



SAR EVALUATION REPORT

Applicant Name: Samsung Electronics Co., Ltd. 416, Maetan 3-dong, Yeongtong-gu, Suwon-si Gyeonggi-do, 443-742 Republic of Korea	Date of Testing: 08/31/12 - 09/10/12 Test Site/Location: PCTEST Lab, Columbia, MD, USA Document Serial No.: 0Y1208311278-R4.A3L
--	---

FCC ID: A3LGTN8020

APPLICANT: SAMSUNG ELECTRONICS CO., LTD.

DUT Type: Portable Tablet Computer
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): GT-N8020
Test Device Serial No.: Pre-Production [S/N: FCC #1, FCC #3]

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR
			1 gm Body (W/kg)
GSM/GPRS/EDGE 850	824.20 - 848.80 MHz	32.08	1.02
UMTS 850	826.40 - 846.60 MHz	22.96	0.67
GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz	29.62	0.97
2.4 GHz WLAN	2412 - 2462 MHz	12.73	0.43
5.8 GHz WLAN	5745 - 5825 MHz	11.18	0.79
5.2 GHz WLAN	5180 - 5240 MHz	11.18	0.31
5.3 GHz WLAN	5260 - 5320 MHz	11.03	0.33
5.5 GHz WLAN	5500 - 5700 MHz	10.85	0.77
Bluetooth	2402 - 2480 MHz	11.93	N/A
Simultaneous SAR per KDB 690783 D01:			1.53


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

Note: This revised Test Report (S/N: 0Y1208311278-R4.A3L) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly



This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

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

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.




 Randy Ortanez
 President



FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 1 of 34	

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

1	DEVICE UNDER TEST	3
2	INTRODUCTION	6
3	SAR MEASUREMENT SETUP	7
4	DOSIMETRIC ASSESSMENT	8
5	FCC RF EXPOSURE LIMITS	9
6	SAR TABLET TESTING	10
7	FCC MEASUREMENT PROCEDURES	11
8	RF CONDUCTED POWERS	14
9	SYSTEM VERIFICATION	21
10	SAR DATA SUMMARY	23
11	FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS	26
12	EQUIPMENT LIST	29
13	MEASUREMENT UNCERTAINTIES	30
14	CONCLUSION	32
15	REFERENCES	33

FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 2 of 34	

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
GSM/GPRS/EDGE 850	824.20 - 848.80 MHz
UMTS 850	826.40 - 846.60 MHz
GSM/GPRS/EDGE 1900	1850.20 - 1909.80 MHz
2.4 GHz WLAN	2412 - 2462 MHz
5.8 GHz WLAN	5745 - 5825 MHz
5.2 GHz WLAN	5180 - 5240 MHz
5.3 GHz WLAN	5260 - 5320 MHz
5.5 GHz WLAN	5500 - 5700 MHz
Bluetooth	2402 - 2480 MHz

1.2 DUT Antenna Locations

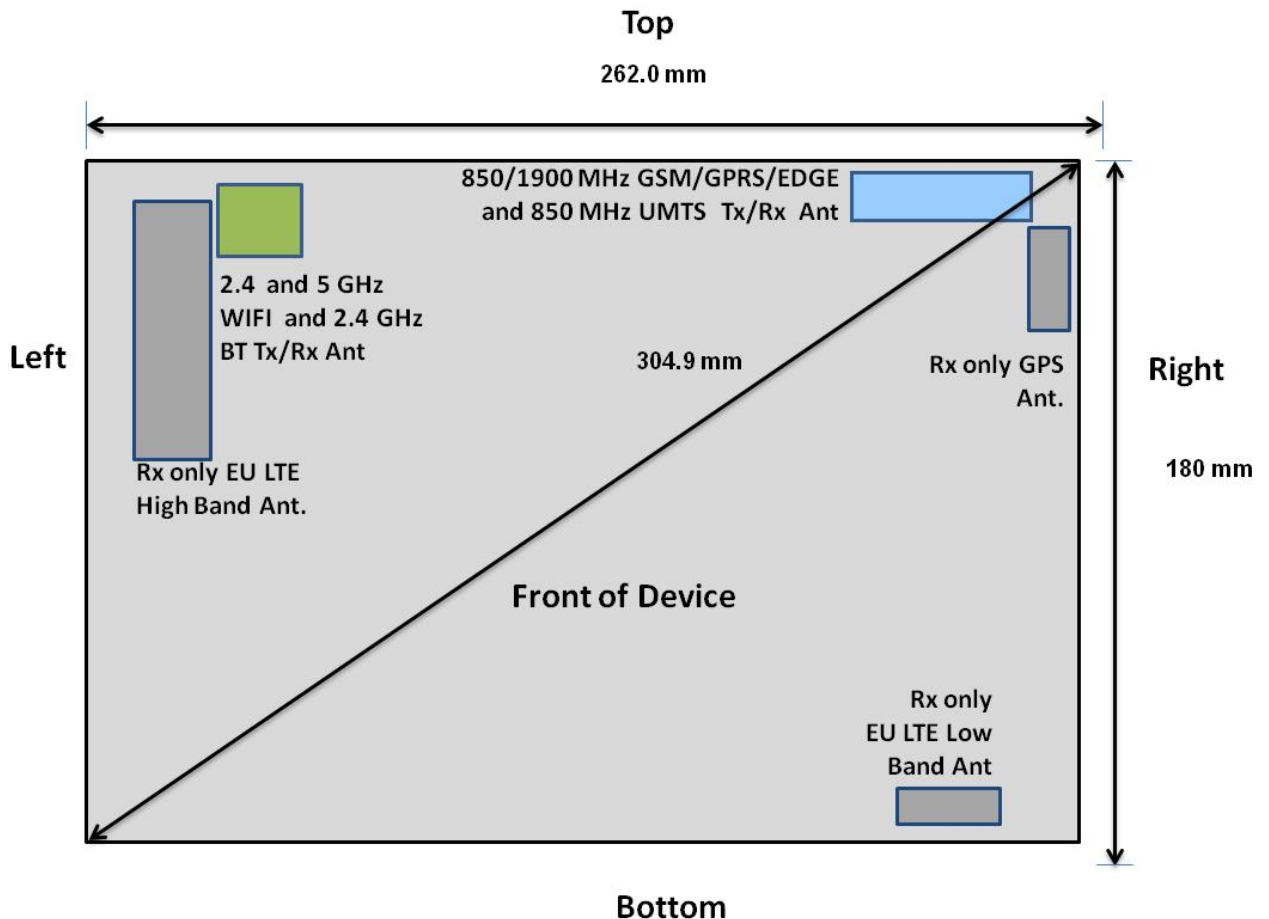




Figure 1-1
DUT Antenna Locations

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 3 of 34

1.3 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5 GHz WIFI, only 2.4 GHz WIFI SAR tests and combinations are considered for SAR with respect to Wireless Router configurations.

The separation between the main antenna and the Bluetooth/WLAN antennas is 155.2 mm. RF Conducted Power of Bluetooth Tx is 15.596 mW (Please refer to the EMC DSS Report for a full set of Bluetooth conducted powers).

2.4 GHz and 5 GHz WIFI and Bluetooth share the same antenna path and cannot transmit simultaneously.

Per KDB Publication 447498, **Bluetooth SAR was not required** based on the maximum conducted power, the Bluetooth/WLAN to main antenna separation distance.

(B) Licensed Transmitter(s)



This model does supports Simultaneous Voice and Data for the licensed transmitter in WCDMA which allows Multi-RAB transmissions that share voice and data operations on a single physical channel.

GSM/GPRS/EDGE DTM is not supported. Therefore GSM Voice cannot transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink, but is capable of HSPA+ in the downlink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01.

1.4 Power Reduction for SAR

Proximity Sensors were utilized in the device for SAR purposes. April/October 2011 TCB Workshop Notes and FCC KDB 616217 DR01 (4/23/12) regarding Power reduction using proximity sensors were used for guidance for SAR Testing. See Section 6.3 for more information.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 4 of 34

1.5 Simultaneous Transmission Capabilities

According to KDB 648474, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-2 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.





Figure 1-2
Simultaneous Transmission Paths

No.	Capable Transmit Configurations	Body	Note
1	GSM Voice + 2.4 GHz WIFI	√	
2	GPRS Data + 2.4 GHz WIFI	√	Hotspot
3	UMTS + 2.4 GHz WIFI	√	Hotspot
4	GSM Voice + 5 GHz WIFI	√	
5	UMTS + 5 GHz WIFI	√	
6	GPRS Data + 5 GHz WIFI	N/A	5GHz WIFI Hotspot Not available by SW

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

1.6 Guidance Applied

- FCC KDB 941225 (3G)
- FCC KDB 248227 (802.11)
- FCC KDB 447498 Section 4 (Tablet SAR Considerations)
- April/Oct 2011 TCB Workshop Notes for RF Exposure and Sensors with Power Reduction
- FCC KDB 865664 (5 GHz)
- FCC KDB 616217 DR01 (Proximity Sensor Considerations, from 4/23/2012)
- October 2012 TCB Workshop Notes for HSPA+ and DC-HSDPA

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 5 of 34

2 INTRODUCTION

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

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

2.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 2-1).

Equation 2-1
SAR Mathematical Equation

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



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

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

where:

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

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

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 6 of 34

3 SAR MEASUREMENT SETUP

3.1 Automated SAR Measurement System

Measurements are performed using the DASY automated dosimetric SAR assessment system. The DASY is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). See www.speag.com for more information about the specification of the SAR assessment system.



Figure 3-1
SAR Measurement System



Figure 3-2
Near-Field Probe

Table 3-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	1900	2450	5200-5800
Tissue	Body	Body	Body	Body
Ingredients (% by weight)				
Bactericide	0.1			
DGBE		29.44	26.7	
HEC	1			
NaCl	0.94	0.39	0.1	
Sucrose	44.9			
Polysorbate (Tween) 80				20
Water	53.06	70.17	73.2	80

FCC ID: A3LGTN8020	PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 7 of 34

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head interface and the horizontal grid resolution was 15mm and 15mm for frequencies < 3 GHz in the x and y directions respectively. When applicable, for frequencies above 3 GHz, a 10 mm by 10 mm resolution was used.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring at least 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.
5. For testing 5 GHz devices, finer resolution zoom scans were performed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB 865664 publication. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.

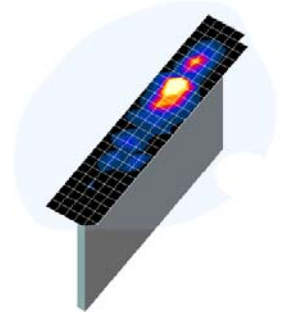




Figure 4-1
Sample SAR Area Scan

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 8 of 34

5 FCC RF EXPOSURE LIMITS

5.1 Uncontrolled Environment

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



5.2 Controlled Environment

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

Table 5-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

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

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 9 of 34

6

SAR TABLET TESTING

6.1 SAR Testing for Tablet per KDB Publication 447498 Section 4

Lap-touching devices that have transmitting antennas located less than 20 cm from the body of the user require routine SAR evaluation. Such devices are considered portable, and are capable of being held to the body. Devices are to be setup according to KDB publication 447498 requirements and are configured with maximum output power during SAR assessment for a worst-case SAR evaluation.

Per KDB 447498 4) b) i), the bottom face (back of the device) is required to be tested touching the flat phantom.

Per KDB Publication 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user. According to KDB Publication 447498 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

Since the diagonal dimension of the device is more than 20 cm (actual dimension: 30.49 cm), this device is a tablet (not a mini-tablet).

6.2 Display Orientation Capabilities

This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user. 4) b) ii) (2), for each antenna, SAR is only required for the edge with the most conservative exposure condition.

6.3 Proximity Sensor Information

The sensor pad is located near the top half of the device to cover exposure conditions to the main antenna. The technical description contains information about sensor size and location. Power reduction levels are provided in Section 8.



KDB draft 616217 DR01 (4/23/12) Section V was used as a guideline to determine the SAR test distances this device. Since the back-off sensor activation distance for back is 13 mm, a conservative distance of 12 mm was tested for the back side at maximum power. Since the back-off sensor activation distance was 11 mm for the top edge, a conservative distance of 10 mm was tested at maximum power. Details about sensing mechanism and sensor pad location are included in the technical description. Sensor triggering distance data can be found in Appendix E.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions.

6.4 Method of SAR measurement with Power Reduction

This tablet was tested in accordance with KDB Draft Publication 616217 DR01 (4/23/12) and April 2011 TCB workshop notes for proximity sensor and power reduction.

Based on the power-reduction activation vs. distance results for the sensors, the sample representative of the device with the sensors activated (reduced power, S/N: FCC #3) was tested for SAR at 0 mm. For the additional SAR measurements with the sensors de-activated (max power, no power reduction, S/N: FCC #1) when the device is positioned away from the user, SAR evaluation is required at 12 mm (from the back) and 10 mm (from the top edge) distances from the phantom. Since the device sensor detection mechanism is active at these distances, the power reduction was disabled via manufacturer test software, and the device was placed in maximum power transmit mode with a base station simulator under the tissue equivalent liquid- filled flat phantom at the required distances for testing.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 10 of 34

7 FCC MEASUREMENT PROCEDURES

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

7.1 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

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

7.2 SAR Measurement Conditions for WCDMA

7.2.1 Output Power Verification

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



Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121 (release 5), using the appropriate RMC with TPC (transmit power control) set to all "1s". Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH) is tabulated in the test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations is identified.

7.2.2 Body SAR Measurements

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

7.2.3 Procedures Used to Establish RF Signal for SAR HSDPA Data Devices

The following procedures are applicable to HSDPA data devices operating under 3GPP Release 5. Body exposure conditions are typically applicable to these devices, including handsets and data modems operating in various electronic devices. HSDPA operates in conjunction with WCDMA and requires an active DPCCH. The default test configuration is to measure SAR in WCDMA without HSDPA, with an established radio link between the DUT and a communication test set with 12.2 kbps RMC mode configured in Test Loop Mode 1; and tested with HSDPA with FRC and a 12.2 kbps RMC using the highest SAR configuration in WCDMA. SAR is selectively confirmed for other physical channel configurations according to output power, exposure conditions and device operating capabilities. Maximum output power is verified according to 3GPP TS 23.121 (Release 5) and SAR must be measured according to these maximum output conditions.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 11 of 34

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

7.2.1 SAR Measurement Conditions for HSUPA Data Devices

SAR for body exposure configurations are measured according to the 'Body SAR Measurements' procedures in the 'WCDMA Handsets' section of the KDB 941225 D01 FCC 3G document. In addition, Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA active is at least ¼ dB higher of that measured without HSPA in 12.2 kbps RMC mode or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurements should be used to test for head exposure.

Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and EDCH configurations for HSPA should be configured according to the β values indicated below as well as other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of the FCC 3G document.

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

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



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

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

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

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

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

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 12 of 34

7.3 SAR Testing with 802.11 Transmitters

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

7.3.1 General Device Setup



Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

7.3.2 Frequency Channel Configurations [27]

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

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

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg or if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 13 of 34

8 RF CONDUCTED POWERS

8.1 GSM/GPRS/EDGE



Table 8-1
Maximum GSM/GPRS/EDGE Powers (Representing Proximity Sensor Inactive)

		Maximum Burst-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
Cellular	128	31.72	31.80	30.44	28.30	26.74	25.63	24.43	23.33	22.69
	190	32.08	32.15	30.70	28.58	26.86	25.90	24.74	23.62	23.10
	251	32.35	32.33	30.38	28.15	26.52	26.01	24.87	23.67	23.05
PCS	512	29.47	29.44	27.98	25.66	24.73	24.75	24.66	22.41	21.51
	661	29.62	29.52	28.04	25.78	24.89	24.97	24.90	22.56	21.78
	810	29.81	29.77	28.09	25.90	24.92	25.04	24.98	22.71	21.83

		Calculated Maximum Frame-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
Cellular	128	22.69	22.77	24.42	24.04	23.73	16.60	18.41	19.07	19.68
	190	23.05	23.12	24.68	24.32	23.85	16.87	18.72	19.36	20.09
	251	23.32	23.30	24.36	23.89	23.51	16.98	18.85	19.41	20.04
PCS	512	20.44	20.41	21.96	21.40	21.72	15.72	18.64	18.15	18.50
	661	20.59	20.49	22.02	21.52	21.88	15.94	18.88	18.30	18.77
	810	20.78	20.74	22.07	21.64	21.91	16.01	18.96	18.45	18.82

Table 8-2
Reduced GSM/GPRS/EDGE Powers (Representing Proximity Sensor Active)

		Maximum Burst-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
Cellular	128	26.19	26.24	24.90	23.25	21.64	19.72	18.82	17.35	16.25
	190	26.44	26.48	25.10	23.42	21.81	20.00	19.06	17.49	16.45
	251	26.26	26.35	25.07	23.56	22.02	20.11	19.14	17.64	16.66
PCS	512	23.78	23.77	21.58	19.01	18.10	20.69	20.62	18.54	17.47
	661	23.83	23.80	21.60	19.22	18.21	20.74	20.75	18.58	17.50
	810	23.98	23.93	21.85	19.21	18.13	20.80	20.71	18.59	17.66

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 14 of 34

		Calculated Maximum Frame-Averaged Output Power								
		Voice	GPRS/EDGE Data (GMSK)				EDGE Data (8-PSK)			
Band	Channel	GSM [dBm] CS (1 Slot)	GPRS [dBm] 1 Tx Slot	GPRS [dBm] 2 Tx Slot	GPRS [dBm] 3 Tx Slot	GPRS [dBm] 4 Tx Slot	EDGE [dBm] 1 Tx Slot	EDGE [dBm] 2 Tx Slot	EDGE [dBm] 3 Tx Slot	EDGE [dBm] 4 Tx Slot
Cellular	128	17.16	17.21	18.88	18.99	18.63	10.69	12.80	13.09	13.24
	190	17.41	17.45	19.08	19.16	18.80	10.97	13.04	13.23	13.44
	251	17.23	17.32	19.05	19.30	19.01	11.08	13.12	13.38	13.65
PCS	512	14.75	14.74	15.56	14.75	15.09	11.66	14.60	14.28	14.46
	661	14.80	14.77	15.58	14.96	15.20	11.71	14.73	14.32	14.49
	810	14.95	14.90	15.83	14.95	15.12	11.77	14.69	14.33	14.65

Note:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. The bolded GPRS modes were selected according to the highest frame-averaged output power table according to KDB 941225 D03.
3. CS1 coding scheme was used in GPRS output power measurements and SAR Testing, as a condition where GMSK modulation was ensured. It was investigated that CS1 - CS4 settings do not have any impact on the output levels in the GPRS modes.
4. MCS7 coding scheme was used to measure the output powers for EDGE since It has been shown that MCS levels that produce 8PSK modulation do not have an effect on output power.

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



Figure 8-1
Power Measurement Setup

Table 8-3
GSM/GPRS/EDGE Power Reduction Summary due to the Proximity Sensor

Mode / Band	Proximity Sensor State	Voice (in dBm)	Burst Average GMSK (in dBm)				Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
GSM 850	Inactive	32.0	32.0	30.5	28.5	26.5	26.0	24.5	23.5	23.0
	Active	26.0	26.0	25.0	23.5	22.0	20.0	19.0	17.5	16.5
GSM 1900	Inactive	29.5	29.5	28.0	25.5	24.5	25.0	24.5	22.5	21.5
	Active	23.5	23.5	21.5	19.0	18.0	20.5	20.5	18.5	17.0

FCC ID: A3LGTN8020	PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 15 of 34

8.2 HSPA/DC-HSDPA Conducted Powers

Table 8-4
Maximum UMTS Powers (Representing Proximity Sensor Inactive)



3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			MPR per 3GPP [dB]
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	22.98	22.96	23.00	-
99		12.2 kbps AMR	22.70	22.89	22.72	-
6	HSDPA	Subtest 1	21.94	21.91	22.03	0
6		Subtest 2	22.09	21.82	22.02	0
6		Subtest 3	21.54	21.39	21.57	0.5
6		Subtest 4	21.37	21.33	21.54	0.5
6	HSUPA	Subtest 1	21.61	21.58	21.75	0
6		Subtest 2	20.67	20.53	20.52	2
6		Subtest 3	20.62	20.35	20.57	1
6		Subtest 4	20.95	21.10	21.00	2
6		Subtest 5	21.33	21.65	21.33	0
8	DC-HSDPA	Subtest 1	21.81	21.82	22.06	0
8		Subtest 2	21.86	21.79	22.01	0
8		Subtest 3	21.22	21.20	21.38	0.5
8		Subtest 4	21.26	21.28	21.42	0.5

Table 8-5
Reduced UMTS Powers (Representing Proximity Sensor Active)

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			MPR per 3GPP [dB]
			4132	4183	4233	
99	WCDMA	12.2 kbps RMC	16.83	16.76	16.92	-
99		12.2 kbps AMR	16.88	16.99	16.79	-
6	HSDPA	Subtest 1	14.29	14.09	13.65	0
6		Subtest 2	14.31	14.17	13.70	0
6		Subtest 3	13.86	13.60	13.21	0.5
6		Subtest 4	13.83	13.64	13.15	0.5
6	HSUPA	Subtest 1	13.99	13.81	13.42	0
6		Subtest 2	13.26	13.03	12.65	2
6		Subtest 3	13.02	12.85	12.55	1
6		Subtest 4	13.81	13.62	13.16	2
6		Subtest 5	13.79	13.55	13.13	0
8	DC-HSDPA	Subtest 1	14.24	13.96	13.51	0
8		Subtest 2	14.25	13.87	13.45	0
8		Subtest 3	13.72	13.71	13.38	0.5
8		Subtest 4	13.64	13.55	13.14	0.5

UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

It is expected by the manufacturer that MPR for some HSUPA subtests may be as low as 0 dB according to the chipset implementation in this model. Detailed information is included in the operational description explaining how the MPR is applied for this model.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 16 of 34

DC-HSDPA Considerations:



- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12 (QPSK) was confirmed to be used during DC-HSDPA measurements
- Measured maximum output powers for DC-HSDPA were not greater than ¼ dB higher than the WCDMA 12.2 kbps RMC maximum output and as a result, SAR is not required for DC-HSDPA
- The DUT supports UE category 24 for HSDPA



Figure 8-2
Power Measurement Setup

Table 8-6
UMTS Power Reduction Summary due to the Proximity Sensor

Mode / Band	Proximity Sensor State	Modulated Average (in dBm)			
		<i>3GPP Rel 99</i>	<i>3GPP Rel 5</i>	<i>3GPP Rel 6</i>	<i>3GPP Rel 8</i>
WCDMA Band 5 (850 MHz)	Inactive	22.5	22.0	21.5	22.0
	Active	16.5	14.0	13.5	14.0

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 17 of 34

8.3 WLAN Conducted Powers

**Table 8-7
IEEE 802.11b Average RF Power**

Mode	Freq [MHz]	Channel	Conducted Power [dBm]			
			Data Rate [Mbps]			
			1	2	5.5	11
802.11b	2412	1	12.28	12.30	12.35	12.30
802.11b	2437	6	12.73	12.74	12.73	12.71
802.11b	2462	11	12.07	12.10	12.14	12.14

**Table 8-8
IEEE 802.11g Average RF Power**

Mode	Freq [MHz]	Channel	Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11g	2412	1	12.57	12.53	12.58	12.57	12.64	12.60	12.55	12.56
802.11g	2437	6	12.96	12.97	12.94	12.96	12.91	12.95	12.97	12.95
802.11g	2462	11	12.49	12.40	12.46	12.44	12.44	12.41	12.34	12.36

**Table 8-9
IEEE 802.11n Average RF Power**

Mode	Freq [MHz]	Channel	Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	20	26	39	52	58	65
802.11n	2412	1	11.83	11.70	11.73	11.79	11.68	11.60	11.75	11.71
802.11n	2437	6	12.17	12.12	12.18	12.16	12.14	12.19	12.13	12.13
802.11n	2462	11	11.63	11.59	11.57	11.58	11.59	11.65	11.60	11.56

**Table 8-10
IEEE 802.11a Average RF Power**

Mode	Freq [MHz]	Channel	Conducted Power [dBm]							
			Data Rate [Mbps]							
			6	9	12	18	24	36	48	54
802.11a	5180	36*	11.18	11.25	11.27	11.28	11.27	11.26	11.12	11.21
802.11a	5200	40	11.13	11.17	11.24	11.24	11.18	11.19	11.16	11.19
802.11a	5220	44	11.10	11.10	11.09	10.99	11.07	11.19	11.19	11.16
802.11a	5240	48*	11.04	11.10	11.04	11.09	11.12	11.06	11.07	11.09
802.11a	5260	52*	11.03	10.99	11.02	11.04	10.97	11.00	11.08	11.00
802.11a	5280	56	10.92	11.01	11.00	10.97	10.94	10.96	11.06	10.96
802.11a	5300	60	10.96	10.93	10.93	10.95	10.92	10.95	10.96	10.92
802.11a	5320	64*	10.87	10.79	10.87	10.86	10.76	10.90	10.84	10.88
802.11a	5500	100	10.74	10.66	10.72	10.67	10.70	10.71	10.71	10.75
802.11a	5520	104*	10.67	10.69	10.63	10.68	10.73	10.67	10.75	10.73
802.11a	5540	108	10.71	10.64	10.68	10.68	10.71	10.70	10.67	10.69
802.11a	5560	112	10.61	10.71	10.70	10.67	10.70	10.74	10.73	10.70
802.11a	5580	116*	10.72	10.68	10.69	10.62	10.72	10.69	10.75	10.71
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	10.78	10.74	10.80	10.72	10.85	10.77	10.73	10.84
802.11a	5680	136*	10.83	10.84	10.86	10.86	10.81	10.81	10.88	10.90
802.11a	5700	140	10.85	10.85	10.86	10.90	10.88	10.88	10.87	10.95
802.11a	5745	149*	10.93	10.94	10.99	11.01	11.06	11.10	11.08	11.11
802.11a	5765	153	11.08	11.01	10.99	11.01	11.03	11.07	11.08	11.10
802.11a	5785	157*	11.10	11.10	11.13	11.08	11.11	11.04	11.19	11.16
802.11a	5805	161*	11.08	11.09	11.13	11.10	11.16	11.15	11.22	11.19
802.11a	5825	165	11.18	11.26	11.21	11.15	11.22	11.24	11.30	11.24

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band. (*) – indicates default channels per KDB Publication 248227. When the adjacent channels are higher in power then the default channels, these “required channels” are considered instead of the default channels for SAR testing.



FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 18 of 34

Table 8-11
IEEE 802.11n (20 MHz Bandwidth) Average RF Power



Mode	Freq [MHz]	Channel	Conducted Power [dBm]							
			Data Rate [Mbps]							
			6.5	13	20	26	39	52	58	65
802.11n	5180	36*	10.16	10.15	10.17	10.19	10.20	10.20	10.12	10.30
802.11n	5200	40	10.17	10.12	10.12	10.16	10.09	10.20	10.20	10.19
802.11n	5220	44	10.05	10.01	10.11	10.14	10.13	10.08	10.08	10.14
802.11n	5240	48*	9.97	10.06	10.00	10.02	10.12	10.10	10.11	10.11
802.11n	5260	52*	9.96	9.99	10.04	9.97	10.00	10.12	10.08	10.03
802.11n	5280	56	9.89	9.97	9.91	9.95	9.94	10.00	10.01	9.98
802.11n	5300	60	9.88	9.95	9.91	9.87	9.91	9.89	9.91	9.93
802.11n	5320	64*	9.84	9.89	9.84	9.85	9.81	9.83	9.85	9.87
802.11n	5500	100	9.75	9.80	9.79	9.86	9.75	9.75	9.82	9.77
802.11n	5520	104*	9.69	9.77	9.79	9.77	9.77	9.83	9.78	9.78
802.11n	5540	108	9.72	9.79	9.77	9.80	9.83	9.76	9.81	9.76
802.11n	5560	112	9.69	9.80	9.79	9.76	9.85	9.78	9.76	9.75
802.11n	5580	116*	9.76	9.73	9.73	9.72	9.75	9.76	9.75	9.74
802.11n	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	9.81	9.87	9.92	9.83	9.88	9.87	9.84	10.22
802.11n	5680	136*	10.16	10.21	10.25	10.25	10.16	10.15	10.06	10.04
802.11n	5700	140	10.19	10.08	10.14	10.14	10.17	10.09	10.20	10.15
802.11n	5745	149*	10.17	10.22	10.19	10.20	10.16	10.17	10.17	10.16
802.11n	5765	153	10.14	10.20	10.24	10.23	10.29	10.22	10.36	10.39
802.11n	5785	157*	10.30	10.34	10.29	10.36	10.31	10.26	10.33	10.40
802.11n	5805	161*	10.32	10.37	10.35	10.40	10.36	10.29	10.37	10.44
802.11n	5825	165	10.30	10.38	10.40	10.33	10.46	10.35	10.23	10.33

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Bands. (*) – indicates default channels per KDB Publication 248227. When the adjacent channels are higher in power than the default channels, these “required channels” are considered instead of the default channels for SAR testing.

Table 8-12
IEEE 802.11n (40 MHz Bandwidth) Average RF Power

Mode	Freq [MHz]	Channel	40MHz BW 802.11n (5GHz) Conducted Power [dBm]							
			Data Rate [Mbps]							
			13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38	10.43	10.42	10.43	10.44	10.43	10.45	10.40	10.45
802.11n	5230	46	10.22	10.35	10.35	10.23	10.37	10.36	10.40	10.38
802.11n	5270	54	10.17	10.21	10.29	10.24	10.24	10.24	10.23	10.38
802.11n	5310	62	10.14	10.19	10.10	10.23	10.29	10.15	10.25	10.24
802.11n	5510	102	10.22	10.22	10.22	10.24	10.19	10.17	10.20	10.26
802.11n	5550	110	10.13	10.22	10.29	10.10	10.30	10.10	10.30	10.28
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	10.19	10.29	10.40	10.31	10.26	10.45	10.32	10.37
802.11n	5755	151	10.29	10.44	10.39	10.28	10.41	10.44	10.45	10.47
802.11n	5795	159	10.43	10.50	10.45	10.40	10.46	10.51	10.50	10.41

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



FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 19 of 34

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes:

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



Figure 8-3
Power Measurement Setup

FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 20 of 34	

9 SYSTEM VERIFICATION

9.1 Tissue Verification

**Table 9-1
Measured Tissue Properties**

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
09/06/2012	835B	24.7	820	0.966	53.43	0.97	55.28	-0.31%	-3.35%
			835	0.988	53.44	0.97	55.20	1.86%	-3.19%
			850	1.006	53.12	0.99	55.15	1.82%	-3.69%
08/31/2012	1900B	21.9	1850	1.478	53.99	1.52	53.30	-2.76%	1.29%
			1880	1.518	53.79	1.52	53.30	-0.13%	0.92%
			1910	1.557	53.71	1.52	53.30	2.43%	0.77%
09/08/2012	2450B	24.0	2401	1.964	51.25	1.90	52.77	3.21%	-2.87%
			2450	2.028	51.11	1.95	52.70	4.00%	-3.02%
			2499	2.097	50.92	2.02	52.64	3.86%	-3.26%
09/10/2012	5200B-5800B	22.4	5180	5.173	47.80	5.276	49.041	-1.95%	-2.53%
			5200	5.182	47.72	5.299	49.014	-2.21%	-2.64%
			5260	5.354	47.57	5.369	48.906	-0.28%	-2.73%
			5500	5.667	46.83	5.650	48.580	0.30%	-3.60%
			5580	5.762	46.90	5.743	48.471	0.33%	-3.24%
			5700	5.966	46.56	5.880	48.275	1.46%	-3.55%
			5765	6.093	46.25	5.959	48.220	2.25%	-4.09%
			5785	6.143	46.27	5.982	48.242	2.69%	-4.09%
			5800	6.157	46.29	6.000	48.200	2.62%	-3.96%
			5825	6.161	46.34	6.029	48.132	2.19%	-3.72%

Note: KDB Publication 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2).



Probe calibration used within ± 100 MHz of the test frequency in either 5.725 - 5.85 or 5.47-5.725 GHz is acceptable per KDB Publication 865664 since the design of the SAR probe supports the extended frequency, provided the DASY software version recommended is used for the tests, and the expanded calibration uncertainty ($k=2$) is less than or equal to 15% (See SAR probe calibration certificate for this information). The dielectric and conductivities measured are within 10% and 5% respectively of the target parameters specified in Supplement C 01-01.

9.2 Measurement Procedure for Tissue verification

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity ϵ can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho' \cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 21 of 34

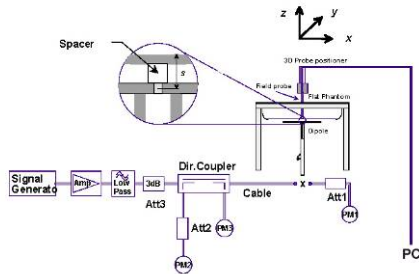
9.3 Test System Verification

Prior to assessment, the system is verified to $\pm 10\%$ of the manufacturer SAR measurement on the reference dipole at the time of calibration.

**Table 9-2
System Verification Results**

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation (%)
835	Body	09/06/2012	23.4	23.5	0.100	4d119	3258	1.02	9.560	10.200	6.69%
1900	Body	08/31/2012	23.6	21.7	0.100	5d149	3288	3.85	39.300	38.500	-2.04%
2450	Body	09/08/2012	23.1	22.8	0.100	797	3258	5.23	50.800	52.300	2.95%
5200	Body	09/10/2012	24.8	23.8	0.100	1057	3589	7.82	73.400	78.200	6.54%
5500	Body	09/10/2012	24.4	23.8	0.100	1057	3589	8.46	78.900	84.600	7.22%
5800	Body	09/10/2012	24.6	23.6	0.100	1057	3589	7.65	74.300	76.500	2.96%

Note: Per KDB Publication 865664, when a reference dipole is not defined within ± 100 MHz of the test frequency, the system verification may be conducted within ± 200 MHz of the center frequency of the measurement frequencies if the SAR probe calibration is valid and the same tissue-equivalent matter is used for verification and test measurements.



**Figure 9-1
System Verification Setup Diagram**



**Figure 9-2
System Verification Setup Photo**



FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 22 of 34

10 SAR DATA SUMMARY

10.1 Standalone Body SAR Data

Table 10-1
Licensed Transmitter Body SAR Data

MEASUREMENT RESULTS											
FREQUENCY		Mode	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Side	SAR (1g)
MHz	Ch.										(W/kg)
836.60	190	GSM 850	GSM	26.5	26.44	0.01	0.0 cm	FCC #3	1	back*	0.530
836.60	190	GSM 850	GSM	32.0	32.08	0.02	1.2 cm	FCC #1	1	back	0.743
836.60	190	GSM 850	GSM	26.4	26.44	0.03	0.0 cm	FCC #3	1	top*	0.182
836.60	190	GSM 850	GSM	32.0	32.08	0.01	1.0 cm	FCC #1	1	top	0.066
836.60	190	GSM 850	GSM	32.0	32.08	-0.18	0.0 cm	FCC #1	1	right	0.125
824.20	128	GSM 850	GPRS	23.5	23.25	-0.07	0.0 cm	FCC #3	3	back*	0.837
836.60	190	GSM 850	GPRS	23.5	23.42	0.01	0.0 cm	FCC #3	3	back*	0.889
848.80	251	GSM 850	GPRS	23.5	23.56	-0.05	0.0 cm	FCC #3	3	back*	0.886
824.20	128	GSM 850	GPRS	30.5	30.44	0.05	1.2 cm	FCC #1	2	back	0.833
836.60	190	GSM 850	GPRS	30.5	30.70	-0.07	1.2 cm	FCC #1	2	back	0.969
848.80	251	GSM 850	GPRS	30.5	30.38	0.02	1.2 cm	FCC #1	2	back	1.020
836.60	190	GSM 850	GPRS	23.5	23.42	-0.02	0.0 cm	FCC #3	3	top*	0.251
836.60	190	GSM 850	GPRS	30.5	30.70	-0.02	1.0 cm	FCC #1	2	top	0.121
836.60	190	GSM 850	GPRS	30.5	30.70	-0.09	0.0 cm	FCC #1	2	right	0.224
836.60	4183	UMTS 850	RMC	16.5	16.76	-0.01	0.0 cm	FCC #3	N/A	back*	0.673
836.60	4183	UMTS 850	RMC	22.5	22.96	0.10	1.2 cm	FCC #1	N/A	back	0.571
836.60	4183	UMTS 850	RMC	16.5	16.76	-0.01	0.0 cm	FCC #3	N/A	top*	0.166
836.60	4183	UMTS 850	RMC	22.5	22.96	-0.07	1.0 cm	FCC #1	N/A	top	0.073
836.60	4183	UMTS 850	RMC	22.5	22.96	-0.01	0.0 cm	FCC #1	N/A	right	0.331
1880.00	661	GSM 1900	GSM	24.0	23.83	-0.12	0.0 cm	FCC #3	1	back*	0.699
1880.00	661	GSM 1900	GSM	29.5	29.62	0.06	1.2 cm	FCC #1	1	back	0.446
1880.00	661	GSM 1900	GSM	24.0	23.83	0.00	0.0 cm	FCC #3	1	top*	0.546
1880.00	661	GSM 1900	GSM	29.5	29.62	0.00	1.0 cm	FCC #1	1	top	0.382
1880.00	661	GSM 1900	GSM	29.5	29.62	0.10	0.0 cm	FCC #1	1	right	0.045
1850.20	512	GSM 1900	GPRS	21.5	21.58	-0.20	0.0 cm	FCC #3	2	back*	0.776
1880.00	661	GSM 1900	GPRS	21.5	21.60	-0.03	0.0 cm	FCC #3	2	back*	0.886
1909.80	810	GSM 1900	GPRS	21.5	21.85	-0.10	0.0 cm	FCC #3	2	back*	0.966
1880.00	661	GSM 1900	GPRS	28.0	28.04	-0.10	1.2 cm	FCC #1	2	back	0.544
1880.00	661	GSM 1900	GPRS	21.5	21.60	-0.10	0.0 cm	FCC #3	2	top*	0.688
1880.00	661	GSM 1900	GPRS	28.0	28.04	0.09	1.0 cm	FCC #1	2	top	0.512
1880.00	661	GSM 1900	GPRS	28.0	28.04	0.04	0.0 cm	FCC #1	2	right	0.062
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							Body 1.6 W/kg (mW/g) averaged over 1 gram				

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 23 of 34



**Table 10-2
WLAN Body SAR Data**

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2437	6	IEEE 802.11b	DSSS	12.73	0.03	0.0 cm	FCC #1	1	back	0.429
2437	6	IEEE 802.11b	DSSS	12.73	0.13	0.0 cm	FCC #1	1	top	0.163
2437	6	IEEE 802.11b	DSSS	12.73	-0.19	0.0 cm	FCC #1	1	left	0.058
5765	153	IEEE 802.11a	OFDM	11.08	0.03	0.0 cm	FCC #1	6	back	0.775
5785	157	IEEE 802.11a	OFDM	11.10	0.02	0.0 cm	FCC #1	6	back	0.775
5825	165	IEEE 802.11a	OFDM	11.18	0.04	0.0 cm	FCC #1	6	back	0.785
5765	153	IEEE 802.11a	OFDM	11.08	0.05	0.0 cm	FCC #1	6	top	0.771
5785	157	IEEE 802.11a	OFDM	11.10	0.01	0.0 cm	FCC #1	6	top	0.752
5825	165	IEEE 802.11a	OFDM	11.18	-0.04	0.0 cm	FCC #1	6	top	0.708
5825	165	IEEE 802.11a	OFDM	11.18	-0.20	0.0 cm	FCC #1	6	left	0.098
5180	36	IEEE 802.11a	OFDM	11.18	0.01	0.0 cm	FCC #1	6	back	0.306
5180	36	IEEE 802.11a	OFDM	11.18	0.18	0.0 cm	FCC #1	6	top	0.243
5180	36	IEEE 802.11a	OFDM	11.18	-0.15	0.0 cm	FCC #1	6	left	0.020
5260	52	IEEE 802.11a	OFDM	11.03	0.09	0.0 cm	FCC #1	6	back	0.330
5260	52	IEEE 802.11a	OFDM	11.03	0.14	0.0 cm	FCC #1	6	top	0.245
5260	52	IEEE 802.11a	OFDM	11.03	0.13	0.0 cm	FCC #1	6	left	0.017
5500	100	IEEE 802.11a	OFDM	10.74	-0.04	0.0 cm	FCC #1	6	back	0.556
5580	116	IEEE 802.11a	OFDM	10.72	0.08	0.0 cm	FCC #1	6	back	0.681
5700	140	IEEE 802.11a	OFDM	10.85	0.04	0.0 cm	FCC #1	6	back	0.723
5500	100	IEEE 802.11a	OFDM	10.74	-0.03	0.0 cm	FCC #1	6	top	0.531
5580	116	IEEE 802.11a	OFDM	10.72	0.07	0.0 cm	FCC #1	6	top	0.700
5700	140	IEEE 802.11a	OFDM	10.85	0.02	0.0 cm	FCC #1	6	top	0.772
5700	140	IEEE 802.11a	OFDM	10.85	-0.15	0.0 cm	FCC #1	6	left	0.106
ANSI / IEEE C95.1 1992 - SAFETY LIMIT						Body				
Spatial Peak						1.6 W/kg (mW/g)				
Uncontrolled Exposure/General Population						averaged over 1 gram				

10.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position of the device configured for SAR testing according to KDB 447498 Section 4.
2. Batteries are fully charged for all readings.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
5. The measured SAR when extrapolated to the maximum tune-up power tolerance levels remains compliant for all operating configurations.
6. Per KDB Publication 447498 4) b) i) the back side is required to be tested touching the flat phantom for large sized tablet devices.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 24 of 34	

7. This device is capable of multiple display orientations supporting both portrait and landscape positions. Therefore per KDB 447498 4) b) ii) (2), SAR testing applies for the tablet edges with antennas located within 5 cm of each tablet edge closest to the user. According to KDB 447498 4) b) ii) (2), for each antenna, SAR is required for the edge with the most conservative exposure condition. Back Side, top edge and right edge were tested for licensed transmitter SAR. Back side, top edge and left edge were tested for WLAN SAR.
8. (*) denotes power reduction active.

GSM Test Notes:



1. Justification for reduced test configurations: Per FCC KDB Publication 447498 and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
2. Justification for reduced test configurations per KDB Publication 941225 D03: The source-based time-averaged output power was evaluated for all multi-slot operations. The highest time-average power configuration was evaluated for SAR
3. Per April 2011 TCB-FCC Workshop Notes and KDB draft publication 616217 DR01 (4/23/12), in addition to the 0 mm test distance required for tablet devices under KDB 447498, a conservative additional test distance of 12 mm from the back and 10 mm from the top edge were tested for SAR at maximum output power with the sensor deactivated.
4. This device does not use an antenna located on the corner of the device, therefore vertex SAR was not measured

UMTS Notes:

1. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per April 2011 TCB-FCC Workshop Notes and KDB draft publication 616217 DR01 (4/23/12), in addition to the 0 mm test distance required for tablet devices under KDB 447498, a conservative additional test distance of 12 mm from the back and 10 mm from the top edge were tested for SAR at maximum output power with the sensor deactivated.
3. This device does not use an antenna located on the corner of the device, therefore vertex SAR was not measured

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20 and 40 MHz Bandwidth) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. When Hotspot is enabled, all 5 GHz bands are disabled.
4. WLAN transmission was verified using an uncalibrated spectrum analyzer.
5. When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.

FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 25 of 34	

11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

Possible simultaneous transmissions for this device indicated in Table 1-1 were numerically summed using stand-alone SAR data and are shown in the following tables.

11.2 Body Simultaneous Transmission Analysis

Table 11-1
Simultaneous Transmission Scenario 2.4 GHz WLAN (Body at 0.0 cm)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.530	0.429	0.959	Body SAR	Back	0.889	0.429	1.318
	Top	0.182	0.163	0.345		Top	0.251	0.163	0.414
	Bottom	-	-	0.000		Bottom	-	-	0.000
	Right	0.125	-	0.125		Right	0.224	-	0.224
	Left	-	0.058	0.058		Left	-	0.058	0.058
Simult Tx	Configuration	GSM 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	GPRS 1900 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.699	0.429	1.128	Body SAR	Back	0.966	0.429	1.395
	Top	0.546	0.163	0.709		Top	0.688	0.163	0.851
	Bottom	-	-	0.000		Bottom	-	-	0.000
	Right	0.045	-	0.045		Right	0.062	-	0.062
	Left	-	0.058	0.058		Left	-	0.058	0.058
Simult Tx	Configuration	UMTS 850 SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)					
Body SAR	Back	0.673	0.429	1.102					
	Top	0.166	0.163	0.329					
	Bottom	-	-	0.000					
	Right	0.331	-	0.331					
	Left	-	0.058	0.058					



FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 26 of 34	

Table 11-2
Simultaneous Transmission Scenario 5 GHz WLAN (Body at 0.0 cm)

Simult Tx	Configuration	GSM 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)	Simult Tx	Configuration	UMTS 850 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.530	0.785	1.315	Body SAR	Back	0.673	0.785	1.458
	Top	0.182	0.772	0.954		Top	0.166	0.772	0.938
	Bottom	-	-	0.000		Bottom	-	-	0.000
	Right	0.125	-	0.125		Right	0.331	-	0.331
	Left	-	0.106	0.106		Left	-	0.106	0.106

Simult Tx	Configuration	GSM 1900 SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Body SAR	Back	0.699	0.785	1.484
	Top	0.546	0.772	1.318
	Bottom	-	-	0.000
	Right	0.045	-	0.045
	Left	-	0.106	0.106

The above tables represent a voice call potentially simultaneously operating with 5 GHz WLAN.

Table 11-3
Simultaneous Transmission Scenario 2.4 GHz WLAN (Back at 1.2 cm)



Configuration	Mode	2G/3G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.743	< 0.429	< 1.172
Back Side	GPRS 850	1.020	< 0.429	< 1.449
Back Side	UMTS 850	0.571	< 0.429	< 1.000
Back Side	GSM 1900	0.446	< 0.429	< 0.875
Back Side	GPRS 1900	0.544	< 0.429	< 0.973

Table 11-4
Simultaneous Transmission Scenario 2.4 GHz WLAN (Top at 1.0 cm)

Configuration	Mode	2G/3G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Top Edge	GSM 850	0.066	< 0.163	< 0.229
Top Edge	GPRS 850	0.121	< 0.163	< 0.550
Top Edge	UMTS 850	0.073	< 0.163	< 0.236
Top Edge	GSM 1900	0.382	< 0.163	< 0.545
Top Edge	GPRS 1900	0.512	< 0.163	< 0.675

Table 11-5
Simultaneous Transmission Scenario 5 GHz WLAN (Back at 1.2 cm)

Configuration	Mode	2G/3G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Back Side	GSM 850	0.743	< 0.785	< 1.528
Back Side	UMTS 850	0.571	< 0.785	< 1.356
Back Side	GSM 1900	0.446	< 0.785	< 1.231

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 27 of 34	

**Table 11-6
Simultaneous Transmission Scenario 5 GHz WLAN (Top at 1.0 cm)**



Configuration	Mode	2G/3G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
Top Edge	GSM 850	0.066	< 0.772	< 0.838
Top Edge	UMTS 850	0.073	< 0.772	< 0.845
Top Edge	GSM 1900	0.382	< 0.772	< 1.154

Notes:

1. For SAR calculations at 1.2 and 1.0 cm, WLAN SAR values for 0.0 cm were used since the 0.0 cm test distance for WLAN was more conservative.
2. "<" denotes that the 0.0 cm WLAN SAR values were used for summation purposes.
3. "-" indicates configurations that were not required per KDB Publication 447498.

11.3 Simultaneous Transmission Conclusion



The above numerical summed SAR was below the SAR limit and the measured SAR when extrapolated to the maximum tune-up power tolerance levels remains compliant for all operating configurations. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation is required per FCC KDB Publication 447498.

FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 28 of 34

12 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	E5515C	Wireless Communications Test Set	10/10/2011	Annual	10/10/2012	GB46110872
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Amplifier Research	551G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5318
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5442
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	5821
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	8013
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	2400
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	1190013
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	98150041
Anritsu	ML2438A	Power Meter	10/13/2011	Annual	10/13/2012	1070030
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Anritsu	MT8820C	Radio Communication Tester	11/11/2011	Annual	11/11/2012	6200901190
COMTECH	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M155A00-009
COMTECH	AR85729-5/5759B	Solid State Amplifier	CBT	N/A	CBT	M3W1A00-1002
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014497
Control Company	61220-416	Long-Stem Thermometer	10/12/2011	Biennial	10/12/2013	111860820
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
Intelligent Weighing	PD-3000	Electronic Balance	6/29/2012	Annual	6/29/2013	120405017
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2012	Annual	5/22/2013	109892
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	D2450V2	2450 MHz SAR Dipole	1/24/2012	Annual	1/24/2013	797
SPEAG	DSGHZV2	5 GHz SAR Dipole	1/19/2012	Annual	1/19/2013	1057
SPEAG	D835V2	835 MHz SAR Dipole	4/20/2012	Annual	4/20/2013	4d119
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/18/2012	Annual	1/18/2013	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2012	Annual	2/15/2013	1323
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2012	Annual	4/12/2013	1333
SPEAG	DAK-3.5	Dielectric Assessment Kit	6/19/2012	Annual	6/19/2013	1070
SPEAG	ES3DV3	SAR Probe	2/21/2012	Annual	2/21/2013	3258
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3288
SPEAG	EX3DV4	SAR Probe	1/27/2012	Annual	1/27/2013	3589
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886430

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



FCC ID: A3LGTN8020	 PCTEST Engineering Laboratory, Inc.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 29 of 34

13 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

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



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

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 30 of 34

Applicable for frequencies up to 6 GHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k	
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i	
Measurement System										
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞	
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞	
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞	
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞	
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞	
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞	
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞	
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞	
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞	
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞	
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞	
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞	
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞	
Test Sample Related										
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287	
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞	
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞	
Phantom & Tissue Parameters										
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞	
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞	
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6	
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞	
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6	
Combined Standard Uncertainty (k=1)							RSS	12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	24.7	24.0	

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



FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 31 of 34

14 CONCLUSION

14.1 Measurement Conclusion



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

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



FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 32 of 34

15 REFERENCES

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.
- [2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.
- [3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.
- [4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.
- [5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.
- [6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.
- [7] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [8] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.
- [10] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [12] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [13] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [14] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [15] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.
- [16] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.
- [17] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

FCC ID: A3LGTN8020	 PCTEST ENGINEERING LABORATORY, INC.	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer		Page 33 of 34

- [18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.
- [19] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.
- [20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.
- [22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.
- [23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.
- [24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009
- [25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002
- [26] FCC SAR Measurement Procedures for 3G Devices KDB Publication 941225
- [27] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227
- [28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publication 648474
- [29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB Publication 450824
- [30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB Publication 616217 DR01 (4/23/12)
- [31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB Publication 865664
- [32] FCC Mobile Portable RF Exposure Procedure, KDB Publication 447498
- [33] FCC SAR Procedures for Dongle Transmitters, KDB Publication 447498
- [34] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [35] FCC SAR Test Considerations for LTE Handsets and Data Modems, KDB Publication 941225.
- [36] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.
- [37] FCC Hot Spot SAR v01, KDB Publication 941225 D06.

FCC ID: A3LGTN8020		SAR EVALUATION REPORT		Reviewed by: Quality Manager
Document S/N: 0Y1208311278-R4.A3L	Test Dates: 08/31/12 - 09/10/12	DUT Type: Portable Tablet Computer	Page 34 of 34	

APPENDIX A: SAR TEST DATA

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #3

Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 850, Body SAR, Back side, Mid.ch, 3 Tx Slots

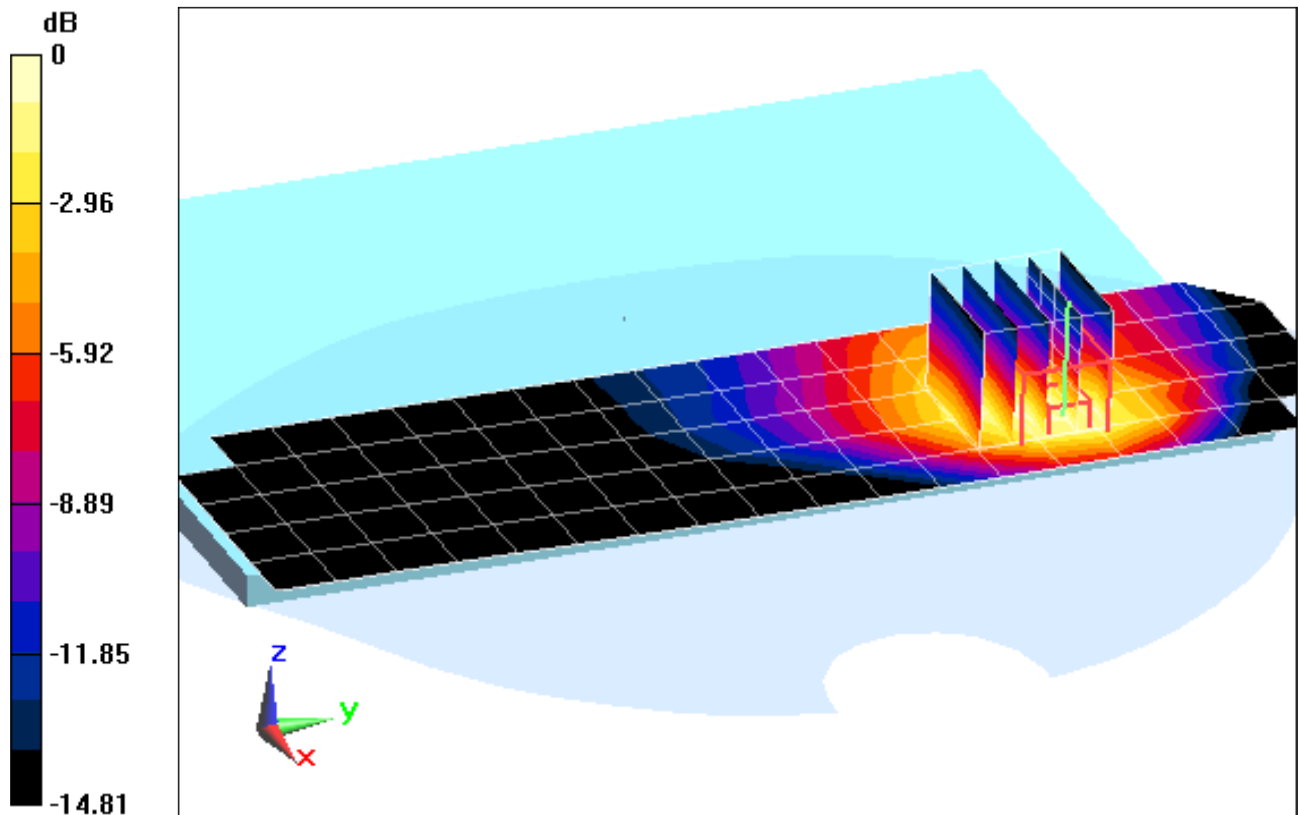
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 29.963 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.868 mW/g

SAR(1 g) = 0.889 mW/g; SAR(10 g) = 0.458 mW/g



0 dB = 0.932 mW/g = -0.61 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

Communication System: GSM850 GPRS; 2 Tx slots; Frequency: 848.8 MHz; Duty Cycle: 1:4.15

Medium: 835 Body Medium parameters used (interpolated):

$f = 848.8 \text{ MHz}$; $\sigma = 1.005 \text{ mho/m}$; $\epsilon_r = 53.146$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.2 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 850, Body SAR, Back side, High.ch, 2 Tx Slots

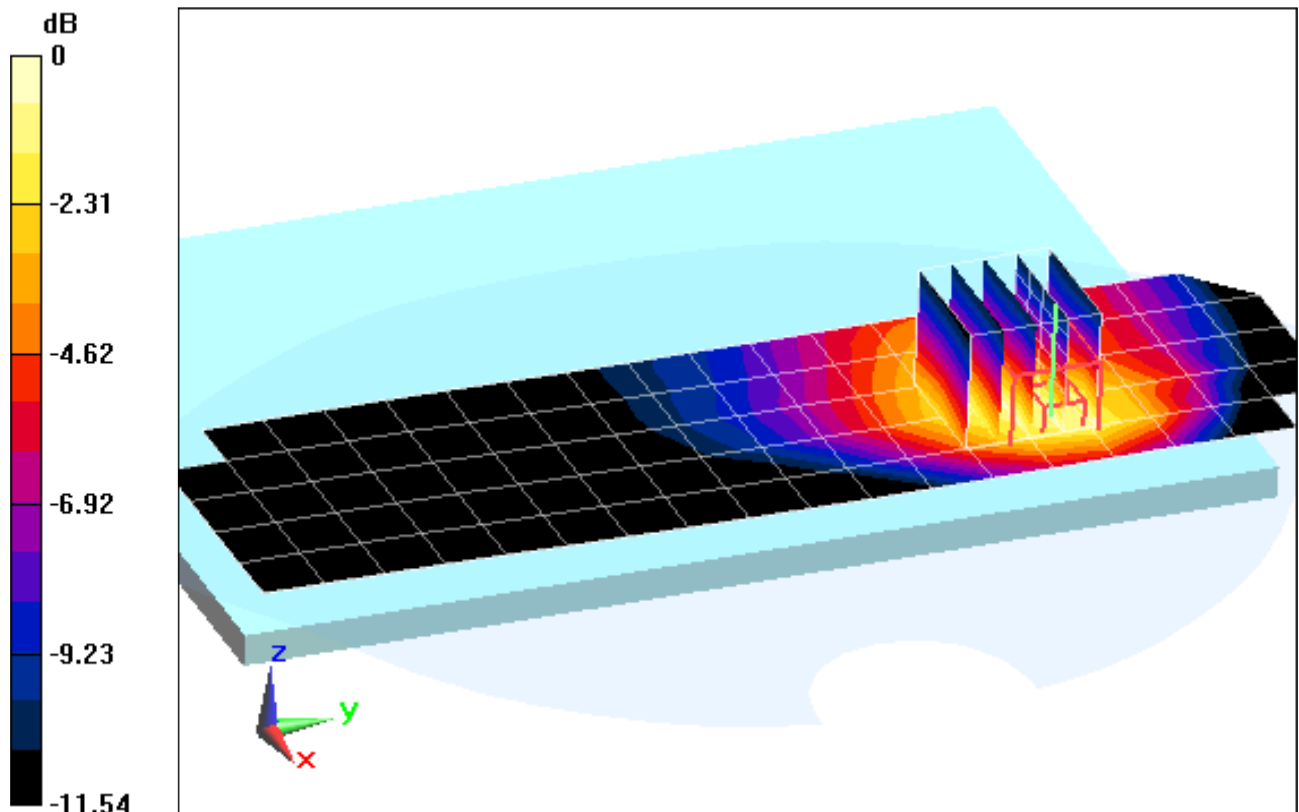
Area Scan (6x19x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 32.169 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.619 mW/g

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.629 mW/g



0 dB = 1.12 mW/g = 0.98 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #3

Communication System: GSM850 GPRS; 3 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:2.76

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 850, Body SAR, Top Edge, Mid.ch, 3 Tx Slots

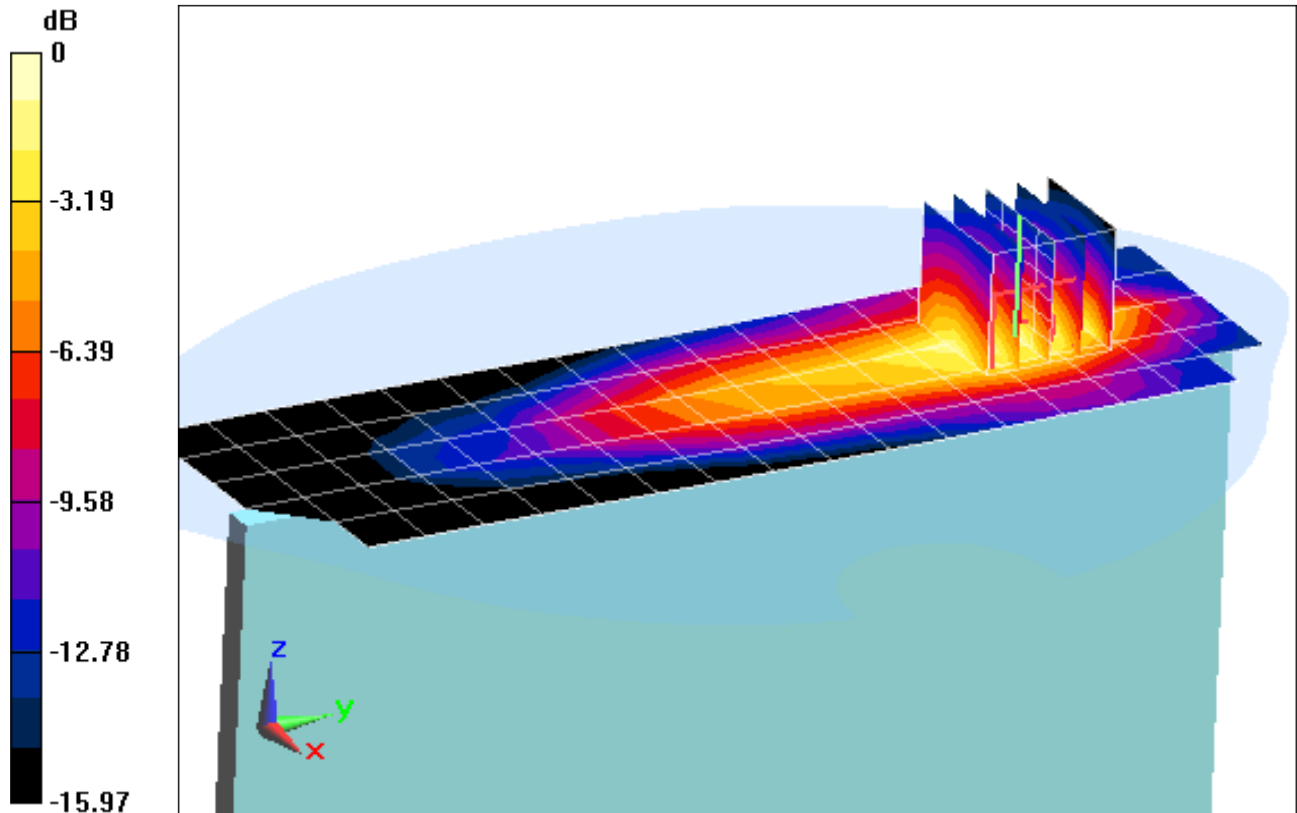
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 15.718 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.489 mW/g

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.131 mW/g



0 dB = 0.290 mW/g = -10.75 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

Communication System: GSM850 GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; 1.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 850, Body SAR, Top Edge, Mid.ch, 2 Tx Slots

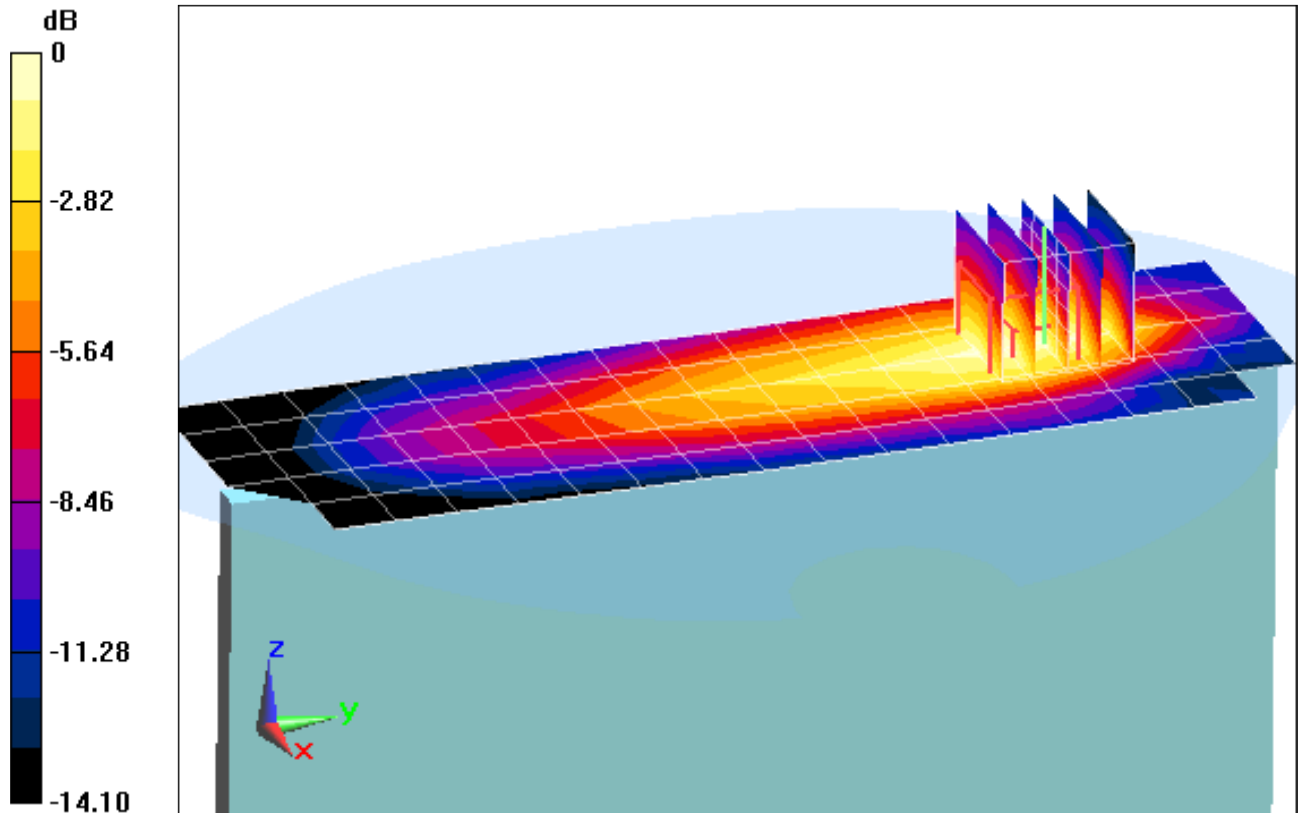
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 11.171 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.196 mW/g

SAR(1 g) = 0.121 mW/g; SAR(10 g) = 0.073 mW/g



0 dB = 0.129 mW/g = -17.79 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

Communication System: GSM 850 GPRS; 2 Tx slots; Frequency: 836.6 MHz; Duty Cycle: 1:4.15

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 850, Body SAR, Right Edge, Mid.ch, 2 Tx Slots

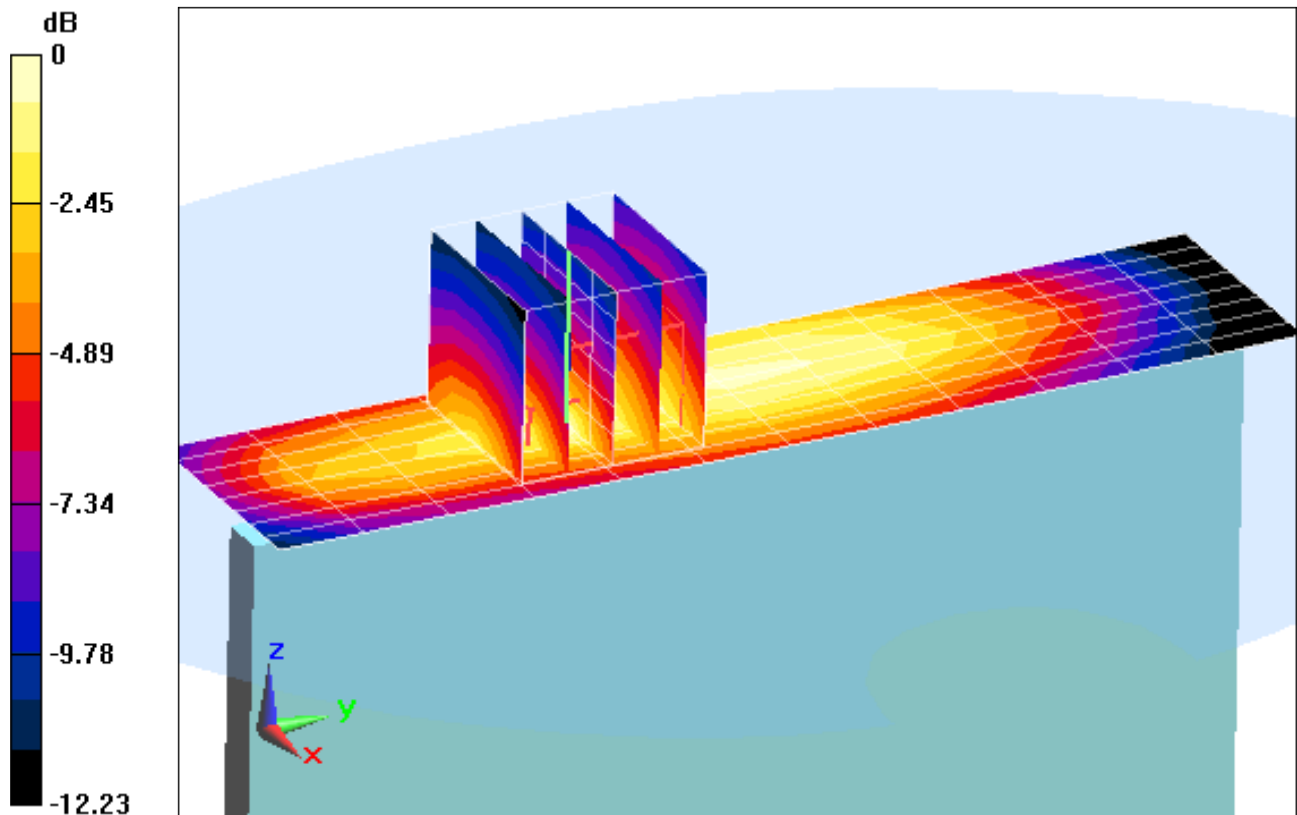
Area Scan (9x13x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 16.542 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.448 mW/g

SAR(1 g) = 0.224 mW/g; SAR(10 g) = 0.131 mW/g



0 dB = 0.265 mW/g = -11.54 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #3

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

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

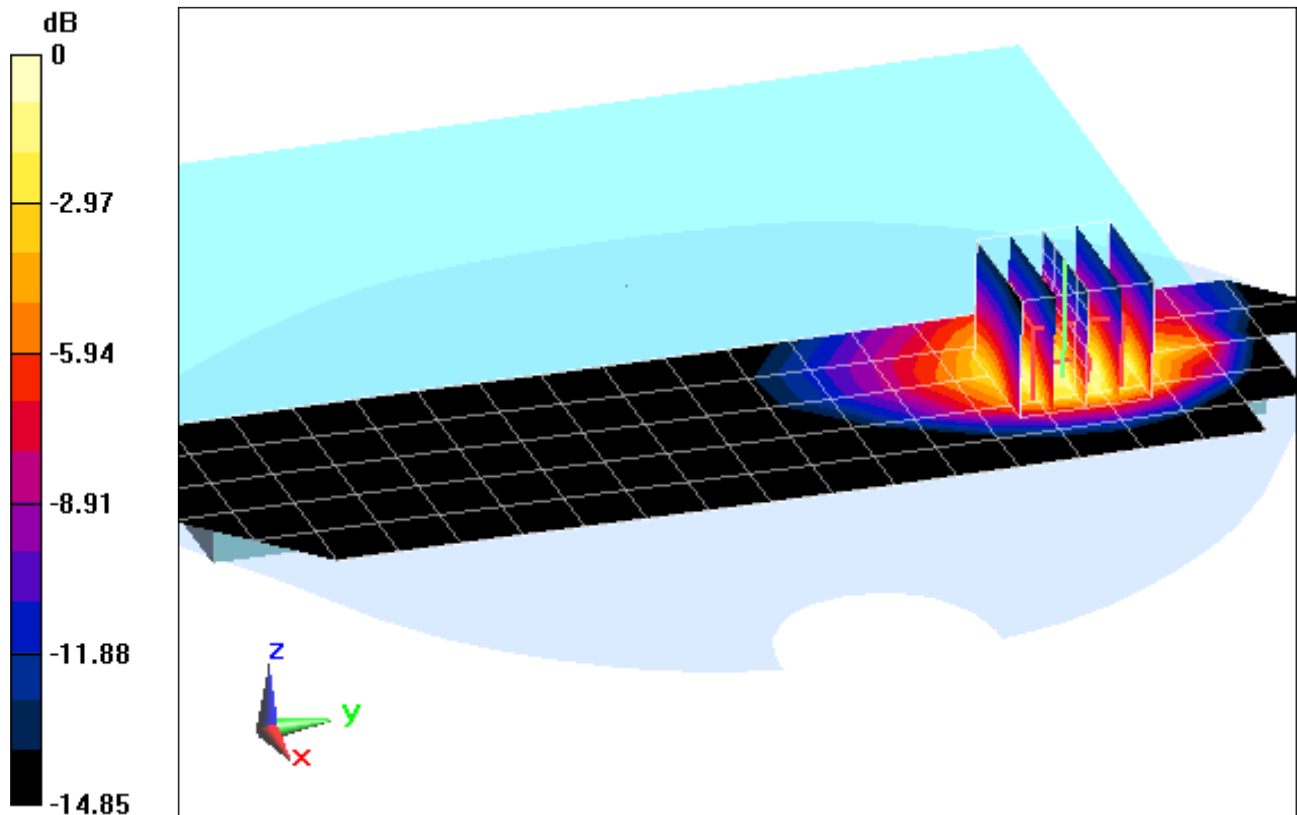
Area Scan (6x20x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 23.527 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.391 mW/g

SAR(1 g) = 0.673 mW/g; SAR(10 g) = 0.352 mW/g



0 dB = 0.769 mW/g = -2.28 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

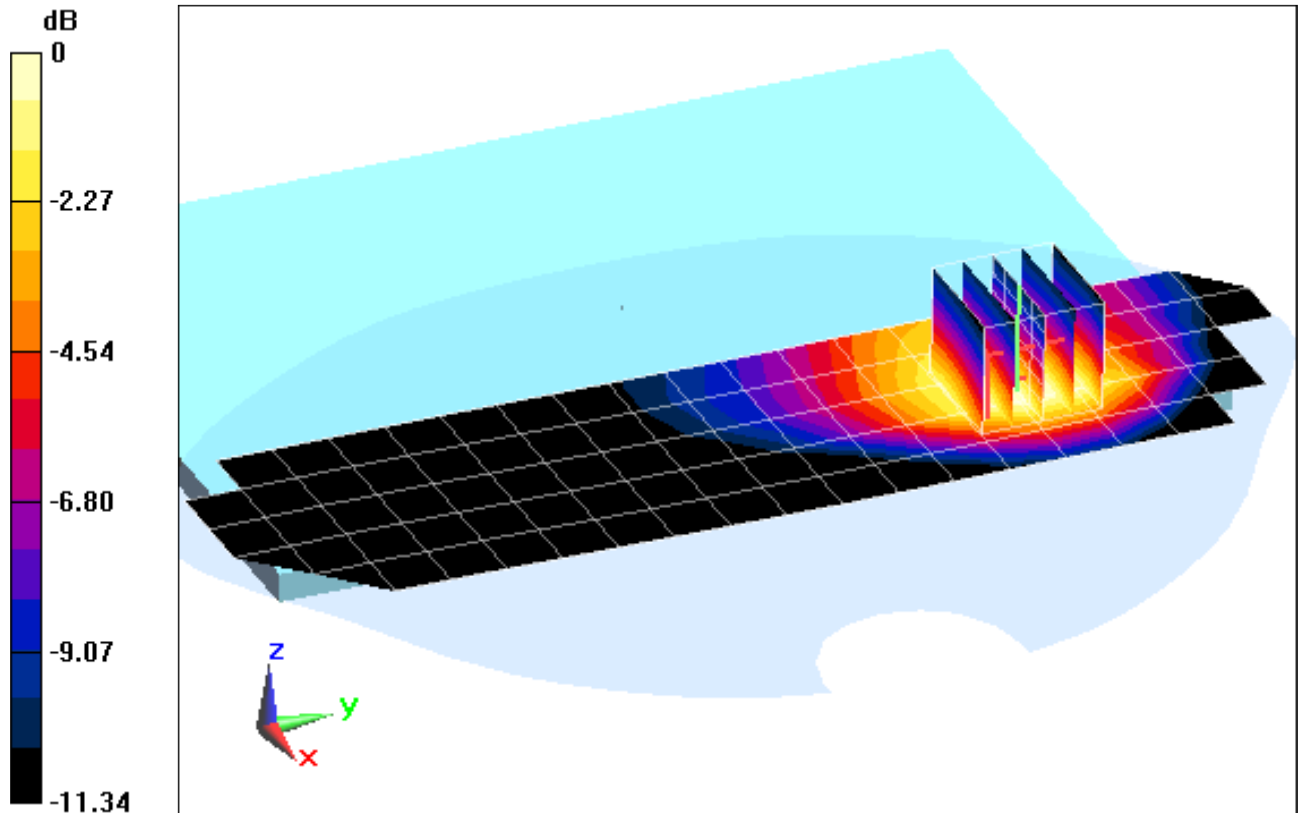
Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
 $f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 1.2 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

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

Area Scan (6x20x1): Measurement grid: dx=15mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.399 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.905 mW/g
SAR(1 g) = 0.571 mW/g; SAR(10 g) = 0.359 mW/g



0 dB = 0.624 mW/g = -4.10 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #3

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: WCDMA 850, Body SAR, Top Edge, Mid.ch

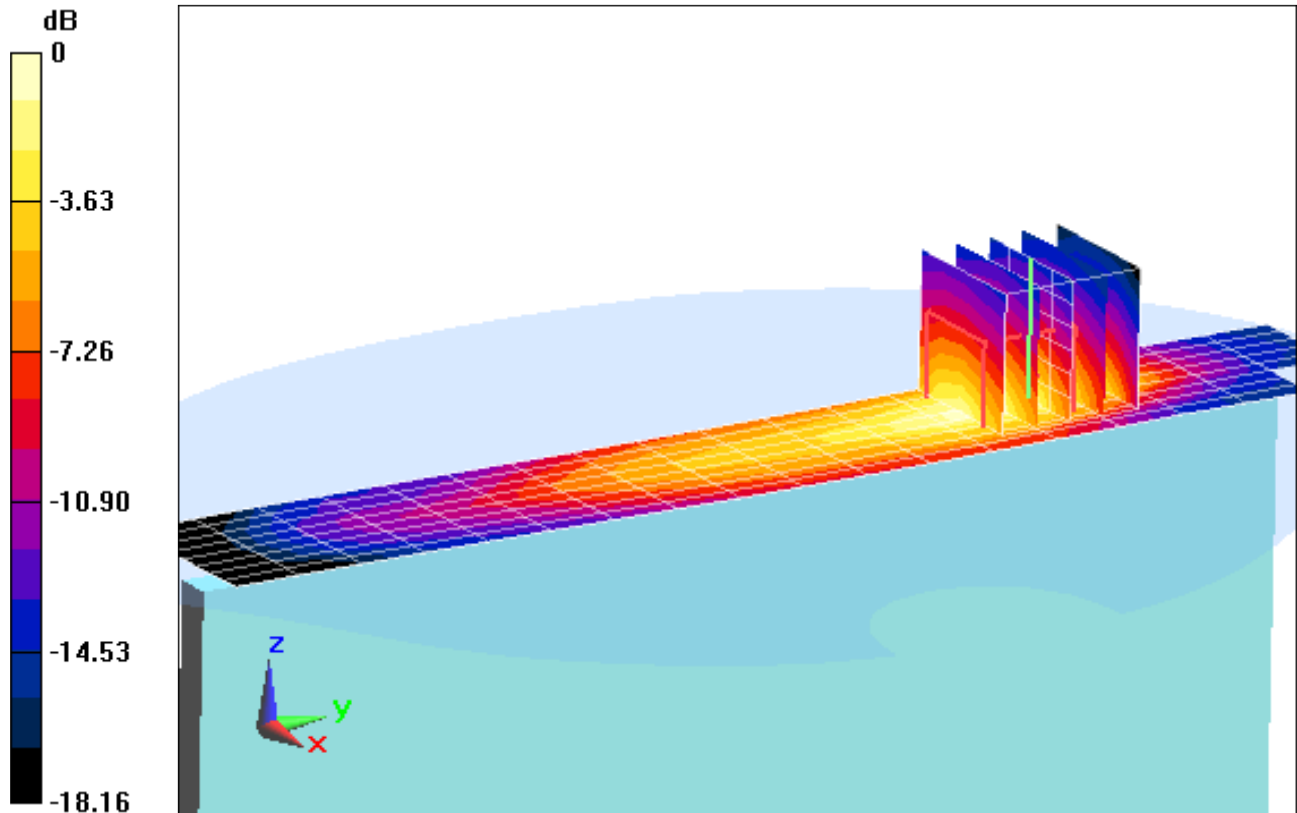
Area Scan (9x19x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 13.395 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.353 mW/g

SAR(1 g) = 0.166 mW/g; SAR(10 g) = 0.082 mW/g



0 dB = 0.188 mW/g = -14.52 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #3

Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium: 835 Body Medium parameters used (interpolated):

$f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: WCDMA 850, Body SAR, Top Edge, Mid.ch

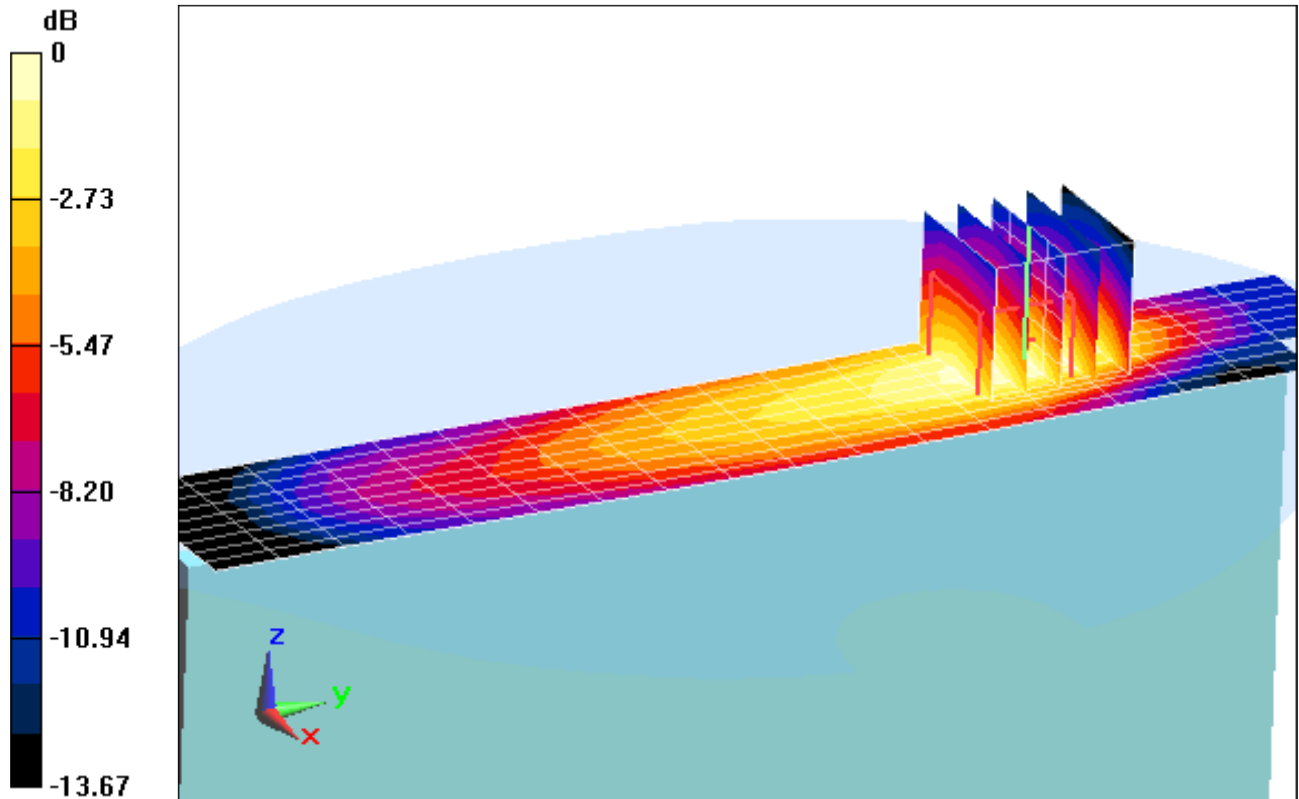
Area Scan (10x19x1): Measurement grid: dx=5mm, dy=15mm

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

Reference Value = 9.100 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.116 mW/g

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.045 mW/g



0 dB = 0.0797 mW/g = -21.97 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

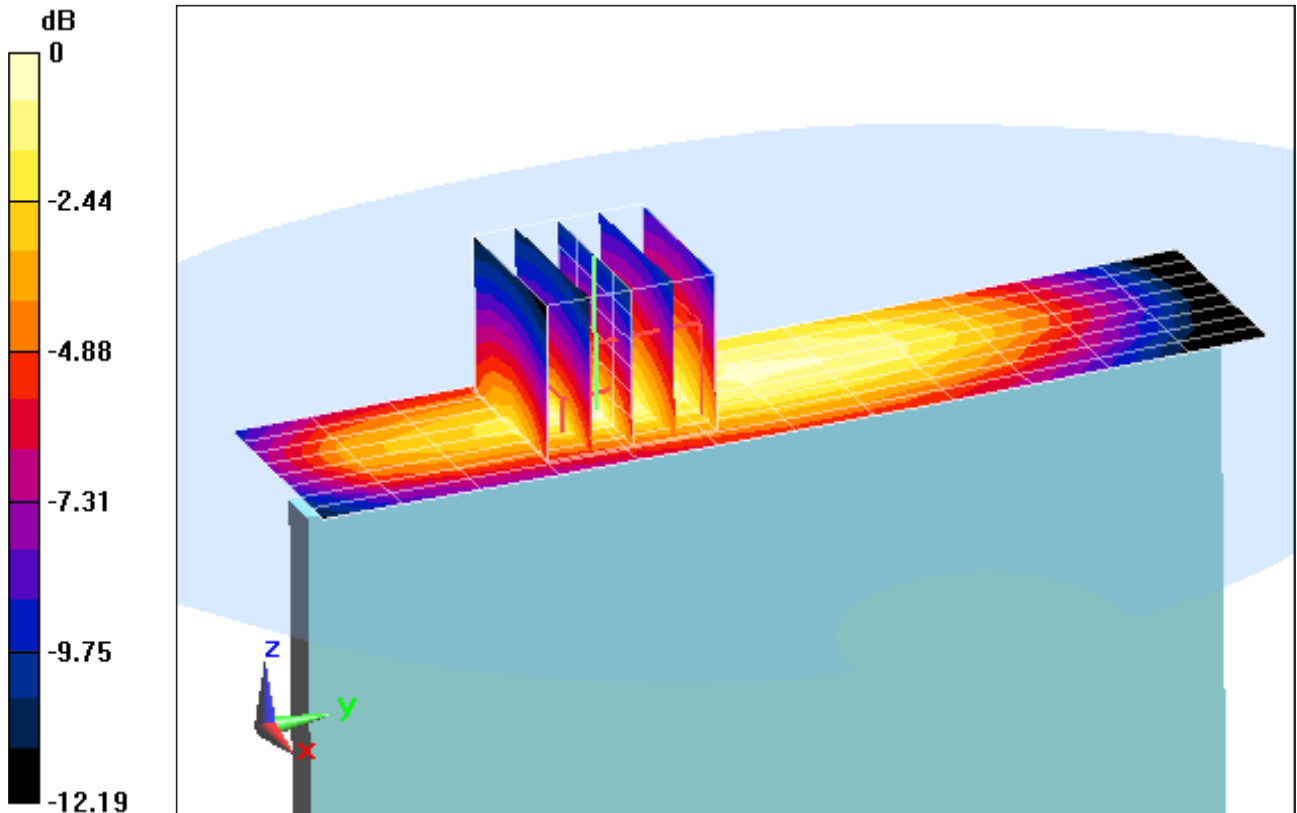
Communication System: WCDMA850; Frequency: 836.6 MHz; Duty Cycle: 1:1
Medium: 835 Body Medium parameters used (interpolated):
 $f = 836.6 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 53.406$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1272; Calibrated: 1/18/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1406
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

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

Area Scan (9x13x1): Measurement grid: dx=5mm, dy=15mm
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.240 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.670 mW/g
SAR(1 g) = 0.331 mW/g; SAR(10 g) = 0.195 mW/g



0 dB = 0.395 mW/g = -8.07 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC#3

Communication System: GSM GPRS; 2 Tx slots; Frequency: 1909.8 MHz; Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:

$f = 1910 \text{ MHz}$; $\sigma = 1.557 \text{ mho/m}$; $\epsilon_r = 53.71$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 1900, Body SAR, Back side, High.ch, 2 Tx Slots

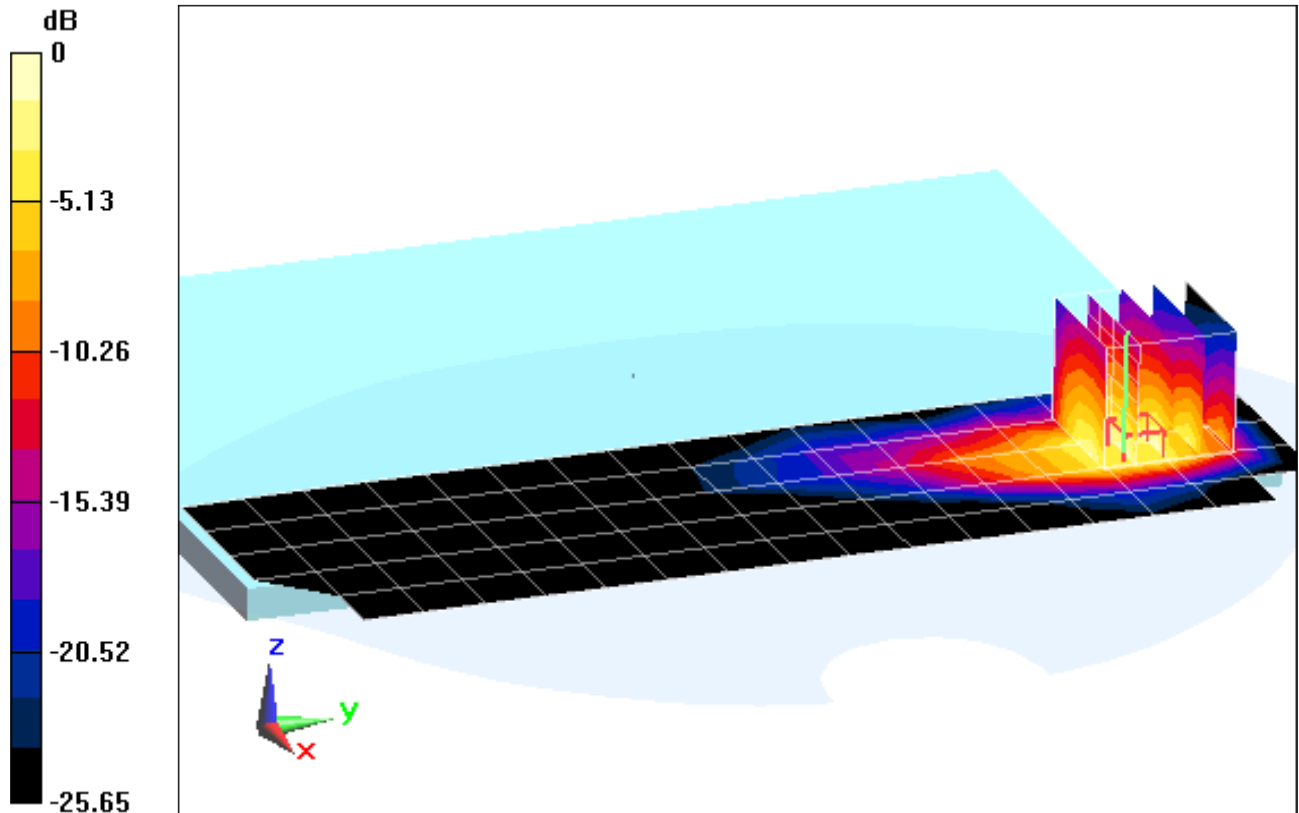
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 20.562 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.958 mW/g

SAR(1 g) = 0.966 mW/g



0 dB = 1.13 mW/g = 1.06 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC#1

Communication System: GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.518 \text{ mho/m}$; $\epsilon_r = 53.79$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.2 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

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

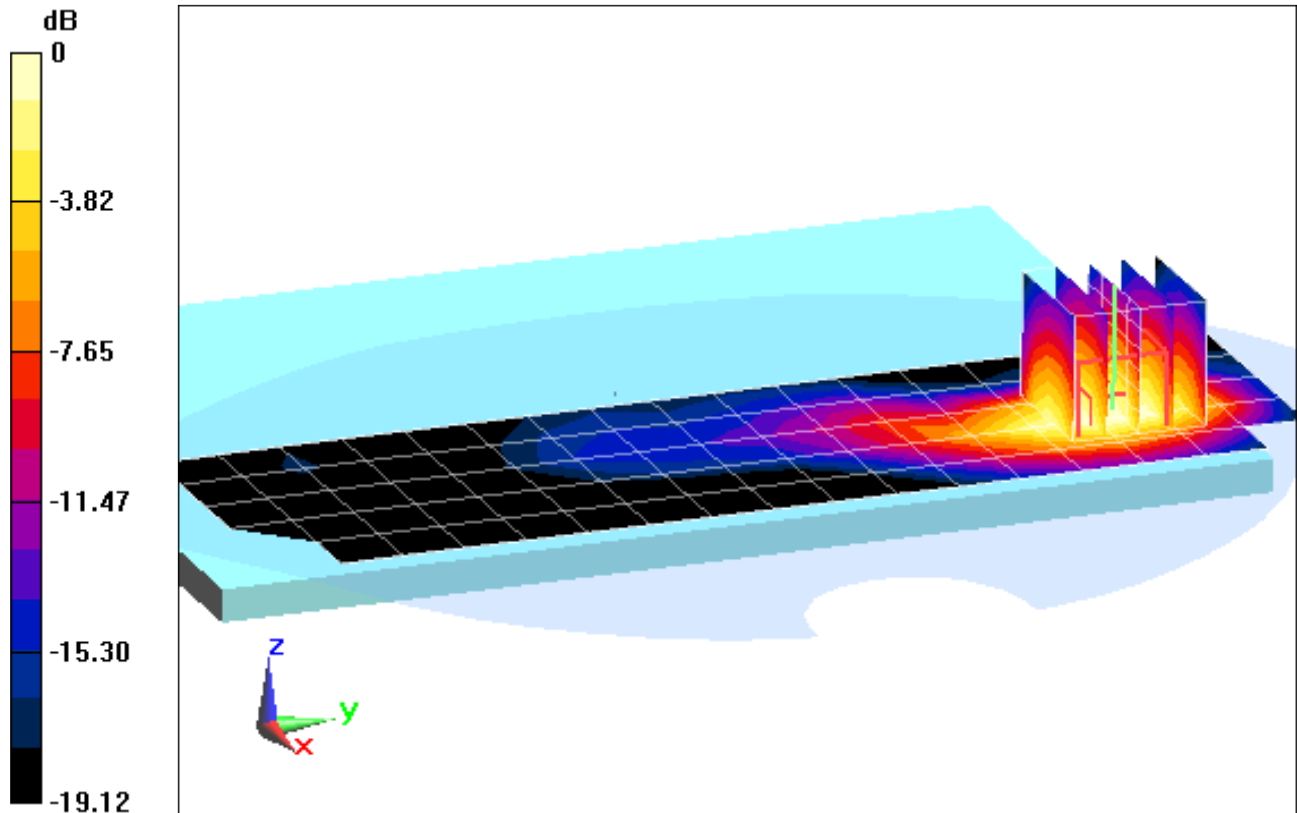
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 22.494 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.900 mW/g

SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.300 mW/g



0 dB = 0.597 mW/g = -4.48 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC#3

Communication System: GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.518 \text{ mho/m}$; $\epsilon_r = 53.79$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 1900, Body SAR, Top Edge, Mid.ch, 2 Tx Slots

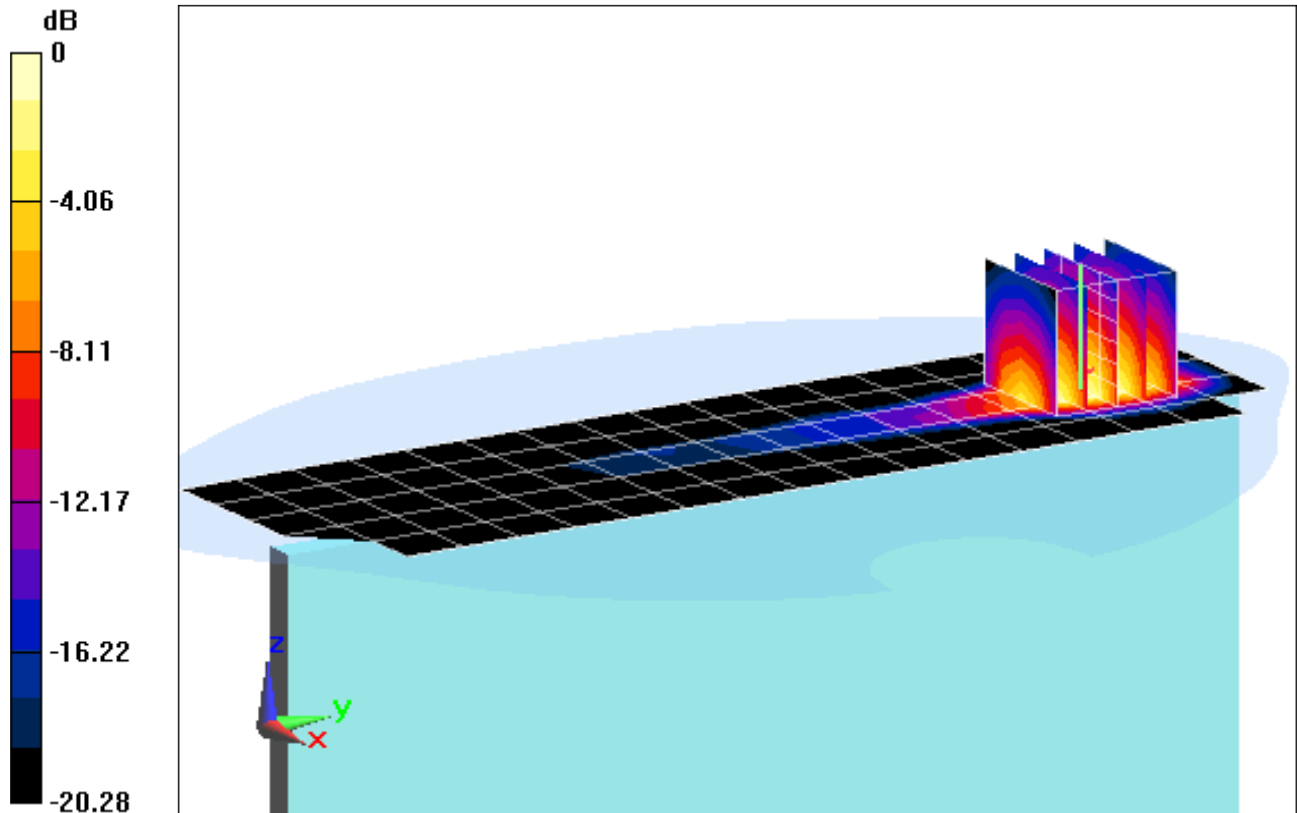
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 18.635 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 1.321 mW/g

SAR(1 g) = 0.688 mW/g



0 dB = 0.793 mW/g = -2.01 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC#1

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

Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.518 \text{ mho/m}$; $\epsilon_r = 53.79$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 1900, Body SAR, Top Edge, Mid.ch, 2 Tx Slots

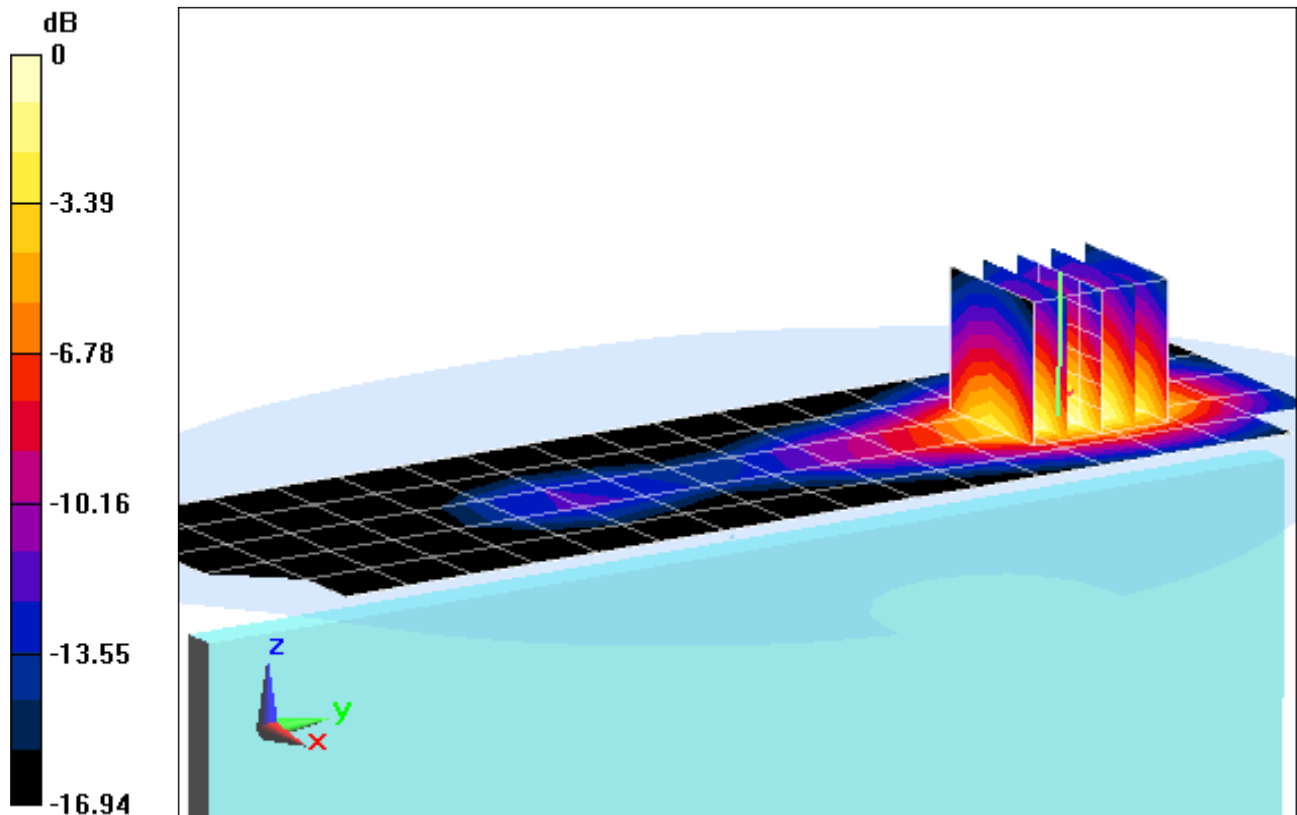
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 17.958 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.826 mW/g

SAR(1 g) = 0.512 mW/g



0 dB = 0.565 mW/g = -4.96 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC#1

Communication System: GSM GPRS; 2 Tx slots; Frequency: 1880 MHz; Duty Cycle: 1:4.15
Medium: 1900 Body Medium parameters used:

$f = 1880 \text{ MHz}$; $\sigma = 1.518 \text{ mho/m}$; $\epsilon_r = 53.79$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;
Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Mode: GPRS 1900, Body SAR, Right Edge, Mid.ch, 2 Tx Slots

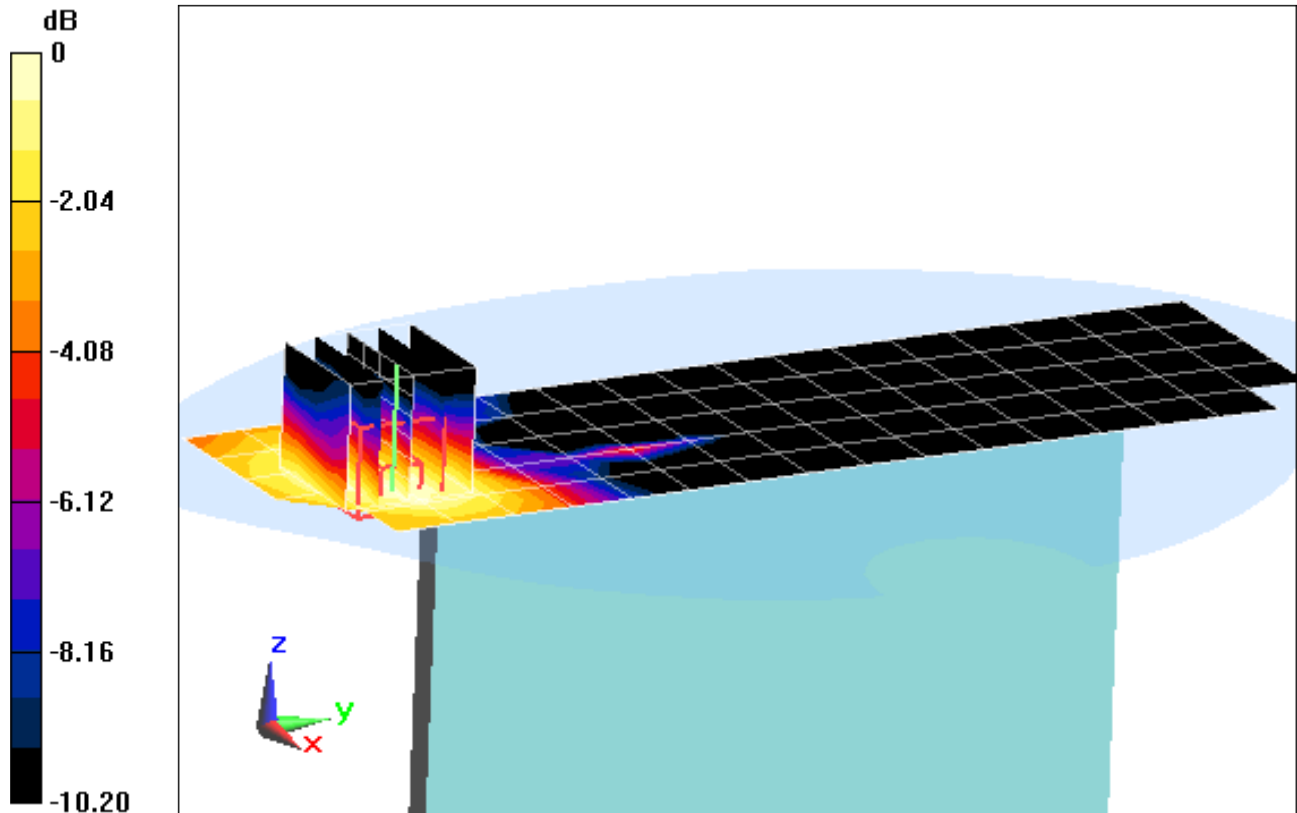
Area Scan (6x18x1): Measurement grid: dx=15mm, dy=15mm

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

Reference Value = 6.617 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.095 mW/g

SAR(1 g) = 0.062 mW/g; SAR(10 g) = 0.040 mW/g



0 dB = 0.0653 mW/g = -23.70 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

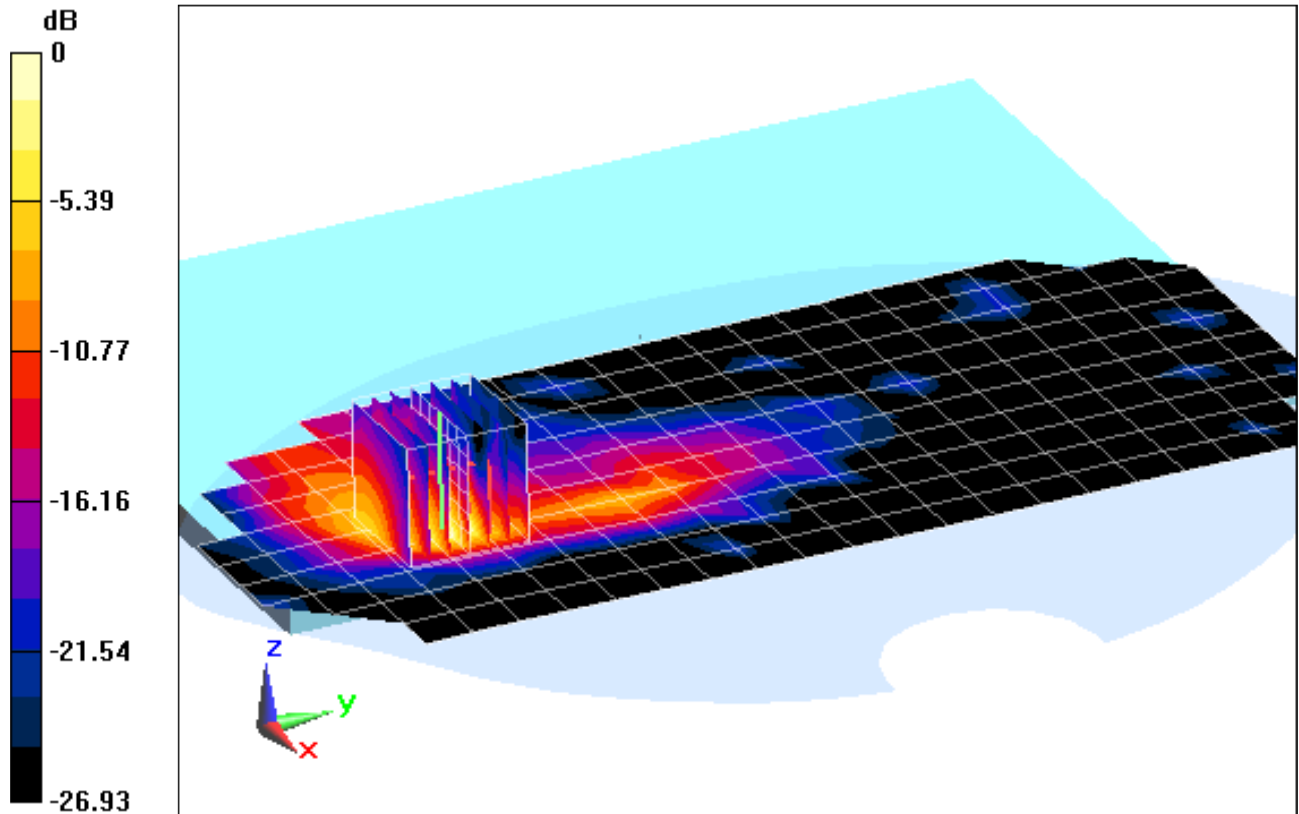
Communication System: IEEE 802.11b; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: 2450 Body Medium parameters used (interpolated):
 $f = 2437 \text{ MHz}$; $\sigma = 2.011 \text{ mho/m}$; $\epsilon_r = 51.147$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-08-2012; Ambient Temp: 23.1°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.28, 4.28, 4.28); Calibrated: 2/21/2012;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1323; Calibrated: 2/15/2012
Phantom: SAM Main; Type: SAM 4.0; Serial: TP-1114
Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

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

Area Scan (11x24x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 12.874 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.344 mW/g
SAR(1 g) = 0.429 mW/g; SAR(10 g) = 0.162 mW/g



0 dB = 0.573 mW/g = -4.84 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

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

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2.011 \text{ mho/m}$; $\epsilon_r = 51.147$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-08-2012; Ambient Temp: 23.1°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.28, 4.28, 4.28); Calibrated: 2/21/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Top Edge

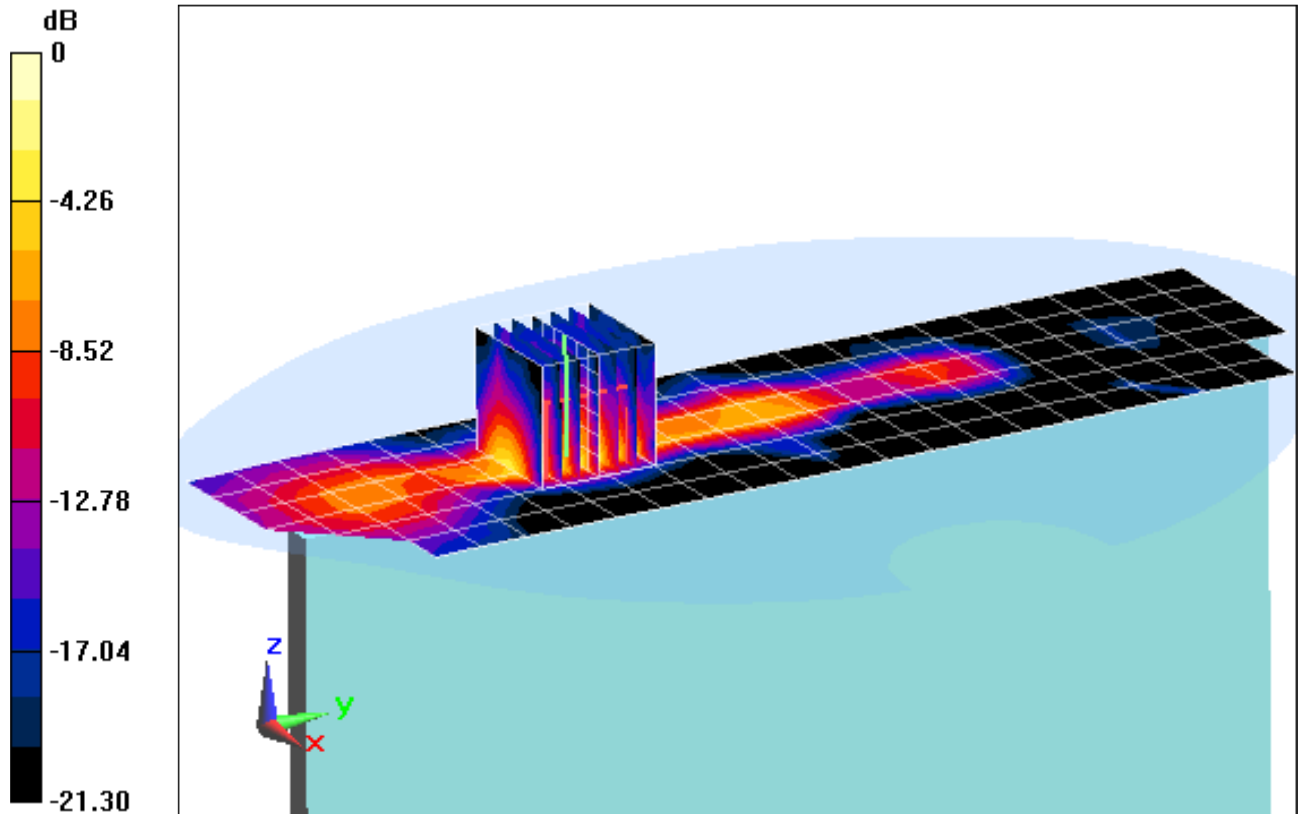
Area Scan (7x24x1): Measurement grid: dx=12mm, dy=12mm

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

Reference Value = 1.956 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.387 mW/g

SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.068 mW/g



0 dB = 0.226 mW/g = -12.92 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

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

Medium: 2450 Body Medium parameters used (interpolated):

$f = 2437 \text{ MHz}$; $\sigma = 2.011 \text{ mho/m}$; $\epsilon_r = 51.147$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-08-2012; Ambient Temp: 23.1°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.28, 4.28, 4.28); Calibrated: 2/21/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11b, Body SAR, Ch 06, 1 Mbps, Left Edge

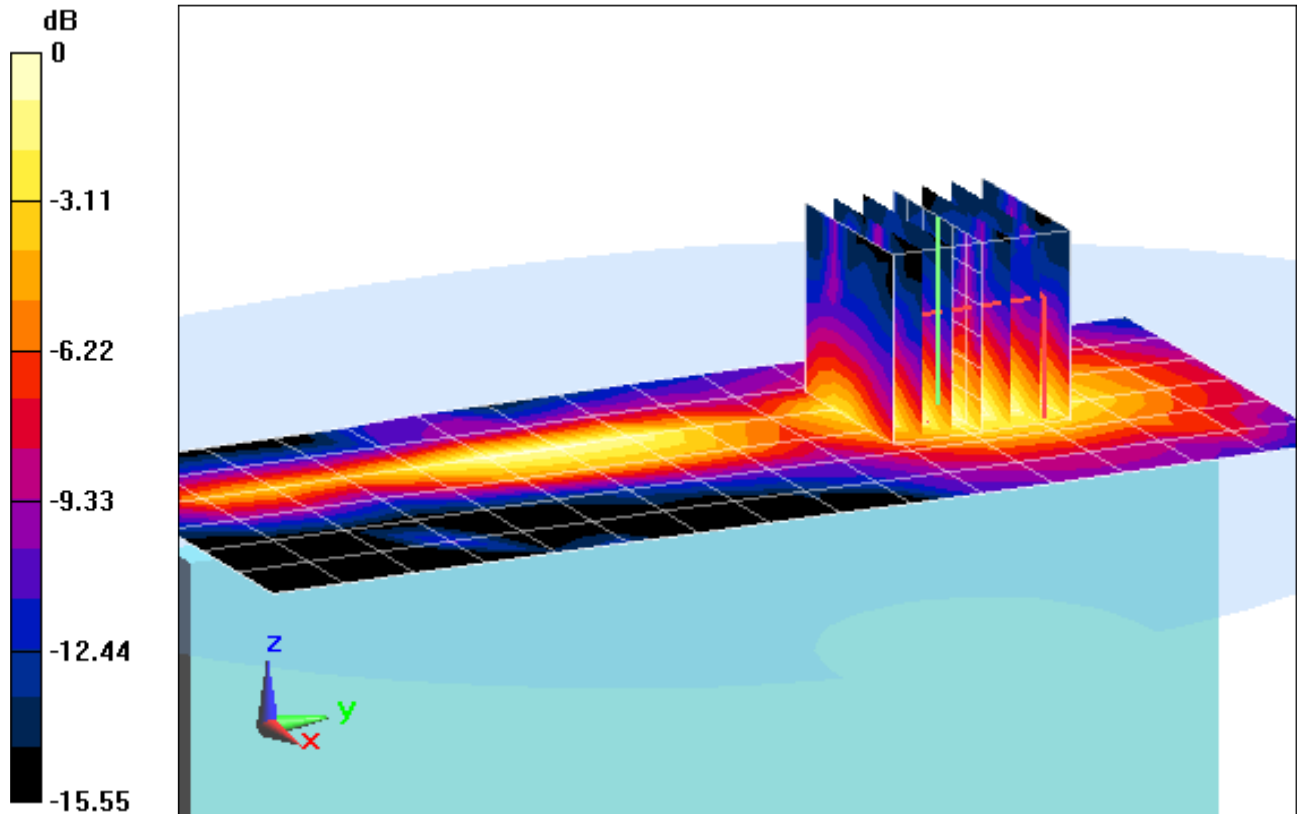
Area Scan (7x16x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

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

Reference Value = 1.364 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 0.119 mW/g

SAR(1 g) = 0.058 mW/g; SAR(10 g) = 0.029 mW/g



0 dB = 0.0732 mW/g = -22.71 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

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

Medium: 5GHz Body Medium parameters used:

$f = 5825 \text{ MHz}$; $\sigma = 6.161 \text{ mho/m}$; $\epsilon_r = 46.34$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a, 5.8 GHz, Body SAR, Ch 165, 6 Mbps, Back Side

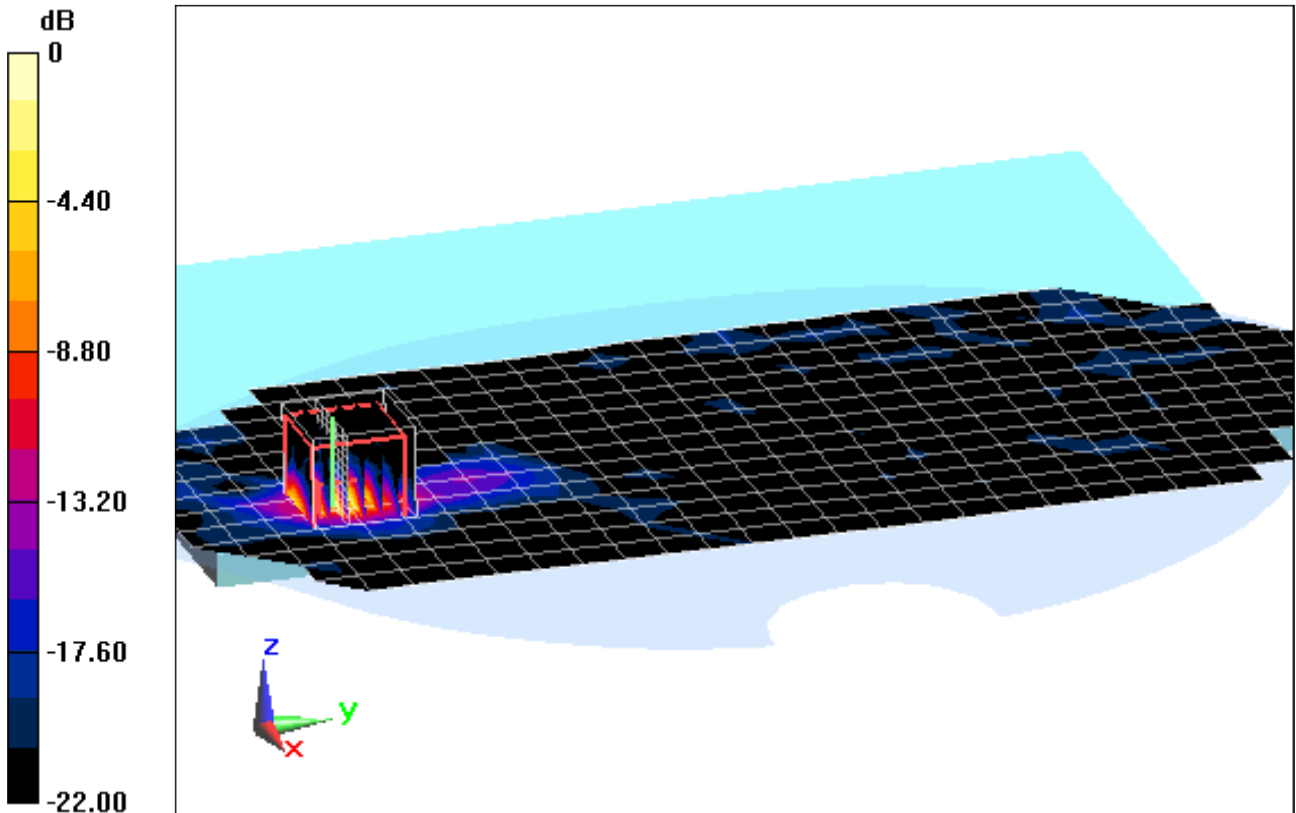
Area Scan (14x30x1): Measurement grid: dx=10mm, dy=10mm

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 12.491 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 4.755 mW/g

SAR(1 g) = 0.785 mW/g; SAR(10 g) = 0.178 mW/g



0 dB = 1.81 mW/g = 5.15 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5700 MHz; Duty Cycle: 1:1

Medium: 5GHz Body Medium parameters used:

$f = 5700 \text{ MHz}$; $\sigma = 5.966 \text{ mho/m}$; $\epsilon_r = 46.56$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(3.25, 3.25, 3.25); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a, 5.5 GHz, Body SAR, Ch 140, 6 Mbps, Top Edge

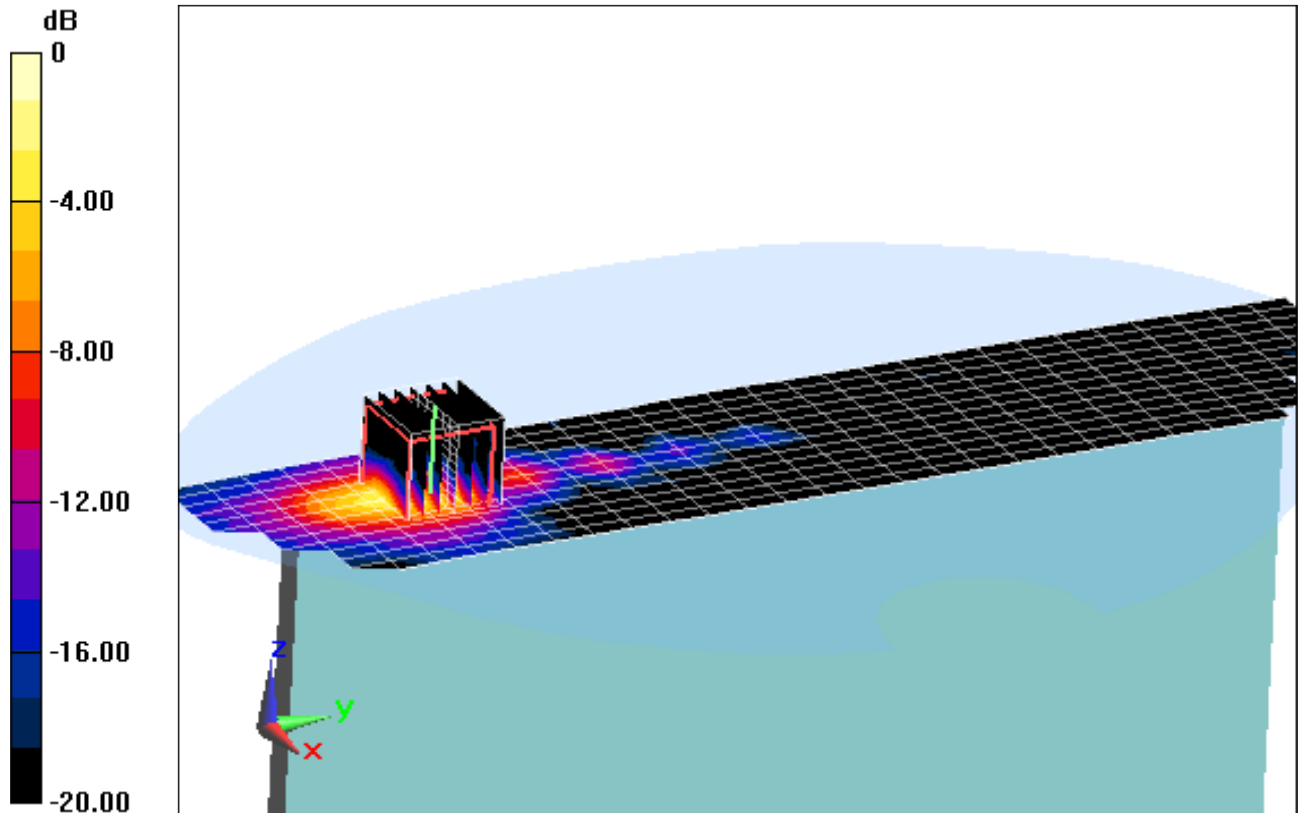
Area Scan (13x30x1): Measurement grid: dx=5mm, dy=10mm

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 12.591 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.784 mW/g

SAR(1 g) = 0.772 mW/g; SAR(10 g) = 0.219 mW/g



0 dB = 1.58 mW/g = 3.97 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: A3LGTN8020; Type: Portable Tablet Computer; Serial: FCC #1

Communication System: IEEE 802.11a 5.2-5.8 GHz Band; Frequency: 5700 MHz; Duty Cycle: 1:1

Medium: 5GHz Body Medium parameters used:

$f = 5700 \text{ MHz}$; $\sigma = 5.966 \text{ mho/m}$; $\epsilon_r = 46.56$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 0.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(3.25, 3.25, 3.25); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Mode: IEEE 802.11a, 5.5 GHz, Body SAR, Ch 140, 6 Mbps, Left Edge

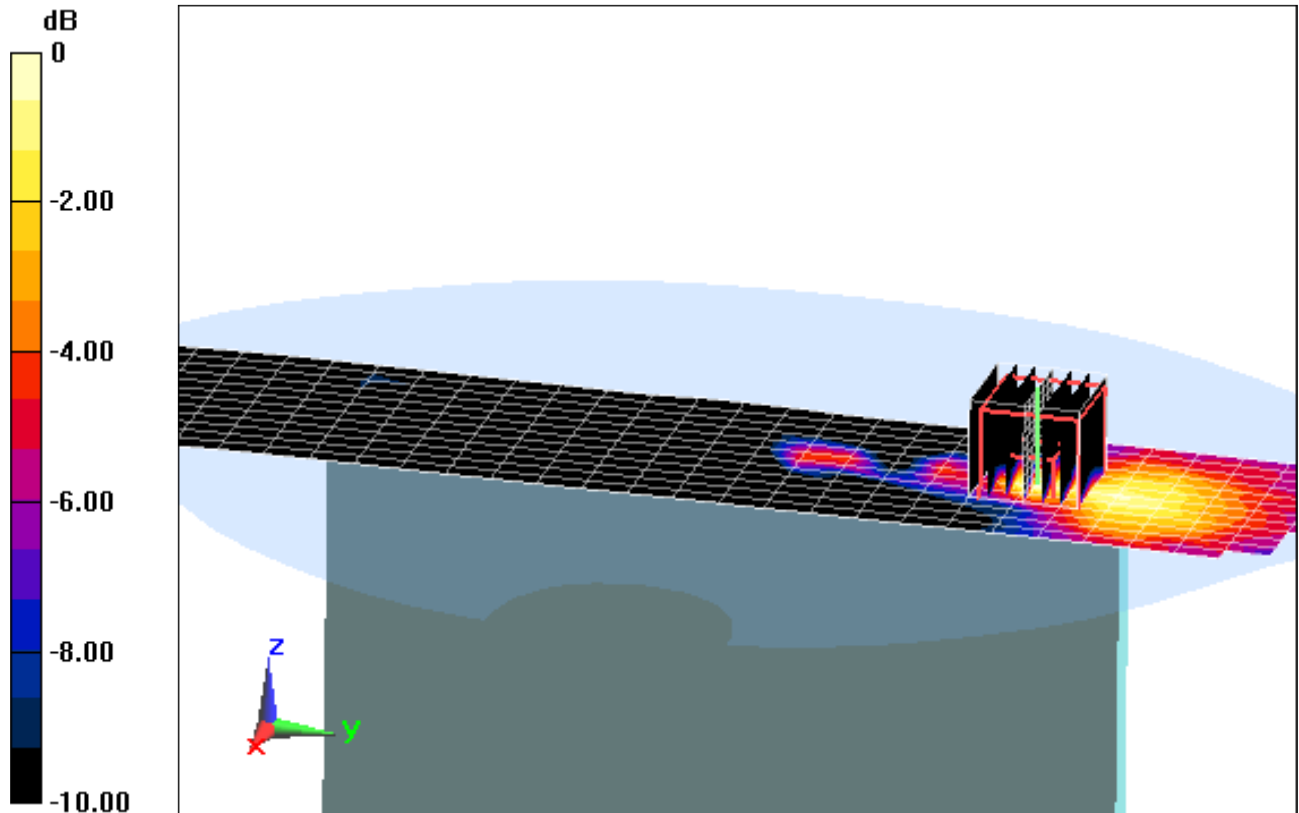
Area Scan (13x30x1): Measurement grid: dx=5mm, dy=10mm

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 4.672 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.452 mW/g

SAR(1 g) = 0.106 mW/g; SAR(10 g) = 0.032 mW/g



0 dB = 0.223 mW/g = -13.03 dB mW/g

APPENDIX B: SYSTEM VERIFICATION

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.988 \text{ mho/m}$; $\epsilon_r = 53.44$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

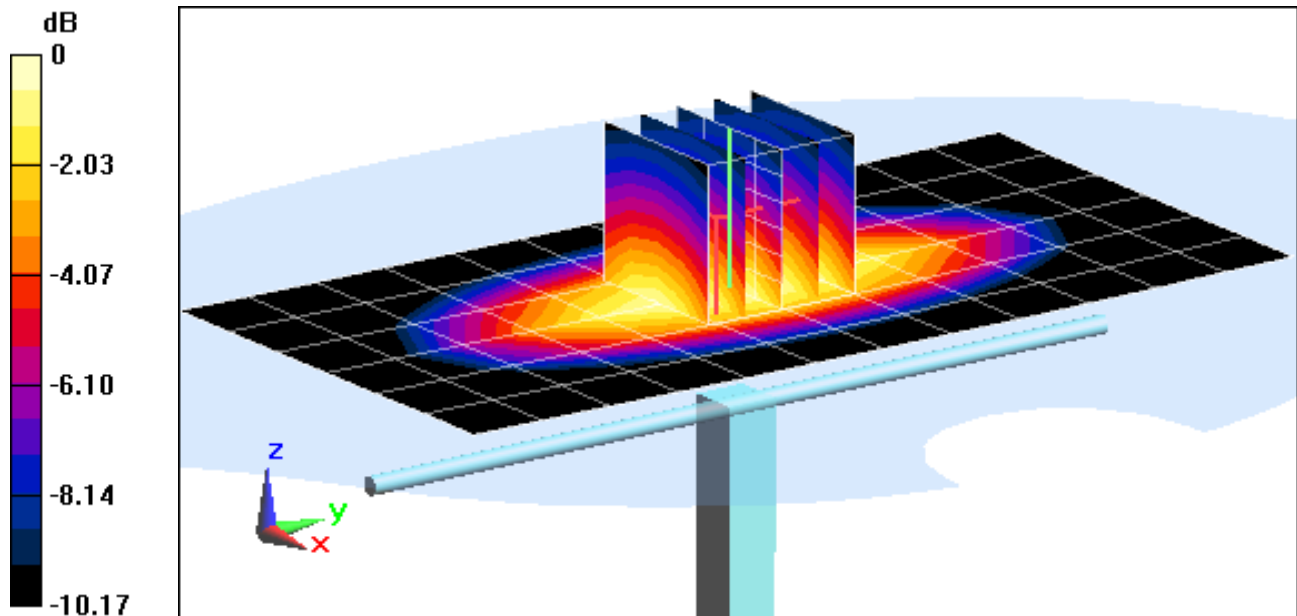
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.478 mW/g

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.674 mW/g

Deviation = 6.69%



0 dB = 1.10 mW/g = 0.83 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 835 Body Medium parameters used:

$f = 835 \text{ MHz}$; $\sigma = 0.988 \text{ mho/m}$; $\epsilon_r = 53.44$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 09-06-2012; Ambient Temp: 23.4°C; Tissue Temp: 23.5°C

Probe: ES3DV3 - SN3258; ConvF(6.06, 6.06, 6.06); Calibrated: 2/21/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

835MHz System Verification

Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

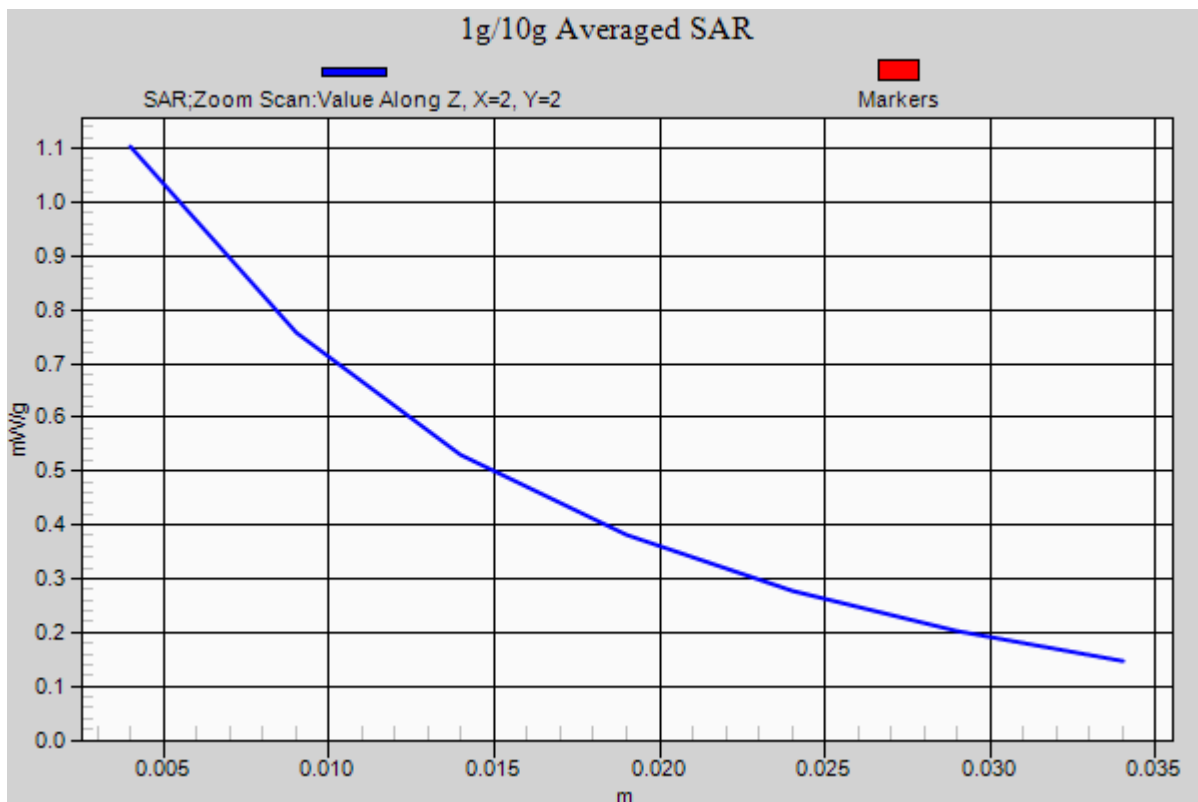
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 1.478 mW/g

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.674 mW/g

Deviation = 6.69%



PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

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

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900$ MHz; $\sigma = 1.544$ mho/m; $\epsilon_r = 53.737$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 MHz System Verification

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

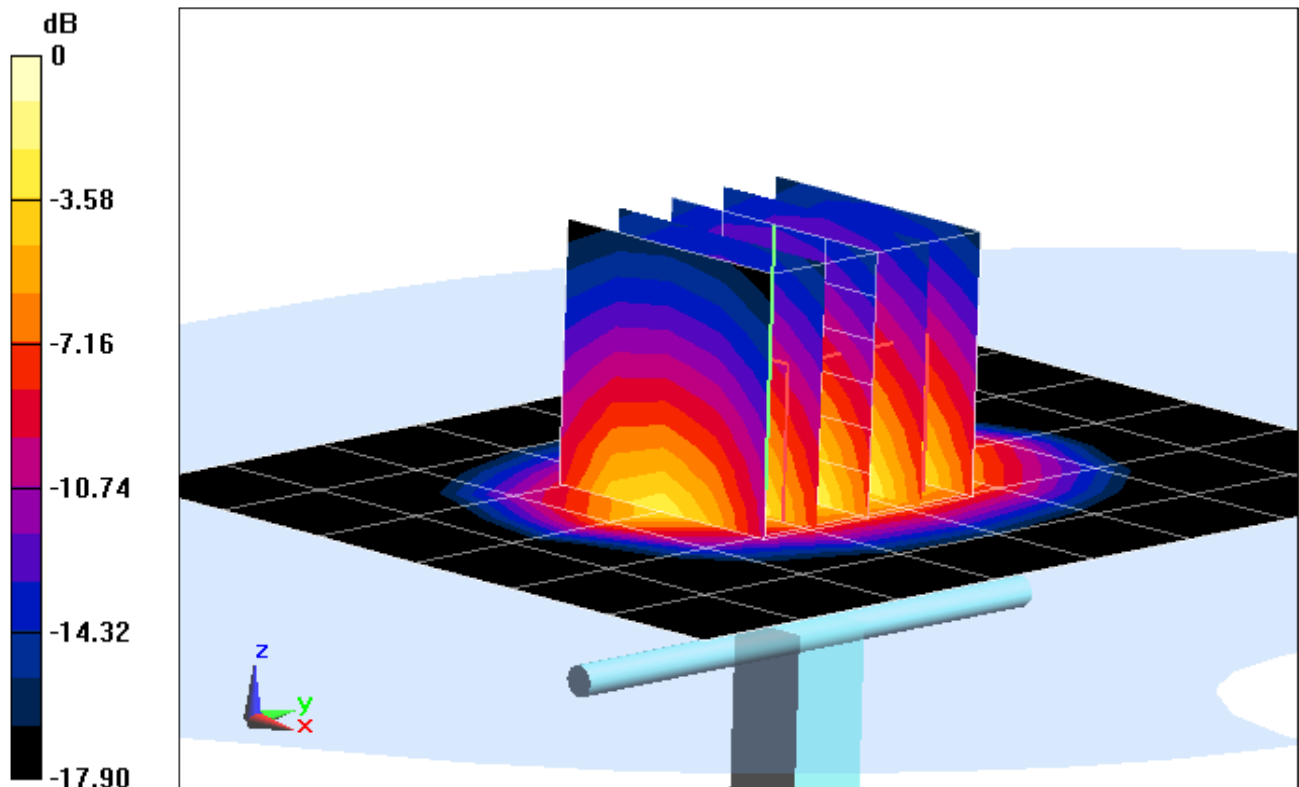
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.875 mW/g

SAR(1 g) = 3.85 mW/g; SAR(10 g) = 2.01 mW/g

Deviation = - 2.04 %



0 dB = 4.30 mW/g = 12.67 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

DUT: SAR Dipole 1900 MHz; Type: D1900V2; Serial: 5d149

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

Medium: 1900 Body Medium parameters used (interpolated):

$f = 1900 \text{ MHz}$; $\sigma = 1.544 \text{ mho/m}$; $\epsilon_r = 53.737$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 08-31-2012; Ambient Temp: 23.6°C; Tissue Temp: 21.7°C

Probe: ES3DV3 - SN3288; ConvF(5.02, 5.02, 5.02); Calibrated: 2/7/2012;

Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 4/12/2012

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

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

1900 MHz System Verification

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

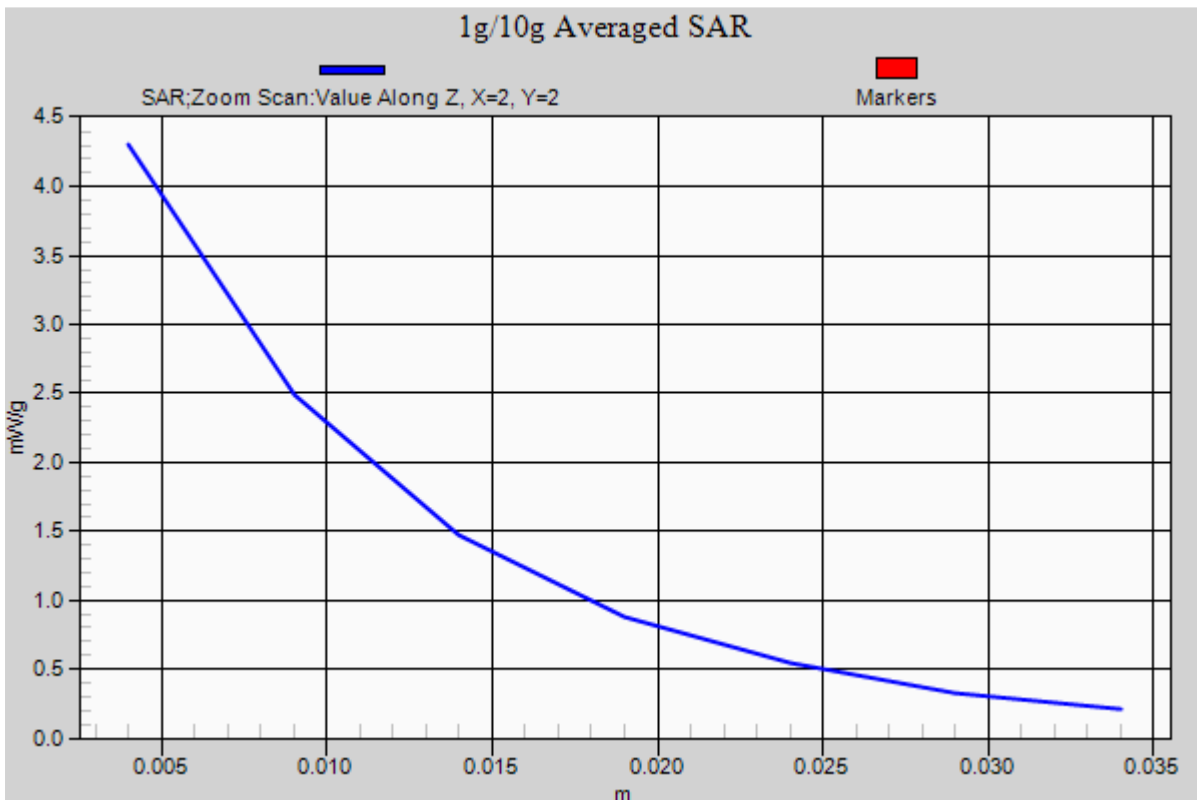
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Input Power = 20.0 dBm (100 mW)

Peak SAR (extrapolated) = 6.875 mW/g

SAR(1 g) = 3.85 mW/g; SAR(10 g) = 2.01 mW/g

Deviation = - 2.04 %



PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.028 \text{ mho/m}$; $\epsilon_r = 51.11$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-08-2012; Ambient Temp: 23.1°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.28, 4.28, 4.28); Calibrated: 2/21/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

2450MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=12mm, dy=12mm

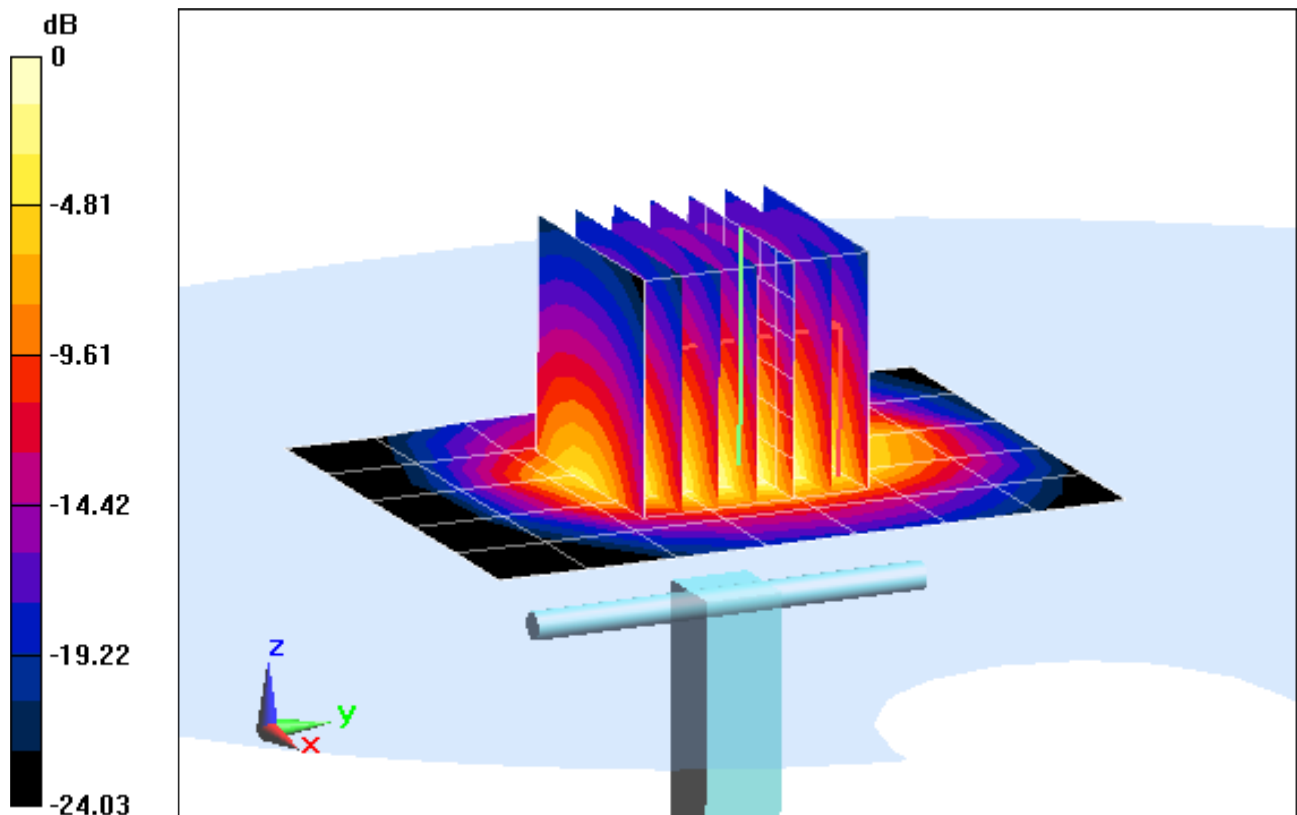
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.890 mW/g

SAR(1 g) = 5.23 mW/g; SAR(10 g) = 2.41 mW/g

Deviation = 2.95%



0 dB = 6.50 mW/g = 16.26 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 2450 Body Medium parameters used:

$f = 2450 \text{ MHz}$; $\sigma = 2.028 \text{ mho/m}$; $\epsilon_r = 51.11$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-08-2012; Ambient Temp: 23.1°C; Tissue Temp: 22.8°C

Probe: ES3DV3 - SN3258; ConvF(4.28, 4.28, 4.28); Calibrated: 2/21/2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1323; Calibrated: 2/15/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

2450MHz System Verification

Area Scan (6x8x1): Measurement grid: dx=12mm, dy=12mm

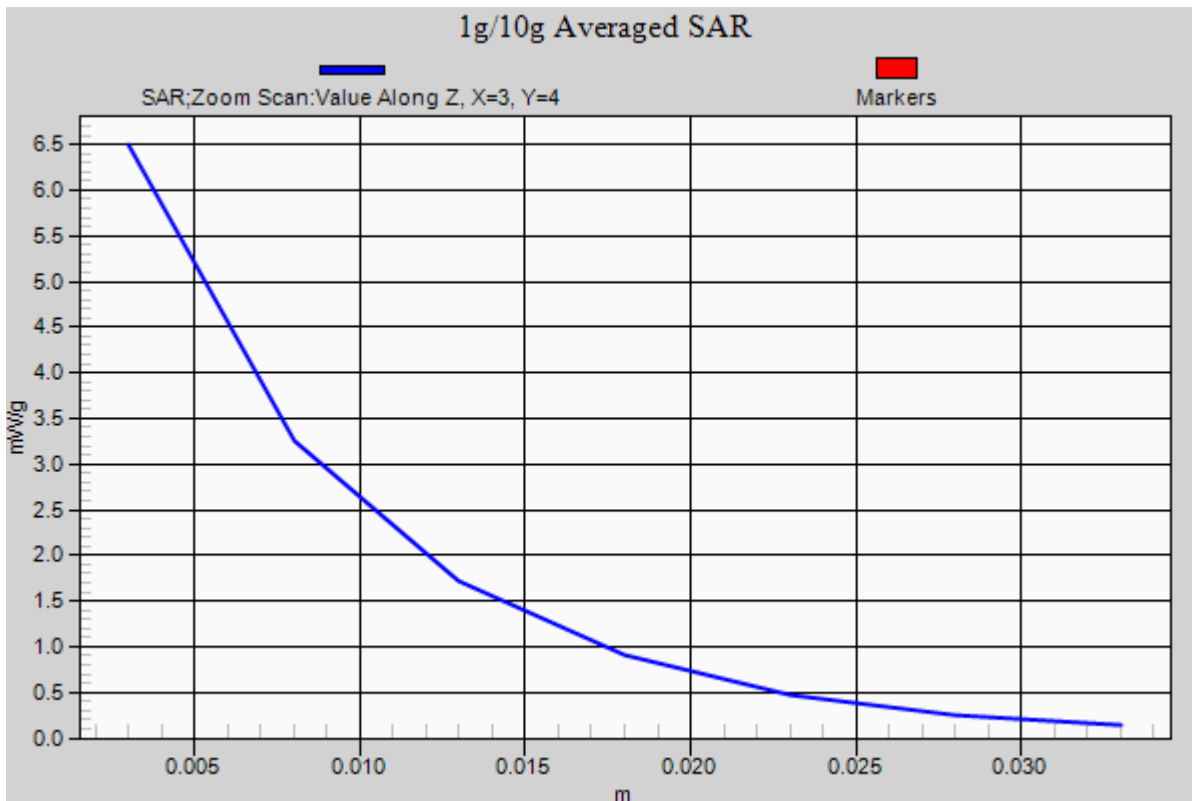
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 10.890 mW/g

SAR(1 g) = 5.23 mW/g; SAR(10 g) = 2.41 mW/g

Deviation = 2.95%



PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5GHz Body Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 5.182 \text{ mho/m}$; $\epsilon_r = 47.72$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.8°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5200MHz System Verification

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

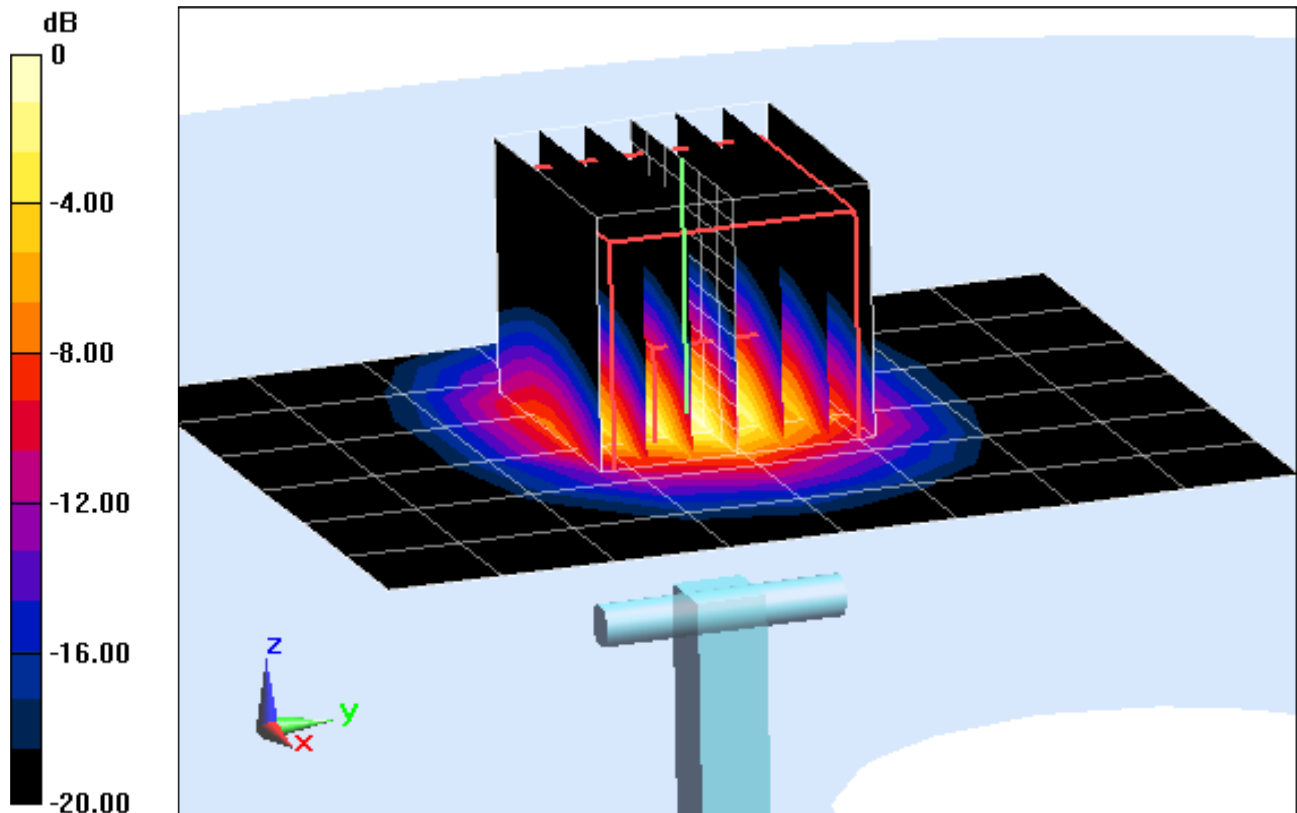
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 33.219 mW/g

SAR(1 g) = 7.82 mW/g; SAR(10 g) = 2.19 mW/g

Deviation = 6.54%



0 dB = 16.1 mW/g = 24.14 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5GHz Body Medium parameters used:

$f = 5200 \text{ MHz}$; $\sigma = 5.182 \text{ mho/m}$; $\epsilon_r = 47.72$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.8°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(3.92, 3.92, 3.92); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5200MHz System Verification

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

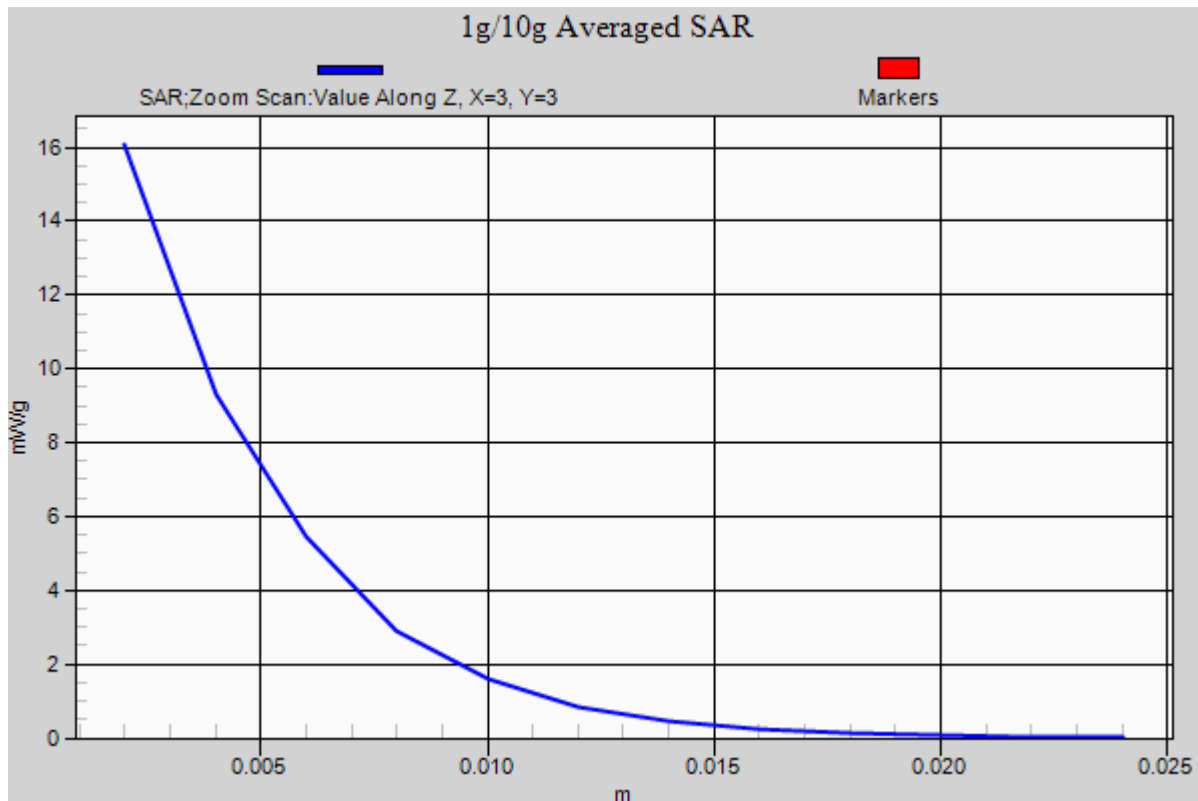
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 33.219 mW/g

SAR(1 g) = 7.82 mW/g; SAR(10 g) = 2.19 mW/g

Deviation = 6.54%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.667 \text{ mho/m}$; $\epsilon_r = 46.83$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5500MHz System Verification

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

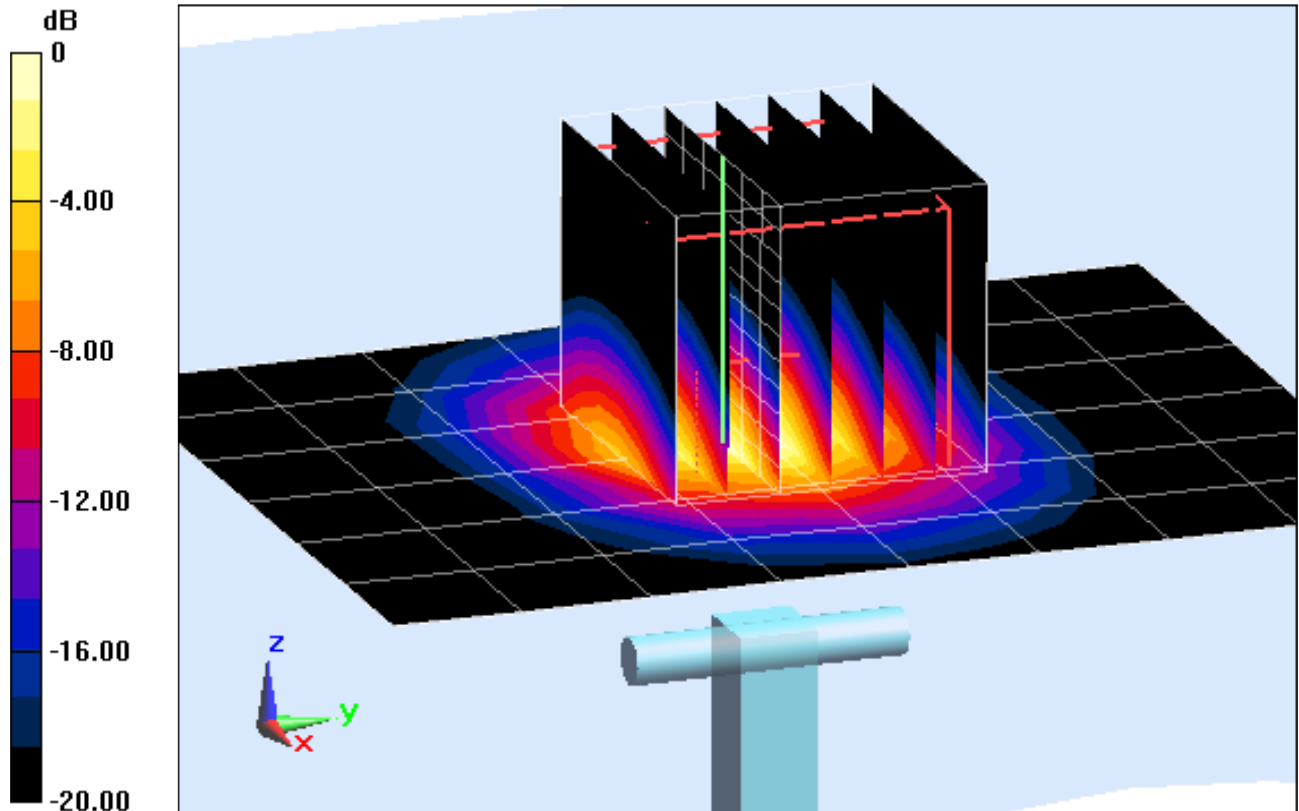
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 37.297 mW/g

SAR(1 g) = 8.46 mW/g; SAR(10 g) = 2.31 mW/g

Deviation = 7.22%



0 dB = 17.1 mW/g = 24.66 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:

$f = 5500 \text{ MHz}$; $\sigma = 5.667 \text{ mho/m}$; $\epsilon_r = 46.83$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.4°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN3589; ConvF(3.4, 3.4, 3.4); Calibrated: 1/27/2012;
Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5500MHz System Verification

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

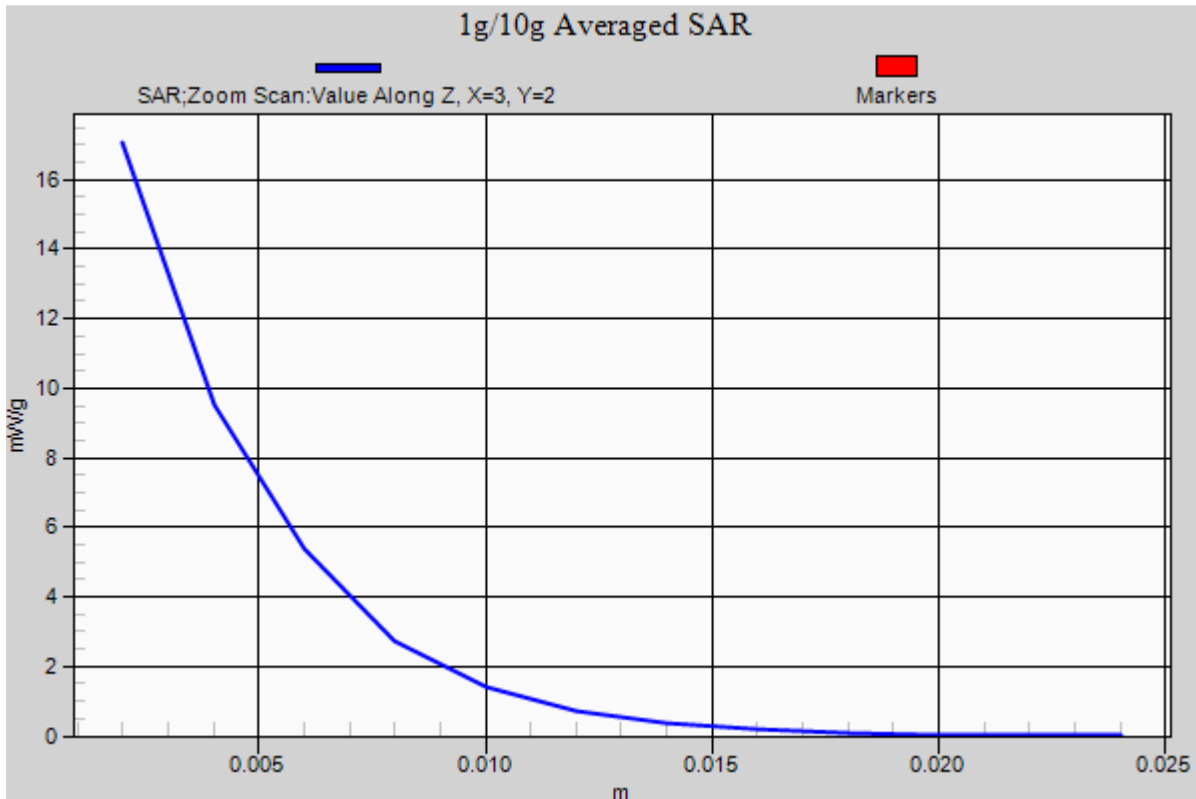
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 37.297 mW/g

SAR(1 g) = 8.46 mW/g; SAR(10 g) = 2.31 mW/g

Deviation = 7.22%



PCTEST ENGINEERING LABORATORY, INC.

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

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium: 5GHz Body Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 6.157 \text{ mho/m}$; $\epsilon_r = 46.29$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5800MHz System Verification

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

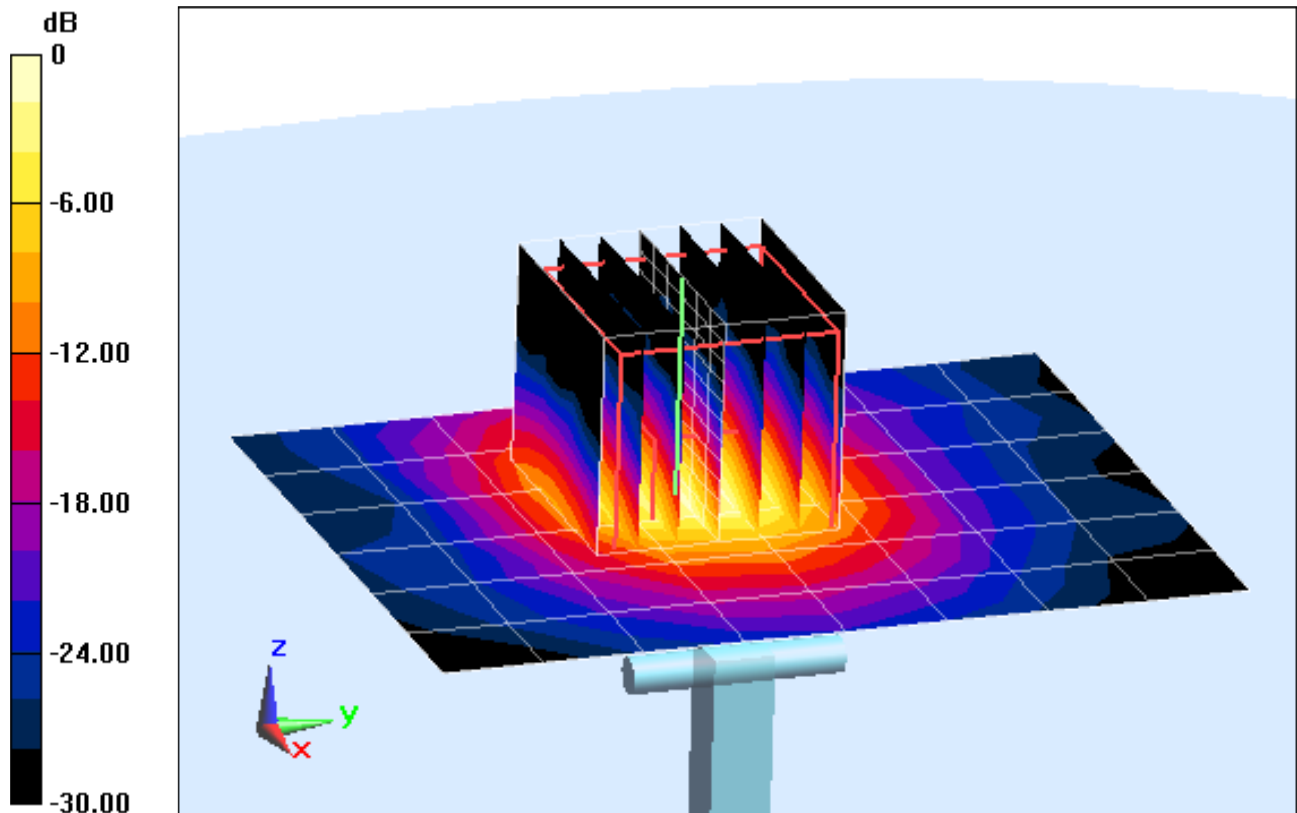
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 34.914 mW/g

SAR(1 g) = 7.65 mW/g; SAR(10 g) = 2.09 mW/g

Deviation = 2.96%



0 dB = 16.2 mW/g = 24.19 dB mW/g

PCTEST ENGINEERING LABORATORY, INC.

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

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

Medium: 5GHz Body Medium parameters used:

$f = 5800 \text{ MHz}$; $\sigma = 6.157 \text{ mho/m}$; $\epsilon_r = 46.29$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 09-10-2012; Ambient Temp: 24.6°C; Tissue Temp: 23.6°C

Probe: EX3DV4 - SN3589; ConvF(3.59, 3.59, 3.59); Calibrated: 1/27/2012;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1272; Calibrated: 1/18/2012

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

Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

5800MHz System Verification

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

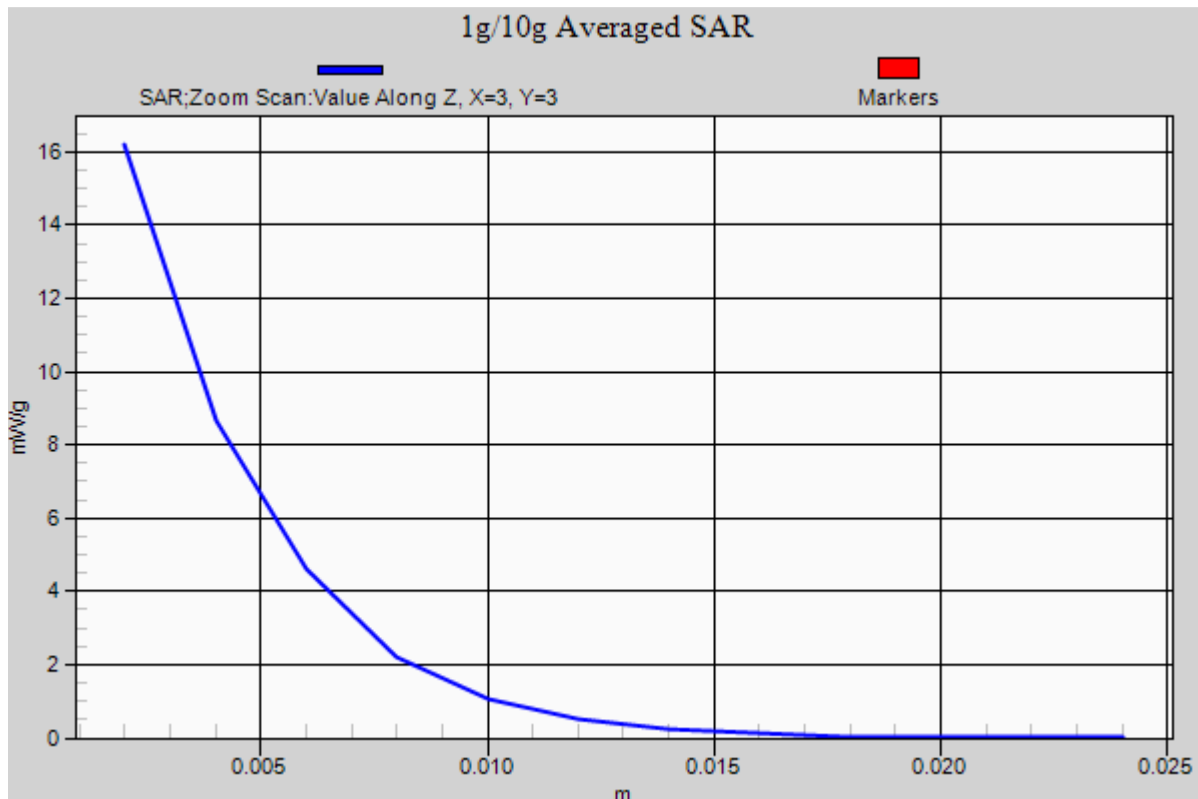
Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Input Power = 20 dBm (100 mW)

Peak SAR (extrapolated) = 34.914 mW/g

SAR(1 g) = 7.65 mW/g; SAR(10 g) = 2.09 mW/g

Deviation = 2.96%



APPENDIX C: PROBE CALIBRATION



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D835V2-4d119_Apr12**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d119**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **April 20, 2012**

*✓ KOK
5/4/12*

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Israe El-Naouq	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: April 20, 2012

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



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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	41.1 \pm 6 %	0.90 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.36 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.42 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.19 mW / g \pm 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	54.5 \pm 6 %	1.01 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.47 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.56 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.31 mW / g \pm 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω - 2.2 j Ω
Return Loss	- 32.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.8 Ω - 4.3 j Ω
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 29, 2010

DASY5 Validation Report for Head TSL

Date: 20.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 41.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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

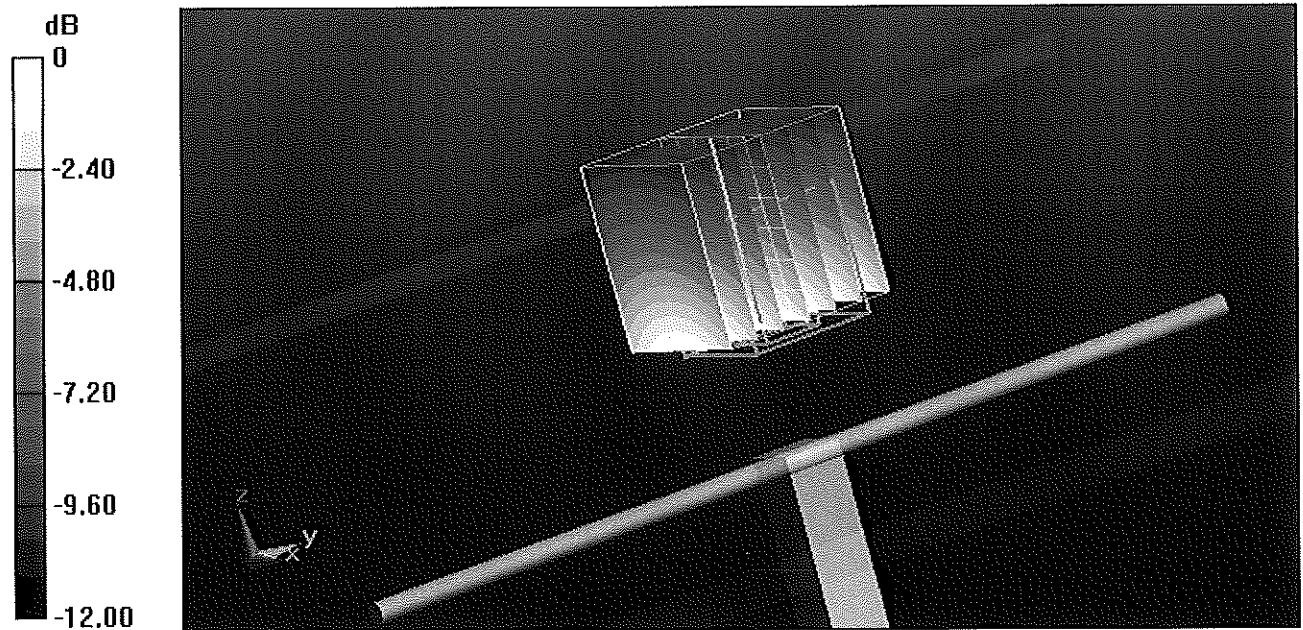
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.041 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.480 mW/g

SAR(1 g) = 2.36 mW/g; SAR(10 g) = 1.55 mW/g

Maximum value of SAR (measured) = 2.75 mW/g

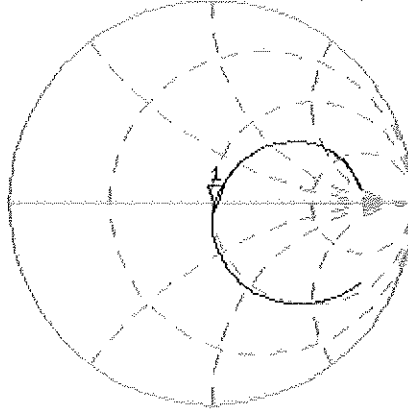


0 dB = 2.75 mW/g = 8.79 dB mW/g

Impedance Measurement Plot for Head TSL

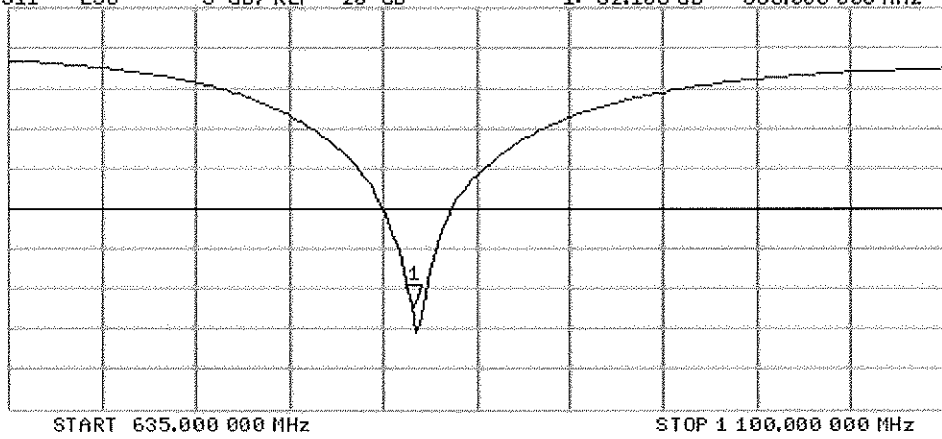
20 Apr 2012 09:34:14
[CH1] S11 1 U FS 1: 51.279 Ω -2.1582 Ω 88.316 μF 835.000 000 MHz

*
Del
Cor
Avg
16
H1 d



CH2 S11 LOG 5 dB/REF -20 dB 1: -32.106 dB 835.000 000 MHz

Cor
Avg
16
H1 d



DASY5 Validation Report for Body TSL

Date: 19.04.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 54.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

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

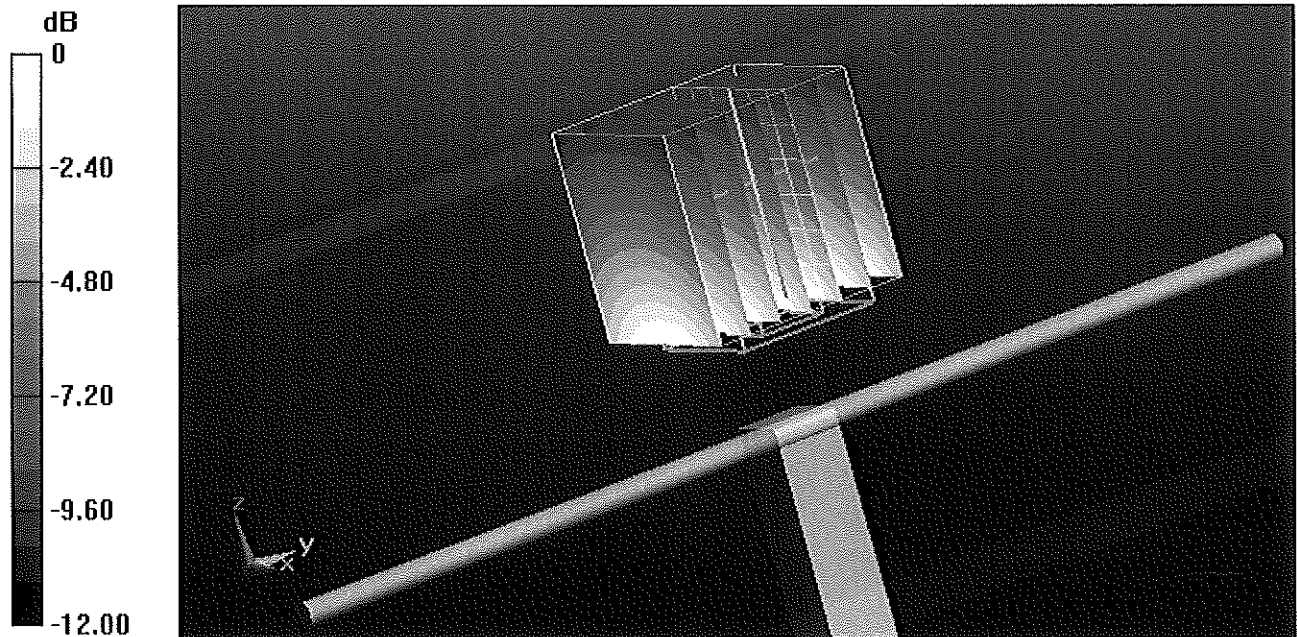
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.253 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.571 mW/g

SAR(1 g) = 2.47 mW/g; SAR(10 g) = 1.62 mW/g

Maximum value of SAR (measured) = 2.87 mW/g



Impedance Measurement Plot for Body TSL

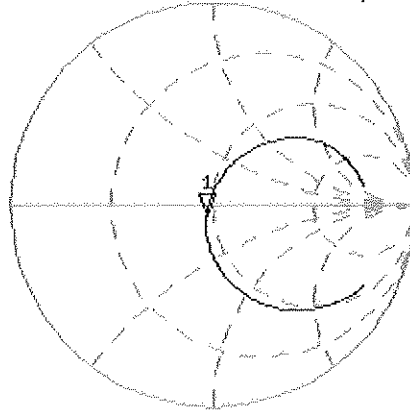
19 Apr 2012 10:20:53
[CH1] S11 1 U FS 1: 46.836 Ω -4.3203 Ω 44.118 μF 835.000 000 MHz

*
De1

Cor

Avg
16

H1 d

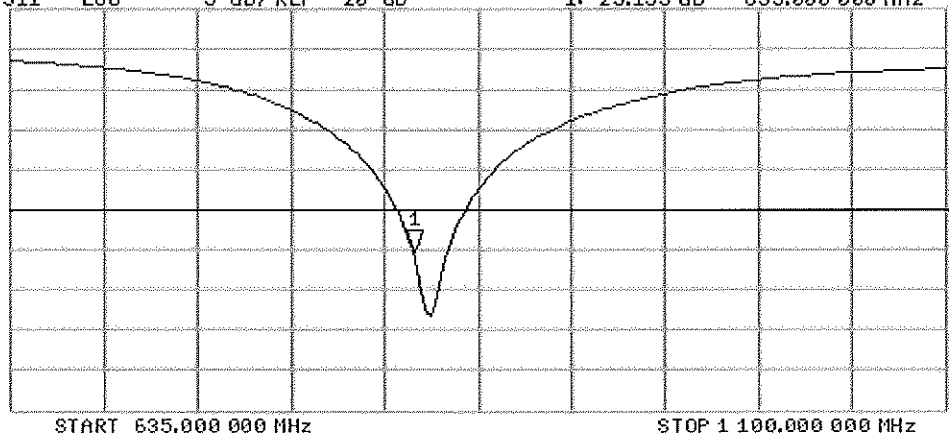


CH2 S11 LOG 5 dB/REF -20 dB 1:-25.155 dB 835.000 000 MHz

Cor

AVG
16

H1 d





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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **D1900V2-5d149_Feb12**

CALIBRATION CERTIFICATE

Object: **D1900V2 - SN: 5d149**

Calibration procedure(s): **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **February 22, 2012**

*✓ KOK
4/11/12*

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by: **Israe El-Naouq** (Name), **Laboratory Technician** (Function), *Israe El-Naouq* (Signature)

Approved by: **Katja Pokovic** (Name), **Technical Manager** (Function), *Katja Pokovic* (Signature)

Issued: February 23, 2012

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



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

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	40.4 \pm 6 %	1.40 mho/m \pm 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.80 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	39.3 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.7 mW / g \pm 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	53.0 \pm 6 %	1.56 mho/m \pm 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	39.3 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.23 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.7 mW / g \pm 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.4 Ω + 5.5 j Ω
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω + 6.7 j Ω
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 11, 2011

DASY5 Validation Report for Head TSL

Date: 22.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d149

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 40.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

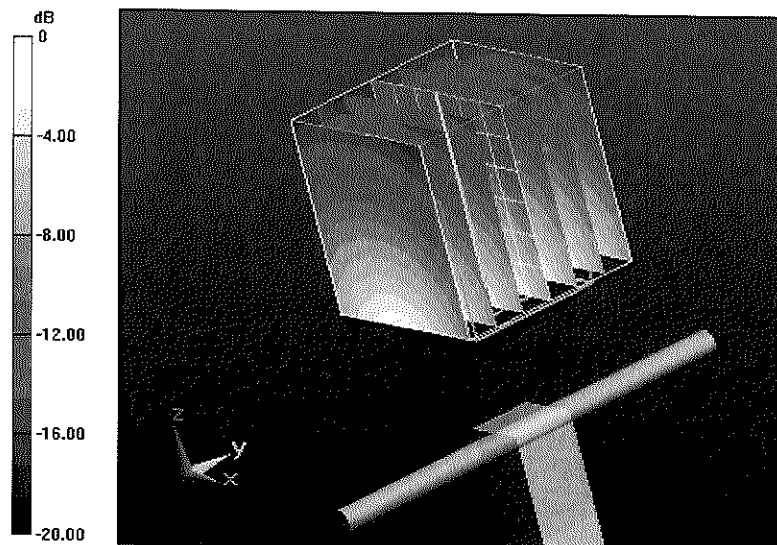
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.685 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.4710

SAR(1 g) = 9.8 mW/g; SAR(10 g) = 5.18 mW/g

Maximum value of SAR (measured) = 12.114 mW/g



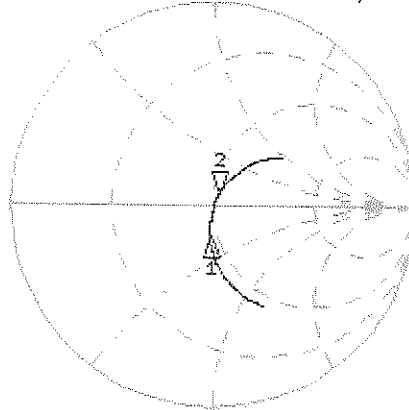
0 dB = 12.110mW/g = 21.66 dB mW/g

Impedance Measurement Plot for Head TSL

22 Feb 2012 09:56:56

CH1 S11 1 U FS 2: 52.387 Ω 5.5859 Ω 461.20 μ H 1 900.000 000 MHz

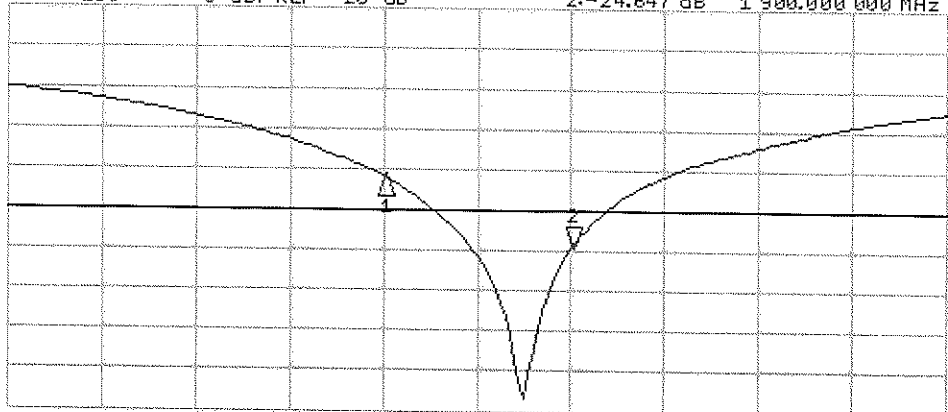
*
Del
Cor
Avg
16
H1 d



CH1 Markers
1: 46.287 Ω
-15.180 Ω
1.00000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 2: -24.647 dB 1 900.000 000 MHz

Cor
Avg
16
H1 d



CH2 Markers
1: -15.901 dB
1.00000 GHz

DASY5 Validation Report for Body TSL

Date: 06.02.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d149

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 53$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

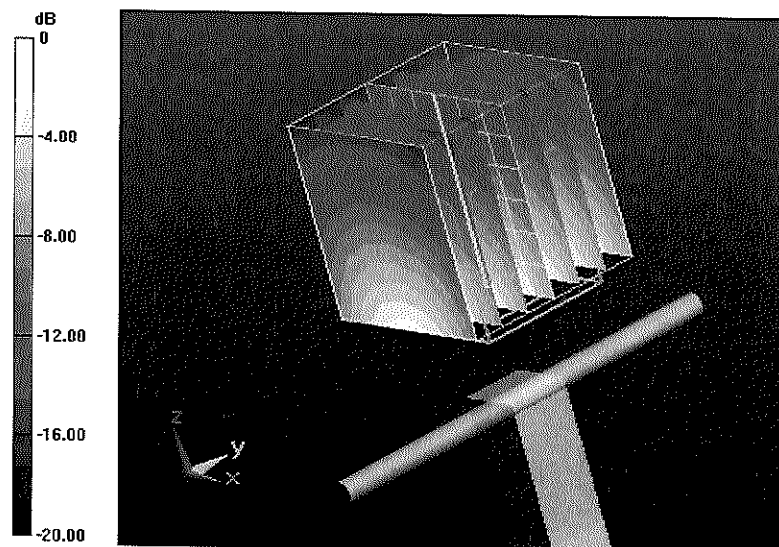
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.047 V/m; Power Drift = 0.0017 dB

Peak SAR (extrapolated) = 18.1310

SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.23 mW/g

Maximum value of SAR (measured) = 12.672 mW/g



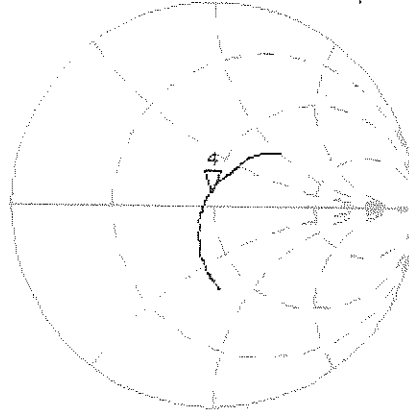
0 dB = 12.670mW/g = 22.06 dB mW/g

Impedance Measurement Plot for Body TSL

6 Feb 2012 12:15:29

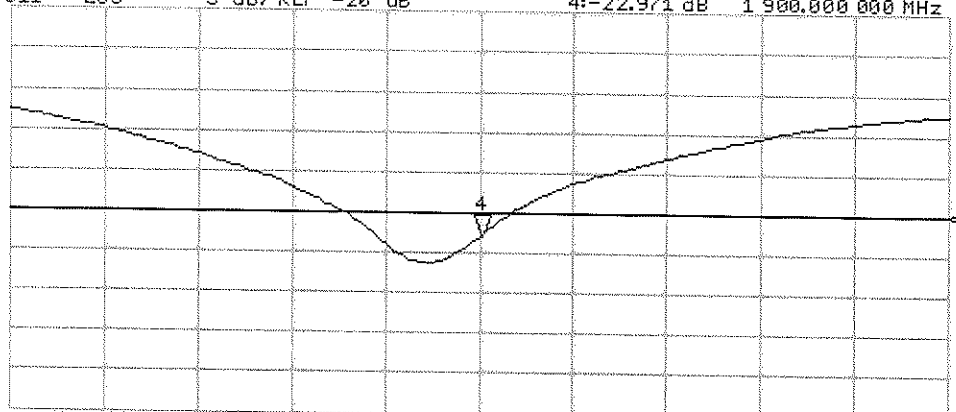
CH1 S11 1 U FS 4: 47.961 Ω 6.8680 Ω 558.55 μ H 1 900.000 000 MHz

*
Del
Ca
Avg
15
H1 d



CH2 S11 LOG 5 dB/REF -20 dB 4:-22.971 dB 1 900.000 000 MHz

Ca
Avg
15
H1 d



START 1 700.000 000 MHz

STOP 2 1 000.000 000 MHz



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D2450V2-797_Jan12**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 797**

Calibration procedure(s) **QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **January 24, 2012**

*✓ KOK
2/6/2012*

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Israe El-Naouq	Function Laboratory Technician	Signature <i>Israe El-Naouq</i>
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature <i>Katja Pokovic</i>

Issued: January 24, 2012

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



The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	52.1 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.12 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.3 mW / g ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.6 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	50.8 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.01 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	23.7 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.0 Ω + 4.7 j Ω
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.1 Ω + 5.4 j Ω
Return Loss	- 25.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2006

DASY5 Validation Report for Head TSL

Date: 24.01.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

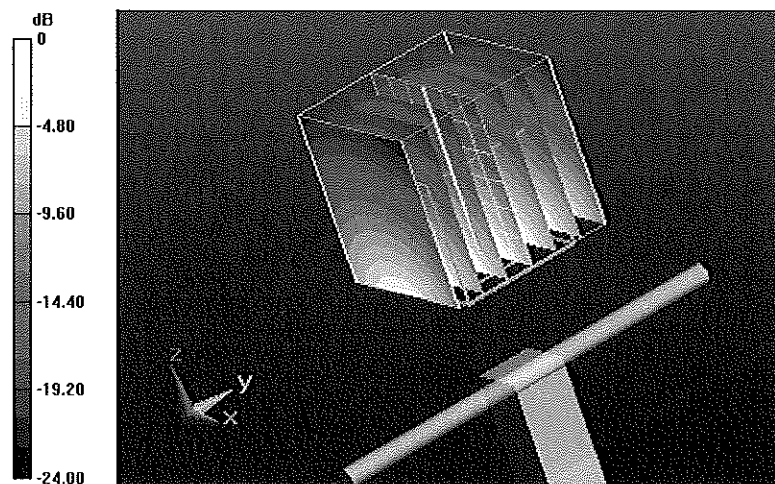
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.248 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 27.3550

SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.12 mW/g

Maximum value of SAR (measured) = 17.017 mW/g



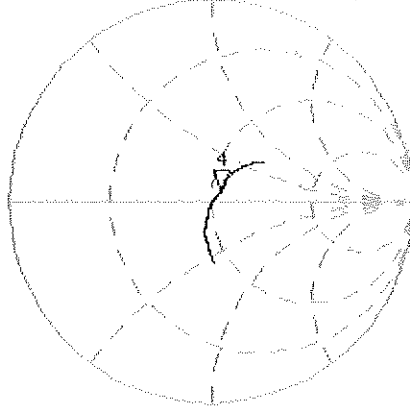
0 dB = 17.020mW/g = 24.62 dB mW/g

Impedance Measurement Plot for Head TSL

24 Jan 2012 11:11:23

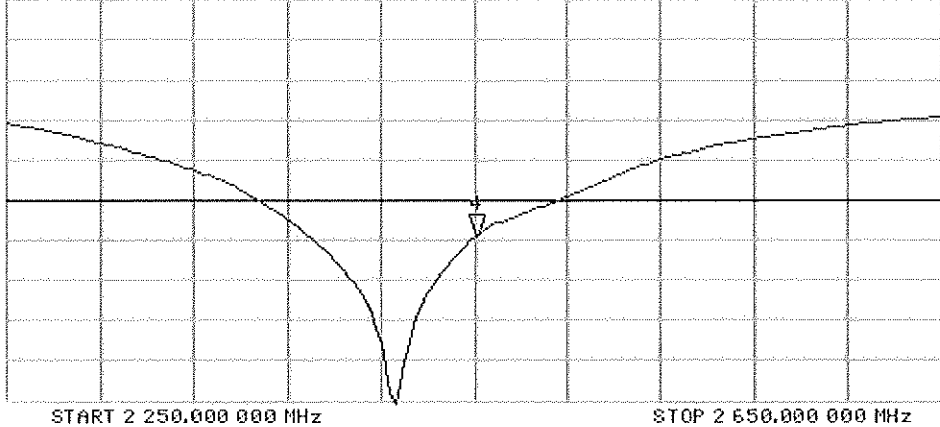
[CH1] S11 1 U FS 4:53.992 n 4:6563 n 382.40 pH 2 450.000 000 MHz

*
De1
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 4:-24.593 dB 2 450.000 000 MHz

CA
Avg
16
H1d



DASY5 Validation Report for Body TSL

Date: 23.01.2012

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.01$ mho/m; $\epsilon_r = 50.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

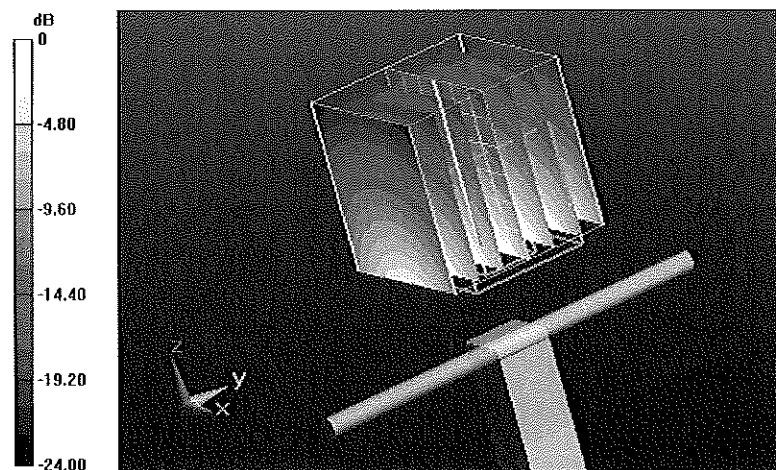
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.727 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 26.9680

SAR(1 g) = 13 mW/g; SAR(10 g) = 6.01 mW/g

Maximum value of SAR (measured) = 17.222 mW/g



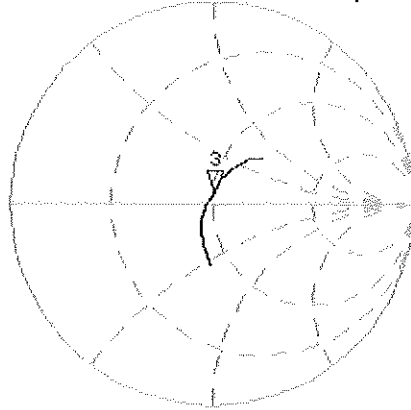
0 dB = 17.220mW/g = 24.72 dB mW/g

Impedance Measurement Plot for Body TSL

23 Jan 2012 11:15:12

[CH2] S11 1 U FS 3: 50.423 A 5.4316 A 352.05 μ H 2 450.000 000 MHz

*
De1
CA



Avg
16

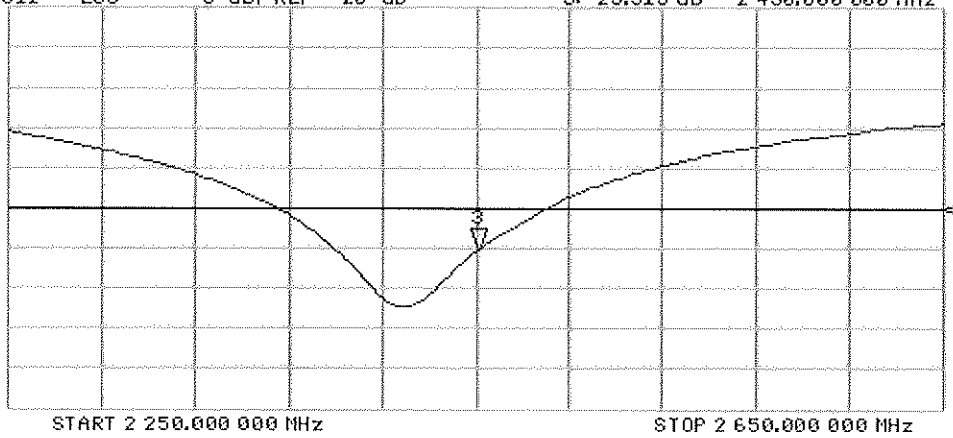
H1d

CH2 S11 LOG 5 dB/REF -20 dB 3:-25.315 dB 2 450.000 000 MHz

CA

Avg
16

H1d





Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Client **PC Test**

Certificate No: **D5GHzV2-1057_Jan12**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1057**

Calibration procedure(s) **QA CAL-22.v1
Calibration procedure for dipole validation kits between 3-6 GHz**

Calibration date: **January 19, 2012**

*✓KOK
2/6/12*

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe EX3DV4	SN: 3503	30-Dec-11 (No. EX3-3503_Dec11)	Dec-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	<i>[Signature]</i>

	Name	Technical Manager	Signature
Approved by:	Katja Pokovic		<i>[Signature]</i>

Issued: January 19, 2012

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.3 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.90 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	79.1 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.6 mW / g ± 16.5 % (k=2)

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.49 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	84.9 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.42 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.2 mW / g ± 16.5 % (k=2)

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	5.22 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.95 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	79.5 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.6 mW / g ± 16.5 % (k=2)

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	49.2 ± 6 %	5.46 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.33 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	73.4 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.05 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.6 mW / g ± 17.6 % (k=2)

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.7 ± 6 %	5.86 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.87 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	78.9 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.19 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.9 mW / g ± 17.6 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.2 ± 6 %	6.28 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.42 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	74.3 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.06 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.6 mW / g ± 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.6 Ω - 8.0 j Ω
Return Loss	- 21.9 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	51.5 Ω - 3.8 j Ω
Return Loss	- 27.8 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	52.4 Ω - 3.9 j Ω
Return Loss	- 27.0 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.6 Ω - 5.7 j Ω
Return Loss	- 24.9 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	49.9 Ω - 2.7 j Ω
Return Loss	- 31.4 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	48.1 Ω - 3.3 j Ω
Return Loss	- 28.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns
----------------------------------	----------

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

DASY5 Validation Report for Head TSL

Date: 19.01.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1057

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: $f = 5200$ MHz; $\sigma = 4.6$ mho/m; $\epsilon_r = 36.3$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 4.9$ mho/m; $\epsilon_r = 35.8$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 5.22$ mho/m; $\epsilon_r = 35.3$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 63.590 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 29.4530

SAR(1 g) = 7.9 mW/g; SAR(10 g) = 2.26 mW/g

Maximum value of SAR (measured) = 18.158 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 64.129 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.6870

SAR(1 g) = 8.49 mW/g; SAR(10 g) = 2.42 mW/g

Maximum value of SAR (measured) = 20.088 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:

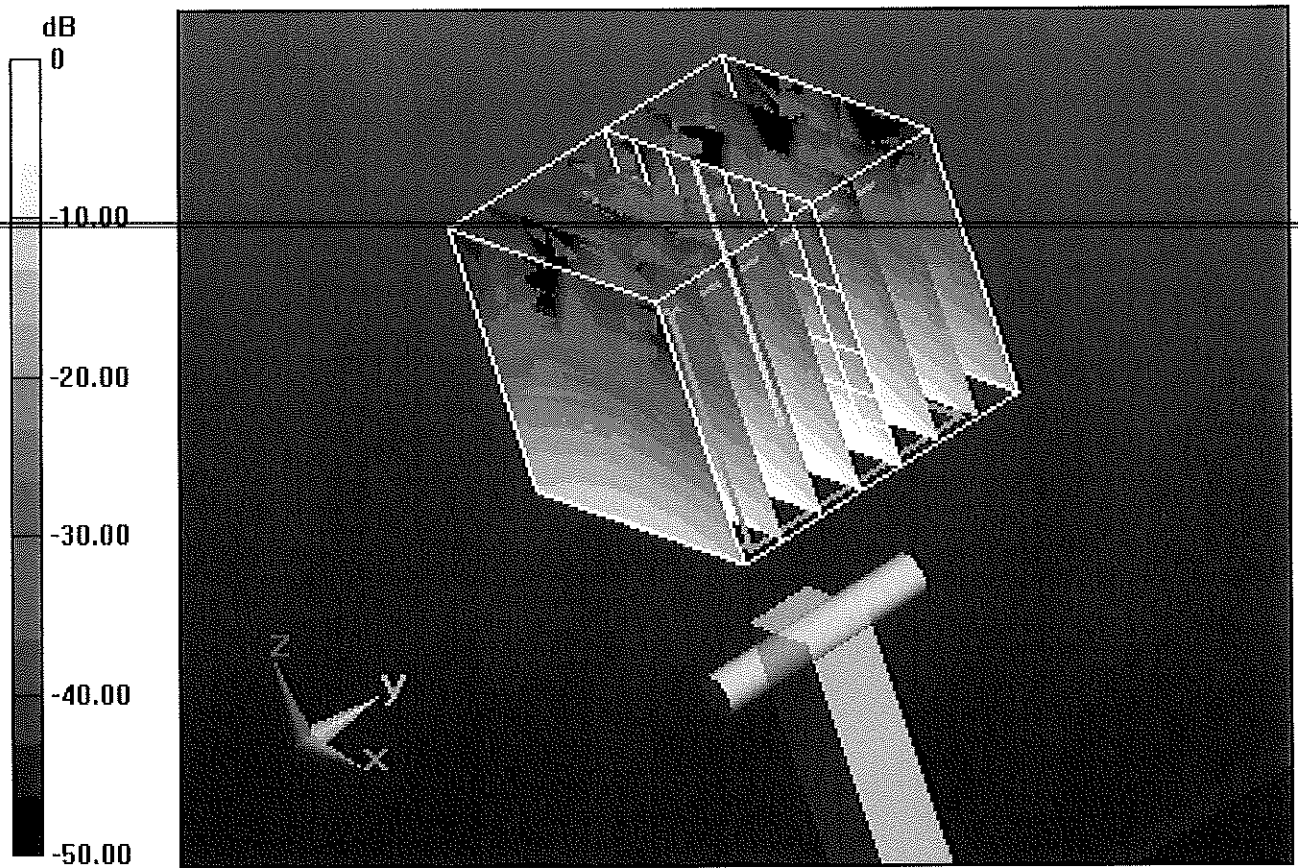
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 60.728 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.3080

SAR(1 g) = 7.95 mW/g; SAR(10 g) = 2.26 mW/g

Maximum value of SAR (measured) = 19.277 mW/g



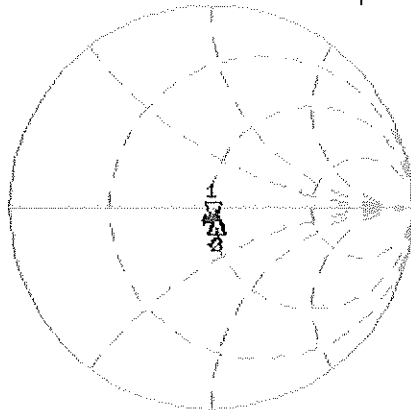
0 dB = 19.280mW/g = 25.70 dB mW/g

Impedance Measurement Plot for Head TSL

19 Jan 2012 10:41:39

[CH1] S11 4 U EG 1: 49.551 Ω 0.0020 Ω 3.9249 pF 5.200.000.000 MHz

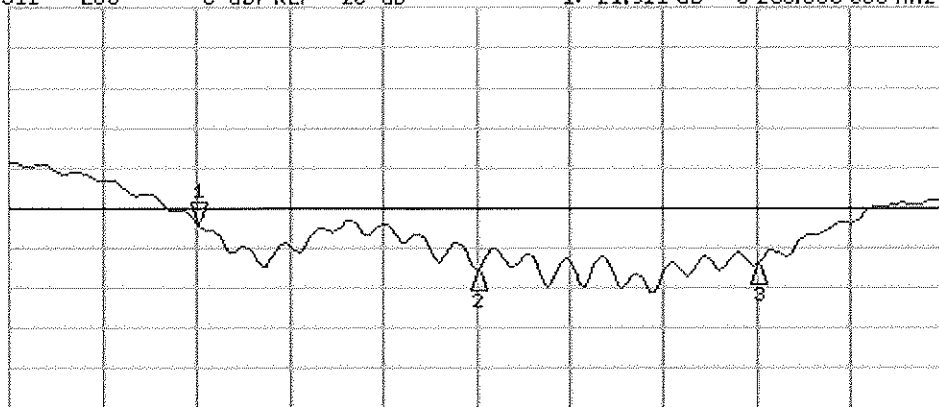
*
De1
Cor
Avg
16
H1 d



CH1 Markers
2: 51.461 Ω
-3.8457 Ω
5.50000 GHz
3: 52.420 Ω
-3.9121 Ω
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1: -21.911 dB 5.200.000.000 MHz

Cor
Avg
16
H1 d



CH2 Markers
2: -27.845 dB
5.50000 GHz
3: -26.962 dB
5.80000 GHz

START 5.000.000.000 MHz

STOP 6.000.000.000 MHz

DASY5 Validation Report for Body TSL

Date: 18.01.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1057

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: $f = 5200$ MHz; $\sigma = 5.46$ mho/m; $\epsilon_r = 49.2$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 5.86$ mho/m; $\epsilon_r = 48.7$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 6.28$ mho/m; $\epsilon_r = 48.2$; $\rho = 1000$ kg/m³
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.280 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 28.9110

SAR(1 g) = 7.33 mW/g; SAR(10 g) = 2.05 mW/g

Maximum value of SAR (measured) = 17.276 mW/g

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.884 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 33.5680

SAR(1 g) = 7.87 mW/g; SAR(10 g) = 2.19 mW/g

Maximum value of SAR (measured) = 19.055 mW/g

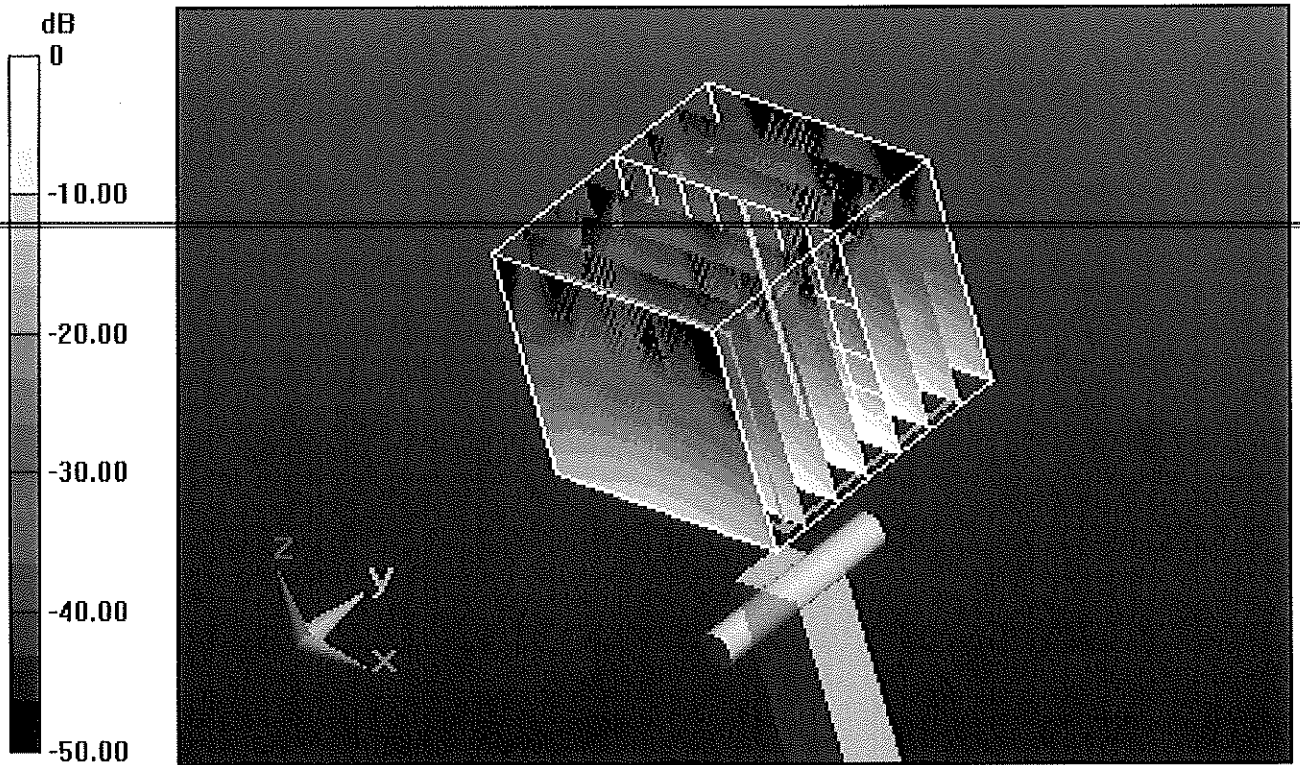
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 54.430 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 34.4850

SAR(1 g) = 7.42 mW/g; SAR(10 g) = 2.06 mW/g

Maximum value of SAR (measured) = 18.495 mW/g

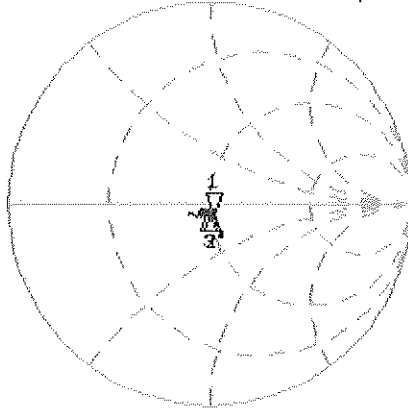


Impedance Measurement Plot for Body TSL

18 Jan 2012 11:08:23

[CH1] S11 1 U FS 1: 50.562 Ω - 5.2162 Ω 5.3538 pF 5.200.000.000 MHz

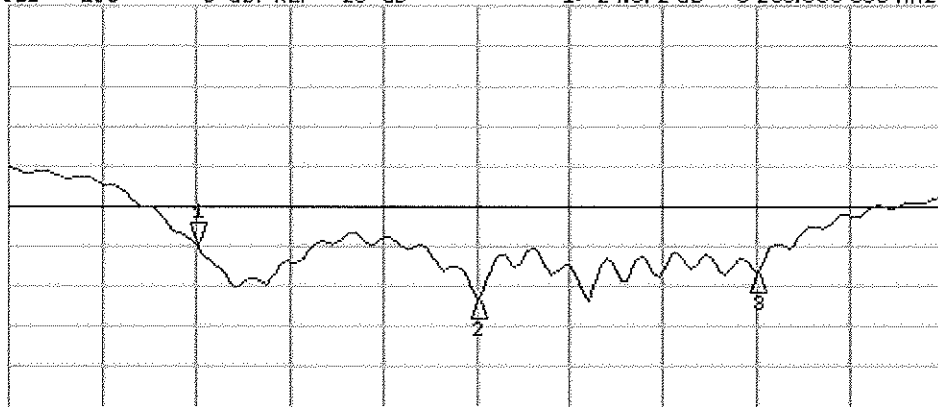
Del
Cor
Avg
16
H1d



CH1 Markers
2: 49.947 Ω
-2.6934 Ω
5.50000 GHz
3: 48.137 Ω
-3.3438 Ω
5.80000 GHz

CH2 S11 LOG 5 dB/REF -20 dB 1:-24.872 dB 5.200.000.000 MHz

Cor
Avg
16
H1d



CH2 Markers
2:-31.393 dB
5.50000 GHz
3:-28.173 dB
5.80000 GHz

START 5.000.000.000 MHz

STOP 6.000.000.000 MHz



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No: **ES3-3258_Feb12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3258**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 21, 2012**

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

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

Calibration Equipment used (M&TE critical for calibration)

*KOK
2/27/12*

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 23, 2012

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



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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A, B, C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3258

Manufactured: January 25, 2010
Calibrated: February 21, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.29	1.18	1.23	$\pm 10.1 \%$
DCP (mV) ^B	101.6	105.0	100.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	115.9	$\pm 3.0 \%$
			Y	0.00	0.00	1.00	107.9	
			Z	0.00	0.00	1.00	115.8	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.26	6.26	6.26	0.43	1.49	± 12.0 %
835	41.5	0.90	6.01	6.01	6.01	0.45	1.48	± 12.0 %
1640	40.3	1.29	5.46	5.46	5.46	0.61	1.30	± 12.0 %
1750	40.1	1.37	5.30	5.30	5.30	0.67	1.30	± 12.0 %
1900	40.0	1.40	5.17	5.17	5.17	0.79	1.23	± 12.0 %
2450	39.2	1.80	4.46	4.46	4.46	0.67	1.40	± 12.0 %
2600	39.0	1.96	4.31	4.31	4.31	0.80	1.33	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258

Calibration Parameter Determined in Body Tissue Simulating Media

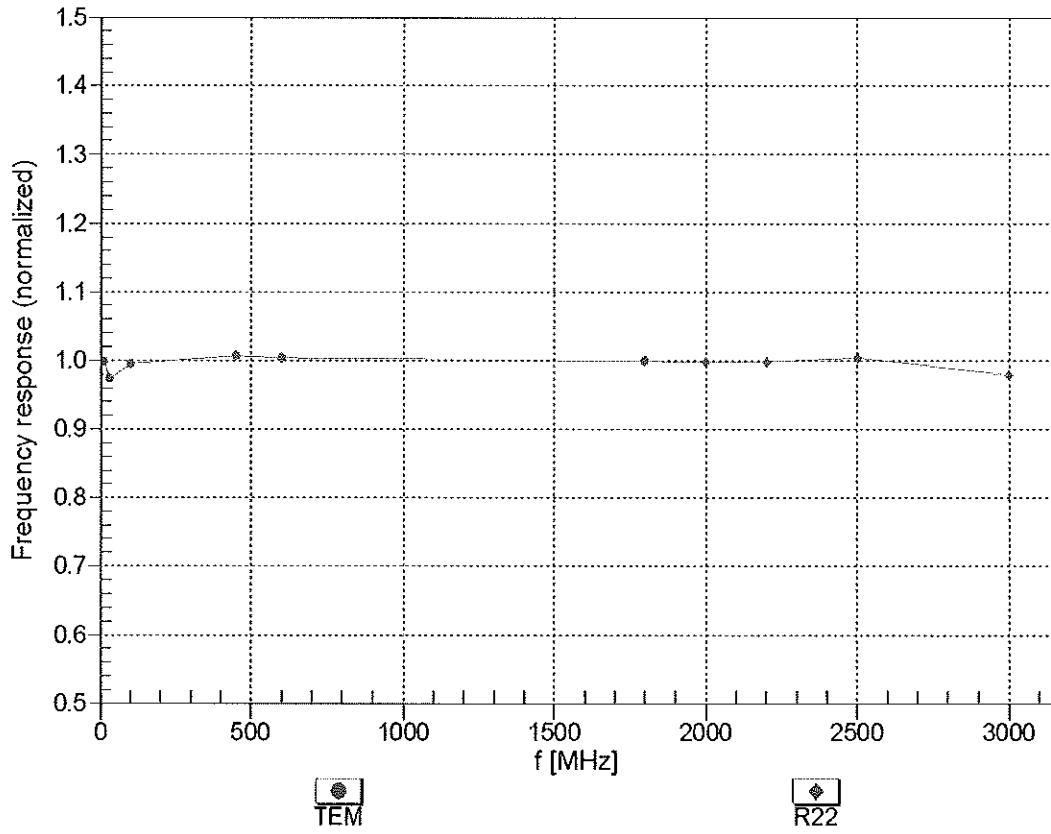
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.21	6.21	6.21	0.80	1.13	± 12.0 %
835	55.2	0.97	6.06	6.06	6.06	0.50	1.46	± 12.0 %
1640	53.8	1.40	5.45	5.45	5.45	0.80	1.23	± 12.0 %
1750	53.4	1.49	4.99	4.99	4.99	0.60	1.48	± 12.0 %
1900	53.3	1.52	4.70	4.70	4.70	0.56	1.57	± 12.0 %
2450	52.7	1.95	4.28	4.28	4.28	0.80	1.08	± 12.0 %
2600	52.5	2.16	4.05	4.05	4.05	0.80	1.02	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

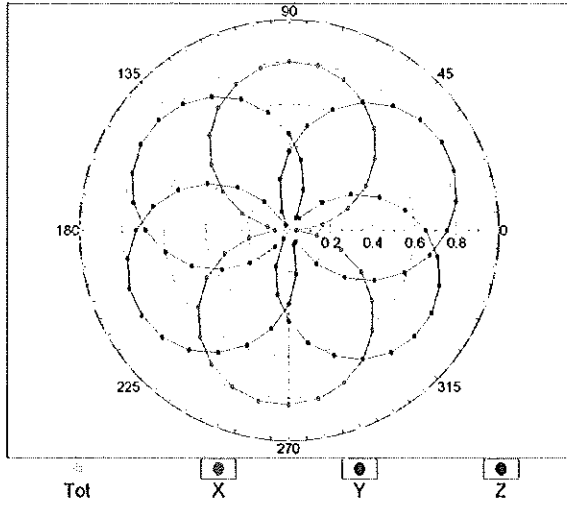
(TEM-Cell:ifi110 EXX, Waveguide: R22)



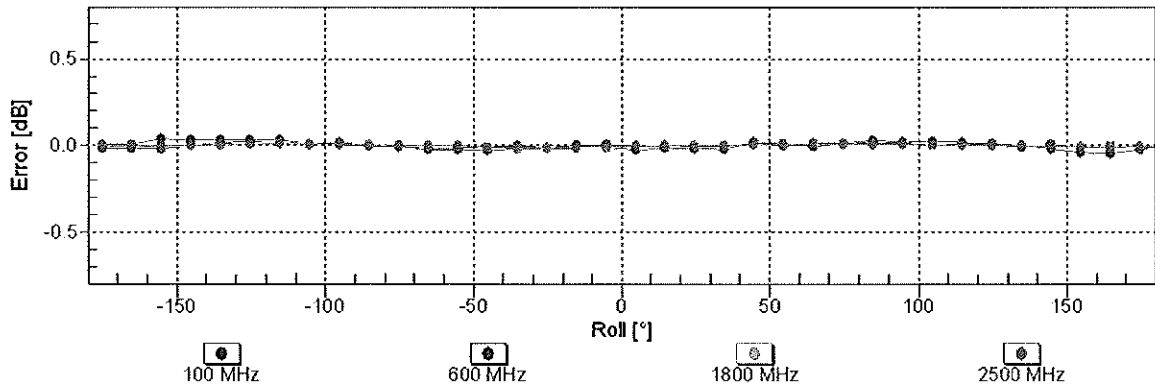
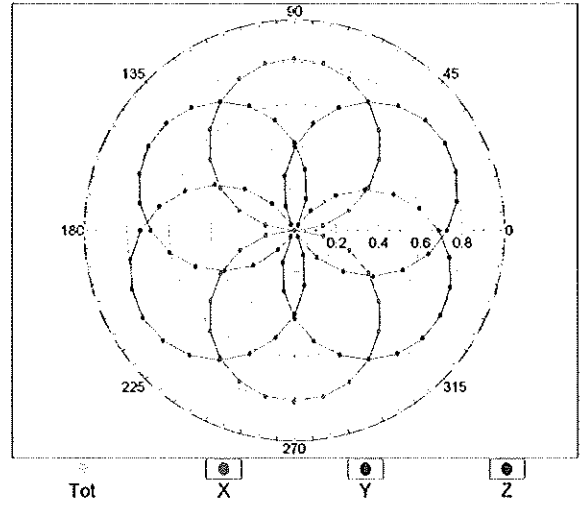
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

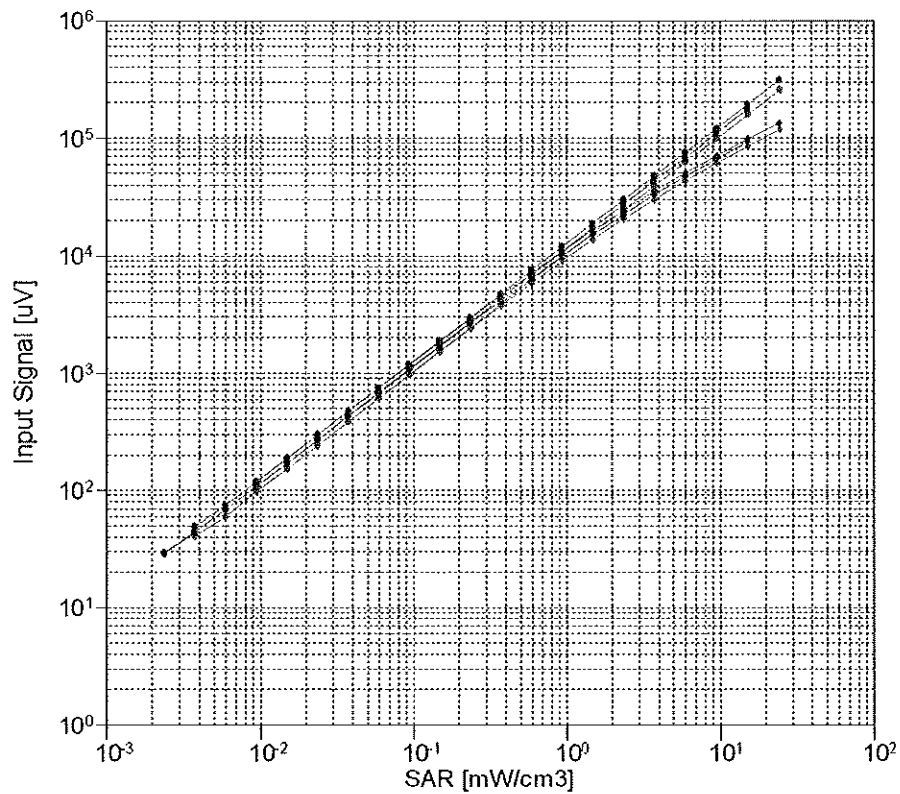


f=1800 MHz,R22

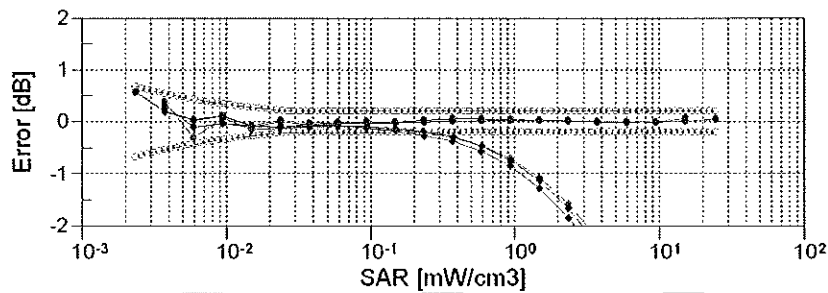


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(SAR_{head})$ (TEM cell , $f = 900$ MHz)



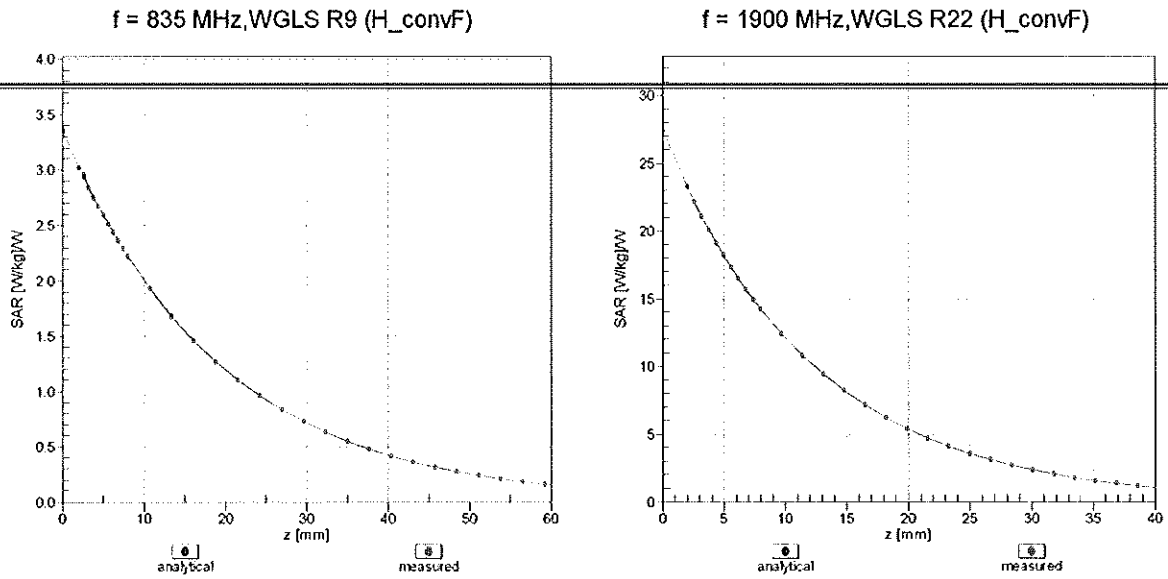
X compensated	X not compensated	Y compensated
Y not compensated	Z compensated	Z not compensated



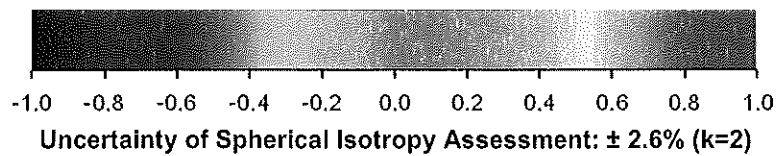
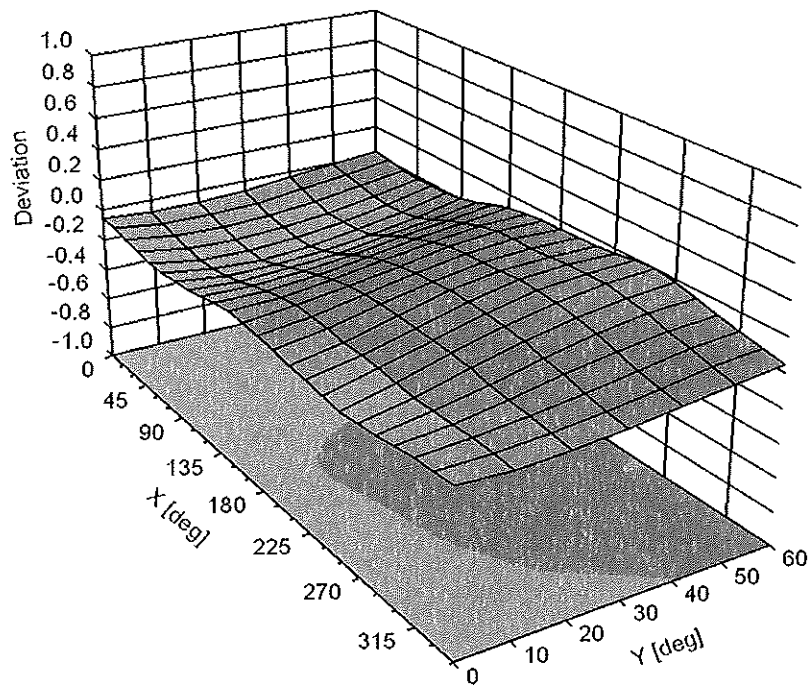
X compensated	X not compensated	Y compensated
Y not compensated	Z compensated	Z not compensated

Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3258**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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

Accreditation No.: **SCS 108**

Client **PC Test**

Certificate No.: **ES3-3288_Feb12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3288**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
 Calibration procedure for dosimetric E-field probes**

Calibration date: **February 7, 2012**

✓
FOK
 4/11/12

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrioti	Laboratory Technician	<i>[Signature]</i>
Approved by:	Katja Pokovic	Technical Manager	<i>[Signature]</i>

Issued: February 7, 2012

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



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

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- **NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- **DCP_{x,y,z}:** DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- **PAR:** PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}:** A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- **ConvF and Boundary Effect Parameters:** Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- **Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- **Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3288

Manufactured: July 6, 2010
Calibrated: February 7, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.87	0.96	0.75	$\pm 10.1 \%$
DCP (mV) ^B	104.3	103.1	103.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	117.5	$\pm 2.7 \%$
			Y	0.00	0.00	1.00	99.3	
			Z	0.00	0.00	1.00	107.8	

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.46	6.46	6.46	0.46	1.42	± 12.0 %
835	41.5	0.90	6.20	6.20	6.20	0.31	1.86	± 12.0 %
1900	40.0	1.40	5.16	5.16	5.16	0.80	1.18	± 12.0 %
2450	39.2	1.80	4.54	4.54	4.54	0.68	1.36	± 12.0 %
2600	39.0	1.96	4.36	4.36	4.36	0.75	1.32	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

Calibration Parameter Determined in Body Tissue Simulating Media

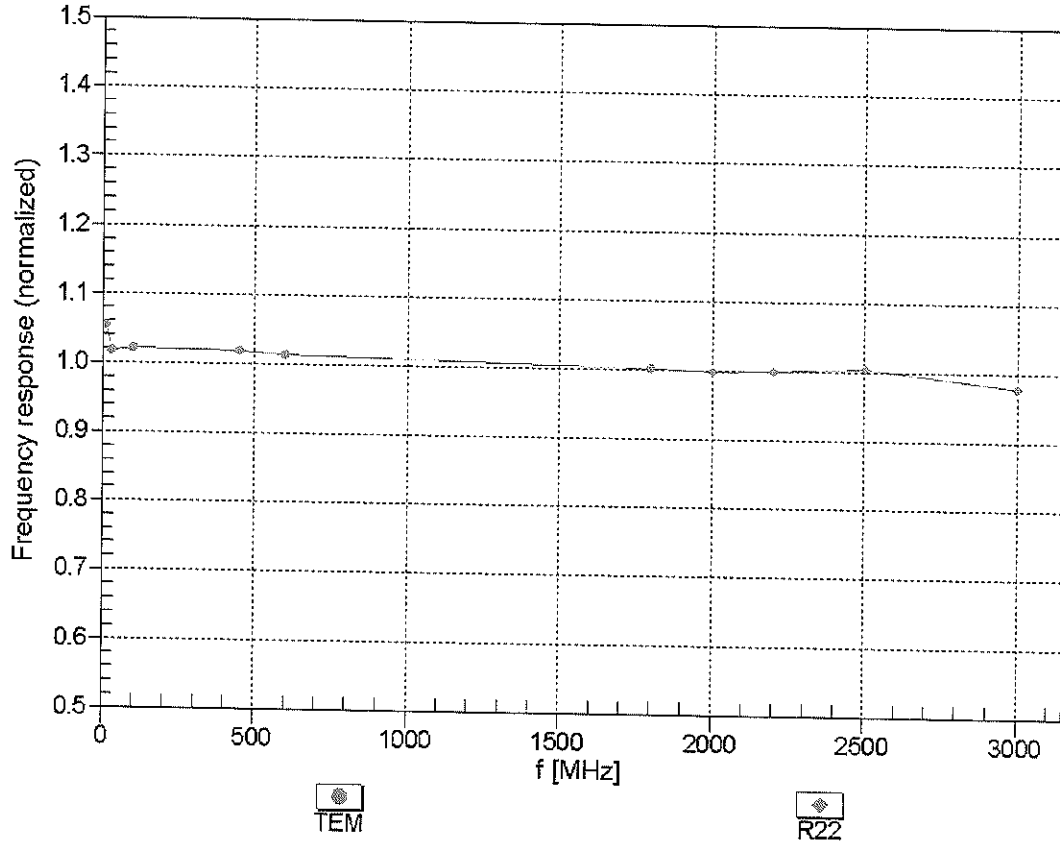
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.34	6.34	6.34	0.70	1.27	± 12.0 %
835	55.2	0.97	6.22	6.22	6.22	0.56	1.40	± 12.0 %
1900	53.3	1.52	5.02	5.02	5.02	0.61	1.54	± 12.0 %
2450	52.7	1.95	4.47	4.47	4.47	0.76	1.08	± 12.0 %
2600	52.5	2.16	4.21	4.21	4.21	0.80	1.04	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

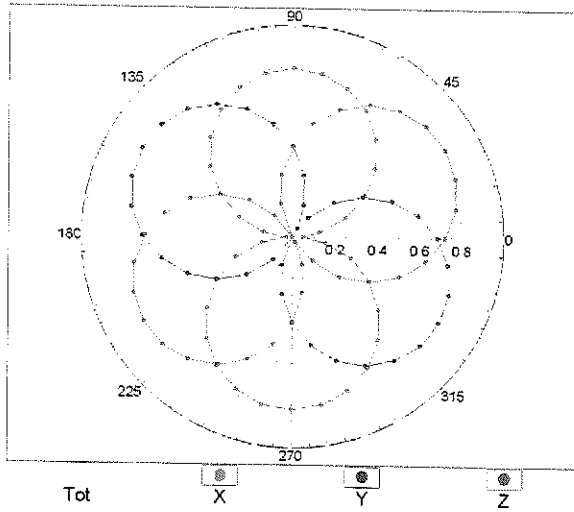
(TEM-Cell:ifi110 EXX, Waveguide: R22)



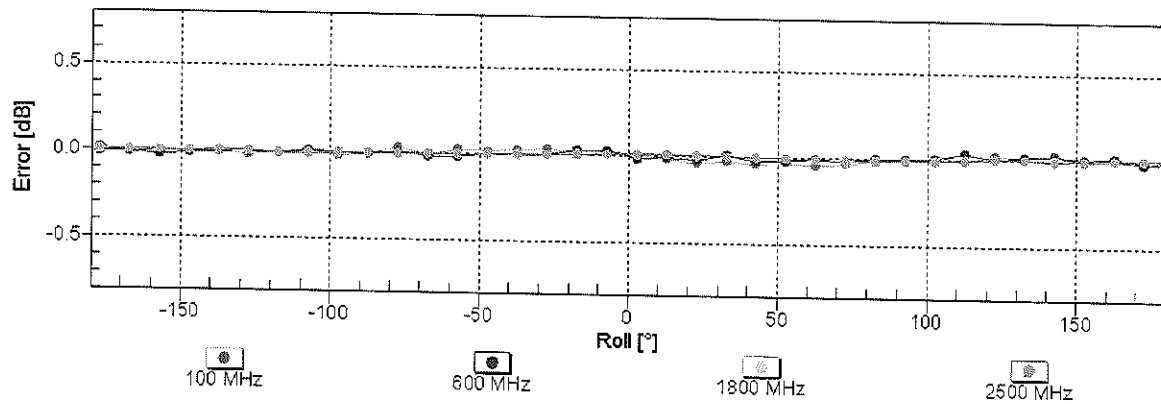
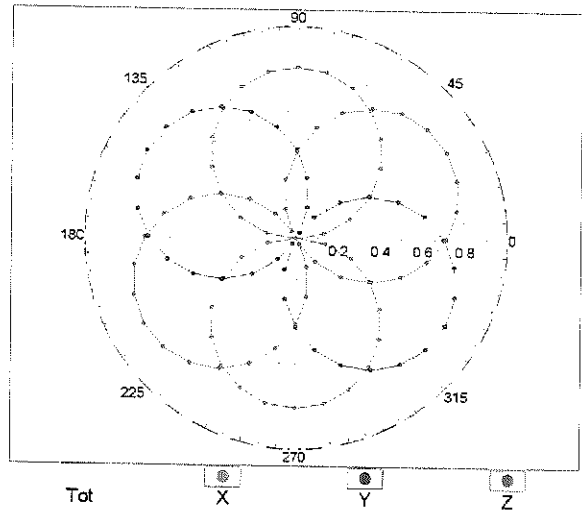
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

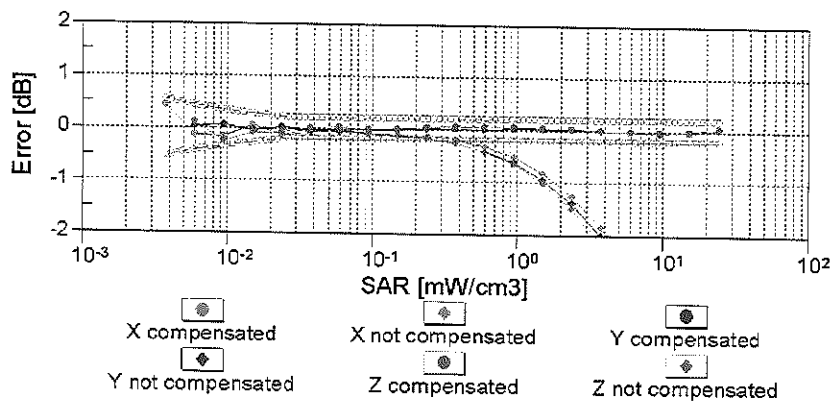
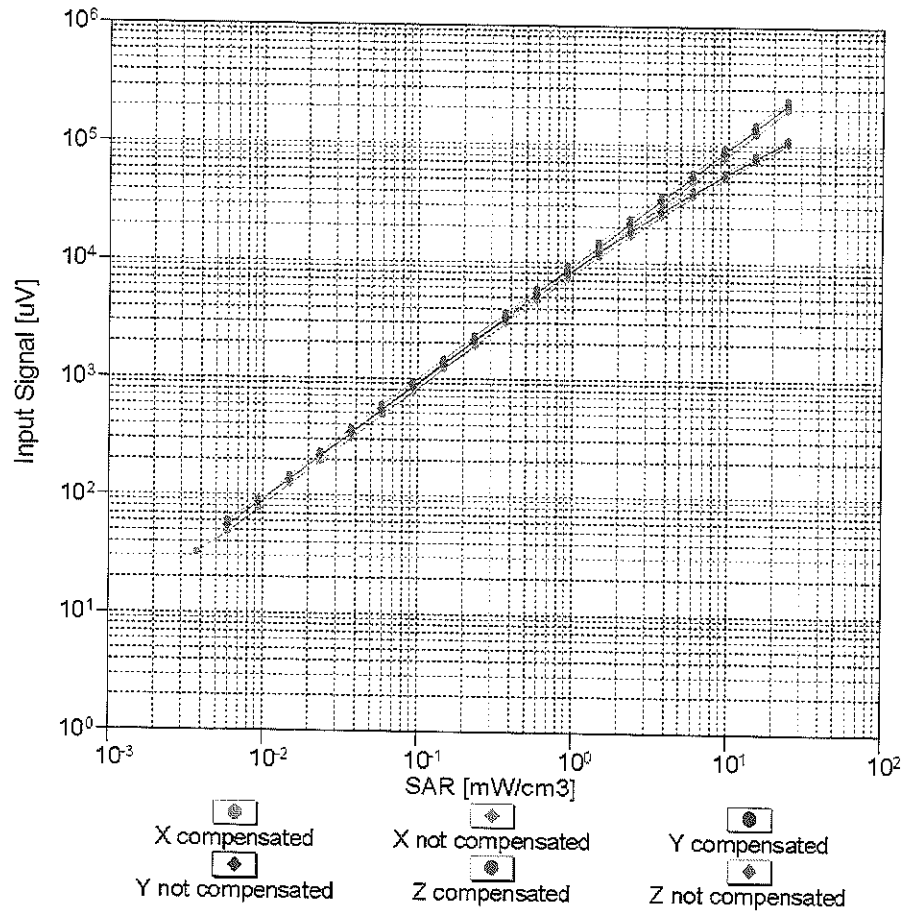


f=1800 MHz,R22



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

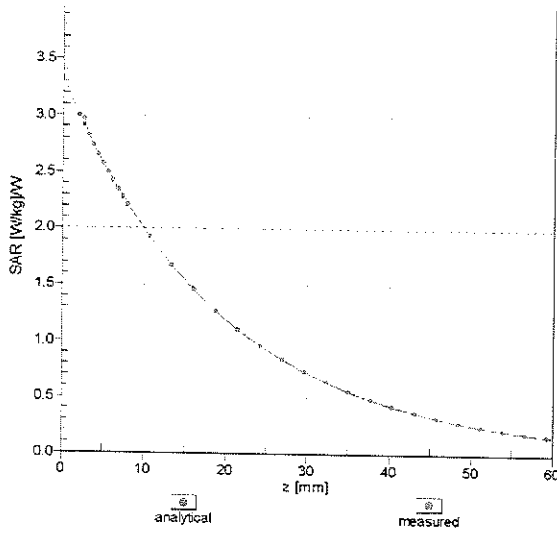
Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)



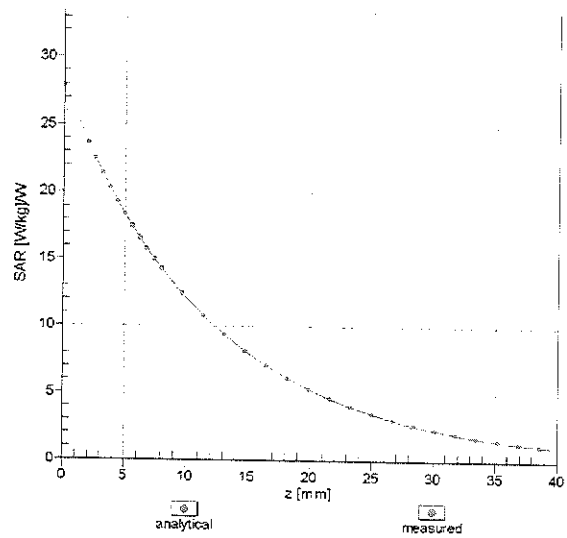
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment

f = 835 MHz, WGLS R9 (H_convF)

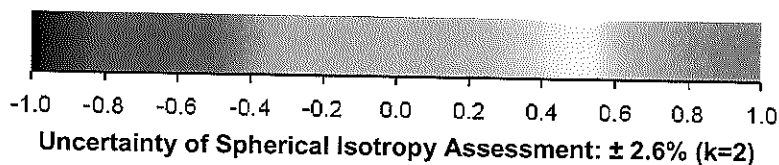
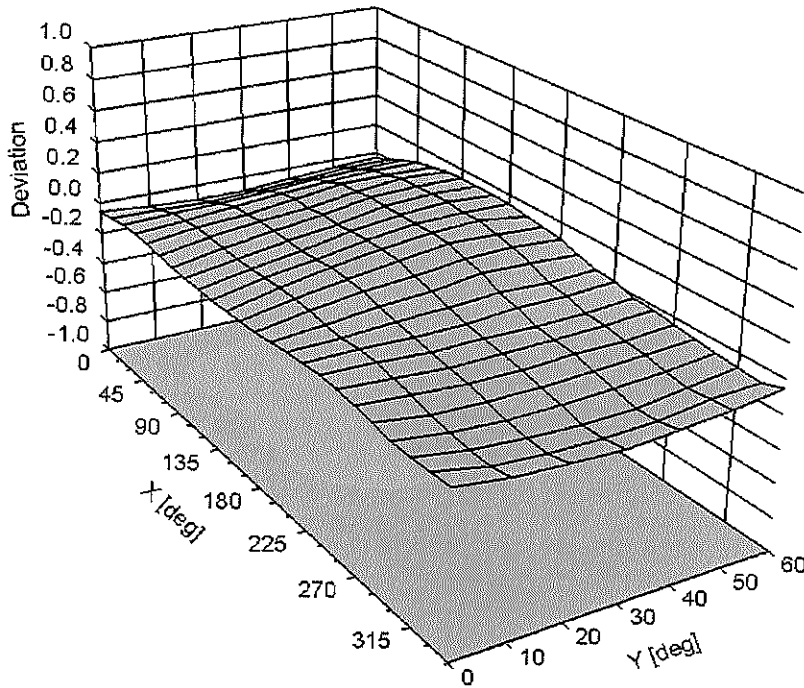


f = 1900 MHz, WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, θ), f = 900 MHz



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3288

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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

Accreditation No.: SCS 108

Client **PC Test**

Certificate No: **EX3-3589 Jan12**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3589**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 27, 2012**

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

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

*✓ KOK
21/1/12*

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature
Approved by:	Name Niels Kuster	Function Quality Manager	Signature

Issued: January 27, 2012

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A, B, C** are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3589

Manufactured: March 30, 2006
Calibrated: January 27, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.46	0.40	0.40	± 10.1 %
DCP (mV) ^B	101.1	102.5	99.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	115.9	±2.7 %
			Y	0.00	0.00	1.00	95.1	
			Z	0.00	0.00	1.00	96.4	

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

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
2600	39.0	1.96	6.56	6.56	6.56	0.45	0.84	± 12.0 %
5200	36.0	4.66	4.59	4.59	4.59	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.36	4.36	4.36	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.33	4.33	4.33	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.04	4.04	4.04	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.05	4.05	4.05	0.45	1.80	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589

Calibration Parameter Determined in Body Tissue Simulating Media

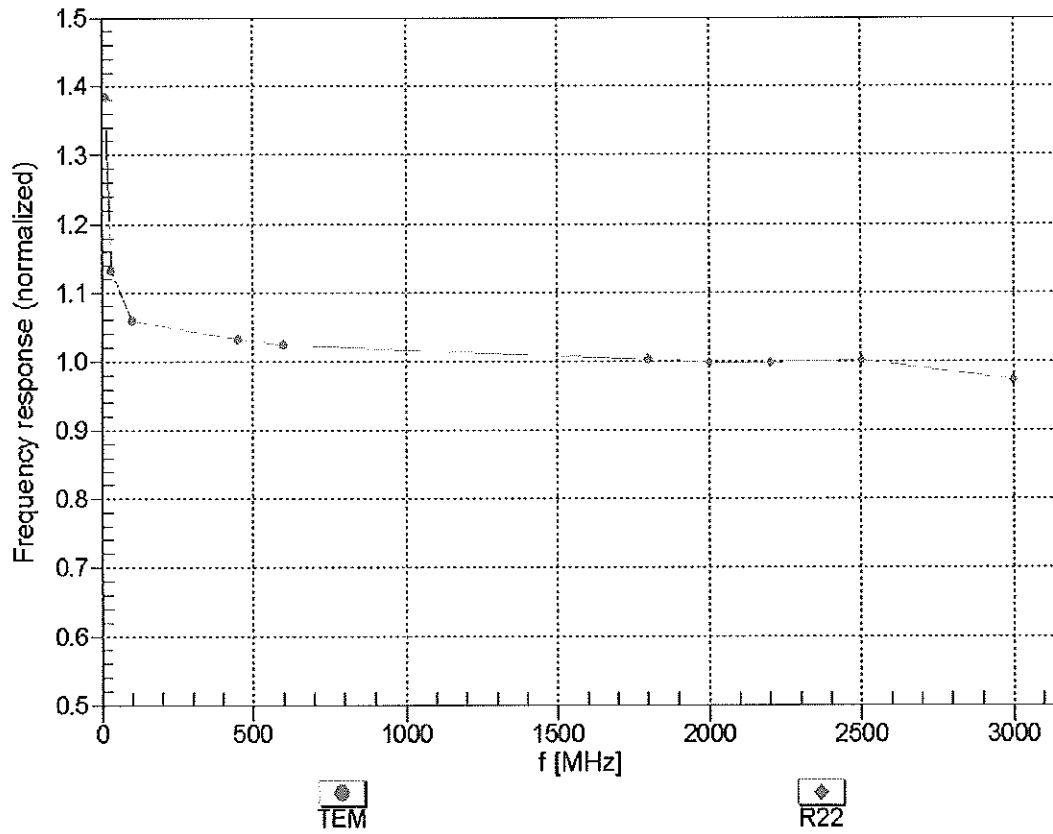
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
2600	52.5	2.16	6.28	6.28	6.28	0.80	0.50	± 12.0 %
5200	49.0	5.30	3.92	3.92	3.92	0.52	1.90	± 13.1 %
5300	48.9	5.42	3.72	3.72	3.72	0.55	1.90	± 13.1 %
5500	48.6	5.65	3.40	3.40	3.40	0.58	1.90	± 13.1 %
5600	48.5	5.77	3.25	3.25	3.25	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.59	3.59	3.59	0.60	1.90	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

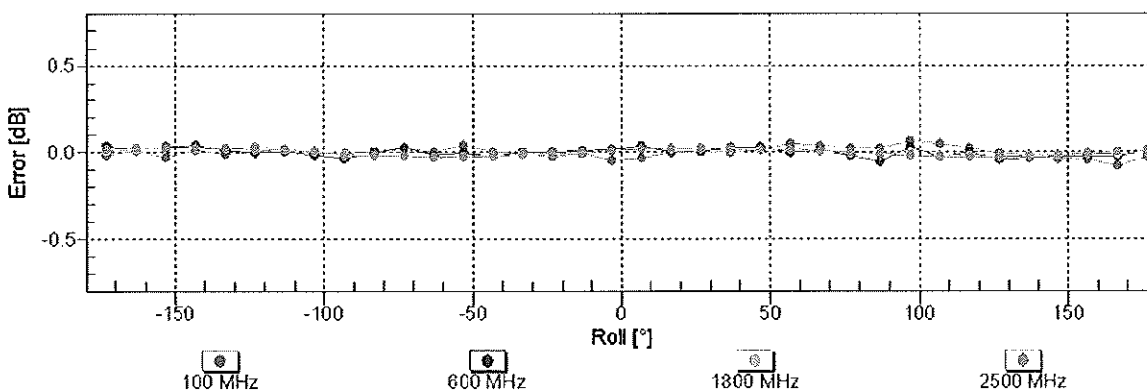
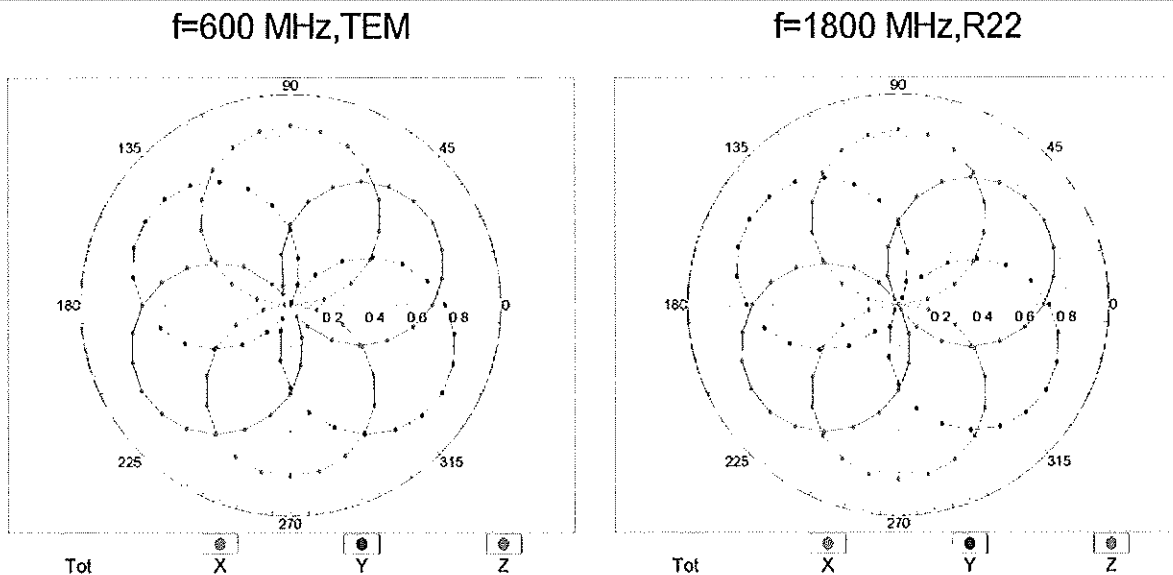
Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



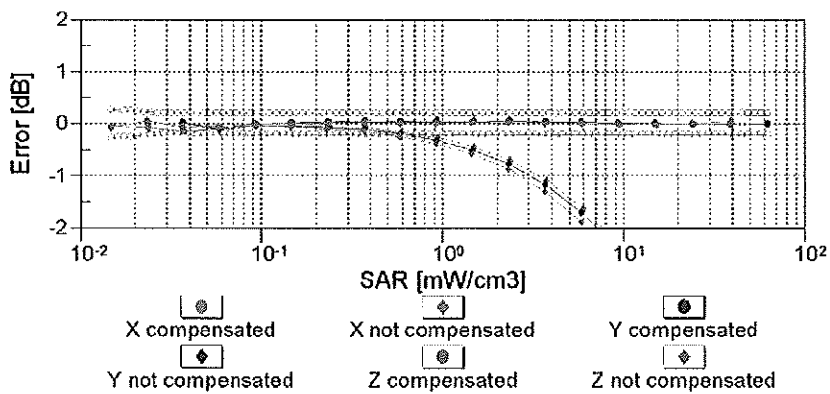
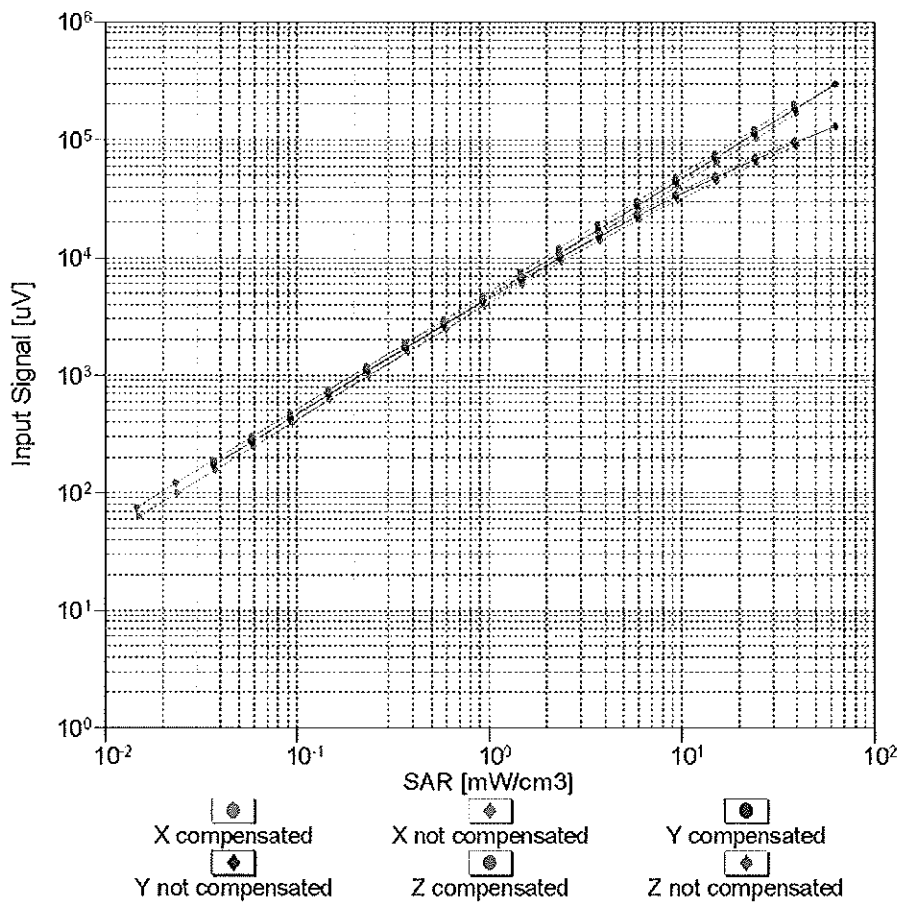
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$



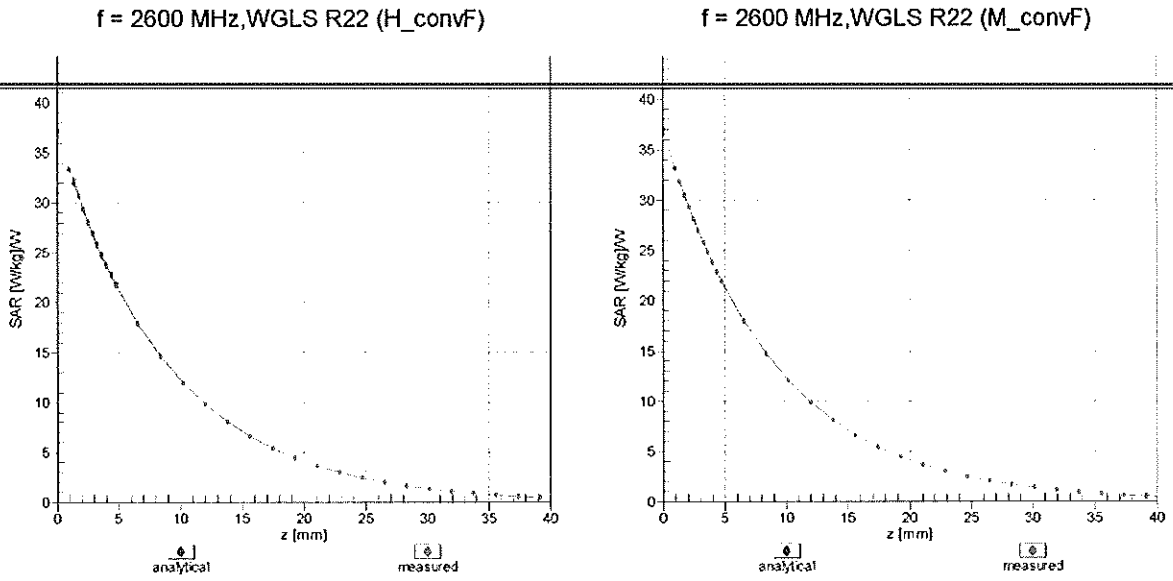
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$)

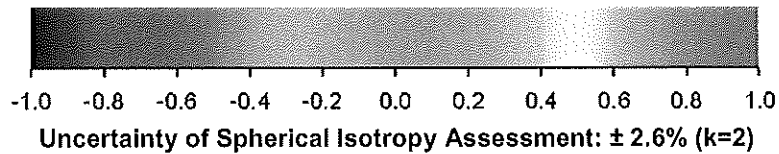
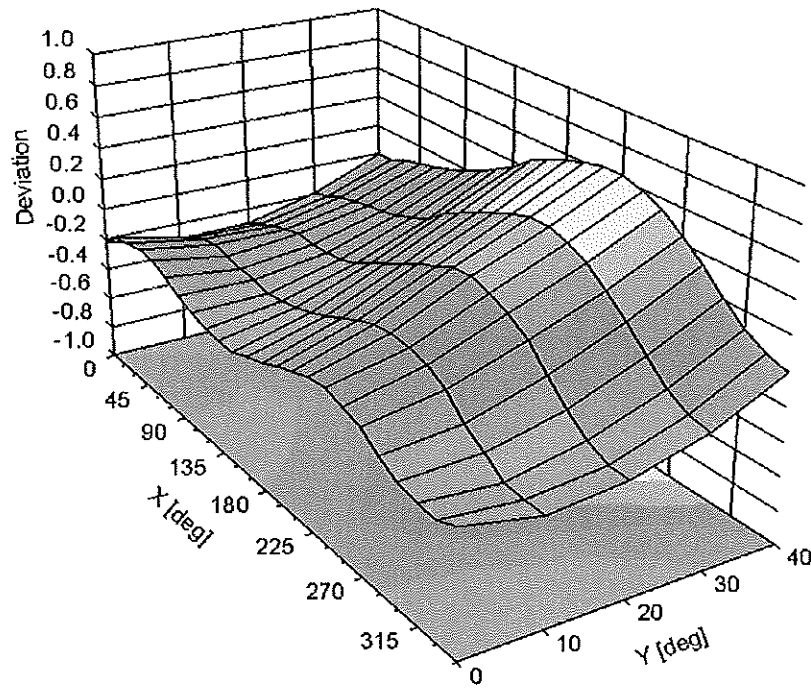


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), f = 900 MHz



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3589**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm