



SAR EVALUATION REPORT

Applicant Name:

Samsung Electronics, Co. Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do 443-742, Korea

Date of Testing:

07/29/13 - 08/12/13

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

0Y1307261454.A3L

FCC ID:

A3LSMN900W8

APPLICANT:

SAMSUNG ELECTRONICS, CO. LTD.

DUT Type:

Portable Handset

Application Type:

Certification

FCC Rule Part(s):

CFR §2.1093

Model(s):

SM-N900W8

Equipment Class	Band & Mode	Tx Frequency	Measured Conducted Power [dBm]	SAR			
				1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)	10 gm Extremity (W/kg)
PCE	GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	33.38	0.21	0.26	0.44	
PCE	GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	30.40	0.18	0.76	1.07	
PCE	UMTS 850	826.40 - 846.60 MHz	23.49	0.18	0.43	0.43	
PCE	UMTS 1750	1712.4 - 1752.5 MHz	22.81	0.32	1.08	1.08	
PCE	UMTS 1900	1852.4 - 1907.6 MHz	22.99	0.27	1.02	1.02	
PCE	LTE Band 17	706.5 - 713.5 MHz	23.25	0.12	0.35	0.35	
PCE	LTE Band 5 (Cell)	826.5 - 846.5 MHz	23.49	0.14	0.45	0.45	
PCE	LTE Band 4 (AWS)	1712.5 - 1752.5 MHz	23.00	0.30	1.06	1.06	
PCE	LTE Band 2 (PCS)	1852.5 - 1907.5 MHz	22.48	0.28	1.08	1.08	
DTS	2.4 GHz WLAN	2412 - 2462 MHz	16.75	0.28	0.15	0.15	
DTS	5.8 GHz WLAN	5745 - 5825 MHz	13.79	0.46	0.12	0.12	
NII	5.2 GHz WLAN	5180 - 5240 MHz	13.93	0.18	0.16		
NII	5.3 GHz WLAN	5260 - 5320 MHz	14.01	0.27	0.16		
NII	5.5 GHz WLAN	5500 - 5700 MHz	14.34	0.35	< 0.1		
DSS/DTS	Bluetooth	2402 - 2480 MHz	9.18	N/A			
Simultaneous SAR per KDB 690783 D01v01r02:				0.77	1.28	1.22	0.45

Note: Powers in the above table represent output powers for the SAR test configurations and may not represent the highest output powers for all configurations for each mode.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.9 of this report; for North American frequency bands only.

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


Randy Ortanez
President



FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 1 of 69

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

1	DEVICE UNDER TEST	3
2	LTE INFORMATION	10
3	INTRODUCTION	11
4	DOSIMETRIC ASSESSMENT	12
5	DEFINITION OF REFERENCE POINTS	13
6	TEST CONFIGURATION POSITIONS FOR HANDSETS	14
7	RF EXPOSURE LIMITS	18
8	FCC MEASUREMENT PROCEDURES.....	19
9	RF CONDUCTED POWERS.....	23
10	SYSTEM VERIFICATION.....	39
11	SAR DATA SUMMARY	43
12	FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS.....	56
13	SAR MEASUREMENT VARIABILITY	63
14	EQUIPMENT LIST	64
15	MEASUREMENT UNCERTAINTIES	65
16	CONCLUSION.....	67
17	REFERENCES	68
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: SAR TEST SETUP PHOTOGRAPHS		

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	Page 2 of 69	

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.5 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 5 (Cell)	Data	826.5 - 846.5 MHz
LTE Band 4 (AWS)	Data	1712.5 - 1752.5 MHz
LTE Band 2 (PCS)	Data	1852.5 - 1907.5 MHz
2.4 GHz WLAN	Data	2412 - 2462 MHz
5.8 GHz WLAN	Data	5745 - 5825 MHz
5.2 GHz WLAN	Data	5180 - 5240 MHz
5.3 GHz WLAN	Data	5260 - 5320 MHz
5.5 GHz WLAN	Data	5500 - 5700 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
Ant+	Data	2402 - 2480 MHz

1.2 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v05.

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 TX Slot	1 TX <i>Slots</i>	2 TX <i>Slots</i>	3 TX <i>Slots</i>	4 TX <i>Slots</i>	1 TX <i>Slots</i>	2 TX <i>Slots</i>	3 TX <i>Slots</i>	4 TX <i>Slots</i>
GSM/GPRS/EDGE 850	Maximum	33.5	33.5	32.0	30.5	29.5	27.5	26.0	24.5	23.5
	Nominal	33.0	33.0	31.5	30.0	29.0	27.0	25.5	24.0	23.0
GSM/GPRS/EDGE 1900	Maximum	30.5	30.5	28.3	26.5	25.3	27.0	26.0	24.5	23.5
	Nominal	30.0	30.0	27.8	26.0	24.8	26.5	25.5	24.0	23.0

Mode / Band		Modulated Average (dBm)			
		3GPP RMC	3GPP HSDPA	3GPP HSUPA	3GPP DC-HSDPA
UMTS Band 5 (850 MHz)	Maximum	24.0	23.0	22.7	23.0
	Nominal	23.5	22.5	22.2	22.5
UMTS Band 4 (1750 MHz)	Maximum	23.0	22.4	22.3	22.0
	Nominal	22.5	21.9	21.8	21.5
UMTS Band 2 (1900 MHz)	Maximum	23.0	22.8	22.7	23.0
	Nominal	22.5	22.3	22.2	22.5

Mode / Band		Modulated Average (dBm)
LTE Band 17	Maximum	24.3
	Nominal	23.8
LTE Band 5 (Cell)	Maximum	23.5
	Nominal	23.0
LTE Band 4 (AWS)	Maximum	23.0
	Nominal	22.5
LTE Band 2 (PCS)	Maximum	22.5
	Nominal	22.0

Mode / Band		Modulated Average (dBm)
IEEE 802.11b (2.4 GHz)	Maximum	17.5
	Nominal	17.0
IEEE 802.11g (2.4 GHz)	Maximum	14.5
	Nominal	14.0
IEEE 802.11n (2.4 GHz)	Maximum	13.5
	Nominal	13.0
IEEE 802.11a (5 GHz)	Maximum	14.5
	Nominal	14.0
IEEE 802.11n (5 GHz 20 MHz BW)	Maximum	13.5
	Nominal	13.0
IEEE 802.11n (5 GHz 40 MHz BW)	Maximum	13.5
	Nominal	13.0
IEEE 802.11ac (5 GHz 80MHz BW)	Maximum	11.5
	Nominal	11.0
Bluetooth	Maximum	10.0
	Nominal	9.5
Bluetooth LE	Maximum	6.5
	Nominal	6.0

FCC ID: A3LSMN900W8	 SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	Page 4 of 69

1.3 DUT Antenna Locations

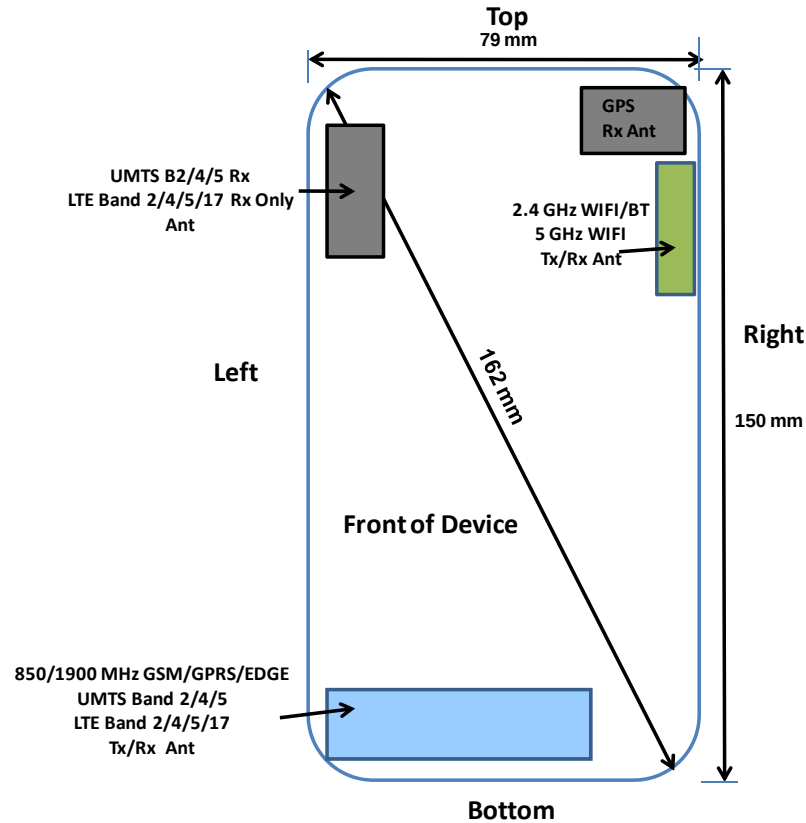


Figure 1-1
DUT Antenna Locations

Note:

1. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC Filing.
2. Because the diagonal distance of this device is >160 mm, it is considered as a "phablet".

Table 1-1
Wireless Router and Extremity Sides for SAR Testing

Mode	Exposure Configuration	Back	Front	Top	Bottom	Right	Left
GPRS 850	Hotspot	Yes	Yes	No	Yes	No	Yes
GPRS 1900	Hotspot	Yes	Yes	No	Yes	No	Yes
UMTS 850	Hotspot	Yes	Yes	No	Yes	No	Yes
UMTS 1750	Hotspot	Yes	Yes	No	Yes	No	Yes
UMTS 1900	Hotspot	Yes	Yes	No	Yes	No	Yes
LTE Band 17	Hotspot	Yes	Yes	No	Yes	No	Yes
LTE Band 5 (Cell)	Hotspot	Yes	Yes	No	Yes	No	Yes
LTE Band 4 (AWS)	Hotspot	Yes	Yes	No	Yes	No	Yes
LTE Band 2 (PCS)	Hotspot	Yes	Yes	No	Yes	No	Yes
2.4 GHz WLAN	Hotspot	Yes	Yes	Yes	No	Yes	No
5.8 GHz WLAN	Hotspot	Yes	Yes	Yes	No	Yes	No
5.2 - 5.7 GHz WLAN	Extremity	Yes	Yes	Yes	No	Yes	No

Note: Particular DUT edges were not required to be evaluated for Wireless Router and/or Extremity SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v01r01 and KDB Publication 648474 D04v01r01.

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 5 of 69

1.4 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the battery. The SAR tests were performed with the battery model: B800BU.

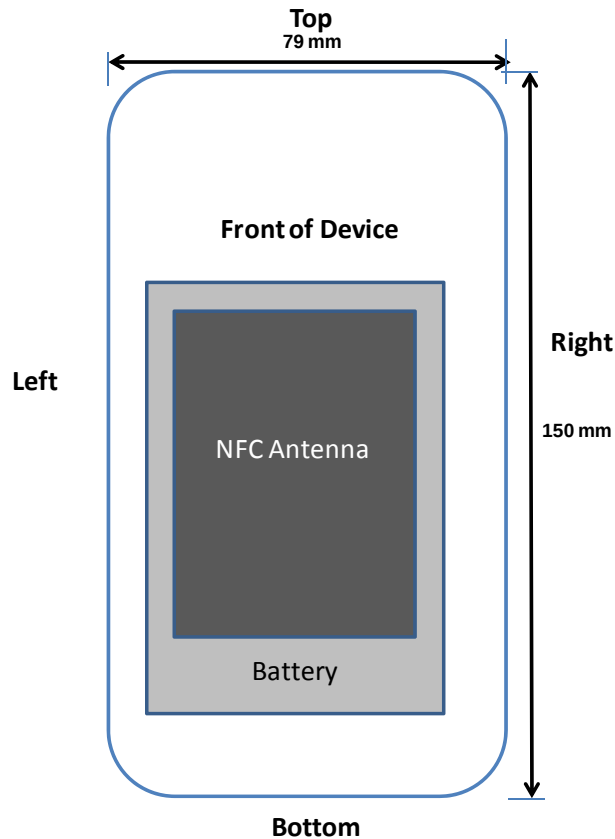


Figure 1-2
NFC Antenna Locations

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v05r01, 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 1-3 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.

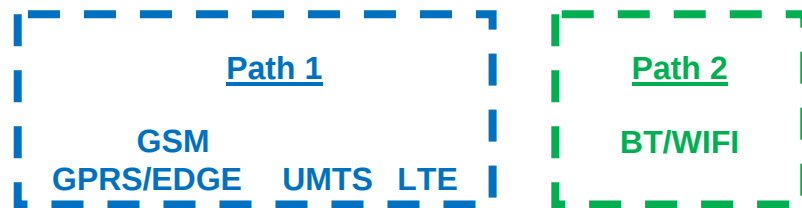


Figure 1-3
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v05r01 3) procedures.

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 6 of 69

Table 1-2
Simultaneous Transmission Scenarios

No.	Capable Transmit Configurations	Head	Body-Worn Accessory	Hot Spot	Extremity	Note
		IEEE 1528, Supp C	Supp C	FCC KDB 941225 D06 edges/sides	FCC KDB 648474 D04 edges/sides	
1	GSM 850/1900 MHz Voice + WiFi 2.4GHz	Yes	Yes	N/A	Yes	2.4 GHz Client only
2	UMTS Band 2/4/5 Voice + WiFi 2.4GHz	Yes	Yes	N/A	Yes	2.4 GHz Client only
3	GPRS 850/1900 MHz Data + WiFi 2.4GHz	N/A	N/A	Yes	Yes	2G Hotspot
4	UMTS Band 2/4/5 Data + WiFi 2.4GHz	Yes	Yes	Yes	Yes	3G Hotspot
5	LTE Band 2/4/5/17 Data + WiFi 2.4 GHz	Yes*	Yes*	Yes	Yes	4G Hotspot
6	GSM 850/1900 MHz Voice + WiFi 5 GHz	Yes	Yes	N/A	Yes	5 GHz Client only
7	UMTS Band 2/4/5 MHz Voice + WiFi 5GHz	Yes	Yes	N/A	Yes	5 GHz Client only
8	GPRS 850/1900 MHz Data + WiFi 5.8 GHz	N/A	N/A	Yes	Yes	2G Hotspot
9	UMTS Band 2/4/5 Data + WiFi 5.8 GHz	Yes	Yes	Yes	Yes	3G Hotspot
10	LTE Band 2/4/5/17 Data + WiFi 5.8 GHz	Yes*	Yes*	Yes	Yes	4G Hotspot
11	GSM 850/1900 MHz Voice + 2.4GHz Bluetooth	N/A	Yes	N/A	Yes	
12	UMTS Band 2/4/5 Voice + 2.4GHz Bluetooth	N/A	Yes	N/A	Yes	
13	LTE Band 2/4/5/17 Data + 2.4 GHz Bluetooth	N/A	Yes*	N/A	Yes	
14	GPRS 850/1900 MHz Data + WiFi 5.2-5.7 GHz	N/A	N/A	N/A	N/A	Not supported by S/W
15	UMTS Band 2/4/5 Data + WiFi 5.2-5.7 GHz	N/A	N/A	N/A	N/A	Not supported by S/W
16	LTE Band 2/4/5/17 Data + WiFi 5.2-5.7 GHz	N/A	N/A	N/A	N/A	Not supported by S/W
17	All Voice + LTE	N/A	N/A	N/A	N/A	Not supported by H/W
18	All Voice + WiFi + LTE	N/A	N/A	N/A	N/A	Not supported by H/W

Notes:
1. 2.4 GHz WLAN, 2.4 GHz Bluetooth, and 5 GHz WLAN share the same antenna path and cannot transmit simultaneously
2. 5 GHz Hotspot is only supported for the 5.8 GHz Band by S/W, therefore all other 5 GHz bands were not evaluated for hotspot conditions.

1. (*) = for VOIP 3rd party applications possibly installed and used by the end-user
2. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
3. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there is no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.

1.6 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5 GHz NII WIFI, only 2.4 GHz WIFI and 5 GHz DTS WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v01v01.

Per FCC KDB Publication 648474 D03-D04, this device is considered a "phablet" since its diagonal distance is greater than 160 mm but less than 200 mm. Therefore hand SAR tests are required. Because wireless router operations are not supported for 5 GHz NII WIFI, hand SAR was evaluated for 5 GHz NII WIFI. However, hand SAR was not evaluated for 2.4 GHz WIFI and 5 GHz DTS WIFI since Hotspot SAR for 2.4 GHz WIFI and 5 GHz DTS WIFI were < 1.2 W/kg.

Per FCC KDB 447498 D01v05r01, the SAR exclusion threshold for distances <50mm is defined by the following equation:

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

Based on the maximum conducted power of Bluetooth (rounded to the nearest mW) and the antenna to user separation distance, Bluetooth 1-g SAR was not required: $[(10/10) * \sqrt{2.441}] = 1.6 < 3.0$;

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 7 of 69

Bluetooth extremity SAR was not required: $[(10/5) * \sqrt{2.441}] = 3.1 < 7.5$. Per KDB Publication 447498 D01v05r01, the maximum power of the channel was rounded to the nearest mW before calculation.

This device supports 20 MHz and 40 MHz Bandwidths for IEEE 802.11n for 5 GHz WIFI only. IEEE 802.11n was not evaluated for SAR since the average output power of 20 MHz and 40 MHz bandwidths was not more than 0.25 dB higher than the average output power of IEEE 802.11a.

This device supports IEEE 802.11ac with the following features:

- a) Up to 80 MHz Bandwidth only
- b) No aggregate channel configurations
- c) 1 Tx antenna output
- d) 256 QAM is supported
- e) No new 5 GHz channels

Per April 2013 TCB Workshop notes, full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.

(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 D01v02r02.

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 D05v02r02.

Per FCC KDB Publication 648474 D03-D04, this device is considered a "phablet" since its diagonal distance is greater than 160 mm but less than 200 mm. Therefore hand SAR tests are required. Hand SAR was not evaluated for licensed transmitter since Hotspot SAR was < 1.2 W/kg.

1.7 Wireless Charging Cover

This DUT may be used with a standard battery cover or with an optional wireless charging battery cover. Per FCC KDB Publication 648474 D04v01r01, SAR was measured using the standard battery cover and then repeated with the wireless charging battery cover for the highest reported SAR for each wireless technology, frequency band, operating mode, and exposure condition. No other additional test with wireless charging cover was required since all reported SAR were less than 1.2 W/kg.

1.8 Power Reduction for SAR

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

1.9 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB Publication 941225 D01-D06 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v01r02 (SAR Considerations for 802.11 Devices)

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 8 of 69

- FCC KDB Publication 447498 D01v05r01 (General SAR Guidance)
- FCC KDB Publication 865664 D01-D02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D03-D04 (Phablet Procedures, Wireless Charging Cover)
- April 2013 TCB Workshop Notes (IEEE 802.11ac)

1.10 Device Serial Numbers

Several samples were used with identical hardware 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.

Mode/Band	Head Serial Number	Body-Worn Serial Number	Hotspot Serial Number	Extremity Serial Number
GSM/GPRS/EDGE 850	31D55	31D55	31D55	-
GSM/GPRS/EDGE 1900	31D55	31D55	31D55	-
UMTS 850	31D55	31D55	31D55	-
UMTS 1750	31D65	31D56	31D56	-
UMTS 1900	31D55	31D6D	31D6D	-
LTE Band 17	31D69	31D69	31D69	-
LTE Band 5 (Cell)	31D69	31D69	31D69	-
LTE Band 4 (AWS)	31D69	31D69	31D69	-
LTE Band 2 (PCS)	31D69	31D69	31D69	-
2.4 GHz WLAN	0209C	0209C	0209C	-
5.8 GHz WLAN	0209C	0209C	0209C	-
5.2 - 5.7 GHz WLAN	0209C	0209C	-	0209C

2

LTE INFORMATION

LTE Information			
FCC ID	A3LSMN900W8		
Form Factor	Portable Handset		
Frequency Range of each LTE transmission band	LTE Band 17 (706.5 - 713.5 MHz)		
	LTE Band 5 (Cell) (826.5 - 846.5 MHz)		
	LTE Band 4 (AWS) (1712.5 - 1752.5 MHz)		
	LTE Band 2 (PCS) (1852.5 - 1907.5 MHz)		
Channel Bandwidths	LTE Band 17: 5 MHz, 10 MHz		
	LTE Band 5 (Cell): 5 MHz, 10 MHz		
	LTE Band 4 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz		
	LTE Band 2 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers and Frequencies (MHz)	Low	Mid	High
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 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): 5 MHz	1712.5 (19975)	1732.5 (20175)	1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)	1732.5 (20175)	1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)	1732.5 (20175)	1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)	1732.5 (20175)	1745 (20300)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)	1880 (18900)	1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)	1880 (18900)	1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)	1880 (18900)	1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)	1880 (18900)	1900 (19100)
UE Category	4		
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		

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 10 of 69

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

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m³)
- E = Total RMS electric field strength (V/m)

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 11 of 69

4

DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

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 D01v01r01 (See Table 4-1).
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 D01v01r01 (See Table 4-1). 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. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

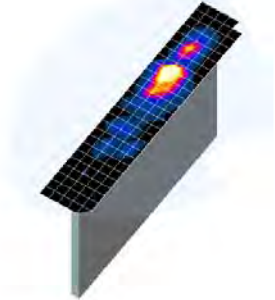


Figure 4-1
Sample SAR Area Scan

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r01

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 12 of 69

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) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (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].

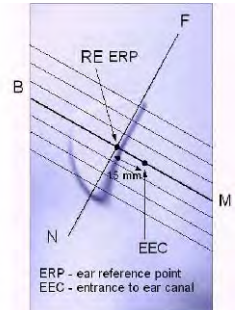


Figure 5-1
Close-Up Side view
of ERP

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 “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 5-3). The “test device reference point” was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



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

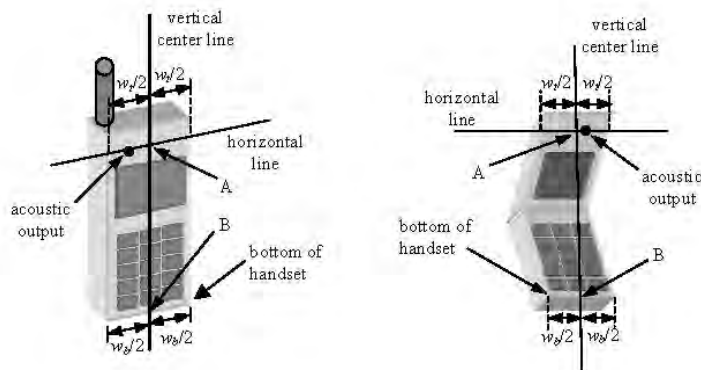


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 13 of 69
© 2013 PCTEST Engineering Laboratory, Inc.				REV 12.5 M 05/20/2013

6

TEST CONFIGURATION POSITIONS FOR HANDSETS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

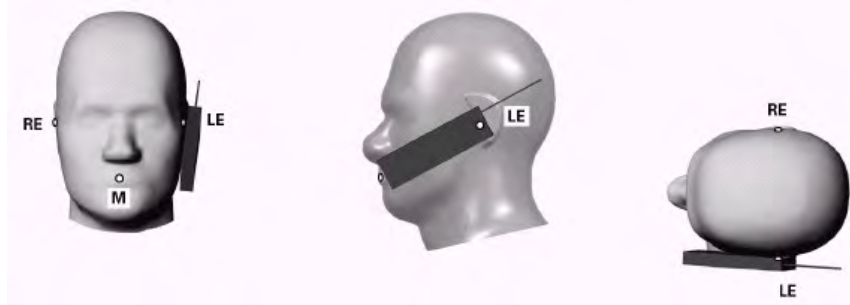


Figure 6-1 Front, Side and Top View of Cheek Position

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

6.3 Positioning for Ear / 15° Tilt

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

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 14 of 69

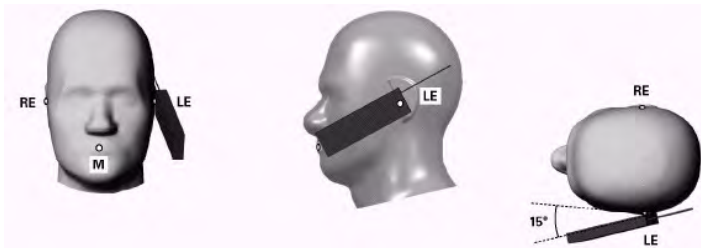


Figure 6-2 Front, Side and Top View of Ear/15° Tilt Position

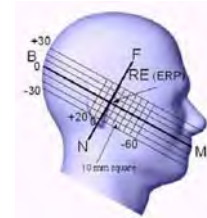


Figure 6-3 Side view w/ relevant markings

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.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r01. 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.

The latest IEEE 1528 committee developments propose the usage of a tilted phantom when the antenna of the phone is mounted at the bottom or in all cases the peak absorption is in the chin region. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed individually from the table for emptying and cleaning.



Figure 6-4 Twin SAM Chin20

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 15 of 69

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 6-5). Per FCC KDB Publication 648474 D04v01r01, 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 D01v05r01 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 $> 1.2 \text{ W/kg}$, 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.

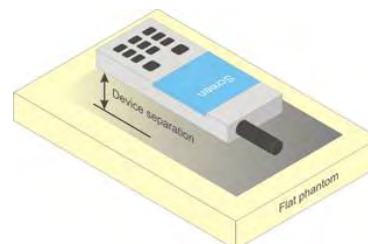


Figure 6-5
Sample Body-Worn Diagram

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

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

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 44798 D01v05r01 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension $> 15.0 \text{ cm}$ or an overall diagonal dimension $> 16.0 \text{ cm}$ that provide similar mobile web access and multimedia support found in mini-tablets or UMPC minitables that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r01 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna $\leq 25 \text{ mm}$ from that surface or edge, in direct contact with the

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 16 of 69

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.

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 D06 v01r01 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 D01v05r01 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 17 of 69

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 18 of 69

Power measurements were performed using a base station simulator under digital average power.

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v05r01, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r02.

8.2 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v02r02 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

The device was 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 were 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 was 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 deviated by more than 5%, the SAR test and drift measurements were repeated.

8.3 SAR Measurement Conditions for UMTS

8.3.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

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 (release 5), 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.

8.3.2 Head SAR Measurements for Handsets

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all "1s". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 19 of 69

8.3.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”.

8.3.4 SAR Measurements for Handsets with Rel 5 HSDPA

Body SAR for HSDPA is not required for handsets with HSDPA capabilities when the maximum average output power of each RF channel with HSDPA active is less than 0.25 dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is $\leq 75\%$ of the SAR limit. Otherwise, SAR is measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration measured in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that resulted in the highest SAR in 12.2 kbps RMC mode for that RF channel.

The H-set used in FRC for HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HSPDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the applicable H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the FRC for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 2 ms to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors of $\beta_c=9$ and $\beta_d=15$, and power offset parameters of $\Delta_{ACK} = \Delta_{NACK} = 5$ and $\Delta_{CQI}=2$ is used. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the FRC.

Sub-Test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5
Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 8 \Rightarrow A_{HS} = \beta_{HS}/\beta_c = 30/15 \Rightarrow \beta_{HS} = 30/15 * \beta_c$. Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 8$ ($A_{HS} = 30/15$) with $\beta_{HS} = 30/15 * \beta_c$, and $\Delta_{CQI} = 7$ ($A_{HS} = 24/15$) with $\beta_{HS} = 24/15 * \beta_c$. Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{HS}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.							

Figure 8-1
Table C.10.1.4 of TS 234.121-1

8.3.5 SAR Measurements for Handsets with Rel 6 HSUPA

Body SAR for HSUPA is not required when the maximum average output of each RF channel with HSUPA/HSDPA active is less than 0.25 dB higher than as measured without HSUPA/HSDPA using 12.2 kbps RMC and maximum SAR for 12.2 kbps RMC is $\leq 75\%$ of the SAR limit. Otherwise SAR is measured on the maximum output channel for the body exposure configuration produced highest SAR in 12.2 kbps RMC for that RF channel, using the additional procedures under “Release 6 HSPA data devices”

Head SAR for VOIP operations under HSPA is not required when maximum average output of each RF channel with HSPA is less than 0.25 dB higher than as measured using 12.2 kbps RMC. Otherwise SAR is measured using same HSPA configuration as used for body SAR.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM ⁽²⁾ (dB)	MPR (dB)	AG ⁽⁴⁾ Index	E-TFCI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{15} = \beta_{15}/\beta_c = 30/15 \Leftrightarrow \beta_{15} = 30/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{15}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

8.3.6 SAR Measurement Conditions for DC-HSDPA

SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion. DC-HSDPA uplink maximum output power measurements using the four Rel. 5 HSDPA subtests in Table C.10.1.4 of TS 234.121-1 is required. When the maximum average output power of each RF channel with DC-HSDPA active is $\leq \frac{1}{4}$ dB higher than that measured using 12.2 kbps RMC, or the maximum reported SAR for 12.2 kbps RMC is $\leq 75\%$ of the SAR limit, SAR evaluation for DC-HSDPA is not required.

8.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02r02 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was 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.

8.4.1 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.

8.4.2 MPR

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

8.4.3 A-MPR

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

8.4.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r02:

- 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.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 21 of 69

- ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
- iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
- c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
- d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to $\frac{1}{2}$ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

8.5 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n /ac transmitters. 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 D01v01r02 for more details.

8.5.1 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. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

8.5.2 Frequency Channel Configurations [27]

For 2.4 GHz, the highest average RF output power channel between the low, mid and high channel at the lowest data rate was selected for SAR evaluation in 802.11b mode. 802.11g/n modes and higher data rates for 802.11b were additionally evaluated for SAR if the output power of the respective mode was 0.25 dB or higher than the powers of the SAR configurations tested in the 802.11b mode.

For 5 GHz, the highest average RF output power channel across the default test channels at the lowest data rate was selected for SAR evaluation in 802.11a. When the adjacent channels are higher in power than the default channels, these "required channels" were considered instead of the default channels for SAR testing. 802.11n modes and higher data rates for 802.11a/n were evaluated only if the respective mode was 0.25 dB or higher than the 802.11a mode. 802.11ac SAR was evaluated for highest 802.11a configuration in each 5 GHz band and each exposure condition. 802.11ac modes were additionally evaluated for SAR if the output power for the respective mode was more than 0.25 dB higher than powers of 802.11a modes.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg and if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 22 of 69

9 RF CONDUCTED POWERS

9.1 GSM Conducted Powers

		Maximum Burst-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	33.44	33.47	31.85	30.07	28.85	27.45	26.00	24.22	22.95
	190	33.38	33.41	31.90	29.95	28.83	27.46	25.98	24.15	22.89
	251	33.35	33.38	31.93	29.96	28.79	27.36	25.89	24.02	22.90
GSM 1900	512	30.48	30.47	28.25	26.37	25.30	26.41	25.32	23.72	22.54
	661	30.40	30.49	28.19	26.35	25.24	26.26	25.20	23.80	22.49
	810	30.43	30.38	28.26	26.38	25.29	26.28	25.28	23.69	22.57
		Calculated Maximum Frame-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
GSM 850	128	24.41	24.44	25.83	25.81	25.84	18.42	19.98	19.96	19.94
	190	24.35	24.38	25.88	25.69	25.82	18.43	19.96	19.89	19.88
	251	24.32	24.35	25.91	25.70	25.78	18.33	19.87	19.76	19.89
GSM 1900	512	21.45	21.44	22.23	22.11	22.29	17.38	19.30	19.46	19.53
	661	21.37	21.46	22.17	22.09	22.23	17.23	19.18	19.54	19.48
	810	21.40	21.35	22.24	22.12	22.28	17.25	19.26	19.43	19.56

Note:

- Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
- The bolded GPRS modes were selected for SAR testing according to the highest frame-averaged output power table according to KDB 941225 D03v01.
- GPRS/EDGE (GMSK) output powers were measured with coding scheme setting of 1 (CS1) on the base station simulator. CS1 was configured to measure GPRS output power measurements and SAR to ensure GMSK modulation in the signal. Our investigation has shown that CS1 - CS4 settings do not have any impact on the output levels or modulation in the GPRS modes.
- EDGE (8-PSK) output powers were measured with MCS7 on the base station simulator. MCS7 coding scheme was used to measure the output powers for EDGE since investigation has shown that choosing MCS7 coding scheme will ensure 8-PSK modulation. It has been shown that MCS levels that produce 8PSK modulation do not have an impact on output power.

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



Figure 9-1
Power Measurement Setup

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 23 of 69

9.2 UMTS Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	1312	1412	1862	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.44	23.49	23.41	22.66	22.76	22.81	22.99	22.92	22.72	-
99		12.2 kbps AMR	23.41	23.49	23.40	22.71	22.83	22.88	23.00	22.94	22.70	-
6	HSDPA	Subtest 1	22.53	22.69	22.51	22.25	22.31	22.12	22.74	22.54	22.36	0
6		Subtest 2	22.52	22.63	22.54	22.28	22.32	22.19	22.70	22.62	22.47	0
6		Subtest 3	22.03	22.15	21.97	21.76	21.78	21.61	22.19	22.03	21.83	0.5
6		Subtest 4	22.08	21.17	22.01	21.64	21.76	21.62	22.27	21.99	21.86	0.5
6	HSUPA	Subtest 1	22.52	22.53	22.55	22.08	22.22	22.05	22.62	22.54	22.29	0
6		Subtest 2	21.04	21.12	21.11	20.62	20.66	20.49	21.01	20.98	20.94	2
6		Subtest 3	21.30	21.17	21.34	20.94	20.67	20.76	20.68	20.79	20.86	1
6		Subtest 4	21.34	21.23	21.38	21.41	21.22	21.28	21.59	21.64	21.33	2
6		Subtest 5	22.14	22.35	22.25	21.74	21.67	21.69	22.26	22.28	22.17	0
8	DC-HSDPA	Subtest 1	22.36	22.79	22.38	21.65	21.60	21.47	22.87	22.78	22.66	0
8		Subtest 2	22.63	22.56	22.58	21.72	21.71	21.54	22.92	22.88	22.80	0
8		Subtest 3	22.01	22.03	21.92	21.16	21.09	20.97	22.35	22.28	22.19	0.5
8		Subtest 4	22.09	22.11	22.05	21.21	21.10	21.01	22.35	22.18	22.20	0.5

UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02r02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

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
- Measured maximum output powers for DC-HSDPA were not greater than 1/4 dB higher than the WCDMA 12.2 kbps RMC maximum output, as a result, SAR is not required for DC-HSDPA
- The DUT supports UE category 24 for HSDPA.

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



Figure 9-2
Power Measurement Setup

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 24 of 69

9.3 LTE Conducted Powers

9.3.1 LTE Band 17

Table 9-1
LTE Band 17 Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	710.0	23790	10	QPSK	1	0	23.15	0	0
	710.0	23790	10	QPSK	1	25	23.17	0	0
	710.0	23790	10	QPSK	1	49	23.25	0	0
	710.0	23790	10	QPSK	25	0	22.16	1	0-1
	710.0	23790	10	QPSK	25	12	22.15	1	0-1
	710.0	23790	10	QPSK	25	25	22.28	1	0-1
	710.0	23790	10	QPSK	50	0	22.10	1	0-1
	710.0	23790	10	16QAM	1	0	22.36	1	0-1
	710.0	23790	10	16QAM	1	25	22.42	1	0-1
	710.0	23790	10	16QAM	1	49	22.49	1	0-1
	710.0	23790	10	16QAM	25	0	21.10	2	0-2
	710.0	23790	10	16QAM	25	12	21.12	2	0-2
	710.0	23790	10	16QAM	25	25	21.22	2	0-2
	710.0	23790	10	16QAM	50	0	21.04	2	0-2

Note: LTE Band 17 at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, 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 17 Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	710.0	23790	5	QPSK	1	0	23.23	0	0
	710.0	23790	5	QPSK	1	12	23.20	0	0
	710.0	23790	5	QPSK	1	24	23.22	0	0
	710.0	23790	5	QPSK	12	0	22.25	1	0-1
	710.0	23790	5	QPSK	12	6	22.27	1	0-1
	710.0	23790	5	QPSK	12	13	22.30	1	0-1
	710.0	23790	5	QPSK	25	0	22.23	1	0-1
	710.0	23790	5	16-QAM	1	0	22.01	1	0-1
	710.0	23790	5	16-QAM	1	12	21.96	1	0-1
	710.0	23790	5	16-QAM	1	24	22.02	1	0-1
	710.0	23790	5	16-QAM	12	0	21.32	2	0-2
	710.0	23790	5	16-QAM	12	6	21.28	2	0-2
	710.0	23790	5	16-QAM	12	13	21.36	2	0-2
	710.0	23790	5	16-QAM	25	0	21.09	2	0-2

Note: LTE Band 17 at 5 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 25 of 69

9.3.2 LTE Band 5 (Cell)

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	836.5	20525	10	QPSK	1	0	23.42	0	0
	836.5	20525	10	QPSK	1	25	23.37	0	0
	836.5	20525	10	QPSK	1	49	23.49	0	0
	836.5	20525	10	QPSK	25	0	22.33	1	0-1
	836.5	20525	10	QPSK	25	12	22.39	1	0-1
	836.5	20525	10	QPSK	25	25	22.40	1	0-1
	836.5	20525	10	QPSK	50	0	22.24	1	0-1
	836.5	20525	10	16QAM	1	0	22.20	1	0-1
	836.5	20525	10	16QAM	1	25	22.23	1	0-1
	836.5	20525	10	16QAM	1	49	22.27	1	0-1
	836.5	20525	10	16QAM	25	0	21.28	2	0-2
	836.5	20525	10	16QAM	25	12	21.23	2	0-2
	836.5	20525	10	16QAM	25	25	21.35	2	0-2

Note: LTE Band 5 (Cell) at 10 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	Page 26 of 69	

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	826.5	20425	5	QPSK	1	0	23.19	0	0
	826.5	20425	5	QPSK	1	12	23.21	0	0
	826.5	20425	5	QPSK	1	24	23.17	0	0
	826.5	20425	5	QPSK	12	0	22.29	1	0-1
	826.5	20425	5	QPSK	12	6	22.32	1	0-1
	826.5	20425	5	QPSK	12	13	22.27	1	0-1
	826.5	20425	5	QPSK	25	0	22.21	1	0-1
	826.5	20425	5	16-QAM	1	0	22.03	1	0-1
	826.5	20425	5	16-QAM	1	12	22.04	1	0-1
	826.5	20425	5	16-QAM	1	24	21.98	1	0-1
	826.5	20425	5	16-QAM	12	0	21.40	2	0-2
	826.5	20425	5	16-QAM	12	6	21.42	2	0-2
Mid	826.5	20425	5	16-QAM	12	13	21.35	2	0-2
	826.5	20425	5	16-QAM	25	0	21.17	2	0-2
	836.5	20525	5	QPSK	1	0	23.35	0	0
	836.5	20525	5	QPSK	1	12	23.30	0	0
	836.5	20525	5	QPSK	1	24	23.47	0	0
	836.5	20525	5	QPSK	12	0	22.44	1	0-1
	836.5	20525	5	QPSK	12	6	22.41	1	0-1
	836.5	20525	5	QPSK	12	13	22.37	1	0-1
	836.5	20525	5	QPSK	25	0	22.35	1	0-1
	836.5	20525	5	16-QAM	1	0	22.36	1	0-1
	836.5	20525	5	16-QAM	1	12	22.32	1	0-1
	836.5	20525	5	16-QAM	1	24	22.40	1	0-1
High	836.5	20525	5	16-QAM	12	0	21.37	2	0-2
	836.5	20525	5	16-QAM	12	6	21.38	2	0-2
	836.5	20525	5	16-QAM	12	13	21.33	2	0-2
	836.5	20525	5	16-QAM	25	0	21.18	2	0-2
	846.5	20625	5	QPSK	1	0	23.45	0	0
	846.5	20625	5	QPSK	1	12	23.43	0	0
	846.5	20625	5	QPSK	1	24	23.40	0	0
	846.5	20625	5	QPSK	12	0	22.40	1	0-1
	846.5	20625	5	QPSK	12	6	22.32	1	0-1
	846.5	20625	5	QPSK	12	13	22.30	1	0-1
	846.5	20625	5	QPSK	25	0	22.24	1	0-1
	846.5	20625	5	16-QAM	1	0	22.39	1	0-1
	846.5	20625	5	16-QAM	1	12	22.35	1	0-1
	846.5	20625	5	16-QAM	1	24	22.32	1	0-1
	846.5	20625	5	16-QAM	12	0	21.31	2	0-2
	846.5	20625	5	16-QAM	12	6	21.26	2	0-2
	846.5	20625	5	16-QAM	12	13	21.20	2	0-2
	846.5	20625	5	16-QAM	25	0	21.15	2	0-2

9.3.3 LTE Band 4 (AWS)

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Mid	1732.5	20175	20	QPSK	1	0	23.00	0	0
	1732.5	20175	20	QPSK	1	50	22.97	0	0
	1732.5	20175	20	QPSK	1	99	22.93	0	0
	1732.5	20175	20	QPSK	50	0	21.78	1	0-1
	1732.5	20175	20	QPSK	50	25	21.81	1	0-1
	1732.5	20175	20	QPSK	50	50	21.72	1	0-1
	1732.5	20175	20	QPSK	100	0	21.78	1	0-1
	1732.5	20175	20	16QAM	1	0	21.94	1	0-1
	1732.5	20175	20	16QAM	1	50	21.87	1	0-1
	1732.5	20175	20	16QAM	1	99	21.85	1	0-1
	1732.5	20175	20	16QAM	50	0	20.75	2	0-2
	1732.5	20175	20	16QAM	50	25	20.72	2	0-2
	1732.5	20175	20	16QAM	50	50	20.76	2	0-2
	1732.5	20175	20	16QAM	100	0	20.75	2	0-2

Note: LTE Band 4 (AWS) at 20 MHz bandwidth does not support three non-overlapping channels. Per KDB Publication 941225 D05v02r02, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 28 of 69

Table 9-6
LTE Band 4 (AWS) Conducted Powers - 15 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1717.5	20025	15	QPSK	1	0	22.95	0	0
	1717.5	20025	15	QPSK	1	36	22.92	0	0
	1717.5	20025	15	QPSK	1	74	22.91	0	0
	1717.5	20025	15	QPSK	36	0	21.72	1	0-1
	1717.5	20025	15	QPSK	36	18	21.68	1	0-1
	1717.5	20025	15	QPSK	36	37	21.71	1	0-1
	1717.5	20025	15	QPSK	75	0	21.69	1	0-1
	1717.5	20025	15	16QAM	1	0	21.77	1	0-1
	1717.5	20025	15	16QAM	1	36	21.68	1	0-1
	1717.5	20025	15	16QAM	1	74	21.71	1	0-1
	1717.5	20025	15	16QAM	36	0	20.60	2	0-2
	1717.5	20025	15	16QAM	36	18	20.61	2	0-2
Mid	1717.5	20025	15	16QAM	36	37	20.66	2	0-2
	1717.5	20025	15	16QAM	75	0	20.63	2	0-2
	1732.5	20175	15	QPSK	1	0	22.90	0	0
	1732.5	20175	15	QPSK	1	36	22.92	0	0
	1732.5	20175	15	QPSK	1	74	22.83	0	0
	1732.5	20175	15	QPSK	36	0	21.66	1	0-1
	1732.5	20175	15	QPSK	36	18	21.67	1	0-1
	1732.5	20175	15	QPSK	36	37	21.65	1	0-1
	1732.5	20175	15	QPSK	75	0	21.64	1	0-1
	1732.5	20175	15	16QAM	1	0	21.73	1	0-1
	1732.5	20175	15	16QAM	1	36	21.70	1	0-1
	1732.5	20175	15	16QAM	1	74	21.72	1	0-1
High	1732.5	20175	15	16QAM	36	0	20.68	2	0-2
	1732.5	20175	15	16QAM	36	18	20.67	2	0-2
	1732.5	20175	15	16QAM	36	37	20.69	2	0-2
	1732.5	20175	15	16QAM	75	0	20.55	2	0-2
	1747.5	20325	15	QPSK	1	0	22.66	0	0
	1747.5	20325	15	QPSK	1	36	22.57	0	0
	1747.5	20325	15	QPSK	1	74	22.48	0	0
	1747.5	20325	15	QPSK	36	0	21.56	1	0-1
	1747.5	20325	15	QPSK	36	18	21.52	1	0-1
	1747.5	20325	15	QPSK	36	37	21.44	1	0-1
	1747.5	20325	15	QPSK	75	0	21.47	1	0-1
	1747.5	20325	15	16QAM	1	0	21.95	1	0-1
	1747.5	20325	15	16QAM	1	36	21.90	1	0-1
	1747.5	20325	15	16QAM	1	74	21.78	1	0-1
	1747.5	20325	15	16QAM	36	0	20.53	2	0-2
	1747.5	20325	15	16QAM	36	18	20.51	2	0-2
	1747.5	20325	15	16QAM	36	37	20.50	2	0-2
	1747.5	20325	15	16QAM	75	0	20.44	2	0-2

Table 9-7
LTE Band 4 (AWS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1715	20000	10	QPSK	1	0	22.84	0	0
	1715	20000	10	QPSK	1	25	22.76	0	0
	1715	20000	10	QPSK	1	49	22.85	0	0
	1715	20000	10	QPSK	25	0	21.71	1	0-1
	1715	20000	10	QPSK	25	12	21.64	1	0-1
	1715	20000	10	QPSK	25	25	21.67	1	0-1
	1715	20000	10	QPSK	50	0	21.66	1	0-1
	1715	20000	10	16QAM	1	0	21.61	1	0-1
	1715	20000	10	16QAM	1	25	21.54	1	0-1
	1715	20000	10	16QAM	1	49	21.63	1	0-1
	1715	20000	10	16QAM	25	0	20.61	2	0-2
	1715	20000	10	16QAM	25	12	20.57	2	0-2
Mid	1715	20000	10	16QAM	25	25	20.62	2	0-2
	1715	20000	10	16QAM	50	0	20.56	2	0-2
	1732.5	20175	10	QPSK	1	0	22.70	0	0
	1732.5	20175	10	QPSK	1	25	22.72	0	0
	1732.5	20175	10	QPSK	1	49	22.72	0	0
	1732.5	20175	10	QPSK	25	0	21.76	1	0-1
	1732.5	20175	10	QPSK	25	12	21.74	1	0-1
	1732.5	20175	10	QPSK	25	25	21.72	1	0-1
	1732.5	20175	10	QPSK	50	0	21.68	1	0-1
	1732.5	20175	10	16QAM	1	0	21.54	1	0-1
	1732.5	20175	10	16QAM	1	25	21.52	1	0-1
	1732.5	20175	10	16QAM	1	49	21.53	1	0-1
	1732.5	20175	10	16QAM	25	0	20.75	2	0-2
	1732.5	20175	10	16QAM	25	12	20.67	2	0-2
High	1732.5	20175	10	16QAM	25	25	20.68	2	0-2
	1732.5	20175	10	16QAM	50	0	20.66	2	0-2
	1750	20350	10	QPSK	1	0	22.60	0	0
	1750	20350	10	QPSK	1	25	22.54	0	0
	1750	20350	10	QPSK	1	49	22.46	0	0
	1750	20350	10	QPSK	25	0	21.53	1	0-1
	1750	20350	10	QPSK	25	12	21.53	1	0-1
	1750	20350	10	QPSK	25	25	21.49	1	0-1
	1750	20350	10	QPSK	50	0	21.46	1	0-1
	1750	20350	10	16QAM	1	0	21.86	1	0-1
	1750	20350	10	16QAM	1	25	21.82	1	0-1
	1750	20350	10	16QAM	1	49	21.76	1	0-1
	1750	20350	10	16QAM	25	0	20.48	2	0-2
	1750	20350	10	16QAM	25	12	20.46	2	0-2
	1750	20350	10	16QAM	25	25	20.44	2	0-2
	1750	20350	10	16QAM	50	0	20.41	2	0-2
	1750	20350	10	16QAM	50	0	20.41	2	0-2

Table 9-8
LTE Band 4 (AWS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1712.5	19975	5	QPSK	1	0	22.64	0	0
	1712.5	19975	5	QPSK	1	12	22.66	0	0
	1712.5	19975	5	QPSK	1	24	22.63	0	0
	1712.5	19975	5	QPSK	12	0	21.81	1	0-1
	1712.5	19975	5	QPSK	12	6	21.76	1	0-1
	1712.5	19975	5	QPSK	12	13	21.78	1	0-1
	1712.5	19975	5	QPSK	25	0	21.65	1	0-1
	1712.5	19975	5	16-QAM	1	0	21.49	1	0-1
	1712.5	19975	5	16-QAM	1	12	21.44	1	0-1
	1712.5	19975	5	16-QAM	1	24	21.45	1	0-1
	1712.5	19975	5	16-QAM	12	0	20.82	2	0-2
	1712.5	19975	5	16-QAM	12	6	20.81	2	0-2
Mid	1712.5	19975	5	16-QAM	12	13	20.78	2	0-2
	1712.5	19975	5	16-QAM	25	0	20.59	2	0-2
	1732.5	20175	5	QPSK	1	0	22.88	0	0
	1732.5	20175	5	QPSK	1	12	22.89	0	0
	1732.5	20175	5	QPSK	1	24	22.88	0	0
	1732.5	20175	5	QPSK	12	0	21.88	1	0-1
	1732.5	20175	5	QPSK	12	6	21.91	1	0-1
	1732.5	20175	5	QPSK	12	13	21.94	1	0-1
	1732.5	20175	5	QPSK	25	0	21.80	1	0-1
	1732.5	20175	5	16-QAM	1	0	21.86	1	0-1
	1732.5	20175	5	16-QAM	1	12	21.84	1	0-1
	1732.5	20175	5	16-QAM	1	24	21.81	1	0-1
	1732.5	20175	5	16-QAM	12	0	20.90	2	0-2
	1732.5	20175	5	16-QAM	12	6	20.88	2	0-2
High	1732.5	20175	5	16-QAM	12	13	20.86	2	0-2
	1732.5	20175	5	16-QAM	25	0	20.71	2	0-2
	1752.5	20375	5	QPSK	1	0	22.65	0	0
	1752.5	20375	5	QPSK	1	12	22.62	0	0
	1752.5	20375	5	QPSK	1	24	22.58	0	0
	1752.5	20375	5	QPSK	12	0	21.61	1	0-1
	1752.5	20375	5	QPSK	12	6	21.58	1	0-1
	1752.5	20375	5	QPSK	12	13	21.59	1	0-1
	1752.5	20375	5	QPSK	25	0	21.51	1	0-1
	1752.5	20375	5	16-QAM	1	0	21.62	1	0-1
	1752.5	20375	5	16-QAM	1	12	21.58	1	0-1
	1752.5	20375	5	16-QAM	1	24	21.55	1	0-1
	1752.5	20375	5	16-QAM	12	0	20.54	2	0-2
	1752.5	20375	5	16-QAM	12	6	20.49	2	0-2
	1752.5	20375	5	16-QAM	12	13	20.46	2	0-2
	1752.5	20375	5	16-QAM	25	0	20.35	2	0-2

9.3.4 LTE Band 2 (PCS)

Table 9-9
LTE Band 2 (PCS) Conducted Powers - 20 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1860	18700	20	QPSK	1	0	22.18	0	0
	1860	18700	20	QPSK	1	50	22.34	0	0
	1860	18700	20	QPSK	1	99	22.47	0	0
	1860	18700	20	QPSK	50	0	21.10	1	0-1
	1860	18700	20	QPSK	50	25	21.09	1	0-1
	1860	18700	20	QPSK	50	50	21.18	1	0-1
	1860	18700	20	QPSK	100	0	21.16	1	0-1
	1860	18700	20	16QAM	1	0	21.21	1	0-1
	1860	18700	20	16QAM	1	50	21.26	1	0-1
	1860	18700	20	16QAM	1	99	21.50	1	0-1
	1860	18700	20	16QAM	50	0	20.07	2	0-2
	1860	18700	20	16QAM	50	25	20.10	2	0-2
	1860	18700	20	16QAM	50	50	20.17	2	0-2
Mid	1860	18700	20	16QAM	100	0	20.20	2	0-2
	1880.0	18900	20	QPSK	1	0	22.48	0	0
	1880.0	18900	20	QPSK	1	50	22.26	0	0
	1880.0	18900	20	QPSK	1	99	22.14	0	0
	1880.0	18900	20	QPSK	50	0	21.20	1	0-1
	1880.0	18900	20	QPSK	50	25	21.17	1	0-1
	1880.0	18900	20	QPSK	50	50	21.13	1	0-1
	1880.0	18900	20	QPSK	100	0	21.16	1	0-1
	1880.0	18900	20	16QAM	1	0	21.48	1	0-1
	1880.0	18900	20	16QAM	1	50	21.32	1	0-1
	1880.0	18900	20	16QAM	1	99	21.14	1	0-1
	1880.0	18900	20	16QAM	50	0	20.15	2	0-2
	1880.0	18900	20	16QAM	50	25	20.14	2	0-2
	1880.0	18900	20	16QAM	50	50	20.10	2	0-2
High	1880.0	18900	20	16QAM	100	0	20.09	2	0-2
	1900	19100	20	QPSK	1	0	21.98	0	0
	1900	19100	20	QPSK	1	50	21.99	0	0
	1900	19100	20	QPSK	1	99	21.88	0	0
	1900	19100	20	QPSK	50	0	21.05	1	0-1
	1900	19100	20	QPSK	50	25	21.03	1	0-1
	1900	19100	20	QPSK	50	50	21.05	1	0-1
	1900	19100	20	QPSK	100	0	21.10	1	0-1
	1900	19100	20	16QAM	1	0	21.00	1	0-1
	1900	19100	20	16QAM	1	50	20.94	1	0-1
	1900	19100	20	16QAM	1	99	20.96	1	0-1
	1900	19100	20	16QAM	50	0	20.04	2	0-2
	1900	19100	20	16QAM	50	25	20.00	2	0-2
	1900	19100	20	16QAM	50	50	19.97	2	0-2
	1900	19100	20	16QAM	100	0	19.99	2	0-2

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

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1857.5	18675	15	QPSK	1	0	22.22	0	0
	1857.5	18675	15	QPSK	1	36	22.19	0	0
	1857.5	18675	15	QPSK	1	74	22.39	0	0
	1857.5	18675	15	QPSK	36	0	21.06	1	0-1
	1857.5	18675	15	QPSK	36	18	21.09	1	0-1
	1857.5	18675	15	QPSK	36	37	21.11	1	0-1
	1857.5	18675	15	QPSK	75	0	21.06	1	0-1
	1857.5	18675	15	16QAM	1	0	21.02	1	0-1
	1857.5	18675	15	16QAM	1	36	21.04	1	0-1
	1857.5	18675	15	16QAM	1	74	21.19	1	0-1
	1857.5	18675	15	16QAM	36	0	20.04	2	0-2
	1857.5	18675	15	16QAM	36	18	20.08	2	0-2
Mid	1857.5	18675	15	16QAM	36	37	20.11	2	0-2
	1857.5	18675	15	16QAM	75	0	20.07	2	0-2
	1880.0	18900	15	QPSK	1	0	22.47	0	0
	1880.0	18900	15	QPSK	1	36	22.35	0	0
	1880.0	18900	15	QPSK	1	74	22.22	0	0
	1880.0	18900	15	QPSK	36	0	21.18	1	0-1
	1880.0	18900	15	QPSK	36	18	21.16	1	0-1
	1880.0	18900	15	QPSK	36	37	21.09	1	0-1
	1880.0	18900	15	QPSK	75	0	21.07	1	0-1
	1880.0	18900	15	16QAM	1	0	21.33	1	0-1
	1880.0	18900	15	16QAM	1	36	21.29	1	0-1
	1880.0	18900	15	16QAM	1	74	21.12	1	0-1
High	1880.0	18900	15	16QAM	36	0	20.21	2	0-2
	1880.0	18900	15	16QAM	36	18	20.16	2	0-2
	1880.0	18900	15	16QAM	36	37	20.13	2	0-2
	1880.0	18900	15	16QAM	75	0	20.05	2	0-2
	1902.5	19125	15	QPSK	1	0	22.05	0	0
	1902.5	19125	15	QPSK	1	36	22.05	0	0
	1902.5	19125	15	QPSK	1	74	21.95	0	0
	1902.5	19125	15	QPSK	36	0	21.11	1	0-1
	1902.5	19125	15	QPSK	36	18	21.05	1	0-1
	1902.5	19125	15	QPSK	36	37	21.04	1	0-1
	1902.5	19125	15	QPSK	75	0	20.98	1	0-1
	1902.5	19125	15	16QAM	1	0	21.36	1	0-1
	1902.5	19125	15	16QAM	1	36	21.35	1	0-1
	1902.5	19125	15	16QAM	1	74	21.28	1	0-1
	1902.5	19125	15	16QAM	36	0	20.10	2	0-2
	1902.5	19125	15	16QAM	36	18	20.08	2	0-2
	1902.5	19125	15	16QAM	36	37	20.07	2	0-2
	1902.5	19125	15	16QAM	75	0	19.98	2	0-2

Table 9-11
LTE Band 2 (PCS) Conducted Powers - 10 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1855	18650	10	QPSK	1	0	22.21	0	0
	1855	18650	10	QPSK	1	25	22.27	0	0
	1855	18650	10	QPSK	1	49	22.35	0	0
	1855	18650	10	QPSK	25	0	21.06	1	0-1
	1855	18650	10	QPSK	25	12	21.12	1	0-1
	1855	18650	10	QPSK	25	25	21.08	1	0-1
	1855	18650	10	QPSK	50	0	21.10	1	0-1
	1855	18650	10	16QAM	1	0	21.02	1	0-1
	1855	18650	10	16QAM	1	25	21.03	1	0-1
	1855	18650	10	16QAM	1	49	21.14	1	0-1
	1855	18650	10	16QAM	25	0	20.08	2	0-2
	1855	18650	10	16QAM	25	12	20.16	2	0-2
Mid	1855	18650	10	16QAM	25	25	20.17	2	0-2
	1855	18650	10	16QAM	50	0	20.11	2	0-2
	1880.0	18900	10	QPSK	1	0	22.17	0	0
	1880.0	18900	10	QPSK	1	25	22.11	0	0
	1880.0	18900	10	QPSK	1	49	22.14	0	0
	1880.0	18900	10	QPSK	25	0	21.28	1	0-1
	1880.0	18900	10	QPSK	25	12	21.26	1	0-1
	1880.0	18900	10	QPSK	25	25	21.16	1	0-1
	1880.0	18900	10	QPSK	50	0	21.14	1	0-1
	1880.0	18900	10	16QAM	1	0	20.98	1	0-1
	1880.0	18900	10	16QAM	1	25	20.92	1	0-1
	1880.0	18900	10	16QAM	1	49	20.94	1	0-1
High	1880.0	18900	10	16QAM	25	0	20.22	2	0-2
	1880.0	18900	10	16QAM	25	12	20.08	2	0-2
	1880.0	18900	10	16QAM	25	25	20.09	2	0-2
	1880.0	18900	10	16QAM	50	0	20.08	2	0-2
	1905	19150	10	QPSK	1	0	22.00	0	0
	1905	19150	10	QPSK	1	25	22.06	0	0
	1905	19150	10	QPSK	1	49	22.01	0	0
	1905	19150	10	QPSK	25	0	21.12	1	0-1
	1905	19150	10	QPSK	25	12	21.14	1	0-1
	1905	19150	10	QPSK	25	25	21.11	1	0-1
	1905	19150	10	QPSK	50	0	21.08	1	0-1
	1905	19150	10	16QAM	1	0	21.31	1	0-1
	1905	19150	10	16QAM	1	25	21.38	1	0-1
	1905	19150	10	16QAM	1	49	21.28	1	0-1
	1905	19150	10	16QAM	25	0	20.05	2	0-2
	1905	19150	10	16QAM	25	12	20.10	2	0-2
	1905	19150	10	16QAM	25	25	20.08	2	0-2
	1905	19150	10	16QAM	50	0	20.01	2	0-2

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 34 of 69

Table 9-12
LTE Band 2 (PCS) Conducted Powers - 5 MHz Bandwidth

	Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
Low	1852.5	18625	5	QPSK	1	0	22.11	0	0
	1852.5	18625	5	QPSK	1	12	22.14	0	0
	1852.5	18625	5	QPSK	1	24	22.20	0	0
	1852.5	18625	5	QPSK	12	0	21.21	1	0-1
	1852.5	18625	5	QPSK	12	6	21.18	1	0-1
	1852.5	18625	5	QPSK	12	13	21.28	1	0-1
	1852.5	18625	5	QPSK	25	0	21.10	1	0-1
	1852.5	18625	5	16-QAM	1	0	21.20	1	0-1
	1852.5	18625	5	16-QAM	1	12	21.13	1	0-1
	1852.5	18625	5	16-QAM	1	24	21.17	1	0-1
	1852.5	18625	5	16-QAM	12	0	20.21	2	0-2
	1852.5	18625	5	16-QAM	12	6	20.18	2	0-2
	1852.5	18625	5	16-QAM	12	13	20.27	2	0-2
Mid	1852.5	18625	5	16-QAM	25	0	20.00	2	0-2
	1880.0	18900	5	QPSK	1	0	22.32	0	0
	1880.0	18900	5	QPSK	1	12	22.31	0	0
	1880.0	18900	5	QPSK	1	24	22.27	0	0
	1880.0	18900	5	QPSK	12	0	21.26	1	0-1
	1880.0	18900	5	QPSK	12	6	21.24	1	0-1
	1880.0	18900	5	QPSK	12	13	21.32	1	0-1
	1880.0	18900	5	QPSK	25	0	21.20	1	0-1
	1880.0	18900	5	16-QAM	1	0	21.31	1	0-1
	1880.0	18900	5	16-QAM	1	12	21.24	1	0-1
	1880.0	18900	5	16-QAM	1	24	21.28	1	0-1
	1880.0	18900	5	16-QAM	12	0	20.26	2	0-2
	1880.0	18900	5	16-QAM	12	6	20.16	2	0-2
High	1880.0	18900	5	16-QAM	12	13	20.21	2	0-2
	1880.0	18900	5	16-QAM	25	0	20.04	2	0-2
	1907.5	19175	5	QPSK	1	0	22.06	0	0
	1907.5	19175	5	QPSK	1	12	22.08	0	0
	1907.5	19175	5	QPSK	1	24	21.94	0	0
	1907.5	19175	5	QPSK	12	0	21.24	1	0-1
	1907.5	19175	5	QPSK	12	6	21.21	1	0-1
	1907.5	19175	5	QPSK	12	13	21.14	1	0-1
	1907.5	19175	5	QPSK	25	0	21.17	1	0-1
	1907.5	19175	5	16-QAM	1	0	20.86	1	0-1
	1907.5	19175	5	16-QAM	1	12	20.90	1	0-1
	1907.5	19175	5	16-QAM	1	24	20.80	1	0-1
	1907.5	19175	5	16-QAM	12	0	20.27	2	0-2
	1907.5	19175	5	16-QAM	12	6	20.19	2	0-2
	1907.5	19175	5	16-QAM	12	13	20.20	2	0-2
	1907.5	19175	5	16-QAM	25	0	20.07	2	0-2

9.4 WLAN Conducted Powers

Table 9-13
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	802.11b (2.4 GHz) Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1*	15.80	15.94	15.98	15.96
802.11b	2437	6*	16.75	16.83	16.86	16.88
802.11b	2462	11*	15.31	15.39	15.44	15.45

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT			Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 35 of 69	

Table 9-14
IEEE 802.11g Average RF Power

Mode	Freq	Channel	802.11g (2.4 GHz) Conducted Power [dBm]							
	[MHz]		Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	13.17	13.33	13.19	13.33	13.24	13.28	13.38	13.26
802.11g	2437	6	13.97	14.13	14.15	14.17	14.13	14.10	14.26	13.94
802.11g	2462	11	12.77	12.78	12.88	12.91	12.86	12.90	13.02	12.81

Table 9-15
IEEE 802.11n Average RF Power

Mode	Freq	Channel	802.11n (2.4 GHz) Conducted Power [dBm]							
	[MHz]		Data Rate [Mbps]							
			6.5	13	20	26	39	52	58	65
802.11n	2412	1	12.17	12.13	12.19	12.33	12.20	12.27	12.38	12.32
802.11n	2437	6	13.12	13.12	13.09	13.15	13.17	13.20	13.22	13.26
802.11n	2462	11	11.84	11.92	11.83	11.98	12.10	12.02	12.05	12.16

Table 9-16
IEEE 802.11a Average RF Power

Mode	Freq	Channel	802.11a (5GHz) Conducted Power [dBm]							
	[MHz]		Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	13.85	14.00	14.01	13.97	13.94	13.85	14.13	13.87
802.11a	5200	40	13.93	13.99	13.98	14.03	13.95	13.93	14.04	13.99
802.11a	5220	44	13.84	13.72	13.91	14.03	13.91	13.76	14.05	13.81
802.11a	5240	48*	13.80	13.85	13.87	13.87	13.89	13.89	13.89	13.77
802.11a	5260	52*	13.98	13.92	14.13	14.10	14.01	14.06	14.24	13.98
802.11a	5280	56	14.01	14.10	14.09	14.07	13.99	13.94	14.15	13.89
802.11a	5300	60	13.88	13.99	14.01	14.05	13.91	13.98	14.18	13.92
802.11a	5320	64*	13.93	14.00	13.99	13.97	13.91	13.88	14.07	13.92
802.11a	5500	100	14.33	14.42	14.43	14.47	14.43	14.39	14.49	14.41
802.11a	5520	104*	14.34	14.37	14.48	14.40	14.44	14.43	14.49	14.36
802.11a	5540	108	14.33	14.42	14.44	14.49	14.37	14.30	14.48	14.44
802.11a	5560	112	14.32	14.46	14.48	14.42	14.39	14.48	14.47	14.44
802.11a	5580	116*	14.31	14.33	14.44	14.44	14.44	14.33	14.40	14.18
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	14.29	14.28	14.41	14.43	14.20	14.36	14.37	14.17
802.11a	5680	136*	14.14	14.29	14.28	14.27	14.23	14.32	14.41	14.25
802.11a	5700	140	14.13	14.27	14.31	14.22	14.30	14.35	14.50	14.31
802.11a	5745	149*	13.75	13.73	13.82	13.82	13.76	13.81	13.95	13.72
802.11a	5765	153	13.75	13.87	13.79	13.83	13.78	13.87	13.93	13.73
802.11a	5785	157*	13.79	13.87	13.70	13.88	13.87	13.81	13.84	13.35
802.11a	5805	161*	13.62	13.76	13.86	13.74	13.83	13.43	13.69	13.39
802.11a	5825	165	13.41	13.41	13.60	13.50	13.38	13.56	13.50	13.43

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band.

(*) – indicates default channels per KDB Publication 248227 D01v01r02. When the adjacent channels are higher in power then the default channels, these “required channels” are considered for SAR testing instead of the default channels.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 36 of 69

Table 9-17
IEEE 802.11n Average RF Power – 20 MHz Bandwidth

Mode	Freq	Channel	20MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	19.5	26	39	52	58.5	65
802.11n	5180	36	12.68	12.75	12.80	12.73	12.63	12.77	12.93	12.91
802.11n	5200	40	12.65	12.62	12.57	12.61	12.60	12.78	12.87	12.84
802.11n	5220	44	12.70	12.60	12.97	12.88	12.95	13.02	12.88	12.93
802.11n	5240	48	12.83	12.75	12.81	12.90	12.88	12.76	12.75	12.81
802.11n	5260	52	12.51	12.69	12.80	12.76	12.90	12.84	12.93	13.05
802.11n	5280	56	12.69	12.85	12.80	12.83	12.74	12.82	12.97	12.90
802.11n	5300	60	12.69	12.63	12.71	12.79	12.77	12.76	12.86	12.93
802.11n	5320	64	12.50	12.60	12.68	12.79	12.73	12.79	12.72	12.67
802.11n	5500	100	13.28	13.24	13.34	13.44	13.38	13.25	13.47	13.49
802.11n	5520	104	13.29	13.44	13.40	13.13	13.41	13.47	13.32	13.33
802.11n	5540	108	13.32	13.27	13.27	13.25	13.24	13.31	13.29	13.32
802.11n	5560	112	13.30	13.22	13.22	13.26	13.41	13.34	13.23	13.45
802.11n	5580	116	13.18	13.18	13.25	13.23	13.28	13.32	13.38	13.38
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	13.15	13.02	13.22	13.29	13.20	13.23	13.18	13.21
802.11n	5680	136	13.16	13.07	13.12	13.16	13.26	13.18	13.27	13.31
802.11n	5700	140	13.15	13.20	13.25	13.19	13.18	13.20	13.16	13.13
802.11n	5745	149	12.77	12.88	12.85	12.95	12.94	12.94	12.92	12.90
802.11n	5765	153	12.78	12.86	12.90	12.85	12.88	12.88	12.93	12.96
802.11n	5785	157	12.74	12.77	12.75	12.79	12.83	12.91	12.82	12.86
802.11n	5805	161	12.81	12.90	12.86	12.92	12.87	12.93	13.03	12.98
802.11n	5825	165	12.84	12.73	12.89	12.89	12.93	13.00	12.88	12.95

Table 9-18
IEEE 802.11n Average RF Power – 40 MHz Bandwidth

Mode	Freq	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		13.5	27	40.5	54	81	108	121.5	135
802.11n	5190	38	12.81	12.93	12.96	12.96	13.14	12.89	13.05	12.92
802.11n	5230	46	12.84	12.75	12.95	12.78	13.01	13.00	12.96	13.03
802.11n	5270	54	12.64	12.76	12.80	12.77	12.85	12.92	12.96	12.86
802.11n	5310	62	12.60	12.60	12.83	12.62	12.82	12.73	12.76	12.94
802.11n	5510	102	13.36	13.42	13.45	13.34	13.48	13.49	13.49	13.48
802.11n	5550	110	13.39	13.41	13.49	13.37	13.46	13.48	13.40	13.43
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	13.22	13.39	13.30	13.24	13.40	13.43	13.36	13.42
802.11n	5755	151	12.86	12.97	12.95	12.90	12.92	12.79	12.90	12.96
802.11n	5795	159	12.73	12.87	12.93	12.93	12.97	12.95	12.95	12.83

Table 9-19
IEEE 802.11ac Average RF Power – 80 MHz Bandwidth

Mode	Freq [MHz]	Channel	80MHz BW 802.11ac (5GHz) Conducted Power [dBm]									
			Data Rate [Mbps]									
			29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
802.11ac	5210	42	10.83	10.89	10.89	10.71	10.84	10.89	10.96	11.05	11.07	11.07
802.11ac	5290	58	10.74	10.72	10.88	10.66	10.87	10.71	10.56	10.88	10.81	10.98
802.11ac	5530	106	10.51	10.49	10.59	10.47	10.66	10.65	10.74	10.74	10.72	10.74
802.11ac	5775	155	10.70	10.64	10.78	10.73	10.85	10.79	10.75	10.79	10.68	10.94

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012/April 2013 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- Full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rate and channel above were tested for SAR.

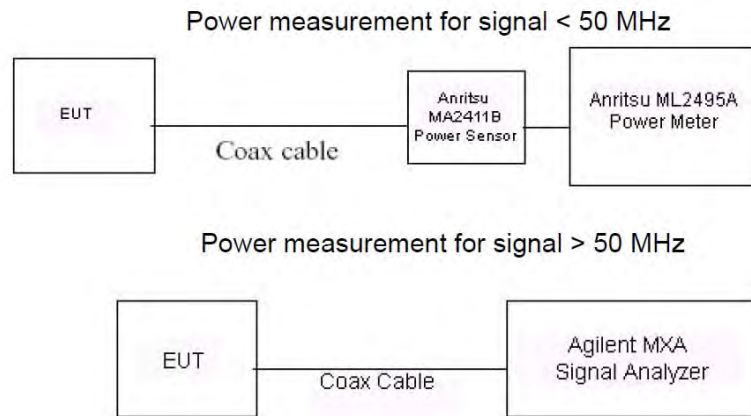


Figure 9-3
Power Measurement Setup

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 38 of 69

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties – Head

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
08/12/2013	750H	22.9	710	0.862	40.720	0.887	42.113	-2.82%	-3.31%
			725	0.875	40.589	0.888	42.033	-1.46%	-3.44%
			740	0.890	40.353	0.889	41.953	0.11%	-3.81%
			755	0.906	40.198	0.891	41.876	1.68%	-4.01%
07/31/2013	835H	22.9	820	0.912	42.202	0.898	41.571	1.56%	1.52%
			835	0.926	42.024	0.900	41.500	2.89%	1.26%
			850	0.939	41.844	0.916	41.500	2.51%	0.83%
08/08/2013	835H	21.9	820	0.927	42.809	0.898	41.571	3.23%	2.98%
			835	0.938	42.624	0.900	41.500	4.22%	2.71%
			850	0.955	42.372	0.916	41.500	4.26%	2.10%
08/12/2013	1750H	23.1	1710	1.289	39.565	1.348	40.136	-4.38%	-1.42%
			1750	1.335	39.446	1.370	40.100	-2.55%	-1.63%
			1790	1.378	39.282	1.394	40.020	-1.15%	-1.84%
07/29/2013	1900H	21.7	1850	1.383	38.918	1.400	40.000	-1.21%	-2.71%
			1880	1.412	38.758	1.400	40.000	0.86%	-3.10%
			1910	1.445	38.637	1.400	40.000	3.21%	-3.41%
07/31/2013	1900H	23.8	1850	1.338	39.804	1.400	40.000	-4.43%	-0.49%
			1880	1.365	39.716	1.400	40.000	-2.50%	-0.71%
			1910	1.390	39.595	1.400	40.000	-0.71%	-1.01%
07/31/2013	2450H	23.9	2401	1.795	39.289	1.758	39.298	2.10%	-0.02%
			2450	1.852	39.114	1.800	39.200	2.89%	-0.22%
			2499	1.908	38.894	1.852	39.135	3.02%	-0.62%
07/29/2013	5200H - 5800H	22.6	5200	4.688	34.839	4.660	36.000	0.60%	-3.23%
			5220	4.704	34.872	4.680	35.980	0.51%	-3.08%
			5280	4.811	34.742	4.740	35.920	1.50%	-3.28%
			5300	4.826	34.642	4.760	35.900	1.39%	-3.50%
			5500	5.080	34.302	4.965	35.650	2.32%	-3.78%
			5520	5.101	34.266	4.986	35.620	2.31%	-3.80%
			5540	5.122	34.219	5.007	35.590	2.30%	-3.85%
			5745	5.318	33.825	5.215	35.355	1.98%	-4.33%
			5765	5.334	33.761	5.235	35.335	1.89%	-4.45%
			5785	5.349	33.702	5.255	35.315	1.79%	-4.57%
			5800	5.370	33.638	5.270	35.300	1.90%	-4.71%
			5805	5.377	33.651	5.275	35.295	1.93%	-4.66%

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 39 of 69

Table 10-2
Measured Tissue Properties – Body

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
08/07/2013	750B	21.5	710	0.953	55.562	0.960	55.687	-0.73%	-0.22%
			725	0.965	55.358	0.961	55.629	0.42%	-0.49%
			740	0.982	55.116	0.963	55.570	1.97%	-0.82%
			755	0.995	54.898	0.964	55.512	3.22%	-1.11%
07/31/2013	835B	22.7	820	0.983	54.651	0.969	55.258	1.44%	-1.10%
			835	0.997	54.493	0.970	55.200	2.78%	-1.28%
			850	1.012	54.340	0.988	55.154	2.43%	-1.48%
08/08/2013	835B	22.1	820	1.001	54.201	0.969	55.258	3.30%	-1.91%
			835	1.014	54.054	0.970	55.200	4.54%	-2.08%
			850	1.030	53.869	0.988	55.154	4.25%	-2.33%
08/12/2013	835B	23.6	820	0.983	53.932	0.969	55.258	1.44%	-2.40%
			835	0.998	53.794	0.970	55.200	2.89%	-2.55%
			850	1.012	53.654	0.988	55.154	2.43%	-2.72%
08/01/2013	1750B	23.0	1710	1.472	51.192	1.460	53.540	0.82%	-4.39%
			1750	1.513	51.058	1.490	53.430	1.54%	-4.44%
			1790	1.557	50.923	1.510	53.330	3.11%	-4.51%
08/12/2013	1750B	23.0	1710	1.474	50.986	1.460	53.540	0.96%	-4.77%
			1750	1.515	50.876	1.490	53.430	1.68%	-4.78%
			1790	1.559	50.695	1.510	53.330	3.25%	-4.94%
08/08/2013	1900B	23.3	1850	1.480	50.786	1.520	53.300	-2.63%	-4.72%
			1880	1.520	50.692	1.520	53.300	0.00%	-4.89%
			1910	1.535	50.656	1.520	53.300	0.99%	-4.96%
08/12/2013	1900B	23.5	1850	1.452	52.568	1.520	53.300	-4.47%	-1.37%
			1880	1.480	52.442	1.520	53.300	-2.63%	-1.61%
			1910	1.515	52.398	1.520	53.300	-0.33%	-1.69%
07/29/2013	2450B	24.0	2401	1.922	52.230	1.903	52.765	1.00%	-1.01%
			2450	1.980	51.971	1.950	52.700	1.54%	-1.38%
			2499	2.026	51.744	2.019	52.638	0.35%	-1.70%
08/05/2013	5200B - 5800B	23.4	5200	5.512	46.801	5.299	49.014	4.02%	-4.52%
			5220	5.486	47.059	5.323	48.987	3.06%	-3.94%
			5280	5.659	47.141	5.393	48.879	4.93%	-3.56%
			5300	5.642	46.865	5.416	48.851	4.17%	-4.07%
			5500	5.890	47.060	5.650	48.580	4.25%	-3.13%
			5520	5.892	47.074	5.673	48.553	3.86%	-3.05%
			5540	5.900	47.047	5.696	48.526	3.58%	-3.05%
			5765	6.084	46.598	5.959	48.220	2.10%	-3.36%
			5785	6.122	46.561	5.982	48.242	2.34%	-3.48%
			5800	6.168	46.377	6.000	48.200	2.80%	-3.78%

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 IEEE 1528 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 40 of 69

10.2 Test System Verification

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

Table 10-3
System Verification Results – 1 g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation _{1g} (%)
D	750	HEAD	08/12/2013	23.1	22.9	0.100	1003	3288	0.871	8.460	8.710	2.96%
G	835	HEAD	07/31/2013	24.6	23.2	0.100	4d026	3209	0.994	9.390	9.940	5.86%
G	835	HEAD	08/08/2013	24.1	22.1	0.100	4d026	3209	1.000	9.390	10.000	6.50%
G	1750	HEAD	08/12/2013	24.2	23.1	0.100	1051	3209	3.540	36.500	35.400	-3.01%
D	1900	HEAD	07/29/2013	23.3	21.7	0.100	5d148	3288	3.850	39.700	38.500	-3.02%
D	1900	HEAD	07/31/2013	22.1	23.8	0.100	5d148	3288	3.750	39.700	37.500	-5.54%
C	2450	HEAD	07/31/2013	23.5	23.4	0.100	719	3022	5.620	52.700	56.200	6.64%
A	5200	HEAD	07/29/2013	24.3	22.7	0.100	1057	3589	7.710	75.900	77.100	1.58%
A	5300	HEAD	07/29/2013	24.3	22.7	0.100	1057	3589	8.280	76.900	82.800	7.67%
A	5500	HEAD	07/29/2013	24.4	22.7	0.100	1057	3589	7.650	80.100	76.500	-4.49%
A	5800	HEAD	07/29/2013	24.4	22.9	0.100	1057	3589	8.020	76.100	80.200	5.39%
D	750	BODY	08/07/2013	22.4	21.5	0.100	1003	3288	0.878	8.830	8.780	-0.57%
G	835	BODY	07/31/2013	24.9	22.7	0.100	4d026	3209	1.020	9.580	10.200	6.47%
G	835	BODY	08/08/2013	24.3	22.1	0.100	4d026	3209	1.020	9.580	10.200	6.47%
G	835	BODY	08/12/2013	24.1	23.6	0.100	4d026	3209	0.964	9.580	9.640	0.63%
B	1750	BODY	08/01/2013	23.2	23.0	0.100	1008	3287	3.920	38.200	39.200	2.62%
B	1750	BODY	08/12/2013	23.8	23.0	0.100	1008	3287	3.920	38.200	39.200	2.62%
B	1900	BODY	08/08/2013	23.8	23.3	0.100	5d141	3287	3.870	41.500	38.700	-6.75%
E	1900	BODY	08/12/2013	24.2	23.8	0.100	5d148	3920	4.170	40.800	41.700	2.21%
C	2450	BODY	07/29/2013	23.0	23.2	0.100	719	3022	5.340	51.600	53.400	3.49%
A	5200	BODY	08/05/2013	23.8	22.7	0.100	1057	3589	7.670	75.500	76.700	1.59%
A	5300	BODY	08/05/2013	23.8	22.7	0.100	1057	3589	8.110	75.300	81.100	7.70%
A	5500	BODY	08/05/2013	23.8	22.9	0.100	1057	3589	8.020	80.800	80.200	-0.74%
A	5800	BODY	08/05/2013	23.9	22.8	0.100	1057	3589	7.970	75.100	79.700	6.13%

Table 10-4
System Verification Results – 10 g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{10g} (W/kg)	1 W Target SAR _{10g} (W/kg)	1 W Normalized SAR _{10g}	Deviation _{10g} (%)
A	5200	BODY	08/05/2013	23.8	22.7	0.100	1057	3589	2.140	21.100	21.400	1.42%
A	5300	BODY	08/05/2013	23.8	22.7	0.100	1057	3589	2.250	21.100	22.500	6.64%
A	5500	BODY	08/05/2013	23.8	22.9	0.100	1057	3589	2.200	22.400	22.000	-1.79%

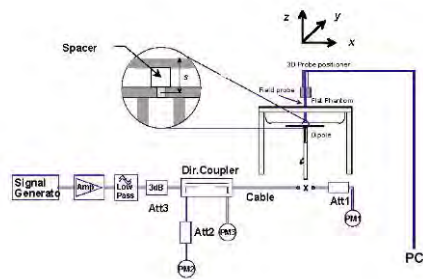


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 42 of 69

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
GSM 850 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Model/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	33.38	-0.03	Right	Cheek	Standard	31D55	1:8.3	0.104	1.028	0.107	
836.60	190	GSM 850	GSM	33.5	33.38	0.02	Right	Tilt	Standard	31D55	1:8.3	0.069	1.028	0.071	
836.60	190	GSM 850	GSM	33.5	33.38	-0.05	Left	Cheek	Standard	31D55	1:8.3	0.130	1.028	0.134	
836.60	190	GSM 850	GSM	33.5	33.38	-0.02	Left	Cheek	Wireless Charging Cover	31D55	1:8.3	0.201	1.028	0.207	A1
836.60	190	GSM 850	GSM	33.5	33.38	0.02	Left	Tilt	Standard	31D55	1:8.3	0.064	1.028	0.066	
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	Back Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	661	GSM 1900	GSM	30.5	30.40	0.08	Right	Cheek	Standard	31D55	1:8.3	0.097	1.023	0.099	
1880.00	661	GSM 1900	GSM	30.5	30.40	0.14	Right	Tilt	Standard	31D55	1:8.3	0.104	1.023	0.106	
1880.00	661	GSM 1900	GSM	30.5	30.40	0.13	Left	Cheek	Standard	31D55	1:8.3	0.171	1.023	0.175	A2
1880.00	661	GSM 1900	GSM	30.5	30.40	0.02	Left	Cheek	Wireless Charging Cover	31D55	1:8.3	0.156	1.023	0.160	
1880.00	661	GSM 1900	GSM	30.5	30.40	0.11	Left	Tilt	Standard	31D55	1:8.3	0.070	1.023	0.072	
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	Back Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	24.0	23.49	0.05	Right	Cheek	Standard	31D55	1:1	0.090	1.125	0.101	
836.60	4183	UMTS 850	RMC	24.0	23.49	0.04	Right	Tilt	Standard	31D55	1:1	0.061	1.125	0.069	
836.60	4183	UMTS 850	RMC	24.0	23.49	-0.12	Left	Cheek	Standard	31D55	1:1	0.116	1.125	0.131	
836.60	4183	UMTS 850	RMC	24.0	23.49	0.01	Left	Cheek	Wireless Charging Cover	31D55	1:1	0.162	1.125	0.182	A3
836.60	4183	UMTS 850	RMC	24.0	23.49	0.10	Left	Tilt	Standard	31D55	1:1	0.062	1.125	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							

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 43 of 69

Table 11-4
UMTS 1750 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	0.01	Right	Cheek	Standard	31D65	1:1	0.173	1.057	0.183	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	0.13	Right	Tilt	Standard	31D65	1:1	0.195	1.057	0.206	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	0.04	Left	Cheek	Standard	31D65	1:1	0.257	1.057	0.272	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	0.01	Left	Cheek	Wireless Charging Cover	31D65	1:1	0.299	1.057	0.316	A4
1732.40	1412	UMTS 1750	RMC	23.0	22.76	0.00	Left	Tilt	Standard	31D65	1:1	0.138	1.057	0.146	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-5
UMTS 1900 Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode/Band	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back Cover Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.											(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.01	Right	Cheek	Standard	31D55	1:1	0.151	1.019	0.154	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.00	Right	Tilt	Standard	31D55	1:1	0.175	1.019	0.178	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.11	Left	Cheek	Standard	31D55	1:1	0.267	1.019	0.272	A5
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.10	Left	Cheek	Wireless Charging Cover	31D55	1:1	0.249	1.019	0.254	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	-0.04	Left	Tilt	Standard	31D55	1:1	0.119	1.019	0.121	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram							

Table 11-6
LTE Band 17 Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.09	0	Right	Cheek	QPSK	1	49	31D69	1:1	0.066	1.274	0.084	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.14	1	Right	Cheek	QPSK	25	25	31D69	1:1	0.044	1.265	0.056	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.00	0	Right	Tilt	QPSK	1	49	31D69	1:1	0.041	1.274	0.052	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.09	1	Right	Tilt	QPSK	25	25	31D69	1:1	0.027	1.265	0.034	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.04	0	Left	Cheek	QPSK	1	49	31D69	1:1	0.067	1.274	0.085	
710.00	23790	Mid	LTE Band 17	10	Wireless Charging Cover	24.3	23.25	0.04	0	Left	Cheek	QPSK	1	49	31D69	1:1	0.091	1.274	0.116	A6
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.06	1	Left	Cheek	QPSK	25	25	31D69	1:1	0.055	1.265	0.070	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.09	0	Left	Tilt	QPSK	1	49	31D69	1:1	0.035	1.274	0.045	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.05	1	Left	Tilt	QPSK	25	25	31D69	1:1	0.028	1.265	0.035	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-7
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	0.04	0	Right	Cheek	QPSK	1	49	31D69	1:1	0.099	1.002	0.099	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.01	1	Right	Cheek	QPSK	25	25	31D69	1:1	0.076	1.023	0.078	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	0.19	0	Right	Tilt	QPSK	1	49	31D69	1:1	0.066	1.002	0.066	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.04	1	Right	Tilt	QPSK	25	25	31D69	1:1	0.051	1.023	0.052	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	0.01	0	Left	Cheek	QPSK	1	49	31D69	1:1	0.141	1.002	0.141	A7
836.50	20525	Mid	LTE Band 5 (Cell)	10	Wireless Charging Cover	23.5	23.49	0.08	0	Left	Cheek	QPSK	1	49	31D69	1:1	0.137	1.002	0.137	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	-0.03	1	Left	Cheek	QPSK	25	25	31D69	1:1	0.100	1.023	0.102	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	-0.16	0	Left	Tilt	QPSK	1	49	31D69	1:1	0.072	1.002	0.072	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.15	1	Left	Tilt	QPSK	25	25	31D69	1:1	0.049	1.023	0.050	
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 4 (AWS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
																	(W/kg)		(W/kg)	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.02	0	Right	Cheek	QPSK	1	0	31D69	1:1	0.183	1.000	0.183	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	0.02	1	Right	Cheek	QPSK	50	25	31D69	1:1	0.138	1.045	0.144	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.04	0	Right	Tilt	QPSK	1	0	31D69	1:1	0.169	1.000	0.169	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	-0.01	1	Right	Tilt	QPSK	50	25	31D69	1:1	0.136	1.045	0.142	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.08	0	Left	Cheek	QPSK	1	0	31D69	1:1	0.296	1.000	0.296	A8
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging Cover	23.0	23.00	-0.04	0	Left	Cheek	QPSK	1	0	31D69	1:1	0.285	1.000	0.285	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	-0.04	1	Left	Cheek	QPSK	50	25	31D69	1:1	0.245	1.045	0.256	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	-0.13	0	Left	Tilt	QPSK	1	0	31D69	1:1	0.179	1.000	0.179	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	-0.02	1	Left	Tilt	QPSK	50	25	31D69	1:1	0.139	1.045	0.145	
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 2 (PCS) Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #	
MHz	Ch.															(W/kg)				
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.07	0	Right	Cheek	QPSK	1	0	31D69	1:1	0.158	1.005	0.159	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	-0.01	1	Right	Cheek	QPSK	50	0	31D69	1:1	0.108	1.072	0.116	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.07	0	Right	Tilt	QPSK	1	0	31D69	1:1	0.157	1.005	0.158	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	0.04	1	Right	Tilt	QPSK	50	0	31D69	1:1	0.123	1.072	0.132	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.02	0	Left	Cheek	QPSK	1	0	31D69	1:1	0.280	1.005	0.281	A9
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Wireless Charging Cover	22.5	22.48	0.01	0	Left	Cheek	QPSK	1	0	31D69	1:1	0.279	1.005	0.280	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	0.06	1	Left	Cheek	QPSK	50	0	31D69	1:1	0.203	1.072	0.218	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	-0.04	0	Left	Tilt	QPSK	1	0	31D69	1:1	0.120	1.005	0.121	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	0.01	1	Left	Tilt	QPSK	50	0	31D69	1:1	0.085	1.072	0.091	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Head 1.6 W/kg (mW/g) averaged over 1 gram										

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 45 of 69

**Table 11-10
DTS Head SAR**

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back Cover Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.04	Right	Cheek	Standard	0209C	1	1:1	0.093	1.189	0.111	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	-0.03	Right	Tilt	Standard	0209C	1	1:1	0.081	1.189	0.096	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.00	Left	Cheek	Standard	0209C	1	1:1	0.236	1.189	0.281	A10
2437	6	IEEE 802.11b	DSSS	17.5	16.75	-0.02	Left	Cheek	Wireless Charging Cover	0209C	1	1:1	0.222	1.189	0.264	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.01	Left	Tilt	Standard	0209C	1	1:1	0.127	1.189	0.151	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	0.09	Right	Cheek	Standard	0209C	6	1:1	0.134	1.178	0.158	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	-0.02	Right	Tilt	Standard	0209C	6	1:1	0.132	1.178	0.155	
5745	149	IEEE 802.11a	OFDM	14.5	13.75	0.04	Left	Cheek	Standard	0209C	6	1:1	0.383	1.189	0.455	A11
5785	157	IEEE 802.11a	OFDM	14.5	13.79	-0.03	Left	Cheek	Standard	0209C	6	1:1	0.332	1.178	0.391	
5805	161	IEEE 802.11a	OFDM	14.5	13.62	0.03	Left	Cheek	Standard	0209C	6	1:1	0.263	1.225	0.322	
5775	155	IEEE 802.11ac	OFDM	11.5	10.70	0.00	Left	Cheek	Standard	0209C	29.3	1:1	0.244	1.202	0.293	
5745	149	IEEE 802.11a	OFDM	14.5	13.75	0.03	Left	Cheek	Wireless Charging Cover	0209C	6	1:1	0.282	1.189	0.335	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	-0.02	Left	Tilt	Standard	0209C	6	1:1	0.290	1.178	0.342	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram								

**Table 11-11
NII Head SAR**

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Back Cover Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	0.10	Right	Cheek	Standard	0209C	6	1:1	0.059	1.140	0.067	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	0.12	Right	Tilt	Standard	0209C	6	1:1	0.054	1.140	0.062	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	-0.04	Left	Cheek	Standard	0209C	6	1:1	0.159	1.140	0.181	
5210	42	IEEE 802.11ac	OFDM	11.5	10.83	0.06	Left	Cheek	Standard	0209C	29.3	1:1	0.121	1.167	0.141	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	0.09	Left	Tilt	Standard	0209C	6	1:1	0.103	1.140	0.117	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	0.04	Right	Cheek	Standard	0209C	6	1:1	0.087	1.119	0.097	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	0.06	Right	Tilt	Standard	0209C	6	1:1	0.080	1.119	0.090	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	-0.13	Left	Cheek	Standard	0209C	6	1:1	0.243	1.119	0.272	
5290	58	IEEE 802.11ac	OFDM	11.5	10.74	0.10	Left	Cheek	Standard	0209C	29.3	1:1	0.159	1.191	0.189	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	0.05	Left	Tilt	Standard	0209C	6	1:1	0.155	1.119	0.173	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.14	Right	Cheek	Standard	0209C	6	1:1	0.113	1.038	0.117	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.09	Right	Tilt	Standard	0209C	6	1:1	0.111	1.038	0.115	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.11	Left	Cheek	Standard	0209C	6	1:1	0.337	1.038	0.350	A12
5530	106	IEEE 802.11ac	OFDM	11.5	10.51	0.03	Left	Cheek	Standard	0209C	29.3	1:1	0.277	1.256	0.348	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.01	Left	Tilt	Standard	0209C	6	1:1	0.249	1.038	0.258	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram								

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 46 of 69

11.2 Standalone Body-Worn SAR Data

Table 11-12
GSM/UMTS Body-Worn SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back Cover Type	Device Serial Number	# of Time Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GSM	33.5	33.38	0.02	10 mm	Standard	31D55	1	1:8.3	back	0.250	1.028	0.257	A13
836.60	190	GSM 850	GSM	33.5	33.38	-0.02	10 mm	Wireless Charging Cover	31D55	1	1:8.3	back	0.211	1.028	0.217	
1880.00	661	GSM 1900	GSM	30.5	30.40	0.05	10 mm	Standard	31D55	1	1:8.3	back	0.744	1.023	0.761	A15
1880.00	661	GSM 1900	GSM	30.5	30.40	-0.02	10 mm	Wireless Charging Cover	31D55	1	1:8.3	back	0.566	1.023	0.579	
836.60	4183	UMTS 850	RMC	24.0	23.49	-0.04	10 mm	Standard	31D55	N/A	1:1	back	0.381	1.125	0.429	A17
836.60	4183	UMTS 850	RMC	24.0	23.49	-0.02	10 mm	Wireless Charging Cover	31D55	N/A	1:1	back	0.321	1.125	0.361	
1712.40	1312	UMTS 1750	RMC	23.0	22.66	-0.12	10 mm	Standard	31D56	N/A	1:1	back	0.772	1.081	0.835	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	-0.09	10 mm	Standard	31D56	N/A	1:1	back	1.000	1.057	1.057	
1752.50	1862	UMTS 1750	RMC	23.0	22.81	-0.06	10 mm	Standard	31D56	N/A	1:1	back	1.030	1.045	1.076	A18
1752.50	1862	UMTS 1750	RMC	23.0	22.81	-0.16	10 mm	Wireless Charging Cover	31D56	N/A	1:1	back	0.798	1.045	0.834	
1852.40	9262	UMTS 1900	RMC	23.0	22.99	0.05	10 mm	Standard	31D6D	N/A	1:1	back	1.020	1.002	1.022	A19
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.00	10 mm	Standard	31D6D	N/A	1:1	back	0.947	1.019	0.965	
1907.60	9538	UMTS 1900	RMC	23.0	22.72	0.10	10 mm	Standard	31D6D	N/A	1:1	back	0.889	1.067	0.949	
1852.40	9262	UMTS 1900	RMC	23.0	22.99	-0.01	10 mm	Wireless Charging Cover	31D6D	N/A	1:1	back	0.793	1.002	0.795	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 47 of 69

Table 11-13
LTE Body-Worn SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.01	0	31D69	QPSK	1	49	10 mm	back	1:1	0.278	1.274	0.354	A20
710.00	23790	Mid	LTE Band 17	10	Wireless Charging Cover	24.3	23.25	-0.02	0	31D69	QPSK	1	49	10 mm	back	1:1	0.221	1.274	0.282	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.07	1	31D69	QPSK	25	25	10 mm	back	1:1	0.202	1.265	0.256	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	0.02	0	31D69	QPSK	1	49	10 mm	back	1:1	0.453	1.002	0.454	A21
836.50	20525	Mid	LTE Band 5 (Cell)	10	Wireless Charging Cover	23.5	23.49	-0.04	0	31D69	QPSK	1	49	10 mm	back	1:1	0.406	1.002	0.407	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.01	1	31D69	QPSK	25	25	10 mm	back	1:1	0.383	1.023	0.392	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.08	0	31D69	QPSK	1	0	10 mm	back	1:1	1.060	1.000	1.060	A22
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging Cover	23.0	23.00	0.05	0	31D69	QPSK	1	0	10 mm	back	1:1	0.915	1.000	0.915	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	0.09	1	31D69	QPSK	50	25	10 mm	back	1:1	0.663	1.045	0.693	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.78	0.18	1	31D69	QPSK	100	0	10 mm	back	1:1	0.641	1.052	0.674	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.07	0	31D69	QPSK	1	0	10 mm	back	1:1	1.020	1.000	1.020	
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	22.5	22.47	0.05	0	31D69	QPSK	1	99	10 mm	back	1:1	1.050	1.007	1.057	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.01	0	31D69	QPSK	1	0	10 mm	back	1:1	1.070	1.005	1.075	A23
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	22.5	21.99	0.01	0	31D69	QPSK	1	50	10 mm	back	1:1	0.891	1.125	1.002	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Wireless Charging Cover	22.5	22.48	-0.03	0	31D69	QPSK	1	0	10 mm	back	1:1	0.850	1.005	0.854	
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.01	1	31D69	QPSK	50	50	10 mm	back	1:1	0.866	1.076	0.932	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	-0.03	1	31D69	QPSK	50	0	10 mm	back	1:1	0.898	1.072	0.963	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.05	0.02	1	31D69	QPSK	50	0	10 mm	back	1:1	0.830	1.109	0.920	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.16	0.02	1	31D69	QPSK	100	0	10 mm	back	1:1	0.696	1.081	0.752	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Note: Blue entry represents variability test data.

Table 11-14
DTS Body-Worn SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Scaled SAR (1g) (W/kg)	Plot #
MHz	Ch.															
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.02	10 mm	Standard	0209C	1	back	1:1	0.122	1.189	0.145	A24
2437	6	IEEE 802.11b	DSSS	17.5	16.75	-0.07	10 mm	Wireless Charging Cover	0209C	1	back	1:1	0.088	1.189	0.105	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	0.01	10 mm	Standard	0209C	6	back	1:1	0.104	1.178	0.123	A25
5775	155	IEEE 802.11ac	OFDM	11.5	10.70	0.00	10 mm	Standard	0209C	29.3	back	1:1	0.000	1.202	0.000	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram						

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 48 of 69

Table 11-15
NII Body-Worn SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	0.09	10 mm	Standard	0209C	6	back	1:1	0.140	1.140	0.160	A26
5210	42	IEEE 802.11ac	OFDM	11.5	10.83	0.16	10 mm	Standard	0209C	29.3	back	1:1	0.048	1.167	0.056	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	-0.18	10 mm	Wireless Charging Cover	0209C	6	back	1:1	0.110	1.140	0.125	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	-0.03	10 mm	Standard	0209C	6	back	1:1	0.139	1.119	0.156	
5290	58	IEEE 802.11ac	OFDM	11.5	10.74	0.15	10 mm	Standard	0209C	29.3	back	1:1	0.036	1.191	0.043	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.14	10 mm	Standard	0209C	6	back	1:1	0.068	1.038	0.071	
5530	106	IEEE 802.11ac	OFDM	11.5	10.51	0.00	10 mm	Standard	0209C	29.3	back	1:1	0.019	1.256	0.024	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 49 of 69

11.3 Standalone Wireless Router SAR Data

Table 11-16
GPRS/UMTS Hotspot SAR Data

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back Cover Type	Device Serial Number	# of GPRS Slots	Duty Cycle	Side	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	190	GSM 850	GPRS	32.0	31.90	0.01	10 mm	Standard	31D55	2	1:4.15	back	0.427	1.023	0.437	A14
836.60	190	GSM 850	GPRS	32.0	31.90	-0.04	10 mm	Wireless Charging Cover	31D55	2	1:4.15	back	0.312	1.023	0.319	
836.60	190	GSM 850	GPRS	32.0	31.90	0.11	10 mm	Standard	31D55	2	1:4.15	front	0.065	1.023	0.066	
836.60	190	GSM 850	GPRS	32.0	31.90	0.02	10 mm	Standard	31D55	2	1:4.15	bottom	0.139	1.023	0.142	
836.60	190	GSM 850	GPRS	32.0	31.90	0.10	10 mm	Standard	31D55	2	1:4.15	left	0.051	1.023	0.052	
1850.20	512	GSM 1900	GPRS	25.3	25.30	-0.02	10 mm	Standard	31D55	4	1:2.076	back	1.070	1.000	1.070	A16
1880.00	661	GSM 1900	GPRS	25.3	25.24	-0.06	10 mm	Standard	31D55	4	1:2.076	back	0.951	1.014	0.964	
1909.80	810	GSM 1900	GPRS	25.3	25.29	0.07	10 mm	Standard	31D55	4	1:2.076	back	0.791	1.002	0.793	
1850.20	512	GSM 1900	GPRS	25.3	25.30	0.00	10 mm	Wireless Charging Cover	31D55	4	1:2.076	back	0.885	1.000	0.885	
1880.00	661	GSM 1900	GPRS	25.3	25.24	0.06	10 mm	Standard	31D55	4	1:2.076	front	0.752	1.014	0.763	
1880.00	661	GSM 1900	GPRS	25.3	25.24	-0.03	10 mm	Standard	31D55	4	1:2.076	bottom	0.565	1.014	0.573	
1880.00	661	GSM 1900	GPRS	25.3	25.24	-0.05	10 mm	Standard	31D55	4	1:2.076	left	0.196	1.014	0.199	
1850.20	512	GSM 1900	GPRS	25.3	25.30	-0.01	10 mm	Standard	31D55	4	1:2.076	back	1.010	1.000	1.010	
836.60	4183	UMTS 850	RMC	24.0	23.49	-0.04	10 mm	Standard	31D55	N/A	1:1	back	0.381	1.125	0.429	A17
836.60	4183	UMTS 850	RMC	24.0	23.49	-0.02	10 mm	Wireless Charging Cover	31D55	N/A	1:1	back	0.321	1.125	0.361	
836.60	4183	UMTS 850	RMC	24.0	23.49	0.08	10 mm	Standard	31D55	N/A	1:1	front	0.137	1.125	0.154	
836.60	4183	UMTS 850	RMC	24.0	23.49	-0.02	10 mm	Standard	31D55	N/A	1:1	bottom	0.107	1.125	0.120	
836.60	4183	UMTS 850	RMC	24.0	23.49	0.07	10 mm	Standard	31D55	N/A	1:1	left	0.163	1.125	0.183	
1712.40	1312	UMTS 1750	RMC	23.0	22.66	-0.12	10 mm	Standard	31D56	N/A	1:1	back	0.772	1.081	0.835	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	-0.09	10 mm	Standard	31D56	N/A	1:1	back	1.000	1.057	1.057	
1752.50	1862	UMTS 1750	RMC	23.0	22.81	-0.06	10 mm	Standard	31D56	N/A	1:1	back	1.030	1.045	1.076	A18
1752.50	1862	UMTS 1750	RMC	23.0	22.81	-0.16	10 mm	Wireless Charging Cover	31D56	N/A	1:1	back	0.798	1.045	0.834	
1712.40	1312	UMTS 1750	RMC	23.0	22.66	0.18	10 mm	Standard	31D56	N/A	1:1	front	0.684	1.081	0.739	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	0.19	10 mm	Standard	31D56	N/A	1:1	front	0.860	1.057	0.909	
1752.50	1862	UMTS 1750	RMC	23.0	22.81	0.18	10 mm	Standard	31D56	N/A	1:1	front	0.907	1.045	0.948	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	-0.05	10 mm	Standard	31D56	N/A	1:1	bottom	0.695	1.057	0.735	
1732.40	1412	UMTS 1750	RMC	23.0	22.76	-0.01	10 mm	Standard	31D56	N/A	1:1	left	0.216	1.057	0.228	
1852.40	9262	UMTS 1900	RMC	23.0	22.99	0.05	10 mm	Standard	31D6D	N/A	1:1	back	1.020	1.002	1.022	A19
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.00	10 mm	Standard	31D6D	N/A	1:1	back	0.947	1.019	0.965	
1907.60	9538	UMTS 1900	RMC	23.0	22.72	0.10	10 mm	Standard	31D6D	N/A	1:1	back	0.889	1.067	0.949	
1852.40	9262	UMTS 1900	RMC	23.0	22.99	-0.01	10 mm	Wireless Charging Cover	31D6D	N/A	1:1	back	0.793	1.002	0.795	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	-0.03	10 mm	Standard	31D6D	N/A	1:1	front	0.784	1.019	0.799	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	0.00	10 mm	Standard	31D6D	N/A	1:1	bottom	0.521	1.019	0.531	
1880.00	9400	UMTS 1900	RMC	23.0	22.92	-0.04	10 mm	Standard	31D6D	N/A	1:1	left	0.253	1.019	0.258	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram									

Note: Blue entry represents variability test data.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 50 of 69
© 2013 PCTEST Engineering Laboratory, Inc.				REV 12.5 M 05/20/2013

Table 11-17
LTE Band 17 Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth h [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.01	0	31D69	QPSK	1	49	10 mm	back	1:1	0.278	1.274	0.354	A20
710.00	23790	Mid	LTE Band 17	10	Wireless Charging Cover	24.3	23.25	-0.02	0	31D69	QPSK	1	49	10 mm	back	1:1	0.221	1.274	0.282	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.07	1	31D69	QPSK	25	25	10 mm	back	1:1	0.202	1.265	0.256	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	-0.01	0	31D69	QPSK	1	49	10 mm	front	1:1	0.179	1.274	0.228	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	-0.04	1	31D69	QPSK	25	25	10 mm	front	1:1	0.132	1.265	0.167	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	-0.07	0	31D69	QPSK	1	49	10 mm	bottom	1:1	0.069	1.274	0.088	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	0.07	1	31D69	QPSK	25	25	10 mm	bottom	1:1	0.050	1.265	0.063	
710.00	23790	Mid	LTE Band 17	10	Standard	24.3	23.25	0.10	0	31D69	QPSK	1	49	10 mm	left	1:1	0.227	1.274	0.289	
710.00	23790	Mid	LTE Band 17	10	Standard	23.3	22.28	-0.03	1	31D69	QPSK	25	25	10 mm	left	1:1	0.162	1.265	0.205	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak									Body 1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population									averaged over 1 gram											

Table 11-18
LTE Band 5 (Cell) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	0.02	0	31D69	QPSK	1	49	10 mm	back	1:1	0.453	1.002	0.454	A21
836.50	20525	Mid	LTE Band 5 (Cell)	10	Wireless Charging Cover	23.5	23.49	-0.04	0	31D69	QPSK	1	49	10 mm	back	1:1	0.406	1.002	0.407	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.01	1	31D69	QPSK	25	25	10 mm	back	1:1	0.383	1.023	0.392	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	-0.06	0	31D69	QPSK	1	49	10 mm	front	1:1	0.160	1.002	0.160	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.01	1	31D69	QPSK	25	25	10 mm	front	1:1	0.119	1.023	0.122	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	-0.01	0	31D69	QPSK	1	49	10 mm	bottom	1:1	0.141	1.002	0.141	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	0.05	1	31D69	QPSK	25	25	10 mm	bottom	1:1	0.109	1.023	0.112	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	23.5	23.49	0.01	0	31D69	QPSK	1	49	10 mm	left	1:1	0.214	1.002	0.214	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Standard	22.5	22.40	-0.01	1	31D69	QPSK	25	25	10 mm	left	1:1	0.166	1.023	0.170	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 51 of 69

Table 11-19
LTE Band 4 (AWS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #	
MHz	Ch.															(W/kg)		(W/kg)		
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.08	0	31D69	QPSK	1	0	10 mm	back	1:1	1.060	1.000	1.060	A22
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Wireless Charging Cover	23.0	23.00	0.05	0	31D69	QPSK	1	0	10 mm	back	1:1	0.915	1.000	0.915	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	0.09	1	31D69	QPSK	50	25	10 mm	back	1:1	0.663	1.045	0.693	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.78	0.18	1	31D69	QPSK	100	0	10 mm	back	1:1	0.641	1.052	0.674	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	-0.12	0	31D69	QPSK	1	0	10 mm	front	1:1	1.020	1.000	1.020	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	-0.12	1	31D69	QPSK	50	25	10 mm	front	1:1	0.845	1.045	0.883	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.78	-0.03	1	31D69	QPSK	100	0	10 mm	front	1:1	0.744	1.052	0.783	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	-0.02	0	31D69	QPSK	1	0	10 mm	bottom	1:1	0.713	1.000	0.713	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	-0.01	1	31D69	QPSK	50	25	10 mm	bottom	1:1	0.644	1.045	0.673	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.12	0	31D69	QPSK	1	0	10 mm	left	1:1	0.291	1.000	0.291	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	22.0	21.81	-0.03	1	31D69	QPSK	50	25	10 mm	left	1:1	0.224	1.045	0.234	
1732.50	20175	Mid	LTE Band 4 (AWS)	20	Standard	23.0	23.00	0.07	0	31D69	QPSK	1	0	10 mm	back	1:1	1.020	1.000	1.020	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram										

Note: Blue entry represents variability test data.

Table 11-20
LTE Band 2 (PCS) Hotspot SAR

MEASUREMENT RESULTS																				
FREQUENCY			Mode	Bandwidth [MHz]	Back Cover Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.	(W/kg)															(W/kg)			
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	22.5	22.47	0.05	0	31D69	QPSK	1	99	10 mm	back	1:1	1.050	1.007	1.057	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.01	0	31D69	QPSK	1	0	10 mm	back	1:1	1.070	1.005	1.075	A23
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	22.5	21.99	0.01	0	31D69	QPSK	1	50	10 mm	back	1:1	0.891	1.125	1.002	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Wireless Charging Cover	22.5	22.48	-0.03	0	31D69	QPSK	1	0	10 mm	back	1:1	0.850	1.005	0.854	
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	21.5	21.18	0.01	1	31D69	QPSK	50	50	10 mm	back	1:1	0.866	1.076	0.932	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	-0.03	1	31D69	QPSK	50	0	10 mm	back	1:1	0.898	1.072	0.963	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	21.5	21.05	0.02	1	31D69	QPSK	50	0	10 mm	back	1:1	0.830	1.109	0.920	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.16	0.02	1	31D69	QPSK	100	0	10 mm	back	1:1	0.696	1.081	0.752	
1860.00	18700	Low	LTE Band 2 (PCS)	20	Standard	22.5	22.47	-0.07	0	31D69	QPSK	1	99	10 mm	front	1:1	0.833	1.007	0.839	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.03	0	31D69	QPSK	1	0	10 mm	front	1:1	0.827	1.005	0.831	
1900.00	19100	High	LTE Band 2 (PCS)	20	Standard	22.5	21.99	-0.01	0	31D69	QPSK	1	50	10 mm	front	1:1	0.777	1.125	0.874	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	-0.03	1	31D69	QPSK	50	0	10 mm	front	1:1	0.641	1.072	0.687	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.16	-0.05	1	31D69	QPSK	100	0	10 mm	front	1:1	0.605	1.081	0.654	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.01	0	31D69	QPSK	1	0	10 mm	bottom	1:1	0.683	1.005	0.686	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	0.06	1	31D69	QPSK	50	0	10 mm	bottom	1:1	0.534	1.072	0.572	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	22.5	22.48	0.06	0	31D69	QPSK	1	0	10 mm	left	1:1	0.199	1.005	0.200	
1880.00	18900	Mid	LTE Band 2 (PCS)	20	Standard	21.5	21.20	0.06	1	31D69	QPSK	50	0	10 mm	left	1:1	0.157	1.072	0.168	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram											

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 52 of 69

Table 11-21
WLAN Hotspot SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (1g)	Scaling Factor	Scaled SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.02	10 mm	Standard	0209C	1	back	1:1	0.122	1.189	0.145	A24
2437	6	IEEE 802.11b	DSSS	17.5	16.75	-0.07	10 mm	Wireless Charging Cover	0209C	1	back	1:1	0.088	1.189	0.105	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.21	10 mm	Standard	0209C	1	front	1:1	0.041	1.189	0.049	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.19	10 mm	Standard	0209C	1	top	1:1	0.029	1.189	0.034	
2437	6	IEEE 802.11b	DSSS	17.5	16.75	0.07	10 mm	Standard	0209C	1	right	1:1	0.071	1.189	0.084	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	0.01	10 mm	Standard	0209C	6	back	1:1	0.104	1.178	0.123	A25
5785	157	IEEE 802.11a	OFDM	14.5	13.79	-0.08	10 mm	Wireless Charging Cover	0209C	6	back	1:1	0.057	1.178	0.067	
5775	155	IEEE 802.11ac	OFDM	11.5	10.70	0.00	10 mm	Standard	0209C	29.3	back	1:1	0.000	1.202	0.000	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	0.00	10 mm	Standard	0209C	6	front	1:1	0.028	1.178	0.033	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	0.10	10 mm	Standard	0209C	6	top	1:1	0.069	1.178	0.081	
5785	157	IEEE 802.11a	OFDM	14.5	13.79	0.08	10 mm	Standard	0209C	6	right	1:1	0.057	1.178	0.067	
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 Hand SAR Data

Table 11-22
WLAN Hand SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Back Cover Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle	SAR (10g)	Scaling Factor	Scaled SAR (10g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	0.07	0 mm	Standard	0209C	6	back	1:1	0.392	1.140	0.447	A27
5210	42	IEEE 802.11ac	OFDM	11.5	10.83	0.07	0 mm	Standard	0209C	29.3	back	1:1	0.204	1.167	0.238	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	0.07	0 mm	Wireless Charging Cover	0209C	6	back	1:1	0.313	1.140	0.357	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	-0.03	0 mm	Standard	0209C	6	front	1:1	0.075	1.140	0.086	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	-0.04	0 mm	Standard	0209C	6	top	1:1	0.055	1.140	0.063	
5200	40	IEEE 802.11a	OFDM	14.5	13.93	-0.08	0 mm	Standard	0209C	6	right	1:1	0.200	1.140	0.228	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	-0.05	0 mm	Standard	0209C	6	back	1:1	0.334	1.119	0.374	
5290	58	IEEE 802.11ac	OFDM	11.5	10.74	-0.04	0 mm	Standard	0209C	29.3	back	1:1	0.166	1.191	0.198	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	-0.12	0 mm	Standard	0209C	6	front	1:1	0.105	1.119	0.117	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	-0.12	0 mm	Standard	0209C	6	top	1:1	0.084	1.119	0.094	
5280	56	IEEE 802.11a	OFDM	14.5	14.01	0.03	0 mm	Standard	0209C	6	right	1:1	0.177	1.119	0.198	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.02	0 mm	Standard	0209C	6	back	1:1	0.230	1.038	0.239	
5530	106	IEEE 802.11ac	OFDM	11.5	10.51	-0.14	0 mm	Standard	0209C	29.3	back	1:1	0.196	1.256	0.246	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.15	0 mm	Standard	0209C	6	front	1:1	0.195	1.038	0.202	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	-0.16	0 mm	Standard	0209C	6	top	1:1	0.144	1.038	0.149	
5520	104	IEEE 802.11a	OFDM	14.5	14.34	0.03	0 mm	Standard	0209C	6	right	1:1	0.177	1.038	0.184	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Hand 4.0 W/kg (mW/g) averaged over 10 grams									

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 53 of 69

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 1528-2003, FCC/OET Bulletin 65, Supplement C [June 2001] and FCC KDB Publication 447498 D01v05r01.
2. Batteries are fully charged at the beginning of the SAR measurements. Battery with NFC antenna was used for all 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 D01v05r01.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r01, 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 SAR evaluations using a headset cable were required.
8. Per FCC KDB 865664 D01v01r01, variability SAR tests were performed when the measured SAR results for a frequency band were greater than 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 13 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v01r01, 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 D04v01r01, this device is considered a "phablet" since the diagonal distance is greater than 160 mm but less than 200 mm. Hand SAR tests are not required for licensed transmitter because Hotspot SAR was < 1.2 W/kg.

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 D03v01r01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power was evaluated for SAR for hotspot SAR.
3. Per FCC KDB Publication 447498 D01v05r01, when the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg, testing at the other channels was not required for such test configuration(s).

UMTS Notes:

1. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v02r02. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D01v05r01, when the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg, testing at the other channels was not required for such test configuration(s).

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r02. The general test procedures used for testing can be found in Section 8.4.4.

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 54 of 69

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.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v01r02 and October 2012 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20 MHz and 40 MHz bandwidths) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. Per April 2013 TCB Workshop notes, full SAR tests for all IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.
4. This device only supports Hotspot for 2.4 GHz and 5.8 GHz bands. Therefore all other bands were not evaluated for Hotspot SAR conditions.
5. WIFI transmission was verified using an uncalibrated spectrum analyzer.
6. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the reported 1g averaged SAR is <0.8 W/kg or 10g averaged SAR is <2.0 W/kg testing on other default channels was not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
7. Per FCC KDB Publication 648474 D04v01r01, this device is considered a "phablet" since the diagonal distance is greater than 160 mm, but less than 200 mm. Therefore, hand SAR tests are required when hotspot mode does not apply or if hotspot 1g SAR >1.2 W/kg. Because wireless router operations are supported for 5 GHz DTS WLAN, but not for 5 GHz NII WLAN, hand SAR was evaluated for 5 GHz NII WLAN only. Hand SAR was not evaluated for 2.4 GHz WIFI or 5 GHz DTS WIFI since Hotspot SAR for these modes was < 1.2 W/kg.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 55 of 69

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v05r01 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n/ac and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v05r01 IV.C.1.iii, 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 physical test configuration is ≤ 1.6 W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v05r01 4.3.2 2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

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

Table 12-1
Estimated SAR

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[dBm]	[mm]	[W/kg]
Bluetooth	2441	10.00	10	0.208

Note:

1. Held-to ear configurations are not applicable to Bluetooth operations and therefore were not considered for simultaneous transmission.
2. Per KDB Publication 447498 D01v05r01, the maximum power of the channel was rounded to the nearest mW before calculation.
3. Main Antenna SAR testing was not required for extremity exposure conditions per FCC KDB 648474 D04v01r01. Therefore, no further analysis was required to determine that possible simultaneous scenarios (including those with WIFI direct) would not exceed the SAR limit.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 56 of 69

12.3 Head SAR Simultaneous Transmission Analysis

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

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.107	0.111	0.218	Head SAR	Right Cheek	0.099	0.111	0.210
	Right Tilt	0.071	0.096	0.167		Right Tilt	0.106	0.096	0.202
	Left Cheek	0.207	0.281	0.488		Left Cheek	0.175	0.281	0.456
	Left Tilt	0.066	0.151	0.217		Left Tilt	0.072	0.151	0.223
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.101	0.111	0.212	Head SAR	Right Cheek	0.183	0.111	0.294
	Right Tilt	0.069	0.096	0.165		Right Tilt	0.206	0.096	0.302
	Left Cheek	0.182	0.281	0.463		Left Cheek	0.316	0.281	0.597
	Left Tilt	0.070	0.151	0.221		Left Tilt	0.146	0.151	0.297
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.154	0.111	0.265	Head SAR	Right Cheek	0.084	0.111	0.195
	Right Tilt	0.178	0.096	0.274		Right Tilt	0.052	0.096	0.148
	Left Cheek	0.272	0.281	0.553		Left Cheek	0.116	0.281	0.397
	Left Tilt	0.121	0.151	0.272		Left Tilt	0.045	0.151	0.196
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.099	0.111	0.210	Head SAR	Right Cheek	0.183	0.111	0.294
	Right Tilt	0.066	0.096	0.162		Right Tilt	0.169	0.096	0.265
	Left Cheek	0.141	0.281	0.422		Left Cheek	0.296	0.281	0.577
	Left Tilt	0.072	0.151	0.223		Left Tilt	0.179	0.151	0.330
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Head SAR	Right Cheek	0.159	0.111	0.270					
	Right Tilt	0.158	0.096	0.254					
	Left Cheek	0.281	0.281	0.562					
	Left Tilt	0.121	0.151	0.272					

Table 12-3
Simultaneous Transmission Scenario with 5 GHz WLAN (Held to Ear)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.107	0.158	0.265	Head SAR	Right Cheek	0.099	0.158	0.257
	Right Tilt	0.071	0.155	0.226		Right Tilt	0.106	0.155	0.261
	Left Cheek	0.207	0.455	0.662		Left Cheek	0.175	0.455	0.630
	Left Tilt	0.066	0.342	0.408		Left Tilt	0.072	0.342	0.414
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.101	0.158	0.259	Head SAR	Right Cheek	0.183	0.158	0.341
	Right Tilt	0.069	0.155	0.224		Right Tilt	0.206	0.155	0.361
	Left Cheek	0.182	0.455	0.637		Left Cheek	0.316	0.455	0.771
	Left Tilt	0.070	0.342	0.412		Left Tilt	0.146	0.342	0.488
Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.154	0.158	0.312	Head SAR	Right Cheek	0.084	0.158	0.242
	Right Tilt	0.178	0.155	0.333		Right Tilt	0.052	0.155	0.207
	Left Cheek	0.272	0.455	0.727		Left Cheek	0.116	0.455	0.571
	Left Tilt	0.121	0.342	0.463		Left Tilt	0.045	0.342	0.387
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Head SAR	Right Cheek	0.099	0.158	0.257	Head SAR	Right Cheek	0.183	0.158	0.341
	Right Tilt	0.066	0.155	0.221		Right Tilt	0.169	0.155	0.324
	Left Cheek	0.141	0.455	0.596		Left Cheek	0.296	0.455	0.751
	Left Tilt	0.072	0.342	0.414		Left Tilt	0.179	0.342	0.521
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Head SAR	Right Cheek	0.159	0.158	0.317					
	Right Tilt	0.158	0.155	0.313					
	Left Cheek	0.281	0.455	0.736					
	Left Tilt	0.121	0.342	0.463					

Note: The worst case 5 GHz WLAN reported SAR for each Head configuration was used for SAR summation, regardless of whether the WLAN channel has Hotspot capability. Therefore, the summations above represent the absolute worst cases for simultaneous transmission with 5 GHz WLAN.

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.257	0.145	0.402
Back Side	GSM 1900	0.761	0.145	0.906
Back Side	UMTS 850	0.429	0.145	0.574
Back Side	UMTS 1750	1.076	0.145	1.221
Back Side	UMTS 1900	1.022	0.145	1.167
Back Side	LTE Band 17	0.354	0.145	0.499
Back Side	LTE Band 5 (Cell)	0.454	0.145	0.599
Back Side	LTE Band 4 (AWS)	1.060	0.145	1.205
Back Side	LTE Band 2 (PCS)	1.075	0.145	1.220

Table 12-5
Simultaneous Transmission Scenario with 5 GHz WLAN (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.257	0.160	0.417
Back Side	GSM 1900	0.761	0.160	0.921
Back Side	UMTS 850	0.429	0.160	0.589
Back Side	UMTS 1750	1.076	0.160	1.236
Back Side	UMTS 1900	1.022	0.160	1.182
Back Side	LTE Band 17	0.354	0.160	0.514
Back Side	LTE Band 5 (Cell)	0.454	0.160	0.614
Back Side	LTE Band 4 (AWS)	1.060	0.160	1.220
Back Side	LTE Band 2 (PCS)	1.075	0.160	1.235

Note: The worst case 5 GHz WLAN reported SAR for each Body worn configuration was used for SAR summation, regardless of whether the WLAN channel has Hotspot capability. Therefore, the summations above represent the absolute worst cases for simultaneous transmission with 5 GHz WLAN.

Table 12-6
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 10 mm)

Configuration	Mode	2G/3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.257	0.208	0.465
Back Side	GSM 1900	0.761	0.208	0.969
Back Side	UMTS 850	0.429	0.208	0.637
Back Side	UMTS 1750	1.076	0.208	1.284
Back Side	UMTS 1900	1.022	0.208	1.230
Back Side	LTE Band 17	0.354	0.208	0.562
Back Side	LTE Band 5 (Cell)	0.454	0.208	0.662
Back Side	LTE Band 4 (AWS)	1.060	0.208	1.268
Back Side	LTE Band 2 (PCS)	1.075	0.208	1.283

Note: Bluetooth SAR was not required to be measured per FCC KDB 447498 D01v05r01. Estimated SAR results were used in the above table to determine simultaneous transmission SAR test exclusion.

12.5 Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v01r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR (“-”).

Table 12-7
Simultaneous Transmission Scenario (2.4 GHz Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.437	0.145	0.582	Body SAR	Back	1.070	0.145	1.215
	Front	0.066	0.049	0.115		Front	0.763	0.049	0.812
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.142	-	0.142		Bottom	0.573	-	0.573
	Right	-	0.084	0.084		Right	-	0.084	0.084
	Left	0.052	-	0.052		Left	0.199	-	0.199
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.429	0.145	0.574	Body SAR	Back	1.076	0.145	1.221
	Front	0.154	0.049	0.203		Front	0.948	0.049	0.997
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.120	-	0.120		Bottom	0.735	-	0.735
	Right	-	0.084	0.084		Right	-	0.084	0.084
	Left	0.183	-	0.183		Left	0.228	-	0.228

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.022	0.145	1.167	Body SAR	Back	0.354	0.145	0.499
	Front	0.799	0.049	0.848		Front	0.228	0.049	0.277
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.531	-	0.531		Bottom	0.088	-	0.088
	Right	-	0.084	0.084		Right	-	0.084	0.084
	Left	0.258	-	0.258		Left	0.289	-	0.289
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.454	0.145	0.599	Body SAR	Back	1.060	0.145	1.205
	Front	0.160	0.049	0.209		Front	1.020	0.049	1.069
	Top	-	0.034	0.034		Top	-	0.034	0.034
	Bottom	0.141	-	0.141		Bottom	0.713	-	0.713
	Right	-	0.084	0.084		Right	-	0.084	0.084
	Left	0.214	-	0.214		Left	0.291	-	0.291
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Body SAR	Back	1.075	0.145	1.220					
	Front	0.874	0.049	0.923					
	Top	-	0.034	0.034					
	Bottom	0.686	-	0.686					
	Right	-	0.084	0.084					
	Left	0.200	-	0.200					

Table 12-8
Simultaneous Transmission Scenario (5.8 GHz Hotspot at 1.0 cm)

Simult Tx	Configuration	GPRS 850 SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.437	0.123	0.560	Body SAR	Back	1.070	0.123	1.193
	Front	0.066	0.033	0.099		Front	0.763	0.033	0.796
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.142	-	0.142		Bottom	0.573	-	0.573
	Right	-	0.067	0.067		Right	-	0.067	0.067
	Left	0.052	-	0.052		Left	0.199	-	0.199
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 1750 SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.429	0.123	0.552	Body SAR	Back	1.076	0.123	1.199
	Front	0.154	0.033	0.187		Front	0.948	0.033	0.981
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.120	-	0.120		Bottom	0.735	-	0.735
	Right	-	0.067	0.067		Right	-	0.067	0.067
	Left	0.183	-	0.183		Left	0.228	-	0.228

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	Page 61 of 69	

Simult Tx	Configuration	UMTS 1900 SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 17 SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	1.022	0.123	1.145	Body SAR	Back	0.354	0.123	0.477
	Front	0.799	0.033	0.832		Front	0.228	0.033	0.261
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.531	-	0.531		Bottom	0.088	-	0.088
	Right	-	0.067	0.067		Right	-	0.067	0.067
	Left	0.258	-	0.258		Left	0.289	-	0.289
Simult Tx	Configuration	LTE Band 5 (Cell) SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	LTE Band 4 (AWS) SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.454	0.123	0.577	Body SAR	Back	1.060	0.123	1.183
	Front	0.160	0.033	0.193		Front	1.020	0.033	1.053
	Top	-	0.081	0.081		Top	-	0.081	0.081
	Bottom	0.141	-	0.141		Bottom	0.713	-	0.713
	Right	-	0.067	0.067		Right	-	0.067	0.067
	Left	0.214	-	0.214		Left	0.291	-	0.291
Simult Tx	Configuration	LTE Band 2 (PCS) SAR (W/kg)	5.8 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Body SAR	Back	1.075	0.123	1.198					
	Front	0.874	0.033	0.907					
	Top	-	0.081	0.081					
	Bottom	0.686	-	0.686					
	Right	-	0.067	0.067					
	Left	0.200	-	0.200					

12.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v05r01.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 62 of 69

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

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

Table 13-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS														
Band	FREQUENCY		Mode	Service	# of Time Slots	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.						(W/kg)	(W/kg)		(W/kg)		(W/kg)	
1750	1732.50	20175	LTE Band 4 (AWS)	QPSK, 1 RB, 0 RB Offset	N/A	back	10 mm	1.060	1.020	1.04	N/A	N/A	N/A	N/A
1900	1850.20	512	GSM 1900	GPRS	4	back	10 mm	1.070	1.010	1.06	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram							

13.2 Measurement Uncertainty

The measured SAR was < 1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01r01, the extended measurement uncertainty analysis per IEEE 1528-2003 was not required.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 63 of 69

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/16/2013	Annual	4/16/2014	MY45470194
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/16/2013	Annual	4/16/2014	JP38020182
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	4/17/2013	Annual	4/17/2014	3629U00687
Agilent	85070C	Dielectric Probe Kit	2/14/2013	Annual	2/14/2014	MY44300633
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Agilent	E5515C	Wireless Communications Test Set	9/24/2012	Annual	9/24/2013	GB43163447
Amplifier Research	551G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Anritsu	ML2438A	Power Meter	12/4/2012	Annual	12/4/2013	1070030
Anritsu	MA2481A	Power Sensor	2/14/2013	Annual	2/14/2014	5821
Anritsu	MA2481A	Power Sensor	2/14/2013	Annual	2/14/2014	2400
Anritsu	MA2411B	Pulse Power Sensor	12/4/2012	Annual	12/4/2013	1207364
Anritsu	MA2411B	Pulse Power Sensor	12/5/2012	Annual	12/5/2013	1126066
Anritsu	MT8820C	Radio Communication Analyzer	6/28/2013	Annual	6/28/2014	6201240328
Anritsu	MT8820C	Radio Communication Tester	11/6/2012	Annual	11/6/2013	6200901190
Anritsu	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244515
Anritsu	MA24106A	USB Power Sensor	12/7/2012	Annual	12/7/2013	1244512
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
COMTECH	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Gigatronics	8651A	Universal Power Meter	10/10/2012	Annual	10/10/2013	8650319
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
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
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	5/3/2013	Annual	5/3/2014	836371/0079
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	2/8/2013	Annual	2/8/2014	101699
Rohde & Schwarz	NRV-Z32	Peak Power Sensor	10/12/2012	Biennial	10/12/2014	836019/013
Rohde & Schwarz	SME06	Signal Generator	10/11/2012	Annual	10/11/2013	832026
Rohde & Schwarz	SMI030B	Signal Generator	4/17/2013	Annual	4/17/2014	DE27259
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	D1750V2	1750 MHz SAR Dipole	4/30/2013	Annual	4/30/2014	1051
SPEAG	D1765V2	1765 MHz SAR Dipole	5/14/2013	Annual	5/14/2014	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	2/6/2013	Annual	2/6/2014	5d148
SPEAG	D1900V2	1900 MHz SAR Dipole	5/2/2013	Annual	5/2/2014	5d141
SPEAG	D2450V2	2450 MHz SAR Dipole	8/23/2012	Annual	8/23/2013	719
SPEAG	D56HzV2	5 GHz SAR Dipole	1/11/2013	Annual	1/11/2014	1057
SPEAG	D750V3	750 MHz Dipole	1/7/2013	Annual	1/7/2014	1003
SPEAG	D835V2	835 MHz SAR Dipole	8/23/2012	Annual	8/23/2013	4d026
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/24/2012	Annual	8/24/2013	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/19/2012	Annual	9/19/2013	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/13/2012	Annual	11/13/2013	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/17/2013	Annual	1/17/2014	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/6/2013	Annual	2/6/2014	649
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/8/2013	Annual	3/8/2014	1334
SPEAG	DAK-3.5	Dielectric Assessment Kit	12/11/2012	Annual	12/11/2013	1091
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/14/2013	Annual	5/14/2014	1070
SPEAG	ES3DV2	SAR Probe	8/28/2012	Annual	8/28/2013	3022
SPEAG	ES3DV3	SAR Probe	9/20/2012	Annual	9/20/2013	3288
SPEAG	ES3DV3	SAR Probe	11/15/2012	Annual	11/15/2013	3287
SPEAG	EX3DV4	SAR Probe	1/17/2013	Annual	1/17/2014	3589
SPEAG	EX3DV4	SAR Probe	2/27/2013	Annual	2/27/2014	3920
SPEAG	ES3DV3	SAR Probe	3/15/2013	Annual	3/15/2014	3209
Tektronix	RSA6114A	Real Time Spectrum Analyzer	4/17/2013	Annual	4/17/2014	B010177
VWR	23226-658	Long Stem Thermometer	3/30/2012	Biennial	3/30/2014	122179874
VWR	23226-658	Long Stem Thermometer	5/16/2012	Biennial	5/16/2014	122295544
VWR	23226-658	Long Stem Thermometer	6/27/2012	Biennial	6/27/2014	122363923
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886414
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886441
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859323
VWR	36934-158	Wall-Mounted Thermometer	9/30/2011	Biennial	9/30/2013	111859332

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 64 of 69

15 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.1	11.7
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.2	23.5
									299

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 65 of 69

Applicable for frequencies up to 6 GHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)							RSS	12.4	12.0
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.7	24.0

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 66 of 69

16 CONCLUSION

16.1 Measurement Conclusion

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

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

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 67 of 69

17 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] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.
- [6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.
- [7] 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.
- [8] 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.
- [9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. -124.
- [10] 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.
- [11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [12] 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.
- [13] 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.
- [14] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [15] 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.
- [16] W. Gander, Computermathematik, Birkhaeuser, Basel, 1992.
- [17] 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.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 68 of 69

- [18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.
- [19] 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.
- [20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.
- [22] 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.
- [23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.
- [24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009
- [25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002
- [26] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07
- [27] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227 D01v01r02
- [28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D02-D04
- [29] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04
- [30] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02
- [31] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02
- [32] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [33] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1307261454.A3L	Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset		Page 69 of 69

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.927 \text{ S/m}$; $\epsilon_r = 42.005$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 07-31-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: GSM 850, Left Head, Cheek, Mid.ch, Wireless Charging Cover

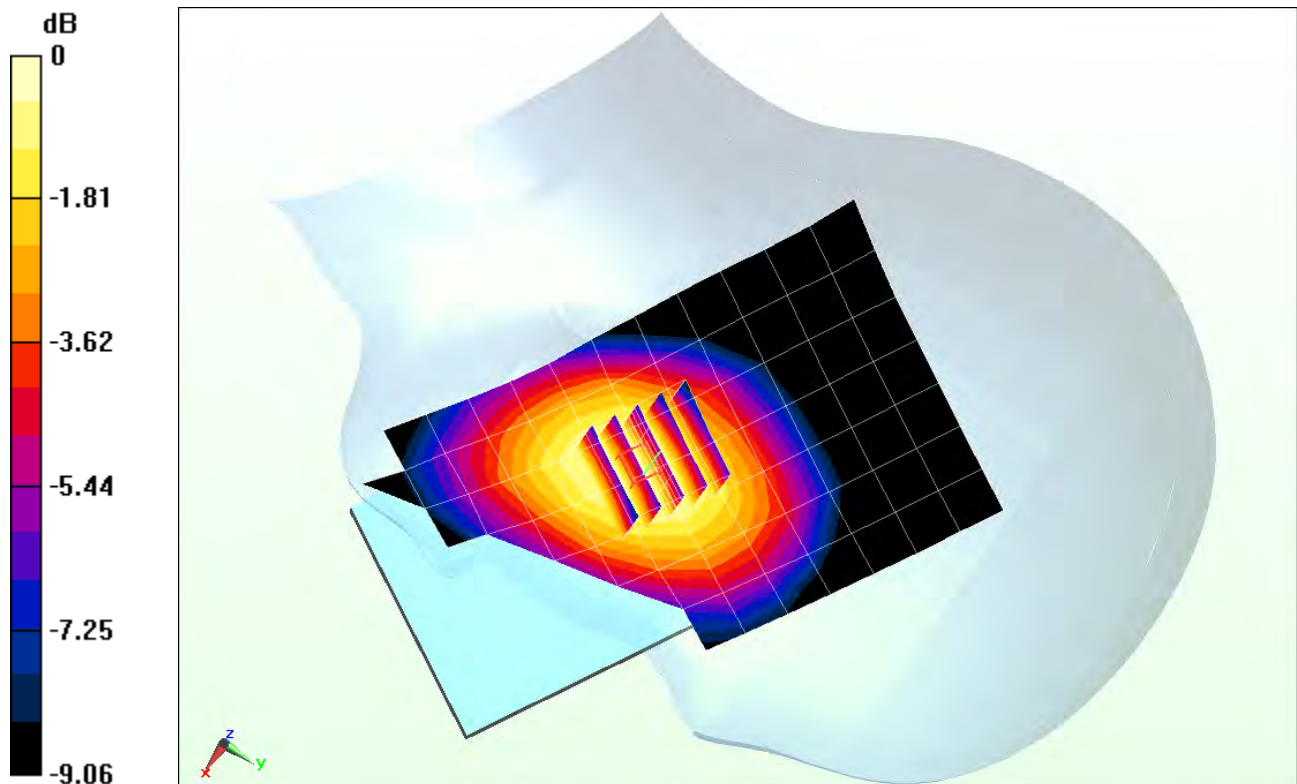
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 15.372 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.251 W/kg

SAR(1 g) = 0.201 W/kg



0 dB = 0.210 W/kg = -6.78 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Head; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.412 \text{ S/m}$; $\epsilon_r = 38.758$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 07-29-2013; Ambient Temp: 23.3°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.28, 5.28, 5.28); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

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

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

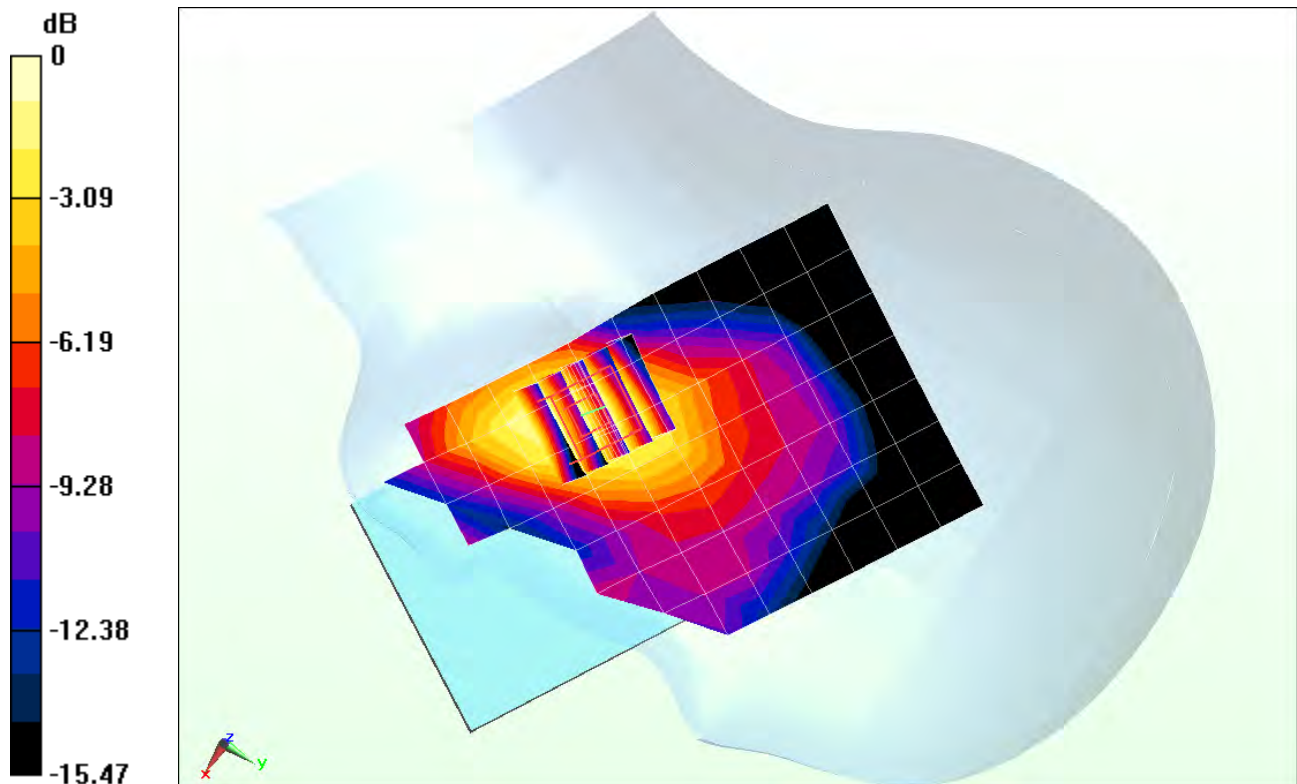
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 10.757 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.258 W/kg

SAR(1 g) = 0.171 W/kg



0 dB = 0.186 W/kg = -7.30 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.927 \text{ S/m}$; $\epsilon_r = 42.005$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 07-31-2013; Ambient Temp: 24.6°C; Tissue Temp: 23.2°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: UMTS 850, Left Head, Cheek, Mid.ch, Wireless Charging Cover

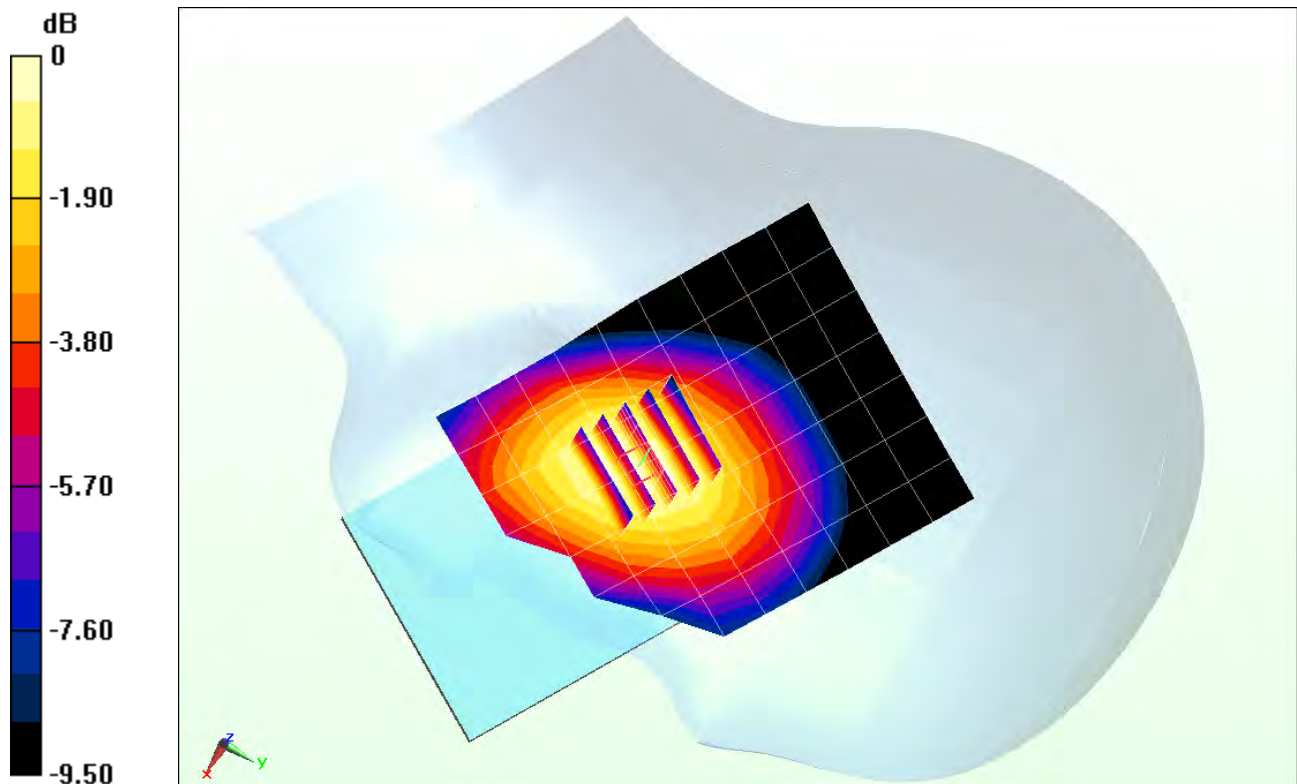
Area Scan (8x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 13.005 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.204 W/kg

SAR(1 g) = 0.162 W/kg



0 dB = 0.171 W/kg = -7.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D65

Communication System: UMTS; Frequency: 1732.4 MHz; Duty Cycle: 1:1

Medium: 1750 Head; Medium parameters used (interpolated):

$f = 1732.4 \text{ MHz}$; $\sigma = 1.315 \text{ S/m}$; $\epsilon_r = 39.498$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3209; ConvF(5.39, 5.39, 5.39); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

Mode: AWS UMTS, Left Head, Cheek, Mid.ch, Wireless Charging Cover

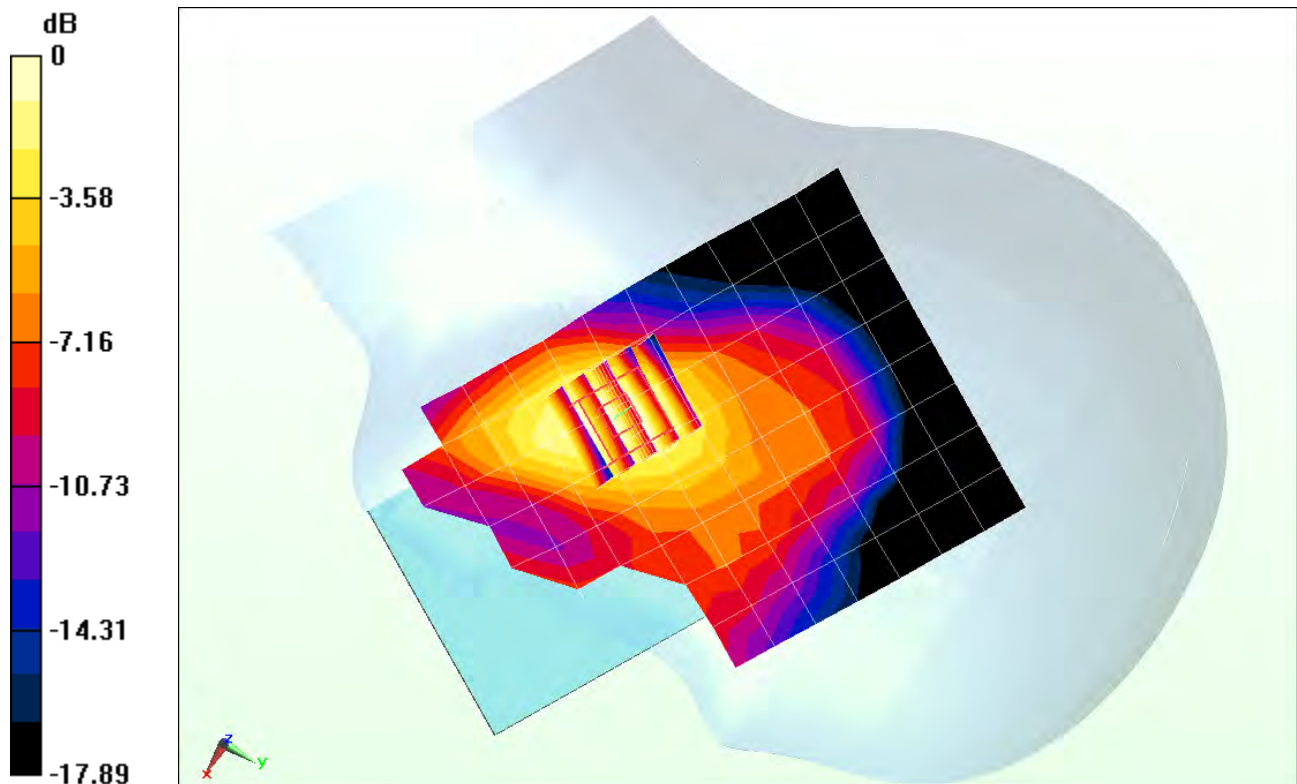
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 15.554 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.438 W/kg

SAR(1 g) = 0.299 W/kg



0 dB = 0.324 W/kg = -4.89 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: UMTS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.412 \text{ S/m}$; $\epsilon_r = 38.758$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 07-29-2013; Ambient Temp: 23.3°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.28, 5.28, 5.28); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

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

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

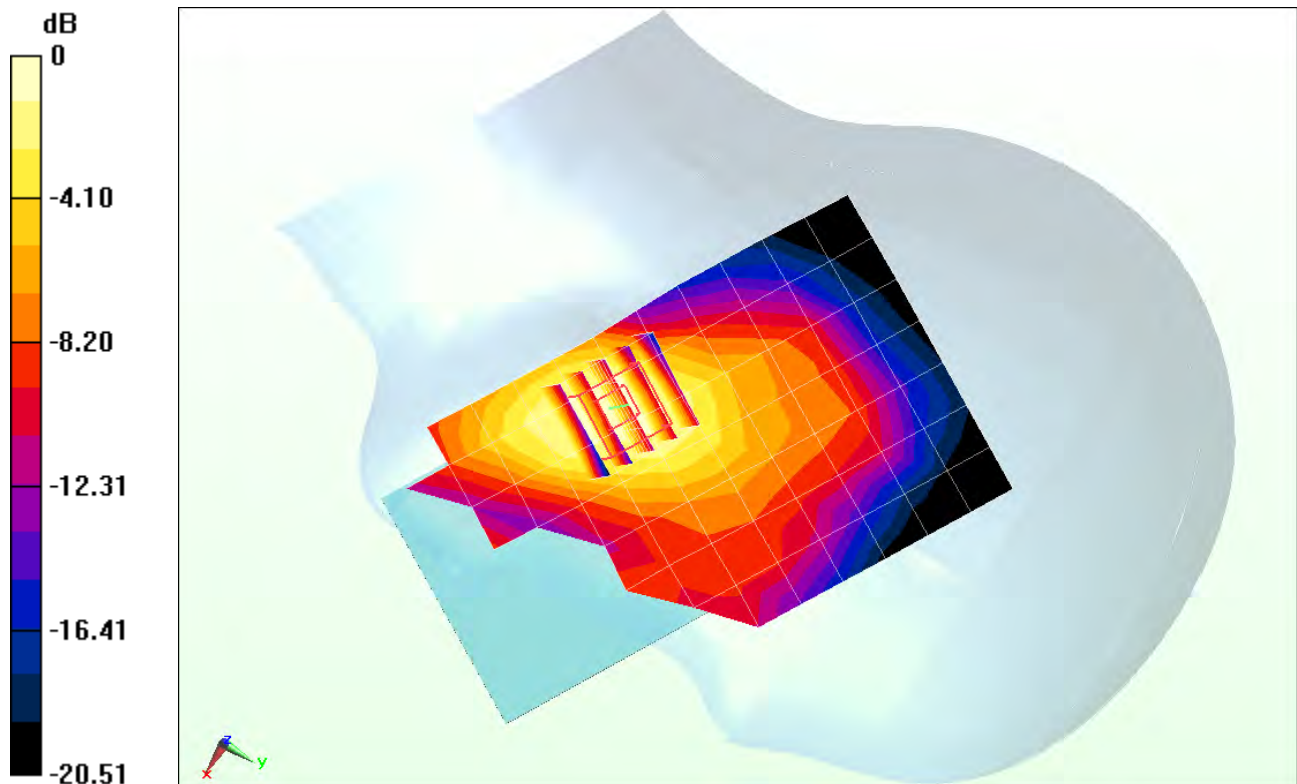
Area Scan (8x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 13.629 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.405 W/kg

SAR(1 g) = 0.267 W/kg



0 dB = 0.289 W/kg = -5.39 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1

Medium: 750 Head; Medium parameters used:

$$f = 710 \text{ MHz}; \sigma = 0.862 \text{ S/m}; \epsilon_r = 40.72; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Left Section

Test Date: 08-12-2013; Ambient Temp: 23.1°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3288; ConvF(6.67, 6.67, 6.67); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 17, Left Head, Cheek, Mid.ch, 10 MHz Bandwidth,
QPSK, 1 RB, 49 RB Offset, Wireless Charging Cover**

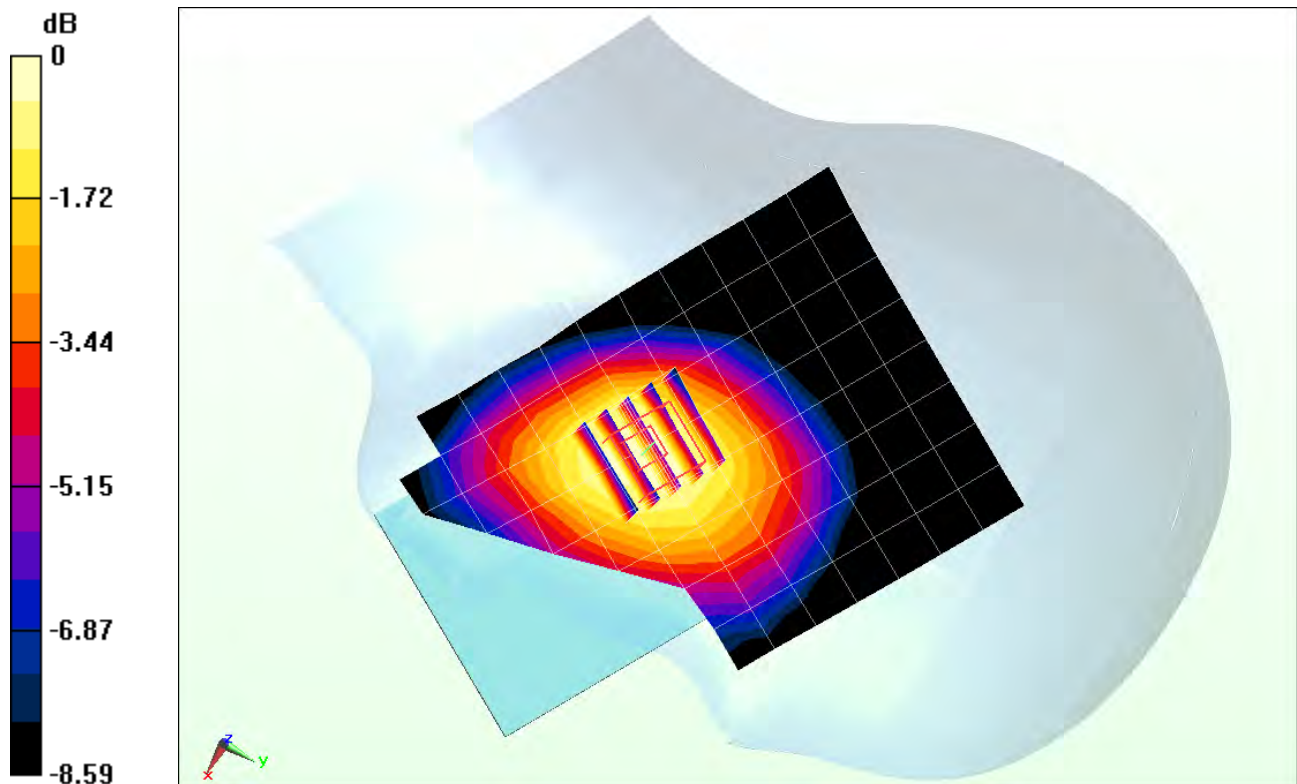
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 11.011 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.115 W/kg

SAR(1 g) = 0.091 W/kg



0 dB = 0.0952 W/kg = -10.21 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE Band 5 (Cell.); Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$; $\sigma = 0.94 \text{ S/m}$; $\epsilon_r = 42.599$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-08-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

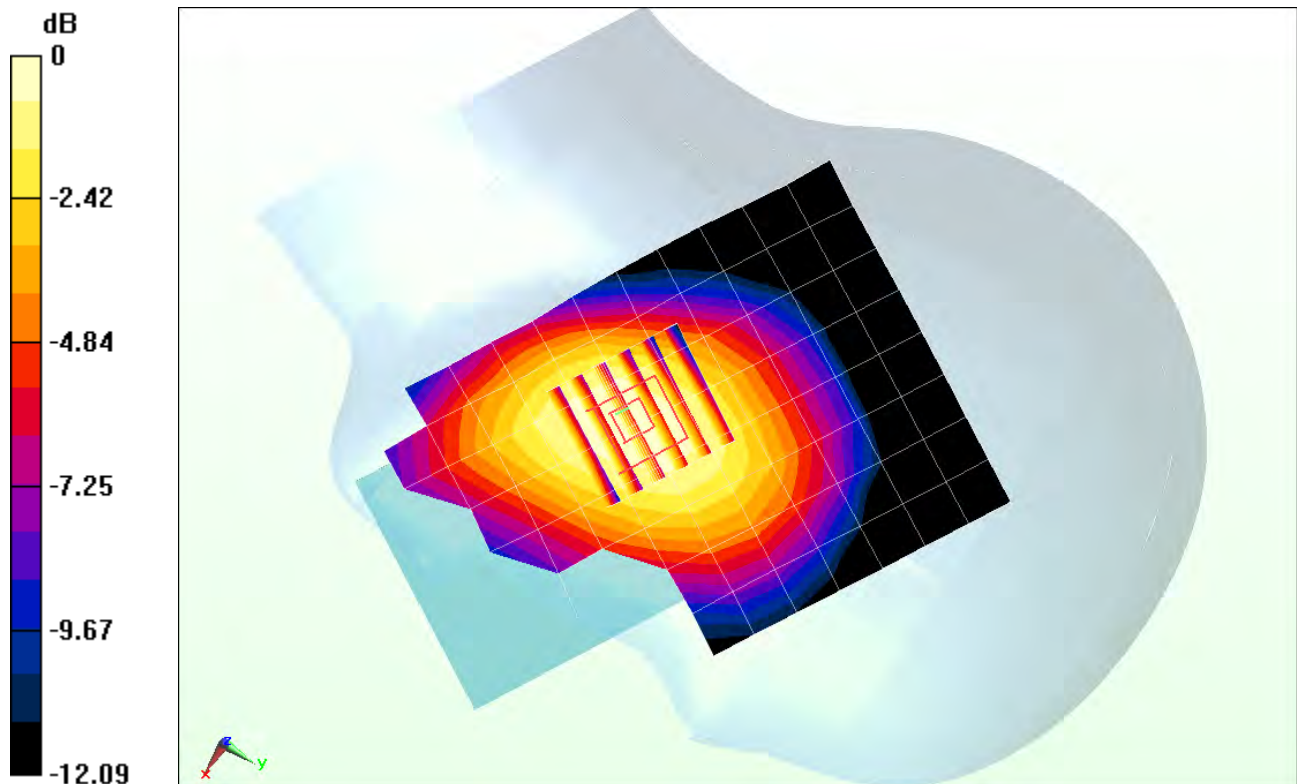
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 13.200 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.179 W/kg

SAR(1 g) = 0.141 W/kg



0 dB = 0.146 W/kg = -8.36 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE Band 4 (AWS); Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Head; Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.315 \text{ S/m}$; $\epsilon_r = 39.498$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3209; ConvF(5.39, 5.39, 5.39); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

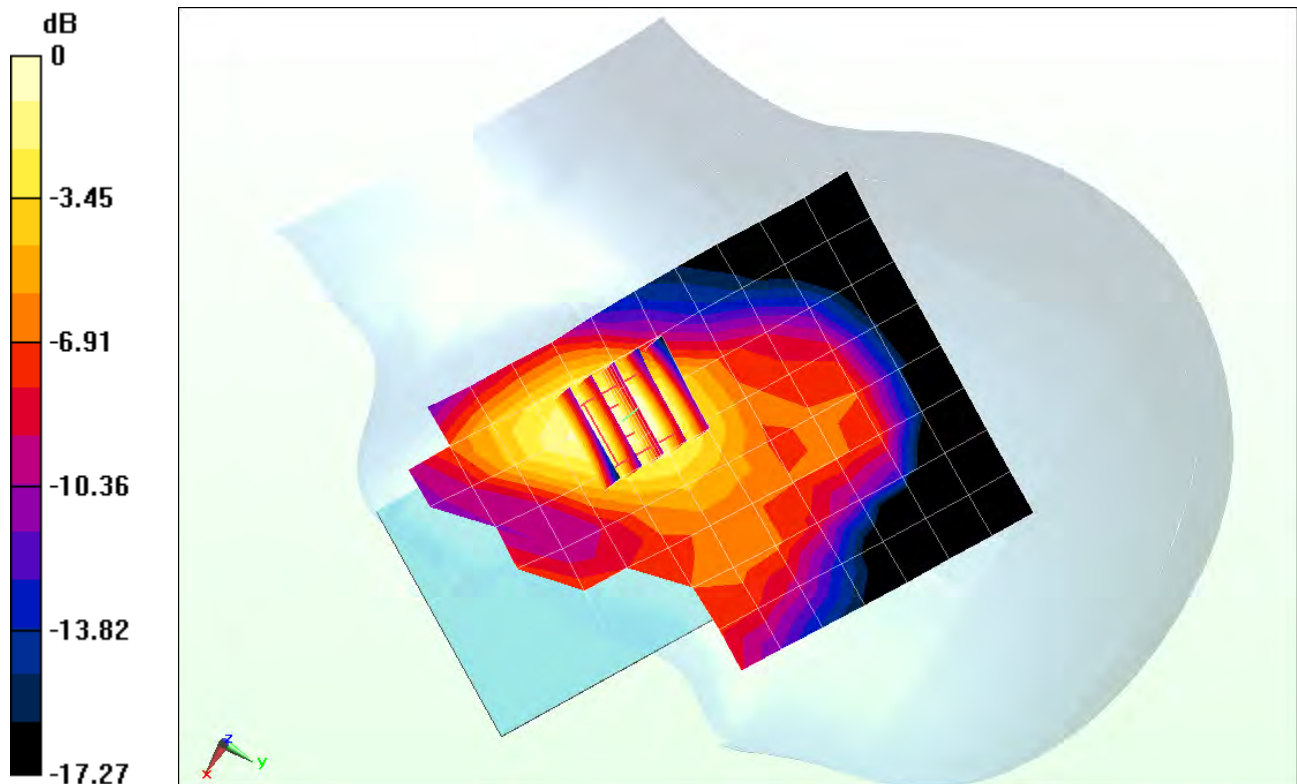
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 16.635 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.435 W/kg

SAR(1 g) = 0.296 W/kg



0 dB = 0.320 W/kg = -4.95 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

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

Medium: 1900 Head; Medium parameters used:

$$f = 1880 \text{ MHz}; \sigma = 1.365 \text{ S/m}; \epsilon_r = 39.716; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Left Section

Test Date: 07-31-2013; Ambient Temp: 22.1°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3288; ConvF(5.28, 5.28, 5.28); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

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

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 2 (PCS), Left Head, Cheek, Mid.ch, QPSK,
20 MHz Bandwidth, 1 RB, 0 RB Offset, Standard Cover**

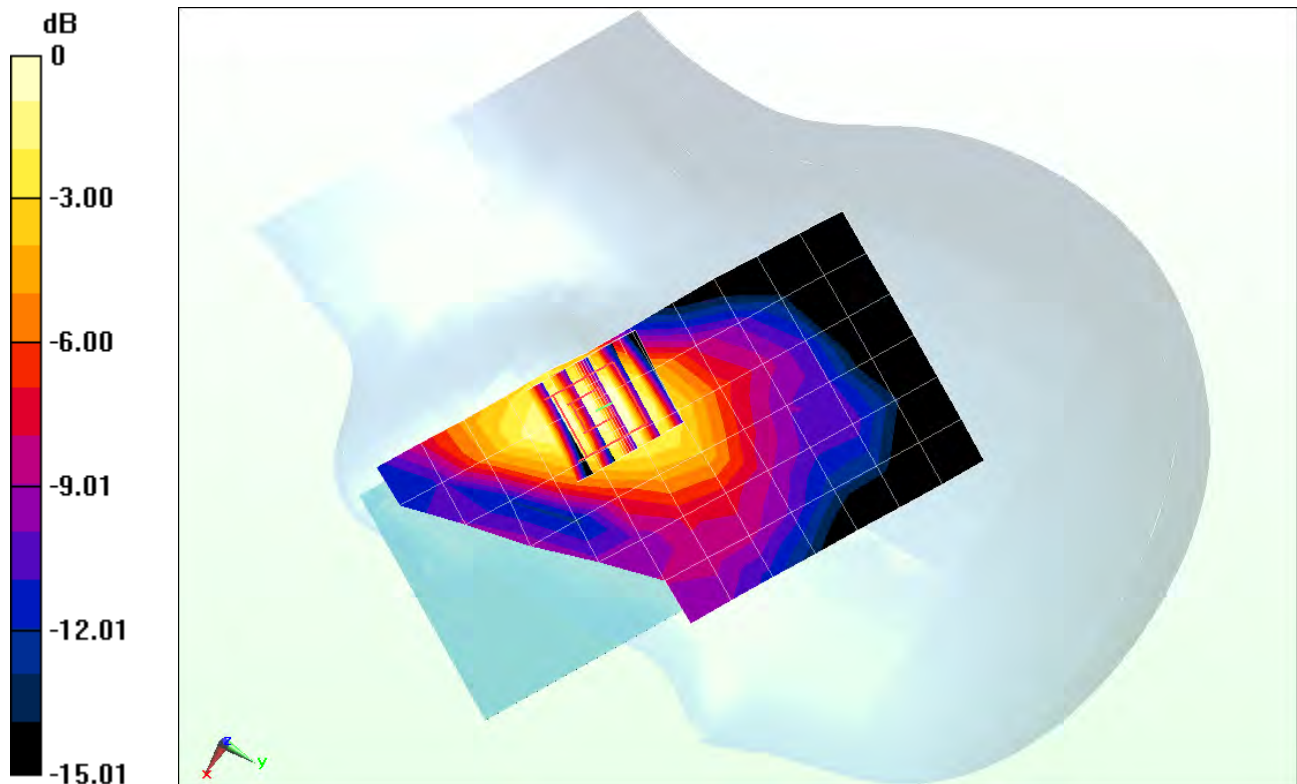
Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.911 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.423 W/kg

SAR(1 g) = 0.280 W/kg



0 dB = 0.302 W/kg = -5.20 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

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

Medium: 2450 Head; Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.837 \text{ S/m}$; $\epsilon_r = 39.16$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

Test Date: 07-31-2013; Ambient Temp: 23.5°C; Tissue Temp: 23.4°C

Probe: ES3DV2 - SN3022; ConvF(4.23, 4.23, 4.23); Calibrated: 8/28/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/24/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11b, Left Head, Cheek, Ch 06, 1 Mbps, Standard Cover

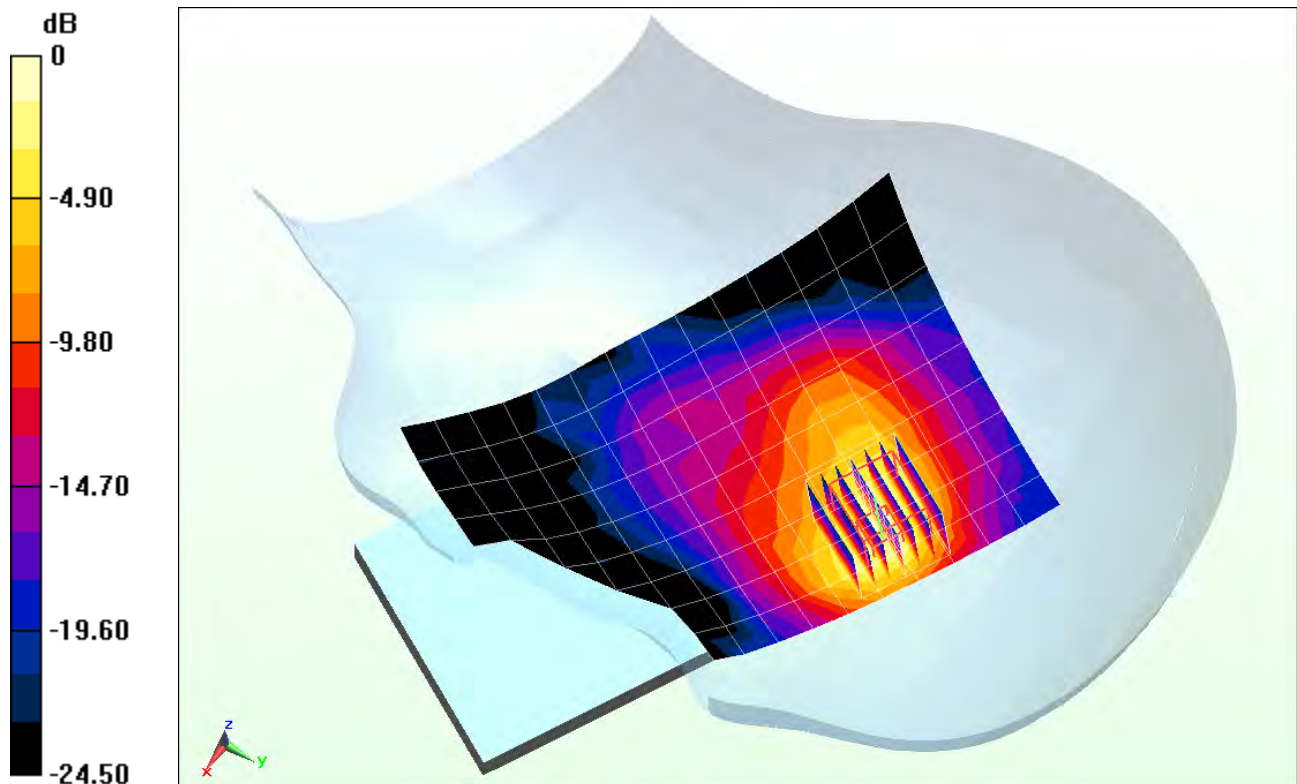
Area Scan (10x15x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Reference Value = 11.682 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.583 W/kg

SAR(1 g) = 0.236 W/kg



0 dB = 0.325 W/kg = -4.88 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5745 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head; Medium parameters used:

$$f = 5745 \text{ MHz}; \sigma = 5.318 \text{ S/m}; \epsilon_r = 33.825; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Left Section

Test Date: 07-29-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(3.85, 3.85, 3.85); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.8 GHz Left Head, Cheek, Ch 149, 6 Mbps, Standard Cover

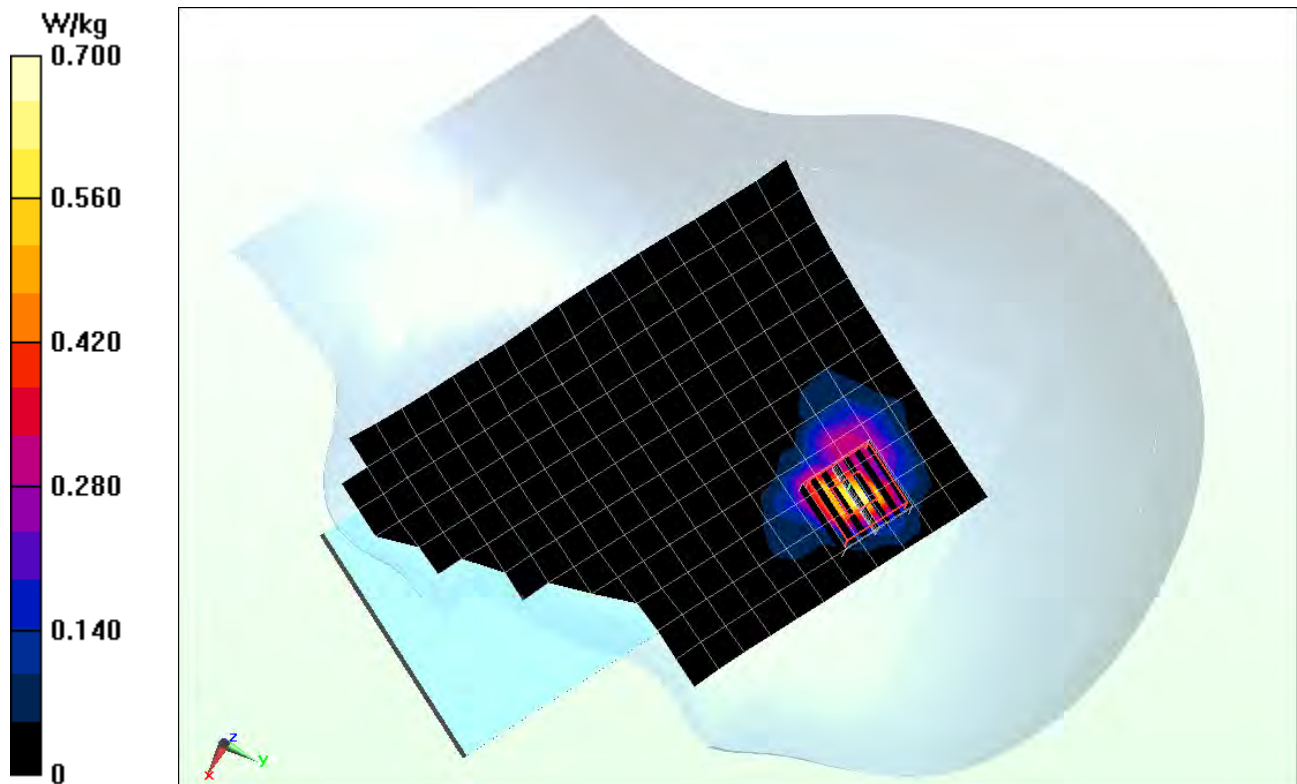
Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 8.766 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.68 W/kg

SAR(1 g) = 0.383 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5520 MHz; Duty Cycle: 1:1
Medium: 5 GHz Head; Medium parameters used:

$$f = 5520 \text{ MHz}; \sigma = 5.101 \text{ S/m}; \epsilon_r = 34.266; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Left Section

Test Date: 07-29-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(4.14, 4.14, 4.14); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.5 GHz Left Head, Cheek, Ch 104, 6 Mbps, Standard Cover

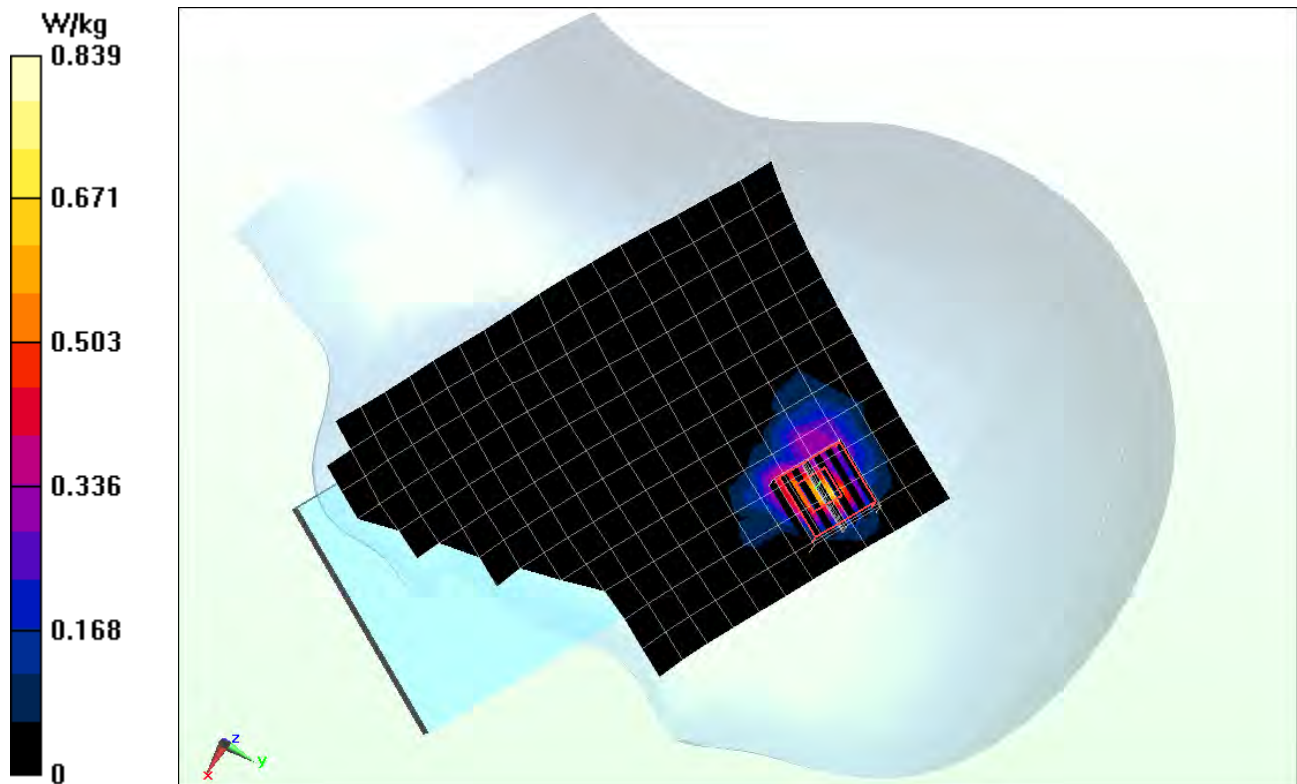
Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 8.366 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.337 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: GSM; Frequency: 836.6 MHz; Duty Cycle: 1:8.3

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.999 \text{ S/m}$; $\epsilon_r = 53.779$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 24.1°C; Tissue Temp: 23.6°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

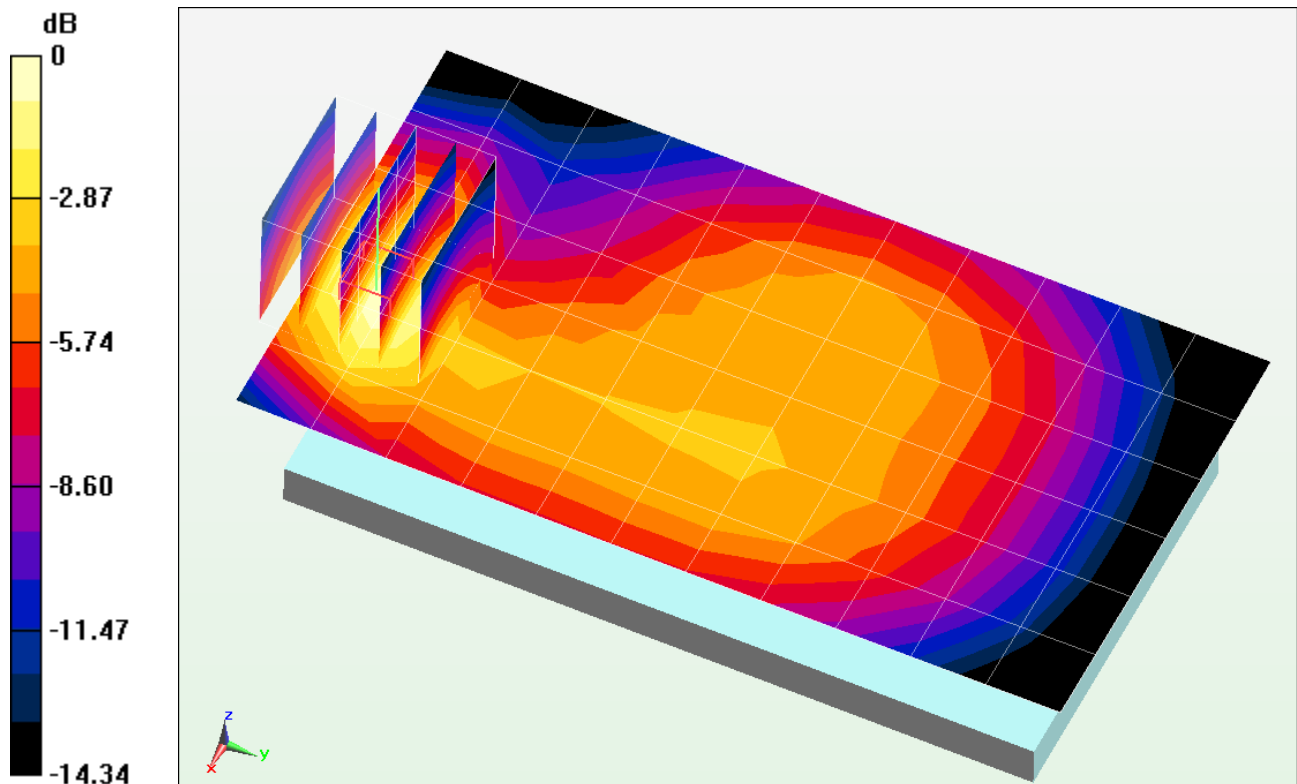
Area Scan (7x12x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 16.658 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.398 W/kg

SAR(1 g) = 0.250 W/kg



0 dB = 0.278 W/kg = -5.56 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: GSM GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium: 835 Body; Medium parameters used (interpolated):

$$f = 836.6 \text{ MHz}; \sigma = 0.999 \text{ S/m}; \epsilon_r = 54.477; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2013; Ambient Temp: 24.9°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

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

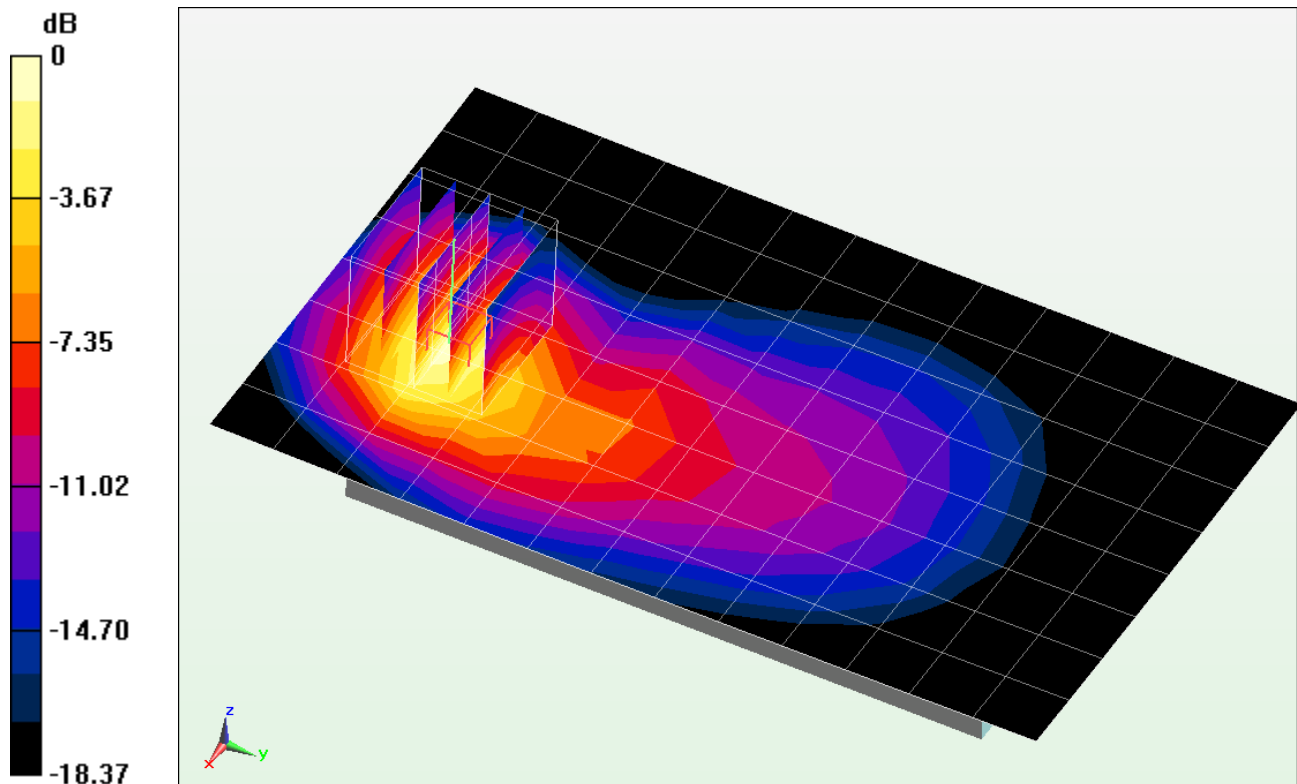
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 21.332 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.779 W/kg

SAR(1 g) = 0.427 W/kg



0 dB = 0.475 W/kg = -3.23 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.3

Medium: 1900 Body; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.48 \text{ S/m}$; $\epsilon_r = 52.442$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(7.38, 7.38, 7.38); Calibrated: 2/27/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/6/2013

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

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

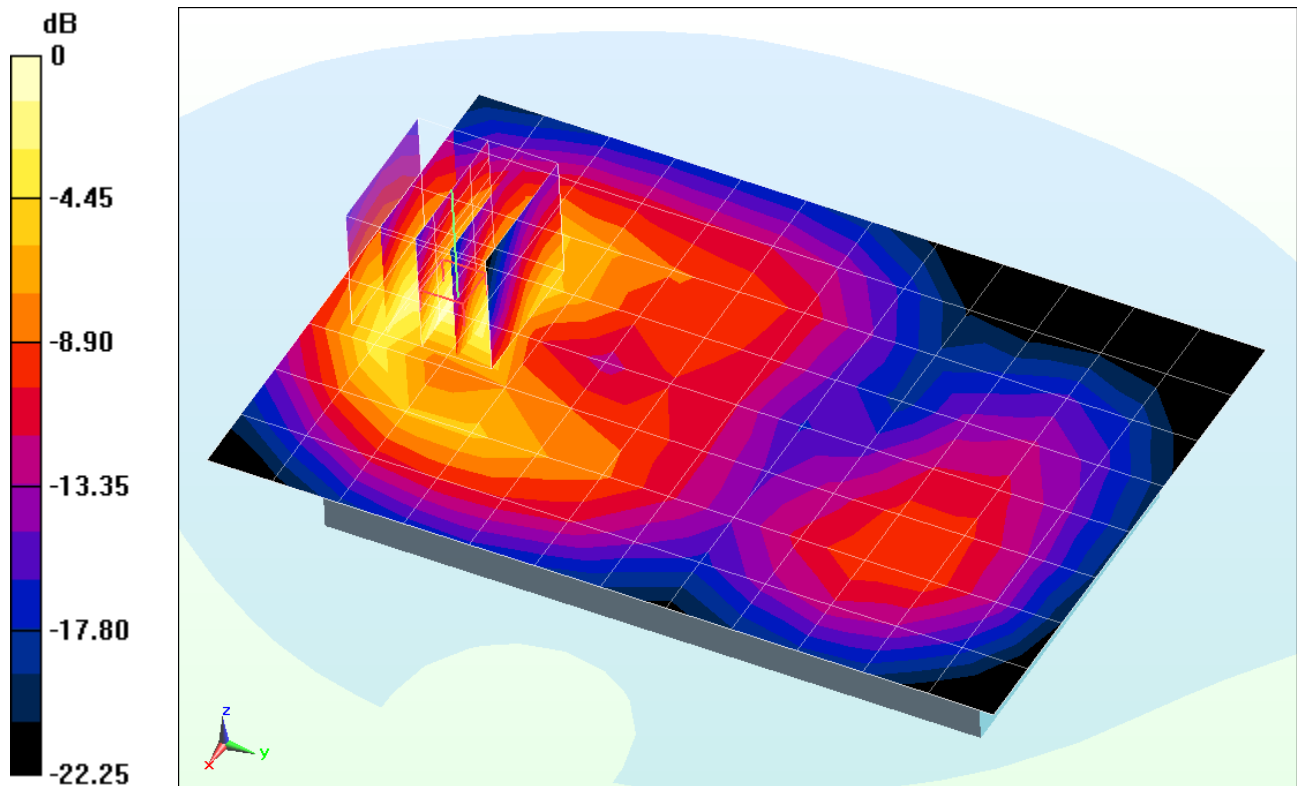
Area Scan (9x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 20.580 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.30 W/kg

SAR(1 g) = 0.744 W/kg



0 dB = 0.824 W/kg = -0.84 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: GSM GPRS; 4 Tx slots; Frequency: 1850.2 MHz; Duty Cycle: 1:2.076

Medium: 1900 Body; Medium parameters used:

$f = 1850.2 \text{ MHz}$; $\sigma = 1.452 \text{ S/m}$; $\epsilon_r = 52.567$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(7.38, 7.38, 7.38); Calibrated: 2/27/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/6/2013

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

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Mode: GPRS 1900, Body SAR, Back side, Low.ch, 4 Tx Slots, Standard Cover

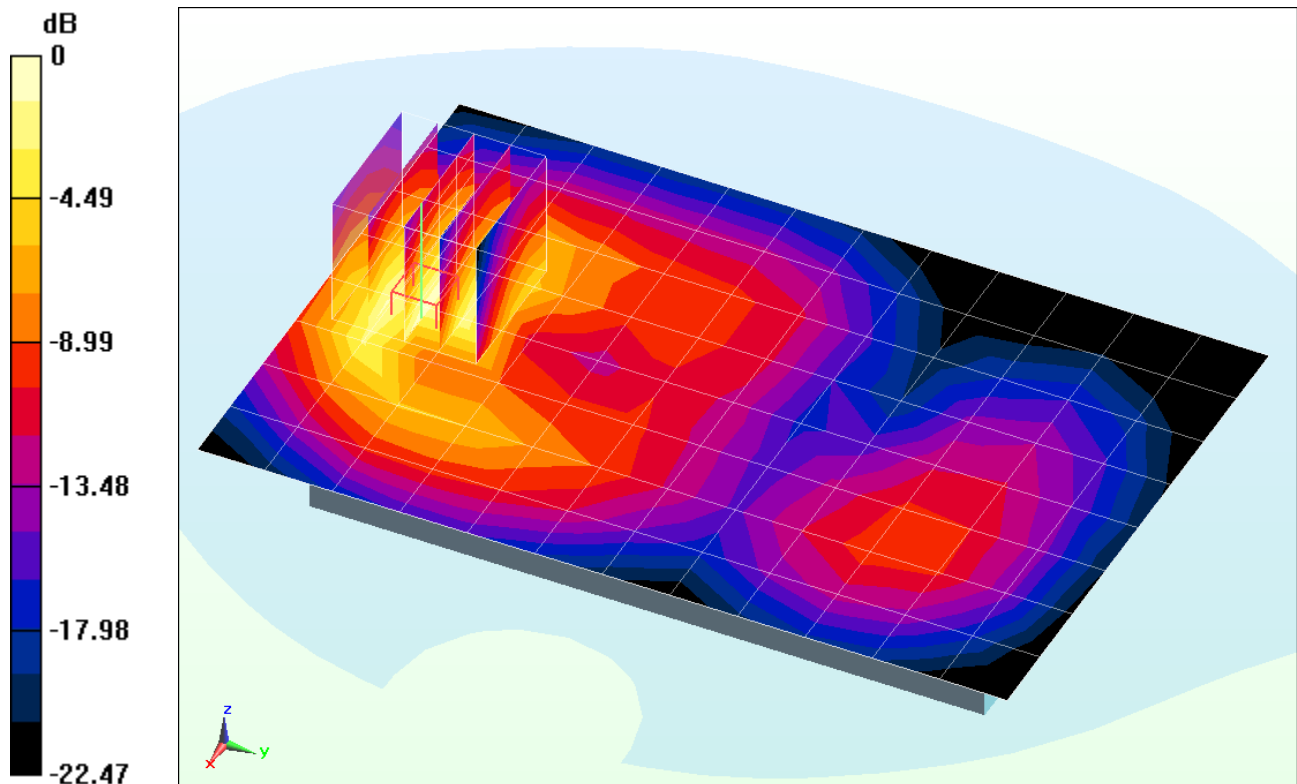
Area Scan (9x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 23.791 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.84 W/kg

SAR(1 g) = 1.07 W/kg



0 dB = 1.15 W/kg = 0.61 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D55

Communication System: UMTS; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.999 \text{ S/m}$; $\epsilon_r = 54.477$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2013; Ambient Temp: 24.9°C; Tissue Temp: 22.7°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

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

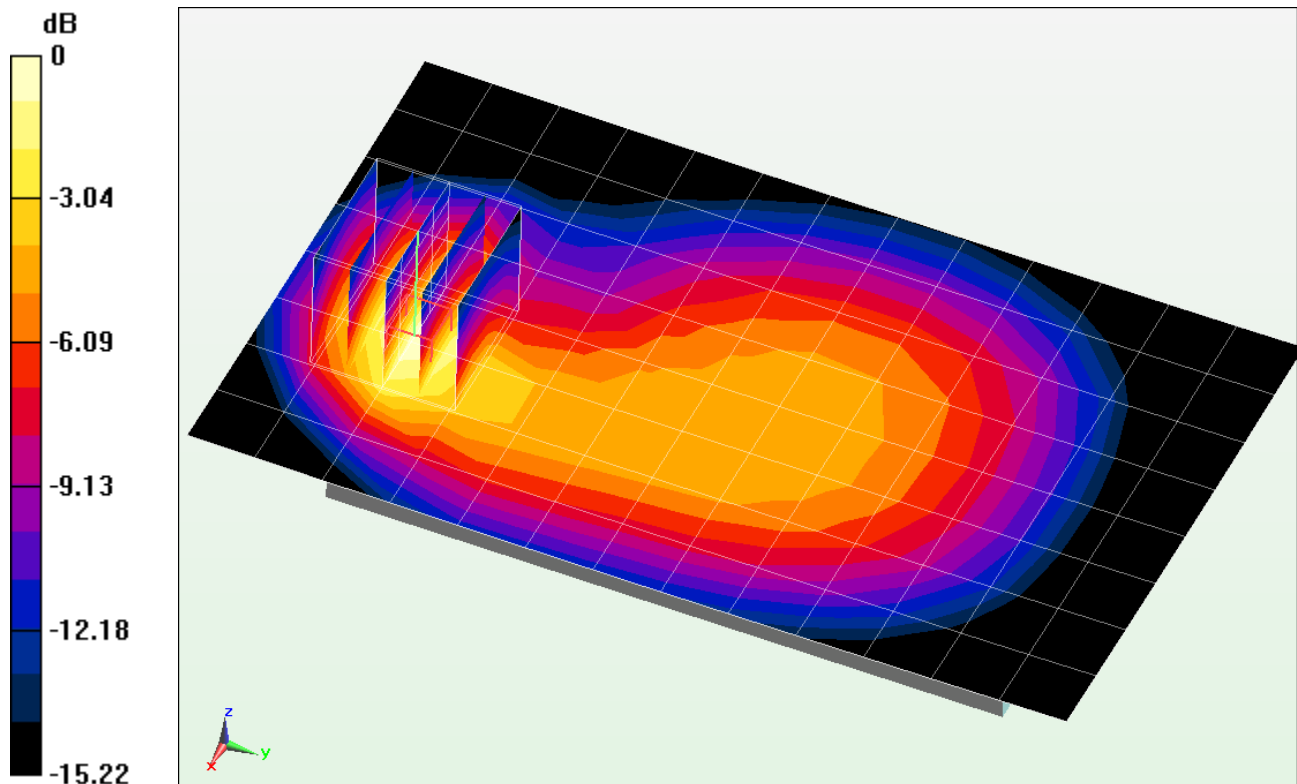
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 21.015 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.632 W/kg

SAR(1 g) = 0.381 W/kg



0 dB = 0.426 W/kg = -3.71 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D56

Communication System: AWS UMTS; Frequency: 1752.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used (interpolated):

$f = 1752.5 \text{ MHz}$; $\sigma = 1.518 \text{ S/m}$; $\epsilon_r = 50.865$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3287; ConvF(4.86, 4.86, 4.86); Calibrated: 11/15/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/13/2012

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: AWS UMTS, Body SAR, Back side, High.ch, Standard Cover

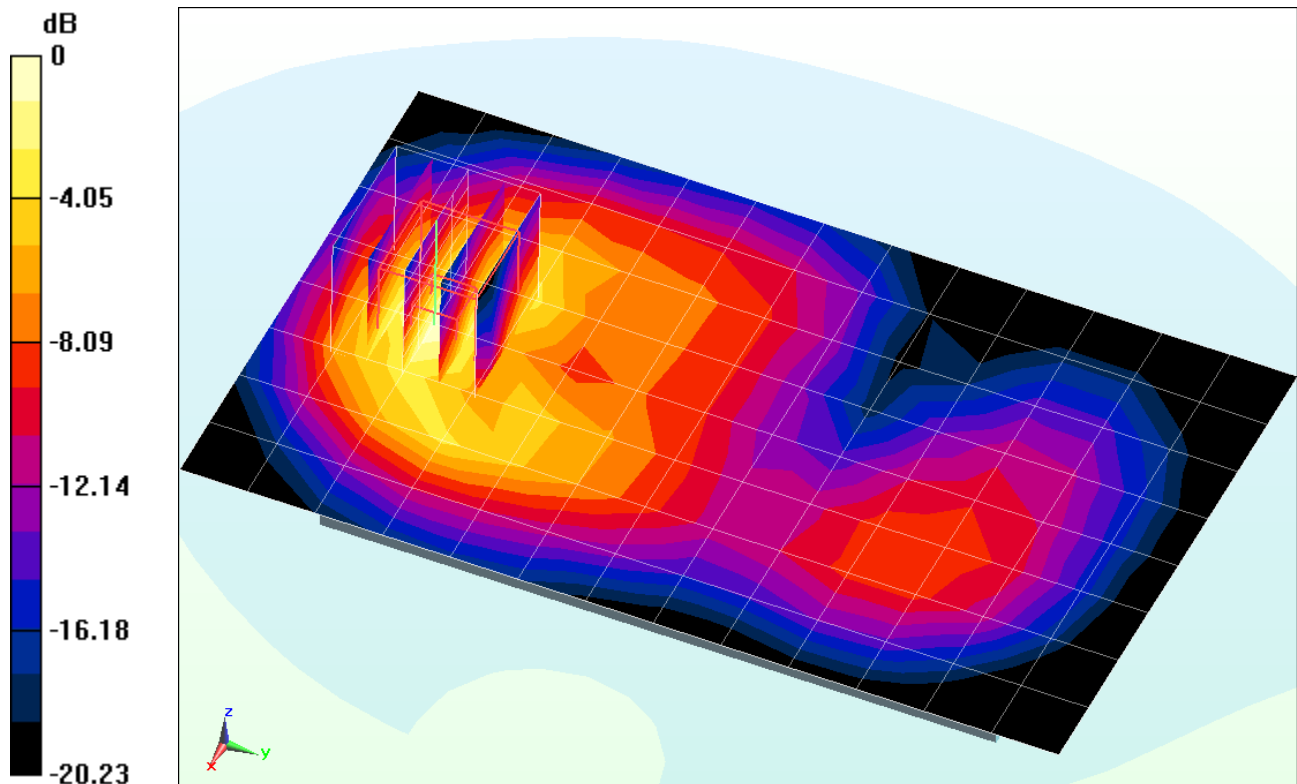
Area Scan (9x14x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

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

Reference Value = 27.674 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.81 W/kg

SAR(1 g) = 1.03 W/kg



0 dB = 1.14 W/kg = 0.57 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D6D

Communication System: UMTS; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used: (interpolated):

$f = 1852.4 \text{ MHz}$; $\sigma = 1.454 \text{ S/m}$; $\epsilon_r = 52.558$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(7.38, 7.38, 7.38); Calibrated: 2/27/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/6/2013

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

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

Mode: UMTS 1900, Body SAR, Back side, Low.ch, Standard Cover

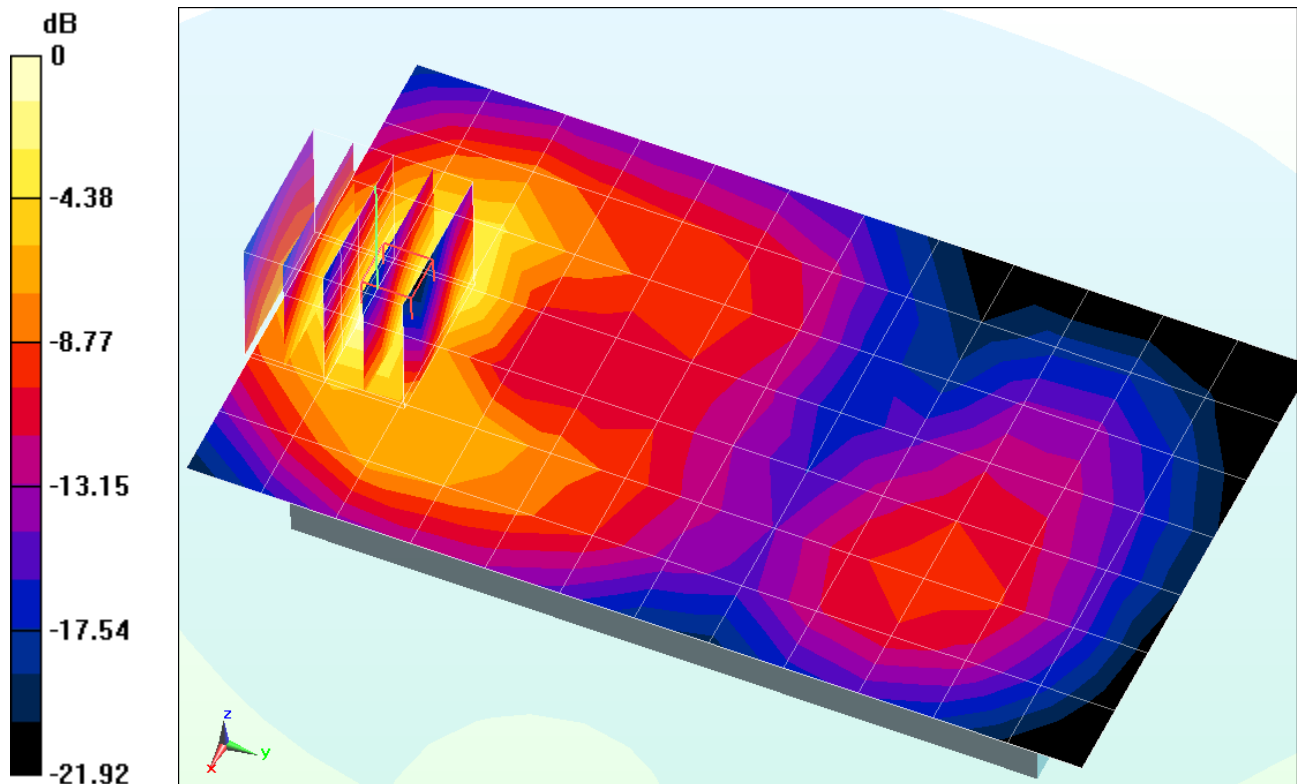
Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 25.486 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 1.02 W/kg



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE Band 17; Frequency: 710 MHz; Duty Cycle: 1:1

Medium: 750 Body; Medium parameters used:

$f = 710 \text{ MHz}$; $\sigma = 0.953 \text{ S/m}$; $\epsilon_r = 55.562$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-07-2013; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3288; ConvF(6.44, 6.44, 6.44); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

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

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 17, Body SAR, Back side, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 49 RB Offset, Standard Cover**

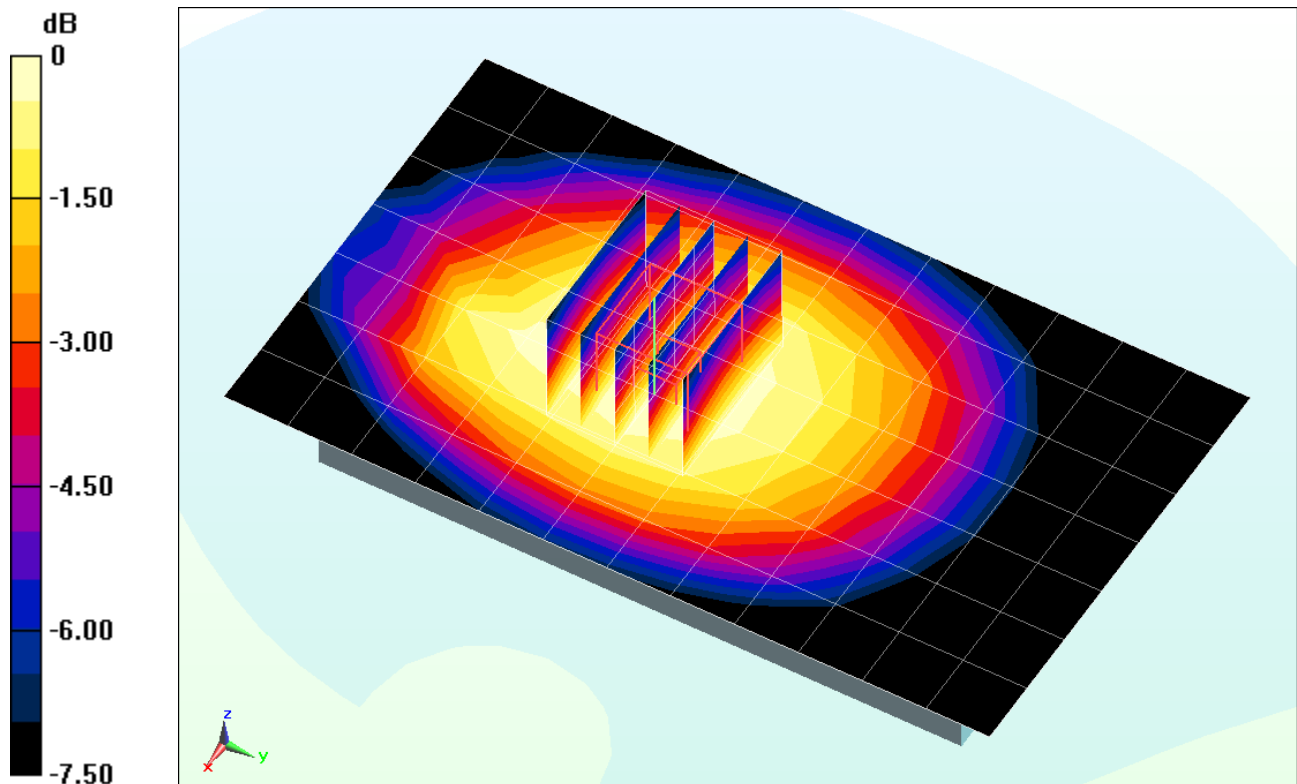
Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 17.658 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.341 W/kg

SAR(1 g) = 0.278 W/kg



0 dB = 0.289 W/kg = -5.39 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE Band 5; Frequency: 836.5 MHz; Duty Cycle: 1:1

Medium: 835 Body; Medium parameters used (interpolated):

$f = 836.5 \text{ MHz}$; $\sigma = 1.016 \text{ S/m}$; $\epsilon_r = 54.035$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 5 (Cell.), Body SAR, Back side, Mid.ch, QPSK,
10 MHz Bandwidth, 1 RB, 49 RB Offset, Standard Cover**

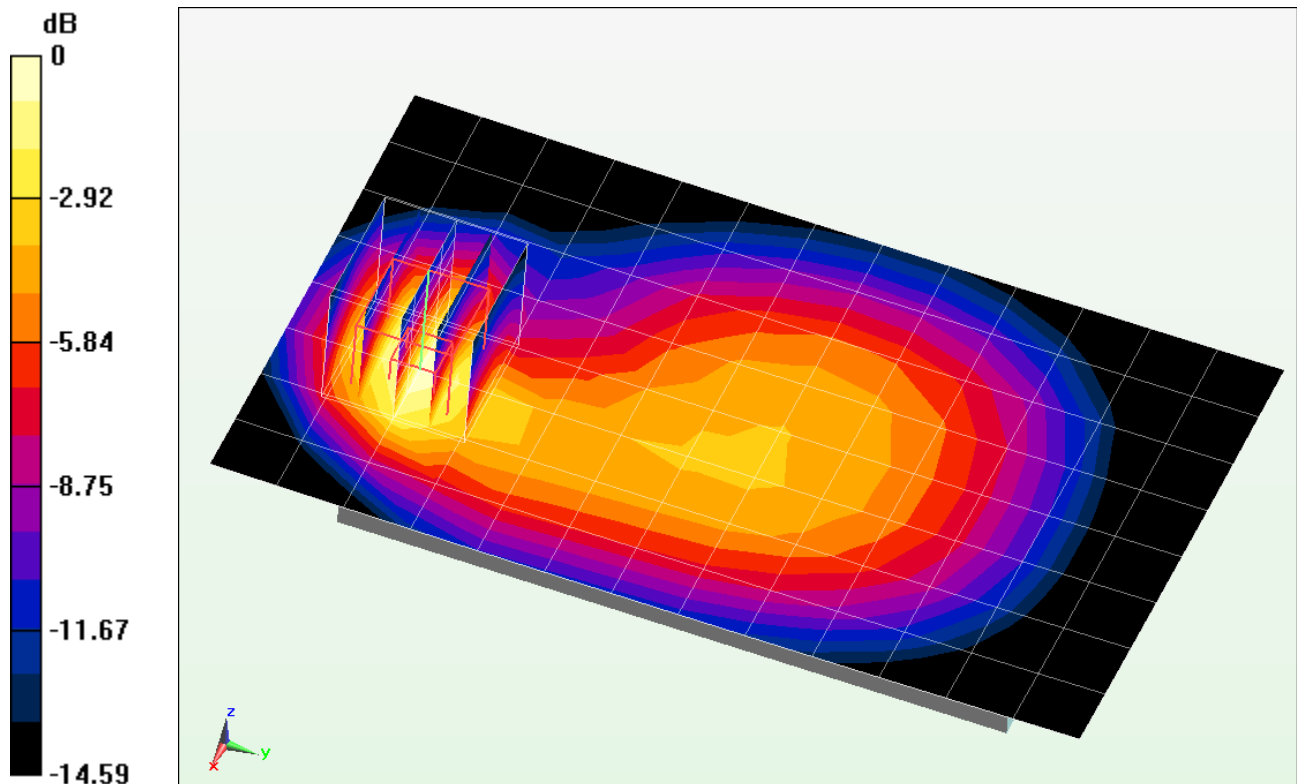
Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 22.644 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.745 W/kg

SAR(1 g) = 0.453 W/kg



0 dB = 0.507 W/kg = -2.95 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE RF; Frequency: 1732.5 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used (interpolated):

$f = 1732.5 \text{ MHz}$; $\sigma = 1.495 \text{ S/m}$; $\epsilon_r = 51.117$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-01-2013; Ambient Temp: 23.2°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3287; ConvF(4.86, 4.86, 4.86); Calibrated: 11/15/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/13/2012

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

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

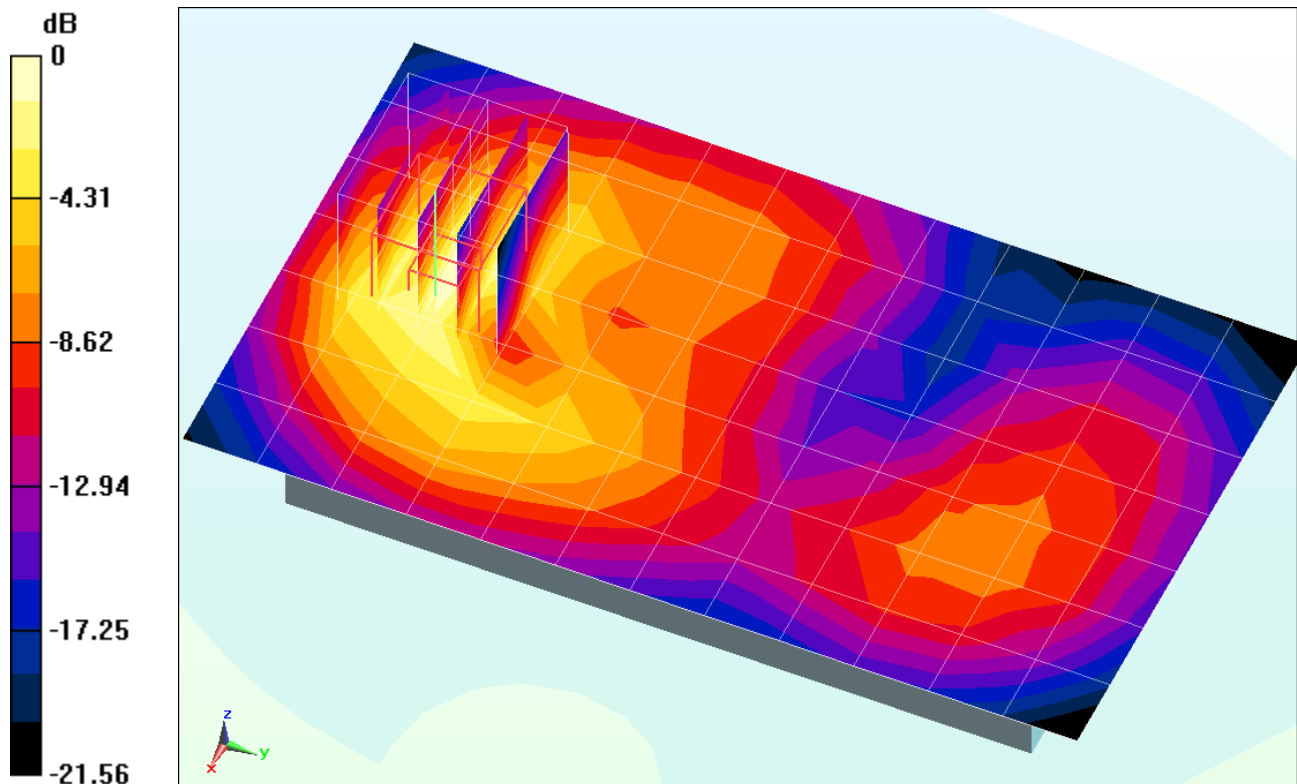
Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 28.204 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 1.86 W/kg

SAR(1 g) = 1.06 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 31D69

Communication System: LTE PCS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.52 \text{ S/m}$; $\epsilon_r = 50.692$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.3°C

Probe: ES3DV3 - SN3287; ConvF(4.69, 4.69, 4.69); Calibrated: 11/15/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/13/2012

Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

**Mode: LTE Band 2 (PCS), Body SAR, Back side, Mid.ch, QPSK,
20 MHz Bandwidth, 1 RB, 0 RB Offset, Standard Cover**

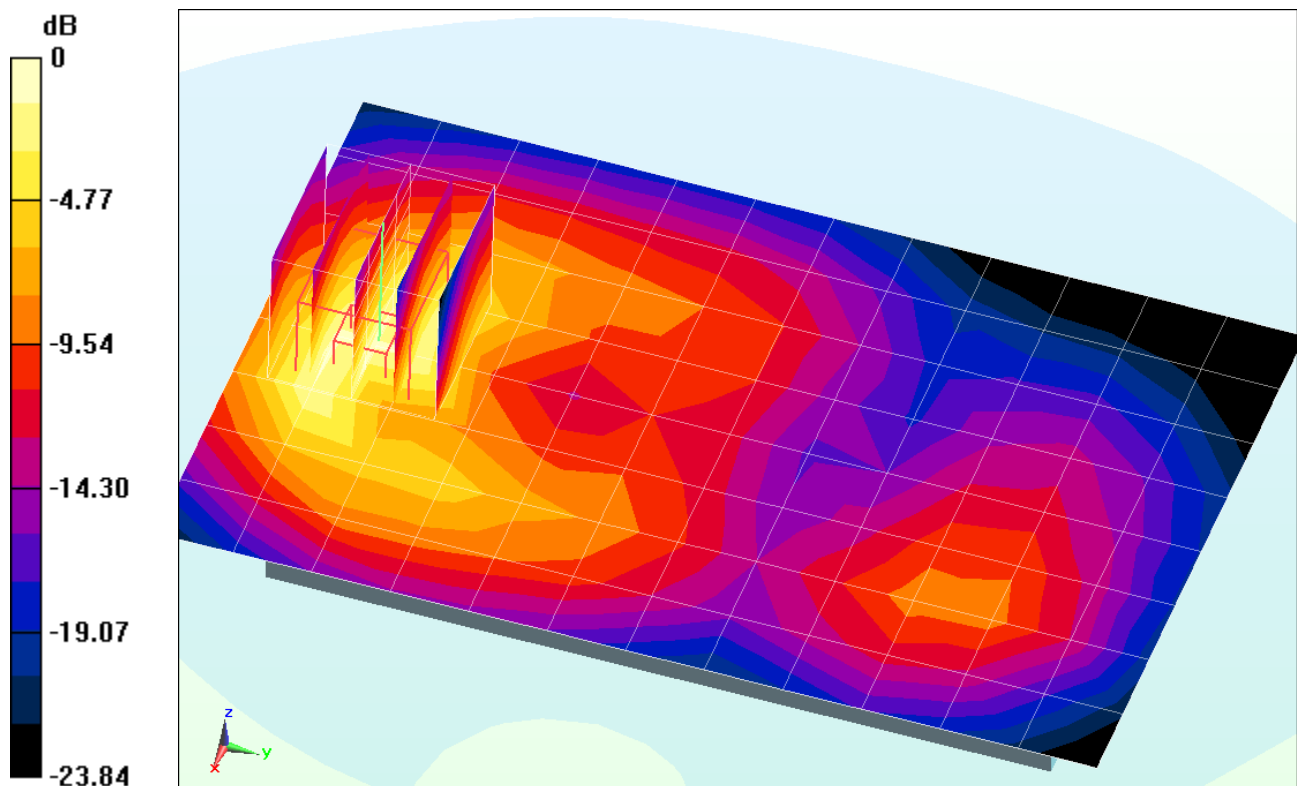
Area Scan (9x13x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 24.367 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.91 W/kg

SAR(1 g) = 1.07 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

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

Medium: 2450 Body; Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 1.965 \text{ S/m}$; $\epsilon_r = 52.04$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-29-2013; Ambient Temp: 23.0°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(3.97, 3.97, 3.97); Calibrated: 8/28/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/24/2012

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Back Side, Standard Cover

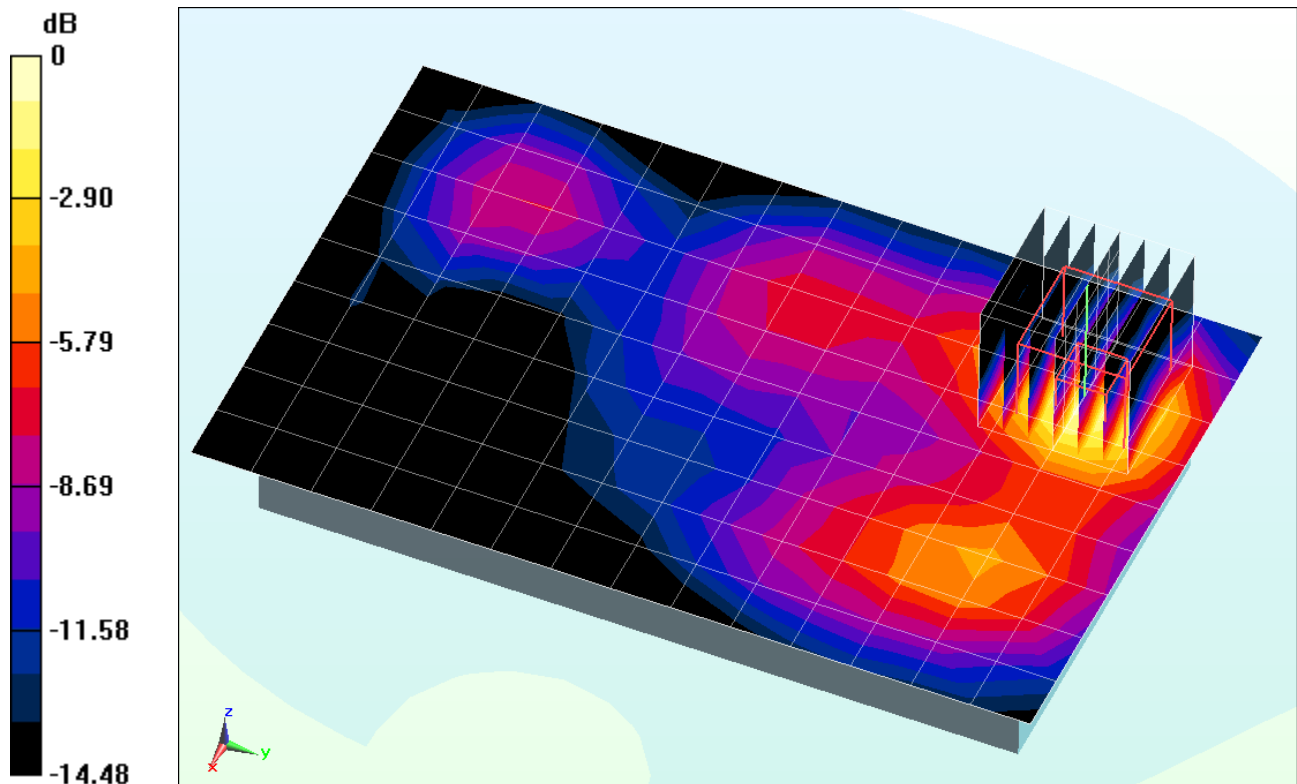
Area Scan (10x15x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Reference Value = 8.419 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.251 W/kg

SAR(1 g) = 0.122 W/kg



0 dB = 0.156 W/kg = -8.07 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:

$$f = 5785 \text{ MHz}; \sigma = 6.122 \text{ S/m}; \epsilon_r = 46.561; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3589; ConvF(3.66, 3.66, 3.66); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 157, 6 Mbps, Back Side, Standard Cover

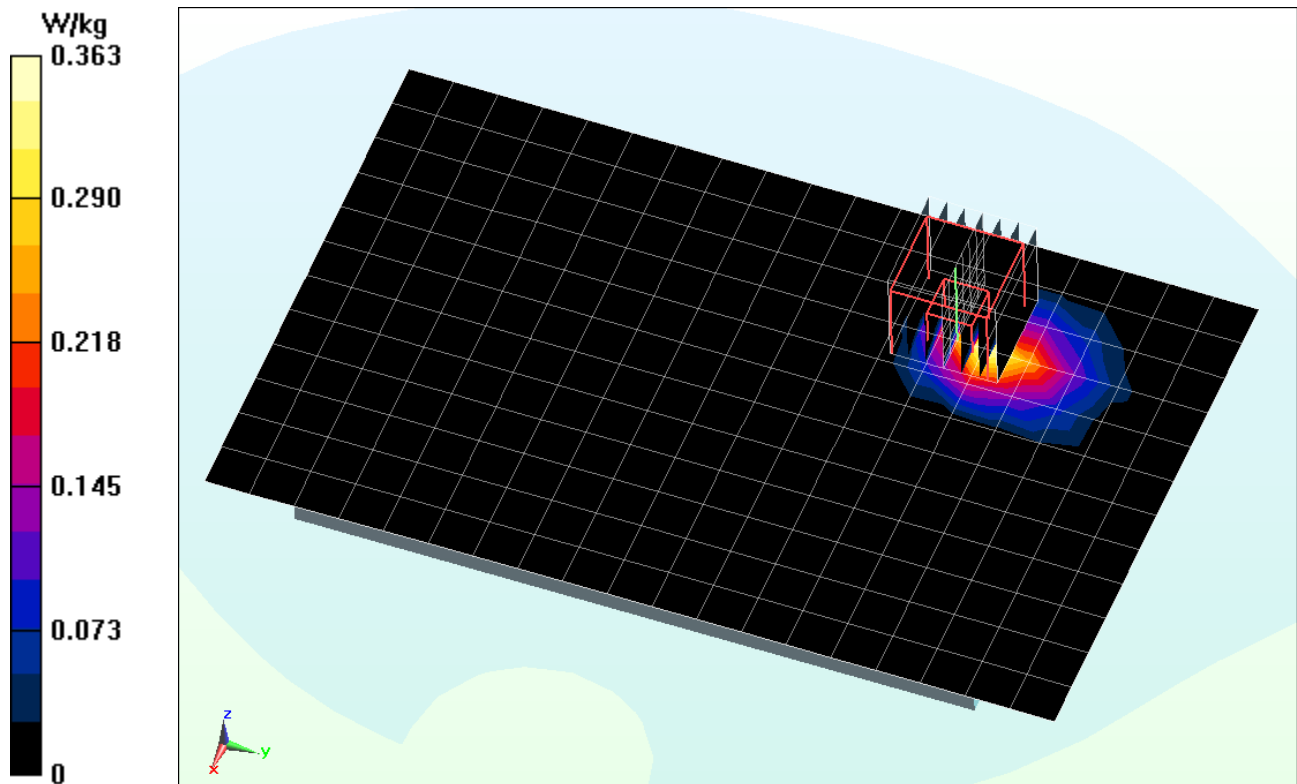
Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 4.410 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.626 W/kg

SAR(1 g) = 0.104 W/kg



PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:

$$f = 5200 \text{ MHz}; \sigma = 5.512 \text{ S/m}; \epsilon_r = 46.801; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(3.99, 3.99, 3.99); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.2 GHz, Body SAR, Ch 40, 6 Mbps, Back Side, Standard Cover

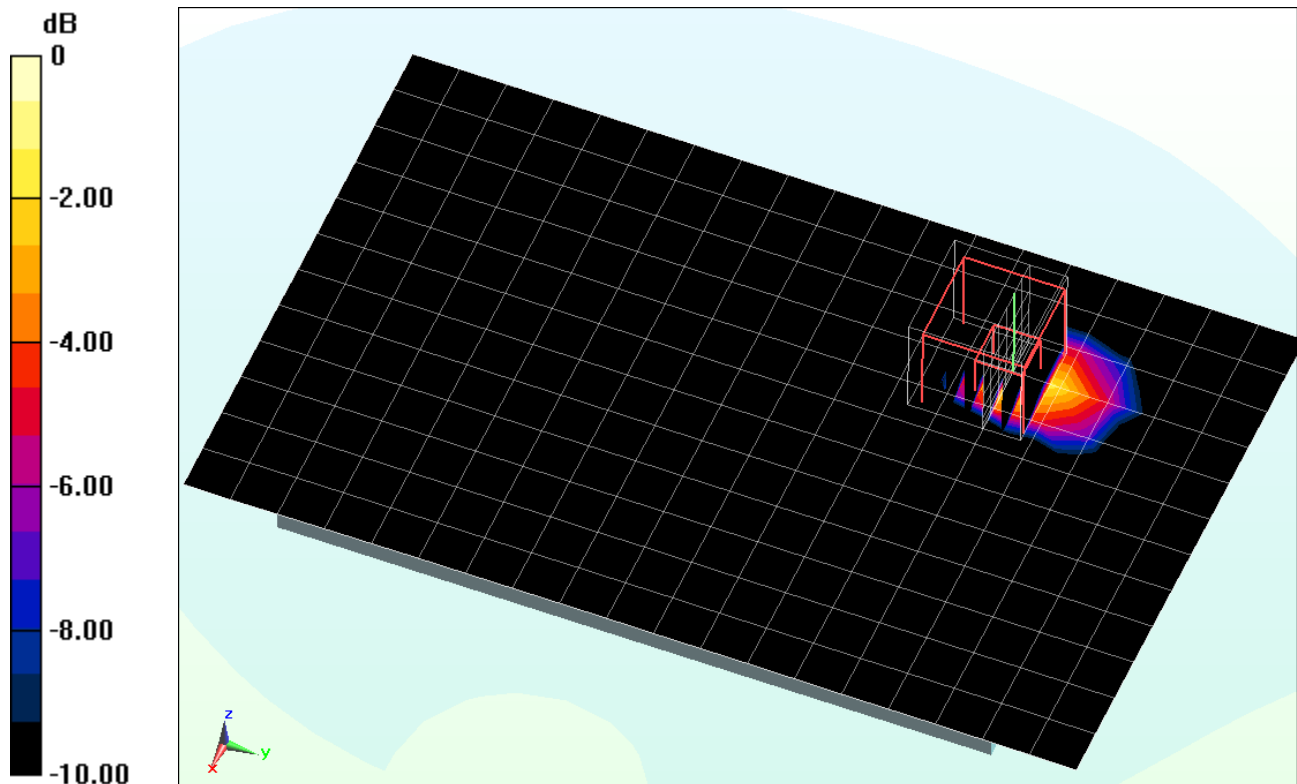
Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm

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

Reference Value = 5.328 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.632 W/kg

SAR(1 g) = 0.140 W/kg



0 dB = 0.403 W/kg = -3.95 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LSMN900W8; Type: Portable Handset; Serial: 0209C

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium: 5 GHz Body; Medium parameters used:

$$f = 5200 \text{ MHz}; \sigma = 5.512 \text{ S/m}; \epsilon_r = 46.801; \rho = 1000 \text{ kg/m}^3$$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(3.99, 3.99, 3.99); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

Mode: IEEE 802.11a, 5.2 GHz, Hand SAR, Ch 40, 6 Mbps, Back Side, Standard Cover

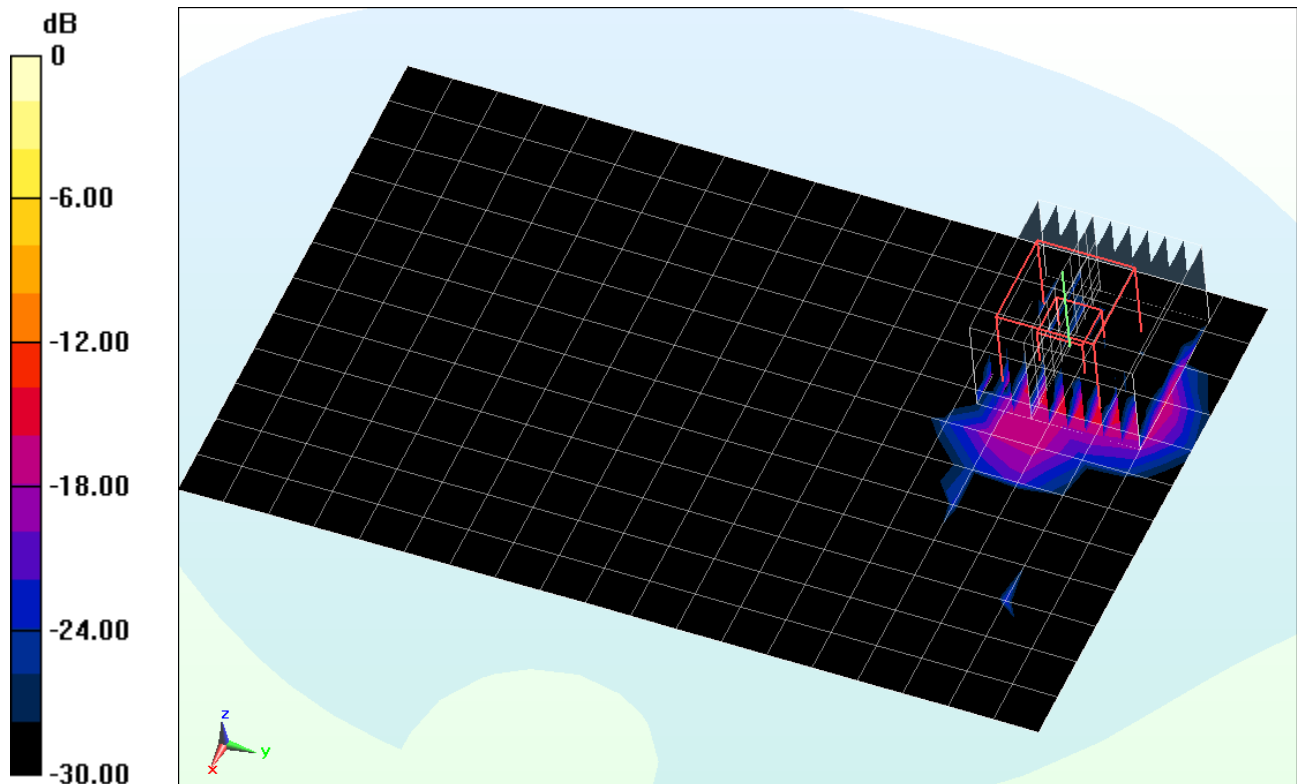
Area Scan (13x20x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (10x10x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Reference Value = 17.058 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 21.2 W/kg

SAR(10 g) = 0.392 W/kg



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

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Head; Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.901 \text{ S/m}$; $\epsilon_r = 40.25$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-12-2013; Ambient Temp: 23.1°C; Tissue Temp: 22.9°C

Probe: ES3DV3 - SN3288; ConvF(6.67, 6.67, 6.67); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

Phantom: SAM v5.0 Left; Type: QD000P40CD; Serial: TP: 1687

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

750 MHz System Verification

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

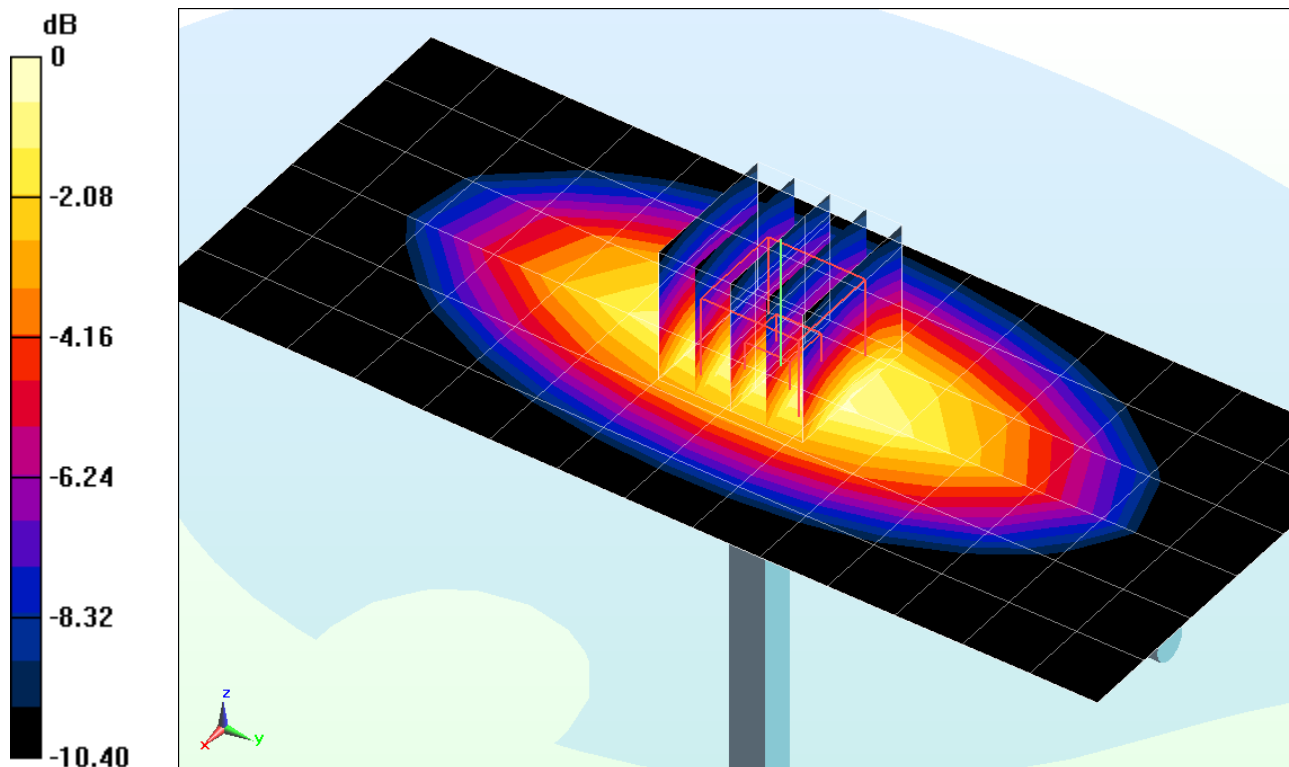
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.31 W/kg

SAR(1 g) = 0.871 W/kg

Deviation = 2.96%



0 dB = 0.939 W/kg = -0.27 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d026

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Head; Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.938 \text{ S/m}$; $\epsilon_r = 42.624$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-08-2013; Ambient Temp: 24.1°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(6.46, 6.46, 6.46); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

835 MHz System Verification

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

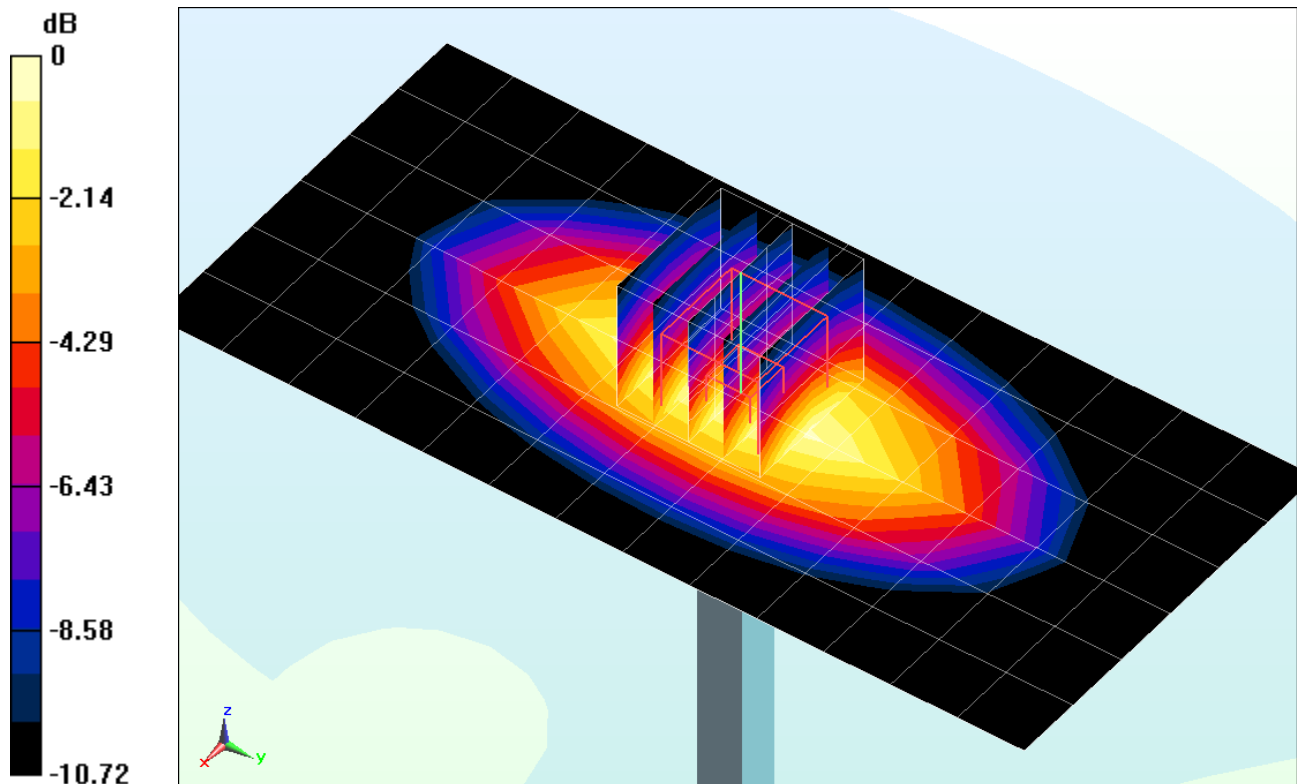
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 1 W/kg

Deviation = 6.50%



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

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1051

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Head; Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.335 \text{ S/m}$; $\epsilon_r = 39.446$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.1°C

Probe: ES3DV3 - SN3209; ConvF(5.39, 5.39, 5.39); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: SAM Right; Type: QD000P40CD; Serial: 1686

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

1750 MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

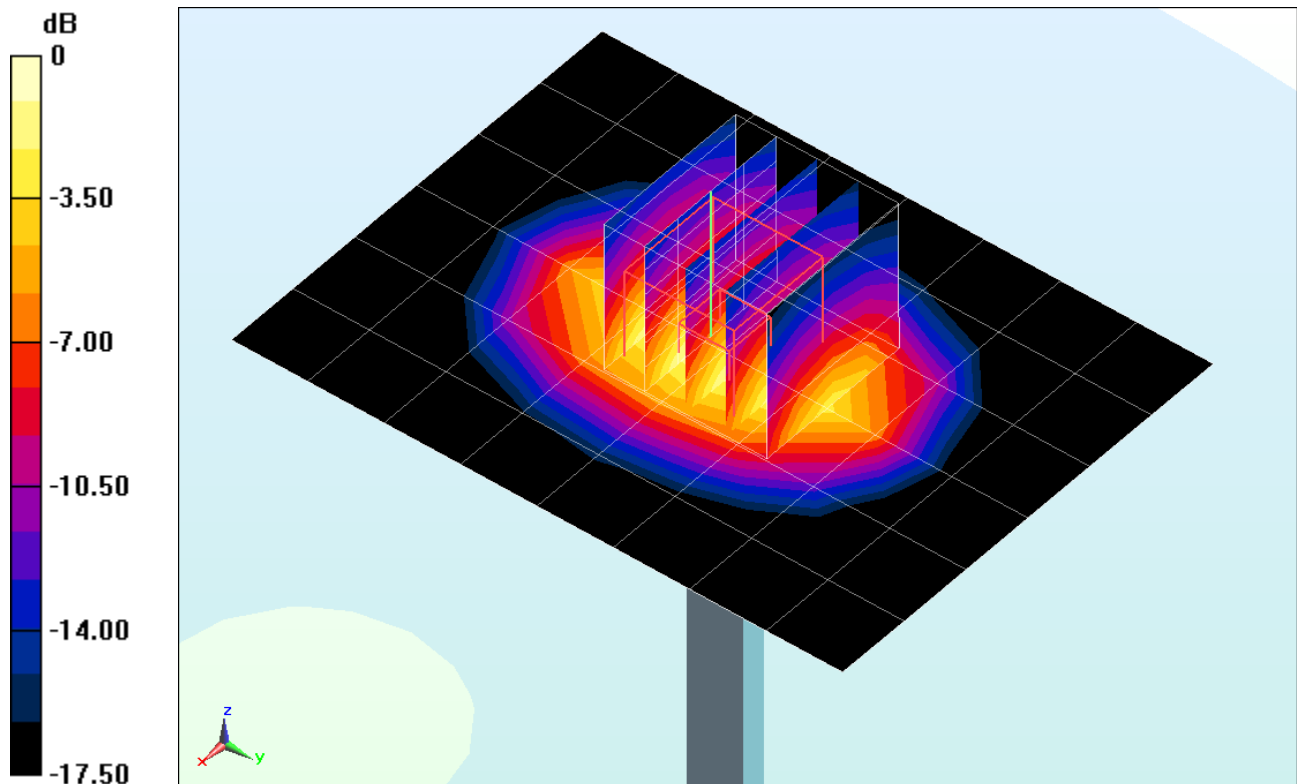
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.34 W/kg

SAR(1 g) = 3.54 W/kg

Deviation = -3.01%



0 dB = 3.88 W/kg = 5.89 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.382 \text{ S/m}$; $\epsilon_r = 39.635$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2013; Ambient Temp: 22.1°C; Tissue Temp: 23.8°C

Probe: ES3DV3 - SN3288; ConvF(5.28, 5.28, 5.28); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

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

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

1900 MHz System Verification

Area Scan (7x10x1): Measurement grid: dx=15mm, dy=15mm

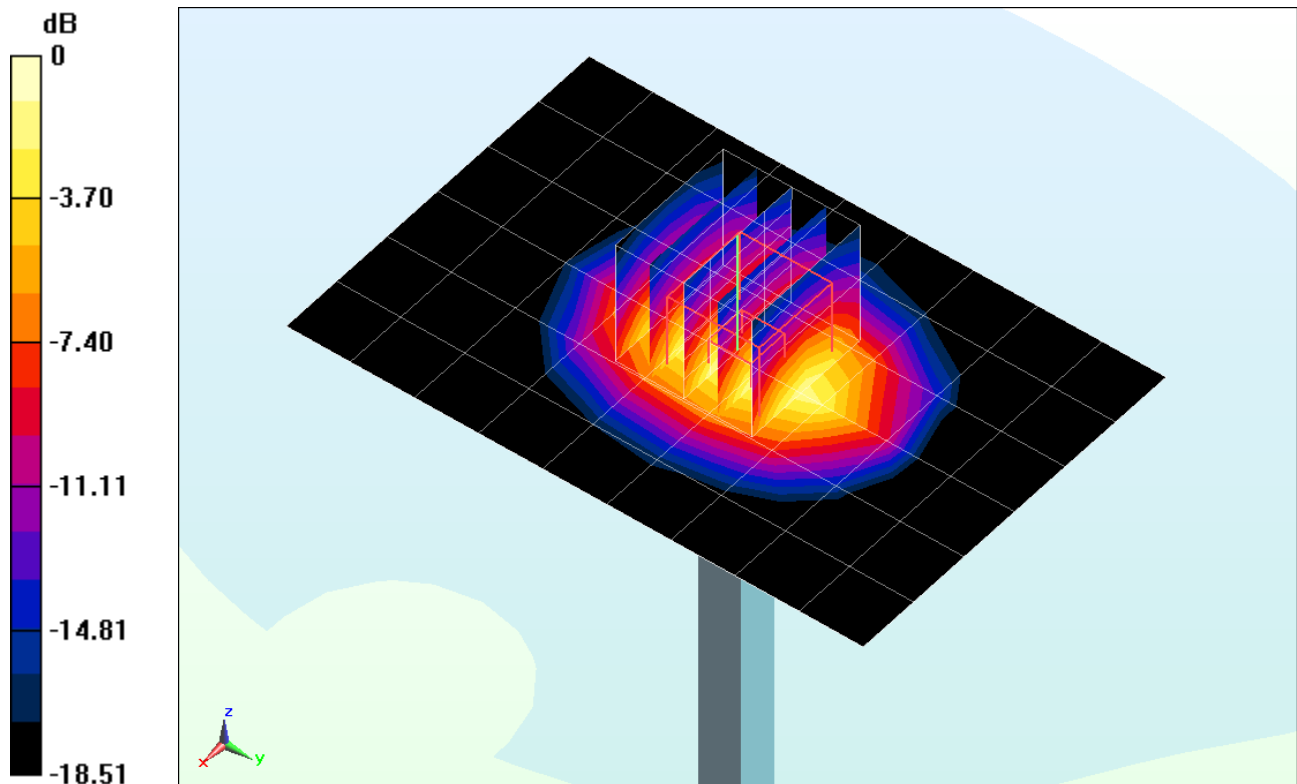
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.01 W/kg

SAR(1 g) = 3.75 W/kg

Deviation = -5.54%



0 dB = 4.17 W/kg = 6.20 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Head; Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.852 \text{ S/m}$; $\epsilon_r = 39.114$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-31-2013; Ambient Temp: 23.5°C; Tissue Temp: 23.4°C

Probe: ES3DV2 - SN3022; ConvF(4.23, 4.23, 4.23); Calibrated: 8/28/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/24/2012

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

2450MHz System Verification

Area Scan (6x9x1): Measurement grid: dx=12mm, dy=12mm

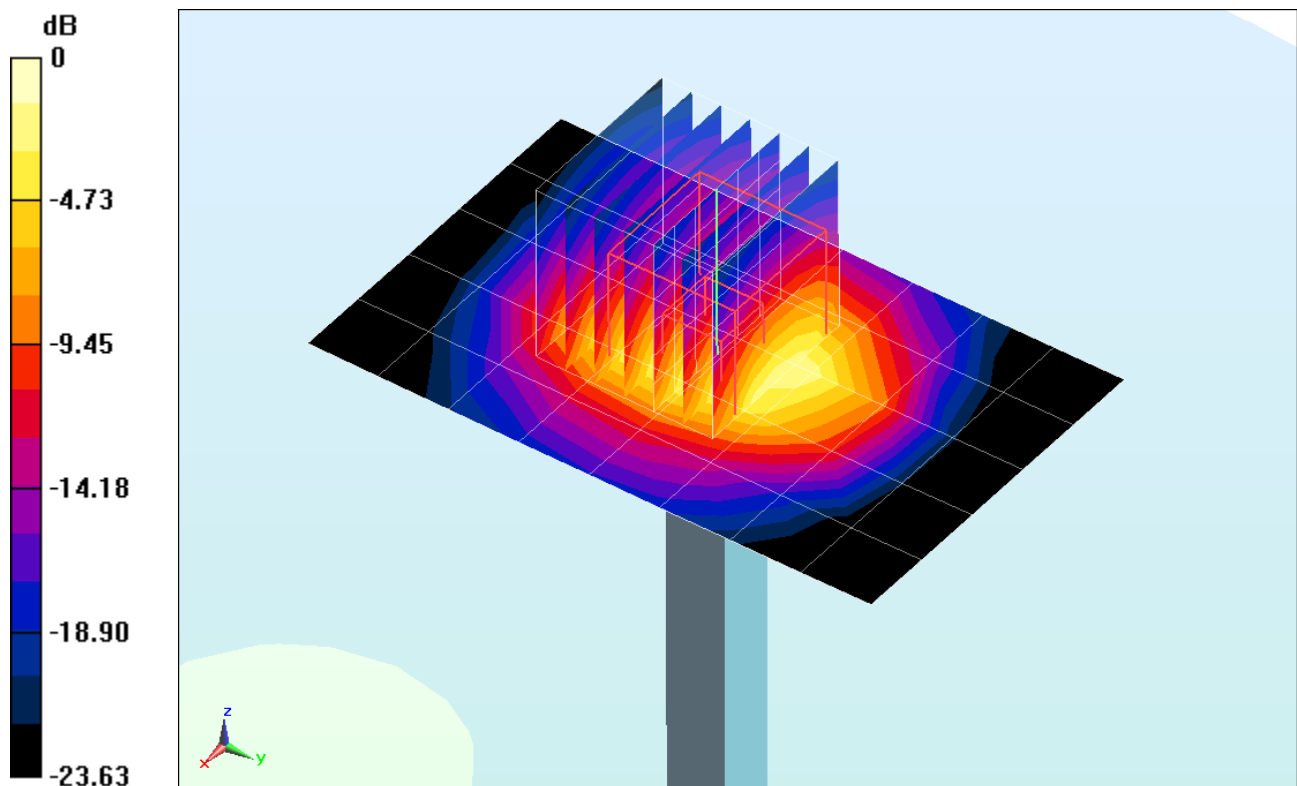
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 11.8 W/kg

SAR(1 g) = 5.62 W/kg

Deviation = 6.64%



0 dB = 7.29 W/kg = 8.63 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 4.688 \text{ S/m}$; $\epsilon_r = 34.839$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-29-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(4.48, 4.48, 4.48); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

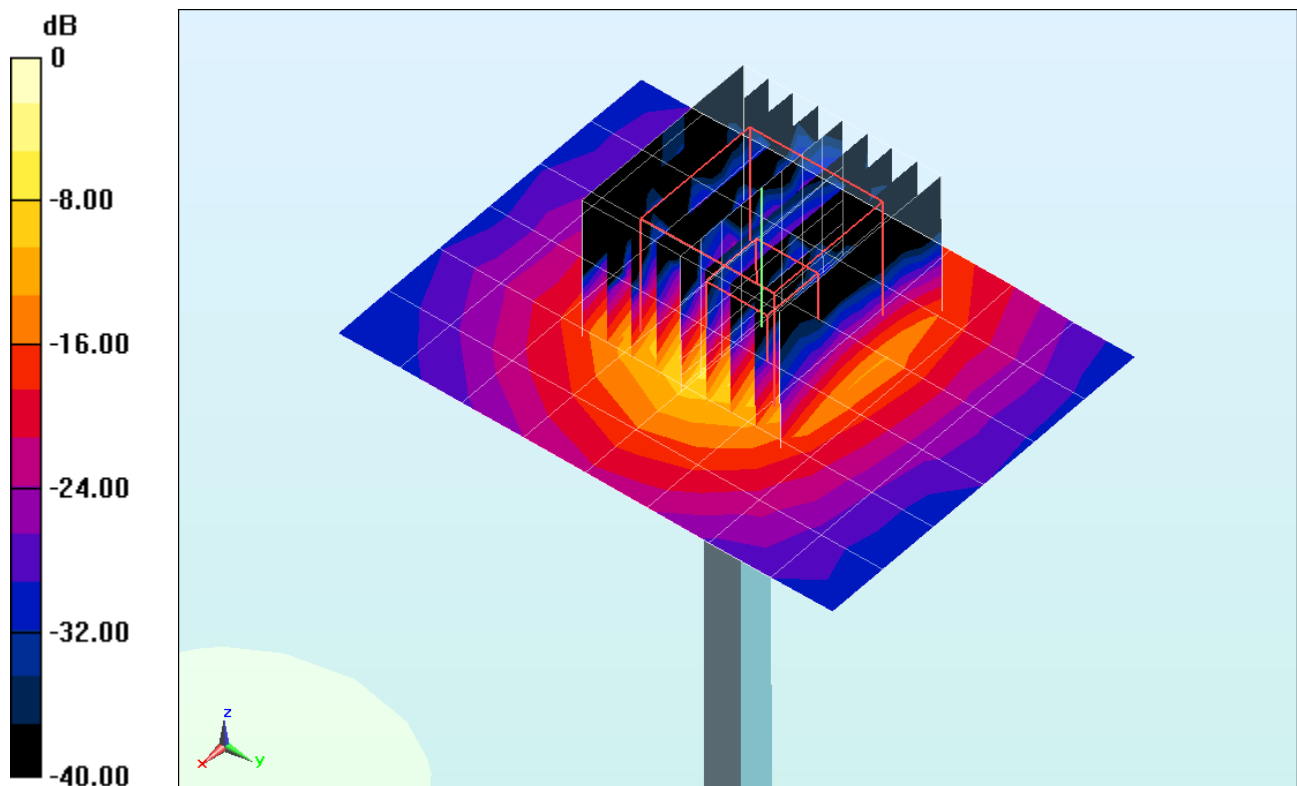
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 29.9 W/kg

SAR(1 g) = 7.71 W/kg

Deviation = 1.58%



0 dB = 19.4 W/kg = 12.88 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 4.826 \text{ S/m}$; $\epsilon_r = 34.642$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-29-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(4.27, 4.27, 4.27); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5300MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

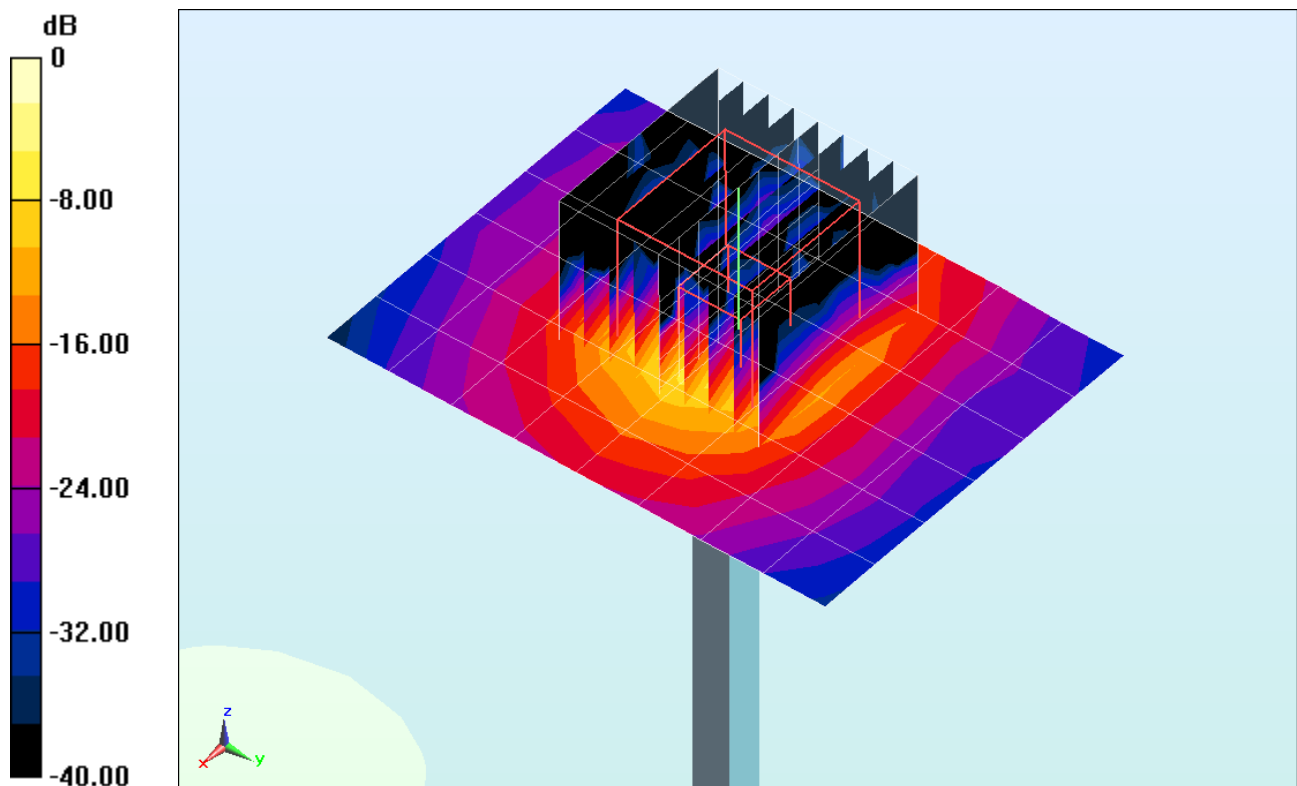
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 33.8 W/kg

SAR(1 g) = 8.28 W/kg

Deviation = 7.67%



0 dB = 20.7 W/kg = 13.16 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.08 \text{ S/m}$; $\epsilon_r = 34.302$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-29-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(4.14, 4.14, 4.14); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

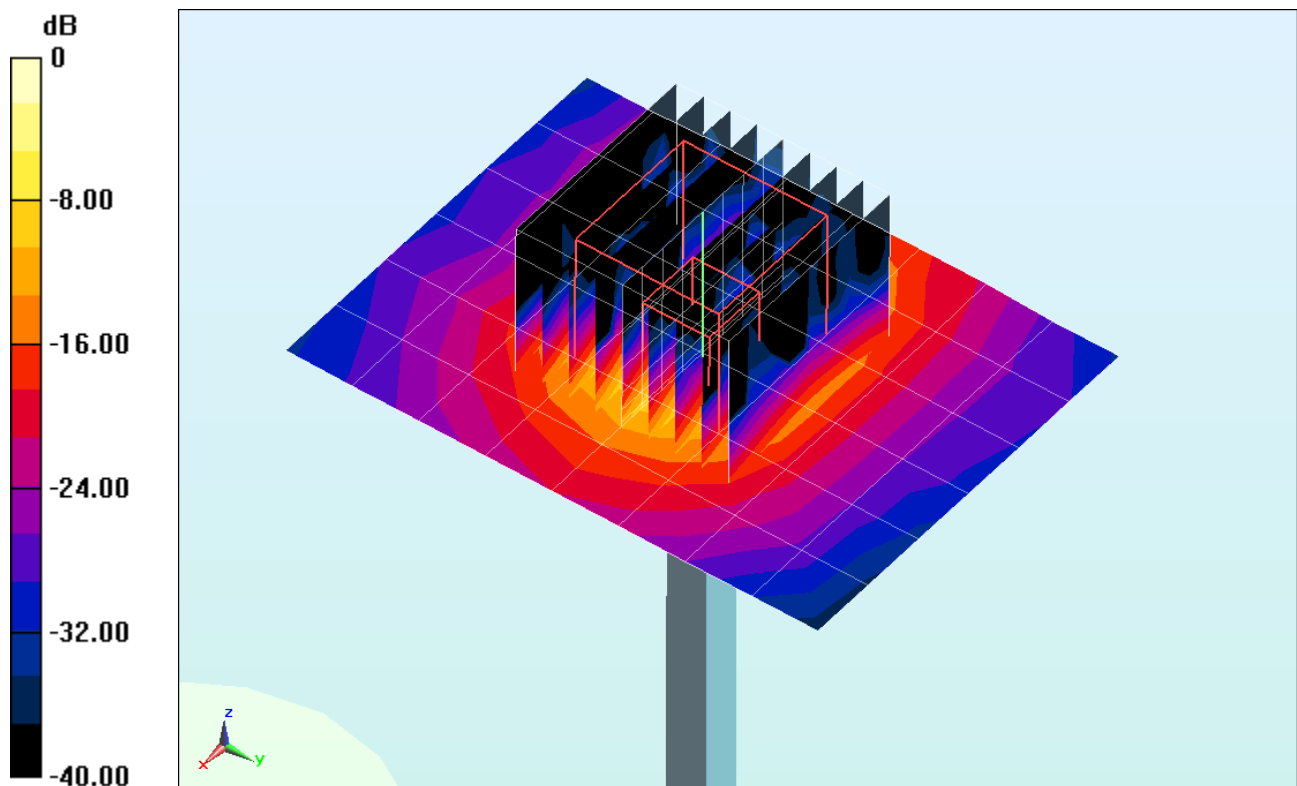
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 35.4 W/kg

SAR(1 g) = 7.65 W/kg

Deviation = -4.49%



0 dB = 19.9 W/kg = 12.99 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Head; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 5.37 \text{ S/m}$; $\epsilon_r = 33.638$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-29-2013; Ambient Temp: 24.4°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(3.85, 3.85, 3.85); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

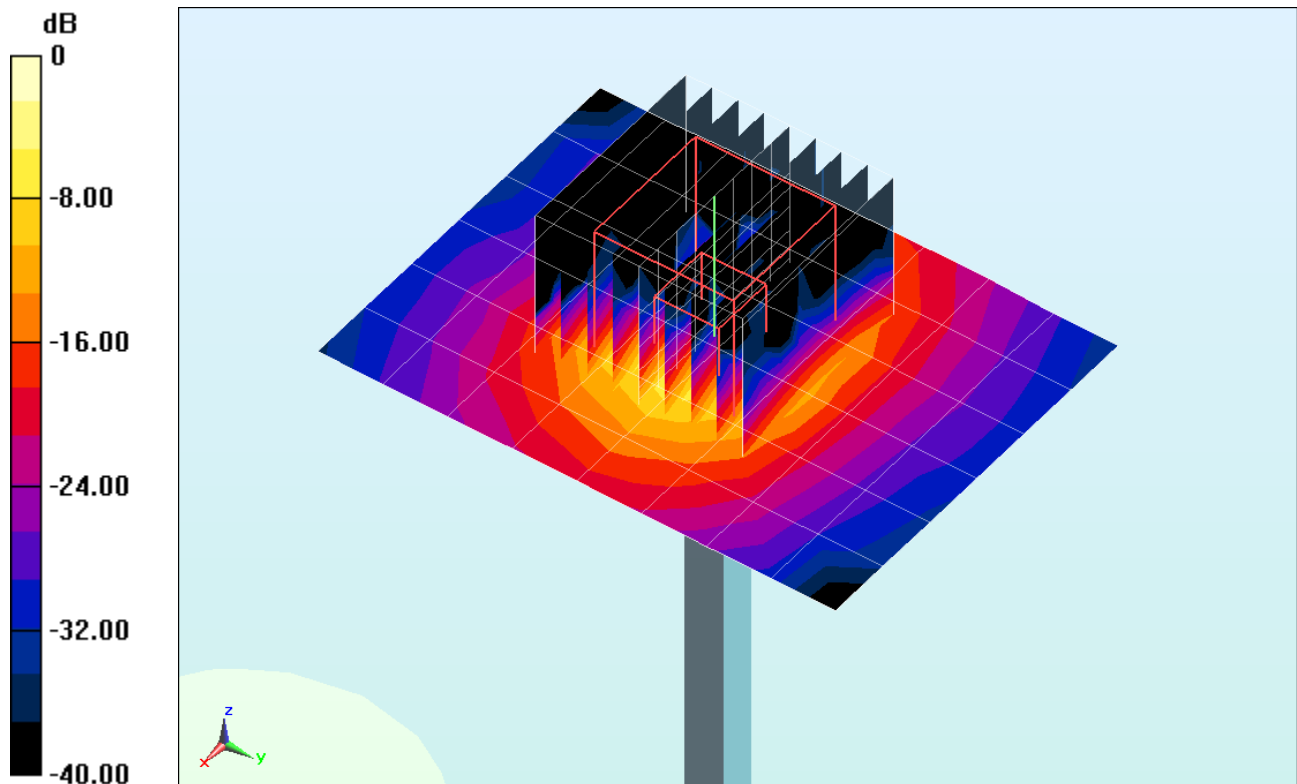
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 37.4 W/kg

SAR(1 g) = 8.02 W/kg

Deviation = 5.39%



0 dB = 20.7 W/kg = 13.16 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: 750 Body; Medium parameters used (interpolated):

$f = 750 \text{ MHz}$; $\sigma = 0.991 \text{ S/m}$; $\epsilon_r = 54.971$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-07-2013; Ambient Temp: 22.4°C; Tissue Temp: 21.5°C

Probe: ES3DV3 - SN3288; ConvF(6.44, 6.44, 6.44); Calibrated: 9/20/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 9/19/2012

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

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

750 MHz System Verification

Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm

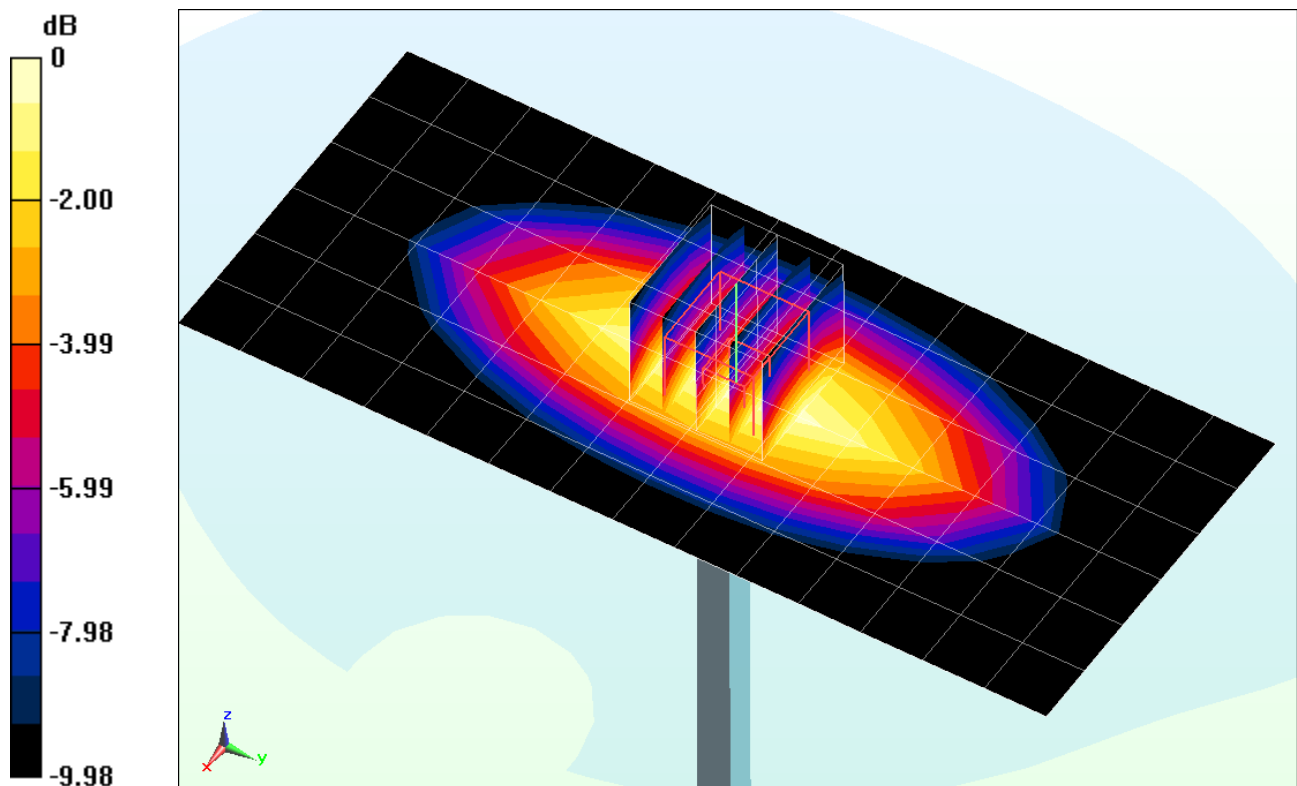
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.878 W/kg

Deviation = -0.57%



0 dB = 0.949 W/kg = -0.23 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 835 MHz; Type: D835V2; Serial: 4d026

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: 835 Body; Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 1.014 \text{ S/m}$; $\epsilon_r = 54.054$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 08-08-2013; Ambient Temp: 24.3°C; Tissue Temp: 22.1°C

Probe: ES3DV3 - SN3209; ConvF(6.28, 6.28, 6.28); Calibrated: 3/15/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1334; Calibrated: 3/8/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP-1158

Measurement SW: DASY52, Version 52.8 (7);SEMCAD X Version 14.6.10 (7164)

835 MHz System Verification

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

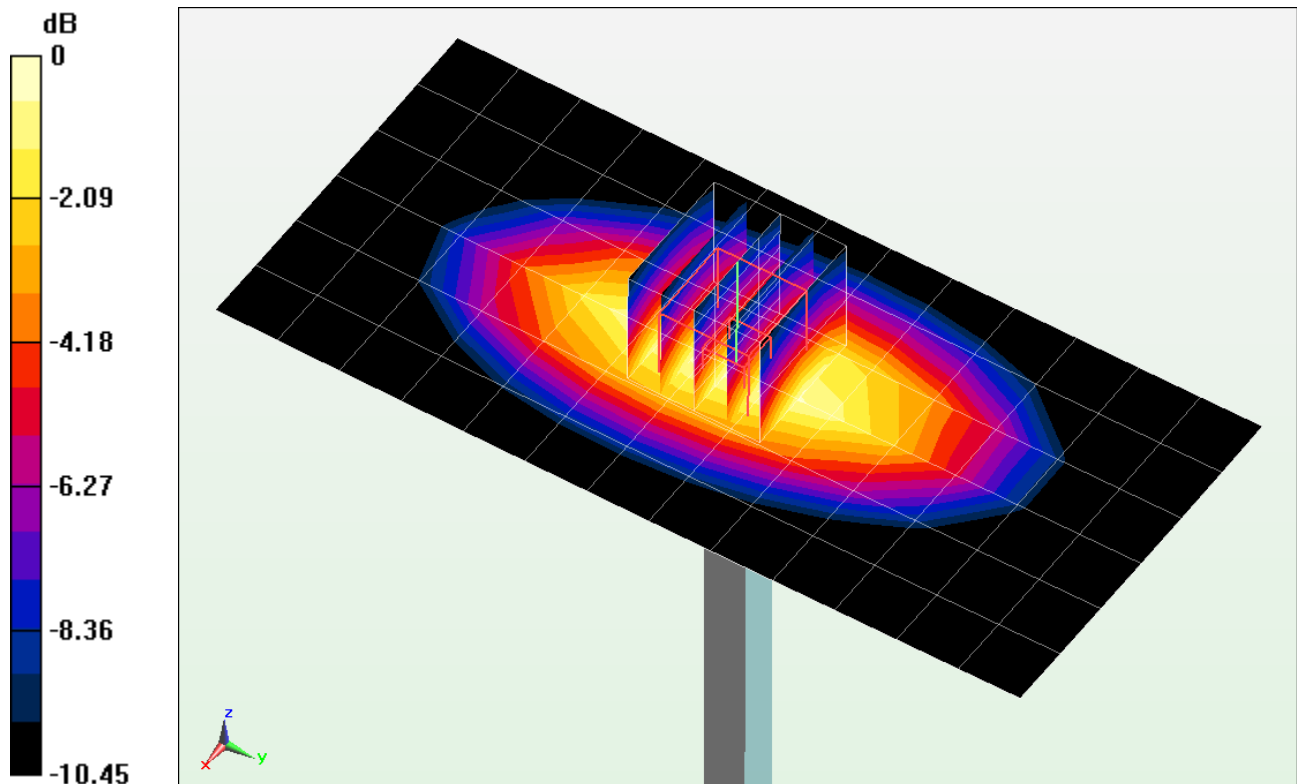
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 1.02 W/kg

Deviation = 6.47%



0 dB = 1.11 W/kg = 0.45 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.515 \text{ S/m}$; $\epsilon_r = 50.876$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.0°C

Probe: ES3DV3 - SN3287; ConvF(4.86, 4.86, 4.86); Calibrated: 11/15/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/13/2012

Phantom: SAM Sub Dasy B; Type: SAM 5.0; Serial: TP-1626

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

1750 MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm

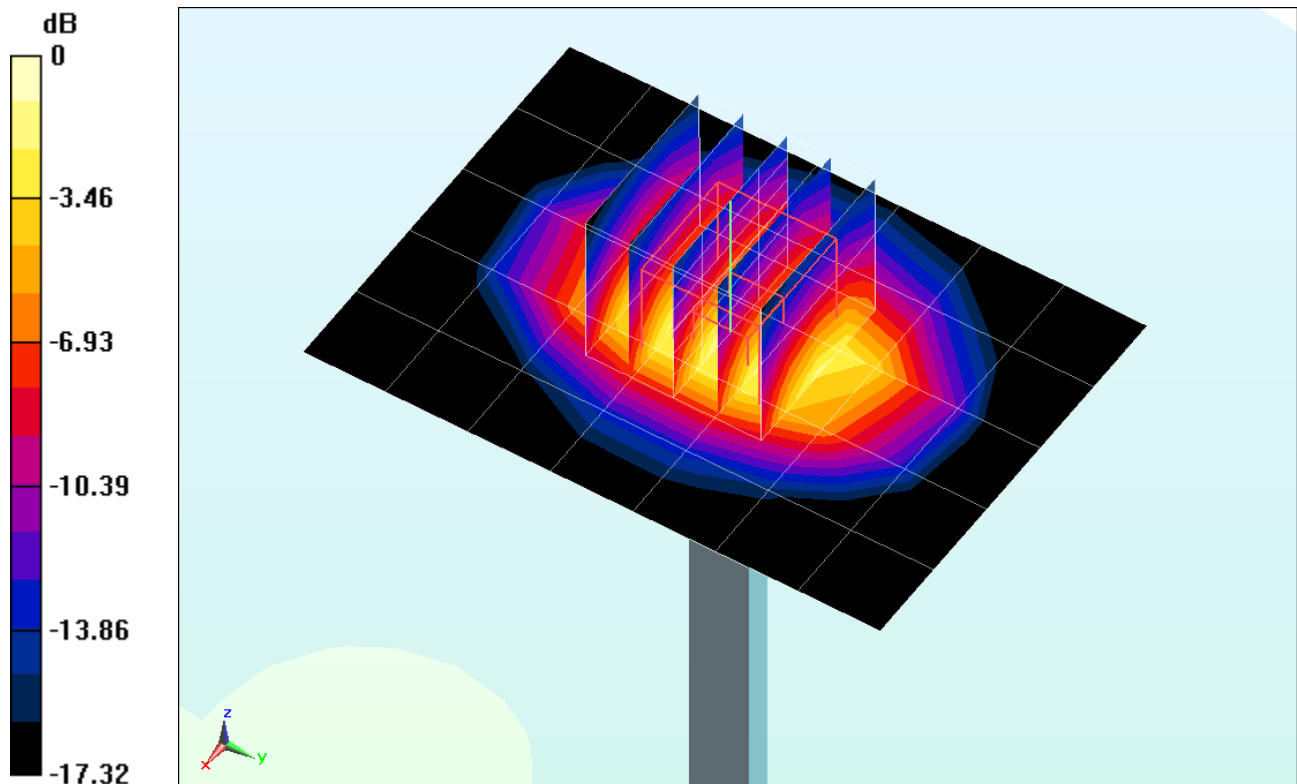
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.01 W/kg

SAR(1 g) = 3.92 W/kg

Deviation = 2.62%



0 dB = 4.40 W/kg = 6.43 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.53 \text{ S/m}$; $\epsilon_r = 50.668$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-08-2013; Ambient Temp: 23.8°C; Tissue Temp: 23.3°C

Probe: ES3DV3 - SN3287; ConvF(4.69, 4.69, 4.69); Calibrated: 11/15/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 11/13/2012

Phantom: SAM with CRP; Type: SAM 4.0; Serial: TP1375

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

1900MHz System Verification

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

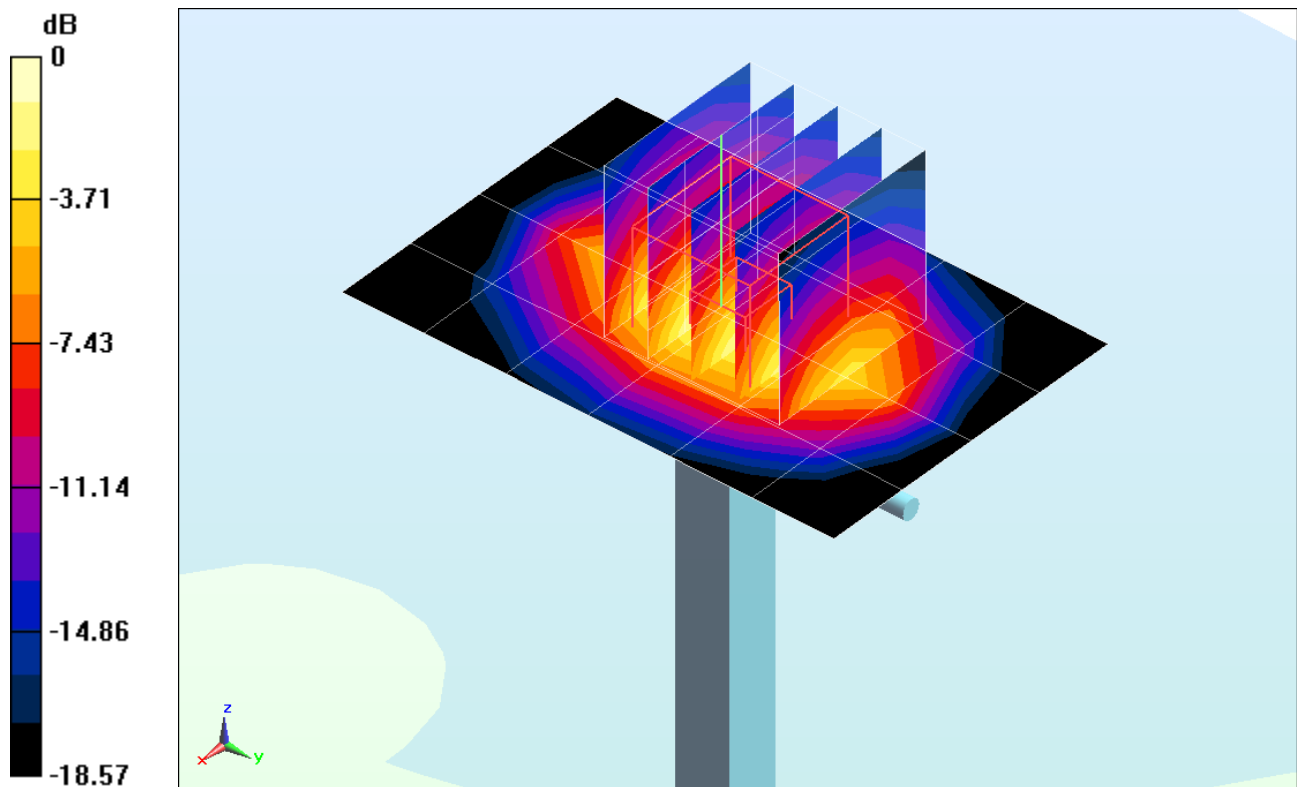
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.00 W/kg

SAR(1 g) = 3.87 W/kg

Deviation = -6.75%



0 dB = 4.28 W/kg = 6.31 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.503 \text{ S/m}$; $\epsilon_r = 52.413$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-12-2013; Ambient Temp: 24.2°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3920; ConvF(7.38, 7.38, 7.38); Calibrated: 2/27/2013;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn649; Calibrated: 2/6/2013

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

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

1900 MHz System Verification

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

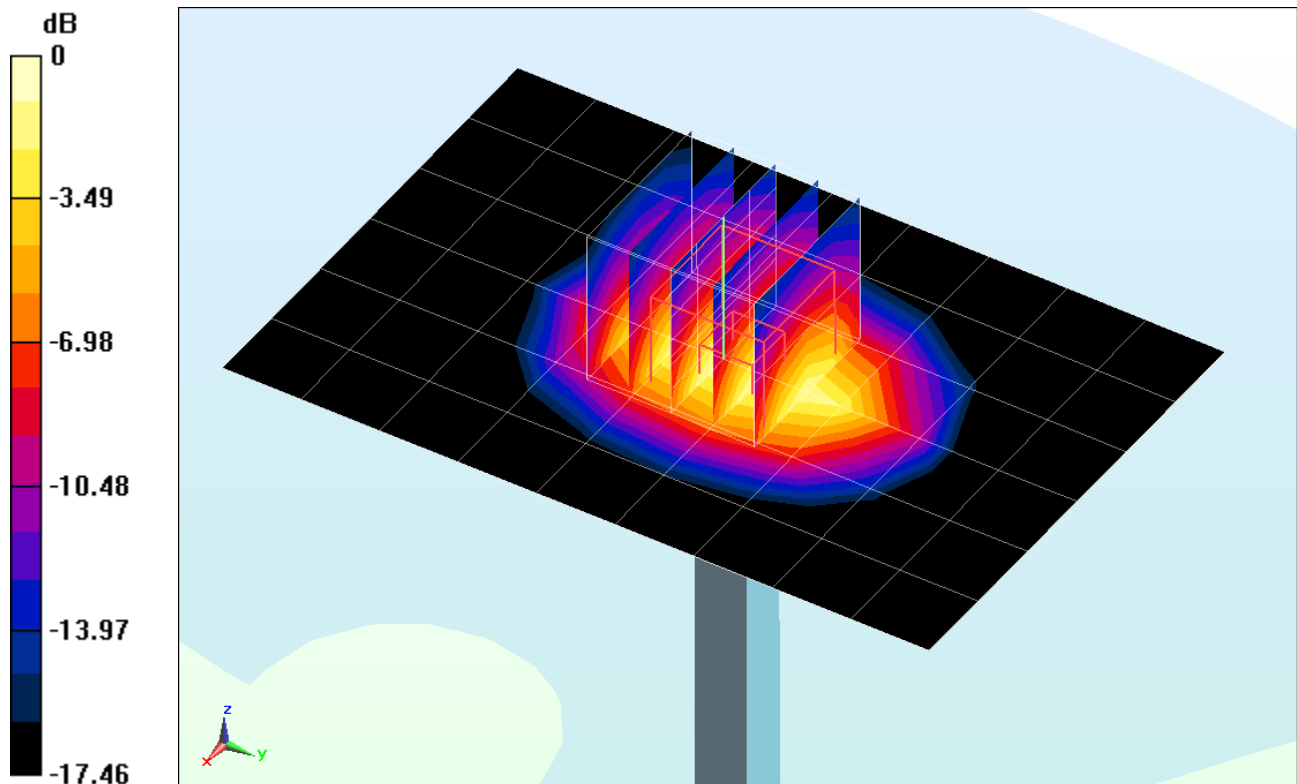
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 7.46 W/kg

SAR(1 g) = 4.17 W/kg

Deviation = 2.21%



0 dB = 4.60 W/kg = 6.63 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: 2450 Body; Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 1.98 \text{ S/m}$; $\epsilon_r = 51.971$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 07-29-2013; Ambient Temp: 23.0°C; Tissue Temp: 23.2°C

Probe: ES3DV2 - SN3022; ConvF(3.97, 3.97, 3.97); Calibrated: 8/28/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 8/24/2012

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1403

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

2450MHz System Verification

Area Scan (6x9x1): Measurement grid: dx=12mm, dy=12mm

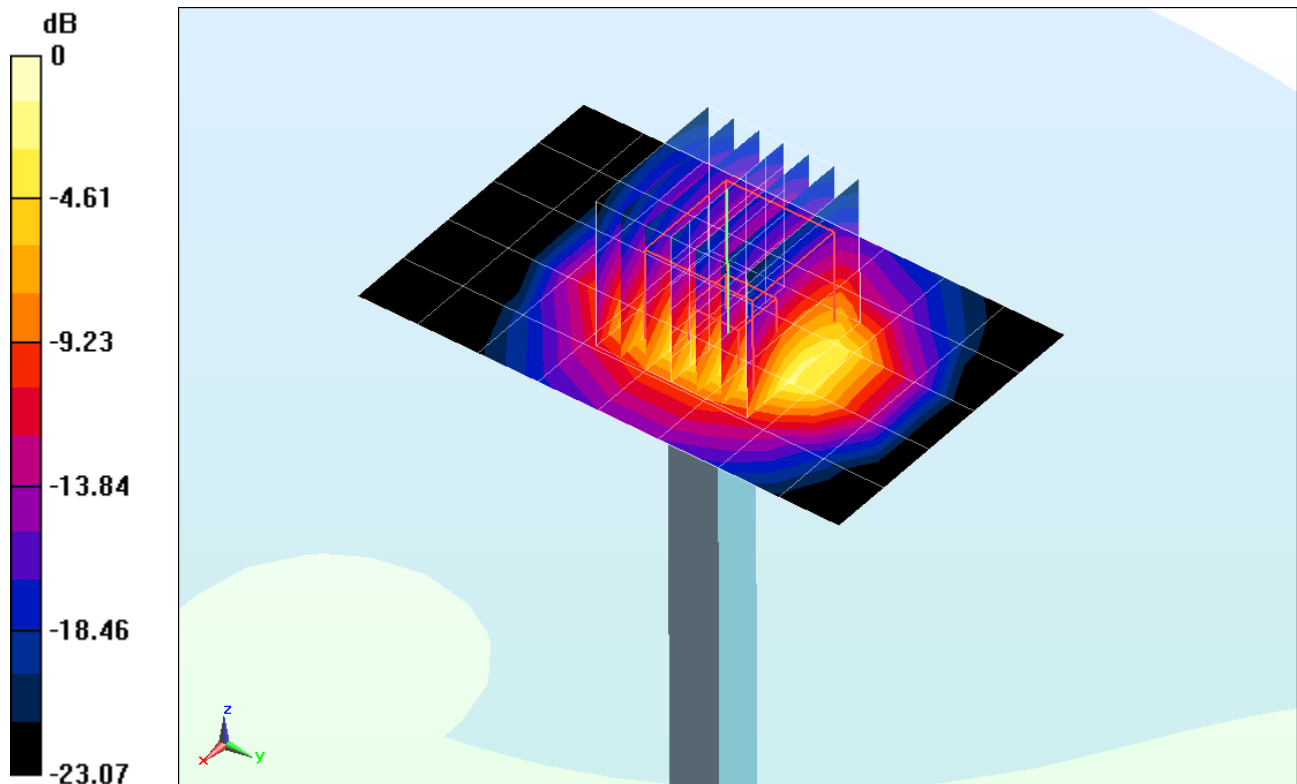
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 11.6 W/kg

SAR(1 g) = 5.34 W/kg

Deviation = 3.49%



0 dB = 6.91 W/kg = 8.39 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5200 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 5.512 \text{ S/m}$; $\epsilon_r = 46.801$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(3.99, 3.99, 3.99); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5200MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

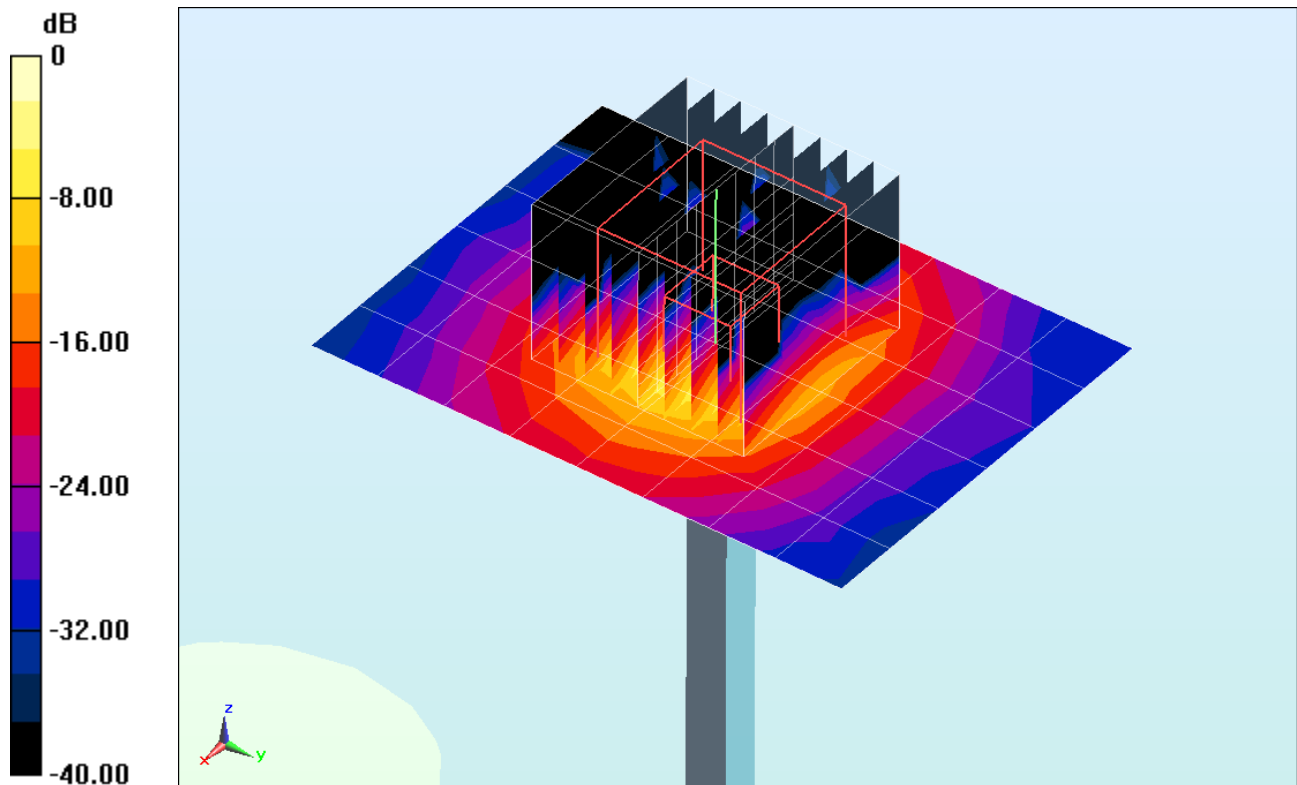
Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 30.1 W/kg

SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.14 W/kg

Deviation (1 g) = 1.59%

Deviation (10 g) = 1.42%



0 dB = 18.5 W/kg = 12.67 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5300 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5300 \text{ MHz}$; $\sigma = 5.642 \text{ S/m}$; $\epsilon_r = 46.865$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.7°C

Probe: EX3DV4 - SN3589; ConvF(3.81, 3.81, 3.81); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5300MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

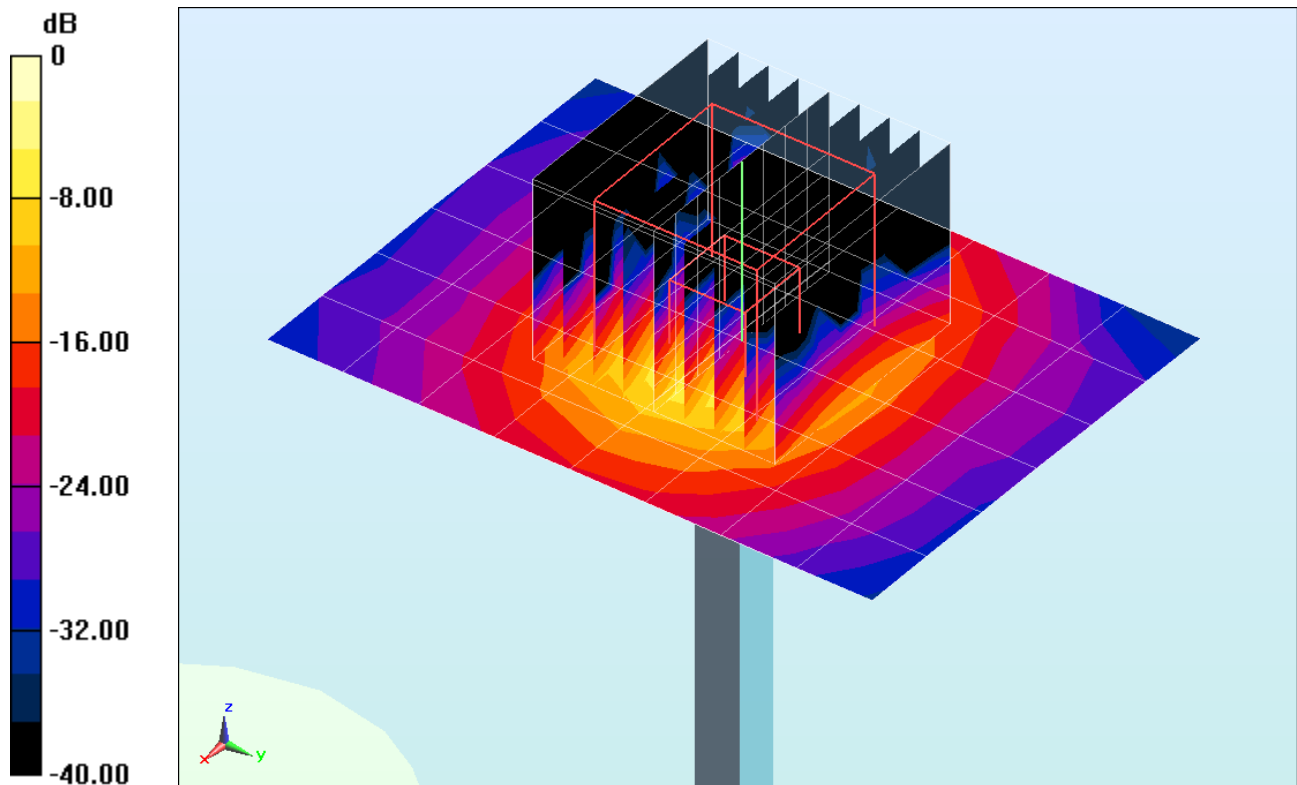
Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 31.3 W/kg

SAR(1 g) = 8.11 W/kg; SAR(10 g) = 2.25 W/kg

Deviation (1 g) = 7.70%

Deviation (10 g) = 6.64%



0 dB = 19.8 W/kg = 12.97 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5500 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.89 \text{ S/m}$; $\epsilon_r = 47.06$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.8°C; Tissue Temp: 22.9°C

Probe: EX3DV4 - SN3589; ConvF(3.52, 3.52, 3.52); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5500MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

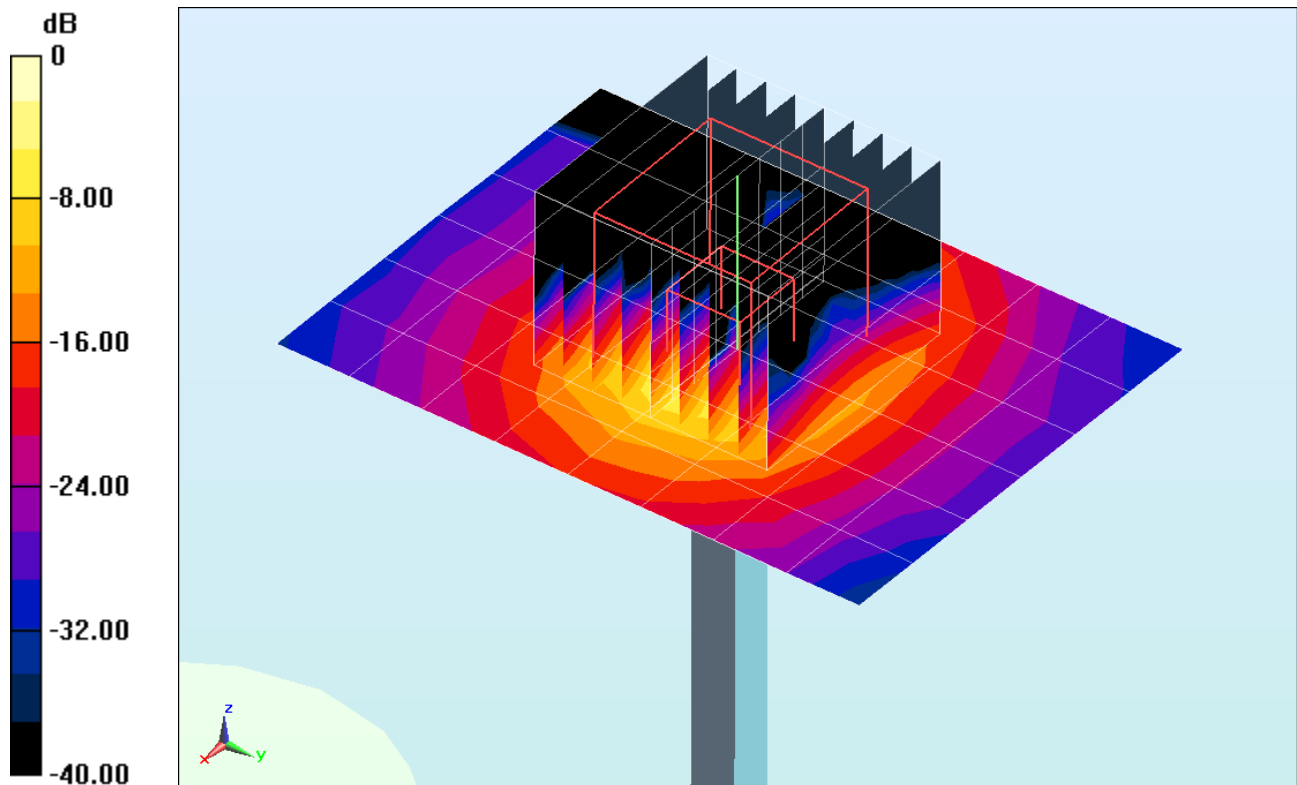
Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 32.8 W/kg

SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.2 W/kg

Deviation (1 g) = -0.74%

Deviation (10 g) = -1.79%



0 dB = 20.1 W/kg = 13.03 dBW/kg

PCTEST ENGINEERING LABORATORY, INC.

DUT: Dipole 5800 MHz; Type: D5GHzV2; Serial: 1057

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Medium: 5 GHz Body; Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 6.168 \text{ S/m}$; $\epsilon_r = 46.377$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-05-2013; Ambient Temp: 23.9°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN3589; ConvF(3.66, 3.66, 3.66); Calibrated: 1/17/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/17/2013

Phantom: SAM Sub; Type: SAM 4.0; Serial: TP-1357

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.10 (7164)

5800MHz System Verification

Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm

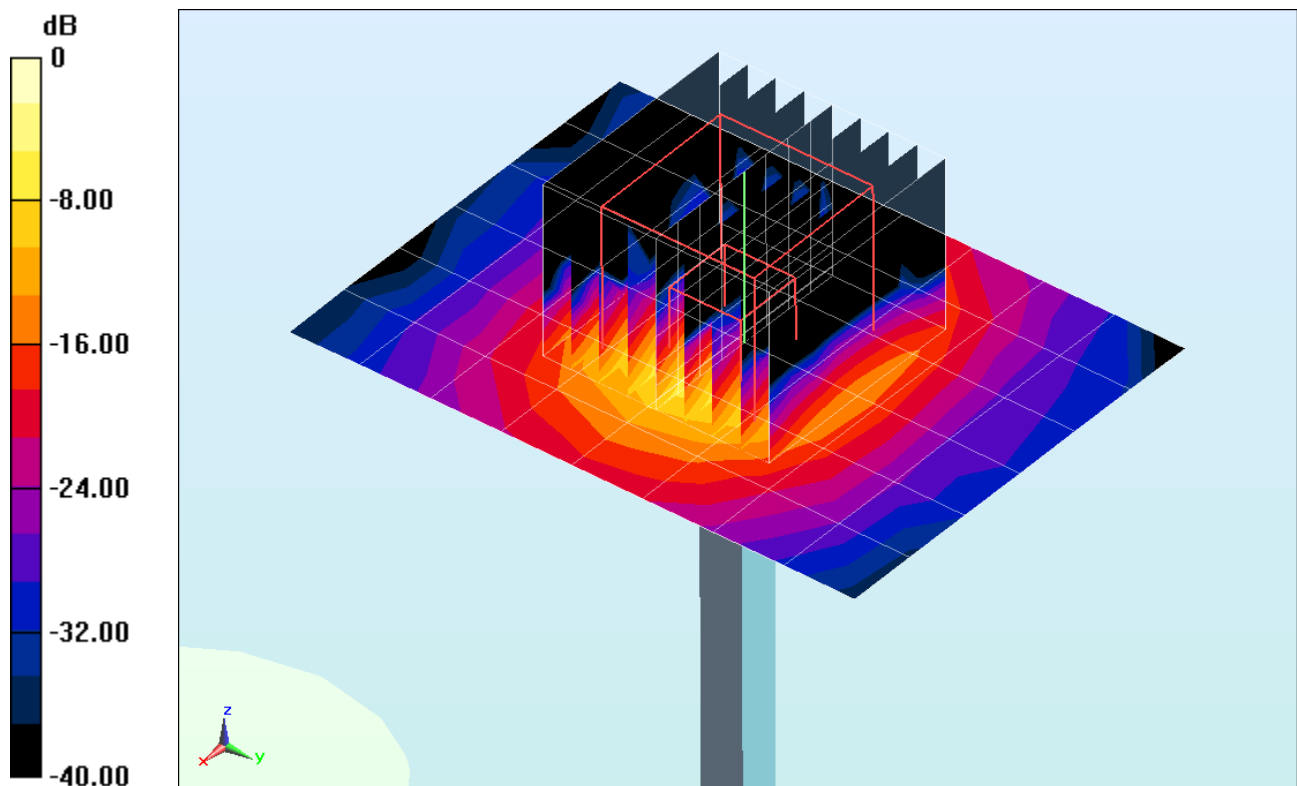
Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio: 1.4

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 33.7 W/kg

SAR(1 g) = 7.97 W/kg

Deviation = 6.13%



0 dB = 19.6 W/kg = 12.92 dBW/kg

APPENDIX C: PROBE CALIBRATION



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D750V3-1003_Jan13**

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 07, 2013**

✓ KOK
1/28/13

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: January 8, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.4 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.46 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.51 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.8 $\pm$ 6 %	0.97 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.83 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	5.87 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.1 Ω - 0.2 j Ω
Return Loss	- 24.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω - 3.5 j Ω
Return Loss	- 29.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.043 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 21, 2009

DASY5 Validation Report for Head TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.89 \text{ S/m}$; $\epsilon_r = 41.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

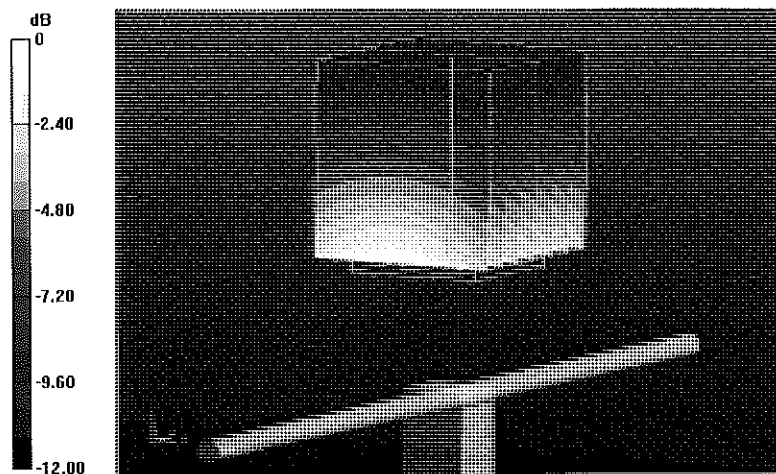
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.114 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.24 W/kg

SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.38 W/kg

Maximum value of SAR (measured) = 2.47 W/kg

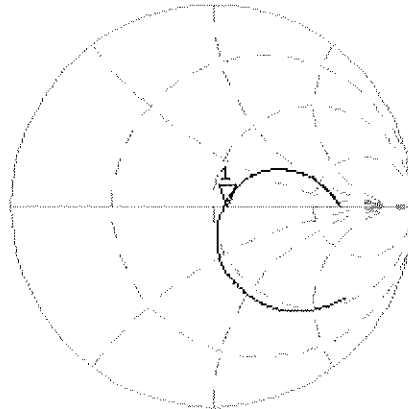


0 dB = 2.47 W/kg = 3.93 dBW/kg

Impedance Measurement Plot for Head TSL

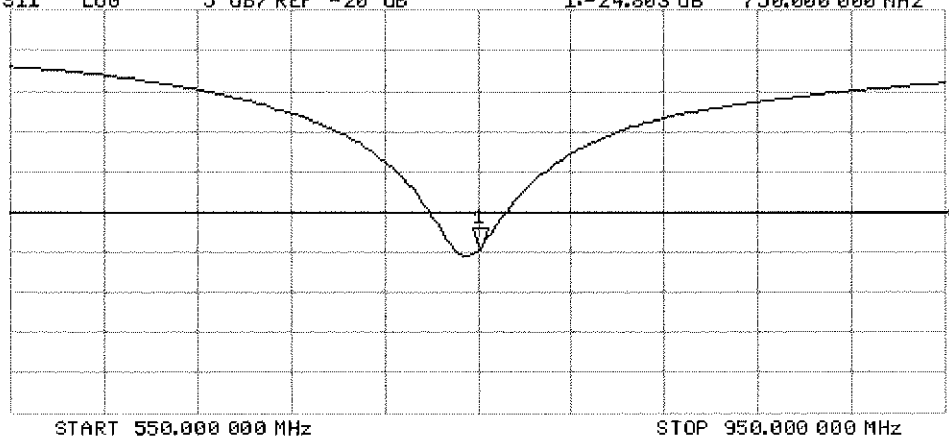
7 Jan 2013 12:55:14
 CH1 S11 1 U FS 1: 56.100 Ω -179.69 m Ω 1.1810 nF 750.000 000 MHz

*
 De1
 Ca
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1: -24.803 dB 750.000 000 MHz

Ca
 Avg
 16
 H1d



DASY5 Validation Report for Body TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 750 MHz

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.97 \text{ S/m}$; $\epsilon_r = 54.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.11, 6.11, 6.11); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

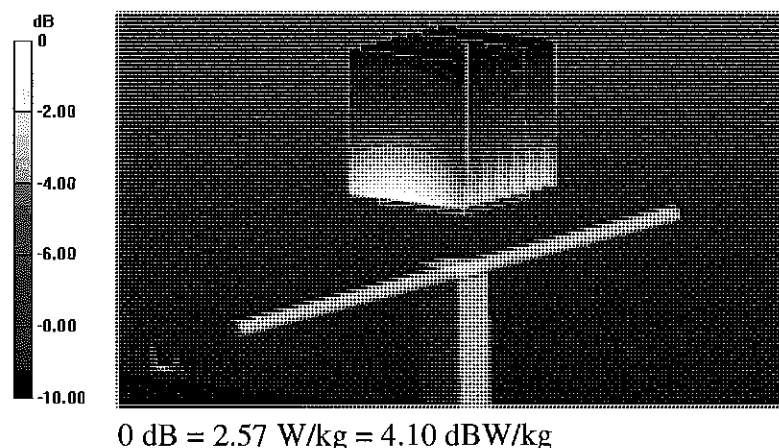
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.114 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.25 W/kg

SAR(1 g) = 2.23 W/kg; SAR(10 g) = 1.48 W/kg

Maximum value of SAR (measured) = 2.57 W/kg



Impedance Measurement Plot for Body TSL

7 Jan 2013 09:57:48
CH1 S11 1 U FS 1: 49.564 Ω -3.4629 Ω 61.280 pF 750.000 000 MHz

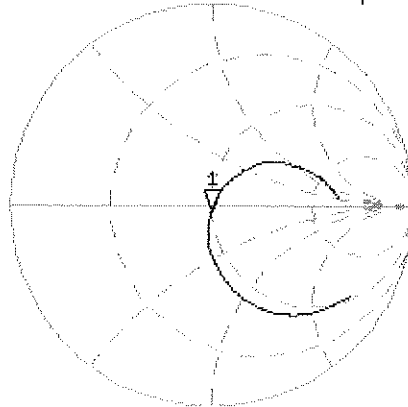
*

De1

Ca

Avg
16

H1 d

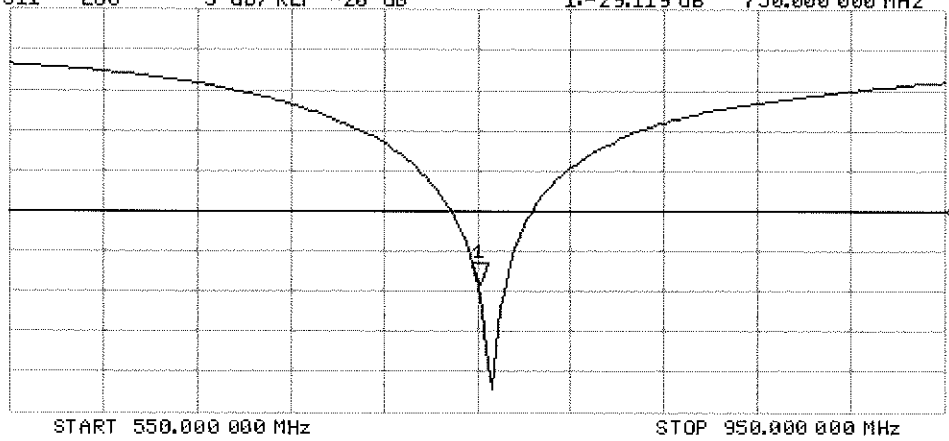


CH2 S11 LOG 5 dB/REF -20 dB 1:-29.119 dB 750.000 000 MHz

Ca

Avg
16

H1 d





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 108**

Client **PC Test**

Certificate No: **D835V2-4d026_Aug12**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d026**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **August 23, 2012**

*1/OK
9/12/12*

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by: **Israe El-Naouq** **Israe El-Naouq** **Israe El-Naouq**
 Name Function Laboratory Technician

Approved by: **Katja Pokovic** **Katja Pokovic** **Katja Pokovic**
 Name Function Technical Manager

Signature
Israe El-Naouq
Katja Pokovic

Issued: August 23, 2012

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



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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.3 $\pm$ 6 %	0.90 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.35 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.39 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.53 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.12 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.2 $\pm$ 6 %	1.00 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.47 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.58 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.33 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7 Ω - 3.4 j Ω
Return Loss	- 26.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω - 4.8 j Ω
Return Loss	- 26.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.389 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, 2004

DASY5 Validation Report for Head TSL

Date: 23.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d026

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 41.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm 2/Zoom Scan (7x7x7)/Cube 0:

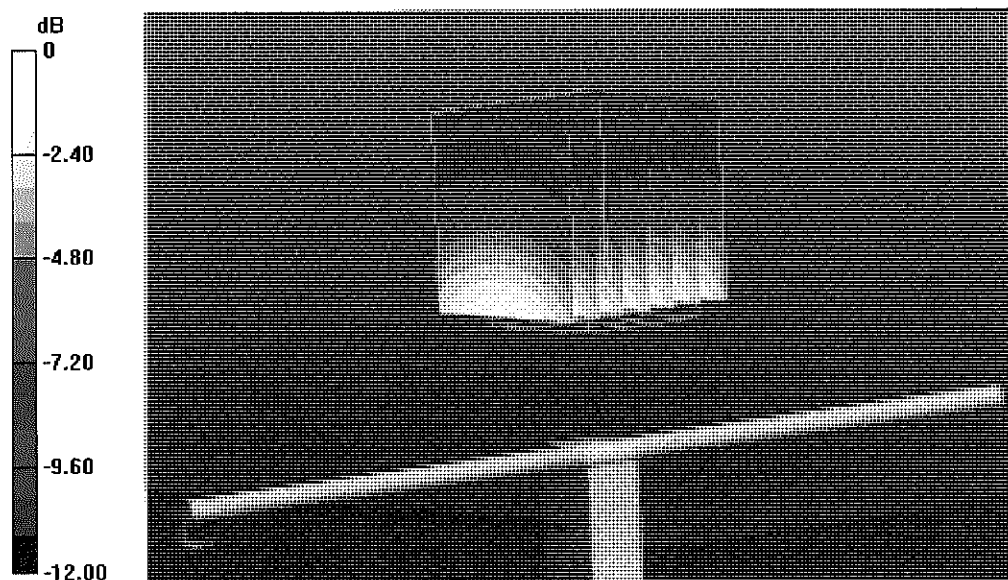
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.824 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.482 mW/g

SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.53 mW/g

Maximum value of SAR (measured) = 2.72 W/kg

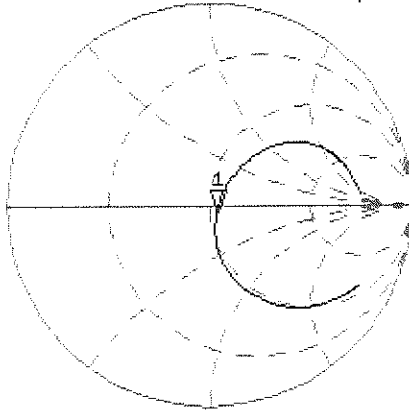


0 dB = 2.72 W/kg = 8.69 dB W/kg

Impedance Measurement Plot for Head TSL

23 Aug 2012 12:19:04
 CH1 S11 1 U FS 1: 53.662 $\angle$ -3.3516 $\angle$ 56.870 pF 835.000 000 MHz

*
 Del
 Cor



Avg
 15

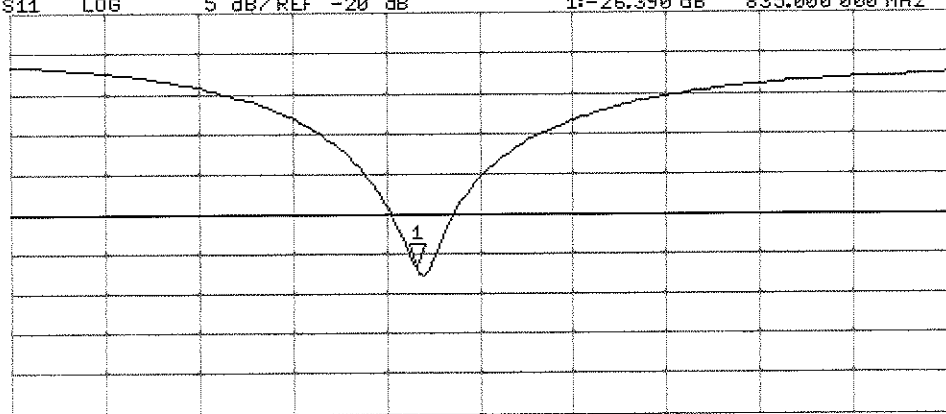
H1 d

CH2 S11 LOG 5 dB/REF -20 dB 1:-26.390 dB 835.000 000 MHz

Cor

Avg
 15

H1 d



START 635.000 000 MHz

STOP 1 100.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 23.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d026

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

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

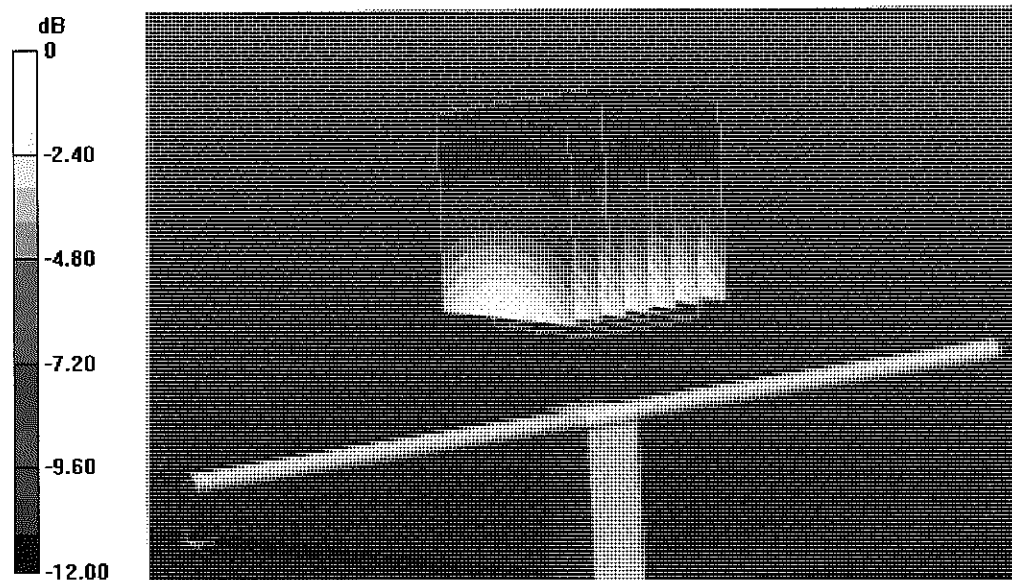
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.339 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.592 mW/g

SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g

Maximum value of SAR (measured) = 2.87 W/kg

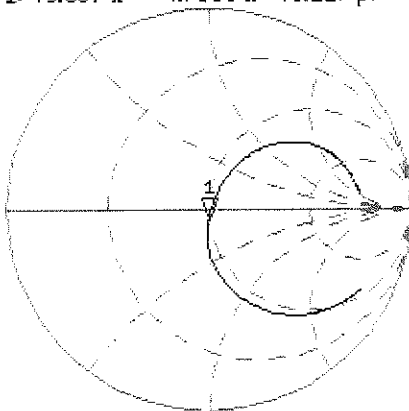


0 dB = 2.87 W/kg = 9.16 dB W/kg

Impedance Measurement Plot for Body TSL

23 Aug 2012 10:54:42
 [CH1] S11 1 U FS 1: 49.557 $\angle$ -4.7500 $\angle$ 40.127 pF 835.000 000 MHz

*
 Del
 Cor



Avg
 16

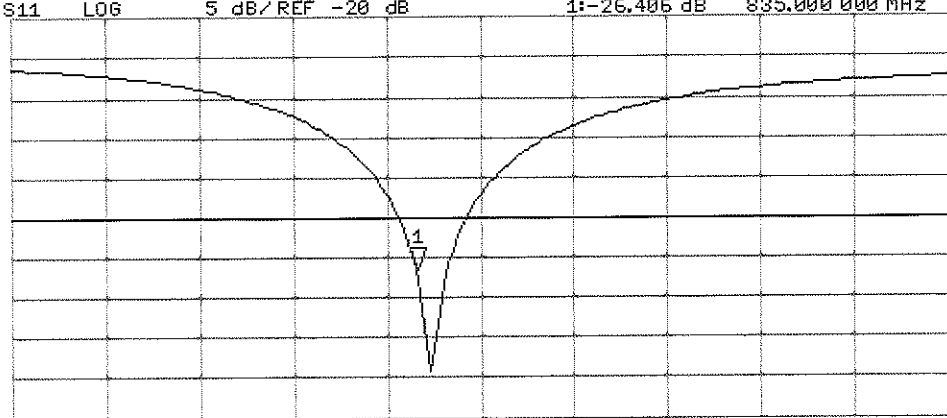
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-26.405 dB 835.000 000 MHz

Cor

Avg
 16

H1d



START 635.000 000 MHz

STOP 1 100.000 000 MHz



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1750V2-1051_Apr13**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1051**

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

Calibration date: **April 30, 2013**

✓
KOK
5/8/13

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by: **Claudio Leubler** Name: **Claudio Leubler** Function: **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** Name: **Katja Pokovic** Technical Manager

Issued: April 30, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.1 $\pm$ 6 %	1.33 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (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	19.5 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.8 $\pm$ 6 %	1.50 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.55 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.4 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$50.9 \Omega + 0.3 j\Omega$
Return Loss	- 40.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$47.0 \Omega + 0.4 j\Omega$
Return Loss	- 30.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 19, 2010

DASY5 Validation Report for Head TSL

Date: 30.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1051

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.33$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.18, 5.18, 5.18); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (8x7x7)/Cube 0:

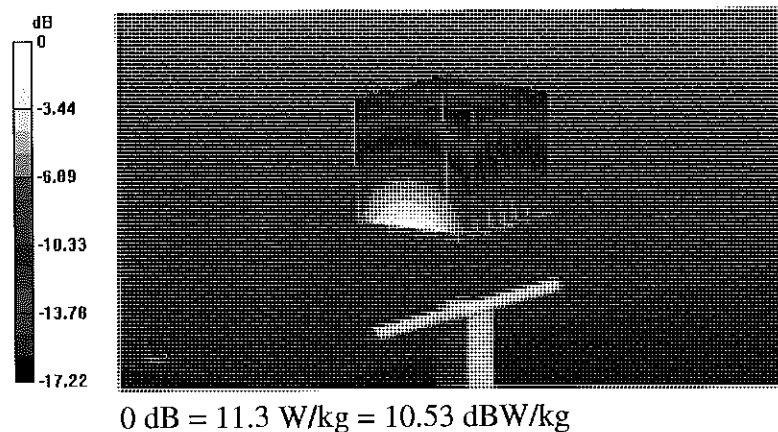
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.104 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 16.0 W/kg

SAR(1 g) = 9.01 W/kg; SAR(10 g) = 4.83 W/kg

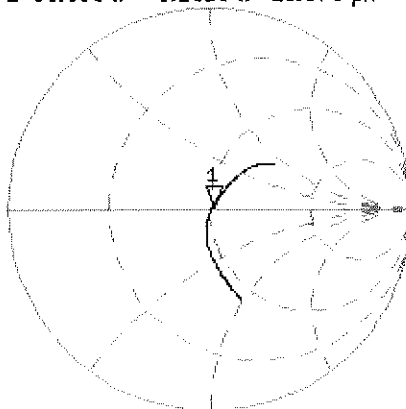
Maximum value of SAR (measured) = 11.3 W/kg



Impedance Measurement Plot for Head TSL

30 Apr 2013 12:59:57
 [CH1] S11 1 U FS 1: 50.889 Ω 0.2813 Ω 25.578 μH 1 750.000 000 MHz

*
 Del
 C Δ



Avg
 4

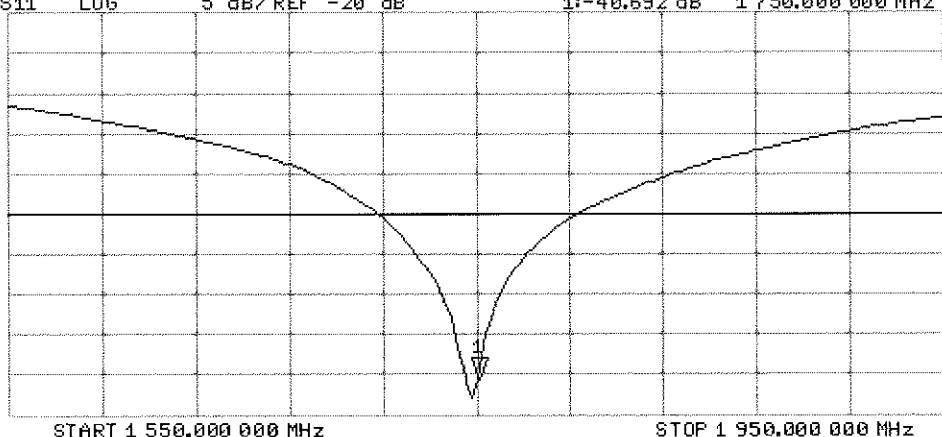
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-40.692 dB 1 750.000 000 MHz

C Δ

Avg
 4

H1d



DASY5 Validation Report for Body TSL

Date: 30.04.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1051

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.5$ S/m; $\epsilon_r = 51.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.83, 4.83, 4.83); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

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

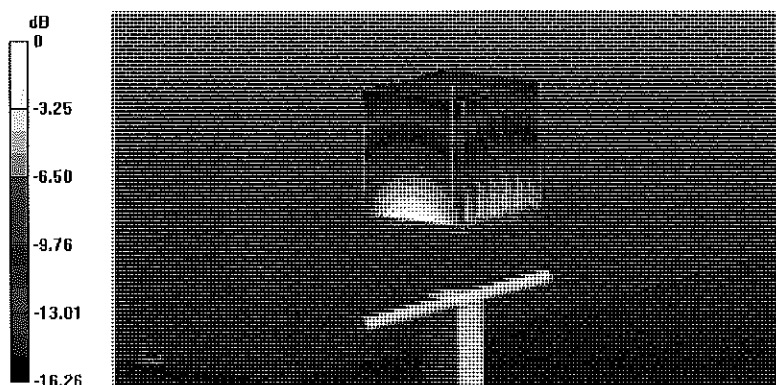
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.473 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.55 W/kg; SAR(10 g) = 5.13 W/kg

Maximum value of SAR (measured) = 12.0 W/kg



0 dB = 12.0 W/kg = 10.79 dBW/kg

Impedance Measurement Plot for Body TSL

30 Apr 2013 12:59:14
[CH1] S11 1 U FS 1: 46.998 Ω 0.4160 Ω 37.835 pF 1 750.000 000 MHz

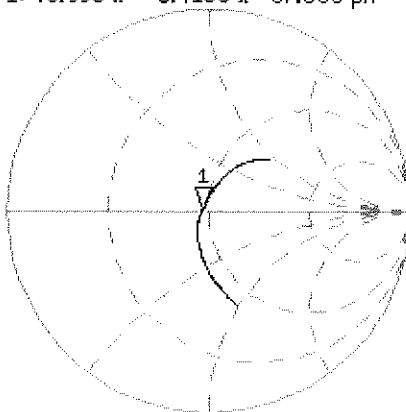
*

De1

CA

Avg
16

H1d

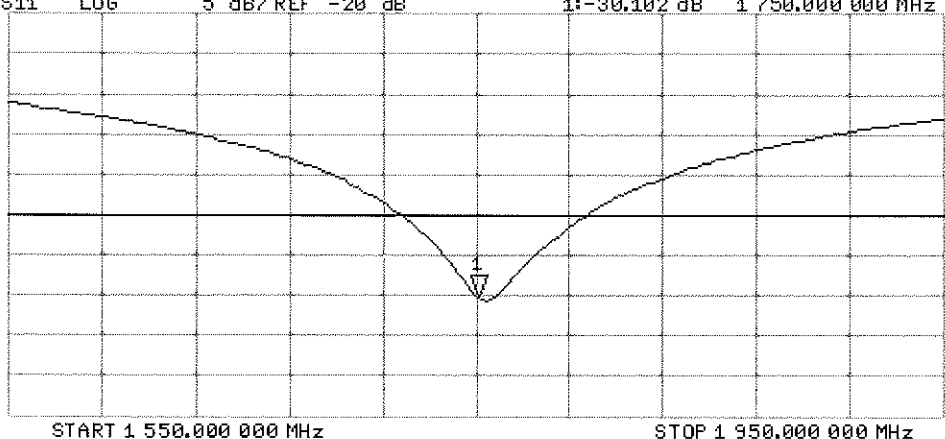


CH2 S11 LOG 5 dB/REF -20 dB 1:-30.102 dB 1 750.000 000 MHz

CA

Avg
16

H1d





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D1900V2-5d148_Feb13**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d148**

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

Calibration date: **February 06, 2013**

✓
KOK
2/21/13

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by: **Leif Klysner** Name: **Leif Klysner** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Name: **Katja Pokovic** Technical Manager

Signature

Issued: February 6, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.5
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.4 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.9 $\pm$ 6 %	1.53 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	40.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.7 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.1 Ω + 5.9 j Ω
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω + 6.3 j Ω
Return Loss	- 23.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 06.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

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

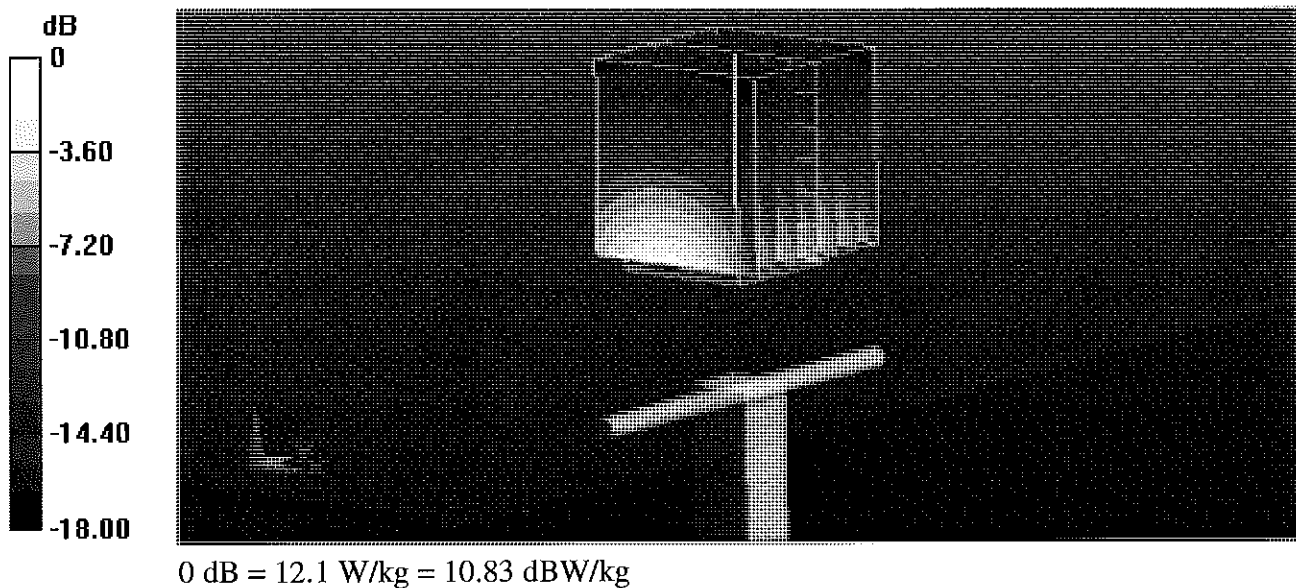
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.534 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.18 W/kg

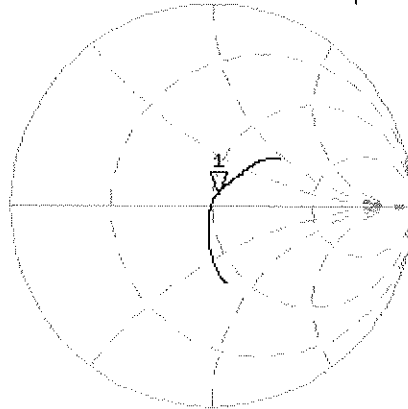
Maximum value of SAR (measured) = 12.1 W/kg



Impedance Measurement Plot for Head TSL

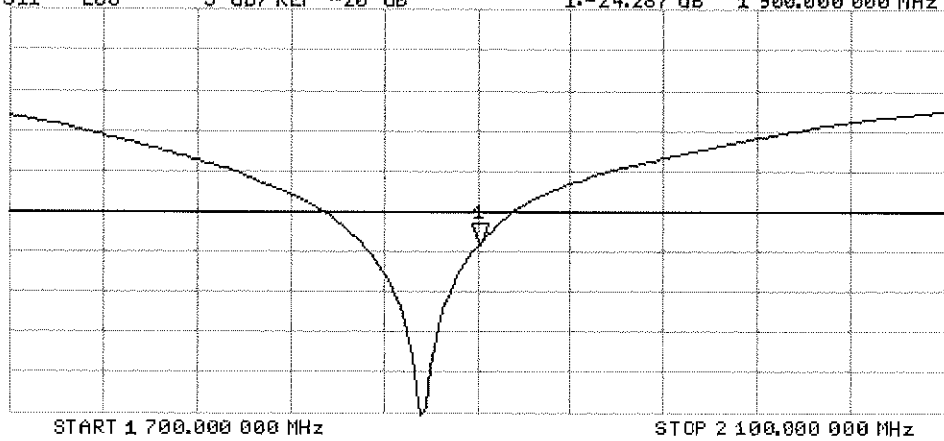
6 Feb 2013 09:25:10
 CH1 S11 1 U FS 1: 52.125 $\angle$ 5.8711 $\angle$ 491.80 μ H 1 900.000 000 MHz

*
 Del
 CA
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1: -24.287 dB 1 900.000 000 MHz

CA
 Avg
 16
 H1d



DASY5 Validation Report for Body TSL

Date: 06.02.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.53$ S/m; $\epsilon_r = 51.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

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

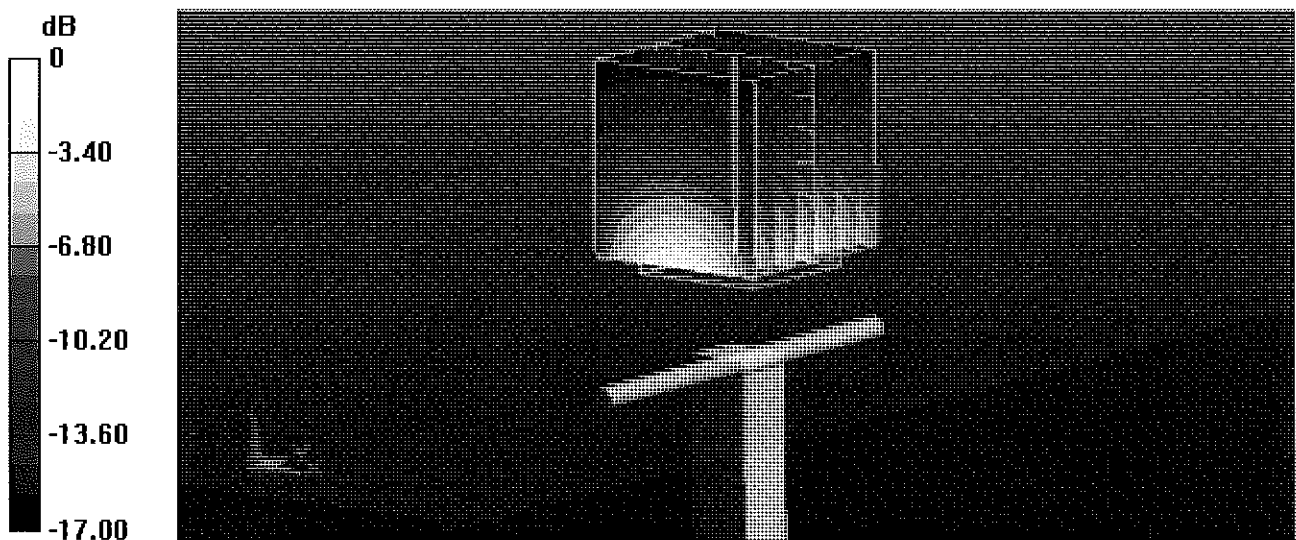
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.534 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.45 W/kg

Maximum value of SAR (measured) = 13.1 W/kg

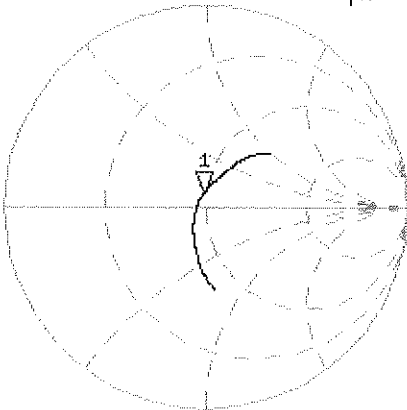


0 dB = 13.1 W/kg = 11.17 dBW/kg

Impedance Measurement Plot for Body TSL

6 Feb 2013 09:24:17
CH1 S11 1 U FS 1: 48.344 Ω 6.2715 Ω 525.34 μ H 1 900.000 000 MHz

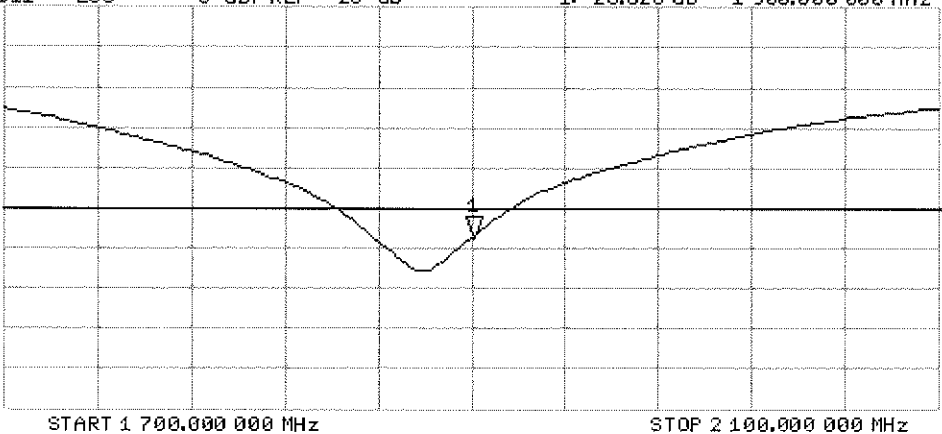
*
De1
CA



Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-23.628 dB 1 900.000 000 MHz

CA
Avg
16
H1d





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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D2450V2-719_Aug12**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 719**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **August 23, 2012**

✓ KOK
9/17/12

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by: **Israe El-Naouq** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Technical Manager

Signature

Israe El-Naouq
Katja Pokovic

Issued: August 23, 2012

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



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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 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 $\pm$ 0.2) °C	39.2 $\pm$ 6 %	1.81 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	52.7 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.19 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.7 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.3 $\pm$ 6 %	1.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	51.6 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.16 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.4 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$54.4 \Omega + 3.8 j\Omega$
Return Loss	- 25.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$50.7 \Omega + 5.9 j\Omega$
Return Loss	- 24.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 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 10, 2002

DASY5 Validation Report for Head TSL

Date: 23.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.81$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

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

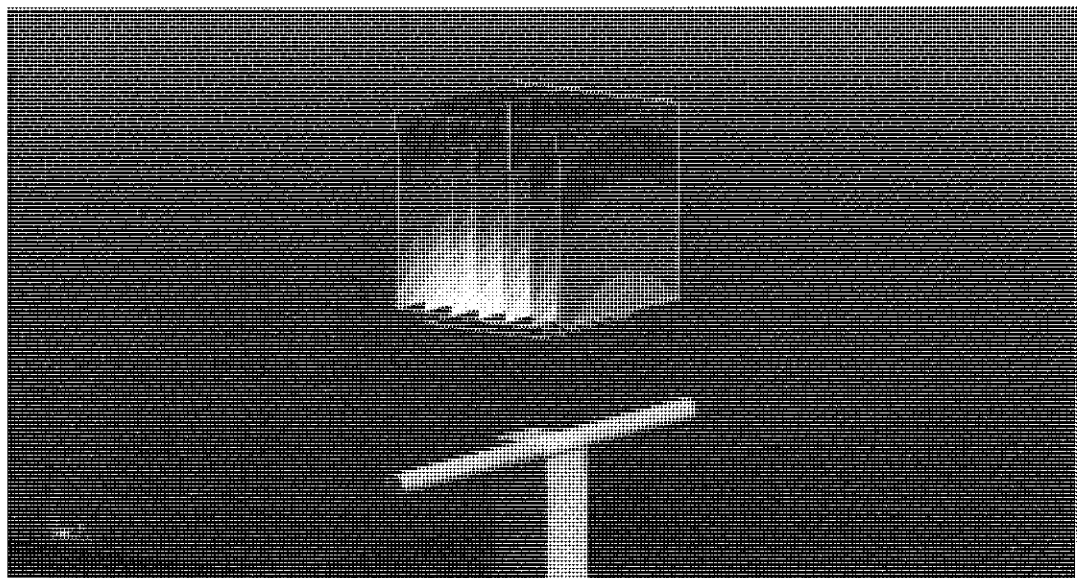
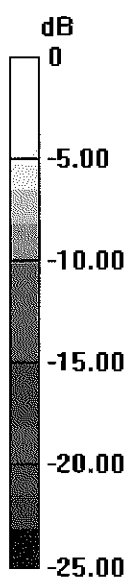
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.219 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 26.633 mW/g

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.19 mW/g

Maximum value of SAR (measured) = 16.5 W/kg

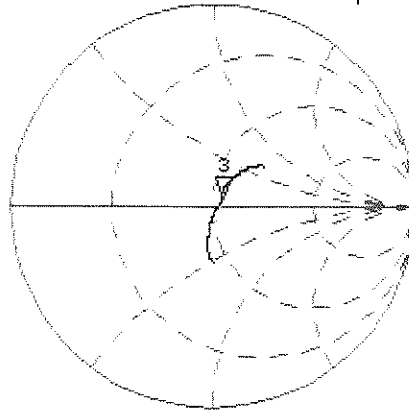


0 dB = 16.5 W/kg = 24.35 dB W/kg

Impedance Measurement Plot for Head TSL

22 Aug 2012 15:39:08
 [CH1] S11 1 U FS 3: 54.416 Ω 3.7656 Ω 244.62 pH 2 450.000 000 MHz

*
 Del
 CA



Avg
 16

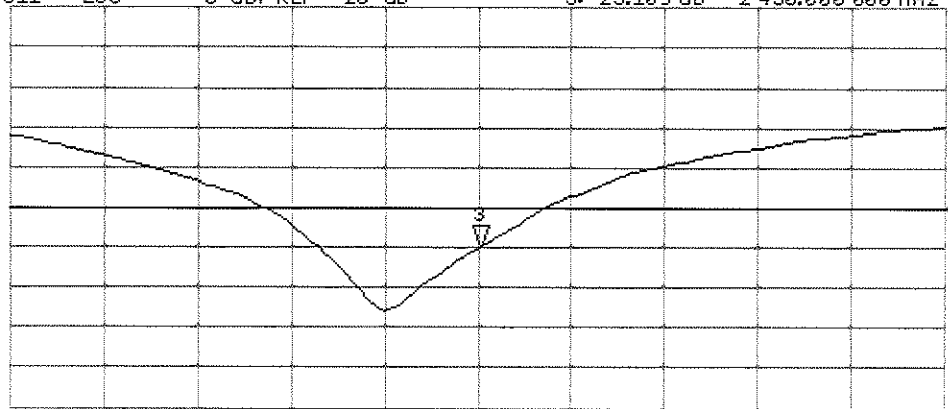
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3: -25.109 dB 2 450.000 000 MHz

CA

Avg
 16

H1d



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 22.08.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 51.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.2(969); SEMCAD X 14.6.6(6824)

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

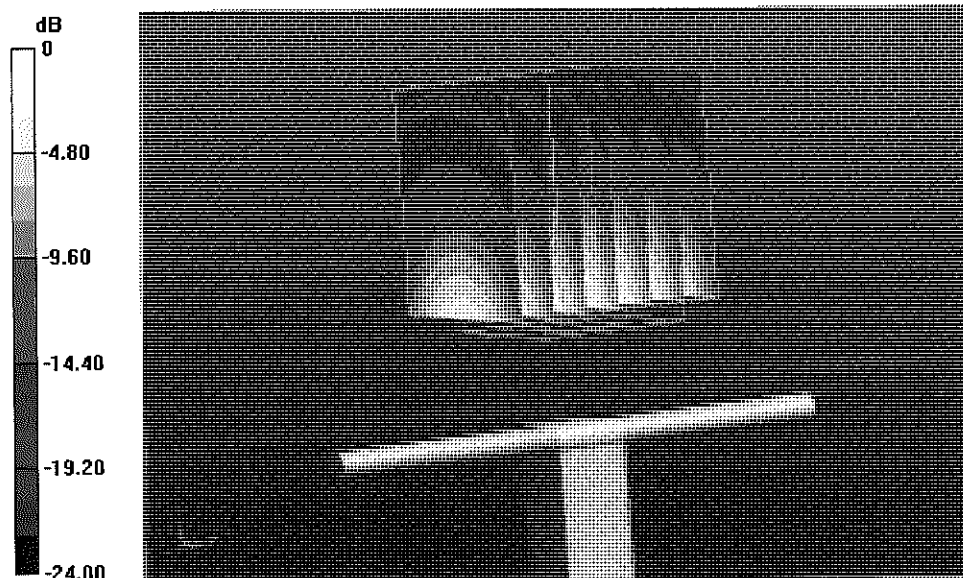
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.970 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 26.692 mW/g

SAR(1 g) = 13.1 mW/g; SAR(10 g) = 6.16 mW/g

Maximum value of SAR (measured) = 17.1 W/kg

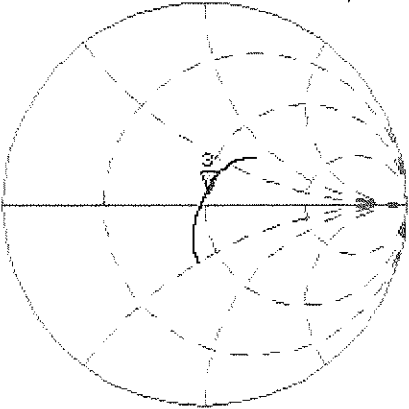


0 dB = 17.1 W/kg = 24.66 dB W/kg

Impedance Measurement Plot for Body TSL

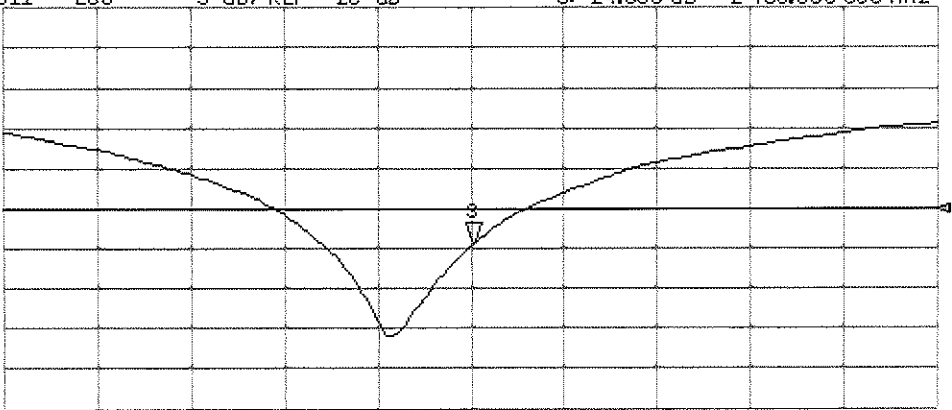
22 Aug 2012 15:38:22
[CH1] S11 1 U FS 3: 50.709 Ω 5.8906 Ω 382.66 pF 2 450.000 000 MHz

*
Del
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 3:-24.605 dB 2 450.000 000 MHz

CA
Avg
16
H1d



START 2 250.000 000 MHz STOP 2 650.000 000 MHz



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D5GHzV2-1057_Jan13**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1057**

Calibration procedure(s) **QA CAL-22.v2**
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: **January 11, 2013**

✓
KOK
1/29/13

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe EX3DV4	SN: 3503	28-Dec-12 (No. EX3-3503_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by: **Israe El-Naouq** Function: **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** Technical Manager

Israe El-Naouq
Katja Pokovic

Issued: January 11, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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:

- IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.5
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	5200 MHz $\pm$ 1 MHz 5300 MHz $\pm$ 1 MHz 5500 MHz $\pm$ 1 MHz 5600 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	34.6 $\pm$ 6 %	4.50 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.66 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	75.9 W/kg $\pm$ 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.4 W/kg $\pm$ 19.5 % (k=2)

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	76.9 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.9 W/kg ± 19.5 % (k=2)

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.79 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	80.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.5 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	34.1 ± 6 %	4.88 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	8.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	80.4 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 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.8 ± 6 %	5.09 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.69 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	76.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.4 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.42 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm ³ (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	75.5 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.1 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.55 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	75.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.1 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.81 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	80.8 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.4 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	46.3 ± 6 %	5.94 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	8.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	80.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.3 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.57 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	75.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.7 W/kg ± 19.5 % (k=2)

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	50.5 Ω - 9.8 j Ω
Return Loss	- 20.3 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	48.5 Ω - 4.5 j Ω
Return Loss	- 26.4 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.6 Ω - 5.8 j Ω
Return Loss	- 24.8 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	53.9 Ω - 3.8 j Ω
Return Loss	- 25.6 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	52.5 Ω - 4.4 j Ω
Return Loss	- 26.1 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.3 Ω - 7.9 j Ω
Return Loss	- 22.0 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	48.7 Ω - 3.2 j Ω
Return Loss	- 29.2 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.2 Ω - 4.8 j Ω
Return Loss	- 26.2 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	53.6 Ω - 2.1 j Ω
Return Loss	- 27.9 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	53.3 Ω - 2.9 j Ω
Return Loss	- 27.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 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 27, 2006

DASY5 Validation Report for Head TSL

Date: 11.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1057

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used: $f = 5200$ MHz; $\sigma = 4.5$ S/m; $\epsilon_r = 34.6$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5300$ MHz; $\sigma = 4.6$ S/m; $\epsilon_r = 34.5$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 4.79$ S/m; $\epsilon_r = 34.2$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5600$ MHz; $\sigma = 4.88$ S/m; $\epsilon_r = 34.1$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 5.09$ S/m; $\epsilon_r = 33.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(5.1, 5.1, 5.1); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.76, 4.76, 4.76); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.671 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 29.4 W/kg

SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.17 W/kg

Maximum value of SAR (measured) = 18.5 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.473 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 30.3 W/kg

SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.22 W/kg

Maximum value of SAR (measured) = 18.8 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.735 V/m; Power Drift = 0.08 dB

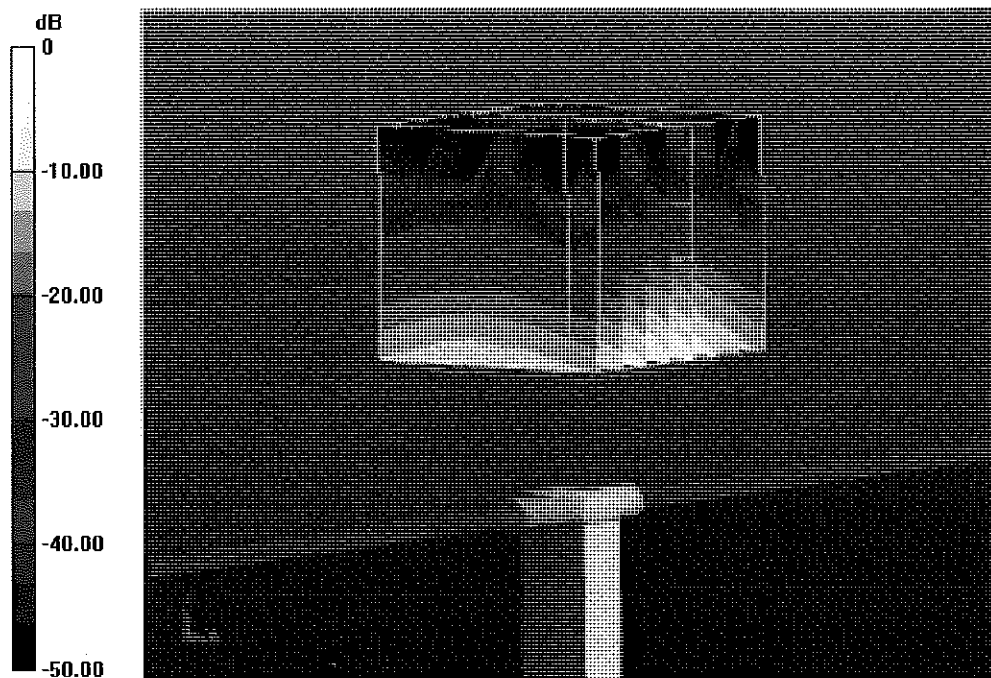
Peak SAR (extrapolated) = 33.2 W/kg

SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 20.1 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 = 63.848 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 33.5 W/kg
SAR(1 g) = 8.12 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 20.2 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.467 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 33.3 W/kg
SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

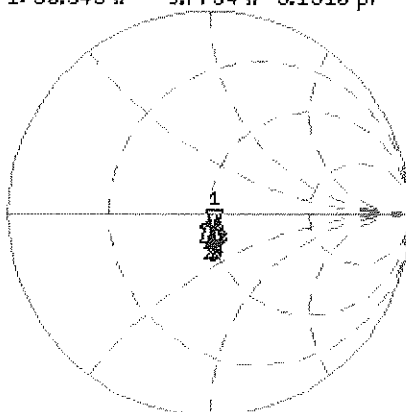
Impedance Measurement Plot for Head TSL

11 Jan 2013 09:26:56
 [CH1] S11 1 U FS 1: 50.543 Ω -9.7754 Ω 3.1310 pF 5 200.000 000 MHz

*
 Del
 CA

Avg
 16

H1 d



CH1 Markers

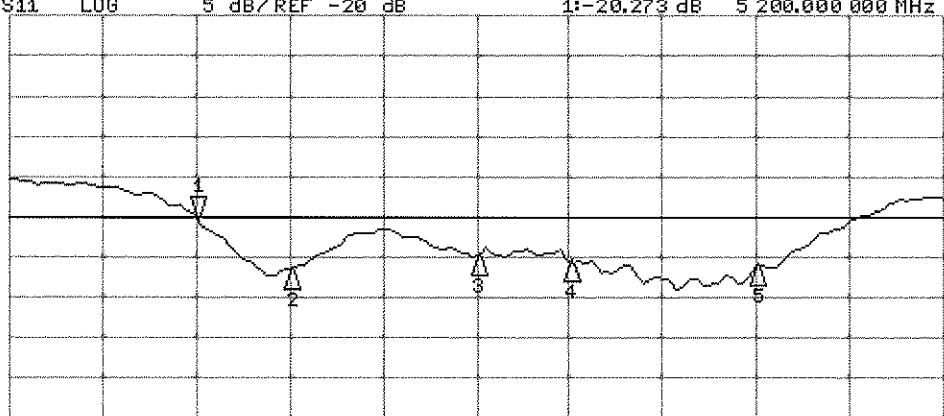
2: 48.508 Ω
 -4.4805 Ω
 5.30000 GHz
 3: 50.617 Ω
 -5.7559 Ω
 5.50000 GHz
 4: 53.891 Ω
 -3.8418 Ω
 5.60000 GHz
 5: 52.500 Ω
 -4.4160 Ω
 5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -20.273 dB 5 200.000 000 MHz

CA

Avg
 16

H1 d



CH2 Markers

2: -26.396 dB
 5.30000 GHz
 3: -24.818 dB
 5.50000 GHz
 4: -25.573 dB
 5.60000 GHz
 5: -26.115 dB
 5.80000 GHz

START 5 000.000 000 MHz

STOP 6 000.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 10.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1057

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5300$ MHz; $\sigma = 5.55$ S/m; $\epsilon_r = 46.8$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 5.81$ S/m; $\epsilon_r = 46.5$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5600$ MHz; $\sigma = 5.94$ S/m; $\epsilon_r = 46.3$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 6.21$ S/m; $\epsilon_r = 46$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.67, 4.67, 4.67); Calibrated: 28.12.2012, ConvF(4.43, 4.43, 4.43); Calibrated: 28.12.2012, ConvF(4.22, 4.22, 4.22); Calibrated: 28.12.2012, ConvF(4.38, 4.38, 4.38); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.074 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 30.4 W/kg

SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.13 W/kg

Maximum value of SAR (measured) = 18.0 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.924 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 30.9 W/kg

SAR(1 g) = 7.59 W/kg; SAR(10 g) = 2.13 W/kg

Maximum value of SAR (measured) = 17.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.561 V/m; Power Drift = -0.01 dB

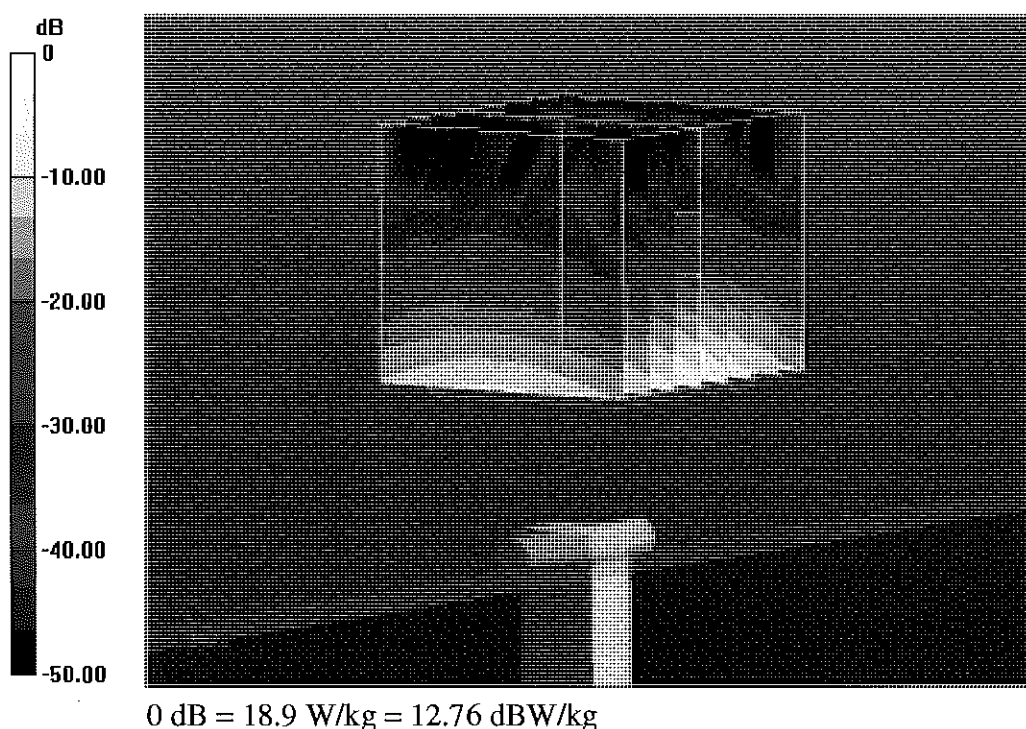
Peak SAR (extrapolated) = 35.3 W/kg

SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.26 W/kg

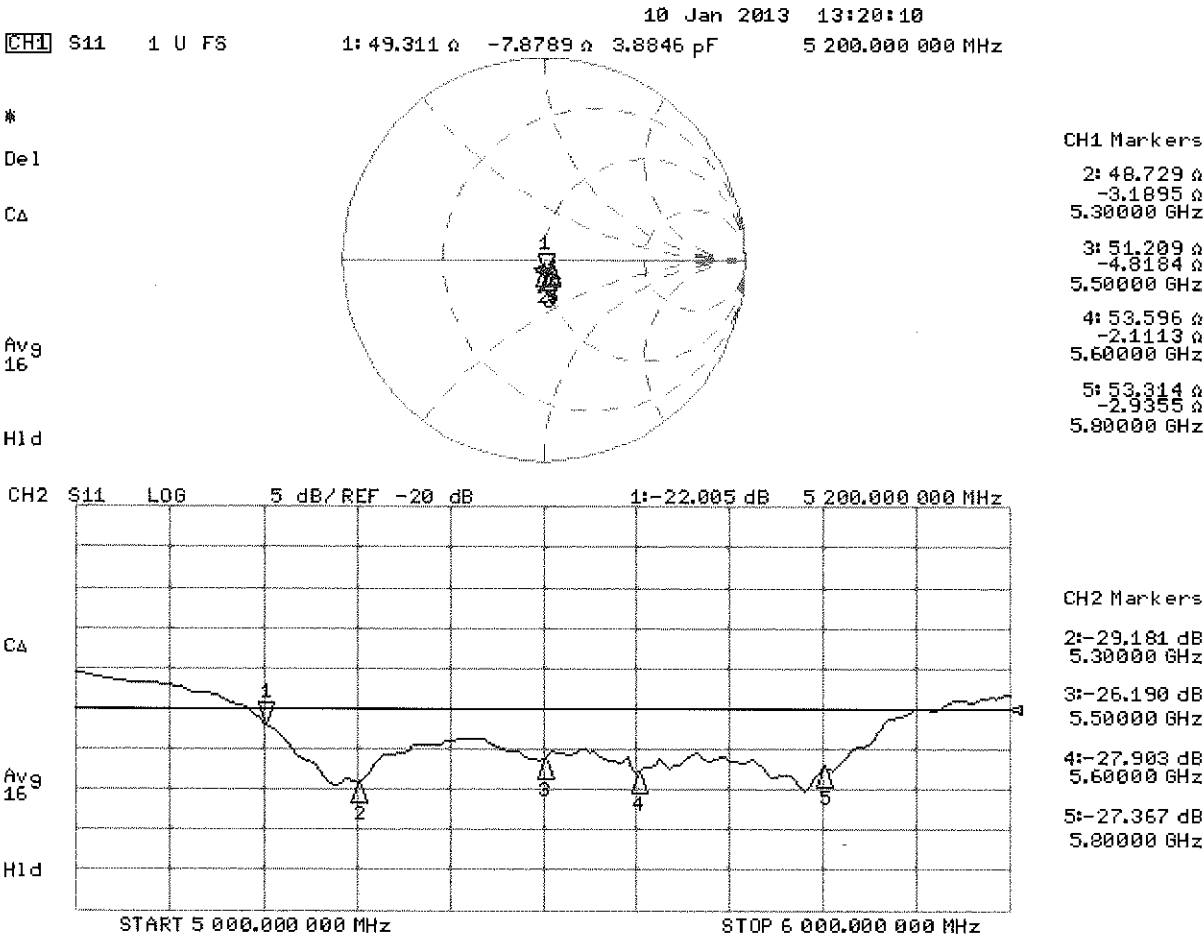
Maximum value of SAR (measured) = 19.7 W/kg

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 = 58.884 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 36.3 W/kg
SAR(1 g) = 8.1 W/kg; SAR(10 g) = 2.25 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 55.753 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 35.6 W/kg
SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 18.9 W/kg



Impedance Measurement Plot for Body TSL





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 108**

Client **PC Test**

Certificate No: **D1765V2-1008_May13**

CALIBRATION CERTIFICATE

Object **D1765V2 - SN: 1008**

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

Calibration date: **May 14, 2013**

*✓ 100K
5/23/13*

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: May 15, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.1 $\pm$ 6 %	1.33 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.6 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	51.7 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.53 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	38.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.4 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.3 Ω - 6.4 j Ω
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.8 Ω - 6.1 j Ω
Return Loss	- 20.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.211 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2005

DASY5 Validation Report for Head TSL

Date: 14.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW ; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.33$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.18, 5.18, 5.18); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

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

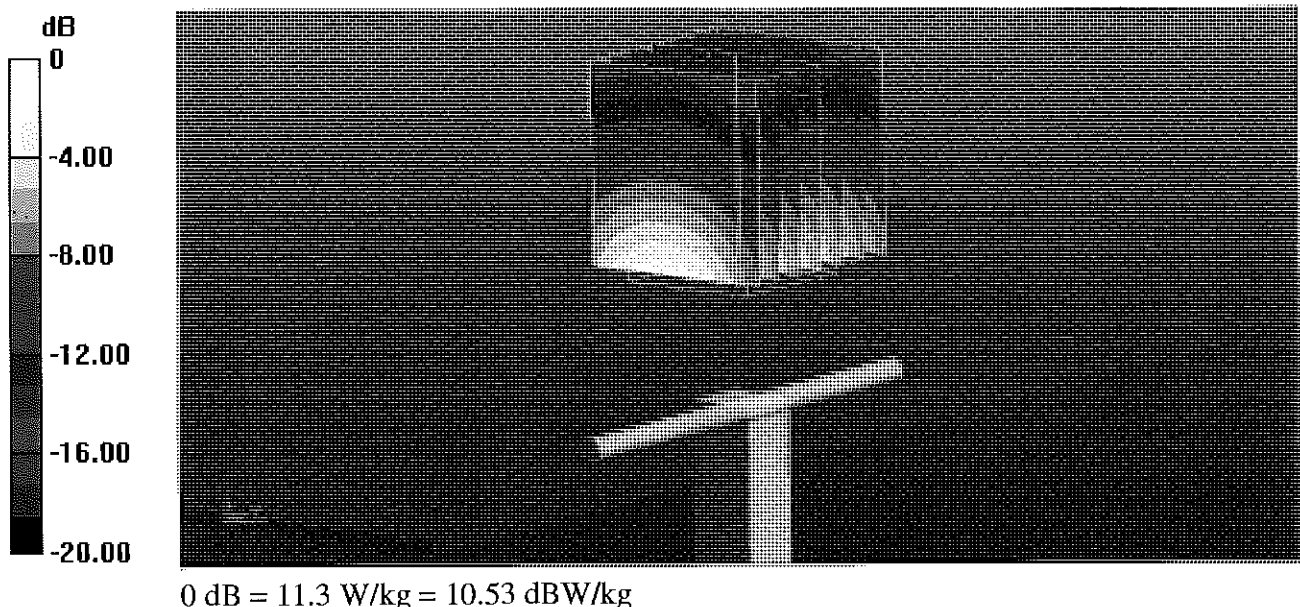
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.430 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 9.09 W/kg; SAR(10 g) = 4.85 W/kg

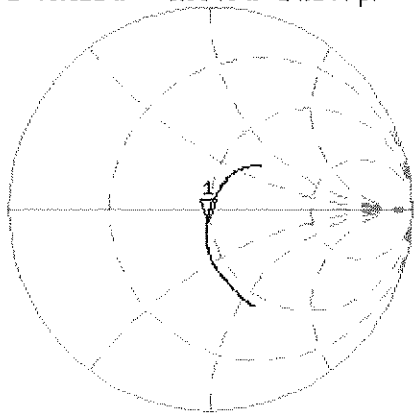
Maximum value of SAR (measured) = 11.3 W/kg



Impedance Measurement Plot for Head TSL

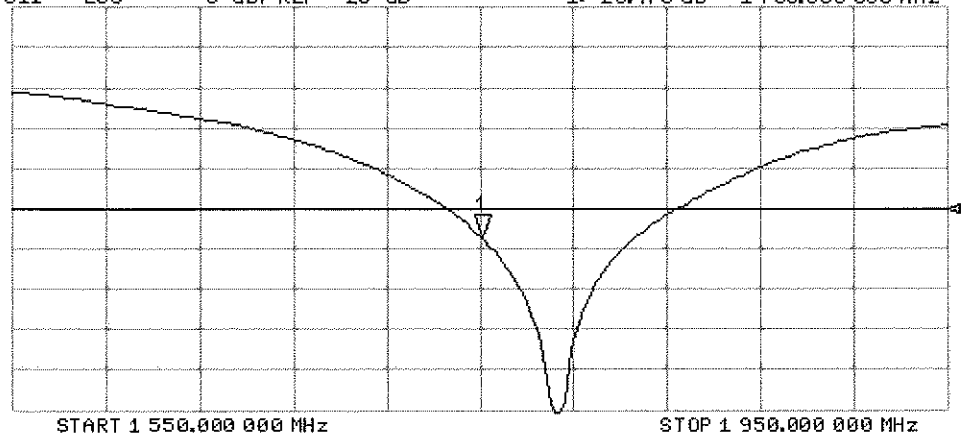
14 May 2013 15:57:39
[CH1] S11 1 U FS 1: 48.322 Ω -6.3848 Ω 14.244 pF 1 750.000 000 MHz

*
De1
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-23.476 dB 1 750.000 000 MHz

CA
Avg
16
H1d



DASY5 Validation Report for Body TSL

Date: 13.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW ; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 51.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.83, 4.83, 4.83); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

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

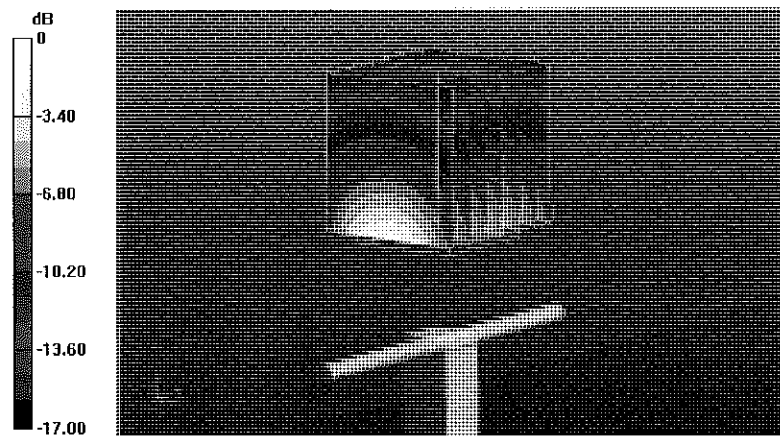
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.430 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.53 W/kg; SAR(10 g) = 5.1 W/kg

Maximum value of SAR (measured) = 12.0 W/kg

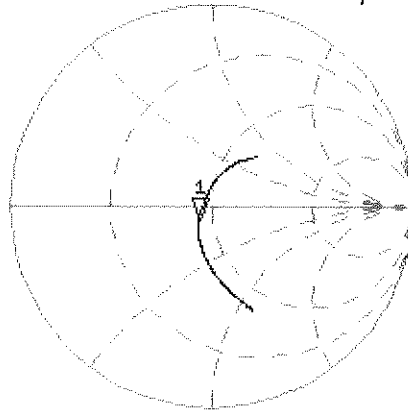


0 dB = 12.0 W/kg = 10.79 dBW/kg

Impedance Measurement Plot for Body TSL

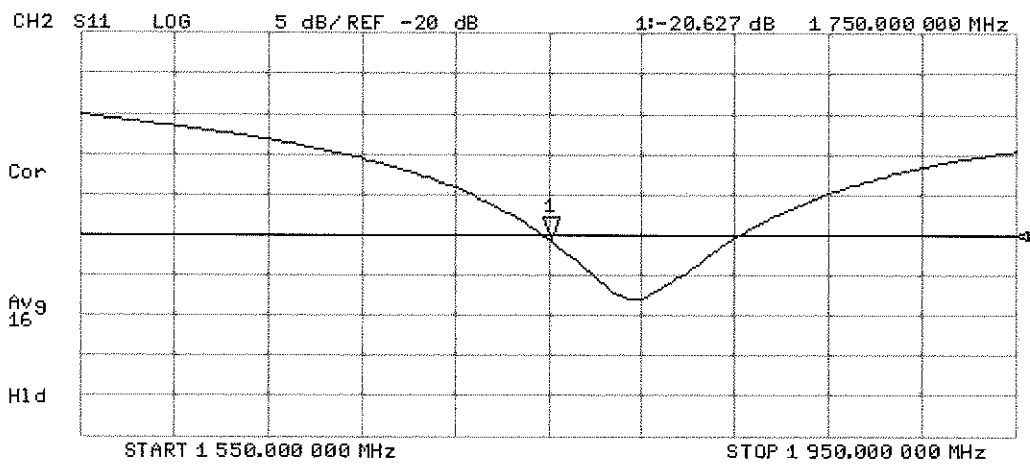
13 May 2013 15:25:53
[CH1] S11 1 U FS 1: 43.775 Ω -6.1426 Ω 14.806 pF 1 750.000 000 MHz

*
De1
Cor



Avg
16

H1d





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D1900V2-5d141_May13**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d141**

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

Calibration date: **May 02, 2013**

✓
5/8/13

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by: **Claudio Leubler** Name: **Claudio Leubler** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Name: **Katja Pokovic** Function: **Technical Manager**

Signature

[Signature of Claudio Leubler]

[Signature of Katja Pokovic]

Issued: May 2, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.3 $\pm$ 6 %	1.37 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.3 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.0 $\pm$ 6 %	1.51 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	41.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.51 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.1 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.6 \Omega + 4.9 j\Omega$
Return Loss	- 25.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.3 \Omega + 5.9 j\Omega$
Return Loss	- 24.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 02.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

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

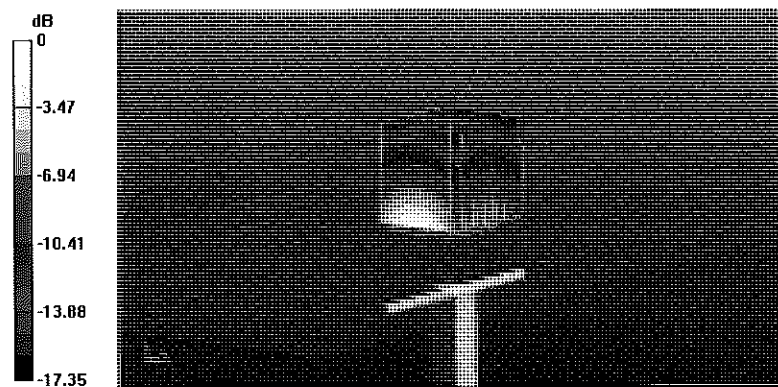
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.124 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 18.2 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.3 W/kg

Maximum value of SAR (measured) = 12.5 W/kg

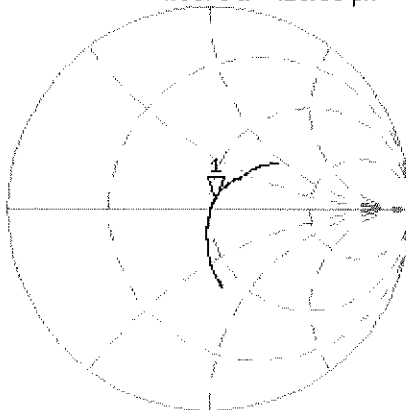


0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Head TSL

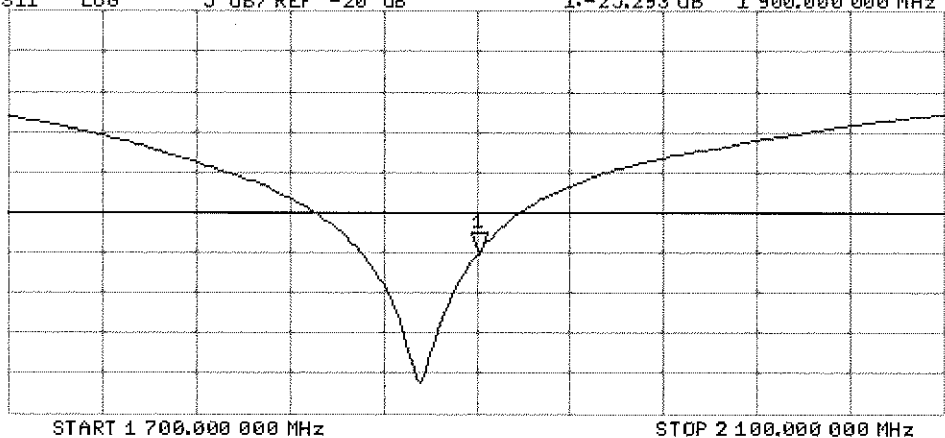
2 May 2013 15:38:50
 [CH1] S11 1 U FS 1: 52.600 Ω 4.9375 Ω 413.59 μ H 1 900.000 000 MHz

*
 Del
 Cor
 Avg
 4
 Hld



CH2 S11 LOG 5 dB/REF -20 dB 1:-25.293 dB 1 900.000 000 MHz

Cor
 Avg
 4
 Hld



DASY5 Validation Report for Body TSL

Date: 02.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.51$ S/m; $\epsilon_r = 54$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

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

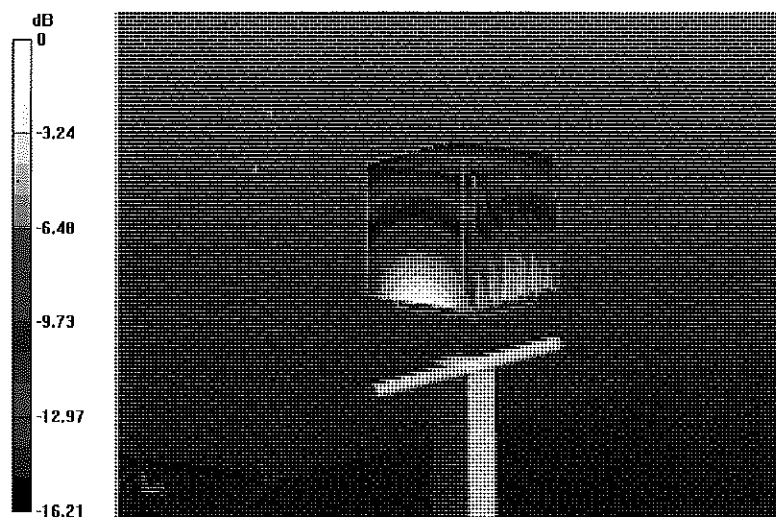
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.124 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.51 W/kg

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.14 dBW/kg

Impedance Measurement Plot for Body TSL

2 May 2013 15:38:04
 [CH1] S11 1 U FS 1: 48.273 Ω 5.9121 Ω 495.23 μ H 1 900.000 000 MHz

*

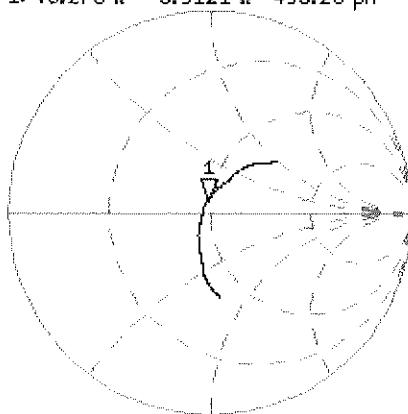
De1

Cor

Avg

16

H1d



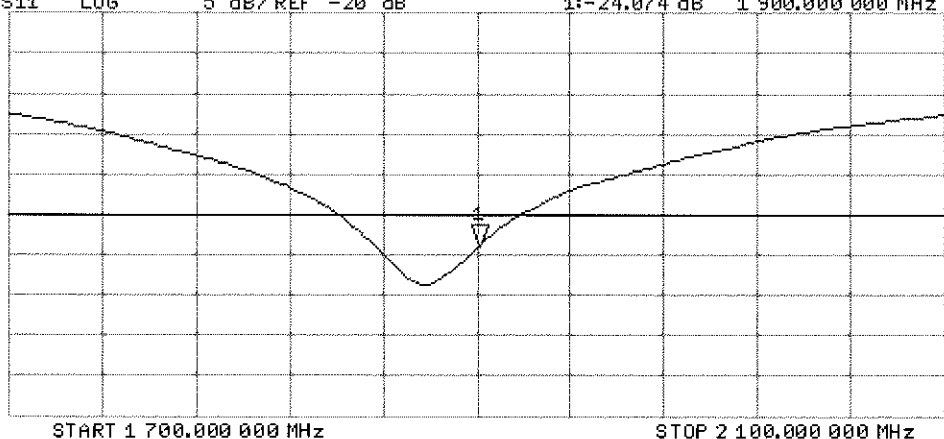
CH2 S11 LOG 5 dB/REF -20 dB 1:-24.074 dB 1 900.000 000 MHz

Cor

Avg

16

H1d



**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 108**

Client **PC Test**

Certificate No: **ES3-3288_Sep12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3288**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

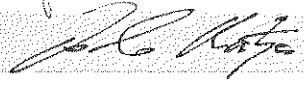
Calibration date: **September 20, 2012**

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 E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: September 20, 2012



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A, B, C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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.

Probe ES3DV3

SN:3288

Manufactured: July 6, 2010
Calibrated: September 20, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.87	0.97	0.75	$\pm 10.1 \%$
DCP (mV) ^B	101.3	102.4	103.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	168.6	$\pm 3.3 \%$
			Y	0.00	0.00	1.00	132.2	
			Z	0.00	0.00	1.00	156.8	

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 NormX,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:3288

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.67	6.67	6.67	0.80	1.14	± 12.0 %
835	41.5	0.90	6.41	6.41	6.41	0.76	1.18	± 12.0 %
1750	40.1	1.37	5.51	5.51	5.51	0.70	1.28	± 12.0 %
1900	40.0	1.40	5.28	5.28	5.28	0.80	1.22	± 12.0 %
2450	39.2	1.80	4.61	4.61	4.61	0.80	1.26	± 12.0 %
2600	39.0	1.96	4.45	4.45	4.45	0.80	1.31	± 12.0 %

^c Frequency validity 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.

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

Calibration Parameter Determined in Body Tissue Simulating Media

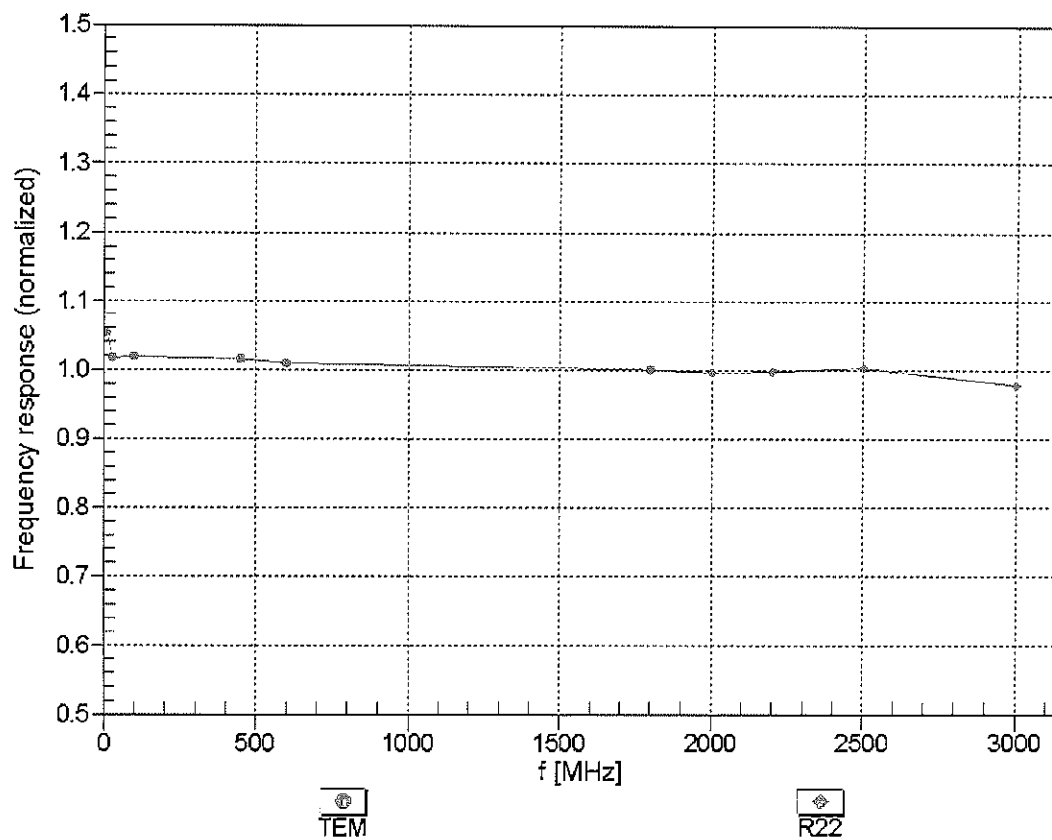
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.44	6.44	6.44	0.62	1.31	± 12.0 %
835	55.2	0.97	6.31	6.31	6.31	0.38	1.78	± 12.0 %
1750	53.4	1.49	5.18	5.18	5.18	0.64	1.43	± 12.0 %
1900	53.3	1.52	4.89	4.89	4.89	0.50	1.64	± 12.0 %
2450	52.7	1.95	4.35	4.35	4.35	0.74	1.23	± 12.0 %
2600	52.5	2.16	4.09	4.09	4.09	0.80	1.07	± 12.0 %

^C Frequency validity 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.

^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.

Frequency Response of E-Field

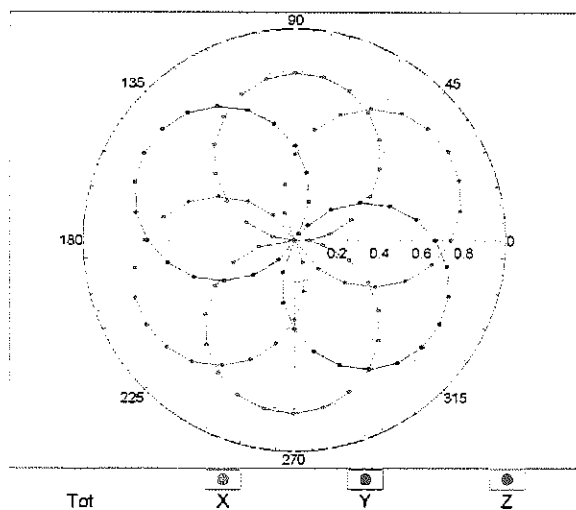
(TEM-Cell:ifi110 EXX, Waveguide: R22)



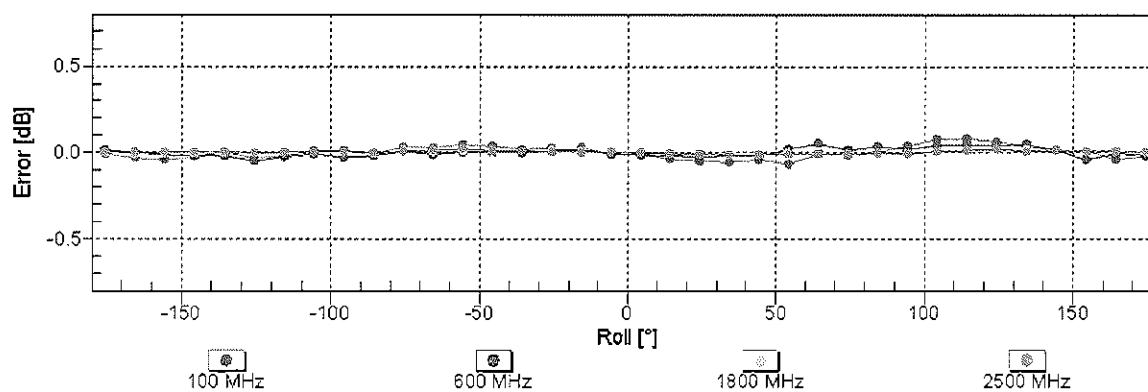
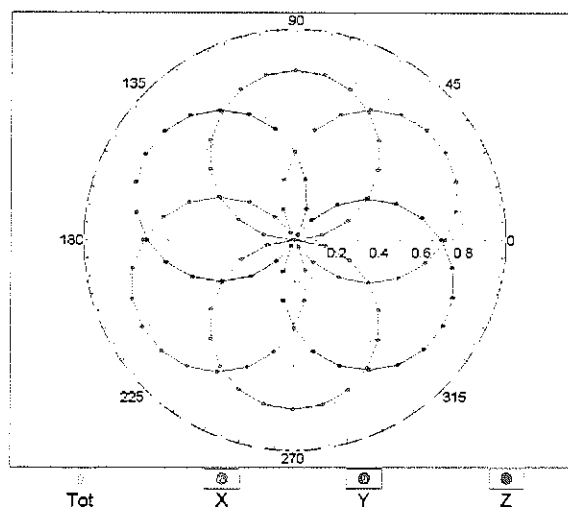
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

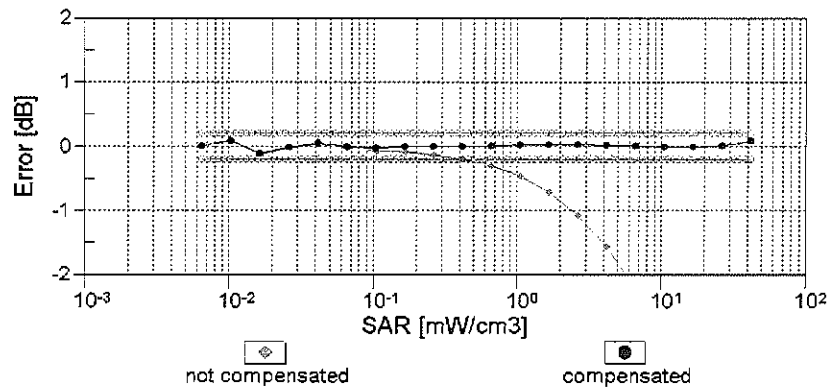
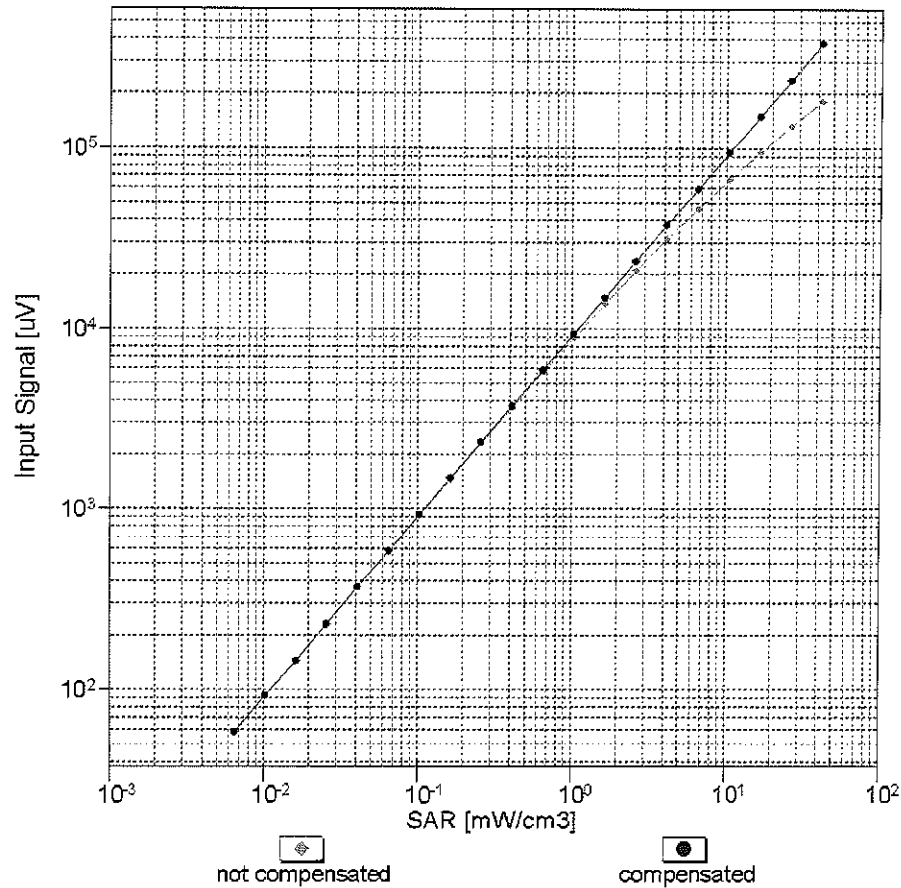


f=1800 MHz,R22



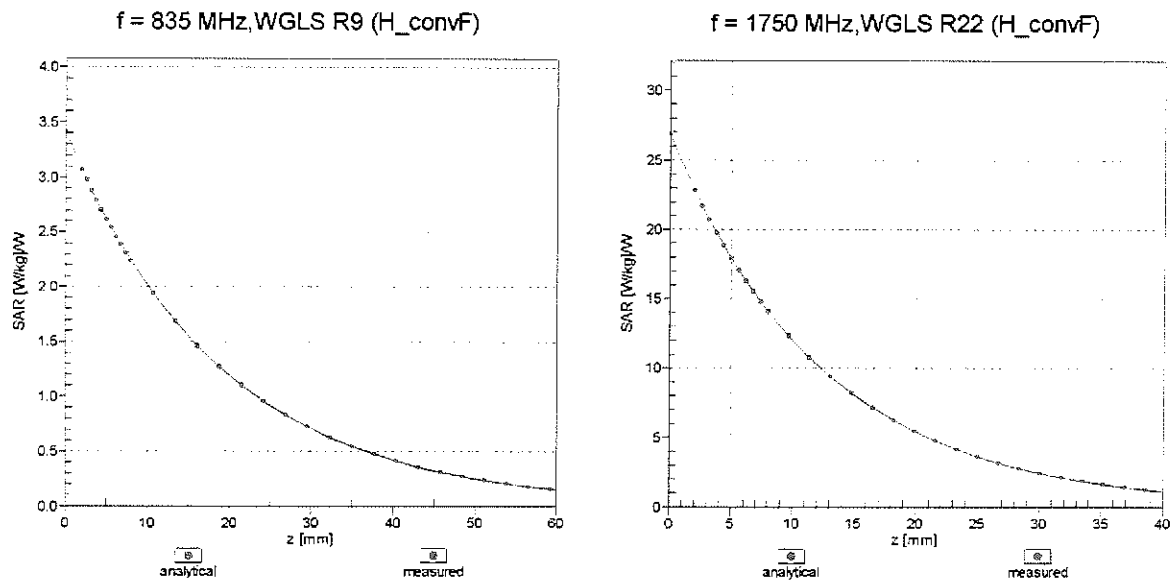
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



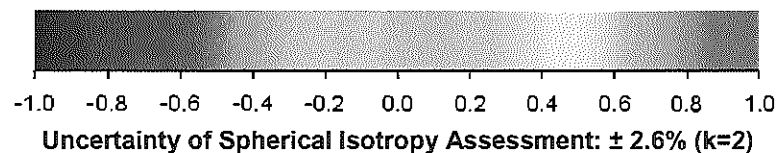
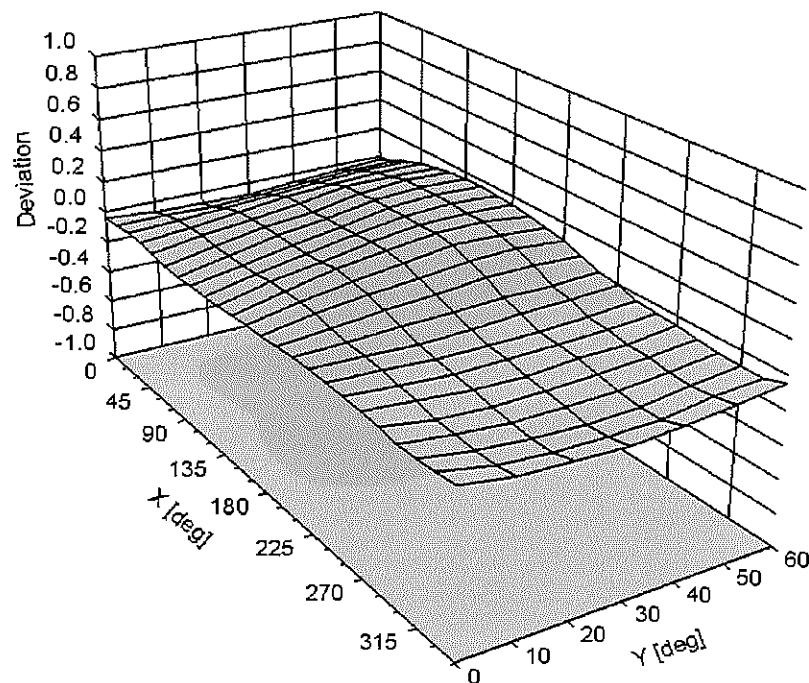
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	54.3
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



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 108**

Client **PC Test**

Certificate No: **ES3-3209_Mar13**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3209**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **March 15, 2013**

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)

✓ KOK
3/24/13

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Israe El-Naouq	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature
			Issued: March 15, 2013
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}; A, B, C, D** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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.

Probe ES3DV3

SN:3209

Manufactured: October 14, 2008
Calibrated: March 15, 2013

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 ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.35	1.33	1.14	$\pm 10.1 \%$
DCP (mV) ^B	99.2	97.8	98.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	163.6	$\pm 3.5 \%$
		Y	0.0	0.0	1.0		170.3	
		Z	0.0	0.0	1.0		158.7	

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 NormX,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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.74	6.74	6.74	0.76	1.18	± 12.0 %
835	41.5	0.90	6.46	6.46	6.46	0.31	1.81	± 12.0 %
1750	40.1	1.37	5.39	5.39	5.39	0.80	1.21	± 12.0 %
1900	40.0	1.40	5.21	5.21	5.21	0.78	1.26	± 12.0 %
2450	39.2	1.80	4.57	4.57	4.57	0.65	1.43	± 12.0 %
2600	39.0	1.96	4.43	4.43	4.43	0.75	1.36	± 12.0 %

^C Frequency validity 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.

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Calibration Parameter Determined in Body Tissue Simulating Media

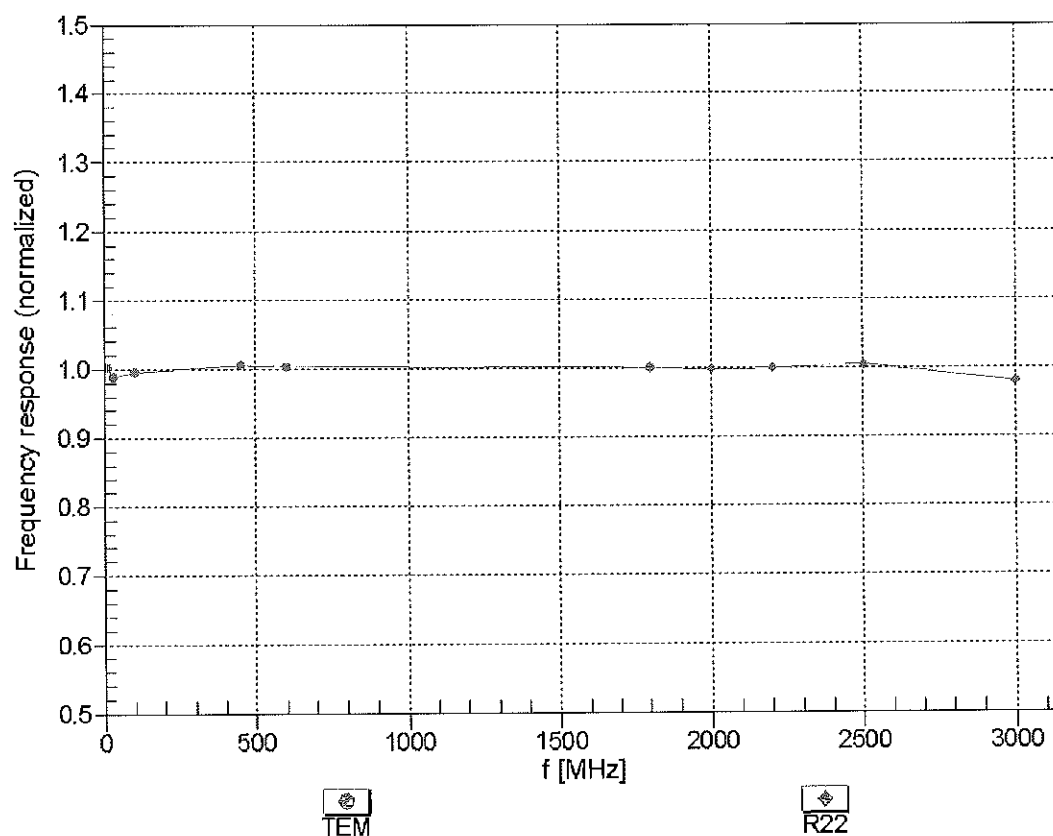
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.38	6.38	6.38	0.80	1.16	± 12.0 %
835	55.2	0.97	6.28	6.28	6.28	0.52	1.45	± 12.0 %
1750	53.4	1.49	5.03	5.03	5.03	0.58	1.45	± 12.0 %
1900	53.3	1.52	4.77	4.77	4.77	0.70	1.36	± 12.0 %
2450	52.7	1.95	4.34	4.34	4.34	0.80	1.15	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.80	1.00	± 12.0 %

^C Frequency validity 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.

^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.

Frequency Response of E-Field

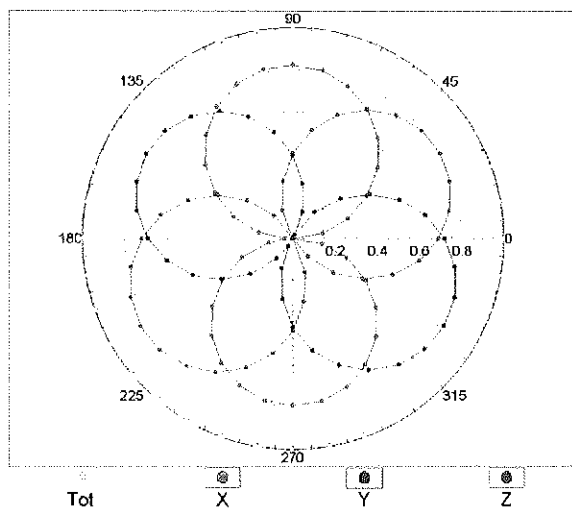
(TEM-Cell:ifi110 EXX, Waveguide: R22)



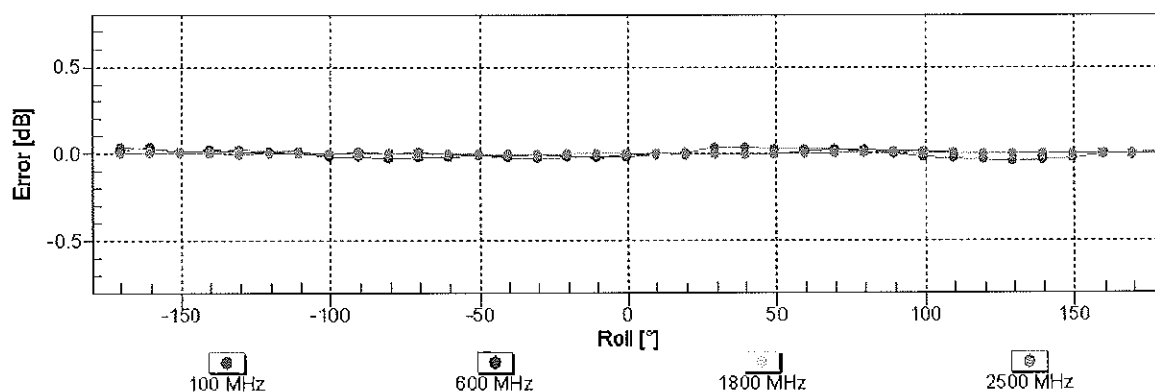
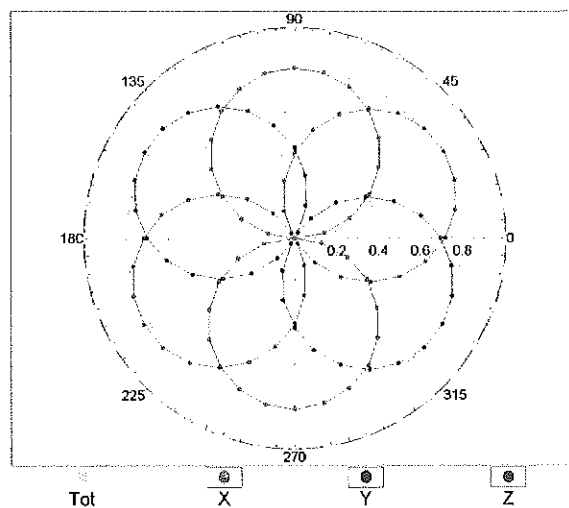
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

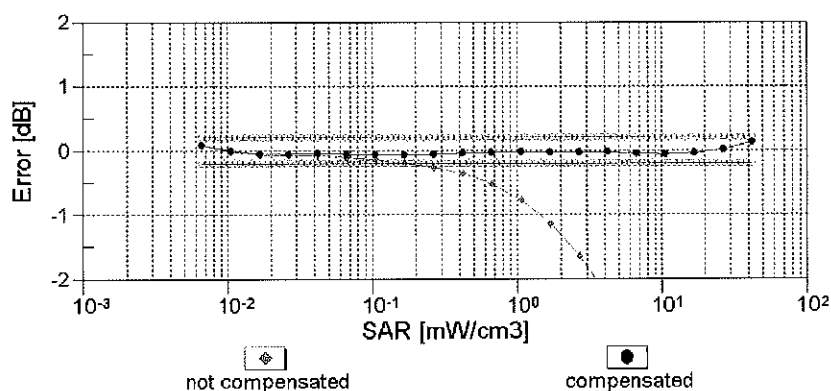
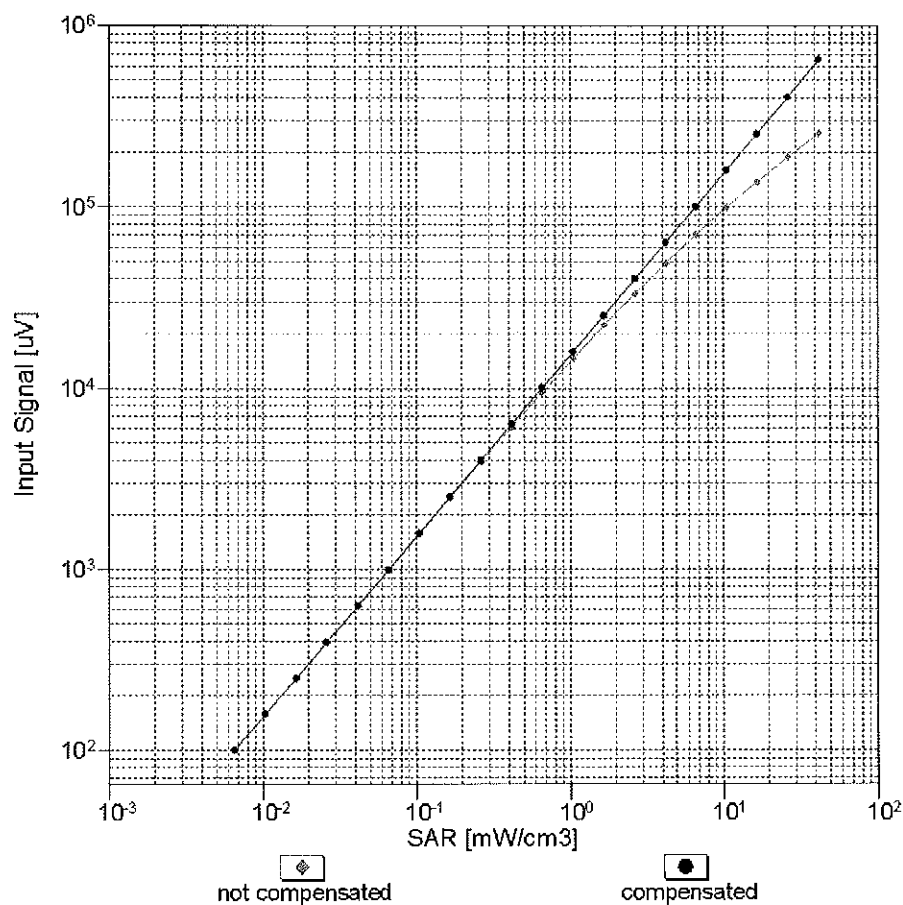


f=1800 MHz,R22



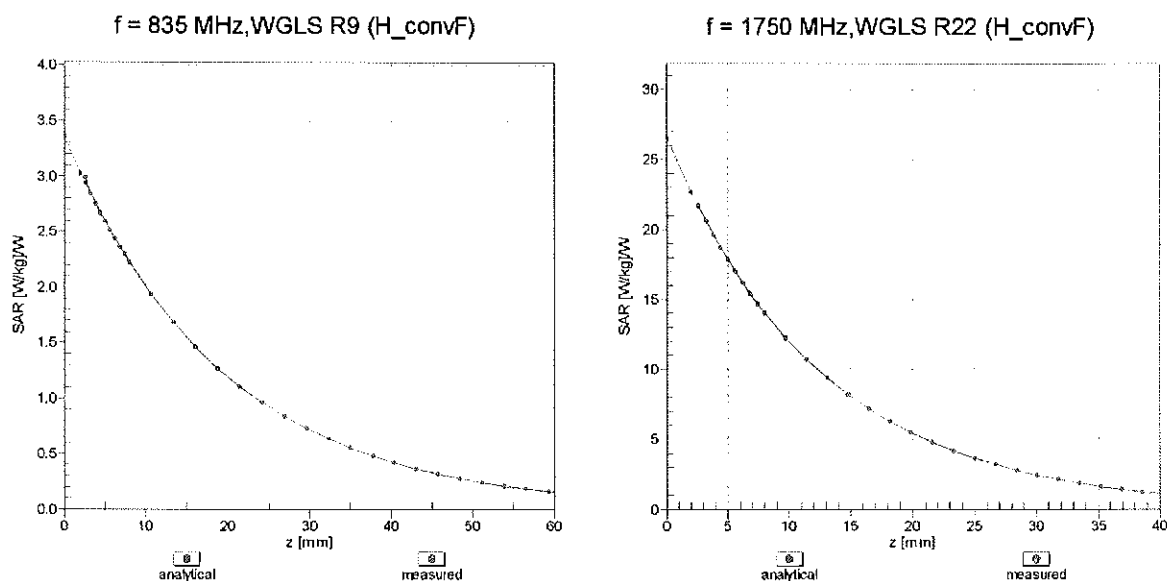
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



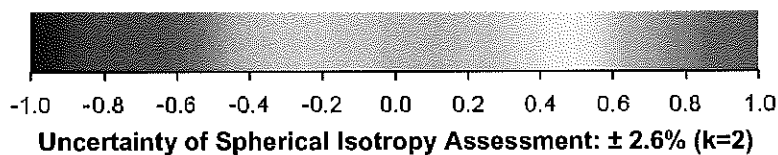
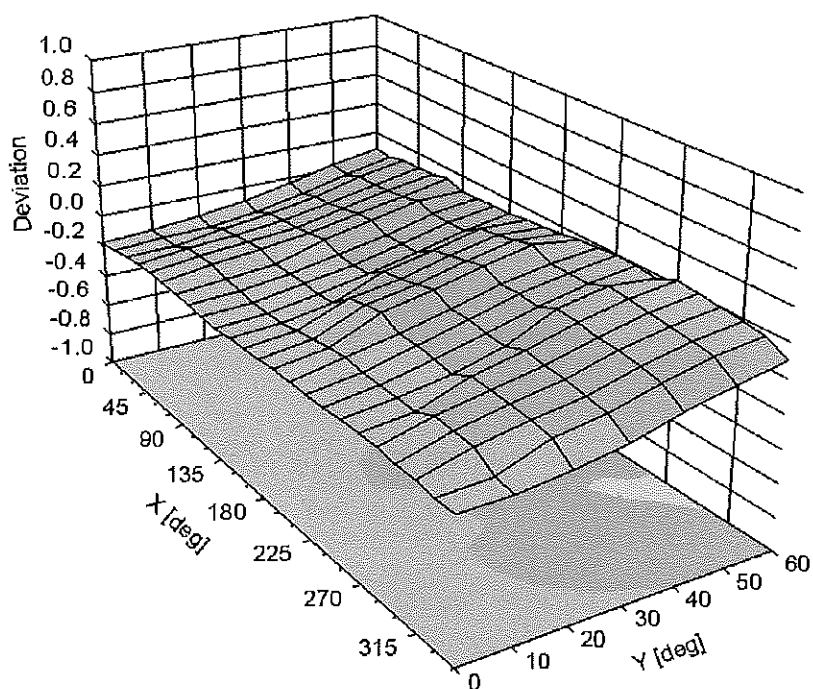
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3209

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-40.6
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



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 108**

Client **PC Test**

Certificate No: **ES3-3022_Aug12**

CALIBRATION CERTIFICATE

Object **ES3DV2 - SN:3022**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

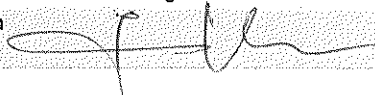
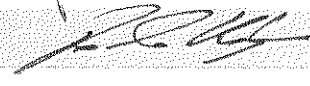
Calibration date: **August 28, 2012**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	
			Issued: August 28, 2012
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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.

Probe ES3DV2

SN:3022

Manufactured: April 15, 2003
Calibrated: August 28, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.00	1.04	0.99	$\pm 10.1 \%$
DCP (mV) ^B	98.3	99.5	101.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	133.3	$\pm 2.7 \%$
			Y	0.00	0.00	1.00	140.3	
			Z	0.00	0.00	1.00	178.9	

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 NormX,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: ES3DV2 - SN:3022

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.30	6.30	6.30	0.30	1.72	± 12.0 %
835	41.5	0.90	6.03	6.03	6.03	0.35	1.63	± 12.0 %
1750	40.1	1.37	5.07	5.07	5.07	0.32	1.89	± 12.0 %
1900	40.0	1.40	4.86	4.86	4.86	0.40	1.57	± 12.0 %
2450	39.2	1.80	4.23	4.23	4.23	0.59	1.44	± 12.0 %
2600	39.0	1.96	4.10	4.10	4.10	0.67	1.37	± 12.0 %

^C Frequency validity 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.

^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.

DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Calibration Parameter Determined in Body Tissue Simulating Media

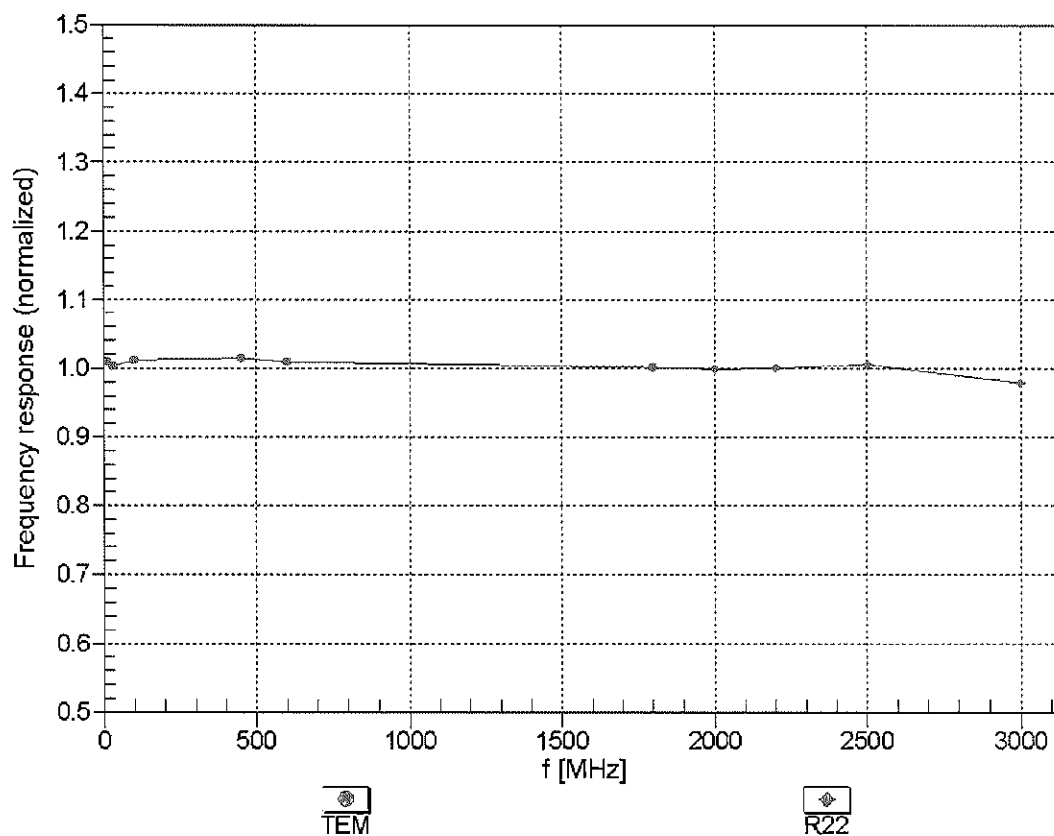
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.07	6.07	6.07	0.23	2.09	± 12.0 %
835	55.2	0.97	6.02	6.02	6.02	0.47	1.44	± 12.0 %
1750	53.4	1.49	4.70	4.70	4.70	0.46	1.55	± 12.0 %
1900	53.3	1.52	4.43	4.43	4.43	0.36	1.87	± 12.0 %
2450	52.7	1.95	3.97	3.97	3.97	0.65	1.06	± 12.0 %
2600	52.5	2.16	3.80	3.80	3.80	0.54	0.75	± 12.0 %

^C Frequency validity 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.

^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.

Frequency Response of E-Field

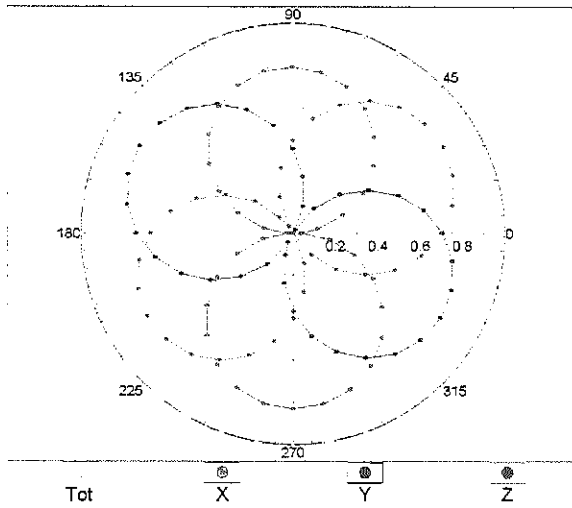
(TEM-Cell:ifi110 EXX, Waveguide: R22)



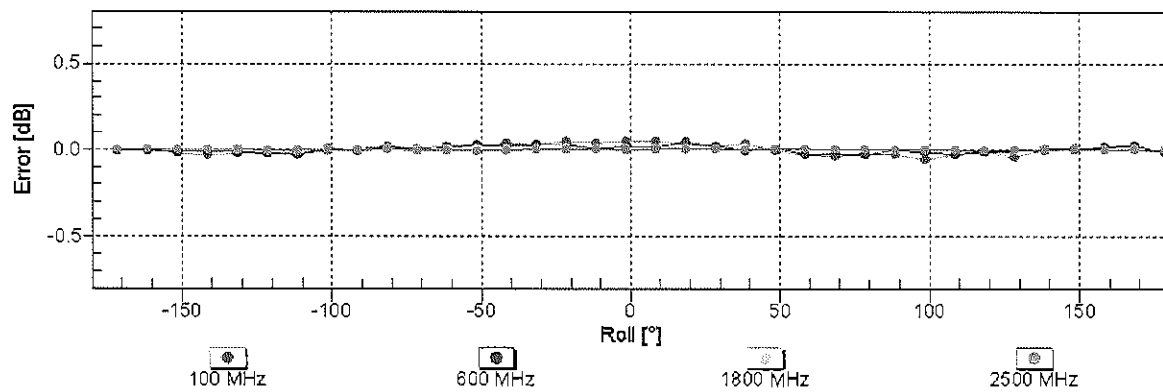
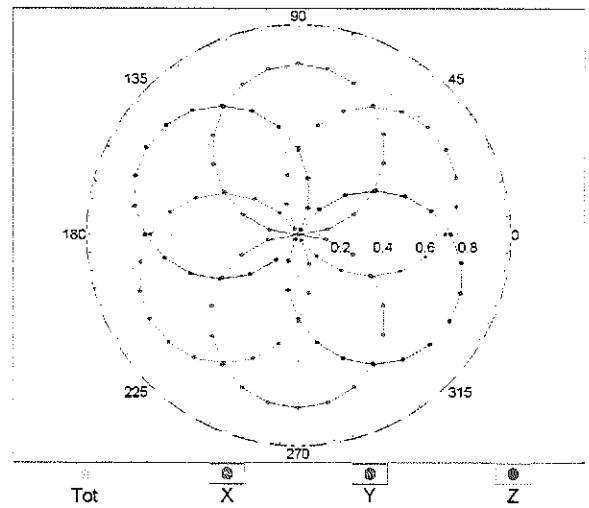
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM

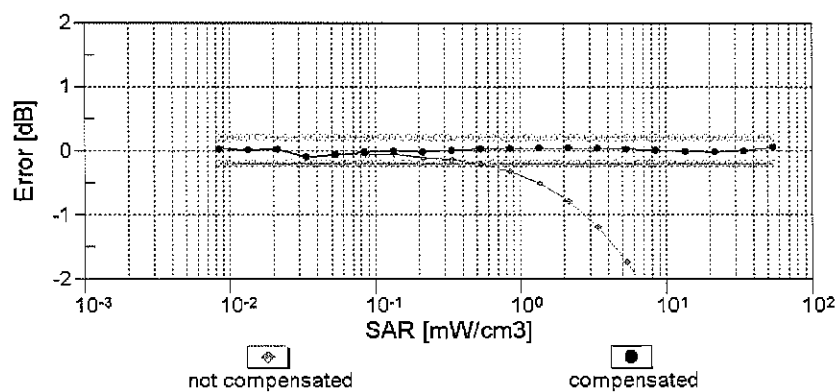
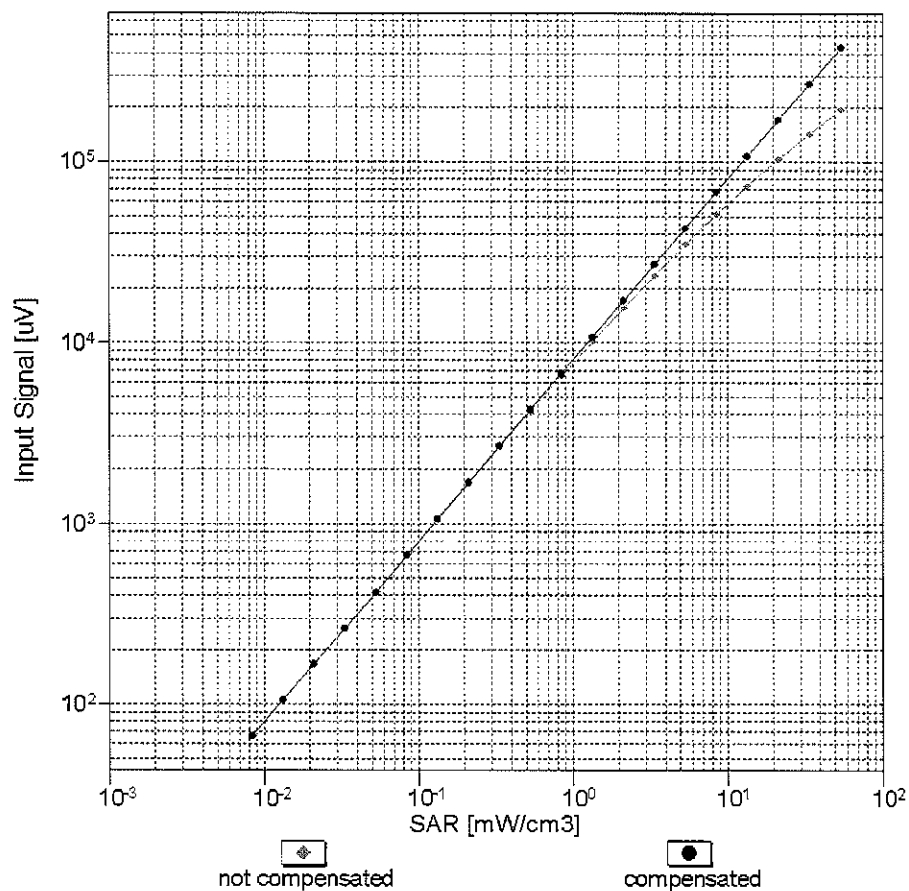


f=1800 MHz, R22



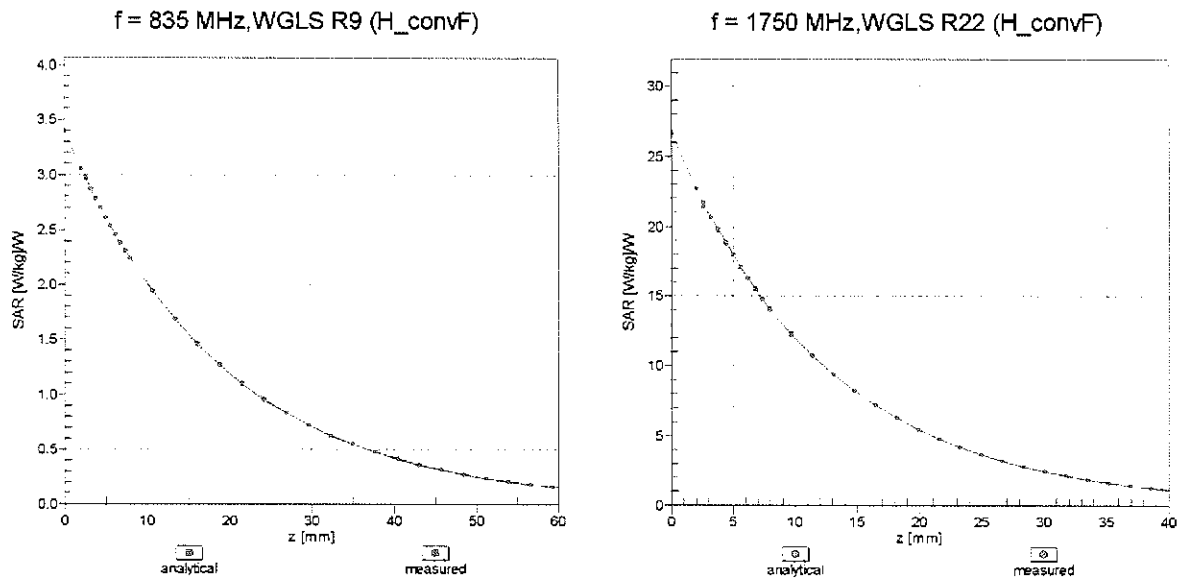
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



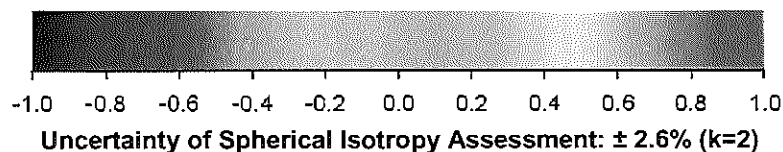
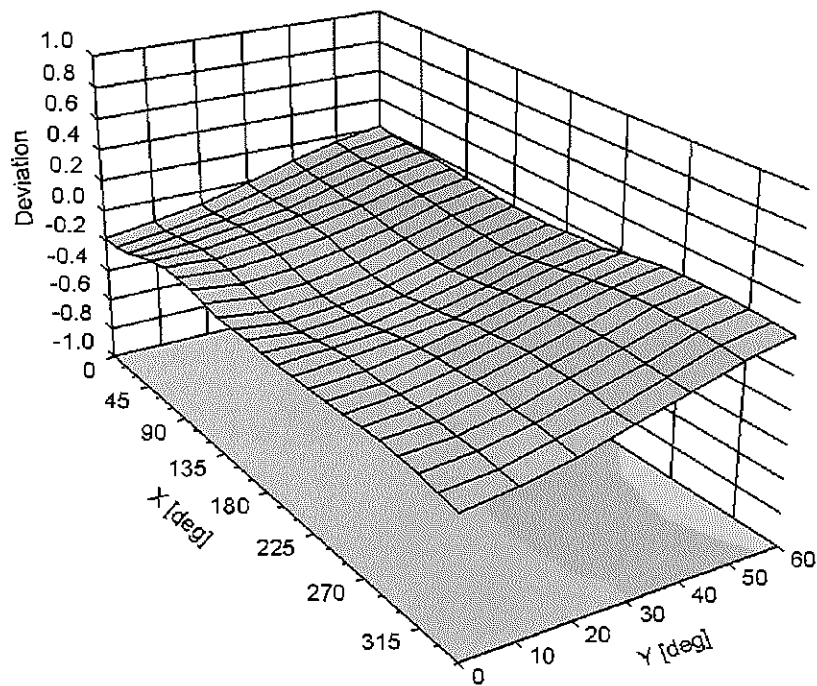
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV2 - SN:3022

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	98.5
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



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 108**

Client **PC Test**

Certificate No: **EX3-3589 Jan13**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3589**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **January 17, 2013**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
Issued: January 17, 2013			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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.

Probe EX3DV4

SN:3589

Manufactured: March 30, 2006
Calibrated: January 17, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.46	0.40	0.40	$\pm 10.1 \%$
DCP (mV) ^B	100.5	103.8	99.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	165.8	$\pm 3.3 \%$
		Y	0.0	0.0	1.0		134.3	
		Z	0.0	0.0	1.0		140.5	

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 NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	8.70	8.70	8.70	0.39	0.96	± 12.0 %
835	41.5	0.90	8.40	8.40	8.40	0.52	0.74	± 12.0 %
1750	40.1	1.37	7.34	7.34	7.34	0.45	0.93	± 12.0 %
1900	40.0	1.40	7.09	7.09	7.09	0.80	0.65	± 12.0 %
2450	39.2	1.80	6.37	6.37	6.37	0.39	0.97	± 12.0 %
2600	39.0	1.96	6.19	6.19	6.19	0.30	1.12	± 12.0 %
5200	36.0	4.66	4.48	4.48	4.48	0.45	1.80	± 13.1 %
5300	35.9	4.76	4.27	4.27	4.27	0.45	1.80	± 13.1 %
5500	35.6	4.96	4.14	4.14	4.14	0.50	1.80	± 13.1 %
5600	35.5	5.07	3.81	3.81	3.81	0.55	1.80	± 13.1 %
5800	35.3	5.27	3.85	3.85	3.85	0.55	1.80	± 13.1 %

^C Frequency validity 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.

^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.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

Calibration Parameter Determined in Body Tissue Simulating Media

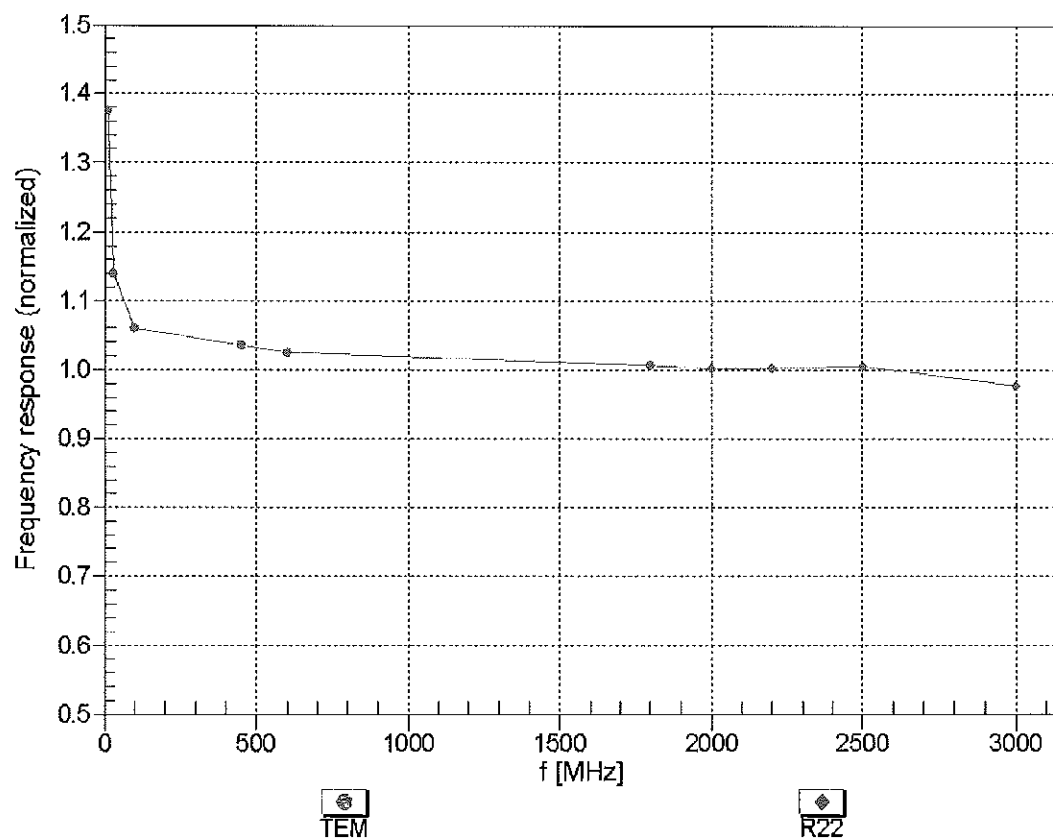
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	8.59	8.59	8.59	0.49	0.86	± 12.0 %
835	55.2	0.97	8.43	8.43	8.43	0.38	1.05	± 12.0 %
1750	53.4	1.49	7.87	7.87	7.87	0.44	0.89	± 12.0 %
1900	53.3	1.52	7.46	7.46	7.46	0.58	0.75	± 12.0 %
2450	52.7	1.95	7.07	7.07	7.07	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.68	6.68	6.68	0.80	0.50	± 12.0 %
5200	49.0	5.30	3.99	3.99	3.99	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.81	3.81	3.81	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.52	3.52	3.52	0.55	1.90	± 13.1 %
5600	48.5	5.77	3.32	3.32	3.32	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.66	3.66	3.66	0.60	1.90	± 13.1 %

^C Frequency validity 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.

^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.

Frequency Response of E-Field

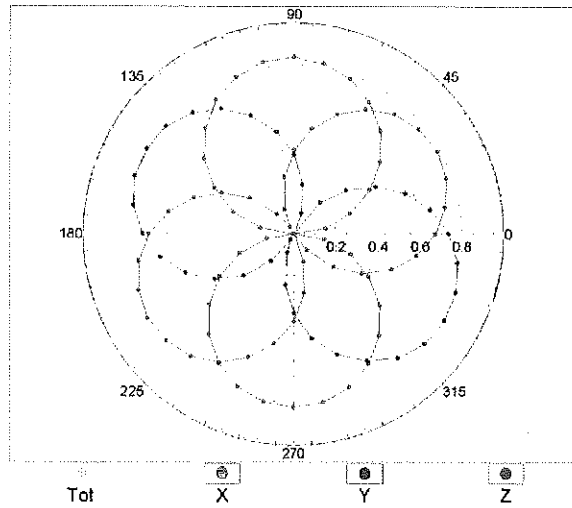
(TEM-Cell:ifi110 EXX, Waveguide: R22)



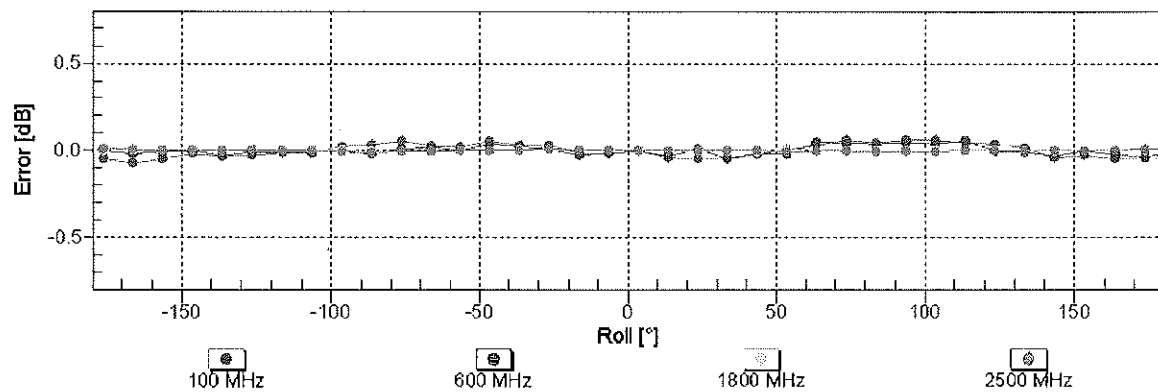
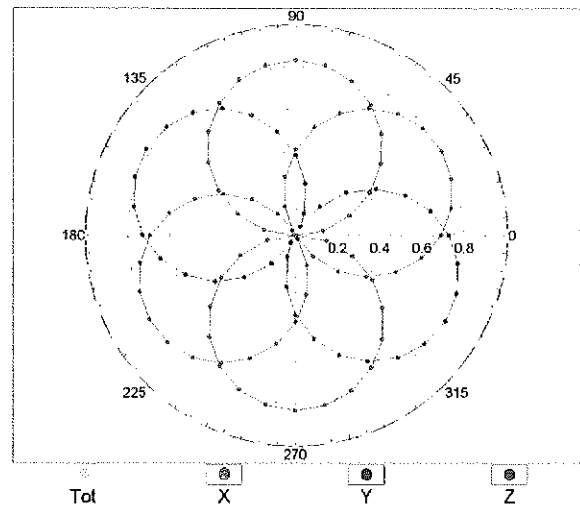
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

f=600 MHz,TEM



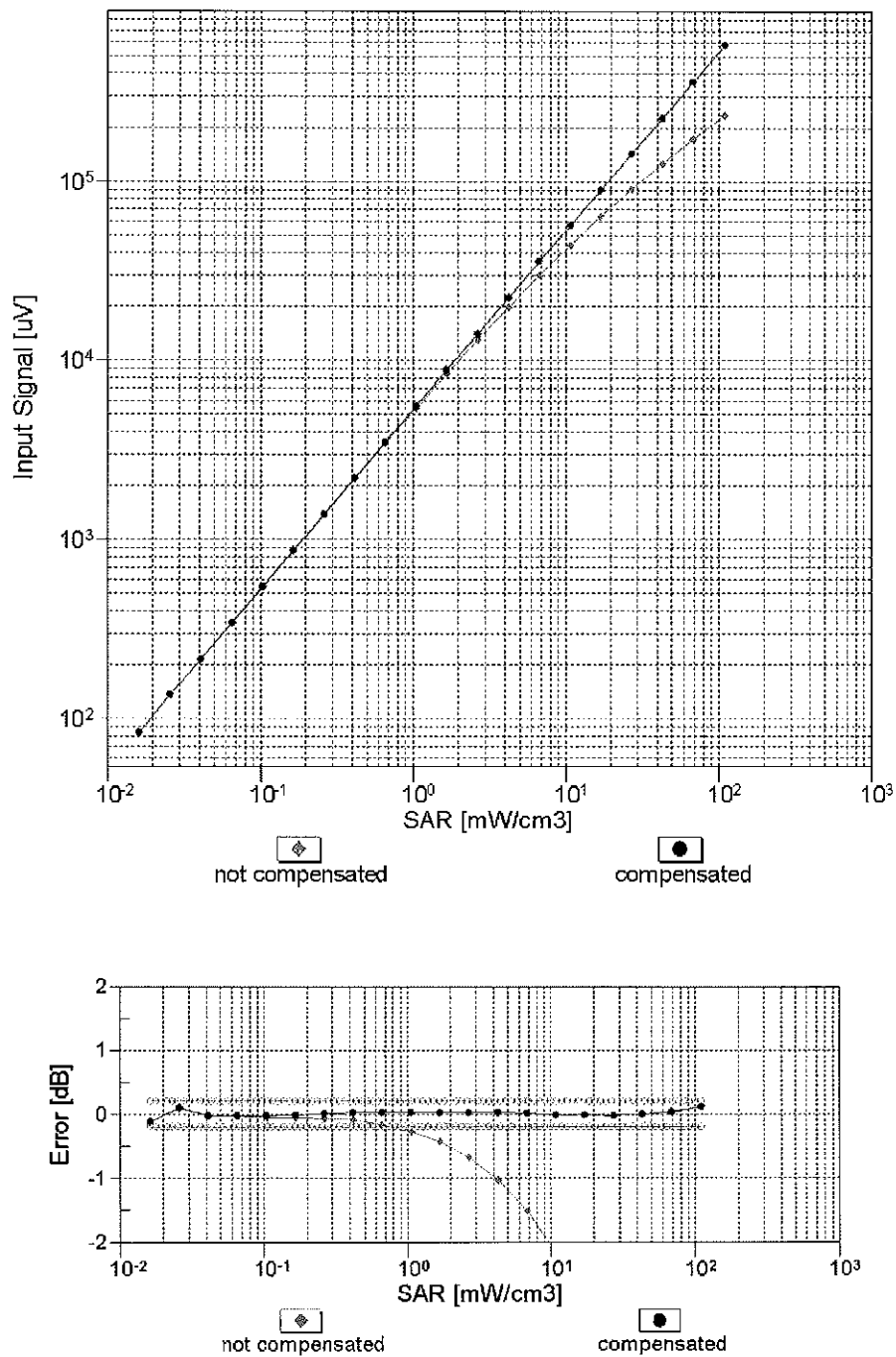
f=1800 MHz,R22



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

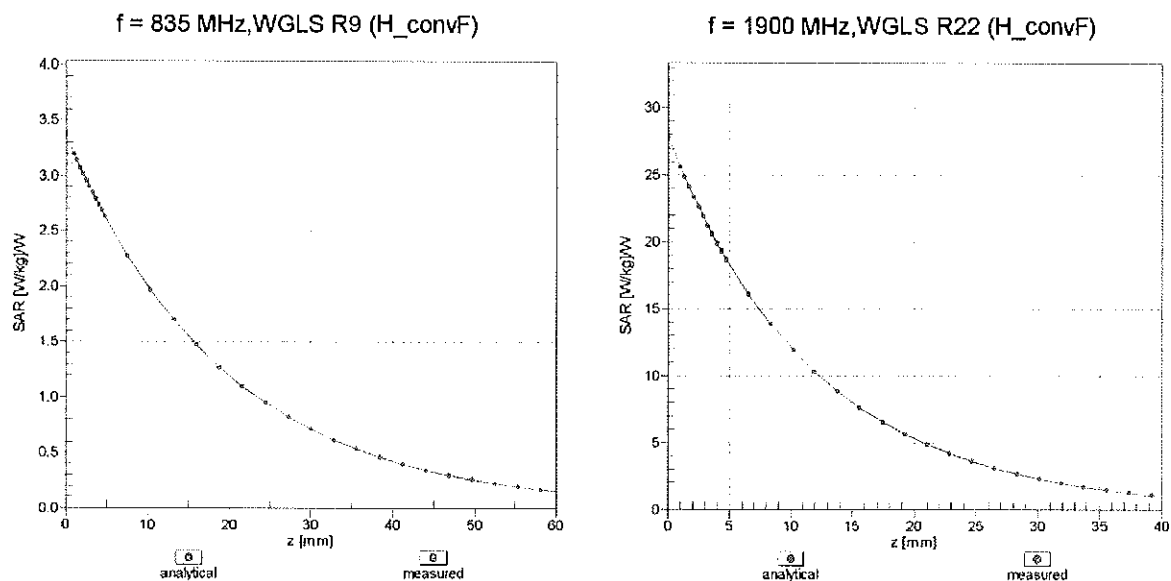
Dynamic Range f(SAR_{head})

(TEM cell , f = 900 MHz)



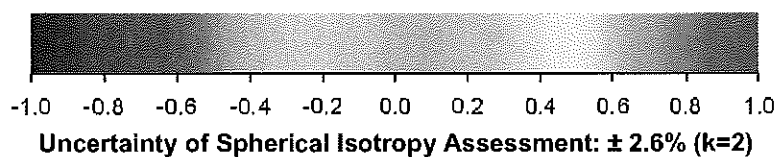
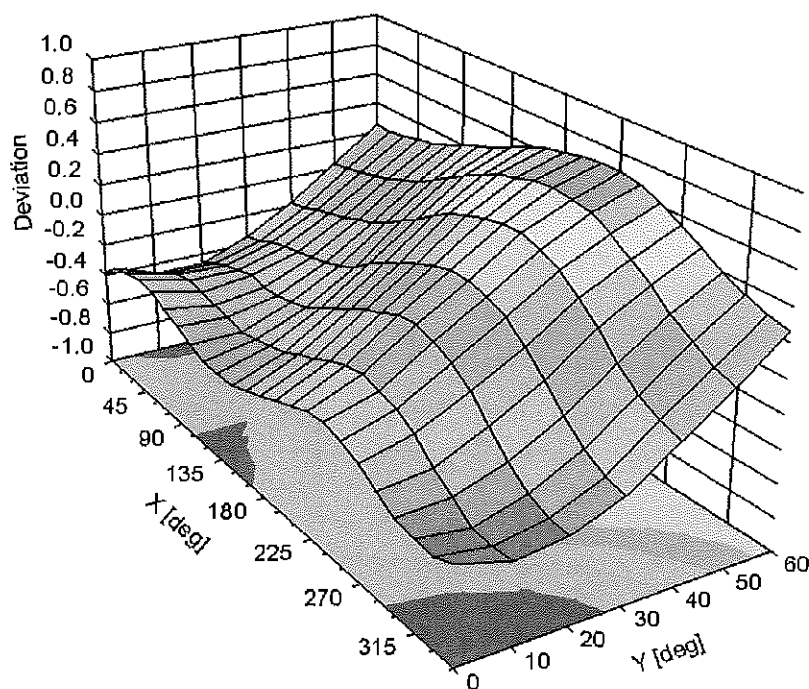
Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	-26.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **ES3-3287_Nov12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3287**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

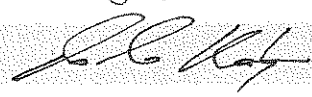
Calibration date: **November 15, 2012**

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 E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature 
			Issued: November 16, 2012

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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.

Probe ES3DV3

SN:3287

Manufactured: June 7, 2010
Calibrated: November 15, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.31	1.25	1.25	$\pm 10.1 \%$
DCP (mV) ^B	102.9	103.6	101.6	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.0	0.0	1.0	116.8	$\pm 3.5 \%$
			Y	0.0	0.0	1.0	118.5	
			Z	0.0	0.0	1.0	154.1	

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 NormX,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:3287

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.40	6.40	6.40	0.20	2.54	± 12.0 %
835	41.5	0.90	6.17	6.17	6.17	0.34	1.68	± 12.0 %
1750	40.1	1.37	5.16	5.16	5.16	0.63	1.30	± 12.0 %
1900	40.0	1.40	4.96	4.96	4.96	0.48	1.55	± 12.0 %
2450	39.2	1.80	4.30	4.30	4.30	0.79	1.31	± 12.0 %
2600	39.0	1.96	4.19	4.19	4.19	0.80	1.31	± 12.0 %

^C Frequency validity 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.

^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.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Calibration Parameter Determined in Body Tissue Simulating Media

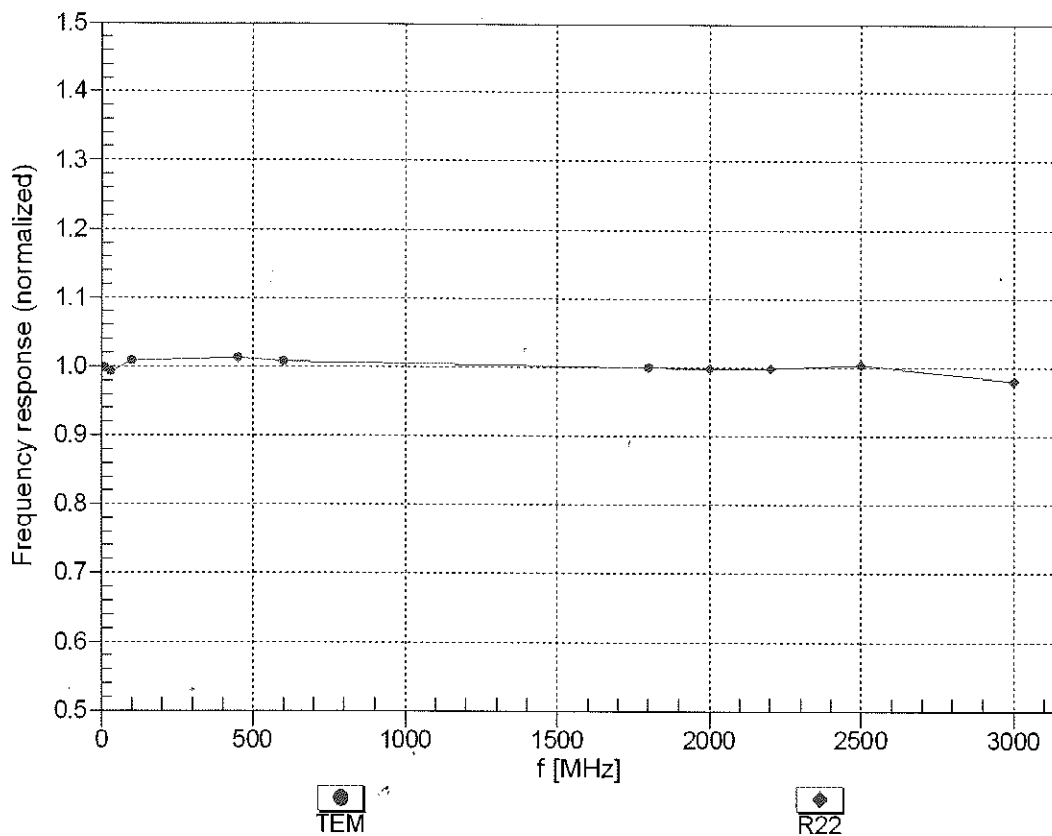
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.14	6.14	6.14	0.28	2.06	± 12.0 %
835	55.2	0.97	6.06	6.06	6.06	0.42	1.63	± 12.0 %
1750	53.4	1.49	4.86	4.86	4.86	0.43	1.64	± 12.0 %
1900	53.3	1.52	4.69	4.69	4.69	0.56	1.54	± 12.0 %
2450	52.7	1.95	4.29	4.29	4.29	0.80	1.02	± 12.0 %
2600	52.5	2.16	4.12	4.12	4.12	0.64	0.92	± 12.0 %

^C Frequency validity 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.

^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.

Frequency Response of E-Field

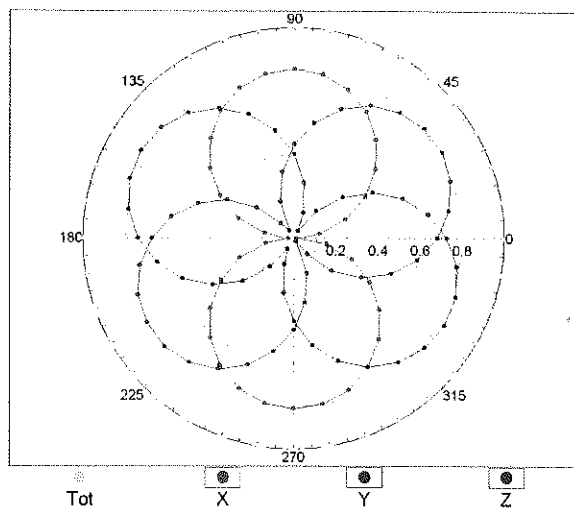
(TEM-Cell:ifi110 EXX, Waveguide: R22)



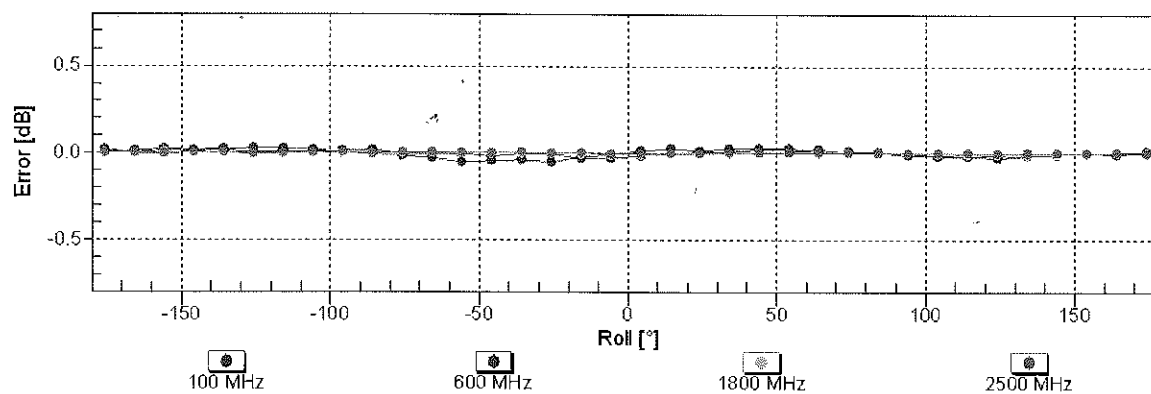
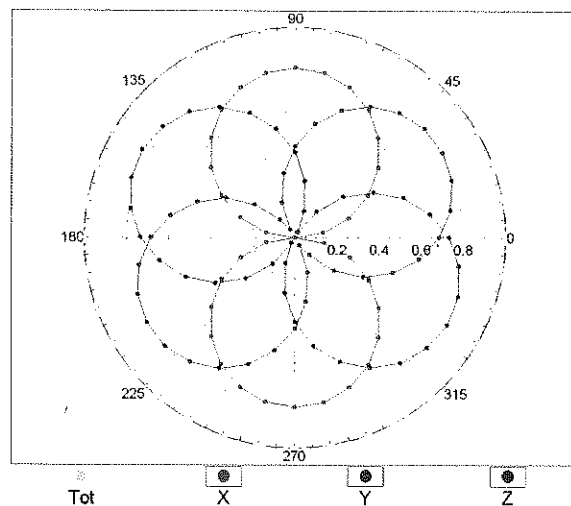
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz, TEM

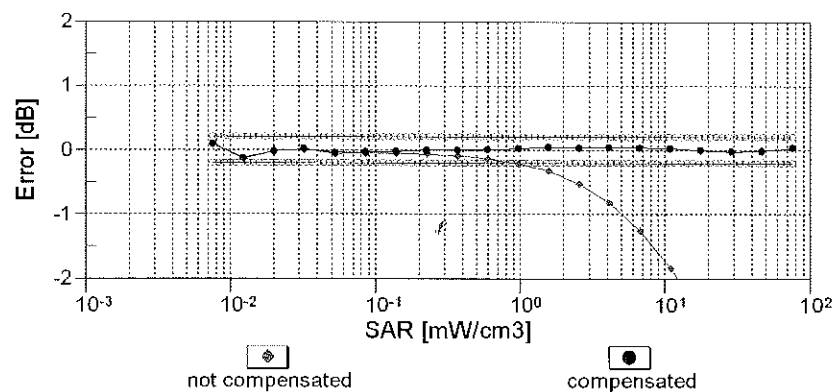
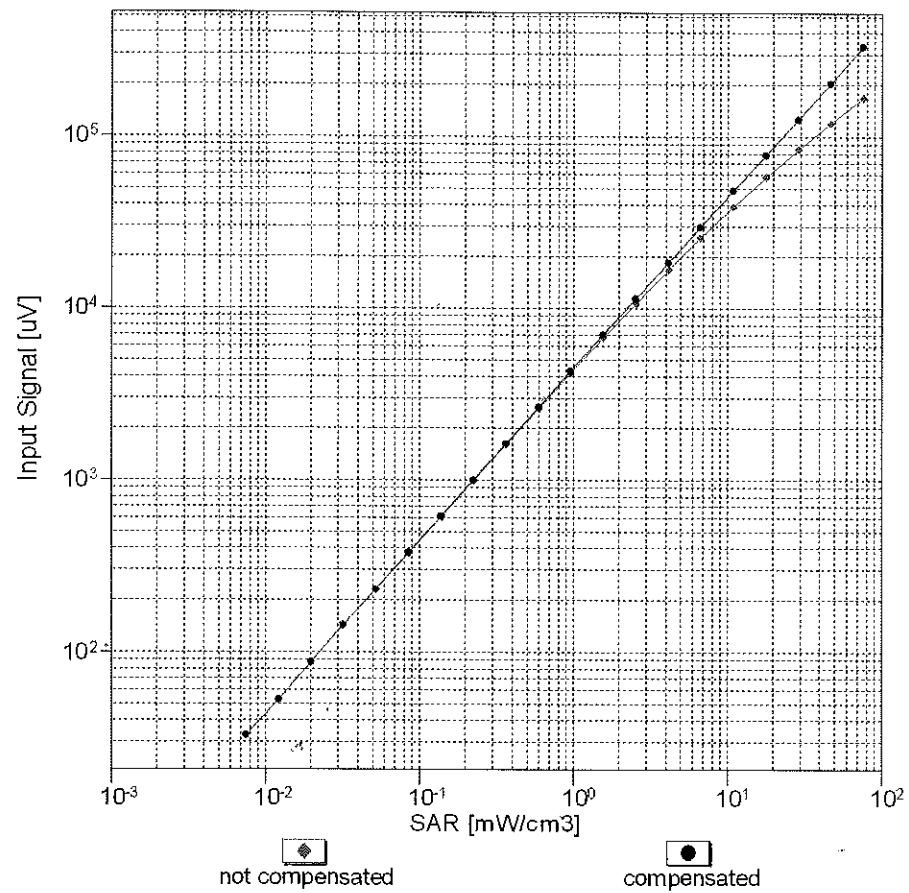


f=1800 MHz, R22



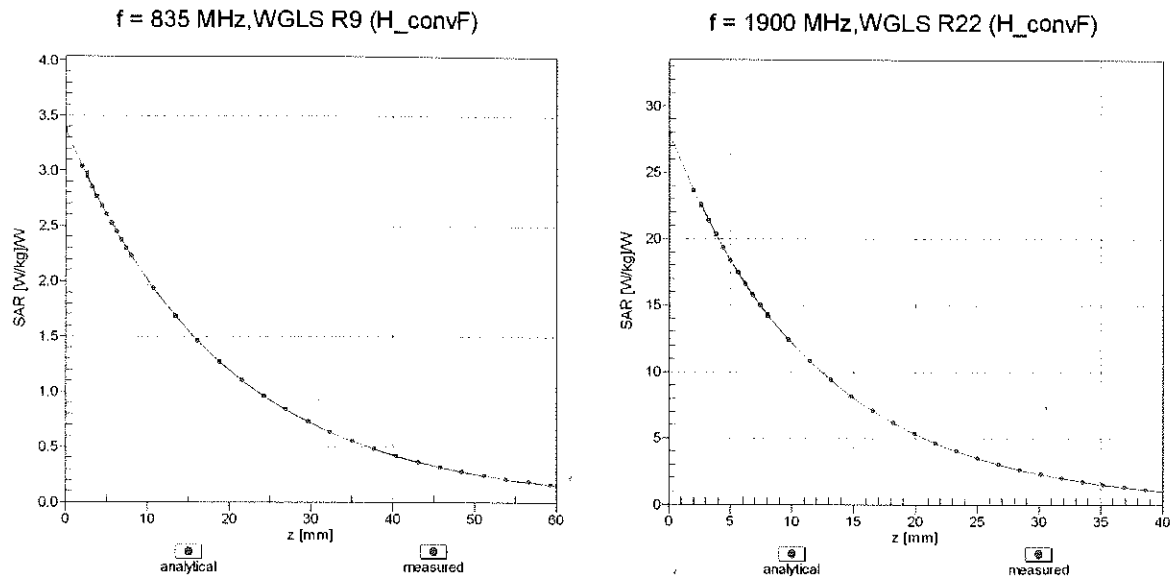
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell, $f = 900 \text{ MHz}$)



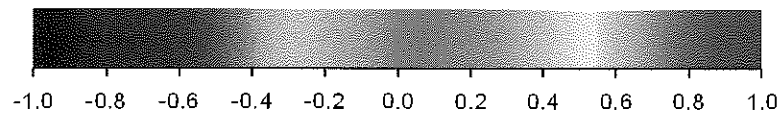
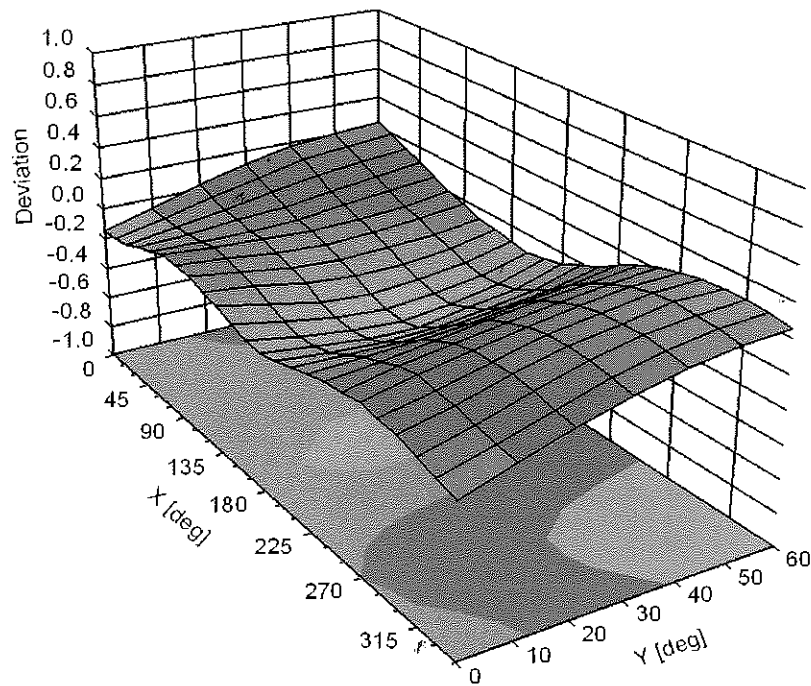
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3287

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-15.9
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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **EX3-3920_Feb13/2**

CALIBRATION CERTIFICATE (Replacement of No: EX3-3920_Feb13)

Object **EX3DV4 - SN:3920**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4**
Calibration procedure for dosimetric E-field probes

Calibration date: **February 27, 2013**

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)

✓
KOK
3/24/13

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature
			Issued: March 5, 2013

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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.

Probe EX3DV4

SN:3920

Manufactured: December 18, 2012
Calibrated: February 27, 2013

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.34	0.50	0.50	$\pm 10.1 \%$
DCP (mV) ^B	101.2	101.0	99.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	134.3	$\pm 3.3 \%$
		Y	0.0	0.0	1.0		164.7	
		Z	0.0	0.0	1.0		161.4	

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 NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.86	9.86	9.86	0.19	1.39	± 12.0 %
835	41.5	0.90	9.58	9.58	9.58	0.77	0.54	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.57	0.69	± 12.0 %
1900	40.0	1.40	7.73	7.73	7.73	0.54	0.73	± 12.0 %
2450	39.2	1.80	7.04	7.04	7.04	0.40	0.82	± 12.0 %
2600	39.0	1.96	6.80	6.80	6.80	0.49	0.76	± 12.0 %
5200	36.0	4.66	4.87	4.87	4.87	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.73	4.73	4.73	0.37	1.80	± 13.1 %
5500	35.6	4.96	4.52	4.52	4.52	0.39	1.80	± 13.1 %
5600	35.5	5.07	4.17	4.17	4.17	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.02	4.02	4.02	0.45	1.80	± 13.1 %

^C Frequency validity 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.

^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.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

Calibration Parameter Determined in Body Tissue Simulating Media

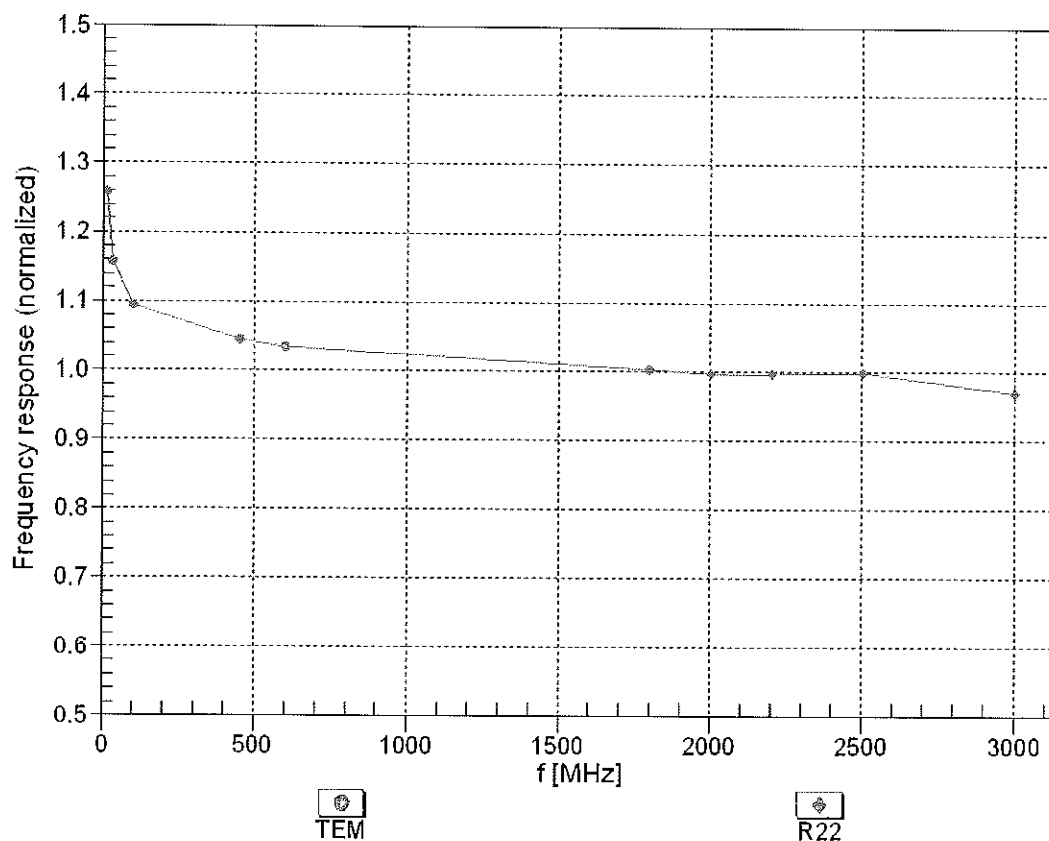
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.57	9.57	9.57	0.43	0.83	± 12.0 %
835	55.2	0.97	9.42	9.42	9.42	0.36	0.98	± 12.0 %
1750	53.4	1.49	7.59	7.59	7.59	0.43	0.78	± 12.0 %
1900	53.3	1.52	7.38	7.38	7.38	0.33	0.91	± 12.0 %
2450	52.7	1.95	7.07	7.07	7.07	0.80	0.55	± 12.0 %
2600	52.5	2.16	6.73	6.73	6.73	0.80	0.56	± 12.0 %
5200	49.0	5.30	4.23	4.23	4.23	0.51	1.90	± 13.1 %
5300	48.9	5.42	4.13	4.13	4.13	0.49	1.90	± 13.1 %
5500	48.6	5.65	3.63	3.63	3.63	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.62	3.62	3.62	0.49	1.90	± 13.1 %
5800	48.2	6.00	3.91	3.91	3.91	0.54	1.90	± 13.1 %

^C Frequency validity 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.

^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.

Frequency Response of E-Field

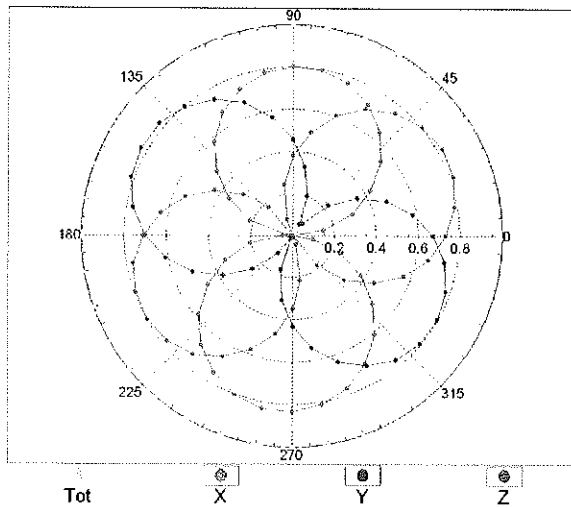
(TEM-Cell:ifi110 EXX, Waveguide: R22)



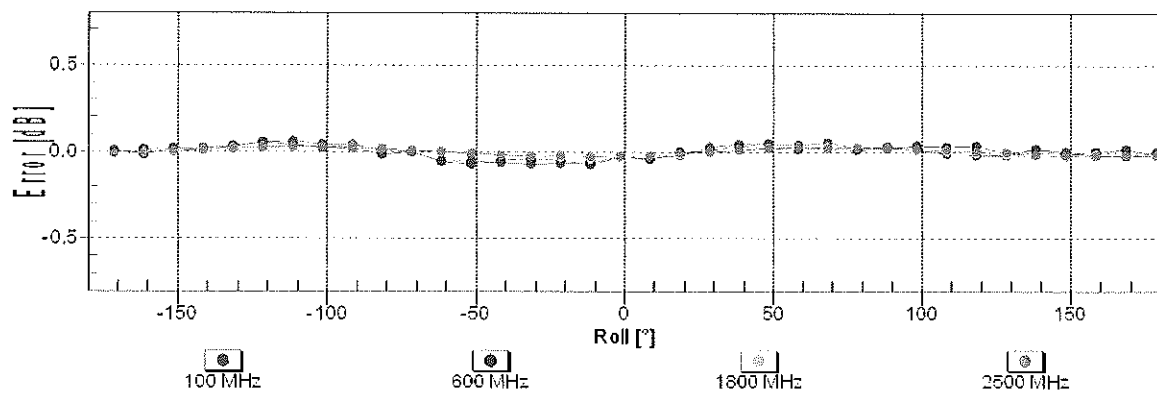
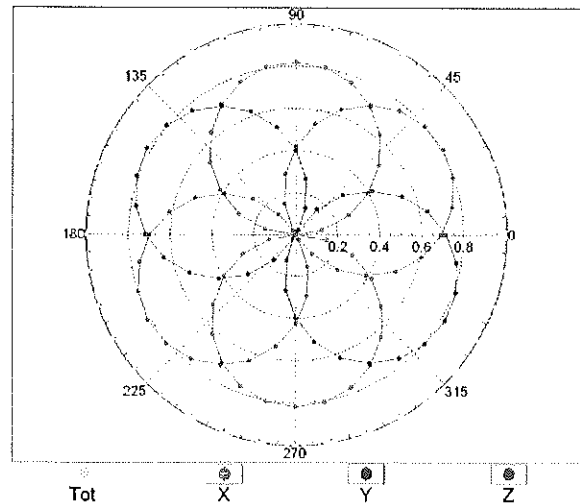
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

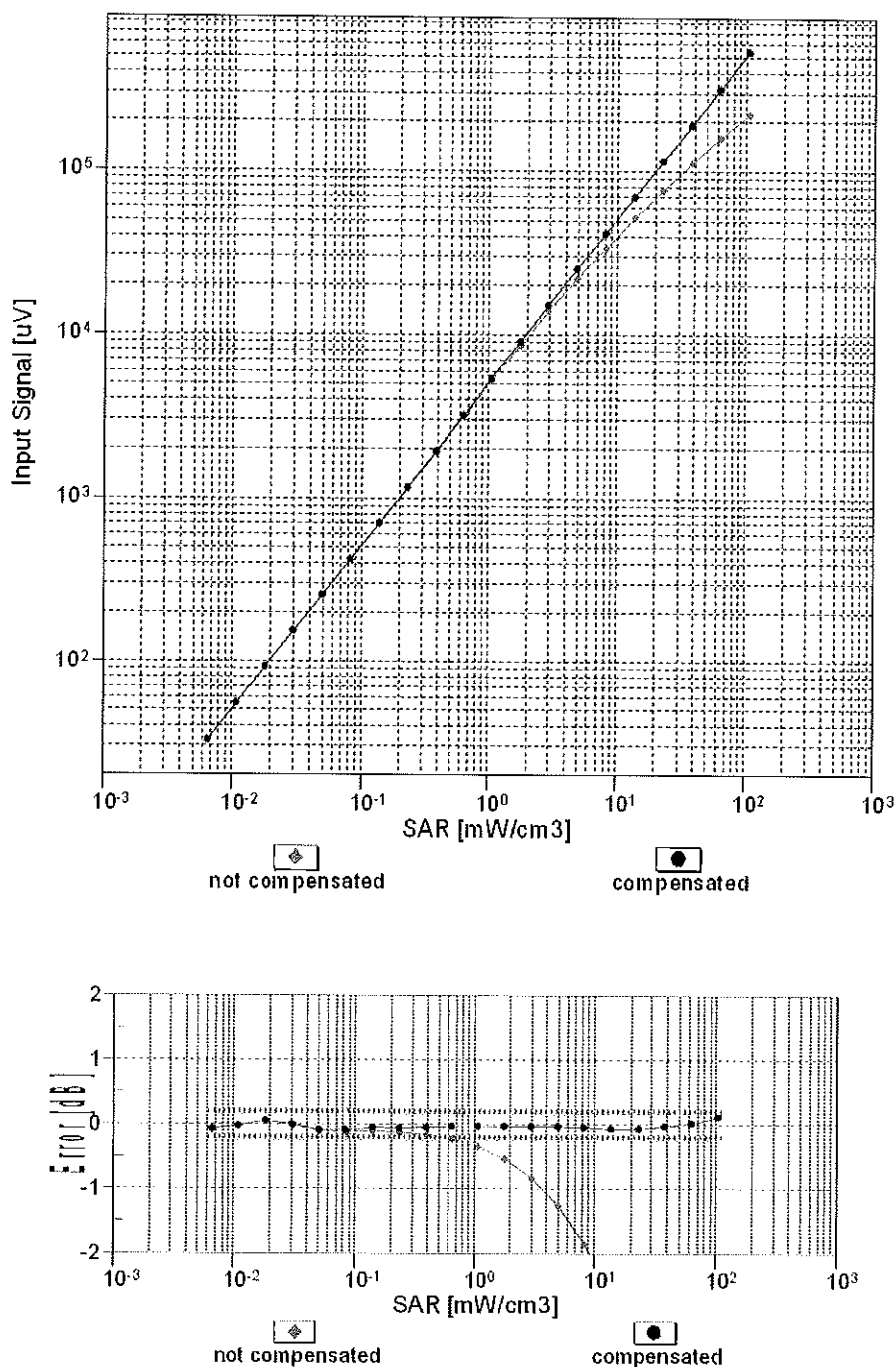
f=600 MHz,TEM



f=1800 MHz,R22

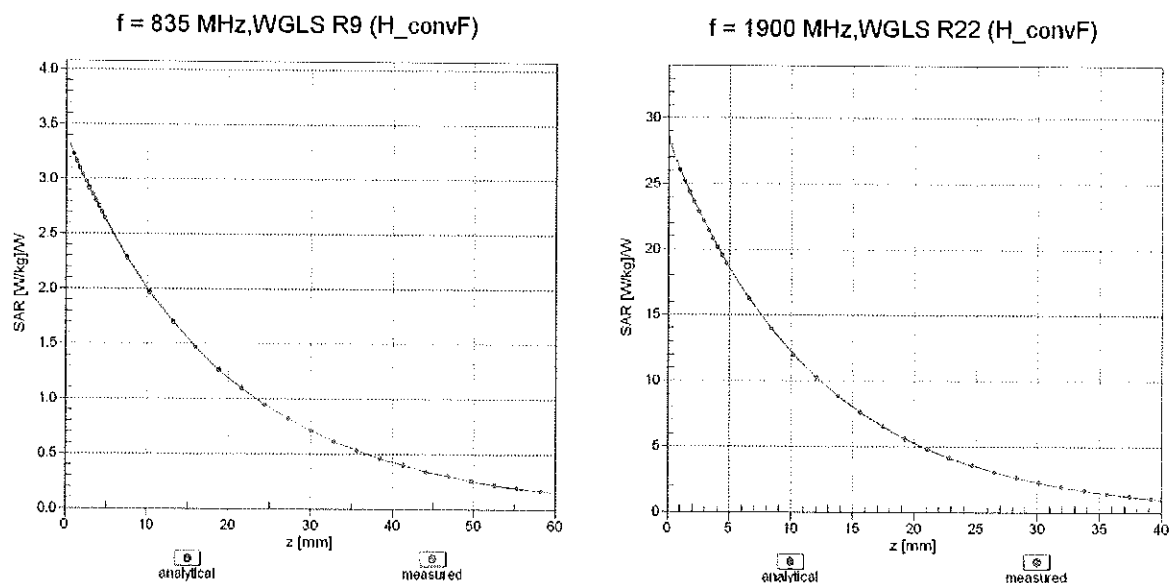
**Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)**

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



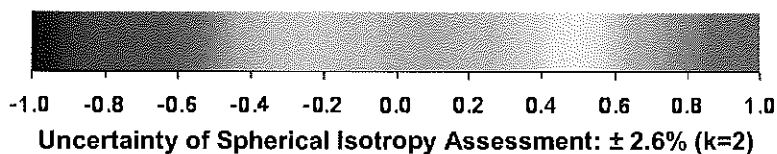
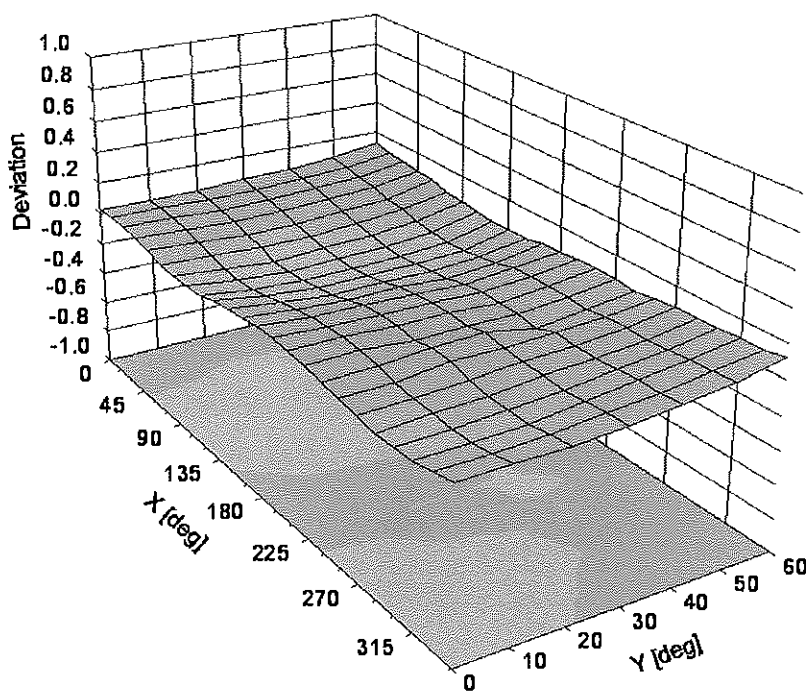
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3920

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-21.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

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

Table D-I
Composition of the Tissue Equivalent Matter

Frequency (MHz)	750	750	835	835	1750	1750	1900	1900	2450	2450	5200-5800	5200-5800
Tissue	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)												
Bactericide	See Pp. 2-3		0.1	0.1					See Page 4		See Page 5	
DGBE					47	31	44.92	29.44		26.7		
HEC			1	1								
NaCl			1.45	0.94	0.4	0.2	0.18	0.39		0.1		
Sucrose			57	44.9								
Polysorbate (Tween) 80												20
Water			40.45	53.06	52.6	68.8	54.9	70.17				80

FCC ID: A3LSMN900W8	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	APPENDIX D: Page 1 of 5		

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

H ₂ O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%
Relevant for safety; Refer to the respective Safety Data Sheet*.	

Figure D-1

Composition of 750 MHz Head and Body Tissue Equivalent Matter

Note: 750MHz liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MSL750)
Product No.	SL AAM 075 AA (Charge: 111130-3)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

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

Test Condition

Ambient Condition 22°C ; 30% humidity
TSL Temperature 22°C
Test Date 7-Dec-11

Additional Information

TSL Density 1.212 g/cm³
TSL Heat-capacity 3.006 kJ/(kg*K)

Results

f [MHz]	Measured			Target			Diff. to Target (%)	
	HP-e'	HP-e''	sigma	eps	sigma		Δ-eps	Δ-sigma
600	57.9	25.01	0.83	56.1	0.95	3.1	-12.3	
625	57.6	24.66	0.86	56.0	0.95	2.9	-10.1	
650	57.4	24.31	0.88	55.9	0.96	2.6	-8.0	
675	57.1	24.02	0.90	55.8	0.96	2.3	-5.8	
700	56.8	23.74	0.92	55.7	0.96	2.0	-3.7	
725	56.6	23.50	0.95	55.6	0.96	1.7	-1.5	
750	56.4	23.26	0.97	55.5	0.96	1.5	0.8	
775	56.1	23.06	0.99	55.4	0.97	1.2	3.0	
800	55.8	22.86	1.02	55.3	0.97	0.9	5.2	
825	55.6	22.72	1.04	55.2	0.98	0.6	6.6	
850	55.5	22.64	1.05	55.2	0.98	0.5	7.3	
875	55.4	22.57	1.07	55.2	0.99	0.4	8.0	
900	55.1	22.44	1.09	55.1	1.02	0.1	7.2	
925	54.9	22.31	1.12	55.0	1.05	-0.2	6.4	
950	54.7	22.20	1.14	55.0	1.06	-0.5	7.5	
975	54.5	22.09	1.17	54.9	1.08	-0.9	8.5	
1000	54.3	21.99	1.19	54.9	1.09	-1.2	9.7	
1000	54.1	21.89	1.22	54.8	1.10	-1.4	10.9	

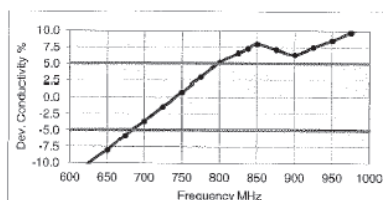
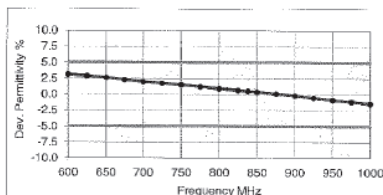


Figure D-2

750MHz Body Tissue Equivalent Matter

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	APPENDIX D: Page 2 of 5		

Measurement Certificate / Material Test

Item Name **Head Tissue Simulating Liquid (HSL 750)**
 Product No. SL AAH 075 (Charge: 111208-2)
 Manufacturer SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

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

Test Condition

Ambient Condition 22°C ; 30% humidity
 TSL Temperature 22°C
 Test Date 14-Dec-11

Additional Information

TSL Density 1.284 g/cm³
 TSL Heat-capacity 2.701 kJ/(kg*K)

Results

f [MHz]	Measured			Target		Diff.to Target [%]	
	HP-e'	HP-e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	44.5	22.77	0.76	42.7	0.88	4.2	-13.8
625	44.2	22.50	0.78	42.6	0.88	3.7	-11.5
650	43.6	22.24	0.80	42.5	0.89	3.1	-9.2
675	43.4	22.03	0.83	42.3	0.89	2.5	-6.8
700	43.0	21.82	0.85	42.2	0.89	1.9	-4.5
725	42.7	21.64	0.87	42.1	0.89	1.4	-2.1
750	42.3	21.45	0.89	41.9	0.89	1.0	0.2
775	42.0	21.28	0.92	41.8	0.90	0.5	2.4
800	41.7	21.11	0.94	41.7	0.90	0.0	4.7
825	41.4	20.97	0.96	41.6	0.91	-0.5	6.1
838	41.2	20.90	0.97	41.5	0.91	-0.7	6.8
850	41.1	20.83	0.98	41.5	0.92	-1.0	7.5
875	40.8	20.69	1.01	41.5	0.94	-1.7	6.8
900	40.5	20.55	1.03	41.5	0.97	-2.4	6.1
925	40.2	20.45	1.05	41.5	0.98	-3.0	7.1
950	39.9	20.34	1.08	41.4	0.99	-3.6	8.1
975	39.7	20.24	1.10	41.4	1.00	-4.2	9.3
1000	39.4	20.14	1.12	41.3	1.01	-4.7	10.4

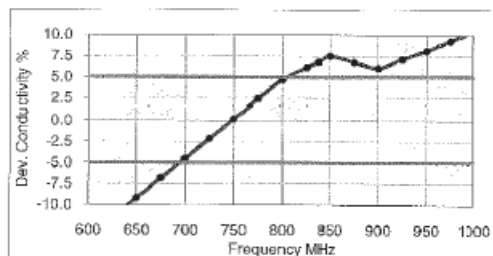
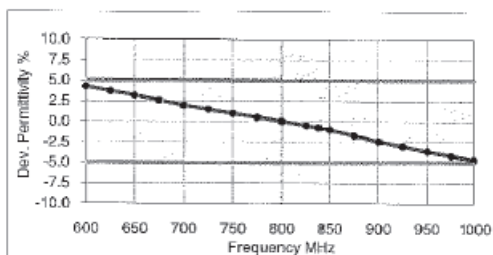


Figure D-3
750MHz Head Tissue Equivalent Matter

FCC ID: A3LSMN900W8	 PCTEST Engineering Laboratory, Inc.	SAR EVALUATION REPORT	 SAMSUNG	Reviewed by: Quality Manager
Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset	APPENDIX D: Page 3 of 5		

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

H ₂ O	Water, 52 – 75%
C ₈ H ₁₈ O ₃	Diethylene glycol monobutyl ether (DGBE), 25 – 48% (CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8)
	Relevant for safety; Refer to the respective Safety Data Sheet*.
NaCl	Sodium Chloride, <1.0%

Figure D-4

Composition of 2.4 GHz Head Tissue Equivalent Matter

Note: 2.4 GHz head liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HSL 2450)
Product No.	SL A&H 245 BA (Charge: 120112-4)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

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

Test Condition

Ambient Condition 22°C; 30% humidity
TSL Temperature 23°C
Test Date 18-Jan-12

Additional Information

TSL Density 0.988 g/cm³
TSL Heat-capacity 3.680 kJ/(kg*K)

Results

	Measured				Target		Diff.to Target [%]		
f [MHz]	HP-e'	HP-e''	sigma	eps	sigma	Delta-eps	Delta-sigma		
1900	40.5	11.99	1.27	40.0	1.40	1.1	-9.5		
1925	40.3	12.08	1.29	40.0	1.40	0.9	-7.6		
1950	40.2	12.17	1.32	40.0	1.40	0.6	-5.7		
1975	40.1	12.26	1.35	40.0	1.40	0.3	-3.8		
2000	40.0	12.35	1.37	40.0	1.40	0.0	-1.9		
2025	39.9	12.44	1.40	40.0	1.42	-0.1	-1.5		
2050	39.8	12.53	1.43	39.9	1.44	-0.3	-1.1		
2075	39.7	12.60	1.46	39.9	1.47	-0.4	-0.8		
2100	39.6	12.68	1.48	39.8	1.49	-0.6	-0.5		
2125	39.5	12.76	1.51	39.8	1.51	-0.7	-0.2		
2150	39.4	12.84	1.54	39.7	1.53	-0.8	0.2		
2175	39.3	12.93	1.56	39.7	1.56	-1.0	0.6		
2200	39.2	13.02	1.59	39.6	1.58	-1.1	1.0		
2225	39.1	13.09	1.62	39.6	1.60	-1.3	1.3		
2250	39.0	13.17	1.65	39.6	1.62	-1.4	1.6		
2275	38.9	13.25	1.68	39.5	1.64	-1.5	2.0		
2300	38.8	13.33	1.71	39.5	1.67	-1.7	2.3		
2325	38.7	13.40	1.73	39.4	1.69	-1.8	2.7		
2350	38.6	13.48	1.76	39.4	1.71	-2.0	3.0		
2375	38.5	13.56	1.79	39.3	1.73	-2.1	3.3		
2400	38.4	13.63	1.82	39.3	1.76	-2.3	3.7		
2425	38.3	13.71	1.85	39.2	1.78	-2.4	4.0		
2450	38.2	13.78	1.88	39.2	1.80	-2.6	4.4		
2475	38.1	13.85	1.91	39.2	1.83	-2.7	4.4		
2500	38.0	13.93	1.94	39.1	1.85	-2.9	4.4		
2525	37.9	13.99	1.97	39.1	1.88	-3.1	4.4		
2550	37.8	14.06	1.99	39.1	1.91	-3.3	4.4		
2575	37.7	14.13	2.02	39.0	1.94	-3.5	4.5		
2600	37.6	14.20	2.05	39.0	1.96	-3.7	4.6		
2625	37.5	14.28	2.08	39.0	1.99	-3.8	4.6		
2650	37.4	14.32	2.11	38.9	2.02	-4.0	4.6		
2675	37.3	14.39	2.14	38.9	2.05	-4.3	4.7		
2700	37.1	14.46	2.17	38.9	2.07	-4.5	4.8		

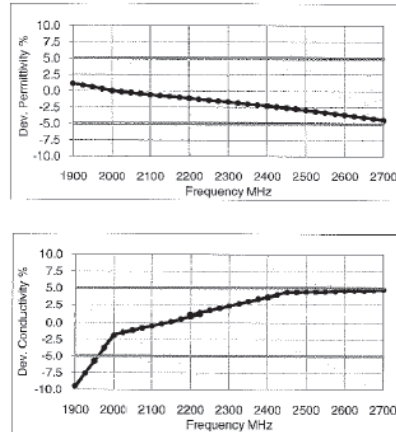


Figure D-5

2.4 GHz Head Tissue Equivalent Matter

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset			APPENDIX D: Page 4 of 5

2 Composition / Information on ingredients

The Item is composed of the following ingredients:

Water	50 – 65%
Mineral oil	10 – 30%
Emulsifiers	8 – 25%
Sodium salt	0 – 1.5%

Figure D-6

Composition of 5 GHz Head Tissue Equivalent Matter

Note: 5GHz head liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HBBL3500-5800V5)
Product No.	SL AAH 502 AB (Charge: 120402-2)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated OCP probe (type DAK).

Target Parameters

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

Test Condition

Ambient Condition 22°C ; 30% humidity
TSL Temperature 22°C
Test Date 4-Apr-12

Additional Information

TSL Density 0.985 g/cm³
TSL Heat-capacity 3.383 kJ/(kg*K)

Results

	Measured			Target		Diff.to Target [%]	
f [MHz]	HP-ε'	HP-ε''	sigma	eps	sigma	Δ-eps	Δ-sigma
3400	38.7	14.96	2.83	38.0	2.81	1.8	0.7
3500	38.6	14.91	2.90	37.9	2.91	1.7	-0.3
3600	38.5	14.92	2.99	37.8	3.02	1.7	-0.9
3700	38.3	14.92	3.07	37.7	3.12	1.7	-1.5
3800	38.2	14.94	3.16	37.6	3.22	1.7	-1.9
3900	38.1	14.95	3.24	37.5	3.32	1.7	-2.4
4000	38.0	15.00	3.34	37.4	3.43	1.8	-2.5
4100	37.9	15.04	3.43	37.2	3.53	1.8	-2.6
4200	37.8	15.08	3.52	37.1	3.63	1.8	-2.9
4300	37.7	15.14	3.62	37.0	3.73	1.8	-3.0
4400	37.5	15.18	3.71	36.9	3.84	1.7	-3.1
4500	37.4	15.20	3.81	36.8	3.94	1.6	-3.3
4600	37.3	15.29	3.91	36.7	4.04	1.6	-3.2
4700	37.1	15.34	4.01	36.6	4.14	1.5	-3.2
4800	37.0	15.39	4.11	36.4	4.25	1.4	-3.2
4850	36.9	15.43	4.16	36.4	4.30	1.3	-3.1
4900	36.8	15.45	4.21	36.3	4.35	1.3	-3.1
4950	36.7	15.47	4.26	36.3	4.40	1.2	-3.1
5000	36.7	15.50	4.31	36.2	4.45	1.2	-3.1
5050	36.6	15.55	4.37	36.2	4.50	1.1	-3.0
5100	36.5	15.60	4.43	36.1	4.55	1.1	-2.8
5150	36.4	15.62	4.48	36.0	4.60	1.0	-2.8
5200	36.4	15.65	4.53	36.0	4.66	1.0	-2.8
5250	36.3	15.67	4.58	35.9	4.71	1.0	-2.8
5300	36.2	15.70	4.63	35.9	4.76	1.0	-2.7
5350	36.1	15.70	4.67	35.8	4.81	0.9	-2.9
5400	36.1	15.74	4.73	35.8	4.86	0.8	-2.7
5450	36.0	15.75	4.77	35.7	4.91	0.9	-2.8
5500	35.9	15.75	4.82	35.6	4.96	0.8	-2.9
5550	35.9	15.80	4.88	35.6	5.01	0.8	-2.7
5600	35.8	15.82	4.93	35.5	5.07	0.7	-2.7
5650	35.7	15.86	4.98	35.5	5.12	0.7	-2.6
5700	35.7	15.88	5.03	35.4	5.17	0.7	-2.6
5750	35.6	15.90	5.08	35.4	5.22	0.6	-2.6
5800	35.5	15.94	5.14	35.3	5.27	0.5	-2.4
5850	35.4	15.98	5.20	35.3	5.34	0.4	-2.5
5900	35.4	16.02	5.26	35.3	5.40	0.2	-2.6

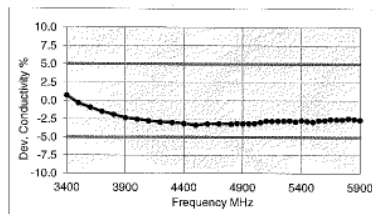
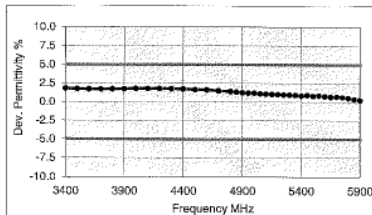


Figure D-7

5GHz Head Tissue Equivalent Matter

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset			APPENDIX D: Page 5 of 5

APPENDIX E: SAR SYSTEM VALIDATION

Per FCC KDB 865664 D02v01r01, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2003 and FCC KDB 865664 D01v01r01. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

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

Table E-I
SAR System Validation Summary

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE TYPE	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
							(σ)	(ε)	SENSI- TIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
D	750	10/18/2012	3288	ES3DV3	750	Head	0.894	41.92	PASS	PASS	PASS	N/A	N/A	N/A
G	835	3/27/2013	3209	ES3DV3	835	Head	0.925	41.29	PASS	PASS	PASS	GMSK	PASS	PASS
G	1750	3/26/2013	3209	ES3DV3	1750	Head	1.353	40.50	PASS	PASS	PASS	N/A	N/A	N/A
D	1900	10/17/2012	3288	ES3DV3	1900	Head	1.446	40.76	PASS	PASS	PASS	GMSK	PASS	N/A
C	2450	11/9/2013	3022	ES3DV3	2450	Head	1.874	38.23	PASS	PASS	PASS	OFDM	N/A	PASS
A	5200	1/24/2013	3589	EX3DV4	5200	Head	4.659	35.55	PASS	PASS	PASS	OFDM	N/A	PASS
A	5300	1/24/2013	3589	EX3DV4	5300	Head	4.800	35.40	PASS	PASS	PASS	OFDM	N/A	PASS
A	5500	1/24/2013	3589	EX3DV4	5500	Head	5.004	34.83	PASS	PASS	PASS	OFDM	N/A	PASS
A	5800	1/24/2013	3589	EX3DV4	5800	Head	5.392	34.17	PASS	PASS	PASS	OFDM	N/A	PASS
D	750	10/18/2012	3288	ES3DV3	750	Body	0.947	55.34	PASS	PASS	PASS	N/A	N/A	N/A
G	835	3/26/2013	3209	ES3DV3	835	Body	1.006	54.42	PASS	PASS	PASS	GMSK	PASS	N/A
B	1750	1/28/2013	3287	ES3DV3	1750	Body	1.524	52.77	PASS	PASS	PASS	N/A	N/A	N/A
B	1900	1/29/2013	3287	ES3DV3	1900	Body	1.570	51.00	PASS	PASS	PASS	GMSK	PASS	N/A
E	1900	3/5/2013	3920	EX3DV4	1900	Body	1.574	52.42	PASS	PASS	PASS	GMSK	PASS	N/A
C	2450	11/8/2013	3022	ES3DV3	2450	Body	2.038	51.10	PASS	PASS	PASS	OFDM	N/A	PASS
A	5200	1/23/2013	3589	EX3DV4	5200	Body	5.292	47.85	PASS	PASS	PASS	OFDM	N/A	PASS
A	5300	1/23/2013	3589	EX3DV4	5300	Body	5.477	47.47	PASS	PASS	PASS	OFDM	N/A	PASS
A	5500	1/23/2013	3589	EX3DV4	5500	Body	5.729	47.03	PASS	PASS	PASS	OFDM	N/A	PASS
A	5800	1/23/2013	3589	EX3DV4	5800	Body	6.233	46.20	PASS	PASS	PASS	OFDM	N/A	PASS

Table E-II
SAR System Validation Summary – Extremity SAR Considerations

SAR SYSTEM #	FREQ. [MHz]	DATE	PROBE SN	PROBE TYPE	PROBE CAL. POINT		COND.	PERM.	CW VALIDATION			MOD. VALIDATION		
							(σ)	(ε)	SENSI- TIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
A	5200	4/11/2013	3589	EX3DV4	5200	Body	5.268	48.58	PASS	PASS	PASS	OFDM	N/A	PASS
A	5300	4/11/2013	3589	EX3DV4	5300	Body	5.405	48.31	PASS	PASS	PASS	OFDM	N/A	PASS
A	5500	4/11/2013	3589	EX3DV4	5500	Body	5.703	47.90	PASS	PASS	PASS	OFDM	N/A	PASS

NOTE: All measurements were performed using probes calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r01. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664.

FCC ID: A3LSMN900W8		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 07/29/13 - 08/12/13	DUT Type: Portable Handset			APPENDIX E: Page 1 of 1