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



SAR EVALUATION REPORT

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

Date of Testing:
07/19/17 - 08/22/17
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M1707170219-01.A3L

FCC ID: **A3LSC01K**

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

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: SC-01K

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)	10 gm Phablet (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	0.17	0.31	0.58	N/A
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	< 0.1	0.28	0.58	3.29
PCE	UMTS 850	826.40 - 846.60 MHz	0.18	0.34	0.69	N/A
PCE	LTE Band 12	699.7 - 715.3 MHz	0.12	0.21	0.41	N/A
PCE	LTE Band 17	706.5 - 713.5 MHz	N/A	N/A	N/A	N/A
PCE	LTE Band 13	779.5 - 784.5 MHz	< 0.1	0.20	0.45	N/A
PCE	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.16	0.28	0.57	N/A
PCE	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	0.10	0.59	0.60	N/A
PCE	LTE Band 7	2502.5 - 2567.5 MHz	0.11	0.37	0.65	3.10
PCE	LTE Band 41	2498.5 - 2687.5 MHz	0.10	0.42	0.68	N/A
PCE	LTE Band 38	2572.5 - 2617.5 MHz	N/A	N/A	N/A	N/A
DTS	2.4 GHz WLAN	2412 - 2472 MHz	1.09	< 0.1	0.24	N/A
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A	N/A	N/A
NII	U-NII-2A	5260 - 5320 MHz	0.34	0.12	N/A	0.69
NII	U-NII-2C	5500 - 5720 MHz	0.50	0.21	N/A	1.01
NII	U-NII-3	5745 - 5825 MHz	0.48	0.16	0.26	N/A
DSS/DTS	Bluetooth	2402 - 2480 MHz	0.58	< 0.1	< 0.1	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.51	1.09	1.59	3.29

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

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

Randy Ortanez
President

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

© 2017 PCTEST Engineering Laboratory, Inc.
REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

TABLE OF CONTENTS

1 DEVICE UNDER TEST 3

2 LTE INFORMATION 12

3 INTRODUCTION 13

4 DOSIMETRIC ASSESSMENT 14

5 DEFINITION OF REFERENCE POINTS 15

6 TEST CONFIGURATION POSITIONS 16

7 RF EXPOSURE LIMITS 19

8 FCC MEASUREMENT PROCEDURES 20

9 RF CONDUCTED POWERS 25

10 SYSTEM VERIFICATION 52

11 SAR DATA SUMMARY 56

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS 69

13 SAR MEASUREMENT VARIABILITY 77

14 ADDITIONAL TESTING PER FCC GUIDANCE 78

15 EQUIPMENT LIST 81

16 MEASUREMENT UNCERTAINTIES 82

17 CONCLUSION 83

18 REFERENCES 84

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: CONDUCTED POWERS FOR 4X4 DL MIMO

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 17	Voice/Data	706.5 - 713.5 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 7	Voice/Data	2502.5 - 2567.5 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
LTE Band 38	Voice/Data	2572.5 - 2617.5 MHz
2.4 GHz WLAN	Data	2412 - 2472 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	555 Hz - 8.33 kHz

1.2 Power Reduction for SAR

This device utilizes a single step power reduction mechanism for SAR compliance under portable hotspot conditions for some wireless modes and bands. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when hotspot is enabled. Detailed descriptions of the power reduction mechanism are included in the operational description.

This device uses 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.

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.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 PCE Targets

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	**33.0**	**33.0**	**29.5**	**27.5**	**26.0**	**27.0**	**25.5**	**23.5**	**22.0**
	Nominal	**32.5**	**32.5**	**29.0**	**27.0**	**25.5**	**26.5**	**25.0**	**23.0**	**21.5**
GSM/GPRS/EDGE 1900	Maximum	**30.0**	**30.0**	**28.5**	**26.5**	**25.0**	**25.7**	**24.7**	**22.7**	**21.3**
	Nominal	**29.5**	**29.5**	**28.0**	**26.0**	**24.5**	**25.2**	**24.2**	**22.2**	**20.8**

Mode / Band		Modulated Average (dBm)			
		3GPP WCDMA	*3GPP HSDPA*	*3GPP HSUPA*	*3GPP DC-HSDPA*
UMTS Band 5 (850 MHz)	Maximum	**24.2**	**23.0**	**23.0**	**23.0**
	Nominal	**23.7**	**22.5**	**22.5**	**22.5**

Mode / Band		Modulated Average (dBm)
LTE Band 12	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 17	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 13	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 5 (Cell)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 4 (AWS)	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 7	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 41	Maximum	**23.5**
	Nominal	**23.0**
LTE Band 38	Maximum	**23.5**
	Nominal	**23.0**

1.3.2 Reduced PCE Targets

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*	*1 TX Slots*	*2 TX Slots*	*3 TX Slots*	*4 TX Slots*
GSM/GPRS/EDGE 1900	Maximum	**28.0**	**28.0**	**25.0**	**23.0**	**21.0**	**22.5**	**21.5**	**19.5**	**18.5**
	Nominal	**27.5**	**27.5**	**24.5**	**22.5**	**20.5**	**22.0**	**21.0**	**19.0**	**18.0**

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	**20.5**
	Nominal	**20.0**
LTE Band 7	Maximum	**20.5**
	Nominal	**20.0**
LTE Band 41	Maximum	**22.5**
	Nominal	**22.0**
LTE Band 38	Maximum	**22.0**
	Nominal	**21.5**

1.3.3 Maximum Bluetooth and SISO and MIMO WLAN Targets

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11b (2.4 GHz)	Maximum	**19.5**	**15.0**	**14.0**
	Nominal	**19.0**	**14.5**	**13.5**
IEEE 802.11g (2.4 GHz)	Maximum	**17.5**	**12.5**	**9.5**
	Nominal	**17.0**	**12.0**	**9.0**
IEEE 802.11n (2.4 GHz)	Maximum	**17.5**	**12.5**	**9.5**
	Nominal	**17.0**	**12.0**	**9.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11g (2.4 GHz)	Maximum	**17.5**	**15.5**	**12.5**
	Nominal	**17.0**	**15.0**	**12.0**
IEEE 802.11n (2.4 GHz)	Maximum	**17.5**	**15.5**	**12.5**
	Nominal	**17.0**	**15.0**	**12.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**16.5**		
	Nominal	**16.0**		
IEEE 802.11n (5 GHz)	Maximum	**16.5**	**13.5**	
	Nominal	**16.0**	**13.0**	
IEEE 802.11ac (5 GHz)	Maximum	**16.5**	**13.5**	**13.5**
	Nominal	**16.0**	**13.0**	**13.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**16.5**		
	Nominal	**16.0**		
IEEE 802.11n (5 GHz)	Maximum	**16.5**	**13.5**	
	Nominal	**16.0**	**13.0**	
IEEE 802.11ac (5 GHz)	Maximum	**16.5**	**13.5**	**13.5**
	Nominal	**16.0**	**13.0**	**13.0**

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	**14.5**
	Nominal	**14.0**
Bluetooth LE	Maximum	**8.0**
	Nominal	**7.5**

1.3.4 Reduced SISO and MIMO WLAN Targets

Mode / Band		Modulated Average (dBm)		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11b (2.4 GHz)	Maximum	**16.5**	**15.0**	**14.0**
	Nominal	**16.0**	**14.5**	**13.5**
IEEE 802.11g (2.4 GHz)	Maximum	**16.5**	**12.5**	**9.5**
	Nominal	**16.0**	**12.0**	**9.0**
IEEE 802.11n (2.4 GHz)	Maximum	**16.5**	**12.5**	**9.5**
	Nominal	**16.0**	**12.0**	**9.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth		
		Ch. 1-11	Ch. 12	Ch. 13
IEEE 802.11g (2.4 GHz)	Maximum	**16.5**	**15.5**	**12.5**
	Nominal	**16.0**	**15.0**	**12.0**
IEEE 802.11n (2.4 GHz)	Maximum	**16.5**	**15.5**	**12.5**
	Nominal	**16.0**	**15.0**	**12.0**

Mode / Band		Modulated Average - Single Tx Chain (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**14.5**		
	Nominal	**14.0**		
IEEE 802.11n (5 GHz)	Maximum	**14.5**	**13.5**	
	Nominal	**14.0**	**13.0**	
IEEE 802.11ac (5 GHz)	Maximum	**14.5**	**13.5**	**13.5**
	Nominal	**14.0**	**13.0**	**13.0**

Mode / Band		Modulated Average - MIMO (dBm)		
		20 MHz Bandwidth	40 MHz Bandwidth	80 MHz Bandwidth
IEEE 802.11a (5 GHz)	Maximum	**14.5**		
	Nominal	**14.0**		
IEEE 802.11n (5 GHz)	Maximum	**14.5**	**13.5**	
	Nominal	**14.0**	**13.0**	
IEEE 802.11ac (5 GHz)	Maximum	**14.5**	**13.5**	**13.5**
	Nominal	**14.0**	**13.0**	**13.0**

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

1.3.5 Maximum Powers During Conditions with Simultaneous 2.4 GHz and 5 GHz WLAN

	# Tx	5 GHz WIFI [dBm]		2.4 GHz WIFI [dBm]		802.11 Modes
		Ant1	Ant2	Ant1	Ant2	
2.4 GHz + 5 GHz	2	A	-	-	B	2.4 GHz: b,g,n 5 GHz: a,n,ac
	2	-	A	B	-	
	2	A	-	B	-	
	2	-	A	-	B	
2.4 GHz + 5 GHz	3	A	A	B	-	2.4 GHz: b, g, n 5 GHz: n, ac, a (CDD +STBC only)
	3	A	A	-	B	
	3	A	-	B	B	2.4 GHz: n, g (CDD +STBC only) 5 GHz: a, n, ac
	3	-	A	B	B	
2.4 GHz + 5 GHz	4	A	A	B	B	2.4 GHz: n, g (CDD +STBC only) 5 GHz: n, ac, a (CDD +STBC only)

A = 10.0 dBm
B = 13.0 dBm
2.4 GHz WLAN Channel 12 will operate with Single Tx target power of 9.0 dBm.
2.4 GHz WLAN Channel 13 will operate with Single Tx target power of 6.0 dBm.
(Upper tolerance: target +0.5dB)

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
GPRS 850	Yes	Yes	No	Yes	Yes	Yes
GPRS 1900	Yes	Yes	No	Yes	Yes	Yes
UMTS 850	Yes	Yes	No	Yes	Yes	Yes
LTE Band 12	Yes	Yes	No	Yes	Yes	Yes
LTE Band 13	Yes	Yes	No	Yes	Yes	Yes
LTE Band 5 (Cell)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 4 (AWS)	Yes	Yes	No	Yes	Yes	Yes
LTE Band 7	Yes	Yes	No	Yes	No	Yes
LTE Band 41	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN Ant 1	Yes	Yes	Yes	No	No	Yes
2.4 GHz WLAN Ant 2	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN Ant 1	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN Ant 2	Yes	Yes	Yes	No	No	Yes
Bluetooth	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-1, U-NII-2A, U-NII-2C operations are disabled.

1.5 Near Field Communications (NFC) Antenna

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

1.6 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in **Figure 1-1** and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

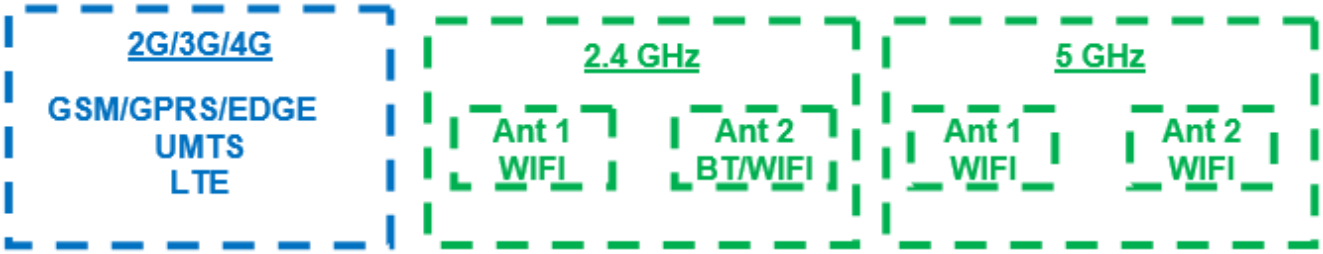


Figure 1-1
Simultaneous Transmission Paths

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Phablet	Notes
1	GSM voice + 2.4 GHz WI-FI	Yes	Yes	N/A	Yes	
2	GSM voice + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
3	GSM voice + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	N/A	Yes	
4	GSM voice + 2.4 GHz Bluetooth	Yes^	Yes	N/A	Yes	^BT Tethering applications are considered
5	GSM voice + 2.4 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
6	GSM voice + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
7	GSM voice + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
8	UMTS + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
9	UMTS + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
10	UMTS + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
11	UMTS + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^BT Tethering applications are considered
12	UMTS + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
13	UMTS + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
14	UMTS + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
15	LTE + 2.4 GHz WI-FI	Yes	Yes	Yes	Yes	
16	LTE + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
17	LTE + 2.4 GHz WI-FI + 5 GHz WI-FI	Yes	Yes	Yes	Yes	
18	LTE + 2.4 GHz Bluetooth	Yes^	Yes	Yes^	Yes	^BT Tethering applications are considered
19	LTE + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
20	LTE + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
21	LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
22	GPRS/EDGE + 2.4 GHz WI-FI	N/A	N/A	Yes	Yes	
23	GPRS/EDGE + 5 GHz WI-FI	N/A	N/A	Yes	Yes	
24	GPRS/EDGE + 2.4 GHz WI-FI + 5 GHz WI-FI	N/A	N/A	Yes	Yes	
25	GPRS/EDGE + 2.4 GHz Bluetooth	N/A	N/A	Yes^	Yes	^BT Tethering applications are considered
26	GPRS/EDGE + 2.4 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
27	GPRS/EDGE + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
28	GPRS/EDGE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	

1. Bluetooth cannot transmit simultaneously with WLAN.
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
4. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
5. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII2A, and U-NII2C were not evaluated for wireless router conditions.
6. This device supports 2x2 MIMO Tx for WLAN. 802.11a/g/n/ac supports CDD and STBC and 802.11n/ac additionally supports SDM.
7. This device supports Bluetooth tethering.
8. This device supports VOLTE.

1.7 Miscellaneous SAR Test Considerations

(A) WIFI/BT

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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

This device supports IEEE 802.11ac with the following features:
a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 2 Tx antenna output
d) 256 QAM is supported
e) TDWR and Band gap channels are supported

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

(B) Licensed Transmitter(s)

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

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

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

This device supports downlink 4x4 MIMO operations for LTE Band 41 only. Per FCC Guidance, SAR for downlink 4x4 MIMO was not needed since the maximum average output power in 4x4 downlink MIMO mode was not > 0.25 dB higher than the maximum output power with downlink 4x4 MIMO inactive.

This device supports both LTE B12 and LTE B17. Since the supported frequency span for LTE B17 falls completely within the supported frequency span for LTE B12, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE B12.

This device supports both LTE B41 and LTE B38. Since the supported frequency span for LTE B38 falls completely within the supported frequency span for LTE B41, both LTE bands have the same target power, and both LTE bands share the same transmission path, SAR was only assessed for LTE B41.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router scaled to the maximum output power (including tolerance) 1g SAR > 1.2 W/kg.

1.8 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE 4x4 DL MIMO)

1.9 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.

	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number	Phablet Serial Number
GSM/GPRS/EDGE 850	12E5F	12E2E	12E2E	-
GSM/GPRS/EDGE 1900	12ECB	12E2E	12E9A	12E2E
UMTS 850	12E5F	12E5F	12E5F	-
LTE Band 12	12E2E	12E5F	12E5F	-
LTE Band 13	12E2E	12E5F	12E5F	-
LTE Band 5 (Cell)	12E5F	12E5F	12E5F	-
LTE Band 4 (AWS)	12E2E	12ECB	12E48	-
LTE Band 7	12E2E	12E9A	12E9A	12ECB
LTE Band 41	12ECB	12E9A	12E9A	-
2.4 GHz WLAN	13056	13056	13056	-
5 GHz WLAN	12EC2	12EC2	12EC2	12EC2
Bluetooth	12EC2	13056	13056	-

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

2 LTE INFORMATION

LTE Information					
FCC ID	**A3LSC01K**				
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 7 (2502.5 - 2567.5 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
	LTE Band 38 (2572.5 - 2617.5 MHz)				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 7: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 38: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 17: 5 MHz	706.5 (23755)		710 (23790)	713.5 (23825)	
LTE Band 17: 10 MHz	709 (23780)		710 (23790)	711 (23800)	
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)	784.5 (23255)	
LTE Band 13: 10 MHz	N/A		782 (23230)	N/A	
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)	846.5 (20625)	
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)	844 (20600)	
LTE Band 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 7: 5 MHz	2502.5 (20775)		2535 (21100)	2567.5 (21425)	
LTE Band 7: 10 MHz	2505 (20800)		2535 (21100)	2565 (21400)	
LTE Band 7: 15 MHz	2507.5 (20825)		2535 (21100)	2562.5 (21375)	
LTE Band 7: 20 MHz	2510 (20850)		2535 (21100)	2560 (21350)	
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)
LTE Band 38: 5 MHz	2572.5 (37775)		2595 (38000)	38224 (2617.5)	
LTE Band 38: 10 MHz	2575.0 (37800)		2595 (38000)	2615.0 (38199)	
LTE Band 38: 15 MHz	2577.5 (37825)		2595 (38000)	2612.5 (38174)	
LTE Band 38: 20 MHz	2580 (37850)		2595 (38000)	2610 (38150)	
UE Category	DL UE Cat 16 (QPSK, 16QAM, 64QAM, 256QAM) UL UE Cat 5 (QPSK, 16QAM)				
Modulations Supported in UL	QPSK, 16QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Additional Information	This device does not support full features on 3GPP Release 14. It supports downlink MIMO features as shown inAppendix G. All other uplink communications are identical to the Release 8 Specifications. The following LTE Release 14 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced eICIC, WIFI Offloading, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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]

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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:

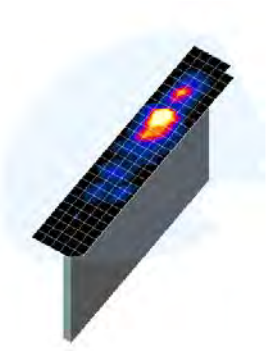


Figure 4-1
Sample SAR Area Scan

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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].

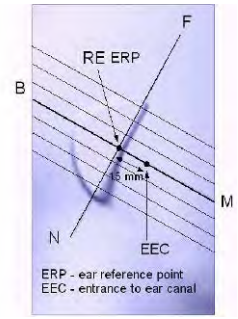


Figure 5-1
Close-Up Side view of ERP

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

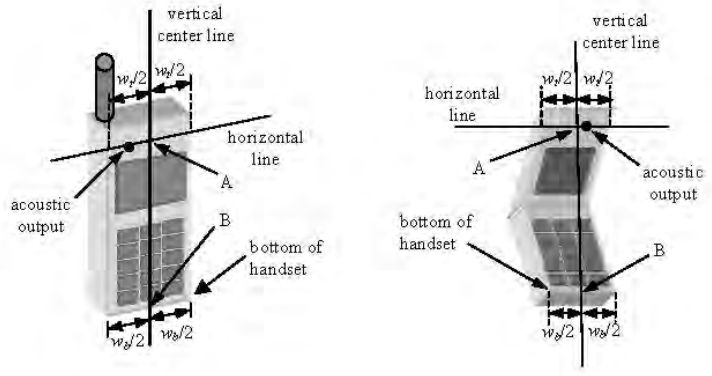


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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).

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

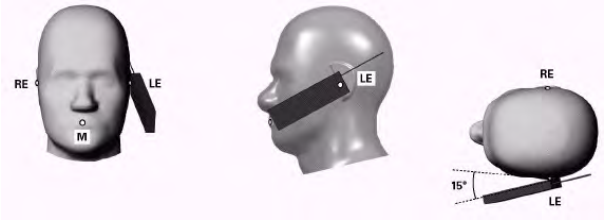


Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

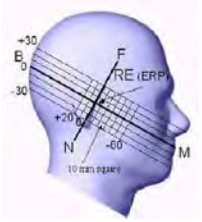


Figure 6-3 Side view w/ relevant markings

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.

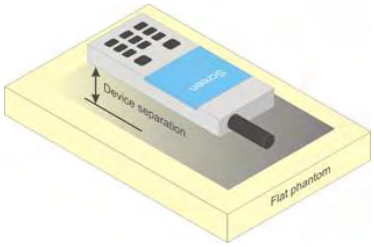


Figure 6-4 Sample Body-Worn Diagram

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 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.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

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

6.7 Wireless Router Configurations

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

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

6.8 Phablet Configurations

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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 $\leq$ 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 $\leq$ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

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

8.4.2 Head SAR Measurements

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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.

8.4.3 Body SAR Measurements

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

8.4.4 SAR Measurements with Rel 5 HSDPA

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

8.4.5 SAR Measurements with Rel 6 HSUPA

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

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

8.4.6 SAR Measurement Conditions for DC-HSDPA

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

8.5 SAR Measurement Conditions for LTE

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

8.5.1 Spectrum Plots for RB Configurations

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

8.5.2 MPR

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

8.5.3 A-MPR

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

8.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.6 W/kg for LTE Band 41 and ≤ 0.8 W/kg for other LTE Bands, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

8.5.5 TDD

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

8.6 SAR Testing with 802.11 Transmitters

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

8.6.1 General Device Setup

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

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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

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

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

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

8.6.4 Initial Test Position Procedure

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

8.6.5 2.4 GHz SAR Test Requirements

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

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

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

8.6.6 OFDM Transmission Mode and SAR Test Channel Selection

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.6.7 Initial Test Configuration Procedure

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

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

8.6.8 Subsequent Test Configuration Procedures

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

8.6.9 MIMO SAR considerations

Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D01v06 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is <1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

Maximum

Maximum Burst-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	32.35	**32.39**	29.30	27.16	25.70	26.34	25.19	23.30	21.94
	190	32.00	**32.07**	29.22	26.99	25.50	26.07	24.82	23.10	21.77
	251	31.92	**31.95**	29.05	26.88	25.39	25.92	24.70	23.02	21.64
GSM 1900	512	29.55	29.57	26.93	**25.63**	23.31	25.50	23.40	21.60	20.33
	661	29.51	29.54	26.98	**25.57**	23.50	25.41	23.30	21.43	20.18
	810	29.29	29.32	26.84	**25.45**	23.26	25.04	23.05	21.44	20.02
Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 850	128	23.32	**23.36**	23.28	22.90	22.69	17.31	19.17	19.04	18.93
	190	22.97	**23.04**	23.20	22.73	22.49	17.04	18.80	18.84	18.76
	251	22.89	**22.92**	23.03	22.62	22.38	16.89	18.68	18.76	18.63
GSM 1900	512	20.52	20.54	20.91	**21.37**	20.30	16.47	17.38	17.34	17.32
	661	20.48	20.51	20.96	**21.31**	20.49	16.38	17.28	17.17	17.17
	810	20.26	20.29	20.82	**21.19**	20.25	16.01	17.03	17.18	17.01
GSM 850	**Frame Avg.Targets:**	23.47	**23.47**	22.98	22.74	22.49	17.47	18.98	18.74	18.49
GSM 1900		20.47	20.47	21.98	**21.74**	21.49	16.17	18.18	17.94	17.79

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Reduced

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 1900	512	27.32	27.50	24.50	**22.17**	20.24	22.50	20.77	18.41	16.98
	661	27.37	27.52	24.47	**22.27**	20.23	22.46	20.81	18.40	17.05
	810	27.23	27.34	24.15	**22.00**	19.95	22.22	20.57	18.10	16.79
Calculated Maximum Frame-Averaged Output Power										
		Voice	*GPRS/EDGE Data (GMSK)*				*EDGE Data (8-PSK)*			
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**GPRS [dBm] 3 Tx Slot**	**GPRS [dBm] 4 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**	**EDGE [dBm] 3 Tx Slot**	**EDGE [dBm] 4 Tx Slot**
GSM 1900	512	18.29	18.47	18.48	**17.91**	17.23	13.47	14.75	14.15	13.97
	661	18.34	18.49	18.45	**18.01**	17.22	13.43	14.79	14.14	14.04
	810	18.20	18.31	18.13	**17.74**	16.94	13.19	14.55	13.84	13.78
GSM 1900	**Frame Avg.Targets:**	18.47	18.47	18.48	**18.24**	17.49	12.97	14.98	14.74	14.99

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 ensure GMSK modulation in the signal. Our Investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
3. EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

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



Figure 9-1
Power Measurement Setup

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.2 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	23.55	23.57	23.38	-
99		12.2 kbps AMR	23.45	23.54	23.43	-
6	HSDPA	Subtest 1	22.42	22.45	22.34	0
6		Subtest 2	21.63	22.07	22.19	0
6		Subtest 3	21.08	21.46	21.52	0.5
6		Subtest 4	21.22	21.45	21.58	0.5
6	HSUPA	Subtest 1	21.42	22.00	21.78	0
6		Subtest 2	19.73	20.10	20.18	2
6		Subtest 3	19.02	19.12	19.19	1
6		Subtest 4	18.50	18.94	19.01	2
6		Subtest 5	21.95	21.97	21.96	0
8	DC-HSDPA	Subtest 1	22.33	22.10	22.14	0
8		Subtest 2	21.94	22.18	22.29	0
8		Subtest 3	21.36	21.59	21.72	0.5
8		Subtest 4	21.78	21.69	21.79	0.5

DC-HSDPA considerations

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

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



Figure 9-2
Power Measurement Setup

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.3 LTE Conducted Powers

9.3.1 LTE Band 12

Table 9-1
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	22.30	0	0
	1	25	**22.64**		0
	1	49	22.32		0
	25	0	**21.69**	0-1	1
	25	12	21.64		1
	25	25	21.48		1
	50	0	21.61		1
16QAM	1	0	21.44	0-1	1
	1	25	21.66		1
	1	49	21.33		1
	25	0	20.76	0-2	2
	25	12	20.64		2
	25	25	20.51		2
	50	0	20.61		2

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

Table 9-2
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	22.31	22.34	22.35	0	0
	1	12	22.02	22.26	21.84		0
	1	24	22.30	22.26	22.32		0
	12	0	21.34	21.35	21.24	0-1	1
	12	6	21.15	21.39	20.98		1
	12	13	21.27	21.38	21.06		1
	25	0	21.31	21.30	21.13		1
16QAM	1	0	21.32	21.73	21.43	0-1	1
	1	12	20.97	21.66	20.90		1
	1	24	21.70	21.59	21.55		1
	12	0	20.40	20.37	20.31	0-2	2
	12	6	20.21	20.34	20.04		2
	12	13	20.27	20.32	20.13		2
	25	0	20.28	20.34	20.18		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 9-3
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	22.29	22.22	21.85	0	0
	1	7	22.36	22.35	22.04		0
	1	14	22.00	22.21	22.31		0
	8	0	21.31	21.35	20.86	0-1	1
	8	4	21.34	21.29	21.00		1
	8	7	21.17	21.26	21.18		1
	15	0	21.27	21.30	21.04		1
16QAM	1	0	21.16	21.64	21.09	0-1	1
	1	7	21.27	21.72	21.28		1
	1	14	20.96	21.61	21.53		1
	8	0	20.38	20.34	19.96	0-2	2
	8	4	20.30	20.37	20.01		2
	8	7	20.20	20.31	20.36		2
	15	0	20.23	20.23	20.03		2

Table 9-4
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	22.61	22.50	22.14	0	0
	1	2	22.63	22.67	22.31		0
	1	5	22.31	22.54	22.64		0
	3	0	22.60	22.63	22.18		0
	3	2	22.63	22.58	22.29		0
	3	3	22.44	22.53	22.45		0
	6	0	21.55	21.62	21.33	0-1	1
16QAM	1	0	21.43	21.97	21.39	0-1	1
	1	2	21.58	22.04	21.60		1
	1	5	21.27	21.94	21.81		1
	3	0	21.68	21.65	21.27		1
	3	2	21.60	21.70	21.32		1
	3	3	21.50	21.63	21.66		1
	6	0	20.53	20.53	20.35	0-2	2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

9.3.2 LTE Band 13

Table 9-5
LTE Band 13 Conducted Powers - 10 MHz Bandwidth

LTE Band 13 10 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.68**	0	0
	1	25	22.38		0
	1	49	22.25		0
	25	0	**21.45**	0-1	1
	25	12	21.44		1
	25	25	21.40		1
	50	0	21.41		1
16QAM	1	0	21.61	0-1	1
	1	25	21.72		1
	1	49	21.40		1
	25	0	20.52	0-2	2
	25	12	20.57		2
	25	25	20.30		2
	50	0	20.44		2

Table 9-6
LTE Band 13 Conducted Powers - 5 MHz Bandwidth

LTE Band 13 5 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	22.46	0	0
	1	12	22.34		0
	1	24	22.32		0
	12	0	21.44	0-1	1
	12	6	21.43		1
	12	13	21.40		1
	25	0	21.40		1
16QAM	1	0	21.60	0-1	1
	1	12	21.54		1
	1	24	21.52		1
	12	0	20.46	0-2	2
	12	6	20.46		2
	12	13	20.40		2
	25	0	20.44		2

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

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

9.3.3 LTE Band 5 (Cell)

Table 9-7
LTE Band 5 (Cell) Conducted Powers - 10 MHz Bandwidth

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20525 (836.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.61**	0	0
	1	25	22.52		0
	1	49	22.29		0
	25	0	**21.61**	0-1	1
	25	12	21.58		1
	25	25	21.41		1
	50	0	21.50		1
16QAM	1	0	21.83	0-1	1
	1	25	21.85		1
	1	49	21.44		1
	25	0	20.51	0-2	2
	25	12	20.48		2
	25	25	20.37		2
	50	0	20.51		2

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

Table 9-8
LTE Band 5 (Cell) Conducted Powers - 5 MHz Bandwidth

LTE Band 5 (Cell) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20425 (826.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20625 (846.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.90	22.98	22.68	0	0
	1	12	22.85	22.92	22.62		0
	1	24	22.81	22.89	22.63		0
	12	0	21.91	21.95	21.69	0-1	1
	12	6	21.91	21.95	21.69		1
	12	13	21.82	21.90	21.63		1
	25	0	21.87	21.91	21.65		1
16QAM	1	0	22.15	22.19	21.96	0-1	1
	1	12	22.07	22.18	21.89		1
	1	24	22.03	22.09	21.80		1
	12	0	20.90	20.98	20.69	0-2	2
	12	6	20.88	20.92	20.68		2
	12	13	20.87	20.87	20.63		2
	25	0	20.84	20.90	20.60		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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

LTE Band 5 (Cell) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20415 (825.5 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20635 (847.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.85	22.73	22.51	0	0
	1	7	22.89	22.80	22.58		0
	1	14	22.78	22.67	22.44		0
	8	0	21.79	21.73	21.52	0-1	1
	8	4	21.77	21.74	21.52		1
	8	7	21.74	21.71	21.49		1
	15	0	21.76	21.72	21.45		1
16QAM	1	0	21.98	21.96	21.76	0-1	1
	1	7	22.10	22.07	21.81		1
	1	14	21.99	21.97	21.67		1
	8	0	20.84	20.78	20.54	0-2	2
	8	4	20.82	20.76	20.52		2
	8	7	20.80	20.72	20.48		2
	15	0	20.75	20.65	20.44		2

Table 9-10
LTE Band 5 (Cell) Conducted Powers -1.4 MHz Bandwidth

LTE Band 5 (Cell) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20407 (824.7 MHz)	Mid Channel 20525 (836.5 MHz)	High Channel 20643 (848.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.68	22.58	22.34	0	0
	1	2	22.74	22.64	22.39		0
	1	5	22.67	22.57	22.30		0
	3	0	22.71	22.60	22.36		0
	3	2	22.72	22.65	22.39		0
	3	3	22.67	22.57	22.34		0
	6	0	21.67	21.59	21.35	0-1	1
16QAM	1	0	21.92	21.86	21.61	0-1	1
	1	2	21.97	21.92	21.68		1
	1	5	21.91	21.82	21.57		1
	3	0	21.81	21.72	21.49		1
	3	2	21.85	21.76	21.52		1
	3	3	21.80	21.67	21.47		1
	6	0	20.73	20.61	20.38	0-2	2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

9.3.4 Maximum LTE Band 4 (AWS)

Table 9-11
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**22.68**	0	0
	1	50	22.40		0
	1	99	22.35		0
	50	0	**21.50**	0-1	1
	50	25	21.47		1
	50	50	21.46		1
	100	0	21.42		1
16QAM	1	0	21.81	0-1	1
	1	50	21.56		1
	1	99	21.83		1
	50	0	20.50	0-2	2
	50	25	20.45		2
	50	50	20.44		2
	100	0	20.47		2

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

Table 9-12
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.39	22.42	22.40	0	0
	1	36	22.28	22.27	22.24		0
	1	74	22.34	22.29	22.25		0
	36	0	21.30	21.39	21.36	0-1	1
	36	18	21.33	21.35	21.28		1
	36	37	21.29	21.38	21.25		1
	75	0	21.34	21.37	21.25		1
16QAM	1	0	21.97	21.60	22.01	0-1	1
	1	36	21.82	21.27	21.82		1
	1	74	21.94	21.96	21.77		1
	36	0	20.30	20.41	20.38	0-2	2
	36	18	20.31	20.35	20.33		2
	36	37	20.27	20.37	20.27		2
	75	0	20.32	20.36	20.27		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 9-13
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.50	22.35	22.30	0	0
	1	25	22.43	22.27	22.23		0
	1	49	22.47	22.26	22.17		0
	25	0	21.48	21.33	21.29	0-1	1
	25	12	21.46	21.35	21.25		1
	25	25	21.47	21.31	21.22		1
	50	0	21.44	21.32	21.27		1
16QAM	1	0	21.45	21.16	21.84	0-1	1
	1	25	22.06	21.11	21.57		1
	1	49	21.68	21.38	21.54		1
	25	0	20.44	20.36	20.37	0-2	2
	25	12	20.45	20.35	20.28		2
	25	25	20.46	20.31	20.20		2
	50	0	20.45	20.29	20.27		2

Table 9-14
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.45	22.35	22.27	0	0
	1	12	22.40	22.24	22.25		0
	1	24	22.46	22.25	22.20		0
	12	0	21.41	21.30	21.27	0-1	1
	12	6	21.44	21.31	21.26		1
	12	13	21.40	21.27	21.22		1
	25	0	21.42	21.30	21.24		1
16QAM	1	0	21.68	21.53	21.50	0-1	1
	1	12	21.43	21.29	21.56		1
	1	24	21.49	21.31	21.78		1
	12	0	20.48	20.38	20.31	0-2	2
	12	6	20.50	20.39	20.31		2
	12	13	20.47	20.34	20.23		2
	25	0	20.46	20.30	20.29		2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 9-15
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.39	22.27	22.23	0	0
	1	7	22.52	22.36	22.30		0
	1	14	22.35	22.25	22.16		0
	8	0	21.42	21.30	21.23	0-1	1
	8	4	21.42	21.33	21.25		1
	8	7	21.40	21.29	21.19		1
	15	0	21.39	21.33	21.21		1
16QAM	1	0	21.94	21.49	21.80	0-1	1
	1	7	21.74	21.59	21.90		1
	1	14	21.64	21.52	21.75		1
	8	0	20.43	20.27	20.42	0-2	2
	8	4	20.39	20.28	20.36		2
	8	7	20.44	20.27	20.33		2
	15	0	20.42	20.37	20.15		2

Table 9-16
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.28	22.24	22.16	0	0
	1	2	22.37	22.25	22.23		0
	1	5	22.33	22.21	22.19		0
	3	0	22.31	22.24	22.15		0
	3	2	22.37	22.26	22.18		0
	3	3	22.31	22.23	22.17		0
	6	0	21.32	21.23	21.13	0-1	1
16QAM	1	0	21.64	21.28	21.32	0-1	1
	1	2	21.70	21.47	21.81		1
	1	5	21.21	21.41	21.70		1
	3	0	21.41	21.58	21.26		1
	3	2	21.49	21.34	21.43		1
	3	3	21.45	21.31	21.36		1
	6	0	20.46	20.38	20.36	0-2	2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.3.5 Reduced LTE Band 4 (AWS)

Table 9-17
LTE Band 4 (AWS) Conducted Powers - 20 MHz Bandwidth

LTE Band 4 (AWS) 20 MHzBandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20175 (1732.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**19.97**	0	0
	1	50	19.73		0
	1	99	19.74		0
	50	0	**18.88**	0-1	1
	50	25	18.80		1
	50	50	18.82		1
	100	0	18.87		1
16QAM	1	0	18.66	0-1	1
	1	50	18.89		1
	1	99	18.88		1
	50	0	17.80	0-2	2
	50	25	17.86		2
	50	50	17.81		2
	100	0	17.88		2

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

Table 9-18
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

LTE Band 4 (AWS) 15 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20025 (1717.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20325 (1747.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.60	19.68	19.74	0	0
	1	36	19.47	19.55	19.55		0
	1	74	19.51	19.55	19.50		0
	36	0	18.54	18.63	18.69	0-1	1
	36	18	18.56	18.60	18.62		1
	36	37	18.53	18.67	18.58		1
	75	0	18.54	18.57	18.63		1
16QAM	1	0	18.86	18.82	18.99	0-1	1
	1	36	18.73	18.70	18.80		1
	1	74	18.81	18.71	18.75		1
	36	0	17.58	17.54	17.71	0-2	2
	36	18	17.57	17.52	17.66		2
	36	37	17.54	17.51	17.59		2
	75	0	17.56	17.61	17.64		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 9-19
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

LTE Band 4 (AWS) 10 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 20000 (1715.0 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20350 (1750.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.68	19.68	19.60	0	0
	1	25	19.64	19.63	19.49		0
	1	49	19.63	19.61	19.43		0
	25	0	18.67	18.70	18.54	0-1	1
	25	12	18.65	18.67	18.50		1
	25	25	18.66	18.63	18.45		1
	50	0	18.65	18.65	18.49		1
16QAM	1	0	18.90	18.93	18.81	0-1	1
	1	25	18.86	18.99	18.71		1
	1	49	18.88	19.00	18.66		1
	25	0	17.67	17.72	17.57	0-2	2
	25	12	17.69	17.73	17.56		2
	25	25	17.63	17.67	17.49		2
	50	0	17.66	17.70	17.55		2

Table 9-20
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

LTE Band 4 (AWS) 5 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19975 (1712.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20375 (1752.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.61	19.65	19.49	0	0
	1	12	19.59	19.62	19.42		0
	1	24	19.60	19.62	19.41		0
	12	0	18.58	18.69	18.49	0-1	1
	12	6	18.58	18.69	18.52		1
	12	13	18.59	18.67	18.46		1
	25	0	18.59	18.64	18.44		1
16QAM	1	0	18.86	18.92	18.75	0-1	1
	1	12	18.80	18.87	18.68		1
	1	24	18.83	18.87	18.66		1
	12	0	17.61	17.68	17.54	0-2	2
	12	6	17.62	17.71	17.56		2
	12	13	17.62	17.68	17.50		2
	25	0	17.59	17.67	17.52		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 9-21
LTE Band 4 (AWS) Conducted Powers - 3 MHz Bandwidth

LTE Band 4 (AWS) 3 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19965 (1711.5 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20385 (1753.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.55	19.58	19.48	0	0
	1	7	19.63	19.67	19.55		0
	1	14	19.54	19.54	19.42		0
	8	0	18.56	18.73	18.51	0-1	1
	8	4	18.56	18.72	18.51		1
	8	7	18.54	18.69	18.48		1
	15	0	18.57	18.69	18.45		1
16QAM	1	0	18.80	18.95	18.69	0-1	1
	1	7	18.89	19.06	18.78		1
	1	14	18.82	18.95	18.65		1
	8	0	17.60	17.65	17.54	0-2	2
	8	4	17.61	17.68	17.54		2
	8	7	17.59	17.65	17.53		2
	15	0	17.53	17.58	17.45		2

Table 9-22
LTE Band 4 (AWS) Conducted Powers -1.4 MHz Bandwidth

LTE Band 4 (AWS) 1.4 MHzBandwidth							
Modulation	RB Size	RB Offset	Low Channel 19957 (1710.7 MHz)	Mid Channel 20175 (1732.5 MHz)	High Channel 20393 (1754.3 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.50	19.55	19.38	0	0
	1	2	19.57	19.63	19.46		0
	1	5	19.49	19.53	19.37		0
	3	0	19.53	19.57	19.37		0
	3	2	19.57	19.62	19.41		0
	3	3	19.53	19.57	19.36		0
	6	0	18.49	18.56	18.39	0-1	1
16QAM	1	0	18.75	18.84	18.64	0-1	1
	1	2	18.82	18.87	18.69		1
	1	5	18.74	18.80	18.60		1
	3	0	18.64	18.70	18.52		1
	3	2	18.68	18.75	18.56		1
	3	3	18.63	18.69	18.49		1
	6	0	17.57	17.65	17.53	0-2	2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.3.6 Maximum LTE Band 7

Table 9-23
LTE Band 7 Conducted Powers - 20 MHz Bandwidth

LTE Band 7 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20850 (2510.0 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21350 (2560.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	**23.14**	23.07	23.02	0	0
	1	50	22.93	23.02	22.92		0
	1	99	23.04	22.86	22.84		0
	50	0	**22.10**	22.08	21.96	0-1	1
	50	25	22.07	22.07	21.95		1
	50	50	22.01	21.97	21.91		1
	100	0	22.07	21.99	21.88		1
16QAM	1	0	22.38	22.05	22.06	0-1	1
	1	50	22.20	22.15	21.99		1
	1	99	22.22	22.23	22.17		1
	50	0	21.17	21.10	21.01	0-2	2
	50	25	21.09	21.09	20.99		2
	50	50	21.07	20.92	20.82		2
	100	0	21.05	21.09	21.05		2

Table 9-24
LTE Band 7 Conducted Powers - 15 MHz Bandwidth

LTE Band 7 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20825 (2507.5 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21375 (2562.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.01	22.91	22.86	0	0
	1	36	22.91	22.84	22.78		0
	1	74	22.90	22.85	22.80		0
	36	0	21.98	21.90	21.84	0-1	1
	36	18	21.97	21.89	21.85		1
	36	37	21.96	21.87	21.79		1
	75	0	21.96	21.88	21.83		1
16QAM	1	0	22.28	22.17	22.13	0-1	1
	1	36	22.19	22.10	22.03		1
	1	74	22.15	22.15	22.05		1
	36	0	21.00	20.92	20.85	0-2	2
	36	18	20.99	20.91	20.86		2
	36	37	20.93	20.88	20.81		2
	75	0	20.97	20.89	20.83		2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 9-25
LTE Band 7 Conducted Powers - 10 MHz Bandwidth

LTE Band 7 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20800 (2505.0 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21400 (2565.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.08	22.85	22.83	0	0
	1	25	23.06	22.84	22.80		0
	1	49	23.03	22.83	22.78		0
	25	0	22.09	21.89	21.82	0-1	1
	25	12	22.09	21.92	21.82		1
	25	25	22.04	21.89	21.80		1
	50	0	22.05	21.88	21.82		1
16QAM	1	0	22.34	22.16	22.07	0-1	1
	1	25	22.29	22.12	22.08		1
	1	49	22.28	22.13	22.05		1
	25	0	21.09	20.89	20.82	0-2	2
	25	12	21.12	20.93	20.85		2
	25	25	21.06	20.87	20.79		2
	50	0	21.09	20.88	20.82		2

Table 9-26
LTE Band 7 Conducted Powers - 5 MHz Bandwidth

LTE Band 7 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20775 (2502.5 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21425 (2567.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.14	22.83	22.77	0	0
	1	12	23.16	22.86	22.79		0
	1	24	23.04	22.83	22.76		0
	12	0	22.08	21.88	21.79	0-1	1
	12	6	22.09	21.89	21.82		1
	12	13	22.07	21.85	21.79		1
	25	0	22.07	21.86	21.78		1
16QAM	1	0	22.32	22.12	22.05	0-1	1
	1	12	22.35	22.13	22.03		1
	1	24	22.30	22.09	22.02		1
	12	0	21.12	20.91	20.84	0-2	2
	12	6	21.15	20.93	20.87		2
	12	13	21.10	20.91	20.83		2
	25	0	21.15	20.89	20.81		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.3.7 Reduced LTE Band 7

Table 9-27
LTE Band 7 Conducted Powers - 20 MHz Bandwidth

LTE Band 7 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20850 (2510.0 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21350 (2560.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.11	**20.13**	19.93	0	0
	1	50	19.97	20.01	19.79		0
	1	99	19.98	20.05	19.81		0
	50	0	19.09	**19.14**	18.90	0-1	1
	50	25	19.07	19.13	18.89		1
	50	50	19.04	19.10	18.85		1
	100	0	19.07	19.10	18.88		1
16QAM	1	0	19.26	19.13	19.05	0-1	1
	1	50	19.11	19.03	18.92		1
	1	99	19.12	19.07	18.95		1
	50	0	18.11	18.04	17.92	0-2	2
	50	25	18.06	18.00	17.90		2
	50	50	18.04	18.00	17.87		2
	100	0	18.08	18.00	17.89		2

Table 9-28
LTE Band 7 Conducted Powers - 15 MHz Bandwidth

LTE Band 7 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20825 (2507.5 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21375 (2562.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.09	20.06	19.96	0	0
	1	36	20.00	19.99	19.86		0
	1	74	19.98	20.02	19.87		0
	36	0	19.07	19.06	18.94	0-1	1
	36	18	19.06	19.08	18.92		1
	36	37	19.01	19.04	18.90		1
	75	0	19.07	19.05	18.92		1
16QAM	1	0	19.18	19.19	19.08	0-1	1
	1	36	19.11	19.13	18.95		1
	1	74	19.10	19.17	18.99		1
	36	0	18.08	18.09	17.93	0-2	2
	36	18	18.07	18.10	17.93		2
	36	37	18.05	18.06	17.90		2
	75	0	18.06	18.08	17.92		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 9-29
LTE Band 7 Conducted Powers - 10 MHz Bandwidth

LTE Band 7 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20800 (2505.0 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21400 (2565.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	20.11	20.00	19.88	0	0
	1	25	20.05	19.99	19.85		0
	1	49	19.94	19.98	19.83		0
	25	0	19.12	19.07	18.86	0-1	1
	25	12	19.11	19.06	18.89		1
	25	25	19.09	19.01	18.85		1
	50	0	19.05	19.02	18.89		1
16QAM	1	0	19.20	19.14	18.99	0-1	1
	1	25	19.18	19.12	18.96		1
	1	49	19.16	19.11	18.95		1
	25	0	18.12	18.07	17.88	0-2	2
	25	12	18.14	18.09	17.91		2
	25	25	18.09	18.03	17.87		2
	50	0	18.06	18.06	17.88		2

Table 9-30
LTE Band 7 Conducted Powers - 5 MHz Bandwidth

LTE Band 7 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20775 (2502.5 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21425 (2567.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	19.98	19.99	19.84	0	0
	1	12	19.98	20.00	19.85		0
	1	24	19.95	19.99	19.79		0
	12	0	19.03	19.06	18.87	0-1	1
	12	6	19.05	19.05	18.88		1
	12	13	19.00	19.03	18.85		1
	25	0	19.00	19.04	18.85		1
16QAM	1	0	19.07	19.09	18.95	0-1	1
	1	12	19.08	19.11	18.93		1
	1	24	19.05	19.08	18.92		1
	12	0	18.01	18.04	17.87	0-2	2
	12	6	18.05	18.06	17.88		2
	12	13	18.00	18.04	17.85		2
	25	0	18.03	18.04	17.87		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.3.8 Maximum LTE Band 41

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

LTE Band 41 20 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.58	22.33	22.35	22.63	**22.78**	0	0
	1	50	22.40	22.15	22.22	22.52	22.48		0
	1	99	22.35	22.04	22.23	22.43	22.33		0
	50	0	21.56	21.29	21.35	21.59	**21.68**	0-1	1
	50	25	21.48	21.23	21.31	21.57	21.58		1
	50	50	21.41	21.20	21.27	21.52	21.50		1
	100	0	21.47	21.25	21.32	21.58	21.52		1
16QAM	1	0	21.68	21.40	21.60	21.85	21.87	0-1	1
	1	50	21.46	21.23	21.46	21.68	21.58		1
	1	99	21.41	21.18	21.44	21.72	21.39		1
	50	0	20.54	20.38	20.30	20.61	20.71	0-2	2
	50	25	20.46	20.32	20.33	20.58	20.60		2
	50	50	20.49	20.14	20.26	20.54	20.51		2
	100	0	20.51	20.30	20.35	20.63	20.57		2

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

LTE Band 41 15 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.58	22.39	22.18	22.35	22.56	0	0
	1	36	22.48	22.27	22.01	22.27	22.39		0
	1	74	22.37	22.17	22.00	22.22	22.39		0
	36	0	21.51	21.26	21.10	21.36	21.61	0-1	1
	36	18	21.53	21.23	21.08	21.38	21.55		1
	36	37	21.46	21.22	21.01	21.29	21.53		1
	75	0	21.50	21.25	21.00	21.36	21.44		1
16QAM	1	0	21.64	21.35	21.15	21.42	21.50	0-1	1
	1	36	21.45	21.26	21.03	21.33	21.66		1
	1	74	21.40	21.30	21.07	21.31	21.50		1
	36	0	20.59	20.32	20.08	20.39	20.63	0-2	2
	36	18	20.53	20.39	20.10	20.35	20.54		2
	36	37	20.53	20.35	20.04	20.31	20.53		2
	75	0	20.51	20.35	20.07	20.32	20.51		2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

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

LTE Band 41 10 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.49	22.31	22.14	22.40	22.50	0	0
	1	25	22.46	22.31	22.04	22.33	22.46		0
	1	49	22.44	22.26	22.03	22.29	22.37		0
	25	0	21.48	21.34	21.05	21.30	21.56	0-1	1
	25	12	21.48	21.38	21.06	21.35	21.57		1
	25	25	21.47	21.27	21.03	21.27	21.44		1
	50	0	21.50	21.32	21.06	21.34	21.49		1
16QAM	1	0	21.57	21.39	21.17	21.38	21.59	0-1	1
	1	25	21.46	21.33	21.15	21.29	21.52		1
	1	49	21.42	21.31	21.14	21.29	21.43		1
	25	0	20.47	20.30	20.12	20.28	20.47	0-2	2
	25	12	20.49	20.34	20.14	20.28	20.54		2
	25	25	20.37	20.25	20.09	20.26	20.44		2
	50	0	20.52	20.35	20.13	20.33	20.57		2

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

LTE Band 41 5 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.46	22.27	22.07	22.32	22.43	0	0
	1	12	22.49	22.24	22.11	22.34	22.46		0
	1	24	22.40	22.25	22.07	22.28	22.40		0
	12	0	21.46	21.35	21.11	21.34	21.49	0-1	1
	12	6	21.47	21.31	21.17	21.34	21.52		1
	12	13	21.48	21.33	21.14	21.26	21.50		1
	25	0	21.45	21.32	21.08	21.30	21.49		1
16QAM	1	0	21.51	21.35	21.13	21.35	21.51	0-1	1
	1	12	21.47	21.36	21.18	21.29	21.47		1
	1	24	21.43	21.33	21.16	21.26	21.44		1
	12	0	20.47	20.37	20.12	20.35	20.50	0-2	2
	12	6	20.50	20.35	20.14	20.35	20.51		2
	12	13	20.49	20.31	20.09	20.32	20.46		2
	25	0	20.43	20.24	20.09	20.22	20.47		2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

9.3.9 Reduced LTE Band 41

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

LTE Band 41 20 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.52	21.33	21.03	21.26	**21.53**	0	0
	1	50	21.35	21.16	20.93	21.11	21.19		0
	1	99	21.29	21.17	20.92	21.07	21.07		0
	50	0	20.46	20.25	20.01	20.20	**20.48**	0-1	1
	50	25	20.40	20.23	19.97	20.15	20.30		1
	50	50	20.32	20.16	19.96	20.12	20.24		1
	100	0	20.39	20.22	19.99	20.15	20.29		1
16QAM	1	0	20.72	20.54	20.35	20.48	20.66	0-1	1
	1	50	20.54	20.38	20.20	20.31	20.45		1
	1	99	20.50	20.38	20.19	20.26	20.37		1
	50	0	19.45	19.27	19.05	19.20	19.37	0-2	2
	50	25	19.40	19.22	18.99	19.17	19.31		2
	50	50	19.37	19.19	18.96	19.11	19.24		2
	100	0	19.40	19.27	19.01	19.20	19.32		2

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

LTE Band 41 15 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.41	21.24	21.04	21.19	21.37	0	0
	1	36	21.29	21.13	20.93	21.06	21.23		0
	1	74	21.26	21.12	20.94	21.03	21.13		0
	36	0	20.40	20.22	20.00	20.20	20.34	0-1	1
	36	18	20.39	20.21	20.03	20.16	20.34		1
	36	37	20.31	20.18	19.97	20.14	20.26		1
	75	0	20.35	20.21	19.97	20.14	20.30		1
16QAM	1	0	20.68	20.48	20.29	20.46	20.62	0-1	1
	1	36	20.55	20.39	20.17	20.32	20.47		1
	1	74	20.49	20.36	20.16	20.29	20.38		1
	36	0	19.43	19.21	19.03	19.20	19.35	0-2	2
	36	18	19.38	19.21	19.01	19.17	19.31		2
	36	37	19.32	19.16	18.96	19.10	19.25		2
	75	0	19.37	19.19	18.99	19.17	19.31		2

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

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

LTE Band 41 10 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.38	21.19	21.00	21.13	21.35	0	0
	1	25	21.33	21.16	20.95	21.08	21.25		0
	1	49	21.25	21.13	20.92	21.03	21.22		0
	25	0	20.36	20.22	20.01	20.15	20.31	0-1	1
	25	12	20.39	20.20	20.00	20.15	20.30		1
	25	25	20.31	20.16	19.95	20.11	20.27		1
	50	0	20.34	20.17	20.00	20.13	20.28		1
16QAM	1	0	20.59	20.41	20.21	20.37	20.55	0-1	1
	1	25	20.53	20.38	20.19	20.33	20.47		1
	1	49	20.48	20.34	20.16	20.27	20.38		1
	25	0	19.33	19.14	18.95	19.13	19.25	0-2	2
	25	12	19.29	19.14	18.96	19.10	19.25		2
	25	25	19.26	19.11	18.92	19.05	19.21		2
	50	0	19.35	19.17	19.00	19.15	19.30		2

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

LTE Band 41 5 MHzBandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	21.28	21.15	20.90	21.00	21.21	0	0
	1	12	21.27	21.14	20.91	21.05	21.21		0
	1	24	21.23	21.10	20.87	20.99	21.16		0
	12	0	20.32	20.17	19.96	20.12	20.28	0-1	1
	12	6	20.34	20.19	19.99	20.14	20.29		1
	12	13	20.30	20.13	19.95	20.10	20.22		1
	25	0	20.31	20.14	19.93	20.10	20.23		1
16QAM	1	0	20.54	20.38	20.18	20.32	20.46	0-1	1
	1	12	20.50	20.35	20.15	20.28	20.44		1
	1	24	20.47	20.33	20.13	20.25	20.39		1
	12	0	19.32	19.15	18.96	19.11	19.24	0-2	2
	12	6	19.32	19.18	18.96	19.10	19.25		2
	12	13	19.28	19.12	18.92	19.05	19.21		2
	25	0	19.24	19.07	18.89	19.04	19.20		2

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

9.4 WLAN Conducted Powers

Table 9-39
2.4 GHz WLAN Maximum Average RF Power – Antenna 1

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
		Average	Average	Average
2412	1	**18.85**	16.93	16.74
2437	6	18.76	16.84	16.70
2462	11	18.78	16.74	16.54

Table 9-40
2.4 GHz WLAN Maximum Average RF Power – Antenna 2

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
		Average	Average	Average
2412	1	**19.39**	17.49	17.16
2437	6	18.73	16.79	17.43
2462	11	19.27	17.28	17.11

Table 9-41
2.4 GHz WLAN Reduced Average RF Power – Antenna 1 (Held-to-Ear)

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	16.07	16.05	16.48
2437	6	**16.46**	16.32	15.86
2462	11	16.45	16.14	15.98

Table 9-42
2.4 GHz WLAN Reduced Average RF Power – Antenna 2 (Held-to-Ear)

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11b	802.11g	802.11n
2412	1	15.87	16.46	16.33
2437	6	**16.49**	16.16	15.95
2462	11	15.99	16.50	16.21

Table 9-43
2.4 GHz WLAN Reduced Average RF Power – MIMO (Held-to-Ear)

Freq [MHz]	Channel	2.4GHz Conducted Power [dBm] IEEE 802.11n		
		ANT1	ANT2	MIMO
2412	1	13.11	12.42	**15.79**
2437	6	13.13	12.09	15.65
2462	11	13.01	12.32	15.69

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 9-44
5 GHz WLAN Maximum Average RF Power – Antenna 1

5GHz (20MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
		Average	Average	Average
5180	36	15.98	16.06	16.05
5200	40	16.05	16.07	16.09
5220	44	16.10	16.11	16.13
5240	48	16.07	16.17	16.15
5260	52	**16.26**	16.25	16.14
5280	56	16.17	16.19	16.25
5300	60	16.21	16.22	16.28
5320	64	16.18	16.20	16.17
5500	100	**16.45**	16.37	16.47
5600	120	16.44	16.44	15.54
5620	124	15.62	15.65	15.57
5720	144	15.71	15.70	15.58
5745	149	16.40	16.45	16.48
5785	157	16.39	16.46	16.43
5825	165	**16.47**	16.33	16.47

Table 9-45
5 GHz WLAN Maximum Average RF Power – Antenna 2

5GHz (20MHz) Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
		Average	Average	Average
5180	36	16.10	16.06	16.02
5200	40	16.04	16.17	16.07
5220	44	16.12	16.23	16.15
5240	48	16.14	16.15	16.08
5260	52	16.11	16.07	16.16
5280	56	16.07	16.25	16.15
5300	60	**16.20**	16.12	16.02
5320	64	16.11	16.17	16.15
5500	100	16.25	16.24	16.27
5600	120	**16.30**	16.22	16.24
5620	124	16.22	16.23	16.14
5720	144	16.19	16.03	16.12
5745	149	15.63	16.47	16.48
5785	157	**16.45**	16.49	15.61
5825	165	15.50	15.47	15.45

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 9-46
5 GHz WLAN Reduced Average RF Power – Antenna 1 (Held to Ear)

Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
5180	36	14.17	13.81	13.62
5200	40	14.07	13.70	13.82
5220	44	13.96	13.98	13.55
5240	48	14.39	13.80	13.65
5260	52	14.34	14.00	13.97
5280	56	**14.49**	13.99	14.03
5300	60	14.44	14.10	13.96
5320	64	13.77	14.06	14.08
5500	100	14.03	14.45	14.26
5600	120	13.82	14.46	14.35
5620	124	13.77	14.49	14.43
5720	144	**14.04**	13.59	14.29
5745	149	13.61	13.23	14.21
5785	157	13.83	13.24	14.05
5825	165	**14.49**	14.23	14.07

Table 9-47
5 GHz WLAN Maximum Average RF Power – Antenna 2 (Held to Ear)

Freq [MHz]	Channel	5GHz (20MHz) Conducted Power [dBm]		
		IEEE Transmission Mode		
		802.11a	802.11n	802.11ac
5180	36	14.11	14.12	13.85
5200	40	14.23	14.13	13.94
5220	44	14.05	14.05	13.91
5240	48	14.35	14.12	13.83
5260	52	14.15	14.10	13.79
5280	56	**14.24**	14.06	14.03
5300	60	14.17	14.09	13.80
5320	64	14.13	13.99	13.78
5500	100	14.34	14.04	14.06
5600	120	**14.37**	14.02	13.94
5620	124	14.26	14.19	13.99
5720	144	14.31	13.92	13.84
5745	149	13.95	13.50	13.46
5785	157	13.89	13.43	13.50
5825	165	**14.03**	13.43	13.45

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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

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

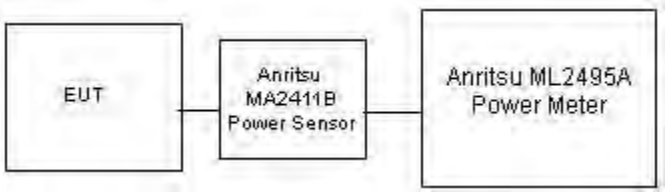


Figure 9-3
Power Measurement Setup for Bandwidths

9.5 Bluetooth Conducted Powers

Table 9-48
Bluetooth Average RF Power

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
			[dBm]	[mW]
2402	1.0	0	13.40	21.878
2441	1.0	39	**14.37**	27.353
2480	1.0	78	13.13	20.559
2402	2.0	0	4.49	2.812
2441	2.0	39	5.43	3.491
2480	2.0	78	5.03	3.184
2402	3.0	0	4.52	2.831
2441	3.0	39	5.56	3.597
2480	3.0	78	5.07	3.214

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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

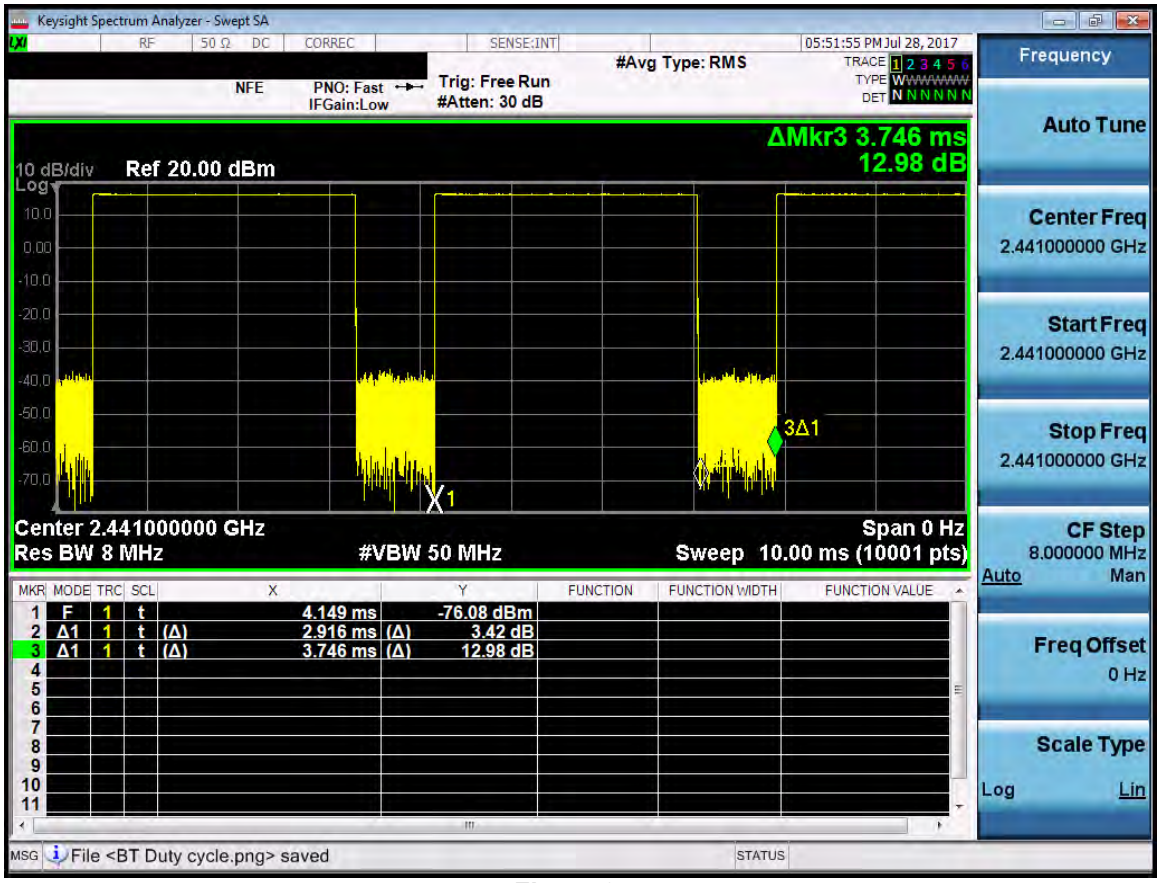


Figure 9-4
Bluetooth Transmission Plot

Equation 2
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.916ms}{3.746ms} * 100\% = 77.8\%$$

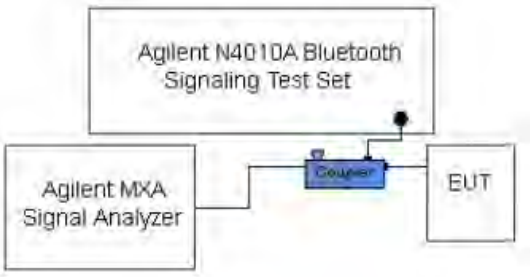


Figure 9-5
Power Measurement Setup

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Head Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	%dev σ	%dev ε
7/24/2017	750H	20.5	700	0.880	44.097	0.889	42.201	-1.01%	4.49%
			710	0.883	44.057	0.890	42.149	-0.79%	4.53%
			740	0.893	43.978	0.893	41.994	0.00%	4.72%
			755	0.898	43.942	0.894	41.916	0.45%	4.83%
8/7/2017	750H	21.2	740	0.891	42.096	0.893	41.994	-0.22%	0.24%
			755	0.905	41.897	0.894	41.916	1.23%	-0.05%
			770	0.919	41.713	0.895	41.838	2.68%	-0.30%
			785	0.934	41.514	0.896	41.760	4.24%	-0.59%
7/31/2017	835H	20.5	820	0.886	40.978	0.899	41.578	-1.45%	-1.44%
			835	0.902	40.784	0.900	41.500	0.22%	-1.73%
			850	0.918	40.579	0.916	41.500	0.22%	-2.22%
7/26/2017	1750H	20.0	1710	1.369	39.841	1.348	40.142	1.56%	-0.75%
			1750	1.407	39.653	1.371	40.079	2.63%	-1.06%
			1790	1.450	39.457	1.394	40.016	4.02%	-1.40%
8/2/2017	1900H	22.4	1850	1.392	39.479	1.400	40.000	-0.57%	-1.30%
			1880	1.419	39.319	1.400	40.000	1.36%	-1.70%
			1910	1.454	39.221	1.400	40.000	3.86%	-1.95%
7/26/2017	2450H	22.7	2400	1.825	38.609	1.756	39.289	3.93%	-1.73%
			2450	1.877	38.446	1.800	39.200	4.28%	-1.92%
			2500	1.938	38.233	1.855	39.136	4.47%	-2.31%
7/31/2017	2450H	21.6	2400	1.812	39.268	1.756	39.289	3.19%	-0.05%
			2450	1.865	39.092	1.800	39.200	3.61%	-0.28%
			2500	1.927	38.894	1.855	39.136	3.88%	-0.62%
8/16/2017	2450H	22.7	2400	1.740	39.307	1.756	39.289	-0.91%	0.05%
			2450	1.794	39.174	1.800	39.200	-0.33%	-0.07%
			2500	1.853	38.980	1.855	39.136	-0.11%	-0.40%
			2550	1.907	38.815	1.909	39.073	-0.10%	-0.66%
7/19/2017	2600H	21.4	2600	2.047	37.965	1.964	39.009	4.23%	-2.68%
			2650	2.099	37.774	2.018	38.945	4.01%	-3.01%
			2700	2.156	37.573	2.073	38.882	4.00%	-3.37%
7/31/2017	5200H-5800H	21.5	5240	4.552	35.877	4.696	35.940	-3.07%	-0.18%
			5260	4.600	35.828	4.717	35.917	-2.48%	-0.25%
			5280	4.606	35.771	4.737	35.894	-2.77%	-0.34%
			5600	4.913	35.421	5.065	35.529	-3.00%	-0.30%
			5700	5.018	35.225	5.168	35.414	-2.90%	-0.53%
			5745	5.078	35.166	5.214	35.363	-2.61%	-0.56%
			5765	5.087	35.252	5.234	35.340	-2.81%	-0.25%
			5825	5.144	35.095	5.296	35.271	-2.87%	-0.50%

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 10-2
Measured Body Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	%dev σ	%dev ε
8/4/2017	750B	20.6	740	0.957	55.831	0.963	55.570	-0.62%	0.47%
			755	0.970	55.661	0.964	55.512	0.62%	0.27%
			770	0.984	55.473	0.965	55.453	1.97%	0.04%
			785	1.002	55.334	0.966	55.395	3.73%	-0.11%
8/8/2017	750B	20.8	700	0.925	55.825	0.959	55.726	-3.55%	0.18%
			710	0.935	55.731	0.960	55.687	-2.60%	0.08%
			740	0.965	55.433	0.963	55.570	0.21%	-0.25%
			755	0.980	55.282	0.964	55.512	1.66%	-0.41%
			770	0.994	55.124	0.965	55.453	3.01%	-0.59%
			785	1.009	54.957	0.966	55.395	4.45%	-0.79%
8/3/2017	835B	21.5	820	0.985	54.017	0.969	55.258	1.65%	-2.25%
			835	1.000	53.872	0.970	55.200	3.09%	-2.41%
			850	1.014	53.722	0.988	55.154	2.63%	-2.60%
8/4/2017	835B	21.2	820	0.956	53.042	0.969	55.258	-1.34%	-4.01%
			835	0.974	52.870	0.970	55.200	0.41%	-4.22%
			850	0.986	52.727	0.988	55.154	-0.20%	-4.40%
7/31/2017	1750B	21.3	1710	1.466	51.194	1.463	53.537	0.21%	-4.38%
			1750	1.509	51.024	1.488	53.432	1.41%	-4.51%
			1790	1.555	50.865	1.514	53.326	2.71%	-4.62%
8/7/2017	1750B	21.0	1710	1.467	52.131	1.463	53.537	0.27%	-2.63%
			1750	1.506	51.942	1.488	53.432	1.21%	-2.79%
			1790	1.552	51.794	1.514	53.326	2.51%	-2.87%
7/27/2017	1900B	22.5	1850	1.518	53.418	1.520	53.300	-0.13%	0.22%
			1880	1.557	53.357	1.520	53.300	2.43%	0.11%
			1910	1.584	53.221	1.520	53.300	4.21%	-0.15%
7/31/2017	1900B	21.9	1850	1.520	53.355	1.520	53.300	0.00%	0.10%
			1880	1.556	53.270	1.520	53.300	2.37%	-0.06%
			1910	1.590	53.182	1.520	53.300	4.61%	-0.22%
8/3/2017	2450B-2600B	23.0	2400	1.939	52.211	1.902	52.767	1.95%	-1.05%
			2450	2.008	52.040	1.950	52.700	2.97%	-1.25%
			2500	2.074	51.836	2.021	52.636	2.62%	-1.52%
			2600	2.211	51.472	2.163	52.509	2.22%	-1.97%
			2650	2.275	51.315	2.234	52.445	1.84%	-2.15%
			2700	2.347	51.104	2.305	52.382	1.82%	-2.44%
8/7/2017	2450B-2600B	22.9	2400	1.945	51.453	1.902	52.767	2.26%	-2.49%
			2450	2.005	51.277	1.950	52.700	2.82%	-2.70%
			2500	2.079	51.054	2.021	52.636	2.87%	-3.01%
			2550	2.147	50.921	2.092	52.573	2.63%	-3.14%
			2600	2.213	50.656	2.163	52.509	2.31%	-3.53%
8/7/2017	2450B	22.8	2400	1.890	51.453	1.902	52.767	-0.63%	-2.49%
			2450	1.942	51.212	1.950	52.700	-0.41%	-2.82%
			2500	2.023	51.026	2.021	52.636	0.10%	-3.06%
8/22/2017	2450B-2600B	22.4	2450	1.990	50.740	1.950	52.700	2.05%	-3.72%
			2500	2.067	50.522	2.021	52.636	2.28%	-4.02%
			2550	2.131	50.386	2.092	52.573	1.86%	-4.16%
			2600	2.195	50.137	2.163	52.509	1.48%	-4.52%
8/7/2017	5200B-5800B	21.9	5240	5.367	47.776	5.346	48.960	0.39%	-2.42%
			5260	5.390	47.746	5.369	48.933	0.39%	-2.43%
			5300	5.444	47.660	5.416	48.879	0.52%	-2.49%
			5500	5.692	47.367	5.650	48.607	0.74%	-2.55%
			5600	5.846	47.191	5.766	48.471	1.39%	-2.64%
			5745	6.024	47.002	5.936	48.275	1.48%	-2.64%
			5765	6.036	46.953	5.959	48.248	1.29%	-2.68%
			5785	6.081	46.911	5.982	48.220	1.65%	-2.71%
			5825	6.149	46.853	6.029	48.166	1.99%	-2.73%

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.

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.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 10-3
System Verification Results – 1g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	$Deviation_{1g}$ (%)
J	750	HEAD	07/24/2017	20.7	20.5	0.200	1054	3209	1.650	8.370	8.250	-1.43%
E	750	HEAD	08/07/2017	22.5	21.0	0.200	1003	3319	1.570	8.390	7.850	-6.44%
K	835	HEAD	07/31/2017	21.8	20.5	0.200	4d180	7406	1.880	9.260	9.400	1.51%
H	1750	HEAD	07/26/2017	22.3	20.0	0.100	1092	3318	3.700	36.400	37.000	1.65%
J	1900	HEAD	08/02/2017	21.9	21.1	0.100	5d026	3209	3.880	39.300	38.800	-1.27%
I	2450	HEAD	07/26/2017	21.7	21.7	0.100	945	3213	5.460	51.300	54.600	6.43%
I	2450	HEAD	07/31/2017	22.1	21.6	0.100	797	3213	5.500	52.100	55.000	5.57%
K	2450	HEAD	08/16/2017	22.1	22.7	0.100	797	7406	5.320	52.100	53.200	2.11%
I	2600	HEAD	07/19/2017	22.6	21.4	0.100	1004	3213	6.060	57.600	60.600	5.21%
H	5250	HEAD	07/31/2017	21.1	20.0	0.050	1237	3914	3.870	79.200	77.400	-2.27%
H	5600	HEAD	07/31/2017	21.1	20.0	0.050	1237	3914	4.050	83.300	81.000	-2.76%
H	5750	HEAD	07/31/2017	21.1	20.0	0.050	1237	3914	4.000	81.500	80.000	-1.84%
J	750	BODY	08/04/2017	20.7	20.6	0.200	1034	3209	1.710	8.710	8.550	-1.84%
K	750	BODY	08/08/2017	22.7	20.8	0.200	1034	7406	1.860	8.710	9.300	6.77%
E	835	BODY	08/03/2017	22.4	21.5	0.200	4d180	3319	2.040	9.610	10.200	6.14%
I	835	BODY	08/04/2017	22.4	21.0	0.200	4d132	3213	1.940	9.800	9.700	-1.02%
E	1750	BODY	07/31/2017	22.5	21.3	0.100	1092	3319	3.800	37.000	38.000	2.70%
J	1750	BODY	08/07/2017	19.5	21.0	0.100	1092	3209	3.750	37.000	37.500	1.35%
J	1900	BODY	07/27/2017	20.6	21.8	0.100	5d026	3209	4.040	40.300	40.400	0.25%
J	1900	BODY	07/31/2017	21.3	21.6	0.100	5d026	3209	4.040	40.300	40.400	0.25%
G	2450	BODY	08/03/2017	21.7	22.0	0.100	797	3287	5.390	50.700	53.900	6.31%
G	2450	BODY	08/07/2017	22.3	21.5	0.100	945	3287	5.080	50.200	50.800	1.20%
H	2450	BODY	08/07/2017	20.8	22.8	0.100	945	3318	5.100	50.200	51.000	1.59%
G	2600	BODY	08/03/2017	21.7	22.0	0.100	1071	3287	5.800	54.200	58.000	7.01%
G	2600	BODY	08/07/2017	22.3	21.5	0.100	1004	3287	5.630	55.300	56.300	1.81%
D	5250	BODY	08/07/2017	21.8	21.0	0.050	1123	3589	3.730	75.900	74.600	-1.71%
D	5600	BODY	08/07/2017	21.8	21.0	0.050	1123	3589	3.950	78.900	79.000	0.13%
D	5750	BODY	08/07/2017	21.8	21.0	0.050	1123	3589	3.680	76.300	73.600	-3.54%

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 10-4
System Verification Results – 10g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR_{10g} (W/kg)	1 W Target SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	$Deviation_{10g}$ (%)
J	1900	BODY	07/31/2017	21.3	21.6	0.100	5d026	3209	2.100	21.500	21.000	-2.33%
E	2450	BODY	08/22/2017	23.1	20.9	0.100	945	3319	2.370	23.700	23.700	0.00%
E	2600	BODY	08/22/2017	23.1	20.9	0.100	1004	3319	2.590	24.900	25.900	4.02%
D	5250	BODY	08/07/2017	21.8	21.0	0.050	1123	3589	1.040	21.300	20.800	-2.35%
D	5600	BODY	08/07/2017	21.8	21.0	0.050	1123	3589	1.090	22.100	21.800	-1.36%

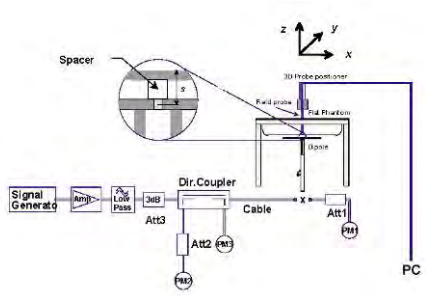


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.0	32.00	0.08	Right	Cheek	12E5F	1:8.3	0.138	1.259	0.174	A1
836.60	190	GSM 850	GSM	33.0	32.00	0.13	Right	Tilt	12E5F	1:8.3	0.066	1.259	0.083	
836.60	190	GSM 850	GSM	33.0	32.00	-0.07	Left	Cheek	12E5F	1:8.3	0.096	1.259	0.121	
836.60	190	GSM 850	GSM	33.0	32.00	0.04	Left	Tilt	12E5F	1:8.3	0.064	1.259	0.081	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-2
GSM 1900 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.0	29.51	-0.09	Right	Cheek	12ECB	1:8.3	0.037	1.119	0.041	
1880.00	661	GSM 1900	GSM	30.0	29.51	0.20	Right	Tilt	12ECB	1:8.3	0.009	1.119	0.010	
1880.00	661	GSM 1900	GSM	30.0	29.51	0.11	Left	Cheek	12ECB	1:8.3	0.040	1.119	0.045	A2
1880.00	661	GSM 1900	GSM	30.0	29.51	-0.08	Left	Tilt	12ECB	1:8.3	0.015	1.119	0.017	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-3
UMTS 850 Head SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.										(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	24.2	23.57	0.00	Right	Cheek	12E5F	1:1	0.159	1.156	**0.184**	A3
836.60	4183	UMTS 850	RMC	24.2	23.57	0.09	Right	Tilt	12E5F	1:1	0.077	1.156	0.089	
836.60	4183	UMTS 850	RMC	24.2	23.57	0.12	Left	Cheek	12E5F	1:1	0.113	1.156	0.131	
836.60	4183	UMTS 850	RMC	24.2	23.57	0.18	Left	Tilt	12E5F	1:1	0.086	1.156	0.099	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Head 1.6 W/kg (mW/g) averaged over 1 gram							

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 11-4
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	Antenna State	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	23.5	22.64	0.06	0	Right	Cheek	15	QPSK	1	25	12E2E	1:1	0.098	1.219	0.119	A4
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.01	1	Right	Cheek	15	QPSK	25	0	12E2E	1:1	0.080	1.205	0.096	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	0.16	0	Right	Tilt	15	QPSK	1	25	12E2E	1:1	0.047	1.219	0.057	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.08	1	Right	Tilt	15	QPSK	25	0	12E2E	1:1	0.038	1.205	0.046	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	0.01	0	Left	Cheek	15	QPSK	1	25	12E2E	1:1	0.075	1.219	0.091	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.04	1	Left	Cheek	15	QPSK	25	0	12E2E	1:1	0.064	1.205	0.077	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	-0.01	0	Left	Tilt	15	QPSK	1	25	12E2E	1:1	0.064	1.219	0.078	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.01	1	Left	Tilt	15	QPSK	25	0	12E2E	1:1	0.051	1.205	0.061	
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
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	Antenna State	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	23.5	22.68	-0.12	0	Right	Cheek	70	QPSK	1	0	12E2E	1:1	0.063	1.208	0.076	A5
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.20	1	Right	Cheek	70	QPSK	25	0	12E2E	1:1	0.043	1.274	0.055	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	0.08	0	Right	Tilt	70	QPSK	1	0	12E2E	1:1	0.021	1.208	0.025	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	0.06	1	Right	Tilt	70	QPSK	25	0	12E2E	1:1	0.017	1.274	0.022	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	0.09	0	Left	Cheek	70	QPSK	1	0	12E2E	1:1	0.029	1.208	0.035	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.02	1	Left	Cheek	70	QPSK	25	0	12E2E	1:1	0.025	1.274	0.032	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	-0.10	0	Left	Tilt	70	QPSK	1	0	12E2E	1:1	0.027	1.208	0.033	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	0.10	1	Left	Tilt	70	QPSK	25	0	12E2E	1:1	0.023	1.274	0.029	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram												

Table 11-6
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Antenna State	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	-0.10	0	Right	Cheek	68	QPSK	1	0	12E5F	1:1	0.126	1.227	0.155	A6
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.07	1	Right	Cheek	68	QPSK	25	0	12E5F	1:1	0.104	1.227	0.128	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	0.20	0	Right	Tilt	68	QPSK	1	0	12E5F	1:1	0.051	1.227	0.063	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.12	1	Right	Tilt	68	QPSK	25	0	12E5F	1:1	0.042	1.227	0.052	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	0.04	0	Left	Cheek	68	QPSK	1	0	12E5F	1:1	0.090	1.227	0.110	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.16	1	Left	Cheek	68	QPSK	25	0	12E5F	1:1	0.069	1.227	0.085	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	0.14	0	Left	Tilt	68	QPSK	1	0	12E5F	1:1	0.079	1.227	0.097	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.08	1	Left	Tilt	68	QPSK	25	0	12E5F	1:1	0.057	1.227	0.070	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram												

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 11-7
LTE Band 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.68	0.03	0	Right	Cheek	QPSK	1	0	12E2E	1:1	0.063	1.208	0.076	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.50	0.11	1	Right	Cheek	QPSK	50	0	12E2E	1:1	0.044	1.259	0.055	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.68	-0.09	0	Right	Tilt	QPSK	1	0	12E2E	1:1	0.060	1.208	0.072	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.50	0.12	1	Right	Tilt	QPSK	50	0	12E2E	1:1	0.044	1.259	0.055	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.68	0.13	0	Left	Cheek	QPSK	1	0	12E2E	1:1	0.081	1.208	0.098	A7
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.50	0.04	1	Left	Cheek	QPSK	50	0	12E2E	1:1	0.070	1.259	0.088	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.68	-0.03	0	Left	Tilt	QPSK	1	0	12E2E	1:1	0.057	1.208	0.069	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.50	0.05	1	Left	Tilt	QPSK	50	0	12E2E	1:1	0.042	1.259	0.053	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Head 1.6 W/kg (mW/g) averaged over 1 gram			

Table 11-8
LTE Band 7 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)	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	0.11	0	Right	Cheek	QPSK	1	0	12E2E	1:1	0.080	1.086	0.087	
2510.00	20850	Low	LTE Band 7	20	22.5	22.10	0.14	1	Right	Cheek	QPSK	50	0	12E2E	1:1	0.070	1.096	0.077	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	0.13	0	Right	Tilt	QPSK	1	0	12E2E	1:1	0.081	1.086	0.088	
2510.00	20850	Low	LTE Band 7	20	22.5	22.10	0.15	1	Right	Tilt	QPSK	50	0	12E2E	1:1	0.057	1.096	0.062	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	0.20	0	Left	Cheek	QPSK	1	0	12E2E	1:1	0.098	1.086	0.106	A8
2510.00	20850	Low	LTE Band 7	20	22.5	22.10	0.06	1	Left	Cheek	QPSK	50	0	12E2E	1:1	0.075	1.096	0.082	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	0.12	0	Left	Tilt	QPSK	1	0	12E2E	1:1	0.041	1.086	0.045	
2510.00	20850	Low	LTE Band 7	20	22.5	22.10	0.13	1	Left	Tilt	QPSK	50	0	12E2E	1:1	0.036	1.096	0.039	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Head 1.6 W/kg (mW/g) averaged over 1 gram			

Table 11-9
LTE Band 41 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
2680.00	41490	High	LTE Band 41	20	23.5	22.78	0.13	0	Right	Cheek	QPSK	1	0	12ECB	1:1.58	0.079	1.180	0.093	
2680.00	41490	High	LTE Band 41	20	22.5	21.68	0.17	1	Right	Cheek	QPSK	50	0	12ECB	1:1.58	0.060	1.208	0.072	
2680.00	41490	High	LTE Band 41	20	23.5	22.78	0.16	0	Right	Tilt	QPSK	1	0	12ECB	1:1.58	0.074	1.180	0.087	
2680.00	41490	High	LTE Band 41	20	22.5	21.68	0.07	1	Right	Tilt	QPSK	50	0	12ECB	1:1.58	0.056	1.208	0.068	
2680.00	41490	High	LTE Band 41	20	23.5	22.78	0.08	0	Left	Cheek	QPSK	1	0	12ECB	1:1.58	0.087	1.180	0.103	A9
2680.00	41490	High	LTE Band 41	20	22.5	21.68	0.11	1	Left	Cheek	QPSK	50	0	12ECB	1:1.58	0.074	1.208	0.089	
2680.00	41490	High	LTE Band 41	20	23.5	22.78	-0.07	0	Left	Tilt	QPSK	1	0	12ECB	1:1.58	0.044	1.180	0.052	
2680.00	41490	High	LTE Band 41	20	22.5	21.68	0.12	1	Left	Tilt	QPSK	50	0	12ECB	1:1.58	0.031	1.208	0.037	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Head 1.6 W/kg (mW/g) averaged over 1 gram			

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 11-10
SISO DTS Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	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	16.5	16.46	0.01	Right	Cheek	1	13056	1	98.6	1.058	0.868	1.009	1.014	0.888	
2462	11	802.11b	DSSS	22	16.5	16.45	0.13	Right	Cheek	1	13056	1	98.6	0.811	0.735	1.012	1.014	0.754	
2437	6	802.11b	DSSS	22	16.5	16.46	0.08	Right	Tilt	1	13056	1	98.6	0.796	0.650	1.009	1.014	0.665	
2437	6	802.11b	DSSS	22	16.5	16.46	-0.21	Left	Cheek	1	13056	1	98.6	0.293	-	1.009	1.014	-	
2437	6	802.11b	DSSS	22	16.5	16.46	0.08	Left	Tilt	1	13056	1	98.6	0.255	-	1.009	1.014	-	
2437	6	802.11b	DSSS	22	16.5	16.49	0.13	Right	Cheek	2	13056	1	98.8	1.110	1.070	1.002	1.012	**1.085**	A10
2462	11	802.11b	DSSS	22	16.5	15.99	0.12	Right	Cheek	2	13056	1	98.8	1.054	0.954	1.125	1.012	**1.086**	
2437	6	802.11b	DSSS	22	16.5	16.49	0.06	Right	Tilt	2	13056	1	98.8	0.826	0.591	1.002	1.012	0.599	
2437	6	802.11b	DSSS	22	16.5	16.49	-0.16	Left	Cheek	2	13056	1	98.8	0.687	-	1.002	1.012	-	
2437	6	802.11b	DSSS	22	16.5	16.49	-0.18	Left	Tilt	2	13056	1	98.8	0.409	-	1.002	1.012	-	
2437	6	802.11b	DSSS	22	16.5	16.49	0.07	Right	Cheek	2	13056	1	98.8	1.146	0.993	1.002	1.012	1.007	
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 11-11
MIMO DTS Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Ant1 Conducted Power [dBm]	Ant2 Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														W/kg	(W/kg)			(W/kg)	
2412	1	802.11n	OFDM	20	13.5	13.11	12.42	0.18	Right	Cheek	MIMO	1 2EC2	13	97.8	0.604	0.530	1.282	1.022	0.694	
2412	1	802.11n	OFDM	20	13.5	13.11	12.42	0.15	Right	Tilt	MIMO	1 2EC2	13	97.8	0.506	0.404	1.282	1.022	0.529	
2412	1	802.11n	OFDM	20	13.5	13.11	12.42	-0.12	Left	Cheek	MIMO	1 2EC2	13	97.8	0.256	-	1.282	1.022	-	
2412	1	802.11n	OFDM	20	13.5	13.11	12.42	-0.09	Left	Tilt	MIMO	1 2EC2	13	97.8	0.197	-	1.282	1.022	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram											

To achieve the 16.5 dBm maximum allowed MIMO power shown in the documentation, each antenna transmits at a maximum allowed power of 13.5 dBm.

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 11-12
NII Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Antenna Config.	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	14.5	14.49	0.16	Right	Cheek	1	12EC2	6	98.9	0.762	-	1.002	1.011	-	
5280	56	802.11a	OFDM	20	14.5	14.49	0.16	Right	Tilt	1	12EC2	6	98.9	0.764	0.334	1.002	1.011	0.338	
5280	56	802.11a	OFDM	20	14.5	14.49	0.18	Left	Cheek	1	12EC2	6	98.9	0.614	-	1.002	1.011	-	
5280	56	802.11a	OFDM	20	14.5	14.49	0.15	Left	Tilt	1	12EC2	6	98.9	0.429	-	1.002	1.011	-	
5280	56	802.11a	OFDM	20	14.5	14.24	0.19	Right	Cheek	2	12EC2	6	98.3	0.229	-	1.062	1.017	-	
5280	56	802.11a	OFDM	20	14.5	14.24	0.19	Right	Tilt	2	12EC2	6	98.3	0.232	0.094	1.062	1.017	0.102	
5280	56	802.11a	OFDM	20	14.5	14.24	-0.06	Left	Cheek	2	12EC2	6	98.3	0.143	-	1.062	1.017	-	
5280	56	802.11a	OFDM	20	14.5	14.24	0.20	Left	Tilt	2	12EC2	6	98.3	0.135	-	1.062	1.017	-	
5720	144	802.11a	OFDM	20	14.5	14.04	0.18	Right	Cheek	1	12EC2	6	98.9	1.035	-	1.112	1.011	-	
5720	144	802.11a	OFDM	20	14.5	14.04	-0.05	Right	Tilt	1	12EC2	6	98.9	1.201	0.442	1.112	1.011	**0.497**	
5720	144	802.11a	OFDM	20	14.5	14.04	0.00	Left	Cheek	1	12EC2	6	98.9	1.345	0.389	1.112	1.011	0.437	
5720	144	802.11a	OFDM	20	14.5	14.04	0.19	Left	Tilt	1	12EC2	6	98.9	0.433	-	1.112	1.011	-	
5600	120	802.11a	OFDM	20	14.5	14.37	0.20	Right	Cheek	2	12EC2	6	98.3	0.515	0.127	1.030	1.017	0.133	
5600	120	802.11a	OFDM	20	14.5	14.37	0.16	Right	Tilt	2	12EC2	6	98.3	0.256	-	1.030	1.017	-	
5600	120	802.11a	OFDM	20	14.5	14.37	0.09	Left	Cheek	2	12EC2	6	98.3	0.204	-	1.030	1.017	-	
5600	120	802.11a	OFDM	20	14.5	14.37	0.17	Left	Tilt	2	12EC2	6	98.3	0.153	-	1.030	1.017	-	
5825	165	802.11a	OFDM	20	14.5	14.49	0.19	Right	Cheek	1	12EC2	6	98.9	1.282	0.466	1.002	1.011	0.472	
5825	165	802.11a	OFDM	20	14.5	14.49	0.10	Right	Tilt	1	12EC2	6	98.9	1.426	0.469	1.002	1.011	0.475	A11
5825	165	802.11a	OFDM	20	14.5	14.49	-0.04	Left	Cheek	1	12EC2	6	98.9	1.090	-	1.002	1.011	-	
5825	165	802.11a	OFDM	20	14.5	14.49	0.18	Left	Tilt	1	12EC2	6	98.9	0.828	-	1.002	1.011	-	
5825	165	802.11a	OFDM	20	14.5	14.03	0.12	Right	Cheek	2	12EC2	6	98.3	0.376	0.123	1.114	1.017	0.139	
5825	165	802.11a	OFDM	20	14.5	14.03	0.17	Right	Tilt	2	12EC2	6	98.3	0.261	-	1.114	1.017	-	
5825	165	802.11a	OFDM	20	14.5	14.03	0.21	Left	Cheek	2	12EC2	6	98.3	0.223	-	1.114	1.017	-	
5825	165	802.11a	OFDM	20	14.5	14.03	0.19	Left	Tilt	2	12EC2	6	98.3	0.123	-	1.114	1.017	-	

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

Table 11-13
Bluetooth Head SAR

MEASUREMENT RESULTS																	
FREQUENCY			Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Data Rate [Mbps]	Side	Test Position	Device Serial Number	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)			(W/kg)	
2441	39	Mid	Bluetooth	FHSS	14.5	14.37	0.15	1	Right	Cheek	12EC2	77.8	0.438	1.030	1.285	**0.580**	A12
2441	39	Mid	Bluetooth	FHSS	14.5	14.37	0.18	1	Right	Tilt	12EC2	77.8	0.322	1.030	1.285	0.426	
2441	39	Mid	Bluetooth	FHSS	14.5	14.37	0.18	1	Left	Cheek	12EC2	77.8	0.239	1.030	1.285	0.316	
2441	39	Mid	Bluetooth	FHSS	14.5	14.37	0.21	1	Left	Tilt	12EC2	77.8	0.157	1.030	1.285	0.208	

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

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

11.2 Standalone Body-Worn SAR Data

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

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.0	32.00	-0.01	15 mm	12E2E	1	1:8.3	back	0.243	1.259	0.306	A13
1880.00	661	GSM 1900	GSM	30.0	29.51	-0.01	15 mm	12E2E	1	1:8.3	back	0.253	1.119	0.283	A15
836.60	4183	UMTS 850	RMC	24.2	23.57	-0.04	15 mm	12E5F	N/A	1:1	back	0.290	1.156	0.335	A17
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-15
LTE Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Antenna State	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	23.5	22.64	0.00	0	15	12E5F	QPSK	1	25	15 mm	back	1:1	0.172	1.219	0.210	A19
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	-0.03	1	15	12E5F	QPSK	25	0	15 mm	back	1:1	0.137	1.205	0.165	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	-0.03	0	70	12E5F	QPSK	1	0	15 mm	back	1:1	0.166	1.208	0.201	A21
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.04	1	70	12E5F	QPSK	25	0	15 mm	back	1:1	0.126	1.274	0.161	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	0.00	0	68	12E5F	QPSK	1	0	15 mm	back	1:1	0.228	1.227	0.280	A23
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.01	1	68	12E5F	QPSK	25	0	15 mm	back	1:1	0.184	1.227	0.226	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	23.5	22.68	-0.06	0	N/A	12ECB	QPSK	1	0	15 mm	back	1:1	0.490	1.208	**0.592**	A25
1732.50	20175	Mid	LTE Band 4 (AWS)	20	22.5	21.50	-0.07	1	N/A	12ECB	QPSK	50	0	15 mm	back	1:1	0.386	1.259	0.486	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	-0.11	0	N/A	12ECB	QPSK	1	0	15 mm	back	1:1	0.338	1.086	0.367	A27
2510.00	20850	Low	LTE Band 7	20	22.5	22.10	0.02	1	N/A	12ECB	QPSK	50	0	15 mm	back	1:1	0.259	1.096	0.284	
2680.00	41490	High	LTE Band 41	20	23.5	22.78	-0.03	0	N/A	12E5F	QPSK	1	0	15 mm	back	1:1.58	0.358	1.180	0.422	A29
2680.00	41490	High	LTE Band 41	20	22.5	21.68	0.01	1	N/A	12E5F	QPSK	50	0	15 mm	back	1:1.58	0.275	1.208	0.332	
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 11-16
DTS Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	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)	
2412	1	802.11b	DSSS	22	19.5	18.85	0.18	15 mm	1	13056	1	back	98.6	0.084	0.069	1.161	1.014	0.081	
2412	1	802.11b	DSSS	22	19.5	19.39	-0.12	15 mm	2	13056	1	back	98.8	0.113	0.089	1.026	1.012	**0.092**	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											

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 11-17
NII Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	16.5	16.26	0.17	15 mm	1	12EC2	6	back	98.9	0.264	0.113	1.057	1.011	0.121	
5300	60	802.11a	OFDM	20	16.5	16.20	-0.03	15 mm	2	12EC2	6	back	98.3	0.233	0.089	1.072	1.017	0.097	
5500	100	802.11a	OFDM	20	16.5	16.45	0.10	15 mm	1	12EC2	6	back	98.9	0.442	0.205	1.012	1.011	**0.210**	A33
5600	120	802.11a	OFDM	20	16.5	16.30	0.12	15 mm	2	12EC2	6	back	98.3	0.287	0.105	1.047	1.017	0.112	
5825	165	802.11a	OFDM	20	16.5	16.47	0.11	15 mm	1	12EC2	6	back	98.9	0.388	0.158	1.007	1.011	0.161	
5785	157	802.11a	OFDM	20	16.5	16.45	0.16	15 mm	2	12EC2	6	back	98.3	0.267	0.098	1.012	1.017	0.101	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram											

Table 11-18
Bluetooth 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	14.5	14.37	0.00	15 mm	13056	1	back	77.8	0.020	1.030	1.285	**0.026**	A35
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

11.3 Standalone Hotspot SAR Data

Table 11-19
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS														
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	33.0	32.07	-0.06	10 mm	12E2E	1	1:8.3	back	0.468	1.239	0.580	A14
836.60	190	GSM 850	GPRS	33.0	32.07	-0.02	10 mm	12E2E	1	1:8.3	front	0.359	1.239	0.445	
836.60	190	GSM 850	GPRS	33.0	32.07	0.14	10 mm	12E2E	1	1:8.3	bottom	0.269	1.239	0.333	
836.60	190	GSM 850	GPRS	33.0	32.07	0.09	10 mm	12E2E	1	1:8.3	right	0.231	1.239	0.286	
836.60	190	GSM 850	GPRS	33.0	32.07	-0.02	10 mm	12E2E	1	1:8.3	left	0.063	1.239	0.078	
1880.00	661	GSM 1900	GPRS	23.0	22.27	-0.06	10 mm	12E9A	3	1:2.76	back	0.272	1.183	0.322	
1880.00	661	GSM 1900	GPRS	23.0	22.27	-0.05	10 mm	12E9A	3	1:2.76	front	0.259	1.183	0.306	
1880.00	661	GSM 1900	GPRS	23.0	22.27	0.01	10 mm	12E9A	3	1:2.76	bottom	0.492	1.183	0.582	A16
1880.00	661	GSM 1900	GPRS	23.0	22.27	-0.08	10 mm	12E9A	3	1:2.76	right	0.069	1.183	0.082	
1880.00	661	GSM 1900	GPRS	23.0	22.27	-0.01	10 mm	12E9A	3	1:2.76	left	0.043	1.183	0.051	
836.60	4183	UMTS 850	RMC	24.2	23.57	0.02	10 mm	12E5F	N/A	1:1	back	0.595	1.156	**0.688**	A18
836.60	4183	UMTS 850	RMC	24.2	23.57	-0.05	10 mm	12E5F	N/A	1:1	front	0.461	1.156	0.533	
836.60	4183	UMTS 850	RMC	24.2	23.57	-0.04	10 mm	12E5F	N/A	1:1	bottom	0.369	1.156	0.427	
836.60	4183	UMTS 850	RMC	24.2	23.57	-0.01	10 mm	12E5F	N/A	1:1	right	0.313	1.156	0.362	
836.60	4183	UMTS 850	RMC	24.2	23.57	0.00	10 mm	12E5F	N/A	1:1	left	0.062	1.156	0.072	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram								

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 11-20
LTE Band 12 Hotspot SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Antenna State	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	-0.06	0	15	12E5F	QPSK	1	25	10 mm	back	1:1	0.334	1.219	0.407	A20
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	-0.02	1	15	12E5F	QPSK	25	0	10 mm	back	1:1	0.256	1.205	0.308	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	0.05	0	15	12E5F	QPSK	1	25	10 mm	front	1:1	0.249	1.219	0.304	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.01	1	15	12E5F	QPSK	25	0	10 mm	front	1:1	0.205	1.205	0.247	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	-0.08	0	15	12E5F	QPSK	1	25	10 mm	bottom	1:1	0.182	1.219	0.222	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.17	1	15	12E5F	QPSK	25	0	10 mm	bottom	1:1	0.139	1.205	0.167	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	0.01	0	15	12E5F	QPSK	1	25	10 mm	right	1:1	0.222	1.219	0.271	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	0.01	1	15	12E5F	QPSK	25	0	10 mm	right	1:1	0.188	1.205	0.227	
707.50	23095	Mid	LTE Band 12	10	23.5	22.64	-0.21	0	15	12E5F	QPSK	1	25	10 mm	left	1:1	0.089	1.219	0.108	
707.50	23095	Mid	LTE Band 12	10	22.5	21.69	-0.02	1	15	12E5F	QPSK	25	0	10 mm	left	1:1	0.071	1.205	0.086	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-21
LTE Band 13 Hotspot SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Antenna State	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	-0.06	0	70	12E5F	QPSK	1	0	10 mm	back	1:1	0.368	1.208	0.445	A22
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.03	1	70	12E5F	QPSK	25	0	10 mm	back	1:1	0.284	1.274	0.362	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	0.02	0	70	12E5F	QPSK	1	0	10 mm	front	1:1	0.226	1.208	0.273	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.02	1	70	12E5F	QPSK	25	0	10 mm	front	1:1	0.173	1.274	0.220	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	0.01	0	70	12E5F	QPSK	1	0	10 mm	bottom	1:1	0.142	1.208	0.172	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.07	1	70	12E5F	QPSK	25	0	10 mm	bottom	1:1	0.110	1.274	0.140	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	-0.09	0	70	12E5F	QPSK	1	0	10 mm	right	1:1	0.131	1.208	0.158	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	-0.02	1	70	12E5F	QPSK	25	0	10 mm	right	1:1	0.092	1.274	0.117	
782.00	23230	Mid	LTE Band 13	10	23.5	22.68	0.07	0	70	12E5F	QPSK	1	0	10 mm	left	1:1	0.033	1.208	0.040	
782.00	23230	Mid	LTE Band 13	10	22.5	21.45	0.07	1	70	12E5F	QPSK	25	0	10 mm	left	1:1	0.028	1.274	0.036	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-22
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																					
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Antenna State	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	0.00	0	68	12E5F	QPSK	1	0	10 mm	back	1:1	0.462	1.227	0.567	A24
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.05	1	68	12E5F	QPSK	25	0	10 mm	back	1:1	0.373	1.227	0.458	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	-0.01	0	68	12E5F	QPSK	1	0	10 mm	front	1:1	0.351	1.227	0.431	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.05	1	68	12E5F	QPSK	25	0	10 mm	front	1:1	0.276	1.227	0.339	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	-0.05	0	68	12E5F	QPSK	1	0	10 mm	bottom	1:1	0.247	1.227	0.303	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.03	1	68	12E5F	QPSK	25	0	10 mm	bottom	1:1	0.200	1.227	0.245	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	-0.04	0	68	12E5F	QPSK	1	0	10 mm	right	1:1	0.226	1.227	0.277	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.10	1	68	12E5F	QPSK	25	0	10 mm	right	1:1	0.176	1.227	0.216	
836.50	20525	Mid	LTE Band 5 (Cell)	10	23.5	22.61	-0.01	0	68	12E5F	QPSK	1	0	10 mm	left	1:1	0.065	1.227	0.080	
836.50	20525	Mid	LTE Band 5 (Cell)	10	22.5	21.61	0.06	1	68	12E5F	QPSK	25	0	10 mm	left	1:1	0.056	1.227	0.069	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 11-23
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
1732.50	20175	Mid	LTE Band 4 (AWS)	20	20.5	19.97	-0.11	0	12E48	QPSK	1	0	10 mm	back	1:1	0.438	1.130	0.495	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	19.5	18.88	0.00	1	12E48	QPSK	50	0	10 mm	back	1:1	0.342	1.153	0.394	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	20.5	19.97	-0.02	0	12E48	QPSK	1	0	10 mm	front	1:1	0.375	1.130	0.424	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	19.5	18.88	0.07	1	12E48	QPSK	50	0	10 mm	front	1:1	0.293	1.153	0.338	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	20.5	19.97	-0.01	0	12E48	QPSK	1	0	10 mm	bottom	1:1	0.529	1.130	0.598	A26
1732.50	20175	Mid	LTE Band 4 (AWS)	20	19.5	18.88	-0.01	1	12E48	QPSK	50	0	10 mm	bottom	1:1	0.420	1.153	0.484	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	20.5	19.97	-0.02	0	12E48	QPSK	1	0	10 mm	right	1:1	0.076	1.130	0.086	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	19.5	18.88	-0.03	1	12E48	QPSK	50	0	10 mm	right	1:1	0.058	1.153	0.067	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	20.5	19.97	-0.07	0	12E48	QPSK	1	0	10 mm	left	1:1	0.095	1.130	0.107	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	19.5	18.88	-0.04	1	12E48	QPSK	50	0	10 mm	left	1:1	0.075	1.153	0.086	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-24
LTE Band 7 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
2535.00	21100	Mid	LTE Band 7	20	20.5	20.13	-0.01	0	12E9A	QPSK	1	0	10 mm	back	1:1	0.345	1.089	0.376	
2535.00	21100	Mid	LTE Band 7	20	19.5	19.14	-0.03	1	12E9A	QPSK	50	0	10 mm	back	1:1	0.270	1.086	0.293	
2535.00	21100	Mid	LTE Band 7	20	20.5	20.13	0.02	0	12E9A	QPSK	1	0	10 mm	front	1:1	0.283	1.089	0.308	
2535.00	21100	Mid	LTE Band 7	20	19.5	19.14	0.04	1	12E9A	QPSK	50	0	10 mm	front	1:1	0.221	1.086	0.240	
2535.00	21100	Mid	LTE Band 7	20	20.5	20.13	-0.05	0	12E9A	QPSK	1	0	10 mm	bottom	1:1	0.597	1.089	0.650	A28
2535.00	21100	Mid	LTE Band 7	20	19.5	19.14	-0.04	1	12E9A	QPSK	50	0	10 mm	bottom	1:1	0.460	1.086	0.500	
2535.00	21100	Mid	LTE Band 7	20	20.5	20.13	-0.03	0	12E9A	QPSK	1	0	10 mm	left	1:1	0.171	1.089	0.186	
2535.00	21100	Mid	LTE Band 7	20	19.5	19.14	-0.03	1	12E9A	QPSK	50	0	10 mm	left	1:1	0.135	1.086	0.147	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Table 11-25
LTE Band 41 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																			
2680.00	41490	High	LTE Band 41	20	22.5	21.53	0.04	0	12E9A	QPSK	1	0	10 mm	back	1:1.58	0.397	1.250	0.496	
2680.00	41490	High	LTE Band 41	20	21.5	20.48	0.03	1	12E9A	QPSK	50	0	10 mm	back	1:1.58	0.307	1.265	0.388	
2680.00	41490	High	LTE Band 41	20	22.5	21.53	0.05	0	12E9A	QPSK	1	0	10 mm	front	1:1.58	0.333	1.250	0.416	
2680.00	41490	High	LTE Band 41	20	21.5	20.48	0.03	1	12E9A	QPSK	50	0	10 mm	front	1:1.58	0.256	1.265	0.324	
2506.00	39750	Low	LTE Band 41	20	22.5	21.52	-0.01	0	12E9A	QPSK	1	0	10 mm	bottom	1:1.58	0.520	1.253	0.652	
2549.50	40185	Low-Mid	LTE Band 41	20	22.5	21.33	-0.03	0	12E9A	QPSK	1	0	10 mm	bottom	1:1.58	0.505	1.309	0.661	
2593.00	40620	Mid	LTE Band 41	20	22.5	21.03	0.00	0	12E9A	QPSK	1	0	10 mm	bottom	1:1.58	0.469	1.403	0.658	
2636.50	41055	Mid-High	LTE Band 41	20	22.5	21.26	-0.05	0	12E9A	QPSK	1	0	10 mm	bottom	1:1.58	0.479	1.330	0.637	
2680.00	41490	High	LTE Band 41	20	22.5	21.53	-0.04	0	12E9A	QPSK	1	0	10 mm	bottom	1:1.58	0.543	1.250	0.679	A30
2680.00	41490	High	LTE Band 41	20	21.5	20.48	-0.02	1	12E9A	QPSK	50	0	10 mm	bottom	1:1.58	0.418	1.265	0.529	
2506.00	39750	Low	LTE Band 41	20	21.5	20.39	0.00	1	12E9A	QPSK	100	0	10 mm	bottom	1:1.58	0.429	1.291	0.554	
2680.00	41490	High	LTE Band 41	20	22.5	21.53	-0.08	0	12E9A	QPSK	1	0	10 mm	left	1:1.58	0.148	1.250	0.185	
2680.00	41490	High	LTE Band 41	20	21.5	20.48	0.02	1	12E9A	QPSK	50	0	10 mm	left	1:1.58	0.110	1.265	0.139	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 11-26
WLAN Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	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)	
2412	1	802.11b	DSSS	22	19.5	18.85	-0.20	10 mm	1	13056	1	back	98.6	0.172	-	1.161	1.014	-	
2412	1	802.11b	DSSS	22	19.5	18.85	0.10	10 mm	1	13056	1	front	98.6	0.121	-	1.161	1.014	-	
2412	1	802.11b	DSSS	22	19.5	18.85	-0.04	10 mm	1	13056	1	top	98.6	0.229	0.193	1.161	1.014	0.227	
2412	1	802.11b	DSSS	22	19.5	18.85	0.00	10 mm	1	13056	1	left	98.6	0.105	-	1.161	1.014	-	
2412	1	802.11b	DSSS	22	19.5	19.39	0.12	10 mm	2	13056	1	back	98.8	0.257	-	1.026	1.012	-	
2412	1	802.11b	DSSS	22	19.5	19.39	-0.12	10 mm	2	13056	1	front	98.8	0.286	0.228	1.026	1.012	**0.237**	A32
2412	1	802.11b	DSSS	22	19.5	19.39	0.08	10 mm	2	13056	1	top	98.8	0.101	-	1.026	1.012	-	
2412	1	802.11b	DSSS	22	19.5	19.39	-0.18	10 mm	2	13056	1	left	98.8	0.116	-	1.026	1.012	-	
5825	165	802.11a	OFDM	20	16.5	16.47	0.10	10 mm	1	12EC2	6	back	98.9	0.549	0.253	1.007	1.011	**0.258**	A34
5825	165	802.11a	OFDM	20	16.5	16.47	0.16	10 mm	1	12EC2	6	front	98.9	0.233	-	1.007	1.011	-	
5825	165	802.11a	OFDM	20	16.5	16.47	0.16	10 mm	1	12EC2	6	top	98.9	0.307	-	1.007	1.011	-	
5825	165	802.11a	OFDM	20	16.5	16.47	0.00	10 mm	1	12EC2	6	left	98.9	0.018	-	1.007	1.011	-	
5785	157	802.11a	OFDM	20	16.5	16.45	0.07	10 mm	2	12EC2	6	back	98.3	0.423	0.176	1.012	1.017	0.181	
5785	157	802.11a	OFDM	20	16.5	16.45	0.00	10 mm	2	12EC2	6	front	98.3	0.098	-	1.012	1.017	-	
5785	157	802.11a	OFDM	20	16.5	16.45	0.10	10 mm	2	12EC2	6	top	98.3	0.154	-	1.012	1.017	-	
5785	157	802.11a	OFDM	20	16.5	16.45	0.00	10 mm	2	12EC2	6	left	98.3	0.046	-	1.012	1.017	-	

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
Bluetooth 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	14.5	14.37	-0.05	10 mm	13056	1	back	77.8	0.052	1.030	1.285	0.069	
2441	39	Bluetooth	FHSS	14.5	14.37	-0.04	10 mm	13056	1	front	77.8	0.068	1.030	1.285	**0.090**	A36
2441	39	Bluetooth	FHSS	14.5	14.37	0.16	10 mm	13056	1	top	77.8	0.020	1.030	1.285	0.026	
2441	39	Bluetooth	FHSS	14.5	14.37	0.19	10 mm	13056	1	left	77.8	0.031	1.030	1.285	0.041	

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

11.4 Standalone Phablet SAR Data

Table 11-28
GPRS Phablet SAR Data

MEASUREMENT RESULTS															
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1850.20	512	GSM 1900	GPRS	26.5	25.63	-0.01	0 mm	12ECB	3	1:2.76	bottom	2.200	1.222	2.688	
1880.00	661	GSM 1900	GPRS	26.5	25.57	0.01	0 mm	12ECB	3	1:2.76	bottom	2.490	1.239	3.085	
1909.80	810	GSM 1900	GPRS	26.5	25.45	-0.04	0 mm	12ECB	3	1:2.76	bottom	2.580	1.274	**3.287**	A37
1909.80	810	GSM 1900	GPRS	26.5	25.45	-0.04	0 mm	12ECB	3	1:2.76	bottom	2.560	1.274	3.261	

ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**	**Phablet** **4.0 W/kg (mW/g)** averaged over 10 grams

Note: Blue entry represents variability measurement.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 11-29
LTE Band 7 Phablet SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.															(W/kg)		(W/kg)	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	-0.21	0	12ECB	QPSK	1	0	0 mm	bottom	1:1	2.730	1.086	2.965	
2535.00	21100	Mid	LTE Band 7	20	23.5	23.07	-0.14	0	12ECB	QPSK	1	0	0 mm	bottom	1:1	2.650	1.104	2.926	
2560.00	21350	High	LTE Band 7	20	23.5	23.02	-0.19	0	12ECB	QPSK	1	0	0 mm	bottom	1:1	2.580	1.117	2.882	
2510.00	20850	Low	LTE Band 7	20	22.5	22.10	-0.16	1	12ECB	QPSK	50	0	0 mm	bottom	1:1	2.170	1.096	2.378	
2535.00	21100	Mid	LTE Band 7	20	22.5	22.08	-0.17	1	12ECB	QPSK	50	0	0 mm	bottom	1:1	2.110	1.102	2.325	
2560.00	21350	High	LTE Band 7	20	22.5	21.96	-0.20	1	12ECB	QPSK	50	0	0 mm	bottom	1:1	2.030	1.132	2.298	
2510.00	20850	Low	LTE Band 7	20	22.5	22.07	-0.16	1	12ECB	QPSK	100	0	0 mm	bottom	1:1	2.010	1.104	2.219	
2510.00	20850	Low	LTE Band 7	20	23.5	23.14	-0.01	0	12ECB	QPSK	1	0	0 mm	bottom	1:1	2.850	1.086	3.095	A38
2535.00	21100	Mid	LTE Band 7	20	23.5	23.07	0.03	0	12ECB	QPSK	1	0	0 mm	bottom	1:1	2.770	1.104	3.058	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Phablet 4.0 W/kg (mW/g) averaged over 10 grams						

Note: Blue entries represent variability measurement.

Table 11-30
WLAN Phablet SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	Peak SAR of Area Scan	SAR (10g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.													W/kg	(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	16.5	16.26	-0.19	0 mm	1	12EC2	6	back	98.9	7.911	0.642	1.057	1.011	0.686	
5260	52	802.11a	OFDM	20	16.5	16.26	0.00	0 mm	1	12EC2	6	front	98.9	3.978	-	1.057	1.011	-	
5260	52	802.11a	OFDM	20	16.5	16.26	0.11	0 mm	1	12EC2	6	top	98.9	6.761	-	1.057	1.011	-	
5260	52	802.11a	OFDM	20	16.5	16.26	0.13	0 mm	1	12EC2	6	left	98.9	0.425	-	1.057	1.011	-	
5300	60	802.11a	OFDM	20	16.5	16.20	0.00	0 mm	2	12EC2	6	back	98.3	5.975	0.582	1.072	1.017	0.635	
5300	60	802.11a	OFDM	20	16.5	16.20	0.00	0 mm	2	12EC2	6	front	98.3	1.466	-	1.072	1.017	-	
5300	60	802.11a	OFDM	20	16.5	16.20	0.18	0 mm	2	12EC2	6	top	98.3	1.640	-	1.072	1.017	-	
5300	60	802.11a	OFDM	20	16.5	16.20	0.00	0 mm	2	12EC2	6	left	98.3	0.302	-	1.072	1.017	-	
5500	100	802.11a	OFDM	20	16.5	16.45	0.09	0 mm	1	12EC2	6	back	98.9	7.250	0.985	1.012	1.011	**1.008**	A39
5500	100	802.11a	OFDM	20	16.5	16.45	-0.05	0 mm	1	12EC2	6	front	98.9	4.314	-	1.012	1.011	-	
5500	100	802.11a	OFDM	20	16.5	16.45	-0.18	0 mm	1	12EC2	6	top	98.9	6.333	0.666	1.012	1.011	0.681	
5500	100	802.11a	OFDM	20	16.5	16.45	0.00	0 mm	1	12EC2	6	left	98.9	0.558	-	1.012	1.011	-	
5600	120	802.11a	OFDM	20	16.5	16.30	0.00	0 mm	2	12EC2	6	back	98.3	9.948	0.754	1.047	1.017	0.803	
5600	120	802.11a	OFDM	20	16.5	16.30	0.00	0 mm	2	12EC2	6	front	98.3	2.798	-	1.047	1.017	-	
5600	120	802.11a	OFDM	20	16.5	16.30	0.14	0 mm	2	12EC2	6	top	98.3	1.085	-	1.047	1.017	-	
5600	120	802.11a	OFDM	20	16.5	16.30	0.00	0 mm	2	12EC2	6	left	98.3	0.498	-	1.047	1.017	-	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Phablet 4.0 W/kg (mW/g) averaged over 10 grams					

11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg for 1g SAR and 2.0 W/kg for 10g SAR. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router scaled to the maximum output power (including tolerance) 1g SAR > 1.2 W/kg.
11. This device supports dynamic antenna tuning for some bands. Per FCC Guidance, SAR was measured according to the normally required SAR measurement configurations with tuner active. The auto-tune state determined by the device was verified before and after each SAR measurement and is listed in tables above. Please see Section 14 for supplemental data.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
2. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.
3. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel was used.
4. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

UMTS Notes:

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

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.5.4.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported (scaled) for LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI 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 8.6.5 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. See Section 8.6.6 for more information.
4. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06. Please see Section 12 for complete analysis. Per KDB Publication 248227 D01v02r02, MIMO SAR was measured with both antennas transmitting simultaneously at the specified maximum output power in MIMO mode following the initial test configuration procedures.
5. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
6. When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.
7. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

Bluetooth Notes:

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests test mode type. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. See Section 9.5 for the time-domain plot and calculation for the duty factor of the device.
2. Head and hotspot Bluetooth SAR was evaluated for BT BR tethering applications.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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 1-g 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 1-g or 10-g SAR.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

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 Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	1+2	1+3
Head SAR	GSM 850	0.174	0.888	1.086	1.062	1.260
	GSM 1900	0.045	0.888	1.086	0.933	1.131
	UMTS 850	0.184	0.888	1.086	1.072	**1.270**
	LTE Band 12	0.119	0.888	1.086	1.007	1.205
	LTE Band 13	0.076	0.888	1.086	0.964	1.162
	LTE Band 5 (Cell)	0.155	0.888	1.086	1.043	1.241
	LTE Band 4 (AWS)	0.098	0.888	1.086	0.986	1.184
	LTE Band 7	0.106	0.888	1.086	0.994	1.192
	LTE Band 41	0.103	0.888	1.086	0.991	1.189

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM 850	0.174	0.694	0.868
	GSM 1900	0.045	0.694	0.739
	UMTS 850	0.184	0.694	**0.878**
	LTE Band 12	0.119	0.694	0.813
	LTE Band 13	0.076	0.694	0.770
	LTE Band 5 (Cell)	0.155	0.694	0.849
	LTE Band 4 (AWS)	0.098	0.694	0.792
	LTE Band 7	0.106	0.694	0.800
	LTE Band 41	0.103	0.694	0.797

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 Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	GSM 850	0.174	0.497	0.139	0.671	0.313	0.810
	GSM 1900	0.045	0.497	0.139	0.542	0.184	0.681
	UMTS 850	0.184	0.497	0.139	0.681	0.323	**0.820**
	LTE Band 12	0.119	0.497	0.139	0.616	0.258	0.755
	LTE Band 13	0.076	0.497	0.139	0.573	0.215	0.712
	LTE Band 5 (Cell)	0.155	0.497	0.139	0.652	0.294	0.791
	LTE Band 4 (AWS)	0.098	0.497	0.139	0.595	0.237	0.734
	LTE Band 7	0.106	0.497	0.139	0.603	0.245	0.742
	LTE Band 41	0.103	0.497	0.139	0.600	0.242	0.739

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 12-3
Simultaneous Transmission Scenario with 2.4 GHz MIMO and 5 GHz MIMO (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	GSM 850	0.174	0.694	0.497	0.139	1.504
	GSM 1900	0.045	0.694	0.497	0.139	1.375
	UMTS 850	0.184	0.694	0.497	0.139	**1.514**
	LTE Band 12	0.119	0.694	0.497	0.139	1.449
	LTE Band 13	0.076	0.694	0.497	0.139	1.406
	LTE Band 5 (Cell)	0.155	0.694	0.497	0.139	1.485
	LTE Band 4 (AWS)	0.098	0.694	0.497	0.139	1.428
	LTE Band 7	0.106	0.000	0.497	0.139	0.742
	LTE Band 41	0.103	0.694	0.497	0.139	1.433

Table 12-4
Simultaneous Transmission Scenario with Bluetooth (Held to Ear)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	GSM 850	0.174	0.580	0.754
	GSM 1900	0.045	0.580	0.625
	UMTS 850	0.184	0.580	**0.764**
	LTE Band 12	0.119	0.580	0.699
	LTE Band 13	0.076	0.580	0.656
	LTE Band 5 (Cell)	0.155	0.580	0.735
	LTE Band 4 (AWS)	0.098	0.580	0.678
	LTE Band 7	0.106	0.580	0.686
	LTE Band 41	0.103	0.580	0.683

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

12.4 Body-Worn Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.306	0.081	0.092	0.387	0.398	0.479
	GSM 1900	0.283	0.081	0.092	0.364	0.375	0.456
	UMTS 850	0.335	0.081	0.092	0.416	0.427	0.508
	LTE Band 12	0.210	0.081	0.092	0.291	0.302	0.383
	LTE Band 13	0.201	0.081	0.092	0.282	0.293	0.374
	LTE Band 5 (Cell)	0.280	0.081	0.092	0.361	0.372	0.453
	LTE Band 4 (AWS)	0.592	0.081	0.092	0.673	0.684	**0.765**
	LTE Band 7	0.367	0.081	0.092	0.448	0.459	0.540
	LTE Band 41	0.422	0.081	0.092	0.503	0.514	0.595

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn	GSM 850	0.306	0.210	0.112	0.516	0.418	0.628
	GSM 1900	0.283	0.210	0.112	0.493	0.395	0.605
	UMTS 850	0.335	0.210	0.112	0.545	0.447	0.657
	LTE Band 12	0.210	0.210	0.112	0.420	0.322	0.532
	LTE Band 13	0.201	0.210	0.112	0.411	0.313	0.523
	LTE Band 5 (Cell)	0.280	0.210	0.112	0.490	0.392	0.602
	LTE Band 4 (AWS)	0.592	0.210	0.112	0.802	0.704	**0.914**
	LTE Band 7	0.367	0.210	0.112	0.577	0.479	0.689
	LTE Band 41	0.422	0.210	0.112	0.632	0.534	0.744

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 12-7
Simultaneous Transmission Scenario with 2.4 GHz MIMO and 5 GHz MIMO (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body-Worn	GSM 850	0.306	0.081	0.092	0.210	0.112	0.801
	GSM 1900	0.283	0.081	0.092	0.210	0.112	0.778
	UMTS 850	0.335	0.081	0.092	0.210	0.112	0.830
	LTE Band 12	0.210	0.081	0.092	0.210	0.112	0.705
	LTE Band 13	0.201	0.081	0.092	0.210	0.112	0.696
	LTE Band 5 (Cell)	0.280	0.081	0.092	0.210	0.112	0.775
	LTE Band 4 (AWS)	0.592	0.081	0.092	0.210	0.112	**1.087**
	LTE Band 7	0.367	0.081	0.092	0.210	0.112	0.862
	LTE Band 41	0.422	0.081	0.092	0.210	0.112	0.917

Table 12-8
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.5 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn	GSM 850	0.306	0.026	0.332
	GSM 1900	0.283	0.026	0.309
	UMTS 850	0.335	0.026	0.361
	LTE Band 12	0.210	0.026	0.236
	LTE Band 13	0.201	0.026	0.227
	LTE Band 5 (Cell)	0.280	0.026	0.306
	LTE Band 4 (AWS)	0.592	0.026	**0.618**
	LTE Band 7	0.367	0.026	0.393
	LTE Band 41	0.422	0.026	0.448

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

12.5 Hotspot SAR Simultaneous Transmission Analysis

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	GPRS 850	0.580	0.227	0.237	0.807	0.817	1.044
	GPRS 1900	0.582	0.227	0.237	0.809	0.819	1.046
	UMTS 850	0.688	0.227	0.237	0.915	0.925	**1.152**
	LTE Band 12	0.407	0.227	0.237	0.634	0.644	0.871
	LTE Band 13	0.445	0.227	0.237	0.672	0.682	0.909
	LTE Band 5 (Cell)	0.567	0.227	0.237	0.794	0.804	1.031
	LTE Band 4 (AWS)	0.598	0.227	0.237	0.825	0.835	1.062
	LTE Band 7	0.650	0.227	0.237	0.877	0.887	1.114
	LTE Band 41	0.679	0.227	0.237	0.906	0.916	1.143

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

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	GPRS 850	0.580	0.258	0.181	0.838	0.761	1.019
	GPRS 1900	0.582	0.258	0.181	0.840	0.763	1.021
	UMTS 850	0.688	0.258	0.181	0.946	0.869	**1.127**
	LTE Band 12	0.407	0.258	0.181	0.665	0.588	0.846
	LTE Band 13	0.445	0.258	0.181	0.703	0.626	0.884
	LTE Band 5 (Cell)	0.567	0.258	0.181	0.825	0.748	1.006
	LTE Band 4 (AWS)	0.598	0.258	0.181	0.856	0.779	1.037
	LTE Band 7	0.650	0.258	0.181	0.908	0.831	1.089
	LTE Band 41	0.679	0.258	0.181	0.937	0.860	1.118

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 12-11
Simultaneous Transmission Scenario (2.4 GHz MIMO and 5 GHz MIMO Hotspot at 1.0 cm)

Exposure Condition	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Hotspot SAR	GPRS 850	0.580	0.227	0.237	0.258	0.181	1.483
	GPRS 1900	0.582	0.227	0.237	0.258	0.181	1.485
	UMTS 850	0.688	0.227	0.237	0.258	0.181	**1.591**
	LTE Band 12	0.407	0.227	0.237	0.258	0.181	1.310
	LTE Band 13	0.445	0.227	0.237	0.258	0.181	1.348
	LTE Band 5 (Cell)	0.567	0.227	0.237	0.258	0.181	1.470
	LTE Band 4 (AWS)	0.598	0.227	0.237	0.258	0.181	1.501
	LTE Band 7	0.650	0.227	0.237	0.258	0.181	1.553
	LTE Band 41	0.679	0.227	0.237	0.258	0.181	1.582

Table 12-12
Simultaneous Transmission Scenario (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	0.580	0.090	0.670
	GPRS 1900	0.582	0.090	0.672
	UMTS 850	0.688	0.090	**0.778**
	LTE Band 12	0.407	0.090	0.497
	LTE Band 13	0.445	0.090	0.535
	LTE Band 5 (Cell)	0.567	0.090	0.657
	LTE Band 4 (AWS)	0.598	0.090	0.688
	LTE Band 7	0.650	0.090	0.740
	LTE Band 41	0.679	0.090	0.769

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

12.6 Phablet Simultaneous Transmission Analysis

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

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

Per FCC KDB Publication 648474 D04 Handset SAR v01r01, only bottom edges for LTE Band 7 and GPRS1900 were required for phablet testing. Therefore other edges are not required to be evaluated for SAR ("-") to determine simultaneous transmission analysis.

Table 12-13
Simultaneous Transmission Scenario with 5 GHz (Phablet)

Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Phablet SAR	Back	-	1.008	0.803	1.008	0.803	1.811
	Front	-	1.008*	0.803*	1.008	0.803	1.811
	Top	-	0.681	0.803*	0.681	0.803	1.484
	Bottom	3.287	-	-	**3.287**	**3.287**	**3.287**
	Right	-	-	-	0.000	0.000	0.000
	Left	-	1.008*	0.803*	1.008	0.803	1.811

Simult Tx	Configuration	LTE Band 7 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Phablet SAR	Back	-	1.008	0.803	1.008	0.803	1.811
	Front	-	1.008*	0.803*	1.008	0.803	1.811
	Top	-	0.681	0.803*	0.681	0.803	1.484
	Bottom	3.095	-	-	**3.095**	**3.095**	**3.095**
	Right	-	-	-	0.000	0.000	0.000
	Left	-	1.008*	0.803*	1.008	0.803	1.811

12.7 Simultaneous Transmission Conclusion

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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 preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg
5) When 10-g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Table 13-1
Head SAR Measurement Variability Results

HEAD VARIABILITY RESULTS														
Band	FREQUENCY		Mode/Band	Service	Side	Test Position	Data Rate (Mbps)	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
2450	2437.00	6	802.11b, 22 MHz Bandwidth	DSSS , ANT 2	Right	Cheek	1	1.070	0.993	1.08	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
Phablet SAR Measurement Variability Results

PHABLET VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Spacing	Measured SAR (10g)	1st Repeated SAR (10g)	Ratio	2nd Repeated SAR (10g)	Ratio	3rd Repeated SAR (10g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1900	1909.80	810	GSM 1900	GPRS	3	bottom	0 mm	2.580	2.560	1.01	N/A	N/A	N/A	N/A
2450	2510.00	20850	LTE Band 7, 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	N/A	bottom	0 mm	2.730	2.850	1.04	N/A	N/A	N/A	N/A
2600	2535.00	21100	LTE Band 7, 20 MHz Bandwidth	QPSK, 1 RB, 0 RB Offset	N/A	bottom	0 mm	2.650	2.770	1.05	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Phablet 4.0 W/kg (mW/g) averaged over 10 grams						

13.2 Measurement Uncertainty

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

14 ADDITIONAL TESTING PER FCC GUIDANCE

14.1 Tuner Testing

The following test procedures were followed to demonstrate that the SAR results in Section 11 represented the appropriate SAR test conditions. For bands with dynamic tuning implemented, SAR was measured according to the required FCC SAR test procedures with the dynamic tuner active to allow the device to automatically tune to the antenna state for the respective RF exposure test configurations. Additional single point SAR time-sweep measurements were evaluated for other tuner states to determine that the other tuner configurations would result in equivalent or lower SAR values. The additional tuner hardware has no influence to the antenna characteristics, other than impedance matching.

To evaluate all of the tuner states, the 80 tuner states were divided evenly among band, mode and exposure combinations so that at least one single point SAR measurement was measured among the configurations. Single point time-sweep measurements were performed at the peak SAR location determined by the zoom scan of the configuration with the highest reported SAR for each combination. The tuner state was able to be established remotely so that the device was not moved for the entire series of single point SAR for the tuner states in each combination. The SAR probe remained stationary at the same position throughout the entire series of single point measurements for each combination.

The operational description contains more information about the design and implementation of the dynamic antenna tuning.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

Table 14-1
Supplemental Head SAR Data

Supplemental Head SAR Data					
LTE Band 12		LTE Band 13		LTE Band 5	
QPSK, 10 MHz Bandwidth, 1 RB, 25 RB Offset		QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offset		QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offset	
Test Position	Right Cheek	Test Position	Right Cheek	Test Position	Right Cheek
Frequency (MHz)	707.5	Frequency (MHz)	782.0	Frequency (MHz)	836.5
Channel	23095	Channel	23230	Channel	20525
Measured 1g SAR (W/kg)	0.098	Measured 1g SAR (W/kg)	0.063	Measured 1g SAR (W/kg)	0.126
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 15)	0.103	Auto-tune (State 70)	0.072	Auto-tune (State 68)	0.162
Default (State 15)	0.102	Default (State 15)	0.051	Default (State 15)	0.161
State 2	0.032	State 1	0.002	State 3	0.059
State 5	0.062	State 4	0.008	State 9	0.133
State 10	0.095	State 11	0.040	State 12	0.144
State 15	0.102	State 15	0.051	State 14	0.162
State 19	0.005	State 16	0.001	State 15	0.161
State 22	0.015	State 18	0.000	State 17	0.005
State 26	0.030	State 24	0.001	State 29	0.073
State 30	0.038	State 32	0.005	State 35	0.030
State 34	0.016	State 37	0.002	State 50	0.015
State 40	0.058	State 43	0.061	State 53	0.041
State 42	0.061	State 48	0.018	State 57	0.083
State 54	0.023	State 52	0.003	State 60	0.097
State 58	0.040	State 55	0.009	State 63	0.105
State 62	0.046	State 67	0.023	State 68	0.161
State 70	0.085	State 70	0.073	State 75	0.104
State 79	0.046	State 74	0.071	State 78	0.120

© 2017 PCTEST Engineering Laboratory, Inc.

REV 18.3 M
01/30/2017

© 2017 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@PCTESTLAB.COM.

Table 14-2
Supplemental Body SAR Data

Supplemental Body SAR Data					
LTE Band 12		LTE Band 13		LTE Band 5	
QPSK, 10 MHz Bandwidth, 1 RB, 25 RB Offset		QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offset		QPSK, 10 MHz Bandwidth, 1 RB, 0 RB Offset	
Test Position	Back Side	Test Position	Back Side	Test Position	Back Side
Spacing	10 mm	Spacing	10 mm	Spacing	10 mm
Frequency (MHz)	707.5	Frequency (MHz)	782.0	Frequency (MHz)	836.5
Channel	23095	Channel	23230	Channel	20525
Measured 1g SAR (W/kg)	0.334	Measured 1g SAR (W/kg)	0.368	Measured 1g SAR (W/kg)	0.462
Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)		Average Value of Time Sweep (W/kg)	
Auto-tune (State 15)	0.530	Auto-tune (State 70)	0.580	Auto-tune (State 68)	0.504
Default (State 15)	0.530	Default (State 15)	0.466	Default (State 15)	0.469
State 7	0.408	State 0	0.388	State 4	0.240
State 12	0.495	State 6	0.176	State 8	0.435
State 15	0.530	State 15	0.466	State 13	0.479
State 23	0.107	State 16	0.141	State 15	0.469
State 25	0.140	State 19	0.024	State 20	0.057
State 31	0.189	State 21	0.044	State 28	0.221
State 39	0.274	State 26	0.111	State 36	0.135
State 41	0.323	State 27	0.126	State 41	0.279
State 47	0.462	State 30	0.181	State 45	0.326
State 51	0.047	State 33	0.053	State 46	0.410
State 59	0.217	State 38	0.275	State 49	0.034
State 64	0.528	State 44	0.515	State 56	0.257
State 66	0.461	State 61	0.170	State 68	0.507
State 69	0.190	State 65	0.180	State 70	0.409
State 71	0.236	State 70	0.592	State 73	0.251
State 77	0.189	State 72	0.445	State 76	0.509

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/22/2017	Annual	3/22/2018	MY45470194
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	E5515C	8960 Series 10 Wireless Communications Test Set	10/5/2016	Annual	10/5/2017	GB42230325
Agilent	E4438C	ESG Vector Signal Generator	3/24/2017	Biennial	3/24/2019	MY42082385
Agilent	E4438C	ESG Vector Signal Generator	3/23/2017	Biennial	3/23/2019	MY42082659
Agilent	N9020A	MXA Signal Analyzer	10/28/2016	Annual	10/28/2017	US46470561
Agilent	N5182A	MXG Vector Signal Generator	10/27/2016	Annual	10/27/2017	MY47420603
Agilent	8753ES	S-Parameter Network Analyzer	10/26/2016	Annual	10/26/2017	US39170118
Agilent	E5515C	Wireless Communications Test Set	1/8/2015	Triennial	1/8/2018	GB43163447
Agilent	N4010A	Wireless Connectivity Test Set	CBT	N/A	CBT	GB44450273
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Anritsu	ML2495A	Power Meter	10/16/2015	Biennial	10/16/2017	941001
Anritsu	MA2411B	Pulse Power Sensor	8/18/2016	Annual	8/18/2017	1126066
Anritsu	MA2411B	Pulse Power Sensor	2/10/2017	Annual	2/10/2018	1207364
Anritsu	MT8820C	Radio Communication Analyzer	11/4/2016	Annual	11/4/2017	6201144418
Anritsu	MT8820C	Radio Communication Analyzer	9/13/2016	Annual	9/13/2017	6201144419
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231535
Anritsu	MA24106A	USB Power Sensor	6/7/2017	Annual	6/7/2018	1231538
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M15SA00-009
Control Company	4040	Therm./Clock/Humidity Monitor	3/31/2017	Biennial	3/31/2019	170232394
Control Company	4352	Ultra Long Stem Thermometer	3/8/2016	Biennial	3/8/2018	160261694
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mitutoyo	CD-6"CSX	Digital Caliper	3/2/2016	Biennial	3/2/2018	13264162
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	EHP-200AC	Electric & Magnetic Field Probe	4/18/2017	Annual	4/18/2018	170WX70211
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	3/8/2017	Annual	3/8/2018	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	12/12/2016	Annual	12/12/2017	833855/0010
Rohde & Schwarz	CMU200	Base Station Simulator	4/11/2017	Annual	4/11/2018	836371/0079
Rohde & Schwarz	CMW500	Radio Communication Tester	10/20/2016	Annual	10/20/2017	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	5/4/2017	Annual	5/4/2018	101699
Seekonk	NC-100	Torque Wrench	11/6/2015	Biennial	11/6/2017	22313
Seekonk	NC-100	Torque Wrench (8" lb)	9/1/2016	Biennial	9/1/2018	21053
SPEAG	D750V3	750 MHz SAR Dipole	3/7/2017	Annual	3/7/2018	1054
SPEAG	D750V3	750 MHz SAR Dipole	1/11/2017	Annual	1/11/2018	1003
SPEAG	D750V3	750 MHz SAR Dipole	5/11/2017	Annual	5/11/2018	1034
SPEAG	D835V2	835 MHz SAR Dipole	1/11/2017	Annual	1/11/2018	4d132
SPEAG	D835V2	850 MHz SAR Dipole	5/11/2017	Annual	5/11/2018	4d180
SPEAG	D1750V2	1750 MHz SAR Dipole	5/9/2017	Annual	5/9/2018	1092
SPEAG	D1900V2	1900 MHz SAR Dipole	5/10/2017	Annual	5/10/2018	5d026
SPEAG	D2450V2	2450 MHz SAR Dipole	9/13/2016	Annual	9/13/2017	797
SPEAG	D2450V2	2450 MHz SAR Dipole	5/9/2017	Annual	5/9/2018	945
SPEAG	D2600V2	2600 MHz SAR Dipole	4/13/2017	Annual	4/13/2018	1004
SPEAG	D2600V2	2600 MHz SAR Dipole	9/13/2016	Annual	9/13/2017	1071
SPEAG	D5GHzV2	5 GHz SAR Dipole	3/9/2017	Annual	3/9/2018	1123
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/2/2016	Annual	8/2/2017	1237
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/9/2017	Annual	2/9/2018	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2017	Annual	3/8/2018	1368
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/11/2017	Annual	4/11/2018	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/14/2016	Annual	9/14/2017	1408
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/13/2017	Annual	3/13/2018	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/16/2017	Annual	1/16/2018	1466
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/10/2017	Annual	5/10/2018	1070
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3209
SPEAG	ES3DV3	SAR Probe	2/10/2017	Annual	2/10/2018	3213
SPEAG	ES3DV3	SAR Probe	9/19/2016	Annual	9/19/2017	3287
SPEAG	ES3DV3	SAR Probe	2/10/2017	Annual	2/10/2018	3318
SPEAG	ES3DV3	SAR Probe	3/14/2017	Annual	3/14/2018	3319
SPEAG	EX3DV4	SAR Probe	1/13/2017	Annual	1/13/2018	3589
SPEAG	EX3DV4	SAR Probe	2/13/2017	Annual	2/13/2018	3914
SPEAG	EX3DV4	SAR Probe	4/18/2017	Annual	4/18/2018	7406

Note:

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

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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	

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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]

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.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, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.

[21] 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.

© 2017 PCTEST Engineering Laboratory, Inc.

© 2017 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@PCTESTLAB.COM.

APPENDIX A: SAR TEST DATA

© 2017 PCTEST Engineering Laboratory, Inc.

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

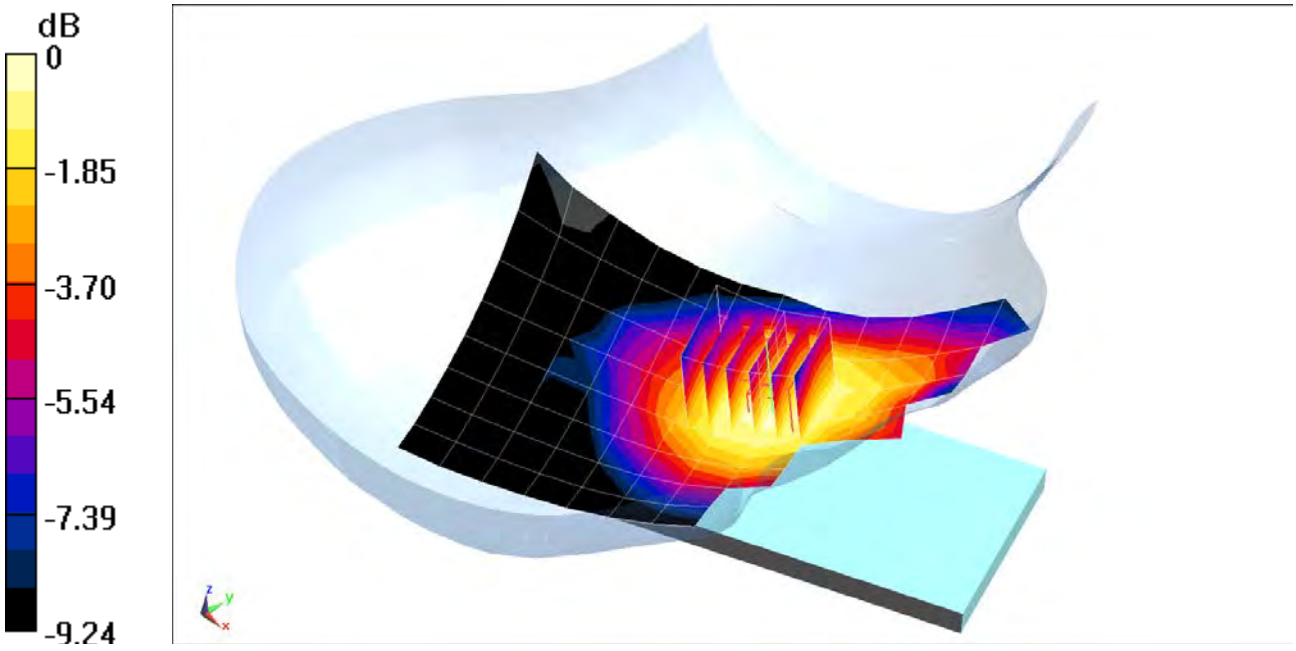
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.904 S/m; ε_r = 40.762; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-31-2017; Ambient Temp: 21.8°C; Tissue Temp: 20.5°C

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

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.43 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.174 W/kg
SAR(1 g) = 0.138 W/kg



0 dB = 0.161 W/kg = -7.93 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12ECB

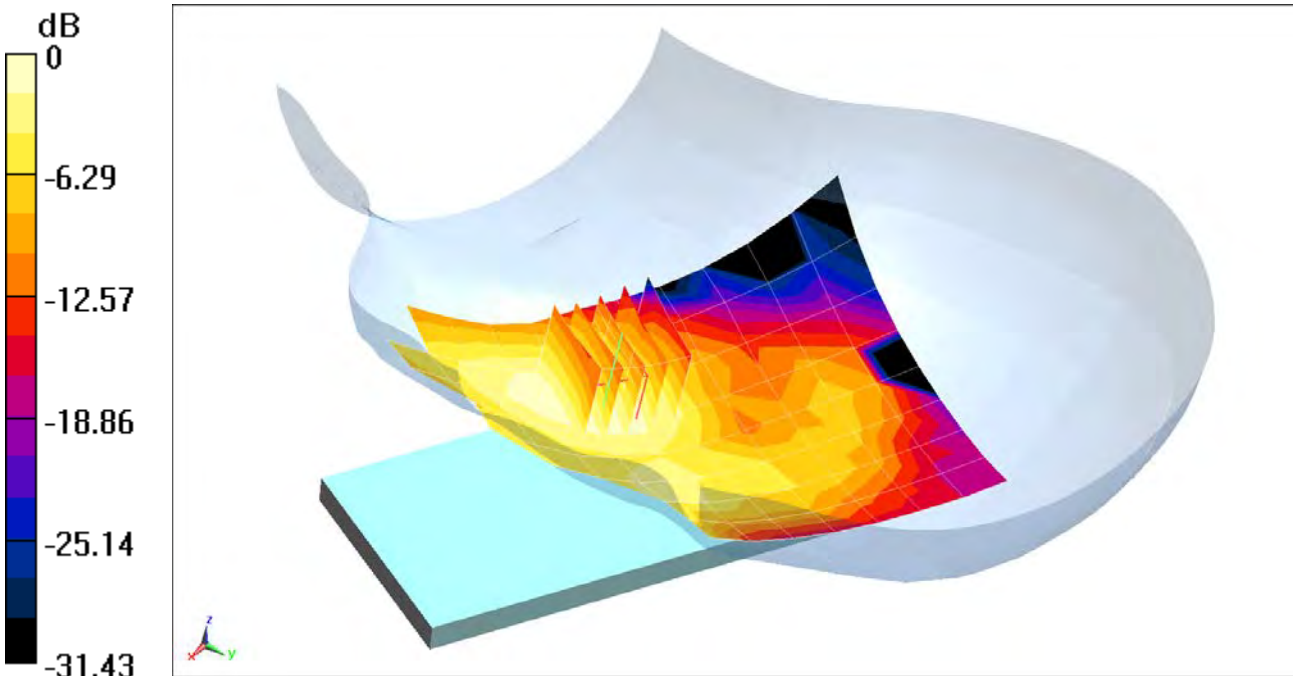
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Head Medium parameters used:
f = 1880 MHz; σ = 1.419 S/m; ε_r = 39.319; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-02-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.1°C

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

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.577 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.0610 W/kg
SAR(1 g) = 0.040 W/kg



0 dB = 0.0468 W/kg = -13.30 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

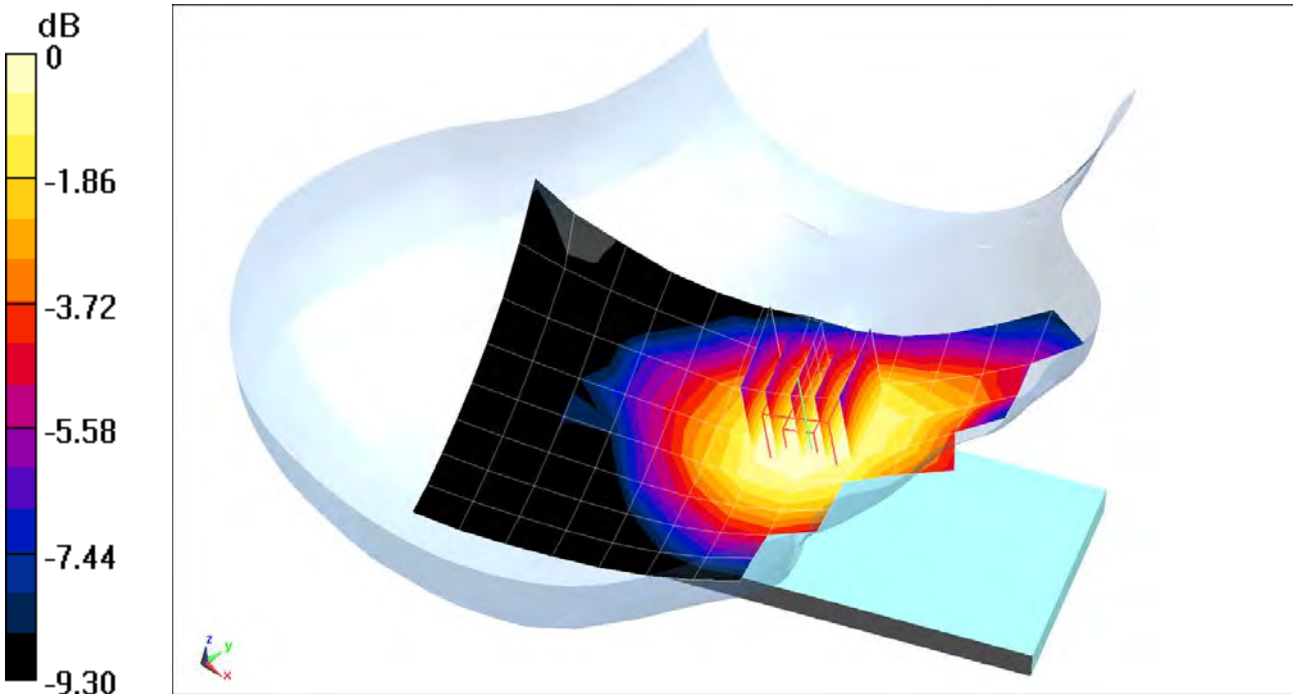
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.904 S/m; ε_r = 40.762; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-31-2017; Ambient Temp: 21.8°C; Tissue Temp: 20.5°C

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

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.49 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.200 W/kg
SAR(1 g) = 0.159 W/kg



0 dB = 0.185 W/kg = -7.33 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

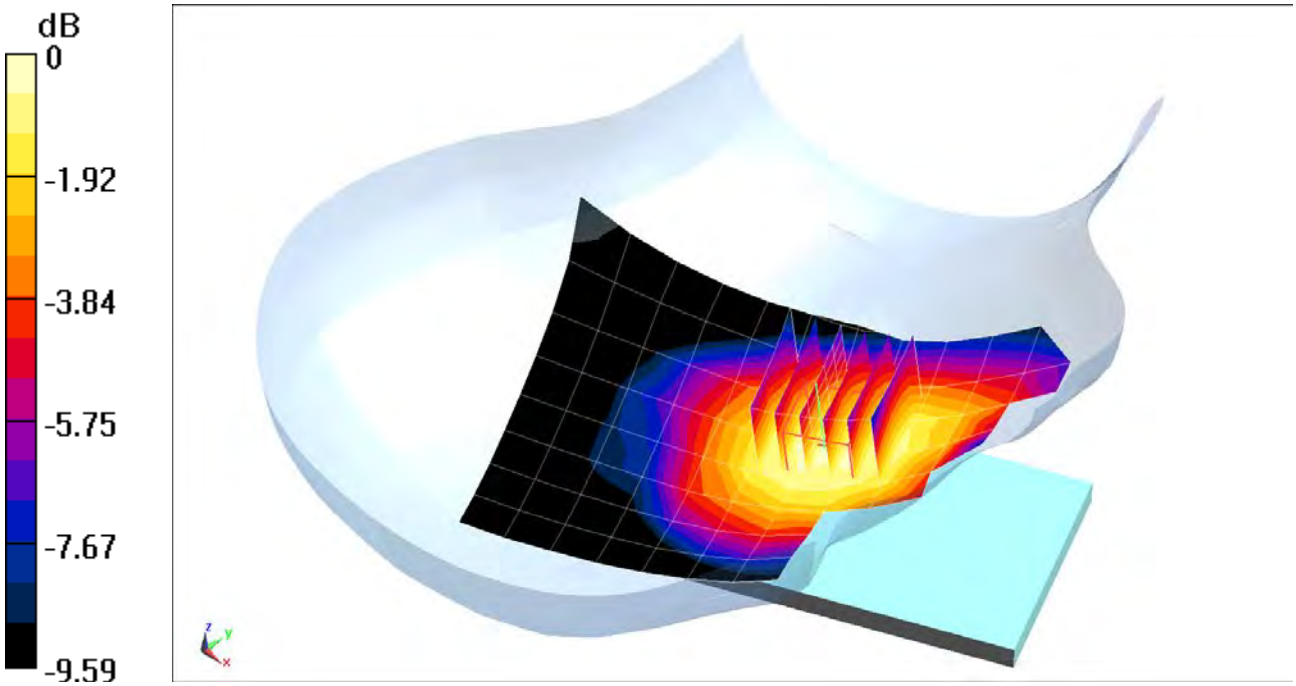
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.882 S/m; ε_r = 44.067; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-24-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.76, 6.76, 6.76); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.10 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.121 W/kg
SAR(1 g) = 0.098 W/kg



0 dB = 0.107 W/kg = -9.71 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

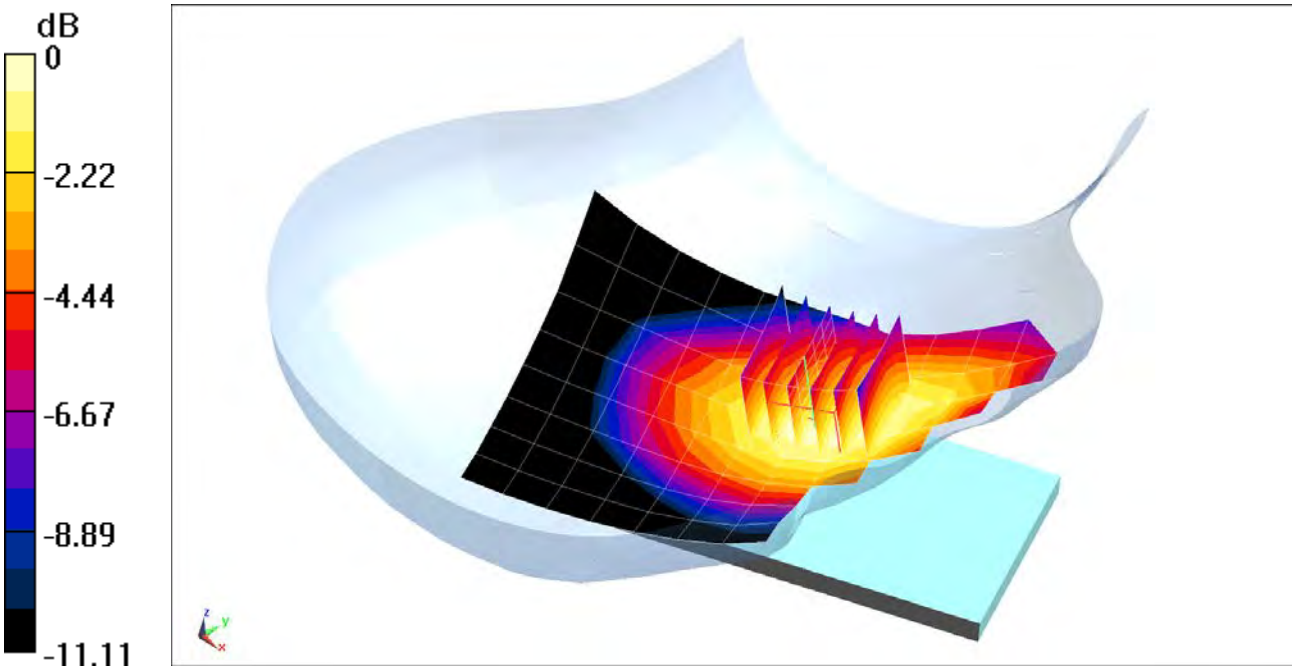
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 782 MHz; σ = 0.931 S/m; ε_r = 41.554; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 08-07-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.0°C

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

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.909 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.0800 W/kg
SAR(1 g) = 0.063 W/kg



0 dB = 0.0683 W/kg = -11.66 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

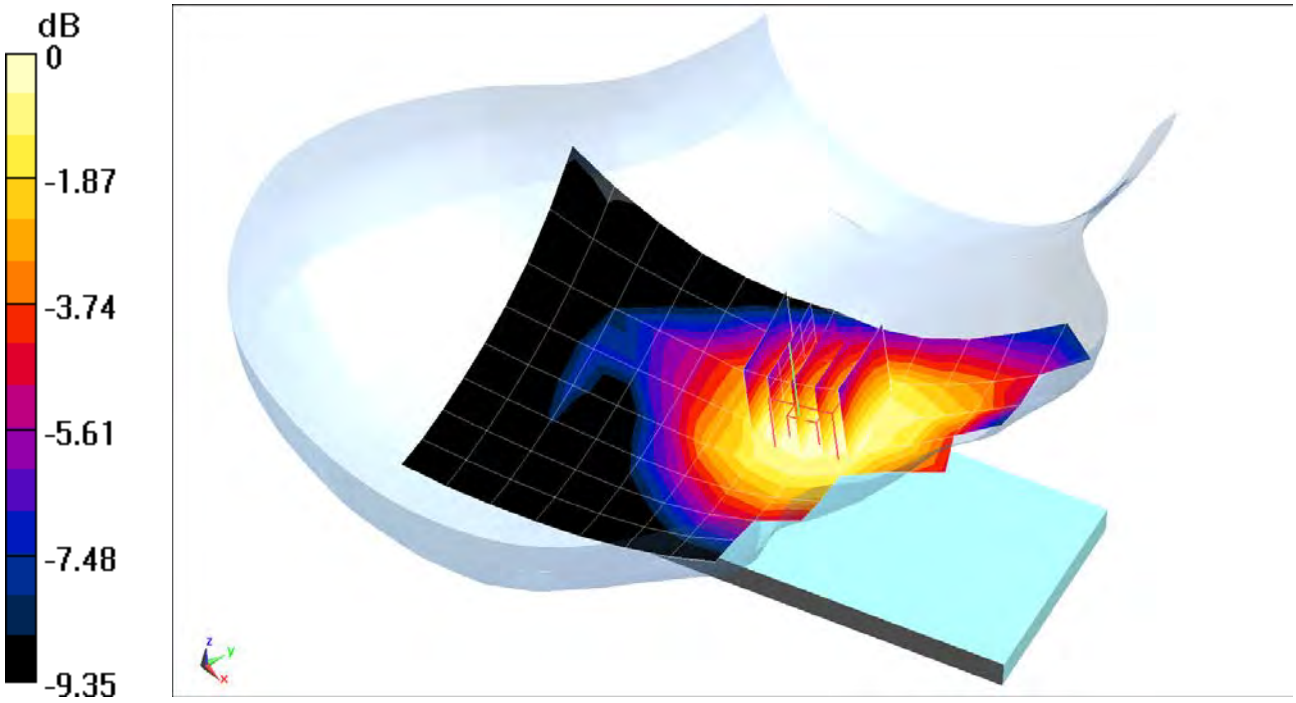
Communication System: UID 0, LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used (interpolated):
f = 836.5 MHz; σ = 0.904 S/m; ε_r = 40.764; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-31-2017; Ambient Temp: 21.8°C; Tissue Temp: 20.5°C

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

Mode: LTE Band 5 (Cell.), Right Head, Cheek, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.38 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.162 W/kg
SAR(1 g) = 0.126 W/kg



0 dB = 0.148 W/kg = -8.30 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

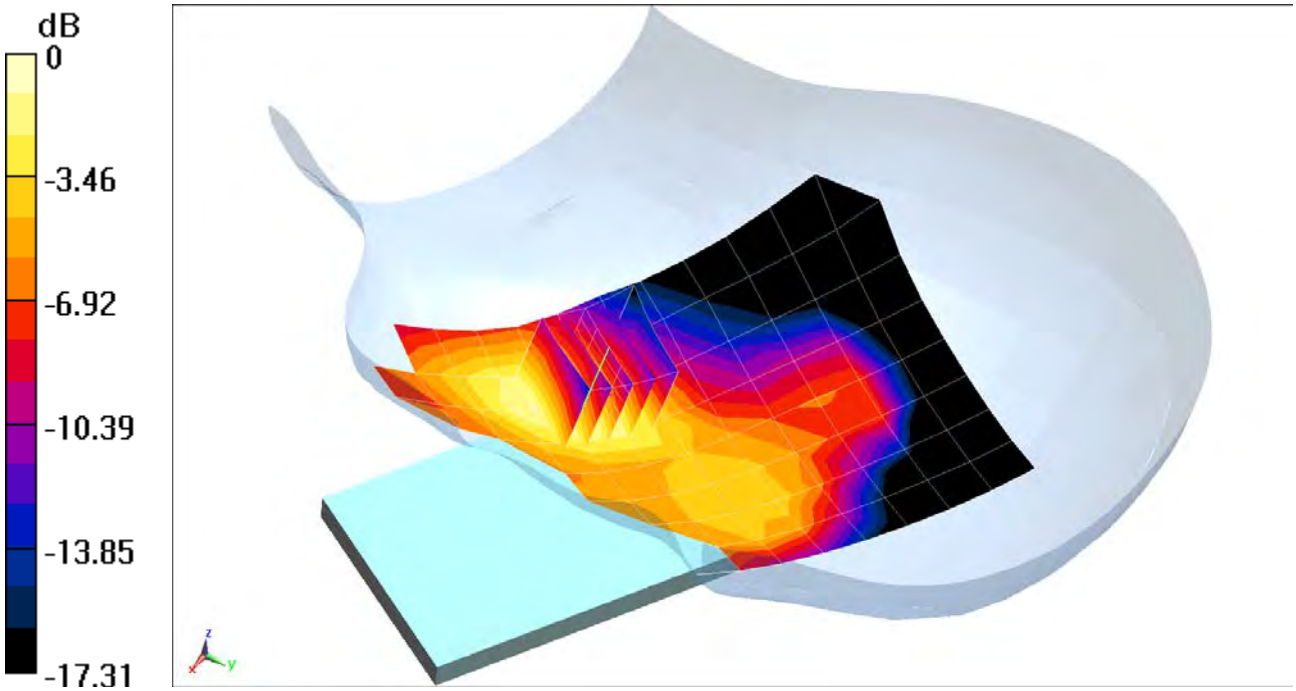
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.39 S/m; ε_r = 39.735; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 07-26-2017; Ambient Temp: 22.3°C; Tissue Temp: 20.0°C

Probe: ES3DV3 - SN3318; ConvF(5.49, 5.49, 5.49); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 4 (AWS), Left Head, Cheek, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.545 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.12 W/kg
SAR(1 g) = 0.081 W/kg



0 dB = 0.0942 W/kg = -10.26 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

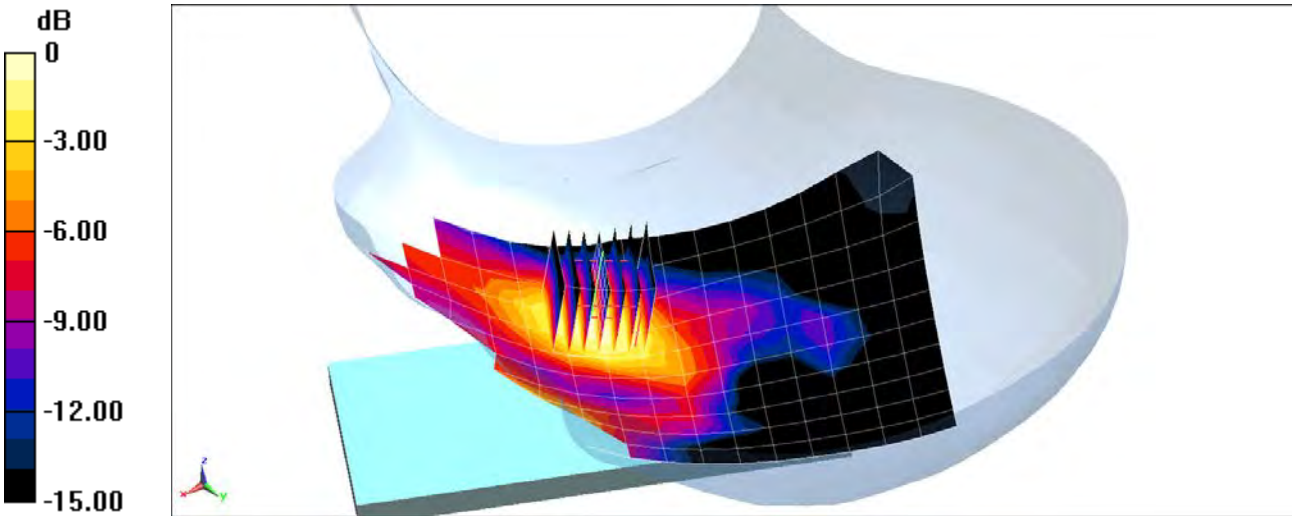
Communication System: UID 0, LTE Band 7; Frequency: 2510 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2510 MHz; σ = 1.864 S/m; ε_r = 38.947; ρ = 1000 kg/m^3
Phantom section: Left Section

Test Date: 08-16-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7406; ConvF(7.68, 7.68, 7.68); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 7, Left Head, Cheek, Low.ch, QPSK,
20 MHz Bandwidth, 1 RB, 0 RB Offset

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.072 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 0.182 W/kg
SAR(1 g) = 0.098 W/kg



0 dB = 0.146 W/kg = -8.35 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12ECB

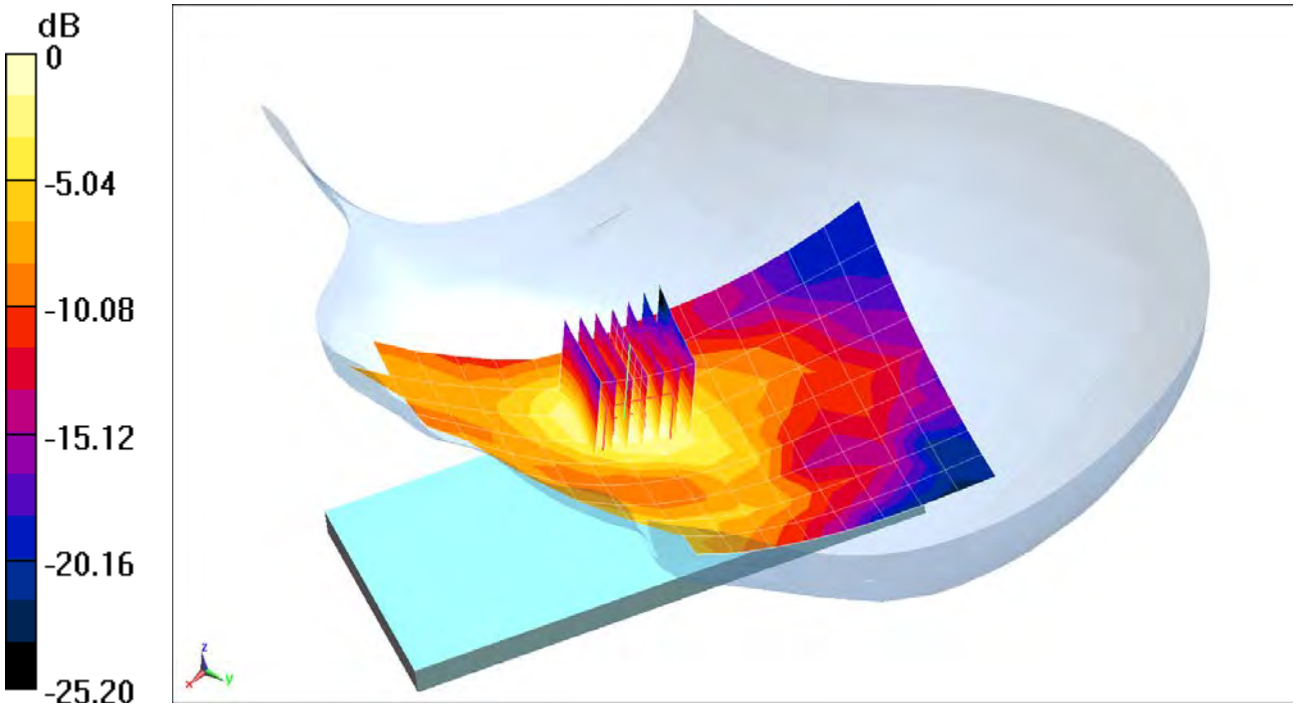
Communication System: UID 0, _LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Head Medium parameters used (interpolated):
$f = 2680$ MHz; $\sigma = 2.133$ S/m; $\varepsilon_r = 37.653$; $\rho = 1000$ kg/m^3
Phantom section: Left Section

Test Date: 07-19-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.4°C

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

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

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.388 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.159 W/kg
SAR(1 g) = 0.087 W/kg



0 dB = 0.107 W/kg = -9.71 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 13056

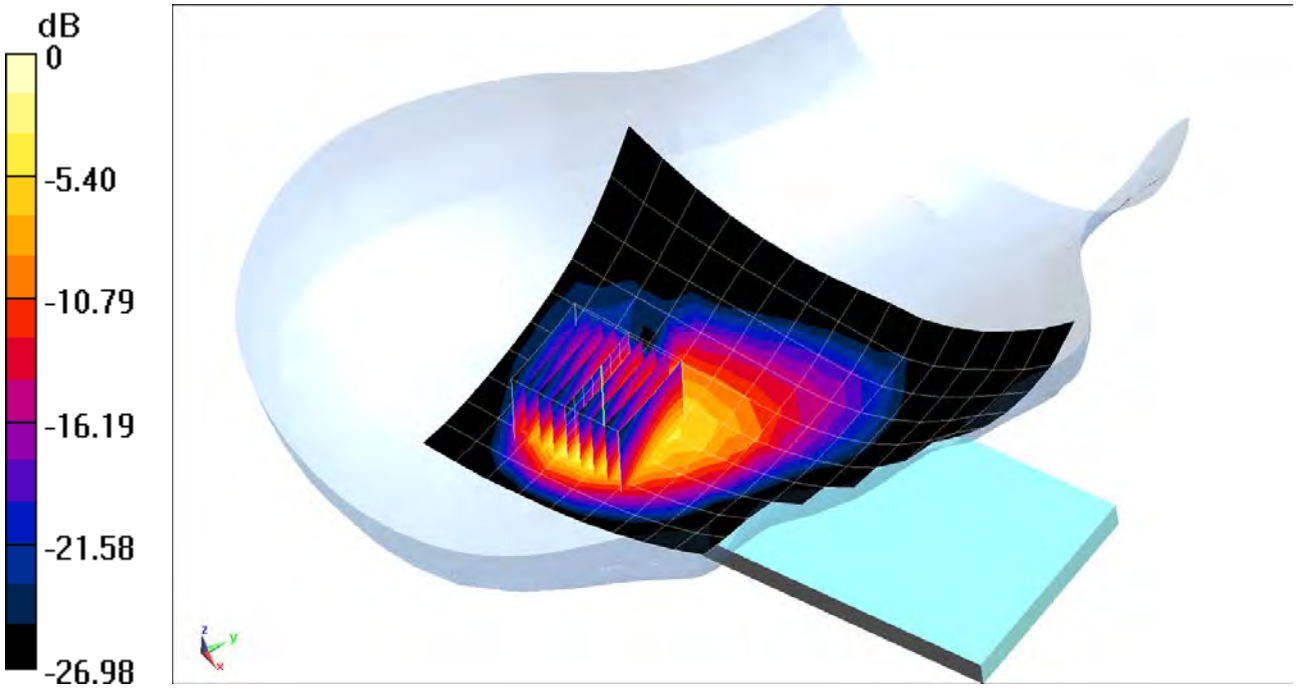
Communication System: UID 0, 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used (interpolated):
f = 2437 MHz; σ = 1.863 S/m; ε_r = 38.488; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-26-2017; Ambient Temp: 21.7°C; Tissue Temp: 21.7°C

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

Mode: IEEE 802.11b, 22 MHz Bandwidth,
Antenna 2, Right Head, Cheek, Ch 6, 1 Mbps

Area Scan (11x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (8x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.73 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 2.26 W/kg
SAR(1 g) = 1.07 W/kg



0 dB = 1.43 W/kg = 1.55 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12EC2

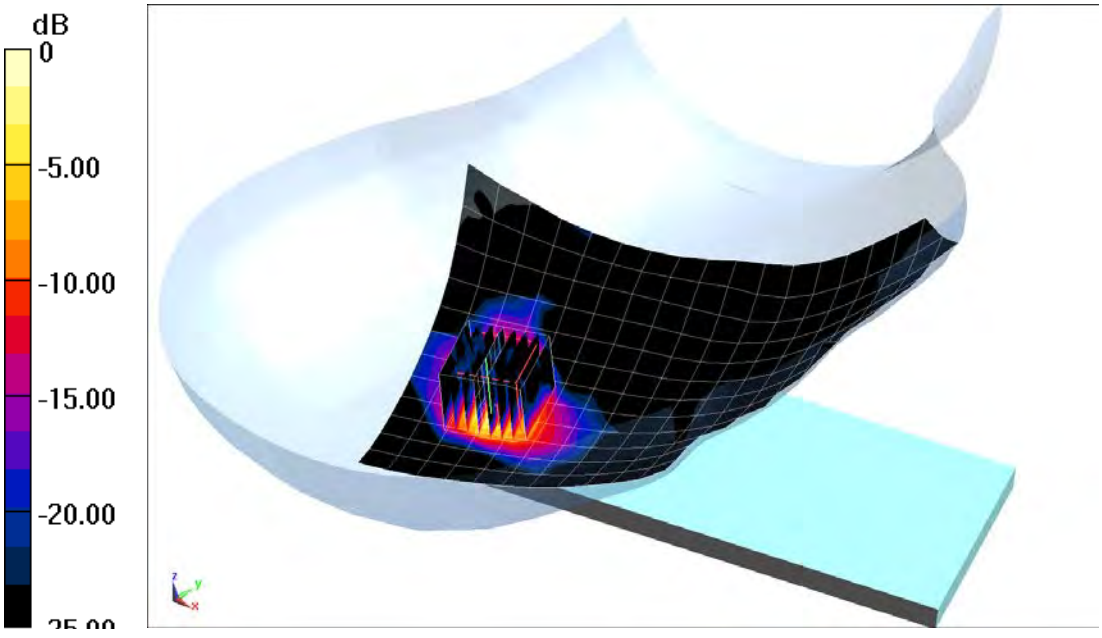
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5825 MHz; σ = 5.144 S/m; ε_r = 35.095; ρ = 1000 kg/m^3
Phantom section: Right Section

Test Date: 07-31-2017; Ambient Temp: 21.1°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN3914; ConvF(4.91, 4.91, 4.91); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11a, U-NII-3, Antenna 1, 20 MHz Bandwidth, Right Head, Tilt, Ch 165, 6 Mbps

Area Scan (13x22x1): 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 = 9.936 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 2.97 W/kg
SAR(1 g) = 0.469 W/kg



0 dB = 1.46 W/kg = 1.64 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12EC2

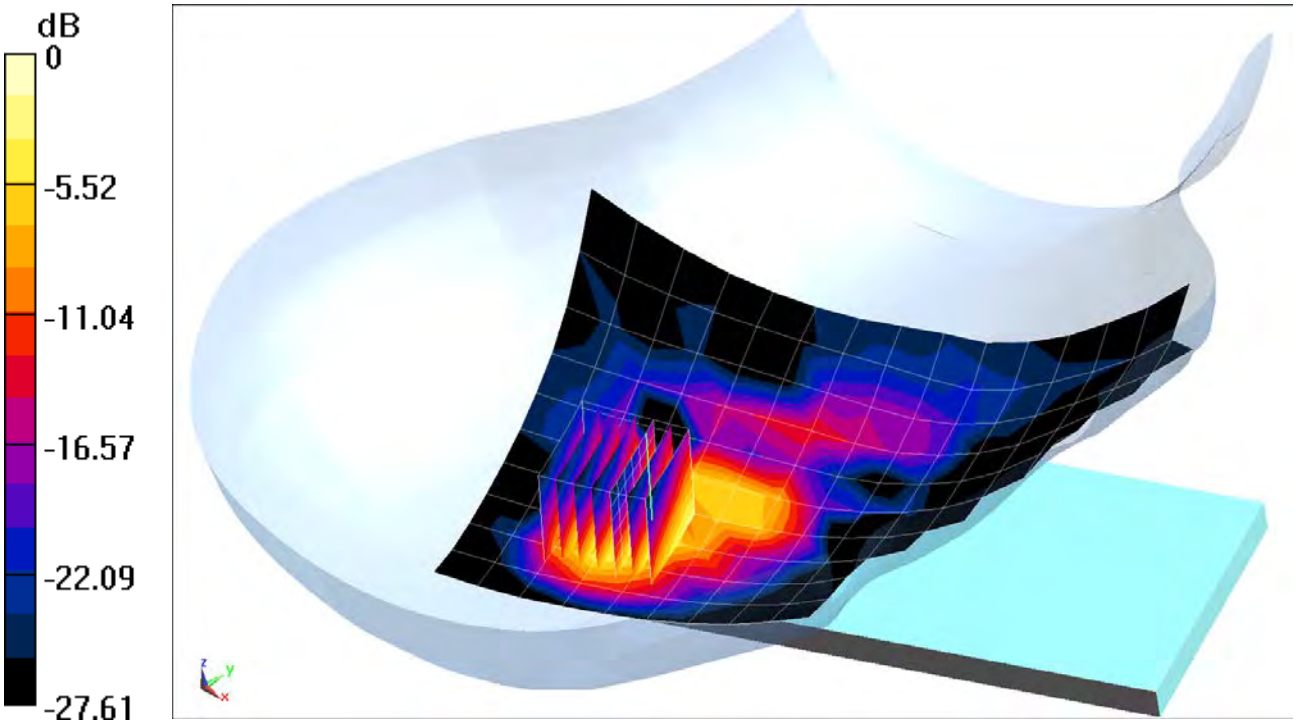
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.285
Medium: 2450 Head Medium parameters used (interpolated):
$f = 2441$ MHz; $\sigma = 1.855$ S/m; $\varepsilon_r = 39.124$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

Test Date: 07-31-2017; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

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

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

Area Scan (11x19x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.59 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.921 W/kg
SAR(1 g) = 0.438 W/kg



0 dB = 0.567 W/kg = -2.46 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

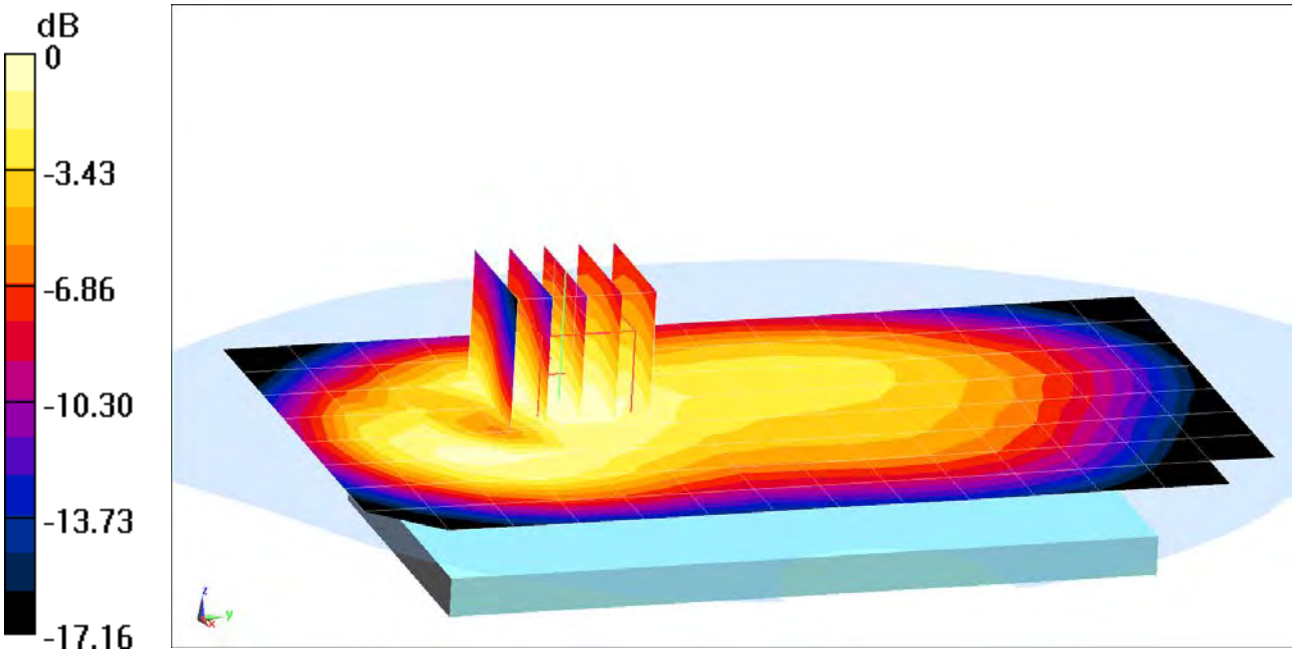
Communication System: UID 0, GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 53.856; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-03-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

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

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 = 16.31 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.342 W/kg
SAR(1 g) = 0.243 W/kg



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

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

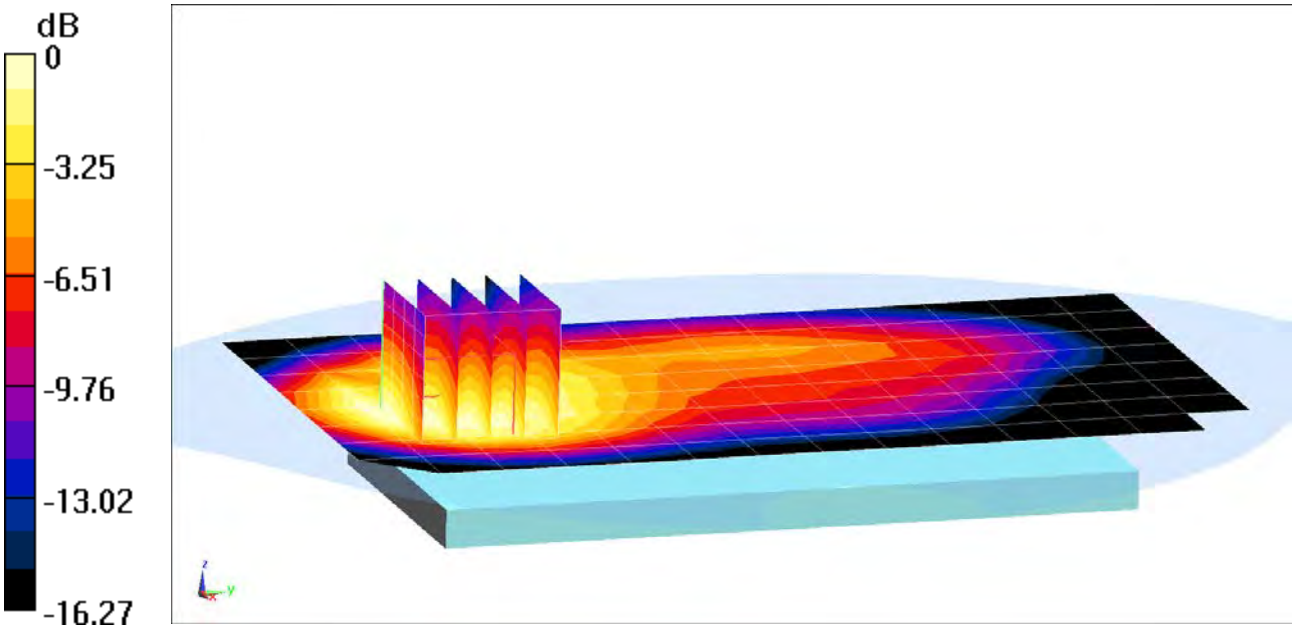
Communication System: UID 0, GSM GPRS; 1 Tx slot; Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 1.001 S/m; ε_r = 53.856; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

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

Mode: GPRS 850, Body SAR, Back Side, Mid.ch, 1 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 = 22.48 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.766 W/kg
SAR(1 g) = 0.468 W/kg



0 dB = 0.546 W/kg = -2.63 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E2E

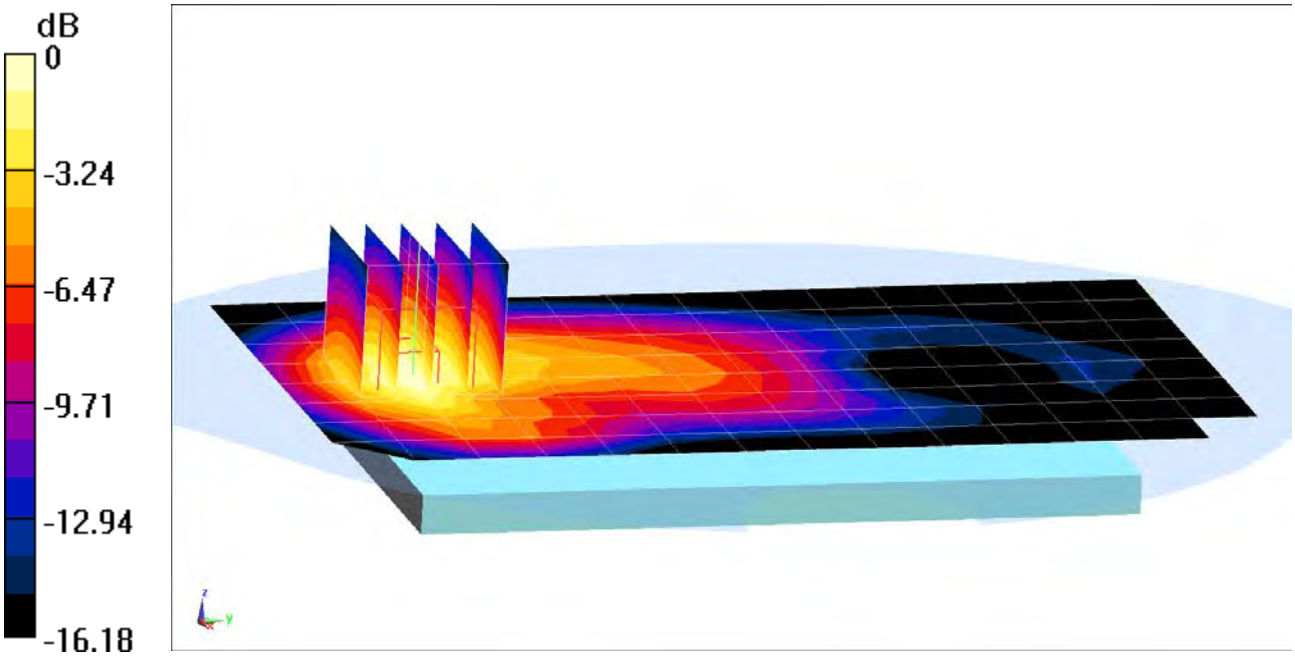
Communication System: UID 0, GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.557 S/m; ε_r = 53.357; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-27-2017; Ambient Temp: 20.6°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.62 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.253 W/kg



0 dB = 0.303 W/kg = -5.19 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E9A

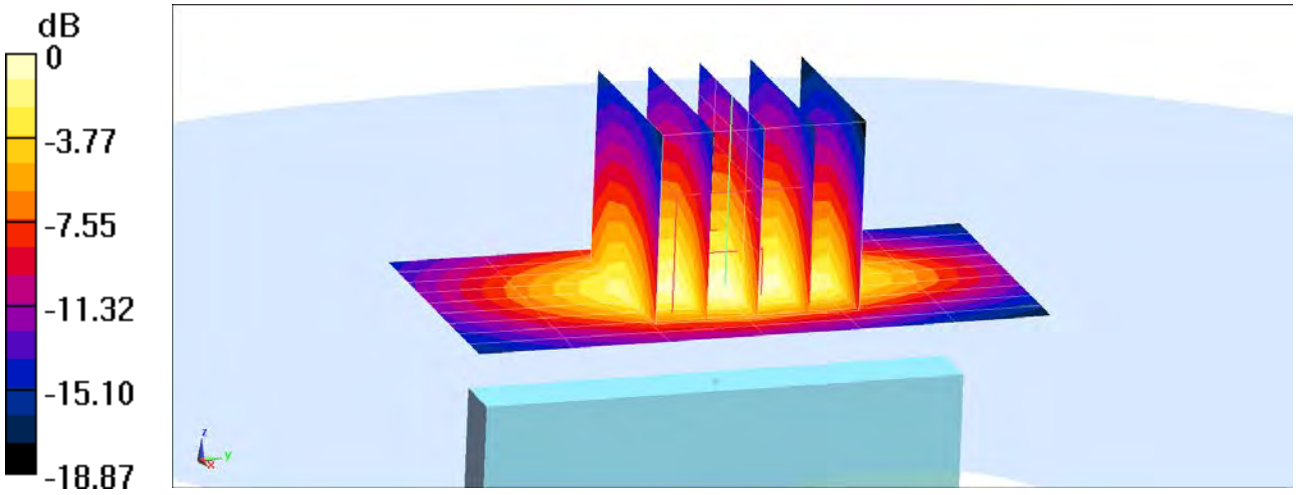
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1880 MHz; σ = 1.556 S/m; ε_r = 53.27; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 21.3°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 1900, Body SAR, Bottom Edge, Mid.ch, 3 Tx Slots

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.12 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.836 W/kg
SAR(1 g) = 0.492 W/kg



0 dB = 0.615 W/kg = -2.11 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

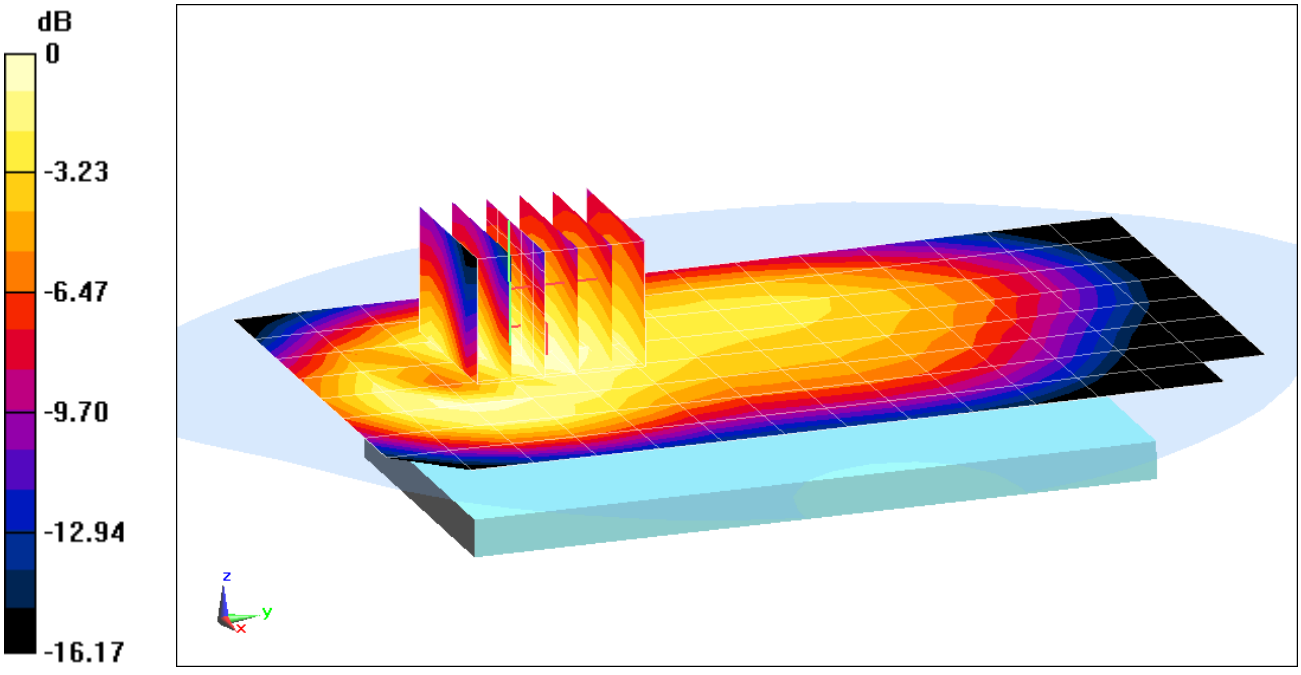
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.975 S/m; ε_r = 52.855; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-04-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3213; ConvF(6.28, 6.28, 6.28); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.03 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.406 W/kg
SAR(1 g) = 0.290 W/kg



0 dB = 0.329 W/kg = -4.83 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

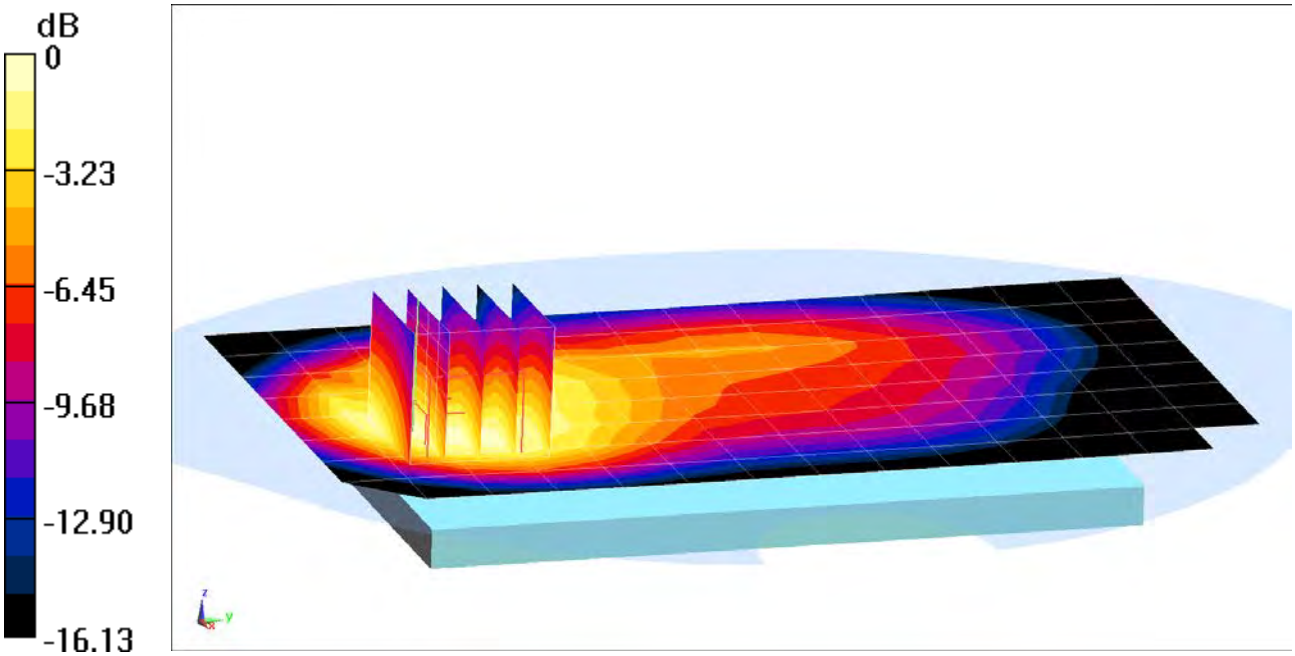
Communication System: UID 0, UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.6 MHz; σ = 0.975 S/m; ε_r = 52.855; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-04-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3213; ConvF(6.28, 6.28, 6.28); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: 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 = 25.98 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.987 W/kg
SAR(1 g) = 0.595 W/kg



0 dB = 0.711 W/kg = -1.48 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

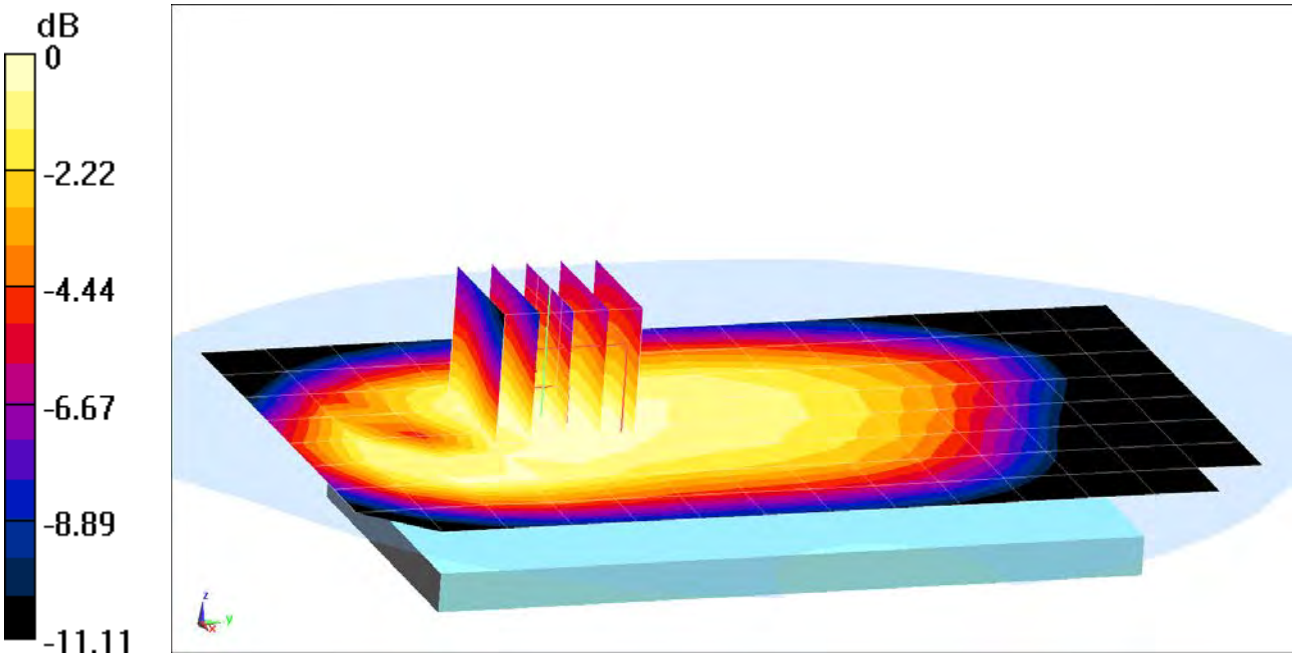
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.932 S/m; ε_r = 55.755; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-08-2017; Ambient Temp: 22.7°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.77 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.229 W/kg
SAR(1 g) = 0.172 W/kg



0 dB = 0.209 W/kg = -6.80 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

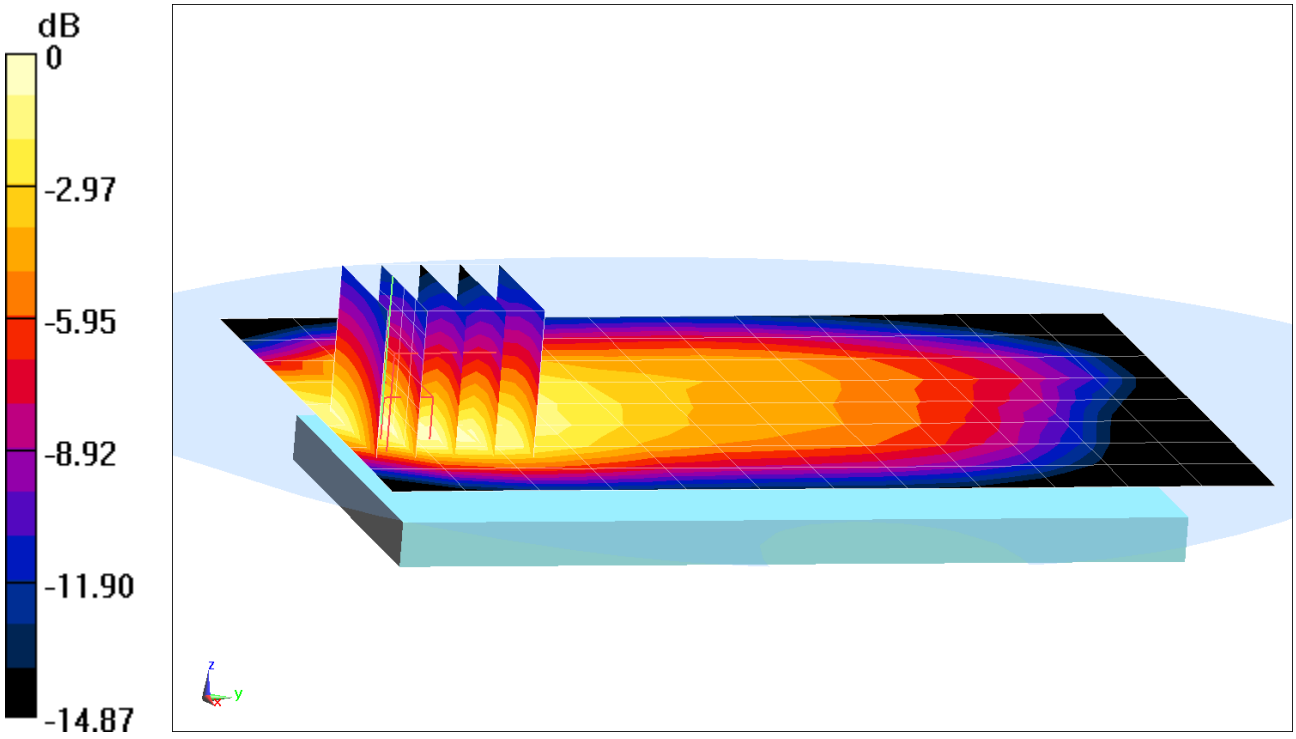
Communication System: UID 0, LTE Band 12; Frequency: 707.5 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 707.5 MHz; σ = 0.932 S/m; ε_r = 55.755; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2017; Ambient Temp: 22.7°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 12, Body SAR, Back Side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 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 = 19.53 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.590 W/kg
SAR(1 g) = 0.334 W/kg



0 dB = 0.480 W/kg = -3.19 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

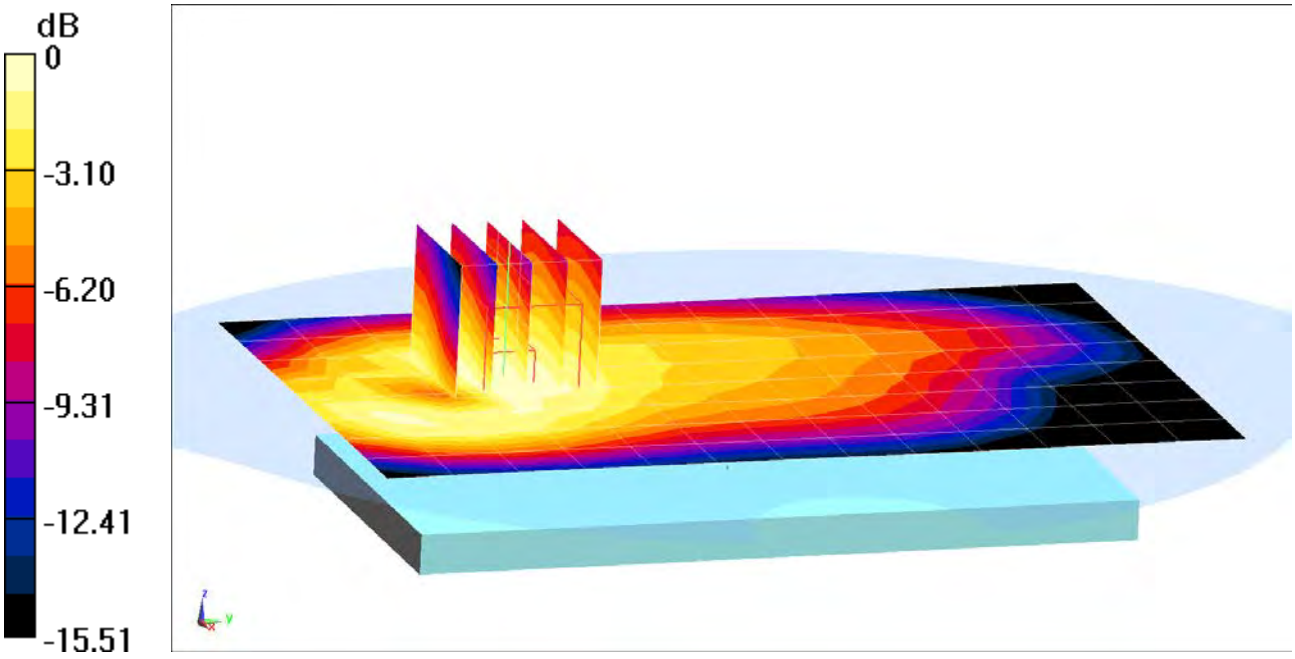
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 0.998 S/m; ε_r = 55.362; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-04-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3209; ConvF(6.44, 6.44, 6.44); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.48 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.225 W/kg
SAR(1 g) = 0.166 W/kg



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

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

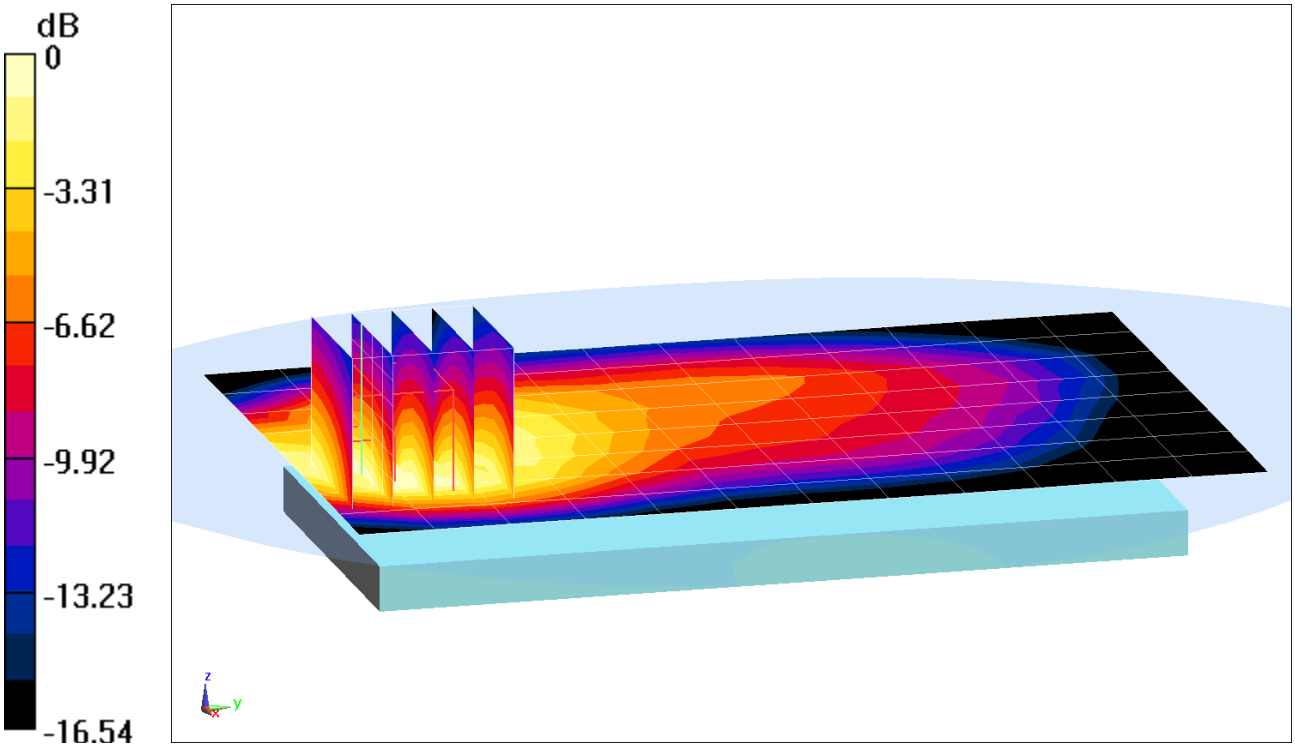
Communication System: UID 0, LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 782 MHz; σ = 1.006 S/m; ε_r = 54.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2017; Ambient Temp: 22.7°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.89 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.648 W/kg
SAR(1 g) = 0.368 W/kg



0 dB = 0.540 W/kg = -2.68 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

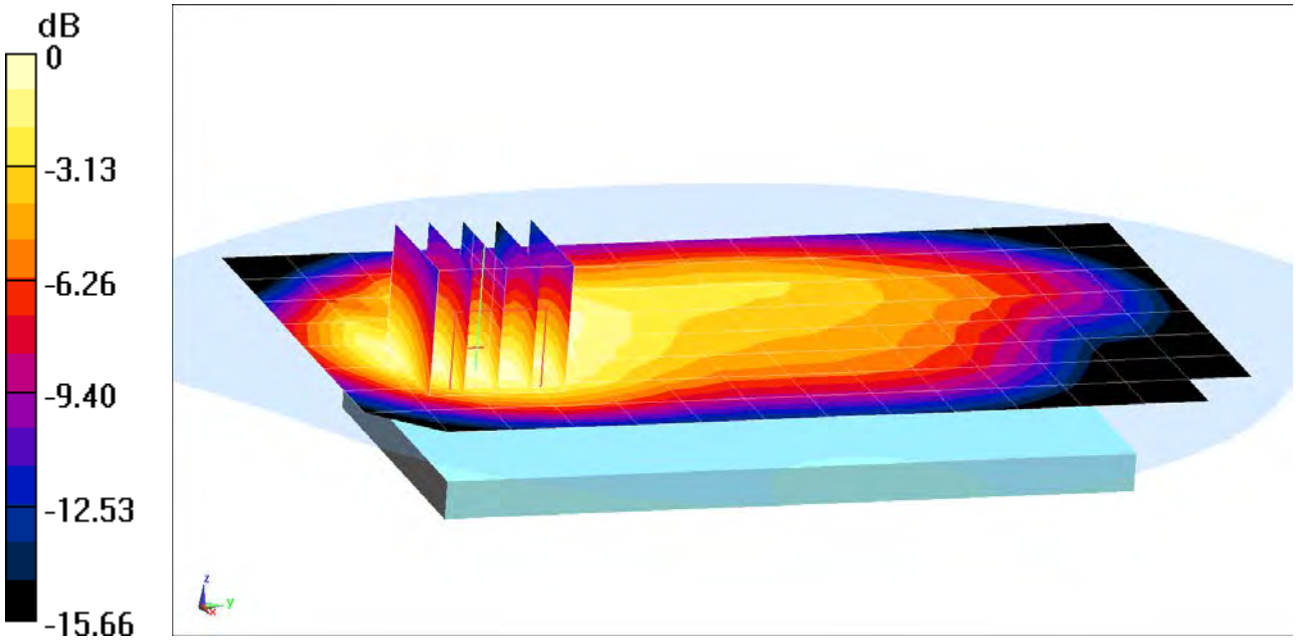
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 1.001 S/m; ε_r = 53.857; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-03-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

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

Mode: LTE Band 5 (Cell.), Body SAR, Back Side,
Mid.ch, 10 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 = 15.89 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.358 W/kg
SAR(1 g) = 0.228 W/kg



0 dB = 0.269 W/kg = -5.70 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

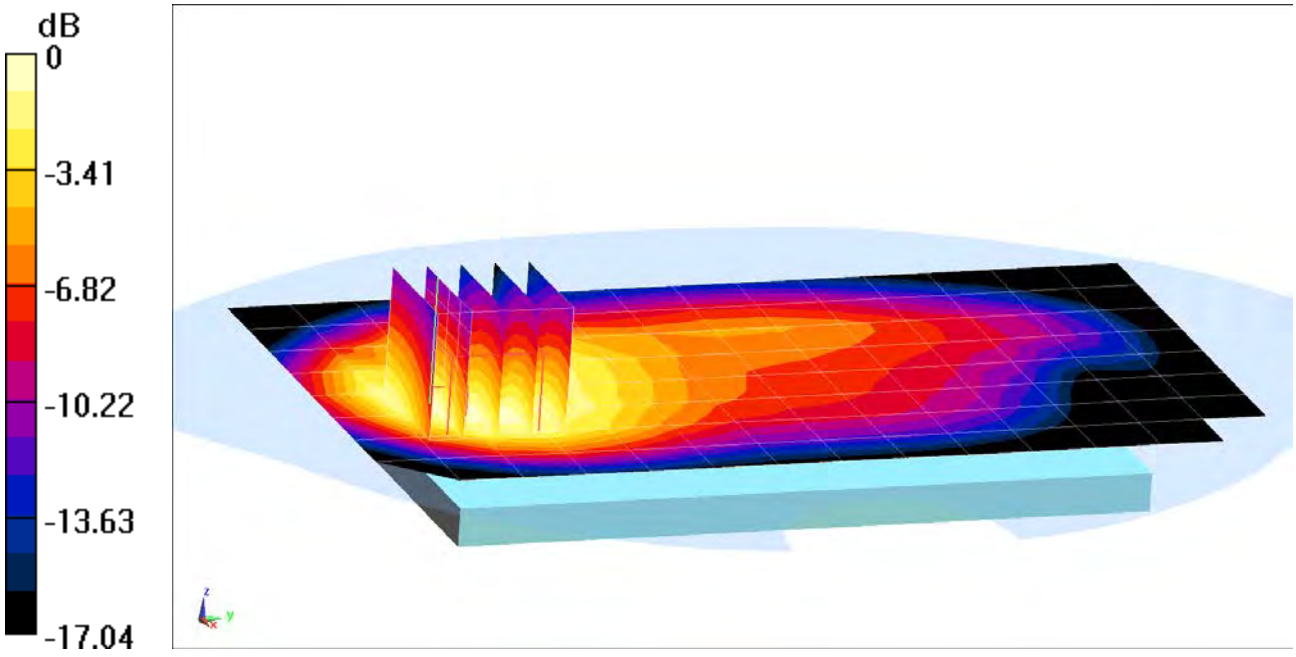
Communication System: UID 0, LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
f = 836.5 MHz; σ = 1.001 S/m; ε_r = 53.857; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

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

Mode: LTE Band 5 (Cell.), Body SAR, Back Side, Mid.ch,
10 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.39 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.784 W/kg
SAR(1 g) = 0.462 W/kg



0 dB = 0.564 W/kg = -2.49 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12ECB

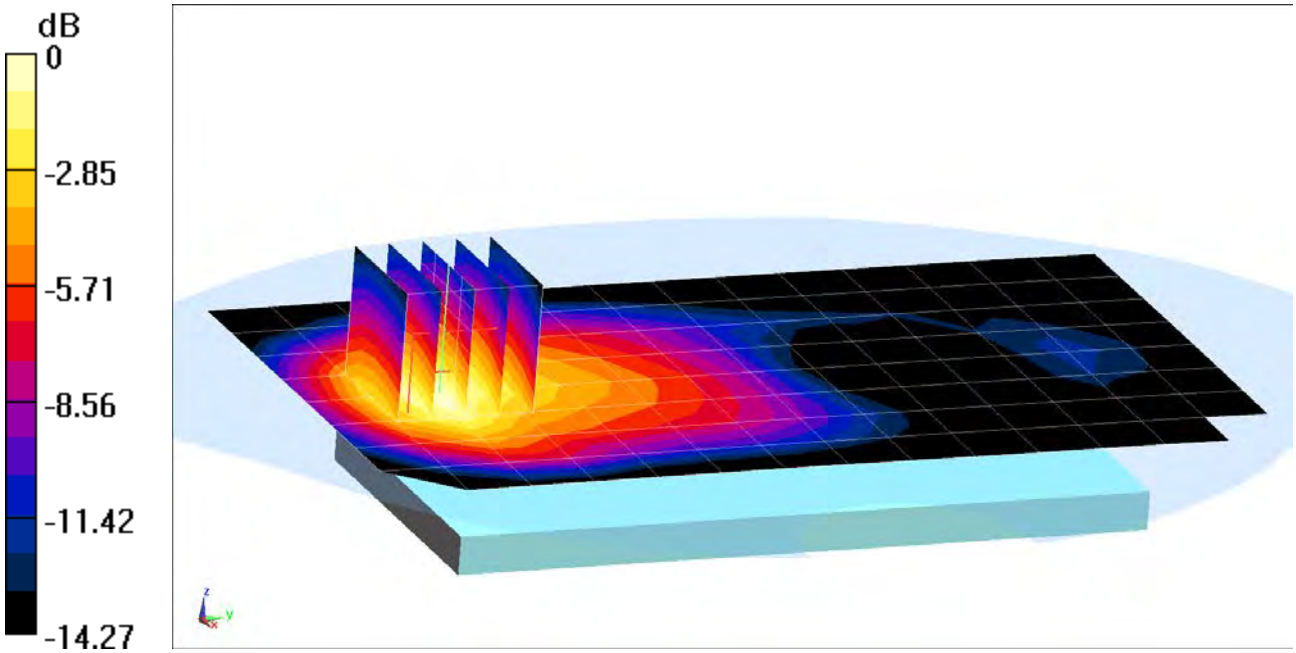
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.49 S/m; ε_r = 51.098; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-31-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

**Mode: LTE Band 4 (AWS), Body SAR, Back Side, Mid.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.27 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.751 W/kg
SAR(1 g) = 0.490 W/kg



0 dB = 0.578 W/kg = -2.38 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E48

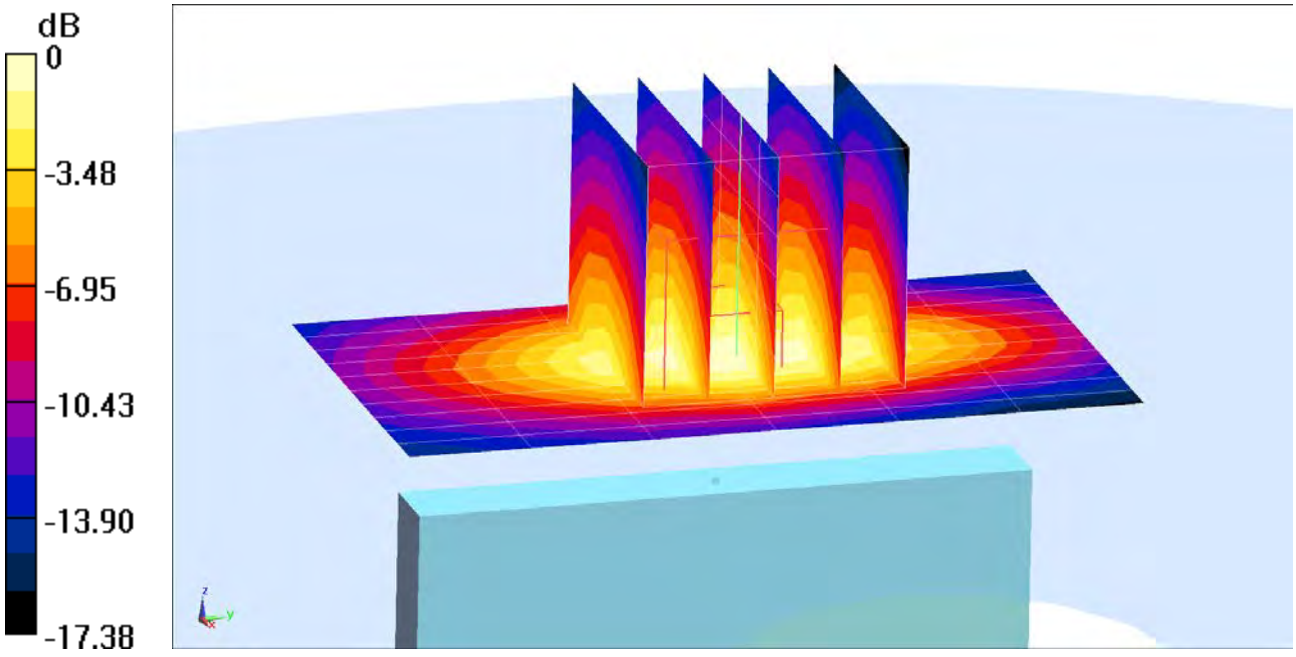
Communication System: UID 0, LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used (interpolated):
f = 1732.5 MHz; σ = 1.489 S/m; ε_r = 52.025; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 19.5°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3209; ConvF(5.13, 5.13, 5.13); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: LTE Band 4 (AWS), Body SAR, Bottom Edge, Mid.ch, 20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

Area Scan (11x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.34 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.874 W/kg
SAR(1 g) = 0.529 W/kg



0 dB = 0.652 W/kg = -1.86 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12ECB

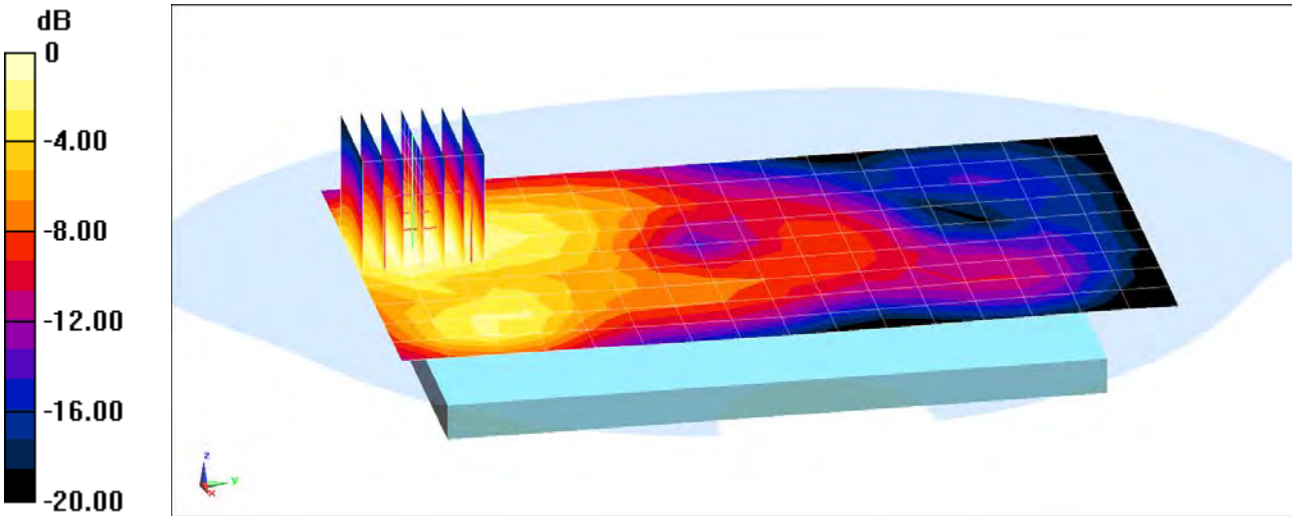
Communication System: UID 0, LTE Band 7; Frequency: 2510 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2510 MHz; σ = 2.093 S/m; ε_r = 51.027; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-07-2017; Ambient Temp: 22.3°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3287; ConvF(4.35, 4.35, 4.35); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.50 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.633 W/kg
SAR(1 g) = 0.338 W/kg



0 dB = 0.421 W/kg = -3.76 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E9A

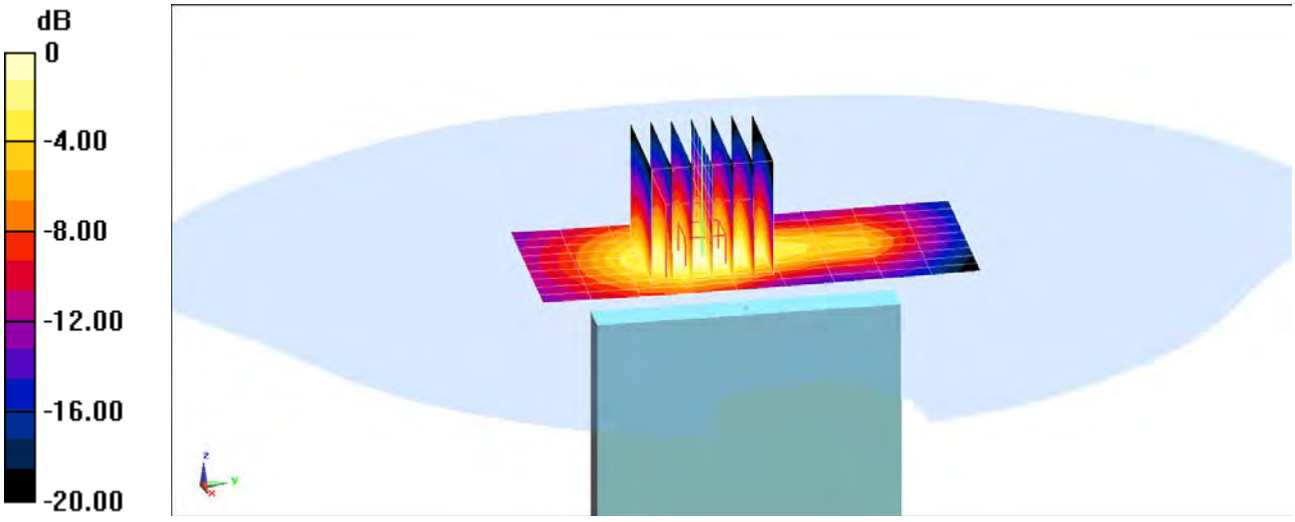
Communication System: UID 0, LTE Band 7; Frequency: 2535 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used (interpolated):
f = 2535 MHz; σ = 2.127 S/m; ε_r = 50.961; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 22.3°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3287; ConvF(4.12, 4.12, 4.12); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x10x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.06 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.597 W/kg



0 dB = 0.772 W/kg = -1.12 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E5F

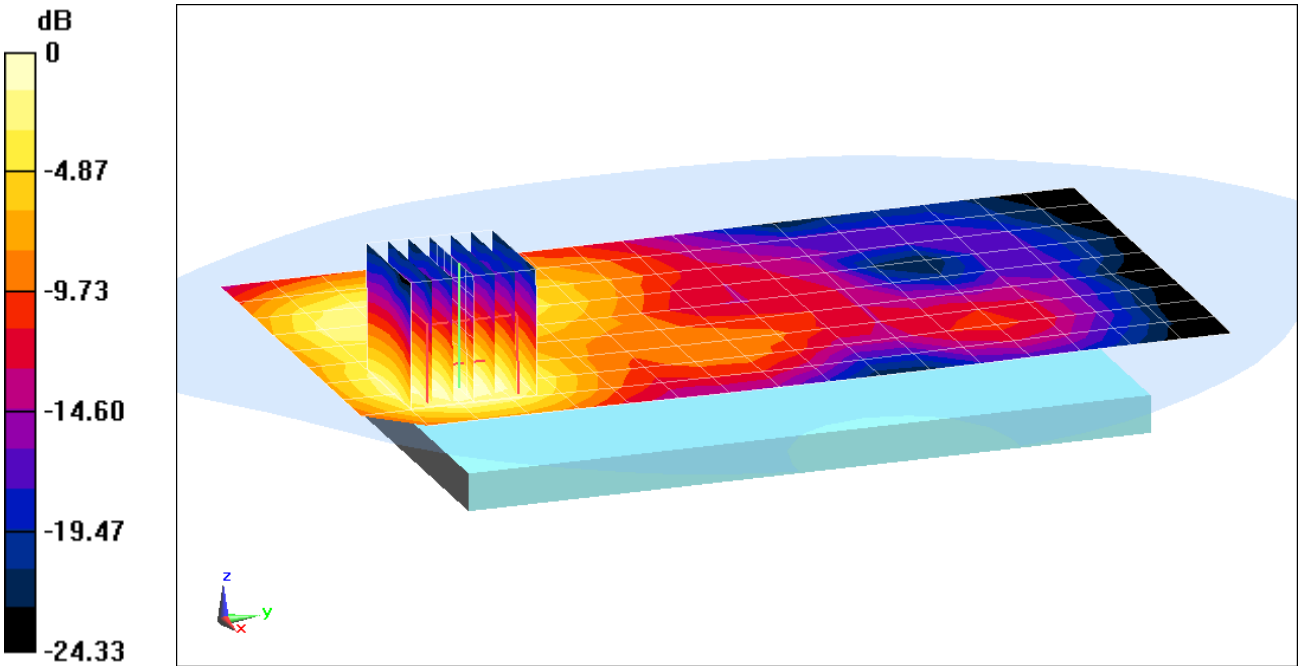
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.318 S/m; ε_r = 51.188; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3287; ConvF(4.12, 4.12, 4.12); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.87 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.761 W/kg
SAR(1 g) = 0.358 W/kg



0 dB = 0.454 W/kg = -3.43 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12E9A

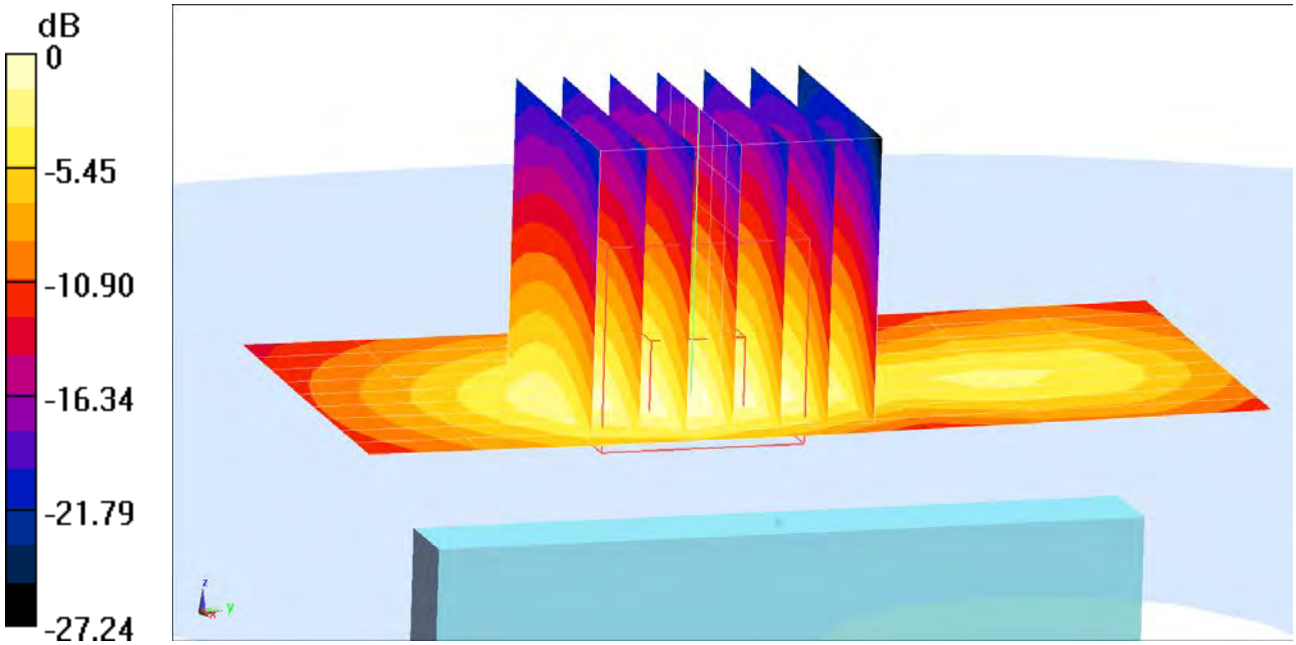
Communication System: UID 0, LTE Band 41; Frequency: 2680 MHz; Duty Cycle: 1:1.58
Medium: 2600 Body Medium parameters used (interpolated):
f = 2680 MHz; σ = 2.318 S/m; ε_r = 51.188; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3287; ConvF(4.12, 4.12, 4.12); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (10x9x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.43 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.12 W/kg
SAR(1 g) = 0.543 W/kg



0 dB = 0.701 W/kg = -1.54 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 13056

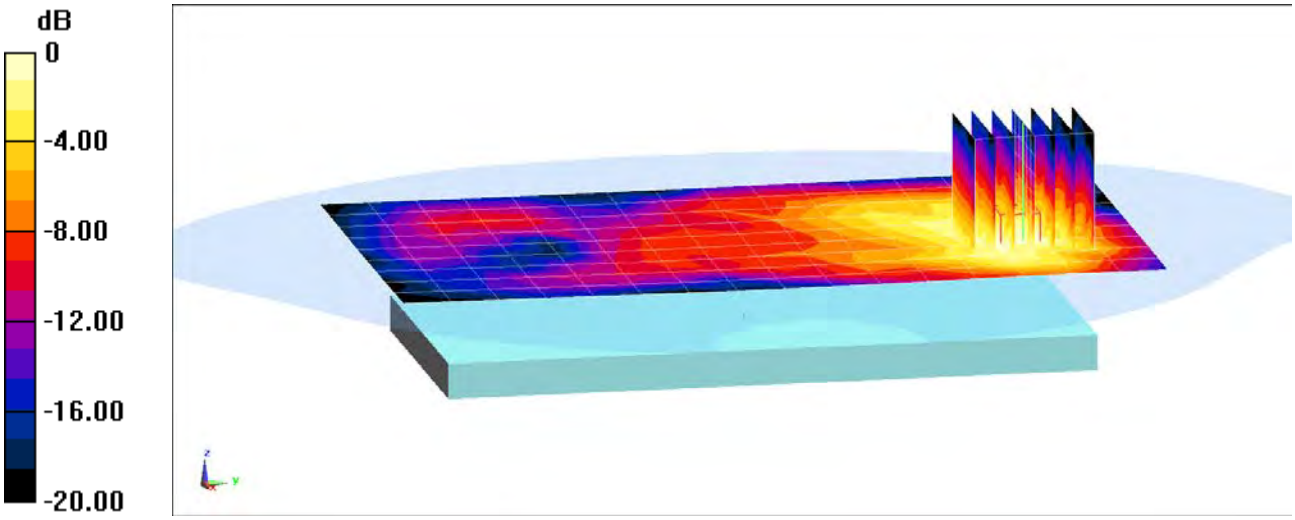
Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.956 S/m; ε_r = 52.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3287; ConvF(4.35, 4.35, 4.35); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11b, Antenna 2, 22 MHz Bandwidth,
Body SAR, Ch 1, 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 = 0.6910 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.188 W/kg
SAR(1 g) = 0.089 W/kg



0 dB = 0.125 W/kg = -9.03 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 13056

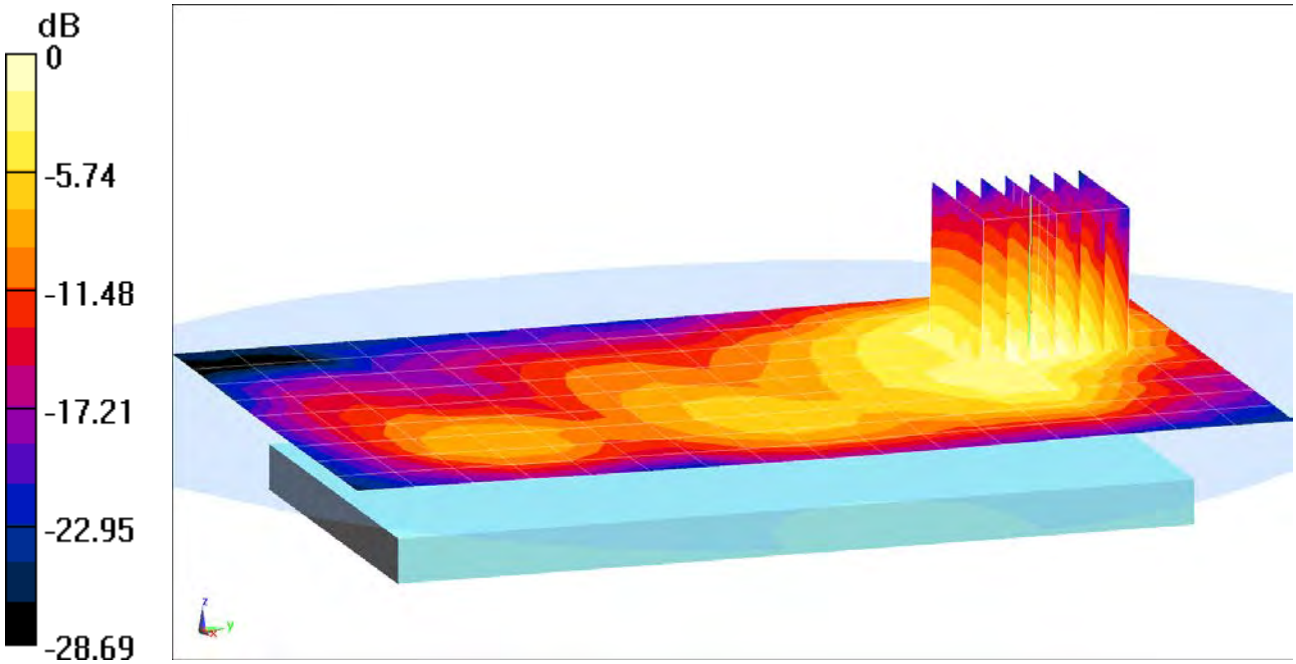
Communication System: UID 0, IEEE 802.11b; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2412 MHz; σ = 1.956 S/m; ε_r = 52.17; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3287; ConvF(4.35, 4.35, 4.35); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: IEEE 802.11b, Antenna 2, 22 MHz Bandwidth,
Body SAR, Ch 1, 1 Mbps, Front 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 = 4.733 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.490 W/kg
SAR(1 g) = 0.228 W/kg



0 dB = 0.292 W/kg = -5.35 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12EC2

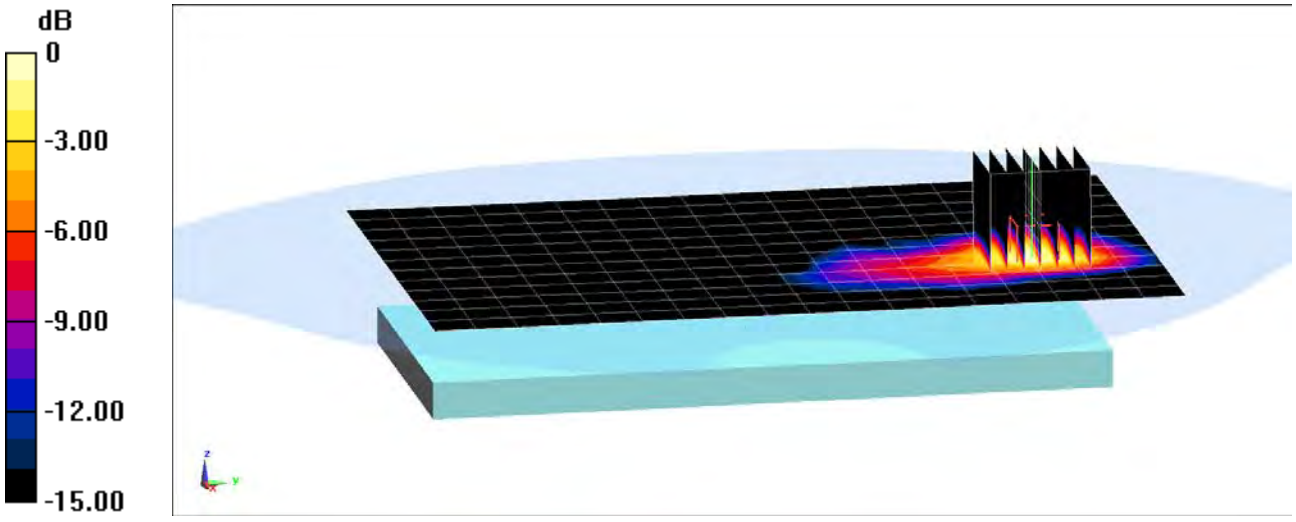
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5500 MHz; σ = 5.692 S/m; ε_r = 47.367; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-07-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.0°C

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

Mode: IEEE 802.11a, UNII-2C, Antenna 1, 20 MHz Bandwidth, Body SAR, Ch 100, 6 Mbps, Back Side

Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 6.233 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.866 W/kg
SAR(1 g) = 0.205 W/kg



0 dB = 0.518 W/kg = -2.86 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12EC2

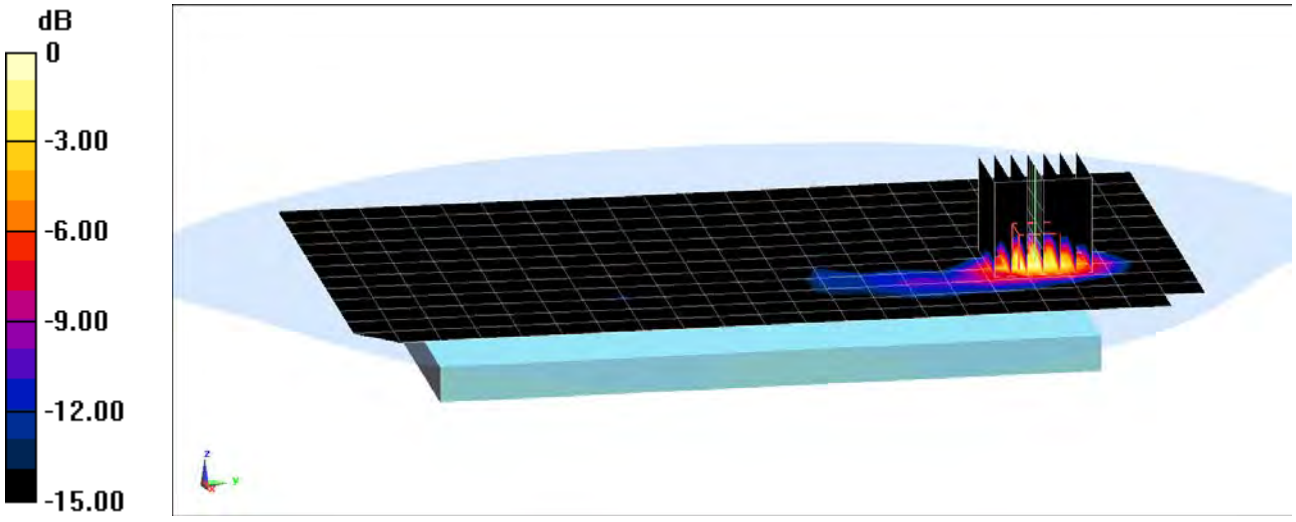
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5825 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5825 MHz; σ = 6.149 S/m; ε_r = 46.853; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.0°C

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

Mode: IEEE 802.11a, UNII-3, Antenna 1, 20 MHz Bandwidth, Body SAR, Ch 165, 6 Mbps, Back Side

Area Scan (13x22x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 7.045 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.253 W/kg



0 dB = 0.709 W/kg = -1.49 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 13056

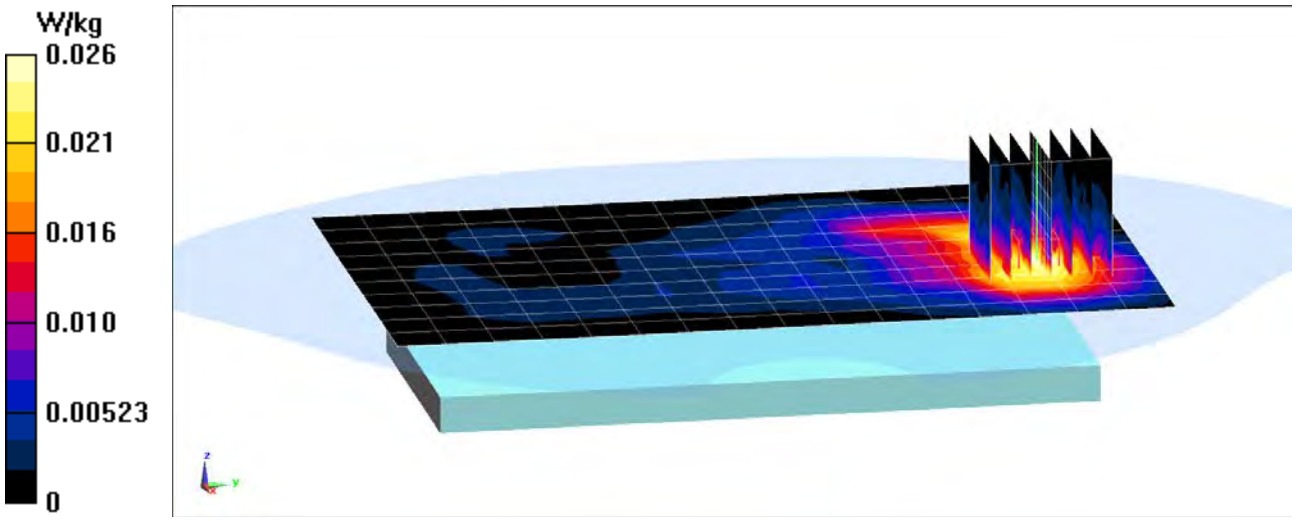
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.285
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.933 S/m; ε_r = 51.255; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-07-2017; Ambient Temp: 20.8°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3318; ConvF(4.55, 4.55, 4.55); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.613 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.0480 W/kg
SAR(1 g) = 0.020 W/kg



DUT: A3LSC01K; Type: Portable Handset; Serial: 13056

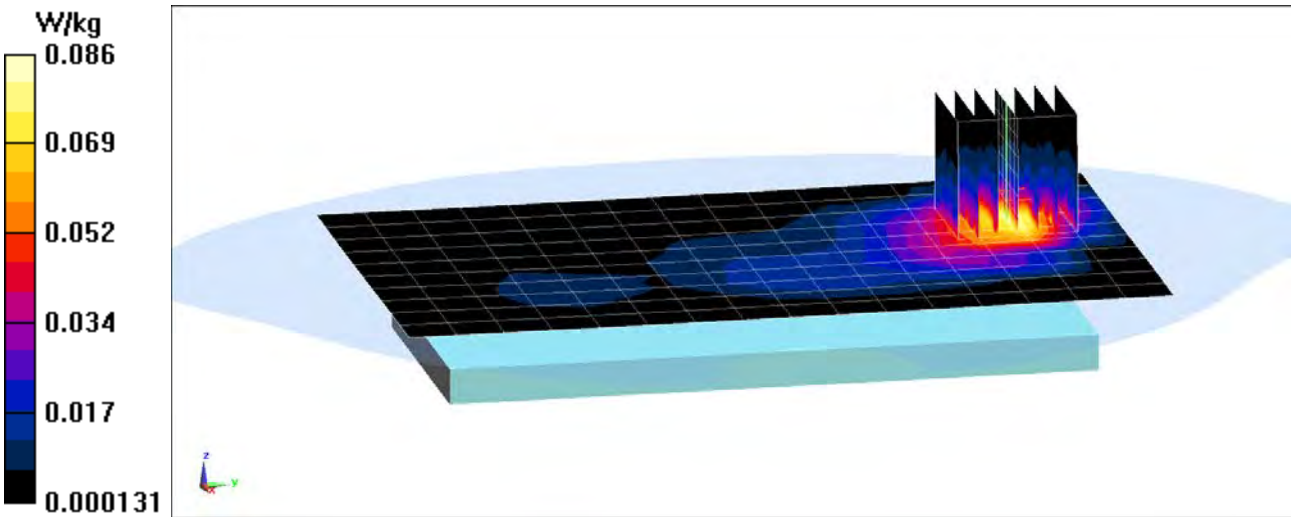
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.285
Medium: 2450 Body Medium parameters used (interpolated):
f = 2441 MHz; σ = 1.933 S/m; ε_r = 51.255; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 20.8°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3318; ConvF(4.55, 4.55, 4.55); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: Bluetooth, Body SAR, Ch 39, 1 Mbps, Front Side

Area Scan (11x17x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.298 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.147 W/kg
SAR(1 g) = 0.068 W/kg



DUT: A3LSC01K; Type: Portable Handset; Serial: 12ECB

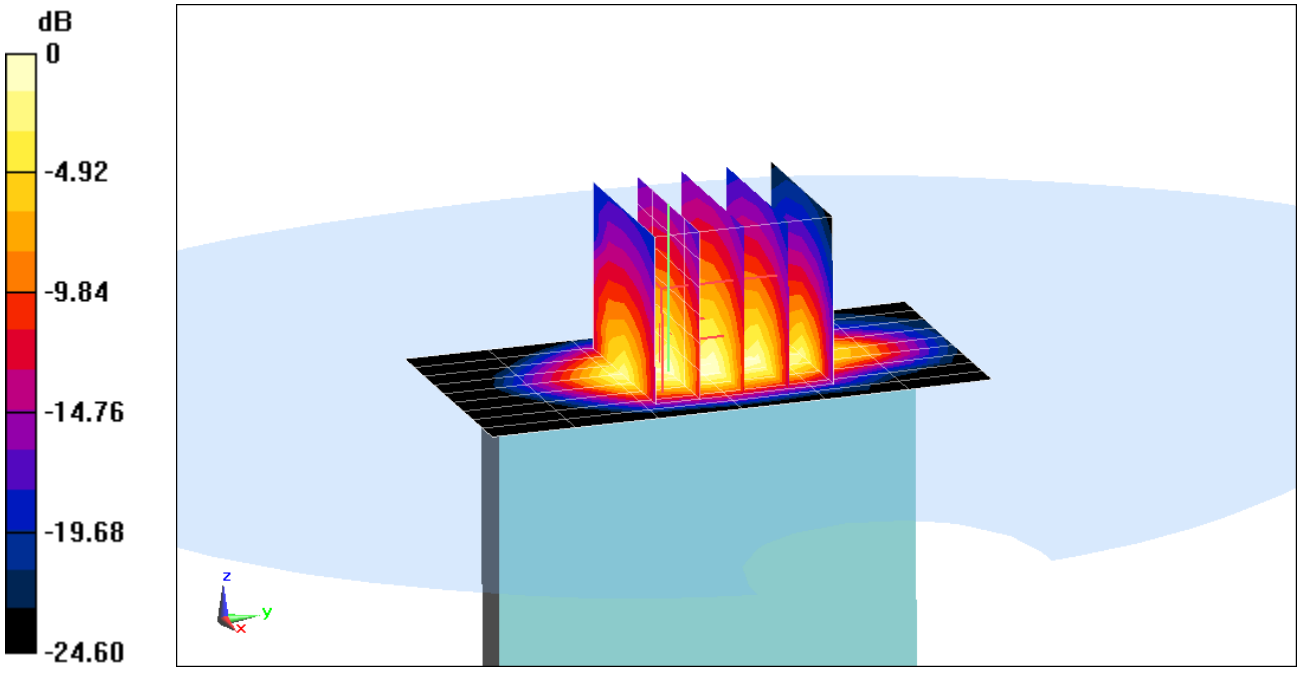
Communication System: UID 0, GSM GPRS; 3 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:2.76
Medium: 1900 Body Medium parameters used:
f = 1910 MHz; σ = 1.59 S/m; ε_r = 53.182; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 07-31-2017; Ambient Temp: 21.3°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

Mode: GPRS 1900, Phablet SAR, Bottom Edge, High.ch, 3 Tx Slots

Area Scan (10x7x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 65.57 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 11.8 W/kg
SAR(10 g) = 2.58 W/kg



0 dB = 7.69 W/kg = 8.86 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12ECB

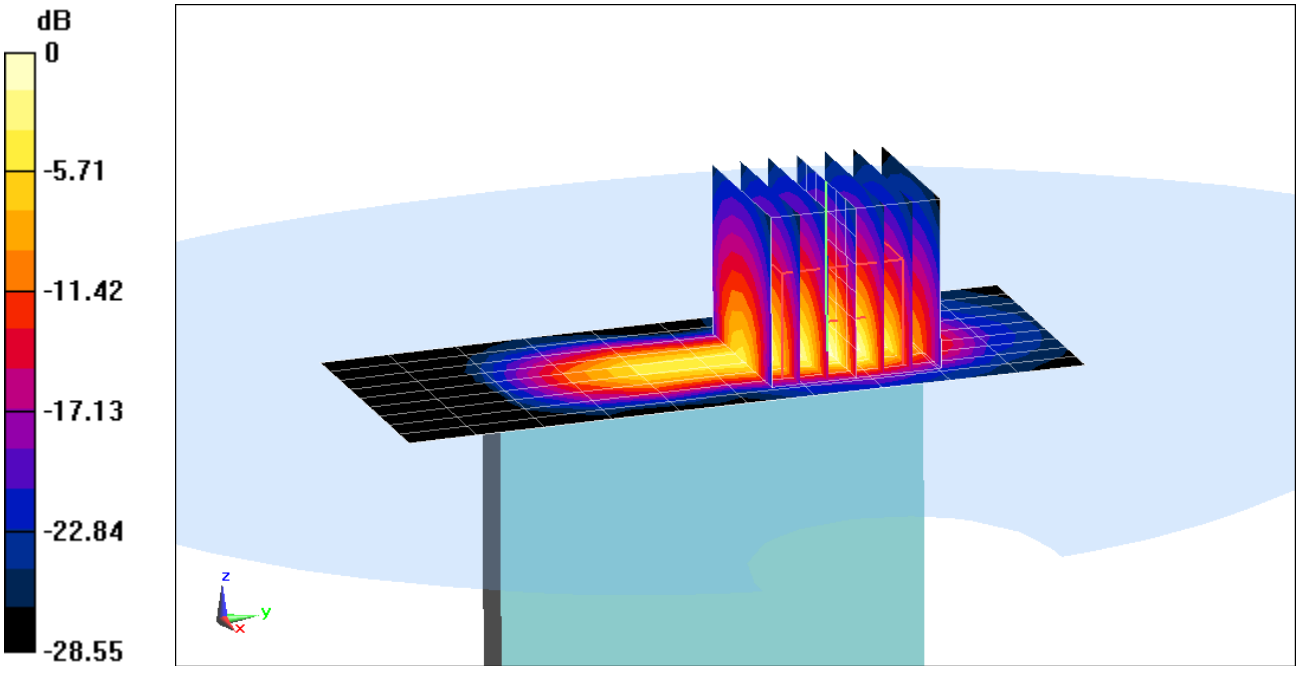
Communication System: UID 0, LTE Band 7; Frequency: 2510 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
f = 2510 MHz; σ = 2.08 S/m; ε_r = 50.495; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-22-2017; Ambient Temp: 23.1°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3319; ConvF(4.42, 4.42, 4.42); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

**Moe: LTE Band 7, Phablet SAR, Bottom Edge, Low.ch,
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset**

Area Scan (10x11x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 74.93 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 29.8 W/kg
SAR(10 g) = 2.85 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

DUT: A3LSC01K; Type: Portable Handset; Serial: 12EC2

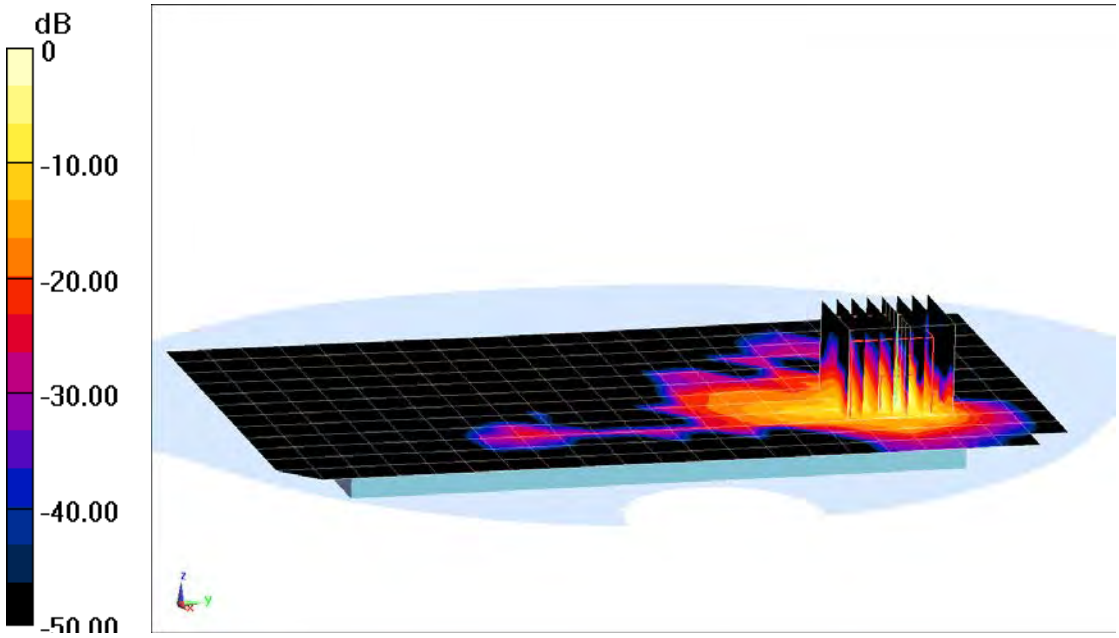
Communication System: UID 0, 802.11a 5.2-5.8 GHz Band; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5500 MHz; σ = 5.692 S/m; ε_r = 47.367; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-07-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.0°C

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

Mode: IEEE 802.11a, UNII-2C, Antenna 1, 20 MHz Bandwidth, Phablet SAR, Ch 100, 6 Mbps, Back Side

Area Scan (13x22x1): 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 = 26.46 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 39.1 W/kg
SAR(10 g) = 0.985 W/kg



0 dB = 17.9 W/kg = 12.53 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

© 2017 PCTEST Engineering Laboratory, Inc.

PCTEST ENGINEERING LABORATORY, INC.

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

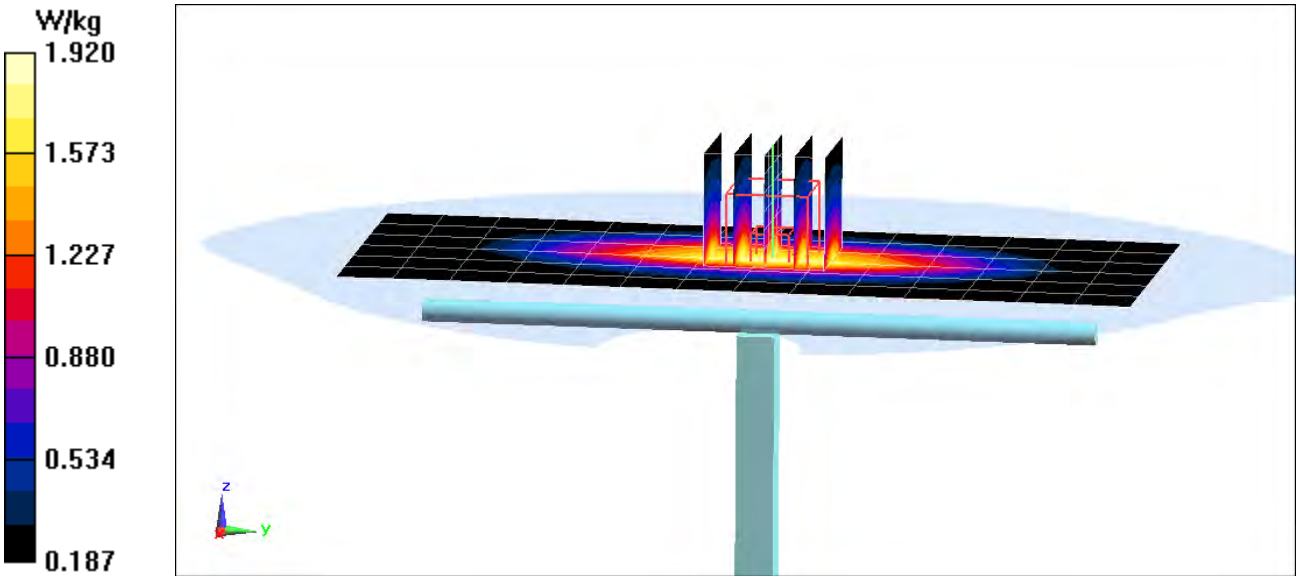
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
$f = 750$ MHz; $\sigma = 0.896$ S/m; $\varepsilon_r = 43.954$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-24-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.5°C

Probe: ES3DV3 - SN3209; ConvF(6.76, 6.76, 6.76); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

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) = 1.65 W/kg
Deviation(1 g) = -1.43%



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

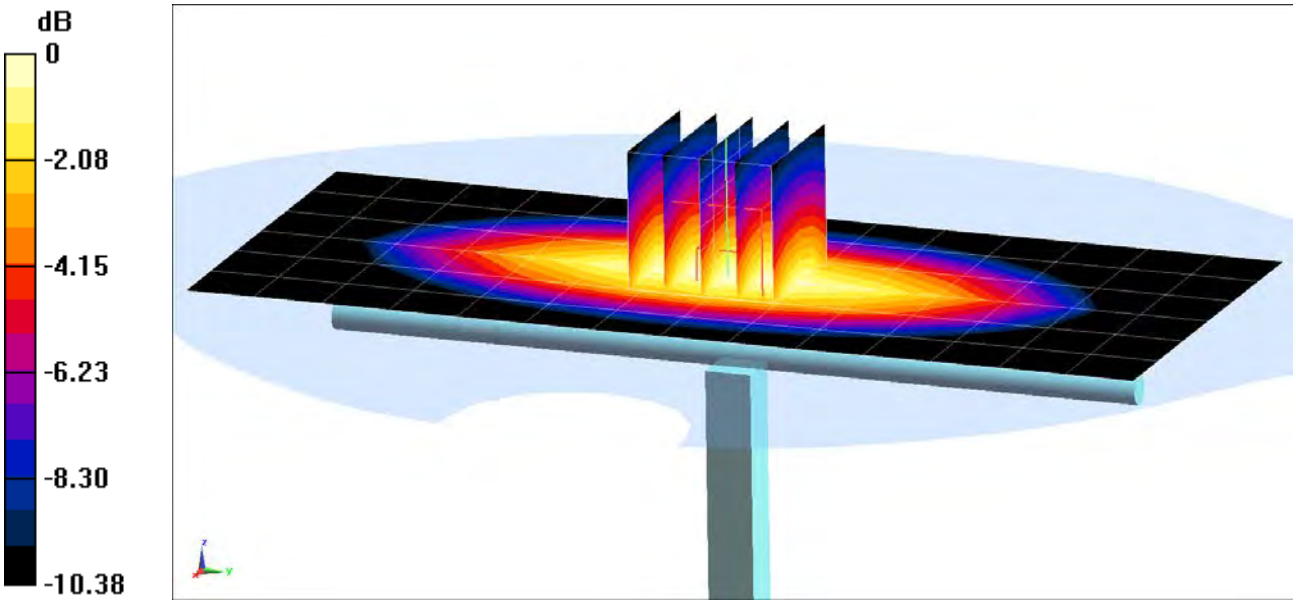
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Head Medium parameters used (interpolated):
f = 750 MHz; σ = 0.9 S/m; ε_r = 41.963; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-07-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.0°C

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

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.33 W/kg
SAR(1 g) = 1.57 W/kg
Deviation(1 g) = -6.44%



0 dB = 1.84 W/kg = 2.65 dBW/kg

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d180

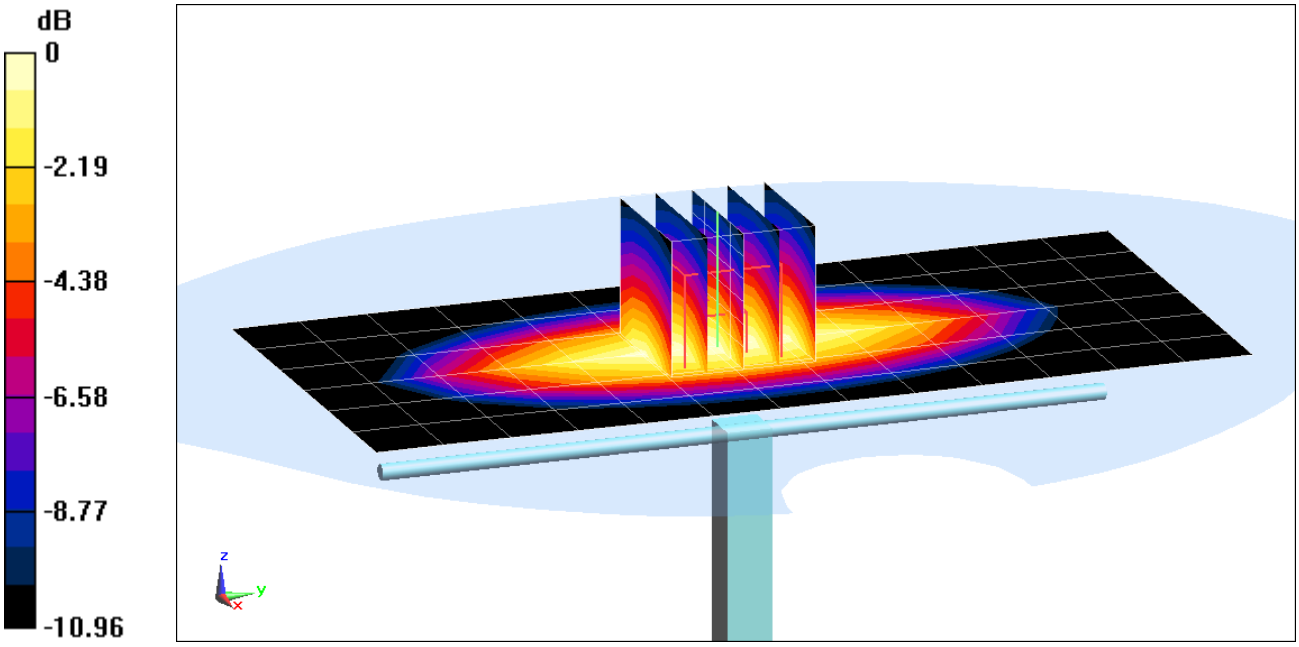
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Head Medium parameters used:
f = 835 MHz; σ = 0.902 S/m; ε_r = 40.784; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 07-31-2017; Ambient Temp: 21.8°C; Tissue Temp: 20.5°C

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

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.90 W/kg
SAR(1 g) = 1.88 W/kg
Deviation(1 g) = 1.51%



0 dB = 2.54 W/kg = 4.05 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1092

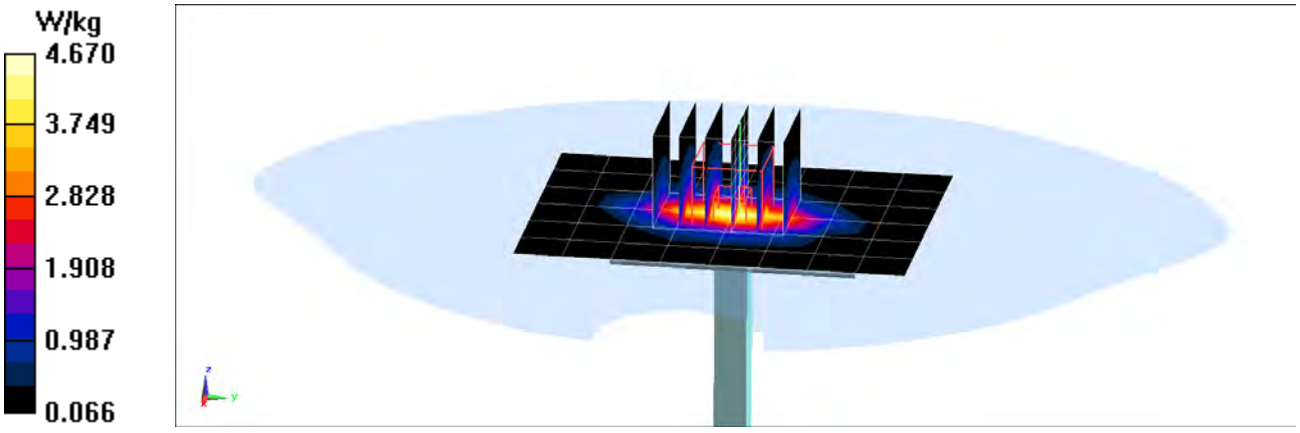
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Head Medium parameters used:
f = 1750 MHz; σ = 1.407 S/m; ε_r = 39.653; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-26-2017; Ambient Temp: 22.3°C; Tissue Temp: 20.0°C

Probe: ES3DV3 - SN3318; ConvF(5.49, 5.49, 5.49); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP (Left); Type: SAM; Serial: 1715
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.72 W/kg
SAR(1 g) = 3.70 W/kg
Deviation(1 g) = 1.65%



DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d026

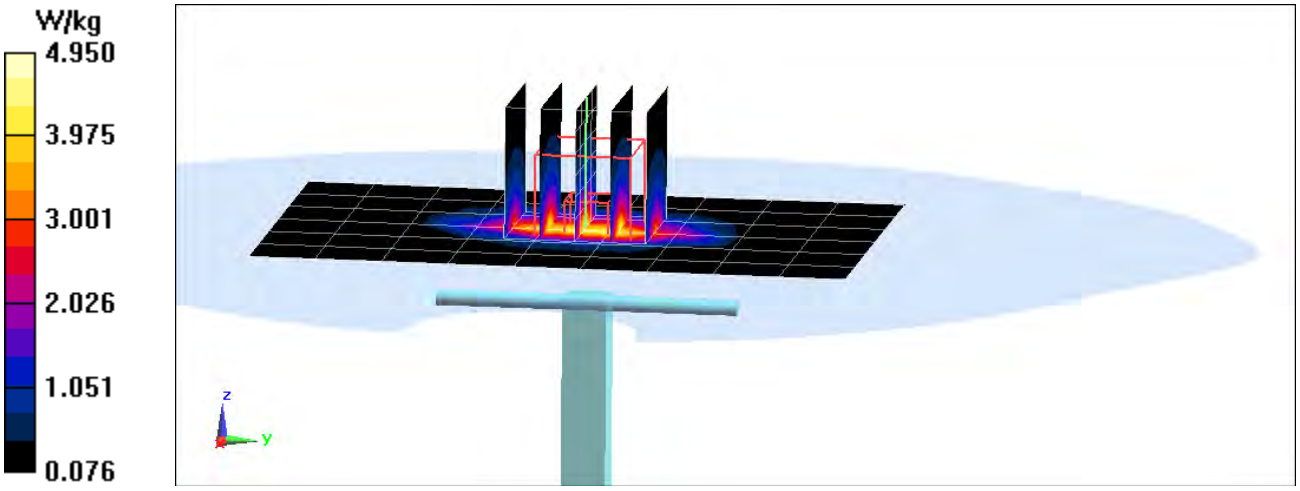
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Head Medium parameters used (interpolated):
$f = 1900$ MHz; $\sigma = 1.442$ S/m; $\varepsilon_r = 39.254$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-02-2017; Ambient Temp: 21.9°C; Tissue Temp: 21.1°C

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

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.14 W/kg
SAR(1 g) = 3.88 W/kg
Deviation(1 g) = -1.27%



DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 945

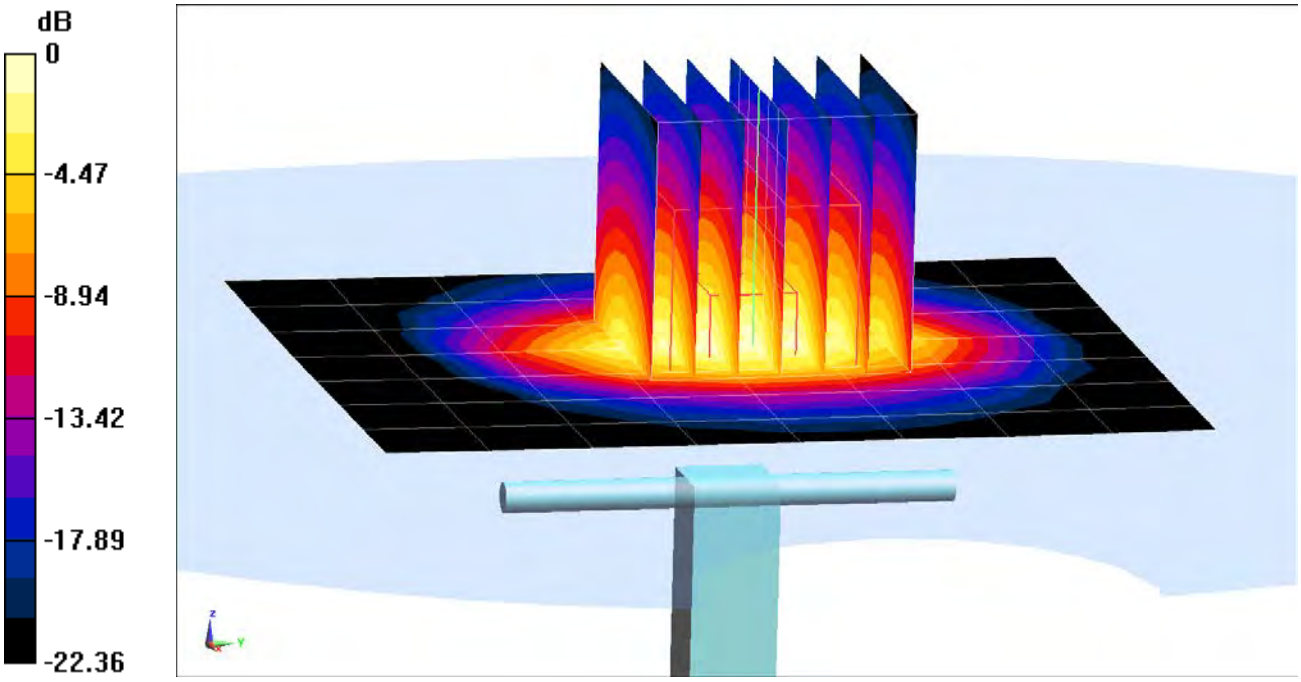
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.877 S/m; ε_r = 38.446; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-26-2017; Ambient Temp: 21.7°C; Tissue Temp: 21.7°C

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

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.4 W/kg
SAR(1 g) = 5.46 W/kg
Deviation(1 g) = 6.43%



0 dB = 7.22 W/kg = 8.59 dBW/kg

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

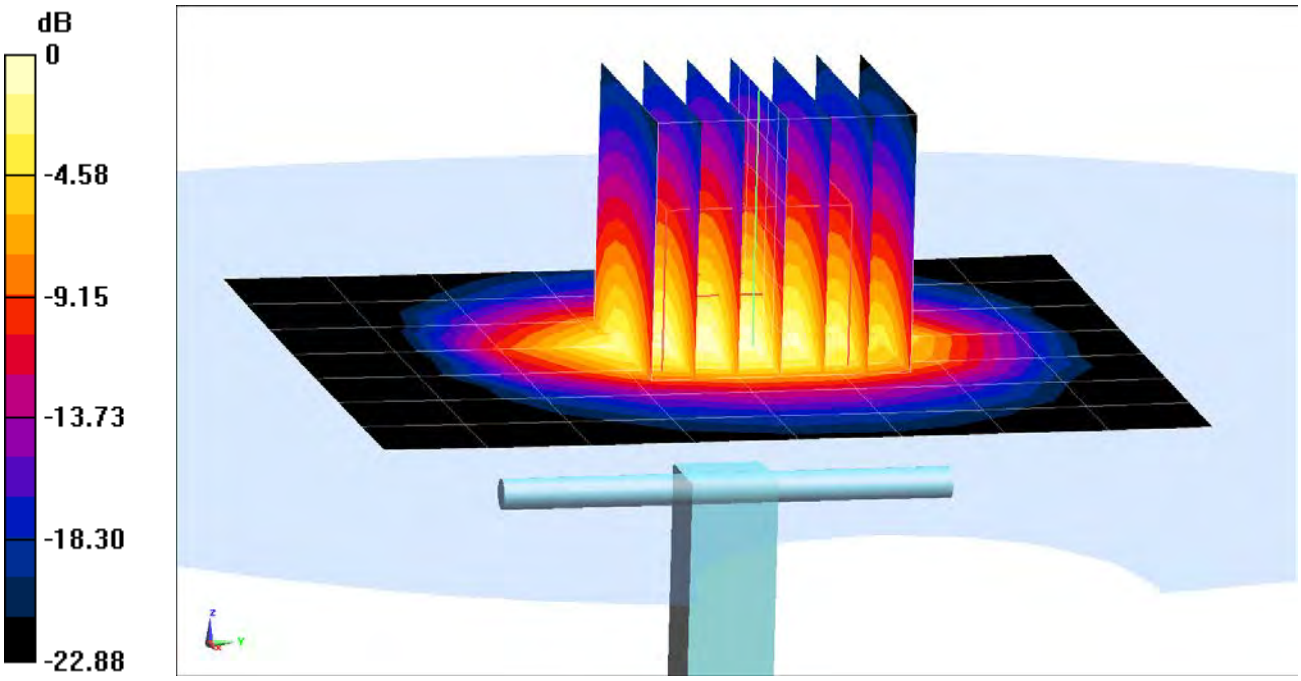
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.865 S/m; ε_r = 39.092; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 22.1°C; Tissue Temp: 21.6°C

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

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.50 W/kg
Deviation(1 g) = 5.57%



0 dB = 7.20 W/kg = 8.57 dBW/kg

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

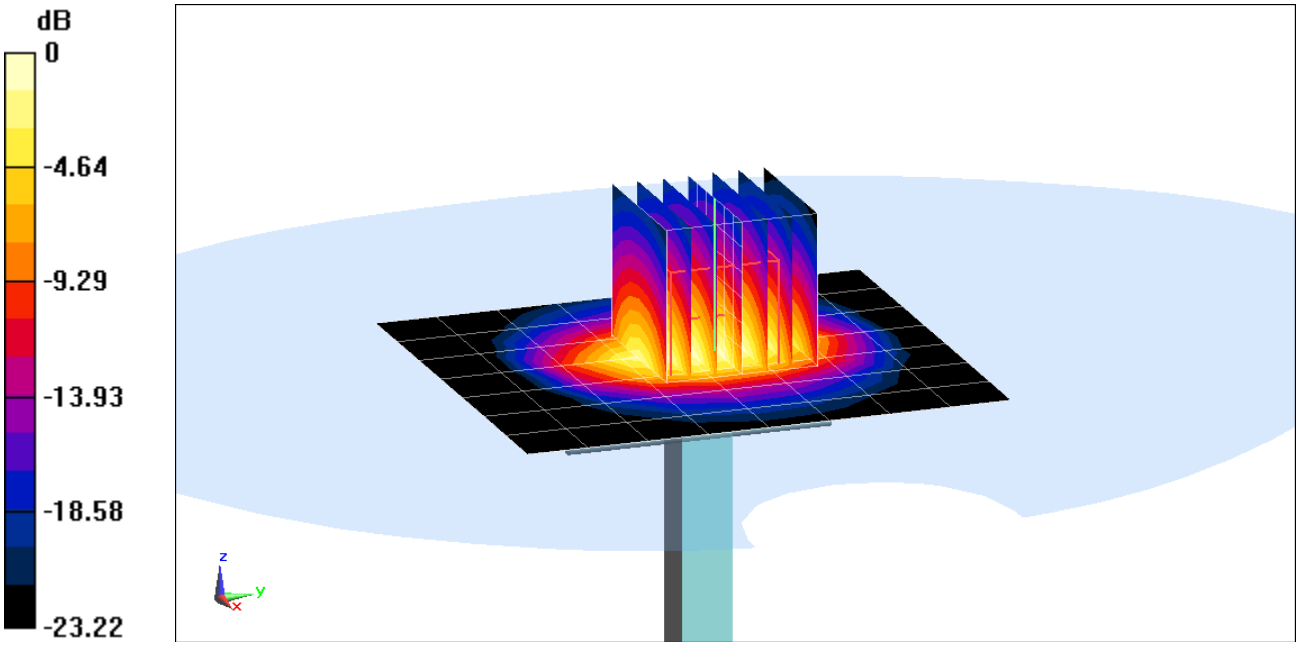
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Head Medium parameters used:
f = 2450 MHz; σ = 1.794 S/m; ε_r = 39.174; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-16-2017; Ambient Temp: 22.1°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN7406; ConvF(7.68, 7.68, 7.68); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.5 W/kg
SAR(1 g) = 5.32 W/kg
Deviation(1 g) = 2.11%



0 dB = 9.06 W/kg = 9.57 dBW/kg

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

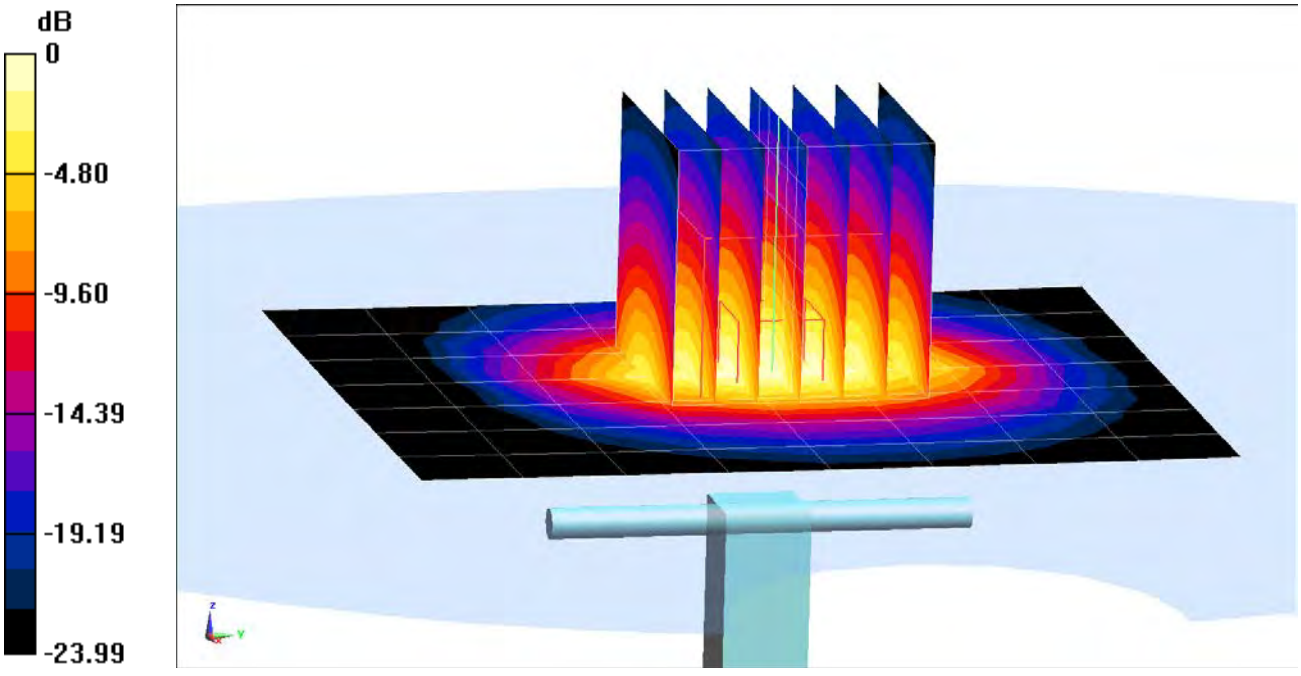
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Head Medium parameters used:
f = 2600 MHz; σ = 2.047 S/m; ε_r = 37.965; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-19-2017; Ambient Temp: 22.6°C; Tissue Temp: 21.4°C

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

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 13.3 W/kg
SAR(1 g) = 6.06 W/kg
Deviation(1 g) = 5.21%



0 dB = 8.16 W/kg = 9.12 dBW/kg

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

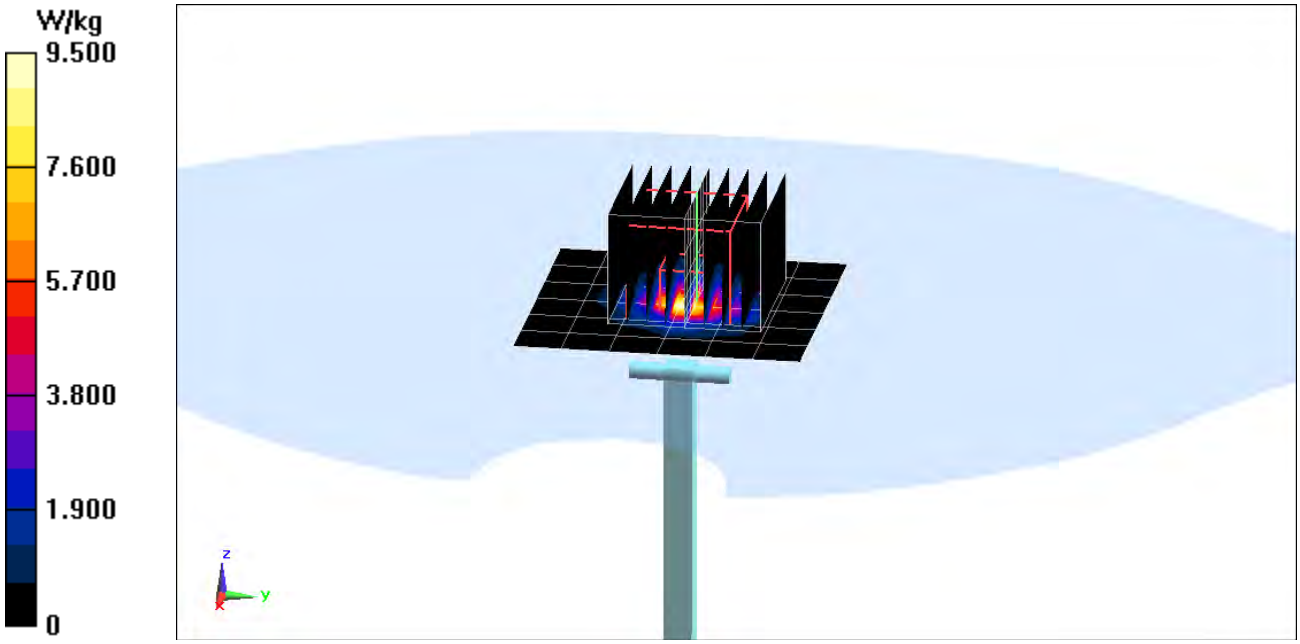
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
$f = 5250$ MHz; $\sigma = 4.576$ S/m; $\varepsilon_r = 35.853$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 21.1°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN3914; ConvF(5.49, 5.49, 5.49); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 3.87 W/kg
Deviation(1 g) = -2.27%



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

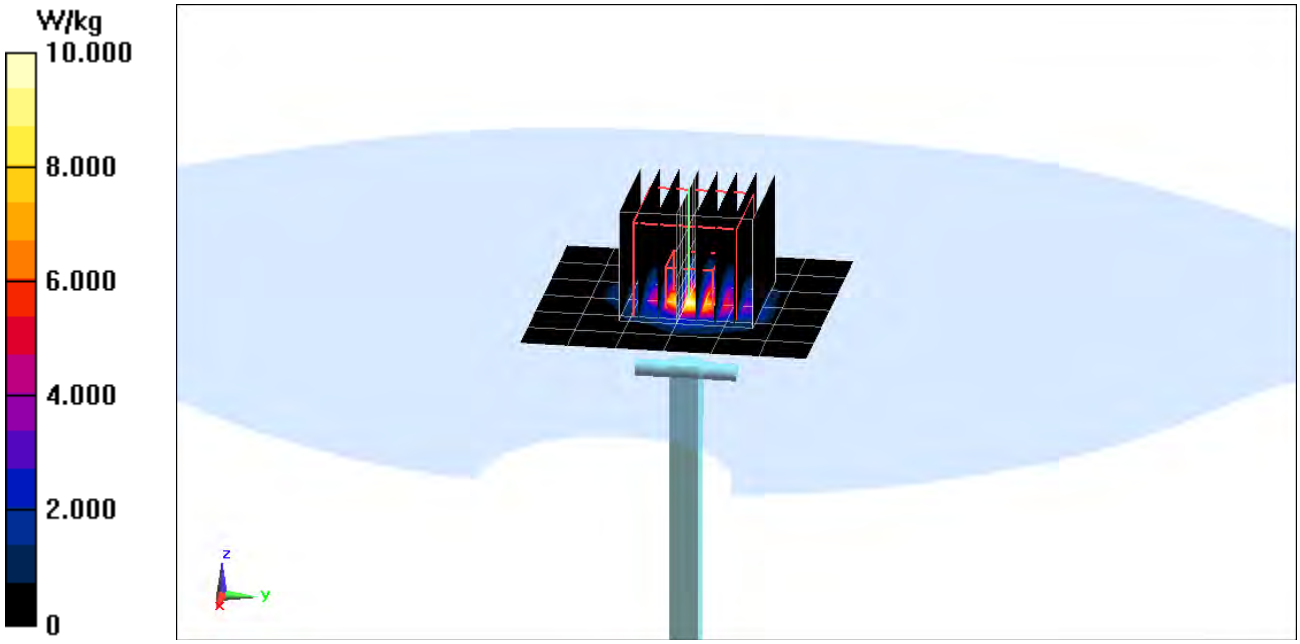
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used:
f = 5600 MHz; σ = 4.913 S/m; ε_r = 35.421; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 21.1°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN3914; ConvF(4.94, 4.94, 4.94); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.1 W/kg
SAR(1 g) = 4.05 W/kg
Deviation(1 g) = -2.76%



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

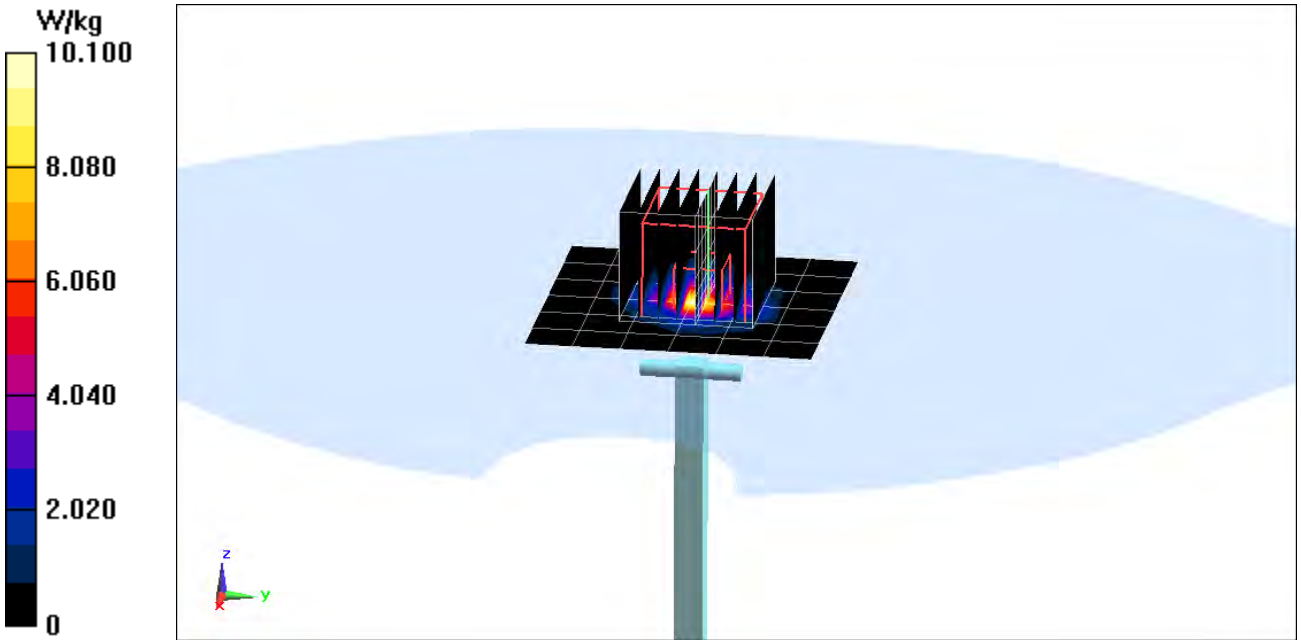
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5GHz Head Medium parameters used (interpolated):
f = 5750 MHz; σ = 5.08 S/m; ε_r = 35.188; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 21.1°C; Tissue Temp: 20.0°C

Probe: EX3DV4 - SN3914; ConvF(4.91, 4.91, 4.91); Calibrated: 2/13/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 4.00 W/kg
Deviation(1 g) = -1.84%



DUT: Dipole 750 MHz; Type: D750V3; Serial: 1034

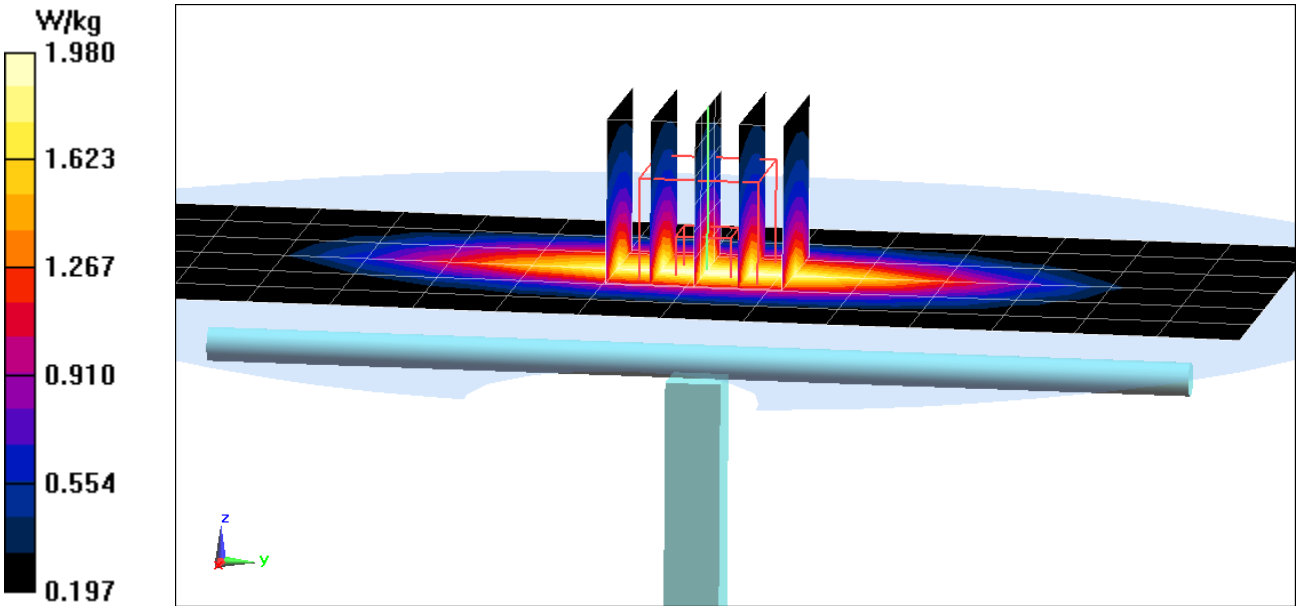
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.966 S/m; ε_r = 55.718; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-04-2017; Ambient Temp: 20.7°C; Tissue Temp: 20.6°C

Probe: ES3DV3 - SN3209; ConvF(6.44, 6.44, 6.44); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.48 W/kg
SAR(1 g) = 1.71 W/kg
Deviation(1 g) = -1.84%



DUT: Dipole 750 MHz; Type: D750V3; Serial: 1034

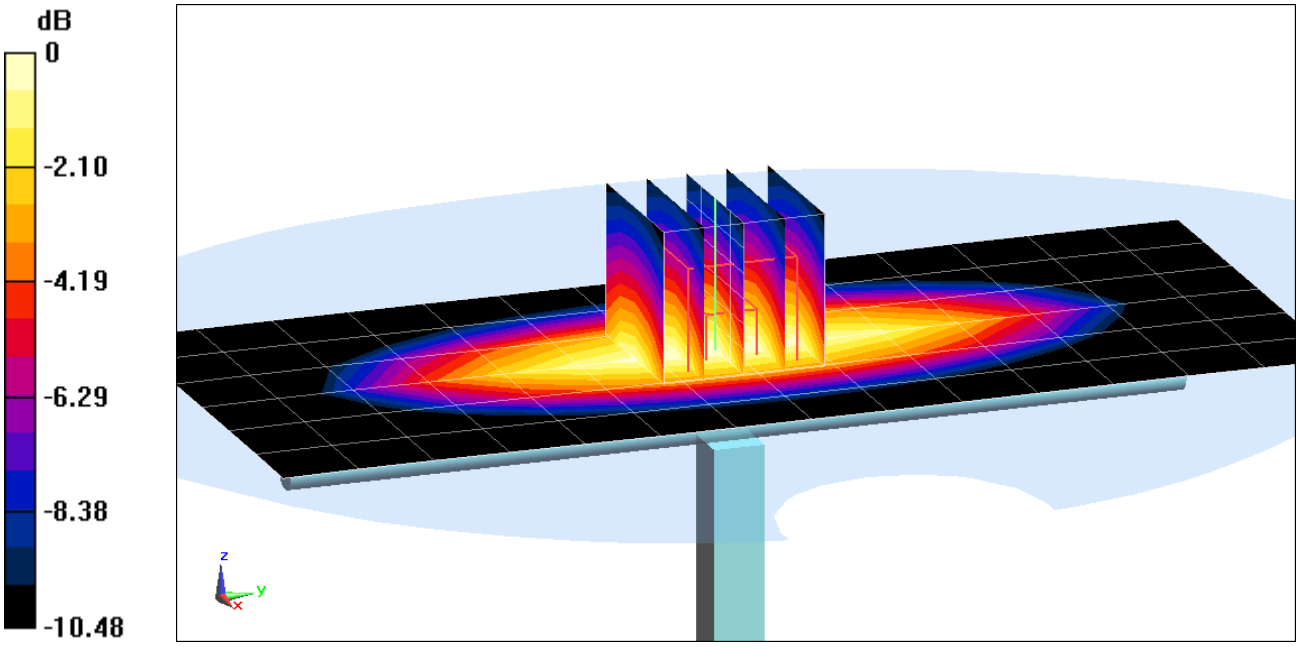
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium: 750 Body Medium parameters used (interpolated):
f = 750 MHz; σ = 0.975 S/m; ε_r = 55.332; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-08-2017; Ambient Temp: 22.7°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7406; ConvF(9.9, 9.9, 9.9); Calibrated: 4/18/2017;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1407; Calibrated: 4/11/2017
Phantom: SAM Left; Type: QD000P40CD; Serial: TP:7535
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

750 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.88 W/kg
SAR(1 g) = 1.86 W/kg
Deviation(1 g) = 6.77%



0 dB = 2.51 W/kg = 4.00 dBW/kg

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d180

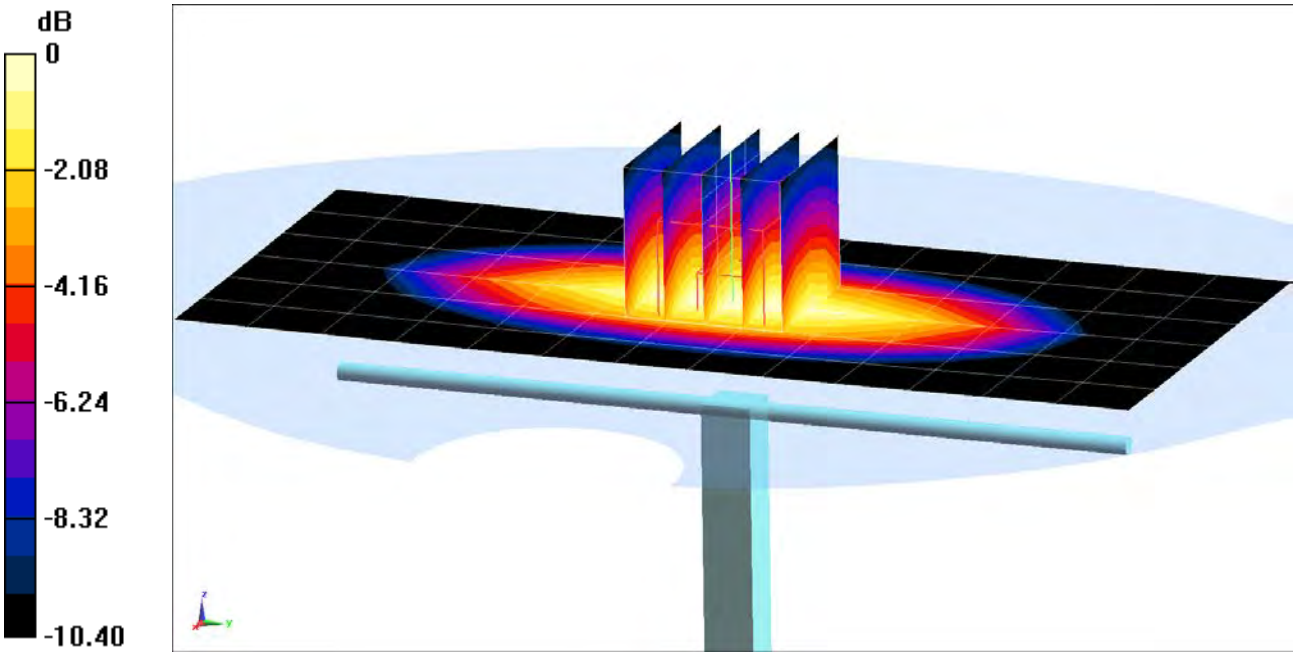
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 1 S/m; ε_r = 53.872; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5cm

Test Date: 08-03-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3319; ConvF(6.29, 6.29, 6.29); Calibrated: 03/04/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 03/08/2017
Phantom: SAM 5.0 front; Type: QD000P40CD; Serial: TP:-1648
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 3.01 W/kg
SAR(1 g) = 2.04 W/kg
Deviation(1 g) = 6.14%



0 dB = 2.38 W/kg = 3.77 dBW/kg

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

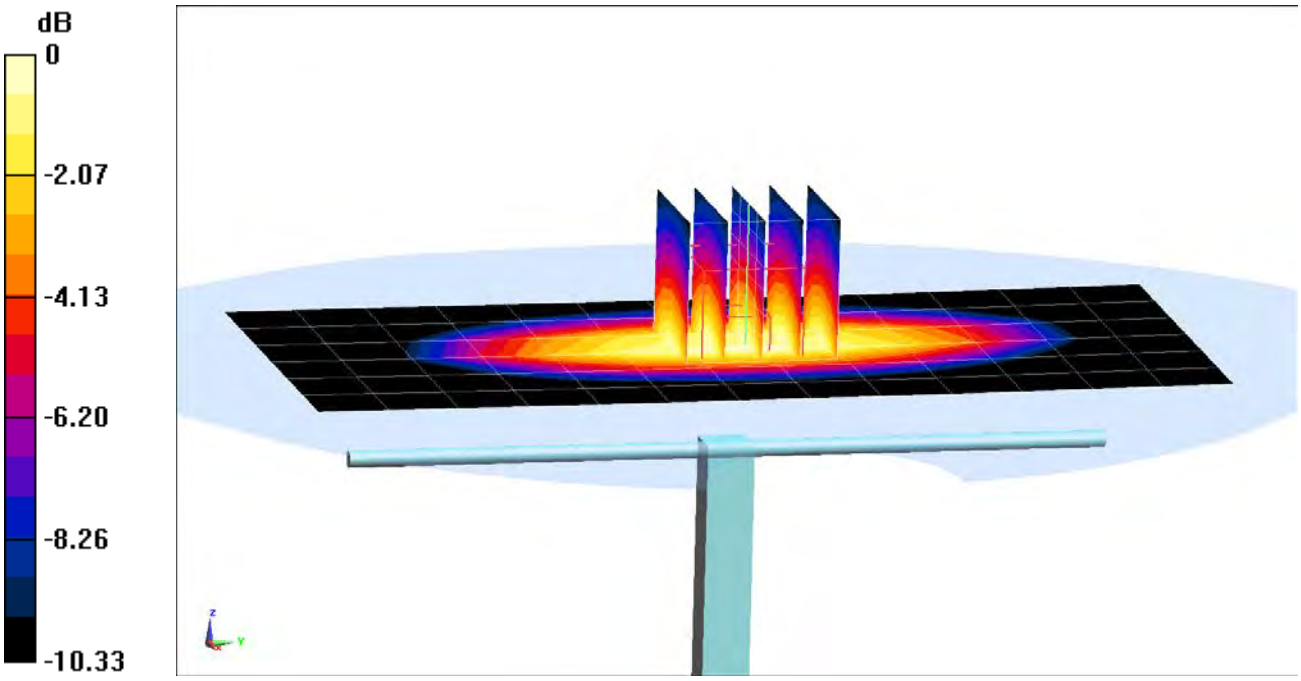
Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used:
f = 835 MHz; σ = 0.974 S/m; ε_r = 52.87; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-04-2017; Ambient Temp: 22.4°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3213; ConvF(6.28, 6.28, 6.28); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 2/9/2017
Phantom: SAM Front; Type: QD000P40CD; Serial: TP:1758
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

835 MHz System Verification at 23.0 dBm (200 mW)

Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 2.84 W/kg
SAR(1 g) = 1.94 W/kg
Deviation(1 g) = -1.02%



0 dB = 2.25 W/kg = 3.52 dBW/kg

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1092

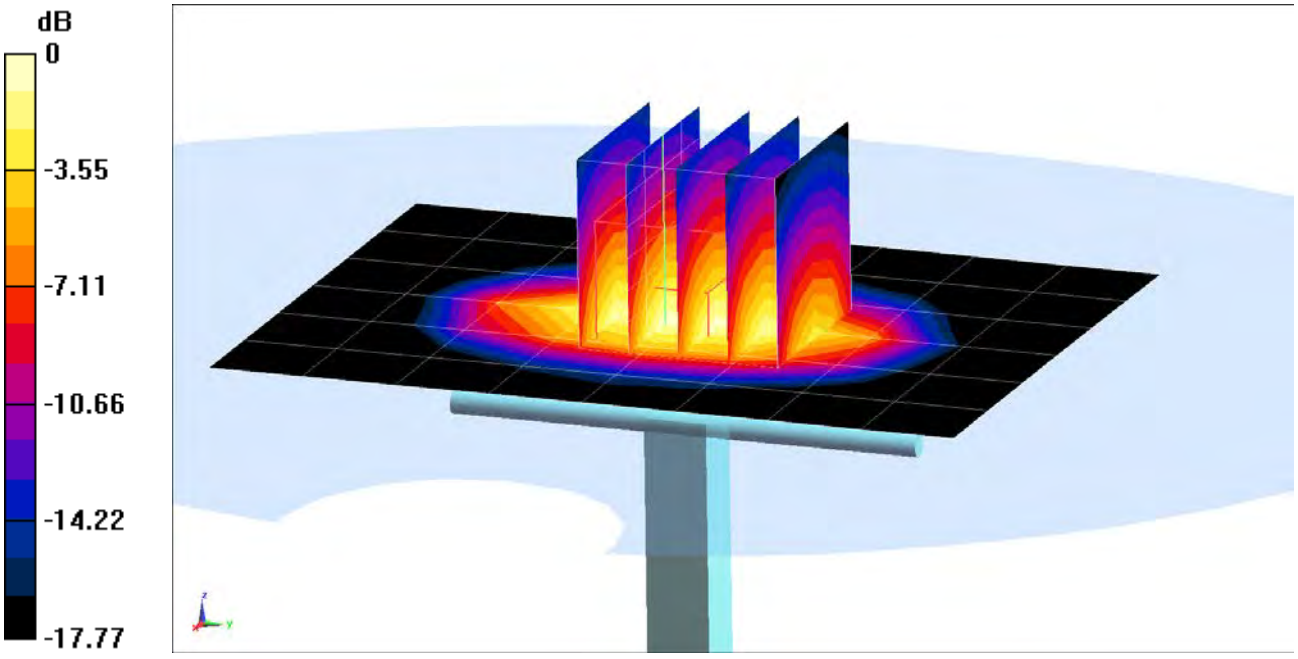
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.509 S/m; ε_r = 51.024; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 22.5°C; Tissue Temp: 21.3°C

Probe: ES3DV3 - SN3319; ConvF(5.07, 5.07, 5.07); Calibrated: 03/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 03/08/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

1750 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 6.67 W/kg
SAR(1 g) = 3.80 W/kg
Deviation(1 g) = 2.70%



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

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1092

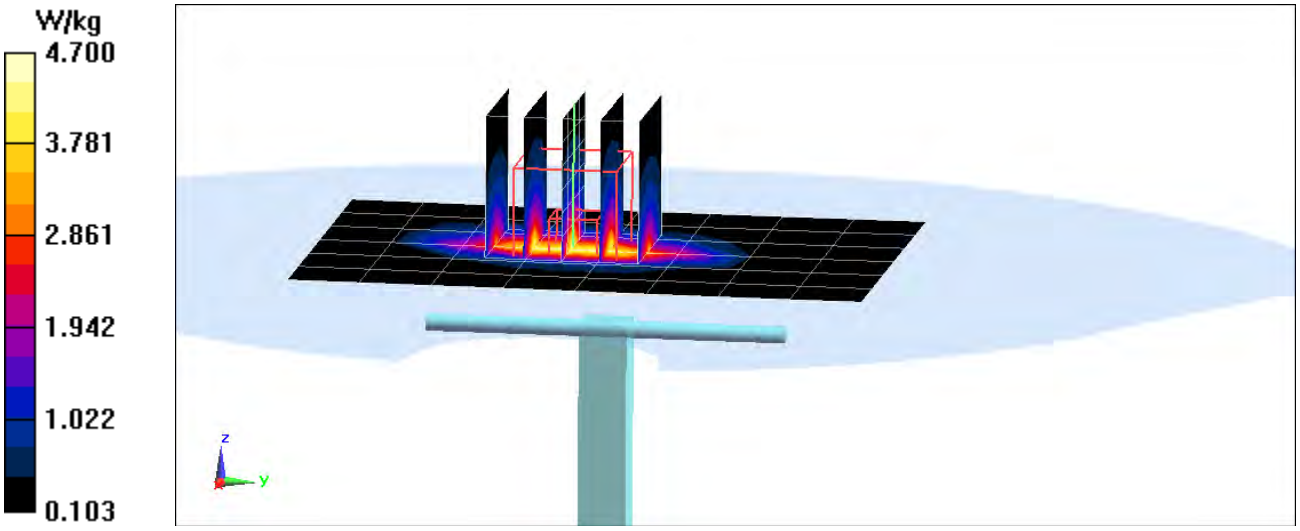
Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: 1750 Body Medium parameters used:
f = 1750 MHz; σ = 1.506 S/m; ε_r = 51.942; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 19.5°C; Tissue Temp: 21.0°C

Probe: ES3DV3 - SN3209; ConvF(5.13, 5.13, 5.13); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0; Type: QD000P40CD; Serial: TP:1800
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 6.58 W/kg
SAR(1 g) = 3.75 W/kg
Deviation(1 g) = 1.35%



DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d026

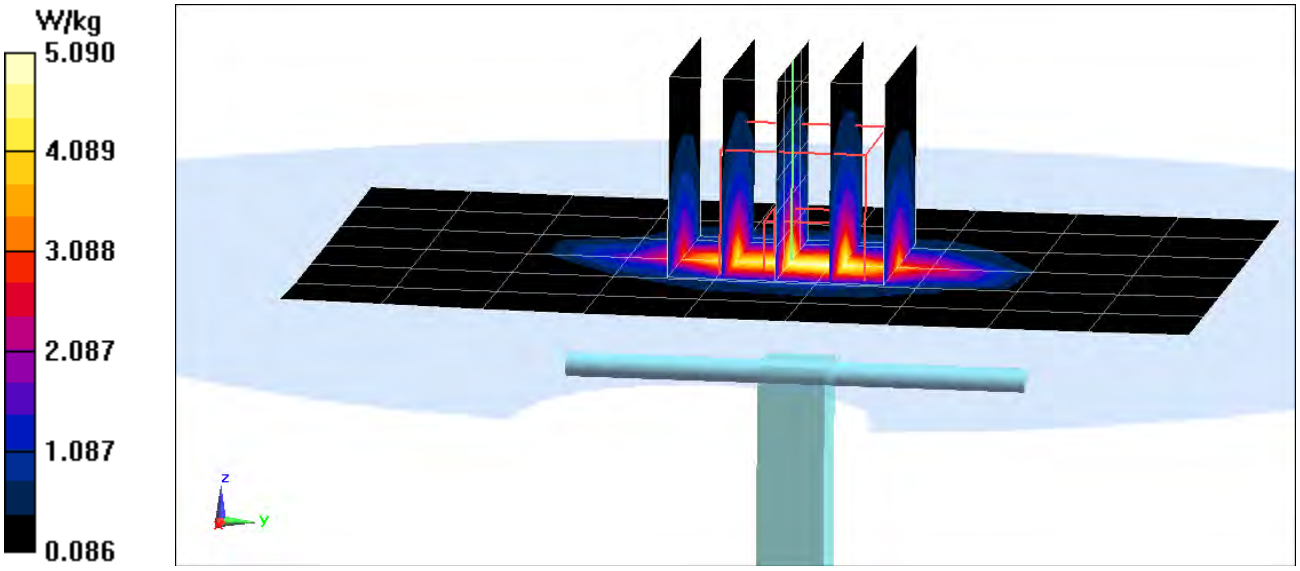
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.575 S/m; ε_r = 53.266; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-27-2017; Ambient Temp: 20.6°C; Tissue Temp: 21.8°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.14 W/kg
SAR(1 g) = 4.04 W/kg
Deviation(1 g) = 0.25%



DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d026

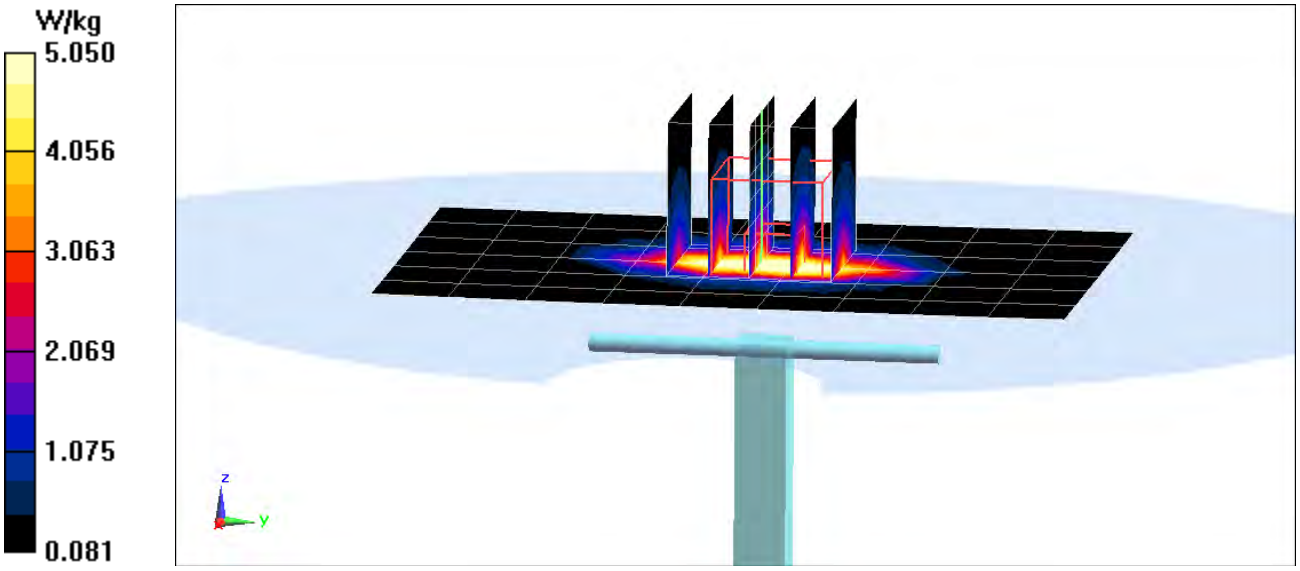
Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: 1900 Body Medium parameters used (interpolated):
f = 1900 MHz; σ = 1.579 S/m; ε_r = 53.211; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2017; Ambient Temp: 21.3°C; Tissue Temp: 21.6°C

Probe: ES3DV3 - SN3209; ConvF(4.93, 4.93, 4.93); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1415; Calibrated: 3/13/2017
Phantom: SAM with CRP v4.0 Left; Type: QD000P40CD; Serial: TP:1692
Measurement SW: DASY52, Version 52.10; SEMCAD X Version 14.6.10 (7417)

1900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Peak SAR (extrapolated) = 7.18 W/kg
SAR(1 g) = 4.04 W/kg; SAR(10 g) = 2.10 W/kg
Deviation(1 g) = 0.25%; Deviation(10 g) = -2.33%



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

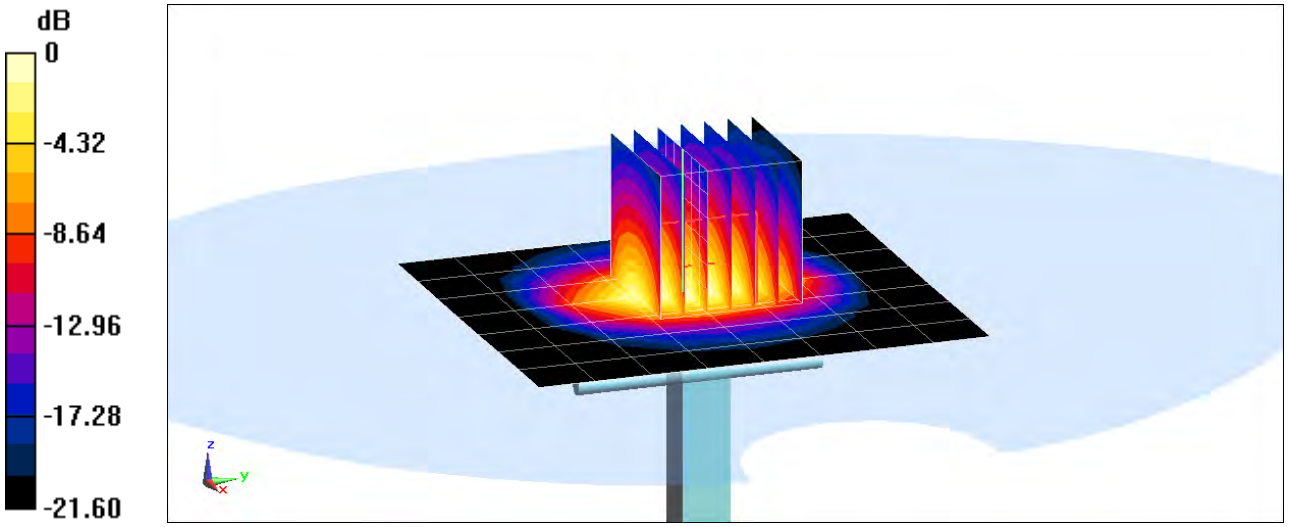
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.008 S/m; ε_r = 52.04; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3287; ConvF(4.35, 4.35, 4.35); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 5.39 W/kg
Deviation(1 g) = 6.31%



0 dB = 6.90 W/kg = 8.39 dBW/kg

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 945

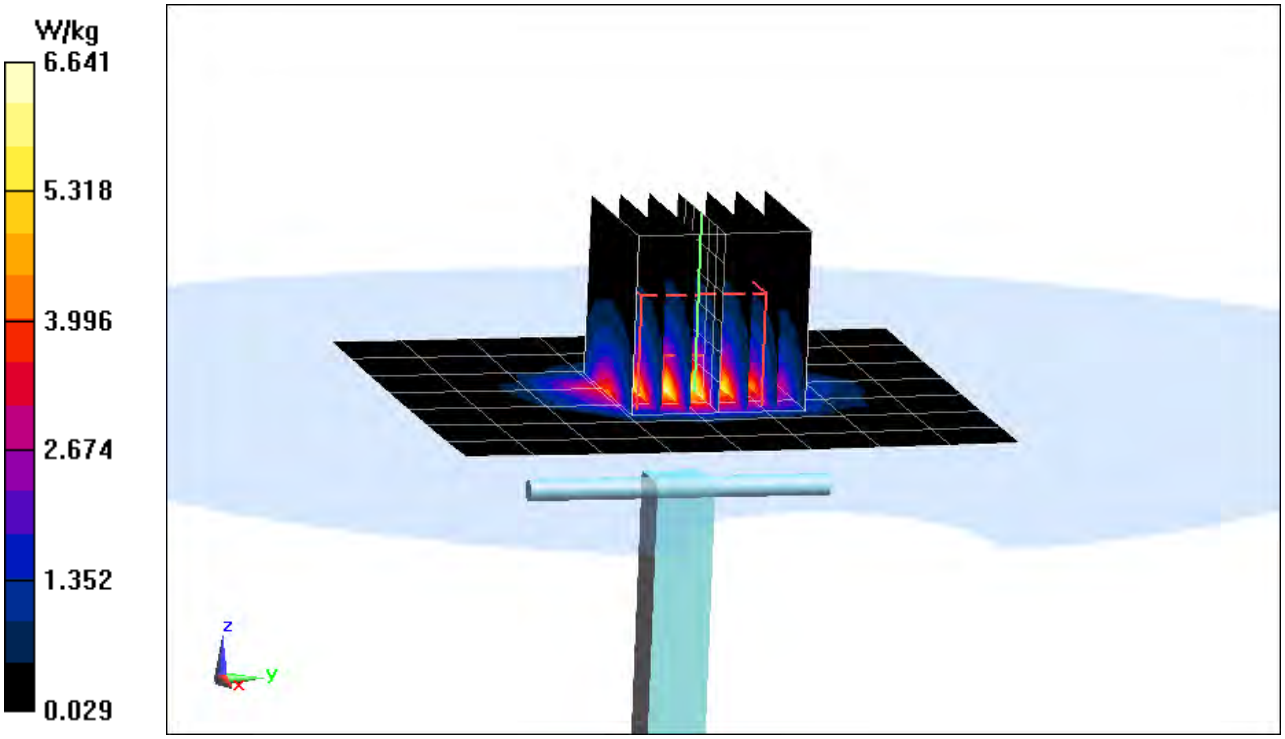
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 2.005 S/m; ε_r = 51.277; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 22.3°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3287; ConvF(4.35, 4.35, 4.35); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.0 W/kg
SAR(1 g) = 5.08 W/kg
Deviation(1 g) = 1.20%



DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 945

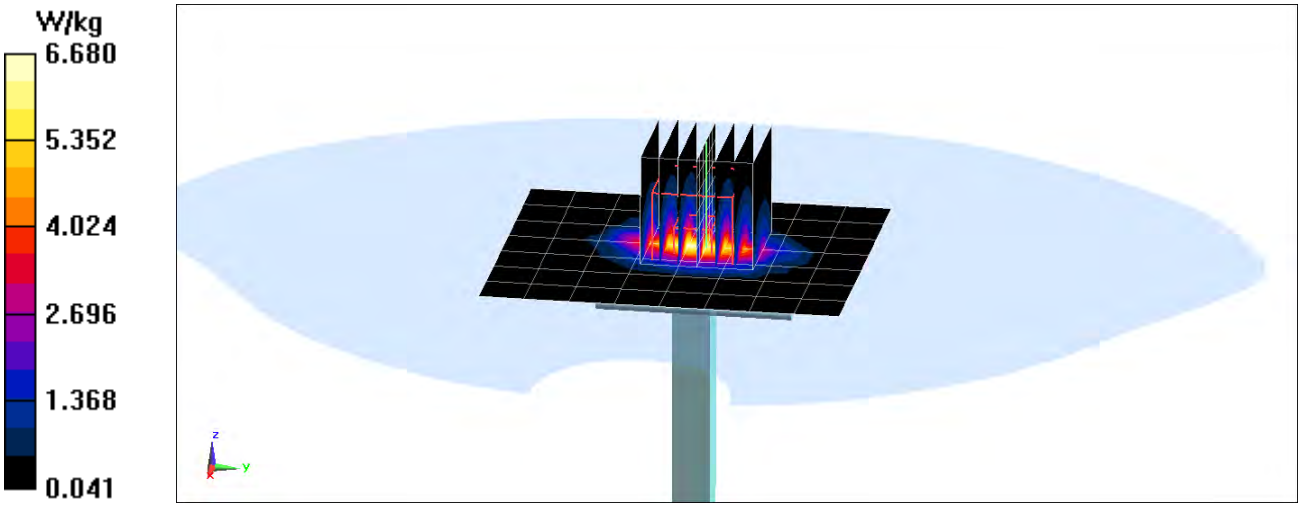
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2.45 GHz Body Medium parameters used:
f = 2450 MHz; σ = 1.942 S/m; ε_r = 51.212; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 20.8°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3318; ConvF(4.55, 4.55, 4.55); Calibrated: 2/10/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn665; Calibrated: 2/9/2017
Phantom: SAM with CRP v5.0 (Right); Type: QD000P40CD; Serial: TP:1759
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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) = 10.9 W/kg
SAR(1 g) = 5.10 W/kg
Deviation(1 g) = 1.59%



DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 945

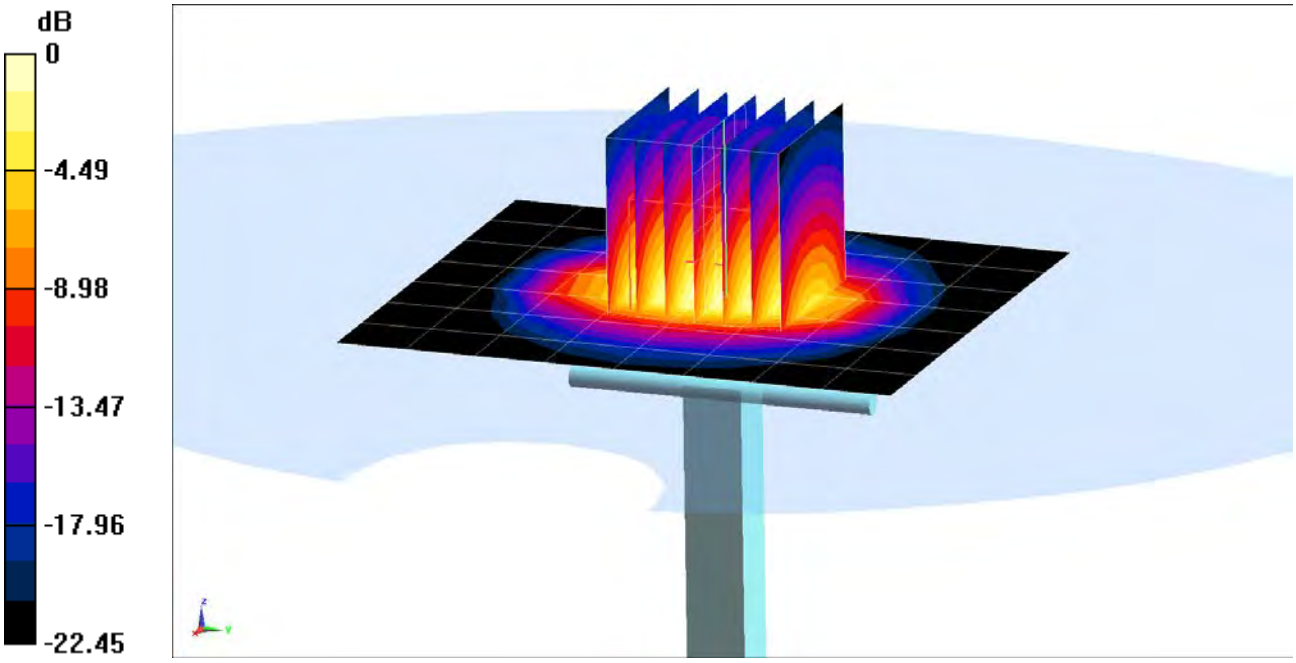
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used:
f = 2450 MHz; σ = 1.99 S/m; ε_r = 50.74; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-22-2017; Ambient Temp: 23.1°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3319; ConvF(4.42, 4.42, 4.42); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 10.6 W/kg
SAR(10 g) = 2.37 W/kg
Deviation(10 g) = 0.00%



0 dB = 6.74 W/kg = 8.29 dBW/kg

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1071

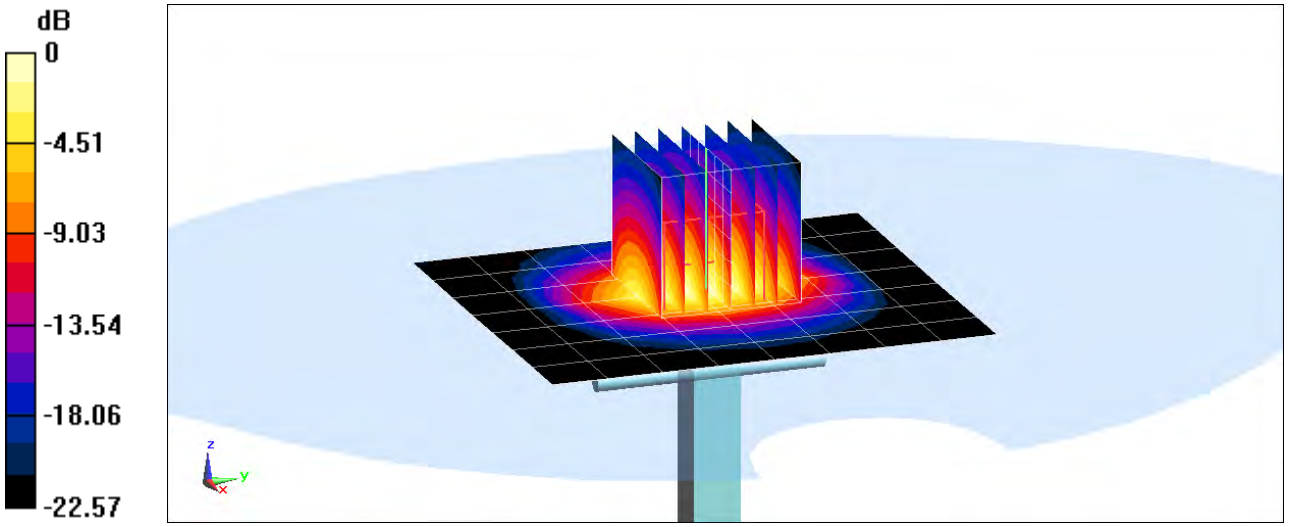
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; σ = 2.211 S/m; ε_r = 51.472; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-03-2017; Ambient Temp: 21.7°C; Tissue Temp: 22.0°C

Probe: ES3DV3 - SN3287; ConvF(4.12, 4.12, 4.12); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.7 W/kg
SAR(1 g) = 5.80 W/kg
Deviation(1 g) = 7.01%



0 dB = 7.57 W/kg = 8.79 dBW/kg

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

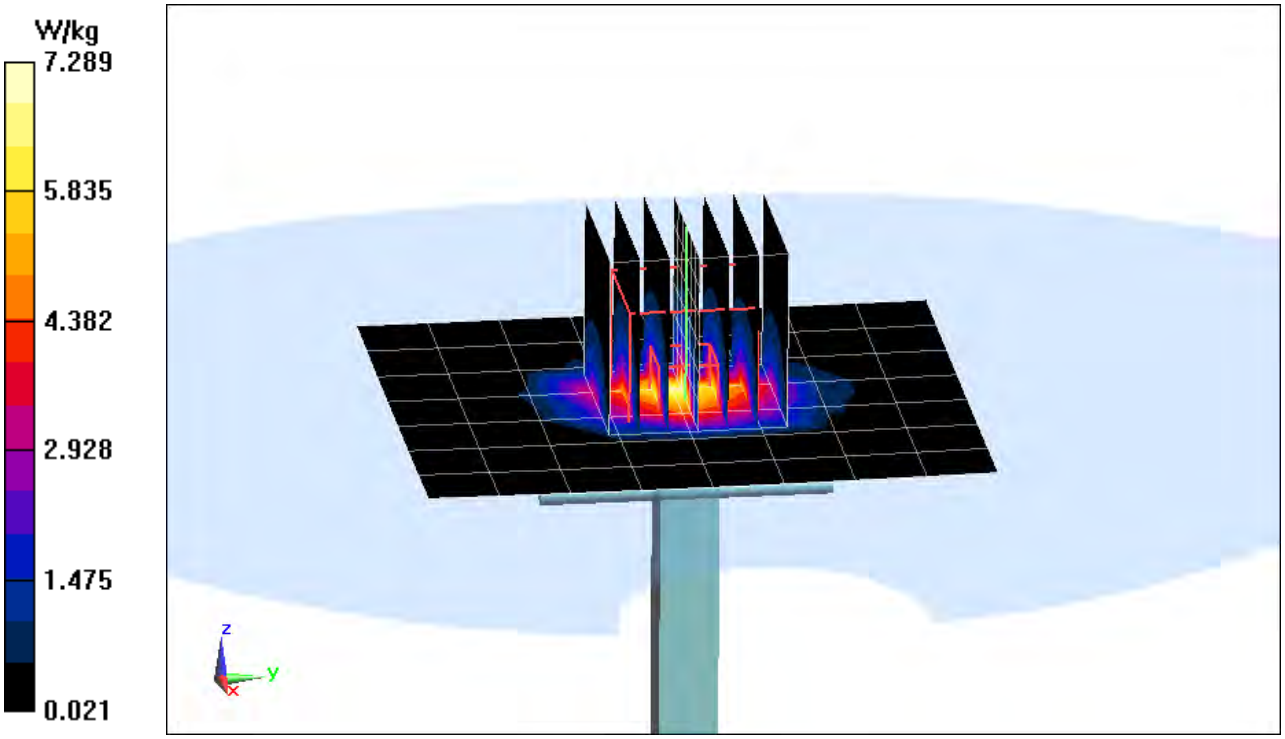
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; σ = 2.213 S/m; ε_r = 50.656; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 22.3°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3287; ConvF(4.12, 4.12, 4.12); Calibrated: 9/19/2016;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1408; Calibrated: 9/14/2016
Phantom: SAM Left; Type: QD000P40CA; Serial: TP:82355
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

2600 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 12.8 W/kg
SAR(1 g) = 5.63 W/kg
Deviation(1 g) = 1.81%



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

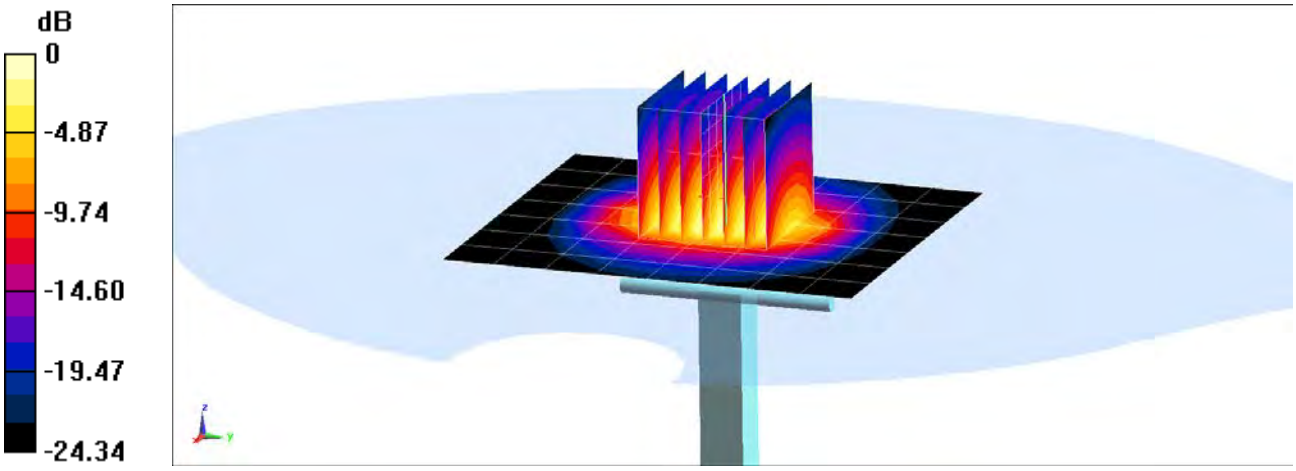
Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1
Medium: 2600 Body Medium parameters used:
f = 2600 MHz; σ = 2.195 S/m; ε_r = 50.137; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-22-2017; Ambient Temp: 23.1°C; Tissue Temp: 20.9°C

Probe: ES3DV3 - SN3319; ConvF(4.18, 4.18, 4.18); Calibrated: 3/14/2017;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1368; Calibrated: 3/8/2017
Phantom: SAM V5.0 Right; Type: QD000P40CD; Serial: 1647
Measurement SW: DASY52, Version 52.10;SEMCAD X Version 14.6.10 (7417)

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(10 g) = 2.59 W/kg
Deviation(10 g) = 4.02%



0 dB = 7.72 W/kg = 8.88 dBW/kg

DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1123

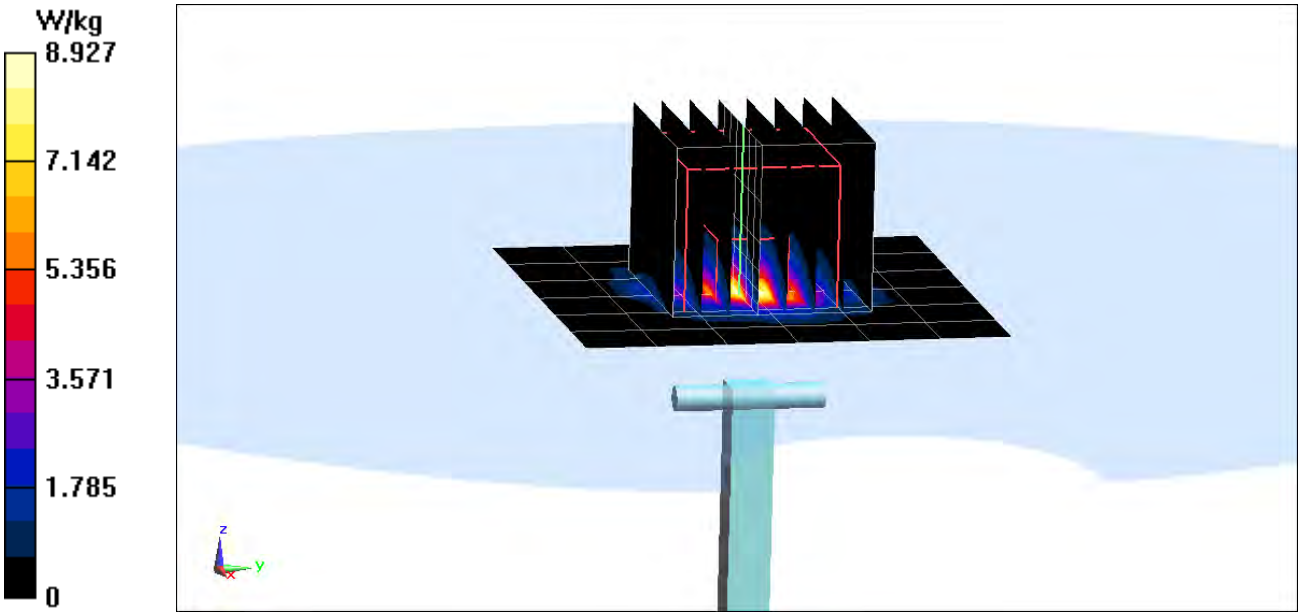
Communication System: UID 0, CW; Frequency: 5250 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
$f = 5250$ MHz; $\sigma = 5.378$ S/m; $\varepsilon_r = 47.761$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.0°C

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

5250 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 3.73 W/kg; SAR(10 g) = 1.04 W/kg
Deviation(1 g) = -1.71%; Deviation(10 g) = -2.35%



DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1123

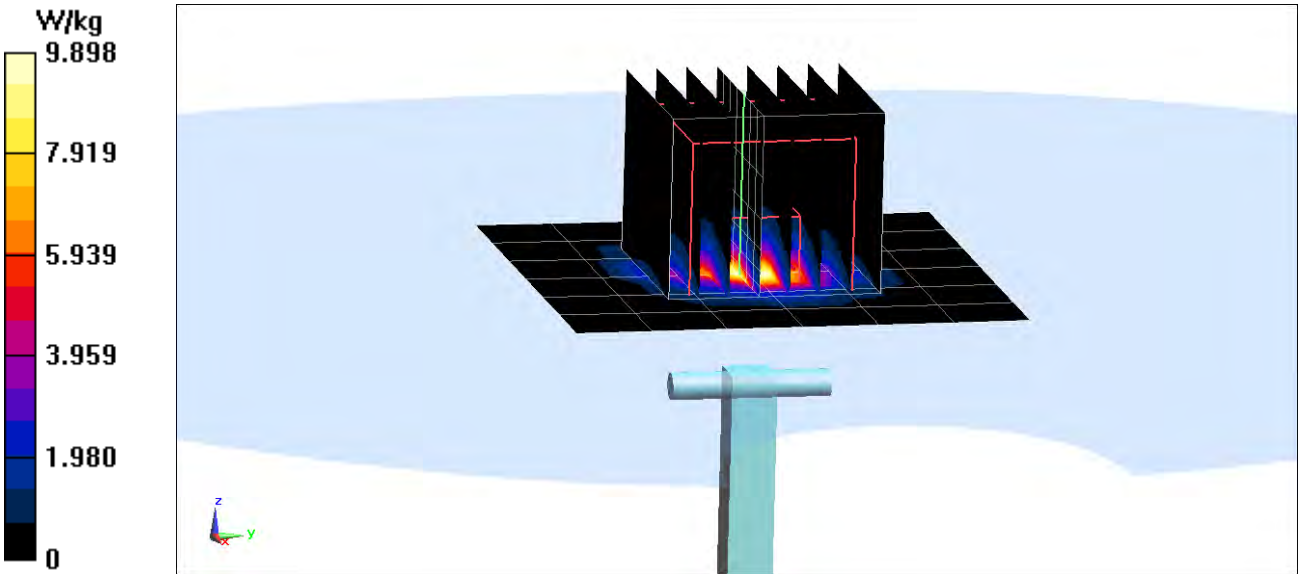
Communication System: UID 0, CW; Frequency: 5600 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used:
f = 5600 MHz; σ = 5.846 S/m; ε_r = 47.191; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.0°C

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

5600 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 3.95 W/kg; SAR(10 g) = 1.09 W/kg
Deviation(1 g) =0.13%; Deviation(10 g) = -1.36%



DUT: Dipole 5 GHz; Type: D5GHzV2; Serial: 1123

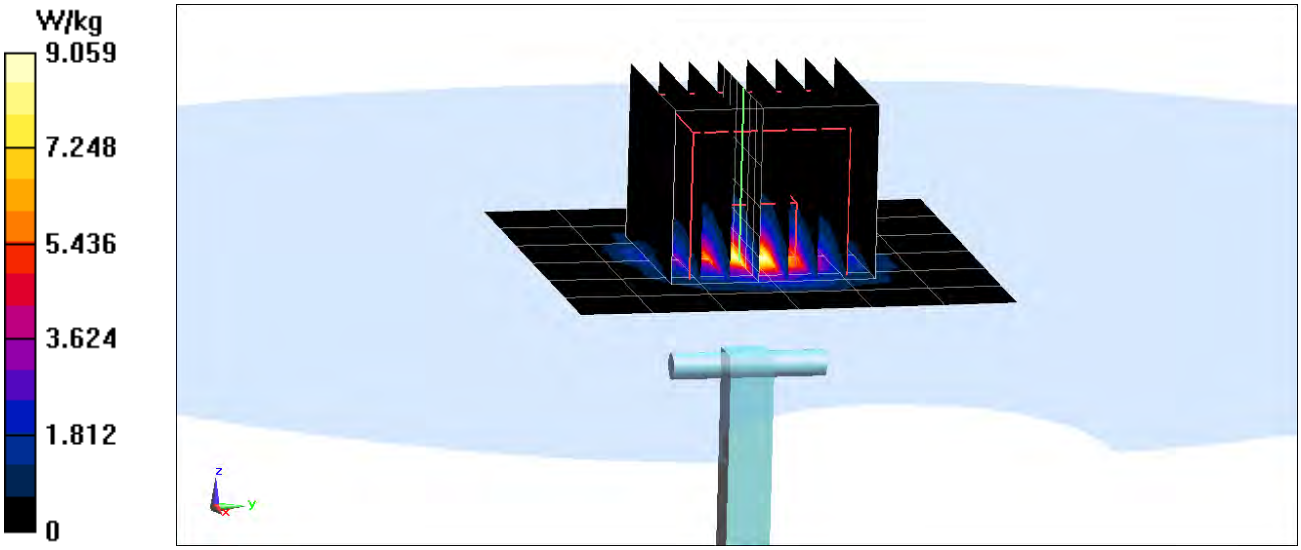
Communication System: UID 0, CW; Frequency: 5750 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body Medium parameters used (interpolated):
f = 5750 MHz; σ = 6.027 S/m; ε_r = 46.99; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2017; Ambient Temp: 21.8°C; Tissue Temp: 21.0°C

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

5750 MHz System Verification at 17.0 dBm (50 mW)

Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 3.68 W/kg
Deviation(1 g) = -3.54%



APPENDIX C: PROBE CALIBRATION

© 2017 PCTEST Engineering Laboratory, Inc.

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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1054_Mar17

CALIBRATION CERTIFICATE

Object D750V3 - SN:1054

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

BNV 03-27-2017

Calibration date: March 07, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-18

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

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 14, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.37 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.50 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.6 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.61 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.68 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.7 Ω - 0.7 jΩ
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7 Ω - 3.6 jΩ
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 08, 2011

DASY5 Validation Report for Head TSL

Date: 07.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

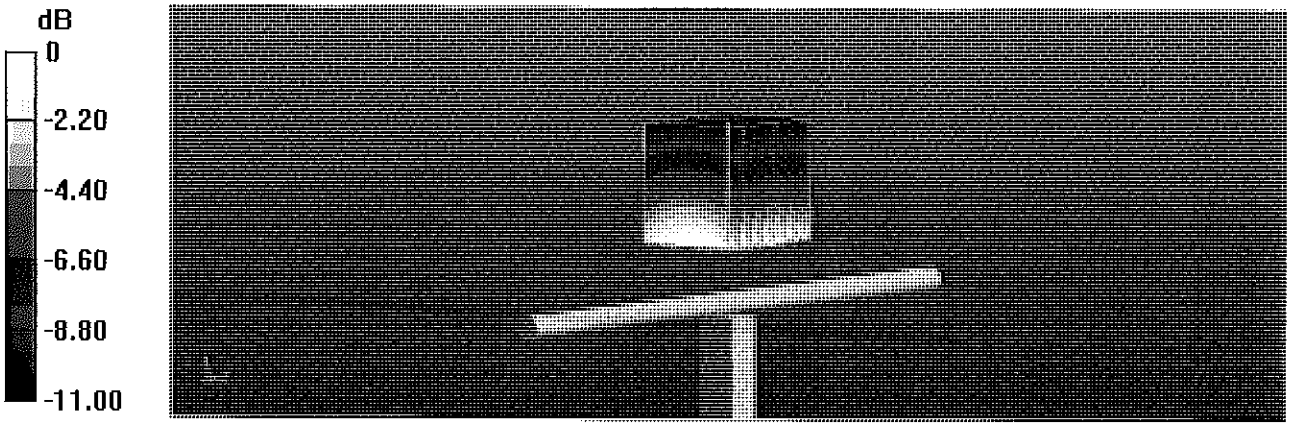
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.17, 10.17, 10.17); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

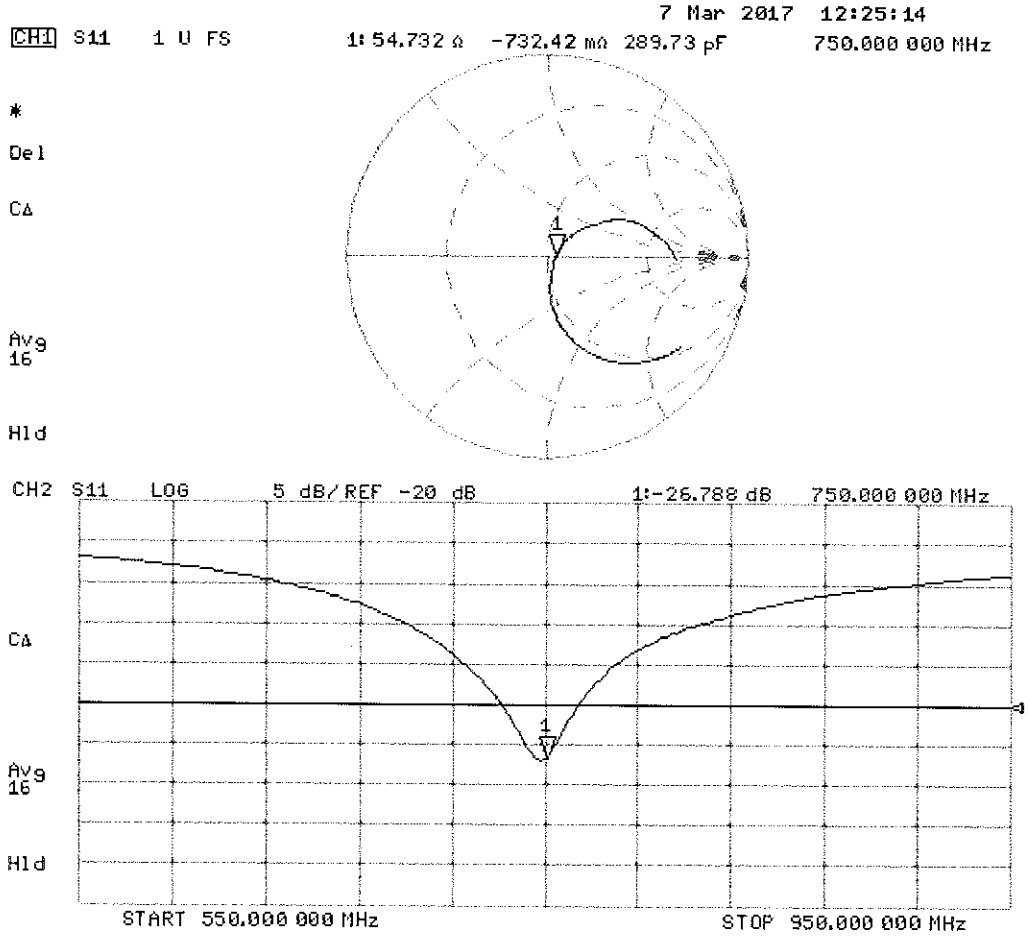
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.71 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.21 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

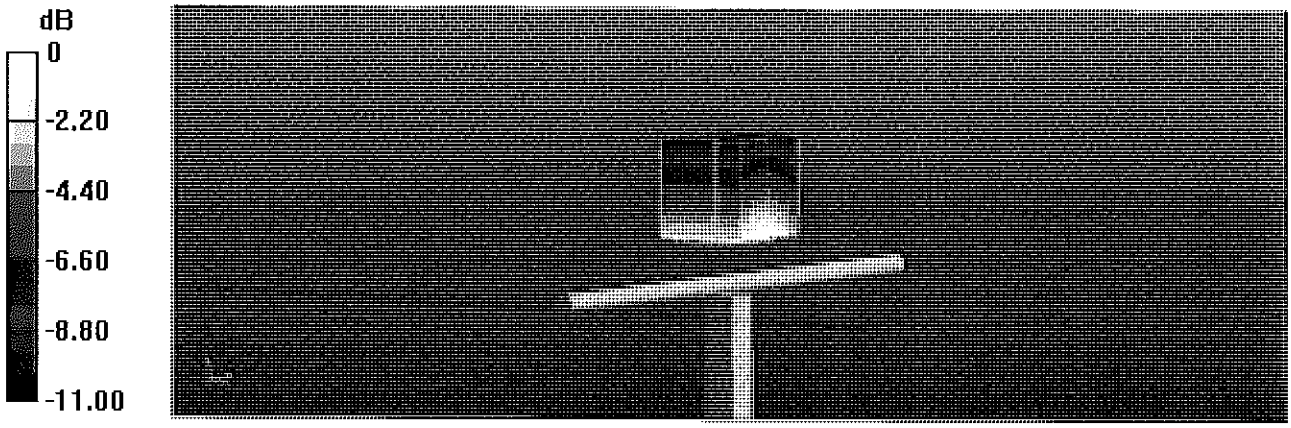
Communication System: UID 0 - CW ; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.99 S/m; ε_r = 54.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

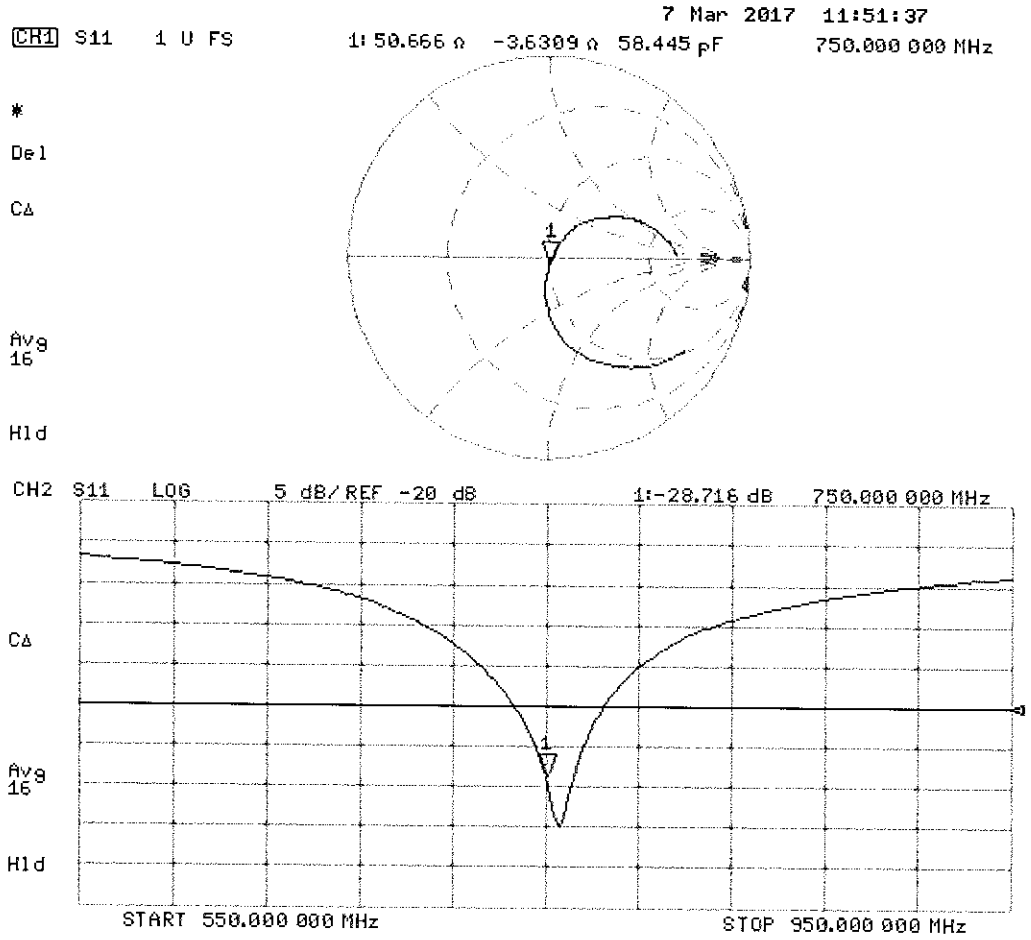
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.88 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.31 W/kg
SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.45 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D750V3-1003_Jan17**

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1003
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	January 11, 2017

BNV
01/26/2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-18

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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 11, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.6 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.39 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.43 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.79 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.78 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.3 Ω - 1.4 jΩ
Return Loss	- 27.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.4 Ω - 6.0 jΩ
Return Loss	- 24.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 21, 2009

DASY5 Validation Report for Head TSL

Date: 11.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

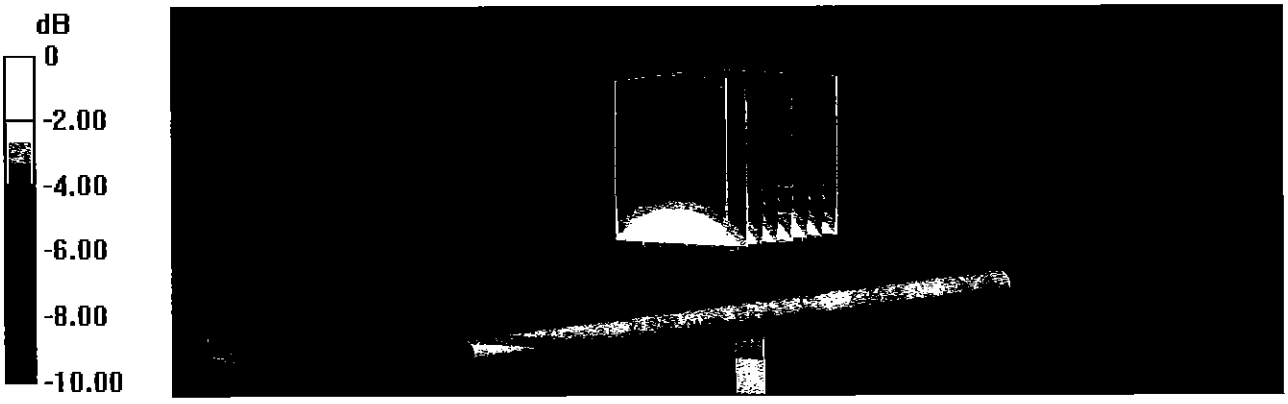
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.89 S/m; ε_r = 41.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.17, 10.17, 10.17); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

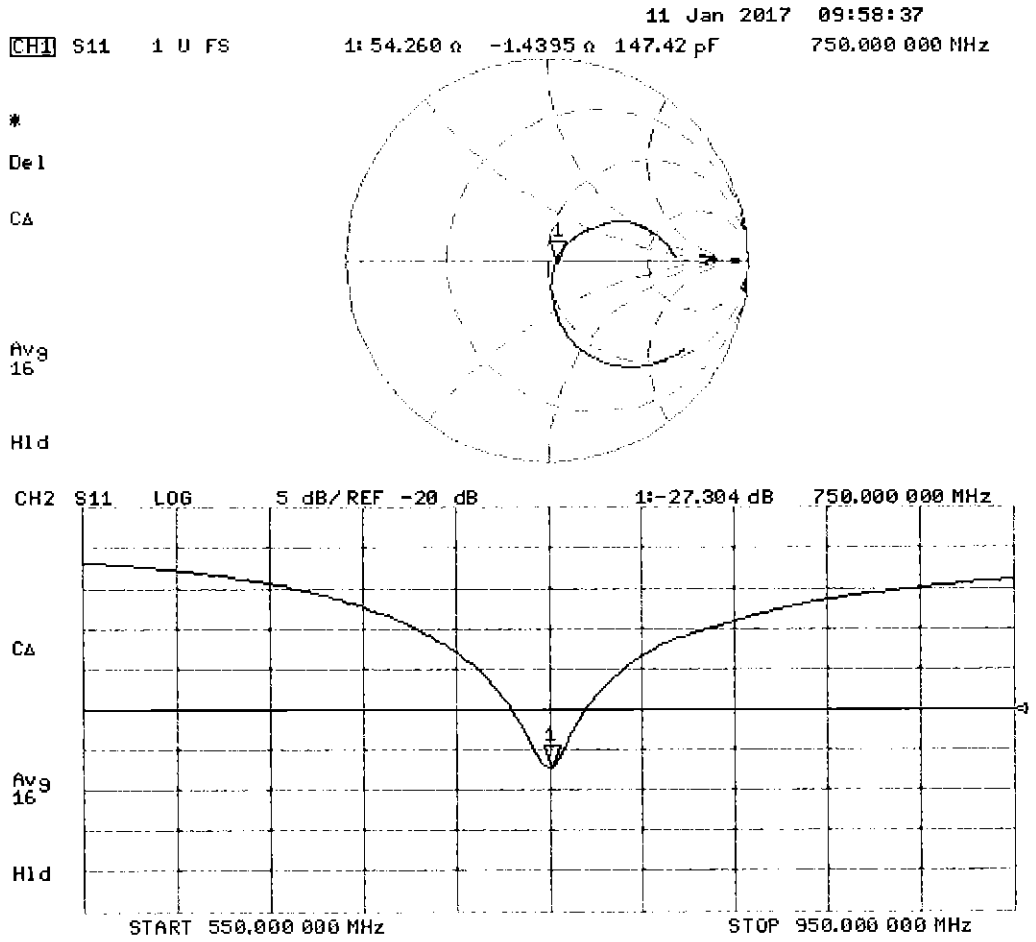
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.38 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.20 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.36 W/kg
Maximum value of SAR (measured) = 2.82 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

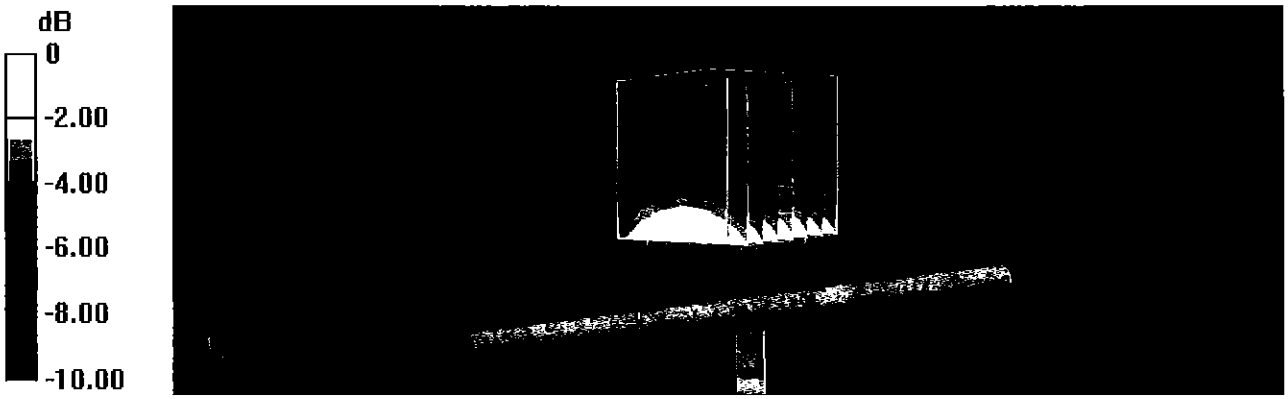
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

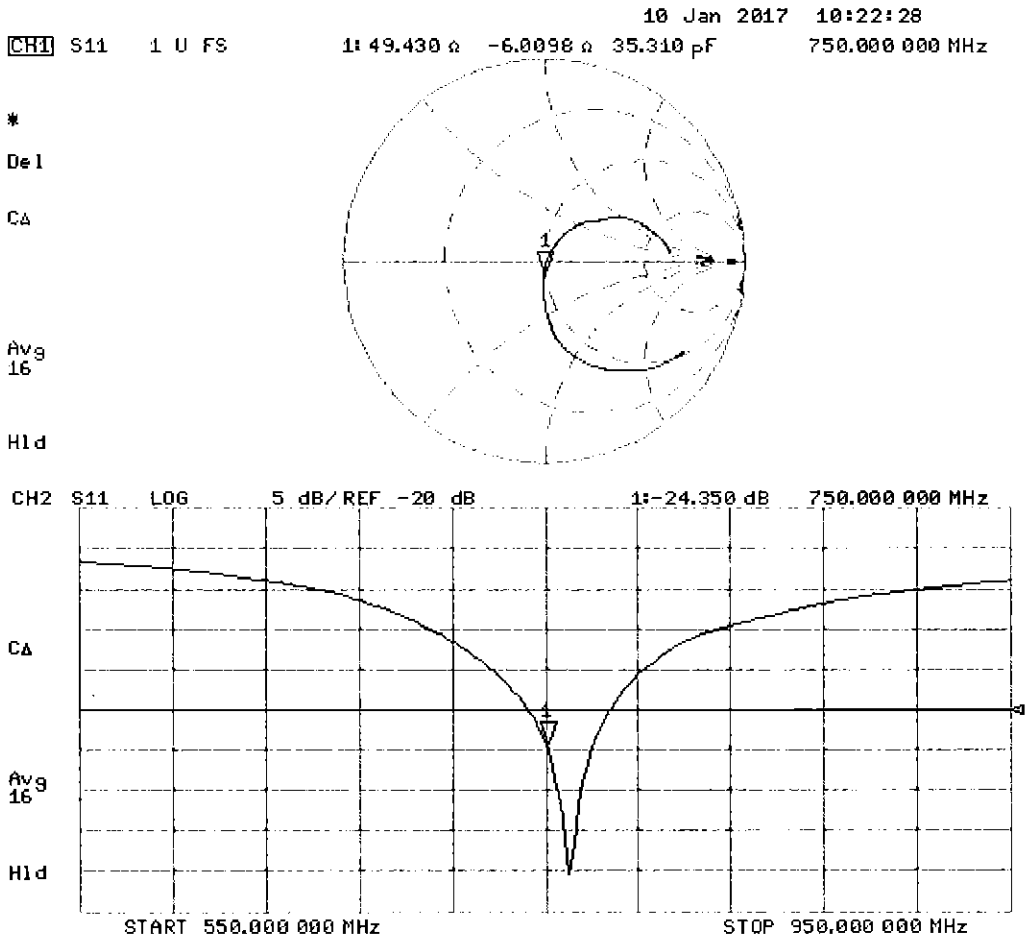
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.22 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.40 W/kg
SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.45 W/kg
Maximum value of SAR (measured) = 2.98 W/kg



0 dB = 2.98 W/kg = 4.74 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d180_May17

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d180
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 11, 2017

BN ✓
05-23-2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

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

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 11, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.26 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.07 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.61 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.32 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω - 5.0 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 8.6 jΩ
Return Loss	- 20.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 24, 2014

DASY5 Validation Report for Head TSL

Date: 11.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d180

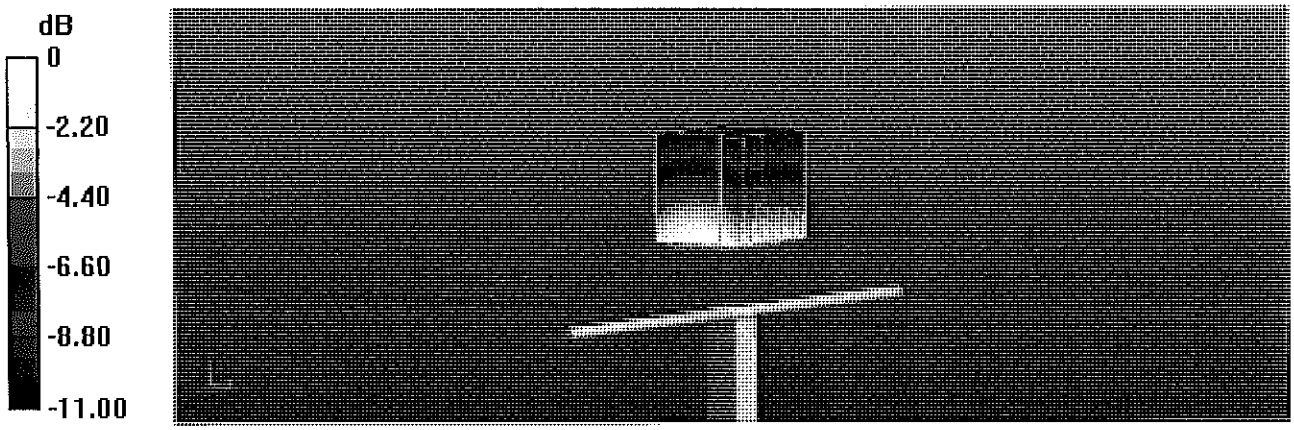
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma = 0.94$ S/m; $\varepsilon_r = 40.8$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1444); SEMCAD X 14.6.10(7416)

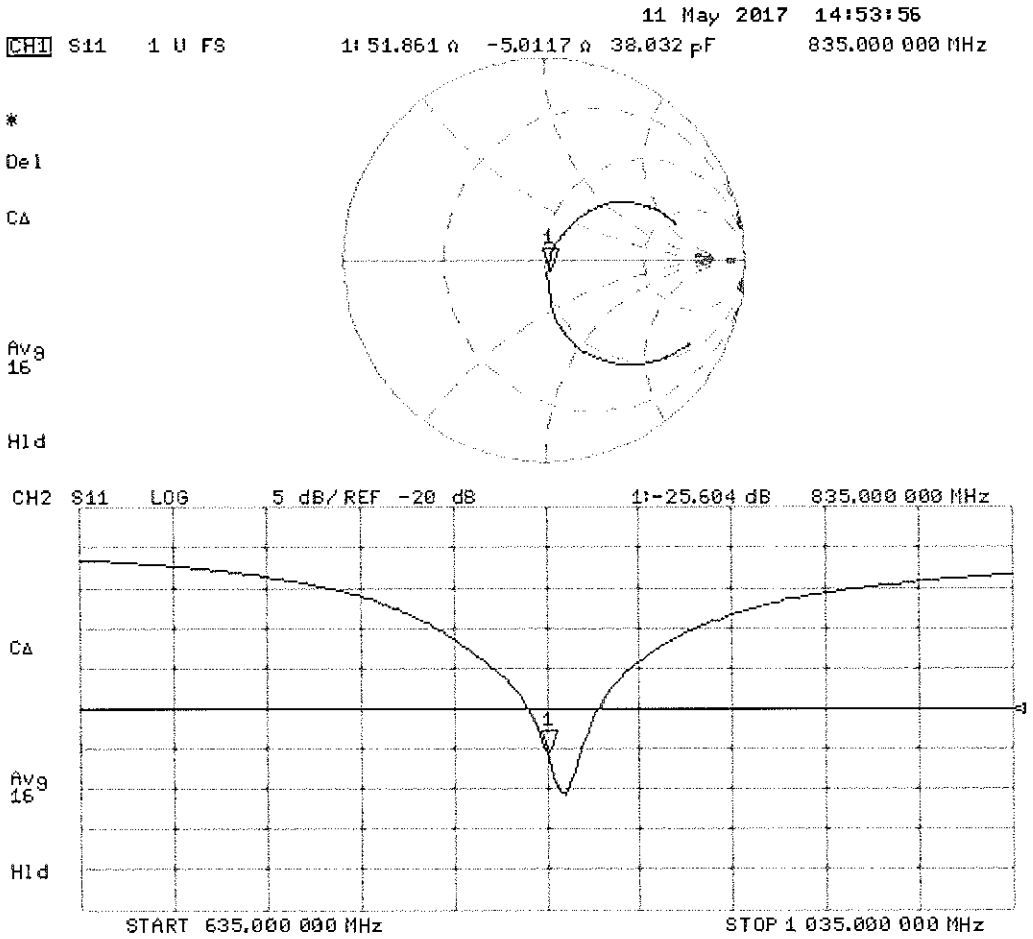
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.02 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (measured) = 3.21 W/kg



0 dB = 3.21 W/kg = 5.07 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d180

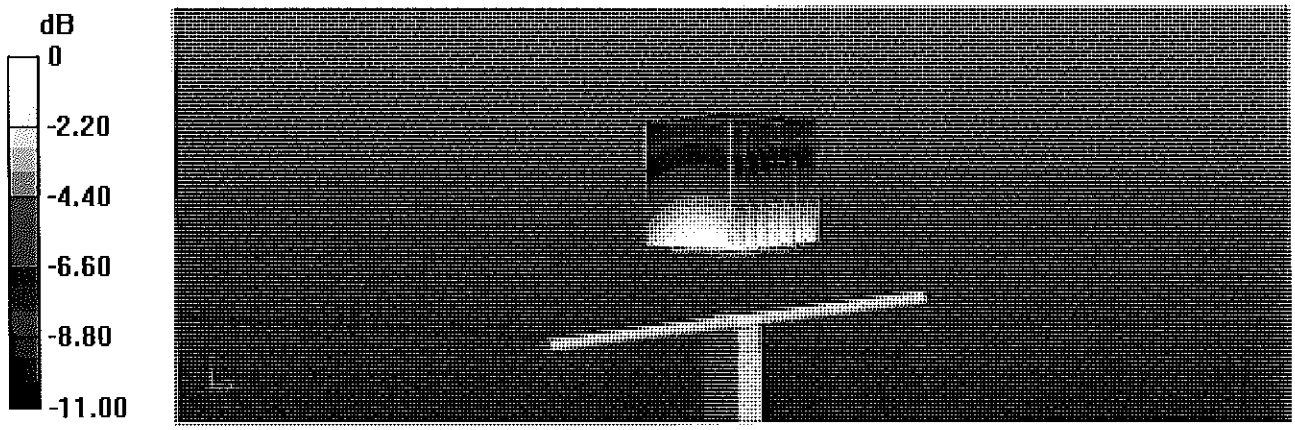
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.99 S/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.73, 9.73, 9.73); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1444); SEMCAD X 14.6.10(7416)

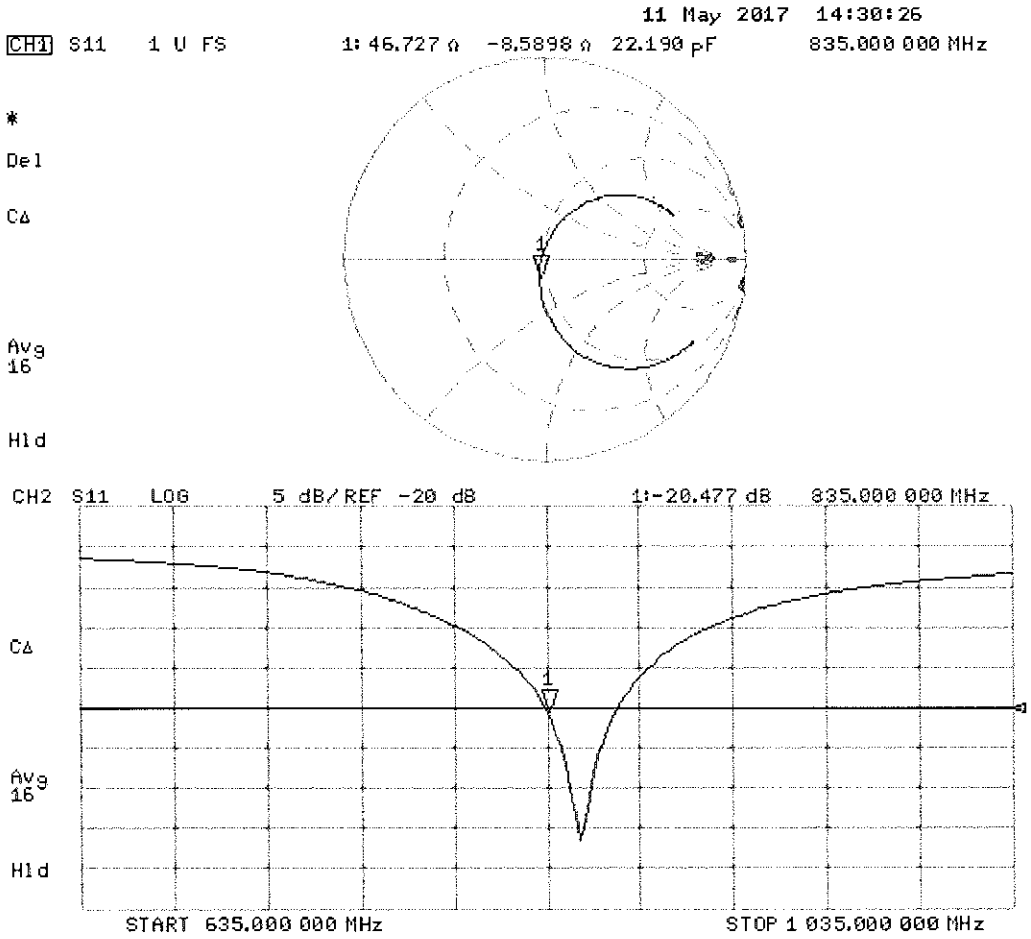
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.10 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.19 W/kg



0 dB = 3.19 W/kg = 5.04 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test** **Certificate No: D1750V2-1092_May17**

CALIBRATION CERTIFICATE

Object D1750V2 - SN:1092

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

BN✓
05-23-2017

Calibration date: May 09, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

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

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

Issued: May 11, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.83 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.7 ± 6 %	1.47 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.8 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.9 Ω - 0.5 jΩ
Return Loss	- 38.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.2 Ω - 0.8 jΩ
Return Loss	- 25.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 07, 2012

DASY5 Validation Report for Head TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1092

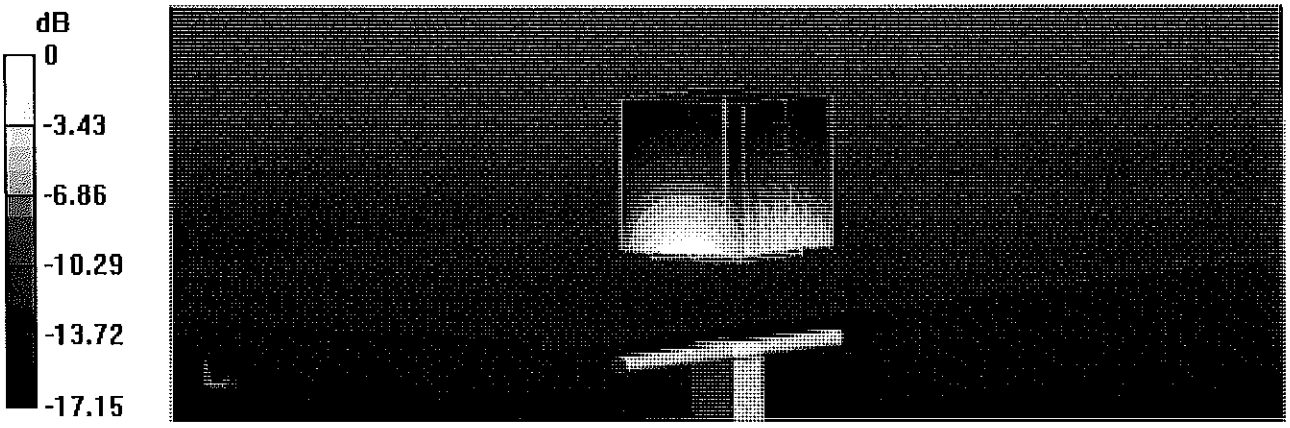
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.36 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.46, 8.46, 8.46); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

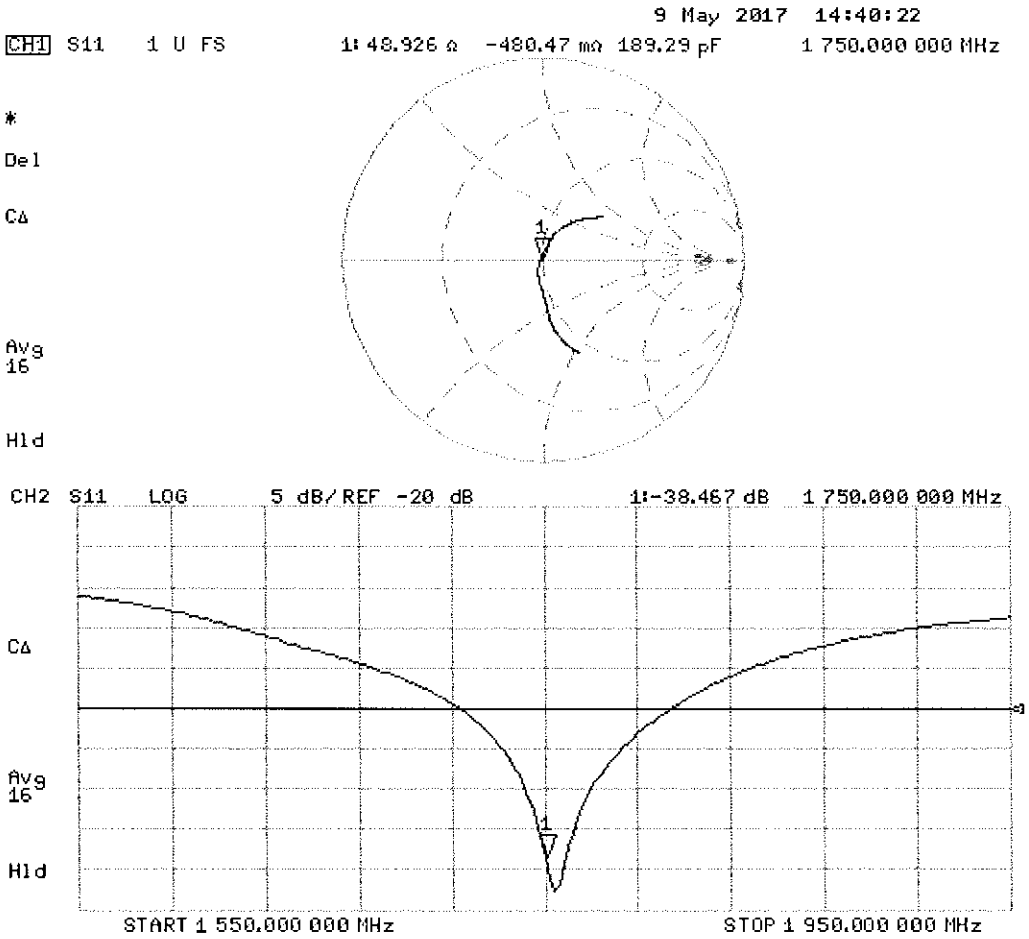
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.6 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 9.11 W/kg; SAR(10 g) = 4.83 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1092

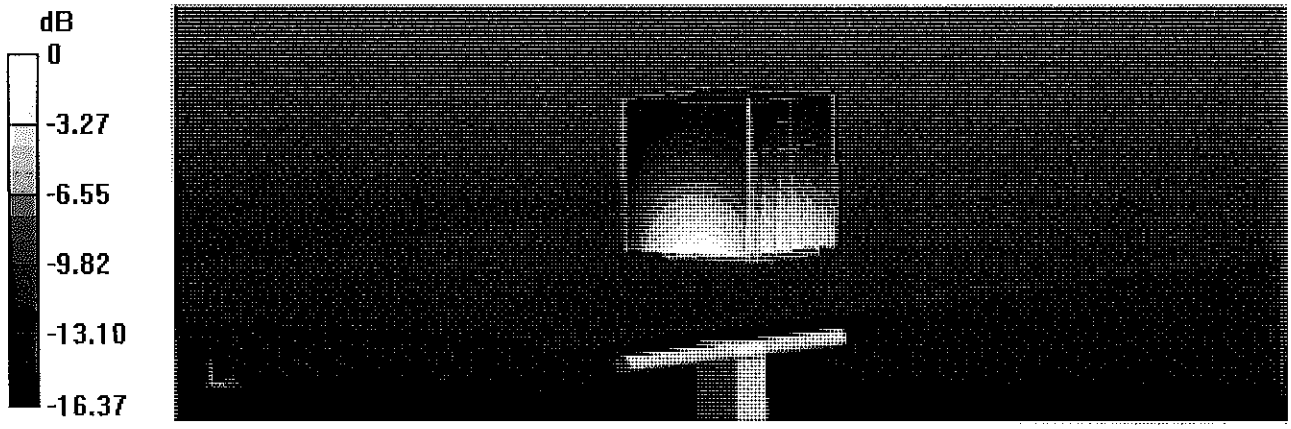
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

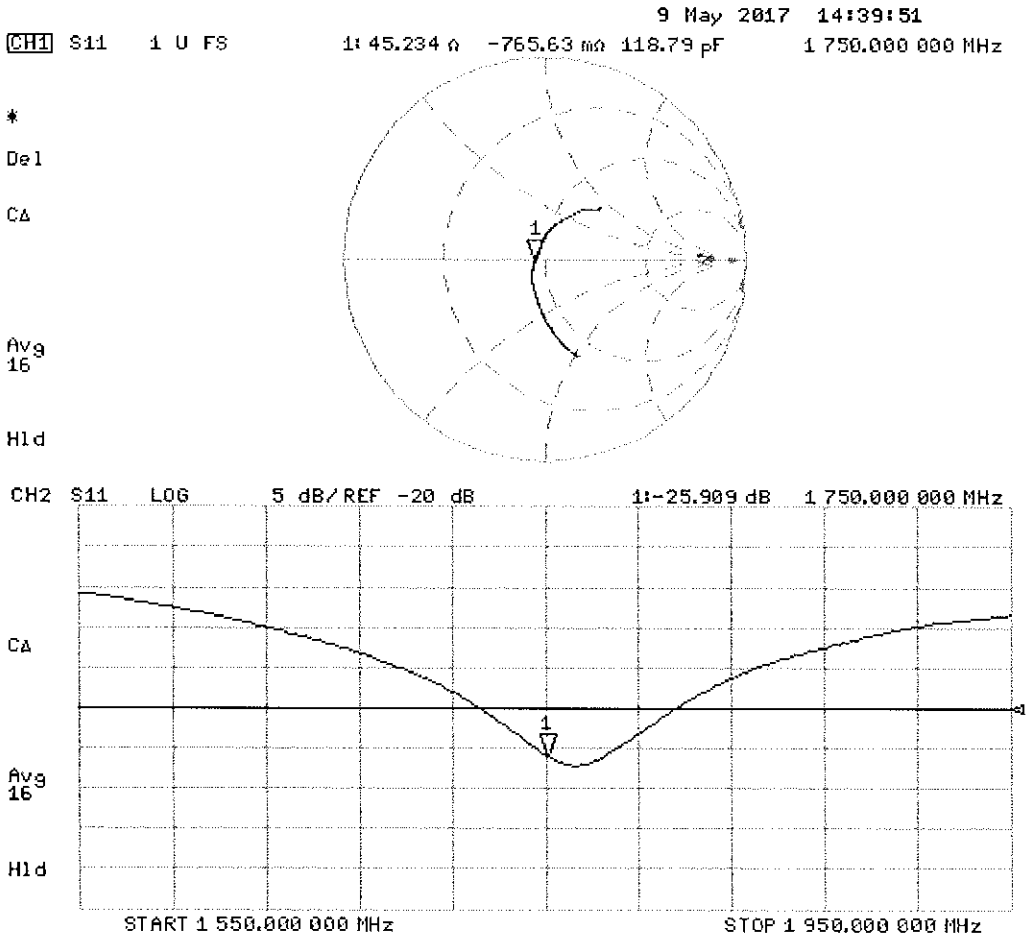
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.81 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 15.8 W/kg
SAR(1 g) = 9.15 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 13.1 W/kg = 11.17 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d026_May17**

CALIBRATION CERTIFICATE

Object D1900V2 - SN:5d026

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

BNV
05-23-2017

Calibration date: May 10, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

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

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

Issued: May 12, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.3 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.75 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.51 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.34 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.7 Ω + 8.4 jΩ
Return Loss	- 21.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω + 8.8 jΩ
Return Loss	- 20.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

DASY5 Validation Report for Head TSL

Date: 10.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d026

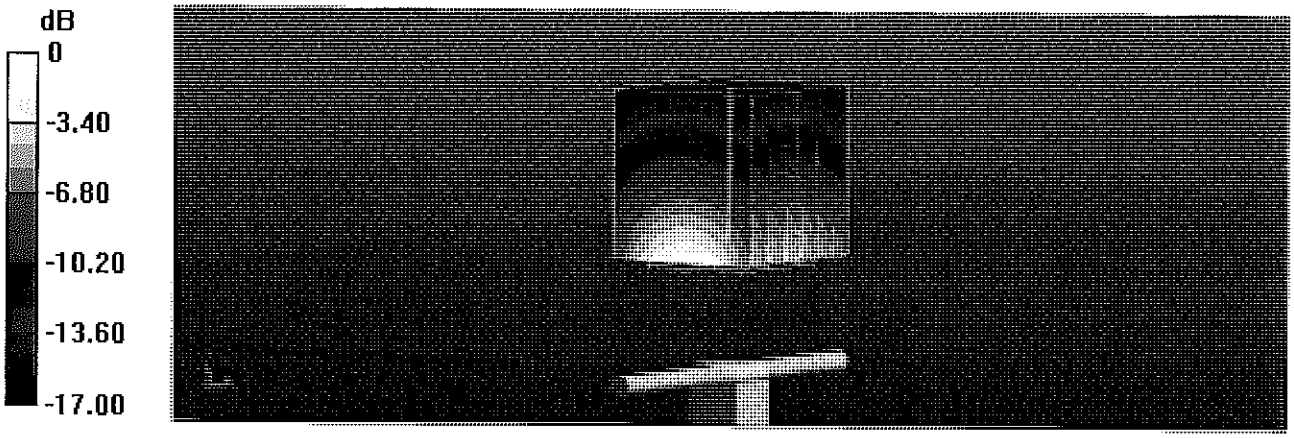
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 41.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.12, 8.12, 8.12); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.0(1444); SEMCAD X 14.6.10(7416)

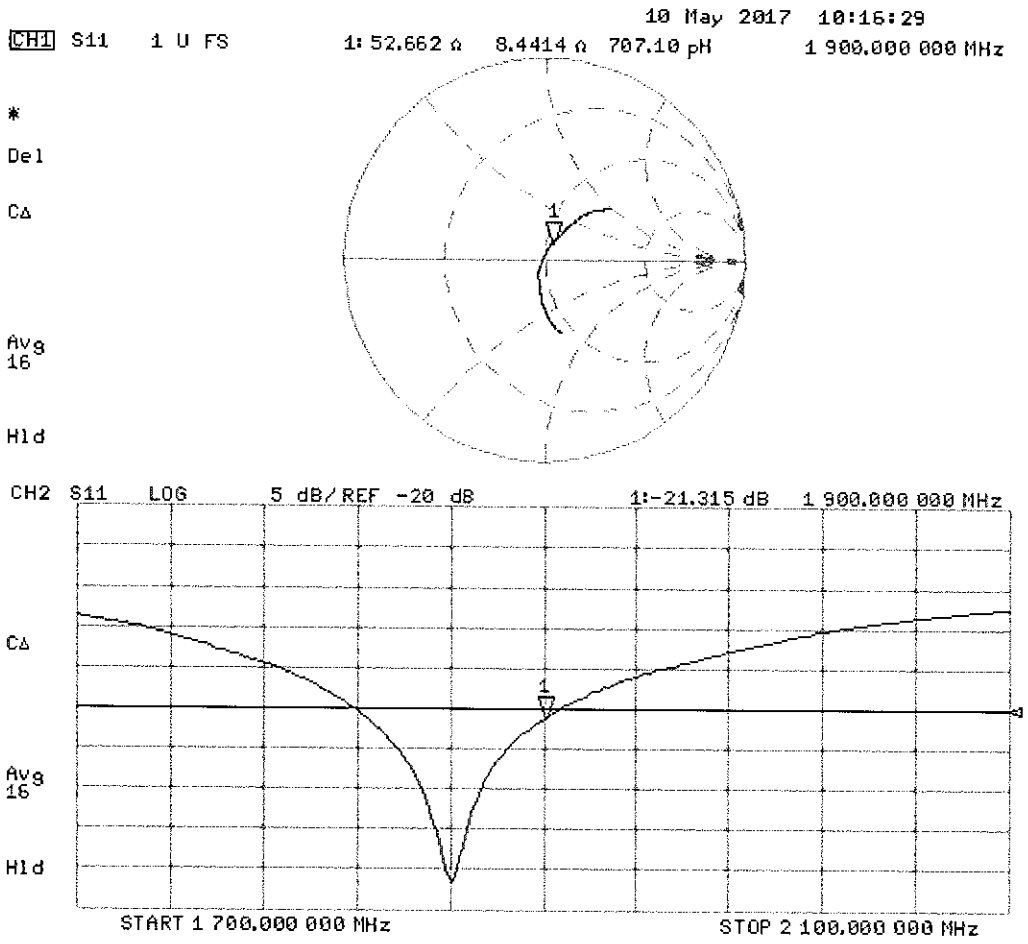
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.4 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 17.9 W/kg
SAR(1 g) = 9.75 W/kg; SAR(10 g) = 5.14 W/kg
Maximum value of SAR (measured) = 14.9 W/kg



0 dB = 14.9 W/kg = 11.73 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d026

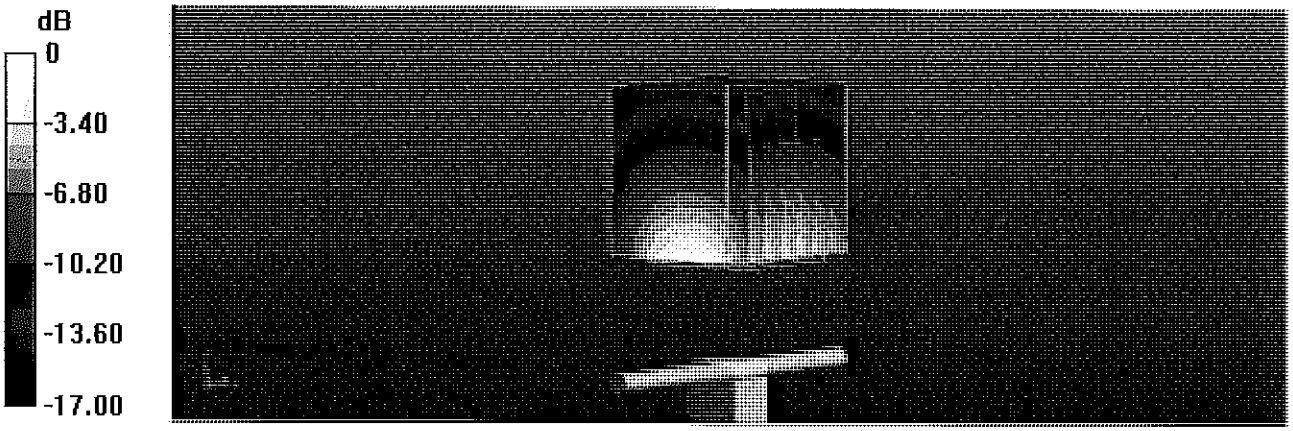
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.51 S/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.03, 8.03, 8.03); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1444); SEMCAD X 14.6.10(7416)

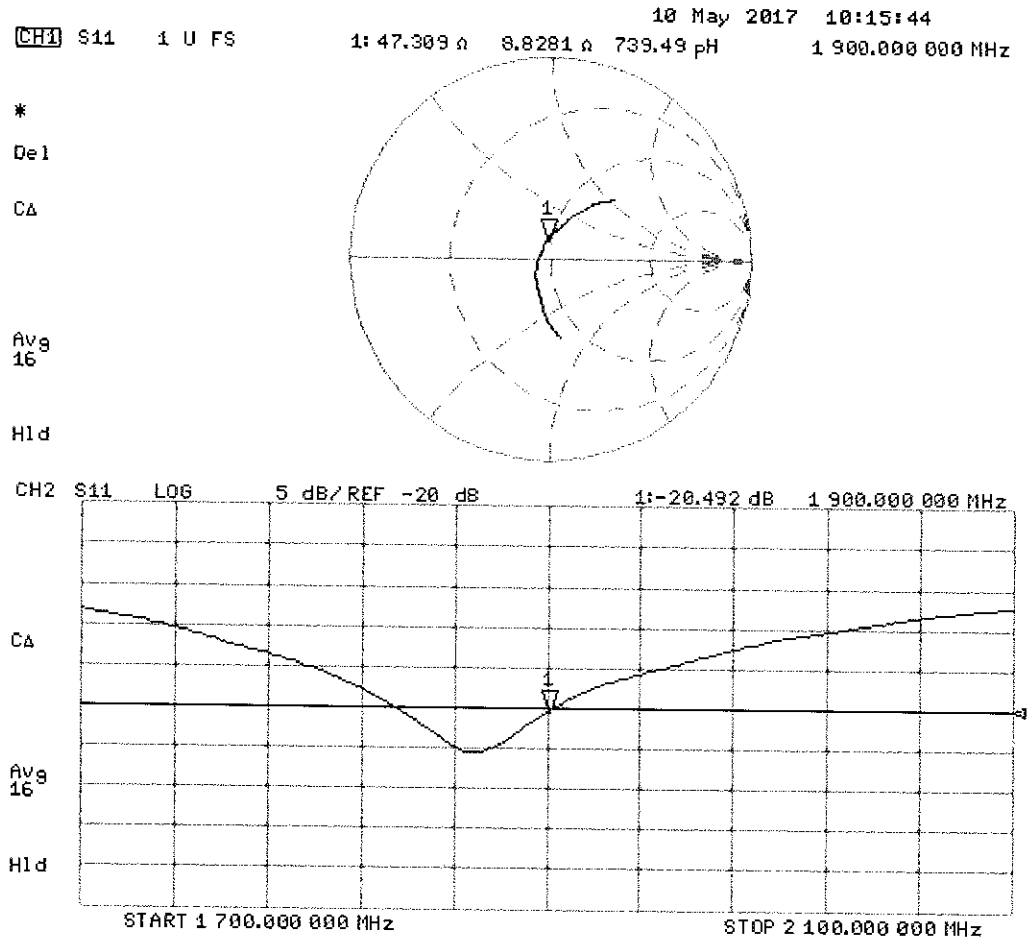
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.9 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 10 W/kg; SAR(10 g) = 5.34 W/kg
Maximum value of SAR (measured) = 14.5 W/kg



0 dB = 14.5 W/kg = 11.61 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test** **Certificate No: D2450V2-945_May17**

CALIBRATION CERTIFICATE

Object D2450V2 - SN:945

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

BN ✓
05-23-2017

Calibration date: May 09, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

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

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

Issued: May 11, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.9 ± 6 %	1.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**51.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.9 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.98 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.3 Ω + 1.8 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.6 Ω + 3.6 jΩ
Return Loss	- 28.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 15, 2014

DASY5 Validation Report for Head TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:945

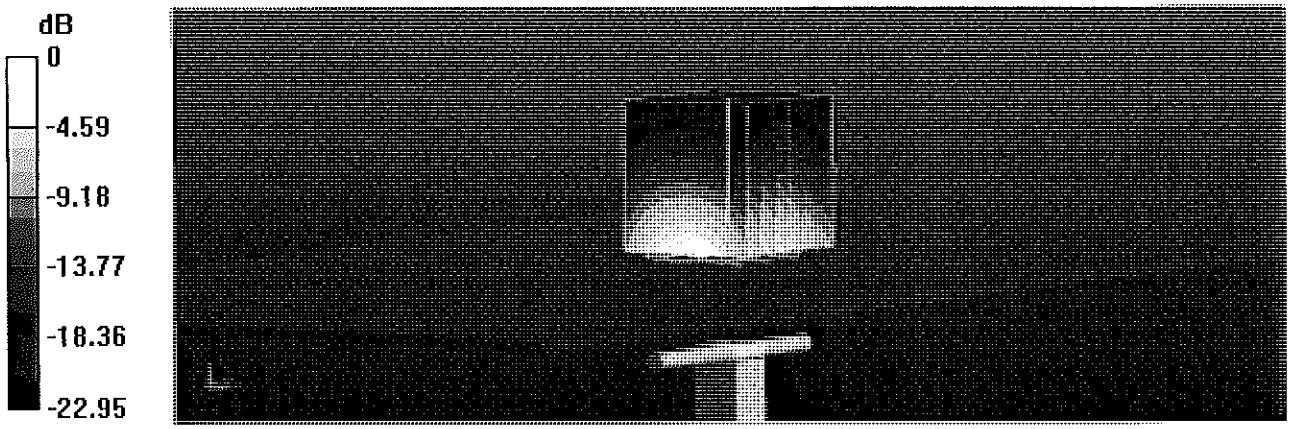
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

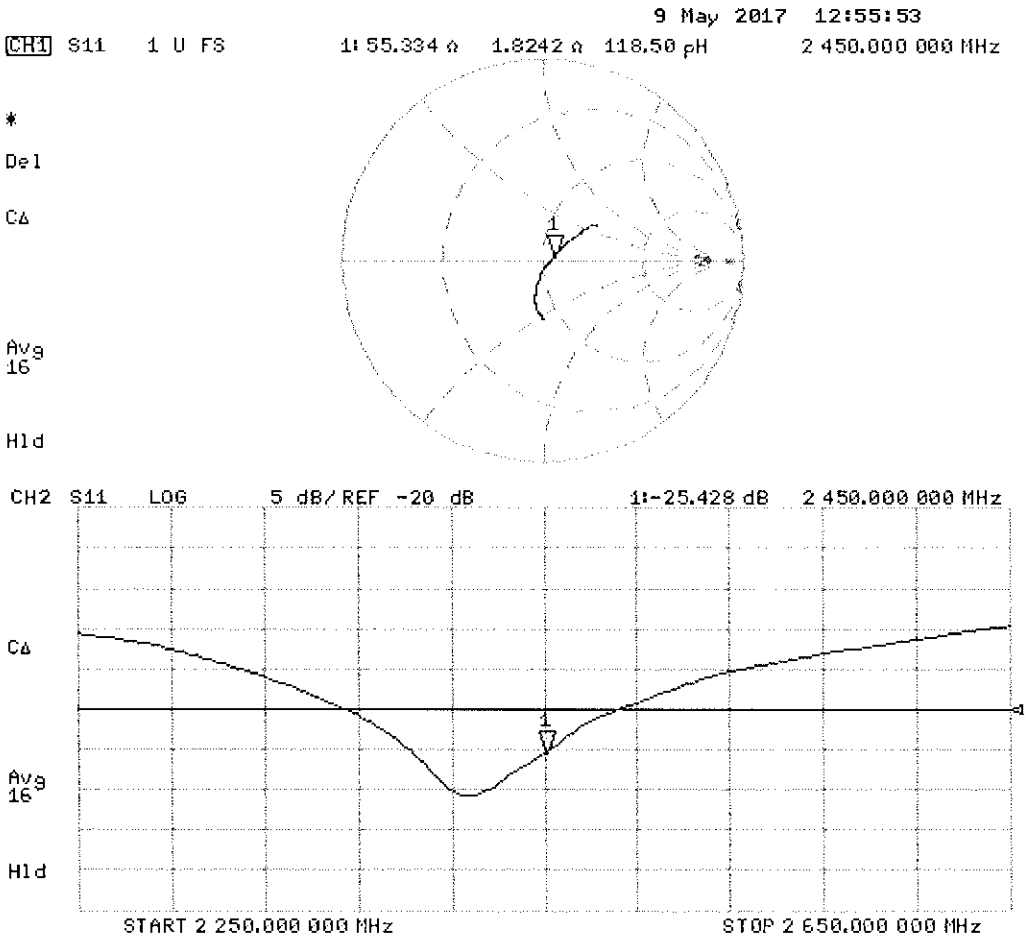
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 114.4 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.08 W/kg
Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 09.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:945

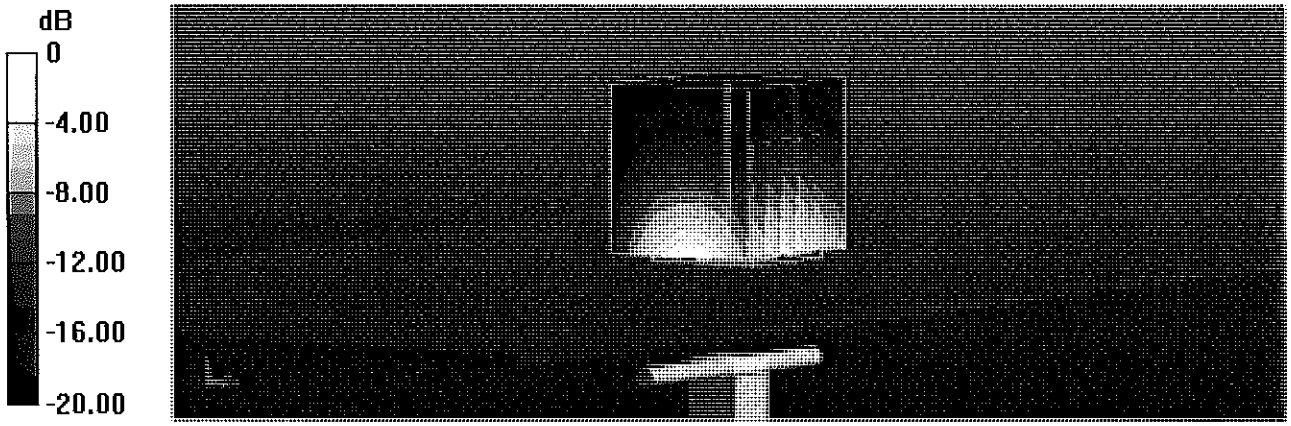
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

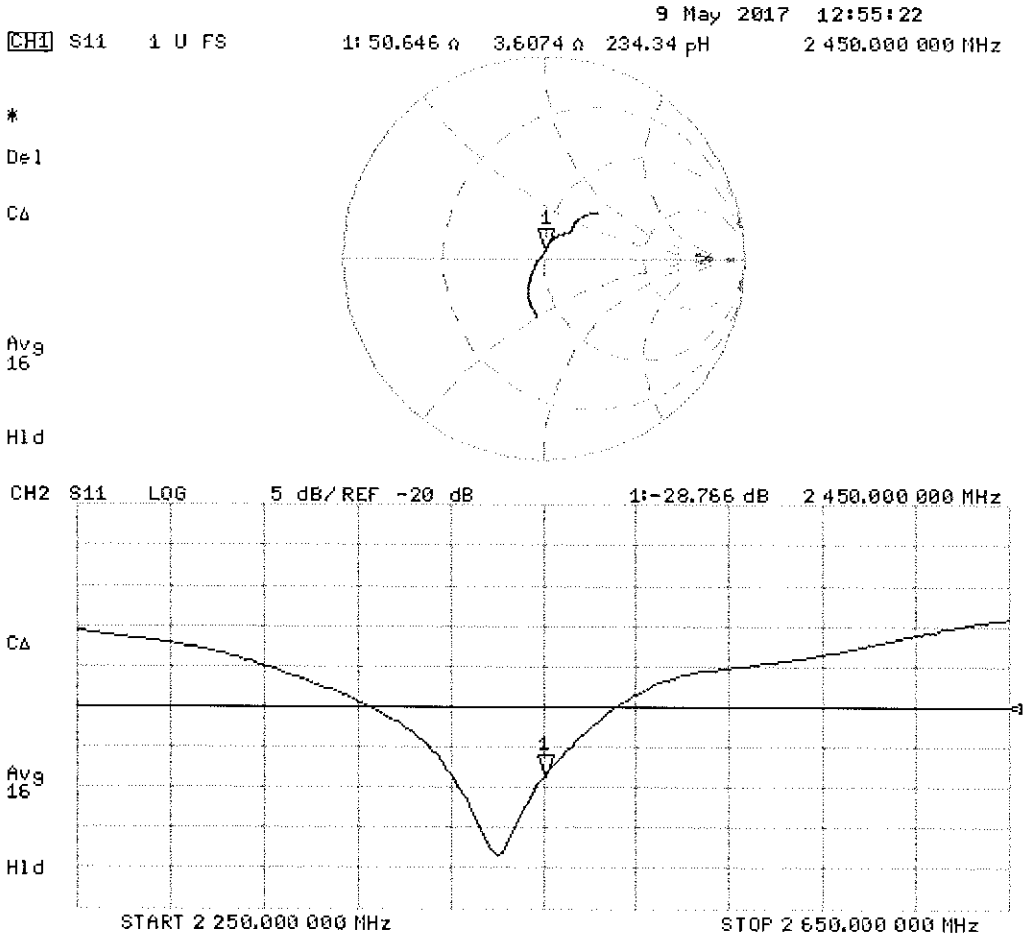
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.8 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 25.3 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.98 W/kg
Maximum value of SAR (measured) = 19.9 W/kg



0 dB = 19.9 W/kg = 12.99 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2450V2-797_Sep16

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:797
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	September 13, 2016

BNV 09-28-2016

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 13, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 0108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.9 ± 6 %	1.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.6 ± 6 %	2.04 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.8 Ω + 6.0 jΩ
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.8 Ω + 8.0 jΩ
Return Loss	- 22.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2006

DASY5 Validation Report for Head TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

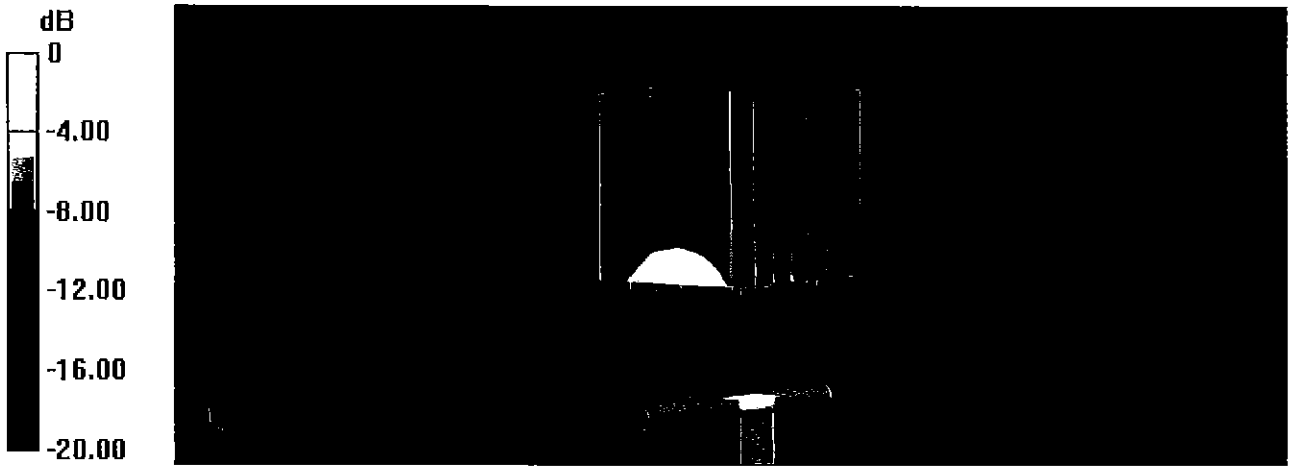
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.72, 7.72, 7.72); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

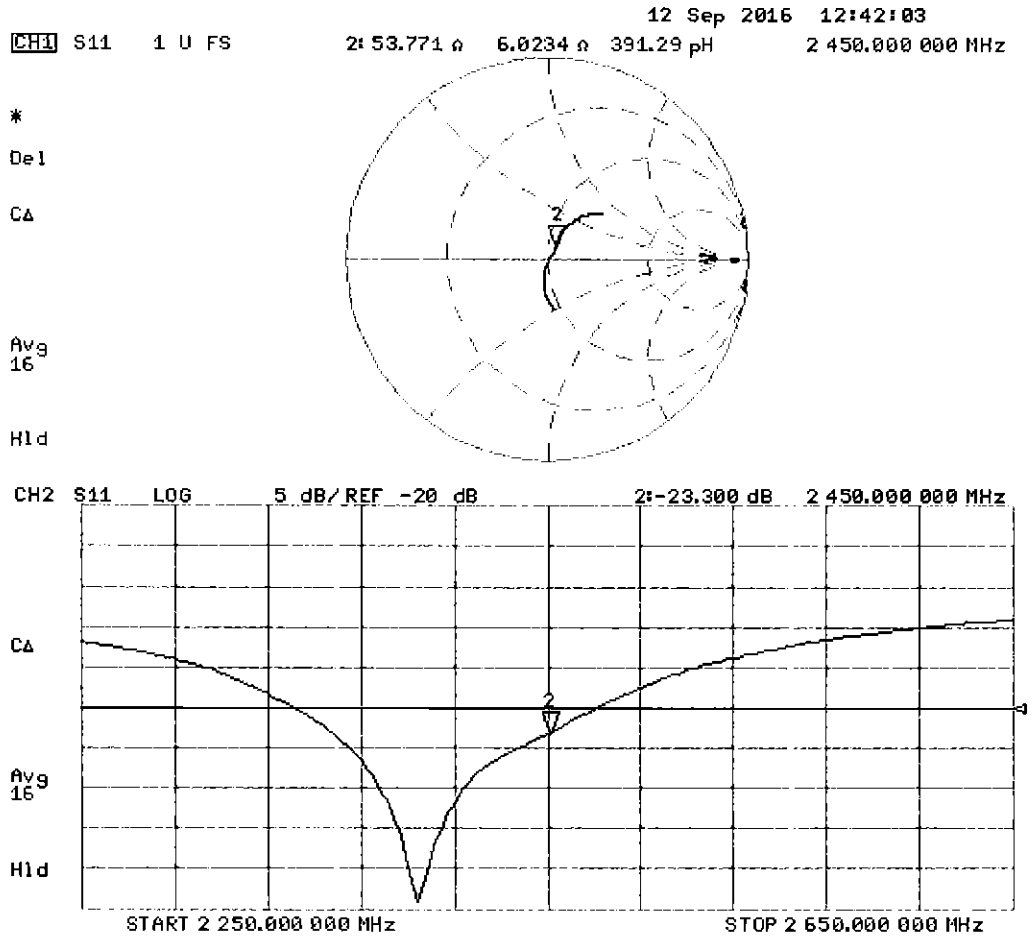
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 113.4 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.26 W/kg
Maximum value of SAR (measured) = 21.9 W/kg



0 dB = 21.9 W/kg = 13.40 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

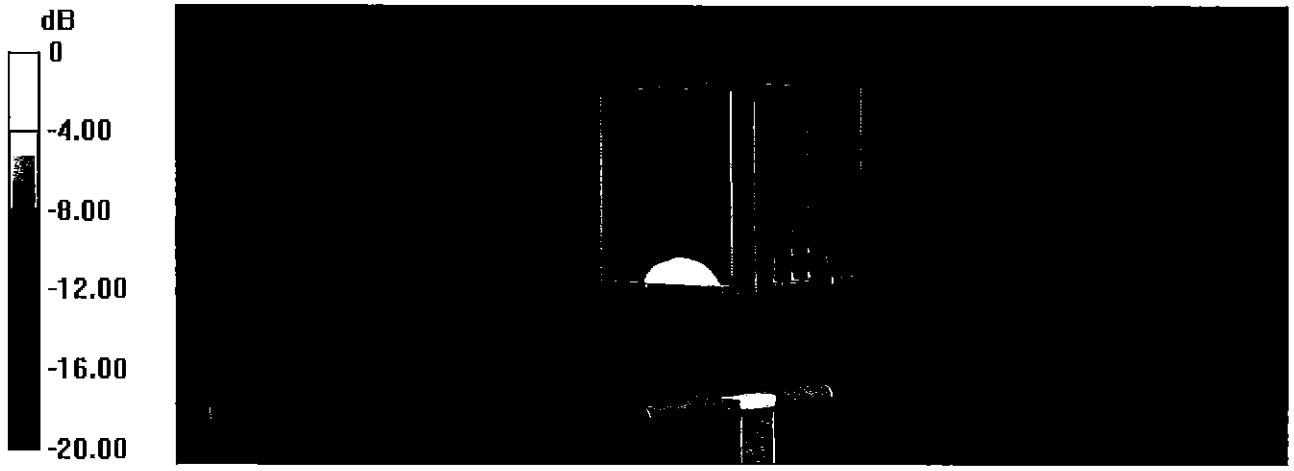
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.04 S/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.79, 7.79, 7.79); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

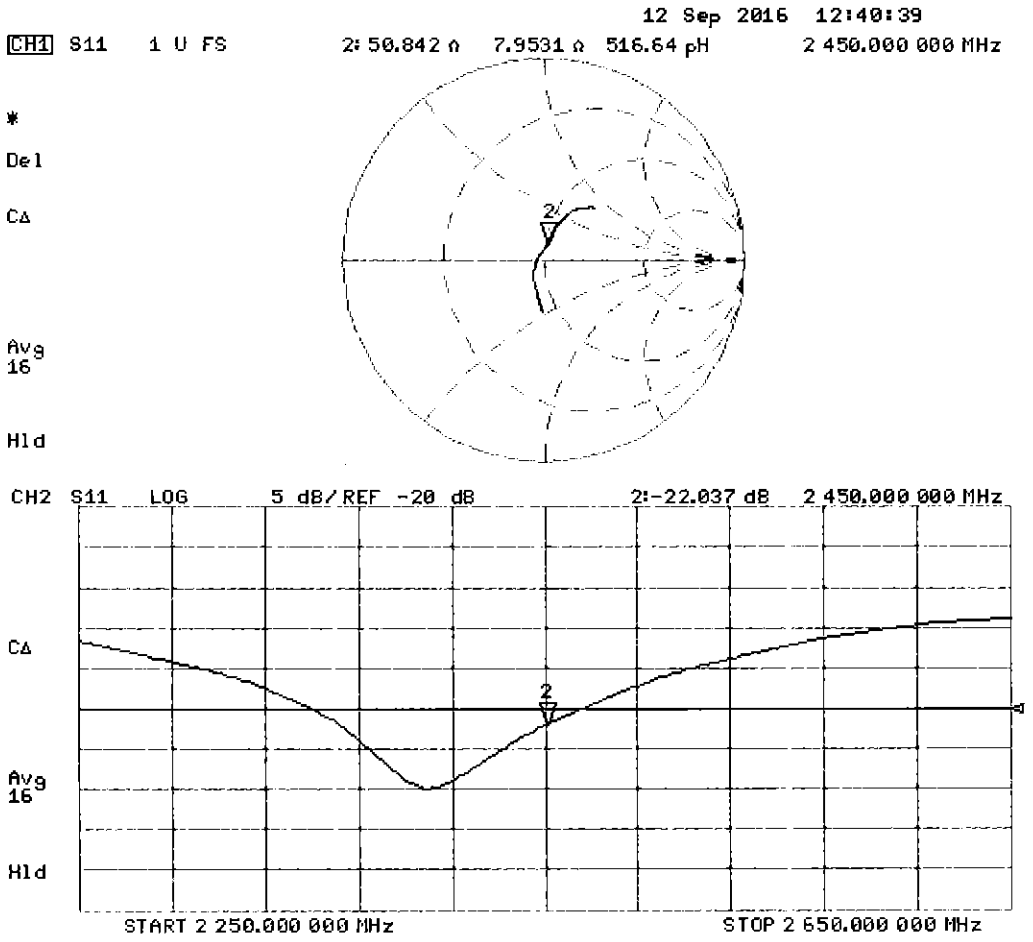
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.5 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.13 W/kg
Maximum value of SAR (measured) = 21.2 W/kg



0 dB = 21.2 W/kg = 13.26 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2600V2-1004_Apr17

CALIBRATION CERTIFICATE

Object D2600V2 - SN:1004

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

Calibration date: April 13, 2017

BNV
5-3-2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

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

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 18, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.1 ± 6 %	2.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	2.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**55.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.9 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.5 Ω - 5.9 jΩ
Return Loss	- 24.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.7 Ω - 4.9 jΩ
Return Loss	- 22.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 23, 2006

DASY5 Validation Report for Head TSL

Date: 13.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

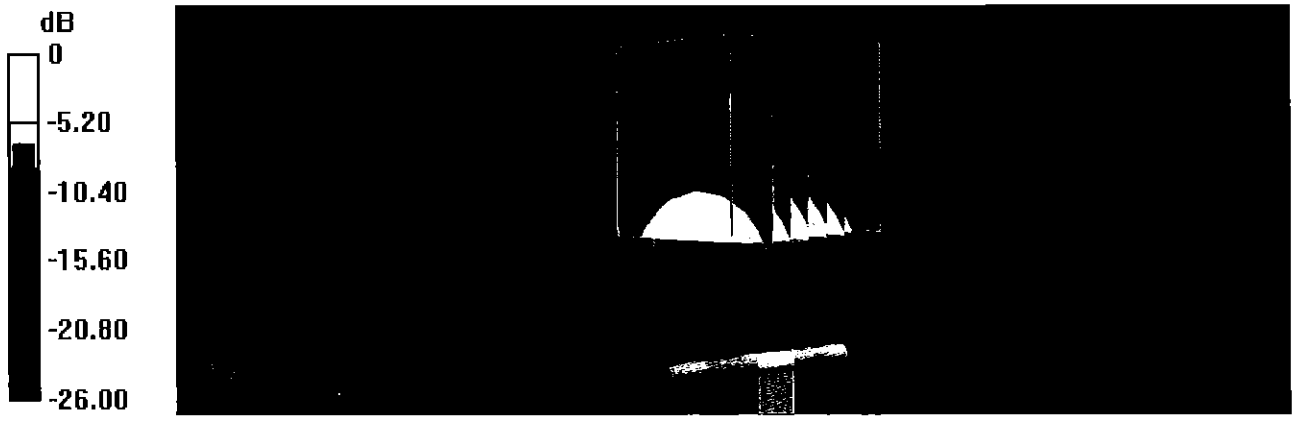
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.03 S/m; ε_r = 37.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.56, 7.56, 7.56); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

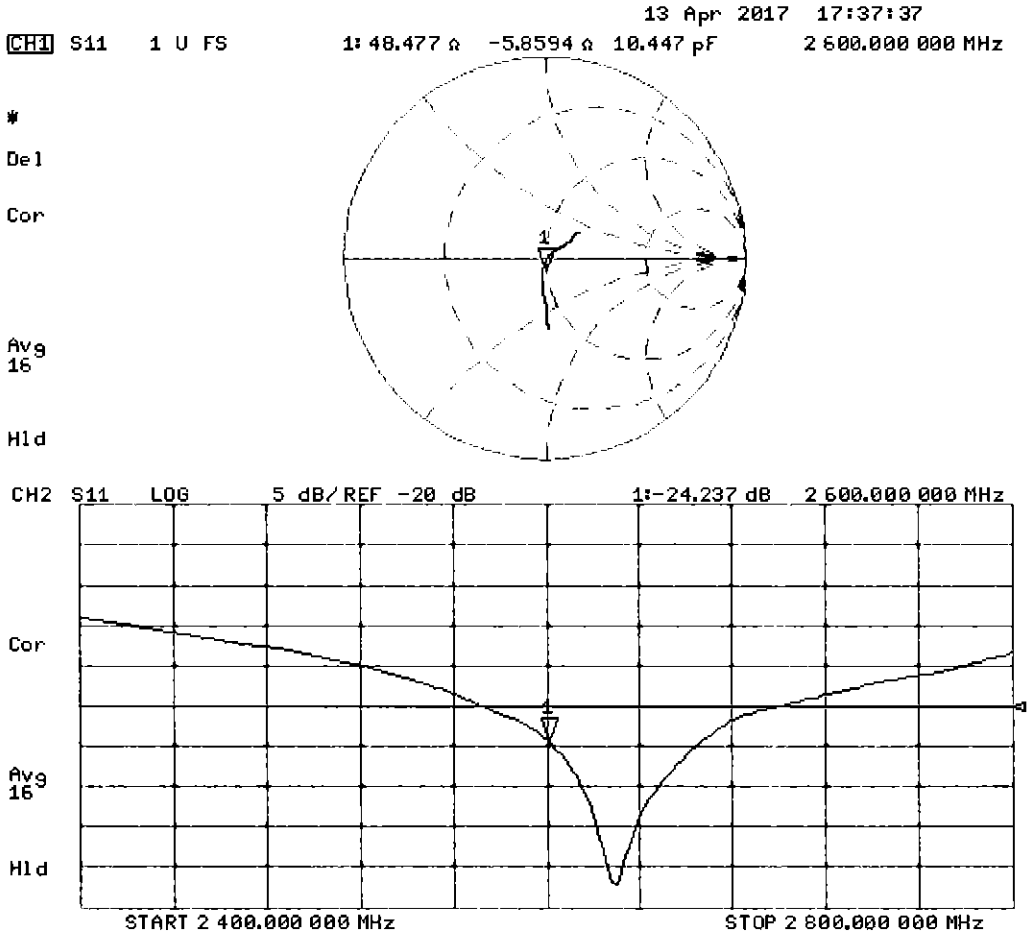
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.4 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.54 W/kg
Maximum value of SAR (measured) = 24.6 W/kg



0 dB = 24.6 W/kg = 13.91 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

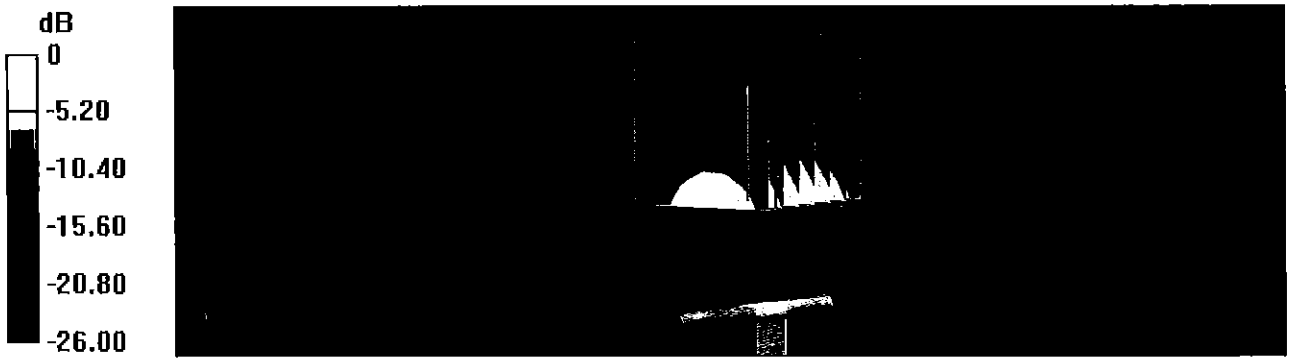
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.21 S/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.48, 7.48, 7.48); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

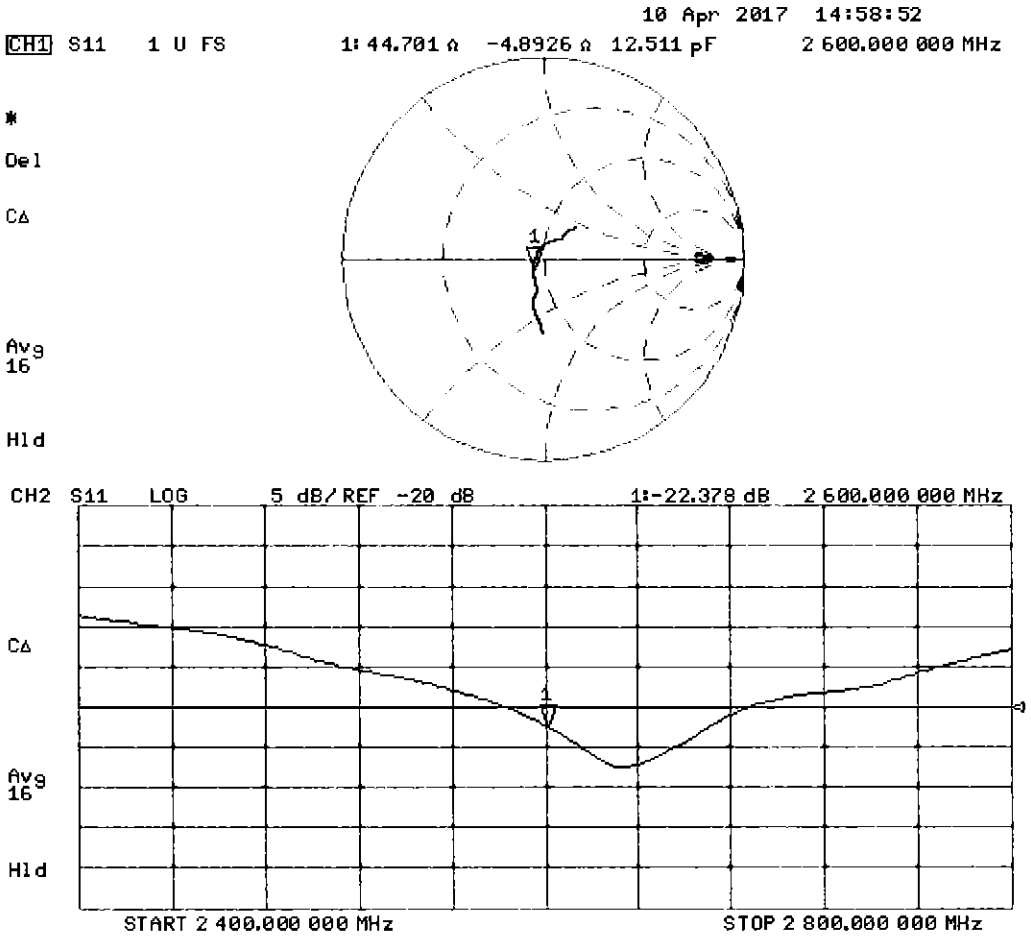
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.3 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 14 W/kg; SAR(10 g) = 6.26 W/kg
Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1237_Aug16**

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1237

Calibration procedure(s) QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

vPT 8/9/16

Calibration date: August 02, 2016

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:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 4, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.52 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.00 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.9 ± 6 %	4.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.3 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.9 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.7 ± 6 %	5.02 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.25 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.42 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.54 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.88 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.11 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	48.6 Ω - 2.5 jΩ
Return Loss	- 30.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	50.9 Ω + 1.5 jΩ
Return Loss	- 35.3 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.8 Ω + 5.8 jΩ
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	47.0 Ω - 3.9 jΩ
Return Loss	- 25.9 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	51.5 Ω + 3.9 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	53.8 Ω + 0.3 jΩ
Return Loss	- 28.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 04, 2015

DASY5 Validation Report for Head TSL

Date: 02.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1237

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.52 S/m; ε_r = 34.4; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 4.86 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 5.02 S/m; ε_r = 33.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

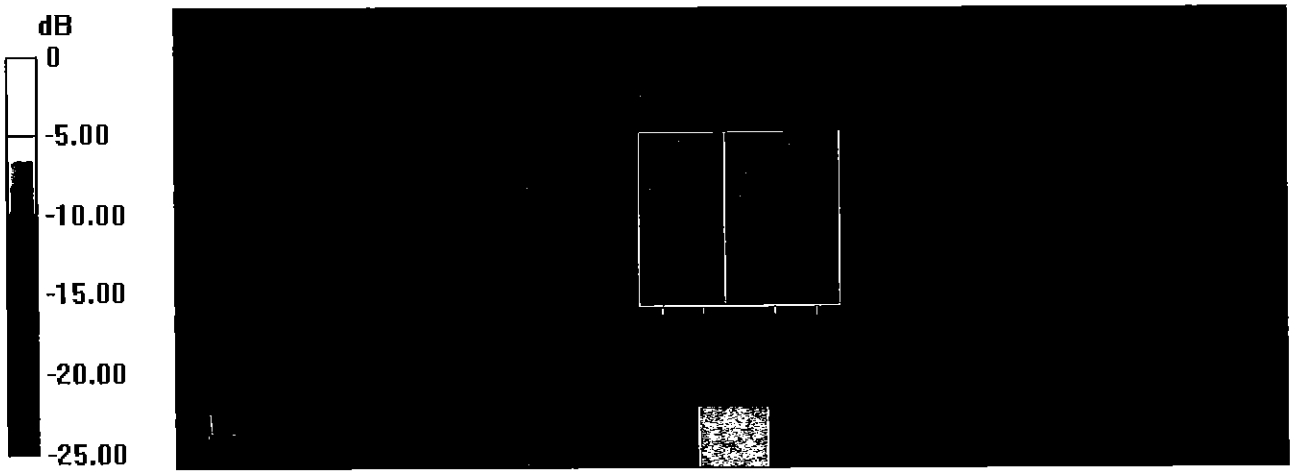
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.42, 5.42, 5.42); Calibrated: 30.06.2016; ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.10 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 29.5 W/kg
SAR(1 g) = 8 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

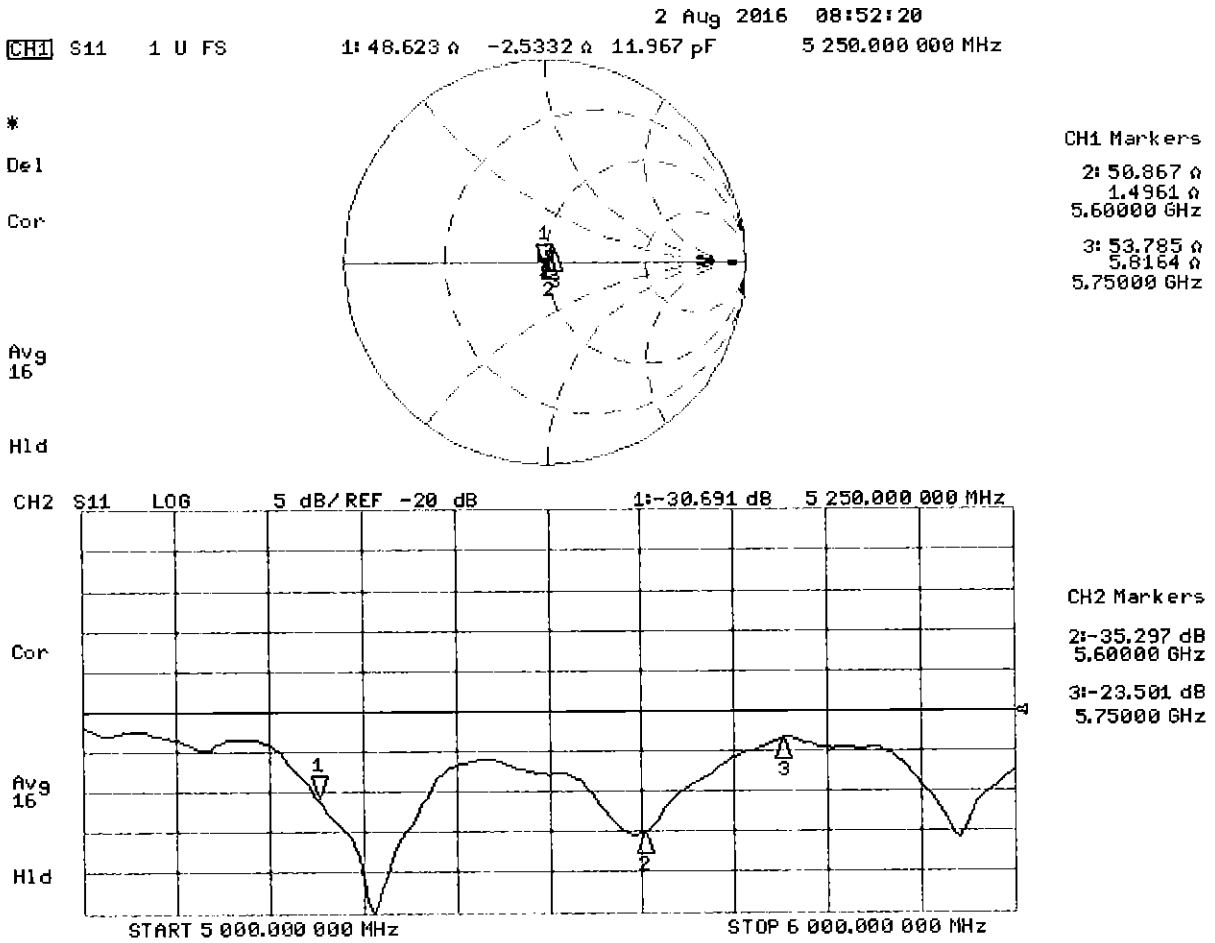
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 73.55 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.42 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.23 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 33.6 W/kg
SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 02.08.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1237

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.42 S/m; ε_r = 47.1; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 5.88 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 6.11 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

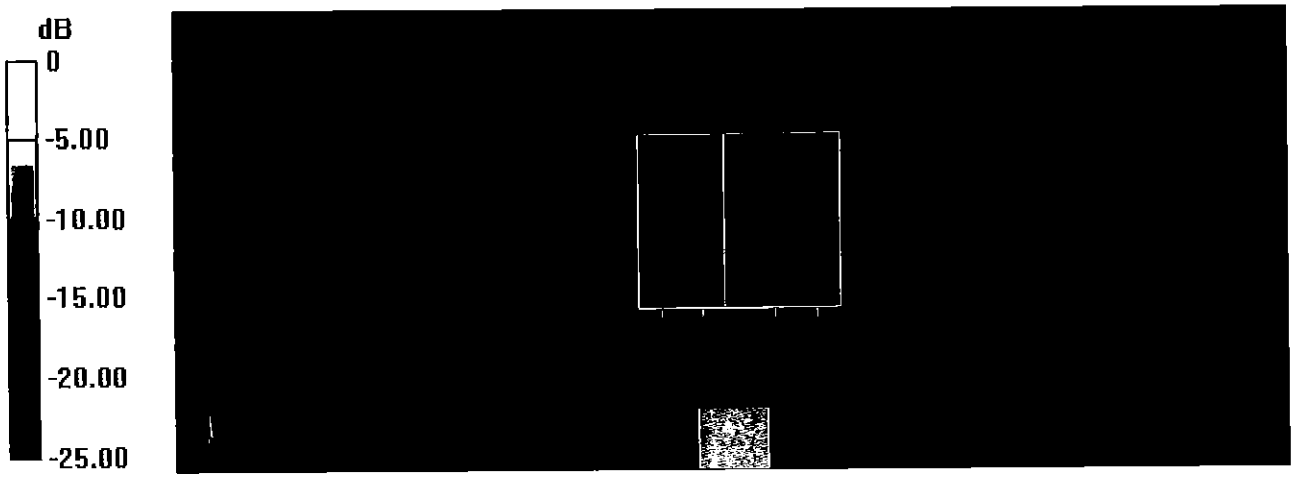
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.3, 4.3, 4.3); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.19 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 28.4 W/kg
SAR(1 g) = 7.54 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 17.3 W/kg

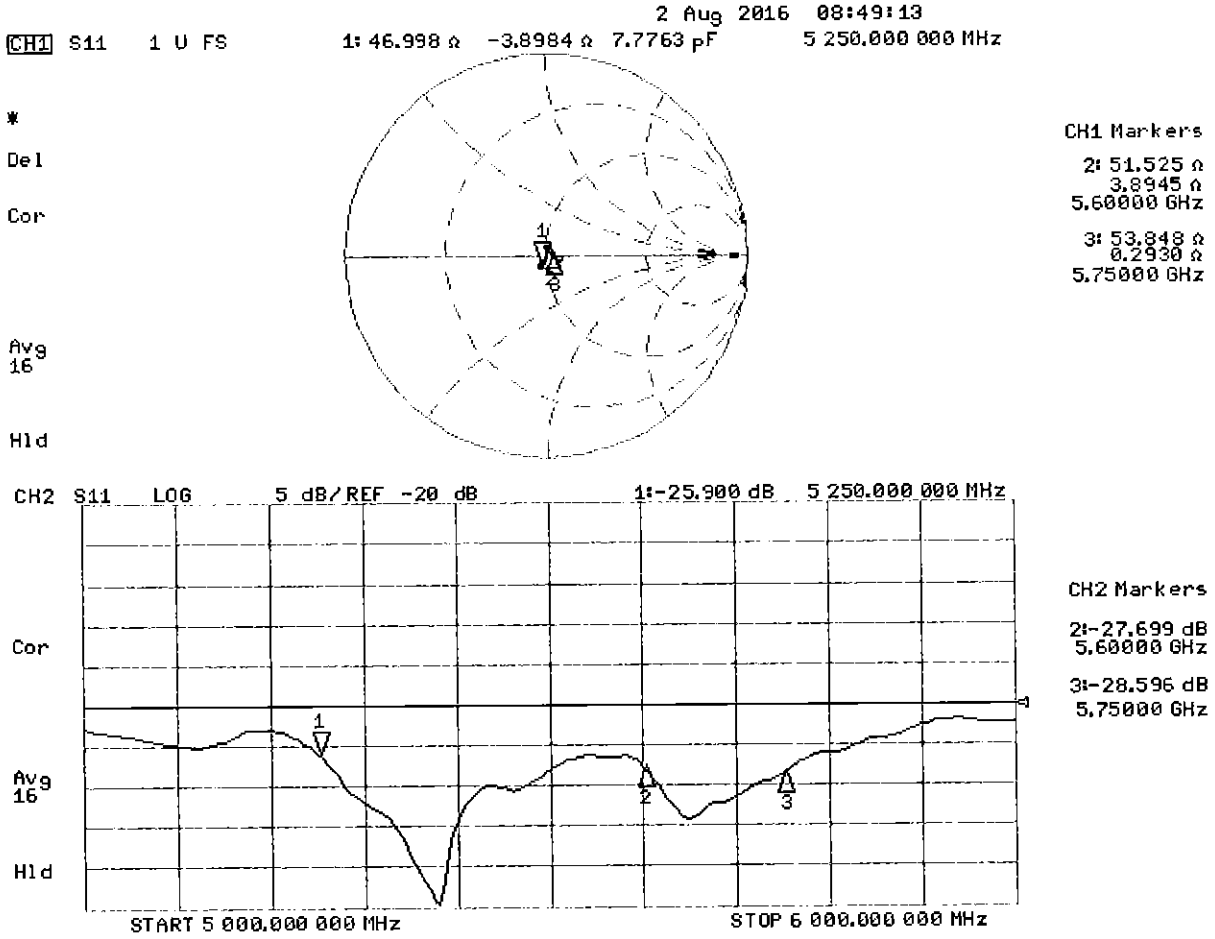
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.80 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.31 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.6 W/kg
SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 17.3 W/kg = 12.38 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D750V3-1034_May17

CALIBRATION CERTIFICATE

Object D750V3 - SN:1034

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

BN ✓
05-23-2017

Calibration date: May 11, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02522)	Apr-18
Reference 20 dB Attenuator	SN: 5058 (20k)	07-Apr-17 (No. 217-02528)	Apr-18
Type-N mismatch combination	SN: 5047.2 / 06327	07-Apr-17 (No. 217-02529)	Apr-18
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	28-Mar-17 (No. DAE4-601_Mar17)	Mar-18

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

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 11, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	0.91 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.22 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.39 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.3 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.18 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.71 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.76 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.6 Ω + 0.9 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.4 Ω - 2.5 jΩ
Return Loss	- 32.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 06, 2011

DASY5 Validation Report for Head TSL

Date: 11.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1034

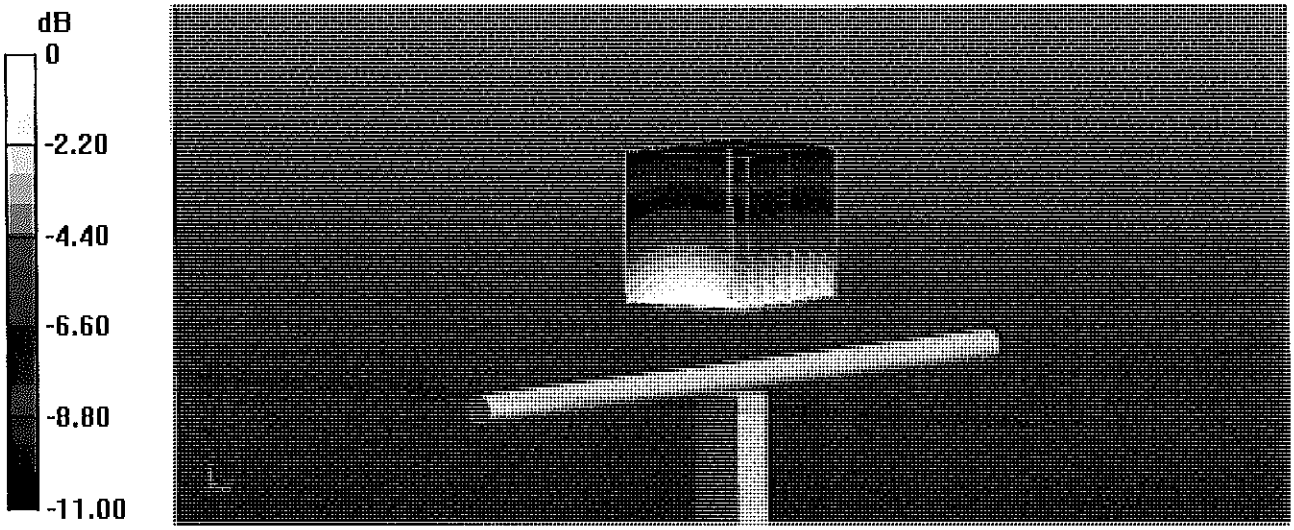
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.17, 10.17, 10.17); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.0(1444); SEMCAD X 14.6.10(7416)

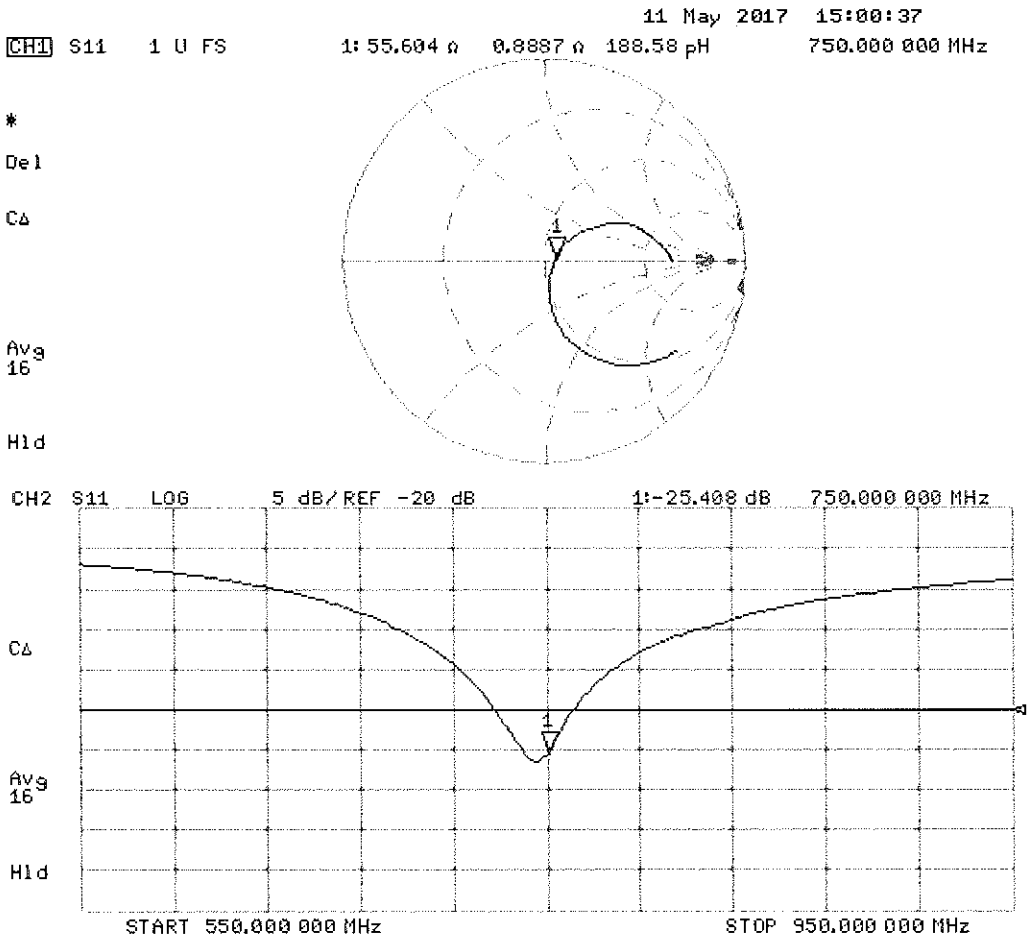
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.89 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.13 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 11.05.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1034

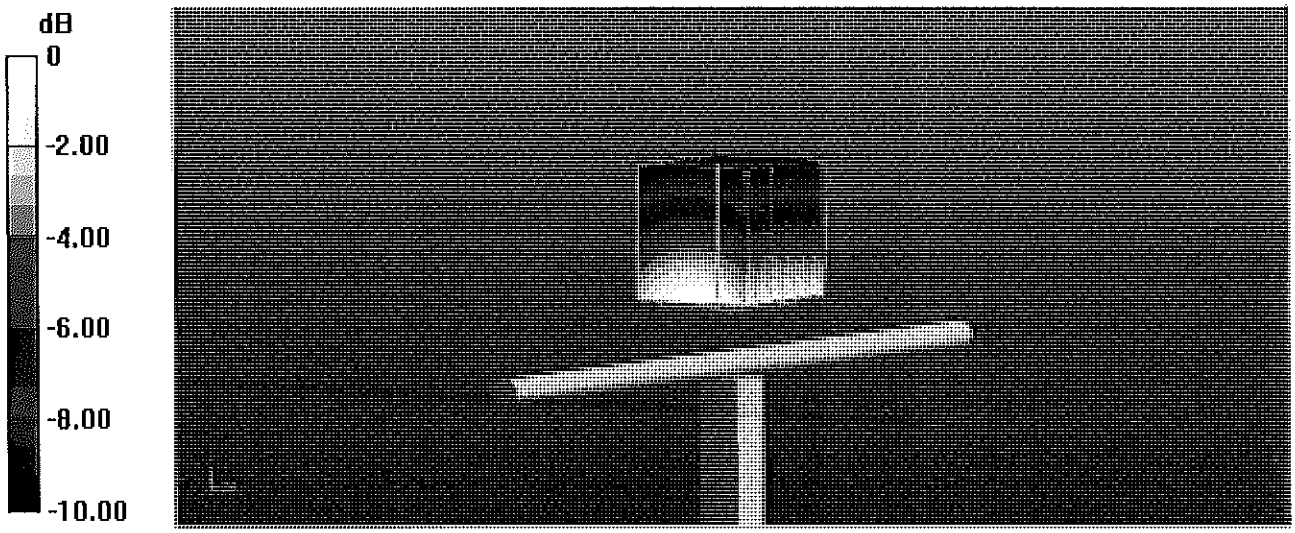
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.99, 9.99, 9.99); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.0(1444); SEMCAD X 14.6.10(7416)

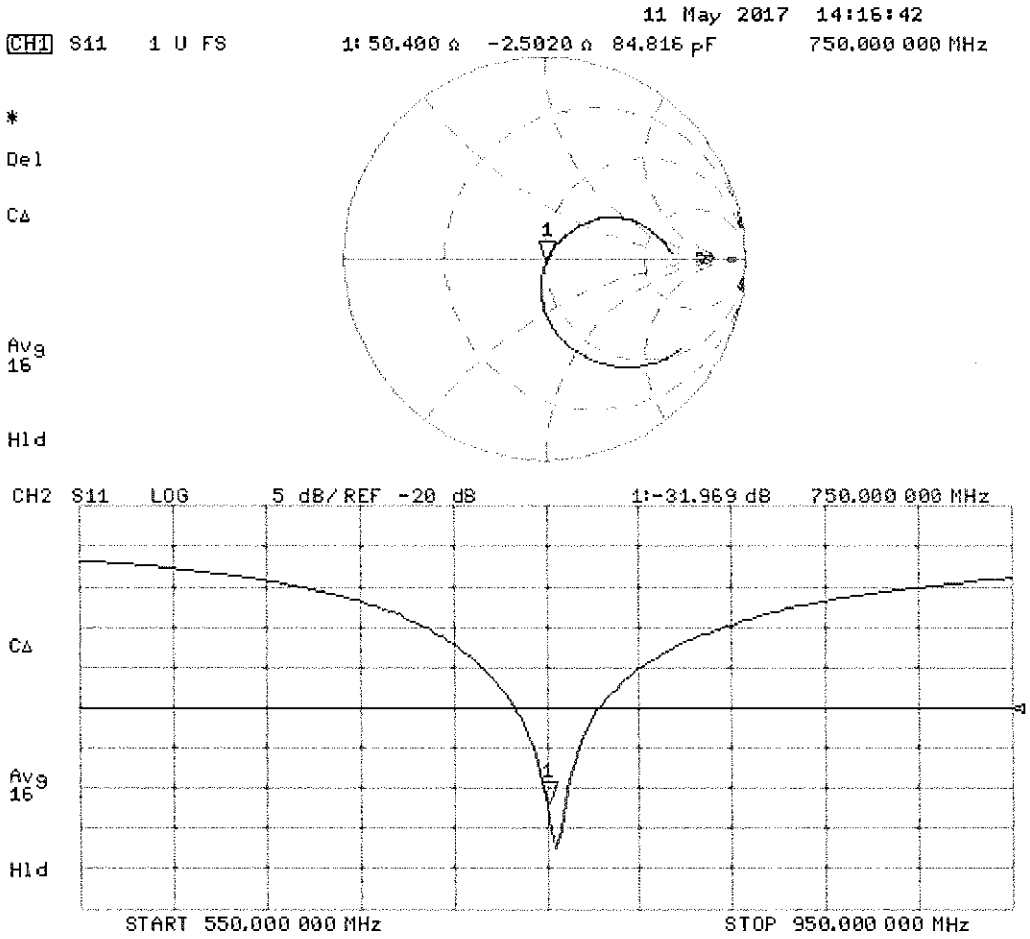
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.84 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.44 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



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

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D835V2-4d132_Jan17

CALIBRATION CERTIFICATE

Object D835V2 - SN:4d132

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

BN ✓
01/26/2017

Calibration date: January 11, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 7349	31-Dec-16 (No. EX3-7349_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-18

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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 12, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.52 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.16 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.0 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.50 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.80 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.64 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.46 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω - 2.6 jΩ
Return Loss	- 29.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω - 6.1 jΩ
Return Loss	- 23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 22, 2011

DASY5 Validation Report for Head TSL

Date: 11.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

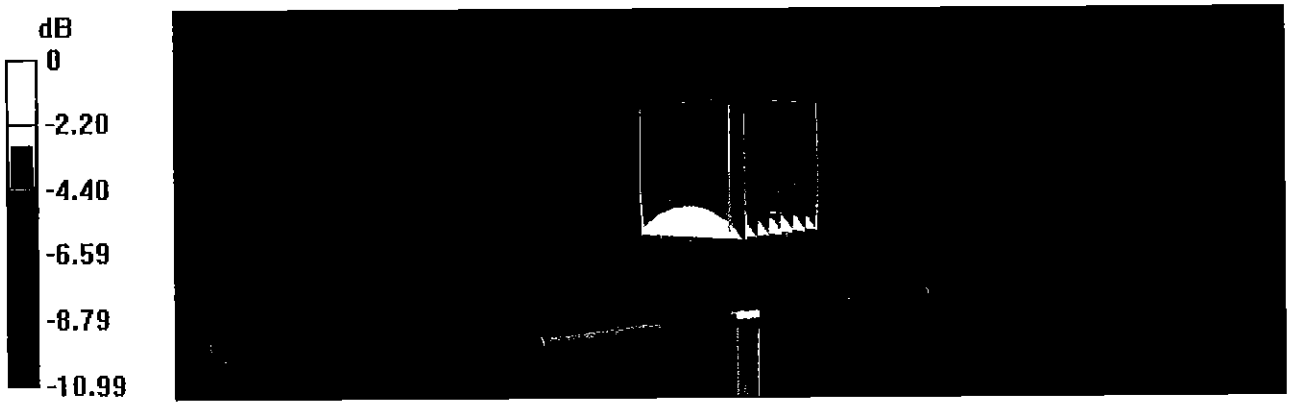
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.92 S/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.72, 9.72, 9.72); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

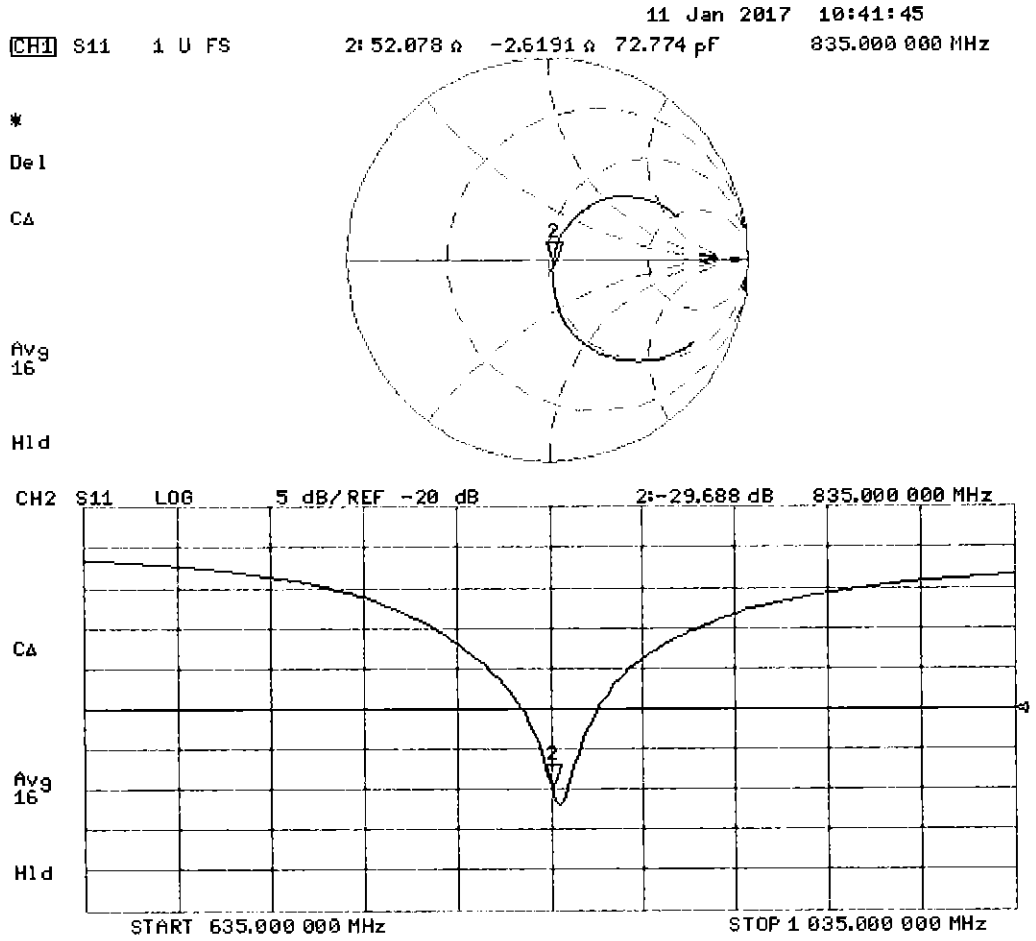
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.53 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27 W/kg = 5.15 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

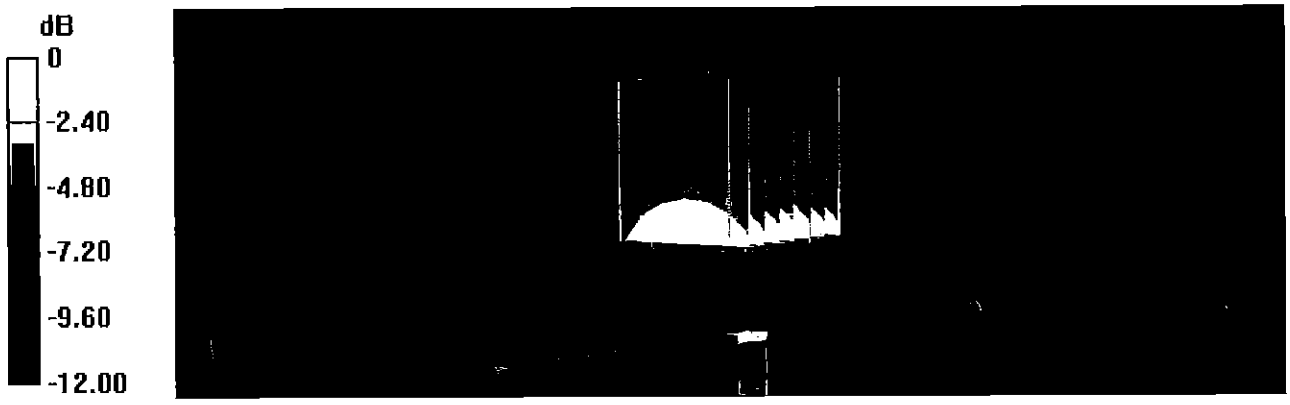
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.99 S/m; ε_r = 54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.73, 9.73, 9.73); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

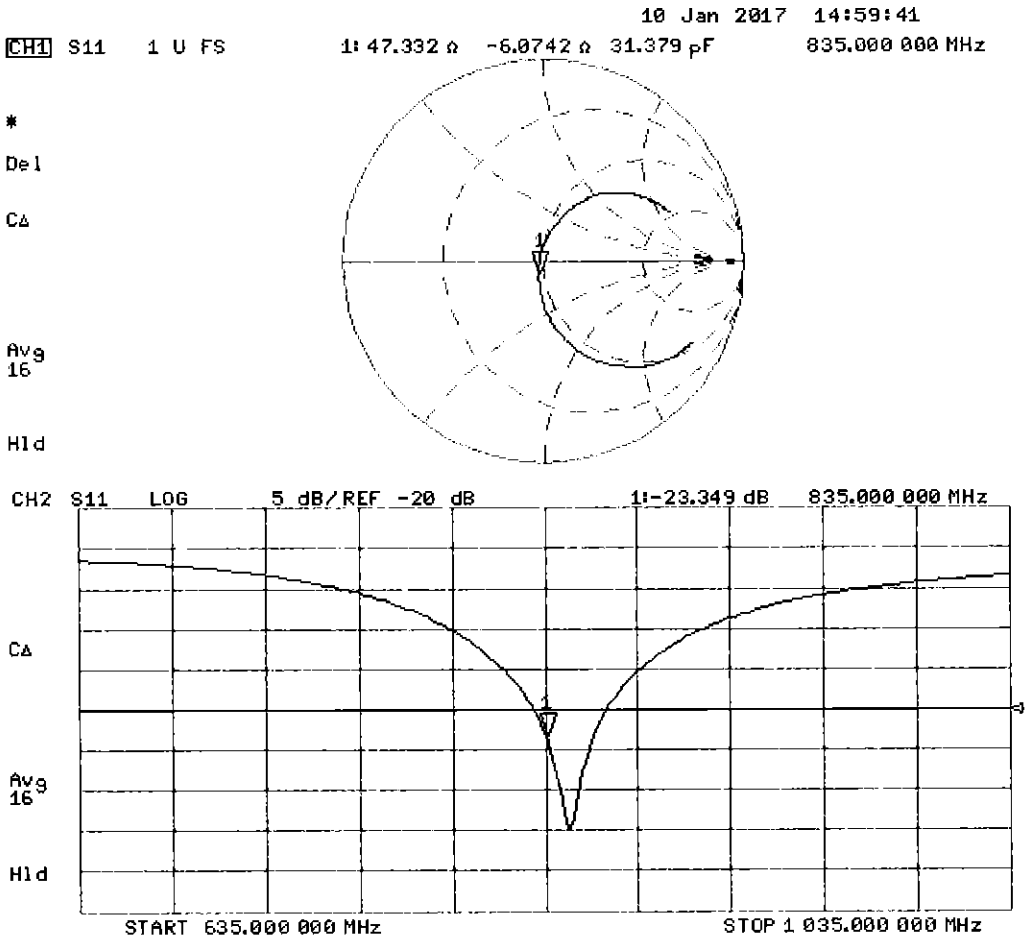
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.28 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.75 W/kg
SAR(1 g) = 2.5 W/kg; SAR(10 g) = 1.64 W/kg
Maximum value of SAR (measured) = 3.32 W/kg



0 dB = 3.32 W/kg = 5.21 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test**

Certificate No: D2600V2-1071_Sep16

CALIBRATION CERTIFICATE

Object: D2600V2 - SN:1071

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

BN ✓
09-28-2016

Calibration date: September 13, 2016

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 13, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: SCS 0108

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	2.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.1 ± 6 %	2.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**54.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.9 Ω - 6.7 jΩ
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.1 Ω - 2.1 jΩ
Return Loss	- 26.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 17, 2013

DASY5 Validation Report for Head TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1071

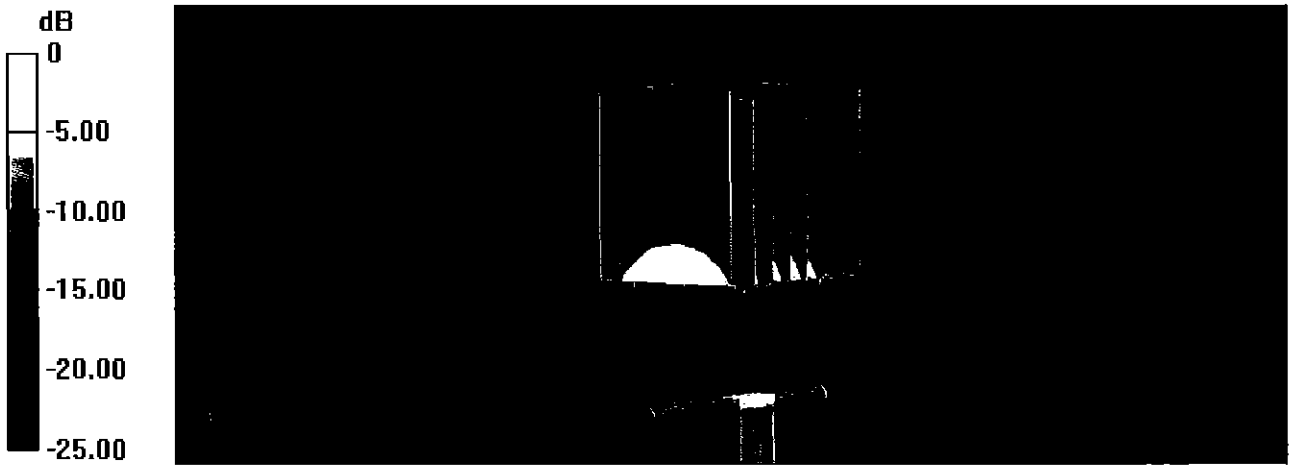
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.05 S/m; ε_r = 37.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.56, 7.56, 7.56); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

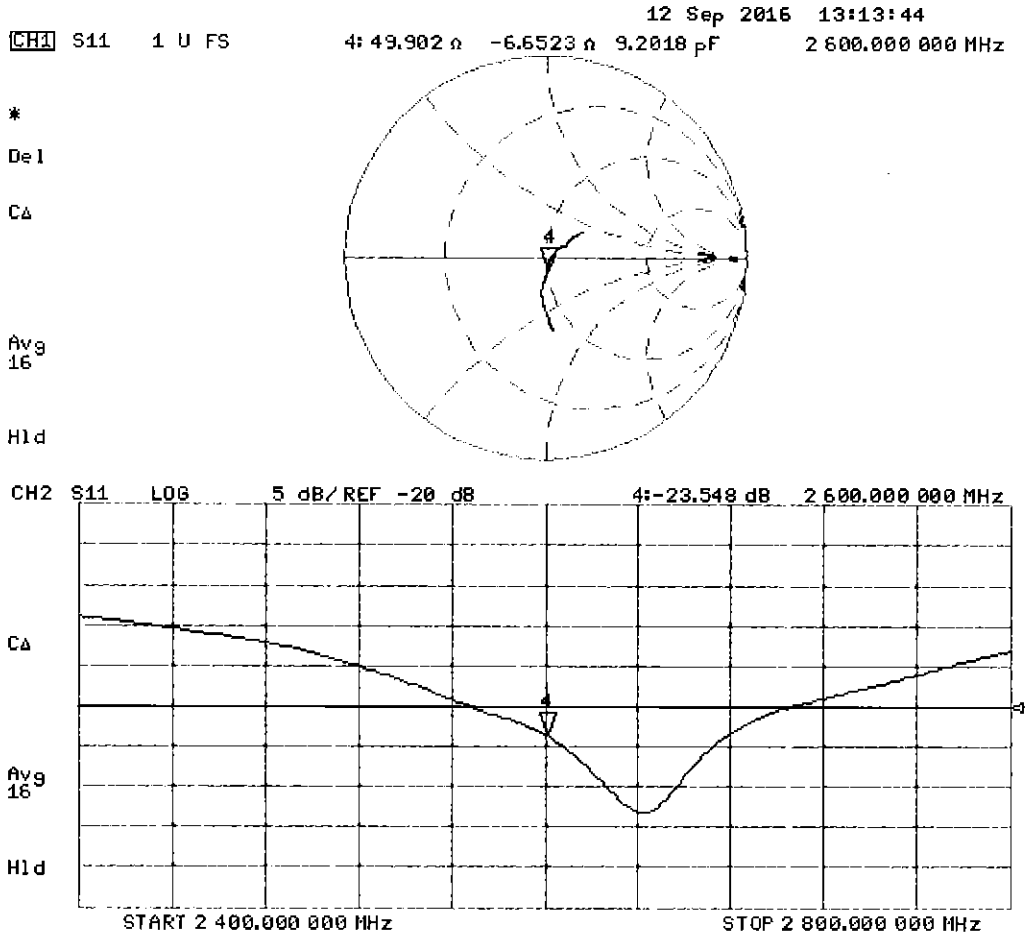
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.1 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 30.4 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.45 W/kg
Maximum value of SAR (measured) = 24.6 W/kg



0 dB = 24.6 W/kg = 13.91 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1071

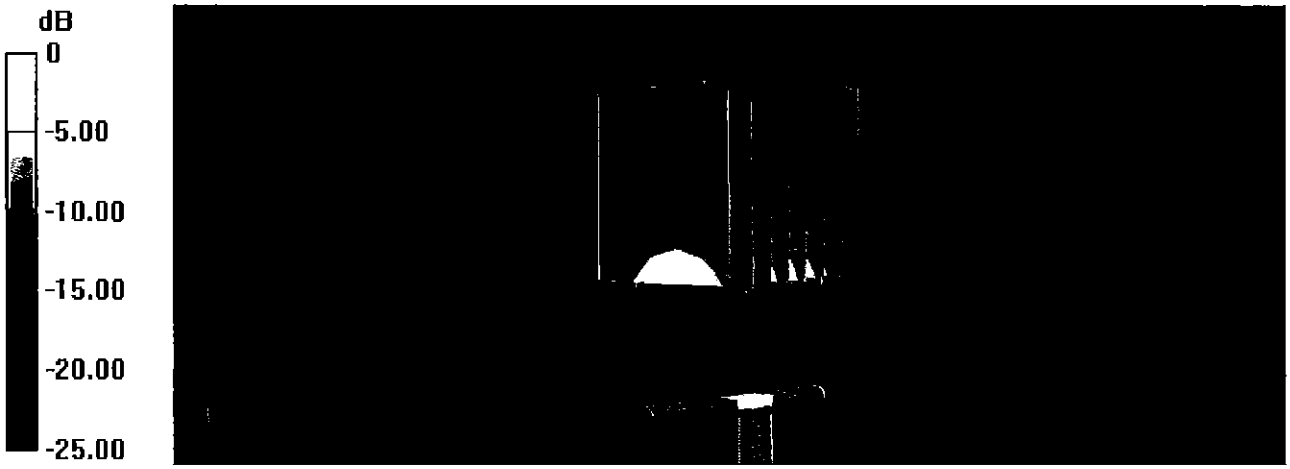
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.22 S/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.48, 7.48, 7.48); Calibrated: 15.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

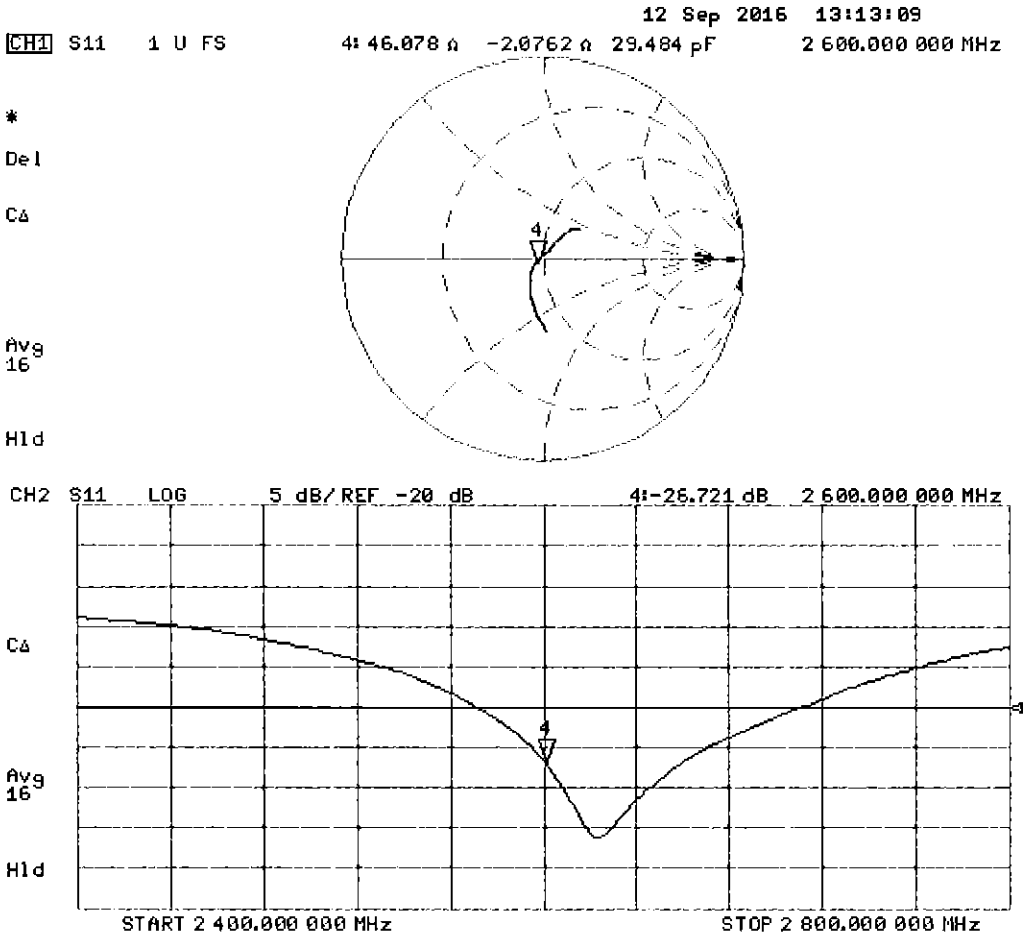
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.7 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.2 W/kg
Maximum value of SAR (measured) = 23.3 W/kg



0 dB = 23.3 W/kg = 13.67 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D5GHzV2-1123_Mar17**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1123
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	March 09, 2017

BNV 03-27-2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	31-Dec-16 (No. EX3-3503_Dec16)	Dec-17
DAE4	SN: 601	04-Jan-17 (No. DAE4-601_Jan17)	Jan-18

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

	Name	Function	Signature
Calibrated by:	Johannes Kurikka	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 10, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

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

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.9 ± 6 %	4.57 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.98 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.49 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.2 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.0 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	5.07 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.1 ± 6 %	5.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.5 ± 6 %	5.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.91 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**78.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.2 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.65 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	51.6 Ω - 5.7 jΩ
Return Loss	- 24.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	55.9 Ω - 0.7 jΩ
Return Loss	- 25.1 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.7 Ω + 1.2 jΩ
Return Loss	- 23.9 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	51.8 Ω - 3.8 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.2 Ω + 1.4 jΩ
Return Loss	- 22.3 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	57.3 Ω + 3.7 jΩ
Return Loss	- 22.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.205 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 08, 2011

DASY5 Validation Report for Head TSL

Date: 08.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1123

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.57 S/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.92 S/m; ε_r = 34.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 5.07 S/m; ε_r = 34.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

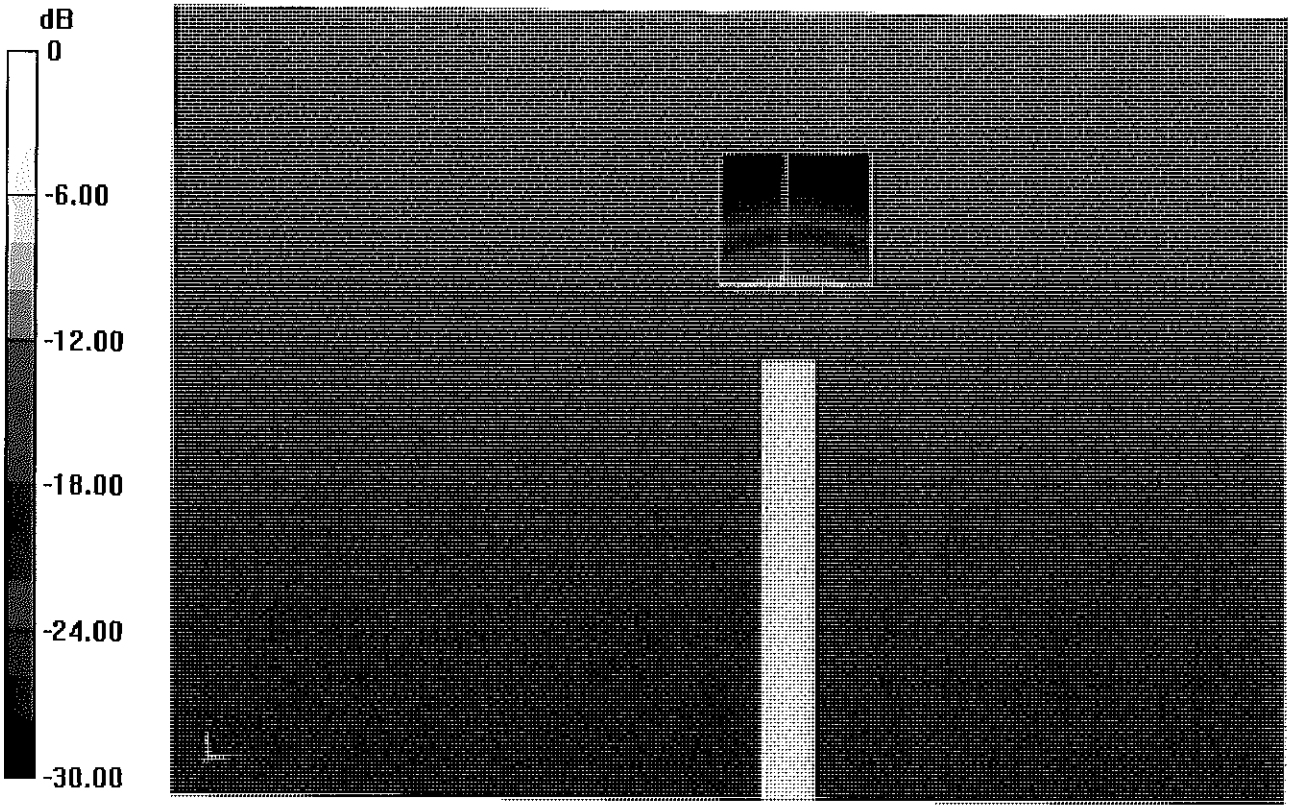
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.58, 5.58, 5.58); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.02, 5.02, 5.02); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.62 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 29.9 W/kg
SAR(1 g) = 7.98 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 18.3 W/kg

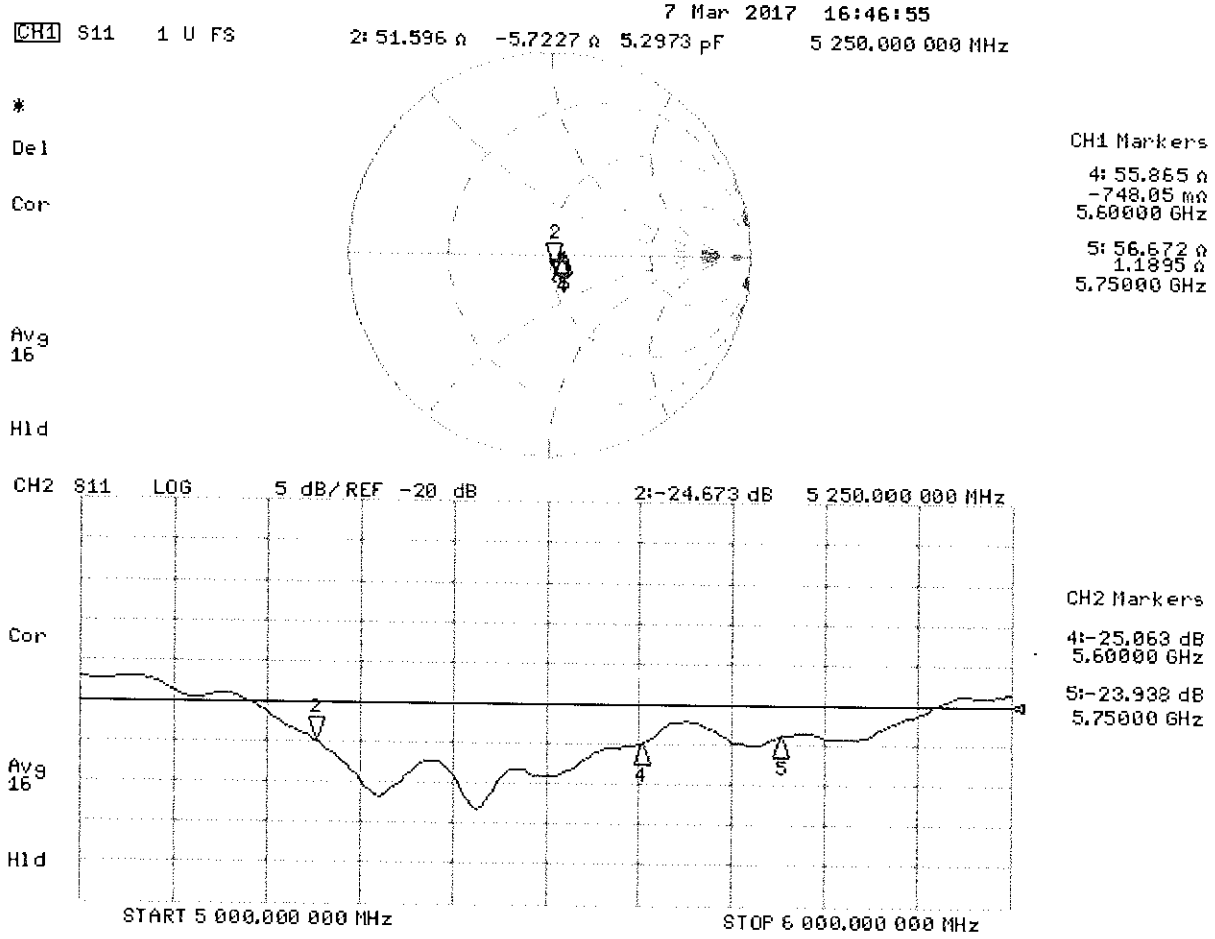
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.47 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 34.1 W/kg
SAR(1 g) = 8.49 W/kg; SAR(10 g) = 2.42 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.34 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 34.6 W/kg
SAR(1 g) = 8.3 W/kg; SAR(10 g) = 2.35 W/kg
Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 09.03.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1123

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.52 S/m; ε_r = 48.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.99 S/m; ε_r = 47.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5750 MHz; σ = 6.21 S/m; ε_r = 47.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

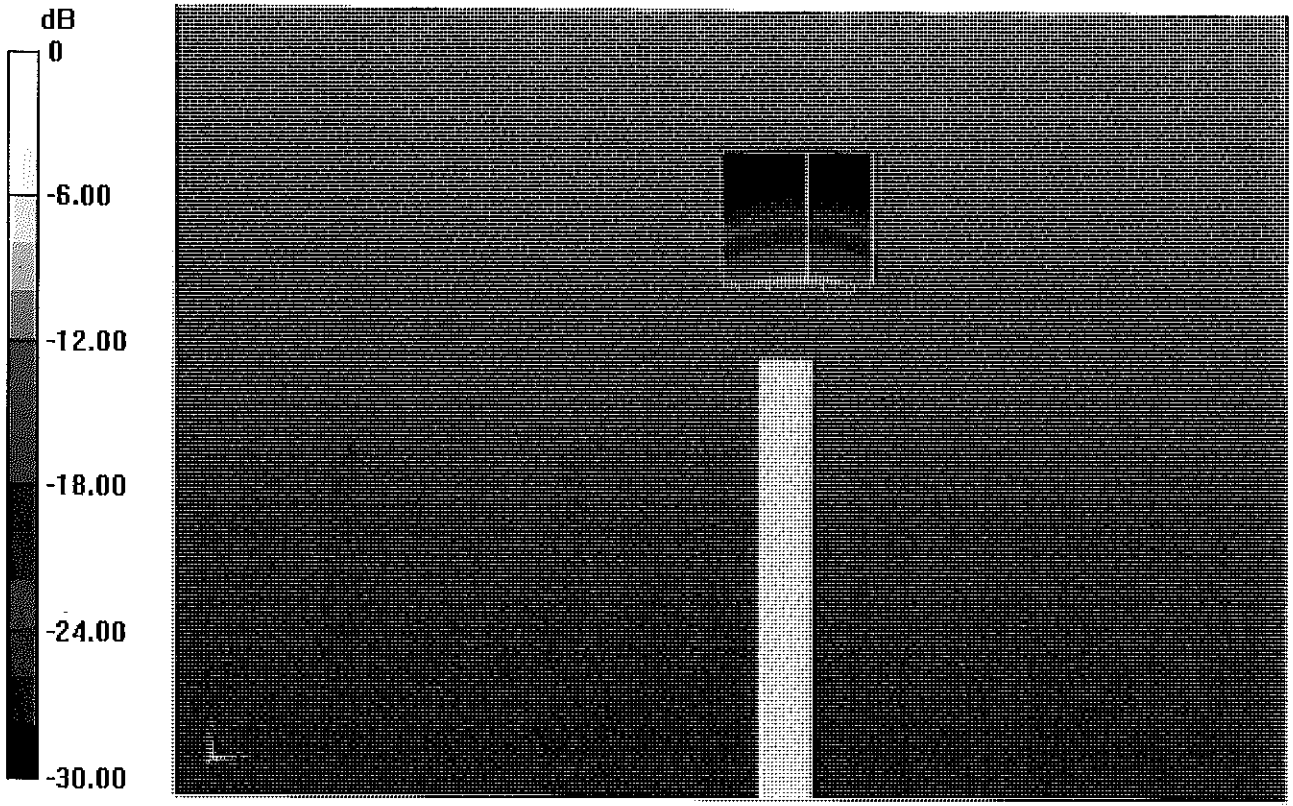
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.14, 5.14, 5.14); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.52, 4.52, 4.52); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.40 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 17.5 W/kg

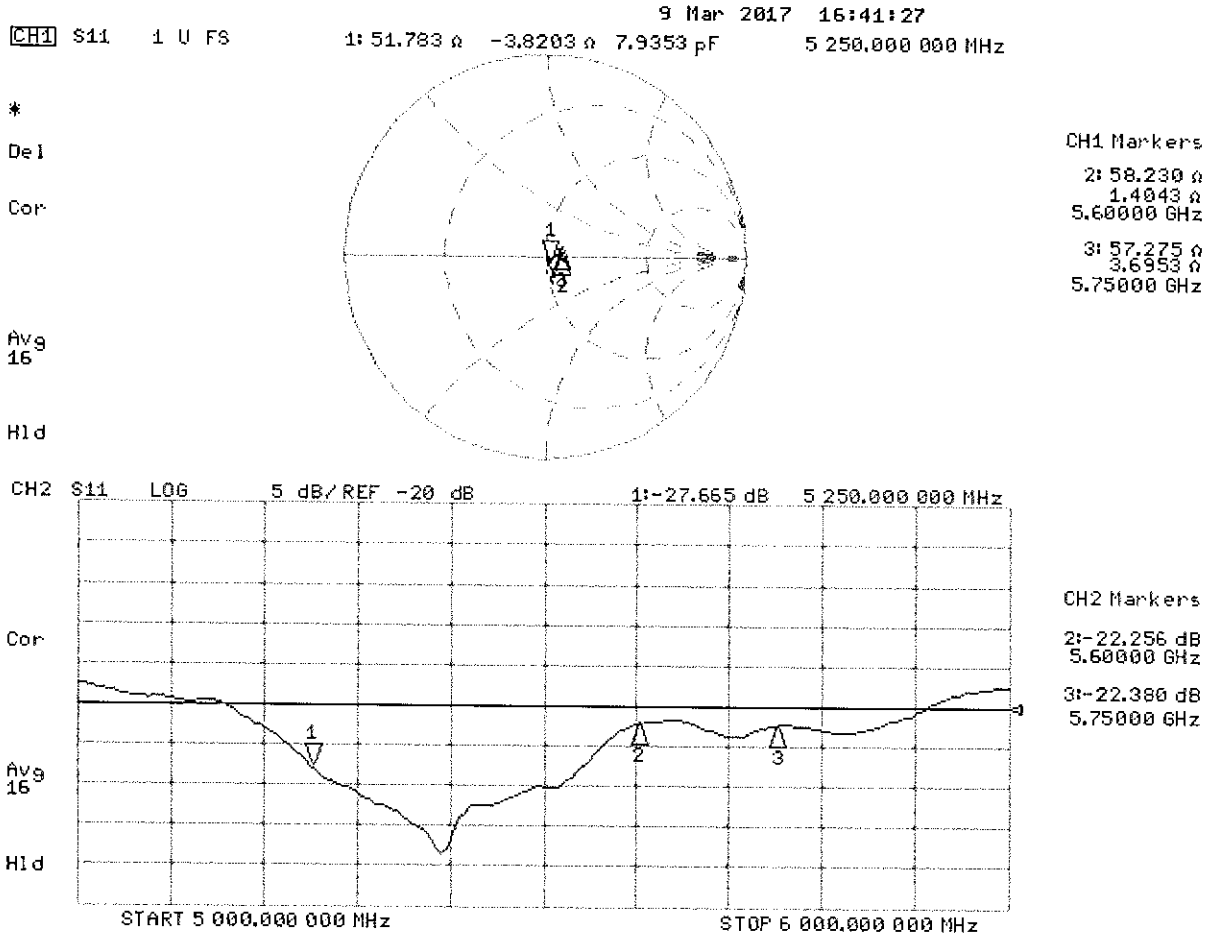
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.91 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 33.2 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 18.7 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.25 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 33.4 W/kg
SAR(1 g) = 7.65 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Impedance Measurement Plot for Body TSL



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

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

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

Accreditation No.: SCS 0108

Client **PC Test** **Certificate No: ES3-3209_Mar17**

CALIBRATION CERTIFICATE

Object ES3DV3 - SN:3209

Calibration procedure(s) QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

BN✓
03-27-2017

Calibration date: March 14, 2017

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	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: S5277 (20x)	05-Apr-16 (No. 217-02293)	Apr-17
Reference Probe ES3DV2	SN: 3013	31-Dec-16 (No. ES3-3013_Dec16)	Dec-17
DAE4	SN: 660	7-Dec-16 (No. DAE4-660_Dec16)	Dec-17
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

	Name	Function	Signature
Calibrated by:	**Jeton Kastrati**	**Laboratory Technician**	
Approved by:	**Katja Pokovic**	**Technical Manager**	

Issued: March 16, 2017

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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

Accredited by the Swiss Accreditation Service (SAS) **Accreditation No.: SCS 0108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe ES3DV3

SN:3209

Manufactured: October 14, 2008
Calibrated: March 14, 2017

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.31	1.28	1.10	± 10.1 %
DCP (mV)[B]	98.7	100.9	101.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	185.7	±3.5 %
		Y	0.0	0.0	1.0		188.4	
		Z	0.0	0.0	1.0		174.0	

Note: For details on UID parameters see Appendix.

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	55.02	400.2	36.4	24.81	1.139	5.1	1.332	0.294	1.012
Y	53.76	389.5	36.01	25.47	1.401	5.1	1.486	0.333	1.011
Z	54.22	392	35.92	24.25	1.184	5.1	1.305	0.356	1.012

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.76	6.76	6.76	0.80	1.17	± 12.0 %
835	41.5	0.90	6.36	6.36	6.36	0.63	1.31	± 12.0 %
1750	40.1	1.37	5.50	5.50	5.50	0.74	1.16	± 12.0 %
1900	40.0	1.40	5.31	5.31	5.31	0.63	1.30	± 12.0 %
2300	39.5	1.67	4.92	4.92	4.92	0.80	1.20	± 12.0 %
2450	39.2	1.80	4.72	4.72	4.72	0.71	1.33	± 12.0 %
2600	39.0	1.96	4.53	4.53	4.53	0.69	1.37	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	6.44	6.44	6.44	0.80	1.17	± 12.0 %
835	55.2	0.97	6.36	6.36	6.36	0.80	1.20	± 12.0 %
1750	53.4	1.49	5.13	5.13	5.13	0.51	1.53	± 12.0 %
1900	53.3	1.52	4.93	4.93	4.93	0.50	1.59	± 12.0 %
2300	52.9	1.81	4.62	4.62	4.62	0.80	1.24	± 12.0 %
2450	52.7	1.95	4.48	4.48	4.48	0.80	1.24	± 12.0 %
2600	52.5	2.16	4.26	4.26	4.26	0.80	1.20	± 12.0 %

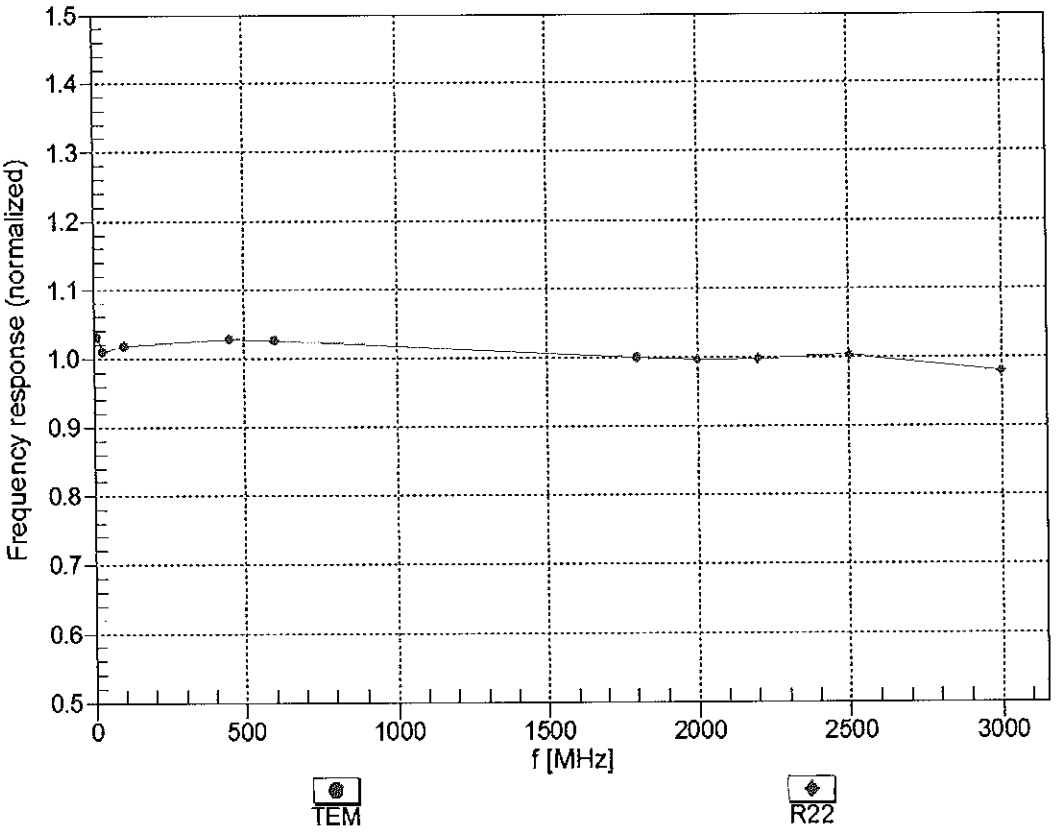
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

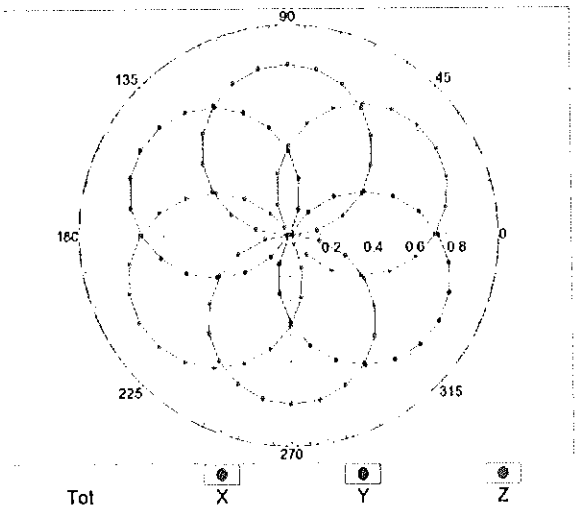
(TEM-Cell:ifi110 EXX, Waveguide: R22)



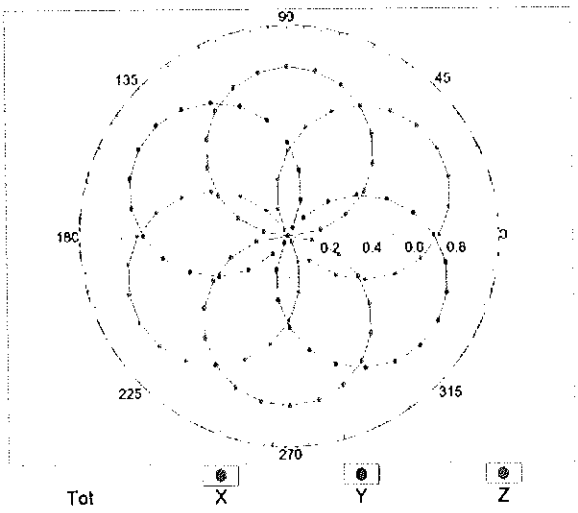
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

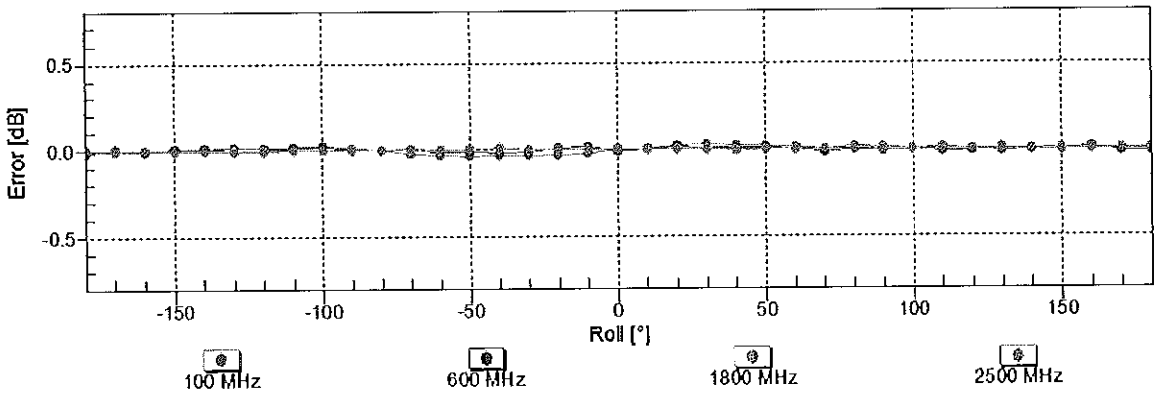
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



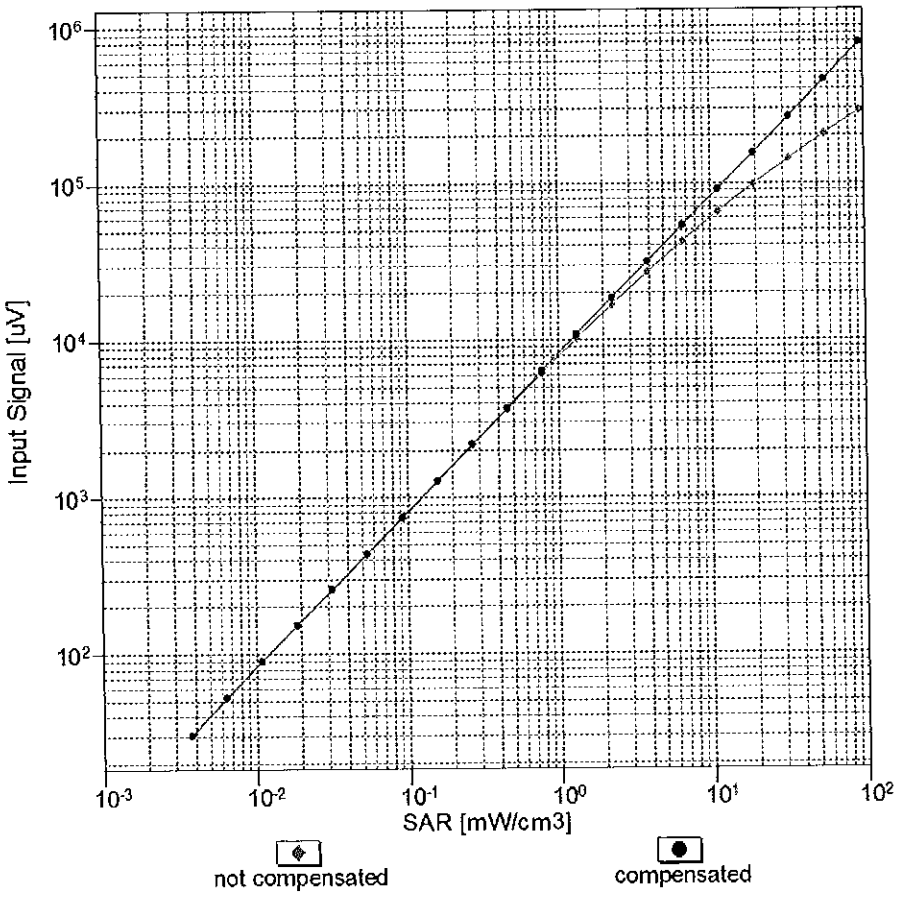
f=1800 MHz,R22

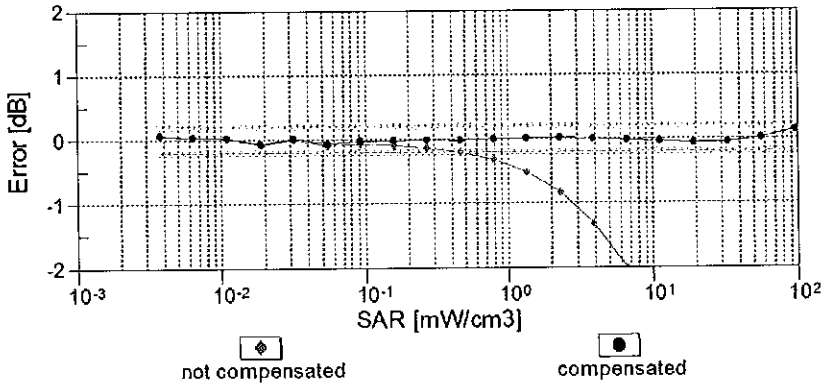




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)

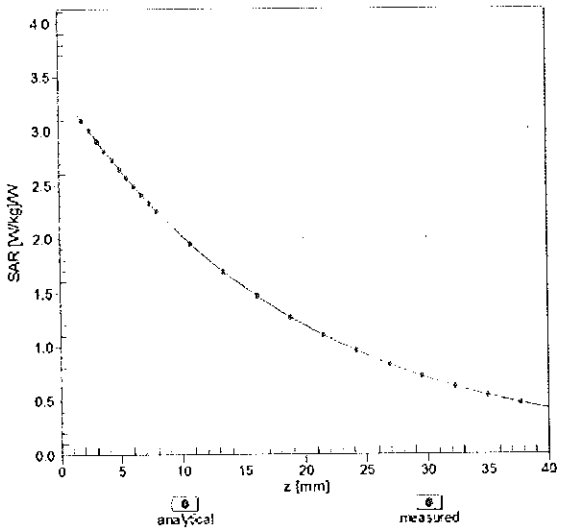




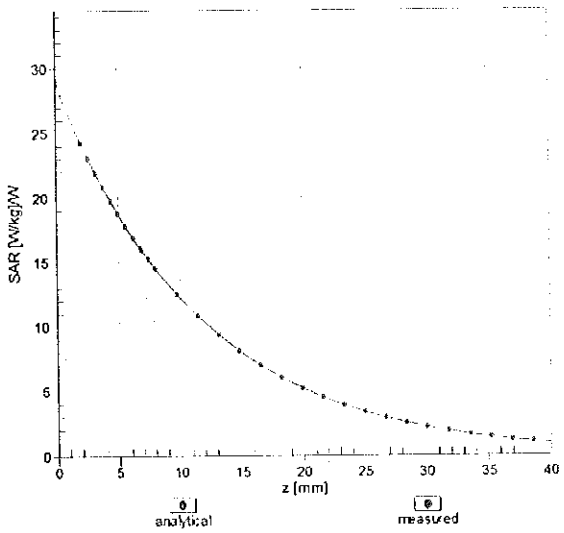
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

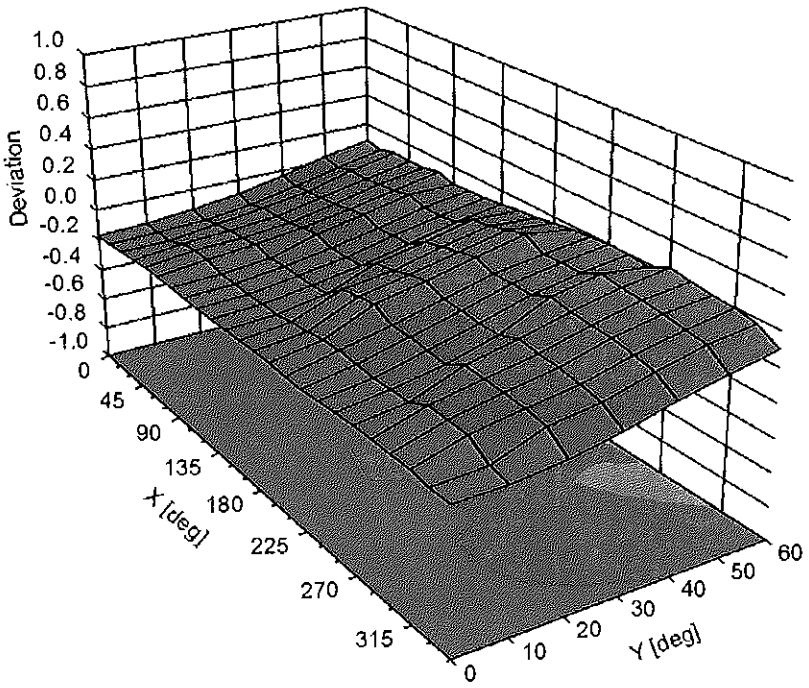


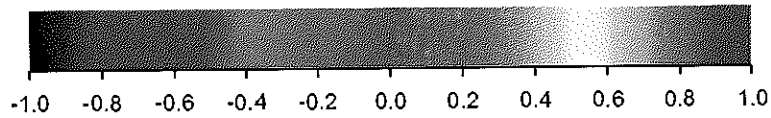
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-39.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix: Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	185.7	± 3.5 %
		Y	0.00	0.00	1.00		188.4	
		Z	0.00	0.00	1.00		174.0	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	16.56	89.85	21.07	10.00	25.0	± 9.6 %
		Y	14.18	87.91	20.84		25.0	
		Z	16.46	89.94	21.19		25.0	
10011-CAB	UMTS-FDD (WCDMA)	X	1.31	71.34	17.73	0.00	150.0	± 9.6 %
		Y	1.07	67.38	15.30		150.0	
		Z	1.14	68.61	16.10		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.33	65.77	16.71	0.41	150.0	± 9.6 %
		Y	1.28	64.69	15.69		150.0	
		Z	1.29	65.03	16.02		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	5.11	67.29	17.66	1.46	150.0	± 9.6 %
		Y	5.08	67.12	17.41		150.0	
		Z	5.08	67.16	17.48		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	100.00	120.30	31.44	9.39	50.0	± 9.6 %
		Y	100.00	121.02	32.06		50.0	
		Z	100.00	120.74	31.69		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	100.00	120.21	31.45	9.57	50.0	± 9.6 %
		Y	100.00	120.94	32.08		50.0	
		Z	100.00	120.65	31.69		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	100.00	118.31	29.49	6.56	60.0	± 9.6 %
		Y	100.00	118.38	29.74		60.0	
		Z	100.00	118.51	29.61		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	79.79	164.11	61.22	12.57	50.0	± 9.6 %
		Y	21.03	115.56	45.00		50.0	
		Z	21.02	118.33	46.74		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	56.10	137.19	47.52	9.56	60.0	± 9.6 %
		Y	22.58	110.81	38.90		60.0	
		Z	30.67	120.33	42.31		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	118.60	28.85	4.80	80.0	± 9.6 %
		Y	100.00	117.96	28.73		80.0	
		Z	100.00	118.50	28.81		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	120.37	28.91	3.55	100.0	± 9.6 %
		Y	100.00	118.79	28.36		100.0	
		Z	100.00	119.82	28.67		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	18.11	107.13	37.13	7.80	80.0	± 9.6 %
		Y	12.22	95.66	32.56		80.0	
		Z	13.69	99.54	34.27		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	100.00	117.23	28.52	5.30	70.0	± 9.6 %
		Y	100.00	116.90	28.56		70.0	
		Z	100.00	117.22	28.54		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	124.45	29.19	1.88	100.0	± 9.6 %
		Y	100.00	120.00	27.42		100.0	
		Z	100.00	122.22	28.25		100.0	

10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	134.81	32.39	1.17	100.0	± 9.6 %
		Y	100.00	125.40	28.63		100.0	
		Z	100.00	129.61	30.26		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	100.00	129.27	35.65	5.30	70.0	± 9.6 %
		Y	49.54	115.99	32.11		70.0	
		Z	90.11	126.99	34.97		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	16.84	102.10	27.13	1.88	100.0	± 9.6 %
		Y	7.82	89.20	22.87		100.0	
		Z	9.48	92.81	24.19		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	6.67	89.65	23.23	1.17	100.0	± 9.6 %
		Y	3.84	80.35	19.62		100.0	
		Z	4.40	82.90	20.73		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	100.00	129.52	35.77	5.30	70.0	± 9.6 %
		Y	85.34	125.22	34.45		70.0	
		Z	100.00	128.99	35.51		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	15.79	101.19	26.84	1.88	100.0	± 9.6 %
		Y	7.32	88.29	22.54		100.0	
		Z	8.88	91.91	23.88		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	6.96	90.64	23.66	1.17	100.0	± 9.6 %
		Y	3.95	81.00	19.95		100.0	
		Z	4.52	83.60	21.07		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	2.68	77.46	18.66	0.00	150.0	± 9.6 %
		Y	1.87	71.76	15.92		150.0	
		Z	2.09	73.47	16.81		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	100.00	116.28	28.75	7.78	50.0	± 9.6 %
		Y	100.00	116.68	29.16		50.0	
		Z	100.00	116.58	28.91		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.01	103.03	6.46	0.00	150.0	± 9.6 %
		Y	0.01	95.61	0.65		150.0	
		Z	0.02	122.64	11.17		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	100.00	122.27	33.78	13.80	25.0	± 9.6 %
		Y	88.36	120.80	33.95		25.0	
		Z	100.00	122.70	34.06		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	100.00	120.46	31.88	10.79	40.0	± 9.6 %
		Y	100.00	121.38	32.63		40.0	
		Z	100.00	120.92	32.14		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	64.71	119.17	33.88	9.03	50.0	± 9.6 %
		Y	31.81	105.88	30.24		50.0	
		Z	48.79	114.06	32.52		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	10.31	93.78	31.68	6.55	100.0	± 9.6 %
		Y	8.35	87.44	28.76		100.0	
		Z	8.74	89.37	29.77		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.47	67.98	17.85	0.61	110.0	± 9.6 %
		Y	1.41	66.57	16.67		110.0	
		Z	1.42	66.96	17.03		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	100.00	138.63	36.70	1.30	110.0	± 9.6 %
		Y	100.00	134.16	34.76		110.0	
		Z	100.00	136.34	35.67		110.0	

10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	21.25	113.68	33.06	2.04	110.0	± 9.6 %
		Y	8.67	95.89	27.33		110.0	
		Z	10.38	100.06	28.88		110.0	
10062-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.87	67.16	16.99	0.49	100.0	± 9.6 %
		Y	4.83	66.94	16.72		100.0	
		Z	4.84	67.02	16.80		100.0	
10063-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.90	67.29	17.12	0.72	100.0	± 9.6 %
		Y	4.86	67.08	16.85		100.0	
		Z	4.87	67.15	16.93		100.0	
10064-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	5.22	67.61	17.38	0.86	100.0	± 9.6 %
		Y	5.17	67.40	17.11		100.0	
		Z	5.19	67.47	17.19		100.0	
10065-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	5.10	67.59	17.53	1.21	100.0	± 9.6 %
		Y	5.06	67.39	17.27		100.0	
		Z	5.07	67.45	17.34		100.0	
10066-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	5.14	67.68	17.74	1.46	100.0	± 9.6 %
		Y	5.10	67.48	17.48		100.0	
		Z	5.11	67.54	17.56		100.0	
10067-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.44	67.85	18.21	2.04	100.0	± 9.6 %
		Y	5.41	67.66	17.95		100.0	
		Z	5.41	67.71	18.02		100.0	
10068-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.54	68.11	18.56	2.55	100.0	± 9.6 %
		Y	5.51	67.91	18.28		100.0	
		Z	5.51	67.95	18.36		100.0	
10069-CAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.62	68.08	18.75	2.67	100.0	± 9.6 %
		Y	5.59	67.88	18.46		100.0	
		Z	5.59	67.92	18.55		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	5.23	67.47	18.03	1.99	100.0	± 9.6 %
		Y	5.20	67.30	17.78		100.0	
		Z	5.20	67.34	17.85		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	5.25	67.96	18.33	2.30	100.0	± 9.6 %
		Y	5.23	67.77	18.07		100.0	
		Z	5.22	67.81	18.14		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	5.35	68.24	18.74	2.83	100.0	± 9.6 %
		Y	5.33	68.06	18.47		100.0	
		Z	5.32	68.08	18.54		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	5.35	68.21	18.96	3.30	100.0	± 9.6 %
		Y	5.34	68.06	18.69		100.0	
		Z	5.32	68.06	18.76		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	5.45	68.57	19.42	3.82	90.0	± 9.6 %
		Y	5.44	68.40	19.14		90.0	
		Z	5.42	68.40	19.20		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	5.44	68.33	19.53	4.15	90.0	± 9.6 %
		Y	5.45	68.18	19.25		90.0	
		Z	5.42	68.16	19.32		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	5.47	68.40	19.63	4.30	90.0	± 9.6 %
		Y	5.48	68.26	19.35		90.0	
		Z	5.45	68.24	19.42		90.0	

10081-CAB	CDMA2000 (1xRTT, RC3)	X	1.23	71.08	15.82	0.00	150.0	± 9.6 %
		Y	0.91	66.28	13.04		150.0	
		Z	0.99	67.64	13.91		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	1.44	62.24	7.11	4.77	80.0	± 9.6 %
		Y	1.55	62.44	7.40		80.0	
		Z	1.44	62.17	7.10		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	100.00	118.36	29.54	6.56	60.0	± 9.6 %
		Y	100.00	118.45	29.79		60.0	
		Z	100.00	118.56	29.65		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	2.01	69.10	16.79	0.00	150.0	± 9.6 %
		Y	1.86	67.49	15.67		150.0	
		Z	1.91	68.05	16.06		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.98	69.12	16.80	0.00	150.0	± 9.6 %
		Y	1.82	67.46	15.64		150.0	
		Z	1.87	68.03	16.04		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	56.10	137.12	47.49	9.56	60.0	± 9.6 %
		Y	22.61	110.79	38.89		60.0	
		Z	30.74	120.33	42.30		60.0	
10100-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	3.46	71.82	17.60	0.00	150.0	± 9.6 %
		Y	3.20	70.34	16.69		150.0	
		Z	3.29	70.87	17.01		150.0	
10101-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.44	68.35	16.55	0.00	150.0	± 9.6 %
		Y	3.33	67.66	16.01		150.0	
		Z	3.37	67.92	16.20		150.0	
10102-CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.53	68.21	16.59	0.00	150.0	± 9.6 %
		Y	3.43	67.60	16.09		150.0	
		Z	3.46	67.83	16.26		150.0	
10103-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	8.71	80.18	22.43	3.98	65.0	± 9.6 %
		Y	8.63	79.54	22.01		65.0	
		Z	8.72	80.06	22.29		65.0	
10104-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	8.41	78.26	22.59	3.98	65.0	± 9.6 %
		Y	8.16	77.17	21.90		65.0	
		Z	8.16	77.51	22.15		65.0	
10105-CAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	7.75	76.58	22.19	3.98	65.0	± 9.6 %
		Y	7.29	74.89	21.22		65.0	
		Z	7.40	75.53	21.60		65.0	
10108-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	3.04	71.09	17.48	0.00	150.0	± 9.6 %
		Y	2.81	69.59	16.53		150.0	
		Z	2.89	70.12	16.86		150.0	
10109-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	3.10	68.24	16.51	0.00	150.0	± 9.6 %
		Y	2.98	67.47	15.91		150.0	
		Z	3.02	67.76	16.12		150.0	
10110-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	2.51	70.39	17.27	0.00	150.0	± 9.6 %
		Y	2.30	68.71	16.17		150.0	
		Z	2.37	69.29	16.55		150.0	
10111-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.80	68.98	16.82	0.00	150.0	± 9.6 %
		Y	2.67	68.08	16.14		150.0	
		Z	2.72	68.39	16.37		150.0	

10112-CAD	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	3.21	68.13	16.51	0.00	150.0	± 9.6 %
		Y	3.11	67.44	15.96		150.0	
		Z	3.14	67.70	16.15		150.0	
10113-CAD	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.94	69.00	16.88	0.00	150.0	± 9.6 %
		Y	2.83	68.20	16.26		150.0	
		Z	2.87	68.48	16.47		150.0	
10114-CAB	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	5.29	67.60	16.80	0.00	150.0	± 9.6 %
		Y	5.23	67.37	16.54		150.0	
		Z	5.25	67.46	16.62		150.0	
10115-CAB	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.64	67.91	16.97	0.00	150.0	± 9.6 %
		Y	5.58	67.65	16.70		150.0	
		Z	5.60	67.75	16.78		150.0	
10116-CAB	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.42	67.88	16.87	0.00	150.0	± 9.6 %
		Y	5.35	67.63	16.60		150.0	
		Z	5.37	67.72	16.68		150.0	
10117-CAB	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	5.27	67.51	16.78	0.00	150.0	± 9.6 %
		Y	5.21	67.27	16.51		150.0	
		Z	5.23	67.37	16.60		150.0	
10118-CAB	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.75	68.18	17.12	0.00	150.0	± 9.6 %
		Y	5.68	67.91	16.83		150.0	
		Z	5.70	68.00	16.92		150.0	
10119-CAB	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.39	67.82	16.85	0.00	150.0	± 9.6 %
		Y	5.33	67.57	16.58		150.0	
		Z	5.35	67.66	16.66		150.0	
10140-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.57	68.23	16.51	0.00	150.0	± 9.6 %
		Y	3.47	67.61	16.01		150.0	
		Z	3.51	67.84	16.19		150.0	
10141-CAC	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.69	68.24	16.63	0.00	150.0	± 9.6 %
		Y	3.59	67.69	16.17		150.0	
		Z	3.63	67.89	16.33		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	2.30	70.61	17.13	0.00	150.0	± 9.6 %
		Y	2.07	68.65	15.88		150.0	
		Z	2.15	69.31	16.31		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.70	69.93	16.73	0.00	150.0	± 9.6 %
		Y	2.53	68.73	15.89		150.0	
		Z	2.59	69.14	16.18		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	2.50	67.93	15.31	0.00	150.0	± 9.6 %
		Y	2.35	66.79	14.47		150.0	
		Z	2.40	67.20	14.77		150.0	
10145-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.61	68.59	14.32	0.00	150.0	± 9.6 %
		Y	1.36	65.99	12.68		150.0	
		Z	1.44	66.83	13.25		150.0	
10146-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	4.12	76.15	17.00	0.00	150.0	± 9.6 %
		Y	3.13	71.87	14.86		150.0	
		Z	3.61	74.04	16.00		150.0	
10147-CAD	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	5.91	81.17	19.01	0.00	150.0	± 9.6 %
		Y	4.21	75.86	16.64		150.0	
		Z	5.05	78.62	17.93		150.0	

10149-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	3.10	68.30	16.55	0.00	150.0	± 9.6 %
		Y	2.99	67.53	15.95		150.0	
		Z	3.03	67.81	16.16		150.0	
10150-CAC	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.22	68.17	16.55	0.00	150.0	± 9.6 %
		Y	3.11	67.49	16.00		150.0	
		Z	3.15	67.74	16.19		150.0	
10151-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	9.92	84.00	24.01	3.98	65.0	± 9.6 %
		Y	9.28	82.23	23.13		65.0	
		Z	9.42	82.88	23.47		65.0	
10152-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	8.12	78.81	22.58	3.98	65.0	± 9.6 %
		Y	7.79	77.46	21.77		65.0	
		Z	7.82	77.90	22.06		65.0	
10153-CAC	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	8.47	79.51	23.20	3.98	65.0	± 9.6 %
		Y	8.19	78.31	22.47		65.0	
		Z	8.19	78.67	22.72		65.0	
10154-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	2.56	70.77	17.50	0.00	150.0	± 9.6 %
		Y	2.35	69.09	16.42		150.0	
		Z	2.42	69.67	16.79		150.0	
10155-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.80	68.99	16.83	0.00	150.0	± 9.6 %
		Y	2.68	68.09	16.15		150.0	
		Z	2.72	68.40	16.38		150.0	
10156-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	2.18	71.04	17.14	0.00	150.0	± 9.6 %
		Y	1.92	68.76	15.73		150.0	
		Z	2.01	69.52	16.21		150.0	
10157-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	2.37	68.82	15.55	0.00	150.0	± 9.6 %
		Y	2.18	67.35	14.55		150.0	
		Z	2.25	67.86	14.90		150.0	
10158-CAD	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	2.95	69.05	16.92	0.00	150.0	± 9.6 %
		Y	2.83	68.25	16.30		150.0	
		Z	2.87	68.52	16.51		150.0	
10159-CAD	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.48	69.16	15.77	0.00	150.0	± 9.6 %
		Y	2.29	67.76	14.81		150.0	
		Z	2.35	68.25	15.15		150.0	
10160-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	3.02	70.00	17.21	0.00	150.0	± 9.6 %
		Y	2.84	68.79	16.39		150.0	
		Z	2.90	69.20	16.66		150.0	
10161-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	3.11	68.10	16.49	0.00	150.0	± 9.6 %
		Y	3.01	67.41	15.93		150.0	
		Z	3.04	67.66	16.12		150.0	
10162-CAC	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	3.22	68.18	16.56	0.00	150.0	± 9.6 %
		Y	3.11	67.53	16.02		150.0	
		Z	3.15	67.77	16.21		150.0	
10166-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	4.01	71.57	20.55	3.01	150.0	± 9.6 %
		Y	3.96	70.99	19.97		150.0	
		Z	4.00	71.24	20.22		150.0	
10167-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	5.34	76.03	21.61	3.01	150.0	± 9.6 %
		Y	5.24	75.14	20.90		150.0	
		Z	5.29	75.43	21.17		150.0	

10168-CAD	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	5.92	78.26	22.84	3.01	150.0	± 9.6 %
		Y	5.88	77.64	22.28		150.0	
		Z	5.88	77.74	22.45		150.0	
10169-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	3.56	72.83	21.25	3.01	150.0	± 9.6 %
		Y	3.54	72.03	20.47		150.0	
		Z	3.57	72.33	20.78		150.0	
10170-CAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	5.89	82.52	24.81	3.01	150.0	± 9.6 %
		Y	5.80	81.18	23.85		150.0	
		Z	5.77	81.27	24.06		150.0	
10171-AAC	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	4.66	77.30	21.81	3.01	150.0	± 9.6 %
		Y	4.48	75.56	20.63		150.0	
		Z	4.56	76.10	21.06		150.0	
10172-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	100.00	142.02	43.67	6.02	65.0	± 9.6 %
		Y	29.14	113.86	35.69		65.0	
		Z	42.14	122.72	38.48		65.0	
10173-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	100.00	131.99	38.44	6.02	65.0	± 9.6 %
		Y	100.00	129.98	37.53		65.0	
		Z	100.00	131.24	38.14		65.0	
10174-CAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	100.00	130.14	37.45	6.02	65.0	± 9.6 %
		Y	100.00	127.86	36.41		65.0	
		Z	91.70	127.77	36.74		65.0	
10175-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	3.52	72.50	21.01	3.01	150.0	± 9.6 %
		Y	3.49	71.66	20.21		150.0	
		Z	3.53	71.99	20.53		150.0	
10176-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	5.90	82.55	24.82	3.01	150.0	± 9.6 %
		Y	5.81	81.21	23.86		150.0	
		Z	5.78	81.30	24.07		150.0	
10177-CAF	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	3.55	72.66	21.10	3.01	150.0	± 9.6 %
		Y	3.52	71.84	20.31		150.0	
		Z	3.56	72.16	20.62		150.0	
10178-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	5.82	82.23	24.68	3.01	150.0	± 9.6 %
		Y	5.72	80.87	23.70		150.0	
		Z	5.70	80.99	23.93		150.0	
10179-CAD	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	5.25	79.82	23.19	3.01	150.0	± 9.6 %
		Y	5.07	78.18	22.08		150.0	
		Z	5.12	78.56	22.43		150.0	
10180-CAD	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	4.65	77.21	21.76	3.01	150.0	± 9.6 %
		Y	4.46	75.45	20.57		150.0	
		Z	4.54	76.00	21.00		150.0	
10181-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	3.55	72.65	21.10	3.01	150.0	± 9.6 %
		Y	3.51	71.82	20.30		150.0	
		Z	3.55	72.14	20.62		150.0	
10182-CAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	5.81	82.20	24.67	3.01	150.0	± 9.6 %
		Y	5.71	80.84	23.69		150.0	
		Z	5.69	80.96	23.92		150.0	
10183-AAB	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	4.64	77.18	21.74	3.01	150.0	± 9.6 %
		Y	4.45	75.42	20.56		150.0	
		Z	4.53	75.97	20.99		150.0	

10184-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	3.56	72.69	21.12	3.01	150.0	± 9.6 %
		Y	3.53	71.87	20.33		150.0	
		Z	3.57	72.19	20.64		150.0	
10185-CAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	5.84	82.29	24.71	3.01	150.0	± 9.6 %
		Y	5.74	80.94	23.73		150.0	
		Z	5.72	81.05	23.96		150.0	
10186-AAD	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	4.67	77.27	21.78	3.01	150.0	± 9.6 %
		Y	4.47	75.51	20.59		150.0	
		Z	4.56	76.06	21.03		150.0	
10187-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	3.57	72.74	21.18	3.01	150.0	± 9.6 %
		Y	3.54	71.92	20.39		150.0	
		Z	3.58	72.24	20.70		150.0	
10188-CAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	6.08	83.16	25.13	3.01	150.0	± 9.6 %
		Y	6.00	81.87	24.19		150.0	
		Z	5.95	81.90	24.38		150.0	
10189-AAD	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	4.80	77.83	22.09	3.01	150.0	± 9.6 %
		Y	4.61	76.08	20.92		150.0	
		Z	4.69	76.60	21.33		150.0	
10193-CAB	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.68	66.98	16.53	0.00	150.0	± 9.6 %
		Y	4.62	66.73	16.24		150.0	
		Z	4.64	66.83	16.34		150.0	
10194-CAB	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	X	4.86	67.32	16.65	0.00	150.0	± 9.6 %
		Y	4.81	67.07	16.37		150.0	
		Z	4.83	67.17	16.46		150.0	
10195-CAB	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	X	4.91	67.35	16.66	0.00	150.0	± 9.6 %
		Y	4.85	67.10	16.38		150.0	
		Z	4.87	67.20	16.47		150.0	
10196-CAB	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	X	4.69	67.06	16.56	0.00	150.0	± 9.6 %
		Y	4.63	66.81	16.27		150.0	
		Z	4.65	66.91	16.37		150.0	
10197-CAB	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	X	4.88	67.35	16.66	0.00	150.0	± 9.6 %
		Y	4.82	67.09	16.38		150.0	
		Z	4.84	67.19	16.47		150.0	
10198-CAB	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	X	4.91	67.37	16.68	0.00	150.0	± 9.6 %
		Y	4.85	67.12	16.39		150.0	
		Z	4.87	67.22	16.49		150.0	
10219-CAB	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X	4.64	67.08	16.52	0.00	150.0	± 9.6 %
		Y	4.58	66.82	16.23		150.0	
		Z	4.60	66.92	16.33		150.0	
10220-CAB	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	X	4.88	67.33	16.66	0.00	150.0	± 9.6 %
		Y	4.82	67.07	16.37		150.0	
		Z	4.84	67.17	16.47		150.0	
10221-CAB	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	X	4.92	67.29	16.66	0.00	150.0	± 9.6 %
		Y	4.86	67.05	16.38		150.0	
		Z	4.88	67.14	16.47		150.0	
10222-CAB	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	X	5.24	67.52	16.77	0.00	150.0	± 9.6 %
		Y	5.18	67.28	16.51		150.0	
		Z	5.21	67.38	16.59		150.0	

10223-CAB	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	X	5.57	67.76	16.92	0.00	150.0	± 9.6 %
		Y	5.51	67.51	16.65		150.0	
		Z	5.53	67.60	16.73		150.0	
10224-CAB	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	X	5.29	67.62	16.75	0.00	150.0	± 9.6 %
		Y	5.23	67.38	16.48		150.0	
		Z	5.25	67.47	16.57		150.0	
10225-CAB	UMTS-FDD (HSPA+)	X	2.96	66.72	15.94	0.00	150.0	± 9.6 %
		Y	2.88	66.18	15.44		150.0	
		Z	2.91	66.38	15.61		150.0	
10226-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	X	100.00	132.19	38.58	6.02	65.0	± 9.6 %
		Y	100.00	130.20	37.67		65.0	
		Z	100.00	131.44	38.27		65.0	
10227-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	X	100.00	129.74	37.30	6.02	65.0	± 9.6 %
		Y	100.00	127.95	36.49		65.0	
		Z	100.00	129.11	37.05		65.0	
10228-CAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	X	100.00	141.90	43.60	6.02	65.0	± 9.6 %
		Y	64.28	130.08	40.04		65.0	
		Z	94.90	139.78	42.86		65.0	
10229-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	X	100.00	131.97	38.44	6.02	65.0	± 9.6 %
		Y	100.00	129.97	37.54		65.0	
		Z	100.00	131.22	38.14		65.0	
10230-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	X	100.00	129.60	37.20	6.02	65.0	± 9.6 %
		Y	100.00	127.79	36.39		65.0	
		Z	100.00	128.96	36.95		65.0	
10231-CAB	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	X	100.00	141.75	43.50	6.02	65.0	± 9.6 %
		Y	57.85	127.76	39.37		65.0	
		Z	84.57	137.19	42.14		65.0	
10232-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	100.00	131.99	38.45	6.02	65.0	± 9.6 %
		Y	100.00	129.98	37.54		65.0	
		Z	100.00	131.24	38.14		65.0	
10233-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	100.00	129.61	37.21	6.02	65.0	± 9.6 %
		Y	100.00	127.81	36.39		65.0	
		Z	100.00	128.97	36.95		65.0	
10234-CAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	100.00	141.44	43.31	6.02	65.0	± 9.6 %
		Y	52.53	125.50	38.67		65.0	
		Z	75.93	134.62	41.39		65.0	
10235-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	100.00	132.00	38.45	6.02	65.0	± 9.6 %
		Y	100.00	130.00	37.54		65.0	
		Z	100.00	131.25	38.15		65.0	
10236-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	100.00	129.56	37.18	6.02	65.0	± 9.6 %
		Y	100.00	127.76	36.37		65.0	
		Z	100.00	128.92	36.93		65.0	
10237-CAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	100.00	141.78	43.50	6.02	65.0	± 9.6 %
		Y	58.86	128.14	39.47		65.0	
		Z	86.67	137.73	42.28		65.0	
10238-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	100.00	132.00	38.45	6.02	65.0	± 9.6 %
		Y	100.00	129.99	37.54		65.0	
		Z	100.00	131.25	38.14		65.0	

10239-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	100.00	129.64	37.21	6.02	65.0	± 9.6 %
		Y	100.00	127.83	36.40		65.0	
		Z	100.00	129.00	36.96		65.0	
10240-CAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	100.00	141.80	43.51	6.02	65.0	± 9.6 %
		Y	58.51	128.03	39.44		65.0	
		Z	86.02	137.59	42.24		65.0	
10241-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	13.65	92.13	30.26	6.98	65.0	± 9.6 %
		Y	12.73	89.47	28.84		65.0	
		Z	12.83	90.19	29.33		65.0	
10242-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	11.56	88.33	28.75	6.98	65.0	± 9.6 %
		Y	12.17	88.47	28.39		65.0	
		Z	10.55	85.79	27.57		65.0	
10243-CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	8.75	83.84	28.04	6.98	65.0	± 9.6 %
		Y	9.16	83.97	27.64		65.0	
		Z	8.20	81.83	26.97		65.0	
10244-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	11.15	85.22	22.92	3.98	65.0	± 9.6 %
		Y	10.49	83.51	22.06		65.0	
		Z	10.74	84.39	22.53		65.0	
10245-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	10.71	84.28	22.53	3.98	65.0	± 9.6 %
		Y	10.12	82.65	21.69		65.0	
		Z	10.34	83.48	22.15		65.0	
10246-CAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	11.99	89.44	24.35	3.98	65.0	± 9.6 %
		Y	10.01	85.73	22.85		65.0	
		Z	10.59	87.16	23.46		65.0	
10247-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	7.78	79.88	21.56	3.98	65.0	± 9.6 %
		Y	7.39	78.44	20.77		65.0	
		Z	7.42	78.92	21.06		65.0	
10248-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	7.68	79.17	21.27	3.98	65.0	± 9.6 %
		Y	7.29	77.74	20.47		65.0	
		Z	7.33	78.22	20.77		65.0	
10249-CAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	13.65	92.24	26.09	3.98	65.0	± 9.6 %
		Y	11.34	88.25	24.50		65.0	
		Z	12.01	89.77	25.14		65.0	
10250-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	8.65	81.91	23.79	3.98	65.0	± 9.6 %
		Y	8.26	80.45	22.98		65.0	
		Z	8.27	80.90	23.26		65.0	
10251-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	8.08	79.43	22.51	3.98	65.0	± 9.6 %
		Y	7.71	78.00	21.68		65.0	
		Z	7.74	78.46	21.99		65.0	
10252-CAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	11.90	89.42	25.97	3.98	65.0	± 9.6 %
		Y	10.50	86.42	24.67		65.0	
		Z	10.87	87.52	25.18		65.0	
10253-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	7.84	78.03	22.28	3.98	65.0	± 9.6 %
		Y	7.57	76.80	21.51		65.0	
		Z	7.57	77.19	21.79		65.0	
10254-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	8.21	78.77	22.87	3.98	65.0	± 9.6 %
		Y	7.97	77.64	22.16		65.0	
		Z	7.95	77.97	22.41		65.0	

10255-CAC	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	9.44	83.41	24.04	3.98	65.0	± 9.6 %
		Y	8.86	81.64	23.14		65.0	
		Z	8.96	82.26	23.48		65.0	
10256-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	9.33	81.69	20.68	3.98	65.0	± 9.6 %
		Y	8.73	79.97	19.81		65.0	
		Z	9.01	80.96	20.33		65.0	
10257-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	8.80	80.36	20.09	3.98	65.0	± 9.6 %
		Y	8.27	78.77	19.26		65.0	
		Z	8.51	79.68	19.75		65.0	
10258-CAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	9.10	84.22	21.80	3.98	65.0	± 9.6 %
		Y	7.87	81.28	20.53		65.0	
		Z	8.20	82.41	21.04		65.0	
10259-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	8.13	80.62	22.35	3.98	65.0	± 9.6 %
		Y	7.73	79.15	21.54		65.0	
		Z	7.76	79.63	21.84		65.0	
10260-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	8.07	80.16	22.18	3.98	65.0	± 9.6 %
		Y	7.70	78.77	21.40		65.0	
		Z	7.73	79.22	21.69		65.0	
10261-CAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	11.98	89.88	25.68	3.98	65.0	± 9.6 %
		Y	10.32	86.47	24.25		65.0	
		Z	10.77	87.74	24.81		65.0	
10262-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	8.64	81.87	23.76	3.98	65.0	± 9.6 %
		Y	8.25	80.40	22.94		65.0	
		Z	8.26	80.85	23.23		65.0	
10263-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	8.06	79.41	22.51	3.98	65.0	± 9.6 %
		Y	7.70	77.98	21.68		65.0	
		Z	7.73	78.44	21.98		65.0	
10264-CAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	11.79	89.22	25.88	3.98	65.0	± 9.6 %
		Y	10.40	86.22	24.58		65.0	
		Z	10.77	87.33	25.09		65.0	
10265-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	8.12	78.81	22.58	3.98	65.0	± 9.6 %
		Y	7.79	77.46	21.77		65.0	
		Z	7.81	77.90	22.07		65.0	
10266-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	8.47	79.50	23.19	3.98	65.0	± 9.6 %
		Y	8.19	78.30	22.46		65.0	
		Z	8.19	78.66	22.72		65.0	
10267-CAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	9.89	83.95	23.99	3.98	65.0	± 9.6 %
		Y	9.26	82.18	23.11		65.0	
		Z	9.39	82.83	23.45		65.0	
10268-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	8.44	77.80	22.53	3.98	65.0	± 9.6 %
		Y	8.24	76.84	21.89		65.0	
		Z	8.22	77.13	22.11		65.0	
10269-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	8.33	77.26	22.37	3.98	65.0	± 9.6 %
		Y	8.15	76.36	21.76		65.0	
		Z	8.12	76.62	21.97		65.0	
10270-CAC	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	8.75	79.75	22.52	3.98	65.0	± 9.6 %
		Y	8.49	78.72	21.92		65.0	
		Z	8.50	79.07	22.14		65.0	

10274-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	X	2.73	67.18	15.92	0.00	150.0	± 9.6 %
		Y	2.64	66.46	15.31		150.0	
		Z	2.68	66.73	15.52		150.0	
10275-CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	X	1.87	70.21	17.08	0.00	150.0	± 9.6 %
		Y	1.66	67.87	15.58		150.0	
		Z	1.73	68.66	16.09		150.0	
10277-CAA	PHS (QPSK)	X	3.84	66.56	11.27	9.03	50.0	± 9.6 %
		Y	4.12	66.98	11.68		50.0	
		Z	3.85	66.55	11.29		50.0	
10278-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	X	11.65	86.02	22.30	9.03	50.0	± 9.6 %
		Y	10.21	83.31	21.39		50.0	
		Z	10.96	84.97	21.93		50.0	
10279-CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	X	11.92	86.31	22.44	9.03	50.0	± 9.6 %
		Y	10.38	83.50	21.49		50.0	
		Z	11.18	85.20	22.04		50.0	
10290-AAB	CDMA2000, RC1, SO55, Full Rate	X	2.05	73.37	16.75	0.00	150.0	± 9.6 %
		Y	1.54	68.94	14.39		150.0	
		Z	1.68	70.29	15.17		150.0	
10291-AAB	CDMA2000, RC3, SO55, Full Rate	X	1.19	70.69	15.63	0.00	150.0	± 9.6 %
		Y	0.89	66.06	12.92		150.0	
		Z	0.97	67.37	13.76		150.0	
10292-AAB	CDMA2000, RC3, SO32, Full Rate	X	1.82	77.98	19.13	0.00	150.0	± 9.6 %
		Y	1.09	69.78	15.12		150.0	
		Z	1.26	72.00	16.33		150.0	
10293-AAB	CDMA2000, RC3, SO3, Full Rate	X	3.13	86.75	22.80	0.00	150.0	± 9.6 %
		Y	1.53	74.84	17.78		150.0	
		Z	1.85	77.92	19.23		150.0	
10295-AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	X	16.24	95.47	28.50	9.03	50.0	± 9.6 %
		Y	13.39	90.69	26.64		50.0	
		Z	14.20	92.62	27.44		50.0	
10297-AAB	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	3.05	71.18	17.54	0.00	150.0	± 9.6 %
		Y	2.82	69.68	16.59		150.0	
		Z	2.90	70.21	16.92		150.0	
10298-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	1.96	70.66	16.14	0.00	150.0	± 9.6 %
		Y	1.66	67.94	14.50		150.0	
		Z	1.76	68.83	15.06		150.0	
10299-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	X	4.77	78.24	18.75	0.00	150.0	± 9.6 %
		Y	3.92	74.76	16.99		150.0	
		Z	4.32	76.42	17.88		150.0	
10300-AAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	X	3.00	70.52	14.82	0.00	150.0	± 9.6 %
		Y	2.63	68.29	13.44		150.0	
		Z	2.81	69.37	14.14		150.0	
10301-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	X	5.51	68.11	19.09	4.17	80.0	± 9.6 %
		Y	5.33	67.16	18.33		80.0	
		Z	5.40	67.58	18.66		80.0	
10302-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3 CTRL symbols)	X	5.91	68.43	19.68	4.96	80.0	± 9.6 %
		Y	5.80	67.70	19.02		80.0	
		Z	5.81	67.92	19.25		80.0	

10303-AAA	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	X	5.70	68.33	19.67	4.96	80.0	± 9.6 %
		Y	5.59	67.57	18.98		80.0	
		Z	5.60	67.78	19.21		80.0	
10304-AAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	X	5.41	67.77	18.89	4.17	80.0	± 9.6 %
		Y	5.31	67.11	18.28		80.0	
		Z	5.33	67.30	18.48		80.0	
10305-AAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	X	6.16	75.00	23.87	6.02	50.0	± 9.6 %
		Y	6.03	73.79	22.78		50.0	
		Z	5.90	73.64	22.94		50.0	
10306-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	X	5.76	70.24	21.37	6.02	50.0	± 9.6 %
		Y	5.59	69.03	20.35		50.0	
		Z	5.60	69.33	20.68		50.0	
10307-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	5.75	70.76	21.47	6.02	50.0	± 9.6 %
		Y	5.78	71.13	21.51		50.0	
		Z	5.57	69.74	20.73		50.0	
10308-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	5.77	71.12	21.68	6.02	50.0	± 9.6 %
		Y	5.80	71.54	21.74		50.0	
		Z	5.57	70.05	20.90		50.0	
10309-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	5.87	70.63	21.59	6.02	50.0	± 9.6 %
		Y	5.68	69.33	20.52		50.0	
		Z	5.69	69.66	20.87		50.0	
10310-AAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	X	5.74	70.42	21.38	6.02	50.0	± 9.6 %
		Y	5.56	69.17	20.34		50.0	
		Z	5.57	69.47	20.67		50.0	
10311-AAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	X	3.41	70.28	17.06	0.00	150.0	± 9.6 %
		Y	3.18	68.96	16.24		150.0	
		Z	3.26	69.44	16.53		150.0	
10313-AAA	iDEN 1:3	X	11.93	87.85	22.00	6.99	70.0	± 9.6 %
		Y	8.95	83.03	20.34		70.0	
		Z	9.92	85.08	21.06		70.0	
10314-AAA	iDEN 1:6	X	19.66	101.09	29.03	10.00	30.0	± 9.6 %
		Y	13.64	93.68	26.63		30.0	
		Z	14.94	96.21	27.54		30.0	
10315-AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.20	65.36	16.48	0.17	150.0	± 9.6 %
		Y	1.15	64.26	15.42		150.0	
		Z	1.17	64.62	15.77		150.0	
10316-AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	X	4.76	67.14	16.74	0.17	150.0	± 9.6 %
		Y	4.71	66.90	16.45		150.0	
		Z	4.73	66.99	16.55		150.0	
10317-AAB	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	X	4.76	67.14	16.74	0.17	150.0	± 9.6 %
		Y	4.71	66.90	16.45		150.0	
		Z	4.73	66.99	16.55		150.0	
10400-AAC	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	X	4.87	67.43	16.68	0.00	150.0	± 9.6 %
		Y	4.81	67.14	16.37		150.0	
		Z	4.83	67.26	16.47		150.0	
10401-AAC	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	X	5.57	67.64	16.85	0.00	150.0	± 9.6 %
		Y	5.51	67.40	16.57		150.0	
		Z	5.53	67.48	16.66		150.0	

10402-AAC	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc duty cycle)	X	5.83	67.94	16.82	0.00	150.0	± 9.6 %
		Y	5.77	67.71	16.58		150.0	
		Z	5.79	67.80	16.65		150.0	
10403-AAB	CDMA2000 (1xEV-DO, Rev. 0)	X	2.05	73.37	16.75	0.00	115.0	± 9.6 %
		Y	1.54	68.94	14.39		115.0	
		Z	1.68	70.29	15.17		115.0	
10404-AAB	CDMA2000 (1xEV-DO, Rev. A)	X	2.05	73.37	16.75	0.00	115.0	± 9.6 %
		Y	1.54	68.94	14.39		115.0	
		Z	1.68	70.29	15.17		115.0	
10406-AAB	CDMA2000, RC3, SO32, SCH0, Full Rate	X	100.00	124.58	31.94	0.00	100.0	± 9.6 %
		Y	100.00	121.04	30.37		100.0	
		Z	100.00	123.01	31.32		100.0	
10410-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	125.25	32.53	3.23	80.0	± 9.6 %
		Y	100.00	122.76	31.43		80.0	
		Z	100.00	124.49	32.22		80.0	
10415-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	X	1.07	64.01	15.66	0.00	150.0	± 9.6 %
		Y	1.03	63.00	14.62		150.0	
		Z	1.05	63.37	14.98		150.0	
10416-AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	X	4.68	67.03	16.59	0.00	150.0	± 9.6 %
		Y	4.63	66.78	16.30		150.0	
		Z	4.65	66.88	16.40		150.0	
10417-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	X	4.68	67.03	16.59	0.00	150.0	± 9.6 %
		Y	4.63	66.78	16.30		150.0	
		Z	4.65	66.88	16.40		150.0	
10418-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preambule)	X	4.67	67.18	16.60	0.00	150.0	± 9.6 %
		Y	4.61	66.92	16.31		150.0	
		Z	4.64	67.02	16.41		150.0	
10419-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preambule)	X	4.69	67.13	16.61	0.00	150.0	± 9.6 %
		Y	4.64	66.87	16.32		150.0	
		Z	4.66	66.98	16.42		150.0	
10422-AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	X	4.82	67.13	16.62	0.00	150.0	± 9.6 %
		Y	4.76	66.89	16.34		150.0	
		Z	4.78	66.98	16.43		150.0	
10423-AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	X	5.00	67.48	16.75	0.00	150.0	± 9.6 %
		Y	4.94	67.23	16.47		150.0	
		Z	4.96	67.33	16.56		150.0	
10424-AAA	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	X	4.92	67.43	16.72	0.00	150.0	± 9.6 %
		Y	4.86	67.17	16.43		150.0	
		Z	4.88	67.27	16.53		150.0	
10425-AAA	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	X	5.54	67.85	16.94	0.00	150.0	± 9.6 %
		Y	5.48	67.60	16.67		150.0	
		Z	5.50	67.69	16.75		150.0	
10426-AAA	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	X	5.55	67.86	16.94	0.00	150.0	± 9.6 %
		Y	5.48	67.61	16.67		150.0	
		Z	5.50	67.70	16.75		150.0	

10427-AAA	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	X	5.55	67.81	16.91	0.00	150.0	± 9.6 %
		Y	5.49	67.57	16.65		150.0	
		Z	5.51	67.66	16.73		150.0	
10430-AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	X	4.30	70.44	18.21	0.00	150.0	± 9.6 %
		Y	4.27	70.38	18.04		150.0	
		Z	4.27	70.33	18.05		150.0	
10431-AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	X	4.40	67.65	16.65	0.00	150.0	± 9.6 %
		Y	4.32	67.31	16.31		150.0	
		Z	4.35	67.44	16.43		150.0	
10432-AAA	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	X	4.69	67.49	16.69	0.00	150.0	± 9.6 %
		Y	4.62	67.20	16.38		150.0	
		Z	4.65	67.32	16.48		150.0	
10433-AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	X	4.93	67.46	16.74	0.00	150.0	± 9.6 %
		Y	4.87	67.20	16.45		150.0	
		Z	4.89	67.31	16.55		150.0	
10434-AAA	W-CDMA (BS Test Model 1, 64 DPCH)	X	4.38	71.21	18.18	0.00	150.0	± 9.6 %
		Y	4.35	71.12	17.99		150.0	
		Z	4.34	71.07	18.01		150.0	
10435-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	125.05	32.43	3.23	80.0	± 9.6 %
		Y	100.00	122.57	31.34		80.0	
		Z	100.00	124.29	32.13		80.0	
10447-AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	X	3.71	67.79	16.12	0.00	150.0	± 9.6 %
		Y	3.61	67.29	15.67		150.0	
		Z	3.65	67.48	15.83		150.0	
10448-AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	X	4.22	67.42	16.51	0.00	150.0	± 9.6 %
		Y	4.15	67.08	16.17		150.0	
		Z	4.18	67.21	16.28		150.0	
10449-AAA	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	X	4.49	67.31	16.58	0.00	150.0	± 9.6 %
		Y	4.42	67.02	16.27		150.0	
		Z	4.45	67.13	16.38		150.0	
10450-AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	X	4.67	67.22	16.59	0.00	150.0	± 9.6 %
		Y	4.62	66.95	16.30		150.0	
		Z	4.64	67.06	16.40		150.0	
10451-AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	X	3.63	68.08	15.83	0.00	150.0	± 9.6 %
		Y	3.51	67.49	15.33		150.0	
		Z	3.56	67.71	15.51		150.0	
10456-AAA	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc duty cycle)	X	6.40	68.36	17.05	0.00	150.0	± 9.6 %
		Y	6.34	68.15	16.82		150.0	
		Z	6.36	68.22	16.89		150.0	
10457-AAA	UMTS-FDD (DC-HSDPA)	X	3.89	65.64	16.31	0.00	150.0	± 9.6 %
		Y	3.85	65.40	16.01		150.0	
		Z	3.87	65.50	16.11		150.0	
10458-AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	X	3.46	67.50	15.35	0.00	150.0	± 9.6 %
		Y	3.34	66.87	14.80		150.0	
		Z	3.39	67.11	15.01		150.0	
10459-AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	X	4.52	65.47	16.05	0.00	150.0	± 9.6 %
		Y	4.52	65.47	15.86		150.0	
		Z	4.43	65.14	15.75		150.0	

10460-AAA	UMTS-FDD (WCDMA, AMR)	X	1.17	72.68	18.90	0.00	150.0	± 9.6 %
		Y	0.92	67.87	15.98		150.0	
		Z	0.99	69.33	16.91		150.0	
10461-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	132.17	35.74	3.29	80.0	± 9.6 %
		Y	100.00	128.42	34.08		80.0	
		Z	100.00	130.59	35.07		80.0	
10462-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	113.31	26.72	3.23	80.0	± 9.6 %
		Y	100.00	110.59	25.58		80.0	
		Z	100.00	112.57	26.48		80.0	
10463-AAA	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	109.35	24.86	3.23	80.0	± 9.6 %
		Y	100.00	106.97	23.86		80.0	
		Z	100.00	108.85	24.71		80.0	
10464-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	130.18	34.63	3.23	80.0	± 9.6 %
		Y	100.00	126.36	32.95		80.0	
		Z	100.00	128.62	33.98		80.0	
10465-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	112.71	26.43	3.23	80.0	± 9.6 %
		Y	100.00	110.00	25.29		80.0	
		Z	100.00	111.98	26.19		80.0	
10466-AAA	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.78	24.59	3.23	80.0	± 9.6 %
		Y	100.00	106.43	23.61		80.0	
		Z	100.00	108.29	24.45		80.0	
10467-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	130.44	34.75	3.23	80.0	± 9.6 %
		Y	100.00	126.60	33.07		80.0	
		Z	100.00	128.86	34.09		80.0	
10468-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	112.91	26.52	3.23	80.0	± 9.6 %
		Y	100.00	110.19	25.38		80.0	
		Z	100.00	112.17	26.28		80.0	
10469-AAB	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.81	24.59	3.23	80.0	± 9.6 %
		Y	100.00	106.45	23.61		80.0	
		Z	100.00	108.32	24.46		80.0	
10470-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	130.49	34.76	3.23	80.0	± 9.6 %
		Y	100.00	126.64	33.07		80.0	
		Z	100.00	128.91	34.11		80.0	
10471-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	112.85	26.49	3.23	80.0	± 9.6 %
		Y	100.00	110.13	25.35		80.0	
		Z	100.00	112.12	26.25		80.0	
10472-AAB	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.74	24.56	3.23	80.0	± 9.6 %
		Y	100.00	106.39	23.57		80.0	
		Z	100.00	108.26	24.42		80.0	
10473-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	100.00	130.46	34.75	3.23	80.0	± 9.6 %
		Y	100.00	126.61	33.06		80.0	
		Z	100.00	128.88	34.09		80.0	
10474-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	112.87	26.49	3.23	80.0	± 9.6 %
		Y	100.00	110.14	25.35		80.0	
		Z	100.00	112.13	26.25		80.0	
10475-AAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.76	24.57	3.23	80.0	± 9.6 %
		Y	100.00	106.40	23.58		80.0	
		Z	100.00	108.28	24.43		80.0	

10477-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	112.67	26.40	3.23	80.0	± 9.6 %
		Y	100.00	109.96	25.26		80.0	
		Z	100.00	111.94	26.16		80.0	
10478-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	100.00	108.69	24.54	3.23	80.0	± 9.6 %
		Y	100.00	106.34	23.55		80.0	
		Z	100.00	108.21	24.40		80.0	
10479-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	40.01	113.99	32.23	3.23	80.0	± 9.6 %
		Y	25.66	104.98	29.34		80.0	
		Z	28.59	107.69	30.37		80.0	
10480-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	65.50	112.78	29.57	3.23	80.0	± 9.6 %
		Y	38.67	103.69	26.87		80.0	
		Z	45.46	106.90	27.97		80.0	
10481-AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	43.66	105.54	27.32	3.23	80.0	± 9.6 %
		Y	27.51	97.77	24.89		80.0	
		Z	32.53	100.89	25.98		80.0	
10482-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.07	83.64	21.75	2.23	80.0	± 9.6 %
		Y	5.28	78.63	19.68		80.0	
		Z	5.64	80.01	20.31		80.0	
10483-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	12.44	88.49	23.12	2.23	80.0	± 9.6 %
		Y	10.70	85.40	21.78		80.0	
		Z	11.46	86.94	22.49		80.0	
10484-AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	10.60	85.91	22.30	2.23	80.0	± 9.6 %
		Y	9.30	83.19	21.06		80.0	
		Z	9.88	84.56	21.72		80.0	
10485-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.73	83.37	22.54	2.23	80.0	± 9.6 %
		Y	5.38	79.13	20.71		80.0	
		Z	5.62	80.23	21.24		80.0	
10486-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.83	74.76	18.90	2.23	80.0	± 9.6 %
		Y	4.43	72.99	17.93		80.0	
		Z	4.49	73.45	18.22		80.0	
10487-AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.73	74.06	18.61	2.23	80.0	± 9.6 %
		Y	4.38	72.45	17.70		80.0	
		Z	4.42	72.86	17.97		80.0	
10488-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	5.94	79.74	21.83	2.23	80.0	± 9.6 %
		Y	5.18	76.93	20.48		80.0	
		Z	5.31	77.65	20.88		80.0	
10489-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.65	72.93	19.25	2.23	80.0	± 9.6 %
		Y	4.44	71.79	18.53		80.0	
		Z	4.45	72.03	18.73		80.0	
10490-AAB	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.70	72.53	19.10	2.23	80.0	± 9.6 %
		Y	4.51	71.49	18.42		80.0	
		Z	4.51	71.71	18.61		80.0	
10491-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	5.47	76.11	20.55	2.23	80.0	± 9.6 %
		Y	5.05	74.35	19.60		80.0	
		Z	5.11	74.80	19.88		80.0	
10492-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.82	71.43	18.89	2.23	80.0	± 9.6 %
		Y	4.68	70.61	18.31		80.0	
		Z	4.67	70.78	18.47		80.0	

10493-AAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.87	71.19	18.80	2.23	80.0	± 9.6 %
		Y	4.73	70.41	18.24		80.0	
		Z	4.72	70.57	18.39		80.0	
10494-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.24	78.41	21.24	2.23	80.0	± 9.6 %
		Y	5.62	76.22	20.16		80.0	
		Z	5.73	76.81	20.48		80.0	
10495-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.91	72.01	19.14	2.23	80.0	± 9.6 %
		Y	4.75	71.11	18.53		80.0	
		Z	4.74	71.30	18.69		80.0	
10496-AAB	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.93	71.51	18.96	2.23	80.0	± 9.6 %
		Y	4.79	70.71	18.40		80.0	
		Z	4.78	70.87	18.55		80.0	
10497-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	5.37	79.10	19.27	2.23	80.0	± 9.6 %
		Y	4.01	74.46	17.26		80.0	
		Z	4.32	75.84	17.92		80.0	
10498-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	3.20	69.04	14.31	2.23	80.0	± 9.6 %
		Y	2.73	66.72	13.06		80.0	
		Z	2.85	67.49	13.50		80.0	
10499-AAA	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	3.04	68.09	13.76	2.23	80.0	± 9.6 %
		Y	2.62	65.95	12.57		80.0	
		Z	2.73	66.66	12.99		80.0	
10500-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.09	81.07	21.99	2.23	80.0	± 9.6 %
		Y	5.13	77.67	20.43		80.0	
		Z	5.29	78.55	20.89		80.0	
10501-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.73	73.89	18.97	2.23	80.0	± 9.6 %
		Y	4.43	72.44	18.13		80.0	
		Z	4.46	72.79	18.37		80.0	
10502-AAA	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.76	73.56	18.78	2.23	80.0	± 9.6 %
		Y	4.47	72.19	17.97		80.0	
		Z	4.49	72.52	18.21		80.0	
10503-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	5.85	79.51	21.73	2.23	80.0	± 9.6 %
		Y	5.11	76.71	20.38		80.0	
		Z	5.24	77.44	20.78		80.0	
10504-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.63	72.85	19.20	2.23	80.0	± 9.6 %
		Y	4.42	71.70	18.48		80.0	
		Z	4.43	71.95	18.68		80.0	
10505-AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.68	72.44	19.05	2.23	80.0	± 9.6 %
		Y	4.49	71.39	18.37		80.0	
		Z	4.49	71.62	18.56		80.0	
10506-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.19	78.25	21.17	2.23	80.0	± 9.6 %
		Y	5.58	76.07	20.08		80.0	
		Z	5.68	76.66	20.41		80.0	
10507-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	4.89	71.95	19.11	2.23	80.0	± 9.6 %
		Y	4.73	71.04	18.50		80.0	
		Z	4.73	71.24	18.66		80.0	

10508-AAB	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	4.92	71.45	18.93	2.23	80.0	± 9.6 %
		Y	4.78	70.64	18.36		80.0	
		Z	4.77	70.80	18.51		80.0	
10509-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	5.95	75.24	19.99	2.23	80.0	± 9.6 %
		Y	5.60	73.90	19.24		80.0	
		Z	5.65	74.26	19.47		80.0	
10510-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.29	71.15	18.83	2.23	80.0	± 9.6 %
		Y	5.16	70.46	18.33		80.0	
		Z	5.15	70.61	18.47		80.0	
10511-AAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.30	70.75	18.70	2.23	80.0	± 9.6 %
		Y	5.19	70.12	18.23		80.0	
		Z	5.17	70.25	18.36		80.0	
10512-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.65	77.81	20.82	2.23	80.0	± 9.6 %
		Y	6.08	75.94	19.88		80.0	
		Z	6.18	76.48	20.17		80.0	
10513-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.24	71.68	19.04	2.23	80.0	± 9.6 %
		Y	5.09	70.89	18.50		80.0	
		Z	5.08	71.06	18.65		80.0	
10514-AAB	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.18	71.04	18.83	2.23	80.0	± 9.6 %
		Y	5.06	70.34	18.33		80.0	
		Z	5.05	70.49	18.47		80.0	
10515-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	1.04	64.30	15.79	0.00	150.0	± 9.6 %
		Y	1.00	63.17	14.68		150.0	
		Z	1.01	63.58	15.06		150.0	
10516-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	X	1.17	82.68	23.48	0.00	150.0	± 9.6 %
		Y	0.61	69.65	16.88		150.0	
		Z	0.72	72.79	18.69		150.0	
10517-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.94	67.44	17.14	0.00	150.0	± 9.6 %
		Y	0.85	65.01	15.25		150.0	
		Z	0.88	65.81	15.88		150.0	
10518-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	X	4.68	67.10	16.57	0.00	150.0	± 9.6 %
		Y	4.62	66.85	16.28		150.0	
		Z	4.64	66.95	16.38		150.0	
10519-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.88	67.37	16.70	0.00	150.0	± 9.6 %
		Y	4.82	67.11	16.42		150.0	
		Z	4.84	67.21	16.51		150.0	
10520-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.73	67.35	16.63	0.00	150.0	± 9.6 %
		Y	4.67	67.07	16.33		150.0	
		Z	4.69	67.18	16.43		150.0	
10521-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.66	67.35	16.62	0.00	150.0	± 9.6 %
		Y	4.60	67.06	16.32		150.0	
		Z	4.62	67.17	16.42		150.0	
10522-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	X	4.72	67.40	16.69	0.00	150.0	± 9.6 %
		Y	4.66	67.13	16.39		150.0	
		Z	4.68	67.24	16.49		150.0	

10523-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	X	4.59	67.26	16.53	0.00	150.0	± 9.6 %
		Y	4.53	66.98	16.23		150.0	
		Z	4.55	67.09	16.33		150.0	
10524-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	X	4.66	67.34	16.66	0.00	150.0	± 9.6 %
		Y	4.60	67.06	16.36		150.0	
		Z	4.63	67.17	16.46		150.0	
10525-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc duty cycle)	X	4.64	66.35	16.23	0.00	150.0	± 9.6 %
		Y	4.58	66.08	15.94		150.0	
		Z	4.60	66.19	16.04		150.0	
10526-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc duty cycle)	X	4.82	66.75	16.38	0.00	150.0	± 9.6 %
		Y	4.76	66.47	16.09		150.0	
		Z	4.78	66.58	16.19		150.0	
10527-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc duty cycle)	X	4.74	66.71	16.33	0.00	150.0	± 9.6 %
		Y	4.68	66.42	16.03		150.0	
		Z	4.70	66.54	16.13		150.0	
10528-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc duty cycle)	X	4.76	66.73	16.36	0.00	150.0	± 9.6 %
		Y	4.69	66.44	16.07		150.0	
		Z	4.72	66.56	16.17		150.0	
10529-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc duty cycle)	X	4.76	66.73	16.36	0.00	150.0	± 9.6 %
		Y	4.69	66.44	16.07		150.0	
		Z	4.72	66.56	16.17		150.0	
10531-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc duty cycle)	X	4.76	66.87	16.39	0.00	150.0	± 9.6 %
		Y	4.69	66.56	16.08		150.0	
		Z	4.72	66.68	16.19		150.0	
10532-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc duty cycle)	X	4.62	66.72	16.33	0.00	150.0	± 9.6 %
		Y	4.55	66.41	16.02		150.0	
		Z	4.57	66.53	16.12		150.0	
10533-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc duty cycle)	X	4.77	66.77	16.35	0.00	150.0	± 9.6 %
		Y	4.70	66.48	16.05		150.0	
		Z	4.73	66.60	16.15		150.0	
10534-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc duty cycle)	X	5.29	66.84	16.41	0.00	150.0	± 9.6 %
		Y	5.23	66.60	16.14		150.0	
		Z	5.25	66.69	16.23		150.0	
10535-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc duty cycle)	X	5.37	67.02	16.49	0.00	150.0	± 9.6 %
		Y	5.30	66.78	16.22		150.0	
		Z	5.32	66.87	16.31		150.0	
10536-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc duty cycle)	X	5.23	66.97	16.44	0.00	150.0	± 9.6 %
		Y	5.17	66.72	16.17		150.0	
		Z	5.19	66.82	16.26		150.0	
10537-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc duty cycle)	X	5.29	66.95	16.43	0.00	150.0	± 9.6 %
		Y	5.23	66.69	16.17		150.0	
		Z	5.25	66.79	16.25		150.0	
10538-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc duty cycle)	X	5.39	66.99	16.50	0.00	150.0	± 9.6 %
		Y	5.33	66.74	16.23		150.0	
		Z	5.35	66.84	16.31		150.0	
10540-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc duty cycle)	X	5.32	66.99	16.51	0.00	150.0	± 9.6 %
		Y	5.25	66.74	16.24		150.0	
		Z	5.27	66.83	16.33		150.0	

10541-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc duty cycle)	X	5.28	66.83	16.43	0.00	150.0	± 9.6 %
		Y	5.22	66.59	16.16		150.0	
		Z	5.24	66.69	16.25		150.0	
10542-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc duty cycle)	X	5.44	66.91	16.48	0.00	150.0	± 9.6 %
		Y	5.38	66.68	16.22		150.0	
		Z	5.40	66.77	16.30		150.0	
10543-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc duty cycle)	X	5.53	66.97	16.53	0.00	150.0	± 9.6 %
		Y	5.47	66.73	16.27		150.0	
		Z	5.49	66.82	16.35		150.0	
10544-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc duty cycle)	X	5.59	66.91	16.37	0.00	150.0	± 9.6 %
		Y	5.53	66.70	16.13		150.0	
		Z	5.55	66.79	16.21		150.0	
10545-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc duty cycle)	X	5.82	67.42	16.57	0.00	150.0	± 9.6 %
		Y	5.75	67.17	16.32		150.0	
		Z	5.77	67.26	16.40		150.0	
10546-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc duty cycle)	X	5.68	67.19	16.48	0.00	150.0	± 9.6 %
		Y	5.61	66.95	16.22		150.0	
		Z	5.64	67.05	16.30		150.0	
10547-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc duty cycle)	X	5.77	67.28	16.51	0.00	150.0	± 9.6 %
		Y	5.70	67.03	16.25		150.0	
		Z	5.72	67.12	16.33		150.0	
10548-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc duty cycle)	X	6.16	68.66	17.18	0.00	150.0	± 9.6 %
		Y	6.05	68.25	16.83		150.0	
		Z	6.07	68.36	16.93		150.0	
10550-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc duty cycle)	X	5.70	67.18	16.48	0.00	150.0	± 9.6 %
		Y	5.64	66.95	16.23		150.0	
		Z	5.66	67.04	16.31		150.0	
10551-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc duty cycle)	X	5.70	67.20	16.45	0.00	150.0	± 9.6 %
		Y	5.64	66.98	16.21		150.0	
		Z	5.66	67.07	16.28		150.0	
10552-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc duty cycle)	X	5.60	66.97	16.34	0.00	150.0	± 9.6 %
		Y	5.55	66.76	16.11		150.0	
		Z	5.57	66.85	16.18		150.0	
10553-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc duty cycle)	X	5.69	67.02	16.40	0.00	150.0	± 9.6 %
		Y	5.64	66.81	16.16		150.0	
		Z	5.66	66.90	16.24		150.0	
10554-AAA	IEEE 1602.11ac WiFi (160MHz, MCS0, 99pc duty cycle)	X	6.00	67.29	16.47	0.00	150.0	± 9.6 %
		Y	5.95	67.09	16.23		150.0	
		Z	5.96	67.17	16.31		150.0	
10555-AAA	IEEE 1602.11ac WiFi (160MHz, MCS1, 99pc duty cycle)	X	6.15	67.65	16.62	0.00	150.0	± 9.6 %
		Y	6.09	67.42	16.38		150.0	
		Z	6.11	67.51	16.45		150.0	
10556-AAA	IEEE 1602.11ac WiFi (160MHz, MCS2, 99pc duty cycle)	X	6.17	67.68	16.63	0.00	150.0	± 9.6 %
		Y	6.11	67.45	16.39		150.0	
		Z	6.13	67.54	16.46		150.0	
10557-AAA	IEEE 1602.11ac WiFi (160MHz, MCS3, 99pc duty cycle)	X	6.14	67.59	16.60	0.00	150.0	± 9.6 %
		Y	6.07	67.36	16.36		150.0	
		Z	6.09	67.45	16.44		150.0	

10558-AAA	IEEE 1602.11ac WiFi (160MHz, MCS4, 99pc duty cycle)	X	6.20	67.79	16.72	0.00	150.0	± 9.6 %
		Y	6.13	67.55	16.47		150.0	
		Z	6.15	67.64	16.55		150.0	
10560-AAA	IEEE 1602.11ac WiFi (160MHz, MCS6, 99pc duty cycle)	X	6.18	67.59	16.66	0.00	150.0	± 9.6 %
		Y	6.11	67.37	16.42		150.0	
		Z	6.14	67.46	16.49		150.0	
10561-AAA	IEEE 1602.11ac WiFi (160MHz, MCS7, 99pc duty cycle)	X	6.10	67.58	16.69	0.00	150.0	± 9.6 %
		Y	6.04	67.35	16.45		150.0	
		Z	6.06	67.44	16.52		150.0	
10562-AAA	IEEE 1602.11ac WiFi (160MHz, MCS8, 99pc duty cycle)	X	6.27	68.10	16.96	0.00	150.0	± 9.6 %
		Y	6.19	67.81	16.68		150.0	
		Z	6.21	67.92	16.77		150.0	
10563-AAA	IEEE 1602.11ac WiFi (160MHz, MCS9, 99pc duty cycle)	X	6.68	68.88	17.30	0.00	150.0	± 9.6 %
		Y	6.56	68.48	16.97		150.0	
		Z	6.59	68.61	17.07		150.0	
10564-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	X	5.02	67.23	16.76	0.46	150.0	± 9.6 %
		Y	4.96	66.98	16.48		150.0	
		Z	4.98	67.08	16.57		150.0	
10565-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	X	5.26	67.67	17.06	0.46	150.0	± 9.6 %
		Y	5.20	67.43	16.79		150.0	
		Z	5.22	67.52	16.88		150.0	
10566-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	X	5.09	67.55	16.90	0.46	150.0	± 9.6 %
		Y	5.03	67.29	16.62		150.0	
		Z	5.05	67.39	16.71		150.0	
10567-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	X	5.11	67.86	17.20	0.46	150.0	± 9.6 %
		Y	5.05	67.64	16.94		150.0	
		Z	5.07	67.72	17.02		150.0	
10568-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	X	5.02	67.38	16.73	0.46	150.0	± 9.6 %
		Y	4.95	67.09	16.41		150.0	
		Z	4.98	67.21	16.52		150.0	
10569-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	X	5.05	67.90	17.23	0.46	150.0	± 9.6 %
		Y	5.00	67.70	16.99		150.0	
		Z	5.02	67.78	17.06		150.0	
10570-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	X	5.10	67.80	17.20	0.46	150.0	± 9.6 %
		Y	5.05	67.57	16.93		150.0	
		Z	5.07	67.66	17.02		150.0	
10571-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	X	1.35	66.69	17.17	0.46	130.0	± 9.6 %
		Y	1.30	65.45	16.06		130.0	
		Z	1.31	65.81	16.41		130.0	
10572-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X	1.38	67.41	17.59	0.46	130.0	± 9.6 %
		Y	1.32	66.05	16.42		130.0	
		Z	1.33	66.44	16.78		130.0	
10573-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	X	100.00	151.66	41.18	0.46	130.0	± 9.6 %
		Y	3.17	90.18	24.53		130.0	
		Z	5.56	100.47	28.08		130.0	
10574-AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	X	1.74	75.66	21.49	0.46	130.0	± 9.6 %
		Y	1.50	72.10	19.33		130.0	
		Z	1.55	73.02	19.95		130.0	

10575-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc duty cycle)	X	4.81	67.07	16.85	0.46	130.0	± 9.6 %
		Y	4.77	66.83	16.57		130.0	
		Z	4.78	66.92	16.66		130.0	
10576-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	X	4.84	67.21	16.90	0.46	130.0	± 9.6 %
		Y	4.79	66.98	16.63		130.0	
		Z	4.81	67.07	16.71		130.0	
10577-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	X	5.05	67.51	17.07	0.46	130.0	± 9.6 %
		Y	5.00	67.28	16.80		130.0	
		Z	5.02	67.37	16.88		130.0	
10578-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	X	4.95	67.65	17.15	0.46	130.0	± 9.6 %
		Y	4.90	67.43	16.89		130.0	
		Z	4.91	67.51	16.97		130.0	
10579-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	X	4.73	67.10	16.58	0.46	130.0	± 9.6 %
		Y	4.67	66.80	16.26		130.0	
		Z	4.70	66.92	16.37		130.0	
10580-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	X	4.79	67.13	16.61	0.46	130.0	± 9.6 %
		Y	4.72	66.82	16.27		130.0	
		Z	4.74	66.95	16.39		130.0	
10581-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	X	4.85	67.72	17.11	0.46	130.0	± 9.6 %
		Y	4.80	67.49	16.84		130.0	
		Z	4.81	67.57	16.92		130.0	
10582-AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	X	4.69	66.92	16.42	0.46	130.0	± 9.6 %
		Y	4.62	66.58	16.06		130.0	
		Z	4.65	66.72	16.19		130.0	
10583-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	X	4.81	67.07	16.85	0.46	130.0	± 9.6 %
		Y	4.77	66.83	16.57		130.0	
		Z	4.78	66.92	16.66		130.0	
10584-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.84	67.21	16.90	0.46	130.0	± 9.6 %
		Y	4.79	66.98	16.63		130.0	
		Z	4.81	67.07	16.71		130.0	
10585-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	5.05	67.51	17.07	0.46	130.0	± 9.6 %
		Y	5.00	67.28	16.80		130.0	
		Z	5.02	67.37	16.88		130.0	
10586-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.95	67.65	17.15	0.46	130.0	± 9.6 %
		Y	4.90	67.43	16.89		130.0	
		Z	4.91	67.51	16.97		130.0	
10587-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.73	67.10	16.58	0.46	130.0	± 9.6 %
		Y	4.67	66.80	16.26		130.0	
		Z	4.70	66.92	16.37		130.0	
10588-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	X	4.79	67.13	16.61	0.46	130.0	± 9.6 %
		Y	4.72	66.82	16.27		130.0	
		Z	4.74	66.95	16.39		130.0	
10589-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	X	4.85	67.72	17.11	0.46	130.0	± 9.6 %
		Y	4.80	67.49	16.84		130.0	
		Z	4.81	67.57	16.92		130.0	
10590-AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	X	4.69	66.92	16.42	0.46	130.0	± 9.6 %
		Y	4.62	66.58	16.06		130.0	
		Z	4.65	66.72	16.19		130.0	

10591-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc duty cycle)	X	4.96	67.09	16.93	0.46	130.0	± 9.6 %
		Y	4.92	66.88	16.66		130.0	
		Z	4.93	66.96	16.75		130.0	
10592-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc duty cycle)	X	5.13	67.44	17.05	0.46	130.0	± 9.6 %
		Y	5.08	67.22	16.79		130.0	
		Z	5.09	67.30	16.87		130.0	
10593-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc duty cycle)	X	5.05	67.38	16.96	0.46	130.0	± 9.6 %
		Y	5.00	67.15	16.69		130.0	
		Z	5.02	67.24	16.77		130.0	
10594-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc duty cycle)	X	5.10	67.52	17.09	0.46	130.0	± 9.6 %
		Y	5.05	67.30	16.83		130.0	
		Z	5.07	67.38	16.91		130.0	
10595-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc duty cycle)	X	5.08	67.50	17.01	0.46	130.0	± 9.6 %
		Y	5.02	67.26	16.73		130.0	
		Z	5.04	67.35	16.82		130.0	
10596-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc duty cycle)	X	5.02	67.52	17.02	0.46	130.0	± 9.6 %
		Y	4.96	67.27	16.74		130.0	
		Z	4.98	67.36	16.83		130.0	
10597-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc duty cycle)	X	4.97	67.44	16.92	0.46	130.0	± 9.6 %
		Y	4.91	67.18	16.63		130.0	
		Z	4.93	67.28	16.72		130.0	
10598-AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc duty cycle)	X	4.94	67.63	17.14	0.46	130.0	± 9.6 %
		Y	4.89	67.40	16.88		130.0	
		Z	4.91	67.48	16.96		130.0	
10599-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle)	X	5.64	67.68	17.14	0.46	130.0	± 9.6 %
		Y	5.59	67.47	16.88		130.0	
		Z	5.61	67.54	16.96		130.0	
10600-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc duty cycle)	X	5.87	68.41	17.49	0.46	130.0	± 9.6 %
		Y	5.79	68.09	17.17		130.0	
		Z	5.81	68.18	17.26		130.0	
10601-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc duty cycle)	X	5.71	67.98	17.28	0.46	130.0	± 9.6 %
		Y	5.65	67.72	17.00		130.0	
		Z	5.66	67.81	17.08		130.0	
10602-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty cycle)	X	5.79	67.98	17.21	0.46	130.0	± 9.6 %
		Y	5.73	67.73	16.93		130.0	
		Z	5.75	67.82	17.01		130.0	
10603-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc duty cycle)	X	5.87	68.25	17.46	0.46	130.0	± 9.6 %
		Y	5.81	68.01	17.19		130.0	
		Z	5.83	68.09	17.27		130.0	
10604-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc duty cycle)	X	5.65	67.64	17.14	0.46	130.0	± 9.6 %
		Y	5.60	67.42	16.89		130.0	
		Z	5.61	67.50	16.96		130.0	
10605-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc duty cycle)	X	5.80	68.11	17.39	0.46	130.0	± 9.6 %
		Y	5.73	67.85	17.10		130.0	
		Z	5.75	67.93	17.19		130.0	
10606-AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc duty cycle)	X	5.53	67.43	16.92	0.46	130.0	± 9.6 %
		Y	5.48	67.20	16.64		130.0	
		Z	5.50	67.29	16.73		130.0	

10607-AAA	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc duty cycle)	X	4.80	66.40	16.54	0.46	130.0	± 9.6 %
		Y	4.75	66.17	16.27		130.0	
		Z	4.76	66.26	16.35		130.0	
10608-AAA	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc duty cycle)	X	5.00	66.83	16.71	0.46	130.0	± 9.6 %
		Y	4.94	66.59	16.44		130.0	
		Z	4.96	66.68	16.52		130.0	
10609-AAA	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc duty cycle)	X	4.89	66.71	16.57	0.46	130.0	± 9.6 %
		Y	4.83	66.45	16.28		130.0	
		Z	4.85	66.55	16.38		130.0	
10610-AAA	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc duty cycle)	X	4.94	66.85	16.71	0.46	130.0	± 9.6 %
		Y	4.88	66.60	16.44		130.0	
		Z	4.90	66.69	16.53		130.0	
10611-AAA	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc duty cycle)	X	4.86	66.68	16.58	0.46	130.0	± 9.6 %
		Y	4.80	66.42	16.30		130.0	
		Z	4.82	66.52	16.39		130.0	
10612-AAA	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc duty cycle)	X	4.88	66.87	16.65	0.46	130.0	± 9.6 %
		Y	4.82	66.59	16.35		130.0	
		Z	4.84	66.69	16.44		130.0	
10613-AAA	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc duty cycle)	X	4.89	66.78	16.55	0.46	130.0	± 9.6 %
		Y	4.82	66.49	16.24		130.0	
		Z	4.85	66.60	16.34		130.0	
10614-AAA	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc duty cycle)	X	4.81	66.89	16.73	0.46	130.0	± 9.6 %
		Y	4.75	66.64	16.45		130.0	
		Z	4.77	66.73	16.54		130.0	
10615-AAA	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc duty cycle)	X	4.87	66.56	16.40	0.46	130.0	± 9.6 %
		Y	4.81	66.27	16.09		130.0	
		Z	4.83	66.38	16.19		130.0	
10616-AAA	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc duty cycle)	X	5.46	66.92	16.73	0.46	130.0	± 9.6 %
		Y	5.41	66.70	16.48		130.0	
		Z	5.43	66.79	16.56		130.0	
10617-AAA	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc duty cycle)	X	5.54	67.11	16.80	0.46	130.0	± 9.6 %
		Y	5.48	66.88	16.54		130.0	
		Z	5.50	66.96	16.62		130.0	
10618-AAA	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc duty cycle)	X	5.42	67.11	16.81	0.46	130.0	± 9.6 %
		Y	5.36	66.88	16.56		130.0	
		Z	5.38	66.97	16.63		130.0	
10619-AAA	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc duty cycle)	X	5.45	66.98	16.69	0.46	130.0	± 9.6 %
		Y	5.39	66.74	16.43		130.0	
		Z	5.41	66.83	16.51		130.0	
10620-AAA	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc duty cycle)	X	5.55	67.03	16.77	0.46	130.0	± 9.6 %
		Y	5.49	66.78	16.50		130.0	
		Z	5.51	66.88	16.58		130.0	
10621-AAA	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc duty cycle)	X	5.51	67.03	16.86	0.46	130.0	± 9.6 %
		Y	5.46	66.84	16.63		130.0	
		Z	5.48	66.91	16.70		130.0	
10622-AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc duty cycle)	X	5.54	67.25	16.97	0.46	130.0	± 9.6 %
		Y	5.49	67.04	16.73		130.0	
		Z	5.50	67.11	16.80		130.0	

10623-AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc duty cycle)	X	5.41	66.79	16.63	0.46	130.0	± 9.6 %
		Y	5.36	66.56	16.37		130.0	
		Z	5.38	66.65	16.45		130.0	
10624-AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc duty cycle)	X	5.62	67.00	16.79	0.46	130.0	± 9.6 %
		Y	5.56	66.77	16.54		130.0	
		Z	5.58	66.86	16.62		130.0	
10625-AAA	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc duty cycle)	X	6.10	68.33	17.51	0.46	130.0	± 9.6 %
		Y	6.00	67.98	17.19		130.0	
		Z	6.02	68.08	17.28		130.0	
10626-AAA	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc duty cycle)	X	5.74	66.93	16.65	0.46	130.0	± 9.6 %
		Y	5.69	66.74	16.43		130.0	
		Z	5.71	66.82	16.50		130.0	
10627-AAA	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc duty cycle)	X	6.03	67.63	16.96	0.46	130.0	± 9.6 %
		Y	5.97	67.40	16.71		130.0	
		Z	5.98	67.48	16.79		130.0	
10628-AAA	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc duty cycle)	X	5.81	67.14	16.66	0.46	130.0	± 9.6 %
		Y	5.75	66.90	16.41		130.0	
		Z	5.77	67.00	16.49		130.0	
10629-AAA	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc duty cycle)	X	5.89	67.21	16.69	0.46	130.0	± 9.6 %
		Y	5.84	67.00	16.45		130.0	
		Z	5.85	67.08	16.52		130.0	
10630-AAA	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc duty cycle)	X	6.58	69.47	17.83	0.46	130.0	± 9.6 %
		Y	6.44	68.97	17.43		130.0	
		Z	6.47	69.10	17.53		130.0	
10631-AAA	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc duty cycle)	X	6.29	68.65	17.58	0.46	130.0	± 9.6 %
		Y	6.21	68.38	17.32		130.0	
		Z	6.23	68.46	17.39		130.0	
10632-AAA	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc duty cycle)	X	5.97	67.59	17.06	0.46	130.0	± 9.6 %
		Y	5.92	67.40	16.84		130.0	
		Z	5.93	67.46	16.90		130.0	
10633-AAA	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc duty cycle)	X	5.86	67.25	16.74	0.46	130.0	± 9.6 %
		Y	5.80	67.03	16.49		130.0	
		Z	5.82	67.11	16.57		130.0	
10634-AAA	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc duty cycle)	X	5.83	67.23	16.78	0.46	130.0	± 9.6 %
		Y	5.78	67.04	16.55		130.0	
		Z	5.80	67.11	16.62		130.0	
10635-AAA	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc duty cycle)	X	5.74	66.71	16.29	0.46	130.0	± 9.6 %
		Y	5.68	66.44	16.01		130.0	
		Z	5.70	66.56	16.11		130.0	
10636-AAA	IEEE 1602.11ac WiFi (160MHz, MCS0, 90pc duty cycle)	X	6.17	67.34	16.76	0.46	130.0	± 9.6 %
		Y	6.11	67.15	16.53		130.0	
		Z	6.13	67.22	16.60		130.0	
10637-AAA	IEEE 1602.11ac WiFi (160MHz, MCS1, 90pc duty cycle)	X	6.35	67.79	16.97	0.46	130.0	± 9.6 %
		Y	6.29	67.57	16.73		130.0	
		Z	6.30	67.65	16.80		130.0	
10638-AAA	IEEE 1602.11ac WiFi (160MHz, MCS2, 90pc duty cycle)	X	6.35	67.77	16.94	0.46	130.0	± 9.6 %
		Y	6.29	67.54	16.69		130.0	
		Z	6.30	67.62	16.76		130.0	

10639-AAA	IEEE 1602.11ac WiFi (160MHz, MCS3, 90pc duty cycle)	X	6.32	67.69	16.93	0.46	130.0	± 9.6 %
		Y	6.26	67.48	16.70		130.0	
		Z	6.28	67.56	16.77		130.0	
10640-AAA	IEEE 1602.11ac WiFi (160MHz, MCS4, 90pc duty cycle)	X	6.35	67.80	16.94	0.46	130.0	± 9.6 %
		Y	6.28	67.54	16.68		130.0	
		Z	6.30	67.64	16.76		130.0	
10641-AAA	IEEE 1602.11ac WiFi (160MHz, MCS5, 90pc duty cycle)	X	6.36	67.58	16.85	0.46	130.0	± 9.6 %
		Y	6.30	67.37	16.61		130.0	
		Z	6.32	67.45	16.69		130.0	
10642-AAA	IEEE 1602.11ac WiFi (160MHz, MCS6, 90pc duty cycle)	X	6.40	67.80	17.11	0.46	130.0	± 9.6 %
		Y	6.34	67.61	16.89		130.0	
		Z	6.36	67.68	16.96		130.0	
10643-AAA	IEEE 1602.11ac WiFi (160MHz, MCS7, 90pc duty cycle)	X	6.25	67.58	16.92	0.46	130.0	± 9.6 %
		Y	6.19	67.34	16.66		130.0	
		Z	6.21	67.43	16.74		130.0	
10644-AAA	IEEE 1602.11ac WiFi (160MHz, MCS8, 90pc duty cycle)	X	6.47	68.26	17.28	0.46	130.0	± 9.6 %
		Y	6.39	67.96	16.99		130.0	
		Z	6.42	68.06	17.08		130.0	
10645-AAA	IEEE 1602.11ac WiFi (160MHz, MCS9, 90pc duty cycle)	X	7.06	69.52	17.87	0.46	130.0	± 9.6 %
		Y	6.93	69.10	17.52		130.0	
		Z	6.96	69.22	17.62		130.0	
10646-AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	X	100.00	148.85	48.77	9.30	60.0	± 9.6 %
		Y	80.54	141.06	46.17		60.0	
		Z	100.00	148.08	48.38		60.0	
10647-AAB	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	X	100.00	150.12	49.32	9.30	60.0	± 9.6 %
		Y	73.97	140.10	46.12		60.0	
		Z	100.00	149.31	48.92		60.0	
10648-AAA	CDMA2000 (1x Advanced)	X	0.92	66.97	13.32	0.00	150.0	± 9.6 %
		Y	0.75	63.96	11.29		150.0	
		Z	0.80	64.80	11.93		150.0	

[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.