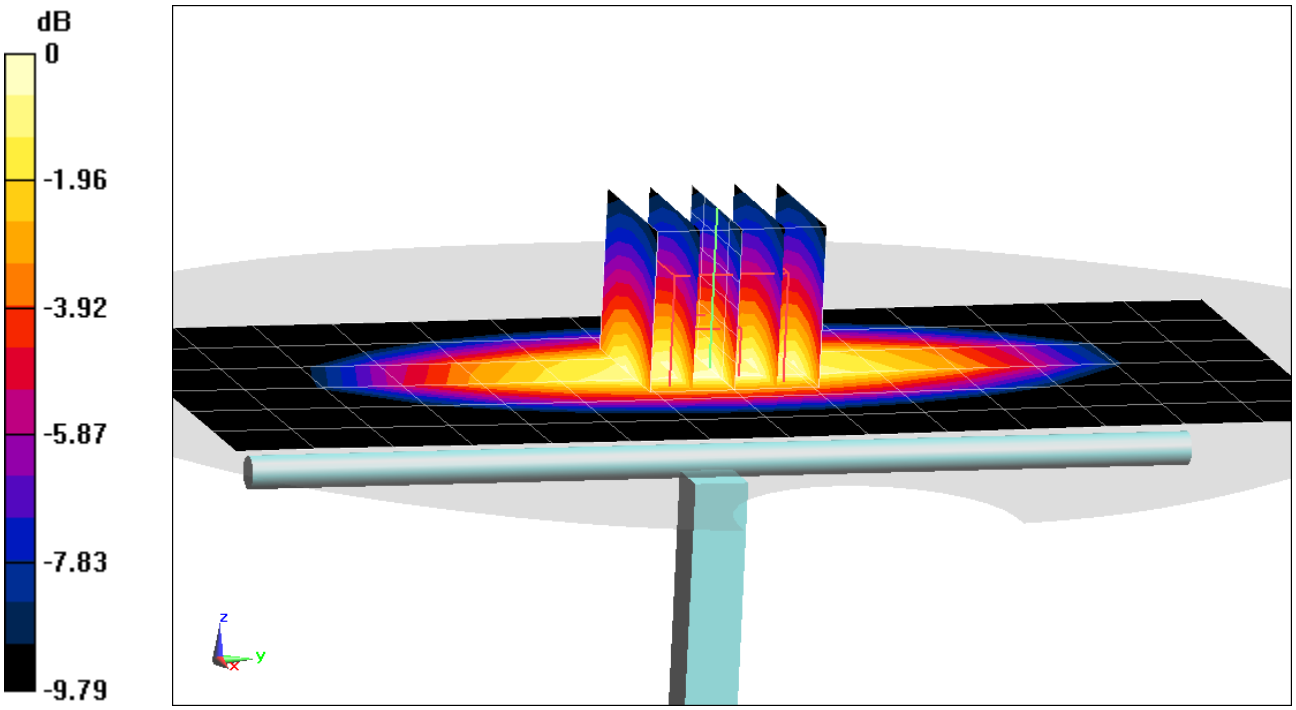
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body; Medium parameters used (interpolated):
f = 750 MHz; σ = 0.94 S/m; ε_r = 57.132; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-17-2019; Ambient Temp: 21.7°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7357; ConvF(10.19, 10.19, 10.19) @ 750 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.59 W/kg
SAR(1 g) = 1.73 W/kg
Deviation(1 g) = 0.82%



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

PCTEST ENGINEERING LABORATORY, INC.

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

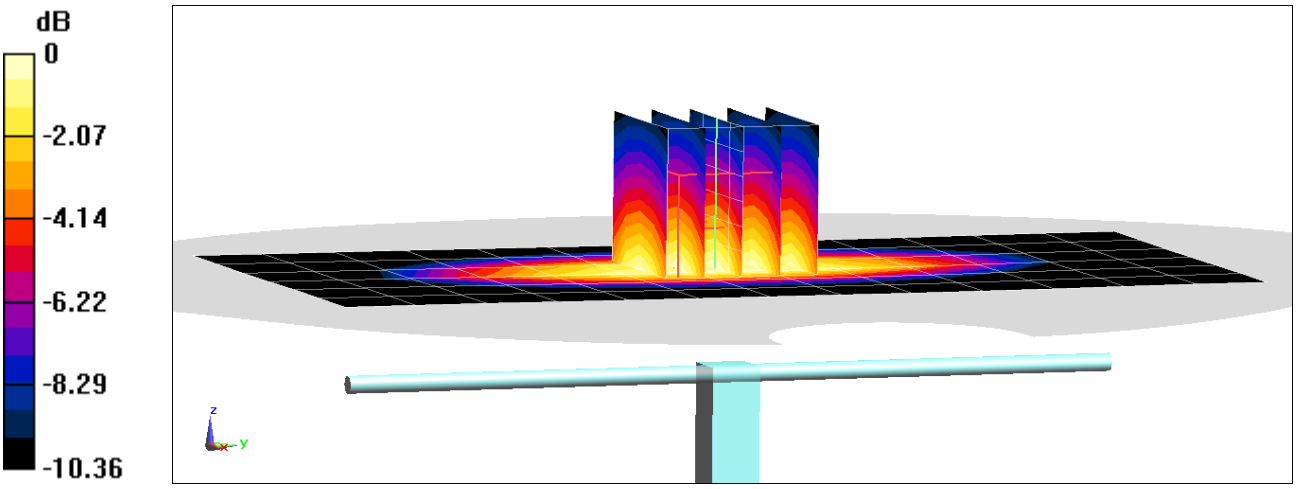
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.965 S/m; ε_r = 54.499; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-26-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.0°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 835 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.99 W/kg
SAR(1 g) = 2.01 W/kg
Deviation(1 g) = 3.93%



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

PCTEST ENGINEERING LABORATORY, INC.

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

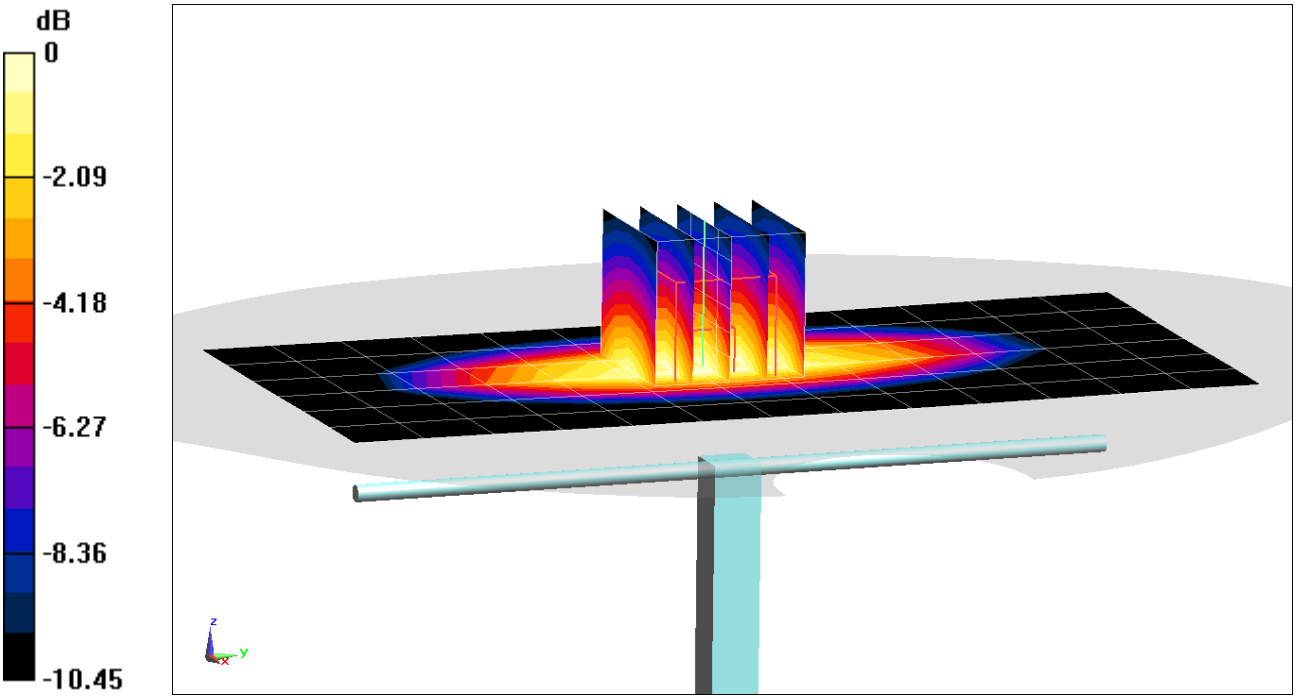
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.966 S/m; ε_r = 54.143; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 06-28-2019; Ambient Temp: 22.3°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7410; ConvF(9.63, 9.63, 9.63) @ 835 MHz; Calibrated: 7/20/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1322; Calibrated: 7/11/2018
Phantom: Front; Type: QD 000 P40 CD; Serial: 1686
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 2.09 W/kg
Deviation(1 g) = 7.18%



0 dB = 2.79 W/kg = 4.46 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

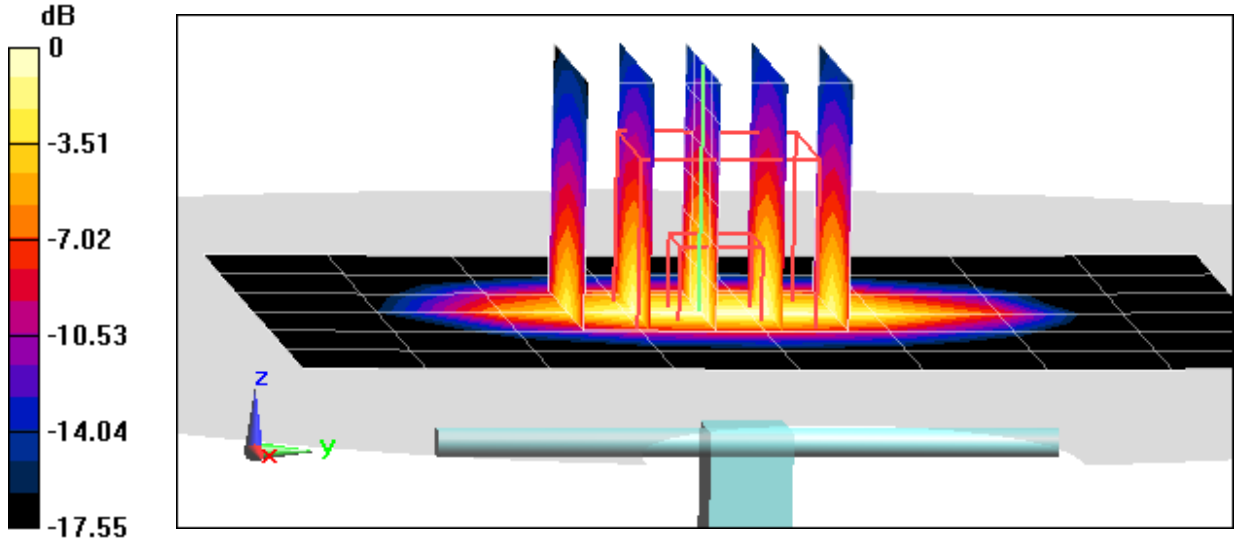
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; σ = 1.5 S/m; ε_r = 51.102; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-23-2019; Ambient Temp: 19.5°C; Tissue Temp: 21.6°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1750 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V5.0 Back Right; Type: QD 000 P40 CD; Serial: 1692
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.09 W/kg
SAR(1 g) = 3.88 W/kg
Deviation(1 g) = 6.01%



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

PCTEST ENGINEERING LABORATORY, INC.

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

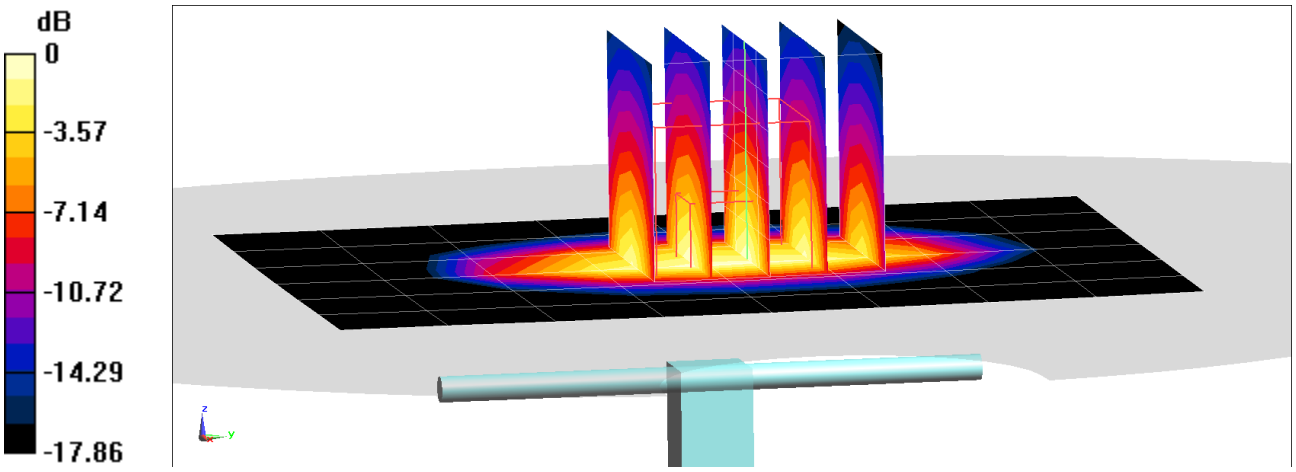
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body; Medium parameters used:
f = 1750 MHz; σ = 1.543 S/m; ε_r = 51.76; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-03-2019; Ambient Temp: 23.9°C; Tissue Temp: 21.9°C

Probe: EX3DV4 - SN7357; ConvF(8.26, 8.26, 8.26) @ 1750 MHz; Calibrated: 4/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/18/2019
Phantom: Twin-SAM V4.0 Front Right; Type: QD 000 P40 CC; Serial: 1167
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.89 W/kg
SAR(1 g) = 3.78 W/kg
Deviation(1 g) = 3.28%



0 dB = 5.72 W/kg = 7.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

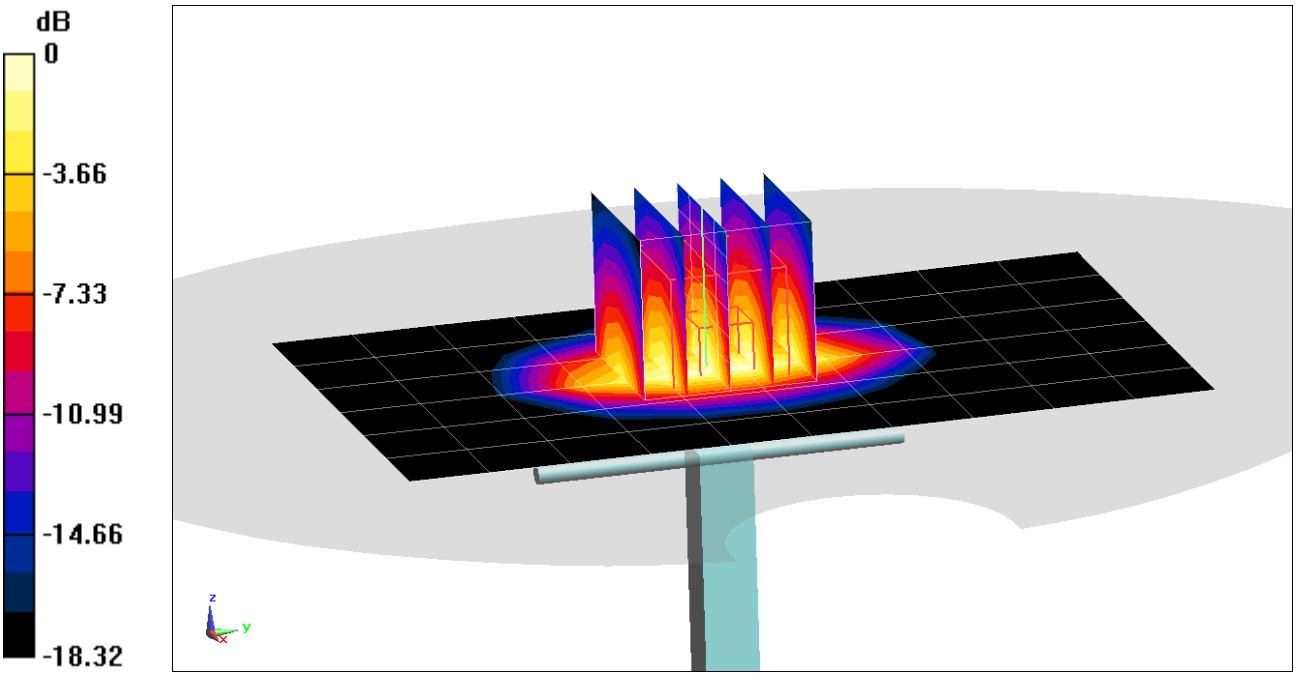
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.561 S/m; ε_r = 54.499; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-25-2019; Ambient Temp: 20.1°C; Tissue Temp: 20.6°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.85 W/kg
SAR(1 g) = 4.25 W/kg
Deviation(1 g) = 7.87%



0 dB = 6.53 W/kg = 8.15 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

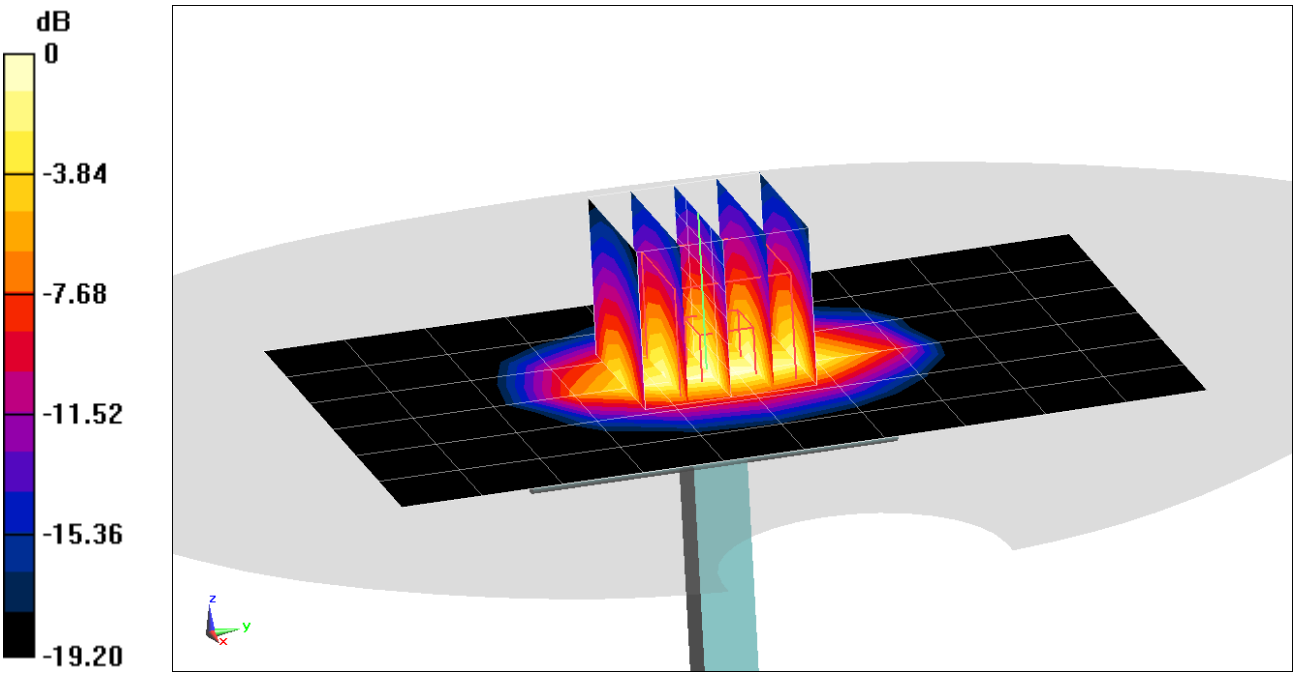
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.559 S/m; ε_r = 51.003; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-01-2019; Ambient Temp: 20.7°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.84 W/kg
SAR(1 g) = 4.08 W/kg
Deviation(1 g) = 4.08%



0 dB = 6.39 W/kg = 8.06 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

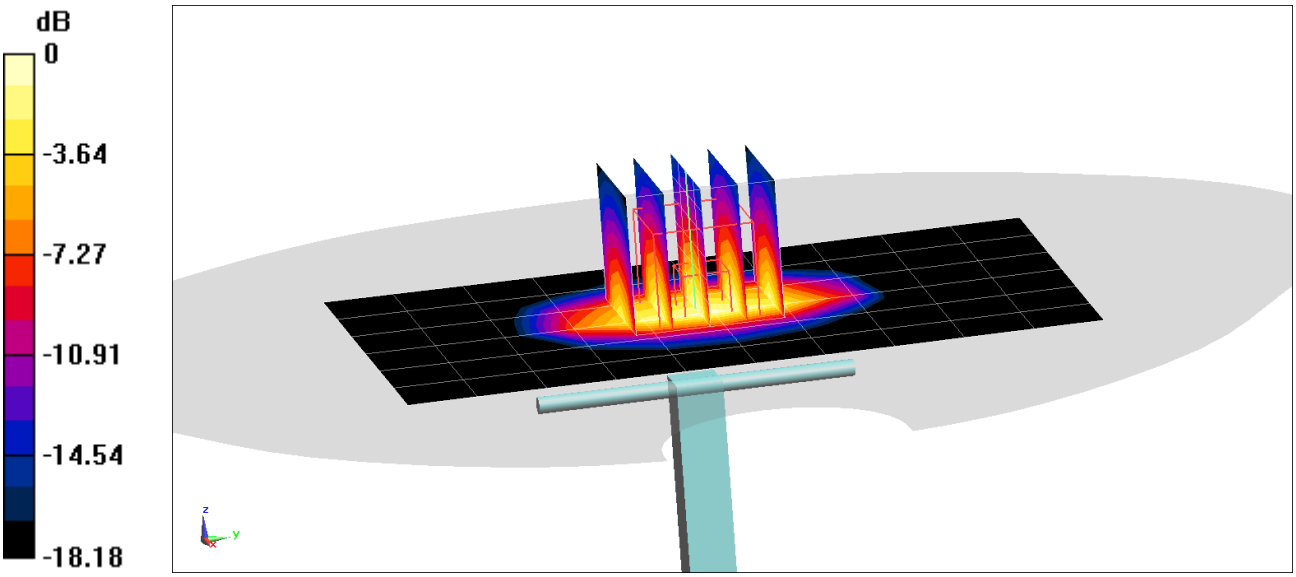
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.551 S/m; ε_r = 52.766; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-05-2019; Ambient Temp: 21.3°C; Tissue Temp: 24.8°C

Probe: EX3DV4 - SN7488; ConvF(8.37, 8.37, 8.37) @ 1900 MHz; Calibrated: 1/24/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1530; Calibrated: 1/15/2019
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1800
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.84 W/kg
SAR(1 g) = 4.17 W/kg
Deviation(1 g) = 6.38%



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

PCTEST ENGINEERING LABORATORY, INC.

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

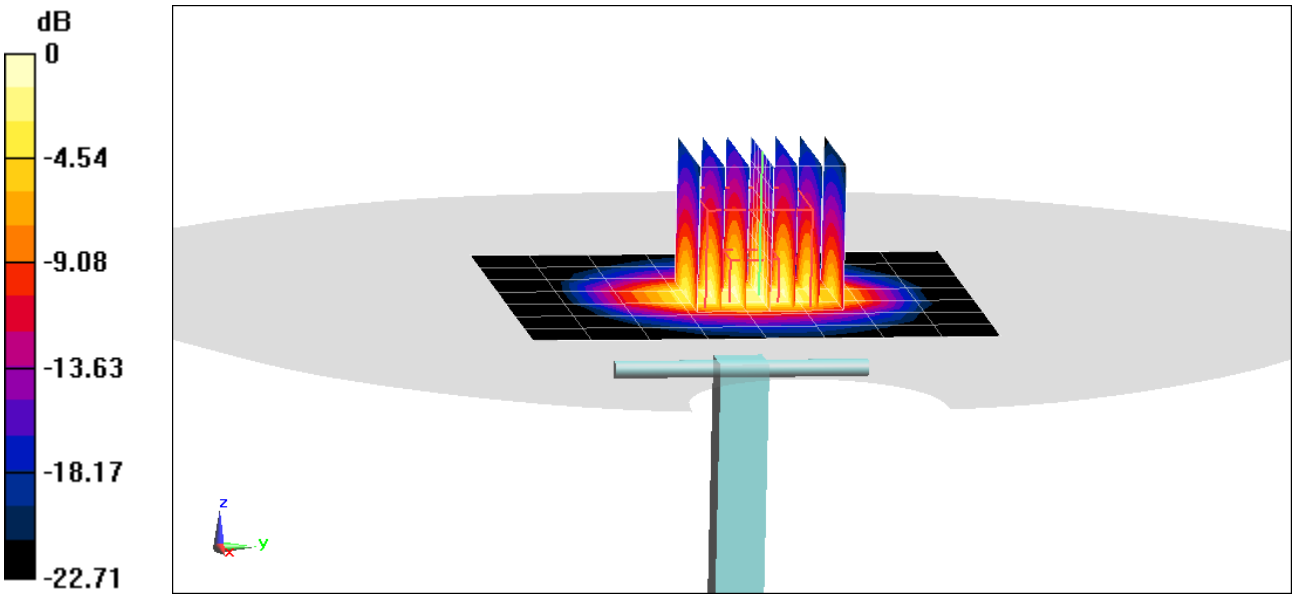
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.028 S/m; ε_r = 53.361; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-24-2019; Ambient Temp: 21.3°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7308; ConvF(7.57, 7.57, 7.57) @ 2450 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.8 W/kg
SAR(1 g) = 5.09 W/kg
Deviation(1 g) = 0.00%



0 dB = 8.61 W/kg = 9.35 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

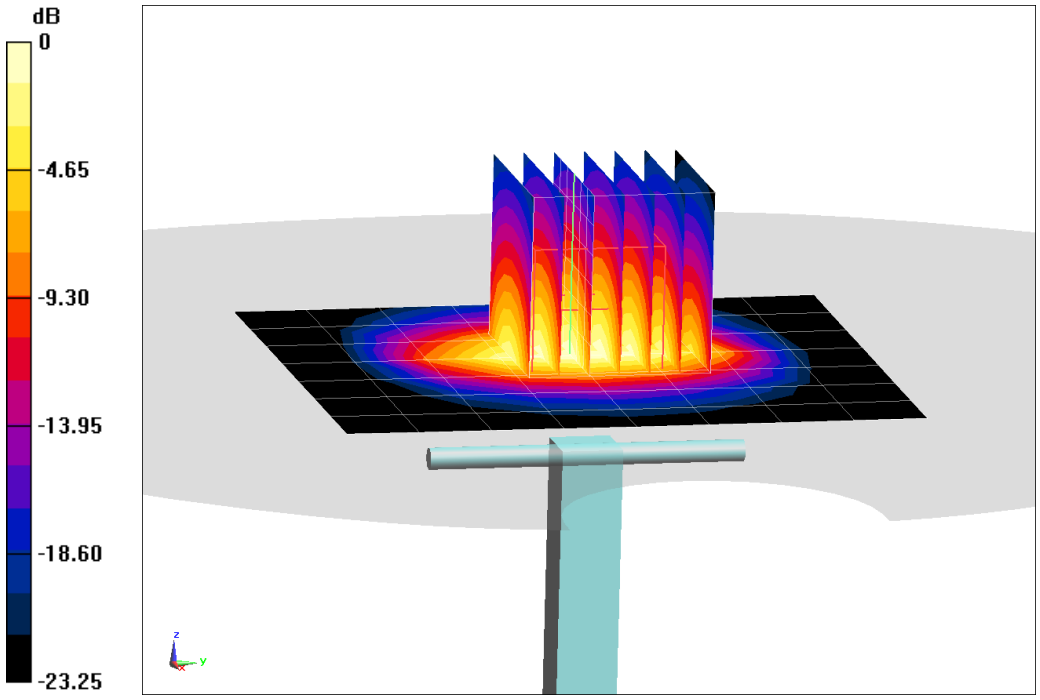
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.006 S/m; ε_r = 51.261; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.9°C; Tissue Temp: 21.8°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2450 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.3 W/kg
SAR(1 g) = 4.97 W/kg
Deviation(1 g) = -0.80%



0 dB = 8.27 W/kg = 9.18 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

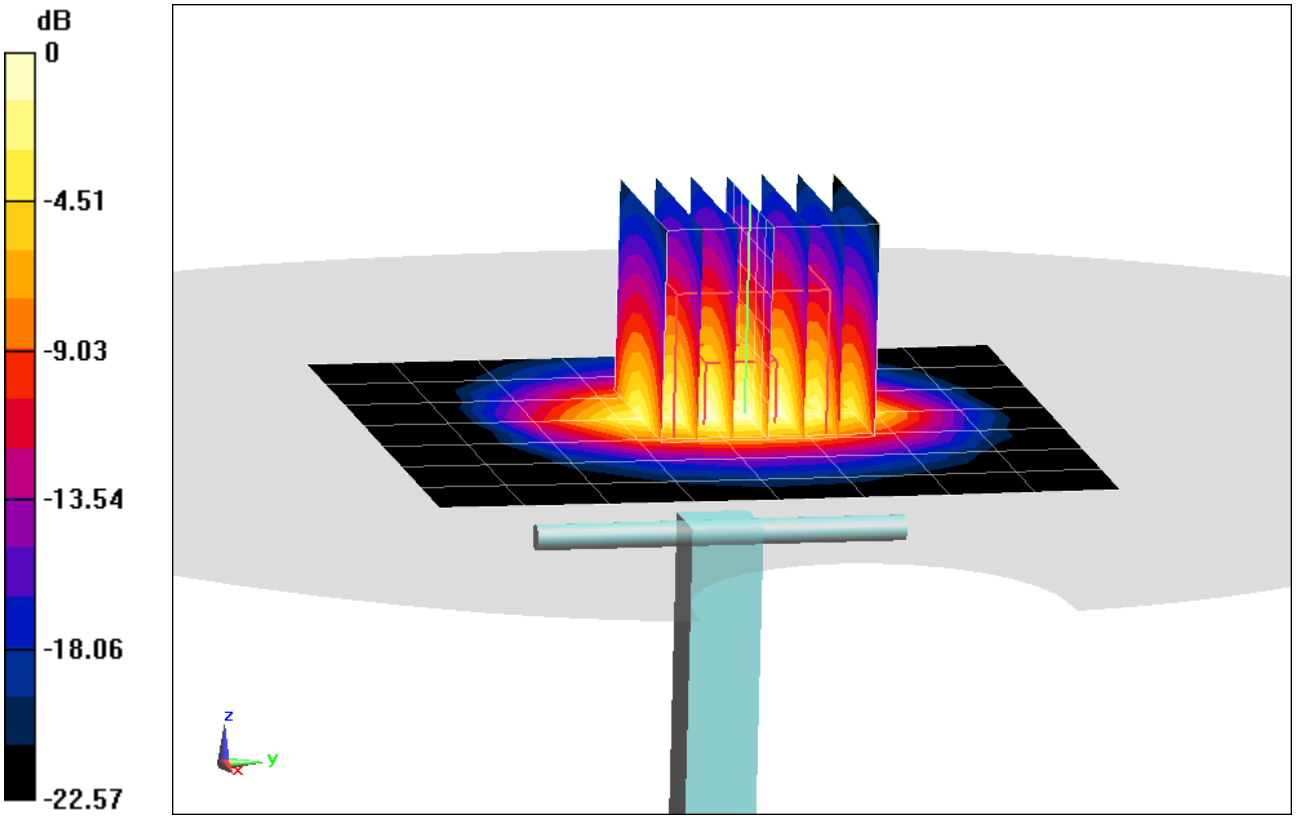
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.022 S/m; ε_r = 51.296; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-04-2019; Ambient Temp: 23.4°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7417; ConvF(7.51, 7.51, 7.51) @ 2450 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.4 W/kg
SAR(1 g) = 4.95 W/kg
Deviation(1 g) = -1.20%



0 dB = 8.35 W/kg = 9.22 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

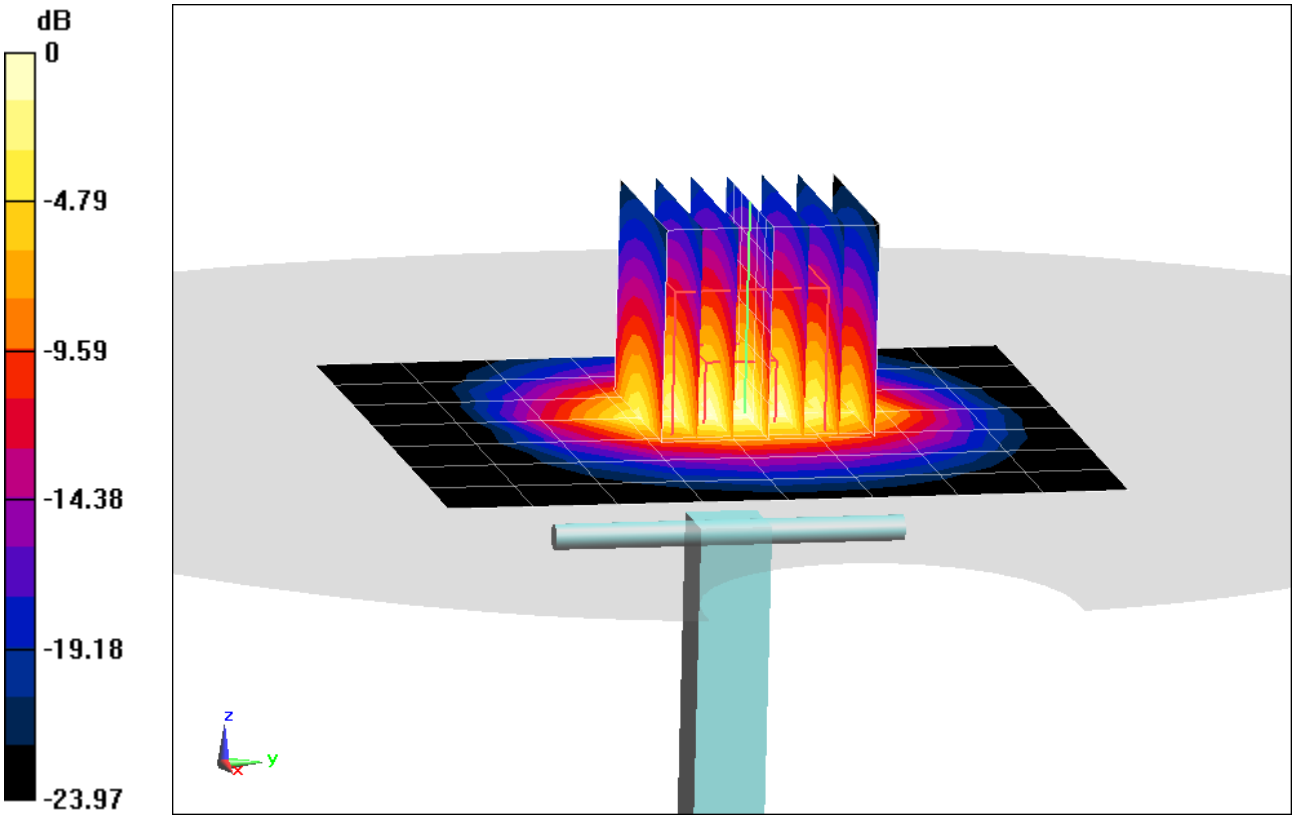
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.202 S/m; ε_r = 50.887; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-04-2019; Ambient Temp: 23.4°C; Tissue Temp: 21.7°C

Probe: EX3DV4 - SN7417; ConvF(7.37, 7.37, 7.37) @ 2600 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.1 W/kg
SAR(1 g) = 5.16 W/kg
Deviation(1 g) = -5.84%



0 dB = 8.80 W/kg = 9.44 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

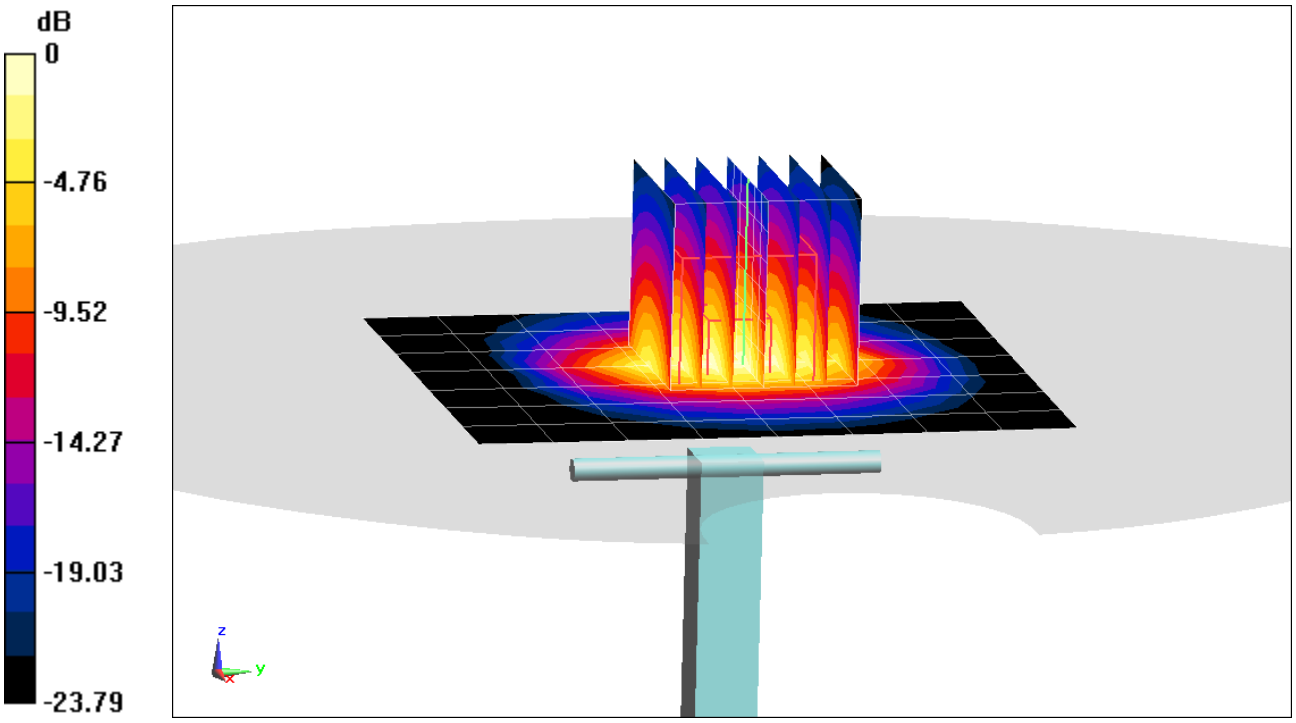
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2600 MHz; σ = 2.19 S/m; ε_r = 50.769; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-07-2019; Ambient Temp: 23.0°C; Tissue Temp: 22.1°C

Probe: EX3DV4 - SN7417; ConvF(7.37, 7.37, 7.37) @ 2600 MHz; Calibrated: 2/19/2019
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/13/2019
Phantom: LeftTwin-SAM V5.0; Type: QD 000 P40 CD; Serial: TP1375
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.6 W/kg
SAR(1 g) = 5.36 W/kg
Deviation(1 g) = -2.19%



0 dB = 9.22 W/kg = 9.65 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

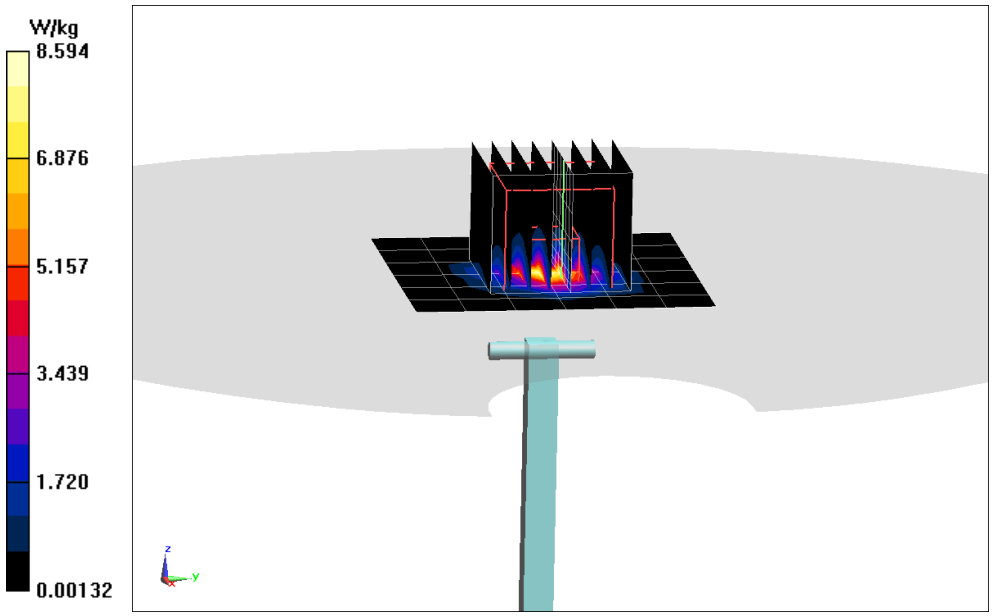
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Body; Medium parameters used (interpolated):
f = 5250 MHz; σ = 5.453 S/m; ε_r = 48.55; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.5°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7308; ConvF(4.48, 4.48, 4.48) @ 5250 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 14.9 W/kg
SAR(1 g) = 3.71 W/kg
Deviation(1 g) = -3.64%



PCTEST ENGINEERING LABORATORY, INC.

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

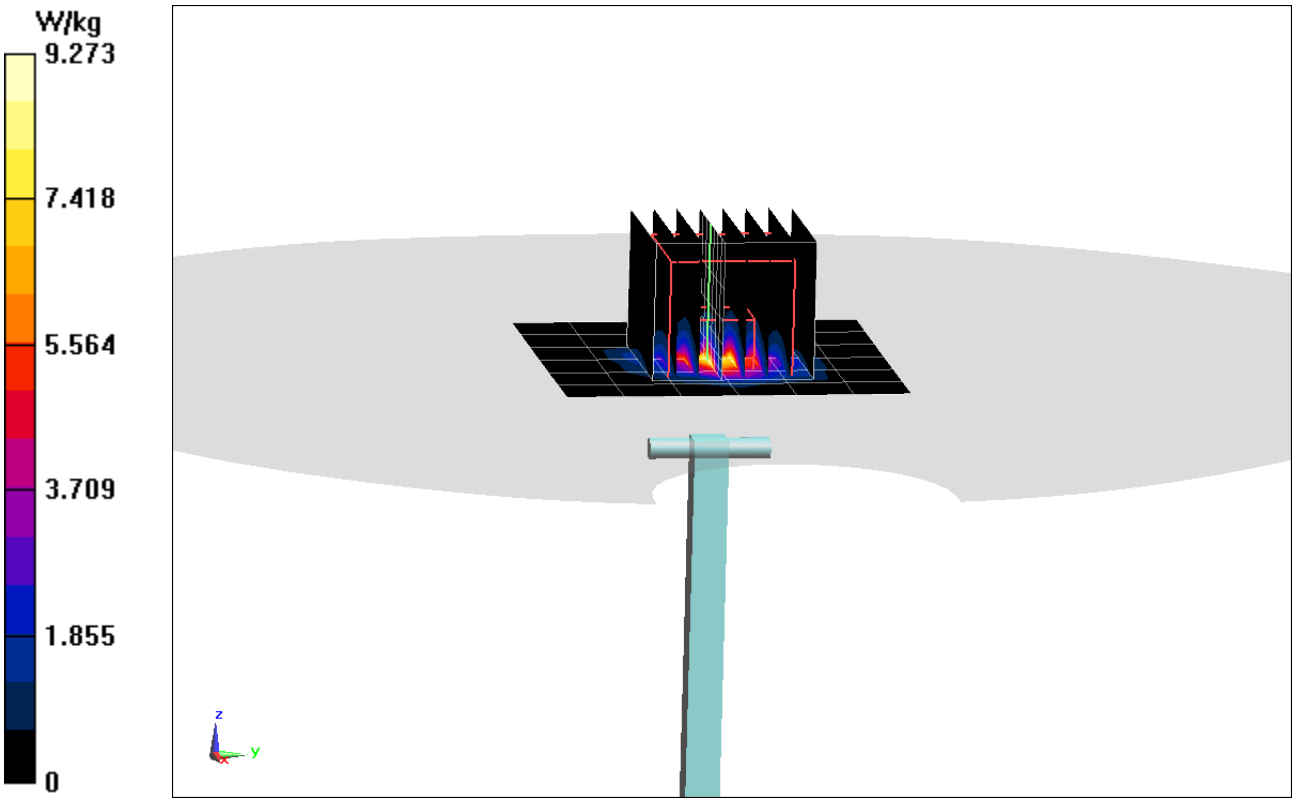
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Body; Medium parameters used:
f = 5600 MHz; σ = 5.972 S/m; ε_r = 47.912; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.5°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7308; ConvF(4, 4, 4) @ 5600 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 3.89 W/kg;
Deviation(1 g) = -1.77%



PCTEST ENGINEERING LABORATORY, INC.

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

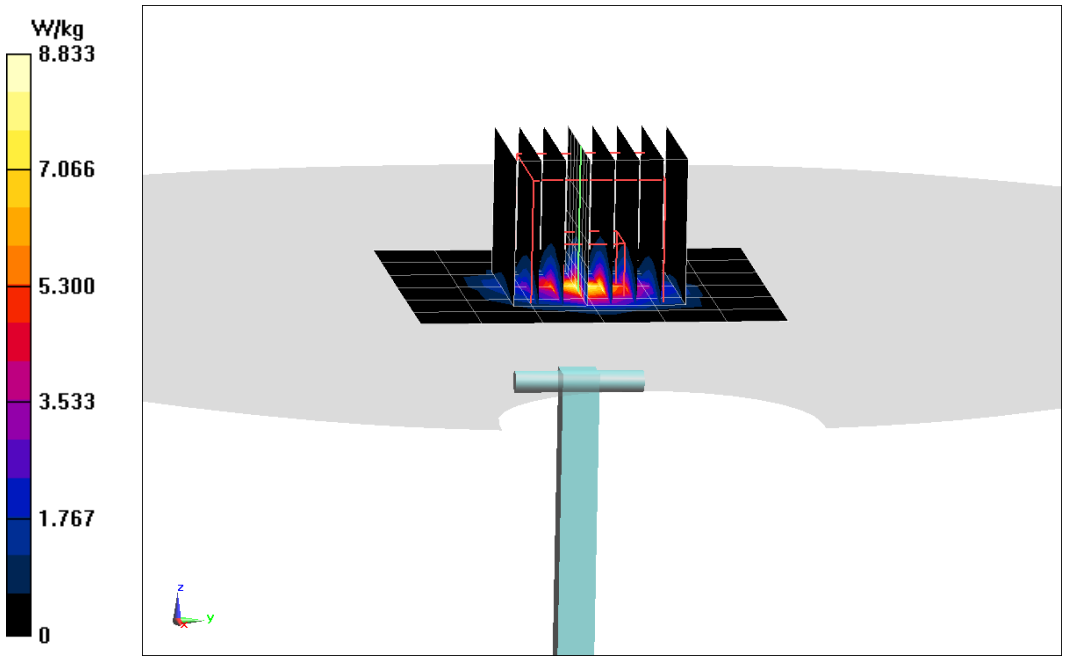
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Body; Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.205 S/m; ε_r = 47.593; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 06-27-2019; Ambient Temp: 23.5°C; Tissue Temp: 21.1°C

Probe: EX3DV4 - SN7308; ConvF(4.18, 4.18, 4.18) @ 5750 MHz; Calibrated: 8/23/2018
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1558; Calibrated: 10/3/2018
Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1630
Measurement SW: DASY52, Version 52.10 (2);SEMCAD X Version 14.6.12 (7450)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 3.58 W/kg;
Deviation(1 g) = -5.91%



APPENDIX C: PROBE CALIBRATION

© 2019 PCTEST Engineering Laboratory, Inc.

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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1191_Sep16**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1191
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	September 21, 2016

BN✓ 09-28-2016

Extended PM✓ 9/20/2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	30-Jun-16 (No. EX3-3503_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

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

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

Issued: September 22, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.