



SAR TEST REPORT

No. I16Z42351-SEM01

For

Huawei Technologies Co.,Ltd.

Smart Phone

Model Name: MYA-L11

With

Hardware Version: VER.A

Software Version: Maya-L11C432B017

FCC ID: QISMYA-L11

Issued Date: 2017-1-17



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CNAS L0570

Note:

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I16Z42351-SEM01	Rev.0	2017-1-17	Initial creation of test report

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1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

1.2 Testing Environment

Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

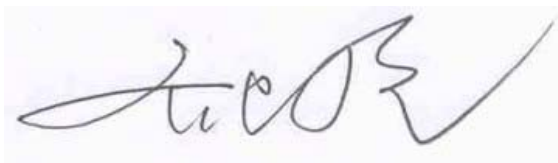
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	January 1,2017
Testing End Date:	January 4,2017

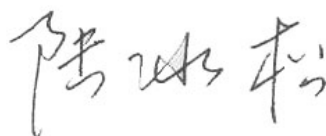
1.4 Signature



Lin Xiaojun
(Prepared this test report)



Qi Dianyuan
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2 Statement of Compliance

The maximum results of SAR found during testing for Huawei Technologies Co.,Ltd. Smart Phone MYA-L11 is as follows:

Table 2.1: Highest Reported SAR (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g (W/Kg)	Equipment Class
Head (Separation Distance 0mm)	GSM 850	0.41	PCE
	PCS 1900	0.29	
	WCDMA1900-BII	0.74	
	LTE2500-FDD7	0.66	
	WLAN 2.4 GHz	0.74	DTS
Hotspot (Separation Distance 10mm)	GSM 850	0.66	PCE
	PCS 1900	0.40	
	WCDMA1900-BII	0.66	
	LTE2500-FDD7	0.96	
	WLAN 2.4 GHz	0.13	DTS
Body worn (Separation Distance 15mm)	GSM 850	0.55	PCE
	PCS 1900	0.17	
	WCDMA1900-BII	0.25	
	LTE2500-FDD7	0.40	
	WLAN 2.4 GHz	0.11	DTS

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 10 mm or 15mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report.

The highest reported SAR value is obtained at the case of (**Table 2.1**), and the values are: 0.96 W/kg (1g).

Table 2.2: The sum of reported SAR values for main antenna and WiFi

	Position	Main antenna	WiFi	Sum
Highest reported SAR value for Head	Right hand, Touch cheek	0.74	0.74	1.48
Highest reported SAR value for Body	Front 10mm	0.96	0.12	1.08
	Rear 15mm	0.55	0.11	0.66

Table 2.3: The sum of reported SAR values for main antenna and BT

	Position	Main antenna	BT	Sum
Maximum reported SAR value for Head	Right hand, Touch cheek	0.74	0.33 ^[1]	1.07
Maximum reported SAR value for Body	Front 10mm	0.96	0.17 ^[1]	1.13
	Rear 15mm	0.55	0.11 ^[1]	0.66

[1] - Estimated SAR for Bluetooth (see the table 13.3)

According to the above tables, the highest sum of reported SAR values is 1.48 **W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

3 Client Information

3.1 Applicant Information

Company Name:	Huawei Technologies Co.,Ltd.
Address /Post:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District Shenzhen China
City:	Shenzhen
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3.2 Manufacturer Information

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Country:	China
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E-mail:	zhe.dong@huawei.com
Telephone:	75536375506
Fax:	/

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Smart Phone
Model name:	MYA-L11
Operating mode(s):	GSM 850/1900 WCDMA1900 LTE B7, BT, WLAN
Tx Frequency:	825 – 848.8 MHz (GSM 850)
	1850.2 – 1910 MHz (GSM 1900)
	1852.4–1907.6 MHz (WCDMA1900 Band II)
	2502.5 – 2567.5 MHz (LTE Band 7)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	2402 – 2480 MHz (Bluetooth)
Rx Frequency:	869.2 – 891.8 MHz (GSM 850)
	1930.2 – 1989.8 MHz (GSM 1900)
	1932.4 –1987.6 MHz (WCDMA1900 Band II)
	2630 – 2680(LTE Band 7)
	2402 – 2472 MHz (Wi-Fi 2.4G)
	2400 – 2480 MHz (Bluetooth)
WCDMA Category	HSDPA: 14
	HSUPA: 7
	HSPA+: 7
	DC-HSDPA: 24
Release Version	GSM: R5
	GPRS: R5
	UMTS: Rel 8
GPRS/EGPRS Multislot Class:	12
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Accessories/Body-worn configurations:	Headset
Hotspot mode:	Support
NFC:	Support

4.2 Internal Identification of EUT used during the test

EUTID	IMEI	HW Version	SW Version
1	862665030014002	VER.A	Maya-L11C432B017
2	862665030015405	VER.A	Maya-L11C432B017
3	862665030015413	VER.A	Maya-L11C432B017
4	862665030015355	VER.A	Maya-L11C432B017
5	862665030015397	VER.A	Maya-L11C432B017
6	862665030014986	VER.A	Maya-L11C432B017

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1 to 5 and conducted power with the EUT6.

4.3 Internal Identification of AE used during the test

AE ID	Description	Model	SN	Manufacturer
AE1	Battery	HB405979ECW	862665030015132	Sunwoda Electronic Co., LTD.
AE2	Battery	HB405979ECW	862665030015280	SCUD (FUJIAN) Electronics Co., Ltd.
AE3	Battery	HB405979ECW	862665030014812	SCUD (FUJIAN) Electronics Co., Ltd.
AE4	Battery	HB405979ECW	862665030015272	Huizhou Desay Battery Co., Ltd.
AE5	Headset	MEMD1632B580C00	/	Jiangxi Lianchuang Hongsheng Electronic Co., LTD.
AE6	Headset	EMC309-001	/	MERRY ELECTRONICS CO., LTD.
AE7	Headset	1311-3291-3.5mm-229	/	BOLUO COUNTY QUANCHENG ELECTRONIC CO.,LTD.

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets.

KDB941225 D01 SAR test for 3G devices v03r01: SAR Measurement Procedures for 3G Devices

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

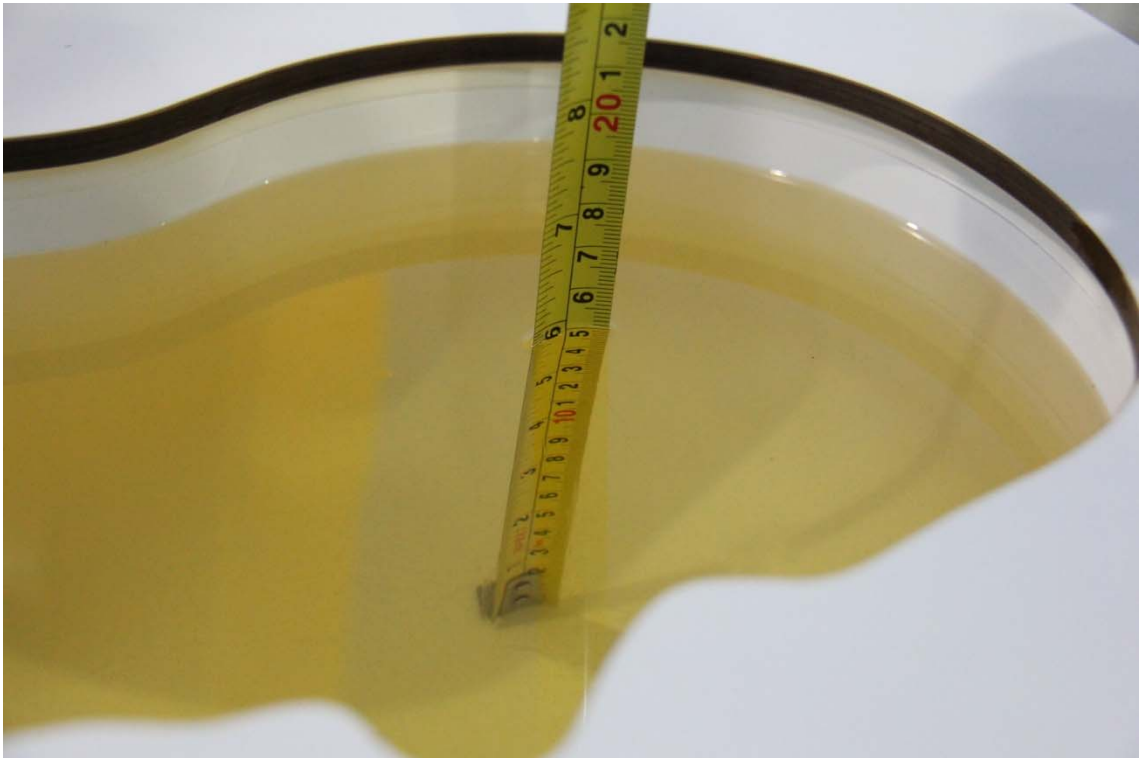
Frequency(MHz)	Liquid Type	Conductivity(σ)	$\pm 5\%$ Range	Permittivity(ϵ)	$\pm 5\%$ Range
835	Head	0.90	0.86~0.95	41.5	39.4~43.6
835	Body	0.97	0.92~1.02	55.2	52.4~58.0
1900	Head	1.40	1.33~1.47	40.0	38.0~42.0
1900	Body	1.52	1.44~1.60	53.3	50.6~56.0
2450	Head	1.80	1.71~1.89	39.2	37.2~41.2
2450	Body	1.95	1.85~2.05	52.7	50.1~55.3
2600	Head	1.96	1.86~2.06	39.01	37.1~41.0
2600	Body	2.16	2.05~2.27	52.5	49.9~55.1

7.2 Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date yyyy/mm/dd	Frequency	Type	Permittivity ϵ	Drift (%)	Conductivity σ (S/m)	Drift (%)
2017/1/1	835 MHz	Head	41.1	-0.96	0.892	-0.89
		Body	54.29	-1.65	0.977	0.72
2017/1/2	1900 MHz	Head	40.74	1.85	1.408	0.57
		Body	52.48	-1.54	1.515	-0.33
2017/1/3	2450 MHz	Head	39.19	-0.03	1.836	2.00
		Body	52.52	-0.34	1.938	-0.62
2017/1/4	2600 MHz	Head	38.8	-0.54	1.938	-1.12
		Body	53.29	1.50	2.167	0.32

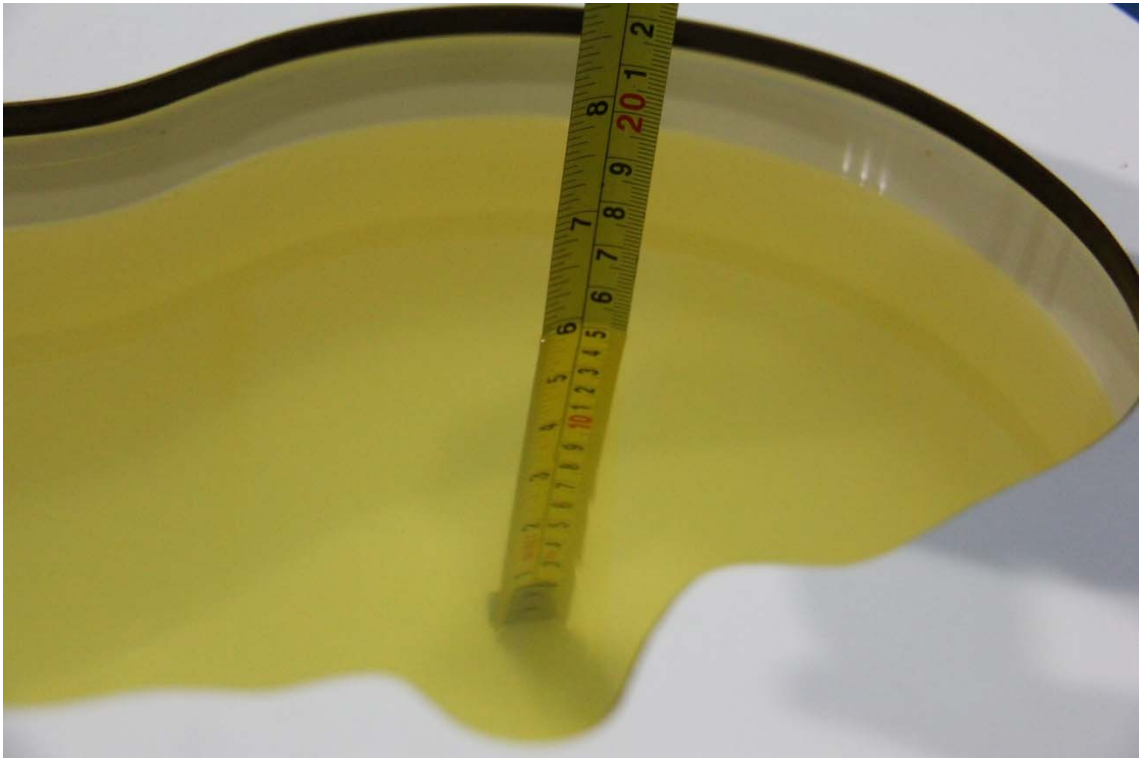
Note: The liquid temperature is 22.0°C



Picture 7-1 Liquid depth in the Head Phantom (835MHz)



Picture 7-2 Liquid depth in the Flat Phantom (835MHz)



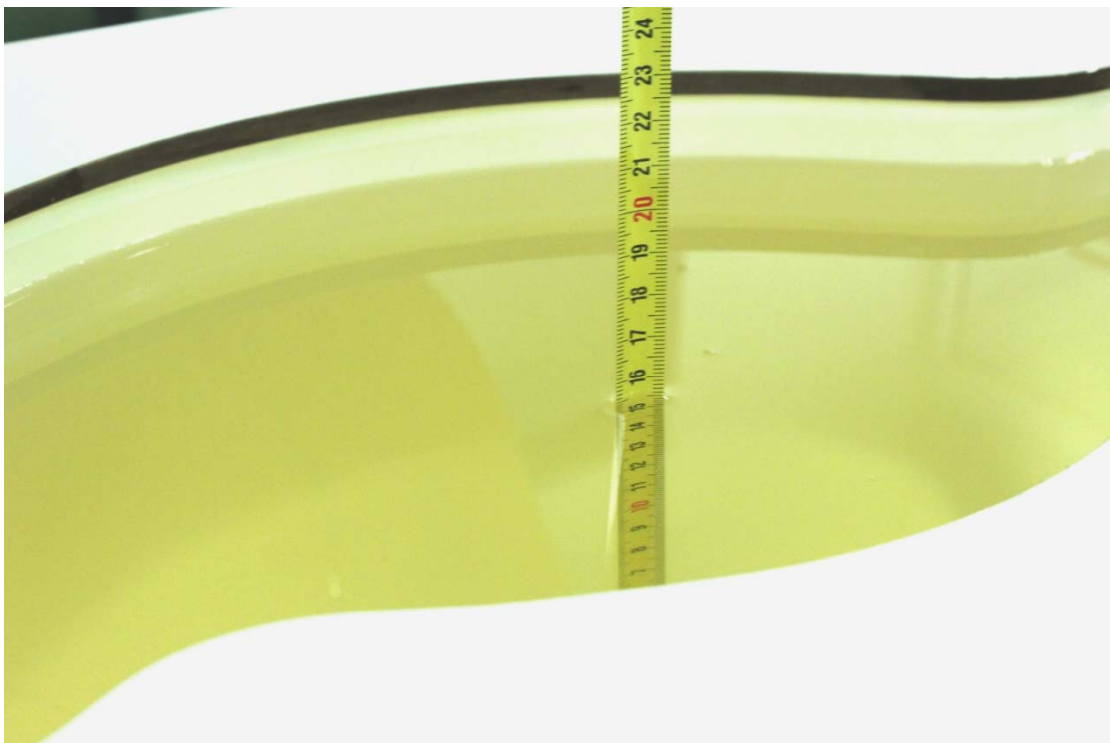
Picture 7-3 Liquid depth in the Head Phantom (1900 MHz)



Picture 7-4 Liquid depth in the Flat Phantom (1900MHz)



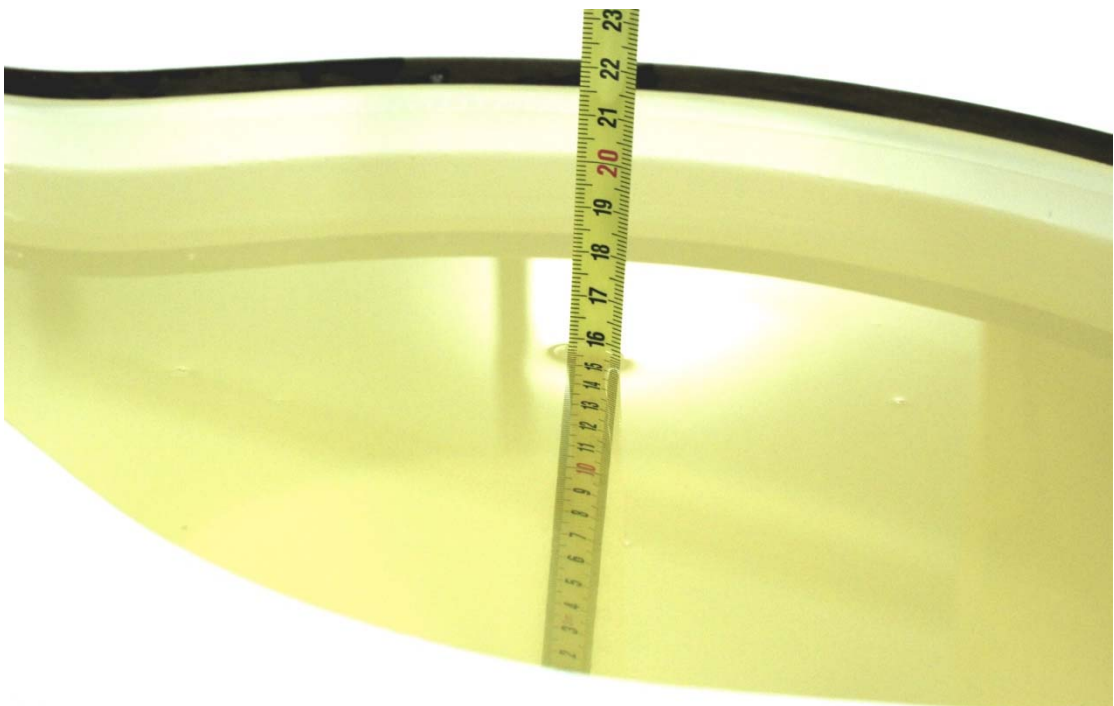
Picture 7-5 Liquid depth in the Head Phantom (2450MHz)



Picture 7-6 Liquid depth in the Flat Phantom (2450MHz)



Picture 7-7 Liquid depth in the Head Phantom (2600 MHz Head)



Picture 7-8 Liquid depth in the Flat Phantom (2600MHz)

8.1 System Setup

The diagram illustrates the experimental setup for measuring the radiation pattern of a dipole antenna. The setup includes a Signal Generator connected to an Amplifier (Amp), which is connected to a 3dB coupler. The coupler has three ports: one leading to Att3, another to Att2 (connected to PM2), and a third to a Dir. Coupler. The Dir. Coupler has two ports: one leading to Att1 (connected to PM1) and another to a Cable. The Cable is connected to a 3D Probe positioner, which holds a Field probe. The Field probe is positioned above a Flat Phantom, which contains a Dipole antenna. A Spacer is shown in an inset, indicating the distance s between the Field probe and the Dipole. A computer is connected to the 3D Probe positioner.

Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2017/1/1	835 MHz	6.18	9.44	6.2	9.32	0.32%	-1.27%
2017/1/2	1900 MHz	21.20	40.70	21.24	40.76	0.19%	0.15%
2017/1/3	2450 MHz	24.60	52.80	25	52.76	1.63%	-0.08%
2017/1/4	2600 MHz	25.20	56.70	25.48	55.72	1.11%	-1.73%

Table 8.2: System Verification of Body

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2017/1/1	835 MHz	6.36	9.69	6.24	9.56	-1.89%	-1.34%
2017/1/2	1900 MHz	21.3	40.1	21.12	41.4	-0.85%	3.24%
2017/1/3	2450 MHz	24.1	51.2	24.48	53.2	1.58%	3.91%
2017/1/4	2600 MHz	24.8	55.3	25.08	55.72	1.13%	0.76%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

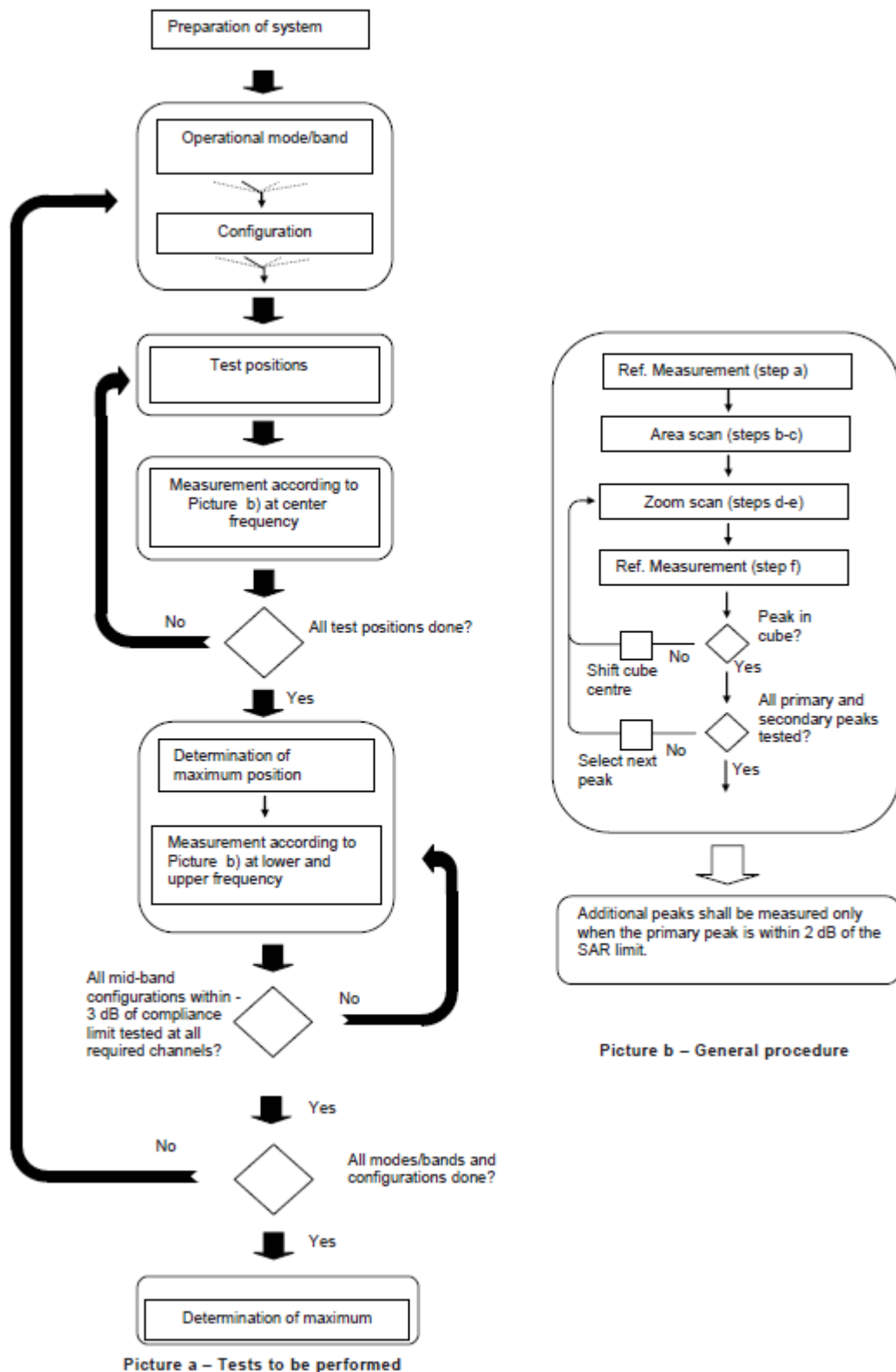
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the center of the transmit frequency band (f_c) for:

- a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
- b) all configurations for each device position in a), e.g., antenna extended and retracted, and
- c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1 Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

9.3 WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99, Release 5 and Release 6. The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & DPDCH_n), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.5	1.5	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	1.5	1.5	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}:47/15$ $\beta_{ed2}:47/15$	4	2	1.5	1.5	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	1.5	1.5	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.5	1.5	21	81

Rel.8 DC-HSDPA (Cat 24)

SAR test exclusion for Rel.8 DC-HSDPA must satisfy the SAR test exclusion requirements of Rel.5 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.

9.4 SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Schwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.

It is performed for conducted power and SAR based on the KDB941225 D05.

SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

9.5 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. 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 that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a 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.

9.6 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01 v05, when the implementation is based the specific polynomial fit

algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-g SAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz) and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

11.1 GSM Measurement result

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (E5515C) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

Table 11-1 GSM850

GSM850								
Config	Tune-up	Measured Power (dBm)			Calculation	Average Power (dBm)		
		CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz		CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz
GSM Speech	33.50	33.01	33.04	33.01				
GPRS 1 Txslot	33.50	32.92	32.96	32.93	-9.03	23.89	23.93	23.90
GPRS 2 Txslots	32.50	32.25	32.29	32.26	-6.02	26.23	26.27	26.24
GPRS 3 Txslots	30.50	30.38	30.39	30.35	-4.26	26.12	26.13	26.09
GPRS 4 Txslots	29.50	29.42	29.43	29.40	-3.01	26.41	26.42	26.39
EGPRS GMSK 1 Txslot	33.50	32.20	32.24	32.21	-9.03	23.17	23.21	23.18
EGPRS GMSK 2 Txslots	32.50	31.54	31.58	31.55	-6.02	25.52	25.56	25.53
EGPRS GMSK 3 Txslots	30.50	29.80	29.82	29.79	-4.26	25.54	25.56	25.53
EGPRS GMSK 4 Txslots	29.00	28.63	28.69	28.67	-3.01	25.62	25.68	25.66
EGPRS 8PSK 1 Txslot	27.10	25.75	25.62	25.49	-9.03	16.72	16.59	16.46
EGPRS 8PSK 2 Txslots	26.10	24.43	24.30	24.19	-6.02	18.41	18.28	18.17
EGPRS 8PSK 3 Txslots	24.10	23.05	22.93	22.82	-4.26	18.79	18.67	18.56
EGPRS 8PSK 4 Txslots	23.10	21.85	21.73	21.65	-3.01	18.84	18.72	18.64

Table 11-2 PCS1900

PCS1900								
Config	Tune-up	Measured Power (dBm)			Calculation	Average Power (dBm)		
		CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz		CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz
GSM Speech	30.50	29.84	29.82	29.92				
GPRS 1 Txslot	30.50	29.82	29.82	29.91	-9.03	20.79	20.79	20.88
GPRS 2 Txslots	29.50	29.03	29.02	29.13	-6.02	23.01	23.00	23.11
GPRS 3 Txslots	27.50	27.19	27.17	27.28	-4.26	22.93	22.91	23.02
GPRS 4 Txslots	26.50	26.09	26.08	26.17	-3.01	23.08	23.07	23.16
EGPRS GMSK 1 Txslot	30.50	29.81	29.82	29.91	-9.03	20.78	20.79	20.88
EGPRS GMSK 2 Txslots	29.50	29.03	29.01	29.13	-6.02	23.01	22.99	23.11
EGPRS GMSK 3 Txslots	27.50	27.18	27.17	27.28	-4.26	22.92	22.91	23.02
EGPRS GMSK 4 Txslots	26.50	26.08	26.08	26.16	-3.01	23.07	23.07	23.15
EGPRS 8PSK 1 Txslot	26.10	25.60	25.64	25.67	-9.03	16.57	16.61	16.64
EGPRS 8PSK 2 Txslots	25.10	24.37	24.36	24.43	-6.02	18.35	18.34	18.41
EGPRS 8PSK 3 Txslots	23.10	22.24	22.27	22.33	-4.26	17.98	18.01	18.07
EGPRS 8PSK 4 Txslots	22.10	21.16	21.18	21.20	-3.01	18.15	18.17	18.19

NOTES:

Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 4Txslots for 850 and 1900 GPRS and EGPRS.

11.2 WCDMA Measurement result

Table 11-3 WCDMA1900-BII

WCDMA1900-BII					
Item		Tune-up	Measured Power (dBm)		
			CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz
WCDMA	RMC	23.50	22.30	22.00	22.20
HSDPA	subtest1	23.00	21.67	21.49	21.92
	subtest2	23.00	21.65	21.45	21.94
	subtest3	22.00	21.16	21.00	21.41
	subtest4	22.00	21.13	21.00	21.36
HSUPA	subtest1	21.00	19.67	19.53	20.39
	subtest2	20.50	19.68	19.50	19.90
	subtest3	21.00	20.66	20.50	20.91
	subtest4	20.50	19.15	18.94	19.36
	subtest5	22.00	21.69	21.44	21.87
HSPA+	\	22.50	21.47	21.30	21.69
DC-HSDPA	subtest1	23.50	21.94	21.74	22.29
	subtest2	23.50	21.93	21.79	22.17
	subtest3	22.50	21.37	21.21	21.73
	subtest4	22.50	21.36	21.25	21.71

11.3 LTE Measurement result

Table 11-4 LTE2500-FDD7

LTE2500-FDD7							
BandWidth	RB Number/Star	Channel/Frequency	Tune-up	Measured Power (dBm) & MPR			
				QPSK		16QAM	
				Measured Power	MPR	Measured Power	MPR
5MHz	1H	21425	23.2	22.55	0	21.73	1
		21100	23.2	22.38	0	21.57	1
		20775	23.2	22.26	0	21.42	1
	1M	21425	23.2	22.59	0	21.77	1
		21100	23.2	22.48	0	21.62	1
		20775	23.2	22.28	0	21.43	1
	1L	21425	23.2	22.54	0	21.77	1
		21100	23.2	22.41	0	21.59	1
		20775	23.2	22.25	0	21.39	1
	12H	21425	23.2	21.67	1	20.66	2
		21100	23.2	21.51	1	20.48	2
		20775	23.2	21.36	1	20.34	2
	12M	21425	23.2	21.66	1	20.64	2
		21100	23.2	21.51	1	20.49	2
		20775	23.2	21.33	1	20.29	2
	12L	21425	23.2	21.65	1	20.64	2
		21100	23.2	21.50	1	20.48	2
		20775	23.2	21.35	1	20.32	2
	25	21425	23.2	21.64	1	20.62	2
		21100	23.2	21.50	1	20.46	2
		20775	23.2	21.33	1	20.29	2
10MHz	1H	21400	23.2	22.62	0	21.80	1
		21100	23.2	22.42	0	21.61	1
		20800	23.2	22.33	0	21.57	1
	1M	21400	23.2	22.54	0	21.77	1
		21100	23.2	22.43	0	21.62	1
		20800	23.2	22.31	0	21.49	1
	1L	21400	23.2	22.48	0	21.74	1
		21100	23.2	22.39	0	21.60	1
		20800	23.2	22.28	0	21.42	1
	25H	21400	23.2	21.65	1	20.62	2
		21100	23.2	21.50	1	20.47	2
		20800	23.2	21.38	1	20.35	2
	25M	21400	23.2	21.60	1	20.60	2
		21100	23.2	21.50	1	20.46	2
		20800	23.2	21.37	1	20.32	2
	25L	21400	23.2	21.55	1	20.57	2
		21100	23.2	21.47	1	20.44	2
		20800	23.2	21.33	1	20.28	2
	50	21400	23.2	21.64	1	20.63	2
		21100	23.2	21.53	1	20.51	2
		20800	23.2	21.37	1	20.34	2
15MHz	1H	21375	23.2	22.65	0	21.85	1
		21100	23.2	22.49	0	21.67	1
		20825	23.2	22.36	0	21.63	1
	1M	21375	23.2	22.51	0	21.78	1
		21100	23.2	22.45	0	21.63	1
		20825	23.2	22.37	0	21.53	1
	1L	21375	23.2	22.40	0	21.70	1
		21100	23.2	22.40	0	21.61	1
		20825	23.2	22.29	0	21.43	1
	36H	21375	23.2	21.68	1	20.68	2
		21100	23.2	21.56	1	20.52	2
		20825	23.2	21.43	1	20.39	2
	36M	21375	23.2	21.63	1	20.64	2
		21100	23.2	21.54	1	20.53	2
		20825	23.2	21.43	1	20.40	2
	36L	21375	23.2	21.54	1	20.56	2
		21100	23.2	21.48	1	20.47	2
		20825	23.2	21.40	1	20.36	2
	75	21375	23.2	21.60	1	20.61	2
		21100	23.2	21.53	1	20.51	2
		20825	23.2	21.42	1	20.39	2
20MHz	1H	21350	23.2	22.71	0	21.88	1
		21100	23.2	22.50	0	21.69	1
		20850	23.2	22.42	0	21.68	1
	1M	21350	23.2	22.52	0	21.75	1
		21100	23.2	22.44	0	21.63	1
		20850	23.2	22.33	0	21.56	1
	1L	21350	23.2	22.46	0	21.68	1
		21100	23.2	22.41	0	21.64	1
		20850	23.2	22.28	0	21.39	1
	50H	21350	23.2	21.57	1	20.66	2
		21100	23.2	21.54	1	20.51	2
		20850	23.2	21.41	1	20.42	2
	50M	21350	23.2	21.54	1	20.58	2
		21100	23.2	21.52	1	20.49	2
		20850	23.2	21.39	1	20.37	2
	50L	21350	23.2	21.47	1	20.53	2
		21100	23.2	21.46	1	20.46	2
		20850	23.2	21.38	1	20.35	2
	100	21350	23.2	21.54	1	20.58	2
		21100	23.2	21.49	1	20.46	2
		20850	23.2	21.36	1	20.34	2

11.4 Wi-Fi and BT Measurement result

The output power of BT antenna is as following:

Table 11-5 Bluetooth Power

Bluetooth Power				
Mode	Channel	Frequency	Tune-up	Measured
GFSK	78	2480 MHz	9	7.98
	39	2441 MHz	9	7.69
	0	2402 MHz	9	7.5

The average conducted power for Wi-Fi is as following:

Table 11-6 WLAN 2450

WLAN 2450				SN		
Band	Mode	Channel	Frequency	Data Rate	Tune-up	Measured
WLAN 2.4G	802.11b	1	2412 MHz	1Mbps	17.50	16.75
		6	2437 MHz		17.50	16.58
		11	2462 MHz		17.50	16.50
	802.11g	1	2412 MHz	12Mbps	15.00	14.65
		6	2437 MHz		15.00	14.54
		11	2462 MHz		15.00	14.59
	802.11n 20M	1	2412 MHz	MCS3	14.00	13.24
		6	2437 MHz		14.00	13.02
		11	2462 MHz		14.00	13.84
	802.11n 40M	1	2412 MHz	MCS0	13.00	12.47
		6	2437 MHz		13.00	12.46
		11	2462 MHz		13.00	12.42

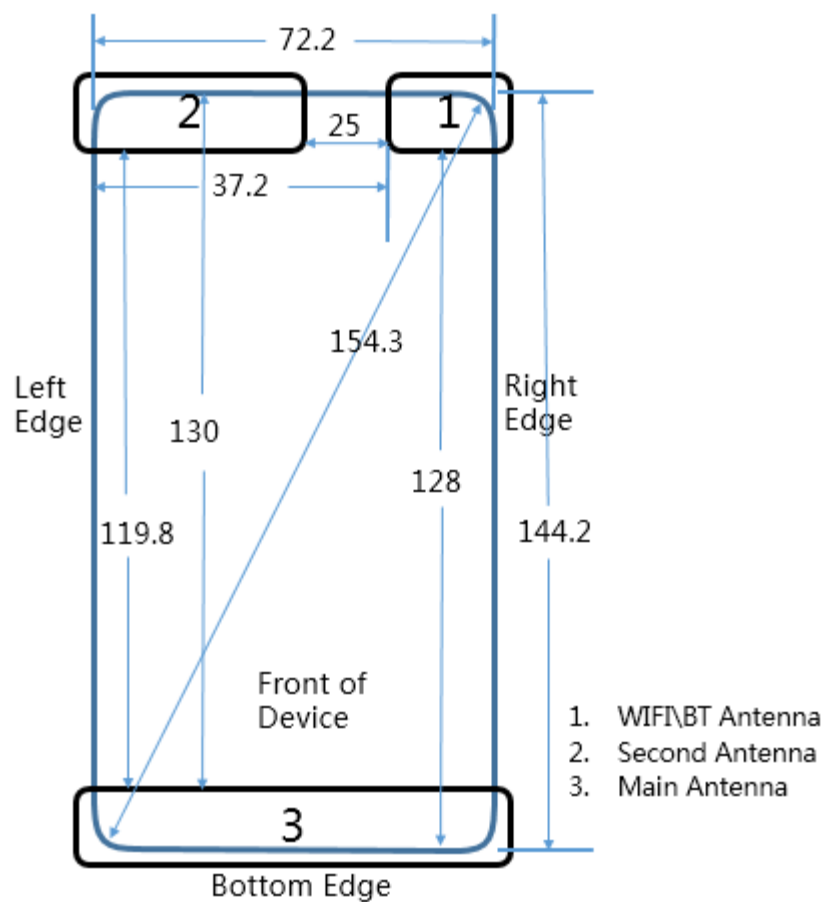
Note: All values in the above table is the worst case value based on our evaluation.

12 Simultaneous TX SAR Considerations

12.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter. For this device, the BT and Wi-Fi can transmit simultaneous with other transmitters.

12.2 Transmit Antenna Separation Distances



Picture 12.1 Antenna Locations

Note: The second antenna is a diversity antenna.

12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR v01, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
Main antenna	Yes	Yes	Yes	Yes	No	Yes
WLAN	Yes	Yes	No	Yes	Yes	No

12.4 Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \right] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
 for 1-g SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Table 12.1: Standalone SAR test exclusion considerations

Band/Mode	F(GHz)	Position	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.441	Head	9.6	9	7.94	Yes
		Body	19.2	9	7.94	Yes
2.4GHz WLAN 802.11 b	2.45	Head	9.58	17.5	56.23	No
		Body	19.17	17.5	56.23	No

13 Evaluation of Simultaneous

Table 13.1: The sum of reported SAR values for main antenna and WiFi

	Position	Main antenna	WiFi	Sum
Highest reported SAR value for Head	Right hand, Touch cheek	0.74	0.74	1.48
Highest reported SAR value for Body	Front 10mm	0.96	0.12	1.08
	Rear 15mm	0.55	0.11	0.66

Table 13.2: The sum of reported SAR values for main antenna and BT

	Position	Main antenna	BT	Sum
Maximum reported SAR value for Head	Right hand, Touch cheek	0.74	0.33	1.07
Maximum reported SAR value for Body	Front 10mm	0.96	0.17	1.13
	Rear 15mm	0.55	0.11	0.66

[1] - Estimated SAR for Bluetooth (see the table 13.3)

Table 13.3: Estimated SAR for Bluetooth

Mode/Band	F (GHz)	Position	Distance (mm)	Upper limit of power *		Estimated _{1g} (W/kg)
				dBm	mW	
Bluetooth	2.441	Head	5	9	7.94	0.33
Bluetooth	2.441	Body	10	9	7.94	0.17
Bluetooth	2.441	Body	15	9	7.94	0.11

* - Maximum possible output power declared by manufacturer

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm) · [$\sqrt{f(\text{GHz})}/x$] W/kg for test separation distances ≤ 50 mm;

where $x = 7.5$ for 1-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Conclusion:

According to the above tables, the sum of reported SAR values is < 1.6 W/kg. So the simultaneous transmission SAR with volume scans is not required.

14 SAR Test Result

It is determined by user manual for the distance between the EUT and the phantom bottom. The distance is 10 mm or 15mm and just applied to the condition of body worn accessory. It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-g SAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or more than 1.2W/kg.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{\text{Target}} - P_{\text{Measured}})/10}$$

Where P_{Target} is the power of manufacturing upper limit;

P_{Measured} is the measured power in chapter 11.

Table 14-1 Duty Cycle

Mode	Duty Cycle
Speech for GSM850/1900	1:8.3
GPRS&EGPRS for GSM850/1900	1:2
WCDMA<E	1:1

14.1 valuation of multi-batteries

We'll perform the head measurement in all bands with the primary battery depending on the evaluation of multi-batteries and retest on highest value point with other batteries. Then, repeat the measurement in the Body test.

Note:

B1: HB405979ECW SCUD (FUJIAN) Electronics Co., Ltd. Chip Coslight electric core

B2: HB405979ECW SCUD (FUJIAN) Electronics Co., Ltd. Chip LG electric core

B3: HB405979ECW Sunwoda Electronic Co., LTD.

B4: HB405979ECW Huizhou Desay Battery Co., Ltd.

H1: MEMD1632B580C00

H2: EMC309-001

H3: 1311-3291-3.5mm-229

Frequency		Mode/Band	Side	Position	Battery Type	1g SAR (W/kg)	Power Drift
MHz	Channel						
1880	9400	WCDMA1900-BII	Left	Cheek	B1	0.382	0.08
1880	9400	WCDMA1900-BII	Left	Cheek	B2	0.353	0.08
1880	9400	WCDMA1900-BII	Left	Cheek	B3	0.341	0.17
1880	9400	WCDMA1900-BII	Left	Cheek	B4	0.356	0.09

Note: According to the values in the above table, the battery, B1, is the primary battery. We'll perform the head measurement with this battery and retest on highest value point with others.

Frequency		Mode/Band	Position	Battery Type	1g SAR (W/kg)	Power Drift
MHz	Channel					
1880	9400	WCDMA1900-BII	Rear	B1	0.439	0.07
1880	9400	WCDMA1900-BII	Rear	B2	0.430	0.01
1880	9400	WCDMA1900-BII	Rear	B3	0.307	0.02
1880	9400	WCDMA1900-BII	Rear	B4	0.397	0.05

Note: According to the values in the above table, the battery, B1, is the primary battery. We'll perform the Body measurement with this battery and retest on highest value point with others.

14.2 SAR results

Table 14-1 GSM850 Head

GSM850 Head								
Ambient Temperature:			22.4			Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz	CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz
GSM	Tune-up		33.50	33.50	33.50	Scaling factor*		
	Slot Average Power [dBm]		33.01	33.04	33.01	1.12	1.11	1.12
	Left Cheek	1g SAR	0.366	0.34	0.269	0.41	0.38	0.30
		10g SAR	0.279	0.253	0.199	0.31	0.28	0.22
		Deviation	-0.08	-0.01	0.04	-0.08	-0.01	0.04
	Left Tilt	1g SAR		0.209		0.00	0.23	0.00
		10g SAR		0.164		0.00	0.18	0.00
		Deviation		-0.07			-0.07	
	Right Cheek	1g SAR		0.326		0.00	0.36	0.00
		10g SAR		0.248		0.00	0.28	0.00
		Deviation		-0.01		0.00	-0.01	0.00
	Right Tilt	1g SAR		0.206		0.00	0.23	0.00
		10g SAR		0.164		0.00	0.18	0.00
		Deviation		0.02		0.00	0.02	0.00
GSM B2	Left Cheek	1g SAR	0.364			0.41	0.00	0.00
		10g SAR	0.273			0.31	0.00	0.00
		Deviation	-0.02			-0.02	0.00	0.00
GSM B3	Left Cheek	1g SAR	0.347			0.39	0.00	0.00
		10g SAR	0.258			0.29	0.00	0.00
		Deviation	-0.01			-0.01	0.00	0.00
GSM B4	Left Cheek	1g SAR	0.354			0.40	0.00	0.00
		10g SAR	0.263			0.29	0.00	0.00
		Deviation	-0.05			-0.05	0.00	0.00

Table 14-2 GSM850 Body 10mm

GSM850 Body								
Ambient Temperature: 22.4						Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz	CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz
GPRS 4 Txslots	Tune-up		29.50	29.50	29.50	Scaling factor*		
	Slot Average Power [dBm]		29.42	29.43	29.40	1.02	1.02	1.02
	Front	1g SAR		0.283		0.00	0.29	0.00
		10g SAR		0.203		0.00	0.21	0.00
		Deviation		-0.02		0.00	-0.02	0.00
	Rear	1g SAR	0.648	0.368	0.385	0.66	0.37	0.39
		10g SAR	0.504	0.258	0.269	0.51	0.26	0.28
		Deviation	0.05	-0.04	0.13	0.05	-0.04	0.13
	Bottom edge	1g SAR		0.035		0.00	0.04	0.00
		10g SAR		0.0186		0.00	0.02	0.00
		Deviation		-0.03		0.00	-0.03	0.00
	Left edge	1g SAR		0.334		0.00	0.34	0.00
		10g SAR		0.215		0.00	0.22	0.00
		Deviation		0.09		0.00	0.09	0.00
	Right edge	1g SAR		0.285		0.00	0.29	0.00
		10g SAR		0.184		0.00	0.19	0.00
		Deviation		-0.09		0.00	-0.09	0.00
EGPRS GMSK 4 Txslots	Tune-up		29.00	29.00	29.00	Scaling factor*		
	Slot Average Power [dBm]		28.63	28.69	28.67	1.09	1.07	1.08
	Rear	1g SAR	0.585			0.64	0.00	0.00
		10g SAR	0.426			0.46	0.00	0.00
		Deviation	-0.01			-0.01	0.00	0.00
GPRS 4 Txslots B2	Rear	1g SAR	0.557			0.57	0.00	0.00
		10g SAR	0.386			0.39	0.00	0.00
		Deviation	-0.04			-0.04	0.00	0.00
GPRS 4 Txslots B3	Rear	1g SAR	0.611			0.62	0.00	0.00
		10g SAR	0.432			0.44	0.00	0.00
		Deviation	0.02			0.02	0.00	0.00
GPRS 4 Txslots B4	Rear	1g SAR	0.602			0.61	0.00	0.00
		10g SAR	0.422			0.43	0.00	0.00
		Deviation	0.17			0.17	0.00	0.00

Table 14-3 GSM850 Body 15mm

GSM850 Body									
Ambient Temperature:			22.4			Liquid Temperature:			22.2
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]			
			CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz	CH25 1 848.8 MHz	CH190 836.6 MHz	CH128 824.2 MHz	
GPRS 4 Txslots	Tune-up		29.50	29.50	29.50	Scaling factor*			
	Slot Average Power [dBm]		29.42	29.43	29.40	1.02	1.02	1.02	
	Front	1g SAR		0.237		0.00	0.24	0.00	
		10g SAR		0.167		0.00	0.17	0.00	
		Deviation		-0.02		0.00	-0.02	0.00	
	Rear	1g SAR	0.543	0.308	0.322	0.55	0.31	0.33	
		10g SAR	0.416	0.213	0.222	0.42	0.22	0.23	
		Deviation	-0.02	0.06	0.11	-0.02	0.06	0.11	
EGPRS GMSK 4 Txslots	Tune-up		29.00	29.00	29.00	Scaling factor*			
	Slot Average Power [dBm]		28.63	28.69	28.67	1.09	1.07	1.08	
	Rear	1g SAR	0.489			0.53	0.00	0.00	
		10g SAR	0.351			0.38	0.00	0.00	
		Deviation	0.02			0.02	0.00	0.00	
GPRS 4 Txslots B2	Rear	1g SAR	0.466			0.47	0.00	0.00	
		10g SAR	0.32			0.33	0.00	0.00	
		Deviation	0.18			0.18	0.00	0.00	
GPRS 4 Txslots B3	Rear	1g SAR	0.511			0.52	0.00	0.00	
		10g SAR	0.357			0.36	0.00	0.00	
		Deviation	0.04			0.04	0.00	0.00	
GPRS 4 Txslots B4	Rear	1g SAR	0.506			0.52	0.00	0.00	
		10g SAR	0.256			0.26	0.00	0.00	
		Deviation	0.07			0.07	0.00	0.00	

Table 14-4 PCS1900 Head

PCS1900 Head								
Ambient Temperature:			22.4			Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz	CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz
GSM	Tune-up		30.50	30.50	30.50	Scaling factor*		
	Slot Average Power [dBm]		29.84	29.82	29.92	1.16	1.17	1.14
	Left Cheek	1g SAR		0.179		0.00	0.21	0.00
		10g SAR		0.112		0.00	0.13	0.00
		Deviation		-0.08		0.00	-0.08	0.00
	Left Tilt	1g SAR		0.104		0.00	0.12	0.00
		10g SAR		0.066		0.00	0.08	0.00
		Deviation		0.12		0.00	0.12	
	Right Cheek	1g SAR	0.237	0.238	0.254	0.28	0.28	0.29
		10g SAR	0.14	0.138	0.163	0.16	0.16	0.19
		Deviation	0.03	0.09	0.02	0.03	0.09	0.02
	Right Tilt	1g SAR		0.105		0.00	0.12	0.00
		10g SAR		0.066		0.00	0.08	0.00
		Deviation		0.06		0.00	0.06	0.00
GSM B2	Right Cheek	1g SAR			0.234	0.00	0.00	0.27
		10g SAR			0.136	0.00	0.00	0.16
		Deviation			0.07	0.00	0.00	0.07
GSM B3	Right Cheek	1g SAR			0.231	0.00	0.00	0.26
		10g SAR			0.132	0.00	0.00	0.15
		Deviation			-0.03	0.00	0.00	-0.03
GSM B4	Right Cheek	1g SAR			0.236	0.00	0.00	0.27
		10g SAR			0.135	0.00	0.00	0.15
		Deviation			0.04	0.00	0.00	0.04

Table 14-5 PCS1900 Body 10mm

PCS1900 Body									
Ambient Temperature:			22.4			Liquid Temperature:			22.2
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]			
			CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz	CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz	
GPRS 4 Txslots	Tune-up		26.50	26.50	26.50	Scaling factor*			
	Slot Average Power [dBm]		26.09	26.08	26.17	1.10	1.10	1.08	
	Front	1g SAR		0.247		0.00	0.27	0.00	
		10g SAR		0.166		0.00	0.18	0.00	
		Deviation		-0.07		0.00	-0.07	0.00	
	Rear	1g SAR	0.278	0.279	0.374	0.31	0.31	0.40	
		10g SAR	0.175	0.178	0.242	0.19	0.20	0.26	
		Deviation	0.03	-0.09	0.07	0.03	-0.09	0.07	
	Bottom edge	1g SAR		0.207		0.00	0.23	0.00	
		10g SAR		0.114		0.00	0.13	0.00	
		Deviation		0.07		0.00	0.07	0.00	
	Left edge	1g SAR		0.193		0.00	0.21	0.00	
		10g SAR		0.113		0.00	0.12	0.00	
		Deviation		0.01		0.00	0.01	0.00	
	Right edge	1g SAR		0.163		0.00	0.18	0.00	
		10g SAR		0.102		0.00	0.11	0.00	
		Deviation		0.12		0.00	0.12	0.00	
EGPRS GMSK 4 Txslots	Tune-up		26.50	26.50	26.50	Scaling factor*			
	Slot Average Power [dBm]		26.08	26.08	26.16	1.10	1.10	1.08	
	Rear	1g SAR			0.359	0.00	0.00	0.39	
10g SAR				0.211	0.00	0.00	0.23		
Deviation				0.03	0.00	0.00	0.03		
GPRS 4 Txslots B2	Rear	1g SAR			0.351	0.00	0.00	0.38	
		10g SAR			0.204	0.00	0.00	0.22	
		Deviation			0.16	0.00	0.00	0.16	
GPRS 4 Txslots B3	Rear	1g SAR			0.35	0.00	0.00	0.38	
		10g SAR			0.194	0.00	0.00	0.21	
		Deviation			0.14	0.00	0.00	0.14	
GPRS 4 Txslots B4	Rear	1g SAR			0.358	0.00	0.00	0.39	
		10g SAR			0.21	0.00	0.00	0.23	
		Deviation			0.07	0.00	0.00	0.07	

Table 14-6 PCS1900 Body 15mm

PCS1900 Body								
Ambient Temperature: 22.4					Liquid Temperature: 22.2			
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz	CH810 1909.8 MHz	CH661 1880 MHz	CH512 1850.2 MHz
GPRS 4 Txslots	Tune-up		26.50	26.50	26.50	Scaling factor*		
	Slot Average Power [dBm]		26.09	26.08	26.17	1.10	1.10	1.08
	Front	1g SAR		0.107		0.00	0.12	0.00
		10g SAR		0.07		0.00	0.08	0.00
		Deviation		-0.03		0.00	-0.03	0.00
	Rear	1g SAR	0.119	0.121	0.161	0.13	0.13	0.17
		10g SAR	0.075	0.077	0.107	0.08	0.08	0.12
		Deviation	-0.02	0.06	-0.04	-0.02	0.06	-0.04
EGPRS GMSK 4 Txslots	Tune-up		26.50	26.50	26.50	Scaling factor*		
	Slot Average Power [dBm]		26.08	26.08	26.16	1.10	1.10	1.08
	Rear	1g SAR			0.152	0.00	0.00	0.16
		10g SAR			0.087	0.00	0.00	0.09
		Deviation			0.07	0.00	0.00	0.07
GPRS 4 Txslots B2	Rear	1g SAR			0.142	0.00	0.00	0.15
		10g SAR			0.083	0.00	0.00	0.09
		Deviation			0.11	0.00	0.00	0.11
GPRS 4 Txslots B3	Rear	1g SAR			0.141	0.00	0.00	0.15
		10g SAR			0.078	0.00	0.00	0.08
		Deviation			0.08	0.00	0.00	0.08
GPRS 4 Txslots B4	Rear	1g SAR			0.148	0.00	0.00	0.16
		10g SAR			0.086	0.00	0.00	0.09
		Deviation			0.09	0.00	0.00	0.09

Table 14-7 WCDMA1900-BII Head

WCDMA1900-BII Head								
Ambient Temperature: 22.4			Liquid Temperature: 22.2					
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz	CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz
RMC	Tune-up		23.50	23.50	23.50	Scaling factor*		
	Slot Average Power [dBm]		22.30	22.00	22.20	1.32	1.41	1.35
	Left Cheek	1g SAR		0.382		0.00	0.54	0.00
		10g SAR		0.253		0.00	0.36	0.00
		Deviation		0.08		0.00	0.08	0.00
	Left Tilt	1g SAR		0.21		0.00	0.30	0.00
		10g SAR		0.143		0.00	0.20	0.00
		Deviation		0.04		0.00	0.04	0.00
	Right Cheek	1g SAR	0.56	0.447	0.496	0.74	0.63	0.67
		10g SAR	0.355	0.285	0.316	0.47	0.40	0.43
		Deviation	0.07	0.03	0.12	0.07	0.03	0.12
	Right Tilt	1g SAR		0.204		0.00	0.29	0.00
		10g SAR		0.135		0.00	0.19	0.00
		Deviation		0.04		0.00	0.04	0.00
RMC B2	Right Cheek	1g SAR	0.544			0.72	0.00	0.00
		10g SAR	0.345			0.45	0.00	0.00
		Deviation	-0.08			-0.08	0.00	0.00
RMC B3	Right Cheek	1g SAR	0.554			0.73	0.00	0.00
		10g SAR	0.348			0.46	0.00	0.00
		Deviation	0.04			0.04	0.00	0.00
RMC B4	Right Cheek	1g SAR	0.547			0.72	0.00	0.00
		10g SAR	0.349			0.46	0.00	0.00
		Deviation	0.12			0.12	0.00	0.00

Table 14-8 WCDMA1900-BII Body 10mm

WCDMA1900-BII Body								
Ambient Temperature: 22.4						Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz	CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz
RMC	Tune-up		23.50	23.50	23.50	Scaling factor*		
	Slot Average Power [dBm]		22.30	22.00	22.20	1.32	1.41	1.35
	Front	1g SAR		0.356		0.00	0.50	0.00
		10g SAR		0.253		0.00	0.36	0.00
		Deviation		0.03		0.00	0.03	0.00
	Rear	1g SAR	0.451	0.439	0.49	0.59	0.62	0.66
		10g SAR	0.311	0.305	0.302	0.41	0.43	0.41
		Deviation	0.01	0.07	0.01	0.01	0.07	0.01
	Bottom edge	1g SAR		0.355		0.00	0.50	0.00
		10g SAR		0.209		0.00	0.30	0.00
		Deviation		0.14		0.00	0.14	0.00
	Left edge	1g SAR		0.204		0.00	0.29	0.00
		10g SAR		0.132		0.00	0.19	0.00
		Deviation		0.17		0.00	0.17	0.00
	Right edge	1g SAR		0.235		0.00	0.33	0.00
		10g SAR		0.158		0.00	0.22	0.00
		Deviation		0.05		0.00	0.05	0.00
RMC B2	Rear	1g SAR			0.452	0.00	0.00	0.61
		10g SAR			0.285	0.00	0.00	0.38
		Deviation			0.05	0.00	0.00	0.05
RMC B3	Rear	1g SAR			0.458	0.00	0.00	0.62
		10g SAR			0.288	0.00	0.00	0.39
		Deviation			0.08	0.00	0.00	0.08
RMC B4	Rear	1g SAR			0.457	0.00	0.00	0.62
		10g SAR			0.291	0.00	0.00	0.39
		Deviation			0.03	0.00	0.00	0.03

Table 14-9 WCDMA1900-BII Body 15mm

WCDMA1900-BII Body										
Ambient Temperature:			22.4			Liquid Temperature:			22.2	
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]				
			CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz	CH9538 1907.6 MHz	CH9400 1880 MHz	CH9262 1852.4 MHz		
RMC	Tune-up		23.50	23.50	23.50	Scaling factor*				
	Slot Average Power [dBm]		22.30	22.00	22.20	1.32	1.41	1.35		
	Front	1g SAR		0.137		0.00	0.19	0.00		
		10g SAR		0.097		0.00	0.14	0.00		
		Deviation		0.09		0.00	0.09	0.00		
	Rear	1g SAR	0.174	0.168	0.189	0.23	0.24	0.25		
		10g SAR	0.119	0.116	0.125	0.16	0.16	0.17		
		Deviation	0.03	-0.01	0.07	0.03	-0.01	0.07		
RMC B2	Rear	1g SAR			0.174	0.00	0.00	0.23		
		10g SAR			0.09	0.00	0.00	0.12		
		Deviation			0.07	0.00	0.00	0.07		
RMC B3	Rear	1g SAR			0.177	0.00	0.00	0.24		
		10g SAR			0.112	0.00	0.00	0.15		
		Deviation			0.11	0.00	0.00	0.11		
RMC B4	Rear	1g SAR			0.176	0.00	0.00	0.24		
		10g SAR			0.113	0.00	0.00	0.15		
		Deviation			0.13	0.00	0.00	0.13		

Table 14-10 LTE2500-FDD7 Head

LTE2500-FDD7 Head								
Ambient Temperature: 22.4						Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
			H	H	H	H	H	H
20MHz QPSK1RB	Tune-up		23.20	23.20	23.20	Scaling factor*		
	Measured Power [dBm]		22.71	22.50	22.42	1.12	1.17	1.20
	Left Cheek	1g SAR	0.213			0.24	0.10	0.10
		10g SAR	0.127			0.14	0.10	0.10
		Deviation	0.11			0.11	0.10	0.10
	Left Tilt	1g SAR	0.17			0.19	0.10	0.10
		10g SAR	0.083			0.09	0.10	0.10
		Deviation	0.09			0.09	0.10	0.10
	Right Cheek	1g SAR	0.587			0.66	0.10	0.10
		10g SAR	0.309			0.35	0.10	0.10
		Deviation	-0.04			-0.04	0.10	0.10
	Right Tilt	1g SAR	0.147			0.16	0.10	0.10
		10g SAR	0.08			0.09	0.10	0.10
		Deviation	-0.1			-0.10	0.10	0.10
TRUE	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
			H	H	H	H	H	H
20MHz QPSK50%RB	Tune-up		22.20	22.20	22.20	Scaling factor*		
	Measured Power [dBm]		21.57	21.54	21.41	1.16	1.17	1.20
	Left Cheek	1g SAR	0.168			0.19	0.10	0.10
		10g SAR	0.101			0.12	0.10	0.10
		Deviation	0.02			0.02	0.10	0.10
	Left Tilt	1g SAR	0.127			0.15	0.10	0.10
		10g SAR	0.063			0.07	0.10	0.10
		Deviation	0.16			0.16	0.10	0.10
	Right Cheek	1g SAR	0.484			0.56	0.10	0.10
		10g SAR	0.257			0.30	0.10	0.10
		Deviation	-0.08			-0.08	0.10	0.10
	Right Tilt	1g SAR	0.116			0.13	0.10	0.10
		10g SAR	0.063			0.07	0.10	0.10
		Deviation	-0.12			-0.12	0.10	0.10
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
20MHz QPSK100%RB	Tune-up		22.20	22.20	22.20	Scaling factor*		
	Measured Power [dBm]		21.54	21.49	21.36	1.16	1.18	1.21
	Left Cheek	1g SAR				0.10	0.10	0.10
		10g SAR				0.10	0.10	0.10
20MHz QPSK1RB B2	Right Cheek	Deviation				0.10	0.10	0.10
		1g SAR	0.498			0.56	0.10	0.10
		10g SAR	0.266			0.30	0.10	0.10
20MHz QPSK1RB B3	Right Cheek	Deviation	0.04			0.04	0.10	0.10
		1g SAR	0.521			0.58	0.10	0.10
		10g SAR	0.274			0.31	0.10	0.10
20MHz QPSK1RB B4	Right Cheek	Deviation	0.18			0.18	0.10	0.10
		1g SAR	0.51			0.57	0.10	0.10
		10g SAR	0.271			0.30	0.10	0.10
		Deviation	0.02			0.02	0.10	0.10

Table 14-11 LTE2500-FDD7 Body 10mm

LTE2500-FDD7 Body								
Ambient Temperature: 22.4			Liquid Temperature: 22.2					
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
			H	H	H	H	H	H
20MHz QPSK1RB	Tune-up		23.20	23.20	23.20	Scaling factor*		
	Measured Power [dBm]		22.71	22.50	22.42	1.12	1.17	1.20
	Front	1g SAR	0.853	0.631	0.555	0.96	0.74	0.66
		10g SAR	0.465	0.332	0.293	0.52	0.39	0.35
		Deviation	0.19	0.12	0.09	0.19	0.12	0.09
	Rear	1g SAR	0.574			0.64	0.40	0.35
		10g SAR	0.298			0.33	0.19	0.17
		Deviation	-0.12			-0.12	0.10	0.09
	Bottom edge	1g SAR	0.79	0.739	0.648	0.88	0.87	0.78
		10g SAR	0.376	0.341	0.302	0.42	0.40	0.36
		Deviation	0.07	-0.04	0.12	0.07	-0.04	0.12
	Left edge	1g SAR	0.238			0.27	0.10	0.09
		10g SAR	0.131			0.15	0.10	0.09
		Deviation	-0.1			-0.10	0.10	0.09
	Right edge	1g SAR	0.399			0.45	0.10	0.09
		10g SAR	0.208			0.23	0.10	0.09
		Deviation	0.13			0.13	0.10	0.09
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
			H	H	H			
20MHz QPSK50%RB	Tune-up		22.20	22.20	22.20	Scaling factor*		
	Measured Power [dBm]		21.57	21.54	21.41	1.16	1.17	1.20
	Front	1g SAR	0.612			0.71		
		10g SAR	0.313			0.36		
		Deviation	0.06			0.06		
	Rear	1g SAR	0.469			0.54		
		10g SAR	0.241			0.28		
		Deviation	-0.05			-0.05		
	Bottom edge	1g SAR	0.622			0.72		
		10g SAR	0.285			0.33		
		Deviation	-0.08			-0.08		
	Left edge	1g SAR	0.188			0.22		
		10g SAR	0.103			0.12		
		Deviation	0.04			0.04		
	Right edge	1g SAR	0.317			0.37		
		10g SAR	0.166			0.19		
		Deviation	-0.03			-0.03		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
20MHz QPSK100%RB	Tune-up		22.20	22.20	22.20	Scaling factor*		
	Measured Power [dBm]		21.54	21.49	21.36	1.16	1.18	1.21
	Front	1g SAR	0.546			0.64	0.10	0.09
		10g SAR	0.287			0.33	0.10	0.09
20MHz QPSK1RB B2	Front	Deviation	0.08			0.08	0.10	0.09
		1g SAR	0.794			0.89	0.10	0.09
		10g SAR	0.405			0.45	0.10	0.09
20MHz QPSK1RB B3	Front	Deviation	-0.12			-0.12	0.10	0.09
		1g SAR	0.774			0.87	0.10	0.09
		10g SAR	0.395			0.44	0.10	0.09
20MHz QPSK1RB B4	Front	Deviation	0.08			0.08	0.10	0.09
		1g SAR	0.782			0.88	0.10	0.09
		10g SAR	0.401			0.45	0.10	0.09
20MHz QPSK100%RB	Bottom edge	Deviation	-0.04			-0.04	0.10	0.09
		1g SAR	0.611			0.68	0.10	0.09
		10g SAR	0.28			0.31	0.10	0.09
		Deviation	-0.1			-0.10	0.10	0.09

Table 14-12 LTE2500-FDD7 Body 15mm

LTE2500-FDD7 Body								
Ambient Temperature: 22.4						Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
			H	H	H	H	H	H
20MHz QPSK1RB	Tune-up		23.20	23.20	23.20	Scaling factor*		
	Measured Power [dBm]		22.71	22.50	22.42	1.12	1.17	1.20
	Front	1g SAR	0.354			0.40	0.00	0.00
		10g SAR	0.194			0.22	0.00	0.00
		Deviation	0.11			0.11	0.00	0.00
	Rear	1g SAR	0.235			0.26	0.00	0.00
		10g SAR	0.122			0.14	0.00	0.00
		Deviation	0.04			0.04	0.00	0.00
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
			H	H	H			
20MHz QPSK50%RB	Tune-up		22.20	22.20	22.20	Scaling factor*		
	Measured Power [dBm]		21.57	21.54	21.41	1.16	1.17	1.20
	Front	1g SAR	0.265			0.31		
		10g SAR	0.124			0.14		
		Deviation	0.01			0.01		
	Rear	1g SAR	0.174			0.20		
		10g SAR	0.091			0.11		
		Deviation	0.11			0.11		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			21350	21100	20850	21350	21100	20850
20MHz QPSK100%RB	Tune-up		22.20	22.20	22.20	Scaling factor*		
	Measured Power [dBm]		21.54	21.49	21.36	1.16	1.18	1.21
	Front	1g SAR				0.00	0.00	0.00
		10g SAR				0.00	0.00	0.00
Deviation					0.00	0.00	0.00	
20MHz QPSK1RB B2	Front	1g SAR	0.325			0.36	0.00	0.00
		10g SAR	0.166			0.19	0.00	0.00
		Deviation	0.06			0.06	0.00	0.00
20MHz QPSK1RB B3	Front	1g SAR	0.317			0.35	0.00	0.00
		10g SAR	0.162			0.18	0.00	0.00
		Deviation	0.12			0.12	0.00	0.00
20MHz QPSK1RB B4	Front	1g SAR	0.32			0.36	0.00	0.00
		10g SAR	0.164			0.18	0.00	0.00
		Deviation	0.07			0.07	0.00	0.00

14.3 Full SAR

Table 14-13 Full SAR for 10mm

Test Band	Channel	Frequency	Tune-Up	Measured Power	Test Position	Measured 10g SAR	Measured 1g SAR	Reported 10g SAR	Reported 1g SAR	Power Drift	Figure
GSM850	251	848.8 MHz	33.5	33.01	Left Cheek	0.279	0.366	0.31	0.41	-0.08	Fig A.1
GSM850	251	848.8 MHz	29.5	29.42	Rear	0.504	0.648	0.51	0.66	0.05	Fig A.2
PCS1900	512	1850.2 MHz	30.5	29.92	Right Cheek	0.163	0.254	0.19	0.29	0.02	Fig A.4
PCS1900	512	1850.2 MHz	26.5	26.17	Rear	0.242	0.374	0.26	0.40	0.07	Fig A.5
WCDMA1900-BII	9538	1907.6 MHz	23.5	22.30	Right Cheek	0.355	0.56	0.47	0.74	0.07	Fig A.7
WCDMA1900-BII	9262	1852.4 MHz	23.5	22.20	Rear	0.302	0.49	0.41	0.66	0.01	Fig A.8
LTE2500-FDD7	21350	2560 MHz	23.2	22.71	Right Cheek	0.309	0.587	0.35	0.66	-0.04	Fig A.7
LTE2500-FDD7	21350	2560 MHz	23.2	22.71	Front	0.465	0.853	0.52	0.96	0.19	Fig A.11

Table 14-14 Full SAR for 15mm

Test Band	Channel	Frequency	Tune-Up	Measured Power	Test Position	Measured 10g SAR	Measured 1g SAR	Reported 10g SAR	Reported 1g SAR	Power Drift	Figure
GSM850	251	848.8 MHz	29.5	29.42	Rear	0.416	0.543	0.42	0.55	-0.02	Fig A.3
PCS1900	512	1850.2 MHz	26.5	26.17	Rear	0.107	0.161	0.12	0.17	-0.04	Fig A.6
WCDMA1900-BII	9262	1852.4 MHz	23.5	22.20	Rear	0.125	0.189	0.17	0.25	0.07	Fig A.9
LTE2500-FDD7	21350	2560 MHz	23.2	22.71	Front	0.194	0.354	0.22	0.40	0.11	Fig A.12

14.4 WLAN Evaluation

According to the KDB248227 D01, SAR is measured for 802.11b DSSS using the initial test position procedure.

Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg.

Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

Table 14-15 WLAN 2450 Head Area Scan

WLAN Head Area scan								
Ambient Temperature: 22.4			Liquid Temperature: 22.2					
Rate	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			11	6	1	11	6	1
			2462 MHz	2437 MHz	2412 MHz	2462 MHz	2437 MHz	2412 MHz
802.11b 1Mbps	Tune-up		17.50	17.50	17.50	Scaling factor*		
	Slot Average Power [dBm]		16.50	16.58	16.75	1.26	1.24	1.19
	Left Cheek	1g Fast SAR			0.218	0.00	0.00	0.26
		10g SAR			0.119	0.00	0.00	0.14
		Deviation			0.05	0.00	0.00	0.05
	Left Tilt	1g Fast SAR			0.127	0.00	0.00	0.15
		10g SAR			0.068	0.00	0.00	0.08
		Deviation			0.07	0.00	0.00	0.07
	Right Cheek	1g Fast SAR			0.555	0.00	0.00	0.66
		10g SAR			0.277	0.00	0.00	0.33
		Deviation			-0.17	0.00	0.00	-0.17
	Right Tilt	1g Fast SAR			0.26	0.00	0.00	0.31
		10g SAR			0.138	0.00	0.00	0.16
		Deviation			0.03	0.00	0.00	0.03
802.11b 1Mbps B2	Right Cheek	1g Fast SAR			0.513	0.00	0.00	0.61
		10g SAR			0.262	0.00	0.00	0.31
		Deviation			0.07	0.00	0.00	0.07
802.11b 1Mbps B3	Right Cheek	1g Fast SAR			0.53	0.00	0.00	0.63
		10g SAR			0.269	0.00	0.00	0.32
		Deviation			0.06	0.00	0.00	0.06
802.11b 1Mbps B4	Right Cheek	1g Fast SAR			0.515	0.00	0.00	0.61
		10g SAR			0.258	0.00	0.00	0.31
		Deviation			0.1	0.00	0.00	0.10

Table 14-16 WLAN 2450 Head Zoom Scan

WLAN Head Zoom scan								
Ambient Temperature: 22.4			Liquid Temperature: 22.2					
Rate	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			11	6	1	11	6	1
			2462 MHz	2437 MHz	2412 MHz	2462 MHz	2437 MHz	2412 MHz
802.11b 1Mbps	Tune-up		17.50	17.50	17.50	Scaling factor*		
	Slot Average Power [dBm]		16.50	16.58	16.75	1.26	1.24	1.19
	Right Cheek	1g Fast SAR			0.555	0.00	0.00	0.66
		1g Full SAR			0.626	0.00	0.00	0.74
		10g SAR			0.277	0.00	0.00	0.33
		Deviation			-0.17	0.00	0.00	-0.17
	Right Tilt	1g Fast SAR			0.26	0.00	0.00	0.31
		1g Full SAR			0.27	0.00	0.00	0.32
		10g SAR			0.138	0.00	0.00	0.16
		Deviation			0.03	0.00	0.00	0.03

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Ambient Temperature: 22.4 °C				Liquid Temperature: 22.2 °C				
Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR	Scaled reported SAR (1g) (W/kg)	Figure
MHz	Ch.					(1g) (W/kg)		
2412	1	Right	Touch	99.66%	100%	0.74	0.74	Fig.A.13

Table 14-17 WLAN 2450 Body Area Scan 10mm

WLAN Body Area scan								
Ambient Temperature: 22.4			Liquid Temperature: 22.2					
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			11	6	1	11	6	1
			2462 MHz	2437 MHz	2412 MHz	2462 MHz	2437 MHz	2412 MHz
802.11b 1Mbps	Tune-up		17.50	17.50	17.50	Scaling factor*		
	Slot Average Power [dBm]		16.50	16.58	16.75	1.26	1.24	1.19
	Front	1g Fast SAR			0.098			0.12
		10g SAR			0.053			0.06
		Deviation			0.08			0.08
	Rear	1g Fast SAR			0.105			0.12
		10g SAR			0.055			0.07
		Deviation			0.07			0.07
	Top edge	1g Fast SAR			0.025			0.03
		10g SAR			0.014			0.02
		Deviation			-0.01			-0.01
	Right edge	1g Fast SAR			0.003			<0.01
		10g SAR			0.002			<0.01
		Deviation			0.11			0.11
802.11b 1Mbps B2	Rear	1g Fast SAR			0.096			0.11
		10g SAR			0.052			0.06
		Deviation			0.09			0.09
802.11b 1Mbps B3	Rear	1g Fast SAR			0.102			0.12
		10g SAR			0.052			0.06
		Deviation			0.09			0.09
802.11b 1Mbps B4	Rear	1g Fast SAR			0.101			0.12
		10g SAR			0.053			0.06
		Deviation			-0.14			-0.14

Table 14-18 WLAN 2450 Body Zoom Scan 10mm

WLAN Body Zoom scan									
Ambient Temperature:			22.4			Liquid Temperature:			22.2
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]			
			11	6	1	11	6	1	
			2462 MHz	2437 MHz	2412 MHz	2462 MHz	2437 MHz	2412 MHz	
802.11b 1Mbps	Tune-up		17.50	17.50	17.50	Scaling factor*			
	Slot Average Power [dBm]		16.50	16.58	16.75	1.26	1.24	1.19	
	Rear	1g Fast SAR			0.105			0.12	
		1g Full SAR			0.111			0.13	
		10g SAR			0.055			0.07	
		Deviation			0.07			0.07	

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Ambient Temperature: 22.4 °C				Liquid Temperature: 22.2 °C			
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR	Scaled reported SAR (1g) (W/kg)	Figure
MHz	Ch.				(1g) (W/kg)		
2412	1	Rear	99.66%	100%	0.13	0.13	Fig.A.14
2412	1	Front	99.66%	100%	0.12	0.12	/

Table 14-19 WLAN 2450 Body Area Scan 15mm

WLAN Body Area scan								
Ambient Temperature: 22.4						Liquid Temperature: 22.2		
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			11	6	1	11	6	1
			2462 MHz	2437 MHz	2412 MHz	2462 MHz	2437 MHz	2412 MHz
802.11b 1Mbps	Tune-up		17.50	17.50	17.50	Scaling factor*		
	Slot Average Power [dBm]		16.50	16.58	16.75	1.26	1.24	1.19
	Front	1g Fast SAR			0.079	0.00	0.00	0.09
		10g SAR			0.048	0.00	0.00	0.06
		Deviation			0.09	0.00	0.00	0.09
	Rear	1g Fast SAR			0.088	0.00	0.00	0.10
		10g SAR			0.048			0.06
		Deviation			0.04	0.00	0.00	0.04
	802.11b 1Mbps B2	Rear	1g Fast SAR			0.08	0.00	0.00
10g SAR					0.046	0.00	0.00	0.05
Deviation					0.11	0.00	0.00	0.11
802.11b 1Mbps B3	Rear	1g Fast SAR			0.085	0.00	0.00	0.10
		10g SAR			0.047	0.00	0.00	0.06
		Deviation			-0.08			-0.08
802.11b 1Mbps B4	Rear	1g Fast SAR			0.084			0.10
		10g SAR			0.048	0.00	0.00	0.06
		Deviation			0.02		0.00	0.02

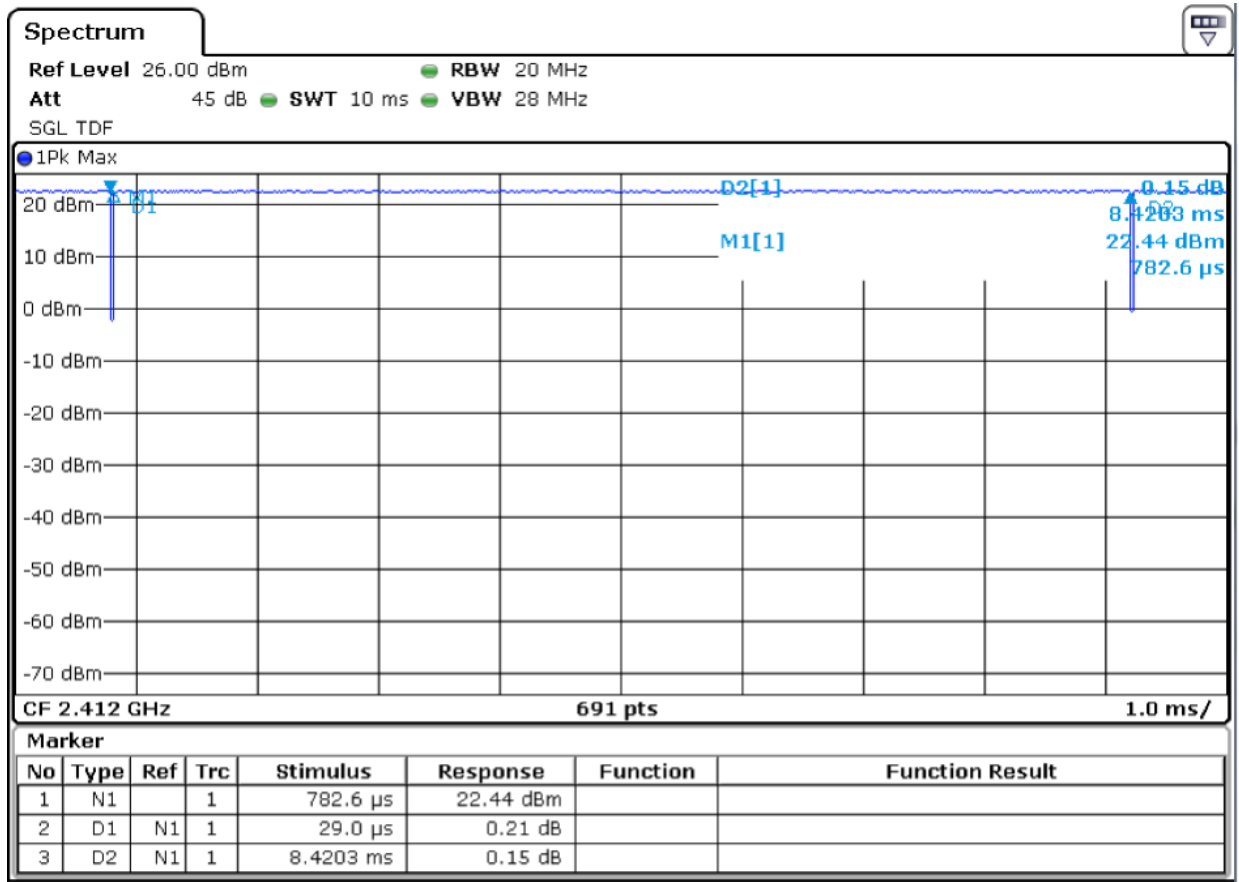
Table 14-20 WLAN 2450 Body Zoom Scan 15mm

WLAN Body Zoom scan								
Ambient Temperature: 22.4			Liquid Temperature: 22.2					
Mode	Device orientation	SAR measurement	Measured SAR [W/kg]			Reported SAR [W/kg]		
			11	6	1	11	6	1
			2462 MHz	2437 MHz	2412 MHz	2462 MHz	2437 MHz	2412 MHz
802.11b 1Mbps	Tune-up		17.50	17.50	17.50	Scaling factor*		
	Slot Average Power [dBm]		16.50	16.58	16.75	1.26	1.24	1.19
	Rear	1g Fast SAR			0.088			0.10
		1g Full SAR			0.09			0.11
		10g SAR			0.05			0.06
		Deviation			0.04			0.04

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Ambient Temperature: 22.4 °C				Liquid Temperature: 22.2 °C			
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR	Scaled reported SAR (1g) (W/kg)	Figure
MHz	Ch.				(1g) (W/kg)		
2412	1	Rear	99.66%	100%	0.11	0.11	Fig.A.15

SAR is not required for OFDM because the 802.11b adjusted SAR $\leq$ 1.2 W/kg.



Picture 14.1 Duty factor plot

15 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

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

Test Band	Channel	Frequency	Test Poisition	Original SAR (W/kg)	First Repeated SAR(W/kg)	The Ratio
LTE2500-FDD7	21350	2560 MHz	Front	0.853	0.849	1.00

16 Measurement Uncertainty

16.1 Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u'_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$					19.1	18.9	

16.2 Measurement Uncertainty for Normal SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞

	(target)									
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

16.3 Measurement Uncertainty for Fast SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	7.0	R	$\sqrt{3}$	1	1	4.0	4.0	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞

19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						10.4	10.3	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						20.8	20.6	

16.4 Measurement Uncertainty for Fast SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71

16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u'_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.5	13.4	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						27.0	26.8	

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	January 26, 2016	One year
02	Dielectric Probe Kit	85070E	Agilent	No Calibration Requested	
03	Power meter	NRVD	102083	September 16,2016	One year
04	Power sensor	NRV-Z5	100595		
05	Power sensor	NRV-Z5	100596	March 3,2016	One year
06	Signal Generator	E4438C	MY49071430	February 01, 2016	One Year
07	Amplifier	60S1G4	0331848	No Calibration Requested	
08	Directional Coupler	778D	MY48220584	No Calibration Requested	
09	Directional Coupler	772D	MY46151265	No Calibration Requested	
10	BTS	E5515C	MY50263375	January 30, 2016	One year
11	BTS	CMW500	129942	March 03, 2016	One year
12	E-field Probe	SPEAG EX3DV4	7307	February19, 2016	One year
13	DAE	SPEAG DAE4	1331	January 21, 2016	One year
14	Dipole Validation Kit	SPEAG D835V2	4d069	July 20, 2016	One year
15	Dipole Validation Kit	SPEAG D1900V2	5d101	July 28, 2016	One year
16	Dipole Validation Kit	SPEAG D2450V2	853	July 25, 2016	One year
17	Dipole Validation Kit	SPEAG D2600V2	1012	July 25, 2016	One year

END OF REPORT BODY

ANNEX A Graph Results

GSM850_CH251 Left Cheek

Date: 1/1/2017

Electronics: DAE4 Sn1331

Medium: Head 835 MHz

Medium parameters used: $f = 848.8$ MHz; $\sigma = 0.886$ mho/m; $\epsilon_r = 41.16$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: GSM850 848.8 MHz Duty Cycle: 1: 8.3

Probe: EX3DV4 – SN7307 ConvF(10.01,10.01,10.01)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.401 W/kg

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

Reference Value = 6.894 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.463 W/kg

SAR(1 g) = 0.366 W/kg; SAR(10 g) = 0.279 W/kg

Maximum value of SAR (measured) = 0.399 W/kg

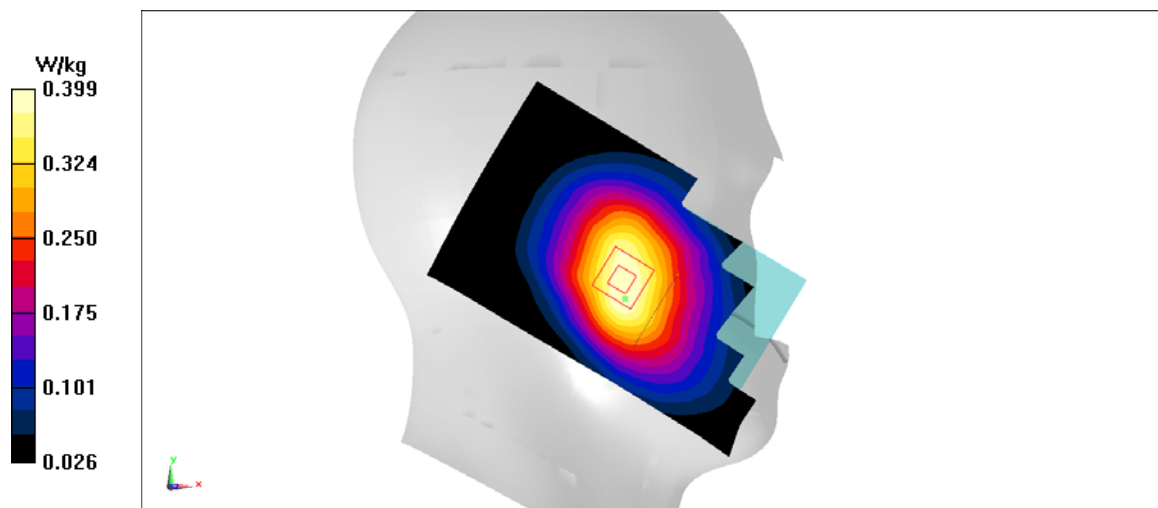


Figure A.1

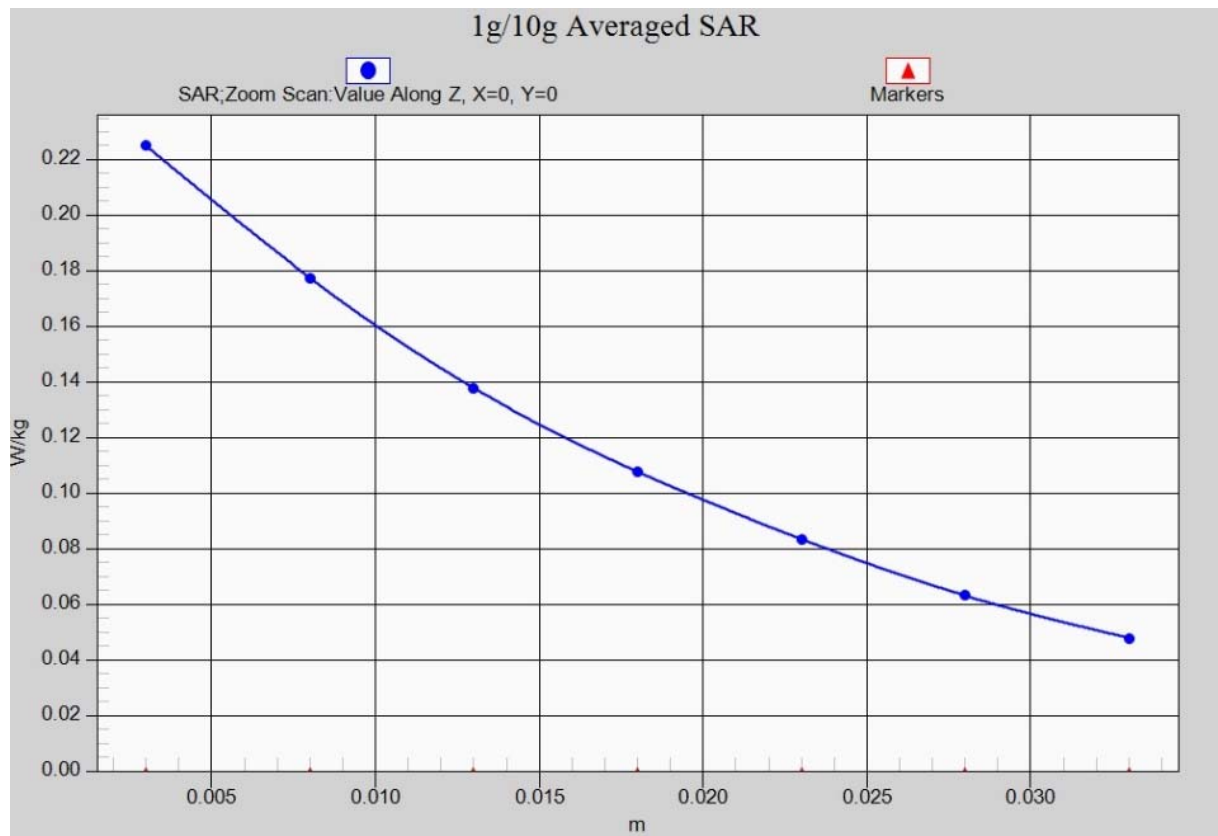


Figure A.1-1

GSM850_CH251 Rear for 10mm

Date: 1/1/2017

Electronics: DAE4 Sn1331

Medium: Head 835 MHz

Medium parameters used: $f = 848.8$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 54.33$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: GSM850 848.8 MHz Duty Cycle: 1: 2

Probe: EX3DV4 – SN7307 ConvF(9.83,9.83,9.83)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.71 W/kg

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

Reference Value = 25.73 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.805 W/kg

SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.504 W/kg

Maximum value of SAR (measured) = 0.674 W/kg

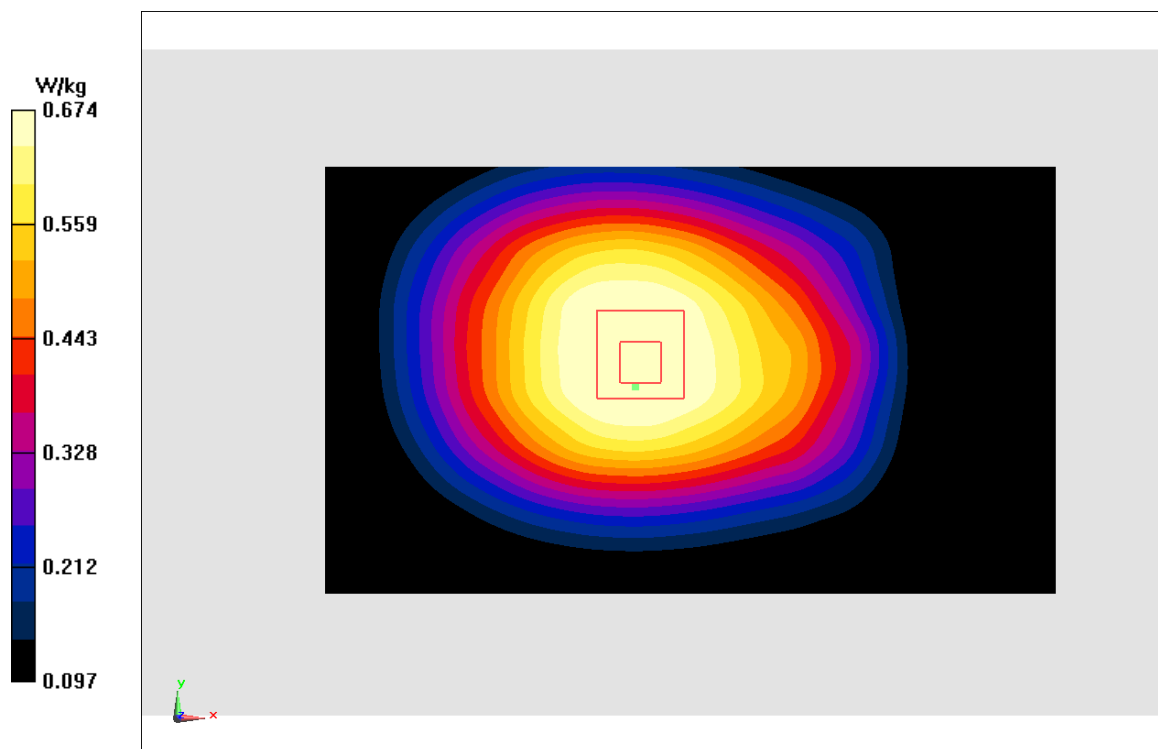


Figure A.2

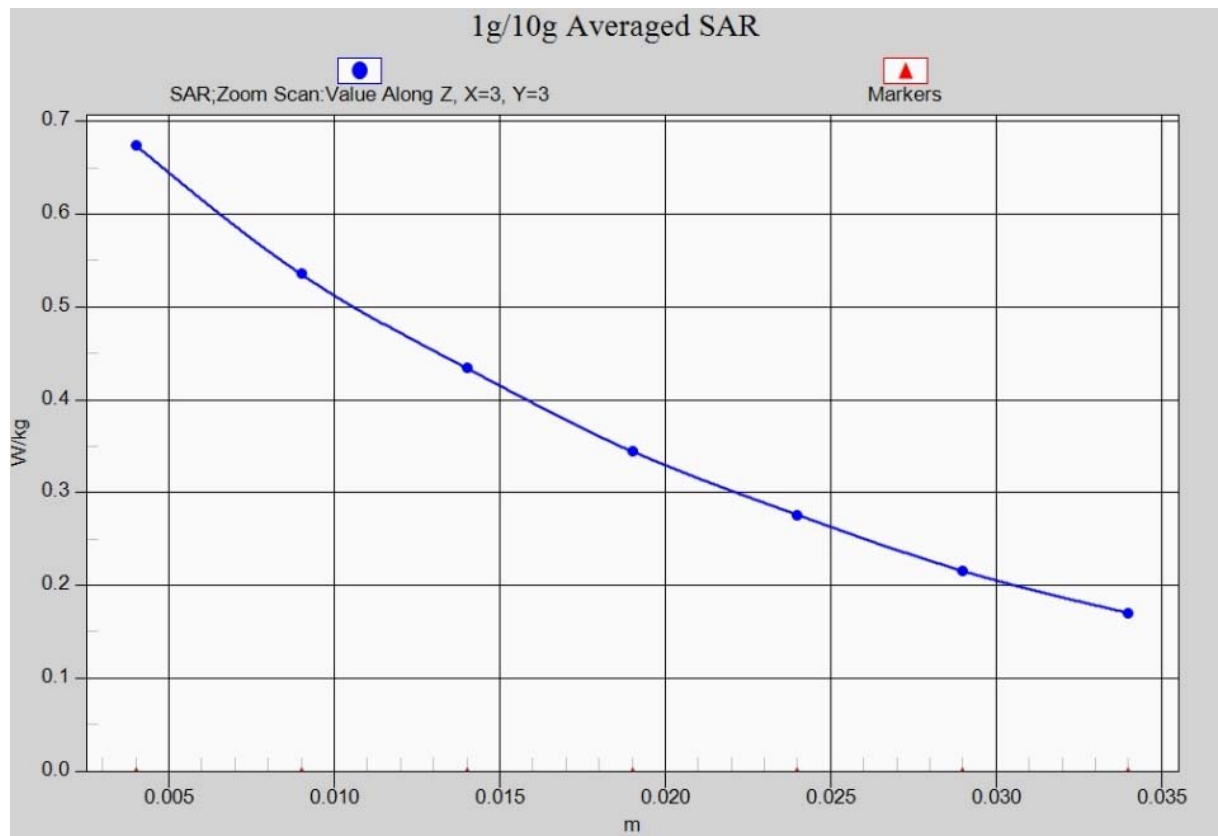


Figure A.2-1

GSM850_CH251 Rear for 15mm

Date: 1/1/2017

Electronics: DAE4 Sn1331

Medium: Head 835 MHz

Medium parameters used: $f = 848.8$ MHz; $\sigma = 0.972$ mho/m; $\epsilon_r = 54.33$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: GSM850 848.8 MHz Duty Cycle: 1:2

Probe: EX3DV4 – SN7307 ConvF(9.83,9.83,9.83)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.596 W/kg

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

Reference Value = 23.74 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.677 W/kg

SAR(1 g) = 0.543 W/kg; SAR(10 g) = 0.416 W/kg

Maximum value of SAR (measured) = 0.564 W/kg

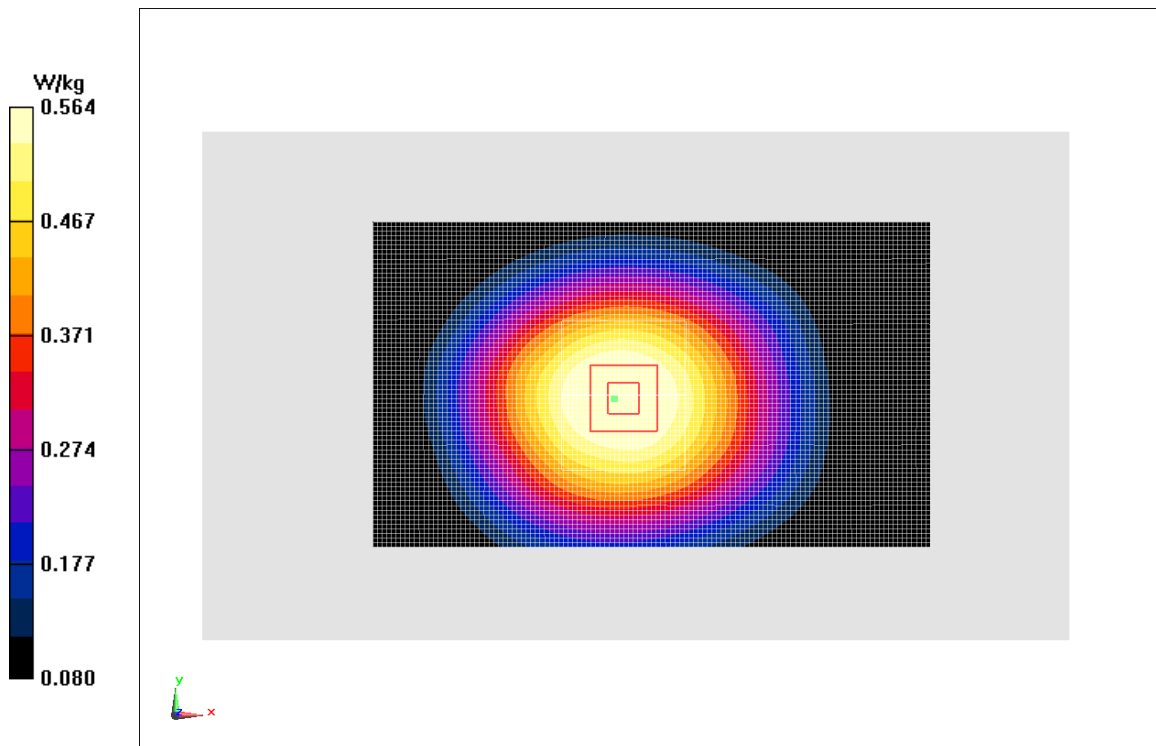


Figure A.3

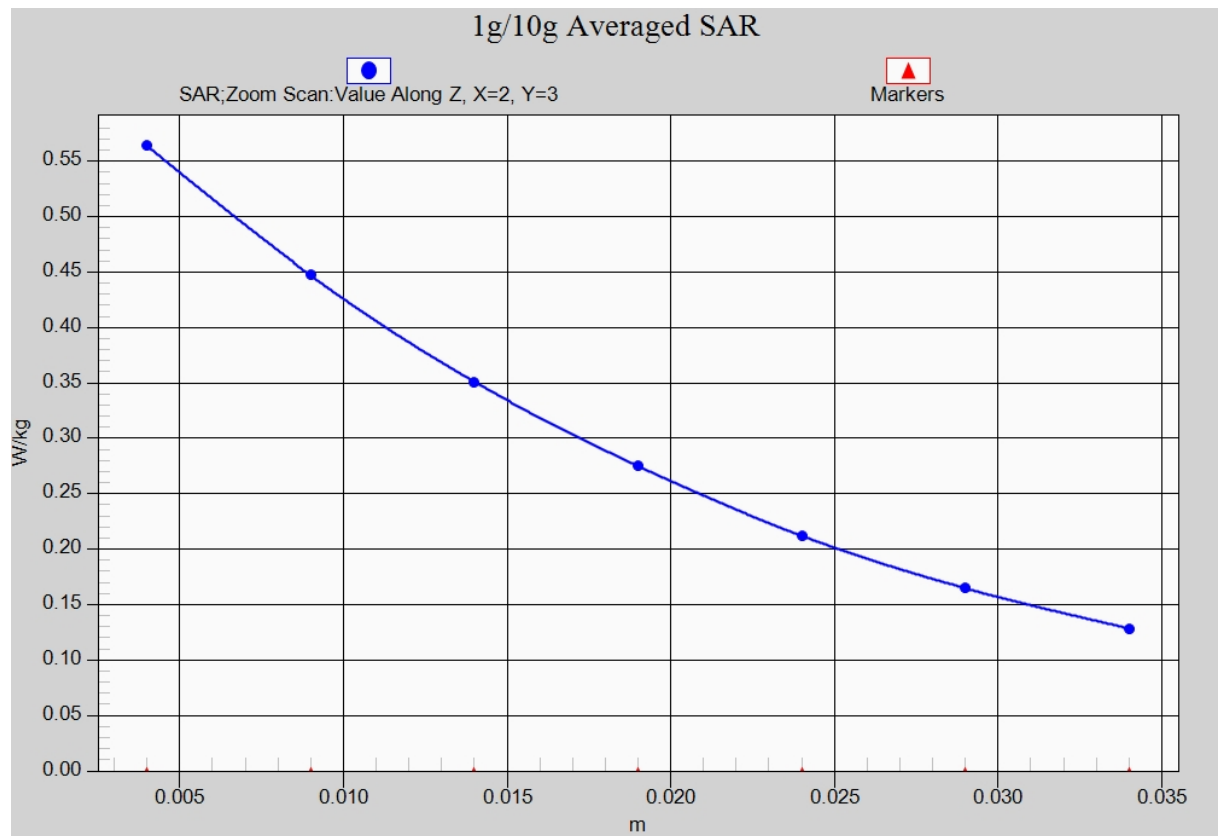


Figure A.3-1

PCS1900_CH512 Right Cheek

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.416$ mho/m; $\epsilon_r = 40.731$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: PCS1900 1850.2 MHz Duty Cycle: 1: 8.3

Probe: EX3DV4 – SN7307 ConvF(8.1,8.1,8.1)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.284 W/kg

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

Reference Value = 3.943 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.375 W/kg

SAR(1 g) = 0.254 W/kg; SAR(10 g) = 0.163 W/kg

Maximum value of SAR (measured) = 0.275 W/kg

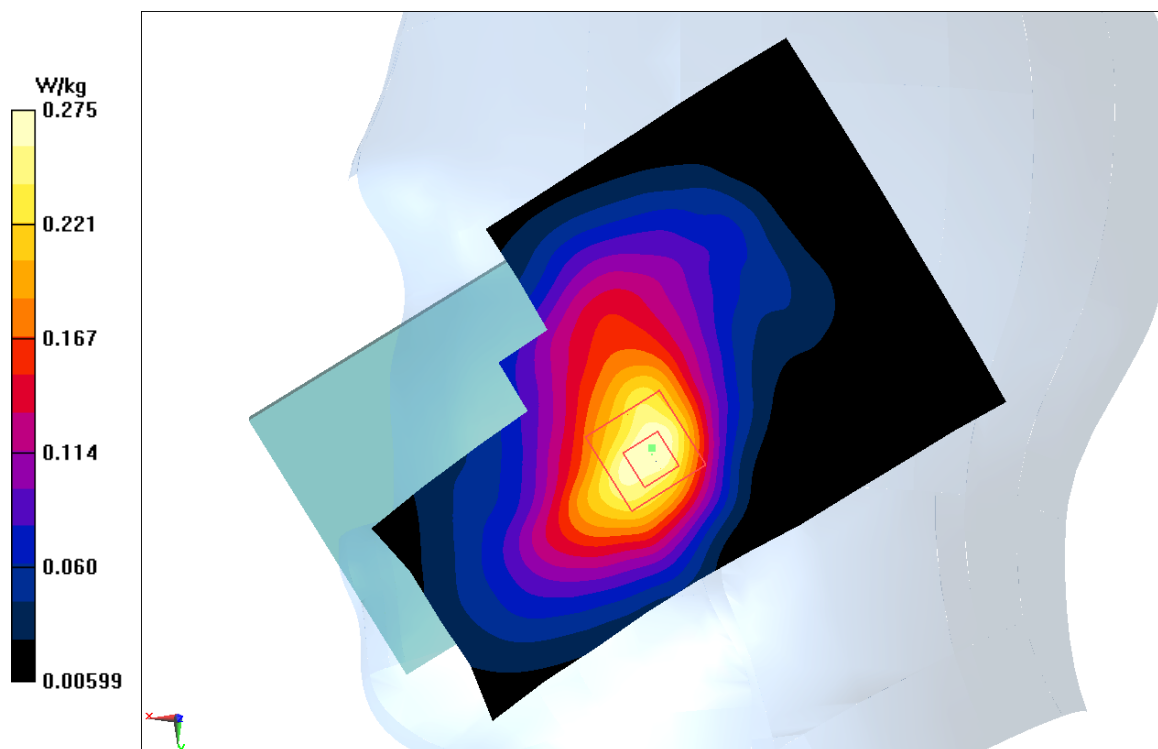


Figure A.4

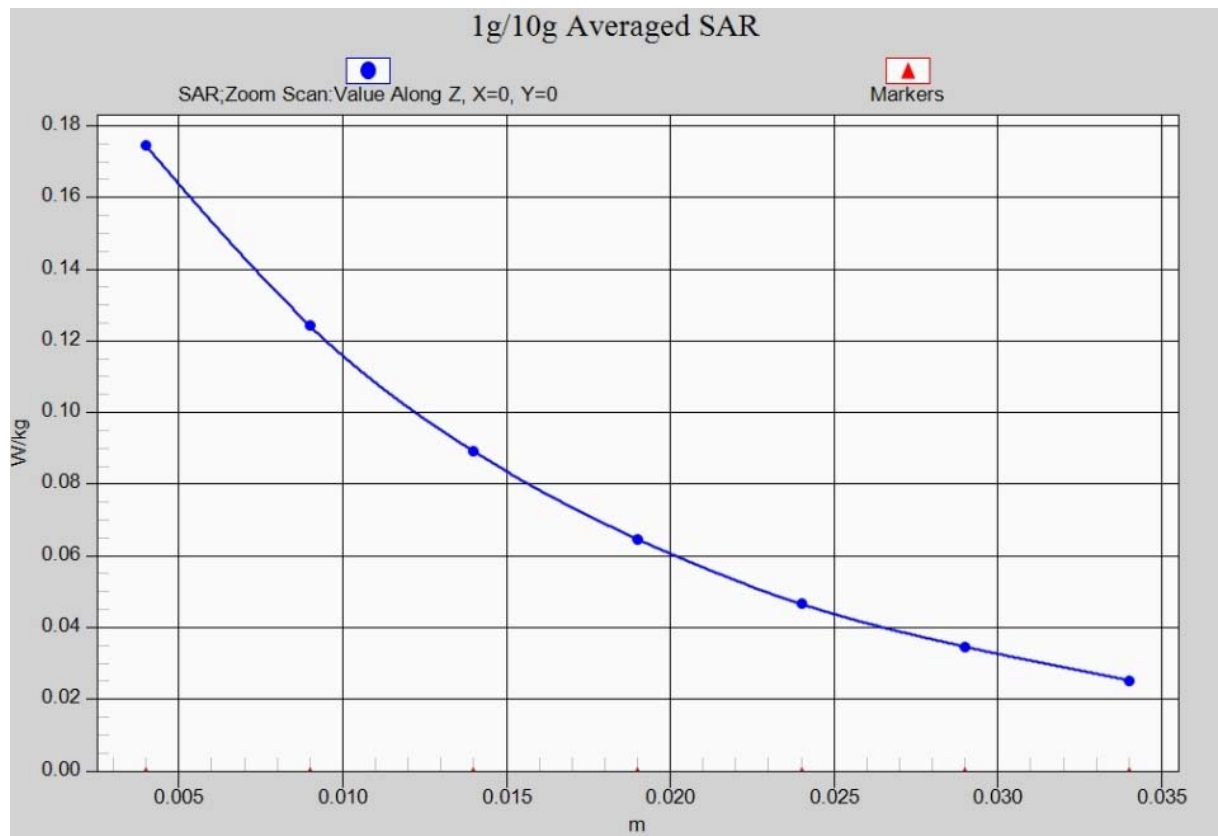


Figure A.4-1

PCS1900_CH512 Rear for 10mm

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.523$ mho/m; $\epsilon_r = 52.322$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: PCS1900 1850.2 MHz Duty Cycle: 1: 2

Probe: EX3DV4 – SN7307 ConvF(7.67,7.67,7.67)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.454 W/kg

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

Reference Value = 8.699 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.589 W/kg

SAR(1 g) = 0.374 W/kg; SAR(10 g) = 0.242 W/kg

Maximum value of SAR (measured) = 0.399 W/kg

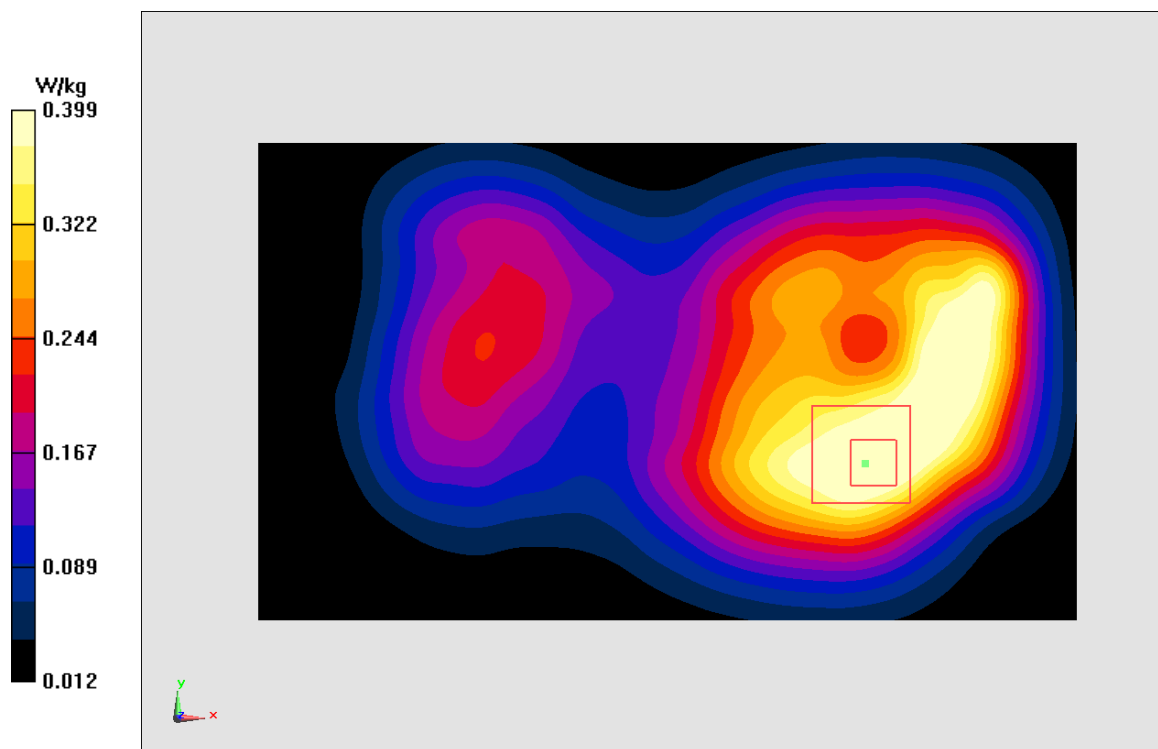


Figure A.5

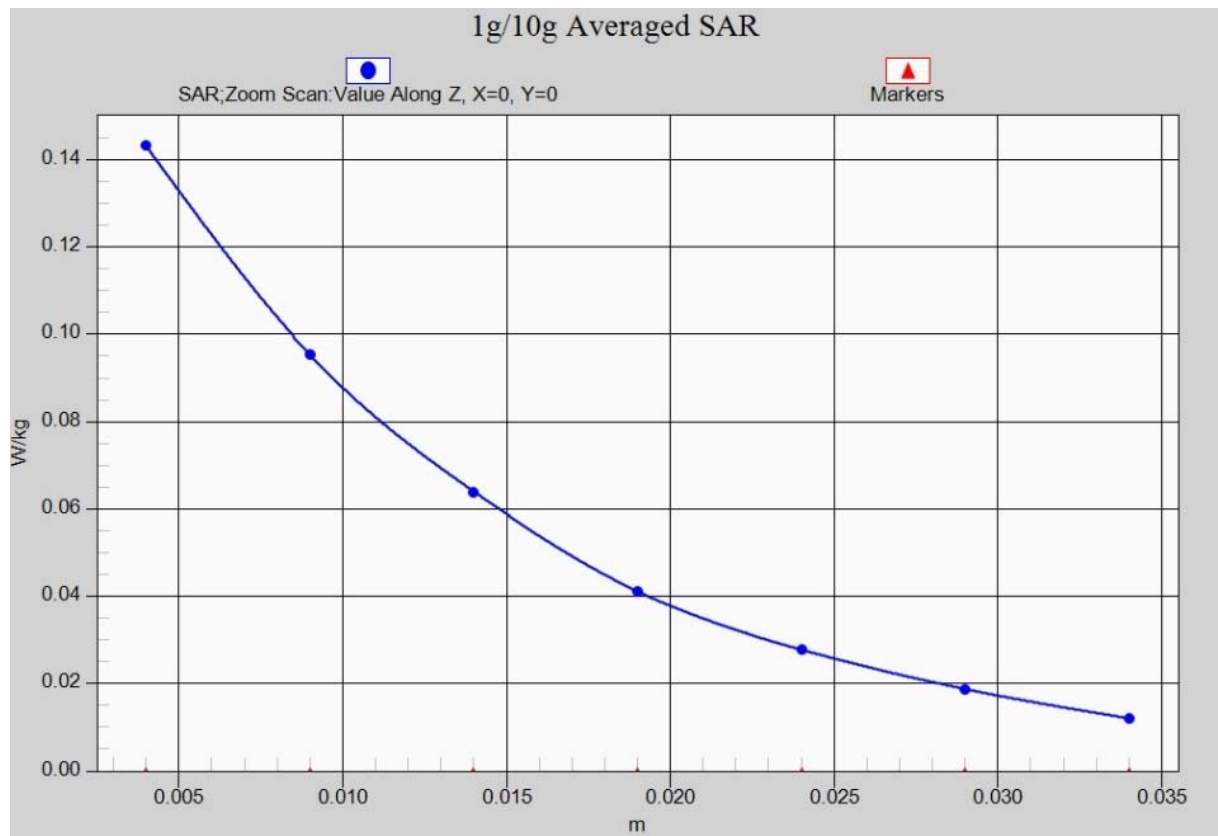


Figure A.5-1

PCS1900_CH512 Rear for 15mm

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.523$ mho/m; $\epsilon_r = 52.322$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: PCS1900 1850.2 MHz Duty Cycle: 1:2

Probe: EX3DV4 – SN7307 ConvF(7.67,7.67,7.67)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.189 W/kg

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

Reference Value = 8.710 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.240 W/kg

SAR(1 g) = 0.161 W/kg; SAR(10 g) = 0.107 W/kg

Maximum value of SAR (measured) = 0.173 W/kg

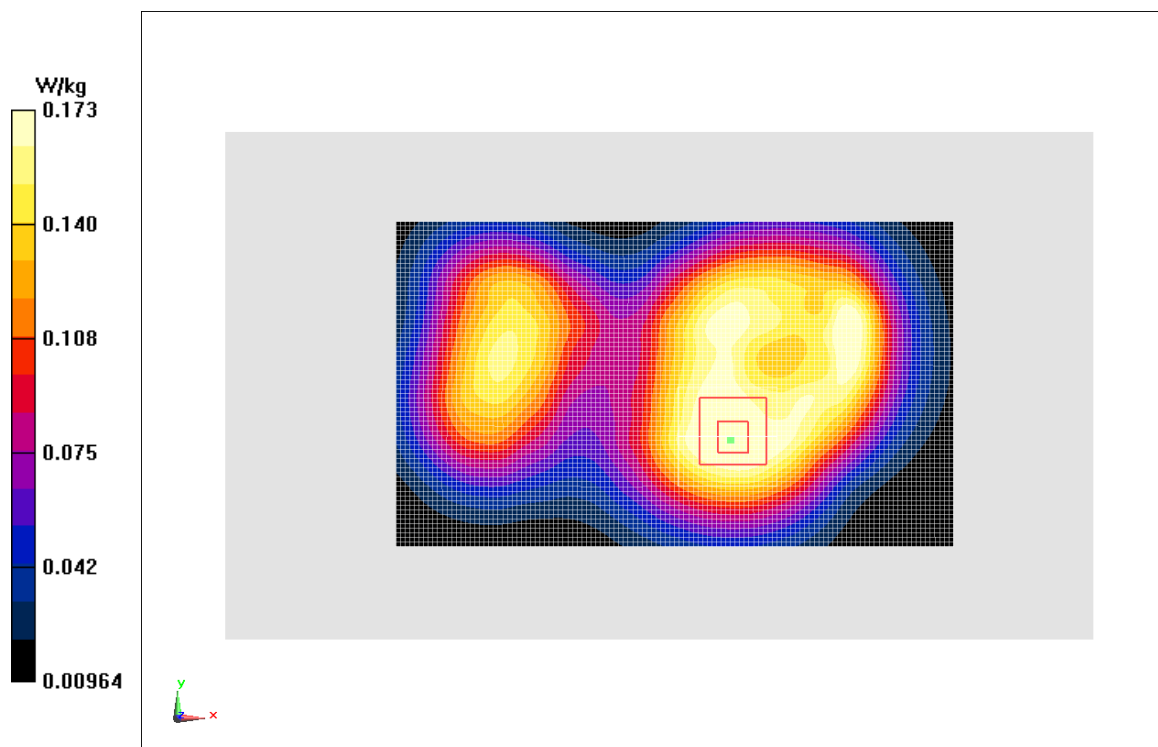


Figure A.6

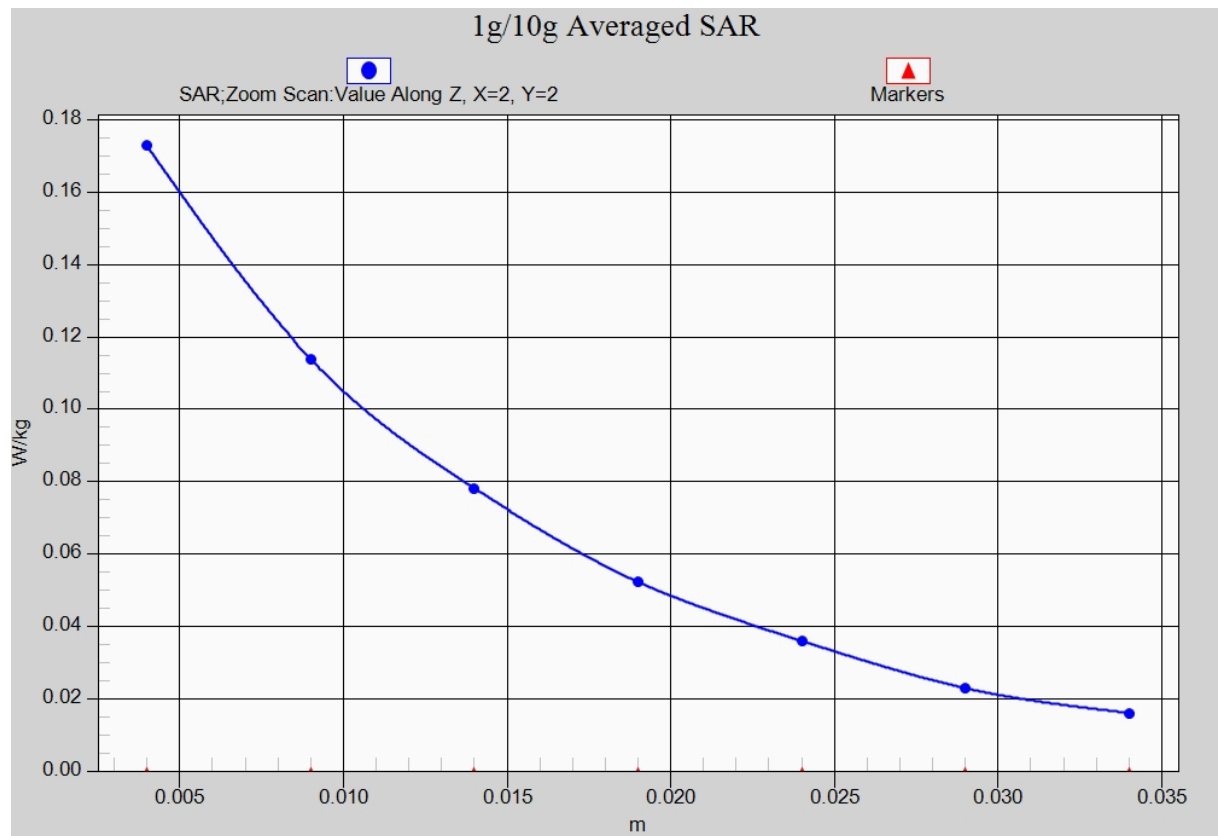


Figure A.6-1

WCDMA1900-BII_CH9538 Right Cheek

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1907.6$ MHz; $\sigma = 1.401$ mho/m; $\epsilon_r = 40.749$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: WCDMA1900-BII 1907.6 MHz Duty Cycle: 1: 1

Probe: EX3DV4 – SN7307 ConvF(8.1,8.1,8.1)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.639 W/kg

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

Reference Value = 6.122 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.56 W/kg; SAR(10 g) = 0.355 W/kg

Maximum value of SAR (measured) = 0.614 W/kg

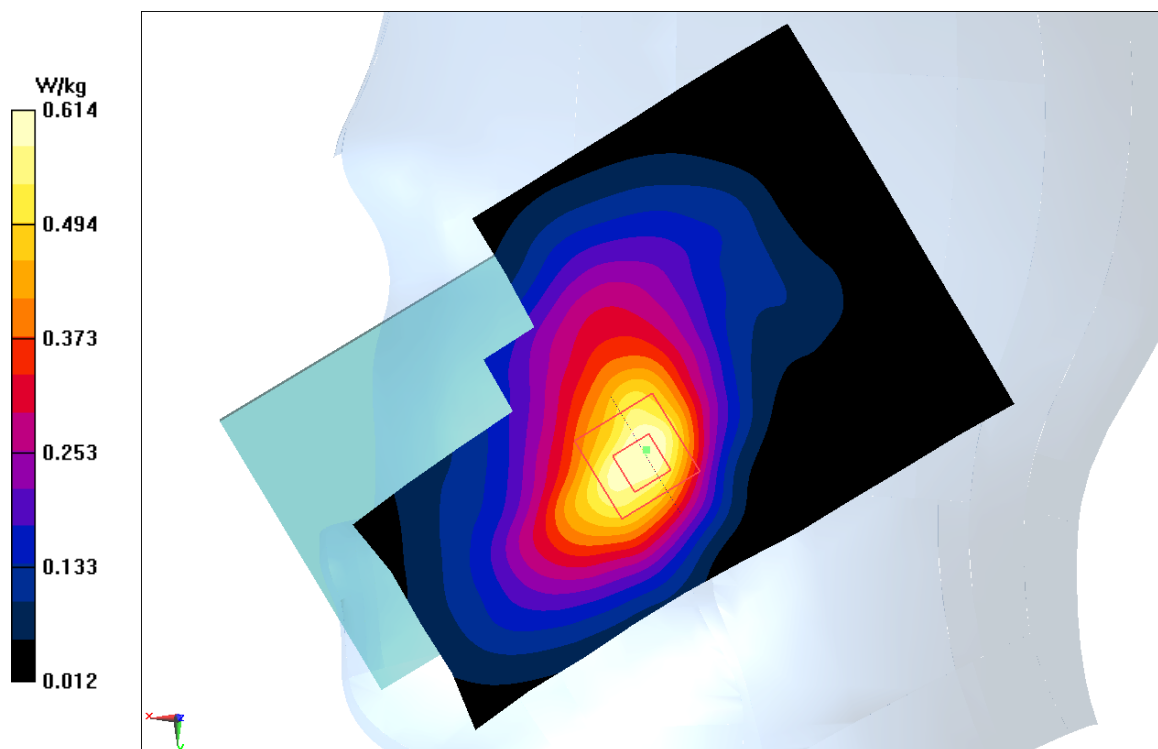


Figure A.7

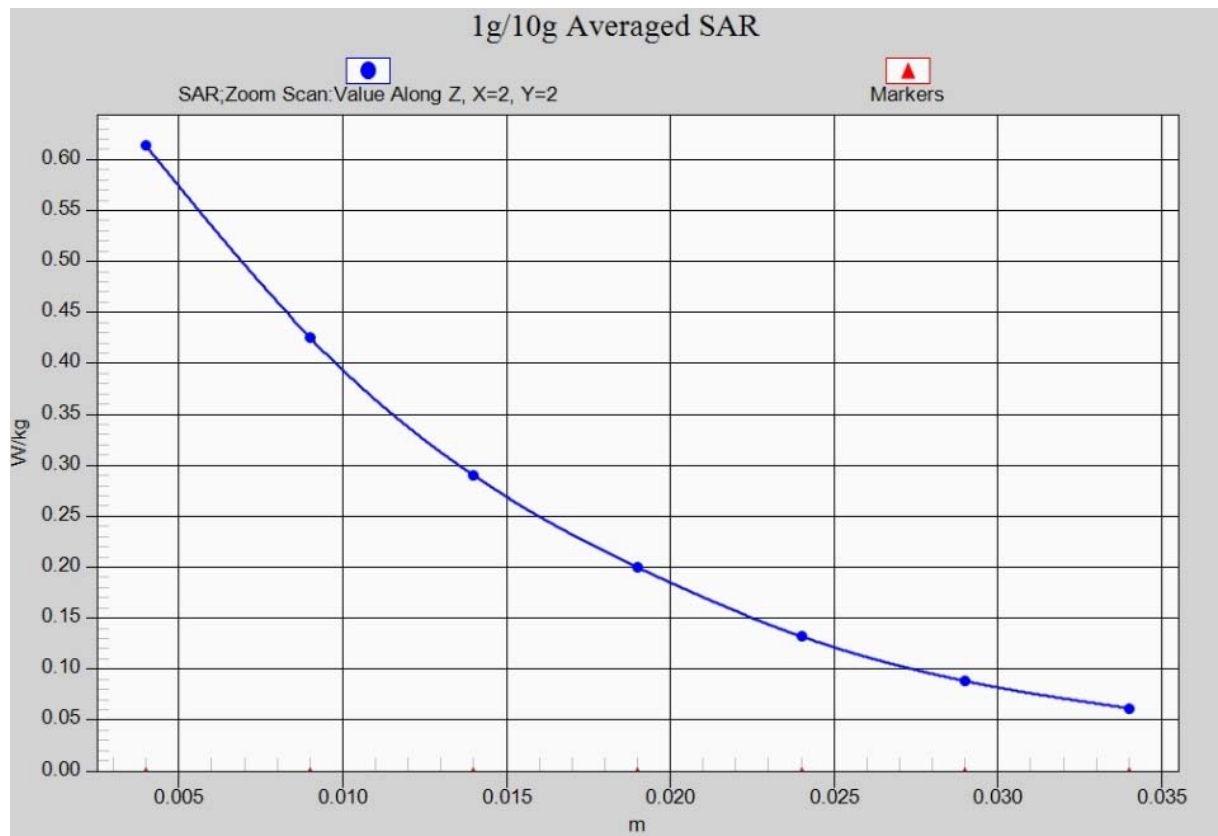


Figure A.7-1

WCDMA1900-BII_CH9262 Rear for 10mm

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1852.4$ MHz; $\sigma = 1.504$ mho/m; $\epsilon_r = 52.512$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: WCDMA1900-BII 1852.4 MHz Duty Cycle: 1: 1

Probe: EX3DV4 – SN7307 ConvF(7.67,7.67,7.67)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.606 W/kg

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

Reference Value = 10.67 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.795 W/kg

SAR(1 g) = 0.49 W/kg; SAR(10 g) = 0.302 W/kg

Maximum value of SAR (measured) = 0.547 W/kg

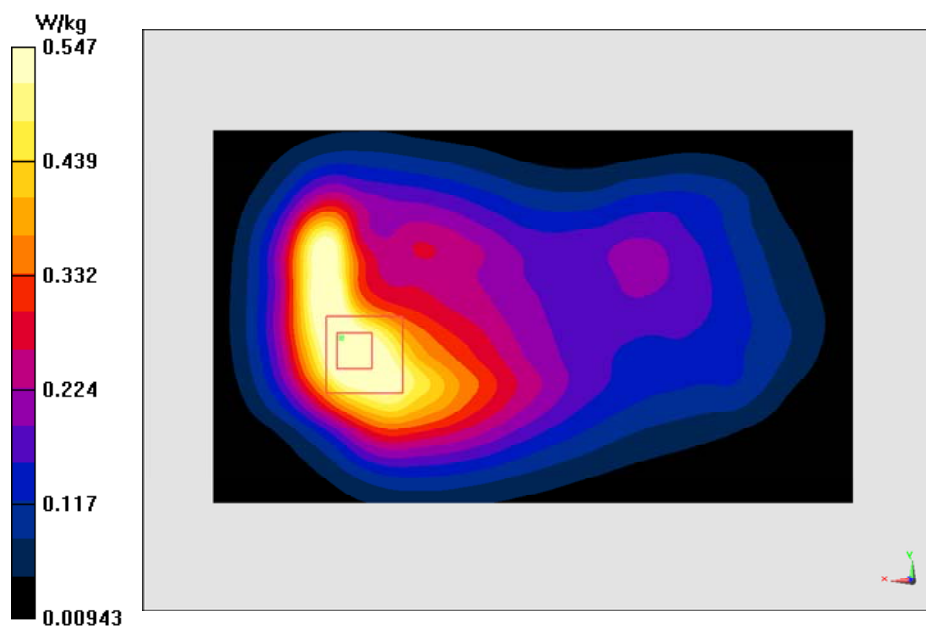


Figure A.8

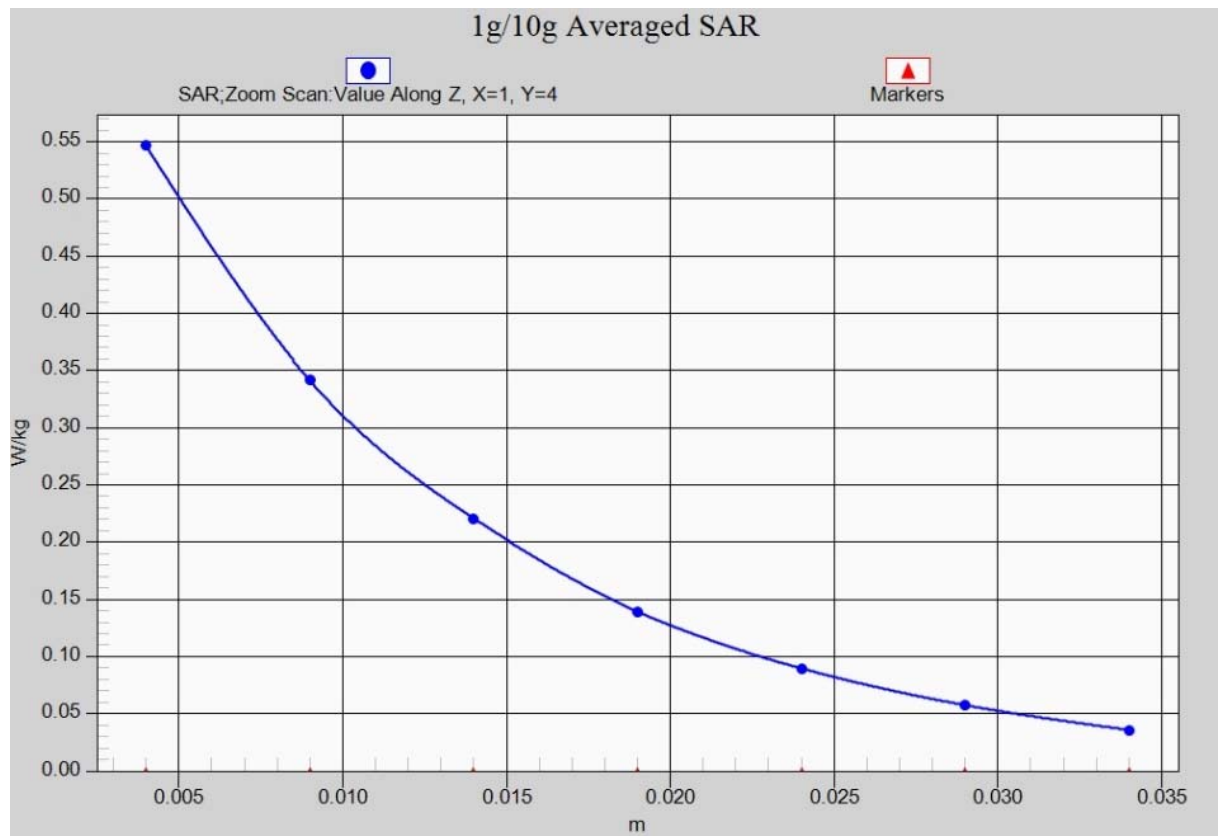


Figure A.8-1

WCDMA1900-BII_CH9262 Rear for 15mm

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1852.4$ MHz; $\sigma = 1.504$ mho/m; $\epsilon_r = 52.512$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: WCDMA1900-BII 1852.4 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.67,7.67,7.67)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.221 W/kg

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

Reference Value = 8.908 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.285 W/kg

SAR(1 g) = 0.189 W/kg; SAR(10 g) = 0.125 W/kg

Maximum value of SAR (measured) = 0.202 W/kg

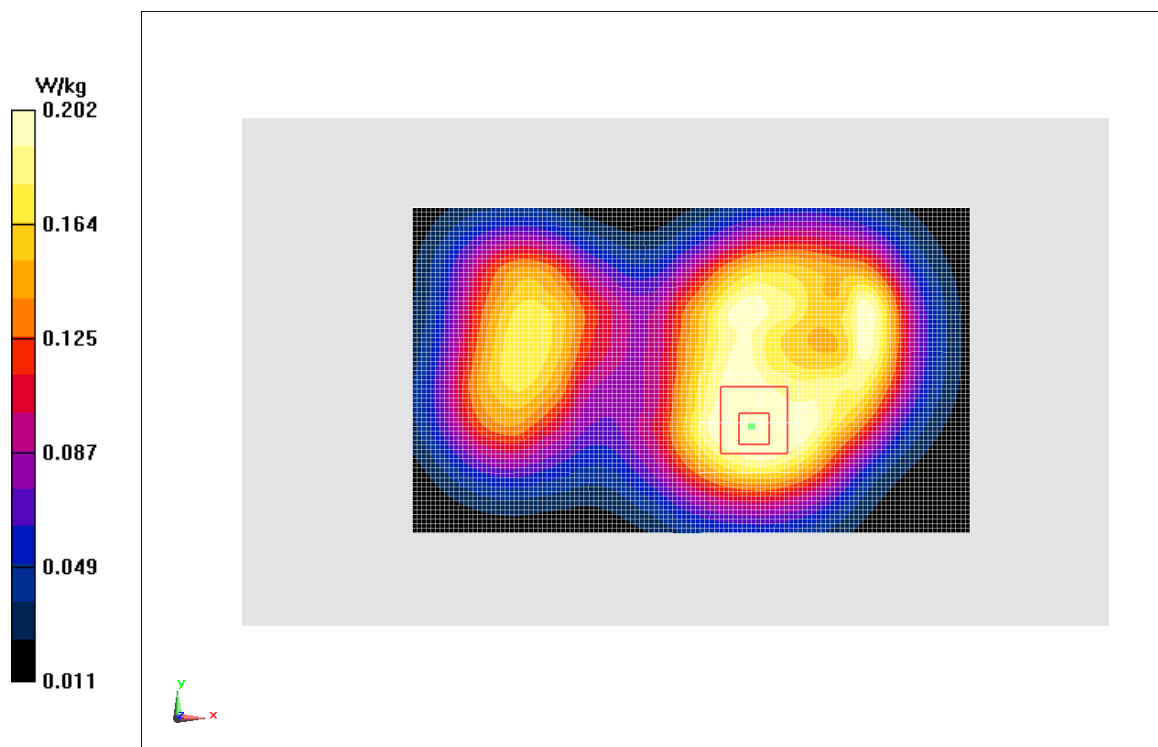


Figure A.9

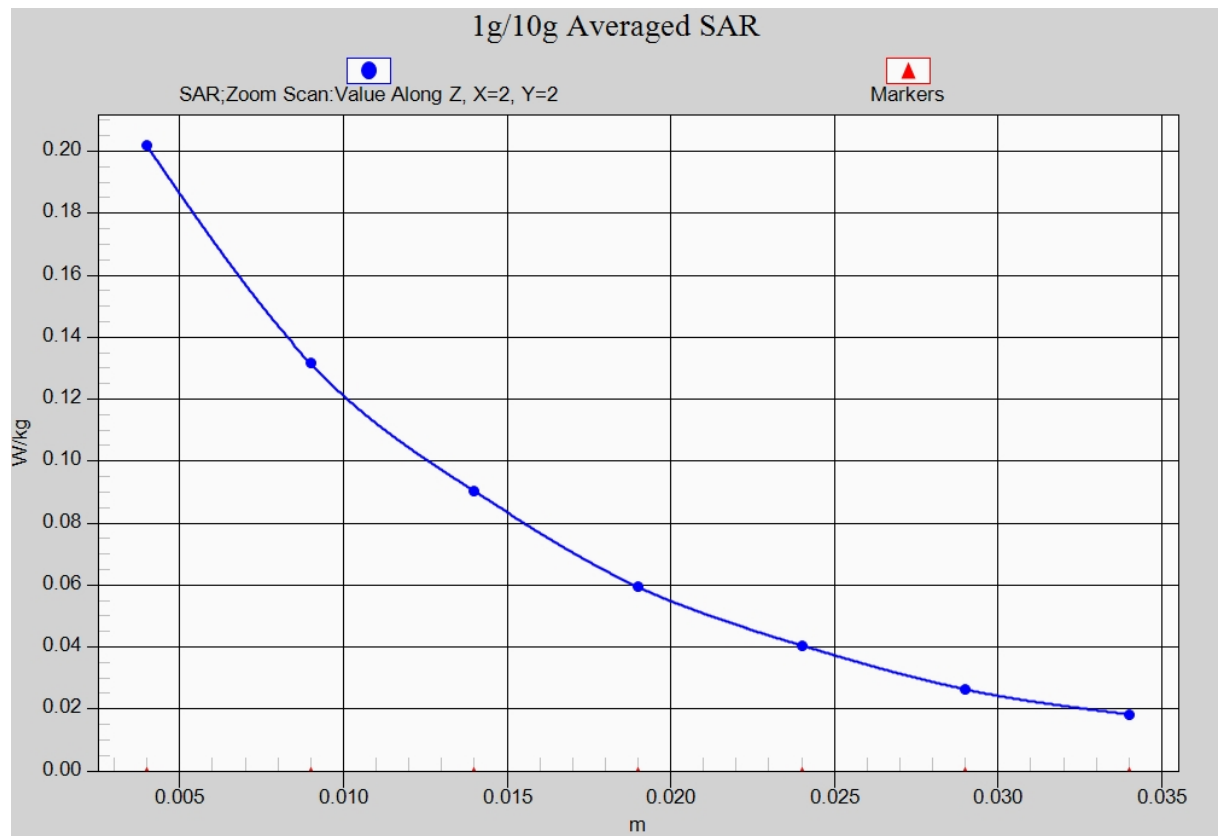


Figure A.9-1

LTE2500-FDD7_CH21350 Right Cheek

Date: 1/4/2017

Electronics: DAE4 Sn1331

Medium: Head 2600 MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 1.942$ mho/m; $\epsilon_r = 38.59$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: LTE2500-FDD7 2560 MHz Duty Cycle: 1: 1

Probe: EX3DV4 – SN7307 ConvF(7.21,7.21,7.21)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.732 W/kg

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

Reference Value = 4.493 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.587 W/kg; SAR(10 g) = 0.309 W/kg

Maximum value of SAR (measured) = 0.742 W/kg

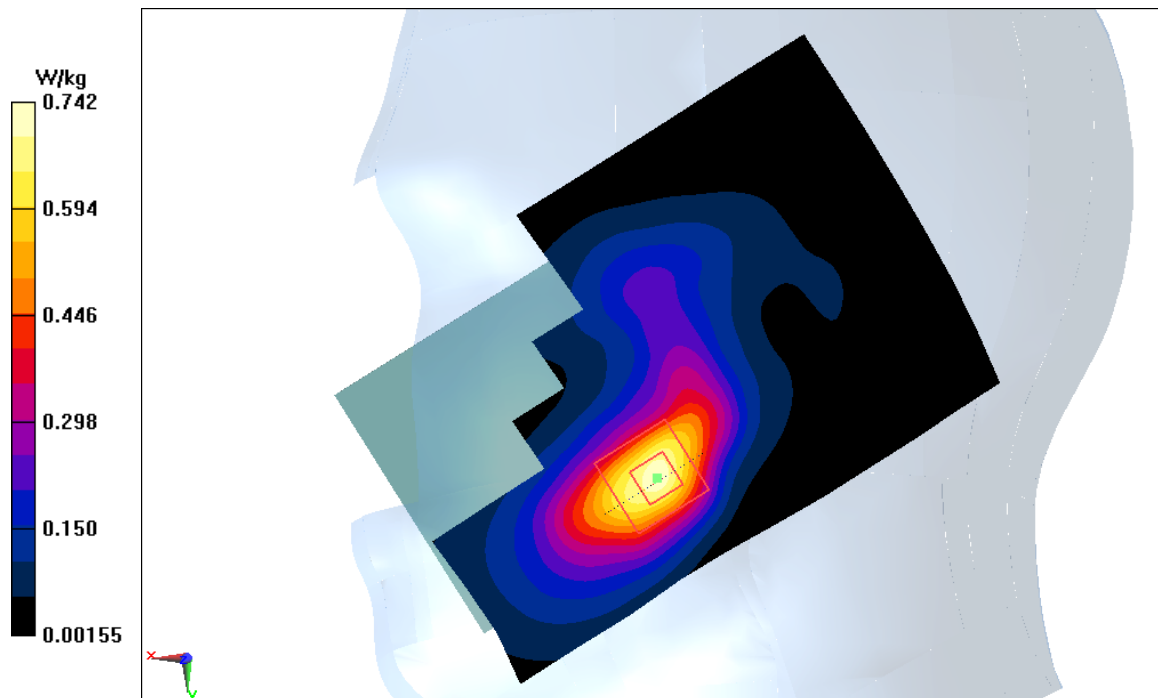


Figure A.10

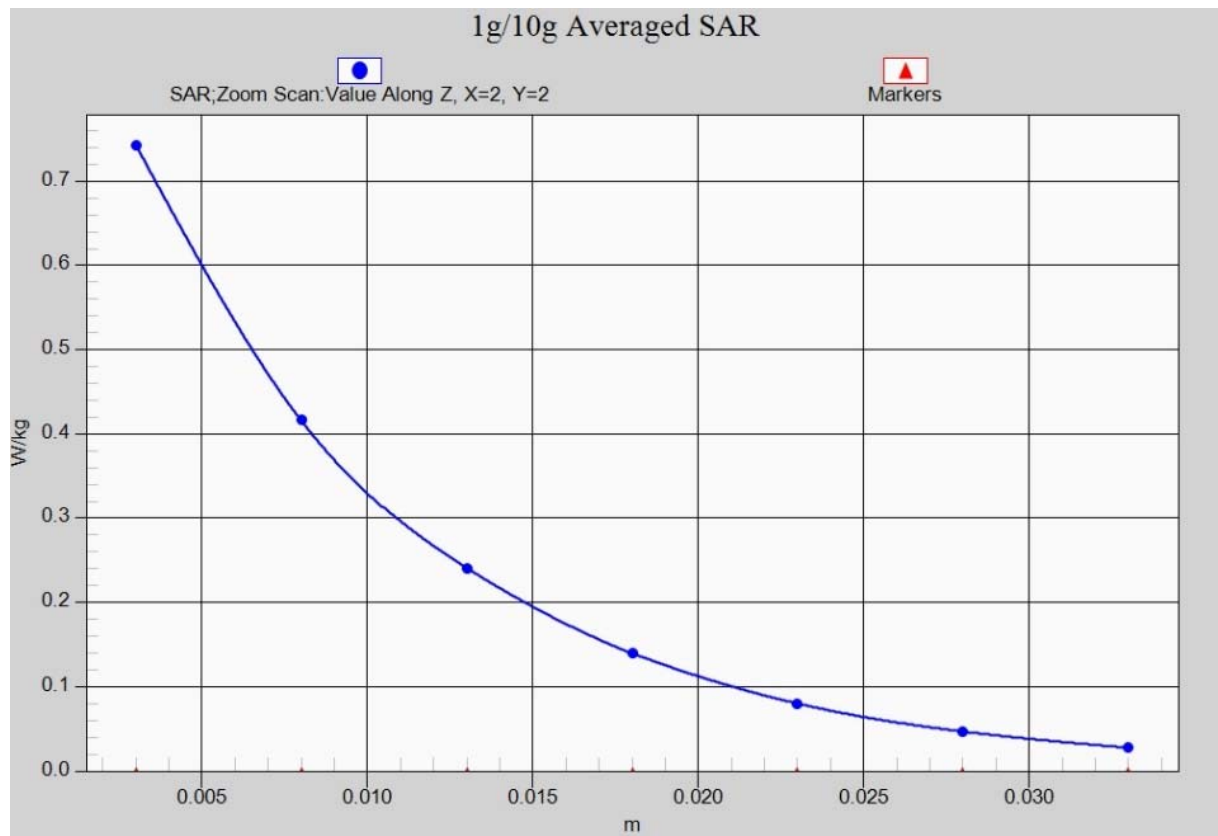


Figure A.10-1

LTE2500-FDD7_CH21350 Front for 10mm

Date: 1/4/2017

Electronics: DAE4 Sn1331

Medium: Head 2600 MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 2.172$ mho/m; $\epsilon_r = 53.113$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: LTE2500-FDD7 2560 MHz Duty Cycle: 1: 1

Probe: EX3DV4 – SN7307 ConvF(7.03,7.03,7.03)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.08 W/kg

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

Reference Value = 7.098 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.853 W/kg; SAR(10 g) = 0.465 W/kg

Maximum value of SAR (measured) = 0.927 W/kg

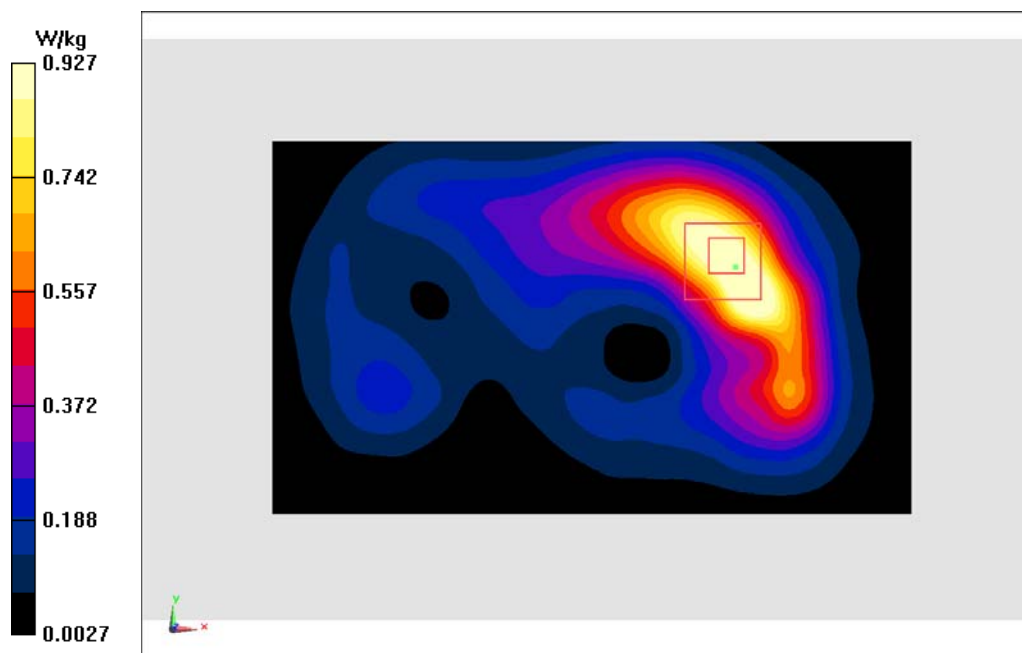


Figure A.11

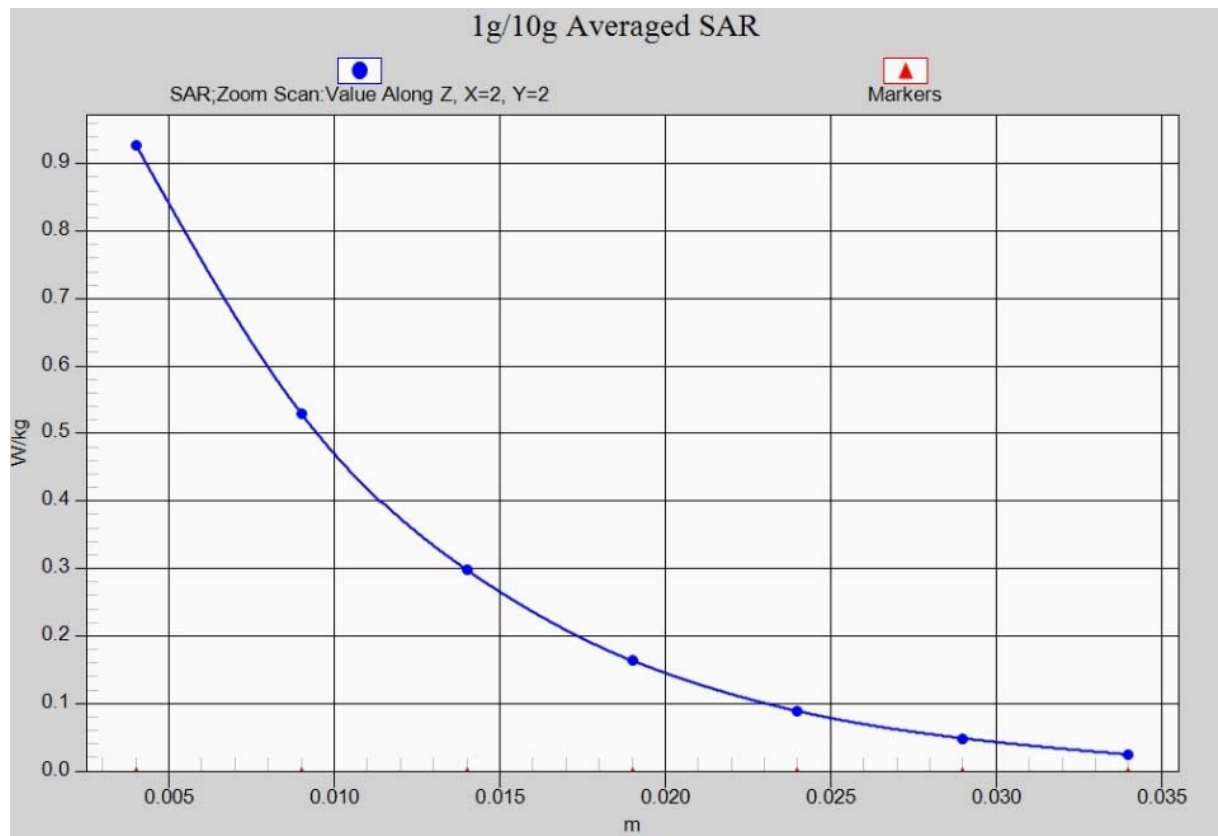


Figure A.11-1

LTE2500-FDD7_CH21350 Front for 15mm

Date: 1/4/2017

Electronics: DAE4 Sn1331

Medium: Head 2600 MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 2.172$ mho/m; $\epsilon_r = 53.113$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: LTE2500-FDD7 2560 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.03,7.03,7.03)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.447 W/kg

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

Reference Value = 7.080 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.650 W/kg

SAR(1 g) = 0.354 W/kg; SAR(10 g) = 0.194 W/kg

Maximum value of SAR (measured) = 0.423 W/kg

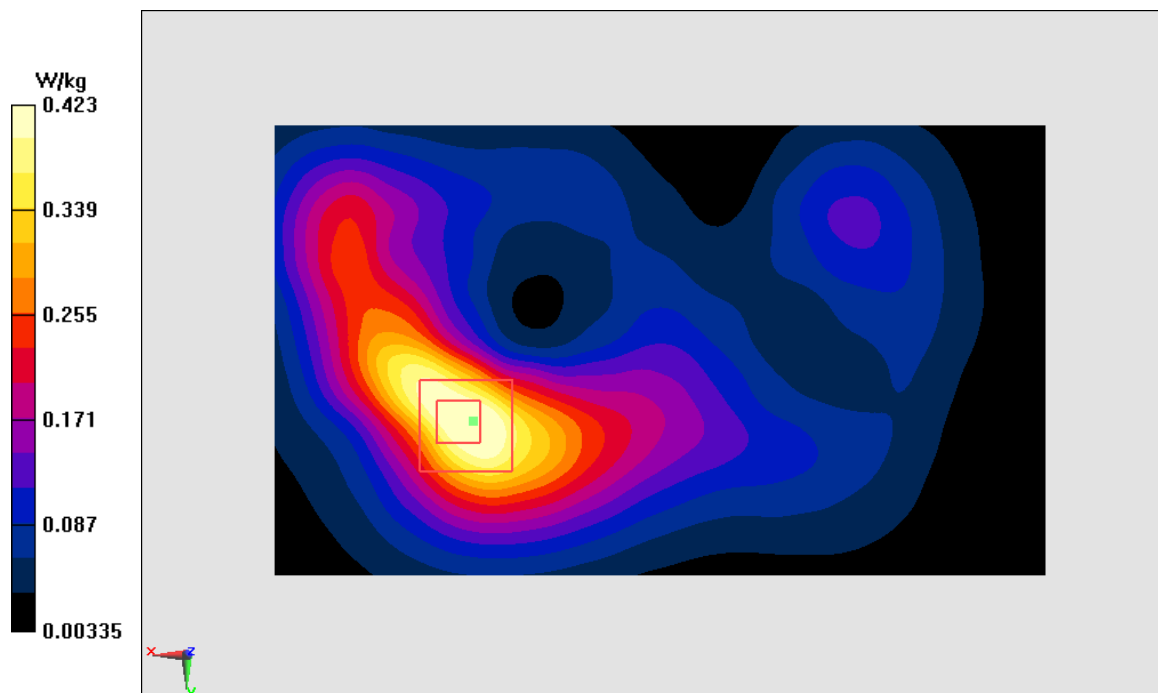


Figure A.12

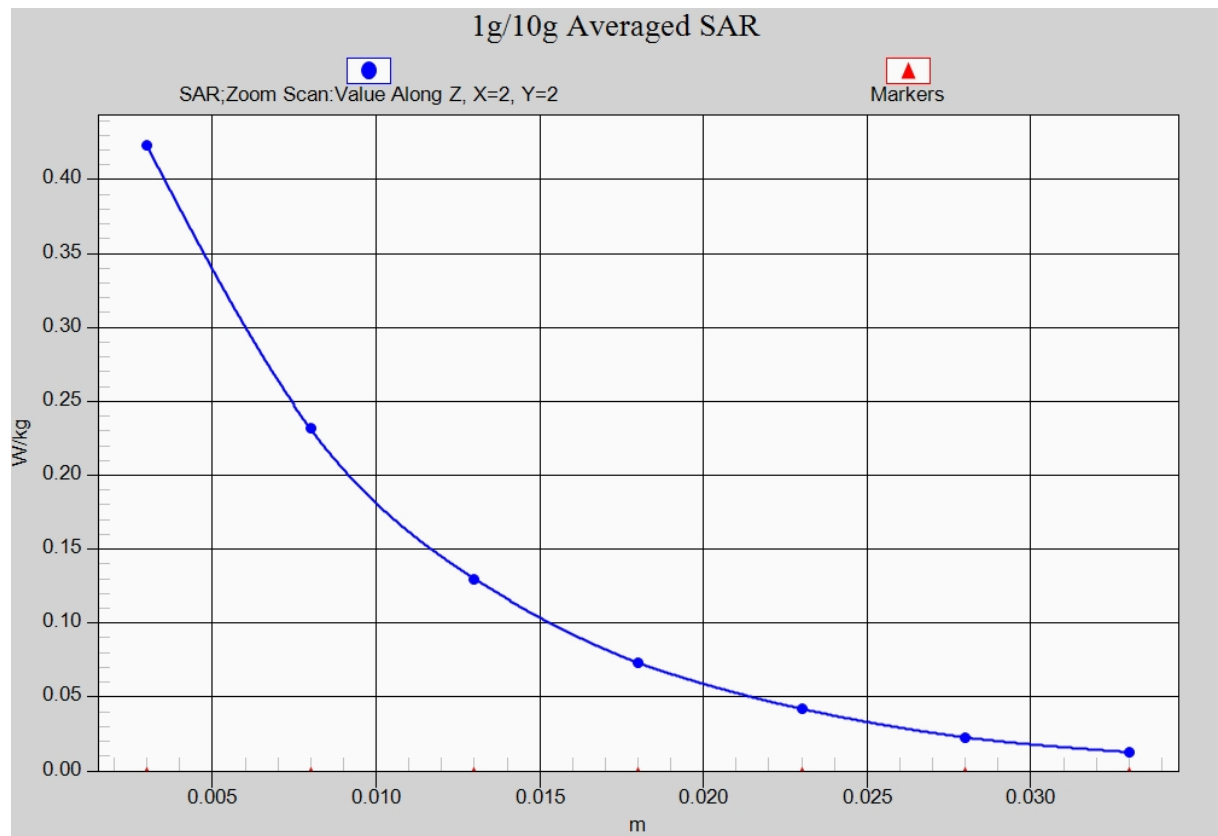


Figure A.12-1

WLAN_CH1 Right Cheek

Date: 1/3/2017

Electronics: DAE4 Sn1331

Medium: Head 2450 MHz

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.844$ mho/m; $\epsilon_r = 39.179$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: WLAN 2412 MHz Duty Cycle: 1: 1

Probe: EX3DV4 – SN7307 ConvF(7.36,7.36,7.36)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.75 W/kg

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

Reference Value = 8.032 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 1.4 W/kg

SAR(1 g) = 0.626 W/kg; SAR(10 g) = 0.277 W/kg

Maximum value of SAR (measured) = 0.794 W/kg

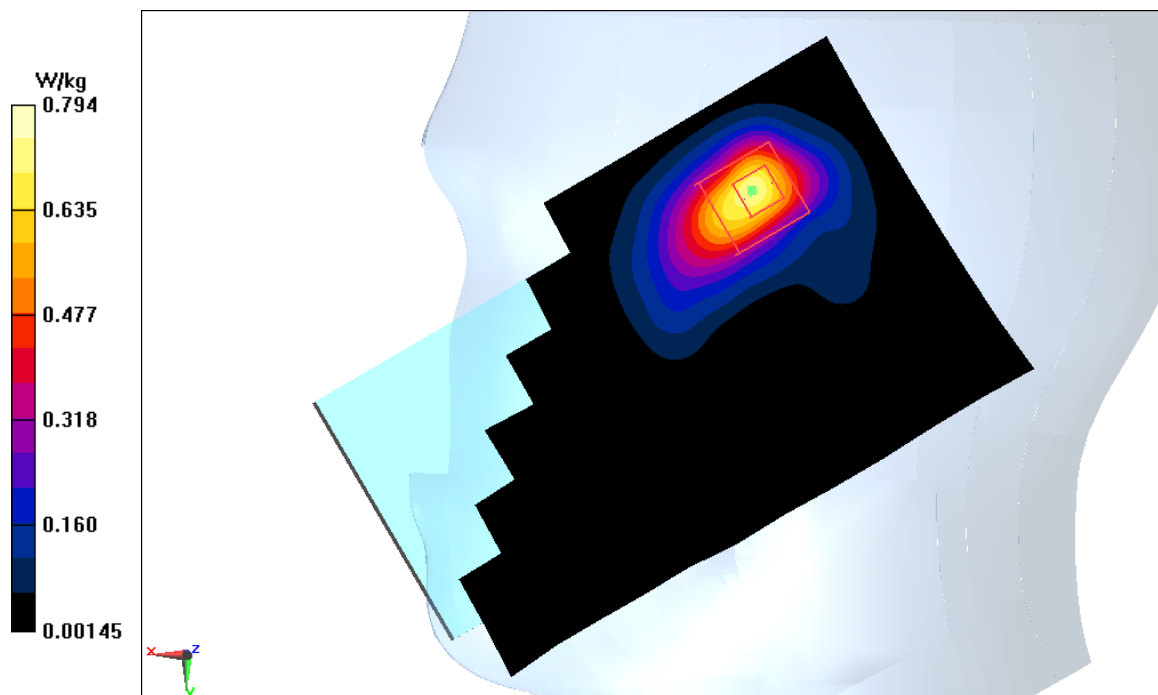


Figure A.13

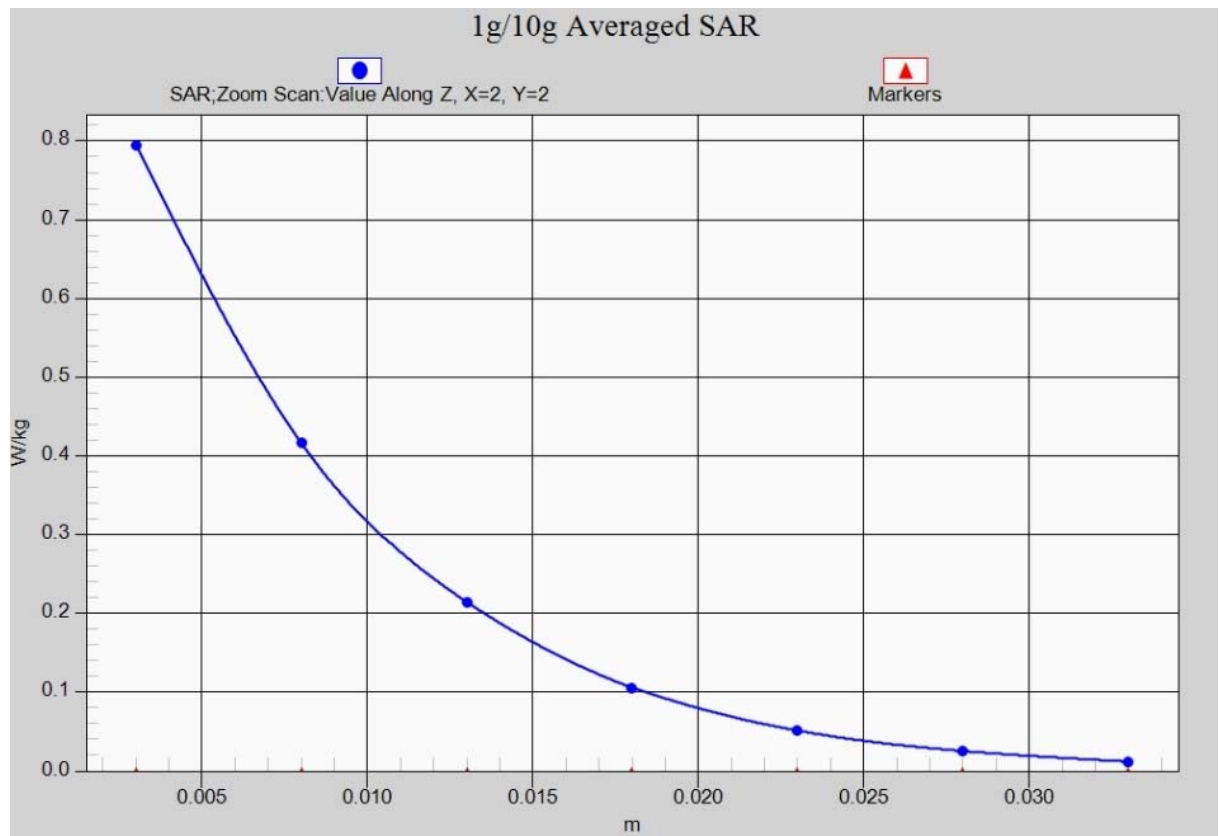


Figure A.13-1

WLAN_CH1 Rear for 10mm

Date: 1/3/2017

Electronics: DAE4 Sn1331

Medium: Head 2450 MHz

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.945$ mho/m; $\epsilon_r = 52.496$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: WLAN 2412 MHz Duty Cycle: 1: 1

Probe: EX3DV4 – SN7307 ConvF(7.22,7.22,7.22)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.133 W/kg

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

Reference Value = 4.157 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.206 W/kg

SAR(1 g) = 0.111 W/kg; SAR(10 g) = 0.0553 W/kg

Maximum value of SAR (measured) = 0.134 W/kg

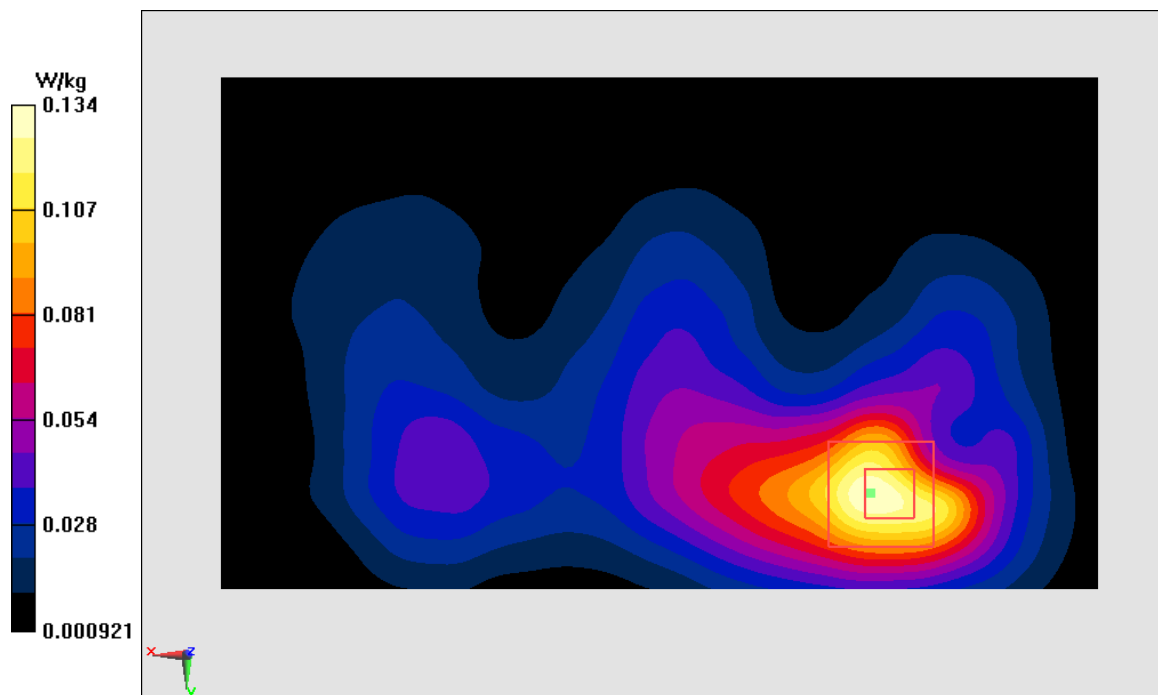


Figure A.14

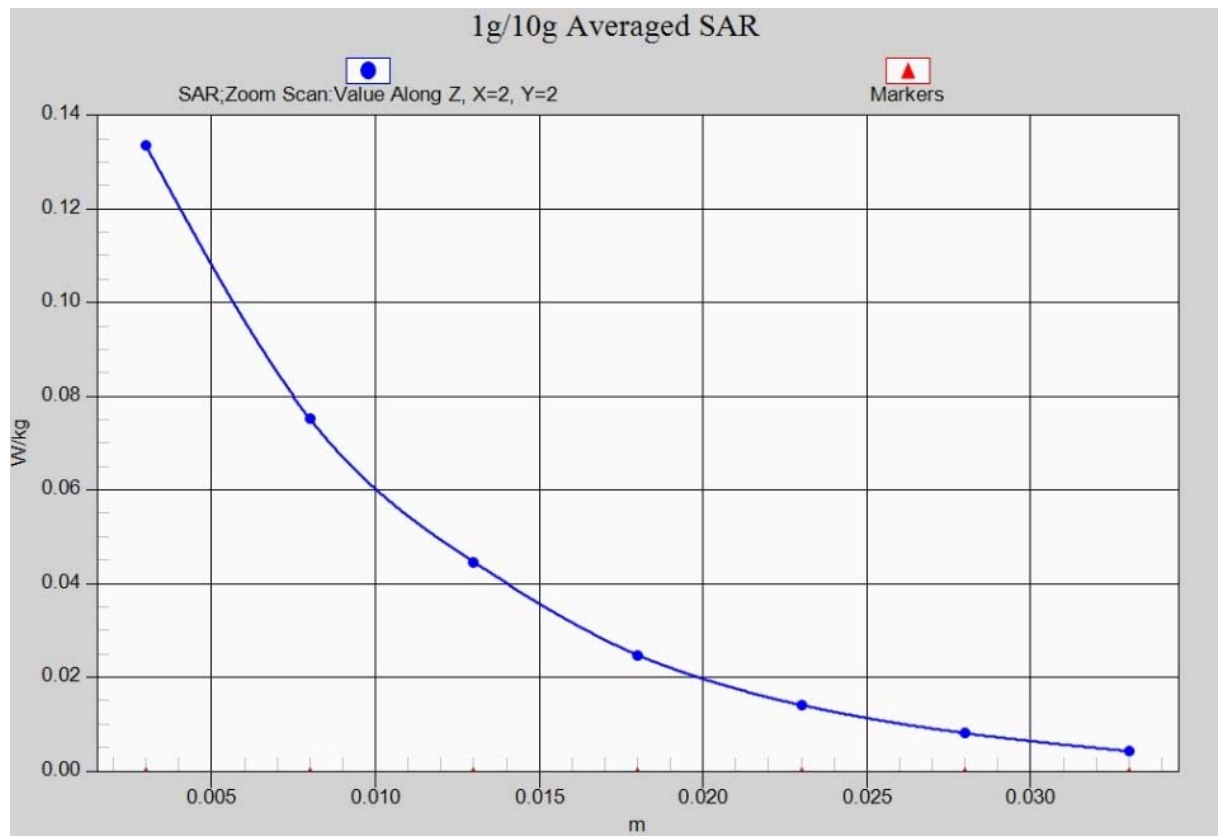


Figure A.14-1

WLAN_CH1 Rear for 15mm

Date: 1/3/2017

Electronics: DAE4 Sn1331

Medium: Head 2450 MHz

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.945$ mho/m; $\epsilon_r = 52.496$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C, Liquid Temperature: 22.2°C

Communication System: LTE2500-FDD7 425.1 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.22,7.22,7.22)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.109 W/kg

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

Reference Value = 4.722 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.168 W/kg

SAR(1 g) = 0.09 W/kg; SAR(10 g) = 0.088 W/kg

Maximum value of SAR (measured) = 0.111 W/kg

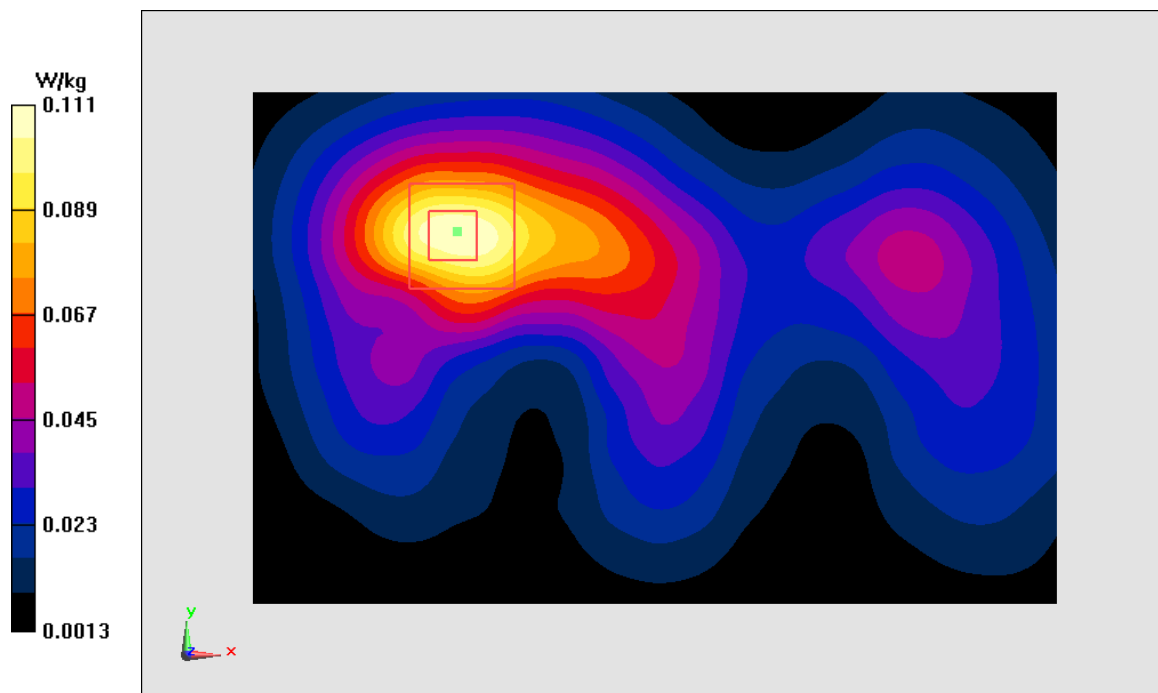


Figure A.15

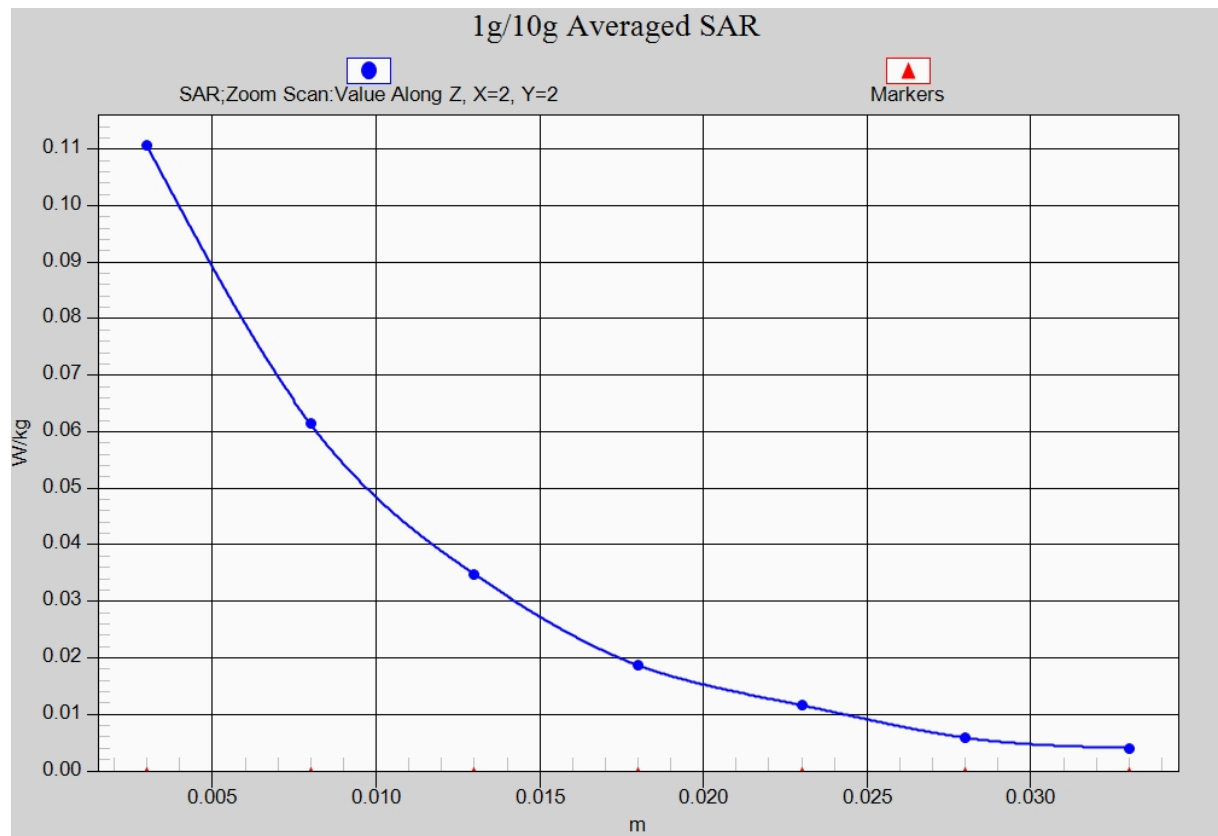


Figure A.15-1

ANNEX B System Verification Results

835 MHz

Date: 1/1/2017

Electronics: DAE4 Sn1331

Medium: Head 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.892 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

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

Probe: EX3DV4 – SN7307 ConvF(10.01,10.01,10.01)

System Validation /Area Scan (81x191x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 59.5 V/m ; Power Drift = 0.02

Fast SAR: SAR(1 g) = 2.34 W/kg ; SAR(10 g) = 1.52 W/kg

Maximum value of SAR (interpolated) = 3.22 W/kg

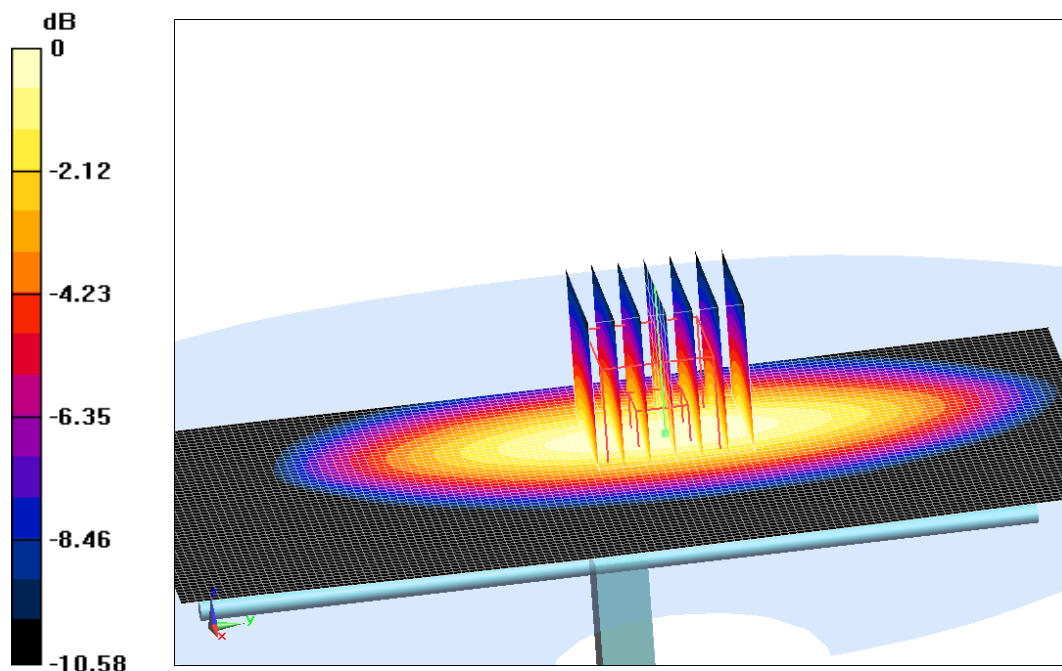
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 59.5 V/m ; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.64 W/kg

SAR(1 g) = 2.33 W/kg ; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 3.37 W/kg



$0 \text{ dB} = 3.37 \text{ W/kg} = 5.28 \text{ dB W/kg}$

Fig.B.1 validation 835 MHz 250mW

835 MHz

Date: 1/1/2017

Electronics: DAE4 Sn1331

Medium: Body 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.977 \text{ mho/m}$; $\epsilon_r = 54.29$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

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

Probe: EX3DV4 – SN7307 ConvF(9.83,9.83,9.83)

System Validation /Area Scan (81x191x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 60.21 V/m ; Power Drift = -0.01

Fast SAR: SAR(1 g) = 2.34 W/kg ; SAR(10 g) = 1.54 W/kg

Maximum value of SAR (interpolated) = 3.33 W/kg

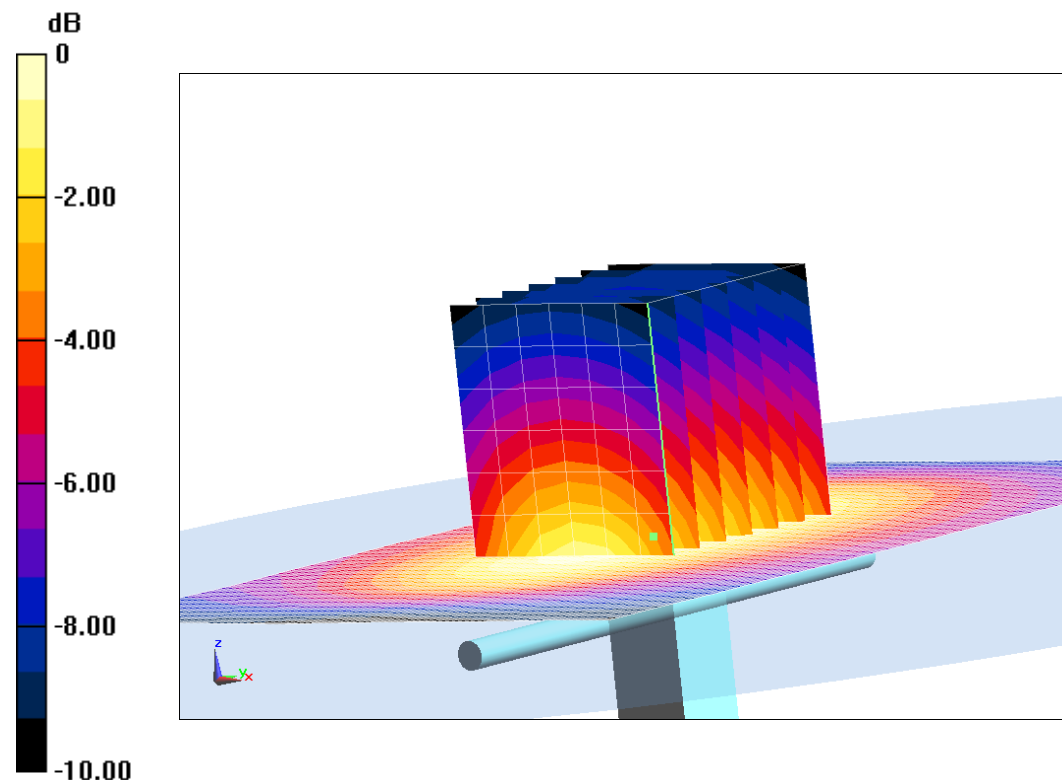
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 60.21 V/m ; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.68 W/kg

SAR(1 g) = 2.39 W/kg ; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 3.29 W/kg



$0 \text{ dB} = 3.29 \text{ W/kg} = 5.17 \text{ dB W/kg}$

Fig.B.2 validation 835 MHz 250mW

1900 MHz

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Head 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.408$ mho/m; $\epsilon_r = 40.74$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

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

Probe: EX3DV4 – SN7307 ConvF(8.1,8.1,8.1)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 109.73 V/m; Power Drift = -0.01

Fast SAR: SAR(1 g) = 10.38 W/kg; SAR(10 g) = 5.2 W/kg

Maximum value of SAR (interpolated) = 15.43 W/kg

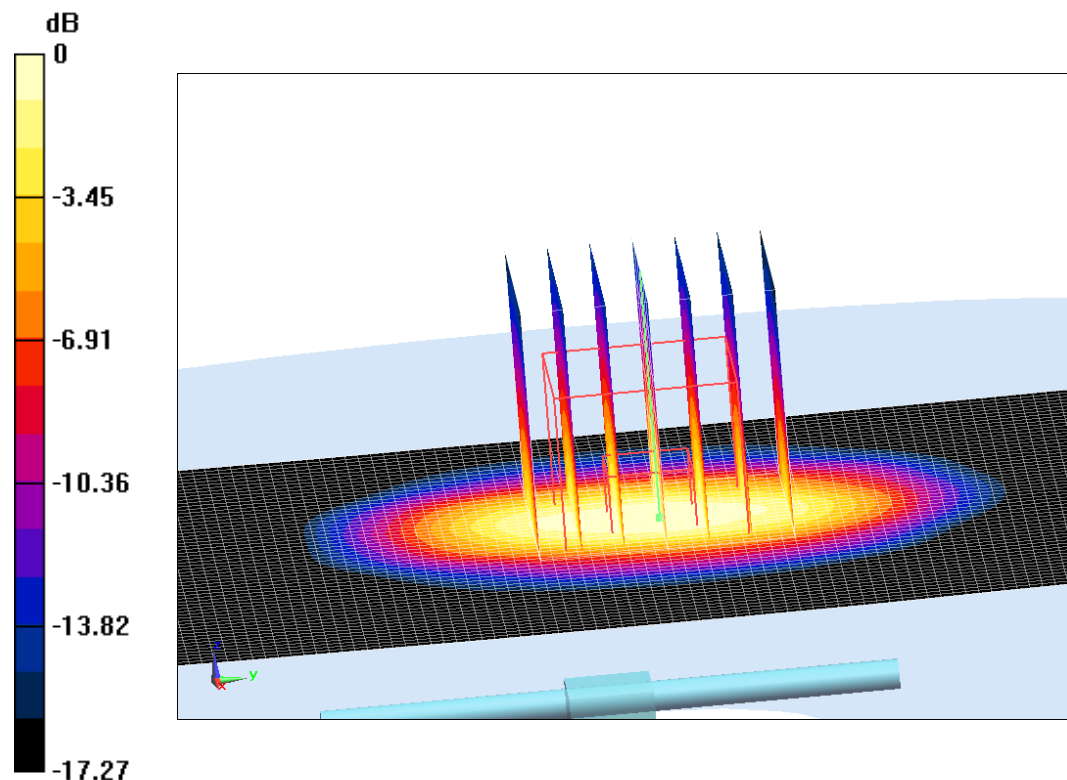
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 109.73 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 18.98 W/kg

SAR(1 g) = 10.19 W/kg; SAR(10 g) = 5.31 W/kg

Maximum value of SAR (measured) = 16.02 W/kg



0 dB = 16.02 W/kg = 12.05 dB W/kg

Fig.B.3 validation 1900 MHz 250mW

1900 MHz

Date: 1/2/2017

Electronics: DAE4 Sn1331

Medium: Body 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.515$ mho/m; $\epsilon_r = 52.48$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

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

Probe: EX3DV4 – SN7307 ConvF(7.67,7.67,7.67)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 104.7 V/m; Power Drift = -0.02

Fast SAR: SAR(1 g) = 10.12 W/kg; SAR(10 g) = 5.27 W/kg

Maximum value of SAR (interpolated) = 14.77 W/kg

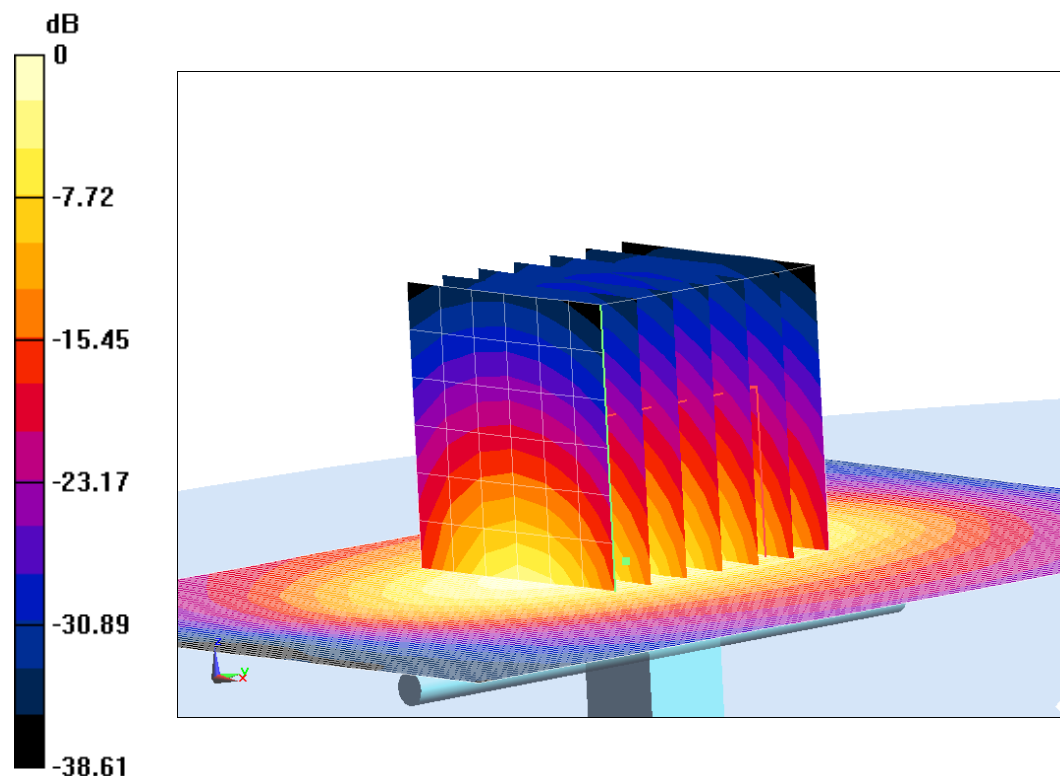
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.7 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 10.35 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.82 dB W/kg

Fig.B.4 validation 1900 MHz 250mW

2450 MHz

Date: 1/3/2017

Electronics: DAE4 Sn1331

Medium: Head 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.836$ mho/m; $\epsilon_r = 39.19$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

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

Probe: EX3DV4 – SN7307 ConvF(7.36,7.36,7.36)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 115.9 V/m; Power Drift = 0

Fast SAR: SAR(1 g) = 13.16 W/kg; SAR(10 g) = 6.08 W/kg

Maximum value of SAR (interpolated) = 22.25 W/kg

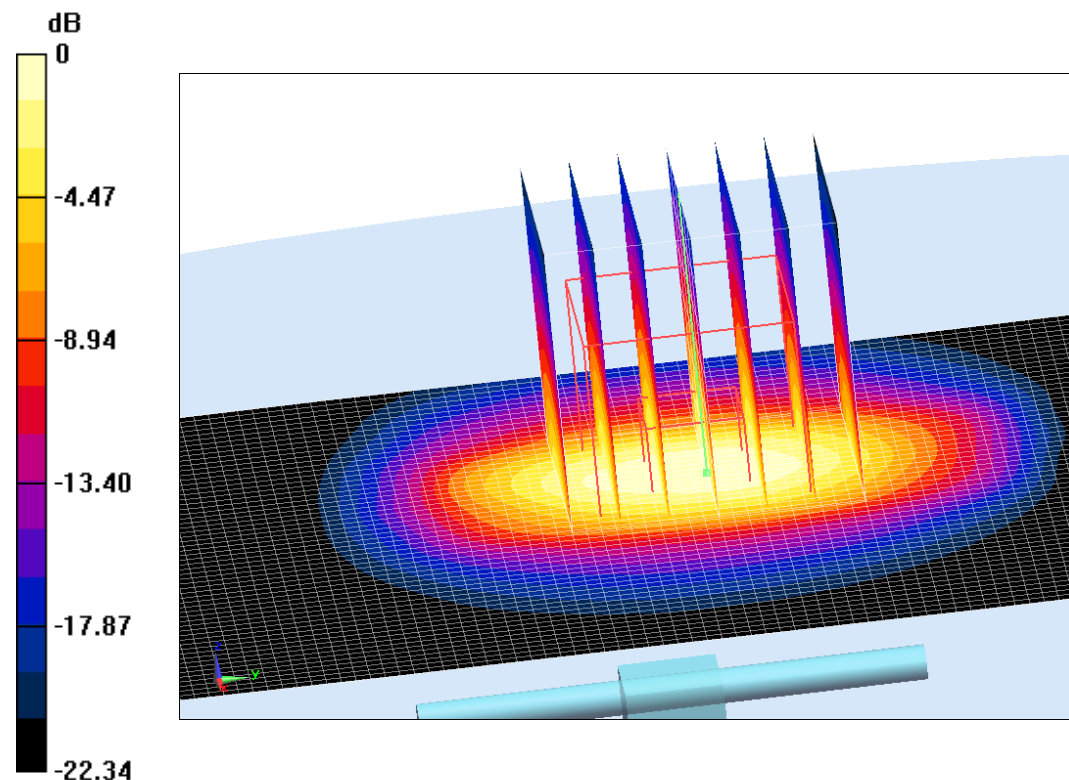
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 115.9 V/m; Power Drift = 0 dB

Peak SAR (extrapolated) = 27.85 W/kg

SAR(1 g) = 13.19 W/kg; SAR(10 g) = 6.25 W/kg

Maximum value of SAR (measured) = 22.02 W/kg



0 dB = 22.02 W/kg = 13.43 dB W/kg

Fig.B.5 validation 2450 MHz 250mW

2450 MHz

Date: 1/3/2017

Electronics: DAE4 Sn1331

Medium: Body 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.938$ mho/m; $\epsilon_r = 52.52$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

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

Probe: EX3DV4 – SN7307 ConvF(7.22,7.22,7.22)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 106.02 V/m; Power Drift = 0

Fast SAR: SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.18 W/kg

Maximum value of SAR (interpolated) = 21.73 W/kg

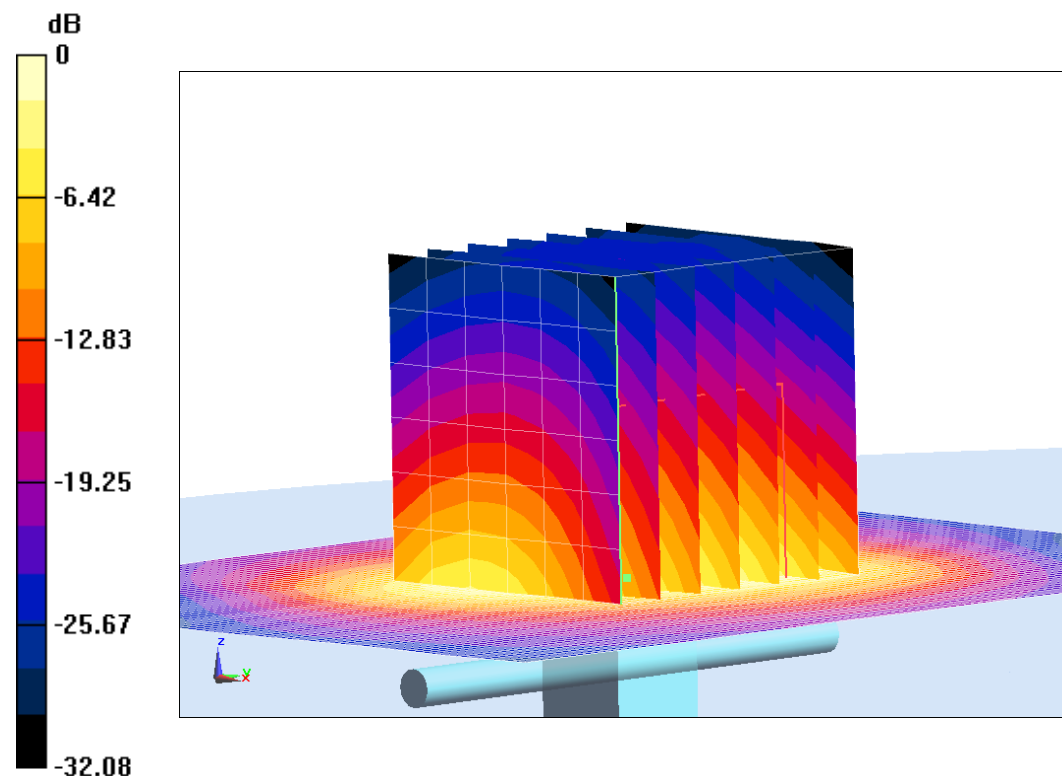
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.02 V/m; Power Drift = 0 dB

Peak SAR (extrapolated) = 26.34 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.12 W/kg

Maximum value of SAR (measured) = 21.42 W/kg



0 dB = 21.42 W/kg = 13.31 dB W/kg

Fig.B.6 validation 2450 MHz 250mW

2600 MHz

Date: 1/4/2017

Electronics: DAE4 Sn1331

Medium: Head 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 1.938$ mho/m; $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.21,7.21,7.21)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 115.2 V/m; Power Drift = 0.01

Fast SAR: SAR(1 g) = 13.98 W/kg; SAR(10 g) = 6.23 W/kg

Maximum value of SAR (interpolated) = 24 W/kg

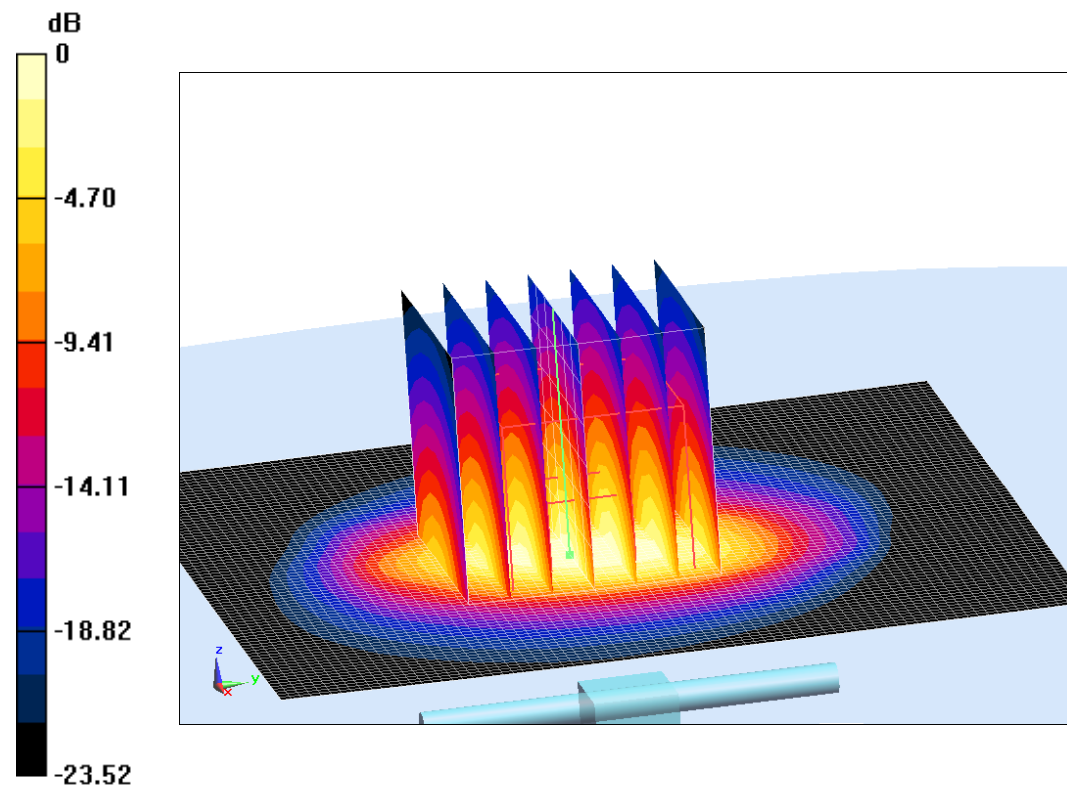
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 115.2 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 31.04 W/kg

SAR(1 g) = 13.93 W/kg; SAR(10 g) = 6.37 W/kg

Maximum value of SAR (measured) = 24.66 W/kg



0 dB = 24.66 W/kg = 13.92 dB W/kg

Fig.B.7 validation 2600 MHz 250mW

2600 MHz

Date: 1/4/2017

Electronics: DAE4 Sn1331

Medium: Body 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.167$ mho/m; $\epsilon_r = 53.29$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.4°C Liquid Temperature: 22.2°C

Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.03,7.03,7.03)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 107.45 V/m; Power Drift = 0.01

Fast SAR: SAR(1 g) = 14.25 W/kg; SAR(10 g) = 6.42 W/kg

Maximum value of SAR (interpolated) = 23.06 W/kg

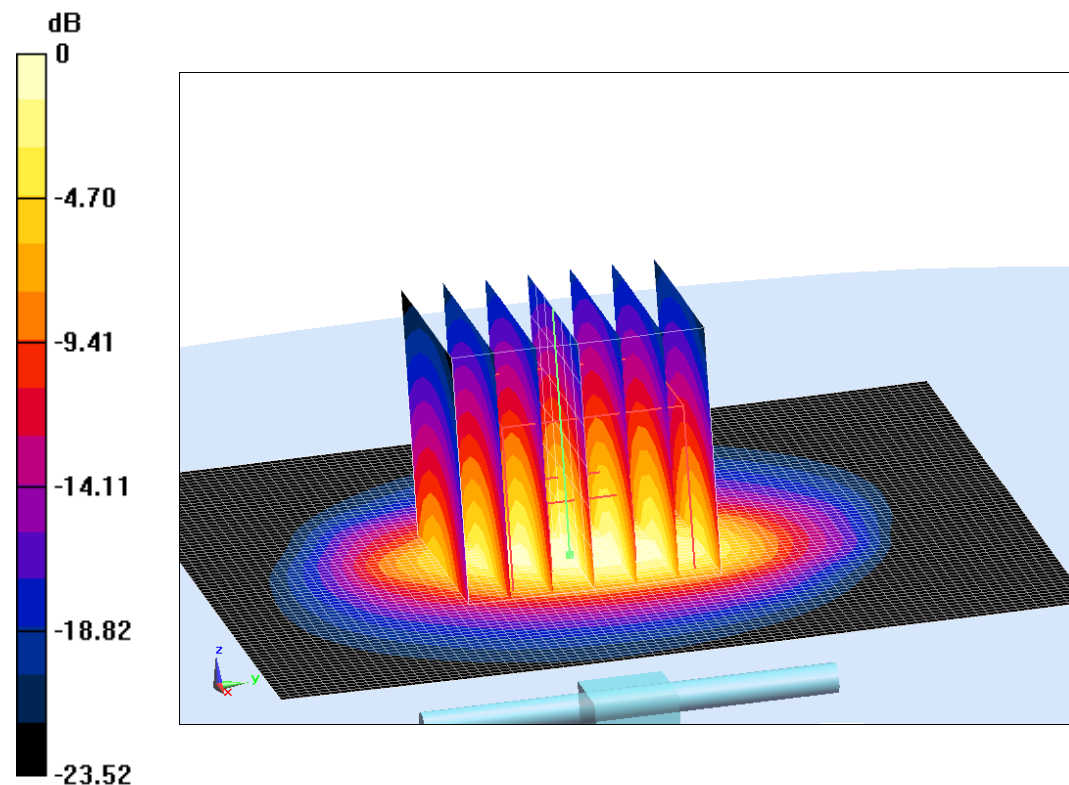
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 107.45 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 29.23 W/kg

SAR(1 g) = 13.93 W/kg; SAR(10 g) = 6.27 W/kg

Maximum value of SAR (measured) = 23.14 W/kg



0 dB = 23.14 W/kg = 13.64 dB W/kg

Fig.B.8 validation 2600 MHz 250mW

The SAR system verification must be required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR.

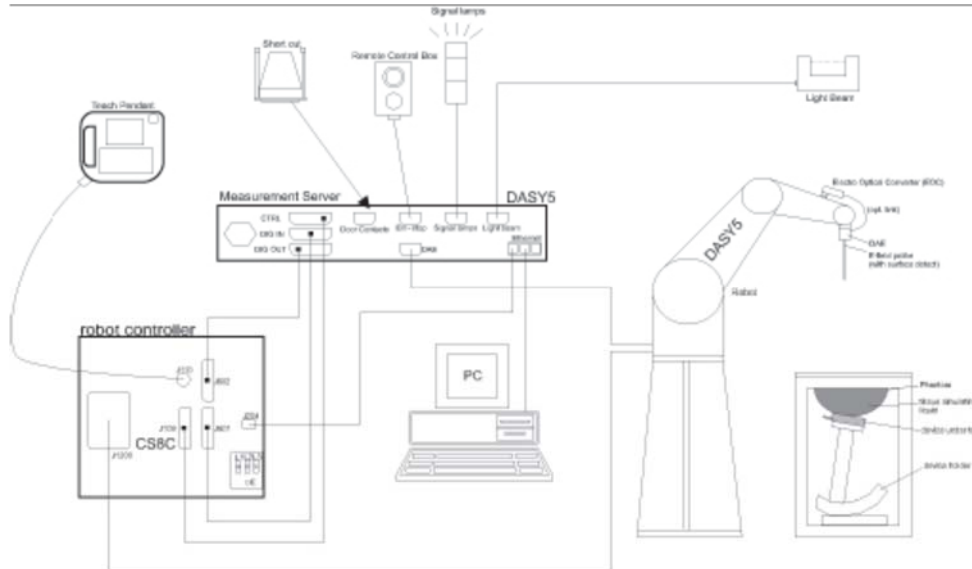
Table B.1 Comparison between area scan and zoom scan for system verification

Date	Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
2017-1-1	835	Head	2.34	2.33	0.43
	835	Body	2.34	2.39	-2.09
2017-1-2	1900	Head	10.38	10.19	1.86
	1900	Body	10.12	10.35	-2.22
2017-1-3	2450	Head	13.16	13.19	-0.23
	2450	Body	13.2	13.3	-0.75
2017-1-4	2600	Head	13.98	13.93	0.36
	2600	Body	14.25	13.93	2.30

ANNEX C SAR Measurement Setup

C.1 Measurement Set-up

The Dasy4 or DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1 SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY4 or DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.